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CH2MHILL

December 15, 2009

371322.DI.DR

Mr. Rod Jones
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814-5512

Subject: Lodi Energy Center (08-AFC-10)
Preliminary Endangerment Assessment Workplan, Preliminary Endangerment Assessment, and Determination of No Further Action for the Lodi Energy Center

Dear Mr. Jones:

Attached please find one original and 12 copies of the following three documents:

- Preliminary Endangerment Assessment Workplan for the Proposed Lodi Energy Center Site;
- Preliminary Endangerment Assessment for the Proposed Lodi Energy Center Site; and
- Determination of No Further Action for the Lodi Energy Site

If you have any questions about this matter, please contact me at (916) 286-0249 or Andrea Grenier at (916) 780-1171.

Sincerely,

CH2M HILL

Sarah Madams
AFC Project Manager

Attachment

cc: A. Grenier
E. Warner/NCPA

Stantec Consulting Corporation
3017 Kilgore Road Suite 100
Rancho Cordova CA 95670
Tel: (916) 861-0400
Fax: (916) 861-0430

August 13, 2009
File: 185702098

Mr. Charles E. Swimley
Public Works Department
City of Lodi
1331 South Ham Lane
Lodi, California 95242

Reference: **Preliminary Endangerment Assessment Workplan**
Proposed Lodi Energy Center Site
12745 N. Thornton Road
Lodi, California 95240

Dear Mr. Swimley:

Stantec Consulting Corporation (Stantec) is pleased to submit this workplan for the above referenced site. A copy of this report has been sent directly to the Department of Toxic Substances Control (DTSC). If you have any questions, please do not hesitate to contact me.

Sincerely,

STANTEC CONSULTING CORPORATION

Gary D. Haeck, Ph.D., P.G.
Managing Senior Geologist
Tel: (916) 861-0400
Fax: (916) 861-0430

Attachment: Preliminary Endangerment Assessment Workplan

c. D. Stephen Schwabauer, City of Lodi
Maria Gillette, DTSC
Leah Goldberg, Meyers Nave
Ed Warner, NCPA
Sarah Madams, CH2MHill

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PRELIMINARY ENDANGERMENT ASSESSMENT WORKPLAN

Proposed Lodi Energy Center Site
12745 N. Thornton Road
Lodi, California 95240

Prepared For:
Mr. Charles E. Swimley
Public Works Department
City of Lodi
1331 South Ham Lane
Lodi, California 95242

Submitted By:
Stantec Consulting Corporation
3017 Kilgore Road Suite 100
Rancho Cordova, California 95670

August 13, 2009
185702098

Stantec Consulting Corporation
3017 Kilgore Road Suite 100
Rancho Cordova CA 95670
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August 14, 2009
File: 185702098

Ms. Maria Gillette
Department of Toxic Substances Control
Sacramento Field Office
8800 Cal Center Drive
Sacramento, California, 95826-3200

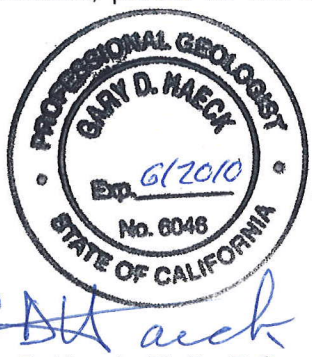
Reference: **Preliminary Endangerment Assessment Workplan**
Proposed Lodi Energy Center Site
12745 N. Thornton Road
Lodi, California 95240

Dear Ms. Gillette:

On behalf of the City of Lodi, Stantec Consulting Corporation (Stantec) is pleased to submit this workplan for the above referenced site. If you have any questions, please do not hesitate to contact me.

Sincerely,

STANTEC CONSULTING CORPORATION



Christy L. Confar, R.G., R.E.A.
Associate Geologist

Gary D. Haeck, Ph.D., P.G.
Managing Senior Geologist
Tel: (916) 384-0768
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Attachment: Preliminary Endangerment Assessment Workplan

c. Charles Swimley, City of Lodi
D. Stephen Schwabauer, City of Lodi
Leah Goldberg, Meyers Nave
Ed Warner, NCPA
Sarah Madams, CH2MHill

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PEA WORKPLAN
Proposed Lodi Energy Center Site
Lodi, California

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Lodi, California

1.0 INTRODUCTION

Stantec Consulting Corporation (Stantec), on behalf the City of Lodi (City), presents this Preliminary Endangerment Assessment (PEA) Workplan for the proposed Lodi Energy Center (LEC) (Site; Figures 1 and 2). This Workplan (and included Site-Specific Health and Safety Plan [SSP], Sampling and Analysis Plan [SAP] and Quality Assurance Project Plan [QAPP]) details the scope of work that Stantec will perform to address PEA requirements issued by the California Department of Toxic Substances Control (DTSC).

The Northern California Power Agency (NCPA) is proposing to construct on City of Lodi property a natural gas-fired electrical power generation facility (LEC) on a 4.4 acre portion (Site) of San Joaquin County APN 055-130-16 in Lodi, California. Environmental review of this proposed facility by NCPA identified impacts to soil during a recently completed environmental site assessment. The lead agency, California Energy Commission (CEC) subsequently requested additional assessment of the Site under DTSC oversight. Therefore, this PEA Workplan has been prepared as part of DTSC requirements for completion of a PEA.

1.1 REGULATORY GUIDANCE

The proposed site assessment described in this Workplan was developed in general accordance with the following regulatory guidance documents:

- DTSC Preliminary Endangerment Assessment Guidance Manual, June 1999;
- DTSC Guidance Document for the Implementation of USEPA Method 5035; Methodologies for Collection, Preservation, Storage and Preparation of Soils to be Analyzed for VOCs, November 2004;
- USEPA Quality Assurance Guidance for Conducting Brownfields Site Assessments, September 1998;
- Chapter 9 of SW-846 Update III; and
- ASTM D-2488.

2.0 SITE DESCRIPTION AND BACKGROUND

2.1 SITE DESCRIPTION

The Northern California Power Agency (NCPA) is proposing to construct on City of Lodi property a natural gas-fired electrical power generation facility (LEC) on a 4.4 acre portion (Site) of San Joaquin County APN 055-130-16 in Lodi, California. NCPA contracted Carlton Engineering Inc. (Carlton) to perform a Phase I Environmental Site Assessment (ESA) at the Site. The June 30, 2008 ESA did not identify any recognized environmental conditions (ASTM 1527) at the Site, but did identify several potential environmental concerns (PECs).

The Site address is 12745 N. Thornton Road in Lodi, California. The 4.4-acre parcel of land is undeveloped, irregularly shaped, and bound by the following adjacent properties: White Slough Water Pollution Control Facility (WPCF) (east), treatment and holding ponds associated with the WPCF (north), existing NCPA Combustion Turbine Engine Project #2 (STIG plant) (west), and the San Joaquin County Mosquito and Vector Control Facility (SJCM&VCF) (south).

2.2 SITE BACKGROUND

2.2.1 Previous Reports

The historical and environmental background of the Site and vicinity have been documented in prior reports, which include the following:

- Soil boring logs and monitoring well construction diagrams for monitoring wells WSM-3 (located on the Site), WSM-2 and WSM-4 (adjacent to the Site) prepared by ERM-West on behalf of the City of Lodi dated April 1989;
- Final Report City of Lodi White Slough WPCF Soil and Groundwater Investigation Existing Conditions Report prepared by West Yost Associates on behalf of the City of Lodi dated September 2006;
- Geotechnical Feasibility Study prepared by Carlton Engineering on behalf of NCPA dated July 2007;
- Phase I ESA prepared by Carlton Engineering, Inc. on behalf of NCPA dated June 2008;
- Phase II ESA prepared by CH2MHill on behalf of NCPA dated February 26, 2009; and
- Multiple documents for the Site available at CEC Docket 08-AFC-10 (website http://www.energy.ca.gov/sitingcases/lodi/index.html).

Based on the Phase I ESA results, the CEC requested that NCPA conduct field sampling and soil analyses to adequately characterize the presence of harmful chemicals at the Site and discuss potential risks to construction or plant personnel from these chemicals. In compliance, NCPA directed CH2M HILL to perform a limited Phase II ESA to obtain data to comply with the CEC request. On February 2, 2009, CH2M HILL performed preliminary soil sampling and

subsequent analyses to provide data associated with the PECs identified by the Carlton ESA. CH2M HILL summarized the data and compared it to various agency soil screening levels in a preliminary evaluation of risk to human health in the February 26, 2009 Memorandum titled NCPA Lodi Preliminary Phase II ESA Sample Results. CH2M HILL concluded that exposure of construction workers and onsite industrial workers to surface and subsurface soils may adversely affect human health.

Based on the Phase II ESA results, the CEC requested that additional investigation and evaluation of risk be conducted under DTSC oversight.

2.2.2 Regulatory Background

The CEC is the lead agency (for licensing thermal power plants 50 megawatts and larger) under the California Environmental Quality Act (CEQA) and has a certified regulatory program under CEQA. Under its certified program, the CEC is exempt from having to prepare an environmental impact report. Its certified program, however, does require environmental analysis of the project, including an analysis of alternatives and mitigation measures to minimize any significant adverse effect the project may have on the environment.

NCPA, as part of it's environmental review of the Site under CEQA, identified soil impacts to the Site including deposition of wastewater sludge and surface water runoff discharges from an adjacent area. The CEC encouraged NCPA to work closely with the DTSC on remedial options and cleanup.

3.0 GEOLOGY AND HYDROGEOLOGY

3.1 TOPOGRAPHY

The Site consists predominantly of exposed soil with low-lying vegetation. The parcel is relatively flat and gently slopes to the west. Berms, drainage channels and lagoons associated with the WPCF border the Site on the north and east. SJCM&VCF ponds border the Site to the south (Figures 1 and 2). The elevation of the Site is approximately 5 feet above mean sea level.

3.2 GEOLOGY

The project area is situated in the Great Valley physiographic province. The Great Valley and the adjacent Sierra Nevada to the east form a relatively stable crustal block (Sierran block) composed of Mesozoic crystalline basement that dips gently to the west. The Great Valley physiographic province separates the Coast Ranges to the west from the Sierra Nevada to the east. This province is composed of two elongated northwest- to southeast-trending basins: the Sacramento basin to the northwest and the San Joaquin basin to the southeast.

Within the basin deposits, the Site near-surface deposits have been derived from the Sacramento, Mokelumne, and San Joaquin river systems. The Site lies on the eastern edge of the Sacramento-San Joaquin River Delta, and the surficial unit mapped in the Site vicinity is the lower member of the Quaternary Modesto Formation. Deposits of this formation are described as undifferentiated alluvial deposits overlain by Holocene intertidal deposits.

Based on prior subsurface assessment of the Site and adjacent WPCF property, the Site subsurface is comprised of fine-grained silty sands/sandy silts to a depth of approximately 10 feet below ground surface (ft bgs). A dense material (cemented or hard pan zone) was reportedly encountered between 2 and 4 ft bgs in the central portion of the Site, as well as between 6 and 10 ft bgs locally onsite and on property east of the Site during a prior investigation. The silty sands/sandy silts are underlain by clayey sand to a depth of approximately 13 ft bgs, and sand was encountered below the clayey sand to a maximum depth of 20 ft bgs.

3.3 HYDROGEOLOGY

Based on Carlton's recent geotechnical assessment, historical groundwater levels have ranged between 3 and 20 ft bgs in the Site vicinity over the past 30 years. Carlton reported that that regional groundwater flow direction at the Site is toward the east-southeast through southeast towards a cone of depression located approximately 5 miles to the east-southeast. Locally, groundwater pumping and recharge reportedly cause deflections in groundwater flow direction, and northerly and southwesterly flow direction components have been observed in the past.

Based on review of recent shallow groundwater contour maps prepared by West & Yost Associates for fourth quarter 2008 through second quarter 2009, the groundwater elevation at Site monitoring well WSM-3 ranged from -6.89 ft msl (4Q2008) to -3.99 ft msl (2Q2009). Based on these measurements, the groundwater elevation at the Site has increased by approximately 3 feet since fourth quarter 2008. Based on the contour data, the groundwater flow direction has

been to the east with a slight southeasterly component. As discussed above, a cone of depression is present to the east at monitoring well WSM-11 where the groundwater elevation drops to more than -20 ft msl (see Appendix A Figure 1). Locally at the Site, groundwater flow has been generally to the east over the last three quarters, and the elevation drops by one foot or more from onsite well WSM-3 to well WSM-4..

The most recent depth to groundwater was reported by Carlton to be near 9 ft bgs. Carlton also reported that pore pressure readings from CPT soundings indicated groundwater near 10 ft bgs at the Site. Season fluctuations in groundwater elevation in the Site vicinity have reportedly been on the order of one to two feet.

4.0 PAST SAMPLING ACTIVITIES

Past sampling activities at the Site included collection and analysis of shallow soil samples. In addition, one groundwater monitoring well (WSM-3) is present on the Site, and has been sampled for water quality parameters. The results of these soil and groundwater analytical data are presented below. Sampling of other media including surface water, sediment, or soil vapor have not been sampled.

4.1 SOIL DATA

Prior soil sampling on the Site was documented in a memorandum entitled *NCPA Lodi Preliminary Phase II ESA Sample Results* prepared by CH2M HILL dated February 26, 2009. The scope of work for this Phase II ESA included completion of seven hand auger soil borings to a maximum depth of 3 ft bgs. A total of 22 soil samples were collected including two duplicates and six background samples. Two samples were collected from each boring, consisting of a shallow sample collected from 0 to 6 inches bgs and a deep sample from 30 to 36 inches bgs. One or more of the soil samples were analyzed for CAM 17 metals, organochlorine pesticides (OCPs), volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), and total petroleum hydrocarbons (TPH) quantified in the oil range (TPH-oil). The soil analytical summary table from this study is included in Appendix B. Not all of the samples were analyzed for all constituents and the background samples were not analyzed for PAHs. Many of the OCPs results were flagged due to detections between the instrument detection limits and the reporting limits. The boring locations for these samples are shown on Figure 2.

Based on the analytical results, a general summary of the impacts follows:

- Concentrations of PAHs above risk-based Environmental Screening Levels (ESLs) were detected in samples analyzed from the central and southern portion of the Site. Benzo(a)pyrene concentrations were detected two orders of magnitude higher than screening criteria. However, background samples were not analyzed for PAHs.
- Concentrations of some OCPs exceeded risk-based screening values, Total Threshold Limit Concentrations (TTLCs), and 10 times Soluble Limit Threshold Concentrations (STLCs) concentrations, indicating special handling and disposal requirements may be required. However, most of these results were J-flagged due to detections between the instrument detection limit and the reporting limit or their relative percent differences from duplicate samples were greater than 40 percent.
- Arsenic was detected in several samples at concentrations up to 6.91 milligrams per kilogram (mg/kg), which exceeded one or more risk-based screening values. However, based on several published studies, these levels are within typical background ranges for arsenic in California. All background samples contained arsenic concentrations (up to 4.10 mg/kg), which also exceeded one or more risk-based screening values.
- Elevated concentrations of total chromium and lead in excess of 10 times STLCs were detected in some samples, but concentrations did not exceed risk-based screening values.

- TPH-oil was detected in the same samples analyzed for PAHs, but at relatively low concentrations (131 to 2,200 mg/kg).
- One sample was selected for VOC analysis from the northern portion of the Site, and VOCs were not detected.

In general, most of the constituent concentrations detected in both the shallow and deep samples from the same boring displayed reduced concentrations in the deep sample relative to the shallow sample. This is especially true for the PAHs and less so for the metals. In summary, the presence of PAHs in the shallow soil appears to be the primary health concern, based on data collected to date.

4.2 GROUNDWATER DATA

One groundwater monitoring well designated as WSM-3 is present on the southern portion of the Site. This well was installed in April 1989 to a depth of 20 ft bgs on behalf of the City of Lodi for monitoring associated with the WPCF. The well is constructed with a 2-inch PVC casing and a 15-foot 0.020-inch slotted screen extending from 5 to 20 ft bgs. Shallow groundwater in this well is analyzed for water quality parameters including selected metals, nutrients, bacteria, and physical parameters in connection with the WPCF's National Pollution Discharge Elimination System permit. Groundwater has not been analyzed for constituents proposed for analysis in this Workplan.

The following table includes the most recent analytical data from WSM-3 collected on May 5, 2009:

Boron	mg/L	0.19	pH	units	7.5
Bromide	mg/L	ND	Specific Conductance	uS/cm	780
Calcium	mg/L	71	Total Dissolved Solids	mg/L	520
Fluoride	mg/L	0.22	Fixed Dissolved Solids	mg/L	390
Iron	mg/L	ND	Ammonia as N	mg/L	ND
Magnesium	mg/L	30	Nitrate as N	mg/L	4.1
Potassium	mg/L	2.2	Nitrite as N	mg/L	ND
Sodium	mg/L	53	Total Kjeldahl Nitrogen	mg/L	0.99 (J)
Chloride	mg/L	47	Dissolved Iron	mg/L	0.02 (J)
Phosphorus	mg/L	0.66	Dissolved Lead	ug/L	ND
Total Alkalinity	mg/L	320	Dissolved Manganese	ug/L	50
Bicarbonate Alkalinity	mg/L	390	Total Coliform	MPN/ 100mL	<2.2
Carbonate Alkalinity	mg/L	ND	Bromoform	ug/L	ND
Hydroxide Alkalinity	mg/L	ND	Chloroform	ug/L	ND
Hardness	mg/L	300	Chlorodibromomethane	ug/L	ND
Cation/Anion Balance	%	0.33	Dichlorobromomethane	ug/L	ND
Sulfate	mg/L	15	Groundwater elevation	feet	-3.99

Notes:
mg/L = milligrams per liter
ug/L = micrograms per liter
uS/cm = microsiemens per centimeter
MPN/100mL = most probable number per 100 milliliters
(J) = Estimated analytical result value detected below the Reporting Limit and above the Method Detection Limit.
ND = Analyte not detected at or above the Reporting Limit

5.0 PROPOSED FIELD INVESTIGATION

5.1 PRE-FIELD ACTIVITIES

5.1.1 Scoping Meeting and Site Visit

Prior to final work plan preparation, a scoping meeting was held with the DTSC case worker on August 14, 2009 at the DTSC Sacramento Field Office. The proposed scope was discussed and the City of Lodi agreed to and incorporated the modifications requested by DTSC into this document. Stantec will also perform a Site visit accompanied by a City representative to evaluate site-specific access, logistical, and safety issues.

As discussed at the scoping meeting, geotechnical considerations require that the top 18 inches of soil across the entire site be replaced with engineered fill. Based on the previous soil analytical results discussed above in Section 4.1, this soil exceeds one or more risk-based industrial screening levels and may require appropriate disposal or mitigation. The top 18 inches of soil will be utilized as berm material at the adjacent WPCF and capped or appropriately disposed of in accordance with state and federal regulations. In addition to this soil, engineered fill will be required beneath portions of the foundations for several of the heavier pieces of equipment to a depth of approximately 5 feet bgs. Depending on the results of additional sampling and analyses proposed in this Workplan and contingent on DTSC approval, should the soil in the deeper footings also exceed risk-based screening levels and require mitigation, this soil also will potentially be capped and used as berm material, or appropriately disposed in accordance with state and federal regulations.

5.1.2 Site Safety Plan

Stantec will prepare a Site Safety Plan (SSP) for site-specific conditions and scope of work as required by the Occupational Health and Safety Administration (OSHA) standard guidelines (29 CFR 1910.120), and by California Occupational Health and Safety Administration (Cal OSHA) guidelines (CCR Title 8, Section 5192). Prior to the commencement of the field investigation, the SSP will be updated with appropriate field personnel and subcontractor information. The field staff and contractors will review and sign the SSP before beginning field operations at the Site. The SSP has been prepared as a stand-alone document, and is included with this Workplan (Appendix C).

5.1.3 Permitting

The investigation will require acquisition of soil boring permits from San Joaquin County Environmental Health Department (SJCEHD) prior to the commencement of drilling activities. If a current Master File Record Form (MFRF) for the Site is not on file with SJCEHD, Stantec will complete the required form on behalf of the City. Stantec will also complete and submit the boring permit application, the MFRF, a copy of the DTSC work plan-approval letter, along with permit and MFRF fees to the SJCEHD. Stantec will also coordinate with SJCEHD to schedule the boring grout inspection and pay for additional grouting inspection fees if required.

5.1.4 Boring Location and Clearance

Stantec will mark the proposed boring locations with white paint, as required by law, and contact Underground Service Alert (USA) at least 48-hours prior to drilling to notify all utility operators in the area to clear the marked locations. Additionally, Stantec will hire a private utility locating service to conduct a utility clearance of the drilling area prior to conducting fieldwork to ensure that underground utilities other subsurface structures are not encountered during drilling activities. After clearance is verified by USA and the utility locator, the borings will be hand augered to a depth of approximately five feet bgs to further minimize the risk of encountering subsurface obstructions.

5.2 SAMPLING LOCATIONS

A total of 20 soil borings are proposed at the Site in the locations depicted on Figure 2. The 20 locations have been selected to provide adequate coverage of the Site for site assessment purposes. An approximate 100-foot grid spacing was used. With DTSC concurrence, the prior soil analytical data will be included in the overall assessment of the Site to the extent possible, the proposed sampling locations have been spaced in order to characterize both the lateral and vertical characteristics of the vadose zone across the 4.4-acre site.

Four off-site borings for background samples also are proposed for collection at a location east of the Site where the previous background samples were collected.

5.3 FIELD INVESTIGATION

Following receipt of boring permits and notification of DTSC, Stantec will mobilize a C-57 licensed drilling contractor to advance the soil borings to a maximum depth of approximately 6.5 feet below ground surface (bgs). Based on available information groundwater is anticipated to occur at approximately 10 to 12 feet bgs and will not be encountered. Borings will be advanced with a combination of direct-push drilling and sampling methods following hand clearing of the first five feet of borings to avoid subsurface utilities. Soils will be field-screened using a photoionization detector (PID) and described in general accordance with ASTM D-2488 under the direct supervision of a California Professional Geologist. Additional information for the field program is described in the SAP (Appendix D).

5.4 SAMPLE COLLECTION

One round of sample collection is proposed. Soil sampling will be conducted at 20 sampling locations (designated as locations 8 through 27). The sample location numbering scheme begins at 8 to avoid confusion with the previously completed sampling locations designated as number 1 through 7. The following subsections describe the process for sample collection by matrix. Step-by-step sample collection procedures and methods are described in the attached SAP (Appendix D). Field conditions that impede or prohibit sample collection will be documented, and DTSC will be notified as soon as reasonably possible.

5.4.1 Soil

Depth-discrete soil samples will be collected from each proposed soil boring location (locations 8 through 27 and Background) at the time of drilling. Depending on depth, soil samples will be collected with an Impact Sampler (i.e., a slide hammer) or from the acetate liner of the direct push sampler in each soil boring. Soil samples will be collected in stainless steel/brass sleeves, or acetate liners for non-volatile constituents; and will be collected using EPA Method 5035 collection methodologies for volatile constituents. An experienced Stantec geologist or environmental scientist working under the supervision of a California Professional Geologist will conduct the soil sampling. The results of the soil sampling will be documented on a Field Drill Log form. Additional information on specific soil sampling and documentation procedures is included in the SAP (Appendix D).

5.4.2 Groundwater

Collection of one groundwater sample from existing onsite monitoring well WSM-3 (Figure 2) is proposed. This well will be purged and sampled in accordance with Stantec's Standard Operating Procedure (SOP) for groundwater sampling (Appendix D). This procedure includes purging at least three casing volumes and collection of a groundwater sample. The purged groundwater will be containerized until proper disposal can be arranged.

An experienced Stantec geologist or environmental scientist working under the supervision of a California Professional Geologist will conduct the groundwater sampling activities. Each groundwater sample collected will be documented on a Groundwater Sample Collection form.

5.5 BACKGROUND SAMPLING

In accordance with the DTSC PEA Guidance Manual (PEA Manual Section 2.4.2.5), collection of background samples is proposed. The background samples are proposed to be located in the vicinity of the background soil samples previously collected by NCPA's environmental consultant, which is east of the Site beyond the existing WPCF facility and west of the I-5 freeway (Figure 2). This location was chosen because it has not been developed or altered from prior to construction of the WPCF. Four background locations are proposed designated as BG-4 through BG-8. The numbering scheme continues in consecutive order from the prior background samples to avoid confusion. Soil samples will be collected at the four proposed locations in the same manner and at the same depths as the onsite soil samples (Section 5.4.1). The proposed laboratory analyses for the background samples are listed in Table 1, and selection of analytical parameters is based on analysis for naturally occurring constituents, as well as detection of other constituents during NCPA's prior background sampling.

5.6 SAMPLE ANALYSIS

The sampling strategy for the Site is summarized on Table 1. This table includes the proposed laboratory analyses by sample location for the media to be tested.

5.6.1 Soil

As discussed above, the top 18 inches of soil is unusable for geotechnical considerations and exceeds one or more risk-base screening levels. In addition to the samples described below, soil samples will be collected at depths of 0.5 to 1.0 feet bgs in four of the 20 proposed sampling locations in the northern part of the Site. A shallow sample (approximately 2 ft bgs) and a deeper soil sample (approximately 6 feet bgs) will also be analyzed from each of the 20 sampling locations. Additional supplemental or contingency soil samples will also be collected from approximately 4 feet bgs, and will be analyzed based on the results of the initial round of analytical results. This will further characterize impacted soils, thereby providing additional analytical data to facilitate minimizing the amount of soils below risk-based levels that may need mitigation. These additional samples will be analyzed for constituents based on the analytical results of the shallow samples.

Soil samples will be analyzed for constituents in accordance with the following analytical methods. At least two soil samples per soil boring (for a total of 42 samples including five percent (two) QA/QC samples will be analyzed with the methods listed below. The additional contingency samples will be analyzed for constituents based on the analytical results of the 2- and 6-foot bgs samples.

- Volatile Organic Compounds (VOCs) by EPA Methods 5035 and 8260B – a subset of four 2-foot bgs soil samples from among the 20 proposed soil boring locations will be selected.
- Polycyclic Aromatic Hydrocarbons (PAHs) by EPA Method 8270C – all proposed soil samples will be analyzed.
- Organochlorine Pesticides (OCPs) by EPA Method 8081A – all proposed soil samples will be analyzed.
- Title 22 Metals (CAM 17) by EPA Method 6010B, 6020, and 7471A – all proposed soil samples will be analyzed.
- Total Petroleum Hydrocarbons (TPH) quantified as gasoline, diesel and motor oil by EPA Method 8260B or 8015M (as appropriate) – all proposed soil samples (48 samples) will be analyzed.

In accordance with Section 2.4.2.5 of the PEA Manual, the background samples will be analyzed for PAHs and CAM 17 metals by the above methods.

5.6.2 Groundwater

The one proposed groundwater sample to be collected from WSM-3 will be analyzed for PAHs, OCPs, and CAM 17 metals.

5.7 SAMPLE HANDLING PROCEDURES

Procedures for sample handling including sample containers, decontamination, chain of custody, and field documentation are described in the attached SAP (Appendix D).

5.8 INVESTIGATION-DERIVED WASTES

Investigation-derived wastes, monitoring well purge water, and decontamination water will be collected separately in Department of Transportation (DOT)-approved 55-gallon drums. The drums will be labeled appropriately and sealed. The drums will be temporarily stored for a maximum of 90 days in a designated area on the Site until required chemical analyses for proper waste characterization are completed. Based on the analytical results, the wastes will be disposed of at an appropriate waste treatment or disposal facility according to applicable federal, state, and local regulations. The transportation and disposal documents (*i.e.,* waste manifests) will be signed by a City representative and included in the PEA report. Note that wastes generated during the proposed assessment are assumed to be characterized as non-hazardous waste.

6.0 QUALITY ASSURANCE AND QUALITY CONTROL

Quality assurance and quality control (QA/QC) measures will be conducted as specified in the attached Quality Assurance Project Plan (QAPP; Appendix E). QA/QC measures are briefly summarized below:

6.1 FIELD QUALITY CONTROL

Field quality control will include:

- Documenting field instrument calibration and sample container preparation.
- Documenting and justifying deviations from this Workplan.
- Documenting field activities in a log book, including collection of Site photographs.
- Documenting sample delivery and integrity of samples. A chain of custody record will accompany the samples.
- Decontaminating equipment that may cause cross-contamination between sampling locations.
- Generating quality control samples, including:
  - Field Duplicate Samples: Duplicate analyses will indicate if field or laboratory quality control measures were acceptable. In accordance with the PEA Guidance Manual five percent field duplicates will be collected, which will include two duplicate soil samples for the 40 proposed soil samples collected .
  - Trip Blank Sample: One trip blank sample will be collected and analyzed for VOCs for each cooler of soil samples submitted to the laboratory.

6.2 ANALYTICAL QUALITY CONTROL

Level III analytical quality control measures will be taken by the laboratory to ensure the validity and integrity of the results. The laboratory will analyze the following quality control samples:

- Method Blank: A method blank will be analyzed one per each analytical method at the rate of one sample per batch or 20 samples. This method blank is to identify if the analytical instruments or sample preparation caused false values and will be performed daily for volatile organic analysis.
- Matrix Spike and Matrix Spike Duplicates: A spiked sample will be analyzed one per each analytical method with every analytical batch or once every 20 or fewer samples. The laboratory will conduct these analyses to ensure that the method recovery of the compounds is within acceptable limits.

- Laboratory Duplicates: Laboratory duplicates for internal QA/QC sample analyses may be duplicated by analyzing separate aliquot from a field sample.

- Surrogate Spike Compounds: Every blank, standard, and environmental sample will be spiked with surrogate compounds prior to purging or extraction. The laboratory will ensure that surrogate spike recoveries fall within the control limits specified by the analytical method.

- Check Sample, Column Check Sample, Column Check Sample Blank: The laboratory will run these and any other quality control samples specified by the method to ensure accuracy and validity of the analytical result.

Quality control data and records will be supplied by the analytical laboratories as part of each analytical laboratory report generated for the Site.

7.0 SELECTION OF SCREENING CRITERIA

Based on the results of the scoping meeting, a few modifications to the standard PEA requirements are proposed. These include utilizing exposure point concentrations (EPCs) based on the 95 percent upper confidence limit (UCL) of the mean (rather than maximum concentrations) for comparisons with risk-based screening levels based on industrial worker (rather than residential) exposure assumptions. In addition, the soil sample metals results will be compared with existing background data using a Wilcoxon-Rank Sum or similar test. EPCs will be generated for each exposure area using US EPA Pro-UCL Version 4.0 software. For organic compounds detected at least once in an exposure area and for metals and PAHs exceeding background levels, the ratio of the EPCs to the screening-level criteria will be calculated for each analyte as a measure of risk. Cumulative risk will be calculated for both carcinogenic and non-carcinogenic effects, using the screening criteria accepted by DTSC.

Stantec proposes to compare soil analytical data to the following risk-based screening criteria using a hierarchical approach in the order listed below:

- California Human Health Screening Levels (CHHSLs) for commercial/industrial land use;
- USEPA Regional Screening Levels (RSLs) for industrial soil; and
- Where a CHHSL or RSL screening value does not exist, detected concentrations will be compared to San Francisco Regional Water Quality Control Board Environmental Screening Levels (ESLs) Shallow Soil Screening Levels (< 3 meters bgs), Commercial/Industrial land use where groundwater is not a current or potential drinking water source.

Stantec proposes to compare groundwater analytical data to California Maximum Contaminant Levels (MCLs).

8.0 REPORT PREPARATION

Upon completion of the PEA field activities, Stantec will prepare a PEA Report detailing the field investigation and sampling procedures in general compliance with the PEA Manual. The report will contain a description of the completed field activities and field methods, waste disposal documentation, deviations from the PEA Workplan, general findings about subsurface conditions, detected constituent concentrations and laboratory analytical reports (including chain-of-custody documentation), and comparison to previously agreed upon risk-based screening values. Soil boring logs including groundwater temporary well construction details will be signed by a professional geologist. Field logs generated from soil and groundwater and sampling activities will also be appended to the report. A State of California Registered Professional Geologist will sign and stamp the final report.

9.0 PROJECT MANAGEMENT PLAN

The project organization for the site assessment is discussed below.

9.1 REGULATORY OVERSIGHT AGENCY

The Department of Toxic Substances Control (DTSC) will be the lead agency overseeing the project and reviewing the Workplan and PEA report.

9.2 CLIENT APPROVALS

Implementation of this Workplan will be managed through the City of Lodi, Site property owner, under the direction of Mr. Charles Swimley. Mr. Swimley will receive all notices, comments, approvals and other communications from the DTSC, and other parties. Mr. Swimley will also directly oversee and authorize the work of Stantec.

9.3 STANTEC PROJECT MANAGER

The Stantec Project Manager (PM), Mr. Gary Haeck, Ph.D., P.G., is a California Professional Geologist and will be responsible for ensuring that all project personnel are made available and that all activities associated with the project are conducted in a manner consistent with the Workplan. Mr. Haeck will be the primary liaison between DTSC, the City, and Stantec, and Mr. Haeck will monitor day-to-day activities to ensure that quality work is done on time and within budget. He will also be responsible for reporting work progress and findings to the City.

9.4 STANTEC QA/QC MANAGER

The Stantec Project Quality Assurance/Quality Control (QA/QC) Manager, Ms. Sandra Pimienta, P.G., will be responsible to establish and implement the QA/QC program to ensure that established sampling and analytical procedures are properly followed, direct Stantec Quality Assurance (QA) personnel to implement the appropriate field QA measures, and review the project activities to verify that project QA goals are met. The Project QA/QC Manager will report to the Stantec PM and will coordinate the necessary technical reviews.

9.5 STANTEC FIELD PROJECT MANAGERS

The Stantec Field Project Managers (FPMs), Mr. Gary Haeck, Ph.D., P.G, Ms. Sandra Pimienta, P.G., and Mr. Brian Rorie will be responsible to act as the managers of daily field operations. Mr. Haeck will be primarily responsible for field activities including project schedule, budget tracking, and assigning project personnel and resources. Both Mr. Haeck and Ms. Pimienta will direct the implementation of the Workplan, and ensure quality. The Stantec FPMs will report to the Stantec PM and will also receive direction or authorization directly from the City PM.

9.6 SUBCONTRACTORS

The subcontractors selected for this project are:

Subcontractor	Specialty
Spectrum Geophysics	Private Utility Locator
Gregg Drilling	Direct-Push Drilling
TestAmerica, Inc.	Laboratory Analysis – Soil and Groundwater
Belshire Environmental	Waste Disposal

9.7 COMMUNICATION OF WORKPLAN DEVIATIONS

Deviations that may arise during implementation of this Workplan will be communicated to the City and to DTSC as soon as reasonably practicable. If possible, deviations that may arise during the field investigation will be communicated to the City and DTSC such that changes can be made while the field activities are still occurring, which will provide the most cost effective approach to meeting DTSC's assessment requirements for the Site.

10.0 LIMITATIONS

This work plan was prepared in accordance with the scope of work outlined in Stantec's contract and with generally accepted professional engineering and environmental consulting practices existing at the time it was prepared and applicable to the location of the Site. It was prepared for the exclusive use of the City of Lodi and the appropriate regulatory agencies, for the express purpose stated above. Any re-use of this report for a different purpose or by others not identified above shall be at the user's sole risk without liability to Stantec. To the extent that this report is based on information provided to Stantec by third parties, Stantec may have made efforts to verify this third party information, but Stantec cannot guarantee the completeness or accuracy of this information. The opinions expressed and data collected are based on the conditions of the Site existing at the time of the field investigation. No other warranties, expressed or implied are made by Stantec.

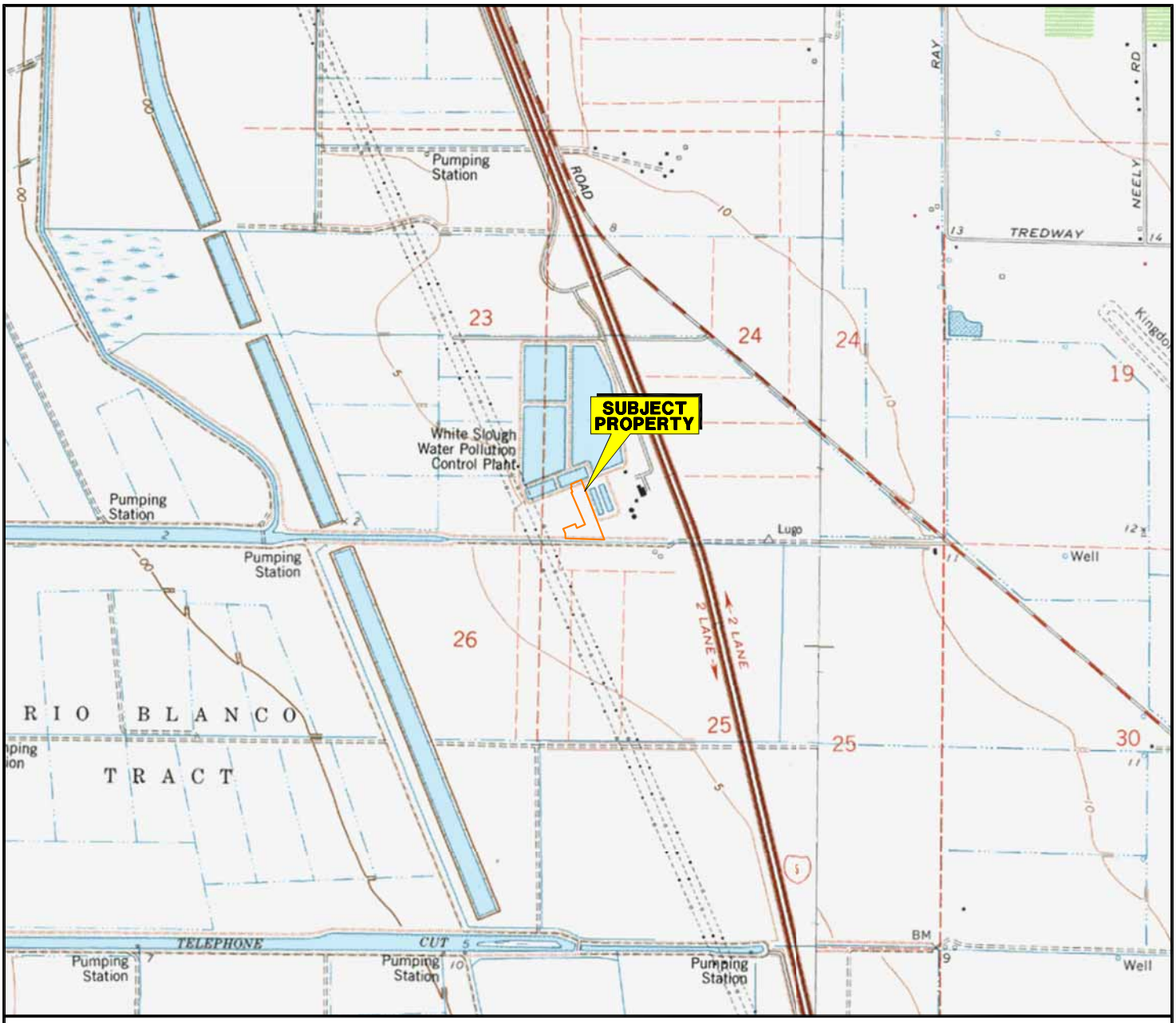
TABLES

TABLE 1
List of Sampling Locations
Proposed Lodi Energy Center Site
12745 N. Thornton Road, Lodi, CA

Sample Location	Location	Drill/Sampling Method*	Soil Sample Depth (ft bgs)**	# Soil Samples Collected	Total Depth (ft bgs)	Groundwater Sample Depth (ft bgs)***	Proposed Lab Analyses****
WSM-3	Existing on-site groundwater monitoring well located on the southeast corner of the Site	n/a	n./a	n/a	n/a	Static level	PAHs, OCPs, CAM 17
8	Northeast corner of Site	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	3	6.5	none	TPH, CAM 17, PAHs, OCPs
9	Northwest corner of Site	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	3	6.5	none	TPH, CAM 17, PAHs, OCPs
10	Northeast Site boundary	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	3	6.5	none	TPH, CAM 17, PAHs, OCPs
11	Northwest Site boundary	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	3	6.5	none	TPH, CAM 17, PAHs, OCPs
12	Northeast Site boundary	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	3	6.5	none	TPH, CAM 17, PAHs, OCPs
13	Central-west portion of Site	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	3	6.5	none	TPH, CAM 17, PAHs, OCPs
14	Central-east portion of Site	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	3	6.5	none	TPH, CAM 17, PAHs, OCPs
15	Central-west portion of Site	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	3	6.5	none	TPH, CAM 17, PAHs, OCPs
16	Central-east portion of Site	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	3	6.5	none	TPH, CAM 17, PAHs, OCPs
17	Central-west portion of Site	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	3	6.5	none	TPH, CAM 17, PAHs, OCPs
18	Central-east portion of Site	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	3	6.5	none	TPH, CAM 17, PAHs, OCPs
19	Southern portion of Site	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	3	6.5	none	TPH, CAM 17, PAHs, OCPs
20	Southeast corner of Site	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	3	6.5	none	TPH, CAM 17, PAHs, OCPs
21	South-central portion of Site	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	3	6.5	none	TPH, CAM 17, PAHs, OCPs
22	South-central portion of Site	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	3	6.5	none	TPH, CAM 17, PAHs, OCPs
23	Southern portion of Site in paved area	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	3	6.5	none	TPH, CAM 17, PAHs, OCPs
24	Southwest corner of site	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	3	6.5	none	TPH, CAM 17, PAHs, OCPs
25	Southern Site boundary	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	3	6.5	none	TPH, CAM 17, PAHs, OCPs
26	Southern Site boundary	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	3	6.5	none	TPH, CAM 17, PAHs, OCPs
27	Southern portion of Site along paved road	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	3	6.5	none	TPH, CAM 17, PAHs, OCPs
BG-4	Background sample location near prior background sample locations BG-1 through BG-3	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	At least 2	6.5	none	TPH, CAM 17, PAHs, OCPs
BG-5		Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	At least 2	6.5	none	TPH, CAM 17, PAHs, OCPs
BG-6		Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	At least 2	6.5	none	TPH, CAM 17, PAHs, OCPs
BG-7		Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	At least 2	6.5	none	TPH, CAM 17, PAHs, OCPs
QA/QC	Duplicates, Field, trip, and equipment blanks	n/a	n/a	5% total	n/a	none	TPH, CAM 17, PAHs, OCPs

Notes:
* Surface to 5 ft bgs completed using hand auger for utility clearance. Soil samples from above 5 ft bgs to be collected using an Impact Sampler (slide hammer).
** A minimum of 50 soil samples (including 2 QA/QC samples) will be collected. Four shallow soil samples (0.5-1.0 ft bgs) will be collected from the northern soil borings.
*** One groundwater sample will be collected from existing well WSM-3.
**** Four samples from sample numbers 8 through 27 to be selected for VOC analysis at the 2-ft bgs depth.
VOCs = Volatile Organic Compounds by 5035/8260B (full scan and low level)
TPH = Total Petroleum Hydrocarbons quantified as gasoline, diesel, and motor oil by EPA Method 8015M or 8260B (as appropriate).
CAM 17 = Title 22 Metals by EPA Method 6000/7000 Series (groundwater samples to be filtered in the field)
PAHs = Polycyclic Aromatic Hydrocarbons by EPA Method 8270C
OCPs = Organochlorine Pesticides by EPA Method 8081A
ft bgs = feet below ground surface
n/a = not applicable
BG = background sample
S = shallow soil sample

FIGURES



SOURCE: USGS 7.5 MINUTE TOPOGRAPHIC MAPS, TERMINOUS QUADRANGLE, 1978
PHOTOREVISED 1993
LODI SOUTH QUADRANGLE, 1968
PHOTOREVISED 1976

N

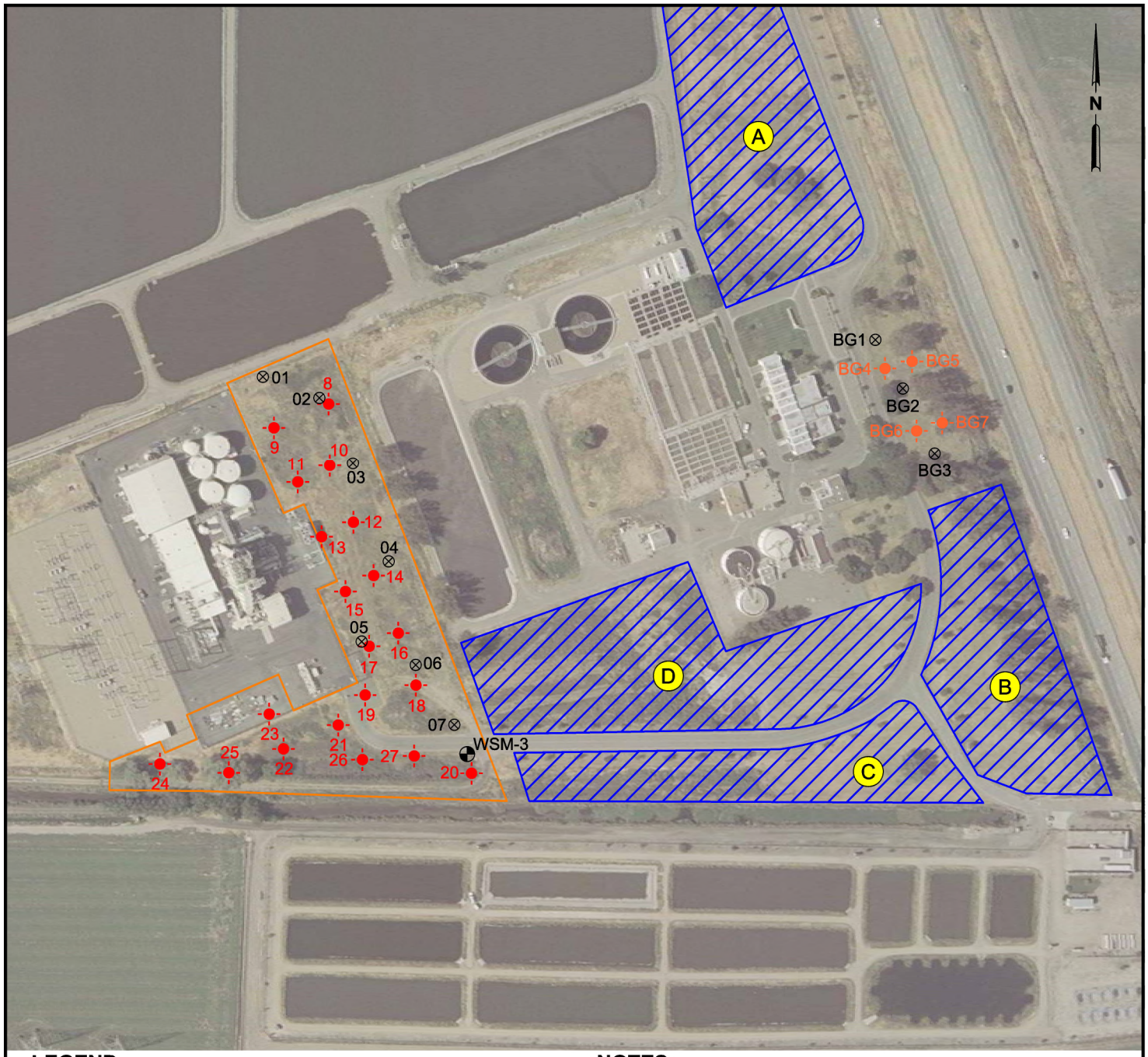
0 2000 4000

APPROXIMATE SCALE (FEET)

Stantec
290 Conejo Ridge Avenue
Thousand Oaks, CA 91361
(805) 230-1266/230-1277 (Fax)

FOR:		SITE LOCATION MAP	FIGURE:
LODI ENERGY CENTER 12745 North Thornton Road Lodi, CA 95240			1
JOB NUMBER: 185702076	DRAWN BY: R. Roman	CHECKED BY: C. Confar	APPROVED BY: C. Confar	DATE: 08/04/09

FILEPATH:Q:\CADD-37\Client\Lodi_Energy_Center\WorkPlan\2009-Aug\LEC-SLM.dwg|troman|Aug 05, 2009 at 5:15|Layout: SLM



LEGEND

WSM-3	EXISTING GROUNDWATER MONITORING WELL
07 ⊗	PREVIOUS SHALLOW SOIL SAMPLE LOCATIONS (CH2MHILL)
	PROPOSED LAYDOWN AND/OR PARKING AREAS
	PROPOSED PLANT SITE
8	PROPOSED SOIL BORING LOCATIONS (STANTEC)
BG4	PROPOSED BACKGROUND SOIL SAMPLING LOCATIONS

NOTES;

1. MAP REFERENCES; CH2MHILL, SOIL SAMPLINGLOCATIONS, FIGURE 2, DATED FEBRUARY 11, 2009. USGS URBAN AERIAL IMAGE, DATED MARCH 29, 2004.
2. CALIFORNIA STATE PLANES, ZONE 3 (FT.), NOT A SURVEYED MAP, SITE FEATURES AND LOCATIONS ARE APPROXIMATE.

0 250 500

APPROXIMATE SCALE (FEET)

Stantec
290 Conejo Ridge Avenue
Thousand Oaks, CA 91361
(805) 230-1266/230-1277 (Fax)

FOR:
LODI ENERGY CENTER
12745 North Thornton Road
Lodi, CA 95240

PROPOSED SAMPLING LOCATIONS

FIGURE: **2**

JOB NUMBER:	DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:
185702098	R. Roman	C. Confar	C. Confar	08/04/09

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APPENDIX A

Figure 1
City of Lodi
White Slough WPCF
GROUNDWATER ELEVATION CONTOUR MAP
2ND QUARTER 2009

LEGEND

- Boundary of City-Owned Land
- -3.99 / WSM5 — WPCF Monitoring Well with Groundwater Elevation (Feet, MSL)
- -3.99 / WSM5 — Background Monitoring Well with Groundwater Elevation (Feet, MSL)
- -5 — Groundwater Elevation Contour (feet, msl). Contour interval: 1 foot

Groundwater gradient from the White Slough Water Pollution Control Facility was easterly at approximately -0.002 feet/foot for the second quarter of 2009.

Note: WSM9 was dry on May 6, 2009. The groundwater elevation was estimated to be equal to or less than the well sump.

Note: Groundwater levels were measured on May 6, 2009

0 1000 2000
SCALE IN FEET

WEST YOST ASSOCIATES
Consulting Engineers

H:\Shared\Barrett Kaasa\711 Lodi MW\GW Contours\20090506\Fig_1.dwg 7-20-09 09:41:02 AM bkaasa

APPENDIX B

Table 1. Summary of Soil Analytical Results, Phase II Environmental Site Assessment, Lodi Energy Center, Lodi, California

Sample ID	PRGs[1] Industrial Soil (mg/kg)	CHHSL's[2] or ESLs[4] Industrial Soil (mg/kg)	TTLC[3] Wet wt basis (mg/kg)	01-LEC-06	01-LEC-36	02-LEC-06	02-LEC-36	Field Duplicate 03-LEC-06	08-LEC-06	03-LEC-36	04-LEC-06	04-LEC-36	05-LEC-06	05-LEC-36	Field Duplicate 08-LEC-36	06-LEC-06	06-LEC-36	07-LEC-06	07-LEC-36	BG1-LEC06	BG1-LEC36	BG2-LEC-06	BG2-LEC36	BG3-LEC06	BG3-LEC36	95% Upper Confidence Limit[5]
Metals by SW6010B																										
Antimony	410 n	380	500	0.19 U	***0.78 J***	***0.60 J***	***0.23 J***	**1.26**	**1.70**	0.21 U	NT	NT	NT	NT	NT	***0.39 J***	0.17 U	0.20 U	0.18 U	0.23 U	0.16 U	0.19 U	0.19 U	0.18 U	0.22 U	0.21
Arsenic	1.6 c	0.24	500	***3.51***	***4.71***	***5.86***	***2.35***	***6.59***	***6.91***	**1.18**	NT	NT	NT	NT	NT	**3.13**	**2.28 J**	***4.10***	**2.86**	**1.74 J**	**1.72 J**	**1.61 J**	**2.35 J**	**3.85**	**3.94**	3.23
Barium	190,000 nm	63,000	10,000	***108***	***268***	***99.2***	***109***	***227***	***387***	***77.1***	NT	NT	NT	NT	NT	***132***	***116***	**93.3**	***110***	**98.7**	**94.4**	**101**	**88.3**	**103**	**104**	103
Beryllium	2,000 n	1,700	75	***0.41***	**0.32 J**	**0.39 J**	**0.36**	**0.34 J**	***0.48***	**0.21**	NT	NT	NT	NT	NT	***0.42***	**0.36 J**	**0.26 J**	**0.26 J**	**0.36 J**	**0.36 J**	**0.34 J**	**0.31 J**	**0.41 J**	**0.42 J**	0.40
Cadmium	810 n	7.5	100	**0.072 J**	***1.41***	**0.013 J**	**0.054 J**	***1.75***	***2.47***	***0.17***	NT	NT	NT	NT	NT	***0.17 J***	***0.16 J***	0.0099 U	0.0094 U	0.010 U	0.0095 U	0.011 U	0.011 U	0.011 U	0.011 U	0.011
Chromium *(based on III)*	1,400 c	10,000	2,500	***17.5***	***55.1***	***20.7***	***17.0***	***77.2***	***106***	***13.5***	NT	NT	NT	NT	NT	***19.5***	***19.9***	***15.1***	***17.1***	**11.8**	**12.0**	**13.7**	**12.0**	**12.5**	**12.9**	13.0
Chromium *(based on VI)*	200 c*	37	500	***17.5***	***55.1***	***20.7***	***17.0***	***77.2***	***106***	***13.5***	NT	NT	NT	NT	NT	***19.5***	***19.9***	***15.1***	***17.1***	**11.8**	**12.0**	**13.7**	**12.0**	**12.5**	**12.9**	---
Cobalt	300 n	3,200	8,000	***5.12***	***5.15***	***5.15***	**4.80**	***6.18***	***8.03***	**2.78**	NT	NT	NT	NT	NT	***5.53***	**4.80**	**3.80**	***4.84***	**4.41**	**4.52**	**4.38**	**3.94**	**4.93**	**4.98**	4.82
Copper	41,000 nc	38,000	2,500	***21.4***	***83.5***	***34.7***	***18.6***	***123***	***176***	***16.8***	NT	NT	NT	NT	NT	***26.7***	***23.6***	***19.1***	***17.8***	**10.9**	**10.2**	**13.3**	**10.1**	**11.5**	**11.8**	12.2
Lead	800 n	3,500	1,000	***12.8***	***79.8***	***14.5***	***11.5***	***104***	***137***	***12.8***	NT	NT	NT	NT	NT	***16.5***	***16.6***	***8.87***	***10.2***	**7.87**	**8.01**	**9.33**	**6.31**	**5.30**	**5.17**	8.17
Mercury (SW7471A)	28 ns	180	20	***0.14***	***1.09***	***0.17***	***0.095***	***1.63***	***1.98***	**0.29**	NT	NT	NT	NT	NT	**0.23**	**0.14**	**0.090**	***0.11***	**0.034**	**0.032**	**0.061**	**0.031**	**0.028**	**0.024**	0.044
Molybdenum	5,100 n	4,800	3,500	***0.79 J***	***2.99***	***2.42 J***	**0.49 J**	***3.41***	***4.30***	***0.65 J***	NT	NT	NT	NT	NT	***0.53 J***	**0.51 J**	***0.62 J***	***0.56 J***	**0.41 J**	**0.35 J**	**0.48 J**	**0.61 J**	**0.39 J**	**0.51 J**	0.53
Nickel *(assumed soluble salts)*	20,000 n	16,000	2,000	***17.7***	***78.7***	***16.3***	***16.2***	***120***	***164***	***15.7***	NT	NT	NT	NT	NT	***22.1***	***19.6***	***14.5***	***19.0***	**10.2**	**10.5**	**12.0**	**9.87**	**10.0**	**10.1**	11.1
Selenium	5,100 n	4,800	100	**3.54**	***4.70***	***4.35***	***3.98***	***5.66***	***7.79***	**3.24**	NT	NT	NT	NT	NT	***4.11***	***4.24***	**1.82 J**	**3.38**	**1.97 J**	**3.38**	**3.57**	**1.99 J**	**3.84**	**4.12**	3.76
Silver	5,100 n	4,800	500	***0.69 J***	***5.34***	**0.25 J**	***0.99***	***8.5***	***11.6***	***1.09***	NT	NT	NT	NT	NT	***1.00***	***1.18***	***0.37 J***	***0.39 J***	**0.20 J**	**0.21 J**	**0.40 J**	**0.26 J**	**0.068 J**	**0.068 J**	0.265
Thallium	66 n	63	700	0.54 U	0.54 U	0.58 U	0.49 U	0.69 U	0.65 U	0.54 U	NT	NT	NT	NT	NT	0.53 U	0.59 U	0.58 U	0.55 U	0.60 U	0.56 U	0.64 U	0.63 U	0.62	0.65 U	0.64
Vanadium	5,200 n	6,700	2,400	***37.9***	***44.3***	***36.7***	**31.7**	***58.2***	***78.4***	***20.0***	NT	NT	NT	NT	NT	***40.2***	**32.8**	**24.6**	**24.0**	**26.6**	**26.9**	**29.7**	**27.2**	**34.8**	**35.9**	33.3
Zinc	31,000 nm	100,000	5,000	***71.7***	***291***	***70.1***	***60.2***	***470***	***641***	***62.5***	NT	NT	NT	NT	NT	***91.7***	***83.5***	***58.2***	***55.6***	**41.5**	**39.6**	**47.9**	**36.0**	**43.0**	**43.7**	45.0
Organochlorine Pesticides by SW8081																										
alpha-BHC (based on Lindane)	0.27^ c	2.0^	4.0^	5.32 U	5.65 U	5.10 U	5.21 U	**6.44 JP**	**6.16 JP**	5.48 U	NT	NT	NT	NT	NT	5.90 U	5.19 U	5.26 U	5.16 U	**6.37 JP**	5.79 U	5.77 U	5.42 U	5.91 U	5.67 U	---
gamma-BHC (Lindane)	2.1^ c	2.0^	4.0^	5.32 U	5.65 U	5.10 U	5.21 U	6.46 U	6.31 U	5.48 U	NT	NT	NT	NT	NT	5.90 U	5.19 U	5.26 U	5.16 U	6.03 U	5.79 U	5.77 U	5.42 U	5.91 U	5.67 U	---
beta-BHC (based on Lindane)	0.96^ c	2.0^	4.0^	5.32 U	5.65 U	5.10 U	5.21 U	6.46 U	6.31 U	5.48 U	NT	NT	NT	NT	NT	5.90 U	5.19 U	5.26 U	5.16 U	6.03 U	5.79 U	5.77 U	5.42 U	5.91 U	5.67 U	---
delta-BHC (based on Lindane)	0.96^ c	2.0^	4.0^	5.32 U	5.65 U	5.10 U	5.21 U	6.46 U	6.31 U	5.48 U	NT	NT	NT	NT	NT	5.90 U	5.19 U	5.26 U	5.16 U	6.03 U	5.79 U	5.77 U	5.42 U	5.91 U	5.67 U	---
Heptachlor	0.38^ c	0.52^	4.7^	5.32 U	5.65 U	5.10 U	5.21 U	6.46 U	6.31 U	5.48 U	NT	NT	NT	NT	NT	5.90 U	5.19 U	5.26 U	5.16 U	6.03 U	5.79 U	5.77 U	5.42 U	5.91 U	5.67 U	---
Aldrin^	0.13^	0.13^	1.4^	5.32 U	5.65 U	5.10 U	5.21 U	6.46 U	6.31 U	5.48 U	NT	NT	NT	NT	NT	5.90 U	5.19 U	5.26 U	5.16 U	6.03 U	5.79 U	5.77 U	5.42 U	5.91 U	5.67 U	---
Heptachlor epoxide	0.19^ c*	0.52^	4.7^	5.32 U	5.65 U	5.10 U	5.21 U	6.46 U	6.31 U	5.48 U	NT	NT	NT	NT	NT	5.90 U	5.19 U	5.26 U	5.16 U	6.03 U	5.79 U	5.77 U	5.42 U	5.91 U	5.67 U	---
gamma-Chlordane	6.5 c*	1.7	2.5^	**1.24 J**	**4.69 J**	5.10 U	**1.87 JP**	**14.7 P**	**12.8 P**	**2.54 J**	NT	NT	NT	NT	NT	**1.46 J**	**1.70 JP**	5.26 U	5.16 U	6.03 U	5.79 U	**2.29 JP**	5.42 U	5.91 U	5.67 U	---
alpha-Chlordane	6.5 c*	1.7	2.5^	**1.62 JP**	**5.37 P**	**1.49 JP**	**1.36 JP**	**15.6 P**	**13.2 P**	**1.99 JP**	NT	NT	NT	NT	NT	**1.22 JP**	**1.55 JP**	**0.63 JP**	5.16 U	6.03 U	5.79 U	5.77 U	**1.34 J**	5.91 U	5.67 U	---
4,4'-DDE	5.1^	6.3	1.0^	5.32 U	5.65 U	**2.40 J**	**1.57 J**	**23.9**	**21.6**	**2.25 JP**	NT	NT	NT	NT	NT	5.90 U	**1.94 J**	5.26 U	5.16 U	**1.18 J**	5.79 U	5.77 U	5.42 U	5.91 U	5.67 U	---
Endosulfan I	3,700 n	NA	NA	5.32 U	5.65 U	5.10 U	5.21 U	**6.48**	6.31 U	5.48 U	NT	NT	NT	NT	NT	5.90 U	5.19 U	5.26 U	5.16 U	6.03 U	5.79 U	5.77 U	5.42 U	5.91 U	5.67 U	---
Dieldrin^	0.11^ c	0.13	8.0	5.32 U	5.65 U	5.10 U	5.21 U	**23.0 JP**	**20.9 JP**	5.48 U	NT	NT	NT	NT	NT	5.90 U	5.19 U	5.26 U	5.16 U	6.03 U	5.79 U	5.77 U	5.42 U	5.91 U	5.67 U	---
Endrin	180 n	230	0.2^	5.32 U	5.65 U	5.10 U	5.21 U	6.46 U	6.31 U	5.48 U	NT	NT	NT	NT	NT	5.90 U	5.19 U	5.26 U	5.16 U	6.03 U	5.79 U	5.77 U	5.42 U	5.91 U	5.67 U	---
4,4'-DDD	7.2	9	1.0^	**1.82 JP**	**1.49 JP**	**1.79 J**	5.21 U	**3.74 P**	6.31 U	**4.75 JP**	NT	NT	NT	NT	NT	5.90 U	5.19 U	5.26 U	5.16 U	6.03 U	5.79 U	5.77 U	5.42 U	5.91 U	5.67 U	---
Endosulfan II	3,700 n	NA	NA	5.32 U	5.65 U	5.10 U	5.21 U	6.46 U	6.31 U	5.48 U	NT	NT	NT	NT	NT	5.90 U	5.19 U	5.26 U	5.16 U	6.03 U	5.79 U	5.77 U	5.42 U	5.91 U	5.67 U	---
4,4'-DDT	7.0	6.3^	1.0^	**4.85 JP**	5.65 U	**4.53 P**	**2.86 J**	6.46 U	6.31 U	5.48 U	NT	NT	NT	NT	NT	**2.28 J**	**3.88 JP**	**2.87 JP**	**2.53 JP**	**2.96 JP**	**1.67J**	**3.17 JP**	**20.7 JP**	**1.59 J**	**1.85 J**	---
Endrin aldehyde (based on Endrin)	180 n	230	0.2^	5.32 U	5.65 U	5.10 U	5.21 U	6.46 U	6.31 U	5.48 U	NT	NT	NT	NT	NT	5.90 U	5.19 U	5.26 U	5.16 U	6.03 U	5.79 U	5.77 U	5.42 U	5.91 U	5.67 U	---
Methoxychlor	3,100 n	3,800	100	5.32 U	5.65 U	5.10 U	5.21 U	6.46 U	6.31 U	5.48 U	NT	NT	NT	NT	NT	5.90 U	5.19 U	5.26 U	5.16 U	6.03 U	5.79 U	5.77 U	5.42 U	5.91 U	5.67 U	---
Endosulfan sulfate	3,700 n	NA	NA	5.32 U	5.65 U	5.10 U	5.21 U	**6.26 JP**	**5.41 JP**	5.48 U	NT	NT	NT	NT	NT	5.90 U	5.19 U	5.26 U	5.16 U	6.03 U	5.79 U	5.77 U	5.42 U	5.91 U	5.67 U	---
Endrin ketone	NA	NA	NA	5.32 U	5.65 U	5.10 U	5.21 U	6.46 U	6.31 U	5.48 U	NT	NT	NT	NT	NT	5.90 U	5.19 U	5.26 U	5.16 U	6.03 U	5.79 U	5.77 U	5.42 U	5.91 U	5.67 U	---
Volatile Organic Compounds (VOCs) by SW8260	various	various	various	NT	NT	NT	NT	NT	NT	All ND	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	---
Polycyclic Aromatic Hydrocarbons (PAHs) by SW8270-SIM																										
Naphthalene	20 c*	2.8 [4]	NA	NT	NT	NT	NT	NT	NT	NT	**11.6**	**4.30**	**1.07 J**	**3.23**	**0.82 J**	**0.70 J**	NT	**0.75 J**	NT	NT	NT	NT	NT	NT	NT	---
2-Methylnaphthalene	99 c	0.25 [4]	NA	NT	NT	NT	NT	NT	NT	NT	**9.39**	**3.05**	**0.72 J**	**3.43**	**0.45 J**	**0.48 J**	NT	**0.65 J**	NT	NT	NT	NT	NT	NT	NT	---
1-Methylnaphthalene	4,100 ns	NA	NA	NT	NT	NT	NT	NT	NT	NT	**10.7**	**6.57**	**2.74**	**5.94**	**1.06 J**	**4.25**	NT	**1.38 J**	NT	NT	NT	NT	NT	NT	NT	---
Acenaphthylene	NA	13 [4]	NA	NT	NT	NT	NT	NT	NT	NT	**4.59**	**1.96**	**2.06**	**6.37**	**0.73 J**	**0.41 J**	NT	**0.87 J**	NT	NT	NT	NT	NT	NT	NT	---
Acenaphthene	33,000 n	16 [4]	NA	NT	NT	NT	NT	NT	NT	NT	**1.51 J**	**0.64 J**	**0.92 J**	0.15 U	0.16 U	**0.32 J**	NT	**0.96 J**	NT	NT	NT	NT	NT	NT	NT	---
Fluorene	22,000 n	8.9 [4]	NA	NT	NT	NT	NT	NT	NT	NT	**2.17**	**0.95 J**	0.23 U	0.21 U	0.22 U	**0.54 J**	NT	**1.34 J**	NT	NT	NT	NT	NT	NT	NT	---
Phenanthrene	NA	11 [4]	NA	NT	NT	NT	NT	NT	NT	NT	**15.6**	**8.06**	**4.01**	0.14 U	**3.49**	**4.25**	NT	**9.26**	NT	NT	NT	NT	NT	NT	NT	---
Anthracene	170,000 nm	2.8 [4]	NA	NT	NT	NT	NT	NT	NT	NT	**7.30**	**2.79**	**2.59**	0.23 U	0.24 U	**1.10 J**	NT	**2.01**	NT	NT	NT	NT	NT	NT	NT	---
Fluoranthene	22,000 n	40 [4]	NA	NT	NT	NT	NT	NT	NT	NT	**50.3**	**20.0**	**26.2**	**3.68**	**12.2**	**18.5**	NT	**25.8**	NT	NT	NT	NT	NT	NT	NT	---
Pyrene	17,000 n	13 [4]	NA	NT	NT	NT	NT	NT	NT	NT	**60.4**	**23.0**	**32.8**	**39.2**	**16.5**	**17.6**	NT	**33.4**	NT	NT	NT	NT	NT	NT	NT	---
Benz(a)anthracene	2.1 c	1.3 [4]	NA	NT	NT	NT	NT	NT	NT	NT	**58.8**	**18.0**	**56.8**	**1.32 J**	**10.9**	**17.0**	NT	**18.9**	NT	NT	NT	NT	NT	NT	NT	---
Chrysene	210 c	2.3 [4]	NA	NT	NT	NT	NT	NT	NT	NT	**59.8**	**16.0**	**55.3**	**12.0**	**10.4**	**14.9**	NT	**18.8**	NT	NT	NT	NT	NT	NT	NT	---
Benzo(b)fluoranthene	2.1 c	1.3 [4]	NA	NT	NT	NT	NT	NT	NT	NT	**188**	**55.6**	**113**	**19.8**	**27.5**	**36.1**	NT	**50.1**	NT	NT	NT	NT	NT	NT	NT	---
Benzo(k)fluoranthene	21 c	1.3 [4]	NA	NT	NT	NT	NT	NT	NT	NT	**63.7**	**20.5**	**35.9**	**4.17**	**9.62**	**9.65**	NT	**12.1**	NT	NT	NT	NT	NT	NT	NT	---
Benzo(a)pyrene	0.21 c	1.7 [2] or 0.13 [4]	NA	NT	NT	NT	NT	NT	NT	NT	**89.5**	**31.5**	**67.7**	**9.07**	**16.1**	**19.4**	NT	**21.7**	NT	NT	NT	NT	NT	NT	NT	---
Indeno(1,2,3-c,d)pyrene	2.1 c	2.1 [4]	NA	NT	NT	NT	NT	NT	NT	NT	**55.2**	**17.2**	**30.6**	**4.71**	**5.83**	**7.48**	NT	**6.73**	NT	NT	NT	NT	NT	NT	NT	---
Dibenzo(a,h)anthracene	0.21 c	0.21^ [4]	NA	NT	NT	NT	NT	NT	NT	NT	**18.4**	0.37 U	**11.0**	0.37 U	0.39 U	0.42 U	NT	0.39 U	NT	NT	NT	NT	NT	NT	NT	---
Benzo(g,h,i)perylene	NA	27 [4]	NA	NT	NT	NT	NT	NT	NT	NT	**81.5**	**24.4**	**34.0**	**9.99**	**7.77**	**8.27**	NT	**12.3**	NT	NT	NT	NT	NT	NT	NT	---
Total Petroleum Hydrocarbons (TPH by SW8015-E)																										
TPH-Oil	NA	2,500 [4]	NA	NT	NT	NT	NT	NT	NT	NT	**2,200**	**601**	**216**	**697**	**131**	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	---

Notes:

All analytical results for soil given in mg/kg on a dry weight basis. Samples ending in -06 were surface samples collected in the 0 to 6 inch depth interval. Samples ending in -36 were subsurface samples collected in the 30 to 36 inch depth interval.

NA - Comparative value not available
NT - Sample not tested for this parameter
U = Not detected at specified reporting limit
J = Estimated value below reporting limit
E = Estimated value above calibration range
P = Primary and confirmation results outside of 40% RPD

Boldface entries indicate detected constituents/compounds (including those detected between MDL and RL - 'J' flagged). Exceedances noted according to shaded boxes below for detected compounds only.

Exceeds Title 22 Hazardous Waste Criteria — Exceeds one or more of the risk-based criteria (PRGs or CHHSLs) — Exceeds both Title 22 HWC and one or more of the risk-based criteria

Boldface Italics metal entries exceed the corresponding 95% upper confidence limit on the geometric mean for background soils (using surface and subsurface samples).

c = Cancer PRG
n = Noncancer PRG
c* = where: n screening level < 100x cancer screening level
m = concentration may exceed ceiling limit
^ = MDL's for this method are less than or equal to the screening level.

[1] USEPA Region IX PRGs 2008
[2] California Human Health Screening Levels - values in this column are from the CHHSLs list unless otherwise noted.
[3] TTLC = Total Threshold Limit Concentration (wet weight basis) that is hazardous waste criteria under California Code of Regulation, Title 22, Division 4.5, Chapter 11, Section 66261.24.
[4] San Francisco Bay RWQCB Environmental Screening Levels (2008) - Shallow Soil Screening Levels (<3m bgs), Commercial/industrial land use where groundwater is not a current or potential drinking water resource)
TPH-Oil by SW8105-E corresponds to TPH-residual fuels criteria
[5] The 95% UCL for chromium and thallium are based solely on the method detection limits for these constituents that were not detected in background soils.

APPENDIX C

APPENDIX D

APPENDIX E

Site-Specific
Health & Safety Plan (HASP) for
Preliminary Endangerment Assessment

Lodi Energy Center
12745 N Thornton Rd
Lodi, CA 95242

Prepared for:
(City of Lodi)

Prepared by:

Stantec

077

3017 Kilgore Road Suite 100
Rancho Cordova, CA 95670

8/15/2009

STANTEC
HEALTH AND SAFETY PLAN
REVIEW AND APPROVAL

CLIENT: City of Lodi.	SITE NAME: Lodi Energy Center (LEC)
PROJECT NAME: Preliminary Endangerment Assessment (PEA)	PROJECT NUMBER: *185702098.200.0002*
START DATE: 8/15/2009 PLAN REVIEW DATE: 2/10/2010 (Last day of expected fieldwork or no longer than 6 months).	END DATE: 8/15/2010

Gary Haeck Project Manager	Signature: Gary Haeck	Date: 8/15/09
Todd Brown Stantec office Health and Safety Coordinator	Signature: Todd Brown	Date: 8/15/09
Bryan Rorie Site Health and Safety Officer	Signature: Bryan Rorie	Date: 8/15/09
Bryan Rorie HASP Author	Signature: Bryan Rorie	Date: 8/15/09
Rachael Miller Peer Reviewer	Signature:	Date: 8/15/09

This Health and Safety Plan has been written for the use of Stantec and its employees. It may also be used as a guidance document by properly trained and experienced Stantec subcontractors and clients.

Our work can be hazardous, and it is imperative that we never forget that! It is the intent of this document to address our risks. The health and safety guidelines in this Plan were prepared specifically for this site, its conditions, purposes, dates and personnel and must be amended if conditions change. This Plan must not be used on any other site without prior research by trained health and safety specialists.

Stantec claims no responsibility for its use by others for purposes unrelated to this project. This Plan will provide useful information to subcontractors and will assist them in developing their own HASP. Subcontractors should sign this plan (See **Attachment 12**) as an acknowledgement of hazard information and notice that they must ensure that the risks posed by work on this site are addressed. Stantec is readily available to assist subcontractors in identifying and addressing their employees' risks.

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ATTACHMENTS

1.0 LOCAL EMERGENCY CONTACT NAMES, PHONE NUMBERS, AND DIRECTIONS TO THE HOSPITAL

The nearest telephone is a: Cell Phone carried by the STANTEC SHSO.
The number of the nearest telephone is (916) 296-8653

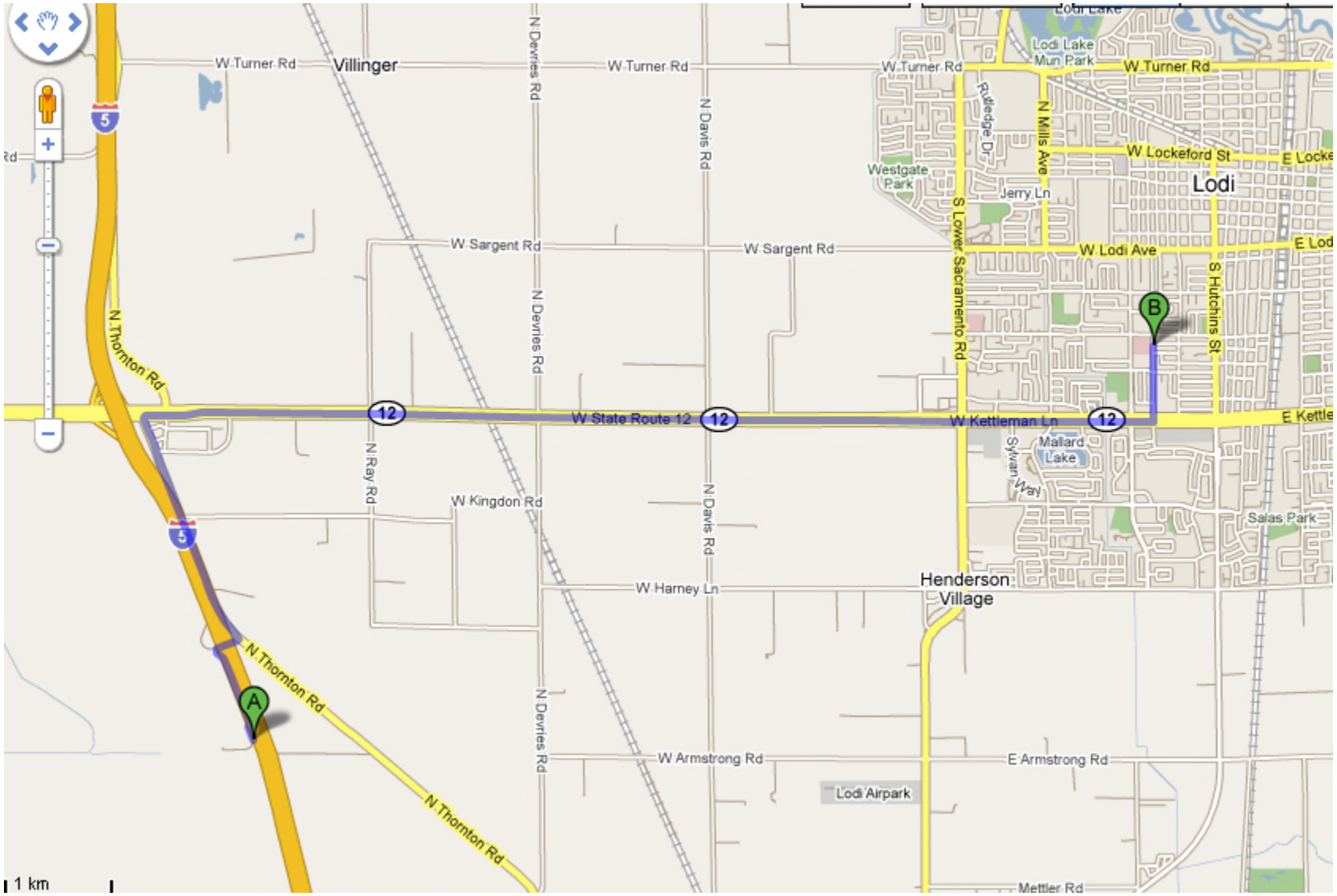
	NAME	TELEPHONE	VERIFIED
Hospital	Lodi Memorial Hospital	**911 or (209) 334-3411**	**BMR 8/7/09**
Ambulance	**American Medical Response**	**911 or (209) 948-6056**	**BMR 8/7/09**
Police	**City of Lodi Police**	**911 or (209) 333-6727**	**BMR 8/7/09**
Fire Department	**City of Lodi Fire Department**	**911 or (209) 333-6727**	**BMR 8/7/09**

DIRECTIONS AND MAP TO THE HOSPITAL – SEE BELOW

N Cord Rd

1. Head **north** on **N Cord Rd** toward **N I 5 FR Rd** — 0.6 mi
2. Turn **right** at **N I 5 FR Rd** — 0.2 mi
3. Turn **left** at **N Thornton Rd** — 1.5 mi
4. Slight **right** at **CA-12/W State Route 12**
   Continue to follow CA-12 — 5.9 mi
5. Turn **left** at **S Fairmont Ave**
   Destination will be on the left — 0.4 mi

Lodi Memorial Hospital
975 S Fairmont Ave
Lodi, CA 95240, United States


W Turner Rd
Villinger
N Devries Rd
N Davis Rd
Rutledge Dr
N Mills Ave
Lodi Lake
Lodi Lake Mun Park
W Lockeford St
Westgate Park
Jerry Ln
Lodi
S Lower Sacramento Rd
W Sargent Rd
W Lodi Ave
S Hutchins St
N Thornton Rd
W State Route 12
W Kettleman Ln
Mallard Lake
Sylvan Way
Salas Park
N Ray Rd
W Kingdon Rd
Henderson Village
W Harney Ln
A
B
W Armstrong Rd
E Armstrong Rd
Lodi Airpark
Mettler Rd
1 km

2.0 OBJECTIVES, GOALS, PURPOSES AND POLICY OF THIS HASP

Let's be clear about our objectives in this HASP. The purpose of this HASP is to:

- Document a proactive, scientific exposure assessment, which identifies and helps us understand our risks.
- Document proactive precautions we are going to take to avoid the risks.

Let's be clear about our goal in this HASP. Our policy is to:

- Complete our work on this site without incidents of all types; no injuries, no illnesses, no impacts to the environment or to property and equipment. In order to achieve this goal, the project team must work together to perform an effective hazard assessment. The team will then establish appropriate precautions and communicate these daily among project staff. Staff will be responsible for communicating changing field conditions to the project management so these conditions and appropriate precautions may be reevaluated as needed. Staff should implement **STOP WORK AUTHORITY** at any time they believe that conditions may be inherently unsafe or might cause damage to property or harm to the environment. Staff may refuse to participate in work they believe will be unsafe. If such conditions exist, staff must communicate immediately with the Project Manager to resolve the situation. We expect all subcontractors and project personnel to share this goal.

3.0 SCOPE OF WORK

The scope of this project is to:

- **Advance soil borings**
- **Collect soil samples**
- **Collect groundwater samples**

This HASP was prepared for the use of Stantec personnel while performing the following tasks:

- Drive to and from site
- Call USA 48 prior to subsurface investigation and clear utilities with a private utility locating company.
- Clear boring to five feet bgs for utilities.
- Advance soil borings using direct push drill rig, collect samples, and grout boring.
- Collect Groundwater Samples

A general site map is included in **Attachment 2**.

4.0 EMERGENCY RESPONSE

- *Remember this must be specific to the site and discussed with the client/facility manager.*
- *This must be coordinated with other contractors working on the site. This can be done at the initial site meeting, but do not forget to do it.*
- *In addition to injuries and illnesses noted here, this section should also address how the client wants us to respond to: the public or the press, fires, bomb threats, etc.*
- *You must discuss emergency response at the pre-startup meeting with the contractor to make sure that you can act on the response plan in the event of an emergency.*
- *All Stantec staff on site must have completed CPR and First Aid training.*
- *In the event of an injury or illness, notification of the family of the individual involved shall be made as promptly as possible following the office's emergency action plan.*
- *You must have an eyewash bottle with you on site in case you get something in your eyes.*
- **If there is any type of emergency (injury, spill, etc.), work is to be shut down until the situation that caused the emergency is corrected and work can resume without further risk of a similar incident.**
- **ALL INCIDENTS regardless of severity and all near misses shall be reported IMMEDIATELY, (after stabilizing the victim(s)/site), to the Stantec Project Manager and to Philip Platcow, Director of HSE, Michael Philipp, II/NMI Program Manager, and to Stantec's Practice and Risk Management (PRM) group. PRM will make all other necessary notifications within Stantec (human resources, program directors, management, etc). The Project Manager together with Philip Platcow (or Michael Philipp if Mr. Platcow is not available) shall then communicate with the client Project Manager in accordance with the client's incident reporting guidelines. Client and Stantec incident reporting guidelines are contained in Attachment 1 and Attachment 3 respectively.**

The **Site Health & Safety Officer (SHSO)** must be familiar with the directions to the hospital given in **Section 1.** *(It has become common to take directions off the Internet. In some cases these directions are no longer correct. It is the* **SHSO's** *responsibility to ensure that the directions stated in the HASP are absolutely accurate. It may be advisable to ask the client or call a local institution for directions. The* ***SHSO*** *should then verify and validate the route to the hospital by driving it before work begins.*

Injury or Illness

If an injury or illness occurs, take the following action:

- Determine if emergency response (fire/ambulance) staff are necessary. If so, dial **911** or **(209) 333-6727** (City of Lodi Fire Department) on cell phone or closest available phone. *(**carried by the STANTEC SHSO**)* Provide the location of the injured person and other details as requested. If it makes sense to take an individual to the hospital, follow the directions in **Section 1.**

- Get First Aid for the person immediately. Utilize first aid kit in vehicle. Also utilize the bloodborne pathogens kit. *(Make sure you have both kits, or one combined kit).*

- Notify the **SHSO** immediately. The **SHSO** is responsible for contacting the Stantec Project Manager immediately after stabilizing the victim(s)/site. The Stantec Project Manager shall then immediately contact Philip Platcow, Director of HSE and Michael Philipp II/NMI Program Director. The Stantec Project Manager shall then immediately contact **Stantec's Practice and Risk Management (PRM) group**. PRM will contact the appropriate Human Resources contacts and all other necessary Stantec parties. The Stantec Project Manager along with the SHSO, and the Office Safety & Environment Coordinator (OSEC) / Operational Excellence Coordinator (OEC) (and other witnesses, experts, etc.) are responsible for preparing and submitting the Incident/Near Miss Investigation Report to PRM at (780) 969-2030 within 24 hours of the incident. The client shall be notified in accordance with the client's reporting procedures and timelines by the Stantec Project Manager (or other Stantec representative per client reporting procedures). Use the Incident Investigation / Near Miss Investigation Report in **Attachment 3**.

- The **SHSO** will assume responsibility during a medical emergency until more qualified emergency response personnel arrive at the site.

First Aid Procedures for Minor Cuts, Scratches, Bruises, etc.

- Each occupational illness or injury shall be reported immediately by employees to the **SHSO**. The **SHSO** will complete the Incident Investigation / Near Miss Investigation Report in **Attachment 3** and report the incident to Stantec's Practice Risk Management group.

Medical Cases Not Requiring Ambulance Service

- Medical cases normally not requiring ambulance services are injuries such as minor lacerations, minor sprains, etc.

- The **SHSO** will ensure prompt transportation of the injured person to a physician or hospital following the directions in **Section 1**.

- A representative of Stantec /sub-contractor should always drive the injured employee to the medical facility and remain at the facility until the employee is ready to return.

- If the driver of the vehicle is not familiar with directions to the hospital, a second person shall accompany the driver and the injured employee and navigate the route to the hospital following the directions in **Section 1**.

- If it is necessary for the **SHSO** to accompany the injured employee, provisions must be made to have another employee, properly trained and certified in first aid, to act as the temporary **SHSO**.

- If the injured employee is able to return to the jobsite the same day, he/she should bring with him/her a statement from the doctor containing such information as:

    - Date
    - Employee's name
    - Diagnosis
    - Date he/she is able to return to work, regular or light duty

- Date he/she is to return to doctor for follow-up appointment, if necessary
- Signature and address of doctor

If the injured employee is unable to return to the jobsite the same day, the employee who transported him should bring this information back to the jobsite and report it to the Director Health & Safety and Environment (HSE), Philip Platcow at (617) 232-7355, to Practice and Risk Management at (780) 969-2030, and their regional Human Resources Specialist

- US East = Jennie Moore at (585) 413-5241
- US West = Peggy Ramos (949) 923-6061
- US Mtn Desert (1) = Shannon Drake (602) 707-4627 (Arlington, Houston, Midland, Phoenix, Scottsdale, Ponca City SLC)
- US Mtn Desert (2) = Sheryl Appelt (602) 707-9495 (Dallas, Fort Worth, Denver, Fort Collins, Golden, Las Vegas, Reno, Oklahoma City, Tucson)

Emergency Cases Requiring Ambulance Services

- Medical cases requiring ambulance services would be such cases as severe head injuries, amputations, heart attacks, etc.

- Should ambulance service be necessary, the following procedures should be taken immediately.

  - Contact necessary ambulance service and company emergency services by dialing **911 or ((209) 333-6727** (City of Lodi Fire Department) and notify the **SHSO** for the site.
  - Administer first aid until ambulance service arrives.
  - While the injured employee is being transported, the **SHSO** should contact the medical facility to be utilized.
  - One designated representative should accompany the injured employee to the medical facility and remain at the facility until final diagnosis and other relevant information is obtained.

Death of an Individual or Hospitalization of Three or More Employees

The procedure as outlined in "First Aid and Medical Cases", above, should be followed. If the injured person dies, then Human Resources Department, local officials and coroner must be notified ***immediately*** (by PRM). Human Resources will notify the **local OSHA office within 8 hours of the incident or fatality** in the event of fatality or hospitalization of three or more employees.

Response to Spills or Cut Lines

Prevent problems by documenting the location of underground lines (e.g., product, sewer, telephone, fiber optic) before starting site work. If a line or tank is drilled through, or another leak occurs, document the event as soon as possible using the Incident Investigation Report in **Attachment 3. Notification of the event must be made to the Stantec Project Manager by the SHSO immediately after stabilizing the site.** The Stantec Project Manager shall then immediately contact **Practice Risk Management and Health Safety & Environment (HSE) Department.** Include dates, times, actions taken, agreements reached, and names of people involved. Use additional pieces of

paper to document the event completely. The **SHSO**, PM and PRM must be notified immediately. The PM will notify the client and the regulatory authorities and/or utility as necessary.

In the event of a spill/release, follow this plan:

1. Stay upwind of the spill/release.
2. Wear appropriate PPE.
3. Turn off equipment and other sources of ignition.
4. Turn off pumps and shut valves to stop the flow/leak.
5. Plug the leak or collect drippings, when possible.
6. Use sorbent pads to collect product and impede its flow, if possible.
7. Call Fire Department immediately if fire or emergency develops.
8. Inform Stantec Project Manager about the situation.
9. Determine if the client wants Stantec to repair the damage or if the client will use an emergency repair contractor.
10. Based on agreements, contact emergency spill contractor for containment of free product. The contact for this project will be Veolia Environmental, Mark LaLiberte Phone: (707) 748-3722
11. Advise the client of spill discharge notification requirements and determine who will complete and submit forms. *(Do not submit or report to agencies without the client's consent.)* Document each interaction with the client and regulators and note, in writing; name, title, authorizations, refusals, decisions, and commitments to any action.
12. Do not transport or approve transportation of contaminated soils or product until proper manifests have been completed and approved. Be aware that soils / product may meet criteria for hazardous waste.
13. Do not sign manifests as generator of wastes; contact PM or Waste Compliance Manager to discuss waste transportation.

Notifications – a spill/release requires completion of an Incident Investigation (II). **The incident shall be reported immediately after stabilizing the victim(s)/site. The PM must involve the client/generator in the Incident Investigation process. The client/generator is under obligation to report to the proper government agencies. If the spill extends into waterways, the Coast Guard and the National Response Center (800) 424-8802 must be notified immediately by the client or by Stantec PM with the client's permission.**

All spills/releases must be reported per site/client requirements per procedures listed in **Attachment 1**.
All spills/releases must be reported to Gary Haeck Phone: (916) 861-0400 at .

Emergency Decontamination Procedures

Ensure eyewash bottle, water (unless the chemicals of concern are water reactive), and other decontamination aids are available on-site.

In the event of emergency decontamination:

- Secure area or move/evacuate to the emergency gathering location.
- Immediately remove any contaminated PPE or clothing (gloves, etc.)
- If possible, wash contaminated area with mild soap and water. Use eyewash station if necessary.
- Observe the contaminated area.
- Repeat washing as necessary.
- Notify SHSO immediately.

Exposure to contaminated individuals should be limited to personnel wearing the proper PPE to avoid unnecessary exposure.

5.0 CONTRACTOR EMERGENCY ACTION PLAN

The **SHSO** will ensure that the Subcontractor/Contractor is capable of efficient evacuation/emergency response in the event of an emergency. Subcontractor/Contractor's employees will be trained by their employer in site-specific evacuation/emergency procedures, including alarm systems and evacuation plans and routes.

The Subcontractor/Contractor shall instruct its employees that in the event of an emergency such as a fire, release, or accident involving injuries, they are required to dial **911,** or **((209) 333-6727** (City of Lodi Police) **(non-emergency)**). The reporting employee is to state the problem clearly and fully and remain on the line until dismissed by the operator.

Stantec staff and Subcontractor/Contractors working in an area where an emergency exists shall evacuate to a safe location, preferably upwind, away from the area and take attendance. **The gathering location will be determined by the Stantec SHSO upon arrival on site. It is the responsibility of the SHSO to annotate the Site Plan with the gathering location position and to disseminate that info to all site personnel during the Daily Production Safety Meeting and any other appropriate time after that.**

(If the emergency causes the route to a gate surrounding the site to be closed, the Stantec staff and Subcontractor/Contractors shall move to an open area upwind of the hazard area, and remain there until instructed by emergency response personnel (i.e., police, fire, ambulance, paramedics, etc.) to do otherwise.)

Subcontractor/Contractor has the responsibility to account for its own employees and to provide such information immediately to emergency response personnel upon request.

Stantec staff and Subcontractor/Contractor may not reenter the emergency site without specific approval from emergency response personnel.

In the event of fire ignition in close proximity to Stantec staff and Subcontractor/Contractor's employees, those persons shall evacuate the area and notify emergency personnel unless the fire is readily extinguished with portable dry chemical equipment on-hand. **When in doubt, emergency response personnel shall be notified.**

6.0 BACKGROUND INFORMATION ON THE PROJECT SITE

The Northern California Power Agency (NCPA) is proposing to construct on City of Lodi property a natural gas-fired electrical power generation facility (LEC) on a 4.4 acre portion (Site) of San Joaquin County APN 055-139-16 in Lodi, California. NCPA contracted Carlton Engineering Inc. (Carlton) to perform a Phase I Environmental Site Assessment (ESA) at the Site.

The June 30, 2008 ESA did not identify any recognized environmental conditions (ASTM 1527) at the Site, but did identify several potential environmental concerns (PECs). Based on the ESA results, the CEC requested that NCPA conduct field sampling and soil analyses to adequately characterize the presence of harmful chemicals at the Site and discuss potential risks to construction or plant personnel from these chemicals. In compliance, NCPA directed CH2M HILL to perform a limited Phase II Environmental Site Assessment (Phase II ESA) to obtain data to comply with the CEC request.

On February 2, 2009, CH2M HILL performed preliminary soil sampling and subsequent analyses to provide data associated with the PECs identified by the Carlton ESA. CH2M HILL summarized the data and compared it to various agency soil screening levels in a preliminary evaluation of risk to human health in the February 26, 2009 Memorandum entitled *NCPA Lodi Preliminary Phase II ESA Sample Results.* CH2M HILL concluded that exposure of construction workers and onsite industrial workers to surface and subsurface soils may adversely affect human health. Based on these results, the CEC requested that additional investigation and evaluation of risk be conducted under DTSC oversight. Stantec understands that the NCPAs consultant has initiated preliminary discussions with DTSC regarding CEC's request, including acceptable modifications to the standard PEA requirements.

7.0 CLIENT SAFETY PROCEDURES

City of Lodi does not have any required safety programming or expectations, thus our staff and any subcontractors will comply with state, federal and local regulations, and Stantec's policies, procedures and expectations.

ALL WORKERS HAVE STOP WORK AUTHORITY!!

8.0 GOVERNMENT AND LINE LOCATOR CONTACT NAMES AND PHONE NUMBERS

AGENCY or LINE LOCATOR	NAME	TELEPHONE NO	VERIFIED
National Response Center	(24 Hour Hotline)	(800) 424-8802	BMR 8/7/09
U.S. E.P.A.	(24 Hour Hotline)	(800) 424-9346	BMR 8/7/09
California Emergency Management Services	(24 Hour Hotline)	(800) 852-7550	BMR 8/7/09
U.S. National Poison Control Center	(24 Hour Hotline)	(800) 222-1222	BMR 8/7/09
National 811 Call-before-you-dig Hotline	(24 Hour Hotline)	811	BMR 8/7/09
LINE LOCATOR	Underground Service Alert	(800) 227-2600	BMR 8/7/09
LINE LOCATOR	Underground Service Alert	(800) 422-4133	BMR 8/7/09

9.0 PROJECT PERSONNEL AND RELEVANT INFORMATION

Questions about this project posed by neighbors, the press, or other interested parties should be directed to:

Name: Gary Haeck Company: Stantec Phone: (916) 861-0400

The site phone number is a cell phone in the possession of Bryan Rorie (916) 296-8653

Site personnel shall be trained and certified in hazardous waste operations; specifically,

- 40-Hour HAZWOPER Training and a current;
- Annual 8-Hour Refresher [29 CFR 1910.120(e)(8)];
- First Aid/CPR training; and
- Shall have had a physical examination consistent with 29 Code of Federal Regulations (CFR) 1910.120. (and 8 California Code of Regulations (CCR) 5192, if applicable.)
-

In addition, the Site Manager/SHSO will have Supervisory 8-hour Training [29 CFR 1910.120(e)(4)].

Subcontractors shall review and sign the form in **Attachment 12 ACKNOWLEDGMENT & AGREEMENT FORM**

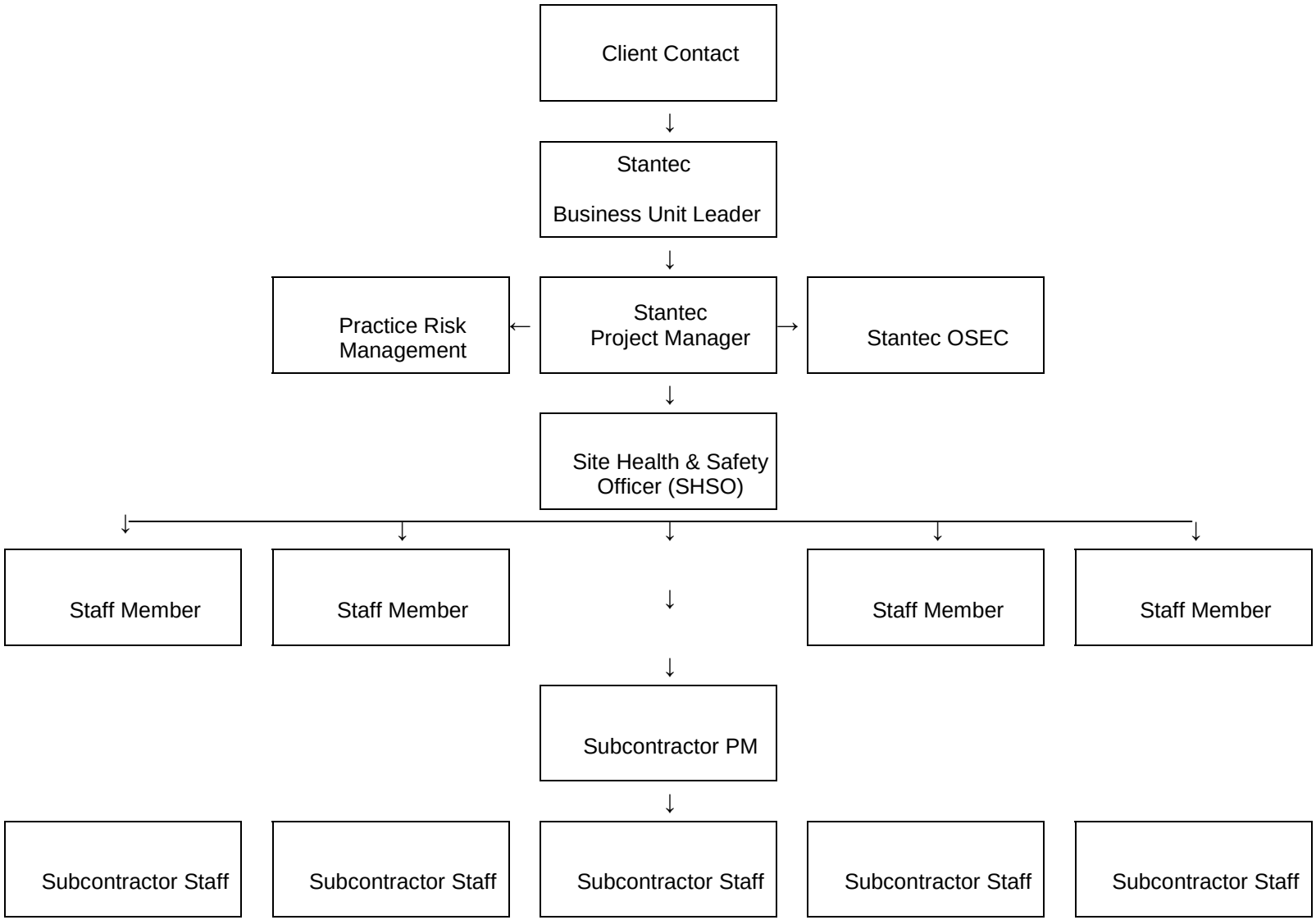
The table below summarizes project personnel, responsibilities, and training dates.

PROJECT JOB TITLE	NAME	TELEPHONE NO.	GENERAL PROJECT RESPONSIBILITIES	40-Hr HAZWOPER	8-Hr Refresher	CPR/First-Aid	MEDICAL SURVEILANCE DATE
Site Health and Safety Officer	**Bryan Rorie**	**(916) 296-8653 Cell**	**Implementing this HASP. Has authority to stop work. Perform air quality tasks. Take charge of all incidents. Review subcontractor HASP**	**6/6/2005**	**3/5/2009**	**6/23/2009**	**5/18/2009**
Project Manager	**Gary Haeck**	**(916) 861-0400**	**Overall financial and logistics. Contact client and subs to understand all hazards. Discuss with SHSO. Follow-up all incidents upon notice.**	**2/12/1993**	**3/11/2009**	**6/4/2009**	**4/25/2008**
Stantec Business Unit Leader	**Jim Grasty**	**(916) 861-0400**	**Provide immediate support at notice of all incidents**	**12/01/88**	**03/13/09**	**11/26/07**	**10/03/09**
STANTEC Director of Industrial Hygiene	**Philip Platcow**	**(617) 232-7355 Cell (617) 739-1224 Home**	**Respond with corporate resources to all incidents as appropriate. Assist in HASP review. Assist in incident investigation.**	**3/1/1997**	**1/29/2009**	**1/12/2007**	**5/29/2008**
STANTEC Human Resources Director	**Peggy Ramos**	**(949) 923-6061**	**Assist with incident review, recordkeeping.**	**N/A**	**N/A**	**N/A**	**N/A**

Stantec office Health and Safety Coordinator	**Todd Brown**	**(916) 792-2747 Cell**	**Manage Health and Safety responsibilities for personnel in Office. Assist employees with setting up training and attending/completing necessary courses.**	**5/1/1994**	**3/11/2009**	**6/4/2008**	**6/3/2009**

- Other training may be required such as LPS, Passport, Fall Protection, Lock Out Tag Out, Hot Work, Confined Space, etc. according to the clients training requirements and hazards specific to the job being performed. Enter into the table below.

NAME	TRAINING COURSE	DATE	RECERTIFICATION DUE


Client Contact
Stantec
Business Unit Leader
Practice Risk Management
Stantec Project Manager
Stantec OSEC
Site Health & Safety Officer (SHSO)
Staff Member
Staff Member
Staff Member
Staff Member
Subcontractor PM
Subcontractor Staff
Subcontractor Staff
Subcontractor Staff
Subcontractor Staff
Subcontractor Staff

10.0 CONSTITUENTS OF POTENTIAL CONCERN AND MAXIMUM CONCENTRATIONS IDENTIFIED ONSITE

Potential Chemicals of concern are as follows but not limited to; Metals (CAM-17), Organic Pesticides, Volatile Organic Compounds (VOCs), Total Petroleum Hydrocarbons as Oil (TPHo), and Oxygenates. Concentration levels are to be determined through further investigation.

11.0 POTENTIAL AIRBORNE CONCERNS

POTENTIAL AIRBORNE CHEMICALS ONSITE IN THIS PROJECT REVIEW THIS TABLE AND CONTACT SHSO WITH QUESTIONS						
CHEMICAL (OR CLASS)	**OSHA PEL ACGIH TLV**	**OTHER PERTINENT LIMITS**	**WARNING PROPERTIES**	**ROUTES OF EXPOSURE OR IRRITATION**	**ACUTE HEALTH EFFECTS**	**CHRONIC HEALTH EFFECTS/ TARGET ORGANS**
Benzene-1910.1028	Cal/FedOSHA PEL 1.0 ppm TLV 0.5.0 ppm (skin)	CalOSHA & FedOSHA STEL 5.0 ppm NIOSH REL 0.1 ppm IDLH 500 ppm	Characteristic benzene odor.	Inhalation, Dermal, ingestion, eyes.	Skin (dermatitis), eye, respiratory tract irritant, headache, dizziness, nausea.	Carcinogen, CNS, eye damage, bone marrow, blood, skin, leukemia.
Ethylbenzene	Cal/FedOSHA PEL 100 ppm TLV 100 ppm PEL-STEL 125 ppm	TLV STEL 125 ppm NIOSH REL 100 ppm REL-STEL 125 ppm IDLH 800 ppm CalOSHA STEL 125 ppm	Pungent aromatic odor.	Inhalation, dermal, ingestion, eyes.	Skin/eye/mucous membrane irritant, headache, dizziness, drowsiness	Eyes, respiratory tract, skin, CNS, blood, kidneys, liver.
Methyl Tertiary Butyl Ether (MTBE)	CalOSHA PEL 40 ppm FedOSHA PEL None Established TLV 40 ppm	AIHA WEEL 100 ppm.	Flammable liquid with a distinctive, disagreeable odor.	Inhalation, dermal, ingestion.	Irritated nose, throat, headache, dizziness, nausea, sleepiness	CNS, liver, kidney, gastrointestinal damage, potential carcinogen
Tert Butyl Alcohol (TBA)	Fed OSHA PEL 100 ppm TLV 100 ppm	Fed OSHA STEL 150 ppm TLV STEL 150 ppm	Colorless solid or liquid with a camphor like odor.	Inhalation, ingestion, absorption through the skin or eye	Irritation to eyes, skin, respiratory tract, mucous membranes.	Eyes, skin, respiratory tract and mucous membranes
Tertiary Amyl Methyl Ether (TAME)	Cal/Fed OSHA PEL None listed TLV 20 ppm	NIOSH REL None listed	Clear, colorless liquid with a mild ether like odor.	Inhalation, ingestion, absorption through the skin or eye	Irritation to the eyes, skin, respiratory tract, gastro intestinal tract, nausea, vomiting and diarrhea.	Nervous system reproduction system.
Toluene	CalOSHA PEL 50 ppm FedOSHA PEL 200 ppm TLV 50 ppm	NIOSH REL 100 ppm TWA; 50 ppm STELILDH 500 ppm CalOSHA C 500 ppm CalOSHA STEL 150 ppm	Sweet, pungent, benzene-like odor.	Inhalation, dermal, ingestion, eyes.	Skin (dermatitis) eye, respiratory tract irritant, headache, dizziness, weakness, and fatigue.	CNS, liver, kidneys, skin.
TPHg (GRO)	CalOSHA PEL 300 ppm FedOSHA PEL None Established TLV 300 ppm	No REL Established CalOSHA STEL 500 ppm	Clear liquid with a characteristic odor.	Inhalation, skin absorption, ingestion, skin and/or eye contact.	Irritation eyes, skin, mucous membrane; dermatitis; headache, fatigue, blurred vision, dizziness, slurred speech, confusion, convulsions; chemical pneumonia (aspiration liquid); possible liver, kidney damage; [Potential occupational carcinogen]	Eyes, skin, respiratory system, central nervous system, liver, kidneys
Xylenes	Cal/FedOSHA PEL 100 ppm TLV 100 ppm	TLV STEL 500 ppm NIOSH REL 100 ppm REL STEL 100 ppm IDLH 900 ppm CalOSHA C 300 ppm CalOSHA STEL 150 ppm	Aromatic odor.	Inhalation, dermal, ingestion, eyes.	Throat and skin irritant(dermatitis), headache, nausea, drowsiness, fatigue	CNS, liver, kidneys, skin, gastrointestinal damage, eye damage

Explanation of Abbreviations

Abbreviation	Explanation
PEL	Permissible Exposure Limit
REL	Recommended exposure limit set by NIOSH
C	Ceiling limit
STEL	Short Term Exposure Limit
IDLH	Immediately Dangerous to Life or Health
TLV	Threshold Limit Value set by the ACGIH (American Conference of Governmental Industrial Hygienists)
AIHA WEEL	Workplace Environmental Exposure Limits set by the AIHA (American Industrial Hygiene Association)
SKIN	Skin absorption
NIOSH	National Institute for Occupation Safety and Health
CNS	Central Nervous System
CVS	cardiovascular system

Action Level Table for Air Quality Monitoring

- *The level for respirator use indicated below is that concentration at which a respirator must be put on. It does not require the job to stop. The respirator is a tool to be used while determining why the exposure has reached that concentration. Take action to reduce the concentration by engineering controls such as water mist, spray foam, plastic cover, etc.*
- *The level for work stoppage indicated below is that concentration at which work on the job must stop. Determine why exposures have reached that concentration and how they can be reduced. Site evacuation is not necessary at this level. It does not mean that stopping operations should reduce the likelihood that the concentration will continue to rise. Implement engineering controls to reduce the concentration, and then resume work.*
- ***PIDs – Photoionization Detectors** are used for general hydrocarbon monitoring; an example would be benzene, toluene, ethyl benzene and xylene, common on gasoline station sites. The PID typically uses either a 10.6 eV lamp (responds to pentane and higher hydrocarbons), or 11.7 eV lamp (responds to ethane (weakly), propane and higher hydrocarbons) to ionize and detect the gas. The PID will measure hydrocarbons that are ionized, and therefore is a screening device, not a chemical-specific measurement instrument.*
- ***FIDs – Flame Ionization Detectors** – Uses a hydrogen flame to ionize the gas and detect its concentration. Typically used to measure concentrations of natural gas or gases that can not be ionized by the PID. Use of an FID may not be intrinsically safe for use on high hazard sites where there is a danger of reaching the lower explosive limit of the gas being measured. FIDs are typically calibrated using methane. **Always follow the manufacturer's instructions for calibrating the FID and for calculating response and correction factors.***
- ***Combustible Gas Meters** – **Measure 10% of the LEL** or Lower Explosive Limit for the particular gas of concern – check the MSDS for the LEL. Combustible gas meters are usually equipped with an oxygen monitor measuring in % Oxygen. These meters are used in potentially explosive environments or where the PID measurement is at or above 100ppm.*
  Example: Gasoline has an LEL of 1.7%. 1% = 10,000 PPM. LEL of 1.7% = 17,000 PPM and 10% of that is 1700 PPM.
- *Use of PDA's, cell phones, pagers or other electrical devices (with the exception of intrinsically safe monitoring instruments) are prohibited in the exclusion zone until the atmosphere is considered safe through the use of a CGI.*
- *The "levels for work stoppage" listed in the table below are based on measurements taken using PIDs calibrated with isobutylene; PIDs calibrated with gases other than isobutylene may have a different response factor. When calibrating with a calibration gas other than isobutylene, contact **Phil Platcow**, Director of HSE, at (617) 232-7355 office/(617)899-5403 cell or*
  ***Mike Philipp**, at (619) 296-6195X240 office / (619) 985-4340 cell,*
  for guidance on the air monitoring requirements.
- ***These values can be modified with particular knowledge of contaminants and site conditions. Contact Director of Health Safety and Environment (HSE), Philip Platcow to discuss (617) 232-7355.***
- ***On sites impacted with chemicals other than petroleum products, contact Phil Platcow, Director of HSE, at (617) 232-7355 office / (617)899-5403 cell or Mike Philipp, at (619) 296-6195-Ext 240 office/(619) 985-4340 cell, for guidance on the air monitoring requirements.***

CHEMICAL (OR CLASS)	MONITORING EQUIPMENT	TASK	MONITORING FREQUENCY/ LOCATION	LEVEL FOR RESPIRATOR USE	LEVEL FOR WORK STOPPAGE
Volatile Organic Vapors	FID/PID as appropriate for chemicals of concern. Read manual to determine. Draeger Tube for vinyl chloride (model 1/a part number 67 28031). Draeger Tube for benzene (model 0.5/a).	From start of mobilization to completion and demobilization	Sampling should be continuous during the project while disturbing potentially contaminated soil or uncovering/removing tanks and piping, or during drilling. At least every 15 minutes in the breathing zone. Sample at the exclusion zone boundaries every 30 minutes. Continuously sample during each soil and groundwater sampling interval. If 5 ppm in breathing zone, collect a Draeger tube for benzene and/or vinyl chloride (depending upon contaminants of concern).	Respirator to be used will be full-face piece respirator with organic vapor/P 100 combination cartridges. 20 ppm sustained in breathing zone for 2 minutes, and no benzene and/or vinyl chloride tube discoloration. If a color change appears on tube for benzene or vinyl chloride at < 20ppm on PID/FID, don respirator. If no Draeger Tubes are available, the level for respirator use will be 5ppm on the PID/FID. At donning respirator level, determine cause of exposure and implement engineering controls to reduce concentrations.	50 ppm in breathing zone and no vinyl chloride or benzene tube discoloration. Stop work if tube indicates > 1ppm for benzene or vinyl chloride. If no Draeger Tube available, stop work at 25 ppm on the PID/FID. Continuously attempt to determine cause of exposure and usage of engineering controls to attempt to never reach the stop work level.

12.0 WASTE CHARACTERISTICS

A.WasteGeneration(Type(s)/Quantities Expected):

Anticipated (YES/NO): YES

Types: ___X____ Liquid Solid X Sludge Other (describe)

Quantity (Expected Volume): (10) 55-gallon drums

B.Characteristics(Expected):

Corrosive ___ Flammable/Ignitable ___ Radioactive Toxic

Reactive Unknown_____

Other (specify) Non Hazardous

C.Packaging requirements for waste material(Expected):

- DOT-approved drums___X
- Baker tanks—water (possibly tankers if trucked off site)
- Lined waste bins
- Temporary Stockpile X

D.Disposal and/or Treatment Methods Proposed:

All wastes will be sampled and analyzed for all applicable COCs and physical properties (pH, Vapor Pressure, etc) to ensure proper waste characterization. Results of analysis will determine how and where impacted materials may be disposed of. Belshire ((949) 460-5200) will be responsible for the categorization and transportation of all waste generated on this site. All materials will be disposed of or treated in accordance with federal, state and local regulations as selected and arranged by STANTEC/Conoco Phillips. The client (Conoco Phillips) will be responsible for signing the manifest.

13.0 DETAILED PROJECT STEPS WITH HAZARD ASSESSMENTS, PRECAUTIONS AND JSAs

Task 1. Driving to/from the job Site – Job Safety Analysis (JSA)
Task 2. Call USA 48 hours prior to subsurface investigation and clear underground utilities with private utility locating company – Job Safety Analysis (JSA)
Task 3. Clear boring to five feet bgs for utilities – Job Safety Analysis (JSA)
Task 4. Advance soil borings using direct push drill rig, collect samples, and grout boring – Job Safety Analysis (JSA)
Task 5. Sample Groundwater – Job Safety Analysis (JSA)
Task 6. Blank JSA Job Safety Analysis – Job Safety Analysis (JSA)

Traffic Guidance and Control Plan:

Incidents on sites have shown the need for a well-thought out traffic guidance and control plan. This plan must consider:

- *Level of traffic activity on a site and provide for the safety of all workers on the site. E.g., a gasoline site that is open to the public should require sawhorse barricades to protect workers.*
- *Using rotating amber lights on vehicles.*
- *Using flaggers in high hazard areas.*
- *Stepping back and evaluating (PPE/SPSA) the Traffic Guidance and Control setup to see if it will really protect you.*
- *Stop Work Authority if after performing a PPE/SPSA and the set up aren't protecting you as planned.*
- *Cones and caution tape have proven ineffective in a number of situations. Other traffic guidance and control precautions include, delineators, placing vehicles between staff and the public, construction fence, etc.*
- *We must cordon off as much space as is necessary to ensure our safety. This must be discussed with clients as it may mean closing down additional gasoline pumps or entrances to a factory, etc.*
- *Personal vehicles should be parked as far away from potential traffic as possible.*
- *How contractor heavy equipment, e.g., vacuum trucks, drill rigs, cranes, loader/diggers, etc will be parked and maneuvered around the site. All heavy equipment movements must be coordinated in advance to avoid incidents.*
- *Review local regulations for: formally developed traffic guidance and control plans signed by licensed individuals, police details, flagmen, hours of activity, closure of streets to move equipment, etc.*
- *Review the Stantec Safe Driving Procedures located in* **Attachment 6**.
- *Utilize the Journey Hazard Assessment Card to identify potential driving/journey/traffic hazards before each trip. Copies of the Journey Hazard Assessment Card are located in* **Attachment 6a**.
- *Utilize the Daily Vehicle Checklist at least once a day for each vehicle driven for Stantec business to identify potential vehicle issues/hazards. Copies of the Daily Vehicle Inspection Checklist are located in* **Attachment 6b**.
- *Have each team member who will travel to/from the site complete a Journey Management Plan (JMP) before traveling to identify routes of travel and potential driving/journey/traffic hazards. JMP(s) should be kept with each traveling employee throughout the entire course of travel. A blank JMP is included in* **Attachment 6c**.
- *A Stantec Vehicle Collision Kit should be kept in every vehicle used for Stantec project work. A copy of the Stantec Vehicle Collision Kit is located in* **Attachment 6d**.
- **It is the responsibility of the SHSO to annotate the Site Plan with the Traffic Guidance and Control configuration if a "formally developed" Traffic Guidance and Control Plan is not available. It is also the responsibility of the SHSO to disseminate the Traffic Guidance and Control information to all site personnel during the Daily Production Safety Meeting and any other time as necessary.**

Work on this project will be conducted during the hours: **Start: 8:00 AM End: 5:00 PM Monday -- Friday**

Daily Production Safety Meeting

A safety meeting will be conducted in the morning on each working day on the site to discuss the health and safety issues for the activities to be conducted that day. The topics of the meeting will include, at a minimum, general health and safety procedures, reviewing heath and safety policies and reviewing the job hazard analyses for the tasks to be conducted. Additional safety meetings may be conducted if the scope of work changes during the day, or if other health and safety issues are identified. Suggested meeting topics and daily meeting log sheets are included in **Attachment 11**.

Hazard Communication

All employees at the Site must review this site wide HASP prior to field activities. The information in the JSAs and the attached data sheets is made available to all employees who could be affected by it prior to the time they begin their work activities. Modifications to JSAs and the accompanying data sheets are communicated during routine briefings. Consistent with OSHA regulations, Stantec must also inform other contractors and subcontractors about the nature and level of hazardous substances at this site, and the likely degree of exposure to workers who participate in site operations.

Evacuation Information

Randomly scheduled evacuation drills may be conducted at any time during field activities. Employees should follow emergency procedures outlined in **Section 4** of this HASP and discussed during the day's daily production safety meeting.

Shutoff valves/switches for utilities and products: **It is the responsibility of the SHSO to annotate the Site Plan with the location of all shutoff valves and switches and to disseminate that information to all site personnel during the Daily Production Safety Meeting and any other time as necessary.**

Personal Protective Equipment

The site-specific Personal Protective Equipment (PPE) ensembles and materials are identified in the Job Safety Analysis (JSA) sheets located later in this section. The PPE ensembles listed in each JSA has been identified as appropriate to protect the worker for the task addressed. The PPE ensembles are consistent with Appendix B of 29 CFR 1910.120. PPE is to be used in accordance with manufacturers' recommendations.

Personal Safety Concerns and Precautions:

Jewelry safety: **Jewelry can be dangerous. Large ear rings, long necklaces, loose-fitting bracelets, rings, watches, etc. can become entangled in machinery and cause removal of limbs, as well as be conductive of electricity. Use caution and avoid unnecessary hazards!**

Personal Hygiene

No eating, drinking or tobacco use within the exclusion zone. Wash your hands, face, arms, and neck (i.e. any exposed skin) before leaving the site.

Permits

This HASP will serve as the general permit to work for this site. Other permits that may be required such as, authorization to work, confined space entry, and other required "work" permits are to be kept in **Attachment 7**.

Additional Physical and Biological Concerns

Any additional health and safety issues such as **physical concerns** (including but not limited to uneven terrain, electrical fencing, buried spikes, tsunamis, holes, extreme heat/cold etc) or **biological concerns** (including but not limited to poisonous spiders, bees/wasps/other flying/stinging insects, gophers (holes), wild dogs, poisonous/allergenic plants, etc) should be identified prior to work with precautionary measures listed in **Attachment 8**.

Material Safety Data Sheets

Material Safety Data Sheets (MSDSs) for all compounds used and/or found on site should be obtained prior to work on site. Current copies of MSDSs are to be maintained on site in this HASP in **Attachment 9**.

Cameras

Prior to using a camera or other electronic recording devices on this site, all contractors and/or visitors must obtain written approval from the property owner and/or Conoco Phillips Project Manager.

Task 1. Driving to/from the job Site Job Safety Analysis (JSA)

POC	Development Team	Position/Title	Date	Reviewed By	Position/Title
	Christina DeJarlais	OE Coordinator	10/4/2006		
	Gary Sparks	Project Geologist	12/5/2006		
	Anthony Evans	Project Geologist	12/6/2006		
X	Michael Philipp	West Region Health and Safety Manager	10/4/2006		
			12/6/2006	Michael Philipp	West Region Health and Safety Manager
		HASP Author review completed by	7/24/09	Bryan Rorie	Project Scientist
		Site specific edits to this JSA were made by			
If most recent review date is more than six months old, then this JSA must be updated and reviewed again to remain current					
POC is the JSA development 'Point Of Contact'					

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Perform HRAC/SPSA procedures.	Wear reflective vest for traffic, steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, and leather gloves as necessary.	Slip/trip/falls, struck by traffic	● Assess the potential hazards. Analyze how to reduce the risk. Act to ensure trailer use is performed safely Stantec/Contractor _____ ● Review JSA Stantec/Contractor _____ ● Verify trailer wheels are chocked Stantec/Contractor _____
Verify Journey Management Plan is complete and current		Unexpected traffic detours	● Assure directions are available and understood prior to commencing travel Stantec/Contractor _____ ● Pull the vehicle into a safe location if additional directions must be confirmed Stantec/Contractor _____ ● Increase following distance to allow extra time to stop if you are in unfamiliar territory - Stantec/Contractor _____

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Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Set up necessary traffic guidance and control equipment (as necessary).	Wear reflective vest for traffic, steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, and leather gloves as necessary.	Potentially can be struck by vehicle during placement. Vehicle accident as a result of improper traffic control equipment. Slip, Trip, Falls. If trailer load is centered, or toward the rear, it will cause the trailer to sway, sometimes violently.	● Use buddy system for placing traffic guidance and control equipment. Stantec/Contractor _____ ● Create a traffic guidance and control plan to address traffic issues Stantec/Contractor _____ ● Adhere to approved Traffic Guidance and Control Plans when working in roadways. Stantec/Contractor _____ ● It is the responsibility of the SHSO to annotate the Site Plan with the Traffic Guidance and Control configuration if a formally developed Traffic Guidance and Control Plan is not available. Stantec _____
Verify a Vehicle Collision Kit, a 3-lb type ABC fire extinguisher and other as needed emergency equipment is in the vehicle.	Fire extinguisher	Fire in vehicle, vehicle incident	● Verify prepared field kit is in the vehicle. Inventory of the kit should include first aid kit, blood borne pathogen kit, fire extinguisher, collision kit, flashlight, etc. Stantec/Contractor _____ ● For cold weather areas the inventory should also include a bag of sand, a bag of salt, gloves, wool socks, wool caps, wool blankets, tire chains, small shovel and matches Stantec/Contractor _____
Perform perimeter walk around of vehicle for damage or unusual conditions.	Window scraper	Flat tire, blowout, impaired vision, collision, slippery surfaces, injury or death.	● Complete the Stantec Daily Vehicle Checklist prior to travel Stantec/Contractor _____ ● Assure tires are properly inflated and there is sufficient tread Stantec/Contractor _____ ● Assure there are no cuts or bulges in the sidewalls Stantec/Contractor _____ ● Assure windshield and window glass is clean Stantec/Contractor _____ ● Lift wiper arms and check wiper blades for damage or deterioration Stantec/Contractor _____ ● Check behind vehicle for obstructions Stantec/Contractor _____ ● Check under vehicle engine for evidence of fluid leaks Stantec/Contractor _____ ● Do not touch metal with moist or wet skin Stantec/Contractor _____ ● Scrape windows, front and rear windshields Stantec/Contractor _____

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Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Identify appropriate towing equipment.	Wear reflective vest for traffic, steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, and leather gloves as necessary.	Trailer and tow vehicle not mechanically compatible (hitch size, weight restriction, etc.); Damage to trailer, towing vehicle, cargo; Physical injury during hook-up.	● Review towing vehicle mechanical specifications as pertains to towing (load capacity, height of load, safe towing speed) Stantec/Contractor _____ ● Review trailer specifications (Manufacturer Identification Tag (weight limit, etc)) Stantec/Contractor _____ ● Confirm hitch size compatibility (The ball size is listed on both the ball and hitch) Stantec/Contractor _____ ● Confirm that the hitch is in good working condition (nut on bottom that tightens the hitch is snug and set properly) Stantec/Contractor _____ ● Towing a trailer use should only be accomplished by individuals that have the appropriate training/licensing Stantec/Contractor _____
Inspect trailer.	Wear reflective vest for traffic, steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, and leather gloves as necessary.	Slip/trip/falls, equipment malfunction, traffic, trailer rolling.	● Verify trailer tires are chocked Stantec/Contractor _____ ● Inspect: hitch, wiring, cargo tie down points, loose equipment, tires, jacks, chains, sway bars, and brakes, as applicable Stantec/Contractor _____
Check and adjust seat, mirrors, headlamps, turn signals, washer/wipers.	Window scraper	Back or body strain. Blind spots. Inability to signal intentions. Streaking windshield, impaired vision.	● Adjust seat so back is fully supported, upper arms close to body, and pedals within easy reach Stantec/Contractor _____ ● Lower steering wheel so hands are below shoulders and shoulders are relaxed Stantec/Contractor _____ ● Check mirror adjustments each time vehicle is re-started Stantec/Contractor _____ ● Test operations of front and rear turn signals - Stantec/Contractor _____ ● Locate and test operation of headlamps, wiper and washer switches Stantec/Contractor _____ ● Verify air conditioner/heater and windshield defroster fan operates properly Stantec/Contractor _____
Site specific emergency equipment.		Unexpected situations.	● When applicable, each vehicle is to be outfitted with site specific emergency equipment in the vehicle (i.e. snake bite kit, hypothermia kit) Stantec/Contractor _____

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Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Fasten seat belts.		Increased risk of more serious injury or death in collision.	● Assure seat belt is in good condition and fastened Stantec/Contractor _____ ● Assure all passenger seat belts are in good condition and fastened Stantec/Contractor _____
Lock doors.		Ejection from vehicle in collision. Unwanted intrusion.	● Lock all doors to vehicle Stantec/Contractor _____
Cellular Phone Usage		Driver distractions and static electric discharge that could lead to preventable incidents	● Always turn cellular phones to the off position before starting the engine Stantec/Contractor _____ ● Do not use cellular phones when refueling Stantec/Contractor _____
Start engine and let vehicle warm up.		Unexpected movement.	● Refer to Manufacturers vehicle manual for warm up times Stantec/Contractor _____ ● Assure that transmission is in 'Park' or neutral if a standard transmission and that parking brake is set Stantec/Contractor _____
Check heater, defroster, gauges and warning lights.		Overheated engine or break-down due to lack of critical fluids. Brake failure. Stranding.	● Assure there is sufficient gas, oil and other critical fluids Stantec/Contractor _____

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Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Back towing vehicle to trailer hitch.	Wear reflective vest for traffic, steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, and leather gloves as necessary.	Slip/trip/falls, back strain, pinch points. Personal injury or equipment damage. Potential collision due to equipment failure. Struck by vehicle.	● Verify trailer wheels are chocked Stantec/Contractor _____ ● Trailer and tow vehicle should be located on a level area Stantec/Contractor _____ ● Clear obstructions from loading areas Stantec/Contractor _____ ● Use a spotter to back tow vehicle to the trailer. Spotter shall be in a position to see the driver, towing hitch and be out of the way of the towing vehicle as it reverses Stantec/Contractor _____ ● Ensure trailer is high enough for ball to clear the hitch without making contact Stantec/Contractor _____ ● Utilize safe lifting techniques Stantec/Contractor _____ ● Keep hands free of pinch points/moving parts especially around the ball and hitch, pins or other connecting points Stantec/Contractor _____ ● Back up slowly to avoid overcompensating for steering errors Stantec/Contractor _____ ● Do not try to reposition the trailer by hand. Move the towing vehicle as necessary Stantec/Contractor _____

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Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Attaching the trailer to the towing vehicle.	Wear reflective vest for traffic, steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, and leather gloves as necessary.	Slip/trip/falls, back strain, pinch points. Personal injury or equipment damage. Potential collision due to equipment failure.	● Keep hands free of pinch points/moving parts especially around the ball and hitch when lowering the trailer, pins or other connecting points Stantec/Contractor _____ ● If the trailer has never been towed before, use the following procedure to adjust the height of the ball (or pintle hook) Stantec/Contractor 1. Level the trailer using the tongue jack. 2. Adjust the height of the ball (or pintle hook) so the trailer is level once it is connected to the towing vehicle. 3. Ensure the lock mechanism grasps the ball (or the lunette eye) securely. 4. Secure the trailer hitch and ball with the latch. Ensure the latch is secured with the appropriate hardware (pin, lock, or a bolt with a self locking nut). Do not use nail, wire or tape. 5. Secure sway bars (as required). 6. Measure the height from the bottom of the bumper to the ground at all four corners. The vehicle should squat somewhat but be close to sitting level. If the tow vehicle squats unequally, a weight distributing hitch may be necessary to tow the trailer. See pictures in the definitions section below. _____ ● Connect the safety chains from the trailer to the tow vehicle in a crisscross pattern under the trailer hitch with approximately four inches of clearance to the ground surface. (If the hitch becomes disconnected the chains will prevent the tongue from hitting the ground). When connecting a fifth wheel (gooseneck) trailer, the chains do not need to be attached in a crisscross pattern. See pictures in the definitions section below. Stantec/Contractor _____ ● Make connections for the lights and brakes as appropriate. (Minimum requirements for lighting are running lights, brake lights and turn signals Stantec/Contractor _____ ● Use a spotter to verify lights and brakes work properly. Replace/repair light bulbs/fuses/functions immediately after problem is identified Stantec/Contractor _____ ● Tandem-axle trailers and trailers greater than 2500 lbs require trailer braking systems and emergency breakaway braking systems (Tow vehicle must have appropriate connections and controllers). _____

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Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Loading/unloading cargo onto trailer.	Wear reflective vest for traffic, steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, and leather gloves as necessary.	Slip, Trip, Falls Back strain. If trailer load is centered, or toward the rear, it will cause the trailer to sway, sometimes violently.	● Verify trailer wheels are chocked Stantec/Contractor _____ ● Trailer and tow vehicle should be located on a level area Stantec/Contractor _____ ● Clear obstructions from loading areas Stantec/Contractor _____ ● Utilize safe lifting techniques Stantec/Contractor _____ ● All dollies or ramps used to maneuver cargo onto the trailer must be inspected prior to use. Extra attention should be given to the location where the ramp meets the bed of the trailer. Ramps that slip from the edge of the trailer bed can cause serious injury. Ensure that ramps are secured to trailer bed BEFORE attempting use Stantec/Contractor _____ ● Load trailer so that it is heavier at the front, which will transfer most of the weight to the rear of the tow vehicle. Approximately 60% of the gross trailer weight should be forward of the axle Stantec/Contractor _____ ● Ensure the load is properly secured/tied down on the trailer and all loose chains and/or straps are secured Stantec/Contractor _____ ● Once the trailer is loaded, do a complete walk around the trailer to ensure the wheel chocks have been removed and properly stowed, trailer ramps are stored and secured, all cargo/equipment is secured and tie-downs are tight, recheck all the chains, electrical and hitch connections Stantec/Contractor _____

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Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Pull out of parking space.		Collision with other vehicles, pedestrians, or stationary objects.	● When pulling a trailer ALWAYS look for pull through parking first. Avoid reversing whenever possible Stantec/Contractor _____ ● Verify all traffic guidance and control equipment is removed/safely stowed away Stantec/Contractor _____ ● Check mirrors and over shoulder in all directions prior to pulling out of parking space Stantec/Contractor _____ ● Signal if parallel parked along a street Stantec/Contractor _____ ● Avoid reversing while pulling a trailer as much as possible. If reversing with 2 or more personnel in the vehicle, then at least 1 person must exit the vehicle and act as a spotter. Before using a spotter, both driver and spotter should discuss and pre-plan desired route, destination, positioning, obstacles, hand signals (and their meaning) before relocating. If alone before getting in the car, assess the area looking for approaching pedestrians/vehicles. When clear get in vehicle, do a 360 scan then put in gear. Give two short blasts on the horn and while looking over your shoulder, slowly back out of the parking space being prepared to apply the brakes if needed Stantec/Contractor. _____
DURING TRIP Scan - Keep your eyes moving.		Collision, injury or death to occupants or other parties.	● Move eyes at least every 2 seconds Stantec/Contractor _____ ● Scan major and minor intersections before entry (left-right-left) Stantec/Contractor _____ ● Check mirrors when slowing or stopping vehicle Stantec/Contractor _____ ● Scan mirrors frequently, at least one mirror every 5-8 seconds Stantec/Contractor _____ ● Avoid staring while evaluating road conditions Stantec/Contractor _____ ● Maintain adequate spacing between your vehicle and the vehicle in front of you. (Rule of thumb two second for every 10 miles per hour (minimum of 6 seconds), double the distance during poor road conditions) Stantec/Contractor _____ ● Watch for ice on road, slow down before hitting the ice, keep your foot off the brake Stantec/Contractor _____

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Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Elevate elevate your line sight.		Collision, injury or death to occupants or other parties.	● Maintain 12 second eye lead time (1 1/2 blocks in city traffic, 1/4 mile in highway traffic). Assess condition of traffic lights (fresh vs. stale) Stantec/Contractor _____ ● Assess information from distant objects Stantec/Contractor _____ ● Adjust eye lead distance to speed Stantec/Contractor _____ ● Watch for ice on road, slow down before hitting the ice, keep your foot off the brake Stantec/Contractor _____
Count keep your distance		Collision, injury or death to occupants or other parties.	● Maintain safety cushion around vehicle (front, sides, rear) Stantec/Contractor _____ ● Adjust vehicle space and speed to avoid unsafe intrusion by other drivers Stantec/Contractor _____ ● Allow a minimum of 1 second for every 10 mph you are traveling between you and the vehicle in front of you when driving a vehicle without a trailer. Stantec/Contractor _____ ● It takes longer to stop when pulling a trailer due to the extra weight. Allow a minimum of 2 seconds for each 10 mph you are traveling between you and the vehicle in front of you Stantec/Contractor _____ ● At signal controlled intersections, stop 10 feet behind crosswalks or behind other vehicles Stantec/Contractor _____ ● When stopped, allow vehicle in front to move for 3 seconds before accelerating Stantec/Contractor _____ ● Observe approaching merge areas and choose lane of least resistance Stantec/Contractor _____ ● Cede right of way and allow other vehicles to merge, change lanes, make turns, etc Stantec/Contractor _____ ● Watch for ice on road, slow down before hitting the ice, keep your foot off the brake Stantec/Contractor _____

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Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Out have a way out		Collision, injury or death to occupants or other parties.	● Avoid being unnecessarily boxed in Stantec/Contractor _____ ● Avoid sudden acceleration and deceleration Stantec/Contractor _____ ● Maintain 1 second for every 10 mph (with 3 second minimum) following distance when driving a vehicle without a trailer, adjust speed to traffic conditions, scan immediate and adjacent lanes before merging Stantec/Contractor _____ ● Maintain 2 seconds for every 10 mph (with 6 second minimum) following distance when pulling a trailer, adjust speed to traffic conditions, scan immediate and adjacent lanes before merging Stantec/Contractor _____
Recognize - make sure others see you.		Collision, injury or death to occupants or other parties.	● Seek eye contact with other drivers Stantec/Contractor _____ ● Cover or use horn when conditions warrant Stantec/Contractor _____ ● Before changing lanes, signal well in advance, check mirrors and over shoulder, and allow adequate space before changing lanes Stantec/Contractor _____ ● Break early to activate brake lights Stantec/Contractor _____ ● Stay out of blind spots. Gently sound horn or flash lights if unsure other driver sees you Stantec/Contractor _____ ● Turn on headlamps in high traffic areas, at dusk, and in inclement weather. Do not over drive your headlights Stantec/Contractor _____ ● Increase the distance between your vehicle and the vehicle in front of you at night Stantec/Contractor _____

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Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Turning with trailer		Turning too tightly with the trailer may result in sideswiping objects with trailer.	● Signal all turns well in advance. The trailer wheels will be closer to the inside of a turn than the vehicle wheels. Use caution if swinging wide to the left Stantec/Contractor _____ ● Because the arc of the turn is greater with a trailer, you cannot turn as tightly. Start a turn near the center of the street to place you on the far right side of the new street when the turn is complete. Start the turn at the outside portion of the road to complete the turn near the center of the new street. This means that you must drive slightly beyond your normal turning point. Before turning, ensure that no cars are beside the trailer on the turn side Stantec/Contractor _____
Passing other vehicles while towing trailer.		Not allowing extra room for the length of the trailer when passing may result in sideswiping the vehicle you were passing. When being passed by a large truck or bus, displaced air may push the trailer causing sway.	● Never pass on a hill, curve or an intersection. Leave enough room before starting to pass; acceleration will be considerably slower with added weight. Remember to allow for extra length when pulling back in after passing Stantec/Contractor _____ ● When you are passed by, or passing a large truck or bus, the displaced air may push the trailer and affect the front of the trailer, causing the trailer to sway. Dont hit the brakes or make any sudden maneuvers; this will only make it worse. Slow a little and the trailer will straighten itself out Stantec/Contractor _____
Following and stopping		Sudden stops may cause the trailer to jackknife.	● It takes longer to stop with a trailer. Allow at least twice you normal stopping distance and try to anticipate all stops. Do not follow too closely behind other vehicles. Allow a minimum of 2 seconds for each 10 mph you are traveling between you and the vehicle in front of you (i.e. 20 mph = 4 seconds) Stantec/Contractor _____ ● If trailer is equipped with electric brakes and an emergency stop is necessary, manual application of electric brakes for the trailer will mitigate the possibility of a jackknife Stantec/Contractor _____ ● Exercise caution when nearing intersections. Remember, if someone pulls out in front of you, the stopping distance is proportional to how fast you are traveling Stantec/Contractor _____

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Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Driving on hills		Overuse of brakes may result in overheating and loss of effectiveness.	● On down grades, use lower gears and let engine compression slow the vehicle and trailer Stantec/Contractor _____ ● When going up long hills, reduce the chance of overheating by using a lower gear. Should overheating occur, pull off the road, turn off all accessories except the heater and run the engine at fast idle until the temperature returns to normal. Check for leaks, broken drive belts, cracked hoses, etc., but never open the radiator cap. _____
Pauses in travel	Wear reflective vest for traffic, steel toed and shank shoes, hardhat, safety glasses with side shields, and leather gloves as necessary.	Load shifting, chains dragging, load security, insecure connections	● If there is a pause in travel (i.e. rest stop) do another walk around the vehicle to recheck all connections to the towing vehicle and double-check the load is still secure. Stantec _____
Backing up.		Collision, injury or death to occupants or other parties.	● Make all backing maneuvers slowly and cautiously Stantec/Contractor _____ ● Check mirrors and over shoulders. When parking, look for pull-through parking to avoid backing Stantec/Contractor _____ ● If reversing with 2 or more personnel in the vehicle, then at least 1 person must exit the vehicle and act as a spotter. If alone before getting in the car, assess the area looking for approaching pedestrians/vehicles. When clear get in vehicle, do a 360 scan then put in gear. Give two short blasts on the horn and while looking over your shoulder, slowly back out of the parking space being prepared to apply the brakes if needed Stantec/Contractor _____
Pay attention to driving at all times		Collision, injury or death to occupants or other parties.	● Always focus on driving. Stop driving if you become distracted Stantec/Contractor _____ ● Refrain from conducting involved or emotional discussions while driving - end the conversation or pull over to the side of the road if it becomes difficult to concentrate on driving while conversing with your passengers Stantec/Contractor _____

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Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Parking.		Collision, injury or death to occupants or other parties.	● Park away from other cars Stantec/Contractor _____ ● Back into parking spot when possible and safe Stantec/Contractor _____ ● If reversing with 2 or more personnel in the vehicle, then at least 1 person must exit the vehicle and act as a spotter. If alone before getting in the car, assess the area looking for approaching pedestrians/vehicles. When clear get in vehicle, do a 360 scan then put in gear. Give two short blasts on the horn and while looking over your shoulder, slowly back out of the parking space being prepared to apply the brakes if needed Stantec/Contractor _____ ● Maintain cushion of safety from fixed objects. Set parking brake Stantec/Contractor _____
POST-TRIP - Report maintenance or mechanical problems upon returning vehicle.		Conditions worsen leading to mechanical failure resulting in accident, injury or death.	● Report vehicle problems immediately to company representative or rental car agency Stantec/Contractor _____

Task 2. – Clear for Utilities Job Safety Analysis (JSA)

POC	Development Team	Position/Title	Date	Reviewed By	Position/Title
	Michael Philipp	West Region Health and Safety Manager	9/23/2005		
	Anthony Wong	Assoc Scientist	4/11/2008		
	Bradley Bishop	Project Engineer	4/11/2008		
			2/2/2006	Michael Philipp	West Region Health and Safety Manager
			7/24/09	Bryan Rorie	Project Scientist
Site specific edits to this JSA were made by					
If most recent review date is more than six months old, then this JSA must be updated and reviewed again to remain current					
POC is the JSA development 'Point Of Contact'					

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Mobilize with proper equipment/supplies for Utility Locating.	Gather necessary PPE. Reflective vest for traffic, steel toed and shank shoes, hardhat, safety glasses with side shields, ear plugs/muffs, and leather gloves. (Howard Leight Max foam earplugs with an NRR of 33).	Vehicle accident. Lifting hazards. Delay or improper performance of work due to improper equipment onsite.	● Start project with Daily Production Safety Meeting - Stantec _____ ● Follow safe driving procedures. - Stantec _____ ● Employ safe lifting procedures. - Stantec _____ ● Make sure sub-contractors are aware of their responsibilities for labor, equipment and supplies. - Stantec _____ ● Review permits conditions. - Stantec _____

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Set up necessary traffic guidance and control equipment.	Wear reflective vest for traffic; steel toed and shank shoes, hardhat, safety glasses with side shields, ear plugs/muffs and leather gloves as necessary.	Potentially can be struck by vehicle during placement. Vehicle accident as a result of improper traffic guidance and control equipment placement.	● Use buddy system for placing traffic guidance and control equipment - Stantec _____ ● Create a traffic guidance and control plan to address traffic issues. Refer to section above and Traffic - Stantec _____ ● Adhere to approved Traffic Guidance and Control Plans when working in roadways. - Stantec _____ ● It is the responsibility of the SHSO to annotate the Site Plan with the Traffic Guidance and Control configuration if a formally developed Traffic Guidance and Control Plan is not available. - Stantec _____
Perform Utility Locating, marking utility locations with paint.	Wear reflective vest for traffic; steel toed and shank shoes, hardhat, safety glasses with side shields, ear plugs/muffs and leather gloves as necessary.	Potentially can be struck by vehicle during placement. Vehicle accident as a result of improper traffic control equipment placement. Muscle strains/sprains from lifting equipment.	● Adhere to approved traffic guidance and control plan - Stantec _____ ● Use proper lifting techniques. - Stantec _____
Clean site/demobilize.	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work.	Traffic. Safety hazard left on site. Lifting hazards.	● Use buddy system as necessary to remove traffic guidance and control equipment. - Stantec _____ ● Leave site clean of refuse and debris. - Stantec _____ ● Clearly mark/barricade any borings that need later topping off or curing. - Stantec _____ ● Notify site personnel of departure, final well locations and any cuttings/purge water left onsite - Stantec _____ ● Use proper lifting techniques - Stantec _____

Task 3. Clear Boring for Utilities - Job Safety Analysis (JSA)

POC	Development Team	Position/Title	Date	Reviewed By	Position/Title
	Thomas Potter	Project Scientist	3/24/2006		
	Michele Boswell		3/24/2006		
X	Wilson Wong	Staff Scientist	3/24/2006		
			3/27/2006	Michael Philipp	West Region Health and Safety Manager
			7/24/09	Bryan Rorie	Project Scientist
Site specific edits to this JSA were made by					
If most recent review date is more than six months old, then this JSA must be updated and reviewed again to remain current					
POC is the JSA development 'Point Of Contact'					

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Check weather conditions.	Wear reflective vest for traffic, steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, and leather gloves as necessary.	Slip, trip, fall. Hand injury, knee injury, back injury, laceration injury.	● Check for Snow on Ground DO NOT proceed with sampling if snow covers stockpiles - Stantec _____ ● Check for rain / rainy conditions DO NOT proceed with sampling if raining stockpiles - Stantec _____ ● Check for wind / windy conditions DO NOT proceed with sampling if wind speed is greater than 30 mph - Stantec _____ ● Check for available day light. Different times of year will have vastly different amounts of daylight. Do not begin sampling before sunrise, and do not continue sampling activities after "Civil Twilight" - Stantec _____

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Mobilize with proper equipment/supplies for probing.	Gather necessary PPE. Reflective vest for traffic, steel toed and shank shoes, long sleeve shirt, hard hat, safety glasses with side shields, ear plugs/muffs, leather gloves for the non-chemical aspects of work as necessary (turning hand auger), high-visibility nitrile gloves for chemical aspects of work (handling soils), Tyvek or other over-garment clothing protection if soils are expected to be muddy/sloppy; Have an air purifying respirator available with appropriate cartridges (combination organic vapor/P-100 cartridges for BTEX/gasoline impacted soils), and other PPE as needed. (Use a North 7600 series full face respirator or its equivalent. Best brand nitrile gloves or their equivalent. Howard Leight Max foam earplugs with an NRR of 33 or their equivalent. Tyvek, poly coated chemical resistant suit or its equivalent).	Vehicle accident. Lifting hazards. Delay or improper performance of work due to improper equipment onsite.	● Start project with Production Safety Meeting (Attachment 11) - Stantec _____ ● Follow safe driving procedures. - Stantec _____ ● Employ safe lifting procedures. - Stantec _____ ● Review permits conditions. - Stantec _____

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Clear/Mark hand auger locations.	Wear reflective vest for traffic, steel toed and shank shoes, long sleeve shirt, hard-hat, safety glasses with side shields, and leather gloves as necessary.	Traffic hazards, overhead and underground installations, product releases, property damage, dealer inconvenience.	● Reference Utility Clearance Review form (Attachment 4) - Stantec _____ ● Coordinate with Site Manager (or designee) to minimize potential conflicts. - Stantec _____ ● Review proposed locations against available construction drawings and known utilities, tanks, product lines, etc. - Stantec _____ ● Mark out the proposed probing locations. - Stantec _____ ● Call underground utility locating service for public line location clearance and get list of utilities being contacted. If necessary, coordinate private line locator for private property. - Stantec _____ ● Develop traffic guidance and control plan with the client and local agencies as applicable. Plan may include use of delineators; caution tape, jersey barriers, construction fence, etc (Refer to Attachment 2). - Stantec _____ ● It is the responsibility of the SHSO to annotate the Site Plan with the Traffic Guidance and Control configuration if a formally developed Traffic Guidance and Control Plan is not available. - Stantec _____
Visually clear proposed probing locations.	Wear reflective vest for traffic, steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, and leather gloves as necessary.	Underground and overhead installations.	● Complete Pre-Mobilization section of Utility Clearance Review form (Attachment 4) and adjust probing locations as necessary. - Stantec _____ ● Compare original locations to marked locations of utilities. - Stantec _____ ● Move/adjust sample locations so that holes are at least 10 feet (or Client/Stantec H&S approved offset distance) from nearest utility. - Stantec _____

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Set up necessary traffic guidance and control equipment. See Attachment 2 for detailed plan.	Wear reflective vest for traffic, steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, and leather gloves as necessary.	Struck by vehicle during placement. Vehicle accident as a result of improper traffic guidance and control equipment placement.	● Use buddy system for placing traffic guidance and control equipment. - Stantec _____ ● Implement traffic guidance and control plan such as setting out delineators, construction fence and caution tape defining safety area. - Stantec _____ ● Adhere to approved Traffic Guidance and Control Plans when working in roadways. (See Attachment 2). - Stantec _____ ● It is the responsibility of the SHSO to annotate the Site Plan with the Traffic Guidance and Control configuration if a formally developed Traffic Guidance and Control Plan is not available. - Stantec _____
Set up exclusion zone(s) and workstations (hand auger / logging / sample collection).	Wear reflective vest for traffic, steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, and leather gloves as necessary.	Slip / trip / fall. Struck by vehicle during set up. Slip trip and fall hazards.	● Implement exclusion zone set-up as appropriate for each sample location. - Stantec _____ ● Set up workstations with clear walking paths to and from each. - Stantec _____ ● Use caution tape, construction fence and delineators. - Stantec _____ ● It is the responsibility of the SHSO to annotate the Site Plan with the exclusion zone configuration. - Stantec _____

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Commence soil sampling operations using hand auger tools.	Don required PPE as appropriate for this step: steel toed and shank shoes, long sleeve shirt, hard hat, safety glasses with side shields, hearing protection, reflective safety vest, leather gloves for the non-chemical aspects of work as necessary. Wear chemical resistant gloves during handling of soil. Wear an air-purifying respirator with combination organic vapor/P-100 cartridges if necessary. (Use a North 7600 series full face respirator or its equivalent. Best brand nitrile gloves or their equivalent. Howard Leight Max foam earplugs with an NRR of 33 or their equivalent. Tyvek poly coated chemical resistant suit or its equivalent).	Back strain, exposure to chemical hazards, hitting an underground utility, repetitive motion.	● Initiate air quality monitoring in accordance with Section 12. - Stantec _____ ● Stand upwind to avoid exposure whenever possible. - Stantec _____ ● Use the organic vapor monitor aggressively to track the airborne concentration of contaminants close to potential sources such as the core as it is being raised from the hole; the core is opened, etc). - Stantec _____ ● Have appropriate respirator with combination organic vapor/P-100 cartridges within 3-5 feet of work area, readily available. - Stantec _____ ● Use proper lifting techniques and tools. - Stantec _____ ● Avoid twisting back during the operation; Decontaminate equipment after use. Decontamination will be accomplished by an Alconox wash with tap water rinse followed by a de-ionized or distilled water rinse. Collect rinse water in 5 gallon buckets and transfer to 55-gallon drums and stage drums (say where it will be stored) - Stantec _____ ● Keep work area clear of tripping or slipping hazards. - Stantec _____ ● Evaluate any soil samples inside a Ziploc bag at arm's length. DO NOT EVALUATE THE SAMPLE WITH THE BAG OPEN. THIS WILL AVOID UNNECESSARY EXPOSURE. - Stantec _____ ● Complete the Pre-Drilling section of the Borehole Clearance Review form. - Stantec _____ ● Decontaminate sampling equipment between each distinct sample (within hole) and/or locations (before each new hole) . - Stantec _____

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Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Collect samples in accordance with sampling plan.	Steel toed and shank shoes, long sleeve shirt, hard hat, safety glasses with side shields, hearing protection, reflective safety vest, and chemical resistant gloves as necessary. Wear appropriate air purifying respirator with combination organic vapor/P-100 cartridges as needed.	Cross-contamination. Back strain, inhalation or dermal exposure to chemical hazards, slip and fall. Improper labeling or storage, injury from broken sample bottle (cuts or acid burn).	● Perform air monitoring in accordance with Section 12 - Stantec _____ ● Have appropriate respirator with combination organic vapor/P-100 cartridges within 3-5 feet of work area, readily available. - Stantec _____ ● Wear the appropriate gloves to protect self from exposure to potential constituents of concern (High-visibility Nitrile or similar). - Stantec _____ ● Use proper lifting techniques. - Stantec _____ ● Avoid twisting back during the operation; Decontaminate equipment after use. Decontamination will be accomplished by an Alconox wash with tap water rinse followed by a de-ionized or distilled water rinse. Collect rinse water in 5 gallon buckets and transfer to 55-gallon drums and stage drums (say where it will be stored). - Stantec _____ ● Label samples in accordance with sampling plan. - Stantec _____ ● Keep samples stored in proper containers, at correct temperature, and away from work area. Handle bottles carefully. - Stantec _____
Excess soil will be placed back down the hand augered hole or disposed of according to procedures outlined in workplan.	Steel toed and shank shoes, long sleeve shirt, hard hat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary. If you suspect that equipment is contaminated, wear chemical resistant gloves.	Exposure to public. Traffic hazard or obstruction/inconvenience to station operation. Improper storage or disposal. Back strain.	● Have proper storage containment and labeling available onsite. - Stantec _____ ● Place materials in isolated location away from traffic and other site functions. Drums will be staged (say where drums will be staged)(See section for Waste Description). - Stantec _____ ● Do not attempt to lift, push or move bins/drums without the proper tools and equipment. - Stantec _____

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Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Backfill probe hole.	Steel toed and shank shoes, long sleeve shirt, hard hat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary.	Improper grouting can lead to future vertical conduit for contaminant migration. Back strain, slip, trip and fall hazards, and eye injury from splashing or release of pressurized grout. Unauthorized backfilling causes extra work.	● Mix grout/cement to specification and completely fill the hole. - Stantec _____ ● Use proper lifting techniques. - Stantec _____ ● Keep work area clear of tripping hazards. - Stantec _____
Perform personal decontamination procedures.	As worn in exclusion zone.	Slips/trips/falls. Splashes, chemical contamination. Contact with contaminated materials.	● Perform personal (dry) decontamination procedures Stantec/Contractor _____ Drop off tools and perform equipment decontamination procedures on the equipment - Stantec/Contractor _____ Perform a dry decontamination on boots using a stiff bristle fiberglass long handled brush - Stantec/Contractor. _____ Remove inner/outer gloves and dispose of properly - Stantec/Contractor _____ ● Wash hands, face, arms and neck (any exposed skin) using sink or bottled water. If water isnt available, use baby wipes or a similar product - Stantec/Contractor _____
Supervisor/SHSO must confirm all boreholes/probings are closed, filled in and/or capped.	Steel toed and shank shoes, long sleeve shirt, hard hat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary.	Possible injuries and damage to property due to stepping into or driving over the well.	● Visually inspect each and every borehole/probing. - Stantec _____

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Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Clean site/demobilize.	Steel toed and shank shoes, long sleeve shirt, hard hat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary.	Traffic. Safety hazard left on site. Lifting hazards.	● Use buddy system as necessary to remove traffic guidance and control equipment. - Stantec _____ ● Leave site clean of refuse and debris. - Stantec _____ ● Clearly mark/barricade any holes that need later topping off or curing. - Stantec _____ ● Notify site personnel of departure, final well locations and any cuttings left onsite. - Stantec _____ ● Use proper lifting techniques. - Stantec _____
Package and deliver samples to lab.	Nitrile gloves, leather gloves. Steel toed and shank shoes, long sleeve shirt, hard hat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary.	Bottle breakage, back strain.	● Handle and pack bottle carefully (bubble wrap bags are helpful). Use proper lifting techniques. - Stantec _____ ● Wear nitrile gloves when handling sample containers. - Stantec _____ ● Wear leather gloves when handling gel-ice packs and/or bags of water-ice. - Stantec _____ ● Use legs (not back) when lifting coolers. Often, fully packed coolers weigh more than 40 lbs. If heavy use two people to lift/move coolers. - Stantec _____

Task 4. Direct Push Drilling, collect samples, and grout boring - Job Safety Analysis (JSA)

POC	Development Team	Position/Title	Date	Reviewed By	Position/Title
	David Stolcenberg	Staff Engineer	12/3/2003		
X	Michael Philipp	West Region Health and Safety Manager	12/3/2003		
			12/3/2003	Michael Philipp	West Region Health and Safety Manager
			7/24/09	Bryan Rorie	Project Scientist
Site specific edits to this JSA were made by					
If most recent review date is more than six months old, then this JSA must be updated and reviewed again to remain current					
POC is the JSA development 'Point Of Contact'					

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Clear drilling locations.	Wear reflective vest for traffic, steel toed and shank shoes, hardhat, safety glasses with side shields, and leather gloves as necessary.	Traffic hazards, overhead and underground installations, product releases, property damage, dealer inconvenience.	

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Clean site/demobilize.	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary.	Traffic. Safety hazard left on site. Lifting hazards. Sharp equipment, broken glass, heavy equipment.	● Reference Utility Clearance Review form (Attachment 4) - Stantec _____ ● Reference Utility Clearance Review form (Attachment 4) - Stantec _____ ● Coordinate with Site Manager (or designee) to minimize potential conflicts. - Stantec _____ ● Coordinate with Site Manager (or designee) to minimize potential conflicts. - Stantec _____ ● Review proposed locations against available construction drawings and known utilities, tanks, product lines, etc. - Stantec _____ ● Review proposed locations against available construction drawings and known utilities, tanks, product lines, etc. - Stantec _____ ● Mark out the proposed borehole locations. - Stantec _____ ● Mark out the proposed borehole locations. - Stantec _____ ● Call underground utility locating service for public line location clearance and get list of utilities being contacted. If necessary, coordinate private line locator for private property. - Stantec _____ ● Call underground utility locating service for public line location clearance and get list of utilities being contacted. If necessary, coordinate private line locator for private property. - Stantec _____ ● Develop a traffic control plan with the client and local agencies as applicable. Plan may include use of cones, barrier tape, jersey barriers, etc (Refer to Attachment 2). - Stantec _____ ● Develop a traffic control plan with the client and local agencies as applicable. Plan may include use of cones, barrier tape, jersey barriers, etc (Refer to Attachment 2). - Stantec not available. - Stantec _____

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Obtain sub-contractor equipment maintenance records prior to commencing work.		Improper equipment maintenance, which can cause equipment failure and possible personal injury.	_____ ● It is the responsibility of the SHSO to annotate the Site Plan with the Traffic Control configuration if an Approved Traffic Control Plan is ● It is the responsibility of the SHSO to annotate the Site Plan with the Traffic Control configuration if an Approved Traffic Control Plan is not available. - Stantec _____ ● Verify maintenance records in possession are for equipment on site. - Stantec _____ ● Verify maintenance is current. - Stantec _____

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Mobilize with proper equipment/supplies for drilling.	Gather necessary PPE. Reflective vest for traffic, steel toed and shank shoes, hardhat, ear plugs/muffs, and leather gloves for the non-chemical aspects of work as necessary; Wear an appropriate air purifying respirator with combination organic vapor/P-100 cartridges, and other PPE as needed.	Vehicle accident. Lifting hazards. Delay or improper performance of work due to improper equipment onsite. Exposure to broken glass Injury from material handling	● Start project with Production Safety Meeting (Attachment 11) Discuss. - Stantec _____ -potential hazards and ways to avoid them. - Stantec _____ -motor vehicle safety topic. - Stantec _____ -current days weather conditions. - Stantec _____ ● Confirm sub-contractors are aware of their responsibilities for labor, equipment and supplies. - Stantec _____ ● Review permits conditions. - Stantec _____ ● Conduct Plan, Prevent, Execute/Self Performance Safe Assessment. - Stantec _____ ● Perform tasks at a safe pace. - Stantec _____ ● Access the area, are there trip hazards present? - Stantec _____ ● Follow safe driving procedures. - Stantec _____ ● Employ proper lifting and bending procedures. - Stantec _____ ● Wear safety glasses and leather work gloves when loading, unloading, and whenever material handling. - Stantec _____ ● Secure load in vehicle. - Stantec _____ ● Use lids to debris/garbage containers. Do not leave buckets open with out a lid! Material in the bucket can spill. - Stantec _____ ● Use bubble wrap or other insulating material to cushion the sample containers during transport. - Stantec _____ ● Use the right tools to open and close well boxes. Wear leather work gloves when opening the well boxes. - Stantec _____ - Stantec _____
Visually clear proposed drilling locations.	Wear reflective vest for traffic, steel toed and shank shoes, hardhat, safety glasses with side shields, and leather gloves as necessary.	Underground and overhead installations.	● Complete Pre-Mobilization section of Utility Clearance Review form (Attachment 4) and adjust drilling locations as necessary. - Stantec _____

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Set up necessary traffic control. See Attachment 2 for detailed plan.	Wear reflective vest for traffic, steel toed and shank shoes, hardhat, safety glasses with side shields, and leather gloves as necessary.	Struck by vehicle during placement. Vehicle accident as a result of improper traffic control equipment placement.	● Use buddy system for placing traffic control. Implement traffic control plan such as setting out cones and tape defining safety area. - Stantec _____ ● It is the responsibility of the SHSO to annotate the Site Plan with the Traffic Control configuration if a separate diagram is not available. - Stantec _____ ● Adhere to approved Traffic Control Plans (see Attachment 2) when working in roadways. - Stantec _____ ● It is the responsibility of the SHSO to annotate the Site Plan with the Traffic Control configuration if an Approved Traffic Control Plan is not available. - Stantec _____
Assist with set up of rig.	Wear reflective vest for traffic, steel toed and shank shoes, hardhat, safety glasses with side shields, and leather gloves as necessary.	Vehicle accident during rig movement. Damage caused by rig while accessing set-up location. Contact with overhead installations. Soft terrain. Rig movement.	● All staff should know where the kill switch is for the drilling rig (incorporate into Production Safety Meeting (See Attachment 11) - Stantec _____ ● Verify clear pathway to drilling location and clearance for raising mast. - Stantec _____ ● Provide as-needed hand signals and guidance to driver to place rig. - Stantec _____ ● Visually inspect rig (fire extinguisher on board, no oil or other fluid leaks, cabling and associated equipment in good condition, pressurized hoses secured with whip-checks or adequate substitute, jacks in good condition?). - Stantec _____ ● If necessary, use wooden blocks under jacks to spread load. Chock wheels. - Stantec _____
Set up exclusion zone(s) and workstations (CPT / Hydropunch / Geoprobe and logging/sample collection).	Wear reflective vest for traffic, steel toed and shank shoes, hardhat, safety glasses with side shields, and leather gloves as necessary.	Struck by vehicle during set up. Slip/fall hazards.	● Implement exclusion zone set up. - Stantec _____ ● It is the responsibility of the SHSO to annotate the Site Plan with the exclusion zone configuration. - Stantec _____ ● Set up workstations with clear walking paths to and from rig. Use safety tape and cones. - Stantec _____

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Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Clear upper five feet of CPT / Hydro punch / Geoprobe location using post-hole digger or hand auger.	Don required PPE as appropriate for this step: steel toed and shank shoes, hard hat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary Wear chemical resistant gloves during handling of soil. Wear an air-purifying respirator with combination organic vapor/P-100 cartridges if necessary.	Back strain, exposure to chemical hazards, hitting an underground utility, repetitive motion.	● Stand upwind to avoid exposure whenever possible. - Stantec _____ ● Initiate air quality monitoring in accordance with Section 12. - Stantec _____ ● Use the organic vapor monitor aggressively to track the airborne concentration of contaminants close to potential sources such as the core as it is being raised from the hole, the core is opened, etc. - Stantec _____ ● Have appropriate respirator with combination organic vapor/P-100 cartridges within 3-5 feet of work area, readily available. - Stantec _____ ● Evaluate any soil samples inside a Ziploc bag at arm^s length. DO NOT EVALUATE THE SAMPLE WITH THE BAG OPEN. THIS WILL AVOID UNNECESSARY EXPOSURE. - Stantec _____ ● Use proper lifting techniques and tools. - Stantec _____ ● Complete the Pre-Drilling section of the Borehole Clearance Review form. - Stantec _____ ● Avoid twisting back during the operation. - Stantec _____ ● Decontaminate equipment after use. Decontamination will be accomplished by an Alconox wash with tap water rinse followed by a de-ionized or distilled water rinse. Collect rinse water in 5 gallon buckets and transfer to 55-gallon drums and stage drums (say where it will be stored) - Stantec _____

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Commence CPT / Hydro punch / Geoprobe operation.	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary. Wear appropriate air purifying respirator with combination organic vapor/P-100 cartridges if needed.	Cross-contamination from previous hole. Back strain, heat or cold, eye injury, noise, exposure to chemical hazards, hitting an underground utility, trip and fall, equipment failure	● Decontaminate sampling equipment after collecting a sample. Decontaminate equipment after use. Decontamination will be accomplished by an Alconox wash with tap water rinse followed by a second distilled or de-ionized water rinse. Collect rinse water in 5 gallon buckets and transfer to 55-gallon drums and stage drums (say where it will be stored) - Stantec _____ ● Decontaminate CPT / Hydro punch / Geoprobe equipment after each location. (State how Subcontractor will decon equipment. - Stantec _____ ● Use proper lifting techniques. - Stantec _____ ● Monitor air quality in accordance with Section 11. - Stantec _____ ● Have appropriate respirator with combination organic vapor/P-100 cartridges within 3-5 feet of work area, readily available. - Stantec _____ ● Monitor CPT / Hydro punch / Geoprobe progress. - Stantec _____ ● Keep work area clear of tripping or slipping hazards. - Stantec _____ ● Perform periodic visual inspections of CPT / Hydro punch / Geoprobe rig. - Stantec _____

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Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Collect samples in accordance with sampling plan.	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and chemical resistant gloves as necessary, leather work gloves. Wear appropriate air purifying respirator with combination organic vapor/P-100 cartridges as needed.	Cross-contamination. Back strain, inhalation or dermal exposure to chemical hazards, slip and fall. Improper labeling or storage, injury from broken sample bottle (cuts or acid burn), spill.	● Perform air monitoring in accordance with Section 11 - Stantec _____ ● Have appropriate respirator with combination organic vapor/P-100 cartridges within 3-5 feet of work area, readily available. - Stantec _____ ● Decontaminate sampling equipment between each well (unless disposable). If the equipment is reusable, then wash in an Alconox wash, rinsed with tap water, then rinsed with distilled or de-ionized water. Decontamination water will be transferred to 55-gallon drums and staged Indicate where the decon water will be staged on site? This must cover both people and equipment decontamination. - Stantec _____ ● Use proper lifting and bending techniques. Use knee pads or a kneeling pad. - Stantec _____ ● Have appropriate respirator with combination organic vapor/P-100 cartridges within 3-5 feet of work area, readily available. - Stantec _____ ● Stand upwind (wind blowing into your back) to avoid exposure whenever possible - Stantec _____ ● Change chemical resistant gloves between each sample. - Stantec _____ ● Label samples in accordance with sampling plan. - Stantec _____ ● Keep samples stored in proper containers, at correct temperature, and away from work area. Handle bottles carefully. - Stantec _____ ● Determine the best location to set the sample containers (avoid stepping on them or other materials coming into contact with them. - Stantec _____

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Collect samples in accordance with sampling plan. (continued)	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and chemical resistant gloves as necessary, leather work gloves. Wear appropriate air purifying respirator with combination organic vapor/P-100 cartridges as needed.	Cross-contamination. Back strain, inhalation or dermal exposure to chemical hazards, slip and fall. Improper labeling or storage, injury from broken sample bottle (cuts or acid burn), spill.	● Label samples in accordance with sampling plan. - Stantec _____ ● Fill sample containers slowly and over a bucket to eliminate potential spills. Or place sample container on bucket lid on the ground or other surface, then fill container to avoid sample container from slipping out of your nitrile gloved hand. - Stantec _____ ● Do not over pack cooler. - Stantec _____ ● Use bubble wrap or other insulating material for cushioning sample containers in the cooler. - Stantec _____ ● Keep samples stored in proper containers, at correct temperature, and away from work area. Handle bottles carefully. - Stantec _____
Proper clean up and disposal of broken sample container.	Safety glasses. Leather Work Gloves. Long Sleeve Shirt. Hand Broom and Dust Pan. A receptacle for the broken glass (something to contain the broken glass - double garbage bag, a box, or bucket.)	Exposure to broken glass and acid (from water preservation acids)Injury	● Isolate area where broken glass is located. – Stantec _____ ● Determine if the sample container was preserved (did it have acid in it?). - Stantec _____ ● Determine what to contain the broken glass in, and where to dispose of the broken glass before beginning to pick up the glass. - Stantec _____ ● Collect equipment needed to clean up and contain the broken glass. - Stantec _____ ● Minimize picking up broken glass pieces with your gloved hands. Use a dust pan if possible/practical. - Stantec _____ ● If broken glass is located inside a container (i.e. box), to the extent practical, leave glass inside box and put entire box into a garbage bag. Double bag if warranted. Place into dumpster. - Stantec _____ ● If broken glass is inside a cooler, remove all other sample containers and place in a safe location, then use hand broom and dust pan to sweep up glass in cooler. - Stantec _____ ● After clean up is complete, contact your Project Manager to report this Near Loss/Miss. - Stantec _____

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Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Perform personnel decontamination.		Cross-contamination. Inhalation or dermal exposure to chemical hazards, slips, trips and falls.	● Decontamination of personnel will be done by a dry decon method. Personnel will proceed from the hot zone through the CRZ where dry decon of PPE and hand equipment will occur. Tyvek outerwear and gloves will be removed by each person and disposed of in receptacles provided in the CRZ. Personnel will then proceed to washing area and wash their hands, face, arms and neck and then change into clean dry clothes in the support zone. - Stantec _____ ● Use proper lifting techniques. - Stantec _____
Package and deliver samples to lab.		Bottle breakage, back strain.	● Handle and pack bottle carefully (bubble wrap bags are helpful). - Stantec _____ ● Use proper lifting techniques. - Stantec _____
Cuttings will be picked up by shovel and placed directly in 55-gallon drums.	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary. If you suspect that equipment is contaminated, wear chemical resistant gloves.	Exposure to public. Traffic hazard or obstruction/inconvenience to station operation. Improper storage or disposal. Back strain.	● Have proper storage containment and labeling available onsite. - Stantec _____ ● Place materials in isolated location away from traffic and other site functions. (See section for Waste Description). - Stantec _____ ● Use appropriate drum handling practices. Do not attempt to lift, push or move drums without the proper tools and equipment. - Stantec _____
Backfill borehole.	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary.	Improper grouting can lead to future vertical conduit for contaminant migration. Back strain, trip hazards, and eye injury from splashing or release of pressurized grout. Unauthorized backfilling causes extra work.	● Mix grout to specification and completely fill the hole. - Stantec _____ ● Use proper lifting techniques. - Stantec _____ ● Keep work area clear of tripping hazards. - Stantec _____

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Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Dispose or store purge water (if any) onsite.	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and chemical resistant gloves as necessary. Wear appropriate air purifying respirator with combination organic vapor/P-100 cartridges as needed.	Back strain. Exposure to contaminants. If disposing through onsite treatment system, damage or injury from improper use of equipment. Improper storage or disposal.	● Use appropriate drum handling practice. - Stantec _____ ● Use proper equipment to transport water (pumps, drum dollies, etc). - Stantec _____ ● Monitor air quality in accordance with Section 12. - Stantec _____ ● Have appropriate respirator with combination organic vapor/P-100 cartridges within 3-5 feet of working location, readily available. - Stantec _____ ● Label storage containers properly, and locate in isolated area away from traffic and other site functions. - Stantec _____ ● Coordinate offsite disposal (where applicable). - Stantec _____ ● Do not attempt to lift, push or move bins/drums without the proper tools and equipment. - Stantec _____
Supervisor/SHSO must confirm all boreholes are closed, filled in and/or capped.		Possible injuries and damage to property due to stepping into or driving over the well.	● Visually inspect each and every borehole. - Stantec _____

Task 5. Groundwater Sampling (JSA)

POC	Development Team	Position/Title	Date	Reviewed By	Position/Title
	Michael Philipp	West Region Health and Safety Manager	9/23/2005		
	Anthony Wong	Assoc Scientist	4/11/2008		
	Bradley Bishop	Project Engineer	4/11/2008		
			2/2/2006	Michael Philipp	West Region Health and Safety Manager
			7/24/2009	Bryan Rorie	Project Scientist
		Site specific edits to this JSA were made by			

If most recent review date is more than six months old, then this JSA must be updated and reviewed again to remain current

POC is the JSA development 'Point Of Contact'

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions

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Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Mobilize with proper equipment/supplies for sampling.	Gather necessary equipment and supplies: Scope of Work, or sampling plan HASP, including Journey Management Plan, Steel-toed and shank boots, Long sleeve shirt. Hardhat, Hearing protection (NRR 33), if needed Full Face Respirator with organic vapor/P-100 combo cartridges, Safety glasses and Safety Sun Glasses, Leather work gloves Chemical resistant gloves and Tyvek. Safety Vest, Sun block/Insect Repellant First Aid & Blood borne Path. Kit, Eye Wash Bottle, Fire Extinguisher	Back or muscle strain (lifting hazard), Motor Vehicle Crash Delay or improper performance of work due to improper equipment onsite. Exposure to broken glass Injury from material handling	● Conduct Plan Prevent Execute/Self Assessment Safe Performance procedures Stantec/Contractor. _____ ● Assess the site for slip/trip/fall hazards, biological and chemical hazards, unsafe conditions, traffic hazards, etc - Stantec/Contractor _____ ● Perform tasks at a safe pace - Stantec/Contractor _____ ● Start project with Daily Production Safety Meeting (Attachment 11) - Stantec/Contractor _____ - potential hazards and ways to avoid them - Stantec/Contractor. _____ - motor vehicle safety topic - Stantec/Contractor _____ -current days weather conditions - Stantec/Contractor. _____ -PPE requirements - Stantec/Contractor. _____ -check subcontractors HASP, Certs, MSDSs, and equipment maintenance records as applicable - Stantec _____ ● Follow safe driving procedures - Stantec/Contractor. _____ ● Employ proper lifting and bending procedures - Stantec/Contractor. _____ ● Wear safety glasses and leather work gloves when loading, unloading, and whenever material handling Stantec/Contractor. _____ ● Secure load in vehicle - Stantec/Contractor _____ ● Use lids to debris/garbage containers. Do not leave buckets open with out a lid! Material in the bucket can spill Stantec/Contractor. _____ ● Use bubble wrap or other insulating material to cushion the sample containers during transport Stantec/Contractor _____ ● Use the right tools to open and close well boxes. Wear leather work gloves when opening the well boxes - Stantec/Contractor _____ ● Wear leather gloves when walking/working in areas with brush or other undergrowth Stantec/Contractor. _____

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Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Set up necessary traffic control.	Wear reflective traffic vest, steel toed and shank shoes, long sleeve shirt, hardhat.	Struck by vehicle during placement. Vehicle accident as a result of improper traffic control equipment placement.	● Use buddy system for placing traffic control - Stantec/Contractor _____ ● Reference traffic control plan (See Attachment 2) - Stantec/Contractor _____ ● It is the responsibility of the Supervisor / SHSO to annotate the Site Plan with the Traffic Control configuration if an Approved Traffic Control Plan is not available - Stantec. _____
Set up exclusion zone(s).	Wear reflective traffic vest, steel toed and shank shoes, long sleeve shirt, hardhat.	Struck by vehicle. Slip and fall hazards to workers.	● Implement exclusion zone set-up instructions - Stantec/Contractor. _____ ● It is the responsibility of the Supervisor / SHSO to annotate the site Plan with the Exclusion Zone configuration Stantec. _____ ● Set up clear walking paths between workstations - Stantec/Contractor _____
Opening well box or vault.(If well box/vault is 24 inches be sure to review Working with Well Boxes 24 inches job step below)	Don required PPE as appropriate for this step: steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, , reflective safety vest, leather gloves for the non-chemical aspects of work as necessary.	Struck by vehicle while opening the well box/vault. Back strain, pinch points and biological hazards (i.e. spiders, insects).	● Implement exclusion zone set-up instructions, Face on-coming traffic and use work vehicle to block on-coming traffic if possible- Stantec/Contractor. _____ ● Use proper lifting techniques - Stantec/Contractor. _____ ● Be aware of pinch points associated with removal/replacement of the well lid/vault cover. Wear sturdy leather palm or equivalent gloves. Use appropriate tool to remove well lid cover. If well box/vault is 24 be sure to review Working with Well Boxes 24 job step below. Stantec/Contractor. _____ ● Look for spiders before placing hands in well box. Use a screwdriver or equivalent long handle tool to remove spider webs attached to well casing/cap - Stantec/Contractor. _____

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Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Opening well box or vault 24 inches.Well box opening tools:- Condux Manhole Remover- Top Popper- GMP Manhole Cover Lifter- Magnetic Manhole Cover Lifter(Please note that a separate JSA may be required for one of the well box opening tools listed above)	Don required PPE as appropriate for this step: steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, reflective safety vest, leather gloves for the non-chemical aspects of work as necessary.	Struck by vehicle while opening the well box/vault. Back strain, pinch points and biological hazards (i.e. spiders, insects).	● Implement exclusion zone set-up instructions, Face on-coming traffic and use work vehicle to block on-coming traffic if possible-Stantec/Contractor. _____ ● Use proper lifting techniques - Stantec/Contractor. _____ ● Be aware of pinch points associated with removal/replacement of the well lid/vault cover. Wear sturdy leather palm or equivalent gloves. Stantec. _____ ● Look for spiders before placing hands in well box. Use a screwdriver or equivalent long handle tool to remove spider webs attached to well casing/cap - Stantec/Contractor. _____ ● Use appropriate tool to remove well lid cover (i.e Condux manhole remover, magnetic manhole cover lifter, pry bar, Top Popper, handle hook,) Selected tool is:_____ Stantec. _____ ● Place removed well lid/vault cover in a designated area away from walkways/traffic.Stantec. _____ ● Use proper lifting techniques and be aware of pinch points when replacing well lid/vault cover on well box. - Stantec/Contractor. _____
Gauge water levels and product thickness (where applicable) in wells.	Don required PPE as appropriate for this step: steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, leather gloves for the non-chemical aspects of work as necessary. Wear chemical resistant gloves during handling of soil. Wear an air-purifying respirator with combination organic vapor/P-100 cartridges as necessary.	Back strain, inhalation or dermal exposure to chemical hazards, repetitive motion	● Initiate air quality monitoring in accordance with Section 12 - Stantec _____ ● Have appropriate respirator with combination organic vapor/P-100 cartridges within 3 5 feet of working location, readily available - Stantec/Contractor. _____ ● Maintain safe distance from wellhead - Stantec/Contractor. _____ ● Use proper lifting techniques - Stantec/Contractor. _____ ● Decontaminate equipment between each measurement - Stantec/Contractor. _____

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Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Purge well(s) and collect purge water. Purging of the wells can be done by using one of two methods, by hand bailer or vacuum truck. If a hand bailer is used, collected water will be transferred to a 55-gallon drum. If the vacuum truck is used there will be no collected water.	Steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary. If you suspect that equipment is contaminated, wear chemical resistant gloves. Wear appropriate air-purifying respirator with combination organic vapor/P-100 cartridges as needed. Wear appropriate chemical resistant suit as needed.	Cross-contamination. Back strain, inhalation or dermal exposure to chemical hazards, slip and fall. Spilling contaminated water.	● Decontaminate purging equipment between each sampling location. (Two methods of equipment decontamination can be used. If disposable bailers are used, then they will be properly disposed of. If the bailers are reusable then they will be washed in an Alconox wash, rinsed with tap water, then rinsed with a de-ionized or distilled water rinse. Wash/rinse water will be transferred to 55-gallon drums and staged (Indicate where the decon water will be stored on site? - Stantec/Contractor. _____ ● Use proper lifting techniques Stantec/Contractor. _____ ● Perform air monitoring in accordance with Section 12 - Stantec _____ ● Have appropriate respirator with combination organic vapor/P-100 cartridges within 3 5 feet of working location, readily available - Stantec/Contractor. _____ ● Keep work area clear of tripping or slipping hazards - Stantec/Contractor. _____ ● Store purge water in 55-gallon drums. . Drums will be staged at (state where drums will be staged) - Stantec/Contractor _____ ● Drums containing flammable/combustible liquids or solids must be grounded and if there are multiple drums bonded together - Stantec/Contractor. _____ ● Use extreme care when opening the bung caps. Stand an arms length away and open the bung slowly to relieve any built up pressure - Stantec/Contractor _____

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Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Collect samples in accordance with sampling plan.	Steel toed and shank shoes, long sleeve shirt, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary. If you suspect that equipment is contaminated, wear chemical resistant gloves. Wear appropriate air-purifying respirator with combination organic vapor/P-100 cartridges as needed. Wear appropriate chemical resistant suit as needed. Level D PPE with nitrile gloves, Traffic Vest, Exclusion Zone Equipment, Leather Work Gloves.	Cross-contamination. Back strain, inhalation or dermal exposure to chemical hazards, slip and fall. Improper labeling or storage, injury from broken sample bottle (cuts or acid burn). Note: If a sample bottle breaks while sampling, follow the guidelines listed below for proper containment and disposal of broken glass.	● Use proper lifting and bending techniques. Use knee pads or a kneeling pad - Stantec/Contractor. _____ ● Determine the best location to set the sample containers (avoid stepping on them, or other materials coming into contact with them) - Stantec. _____ ● Label samples in accordance with sampling plan - Stantec. _____ ● Fill sample containers slowly and over a bucket to eliminate potential spills. Or place sample container on bucket lid on the ground or other surface, then fill container. To avoid sample container from slipping out of your nitrile gloved hand - Stantec. _____ ● Do not over pack cooler - Stantec. _____ ● Use bubble wrap or other insulating material for cushioning sample containers in the cooler - Stantec. _____ ● Have full face respirator with organic vapor/P-100 combination cartridges within 3-5 feet of working location for quick access - Stantec/Contractor. _____ ● Keep samples stored in proper containers, at correct temperature, and away from work area. Handle bottles carefully - Stantec/Contractor. _____ ● Perform personal decontamination procedures Stantec/Contractor. _____ ● Wash hands, face, arms and neck (any exposed skin) using sink or bottled water. If water isnt available, use baby wipes or a similar product - Stantec/Contractor. _____ ● Drop off tools and perform equipment decontamination procedures on the equipment - Stantec/Contractor. _____ ● Perform a dry decon on boots using a stiff bristle long fiberglass handled brush - Stantec/Contractor. _____ ● Remove inner/outer gloves and dispose of properly - Stantec/Contractor. _____

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Proper clean up and disposal of broken sample container.	Safety glasses. Leather Work Gloves. Long Sleeve Shirt. Hand Broom and Dust Pan. A receptacle for the broken glass (something to contain the broken glass (double garbage bag, a box, or bucket.	Exposure to broken glass and acid (from water preservation acids)Injury	● Isolate area where broken glass is located - Stantec/Contractor. _____ ● Determine if the sample container was preserved (did it have preservative acid in it?) - Stantec/Contractor. _____ ● Determine what to contain the broken glass in, and where to dispose of the broken glass before beginning to pick up the glass - Stantec/Contractor. _____ ● Collect equipment needed to clean up and contain the broken glass. _____ ● Minimize picking up broken glass pieces with your gloved hands. Use a dust pan if possible/practical - Stantec/Contractor. _____ ● If broken glass is located inside a container (i.e. box), to the extent practical, leave glass inside box and put entire box into a garbage bag. Double bag if warranted. Place into dumpster - Stantec/Contractor. _____ ● If broken glass is inside a cooler, remove all other sample containers and place in a safe location, then use hand broom and dust pan to sweep up glass in cooler - Stantec/Contractor. _____ ● After clean up is complete, contact your Project Manager to report this Near Loss/Miss - Stantec/Contractor. _____

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Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Dispose or store purge water (if any) onsite.	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary. If you suspect that equipment is contaminated, wear chemical resistant gloves. Wear appropriate air-purifying respirator with combination organic vapor / P-100 cartridges as needed. Wear appropriate chemical resistant suit as needed.	Back strain. Exposure to contaminants. If disposing through onsite treatment system, damage or injury from improper use of equipment. Improper storage or disposal.	● Use proper equipment to transport water (pumps, drum dollies, etc). - Stantec/Contractor. _____ ● Perform air monitoring in accordance with Section 12 - Stantec. _____ ● Have appropriate respirator with combination organic vapor P-100 cartridges within 3 5 feet of working location, readily available - Stantec/Contractor. _____ ● Label storage containers properly, and locate in isolated area away from traffic and other site functions - Stantec/Contractor. _____ ● Coordinate offsite disposal (where applicable) - Stantec. _____ ● Do not attempt to lift, push or move drums without the proper tools or equipment - Stantec/Contractor. _____ ● Store purge water in 55-gallon drums. Stage drums on border of empty lot - Stantec/Contractor. _____ ● Drums containing flammable/combustible liquids or solids must be grounded and if there are multiple drums bonded together - Stantec. _____ ● Use extreme care when opening the bung caps. Stand an arms length away and open the bung slowly to relieve any built up pressure - Stantec/Contractor. _____
Supervisor/SHSO must confirm all boreholes/monitoring wells are closed, filled in and/or capped.	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary.	Possible injuries and damage to property due to stepping into or driving over the well.	● Visually inspect each and every borehole/monitoring well - Stantec/Contractor. _____

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Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Perform personnel dry decontamination procedures.		Chemical exposure.	● Perform dry boot wash using a stiff bristle, fiberglass handled brush paying special attention to the welt and sole areas of the boot. Remove tape from boot tops and properly dispose of the tape, remove tape from outer gloves and properly dispose of the tape, remove outer gloves and properly dispose of outer gloves, remove Tyvek and properly dispose of Tyvek, remove boots and place in large garbage bag, remove inner gloves and properly dispose of inner gloves. Put street shoes on. Wash hands, face, arms and neck (any exposed skin) (use baby wipes if a washing facility is unavailable) Decontamination water will be stored in 55 gallon drums - Stantec _____ ● Drums will be staged in a location determined by the SHSO and the Property Owner/Station Manager - Stantec. _____ ● Drums containing flammable/combustible liquids or solids must be grounded and if there are multiple drums bonded together - Stantec. _____ ● Use extreme care when opening the bung caps. Stand an arms length away and open the bung slowly to relieve any built up pressure - Stantec. _____
Clean site/demobilize.	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary.	Traffic. Safety hazard left on site. Lifting hazard. Sharp equipment, broken glass, heavy equipment.	● Use buddy system as necessary to remove traffic control - Stantec/Contractor. _____ ● Leave site clean of refuse and debris - Stantec/Contractor. _____ ● Notify station personnel of departure - Stantec. _____ ● Use proper lifting techniques or use mechanical assistance - Stantec/Contractor. _____ ● Use a mechanical aid or other colleague, as appropriate to help lift weights over 50lbs - Stantec/Contractor. _____ ● Be careful of sharp edges on equipment - Stantec/Contractor. _____ ● Ensure that all waste containers are closed before moving them - Stantec/Contractor. _____ ● Do not jump off the back of the pick-up - Stantec/Contractor. _____

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Package and deliver samples to lab.	Nitrile gloves, Heavy leather gloves if bottles are broken.	Bottle breakage, back strain.	● Handle and pack bottle carefully (bubble wrap bags are helpful) - Stantec. _____ ● Use proper lifting techniques - Stantec/Contractor. _____ ● Broken glass shall be placed in a container with a secure lid o` disposed on site whenever possible - Stantec/Contractor. _____ ● Heavy leather gloves shall be worn when handling broken glass. DO NOT PICK UP BROKEN GLASS WITH YOUR HANDS. USE A BROOM AND DUST PAN! - Stantec/Contractor. _____

Task 6. Blank Job Safety Analysis (JSA)

POC	Development Team	Position/Title	Date	Reviewed By	Position/Title
X	Michael Philipp	West Region Health and Safety Manager	12/3/2003		
			12/3/2003	Michael Philipp	West Region Health and Safety Manager
HASP Author review completed by			7/24/09	Bryan Rorie	Project Scientist
If most recent review date is more than six months old, then this JSA must be updated and reviewed again to remain current					
POC is the JSA development 'Point Of Contact'					

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
HRAC, SPSA	Understand scope of work	Understand scope of workFamiliarize yourself with taskReview STANTEC (Now Stantec) Policies and Prcedures	● Perfrom HRAC or SPSA pre-work procedures Stantec_____ ● Other - Stantec _____
Obtain sub-contractor equipment maintenance records prior to commencing work.	n/a	Improper equipment maintenance, which can cause equipment failure and possible personal injury.	● Verify records in possession are for equipment on site - Stantec_____ ● Verify maintenance is current - Stantec_____

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Mobilize with proper equipment/supplies for (name of task)	Gather necessary PPE. Reflective vest for traffic, steel toed and shank shoes, long sleeved shirts, hard hat, safety glasses with side shields, (chemical splash goggles and a full face shield during air knife procedures), ear plugs/muffs, leather gloves for the non-chemical aspects of work as necessary; an air purifying respirator with combination organic vapor/P-100 cartridges for work in hazardous environments, and other PPE as needed.	Vehicle accident. Lifting hazards. Delay or improper performance of work due to improper equipment onsite. Exposure to broken glass.Injury from material handling.	● Start project with Production Safety Meeting (Attachment 11) - Stantec_____ Discuss the following: -Ensure all Stantec/Client permits are filled out appropriately and discussed - -Potential hazards and ways to avoid them -Motor vehicle safety topic -Current days weather conditions -PPE requirements -Check subcontractors HASP, Certs, MSDSs, and equipment maintenance records -Using safe lifting procedures ● Make sure sub-contractors are aware of their responsibilities for labor, equipment and supplies Stantec_____ ● Review permit conditions Stantec_____ ● Conduct Hazard Recognition Assessment and Control (HRAC)/Safe Performance Self Assessment (SPSA) procedures Stantec_____ ● Take your time. Do not rush - Stantec_____ ● Assess the area; are there trip hazards present - Stantec_____ ● Wear safety glasses and leather work gloves when loading, unloading, and whenever material handling - Stantec_____ ● Secure load in vehicle - Stantec_____
Set up necessary traffic control. See Attachment 2 for detailed plan.	Wear reflective vest for traffic, steel toed and shank shoes, long sleeved shirts, hardhat, safety glasses with side shields, and leather gloves as necessary.	Struck by vehicle during placement. Vehicle accident as a result of improper traffic control equipment placement.	● Use buddy system for placing traffic control. Implement traffic control plan such as setting out delineators, construction fence and/or caution tape defining safety area - Stantec_____ ● Adhere to approved Traffic Control Plans when working in roadways -Stantec_____ ● It is the responsibility of the SHSO to annotate the Site Plan with the Traffic Control configuration if a formally developed Traffic Control Plan is not available -Stantec_____

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered. Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe. All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Set up exclusion zone(s) and workstations (drilling and logging/sample collection).	Wear reflective vest for traffic, steel toed and shank shoes, long sleeved shirts, hardhat, safety glasses with side shields, and leather gloves as necessary.	Struck by vehicle during set up. Slip, trip and fall hazards.	● Implement exclusion zone set-up - Stantec_____ ● It is the responsibility of the SHSO to annotate the Site Plan with the Exclusion Zone set up - Stantec_____ ● Set up workstations with clear walking paths to and from rig. Use caution tape and or construction fence and delineators - Stantec_____
			● - Stantec _____ ● - Stantec _____ ● - Stantec _____ ● - Stantec _____
			● - Stantec _____ ● - Stantec _____ ● - Stantec _____ ● - Stantec _____
			● - Stantec _____ ● - Stantec _____ ● - Stantec _____ ● - Stantec _____

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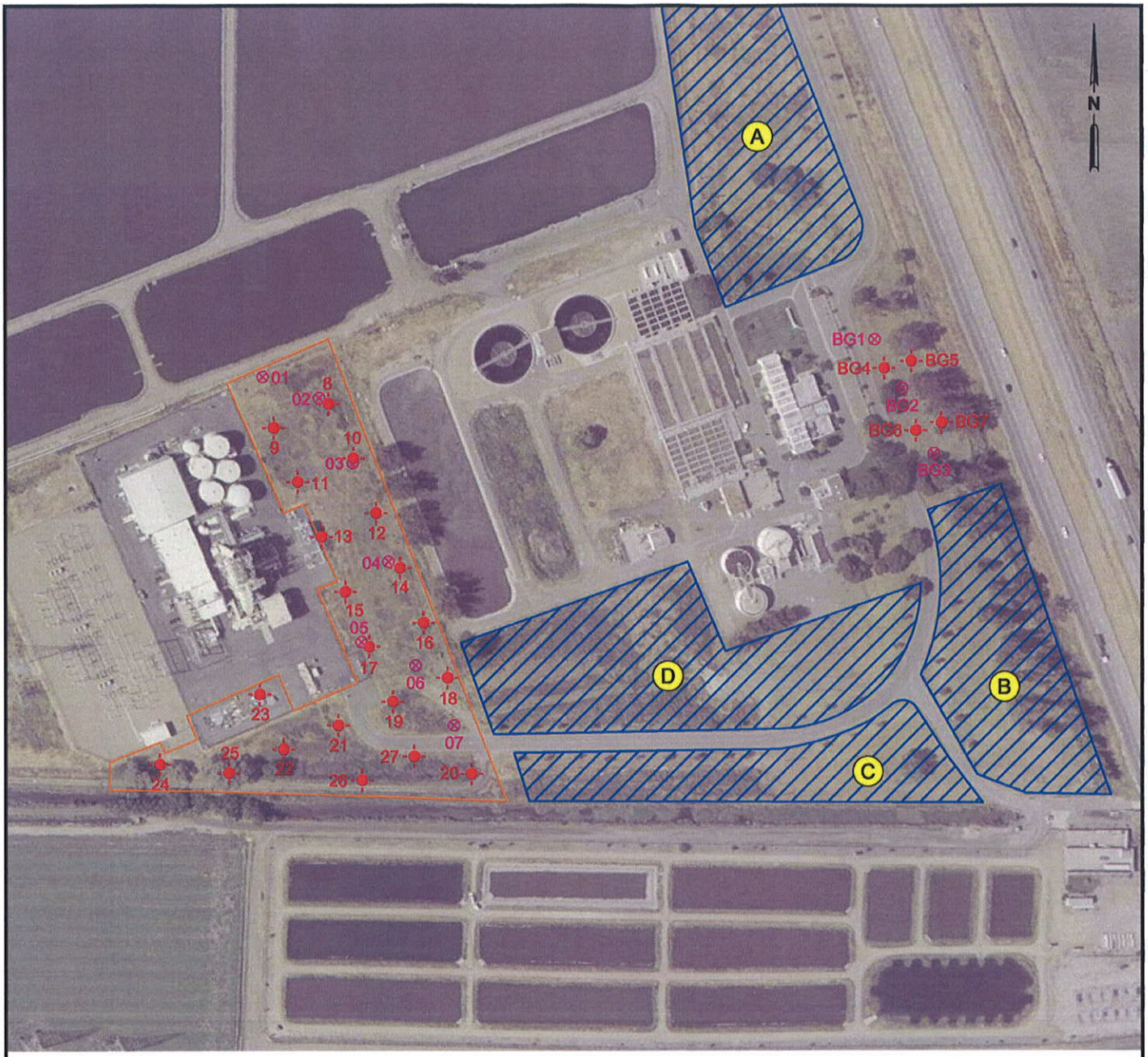
Job Steps	**Personal Protective Equipment**	**Potential Hazard**	**Critical Actions**
			● - Stantec _____ ● - Stantec _____ ● - Stantec _____ ● - Stantec _____

ATTACHMENT 1

CLIENT'S SAFETY PROCEDURES

ATTACHMENT 2

SITE PLAN(s)



LEGEND

- 07 ⊗ — PREVIOUS SHALLOW SOIL SAMPLE LOCATIONS (CH2MHILL)
- PROPOSED LAYDOWN AND/OR PARKING AREAS
- PROPOSED PLANT SITE
- 8 - PROPOSED SOIL BORING LOCATIONS (STANTEC)
- BG4 - PROPOSED BACKGROUND SOIL SAMPLING LOCATIONS

NOTES;

1. MAP REFERENCES; CH2MHILL, SOIL SAMPLINGLOCATIONS, FIGURE 2, DATED FEBRUARY 11, 2009. USGS URBAN AERIAL IMAGE, DATED MARCH 29, 2004.
2. CALIFORNIA STATE PLANES, ZONE 3 (FT.), NOT A SURVEYED MAP, SITE FEATURES AND LOCATIONS ARE APPROXIMATE.

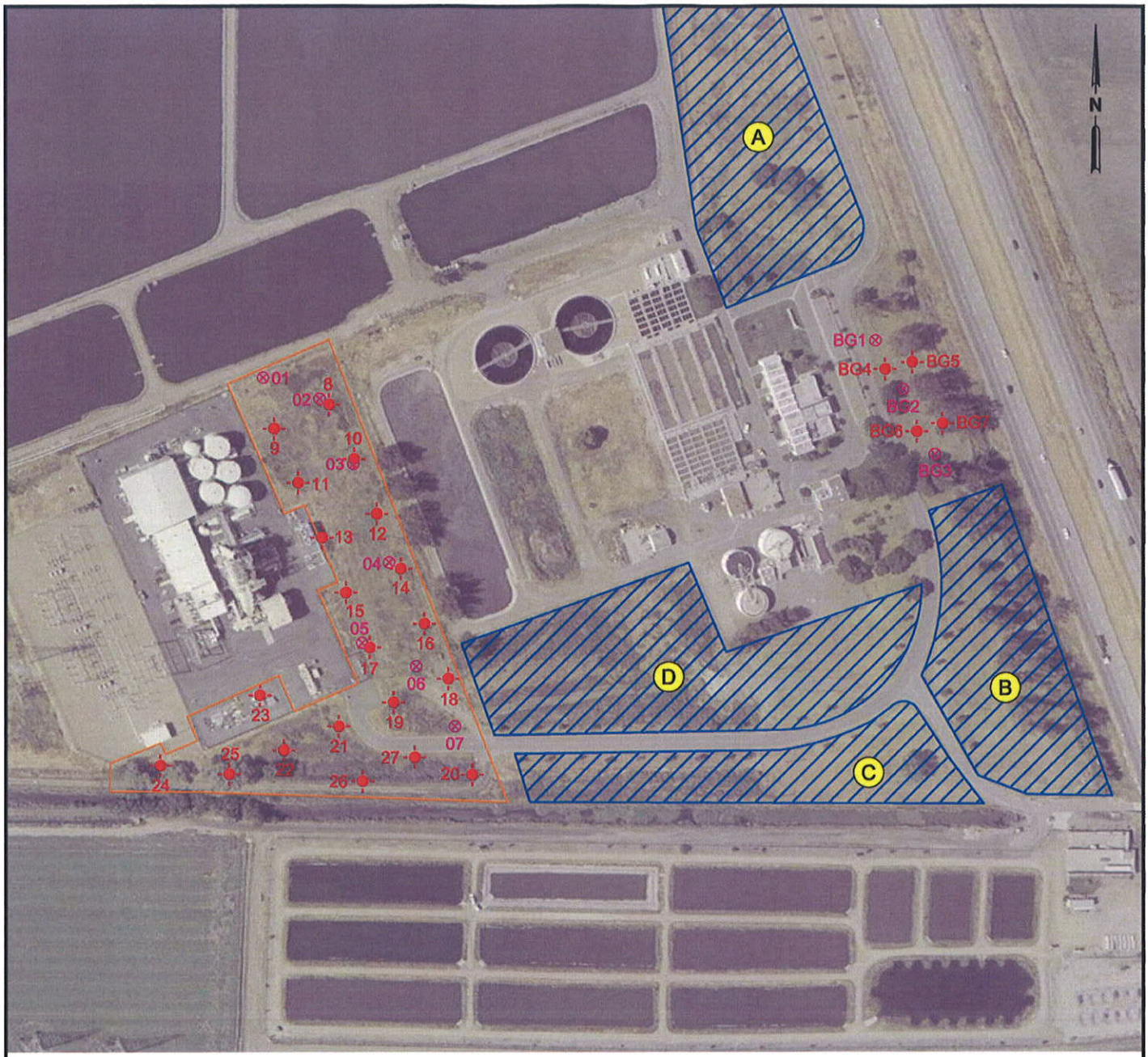
0 125 250

APPROXIMATE SCALE (FEET)

Stantec
290 Conejo Ridge Avenue
Thousand Oaks, CA 91361
(805) 230-1266/230-1277 (Fax)

FOR:		PROPOSED SAMPLING LOCATIONS		FIGURE:
LODI ENERGY CENTER 12745 North Thornton Road Lodi, CA 95240				2
JOB NUMBER: 185702076	DRAWN BY: R. Roman	CHECKED BY: C. Confar	APPROVED BY: C. Confar	DATE: 08/04/09

FILEPATH:Q:\CADD-37\Client\Lodi_Energy_Center\WorkPlan\2009-Aug\LEC-SLM.dwg|troman|Aug 11, 2009 at 14:57|Layout: SM



LEGEND

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- PROPOSED LAYDOWN AND/OR PARKING AREAS
- PROPOSED PLANT SITE
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- BG4 -⊕- — PROPOSED BACKGROUND SOIL SAMPLING LOCATIONS

NOTES;

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2. CALIFORNIA STATE PLANES, ZONE 3 (FT.), NOT A SURVEYED MAP, SITE FEATURES AND LOCATIONS ARE APPROXIMATE.

0 125 250

APPROXIMATE SCALE (FEET)

Stantec
290 Conejo Ridge Avenue
Thousand Oaks, CA 91361
(805) 230-1266/230-1277 (Fax)

FOR:
LODI ENERGY CENTER
12745 North Thornton Road
Lodi, CA 95240

PROPOSED SAMPLING LOCATIONS

FIGURE: **2**

JOB NUMBER:	DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:
185702076	R. Roman	C. Confar	C. Confar	08/04/09

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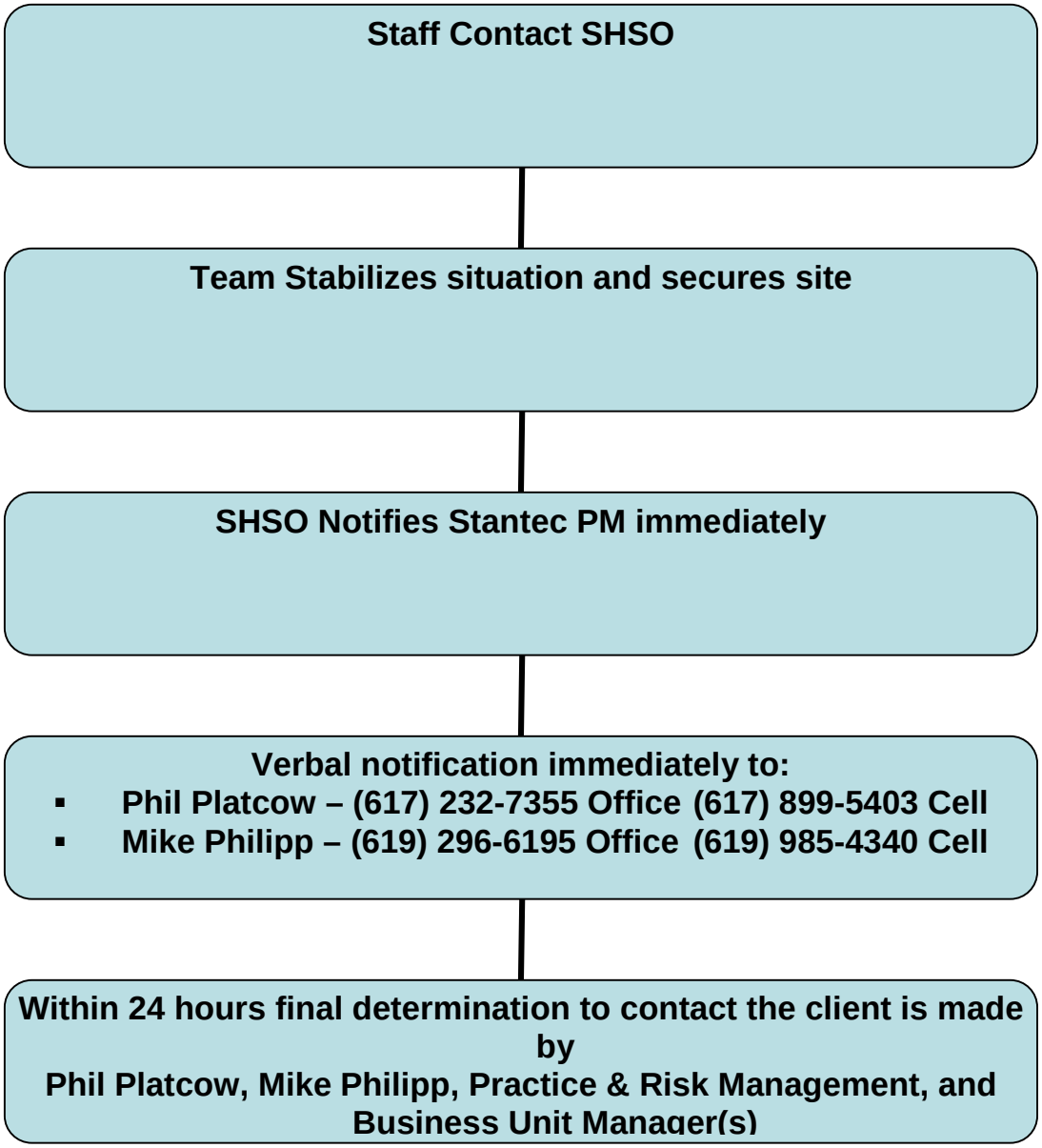
ATTACHMENT 3

INCIDENT REPORTING PROCEDURES

ATTACHMENT 3a
INCIDENT REPORTING FLOWCHART

INCIDENT INVESTIGATION REPORTING GUIDELINES
(MEDICAL EMERGENCY, FIRST AID, MVC, SPILL, NOV)



ATTACHMENT 3b
INCIDENT INVESTIGATION / NEAR-MISS INVESTIGATION REPORT

INCIDENT, NEAR MISS AND LOSS REPORT
(HSE / AUTO / PROPERTY)

Office & PC No.:		Date of incident:	
Project:		Time of Incident:	
Location of Project:		Project No.:	
Location of Incident:		Client:	
Person in Charge:		Reported to:	
Reported By:		Time Reported:	
Date reported:		Time employee started work:	☐ am ☐ pm

Type of Incident

☐ Auto ☐ Property Loss ☐ Environmental ☐ Occupational Illness ☐ Injury

☐ Medical Aid ☐ First Aid ☐ Non-First Aid ☐ Near Miss

COMPLETED BY	Print Name & Title	Signature	Date
REVIEWED BY	Print Name (Project Manager)	Signature (Project Manager)	Date
	Print Name (PCML)	Signature (PCML)	Date
	Print Name (OSEC)	Signature (OSEC)	Date

This document contains privileged and confidential information prepared at the request of Stantec's Legal Counsel. The contents of this report are restricted to HR personnel, Risk Management Representatives, Project Manager and PC Leader, and Stantec's Insurer, Adjuster and Legal Counsel. Information collected will be used solely for the purpose of meeting the requirements of Stantec's HSE and insurance programs, complying with applicable legislation, and will be used in accordance with any governing privacy legislation. The information collected will be maintained on file and may be included in required reports.

INSTRUCTIONS: This form must be completed and **submitted with in 24 hours** of any incident, near miss or loss. Where possible the Worker or Workers involved shall complete this form, alternatively the Project Manager, OSEC, or other employee may complete and submit this form. Do not delay submission waiting for signatures. Fax unsigned Report immediately to **(780) 969-2030** and forward original once all signatures have been obtained. Project Managers will follow up on all verbal incident reports to make sure written reports are submitted.

- Complete Section 1 for **ALL** incidents.
- Complete Section 2 for any incident involving injuries, illnesses and environmental incidents or where an injury, illness or environmental incident could have occurred.
- Complete Section 3 for any incident involving a vehicle owned, leased or rented by Stantec.
- Attach copies of Police Report, Repair and/or replacement estimates, documentation of original cost/purchase for property/equipment losses, if being replaced.
- Attach Diagram of Scene or Photographs if required. (use diagram on page 5 for auto accidents)

Return original completed and signed form to Stantec's Practice and Risk Management group (Edmonton) with a copy to regional Human Resources (only if medical aid required). Any supporting electronic documents can be sent to riskmgt@stantec.com.

INCIDENT, NEAR MISS AND LOSS REPORT
(HSE / AUTO / PROPERTY)

SECTION 1 - GENERAL

STANTEC EMPLOYEE(S) INVOLVED		
Name	Address	Phone No.

OTHER PERSONS INVOLVED (Including Stantec Sub-Contractors/Consultants)

Name	Address	Phone	Employer (if applicable)

DESCRIPTION OF THE INCIDENT

Describe the incident and provide as much detail as possible with respect to what happened and how it happened. For lost, stolen or damaged equipment provide a list including the value and serial number of each piece of equipment. Attach additional sheets if required.

Type of Contact (**see Table 1**):	

WORK SITE CONDITIONS AT TIME OF INCIDENT (Describe weather, housekeeping, etc.)

WITNESS INFORMATION	
Name	Name
Address	Address
Phone	Phone
Employer	Employer

POLICE

Was a Police Report filed? ☐ yes ☐ No File No. City:

Name of Officer Badge No.

Charges Laid ☐ Yes ☐ No Person Charged Type of Charge

IMMEDIATE ACTIONS TAKEN (**Must** be completed for **All** Incidents)

What immediate actions were taken to prevent further injury or damages?

IMMEDIATE CAUSES: Substandard actions and or conditions that caused or could cause this event, **See Table 2**

UNDERLYING CAUSES: Specific personal or job factors that caused or could cause this event, **See Table 3**

CORRECTIVE ACTIONS REQUIRED

INCIDENT, NEAR MISS AND LOSS REPORT
(HSE / AUTO / PROPERTY)

	Corrective Action	Person Responsible	Due Date	Date Completed
1				
2				
3				
4				

INVESTIGATION COMPLETED BY

Name	Address	Phone No.

RESULTS OF CORRECTIVE ACTIONS (Verify and Validate corrective actions after implementation)

SECTION 2: HSE

INJURY / ILLNESS

Name	Address	Employer

INJURY / ILLNESS: Describe the specific injury or illness (e.g. fracture left arm, skin rash upper body, sprain lower back)

First Aid Required ☐ Yes ☐ No — If yes, by whom and qualifications

What First Aid was provided: (attach first aid report)

Medical Aid Required ☐ Yes ☐ No — If yes, name of facility and city

Workers' Compensation Report Completed (or equivalent) ☐ Yes ☐ No

Note: Should any of the above information change, the employee is responsible for notifying HR or P&RM.

SPILLS/RELEASES OR CONTACT WITH CONTAMINANTS AND HAZARDOUS MATERIALS

What substance or mix of substances was involved?

How much of the substance or mix was involved (by volume or weight)?

Was the Employee exposed to the substance? ☐ Yes ☐ No	Describe exposure type (Inhalation, ingestion, skin contact)
Offsite Impacts Observed Or Anticipated? ☐ Yes ☐ No	Identify regulatory authorities that the spill or release was reported to

INCIDENT, NEAR MISS AND LOSS REPORT
(HSE / AUTO / PROPERTY)

Complete only if incident involves a vehicle owned, leased or rented by Stantec

SECTION 3 - AUTOMOBILE LOSS

STANTEC VEHICLE			
Year Make Model		VIN	
Mileage		License Plate No. & Province/State	
Present location of vehicle		Use at time of accident	

STANTEC DRIVER			
Name	Date of Birth	Operator License. No. & Province/State	
No. Years Driving		No. Years Driving for Stantec	

DESCRIPTION AND ESTIMATE OF DAMAGES

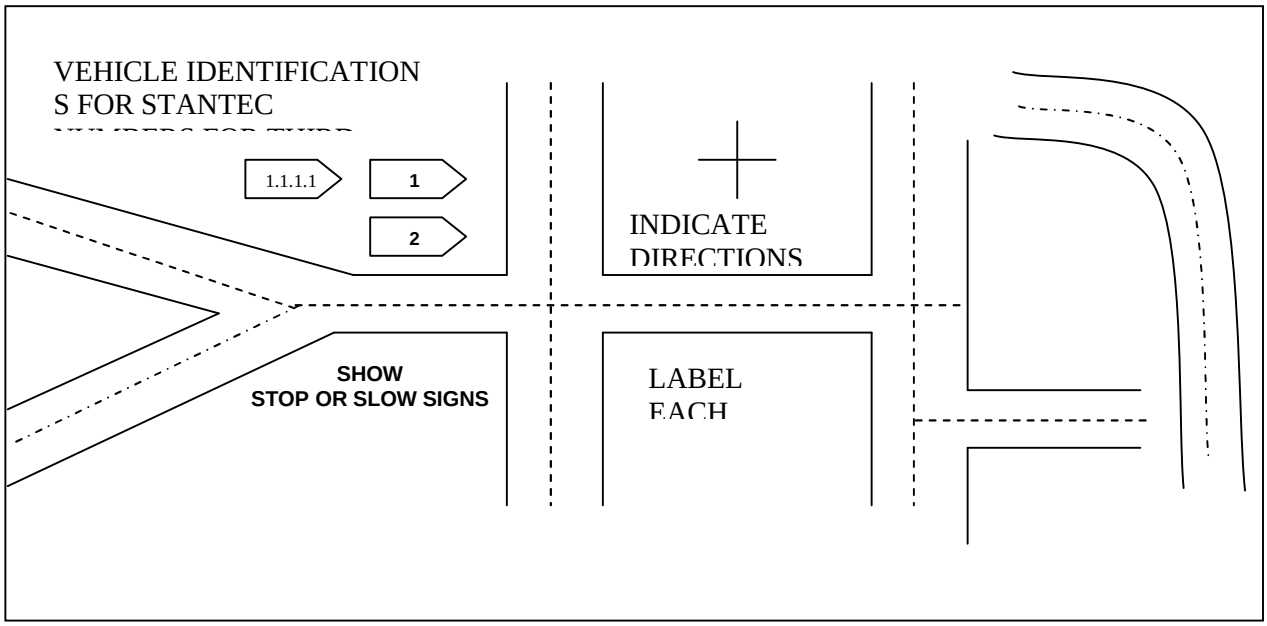
DAMAGE TO OTHER VEHICLES (Attach separate page if necessary)

VEHICLE #1			VEHICLE #2		
Owner Name	Phone		Owner Name	Phone	
Address			Address		
Year, Make & Model of vehicle	License Plate No.		Year, Make & Model of vehicle	License Plate No.	
Name of Insurer			Name of Insurer		
Policy No.			Policy No.		
Description of damage			Description of damage		
Name of Driver (if different from owner)			Name of Driver (if different from owner)		
Address (if different from owner)			Address (if different from owner)		
Phone	Operator License. No. & Province/State		Phone	Operator License. No. & Province/State	
Injured? ☐ Yes ☐ No			Injured? ☐ Yes ☐ No		
Describe			Describe		

DRIVERS STATEMENT (Describe in detail – attach additional sheets if required)

INCIDENT, NEAR MISS AND LOSS REPORT
(HSE / AUTO / PROPERTY)

Use one of layouts below or draw plan (separate sheet). If any street is more than two-lane or is one way only, please indicate. Illustrate position of cars at the time of collision. Show skid marks, road signs, direction of movement and any relevant details.



VEHICLES			
	Stantec (S)	Vehicle No. 1	Vehicle No. 2
DIRECTION HEADED			
SIDE OF STREET			
RATE OF SPEED			
BLEW HORN			
GAVE SIGNAL			
WEATHER	☐ Clear ☐ Cloudy ☐ Fog ☐ Raining ☐ Snowing ☐ Other If other, describe		
LIGHT	☐ Daylight ☐ Dusk ☐ Darkness with street or highway ☐ Lighted ☐ Not Lighted		
ROAD CONDITIONS	☐ Paved ☐ Gravel ☐ Wet Dry ☐ Muddy ☐ Icy ☐ Snowy ☐ Loose material on surface ☐ Defective shoulder ☐ Holes/deep ruts ☐ Other		

INCIDENT, NEAR MISS AND LOSS REPORT
(HSE / AUTO / PROPERTY)

TABLE 1 – Type of Contact

Type of Contact	Contact With
1. Struck against 2. Struck by 3. Caught in 4. Caught on 5. Caught between 6. Slip 7. Fall on same level 8. Fall to lower level 9. Overexertion 10. Sprains and Strains 11. Repetitive Motion 12. Animal attack 13. Other	1. Electricity 2. Heat 3. Cold 4. Radiation 5. Caustics 6. Noise 7. Toxic or Noxious substances

TABLE 2 – Immediate Causes

Substandard Actions:	Substandard Conditions
1. Operating Equipment without authority 2. Failure to Warn 3. Failure to Secure 4. Operating at improper speed 5. Making safety devices inoperable 6. Removing safety devices 7. Using defective Equipment 8. Using equipment improperly 9. Failing to use personal protective equipment properly 10. Improper loading 11. Improper placement 12. Improper lifting 13. Improper Position for task 14. Servicing equipment in operation 15. Horseplay 16. Under influence of alcohol and/or drugs	1. Inadequate or improper protective equipment 2. Defective tools, equipment or materials 3. Restricted Action 4. Inadequate warning systems 5. fire and explosion hazard 6. Poor Housekeeping 7. Hazardous environmental conditions; gases, dusts, fumes, smoke, vapors 8. Noise Exposure 9. High or low temperature exposure 10. Inadequate or excess illumination 11. inadequate ventilation 12. External Factors

TABLE 3 - Underlying Causes

Personal Factors	Job Factors
1. Inadequate capability 2. Lack of knowledge 3. Lack of skill 4. Stress 5. Improper Motivation	1. Inadequate leadership/supervision 2. Inadequate engineering 3. Inadequate purchasing 4. Inadequate maintenance 5. Inadequate tools/equipment/materials 6. Inadequate work standards 7. Wear and tear 8. Abuse and misuse

INCIDENT, NEAR MISS AND LOSS REPORT
(HSE / AUTO / PROPERTY)

Contact information.
Immediately Call Corporate HSE, and Practice & Risk Management, and (if injuries) Human Resources.

Health, Safety & Environment: Call Philip Platcow and Michael Philipp
Philip Platcow: 617-232-7355; fax 801-340-8657 Email: philip.platcow@stantec.com.
After hours or weekends, cell: 617-899-5403 or Home 617-739-1224 and
Mike Philipp 619-296-6195; fax 619-296-6199 Email: mike.philipp@stantec.com
After hours or weekends, cell: (619) 985-4340

Practice & Risk Management: Fax unsigned report to (780) 969-2030

Human Resources: **For Injuries Only** contact the Human Resources Rep. for your region:
US East: Jennie Moore
Jennie Moore: Phone: (585) 413-5241, Cell: (585) 613-8022, Fax: (585) 272-7442,
E-Mail: jennie.moore@stantec.com.
US West: Peggy Ramos
Peggy Ramos: Phone: (949) 923-6061, Fax: (949) 923-6015,
E-Mail: peggy.ramos@stantec.com
US Mtn Desert: (Arlington, Houston, Midland, Phoenix, Scottsdale, Ponca City SLC): Shannon Drake
Shannon Drake: Phone: (602) 707-4627, Fax (602) 532-7784,
E-Mail: Shannon.Drake@stantec.com
US Mtn Desert: (Dallas, Fort Worth, Denver, Fort Collins, Golden, Las Vegas, Reno, Oklahoma City, Tucson) Sheryl Appelt
Sheryl Appelt: Phone: (602) 707-9495, Fax (602) 926-2217,
E-Mail: Sheryl.Appelt@stantec.com

Fax and/or scan-email report to all three**.**

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ATTACHMENT 3c
EMERGENCY RESPONSE INFORMATION

Local emergency contact information

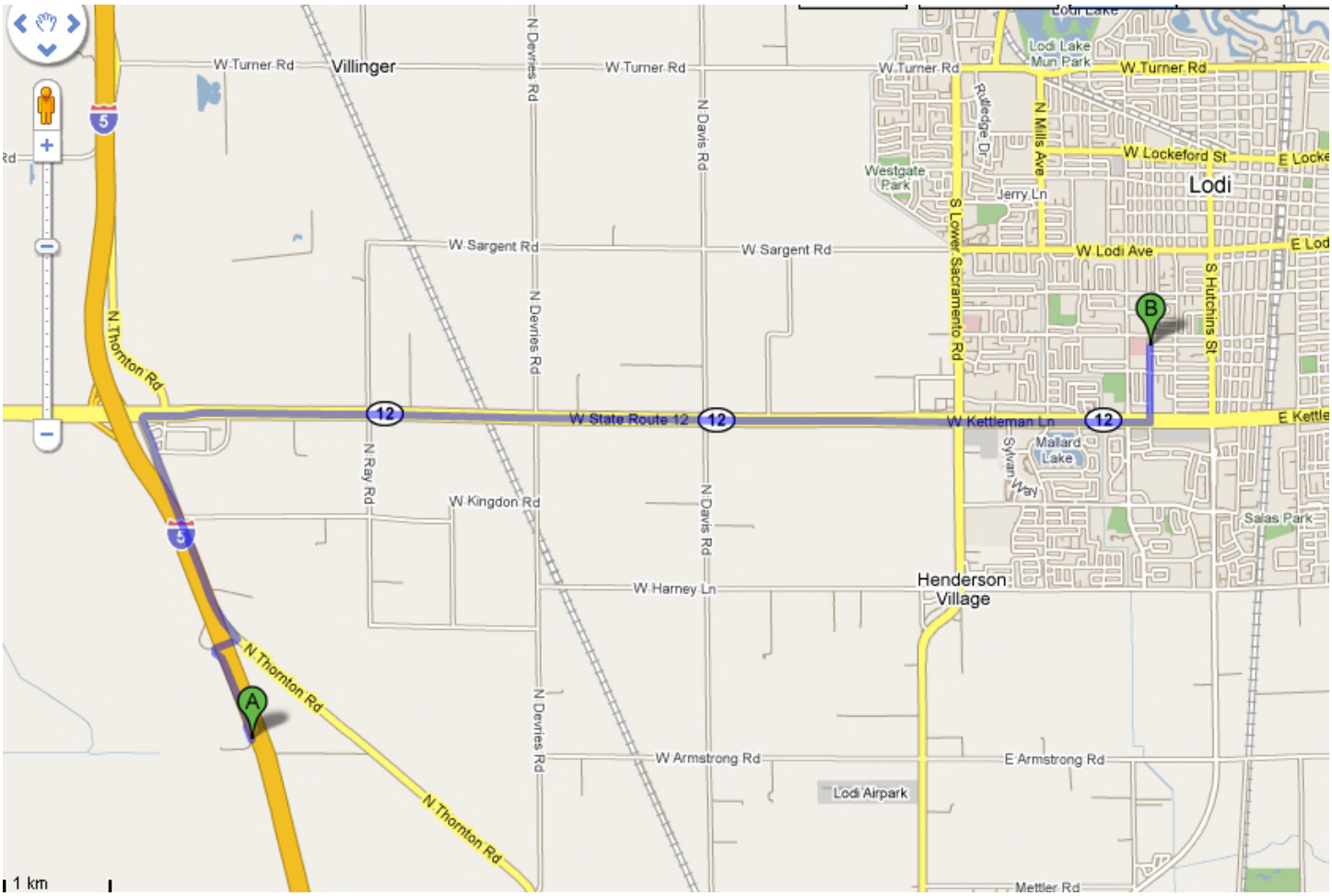
	NAME	TELEPHONE NO.
Hospital	Lodi Memorial Hospital	**911 or (209) 334-3411**
Ambulance	**American Medical Response**	**911 or (209) 948-6056**
Police/Sheriff	**City of Lodi Police**	**911 or (209) 333-6727**
Fire	**City of Lodi Fire Department**	**911 or (209) 333-6727**

DIRECTIONS AND MAP TO THE HOSPITAL

N Cord Rd

1. Head **north** on **N Cord Rd** toward **N I 5 FR Rd** — 0.6 mi
2. Turn **right** at **N I 5 FR Rd** — 0.2 mi
3. Turn **left** at **N Thornton Rd** — 1.5 mi
4. Slight **right** at **CA-12/W State Route 12**
   Continue to follow CA-12 — 5.9 mi
5. Turn **left** at **S Fairmont Ave**
   Destination will be on the left — 0.4 mi

Lodi Memorial Hospital
975 S Fairmont Ave
Lodi, CA 95240, United States



Attachment 3

ATTACHMENT 3d
OCCUPATIONAL HEALTH CLINICS

Concentra Location Search Results

Showing **20** locations in **California**

1. Medical Center with Urgent Care

2121 Towne Centre Place
Ste. 100
Anaheim, CA 92806
Phone: (714) 937-1919
Fax: (714) 937-1095
After-hours: (714) 937-1919

Hours of Operation
Urgent Care
24 hours / 7 days
Occupational Medicine
24 hours / 7 days

2. Medical Center with Urgent Care

9500 Stockdale Hwy
Ste. 100, 101
Bakersfield, CA 93311
Phone: (661) 282-4900
Fax: (661) 321-0690

Hours of Operation
Urgent Care
8:00 am - 9:00 pm (Mon. - Fri.)
9:00 am - 7:00 pm (Sat. - Sun.)
10:00 am - 4:00 pm (holidays)
Occupational Medicine
8:00 am - 6:00 pm (Mon. - Fri.)

3. Medical Center with Urgent Care

2610 Tuolumne Street
Fresno, CA 93721
Phone: (559) 268-0666
Fax: (559) 268-0462

Hours of Operation
Urgent Care
8:00 am - 5:00 pm (Mon. - Fri.)
Occupational Medicine
8:00 am - 5:00 pm (Mon. - Fri.)

4. Medical Center with Urgent Care

7265 N First Street
Suite 105
Fresno, CA 93720
Phone: (559) 431-8181
Fax: (559) 431-1291
After-hours: (559) 449-2802

Hours of Operation
Urgent Care
7:00 am - 7:00 pm (Mon. - Fri.)
Occupational Medicine
7:00 am - 7:00 pm (Mon. - Fri.)

5. Medical Center with Urgent Care

2555 S East Avenue
Fresno, CA 93706
Phone: (559) 499-2400
Fax: (559) 264-9241
After-hours: (559) 449-2802

Hours of Operation
Urgent Care
7:00 am - 6:00 pm (Mon. - Fri.)
8:00 am - 12:00 pm (Sat.)
Occupational Medicine
7:00 am - 6:00 pm (Mon. - Fri.)
8:00 am - 12:00 pm (Sat.)

6. Medical Center with Urgent Care

26 Centerpointe Drive
Ste. 115
La Palma, CA 90623
Phone: (714) 522-8020
Fax: (714) 522-7833

Hours of Operation
Urgent Care
24 hours / 7 days
Occupational Medicine
24 hours / 7 days

7. Medical Center with Urgent Care

6033 W Century Blvd.
Ste. 200
Los Angeles, CA 90045
Phone: (310) 215-1600
Fax: (310) 215-0783

Hours of Operation
Urgent Care
24 hours / 7 days
Occupational Medicine
24 hours / 7 days

8. Medical Center with Urgent Care

509 S I Street
Ste. A
Madera, CA 93637
Phone: (559) 673-9020
Fax: (559) 673-6124
After-hours: (559) 673-9256

Hours of Operation
Urgent Care
8:00 am - 6:00 pm (Mon. - Fri.)
Occupational Medicine
8:00 am - 6:00 pm (Mon. - Fri.)

9. Medical Center with Urgent Care

384 Embarcadero West
Oakland, CA 94607
Phone: (510) 465-9565
Fax: (510) 465-3840
After-hours: (510) 204-2750

Hours of Operation
Urgent Care
8:00 am - 5:00 pm (Mon. - Fri.)
Occupational Medicine
8:00 am - 5:00 pm (Mon. - Fri.)

10. Medical Center with Urgent Care

1101 S Milliken Avenue
Ste. C
Ontario, CA 91761
Phone: (909) 390-2799
Fax: (909) 390-0929
After-hours: (909) 390-2799

Hours of Operation
Urgent Care
7:00 am - 6:00 pm (Mon. - Fri.)
Occupational Medicine
7:00 am - 6:00 pm (Mon. - Fri.)

11. Medical Center with Urgent Care

640 S Placentia Avenue
Placentia, CA 92870
Phone: (714) 579-7772
Fax: (714) 579-7781
After-hours: (714) 579-7772

Hours of Operation
Urgent Care
8:00 am - 5:00 pm (Mon. - Fri.)
Occupational Medicine
8:00 am - 5:00 pm (Mon. - Fri.)

12. Medical Center with Urgent Care

9405 Fairway View Place
Rancho Cucamonga, CA 91730
Phone: (909) 481-7345
Fax: (909) 484-8661
After-hours: (909) 481-7345

Hours of Operation
Urgent Care
24 hours / 7 days
Occupational Medicine
24 hours / 7 days

13. Medical Center with Urgent Care

2970 Hilltop Mall Road
Suite 203
Richmond, CA 94806
Phone: (510) 222-8000
Fax: (510) 222-2690
After-hours: (510) 243-6927

Hours of Operation
Urgent Care
8:00 am - 5:00 pm (Mon. - Fri.)
Occupational Medicine
8:00 am - 5:00 pm (Mon. - Fri.)

14. Medical Center with Urgent Care

6174 State Farm Drive
Rohnert Park, CA 94928
Phone: (707) 586-4320
Fax: (707) 586-4328

Hours of Operation
Urgent Care
8:00 am - 5:00 pm (Mon. - Fri.)
Occupational Medicine
8:00 am - 5:00 pm (Mon. - Fri.)

15. Medical Center with Urgent Care

728 20th Street
San Francisco, CA 94107
Phone: (415) 648-9501
Fax: (415) 648-9508
After-hours: (415) 647-8600

Hours of Operation
Urgent Care
7:00 am - 7:00 pm (Mon. - Fri.)
Occupational Medicine
7:00 am - 7:00 pm (Mon. - Fri.)

16. Medical Center with Urgent Care

110 Sutter Street
Ste. 300
San Francisco, CA 94104
Phone: (415) 781-7077
Fax: (415) 781-7099
After-hours: (415) 210-3494

Hours of Operation
Urgent Care
8:00 am - 5:00 pm (Mon. - Fri.)
Occupational Medicine
8:00 am - 5:00 pm (Mon. - Fri.)

17. Medical Center

2 Connecticut Street
San Francisco, CA 94107
Phone: (415) 621-5055
Fax: (415) 621-0611

Hours of Operation
Occupational Medicine
7:00 am - 5:00 pm (Mon. - Fri.)

18. Medical Center with Urgent Care

2587 Merced Street
San Leandro, CA 94577
Phone: (510) 351-3553
Fax: (510) 351-3585
After-hours: (510) 667-4545

Hours of Operation
Urgent Care
8:00 am - 6:00 pm (Mon. - Fri.)
8:00 am - 6:00 pm (holidays)
Occupational Medicine
7:00 am - 6:00 pm (Mon. - Fri.)

19. Medical Center with Urgent Care

740 Nordahl Road
Ste. 117
San Marcos, CA 92069
Phone: (760) 432-9000
Fax: (760) 741-0746

Hours of Operation
Urgent Care
8:00 am - 6:00 pm (Mon. - Fri.)
Occupational Medicine
8:00 am - 6:00 pm (Mon. - Fri.)

20. Medical Center with Urgent Care

1221 N Dutton Avenue
Santa Rosa, CA 95401
Phone: (707) 543-8360
Fax: (707) 543-8361

Hours of Operation
Urgent Care
8:00 am - 5:00 pm (Mon. - Fri.)
Occupational Medicine
8:00 am - 5:00 pm (Mon. - Fri.)

ATTACHMENT 4

ATTACHMENT 4
PRE-DRILLING/EXCAVATION CHECKLIST AND UTILITY CLEARANCE LOG

PROJECT:			
LOCATION:		**DATE:**	
UTILITY LOCATOR:		**UTILITY LOCATOR PHONE #:**	
DATE OF LOCATOR REQUEST:		**LOCATOR CALL REFERENCE #:**	

Instructions: This checklist is to be completed by Stantec personnel prior to initiation of field activities as a safety measure to insure that all underground utility lines, other underground structures and above-ground power lines are clearly marked in the area selected for boring or excavation. **DRILLING OR EXCAVATION WORK MAY NOT PROCEED UNTIL ALL UTILITY SERVICES LISTED IN SECTION 8.0 OF THIS HASP HAVE BEEN CONTACTED AND THIS CHECKLIST HAS BEEN COMPLETED. IF ANY OF THE QUESTIONS ANSWERED BELOW ARE ANSWERED "NO", THEN PROJECT MANAGER MUST BE CONTACTED AND CONCERNS/ISSUES DISCUSSED**. Document the reason for a "NO" answer on the back of this form.

Type of Utilities and Structures	**Not Present**	**Present**	**How Marked** (Flags, paint on pavement, wooden stakes, etc.)
Petroleum product line			
Septic tank/drain field			
Other			

YES	**NO**	**PRE-MOBILIZATION**
		Is a scaled site plan, map or drawing showing the proposed borehole locations attached to this form?
		Does each borehole location allow for clear entry and exit, adequate workspace, and a clear path for raising the mast and operating the drill rig and all support equipment? Ensure 20 feet of clearance distance between the mast and electrical lines (Stantec H&S Policy and 29 CFR 1926.550). Check with the power utility company.
		Are all of the proposed borehole locations and associated areas of pavement cutting at least 10 feet from any subsurface or above-ground utilities shown on client's building plans? Stantec PM check here □ if plans not provided by client (therefore not applicable to this job).
		Are all of the proposed borehole locations and associated areas of pavement cutting at least 10 feet from any subsurface or above-ground utilities shown on public right-of-way street improvement or other public property plan or site map? PM check here □ if not applicable to this job.
		Has the Site Representative, familiar with the site, such as a construction manager, indicated no knowledge of any subsurface or above-ground utilities within 10 feet of the proposed borehole locations? Is the Site Representative qualified to make such a determination?
		Are all of the proposed borehole locations and associated areas of pavement cutting at least 10 feet from any subsurface utilities identified during a geophysical survey? Applicable: Yes / No
		Have all Utility Locating Service providers notified by the public line locator marked out their facilities in the vicinity of the borehole locations or otherwise notified us that they do not have any facilities near the proposed borehole locations?
		Are all proposed borehole locations and associated areas of pavement cutting at least 10 feet from a visual line connecting two similar looking manhole covers?
		Are all proposed borehole locations and associated areas of pavement cutting at least 10 feet from a visual line perpendicular to the street from the water, gas, and electrical meters?
		Are all proposed boring locations and associated areas of pavement cutting clear of pavement joints, curbs, crash posts, or other engineered structures?
		Does the pavement lack signs of previous excavation (e.g. no pavement subsidence, no differences in pavement texture or relief, no pavement patching)? If there are signs, determine the purpose of the previous excavation and act accordingly.
		Before drilling have you hand dug/used a water jet VacTron unit/tile probe/etc., to dig a hole 5 feet below grade if possible, and is the diameter of the hole at least 2 inches greater than the outer diameter of the drilling auger?
		Does the soil you encountered in the hand-dug hole appear to be native material (i.e. free of clean gravel, clean sand, aggregate base [gravelly sand with ~10% fines], or other non-native looking material)?
		Have you made sure that you have identified all the expected utilities or have made sure that you can explain any missing utilities?

Have the above concerns been discussed with the Stantec Project Manager? Yes / No
Have the above concerns been discussed with the client? Yes / No
Have you made a reasonable effort to resolve the above issues? Yes / No
Approval to proceed provided by: Client Representative Name _____ Title and Date: _____
Approval to proceed provided by: Stantec Representative Name _____ Title and Date: _____
Stantec Field Technician Name: _____ Title and Date: _____

ATTACHMENT 5

MONITORING

ATTACHMENT 5a
EQUIPMENT CALIBRATION/CHECK LOG(S)

DATE	INSTRUMENT/ MODEL NO.	SERIAL NO.	BATTERY CHECK OK?	ZERO ADJUST OK?	CALIBRATION GAS (PPM)	READING (PPM)	LEAK CHECK	PERFORMED BY	COMMENTS

* Submit copies of logs to Director of Health Safety& Environment (HSE), Philip A. Platcow, CIH within 24 hours, if a PEL is exceeded, or personal protective equipment level is upgraded at (617) 232-7355 or via email at philip.platcow@stantec.com

ATTACHMENT 5b
AIR MONITORING LOG(S)

Instrument(s) Used: Make: _____ Model: _____

DATE	TIME	LOCATION/SOURCE (Personal/Area Sampling)	WORK ACTIVITY DURING SAMPLING (Be specific)	Measurement (Units)	WHAT DID YOU DO BECAUSE OF THE RESULT? (PPE Change/Activity Change/Nothing Needed)	SAMPLED BY

* Submit copies of logs to Director of Health Safety& Environment (HSE), Philip A. Platcow, CIH within 24 hours, if a PEL is exceeded, or personal protective equipment level is upgraded at (617) 232-7355 or via email at philip.platcow@stantec.com

ATTACHMENT 6

SAFE DRIVING PROCEDURES

Too tired to drive?

A road safety initiative of RACV, Rural Ambulance Victoria and Metropolitan Ambulance Service

Driver Fatigue Checklist

Before you drive, answer these questions to make sure you are not too tired to drive.

	Yes	No
Have you been getting full nights of restful sleep over the past week? *When you don't get enough sleep you acquire sleep debt. The only way to repay the debt is by sleeping.*	❑	❑
Are you setting off on a trip after a good night's sleep, rather than after a full day at work? *Being awake for 17 hours has the same effect on driving as having a BAC (Blood Alcohol Concentration) of .05, doubling your risk of crashing. After 24 hours the BAC equivalent is 0.1, equating to a 7 times greater risk of crashing than someone who is well rested.*	❑	❑
Are you planning to start your trip after 6am, rather than starting out earlier when you would normally be asleep? *Your body naturally wants to sleep between about 1am and 6am greatly increasing your risk of crashing, at those times.*	❑	❑
Have you allowed time in your trip to stop and rest if you feel tired? *Regular breaks every 2 hours will help maintain vigilance, however, the only way to combat fatigue is to sleep.*	❑	❑
Do you stop and have a Powernap if you feel tired while driving? *Stopping for a 15 to 30 minute sleep or Powernap when you are tired is effective in alleviating the short-term effects of fatigue, but ensure you allow time to recover from your sleep before commencing to drive.*	❑	❑
Are you sure that you do not suffer from a sleeping disorder, such as sleep apnoea? *2% of people suffer from the most common sleep disorder, sleep apnoea. Men over 50, particularly those overweight, are most at risk.*	❑	❑

If you have answered "no" to any of these questions you may be at risk of fatigue.

RACV

Too tired to drive?

What is fatigue?

Driver fatigue contributes to more than 25 per cent of all road crashes in Victoria.

Two main causes:

- lack of quality sleep
- driving at times when you would normally be asleep.

Protect yourself from having a fatigue-related crash by:

- making sure you regularly get enough sleep
- being aware of the fatigue high crash risk times when driving between 1am-6am
- not starting a long trip after a long day's work
- planning your trip so you can take regular breaks
- seeking medical advice if you often feel sleepy
- being aware of the effects of any medication taken.

Once you're on the road:

- regular rest breaks to help keep you alert, but if you feel tired, the only way to keep safe is to stop and sleep
- eat proper and well-balanced meals, preferably at your normal meal times.

If you feel tired when driving, take a Powernap (sleep for 15 to 30 minutes), but allow time to recover from your sleep before commencing to drive.

Don't be fooled by myths about fatigue! The following common beliefs about fatigue are untrue:

myth – Coffee is the best way to combat fatigue.
Coffee only provides short-term benefits; once its effects wear off, you suffer from sleep rebound, which is a major cause of crashes.

myth – Playing music will help keep me alert.
This is only a short-term benefit.

myth – Plenty of fresh air through the window will help keep me alert.
This is only a short-term benefit.

myth – Young people need less sleep.
In fact, drivers under 25 years of age are over-represented in fatigue crashes.

myth – I know when I am tired, or when I am having "sleep attacks".
The danger is that you only find out how tired you are when it's too late.

The only cure for fatigue is sleep

ATTACHMENT 6a
JOURNEY HAZARD ASSESSMENT CARD(S)

JOURNEY HAZARD ASSESSMENT CARD

STOP! THINK! GO!

Name _____ Date _____

STOP

Do I need to make this journey? ❑ Yes ❑ No

STOP

Where am I traveling? How long will I be driving?
And do I have an ETA with a contact person?
Have I communicated area hazards and safest mode of transport?

THINK

How can I ensure that I have a safe journey?

THINK

Am I well rested an alert for the journey? ❑ Yes ❑ No

THINK

Have I done a complete vehicle walk around and ensured that the vehicle is safe and ready for travel? ❑ Yes ❑ No

ELEMENTS OF THE DRIVING STANDARD

- Has vehicle been inspected? ❑ Yes ❑ No
  - Will passengers be transported? ❑ Yes ❑ No
  - Has cargo been secured? ❑ Yes ❑ No
- Driver's License is current? ❑ Yes ❑ No
  - Appropriately rested and alert? ❑ Yes ❑ No
- Journey risks have been identified? ❑ Yes ❑ No
  - Seatbelts are in working order? ❑ Yes ❑ No
  - Medically fit for driving? ❑ Yes ❑ No

HAVE A SAFE TRIP!

DRIVING IS RISKY BUSINESS!

JOURNEY HAZARD ASSESSMENT CARD

STOP! THINK! GO!

Name _____ Date _____

STOP

Do I need to make this journey? ❑ Yes ❑ No

STOP

Where am I traveling? How long will I be driving?
And do I have an ETA with a contact person?
Have I communicated area hazards and safest mode of transport?

THINK

How can I ensure that I have a safe journey?

THINK

Am I well rested an alert for the journey? ❑ Yes ❑ No

THINK

Have I done a complete vehicle walk around and ensured that the vehicle is safe and ready for travel? ❑ Yes ❑ No

ELEMENTS OF THE DRIVING STANDARD

- Has vehicle been inspected? ❑ Yes ❑ No
  - Will passengers be transported? ❑ Yes ❑ No
  - Has cargo been secured? ❑ Yes ❑ No
- Driver's License is current? ❑ Yes ❑ No
  - Appropriately rested and alert? ❑ Yes ❑ No
- Journey risks have been identified? ❑ Yes ❑ No
  - Seatbelts are in working order? ❑ Yes ❑ No
  - Medically fit for driving? ❑ Yes ❑ No

HAVE A SAFE TRIP!

DRIVING IS RISKY BUSINESS!

ATTACHMENT 6b
DAILY VEHICLE INSPECTION CHECKLIST(S)

Stantec	DAILY VEHICLE CHECKLIST	ADMIN-602
		Page 1 of 1
		Rev. 3 | OCT 4, 2007

Employee Name: _____ **Region/Business Unit:** _____ **Date:** _____

Vehicle Color/Make/Model: _____ **Vehicle Plate Number:** _____

Vehicle Mileage Start: _____ **Vehicle Mileage Stop:** _____

Job: _____ **Job #:** _____ **# Miles:** _____ **# On-Site Miles:** _____

Job: _____ **Job #:** _____ **# Miles:** _____ **# On-Site Miles:** _____

☐ **Stantec Vehicle** ☐ **Rental Vehicle** ☐ **Personal Vehicle**

Perimeter Walk Around:	**ITEM IS:**	
	OK	**NOT OK**
Check for signs of vandalism, negligence, damage or unusual conditions		
Check all tires for excessive and unusual wear and proper inflation – include the spare tire if it is easily accessible		
Check under vehicle for signs of leaking fluids		
Check wiper blades (Do they work? Do they need replacement?)		
Check all light systems – brake, head, back-up, running, turn signals, emergency flashers		
Check to make sure doors, truck/toolbox lids, tailgates all open and close properly (Make sure you have keys to any toolboxes that you may need to access)		

Check Gauges on Dashboard:	**ITEM IS:**	
	OK	**NOT OK**
Fuel Level		
Oil light		
Engine Coolant Temperature Gauge		
Service Indicator Lights		
Battery Charge Indicator		

Inside Vehicle:	**ITEM IS:**	
	OK	**NOT OK**
Make sure seatbelts are present for all who will be riding in the vehicle		
Secure all cargo in the vehicle so that items will not become projectiles in the event of sudden stops or collisions		
Adjust the seat position, rearview and side mirrors		
Adjust temperature controls, vents, radio, etc.		

If Pulling a Trailer:	**ITEM IS:**	
	OK	**NOT OK**
Is trailer properly hitched to the vehicle (including safety chains)		
All lights are working properly		
Proper trailer for the load (check weight specifications) and load is balanced. If you anticipate the load is near the trailer weight limit, weigh the trailer at a weigh station.		
Are tires in good condition and properly inflated?		

Administrative Procedure:	**YES**	**NO**
Equipment Form has been completed and turned in.		

Notify the Vehicle Manager or Rental Company if you feel that any deficiencies are unsafe and DO NOT drive the vehicle! **Signature:** _____

Stantec	DAILY VEHICLE CHECKLIST	ADMIN-602
		Page 1 of 1
		Rev. 3 | OCT 4, 2007

Employee Name: _____ **Region/Business Unit:** _____ **Date:** _____

Vehicle Color/Make/Model: _____ **Vehicle Plate Number:** _____

Vehicle Mileage Start: _____ **Vehicle Mileage Stop:** _____

Job: _____ **Job #:** _____ **# Miles:** _____ **# On-Site Miles:** _____

Job: _____ **Job #:** _____ **# Miles:** _____ **# On-Site Miles:** _____

☐ **Stantec Vehicle** ☐ **Rental Vehicle** ☐ **Personal Vehicle**

Perimeter Walk Around:	**ITEM IS:**	
	OK	**NOT OK**
Check for signs of vandalism, negligence, damage or unusual conditions		
Check all tires for excessive and unusual wear and proper inflation – include the spare tire if it is easily accessible		
Check under vehicle for signs of leaking fluids		
Check wiper blades (Do they work? Do they need replacement?)		
Check all light systems – brake, head, back-up, running, turn signals, emergency flashers		
Check to make sure doors, truck/toolbox lids, tailgates all open and close properly (Make sure you have keys to any toolboxes that you may need to access)		

Check Gauges on Dashboard:	**ITEM IS:**	
	OK	**NOT OK**
Fuel Level		
Oil light		
Engine Coolant Temperature Gauge		
Service Indicator Lights		
Battery Charge Indicator		

Inside Vehicle:	**ITEM IS:**	
	OK	**NOT OK**
Make sure seatbelts are present for all who will be riding in the vehicle		
Secure all cargo in the vehicle so that items will not become projectiles in the event of sudden stops or collisions		
Adjust the seat position, rearview and side mirrors		
Adjust temperature controls, vents, radio, etc.		

If Pulling a Trailer:	**ITEM IS:**	
	OK	**NOT OK**
Is trailer properly hitched to the vehicle (including safety chains)		
All lights are working properly		
Proper trailer for the load (check weight specifications) and load is balanced. If you anticipate the load is near the trailer weight limit, weigh the trailer at a weigh station.		
Are tires in good condition and properly inflated?		

Administrative Procedure:	**YES**	**NO**
Equipment Form has been completed and turned in.		

Notify the Vehicle Manager or Rental Company if you feel that any deficiencies are unsafe and DO NOT drive the vehicle! **Signature:** _____

Stantec	DAILY VEHICLE CHECKLIST	ADMIN-602
		Page 1 of 1
		Rev. 3 | OCT 4, 2007

Employee Name: _____ **Region/Business Unit:** _____ **Date:** _____

Vehicle Color/Make/Model: _____ **Vehicle Plate Number:** _____

Vehicle Mileage Start: _____ **Vehicle Mileage Stop:** _____

Job: _____ **Job #:** _____ **# Miles:** _____ **# On-Site Miles:** _____

Job: _____ **Job #:** _____ **# Miles:** _____ **# On-Site Miles:** _____

☐ **Stantec Vehicle** ☐ **Rental Vehicle** ☐ **Personal Vehicle**

Perimeter Walk Around:	**ITEM IS:**	
	OK	**NOT OK**
Check for signs of vandalism, negligence, damage or unusual conditions		
Check all tires for excessive and unusual wear and proper inflation – include the spare tire if it is easily accessible		
Check under vehicle for signs of leaking fluids		
Check wiper blades (Do they work? Do they need replacement?)		
Check all light systems – brake, head, back-up, running, turn signals, emergency flashers		
Check to make sure doors, truck/toolbox lids, tailgates all open and close properly (Make sure you have keys to any toolboxes that you may need to access)		

Check Gauges on Dashboard:	**ITEM IS:**	
	OK	**NOT OK**
Fuel Level		
Oil light		
Engine Coolant Temperature Gauge		
Service Indicator Lights		
Battery Charge Indicator		

Inside Vehicle:	**ITEM IS:**	
	OK	**NOT OK**
Make sure seatbelts are present for all who will be riding in the vehicle		
Secure all cargo in the vehicle so that items will not become projectiles in the event of sudden stops or collisions		
Adjust the seat position, rearview and side mirrors		
Adjust temperature controls, vents, radio, etc.		

If Pulling a Trailer:	**ITEM IS:**	
	OK	**NOT OK**
Is trailer properly hitched to the vehicle (including safety chains)		
All lights are working properly		
Proper trailer for the load (check weight specifications) and load is balanced. If you anticipate the load is near the trailer weight limit, weigh the trailer at a weigh station.		
Are tires in good condition and properly inflated?		

Administrative Procedure:	**YES**	**NO**
Equipment Form has been completed and turned in.		

Notify the Vehicle Manager or Rental Company if you feel that any deficiencies are unsafe and DO NOT drive the vehicle! **Signature:** _____

Stantec	DAILY VEHICLE CHECKLIST	ADMIN-602
		Page 1 of 1
		Rev. 3 | OCT 4, 2007

Employee Name: _____ **Region/Business Unit:** _____ **Date:** _____

Vehicle Color/Make/Model: _____ **Vehicle Plate Number:** _____

Vehicle Mileage Start: _____ **Vehicle Mileage Stop:** _____

Job: _____ **Job #:** _____ **# Miles:** _____ **# On-Site Miles:** _____

Job: _____ **Job #:** _____ **# Miles:** _____ **# On-Site Miles:** _____

☐ **Stantec Vehicle** ☐ **Rental Vehicle** ☐ **Personal Vehicle**

Perimeter Walk Around:	**ITEM IS:**	
	OK	**NOT OK**
Check for signs of vandalism, negligence, damage or unusual conditions		
Check all tires for excessive and unusual wear and proper inflation – include the spare tire if it is easily accessible		
Check under vehicle for signs of leaking fluids		
Check wiper blades (Do they work? Do they need replacement?)		
Check all light systems – brake, head, back-up, running, turn signals, emergency flashers		
Check to make sure doors, truck/toolbox lids, tailgates all open and close properly (Make sure you have keys to any toolboxes that you may need to access)		

Check Gauges on Dashboard:	**ITEM IS:**	
	OK	**NOT OK**
Fuel Level		
Oil light		
Engine Coolant Temperature Gauge		
Service Indicator Lights		
Battery Charge Indicator		

Inside Vehicle:	**ITEM IS:**	
	OK	**NOT OK**
Make sure seatbelts are present for all who will be riding in the vehicle		
Secure all cargo in the vehicle so that items will not become projectiles in the event of sudden stops or collisions		
Adjust the seat position, rearview and side mirrors		
Adjust temperature controls, vents, radio, etc.		

If Pulling a Trailer:	**ITEM IS:**	
	OK	**NOT OK**
Is trailer properly hitched to the vehicle (including safety chains)		
All lights are working properly		
Proper trailer for the load (check weight specifications) and load is balanced. If you anticipate the load is near the trailer weight limit, weigh the trailer at a weigh station.		
Are tires in good condition and properly inflated?		

Administrative Procedure:	**YES**	**NO**
Equipment Form has been completed and turned in.		

Notify the Vehicle Manager or Rental Company if you feel that any deficiencies are unsafe and DO NOT drive the vehicle! **Signature:** _____

Stantec	DAILY VEHICLE CHECKLIST	ADMIN-602
		Page 1 of 1
		Rev. 3 | OCT 4, 2007

Employee Name: _____ **Region/Business Unit:** _____ **Date:** _____

Vehicle Color/Make/Model: _____ **Vehicle Plate Number:** _____

Vehicle Mileage Start: _____ **Vehicle Mileage Stop:** _____

Job: _____ **Job #:** _____ **# Miles:** _____ **# On-Site Miles:** _____

Job: _____ **Job #:** _____ **# Miles:** _____ **# On-Site Miles:** _____

☐ **Stantec Vehicle** ☐ **Rental Vehicle** ☐ **Personal Vehicle**

Perimeter Walk Around:	**ITEM IS:**	
	OK	**NOT OK**
Check for signs of vandalism, negligence, damage or unusual conditions		
Check all tires for excessive and unusual wear and proper inflation – include the spare tire if it is easily accessible		
Check under vehicle for signs of leaking fluids		
Check wiper blades (Do they work? Do they need replacement?)		
Check all light systems – brake, head, back-up, running, turn signals, emergency flashers		
Check to make sure doors, truck/toolbox lids, tailgates all open and close properly (Make sure you have keys to any toolboxes that you may need to access)		

Check Gauges on Dashboard:	**ITEM IS:**	
	OK	**NOT OK**
Fuel Level		
Oil light		
Engine Coolant Temperature Gauge		
Service Indicator Lights		
Battery Charge Indicator		

Inside Vehicle:	**ITEM IS:**	
	OK	**NOT OK**
Make sure seatbelts are present for all who will be riding in the vehicle		
Secure all cargo in the vehicle so that items will not become projectiles in the event of sudden stops or collisions		
Adjust the seat position, rearview and side mirrors		
Adjust temperature controls, vents, radio, etc.		

If Pulling a Trailer:	**ITEM IS:**	
	OK	**NOT OK**
Is trailer properly hitched to the vehicle (including safety chains)		
All lights are working properly		
Proper trailer for the load (check weight specifications) and load is balanced. If you anticipate the load is near the trailer weight limit, weigh the trailer at a weigh station.		
Are tires in good condition and properly inflated?		

Administrative Procedure:	**YES**	**NO**
Equipment Form has been completed and turned in.		

Notify the Vehicle Manager or Rental Company if you feel that any deficiencies are unsafe and DO NOT drive the vehicle! **Signature:** _____

ATTACHMENT 6C
JOURNEY MANAGEMENT PLAN(s)

PURPOSE

The purpose of this Journey Management Procedure (JMP) is to prevent losses associated with motor vehicle related incidents including: injuries to drivers, passengers and pedestrians, damage to motor vehicles and damage to third party property. By communicating potential safety risks before mobilizing to a site, a motor vehicle operator will be able to prepare for and avoid potential hazards.

SCOPE

This JMP applies to all vehicles assigned for the support of site operations, including company owned and personal use vehicles. This JMP does not apply to vendors (such as UPS, FedEx. etc.) not under contract with Stantec or their supplier. This JMP does not address hazards that are external to the site access/egress and on the onsite project operations.

SPECIAL NOTE

Because the site, weather and traffic conditions may change frequently the JMP shall be maintained and updated separate from the Site Health and Safety Plan.

Responsibilities

Contract Project Manager

The contract project manager is responsible to ensure that the site has a current Journey Management Plan.

Field Manager

The field manager is responsible to create and keep current a JMP that is appropriate for the site conditions. It is also the field manager's role to ensure each vehicle operator has a JMP that describes the conditions for his vehicle and equipment prior to mobilizing to the site. A common JMP may be used for several vehicles or as conditions dictate a separate JMP may be specific or unique to an individual vehicle.

Vehicle Operator

The assigned vehicle operator shall not mobilize to the site without first receiving the JMP. It is also the vehicle operator's responsibility to read and become familiar with the description and stipulations of the JMP prior to mobilizing to the site. DO NOT mobilize to the site to get clarification to the JMP. Because driving conditions may vary, vehicle operators shall also notify the field manager of any hazards not identified on the JMP so that the field manager can update the JMP. Because traffic conditions may change frequently on a project, the JMP shall be maintained and updated separate from the Site Health and Safety Plan.

Scope of this JMP

This JMP shall include the operation and use of the following vehicles and equipment: Vehicles to transport personnel to and from the site, Drill Rigs, Roll off boxes, Vacuum Trucks, support equipment such as trailers, backhoes, front end loaders, rollers, etc. All vehicle operators shall be responsible for ensuring their vehicles are maintained and being familiar with and obeying all laws related to vehicle operation.

General Hazards

This site is in a medium to low traffic area. **Special note to the vehicle operator that it is their sole responsibility to read and become familiar with the description and stipulations of the JMP prior to mobilizing to the site. All drivers will avoid distractions including but not limited to using cell phones in any form or two way radios while driving.**

Site Specific Hazards

Site is near agriculture and drivers may encounter farm equipment on nearby road ways.

Directions: Access to the Site

Take Interstate I5 South from I80W. Exit Highway 12 W/ Kettleman Lane. Turn left Highway 12 W/ Kettleman Lane. Make a right onto Thornton Rd. Turn Right onto N15 FR Road. Turn L onto N. Cord Road. Site is at the end of the road on the right side.

Directions: Leaving the Site

Depart from N. Cord Road turn R onto N15 FR Road and left onto Thornton Rd. Turn Left onto Highway 12 W/ Kettleman Lane and enter I5 either North or South directions.

Site Specific Restrictions and Controls

All vehicles with limited vision shall not be positioned into place or backed without a spotter to assist the vehicle operator. Work zones will be marked by a highly visible exclusion zone. Use professional traffic control when sampling wells in the street.

This Journey Management Plan is approved for use:

From: 08/10/2009	Time: 8:00 a.m.	To: 08/10/2010	Time: 8:00 a.m.

Journey Management Plan Created and Maintained by

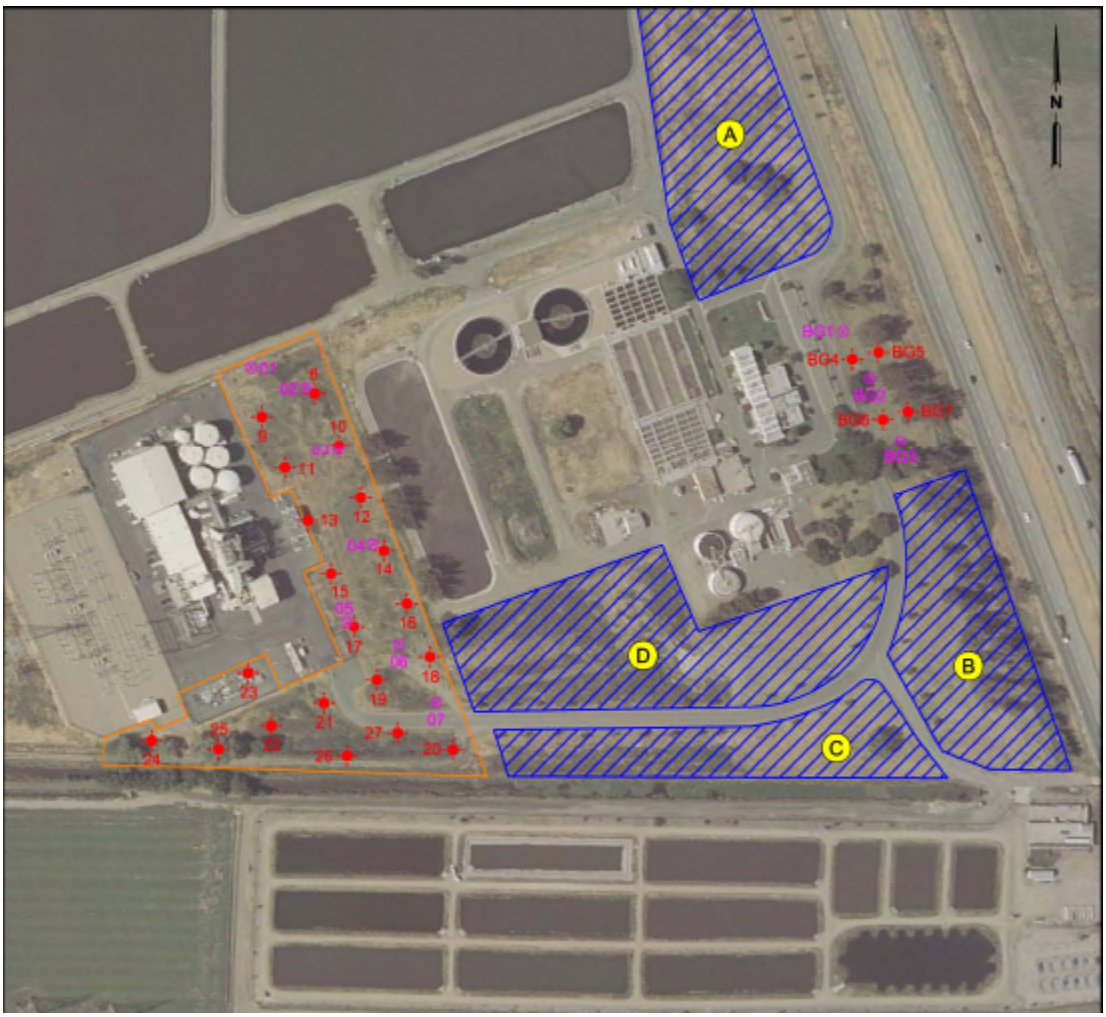
Field Manager : Bryan Rorie	Cell: (916) 296-8653
Contract Project Manager: Gary Haeck	Cell: (916) 861-0400

CHANGES TO THE JOURNEY MANAGEMENT PLAN

Date	Name	Change/Comment (be specific)

As appropriate create a sketch of the site. It can be helpful in clarifying access/egress routes, parking and positioning of equipment, traffic cones and other delineators.

Site Sketch



Because this is a sketch it can not be interpreted as accurate to scale.

ATTACHMENT 6d
VEHICLE COLLISION KIT

Stantec Vehicle Collision Kit

The following items should be enclosed in an envelope in the glove box of all Stantec vehicles:

- Vehicle Registration Card
- Vehicle Insurance Card with name and phone number of agent
- Name of Preferred Body Shop or Maintenance Facility to take damaged vehicle (usually nearest Dealership)
- Owners Manual
- Disposable Camera
- Note Pad and Pen

WHAT TO DO AFTER A COLLISION:

Auto collisions: Even the most careful drivers may be involved. Knowledge of what to do **after** the collision can make the experience a little less frightening and decrease the chance of unnecessary complications.

After a Collision

- Check for injuries. Life and health are more important than damage to vehicles.
- Make note of specific damages to all vehicles involved.
- Write down the names, addresses and license numbers of persons involved in the collision. Also, write a description of the other vehicles.
- Call the police, even if the collision is minor.
- Jot down names and addresses of anyone who may have witnessed the collision. This can prevent disagreement concerning how the collision actually happened.

Other Do's and Don'ts

- DO jot down details about the collision, the location, and circumstances such as weather conditions and visibility.
- DO notify your insurance agent about the collision immediately.
- DON'T sign any document unless it is for the police or your insurance agent.

Remember that a Stantec Incident Investigation form must also be completed following any collision. The collision must be reported to the Stantec Project Manager in addition to the following people:

Practice and Risk Management :
Fax: 780-969-2030

Phil Platcow, Director of Health Safety and Environment (HSE):
Office: 617-232-7355
Cell: 617-899-5403
Home: 617-739-1224

Michael Allen Philipp, West Region Health & Safety Manager
Office (619) 296-6195 X240 Fax (619) 296-6199
Cell (619) 985-4340
Home (858) 391-0347

COLLISION FORM

Driver's Name: _____Driver's Lic. No._____ Lic. Plate No._____
Make of Vehicle: _____Model: _____ Yr. _____ VIN No. _____
Date: _____ Time: _____
Location of Collision: _____
Specific Damages to the vehicle you were driving:_____
_____
_____
_____
_____
_____

Conditions:
Pavement □ Dry □ Wet □ Ice □ Snow Weather _____Visibility _____
Traffic Control □ Lights □ Signal □ None – indicate any traffic control on the schematic you draw
Police Investigation □ Yes □ No Officer Name and Badge No. _____
Name of Department: _____
* Request a copy of the police report for submission to the insurance company
Were citations issued? □ Yes □ No If yes, to whom and for what violation? _____

Other Motorists involved in the incident:
Name: _____ Address: _____
Phone Number: _____ Drivers License Number: _____
Lic. Plate No. _____ Make of Vehicle _____
Model _____ Yr. _____ VIN No. _____
Owner of Vehicle _____ Insurance Company Name: _____ Policy and
Phone Number: _____Vehicle Speed _____
Direction of Travel: □ N □ E □ S □ W Description of Damage _____

Name: _____ Address: _____
Phone Number: _____ Drivers License Number: _____
Lic. Plate No. _____ Make of Vehicle _____
Model _____ Yr. _____ VIN No. _____
Owner of Vehicle _____ Insurance Company Name: _____ Policy and
Phone Number: _____Vehicle Speed _____
Direction of Travel: □ N □ E □ S □ W Description of Damage _____

Other Person(s) who witnessed the incident:
Name: _____ Phone Number: _____
Address:_____

Name: _____ Phone Number: _____
Address:_____

Name: _____ Phone Number: _____
Address:_____

Property Damage other than Vehicles:

Owner _____Address_____

What was damaged _____

_____

Location of Property _____

_____

List all Persons Involved:

Name _____ Phone No _____

Address _____

□ Your Vehicle □ Other Vehicle □ Pedestrian Injured? □ No □ Yes, Describe _____

Name _____ Phone No _____

Address _____

□ Your Vehicle □ Other Vehicle □ Pedestrian Injured? □ No □ Yes, Describe _____

Name _____ Phone No _____

Address _____

□ Your Vehicle □ Other Vehicle □ Pedestrian Injured? □ No □ Yes, Describe _____

Name _____ Phone No _____

Address _____

□ Your Vehicle □ Other Vehicle □ Pedestrian Injured? □ No □ Yes, Describe _____

Brief Description of Photos Taken:

Use this paper to draw a schematic of the collision – indicate North on schematic for reference
Describe what happened below the schematic

IF AN ACCIDENT OCCURS AFTER STANTEC'S NORMAL WORKING HOURS PLEASE REPORT YOUR CLAIM TO KIBBLE & PRENTICE INSURANCE AGENT, PHONE NO 425-454-2445, FAX NO 425-646-9616 - AFTER HOURS PHONE NO 425-681-1349

ACORD CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YY) 05/01/2009

PRODUCER Serial # 90

AON REED STENHOUSE, INC.
AON RISK SERVICES CENTRAL, INC.
10025 - 102A AVENUE, EDMONTON, AB T5J 0Y2
PHONE: (780) 423-9801 FAX: (780) 423-9876

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.

INSURED

STANTEC CONSULTING INC., STANTEC CONSULTING SERVICES INC., STANTEC CONSULTING CORP., SECOR INTERNATIONAL INC. 12034 - 134TH COURT NE, SUITE 102 REDMOND WA 98052

INSURERS AFFORDING COVERAGE

INSURER A:	ZURICH AMERICAN INSURANCE COMPANY
INSURER B:	ZURICH AMERICAN INSURANCE COMPANY
INSURER C:	ZURICH AMERICAN INSURANCE COMPANY
INSURER D:	ZURICH AMERICAN INSURANCE COMPANY
INSURER E:	LLOYD'S OF LONDON

COVERAGES

THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. AGGREGATE LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EXPIRATION DATE (MM/DD/YY)	LIMITS	
A	GENERAL LIABILITY X COMMERCIAL GENERAL LIABILITY CLAIMS MADE [X] OCCUR X CONTRACTUAL/CROSS LIABILITY X OWNERS & CONTRACTORS PROTECTIVE GEN'L AGGREGATE LIMIT APPLIES PER: POLICY [X] PRO-JECT [X] LOC	GLO 3373919-06 XCU COVER INCLUDED	05/01/09	05/01/10	EACH OCCURRENCE FIRE DAMAGE (Any one fire) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG	$ 1,000,000 $ 1,000,000 $ 10,000 $ 1,000,000 $ 2,000,000 $ 1,000,000
B	AUTOMOBILE LIABILITY X ANY AUTO ALL OWNED AUTOS SCHEDULED AUTOS HIRED AUTOS NON-OWNED AUTOS	BAP5940882-00	11/01/08	11/01/09	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)	$ 1,000,000 $ $ $
	GARAGE LIABILITY ANY AUTO				AUTO ONLY - EA ACCIDENT OTHER THAN AUTO ONLY: EA ACC AGG	$ NOT $ APPLICABLE $
C	EXCESS LIABILITY X OCCUR CLAIMS MADE DEDUCTIBLE X RETENTION $ 10,000	8831307 EXCESS GENERAL, AUTO AND EMPLOYERS LIABILITY (FOLLOW FORM)	05/01/09	05/01/10	EACH OCCURRENCE AGGREGATE	$ 5,000,000 $ 5,000,000 $ $ $
D	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY EMPLOYERS LIABILITY ONLY	WC5940881-00	11/01/08	11/01/09	WC STATU-TORY LIMITS / OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	$ 1,000,000 $ 1,000,000 $ 1,000,000
E	OTHER PROFESSIONAL LIABILITY INCLUDING ENVIRONMENTAL	QK0902009 NO RETROACTIVE DATE	08/01/09	08/01/10	CLAIM & AGGREGATE LIMIT $2,000,000 INCLUSIVE OF COSTS CLAIMS MADE BASIS	

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/EXCLUSIONS ADDED BY ENDORSEMENT/SPECIAL PROVISIONS

REDMOND

CERTIFICATE HOLDER | ADDITIONAL INSURED; INSURER LETTER:

TO WHOM IT MAY CONCERN

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING INSURER WILL ENDEAVOR TO MAIL N/A DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO THE LEFT, BUT FAILURE TO DO SO SHALL IMPOSE NO OBLIGATION OR LIABILITY OF ANY KIND UPON THE INSURER, ITS AGENTS OR REPRESENTATIVES.

AUTHORIZED REPRESENTATIVE

Frank K. Noranta

INCIDENT, NEAR MISS AND LOSS REPORT
(HSE / AUTO / PROPERTY)

Office & PC No.:		Date of incident:	
Project:		Time of Incident:	
Location of Project:		Project No.:	
Location of Incident:		Client:	
Person in Charge:		Reported to:	
Reported By:		Time Reported:	
Date reported:		Time employee started work:	☐ am ☐ pm

Type of Incident

☐ Auto ☐ Property Loss ☐ Environmental ☐ Occupational Illness ☐ Injury

☐ Medical Aid ☐ First Aid ☐ Non-First Aid ☐ Near Miss

COMPLETED BY	Print Name & Title	Signature	Date
REVIEWED BY	Print Name (Project Manager)	Signature (Project Manager)	Date
	Print Name (PCML)	Signature (PCML)	Date
	Print Name (OSEC)	Signature (OSEC)	Date

This document contains privileged and confidential information prepared at the request of Stantec's Legal Counsel. The contents of this report are restricted to HR personnel, Risk Management Representatives, Project Manager and PC Leader, and Stantec's Insurer, Adjuster and Legal Counsel. Information collected will be used solely for the purpose of meeting the requirements of Stantec's HSE and insurance programs, complying with applicable legislation, and will be used in accordance with any governing privacy legislation. The information collected will be maintained on file and may be included in required reports.

INSTRUCTIONS: This form must be completed and **submitted with in 24 hours** of any incident, near miss or loss. Where possible the Worker or Workers involved shall complete this form, alternatively the Project Manager, OSEC, or other employee may complete and submit this form. Do not delay submission waiting for signatures. Fax unsigned Report immediately to **(780) 969-2030** and forward original once all signatures have been obtained. Project Managers will follow up on all verbal incident reports to make sure written reports are submitted.

- Complete Section 1 for **ALL** incidents.
- Complete Section 2 for any incident involving injuries, illnesses and environmental incidents or where an injury, illness or environmental incident could have occurred.
- Complete Section 3 for any incident involving a vehicle owned, leased or rented by Stantec.
- Attach copies of Police Report, Repair and/or replacement estimates, documentation of original cost/purchase for property/equipment losses, if being replaced.
- Attach Diagram of Scene or Photographs if required. (use diagram on page 5 for auto accidents)

Return original completed and signed form to Stantec's Practice and Risk Management group (Edmonton) with a copy to regional Human Resources (only if medical aid required). Any supporting electronic documents can be sent to riskmgt@stantec.com.

INCIDENT, NEAR MISS AND LOSS REPORT
(HSE / AUTO / PROPERTY)

SECTION 1 - GENERAL

STANTEC EMPLOYEE(S) INVOLVED

Name	Address	Phone No.

OTHER PERSONS INVOLVED (Including Stantec Sub-Contractors/Consultants)

Name	Address	Phone	Employer (if applicable)

DESCRIPTION OF THE INCIDENT

Describe the incident and provide as much detail as possible with respect to what happened and how it happened. For lost, stolen or damaged equipment provide a list including the value and serial number of each piece of equipment. Attach additional sheets if required.

Type of Contact (**see Table 1**):

WORK SITE CONDITIONS AT TIME OF INCIDENT (Describe weather, housekeeping, etc.)

WITNESS INFORMATION

Name	Name
Address	Address
Phone	Phone
Employer	Employer

POLICE

Was a Police Report filed? ☐ yes ☐ No File No. City:

Name of Officer Badge No.

Charges Laid ☐ Yes ☐ No Person Charged Type of Charge

IMMEDIATE ACTIONS TAKEN (**Must** be completed for **All** Incidents)

What immediate actions were taken to prevent further injury or damages?

IMMEDIATE CAUSES: Substandard actions and or conditions that caused or could cause this event, **See Table 2**

UNDERLYING CAUSES: Specific personal or job factors that caused or could cause this event, **See Table 3**

CORRECTIVE ACTIONS REQUIRED

INCIDENT, NEAR MISS AND LOSS REPORT
(HSE / AUTO / PROPERTY)

	Corrective Action	Person Responsible	Due Date	Date Completed
1				
2				
3				
4				

INVESTIGATION COMPLETED BY

Name	Address	Phone No.

RESULTS OF CORRECTIVE ACTIONS (Verify and Validate corrective actions after implementation)

SECTION 2: HSE

INJURY / ILLNESS

Name	Address	Employer

INJURY / ILLNESS: Describe the specific injury or illness (e.g. fracture left arm, skin rash upper body, sprain lower back)

First Aid Required ☐ Yes ☐ No — If yes, by whom and qualifications

What First Aid was provided: (attach first aid report)

Medical Aid Required ☐ Yes ☐ No — If yes, name of facility and city

Workers' Compensation Report Completed (or equivalent) ☐ Yes ☐ No

Note: Should any of the above information change, the employee is responsible for notifying HR or P&RM.

SPILLS/RELEASES OR CONTACT WITH CONTAMINANTS AND HAZARDOUS MATERIALS

What substance or mix of substances was involved?

How much of the substance or mix was involved (by volume or weight)?

Was the Employee exposed to the substance? ☐ Yes ☐ No	Describe exposure type (Inhalation, ingestion, skin contact)
Offsite Impacts Observed Or Anticipated? ☐ Yes ☐ No	Identify regulatory authorities that the spill or release was reported to

INCIDENT, NEAR MISS AND LOSS REPORT
(HSE / AUTO / PROPERTY)

Complete only if incident involves a vehicle owned, leased or rented by Stantec

SECTION 3 - AUTOMOBILE LOSS

STANTEC VEHICLE			
Year Make Model		VIN	
Mileage		License Plate No. & Province/State	
Present location of vehicle		Use at time of accident	

STANTEC DRIVER			
Name	Date of Birth	Operator License. No. & Province/State	
No. Years Driving		No. Years Driving for Stantec	

DESCRIPTION AND ESTIMATE OF DAMAGES

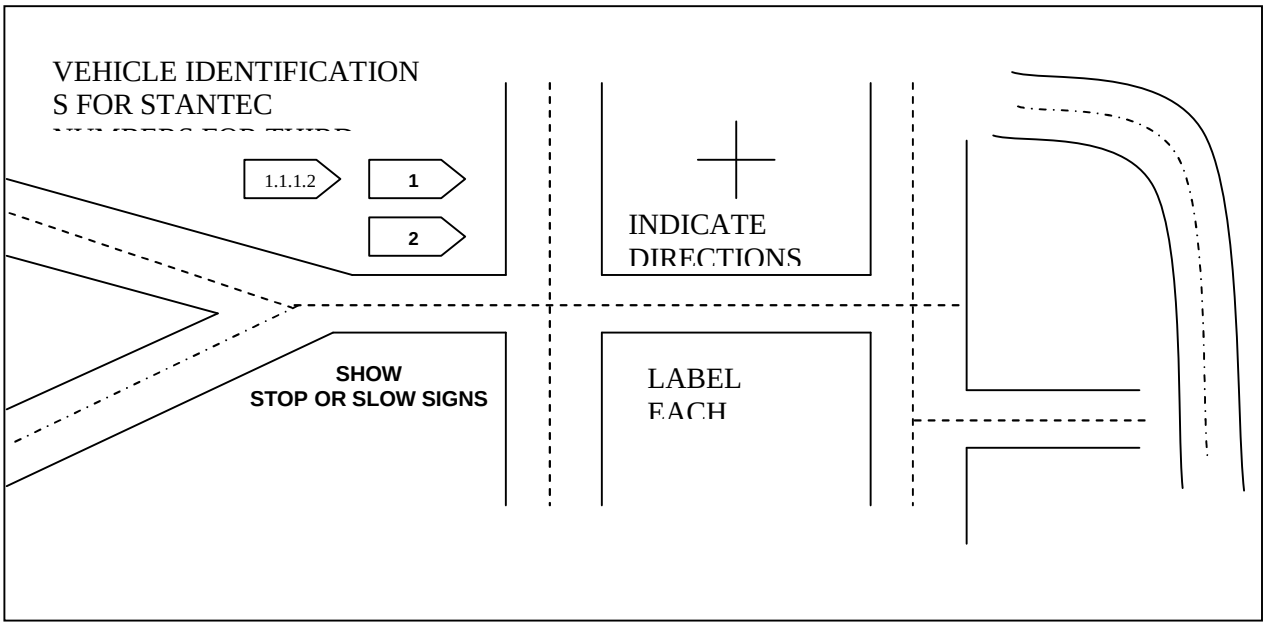
DAMAGE TO OTHER VEHICLES (Attach separate page if necessary)

VEHICLE #1			VEHICLE #2		
Owner Name	Phone		Owner Name	Phone	
Address			Address		
Year, Make & Model of vehicle	License Plate No.		Year, Make & Model of vehicle	License Plate No.	
Name of Insurer			Name of Insurer		
Policy No.			Policy No.		
Description of damage			Description of damage		
Name of Driver (if different from owner)			Name of Driver (if different from owner)		
Address (if different from owner)			Address (if different from owner)		
Phone	Operator License. No. & Province/State		Phone	Operator License. No. & Province/State	
Injured? ☐ Yes ☐ No			Injured? ☐ Yes ☐ No		
Describe			Describe		

DRIVERS STATEMENT (Describe in detail – attach additional sheets if required)

INCIDENT, NEAR MISS AND LOSS REPORT
(HSE / AUTO / PROPERTY)

Use one of layouts below or draw plan (separate sheet). If any street is more than two-lane or is one way only, please indicate. Illustrate position of cars at the time of collision. Show skid marks, road signs, direction of movement and any relevant details.



VEHICLES			
	Stantec (S)	Vehicle No. 1	Vehicle No. 2
DIRECTION HEADED			
SIDE OF STREET			
RATE OF SPEED			
BLEW HORN			
GAVE SIGNAL			
WEATHER	☐ Clear ☐ Cloudy ☐ Fog ☐ Raining ☐ Snowing ☐ Other If other, describe		
LIGHT	☐ Daylight ☐ Dusk ☐ Darkness with street or highway ☐ Lighted ☐ Not Lighted		
ROAD CONDITIONS	☐ Paved ☐ Gravel ☐ Wet Dry ☐ Muddy ☐ Icy ☐ Snowy ☐ Loose material on surface ☐ Defective shoulder ☐ Holes/deep ruts ☐ Other		

INCIDENT, NEAR MISS AND LOSS REPORT
(HSE / AUTO / PROPERTY)

Stantec

TABLE 1 – Type of Contact	
Type of Contact 14. Struck against 15. Struck by 16. Caught in 17. Caught on 18. Caught between 19. Slip 20. Fall on same level 21. Fall to lower level 22. Overexertion 23. Sprains and Strains 24. Repetitive Motion 25. Animal attack 26. Other	**Contact With** 8. Electricity 9. Heat 10. Cold 11. Radiation 12. Caustics 13. Noise 14. Toxic or Noxious substances
TABLE 2 – Immediate Causes	
Substandard Actions: 17. Operating Equipment without authority 18. Failure to Warn 19. Failure to Secure 20. Operating at improper speed 21. Making safety devices inoperable 22. Removing safety devices 23. Using defective Equipment 24. Using equipment improperly 25. Failing to use personal protective equipment properly 26. Improper loading 27. Improper placement 28. Improper lifting 29. Improper Position for task 30. Servicing equipment in operation 31. Horseplay 32. Under influence of alcohol and/or drugs	**Substandard Conditions** 13. Inadequate or improper protective equipment 14. Defective tools, equipment or materials 15. Restricted Action 16. Inadequate warning systems 17. fire and explosion hazard 18. Poor Housekeeping 19. Hazardous environmental conditions; gases, dusts, fumes, smoke, vapors 20. Noise Exposure 21. High or low temperature exposure 22. Inadequate or excess illumination 23. inadequate ventilation 24. External Factors
TABLE 3 - Underlying Causes	
Personal Factors 6. Inadequate capability 7. Lack of knowledge 8. Lack of skill 9. Stress 10. Improper Motivation	**Job Factors** 9. Inadequate leadership/supervision 10. Inadequate engineering 11. Inadequate purchasing 12. Inadequate maintenance 13. Inadequate tools/equipment/materials 14. Inadequate work standards 15. Wear and tear 16. Abuse and misuse

INCIDENT, NEAR MISS AND LOSS REPORT
(HSE / AUTO / PROPERTY)

Contact information.
Immediately Call Corporate HSE, and Practice & Risk Management, and (if injuries) Human Resources.

Health, Safety & Environment: Call Philip Platcow and Michael Philipp
Philip Platcow: 617-232-7355; fax 801-340-8657 Email: philip.platcow@stantec.com.
After hours or weekends, cell: 617-899-5403 or Home 617-739-1224 and
Mike Philipp 619-296-6195; fax 619-296-6199 Email: mike.philipp@stantec.com
After hours or weekends, cell: (619) 985-4340

Practice & Risk Management: Fax unsigned report to (780) 969-2030

Human Resources: **For Injuries Only** contact the Human Resources Rep. for your region:
US East: Jennie Moore
Jennie Moore: Phone: (585) 413-5241, Cell: (585) 613-8022, Fax: (585) 272-7442,
E-Mail: jennie.moore@stantec.com.
US West: Peggy Ramos
Peggy Ramos: Phone: (949) 923-6061, Fax: (949) 923-6015,
E-Mail: peggy.ramos@stantec.com
US Mtn Desert: (Arlington, Houston, Midland, Phoenix, Scottsdale, Ponca City SLC): Shannon Drake
Shannon Drake: Phone: (602) 707-4627, Fax (602) 532-7784,
E-Mail: Shannon.Drake@stantec.com
US Mtn Desert: (Dallas, Fort Worth, Denver, Fort Collins, Golden, Las Vegas, Reno, Oklahoma City, Tucson) Sheryl Appelt
Sheryl Appelt: Phone: (602) 707-9495, Fax (602) 926-2217,
E-Mail: Sheryl.Appelt@stantec.com

Fax and/or scan-email report to all three**.**

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ATTACHMENT 7

PERMITS

ATTACHMENT 8

PHYSICAL AND BIOLOGICAL CONCERNS

Heat Exhaustion

What are the symptoms?

HEADACHES; DIZZINESS OR LIGHTHEADEDNESS; WEAKNESS; MOOD CHANGES SUCH AS IRRITABILITY, CONFUSION, OR THE INABILITY TO THINK STRAIGHT; UPSET STOMACH; VOMITING; DECREASED OR DARK-COLORED URINE; FAINTING OR PASSING OUT; AND PALE, CLAMMY SKIN

What should you do?

- Act immediately. If not treated, heat exhaustion may advance to heat stroke or death.
- Move the victim to a cool, shaded area to rest. Don't leave the person alone. If symptoms include dizziness or lightheadedness, lay the victim on his or her back and raise the legs 6 to 8 inches. If symptoms include nausea or upset stomach, lay the victim on his or her side.
- Loosen and remove any heavy clothing.
- Have the person drink cool water (about a cup every 15 minutes) unless sick to the stomach.
- Cool the person's body by fanning and spraying with a cool mist of water or applying a wet cloth to the person's skin.
- Call 911 for emergency help if the person does not feel better in a few minutes.

Heat Stroke–A Medical Emergency

What are the symptoms?

DRY, PALE SKIN WITH NO SWEATING; HOT, RED SKIN THAT LOOKS SUNBURNED; MOOD CHANGES SUCH AS IRRITABILITY, CONFUSION, OR THE INABILITY TO THINK STRAIGHT; SEIZURES OR FITS; AND UNCONCIOUSNESS WITH NO RESPONSE

What should you do?

- Call 911 for emergency help immediately.
- Move the victim to a cool, shaded area. Don't leave the person alone. Lay the victim on his or her back. Move any nearby objects away from the person if symptoms include seizures or fits. If symptoms include nausea or upset stomach, lay the victim on his or her side.
- Loosen and remove any heavy clothing.
- Have the person drink cool water (about a cup every 15 minutes) if alert enough to drink something, unless sick to the stomach.
- Cool the person's body by fanning and spraying with a cool mist of water or wiping the victim with a wet cloth or covering him or her with a wet sheet.
- Place ice packs under the armpits and groin area.

How can you protect yourself and your coworkers?

- Learn the signs and symptoms of heat-induced illnesses and how to respond.
- Train your workforce about heat-induced illnesses.
- Perform the heaviest work during the coolest part of the day.
- Build up tolerance to the heat and the work activity slowly. This usually takes about 2 weeks.
- Use the buddy system, with people working in pairs.
- Drink plenty of cool water, about a cup every 15 to 20 minutes.
- Wear light, loose-fitting, breathable clothing, such as cotton.
- Take frequent, short breaks in cool, shaded areas to allow the body to cool down.
- Avoid eating large meals before working in hot environments.
- Avoid alcohol or beverages with caffeine. These make the body lose water and increase the risk for heat illnesses.

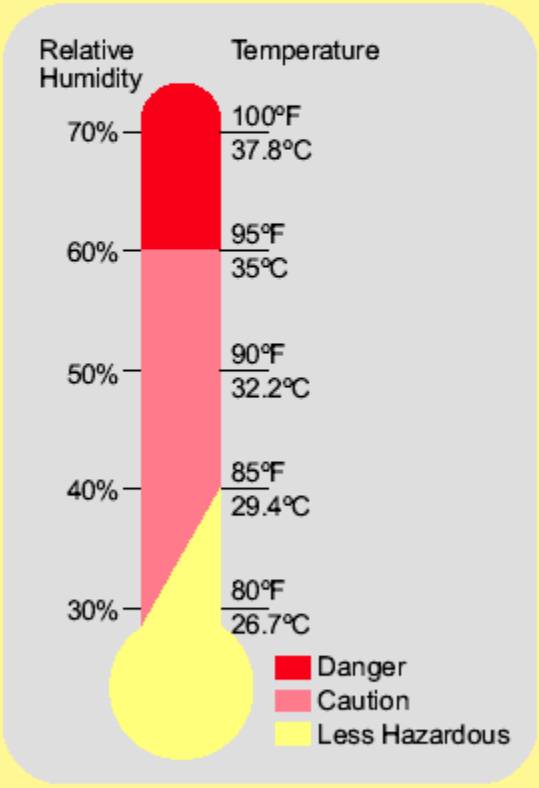
What factors put you at increased risk?

- Taking certain medications. Check with your health-care provider or pharmacist to see if any medicines you are taking affect you when working in hot environments.
- Having a previous heat-induced illness.
- Wearing personal protective equipment such as a respirator or protective suit.

The Heat Equation

HIGH TEMPERATURE + HIGH HUMIDITY + PHYSICAL WORK = HEAT ILLNESS

When the body is unable to cool itself through sweating, **serious** heat illnesses may occur. The most severe heat-induced illnesses are heat exhaustion and heat stroke. If left untreated, **heat exhaustion** could progress to **heat stroke** and possible **death**.



U.S. Department of Labor
Occupational Safety and Health Administration

OSHA 3154
2002

HEAT STRESS

INTRODUCTION

Operations involving high air temperatures, radiant heat sources, high humidity, direct physical contact with hot objects, or strenuous physical activities have a high potential for inducing heat stress in employees engaged in such operations. Outdoor operations conducted in hot weather, such as construction, refining, asbestos removal, and hazardous waste site activities, especially those that require workers to wear semi-permeable or impermeable protective clothing, are also likely to cause heat stress among exposed workers.

CAUSAL FACTORS

Age, weight, degree of physical fitness, degree of acclimatization, metabolism, use of alcohol or drugs, and a variety of medical conditions such as hypertension all affect a person's sensitivity to heat. However, even the type of clothing worn must be considered. Prior heat injury predisposes an individual to additional injury. It is difficult to predict just who will be affected and when, because individual susceptibility varies. In addition, environmental factors include more than the ambient air temperature. Radiant heat, air movement, conduction, and relative humidity all affect an individual's response to heat.

DEFINITIONS

The American Conference of Governmental Industrial Hygienists (2002) states that workers should not be permitted to work when their deep body temperature exceeds 38°C (100.4°F).

Heat is a measure of energy in terms of quantity.

A **calorie** is the amount of heat required to raise 1 gram of water 1°C (based on a standard temperature of 16.5 to 17.5°C).

Conduction is the transfer of heat between materials that contact each other. Heat passes from the warmer material to the cooler material. For example, a worker's skin can transfer heat to a contacting surface if that surface is cooler, and vice versa.

Convection is the transfer of heat in a moving fluid. Air can be described as a fluid. Air flowing past the body can cool the body if the air temperature is cool. On the other hand, air that exceeds 35°C (95°F) can increase the heat load on the body.

Evaporative cooling takes place when sweat evaporates from the skin. High humidity reduces the rate of evaporation and thus reduces the effectiveness of the body's primary cooling mechanism.

Radiation is the transfer of heat energy through space. A worker whose body temperature is greater than the temperature of the surrounding surfaces radiates heat to these surfaces. Hot surfaces and infrared light sources radiate heat that can increase the body's heat load.

Globe temperature is the temperature inside a blackened, hollow, thin copper globe.

Metabolic heat is a by-product of the body's activity.

Natural wet bulb (NWB) temperature is measured by exposing a wet sensor, such as a wet cotton wick fitted over the bulb of a thermometer, to the effects of evaporation and convection. The term natural refers to the movement of air around the sensor.

Dry bulb (DB) temperature is measured by a thermal sensor, such as an ordinary mercury-in-glass thermometer, that is shielded from direct radiant energy sources.

HEAT DISORDERS AND HEALTH EFFECTS

HEAT STROKE

Heat Stroke occurs when the body's system of temperature regulation fails and body temperature rises to critical levels. This condition is caused by a combination of highly variable factors, and its occurrence is difficult to predict. **Heat stroke is a medical emergency.** The primary signs and symptoms of heat stroke are confusion; irrational behavior; loss of consciousness; convulsions; a lack of sweating (usually); hot, dry skin; and an abnormally high body temperature, e.g., a rectal temperature of 41°C (105.8°F). If body temperature is too high, it causes death. The elevated metabolic temperatures caused by a combination of workload and environmental heat load, both of which contribute to heat stroke, are also highly variable and difficult to predict. If a worker shows signs of possible heat stroke, professional medical treatment should be obtained immediately. The worker should be placed in a shady area and the outer clothing should be removed. The worker's skin should be wetted and air movement around the worker should be increased (as long as the temperature of the air is less than 95º F) to improve evaporative cooling until professional methods of cooling are initiated and the seriousness of the condition can be assessed. Fluids should be replaced as soon as possible.

The medical outcome of an episode of heat stroke depends on the victim's physical fitness and the timing and effectiveness of first aid treatment. Regardless of the worker's protests, no employee suspected of being ill from heat stroke should be sent home or left unattended unless a physician has specifically approved such an order.

HEAT EXHAUSTION

The signs and symptoms of heat exhaustion are headache, nausea, vertigo, weakness, thirst, and giddiness. Fortunately, this condition responds readily to prompt treatment. Heat exhaustion should not be dismissed lightly, however, for several reasons. One is that the fainting associated with heat exhaustion can be dangerous because the victim may be operating machinery or controlling an operation that should not be left unattended; moreover, the victim may be injured when he or she faints. Also, the signs and symptoms seen in heat exhaustion are similar to those of heat stroke, a real potential medical emergency.

Workers suffering from heat exhaustion should be removed from the hot environment and given fluid replacement. They should also be encouraged to get adequate rest.

HEAT CRAMPS

Heat Cramps are usually caused by performing hard physical labor in a hot environment. These cramps have been attributed to an electrolyte imbalance caused by sweating. It is important to understand that cramps can be caused by both too much and too little salt. Cramps appear to be caused by the lack of water replenishment. Because sweat is a hypotonic solution (±0.3% NaCl), excess salt can build up in the body if the water lost through sweating is not replaced.

Thirst cannot be relied on as a guide to the need for water; instead, water must be taken every 15 to 20 minutes in hot environments. Under extreme conditions, such as working for 6 to 8 hours in heavy protective gear, a loss of sodium may occur. Studies have shown that drinking commercially available

carbohydrate-electrolyte replacement liquids is effective in minimizing physiological disturbances during recovery.

HEAT COLLAPSE

Heat Collapse ("Fainting"). In heat collapse, the brain does not receive enough oxygen because blood pools in the extremities. As a result, the exposed individual may lose consciousness. This reaction is similar to that of heat exhaustion and does not affect the body's heat balance. However, the onset of heat collapse is rapid and unpredictable. To prevent heat collapse, the worker should gradually become acclimatized to the hot environment.

HEAT RASHES

Heat Rashes are the most common problem in hot work environments. "Prickly heat", as heat rashes are sometimes called, is manifested as red papules on the skin and usually appears in areas where the clothing is restrictive. As sweating increases, these papules give rise to a prickling sensation. Prickly heat occurs in skin that is persistently wetted by unevaporated sweat, and heat rash papules may become infected if they are not treated. In most cases, heat rashes will disappear when the affected individual returns to a cool environment.

HEAT FATIGUE

A factor that predisposes an individual to heat fatigue is lack of acclimatization. The use of a program of acclimatization and training for work in hot environments is advisable. Acclimatization can take several weeks depending on the individual involved and the difference in temperature between the location from which the person is coming and the temperature to which he/she is going. The signs and symptoms of heat fatigue include impaired performance of skilled sensorimotor, mental, or vigilance jobs. There is no treatment for heat fatigue except to remove the heat stress before a more serious heat-related condition develops.

CONTROLMEASURES FOR HEAT STRESS

Ventilation, air-cooling, fans, shielding, and insulation are the five major types of engineering controls used to reduce heat stress in hot work environments. Heat reduction can also be achieved by using power assists and tools that reduce the physical demands placed on a worker.

However, for this approach to be successful, the metabolic effort required for the worker to use or operate these devices must be less than the effort required without them. Another method is to reduce the effort necessary to operate power assists. The worker should be allowed to take frequent rest breaks in a cooler environment.

ACCLIMATIZATION

The human body can adapt to heat exposure to some extent. This physiological adaptation is called acclimatization. After a period of acclimatization, the same activity will produce fewer cardiovascular demands. The worker will sweat more efficiently (causing better evaporative cooling), and thus will more easily be able to maintain normal body temperatures.

FLUID REPLACEMENT

Cool (50°-60°F) water or any cool liquid (except alcoholic beverages, tea and coffee) should be made available to workers to encourage them to drink small amounts frequently, e.g., one cup every 20 minutes. Ample supplies of liquids should be placed close to the work area. Although some commercial replacement drinks contain salt, this is not necessary for acclimatized individuals because most people add enough salt to their summer diets.

GENERAL VENTILATION

General ventilation is used to dilute hot air with cooler air (generally cooler air that is brought in from the outside). This technique clearly works better in cooler climates than in hot ones. A permanently installed ventilation system usually handles large areas or entire buildings. Portable or local exhaust systems may be more effective or practical in smaller areas.

AIR TREATMENT/AIR COOLING

Air treatment/air cooling differs from ventilation because it reduces the temperature of the air by removing heat (and sometimes humidity) from the air.

Air conditioning is a method of air-cooling, but it is expensive to install and operate. An alternative to air conditioning is the use of chillers to circulate cool water through heat exchangers over which air from the ventilation system is then passed; chillers are more efficient in cooler climates or in dry climates where evaporative cooling can be used.

Local air cooling can be effective in reducing air temperature in specific areas. Two methods have been used successfully in industrial settings. One type, cool rooms, can be used to enclose a specific workplace or to offer a recovery area near hot jobs. The second type is a portable blower with built-in air chiller. The main advantage of a blower, aside from portability, is minimal set-up time.

Another way to reduce heat stress is to increase the airflow or convection using fans, etc. in the work area (as long as the air temperature is less than the worker's skin temperature). Changes in air speed can help workers stay cooler by increasing both the convective heat exchange (the exchange between the skin surface and the surrounding air) and the rate of evaporation. Because this method does not actually cool the air, any increases in air speed must impact the worker directly to be effective.

If the dry bulb temperature is higher than 35°C (95°F), the hot air passing over the skin can actually make the worker hotter. When the temperature is more than 35°C and the air is dry, evaporative cooling may be improved by air movement, although this improvement will be offset by the convective heat. When the temperature exceeds 35°C and the relative humidity is 100%, air movement will make the worker hotter. Increases in air speed have no effect on the body temperature of workers wearing vapor-barrier clothing.

HEAT CONDUCTION

Heat conduction methods include insulating the hot surface that generates the heat and changing the surface itself.

Simple engineering controls, such as shields, can be used to reduce radiant heat i.e. heat coming from hot surfaces within the worker's line of sight. Surfaces that exceed 35°C (95°F) are sources of infrared radiation that can add to the worker's heat load. Flat black surfaces absorb heat more than

smooth, polished ones. Having cooler surfaces surrounding the worker assists in cooling because the worker's body radiates heat toward them.

With some sources of radiation, such as heating pipes, it is possible to use both insulation and surface modifications to achieve a substantial reduction in radiant heat. Instead of reducing radiation from the source, shielding can be used to interrupt the path between the source and the worker. Polished surfaces make the best barriers, although special glass or metal mesh surfaces can be used if visibility is a problem.

Shields should be located so that they do not interfere with airflow, unless they are also being used to reduce convective heating. The reflective surface of the shield should be kept clean to maintain its effectiveness.

ADMINISTRATIVE CONTROLS/SAFE WORK PRACTICES

Training is the key to good work practices. Unless all employees understand the reasons for using new, or changing old, work practices, the chances of such a program succeeding are greatly reduced. NIOSH (1986) states that a good heat stress training program should include least the following components:

- Knowledge of the hazards of heat stress;
- Recognition of predisposing factors, danger signs, and symptoms;
- Awareness of first-aid procedures for, and the potential health effects of, heat stroke and heat exhaustion;
- Employee responsibilities in avoiding heat stress;
- Dangers of using drugs, including therapeutic ones, and alcohol in hot work environments;
- Use of protective clothing and equipment; and
- Purpose and coverage of environmental and medical surveillance programs and the advantages of worker participation programs.

Hot jobs should be scheduled for the cooler part of the day, and routine maintenance and repair work in hot areas should be scheduled for the cooler seasons of the year.

Measurement is often required of those environmental factors that most nearly correlate with deep body temperature and other physiological responses to heat. At the present time, the Wet Bulb Globe Temperature Index (WBGT) is the most used technique to measure these environmental factors. WBGT values are calculated by the following equations:

WET BULB GLOBE TEMPERATURE INDEXES (WBGI)

Indoor or outdoors with no solar load

$$WBGT = 0.7NWB + 0.3GT$$

Outdoors with solar load

$$WBGT = 0.7NWB + 0.2GT + 0.1DB$$

Where: WBGT = Wet Bulb Globe Temperature Index
NWB = Natural Wet Bulb Temperature
DB = Dry Bulb (air) Temperature
GT = Globe Thermometer Temperature

The determination of WBGT requires the use of a black globe thermometer, a natural (static) wet-bulb thermometer, and a dry-bulb thermometer. The measurement of environmental factors shall be performed as follows:

1. The range of the dry and the natural wet-bulb thermometers should be -5°C to +50°C, with an accuracy of ±0.5°C. The dry bulb thermometer must be shielded from the sun and the other radiant surfaces of the environment without restricting the airflow around the bulb. The wick of the natural wet bulb thermometer should be kept wet with distilled water for at least one-half hour before the temperature reading is made. It is not enough to immerse the other end of the wick into a reservoir of distilled water and wait until the whole wick becomes wet by capillarity. The wick must be wetted by direct application of water from a syringe one-half hour before each reading. The wick must cover the bulb of the thermometer and an equal length of additional wick must cover the stem above the bulb. The wick should always be clean, and new wicks should be washed before using.

2. A globe thermometer, consisting of a 15 cm (6-inch) in diameter hollow copper sphere painted on the outside with a matte black finish, or equivalent, must be used. The bulb or sensor of a thermometer (range -5°C to +100°C with an accuracy of ±0.5°C) must be fixed in the center of the sphere. The globe thermometer should be exposed at least 25 minutes before it is read.

3. A stand should be used to suspend the three thermometers so that they do not restrict free airflow around the bulbs and the wet-bulb and globe thermometer are not shaded.

4. It is permissible to use any other type of temperature sensor that gives a reading similar to that of a mercury thermometer under the same conditions.

5. The thermometers must be placed so that the readings are representative of the employee's work or rest areas, as appropriate.

Once the WBGT has been estimated, employers can estimate workers' metabolic heat load and use the ACGIH method to determine the appropriate work/rest regimen, clothing, and equipment to use to control the heat exposures of workers in their facilities.

PERSONAL PROTECTIVE EQUIPMENT

REFLECTIVE CLOTHING

Reflective clothing, which can vary from aprons and jackets to suits that completely enclose the worker from neck to feet, can stop the skin from absorbing radiant heat. However, since most reflective clothing does not allow air exchange through the garment, the reduction of radiant heat must more than offset the corresponding loss in evaporative cooling. For this reason, reflective clothing should be worn as loosely as possible. In situations where radiant heat is high, auxiliary-cooling systems can be used under the reflective clothing.

AUXILIARY BODY COOLING

1. Commercially available **ice vests**, though heavy, may accommodate as many as 72 ice packets, which are usually filled with water. Carbon dioxide (dry ice) can also be used as a coolant. The cooling offered by ice packets lasts only 2 to 4 hours at moderate to heavy heat loads, and frequent replacement is necessary. However, ice vests do not encumber the worker and thus permit maximum mobility. Cooling with ice is also relatively inexpensive.

2. **Wetted clothing** is another simple and inexpensive personal cooling technique. It is effective when reflective or other impermeable protective clothing is worn. The clothing may be wetted terry cloth coveralls or wetted two-piece, whole-body cotton suits. This approach to auxiliary cooling can be quite effective under conditions of high temperature and low humidity, where evaporation from the wetted garment is not restricted.

3. **Water-cooled garments** range from a hood, which cools only the head, to vests and "long johns," which offer partial or complete body cooling. Use of this equipment requires a battery-driven circulating pump, liquid-ice coolant, and a container.

Although this system has the advantage of allowing wearer mobility, the weight of the components limits the amount of ice that can be carried and thus reduces the effective use time. The heat transfer rate in liquid cooling systems may limit their use to low-activity jobs; even in such jobs, their service time is only about 20 minutes per pound of cooling ice. To keep outside heat from melting the ice, an outer insulating jacket should be an integral part of these systems.

4. **Circulating air** is the most highly effective, as well as the most complicated, personal cooling system. By directing compressed air around the body from a supplied air system, both evaporative and convective cooling are improved. The greatest advantage occurs when circulating air is used with impermeable garments or double cotton overalls.

One type, used when respiratory protection is also necessary, forces exhaust air from a supplied-air hood ("bubble hood") around the neck and down inside an impermeable suit. The air then escapes through openings in the suit. Air can also be supplied directly to the suit without using a hood in three ways:

- by a single inlet;
- by a distribution tree; or
- by a perforated vest.

In addition, a vortex tube can be used to reduce the temperature of circulating air. the cooled air from this tube can be introduced either under the clothing or into a bubble hood. The use of a vortex tube separates the air stream into a hot and cold stream; these tubes also can be used to supply heat in cold climates. Circulating air, however, is noisy and requires a constant source of compressed air supplied through an attached air hose.

One problem with this system is the limited mobility of workers whose suits are attached to an air hose. Another is that of getting air to the work area itself. These systems should therefore be used in work areas where workers are not required to move around much or to climb. Another concern with these systems is that they can lead to dehydration. The cool, dry air feels comfortable and the worker may not realize that it is important to drink liquids frequently.

RESPIRATOR USAGE

The weight of a self-contained breathing apparatus (SCBA) increases stress on a worker, and this stress contributes to overall heat stress. Chemical protective clothing such as totally encapsulating chemical protection suits will also add to the heat stress problem.

SUMMARY

Heat stress offers significant challenges when work needs to be performed under hot ambient conditions. However, a well thought-out program can substantially reduce the chances of heat stress. A combination of engineering and administrative controls along with effective use of personal protective equipment can protect employees from suffering the effects of heat stress

Bee/Wasp Precautions

Revision Date: April 13, 2004

PURPOSE

Bees and similar organisms such as wasps, hornets and yellow jackets can cause significant injury, pain and/or discomfort during our work. This precaution has been developed to help avoid injury.

APPLICATION

We can encounter these organisms during a number of our tasks such as:

- Opening well vault covers
- Opening core or sample boxes
- Performing O & M in system compounds
- Working in tall grass, weeds and brush
- Performing site assessments (indoors and outdoors)

Yellow Jackets

Yellow Jackets are found throughout the United States. Yellow Jackets feed on insects, spiders and a wide variety of other food items. They are medium-sized, stout-bodied, and black with bright yellow bands. Yellow-jackets construct globular paper nests, usually in underground cavities. Favorite nesting places include rodent burrows, compost piles and wall voids.

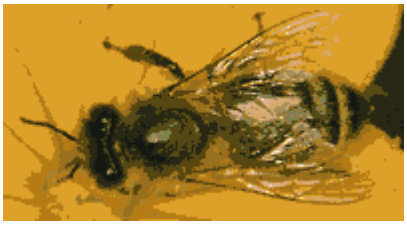
Yellow Jackets are scavengers and frequently are found foraging around compost piles and garbage receptacles. Their activity can be discouraged in the vicinity of patios, parks, picnic and other recreational areas by covering all food and disposing of waste in covered containers.

Paper Wasps

Paper wasps are about 1" in length, have a spindle-shaped body and are marked with a brown and yellow pattern. Paper wasps construct umbrella-shaped, single-layered nests with exposed cells. Nests may be built in trees and shrubs but frequently are found under building overhangs, in attics, barns, garages and sheds. These wasps are not considered overly aggressive and usually pose a threat only when their nests are disturbed. However, foraging wasps can cause considerable annoyance as they fly in and about entrances of buildings.

Honey Bees

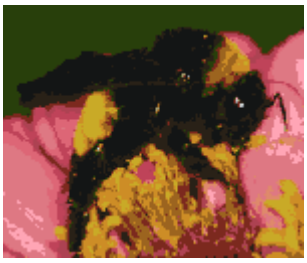
Honey bees may become troublesome when they swarm or build colonies in or near residential areas.



Honeybees occasionally invade homes and establish a colony, building combs of wax containing honey, pollen and brood in wall spaces. Once established, a colony is difficult to remove because it usually involves structural modification of the building. To be effective, the honey and wax should be removed along with the bees or the site will remain attractive to other swarms.

Bumble Bees

These bees most commonly become a problem when they establish nests close to a sidewalk or near building foundations. Bumble bees are large, robust bees covered with dense black and yellow hairs.



They commonly reach one inch in length. Bumble bees usually are not overly aggressive, but will sting if molested. To avoid confrontations with bumble bees, stay clear of patches of flowers visited by adults. These bees can be controlled by spraying or dusting insecticides on their nests.

Retreatment may be necessary.

WHAT TO DO?

Naturally, there are many kinds of bees, and other insects for that matter, about which we should be concerned. The following are some good rules of thumb to keep in mind.

1. The best way to avoid being stung is to avoid the insect. Remember, almost all of these insects sting to protect their colony.
2. Keep your eyes and ears open for swarms.
3. Look for insects flying in or out of openings such as a crack in the wall, an open pipe end or a well vault lid.
4. Be careful of tall grass as some bees build their hives at ground level.
5. Be careful of pointed structures, especially in barns, storage sheds, outbuildings as bees often build hives in those structures.
6. Avoid wearing citrus or floral aftershaves or perfumes, they are sensitive to odors.
7. Wear light colored clothing, experience shows these insects are attracted to dark colors.
8. Fill in cracks or crevices, close open ends of pipes
9. Once you rile up these insects, the best thing you can do is run away as fast as possible. Do not retrieve nearby belongings. Do not run into traffic. Do not stand still, you can't fool them. Do not try to fight them, such as flail you arms or slap at them. This will upset them more. Just keep running. Africanized bees have chased people for more than a ¼ of a mile. Any covering for your body, especially your head and face, will enhance your escape. If nothing else pull your shirt up over your face. A few bites on your belly and chest won't be as bad as a few bites to your face and eyes can be. Although tempting, do not jump into water. They will wait for you to come up for air.
10. Staff should know if they are allergic to bee stings and carry an epi-pen with them.
11. Project managers should find out who on their staff are allergic and emphasize the importance of them obtaining and carrying an epi-pen.

INSECT STING REACTIONS

Insect sting reactions can be classified into three types - a normal reaction, a toxic reaction, and an allergic reaction. A normal reaction, lasts only a few hours, involves pain, redness, swelling, itching, and warmth at the site of the sting. A toxic reaction lasts for several days, results from multiple stings and causes muscle cramps, headache, fever, and drowsiness. An allergic reaction is similar to a toxic reaction but is triggered with only one sting.

An allergic reaction can involve one or more of the following: hives, itching, and swelling in areas other than the sting site; tightness in the chest and difficulty in breathing; a hoarse voice or swelling of the tongue; dizziness or a sharp drop in blood pressure; and unconsciousness or cardiac arrest.

FIRST AID

In the event that someone is bitten by these insects, do the following.

1. Wash the bite area with soap and water.
2. Meat tenderizer, which contains an enzyme that breaks down the venom, and/or a baking soda paste also may be applied to the sting site to help relieve pain. Several over-the-counter sting remedies are available at pharmacies.
3. If you have been bitten over fifteen times or are having symptoms other than pain and swelling, seek emergency medical assistance immediately.
4. Use your epipen if you are allergic.
5. Have Benadryl in your first aid kit.

QUESTIONS?

Call Philip Platcow, CIH, Director of Health Safety & Environment (HSE) if you have questions at (617) 232-7355 or email philip.platcow@stantec.com.

ATTACHMENT 9

MATERIAL SAFETY DATA SHEETS

UNBRANDED,UNLEADED PREMIUM GASOLINE

MSDS Safety Information

TOP

FSC: 9130 **NIIN:** 00-148-7104 **MSDS Date:** 06/12/1985 **MSDS Num:** BGWTS

Submitter: D DG **Tech Review:** 06/25/1999 **Status CD:** C

Product ID: **UNBRANDED,UNLEADED PREMIUM GASOLINE** **MFN:** 01

Article: N **Kit Part:** N

Responsible Party **Cage:** 56242

Name: ATLANTIC RICHFIELD CO.,LYONDELL PETROCHEMICAL DIV.

Address: 1200 MILAM,SUITE 3500

City: HOUSTON **State:** TX **Zip:** 77002

Country: NK

Info Phone Number: 213-486-8258

Emergency Phone Number: 312-210-3000

Preparer's Name: N/P

Proprietary Ind: N **Review Ind:** Y

Published: Y **Special Project CD:** N

Contractor Summary

TOP

Cage: 56242 **Name:** **ATLANTIC RICHFIELD CO**

Address: 515 S. FLOWER ST **Box:** 2451

City: LOS ANGELES **State:** CA **Zip:** 90071-2201

Country: US **Phone:** 213-486-2687

Cage: 4H945 **Name:** **ATLNTIC RICHFIELD CO**

Address: UNKNOWN **Box:** 2451

City: HOUSTON **State:** TX **Zip:** 77001

Country: US **Phone:** 713-584-6000

= Item Description Information =

TOP

Item Manager: S9G

Item Name: GASOLINE,AUTOMOTIVE

Specification Number: VV-V-00169A **Type/Grade/Class:** CL A,B,C,D,E;GR PREM

Unit of Issue: GL **Quantitative Expression:** NK

UI Container Qty: BULK **Type of Container:** BULK

Ingredients

TOP

Cas: 8006-61-9 **Code:** M **RTECS #:** LX3300000 **Code:** M

Name: **GASOLINE**

% Text: 89-99 **Environmental Wt:**

Other REC Limits: N/P

OSHA PEL: 300 PPM/500 STEL **Code:** M **OSHA STEL:** **Code:**

ACGIH TLV: 300 PPM/500STEL;9192 **Code:** M **ACGIH STEL:** N/P **Code:**

EPA Rpt Qty: **DOT Rpt Qty:**

Ozone Depleting Chemical: N

Cas: 71-43-2 **Code:** M **RTECS #:** CY1400000 **Code:** M

Name: **BENZENE (SARA III)**

% Text: 5 **Environmental Wt:**

Other REC Limits: N/P

OSHA PEL: 1PPM/5STEL;1910.1028 **Code:** M **OSHA STEL:** **Code:**

ACGIH TLV: 10 PPM; A2; 9192 **Code:** M **ACGIH STEL:** N/P **Code:**

EPA Rpt Qty: 10 LBS **DOT Rpt Qty:** 10 LBS

Ozone Depleting Chemical: N

Cas: 1634-04-4 **Code:** M **RTECS #:** KN5250000 **Code:** M

Name: **METHYL TERT-BUTYL ETHER (SARA III)**

% Text: 0-11 **Environmental Wt:**

Other REC Limits: N/P

OSHA PEL: NOT ESTABLISHED **Code:** M **OSHA STEL:** **Code:**

ACGIH TLV: NOT ESTABLISHED **Code:** M **ACGIH STEL:** N/P **Code:**

EPA Rpt Qty: 1 LB **DOT Rpt Qty:** 1 LB

Ozone Depleting Chemical: N

Cas: 75-65-0 **Code:** M **RTECS #:** EO1925000 **Code:** M

Name: **TERT-BUTYL ALCOHOL (SARA III)**

% Text: 0-10 **Environmental Wt:**

Other REC Limits: N/P

OSHA PEL: 100 PPM **Code:** M **OSHA STEL:** **Code:**

ACGIH TLV: 100PPM 9394 **Code:** M **ACGIH STEL:** N/P **Code:**

EPA Rpt Qty: **DOT Rpt Qty:**

Ozone Depleting Chemical: N

Cas: 64-17-5 **Code:** M **RTECS #:** KQ6300000 **Code:** M

Name: **ETHYL ALCOHOL (ETHANOL)**

% Text: 0-10 **Environmental Wt:**

Other REC Limits: N/P

OSHA PEL: 1000 PPM **Code:** M **OSHA STEL:** **Code:**

ACGIH TLV: 1000 PPM; 9192 **Code:** M **ACGIH STEL:** N/P **Code:**

EPA Rpt Qty: **DOT Rpt Qty:**

Ozone Depleting Chemical: N

Cas: 67-56-1 **Code:** M **RTECS #:** PC1400000 **Code:** M

Name: **METHYL ALCOHOL (METHANOL) (SARA III)**

% Text: 0-5 **Environmental Wt:**

Other REC Limits: ACGIH STEL 250 PPM

OSHA PEL: S,200PPM/250STEL **Code:** M **OSHA STEL:** **Code:**

ACGIH TLV: S,200PPM/250STEL; 93 **Code:** M **ACGIH STEL:** N/P **Code:**

EPA Rpt Qty: 5000 LBS **DOT Rpt Qty:** 5000 LBS

Ozone Depleting Chemical: N

Health Hazards Data

TOP

LD50 LC50 Mixture ORAL RAT LD50 18,800 MG/KG

Route Of Entry Inds - Inhalation: YES **Skin:** NO **Ingestion:** NO

Carcinogenicity Inds - NTP: YES **IARC:** YES **OSHA:** YES

Health Hazards Acute And Chronic

PRODUCT IS IRRITATING TO EYES,SKIN,RESPIRATORY TRACT AND DEPRESSES THE CENTRAL NERVOUS SYSTEM. CHRONIC OVER EXPOSURE MAY CAUSE LIVER,KIDNEY OR CENTRAL NERVOUS SYSTEM DAMAGE.

Explanation Of Carcinogenicity

CONTAINS BENZENE;LISTED BY ALL THREE. ALSO,AN API STUDY FOUND LIVER CANCER IN MICE EXPOSED TO GASOLINE VAPORS.

Signs And Symptions Of Overexposure

EYE/SKIN CONTACT:TRANSITORY IRRITATION. INHALED:RESPIRATORY IRRITATION,CENTRAL NERVOUS SYSTEM DE
INCLUDING,EUPHORIA,HEADACHE,DIZZINESS,DROWSINESS,FATIGUE,TREMORS,CONVULSIONS,NAUSEA,VOMITING,I
OF CONSCIOUSNESS AND FINALLY DEATH. INGESTE:G/I IRRITATION,PLUS SYMPTOMS SIMILAR TO THOSE UNDER "IN

Medical Cond Aggravated By Exposure

PRE-EXISTING EYE,SKIN CONDITIONS OR INPAIRED LIVER,KIDNEY FUNCTION MAY BE AGGRAVATED BY THIS PRODUCT.

First Aid Information

TOP

EYE:FLUSH WITH WATER 15 MIN. SKIN:WASH WITH SOAP & WATER. REMOVE CONTAMINATED CLOTHING;LAUNDER BEFORE REUSE. INHALED:REMOVE TO FRESH AIR.RESUSCITATE OR GIVE OXYGEN AS NEEDED. GET MEDICAL CARE. INGESTED:GET IMMEDIATE MEDICAL ATTENTION. DO NO T INDUCE VOMIING. IF VOMITING OCCURS,MINIMIZE ASPIRATION HAZARD.

Spill Release Procedures

TOP

ELIMINATE IGNITION SOURCES. ISOLATE AREA. USE PROTECTIVE EQUIPMENT AS NECESSARY. STOP LEAK AND CONTAIN SPILL. DIKE AS NEEDED TO KEEP SPILL FROM DRAINS,WATER WAYS,ETC. WATER FOG MAY BE USED TO REDUCE VAPORS & PERSONAL HAZARD. REPORT SPILL PE R LAW.

Neutralizing Agent

NONE

Waste Disposal Methods

TOP

DISPOSE I/A/W FEDERAL,STATE,LOCAL REGULATIONS. PRODUCT QUALIFYS AS IGNITABLE WASTE AND CANNOT BE LANDFILLED. IF RECOVERY OR RECYLE ARE UNACCEPTABLE, INCINERATION MAY BE ACCEPTABLE DISPOSAL METHOD.

TOP

Handling and Storage Precautions

STORE IN A COOL,DRY,ISOLATED,WELL VENTILATED AREA. KEEP IGNITION SOURCES AWAY. GROUND CONTAINERS TO PREVENT STATIC DISCHARGE DURING TRANSFERS.

Other Precautions

FIRE AND EXPLOSION ARE THE ACUTE HAZARDS OF THISPRODUCT. TAKE EXTRAORDINARY STEPS TO PREVENT THEM.

Fire and Explosion Hazard Information

TOP

Flash Point Method: TCC

Flash Point:

Flash Point Text: -45F

Autoignition Temp:

Autoignition Temp Text: N/A

Lower Limits: 1.3

Upper Limits: 7.6

Extinguishing Media

DRY CHEMICAL,CARBON DIOXIDE,FOAM,WATER FOG. WATER MAY BE INEFFECTIVE AS PRODUCT WILL FLOAT AND MAY SPREAD FIRE.

Fire Fighting Procedures

WEAR SELF CONTAINED BREATHING APPARATUS IN ENCLOSED AREA. WATER SPRAY MAY BE USED TO COOL FIRE EXPOSED CONTAINERS.

Unusual Fire/Explosion Hazard

VAPORS ARE HEAVIER THAN AIR,ACCUMULATING IN LOW AREAS,TRAVELING ALONG GROUND AND MAY FLASH BACK FROM DISTANT IGNITION SOURCE.

Control Measures

TOP

Respiratory Protection

IF NEEDED,USE NIOSH/MSHA RESPIRATOR WITH ORGANIC VAPR CARTRIDGE OR PREFERRABLY,A POSITIVE PRESSURE AIR SUPPLIED RESPIRATOR OR SELF CONTAINED BREATHING APPARATUS.

Ventilation

USE EXPLOSION PROOF VENTILATION EQUIPMENT TO MAINTAIN EXPOSURE BELOW PEL/TLV.

Protective Gloves

IMPERVIOUS RUBBER OR POLYMER.

Eye Protection

SAFETY GLASSES,OR SPLASH GOGGLES.

Other Protective Equipment

SAFETY SHOWER/EYE WASH, WORK CLOTHING AS NEEDED TO PROTECT FROM PROLONGED/REPEATED CONTACT.

Work Hygienic Practices

USE GOOD CHEMICAL HYGIENE PRACTICE. AVOID UNNECESSARY CONTACT. MINIMIZE ALL CONTACT.

Supplemental Safety and Health

MSDS NO. APPC 818.

Physical/Chemical Properties

TOP

HCC:	F1	**NRC/State LIC No:**	N/R
Net Prop WT For Ammo:	N/R		
Boiling Point:		**B.P. Text:**	70-440F
Melt/Freeze Pt:		**M.P/F.P Text:**	N/K
Decomp Temp:		**Decomp Text:**	N/K
Vapor Pres:	N/K	**Vapor Density:**	3.5 (AIR)
Volatile Org Content %:		**Spec Gravity:**	0.72-0.76
VOC Pounds/Gallon:		**PH:**	N/K
VOC Grams/Liter:		**Viscosity:**	N/P

Evaporation Rate & Reference: N/K

Solubility in Water: NEGLIGIBLE

Appearance and Odor: PINK TO RED LIQUID;GASOLINE ODOR.

Percent Volatiles by Volume: 100 **Corrosion Rate:** N/P

Seton Resource Center

Allow access to non-virtual folders: 0

Reactivity Data

TOP

Stability Indicator: YES

Stability Condition To Avoid: HEAT,SPARKS AND OTHER IGNITION SOURCES,VAPOR ACCUMULATIONS.

Materials To Avoid: STRONG OXIDIZERS.

Hazardous Decomposition Products: CARBON DIOXIDE,CARBON MONOXIDE.

Hazardous Polymerization Indicator: NO

Conditions To Avoid Polymerization: N/R

Toxicological Information

TOP

Toxicological Information: N/P

Ecological Information

TOP

Ecological: N/P

MSDS Transport Information

TOP

Transport Information: N/P

Regulatory Information

TOP

Sara Title III Information: N/P

Federal Regulatory Information: N/P

State Regulatory Information: N/P

Other Information

TOP

Other Information: N/P

HMIS Transportation Information

TOP

Responsible Party Cage: 56242 **Trans ID NO:** 51170

Product ID: UNBRANDED,UNLEADED PREMIUM GASOLINE

MSDS Prepared Date: 06/12/1985 **Review Date:** 06/12/1989

MFN: 1

Submitter: D DG **Status CD:** C

Article W/O MSDS: N **Tech Entry NOS Shipping Nm:**

Radioactivity: **Form:**

Net Explosive Weight:

Coast Guard AMMO Code: **Magnetism:** N/P

Net Unit Weight: **AF MMAC Code:**

DOD Exemption NUM: **Limited Quantity IND:**

Multiple KIT Number: 0 **Kit IND:** N

Kit Part IND: N **Review IND:** Y

Unit Of Issue: GL **Container QTY:** BULK

Type Of Container: BULK

Additional Data:

Detail DOT Information

TOP

DOT PSN Code: GTN **Symbols:**

DOT Proper Shipping Name: GASOLINE

DOT PSN Modifier:

Hazard Class: 3 **UN ID Num:** UN1203

DOT Packaging Group: II

Label: FLAMMABLE LIQUID

Special Provision: B33,B101,T8

Packaging Exception:

Non Bulk Pack: 202 **Bulk Pack:** 242

Max Qty Pass: 5 L **Max Qty Cargo:** 60 L

Vessel Stow Req: E

Water/Ship/Other Req:

Detail IMO Information

TOP

IMO PSN Code: HRV

IMO Proper Shipping Name: GASOLINE

IMO PSN Modifier:

IMDG Page Number: 3141 **UN Number:** 1203

UN Hazard Class: 3.1 **IMO Packaging Group:** II

Subsidiary Risk Label: -

EMS Number: 3-07 **MED First Aid Guide NUM:** 311

Detail IATA Information

TOP

IATA PSN Code: RMF **IATA UN ID NUM:** 1203

IATA Proper Shipping Name: MOTOR SPIRIT

IATA PSN Modifier:

IATA UN Class: 3 **Subsidiary Risk Class:**

IATA Label: FLAMMABLE LIQUID

UN Packing Group: II **Packing Note Passenger:** 305

Max Quant Pass: 5L **Max Quant Cargo:** 60L

Packaging Note Cargo: 307 **Exceptions:** A100

Detail AFI Information

TOP

AFI PSN Code: MUC **AFI Symbols:**

AFI Proper Shipping Name: GASOLINE

AFI PSN Modifier:

AFI Hazard Class: 3 **AFI UN ID NUM:** UN1203

AFI Packing Group: II

AFI Label:

Special Provisions: P5 **Back Pack Reference:** A7.3

HMIS HAZCOM Label

TOP

Product ID: **UNBRANDED,UNLEADED PREMIUM GASOLINE**

Cage: 56242 **Assigned IND:** N

Company Name: ATLANTIC RICHFIELD CO

Street: 515 S. FLOWER ST **PO Box:** 2451

City: LOS ANGELES **State:** CA **Zipcode:** 90071-2201

Country: US

Health Emergency Phone:

Label Required IND: Y **Date Of Label Review:** 12/16/1998

Status Code: C **MFG Label NO:**

Label Date: 12/16/1998 **Year Procured:** N/K

Origination Code: F **Chronic Hazard IND:** N/P

Eye Protection IND: N/P **Skin Protection IND:** N/P

Signal Word: N/P **Respiratory Protection IND:** N/P

Health Hazard:

Contact Hazard:

Fire Hazard:

Reactivity Hazard:

Hazard And Precautions

MAY BE POISONOUS IF INHALED OR ABSORBED THROUGH SKIN. VAPORS MAY CAUSE DIZZINESS OR SUFFOCATION. CONTACT MAY IRRITATE OR BURN SKIN AND EYES. FIRE MAY PRODUCE IRRITATING OR POISONOUS GASES. RUNOFF FROM FIRE CONTROL OR DILUTION WATER MAY CAUS E POLLUTION.

DIESEL (FUEL OIL, NO. 2)

MSDS Safety Information

TOP

FSC: 9140 **NIIN:** 00-247-4363 **MSDS Date:** 04/12/1985 **MSDS Num:** BPHHZ

Submitter: D DG **Tech Review:** 11/09/1992 **Status CD:** C

Product ID: **DIESEL (FUEL OIL, NO. 2)** **MFN:** 01

Article: N **Kit Part:** N

Responsible Party **Cage:** 3T432

Name: ARCO PETROLEUM PRODUCTS COMPANY

Address: 515 SOUTH FLOWER STREET

City: LOS ANGELES **State:** CA **Zip:** 90071

Country: US

Info Phone Number: 213-456-8258

Emergency Phone Number: 312-210-3000(CHEMTREC 800-424-9300)

Preparer's Name: N/P

Proprietary Ind: N **Review Ind:** Y

Published: Y **Special Project CD:** N

Contractor Summary

TOP

Cage:3T432 **Name:**ARCO PETROLEUM PRODUCTS COMPANY

Address:515 SOUTH FLOWER STREET

City:LOS ANGELES **State:**CA **Zip:**90071

Country: US **Phone:** 312-210-3000(CHEMTREC 800-424-9300)

= Item Description Information =

TOP

Item Manager: S9F

Item Name: FUEL OIL,BURNER

Specification Number: NK **Type/Grade/Class:** GR 2

Unit of Issue: DR **Quantitative Expression:** 00000000055GL

UI Container Qty: 55 GAL. **Type of Container:** DRUM

Ingredients

TOP

Cas: **Code:** X **RTECS #:** 1008728HM **Code:** M

Name: **HYDROCARBON MIXTURE BOILING RANGE 325F-700F**

% Text: 100 **Environmental Wt:**

Other REC Limits: NONE RECOMMENDED

OSHA PEL: NOT ESTABLISHED **Code:** M **OSHA STEL:** **Code:**

ACGIH TLV: NOT ESTABLISHED **Code:** M **ACGIH STEL:** N/P **Code:**

EPA Rpt Qty: **DOT Rpt Qty:**

Ozone Depleting Chemical:

Health Hazards Data

TOP

LD50 LC50 Mixture ORAL LD50 (RAT) IS UNKNOWN

Route Of Entry Inds - Inhalation: YES **Skin:** YES **Ingestion:** NO

Carcinogenicity Inds - NTP: NO **IARC:** NO **OSHA:** NO

Health Hazards Acute And Chronic

ACUTE: INHALATION OF VAPORS MAY CAUSE RESPIRATORY TRACT IRRITATION AND CENTRAL NERVOUS SYSTEM DEPRESSION. CONTACT WITH LIQUID MAY IRRITATE SKIN AND EYES. SWALLOWING MAY IRRITATE GI TRACT. CHRONIC: PROLONGED OR REPEATED CONTACT MAY CAUSE DER MATITIS.

Explanation Of Carcinogenicity

PETROLEUM DISTALLATES HAVE PRODUCED SKIN TUMORS ON LABORATORY ANIMALS.

Signs And Symptions Of Overexposure

INHALED: COUGHING, WHEEZING, SHORTNESS OF BREATH, DIZZINESS, DROWSINESS,

NAUSEA, VOMITING, HEADACHE. EYES: REDNESS, DISCOMFORT. SKIN: RASH, ITCHING. INGESTED: NAUSEA, VOMITING.

Medical Cond Aggravated By Exposure

PEOPLE WITH CENTRAL NERVOUS SYSTEM DISEASE, SKIN DISORDERS, OR CHRONIC RESPIRATORY DISEASES SHOULD AVOID EXPOSURE TO THIS PRODUCT.

First Aid Information

TOP

INHALED: REMOVE PERSON TO FRESH AIR. FOR RESPIRATORY DISTRESS GIVE ARTIFICIAL RESPIRATION, AIR OR OXYGEN, AS NEEDED. EYES: FLUSH WITH LOTS OF WATER FOR 15 MINUTES WHILE HOLDING EYELIDS OPEN. SEE DOCTOR. SKIN: REMOVE CONTAMINATED CLOTHING. W ASH WITH SOAPAND WATER. INGESTED: DO NOT INDUCE VOMITING! GET IMMEDIATE MEDICAL ATTENTION IF ASPIRATED.

Spill Release Procedures

TOP

ELIMINATE ALL SOURCES OF IGNITION. CONTAIN SPILL. KEEP OUT OF WATERWAYS AND SEWERS. EVACUATE ALL NON-ESSENTIAL PERSONNEL. ABSORB WITH INERT MATERIAL OR PUMP TO SALVAGE CONTAINERS.

Neutralizing Agent

NONE SPECIFIED BY MANUFACTURER.

Waste Disposal Methods

TOP

DISPOSE OF IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS. MANUFACTURER SAYS MATERIAL IS AN EPA D001 HAZARDOUS WASTE. SPILLS MAY NEED TO REPORTED TO NATIONAL RESPONSE CENTER AT 800-424-8802.

TOP

Handling and Storage Precautions

USE PROPER BONDING & GROUNDING AND SLOW-LOAD PROCEDURES DURING LOADING/TRANSFERRING OPERATIONS. STORE IN A COOL, DRY, WELL-VENTILATED AREA.

Other Precautions

STORE AWAY FROM SOURCES OF IGNITION AND INCOMPATIBLES.DO NOT CUT, WELD, DRILL, HEAT OR BRAZE EMPTY CONTAINERS; THEY MAY HAVERESIDUE WHICH CAN BURN OR EXPLODE IF HEATED AND CONFINED.

Fire and Explosion Hazard Information

TOP

Flash Point Method: PMCC

Flash Point: **Flash Point Text:** 140F,60C

Autoignition Temp: **Autoignition Temp Text:** 495F

Lower Limits: 0.6% **Upper Limits:** 7.5%

Extinguishing Media

FOAM, DRY CHEMICAL, HALON, CARBON DIOXIDE, AND WATER FOG.

Fire Fighting Procedures

WEAR SELF-CONTAINED BREATHING APPARATUS AND BUNKER GEAR. COOL FIRE EXPOSED CONTAINERS WITH WATER. USE WATER TO DISPERSE VAPORS AND PROTECT PERSONNEL.

Unusual Fire/Explosion Hazard

THIS MATERIAL RELEASES FLAMMABLE VAPORS WHICH IF EXPOSED TO AN IGNITION SOURCE CAN BURN IN THE OPEN OR BE EXPLOSIVE IN CONFINED SPACES.

Control Measures

TOP

Respiratory Protection

NONE NORMALLY REQUIRED.

Ventilation

USE ADEQUATE MECHANICAL VENTILATION.

Protective Gloves

NITRILE IF REPEATED/PROLONGED CONTACT

Eye Protection

SAFETY GLASSES/CHEMICAL SPLASH GOGGLES

Other Protective Equipment

EYE WASH STATION & SAFETY SHOWER

Work Hygienic Practices

WASH HANDS AFTER USE AND BEFORE EATING, DRINKING, OR SMOKING. LAUNDER CONTAMINATED CLOTHES BEFORE REUSE.

Supplemental Safety and Health

N/P

Physical/Chemical Properties

TOP

HCC: F4 **NRC/State LIC No:**

Net Prop WT For Ammo:

Boiling Point: **B.P. Text:** >325F,>163C

Melt/Freeze Pt: **M.P/F.P Text:** -5F,-21C

Decomp Temp: **Decomp Text:** UNKNOWN

Vapor Pres: 0.1 PSIA **Vapor Density:** 7 (AIR=1)

Volatile Org Content %:		**Spec Gravity:**	0.85
VOC Pounds/Gallon:		**PH:**	N/K
VOC Grams/Liter:		**Viscosity:**	N/P
Evaporation Rate & Reference:	UNKNOWN		
Solubility in Water:	NEGLIGIBLE		
Appearance and Odor:	LIQUID		
Percent Volatiles by Volume:	N/K	**Corrosion Rate:**	UNKNOWN

Seton Resource Center

Allow access to non-virtual folders: 0

Reactivity Data

TOP

Stability Indicator: YES

Stability Condition To Avoid: SOURCES OF IGNITION AND CONTACT WITH INCOMPATIBLES.

Materials To Avoid: STRONG OXIDIZING AGENTS, STRONG MINERAL ACIDS, AND STRONG ALKALIS

Hazardous Decomposition Products: CARBON MONOXIDE AND OTHER HARMFUL GASES/VAPORS INCLUDING OXIDES AND/OR OTHER COMPOUNDS OF SULFUR.

Hazardous Polymerization Indicator: NO

Conditions To Avoid Polymerization: NONE

Toxicological Information

TOP

Toxicological Information: N/P

Ecological Information

TOP

Ecological: N/P

MSDS Transport Information

TOP

Transport Information: N/P

Regulatory Information

TOP

Sara Title III Information: N/P

Federal Regulatory Information: N/P

State Regulatory Information: N/P

Other Information

TOP

Other Information: N/P

HMIS Transportation Information

TOP

Responsible Party Cage: 3T432
Trans ID NO: 60842

Product ID: DIESEL (FUEL OIL, NO. 2)

MSDS Prepared Date: 04/12/1985
Review Date: 11/09/1992

MFN: 1

Submitter: D DG
Status CD: C

Article W/O MSDS: N
Tech Entry NOS Shipping Nm: FUEL OIL, NO. 2

Radioactivity: N/R
Form:

Net Explosive Weight: N/R

Coast Guard AMMO Code: N/R
Magnetism: N/P

Net Unit Weight: 389.3 LBS
AF MMAC Code:

DOD Exemption NUM: N/R
Limited Quantity IND:

Multiple KIT Number: 0
Kit IND: N

Kit Part IND: N
Review IND: Y

Unit Of Issue: DR
Container QTY: 55 GAL.

Type Of Container: DRUM

Additional Data:

Detail DOT Information

TOP

DOT PSN Code: GJL
Symbols:

DOT Proper Shipping Name: FLAMMABLE LIQUIDS, N.O.S.

DOT PSN Modifier:

Hazard Class: 3
UN ID Num: UN1993

DOT Packaging Group: III

Label: FLAMMABLE LIQUID

Special Provision: B1,B52,T7,T30

Packaging Exception: 150

Non Bulk Pack: 203 **Bulk Pack:** 242

Max Qty Pass: 60 L **Max Qty Cargo:** 220 L

Vessel Stow Req: A

Water/Ship/Other Req:

Detail IMO Information

TOP

IMO PSN Code: HIA

IMO Proper Shipping Name: FLAMMABLE LIQUID, N.O.S. o

IMO PSN Modifier:

IMDG Page Number: 3345 **UN Number:** 1993

UN Hazard Class: 3.3 **IMO Packaging Group:** III

Subsidiary Risk Label: -

EMS Number: 3-07 **MED First Aid Guide NUM:** T

Detail IATA Information

TOP

IATA PSN Code: MCA **IATA UN ID NUM:** 1993

IATA Proper Shipping Name: FLAMMABLE LIQUID, N.O.S. *

IATA PSN Modifier:

IATA UN Class: 3 **Subsidiary Risk Class:**

IATA Label: FLAMMABLE LIQUID

UN Packing Group: III **Packing Note Passenger:** 309

Max Quant Pass: 60L **Max Quant Cargo:** 220L

Packaging Note Cargo: 310 **Exceptions:**

Detail AFI Information

TOP

AFI PSN Code: MCA **AFI Symbols:** *

AFI Proper Shipping Name: FLAMMABLE LIQUIDS, N.O.S.

AFI PSN Modifier:

AFI Hazard Class: 3 **AFI UN ID NUM:** UN1993

AFI Packing Group: III

AFI Label:

Special Provisions: P5 **Back Pack Reference:** A7.3

HMIS HAZCOM Label

TOP

Product ID: **DIESEL (FUEL OIL, NO. 2)**

Cage: 3T432 **Assigned IND:** N

Company Name: ARCO PETROLEUM PRODUCTS COMPANY

Street: 515 SOUTH FLOWER STREET **PO Box:**

City: LOS ANGELES **State:** CA **Zipcode:** 90071

Country: US

Health Emergency Phone: 312-210-3000(CHEMTREC 800-424-9300)

Label Required IND: Y **Date Of Label Review:** 11/09/1992

Status Code: C **MFG Label NO:** N/R

Label Date: 11/09/1992 **Year Procured:** 1992

Origination Code: G **Chronic Hazard IND:** Y

Eye Protection IND: YES **Skin Protection IND:** YES

Signal Word: WARNING **Respiratory Protection IND:** N/P

Health Hazard: Moderate

Contact Hazard: Slight

Fire Hazard: Moderate

Reactivity Hazard: None

Hazard And Precautions

COMBUSTIBLE LIQUID/VAPOR. INHALATION OF VAPORS MAY CAUSE RESPIRATORY TRACT IRRITATION AND CENTRAL NERVOUS SYSTEM DEPRESSION. CONTACT WITH LIQUID MAY IRRITATE SKIN AND EYES. SWALLOWING MAY IRRITATE GI TRACT. PROLONGED OR REPEATED CONTACT MAY CAUSE DERMATIIS. FIRST AID: INHALED: REMOVE PERSON TO FRESH AIR. FOR RESPIRATORY DISTRESS GIVE ARTIFICIAL RESPIRATION, AIR OR OXYGEN, AS NEEDED. EYES: FLUSH WITH LOTS OF WATER FOR 15 MINUTES WHILE HOLDING EYELIDS OPEN. SEE DOCTOR. SKIN: R EMOVE CONTAMINATED CLOTHING. ASH WITH SOAP AND WATER. INGESTED: DO NOT INDUCE VOMITING! GET IMMEDIATE MEDICAL ATTENTION IF ASPIRATED.

BENZENE (AMOCO/TOTAL)

MSDS No. 11697000 ANSI/ENGLISH

13.1.1 1.0 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: BENZENE (AMOCO/TOTAL)

MANUFACTURER/SUPPLIER:

Amoco Oil Company
200 East Randolph Drive
Chicago, Illinois 60601 U.S.A.

EMERGENCY HEALTH INFORMATION:
1 (800) 447-8735

EMERGENCY SPILL INFORMATION:
1 (800) 424-9300 CHEMTREC (USA)

OTHER PRODUCT SAFETY INFORMATION:
(312) 856-3907

13.1.2 2.0 COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS#	Range % by Wt.
Benzene	71-43-2	99.80
Toluene	108-88-3	0.20

(See Section 8.0, "Exposure Controls/Personal Protection", for exposure guidelines)

13.1.3 3.0 HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: Danger! Extremely flammable. Causes eye and skin irritation. Inhalation causes headaches, dizziness, drowsiness, and nausea, and may lead to unconsciousness. Harmful or fatal if liquid is aspirated into lungs. Danger! Contains Benzene. Cancer hazard. Can cause blood disorders. Harmful when absorbed through the skin.

POTENTIAL HEALTH EFFECTS:

EYE CONTACT: Causes mild eye irritation.

SKIN CONTACT: Causes mild skin irritation. Causes skin irritation on prolonged or repeated contact. Harmful when absorbed through the skin.

INHALATION: Cancer hazard. Can cause blood disorders. Inhalation causes headaches, dizziness, drowsiness, and nausea, and may lead to unconsciousness. See "Toxicological Information" section (Section 11.0).

INGESTION: Harmful or fatal if liquid is aspirated into lungs. See "Toxicological Information" section (Section 11.0).

HMIS CODE: (Health:2) (Flammability:3) (Reactivity:0)

NFPA CODE: (Health:2) (Flammability:3) (Reactivity:0)

13.1.4 4.0 FIRST AID MEASURES

EYE: Flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation persists.

SKIN: Wash exposed skin with soap and water. Remove contaminated clothing, including shoes, and thoroughly clean and dry before reuse. Get medical attention if irritation develops.

INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get immediate medical attention.
INGESTION: If swallowed, drink plenty of water, do NOT induce vomiting. Get immediate medical attention.

13.1.5 5.0 FIRE FIGHTING MEASURES

FLASHPOINT: 12°F(-11°C)
UEL: 8.0%
LEL: 1.5%
AUTOIGNITION TEMPERATURE: 928°F (498°C)
FLAMMABILITY CLASSIFICATION: Extremely Flammable Liquid.
EXTINGUISHING MEDIA: Agents approved for Class B hazards (e.g., dry chemical, carbon dioxide, foam, steam) or water fog.
UNUSUAL FIRE AND EXPLOSION HAZARDS: Extremely flammable liquid. Vapor may explode if ignited in enclosed area.
FIRE-FIGHTING EQUIPMENT: Firefighters should wear full bunker gear, including a positive pressure self-contained breathing apparatus.
PRECAUTIONS: Keep away from sources of ignition (e.g., heat and open flames). Keep container closed. Use with adequate ventilation.
HAZARDOUS COMBUSTION PRODUCTS: Incomplete burning can produce carbon monoxide and/or carbon dioxide and other harmful products.

13.1.6 6.0 ACCIDENTAL RELEASE MEASURES

Remove or shut off all sources of ignition. Remove mechanically or contain on an absorbent material such as dry sand or earth. Increase ventilation if possible. Wear respirator and spray with water to disperse vapors. Keep out of sewers and waterways.

13.1.7 7.0 HANDLING AND STORAGE

HANDLING: Use with adequate ventilation. Do not breathe vapors. Keep away from ignition sources (e.g., heat, sparks, or open flames). Ground and bond containers when transferring materials. Wash thoroughly after handling. After this container has been emptied, it may contain flammable vapors; observe all warnings and precautions listed for this product.
STORAGE: Store in flammable liquids storage area. Store away from heat, ignition sources, and open flame in accordance with applicable regulations. Keep container closed. Outside storage is recommended.

13.1.8 8.0 EXPOSURE CONTROLS / PERSONAL PROTECTION

EYE: Do not get in eyes. Wear eye protection.
SKIN: Do not get on skin or clothing. Wear protective clothing and gloves.
INHALATION: Do not breathe mist or vapor. If heated and ventilation is inadequate, use supplied-air respirator approved by NIOSH/MSHA.
ENGINEERING CONTROLS: Control airborne concentrations below the exposure guidelines.
EXPOSURE GUIDELINES:

Component	CAS#	Exposure Limits
Benzene	71-43-2	OSHA PEL: 1 ppm OSHA STEL: 5 ppm ACGIH TLV-TWA: 10 ppm
Toluene	108-88-3	OSHA PEL: 100 ppm (1989); 200 ppm (1971) OSHA STEL: 150 ppm (1989); Not established. (1971) OSHA Ceiling: 300 ppm (1971)

		ACGIH TLV-TWA: 50 ppm (skin)

13.1.9 9.0 CHEMICAL AND PHYSICAL PROPERTIES

APPEARANCE AND ODOR: Liquid. Colorless. Sweet odor.
pH: Not determined.
VAPOR PRESSURE: 74.6 mm Hg at 20 °C
VAPOR DENSITY: Not determined.
BOILING POINT: 176°F(80°C)
MELTING POINT: 42°F(6°C)
SOLUBILITY IN WATER: Slight, 0.1 to 1.0%.
SPECIFIC GRAVITY (WATER=1): 0.88

13.1.10 10.0 STABILITY AND REACTIVITY

STABILITY: Stable.
CONDITIONS TO AVOID: Keep away from ignition sources (e.g. heat, sparks, and open flames).
MATERIALS TO AVOID: Avoid chlorine, fluorine, and other strong oxidizers.
HAZARDOUS DECOMPOSITION: None identified.
HAZARDOUS POLYMERIZATION: Will not occur.

13.1.11 11.0 TOXICOLOGICAL INFORMATION

ACUTE TOXICITY DATA:

EYE IRRITATION: Testing not conducted. See Other Toxicity Data.
SKIN IRRITATION: Testing not conducted. See Other Toxicity Data.
DERMAL LD50: Testing not conducted. See Other Toxicity Data.
ORAL LD50: 3.8 g/kg (rat).
INHALATION LC50: 10000 ppm (rat)

OTHER TOXICITY DATA: Acute toxicity of benzene results primarily from depression of the central nervous system (CNS). Inhalation of concentrations over 50 ppm can produce headache, lassitude, weariness, dizziness, drowsiness, or excitation. Exposure to very high levels can result in unconsciousness and death.

Long-term overexposure to benzene has been associated with certain types of leukemia in humans. In addition, the International Agency for Research on Cancer (IARC) and OSHA consider benzene to be a human carcinogen. Chronic exposures to benzene at levels of 100 ppm and below have been reported to cause adverse blood effects including anemia. Benzene exposure can occur by inhalation and absorption through the skin.

Inhalation and forced feeding studies of benzene in laboratory animals have produced a carcinogenic response in a variety of organs, including possibly leukemia, other adverse effects on the blood, chromosomal changes and some effects on the immune system. Exposure to benzene at levels up to 300 ppm did not produce birth defects in animal studies; however, exposure to the higher dosage levels (greater than 100 ppm) resulted in a reduction of body weight of the rat pups (fetotoxicity). Changes in the testes have been observed in mice exposed to benzene at 300 ppm, but reproductive performance was not altered in rats exposed to benzene at the same level.

Aspiration of this product into the lungs can cause chemical pneumonia and can be fatal. Aspiration into the lungs can occur while vomiting after ingestion of this product. Do not siphon by mouth.

13.1.12 12.0 ECOLOGICAL INFORMATION

Ecological testing has not been conducted on this product.

13.1.13 13.0 DISPOSAL INFORMATION

Disposal must be in accordance with applicable federal, state, or local regulations. Enclosed-controlled incineration is recommended unless directed otherwise by applicable ordinances. Residues and spilled material are hazardous waste due to ignitability.

13.1.14 14.0 TRANSPORTATION INFORMATION

U.S. DEPT OF TRANSPORTATION

Shipping Name Benzene
Hazard Class 3
Identification Number UN1114
Packing Group II
RQ RQ

INTERNATIONAL INFORMATION:

Sea (IMO/IMDG)

Shipping Name Not determined.

Air (ICAO/IATA)

Shipping Name Not determined.

European Road/Rail (ADR/RID)

Shipping Name Not determined.

Canadian Transportation of Dangerous Goods

Shipping Name Not determined.

13.1.15 15.0 REGULATORY INFORMATION

CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR Part 302.4): This product is reportable under 40 CFR Part 302.4 because it contains the following substance(s):

Component/CAS Number	Weight %	Component Reportable Quantity (RQ)
Benzene 71-43-2	99.80	10 lbs.

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR Part 355): This product is not regulated under Section 302 of SARA and 40 CFR Part 355.
SARA TITLE III SECTIONS 311/312 HAZARDOUS CATEGORIZATION (40 CFR Part 370): This product is defined as hazardous by OSHA under 29 CFR Part 1910.1200(d).
SARA TITLE III SECTION 313 (40 CFR Part 372): This product contains the following substance(s), which is on the Toxic Chemicals List in 40 CFR Part 372:

Component/CAS Number	Weight Percent
Benzene 71-43-2	99.80

U.S. INVENTORY (TSCA): Listed on inventory.
OSHA HAZARD COMMUNICATION STANDARD: Flammable liquid. Carcinogen. Irritant. CNS Effects. Target organ effects.
EC INVENTORY (EINECS/ELINCS): In compliance.
JAPAN INVENTORY (MITI): Not determined.
AUSTRALIA INVENTORY (AICS): Not determined.
KOREA INVENTORY (ECL): Not determined.
CANADA INVENTORY (DSL): Not determined.
PHILIPPINE INVENTORY (PICCS): Not determined.

13.1.16 16.0 OTHER INFORMATION

Prepared by:

Environment, Health and Safety Department
Issued: November 14, 1995

This material Safety Data Sheet conforms to the requirements of ANSI Z400.1.
This material safety data sheet and the information it contains is offered to you in good faith as accurate. We have reviewed any information contained in this data sheet which we received from sources outside our company. We believe that information to be correct but cannot guarantee its accuracy or completeness. Health and safety precautions in this data sheet may not be adequate for all individuals and/or situations. It is the user's obligation to evaluate and use this product safely and to comply with all applicable laws and regulations. No statement made in this data sheet shall be construed as a permission or recommendation for the use of any product in a manner that might infringe existing patents. No warranty is made, either express or implied.

Material Safety Data Sheet

Ethylbenzene, 99%

ACC# 00596

Section 1 - Chemical Product and Company Identification

MSDS Name: Ethylbenzene, 99%
Catalog Numbers: AC118080000, AC118080010, AC118080025, AC118080250
Synonyms: Ethylbenzol; Phenylethane
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
100-41-4	Ethylbenzene	99.0	202-849-4

Hazard Symbols: XN F
Risk Phrases: 11 20

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear, colorless liquid. Flash Point: 21 deg C. **Warning!** Aspiration hazard if swallowed. Can enter lungs and cause damage. Causes skin irritation. Causes eye irritation. Causes digestive and respiratory tract irritation. May cause central nervous system depression. **Flammable liquid and vapor.** May be absorbed through intact skin.
Target Organs: Central nervous system.

Potential Health Effects

Eye: Causes moderate eye irritation. Vapors may cause eye irritation.
Skin: Causes skin irritation. Prolonged and/or repeated contact may cause irritation and/or dermatitis. May be absorbed through the skin. Contact with the liquid may cause erythema (redness), exfoliation and vesiculation (blistering).
Ingestion: May cause irritation of the digestive tract. May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May cause central nervous system depression, characterized by excitement, followed by headache, dizziness, drowsiness, and nausea. Advanced stages may cause collapse, unconsciousness, coma and possible death due to respiratory failure. Aspiration of material into the lungs may cause chemical pneumonitis, which may be fatal.
Inhalation: Inhalation of high concentrations may cause central nervous system effects characterized by nausea, headache, dizziness, unconsciousness and coma. Causes respiratory tract irritation. Vapors may cause dizziness or suffocation.
Chronic: Chronic inhalation may cause effects similar to those of acute inhalation.

Section 4 - First Aid Measures

Eyes: Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid immediately.
Skin: Get medical aid. Flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.
Ingestion: Do NOT induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.
Inhalation: Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.
Antidote: None reported.

Section 5 - Fire Fighting Measures

General Information: Containers can build up pressure if exposed to heat and/or fire. As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors may form an explosive mixture with air. Vapors can travel to a source of ignition and flash back. Use water spray to keep fire-exposed containers cool. Flammable liquid and vapor. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. Containers may explode when heated.
Extinguishing Media: For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam. Use water spray to cool fire-exposed containers. Water may be ineffective. For large fires, use water spray, fog or alcohol-resistant foam. Contact professional fire-fighters immediately. Cool containers with flooding quantities of water until well after fire is out.
Flash Point: 21 deg C (69.80 deg F)
Autoignition Temperature: 810 deg F (432.22 deg C)
Explosion Limits, Lower:0.8
Upper: 6.7
NFPA Rating: (estimated) Health: 3; Flammability: 4; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Remove all sources of ignition. A vapor suppressing foam may be used to reduce vapors. Water spray may reduce vapor but may not prevent ignition in closed spaces.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Use with adequate ventilation. Ground and bond containers when transferring material. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Avoid contact with heat, sparks and flame. Avoid ingestion and inhalation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.
Storage: Keep away from heat, sparks, and flame. Keep away from sources of ignition. Store in a tightly closed container. Keep from contact with oxidizing materials. Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Ethylbenzene	100 ppm TWA; 125 ppm STEL	100 ppm TWA; 435 mg/m3 TWA 800 ppm IDLH	100 ppm TWA; 435 mg/m3 TWA

OSHA Vacated PELs: Ethylbenzene: 100 ppm TWA; 435 mg/m3 TWA
Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves and clothing to prevent skin exposure.
Clothing: Wear appropriate protective gloves and clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: clear, colorless
Odor: aromatic odor
pH: Not available.
Vapor Pressure: 7.1 mm Hg @ 20 C
Vapor Density: 3.7
Evaporation Rate:<1 (butyl acetate=1)
Viscosity: 0.63 mPa s 20 C
Boiling Point: 277 deg F
Freezing/Melting Point:-139 deg F
Decomposition Temperature: Not available.
Solubility: Insoluble.
Specific Gravity/Density:0.9
Molecular Formula:C8H10
Molecular Weight:106.07

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Incompatible materials, ignition sources, excess heat.
Incompatibilities with Other Materials: Oxidizing agents.
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 100-41-4: DA0700000
LD50/LC50:
CAS# 100-41-4:
Draize test, rabbit, eye: 500 mg Severe;
Oral, rat: LD50 = 3500 mg/kg;
Skin, rabbit: LD50 = 17800 uL/kg;<BR.

Carcinogenicity:
CAS# 100-41-4:
ACGIH: A3 - Animal Carcinogen
OSHA: Possible Select carcinogen
IARC: Group 2B carcinogen
Epidemiology: No information available.
Teratogenicity: No information available.
Reproductive Effects: No information available.
Neurotoxicity: No information available.
Mutagenicity: Mutation in mammalian somatic cells(Rodent,mouse) Lymphocyte = 80 mg/L.
Other Studies: Standard Draize Test: Administration into the eye (rabbit) = 500 mg (Severe). Standard Draize Tes (Rabbit, Skin) = 15 mg/L; Mild.

Section 12 - Ecological Information

Ecotoxicity: Fish: Rainbow trout: LC50 = 14.0 mg/L; 96 Hr.; Static Bioassay Fathead Minnow: LC50 = 12.1 mg/L; 96 Hr.; Flow-through Bioassay Bluegill/Sunfish: LC50 = 150.0 mg/L; 96 Hr.; Static Bioassay, pH 6.5-7.9, 21-23 degrees C flea EC50 = 2.1 mg/L; 48 Hr.; Static Bioassay flea EC50 = 75.0 mg/L; 48 Hr.; Static Bioassay Shrimp (mysidoposis bahia), LC50=87.6 mg/L/96hr. Sheepshead minnow LC50=275 mg/L/96hr. Fathead minnow LC50=42.3 mg/L/96hr in hard water &48.5 mg/L/96hr in softwater.
Environmental: Experimental data on the bioconcentration of ethylbenzene include a log BCF of 1.9 in goldfish and the log BCF of 0.67 for clams exposed to the water-soluble fraction of crude oil. Using its octanol/water partition coefficient (log Kow= 3.15) and using a recommended regression equation, one can calculate a log BCF in fish of 2.16 indicating that ethylbenzene should not significantly bioconcentrate in aquatic organisms. Ethylbenzene has a moderate adsorption for soil. The measured Koc for silt loam was 164
Physical: The predominant photochemical reaction of ethylbenzene in the atmosphere is with hydroxyl radicals; the tropospheric half-life for this reaction is 5.5 and 24 hr in the summer and winter, actively. Degradation is somewhat faster under photochemical smog situations. Photooxidation products which have been identified include ethylphenol, benzaldehyde, acetophenone and m- and p-ethylnitrobenzene. Ethylbenzene is resistant to hydrolysis. Ethylbenzene does not significantly absorb light above 290 nm in methanol solution.
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to

ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	IATA	RID/ADR	IMO	Canada TDG
Shipping Name:	ETHYLBENZENE				No information available.
Hazard Class:	3				
UN Number:	UN1175				
Packing Group:	II				

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 100-41-4 is listed on the TSCA inventory.
Health & Safety Reporting List
CAS# 100-41-4: Effective Date: 6/19/87; Sunset Date: 6/19/97
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA

CERCLA Hazardous Substances and corresponding RQs
CAS# 100-41-4: 1000 lb final RQ; 454 kg final RQ
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 100-41-4: acute, chronic, flammable.
Section 313
This material contains Ethylbenzene (CAS# 100-41-4, 99 0%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.
Clean Air Act:
CAS# 100-41-4 is listed as a hazardous air pollutant (HAP). This material does not contain any Class 1 Ozone depletors. This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
CAS# 100-41-4 is listed as a Hazardous Substance under the CWA. CAS# 100-41-4 is listed as a Priority Pollutant under the Clean Water Act. CAS# 100-41-4 is listed as a Toxic Pollutant under the Clean Water Act.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
CAS# 100-41-4 can be found on the following state right to know lists: California, New Jersey,

Florida, Pennsylvania, Minnesota, Massachusetts.
California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:
XN F

Risk Phrases:
R 11 Highly flammable.
R 20 Harmful by inhalation.

Safety Phrases:
S 16 Keep away from sources of ignition - No smoking.
S 24/25 Avoid contact with skin and eyes.
S 29 Do not empty into drains.

WGK (Water Danger/Protection)
CAS# 100-41-4: 1

Canada - DSL/NDSL
CAS# 100-41-4 is listed on Canada's DSL List.

Canada - WHMIS
This product has a WHMIS classification of D2B.

Canadian Ingredient Disclosure List
CAS# 100-41-4 is listed on the Canadian Ingredient Disclosure List.

Exposure Limits
CAS# 100-41-4: OEL-AUSTRALIA:TWA 100 ppm (435 mg/m3);STEL 125 ppm (5 45 mg/m3) OEL-BELGIUM:TWA 100 ppm (434 mg/m3);STEL 125 ppm (543 mg/m3) OEL-CZECHOSLOVAKIA:TWA 200 mg/m3;STEL 1000 mg/m3 OEL-DENMARK:TWA 5 0 ppm (217 mg/m3) OEL-FINLAND:TWA 100 ppm (435 mg/m3);STEL 150 ppm (6 55 mg/m3) OEL-FRANCE:TWA 100 ppm (435 mg/m3) OEL-GERMANY:TWA 100 ppm (440 mg/m3);Skin OEL-HUNGARY:TWA 100 mg/m3;STEL 200 mg/m3;Skin OEL-JAPAN:TWA 100 ppm (430 mg/m3) OEL-THE NETHERLANDS:TWA 100 ppm (435 mg /m3) OEL-THE PHILIPPINES:TWA 100 ppm (435 mg/m3) OEL-POLAND:TWA 100 mg/m3 OEL-RUSSIA:TWA 100 ppm;STEL 50 mg/m3 OEL-SWEDEN:TWA 50 ppm (20 0 mg/m3);STEL 100 ppm (450 mg/m3) OEL-SWITZERLAND:TWA 100 ppm (435 mg /m3);STEL 500 ppm OEL-TURKEY:TWA 100 ppm (435 mg/m3) OEL-UNITED KING DOM:TWA 100 ppm (435 mg/m3);STEL 125 ppm OEL IN BULGARIA, COLOMBIA, J ORDAN, KOREA check ACGIH TLV OEL IN NEW ZEALAND, SINGAPORE, VIETNAM c heck ACGI TLV

Section 16 - Additional Information

MSDS Creation Date: 4/28/1999
Revision #3 Date: 3/18/2003

TOLUENE (AMOCO/TOTAL)

MSDS No. 11699000 ANSI/ENGLISH

13.2.1 1.0 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: TOLUENE (AMOCO/TOTAL)

MANUFACTURER/SUPPLIER:

Amoco Chemical Company
200 East Randolph Drive
Chicago, Illinois 60601 U.S.A.

EMERGENCY HEALTH INFORMATION:
1 (800) 447-8735

EMERGENCY SPILL INFORMATION:
1 (800) 424-9300 CHEMTREC (USA)

OTHER PRODUCT SAFETY INFORMATION:
(312) 856-3907

13.2.2 2.0 COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS#	Range % by Wt.
Toluene	108-88-3	80
C9 Isoparaffins		9
C8 Isoparaffins		5
Benzene	71-43-2	2
Xylenes		2
Ethylbenzene	100-41-4	2

(See Section 8.0, "Exposure Controls/Personal Protection", for exposure guidelines)

13.2.3 3.0 HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: Warning! Flammable. Causes eye irritation. Prolonged or repeated contact can defat the skin and lead to irritation and/or dermatitis. Inhalation causes headaches, dizziness, drowsiness, nausea, and respiratory irritation. If swallowed, causes headaches, dizziness, drowsiness and nausea, and may lead to unconsciousness. Harmful or fatal if liquid is aspirated into lungs. Danger! Contains Benzene. Cancer hazard. Can cause blood disorders. Harmful when absorbed through the skin.

POTENTIAL HEALTH EFFECTS:

EYE CONTACT: Causes mild eye irritation.

SKIN CONTACT: Prolonged or repeated contact can defat the skin and lead to irritation and/or dermatitis. Harmful when absorbed through the skin. Cancer hazard. Can cause blood disorders.

INHALATION: Inhalation causes headaches, dizziness, drowsiness, nausea, and respiratory irritation. See "Toxicological Information" section (Section 11.0).

INGESTION: If swallowed, causes headaches, dizziness, drowsiness and nausea, and may lead to unconsciousness. Harmful or fatal if liquid is aspirated into lungs.

HMIS CODE: (Health:2) (Flammability:3) (Reactivity:0)

NFPA CODE: (Health:2) (Flammability:3) (Reactivity:0)

13.2.4 4.0 FIRST AID MEASURES

EYE: Immediately flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.
SKIN: Wash exposed skin with soap and water. Remove contaminated clothing and thoroughly clean and dry before reuse.
INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get immediate medical attention.
INGESTION: If swallowed, drink plenty of water, do NOT induce vomiting. Get immediate medical attention.

13.2.5 5.0 FIRE FIGHTING MEASURES

FLASHPOINT: 40°F(4°C)
UEL: 6.8%
LEL: 1.3%
AUTOIGNITION TEMPERATURE: 997°F (536°C)
FLAMMABILITY CLASSIFICATION: Flammable Liquid.
EXTINGUISHING MEDIA: Agents approved for Class B hazards (e.g., dry chemical, carbon dioxide, foam, steam) or water fog.
UNUSUAL FIRE AND EXPLOSION HAZARDS: Flammable liquid. Vapor may explode if ignited in enclosed area.
FIRE-FIGHTING EQUIPMENT: Firefighters should wear full bunker gear, including a positive pressure self-contained breathing apparatus.
PRECAUTIONS: Keep away from sources of ignition (e.g., heat and open flames). Use with adequate ventilation. Keep container closed.
HAZARDOUS COMBUSTION PRODUCTS: Incomplete burning can produce carbon monoxide and/or carbon dioxide and other harmful products.

13.2.6 6.0 ACCIDENTAL RELEASE MEASURES

Remove or shut off all sources of ignition. Remove mechanically or contain on an absorbent material such as dry sand or earth. Keep out of sewers and waterways.

13.2.7 7.0 HANDLING AND STORAGE

HANDLING: Do not breathe vapors. Do not get in eyes. Do not get on skin or clothing.
STORAGE: Store in flammable liquids storage area. Store away from heat, ignition sources, and open flame in accordance with applicable regulations. Keep container closed.

13.2.8 8.0 EXPOSURE CONTROLS / PERSONAL PROTECTION

EYE: Do not get in eyes. Wear chemical goggles.
SKIN: Avoid skin contact. Wear protective clothing and gloves.
INHALATION: Do not breathe mist or vapor. Use with adequate ventilation. If ventilation is inadequate, use NIOSH certified respirator that will protect against organic vapor and dust/mist.
ENGINEERING CONTROLS: Control airborne concentrations below the exposure guidelines.
EXPOSURE GUIDELINES:

Component	CAS#	Exposure Limits
Toluene	108-88-3	OSHA PEL: 100 ppm (1989); 200 ppm (1971) OSHA STEL: 150 ppm (1989); Not established. (1971) OSHA Ceiling: 300 ppm (1971) ACGIH TLV-TWA: 50 ppm (skin)

C9 Isoparaffins		No exposure limit established
C8 Isoparaffins		No exposure limit established
Benzene	71-43-2	OSHA PEL: 1 ppm OSHA STEL: 5 ppm ACGIH TLV-TWA: 10 ppm
Xylenes		No exposure limit established
Ethylbenzene	100-41-4	OSHA PEL: 100 ppm (1989)(1971) OSHA STEL: 125 ppm(1989); Not established. (1971) ACGIH TLV-TWA: 100 ppm ACGIH TLV-STEL: 125 ppm

13.2.9 9.0 CHEMICAL AND PHYSICAL PROPERTIES

APPEARANCE AND ODOR: Liquid. Clear. Colorless. Aromatic odor.
pH: Not determined.
VAPOR PRESSURE: 26 mm Hg at 25 °C
VAPOR DENSITY: 3.2
BOILING POINT: 231°F(111°C)
MELTING POINT: Not determined.
SOLUBILITY IN WATER: Negligible, below 0.1%.
SPECIFIC GRAVITY (WATER=1): 0.87
EVAPORATION RATE:

13.2.10 10.0 STABILITY AND REACTIVITY

STABILITY: Burning can be started easily.
CONDITIONS TO AVOID: Keep away from ignition sources (e.g. heat, sparks, and open flames).
MATERIALS TO AVOID: None identified.
HAZARDOUS DECOMPOSITION: Burning can produce carbon monoxide and/or carbon dioxide and other harmful products.
HAZARDOUS POLYMERIZATION: Will not occur.

13.2.11 11.0 TOXICOLOGICAL INFORMATION

ACUTE TOXICITY DATA:

EYE IRRITATION: Testing not conducted. See Other Toxicity Data.
SKIN IRRITATION: Testing not conducted. See Other Toxicity Data.
DERMAL LD50: Testing not conducted. See Other Toxicity Data.
ORAL LD50: Testing not conducted. See Other Toxicity Data.
INHALATION LC50: Testing not conducted. See Other Toxicity Data.

OTHER TOXICITY DATA: Specific toxicity tests have not been conducted on this product. Our hazard evaluation is based on information from similar products, the ingredients, technical literature, and/or professional experience.
This stream contains benzene, toluene, xylene and ethylbenzene.
Toluene: Toluene is readily absorbed via inhalation, ingestion, and somewhat through skin contact. In the liquid form, it causes mild skin irritation with a single exposure (PDIS: 4.8/8.0) and dermatitis following repeated exposures. Toluene also produces mild eye irritation (Draise score at 1.0 hour 13.7/110.0) which includes reversible corneal opacity and iritis. It is not a dermal sensitizer. Inhalation in humans has caused mild respiratory irritation (200 ppm), mild eye irritation (400 ppm), and lassitude and slight nausea (600 ppm). Drowsiness occurs at 800 ppm. Very high concentrations may result in paresthesia, dizziness, disturbances of vision, nausea, narcosis, and collapse. It does not

induce the hematopoietic effects seen with benzene exposure. Rat oral LD50: 5000 mg/kg; rat inhalation LC50: 4000 ppm (4 hours).
Acute toxicity of benzene results primarily from depression of the central nervous system (CNS). Inhalation of concentrations over 50 ppm can produce headache, lassitude, weariness, dizziness, drowsiness, or excitation. Exposure to very high levels can result in unconsciousness and death. Long-term overexposure to benzene has been associated with certain types of leukemia in humans. In addition, the International Agency for Research on Cancer (IARC) and OSHA consider benzene to be a human carcinogen. Chronic exposures to benzene at levels of 100 ppm and below have been reported to cause adverse blood effects including anemia. Benzene exposure can occur by inhalation and absorption through the skin.
Inhalation and forced feeding studies of benzene in laboratory animals have produced a carcinogenic response in a variety of organs, including possibly leukemia, other adverse effects on the blood, chromosomal changes and some effects on the immune system. Exposure to benzene at levels up to 300 ppm did not produce birth defects in animal studies; however, exposure to the higher dosage levels (greater than 100 ppm) resulted in a reduction of body weight of the rat pups (fetotoxicity). Changes in the testes have been observed in mice exposed to benzene at 300 ppm, but reproductive performance was not altered in rats exposed to benzene at the same level.
This product contains xylene. Xylene is readily absorbed through the skin. It is also absorbed when inhaled or ingested. Overexposure to xylene can cause eye and respiratory irritation, drowsiness, headache, fatigue, irritability, and gastrointestinal disturbances. Some liver damage and lung inflammation were seen in chronic studies in guinea pigs but not in rats. In rat reproduction studies, xylenes did not produce birth defects but were toxic to the embryo when toxicity to the mother was produced. In a mouse study, xylenes caused birth defects at doses that threatened the life of the mother. The doses which produced these effects were greatly in excess of the TLV. Rat oral LD50: 4300 mg/kg; rat inhalation LC50: 5000 ppm/4 hours.
Aspiration of this product into the lungs can cause chemical pneumonia and can be fatal. Aspiration into the lungs can occur while vomiting after ingestion of this product. Do not siphon by mouth.

13.2.12 12.0 ECOLOGICAL INFORMATION

Ecological testing has not been conducted on this product.

13.2.13 13.0 DISPOSAL INFORMATION

Disposal must be in accordance with applicable federal, state, or local regulations. Residues and spilled material are hazardous waste due to ignitability. Incineration at an EPA-permitted hazardous waste management facility as required by law. Do not landfill.

13.2.14 14.0 TRANSPORTATION INFORMATION

U.S. DEPT OF TRANSPORTATION

Shipping Name	Toluene
Hazard Class	3
Identification Number	UN1294
Packing Group	II
RQ	RQ

INTERNATIONAL INFORMATION:

Sea (IMO/IMDG)

Shipping Name Not determined.

Air (ICAO/IATA)

Shipping Name Not determined.

European Road/Rail (ADR/RID)

Shipping Name Not determined.

Canadian Transportation of Dangerous Goods

Shipping Name Not determined.

13.2.15 15.0 REGULATORY INFORMATION

CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR Part 302.4): This product is reportable under 40 CFR Part 302.4 because it contains the following substance(s):

Component/CAS Number	Weight %	Component Reportable Quantity (RQ)
Benzene 71-43-2	2	10 lbs.
Ethylbenzene 100-41-4	2	1,000 lbs.
Xylenes	2	100 lbs.
Toluene 108-88-3	80	1,000 lbs.

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR Part 355): This product is not regulated under Section 302 of SARA and 40 CFR Part 355.

SARA TITLE III SECTIONS 311/312 HAZARDOUS CATEGORIZATION (40 CFR Part 370): This product is defined as hazardous by OSHA under 29 CFR Part 1910.1200(d).

SARA TITLE III SECTION 313 (40 CFR Part 372): This product contains the following substance(s), which is on the Toxic Chemicals List in 40 CFR Part 372:

Component/CAS Number	Weight Percent
Benzene 71-43-2	2
Ethylbenzene 100-41-4	2
Xylenes	2
Toluene 108-88-3	80

U.S. INVENTORY (TSCA): Listed on inventory.
OSHA HAZARD COMMUNICATION STANDARD: Flammable liquid. CNS Effects.
EC INVENTORY (EINECS/ELINCS): In compliance.
JAPAN INVENTORY (MITI): Not determined.
AUSTRALIA INVENTORY (AICS): Not determined.
KOREA INVENTORY (ECL): Not determined.
CANADA INVENTORY (DSL): Not determined.
PHILIPPINE INVENTORY (PICCS): Not determined.

13.2.16 16.0 OTHER INFORMATION

Prepared by:

Environment, Health and Safety Department
Issued: April 14, 1997
Supersedes: April 10, 1997

This material Safety Data Sheet conforms to the requirements of ANSI Z400.1.
This material safety data sheet and the information it contains is offered to you in good faith as accurate. We have reviewed any information contained in this data sheet which we received from sources outside our company. We believe that information to be correct but cannot guarantee its accuracy or completeness. Health and safety precautions in this data sheet may not be adequate for all

individuals and/or situations. It is the user's obligation to evaluate and use this product safely and to comply with all applicable laws and regulations. No statement made in this data sheet shall be construed as a permission or recommendation for the use of any product in a manner that might infringe existing patents. No warranty is made, either express or implied.

Material Safety Data Sheet
Xylene

ACC# 89652

Section 1 - Chemical Product and Company Identification

MSDS Name: Xylene
Catalog Numbers: 57019, 57041A, 57041B
Synonyms: Dimethylbenzene, xylol, methyltoluene, violet3
Company Identification:

Biochemical Sciences Inc.
100 Clarendon Drive
Swedesboro, NJ 08085

For information, call: 800-524-0294
Emergency Number: 800-524-0294
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
1330-20-7	Xylene	100.0	215-535-7

Hazard Symbols: XN
Risk Phrases: 10 20/21 38

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: Clear, colorless liquid(max.20 apha). Flash Point: 25 deg C. **Danger! Flammable liquid and vapor.** Harmful if inhaled. This substance has caused adverse reproductive and fetal effects in animals. May cause central nervous system depression. Aspiration hazard if swallowed. Can enter lungs and cause damage. Poison! May cause severe eye irritation and possible injury. May cause liver and kidney damage. Causes digestive and respiratory tract irritation. Harmful or fatal if swallowed.
Target Organs: Kidneys, central nervous system, liver.

Potential Health Effects

Eye: Causes severe eye irritation.
Skin: Exposure may cause irritation characterized by redness, dryness, and inflammation. Prolonged and/or repeated contact may cause defatting of the skin and dermatitis.
Ingestion: May cause central nervous system depression, kidney damage, and liver damage. Symptoms may include: headache, excitement, fatigue, nausea, vomiting, stupor, and coma. Causes gastrointestinal irritation with nausea, vomiting and diarrhea. Aspiration of material into the lungs may cause chemical pneumonitis, which may be fatal.
Inhalation: Inhalation of high concentrations may cause central nervous system effects characterized by nausea, headache, dizziness, unconsciousness and coma. Inhalation of vapor may cause respiratory tract irritation. Prolonged exposure may result in dizziness and general weakness. Irritation may lead to chemical pneumonitis and pulmonary edema.

Chronic: Chronic exposure to organic solvents has been associated with various neurotoxic effects including permanent brain and nervous system damage.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid immediately.
Skin: Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists. Discard contaminated clothing in a manner which limits further exposure.
Ingestion: Do NOT induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Possible aspiration hazard. Get medical aid immediately.
Inhalation: Get medical aid immediately. Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
Notes to Physician: None

Section 5 - Firefighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors can travel to a source of ignition and flash back. Use water spray to keep fire-exposed containers cool. Flammable Liquid. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. May be ignited by heat, sparks, and flame. Vapors may form an explosive mixture with air. Containers may explode when heated.
Extinguishing Media: For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam. Use water spray to cool fire-exposed containers. For large fires, use dry chemical, carbon dioxide, alcohol-resistant foam, or water spray. Cool containers with flooding quantities of water until well after fire is out.

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Remove all sources of ignition. A vapor suppressing foam may be used to reduce vapors. Water spray may reduce vapor but may not prevent ignition in closed spaces.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Use with adequate ventilation. Ground and bond containers when transferring material. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Avoid contact with heat, sparks and flame. Avoid ingestion and inhalation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.
Storage: Keep away from heat, sparks, and flame. Keep away from sources of ignition. Keep

container closed when not in use. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Xylene	100 ppm; 150 ppm STEL	100 ppm TWA; 435 mg/m3 TWA 900 ppm IDLH	100 ppm TWA; 435 mg/m3 TWA

OSHA Vacated PELs: Xylene: 100 ppm TWA; 435 mg/m3 TWA
Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29CFR 1910.134 or European Standard EN 149. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: Clear, colorless liquid(max.20 apha)
Odor: Aromatic odor
pH: Not available.
Vapor Pressure: 21 mm Hg
Vapor Density: 3.66
Evaporation Rate:0.6
Viscosity: 0.6 MPA 20.00 d
Boiling Point: 140 deg C @ 760.00mm Hg
Freezing/Melting Point:- 50.00 - - 0.00 deg
Decomposition Temperature: Not available.
Autoignition Temperature: 460 deg C (860.00 deg F)
Flash Point: 25 deg C (77.00 deg F)
NFPA Rating: (estimated) Health: 2; Flammability: 3; Reactivity: 0
Explosion Limits, Lower:1.10 vol %
Upper: 7.00 vol %
Solubility: <0.1 G/L (20°C)
Specific Gravity/Density:.8620g/cm3
Molecular Formula:C8H10
Molecular Weight:106.17

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: High temperatures, incompatible materials, ignition sources.
Incompatibilities with Other Materials: Strong acids, strong oxidizers and 1,3-dichloro-5,5-dimethyl-2,4-imidazolidindione (dichlorohydrantoin). Attacks some forms of plastics, rubber and coatings.
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 1330-20-7 unlisted.
LD50/LC50:
CAS# 1330-20-7:
Draize test, rabbit, eye: 87 mg Mild;
Draize test, rabbit, eye: 5 mg/24H Severe;
Draize test, rabbit, skin: 100% Moderate;
Draize test, rabbit, skin: 500 mg/24H Moderate;
Inhalation, rat: LC50 = 5000 ppm/4H;
Oral, rat: LD50 = 4300 mg/kg;
Skin, rabbit: LD50 = >1700 mg/kg;<BR.

Carcinogenicity:
CAS# 1330-20-7:
ACGIH: A4 - Not Classifiable as a Human Carcinogen
IARC: Group 3 carcinogen
Epidemiology: No information available.
Teratogenicity: No information available.
Reproductive Effects: TCLo(Inhalation, rat)= 250 mg/m3/24H, Reproductive - Specific Developmental Abnormalities - musculoskeletal systemTCLo(Inhalation, rat)= 50 mg/m3/6H; Reproductive - Fertility - post-implantation mortality (e.g. dead and/or resorbed implants per total number of implants), Reproductive - Effects on Embryo or Fetus - fetotoxicity (except death, e.g., stunted fetus), Reproductive - Specific Developmental Abnormalities - craniofacial (including nose and tongue).
Neurotoxicity: No information available.
Mutagenicity: No information available.
Other Studies: Standard Draize Test: Administration onto the skin (rabbit) = 500 mg/24H (Moderate). Standard Draize Test: Administ ration into the eye (rabbit) = 5 mg/24H (Severe).

Section 12 - Ecological Information

Ecotoxicity: Acute and long-term toxicity to fish and invertebrates: LD50 for goldfish is 13 mg/L/24 Hr.Cas#1330-20-7:LC50(96Hr.) rainbow trout = 8.05 mg/L, Static condition;LC50(96Hr.) fathead minnow = 16.1 mg/L, flow-through conditions; LC50(96Hr.) bluegill = 16.1 mg/L, flow-through;EC50 (48 Hr.) water flea = 3.82 mg/L, flow-through conditions;EC50(24 Hr.) photobacterium phosphoreum = 0.0084 mg/L, Microtox test.
Environmental Fate: In air, xylenes degrade by reacting with photochemically produced hydroxyl radicals. In soil iit will volatilize and leadch into groundwater. An experimental BCF value of 20 was measured for xylene isomers in eels exposed to petroleum for 10 days. According to a classification scheme, this BCF value suggests that bioconcentration in aquatic organisms is low.
Physical/Chemical: ATMOSPHERIC FATE: According to a model of gas/particle partitioning of semivolatile organic compounds in the atmosphere, xylene, which has an experimental vapor

pressure of 7.99 mm Hg at 25 deg C, will exist solely as a vapor in the ambient atmosphere. Vapor-phase xylene is degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the atmospheric lifetime of xylene is about 1-2 days. Ambient levels of xylene are detected in the atmosphere due to large emissions of this compound.
Other: None

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: CAS# 1330-20-7: waste number U239; (Ignitable waste, Toxic waste).

Section 14 - Transport Information

	US DOT	IATA	RID/ADR	IMO	Canada TDG
Shipping Name:	No information available.				No information available.
Hazard Class:					
UN Number:					
Packing Group:					

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 1330-20-7 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA

Section 302 (RQ)
CAS# 1330-20-7: final RQ = 100 pounds (45.4 kg)
Section 302 (TPQ)
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 1330-20-7: acute, chronic, flammable.
Section 313
This material contains Xylene (CAS# 1330-20-7, 100 0%),which is subject to the reporting

requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:

CAS# 1330-20-7 is listed as a hazardous air pollutant (HAP). This material does not contain any Class 1 Ozone depletors. This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

CAS# 1330-20-7 is listed as a Hazardous Substance under the CWA. None of the chemicals in this product are listed as Priority Pollutants under the CWA. None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 1330-20-7 can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.

California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

XN

Risk Phrases:

R 10 Flammable. R 20/21 Harmful by inhalation and in contact with skin. R 38 Irritating to skin.

Safety Phrases:

S 25 Avoid contact with eyes.

WGK (Water Danger/Protection)

CAS# 1330-20-7: 2

Canada

CAS# 1330-20-7 is listed on Canada's DSL/NDSL List.

This product has a WHMIS classification of B2, D2B.

CAS# 1330-20-7 is not listed on Canada's Ingredient Disclosure List.

Exposure Limits

CAS# 1330-20-7: OEL-ARAB Republic of Egypt:TWA 0.5 ppm (0.9 mg/m3) OEL-AUSTRALIA:TWA 80 ppm (330 mg/m3);STEL 150 ppm (655 mg/m3) OEL-BEL GIUM:TWA 100 ppm (434 mg/m3);STEL 150 ppm (651 mg/m3) OEL-CZECHOSLOVA KIA:TWA 200 mg/m3;STEL 1000 mg/m3 OEL-DENMARK:TWA 50 ppm (217 mg/m3); Skin OEL-FINLAND:TWA 100 ppm (435 mg/m3);STEL 150 ppm;Skin OEL-FRANC E:TWA 100 ppm (435 mg/m3);STEL 150 ppm (650 mg/m3) OEL-GERMANY:TWA 10 0 ppm (440 mg/m3) OEL-HUNGARY:TWA 100 mg/m3;STEL 300 mg/m3 OEL-JAPAN :TWA 100 ppm (430 mg/m3) OEL-THE NETHERLANDS:TWA 100 ppm (435 mg/m3); Skin OEL-THE PHILIPPINES:TWA 0.1 mg/m3 OEL-POLAND:TWA 100 mg/m3 OEL -SWEDEN:TWA 50 ppm (200 mg/m3);STEL 100 ppm (450 mg/m3);Skin OEL-SWIT ZERLAND:TWA 100 ppm (436 mg/m3);STEL 200 ppm (870 mg/m3) OEL-THAILAND :TWA 100 ppm (435 mg/m3) OEL-TURKEY:TWA 100 ppm (435 mg/m3) OEL-UNIT ED KINGDOM:TWA 100 ppm (435 mg/m3);STEL 150 ppm;Skin OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV OEL IN NEW ZEALAND, SINGAPOR E, VIETNAM check ACGI TLV

Section 16 - Additional Information

MSDS Creation Date: 6/22/1999

Revision #2 Date: 8/02/2000

13.2.16.1

METHYL TERTIARY BUTYL ETHER

MSDS Safety Information

TOP

FSC: 6810 **MSDS Date:** 12/09/1991 **MSDS Num:** BPGMN

Submitter: D DG **LIIN:** 00D002894 **Tech Review:** 11/14/1992 **Status CD:** C

Product ID: **METHYL TERTIARY BUTYL ETHER** **MFN:** 01

Article: N **Kit Part:** N

Responsible Party **Cage:** 3D253

Name: ARCO CHEMICAL COMPANY, DIV OF ATLANTIC RICHFIELD

Address: 1500 MARKET STREET **Box:** 7258

City: PHILADELPHIA **State:** PA **Zip:** 19101

Country: US

Info Phone Number: 800-321-7000

Emergency Phone Number: 215-353-8300

Preparer's Name: N/P

Proprietary Ind: N **Review Ind:** Y

Published: Y **Special Project CD:** N

Contractor Summary

TOP

Cage: 3D253 **Name:** **ARCO CHEMICAL COMPANY, DIV OF ATLANTIC RICHFIELD**

Address: 1500 MARKET STREET **Box:** 7258

City: PHILADELPHIA **State:** PA **Zip:** 19101

Country: US **Phone:** 215-353-8300,CHEMTREC 800-424-

Ingredients

TOP

Cas: 1634-04-4 **Code:** M **RTECS #:** KN5250000 **Code:** M

Name: METHYL TERT-BUTYL ETHER (SARA III)

% Text: >97 **Environmental Wt:**

Other REC Limits: NONE RECOMMENDED

OSHA PEL:	NOT ESTABLISHED	**Code:** M	**OSHA STEL:**		**Code:**
ACGIH TLV:	NOT ESTABLISHED	**Code:** M	**ACGIH STEL:**	N/P	**Code:**
EPA Rpt Qty:	1 LB		**DOT Rpt Qty:**	1 LB	

Ozone Depleting Chemical: N

Health Hazards Data

TOP

LD50 LC50 Mixture ORAL LD50 (RAT) IS UNKNOWN

Route Of Entry Inds - Inhalation: NO **Skin:** YES **Ingestion:** YES

Carcinogenicity Inds - NTP: NO **IARC:** NO **OSHA:** NO

Health Hazards Acute And Chronic

ACUTE: CONTACT MAY CAUSE MINOR SKIN AND EYE IRRITATION. SWALLOWING LARGE AMOUNTS MAY CAUSE MILD GI TRACT IRRITATION. CHRONIC: PROLONGED OR REPEATED INHALATION OF VAPOR MAY CAUSE IRRITATION OF RESPIRATORY TRACT AND CNS EFFECTS.

Explanation Of Carcinogenicity

NO INGREDIENT OF A CONCENTRATION OF 0.1% OR GREATER IS LISTED AS A CARCINOGEN OR SUSPECTED CARCINOGEN.

Signs And Symptions Of Overexposure

INHALED: COUGHING, SHORTNESS OF BREATH, DIZZINESS, INTOXICATION. EYES: REDNESS, TEARING, DISCOMFORT. SKIN: RASH, ITCHING. INGESTED: NAUSEA, VOMITING.

Medical Cond Aggravated By Exposure

MEDICAL INFORMATION REGARDING SPECIAL HEALTH EFFECTS IS NOT CONCLUSIVE.

First Aid Information

TOP

INHALED: REMOVE PERSON TO FRESH AIR. GIVE RESPIRATORY SUPPORT IF NEEDED. GET MEDICAL ATTENTION. EYES: FLUSH WITH LOTS OF WATER FOR 15 MINUTES

WHILE HOLDING EYELIDS OPEN. SEE DOCTOR. SKIN: REMOVE CONTAMINATED CLOTHES. WASH WITH SOAP AND WATE R. INGESTED: O NOT INDUCE VOMITING. IF CONSCIOUS, GIVE LUKEWARM WATER. GET IMMEDIATE MEDICAL ATTENTION.

Spill Release Procedures

TOP

ELIMINATE ALL SOURCES OF IGNITION. CONTAIN SPILL. WEAR PROPER PROTECTIVE EQUIPMENT. ISOLATE AND DENY ENTRY. PUMP LARGE SPILL TO SALVAGE TRUCK OR CONTAINERS. ABSORB SMALL SPILL WITH INERT MATERIALS AND PLACE IN A CONTAINER FOR LATER DISPOSAL .

Neutralizing Agent

NONE SPECIFIED BY MANUFACTURER.

Waste Disposal Methods

TOP

DISPOSE OF IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS. **Handling and Storage Precautions**

TOP

STORE IN TIGHTLY CLOSED CONTAINERS, AWAY FROM SOURCES OF IGNITION AND STRONG OXIDIZING AGENTS. USE NON-SPARKING TOOLS.

Other Precautions

USE PROPER BONDING AND GROUNDING TECHNIQUES DURINGTRANSFER OPERATIONS/SPILL RECOVERY. HANDLE EMPTY CONTAINERS WITH CAUTION;MAY CONTAIN VAPOR RESIDUE WHICH IS FLAMMABLE.

Fire and Explosion Hazard Information

TOP

Flash Point Method: SCC

Flash Point:

Flash Point Text: -22F,-30C

Autoignition Temp:

Autoignition Temp Text: 797F

Lower Limits: 2.1%

Upper Limits: 10.5%

Extinguishing Media

DRY CHEMICAL, CARBON DIOXIDE, ALCOHOL FOAM, OR WATER FOG (FOR COOLING).

Fire Fighting Procedures

WEAR SELF-CONTAINED BREATHING APPARATUS AND BUNKER GEAR. FIGHT FIRE FROM SAFE DISTANCE/PROTECTED AREA. USE WATER FOR COOLING FIRE EXPOSED CONTAINERS & PERSONNEL

Unusual Fire/Explosion Hazard

HEAT MAY BUILD PRESSURE/RUPTURE CLOSED CONTAINERS.

Control Measures

TOP

Respiratory Protection

NONE NORMALLY REQUIRED. USE OF NIOSH/MSHA APPROVED AIR-SUPPLIED RESPIRATOR OR SCBA IN CONFINED SPACE OR EMERGENCY SITUATIONS IS RECOMMENDED. USE IN ACCORDANCE WITH 29 CFR 1910.134.

Ventilation

USE ADEQUATE MECHANICAL VENTILATION.

Protective Gloves

PVA OR BUTYL

Eye Protection

SAFETY GLASSES/CHEMICAL SPLASH GOGGLES

Other Protective Equipment

EYE WASH STATION & SAFETY SHOWER. BOOTS, APRON SHOULD BE WORN.

Work Hygienic Practices

WASH HANDS AFTER USE AND BEFORE EATING, DRINKING, OR SMOKING. LAUNDER CONTAMINATED CLOTHES BEFORE REUSE.

Supplemental Safety and Health

N/P

Physical/Chemical Properties

TOP

HCC: F2 **NRC/State LIC No:** N/R

Net Prop WT For Ammo: N/R

Boiling Point: **B.P. Text:** 131F,55C

Melt/Freeze Pt: **M.P/F.P Text:** -164F,-109C

Decomp Temp: **Decomp Text:** UNKNOWN

Vapor Pres: >7 PSIA **Vapor Density:** UNKNOWN

Volatile Org Content %: **Spec Gravity:** 0.74

VOC Pounds/Gallon: **PH:** N/R

VOC Grams/Liter: **Viscosity:** N/P

Evaporation Rate & Reference: UNKNOWN

Solubility in Water: MODERATE

Appearance and Odor: CLEAR, COLORLESS LIQUID WITH TURPENE ODOR

Percent Volatiles by Volume: N/K **Corrosion Rate:** N/R

Allow access to non-virtual folders: 0

Reactivity Data

TOP

Stability Indicator: YES

Stability Condition To Avoid: SOURCES OF IGNITION AND CONTACT WITH INCOMPATIBLES.

Materials To Avoid: STRONG OXIDIZING AGENTS, VITON, FLOUREL

Hazardous Decomposition Products: CARBON MONOXIDE AND OTHER TOXIC VAPORS

Hazardous Polymerization Indicator: NO

Conditions To Avoid Polymerization: NONE

Toxicological Information

TOP

Toxicological Information: N/P

Ecological Information

TOP

Ecological: N/P

MSDS Transport Information

TOP

Transport Information: N/P

Regulatory Information

TOP

Sara Title III Information: N/P

Federal Regulatory Information: N/P

State Regulatory Information: N/P

Other Information

TOP

Other Information: N/P

HMIS Transportation Information

TOP

Responsible Party Cage: 3D253 **Trans ID NO:** 2148

Product ID: METHYL TERTIARY BUTYL ETHER

MSDS Prepared Date: 12/09/1991 **Review Date:** 11/14/1992

MFN: 1

Submitter: D DG **Status CD:** C

Article W/O MSDS:	N	**Tech Entry NOS Shipping Nm:**	METHYL TERTIARY BUTYL ETHER
Radioactivity:	N/R	**Form:**	
Net Explosive Weight:	N/R		
Coast Guard AMMO Code:	N/R	**Magnetism:**	N/P
Net Unit Weight:	UNKNOWN	**AF MMAC Code:**	
DOD Exemption NUM:	N/R	**Limited Quantity IND:**	
Multiple KIT Number:	0	**Kit IND:**	N
Kit Part IND:	N	**Review IND:**	Y
Unit Of Issue:	NK	**Container QTY:**	NK
Type Of Container:			
Additional Data:			

Detail DOT Information

TOP

DOT PSN Code:	GJF	**Symbols:**	
DOT Proper Shipping Name:	FLAMMABLE LIQUIDS, N.O.S.		
DOT PSN Modifier:			
Hazard Class:	3	**UN ID Num:**	UN1993
DOT Packaging Group:	I		
Label:	FLAMMABLE LIQUID		
Special Provision:	T42		
Packaging Exception:			
Non Bulk Pack:	201	**Bulk Pack:**	243
Max Qty Pass:	1 L	**Max Qty Cargo:**	30 L
Vessel Stow Req:	E		
Water/Ship/Other Req:			

Detail IMO Information

TOP

IMO PSN Code:	HIM
IMO Proper Shipping Name:	FLAMMABLE LIQUID, N.O.S. o
IMO PSN Modifier:	

IMDG Page Number: 3126 **UN Number:** 1993

UN Hazard Class: 3.1 **IMO Packaging Group:** I/II

Subsidiary Risk Label: -

EMS Number: 3-07 **MED First Aid Guide NUM:** T

Detail IATA Information

TOP

IATA PSN Code: MBQ **IATA UN ID NUM:** 1993

IATA Proper Shipping Name: FLAMMABLE LIQUID, N.O.S. *

IATA PSN Modifier:

IATA UN Class: 3 **Subsidiary Risk Class:**

IATA Label: FLAMMABLE LIQUID

UN Packing Group: I **Packing Note Passenger:** 302

Max Quant Pass: 1L **Max Quant Cargo:** 30L

Packaging Note Cargo: 303 **Exceptions:** A3

Detail AFI Information

TOP

AFI PSN Code: MBQ **AFI Symbols:** *

AFI Proper Shipping Name: FLAMMABLE LIQUIDS, N.O.S.

AFI PSN Modifier:

AFI Hazard Class: 3 **AFI UN ID NUM:** UN1993

AFI Packing Group: I

AFI Label:

Special Provisions: P3 **Back Pack Reference:** A7.3

HMIS HAZCOM Label

TOP

Product ID: **METHYL TERTIARY BUTYL ETHER**

Cage: 3D253 **Assigned IND:** N

Company Name: ARCO CHEMICAL COMPANY, DIV OF ATLANTIC RICHFIELD

Street: 1500 MARKET STREET **PO Box:** 7258

City: PHILADELPHIA **State:** PA **Zipcode:** 19101

Country: US

Health Emergency Phone: 215-353-8300

Label Required IND: Y

Date Of Label Review: 11/14/1992

Status Code: C

MFG Label NO: HCR000127

Label Date: 11/14/1992

Year Procured: N/K

Origination Code: G

Chronic Hazard IND: N

Eye Protection IND: YES

Skin Protection IND: YES

Signal Word: DANGER

Respiratory Protection IND: YES

Health Hazard: Slight

Contact Hazard: Slight

Fire Hazard: Severe

Reactivity Hazard: None

Hazard And Precautions

EXTREMELY FLAMMABLE. CONTACT MAY CAUSE MINOR SKIN AND EYE IRRITATION. SWALLOWING LARGE AMOUNTS MAY CAUSE MILD GI TRACT IRRITATION. PROLONGED OR REPEATED INHALATION OF VAPOR MAY CAUSE IRRITATION OF RESPIRATORY TRACT AND CNS EFFECTS. FIRST AI D: INHALED: REOVE PERSON TO FRESH AIR. GIVE RESPIRATORY SUPPORT IF NEEDED. GET MEDICAL ATTENTION. EYES: FLUSH WITH LOTS OF WATER FOR 15 MINUTES WHILE HOLDING EYELIDS OPEN. SEE DOCTOR. SKIN: REMOVE CONTAMINATED CLOTHES. WASH WITH SOAP AND W ATER. INGESTED: DO NOT INDUCEVOMITING. IF CONSCIOUS, GIVE LUKEWARM WATER. GET IMMEDIATE MEDICAL ATTENTION.

METHANOL

MSDS Safety Information

TOP

FSC: 6810 **NIIN:** 00-224-8353 **MSDS Date:** 01/28/1983 **MSDS Num:** BDKMB

Submitter: D DG **Tech Review:** 05/19/1999 **Status CD:** C

Product ID: **METHANOL** **MFN:** 01

Article: N **Kit Part:** N

Responsible Party **Cage:** 3D253

Name: ARCO CHEMICAL COMPANY DIV OF ATLANTIC RICHFIELD CO

Address: 1500 MARKET STREET **Box:** 7258

City: PHILADELPHIA **State:** PA **Zip:** 19101

Country: US

Info Phone Number: 800-321-7000

Emergency Phone Number: 215-353-8300/800-424-9300(CHEMTREC)

Preparer's Name: N/P

Proprietary Ind: N **Review Ind:** Y

Published: Y **Special Project CD:** N

Contractor Summary

TOP

Cage: 3D253 **Name:** **ARCO CHEMICAL COMPANY, DIV OF ATLANTIC RICHFIELD**

Address: 1500 MARKET STREET **Box:** 7258

City: PHILADELPHIA **State:** PA **Zip:** 19101

Country: US **Phone:** 215-353-8300,CHEMTREC 800-424-9300

Cage: 86511 **Name:** **PHIPPS PRODUCTS CORP**

Address: 186 LINCOLN ST SUITE 502

City: BOSTON **State:** MA **Zip:** 02111-2403

Country: US **Phone:** OUT OF BUSINESS

= Item Description Information =

TOP

Item Manager: S9G

Item Name: METHANOL,TECHNICAL

Specification Number: O-M-232J **Type/Grade/Class:** GRADE A

Unit of Issue: DR **Quantitative Expression:** 00000000054GL

UI Container Qty: 54 GAL **Type of Container:** DRUM

Ingredients

TOP

Cas: 67-56-1 **Code:** M **RTECS #:** PC1400000 **Code:** M

Name: **METHYL ALCOHOL (METHANOL) (SARA III)**

% Text: 100 **Environmental Wt:**

Other REC Limits: N/P

OSHA PEL: S,200PPM/250STEL **Code:** M **OSHA STEL:** **Code:**

ACGIH TLV: S,200PPM/250STEL; 93 **Code:** M **ACGIH STEL:** N/P **Code:**

EPA Rpt Qty: 5000 LBS **DOT Rpt Qty:** 5000 LBS

Ozone Depleting Chemical: N

Health Hazards Data

TOP

LD50 LC50 Mixture N/P

Route Of Entry Inds - Inhalation: N/P **Skin:** N/P **Ingestion:** N/P

Carcinogenicity Inds - NTP: N/P **IARC:** N/P **OSHA:** N/P

Health Hazards Acute And Chronic

N/P

Explanation Of Carcinogenicity

N/P

Signs And Symptions Of Overexposure

HDACHE,DIZZY,WEAK,BLURRD VISION,LIGHTHEADEDNESS,"DRUNKENNESS",IRRIT OF EYES,SKN,RESP TRACT.

Medical Cond Aggravated By Exposure

N/P

First Aid Information

TOP

INHAL:RMV TO FRESH AIR. IF NOT BRTHNG GIVE CPR; IF BRTHNG DIFF GIVE OXYGEN, EYE:IMMED FLUSH W/PLENTY OF WATER. SKIN:WASH W/SOAP&WATER. RMV CONTAM CLTHG&SHOES. INGEST:INDUCE VOMIT. RPT UNTIL VOMIT IS CLEAR. NOTHG BY MOUTH IF UNCONSC. GET MED ICAL ATTN.

Spill Release Procedures

TOP

EVACUATE UNPROTECTED PERSONS. ELIM IGNITION SOURCES. STOP LEAK. H*2O SPRAY COOL CONT/DIVERT SPILL FROM FIRE/HEAT. PROVIDE VENTILATION. ABSORB W COMMERCIAL ABSORBENT,SHOVEL INTO METAL DRUMS:LG SPILL:DIKE W COMMERCIAL ABSORBENT,PUMP INTO COVE RED DRUMS.

Neutralizing Agent

N/P

Waste Disposal Methods

TOP

INCINERATE IN APPROVED INCINERATOR OR DISPOSE OF IN APPROVED CHEMICAL DUMP IN ACCORDANCE WITH LOCAL,STATE & FEDERAL REGULATIONS. **Handling and Storage Precautions**

TOP

STORE IN TIGHTLY CLOSED/PROPERLY VENTED CONTNRS AWAY FM IGN SOURCE/HEAT IN COOL/VENTILATD AREAR.HANDLE EMPTY DRUMS W/CARE;WILL ABSORB ATMOSPHRC MOISTR

Other Precautions

DO NOT USE SOLID H*2O STREAM BUT H*2O SPRAY/FOG AREUSEFUL TO COOL CONTNRS.AVOID CONTACT W/SKIN & EYES.GROUND CONTNRS PROPERLYBEFORE TRNSFR LIQUID.DO NOT STORE IN ALUMINUM/ZINC CONTAINERS.

Fire and Explosion Hazard Information

TOP

Flash Point Method: N/P

Flash Point: **Flash Point Text:** 52F, 11C (CC)

Autoignition Temp: **Autoignition Temp Text:** 725F

Lower Limits: 6.0 **Upper Limits:** 36.5

Extinguishing Media

DRY CHEMICAL,ACOHOL TYPE FOAM,CO*2.

Fire Fighting Procedures

WEAR SCBA. USE H*2O ONLY AS FOG/MIST TO COOL CONTRS.

Unusual Fire/Explosion Hazard

GIVE FLAMM VAP BELOW ROOM TEMP;IF EXPOSD TO IGN SOURCE IN ARI,MAY BURN IN OPEN OR EXPLODE IF CONFIND

Control Measures

TOP

Respiratory Protection

AIR-SUPPLIED EQUIPMENT OR GAS MASK WITH APPROVED CANISTER FOR METHAN

Ventilation

GENL DILUTION,LOCAL EXHAUST

Protective Gloves

RUBBER/NEOPRENE

Eye Protection

ACID-PROOF GOGGLES

Other Protective Equipment

RUBBER APRON

Work Hygienic Practices

WASH THOROUGHLY AFTER HANDLING.LAUNDER CONTAMINATED CLOTHING BEFORE REUSE.DISCARD CONTAMINATED LEATHER SHOES.

Supplemental Safety and Health

LYONDELL TOOK OVER PRODUCTION OF METHANOL FROM ARCO CHEMICAL IN HOUSTON,TEXAS.

Physical/Chemical Properties

TOP

HCC: F2 **NRC/State LIC No:** N/R

Net Prop WT For Ammo: N/R

Boiling Point: **B.P. Text:** 148F,65C

Melt/Freeze Pt: **M.P/F.P Text:** N/A

Decomp Temp: **Decomp Text:** N/A

Vapor Pres: 92 **Vapor Density:** 1.11

Volatile Org Content %: **Spec Gravity:** 0.79

VOC Pounds/Gallon: **PH:** N/P

VOC Grams/Liter: **Viscosity:** N/P

Evaporation Rate & Reference: 6.3,ETHER

Solubility in Water: COMPLETE

Appearance and Odor: CLEAR LIQUID WITH FAINT ALCOHOL ODOR

Percent Volatiles by Volume: 100 **Corrosion Rate:** N/P

Seton Resource Center

Allow access to non-virtual folders: 0

Reactivity Data

TOP

Stability Indicator: YES

Stability Condition To Avoid: WATER,IGN SOURCES,HEAT

Materials To Avoid: STRONG OXIDANTS,CHLOROFORM,EXPLOSV MATLS,BASES,ACTIVE METALS

Hazardous Decomposition Products: INCOMPLETE COMBUSTION PRODUCES CO & MAY GIVE FORMALDEHYDE.

Hazardous Polymerization Indicator: NO

Conditions To Avoid Polymerization: N/R

Toxicological Information

TOP

Toxicological Information: N/P

Ecological Information

TOP

Ecological: N/P

MSDS Transport Information

TOP

Transport Information: N/P

Regulatory Information

TOP

Sara Title III Information: N/P

Federal Regulatory Information: N/P

State Regulatory Information: N/P

Other Information

TOP

Other Information: N/P

HMIS Transportation Information

TOP

Responsible Party Cage: 3D253 **Trans ID NO:** 57652

Product ID: METHANOL

MSDS Prepared Date: 01/28/1983 **Review Date:** 09/10/1984

MFN: 1

Submitter: D DG **Status CD:** C

Article W/O MSDS: N **Tech Entry NOS Shipping Nm:**

Radioactivity: **Form:**

Net Explosive Weight:

Coast Guard AMMO Code: **Magnetism:** N/P

Net Unit Weight: **AF MMAC Code:**

DOD Exemption NUM: **Limited Quantity IND:**

Multiple KIT Number: 0 **Kit IND:** N

Kit Part IND: N **Review IND:** Y

Unit Of Issue: DR **Container QTY:** 54 GAL

Type Of Container: DRUM

Additional Data: IATA SUBSIDIARY HAZ CLASS:6.1(POISONOUS SUBSTANCE).

Detail DOT Information

TOP

DOT PSN Code: JEZ **Symbols:** I

DOT Proper Shipping Name: METHANOL, OR METHYL ALCOHOL

DOT PSN Modifier: METHYL ALCOHOL SEE METHANOL

Hazard Class: 3 **UN ID Num:** UN1230

DOT Packaging Group: II

Label: FLAMMABLE LIQUID, POISON

Special Provision: T8

Packaging Exception:

Non Bulk Pack: 202 **Bulk Pack:** 242

Max Qty Pass: 1 L **Max Qty Cargo:** 60 L

Vessel Stow Req: B

Water/Ship/Other Req: 40

Detail IMO Information

TOP

IMO PSN Code: JQR

IMO Proper Shipping Name: METHYL ALCOHOL

IMO PSN Modifier:

IMDG Page Number: SEE 3251 **UN Number:** 1230

UN Hazard Class: 3.2 **IMO Packaging Group:** II

Subsidiary Risk Label: TOXIC

EMS Number: 3-06 **MED First Aid Guide NUM:** 306

Detail IATA Information

TOP

IATA PSN Code: QHQ **IATA UN ID NUM:** 1230

IATA Proper Shipping Name: METHANOL

IATA PSN Modifier:

IATA UN Class: 3 **Subsidiary Risk Class:** 6.1

IATA Label: FLAMMABLE LIQUID

UN Packing Group: II **Packing Note Passenger:** 305

Max Quant Pass: 1L **Max Quant Cargo:** 60L

Packaging Note Cargo: 307 **Exceptions:** A104

Detail AFI Information

TOP

AFI PSN Code: QHQ **AFI Symbols:**

AFI Proper Shipping Name: METHANOL OR METHYL ALCOHOL

AFI PSN Modifier:

AFI Hazard Class: 3 **AFI UN ID NUM:** UN1230

AFI Packing Group: II

AFI Label: 6.1

Special Provisions: P4 **Back Pack Reference:** A7.3

HMIS HAZCOM Label

TOP

Product ID: **METHANOL**

Cage: 3D253 **Assigned IND:** N

Company Name: ARCO CHEMICAL COMPANY, DIV OF ATLANTIC RICHFIELD

Street: 1500 MARKET STREET **PO Box:** 7258

City: PHILADELPHIA **State:** PA **Zipcode:** 19101

Country: US

Health Emergency Phone: 215-353-8300

Label Required IND: Y **Date Of Label Review:** 12/16/1998

Status Code: C **MFG Label NO:**

Label Date: 12/16/1998 **Year Procured:** N/K

Origination Code: F **Chronic Hazard IND:** N/P

Eye Protection IND: N/P **Skin Protection IND:** N/P

Signal Word: N/P **Respiratory Protection IND:** N/P

Health Hazard:

Contact Hazard:

Fire Hazard:

Reactivity Hazard:

Hazard And Precautions

POISONOUS; MAY BE FATAL IF INHALED, SWALLOWED OR ABSORBED THROUGH SKIN. CONTACT MAY CAUSE BURNS TO SKIN AND EYES. RUNOFF FROM FIRE CONTROL OR DILUTION WATER MAY CAUSE POLLUTION.

CHEM SERVICE INC -- TERT-BUTYL ALCOHOL, 0-145

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MSDS Safety Information

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FSC: 6810
MSDS Date: 11/13/1992
MSDS Num: BTPXJ
LIIN: 00N045710
Product ID: TERT-BUTYL ALCOHOL, 0-145
MFN: 01
Responsible Party
Cage: 84898
Name: CHEM SERVICE INC
Box: 3108
City: WEST CHESTER PA 19381
Info Phone Number: 251-693-3026
Emergency Phone Number: 251-693-3026
Published: Y

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Contractor Summary

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Cage: 84898
Name: CHEM SERVICE INC
Box: 3108
City: WEST CHESTER PA 19381
Phone: 215-692-3026
Cage: 8Y898
Name: CHEM SERVICE, INC
Address: 660 TOWER LN
Box: 599
City: WEST CHESTER PA 19301-9650
Phone: 610-692-3026

==========

Ingredients

==========

Cas: 75-65-0
RTECS #: EO1925000
Name: TERT-BUTYL ALCOHOL (SARA III)
% Wt: 100
OSHA PEL: 100 PPM; 150 STEL
ACGIH TLV: 100 PPM; 150 STEL

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Health Hazards Data

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LD50 LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.
Route Of Entry Inds - Inhalation: YES
Skin: YES
Ingestion: YES
Carcinogenicity Inds - NTP: NO
IARC: NO
OSHA: NO
Effects of Exposure: CONTACT LENSES SHOULD NOT BE WORN IN THE LABORATORY. ALL CHEMICALS SHOULD BE CONSIDERED HAZARDOUS - AVOID DIRECT PHYSICAL CONTACT. MAY BE HARMFUL IF SWALLOWED, INHALED, ABSORBED THROUGH SKIN. DUST &/V APORS CAN CAUSE IRRITATION TO RESPIRATORY TRACT. CAN BE IRRITATING TO MUCOUS MEMBRANES.
Explanation Of Carcinogenicity: NOT RELEVANT.
Signs And Symptions Of Overexposure: SEE HEALTH HAZARDS.

Medical Cond Aggravated By Exposure: NONE SPECIFIED BY MANUFACTURER.
First Aid: EYES: FLUSH W/WATER FOR AT LEAST 15 MINS. SKIN: FLUSH W/WATER FOR 15-20 MINS. IF NO BURNS HAVE OCCURRED-USE SOAP & WATER TO CLEANSE SKIN. INHAL: REMOVE TO FRESH AIR. ADMIN O2 IF PATIENT IS HAVING DFCL TY BRTHG. IF BRTHG HAS STOPPED, ADMIN ARTF RESP. CONTINUE LIFE SUPPORTING MEASURES UNTIL MED ASSIST HAS ARRIVED. GET MED ATTN IF NEC. INGEST: GET MD IMMED(FP N). DO NOT WEAR SHOES/CLTHG (SUPP DATA)

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Handling and Disposal

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Spill Release Procedures: EVACUATE AREA. WEAR APPROPRIATE NIOSH/MSHA APPRVD REGULATED EQUIPMENT. VENT AREA. ABSORB ON VERMICULITE/SIMILAR MATL. SWEEP UP & PLACE IN AN APPROP CNTNR. HOLD FOR DISP. WASH CONTAMD SURFACES TO REMOV E ANY RESIDUES.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Methods: BURN IN A CHEMICAL INCINERATOR EQUIPPED WITH AN AFTERBURNER & SCRUBBER. DISPOSE OF IN ACCORDANCE WITH LOCAL, STATE & FEDERAL REGULATIONS(FP N).
Handling And Storage Precautions: THIS CHEMICAL SHOULD BE HANDLED ONLY IN A HOOD. EYE SHIELDS SHOULD BE WORN. USE APPROP APPRVD SAFETY EQUIP. AVOID CONT W/SKIN,EYES & CLTHG.
Other Precautions: KEEP TIGHTLY CLOSED IN A COOL DRY PLACE. STORE ONLY W/ COMPATIBLE CHEMICALS. THIS PROD IS FURNISHED FOR LABORATORY USE ONLY! OUR PRODUCTS MAY NOT BE USED AS DRUGS, COSMETICS, AGRICULTURAL/PESTICIDAL P RODUCTS, FOOD ADDITIVES/HOUSEHOLD CHEMS.

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Fire and Explosion Hazard Information

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Flash Point Text: 39.2F,4C
Lower Limits: 2.4%
Upper Limits: 8%
Extinguishing Media: CARBON DIOXIDE, DRY CHEMICAL POWDER OR SPRAY.
Fire Fighting Procedures: WEAR NIOSH/MSHA APPROVED SCBA & FULL PROTECTIVE EQUIPMENT(FP N).
Unusual Fire/Explosion Hazard: NONE SPECIFIED BY MANUFACTURER.

==========

Control Measures

==========

Respiratory Protection: USE NIOSH/MSHA APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN(FP N).
Ventilation: HANDLE ONLY IN A HOOD.
Protective Gloves: IMPERVIOUS GLOVES(FPN)
Eye Protection: ANSI APPROVED SAFETY GLASSES(FP N).
Other Protective Equipment: NONE SPECIFIED BY MANUFACTURER.
Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.
Supplemental Safety and Health: FIRST AID PROC: UNTIL ABSOLUTELY FREE OF ALL CHEMICAL ODORS. AN ANTIDOTE IS A SUBSTANCE INTENDED TO COUNTERACT THE EFFECT OF A POISON. IT SHOULD BE ADMINISTERED ONLY BY A MD OR TRAINED EMERGENCY PERSO NNEL. MED ADVICE CAN BE OBTAINED FROM APOISON CONTROL CENTER.

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Physical/Chemical Properties

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HCC: F3
B.P. Text: 181F,83C
M.P/F.P Text: 77F,25C
Vapor Pres: 31 @ 20C
Spec Gravity: 0.786
Solubility in Water: SOLUBLE
Appearance and Odor: COLORLESS CAMPHOR LIKE ODOR, SOLID OR LIQUID.

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Reactivity Data
==========
Stability Indicator: YES
Stability Condition To Avoid: FLAMMABLE. SENSITIVE TO HEAT.
Materials To Avoid: STRONGS ACIDS. REACTS W/ACID HALIDES & ANHYDRIDES.
INCOMPATIBLE W/STRONG OXIDIZING AGENTS.
Hazardous Decomposition Products: DECOMPOSITION LIBERATES TOXIC FUMES.
Hazardous Polymerization Indicator: NO
Conditions To Avoid Polymerization: NOT RELEVANT.
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Toxicological Information
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Ecological Information
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MSDS Transport Information
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Regulatory Information
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Other Information
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HAZCOM Label
==========
Product ID: TERT-BUTYL ALCOHOL, 0-145
Cage: 84898
Company Name: CHEM SERVICE INC
PO Box: 3108
City: WEST CHESTER PA
Zipcode: 19381
Health Emergency Phone: 251-693-3026
Label Required IND: Y
Date Of Label Review: 12/06/1993
Status Code: C
Label Date: 12/06/1993
Origination Code: G
Eye Protection IND: YES
Skin Protection IND: YES
Signal Word: DANGER
Respiratory Protection IND: YES
Health Hazard: Slight
Contact Hazard: Slight
Fire Hazard: Severe
Reactivity Hazard: None
Hazard And Precautions: FLAMMABLE! STORE ONLY WITH COMPATIBLE MATERIALS.
CONTACT LENSES SHOULD NOT BE WORN IN THE LABORATORY. ALL CHEMICALS SHOULD BE
CONSIDERED HAZARDOUS - AVOID DIRECT PHYSICAL CONTACT. ACUTE: MAY BE HARMFU L
IF SWALLOWED, INHALED, ABSORBED THROUGH SKIN. DUST &/VAPORS CAN CAUSE
IRRITATION TO RESPIRATORY TRACT. CAN BE IRRITATING TO MUCOUS MEMBRANES.
CHRONIC: NONE LISTED BY MANUFACTURER.
==========
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Material Safety Data Sheet

tert-Amyl methyl ether, 94%

ACC# 68380

Section 1 - Chemical Product and Company Identification

MSDS Name: tert-Amyl methyl ether, 94%
Catalog Numbers: AC133050000, AC133050050, AC133051000
Synonyms: TAME; 2-Methoxy-2-methylbutane; Methyl tert-pentyl ether; 1,1-Dimethylpropyl methyl ether; Methyl tert-amyl ether.
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
994-05-8	tert-Amyl methyl ether	94	213-611-4

Hazard Symbols: XN F
Risk Phrases: 11 20/22 36/38

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear, colorless clear liquid. Flash Point: -11 deg C. **Danger!** May cause respiratory tract irritation. Extremely flammable liquid and vapor. Vapor may cause flash fire. Causes eye and skin irritation.
Target Organs: Nervous system, reproductive system.

Potential Health Effects

Eye: Causes eye irritation.
Skin: Causes skin irritation. No data found on whether or not this chemical would be likely to cause an allergic skin reaction. A single prolonged skin exposure is not likely to result in the material being absorbed in harmful amounts.
Ingestion: May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May be harmful if swallowed.
Inhalation: May cause respiratory tract irritation. May be harmful if inhaled.
Chronic: Adverse reproductive effects have been reported in animals. Chronic exposure will cause neurological degradation and/or abnormalities.

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get

medical aid immediately.
Skin: In case of contact, immediately flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical aid. Wash clothing before reuse.
Ingestion: If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical aid.
Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Use water spray to keep fire-exposed containers cool. Extremely flammable liquid and vapor. Vapor may cause flash fire. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas.
Extinguishing Media: Use water spray, dry chemical, carbon dioxide, or chemical foam.
Flash Point: -11 deg C (12.20 deg F)
Autoignition Temperature: 415 deg C (779.00 deg F)
Explosion Limits, Lower:1.0%
Upper: 7.1%
NFPA Rating: (estimated) Health: 2; Flammability: 3; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Clean up spills immediately, observing precautions in the Protective Equipment section. Remove all sources of ignition. Use a spark-proof tool. Provide ventilation. A vapor suppressing foam may be used to reduce vapors.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Ground and bond containers when transferring material. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Take precautionary measures against static discharges. Keep container tightly closed. Avoid ingestion and inhalation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Use only with adequate ventilation. Keep away from heat, sparks and flame.
Storage: Keep away from heat, sparks, and flame. Keep away from sources of ignition. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Flammables-area.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use process enclosure, local exhaust ventilation, or other engineering

controls to control airborne levels below recommended exposure limits. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
tert-Amyl methyl ether	20 ppm TWA	none listed	none listed

OSHA Vacated PELs: tert-Amyl methyl ether: No OSHA Vacated PELs are listed for this chemical.
Personal Protective Equipment
Eyes: Wear chemical goggles.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.

Section 9 - Physical and Chemical Properties

Physical State: Clear liquid
Appearance: clear, colorless
Odor: mild ether-like odor
pH: Not applicable.
Vapor Pressure: 75 mm Hg @ 25 deg C
Vapor Density: 3.52
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 85 - 86 deg C @ 760 mm Hg
Freezing/Melting Point: Not available.
Decomposition Temperature: Not available.
Solubility: Moderately Soluble.
Specific Gravity/Density:.7640 g/cm3
Molecular Formula:C6H14O
Molecular Weight:102.17

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Ignition sources, excess heat.
Incompatibilities with Other Materials: Strong oxidizing agents.
Hazardous Decomposition Products: Carbon monoxide, irritating and toxic fumes and gases, carbon dioxide.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 994-05-8: EK4421000

LD50/LC50:
CAS# 994-05-8:
Draize test, rabbit, eye: 100 uL/24H Severe;
Draize test, rabbit, skin: 500 uL/4H Severe;
Inhalation, rat: LC50 = >5400 mg/m3/4H;
Oral, rat: LD50 = 1602 mg/kg;<BR.

Carcinogenicity:
CAS# 994-05-8: Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
Epidemiology: No information available.
Teratogenicity: No information available.
Reproductive Effects: See actual entry in RTECS for complete information.
Neurotoxicity: The NOEL for acute neurotoxicity was reported as 250 ppm for male rats and 1500 ppm for females, while the NOEL for subchronic neurotoxicity was 3500 ppm for both mal e and female rats.
Mutagenicity: No information available.
Other Studies: No data available.

Section 12 - Ecological Information

Ecotoxicity: No data available. No information available.
Environmental: TAME is a volatile, nonhydrophobic, water-soluble liquid that tends to evaporate readily to the atmosphere from the aqueous solution. TAME is not expected to be absorbed into organic matter in soil or sediment; it is not readily biodegradable; it has a low aquatic organism toxicity; and it is not expected to bioaccumulate.
Physical: log Pow: 1.6
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	IATA	RID/ADR	IMO	Canada TDG
Shipping Name:	FLAMMABLE LIQUIDS, N.O.S.				No information available.
Hazard Class:	3				
UN Number:	UN1993				
Packing Group:	III				

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 994-05-8 is listed on the TSCA inventory.
Health & Safety Reporting List
CAS# 994-05-8: Effective Date: 12/28/94; Sunset Date: 6/30/98 (Section 716.20 (b) (3) applies)
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
CAS# 994-05-8: 4/12b
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA

CERCLA Hazardous Substances and corresponding RQs
None of the chemicals in this material have an RQ.
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 994-05-8: acute, chronic, flammable.
Section 313
No chemicals are reportable under Section 313.
Clean Air Act:
This material does not contain any hazardous air pollutants. This material does not contain any Class 1 Ozone depletors. This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA. None of the chemicals in this product are listed as Priority Pollutants under the CWA. None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
CAS# 994-05-8 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives
Hazard Symbols:
XN F
Risk Phrases:
R 11 Highly flammable.
R 20/22 Harmful by inhalation and if swallowed.
R 36/38 Irritating to eyes and skin.

Safety Phrases:
S 16 Keep away from sources of ignition - No smoking.
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 37/39 Wear suitable gloves and eye/face protection.

WGK (Water Danger/Protection)
CAS# 994-05-8: 1
Canada - DSL/NDSL
CAS# 994-05-8 is listed on Canada's DSL List.
Canada - WHMIS
This product has a WHMIS classification of B2, D2B.
Canadian Ingredient Disclosure List
Exposure Limits

Section 16 - Additional Information

MSDS Creation Date: 5/26/1998
Revision #3 Date: 10/16/2002

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

ULTRA SCIENTIFIC -- ORGANOCHLORIDE PESTICIDE MIXTURE, US-102B

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MSDS Safety Information

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FSC: 6840
MSDS Date: 05/13/1996
MSDS Num: CGGBM
LIIN: 00N078252
Product ID: ORGANOCHLORIDE PESTICIDE MIXTURE, US-102B
MFN: 01
Responsible Party
Cage: 0MU35
Name: ULTRA SCIENTIFIC
Address: 250 SMITH ST
City: NORTH KINGSTOWN RI 02852
Info Phone Number: 401-294-9400
Emergency Phone Number: 401-294-9400
Published: Y

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Contractor Summary

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Cage: 0MU35
Name: ULTRA SCIENTIFIC
Address: 250 SMITH STREET
City: NORTH KINGSTOWN RI 02852-5000
Phone: 401-294-9400

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Ingredients

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Cas: 110-54-3
RTECS #: MN9275000
Name: HEXANE; (N-HEXANE) (CERCLA)
% Wt: 47.903
OSHA PEL: 500 PPM
ACGIH TLV: 50 PPM
EPA Rpt Qty: 1 LB
DOT Rpt Qty: 1 LB

Cas: 108-88-3
RTECS #: XS5250000
Name: TOLUENE (SARA 313) (CERCLA). LD50:(ORAL,RAT) 5000 MG/KG.
% Wt: 47.903
OSHA PEL: 200 PPM
ACGIH TLV: 50 PPM, S
EPA Rpt Qty: 1000 LBS
DOT Rpt Qty: 1000 LBS

Cas: 309-00-2
RTECS #: IO2100000
Name: 1,4:5,8-DIMETHANONAPTHALENE, 1,2,3,4,10,10-
HEXACHLORO-1,4,4A,5,8,8A-HEXAHYDRO-,ENDO,EXO-; (ALDRIN)(SARA 302/313)
% Wt: 0.2621
OSHA PEL: 0.25 MG/M3, S
ACGIH TLV: 0.25 MG/M3, S
EPA Rpt Qty: 1 LB
DOT Rpt Qty: 1 LB

Name: ING 3:LD50:(ORAL,RAT) 38 MG/KG.
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Cas: 50-29-3
RTECS #: KJ3325000
Name: ETHANE, 1,1,1-TRICHLORO-2,2-BIS(P-CHLOROPHENYL)-; (4,4'-DDT) (CERCLA).
LD50:(ORAL,RAT) 113 MG/KG.
% Wt: 0.2621
OSHA PEL: 1 MG/M3, S
ACGIH TLV: 1 MG/M3
EPA Rpt Qty: 1 LB
DOT Rpt Qty: 1 LB

Cas: 60-57-1
RTECS #: IO1750000
Name: 1,4:5,8-DIMETHANONAPHTHALENE, 1,2,3,4,10,10-
HEXACHLORO-6,7-EPOXY-1,4,4A,5,6,7,8,8A-OCTAHYDRO, ENDO, EXO-;
% Wt: 0.2621
OSHA PEL: 0.25 MG/M3, S
ACGIH TLV: 0.25 MG/M3, S
EPA Rpt Qty: 1 LB
DOT Rpt Qty: 1 LB

Name: ING 12:(DIELDRIN) (CERCLA). LD50:(ORAL,RAT) 46 MG/KG.
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Cas: 959-98-8
RTECS #: RB9275100
Name: 5-NORBORNENE-2,3-DIMETHANOL, 1,4,5,6,7,7- HEXACHLORO-, CYCLIC SULFITE,
ENDO-; (ENDOSULFAN I) (CERCLA).
% Wt: 0.2621
OSHA PEL: 0.1 MG/M3, S
ACGIH TLV: N/K (FP N)
EPA Rpt Qty: 1 LB
DOT Rpt Qty: 1 LB

Name: ING 14:LD50:(ORAL,RAT) 43 MG/KG.
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Cas: 33213-65-9
RTECS #: RB9875200
Name: 5-NORBORNENE-2,3-DIMETHANOL, 1,4,5,6,7,7- HEXACHLORO-, CYCLIC SULFITE,
EXO-; (ENDOSULFAN II) (CERCLA).
% Wt: 0.2621
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)
EPA Rpt Qty: 1 LB
DOT Rpt Qty: 1 LB

Name: ING 16:LD50:(ORAL,RAT) 18 MG/KG
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Cas: 1031-07-8
RTECS #: RB9150000
Name: 5-NORBORNENE-2,3-DIMETHANOL, 1,4,5,6,7,7- HEXACHLORO-, CYCLIC SULFATE;
(ENDOSULFAN SULFATE) (CERCLA)
% Wt: 0.2621
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

IARC: YES
OSHA: NO
Effects of Exposure: ALL CHEMICALS SHOULD BE CONSIDERED HAZARDOUS - DIRECT PHYSICAL CONTACT SHOULD BE AVOIDED. TOXIC; IRRITANT. WARNING:THIS PRODUCT CONTAINS CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER AND BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM. NOTE:TOLUENE APPEARS ON THE NAVY LISTING OF OCCUPATIONAL (EFTS OF OVEREXP)
Explanation Of Carcinogenicity: ALPHA-BHC, BETA-BHC & GAMMA-BHC:NTP 7TH ANNUAL RPT ON CARCINS, 1994:ANTIC TO BE CARCIN. 4,4-DDD & 4,4-DDE:IARC (SUPDAT)
Signs And Symptions Of Overexposure: HLTH HAZ:CHEMICAL REPRODUCTIVE HAZARDS. SEEK CONSULTATION FROM APPROPRIATE HEALTH PROFESSIONALS CONCERNING LATEST HAZARD LIST INFORMATION AND SAFE HANDLING AND EXPOSURE INFORMATION (FP N).
Medical Cond Aggravated By Exposure: NONE SPECIFIED BY MANUFACTURER.
First Aid: INGEST:CALL MD IMMEDIATELY (FP N). EYE:FLUSH W/COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. SKIN:FLUSH W/COPIOUS AMOUNTS OF WATER. INHAL:REMOVE TO FRESH AIR - GIVE OXYGEN, IF NECESSARY. CONTACT M D.

Handling and Disposal

Spill Release Procedures: DUE TO SMALL QUANTITY INVOLVED, SPILLS OR LEAKS SHOULD NOT POSE A SIGNIFICANT PROBLEM. LEAKING AMPULE OR BOTTLE MAY BE PLACED IN PLASTIC BAG & NORMAL DISPOSAL PROCEDURES FOLLOWED. LIQUID SAMPLES MAY B E ABSORBED ON VERMICULITE OR SAND.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Methods: BURN IN A CHEMICAL INCINERATOR EQUIPPED W/AFTERBURNER & SCRUBBER. OBSERVE ALL FEDERAL, STATE & LOCAL LAWS CONCERNING DISPOSAL.
Handling And Storage Precautions: KEEP TIGHTLY CLOSED & STORE IN A COOL, DRY PLACE.
Other Precautions: THIS MATERIAL SHOULD ONLY BE USED BY THOSE PERSONS TRAINED IN THE SAFE HANDLING OF HAZARDOUS CHEMICALS.

Fire and Explosion Hazard Information

Extinguishing Media: CARBON DIOXIDE, DRY CHEMICAL POWDER OR WATER SPRAY.
Fire Fighting Procedures: USE NIOSH APPROVED SCBA & FULL PROTECTIVE EQUIPMENT (FP N).
Unusual Fire/Explosion Hazard: COMBUSTIBLE.

Control Measures

Respiratory Protection: NIOSH APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN (FP N).
Ventilation: NONE SPECIFIED BY MANUFACTURER.
Protective Gloves: IMPERVIOUS GLOVES (FP N).
Eye Protection: ANSI APPRVD CHEM WORKERS GOGGS &(SUPDAT)
Other Protective Equipment: ANSI APPRVD EYE WASH FOUNTAIN & DELUGE SHOWER (FP N). APPROP OSHA/MSHA APPRVD SFTY EQUIP; CHEM RESIST CLTHG SUCH(SUPDAT)
Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.
Supplemental Safety and Health: EYE PROT:FULL LGTH FSHLD (FP N). OTHER PROT EQUIP:AS LAB COAT &/OR RUB APRON. EXPLAN OF CARCIN:MONO, VOL 153, PG 179, 1991:GRP 2B. 4,4-DDT:IARC MONO, VOL 53, PG 179, 1991:GRP 2B. NTP 7TH ANNUAL RPT ON CARCINS, 1994:ANTIC TO BE CARCIN. HEPTACHLOR & HEPTACHLOR EPOXIDE:IARC MONO, VOL 53, PG 115, 1991:GROUP 2B.

Physical/Chemical Properties

Spec Gravity: 0.763
Solubility in Water: INSOLUBLE

Material Safety Data Sheet
Arsenic 100 ppm

ACC# 88076

Section 1 - Chemical Product and Company Identification

MSDS Name: Arsenic 100 ppm
Catalog Numbers: MCC-031368
Synonyms: None
Company Identification:
Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
7732-18-5	Water	7732-18-	231-791-2
7664-93-9	Sulfuric Acid	<2.0%	231-639-5
1310-73-2	Sodium Hydroxide	<1.0%	215-185-5
1327-53-3	Arsenic trioxide	<1.0%	215-481-4

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: Not available.
Danger! May cause severe eye irritation and possible injury. Contains inorganic arsenic. Harmful if inhaled or swallowed. Cancer hazard. May cause skin irritation. May cause respiratory and digestive tract irritation. May cause fetal effects. Use only with adequate ventilation or respiratory protection.
Target Organs: None.

Potential Health Effects
Eye: May cause severe eye irritation. May result in corneal injury.
Skin: May cause skin irritation.
Ingestion: May cause irritation of the digestive tract.
Inhalation: May cause respiratory tract irritation.
Chronic: May cause fetal effects.

Section 4 - First Aid Measures

Arsenic trioxide	0.01 mg/m3 TWA (as As) (listed under Arsenic, inorganic compounds).	5 mg/m3 IDLH (as As) (listed under Arsenic, inorganic compounds).	(listed under Arsenic, inorganic compounds).5 æg/m3 Action Level (as As); 10 æg/m3 TWA (as As, Cancer hazard - see 29 CFR 19 10.1018, except Arsine) (listed under Arsenic, inorga nic compounds).

OSHA Vacated PELs: Water: No OSHA Vacated PELs are listed for this chemical. Sulfuric Acid: 1 mg/m3 TWA Sodium Hydroxide: No OSHA Vacated PELs are listed for this chemical. Arsenic trioxide: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to minimize contact with skin.

Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: Not available.
Odor: none reported
pH: Not available.
Vapor Pressure: Not available.
Vapor Density: Not available.
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: Not available.
Freezing/Melting Point: Not available.
Decomposition Temperature: Not available.
Solubility: Not available.
Specific Gravity/Density: Not available.
Molecular Formula: Mixture
Molecular Weight: Not available

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: None reported.
Incompatibilities with Other Materials: None reported.
Hazardous Decomposition Products: Oxides of arsenic, arsine.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

Epidemiology: In a large number of studies, exposure to inorganic arsenic compounds in drugs, food, and water as well as in an occupational setting have been casually associated with the development of cancer, primarily of the skin and lungs.
Teratogenicity: Teratogenic effects, including exencephaly, skeletal defects, and genitourinary system defects have occured when arsenic compounds were administered intravenously or intraperitoneally at high doses in hamsters, rats and mice.
Reproductive Effects: No information available.
Mutagenicity: No information available.
Neurotoxicity: No information available.
Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: CAS# 1327-53-3: waste number P012.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	Not regulated as a hazardous material	No information available.
Hazard Class:		
UN Number:		
Packing Group:		

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 7732-18-5 is listed on the TSCA inventory.
CAS# 7664-93-9 is listed on the TSCA inventory.
CAS# 1310-73-2 is listed on the TSCA inventory.
CAS# 1327-53-3 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule

WGK (Water Danger/Protection)

CAS# 7732-18-5: No information available.
CAS# 7664-93-9: 2
CAS# 1310-73-2: 1
CAS# 1327-53-3: 3

Canada - DSL/NDSL

CAS# 7732-18-5 is listed on Canada's DSL List.
CAS# 7664-93-9 is listed on Canada's DSL List.
CAS# 1310-73-2 is listed on Canada's DSL List.
CAS# 1327-53-3 is listed on Canada's DSL List.

Canada - WHMIS

WHMIS: Not available.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 7664-93-9 is listed on the Canadian Ingredient Disclosure List.
CAS# 1310-73-2 is listed on the Canadian Ingredient Disclosure List.
CAS# 1327-53-3 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 8/24/1997
Revision #4 Date: 11/20/2008

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE A FIRE. CORROSIVE. CAUSES SEVERE BURNS TO EVERY AREA OF CONTACT. HARMFUL IF SWALLOWED OR INHALED. AFFECTS THE RESPIRATORY SYSTEM, LIVER, KIDNEYS, EYES, SKIN AND BLOOD. MAY CAUSE ALLERGIC REACTION. CANCER HAZARD. CAN CAUSE CANCER.
Risk of cancer depends on duration and level of exposure.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 4 - Extreme (Poison)
Flammability Rating: 0 - None
Reactivity Rating: 3 - Severe (Oxidizer)
Contact Rating: 4 - Extreme (Corrosive)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: White (Corrosive)

Potential Health Effects

Inhalation:
Corrosive. Extremely destructive to tissues of the mucous membranes and upper respiratory tract. May cause ulceration and perforation of the nasal septum. Symptoms may include sore throat, coughing, shortness of breath, and labored breathing. May produce pulmonary sensitization or allergic asthma. Higher exposures may cause pulmonary edema.

Ingestion:
Corrosive. Swallowing can cause severe burns of the mouth, throat, and stomach, leading to death. Can cause sore throat, vomiting, diarrhea. May cause violent gastroenteritis, peripheral vascular collapse, dizziness, intense thirst, muscle cramps, shock, coma, abnormal bleeding, fever, liver damage and acute renal failure.

Skin Contact:
Corrosive. Symptoms of redness, pain, and severe burn can occur. Dusts and strong solutions may cause severe irritation. Contact with broken skin may cause ulcers (chrome sores) and absorption, which may cause systemic poisoning, affecting kidney and liver functions. May cause skin sensitization.

Eye Contact:
Corrosive. Contact can cause blurred vision, redness, pain and severe tissue burns. May cause corneal injury or blindness.

Chronic Exposure:
Repeated or prolonged exposure can cause ulceration and perforation of the nasal septum, respiratory irritation, liver and kidney damage and ulceration of the skin. Ulcerations at first may be painless, but may penetrate to the bone producing "chrome holes." Known to be a human carcinogen.

Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders, asthma, allergies or known sensitization to chromic acid or chromates may be more susceptible to the effects of this material.

Keep in a tightly closed container. Protect from physical damage. Store in a cool, dry, ventilated area away from sources of heat, ignition sources, moisture and incompatibilities. Do not store on wooden floors. Wear special protective equipment (Sec. 8) for maintenance break-in or where exposures may exceed established exposure levels. Wash hands, face, forearms and neck when exiting restricted areas. Shower, dispose of outer clothing, change to clean garments at the end of the day. Avoid cross-contamination of street clothes. Wash hands before eating and do not eat, drink, or smoke in workplace. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
- OSHA Permissible Exposure Limit (PEL):
For chromic acid and chromates, as CrO3 = 0.1 mg/m3 (ceiling)
- ACGIH Threshold Limit Value (TLV):
For water-soluble Cr(VI) compounds, as Cr = 0.05 mg/m3 (TWA), A1 - confirmed human carcinogen.

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, a half facepiece particulate respirator (NIOSH type N95 or better filters) may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest.. A full-face piece particulate respirator (NIOSH type N100 filters) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency, or respirator supplier, whichever is lowest. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P filter. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:

Chromium(VI) Oxide (1:3) (1333-82-0)	Yes	No	1

12. Ecological Information

Environmental Fate:
When released into the soil, this material may leach into groundwater. When released into water, this material is not expected to evaporate significantly. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition.
Environmental Toxicity:
This material is expected to be toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: CHROMIUM TRIOXIDE, ANHYDROUS
Hazard Class: 5.1, 6.1, 8
UN/NA: UN1463
Packing Group: II
Information reported for product/size: 100LB

International (Water, I.M.O.)

Proper Shipping Name: CHROMIUM TRIOXIDE, ANHYDROUS
Hazard Class: 5.1, 6.1, 8
UN/NA: UN1463
Packing Group: II
Information reported for product/size: 100LB

International (Air, I.C.A.O.)

Proper Shipping Name: CHROMIUM TRIOXIDE, ANHYDROUS
Hazard Class: 5.1, 6.1, 8
UN/NA: UN1463

SYSTEM, LIVER, KIDNEYS, EYES, SKIN AND BLOOD. MAY CAUSE ALLERGIC REACTION. CANCER HAZARD. CAN CAUSE CANCER. Risk of cancer depends on duration and level of exposure.

Label Precautions:

Keep from contact with clothing and other combustible materials.
Do not get in eyes, on skin, or on clothing.
Do not breathe dust or mist from solutions.
Store in a tightly closed container.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Do not store near combustible materials.

Label First Aid:

In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. In all cases get medical attention immediately.

Product Use:

Laboratory Reagent.

Revision Information:

MSDS Section(s) changed since last revision of document include: 14, 15.

Disclaimer:

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Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

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Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. VAPOR IRRITATING TO EYES AND RESPIRATORY TRACT. INHALATION MAY CAUSE LUNG AND TOOTH DAMAGE.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe
Flammability Rating: 0 - None
Reactivity Rating: 1 - Slight
Contact Rating: 3 - Severe (Corrosive)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: White (Corrosive)

Potential Health Effects

Nitric acid is extremely hazardous; it is corrosive, reactive, an oxidizer, and a poison. The health effects from exposure to diluted forms of this chemical are not well documented. They are expected to be less severe than those for concentrated forms which are referenced in the descriptions below.

Inhalation:
Corrosive! Inhalation of vapors can cause breathing difficulties and lead to pneumonia and pulmonary edema, which may be fatal. Other symptoms may include coughing, choking, and irritation of the nose, throat, and respiratory tract.
Ingestion:
Corrosive! Swallowing nitric acid can cause immediate pain and burns of the mouth, throat, esophagus and gastrointestinal tract.
Skin Contact:
Corrosive! Can cause redness, pain, and severe skin burns. Concentrated solutions cause deep ulcers and stain skin a yellow or yellow-brown color.
Eye Contact:
Corrosive! Vapors are irritating and may cause damage to the eyes. Contact may cause severe burns and permanent eye damage.
Chronic Exposure:
Long-term exposure to concentrated vapors may cause erosion of teeth and lung damage. Long-term exposures seldom occur due to the corrosive properties of the acid.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders, eye disease, or cardiopulmonary diseases may be more susceptible to the effects of this substance.

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4. First Aid Measures

Immediate first aid treatment reduces the health effects of this substance.
Inhalation:

7. Handling and Storage

Store in a cool, dry, ventilated storage area with acid resistant floors and good drainage. Protect from physical damage. Keep out of direct sunlight and away from heat, water, and incompatible materials. Do not wash out container and use it for other purposes. When diluting, the acid should always be added slowly to water and in small amounts. Never use hot water and never add water to the acid. Water added to acid can cause uncontrolled boiling and splashing. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
For Nitric Acid:
OSHA Permissible Exposure Limit (PEL):
2 ppm (TWA)
ACGIH Threshold Limit Value (TLV):
2 ppm (TWA); 4 ppm (STEL)

For Soluble Barium Compounds:
OSHA Permissible Exposure Limit (PEL):
0.5 mg (Ba)/m3
ACGIH Threshold Limit Value (TLV):
0.5 mg (Ba)/m3 A4 - not classifiable as a human carcinogen

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. Canister-type respirators using sorbents are ineffective.
Skin Protection:
Rubber or neoprene gloves and additional protection including impervious boots, apron, or coveralls, as needed in areas of unusual exposure to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Barium Nitrate (10022-31-8)	No	No	None
Nitric Acid (7697-37-2)	No	No	None
Water (7732-18-5)	No	No	None

12. Ecological Information

Environmental Fate:
No information found.
Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (NITRIC ACID)
Hazard Class: 8
UN/NA: UN3264
Packing Group: III
Information reported for product/size: 150ML

International (Water, I.M.O.)

Proper Shipping Name: CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (NITRIC ACID)
Hazard Class: 8
UN/NA: UN3264
Packing Group: III
Information reported for product/size: 150ML

International (Air, I.C.A.O.)

16. Other Information

NFPA Ratings: Health: **3** Flammability: **0** Reactivity: **0**
Label Hazard Warning:
DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. VAPOR IRRITATING TO EYES AND RESPIRATORY TRACT. INHALATION MAY CAUSE LUNG AND TOOTH DAMAGE.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Do not breathe vapor or mist.
Use only with adequate ventilation.
Wash thoroughly after handling.
Keep container closed.
Label First Aid:
In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In all cases get medical attention immediately.
Product Use:
Industrial chemical.
Revision Information:
No Changes.
Disclaimer:
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****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. VAPOR IRRITATING TO EYES AND RESPIRATORY TRACT. INHALATION MAY CAUSE LUNG AND TOOTH DAMAGE.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe
Flammability Rating: 0 - None
Reactivity Rating: 1 - Slight
Contact Rating: 3 - Severe (Corrosive)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: White (Corrosive)

Potential Health Effects

The following hazards are for concentrated solutions. Hazards of less concentrated solutions may be reduced. Degree of hazard for reduced concentrations is not currently addressed in the available literature.

Inhalation:
Corrosive! Inhalation of vapors can cause coughing, choking, inflammation of the nose, throat, and upper respiratory tract, and in severe cases, pulmonary edema, circulatory failure, and death.
Ingestion:
Corrosive! Swallowing can cause immediate pain and burns of the mouth, throat, esophagus and gastrointestinal tract. May cause nausea, vomiting, and diarrhea, and in severe cases, death.
Skin Contact:
Corrosive! Can cause redness, pain, and severe skin burns. Concentrated solutions cause deep ulcers and stain skin a yellow or yellow-brown color. May cause allergic skin reactions.
Eye Contact:
Corrosive! Vapors are irritating and may cause damage to the eyes. Contact may cause severe burns and permanent eye damage.
Chronic Exposure:
Long-term exposure to concentrated vapors may cause erosion of teeth and lung damage. Long-term exposures seldom occur due to the corrosive properties of the acid. Repeated or prolonged exposure may cause lung damage, repsiratory tract sensitization or skin sensitization.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders, eye disease, or cardiopulmonary diseases may be more susceptible to the effects of this substance.

4. First Aid Measures

7. Handling and Storage

Store in a cool, dry, ventilated storage area with acid resistant floors and good drainage. Protect from physical damage. Keep out of direct sunlight and away from heat, water, and incompatible materials. Do not wash out container and use it for other purposes. When diluting, the acid should always be added slowly to water and in small amounts. Never use hot water and never add water to the acid. Water added to acid can cause uncontrolled boiling and splashing. When opening metal containers, use non-sparking tools because of the possibility of hydrogen gas being present. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
For Nitric Acid:
OSHA Permissible Exposure Limit (PEL):
2 ppm (TWA)
ACGIH Threshold Limit Value (TLV):
2 ppm (TWA); 4 ppm (STEL)

For Vanadium Pentoxide:
OSHA Permissible Exposure Limit (PEL):
Vanadium Respirable Dust, as V2O5, 0.5 mg/m3 (Ceiling)
Vanadium Fume, as V2O5, 0.1 mg/m3 (Ceiling)

ACGIH Threshold Limit Value (TLV):
Vanadium Pentoxide as V, 0.05 mg/m3 (TWA) Inhalable fraction, A3, Confirmed animal carcinogen with unknown relevance to humans.

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):
Nitric Acid Component: If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. Canister-type respirators using sorbents are ineffective. For Vanadium Pentoxide: If the exposure limit is exceeded, a half-face dust/mist respirator may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece dust/mist respirator may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency, or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known,

turpentine, and combustible organics.
Conditions to Avoid:
Heat and incompatibles.

11. Toxicological Information

Toxicological Data:
For Nitric Acid: Investigated as a mutagen and reproductive effector.

For Vanadium Pentoxide Dust: Oral rat LD50: 10 mg/kg. Investigated as a mutagen, reproductive effector.
Reproductive Toxicity:
Has shown teratogenic effects in laboratory animals.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Vanadium Pentoxide (1314-62-1)	No	No	None
Nitric Acid (7697-37-2)	No	No	None
Water (7732-18-5)	No	No	None

12. Ecological Information

Environmental Fate:
No information found.
Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Vanadium Pentoxide (1314-62-1)	1000	P120	No
Nitric Acid (7697-37-2)	1000	No	No
Water (7732-18-5)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Mixture / Liquid)

WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: None allocated.
Poison Schedule: S5
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

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16. Other Information

NFPA Ratings: Health: **3** Flammability: **0** Reactivity: **0**
Label Hazard Warning:
DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. VAPOR IRRITATING TO EYES AND RESPIRATORY TRACT. INHALATION MAY CAUSE LUNG AND TOOTH DAMAGE.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Do not breathe vapor or mist.
Use only with adequate ventilation.
Wash thoroughly after handling.
Keep container closed.
Label First Aid:
In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. In all cases get medical attention immediately.
Product Use:
Laboratory Reagent.
Revision Information:
MSDS Section(s) changed since last revision of document include: 8.
Disclaimer:
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ENVIRONMENTAL RESOURCE ASSOC -- 570, TOTAL PETROLEUM HYDROCARBONS (TPH) IN (SUPDAT) -- 6665-00N072167

========== Product Identification ==========

Product ID:570, TOTAL PETROLEUM HYDROCARBONS (TPH) IN (SUPDAT)
MSDS Date:06/10/1994
FSC:6665
NIIN:00N072167
MSDS Number: CBPZJ
=== Responsible Party ===
Company Name:ENVIRONMENTAL RESOURCE ASSOC
Address:5540 MARSHALL ST
City:ARVADA
State:CO
ZIP:80002
Country:US
Info Phone Num:303-431-8454
Emergency Phone Num:303-431-8454
CAGE:1R664
=== Contractor Identification ===
Company Name:ENVIRONMENTAL RESOURCE ASSOCIATES
Address:5540 MARSHALL STREET
Box:City:ARVADA
State:CO
ZIP:80002
Country:US
Phone:303-431-8454
CAGE:1R664

========== Composition/Information on Ingredients ==========

Ingred Name:PETROLEUM HYDROCARBONS; (IN SOIL) (>98% SOIL + <1%
PETROLEUM HYDROCARBONS)
Fraction by Wt: <1%
OSHA PEL:5 MG/M3 (OIL MIST)
ACGIH TLV:5 MG/M3 (OIL MIST)

========== Hazards Identification ==========

LD50 LC50 Mixture:NONE SPECIFIED BY MANUFACTURER.
Routes of Entry: Inhalation:YES Skin:YES Ingestion:YES
Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
Health Hazards Acute and Chronic:NO SIGNIFICANT HAZARD TO HUMAN HEALTH.
MINOR IRRITATION IS POSSIBLE IF EYE EXPOSED TO DUST.
Explanation of Carcinogenicity:NOT RELEVANT
Effects of Overexposure:SEE HEALTH HAZARDS.
Medical Cond Aggravated by Exposure:NONE.

========== First Aid Measures ==========

First Aid:INHAL: REMOVE TO FRESH AIR. SUPPORT BREATHING (GIVE
OXYGEN/ARTIFICIAL RESPIRATION) . EYES: FLUSH WITH WATER FOR AT
LEAST 15 MINUTES. SKIN: FLUSH WITH WATER. INGEST: INDUCE VOMITING
FOR LARGE ING ESTIONS ONLY.

========== Fire Fighting Measures ==========

Flash Point:NOT IGNITABLE

Material Safety Data Sheet

Benzo[a]pyrene, 98%

ACC# 37175

Section 1 - Chemical Product and Company Identification

MSDS Name: Benzo[a]pyrene, 98%
Catalog Numbers: AC105600000, AC105600010, AC105601000, AC377200000, AC377200010, AC377201000 AC377201000
Synonyms: 3,4-Benzopyrene; 3,4-Benzpyrene; Benzo[def]chrysene.
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
50-32-8	Benzo[a]pyrene	>96	200-028-5

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: yellow to brown powder.
Danger! May cause harm to the unborn child. May impair fertility. May cause eye, skin, and respiratory tract irritation. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Cancer hazard. May cause allergic skin reaction. May cause heritable genetic damage.
Target Organs: Reproductive system, skin.

Potential Health Effects
Eye: May cause eye irritation.
Skin: May cause skin irritation. May be harmful if absorbed through the skin. May cause an allergic reaction in certain individuals.
Ingestion: May cause irritation of the digestive tract. The toxicological properties of this substance have not been fully investigated. May be harmful if swallowed.
Inhalation: May cause respiratory tract irritation. The toxicological properties of this substance have not been fully investigated. May be harmful if inhaled.
Chronic: May cause cancer in humans. May cause reproductive and fetal effects. Laboratory experiments have resulted in mutagenic effects.

Section 4 - First Aid Measures

Benzo[a]pyrene	0.2 mg/m3 TWA (as benzene soluble aerosol) (listed under Coal tar pitches).	0.1 mg/m3 TWA (cyclohexane-extractable fraction) (listed under Coal tar pitches).80 mg/m3 IDLH (listed under Coal tar pitches).	0.2 mg/m3 TWA (as benzene soluble fraction) (listed under Coal tar pitches).

OSHA Vacated PELs: Benzo[a]pyrene: No OSHA Vacated PELs are listed for this chemical.
Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Powder
Appearance: yellow to brown
Odor: faint aromatic odor
pH: Not available.
Vapor Pressure: Not available.
Vapor Density: Not available.
Evaporation Rate: Not available.
Viscosity: Not available.
Boiling Point: 495 deg C @ 760 mm Hg
Freezing/Melting Point:175 - 179 deg C
Decomposition Temperature: Not available.
Solubility: 1.60x10-3 mg/l @25°C
Specific Gravity/Density: Not available.
Molecular Formula:C20H12
Molecular Weight:252.31

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Dust generation.
Incompatibilities with Other Materials: Strong oxidizing agents.
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 50-32-8: DJ3675000
LD50/LC50:

CAS# 50-32-8 is listed on the TSCA inventory.

Health & Safety Reporting List

None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

Section 12b

None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

CAS# 50-32-8: 1 lb final RQ; 0.454 kg final RQ

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 50-32-8: immediate, delayed.

Section 313

This material contains Benzo[a]pyrene (CAS# 50-32-8, >96%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR

Clean Air Act:

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
CAS# 50-32-8 is listed as a Priority Pollutant under the Clean Water Act.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 50-32-8 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:

WARNING: This product contains Benzo[a]pyrene, a chemical known to the state of California to cause cancer.

California No Significant Risk Level: CAS# 50-32-8: 0.06 æg/day NSRL

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

T N

Risk Phrases:

R 43 May cause sensitization by skin contact.
R 45 May cause cancer.
R 46 May cause heritable genetic damage.
R 60 May impair fertility.
R 61 May cause harm to the unborn child.
R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

OCCUPATIONAL HEALTH SERVICES INC -- ALPHA-CHLORDANE OHS00776 -- 6810-00N072391

========== Product Identification ==========

Product ID:ALPHA-CHLORDANE OHS00776
MSDS Date:12/03/1990
FSC:6810
NIIN:00N072391
MSDS Number: CDWTF
=== Responsible Party ===
Company Name:OCCUPATIONAL HEALTH SERVICES INC
Address:11 WEST 42ND ST 12 FLOOR
City:NEW YORK
State:NY
ZIP:10036
Country:US
Info Phone Num:800-445-3737;212-789-3535
Emergency Phone Num:615-366-2000
CAGE:DO501
=== Contractor Identification ===
Company Name:OCCUPATIONAL HEA & SAFETY,FORD MOTOR CO
Address:900 PARKLANE TOWERS WEST
City:DEARBORNE
State:MI
ZIP:48126
Phone:800-959-3673
CAGE:DO501
Company Name:OCCUPATIONAL HEALTH SERVICES INC
Address:11 W 42ND ST 12 THE FLOOR
City:NEW YORK
State:NY
ZIP:10036
Country:US
Phone:212-789-3535
CAGE:0G9K0

========== Composition/Information on Ingredients ==========

Ingred Name:4,7-METHANOINDAN, 1-ALPHA, 2-ALPHA, 4-BETA, 5,6,7 -BETA,
8,8-OCTACHLORO-3A-ALPHA 4,7,7A-ALPHA- TETRAHYDRO-; (ING 2)
CAS:5103-71-9
RTECS #:PB9705000
Fraction by Wt: 100%
OSHA PEL:N/K
ACGIH TLV:N/K

Ingred Name:ING 1:(ALPHA - CHLORDANE)
RTECS #:9999999ZZ

Ingred Name:SUPDAT:LT HEAD, NAUS, COUGH, CHEST COMPLAINTS, TREMORS,
ARTHRALGIAS, FATG, THROMBOCYTOPENIC PURPURA, & MARKED (ING 4)
RTECS #:9999999ZZ

Ingred Name:ING 3:BRUISING, PANCYTOPENIA, APLASTIC, HEMOLYTIC, &
MEGALOBLASTIC ANEMIAS, LEUKEMIA, & DEATH HAVE ALSO BEEN (ING 5)
RTECS #:9999999ZZ

Ingred Name:ING 4:RPTD. SKIN:RPTD CONT CAUSED EPISODES OF PARESTHESIA,

RESPIRATOR WITH A HALF-MASK & OPERATED IN A PRESS-DEMAND (ING 21)
RTECS #:9999999ZZ

Ingred Name:ING 20:OR OTHER POSITIVE PRESS MODE. ESCAPE-ANY AIR-PURIFYING FULL FACEPIECE RESP (GAS MASK) W/CHIN-STYLE/FRONT (ING 22)
RTECS #:9999999ZZ

Ingred Name:ING 21:OR BACK-MOUNTED ORGANIC VAPOR CANISTER HAVING HIGH-EFFICIENCY PARTICULATE FILTER. ANY APPROP ESCAPE-TYPE (ING 23)
RTECS #:9999999ZZ

Ingred Name:ING 22:SELF-CONTAINED BREATHING APPARATUS.
RTECS #:9999999ZZ

========== Hazards Identification ==========

LD50 LC50 Mixture:LD50:(ORAL,RAT) 500 MG/KG
Routes of Entry: Inhalation:YES Skin:YES Ingestion:YES
Reports of Carcinogenicity:NTP:NO IARC:YES OSHA:NO
Health Hazards Acute and Chronic:ACUTE:INHAL:SYMPS OF BLURRED VISION, COUGH, CONFUSN, ATAXIA, HDCH, WEAK, DIZZ, & DELIRIUM WERE RPTD FROM INHAL EXPOS TO CHLORDANE. SYMPS OF CNS STIMULATION MAY ALSO OCCUR AS DETAILED IN ACUTE INGEST. SKIN:MAY BE IRRITATING. ABSORP HAS CAUSED BLURRED VISION, CONFUSN, ATAXIA, HDCH, DIZZ, WEAK, & DELIRIUM(EFTS OF OVEREXP)
Explanation of Carcinogenicity:ALPHA-CHLORDANE:IARC MONO ON THE EVAL OF CARCIN RISK OF CHEM TO MAN, VOL 53, PG 115, 1991:GROUP 2B.
Effects of Overexposure:HLTH HAZ:IN SEV POISONING. CONVLS MAY DEVELOP & COMA & DEATH ARE POSS. EYE:MAY BE IRRITATING. INGEST:MAY CAUSE ABDOM PAIN, NAUS, VOMIT, & DIARR. STIMULATES CNS W/CONVLS SOMETIMES APPEARING AS FIRST SY MP OF POISONING. SYMPS OF HDCH, BLURREDVISION, HYPEREXCITABILITY, MUSCLE TWITCHING, TREMOR, INCOORDINATION, & (SUPDAT)
Medical Cond Aggravated by Exposure:PERSONS WITH CONVULSIVE DISORDERS ARE AT INCREASED RISK FROM EXPOSURE.

========== First Aid Measures ==========

First Aid:INHAL:REMOVE TO FRESH AIR IMMED. IF BRTHG STOPPED, GIVE ARTF RESP. MAINTAIN AIRWAY & BLOOD PRES & ADMIN OXYG IF AVAIL. KEEP WARM & AT REST. TREAT SYMPTOMATICALLY & SUPPORTIVELY. GET MED ATTN. SKIN:REM OVE CONTAMD CLTHG & SHOES IMMED. WASH AFFECTED AREA W/SOAP DETERGENT & LG AMTS OF WATER UNTIL NO EVID OF CHEM REMAINS (APPROX 15-20 MINS). GET MED ATTN IMMED. EYE:WASH IMMED W/LG AMTS OF WATER(ING 11)

========== Fire Fighting Measures ==========

Extinguishing Media:DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY/REGULAR FOAM. FOR LARGER FIRES, USE WATER SPRAY OR REGULAR FOAM.
Fire Fighting Procedures:NIOSH APPRVD SCBA & FULL PROT EQUIP . MOVE CNTNR FROM FIRE AREA IF CAN BE DONE W/OUT RISK. EXTING USING AGENT SUITABLE FOR TYPE OF SURROUNDING (SUPDAT)
Unusual Fire/Explosion Hazard:NEGLIGIBLE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

========== Accidental Release Measures ==========

Spill Release Procedures:DO NOT TOUCH SPILLED MATL. STOP LEAK IF W/OUT

PROCEDURES FOR DISP & STORAG E OF PESTICIDES & PESTICIDE CONTAINERS.

WARNING! HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. MAY CAUSE ALLERGIC SKIN REACTION. MAY AFFECT LIVER, KIDNEY, BLOOD AND CENTRAL NERVOUS SYSTEM. COMBUSTIBLE.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate
Flammability Rating: 2 - Moderate
Reactivity Rating: 0 - None
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES; LAB COAT
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Inhalation of dust or vapors can cause headache, nausea, vomiting, extensive sweating, and disorientation. The predominant reaction is delayed intravascular hemolysis with symptoms of anemia, fever, jaundice, and kidney or liver damage.
Ingestion:
Toxic. Can cause headache, profuse perspiration, listlessness, dark urine, nausea, vomiting and disorientation. Intravascular hemolysis may also occur with symptoms similar to those noted for inhalation. Severe cases may produce coma with or without convulsions. Death may result from renal failure.
Skin Contact:
Can irritate the skin and, on prolonged contact, may cause rashes and allergy. "Sensitized" individuals may suffer a severe dermatitis.
Eye Contact:
Vapors and solid causes irritation, redness and pain. Very high exposures can damage the nerves of the eye.
Chronic Exposure:
Has led to cataract formation in eyes. May cause skin allergy.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin, blood or vascular disorders or impaired respiratory function may be more susceptible to the effects of the substance. Particularly susceptible individuals are found in the general population, most commonly in dark skinned races.

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4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.
Ingestion:
Give large amounts of water to drink. Never give anything by mouth to an unconscious person. Get medical attention.

product residues (dust, solids); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
- OSHA Permissible Exposure Limit (PEL):
10 ppm, 50 mg/m3.

- ACGIH Threshold Limit Value (TLV):
TWA= 10 ppm, 52 mg/m3
STEL= 15 ppm, 79 mg/m3.

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a half-face respirator with an organic vapor cartridge and particulate filter (NIOSH type P95 or R95 filter) may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece respirator with an organic vapor cartridge and particulate filter (NIOSH P100 or R100 filter) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. Please note that N series filters are not recommended for this material. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
White crystals.

Odor:
Strong coal tar odor (moth balls).

Solubility:
Insoluble in water.

Specific Gravity:
1.2

12. Ecological Information

Environmental Fate:
When released into the soil, this material may biodegrade to a moderate extent. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released to water, this material is expected to quickly evaporate. When released into water, this material may biodegrade to a moderate extent. When released into the water, this material is expected to have a half-life between 1 and 10 days. This material may bioaccumulate to some extent. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life of less than 1 day.
Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: NAPHTHALENE, REFINED
Hazard Class: 4.1
UN/NA: UN1334
Packing Group: III
Information reported for product/size: 1KG

International (Water, I.M.O.)

Proper Shipping Name: NAPHTHALENE, REFINED
Hazard Class: 4.1
UN/NA: UN1334
Packing Group: III
Information reported for product/size: 1KG

International (Air, I.C.A.O.)

REACTION. MAY AFFECT LIVER, KIDNEY, BLOOD AND CENTRAL NERVOUS SYSTEM. COMBUSTIBLE.

Label Precautions:

Avoid contact with eyes, skin and clothing.
Avoid prolonged or repeated contact with skin.
Avoid breathing dust.
Avoid breathing vapor.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Keep away from heat, sparks and flame.

Label First Aid:

In all cases call a physician. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, give large amounts of water to drink. Never give anything by mouth to an unconscious person.

Product Use:

Laboratory Reagent.

Revision Information:

No Changes.

Disclaimer:

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Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

symptoms appear.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. This material in sufficient quantity and reduced particle size is capable of creating a dust explosion.
Extinguishing Media: Use water spray, dry chemical, carbon dioxide, or chemical foam.
Flash Point: 151 deg C (303.80 deg F)
Autoignition Temperature: Not available.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 1; Flammability: 1; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Vacuum or sweep up material and place into a suitable disposal container. Avoid generating dusty conditions. Provide ventilation. Do not let this chemical enter the environment.

Section 7 - Handling and Storage

Handling: Do not let this chemical enter the environment. Use with adequate ventilation. Minimize dust generation and accumulation. Avoid ingestion and inhalation.
Storage: Store in a cool, dry place. Store in a tightly closed container.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Fluorene	none listed	none listed	none listed

OSHA Vacated PELs: Fluorene: No OSHA Vacated PELs are listed for this chemical.
Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if

Ecotoxicity: No data available. Fish toxicity :LC50 (48hr) fathead minnow > 100mg/l (Finger, S.E. et al ASTM Spec. Tech. Publ. 865 1985); LC50 (24hr) bluegill sunfish, goldfish +/-5mg/l (Wood, E.M. The toxicity of 3400 chemicals to fish 1987); LC50 (unspecified exposure) himedaka killifish 3,3mg/l (Niiromi, J. et al Mie-ken Kankyo Kagaku Senta Kenkyu Hokuku 1989) Invertebrate toxicity : EC50 (48hr) Daphnia magna 0,43 mg/l (Finger, S.E. et al ASTM spec. Tech. Publ. 865 1985); LC50 (96hr) Neanthes arenacoedentata 1mg/l (Rossi, S. S. et al Mar. Pollut. Bull. 1978)
Environmental: Terrestrial: Half-life ranges from 2 to 64 days; biodegradation is the primary route of degradation in soil. Aquatic: Will adsorb strongly to sediments and suspended matter. Adsorption into sediment is an important fate process. Atmospheric: Expected to exist primarily in the vapor phase in the ambient atmosphere; will degrade readily in the ambient atmosphere by reaction with photochemically produced hydroxyl radicals (estimated half-life of about 29 hr).
Physical: No information available.
Other: Do not empty into drains.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOL	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOL
Hazard Class:	9	9
UN Number:	UN3077	UN3077
Packing Group:	III	III

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 86-73-7 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs

no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

upper and lower eyelids. Get medical aid imme diately.
Skin: Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.
Ingestion: If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear.
Extinguishing Media: Use foam, dry chemical, or carbon dioxide.
Flash Point: 210 deg C (410.00 deg F)
Autoignition Temperature: Not available.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 1; Flammability: 1; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Clean up spills immediately, observing precautions in the Protective Equipment section. Sweep up, then place into a suitable container for disposal. Avoid generating dusty conditions. Do not let this chemical enter the environment.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Use with adequate ventilation. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Avoid ingestion and inhalation.
Storage: Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use adequate ventilation to keep airborne concentrations low.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Pyrene	0.2 mg/m3 TWA (as benzene soluble aerosol) (listed under Coal tar pitches).	0.1 mg/m3 TWA (cyclohexane-extractable fraction) (listed under Coal tar pitches).80 mg/m3 IDLH (listed under Coal tar	0.2 mg/m3 TWA (benzene soluble fraction) (listed under Coal tar pitches).

Inhalation, rat: LC50 = 170 mg/m3;
Oral, mouse: LD50 = 800 mg/kg;
Oral, rat: LD50 = 2700 mg/kg;

Carcinogenicity:
CAS# 129-00-0:

- **ACGIH:** A1 - Confirmed Human Carcinogen (listed as 'Coal tar pitches').
- **California:** Not listed.
- **NTP:** Known carcinogen (listed as Coal tar pitches).
- **IARC:** Group 1 carcinogen (listed as Coal tar pitches).

Epidemiology: No information found
Teratogenicity: TDLo(skin, mouse) =10 gm/kg/3W-I; Skin and Appendages - tumors
Reproductive Effects: No information found
Mutagenicity: Mutation in microorganisms(Salmonella typhimurium)= 5 ug/plateUnscheduled DNA synthesis(Human Fibroblast)= 100 mg/LSister chromatid exchange(Human Lymphocyte) = 100 umol/L
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: Water flea Daphnia: EC50 = 1.8 mg/L; 48 Hr.; Unspecified No data available.
Environmental: If pyrene is released to soil, it will be expected to adsorb very strongly to the soil and will not be expected to leach to the groundwater. If released to water, pyrene will be expected to adsorb very strongly to sediments and particulate matter. It will not hydrolyze but may undergo slight to moderate bioconcentration.
Physical: No information available.
Other: Reported BCF: rainbow trout, 72); goldfish, 457; fathead minnow, 600-970. Based on these values, minimal to moderate bioconcentration of pyrene in aquatic organisms would be expected.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	Not regulated as a hazardous material	No information available.

WGK (Water Danger/Protection)

CAS# 129-00-0: No information available.

Canada - DSL/NDSL

CAS# 129-00-0 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of D1A, D2A.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 129-00-0 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 6/21/1999
Revision #4 Date: 11/20/2008

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

ATTACHMENT 10

SUBCONTRACTOR'S HEALTH AND SAFETY PLAN

(<u>Instructions to Project Manager and Subcontractor</u>: Please ensure that all subcontractors provide their own site-specific HASP for their portion of the work. This should be attached behind this page so that it blends smoothly with the Stantec portion of the HASP. The subcontractor's HASP must be site-specific and discuss all of the hazards to which their employees may be exposed, and the appropriate means they will follow to avoid the exposure to the extent possible. Stantec's HASP can be used as a guide for developing the subcontractor's HASP, but cannot be used exclusively since the subcontractor's employees may face exposures and risks not covered by the Stantec HASP.

Subcontractors must understand that our team goal is zero incidents of all types. If the subcontractor has any questions, he/she may contact Philip Platcow, Stantec's Director of Health Safety and Environment at (617) 232-7355 for guidance and direction. Cooperation on this requirement is greatly appreciated.)

ATTACHMENT 11

DAILY PRODUCTION HEALTH & SAFETY BRIEFING

ATTACHMENT 11

DAILY PRODUCTION HEALTH AND SAFETY BRIEFING LOG

Date:	
Start Time:	
Issues Discussed:	
1.	**6.**
2.	**7.**
3.	**8.**
4.	**9.**
5.	**10.**
Attendees	
Print Name and Company	**Signature**
Meeting Conducted by:	**Signature:**
Name (Site Health and Safety Coordinator):	**Signature:**

ATTACHMENT 11

DAILY PRODUCTION HEALTH AND SAFETY BRIEFING LOG

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Issues Discussed:	
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5.	**10.**
Attendees	
Print Name and Company	**Signature**
Meeting Conducted by:	**Signature:**
Name (Site Health and Safety Coordinator):	**Signature:**

Attachment 11

DISCUSSION IDEAS FOR THE DAILY PRODUCTION H&S MEETING

- Emergency response plan, emergency vehicle (full of fuel) and muster point
- Route to medical aid (hospital or other facility)
- Work hours, is night work planned?
- Hand signals around heavy equipment
- Traffic control
- Pertinent Legislation and Regulations
- Above and below ground utilities (energized or de-energized)
- Material Safety Data Sheets (MSDS)
- To who, what, why, and when to report an incident
- Fire extinguisher and first aid kit locations
- Excavations, trenching sloping and shoring
- Personal protective equipment (PPE) and training
- Safety equipment and training
- Emergency telephone and telephone numbers (may not be 911)
- Eye wash stations and washroom locations
- Energy lock-out/tag-out procedures. Location of “kill Switches” etc.
- Weather restrictions
- Site security. Site hazards. Is special waste present?
- Traffic and people movements
- Working around machinery (both static and mobile)
- Sources of ignition, static electricity etc.
- Stings, bites, large animals and other naturally related injuries
- Working above grade
- Working at isolated sites
- Decontamination procedures (both personnel and equipment)
- Falls, trips, sprains and lifting injuries (how to prevent)
- Right to refuse unsafe work
- Adjacent property issues (residence, business, school, day care center)

ATTACHMENT 12

HEALTH AND SAFETY PLAN
ACKNOWLEDGMENT AND AGREEMENT FORM

ATTACHMENT 12
HEALTH AND SAFETY PLAN ACKNOWLEDGMENT AND AGREEMENT FORM
(All Stantec and subcontractor personnel must sign.)

"Zero Tolerance for Incident of ANY Kind. Work Together to Ensure A SAFE and High Quality Project

This Health and Safety Plan has been developed for the purpose of informing Stantec employees of the hazards they are likely to encounter on the project site, and the precautions they should take to avoid those hazards. Sub-contractors and other contractors at the site must develop their own Health and Safety Plan to address the hazards faced by their own employees. Stantec has provided a copy of this Plan to contractors in the interest of full disclosure of hazards of which we may be aware, and to satisfy Stantec's responsibilities under the Occupational Safety and Health Administration (OSHA) Hazard Communication standard. Similarly, contractors are required to inform Stantec of any hazards of which they are aware or that the contractor's work on site might possibly pose to Stantec employees, including (but not limited to) the Material Safety Data Sheets for chemicals the contractor may bring on-site. This plan should NOT be understood by contractors to provide information on all of the hazards to which a contractor's employees may be exposed as a result of their work.

I further certify that I have received training and medical surveillance according to the Health and Safety Plan and the OSHA Standard on Hazardous Waste Operations and Emergency Response (29 CFR 1910.120):

All parties conducting site activities are required to coordinate their activities and practices with the project Site Health and Safety Officer. Your signature below confirms that you have read and understand the hazards discussed in this Plan, and understand that sub-contractors and contractors must develop their own Health and Safety Plan for their employees. You also understand you could be prohibited by the Site Health and Safety Officer or other Stantec personnel from working on this project for not complying with any aspect of this Health and Safety Plan.

Name	Title	Signature	Company	Date

Name	Title	Signature	Company	Date

ATTACHMENT 13

HASP MODIFICATION LOG

ATTACHMENT 13
HASP MODIFICATION LOG

HASP SECTION	DESCRIPTION OF REVISION	REVISION DATE	APPROVED BY

SAMPLING AND ANALYSIS PLAN

Proposed Lodi Energy Center Site
12745 N. Thornton Road
Lodi, California 95240

Prepared For:
Mr. Charles E. Swimley
Public Works Department
City of Lodi
1331 South Ham Lane
Lodi, California 95242

Submitted By:
Stantec Consulting Corporation
3017 Kilgore Road Suite 100
Rancho Cordova, California 95670

August 13, 2009
185702098

SAMPLING AND ANALYSIS PLAN
Proposed Lodi Energy Center Site
Lodi, California

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SAMPLING AND ANALYSIS PLAN
Proposed Lodi Energy Center Site
Lodi, California

1.0 INTRODUCTION

Stantec Consulting Corporation (Stantec), on behalf the City of Lodi (City), presents this Sampling and Analysis Plan (SAP) for the proposed Lodi Energy Center (LEC) (Site; Figures 1 and 2 of the Workplan). This SAP is submitted as supportive documentation to Stantec's Preliminary Endangerment Assessment (PEA) Workplan dated August 6, 2009. This document is intended to describe the sampling and analytical protocols for the PEA activities.

The Northern California Power Agency (NCPA) is proposing to construct on City of Lodi property a natural gas-fired electrical power generation facility (LEC) on a 4.4 acre portion (Site) of San Joaquin County APN 055-130-16 in Lodi, California. Environmental review of this proposed facility by NCPA identified impacts to soil during a recently completed environmental site assessment. The lead agency, California Energy Commission (CEC) subsequently requested additional assessment of the Site under California Department of Toxic Substances Control (DTSC) oversight. Therefore, this SAP has been prepared as part of DTSC requirements for completion of a PEA.

1.1 REGULATORY GUIDANCE

The sampling and analytical protocols included in this SAP were developed in general accordance with the following regulatory guidance documents:

- DTSC Preliminary Endangerment Assessment Guidance Manual, June 1999;
- DTSC Guidance Document for the Implementation of USEPA Method 5035; Methodologies for Collection, Preservation, Storage and Preparation of Soils to be Analyzed for VOCs, November 2004;
- USEPA Quality Assurance Guidance for Conducting Brownfields Site Assessments, September 1998;
- Chapter 9 of SW-846 Update III; and
- ASTM D-2488.

1.2 DOCUMENT ORGANIZATION

This SAP is divided into five sections, which include:

1) Site Description and Background [Section 2.0];
2) Sampling Programs [Section 3.0];
3) Sampling Protocol and Procedures [Section 4.0]; and
4) Sample Analysis Plan [Section 5.0].

The sampling and analytical protocols outlined in this SAP will be followed in conjunction with the procedures outlined in the Quality Assurance Project Plan (QAPP), as appended to the Workplan. Project management, quality assurance/quality control (QA/QC), and data management issues and procedures are discussed in the QAPP. The QAPP describes the

procedures by which the accuracy and validity of all project tasks will be maintained and applies to the collection, identification, preservation, transport, and chemical and physical analysis of soil and groundwater samples.

2.0 SITE DESCRIPTION AND BACKGROUND

The Northern California Power Agency (NCPA) is proposing to construct on City of Lodi property a natural gas-fired electrical power generation facility (LEC) on a 4.4 acre portion (Site) of San Joaquin County APN 055-130-16 in Lodi, California. NCPA contracted Carlton Engineering Inc. (Carlton) to perform a Phase I Environmental Site Assessment (ESA) at the Site. The June 30, 2008 ESA did not identify any recognized environmental conditions (ASTM 1527) at the Site, but did identify several potential environmental concerns (PECs).

Based on the ESA results, the CEC requested that NCPA conduct field sampling and soil analyses to adequately characterize the presence of harmful chemicals at the Site and discuss potential risks to construction or plant personnel from these chemicals. In compliance, NCPA directed CH2M HILL to perform a limited Phase II Environmental Site Assessment (Phase II ESA) to obtain data to comply with the CEC request. On February 2, 2009, CH2M HILL performed preliminary soil sampling and subsequent analyses to provide data associated with the PECs identified by the Carlton ESA. CH2M HILL summarized the data and compared it to various agency soil screening levels in a preliminary evaluation of risk to human health in the February 26, 2009 Memorandum titled *NCPA Lodi Preliminary Phase II ESA Sample Results*. CH2M HILL concluded that exposure of construction workers and onsite industrial workers to surface and subsurface soils may adversely affect human health.

Based on the Phase II ESA results, the CEC requested that additional investigation and evaluation of risk be conducted under DTSC oversight.

3.0 SAMPLING PROGRAMS

The following sections describe the types of samples that will be collected at the Site, and the applicable sample collection methods. The total number of samples collected per day at the Site will be recorded on a **Sample Collection Log** (Form 1). The specific procedures for sample collection are described in Section 4.0.

3.1 SOIL SAMPLING

Depth-discrete soil samples will be collected from each proposed soil boring location (locations 8 through 27), and four proposed off-site background sampling locations at the time of drilling. Soil samples will be collected directly from an Impact Sampler (i.e., a slide hammer) or the barrel of a continuous core acetate liner through the total depth of each soil boring. Soil samples will be collected in stainless steel/brass sleeves, or acetate liners for non-volatile constituents; and will be collected using EPA Method 5035 collection methodologies for volatile constituents. An experienced Stantec geologist or environmental scientist working under the supervision of a California Professional Geologist will conduct the soil sampling. The results of the soil sampling will be documented on a **Field Drill Log** (Form 2).

Field screening will be done at each depth where a soil sample is collected and selected for laboratory analysis. Screening will be performed at the same time as, or immediately following, collection of the soil samples. Each soil sample collected will be recorded on the **Sample Collection Log** (Form 1), which includes documentation of field screening results.

3.2 GROUNDWATER SAMPLING

One groundwater sample will be collected from an existing on-site groundwater monitoring well WSM-3. An experienced Stantec geologist or environmental scientist working under the supervision of a California Professional Geologist will conduct the groundwater sampling activities. The groundwater purging and sampling will be documented on a **Groundwater Sample Collection Log** (Form 3).

4.0 SAMPLING PROTOCOL AND PROCEDURES

4.1 SOIL SAMPLING PROCEDURES

4.1.1 Soil Sample Collection

The soil sampling procedure described herein has been developed to obtain representative lithologic and soil quality information. This sampling procedure will be used during the drilling of soil borings. The procedure provides information on sampling, data recording, and equipment decontamination techniques.

1) Drilling rods and sampling tools (including hand auger and Impact Sampler equipment) will be thoroughly steam cleaned immediately before each boring is started.
2) The borehole location and pertinent data will be recorded on the **Field Drill Log** (Form 2).
3) Each soil boring location will initially be advanced using a hand auger to a depth of 5 ft bgs for utility clearance.
4) Following utility clearance, soil borings will be completed using a direct-push drill rig.
5) Shallow (0.5-1.0-foot and 2-foot bgs) soil samples and supplemental or contingency samples will be collected in stainless steel/brass sleeves using an Impact Sampler/Slide Hammer at the time of utility clearance an initial clearing of the hole to 5 ft bgs. Deeper samples will be collected in two to four-foot acetate liners during continuous coring.
6) Samples will be sealed at the ends with Teflon tape and plastic caps for semi-volatile or non-volatile constituents and by standard 5035 collection methodologies (such as Encore devices) (as specified in SW-846 Method 5035) for volatile constituents.
7) All borings will be completed at the locations specified in the Workplan (Figure 2) to the maximum extent practicable.
8) All borings will be logged by an experienced scientist, geologist, or engineer under the direct supervision of a California Professional Geologist. Boring logs will be reviewed and signed by a California Professional Geologist. At a minimum, the geologic log will include:
    a. Description of soils, conditions (moisture, color, etc.), and classifications per Unified Soil Classification System (USCS) and ASTM D-2488;
    b. Sample depths, in feet;
    c. For driven samples, the length in inches (or percent) of sample recovered;
    d. Vapor readings of samples using Photoionization Detector/Flame Ionization Detector (PID/FID) field headspace-screening methods. The tip of the PID/FID instrument will be inserted into an opening in a Ziploc baggie for direct measurement of organic vapors. PID/FID measurements will be recorded on an **Air Monitoring Log Form** (Form 4).

9) At least two soil samples will be collected from each soil boring. Samples will be selected for analysis as follows:

    a. A near surface (approximately 2 ft bgs) and a deeper soil sample (approximately 6 feet bgs) will be selected for analysis from each sampling location (for a minimum of 2 soil samples per boring).

    b. Four additional shallow soil samples will be collected at a depth of 0.5 to 1.0 foot bgs from four of the soil borings located on the northern portion of the Site. These will be used for characterization and disposal purposes as discussed in the Workplan.

    c. Four background soil borings also will be completed off-site in the vicinity of the previously collected background samples. Samples will be collected in the same manner as on-site locations 8 through 27.

10) Depth-discrete and undisturbed soil samples will be collected, sealed with no headspace, and transported to the testing laboratory for chemical analysis. Soil sample collection/preservation will be in accordance with the following:

    a. <u>Soil Samples Collected from Direct-Push or Impact Sampler (for non-volatile or semi-volatile constituents):</u>

        i. Stainless steel/brass sleeves will be kept at 4-degrees Celsius or less until provided to the analytical laboratory.

        ii. For samples collected in an acetate liner, a section will be cut out of the liner and immediately sealed air tight. Samples will be kept at 4-degrees Celsius or less. Maximum hold time for this method will be 48 hours.

    b. <u>Soil Samples Collected from an Impact or Direct-Push Sampler (for volatile constituents):</u>

        i. A 5035 sample collection device, such as an Encore device or equivalent (as specified in SW-846 Method 5035) will be used to immediately collect 6 aliquots for analysis. The sampling device will be sealed and placed on ice for transport to the analytical laboratory. Maximum holding time for this method will be 48 hours at 4 degrees Celsius. An additional 5 days (for a maximum holding time of 120 hours) are permissible if the Encore device is kept below -4 degrees Celsius.

11) Samples will be collected and submitted in full compliance with chain-of-custody (COC) procedures equivalent to those in Section 9.2.2.7, Chapter 9 of SW-846 Update III. An example of the **COC Record** that will be used is presented in Form 5 attached to this SAP.

4.1.2 Investigation Derived Waste Sampling

The soil sampling procedure described herein has been developed to obtain representative lithologic and soil quality information for profiling purposes and the disposal of investigative derived waste (IDW) generated during the Site PEA activities. The procedure provides information on sampling, data recording, and equipment decontamination techniques.

1) Composite soil samples will be collected using 5035 sampler devices (volatile constituents) and 4 oz. glass jars (non-volatile constituents), sealed and labeled with a date, and unique I.D. The samples will then be transported to the analytical laboratory under chain of custody procedures for chemical analysis. Composite soil sample collection/preservation will be in accordance with the following:

    a. Composite Soil Samples Collected in Encore Sampler Devices (for volatile constituents): A 5035 sample collection device, such as an Encore device or equivalent (as specified in SW-846 Method 5035) will be used to immediately collect 6 aliquots for analysis. The sampling device will be sealed and placed on ice for transport to the analytical laboratory. Maximum holding time for this method will be 48 hours at 4 degrees Celsius. An additional 5 days (for a maximum holding time of 120 hours) are permissible if the Encore device is kept below -4 degrees Celsius.

    b. Composite Soil Samples Collected in 4 oz. Glass Jars (for non-volatile constituents): After collection, the 4 oz. glass jars will be immediately sealed air-tight. Glass jars will be kept at 4-degrees Celsius or less.

2) Samples will be collected and submitted in full compliance with COC procedures equivalent to those in Section 9.2.2.7, Chapter 9 of SW-846 Update III.

4.1.3 Drill Rig and Equipment Decontamination Procedures

The direct-push drill rig, along with all drilling and sampling equipment, will be thoroughly decontaminated before leaving the subcontractors yard and prior to initiation of any drilling activities. Upon completion of this initial and comprehensive decontamination effort, the direct-push drill rig and its equipment will be thoroughly examined to ensure that there are no significant fuel, hydraulic fluid, transmission oil, and/or motor oil leaks that could create a condition not previously in existence or exacerbate an existing condition.

Once the direct-push drill rig and equipment have been thoroughly cleaned and inspected, subsequent decontamination efforts will focus on equipment that contacts the soil or groundwater (if encountered). No petroleum hydrocarbon based lubricants will be allowed on the drill stems or associated connections. Both the initial comprehensive cleaning of the rig and all subsequent decontamination procedures will be performed using a pressurized hot-water cleaner. On-site drilling equipment decontamination will be conducted using a self-contained decontamination trailer that collects all rinsate water for the drill rig. All decontamination fluids will be collected and stored in 55-gallon DOT-approved steel drums and stored at an appropriate location on site until collection and final disposal.

Upon completion of daily drilling activities, between boreholes, and prior to the drilling rigs departure from the site, the direct-push drill rig will be thoroughly decontaminated to ensure that no residual contamination is permitted to leave the Site.

4.2 GROUNDWATER SAMPLING PROCEDURES

A groundwater sample will be collected from existing groundwater monitoring WSM-3 using Stantec's Standard Operating Procedure (SOP) for groundwater sampling (Appendix A):

1) Prior to using any downhole equipment, decontaminate each piece of equipment using a three bucket wash. The first bucket will be comprised of a non-phosphate detergent solution, the second bucket will be clean tap water and the third bucket will be deionized water.

2) The depth to groundwater in the well will be measured using a water level indicator.

3) The total depth of the well will be measured. Based on the measurements and the well diameter, the appropriate volume of groundwater to be purged calculated.

4) A PVC bailer will be used to purge the calculated volume of groundwater from the well. Throughout the purging process, the groundwater parameters of pH, electrical conductivity and temperature were measured. Bailing continued until at least three casing volumes of groundwater and the groundwater parameters stabilized to within 10% of the previous value(s).

5) The depth to groundwater will be again measured prior to sampling. Groundwater samples were collected when the column of groundwater in the well recharged to at least 80% of its original volume or two hours, which ever came first.

6) Using dedicated equipment and materials (twine, sampling gloves, and disposable bailer), a groundwater sample will be collected from the selected well(s). The sampling time and sample appearance will be noted on a Stantec Groundwater Sampling Form.

7) The sample will be transferred to a laboratory-provided and properly labeled VOA.

8) Each sample will be properly identified on a chain-of-custody.

9) The sample(s) were placed in re-sealable plastic bags and stored in an ice-cooled chest for transport to the laboratory for chemical analysis.

10) One laboratory-prepared trip blank accompanied the samples during transportation to the laboratory.

11) Collection of the groundwater sample will be noted on the **Groundwater Sample Collection Log** (Form 3).

12) Groundwater samples will be collected, sealed with no headspace, and transported to the testing laboratory for chemical analysis using the applicable analytical methods. Groundwater samples submitted for Title 22 Metals analysis will be filtered in the field by Stantec personnel using single-use dedicated 0.45 micron filters (separate filter used for each groundwater sample) and sampling vessel. The sampling vessel will be

decontaminated prior to re-use using a three bucket wash. Groundwater sample collection/preservation will be in accordance with the following:

a. Groundwater Samples Collected in VOAs (for volatile constituents): After collection, VOAs will be immediately sealed with no headspace, and labeled and placed on ice for transport to the analytical laboratory. Groundwater samples will be kept at 4-degrees Celsius or less.

b. Groundwater Samples Collected in Glass Amber Jars (for non-volatile constituents): After collection, glass amber jars will be immediately sealed and labeled and placed on ice for transport to the analytical laboratory. Groundwater samples will be kept at 4-degrees Celsius or less.

c. Groundwater Samples Collected in Polyethylene Containers (for metals): After collection, polyethylene containers will be immediately sealed and labeled and placed on ice for transport to the analytical laboratory. Groundwater samples will be kept at 4-degrees Celsius or less.

13) Each groundwater sample collected will be properly identified on a **COC Record** (Form 5).

14) One laboratory-prepared trip blank per cooler shall accompany the samples during transportation to the laboratory.

15) Upon completion of the groundwater sampling activities, all samples will be relinquished to the laboratory for analysis within 48 hours of collection.

4.3 COLLECTION OF SAMPLE DUPLICATES

Collection of sample duplicates will be conducted during the various sampling operations at the Site for quality control purposes. The frequency and protocol for collecting duplicate sample is described in detail in the QAPP.

4.4 SAMPLE CUSTODY

The sample custody program described below will allow for the tracking of possession and handling of individual samples from the time of field collection through laboratory analysis. Sample custody procedures are designed to comply with applicable regulatory requirements for sample control. A copy of the **COC Record** that will be used is presented as Form 5.

4.4.1 Field Custody

Sample containers will be shipped by common carrier (e.g., Federal Express), or courier in sealed coolers to Stantec's office in Rancho Cordova, California, or directly to the Site. This will become a part of the COC record described below. Sample containers will be considered in the custody of the laboratory until the field sampling team receives them.

Sample containers will be labeled at the time of sampling with a sample label containing the information listed below:

- Project number;
- Sampling date and time;
- Sample identification number;
- Preservatives; and
- Initials of sample collector.

An example of a typical **Sample Label** is presented as Form 6.

Sample containers will be filled, labeled, and placed on ice in a cooler. Smaller containers that could submerge in potentially melted ice water will be placed in sealed waterproof bags or foam sample holders for protection.

4.4.2 Chain-of-Custody Record

The COC record is a 3-part carbon copy form that will be used to document the transfer of samples from the sampler to the laboratory. An original and at least one copy of the form are completed for each shipment to the laboratory. The original is placed in a Ziploc, waterproof bag and sent in the cooler with the samples; the copy is retained for the project files. The COC record contains the following information:

- Project identification and location;
- Laboratory identification;
- Sampler(s);
- Sample identity;
- Date of sampling;
- Signature of persons involved in the transfer of the samples, and the date and the time of possession;
- Sample container description;
- Sample analysis request; and
- Sample containing a preservative.

In some cases, an indication of sample characteristics, such as suspected high concentrations, may be made on the COC record. The reason for warning the laboratory of such samples is that instruments, particularly those for organic analyses, can be overloaded by high concentrations, which may result in laboratory down-time or the need for repeat analyses.

The cooler will be sealed with signature seals. An example of a **Custody Seal** is presented in Form 7. A seal will be placed on each side of the cooler, and covered with transparent tape as proof against tampering.

The sampling team is responsible for maintaining custody of the samples until they are delivered to the laboratory or courier, the COC record is signed and dated, and sample custody is formally relinquished. The laboratory is responsible for the sample custody within the laboratory. The containers must be in view at all times, or stored in a secure area restricted to

authorized personnel, or locked to prevent tampering. The samples will be maintained at the proper storage temperature at all times.

5.0 SAMPLE ANALYSIS PLAN

The following analyses of samples will be performed using U.S. Environmental Protection Agency (EPA) Test Methods. The sample container, preservation, and holding times for each test method as well as the practical quantitation limits (PQLs) for each constituent by method are detailed in the QAPP. The PQLs represent goals that the laboratory will strive to meet with all analyses. However, due to potential interferences from non-target compounds in the sample matrix, the laboratory may be required to raise the PQLs to the lowest reasonably achievable PQL to account for matrix interferences.

5.1 LABORATORY ANALYTICAL PARAMETERS

The sampling strategy for the Site is summarized on Table 1. This table includes the proposed laboratory analyses by sample location for the media to be tested.

5.1.1 Soil

A shallow (approximately 2 ft bgs) and a deeper soil sample (approximately 6 feet bgs) will be analyzed from each of the 20 sampling locations, as well as an additional shallow soil sample (0.5 to 1.0 foot bgs) from the four sampling locations in the northern portion of the Site. Additional supplemental or contingency soil samples will be collected from approximately 4 feet bgs, and will be analyzed based on the results of the initial round of analytical results. This will further characterize impacted soils, thereby providing additional analytical data to facilitate minimizing the amount of soil above risk-based levels that needs mitigation. These additional samples will be analyzed for constituents based on the analytical results of the 2- and 6-foot bgs samples.

Soil samples will be analyzed for constituents in accordance with the following analytical methods. At least two soil samples per soil boring (for a total of 42 samples including 5 percent (two) QA/QC samples) will be analyzed with the methods listed below. Additional contingency samples will be analyzed for constituents based on the analytical results of the 2- and 6-foot bgs samples.

- Volatile Organic Compounds (VOCs) by EPA Methods 5035 and 8260B – a spatially representative subset of four 2-foot bgs soil samples from the 20 proposed soil boring locations will be selected based on PID/FID readings.
- Polycyclic Aromatic Hydrocarbons (PAHs) by EPA Method 8270C (GC/MS-SIM) – all proposed soil samples will be selected for analysis.
- Organochlorine Pesticides (OCPs) by EPA Method 8081A – all proposed soil samples will be selected for analysis.
- CAM 17 by EPA Method 6010B, 6020, and 7471A – all proposed soil samples will be selected for analysis.
- Total Petroleum Hydrocarbons (TPH) quantified as gasoline, diesel and motor oil by EPA Method 8260B or 8015M (as appropriate) – all proposed soil samples will be selected for analysis.

In accordance with Section 2.4.2.5 of the PEA Manual, the background samples will be analyzed for PAHs and CAM 17 metals by the above methods.

5.1.2 Groundwater

The one proposed groundwater sample to be collected from WSM-3 will be analyzed for PAHs, OCPs, and CAM 17 metals in accordance with the above methods.

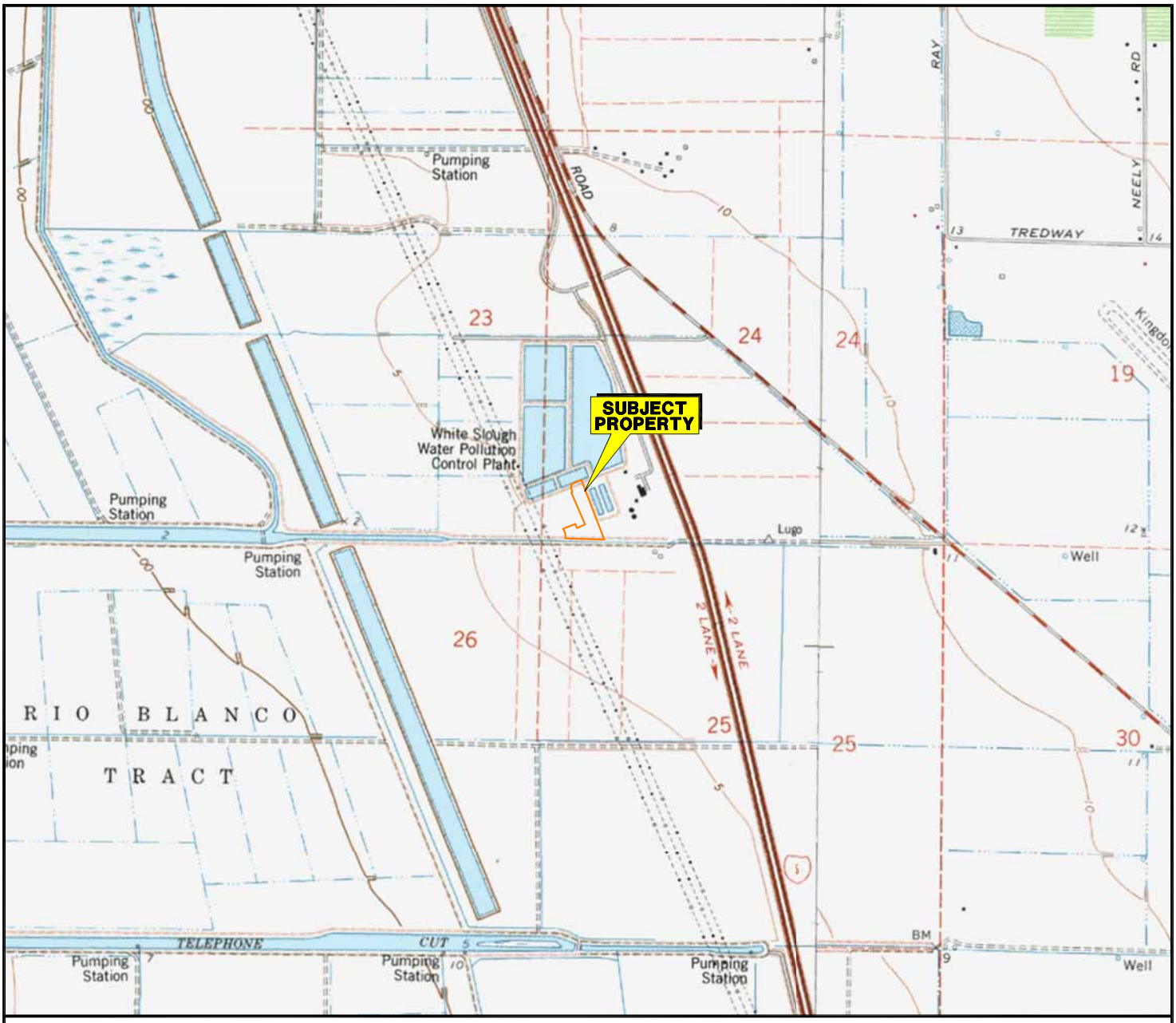
TABLES

TABLE 1
List of Sampling Locations
Proposed Lodi Energy Center Site
12745 N. Thornton Road, Lodi, CA

Sample Location	Location	Drill/Sampling Method*	Soil Sample Depth (ft bgs)**	# Soil Samples Collected	Total Depth (ft bgs)	Groundwater Sample Depth (ft bgs)***	Proposed Lab Analyses****
WSM-3	Existing on-site groundwater monitoring well located on the southeast corner of the Site	n/a	n./a	n/a	n/a	Static level	PAHs, OCPs, CAM 17
8	Northeast corner of Site	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	3	6.5	none	TPH, CAM 17, PAHs, OCPs
9	Northwest corner of Site	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	3	6.5	none	TPH, CAM 17, PAHs, OCPs
10	Northeast Site boundary	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	3	6.5	none	TPH, CAM 17, PAHs, OCPs
11	Northwest Site boundary	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	3	6.5	none	TPH, CAM 17, PAHs, OCPs
12	Northeast Site boundary	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	3	6.5	none	TPH, CAM 17, PAHs, OCPs
13	Central-west portion of Site	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	3	6.5	none	TPH, CAM 17, PAHs, OCPs
14	Central-east portion of Site	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	3	6.5	none	TPH, CAM 17, PAHs, OCPs
15	Central-west portion of Site	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	3	6.5	none	TPH, CAM 17, PAHs, OCPs
16	Central-east portion of Site	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	3	6.5	none	TPH, CAM 17, PAHs, OCPs
17	Central-west portion of Site	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	3	6.5	none	TPH, CAM 17, PAHs, OCPs
18	Central-east portion of Site	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	3	6.5	none	TPH, CAM 17, PAHs, OCPs
19	Southern portion of Site	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	3	6.5	none	TPH, CAM 17, PAHs, OCPs
20	Southeast corner of Site	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	3	6.5	none	TPH, CAM 17, PAHs, OCPs
21	South-central portion of Site	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	3	6.5	none	TPH, CAM 17, PAHs, OCPs
22	South-central portion of Site	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	3	6.5	none	TPH, CAM 17, PAHs, OCPs
23	Southern portion of Site in paved area	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	3	6.5	none	TPH, CAM 17, PAHs, OCPs
24	Southwest corner of site	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	3	6.5	none	TPH, CAM 17, PAHs, OCPs
25	Southern Site boundary	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	3	6.5	none	TPH, CAM 17, PAHs, OCPs
26	Southern Site boundary	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	3	6.5	none	TPH, CAM 17, PAHs, OCPs
27	Southern portion of Site along paved road	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	3	6.5	none	TPH, CAM 17, PAHs, OCPs
BG-4	Background sample location near prior background sample locations BG-1 through BG-3	Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	At least 2	6.5	none	TPH, CAM 17, PAHs, OCPs
BG-5		Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	At least 2	6.5	none	TPH, CAM 17, PAHs, OCPs
BG-6		Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	At least 2	6.5	none	TPH, CAM 17, PAHs, OCPs
BG-7		Direct-push & Slide hammer	Approximately 2 ft bgs, 4 ft bgs, and 6 ft bgs	At least 2	6.5	none	TPH, CAM 17, PAHs, OCPs
QA/QC	Duplicates, Field, trip, and equipment blanks	n/a	n/a	5% total	n/a	none	TPH, CAM 17, PAHs, OCPs

Notes:
* Surface to 5 ft bgs completed using hand auger for utility clearance. Soil samples from above 5 ft bgs to be collected using an Impact Sampler (slide hammer).
** A minimum of 50 soil samples (including 2 QA/QC samples) will be collected. Four shallow soil samples (0.5-1.0 ft bgs) will be collected from the northern soil borings.
*** One groundwater sample will be collected from existing well WSM-3.
**** Four samples from sample numbers 8 through 27 to be selected for VOC analysis at the 2-ft bgs depth.
VOCs = Volatile Organic Compounds by 5035/8260B (full scan and low level)
TPH = Total Petroleum Hydrocarbons quantified as gasoline, diesel, and motor oil by EPA Method 8015M or 8260B (as appropriate).
CAM 17 = Title 22 Metals by EPA Method 6000/7000 Series (groundwater samples to be filtered in the field)
PAHs = Polycyclic Aromatic Hydrocarbons by EPA Method 8270C
OCPs = Organochlorine Pesticides by EPA Method 8081A
ft bgs = feet below ground surface
n/a = not applicable
BG = background sample
S = shallow soil sample

FIGURES



SOURCE: USGS 7.5 MINUTE TOPOGRAPHIC MAPS, TERMINOUS QUADRANGLE, 1978
PHOTOREVISED 1993
LODI SOUTH QUADRANGLE, 1968
PHOTOREVISED 1976

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0 2000 4000

APPROXIMATE SCALE (FEET)

Stantec
290 Conejo Ridge Avenue
Thousand Oaks, CA 91361
(805) 230-1266/230-1277 (Fax)

FOR:		SITE LOCATION MAP	FIGURE:
LODI ENERGY CENTER 12745 North Thornton Road Lodi, CA 95240			1
JOB NUMBER: 185702076	DRAWN BY: R. Roman	CHECKED BY: C. Confar	APPROVED BY: C. Confar	DATE: 08/04/09

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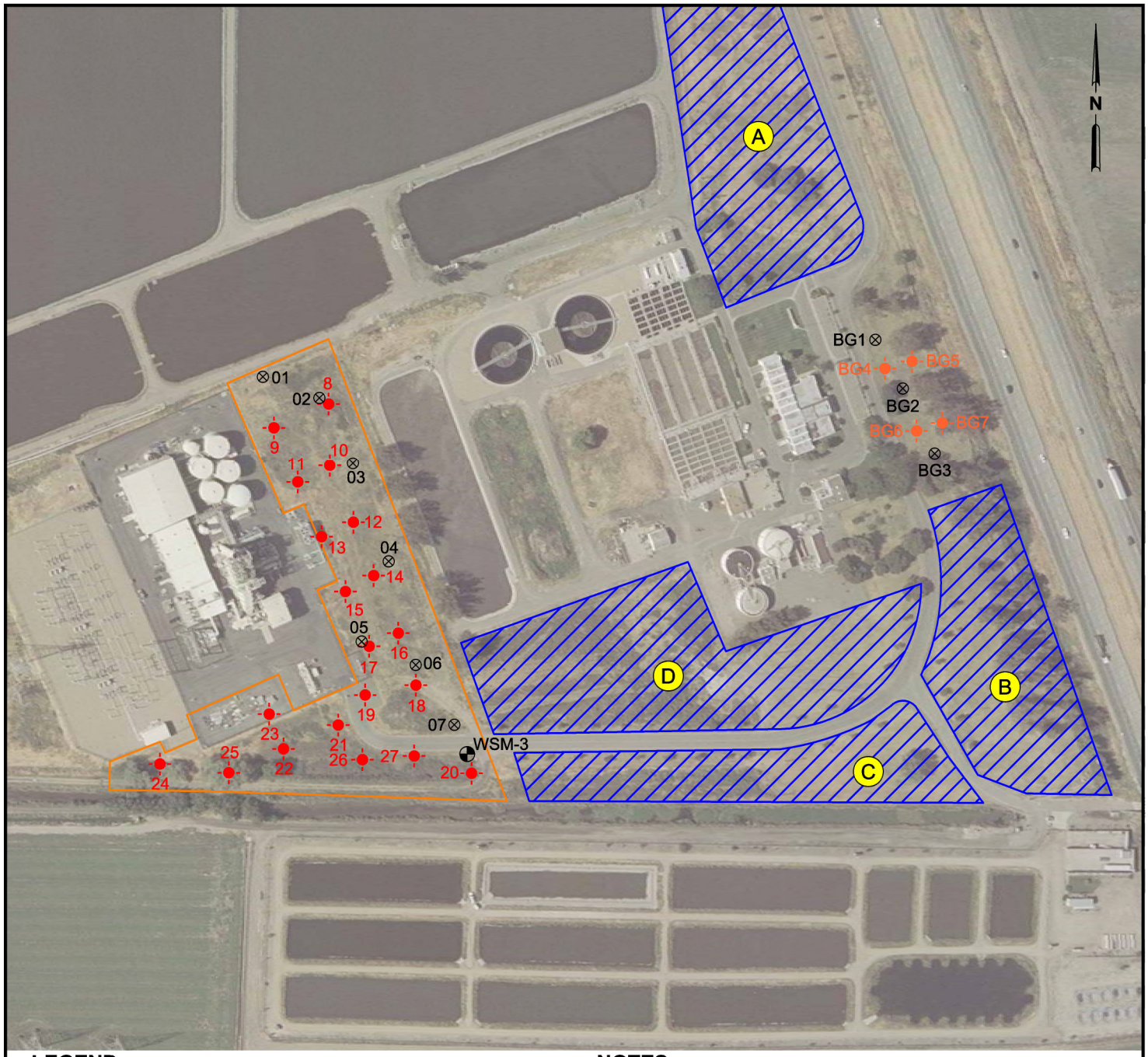

LEGEND

WSM-3	EXISTING GROUNDWATER MONITORING WELL
07 ⊗	PREVIOUS SHALLOW SOIL SAMPLE LOCATIONS (CH2MHILL)
	PROPOSED LAYDOWN AND/OR PARKING AREAS
	PROPOSED PLANT SITE
8	PROPOSED SOIL BORING LOCATIONS (STANTEC)
BG4	PROPOSED BACKGROUND SOIL SAMPLING LOCATIONS

NOTES;

1. MAP REFERENCES; CH2MHILL, SOIL SAMPLINGLOCATIONS, FIGURE 2, DATED FEBRUARY 11, 2009. USGS URBAN AERIAL IMAGE, DATED MARCH 29, 2004.
2. CALIFORNIA STATE PLANES, ZONE 3 (FT.), NOT A SURVEYED MAP, SITE FEATURES AND LOCATIONS ARE APPROXIMATE.

0 250 500

APPROXIMATE SCALE (FEET)

Stantec
290 Conejo Ridge Avenue
Thousand Oaks, CA 91361
(805) 230-1266/230-1277 (Fax)

FOR:
LODI ENERGY CENTER
12745 North Thornton Road
Lodi, CA 95240

PROPOSED SAMPLING LOCATIONS

FIGURE: **2**

JOB NUMBER:	DRAWN BY:	CHECKED BY:	APPROVED BY:	DATE:
185702098	R. Roman	C. Confar	C. Confar	08/04/09

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FORMS

Form 1 – Sample Collection Log
Form 2 – Field Drill Log
Form 3 – Groundwater Sample Collection Log
Form 4 – Air Monitoring Log
Form 5 – Chain of Custody Record
Form 6 – Sample Label
Form 7 – Custody Seal

NOTE: Forms appear in appendix in order listed above.

SAMPLE COLLECTION LOG

Page __ of ___

DATE: ______________________________

SAMPLERS: ______________________________

SAMPLE ID	WELL ID	SAMPLE DEPTH (ft. bgs)	MATRIX (soil, vaper, gw, blank, dup)	SAMPLE METHOD	COLLECTION TIME	PID/FID

Stantec

Logged By:	Dates Drilled:	Drilling Contractor:	Project Name:	Method/Equipment:	Boring Number:

See Unified Soil Classification System for sampling method, classifications and laboratory testing methods.	Boring Diam.(in.):	Surface Elev.(ft.):	Groundwater Depth (ft): First Water ▽ Static Water ▼	Total Depth (ft.):	Drive wt.(lbs.):	Drop Dist.(in.):

Feet (bgs)	Boring or Well Completion	Depth, (ft.)	Sample Recovery	Blows/6"	Classification	Description (classification, color w/code using ASTM standard, grain shape, consistency, moisture, other, odor, percentage)	PID/FID (ppm)	Sample Name	Sample Time	Feet (bgs)
1										1
2										2
3										3
4										4
5										5
6										6
7										7
8										8
9										9
10										10
11										11
12										12
13										13
14										14
15										15

Project No. _____ Date _____ Page **1** of _____

Stantec

PROJECT NO:	SAMPLE ID:
SAMPLER:	FACILITY NO:
DATE:	LOCATION:

CASING DIAMETER (inches) **2 3 4 6 8 12 OTHER:**

DEPTH OF WELL (feet):	CALCULATED PURGE (gal):
DEPTH TO WATER (feet):	ACTUAL PURGE VOL (gal):
Standing Water in Casing (feet) x 0.20=	+ DTW =80% Recharge Water Level

2 (inches)	Standing Water in Casing (feet)	x 0.5=	3 Casing Volumes (gal.)
4 (inches)	Standing Water in Casing (feet)	x 2.0=	3 Casing Volumes (gal.)
6 (inches)	Standing Water in Casing (feet)	x 4.4=	3 Casing Volumes (gal.)
8 (inches)	Standing Water in Casing (feet)	x 7.8=	3 Casing Volumes (gal.)

Date Purged: _____ Start (2400 Hr.): _____ End (2400 Hr.): _____

Date Sampled: _____ Time (2400 Hr.): _____ DTW @ Samp. Time: _____

FIELD QC SAMPLES COLLECTED AT THIS WELL (IE: FB-1, X-DUP-1): _____

TIME (2400 Hr.)	VOLUME (gallons)	TEMP (degrees F)	E.C. (uS/cm) X1000	pH (units)	ORP (units)	DISSOLVED OXYGEN (mg/L)	BAROMETRIC PRESSURE (units)	COLOR (visual)*	TURBIDITY (visual)**	TOTALIZE (gallons)

* (Color) Clear, Cloudy, Yellow, Brown ** (Turbidity) Heavy, Moderate, Light, Trace

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
2" Bladder Pump	Bailer (Teflon)	2" Bladder Pump	Bailer (Stainless Steel
Contrifugal Pump	Bailer (PVC)	Submersible Pump	Bailer (Teflon)
Submersible Pump	Bailer (Stainless Steel)	Dipper	Bailer (Disposable Teflon)
Redi-Flo2	Dedicated	Well Wizard	Dedicated
OTHER:		OTHER:	

Well Condition (cap, cement, padlock, screws, lid, etc.):

Floating Product Thickness (feet): Color: Padlock Number:

COMMENTS:

Sample Containers Collected:

REVIEWED BY: DATE:

Stantec

AIR MONITORING LOG

(EVERY 15 MINUTES ONSITE)

Page __ of ___

DATE: ________________________________

PERSONNEL: ________________________________

TIME	LOCATION OF READING	TASK	DRILL DEPTH (ft bgs)	FID	LEL	BAROMETER

Laboratory Special Instructions: Report low levels for EPA Method 8260 analysis of groundwater.

STANTEC CHAIN-OF-CUSTODY RECORD

COC # _____

Page _____ of _____

FIELD OFFICE INFORMATION	PROJECT INFORMATION
OFFICE:	Project No.: Task:
Send Report to:	Project Name:
	Project Manager:
Telephone:	Laboratory:
Fax/E-Mail:	

Sample No. / Identification	SAMPLE Date	Time	Matrix *	Container & Size **	Preservative	Number of Containers	ANALYSES / METHOD REQUEST	REMARKS/ PRECAUTIONS

TAT
- ☐ Normal
- ☐ Rush
- ☐ Other: _____

REPORTING REQUIREMENTS
- ☐ MB & SURGS
- ☐ Dup/MS/MSD
- ☐ Raw Data
- ☐ CLP Rpt
- ☐ EDD
- ☐ Other

Possible Hazard Identification
☐ Non-Hazardous ☐ Flammable ☐ Skin Irritant ☐ Poison B ☒ Unknown

Sample Disposal
☐ Return to Client ☒ Disposal by Lab ☐ Archive for _____ Months

Sampled by: ***Shipment Method:*** ***Airbill Number:***

Signature	Print Name	Company	Date	Time
1(a) ***Relinquished by:***				
1(b) ***Received by:***				
2(a) ***Relinquished by:***				
2(b) ***Received by:***				
3(a) ***Relinquished by:***				
3(b) ***Received by:***				

***Matrix Key:** **AQ** = Aqueous **AR** = Air **SO** = Soil **WA** = Waste **OT** = Other

****Container:** **A** = Amber **C** = Clear Glass **V** = VOA **S** = Soil Jar **O** = Orbo **T** = Tedlar **B** = Brass **P** = Plastic **OT** = Other

Note: 12 voas needed for groundwater samples with duplicate (3-sample, 3-dup, 3-MS, and 3-MSD)

SAMPLE LABEL

STANTEC

Client: _____

Sampler: _____

Date: _____ Time: _____

Sample ID: _____

Preservative: _____

CUSTODY SEAL

STANTEC CONSULTING CORPORATION

CUSTODY SEAL

Name: _____

Date: _____ Time: _____

APPENDIX A

Standard Operating Procedure

for

Groundwater Sampling Techniques

1.0 Scope and Application

The following section describes field techniques that were performed by Stantec Consulting Corporation's (Stantec's) personnel in the performance of the tasks involved with this project.

2.0 Required Equipment and Supplies

Quantity	Description
1	Electronic water level indicator.
1	2-inch diameter PVC bailer (reusable).
1 per well	Polyethylene bailer (disposable).
1	Triple meter (capable of measuring temperature, pH, and specific conductivity).
As needed	Twine.
3 per well	Lab-provided sample containers (usually 40-milliliter VOA vials). The number and size of container(s) is dependent on the analyses to be performed.
1	Waterproof marking pen.
1 per sample	Re-sealable plastic bag.
As needed	Chain-of-custody forms.
1	Ice chest with ice or dry ice (no "blue ice").
1	Trip blank (supplied and prepared by the laboratory).
As needed	Tools required to remove well box cover (typically a standard socket set).
As needed	Decontamination supplies: 5-gallon buckets, Citri-Nox soap (or equivalent), scrub brushes, tap water, distilled water.

3.0 Procedures

Prior to using any downhole equipment, decontaminate each piece of equipment using a three bucket wash. The first bucket will be comprised of a non-phosphate detergent solution, the second bucket will be clean tap water and the third bucket will be deionized water.

The depth to groundwater in the well will be measured using a water level indicator or interface probe (interface probe will be used where liquid phase hydrocarbons were present).

The total depth of the well will be measured. Based on the measurements and the well diameter, the appropriate volume of groundwater to be purged will be calculated.

A PVC bailer will be used to purge the calculated volume of groundwater from the well. Throughout the purging process, the groundwater parameters of pH, electrical conductivity and temperature were measured. Bailing continued until at least three casing volumes of groundwater and the groundwater parameters stabilized to within 10% of the previous value(s).

The depth to groundwater will be again measured prior to sampling. Groundwater samples were collected when the column of groundwater in the well recharged to at least 80% of its original volume or two hours, which ever came first.

Using dedicated equipment and materials (twine, sampling gloves, and disposable bailer), a groundwater sample will be collected from the selected well(s). The sampling time and sample appearance will be noted on a Stantec Groundwater Sampling Form.

The sample will be transferred to a laboratory-provided and properly labeled VOA.

Each sample will be properly identified on a chain-of-custody.

The sample(s) were placed in re-sealable plastic bags and stored in an ice-cooled chest for transport to the laboratory for chemical analysis.

One laboratory-prepared trip blank accompanied the samples during transportation to the laboratory.

Upon completion of the sampling event, all samples were relinquished to the laboratory for analysis within 48 hours of collection.

PRELIMINARY ENDANGERMENT ASSESSMENT QUALITY ASSURANCE PROJECT PLAN

Proposed Lodi Energy Center Site
12745 N. Thornton Road
Lodi, California 95240

Prepared For:
Mr. Charles E. Swimley
Public Works Department
City of Lodi
1331 South Ham Lane
Lodi, California 95242

Submitted By:
Stantec Consulting Corporation
3017 Kilgore Road Suite 100
Rancho Cordova, California 95670

August 13, 2009
185702098

QUALITY ASSURANCE PROJECT PLAN
Proposed Lodi Energy Center Site
Lodi, California

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QUALITY ASSURANCE PROJECT PLAN
Proposed Lodi Energy Center Site
Lodi, California

1.0 INTRODUCTION

Stantec Consulting Corporation (Stantec), on behalf of the City of Lodi, Public Works Department (City), presents this Quality Assurance Project Plan (QAPP) for the Proposed Lodi Energy Center Site located at 12745 North Thornton Road in Lodi, California (Site) (Figures 1 and 2 of the Workplan). This QAPP is submitted as supportive documentation to Stantec's Preliminary Endangerment Assessment (PEA) Workplan for the Site, dated August 13, 2009. This document is intended to describe the quality assurance protocols for the PEA activities.

The Northern California Power Agency (NCPA) is proposing to construct on City of Lodi property a natural gas-fired electrical power generation facility (LEC) on a 4.4 acre portion (Site) of San Joaquin County APN 055-139-16 in Lodi, California. Environmental review of this proposed facility by NCPA identified impacts to soil during a recently completed environmental site assessment. The lead agency, California Energy Commission (CEC) subsequently requested additional assessment of the Site under California Department of Toxic Substances Control (DTSC) oversight. Therefore, this SAP has been prepared as part of DTSC requirements for completion of a PEA.

1.1 PURPOSE

The purpose of the QAPP is to describe the procedures to be followed in managing the project tasks and resultant data, as well as measures to ensure the validity and accuracy of each project task and the generated data.

The QAPP is divided into the following four areas:

- Introduction (Section 1.0) and Site Background (Section 2.0) that introduces the intent of the QAPP and provides a brief discussion of the Site background.

- Project Management (Section 3.0) – The Project Management section describes how the project will be managed and identifies key project personnel and their responsibilities.

- Quality Assurance/Quality Control (Sections 4.0 through 14.0) – The Quality Assurance/Quality Control (QA/QC) sections describe the procedures by which the accuracy and validity of all project tasks will be maintained. The QA/QC Plan applies to the collection, identification, preservation, transport, and chemical and physical analysis of soil and groundwater samples. The chemical analysis of samples will be initiated based upon appropriate chain-of-custody procedures by TestAmerica Incorporated (TestAmerica). The QA/QC section also describes general laboratory procedures including data verification. TestAmerica has reviewed and commented on the QAPP and will be required to adhere to the QA/QC procedures described within. TestAmerica will be conducting the analytical testing for the soil and groundwater samples.

- Data Management (Section 15.0) – The Data Management section describes collection, management, preservation, and reporting of data resulting from the assessment activities to be conducted at the site.

1.2 REGULATORY GUIDANCE

The methods and QA/QC procedures included in this QAPP were developed in general accordance with the following regulatory guidance documents:

- DTSC Preliminary Endangerment Assessment Guidance Manual, June 1999;
- DTSC Guidance Document for the Implementation of USEPA Method 5035; Methodologies for Collection, Preservation, Storage and Preparation of Soils to be Analyzed for VOCs, November 2004;
- USEPA Quality Assurance Guidance for Conducting Brownfields Site Assessments, September 1998;
- Chapter 9 of SW-846 Update III; and
- ASTM D-2488.

2.0 SITE DESCRIPTION AND BACKGROUND

The Northern California Power Agency (NCPA) is proposing to construct on City of Lodi property a natural gas-fired electrical power generation facility (LEC) on a 4.4 acre portion (Site) of San Joaquin County APN 055-130-16 in Lodi, California. NCPA contracted Carlton Engineering Inc. (Carlton) to perform a Phase I Environmental Site Assessment (ESA) at the Site. The June 30, 2008 ESA did not identify any recognized environmental conditions (ASTM 1527) at the Site, but did identify several potential environmental concerns (PECs).

Based on the ESA results, the CEC requested that NCPA conduct field sampling and soil analyses to adequately characterize the presence of harmful chemicals at the Site and discuss potential risks to construction or plant personnel from these chemicals. In compliance, NCPA directed CH2M HILL to perform a limited Phase II Environmental Site Assessment (Phase II ESA) to obtain data to comply with the CEC request. On February 2, 2009, CH2M HILL performed preliminary soil sampling and subsequent analyses to provide data associated with the PECs identified by the Carlton ESA. CH2M HILL summarized the data and compared it to various agency soil screening levels in a preliminary evaluation of risk to human health in the February 26, 2009 Memorandum titled *NCPA Lodi Preliminary Phase II ESA Sample Results*. CH2M HILL concluded that exposure of construction workers and onsite industrial workers to surface and subsurface soils may adversely affect human health.

Based on the Phase II ESA results, the CEC requested that additional investigation and evaluation of risk be conducted under DTSC oversight. Stantec understands that the NCPA's consultant has initiated preliminary discussions with DTSC regarding CEC's request, including acceptable modifications to the standard PEA requirements.

3.0 PROJECT MANAGEMENT

The project management personnel identified below were selected based on their experience and qualifications in light of the various task requirements. Each listed Stantec staff member has been made aware of his or her project responsibilities and the attendant quality assurance requirements. Stantec has identified Gregg Drilling and Testing, Inc. (Gregg) as the subcontractor to perform the drilling and sampling. The project personnel and their responsibilities are described below.

3.1 STANTEC PROJECT MANAGER

The Stantec Project Manager (PM), Mr. Gary Haeck, Ph.D., P.G., is a California Professional Geologist and will be responsible for ensuring that all project personnel are made available and that all activities associated with the project are conducted in a manner consistent with the Workplan. The Stantec PM provides overall quality assurance of all aspects of the project, ensures resources are available to complete the tasks, reviews all technical reports and workplans, and consults with the City PM as necessary. Mr. Haeck will also be responsible to review sampling plans, activities, and technical reports to ensure that all work is conducted and reported in a manner consistent with standard and accepted geologic principles. The Stantec PM will be responsible for decisions regarding technical issues.

3.2 CITY OF LODI PROJECT MANAGER

The City Project Manager, Mr. Charles Swimley, is responsible for directing and authorizing Stantec's Project Manager to conduct the work necessary to complete the groundwater monitoring and soil investigation. The City's PM is the lead business representative on the project team.

3.3 STANTEC FIELD PROJECT MANAGERS

The Stantec Field Project Managers (FPMs), Mr. Gary Haeck, Ph.D., P.G, Ms. Sandra Pimienta, P.G., and Mr. Brian Rorie will be responsible to act as the managers of daily field operations. Mr. Haeck will be primarily responsible for field activities including project schedule, budget tracking, and assigning project personnel and resources. Both Mr. Haeck and Ms. Pimienta will direct the implementation of the Workplan, and ensure quality. The Stantec FPMs will report to the Stantec PM and will also receive direction or authorization directly from the City PM.

3.4 STANTEC HEALTH AND SAFETY DIRECTOR

The Stantec Health and Safety Director (HSD), Mr. Phil Platcow, C.I.H., will be responsible for ensuring that the activities conducted by Stantec and other parties on site are performed in accordance with the appropriate Occupational Safety and Health Administration (OSHA) standards as well as 29 CFR 1910.120 and other applicable regulatory guidelines. The Stantec HSD and HSC will report to the Stantec PM, but may at any time perform unscheduled project audits to verify that the applicable health and safety activities and precautions are being followed.

3.5 STANTEC SITE HEALTH AND SAFETY OFFICER

A Stantec Site Health and Safety Officer (SHSO) will be on-site at all times during field activities, and will be Ms. Sandra Pimienta, P.G., and/or Mr. Brian Rorie. The SHSO will be responsible for implementing the Site Health and Safety Plan (HASP) while in the field. The Stantec SHSO will be on site through the duration of the fieldwork and monitor field activities to verify that equipment is properly calibrated and used, and that proper work practices are being followed. The SHSO will report to the Stantec HSD and Stantec PM.

3.6 STANTEC PROJECT QUALITY ASSURANCE/QUALITY CONTROL MANAGER

The Stantec Project Quality Assurance/Quality Control (QA/QC) Manager, Ms. Sandra Pimienta, P.G., will be responsible to establish and implement the QA/QC program to ensure that established sampling and analytical procedures are properly followed, direct Stantec Quality Assurance (QA) personnel to implement the appropriate field QA measures, and review the project activities to verify that project QA goals are met. The Project QA/QC Manager will report to the Stantec PM and will coordinate the necessary technical reviews.

3.7 STANTEC FIELD CREWS

Stantec field personnel and subcontractors, collectively referred to as "Field Crews," will be assigned to perform specific field tasks by the Stantec PM as appropriate. Field Crews will be responsible to implement their assigned task(s) as described in the Workplan and associated technical documents.

3.8 STANTEC SUBCONTRACTORS

The subcontractors selected to perform various project tasks will report to the Stantec PM and FPMs as appropriate. The subcontractors will perform their respective tasks in accordance with the specifications provided to them by Stantec, adhere to QA/QC protocols, and comply with the site-specific HASP.

4.0 QUALITY ASSURANCE PROGRAM PLAN OBJECTIVES

The ultimate goal of the QAPP is to ensure the collection of representative data that can be used to meet the objectives of the project. In general, data quality and representativeness are assured by adherence to the formalized and standardized field and laboratory procedures outlined herein and in associated documents. All field and laboratory procedures will be performed by trained, qualified personnel.

The application of the QAPP can be subdivided into the following elements:

- Sample handling and chain-of-custody procedures;
- Equipment calibration and maintenance procedures;
- Analytical procedures;
- Data reduction, validation, and reporting methods;
- Internal quality control checks;
- Performance and system audits;
- Preventive maintenance methods;
- Data assessment procedures;
- Corrective action procedures; and
- Quality assurance reporting.

These elements are discussed in Sections 5.0 through 14.0, respectively.

Samples collected for chemical characterization will be analyzed by State-certified analytical testing laboratories. The analytical laboratories will be accredited under the ELAP (as applicable), and will perform chemical analyses in accordance with SW-846. The analytical laboratory will provide QAPP oversight of chemical analyses.

The general field procedures to be used by Stantec in sample collection include:

- Proper decontamination procedures;
- Management of residual contaminants;
- Environmental Protection Agency (EPA)-approved sampling methods; and
- Proper record keeping/sample tracking.

The analytical laboratory procedures include the following:

- EPA-acceptable sample preparation and analytical methods;
- Instrument calibration via standard analytical reference materials per the SW-846 and equipment manufacturers' guidelines;
- Equipment maintenance and servicing per the equipment manufacturers' guidelines;
- Control samples (spikes, blanks, duplicates) and method control charts;
- Statistical data evaluation to identify acceptable limits, including analytical precision and accuracy determination;
- Corrective action for "out-of-control" situations (Section 13); and

- Laboratory record keeping including sampling chain-of-custody documentation from field to laboratory and within the laboratory itself.

4.1 QUALITY ASSURANCE OBJECTIVES FOR DATA MEASUREMENT

The data quality objectives of this project are to develop and implement procedures that provide data of known quality. The quality of the laboratory data is assessed by precision, accuracy, representativeness, comparability, and completeness (the "PARCC" parameters). The QA objectives for precision, accuracy, and completeness of each measurement parameter are based on prior knowledge of the analytical method, the method validation studies (using replicates, standards, spikes, calibrations, recovery data), and the requirements of the specific project. Definitions of these parameters and the applicable quality control procedures are described below.

Data on precision, accuracy, and completeness have been published in several official sources[1,2,3]; the method used for data analysis is validated only after it is demonstrated that the accuracy, precision and completeness of the measurement data meets or exceeds published values for the particular analysis. If published values are not available, the accuracy, precision, and completeness are thoroughly documented before method validation and reviewed by both laboratory and project management for acceptability.

4.1.1 Precision

Precision measures the reproducibility of measurements under a given set of conditions. Specifically, it is a quantitative measure of the variability (precision) of two or more measurements compared to their average values. Precision is calculated from results of duplicate sample analyses. Precision is quantitatively expressed as the relative percent difference (RPD), and is calculated as follows:

$$RPD = \frac{(C1-C2)}{\left(\frac{C1+C2}{2}\right)} \times 100$$

Where:

RPD = relative percent difference
C1 = larger of the two duplicate results
C2 = smaller of the two duplicate results

Field duplicate and laboratory duplicate samples will be analyzed at a minimum frequency of one per twenty samples (five percent) per matrix analyzed. Quantitative RPD criteria for laboratory duplicate results have only been developed by the U.S. EPA for metals analysis (EPA, 1988b). The criteria are ± 20 percent for water samples and ± 35 percent for soil.

---

[1] Standard Methods for the Examination of Water and Wastewater, 16th Edition, APHA, AWWA, WPCF, 1986.

[2] Test Methods for Evaluating Solid Waste - Physical/Chemical Methods, SW-846, 2nd Edition, U.S. EPA July 1984.

[3] Methods for Chemical Analysis of Water and Wastes, EPA - 600/4-79-020, March 1983.

Note: Methods 1 and 2 will be followed preferentially over Method 3.

4.1.2 4.1.2 Accuracy

Accuracy is a measure of the closeness (bias) of the measured value to the true value. The accuracy of chemical test results is assessed by "spiking" samples in the laboratory with known standards (surrogates or matrix spikes) and determining the percent recovery. Percent recovery (%R) is calculated as follows:

%R = [(Msa-Mua)/Csa] x 100

Where:
%R = percent recovery
Msa = measured concentration in spiked aliquot
Mua = measured concentration in unspiked aliquot
Csa = actual concentration of spike added

Laboratory matrix spikes and surrogates will be carried out in accordance with SW-846 requirements for organic and inorganic analyses (EPA, 1986) at a minimum frequency of one in 20 samples (five percent) per matrix analyzed. LCSs are performed on all compounds, but only a few are monitored by the laboratory (as recommended per the method).

Quantitative percent recovery criteria have only been developed by the EPA for laboratory matrix spikes for metals analysis (EPA, 1988b). The criteria are 75-125 percent, when the sample concentration exceeds the spike concentration by a factor of four or more. All matrix spikes for volatile and semi-volatile organic compounds will follow the criteria set out in current SW-846 methodology. Where the EPA has not provided data validation guidelines, laboratory derived control limits will be used to evaluate surrogate recovery and matrix spike results, and laboratory control spikes.

The accuracy of sample results can also be affected by sample contamination. Sample contamination can occur because of improperly cleaned sampling equipment, exposing samples to high chemical concentrations in the field or during transport to the laboratory, or because of high chemical concentrations in the laboratory. To ascertain that the samples collected are not contaminated, several types of blank samples will be analyzed. These are discussed in Section 6.5.

4.1.3 Representativeness

Representativeness is a qualitative measure of how closely the measured results reflect the actual concentration or distribution of the constituent concentrations in the matrix sampled. The sampling plan design, sampling collection techniques, sample handling protocols, sample analysis methods, and data review procedures have been developed to assure the results obtained are representative of on-site conditions. These issues are addressed in detail throughout the QAPP and the SAP.

4.1.4 Completeness

Completeness is defined as the percentage of measurements judged to be valid. Results will be considered valid if they are not rejected during data validation (see section 8.0, Data Reduction, Validation, and Reporting). Completeness is calculated as follows:

$$C = \frac{(\text{Number of Valid Measurements}) \times 100}{(\text{Total Number of Measurements})}$$

The target completeness goal for this work will be 90 percent for a given analysis.

4.1.5 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. The use of these standard regulatory methods and procedures for both sample collection and laboratory analysis will make data collected comparable to both internal and other data generated.

4.2 CONTROL LIMITS FOR PRECISION, ACCURACY, AND COMPLETENESS OF THE ANALYTICAL METHODS

The performance samples used for the analysis of soil samples include appropriate method blanks, laboratory split samples, and spiked samples in a typical sample matrix for each lot. Control samples are prepared at levels typically encountered in the normal analytical program.

Periodic check samples are submitted for analysis by the Laboratory QA Coordinator. These check samples are submitted as "blind" samples, indistinguishable from primary samples. The sources of these check samples are EPA or commercially available concentrates. If the results of any control sample or check sample fall outside the method control limits, the method is immediately discontinued, the data produced by the method are reviewed, and corrective action is taken. The method will be re-validated as described in Section 8.4. The goals for accuracy, precision, and completeness are presented in Table 1 for the major chemical analytical groups described in Section 7.0.

The frequencies of the various quality assurance sample analyses are summarized in Table 2. Laboratory control samples are prepared by the analytical laboratory. The control samples or stock solutions are made completely separate from any other laboratory stock solutions. Control samples represent a typical matrix with a known analyte level in the analytical range normally encountered. The concentration must be different than the calibration standard concentrations. The purpose of the control sample is to check the precision and accuracy of the method. The results of a control sample analysis must fall within two standard deviations (warning limits) of the known concentrations or within the published acceptance criteria. Any sample which contains an analyte at a concentration exceeding the linear range of the method is diluted and re-analyzed. An additional laboratory blank is analyzed after such a sample to prevent carry-over or cross contamination.

A duplicate sample analysis and duplicate "matrix spike" analysis is performed on approximately one out of every 20 samples. Check samples, or "referee" controls, are submitted to the

laboratory at a frequency depending on analysis. Check samples are made indistinguishable from routine samples. The results of the analysis of these samples must meet published acceptance criteria. All other control samples described in this document are used at the discretion of the laboratory to analyze unusual or unexpected results from an environmental sample.

QC charts may be prepared by the laboratory based upon analysis of standards. They are used to maintain the accuracy and precision of the analysis and to determine when the instrument is "out-of-control," or when new standards need to be prepared. UCL and LCL are abbreviations for upper control limit and lower control limit, and UWL and LWL are abbreviations for upper warning limit and lower warning limit. The standards must be within the control limits, or the instrument is considered "out-of-control". The control limit is plus or minus three standard deviations of the mean. The laboratory looks for trends within the warning range, which is within two standard deviations of the mean. In addition, the laboratory may use results of laboratory quality control samples to maintain accuracy and precision.

5.0 SAMPLE HANDLING AND CUSTODY

5.1 SAMPLE HANDLING AND FIELD DOCUMENTATION

All soil and groundwater samples are collected in accordance with the protocols described in the SAP. This section describes the procedures for sample handling and documentation. Each sample is tracked from the time of collection by documentation which is completed during sampling and includes the following, as appropriate: 1) field log; 2) boring log; 3) sampling field data sheet; 4) chain-of-custody record; and 5) sample labels.

5.1.1 Sample Containers

Soil samples will be collected one of two ways. Soil samples submitted for non-volatile constituents will be collected in glass jars. Soil samples submitted for volatile constituents will utilize the Encore Device (as specified in SW-846 Method 5035). Groundwater samples are to be collected in the appropriate sample container for the required analysis. Water samples (*i.e.,* trip and field blanks for volatile constituents) are to be collected in appropriate new clean glass 40 mL VOA containers supplied by the analytical laboratory. Sample containers and reagents used as preservatives are listed in Table 3. The containers with reagents will be prepared by the analytical laboratory. Reagent grade acids will be used in sample containers to comply with specifications listed in Table 3.

The analytical laboratory will purchase the pre-cleaned sample containers for volatile organic analyses, and perform periodic QC analyses on representative sample containers. All glass sample containers will be supplied with Teflon™ lined lids. After sample collection, soil and water sample containers will be placed in an ice chest that keeps the collected samples at a temperature of approximately 4°C until delivery to the analytical laboratory, where samples will be stored under refrigeration.

5.1.2 Sample Collection

Before a sample is collected, careful consideration is given to the type of analytical testing that will be required to prevent loss of constituents or cross-contamination of the sample, and to preserve the sample for subsequent analysis. Detailed specific procedures for sample collection and preservation are provided in the SAP.

5.1.3 Field Documentation

The field data recorded at the time of sample collection provides an unambiguous identification of each sample. These field data include the following, as appropriate:

- Date of entry;
- Sample Matrix;
- Number and size of sample taken;
- Description of sampling point (boring ID, depth);
- Date and time of collection of sample;

- Field sample identification number(s);
- References, such as maps or photographs, of the sampling site;
- Field observations; and
- Field measurements, time, etc.

Because sampling situations vary widely, field notes will be as descriptive and inclusive as possible; anyone reading the entries should be able to reconstruct the sampling situation from the recorded information. Language within field notes will be objective, factual, and free of inappropriate or ambiguous terminology. All field personnel are to date and sign any data entries. All field documentation will be retained.

5.1.4 Boring Logs

Boring logs will be prepared on Field Drill Log Sheets for each boring by an experienced scientist, geologist, or engineer working under the direct supervision of a California Professional Geologist. The log will include lithologic/pedologic descriptions of encountered horizons. The standard Field Drill Log Sheet is shown as Figure 1 attached to this QAPP. At the completion of a drilling project, all original boring log forms will be retained.

5.1.5 Geologic Data Sheets

Geologic data sheets include information on specific activities related to collection of a single sample. The geologic data sheets will be completed in the field at the time of the sample collection by the sampling personnel. The Geologic Data Sheet is presented in Figure 2 attached to this QAPP.

5.1.6 Sample Chain-of-Custody Record

The written records maintained whenever samples are collected, transferred, stored, analyzed, or destroyed are designed to create an accurate written record which can be used to trace the possession and handling of the sample from the moment of its collection, through analysis, to reporting of analytical values. This written record, the Chain-of-Custody (COC) Record (Figure 3 attached to this QAPP), will be filled out by the field sampling team at the time the sample is obtained. It is the responsibility of the Stantec FPM to arrange sample collection and delivery to the analytical laboratories. The COC Record sheet accompanies the sample through all transportation functions until it is received at the laboratory, signed, and filed. The COC Record includes the following information: site name, sample identification number (assigned by the sampler in the field), sample date, sample location, and type of analysis required. Whenever the sample is transferred from one party to another, both parties sign the COC Record and record the date and time of the transfer.

5.1.7 Sample Label

Sample labels will be filled out and affixed to appropriate containers immediately prior to sample collection. The label will be filled out in indelible ink and includes the following information: sample I.D. number, date, time, preservatives, and sampler's initials.

5.1.8 Sample Collection Log

Each day in the field, the samples collected will be listed on a Sample Collection Log form (Figure 4). The Sample Collection Log form includes the date and time, name of the individual(s) who collected the samples, the Sample ID, sampling location/well/boring number, depth, matrix, sample collection method, number of sample containers per sample, corresponding field screening results (FID, PID), and any other notable comments.

5.2 FIELD DECONTAMINATION PROCEDURES

The field equipment decontamination procedures have been designed to eliminate any cross-contamination from one sample to another. All sampling equipment is used only once and then returned to the field decontamination area for cleaning. Any material and/or sampling apparatus that cannot be completely decontaminated will be discarded and new material will be used. Further details regarding specific decontamination protocols are given in the SAP.

5.3 TRANSFER OF SAMPLES FROM FIELD TO LABORATORY

After sample collection, samples will be handled according to the protocols outlined in Sections 5.3.1 through 5.3.6. Duplicate vials and sample blanks will be provided to the laboratory by the sampler as appropriate. Samples being analyzed for constituents other than hydrocarbons will follow the holding times indicated in Table 3.

5.3.1 Chain-of-Custody Transfer

All samples submitted to the laboratory are accompanied by the COC Record (Section 5.1.6). This form will be checked for accuracy and completeness, and will be then signed and dated by the sampler, the courier, and the laboratory sample custodian accepting the samples. At the analytical laboratory each sample will be assigned a unique, sequential laboratory identification number that is stamped or written on the COC Record.

All samples will be held under internal COC in the Sample Control room using the appropriate storage technique (ambient, refrigeration, frozen). The analytical laboratory Project Manager assigned to this project will be responsible for tracking the status of the samples throughout the laboratory. Samples will be signed out of the Sample Control room in a sample control logbook by the analyst who prepares the samples for analysis. Samples for hydrocarbon analysis will be kept in secure storage in the laboratory area where the analysis is performed.

5.3.2 Electronic Laboratory Sample List

The unique, sequential laboratory identification number assigned to the sample, along with all identifying information, is placed in an electronic, dated Laboratory Sample List.

5.3.3 Laboratory Sample Tracking

A preprinted laboratory ticket will be generated for each sample submitted to the laboratory. This sheet contains a listing of the analyses desired and all identifying information, including laboratory identification number. A copy of this ticket will be forwarded to the appropriate

analytical laboratory Project Manager and Analyst as a reference for the analyses to be performed. The results of the analyses will be recorded on either a hand-written or computer-generated data sheet, along with the analyst's initials, the date(s) of analysis, and any laboratory workbook identification, if workbooks are used. For some analyses, a data printout will be generated by the instrument (*i.e.,* GC/MS, GC), along with raw data information (such as chromatogram and spectra). The completed data sheet, data printout, and raw data are to be submitted to the laboratory supervisor, senior analyst, or manager for validation. The Laboratory Project Manager and the analyst will give final approval of data prior to reporting.

5.3.4 Laboratory Workbooks and Instrument Records

The analytical laboratory will utilize workbooks, instrument records, and individual laboratory data sheets. Most areas within the laboratory use individual laboratory data sheets that are stored in the laboratory ticket folder. Other hard-copy records, such as chromatograms, will also be stored in this ticket folder. Raw QC data is stored by instrument and date in the appropriate laboratory area (*i.e.,* GC, GC/MS).

5.3.5 Permanent Laboratory Records

The analytical laboratory will not destroy any raw analytical data, laboratory data logbooks, workbooks, ticket folders, sampling analyses, or COC Records. The analytical laboratory will archive the data for a period of not less than 5 years.

5.3.6 Laboratory Procedures for Sample Storage and Disposal

Unused or remaining samples will remain in storage for possible analysis within the holding time and throughout the reporting period. At the end of the holding time period, samples are disposed of by methods acceptable to state and federal guidelines.

5.4 LABORATORY ANALYSES REPORTING

Results from laboratory analyses of soil and water samples will be reported on Laboratory Data Sheets. The summary sheets present information including the sample date, sample identification numbers, and results of analyses. The data validation coordinator will approve the Data Sheets. The final laboratory report will be approved by the analyst, supervisor, or laboratory manager and the Laboratory Project Manager. Laboratory reports will include QA/QC data and raw laboratory data where appropriate.

6.0 CALIBRATION AND MAINTENANCE PROCEDURES AND FREQUENCY

6.1 INSTRUMENT MAINTENANCE AND CALIBRATION

All field and analytical equipment/instrumentation used in the investigation are maintained and calibrated to operate within manufacturer's specifications, so that the required sensitivity and precision are maintained. Specific calibration and maintenance are conducted by personnel familiar with the equipment or by manufacturers' technical representatives. When appropriate, these technicians participate in the manufacturers' training courses.

Operational procedures are developed for any field equipment to ensure that the equipment is operating properly and that data are valid and traceable to a properly calibrated instrument. These procedures may include:

- Operation Theory;
- Functional Operational Checks;
- Routine Maintenance;
- Calibration Procedures;
- Operational Instructions;
- Special Environmental Conditions or Interferences; and
- Deactivations and Storage Procedures.

An Equipment Service and Repair Log (ESRL) are maintained for all equipment associated with the investigation. Information regarding any modification, adjustment, repairs, or replacement of parts for any equipment is recorded. The effects of these changes are tested with appropriate standards and the related procedures re-calibrated if required, prior to continued use of the equipment for analytical purposes. The results of these tests are recorded in the ESRL to develop a history relating instrument performance with equipment modification, adjustment, and repair.

Equipment requiring regular calibration is listed in a calibration schedule according to type, calibration requirements, and organization responsible for calibration. A list is also made of routine maintenance for equipment. Logbooks are kept to document calibration of instruments, and maintenance and service on major equipment. Periodic spot-checks are made of equipment and facilities by the Laboratory analysts and supervisor or Stantec QA/QC Manager (as appropriate) to ensure their proper usage and maintenance.

6.2 FIELD INSTRUMENTS

Logbooks are kept with individual field instruments and are used to document each day the instrument is in operation. The primary field instruments to be used during the investigation include flame ionization detectors (FID) or photoionization detectors (PID). Calibration and maintenance requirements of the field instruments follow the manufacturers' specifications. Specific requirements for the various field instruments are presented in Table 4. All data related to field instrument calibration are recorded. Instrument calibration procedures are discussed below.

6.2.1 PID Calibration

The MiniRAE PID is factory calibrated to 100 parts per million (ppm) isobutylene gas and is programmed with alarm limits. To recalibrate the instrument a zero gas calibration is first performed. This is completed by attaching the zero gas adaptor (charcoal filter) to the gas inlet tube. Select "Zero gas calibration" (5th menu item) by depressing the "MENU" button. Press the "ENTER" to zero the instrument and then press "MENU" again to exit zero gas calibration and move to the 6th menu item - "Enter standard gas value". Enter the correct calibration gas value by pressing the "UP" and "DOWN" buttons followed by "ENTER" for each digit. The instrument now displays "GAS on" to remind the operator to open the regulator to the calibration gas. Press "ENTER" to continue the standard gas calibration. Allow the instrument to stabilize and press "ENTER". If the instrument reading is not within 1 ppm to 2 ppm of the known gas concentration, allow the instrument to stabilize again and press "ENTER". Repeat this process until the instrument reading falls within the desired accuracy range. Press "MENU" to exit the calibration.

6.2.2 FID Calibration

The Thermo Electron Corporation, TVA-1000 FID can be calibrated to respond to a wide variety of volatile organic compounds. The FID is calibrated to a mixture of methane and air at the factory. To re-calibrate for a specific compound, a mixture of a specific vapor in air at a known volume and concentration is introduced into the FID. The re-calibration procedure is described in the FID Instruction Manual and is summarized below.

The FID accuracy specified by the manufacturer may be obtained when the instrument is calibrated with known concentrations for each range. To calibrate the instrument, depress the appropriate range switch for the calibration gas being used. Attach the regulator assembly/calibration gas canister. Open the regulator and adjust the ball so that it falls in the green area of the gauge. Adjust the control inside the bottom-rear of the instrument so that the reading falls within ±10% of the known concentration of the calibration gas.

6.3 ANALYTICAL EQUIPMENT CALIBRATION

All analytical instruments and methods are calibrated before analyses are performed, and are also re-calibrated at regular intervals, including whenever a batch CCV fails or when maintenance alters sensitivity. Both initial calibration and re-calibrations are performed as specified by particular methods and are generally consistent with the manufacturer's recommendations.

The analytical laboratory on the basis of the above quality control instructions will establish the calibration requirements for the equipment used in connection with this project. They include the calibration procedure, the frequency of calibrations, and the calibration reference for the equipment involved.

6.4 METHOD CALIBRATION

6.4.1 Standards

All standards used for soil and groundwater method calibration are prepared from pure standard materials or purchased as certified solutions. The accuracy of calibration standards is determined from quality control check samples available from the EPA.

6.4.2 Reagents and Solvents

Selections of reagents and purification of solvents are specific for each analytical method (see Section 9.2). Procedural blanks are performed to demonstrate freedom from interferences (see Section 6.5.1).

6.4.3 Standardization

The laboratory runs and documents calibration standards at a minimum of five concentrations for all inorganic and organic procedural methods. This five-point calibration may be omitted if the laboratory verifies and documents that, on each working day, the calibration factor does not vary from the predicted response by more than 25 percent. Additional information on laboratory calibration for analytical methods are provided in Appendix C.

6.5 BLANKS

6.5.1 Procedural Blanks (Method Blanks)

For each group of samples processed, procedural blanks (using Type I-IV water and reagents) are carried throughout the sample preparation and analytical processes. These blanks are used to determine if contamination of samples occurs during the analysis process. Procedural blanks are specific for each analytical method (see Section 9.2). Frequency of use of procedural blanks and other blanks is shown in Table 2.

6.5.2 Field/Equipment Blanks (Sample Blanks)

Field/equipment blanks are used to demonstrate that the sample container and the sampling procedures are not contaminating the sample. Deionized water is transported to the sampling point and a sample of the deionized water is taken using, to the extent feasible, the same sampling protocol and equipment actually used to take samples. The equipment/field blank will accompany the samples from the time of sample collection until receipt at the laboratory to assess potential contamination of samples during transport in the field, transport to the laboratory, and from sample handling within the laboratory. Specific sampling procedures are discussed in the SAP. The field blank will be analyzed for the same parameters as the samples collected.

6.5.3 Trip Blanks

A trip blank consists of a contaminant-free matrix placed by the laboratory into the appropriate sample container with preservative, if required. This sample is transported to the field and returned without any manipulations. The trip blank provides a measure of the positive interferences introduced by the sample preservation, transportation, storage and analysis. Using the corresponding procedural blank, the interferences due to analysis can be removed. A trip blank will be included in each cooler sent to the analytical laboratory that contains samples intended for volatile organic analysis. Trip blanks will only be analyzed for volatile organic compounds.

6.6 REPLICATE ANALYSES

Replicate analyses provide an indication of the precision of the portion of the sampling and analytical system being measured. They do not provide information on accuracy or matrix effects. Frequency of use of replicate analyses is summarized in Table 2.

6.6.1 Instrument Precision

Multiple runs of a single sample or sample extract through the measuring instrumentation indicates the range of variability for a given analyte measurement technique. Usually, poor reproducibility is an indication of a malfunction in the measuring instrument procedure that requires either maintenance or further development.

6.6.2 Laboratory Split Samples

A single homogeneous sample is split, if feasible, into two portions and each becomes a single analytical sample at the point of sample analysis. This split sample provides an indication of the precision of the laboratory analytical methodology. Instrument variability can be determined at the same time in order to show where the major source of variability occurs. Precision data calculated from these split samples are compared to method certification precision data and to reference method precision data.

6.6.3 Field Replicate Samples

Two or more samples are taken in the field so that they represent the sampled matrix as closely as possible. The measurement of field replicates determines the total precision of the sampling and methodologies as well as the variability in obtaining samples that represent one sampling point. By subtracting the variability of the laboratory split samples, it is possible to obtain an indication of the sample representativeness for an analyte/matrix in the environment. This value has an effect on the limit of quantitation and explains the frequency of "spurious" results.

6.7 SPIKED SAMPLES

A spiked sample is a matrix with a known amount of analyte added. If the Laboratory QC Coordinator spikes the analyte onto a replicate of an environmental sample, the amount added cannot be more than two times or less than one-half of the amount measured or expected to be present in that sample. Ideally, the spike should be equal to the amount present in the sample.

The data from a matrix control spike provides information on the accuracy and matrix effects of that particular sample. The frequency of use of spiked samples is summarized in Table 2.

6.7.1 Performance or Check Samples

A performance or check sample is a known amount of an analyte in a convenient matrix prepared by an outside organization. This spiked sample provides information on the accuracy of the analytical method but it will not give information on matrix effects or natural background levels for the analyte.

6.7.2 Laboratory Control Samples

The laboratory prepares laboratory control samples. The stock solutions are made completely separate from any other laboratory stock solutions. Control samples represent a typical matrix with a known analyte level in the analytical range normally encountered. The concentration must be different than the calibration standard concentrations. The purpose of the control sample is to check the precision and accuracy of the method. The results of a control sample analysis must fall within two standard deviations (warning limits) of the known concentrations, or within laboratory acceptance criteria.

6.7.3 Field Spike Samples

The Laboratory QA Coordinator spikes a known quantity of analyte onto a blank sample in the laboratory (for soil and groundwater). This spike is governed by the same concentration considerations as the laboratory control matrix spike samples. The data from this matrix control spike provides an indication of the analytical accuracy for a specific analyte.

Such possibilities as chemical reactions, physical adsorption, biological degradation or sample loss during sampling transportation, storage, and analysis might account for unusual recoveries for the analyte.

7.0 ANALYTICAL PROCEDURES

7.1 SAMPLE PREPARATION

7.1.1 Water Samples

For this project, water samples consist of groundwater samples, trip blanks, and field/equipment blanks. Water samples will not be filtered prior to analysis when analyzed for VOCs. Water samples will be collected as both unfiltered and field-filtered (45 micron filter) for radioactive parameters.

Water used in organic analyses (dilutions, standard samples, etc.) conforms to ASTM Type II grade. Water used in inorganic analyses conforms to ASTM Type I, III, or IV grade, depending on the analyte requirements of the methods involved.

7.1.2 Soil Samples

For this project, soil samples consist of discrete soil samples and composite samples for the purpose of profiling investigative derived waste (IDW). Soil samples are heterogeneous mixtures of components with varying particle size. Sampling errors can result from selecting an insufficient soil sample volume and thus unrepresentative samples for analysis. Soil samples will be collected in glass jars or stainless steel or brass sleeves for non-volatile or semi-volatile constituents, or Encore samplers that provide for sufficient sample size for VOC constituents. Care will be taken in the field at the time of collection and in the laboratory to select samples that are representative of field conditions.

7.2 ANALYTICAL METHODS

The analytical laboratory will have written procedures for the analytical methods utilized available for inspection. Tables 5 and 6 list the analyses along with corresponding detection limits, as applicable.

7.3 VALIDATION OF NEW ANALYTICAL METHODS

Occasionally, the EPA-approved methods are modified or new methods are developed by the laboratory. In these cases, the methods are validated by validation studies or performance samples (see Sections 7.3.1 and 7.3.2 below). No new methods will be used unless approved by the DTSC.

7.3.1 Validation Studies

The data produced by the new methodology are compared to the data produced by an accepted method. The precision and accuracy of the new methodology must be equal to or better than the established method before the method receives the analytical laboratory's quality assurance approval. This approval is necessary before any data from samples can be entered into the project data management system.

7.3.2 Performance Samples

The new analytical method is used to obtain results on performance samples prepared from concentrates or pure compounds supplied by the laboratory. Typically, three spiked samples at different levels on the calibration curve (high, medium, low) are each analyzed ten times. The results must be equal to or better than the accuracy and precision data published for the established procedure. If there is no approved or established procedure, then the accuracy and precision data obtained in the method certification procedure is used for the documentation of the method.

7.4 DATA ACCEPTANCE CRITERIA

The objective of the data acceptance criteria is to ensure that all interpretations are based on valid data. The analytical data are a subset of the entire database that contains all data collected for the remedial investigation, including replicate and spurious analyses. A separate file is cross-referenced with the database to explain spurious data.

The data acceptance criteria listed below and the laboratory quality assurance plan (see Sections 4.0, 9.0, 10.0, and 11.0) are designed to eliminate "false positives" from either qualitative (wrong identification) or quantitative considerations. These data acceptance criteria include the following:

- Only data reported above the limit of quantitation are represented by a number;
- If a sample dilution is necessary to obtain a result for the major component within the calibrated concentration range, then only data above [(1/d.f.) x (limit of quantitation concentration)] are reported, where d.f. is the dilution factor[4]; and
- Reported chemical data have no more than two significant figures.

Additional information on laboratory acceptance criteria for analytical methods are provided in Appendix C.

[4] Dilution factor = $\frac{\text{aliquot used, gm}}{\text{total weight, gm}}$ = $\frac{\text{aliquot used, ml}}{\text{total volume used, ml}}$

8.0 DATA REDUCTION, VALIDATION, AND REPORTING

This Section describes the data reduction scheme for collected data, the criteria used to evaluate data integrity, the method used for handling data that fail validation criteria, and the flow of data from collection through storage of validated concentrations.

8.1 LABORATORY DATA REDUCTION AND VALIDATION

After method certification (Section 7.4) and demonstration of analytical acceptability through analysis of control samples, all data related to a particular analysis are recorded in bound workbooks associated with that analysis. Data are then recorded on an appropriate laboratory data sheet that the analyst initials and dates. The workbook containing the corresponding data is also recorded on this data sheet. The workbook or instrument-generated printouts contain the date, analyst's initials, sample identification, dilutions used, and any calculations used to arrive at the final results. The basic calculation used to determine the concentration of specific parameters is as follows:

$$\text{Sample concentration} = \frac{(\text{Response Sample}) \times (\text{Conc. of Standard})}{\text{Response Standard}}$$

8.2 FIRST LEVEL CHECKS

The first level check for validating data integrity during collection and reporting is verification of numerical work. A peer chemist or immediate supervisor checks technical analyses, laboratory tests and conceptual designs involving calculations. The purpose of the first level check is to ascertain that the data presented are free of numerical or transcription errors and that established procedures and methodology have been properly followed.

8.3 FINAL LABORATORY CHECK AND REVIEW

The results of each analysis are received, validated, and dated by the data validation coordinator, analyst, Laboratory Project Manager, and/or laboratory manager. The quality assurance data are given to the laboratory manager or supervisor for inclusion on the laboratory's statistical database. The data are validated in the following manner:

1. Review of control, blank, and check sample analyses.
2. Calculations (ionic balance calculations, for example) to determine internal consistency.

If the data fail validation by the above methods, the original data and calculations are reviewed. If no error is found, the sample is re-analyzed, if sufficient sample is available. In the case of well data, the location is resampled, if necessary, to perform the analysis. If an error in analysis or calculations is found, then the laboratory data sheet is corrected by drawing a line through the incorrect value, entering the corrected value, and initialing the correction. If re-analysis is required, the results of the second analysis are submitted on a separate data sheet. An explanation is written on the data sheet and initialed by the laboratory manager. Data sheets are then sent for review and compilation to the person requesting the analyses.

8.4 DATA VALIDATION, STORAGE AND REPORTING

Copies of analytical data from the laboratory are submitted to the Stantec QA/QC Manager on appropriate data sheets. The Stantec QA/QC Manager is responsible for evaluation of the data and completing a QA/QC review. This review is submitted to the Stantec PM and must be approved before any data are transmitted to a regulatory agency or included in draft reports. The guidelines below specify format for the QA tabulation, criteria for "acceptable data," QA review deadlines, and what constitutes a completed, approved QA Review.

8.4.1 QA Tabulation

The laboratory will prepare tables of the results. Data for each well number, boring, or other sample location will be on a separate page or as appropriate. Different symbols will be utilized which clearly distinguishes between "not analyzed" and "not detected". Also, where detection limits vary from compound to compound, they will be specified for each compound by the laboratory detection limit.

8.4.2 QA Criteria

The Stantec Project QA/QC Manager is responsible for reviewing the QA tabulation according to the following criteria, marking all questionable results, and resolving any discrepancies. QA Criteria are as follows:

- Duplicates and triplicates from the same sampling episode are "acceptable" if they differ by less than 80 percent. That is, if A and B are results of duplicate analyses, they are "acceptable" if:

$$\frac{A - B}{(A + B)/2} < 0.8$$

- Data for a given well are compared to historical results. If the results differ by less than 100 percent, the well is not considered to have shown an increase or decrease for that chemical. Thus, if C and D are results for a given well from different sampling episodes, the data are "acceptable" if:

$$\frac{C - D}{(C + D)/2} < 1.0$$

The QA tabulations are marked and annotated so that it is clear which of the above criteria (or both) have been violated. Explanations of the out-of-spec conditions, and any other relevant facts, are included for all data points that do not meet the QA criteria.

8.4.3 Completion of Review

Once all data within the data set is determined to be acceptable, the Stantec PM will approve the data set. If not, the Stantec PM will determine what further action is necessary. Further action could include resampling, reanalyzing archived samples, or eliminating the questionable data from consideration as invalid. Corrective actions are outlined further in Section 13.0.

9.0 INTERNAL QUALITY CONTROL CHECKS

Internal quality control checks have been established for both field and laboratory methods. The objectives and general procedures for the quality control plan are outlined in Section 4.0 and include procedural blanks, split samples, control samples, spiked samples, replicates, and proper calibration of instruments.

9.1 FIELD QUALITY CONTROL

All field samples are collected according to the procedures outlined in the SAP and handled according to Section 5.0. Samples are collected in appropriate containers according to the methods outlined in Table 3. Field instruments are maintained and calibrated as discussed in Section 6.2. Table 2 summarizes the use of quality control samples (*i.e.,* control spikes, performance spikes, replicates) and details the sampling frequency for quality control samples and background samples. Section 8.0 describes how the data are reviewed and compared to previous results.

9.2 LABORATORY QUALITY CONTROL

Analytical quality control procedures are discussed in Section 4.0 and 6.0, and include the use of blanks, replicates, spiked samples, and calibration standards. Table 2 provides a summary of the frequency of use of these samples.

10.0 PERFORMANCE AND SYSTEM AUDITS

Performance and system audits are a key mechanism for assuring technical and procedural compliance with the QA/QC Plan. The purpose of the audits is:

- To verify that the field and laboratory QA procedures called for in this QAPP are followed and executed;
- To check that appropriate documents are up-to-date, orderly, and properly completed;
- To ensure that measurement systems being used are accurate; and
- To identify deficiencies in QA procedures and to implement necessary corrective actions.

The Stantec PM and Field QA personnel are responsible for ensuring conformance with QAPP operation procedures.

10.1 REVIEW OF SAMPLING PROGRAM

Due to the short duration of the project, approximately two field days, internal review of the sampling program will not be conducted during the investigation phase.

10.2 REVIEW OF LABORATORY PROCEDURES AND ANALYTICAL RESULTS

Laboratory analyses are conducted by the analytical laboratories (see Section 4.0). Measurement systems and quality assurance procedures have been evaluated in conjunction with the California certification program.

The measurement systems used in this investigation employ proven instruments and analytical techniques which are required to achieve the detection limits specified in Section 7.2 and Table 5. The analytical methods are selected for determination of specific parameters, with consideration given to the medium (*e.g.,* soil or water) and matrix effects (*e.g.,* interferences and recovery studies). The methods selected are generally EPA-approved methods. However, when no EPA-approved method exists, or when unique conditions exist due to requirements for specific parameters, medium, or matrix effects, ASTM and/or in-house analytical methods are employed. Such methods are validated prior to use according to the procedures outlined in Section 7.3.

Primarily the Laboratory Manager or Supervisor reviews laboratory procedures whenever an "out-of-control" situation is found (see Section 13.0). Analytical results are checked by the analyst, data validation coordinator, Laboratory Project Manager, and/or Laboratory Manager prior to distribution.

10.3 TECHNICAL REVIEW

Technical review of various disciplines (e.g., geology, engineering) is provided by the appropriate technical managers and through periodically scheduled peer reviews. These

reviews are conducted at various phases of the tasks as scheduled in the Workplan. These reviews are to assure the technical feasibility, accuracy, thoroughness, and soundness of the work performed by the technical staff.

10.4 MANAGEMENT REVIEW

The Stantec PM and the Project QA/QC Manager review the execution of the quality assurance program on a regular basis. The review may include the following: training of personnel, progress of the project, manpower commitments, and proper coordination of efforts and schedules.

11.0 PREVENTIVE MAINTENANCE

Preventive maintenance of equipment and instruments is discussed in Section 6.0. The analytical laboratory will maintain manufacturer's service contracts or will utilize trained maintenance personnel on all major equipment to ensure that the equipment is properly maintained in good operating condition.

12.0 DATA ASSESSMENT PROCEDURES

Procedures to assess precision, accuracy and completeness of the data are discussed in Sections 7.3, 7.4, and 8.0. Routine procedures used to assess the quality of soil and groundwater data are discussed below.

12.1 SOIL DATA

The reliability of soil sample data is assessed by comparing the data to the background sample population. If an analyte concentration is less than or not significantly different[5] from the analytical baseline[6] or the background level[7], the soil is considered non-contaminated.

When an analyte concentration is determined to be significantly greater than the analytical baseline or background level, that sample and the material it represents are considered to contain abnormal analyte levels. Contamination is confirmed when duplicate or adjacent samples also contain abnormal analyte concentrations.

12.2 GROUNDWATER DATA

The quality of the groundwater sample data is assessed by comparing the RPD of the sample from well WSM-3 and its duplicate as described in Section 4.1.1 above.

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5 "Significantly different," is at least two times the analytical baseline or background level.

6 The analytical baseline identifies the lowest concentration of an analyte within a specific matrix that can be resolved from analytical interferences associated with the matrix or with sample collection. The analytical baseline is determined from the analysis of matrix samples that do not contain the analyte and from sample blanks. The analytical baseline is generally a higher value than the detection limit.

7 The background level is the concentration of an analyte that "normally" occurs within the sample matrix. In this context, the term normally means either naturally occurring or occurring as a result of past human activities not associated with the activities that are the subject of this investigation. Background levels are determined from the analysis of samples from areas where the past activities under investigation are known not to have occurred.

13.0 CORRECTIVE ACTIONS

Corrective actions are developed on a case-by-case basis and are initiated whenever an internal "out-of-control" situation exists or when results of other system audits or inter-laboratory results indicate an analysis is "out-of-control". Corrective action is taken to determine the causes for the "out-of-control" situation, and a decision is made on the acceptability of the data collected for that lot of samples. When a method is found to be "out-of-control," it is discontinued until corrective action is completed.

An "out-of-control" situation exists in the laboratory when at least one of the following incidents has occurred:

- A blank has exceeded the limit of quantitation;
- An instrument has failed a calibration check;
- A performance or check sample result has exceeded 2 times the standard deviation or other acceptance criteria; and
- A laboratory control sample result has exceeded 3 times the standard deviation or other acceptance criteria.

The QA Program Manager, laboratory manager and/or supervisor documents the cause of the "out-of-control" situation, takes corrective action, and provides documentation. The sample analyses are not restarted until there are two successive control samples analyzed that give data within control limits.

Corrective actions are also initiated for "out-of-control" conditions outside of the laboratory and may include altering procedures in the field, using a different batch of sample containers, increased calibration or maintenance of instruments and increased frequency of audits. All corrective actions are reported to the Stantec QA/QC Manager.

14.0 QUALITY ASSURANCE REPORTING

A data validation report will be prepared after all analytical data are received from the laboratories and Stantec has completed data quality evaluations. The data validation report will summarize the overall quality of the chemical results and will identify chemical results qualified during validation by Stantec. The data validation reports will be included in the PEA.

System audit reports will not be necessary. Laboratory certification and accreditation is achieved through successful completion of independent performance evaluations and is available for review in the laboratory's quality assurance plan. State certification provides initial confidence in the laboratory's ability to successfully apply the requested analytical methods.

15.0 DATA MANAGEMENT PLAN

This section describes how data obtained during the PEA will be managed, preserved, and reported. Procedures for obtaining and recording field measurements and sample collection and tracking procedures including sample number, sample labeling, and chain-of-custody procedures are discussed in the Section 5.0 of the SAP.

15.1 FIELD MEASUREMENTS

Measurements made in the field are recorded on data sheets as described in the SAP. These measurements include field screenings with PID or FID. Sampling personnel provide the Stantec PM with the original data sheets used in the field. The Stantec PM maintains a complete file of data sheets and prepares copies of data sheets.

15.2 ANALYTICAL RESULTS

Soil and groundwater analytical results are sent from the analytical laboratory by the laboratory manager or designated staff to the Stantec PM. The Stantec PM maintains files of all analytical results including laboratory letters and results for quality assurance samples.

15.3 ANALYTICAL DATA MANAGEMENT

Soil and groundwater analytical results will be tabulated, as appropriate, and the tables will be included in technical reports. Alternatively, analytical results may be presented in an illustrative format to better enable an evaluation of the spatial distribution. Photocopies of analytical laboratory reports will be included as an appendix to technical reports. Original laboratory reports will be stored in files maintained by Stantec.

15.4 DATA REPORTING

Data will be presented in technical reports submitted in accordance with approved schedules. Results from the analytical laboratory are typically reported with two or three significant digits. Parameters measured in the field are typically reported with one or two significant digits. Significant digits are based on methodology constraints, site-specific parameters, equipment and specifications. Technical reports will also include laboratory data sheets, cover letters and Chain-of-Custody Records for all soil and groundwater analyses as appendices.

TABLES

TABLE 1
QA/QC GOALS FOR LABORATORY CONTROL SAMPLES

Measurement Parameter and Control Compound	Accuracy Goal[1] (percent)	Precision Goal[2] (percent)	Completeness Goal (percent)
VOCs, 8260B			
Dichlorodifluoromethane	70 -130	30	95
Chloromethane	70 -130	30	95
Vinyl Chloride	70 -130	30	95
Bromomethane	70 -130	30	95
Chloroethane	70 -130	30	95
Trichlorofluoromethane	70 -130	30	95
Acetone	1 – 105 (Soil) 7 – 125 (Water)	30	95
1,1-Dichloroethene	83-122 (Soil) 85 – 130 (Water)	30	95
Carbon Disulfide	70 -130	30	95
Methylene Chloride	70 -130	30	95
trans-1,2-Dichloroethene	70 -130	30	95
1,1-Dichloroethane	70 -130	30	95
2-Butanone (MEK)	29-128 (Soil) 41 – 130 (Water)	30	95
2,2-Dichloropropane	70 -130	30	95
cis-1,2-Dichloroethene	70 -130	30	95
Chloroform	70 -130	30	95
Bromochloromethane	70 -130	30	95
1,1,1-Trichloroethane (TCA)	70 -130	30	95
1,1-Dichloropropene	70 -130	30	95
Carbon Tetrachloride	70 -130	30	95
1,2-Dichloroethane (EDC)	70 -130	30	95
Benzene	88 – 119 (Soil) 87 – 116 (Water)	30	95
Trichloroethene (TCE)	81-124 (Soil) 85 – 117 (Water)	30	95
1,2-Dichloropropane	70 -130	30	95
Bromodichloromethane	70 -130	30	95
Dibromomethane	70 -130	30	95
2-Hexanone	47- 135 (Soil) 56 – 139 (Water)	30	95
cis-1,3-Dichloropropene	70 -130	30	95
Toluene	86-117 (Soil) 86 – 119 (Water)	30	95
trans-1,3-Dichloropropene	70 -130	30	95
1,1,2-Trichloroethane	70 -130	30	95
4-Methyl-2-pentanone (MIBK)	64 – 147 (Soil) 74-139 (Water)	30	95

TABLE 1
QA/QC GOALS FOR LABORATORY CONTROL SAMPLES

Measurement Parameter and Control Compound	Accuracy Goal[1] (percent)	Precision Goal[2] (percent)	Completeness Goal (percent)
1,3-Dichloropropane	70 -130	30	95
Tetrachloroethene (PCE)	70 -130	30	95
Dibromochloromethane	70 -130	30	95
1,2-Dibromoethane (EDB)	70 -130	30	95
Chlorobenzene	84-118 (Soil) 84 – 118 (Water)	30	95
1,1,1-2-Tetrachloroethane	70 -130	30	95
Ethylbenzene	70 -130	30	95
Total Xylenes	70 -130	30	95
Styrene	70 -130	30	95
Bromoform	70 -130	30	95
Isopropylbenzene	70 -130	30	95
1,1,2,2-Tetrachloroethane	70 -130	30	95
1,2,3-Trichloropropane	70 -130	30	95
Bromobenzene	70 -130	30	95
n-Propylbenzene	70 -130	30	95
2-Chlorotoluene	70 -130	30	95
4-Chlorotoluene	70 -130	30	95
1,3,5-Trimethylbenzene	70 -130	30	95
tert-Butylbenzene	70 -130	30	95
1,2,4-Trimethylbenzene	70 -130	30	95
sec-Butylbenzene	70 -130	30	95
1,3-Dichlorobenzene	70 -130	30	95
4-Isopropyltoluene	70 -130	30	95
1,4-Dichlorobenzene	70 -130	30	95
n-Butylbenzene	70 -130	30	95
1,2-Dichlorobenzene	70 -130	30	95
1,2-Dibromo-3-chloropropane	70 -130	30	95
1,2,4-Trichlorobenzene	70 -130	30	95
1,2,3-Trichlorobenzene	70 -130	30	95
Naphthalene	70 -130	30	95
Hexachlorobutadiene	70 -130	30	95
Methyl *tert*-Butyl Ether	76 –124 (Soil) 79 – 125 (Water)	30	95
1,1,2-Trichlorotrifluoroethane	70 -130	30	95
Vinyl Acetate	70 -130	30	95
tert-Butyl Alcohol	52-141 (Soil) 21-185 (Water)	30	95
Diisopropyl Ether	70 -130	30	95
Ethene	Not Reported	30	95

TABLE 1
QA/QC GOALS FOR LABORATORY CONTROL SAMPLES

Measurement Parameter and Control Compound	Accuracy Goal[1] (percent)	Precision Goal[2] (percent)	Completeness Goal (percent)
Ethane	Not Reported	30	95
tert-Butyl Ethyl Ether	70 -130	30	95
tert-Amyl Methyl Ether	70 -130	30	95
Petroleum Hydrocarbons, 8015B			
GRO	74-112 (Soil) 71-120 (Water)	30	95
DRO	28-126 (Soil) 44-123 (Water)	30	95
ORO	N/A	30	95
T-22 Metals, 6010B, 7471A			
Antimony (Sb)	80-120 (Soil) 85-115 (Water)	20	95
Arsenic (As)	80-120 (Soil) 85-115 (Water)	20	95
Barium (Ba)	80-120 (Soil) 85-115 (Water)	20	95
Beryllium (Be)	80-120 (Soil) 85-115 (Water)	20	95
Cadmium (Cd)	80-120 (Soil) 85-115 (Water)	20	95
Chromium (Cr)	80-120 (Soil) 85-115 (Water)	20	95
Cobalt (Co)	80-120 (Soil) 85-115 (Water)	20	95
Copper (Cu)	80-120 (Soil) 85-115 (Water)	20	95
Lead (Pb)	80-120 (Soil) 85-115 (Water)	20	95
Mercury (Hg)	80-120 (Soil) 85-115 (Water)	20	95
Molybdenum (Mo)	80-120 (Soil) 85-115 (Water)	20	95
Nickel (Ni)	80-120 (Soil) 85-115 (Water)	20	95
Selenium (Se)	80-120 (Soil) 85-115 (Water)	20	95
Silver (Ag)	80-120 (Soil) 85-115 (Water)	20	95
Thallium (Tl)	80-120 (Soil) 85-115 (Water)	20	95
Vanadium (V)	80-120 (Soil) 85-115 (Water)	20	95
Zinc (Zn)	80-120 (Soil) 85-115 (Water)	20	95
Organochlorine Pesticides, 8081A			

TABLE 1
QA/QC GOALS FOR LABORATORY CONTROL SAMPLES

Measurement Parameter and Control Compound	Accuracy Goal[1] (percent)	Precision Goal[2] (percent)	Completeness Goal (percent)
Aldrin	73-126 (Soil) 68-134 (Water)	30	95
Alpha-BHC	85-139 (Soil) 76-135 (Water)	30	95
beta-BHC	77-118 (Soil) 70-115 (Water)	30	95
delta-BHC	55-148 (Soil) 46-144 (Water)	30	95
gamma-BHC (Lindane)	70-127 (Soil) 76-132 (Water)	30	95
Chlordane	70 -130	30	95
4,4'-DDD	81-129 (Soil) 72-125 (Water)	30	95
4,4'-DDE	81-129 (Soil) 75-119 (Water)	30	95
4,4'-DDT	59-136 (Soil) 66-140 (Water)	30	95
Dieldrin	68-119 (Soil) 72-124 (Water)	30	95
Endosulfan I	72-122 (Soil) 69-114 (Water)	30	95
Endosulfan II	80-119 (Soil) 75-113 (Water)	30	95
Endosulfan sulfate	75-115 (Soil) 70-112 (Water)	30	95
Endrin	75-154 (Soil) 76-156 (Water)	30	95
Endrin aldehyde	63-127 (Soil) 66-118 (Water)	30	95
Endrin ketone	73-140 (Soil) 74-128 (Water)	30	95
Heptachlor	69-142 (Soil) 64-150 (Water)	30	95
Heptachlor epoxide	79-127 (Soil) 77-116 (Water)	30	95
Methoxychlor	63-146 (Soil) 52-146 (Water)	30	95
Toxaphene	70 - 130	30	95
Polycyclic Aromatic Hydrocarbons, 8270			
Anthracene	70 -130	30	95
Benzo[a]pyrene	70 -130	30	95
Chrysene	70 -130	30	95
Coronene	70 -130	30	95
Corannulene	70 -130	30	95
Naphthacene	70 -130	30	95
Naphthalene	70 -130	30	95
Pentacene	70 -130	30	95

TABLE 1
QA/QC GOALS FOR LABORATORY CONTROL SAMPLES

Measurement Parameter and Control Compound	Accuracy Goal[1] (percent)	Precision Goal[2] (percent)	Completeness Goal (percent)
Phenanthrene	70 -130	30	95
Pyrene	70 -130	30	95
Triphenylene	70 -130	30	95
Ovalene	70 -130	30	95

Notes:

1 Accuracy is expressed in terms of percent recovery as it relates to an Upper Control Limit and a Lower Control Limit for laboratory control samples.

2 Precision is expressed in terms of the relative percent difference (RPD) as it relates to Control Limits for duplicate or MS/MSD samples.

TABLE 2
FREQUENCY OF ANALYSIS OF QUALITY ASSURANCE SAMPLES

QA Sample Type	Frequency of Analysis
BLANKS	
Procedural (Method Blank)	Daily for volatile organic analyses. One per each analytical method. One out of every batch or 20 samples, whichever is greater.
Trip Blank	One per day per shipping container. One per each VOC (8260, 8015) analytical method.
Field Equipment (Sample) Blank	One per day per analytical method.
REPLICATES	
Laboratory Split Analysis	One per each analytical method. Approximately one out of every 10 samples.
Field Replicates Analysis	One per each analytical method. One per each sample episode per site. Approximately one out of every 10 samples.
SPIKED SAMPLES	
Performance or Check Sample	One per each analytical method. One every six months.
Laboratory Control Samples	One surrogate recovery analysis for each sample analyzed by EPA Methods 8260.
Field Spike Samples	One per each analytical method. One every week.
Laboratory Sample Matrix Spike Samples	One per each analytical method. One per each sample episode per site. Requires one analysis and one duplicate analysis. Approximately one out of every 10 samples.
EQUIPMENT CALIBRATION	
External Calibration Standards	One per each analytical method. One out of every 10 samples or every 12 hours.

TABLE 3
CONTAINER, PRESERVATION, AND MAXIMUM HOLDING TIMES FOR SOIL AND GROUNDWATER SAMPLES

Matrix	Analysis	Container	Preservation	Hold Time	Laboratory
Soil	EPA Method 8260	EnCore Sampler	4°C minimal head space	14 days	TestAmerica
Soil	EPA Method 8015M	Glass Jar EnCore Sampler	4°C minimal head space	14 days	TestAmerica
Soil	EPA Method 6010B	Glass Jar (4 oz) Encore Sampler Stainless Steel or Brass Sleeve	4°C	180 days	TestAmerica
Soil	EPA Method 8081A	Glass Jar (4 oz) Stainless Steel or Brass Sleeve	4°C	14 days	TestAmerica
Soil	EPA Method 7196	Brass Tube or glass jar	4°C	30 days	TestAmerica
Soil	EPA Method 8270	Glass Jar (4 oz) Encore Sampler Stainless Steel or Brass Sleeve	4°C	180 days	TestAmerica
Water	EPA Method 8260	Glass VOA Vial (40 mL)	No Bubbles, 4°C Hydrochloric Acid	14 days	TestAmerica
Water	EPA Methods 8260	Glass VOA Vial (40 ml)	No Bubbles, 4°C Hydrochloric Acid	14 days	TestAmerica
Water	EPA Method 8015M	Glass VOA Vial (40 ml) 1 liter amber glass bottle	No Bubbles, 4°C Hydrochloric Acid	14 days	TestAmerica
Water	EPA Method 6010	500ml poly bottle	4°C HNO3	6 months	TestAmerica
Water	EPA Method 8081A	1 liter amber glass bottle	No Bubbles, 4°C Hydrochloric Acid	14 days	TestAmerica
Water	EPA Method 7196	1 liter amber glass bottle	4°C	14 days	TestAmerica
Water	EPA Method 8270	1 liter amber glass bottle	4°C	14 days	TestAmerica

TABLE 4
MAINTENANCE SCHEDULE FOR FIELD EQUIPMENT

Instrument	Task	Frequency
PID[1]	Calibrate	Daily, before use
	Clean Lamp Lens	Once a week (or as required)
	Battery Charging	As Needed
FID[2]	Calibrate	Daily, before use
	Battery Charging	As Needed
	Hydrogen Refill	As Needed
	Filter Cleaning	Weekly to Monthly
	Flame Arrestor, Sampling Fixtures, Supply and Refill Valves	As Needed

Notes:
1 RAE Systems, Inc.: MiniRAE Plus
2 Heath Consultants, Inc.: HeathTech DETECTO-PAK™ OVD

TABLE 5 ANALYTICAL REQUIREMENTS FOR SOIL AND GROUNDWATER[1]			
Method, Analyte	**Matrix, units**	**Required MDL[2,3]**	**Required PQL[4]**
VOCs, 5035/8260B			
Dichlorodifluoromethane	Soil, ug/Kg	0.48	10
Chloromethane	Soil, ug/Kg	0.48	10
Vinyl Chloride	Soil, ug/Kg	0.53	5
Bromomethane	Soil, ug/Kg	0.32	10
Chloroethane	Soil, ug/Kg	0.45	10
Trichlorofluoromethane	Soil, ug/Kg	0.20	5
Acetone	Soil, ug/Kg	6.10	50
1,1-Dichloroethene	Soil, ug/Kg	0.31	5
Methylene Chloride	Soil, ug/Kg	0.65	10
trans-1,2-Dichloroethene	Soil, ug/Kg	0.16	5
1.1-Dichloroethane	Soil, ug/Kg	0.27	5
2-Butanone (MEK)	Soil, ug/Kg	3.96	50
2,2-Dichloropropane	Soil, ug/Kg	0.31	5
cis-1,2-Dichloroethene	Soil, ug/Kg	0.37	5
Chloroform	Soil, ug/Kg	0.28	5
Bromochloromethane	Soil, ug/Kg	0.38	20
1,1,1-Trichloroethane (TCA)	Soil, ug/Kg	0.54	5
1,1-Dichloropropene	Soil, ug/Kg	0.33	5
Carbon Tetrachloride	Soil, ug/Kg	0.14	5
1,2-Dichloroethane (EDC)	Soil, ug/Kg	0.10	5
Benzene	Soil, ug/Kg	0.30	5
Trichloroethene (TCE)	Soil, ug/Kg	0.31	5
1,2-Dichloropropane	Soil, ug/Kg	0.25	5
Bromodichloromethane	Soil, ug/Kg	0.38	5
Dibromomethane	Soil, ug/Kg	0.29	10
2-Hexanone	Soil, ug/Kg	2.62	50
cis-1,3-Dichloropropene	Soil, ug/Kg	0.33	5
Toluene	Soil, ug/Kg	0.20	5
trans-1,3-Dichloropropene	Soil, ug/Kg	0.15	5

TABLE 5 ANALYTICAL REQUIREMENTS FOR SOIL AND GROUNDWATER[1]			
Method, Analyte	**Matrix, units**	**Required MDL[2,3]**	**Required PQL[4]**
1,1,2-Trichloroethane	Soil, ug/Kg	0.37	5
cis-1,3-Dichloropropene	Soil, ug/Kg	0.33	5
4-Methyl-2-pentanone (MIBK)	Soil, ug/Kg	2.62	50
1,3-Dichloropropane	Soil, ug/Kg	0.39	5
Tetrachloroethene (PCE)	Soil, ug/Kg	0.27	5
Dibromochloromethane	Soil, ug/Kg	0.24	5
1,2-Dibromoethane (EDB)	Soil, ug/Kg	1.42	5
Chlorobenzene	Soil, ug/Kg	0.35	5
1,1,1,2-Tetrachloroethane	Soil, ug/Kg	0.28	5
Ethylbenzene	Soil, ug/Kg	0.36	5
Total Xylenes	Soil, ug/Kg	0.52	10
Styrene	Soil, ug/Kg	0.18	5
Bromoform	Soil, ug/Kg	0.31	5
1,2-Dibromoethane (EDB)	Soil, ug/Kg	1.43	5
Isopropylbenzene	Soil, ug/Kg	0.52	5
1,2-Dibromoethane	Soil, ug/Kg	1.42	5
1,1,2,2-Tetrachloroethane	Soil, ug/Kg	0.31	5
1,2,3-Trichloropropane	Soil, ug/Kg	0.31	5
Bromobenzene	Soil, ug/Kg	0.40	5
n-Propylbenzene	Soil, ug/Kg	0.37	5
2-Chlorotoluene	Soil, ug/Kg	0.28	5
4-Chlorotoluene	Soil, ug/Kg	0.27	5
1,3,5-Trimethylbenzene	Soil, ug/Kg	0.31	5
tert-Butylbenzene	Soil, ug/Kg	0.16	5
1,2,4-Trimethylbenzene	Soil, ug/Kg	0.37	5
Sec-Butylbenzene	Soil, ug/Kg	0.43	5
1,3-Dichlorobenzene	Soil, ug/Kg	0.22	5
4-Isopropyltoluene	Soil, ug/Kg	0.41	5
1,4-Dichlorobenzene	Soil, ug/Kg	0.36	5
n-Butylbenzene	Soil, ug/Kg	0.40	5

TABLE 5 ANALYTICAL REQUIREMENTS FOR SOIL AND GROUNDWATER[1]			
Method, Analyte	**Matrix, units**	**Required MDL[2,3]**	**Required PQL[4]**
Isopropyl Alcohol	Soil, ug/Kg	2.86	0.5
1,2-Dichlorobenzene	Soil, ug/Kg	0.36	5
1,2-Dibromo-3-chloropropane	Soil, ug/Kg	0.58	5
1,2,4-Trichlorobenzene	Soil, ug/Kg	0.37	5
1,2,3-Trichlorobenzene	Soil, ug/Kg	0.42	5
Naphthalene	Soil, ug/Kg	0.80	10
Hexachlorobutadiene	Soil, ug/Kg	0.36	5
Methyl *tert*-Butyl Ether	Soil, ug/Kg	0.26	5
2-Chloroethylvinyl Ether	Soil, ug/Kg	0.69	5
1,1,2-Trichlorotrifluoroethane	Soil, ug/Kg	2.08	5
1,1,1,2-Tetrachloroethane	Soil, ug/Kg	0.28	5
Vinyl Acetate	Soil, ug/Kg	1.06	50
Diisopropyl Ether	Soil, ug/Kg	0.10	0.5
tert-Butyl Ethyl Ether	Soil, ug/Kg	0.10	0.5
Ethyl tert-Butyl Ether	Soil, ug/Kg	0.10	0.5
tert-Amyl Methyl Ether	Soil, ug/Kg	0.10	0.5
Petroleum Hydrocarbons, 8015B			
GRO (by CA LUFT MS)	Soil, mg/Kg	0.0204	0.25
DRO	Soil, mg/Kg	0.46	1.0
ORO	Soil, mg/Kg	3.49	50
T-22 Metals, 6010B, 7471A			
Antimony (Sb)	Soil, mg/Kg	0.0579	0.5
Arsenic (As)	Soil, mg/Kg	0.085	0.5
Barium (Ba)	Soil, mg/Kg	0.0458	0.5
Beryllium (Be)	Soil, mg/Kg	0.0325	0.1
Cadmium (Cd)	Soil, mg/Kg	0.0124	0.1
Chromium (Cr)	Soil, mg/Kg	0.0325	0.5
Cobalt (Co)	Soil, mg/Kg	0.020	0.2
Copper (Cu)	Soil, mg/Kg	0.0712	1.5
Lead (Pb)	Soil, mg/Kg	0.1049	0.5

TABLE 5 ANALYTICAL REQUIREMENTS FOR SOIL AND GROUNDWATER[1]			
Method, Analyte	**Matrix, units**	**Required MDL[2,3]**	**Required PQL[4]**
Mercury (Hg)	Soil, mg/Kg	0.0025	0.02
Molybdenum (Mo)	Soil, mg/Kg	0.0432	0.5
Nickel (Ni)	Soil, mg/Kg	0.0379	0.5
Selenium (Se)	Soil, mg/Kg	0.1263	0. 5
Silver (Ag)	Soil, mg/Kg	0.0505	0.5
Thallium (Tl)	Soil, mg/Kg	0.1451	0.5
Vanadium (V)	Soil, mg/Kg	0.0325	0.5
Zinc (Zn)	Soil, mg/Kg	0.6349	1.5
Organochlorine Pesticides, 8081A			
Aldrin	Soil, µg/Kg	0.17	2
alpha-BHC	Soil, µg/Kg	0.47	2
beta-BHC	Soil, µg/Kg	0.97	2
delta-BHC	Soil, µg/Kg	0.46	2
gamma-BHC (Lindane)	Soil, µg/Kg	0.83	2
Chlordane	Soil, µg/Kg	1.8	40
4,4'-DDD	Soil, µg/Kg	0.38	2
4,4'-DDE	Soil, µg/Kg	0.18	2
4,4'-DDT	Soil, µg/Kg	0.80	2
Dieldrin	Soil, µg/Kg	0.20	2
Endosulfan I	Soil, µg/Kg	0.19	2
Endosulfan II	Soil, µg/Kg	0.39	2
Endosulfan sulfate	Soil, µg/Kg	0.48	2
Endrin	Soil, µg/Kg	0.28	2
Endrin aldehyde	Soil, µg/Kg	0.78	2
Endrin ketone	Soil, µg/Kg	0.33	2
Heptachlor	Soil, µg/Kg	0.50	2
Heptachlor epoxide	Soil, µg/Kg	0.41	2
Methoxychlor	Soil, µg/Kg	0.28	2
Toxaphene	Soil, µg/Kg	6.81	40
Polycyclic Aromatic Hydrocarbons, 8270			

TABLE 5 ANALYTICAL REQUIREMENTS FOR SOIL AND GROUNDWATER[1]			
Method, Analyte	**Matrix, units**	**Required MDL[2,3]**	**Required PQL[4]**
Anthracene	Soil, µg/Kg	17.2	67
Benzo[a]pyrene	Soil, µg/Kg	18.7	67
Chrysene	Soil, µg/Kg	14.4	67
Naphthalene	Soil, µg/Kg	19.4	67
Phenanthrene	Soil, µg/Kg	18.9	67
Pyrene	Soil, µg/Kg	14.4	67
VOCs, 8260B			
Dichlorodifluoromethane	Groundwater, µg/l	0.037	0.5
Chloromethane	Groundwater, µg/l	0.189	1
Vinyl Chloride	Groundwater, µg/l	0.045	0.5
Bromomethane	Groundwater, µg/l	0.489	1
Chloroethane	Groundwater, µg/l	0.119	1
Trichlorofluoromethane	Groundwater, µg/l	0.056	1
Acetone	Groundwater, µg/l	2.783	50
1,1-Dichloroethene	Groundwater, µg/l	0.054	0.5
1,1-Dichloropropane	Groundwater, µg/l	0.050	0.5
Methylene Chloride	Groundwater, µg/l	0.121	5.0
trans-1,2-Dichloroethene	Groundwater, µg/l	0.070	0.5
1.1-Dichloroethane	Groundwater, µg/l	0.046	0.5
2-Butanone (MEK)	Groundwater, µg/l	8.380	50
2,2-Dichloropropane	Groundwater, µg/l	0.050	0.5
cis-1,2-Dichloroethene	Groundwater, µg/l	0.057	0.5
Chloroform	Groundwater, µg/l	0.053	1
Bromochloromethane	Groundwater, µg/l	0.073	1
1,1,1-Trichloroethane (TCA)	Groundwater, µg/l	0.037	0.5
1,1-Dichloropropene	Groundwater, µg/l	0.050	0.5
Carbon Tetrachloride	Groundwater, µg/l	0.072	0.5
1,2-Dichloroethane (EDC)	Groundwater, µg/l	0.077	0.5
Benzene	Groundwater, µg/l	0.050	0.5
Trichloroethene (TCE)	Groundwater, µg/l	0.059	0.5

TABLE 5 ANALYTICAL REQUIREMENTS FOR SOIL AND GROUNDWATER[1]			
Method, Analyte	**Matrix, units**	**Required MDL[2,3]**	**Required PQL[4]**
1,2-Dichloropropane	Groundwater, µg/l	0.035	0.5
Bromodichloromethane	Groundwater, µg/l	0.100	0.5
Dibromomethane	Groundwater, µg/l	0.043	0.5
2-Hexanone	Groundwater, µg/l	2.678	50
cis-1,3-Dichloropropene	Groundwater, µg/l	0.070	0.5
Toluene	Groundwater, µg/l	0.075	0.5
trans-1,3-Dichloropropene	Groundwater, µg/l	0.057	0.5
1,1,2-Trichloroethane	Groundwater, µg/l	0.107	0.5
cis-1,3-Dichloropropene	Groundwater, µg/l	0.070	0.5
4-Methyl-2-pentanone (MIBK)	Groundwater, µg/l	4.457	50
1,3-Dichloropropane	Groundwater, µg/l	0.068	1
Tetrachloroethene (PCE)	Groundwater, µg/l	0.065	0.5
Dibromochloromethane	Groundwater, µg/l	0.042	0.5
1,2-Dibromoethane (EDB)	Groundwater, µg/l	0.075	0.5
Chlorobenzene	Groundwater, µg/l	0.051	0.5
1,1,1,2-Tetrachloroethane	Groundwater, µg/l	0.067	0.5
Ethylbenzene	Groundwater, µg/l	0.041	0.5
Total Xylenes	Groundwater, µg/l	0.488	1
Styrene	Groundwater, µg/l	0.075	0.5
Bromoform	Groundwater, µg/l	0.080	1
1,2-Dibromoethane (EDB)	Groundwater, µg/l	0.075	0.5
Isopropylbenzene	Groundwater, µg/l	0.038	0.5
1,2-Dibromoethane	Groundwater, µg/l	0.075	0.5
1,1,2,2-Tetrachloroethane	Groundwater, µg/l	0.074	0.5
1,1,2,2-Tetrachloroethane	Groundwater, µg/l	0.074	0.5
Bromobenzene	Groundwater, µg/l	0.056	1
n-Propylbenzene	Groundwater, µg/l	0.056	1
2-Chlorotoluene	Groundwater, µg/l	0.061	0.5
4-Chlorotoluene	Groundwater, µg/l	0.048	0.5
1,3,5-Trimethylbenzene	Groundwater, µg/l	0.057	0.5

TABLE 5 ANALYTICAL REQUIREMENTS FOR SOIL AND GROUNDWATER[1]			
Method, Analyte	**Matrix, units**	**Required MDL[2,3]**	**Required PQL[4]**
tert-Butylbenzene	Groundwater, µg/l	0.050	1
1,2,4-Trimethylbenzene	Groundwater, µg/l	0.045	1
Sec-Butylbenzene	Groundwater, µg/l	0.166	1
1,3-Dichlorobenzene	Groundwater, µg/l	0.038	0.5
4-Isopropyltoluene	Groundwater, µg/l	0.075	1
1,4-Dichlorobenzene	Groundwater, µg/l	0.05	0.5
n-Butylbenzene	Groundwater, µg/l	0.100	1
Isopropyl Alcohol	Groundwater, µg/l	1.35	5
1,2-Dichlorobenzene	Groundwater, µg/l	0.053	0.5
1,2-Dibromo-3-chloropropane	Groundwater, µg/l	0.210	1
1,2,4-Trichlorobenzene	Groundwater, µg/l	0.161	1
1,2,3-Trichlorobenzene	Groundwater, µg/l	0.212	1
Naphthalene	Groundwater, µg/l	0.221	1
Hexachlorobutadiene	Groundwater, µg/l	0.273	1
Methyl *tert*-Butyl Ether	Groundwater, µg/l	0.069	5
2-Chloroethylvinyl Ether	Groundwater, µg/l	0.148	1
1,1,2-Trichlorotrifluoroethane	Groundwater, µg/l	0.088	0.5
1,1,1,2-Tetrachloroethane	Groundwater, µg/l	0.067	0.5
Vinyl Acetate	Groundwater, µg/l	0.603	0.5
tert-Butyl Alcohol	Groundwater, µg/l	0.0975	0.5
Diisopropyl Ether	Groundwater, µg/l	0.025	0.5
tert-Butyl Ethyl Ether	Groundwater, µg/l	0.0975	0.5
Ethyl tert-Butyl Ether	Groundwater, µg/l	0.0975	0.05
tert-Amyl Methyl Ether	Groundwater, µg/l	0.0707	0.5
Petroleum Hydrocarbons, 8015B			
GRO (by CA LUFT MS)	Groundwater, mg/l	18.8	50
DRO	Groundwater, mg/l	16.3	50
ORO	Groundwater, mg/l	95.8	300
T-22 Metals, 6010B, 7471A			
Antimony (Sb)	Groundwater, mg/l	0.0018	0.01

TABLE 5 ANALYTICAL REQUIREMENTS FOR SOIL AND GROUNDWATER[1]			
Method, Analyte	**Matrix, units**	**Required MDL[2,3]**	**Required PQL[4]**
Arsenic (As)	Groundwater, mg/l	0.0015	0.005
Barium (Ba)	Groundwater, mg/l	0.0007	0.005
Beryllium (Be)	Groundwater, mg/l	0.0002	0.002
Cadmium (Cd)	Groundwater, mg/l	0.0002	0.002
Chromium (Cr)	Groundwater, mg/l	0.0006	0.01
Cobalt (Co)	Groundwater, mg/l	0.0003	0.002
Copper (Cu)	Groundwater, mg/l	0.0009	0.02
Lead (Pb)	Groundwater, mg/l	0.0023	0.005
Mercury (Hg)	Groundwater, mg/l	0.0001	0.0002
Molybdenum (Mo)	Groundwater, mg/l	0.0002	0.01
Nickel (Ni)	Groundwater, mg/l	0.0008	0.01
Selenium (Se)	Groundwater, mg/l	0.0007	0.02
Silver (Ag)	Groundwater, mg/l	0.0019	0.005
Thallium (Tl)	Groundwater, mg/l	0.0035	0.01
Vanadium (V)	Groundwater, mg/l	0.0007	0.01
Zinc (Zn)	Groundwater, mg/l	0.0041	0.02
Organochlorine Pesticides, 8081A			
Aldrin	Groundwater, mg/l	0.005	0.06
alpha-BHC	Groundwater, mg/l	0.006	0.06
beta-BHC	Groundwater, mg/l	0.010	0.06
delta-BHC	Groundwater, mg/l	0.006	0.06
gamma-BHC (Lindane)	Groundwater, mg/l	0.006	0.06
Chlordane	Groundwater, mg/l	0.40	1
4,4'-DDD	Groundwater, mg/l	0.015	0.06
4,4'-DDE	Groundwater, mg/l	0.006	0.06
4,4'-DDT	Groundwater, mg/l	0.023	0.06
Dieldrin	Groundwater, mg/l	0.009	0.06
Endosulfan I	Groundwater, mg/l	0.006	0.06
Endosulfan II	Groundwater, mg/l	0.014	0.06
Endosulfan sulfate	Groundwater, mg/l	0.010	0.06

TABLE 5 ANALYTICAL REQUIREMENTS FOR SOIL AND GROUNDWATER[1]			
Method, Analyte	**Matrix, units**	**Required MDL[2,3]**	**Required PQL[4]**
Endrin	Groundwater, mg/l	0.011	0.06
Endrin aldehyde	Groundwater, mg/l	0.016	0.06
Endrin ketone	Groundwater, mg/l	0.010	0.06
Heptachlor	Groundwater, mg/l	0.003	0.06
Heptachlor epoxide	Groundwater, mg/l	0.006	0.06
Methoxychlor	Groundwater, mg/l	0.006	0.06
Toxaphene	Groundwater, mg/l	0.39	1
Polycyclic Aromatic Hydrocarbons, 8270			
Anthracene	Groundwater, µg/l	0.292	2
Benzo[a]pyrene	Groundwater, µg/l	0.241	2
Chrysene	Groundwater, µg/l	0.227	2
Naphthalene	Groundwater, µg/l	0.240	2
Phenanthrene	Groundwater, µg/l	0.341	2
Pyrene	Groundwater, µg/l	0.318	2

Notes:

1 Detection limit may change if sample dilution is required.
2 MDLs to be updated annually.
3 MDL = Method Detection Limit
4 PQL = Practical Quantitation Limit.

FIGURES

Stantec

Logged By:	Dates Drilled:	Drilling Contractor:	Project Name:	Method/Equipment:	Boring Number:

See Unified Soil Classification System for sampling method, classifications and laboratory testing methods.	Boring Diam.(in.):	Surface Elev.(ft.):	Groundwater Depth (ft): First Water ▽ Static Water ▼	Total Depth (ft.):	Drive wt.(lbs.):	Drop Dist.(in.):

Feet (bgs)	Boring or Well Completion	Depth, (ft.)	Sample Recovery	Blows/6"	Classification	Description (classification, color w/code using ASTM standard, grain shape, consistency, moisture, other, odor, percentage)	PID/FID (ppm)	Sample Name	Sample Time	Feet (bgs)
1										1
2										2
3										3
4										4
5										5
6										6
7										7
8										8
9										9
10										10
11										11
12										12
13										13
14										14
15										15

Project No. _____ Date _____ Page **1** of _____

GEOLOGIC DATA SHEET

Boring ID	Drilling Method	Date Started	Date Finished	Total Depth (in feet bgs)	Sample Methods		Comments
					Soil	Groundwater	

Laboratory Special Instructions: Report low levels for EPA Method 8260 analysis of groundwater.

STANTEC CHAIN-OF-CUSTODY RECORD

COC # _____

Page _____ of _____

FIELD OFFICE INFORMATION	PROJECT INFORMATION
OFFICE:	Project No.: Task:
Send Report to:	Project Name:
	Project Manager:
Telephone:	Laboratory:
Fax/E-Mail:	

Sample No. / Identification	SAMPLE Date	Time	Matrix *	Container & Size **	Preservative	Number of Containers	ANALYSES / METHOD REQUEST	REMARKS/ PRECAUTIONS

TAT
- ☐ Normal
- ☐ Rush
- ☐ Other: _____

REPORTING REQUIREMENTS
- ☐ MB & SURGS
- ☐ Dup/MS/MSD
- ☐ Raw Data
- ☐ CLP Rpt
- ☐ EDD
- ☐ Other

Possible Hazard Identification
☐ Non-Hazardous ☐ Flammable ☐ Skin Irritant ☐ Poison B ☒ Unknown

Sample Disposal
☐ Return to Client ☒ Disposal by Lab ☐ Archive for _____ Months

Sampled by: ***Shipment Method:*** ***Airbill Number:***

Signature	Print Name	Company	Date	Time
1(a) ***Relinquished by:***				
1(b) ***Received by:***				
2(a) ***Relinquished by:***				
2(b) ***Received by:***				
3(a) ***Relinquished by:***				
3(b) ***Received by:***				

***Matrix Key:** **AQ** = Aqueous **AR** = Air **SO** = Soil **WA** = Waste **OT** = Other

****Container:** **A** = Amber **C** = Clear Glass **V** = VOA **S** = Soil Jar **O** = Orbo **T** = Tedlar **B** = Brass **P** = Plastic **OT** = Other

Note: 12 voas needed for groundwater samples with duplicate (3-sample, 3-dup, 3-MS, and 3-MSD)

Stantec

SAMPLE COLLECTION LOG

Page __ of ___

DATE: ______________________________

SAMPLERS: ______________________________

SAMPLE ID	WELL ID	SAMPLE DEPTH (ft. bgs)	MATRIX (soil, vaper, gw, blank, dup)	SAMPLE METHOD	COLLECTION TIME	PID/FID

APPENDICES

APPENDIX A

Cover Page:

Quality Assurance Manual

TestAmerica San Francisco
1220 Quarry Lane
Pleasanton, CA 94566
Tel No. 925-484-1919
Fax No. 925-600-3002

www.testamericainc.com

Facility Distribution No. _____ **Distributed To:_____**

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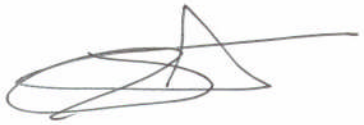
Quality Assurance Manual
Approval Signatures

Laboratory Director – Peter Moreton 	Date 12-17-2007
Quality Manager - Rene Boongaling 	Date 11-15-2007

SECTION 2

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SECTION 3

INTRODUCTION
(NELAC 5.1 - 5.3)

3.1 INTRODUCTION AND COMPLIANCE REFERENCES

TestAmerica San Francisco's Quality Assurance Manual (QAM) is a document prepared to define the overall policies, organization objectives and functional responsibilities for achieving TestAmerica's data quality goals. Each TestAmerica laboratory maintains a local perspective in its scope of services and client relations and maintains a national perspective in terms of quality.

The QAM has been prepared to assure compliance with the 2003 National Environmental Laboratory Accreditation Conference (NELAC) standards and ISO/IEC Guide 17025 (1999). In addition, the policies and procedures outlined in this manual are compliant with the various accreditation and certification programs listed in Appendix 6. The relevant NELAC section is included in the heading of each QAM section. *The QAM has been prepared to assure compliance with the various accreditation and certifications listed in Appendix 6.*

The QAM has been prepared to be consistent with the requirements of the following documents:

- EPA SW-846, *Test Methods for the Evaluation of Solid Waste, 3rd Edition,* September 1986; Update I, July 1992; Update II, September 1994; and Update III, December 1996.
- Federal Register, 40 CFR Parts 136, 141, 172, 173, 178, 179 and 261.
- APHA, *Standard Methods for the Examination of Water and Wastewater,* 18th Edition, 19th, 20th and 21st Edition.

3.2 TERMS AND DEFINITIONS

A Quality Assurance Program is a company-wide system designed to ensure that data produced by TestAmerica San Francisco conforms to the standards set by state and/or federal regulations. The program functions at the management level through company goals and management policies, and at the analytical level through Standard Operating Procedures (SOPs) and quality control. The TestAmerica program is designed to minimize systematic error, encourage constructive, documented problem solving, and provide a framework for continuous improvement within the organization.

Refer to Appendix 5 for the Glossary/Acronyms.

3.3 SCOPE / FIELDS OF TESTING

TestAmerica San Francisco analyzes thousands of environmental and industrial samples every month. Sample matrices vary among air, effluent water, groundwater, hazardous waste, sludge and soils. The Quality Assurance Program contains specific procedures and methods to test samples of differing matrices for chemical, physical parameters. The Program also contains guidelines on maintaining documentation of analytical process, reviewing results, servicing clients and tracking samples through the laboratory. The technical and service requirements of all requests to provide analyses are thoroughly evaluated before commitments are made to accept

the work. Measurements are made using published reference methods or methods developed and validated by the laboratory.

The methods covered by this manual include the most frequently requested water, air, industrial waste, and soil methodologies needed to provide analytical services in the United States and its territories. The specific list of test methods used by the laboratory can be found in Appendix 4. The approach of this manual is to define the minimum level of quality assurance and quality control necessary to meet requirements. All methods performed by TestAmerica Laboratories San Francisco shall meet these criteria as appropriate. In some instances, quality assurance project plans (QAPPs), project specific data quality objectives (DQOs) or local regulations may require criteria other than those contained in this manual. In these cases, the laboratory will abide by the requested criteria following review and acceptance of the requirements by the Laboratory Director and the Quality Assurance (QA) Manager. In some cases, QAPPs and DQOs may specify less stringent requirements. The Laboratory Director and the QA Manager must determine if it is in the lab's best interest to follow the less stringent requirements.

3.4 MANAGEMENT OF THE MANUAL

3.4.1 Review Process

The manual is reviewed annually by the QA Manager and laboratory personnel to assure that it reflects current practices and meets the requirements of TestAmerica Laboratories San Francisco's clients and regulators. Occasionally, the manual may need changes in order to meet new or changing regulations and operations. The QA Manager will review the changes in the normal course of business and incorporate changes into revised sections of the document. The updates will be reviewed by the QA Manager, Laboratory Director/Manager, Technical Director(s), relevant operational staff and Corporate Quality Assurance (if a change is made to the Corporate template) and then formally incorporated into the document in periodic updates. The QAM is based on a Corporate QAM Template that is prepared and approved by the Chief Operating Officers (COOs) and Corporate Quality Assurance. This template is reviewed annually by the COOs, Corporate Quality, and each laboratory. Necessary changes are coordinated by the Vice President of Quality and Environmental Health & Safety (EHS) and distributed to each laboratory for inclusion in the laboratory specific QA Manuals.

Policies in the QAM that require immediate attention may be addressed through the use of Corporate QA/QC Policy Memoranda. QA/QC Policy Memoranda are published from time to time to facilitate immediate changes to QA/QC Policy. QA/QC Policy Memoranda supersede the QAM and all other SOPs (refer to Section 5.3). All policy memoranda are dated, archived and distributed by their placement into the front of the QAM between the signature page and Section 2. At a minimum, each policy memorandum is approved by the same authorized signatories as shown on the cover page of the QA Manual. In addition, Corporate QA/QC Policy Memoranda are signed by the COOs and VP of Quality and EHS. The QA/QC Policy Memoranda are incorporated into the QAM during the periodic updates. Policy memorandum may also include an expiration date if appropriate. An example format can be found in Figure 3-1. A similar procedure is followed for local laboratory changes.

Laboratory-specific QAM changes are approved and documented through the Management of Change process (Refer to SOP No. CA-Q-S-003, Management of Change Procedure).

3.4.2 Control

This manual is considered confidential within TestAmerica and may not be altered in any manner by other than a duly appointed representative from TestAmerica. If the document has been provided to external users or regulators, it is for the exclusive purpose of reviewing TestAmerica San Francisco's quality systems and shall not be used in any other way without the written permission of an appointed representative of TestAmerica. The procedure for control of distribution is incorporated by reference to SOP SF-QA-1203, current revision.

The order of precedence in the event of a conflict between policies is outlined in Section 5.3 of this Quality Assurance Manual.

Figure 3-1.

Example - Format for a QA/QC Policy Memorandum

Corporate (or Laboratory) QA/QC Policy Memorandum # _____

Effective Date: _____ Expiration Date: When Appropriate QAM Section is Revised

Local:

_____ _____
Laboratory Director Approval Date

_____
Quality Assurance Approval Date

1. **Purpose**

2. **Procedure**

3. **Attachments**

4. **References/Cross References**

SECTION 4

ORGANIZATION AND MANAGEMENT
(NELAC 5.4.1)

4.1 OVERVIEW

TestAmerica San Francisco is part of a national network of laboratories known as TestAmerica. This Quality Assurance Manual (QAM) is applicable to the TestAmerica San Francisco laboratory only.

TestAmerica Laboratories San Francisco
1220 Quarry Lane
Pleasanton, CA 94566
EPA ID: CA00290

The Corporate organization chart can be found in Figure 4-1 and the laboratory's organization chart can be found in Appendix 2. The locations of other TestAmerica labs are as follows:

Aerotech Environmental Laboratories (AEL)
TestAmerica Anchorage
TestAmerica Austin
TestAmerica Buffalo
TestAmerica Buffalo Grove
TestAmerica Burlington
TestAmerica Cedar Falls
TestAmerica Chicago
TestAmerica Connecticut
TestAmerica Corpus Christi
TestAmerica Dayton
TestAmerica Denver
TestAmerica Edison
TestAmerica Honolulu
TestAmerica Houston
TestAmerica Irvine
TestAmerica King of Prussia
TestAmerica Knoxville
TestAmerica Los Angeles
TestAmerica Mobile
TestAmerica Morgan Hill
TestAmerica Nashville
TestAmerica North Canton
TestAmerica Ontario
TestAmerica Orlando
TestAmerica Pensacola
TestAmerica Phoenix
TestAmerica Pittsburgh
TestAmerica Portland

TestAmerica Richland
TestAmerica Savannah
TestAmerica Seattle
TestAmerica Spokane
TestAmerica St. Louis
TestAmerica Tacoma
TestAmerica Tallahassee
TestAmerica Tampa
TestAmerica Valparaiso
TestAmerica Watertown
TestAmerica West Sacramento
TestAmerica Westfield

4.2 ROLES AND RESPONSIBILITIES

In order for the Quality Assurance Program to function properly, all members of the staff must clearly understand and meet their individual responsibilities as they relate to the quality program. The following descriptions define each role in its relationship to the Quality Assurance Program. More extensive job descriptions are maintained by laboratory management.

4.2.1 Quality Assurance Program

The responsibility for quality lies with every employee of TestAmerica San Francisco. All employees have access to the QAM and are responsible for knowing the content of this manual and upholding the standards therein. Each person carries out his/her daily tasks in a manner consistent with the goals and in accordance with the procedures in this manual and the laboratory's SOPs.

4.2.2 Chairman/Chief Executive Officer (CEO)

The Chairman/CEO is the Chairman of the Board of Directors and is ultimately responsible for the quality and performance of all TestAmerica facilities. Together with the President/CEO of the Analytical Division, the Chairman/CEO establishes the overall quality standard and data integrity program for the company, providing the necessary leadership and resources to assure that the standard and integrity program are met.

4.2.3 President/Chief Executive Officer (CEO)

The President/CEO is a member of the Board of Directors and is ultimately responsible for the quality and performance of all TestAmerica facilities. Together with the Chairman/CEO, the President/CEO establishes the overall quality standard and data integrity program for the Analytical Division, providing the necessary leadership and resources to assure that the standard and integrity program are met.

4.2.4 Chief Operating Officer (COO) – East and West

The COOs serve as the ranking executives for all respective analytical laboratory operational functions and report to the President/CEO of the Analytical Division. They are responsible for the daily management of all analytical laboratories, long-term planning and development of

technical policies and management plans. They ensure the attainment of corporate objectives through the selection, development, motivation, and evaluation of top management personnel. The COOs approve all operating budgets and capital expenditures. The COOs sign-off on the final QAM template that contains company policies for implementing the Quality Program.

4.2.5 General Manager (GM)

Each GM reports directly to a COO. Each GM has full responsibility for the overall administrative and operational management of their respective laboratories. The GM's responsibilities include allocation of personnel and resources, long-term planning, setting goals, and achieving the financial, business, and quality objectives of TestAmerica. The GM ensures timely compliance with corporate management directives, policies, and management systems reviews. The GM is also responsible for restricting any laboratory from performing analyses that cannot be consistently and successfully performed to meet the standards set forth in this manual.

4.2.6 Vice President of Quality and Environmental Health and Safety (VP-QA/EHS)

The Vice President of QA/EHS reports directly to the Chairman/CEO. With the aid of the Analytical Division and Non-Analytical Division Senior Management Teams, Laboratory Director/ Managers, Quality Directors, EHS Directors, QA Managers and EHS Coordinators, the VP-QA/EHS has the responsibility for the establishment, general overview and Corporate maintenance of the Quality Assurance and Environmental, Health and Safety Program within TestAmerica. Additional responsibilities include:

- Review of QA/QC aspects of Corporate SOPs, national projects and expansions or changes in services.
- Coordination/preparation of the Corporate QAM Template that is used by each laboratory to prepare its own laboratory-specific QAM.
- Maintenance of Corporate Policies, Quality Memorandums and SOPs. Maintenance of data investigation records that are reported to Corporate Management.
- Work with various organizations outside of TestAmerica to further the development of quality standards and represent TestAmerica at various trade meetings.
- Preparation of a monthly report that includes quality metrics across the Analytical Division and a summary of any quality related initiatives and issues.
- With the assistance of the Corporate Senior Management Teams and the EHS Directors, development and implementation of the TestAmerica Environmental, Health and Safety Program.

4.2.7 Quality Directors (Corporate)

The Quality Directors report to the VP-QA/EHS. Together with the VP-QA/EHS, the Quality Directors have the responsibility for the establishment, general overview and maintenance of the Analytical Division's Quality Assurance Program within TestAmerica. The Quality Directors are responsible for:

- Oversight of the QA/QC programs within each laboratory. This includes a final review of each laboratory-specific QAM and receipt of each laboratory's QA monthly report.
- Review of QA/QC aspects of national projects.

- Assistance with certification activities.

4.2.8 Ethics and Compliance Officers (ECOs)

TestAmerica has designated two senior members of the Corporate staff to fulfill the role of Ethics and Compliance Officer (ECO) – VP-QA/EHS and VP-Client and Technical Services. Each ECO acts as a back-up to the other ECO and both are involved when data investigations occur. Each ECO has a direct line of communication to the entire senior Corporate and lab management staff.

The ECOs ensure that the organization distributes the data integrity and ethical practices policies to all employees and ensures annual trainings and orientation of new hires to the ethics program and its policies. The ECO is responsible for establishing a mechanism to foster employee reporting of incidents of illegal, unethical, or improper practices in a safe and confidential environment.

The ECOs monitor and audit procedures to determine compliance with policies and to make recommendations for policy enhancements to the CEOs, COOs, Laboratory Director/Manager or other appropriate individuals within the laboratory. The ECO will assist the laboratory QA Manager in the coordination of internal auditing of ethical policy related activities and processes within the laboratory, in conjunction with the laboratories regular internal auditing function.

The ECOs will also participate in investigations of alleged violations of policies and work with the appropriate internal departments to investigate misconduct, remedy the situation, and prevent recurrence of any such activity.

4.2.9 Vice President of Client and Technical Services

The Vise President (VP) of Client and Technical Services is responsible for offerings to clients including risk management, technical assistance, legal compliance and contract administration. The VP of Client and Technical Services provides support and direction to the Managers of these areas, and supports the COOs in decisions regarding long term planning, resource allocation and capital expenditures.

4.2.10 Director of Technical Services

The Director of Technical Services is responsible for establishing, implementing and communicating TestAmerica's Analytical Division's Technical Policies, SOPs, and Manuals. Other responsibilities include conducting technical assessments as required, acting as a technical resource in national contracts review, coordinating new technologies, establishing best practices, advising staff on technology advances, innovations, and applications.

4.2.11 Chief Information Officer (CIO)

The CIO is responsible for establishing, implementing and communicating TestAmerica's Information Technology (IT) Policies, SOPs and Manuals. Other responsibilities include coordinating new technologies, development of electronic communication tools such as TestAmerica's intranet and internet sites, ensuring data security and documentation of software, ensuring compliance with the NELAC standard, and assistance in establishing, updating, and maintaining Laboratory Information Management Systems (LIMS) at the various TestAmerica facilities.

4.2.12 Environmental Health and Safety Directors (EHSDs) (Corporate)

The EHSDs report directly to the VP-QA/EHS. The EHSDs are responsible for the development and implementation of the TestAmerica Environmental, Health and Safety program. Responsibilities include:

- Consolidation and tracking all safety and health-related information and reports for the company, and managing compliance activities for TestAmerica locations.
- Coordination/preparation of the corporate Environmental, Health and Safety Manual Template that is used by each laboratory to prepare its own laboratory-specific Safety Manual/ CHP.
- Preparation of information and training materials for laboratory EHS Coordinators.
- Assistance in the internal and external coordination of employee exposure and medical monitoring programs to insure compliance with applicable safety and health regulations.
- Serving as Department of Transportation (D.O.T.) focal point and providing technical assistance to location management.
- Serving as Hazardous Waste Management main contact and providing technical assistance to location management.

4.2.13 Laboratory Director / Manager

TestAmerica San Francisco's Laboratory Director/Manager is responsible for the overall quality, safety, financial, technical, human resource and service performance of the whole laboratory and reports to their respective GM. The Laboratory Director/Manager provides the resources necessary to implement and maintain an effective and comprehensive Quality Assurance and Data Integrity Program.

Specific responsibilities include, but are not limited to:

- Provides one or more technical directors for the appropriate fields of testing. The name(s) of the Technical Director will be included in the national database. If the Technical Director is absent for a period of time exceeding 15 consecutive calendar days, the Laboratory Director must designate another full time staff member meeting the qualifications of the Technical Director to temporarily perform this function. If the absence exceeds 65 consecutive calendar days, the primary accrediting authority must be notified in writing.
- Ensures that all analysts and supervisors have the appropriate education and training to properly carry out the duties assigned to them and ensures that this training has been documented.
- Ensures that personnel are free from any commercial, financial and other undue pressures which might adversely affect the quality of their work.
- Ensures TestAmerica's human resource policies are adhered to and maintained.
- Ensures that sufficient numbers of qualified personnel are employed to supervise and perform the work of the laboratory.
- Ensures that appropriate corrective actions are taken to address analyses identified as requiring such actions by internal and external performance or procedural audits. Procedures that do not meet the standards set forth in the QAM or laboratory SOPs may be temporarily suspended by the Laboratory Director.
- Reviews and approves all SOPs prior to their implementation and ensures all approved SOPs are implemented and adhered to.
- Pursues and maintains appropriate laboratory certification and contract approvals. Supports ISO 17025 requirements.
- Ensures client specific reporting and quality control requirements are met.
- Captains the management team, consisting of the QA Manager, the Technical Director(s), and the Operations Manager as direct reports.

4.2.14 Quality Assurance (QA) Manager

The QA Manager has responsibility and authority to ensure the continuous implementation of the quality system based on ISO 17025.

The QA Manager reports directly to the Laboratory Director and has access to Corporate QA for advice and resources. This position is able to evaluate data objectively and perform assessments without outside (i.e., managerial) influence. Corporate QA may be used as a

resource in dealing with regulatory requirements, certifications and other quality assurance related items. The QA Manager directs the activities of the QA officers to accomplish specific responsibilities, which include, but are not limited to:

- Having functions independent from laboratory operations for which he/she has quality assurance oversight.
- Maintaining and updating the QAM.
- Monitoring and evaluating laboratory certifications; scheduling proficiency testing samples.
- Monitoring and communicating regulatory changes that may affect the laboratory to management.
- Training and advising the laboratory staff on quality assurance/quality control procedures that are pertinent to their daily activities.
- Having a general knowledge of the analytical test methods for which data audit/review is performed (and/or having the means of getting this information when needed).
- Arranging for or conducting internal audits on quality systems and the technical operation.
- The laboratory QA Manager will maintain records of all ethics-related training, including the type and proof of attendance.
- Maintain, improve, and evaluate the corrective action database and the corrective and preventive action systems.
- Notifying laboratory management of deficiencies in the quality system and ensuring corrective action is taken. Procedures that do not meet the standards set forth in the QAM or laboratory SOPs are temporarily suspended following the procedures outlined in Section 13.
- Monitoring standards of performance in quality control and quality assurance.
- Coordinating of document control of SOPs, MDLs, control limits, and miscellaneous forms and information.
- Review a percentage of all final data reports for internal consistency. Review of Chain of Custody (COC), correspondence with the analytical request, batch QC status, completeness of any corrective action statements, 5% of calculations, format, holding time, sensibility and completeness of the project file contents.
- Review of external audit reports and data validation requests.
- Follow-up with audits to ensure client QAPP requirements are met.
- Establishment of reporting schedule and preparation of various quality reports for the Laboratory Director, clients and/or Corporate QA.
- Development of suggestions and recommendations to improve quality systems.
- Research of current state and federal requirements and guidelines.

4.2.15 Operations Manager

The Operations Manager manages and directs the analytical production sections of the laboratory. He/She reports directly to the Laboratory Director. More specifically, he/she:

- Evaluates the level of internal/external non-conformances for all departments.

- Continuously evaluates production capacity and improves capacity utilization.
- Continuously evaluates turnaround time and addresses any problems that may hinder meeting the required and committed turnaround time from the various departments.
- Develops and improves the training of all analysts in cooperation with the QA Manager and in compliance with regulatory requirements.
- Works with the all the analysts to ensure that scheduled instrument maintenance is completed.
- Is responsible for efficient utilization of supplies.
- Constantly monitors and modifies the processing of samples through the departments.
- Fully supports the quality system and, if called upon in the absence of the QA Manager, serves as his substitute in the interim.

4.2.16 Hazardous Waste Coordinator

The Hazardous Waste Coordinator reports directly to the Laboratory Director. The duties consist of:

- Staying current with the hazardous waste regulations.
- Continuing training on hazardous waste issues.
- Reviewing and updating annually the Hazardous Waste Contingency Plan in the Environmental Health & Safety Manual.
- Auditing the staff with regard to compliance with the Hazardous Waste Contingency Plan.
- Contacting the hazardous waste subcontractors for review of procedures and opportunities for minimization of waste.

4.2.17 Laboratory Analysts

Laboratory analysts are responsible for conducting analysis and performing all tasks assigned to them by the group leader or supervisor. The responsibilities of the analysts are listed below:

- Perform analyses by adhering to analytical and quality control protocols prescribed by current SOPs, this QA Manual, and project-specific plans honestly, accurately, timely, safely, and in the most cost-effective manner.
- Document standard and sample preparation, instrument calibration and maintenance, data calculations, sample matrix effects, and any observed non-conformance on worklists, benchsheets, lab notebooks and/or the Non-Conformance Database.
- Report all non-conformance situations, instrument problems, matrix problems and QC failures, which might affect the reliability of the data, to their supervisor, the Technical Director, and/or the QA Manager or member of QA staff.
- Perform 100% review of the data generated prior to entering and submitting for secondary level review.
- Suggest method improvements to their supervisor, the Technical Director, and the QA Manager. These improvements, if approved, will be incorporated. Ideas for the optimum

performance of their assigned area, for example, through the proper cleaning and maintenance of the assigned instruments and equipment, are encouraged.

- Work cohesively as a team in their department to achieve the goals of accurate results, optimum turnaround time, cost effectiveness, cleanliness, complete documentation, and personal knowledge of environmental analysis.

4.2.18 Safety Officer

The Safety Officer reports to the Laboratory Director and ensures that systems are maintained for the safe operation of the laboratory. The Safety Officer is responsible to:

- Conduct ongoing, necessary safety training and conduct new employee safety orientation.
- Assist in developing and maintaining the Chemical Hygiene/Safety Manual.
- Administer dispersal of all Material Safety Data Sheet (MSDS) information.
- Perform regular chemical hygiene and housekeeping instruction.
- Give instruction on proper labeling and practice.
- Serve as chairman of the laboratory safety committee.
- Provide and train personnel on protective equipment.
- Oversee the inspection and maintenance of general safety equipment – fire extinguishers, safety showers, eyewash fountains, etc. and ensure prompt repairs as needed.
- Supervise and schedule fire drills and emergency evacuation drills.
- Determine what initial and subsequent exposure monitoring, if necessary to determine potential employee exposure to chemicals used in the laboratory.
- When determined necessary, conduct exposure monitoring assessments.
- Determine when a complaint of possible over-exposure is “reasonable” and should be referred for medical consultation.
- Assist in the internal and external coordination of the medical consultation/monitoring program conducted by TestAmerica’s medical consultants.

4.2.19 Client Services Manager

The Client Services Manager reports to the Laboratory Director and serves as the interface between the laboratory’s technical departments and the laboratory’s clients. The staff consists of the Project Management team. With the overall goal of total client satisfaction, the functions of this position are outlined below:

- Technical training and growth of the Project Management team.
- Technical liaison for the Project Management team.
- Human resource management of the Project Management team.
- Responsible to ensure that clients receive the proper sampling supplies.
- Accountable for response to client inquiries concerning sample status.
- Responsible for assistance to clients regarding the resolution of problems concerning COC.

- Ensuring that client specifications, when known, are met by communicating project and quality assurance requirements to the laboratory.
- Notifying the supervisors of incoming projects and sample delivery schedules.
- Accountable to clients for communicating sample progress in daily status meeting with agreed-upon due dates.
- Responsible for discussing with client any project-related problems, resolving service issues, and coordinating technical details with the laboratory staff.
- Responsible for staff familiarization with specific quotes, sample log-in review, and final report completeness.
- Monitor the status of all data package projects in-house to ensure timely and accurate delivery of reports.
- Inform clients of data package-related problems and resolve service issues.
- Coordinate requests for sample containers and other services (data packages).

4.2.20 Project Manager

- Ensure client specifications are met by communicating project and quality assurance requirements to the laboratory.
- Notify laboratory personnel of incoming projects and sample delivery schedules.
- Monitor the status of all projects in-house to ensure timely delivery of reports.
- Inform clients of project-related problems, resolving service issues and coordinating technical issues with the laboratory staff.
- Coordinate client requests for sample containers and other services.
- Schedule sample pick-ups from client offices or project sites and notifying the laboratory staff of incoming samples.
- Coordinate subcontract work.
- Assist clients in procuring the proper sampling supplies.
- Respond to client inquiries concerning sample status.
- Assist clients with resolution of problems concerning Chains-of-Custody.

4.2.21 Project Manager Assistant

- Provides clerical support to the project management staff in order to allow them to focus on client service and report review.
- Performs faxing duties, prepares and sends electronic data deliverables (EDD) to clients, generates historical data as a cross reference for the laboratory, retrieves laboratory data, and tracks project reports.

4.2.22 Sample Control Group

- Responsible for checking for sufficient sample volume, ensuring that bottles are properly prepared and preserved, receiving and entering samples into the computer LIM system, recording sample condition, and reviewing chain-of-custody forms.
- Act as a liaison between Project Managers and Analysts in respect to handling rush orders, resolving inconsistencies and problems with chain-of-custody forms, and routing of subcontracted analyses.

4.3 DEPUTIES

The following table defines who assumes the responsibilities of key personnel in their absence:

Key Personnel	Deputy	Comment
Laboratory Director/Manager	Client Services Manager	
QA Manager	Laboratory Director	
Operations Manager	Laboratory Director	
Human Resources Manager	Laboratory Director	
EHS Coordinator	Laboratory Director	

Figure 4-1.

Corporate Organization Chart

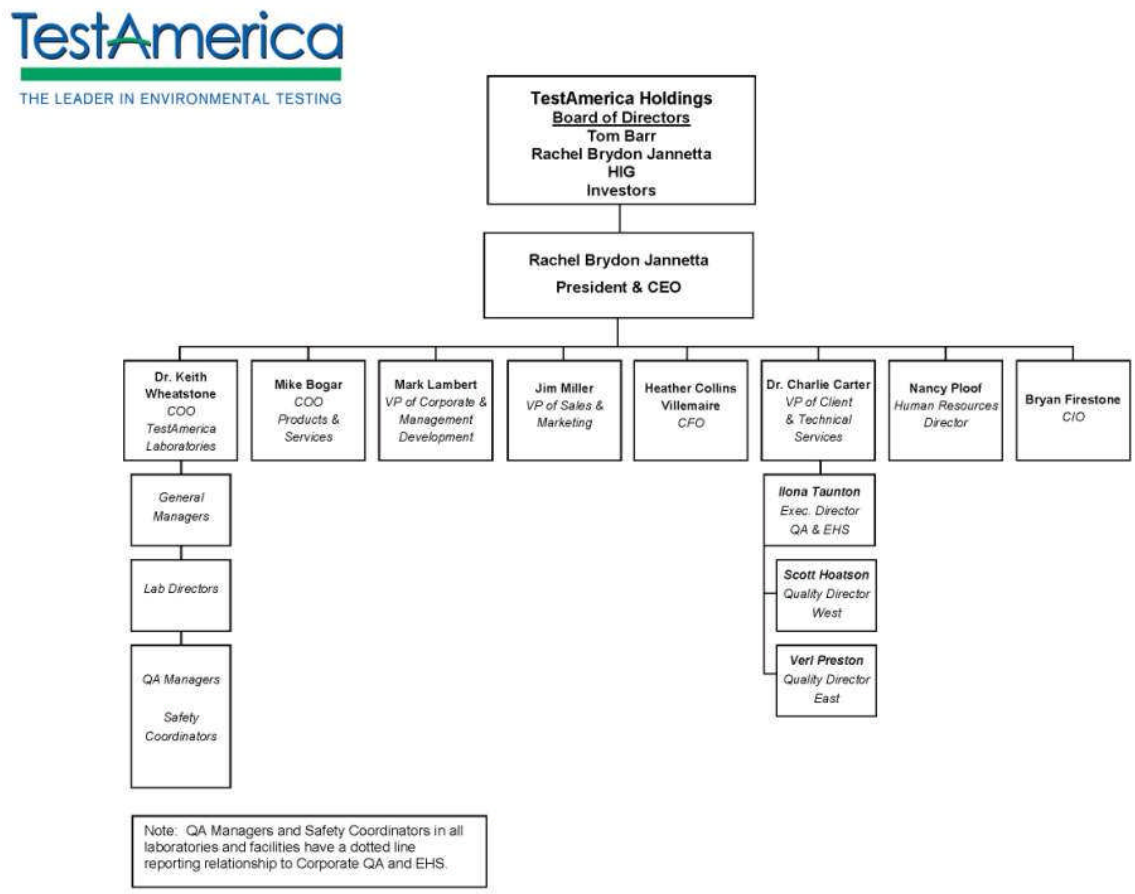
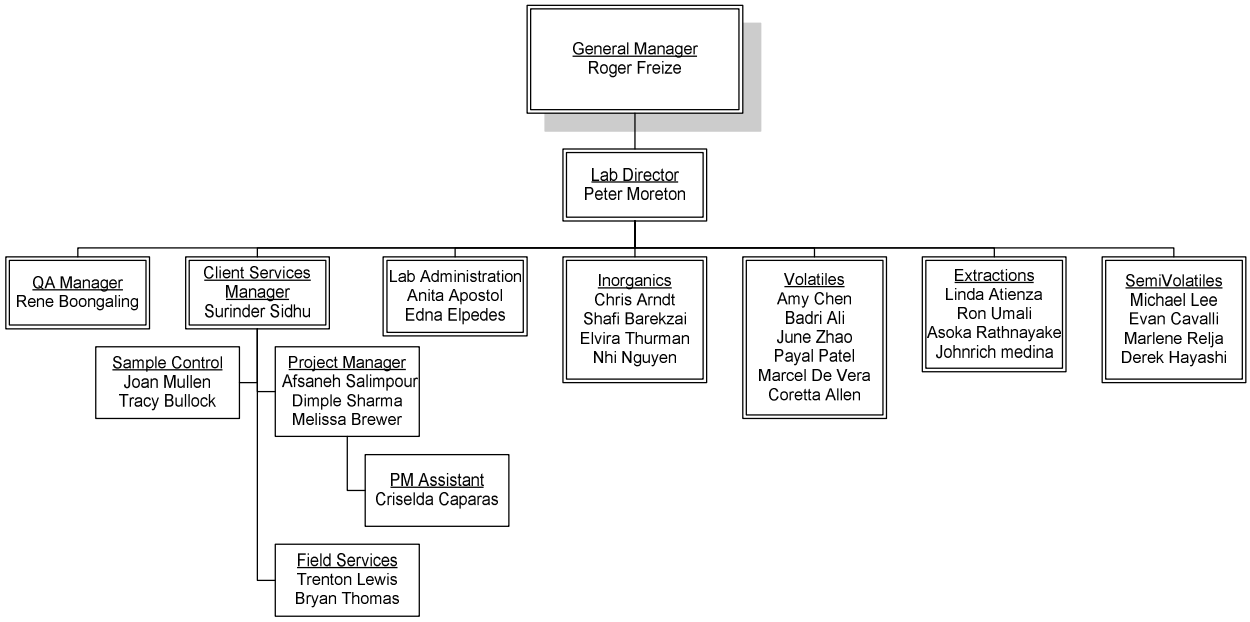


Figure 4-2.

Laboratory Organizational Chart



SECTION 5

QUALITY SYSTEM
(NELAC 5.4.2)

5.1 QUALITY POLICY STATEMENT

The management of TestAmerica and TestAmerica San Francisco are committed to providing data of known quality to its clients by adhering to approved methodologies, regulatory requirements and the QA/QC protocols described in this manual.

In all aspects of the laboratory and business operations, management is dedicated in maintaining the highest ethical standards. An Ethics Policy sign-off can be viewed in Appendix 1. Training on ethical and legal responsibilities is provided annually and each employee signs off annually on the policy as a condition of employment.

It is TestAmerica's Policy to continually improve systems and provide support to quality improvement efforts in laboratory, administrative and managerial activities. The company recognizes that the implementation of a quality assurance program requires management's commitment and support as well as the involvement of the entire staff.

TestAmerica San Francisco strives to provide clients with the highest level of professionalism and the best service practices in the industry.

Every staff member at TestAmerica San Francisco plays an integral part in quality assurance and is held responsible and accountable for the quality of their work. It is, therefore, required that all laboratory personnel are trained and agree to comply with applicable procedures and requirements established by this document.

5.2 ETHICS AND DATA INTEGRITY

TestAmerica is committed to ensuring the integrity of its data and meeting the quality needs of its clients. The 7 elements of TestAmerica's Ethics and Data Integrity Program include:

- An Ethics Policy (Policy No. CA-L-P-001) and employee ethics statements (Appendix 1).
- An Ethics and Compliance Officer (ECO).
- A training program.
- Self-governance through disciplinary action for violations.
- A confidential mechanism for anonymously reporting alleged misconduct and a means for conducting internal investigations of all alleged misconduct. (SOP No. CA-L-S-001)
- Procedures and guidance for recalling data if necessary (SOP No. CA-L-S-001).
- An effective external and internal monitoring system that includes procedures for internal audits (Section 16).

As an American Council of Independent Laboratories (ACIL) member, all TestAmerica laboratories adhere to the following ACIL Code of Ethics:

- Produce results, which are accurate and include QA/QC information that meets client pre-defined Data Quality Objectives (DQOs).
- Present services in a confidential, honest and forthright manner.
- Provide employees with guidelines and an understanding of the ethical and quality standards of our industry.
- Operate our facilities in a manner that protects the environment and the health and safety of employees and the public.
- Obey all pertinent federal, state and local laws and regulations and encourage other members of our industry to do the same.
- Educate clients as the extent and kinds of services available.
- Assert competency only for work for which adequate personnel and equipment are available and for which adequate preparation has been made.
- Promote the status of environmental laboratories, their employees, and the value of services rendered by them.

5.3 QUALITY SYSTEM SUPPORTING DOCUMENTATION

The laboratory's Quality System is communicated through a variety of documents prepared by the laboratory and company management:

- Quality Assurance Manual (QAM) Template
- Quality Assurance Manual – Each laboratory has a lab specific quality assurance manual.
- Corporate SOPs and Policies - Corporate SOPs and Policies are developed for use by all relevant laboratories. They are incorporated into the laboratory's normal SOP distribution, training and tracking system. Corporate SOPs may be general or technical.
- Work Instructions - A subset of procedural steps, tasks or forms associated with an operation of a management system (e.g., checklists, preformatted bench sheets, forms).
- Laboratory SOPs – General and Technical
- Corporate TestAmerica QA/QC Policy Memorandums (Refer to Section 3.4).
- Laboratory QA/QC Policy Memorandums (Refer to Section 3.4).

5.3.1 Order of Precedence

In the event of a conflict or discrepancy between policies, the order of precedence is as follows:

- TestAmerica QA/QC Policy Memorandum - Corporate
- Laboratory QA/QC Policy Memorandum
- Quality Assurance Manual
- Corporate SOPs and Policies
- Laboratory SOPs and Policies

- Other (Work Instructions (WI), memos, flow charts, etc.)

5.4 QA/QC OBJECTIVES FOR THE MEASUREMENT OF DATA

Quality Assurance (QA) and Quality Control (QC) are activities undertaken to achieve the goal of producing data that accurately characterize the sites or materials that have been sampled. Quality Assurance is generally understood to be more comprehensive than Quality Control. Quality Assurance can be defined as the integrated system of activities that ensures that a product or service meets defined standards.

Quality Control is generally understood to be limited to the analyses of samples and to be synonymous with the term *"analytical quality control"*. QC refers to the routine application of statistically based procedures to evaluate and control the accuracy of results from analytical measurements. The QC program includes procedures for estimating and controlling precision and bias and for determining reporting limits.

Request for Proposals (RFPs) and Quality Assurance Project Plans (QAPP) provide a mechanism for the client and the laboratory to discuss the data quality objectives in order to ensure that analytical services closely correspond to client needs. The client is responsible for developing the QAPP. In order to ensure the ability of the laboratory to meet the Data Quality Objectives (DQOs) specified in the QAPP, clients are advised to allow time for the laboratory to review the QAPP before being finalized. Additionally, the laboratory will provide support to the client for developing the sections of the QAPP that concern laboratory activities.

Historically, laboratories have described their QC objectives in terms of precision, accuracy, representativeness, comparability, completeness, selectivity and sensitivity (PARCCSS).

5.4.1 Precision

The laboratory objective for precision is to meet the performance for precision demonstrated for the methods on similar samples and to meet data quality objectives of the EPA and/or other regulatory programs. Precision is defined as the degree of reproducibility of measurements under a given set of analytical conditions (exclusive of field sampling variability). Precision is documented on the basis of replicate analysis, usually duplicate or matrix spike (MS) duplicate samples. The calculation of precision is described in Section 25.

5.4.2 Accuracy

The laboratory objective for accuracy is to meet the performance for accuracy demonstrated for the methods on similar samples and to meet data quality objectives of the EPA and/or other regulatory programs. Accuracy is defined as the degree of bias in a measurement system. Accuracy may be documented through the use of laboratory control samples (LCS) and/or MS. A statement of accuracy is expressed as an interval of acceptance recovery about the mean recovery. The calculation of accuracy is described in Section 25.

5.4.3 Representativeness

The laboratory objective for representativeness is to provide data which is representative of the sampled medium. Representativeness is defined as the degree to which data represent a characteristic of a population or set of samples and is a measurement of both analytical and field sampling precision. The representativeness of the analytical data is a function of the procedures used in procuring and processing the samples. The representativeness can be documented by the relative percent difference between separately procured, but otherwise identical samples or sample aliquots.

The representativeness of the data from the sampling sites depends on both the sampling procedures and the analytical procedures. The laboratory may provide guidance to the client regarding proper sampling and handling methods in order to assure the integrity of the samples.

5.4.4 Comparability

The comparability objective is to provide analytical data for which the accuracy, precision, representativeness and reporting limit statistics are similar to these quality indicators generated by other laboratories for similar samples, and data generated by the laboratory over time.

The comparability objective is documented by inter-laboratory studies carried out by regulatory agencies or carried out for specific projects or contracts, by comparison of periodically generated statements of accuracy, precision and reporting limits with those of other laboratories, and by the degree to which approval from the US EPA or other pertinent regulatory agencies is obtained for any procedure for which significant modifications have been made.

5.4.5 Completeness

The completeness objective for data is 90% (or as specified by a particular project), expressed as the ratio of the valid data to the total data over the course of the project. Data will be considered valid if they are adequate for their intended use. Data usability will be defined in a QAPP, project scope or regulatory requirement. Data validation is the process for reviewing data to determine its usability and completeness. If the completeness objective is not met, actions will be taken internally and with the data user to improve performance. This may take the form of an audit to evaluate the methodology and procedures as possible sources for the difficulty or may result in a recommendation to use a different method.

5.4.6 Selectivity

Selectivity is defined as: The capability of a test method or instrument to respond to a target substance or constituent in the presence of non-target substances. Target analytes are separated from non-target constituents and subsequently identified/detected through one or more of the following, depending on the analytical method: extractions (separation), digestions (separation), interelement corrections (separation), use of matrix modifiers (separation), specific retention times (separation and identification), confirmations with different columns or detectors (separation and identification), specific wavelengths (identification), specific mass spectra (identification), specific electrodes (separation and identification), etc..

5.4.7 Sensitivity

Sensitivity refers to the amount of analyte necessary to produce a detector response that can be reliably detected (Method Detection Limit) or quantified (Reporting Limit).

5.5 CRITERIA FOR QUALITY INDICATORS

The laboratory prepares a Quality Control Limit Summary that contains tables that summarize the precision and accuracy acceptability limits for analyses performed at TestAmerica San Francisco. This summary includes an effective date, is updated each time new limits are generated and is located in LIMS. A historical view of all control limits can be viewed using the Historical function located in the Method Limits Group module. Unless otherwise noted, limits within these tables are laboratory generated. Some acceptability limits are derived from US EPA methods when they are required. Where US EPA method limits are not required, TestAmerica San Francisco has developed limits from evaluation of data from similar matrices. Criteria for development of control limits is contained in Section 25.

5.6 STATISTICAL QUALITY CONTROL

Statistically-derived precision and accuracy limits are required by selected methods (such as SW-846) and programs [such as the Ohio Voluntary Action Plan (VAP)]. TestAmerica San Francisco routinely utilizes statistically-derived limits to evaluate method performance and determine when corrective action is appropriate. The analysts are instructed to use the current limits in the laboratory (dated and approved by the QA Manager) and entered into the Laboratory Information Management System (LIMS). The Quality Assurance department maintains an archive of all limits used within the laboratory. If a method defines the QC limits, the method limits are used.

If a method requires the generation of historical limits, the lab develops such limits from recent data in the QC database of the LIMS following the guidelines described in Section 25. All calculations and limits are documented and dated when approved and effective. On occasion, a client requests contract-specified limits for a specific project.

Surrogate recoveries are determined for a specific time period as defined above. The resulting ranges are entered in LIMS.

Current QC limits are entered and maintained in the LIMS analyte database. As sample results and the related QC are entered into LIMS, the sample QC values are compared with the limits in LIMS to determine if they are within the acceptable range. The analyst then evaluates if the sample needs to be rerun or re-extracted/rerun or if a comment should be added to the report explaining the reason for the QC outlier.

5.6.1 QC Charts

As the QC limits are calculated in LIMS, QC charts are also generated showing warning and control limits for the purpose of evaluating trends. The QA Manager evaluates these to determine if adjustments need to be made or for corrective actions to methods. All findings are documented and kept on file.

5.7 QUALITY SYSTEM METRICS

In addition to the QC parameters discussed above, the entire Quality System is evaluated on a monthly basis through the use of specific metrics (refer to Section 17). These metrics are used to drive continuous improvement in the laboratory's Quality System.

SECTION 6

DOCUMENT CONTROL
(NELAC 5.4.3)

6.1 OVERVIEW

The QA Department is responsible for the control of documents used in the laboratory to ensure that approved, up-to-date documents are in circulation and out-of-date (obsolete) documents are archived or destroyed. The following documents, at a minimum, must be controlled at each laboratory Facility:

- Laboratory Quality Assurance Manual
- Laboratory Standard Operating Procedures (SOP)
- Laboratory Policies
- Work Instructions and Forms
- Corporate Policies and Procedures distributed outside the intranet

The Corporate staff posts Corporate Manuals, SOPs, Policies, Work Instructions, White Papers and Training Materials on the company intranet site. These are collectively termed “Official Documents” and encompass the Policies and Procedures that all facilities are required to employ. These official documents are only considered controlled when they are read on the company intranet site. Printed copies are considered uncontrolled unless the laboratory physically distributes them as controlled documents. A detailed description of the procedure for issuing, authorizing, controlling, distributing, and archiving official documents is found in Corporate SOP No. CW-Q-S-001, Corporate Document Control and Archiving. SF-QA-1203 current revision.

The laboratory QA Department also maintains access to various references and document sources integral to the operation of the laboratory. This includes reference methods and regulations. Instrument manuals (hard or electronic copies) are also maintained by the laboratory.

The laboratory maintains control of records for raw analytical data and supporting records such as audit reports and responses, logbooks, standard logs, training files, MDL studies, Proficiency Testing (PT) studies, certifications and related correspondence, and corrective action reports. Raw analytical data consists of bound logbooks, instrument printouts, any other notes, magnetic media, electronic data and final reports. Discussion on records control is described in Section 15.

The maintenance of purchasing data is discussed in Section 9.

The maintenance of sales and marketing contracts is discussed in Section 7.

6.2 DOCUMENT APPROVAL AND ISSUE

The pertinent elements of a control system for each document include a unique name and number, the number of pages of the item, the effective date, revision number and the laboratory’s name. The Operations Manager is responsible for the maintenance of the system

and maintains the items in each department until enough documents are contained in a box for archiving off-site.

Controlled documents are authorized by the QA Department and other management. In order to develop a new document, the Operations Manager submits an electronic draft to the QA Department for suggestions and approval before use. Upon approval, the QA Manager adds the identifying version information to the document and retains the official document on file. The official document is provided as needed to those using it. Controlled documents shall be available at all locations where the operational activity described in the document is performed (may include electronic access). Controlled documents are identified as such and records of their distribution are kept by the QA Department. Document control may be achieved by either electronic or hardcopy distribution.

The QA Department maintains a list of the official versions of controlled documents.

Quality System Policies and Procedures will be reviewed at a minimum of every two years and revised as appropriate. Changes to documents occur when a procedural change warrants a revision of the document.

6.3 PROCEDURES FOR DOCUMENT CONTROL POLICY

SOPs are generated and maintained using a spreadsheet as described in SOP SF-QA-1203 current revision. This spreadsheet contains the records for all revisions, status (current or archived), implementation dates and expiration dates.

For changes to the QA Manual, refer to Corporate SOP CW-Q-S-001 and SOP No. SF-QA-1203 current revision. Uncontrolled copies must not be used within the laboratory. Previous revisions and back-up data are stored by the QA department. Electronic copies are stored on the Public server in the QA folder for the applicable revision.

For changes to SOPs, refer to SOP No. CW-Q-S-002, Writing a Standard Operating Procedure.

6.4 OBSOLETE DOCUMENTS

All invalid or obsolete documents are removed, or otherwise prevented from unintended use. SOPs containing obsolete information are archived by the QA department and removed from the specific folder in the QA public folder in the network.

SECTION 7

REVIEW OF WORK REQUEST

7.1 OVERVIEW

TestAmerica San Francisco has established procedures for the review of work requests and contracts, oral or written. The procedures include evaluation of the laboratory's capability and resources to meet the contract's requirements within the requested time period. All requirements, including the methods to be used, must be adequately defined, documented and understood. For many environmental sampling and analysis programs, testing design is site or program specific and does not necessarily "fit" into a standard laboratory service or product. It is TestAmerica's intent to provide both standard and customized environmental laboratory services to our clients.

A thorough review of technical and QC requirements contained in contracts is performed to ensure project success. The appropriateness of requested methods, and the lab's capability to perform them must be established. Projects, proposals and contracts are reviewed for adequately defined requirements and TestAmerica's capability to meet those requirements. Alternate test methods that are capable of meeting the clients' requirements may be proposed by the lab. A review of the lab's capability to analyze non-routine analytes is also part of this review process.

All projects, proposals and contracts are reviewed for the client's requirements in terms of compound lists, test methodology requested, sensitivity (detection and reporting levels), accuracy, and precision requirements (% Recovery and RPD). The reviewer ensures that the laboratory's test methods are suitable to achieve these regulatory and client requirements and that the laboratory holds the appropriate certifications and approvals to perform the work. The laboratory and any potential subcontract laboratories must be certified, as required, for all proposed tests.

The laboratory must determine if it has the necessary physical, personnel and information resources to meet the contract, and if the personnel have the expertise needed to perform the testing requested. Each proposal is checked for its impact on the capacity of the laboratory's equipment and personnel. As part of the review, the proposed turnaround time will be checked for feasibility.

Electronic or hard copy deliverable requirements are evaluated against the lab's capacity for production of the documentation.

If the laboratory cannot provide all services but intends to subcontract such services, whether to another TestAmerica facility or to an outside firm, this will be documented and discussed with the client prior to contract approval. (Refer to Section 8 for Subcontracting Procedures.)

The laboratory informs the client of the results of the review if it indicates any potential conflict, deficiency, lack of accreditation, or inability of the lab to complete the work satisfactorily. Any discrepancy between the client's requirements and TestAmerica's capability to meet those requirements is resolved in writing before acceptance of the contract. It is necessary that the

contract be acceptable to both the laboratory and the client. Amendments initiated by the client and/or TestAmerica, are documented in writing.
All contracts, QAPPs, Sampling and Analysis Plans (SAPs), contract amendments, and documented communications become part of the project record.

The review process is repeated when there are amendments to the original contract by the client, and the participating personnel are informed of the changes.

7.2 REVIEW SEQUENCE AND KEY PERSONNEL

Appropriate personnel will review the work request at each stage of evaluation.

For routine projects and other simple tasks, a review by the Project Manager (PM) is considered adequate. The PM confirms that the laboratory has any required certifications, that it can meet the clients' data quality and reporting requirements and that the lab has the capacity to meet the clients turn around needs. It is recommended that, where there is a sales person assigned to the account, an attempt should be made to contact that sales person to inform them of the incoming samples.

For new, complex or large projects, the proposed contract is given to the National Account Director, who will decide which lab will receive the work based on the scope of work and other requirements, including certification, testing methodology, and available capacity to perform the work. The contract review process is outlined in SOP No. CA-L-P-002**,** Contract Compliance Policy.

This review encompasses all facets of the operation. The scope of work is distributed to the appropriate personnel, as needed based on scope of contract, to evaluate all of the requirements shown above (not necessarily in the order below)***:***

- Legal & Contracts Director
- General Manager
- The Laboratory Operations Manager
- Laboratory Directors
- Regional and/or National Account representatives
- Laboratory Quality Manager
- The Laboratory Director reviews the formal laboratory quote and makes final acceptance for their facility.

The National Account Director, Legal Contracts Director, or local account representative then submits the final proposal to the client.

In the event that one of the above personnel is not available to review the contract, his or her back-up will fulfill the review requirements.

The Legal & Contracts Director maintains copies of all signed contracts. Locally, the project manager assistant is responsible for keeping records of all signed contracts.

7.3 DOCUMENTATION

Appropriate records are maintained for every contract or work request. All stages of the contract review process are documented and include records of any significant changes.

The contract will be distributed to and maintained by the appropriate sales/marketing personnel and the Regional Account Manager. A copy of the contract and formal quote will be filed with the laboratory PM and the Lab Director.

Records are maintained of pertinent discussions with a client relating to the client's requirements or the results of the work during the period of execution of the contract. The PM keeps a phone log of conversations with the client.

7.3.1 Project-Specific Quality Planning

Communication of contract specific technical and QC criteria is an essential activity in ensuring the success of site specific testing programs. To achieve this goal, TestAmerica San Francisco assigns a PM to each client. The PM is the first point of contact for the client. It is the PM's responsibility to ensure that project specific technical and QC requirements are effectively evaluated and communicated to the laboratory personnel before and during the project. QA department involvement may be needed to assist in the evaluation of custom QC requirements.

PM's are the direct client contact and they ensure resources are available to meet project requirements. Although PM's do not have direct reports or staff in production, they coordinate opportunities and work with laboratory management and supervisory staff to ensure available resources are sufficient to perform work for the client's project. Project management is positioned between the client and laboratory resources.

Prior to work on a new project, the dissemination of project information and/or project opening meetings may occur to discuss schedules and unique aspects of the project. Items to be discussed may include the project technical profile, turnaround times, holding times, methods, analyte lists, reporting limits, deliverables, sample hazards, or other special requirements. The PM introduces new projects to the laboratory staff through project kick-off meetings or to the supervisory staff during production meetings. These meetings provide direction to the laboratory staff in order to maximize production and client satisfaction, while maintaining quality. In addition, project notes may be associated with each sample batch as a reminder upon sample receipt and analytical processing.

During the project, any change that may occur within an active project is agreed upon between the client/regulatory agency and the PM/laboratory. These changes (e.g., use of a non-standard method or modification of a method) and approvals must be documented prior to implementation. Documentation pertains to any document, e.g., letter, e-mail, variance, contract addendum, which has been signed by both parties.

Such changes are also communicated to the laboratory during production meetings. Such changes are updated to the project notes and are introduced to the managers at these meetings. The laboratory staff is then introduced to the modified requirements via the PM or the Operation Manager. After the modification is implemented into the laboratory process, documentation of the modification is made in the case narrative of the data report(s).

TestAmerica strongly encourages client visits to the laboratory and for formal/informal information sharing session with employees in order to effectively communicate ongoing client needs as well as project specific details for customized testing programs.

SECTION 8

SUBCONTRACTING OF TESTS
(NELAC 5.4.5)

8.1 OVERVIEW

For the purpose of this quality manual, the phrase subcontract laboratory refers to a laboratory external to the corporate network. The phrase "work sharing" refers to internal transfers of samples between company laboratories. The term outsourcing refers to the act of subcontracting tests.

When contracting with our clients, the laboratory makes commitments regarding the services to be performed and the data quality for the results to be generated. When we must outsource testing for our clients because project scope, changes in laboratory capabilities, capacity or unforeseen circumstances, we must be assured that the subcontractors or work sharing laboratories understand the requirements and will meet the same commitments we have made to the client. Refer to the SOP on Subcontracting Procedures (CA-L-S-002) and the Work Sharing Process SOP (CA-C-S-001).

When outsourcing analytical services, the laboratory will assure, to the extent necessary, that the subcontract or work sharing laboratory maintains a program consistent with the requirements of this document, the requirements specified in the client's Quality Assurance Project Plan (QAPP). All QC guidelines specific to the client's analytical program are transmitted to the subcontractor and agreed upon before sending the samples to the subcontract facility. Additionally, work requiring accreditation will be placed with an appropriately accredited laboratory. The laboratory performing the subcontracted work will be identified in the final report, as will non-NELAC accredited work where required.

Project Managers (PMs), Customer Service Managers (CSM), or Regional Account Executives (RAE) for the Export Lab are responsible for obtaining client approval prior to outsourcing any samples. The laboratory will advise the client of a subcontract or work sharing arrangement in writing and when possible approval from the client shall be retained in the project folder.

8.2 QUALIFYING AND MONITORING SUBCONTRACTORS

Whenever a PM or Regional Account Executive (RAE) or Client Services Manager (CSM) becomes aware of a client requirement or laboratory need where samples must be outsourced to another laboratory, the other laboratory(s) shall be selected based on the following:

- The first priority is to attempt to place the work in a qualified network laboratory;
- Firms specified by the client for the task (Documentation that a subcontractor was designated by the client must be maintained with the project file. This documentation can be as simple as placing a copy of an e-mail from the client in the project folder);
- Firms listed as pre-qualified and currently under a subcontract with the company (in JD Edwards): A listing of all approved subcontracting laboratories and supporting documentation is available on the TestAmerica intranet site. Verify necessary accreditation for the requested tests prior to sending samples;

- Firms identified in accordance with the company's Small Business Subcontracting program as small, women-owned, veteran-owned and/or minority-owned businesses;
- NELAC or A2LA accredited laboratories;
- In addition, the firm must hold the appropriate certification to perform the work required.

All intra-company laboratories are pre-qualified for outsourcing provided they hold the appropriate accreditations, can adhere to the project/program requirements, and the client approved sending samples to that laboratory. The client must provide acknowledgement that the samples can be sent to that facility (an e-mail is sufficient documentation or if acknowledgement is verbal, the date, time, and name of person providing acknowledgement must be documented). The originating laboratory is responsible for communicating all technical, quality, and deliverable requirements as well as other contract needs. Refer to SOP No. CA-C-S-001, Work Sharing Process.

When the potential sub-contract laboratory does not meet the above criteria, Account Executives or PMs may nominate a laboratory as a subcontractor based on need. The decision to nominate a laboratory must be approved by the Laboratory Director. The Laboratory Director requests that the QA Manager begin the process of approving the subcontract laboratory. The client must provide acknowledgement that the samples can be sent to that facility (an e-mail is sufficient documentation or if acknowledgement is verbal, the date, time, and name of person providing acknowledgement must be documented).

8.2.1 The QA Manager must ensure that the Subcontracting Approval Form (Figure 8-2) has been completed and have supporting documentation on file prior to initiation of any work. A letter or e-mail is sent to the lab requesting the following information:

8.2.1.1 If a lab is NELAC or A2LA accredited,

8.2.1.1.1 Copy of necessary certifications verifying that the required approvals are current. Ensure that all needed analytes are included; some may not be accredit-able (if so, document). Certificate and scope of International Standard accreditation are required, when applicable.

8.2.1.1.2 Insurance Certificate. This is required by TestAmerica's Chief Financial Officer

8.2.1.1.3 USDA soil permit if available**

8.2.1.2 For Laboratories accredited by other agencies with an auditing program:

8.2.1.2.1 Copy of necessary certifications verifying that the required approvals are current. Ensure that all needed analytes are included; some may not be accredit-able (if so, document). Certificate and scope of International Standard accreditation are required, when applicable.

8.2.1.2.2 Insurance Certificate. This is required by TestAmerica's Chief Financial Officer

8.2.1.2.3 USDA soil permit if available**

8.2.1.2.4 Description of Ethics and Data Integrity Plan.

8.2.1.2.5 The most recent 2 sets of full proficiency testing (PT) results relevant to the analyses of interest and any associated corrective action.

8.2.1.2.6 State Audit with Corrective Action Response

8.2.1.2.7 Example final report to confirm format is compliant and provides the necessary information. (minimally, it must be determined that Batch QC results are included in the laboratory reports and data is appropriately qualified.

8.2.1.2.8 A copy of raw data associated with the first project is requested for internal review. The raw data is reviewed by the QA Manager and the PM to ensure that the results meet the client's needs. If the QA manager is unfamiliar with the analysis being performed, notify Corporate QA for guidance on the review (it may need to be sent elsewhere for evaluation). This requirement can be skipped if an on-site visit of the laboratory is planned. (This requirement is effective as of the effective date of this section. Laboratories worked with previously [minimum of 6 months] are grandfathered in.)

8.2.1.2.9 DoD work includes additional requirements as described in Section 8.1 above.

8.2.1.3 For laboratories performing tests that are unaccredited or accredited by an agency without an audit program:

8.2.1.3.1 A copy of their Quality Assurance Manual (controlled if possible). Ensure data quality limits for relevant methods are acceptable and that training procedures are adequate.

8.2.1.3.2 Copy of necessary certifications (if available) verifying that the required approvals are current. Ensure that all needed analytes are included; some may not be accredit-able (if so, document). Certificate and scope of International Standard accreditation are required, when applicable.

8.2.1.3.3 Insurance Certificate. This is required by TestAmerica's Chief Financial Officer.

8.2.1.3.4 USDA soil permit if available**

8.2.1.3.5 Evidence of a current SOP per method. A copy of the first page and signature page of the SOP is acceptable. A table of contents including effective dates may also be acceptable. The SOP can be examined if an on-site audit is performed.

8.2.1.3.6 Description of Ethics and Data Integrity Plan.

8.2.1.3.7 The most recent 2 sets of full proficiency testing (PT) results relevant to the analyses of interest and any associated corrective action.

8.2.1.3.8 Example final report to confirm format is compliant and provides the necessary information. (minimally, it must be determined that Batch QC results are included in

the laboratory reports and data is appropriately qualified.

8.2.1.3.9 Statement of Qualification (SOQ) or summary list of Technical Staff and Qualifications – position, education and years of experience.

8.2.1.3.10 DoD work includes additional requirements as described in Section 8.1 above.

8.2.1.3.11 A copy of raw data associated with the first project is requested for internal review. The raw data is reviewed by the QA Manager and the PM to ensure that the results meet the client's needs. If the QA manager is unfamiliar with the analysis being performed, notify Corporate QA for guidance on the review (it may need to be sent elsewhere for evaluation). This requirement can be skipped if an on-site visit of the laboratory is planned. (This requirement is effective as of the effective date of this section. Laboratories worked with previously [minimum of 6 months] are grandfathered in.)

8.2.2 Once the information is received by the QA Manager, it is evaluated for acceptability and forwarded to Corporate Contracts for formal contracting with the laboratory. They will add the lab to the approved list on the intranet site along with the associate documentation and notify the finance group for JD Edwards.

**USDA permit is required if soils less than three feet deep from New York, North Carolina, South Carolina, Georgia, Florida, Tennessee, Alabama, Mississippi, Louisiana, Arkansas, Texas, Oklahoma, New Mexico, Arizona, California, Hawaii, or outside the continental U. S. are to be analyzed. These samples require special shipping measures; check with the EHS Department. It may be necessary to heat-treat the samples before shipping if the subcontract laboratory does not have a USDA permit; however, some analytes/tests may be irrelevant after heat treatment.

8.2.3 The client will assume responsibility for the quality of the data generated from the use of a subcontractor they have requested the lab to use. The qualified subcontractors on the intranet site are known to meet minimal standards. The company does not certify laboratories. The subcontractor is on our approved list and can only be recommended to the extent that we would use them.

8.2.4 The status and performance of qualified subcontractors will be monitored periodically by the Laboratory who originally posts a subcontracting lab to the intranet site.

- Complaints shall be investigated. Documentation of the complaint, investigation and corrective action will be maintained in the subcontractor's file on the intranet site. Complaints must be posted using the Vendor Performance Report (Form No. CW-F-WI-009)**.**
- Information must be updated on the intranet when new information is received from the subcontracted laboratories.
- Subcontractors in good standing will be retained on the intranet listing. The QA Manager will notify all network laboratories and Corporate QA if any laboratory is removed from the intranet site. This notification will be posted on the intranet site and e-mailed to all Lab Directors/Managers, QA Managers and Sales Directors.

8.3 OVERSIGHT AND REPORTING

The PM must request that the selected subcontractor be presented with a subcontract, if one is not already executed between the laboratory and the subcontractor. The subcontract must include terms which flow down the requirements of our clients, either in the subcontract itself or through the mechanism of work orders relating to individual projects. A standard subcontract and the Lab Subcontractor Vendor Package (posted on the intranet) can be used to accomplish this, and the Legal & Contracts Director can tailor the document or assist with negotiations, if needed. The PM (or RAE or CSM) responsible for the project must advise and obtain client consent to the subcontract as appropriate, and provide the scope of work to ensure that the proper requirements are made a part of the subcontract and are made known to the subcontractor.

Prior to sending samples to the subcontracted laboratory, the PM confirms their certification status to determine if it's current and scope-inclusive. The information is documented on a Subcontracted Sample Form (Figure 8-3) and the form is retained in the project folder. For network laboratories, certifications can be viewed on the company website.

The Sample Control department is responsible for ensuring compliance with QA requirements and applicable shipping regulations when shipping samples to a subcontracted laboratory.

All subcontracted samples must be accompanied by a Chain of Custody (COC). A copy of the original COC sent by the client must be included with all samples subbed within the network.

The PM will communicate with the subcontracted laboratory to monitor the status of the analyses, facilitate successful execution of the work and ensure the timeliness and completeness of the analytical report.

Non-NELAC accredited work must be identified in the subcontractor's report as appropriate. If NELAC accreditation is not required, the report does not need to include this information.

Reports submitted from subcontractor laboratories are not altered and are included in their original form in the final project report. This clearly identifies the data as being produced by a subcontractor facility. If subcontract laboratory data is incorporated into the laboratories EDD (i.e., imported), the report must explicitly indicate which lab produced the data for which methods and samples.

Note: The results submitted by a network work sharing laboratory may be transferred electronically and the results reported by the network work sharing lab are identified on the final report. The report must explicitly indicate which lab produced the data for which methods and samples. The final report must include a copy of the completed COC for all work sharing reports.

8.4 CONTINGENCY PLANNING

The Laboratory Director may waive the full qualification of a subcontractor process temporarily to meet emergency needs. In the event this provision is utilized, Corporate QA must be informed, and the QA Manager will be required to verify adequacy of proficiency scores and

certifications. The laboratory must also request a copy of the raw data to support the analytical results for the first project submitted to the subcontract laboratory unless the laboratory has NELAC accreditation. The raw data is reviewed by the QA Manager and the PM to ensure that the results meet the client's needs. The QA Manager will request full documentation and qualify the subcontractor under the provisions above. The approval process should be completed within 30 calendar days of subcontracting.

Figure 8-1.

Example - Client-Approved Subcontractor Form

Client Information:

Client Name & Account Number:_____

Client Contact: _____

Client Address: _____

_____

Project Information: (Please choose all applicable.)

- **Certification required: □ State □ NELAC □ A2LA □ Method___**

  □ Target compound_____ □ Other_____

- **Required Turn around time (method provisional)_____**

Subcontractor's Information:

Subcontractor's Name: _____

Subcontractor's Contact: _____

Subcontractor's Email: _____

Subcontractor's Address: _____

_____

Subcontractor's Phone Number: _____

Analytical Test/Compound/Method to be subcontracted: _____

Certification Statement:

I hereby give ***[Insert Lab Name]*** permission to use the above noted subcontractor for the above noted testing procedures/methods. I realize that the above subcontractor will be held liable for the validity of the above mentioned testing procedures/methods. All subcontractors shall meet the requirements as spelled out in project information and will follow all analytical holding times and turn around times for analytical reports. The subcontract laboratory, and not TestAmerica, will be held liable for liquidated damages for delays in subcontracted analytical reports and/or electronic data deliverables.

Client Signature **Date**

Figure 8-2.
Example - Subcontracting Laboratory Approval Form (Initial / Renewal)

SUBCONTRACTING LABORATORY APPROVAL

Reference: Section 8 – Quality Assurance Manual

Date: _____
Laboratory: _____

Address: _____
_____

Contact and e-mail address: _____
Phone: Direct _____ Fax _____

Requested Item[3]	Date Received	Reviewed/ Accepted	Date
1. QA Manual[3]			
2. Copy of State Certification[1]			
3. State Audit with Corrective Action Response (or NELAC or A2LA Audit)[3]			
4. Most Recent (and relevant) 2 Sets of WP/WS Reports with Corrective Action Response[1,3]			
5. SOQ or Summary list of Technical Staff and Qualifications [3]			
6. SOPs for Methods to Be Loadshifted[2,3]			
7. USDA Soil Permit			
8. Insurance Certificate			
9. Sample Report[3]			
10. For DoD Work: Statement that Lab quality system complies with QSM.			
11. For DoD Work: Approved by specific DoD Component laboratory approval process.			
11. Description of Ethics Program[3]			

1 - Required when emergency procedures are implemented.
2 - Some labs may not submit copies due to internal policies. In these cases, a copy of the first page and signature page of the SOP is acceptable. This requirement may also be fulfilled by supplying a table of SOPs with effective dates.
3 – If the laboratory has NELAC accreditation, Item #1,3,4, 5, 6, 9 and 10 are optional.

On Site Audit Planned: YES NO If yes, Date Completed: _____ By Whom: _____

Comments:

Lab Acceptable for Subcontracting Work: YES NO Limitations: _____

QA Manager: _____ Date: _____

Figure 8-3.

Example - Subcontracted Sample Form

Date/Time: _____

Subcontracted Laboratory Information:

- Subcontractor's Name: _____
- Subcontractor Point of Contact: _____
- Subcontractor's Address: _____
- Subcontractor's Phone: _____
- Analyte/Method: _____
- Certified for State of Origin: _____
- NELAC Certified: Yes_____No_____
- A2LA (or ISO 17025) Certified: Yes_____No_____
- CLP-like Required: Yes_____No_____
  (Full doc required)
- Requested Sample Due Date: _____
  (Must be put on COC)

Project Manager: _____

Laboratory Sample # Range: _____
(Only of Subcontracted Samples)

Laboratory Project Number (Billing Control #): _____

All subcontracted samples are to be sent via bonded carrier and Priority Overnight. Please attach tracking number below and maintain these records in the project files.

PM Signature_____**Date**_____

SECTION 9

PURCHASING SERVICES AND SUPPLIES
(NELAC 5.4.6)

9.1 OVERVIEW

Evaluation and selection of suppliers and vendors is performed, in part, on the basis of the quality of their products, their ability to meet the demand for their products on a continuous and short term basis, the overall quality of their services, their past history, and competitive pricing. This is achieved through evaluation of objective evidence of quality furnished by the supplier, which can include certificates of analysis, recommendations, and proof of historical compliance with similar programs for other clients. To ensure that quality critical consumables and equipment conform to specified requirements, all purchases from specific vendors are approved by a member of the supervisory or management staff.

Capital expenditures are made in accordance with the Controlled Purchases Procedure, CW-F-S-004. Only one quote is required where the item being purchased is a sole source product, Examples of sole source capital expenditures are laboratory test equipment, client specified purchases and building leases. A minimum of two quotes is required where the opportunity exists to source from more than one vendor. All documentation related to the purchase of capital items will be maintained in the individual CapEx files located in Corporate Purchasing. Data will be held in accordance with the record retention policy.

TestAmerica will enter into formal contracts with vendors when it is advantageous to do so. Contracts will be signed in accordance with the Authorization Matrix Policy, CW-F-P-002. Examples of items that are purchased through vendor contracts are laboratory instruments, consumables, copiers and office supplies. Request for Proposals (RFP's) will be issued where more information is required from the potential vendors than just price. RFP's allow TestAmerica to determine if a vendor is capable of meeting requirements such as supplying all of the TestAmerica facilities, meeting required quality standards and adhering to necessary ethical and environmental standards. The RFP process also allows potential vendors to outline any additional capabilities they may offer.

Non-capital expenditure items are purchased through the requisition and approval process in JD Edwards or through other TestAmerica authorized methods (approved web-sites, purchasing cards). Labs have the ability to select from the approved vendors in JD Edwards.

9.2 GLASSWARE

Glassware used for volumetric measurements must be Class A or verified for accuracy according to laboratory procedure. Pyrex (or equivalent) glass should be used where possible. For safety purposes, thick-wall glassware should be used where available.

9.3 REAGENTS, STANDARDS & SUPPLIES

Chemical reagents, solvents, glassware, and general supplies are ordered as needed to maintain sufficient quantities on hand. Purchasing guidelines for equipment and reagents must meet with the requirements of the specific method and testing procedures for which they are being purchased. Solvents and acids are pre-tested in accordance with Corporate SOP on Solvent & Acid Lot Testing & Approval, SOP No. CA-Q-S-001.

9.3.1 Purchasing

The nature of the analytical laboratory demands that all material used in any of the procedures is of a known quality. The wide variety of materials and reagents available makes it advisable to specify recommendations for the name, brand, and grade of materials to be used in any determination. This information is contained in the method SOP. The analyst should complete the Purchase Order form (Figure 9-3-1) when requesting reagents, standards, or supplies**.** For supplies that are in the on-site consignment system, the analyst may check the items out that are approved for laboratory use by following these procedure:

- Remove the scanner from the charger and turn it on.
- From the main menu, press the “D” key.
- Scan your badge ID label.
- When prompted, scan the cost center label.
- Scan the part label for each item as it appears on the stockroom label.
- When prompted, scan the object number label for each item.
- Enter the quantity taken on the keypad for each item.
- Press the “Enter” key.
- Press the F4 key to return to the main menu.
- Turn the scanner off.
- Return to charger.

9.3.2 Receiving

It is the responsibility of the purchasing clerk to receive the shipment. It is the responsibility of the analyst who ordered the materials to date the material when received**.** Once the ordered reagents or materials are received, the analyst compares the information on the label or packaging to the original order to ensure that the purchase meets the quality level specified. Material Safety Data Sheets (MSDSs) are kept in the MSDS binder (if not already present) and online through the Company’s intranet website. Anyone may review these for relevant information on the safe handling and emergency precautions of on-site chemicals.

9.3.3 Specifications

There are many different grades of analytical reagents available to the analyst. All methods in use in the laboratory specify the grade of reagent that must be used in the procedure. If the quality of the reagent is not specified, it may be assumed that it is not significant in that procedure and, therefore, any grade reagent may be used. It is the responsibility of the analyst to check the procedure carefully for the suitability of grade of reagent.

Chemicals must not be used past the manufacturer's expiration date and must not be used past the expiration time noted in a method SOP. If dates are not provided, the laboratory may contact the manufacturer to determine an expiration date.

The laboratory assumes a five year expiration date on inorganic dry chemicals unless noted otherwise by the manufacturer or by the reference source method.

- An expiration date can not be extended if the dry chemical is discolored or appears otherwise physically degraded, the dry chemical must be discarded.

- Expiration dates can be extended if the dry chemical is found to be satisfactory based on acceptable performance of quality control samples (Continuing Calibration Verification (CCV), Blanks, Laboratory Control Sample (LCS), etc.).

Wherever possible, standards must be traceable to national or international standards of measurement or to national or international reference materials. Records to that effect are available to the user.

Compressed gases in use are checked for pressure and secure positioning daily. The minimum total pressure must be 500 psig or the tank must be replaced. The quality of the gases must meet method or manufacturer specification or be of a grade that does not cause any analytical interference.

Water used in the preparation of standards or reagents must have a conductivity of less than 1mmho/cm (or resistivity of greater than 1.0 megaohm-cm) at 25^{o}C. The conductivity is checked and recorded daily. If the water's conductivity is less than the specified limit, the Laboratory Director must be notified immediately in order to notify all departments, decide on cessation (based on intended use) of activities, and make arrangements for correction.

The laboratory may purchase reagent grade (or other similar quality) for use in the laboratory. This water must be certified "clean" by the supplier for all target analytes or otherwise verified by the laboratory prior to use. This verification is documented.

Standard lots are verified before first time use if the laboratory switches manufacturers or has historically had a problem with the type of standard.

Purchased VOA vials must be certified clean and the certificates must be maintained. If uncertified VOA vials are purchased, all lots must be verified clean prior to use. This verification must be maintained.

9.3.4 Storage

Reagent and chemical storage is important from the aspects of both integrity and safety. Light-sensitive reagents may be stored in brown-glass containers. Table 9-1 details specific storage instructions for reagents and chemicals. Section 22 discusses conditions for standard storage.

9.4 PURCHASE OF EQUIPMENT/INSTRUMENTS/SOFTWARE

When a new piece of equipment is needed, either for additional capacity or for replacing inoperable equipment, the analyst or manager makes a supply request to the Laboratory Director. If they agree with the request the procedures outlined in Policy No. CA-T-P-001, Qualified Products List, are followed. A decision is made as to which piece of equipment can best satisfy the requirements. The appropriate written requests are completed and purchasing places the order.

Upon receipt of a new or used piece of equipment, it is given a short name, such as HP-20, added to the equipment list described in Section 21 that is maintained by the QA Department and IT must be notified so that can be linked for back-ups. Its capability is assessed to determine if it is adequate or not for the specific application. For instruments, a calibration curve is generated, followed by MDLs, Demonstration of Capabilities (DOCs), and other relevant criteria (see Section 20). For software, its operation must be deemed reliable and evidence of instrument verification must be retained by the IT Department or QA Department as specified in the laboratory's procedure for software verification. Software certificates supplied by the vendors are filed with the LIMS Administrator. The manufacturer's operation manual is retained at the bench.

9.5 SERVICES

Service to analytical instruments (except analytical balances) is performed on an as needed basis. Routine preventative maintenance is discussed in Section 21. The need for service is determined by analysts and/or Operation Manager. The service providers that perform the services are approved by the Operation Manager/Laboratory Director.

9.6 SUPPLIERS

TestAmerica selects vendors through a competitive proposal / bid process, strategic business alliances or negotiated vendor partnerships (contracts). The level of control used in the selection process is dependent on the anticipated spend and the potential impact on TestAmerica business. Vendors that provide test and measuring equipment, solvents, standards, certified containers, instrument related service contracts or subcontract laboratory services shall be subject to more rigorous controls than vendors that provide off-the-shelf items of defined quality that meet the end use requirements. The JD Edwards purchasing system includes all suppliers /vendors that have been approved for use.

Evaluation of suppliers is accomplished by ensuring the supplier ships the product or material ordered and that the material is of the appropriate quality. This is documented by signing off on packing slips or other supply receipt documents. The purchasing documents contain the data that adequately describe the services and supplies ordered.

Any issues of vendor performance are to be reported immediately by the laboratory staff to the Corporate Purchasing Group by completing a Vendor Performance Report (CW-F-WI-009).

The Corporate Purchasing Group will work through the appropriate channels to gather the information required to clearly identify the problem and will contact the vendor to report the problem and to make any necessary arrangements for exchange, return authorization, credit, etc.

As deemed appropriate, the Vendor Performance Reports will be summarized and reviewed to determine corrective action necessary, or service improvements required by vendors

The laboratory has access to a listing of all approved suppliers of critical consumables, supplies and services. This information is provided through the JD Edwards purchasing system.

9.6.1 New Vendor Procedure

TestAmerica employees who wish to request the addition of a new vendor must complete a J.D. Edwards Vendor Add Request Form (CW-F-WI-007 – refer to Figure 9-2).

New vendors are evaluated based upon criteria appropriate to the products or services provided as well as their ability to provide those products and services at a competitive cost. Vendors are also evaluated to determine if there are ethical reasons or potential conflicts of interest with TestAmerica employees that would make it prohibitive to do business with them as well as their financial stability. The QA Department and/or the Laboratory Director are consulted with vendor and product selection that have an impact on quality.

Figure 9-3-1. Purchase Order Form

TestAmerica SAN FRANCISCO

Purchase Order

Tracking #: SC - _____

Standard _____
Rush _____

If Rush, Date Needed: _____

Date of Request: _____
Requested By: _____
Mngr/Team Lead Approval: _____

Vendor: _____

For Purchasing Use Only

PO #: _____

Date Order Placed: _____

PO # Only: _____

Order Placed By: _____

Quantity Ordered	Quantity Received	Quantity B/O	GL #	Part Number	Description	Unit	Unit Price	Total
						EA		0

Units: CA = Case
EA = Each
PKG = Package

Comments:

Table 9-1.

Storage of Reagents and Chemicals

Chemical	Storage Requirements
Concentrated Acids and Bases	Stored in the original containers at room temperature. All organic acids must be stored separately from inorganic acids. Acids should not be stored with bases.
Bulk Dry Chemicals	Stored in the original containers at room temperature. All organic acids must be stored separately from inorganic acids. Acids should not be stored with bases.
Working Solutions containing Organic Compounds	Stored as per method recommendation/ requirement. They are generally stored refrigerated at 4°C± 2°C.
Working Solutions containing only Inorganics	Stored at room temperature; refrigeration is optional.
Flammable Solvents	Stored in solvent cabinets at room temperature.
Non-Flammable Solvents	Stored separately from the flammable solvents in cabinets at room temperature.

Figure 9-2
Example – JD Edwards Vendor Add Request Form

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

JD Edwards Vendor Add Request Form

Vendor name:	Lab location and individual making request:
Vendor address (remit to):	Vendor phone:
Vendor address (remit to):	Vendor fax:
Contact name:	Product / service provided:

Reason for Vendor Addition: Check all reasons that apply

☐ Cost Reduction	Estimated Annual Savings $
☐ Replace Current Vendor	Reason?
	Vendor being Replaced?
☐ New Product / Service	Describe:
☐ ISO Approved (Required for Aerotech / P&K only)	

Small Business:

Does this vendor help us to meet our small business objectives: _____

If yes, which category: _____

Personal and Ethical Considerations:

Is there any personal conflict of interest with a TestAmerica employee and the vendor listed above? _____

_____

Have ethical considerations been taken into account in your evaluation of this vendor?_____

_____

Can this product be sourced from another TestAmerica facility?_____

Please complete form and email to NCPurchasing@testamericainc.com or fax to (330) 966-9275.

I approve the addition of this vendor:

_____ _____

Purchasing Manager - Patrick Eckman Corporate Controller - Leslie Bowers

Form No. CW-F-WI-007

SECTION 10

SERVICE TO THE CLIENT
(NELAC 5.4.7)

10.1 OVERVIEW

TestAmerica San Francisco cooperates with clients and their representatives to monitor the laboratory's performance in relation to work performed for the client. It is the laboratory's goal to meet all client requirements in addition to statutory and regulatory requirements discussed in Section 5. The laboratory has procedures to ensure confidentiality to clients (Section 16 and 26).

10.2 SPECIAL SERVICES

The laboratory's standard procedures for reporting data are described in Section 26. When requested the following special services are provided:

- The laboratory will provide the client or the client's representative reasonable access to the relevant areas of the laboratory for the witnessing of tests performed for the client.
- The laboratory will work with client-specified third party data validators as specified in the client's contract.
- The laboratory will provide the client with all requested information pertaining to the analysis of their samples. An additional charge may apply for additional data/information that was not requested prior to the time of sample analysis or previously agreed upon.

10.3 CLIENT COMMUNICATION

Project managers are an important communication link to the clients. The lab shall inform its clients of any delays in project completion as well as any non-conformances in either sample receipt (refer to Section 24) or sample analysis. Project management will maintain ongoing client communication throughout the entire client project.

The Laboratory Director are available to discuss any technical questions or concerns that the client may have.

10.4 REPORTING

The laboratory will work with the client to produce any special communication reports required by the contract.

10.5 CLIENT SURVEYS

The laboratory assesses both positive and negative client feedback. The results are used to improve overall laboratory quality and client service.

TestAmerica San Francisco participates in the American Council of Independent Laboratories (ACIL) Seal of Excellence program. This program includes the submission of a survey to laboratory clients. The clients send their responses directly to ACIL.

TestAmerica's Sales and Marketing teams periodically develops lab and client specific surveys to assess client satisfaction.

SECTION 11

COMPLAINTS
(NELAC 5.4.8)

11.1 OVERVIEW

TestAmerica San Francisco believes that effective client complaint handling processes have important business and strategic value. Listening to and documenting client concerns captures 'client knowledge' that helps to continually improve processes and improving client satisfaction. An effective client complaint handling process also provides assurance to the data user that the laboratory will stand behind its data, service obligations and products.

A client complaint is any expression of dissatisfaction with any aspect of our business services, communications, responsiveness, data, reports, invoicing and other functions expressed by any party, whether received verbally or in written form. Client inquiries, complaints or noted discrepancies are documented, communicated to management, and addressed promptly and thoroughly.

The laboratory has procedures for dealing with both external and internal complaints.

The nature of the complaint is identified, documented and investigated, and an appropriate action is determined and taken. In cases where a client complaint indicates that an established policy or procedure was not followed, the QA Department must evaluate whether a special audit must be conducted to assist in resolving the issue. A written confirmation or letter to the client, outlining the issue and response taken is recommended as part of the overall action taken.

The process of complaint resolution and documentation utilizes the procedures outlined in Section 13 (Corrective Actions) and is documented using the laboratory's corrective actions system. It is the laboratory's goal to provide a satisfactory resolution to complaints in a timely and professional manner.

11.2 EXTERNAL COMPLAINTS

An employee that receives a complaint initiates the complaint resolution process and the documentation of the complaint.

Complaints fall into two categories: correctable and non-correctable. An example of a correctable complaint would be one where a report re-issue would resolve the complaint. An example of a non-correctable complaint would be one where a client complains that their data was repeatedly late. Non-correctable complaints should be reviewed for preventive action measures to reduce the likely hood of future occurrence and mitigation of client impact.

The general steps in the complaint handling process are:

- Receiving Complaints
- Complaint Investigation and Service Recovery
- Process Improvement

The laboratory shall inform the initiator of the complaint of the results of the investigation and the corrective action taken, if any.

11.3 INTERNAL COMPLAINTS

Internal complaints include, but are not limited to: errors and non-conformances, training issues, internal audit findings, and deviations from methods. Corrective actions may be initiated by any staff member who observes a nonconformance and shall follow the procedures outlined in Section 13. In addition, Corporate management, Sales and Marketing and Information Technology (IT) may initiate a complaint by contacting the laboratory or through the corrective action system described in Section 13.

11.4 MANAGEMENT REVIEW

The number and nature of client complaints is reported by the QA Manager to the laboratory and QA Director in the QA Monthly report. Monitoring and addressing the overall level and nature of client complaints and the effectiveness of the solutions is part of the Annual Management Review (Section 17)

SECTION 12

CONTROL OF NON-CONFORMING WORK
(NELAC 5.4.9)

12.1 OVERVIEW

When data discrepancies are discovered or deviations and departures from laboratory standard procedures, policies and/or client requests have occurred, corrective action is taken immediately. First, the laboratory evaluates the significance of the nonconforming work. Then, a corrective action plan is initiated based on the outcome of the evaluation. If it is determined that the nonconforming work is an isolated incident, the plan could be as simple as adding a qualifier to the final results and/or making a notation in the case narrative. If it is determined that the nonconforming work is a systematic or improper practices issue, the corrective action plan could include a more in depth investigation and a possible suspension of an analytical method. In all cases, the actions taken are documented using the laboratory's corrective action system (refer to Section 13).

Due to the frequently unique nature of environmental samples, sometimes departures from documented policies and procedures are needed. When an analyst encounters such a situation, the problem is presented to the OM for advice. The OM may elect to discuss it with the Laboratory Director or QA Manager or have a representative contact the client to decide on a logical course of action. Once an approach is agreed upon, the analyst documents it in an NCM. This information can then be supplied to the client in the form of a footnote or a case narrative with the report.

Project Management may encounter situations where a client may request that a special procedure be applied to a sample that is not standard lab practice. Based on a technical evaluation, the lab may accept or opt to reject the request based on technical or ethical merit. An example might be the need to report a compound that the lab does not normally report. The lab would not have validated the method for this compound following the procedures in Section 20. The client may request that the compound be reported based only on the calibration. Such a request would need to be approved by the Laboratory Director and QA Manager, documented and included in the project folder. Deviations **must** also be noted on the final report with a statement that the compound is not reported in compliance with the analytical method requirements and the reason. Data being reported to a non-NELAC state would need to note the change made to how the method is normally run.

12.2 RESPONSIBILITIES AND AUTHORITIES

SOP No. CA-L-S-001, Internal Investigation of Potential Data Discrepancies and Determination for Data Recall, outlines the general procedures for the reporting and investigation of data discrepancies and alleged incidents of misconduct or violations of the company's data integrity policies as well as the policies and procedures related to the determination of the potential need to recall data.

Under certain circumstances the Laboratory Director or the QA Manager may exceptionally authorize departures from documented procedures or policies. The departures may be a result of procedural changes due to the nature of the sample; a one-time procedure for a client; QC

failures with insufficient sample to reanalyze, etc. In most cases, the client will be informed of the departure prior to the reporting of the data. Any departures must be well documented using the laboratory's corrective action procedures described in Section 13. Any impacted data must be referenced in a case narrative and/or flagged with an appropriate data qualifier.

Any misrepresentation or possible misrepresentation of analytical data discovered by any laboratory staff member must be reported to facility senior laboratory management within 24-hours. The Senior Management staff is comprised of the Laboratory Director, the QA Manager, the Operation Manager and Client Services Manager. The reporting of issues involving alleged violations of the company's Data Integrity or Manual Integration procedures must be conveyed to an Ethics and Compliance Officer (ECO) and Quality Director within 24 hours.

Whether an inaccurate result was reported due to calculation or quantitation errors, data entry errors, improper practices, or failure to follow SOPs, the data must be evaluated to determine the possible effect.

The Laboratory Director/Manager, QA Manager, ECOs, COO's – East and West, General Managers and the Quality Directors – East and West have the authority and responsibility to halt work, withhold final reports, or suspend an analysis for due cause as well as authorize the resumption of work.

12.3 EVALUATION OF SIGNIFICANCE AND ACTIONS TAKEN

For each nonconforming issue reported, an evaluation of its significance and the level of management involvement needed is made. This includes reviewing its impact on the final data, whether or not it is an isolated or systematic issue, and how it relates to any special client requirements.

SOP No. CA-L-S-001 distinguishes between situations when it would be appropriate for the laboratory QA Manager and Laboratory Director/Manager (or his/her designee) to make the decision on the need for client notification (written or verbal) and data recall (report revision) and when the decision must be made with the assistance of the ECO's and Corporate Management. Laboratory level decisions are documented and approved using the laboratory's standard nonconformance/corrective action reporting (Section 13) in lieu of the data recall determination form contained in SOP No. CA-L-S-001.

12.4 PREVENTION OF NONCONFORMING WORK

If it is determined that the nonconforming work could recur, further corrective actions must be made following the laboratory's corrective action system (Section 13).

On a monthly basis, the QA Department evaluates non-conformances to determine if any nonconforming work has been repeated multiple times. If so, the laboratory's corrective action process may be followed.

12.5 METHOD SUSPENSION/RESTRICTION (STOP WORK PROCEDURES)

In some cases it may be necessary to suspend/restrict the use of a method or target compound which constitutes significant risk and/or liability to the laboratory. Suspension/restriction procedures can be initiated by any of the persons noted in Section 12.2, Paragraph 5 above.

Prior to suspension/restriction, confidentiality will be respected, and the problem and the required corrective and preventive action will be stated in writing and presented to the Laboratory Director/Manager.

The Laboratory Director/Manager shall arrange for the appropriate personnel to meet with the QA Manager as needed. This meeting shall be held to confirm that there is a problem, that suspension/restriction of the method is required and will be concluded with a discussion of the steps necessary to bring the method/target or test fully back on line. In some cases that may not be necessary if all appropriate personnel have already agreed there is a problem and there is agreement on the steps needed to bring the method, target or test fully back on line.

The QA Manager will also initiate a corrective action report as described in Section 13 if one has not already been started. A copy of any meeting notes and agreed upon steps should be faxed or e-mailed by the laboratory to the appropriate General Manager and member of Corporate QA. This fax/e-mail acts as notification of the incident.

After suspension/restriction, the lab will hold all reports to clients pending review. No faxing, mailing or distributing through electronic means may occur. The report must not be posted for viewing on the internet. It is the responsibility of the Laboratory Director/Manager to hold all reporting and to notify all relevant laboratory personnel regarding the suspension/restriction (i.e., Project Management, Log-in, etc…). Clients will NOT generally be notified at this time. Analysis may proceed in some instances depending on the non-conformance issue.

Within 72 hours, the QA Manager will determine if compliance is now met and reports can be released, OR determine the plan of action to bring work into compliance, and release work. A team, with all principals involved (Laboratory Director/Manager, QA Manager, Operation Manager) can devise a start-up plan to cover all steps from client notification through compliance and release of reports. Project Management, the Director of Client Services and Sales and Marketing should be notified if clients must be notified or if the suspension/restriction affects the laboratory's ability to accept work. The QA Manager must approve start-up or elimination of any restrictions after all corrective action is complete. This approval is given by final signature on the completed corrective action report as described in Section 13.

SECTION 13

CORRECTIVE ACTION
(NELAC 5.4.10)

13.1 OVERVIEW

A major component of TestAmerica's Quality Assurance (QA) Program is the problem investigation and feedback mechanism designed to keep the laboratory staff informed on quality related issues and to provide insight to problem resolution. When nonconforming work or departures from policies and procedures in the quality system or technical operations are identified, the corrective action procedure provides a systematic approach to assess the issues, restore the laboratory's system integrity, and prevent reoccurrence. Corrective actions are documented using Non-Conformance Memos (NCM) and Corrective Action Reports (CAR) (refer to Figure 13-1).

13.2 DEFINITIONS

- **Correction***:* Actions necessary to correct or repair analysis specific non-conformances. The acceptance criteria for method specific QC and protocols as well as the associated corrective actions are contained in the method specific SOPs or Appendix 4. The analyst will most frequently be the one to identify the need for this action as a result of calibration checks and QC sample analysis**.** No significant action is taken to change behavior, process or procedure.

- **Corrective Action***:* The action taken is not only a correction made to the immediate event, but a change in process, procedure or behavior that is required to eliminate the causes of an existing nonconformity, defect, or other undesirable situation in order to prevent recurrence.

13.3 GENERAL

Problems within the quality system or within analytical operations may be discovered in a variety of ways, such as QC sample failures, internal or external audits, proficiency testing (PT) performance, client complaints, staff observation, etc..

The purpose of a corrective action system is to:

- Identify non-conformance events and assign responsibility for investigation.
- Resolve non-conformance events and assign responsibility for any required corrective action.
- Identify Systematic Problems before they become serious.
- Identify and track Client complaints and provide resolution (see more on client complaints in Section 11).

13.3.1 Non-Conformance Report (NCM) - is used to document the following types of corrective actions:

- QC outside of limits
- Isolated Reporting / Calculation Errors

- Client Complaints

13.3.2 Corrective Action Report (CAR) - is used to document the following types of corrective actions:

- Issues found while reviewing NCMs that warrant further investigation.
- Issues found while reviewing the QA monthly metrix.
- Internal and External Audit Findings.
- Failed or Unacceptable PT results.
- Corrective actions that cross multiple departments in the laboratory.
- Systematic Reporting / Calculation Errors
- Health and Safety Violations
- Client Complaints
- Deviations from an established procedure or SOP

13.4 CLOSED LOOP CORRECTIVE ACTION PROCESS

Any employee in the company can initiate a corrective action. There are four main components to a closed-loop corrective action process once an issue has been identified: Cause Analysis, Selection and Implementation of Corrective Actions (both short and long term), Monitoring of the Corrective Actions, and Follow-up.

13.4.1 Cause Analysis

- Upon discovery of a non-conformance event, the event must be defined and documented. An CAR must be initiated, someone is assigned to investigate the issue and the event is investigated for cause. Table 13-1 provides some general guidelines on determining responsibility for assessment.
- The cause analysis step is the key to the process as a long term corrective action cannot be determined until the cause is determined.
- If the cause is not readily obvious, the Operation Manager, Lab Director, or QA Manager is consulted.

13.4.2 Selection and Implementation of Corrective Actions

- Where corrective action is needed, the laboratory shall identify potential corrective actions. The action(s) most likely to eliminate the problem and prevent recurrence are selected and implemented. Responsibility for implementation is assigned.
- Corrective actions shall be to a degree appropriate to the magnitude of the problem identified through the cause analysis.
- Whatever corrective action is determined to be appropriate, the laboratory shall document and implement the changes. The NCR or CAR is used for this documentation.

13.4.3 Monitoring of the Corrective Actions

- The Operation Manager and QA Manager is responsible to ensure that the corrective action taken was effective.

- Ineffective actions will be documented and re-evaluated until acceptable resolution is achieved. The Operation Manager are accountable to the Laboratory Director to ensure final acceptable resolution is achieved and documented appropriately.
- Each CAR is entered into a database for tracking purposes. The CAR database is reviewed monthly by the Laboratory Director and QA Manager to discuss each incidence and plan and assign corrective action responsibilities.
- The QA Manager reviews monthly CARs for trends. Highlights are included in the QA monthly report (refer to Section 17). If a significant trend develops that adversely affects quality, an audit of the area is performed and corrective action implemented.
- Any out-of-control situations that are not addressed acceptably at the laboratory level may be reported to the Corporate Quality Director by the QA Manager, indicating the nature of the out-of-control situation and problems encountered in solving the situation.

13.4.4 Follow-up Audits

- Follow-up audits may be initiated by the QA Manager and shall be performed as soon as possible when the identification of a nonconformance casts doubt on the laboratory's compliance with its own policies and procedures, or on its compliance with state or federal requirements. (Section 16 includes additional information regarding internal audit procedures.)
- These audits often follow the implementation of the corrective actions to verify effectiveness. An additional audit would only be necessary when a critical issue or risk to business is discovered.

13.5 TECHNICAL CORRECTIVE ACTIONS

In addition to providing acceptance criteria and specific protocols for technical corrective actions in the method SOPs and Appendix 4, the laboratory has general procedures to be followed to determine when departures from the documented policies and procedures and quality control have occurred (refer to Section 12 for information regarding the control of non-conforming work). The documentation of these procedures is through the use of an NCM or CAR.

Table 13-1 includes examples of general technical corrective actions. For specific criteria and corrective actions refer to the analytical methods or specific method SOPs or Appendix 4.

Table 13-1 provides some general guidelines for identifying the individual(s) responsible for assessing each QC type and initiating corrective action. The table also provides general guidance on how a data set should be treated if associated QC measurements are unacceptable. Specific procedures are included in Method SOPs and Appendix 4, QAM Sections 20 and 21, and SOP CA-L-S-001 (Internal Investigation of Potential Data Discrepancies and Determination for Data Recall). All corrective actions are reviewed at a minimum monthly by the QA Manager and highlights are included in the QA monthly report.

To the extent possible, samples shall be reported only if all quality control measures are acceptable. If the deficiency does not impair the usability of the results, data will be reported with an appropriate data qualifier and/or the deficiency will be noted in the case narrative. Where

sample results may be impaired, the Project Manager is notified and appropriate corrective action (e.g., reanalysis) is taken and documented**.**

13.6 BASIC CORRECTIONS

When mistakes occur in records, each mistake shall be crossed-out, and not erased, deleted, made illegible, or otherwise obliterated (e.g. no white-out), and the correct value entered alongside. All such corrections shall be initialed (or signed) and dated by the person making the correction. In the case of records stored electronically, the original "uncorrected" file must be maintained intact and a second "corrected" file is created.

This same process applies to adding additional information to a record. All additions made later than the initial must also be initialed (or signed) and dated.

When corrections are due to reasons other than obvious transcription errors, the reason for the corrections (or additions) shall also be documented.

Figure 13-1. Corrective Action Report Initiation Form

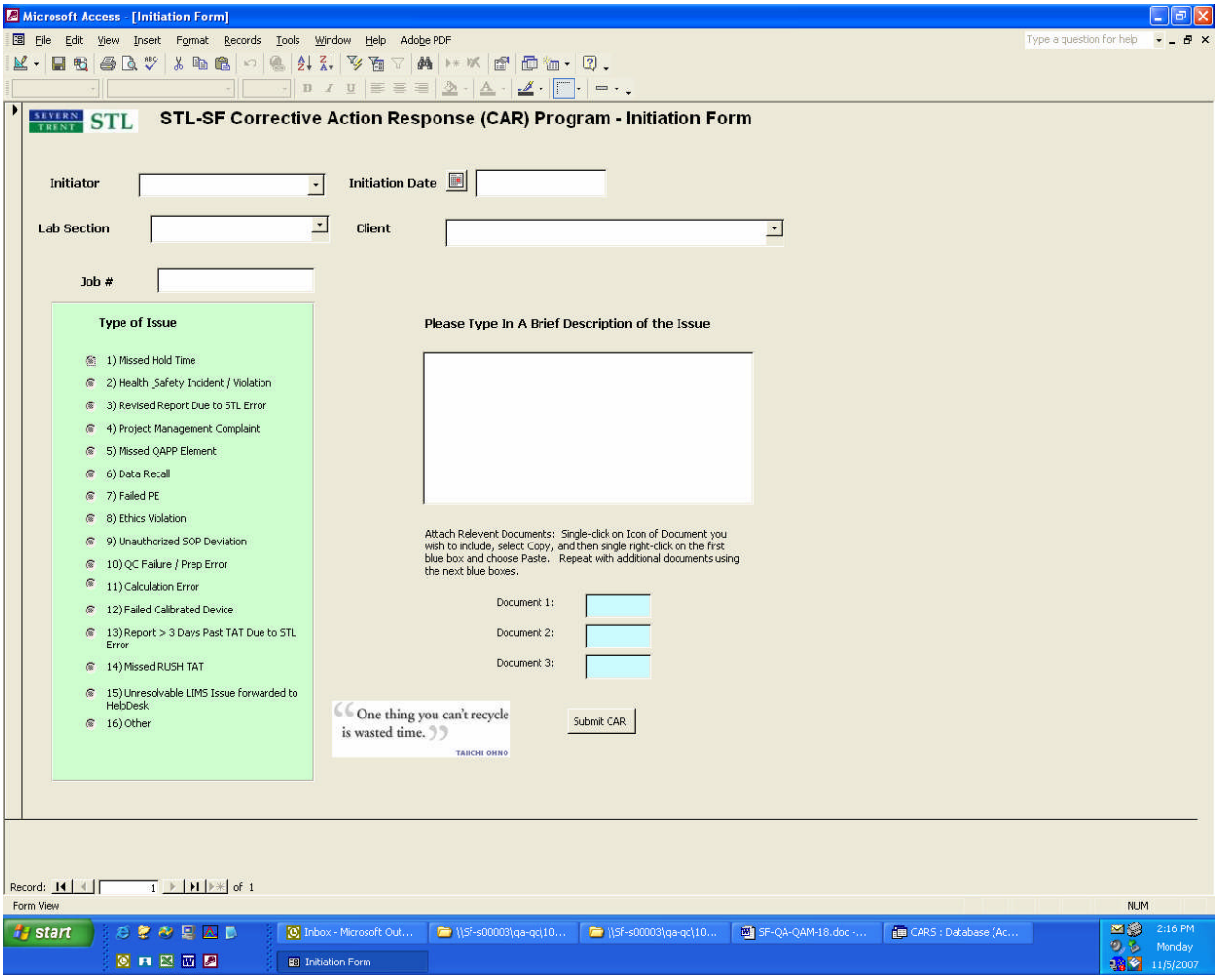


Figure 13.2 Corrective Action Report – Review Form

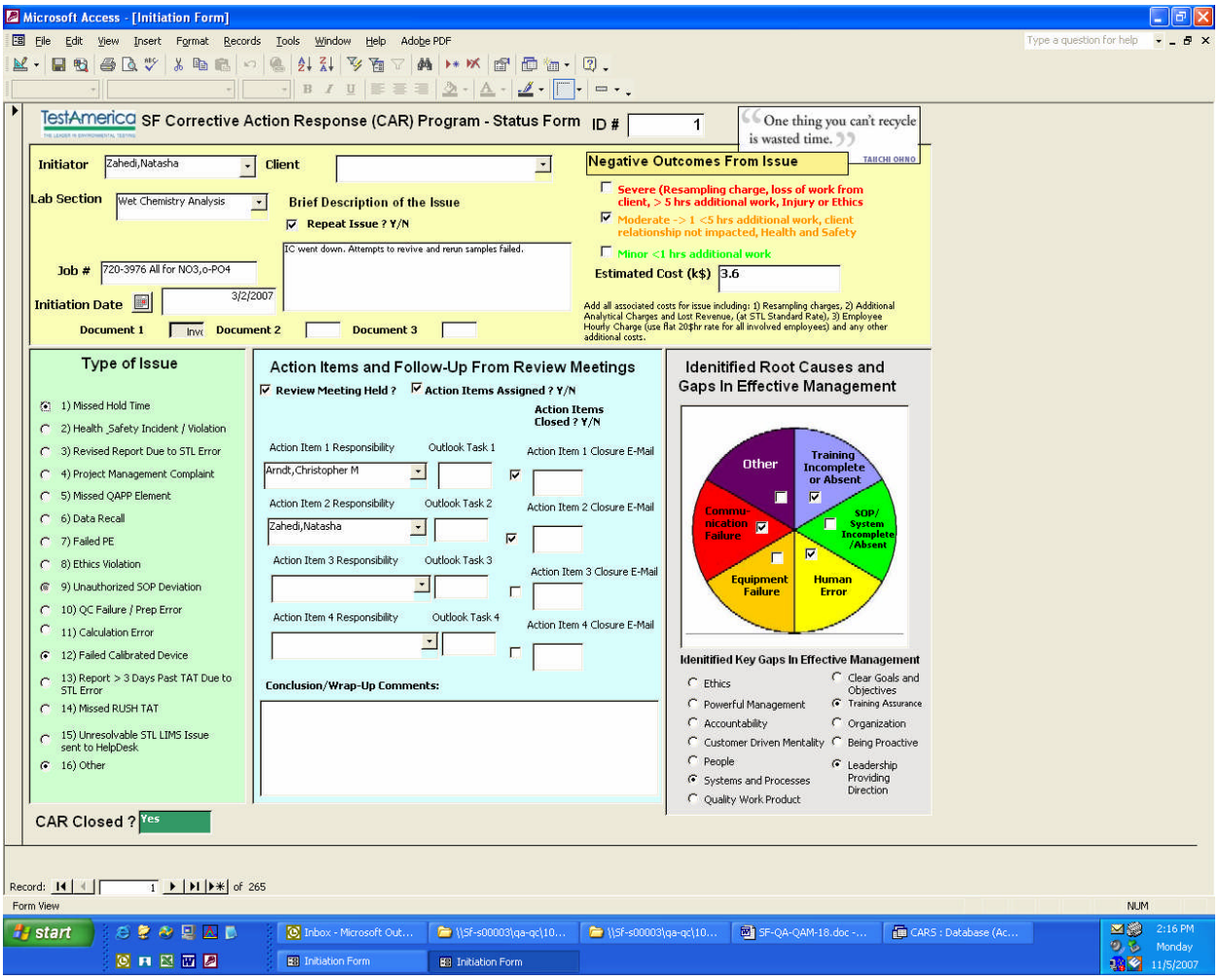


Table 13-1. General Corrective Action Procedures

QC Activity *(Individual Responsible for Initiation/Assessment)*	Acceptance Criteria	Recommended Corrective Action
Initial Instrument Blank *(Analyst)*	• Instrument response < RL	• Prepare another blank. • If same response, determine cause of contamination: reagents, environment, instrument equipment failure, etc.
Initial Calibration Standards *(Analyst)*	• %RSD ≤ 20 (15% for GCMS) • Correlation coefficient ≥ 0.99.	• Reanalyze standards. • If still unacceptable, remake standards and recalibrate instrument.
Independent Calibration Verification (Second Source) *(Analyst)*	• % Recovery within control limits.	• Remake and reanalyze standard. • If still unacceptable, then remake calibration standards or use new primary standards and recalibrate instrument.
Continuing Calibration Standards *(Analyst, Data Reviewer)*	• % Recovery within control limits.	• Reanalyze standard. • If still unacceptable, then recalibrate and rerun affected samples.
Matrix Spike / Matrix Spike Duplicate (MS/MSD) *(Analyst, Data Reviewer)*	• % Recovery within limits documented in LIMS.	• If the acceptance criteria for duplicates or matrix spikes are not met because of matrix interferences, the acceptance of the analytical batch is determined by the validity of the LCS and LCSD. • If the LCS and LCSD are within acceptable limits the batch is acceptable. • The results of the duplicates, matrix spikes and the LCS are reported with the data set.
Laboratory Control Sample / Laboratory Control Sample Duplicate (LCS/LCSD) *(Analyst, Data Reviewer)*	• % Recovery within limits specified in LIMS.	• Batch must be re-prepared and re-analyzed. • **Note:** If there is insufficient sample or the holding time cannot be met, contact client and report with flags.
Surrogates *(Analyst, Data Reviewer)*	• % Recovery within limits of method.	• Individual sample must be repeated. Place comment in LIMS.

QC Activity ***(Individual Responsible for Initiation/Assessment)***	**Acceptance Criteria**	**Recommended Corrective Action**
Method Blank (MB) *(Analyst, Data Reviewer)*	• < Reporting Limit	• Reanalyze blank. • If still positive, determine source of contamination. If necessary, reprocess (i.e. digest or extract) entire sample batch. Report blank results.
Proficiency Testing (PT) Samples *(QA Manager)*	• Criteria supplied by PT Supplier.	• Any failures or warnings must be investigated for cause. Failures may result in the need to repeat a PT sample to show the problem is corrected.
Internal / External Audits *(QA Manager, Operation Manager, Laboratory Director)*	• Defined in Quality System documentation such as SOPs, QAM, etc..	• Non-conformances must be investigated through CAR system and necessary corrections must be made.
Reporting / Calculation Errors (Depends on issue – possible individuals include: Analysts, Data Reviewers, Project Managers, Operation Manager, QA Manager, Corporate QA, Corporate Management)	• SOP CA-L-S-001, Internal Investigation of Potential Data Discrepancies and Determination for Data Recall.	• Corrective action is determined by type of error. Follow the procedures in SOP CA-L-S-001.
Client Complaints *(Project Managers, Lab Director, Sales and Marketing)*		• Corrective action is determined by the type of complaint. For example, a complaint regarding an incorrect address on a report will result in the report being revised. The reason for revising a report is documented in LIMS and with NCMs, if necessary.
QA Monthly Report (Refer to Section 17 for an example) (QA Manager, Lab Director, Operations Manager)	• QAM, SOPs.	• Corrective action is determined by the type of issue. For example, CARs for the month are reviewed and possible trends are investigated.
Health and Safety Violation (Lab Director, Operation Manager)	• Environmental Health and Safety (EHS) Manual.	• Non-conformance is investigated and corrected through CAR system.

SECTION 14

PREVENTIVE ACTION
(NELAC 5.4.11)

14.1 OVERVIEW

The laboratory's preventive action programs improve, or eliminate potential causes of nonconforming product and/or nonconformance to the quality system. This preventive action process is a proactive continuous process improvement activity that can be initiated through feedback from clients, employees, business providers, and affiliates. The QA Department has the overall responsibility to ensure that the preventive action process is in place, and that relevant information on actions is submitted for management review.

Dedicating resources to an effective preventive action system emphasizes TestAmerica San Francisco's commitment to its Quality Assurance (QA) program. It is beneficial to identify and address negative trends before they develop into complaints, problems and corrective actions. Additionally, customer service and satisfaction can be improved through continuous improvements to laboratory systems.

Opportunities for improvement may be discovered during management reviews, the QA Metrics Report, internal or external audits, proficiency testing performance, client complaints, staff observation, etc..

The monthly Quality Assurance Metrics Report shows performance indicators in all areas of the quality system. These areas include revised reports, corrective actions, audit findings, internal auditing and data authenticity audits, client complaints, PT samples, holding time violations, SOPs, ethics training, etc. These metrics are used to help evaluate quality system performance on an ongoing basis and provide a tool for identifying areas for improvement.

The laboratory's Corrective Action process (Section 13) is integral to implementation of preventive actions. A critical piece of the corrective action process is the implementation of actions to prevent further occurrence of a non-compliance event. Historical review of corrective action provides a valuable mechanism for identifying preventive action opportunities.

14.1.1 The following elements are part of a preventive action system:

- Identification of an opportunity for preventive action.
- Process for the preventive action.
- Define the measurements of the effectiveness of the process once undertaken.
- Execution of the preventive action.
- Evaluation of the plan using the defined measurements.
- Verification of the effectiveness of the preventive action. /=
- Close-Out by documenting any permanent changes to the Quality System as a result of the Preventive Action. Documentation of Preventive Action is incorporated into the monthly QA reports, corrective action process, management review, and the Management of Change process (see below).

Note: There may be varying levels of formality and documentation during the preventive action process due to the simplicity/complexity of the action taken.

14.1.2 Any Preventive Actions undertaken or attempted shall be taken into account during the Annual Management Review (Section 17). A highly detailed recap is not required; a simple recount of success and failure within the preventive action program will provide management a measure for evaluation.

14.2 MANAGEMENT OF CHANGE

[Discuss implementation with GM. If ready to implement this process include and revise text below.]

The Management of Change process is designed to manage significant events and changes that occur within the laboratory. Through these procedures, the potential risks inherent with a new event or change are identified and evaluated. The risks are minimized or eliminated through pre-planning and the development of preventive measures. The types of changes covered under this system include: Facility Changes, Major Accreditation Changes, Addition or Deletion to Division's Capabilities or Instrumentation, Key Personnel Changes, Laboratory Information Management System (LIMS) changes. This process is discussed in further detail in SOP CA-Q-S-003, Management of Change.

SECTION 15

CONTROL OF RECORDS
(NELAC 5.4.12)

TestAmerica San Francisco maintains a record system appropriate to its needs and that complies with applicable standards or regulations as required. The system produces unequivocal, accurate records that document all laboratory activities. The laboratory retains all original observations, calculations and derived data, calibration records and a copy of the analytical report for a minimum of five years after it has been issued.

15.1 OVERVIEW

The laboratory has established procedures for identification, collection, indexing, access, filing, storage, maintenance and disposal of quality and technical records. A record index is listed in Table 15-1. Quality records are maintained by the Quality Assurance (QA) Manager in a database, which is backed up as part of the regular network backup. Records are of two types; either electronic or hard copy paper formats depending on whether the record is computer or hand generated (some records may be in both formats). Technical records are maintained by the Operations Manager.

Table 15-1. Record Index[1]

Technical Records	Official Documents	QA Records	Project Records	Administrative Records
Retention: 5 Years from analytical report issue*	5 Years from document retirement date*	5 Years from archival* **Data Investigation:** 5years or the life of the affected raw data storage whichever is greater (beyond 5 years if ongoing project or pending investigation)	5 Years from analytical report issue*	**Personnel:** 7 Years (HR Records must be maintained as per Policy CW-L-P-001) **Finance:** See Accounting and Control Procedures Manual
Raw Data Logbooks[2] Standards Certificates Analytical Records Lab Reports	Quality Assurance Manual (QAM)	Internal and External Audits/ Responses	Sample receipt and COC Documentation	Finance and Accounting
	Work Instructions	Certifications	Contracts and Amendments	EH&S Manual, Permits, Disposal Records
	SOPs	Corrective/Preventive Action	Correspondence	Employee Handbook
	Manuals	Management Reviews	QAPP	Personnel files, Employee Signature & Initials, Administrative Training Records (e.g., Ethics)
		Method & Software Validation, Verification data	SAP	
		Data Investigation	Telephone Logbooks	Administrative Policies
	Policies		Lab Reports	Technical Training Records

[1] Record Types encompass hardcopy and electronic records.
[2] Examples of Logbook types: Maintenance, Instrument Run, Preparation (standard and samples), Standard and Reagent Receipt, Archiving, Balance Calibration, Temperature (hardcopy or electronic records).
* Exceptions listed in Table 15-2.

All records are legible and stored and retained in such a way that they are secure and readily retrievable at the laboratory facility or an offsite location that provides a suitable environment to prevent damage or deterioration and to prevent loss. Records are maintained on-site at the laboratory for at least 3 months but may also be moved off-site at the Records Express facility if the laboratory has limited storage space. Records are maintained for a minimum of five years unless other wise specified by a client or regulatory requirement.

For raw data and project records, record retention shall be calculated from the date the project report is issued. For other records, such as Controlled Documents, QA, or Administrative Records, the retention time is calculated from the date the record is formally retired. Records related to the programs listed in Table 15-2 have lengthier retention requirements and are subject to the requirements in Section 15.1.3. Policy CW-L-P-001 (Record Retention) provides additional information on record retention requirements.

15.1.1 Programs with Longer Retention Requirements

Some regulatory programs have longer record retention requirements than the standard record retention time. These are detailed in Table 15-3 with their retention requirements. In these cases, the longer retention requirement is enacted. If special instructions exist such that client data cannot be destroyed prior to notification of the client, the container or box containing that data is marked as to who to contact for authorization prior to destroying the data.

Table 15-2. Special Record Retention Requirements

Program	[1]Retention Requirement
Drinking Water – All States	10 years (project records)
Drinking Water Lead and Copper Rule	12 years (project records)
Commonwealth of MA – All environmental data 310 CMR 42.14	10 years
FIFRA – 40 CFR Part 160	Retain for life of research or marketing permit for pesticides regulated by EPA
Housing and Urban Development (HUD) Environmental Lead Testing	10 years
Alaska	10 years
Louisiana – All	10 years
Michigan Department of Environmental Quality – all environmental data	10 years
Navy Facilities Engineering Service Center (NFESC)	10 years
NY Potable Water NYCRR Part 55-2	10 years
TSCA - 40 CFR Part 792	10 years after publication of final test rule or negotiated test agreement

[1]Note: Extended retention requirements must be noted with the archive documents or addressed in facility-specific records retention procedures.

15.1.2 All records are held secure and in confidence. Records maintained at the laboratory are located in storage shelves in sample control. Records archived off-site are stored in a secure location where a record is maintained of any entry into the storage facility. Logs are maintained in each storage box to note removal and return of records.

15.1.3 The laboratory has procedures to protect and back-up records stored electronically and to prevent unauthorized access to or amendment of these records. All analytical data is maintained as hard copy or in a secure readable electronic format. For analytical reports that are maintained as copies in PDF format, see section 20.12.1 'Computer and Electronic Data Related Requirements' for more information. ***[Also Reference your SOP on electronic archiving (maintenance of electronic records) if your laboratory scans data for archival or archives data directly into a readable electronic format. You must have a written procedure for this type of archiving.]***

15.1.4 The record keeping system allows for historical reconstruction of all laboratory activities that produced the analytical data, as well as rapid recovery of historical data (Records stored off site should be accessible within 2 days of a request for such records). The history of the sample from when the laboratory took possession of the samples must be readily understood through the documentation. This shall include inter-laboratory transfers of samples and/or extracts.

- The records include the identity of personnel involved in sampling, sample receipt,

preparation, or testing. All analytical work contains the initials (at least) of the personnel involved. The laboratory's copy of the chain of custody is stored with the invoice and the work order sheet generated by the LIMS. The chain of custody would indicate the name of the sampler. If any sampling notes are provided with a work order, they are kept with this package.

- All information relating to the laboratory facilities equipment, analytical test methods, and related laboratory activities, such as sample receipt, sample preparation, or data verification are documented.

- The record keeping system facilitates the retrieval of all working files and archived records for inspection and verification purposes (e.g., set format for naming electronic files, set format for what is included with a given analytical data set. Instrument data is stored sequentially by instrument. A given day's analyses are maintained in the order of the analysis. Run logs are maintained for each instrument or method; a copy of each day's run log or instrument sequence is stored with the data to aid in re-constructing an analytical sequence. Where an analysis is performed without an instrument, bound logbooks or bench sheets are used to record and file data. Standard and reagent information is recorded in logbooks or entered into the LIMS for each method as required.

- Changes to hardcopy records shall follow the procedures outlined in Section 13 and 20. Changes to electronic records in LIMS or instrument data are recorded in audit trails.

- The reason for a signature or initials on a document is clearly indicated in the records such as "sampled by," "prepared by," "reviewed by", or "Analyzed by".

- All generated data except those that are generated by automated data collection systems, are recorded directly, promptly and legibly in permanent dark ink.

- Hard copy data may be scanned into PDF format for record storage as long as the scanning process can be verified in order to ensure that no data is lost and the data files and storage media must be tested to verify the laboratory's ability to retrieve the information prior to the destruction of the hard copy that was scanned.

- Also refer to Section 20.13.1 'Computer and Electronic Data Related Requirements'**.**

15.2 TECHNICAL AND ANALYTICAL RECORDS

15.2.1 The laboratory retains records of original observations, derived data and sufficient information to establish an audit trail, calibration records, staff records and a copy of each analytical report issued, for a minimum of five years unless otherwise specified by a client or regulatory requirement (refer to Section 15.1). The records for each analysis shall contain sufficient information to enable the analysis to be repeated under conditions as close as possible to the original. The records shall include the identity of laboratory personnel responsible for preparation, performance of each analysis and checking of results.

15.2.2 Observations, data and calculations are recorded at the time they are made and are identifiable to the specific task.

15.2.3 Changes to hardcopy records shall follow the procedures outlined in Section 13 and 20. Changes to electronic records in LIMS or instrument data are recorded in audit trails.
The essential information to be associated with analysis, such as strip charts, tabular printouts, computer data files, analytical notebooks, and run logs, include (previous discussions relate where most of this information is maintained – specifics may be added below):

- laboratory sample ID code**;**
- Date of analysis and time of analysis is required if the holding time is seventy-two (72) hours or less, or when time critical steps are included in the analysis (e.g., drying times, incubations, etc.); instrumental analyses have the date and time of analysis recorded as part of their general operations. Where a time critical step exists in an analysis, location for such a time is included as part of the documentation in a specific logbook or on a bench sheet**.**
- Instrumentation identification and instrument operating conditions/parameters. Operating conditions/parameters are typically recorded in the electronic maintenance logs where available.
- analysis type**;**
- all manual calculations and manual integrations**;**
- analyst's or operator's initials/signature**;**
- sample preparation including cleanup, separation protocols, ID codes, volumes, weights, instrument printouts, meter readings, calculations, reagents**;**
- test results**;**
- standard and reagent origin, receipt, preparation, and use**;**
- calibration criteria, frequency and acceptance criteria**;**
- data and statistical calculations, review, confirmation, interpretation, assessment and reporting conventions**;**
- quality control protocols and assessment**;**
- electronic data security, software documentation and verification, software and hardware audits, backups, and records of any changes to automated data entries; and
- Method performance criteria including expected quality control requirements. These are indicated both in the LIMS and on specific analytical report formats**.**

15.3 LABORATORY SUPPORT ACTIVITIES

In addition to documenting all the above-mentioned activities, the following are retained QA records and project records (previous discussions in this section relate where and how these data are stored):

- all original raw data, whether hard copy or electronic, for calibrations, samples and quality control measures, including analysts' work sheets and data output records (chromatograms, strip charts, and other instrument response readout records)**;**
- a written description or reference to the specific test method used which includes a description of the specific computational steps used to translate parametric observations into a reportable analytical value**;**
- copies of final reports**;**
- archived SOPs**;**
- correspondence relating to laboratory activities for a specific project**;**
- all corrective action reports, audits and audit responses**;**
- proficiency test results and raw data; and
- results of data review, verification, and crosschecking procedures

15.3.1 Sample Handling Records

Sample handling and tracking is discussed in Section 24. Records of all procedures to which a sample is subjected while in the possession of the laboratory are maintained. These include but are not limited to records pertaining to:

- sample preservation including appropriateness of sample container and compliance with holding time requirement;
- sample identification, receipt, acceptance or rejection and login;
- sample storage and tracking including shipping receipts, sample transmittal / COC forms; and
- procedures for the receipt and retention of samples, including all provisions necessary to protect the integrity of samples.

15.4 ADMINISTRATIVE RECORDS

The laboratory also maintains the administrative records in either electronic or hard copy form. See Table 15-1.

15.5 RECORDS MANAGEMENT, STORAGE AND DISPOSAL

15.5.1 All records (including those pertaining to test equipment), certificates and reports are safely stored, held secure and in confidence to the client. Certification related records are available to the accrediting body upon request.

15.5.2 All information necessary for the historical reconstruction of data is maintained by the laboratory. Records that are stored only on electronic media must be supported by the hardware and software necessary for their retrieval.

15.5.3 Records that are stored or generated by computers or personal computers have hard copy, write-protected backup copies, or an electronic audit trail controlling access**.**

15.5.4 TestAmerica San Francisco has a record management system for control of instrument logbooks, standards logbooks, and records for data reduction, validation, storage and reporting. Printouts of the sequence are placed in a 3-ring binder that has a unique logbook ID (issued by QA). Hard-copies of the data are filed according to date in boxes designated by instrument ID. Standards are maintained in the LIMS – no logbooks are used to record that data**.**

15.5.5 Records are considered archived when moved off-site. Access to archived hard-copy information is documented with an access log and in/out records is used in archived boxes to note data that is removed and returned. All records shall be protected against fire, theft, loss, environmental deterioration, and vermin. In the case of electronic records, electronic or magnetic sources, storage media are protected from deterioration caused by magnetic fields and/or electronic deterioration. Access to the data is limited to laboratory and company employees**.**

15.5.6 In the event that the laboratory transfers ownership or goes out of business, TestAmerica San Francisco shall ensure that the records are maintained or transferred according to client's instructions. Upon ownership transfer, record retention requirements shall be addressed in the ownership transfer agreement and the responsibility for maintaining archives is clearly established. In addition, in cases of bankruptcy, appropriate regulatory and state legal requirements concerning laboratory records must be followed. In the event of the closure of the laboratory, all records will revert to the control of the corporate headquarters. Should the entire company cease to exist, as much notice as possible will be given to clients and the accrediting bodies who have worked with the laboratory during the previous 5 years of such action.

15.5.7 <u>Records Disposal</u>

15.5.7.1 Records are removed from the archive and disposed after 5 years unless otherwise specified by a client or regulatory requirement. On a project specific or program basis, clients may need to be notified prior to record destruction. Records are destroyed in a manner that ensures their confidentiality such as shredding, mutilation or incineration.

15.5.7.2 Electronic copies of records must be destroyed by erasure or physically damaging off-line storage media so no records can be read.

15.5.7.3 If a third party records management company is hired to dispose of records, a "Certificate of Destruction" is required. [Refer to Policy No. CW-L-P-001 (Records Retention).]

SECTION 16

AUDITS
(NELAC 5.4.13)

16.1 OVERVIEW

Audits measure laboratory performance and insure compliance with accreditation/certification and project requirements. Audits specifically provide management with an on-going assessment of the quality of results produced by the laboratory, including how well the policies and procedures of the QA system and the Ethics and Data Integrity Program are being executed. They are also instrumental in identifying areas where improvement in the QA system will increase the reliability of data. There are two principle types of audits: Internal and External. Internal audits are performed by laboratory or corporate personnel. External audits are conducted by regulators, clients or third-party auditing firms. In either case, the assessment to program requirements is the focus.

Table 16-1. Audit Types and Frequency

Internal Audits	**Description**	**Performed by**	**Frequency**
	Analyst & Method Compliance	QA Department or Designee	- 100% of all methods over a two year period. - 100% of all analysts annually.
	Instrument	QA Department or Designee	100% of all organic instruments and any inorganic chromatography instruments. Annually.
	Work Order/ Final Report	QA Department or Designee	- 1 complete report each month.
	Support Systems	QA Department or Designee	- Annual for entire labs support departments & equipment (e.g., thermometers, balances), can be divided into sub-sections over the course of the year.
	Performance Audits (Double-Blind PTs)	Corporate QA, Laboratory QA Department or Designee	- As needed.
	Special	QA Department or Designee	- As Needed
External Audits	**Description**	**Performed by**	**Frequency**
	Program / Method Compliance	Regulatory Agencies, Clients, accreditation organizations	- As required by program and/or clients needs
	Performance Audits	Provided by a third party.	- As required by a client or regulatory agency. Generally provided semi-annually through the analysis of PT samples.

16.2 INTERNAL AUDITS

Annually, the laboratory prepares a schedule of internal audits to be performed throughout the year. As previously stated, these audits verify and monitor that operations continue to comply with the requirements of the laboratory's QA Manual and the Corporate Ethics Program. A

schedule of the internal audits is maintained by the QA Manager in the *Internal Audit Workbook*. An example can be found in Attachment 1.

It is the responsibility of the QA Manager to plan and organize audits in consideration of the laboratory work load and the department personnel schedules so that all pertinent personnel and operations are thoroughly reviewed. When designees (other than QA department personnel & approved by the QA Manager), perform audits, the QA Manager shall insure that these persons do not audit their own activities except when it can be demonstrated that an effective audit will be carried out. In general, the auditor:

- is neither the person responsible for the process being audited nor the immediate supervisor of the person responsible for the project/process.
- Is free of any conflicts of interest.
- Is free from bias and influences that could affect objectivity.

Laboratory personnel (e.g., supervisors and analysts) may assist with both method and support system audits as long as the items listed in the above paragraph are observed. These audits are conducted according to defined criteria listed in the checklists of the *Internal Audit Workbook.* These personnel must be approved by the QA Manager; and must complete the audit checklists in their entirety. This process introduces analyst experience and insight into the laboratory's auditing program.

The auditor must review the previous audit report and identify all items for verification of corrective actions. A primary focus will be dedicated to the ability of the laboratory to correct root-cause deficiencies and that the corrective action has been implemented and sustained as documented.

16.2.1 Systems

An annual systems audit is required to ensure compliance to analytical methods and SOPs, the laboratory's Data Integrity and Ethics Policies, client and State requirements. This audit is performed in portions throughout the year through method, analyst, instrument, work order/final report and support system audits. Audits are documented and reported to management within 1 week of their performance. Systems audits cover all departments of the facility, both operational and support. The multiple audits are compiled into one systems audit package at the end of the year (*Internal Audit Workbook*).

16.2.1.1 Method, Analyst, Instrument and Work Order/Final Report Audits

Procedures for the method compliance, analyst, instrument and work order/final report audits are incorporated by reference to SOP No. CA-Q-S-004, Method Compliance and Data Authenticity Audits. These audits are not mutually exclusive. For example, the performance of a method audit will also cover multiple analysts and instruments. The laboratory's goal is to annually review all analysts and instruments as described in SOP No. CA-Q-S-004. The laboratory will also audit all methods within a two year time period and audit a minimum of one Work Order/Final Report from receiving through reporting on a monthly basis.

16.2.1.2 Support Systems

Support system audits are performed to ensure that all departments & ancillary equipment are operating according to prescribed criteria. Support system audits include the review of both non-analytical and operational departments. Support equipment audits (e.g., metrology items) include the review of balance calibrations, weight calibrations; water quality testing, etc.. Non-analytical may include sample receiving and bottle preparation. These types of support audits ensure that the operations are being performed to support ethical data as well as ensuring the accuracy & precision of the utilized equipment.

These audits can be performed in portions throughout the year or in one scheduled session. However, the audit schedule must document that these aspects are reviewed annually. Many of the metrology systems are considered to be surveillance activities that can be monitored by QA personnel or delegated to specified department personnel. These surveillance activities are performed on a semi-annual basis unless issues warrant a greater frequency or previous audits continually showing no deficiencies allow the frequency to be reduced to once a year.

An example audit checklist can be found in Attachment 2. Instructions for reporting findings are included in the *Internal Audit Workbook*. In general, findings are reported to management within 1 week of the audit and a response is due from management within 30 days.

16.2.2 Performance Audits

Corporate QA may arrange for double blind PT studies to be performed in the laboratories. Results are given to Management and Corrective actions of any findings are coordinated at each facility by the QA Managers and Laboratory Directors/Managers. These studies are performed on an as needed basis. They may be performed when concerns are raised regarding the performance of a particular method in specific laboratories, periodically to evaluate methods that may not normally be covered in the external PT program or may be used in the process of developing best practices. The local QA Manager may also arrange for PT studies on an as needed basis. (Refer to Section 16.3.2 for additional information on Performance Audits.)

16.2.3 Special Audits

Special audits are conducted on an as needed basis, generally as a follow up to specific issues such as client complaints, corrective actions, PT results, data audits, system audits, validation comments, regulatory audits or suspected ethical improprieties. Special audits are focused on a specific issue, and report format, distribution, and timeframes are designed to address the nature of the issue.

16.3 EXTERNAL AUDITS

TestAmerica facilities are routinely audited by clients and external regulatory authorities. External audits are performed when certifying agencies or clients conduct on-site inspections or submit performance testing samples for analysis. It is TestAmerica's policy to cooperate fully with regulatory authorities and clients. The laboratory makes every effort to provide the auditors with access to personnel, documentation, and assistance. The Operations Manager is responsible for providing corrective actions to the QA Manager who coordinates the response for any deficiencies discovered during an external audit. Audit responses are due in the time allotted by the client or agency performing the audit. This time frame is generally 30 days.

Be aware that NELAC requires that the audit response report be acceptable to the primary accrediting authority after the second submittal. The lab shall have accreditation revoked for all or any portion of its scope of a accreditation for any or all fields of testing, a method, or analyte within a field of testing if it is not corrected.

TestAmerica San Francisco cooperates with clients and their representatives to monitor the laboratory's performance in relation to work performed for the client. The client may only view data and systems related directly to the client's work. All efforts are made to keep other client information confidential.

16.3.1 Confidential Business Information (CBI) Considerations

During on-site audits, on-site auditors may come into possession of information claimed as business confidential. A business confidentiality claim is defined as "a claim or allegation that business information is entitled to confidential treatment for reasons of business confidentiality or a request for a determination that such information is entitled to such treatment." When information is claimed as business confidential, the laboratory must place on (or attach to) the information at the time it is submitted to the auditor, a cover sheet, stamped or typed legend or other suitable form of notice, employing language such as "trade secret", "proprietary" or "company confidential". Confidential portions of documents otherwise non-confidential must be clearly identified. CBI may be purged of references to client identity by the responsible laboratory official at the time of removal from the laboratory. However, sample identifiers may not be obscured from the information. Additional information regarding CBI can be found in within the 2003 NELAC standards.

16.3.2 Performance Audits

The laboratory is involved in performance audits conducted annually through the analysis of PT samples provided by a third party. The laboratory generally participates in the following types of PT studies: Water Pollution, Water Supply, UST, Soil/Hazardous Waste and DMRQA.

- It is TestAmerica's policy that PT samples be treated as typical samples in the production process. Further, where PT samples present special or unique problems in the regular production process they may need to be treated differently, as would any special or unique request submitted by any client. The QA Manager must be consulted and in agreement with any decisions made to treat a PT sample differently due to some special circumstance.

- PTs generally do not have holding times associated with them. In the absence of any holding time requirement, it is recommended that the holding time begin when the PT sample is prepared according to the manufacturers instructions. Holding times should apply to full volume PT samples only if the provider gives a meaningful "sampling date". If this is not provided, it is recommended that the date/time of opening of the full volume sample be considered the beginning of holding time.

- Login will obtain the COC information from the documentation provided with the PTs with review by QA or other designated staff.

- Vials will be prepared as required in the instruction set provided with the samples. After preparation to full volume the sample may be spiked, digested, concentrated, etc., as would be done for any normal sample requiring similar analysis.

- PT samples will not undergo multiple preps, multiple runs, multiple methods (unless being used to evaluate multiple methods), multiple dilutions, UNLESS this is what would be done to a normal client sample (e.g. if a client requests, as PT clients do, that we split VOA coeluters, then dual analysis IS normal practice).

- The type, composition, concentration and frequency of quality control samples analyzed with the PT samples shall be the same as with routine environmental samples.

- Instructions may be included in the laboratory's SOPs for how low level samples are analyzed, including concentration of the sample or adjustment of the normality of titrant. When a PT sample falls below the range of the routine analytical method, the low-level procedure may be used. Where the measured result is below the RL, the result is still reported but qualified with a "J" flag in LIMS.

- No special reviews shall be performed by operation and QA, UNLESS this is what would be done to a normal client sample. To the degree that special report forms or login procedures are required by the PT supplier, it is reasonable that the laboratory WOULD apply special review procedures, as would be done for any client requesting unusual reporting or login processes.

- Written responses to unacceptable PT results are required. In some cases it may be necessary for blind QC samples to be submitted to the laboratory to show a return to control.

16.4 AUDIT FINDINGS

Internal or External Audit findings should be documented using the corrective action process and database (refer to Section 13). The laboratory is expected to prepare a response to audit findings within 30 days of receipt of an audit report unless the report specifies a different time frame. The response may include action plans that could not be completed within the 30 day timeframe. In these instances, a completion date must set and agreed to by operations management and the QA Manager.

Responsibility for developing and implementing corrective actions to findings is the responsibility of the Operations Manager. Findings that are not corrected by specified due dates are reported monthly to management in the QA monthly report.

If any audit finding casts doubt on the effectiveness of the operations or on the correctness or validity of the laboratory's test results, the laboratory shall take timely corrective action, and shall notify clients in writing if the investigations show that the laboratory results have been affected. Once corrective action is implemented, a follow-up audit is scheduled to ensure that the problem has been corrected.

The procedures must be in accordance to SOP No. CA-L-S-001, Internal Investigations of Data Discrepancies and Determination of Data Recall.

Clients must be notified promptly in writing, of any event such as the identification of defective measuring or test equipment that casts doubt on the validity of results given in any test report or amendment to a test report. The investigation must begin within 24-hours of discovery of the problem and all efforts are made to notify the client within two weeks after the completion of the investigation.

Figure 16-1.

Example - Internal Audit Workbook

Internal Audit Schedule

Area Audited	Audit Type	Audit Cycle	Scheduled	Date Audited	Date Closed	Tab No.	Comm
es	System	6 mo				3	
rature Logs/ Thermometers	System	6 mo				4	
Storage and Disposal	System	1 yr				5	
nance Logs	System	6 mo				6	
Blanks for Volatile ezers (where required)	System	6 mo				7	
ater Quality Testing	System	6 mo				8	
Control (Log In)	System	1 yr				9	
g Procedures	System	1 yr				10	
ter Operations (LIMS)	System	1 yr				11	
istribution System	System	1 yr				12	
ng of Paper Records	System	1 yr				13	
cal Process Control	System	1 yr				14	
nic Archiving	System	1 yr				15	
eview System	System	1 yr				16	
eport Generation	System	1 yr				17	
rds/Reagents	System	6 mo				18	
l Integration	System	1 yr				19	
tive Action System	System	1 yr				20	
g Records	System	6 mo				21	
	System	1 yr				22	
Prep/Review/Update s	System	1 yr				23	
sing/Procurement	System	1 yr				24	
/Diluter/Dispenser tion Check	System	6 mo				25	
tract Lab Approval	System	1 yr				26	
er Complaint System	System	1 yr				27	
s	Method	2 yr				28	
ist Pending							

Figure 16-2.

Example – Internal Audit System Checklist: Corrective Actions

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica <Location>

INTERNAL AUDIT - Corrective Actions

[Printed Name(s) or Date(s)]

(Summary Page)

Area Audited:
Auditor:
Date:
Persons Contacted During Audit:

Date Reported to Department Manager:
Reported To:

Date Reported to Lab Director/Manager:
Reported To:

Date Response Due:

Response Received and Accepted by QA Manager:

Associated Corrective Action Report Number(s):

Scheduled Follow-up:

Item	Requirement	Ref.	Y	N	NA	Evidence/Comments	Follow Up
1	Does the laboratory have a corrective action program in place?	5.4.10.1					
2	Does the laboratory have a current corrective action SOP or is this information in the QA Manual?	5.4.10.1					
3	Do all laboratory personnel have documented training and access to initiate corrective actions?	5.4.10.1					
4	Are causes clearly identified by department, staff name, scope of issue (how many reports affected)?	5.4.10.6					
5	Is a root cause for the issue identified?	5.4.10.2					
6	Is a corrective action (plan) clearly described?						
7	Was the corrective action fully implemented?						
8	Is documentation (if applicable) completed as specifed by the corrective action (training, revised SOP, etc)						
9	Has a follow-up assessment been conducted to verify the corrective action was successful?						
10	Are corrective actions reviewed on a regular basis by management?	5.4.10.6a 5					
11	Is there a defined distribution flow for corrective action notification, review, closure, and follow-up?	5.4.10.6a					
12	Are non-conformances reviewed on a regular basis and used, if necessary, to initiate root cause corrective actions?						
13	Does the lab have a documented procedure for QC corrective action (i.e., documented within each method / parameter SOP or in the QA Manual)?	4.10.1					
14	***Verify Corrective Actions from previous systems audits. List Items:***						
15							
16							
17							

Auditor Signature:_____

Primary Reference(s): Corporate SOP CA-Q-S-002, Acceptable Manual Integration Practices
NELAC Standard, June 2003
DoD Quality Systems Manual, Version 3, January 2006
EPA Manual for the Certification of Laboratories Analyzing Drinking Water

SECTION 17

MANAGEMENT REVIEWS
(NELAC 5.4.14)

17.1 QUALITY ASSURANCE REPORT

A comprehensive QA Report shall be prepared each month by the laboratory's QA Department and forwarded to the Laboratory Director for review and comments. The final report shall be submitted to the Operation Manager as well as the appropriate Quality Director and General Manager. All aspects of the QA system are reviewed to evaluate the suitability of policies and procedures. At a minimum, the report content will contain the items listed below. During the course of the year, the Laboratory Director/Manager, General Manager or Corporate QA may request that additional information be added to the report.

The TestAmerica QA Report template is comprised of a discussion of three key QA issues facing the laboratory and ten specific sections (Figure 17-1):

- **Metrics:** Describe actions or improvement activities underway to address any outlying quality metrics that have been reported in the monthly Quality System Metrics Table.
- Quality System Metrics Table: The report also includes statistical results that are used to assess the effectiveness of the quality system. Effective quality systems are the responsibility of the entire laboratory staff. Each laboratory provides their results in a template provided by Corporate QA (Figure 17-2).
- **SOPs:** Report SOPs that have been finalized and report status of any outstanding SOP reviews.
- **Corrective Actions:** Describe highlights and the most frequent cause for report revisions and corrective/preventive action measures underway. Include a discussion of any recalls handled at the lab level as per Section 6.2.2 in the Investigation/Recall SOP (SOP: CA-L-S-001). Include a section for client feedback and complaints. Include both positive and negative feedback. Describe the most serious client complaints and resolutions in progress.
- **MDLs and Control Limits:** Report which MDLs/ MDL verifications are due. Report the same for Control Limits.
- **Audits:** Report Internal and External Audits that were conducted. Include all relevant information such as which methods, by whom, corrective actions needed by when and discuss unresolved audit findings.
- **Performance Testing (PT) Samples:** Report the PT tests that are currently being tested with their due dates, report recent PT results by study, acceptable, total reported and the month and year.
- **Certifications:** Report on any certification programs being worked on by due date, packages completed. Describe any issues, lapses, or potential revocations.
- **Regulatory Updates:** Include information on new state or federal regulations that may impact the laboratory. Report new methods that require new instrumentation, deletion of methods, changes in sampling requirements and frequencies etc…

- **Miscellaneous:** Include any issues that may impact quality within the laboratory.
- **Next Month:** Report on plans for the upcoming month.
- **Lab Director Comments Section:** This section gives the Laboratory Director/Manager the opportunity to comment on issues discussed in the report and to document plans to resolve these issues. Unresolved issues that reappear in subsequent monthly reports must be commented on by the Laboratory Director/Manager.
- **Metrics:** The report also includes statistical results that are used to assess the effectiveness of the quality system. Effective quality systems are the responsibility of the entire laboratory staff. Each laboratory provides their results in a template provided by Corporate QA (Figure 17-2).

On a monthly basis, Corporate QA compiles information from all the monthly laboratory reports. The VP-QA/EHS prepares a report that includes a compilation of all metrics and notable information and concerns regarding the QA programs within the laboratories. The report also includes a listing of new regulations that may potentially impact the laboratories. This report is presented to the Analytical Division Senior Management Team and General Managers.

17.2 ANNUAL MANAGEMENT REVIEW

The senior lab management team (Laboratory Director, QA Manager, Operations Manager and Client Services Manager) conducts an annual review of its quality systems and LIMS to ensure its continuing suitability and effectiveness in meeting client and regulatory requirements and to introduce any necessary changes or improvements. Corporate Operations and Corporate QA personnel may be included in this meeting at the discretion of the Laboratory Director/Manager. The LIMS review consists of examining any audits, complaints or concerns that have been raised through the year that are related to the LIMS. The laboratory will summarize any critical findings that can not be solved by the lab and report them to Corporate IT.

This review uses information generated during the preceding year to assess the “big picture” by ensuring that routine quality actions taken and reviewed on a monthly basis are not components of larger systematic concerns. The monthly review (refer to Section 17.1) should keep the quality systems current and effective, therefore, the annual review is a formal senior management process to review specific existing documentation. Significant issues from the following documentation are compiled or summarized by the QA Manager prior to the review meeting:

- Matters arising from the previous annual review.
- Prior Monthly QA Reports issues.
- Laboratory QA Metrics.
- Review of report reissue requests.
- Review of client feedback and complaints.
- Issues arising from any prior management or staff meetings.
- Minutes from prior Senior Management team meetings. Issues that may be raised from these meetings include:

- Adequacy of staff, equipment and facility resources.
- Adequacy of policies and procedures.
- Future plans for resources and testing capability and capacity.

- The annual internal double blind PT program sample performance (if performed),
- Review of the ACIL seal of excellence program performance.
- Compliance to the Ethics Policy and Data Integrity Plan. Including any evidence/incidents of inappropriate actions or vulnerabilities related to data Integrity.

The annual review includes the previous 12 months. Based on the annual review, a report is generated by the QA Manager and management. The report is distributed to the appropriate General Manager and the Quality Director. The report includes, but is not limited to:

- The date of the review and the names and titles of participants.
- A reference to the existing data quality related documents and topics that were reviewed.
- Quality system or operational changes or improvements that will be made as a result of the review [e.g., an implementation schedule including assigned responsibilities for the changes (Action Table)].

The QA Manual is also reviewed at this time and revised to reflect any significant changes made to the quality systems.

17.3 POTENTIAL INTEGRITY RELATED MANAGERIAL REVIEWS

Potential integrity issues (data or business related) must be handled and reviewed in a confidential manner until such time as a follow-up evaluation, full investigation, or other appropriate actions have been completed and issues clarified. The Corporate Data Investigation/ Recall SOP shall be followed (SOP No. CA-L-S-001). All investigations that result in finding of inappropriate activity are documented and include any disciplinary actions involved, corrective actions taken, and all appropriate notifications of clients.

The Chairman/CEO, President/CEO, COOs and Quality Directors receive a monthly report from the VP of Quality and EHS summarizing any current data integrity or data recall investigations as described in SOP No. CA-L-S-001. The General Manager's are also made aware of progress on these issues for their specific labs.

Figure 17-1.

Example - QA Monthly Report to Management

LABORATORY: x
PERIOD COVERED: Month/Year
PREPARED BY: x DATE: Month Day, Year
DISTRIBUTED TO: xx (Include LD, GM, QA Director, etc…)

THREE KEY ISSUES FOR MONTH:
Include a discussion of three key issues that were focused in on this month.
1. x
2. x
3. x

---

1. METRICS
Describe actions or improvement activities underway to address any outlying quality metrics.

2. SOPs

See Tab for SOP specifics.

The following SOPs were finalized (or reviewed for accuracy): (See Tab)

The following SOPs are due to QA: xx

In QA to complete: xx

3. CORRECTIVE ACTION

Highlights: xx

Revised Reports:
Describe the most frequent cause for report revisions and corrective/preventive action measures underway.

Data Investigations/Recalls (Corporate Data Investigation/Recall SOP) :
Include a discussion of any recalls handled at the lab level as Corp SOP.

Client Feedback and Complaints:
Include both positive and negative feedback.

Describe the most serious client complaints) and resolutions in progress.

4. MDLs AND CONTROL LIMITS

MDLs Due:

Control Limits Due:

5. AUDITS

INTERNAL AUDITS

Discuss Any Outstanding Issues (or Attach Summary):

EXTERNAL AUDITS
Discuss Any Outstanding Issues (or Attach Summary):

6. PT SAMPLES

The following PT samples are now in house (Due Dates):
xx

7. CERTIFICATIONS

Certification Packages Being Worked On (Include Due Date):
x

Describe any issues, lapses, or potential revocations.

8. REGULATORY UPDATE
Include information on new state or federal regulations that may impact the laboratory – new methods that require new instrumentation, deletion of methods, changes in sampling requirements or frequencies, …

9. MISCELLANEOUS
Include any issues that may impact quality within the laboratory.

10. NEXT MONTH
Items planned for next month.

LAB DIRECTOR COMMENTS AND PLANNED CORRECTIVE ACTIONS:	
LAB DIRECTOR REVIEW:	DATE:

Figure 17-2.

Example - Laboratory Metrics Categories

Reports for month
Reports revised due to lab error
% Revised Reports
# of Data Recall Investigations
# of Reports Actually Recalled
Corrective Action Reports
Corrective Action Reports still open
Total Number of Unresolved Open Corrective Action Reports
% of Unresolved Open Corrective Action Reports
# Reports independent QA reviewed
% QA Data Review: Reports
# Technical staff (Analysts/technicians, including Temps)
# of Analyst work product reviewed year-to-date
# of Analytical instruments w/electronic data file storage capability
# of Analytical instruments reviewed for data authenticity year-to-date
% Analyst/Instrument Data Authenticity Audits
 # Client Complaints
 # Client Compliments
# of planned internal audits
# of planned internal method audits performed year-to-date
% Annual Internal Audits Complete
# of Open Internal Audit Findings Past Due
Total Number of External Audit Findings
# of Open External Audit Findings Past Due
% External Audit Findings Past Due
# of PT analytes participated and received scores
# of PT analytes not acceptable
% PT Cumulative Score
 # PT Repeat Analyte Failures Cumulative **(analyte failed more than once in 4 consecutive studies by PT Type) (only applies to failed analytes)**
SOPs

SOPs Reviewed/revised within 24 months
Methods **or Administrative procedures** without approved SOPs
SOP Status
Method certification Losses due to performance/audit issues
Hold Time Violations due to lab error
Date of Last Comprehensive Ethics Training Session
 # Staff that haven't Received Comprehensive Ethics Training (>30 Days From Employment Date)
MDL Status (Good, Fair, or Poor) >90%, >70%, <70%
Training Documentation Records (Good, Fair, or Poor)
LQM Revision/review Date
QAM Updated to New Integrated Template
Last Annual Internal Audit Date (Opened, Closed)
Last Management QS Review Date
#SOPs required for 12 month review cycle (DOD *or drinking water)*
#SOPs for 12 month cycle/revised within 12 months *(Includes QS and Methods Listed in QSM)*
12 month % SOP Status *(Includes QS and Methods Listed in QSM)*

SECTION 18

PERSONNEL
(NELAC 5.5.2)

18.1 OVERVIEW

TestAmerica's management believes that its highly qualified and professional staff is the single most important aspect in assuring a high level of data quality and service. The staff consists of professionals and support personnel as outlined in the organization chart in Appendix 2.

All personnel must demonstrate competence in the areas where they have responsibility. Any staff that is undergoing training shall have appropriate supervision until they have demonstrated their ability to perform their job function on their own. Staff shall be qualified for their tasks based on appropriate education, training, experience and/or demonstrated skills as required.

The laboratory employs sufficient personnel with the necessary education, training, technical knowledge and experience for their assigned responsibilities.

All personnel are responsible for complying with all QA/QC requirements that pertain to the laboratory and their area of responsibility. Each staff member must have a combination of experience and education to adequately demonstrate a specific knowledge of their particular area of responsibility. Technical staff must also have a general knowledge of lab operations, test methods, QA/QC procedures and records management.

Laboratory management is responsible for formulating goals for lab staff with respect to education, training and skills and ensuring that the laboratory has a policy and procedures for identifying training needs and providing training of personnel. The training shall be relevant to the present and anticipated responsibilities of the lab staff.

The laboratory only uses personnel that are employed by or under contract to, the laboratory. Contracted personnel, when used, must meet competency standards of the laboratory and work in accordance to the laboratory's quality system.

18.2 EDUCATION AND EXPERIENCE REQUIREMENTS FOR TECHNICAL PERSONNEL

TestAmerica makes every effort to hire analytical staff that posses a college degree (AA, BA, BS) in an applied science with some chemistry in the curriculum. Exceptions can be made based upon the individual's experience and ability to learn. Selection of qualified candidates for laboratory employment begins with documentation of minimum education, training, and experience prerequisites needed to perform the prescribed task. Minimum education and training requirements for TestAmerica employees are outlined in job descriptions and are generally summarized for analytical staff in the table below.

The laboratory maintains job descriptions for all personnel who manage, perform or verify work affecting the quality of the environmental testing the laboratory performs. Job Descriptions are located on the TestAmerica intranet site's Human Resources web-page (Also see Section 4 for position descriptions/responsibilities).

As a general rule for analytical staff:

Specialty	Education	Experience
Extractions, Digestions, some electrode methods (pH, DO, Redox, etc.), or Titrimetric and Gravimetric Analyses	H.S. Diploma	On the job training (OJT)
CVAA, Single component or short list Chromatography (e.g., Fuels, BTEX-GC, IC	A college degree in an applied science.	Or 2 years prior analytical experience is required
ICP, Long List or complex chromatography (e.g., Pesticides, PCB, Herbicides, HPLC, etc.), GCMS	A college degree in an applied science.	or 5 years of prior analytical experience
Spectra Interpretation	A college degree in an applied science.	And 2 years relevant experience Or 5 years of prior analytical experience
Operations Manager	Bachelors Degree in an applied science.	And 5 years experience in environmental analysis of representative analytes for which they will oversee

When an analyst does not meet these requirements, they can perform a task under the direct supervision of a qualified analyst, peer reviewer or Operations Manager, and are considered an analyst in training. The person supervising an analyst in training is accountable for the quality of the analytical data and must review and approve data and associated corrective actions.

18.3 TRAINING

TestAmerica is committed to furthering the professional and technical development of employees at all levels.

Orientation to the laboratory's policies and procedures, in-house method training, and employee attendance at outside training courses and conferences all contribute toward employee proficiency. Below are examples of various areas of required employee training:

Required Training	Time Frame*	Employee Type
Environmental Health & Safety	Refer to EH&S Manual	All
Ethics – New Hires	1 week of hire	All
Ethics - Comprehensive	90 days of hire	All
Data Integrity	30 days of hire	Technical and PMs
Quality Assurance	90 days of hire	All
Ethics – Comprehensive Refresher	Annually	All

Initial Demonstration of Capability (DOC)	Prior to unsupervised method performance	Technical

The laboratory maintains records of relevant authorization/competence, education, professional qualifications, training, skills and experience of technical personnel (including contracted personnel) as well as the date that approval/authorization was given. These records are kept on file at the laboratory. Also refer to "Demonstration of Capability" in Section 20.

The training of technical staff is kept up to date by:

- Each employee must have documentation in their training file that they have read, understood and agreed to follow the most recent version of the laboratory QA Manual and SOPs in their area of responsibility. This documentation is updated as SOPs are updated.
- Documentation from any training courses or workshops on specific equipment, analytical techniques or other relevant topics are maintained in their training file.
- Documentation of proficiency (refer to Section 20).
- An Ethics Agreement signed by each staff member (renewed each year) and evidence of annual ethics training.
- A Confidentiality Agreement signed by each staff member signed at the time of employment.
- Human Resources maintains documentation and attestation forms on employment status & records; benefit programs; timekeeping/payroll; and employee conduct (e.g., ethics). This information is maintained in the employee's secured personnel file.

18.4 DATA INTEGRITY AND ETHICS TRAINING PROGRAM

Establishing and maintaining a high ethical standard is an important element of a Quality System. Ethics and data integrity training is integral to the success of TestAmerica and is provided for each employee at TestAmerica**.** It is a formal part of the initial employee orientation within 1 week of hire, comprehensive training within 90 days, and an annual refresher for all employees. Senior management at each facility performs the ethics training for their staff.

In order to ensure that all personnel understand the importance TestAmerica places on maintaining high ethical standards at all times; TestAmerica has established an Ethics Policy No. CA-L-P-001 and an Ethics Statement/Agreement (Appendix 1). All initial and annual training is documented by signature on the signed Ethics Policy and Code of Ethical Conduct demonstrating that the employee has participated in the training and understands their obligations related to ethical behavior and data integrity.

Violations of this Ethics Policy will not be tolerated. Employees who violate this policy will be subject to disciplinary actions up to and including termination. Criminal violations may also be referred to the Government for prosecution. In addition, such actions could jeopardize TestAmerica's ability to do work on Government contracts, and for that reason, TestAmerica has a Zero Tolerance approach to such violations.

Employees are trained as to the legal and environmental repercussions that result from data misrepresentation. Key topics covered in the presentation include:

- Organizational mission and its relationship to the critical need for honesty and full disclosure in all analytical reporting.
- Ethics Policy (Appendix 1)
- How and when to report ethical/data integrity issues. Confidential reporting.
- Record keeping.
- Discussion regarding data integrity procedures.
- Specific examples of breaches of ethical behavior (e.g. peak shaving, altering data or computer clocks, improper macros, etc., accepting/offering kickbacks, illegal accounting practices, unfair competition/collusion)
- Internal monitoring. Investigations and data recalls.
- Consequences for infractions including potential for immediate termination, debarment, or criminal prosecution.
- Importance of proper written narration / data qualification by the analyst and project manager with respect to those cases where the data may still be usable but are in one sense or another partially deficient.

Additionally, a data integrity hotline (1-800-736-9407) is maintained by TestAmerica and administered by the Corporate Quality Department.

SECTION 19

ACCOMMODATIONS AND ENVIRONMENTAL CONDITIONS
(NELAC 5.5.3)

19.1 OVERVIEW

TestAmerica San Francisco is a 21 000 ft^2 secure laboratory facility with controlled access and designed to accommodate an efficient workflow and to provide a safe and comfortable work environment for employees. All visitors sign in and are escorted by laboratory personnel. Access is controlled by various measures.

The laboratory is equipped with structural safety features. Each employee is familiar with the location, use, and capabilities of general and specialized safety features associated with their workplace. The laboratory provides and requires the use of protective equipment including safety glasses, protective clothing, gloves, etc.. OSHA and other regulatory agency guidelines regarding required amounts of bench and fume hood space, lighting, ventilation (temperature and humidity controlled), access, and safety equipment are met or exceeded.

Traffic flow through sample preparation and analysis areas is minimized to reduce the likelihood of contamination. Adequate floor space and bench top area is provided to allow unencumbered sample preparation and analysis space. Sufficient space is also provided for storage of reagents and media, glassware, and portable equipment. Ample space is also provided for refrigerated sample storage before analysis and archival storage of samples after analysis. Laboratory HVAC and deionized water systems are designed to minimize potential trace contaminants.

The laboratory is separated into specific areas for sample receiving, sample preparation, volatile organic sample analysis, non-volatile organic sample analysis, inorganic sample analysis, and administrative functions.

19.2 ENVIRONMENT

Laboratory accommodation, test areas, energy sources, lighting are adequate to facilitate proper performance of tests. The facility is equipped with heating, ventilation, and air conditioning (HVAC) systems appropriate to the needs of environmental testing performed at this laboratory.

The environment in which these activities are undertaken does not invalidate the results or adversely affect the required accuracy of any measurements.

The laboratory provides for the effective monitoring, control and recording of environmental conditions that may affect the results of environmental tests as required by the relevant specifications, methods, and procedures. Such environmental conditions include humidity, voltage and temperature in the laboratory. In addition, UPS backups are utilized for the various servers maintained in the laboratory.

When any of the method or regulatory required environmental conditions change to a point where they may adversely affect test results, analytical testing will be discontinued until the environmental conditions are returned to the required levels (refer to Section 12).

Environmental conditions of the facility housing the computer network and LIMS are regulated to protect against raw data loss.

19.3 WORK AREAS

There is effective separation between neighboring areas when the activities therein are incompatible with each other. Examples include:

- Volatile organic chemical handling areas, including sample preparation and waste disposal, and volatile organic chemical analysis areas.

Access to and use of all areas affecting the quality of analytical testing is defined and controlled by secure access to the laboratory building as described below in the Building Security section.

Adequate measures are taken to ensure good housekeeping in the laboratory and to ensure that any contamination does not adversely affect data quality. These measures include regular cleaning to control dirt and dust within the laboratory.

Work areas are available to ensure an unencumbered work area. Work areas include:

- Access and entryways to the laboratory.
- Sample receipt areas.
- Sample storage areas.
- Chemical and waste storage areas.
- Data handling and storage areas.
- Sample processing areas.
- Sample analysis areas.

19.4 FLOOR PLAN

A floor plan can be found in Appendix 3. ***[include your floorplan]***

19.5 BUILDING SECURITY

Building keys and alarm codes are distributed to employees as necessary.

Visitors to the laboratory sign in and out using the visitor's elogbook. A visitor is defined as any person who visits the laboratory who is not an employee of TestAmerica. In addition to signing into the laboratory, the Environmental, Health and Safety Manual contains requirements for visitors and vendors. There are specific safety forms that must be reviewed and signed.

Visitors (with the exception of company employees) are escorted by laboratory personnel at all times, or the location of the visitor is noted in the visitor's logbook.

SECTION 20

TEST METHODS AND METHOD VALIDATION
(NELAC 5.5.4)

20.1 OVERVIEW

TestAmerica San Francisco uses methods that are appropriate to meet our clients' requirements and that are within the scope of the laboratory's capabilities. These include sampling, handling, transport, storage and preparation of samples, and, where appropriate, an estimation of the measurement of uncertainty as well as statistical techniques for analysis of environmental data.

Instructions are available in the laboratory for the operation of equipment as well as for the handling and preparation of samples. All instructions, Standard Operating Procedures (SOPs), reference methods and manuals relevant to the working of the laboratory are readily available to all staff. Deviations from published methods are documented (with justification) in the laboratory's approved SOPs. SOPs are submitted to clients for review at their request. Significant deviations from published methods require client approval and regulatory approval where applicable.

20.2 STANDARD OPERATING PROCEDURES (SOPs)

TestAmerica San Francisco maintains SOPs that accurately reflect all phases of the laboratory such as assessing data integrity, corrective actions, handling customer complaints as well as all analytical methods and sampling procedures. The method SOPs are derived from the most recently promulgated/approved, published methods and are specifically adapted to the laboratory facility. Modifications or clarifications to published methods are clearly noted in the SOPs. All SOPs are controlled in the laboratory (refer to Section 6 on Document Control):

- All SOPs contain a revision number, effective date, and appropriate approval signatures. Controlled copies are available to all staff.
- Procedures for preparation, review, revision and control are incorporated by reference to SOPs: **CW-Q-S-002** (Writing a Standard Operating Procedure (SOP) and SOP SF-QA-1203 current revision**.**
- SOPs are reviewed at a minimum of every 2 years (annually for Drinking Water and DoD SOPs), and where necessary, revised to ensure continuing suitability and compliance with applicable requirements.

20.3 LABORATORY METHODS MANUAL

For each test method, the laboratory shall have available the published referenced method as well as the laboratory developed SOP. Refer to the corporate SOP CW-Q-S-002 "Writing a Standard Operating Procedure" for content and requirements of technical and non-technical SOPs.

Note: If more stringent standards or requirements are included in a mandated test method or regulation than those specified in this manual, the laboratory shall demonstrate that such requirements are met. If it is not clear which requirements are more stringent, the standard from

the method or regulation is to be followed. Any exceptions or deviations from the referenced methods or regulations are noted in the specific analytical SOP.

20.4 SELECTION OF METHODS

Since numerous methods and analytical techniques are available, continued communication between the client and laboratory is imperative to assure the correct methods are utilized. Once client methodology requirements are established, this and other pertinent information is summarized by the Project Manager. These mechanisms ensure that the proper analytical methods are applied when the samples arrive for log-in. For non-routine analytical services (e.g., special matrices, non-routine compound lists, etc..), the method of choice is selected based on client needs and available technology. The methods selected should be capable of measuring the specific parameter of interest, in the concentration range of interest, and with the required precision and accuracy.

20.4.1 Sources of Methods

Routine analytical services are performed using standard EPA-approved methodology. In some cases, modification of standard approved methods may be necessary to provide accurate analyses of particularly complex matrices. When the use of specific methods for sample analysis is mandated through project or regulatory requirements, only those methods shall be used.

In general, [Insert Lab Name] follows procedures from the referenced methods shown below in 20.3.1.4.

When clients do not specify the method to be used or methods are not required, the methods used will be clearly validated and documented in an SOP and available to clients and/or the end user of the data.

20.4.1.1 The analytical methods used by the laboratory are those currently accepted and approved by the U. S. EPA and the state or territory from which the samples were collected. Reference methods include:

- *Method 1664, Revision A: N-Hexane Extractable Material (HEM; Oil and Grease) and Silica Gel Treated N-Hexane Extractable Material (SGT-HEM); Non-polar Material) by Extraction and Gravimetry, EPA-821-R-98-002, February 1999*
- *Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act, and Appendix A-C; 40 CFR Part 136, USEPA Office of Water. Revised as of July 1, 1995, Appendix A to Part 136 - Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater (EPA 600 Series)*
- *Methods for Chemical Analysis of Water and Wastes, EPA 600 (4-79-020), 1983.*
- *Methods for the Determination of Inorganic Substances in Environmental Samples, EPA-600/R-93/100, August 1993.*
- *Methods for the Determination of Metals in Environmental Samples, EPA/600/4-91/010, June 1991. Supplement I: EPA-600/R-94/111, May 1994.*
- *Technical Notes on Drinking Water Methods, EPA-600/R94-173, October 1994*

- *Statement of Work for Inorganics Analysis, ILM04.1, USEPA Contract Laboratory Program Multi-media, Multi-concentration.*
- *Statement of Work for Organics Analysis, OLM04.2, USEPA Contract Laboratory Program, Multi-media, Multi-concentration.*
- *Statement of Work for Organic Analysis, Multi-Media, Multi-Concentration, OLMO4.1, USEPA Contract Laboratory Program, September 1998.*
- *Standard Methods for the Examination of Water and Wastewater, 18th/19th /20th edition; Eaton, A.D. Clesceri, L.S. Greenberg, A.E. Eds; American Water Works Association, Water Pollution Control Federation, American Public Health Association: Washington, D.C.*
- *Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW846), Third Edition, September 1986, Final Update I, July 1992, Final Update IIA, August 1993, Final Update II, September 1994; Final Update IIB, January 1995; Final Update III, December 1996.*
- *Code of Federal Regulations (CFR) 40, Parts 136, 141, 172, 173, 178, 179 and 261*

The laboratory reviews updated versions to all the aforementioned references for adaptation based upon capabilities, instrumentation, etc., and implements them as appropriate. As such, the laboratory strives to perform only the latest versions of each approved method as regulations allow or require.

Other reference procedures for non-routine analyses may include methods established by specific states (e.g., Underground Storage Tank methods), ASTM or equipment manufacturers. Sample type, source, and the governing regulatory agency requiring the analysis will determine the method utilized.

The laboratory shall inform the client when a method proposed by the client may be inappropriate or out of date. After the client has been informed, and they wish to proceed contrary to the laboratory's recommendation, it will be documented.

20.4.2 Demonstration of Capability

Before the laboratory may institute a new method and begin reporting results, the laboratory shall confirm that it can properly operate the method. In general, this demonstration does not test the performance of the method in real world samples, but in an applicable and available clean matrix sample. If the method is for the testing of analytes that are not conducive to spiking, demonstration of capability may be performed on quality control samples.

20.4.2.1 A demonstration of capability is performed whenever there is a change in instrument type, method or personnel.

20.4.2.2 The initial demonstration of capability must be thoroughly documented and approved by the Operations Manager and QA Manager prior to independently analyzing client samples. All associated documentation must be retained in accordance with the laboratories archiving procedures (refer to Section 15, Control of Records).

20.4.2.3 The laboratory must have an approved SOP, demonstrate satisfactory performance, and conduct a method detection limit study (when applicable). There may be other

requirements as stated within the published method or regulations (i.e., retention time window study).

Note: In some instances, a situation may arise where a client requests that an unusual analyte be reported using a method where this analyte is not normally reported. If the analyte is being reported for regulatory purposes, the method must meet all procedures outlined within this QA Manual (SOP, MDL, and Demonstration of Capability). If the client states that the information is not for regulatory purposes, the result may be reported as long as the following criteria are met:

- The instrument is calibrated for the analyte to be reported using the criteria for the method and ICV/CCV criteria are met (unless an ICV/CCV is not required by the method).
- The reporting limit is set at or above the first standard of the curve for the analyte.
- The client request is documented and the lab informs the client of its procedure for working with unusual compounds. The final report must be footnoted: *Reporting Limit based on the low standard of the calibration curve.*
- Refer to Section 12 (Control of Non-Conforming Work).

20.4.3 Initial Demonstration of Capability (IDOC) Procedures

20.4.3.1 The spiking standard used must be prepared independently from those used in instrument calibration.

20.4.3.2 The analyte(s) shall be diluted in a volume of clean matrix sufficient to prepare four aliquots at the concentration specified by a method or the laboratory SOP.

20.4.3.3 At least four aliquots shall be prepared (including any applicable clean-up procedures) and analyzed according to the test method (either concurrently or over a period of days).

20.4.3.4 Using all of the results, calculate the mean recovery in the appropriate reporting units and the standard deviations for each parameter of interest.

20.4.3.5 When it is not possible to determine the mean and standard deviations, such as for presence, absence and logarithmic values, the laboratory will assess performance against criteria described in the Method SOP.

20.4.3.6 Compare the information obtained above to the corresponding acceptance criteria for precision and accuracy in the test method (if applicable) or in laboratory generated acceptance criteria (LCS or interim criteria) if there is no mandatory criteria established. If any one of the parameters do not meet the acceptance criteria, the performance is unacceptable for that parameter.

20.4.3.7 When one or more of the tested parameters fail at least one of the acceptance criteria, the analyst must proceed according to either option listed below:

- Locate and correct the source of the problem and repeat the test for all parameters of interest beginning with 20.4.3.3 above.
- Beginning with 20.4.3.3 above, repeat the test for all parameters that failed to meet criteria. Repeated failure, however, will confirm a general problem with the measurement system. If this occurs, locate and correct the source of the problem and repeat the test for all compounds of interest beginning with 20.4.3.1 above.

A certification statement (see Figure 20-1) shall be used to document the completion of each initial demonstration of capability. A copy of the certification is archived in the analyst's training folder, Figure 20-2.

Methods on line prior to the effective date of this Section shall be updated to the procedures outlined above as new analysts perform their demonstration of capability. A copy of the new record will replace that which was used for documentation in the past. At a minimum, the precision and accuracy of four mid-level laboratory control samples must have been compared to the laboratory's quality control acceptance limits.

20.5 LABORATORY DEVELOPED METHODS AND NON-STANDARD METHODS

Any new method developed by the laboratory must be fully defined in an SOP/Methods Manual (Section 20.2) and validated by qualified personnel with adequate resources to perform the method. Method specifications and the relation to client requirements must be clearly conveyed to the client if the method is a non-standard method (not a published or routinely accepted method). The client must also be in agreement to the use of the non-standard method. The information included in the checklist below (Figure 20-2) is needed before samples are accepted for analysis by a new method.

20.6 VALIDATION OF METHODS

Validation is the confirmation by examination and the provision of objective evidence that the particular requirements for a specific intended use are fulfilled. (From 2003 NELAC Standard)

All non-standard methods, laboratory designed/developed methods, standard methods used outside of their scope, and major modifications to published methods must be validated to confirm they are fit for their intended use. The validation will be as extensive as necessary to meet the needs of the given application. The results are documented with the validation procedure used and contain a statement as to the fitness for use.

20.6.1 Method Validation and Verification Activities for All New Methods

While method validation can take various courses, the following activities can be required as part of method validation. Method validation records are designated QC records and are archived accordingly.

20.6.1.1 Determination of Method Selectivity

Method selectivity is the demonstrated ability to discriminate the analyte(s) of interest from other compounds in the specific matrix or matrices from other analytes or interference. In some

cases to achieve the required selectivity for an analyte, a confirmation analysis is required as part of the method.

20.6.1.2 Determination of Method Sensitivity

Sensitivity can be both estimated and demonstrated. Whether a study is required to estimate sensitivity depends on the level of method development required when applying a particular measurement system to a specific set of samples. Where estimations and/or demonstrations of sensitivity are required by regulation or client agreement, such as the procedure in 40 CFR Part 136 Appendix B, under the Clean Water Act, these shall be followed. The laboratory determinations of MDLs are described in Section 20.6.

20.6.1.3 Relationship of Limit of Detection (LOD) to the Quantitation Limit (QL)

An important characteristic of expression of sensitivity is the difference in the LOD and the QL. The LOD is the minimum level at which the presence of an analyte can be reliably concluded. The QL is the minimum level at which both the presence of an analyte and its concentration can be reliably determined. For most instrumental measurement systems, there is a region where semi-quantitative data is generated around the LOD (both above and below the estimated MDL or LOD) and below the QL. In this region, detection of an analyte may be confirmed but quantification of the analyte is unreliable within the accuracy and precision guidelines of the measurement system. When an analyte is detected below the QL, and the presence of the analyte is confirmed by meeting the qualitative identification criteria for the analyte, the analyte can be reliably reported, but the amount of the analyte can only be estimated. If data is to be reported in this region, it must be done so with a qualification that denotes the semi-quantitative nature of the result.

20.6.1.4 Determination of Interferences

A determination that the method is free from interferences in a blank matrix is performed.

20.6.1.5 Determination of Range

Where appropriate, a determination of the applicable range of the method may be performed. In most cases, range is determined and demonstrated by comparison of the response of an analyte in a curve to established or targeted criteria. The curve is used to establish the range of quantitation and the lower and upper values of the curve represent upper and lower quantitation limits. Curves are not limited to linear relationships.

20.6.1.6 Determination of Accuracy and Precision

Accuracy and precision studies are generally performed using replicate analyses, with a resulting percent recovery and measure of reproducibility (standard deviation, relative standard deviation) calculated and measured against a set of target criteria.

20.6.1.7 Documentation of Method

The method is formally documented in an SOP. If the method is a minor modification of a standard laboratory method that is already documented in an SOP, an SOP Attachment describing the specific differences in the new method is acceptable in place of a separate SOP.

20.6.1.8 Continued Demonstration of Method Performance

Continued demonstration of Method Performance is addressed in the SOP. Continued demonstration of method performance is generally accomplished by batch specific QC samples such as LCS, method blanks or PT samples.

20.7 METHOD DETECTION LIMITS (MDL)/ LIMITS OF DETECTION (LOD)

Method detection limits (MDL) are initially determined in accordance with 40 CFR Part 136, Appendix B or alternatively by other technically acceptable practices that have been accepted by regulators. MDL is also sometimes referred to as Limit of Detection (LOD). The MDL theoretically represents the concentration level for each analyte within a method at which the Analyst is 99% confident that the true value is not zero. The MDL is determined for each analyte initially during the method validation process and updated as required in the analytical methods, whenever there is a significant change in the procedure or equipment, or based on project specific requirements (refer to 20.7.10). The analyst prepares at least seven replicates of solution spiked at one to five times the estimated method detection limit (most often at the lowest standard in the calibration curve) into the applicable matrix with all the analytes of interest. Each of these aliquots is extracted (including any applicable clean-up procedures) and analyzed in the same manner as the samples. Where possible, the seven replicates should be analyzed over 2-4 days to provide a more realistic MDL. To allow for some flexibility, this low level standard may be analyzed every batch or every week or some other frequency rather than doing the study all at once. In addition, a larger number of data points may be used if the appropriate t-value multiplier is used.

20.7.1 MDL's are initially performed for each individual instrument and non-microbiological method analysis. Unless there are requirements to the contrary, the laboratory will use the highest calculated MDL for all instruments used for a given method as the MDL for reporting purposes. This MDL is not required for methods that are not readily spiked (e.g. pH, turbidity, etc.) or where the lab does not report values to the MDL. Titration and gravimetric methods where there is no additional preparation involved, the MDL is based on the lowest discernable unit of measure that can be observed.

20.7.2 MDL's must be run against acceptable instrument QC, including ICV's and Tunes. This is to insure that the instrument is in proper working condition and falsely high or low MDL's are not calculated.

20.7.3 Use only clean matrix which is free of target analytes (e.g.: Laboratory reagent water, Ottawa Sand) unless a project specific MDL is required in a field sample matrix.

20.7.4 The Reporting Limit (also may be referred to as Limit of Quantitation or LOQ) should generally be between 2 and 5 times the MDL. If the MDL is being performed during method development, use this guideline to determine the Reporting Limit for the analysis. If a sample is diluted, the reported MDL is adjusted according to the dilution factor.

20.7.5 If the MDL is < 1/10 of the spike concentration for more than 10% of the analytes in the method the MDL must be repeated (including extraction or digestion) using a lower spike level unless the % recovery is < 50% or > 150% of the "true value". Note: The concentration of the spike will be at a level below the calibration range.

20.7.6 The calculated MDL cannot be not greater than the spike amount.

20.7.7 If the most recent calculated MDL does not permit qualitative identification of the analyte then the laboratory may use technical judgment for establishing the MDL (e.g., calculate what level would give a qualitative ID, compare with IDL (20.7), spike at a level where qualitative

ID is determined and assign that value as MDL, minimum sensitivity requirements, Standard deviation of method blanks over time, etc.).

20.7.8 Each of the 7 spikes must be qualitatively identifiable (e.g., appear in both columns for dual column methods, characteristic ions for GCMS mass spectra, etc). Manual integrations to force the baseline for detection are not allowed.

20.7.9 The initial MDL is calculated as follows:

$$MDL = t_{(n-1,\ 1-a\ =\ 0.99)} \times (\text{Standard Deviation of replicates})$$

where $t_{(n-1,\ 1-a\ =\ 0.99)} = 3.143$ for seven replicates.

20.7.10 Subsequent to the initial MDL determination, periodic MDL verification, confirmation or determinations may be performed by the procedure in 40 CFR Part 136, Appendix B or alternatively by other technically acceptable practices (e.g., method blanks over time, single standard spikes that have been subjected to applicable sample prep processes, etc.). The procedures utilized can be found in MDL SOP SF-QA-1218, current revision.

20.7.11 Because of the inherent variability in results outside of the calibration range, TestAmerica does not recommend the reporting of results below the lowest calibration point in a curve; however, it is recognized that some projects and agencies require the reporting of results below the RL. Any result that falls between the MDL and the Reporting limit, when reported, will be qualified as an estimated value.

20.7.12 Detections reported down to the MDL must be qualitatively identified.

20.7.13 MDLs and Reporting limits are adjusted in LIMs based on moisture content and sample aliquot size.

20.8 INSTRUMENT DETECTION LIMITS (IDL)

20.8.1 The IDL is sometimes used to assess the reasonableness of the MDLs or in some cases required by the analytical method or program requirements. IDLs are most used in metals analyses but may be useful in demonstration of instrument performance in other areas.

20.8.2 IDLs are calculated to determine an instrument's sensitivity independent of any preparation method. IDLs are calculated either using 7 replicate spike analyses, like MDL but without sample preparation, or by the analysis of 10 instrument blanks and calculating 3 x the absolute value of the standard deviation.

20.8.3 If IDL is > than the MDL, it may be used as the reported MDL.

20.9 VERIFICATION OF DETECTION AND REPORTING LIMITS

20.9.1 Once an MDL is established, it must be verified, on each instrument, by analyzing a quality control sample (prepared as a sample) at approximately 2-3 times the calculated MDL for single analyte analyses (e.g. most wet chemistry methods, Atomic Absorption, etc.) and 1-4 times the calculated MDL up to ½ the RL for multiple analyte methods (e.g. GC, GCMS, ICP, TPH by GCFID etc.). The analytes must be qualitatively identified or see section 20.6.7 for other options. This verification does not apply to methods that are not readily spiked (e.g. pH, turbidity, etc.) or where the lab does not report to the MDL. If the MDL does not verify, then the lab will not report to the MDL, or redevelop their MDL or use the level where qualitative identification is established (See 20.6.7). MDLs must be verified at least annually.

20.9.2 When a Reporting limit is established, it must be initially verified by the analysis of a low level standard or QC sample (LCS at 1-2 the reporting limit) and annually thereafter. Unless there are requirements to the contrary the acceptance criteria is ± 50%. The annual requirement is waved for methods that have an annually verified MDL.

20.10 RETENTION TIME WINDOWS

Most organic analyses and some inorganic analyses use chromatography techniques for qualitative and quantitative determinations. For every chromatography analysis each analyte will have a specific time of elution from the column to the detector. This is known as the analyte's retention time. The variance in the expected time of elution is defined as the retention time window. As the key to analyte identification in chromatography, retention time windows must be established on every column for every analyte used for that method. These records are kept with the files associated with an instrument for later quantitation of the analytes.

For GC, HPLC and IC methods, there must be sufficient separation between analyte peaks so as to not misidentify analytes. In the mid-level standard, the distance between the valley and peak height cannot be any less than 25% of the sum of the peak heights of the analytes. This also applies to GCMS in the case where the two compounds share the same quantitation ion.

Note: Some analytes do not separate sufficiently to be able to identify or quantitate them as separate analytes (e.g. m-xylene and p-xylene) and are quantitated and reported as a single analyte (e.g. m,p-xylenes).

Once the analyst has determined that the instrument is in optimum working condition through calibration and calibration verification procedures, he or she uses a mid-range calibration or calibration verification standard to establish the retention times for each of the individual analytes in a method. The analyst makes three injections of the same standard over a 72-hour (24 hr period for 300.0) period, tabulating the retention times for each analyte for each of the three injections. The width of retention time window is normally the average absolute retention time ± 3 Standard Deviations. A peak outside the retention time window will not be identified by the computer as a positive match of the analyte of interest.

It is possible for the statistically calculated RT window to be too tight and need to be adjusted based on analyst experience. In these instances method default retention time windows may be used (e.g., for 8000 series methods a default of 0.03 minutes may be used, and EPA CLP 0.05

minutes is used). The same concept is applied when any peak outside of that window will not be identified by the computer as a positive match.

The calibration verification standard at the beginning of a run may be used to adjust the RT for an analyte. This is essentially re-centering the window but the size of the window remains the same. The RTs are verified when all analytes are within their RT windows and are properly identified.

20.11 EVALUATION OF SELECTIVITY

The laboratory evaluates selectivity by following the checks within the applicable analytical methods, which include mass spectral tuning, second column confirmation, ICP interelement interference checks, chromatography retention time windows, sample blanks, spectrochemical, atomic absorption or fluorescence profiles, co-precipitation evaluations and specific electrode response factors.

20.12 ESTIMATION OF UNCERTAINTY OF MEASUREMENT

20.12.1 Uncertainty is "a parameter associated with the result of a measurement, that characterizes the dispersion of the values that could reasonably be attributed to the measurand" (as defined by the International Vocabulary of Basic and General Terms in Metrology, ISO Geneva, 1993, ISBN 92-67-10175-1). Knowledge of the uncertainty of a measurement provides additional confidence in a result's validity. Its value accounts for all the factors which could possibly affect the result, such as adequacy of analyte definition, sampling, matrix effects and interferences, climatic conditions, variances in weights, volumes, and standards, analytical procedure, and random variation. Some national accreditation organizations require the use of an "expanded uncertainty": the range within which the value of the measurand is believed to lie within at least a 95% confidence level with the coverage factor k=2.

20.12.2 Uncertainty is not error. Error is a single value, the difference between the true result and the measured result. On environmental samples, the true result is never known. The measurement is the sum of the unknown true value and the unknown error. Unknown error is a combination of systematic error, or bias, and random error. Bias varies predictably, constantly, and independently from the number of measurements. Random error is unpredictable, assumed to be Gaussian in distribution, and reducible by increasing the number of measurements.

20.12.3 The uncertainty associated with results generated by the laboratory can be determined by using the Laboratory Control Sample (LCS) accuracy range for a given analyte. The LCS limits are used to assess the performance of the measurement system since they take into consideration all of the laboratory variables associated with a given test over time (except for variability associated with the sampling). The percent recovery of the LCS is compared either to the method-required LCS accuracy limits or to the statistical, historical, in-house LCS accuracy limits.

20.12.4 To calculate the uncertainty for the specific result reported, multiply the result by the decimal of the lower end of the LCS range percent value for the lower end of the uncertainty range, and multiply the result by the decimal of the upper end of the LCS range percent value for the upper end of the uncertainty range. These calculated values represent a 99%-certain range for the reported result. As an example, suppose that the result reported is 1.0 mg/l, and

the LCS percent recovery range is 50 to 150%. The uncertainty range would be 0.5 to 1.5 mg/l, which could also be written as 1.0 +/- 0.5 mg/l.

20.12.5 In the case where a well recognized test method specifies limits to the values of major sources of uncertainty of measurement (e.g. 524.2, 525, etc) and specifies the form of presentation of calculated results, no further discussion of uncertainty is required.

20.13 CONTROL OF DATA

The laboratory has policies and procedures in place to ensure the authenticity, integrity, and accuracy of the analytical data generated by the laboratory.

20.13.1 Computer and Electronic Data Related Requirements

The three basic objectives of our computer security procedures and policies are shown below. The laboratory is currently running the TALS which is a custom in-house developed LIMS system that has been highly customized to meet the needs of the laboratory. It is referred to as LIMS for the remainder of this section. The LIMS utilizes .Net which is an industry standard relational database platform. It is referred to as Database for the remainder of this section.

20.13.1.1 **Maintain the Database Integrity:** Assurance that data is reliable and accurate through data verification (review) procedures, password-protecting access, anti-virus protection, data change requirements, as well as an internal LIMS permissions procedure.

- LIMS Database Integrity is achieved through data input validation, internal user controls, and data change requirements.
- Spreadsheets and other software developed in-house must be verified with documentation through hand calculations prior to use.

  Note: "Commercial off-the-shelf software in use within the designed application range is considered to be sufficiently validated." *From NELAC 2003 Standard.* However, laboratory specific configurations or modifications are validated prior to use.

- In order to assure accuracy, all data entered or transferred into the LIMS data system goes through a minimum of two levels of review.
- The QA department performs random data audits to ensure the correct information has been reported.
- Changes to reports are documented are documented in LIMS. Reasons for revising a report are required before revisions are made.

- Analytical data file security is provided through three policies.
  - The first policy forbids unauthorized personnel from using laboratory data acquisition computers.
  - The second policy is the implementation of network passwords and login names that restrict directory access.
  - The third layer is maintained through the LIMS and includes the use of username/password combinations to gain access to the LIMS system, the fact that

all data in the LIMS is associated with the user to added/reviewed the data, and the restriction of review authority of data.

- All software installations will be in accordance with any relevant copyright licensing regulations.
- All software installed on any computer within the laboratory must be approved by the Information Technology Department regional support technician assigned to the laboratory Shrink-wrapped or otherwise sealed OEM software that is directly related to instrument usage does not need approval but the Information Technology department must be notified of the installation.
- Anti-virus software shall be installed on all servers and workstations. The anti-virus software shall be configured to check for virus signature file and program updates on a daily basis and these updates will be pushed to all servers and workstations. The anti-virus software will be configured to clean any virus-infected file if possible, otherwise the file will be deleted. Disks and CDs brought from any outside source that are not OEM software must be scanned for viruses before being accessed.

- **Interlab LIMS Permissions Policy**
  - PURPOSE - The purpose of this policy is to provide a mechanism for maintaining the integrity of information contained in each laboratory's LIMS while providing the necessary access for information sharing to staff at other laboratory facilities.
  - DEFINITIONS - Host Laboratory: The laboratory facility that 'owns' the LIMS system or 'hosts' a project/job.
  - POLICIES

    (a) All permissions for the laboratory's LIMS system must only be granted by a representative of that laboratory.
    - If someone outside of the host lab needs permissions for Project Management or other uses, they must go through the Lab Director or his/her designated representative.
    - Permissions must never be granted without the knowledge of the host laboratory.

    (b) Only laboratory analytical or QA staff from the home laboratory may have edit permissions for laboratory analysis data.

    (c) Any changes made in laboratory's LIMS system:
    - Must be documented and traceable.
    - If made by staff of an affiliate lab, written permission from the home lab to make the changes (email approval is sufficient) is required.
    - No corrections may be made in another laboratories system without their knowledge.

    (d) Data qualifiers in laboratory reports must only be corrected, edited, etc. by the staff at the host laboratory.

    (e) Full analytical data "View" only permissions may be granted to outside Project Management and Sales staff. ~~Query~~ Search permissions may also be granted so status may be checked.

    (f) All qualifiers must be approved by QA staff before adding to standard reference tables Changes to qualifiers in the master list must be approved by Corp QA.

    (g) Please contact Corporate QA or IT staff if you have any questions regarding implementation or interpretation of this policy.

20.13.1.2 **Ensure Information Availability:** Protection against loss of information or service through scheduled back-ups, secure storage of media, line filter, Uninterruptible Power Supply (UPS), and maintaining older versions of software as revisions are implemented.

- Insured by timely backup procedures on reliable backup media, stable file server network architecture, and UPS protection
- UPS Protection:
  - Each fileserver is protected by an appropriate power protection/backup unit. In the event of a power outage, there is approximately 15-30 minutes of up-time for the servers prior to shutdown. This allows for proper shutdown procedures to be followed with the fileservers.
- File Server Architecture
  - All files are maintained on multiple Windows 2000 or newer servers which are secured physically in the Information Technology office. Access to these servers is limited to members of the Information Technology staff.
  - All supporting software is maintained for at least 5 years from the last raw data generated using that software. [Length of time is dependent on local regulations or client requirements (e.g., OVAP requires 10 years).]
- System Back-up Overview and Procedures
  - Data from both servers and instrument attached PC's are backed up and purged in compliance with the corporate back-up policy.
  - A Maintenance Plan has been defined to create a daily archive of all data within the LIMS database to a backup location. This backup is initiated automatically by either the database or back-up system.
  - Backup tapes will be stored in compliance with the corporate Data Backup Policy. Backup verifications are carried out in accordance with the corporate Data Backup Policy.
  - Instrument data back-ups are verified on a periodic basis by the QA department when performing electronic data audits. The audit takes place on data that has been moved to a back-up location ensuring that it has been moved.

20.13.1.3 Maintain Confidentiality: Ensure data confidentiality through physical access controls, and encryption of when electronically transmitting data.

- All servers are located in a secure area of the IT department offices. Access to the servers is limited to IT staff members, Lab Director and QA Manager.
- The company website contains SSL (Secure Socket Layer) encryption for secure website sessions and data transfers.
- The reporting portion of the LIMS system requires a project manager to enter their unique password anytime they create a report that displays a signature on it (.PDF).
- If electronic documents are made available outside of the web site, the customer must sign an agreement in advance that states they will not alter the data in any way.

20.13.2 Data Reduction

The complexity of the data reduction depends on the analytical method and the number of discrete operations involved (e.g., extractions, dilutions, instrument readings and concentrations). The

analyst calculates the final results from the raw data or uses appropriate computer programs to assist in the calculation of final reportable values.

For manual data entry, e.g., Wet Chemistry, the data is reduced by the analyst and then verified by the Department Manager or alternate analyst prior to updating the data in LIMS. The spreadsheets, or any other type of applicable documents, are signed by both the analyst and alternate reviewer to confirm the accuracy of the manual entry(s).

Manual integration of peaks will be documented and reviewed and the raw data will be flagged in accordance with the TestAmerica Corporate SOP CA-Q-S-002, *Acceptable Manual Integration Practices*.

Analytical results are reduced to appropriate concentration units specified by the analytical method, taking into account factors such as dilution, sample weight or volume, etc. Blank correction will be applied only when required by the method or per manufacturer's indication; otherwise, it should not be performed. Calculations are independently verified by appropriate laboratory staff. Calculations and data reduction steps for various methods are summarized in the respective analytical SOPs or program requirements.

20.13.2.1 All raw data must be retained in the instrument data folder, computer file (if appropriate), and/or run log. All criteria pertinent to the method must be recorded. The documentation is recorded at the time observations or calculations are made and must be signed or initialed/dated (month/day/year). It must be easily identifiable who performed which tasks if multiple people were involved.

20.13.2.2 In general, concentration results are reported in milligrams per liter (mg/l) or micrograms per liter (µg/l) for liquids and milligrams per kilogram (mg/kg) or micrograms per kilogram (µg/kg) for solids. The units "mg/l" and "mg/kg" are the same as "parts per million (ppm)". The units "µg/l" and "µg/kg" are the same as "parts per billion (ppb)." For values greater than 10,000 mg/l, results can be reported in percent, i.e., 10,000 mg/l = 1%.

- Several environmental methods, such as color, turbidity, conductivity, use very specific, non-concentration units to report results (e.g., NTU, umhos/cm etc).
- Occasionally, the client requests that results be reported in units which take into account the measured flow of water or air during the collection of the sample. When they provide this information, the calculations can be performed and reported.

20.13.2.3 In reporting, the analyst or the instrument output records the raw data result using values of known certainty plus one uncertain digit. If final calculations are performed external to LIMS, the results should be entered in LIMS with at least three significant figures. In general, results are reported to 2 significant figures on the final report.

20.13.2.4 For those methods that do not have an instrument printout or an instrumental output compatible with the LIMS System, the raw results and dilution factors are entered directly into LIMS by the analyst, and the software calculates the final result for the analytical report. LIMS has a defined significant figure criterion for each analyte.

20.13.2.5 The laboratory strives to import data directly from instruments or calculation spreadsheets to ensure that the reported data are free from transcription and calculation errors. For those analyses with an instrumental output compatible with the LIMS, the raw results and dilution factors are transferred into LIMS electronically after reviewing the quantitation report, and removing unrequested or poor spectrally-matched compounds. The analyst prints a copy of what has been entered to check for errors. This printout and the instrument's printout of calibrations, concentrations, retention times, chromatograms, and mass spectra, if applicable, are retained with the data file. The data file is stored in a monthly folder on the instrument computer; periodically, this file is transferred to the server and, eventually, to a tape file.

20.13.3 Logbook / Worksheet Use Guidelines

Logbooks and worksheets are filled out 'real time' and have enough information on them to trace the events of the applicable analysis/task. (e.g. calibrations, standards, analyst, sample ID, date, time on short holding time tests, temperatures when applicable, calculations are traceable, etc.)

- Corrections are made following the procedures outlined in Section 13.
- Logbooks are controlled by the QA department. A record is maintained of all logbooks in the lab.
- Unused portions of pages must be "Z"'d out, signed and dated.
- Worksheets are created with the approval of the QA Manager at the facility. The QA Manager controls all worksheets following the procedures in Section 6.

20.13.4 Review / Verification Procedures

Review procedures are out lined in several SOPs [e.g. Sample Control, Data Review, Project Management] to ensure that reported data are free from calculation and transcription errors, that QC parameters have been reviewed and evaluated before data is reported. The laboratory also has an SOP discussing Manual Integrations to ensure the authenticity of the data [SOP SF-QA-1204, current revision.]. The general review concepts are discussed below, more specific information can be found in the SOPs.

20.13.4.1 The data review process at TestAmerica San Francisco starts at the Sample Control level. Sample Control personnel review chain-of-custody forms and input the sample information and required analyses into a computer LIMS. The Project Managers perform final review of the chain-of-custody forms and inputted information.

20.13.4.2 The next level of data review occurs with the Analysts. As results are generated, analysts review their work to ensure that the results generated meet QC requirements and relevant EPA methodologies. The Analysts transfer the data into the LIMS and add data qualifiers if applicable (see Appendix 7 for list of common data qualifiers). To ensure data compliance, a different analyst performs a second level of review. Second level review is accomplished by checking reported results against raw data and evaluating the results for accuracy. During the second level review, blank runs,

QA/QC check results, continuing calibration results, laboratory control samples, sample data, qualifiers and spike information are evaluated. Approximately 15% of all sample data from manual methods and from automated methods, all GC/MS spectra and all manual integrations are reviewed. Manual integrations are also electronically reviewed utilizing auditing software to help ensure compliance to ethics and manual integration policies. Manual integrations performed on data that is generated by software that is not compatible with the auditing software is manually reviewed. Issues that deem further review include the following:

- QC data are outside the specified control limits for accuracy and precision
- Reviewed sample data does not match with reported results
- Unusual detection limit changes are observed
- Samples having unusually high results
- Samples exceeding a known regulatory limit
- Raw data indicating some type of contamination or poor technique
- Inconsistent peak integration
- Transcription errors
- Results outside of calibration range

20.13.4.3 Unacceptable analytical results may require reanalysis of the samples. Any problems are brought to the attention of the Laboratory Director, Project Manager and Quality Assurance Manager for further investigation. Corrective action is initiated whenever necessary.

20.13.4.4 The results are then entered or directly transferred into the computer database and a hard copy (or .pdf) is printed for the client.

20.13.4.5 As a final review prior to the release of the report, the Project Manager reviews the results for appropriateness and completeness. This review and approval ensures that client requirements have been met and that the final report has been properly completed. The process includes, but is not limited to, verifying that chemical relationships are evaluated, COC is followed, cover letters/ narratives are present, flags are appropriate, and project specific requirements are met. The following are some examples of chemical relationships that are reviewed (if data is available):

- Total Results are $\geq$ Dissolved results (e.g. metals)
- Total Solids (TS) $\geq$ TDS or TSS
- COD $\geq$ TOC
- TDS $\geq$ individual anions

20.13.4.6 Any project that requires a data package is subject to a tertiary data review for transcription errors and acceptable quality control requirements. The third level review can be performed by the Operations Manager, QA Manager or Laboratory

Director. The Project Manager then signs the final report. (*Also see section 26 on Reporting Results*). When complete, the report is sent out to the client.

20.13.4.7 A visual summary of the flow of samples and information through the laboratory, as well as data review and validation, is presented in Figure 20-3.

20.13.4.8 Manual Integrations

Computerized data systems provide the analyst with the ability to re-integrate raw instrument data in order to optimize the interpretation of the data. Though manual integration of data is an invaluable tool for resolving variations in instrument performance and some sample matrix problems, when used improperly, this technique would make unacceptable data appear to meet quality control acceptance limits. Improper re-integrations lead to legally indefensible data, a poor reputation, or possible laboratory decertification. Because guidelines for re-integration of data are not provided in the methods and most methods were written prior to widespread implementation of computerized data systems, the laboratory trains all analytical staff on proper manual integration techniques using SOP CA-Q-S-002 as the guidelines**.** Refer to SOP SF-QA-1204 current revision for additional information on when and how to properly perform manual integrations.

20.13.4.9 The analyst must adjust baseline or the area of a peak in some situations, for example when two compounds are not adequately resolved or when a peak shoulder needs to be separated from the peak of interest. The analyst must use professional judgment and common sense to determine when manual integrating is required. Analysts are encouraged to ask for assistance from a senior analyst or manager when in doubt.

20.13.4.10 Analysts shall not increase or decrease peak areas to for the sole purpose of achieving acceptable QC recoveries that would have otherwise been unacceptable. The intentional recording or reporting of incorrect information (or the intentional omission of correct information) is against company principals and policy and is grounds for immediate termination.

20.13.4.11 Client samples, performance evaluation samples, and quality control samples are all treated equally when determining whether or not a peak area or baseline should be manually adjusted.

20.13.4.12 All manual integrations receive a second level review. Manual integrations must be indicated on an expanded scale “after” chromatograms such that the integration performed can be easily evaluated during data review. Expanded scale “before” chromatograms are also required for all manual integrations on QC parameters (calibrations, calibration verifications, laboratory control samples, internal standards, surrogates, etc.) unless the laboratory has another documented corporate approved procedure in place that can demonstrate an active process for detection and deterrence of improper integration practices.

Figure 20-1. Demonstration of Capability Documentation

ANALYST DEMONSTRATION OF CAPABILITY

Method 8260B_LL **Laboratory:** STL San Francisco
Limit Group 8260B_LL Full List Soils & MeOH
Reviewed by: Boongaling, Rene

Preparation Analyst: Chen, Amy

Benzene

All values within Control limits

Analysis Dates: 9/7/2006 to 2/7/2007

Current Limits					
Recovery					
LCL	UCL	Mean	Std Dev	Units	N
69	129			%	
Precision					
Limit				Units	
20				%	

Demonstration of Capability			
Recovery			
Mean	Std Dev	Units	N
96.39	3.46886	%	4
Precision			
Mean	Std Dev	Units	N
4.113	4.32686	%	2

Lab ID	Anal Date	Batch	Samp	Analyst	Prep Analyst	Result	Units	Spike Amount	% Rec	% D	In Rec Limits?
LCS 720-17837/1-AA	02/01/2007	17831	1	Chen, Amy	Chen, Amy	94.527	ug/Kg	100.00	95		Pass
LCSD 720-17837/2-AA	02/01/2007	17831	2	Chen, Amy	Chen, Amy	101.56	ug/Kg	100.00	102	7	Pass
LCS 720-17877/1-AA	02/02/2007	17876	1	Chen, Amy	Chen, Amy	95.246	ug/Kg	100.00	95		Pass
LCSD 720-17877/2-AA	02/02/2007	17876	2	Chen, Amy	Chen, Amy	94.247	ug/Kg	100.00	94	1	Pass

Chlorobenzene

All values within Control limits

Analysis Dates: 9/7/2006 to 2/7/2007

Current Limits					
Recovery					
LCL	UCL	Mean	Std Dev	Units	N
61	121			%	
Precision					
Limit				Units	
20				%	

Demonstration of Capability			
Recovery			
Mean	Std Dev	Units	N
101.1	2.69387	%	4
Precision			
Mean	Std Dev	Units	N
3.295	3.80324	%	2

Lab ID	Anal Date	Batch	Samp	Analyst	Prep Analyst	Result	Units	Spike Amount	% Rec	% D	In Rec Limits?
LCS 720-17837/1-AA	02/01/2007	17831	1	Chen, Amy	Chen, Amy	98.968	ug/Kg	100.00	99		Pass
LCSD 720-17837/2-AA	02/01/2007	17831	2	Chen, Amy	Chen, Amy	105.07	ug/Kg	100.00	105	6	Pass
LCS 720-17877/1-AA	02/02/2007	17876	1	Chen, Amy	Chen, Amy	100.60	ug/Kg	100.00	101		Pass
LCSD 720-17877/2-AA	02/02/2007	17876	2	Chen, Amy	Chen, Amy	100.00	ug/Kg	100.00	100	1	Pass

2/7/2007 Page 1 of 3

Figure 20-2. DOC Summary

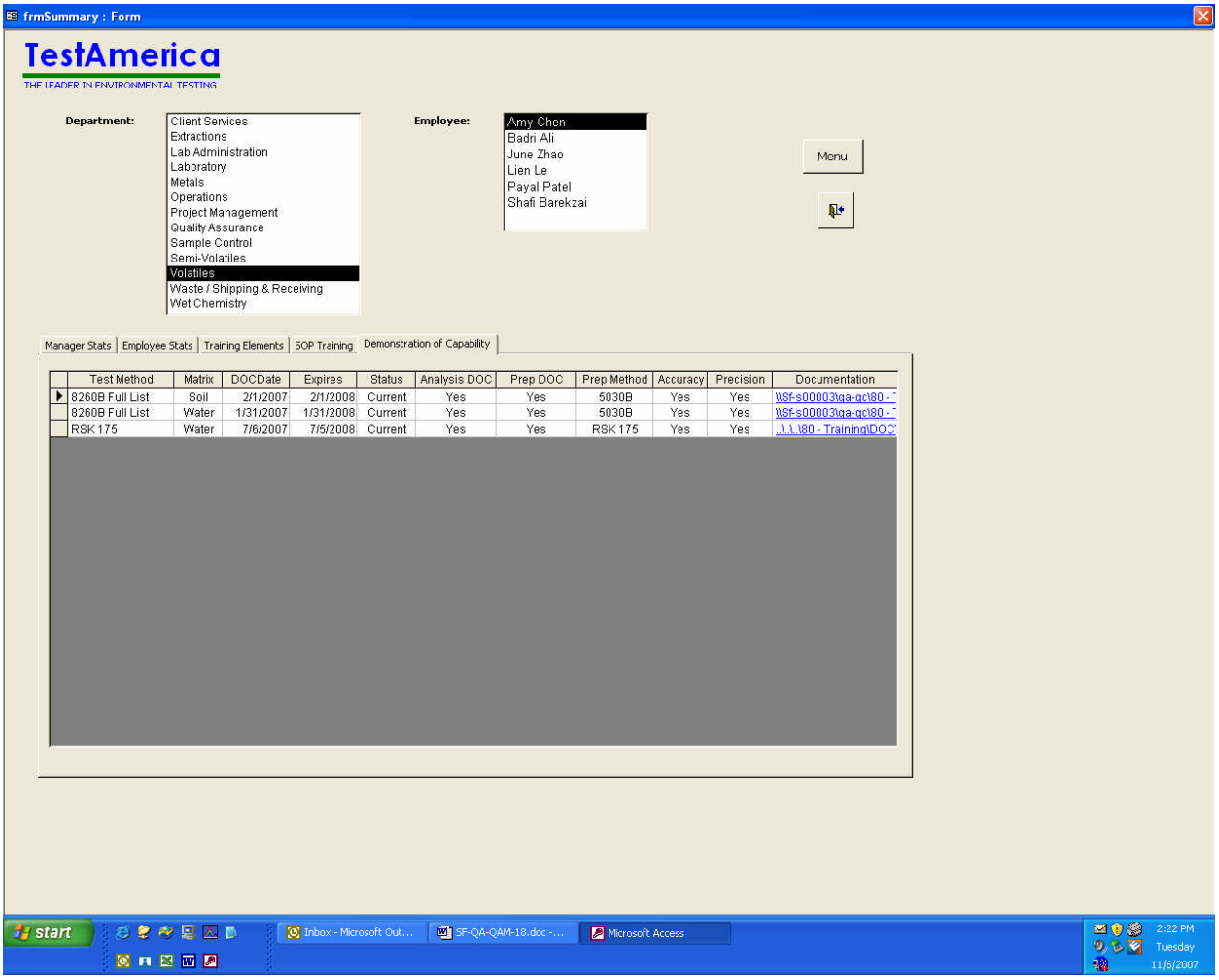
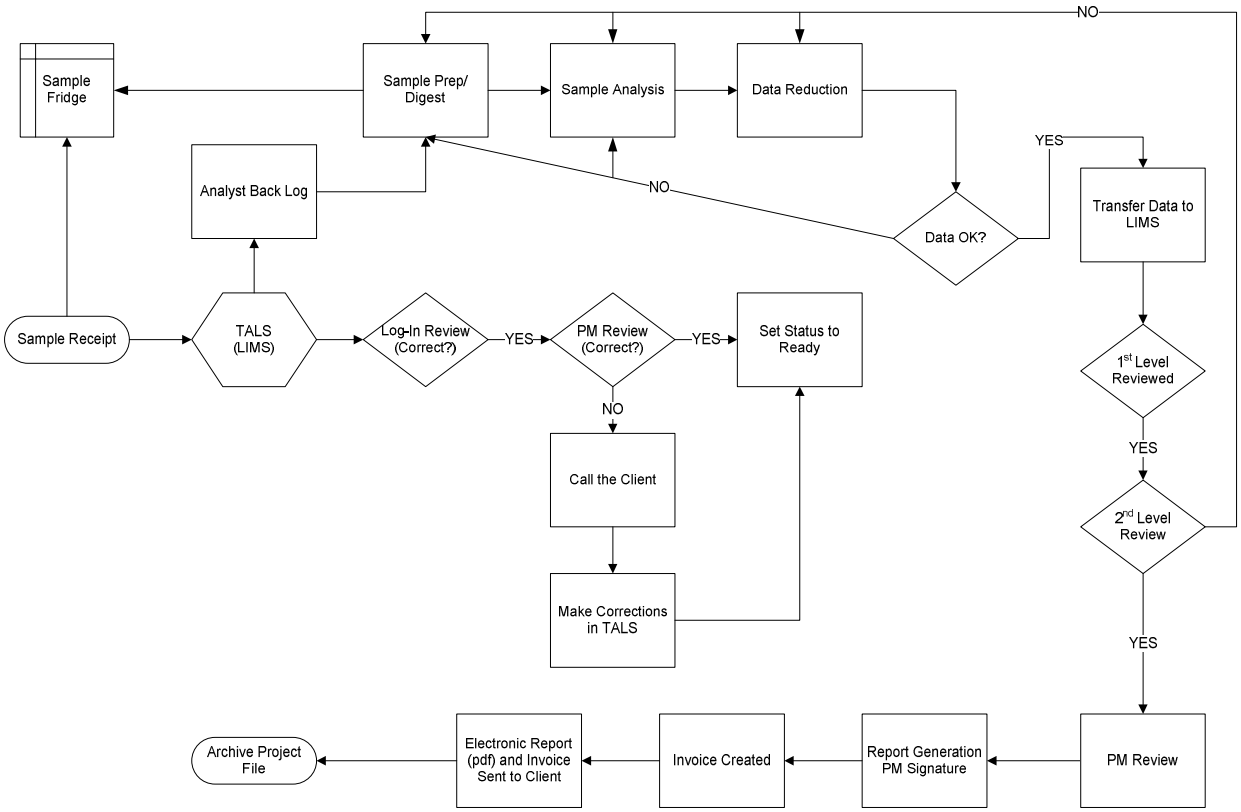


Figure 20-3. WorkFlow Diagram



SECTION 21

EQUIPMENT (AND CALIBRATIONS)
(NELAC 5.5.5)

21.1 OVERVIEW

TestAmerica purchases the most technically advanced analytical instrumentation for sample analyses. Instrumentation is purchased on the basis of accuracy, dependability, efficiency and sensitivity. Each laboratory is furnished with all items of sampling, preparation, analytical testing and measurement equipment necessary to correctly perform the tests for which the laboratory has capabilities. Each piece of equipment is capable of achieving the required accuracy and complies with specifications relevant to the method being performed. Before being placed into use, the equipment (including sampling equipment) is calibrated and checked to establish that it meets its intended specification. The calibration routines for analytical instruments establish the range of quantitation. Calibration procedures are specified in specific laboratory method SOPs. Refer to SOP SF-QA-1207 (current revision) for instructions on how to properly calibrate and evaluate calibrations. A list of laboratory equipment and instrumentation is presented in Table 21-1.

Equipment is only operated by authorized and trained personnel. Manufacturers instructions for equipment use are readily accessible to all appropriate laboratory personnel.

21.2 PREVENTIVE MAINTENANCE

21.2.1 TestAmerica San Francisco follows a well-defined program to ensure proper equipment operation and to prevent the failure of laboratory equipment or instrumentation during use. This program of preventive maintenance helps to avoid delays due to instrument failure.

21.2.2 Routine preventive maintenance procedures and frequency, such as lubrication, cleaning, and replacements, should be performed according to the procedures outlined in the manufacturer's manual. Qualified personnel must also perform maintenance when there is evidence of degradation of peak resolution, a shift in the calibration curve, loss of sensitivity, or failure to continually meet one of the quality control criteria.

21.2.2.1 Calibrations, routine maintenance, and adjustments are part of the analysts' and responsibilities. However, service contracts may be in place for some instruments to cover any major repairs.

21.2.2.2 High purity gases, reagents, and spare parts are kept on hand to minimize repair time and optimize instrument performance.

21.2.3 Table 21-2 summarizes the schedule for routine maintenance. It is the responsibility of each analyst to ensure that instrument maintenance logs are kept for all equipment in his/her department. Preventative maintenance procedures may also be outlined in analytical SOPs or instrument manuals. Note: The maintenance log is Microsoft Access based and is centrally located so that it can be accessed at any data station in the laboratory.

21.2.4 Instrument maintenance logs are controlled and are used to document instrument problems, instrument repair and maintenance activities. Maintenance logs shall be kept for all major pieces of equipment. Instrument maintenance logs may also be used to specify instrument parameters.

21.2.4.1 Documentation must include all major maintenance activities such as contracted preventive maintenance and service and in-house activities such as the replacement of electrical components, lamps, tubing, valves, columns, detectors, cleaning and adjustments.

21.2.4.2 Each entry in the instrument log includes the Analyst's initials, the date, a detailed description of the problem (or maintenance needed/scheduled), a detailed explanation of the solution or maintenance performed, and a verification that the equipment is functioning properly (state what was used to determine a return to control. e.g. CCV run on *'date'* was acceptable, or instrument recalibrated on 'date' with acceptable verification, etc.).

21.2.4.3 When maintenance or repair is performed by an outside agency, service receipts detailing the service performed are scanned into a separate folder in the eMaintenance Log folder in \\sf-s00005\SF00005_Data_Drive\Log\Copies of Service Log by Outside Provider. This file is then linked to the specific Log entry by dragging the file to the database.

21.2.5 In addition, the maintenance records contain:

- The identification of the instrument/equipment **(**instrument's Serial Number and Model Number)
- The date the instrument/equipment was put into use.
- If available, the condition when the instrument was received (e.g. new, used, reconditioned).
- The most common maintenance procedures, as outlined in the individual method SOPs.

21.2.6 If an instrument requires repair (subjected to overloading or mishandling, gives suspect results, or otherwise has shown to be defective or outside of specified limits) it shall be taken out of operation and tagged as out of service or otherwise isolated until such a time as the repairs have been made and the instrument can be demonstrated as operational by calibration and/or verification or other test to demonstrate acceptable performance. The laboratory shall examine the effect of this defect on previous analyses (refer to Sections 12 and 13).

21.2.7 In the event of equipment malfunction that cannot be resolved, service shall be obtained from the instrument vendor manufacturer, or qualified service technician, if such a service can be tendered. If on-site service is unavailable, arrangements shall be made to have the instrument shipped back to the manufacturer for repair. Back up instruments, which have been approved, for the analysis shall perform the analysis normally carried out by the malfunctioning instrument. If the back up is not available and the analysis cannot be carried out within the needed timeframe, the samples shall be subcontracted using the procedures outlined in Section 8.

If an instrument is sent out for service or transferred to another facility, it must be recalibrated and verified (including new initial MDL study) prior to return to lab operations.

21.3 SUPPORT EQUIPMENT

This section applies to all devices that may not be the actual test instrument, but are necessary to support laboratory operations. These include but are not limited to: balances, ovens, refrigerators, freezers, incubators, water baths, field sampling devices, temperature measuring devices, thermal/pressure sample preparation devices and volumetric dispensing devices if quantitative results are dependent on their accuracy, as in standard preparation and dispensing or dilution into a specified volume. All raw data records associated with the support equipment are retained to document instrument performance.

21.3.1 Weights and Balances

The accuracy of the balances used in the laboratory is checked every working day, before use. All balances are placed on stable counter tops.

Each balance is checked prior to use with at least two certified ASTM type 1 weights spanning its range of use (weights that have been calibrated to ASTM type 1 weights may also be used for daily verification). ASTM type 1 weights used only for calibration of other weights (and no other purpose) are inspected for corrosion, damage or nicks at least annually and if no damage is observed, they are calibrated at least every 5 years by an outside calibration laboratory. Any weights (including ASTM Type 1) used for daily balance checks or other purposes are recalibrated/recertified annually to NIST standards (this may be done internally if laboratory maintains “calibration only” ASTM type 1 weights).

All balances are serviced annually by a qualified service representative, who supplies the laboratory with a certificate that identifies traceability of the calibration to the NIST standards.

All of this information is recorded in logs, and the recalibration/recertification certificates are kept on file. Copies of the calibration certificates for all balances and weights used for daily calibration are maintained in the Calibrated Devices database. In addition, the daily balance calibrations are also maintained in this database. See Figure 21-1 and 21-2.

Figure 21-1. Calibrated Devices Database – Calibration Summary.

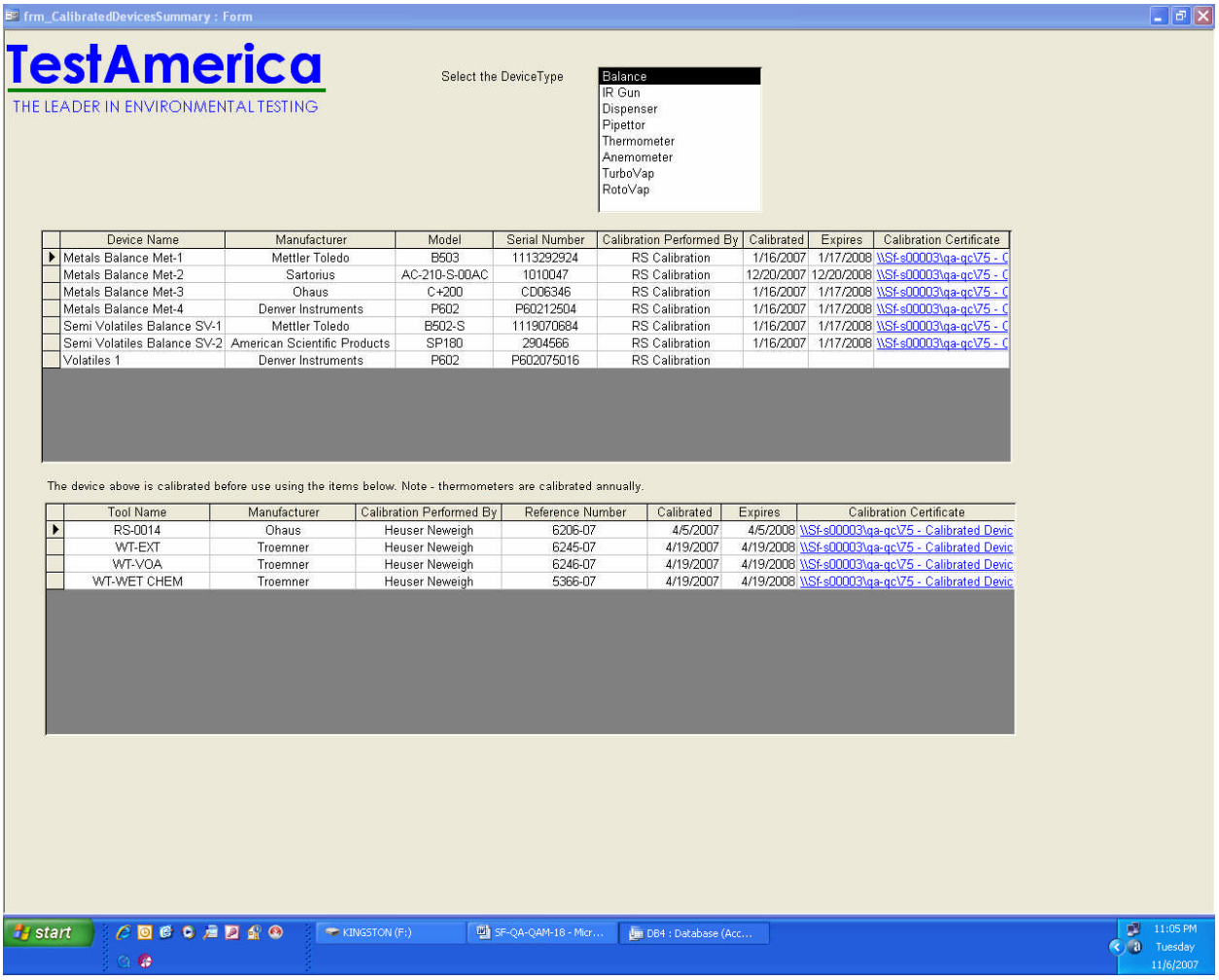
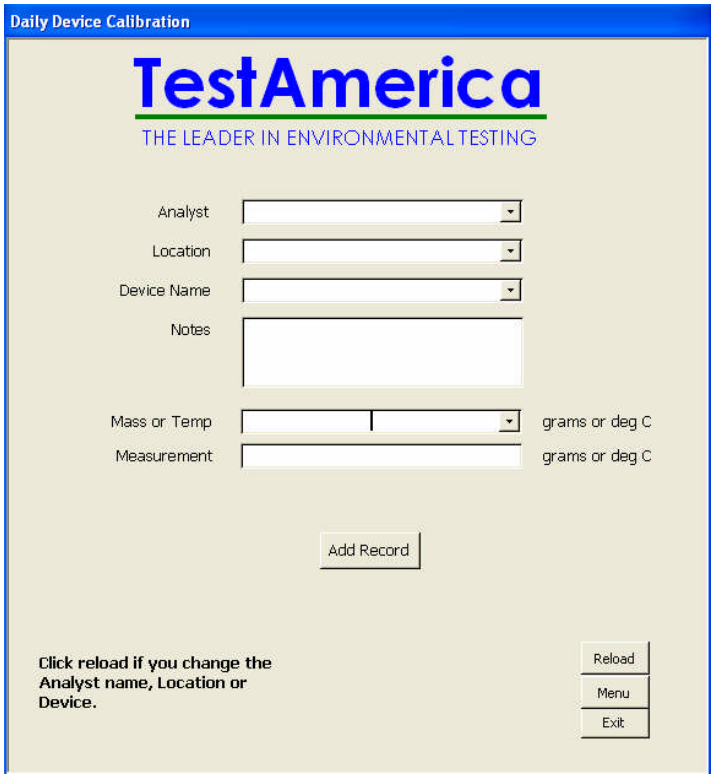


Figure 21-2. Calibrated Devices – Daily Calibration.



21.3.2 pH, Conductivity, and Turbidity Meters

The pH meters used in the laboratory are accurate to ± 0.1 pH units, and have a scale readability of at least 0.05 pH units. The meters automatically compensate for the temperature, and are calibrated with at least two working range buffer solutions before each use.

Conductivity meters are also calibrated before each use with a known standard to demonstrate the meters do not exceed an error of 1% or one umhos/cm.

Turbidity meters are also calibrated before each use. All of this information is documented in logs.

Consult pH and Conductivity, and Turbidity SOPs for further information.

21.3.3 Thermometers

All thermometers are calibrated on an annual basis with a NIST-traceable thermometer. IR thermometers, digital probes and thermocouples are calibrated quarterly.

The NIST thermometer is recalibrated every five years (unless thermometer has been exposed to temperature extremes or apparent separation of internal liquid) by an approved outside service and the provided certificate of traceability is kept on file. The NIST thermometer has increments of 0.2 ºC, and has a range applicable to all method and certification requirements.

The NIST traceable thermometer is used for no other purpose than to calibrate other thermometers.

All of this information is documented in logbooks. Monitoring method-specific temperatures, including incubators, heating blocks, water baths, and ovens, is documented in method-specific logbooks.

21.3.4 Refrigerators/Freezer Units, Waterbaths, Ovens and Incubators

The temperatures of all refrigerator units and freezers used for sample and standard storage are monitored each working.

Ovens, water baths and incubators are monitored on days of use. Temperatures are recorded in the batch sheet in LIMS.

All of this equipment has a unique identification number, and is assigned a unique thermometer for monitoring.

Sample storage refrigerator temperatures are kept between > 0ºC and $\leq$ 6 ºC.

Specific temperature settings/ranges for other refrigerators, ovens waterbaths, and incubators can be found in method specific SOPs.

All of this information is documented in the Calibrated Devices database in the Fridge_Freezer_Oven Temp Readings Table.

21.3.5 Autopipettors, Dilutors, and Syringes

Mechanical volumetric dispensing devices including burettes (except Class A Glassware) are checked for accuracy at least quarterly. Glass micro-syringes are considered the same as Class A glassware and do not require calibration.

The laboratory maintains a sufficient inventory of autopipettors, and dilutors of differing capacities that fulfill all method requirements.

These devices are given unique identification numbers, and the delivery volumes are verified gravimetrically, at a minimum, on a quarterly basis.

For those dispensers that are not used for analytical measurements, a label is applied to the device stating that it is not calibrated. Any device not regularly verified can not be used for any quantitative measurements.

Micro-syringes are purchased from Hamilton Company. Each syringe is traceable to NIST. The laboratory keeps on file an “Accuracy and Precision Statement of Conformance” from Hamilton attesting established accuracy.

21.4 INSTRUMENT CALIBRATIONS

Calibration of analytical instrumentation is essential to the production of quality data. Strict calibration procedures are followed for each method. These procedures are designed to determine and document the method detection limits, the working range of the analytical instrumentation and any fluctuations that may occur from day to day.

Sufficient raw data records are retained to allow an outside party to reconstruct all facets of the initial calibration. Records contain, but are not limited to, the following: calibration date, method, instrument, analyst(s) initials or signatures, analysis date, analytes, concentration, response, type of calibration (Avg RF, curve, or other calculations that may be used to reduce instrument responses to concentration.)

Sample results must be quantitated from the initial calibration and may not be quantitated from any continuing instrument calibration verification unless otherwise required by regulation, method or program.
If the initial calibration results are outside of the acceptance criteria, corrective action is performed and any affected samples are reanalyzed if possible. If the reanalysis is not possible, any data associated with an unacceptable initial calibration will be reported with appropriate data qualifiers (refer to Section 13).

Note: Instruments are calibrated initially and as needed after that and at least annually***.***

21.4.1 CALIBRATION STANDARDS

Calibration standards are prepared using the procedures indicated in the Reagents and Standards section of the determinative method SOP. However, the general procedures are described below.

21.4.1.1 For each analyte and surrogate (if applicable) of interest, prepare calibration standards at the minimum number of concentrations as stated in the analytical methods. If a reference or mandated method does not specify the number of calibration standards, the minimum number is three, not including blanks or a zero standard. All of the standard solutions are prepared using Class A volumetric glassware, calibrated pipettes, and/or microsyringes and appropriate laboratory quality solvents and stock standards.

21.4.1.2 Standards for instrument calibration are obtained from a variety of sources. All standards are traceable to NIST whenever possible. Dilution standards are prepared from stock standards purchased from commercial suppliers. Upon receipt of a new standard, the receipt date and the initials of the person receiving the standard are recorded on the certificate of analysis (COA). The COA is then scanned and placed in the reagents folder in the LIMS folder in the public directory. The standard is then logged into LIMS Reagents as either a Source or an Intermediate standard. In either case, a copy of the COA is attached to the reagent. Preparation of intermediate standards from sources is also documented in LIMS Reagents. Here, the Reagent ID of the source, the expiration date, amount prepared, amount of source standard used, solvent and solvent lot number are recorded.

21.4.1.3 The lowest concentration calibration standard that is analyzed during an initial calibration must be at or below the stated reporting limit for the method based on the final volume of extract (or sample).

21.4.1.4 The other concentrations define the working range of the instrument/method or correspond to the expected range of concentrations found in actual samples that are also within the working range of the instrument/method. Results of samples not bracketed by initial instrument calibration standards (within calibration range to 3 significant figures) must be reported as having less certainty, e.g., defined qualifiers or flags (additional information may be included in the case narrative). The lowest calibration standard must be at or below the reporting limit. The exception to these rules is ICP methods or other methods where the referenced method does not specify two or more standards.

21.4.1.5 Given the number of target compounds addressed by some of the organic methods, it may be necessary to prepare several sets of calibration standards, each set consisting of the appropriate number of solutions at different concentrations. The initial calibration will then involve the analysis of each of these sets of the appropriate number of standards.

21.4.1.6 All initial calibrations are verified with a standard obtained from a second source and traceable to a national standard, when available (or vendor certified different lot if a second source is not available). For unique situations, such as air analysis where no other source or lot is available, a standard made by a different analyst would be considered a second source. This verification occurs immediately after the calibration curve has been analyzed, and before the analysis of any samples.

21.4.2 CALIBRATION FOR ORGANIC METHODS (GC, GC/MS)

21.4.2.1 Many of the organic analytical methods utilize an internal standard calibration (GCMS and some GC). Because of the complex nature of the multipeak chromatograms produced by the method, some instruments necessitate the use of external standard calibration (most GC). Surrogate compounds are included in the calibration processes for all appropriate organic analyses. For more details on the calibration types listed below, refer to SOP No. CA-Q-S-005, Calibration Curves.

21.4.2.2 Once the operating parameters have been established according to the method, each instrument is calibrated for the appropriate method. The analyst prepares five or more standard solutions at various concentrations containing all of the analytes of interest, internal standards, and surrogates that are appropriate for the method. Note: There are a several EPA methods that have different requirements and are exceptions (e.g. EPA 547) where a minimum of 3 calibration standards are prepared and analyzed.

21.4.2.3 The standard solutions are introduced into the instrument in the same manner as samples are; whether it be by direct injection, by headspace analysis, or by purge and trap. The calibration factor (CF) for methods that use external standards, and the response factor (RF) for methods that use internal standards are calculated for the five standards.

- External standard calibration involves comparison of instrument responses from the sample to the responses from the target compounds in the calibration standards. Sample peak areas (or peak heights) are compared to peak areas (or heights) of the standards. The ratio of the response to the amount of analyte in the calibration standard is defined as the Calibration factor (CF).

- Internal standard calibration involves the comparison of instrument responses from the target compounds in the sample to the responses of specific standards added to the sample or sample extract prior to injection. The ratio of the peak area (or height) of the target compound in the sample or sample extract to the peak area (or height) of the internal standard in the sample or sample extract is compared to a similar ratio derived for each calibration standard. The ratio is termed the response factor (RF), and may also be known as a relative response factor in other methods.

In many cases, internal standards are recommended. These recommended internal standards are often brominated, fluorinated, or stable isotopically labeled analogs of specific target compounds, or are closely related compounds whose presence in environmental samples is highly unlikely. The use of specific internal standards is available in the method SOP.

Whichever internal standards are employed, the analyst needs to demonstrate that the measurement of the internal standard is not affected by method analytes and surrogates or by matrix interferences. In general, internal standard calibration is not as useful for GC and HPLC methods with non-MS detectors because of the inability to chromatographically resolve many internal standards from the target compounds. The use of MS detectors makes internal standard calibration practical because the masses of the internal standards can be resolved from those of the target compounds even when chromatographic resolution cannot be achieved.

When preparing calibration standards for use with internal standard calibration, add the same amount of the internal standard solution to each calibration standard, such that the concentration of each internal standard is constant across all of the calibration standards, whereas the concentrations of the target analytes will vary. The internal standard solution will contain one or more internal standards and the concentration of the individual internal standards may differ within the spiking solution (e.g., not all internal standards need to be at the same concentration in this solution). The mass of each internal standard added to each sample extract immediately prior to injection into the instrument or to each sample prior to purging must be the same as the mass of the internal standard in each calibration standard. The volume of the solution spiked into sample extracts should be such that minimal dilution of the extract occurs (e.g., 10 uL of solution added to a 1 mL final extract results in only a negligible 1% change in the final extract volume which can be ignored in the calculations).

An ideal internal standard concentration would yield a response factor of 1 for each analyte. However, this is not practical when dealing with more than a few target analytes. Therefore, as a general rule, the amount of internal standard should produce an instrument response (e.g., area counts) that is no more than 100 times that produced by the lowest concentration of the least responsive target analyte associated with the internal standard. This should result in a minimum response factor of approximately 0.01 for the least responsive target compound. Refer to SOP No. CA-Q-S-005, Calibration Curves, for specific calculations.

21.4.2.4 Policies regarding the use of calibration standard results for creating the calibration curve are as follows:

- A low calibration standard may be excluded from the calibration if the signal-to-noise ratio or spectral criteria are not suitable. The reporting level must be elevated to be the lowest calibration standard used for calibration.

- The upper calibration standard may be excluded if it saturates the detector or is obviously becoming non-linear. Any sample exceeding the upper standard used in the calibration must be diluted and re-analyzed.
- Mid-calibration standards may not be excluded unless an obvious reason is found, i.e., cracked vial, incorrectly made, etc. The failed standard should be re-run immediately and inserted into the initial calibration. If not useful, recalibration is required.

21.4.2.5 Percent RSD Corrective Action

Given the potentially large numbers of analytes that may be analyzed in some methods, it is likely that some analytes may exceed the acceptance limit for the RSD for a given calibration. In those instances, the following steps are recommended, but not required.

21.4.2.5.1 The first step is generally to check the instrument operating conditions. This option will apply in those instances where a linear instrument response is expected. It may involve some trade-offs to optimize performance across all target analytes. For instance, changes to the operating conditions necessary to achieve linearity for problem compounds may cause the RSD for other compounds to increase, but as long as all analytes meet the RSD limits for linearity, the calibration is acceptable.

21.4.2.5.2 If the RSD for any analyte is greater than the applicable acceptance criteria in the applicable analytical method the analyst may wish to review the results (area counts, calibration or response factors, and RSD) for those analytes to ensure that the problem is not associated with just one of the initial calibration standards. If the problem appears to be associated with a single standard, that one standard may be reanalyzed and the RSD recalculated. Replacing the standard may be necessary in some cases.

21.4.2.5.3 A third alternative is to narrow the calibration range by replacing one or more of the calibration standards with standards that cover a narrower range. If linearity can be achieved using a narrower calibration range, document the calibration linearity, and proceed with analyses. The changes to the upper end of the calibration range will affect the need to dilute samples above the range, while changes to the lower end will affect the overall sensitivity of the method. Consider the regulatory limits or action levels associated with the target analytes when adjusting the lower end of the range.

Note: When the purpose of the analysis is to demonstrate compliance with a specific regulatory limit or action level, the laboratory must ensure that the method quantitation limit is at least as low as the regulatory limit or action level.

21.4.2.6 Alternatively, the least squares regression may be used to determine linearity. A five point line must result in a correlation coefficient (r) of 0.990 or better using the least squares method to be considered acceptable. In many cases it may be preferred that the curves be forced through zero (not to be confused with including the origin as an additional data point, which is not allowed). **Note:** EPA method 8000B does not allow forcing through zero however the agency has revaluated this position and has since changed this stance to allow forcing through zero. In addition, from EPA Method 8000C: "However, the use of a linear regression or forcing the regression through zero may NOT be used as a rationale for reporting results below the calibration range demonstrated by the analysis of the standards.").

21.4.2.7 Instead of a linear curve model (either Average RF or least squares regression), a second order curve (Quadratic) may be used (and preferred) as long as it contains at least six data points. As a rule of thumb, if there is a consistent trend in RFs (or CFs) in the calibration curve, either up or down, then quadratic curve fit may be indicated as the preferred calibration routine for that analyte. The coefficient of determination (COD or r^2) for the quadratic curve must be at least 0.99 for it to be considered acceptable. For more details on the calculations see Calibration Curve SOP CA-Q-S-005. Some limitations on the use of Quadratic Curve fits:

21.4.2.7.1 Care MUST be exercised to assure that the results from this equation are real, positive, and fit the range of the initial calibration.

21.4.2.7.2 They **may not** be used to mask instrument problems that can be corrected by maintenance. (Not to be used where the analyte is normally found to be linear in a properly maintained instrument).

21.4.2.7.3 They **may not** be used to compensate for detector saturation. If it is suspected that the detector is being saturated at the high end of the curve, remove the higher concentration standards from the curve and try a 1^{st} order fit or average RF.

21.4.3 Calibration for Inorganic Analyses

EPA Method 7000 from EPA SW-846 is a general introduction to the quality control requirements for metals analysis. For inorganic methods, quality control measures set out in the individual methods and in the *Standard Methods for the Examination of Water and Wastewater* (20th Edition) may also be included. Standard Operating Procedures for the analysis and the quality control documentation measures are kept in the public directory for SOPs.

In general, inorganic instrumentation is calibrated with external standards. Some exceptions would be Inductively Coupled Plasma (ICP). These analyses may use an internal standard to compensate for viscosity or other matrix effects. While the calibration procedures are much the same for inorganics as they are for organics, CF's or RF's are not used. The calibration model in 21.4.2.6 is generally used for most methods, however in some instances the model from section 21.4.2.7 may be used. A correlation coefficient (r) of 0.995 or greater must be used to

accept a calibration curve generated for an inorganic procedure. Correlation coefficients are determined by hand-held scientific calculators or by computer programs [state what your lab uses] and documented as part of the calibration raw data. Coefficients of calibration curves used for quantitation must be documented as part of the raw data. Curves are not allowed to be stored in calculator memories and must be written on the raw data for the purposes of data validation.

21.4.3.1 "Calibrations" for titrimetric analyses are performed by standardizing the titrants against a primary standard solution. See specific methods in *Standard Methods for the Examination of Water and Wastewater* (20th Edition) for more information.

21.4.3.2 Spreadsheets that are used for general chemistry calculations must have all cells containing calculations locked to prevent accidental changes to the calculations.

21.4.3.3 Instrument technologies (e.g. ICP) with validated techniques from the instrument manufacturer or other methods using a zero point and single point calibration require the following:

21.4.3.3.1 The instrument is calibrated using a zero point and a single point calibration standard.

21.4.3.3.2 The linear range is established by analyzing a series of standards, one at the reporting limit (RL).

21.4.3.3.3 Sample results within the established linear range do not need to be qualified.

21.4.3.3.4 The zero point and single standard is run daily with each analytical batch.

21.4.3.3.5 A standard at the RL is analyzed daily with each analytical batch and must meet established acceptance criteria.

21.4.3.3.6 The linearity is verified at a frequency established by the manufacturer or method.

21.4.4 Calibration Verification

The calibration relationship established during the initial calibration must be verified at periodic intervals as specified in the laboratory method SOPs in accordance with the referenced analytical methods. The process of calibration verification applies to both external standard and internal standard calibration techniques, as well as to linear and non-linear calibration models.

Note: The process of calibration verification referred to is fundamentally different from the approach called "calibration" in some methods. As described in those methods, the calibration factors or response factors calculated during calibration are used to update the calibration factors or response factors used for sample quantitation. This approach, while employed in other EPA programs, amounts to a daily single-point calibration, and is not appropriate nor permitted in SW-846 chromatographic procedures for trace environmental analyses.

21.4.4.1 Generally, the initial calibrations must be verified at the beginning of each 12-hour analytical shift during which samples are analyzed. (Some methods may specify more or less frequent verifications). The 12-hour analytical shift begins with the injection of the calibration verification standard (or the MS tuning standard in MS

methods). The shift ends after the completion of the analysis of the last sample or standard that can be injected within 12 hours of the beginning of the shift.

21.4.4.2 A continuing instrument calibration verification (CCV) must be repeated at the beginning and, for methods that have quantitation by external calibration models, at the end of each analytical batch. Some methods have more frequent CCV requirements see specific SOPs. Most Inorganic methods require the CCV to be analyzed after ever 10 samples.

21.4.4.3 The acceptance limits for calibration verifications can be found in each method SOP. As a rule of thumb: GCMS $\pm$ 20%, GC and HPLC $\pm$ 15%, Inorganics: $\pm$ 10 or 15%. Actual methods may have wider or tighter limits; see the method SOP for specifics.

21.4.4.4 If the response (or calculated concentration) for an analyte is within the acceptance limits of the response obtained during the initial calibration, then the initial calibration is considered still valid, and the analyst may continue to use the CF, RF or % drift values from the initial calibration to quantitate sample results.

21.4.4.5 If the response (or calculated concentration) for any analyte varies from the mean response obtained during the initial calibration by more than the acceptance criteria, then the initial calibration relationship may no longer be valid. If routine corrective action procedures fail to produce a second consecutive (immediate) calibration verification within acceptance criteria, then either the laboratory has to demonstrate performance after corrective action with two consecutive successful calibration verifications, or a new initial instrument calibration must be performed. However, sample data associated with an unacceptable calibration verification may be reported as qualified data under the following special conditions:

21.4.4.5.1 When the acceptance criteria for the calibration verification are exceeded high, i.e., high bias, and there are associated samples that are non-detects, then those non-detects may be reported. Otherwise, the samples affected by the unacceptable calibration verification shall be reanalyzed after a new calibration curve has been established, evaluated and accepted.

21.4.4.5.2 When the acceptance criteria for the calibration verification are exceeded low, i.e., low bias, those sample results may be reported if they exceed a maximum regulatory limit/decision level. Otherwise, the samples affected by the unacceptable verification shall be reanalyzed after a new calibration curve has been established, evaluated and accepted. Alternatively, a reporting limit standard may be analyzed to demonstrate that the laboratory can still support non-detects at their reporting limit.

21.4.4.6 Verification of Linear Calibrations

Calibration verification for linear calibrations involves the calculation of the percent drift or the percent difference of the instrument response between the initial calibration and each subsequent analysis of the verification standard. Use the equations below to calculate % Drift or % Difference, depending on the procedure specified in the method SOP. Verification

standards are evaluated based on the % Difference from the average CF or RF of the initial calibration or based on % Drift or % Recovery if a linear or quadratic curve is used.

The Percent Difference is calculated as follows:

$$\% \text{ Difference} = \frac{(CF(v) \text{ or } RF(v)) - (\text{Avg. CF or RF})}{(\text{Avg. CF or RF})} \times 100$$

Where: CF(v) or RF(v) = CF or RF from verification standard

Avg. CF or RF = Average CF or RF from Initial Calibration.

The Percent Drift is calculated as follows:

$$\% \text{ Drift} = \frac{\text{Result} - \text{True Value}}{\text{True Value}} \times 100$$

The Percent Recovery is calculated as follows:

$$\% \text{ Recovery} = \frac{\text{Result}}{\text{True Value}} \times 100$$

21.4.4.7 Verification of a Non-Linear Calibration

Calibration verification of a non-linear calibration is performed using the percent drift or percent recovery calculations described in 21.4.4.6 above.

Regardless of whether a linear or non-linear calibration model is used, if initial verification criterion is not met, then no sample analyses may take place until the calibration has been verified or a new initial calibration is performed that meets the specifications listed in the method SOPs. If the calibration cannot be verified after the analysis of a single verification standard, then adjust the instrument operating conditions and/or perform instrument maintenance, and analyze another aliquot of the verification standard. If the calibration cannot be verified with the second standard, then a new initial calibration is performed.

All target analytes and surrogates, including those reported as non-detects, must be included in periodic calibration verifications for purposes of retention time confirmation and to demonstrate that calibration verification criteria are being met.

All samples must be bracketed by periodic analyses of standards that meet the QC acceptance criteria (e.g., calibration and retention time). The frequency is found in the determinative methods or SOPs

Note: If an internal standard calibration is being used (basically GCMS) then bracketing standards are not required, only daily verifications are needed. The results from these

verification standards must meet the calibration verification criteria and the retention time criteria (if applicable).

21.5 POLICY ON TENTATIVELY IDENTIFIED COMPOUNDS (TICS) – GC/MS ANALYSIS

For samples containing components not associated with the calibration standards, a library search may be made for the purpose of tentative identification. The necessity to perform this type of identification will be determined by the purpose of the analyses being conducted. Data system library search routines should not use normalization routines that would misrepresent the library or unknown spectra when compared to each other.

Note: If the TIC compound is not part of the client target analyte list but is calibrated by the laboratory and is both qualitatively and/or quantitatively identifiable, it will not be reported as a TIC. If the compound is reported on the same form as true TICs, it must be qualified and/or narrated that the reported compound is qualitatively and quantitatively (if verification in control) reported compared to a known standard that is in control (where applicable).

For example, the RCRA permit or waste delisting requirements may require the reporting of non-target analytes. Only after visual comparison of sample spectra with the nearest library searches may the analyst assign a tentative identification.

21.5.1 Use the following guidelines for making tentative identifications

21.5.1.1 Relative intensities of major ions in the reference spectrum (ions greater than 10% of the most abundant ion) should be present in the sample spectrum.

21.5.1.2 The relative intensities of the major ions should agree within ± 20%. (Example: For an ion with an abundance of 50% in the standard spectrum, the corresponding sample ion abundance must be between 30 and 70%).

21.5.1.3 Molecular ions present in the reference spectrum should be present in the sample spectrum.

21.5.1.4 Ions present in the sample spectrum but not in the reference spectrum should be reviewed for possible background contamination or presence of coeluting compounds.

21.5.1.5 Ions present in the reference spectrum but not in the sample spectrum should be reviewed for possible subtraction from the sample spectrum because of background contamination or coeluting peaks. Data system library reduction programs can sometimes create these discrepancies.

The concentration of any non-target analytes identified in the sample (see above) should be estimated. The same formulae as calibrated analytes should be used with the following modifications: The areas A_x and A_{is} should be from the total ion chromatograms, and the RF for the compound should be assumed to be 1.

The resulting concentration should be reported indicating: (1) that the value is an estimate, and (2) which internal standard was used to determine concentration. Use the nearest internal standard free of interferences.

Note: The above guidelines above are from EPA SW846 III edition, method 8260B.
For general reporting if TICs are requested, the ten (10), largest non-target analyte peaks whose area count exceeds 10% of the nearest internal standard will be termed “Tentatively Identified Compounds” (TICs). More or fewer TICs may be identified based on client requirements.

21.5.2 TIC Reporting Limits

In general Reporting limits cannot be specified because of the unknown nature of the TIC. Any reporting limit that is reported can only be evaluated as an estimate as the quantitation is based on the assumption that the TIC responds exactly as the IS responds which is most likely not the case. In general, it is not recommended to set a Reporting limit at too low of a concentration as it gives a false impression.

TICs that meet the above identification criteria (Section 21.5.1) at 10% area of the IS: The RL would be 10% of the concentration of the internal standard used for quantitation. (e.g. 2.5 ug/L for 8260B, 4.0 ug/L for 8270C). In general, if the 10% area criteria is not met, the TIC RLs should be set at a level approximately 5x the level of the poorest performer in the analysis.

If a compound meets the TIC criteria, the reporting limit will reflect the ratio between the TIC and the IS or 5x the level of the poorest performer whichever is lower.

21.6 POLICY ON GC/MS TUNING

Prior to any GCMS analytical sequence, including calibration, the instrument parameters for the tune and subsequent sample analyses within that sequence must be set.

Prior to tuning/auto-tuning the mass spec, the parameters may be adjusted within the specifications set by the manufacturer or the analytical method. These generally don't need any adjustment but it may be required based on the current instrument performance. If the tune verification does not pass it may be necessary to clean the source or perform additional maintenance. Any maintenance is documented in the maintenance log.

21.6.1 The concentration of the BFB or DFTPP must be at or below the concentrations that are referenced in the analytical methods. Part of the purpose of the tune is to demonstrate sensitivity and analyzing solutions at higher concentrations does not support this purpose. Tune failures may be due to saturation and a lower BFB/DFTPP concentration may be warranted.

21.6.2 Tune evaluations usually utilize the "Autofind" function and are set up to look at the apex +/- 1 scan and average the three scans. Background correction is required prior to the start of the peak but no more than 20 scans before. Background correction cannot include any part of the target peak.

21.6.3 Other Options or if Auto Tune Fails:

21.6.3.1 Sometimes the instrument does not always correctly identify the apex on some peaks when the peak is not perfectly shaped. In this case, manually identify and average the apex peak +/- 1 scan and background correct as in 21.6.4 above. This is consistent with EPA 8260 and 8270.

21.6.3.2 Or the scan across the peak at one half peak height may be averaged and background corrected. This is consistent with Standard Methods 6200, EPA 624 and EPA 625.

21.6.3.3 Adjustments such as adjustments to the repeller and ion focus lenses, adjusting the EM Voltage, etc. may be made prior to tune verification as long as all of the

subsequent injections in the 12 hour tune cycle are analyzed under the same MS tune settings and it is documented in the run sequence log and/or maintenance log that an adjustment was made. Excessive adjusting (more than 2 tries) without clear documentation is not allowed. Necessary maintenance is performed and documented in instrument log.

21.6.3.4 A single scan at the Apex (only) may also be used for the evaluation of the tune. For SW 846 and EPA 600 series methods, background correction is still required.

21.6.3.5 Cleaning the source or other maintenance may be performed and then follow steps for tune evaluation above. Note: If significant maintenance was performed, see methods 8000B or 8000C then the instrument may require recalibration prior to proceeding.

21.6.4 Tune evaluation printouts must include the chromatogram and spectra as well as the Tune evaluation information. In addition, the verifications must be sent directly to the printer or pdf file (no screen prints for DFTPP or BFB tunes). This ability should be built into the instrument software.

21.6.5 the limits are expressed in whole percentages, the results may be rounded to whole percentage before comparing to criteria when assessing the tune verification against the tune requirements. However, the comparison to the criteria is usually done automatically by the software and if the printout says “Fail” then there would have to be documentation of the hand calculation on the raw data and comparison to the criteria if the lab intends to still accept the tune. In most cases the analyst is better off performing an adjustment and rerunning the tune standard.

21.6.6 All MS tune settings must remain constant between running the tune check and all other samples. It is recommended that a separate tune method not be used, however a separate method may be used as long as the MS conditions between the methods are the same as the sample analysis method and tracked so any changes that are made to the analysis method are also made to the tune method.

Table 21-1. Laboratory Equipment and Instrumentation

Instrument Type	Manufacturer	Model	Serial Number	Year Put Into Service	Condition
Vial Rotator 1	Glas Col	099A RD4512	401937	2006	New
Vial Rotator 2	Glas Col	099A RD4512	403329	2006	New
Steam Bath 1	Precision	51220042	603111535	1995	New
Steam Bath 2	Precision	51220042	603111534	1995	New
TurboVap 1	Zymark	TurboVap II	TV9513N6088	1995	New
TurboVap 2	Zymark	TurboVap II	TV9543N6441	1995	New
TurboVap 3	Zymark	TurboVap II	TV9907N8680	1995	New
RotoVap 1	Yamato	RE540		1995	New
RotoVap 2	Yamato	RE51		2000	New
1L Rotator	STL-SF			2000	New
0.25L Rotator	STL-SF			2000	New
Hg Analyzer	Perkin Elmer	FIMS 100	1381	2003	New
IC Autosampler	Dionex	AS40	00100276	2000	New
IC Conductivity Detector	Dionex	CD20	99020211	2000	New
IC Enclosure	Dionex	LC20	00060866	2000	New
IC Gradient Pump	Dionex	GC50	99020245	2000	New
TJA ICP	TJA	ICAP 61E	90090	2007	Used
Varian ICP	Varian	Vista Pro	EL04054059	2005	New
Alcohols	Varian	3900	276	2001	Used
Diesel 2 Dual Prosep LVI & FID	Agilent	6890N	CN10529055	2005	New
Diesel 3 Dual Prosep LVI & FID	Agilent	6890+	US00025094	1998	New
Diesel 4 Dual FID	Varian	3800	10428	2000	New
Diesel 5 Dual FID	Agilent	6890N	US10404027	2004	New
HP 3	Agilent	6890+ GC 5973 MSD	US0002091 US72810642	1998	New
HP PCB/PEST Dual ECD	Agilent	6890N	CN10548123	2006	New
PCB 2 ECD	Agilent 6890N	6890N	US00041222	2001	New
Pest 1 Dual ECD	Varian	3400	350	1995	New
Pest 2 Dual ECD	Varian	3400	3669	1995	New
Saturn 2K1	Varian	3800 GC 2000 MSD	4277 5369	New	2000
Saturn 2K2	Varian	3800 GC 2000 MSD	4565 6543	New	2000
2100	Varian	3900 GC 2100T MSD	735 3958	New	2002

3900 A	Varian	3900 GC 2100T MSD	901 4308	New	2003
3900 B	Varian	3900 GC 2100T MSD	908 4309	New	2003
3900 C	Varian	3900 GC 2100T MSD	4404 100366	New	2003
3900 D	Varian	3900 GC 2100T MSD	100360 4416	New	2003
3900 E	Varian	3900 GC 2100T MSD	100358 4414	New	2003
3900 F	Varian	3900 GC 2100T MSD	100613 4581	New	2003
3900 G	Varian	3900 GC 2100T MSD	100615 04580	New	2003
Autosampler	Varian	Archon	14087	New	2003
Autosampler	Varian	Archon	13707	New	2003
Autosampler	Varian	Archon	13398	New	2003
Autosampler	Varian	Archon	13934	New	2003
Autosampler	Varian	Archon	13708	New	2003
Autosampler	Varian	Archon	14088	New	2003
Autosampler	Varian	Archon	13933	New	2002
Autosampler	Varian	Archon	14279	New	2003
Autosampler	Varian	Archon	13996	New	2003
Autosampler	Varian	Archon	14431	New	2003
Autosampler	Varian	Archon	14219	New	2003
Autosampler	Varian	Archon	13997	New	2003
Autosampler	Agilent	7694	IT90103523	Used	2005
HP 4	Agilent	6890N GC 5975 MSD	CN10526015 US52430227	New	2005
Purge & Trap	Tekmar	Velocity	US04099016	New	2003
Purge & Trap	Tekmar	Velocity	US05021002	New	2003
Purge & Trap	Tekmar	3100	0126002	New	2003
Purge & Trap	Tekmar	3000	96283013	New	2003
Purge & Trap	Tekmar	Velocity	US05189005	New	2003
Purge & Trap	Tekmar	3000	9723016	New	2003
Purge & Trap	Tekmar	3100	US02098011	New	2002
Purge & Trap	Tekmar	Velocity	US05192002	New	2003
Purge & Trap	Tekmar	Velocity	US03231015	New	2003
Purge & Trap	Tekmar	3000	00252003	New	2003
RSK 175	Varian	3800 GC	5923	New	2001
RSK 175	Perkin Elmer	Turbo Matrix 40	M41L0508232	New	2005
Saturn 2K	Varian	3800 GC 2000 MSD	6542 4564	New	2000
Conductivity Meter	Thermo Orion	115	4100	New	1995
TOC Autosampler	OI Analytical	1051	B429751469	Used	2007
TOC Analyzer	OI Analytical	1020A	A128722069	Used	2007
pH Meter	Oakton	pH Series 510	335361	New	2006
UV-VIS	Thermo Electron	Spectronic 20D+	3DuG282002	New	2005

Table 21-2. Schedule of Routine Maintenance

INDUCTIVELY COUPLED PLASMA

DAILY OR AS NEEDED

- Wavelength and refractor calibration
- Replace pump tubing when worn
- Check the autosampler arm for alignment

QUARTERLY TO YEARLY

- Clean optical windows for maximum wavelength intensity
- Replace water in water cooler
- Check instrument for signs of wear or corrosion from fumes
- Evaluate present and past detection limit studies for instrument performance

SPARE PARTS

- Sample pump tubing
- Torch
- Nebulizer

MERCURY ANALYZER

DAILY OR AS NEEDED

- Inspect or replace pump tubing
- Inspect or clean mixing chamber

SPARE PARTS

- Sample pump tubing

ION CHROMATOGRAPH

DAILY OR AS NEEDED

- Check for leaks around fittings
- Change Filters
- Change Guard Column
- Change Analytical Column
- Change Suppressor

WEEKLY

- Change eluent

SPARE PARTS

- Assorted pump parts
- Ferrules
- Filters for the guard and analytical column

TOTAL ORGANIC CARBON

DAILY OR AS NEEDED

- Check for leaks around fittings
- Inspect Needle for bends or contamination
- Check that furnace is heating up

SPARE PARTS

- Needles

SEMIVOLATILE GAS CHROMATOGRAPH

DAILY OR AS NEEDED

- Inspect for leaks
- Refill solvent rinse vials and empty solvent waste vials
- All gas cylinders are checked and changed if the pressure is less than 500 psi
- Ensure proper peak shape,(gaussian, minimal tailing,no splitting,proper baseline)
- Inlet seals, ferrules and o-rings are checked and if necessary replaced
- Replace injector septa for each inlet

MONTHLY OR AS NEEDED

- FID jet is removed and cleaned
- ECD, Are many negative peaks present?, if so and the signal for the detectors is > 50 consider sending the detector in for cleaning or refoiling.

6 MONTHS

- Wipe test ECD detectors
  - Every 6 months for Agilent ECDs
  - Every 3 years for Varian ECDs
- Change gas tank filters traps

SPARE PARTS

- Graphite and/or graphite/vespel ferrules
- Injector Septa
- Inlet liners
- O-rings
- Gold Seals (SS for PCB)
- Wipe Test Kits
- Column Cutter
- Flow measurement devices
- GC Tools and wrenches
- Electronic leak detector
- Gas Filters

VOLATILE GAS CHROMATOGRAPH

DAILY

- All gas cylinders are checked and changed if the pressure is less than 500 psi
- Ensure proper peak shape,(gaussian, minimal tailing,no splitting,proper baseline)
- Verify DI water reservoir for autosamplers is full, fill if necessary
- Check internal standard and surrogate levels in Archon are okay
- Empty autosampler waste water container

MONTHLY

- Wipe Archon drive rods clean with Isopropanol.
- Calibrate robotics, Archon
- Inspect autosampler probes for hardness build-up, clean if necessary

ANNUALLY (MINIMUM), BEFORE A CALIBRATION OR AS NEEDED

- Clean or replace FID jet
- Perform injection port maintenance, replace o-ring, liner, gold seal washer, clip column
- Replace in-line filters and traps
- Verify correct column flow or linear velocity
- Pressure test injection port EPC unit

SPARE PARTS

- Graphite and/or graphite/vespel ferrules
- Injector Septa
- Inlet liners
- O-rings
- Gold Seals
- Column Cutter

- Flow measurement devices
- GC Tools and wrenches
- Electronic leak detector
- Universal and Hydrocarbon traps
- Methanol

GAS CHROMATOGRAPH/MASS SPECTROMETER

In addition to the Gas Chromatography maintenance identified in the previous section, the following maintenance must be scheduled for the Mass Spectrometry systems:

DAILY

- Print out PFTBA spectra, confirm peak widths and ion ratios are normal
- Perform air/water leak check
- Check turbo pump voltage on Varian MSDs

6 MONTHS (MINIMUM)

- Replenish rough vacuum pump oil
- Clean ion source or ion trap
- Check diff pump fluid level, change if necessary

SPARE PARTS

- Pump Oil and Filters
- Column Cutter
- GC Tools and wrenches
- Electronic leak detector

Table 21-3. Periodic Calibration

Instrument	Type of Calibration/ Number of Standards	Frequency	Acceptance Limits	Corrective Action
Analytical Balance	Accuracy determined using A2LA-accredited NIST weights. Minimum of 2 standards bracketing the weight of interest. Inspected and calibrated by A2LA accredited person annually.	Daily	± 1%	Clean, check level, insure lack of drafts, and that unit is warmed up, recheck. If fails, call service.
Top Loading Balance	Accuracy determined using-A2LA-accredited NIST weights. Minimum of 2 standards bracketing the weight of interest. Inspected and calibrated by A2LA accredited person annually. A second annual inspection and calibration by same firm.	Daily	± 1%	Clean. Replace.
A2LA-accredited NIST Weights	Accuracy determined by accredited weights and measurement laboratory.	1 year	As per certificate.	Replace.
NIST-Traceable Thermometer	Accuracy determined by A2LA-accredited weights and measurement laboratory.	5 years	As per certificate.	Replace.
Thermometer	Against NIST-traceable thermometer	Yearly at appropriate temperature range for intended use	± 1.2°C	Replace
Solvent Dispensers	Accuracy determined using-A2LA-accredited NIST weights.	Daily	± 5%	Replace
InfraRed Temperature Guns	Against NIST-traceable thermometer	Yearly	± 2°C	Repair/replace

Instrument	Type of Calibration/ Number of Standards	Frequency	Acceptance Limits	Corrective Action
Refrigerator	Temperature checked using IR Gun.	Daily. If out of range, check again in two hours.	4.0 ± 2°C	Adjust. Repair. While waiting for repair, seal door, attach "Out of Service" sign, move items to functional unit. Notify Operation Manager.
Freezer	Temperature checked using IR Gun.	Daily. If out of range, check again in two hours.	0 – (-30)°C	Adjust. Repair. While waiting for repair, seal door, attach "Out of Service" sign, move items to functional unit. Notify supervisor.
Oven	Temperature checked using NIST-traceable thermometer.	When in use.	104 ± 1°C (drying) 180 ± 2°C (TDS)	Adjust. Replace.
Volumetric Dispensing Devices (Eppendorf ® pipette, automatic dilutor or dispensing devices)	Accuracy determined using-A2LA-accredited NIST weights One delivery by weight. Using DI water, dispense into tared vessel. Record weight with device ID number.	Daily	± 2%	Adjust. Replace.
Glass Microliter Syringes	None	Accuracy must be initially de-monstrated if syringe was not received with a certifi-cate attesting to established accuracy.	± 1%	Not applicable.
Conductivity Meter	Cell impedance calibrated with known KCl standards. Verified using 2nd source.	Each use.	± 10%	Recalibrate.

Instrument	Type of Calibration/ Number of Standards	Frequency	Acceptance Limits	Corrective Action
Deionized Water	Check conductivity using the conductivity meter in the Inorganics Department.	Daily	<10 µmhos/cm^2	Record on log. Report discrepancies to Lab Director or QA Manager.

SECTION 22

MEASUREMENT TRACEABILITY
(NELAC 5.5.6)

22.1 OVERVIEW

Traceability of measurements shall be assured using a system of documentation, calibration, and analysis of reference standards. Laboratory equipment that are peripheral to analysis and whose calibration is not necessarily documented in a test method analysis or by analysis of a reference standard shall be subject to ongoing certifications of accuracy. At a minimum, these must include procedures for checking specifications of ancillary equipment: balances, thermometers, temperature, Deionized (DI) and Reverse Osmosis (RO) water systems, automatic pipettes and other volumetric measuring devices. With the exception of Class A Glassware (including glass microliter syringes that have a certificate of accuracy), quarterly accuracy checks are performed for all mechanical volumetric devices. Wherever possible, subsidiary or peripheral equipment is checked against standard equipment or standards that are traceable to national or international standards. The following definitions are provided by the American Association for Laboratory Accreditation (A2LA):

"Traceability is the property of a measurement result whereby it can be related to stated references, usually national or international standards, through an unbroken chain of comparisons, each step in the chain having stated uncertainties." There are six essential elements:

- An unbroken chain of comparison
- A calculated measurement uncertainty for each step in the chain to allow for an overall uncertainty calculation
- Documentation of each step in each calibration report
- All steps in the chain are performed by individuals with evidence of technical competence and accredited by a recognized accreditation body
- Reference to International Standard (SI) units
- Recalibration at appropriate intervals to preserve traceability

Calibration is defined as "determining and documenting the deviation of the indication of a measuring instrument (or the stated value of a material measure) from the conventional 'true' value of the measurand."

Uncertainty is defined as "a parameter associated with the result of a measurement that characterizes the dispersion of the value that could reasonably be attributed to the measurand." Measurement of Uncertainty is discussed is Section 20 of this QA Manual.

22.2 NIST-TRACEABLE WEIGHTS AND THERMOMETERS

Reference standards of measurement shall be used for calibration only and for no other purpose, unless it can be shown that their performance as reference standards would not be invalidated.

For NIST-traceable weights and thermometers, the laboratory requires that all calibrations be conducted by a calibration laboratory accredited by A2LA, NVLAP (National Voluntary Laboratory Accreditation Program), APLAC (Asia-Pacific Laboratory Accreditation Cooperation), or EA (European Cooperation for Accreditation). A certificate and scope of accreditation is kept on file at the laboratory. Refer to Section 21 for calibration of weights and thermometers.

An external certified service engineer services laboratory balances on an annual basis. This service is documented on each balance with a signed and dated certification sticker. Balance calibrations are checked each day of use. All mercury thermometers are calibrated annually against a traceable reference thermometer. Temperature readings of ovens, refrigerators, and incubators are checked on each day of use.

22.3 REFERENCE STANDARDS / MATERIALS

Reference standards/materials, where commercially available, are traceable to certified reference materials. Commercially prepared standard materials are purchased from vendors accredited by A2LA, NVLAP with an accompanying Certificate of Analysis that documents the standard purity. If a standard cannot be purchased from a vendor that supplies a Certificate of Analysis, the purity of the standard is documented by analysis. (Refer to Section 9 for additional information on purchasing). The receipt of all reference standards must be documented. Reference standards are labeled with a unique Standard Identification Number and expiration date. All documentation received with the reference standard is retained as a QC record and references the Standard Identification Number. The Standard Identification Number is generated by LIMS.

All reference, primary and working standards/materials, whether commercially purchased or laboratory prepared, must be checked regularly to ensure that the variability of the standard or material from the ‘true’ value does not exceed method requirements. The accuracy of calibration standards is checked by comparison with a standard from a second source. In cases where a second standard manufacturer is not available, a vendor certified different lot is acceptable for use as a second source. For unique situations, such as air analysis where no other source or lot is available, a standard made by a different analyst would be considered a second source. The appropriate Quality Control (QC) criteria for specific standards are defined in laboratory SOPs. In most cases, the analysis of an Initial Calibration Verification (ICV) or LCS (where there is no sample preparation) is used as the second source confirmation. These checks are generally performed as an integral part of the analysis method (e.g. calibration checks, laboratory control samples).

All standards and materials must be stored and handled according to method or manufacturer’s requirements in order to prevent contamination or deterioration. Refer to Table 9-1 in Section 9 for general storage requirements and Table 22-1 for additional storage information. Please refer to method SOPs “Standards and Reagents” section for additional details. For safety

requirements, please refer to method SOPs and the laboratory Environmental Health and Safety Manual.

22.4 DOCUMENTATION AND LABELING OF STANDARDS, REAGENTS, AND REFERENCE MATERIALS

Reagents must be at a minimum the purity required in the test method. The date of reagent receipt and the expiration date are documented. The lots for most of the common solvents and acids are tested for acceptability prior to company wide purchase. Refer to SOP No. CA-Q-S-001, Solvent and Acid Lot Testing and Approval.

All manufacturer or vendor supplied Certificate of Analysis or Purity must be retained, stored appropriately, and readily available for use and inspection. These records are maintained with each reagent in LIMS. Records must be kept of the date of receipt and date of expiration of standards, reagents and reference materials. In addition, records of preparation of laboratory standards, reagents, and reference materials must be retained, stored appropriately, and be readily available for use and inspection.

Commercial materials purchased for preparation of calibration solutions, spike solutions, etc.., are usually accompanied with an assay certificate or the purity is noted on the label. If the assay purity is 96% or better, the weight provided by the vendor may be used without correction. If the assay purity is less than 96% a correction will be made to concentrations applied to solutions prepared from the stock commercial material.

22.4.1 All standards, reagents, and reference materials must be labeled in an unambiguous manner. Standards are logged into the laboratory's LIMS system, and are assigned a unique identification number. The following information is typically recorded in the electronic database within the LIMS.

- Standard ID
- Description of Standard
- Vendor
- Department
- Preparer's name
- Final volume and number of vials prepared
- Solvent type and lot number
- Preparation Date
- Expiration Date
- Standard type (source or intermediate)
- Standard type (spike, surrogate, other)
- Source standard ID (only for intermediates)
- Parent Standard Analyte Concentration (if applicable)
- Parent Standard Amount used (if applicable)

- Component Analytes
- Final concentration of each analyte
- Comment box (text field)

Records are maintained in LIMS for standard and reference material preparation. These records show the traceability to purchased stocks or neat compounds. These records also include method of preparation, date of preparation, expiration date and preparer's name or initials. Preparation procedures are provided in the Method SOPs.

22.4.2 All standards, reagents, and reference materials must be clearly labeled with a minimum of the following information:

- Expiration Date
- Standard ID from LIMS
- Special Health/Safety warnings if applicable

22.4.3 In addition, the following information may be helpful:

- Date of receipt for commercially purchased items or date of preparation for laboratory prepared items
- Date opened (for multi-use containers, if applicable)
- Description of standard (if different from manufacturer's label or if standard was prepared in the laboratory)
- Concentration (if applicable)
- Initials of analyst preparing standard or opening container

All containers of prepared reagents must include a preparation date, expiration date and an ID number to trace back to preparation.

Procedures for preparation of reagents can be found in the Method SOPs.

Standard ID numbers must be traceable through associated logbooks, worksheets and raw data.

All reagents and standards must be stored in accordance to the following priority:

1) with the manufacturer's recommendations;
2) with requirements in the specific analytical methods; and
3) according to Table 22-1.

Table 22-1.

Standard Sources and Preparation

Department	Source	How Received	Stock Storage	Intermediate Std Storage	Intermediate Stds Made
Semi Volatiles	Restek	Solutions	4 ± 2°C	4 ± 2°C	As needed
	Supelco				
	Chemservice				
	Accustandard				
	NSI				
Volatiles	Restek	Solutions	< 0°C[1]	< 0°C	Weekly for the gases. As needed for others
	Supelco				
	Ultra Scientific				
	Accustandard				
	NSI				
Extractions	Aqua Solutions	Solution	4 ± 2°C	4 ± 2°C	As needed
Inorganics	Ricca Chemical	Solution	Room Temp	Room Temp	As needed
	CPI	Solution			
	Absolute Standards	Solution			
	Aqua Solutions	Solution			
	VWR	Neat			
	Fisher Scientific	Neat			
	Mallinckrodt	Neat			
	Sigma-Aldrich	Neat			
	JT Baker	Neat			

1 Supelco recommends that MTBE and Gasoline solutions be stored at Room Temperature.

SECTION 23

SAMPLING
(NELAC 5.5.7)

23.1 OVERVIEW

TestAmerica San Francisco does not provide sampling services. The laboratory's responsibility in the sample collection process lies in supplying the sampler with the necessary coolers, reagent water, sample containers, preservatives, sample labels, custody seals, COC forms, ice, and packing materials required to properly preserve, pack, and ship samples to the laboratory

23.2 SAMPLING CONTAINERS

The laboratory offers clean sampling containers for use by clients. These containers are obtained from reputable container manufacturers and meet EPA specifications as required. Any certificates of cleanliness that are provided by the supplier are maintained at the laboratory.

Preservatives

Upon request, preservatives are provided to the client in pre-cleaned sampling containers. In some cases containers may be purchased pre-preserved from the container supplier. Whether prepared by the laboratory or bought pre-preserved, the grades of the preservatives are at a minimum:

Hydrochloric Acid – Reagent ACS (Certified VOA Free) or equivalent

- Methanol – Purge and Trap grade
- Nitric Acid – Instra-Analyzed or equivalent
- Sodium Bisulfate – ACS Grade or equivalent
- Sodium Hydroxide – Instra-Analyzed or equivalent
- Sulfuric Acid – Instra-Analyzed or equivalent
- Sodium Thiosulfate – ACS Grade or equivalent

23.2.1 Preparing Container Orders

When new containers arrive at the laboratory, a copy of the certificate of analysis is placed in the Containers Binder. Upon request (completion of a bottle order request form), the containers are then sent to clients for use in collecting samples. The shipping date, type and number of containers are maintained on file by the lab. Shipping personnel insure that container stock is rotated so that "first in" is "first out." When a client requests containers, a client services representative creates a container request in LIMS; it is then stored permanently in LIMS with a unique container order number. Copies of the container request are printed for the shipping department. One copy goes to the client with the containers; one copy is filed in the shipping

department. Container lot numbers are documented in the laboratory's copy and placed in the binder.

The laboratory also provides EnCore, TerraCore or other soil sampling devices when requested.

If containers are provided directly to the client from the manufacturer or from other sources, the laboratory will not be responsible for any of the above records.

23.3 FIELD QUALITY CONTROL (QC)

Common field quality control samples are defined in the following paragraphs. The frequency of field quality control samples should be specified in the site specific Quality Assurance Project Plan (QAPP) or by the client. TestAmerica provides trip blanks for VOC analysis with the sample containers for all volatile organic analyses. Blanks generated in the field will be analyzed along with the field samples (exception soil samples where the blank is aqueous).

23.3.1 Equipment Blank / Rinsate Blank - The equipment blank, sometimes referred to as a rinsate blank, is a sample of the water used to decontaminate sampling equipment. The source water should be as free of target analytes as possible. An aliquot of this water is poured over or through the sample collection device after decontamination, collected in a sample container, preserved with appropriate reagents, and returned to the laboratory. This serves as a check on sampling device cleanliness, and will also be affected by the site and sample handling conditions evaluated by the other types of blanks. The sampling time for the equipment blank should begin when the equipment is rinsed and the water is collected.

23.3.2 Field Blank - The field blank is water that is as free of target analytes as possible and from the same source as the equipment blank. The water is poured into a sampling container at the sampling site, preserved with the appropriate reagents, and returned to the laboratory. This serves as a check on reagent and environmental contamination. The sampling time for the field blank should be when the blank is prepared in the field.

23.3.3 Trip Blank - The trip blank pertains to volatile analysis only. This serves as a check on sample contamination originating from sample transport, sample container contamination, shipping and storage, or from certain site conditions. Trip blanks are often referred to as travel blanks. They are prepared using pre-cleaned sample containers. They are filled with organic-free water (the source of the organic free water is the same source of water used to prepare volatile standards, method blanks, LCS and sample dilutions), sealed and taken into the field with the empty containers which will be used for sampling. The recommended frequency is one trip blank per cooler (in duplicate or triplicate), per volatiles method. Unless otherwise specified, the sampling time for the trip blank is the time of receipt at the laboratory (When the "Trip" ends).

23.3.4 Field Duplicates - Field duplicates are replicate samples collected from the same sampling point or location during a field collection event. This control sample is used to demonstrate the ability of both the sampling and analytical process to generate data of acceptable precision.

23.4 DEFINITION OF HOLDING TIME

The date and time of sampling documented on the chain-of-custody (COC) form establishes the day and time zero. As a general rule, when the maximum allowable holding time is expressed in "days" (e.g. 14 days, 28 days), the holding time is based on calendar day measured. Holding times expressed in "hours" (e.g. 6 hours, 24 hours, etc.) are measured from date and time zero. The first day of holding time ends twenty-four hours after sampling. Holding times for analysis include any necessary reanalysis. However there are some programs that determine holding time compliance based on the date and specific time of analysis compared to the time of sampling regardless of how long the holding time is

23.4.1 Semi-Volatile - Holding times for sample preparation for semi-volatile organics are measured from the sampling date until the day solvent contacts the sample. Holding times for analysis are measured from the date of initiation of extraction to the time of injection into the gas chromatograph.

23.4.2 Volatiles - Holding times for volatile organics are measured from the date (and time where applicable) of sampling to the date and time of injection into the gas chromatograph. The time of initiation of purging is considered the injection time, but data systems record the start of the chromatographic run rather than the start of purging. Extractions, e.g. for high level soils, must be completed in time to allow for analysis to be initiated within the maximum allowable holding time.

23.4.3 Inorganics - For inorganic and metals analysis, the preparation/digestion/distillation must be started within the maximum holding time as measured from the sampling date (and time where applicable).

23.5 SAMPLING CONTAINERS, PRESERVATION REQUIREMENTS, HOLDING TIMES

The preservation and holding time criteria specified in the following tables are derived from the source documents for the methods. If method required holding times (refer to Tables 23-1 to 23-4) or preservation requirements are not met, the reports will be qualified using a flag, footnote or case narrative. As soon as possible or "ASAP" is an EPA designation for tests for which rapid analysis is advised, but for which neither EPA nor the laboratory have a basis for a holding time.

23.6 SAMPLE ALIQUOTS / SUBSAMPLING

Taking a representative sub-sample from a container is necessary to ensure that the analytical results are representative of the sample collected in the field. The size of the sample container, the quantity of sample fitted within the container, and the homogeneity of the sample need consideration when sub-sampling for sample preparation. It is the laboratory's responsibility to take a representative subsample or aliquot of the sample provided for analysis. In that regard the following guidelines apply to analysts:

Analysts should handle each sample as if it is potentially dangerous. At a minimum, safety glasses, gloves, and lab coats must be worn when preparing aliquots for analysis.

23.6.1 For water samples, before taking each aliquot for analysis, invert the sample container end-over-end three times and immediately pour off the aliquot. Especially when suspended solids are present, adequate mixing of the sample is extremely important.

23.6.2 For solid samples, when volatile organics are not requested, if the solid can be mixed, stir before removing the aliquot. Mix more than is needed for the analysis to be performed (e.g. if 30 g are needed, mix 50-100 g, if 1 g is needed, mix 20 g, etc…).

- If the solid cannot be easily mixed: After thoroughly mixing the sample within the sample container or, for non-organic methods, the sample can be transferred to a wip bag (or other suitable plastic bag) for manual mixing, a sub-sample from various quadrants and depths of the sample are taken to acquire the required sample weight.
- For soil samples, avoid debris in the subsample aliquot as much as possible (e.g. gravel, sticks, roots and grass); note this information in the sample preparation record.
- If the solid is extremely heterogeneous, and the client has given no instructions, utilize the following technique: separate the like materials into groups on a clean surface and take portions of masses from each group, proportional to their contribution to the original sample, to make a composite. Record in detail exactly how the composite was created. For very unusual samples, consult with the Operations Manager or QA Manager.

23.6.3 For solid samples, when volatile organics analysis is requested, the sample should be manipulated as little as possible. In most cases, the sample will arrive already preserved or in an EnCore™ sampler of the correct mass (requiring quick preservation of the entire amount). If the client requests volatiles on a solid sample which has been collected in a jar and is in a common container from which aliquots for other test methods must be taken, login should deliver the container to the volatiles department for preparing a proper aliquot prior to any other aliquots being taken out.

23.6.4 For multiphasic samples, the client should instruct the laboratory as to the intent of the testing and how to handle the sample. If the entire sample is to be accounted for, and the phases do not mix easily with inversion/stirring, such that a representative aliquot can be taken, the analyst should record the percent by volume of each phase. The analysis must be conducted on each phase separately; the final results are combined mathematically, weighting the individual phase results by volume. One exception to this procedure is the situation addressed in the TCLP and SPLP methods for wastes containing free liquids. However, if the leachate and final filtrate are not miscible, it is necessary to combine mathematically the concentrations of the two (or more) solutions by volume.

Table 23-1 detail holding times, preservation and container requirements, and sample volumes for SDWA and NPDES methods. **Please note**: the holding times are program specific and different programs may have different holding times for equivalent methods (e.g., there are difference in Holding times for many Organic analytes between SDWA and NPDES. RCRA methods may also be different.)

Table 23-1
Holding Times, Preservation and Container Requirements: NPDES - Inorganic

PARAMETER	CONTAINER [1]	PRESERVATION[2,3] Temp[14].	Chemical	HOLDING TIME[4]	SAMPLE VOLUME
Acidity	Plastic/Glass	≤ 6ºC	None	14 days	100 mL
Alkalinity	Plastic/Glass	≤ 6ºC	None	14 days	100 mL
Ammonia	Plastic/Glass	≤ 6ºC	H_2SO_4 to pH<2	28 days	400 mL
BOD 5 Day	Plastic/Glass	≤ 6ºC	None	48 hours	1000 mL
Boron	Plastic[5]	None	HNO_3 to pH<2	6 months	200 mL
Bromide	Plastic/Glass	None	None	28 days	100 mL
CBOD 5 Day	Plastic/Glass	≤ 6ºC	None	48 hours	1000 mL
COD	Plastic/Glass	≤ 6ºC	H_2SO_4 to pH<2	28 days	100 mL
Chloride	Plastic/Glass	None	None	28 days	50 mL
Chlorine, Residual	Plastic/Glass	None	None	15 min.[6]	200 mL
Color	Plastic/Glass	≤ 6ºC	None	48 hours	50 mL
Cyanide -Total	Plastic/Glass	≤ 6ºC	NaOH to pH >12, 0.6 g ascorbic Acid[7]	14 days	100 mL
Cyanide -Amenable	Plastic/Glass	≤ 6ºC	NaOH to pH >12, 0.6 g ascorbic Acid[7]	14 days	100 mL
Fluoride	Plastic	None	None	28 days	300 mL
Hardness	Plastic/Glass	None	HNO_3 to pH<2[8]	6 months	100 mL
Hexavalent, Chromium	Plastic/Glass	≤ 6ºC	Ammonium sulfate buffer pH = 9.3 - 9.7	28 days / 24 hrs[15]	200 mL
Hydrogen Ion (pH)	Plastic/Glass	None	None	15 min.[6]	200 mL
Kjeldahl and organic Nitrogen	Plastic/Glass	≤ 6ºC	H_2SO_4 to pH <2	28 days	500 mL
Mercury[11]	Plastic/Glass	None	HNO_3 to pH<2	28 days	200 mL
Metals[9,10]	Plastic/Glass	None	HNO_3 to pH<2	6 months	200 mL
Nitrate	Plastic/Glass	≤ 6ºC	None	48 hours	100 mL
Nitrate-Nitrite	Plastic/Glass	≤ 6ºC	H_2SO_4 to pH <2	28 days	100 mL
Nitrite	Plastic/Glass	≤ 6ºC	None	48 hours	100 mL

PARAMETER	CONTAINER [1]	PRESERVATION[2,3] Temp[14].	Chemical	HOLDING TIME[4]	SAMPLE VOLUME
Oil and Grease	Glass	≤ 6ºC	H_2SO_4 or HCl to pH <2	28 days	1 L
Organic Carbon (TOC)	Plastic/Glass	≤ 6ºC	H_2SO_4 or HCl to pH <2[12]	28 days	250 mL
Orthophosphate	Plastic/Glass	≤ 6ºC	Filter within 15 min.	48 hours	250 mL
Oxygen, Dissolved Probe	Glass[13]	None	None	15 min.[6]	200 mL
Oxygen, Winkler	Glass[13]	None	Fix on site and store in dark.	8 hours	300 mL
Phenols	Glass	≤ 6ºC	H_2SO_4 to pH <2	28 days	500 mL
Phosphorus, Elemental	Glass	≤ 6ºC	None	48 hours	250 mL
Phosphorus, Total	Plastic/Glass	≤ 6ºC	H_2SO_4 to pH <2	28 days	250 mL
Residue, Total	Plastic/Glass	≤ 6ºC	None	7 days	1 L
Residue, Filterable	Plastic/Glass	≤ 6ºC	None	7 days	1 L
Residue, Non-Filterable	Plastic/Glass	≤ 6ºC	None	7 days	1 L
Residue, Settleable	Plastic/Glass	≤ 6ºC	None	48 hours	1 L
Residue, Volatile	Plastic/Glass	≤ 6ºC	None	7 days	1 L
Silica	Plastic[5]	≤ 6ºC	None	28 days	250 mL
Specific Conductance	Plastic/Glass	≤ 6ºC	None	28 days	250 mL
Sulfate	Plastic/Glass	≤ 6ºC	None	28 days	250 mL
Sulfide	Plastic/Glass	≤ 6ºC	Zinc acetate plus NaOH to pH>9	7 days	500 mL
Sulfite	Plastic/Glass	None	None	15 min.[6]	200 mL
Surfactants	Plastic/Glass	≤ 6ºC	None	48 hours	1 L
Temperature	Plastic/Glass	None	None	N/A	100 mL
Turbidity	Plastic/Glass	≤ 6ºC	None	48 hours	1 L

Key to Table

1. Plastic should be Polyethylene.
2. Sample preservation should be performed immediately upon sample collection. For composite chemical samples, each aliquot should be preserved at the time of collection. When use of an automated sampler makes it impossible to preserve each aliquot, then chemical samples may be preserved by maintaining at

Key to Table

≤ 6ºC until compositing and sample splitting is completed.

3. When any sample is to be shipped by common carrier or sent through the United States mails, it must comply with the Department of Transportation Hazardous Materials Regulations (49 CFR Part 172). The person offering such material for transportation is responsible for ensuring compliance. For the preservation requirements of Table 6-8, the Office of Hazardous Materials, Materials Transportation Bureau, Department of Transportation has determined that the Hazardous Materials Regulations do not apply to the following materials: Hydrochloric acid, (HCl) in water, solutions at concentrations of 0.04% by weight or less (pH about 1.96 or greater); Nitric acid (HNO_3) in water solutions at concentrations of 0.15% by weight or less (pH about 1.62 or greater); Sulfuric acid (H_2SO_4) in water solutions at concentrations of 0.35% by weight or less pH about 1.15 or greater); and Sodium hydroxide (NaOH) in water solutions at concentrations of 0.080% by weight or less (pH about 12.30 or less).
4. Samples should be analyzed as soon as possible after collection. The times listed are the maximum times that samples may be held before analysis and still be considered valid.
5. May also be collected in quartz or PFTE Plastic.
6. For compliance testing, the analysis must be performed in the field at the time of analysis. If transported to the laboratory for analysis, the analysis will be performed as soon as practical and reported qualified.
7. Should only be used in the presence of residual chlorine.
8. H_2SO_4 to a pH <2 is also acceptable.
9. Except Mercury and Hexavalent Chromium.
10. Samples should be filtered on site before adding HNO_3 preservative for dissolved metals.
11. Samples collected for determination of trace level mercury (100 ng/L) using EPA 1631 must be collected in tightly capped fluoropolymer or glad bottles and preserved with BrCl or HCl solution within 48 hours of sample collection. The time to preservation may be extended to 28 days if a sample is oxidized in the sample bottle. Samples collected for dissolved trace level mercury should be filtered in the laboratory. However, if circumstances prevent overnight shipping, samples should be filtered in a designated clean area in the field in accordance with procedures given in Method 1669. Samples that been collected for determination of total or dissolved trace level mercury must be analyzed within 90 days of sample collection.
12. Phosphoric acid (H_3PO_4) may also be used.
13. Should have glass lid or top.
14. Aqueous samples must be preserved at ≤6 °C unless otherwise indicated, and should not be frozen unless data demonstrating that sample freezing does not adversely impact sample integrity is maintained on file and accepted as valid by the regulatory authority. Also, for purposes of NPDES monitoring, the specification of ‘‘≤ °C’’ is used in place of the ‘‘4 °C’’ and ‘‘<4 °C’’ sample temperature requirements listed in some methods. It is not necessary to measure the sample temperature to three significant figures (1/100th of 1 degree); rather, three significant figures are specified so that rounding down to 6 °C may not be used to meet the ≤6 °C requirement. The preservation temperature does not apply to samples that are analyzed immediately (less than 15 minutes).

15. Holding time is 24 hours if pH adjustment is not performed.

Table 23-2
Holding Times, Preservation and Container Requirements: NPDES - Organic

PARAMETER	CONTAINER	PRESERVATION[1,2] Temp.[15]	Chemical	HOLDING TIME[3]	SAMPLE VOLUME
Purgeable Halocarbons	Glass[4]	≤ 6ºC	0.0008 % $Na_2S_2O_3$[5]	14 days	40 mL
Purgeable Aromatic Hydrocarbons	Glass[4]	≤ 6ºC	0.0008 % $Na_2S_2O_3$[5], HCl to pH<2	14 days[6]	40 mL
Acrolein and Acrylonitrile	Glass[4]	≤ 6ºC	0.0008 % $Na_2S_2O_3$[5], adjust pH to 4-5[7]	14 days	40 mL
Phenols[9]	Glass[4]	≤ 6ºC	0.0008 % $Na_2S_2O_3$[5]	7 days[8]	1 L
Benzidines[9]	Glass[4]	≤ 6ºC	0.0008 % $Na_2S_2O_3$[5]	7 days[8, 11]	1 L
Phthalate esters[9]	Glass[4]	≤ 6ºC	None	7 days[8]	1 L
Nitosamines[9,12]	Glass[4]	≤ 6ºC	0.0008 % $Na_2S_2O_3$[5,13]	7 days[8]	1 L
PCBs[9]	Glass[4]	≤ 6ºC	None	1 year[8]	1 L
Nitroaromatics and Isophorone[9]	Glass[4]	≤ 6ºC	0.0008 % $Na_2S_2O_3$[5,13]	7 days[8]	1 L
Polynuclear Aromatic Hydrocarbons[9]	Glass[4]	≤ 6ºC	0.0008 % $Na_2S_2O_3$[5,13]	7 days[8]	1 L
Haloethers[9]	Glass[4]	≤ 6ºC	0.0008 % $Na_2S_2O_3$[5]	7 days[8]	1 L
Chlorinated Hydrocarbons[9]	Glass[4]	≤ 6ºC	None	7 days[8]	1 L
CDD/CDFs[9] – Aqueous: Field/Lab Preservation	Glass	≤ 6ºC	pH <9, 0.0008 % $Na_2S_2O_3$[5]	1 year	1 L
CDD/CDFs[9] – Solids/Mixed Phase/ - Field Preservation	Glass	≤ 6ºC	None	7 days	1 L
CDD/CDFs[9] – Tissue – Field Preservation	Glass	≤ 6ºC	None	24 hours	
CDD/CDFs[9] – Solids/Mixed Phase/Tissue - Lab Preservation	Glass	< -10ºC	None	1 year	1 L
Pesticides[9]	Glass	≤ 6ºC	pH 5-9 [14]	7 days[8]	1 L

Key to Table

1. Sample preservation should be performed immediately upon sample collection. For composite chemical samples, each aliquot should be preserved at the time of collection. When use of an automated sampler makes it impossible to preserve each aliquot, then chemical samples may be preserved by maintaining at $\leq 6^{o}C$ until compositing and sample splitting is completed.
2. When any sample is to be shipped by common carrier or sent through the United States mails, it must comply with the Department of Transportation Hazardous Materials Regulations (49 CFR Part 172). The person offering such material for transportation is responsible for ensuring compliance. For the preservation requirements of Table 6-8, the Office of Hazardous Materials, Materials Transportation Bureau, Department of Transportation has determined that the Hazardous Materials Regulations do not apply to the following materials: Hydrochloric acid, (HCl) in water, solutions at concentrations of 0.04% by weight or less (pH about 1.96 or greater); Nitric acid (HNO_3) in water solutions at concentrations of 0.15% by weight or less (pH about 1.62 or greater); Sulfuric acid (H_2SO_4) in water solutions at concentrations of 0.35% by weight or less pH about 1.15 or greater); and Sodium hydroxide (NaOH) in water solutions at concentrations of 0.080% by weight or less (pH about 12.30 or less).
3. Samples should be analyzed as soon as possible after collection. The times listed are the maximum times that samples may be held before analysis and still be considered valid.
4. With Teflon lined septum.
5. Should only be used in the presence of residual chlorine.
6. Samples receiving no pH adjustments must be analyzed within 7 days. If 2-chlorovinylethylether is a target analyte, the sample should not be acidified.
7. The pH adjustment is not required if acrolein is not being measured. Samples for acrolein receiving no pH adjustment must be analyze within three days of sampling.
8. 7 days until extraction, 40 days after extraction. (PCB only – 1 year after extraction)
9. When the extractable analytes of concern fall within a single chemical category, the specified preservative and maximum holding times should be observed for optimum safeguard of sample integrity. When the analytes of concern fall within two or more categories, the sample may be preserved by cooling to $\leq 6^{o}C$ reducing residual chlorine with 0.0008 % sodium thiosulfate, storing in the dark, and adjusting the pH to 6-9. Samples preserved in this manner may be held for 7 days before extraction and for 40 days after extraction. Exceptions to this optional preservation and holding time procedure are noted in footnote 5 (re the requirement for thiosulfate reduction of residual chlorine) and footnotes 10 and 11(re the analysis of Benzidine).
10. If 1,2-diphenylhydrazine is likely to be present, adjust pH to of the sample to 4.0 $\pm$ 0.2 to prevent rearrangement to benzidine.
11. Extracts may be stored up to 30 days before analysis if storage temperature is $< 0^{o}C$.
12. For the analysis of diphenylnitrosamine, add 0.008 % $Na_2S_2O_3$ and ajust pH to 7-10 with NaOH within 24 hours of sampling.
13. Store in dark.
14. The pH adjustment may be performed upon receipt in the laboratory and may be omitted if the samples are extracted within 72 hours of collection. For the analysis of aldrin , add 0.0008 % $Na_2S_2O_3$.
15. Aqueous samples must be preserved at ≤6 °C unless otherwise indicated, and should not be frozen unless data demonstrating that sample freezing does not adversely impact sample integrity is maintained on file and accepted as valid by the regulatory authority. Also, for purposes of NPDES monitoring, the specification of ‘‘≤ °C’’ is used in place of the ‘‘4 °C’’ and ‘‘<4 °C’’ sample temperature requirements listed in some methods. It is not necessary to measure the sample temperature to three significant figures (1/100th of 1 degree); rather, three significant figures are specified so that rounding down to 6 °C may not be used to meet the ≤6 °C requirement. The preservation temperature does not apply to samples that are analyzed immediately (less than 15 minutes).

Table 23-3.
Holding Times, Preservation and Container Requirements: RCRA - Aqueous

PARAMETER	CONTAINER [1]	PRESERVATION[2,3] Temp.[12]	PRESERVATION[2,3] Chemical	HOLDING TIME[4]	SAMPLE VOLUME
Chloride	Plastic/Glass	4ºC	None	28 days	100 mL
Cyanide -Total	Plastic/Glass	4ºC	NaOH to pH >12[5]	14 days	250 mL
Cyanide -Amenable	Plastic/Glass	4ºC	NaOH to pH >12[5]	14 days	250 mL
Hydrogen Ion (pH)	Plastic/Glass	4ºC	None	24 hours[11]	100 mL
Nitrate	Plastic/Glass	4ºC	None	48 hours	28 days
Oil and Grease	Glass	4ºC	HCl	28 days	1 L
Organic carbon (TOC)	Plastic/Glass	4ºC	pH to <2[6] Store in dark	28 days	28 days
Sulfate	Plastic/Glass	4ºC	None	28 days	400 mL
Sulfide	Plastic/Glass	4ºC	Add Zn Acetate	7 days	400 mL
Chromium VI	Plastic/Glass	4ºC	None	24 hours	250 mL
Mercury	Plastic/Glass	None	HNO_3 to pH<2	28 days	250 mL
Other Metals	Plastic/Glass	None	HNO_3 to pH<2	6 months	250 mL
Acrolein and Acrylonitrile	Glass[10]	4ºC	0.0008 % $Na_2S_2O_3$[7] Adjust pH to 4-5[13]	14 days	1 L
Benzidines	Glass[10]	4ºC	0.0008 % $Na_2S_2O_3$[7]	7 days[8]	1 L
Chlorinated Hydrocarbons	Glass[10]	4ºC	0.0008 % $Na_2S_2O_3$[7]	7 days[8]	1 L
Dioxins and Furans	Glass[10]	4ºC	0.0008 % $Na_2S_2O_3$[7]	7 days[8]	1 L
Haloethers	Glass[10]	4ºC	0.0008 % $Na_2S_2O_3$[7]	7 days[8]	1 L
Nitroaromatics and cyclic ketones	Glass[10]	4ºC	0.0008 % $Na_2S_2O_3$[7], store in dark	7 days[8]	1 L
Nitrosomines	Glass[10]	4ºC	0.0008 % $Na_2S_2O_3$[7], store in dark	7 days[8]	1 L
Organochlorine Pesticides	Glass[10]	4ºC	None	7 days[8]	1 L
Organophosphorus Pesticides	Glass[10]	4ºC	Adjust pH[9]	7 days[8]	1 L
PCBs	Glass[10]	4ºC	None	7 days[8]	1 L
Phenols	Glass[10]	4ºC	0.0008 % $Na_2S_2O_3$[7]	7 days[8]	1 L

PARAMETER	CONTAINER [1]	PRESERVATION[2,3] Temp.[12]	Chemical	HOLDING TIME[4]	SAMPLE VOLUME
Phthalate Esters	Glass[10]	4ºC	None	7 days[8]	1 L
Polynuclear Aromatic Hydrocarbons	Glass[10]	4ºC	0.0008 % $Na_2S_2O_3$[7], store in dark	7 days[8]	1 L
Purgeable Hydrocarbons	Glass[10]	4ºC	0.0008 % $Na_2S_2O_3$[7] Adjust pH <2[2]	14 days	40 mL
Purgeable Halocarbons	Glass[10]	4ºC	0.0008 % $Na_2S_2O_3$[7]	14 days	40 mL
Total Organic Halides (TOX)	Glass[10]	4ºC	Adjust pH to <2 with H_2SO_4	28 days	1 L
Radiological Tests (Alpha, Beta, Radium)	Plastic/Glass	None	HNO_3 to pH<2	6 months	250 mL

Key to Table

1. Plastic should be Polyethylene.
2. Sample preservation should be performed immediately upon sample collection. For composite chemical samples, each aliquot should be preserved at the time of collection. When use of an automated sampler makes it impossible to preserve each aliquot, then chemical samples may be preserved by maintaining at 4°C until compositing and sample splitting is completed.
3. When any sample is to be shipped by common carrier or sent through the United States mails, it must comply with the Department of Transportation Hazardous Materials Regulations (49 CFR Part 172). The person offering such material for transportation is responsible for ensuring compliance. For the preservation requirements of Table 6-8, the Office of Hazardous Materials, Materials Transportation Bureau, Department of Transportation has determined that the Hazardous Materials Regulations do not apply to the following materials: Hydrochloric acid, (HCl) in water, solutions at concentrations of 0.04% by weight or less (pH about 1.96 or greater); Nitric acid (HNO_3) in water solutions at concentrations of 0.15% by weight or less (pH about 1.62 or greater); Sulfuric acid (H_2SO_4) in water solutions at concentrations of 0.35% by weight or less pH about 1.15 or greater); and Sodium hydroxide (NaOH) in water solutions at concentrations of 0.080% by weight or less (pH about 12.30 or less).
4. Samples should be analyzed as soon as possible after collection. The times listed are the maximum times that samples may be held before analysis and still be considered valid.
5. If oxidizing agents are present, add 5 mL 0.1 N $NaAsO_2$ or 0.06 g of ascorbic acid per L. See Cyanide SOP for additional information about other interferences.
6. Adjust pH to <2 with H_2SO_4, HCl, or solid $NaHSO_4$. Free Chlorine must be removed prior to adjustment.
7. Free Chlorine must be removed by the appropriate addition of $Na_2S_2O_3$.
8. 7 days until extraction. 40 days after extraction.
9. Adjust pH to 5-8 using NaOH or H_2SO_4.
10. With Teflon lined septum.
11. Holding Time is listed as “As Soon as Possible” in SW 846. Per EPA MICE, the recommended maximum holding time for pH in water is 24 hours and pH in soil is 7 days. There are no mandated regulatory requirements.
12. For samples with a temperature requirement of 4°C, a sample temperature of just above the water freezing temperature to $\leq$ 6°C is acceptable.
13. Based on guidance from EPA MICE, if samples are received without pH adjustment, the holding time is 7 days.

Table 23-4.
Holding Times, Preservation and Container Requirements: RCRA – Non-Aqueous

PARAMETER	CONTAINER [1]	PRESERVATION Temp.[7]	PRESERVATION Chemical	HOLDING TIME[2]	SAMPLE WEIGHT
Chloride	Glass	4ºC	None	28 days	50 g
Cyanide -Total	Glass	4ºC	None	14 days	50 g
Cyanide -Amenable	Glass	4ºC	None	14 days	50 g
Hydrogen Ion (pH)	Glass	4ºC	None	7 days[6]	50 g
Nitrate	Glass	4ºC	None	N/A	50 g
Oil and Grease	Glass	4ºC	None	28 days	50 g
Sulfide	Glass	4ºC	Add Zn Acetate, zero headspace	7 days	50 g
Chromium VI	Glass	4ºC	None	30 days	50 g
Mercury	Plastic/Glass	None	None	28 days	50 g
Other Metals	Plastic/Glass	None	None	6 months	50 g
Acrolein and Acrylonitrile	Glass[4]	4ºC	None	14 days	50 g
Benzidines	Glass[4]	4ºC	None	14 days[3]	50 g
Chlorinated Hydrocarbons	Glass[4]	4ºC	None	14 days[3]	50 g
Dioxins and Furans	Glass[4]	4ºC	None	14 days[3]	50 g
Haloethers	Glass[4]	4ºC	None	14 days[3]	50 g
Nitroaromatics and cyclic ketones	Glass[4]	4ºC	None	14 days[3]	50 g
Nitrosomines	Glass[4]	4ºC	None	14 days[3]	50 g
Organochlorine Pesticides	Glass[4]	4ºC	None	14 days[3]	50 g
Organophosphorus Pesticides	Glass[4]	4ºC	None	14 days[3]	50 g
PCBs	Glass[4]	4ºC	None	14 days[3]	50 g
Phenols	Glass[4]	4ºC	None	14 days[3]	50 g
Phthalate Esters	Glass[4]	4ºC	None	14 days[3]	50 g
Polynuclear Aromatic Hydrocarbons	Glass[4]	4ºC	None	14 days[3]	50 g

PARAMETER	CONTAINER [1]	PRESERVATION Temp.[7]	PRESERVATION Chemical	HOLDING TIME[2]	SAMPLE WEIGHT
Purgeable Hydrocarbons	Glass[4]	4ºC	None	14 days[5]	50 g
Purgeable Halocarbons	Glass[4]	4ºC	None	14 days[5]	50 g
Total Organic Halides (TOX)	Glass[4]	4ºC	None	28 days	50 g

Key to Table

1. Plastic should be Polyethylene.
2. Samples should be analyzed as soon as possible after collection. The times listed are the maximum times that samples may be held before analysis and still be considered valid.
3. 14 days until extraction. 40 days after extraction.
4. With Teflon Lined Septum
5. See Volatile SOP for more detailed preservation requirements.
6. Holding Time is listed as "As Soon as Possible" in SW 846. Per EPA MICE, the recommended maximum holding time for pH in water is 24 hours and pH in soil is 7 days. There are no mandated regulatory requirements.
7. For samples with a temperature requirement of $4^{o}C$, a sample temperature of just above the water freezing temperature to $\leq 6^{o}C$ is acceptable.

SECTION 24

HANDLING OF SAMPLES
(NELAC 5.5.8)

Sample management procedures at TestAmerica San Francisco ensure that sample integrity and custody are maintained and documented from sampling/receipt through disposal.

24.1 CHAIN OF CUSTODY (COC)

The COC form is the written documented history of any sample and can be initiated when bottles are sent to the field, or at the time of sampling. This form is completed by the sampling personnel and accompanies the samples to the laboratory where it is received and stored under the laboratory's custody. The purpose of the COC form is to provide a legal written record of the handling of samples from the time of collection until they are received at the laboratory. It also serves as the primary written request for analyses from the client to the laboratory. The COC form acts as a purchase order for analytical services when no other contractual agreement is in effect. An example of a COC form may be found in Figure 24-1.

24.1.1 Field Documentation

The information the sampler needs to provide at the time of sampling on the container label is:

- Sample identification
- Date and time
- Preservative

During the sampling process, the COC form is completed and must be legible (see Figure 24-1). This form includes information such as:

- Client name, address, phone number and fax number (if available)
- Project name and/or number
- The sample identification
- Date, time and location of sampling
- Sample collectors name
- The matrix description
- The container description
- The total number of each type of container
- Preservatives used
- Analysis requested
- Requested turnaround time (TAT)
- Any special instructions
- Purchase Order number or billing information (e.g. quote number) if available
- The date and time that each person received or relinquished the sample(s), including their signed name.

The samples are stored in a cooler with ice, as applicable, and remain solely in the possession of the client's field technician until the samples are delivered to the laboratory. The sample collector must assure that each container is in his/her physical possession or in his/her view at all times, or stored in such a place and manner to preclude tampering. The field technician relinquishes the samples in writing on the COC form to the sample control personnel at the laboratory or to a TestAmerica courier. Samples are only considered to be received by lab when personnel at the laboratory have physical contact with the samples.

Note: Independent couriers are not required to sign the COC form. The COC is usually kept in the sealed sample cooler. The receipt from the courier is included with each job folder.

24.1.2 Legal / Evidentiary Chain-of-Custody

Not Applicable

24.2 SAMPLE RECEIPT

Samples are received at the laboratory by designated sample receiving personnel and a unique laboratory project identification number is assigned. Each sample container shall be assigned a unique sample identification number that is cross-referenced to the client identification number such that traceability of test samples is unambiguous and documented. Each sample container is affixed with a durable sample identification label. Sample acceptance, receipt, tracking and storage procedures are summarized in the following sections.

Refer to SOP SF-SC-0202, current revision.

24.2.1 Laboratory Receipt

When samples arrive at the laboratory, sample receiving personnel inspect the coolers and samples. The integrity of each sample must be determined by comparing sample labels or tags with the COC and by visual checks of the container for possible damage. Any non-conformance, irregularity, or compromised sample receipt must be documented in the log-in checklist. The PM has sole responsibility for bringing any discrepancies to the immediate attention of the client. The COC, shipping documents, documentation of any non-conformance, irregularity, or compromised sample receipt, record of client contact, and resulting instructions become part of the project record.

24.2.1.1 Inspection of samples include a check for:

- Complete documentation to include sample identification, location, date and time of collection, collector's name, preservation type, sample type and any additional comments concerning the samples.
- Complete sample labels to include unique identification in indelible ink.
- Use of appropriate sample containers (see Section 23)
- Adherence to holding times as specified in the test method and/or summarized in Section 23.

- Adequate sample volume for required analyses (see Section 23).
- Damage or signs of contamination to sample container. Volatile vials are also inspected for headspace

24.2.1.2 Check and record the temperature of the samples and temperature blanks that require thermal preservation using the Extech Data Logging IR Gun. Refer to SOP SF-SC-0202, current revision.

- Samples shall be deemed acceptable if arrival temperature is just above freezing and less than or equal to 6.0° C***.*** Samples that are hand-delivered immediately after collection may not be at the required temperatures; however, if there is evidence that the chilling process has begun, such as the arrival on ice, the samples shall be considered acceptable. This will be documented on the COC and in the log-in checklist.

- If the samples were shipped in ice and solid ice is still present and in direct contact with samples, report the samples as "received on ice." Direct contact means samples must be surrounded by ice cubes or crushed ice. Ice present in a plastic bottle or other container does not constitute direct contact. Samples shipped with only “blue ice” may not be reported as “received on ice”.

24.2.1.3 Verify sample preservation as specified in the test method. Check the labels on the samples for correct pH as specified in the test method. The results are documented in the log-in checklist. In the case of volatiles, pH is recorded after the vial has been sampled into the LIMS analytical batch worksheet.

24.2.1.4 After inspecting the samples, the sample receiving personnel sign and date the COC form, make any necessary notes of the samples' conditions and store them in appropriate refrigerators or storage locations.

24.2.1.5 If samples are received without a COC, TestAmerica will provide a generic COC form to be completed by the client when the samples are brought to the laboratory. The client is always provided with a copy of the completed COC form for their records.

24.2.1.6 If analyses with short holding times are requested, the dates and times are inspected to ensure that holding times have not already expired.

24.2.1.7 Samples received after normal working hours are left in their coolers and placed in the walk-in fridge. The person receiving the samples must record the date and time received, the presence or absence of ice and custody seals, the temperature of samples, presence and type of packing material, and initials.

24.2.1.8 Any deviations from the checks described in Section 24.2.1 that question the suitability of the sample for analysis, or incomplete documentation as to the tests required will be resolved by consultation with the client. If the sample acceptance criteria (Section 24.3) are not met, the laboratory shall either:

- Retain all correspondence and/or records of communications with the client regarding the disposition of rejected samples. The project manager may be able to make decisions on samples with prior knowledge from the client, but documentation of acceptable scenarios must be provided and acknowledge by the client, and records of these decisions must be documented, or

- Fully document any decision to proceed with sample analysis that does not meet sample acceptance criteria.

24.2.2 Sample Log-in

All samples that are received by the laboratory are logged into the LIMS to allow the laboratory to track and evaluate sample progress. Each group of samples that are logged in together (typically one project from a given client/sampling event) is assigned a unique job number. Within each job, each sample receives a unique number. Sample numbers are generated sequentially over time, and are not re-assigned. A sample may be composed of more than one bottle since different preservatives may be required to perform all analyses requested. Even if multiple containers are received for a single sample, each container is uniquely identified with an alphabetic letter added to the sample. The LIMS generates sample labels that are attached to each bottle for a given sample.

Each job/set of samples is logged into LIMS with a minimum of the following information:

- Client Name, Project Name, Address, Phone, Fax, Report to information, invoice to information (most of this information is “default information” that is stored in the LIMS).
- Date and time sampled;
- Date and time received;
- Job and/or project description, sample description;
- Sample matrix, special sample remarks;
- Reporting requirements (i.e., QC level, report format, invoicing format);
- Turn-around-time requirements;
- Parameters (methods and reporting limits or MDLs are default information for a given parameter)

24.3 SAMPLE ACCEPTANCE POLICY

The laboratory has a written sample acceptance policy (Figure 24-5) that clearly outlines the circumstances under which samples shall be accepted or rejected. These include:

- a COC filled out completely;
- samples must be properly labeled;
- proper sample containers with adequate volume for the analysis and necessary QC;
- samples must be preserved according to the requirements of the requested analytical method;
- sample holding times must be adhered to;

- all samples submitted for water/solid Volatile Organic analyses must have a Trip Blank submitted at the same time;
- the Project Manager will be notified if any sample is received in damaged condition.

Data from samples which do not meet these criteria are flagged and the nature of the variation from policy is defined. A copy of the sample acceptance policy is provided to each client prior to shipment of samples.

24.4 SAMPLE STORAGE

In order to avoid deterioration, contamination or damage to a sample during storage and handling, from the time of receipt until all analyses are complete, samples are stored in refrigerators suitable for the sample matrix. Samples requiring inorganics analyses are not refrigerated. These samples are stored at room temperature. In addition, samples to be analyzed for volatile organic parameters are stored in separate refrigerators designated for volatile organic parameters only. Samples are never to be stored with reagents, standards or materials that may create contamination.

To ensure the integrity of the samples during storage, refrigerator blanks are maintained in the volatile sample refrigerators and analyzed every two weeks. Refrigerator blanks are replenished every ten days.

Analysts and technicians retrieve the sample container allocated to their analysis from the designated refrigerator or storage shelf and place them on carts, analyze the sample, and return the remaining sample to the refrigerator or storage shelf from which it originally came. Empty liter bottles are placed on a cart located beside the sample disposal room, for later disposal.

Samples are kept in storage for a period of forty five days. Special arrangements may be made to store samples for longer periods of time.

Access to the laboratory is controlled such that sample storage need not be locked at all times unless a project specifically demands it. Samples are accessible to laboratory personnel only. Visitors to the laboratory are prohibited from entering the refrigerator and laboratory areas unless accompanied by an employee of TestAmerica.

24.5 HAZARDOUS SAMPLES AND FOREIGN SOILS

To minimize exposure to personnel and to avoid potential accidents, hazardous samples are stored in an isolated area designated for hazardous waste only or “high concentration samples”. Storing these types of samples in a separate refrigerator also prevents the possibility that other samples will be contaminated. Disposal of these samples is similar to regular samples.

24.6 SAMPLE SHIPPING

In the event that the laboratory needs to ship samples, the samples are placed in a cooler with enough ice to ensure the samples remain just above freezing and at or below 6.0°C during transit. The samples are carefully surrounded by packing material to avoid breakage (yet maintain appropriate temperature). For sample shipments which include water/solid volatile organic analyses, a trip blank is enclosed when required by method specifications or state or

regulatory programs. The chain-of-custody form is signed by the sample control technician and attached to the shipping paperwork.

24.7 SAMPLE DISPOSAL

Samples should be retained for a minimum of 30 days after the project report is sent, however, provisions may be made for earlier disposal of samples once the holding time is exceeded. Some samples are required to be held for longer periods based on regulatory or client requirements (e.g., 60 days after project report is sent). The laboratory must follow the longer sample retention requirements where required by regulation or client agreement. Several possibilities for sample disposal exist: the sample may be consumed completely during analysis, the sample may be returned to the customer or location of sampling for disposal, or the sample may be disposed of in accordance with the laboratory's waste disposal procedures (SOP: SF-QA-1900, current revision). All procedures in the laboratory Environmental, Health and Safety Manual are followed during disposal. Samples are normally maintained in the laboratory no longer than forty five days from receipt unless otherwise requested. Unused portions of samples found or suspected to be hazardous according to state or federal guidelines may be returned to the client upon completion of the analytical work.

If a sample is part of a known litigation, the affected legal authority, sample data user, and/or submitter of the sample must participate in the decision about the sample's disposal. All documentation and correspondence concerning the disposal decision process must be kept on file. Pertinent information includes the date of disposal, nature of disposal (such as sample depletion, hazardous waste facility disposal, return to client), names of individuals who conducted the arrangements and physically completed the task. The laboratory will remove or deface sample labels prior to disposal unless this is accomplished through the disposal method (e.g., samples are incinerated). A Waste Disposal Record (Figure 24-4) should be completed.

Figure 24-1. Chain of Custody

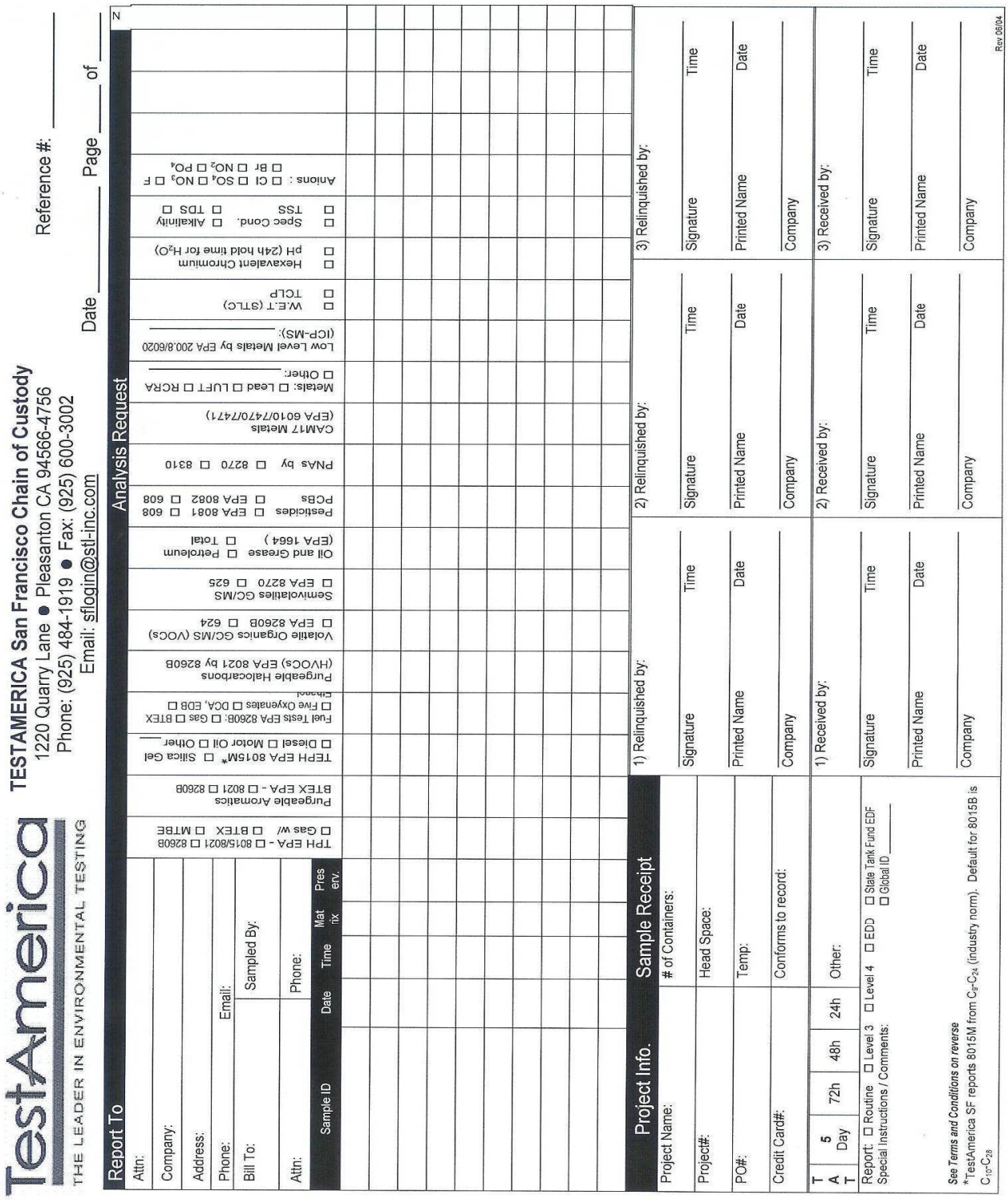


Figure 24-2. Sample Disposal Log

SAMPLE DISPOSAL LOG

Analyst/Date	Analysis	Submission #	LIMS I.D.	Time Out	Time In	Comments
Initials_____ Date_____						
Analyst/Date	**Analysis**	**Submission #**	**LIMS I.D.**	**Time Out**	**Time In**	**Comments**
Initials_____ Date_____						
Analyst/Date	**Analysis**	**Submission #**	**LIMS I.D.**	**Time Out**	**Time In**	**Comments**
Initials_____ Date_____						

Figure 24-3. Sample Acceptance Policy

All incoming work will be evaluated against the criteria listed below. Where applicable, data from any samples that do not meet the criteria listed below will be noted on the laboratory report defining the nature and substance of the variation. In addition the client will be notified either by telephone, fax or e-mail ASAP after the receipt of the samples.

1) Samples must arrive with labels intact with a Chain of Custody filled out completely. The following information must be recorded.

   - *Client name, address, phone number and fax number (if available)*
   - *Project name and/or number*
   - *The sample identification*
   - *Date, time and location of sampling*
   - *The collectors name*
   - *The matrix description*
   - *The container description*
   - *The total number of each type of container*
   - *Preservatives used*
   - *Analysis requested*
   - *Requested turnaround time (TAT)*
   - *Any special instructions*
   - *Purchase Order number or billing information (e.g. quote number) if available*
   - *The date and time that each person received or relinquished the sample(s), including their signed name.*
   - ***The date and time of receipt must be recorded between the last person to relinquish the samples and the person who receives the samples in the lab, and they must be exactly the same.***
   - **Information must be legible**

2) Samples must be properly labeled.

   - Use durable labels (labels provided by TestAmerica are preferred)
   - Include a unique identification number
   - Include sampling date and time & sampler ID
   - Include preservative used.
   - Use indelible ink
   - **Information must be legible**

3) Proper sample containers with adequate volume for the analysis and necessary QC are required for each analysis requested.

4) Samples must be preserved according to the requirements of the requested analytical method. Most analytical methods require chilling samples to 4 ± 2°C other than water samples for metals analysis). For these methods, the criteria are met if the samples are chilled to below 6^{o} C and above freezing (0^{o}C). For methods with other temperature criteria (e.g. some bacteriological methods require $\leq$ 10 ^{o}C), the samples must arrive within $\pm$ 2^{o} C of the required temperature or within the method specified range. **Note:** Samples that are hand delivered to the laboratory immediately after collection may not

have had time to cool sufficiently. In this case the samples will be considered acceptable as long as there is evidence that the chilling process has begun (arrival on ice).

- Chemical preservation (pH) will be verified prior to analysis and the project manager will be notified immediately if there is a discrepancy. If analyses will still be performed, all affected results will be flagged to indicate improper preservation.

5) Sample Holding Times

- TestAmerica will make every effort to analyze samples within the regulatory holding time. Samples must be received in the laboratory with enough time to perform the sample analysis. Except for short holding time samples (< 48hr HT) sample must be received with at least 48 hrs (working days) remaining on the holding time for us to ensure analysis.

- Analyses that are designated as "field" analyses (Odor, pH, Dissolved Oxygen, Disinfectant Residual; a.k.a. Residual Chlorine, and Redox Potential) should be analyzed ASAP by the field sampler prior to delivering to the lab (within 15 minutes). However, if the analyses are to be performed in the laboratory, TestAmerica will make every effort to analyze the samples within 24 hours from receipt of the samples in the testing laboratory. Samples for "field" analyses received after 3:00 pm on Friday or on the weekend will be analyzed no later than the next business day after receipt (Monday unless a holiday). Samples will remain refrigerated and sealed until the time of analysis. Samples analyzed in the laboratory will be qualified on the final report with an 'H' to indicate holding time exceedence.

6) All samples submitted for Volatile Organic analyses must have a Trip Blank submitted at the same time. TestAmerica will supply a blank with the bottle order, if requested.

7) The project manager will be notified if any sample is received in damaged condition. TestAmerica will request that a sample be resubmitted for analysis.

8) Recommendations for packing samples for shipment.

- Pack samples in Ice, if available, otherwise, use blue ice.
- It is recommended that soil samples be placed in plastic zip-lock bags. The containers often have dirt around the top and do not seal very well and are prone to intrusion from the water from melted ice.

- Water samples would be best if wrapped with bubble-wrap or paper (newspaper, or paper towels work) and then placed in plastic zip-lock bags.

- Fill extra cooler space with bubble wrap.

Section 25.0

ASSURING THE QUALITY OF TEST RESULTS
(NELAC 5.5.9)

25.1 OVERVIEW

In order to assure our clients of the validity of their data, the laboratory continuously evaluates the quality of the analytical process. The analytical process is controlled not only by instrument calibration as discussed in Section 21, but also by routine process quality control measurements (e.g. Blanks, Laboratory Control Samples (LCS), Matrix Spikes (MS), duplicates (DUP), surrogates, Internal Standards (IS)). These quality control checks are performed as required by the method or regulations to assess precision and accuracy. In addition to the routine process quality control samples, Proficiency Testing (PT) Samples (concentrations unknown to laboratory) are analyzed to help ensure laboratory performance.

25.2 CONTROLS

Sample preparation or pre-treatment is commonly required before analysis. Typical preparation steps include homogenization, grinding, solvent extraction, sonication, acid digestion, distillation, reflux, evaporation, and drying. During these pre-treatment steps, samples are arranged into discreet manageable groups referred to as preparation (prep) batches. Prep batches provide a means to control variability in sample treatment. Control samples are added to each prep batch to monitor method performance and are processed through the entire analytical procedure with investigative/field samples.

25.3 NEGATIVE CONTROLS

25.3.1 **Method Blanks** are used to assess preparation and analysis for possible contamination during the preparation and processing steps.

25.3.1.1 The method blank is prepared from a clean matrix similar to that of the associated samples that is free from target analytes (e.g., Reagent water, Ottawa sand, glass beads, etc.) and is processed along with and under the same conditions as the associated samples.

25.3.1.2 The method blank goes through all of the steps of the process (including as necessary: filtration, clean-ups, etc.).

25.3.1.3 The specific frequency of use for method blanks during the analytical sequence is defined in the specific standard operating procedure for each analysis. Generally it is 1 for each batch of samples; not to exceed 20 environmental samples.

25.3.1.4 Evaluation criteria and corrective action for method blanks is defined in the specific standard operating procedure for each analysis. Generally, corrective action is taken if the concentration of a target analyte in the blank is at or above the reporting limit as established by the method or regulation.

- The source of contamination is investigated

- Measures are taken to minimize or eliminate the source of the contamination
- Affected samples are reprocessed or the results are qualified on the final report.

25.3.2 **Calibration Blanks** are prepared and analyzed along with calibration standards where applicable. They are prepared using the same reagents that are used to prepare the standards. In some analyses the calibration blank may be included in the calibration curve.

25.3.3 **Instrument Blanks** are blank reagents or reagent water that may be processed during an analytical sequence in order to assess contamination in the analytical system. In general, instrument blanks are used to differentiate between contamination caused by the analytical system and that caused by the sample handling or sample prep process. Instrument blanks may also be inserted throughout the analytical sequence to minimize the effect of carryover from samples with high analyte content.

25.3.4 **Trip Blanks** are required to be submitted by the client with each shipment of samples requiring aqueous and solid volatiles analyses. A trip blank may be purchased (certified clean) or is prepared by the laboratory by filling a clean container with pure deionized water that has been purged to remove any volatile compounds. This is the same water that the laboratory uses to run its method blanks. To supplement the certificate of analysis, which is only for Method 8260 analytes, the laboratory also analyzes one of the prepared trip blanks for fuel oxygenates. This ensures that the trip blanks provided by the laboratory to its clients are contamination free.

25.3.5 Appropriate preservatives are also added to the container. The trip blank is sent with the bottle order and is intended to reflect the environment that the containers are subjected to throughout shipping and handling and help identify possible sources if contamination is found. The field sampler returns the trip blank in the cooler with the field samples. Trip Blanks are also sometimes referred to as Travel Blanks.

25.3.6 **Field Blanks** are sometimes used for specific projects by the field samplers. A field blank prepared in the field by filling a clean container with pure reagent water and appropriate preservative, if any, for the specific sampling activity being undertaken. (EPA OSWER)

25.3.7 **Equipment Blanks** are also sometimes created in the field for specific projects. An equipment blank is a sample of analyte-free media which has been used to rinse common sampling equipment to check effectiveness of decontamination procedures. (NELAC)

25.3.8 **Holding Blanks**, also referred to as refrigerator or freezer blanks, are used to monitor the sample storage units for volatile organic compounds during the storage of VOA samples in the laboratory (refer to section 24)**.**

25.3.9 **Field blanks**, equipment blank and trip blanks, when received, are analyzed in the same manner as other field samples. When known, blanks should not be selected for matrix QC, as it does not provide information on the behavior of the target compounds in the field samples. Usually, the client sample ID will provide information to identify the field blanks with labels such as "FB", "EB", or "TB".

25.4 POSITIVE CONTROLS

Control samples (e.g., QC indicators) are analyzed with each batch of samples to evaluate data based upon (1) Method Performance (Laboratory Control Sample (LCS) and LCSD or Blank Spike (BS)), which entails both the preparation and measurement steps; and (2) Matrix Effects (Matrix Spike (MS) (Matrix spikes are not applicable to air) or Sample Duplicate (MD, DUP), which evaluates field sampling accuracy, precision, representativeness, interferences, and the effect of the matrix on the method performed. Each regulatory program and each method within those programs specify the control samples that are prepared and/or analyzed with a specific batch

Note that frequency of control samples vary with specific regulatory, methodology and project specific criteria. Complete details on method control samples are as listed in each analytical SOP and Appendix 4.

25.4.1 Method Performance Control - Laboratory Control Sample (LCS)

25.4.1.1 The LCS measures the accuracy of the method in a blank matrix and assesses method performance independent of potential field sample matrix affects in a laboratory batch.

25.4.1.2 The LCS are prepared from a clean matrix similar to that of the associated samples that is free from target analytes (for example: Reagent water, Ottawa sand, glass beads, etc.) and is processed along with and under the same conditions as the associated samples. The LCS is spiked with verified known amounts of analytes or is made of a material containing known and verified amounts of analytes, taken through all preparation and analysis steps along with the field samples. Where there is no preparation taken for an analysis (such as in aqueous volatiles), or when all samples and standards undergo the same preparation and analysis process (such as Phosphorus), a calibration verification standard is reported as the LCS. In some instances where there is no practical clean solid matrix available, aqueous LCS's may be processed for solid matrices; final results may be calculated as mg/kg or ug/kg, assuming 100% solids and a weight equivalent to the aliquot used for the corresponding field samples, to facilitate comparison with the field samples.

25.4.1.3 Certified pre-made reference material purchased from a NIST/A2LA accredited vendor may also be used for the LCS when the material represents the sample matrix or the analyte is not easily spiked (e.g. solid matrix LCS for metals, TDS, etc.). The laboratory also refers to this as LCSRM.

25.4.1.4 As stated in the opening of this section, the LCS go through all of the steps of the process (including as necessary: filtration, clean-ups, etc.).

25.4.1.5 The specific frequency of use for LCS during the analytical sequence is defined in the specific standard operating procedure for each analysis and in Appendix 4. It is generally 1 for each batch of samples; not to exceed 20 environmental samples.

25.4.1.6 If the mandated or requested test method, or project requirements, do not specify the spiking components, the laboratory shall spike all reportable components to be reported in the Laboratory Control Sample (and Matrix Spike) where applicable (e.g. no spike of pH). However, in cases where the components interfere with accurate assessment (such as simultaneously spiking chlordane, toxaphene and PCBs in Method 608), the test method has an extremely long list of components or components are incompatible, at a minimum, a representative number of the listed components (see below) shall be used to control the test method. The selected components of each spiking mix shall represent all chemistries, elution patterns and masses, permit specified analytes and other client requested components. However, the laboratory shall ensure that all reported components are used in the spike mixture within a two-year time period.

25.4.1.6.1 For methods that have 1-10 target analytes, spike all components.

25.4.1.6.2 For methods that include 11-20 target analytes, spike at least 10 or 80%, whichever is greater.

25.4.1.6.3 For methods with more than 20 target analytes, spike at least 16 components.

25.4.1.6.4 Exception: Due to analyte incompatibility in pesticides, Toxaphene and Chlordane are only spiked at client request based on specific project needs.

25.4.1.6.5 Exception: Due to analyte incompatibility between the various PCB aroclors, aroclors 1016 and 1260 are used for spiking as they cover the range of all of the aroclors. Specific aroclors may be used by request on a project specific basis.

25.4.1.7 **Accuracy Calculation**: Percent Recovery (%R) Calculation (applies to LCS, CCV, Surrogates, and Matrix Spikes.

$$\%R = \frac{AV}{TV} \times 100$$

Where: AV = Analyzed Value
TV = True Value

25.5 SAMPLE MATRIX CONTROLS

25.5.1 Matrix Spikes (MS)

25.5.1.1 The Matrix spike is used to assess the effect sample matrix of the spiked sample has on the precision and accuracy of the results generated by the method used.

25.5.1.2 An MS is essentially a sample fortified with a known amount of the test analyte(s). At a minimum, with each matrix-specific batch of samples processed, an MS is carried through the complete analytical procedure. Unless specified by the client, samples used for spiking are randomly selected and rotated between different client projects.

25.5.1.3 If the mandated or requested test method does not specify the spiking components, the laboratory shall spike all reportable components to be reported in the Laboratory Control Sample and Matrix Spike. However, in cases where the components interfere with accurate assessment (such as simultaneously spiking chlordane, toxaphene and PCBs in Method 608), the test method has an extremely long list of components or components are incompatible, a representative number of the listed components (see LCS analytes 25.4.1.6 above) may be used to control the test method. The selected components of each spiking mix shall represent all chemistries, elution patterns and masses, permit-specified analytes and other client requested components. However, the laboratory shall ensure that all reported components are used in the spike mixture within a two-year time period.

25.5.1.4 The percent recovery calculation for matrix spikes is essentially the same as the calculation shown in 25.2.1.7 except that:

$$AV = Sp - Sa$$

Where: Sp = Spike result
Sa = Sample result

25.5.2 Surrogate Spikes

25.5.2.1 Surrogate Spikes are similar to matrix spikes except the analytes are compounds with properties that mimic the analyte of interest and are unlikely to be found in environment samples.

25.5.2.2 Surrogate compounds are added to all samples, standards, and blanks, for all organic chromatography methods except when the matrix precludes its use or when a surrogate is not available. The recovery of the surrogates is compared to the acceptance limits for the specific method (also refer to Section 25.5). Poor surrogate recovery may indicate a problem with sample composition and shall be reported, with data qualifiers, to the client whose sample produced poor recovery.

25.5.3 Duplicates

25.5.3.1 For a measure of analytical precision, with each matrix-specific batch of samples processed, a matrix duplicate (MD or DUP) sample, matrix spike duplicate (MSD), or LCS duplicate (LCSD) is carried through the complete analytical procedure. Duplicate samples are usually analyzed with methods that do not require matrix spike analysis. The recoveries for the spiked duplicate samples must meet the same laboratory established recovery limits as the accuracy QC samples. If an LCSD is analyzed both the LCS and LCSD must meet the same recovery criteria and be included in the final report. The precision measurement is reported as “Relative Percent Difference” (RPD). Poor precision between duplicates (except LCS/LCSD) may indicate non-homogeneous matrix or sampling.

25.5.3.2 **Precision Calculation** (Relative Percent Difference - RPD)

$$RPD = \frac{|S - D|}{\frac{(S + D)}{2}} \times 100$$

Where: S=Sample Concentration
D=Duplicate Concentration

25.5.4 Internal Standards

25.5.4.1 In most organic analyses, internal standards are spiked into all environmental and quality control samples (including the initial calibration standards). An internal standard is also used with some metals analyses. It is added to sample extracts after the extraction (post-prep). The acceptance criteria in most methods are 50% to 200% of the responses in the mid-point of the corresponding calibration curve. Consult the method-specific SOPs for details on the internal standard compounds, calculations and acceptance criteria.

25.5.4.2 When the internal standard recoveries fall outside these limits, if there are not obvious chromatographic interferences, reanalyze the sample to confirm a possible matrix effect. If the recoveries confirm or there was obvious interference, results are reported from the original analysis and a qualifier is added. If the reanalysis meets internal standard recovery criteria, the second run is reported (or both are reported if requested by the client).

25.6 ACCEPTANCE CRITERIA (CONTROL LIMITS)

25.6.1 Each individual analyte in the LCS, MS, or Surrogate Spike are evaluated against the control limits as published in the test method. Where there are no established acceptance criteria, the laboratory calculates control limits with the use of control charts or, in some cases, utilizes client project specific or regulatory mandated control limits. When this occurs, the regulatory or project limits will supersede the laboratory's in-house limits.

Note: For methods, analytes and matrices with very limited data (e.g., unusual matrices not analyzed often), interim limits are established using available data or by analogy to similar methods or matrices.

25.6.2 Once control limits have been established, they are verified, reviewed, and updated if necessary on an annual basis unless the method requires more frequent updating (e.g. EPA SW846 8000 series methods). New control limits are generated thirty days before the end of the current year for implementation at the beginning of the following year. Control limits are established per method (as opposed to per instrument) regardless of the number of instruments utilized.

25.6.2.1 The lab should consider the effects of the spiking concentration control limits, and to avoid censoring of data. The acceptance criteria for recovery and precision are often a function of the spike concentration used. Therefore, caution must be used when pooling data to generate control limits.

25.6.2.2 Not only should the results all be from a similar matrix, but the spiking levels should also be approximately the same (within a factor of 2). Similarly, the matrix spike and surrogate results should all be generated using the same set of extraction, cleanup and analysis techniques. For example, results from solid samples extracted by ultrasonic extraction are not mixed with those extracted by Soxhlet.

25.6.2.3 The laboratory should try and avoid discarding data that do not meet a preconceived notion of acceptable performance. This results in a censored data set, which, when used to develop acceptance criteria, will lead to unrealistically narrow criteria. For a 99% confidence interval, 1 out of every 100 observations likely will still fall outside the limits. For methods with long analyte lists this may mean occasional failures every batch or two. While professional judgment is important in evaluating data to be used to develop acceptance criteria, specific results are not discarded simply because they do not meet one's expectations. However, data points shall be discarded if they were the result of human or mechanical error or sample concentration exceeded spike level by > 4x.

25.6.3 Laboratory generated % Recovery acceptance (control) limits are generally established by taking $\pm$ 3 Standard Deviations (99% confidence level) from the average recovery of a minimum of 20-30 data points (more points are preferred). The period chosen for the generation of the control limits should be wide enough to yield approximately 200 data points. For some methods, such as full list 8260, this may only cover a period of less than one month. For less frequent tests, a period of one year is initially chosen.

25.6.3.1 Regardless of the calculated limit, the limit should be no tighter than the Calibration Verification (ICV/CCV). (Unless the analytical method specifies a tighter limit).

25.6.3.2 In-house limits cannot be any wider than those mandated in a regulated analytical method.

25.6.3.3 The lowest acceptable recovery limit will be 10% (the analyte must be detectable).

25.6.3.4 The maximum acceptable recovery limit will be 150%.

25.6.3.5 The maximum acceptable RPD limit will be 35% for waters and 40% for soils. The minimum RPD limit is 10%.

25.6.3.6 If either the high or low end of the control limit changes by $\leq$ 5% from previous, the control chart is visually inspected and, using professional judgment, they may be left unchanged if there is no affect on laboratory ability to meet the existing limits.

25.6.4 The lab must be able to generate a current listing of their control limits and track when the updates are performed. In addition, the laboratory must be able to recreate historical control limits. A historical listing of the control limits is available by pressing the **Historical** button in the Control Limits module in LIMS. Note: Control limits that are approved for implementation at a future date will show as the current limits in the Method Limit Group module. Rest assured that the current limits are still in use up until the future date of implementation of the new limits.

25.6.4.1 The laboratory maintains a copy of the current control limits arranged by method in a binder located in QA. These control limits can also be viewed by accessing the historicals of the control limits for each method limit group in LIMS. The historical section will show all control limits used for any method. In addition, a log is kept that also shows the points used to generate the limits.

25.6.5 A LCS that is within the acceptance criteria establishes that the analytical system is in control and is used to validate the process. Samples that are analyzed with an LCS with recoveries outside of the acceptance limits may be determined as out of control and should be reanalyzed if possible. If reanalysis is not possible, then the results for all affected analytes for samples within the same batch must be qualified when reported. The internal corrective action process (see Section 13) is also initiated if an LCS exceeds the acceptance limits. Sample results may be qualified and reported without reanalysis if:

25.6.5.1 The analyte results are below the reporting limit and the LCS is above the upper control limit.

25.6.5.2 If the analytical results are above the relevant regulatory limit and the LCS is below the lower control limit.

25.6.6 If the MS/MSDs do not meet acceptance limits, the MS/MSD and the associated spiked sample is reported with a qualifier for those analytes that do not meet limits. If obvious preparation errors are suspected, or if requested by the client, unacceptable MS/MSDs are reprocessed and reanalyzed to prove matrix interference. A more detailed discussion of acceptance criteria and corrective action can be found in Appendix 4 and in Section 13.

25.6.7 If a surrogate standard falls outside the acceptance limits, if there is not obvious chromatographic matrix interference, reanalyze the sample to confirm a possible matrix effect. If the recoveries confirm or there was obvious chromatographic interference, results are reported from the original analysis and a qualifier is added. If the reanalysis meets surrogate recovery criteria, the second run is reported (or both are reported if requested by the client). Under certain circumstances, where all of the samples are from the same location and share similar chromatography, the reanalysis may be performed on a single sample rather than all of the samples and if the surrogate meets the recovery criteria in the reanalysis, all of the affected samples would require reanalysis. In addition, reanalysis due to low surrogate recoveries may not be necessary if there is historical data to indicate that certain matrices yield low suuroagte recoveries, i.e. ash, carbon pellets, catalyst, etc.

25.7 METHOD DETECTION LIMITS (MDLs)

MDLs, calculated as described in Section 20.7, are updated or verified annually, or more often if required by the method.

25.8 ADDITIONAL PROCEDURES TO ASSURE QUALITY CONTROL

25.8.1 The laboratory has written procedures to assure the accuracy of the test method including calibration (see Section 21), use of certified reference materials (see Section 22) and use of PT samples (see Section 16).

25.8.2 A discussion regarding MDLs, Limit of Detection (LOD) and Limit of Quantitation (LOQ) can be found in Section 20.

25.8.3 Use of formulae to reduce data is discussed in the method standard operating procedures and in Section 21.

25.8.4 Selection of appropriate reagents and standards is included in Section 9 and 22.

25.8.5 A discussion on selectivity of the test is included in Section 5.

25.8.6 Constant and consistent test conditions are discussed in Section 19.

25.8.7 The laboratories sample acceptance policy is included in Section 24.

SECTION 26

REPORTING RESULTS
(NELAC 5.5.10)

26.1 OVERVIEW

The results of each test are reported accurately, clearly, unambiguously, and objectively in accordance with State and Federal regulations as well as client requirements. Analytical results are issued in a format that is intended to satisfy customer and laboratory accreditation requirements as well as provide the end user with the information needed to properly evaluate the results. Where there is a conflict between the client requested formats and accreditation requirements or data usability information, accreditation requirements and data usability information will take precedence over client requests. A variety of report formats are available to meet specific needs.

In cases where a client asks for simplified reports, there must be a written request from the client. There still must be enough information that would show any analyses that were out of conformance (QC out of limits) and there should be a reference to a full report that is made available to the client.

Review of reported data is included in Section 20.

26.2 TEST REPORTS

Analytical results are reported in a format that is satisfactory to the client and meets all requirements of applicable accrediting authorities and agencies. A variety of report formats are available to meet specific needs. The report is printed on laboratory letterhead, reviewed, and signed by the appropriate project manager. At a minimum, the standard laboratory report shall contain the following information:

26.2.1 A report title (e.g. Analytical Report For Samples) with a “sample results” column header.

26.2.2 Each report page printed on company letterhead, which includes the laboratory name, address and telephone number.

26.2.3 A unique identification of the report (e.g. Job Number) and on each page an identification in order to ensure the page is recognized as part of the report and a clear identification of the end.

Note: Page numbers of report are represented as page # of ##. Where the first number is the page number and the second is the total number of pages.

26.2.4 A copy of the chain of custody (COC).

- Any COCs involved with Subcontracting are included.
- A copy of the COC is included and is an integral part of the report. Any correspondences between the client and PMs
- Any additional addenda to the report must be treated in a similar fashion so it is a recognizable part of the report and cannot accidentally get separated from the report (eg. Sampling information).

26.2.5 The name and address of client and a project name/number, if applicable.

26.2.6 Client project manager or other contact

26.2.7 Description and unambiguous identification of the tested sample(s) including the client identification code.

26.2.8 Date of receipt of sample, date and time of collection, and date(s) of test preparation and performance, and time of preparation or analysis if the required holding time for either activity is less than or equal to 72 hours.

26.2.9 Date reported or date of revision, if applicable.

26.2.10 Method of analysis including method code (EPA, Standard Methods, etc).

26.2.11 Reporting limits

26.2.12 Method detection limits (if requested)

26.2.13 Definition of Data qualifiers and reporting acronyms (e.g. ND).

26.2.14 Sample results.

26.2.15 QC data consisting of method blank, surrogate, LCS, and MS/MSD recoveries and control limits.

26.2.16 Condition of samples at receipt including temperature. This may be accomplished in a narrative or by attaching sample login sheets (Refer to Sec. 26.2.4 – Item 3 regarding additional addenda).

26.2.16.1 Temperatures of the cooler that the samples were transported in are noted on the original copy of the COC. In the event that the temperature is outside of acceptable limits, the appropriate section of the log-in checklist filled out in LIMS.

26.2.17 A statement to the effect that the results relate only to the items tested and the sample as received by the laboratory.

26.2.18 A statement that the report shall not be reproduced except in full, without prior express written approval by the laboratory coordinator.

26.2.19 A signature and title of the person(s) accepting responsibility for the content of the report and date of issue. Signatories are appointed by the Lab Director. For applying an electronic signature refer to the Electronic Signature Policy (Section 26.4).

26.2.20 When NELAC accreditation is required, the lab shall certify that the test results meet all requirements of NELAC or provide reasons and/or justification if they do not.

26.2.21 Where applicable, a narrative to the report that explains the issue(s) and corrective action(s) taken in the event that a specific accreditation or certification requirement was not met.

26.2.22 When Soil samples are analyzed, a specific identification as to whether soils are reported on a “wet weight” or “dry weight” basis.

26.2.23 Appropriate laboratory certification number for the state of origin of the sample, if applicable.

26.2.24 If only part of the report is provided to the client (client requests some results before all of it is complete), it must be clearly indicated on the report, and that a complete report will follow once all of the work has been completed. The report will contain the words “Preliminary Report” as a watermark written across the page.

26.2.25 Any out of network subcontracted analysis results are provided as a separate report on the official letterhead of the subcontractor. All in-network subcontracting is clearly identified on the report as to which laboratory performed a specific analysis.

26.3 REPORTING LEVEL OR REPORT TYPE

TestAmerica San Francisco offers four levels of quality control reporting. Each level, in addition to its own specific requirements, contains all the information provided in the preceding level. The packages provide the following information in addition to the information described above:

- Level I is a report with the features described in Section 26.2 above.
- Level II is a Level I report plus summary information, including results for the method blank reported to the laboratory MDL, percent recovery for laboratory control samples and matrix spike samples, and the RPD values for all MSD and sample duplicate analyses.
- Level III contains all the information supplied in Level II, but presented on the CLP-like summary forms, and relevant calibration information. A Level II report is not included, unless specifically requested. No raw data is provided.
- Level IV is the same as Level III with the addition of all raw supporting data.

In addition to the various levels of QC packaging, the laboratory also provides reports in diskette deliverable form. If requested, Initial reports may be also be provided to clients by facsimile,

later followed by a hardcopy. Procedures used to ensure client confidentiality are outlined in Section 26.7.

26.3.1 Electronic Data Deliverables (EDDs)

EDDs are routinely offered as part of TestAmerica's services. TestAmerica San Francisco offers a variety of EDD formats including Environmental Restoration Information Management System (ERPIMS), New Agency Standard (NAS), Format A, Excel, Dbase, GISKEY, and Text Files. Some of the common EDDs that are handled by the laboratory are listed below.

AdaPT_Fdep_Result
ADR_8.1_2file_LimsValues
Boeing
EDF1.2
EDF_1.2i_Csv
EDF_Weiss
EIM_Cvx_Rcra
EIM_Cvx_Rtbu
EIM_Cvx_Rtbu_Smpl
EIM_Honeywell_EDF
Eim_ParsonsFMC
Element_Ta
Equ_Cra
Equ_Cra_Ez
Equ_Golder_NorthHaven
Equ_Shell_2File
Geomatrix
Geosyntec
LevineFricke_Apr2001
Mactec_MontWat
Secor_HP
Sedd_5.0_2a
Sk01_Cc
Std_Sav_STD1
std_Sav_Std1a
Std_SF_QcN
Std_SF_QcY
Std_Stl
TRC Alton GeoScience
Trc_Vectre
Urs_Mission
WccTl_Ashland_Escambia

EDD specifications are submitted to the IT department by the PM for review and undergo the contract review process. Once the facility has committed to providing data in a specific electronic format, the coding of the format may need to be performed. This coding is documented and validated. The validation of the code is retained by the IT staff coding the EDD.

EDDs shall be subject to a review to ensure their accuracy and completeness. If EDD generation is automated, review may be reduced to periodic screening if the laboratory can demonstrate that it can routinely generate that EDD without errors. Any revisions to the EDD format must be reviewed until it is demonstrated that it can routinely be generated without errors. If the EDD can be reproduced accurately and if all subsequent EDDs can be produced error-free, each EDD does not necessarily require a review.

26.4 SUPPLEMENTAL INFORMATION FOR TEST

The lab identifies any unacceptable QC analyses or any other unusual circumstances or observations such as environmental conditions and any non-standard conditions that may have affected the quality of a result. This is typically in the form of a footnote or a qualifier and/or a narrative explaining the discrepancy in the front of the report. Refer to Appendix 7 for a list of the laboratory's standard footnotes and qualifiers.

26.4.1 Numeric results with values outside of the calibration range, either high or low are qualified as 'estimated'.

26.4.2 Where quality system requirements are not met, a statement of compliance/non-compliance with requirements and/or specifications, including identification of test results derived from any sample that did not meet sample acceptance requirements such as improper container, holding time, or temperature.

26.4.3 Where applicable, a statement on the estimated uncertainty of measurements; information on uncertainty is needed when a client's instructions so require.

26.4.4 Opinions and Interpretations - The test report contains objective information, and generally does not contain subjective information such as opinions and interpretations. If such information is required by the client, the Laboratory Director will determine if a response can be prepared. If so, the Laboratory Director will designate the appropriate member of the management team to prepare a response. The response will be fully documented, and reviewed by the Laboratory Director, before release to the client. There may be additional fees charged to the client at this time, as this is a non-routine function of the laboratory.

Note: Review of data deliverable packages for submittal to regulatory authorities requires responses to non-conforming data concerning potential impact on data quality. This necessitates a limited scope of interpretation, and this work is performed by the QA Department. This is the only form of "interpretation" of data that is routinely performed by the laboratory.

When opinions or interpretations are included in the report, the laboratory provides an explanation as to the basis upon which the opinions and interpretations have been made. Opinions and interpretations are clearly noted as such and where applicable, a comment should be added suggesting that the client verify the opinion or interpretation with their regulator.

26.5 ENVIRONMENTAL TESTING OBTAINED FROM SUBCONTRACTORS

If TestAmerica San Francisco is not able to provide the client the requested analysis, the samples would be subcontracted following the procedures outlined in Section 8.

Data reported from analyses performed by a subcontractor laboratory are clearly identified as such on the analytical report provided to the client. Results from a subcontract laboratory outside of the TestAmerica network are reported to the client on the subcontract laboratory's original report stationary and the report includes any accompanying documentation.

26.6 CLIENT CONFIDENTIALITY

In situations involving the transmission of environmental test results by telephone, facsimile or other electronic means, client confidentiality must be maintained.

TestAmerica will not intentionally divulge to any person (other than the Client or any other person designated by the Client in writing) any information regarding the services provided by TestAmerica or any information disclosed to TestAmerica by the Client. Furthermore, information known to be potentially endangering to national security or an entity's proprietary rights will not be released.

Note: This shall not apply to the extent that the information is required to be disclosed by TestAmerica under the compulsion of legal process. TestAmerica will, to the extent feasible, provide reasonable notice to the client before disclosing the information.

Note: Authorized representatives of an accrediting authority are permitted to make copies of any analyses or records relevant to the accreditation process, and copies may be removed from the laboratory for purposes of assessment.

26.6.1 Report deliverable formats are discussed with each new client. If a client requests that reports be faxed or e-mailed, the reports are faxed with a cover sheet or e-mailed with the following note that includes a confidentiality statement similar to the following:

This material is intended only for the use of the individual(s) or entity to whom it is addressed, and may contain information that is privileged and confidential. If you are not the intended recipient, or the employee or agent responsible for delivering this material to the intended recipient, you are hereby notified that any dissemination, distribution or copying of this communication is strictly prohibited. If you have received this communication in error, please notify us immediately by telephone at the 1-800-765-0980 (or for e-mails: please notify us immediately by e-mail or by phone (1-800-765-0980) and delete this material from any computer).

26.7 FORMAT OF REPORTS

The format of reports are designed to accommodate each type of environmental test carried out and to minimize the possibility of misunderstanding or misuse.

26.8 AMENDMENTS TO TEST REPORTS

Corrections, additions, or deletions to reports are only made when justification arises through supplemental documentation. Justification is documented using the laboratory's corrective action system (refer to Section 13).

When the report is re-issued, a notation of "Revision # "is placed on the cover/signature page of the report *or at the top of the narrative page* with a brief explanation of reason for the re-issue.

LIMS automatically places the notation "Rev(#)" at the end of the report name if the report is revised. All reports are stored in the Documents server.

26.9 POLICIES ON CLIENT REQUESTS FOR AMENDMENTS

26.9.1 Sample Reanalysis Policy

Because there is a certain level of uncertainty with any analytical measurement a sample reanalysis may result in either a higher or lower value from an initial sample analysis. There are also variables that may be present (e.g. sample homogeneity, analyte precipitation over time, etc.) that may affect the results of a reanalysis. Based on the above comments, the laboratory will reanalyze samples at a client's request with the following caveats. Client specific arrangements for reanalysis protocols can be established.

- Homogenous samples: If a reanalysis agrees with the original result to within the RPD limits for MS/MSD or Duplicate analyses, or within $\pm$ 1 reporting limit for samples $\leq$ 5x the reporting limit, the original analysis will be reported. At the client's request, both results may be reported on the same report but not on two separate reports.

- If the reanalysis does not agree (as defined above) with the original result, then the laboratory will investigate the discrepancy and reanalyze the sample a third time for confirmation if sufficient sample is available.

- Any potential charges related to reanalysis are discussed in the contract terms and conditions or discussed at the time of the request. The client will typically be charged for reanalysis unless it is determined that the lab was in error.

- Due to the potential for increased variability, reanalysis may not be applicable to Non-homogenous, Encore, and Sodium Bisulfate preserved samples. See the Operations Manager or Laboratory Director/Manager if unsure.

26.9.2 Policy on Data Omissions or Reporting Limit Increases

Fundamentally, our policy is simply to not omit previously reported results (including data qualifiers) or to not raise reporting limits and report sample results as ND. This policy has few exceptions. Exceptions are:

- Laboratory error.
- Sample identification is indeterminate (confusion between COC and sample labels).

- An incorrect analysis (not analyte) was requested (e.g., COC lists 8315 but client wanted 8310). A written request for the change is required.
- Incorrect limits reported based on regulatory requirements.
- The requested change has absolutely *no possible* impact on the interpretation of the analytical results and there is *no possibility* of the change being interpreted as misrepresentation by anyone inside or outside of our company.

26.9.3 Multiple Reports

TestAmerica does not issue multiple reports for the same workorder where there is different information on each report (this does not refer to copies of the same report) unless required to meet regulatory needs and approved by QA.

Figure 26-1.

Read and Understand Memo for
Electronic Reporting and Electronic Signatures Policy

I have read and understand the TestAmerica Policy on Electronic Reporting and Electronic Signatures and agree to follow procedures stated in this document. Futhermore, I agree to maintain my password secure and confidential and will not divulge this password to anyone. I am aware that my electronic signature is as legally binding as that of my signature signed with a pen. I will not apply my signature until I have reviewed each page.

Employee: _____

Signature: _____

Date: _____

Return this signed form to HR within 5 days for filing in your Personnel File

Figure 26-2.

AGREEMENT FOR ELECTRONIC REPORTS

TestAmerica provides laboratory services and certified lab reports ("Reports") to the undersigned client ("Client"). Client desires to receive the Reports in both written hard copy and electronic format. Both TestAmerica and the Client desire to protect and preserve the integrity of the Reports.

TestAmerica agrees to provide Client with the Reports in both hard copy and electronic format. Client agrees to accept all responsibility for and indemnify and hold TestAmerica harmless from all claims or demands from third parties, including attorneys' fees and costs incurred by TestAmerica, due to alterations or deletions to the Reports by Client, or the use of incomplete Reports by Client.

Client agrees not to alter any Reports whether in the hard copy or electronic format and to use reasonable efforts to preserve the Reports in the form and substance originally provided by TestAmerica.

Date: _____ **Company Name:** _____

Completed By: _____

Title/Position: _____

Client Signature: _____ _____

Date: _____ Company Name: TestAmerica San Francisco

Received By: _____

Title/Position: _____

Signature: _____

Please sign and FAX to 925-600-3012

Appendix 1.

TESTAMERICA
ETHICS POLICY No. CA-L-P-001

Refer to CA-L-P-001 for complete policy.

TestAmerica
EMPLOYEE ETHICS STATEMENT

I understand that TestAmerica is committed to ensuring the highest standard of quality and integrity of the data and services provided to our clients. I have read the Ethics Policy of the Company.

- *With regard to the duties I perform and the data I report in connection with my employment at the Company, I agree that:*
- *I will not intentionally report data values that are inconsistent with the actual values observed or measured.*
- *I will not intentionally report the dates, times, sample or QC identifications, or method citations of data analyses that are not the actual dates, times, sample or QC identifications, or method citations.*
- *I will not intentionally misrepresent another individual's work as my own or represent my own work as someone else's.*
- *I will not intentionally misrepresent any data where data does not meet Method or QC requirements. If it is to be reported, I will report it with all appropriate notes and/or qualifiers; I shall not modify data (either sample or QC data) unless the modification can be technically justified through a measurable analytical process, such as one deemed acceptable to the laboratory's Standard Operating Procedures, Quality Assurance Manual or Technical Director. All such modifications must be clearly and thoroughly documented in the appropriate laboratory notebooks/worksheets and/or raw data and include my initials or signature and date.*
- *I shall not make false statements to, or seek to otherwise deceive, members of Management or their representatives, agents, or clients/customers. I will not, through acts of commission, omission, erasure, or destruction, improperly report measurement standards, quality control data, test results or conclusions.*
- *I shall not compare or disclose results for any Performance Testing (PT) sample, or other similar QA or QC requirements, with any employee of any other laboratory, including any other TestAmerica laboratory, prior to the required submission date of the results to the person, organization, or entity supplying the PT sample.*
- *I shall immediately inform my supervisor or other member of management regarding any intentional or unintentional reporting of my own inauthentic data. Such report shall be given both orally and in writing to the supervisor or other member of management contacted and to the*

local Quality Assurance Manager. The Quality Assurance Manager will initial and date the information and return a copy to me. I shall not condone any accidental or intentional reporting of inauthentic data by other employees and will immediately report its occurrence. If I have actual knowledge of such acts committed by any other employees, and I do not report such information to designated members of Management, it shall be considered as serious as if I personally committed the offense. Accordingly, in that event, I understand that I may be subject to immediate termination of employment.

- *I understand that if any supervisor, manager, or representative of TestAmerica management instructs, requests, or directs me to perform any of the aforementioned improper laboratory practices, or if I am in doubt or uncertain as to whether or not such laboratory practices are proper, I will not comply. In fact, I must report such event to all appropriate members of Management including, but not limited to, the Lab Director, all supervisors and managers with direct line reporting relationship between me and the Lab Director, and the local Quality Assurance representative, excluding such individuals who participated in such perceived improper instruction, request, or directive. In addition, I may contact Corporate Quality Assurance / Ethics Compliance Officer(s) for assistance.*
- *I understand the critical importance of accurately reporting data, measurements, and results, whether initially requested by a client, or retained by TestAmerica and submitted to a client at a later date, or retained by TestAmerica for subsequent internal use;*
- *I will not share the pricing or cost data of Vendors or Suppliers with anyone outside of the TestAmerica family of companies.*
- *I shall not accept gifts of a value that would adversely influence judgment.*
- *I shall avoid conflicts of interest and report any potential conflicts to the management (e.g. employment or consulting with competitors, clients, or vendors).*
- *I shall not participate in unfair competition practices (e.g. slandering competitors, collusion with other labs to restrict others from bidding on projects).*
- *I shall not misrepresent certifications and status of certifications to clients or regulators.*
- *I shall not intentionally discharge wastes illegally down the drain or onto the ground.*
- *I understand that any attempt by management or an employee to circumvent these policies will be subject to disciplinary action.*

As a TestAmerica employee, I understand that I have the responsibility to conduct myself with integrity in accordance with the ethical standards described in the Ethics Policy. I will also report any information relating to possible kickbacks or violations of the Procurement Integrity Act, or other questionable conduct in the course of sales or purchasing activities. I will not knowingly participate in any such activity and will report any actual or suspected violation of this policy to management.

I understand that if my job includes supervisory responsibilities, I shall not instruct, request, or direct any subordinate to perform any laboratory practice which is unethical or improper. Also, I shall not discourage, intimidate, or inhibit an employee who may choose to appropriately appeal my supervisory instruction, request, or directive which the employee perceives to be improper, nor retaliate against those who do.

The Ethics Policy has been explained to me by my supervisor or at a training session, and I have had the opportunity to ask questions if I did not understand any part of it. I understand that any violation of this policy subjects me to disciplinary action, which can include termination of my employment. In addition, I understand that any violation of this policy which relates to work under a government contract or subcontract could also subject me to the potential for prosecution under federal law.

EMPLOYEE SIGNATURE _____ Date _____

Supervisor/Trainer: _____ Date _____

TestAmerica
CONFIDENTIALITY AND PROPRIETARY INFORMATION AGREEMENT

TestAmerica and their predecessors, in their businesses, have developed and use commercially valuable technical and non-technical information and to guard the legitimate interests of TestAmerica and its clients, it is necessary to protect certain information as confidential and proprietary.

I, _____ , understand and acknowledge that during the term of my employment by TestAmerica, I will be privy to and entrusted with certain confidential information and trade secrets of TestAmerica and its clients.

Confidential information and trade secrets include, but are not limited to: customer and client lists; price lists; marketing and sales strategies and procedures; operational and equipment techniques; standard operating procedures; business plans and systems; quality control procedures and systems; special projects and technological research, including projects, research and reports for any government entity or client; client's plans and processes; client's manner of operation; the trade secrets of clients; client's data; vendor or supplier pricing; employee lists and personal information, and any other records, data, files, drawings, inventions, discoveries, applications, or processes which are not in the public domain.

I agree as follows:

1. I will not in any way, during the term of my employment, or at any time thereafter, except as authorized in writing by the Legal Department of TestAmerica or the client where client data is involved, disclose to others, use for my own benefit, remove from TestAmerica's premises (except to the extent off-site work is approved by my supervisor), copy or make notes of any confidential information and/or trade secrets of TestAmerica or its clients, excepting only that information which may be public knowledge. Technical and business information of any previous employer or other third party which I may disclose to TestAmerica shall be limited to that which was acquired legitimately and disclosed to me without restriction as to secrecy.

2. I agree that all inventions (whether or not patentable) conceived or made by me during the period of my employment by TestAmerica shall belong to TestAmerica, provided such inventions grow out of my work for TestAmerica and are related to the business of TestAmerica. I agree to disclose and assign such inventions to TestAmerica. In California, this provision shall not apply to any invention which qualifies fully under Section 2870 of the California Labor Code.

3. On termination of my employment from TestAmerica, I will deliver to TestAmerica all documents, records, notes, data, memoranda, files, manuals, equipment and things of any nature which relate in any way to confidential information and/or trade secrets of TestAmerica or its clients and which are in my possession or under my control.

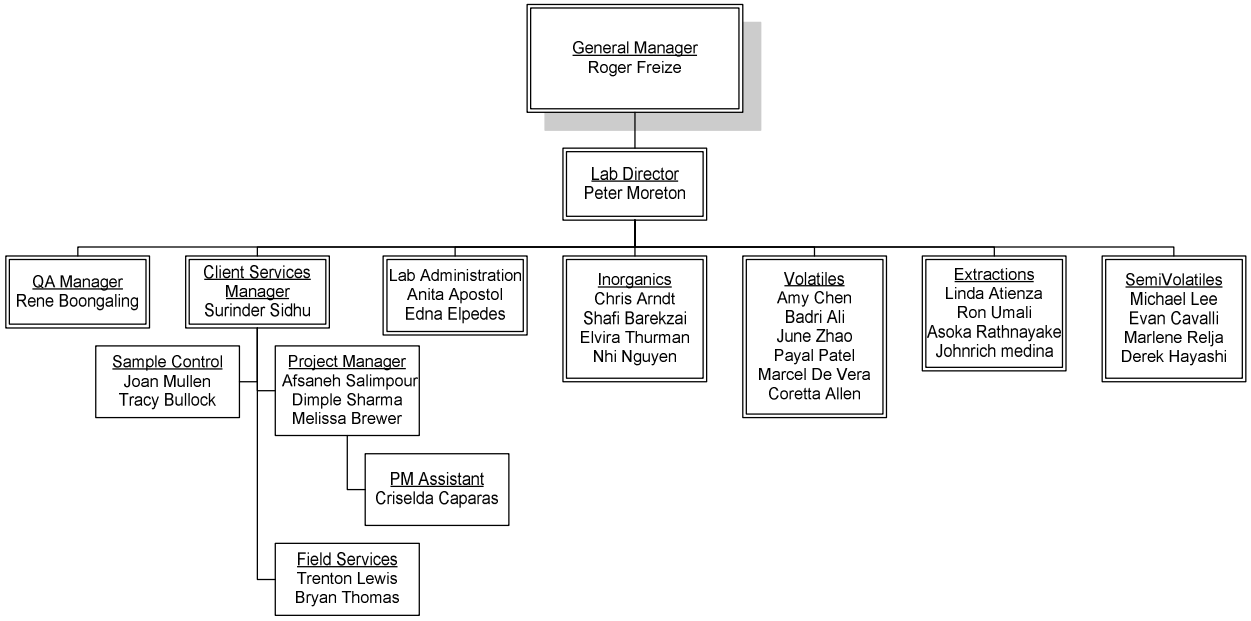
4. I agree that during the period of my employment and for one (1) year from and after the termination (for any reason) of my employment with TestAmerica, I shall not directly or indirectly (without first obtaining the written permission of TestAmerica), recruit for employment, or induce to terminate his or her employment with TestAmerica, any person who is an active employee of TestAmerica on the last day of my employment with TestAmerica.

5. I acknowledge that if I were to breach any provision of this Confidentiality Agreement, money damages will be inadequate, and I hereby agree that TestAmerica shall be entitled, where appropriate, to specific performance and/or injunctive relief (i.e. to require me to comply with this Agreement). I further acknowledge that the willingness of TestAmerica to hire me or to continue my employment constitutes full and adequate consideration for the agreements, and obligations to which I have agreed as set forth in this document.

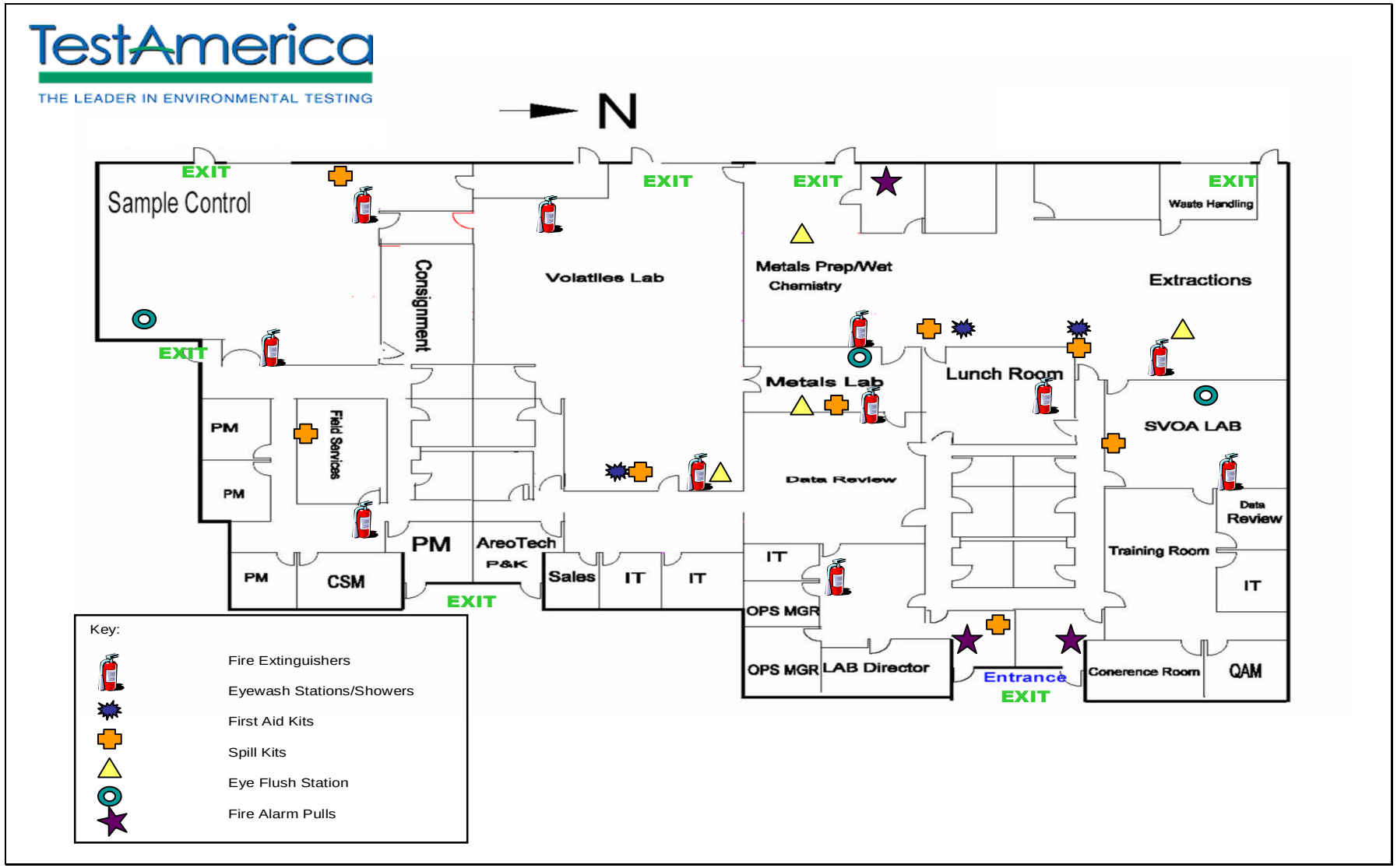
I have executed this Agreement, intending to be legally bound.

_____	_____	_____
Printed Name	*Signature*	*Date*

Appendix 2. Laboratory Organization Chart



Appendix 3. Laboratory Floor Plan



Appendix 4: Summary of Calibration and QC Procedures

SW846 Method 8260B – Low Level			
Quality Control	Frequency	Acceptance Criteria	Corrective Action
• BFB Tune	• Every 12 hours	• Refer to Method SOP for intensity criteria	• Retune MSD • Reanalyze BFB
• ICAL – Minimum of 5 points (6 points if quadratic) • Low cal point @ RL	• After initial instrument setup • As needed	• %RSD ≤ 15 • If %RSD > 15, use 1st or 2nd order not forced through zero • r^2 > 0.990, r ≥ 0.995 • CCC ≤ 30% • SPCC ≥ 0.10 • SPCC ≥ 0.3 ClBz & 1,1,2,2-TCA	• Evaluate • Perform maintenance • Remake standards • Recalibrate • If any CCC > 30%, recalibrate
• ICV (2nd source standard)	• After the ICAL	• CCC ≤ 20% • SPCC ≥0.10 • SPCC ≥ 0.3 ClBz & 1,1,2,2-TCA	• Evaluate • Remake standards • RA but not more than 2X (must have justification for rerunning ICV more than 2X) • Perform maintenance • Recalibrate
• CCV	• Every 12 hours (may use the ICV as the CCV)	• CCC ≤ 20% • SPCC ≥0.10 • SPCC ≥ 0.3 ClBz & 1,1,2,2-TCA	• Evaluate • Remake standards • RA but not more than 2X (must have justification for rerunning ICV more than 2X) • Perform maintenance • Recalibrate
• Method Blank	• 1 per 12 hour batch	• < RL or per QAPP	• Check calculations • RA. If passes, report • No action if samples ND or ≥10X RL • RX/RA samples ≤ 10X RL • If MB ran after the LCS/LCSD and it fails, the LCS/LCSD/MB must be rerun as a set. • RX/RA Batch
• LCS/LCSD	• 1 per 12 hour batch	• Within control limits • Must pass as a pair	• Check calculations • Check solution, reprepare if necessary • Rerun as LCS/LCSD pair

			• RX/RA Batch
• MS/MSD	• 1 per 12 hour batch	• Within control limits	• Check calculations • Is there objective evidence for the failure (heterogeneous sample, history, non-target analytes) • Flag and/or create NCM
• Surrogates	• Every sample	• Within control limits	• Check calculation • RX batch if surrogates fail in MB, LCS, LCSD • Field samples – If low and no evidence of matrix interference, RX. If high and sample ND, no action needed. If high and there is visible matrix interference, report with NCM. If high and no visible matrix interference, RX.
• Internal Standards	• Every Sample	• +200% and – 50% of calibration midpoint	• Check solution • Dilute the sample • RX/RA • Report with NCM if RX/RA is not possible
• Retention Time	• Every Sample	• ± 30 sec of internal standards from ICV/CCV	• Inspect system for leaks • Perform maintenance • RXRA affected samples
• MDL	• Annual	• See SOP SF-QA-1218 current rev	• Perform MDL check if MDL was not run on instrument. MDL check must be detectable. • RX/RA MDL

SW846 Method 8260B – Fuel Oxygenates			
Quality Control	Frequency	Acceptance Criteria	Corrective Action
• BFB Tune	• Every 12 hours	• Refer to Method SOP for intensity criteria	• Retune MSD • Reanalyze BFB
• ICAL – Minimum of 5 points (6 points if quadratic) • Low cal point @ RL	• After initial instrument setup • As needed	• All analytes are CCC • %RSD ≤ 15, use Average RF • 15 < %RSD < 30, use 1st or 2nd order not forced through zero • r^2 > 0.990, r ≥ 0.995 • SPCC ≥ 0.10 • SPCC ≥ 0.05 ETOH, 1,2-DCA[1]	• Evaluate • Perform maintenance • Remake standards • Recalibrate • If %RSD > 30%, recalibrate
• ICV (2nd source standard)	• After the ICAL	• SPCC ≥0.10 • SPCC ≥ 0.05 ETOH, 1,2-DCA[1] • REC ± 20% of actual	• Evaluate • Remake standards • RA but not more than 2X (must have justification for rerunning ICV more than 2X) • Perform maintenance • If REC > 20-40%, verify hits for affected analytes • If REC < 20%, the analyte can not be used • Recalibrate
• CCV	• Every 12 hours (may use the ICV as the CCV)	• SPCC ≥0.10 • SPCC ≥ 0.05 ETOH, 1,2-DCA[1] • REC ± 20% of actual	• Evaluate • Remake standards • RA but not more than 2X (must have justification for rerunning ICV more than 2X) • Perform maintenance • If REC > 20-40%, verify hits for affected analytes • If REC < 20%, the analyte can not be used • Recalibrate
• Method Blank	• 1 per 12 hour batch	• < RL or per QAPP	• Check calculations • RA. If passes, report • No action if samples ND or ≥10X RL • RX/RA samples ≤ 10X RL • If MB ran after the LCS/LCSD and it fails, the LCS/LCSD/MB

			must be rerun as a set. • RX/RA Batch
• LCS/LCSD	• 1 per 12 hour batch	• Within control limits • Must pass as a pair	• Check calculations • Check solution, re-prepare if necessary • Rerun as LCS/LCSD pair • RX/RA Batch
• MS/MSD	• 1 per 12 hour batch	• Within control limits	• Check calculations • Is there objective evidence for the failure (heterogeneous sample, history, non-target analytes) • Flag and/or create NCM
• Surrogates	• Every sample	• Within control limits	• Check calculation • RX batch if surrogates fail in MB, LCS, LCSD • Field samples – If low and no evidence of matrix interference, RX. If high and sample ND, no action needed. If high and there is visible matrix interference, report with NCM. If high and no visible matrix interference, RX.
• Internal Standards	• Every Sample	• +200% and – 50% of calibration midpoint	• Check solution • Dilute the sample • RX/RA • Report with NCM if RX/RA is not possible
• Retention Time	• Every Sample	• ± 30 sec of internal standards from ICV/CCV	• Inspect system for leaks • Perform maintenance • RXRA affected samples
• MDL	• Annual	• See SOP SF-QA-1218 current rev	• Perform MDL check if MDL was not run on instrument. MDL Check must be detaectable. • RX/RA MDL

1 The lower SPCC is because the secondary ion is used for quantitation, instead of the primary ion.

SW846 Method 8270C			
Quality Control	Frequency	Acceptance Criteria	Corrective Action
• DFTPP Tune	• Every 12 hours	• Refer to Method SOP for intensity criteria PCP & Benzidine not tailing • No 4,4-DDT breakdown	• Retune MSD • Perform inlet maintenance • Clean ion trap or ion source • Replace column • Reanalyze DFTPP
• ICAL – Minimum of 5 points (6 points if quadratic) • Low cal point @ RL	• After initial instrument setup • As needed	• %RSD ≤ 15, use Average RF • If %RSD > 15, use 1st or 2nd order not forced through zero • r^2 > 0.990, r ≥ 0.995 • SPCC ≥0.05 • CCC ≤ 30%	• Evaluate • Perform maintenance • Remake standards • Recalibrate • If any CCC > 30%, recalibrate
• ICV (2nd source standard)	• After the ICAL	• CCC ≤ 20% • SPCC ≥0.05	• Evaluate • Remake standard • RA but not more than 2X (must have justification for rerunning ICV more than 2X) • Perform maintenance • Recalibrate
• CCV	• Every 12 hours (may use the ICV as the CCV)	• CCC ≤ 20% • SPCC ≥0.05	• Evaluate • Remake standard • RA but not more than 2X (must have justification for rerunning ICV more than 2X) • Perform maintenance • Recalibrate
• Method Blank	• 1 per batch of 20 samples	• < RL or per QAPP	• Check calculations • RA. If passes, report • No action if samples ND or ≥10X RL • RX/RA samples ≤ 10X RL • RX/RA Batch
• LCS/LCSD	• 1 per batch of 20 samples	• Within control limits	• Check calculations • Check solution, reprepare if necessary • RX/RA Batch
• MS/MSD	• 1 per batch of 20 samples	• Within control limits	• Check calculations • Is there objective evidence for the failure (heterogeneous sample,

			history, non-target analytes) • Flag and/or create NCM
• Surrogates	• Every sample	• Within control limits	• Check calculation • RX batch if surrogates fail in MB, LCS, LCSD • Field samples – If low and no evidence of matrix interference, RX. If high and sample ND, no action needed. If high and there is visible matrix interference, report with NCM. If high and no visible matrix interference, RX.
• Internal Standards	• Every Sample	• +200% and – 50% of calibration midpoint	• Check solution • Dilute the sample • RX/RA • Report with NCM if RX/RA is not possible
• Retention Time	• Every Sample	• ± 30 sec of internal standards from ICV/CCV	• Inspect system for leaks • Perform maintenance • RXRA affected samples
• MDL	• Annual	• See SOP SF-QA-1218 current rev	• Perform MDL check if MDL was not run on instrument. MDL Check must be detectable. • RX/RA MDL

PAHs, 1,4-Dioxane, NDMA & PCP – By 8270C SIM or SIS			
Quality Control	Frequency	Acceptance Criteria	Corrective Action
• DFTPP Tune	• Every 12 hours	• Refer to Method SOP for intensity criteria	• Retune MSD • Reanalyze DFTPP
• ICAL – Minimum of 5 points (6 points if quadratic) • Low cal point @ RL	• After initial instrument setup • As needed	• %RSD ≤ 15, use Average RF • If %RSD > 15, use 1st or 2nd order not forced through zero • r^2 > 0.990, r ≥ 0.995 • SPCC ≥0.05 • CCC ≤ 30%	• Evaluate • Perform maintenance • Remake standards • Recalibrate • If any CCC > 30%, recalibrate
• ICV (2nd source standard)	• After the ICAL	• CCC ≤ 20% • SPCC ≥0.05	• Evaluate • Remake standard • RA but not more than 2X (must have justification for rerunning ICV more than 2X) • Perform maintenance • Recalibrate
• CCV	• Every 12 hours (may use the ICV as the CCV)	• CCC ≤ 20%	• Evaluate • Remake standard • RA but not more than 2X (must have justification for rerunning ICV more than 2X) • Perform maintenance • Recalibrate
• Method Blank	• 1 per batch of 20 samples	• < RL or per QAPP	• Check calculations • RA. If passes, report • No action if samples ND or ≥10X RL • RX/RA samples ≤ 10X RL • RX/RA Batch
• LCS/LCSD	• 1 per batch of 20 samples	• Within control limits	• Check calculations • Check solution, reprepare if necessary • RX/RA Batch
• MS/MSD	• 1 per batch of 20 samples	• Within control limits	• Check calculations • Is there objective evidence for the failure (heterogeneous sample, history, non-target analytes) • Flag and/or create NCM

• Surrogates	• Every sample	• Within control limits	• Check calculation • RX batch if surrogates fail in MB, LCS, LCSD • Field samples – If low and no evidence of matrix interference, RX. If high and sample ND, no action needed. If high and there is visible matrix interference, report with NCM. If high and no visible matrix interference, RX.
• Internal Standards	• Every Sample	• +200% and – 50% of calibration midpoint	• Check solution • Dilute the sample • RX/RA • Report with NCM if RX/RA is not possible
• Retention Time	• Every Sample	• ± 30 sec of internal standards from ICV/CCV	• Inspect system for leaks • Perform maintenance • RXRA affected samples
• MDL	• Annual	• See SOP SF-QA-1218 current rev	• Perform MDL check if MDL was not run on instrument. MDL Check must be detectable. • RX/RA MDL

SW846 Method 8081A			
Quality Control	Frequency	Acceptance Criteria	Corrective Action
• Performance Evaluation Mix (PEM)	• Every 24 hours	• Endrin % Breakdown < 15 • DDT % Breakdown < 15	• Clip column • Replace glass "Y" • Replace guard column • Replace or wash analytical column(s)
• ICAL – Minimum of 5 points (6 points if quadratic) • Low cal point @ RL	• After initial instrument setup • As needed	• %RSD ≤ 20 • 1st or 2nd order not forced through zero, • r^2 > 0.990, r ≥ 0.995	• Evaluate • Perform maintenance • Remake standards • Recalibrate
• ICV (2nd source standard)	• After the ICAL[1]	• ± 15% of actual	• Evaluate • Remake standard • RA but not more than 2X (must have justification for rerunning ICV more than 2X) • Perform maintenance • Recalibrate
• CCV	• Run single peak std at the start, every 12 hours (may use the ICV as the CCV) and at end of sequence[1]	• ± 15% of actual	• Evaluate • Remake standard • RA but not more than 2X (must have justification for rerunning ICV more than 2X) • Perform maintenance • Recalibrate
• Method Blank	• 1 per batch of 20 samples	• < RL or per QAPP	• Check calculations • RA. If passes, report • No action if samples ND or ≥10X RL • RX/RA samples ≤ 10X RL • RX/RA Batch
• LCS/LCSD	• 1 per batch of 20 samples	• Within control limits	• Check calculations • Check solution, reprepare if necessary • RX/RA Batch
• MS/MSD	• 1 per batch of 20 samples	• Within control limits	• Check calculations • Is there objective evidence for the failure (heterogeneous sample, history, non-target analytes)

			• Flag and/or create NCM
• Surrogates	• Every sample	• Within control limits	• Check calculation • RX batch if surrogates fail in MB, LCS, LCSD • Field samples – If low and no evidence of matrix interference, RX. If high and sample ND, no action needed. If high and there is visible matrix interference, report with NCM. If high and no visible matrix interference, RX.
• MDL	• Annual	• See SOP SF-QA-1218 current revision	• Perform MDL check if MDL was not run on instrument. MDL Check must be detectable. • RX/RA MDL
• Retention Time Window Study	• Annual	• See SW846 Method 8000B	• Check system for leaks • Reset integration windows • Redo RT window study

1 QAPP may specify running after every 10 samples. Where no other requirements are present, this standard is run every 12 hours or 20 samples, whichever is less.

SW846 Method 8082			
Quality Control	Frequency	Acceptance Criteria	Corrective Action
• ICAL 1016/1260 – Minimum of 5 points (6 points if quadratic) • 1 point cal for the rest of aroclors • Low cal point @ RL	• After initial instrument setup • As needed	• %RSD ≤ 20 • 1st or 2nd order not forced through zero, • r^2 > 0.990, r ≥ 0.995	• Evaluate • Perform maintenance • Remake standards • Recalibrate
• ICV (2nd source standard)	• After the ICAL[1]	• ± 15% of actual	• Evaluate • Remake standard • RA but not more than 2X (must have justification for rerunning ICV more than 2X) • Perform maintenance • Recalibrate
• CCV	• Run at the start, every 12 hours (may use the ICV as the CCV) and at end of sequence[1]	• ± 15% of actual	• Evaluate • Remake standard • RA but not more than 2X (must have justification for rerunning ICV more than 2X) • Perform maintenance • Recalibrate
• Method Blank	• 1 per batch of 20 samples	• < RL or per QAPP	• Check calculations • RA. If passes, report • No action if samples ND or ≥10X RL • RX/RA samples ≤ 10X RL • RX/RA Batch
• LCS/LCSD	• 1 per batch of 20 samples	• Within control limits	• Check calculations • Check solution, reprepare if necessary • RX/RA Batch
• MS/MSD	• 1 per batch of 20 samples	• Within control limits	• Check calculations • Is there objective evidence for the failure (heterogeneous sample, history, non-target analytes) • Flag and/or create NCM
• Surrogates	• Every sample	• Within control limits	• Check calculation • RX batch if surrogates fail in MB, LCS, LCSD • Field samples – If low and no

			evidence of matrix interference, RX. If high and sample ND, no action needed. If high and there is visible matrix interference, report with NCM. If high and no visible matrix interference, RX.
• MDL	• Annual	• See SOP SF-QA-1218 current revision	• Perform MDL check if MDL was not run on instrument. MDL Check must be detectable. • RX/RA MDL
• Retention Time Window Study	• Annual	• See SW846 Method 8000B	• Check system for leaks • Reset integration windows • Redo RT window study

1 QAPP may specify running after every 10 samples. Where no other requirements are present, this standard is run every 12 hours or 20 samples, whichever is less.

SW846 Method 8015B – TPH			
Quality Control	Frequency	Acceptance Criteria	Corrective Action
• N-Alkane	• Every 24 hours	• C_9 and C_{36} still present • C_{40} present if client needs later carbon range	• Perform inlet maintenance
• ICAL – Minimum of 5 points (6 points if quadratic) • Low cal point @ RL	• After initial instrument setup or as needed	• %RSD ≤ 20 • 1^{st} or 2^{nd} order not forced through zero, • r^2 > 0.990, r ≥ 0.995	• Evaluate • Perform maintenance • Remake standards • Recalibrate
• ICV (2^{nd} source standard only for diesel)	• After the ICAL[1]	• ± 20% of actual	• Evaluate • Remake standard • RA but not more than 2X (must have justification for rerunning ICV more than 2X) • Perform maintenance • Recalibrate
• CCV	• Run Diesel, Motor Oil & PTP CCV every 12 hours and the end of the sequence[1]	• ± 20% of actual	• Evaluate • Remake standard • RA but not more than 2X (must have justification for rerunning ICV more than 2X) • Perform maintenance • Recalibrate
• Method Blank	• 1 per batch of 20 samples	• < RL or per QAPP	• Check calculations • RA. If passes, report • No action if samples ND or ≥10X RL • RX/RA Batch
• LCS/LCSD	• 1 per batch of 20 samples	• Within control limits	• Check calculations • Check solution, reprepare if necessary • RX/RA Batch
• MS/MSD	• 1 per batch of 20 samples	• Within control limits	• Check calculations • Is there objective evidence for the failure (heterogeneous sample, history, non-target analytes) • Flag and/or create NCM
• Surrogates	• Every sample	• Within control limits	• Check calculation

			• RX batch if surrogates fail in MB, LCS, LCSD • Field samples – If low and no evidence of matrix interference, RX. If high and sample ND, no action needed. If high and there is visible matrix interference, report with NCM. If high and no visible matrix interference, RX.
• Capric Acid	• Samples with Silica Gel Cleanup	• ≤ 5%	• RX samples
• MDL	• Annual	• See SOP SF-QA-1218 current revision	• Perform MDL check if MDL was not run on instrument. MDL Check must be detectable. • RX/RA MDL
• Retention Time Window Study	• Annual	• See SW846 Method 8000B	• Check system for leaks • Reset integration windows • Redo RT window study

1 QAPP may specify running after every 10 samples. Where no other requirements are present, this standard is run every 12 hours or 20 samples, whichever is less.

SW846 Method 8015B - Alcohols			
Quality Control	Frequency	Acceptance Criteria	Corrective Action
• ICAL – Minimum of 5 points (6 points if quadratic) • Low cal point @ RL	• After initial instrument setup • As needed	• %RSD ≤ 20 • 1st or 2nd order not forced through zero, • r^2 > 0.990, r ≥ 0.995	• Evaluate • Perform maintenance • Remake standards • Recalibrate
• ICV (2nd source standard)	• After the ICAL[1]	• ± 20% of actual	• Evaluate • Remake standard • RA but not more than 2X (must have justification for rerunning ICV more than 2X) • Perform maintenance • Recalibrate
• CCV	• Run at the start, every 12 hours (may use the ICV as the CCV) and at the end of the sequence[1]	• ± 20% of actual	• Evaluate • Remake standard • RA but not more than 2X (must have justification for rerunning ICV more than 2X) • Perform maintenance • Recalibrate
• Method Blank	• 1 per batch of 20 samples	• < RL or per QAPP	• Check calculations • RA. If passes, report • No action if samples ND or ≥10X RL • RX/RA samples ≤ 10X RL • RX/RA Batch
• LCS/LCSD	• 1 per batch of 20 samples	• Within control limits	• Check calculations • Check solution, reprepare if necessary • RX/RA Batch
• MS/MSD	• 1 per batch of 20 samples	• Within control limits	• Check calculations • Is there objective evidence for the failure (heterogeneous sample, history, non-target analytes) • Flag and/or create NCM
• Surrogates	• Every sample	• Within control limits	• Check calculation • RX batch if surrogates fail in MB, LCS, LCSD • Field samples – If low and no

			evidence of matrix interference, RX. If high and sample ND, no action needed. If high and there is visible matrix interference, report with NCM. If high and no visible matrix interference, RX.
• MDL	• Annual	• See SOP SF-QA-1218 current revision	• Perform MDL check if MDL was not run on instrument. MDL Check must be detectable. • RX/RA MDL
• Retention Time Window Study	• Annual	• See SW846 Method 8000B	• Check system for leaks • Reset integration windows • Redo RT window study

1 QAPP may specify running after every 10 samples. Where no other requirements are present, this standard is run every 12 hours or 20 samples, whichever is less.

RSK 175			
Quality Control	Frequency	Acceptance Criteria	Corrective Action
• ICAL – Minimum of 5 points (6 points if quadratic) • Low cal point @ RL	• After initial instrument setup • As needed	• %RSD ≤ 25 • 1st or 2nd order not forced through zero • r^2 > 0.990, r ≥ 0.995	• Evaluate • Perform maintenance • Remake standards • Recalibrate
• ICV (Using the same source as the ICAL but prepared by a different analyst)	• After the ICAL[1]	• ± 30% of actual	• Evaluate • Remake standard • RA but not more than 2X (must have justification for rerunning ICV more than 2X) • Perform maintenance • Recalibrate
• CCV	• Run at the start, every 10 samples and at the end of the sequence	• ± 30% of actual	• Evaluate • Remake standard • RA but not more than 2X (must have justification for rerunning ICV more than 2X) • Perform maintenance • Recalibrate
• Method Blank	• 1 per batch of 20 samples	• < RL or per QAPP	• Check calculations • RA. If passes, report • No action if samples ND or ≥10X RL • RX/RA samples ≤ 10X RL • RX/RA Batch
• LCS/LCSD	• 1 per batch of 20 samples	• Within control limits	• Check calculations • Check solution, reprepare if necessary • RX/RA Batch
• MS/MSD	• 1 per batch of 20 samples	• Within control limits	• Check calculations • Is there objective evidence for the failure (heterogeneous sample, history, non-target analytes) • Flag and/or create NCM
• MDL	• Annual	• See SOP SF-QA-1218 current revision	• RX/RA MDL
• Retention Time Window Study	• Annual	• See SW846 Method 8000B	• Check system for leaks • Reset integration windows • Redo RT window study

Oil & Grease (HEM) by Method 1664A			
Quality Control	Frequency	Acceptance Criteria	Corrective Action
• Balance Calibration	• Before Use	• ± 1%	• Ensure that balance indicator (bubble) is centered • Notify QA
• Method Blank	• 1 per batch of 20 samples	• < RL or per QAPP	• Check calculations • RA. If passes, report • RX/RA Batch
• LCS/LCSD	• 1 per batch of 20 samples	• Within control limits	• Check calculations • Check solution, reprepare if necessary • RX/RA Batch
• MS/MSD	• 1 per batch of 20 samples	• Within control limits	• Check calculations • Flag and/or create NCM
• MDL	• Annual	• See SOP SF-QA-1218 current revision	• RX/RA MDL

SW-846 Method 6010A			
Quality Control	Frequency	Acceptance Criteria	Corrective Action
• ICAL	• Daily	• Internal Standards Ratio • = 1 ± 50%	• Perform maintenance • Remake standards • Recalibrate
• ICV/CCV (2nd source standard)	• After the ICAL • Beginning, every 10 samples and at end of sequence	• ± 10% of actual	• Evaluate • Remake standard • RA but not more than 2X (must have justification for rerunning ICV more than 2X) • Perform maintenance • Recalibrate
• ICB/CCB	• Daily, after the ICV • End of sequence	• < RL	• Inspect instrument • Rerun ICAL and ICV
• CRI	• Daily, after the ICB	• ± 50%	• Inspect instrument • Rerun ICAL , ICV, ICB
• Linear Dynamic Range LDR • 0.1, 5, 10A, 10B, 50 ppm	• Daily	• ± 10%	• Can only report up to the highest linearity standard that passes. • Recalibrate
• Interference Check Standard AB	• Daily	• ± 20% of actual	• Check IEC Table • Rerun standard • If ICSAB still fails, create new IEC Table • Recalibrate
• Method Blank	• 1 per batch of 20 samples	• < RL or per QAPP	• Check calculations • RA. If passes, report • No action if samples ND or ≥10X RL • RX/RA samples ≤ 10X RL • RX/RA Batch
• LCS/LCSD	• 1 per batch of 20 samples	• 80 – 120 %	• Check calculations • Check solution, reprepare if necessary • RX/RA Batch
• MS/MSD	• 1 per batch of 20 samples	• 75 – 125 %	• Check calculations • Is there objective evidence for the failure (heterogeneous sample, history, non-target analytes) • Flag and/or create NCM

• MDL	• Annual	• See SOP SF-QA-1218 current revision	• Perform MDL check if MDL was not run on instrument. MDL Check must be detectable. • RX/RA MDL

EPA Method 200.7			
Quality Control	Frequency	Acceptance Criteria	Corrective Action
• ICAL	• Daily	• Internal Standards Ratio = 1 ± 50%	• Perform maintenance • Remake standards • Recalibrate
• ICV/CCV (2nd source standard)	• After the ICAL • Beginning, every 10 samples and at end of sequence	• ± 5% of actual	• Evaluate • Remake standard • RA but not more than 2X (must have justification for rerunning ICV more than 2X) • Perform maintenance • Recalibrate
• ICB/CCB	• Daily, after the ICV • End of sequence	• < RL	• Inspect instrument • Rerun ICAL and ICV
• CRI	• Daily, after the ICB	• ± 50%	• Inspect instrument • Rerun ICAL , ICV, ICB
• Linear Dynamic Range LDR • 0.1, 5, 10A, 10B, 50 ppm	• Daily	• > 90% of actual	• Can only report up to the highest linearity standard that passes. • Recalibrate • Results that are > 90% of passing LDR must be diluted and reanalyzed
• Interference Check Standard AB	• Daily	• ± 20% of actual	• Check IEC Table • Rerun standard • If ICSAB still fails, create new IEC Table • Recalibrate
• Method Blank	• 1 per batch of 20 samples	• < RL or per QAPP	• Check calculations • RA. If passes, report • No action if samples ND or ≥10X RL • RX/RA samples ≤ 10X RL • RX/RA Batch
• LCS/LCSD	• 1 per batch of 20 samples	• 85 – 115 %	• Check calculations • Check solution, reprepare if necessary • RX/RA Batch
• MS/MSD	• 2 per batch of 20 samples • each MS/MSD is performed on a	• 85 – 115 %	• Check calculations • Is there objective evidence for the

	different sample		failure (heterogeneous sample, history, non-target analytes) • Flag and/or create NCM
• MDL	• Annual	• See SOP SF-QA-1218 current revision	• Perform MDL check if MDL was not run on instrument. MDL Check must be detectable. • RX/RA MDL

SW-846 Method 7470A/7471A			
Quality Control	Frequency	Acceptance Criteria	Corrective Action
• ICAL – Minimum of 5 points (6 points if quadratic) • Low cal point @ RL	• Daily	• 1st or 2nd order not forced through zero • r^2 > 0.990, r ≥ 0.995	• Evaluate • Perform maintenance • Remake standards • Recalibrate
• ICV / CCV(2nd source standard)	• After the ICAL and before any samples are run • Every 10 samples and end of sequence	• ± 10% of actual	• Evaluate • Remake standard • RA but not more than 2X (must have justification for rerunning ICV more than 2X) • Perform maintenance • Recalibrate
• ICB / CCB	• Run ICB after ICV • Every 10 samples	• < RL or QAPP	• Replace instrument blank water
• CRDL	• 1 per batch of 20 samples or less	• ± 50% of actual	• Evaluate • Remake standard • Perform maintenance • Recalibrate
• Method Blank	• 1 per batch of 20 samples or less	• < RL or per QAPP	• Check calculations • RA. If passes, report • No action if samples ND or ≥10X RL • RX/RA samples ≤ 10X RL • RX/RA Batch
• LCS/LCSD	• 1 per batch of 20 samples or less	• Within control limits	• Check calculations • RA • RX/RA Batch
• MS/MSD	• 1 per batch of 20 samples or less for 7470A/7471A • 2 per batch of 20 samples or less for 245.1	• Within control limits	• Check calculations • Is there objective evidence for the failure (heterogeneous sample, history, non-target analytes) • Flag and/or create NCM
• MDL	• Annual	• See SOP SF-QA-1218 current revision	• Perform MDL check if MDL was not run on instrument. MDL Check must be detectable. • RX/RA MDL

Anions By Method 300.0			
Quality Control	Frequency	Acceptance Criteria	Corrective Action
• ICAL – Minimum of 5 points (6 points if quadratic) • Low cal point @ RL	• At initial setup or as needed	• 1^{st} or 2^{nd} order not forced through zero • r^2 > 0.990, r ≥ 0.995	• Evaluate • Perform maintenance • Remake standards • Recalibrate
• ICV / CCV (2^{nd} source standard)	• After the ICAL and before any samples are run • Every 10 samples • End of sequence	• ± 10% of actual	• Evaluate • Remake standard • RA but not more than 2X (must have justification for rerunning ICV more than 2X) • Perform maintenance • Recalibrate
• ICB / CCB	• Start of sequence • Every 10 samples • End of sequence	• < RL or QAPP	• Replace instrument blank water
• Method Blank	• 1 per batch of 20 samples	• < RL or per QAPP	• Check calculations • RA. If passes, report • No action if samples ND or ≥10X RL • RX/RA samples ≤ 10X RL • RX/RA Batch
• LCS/LCSD	• 1 per batch of 20 samples	• 90-110%	• Check calculations • RA • RX/RA Batch
• MS/MSD	• 1 per batch of 20 samples	• 80-120%	• Check calculations • Is there objective evidence for the failure (heterogeneous sample, history, non-target analytes) • Flag and/or create NCM
• MDL	• Annual	• See SOP SF-QA-1218 current revision	• RX/RA MDL
• Retention Time Window Study	• Annual	• See SW846 Method 8000B	• Check system for leaks • Reset integration windows • Redo RT window study

Ferrous Iron, Hexavalent Chromium			
Quality Control	Frequency	Acceptance Criteria	Corrective Action
• ICAL – Minimum of 5 points (6 points if quadratic) • Low cal point @ RL	• Daily	• 1st or 2nd order not forced through zero • r^2 > 0.990, r ≥ 0.995	• Evaluate • Remake standards • Recalibrate
• ICV / CCV (2nd source standard)	• After the ICAL (before ay samples are run) • Every 10 samples • End of sequence	• ± 10% of actual	• Evaluate • Remake standard • RA but not more than 2X (must have justification for rerunning ICV more than 2X) • Perform maintenance • Recalibrate
• ICB / CCB	• Run before any samples are run • Every 10 samples • End of sequence	• < RL or QAPP	• Replace instrument blank water
• Method Blank	• 1 per batch of 20 samples	• < RL or per QAPP	• Check calculations • No action if samples ND or ≥10X RL • RX samples ≤ 10X RL • RX Batch
• LCS/LCSD	• 1 per batch of 20 samples	• Within control limits	• Check calculations • RA • RX Batch
• MS/MSD	• 1 per batch of 20 samples	• Within control limits	• Check calculations • Is there objective evidence for the failure (heterogeneous sample, history, non-target analytes) • Flag and/or create NCM
• MDL	• Annual	• See SOP SF-QA-1218 current revision	• RX MDL

Total Organic Carbon			
Quality Control	Frequency	Acceptance Criteria	Corrective Action
• ICAL – Minimum of 5 points (6 points if quadratic) • Low cal point @ RL	• At initial setup or as needed	• 1st or 2nd order not forced through zero • r^2 > 0.990, r ≥ 0.995	• Evaluate • Perform maintenance • Recalibrate
• ICV (2nd source standard)	• After the ICAL • Every 10 samples	• ± 10% of actual	• Evaluate • Remake standard • RA but not more than 2X (must have justification for rerunning ICV more than 2X) • Recalibrate
• CCV	• Every 10 samples (may use the ICV as the CCV) • End of sequence	• ± 10% of actual	• Evaluate • Remake standard • RA but not more than 2X (must have justification for rerunning ICV more than 2X) • Recalibrate
• CCB	• Start off sequence • Every 10 samples • End of Sequence	• < RL or QAPP	• Replace instrument blank water
• Method Blank	• 1 per batch of 20 samples	• < RL or per QAPP	• Check calculations • RA. If passes, report • No action if samples ND or ≥10X RL • RX/RA samples ≤ 10X RL • RX/RA Batch
• LCS/LCSD	• 1 per batch of 20 samples	• Within control limits	• Check calculations • RA • RX/RA Batch
• MS/MSD	• 1 per batch of 20 samples	• Within control limits	• Check calculations • Is there objective evidence for the failure (heterogeneous sample, history, non-target analytes) • Flag and/or create NCM
• MDL	• Annual	• See SOP SF-QA-1218 current revision	• RX/RA MDL

Chemical Oxygen Demand			
Quality Control	Frequency	Acceptance Criteria	Corrective Action
• ICAL – Minimum of 5 points (6 points if quadratic) • Low cal point @ RL	• At initial setup or as needed	• 1st or 2nd order not forced through zero • r^2 > 0.990, r ≥ 0.995	• Evaluate • Remake standards • Recalibrate
• ICV/CCV (2nd source standard)	• After the ICAL • Every 20 samples • End of sequence	• ± 10% of actual	• Evaluate • Remake standard • RA but not more than 2X (must have justification for rerunning ICV more than 2X) • Recalibrate
• CCB/Method Blank	• Start of sequence • Every 20 samples • End of sequence	• < RL or QAPP	• Replace instrument blank water
• LCS/LCSD	• 1 per batch of 20 samples	• Within control limits	• Check calculations • RA • RX/RA Batch
• MS/MSD	• 1 per batch of 20 samples	• Within control limits	• Check calculations • Is there objective evidence for the failure (heterogeneous sample, history, non-target analytes) • Flag and/or create NCM
• MDL	• Annual	• See SOP SF-QA-1218 current revision	• RX/RA MDL

Alkalinity			
Quality Control	Frequency	Acceptance Criteria	Corrective Action
• Standardize pH meter using Buffer 4, 7, 10	• Daily	• No error message on pH meter indicating bad calibration	• Recalibrate
• pH 7	• After standardization	• ± 0.1 pH units	• Recalibrate
• CCV (1000 ug/mL)	• Start, every 10 samples and at end of sequence	• ± 10% of actual	• Evaluate • Remake standard • RA but not more than 2X (must have justification for rerunning ICV more than 2X) • Recalibrate
• CCB	• Start, every 10 samples and at end of sequence	• < RL or QAPP	• Check blank water • Recalibrate
• Method Blank	• 1 per batch of 20 samples	• < RL or per QAPP	• Check calculations • No action if samples ND or ≥10X RL • RX samples ≤ 10X RL • RX Batch
• LCS/LCSD	• 1 per batch of 20 samples	• Within control limits	• Check calculations • RA • RX Batch
• MDL	• Annual	• See SOP SF-QA-1218 current revision	• RX MDL

Conductivity			
Quality Control	Frequency	Acceptance Criteria	Corrective Action
• 1412 umho/cm Std	• Every 3 months or as needed whichever is more frequent	• After calibration, the 1412 umho/cm std should read exactly 1412 umho/cm.	• Recalibrate
• ICV/CCV • (1000 umho/cm)	• Start, every 10 samples, and end of sequence	• ± 10% of actual	• Recalibrate
• ICB/CCB	• Start, every 10 samples, and end of sequence	• < RL or QAPP	• Replace instrument blank water • Recalibrate
• Method Blank	• 1 per batch of 20 samples	• < RL or per QAPP	• No action if samples ND or ≥10X RL • RX samples ≤ 10X RL • RX Batch
• LCS/LCSD	• 1 per batch of 20 samples	• Within control limits	• Check calculations • RA • RX Batch
• MDL	• Annual	• See SOP SF-QA-1218 current revision	• RX MDL

Salinity			
Quality Control	Frequency	Acceptance Criteria	Corrective Action
• 1412 umho/cm Std (salinity = 0.7 ppth)	• Every 3 months or as needed whichever is more frequent	• After calibration, the 1412 umho/cm std should read exactly 1412 umho/cm.	• Recalibrate
• ICV/CCV • (1000 umho/cm = 0.5 ppth)	• Start, every 10 samples, and end of sequence	• ± 10% of actual	• Recalibrate
• ICB/CCB	• Start, every 10 samples, and end of sequence	• < RL or QAPP	• Replace instrument blank water • Recalibrate
• Method Blank	• 1 per batch of 20 samples	• < RL or per QAPP	• No action if samples ND or ≥10X RL • RX samples ≤ 10X RL • RX Batch
• LCS/LCSD (salinity = 31.99 ppth)	• 1 per batch of 20 samples	• Within control limits	• Check calculations • RA • RX Batch
• MDL	• Annual	• See SOP SF-QA-1218 current revision	• RX MDL

pH			
Quality Control	Frequency	Acceptance Criteria	Corrective Action
• Standardize pH meter using Buffer 4, 7, 10	• Daily	• No error message on pH meter indicating bad calibration	• Recalibrate
• ICV/CCV (pH 7 2nd source)	• Start, every 10 samples, and end of sequence	• ± 0.1 pH units	• Recalibrate
• CCB	• Start, every 10 samples, and end of sequence	• < RL or QAPP	• Replace instrument blank water • Recalibrate
• Method Blank	• 1 per batch of 20 samples	• < RL or per QAPP	• No action if samples ND or ≥10X RL • RX samples ≤ 10X RL • RX Batch
• LCS/LCSD	• 1 per batch of 20 samples	• Within control limits	• RA • RX Batch
• Sample Dup	• 1 per batch of 20 samples	• RPD = 1%	• RX Sample
• MDL	• Annual	• See SOP SF-QA-1218 current revision	• RX MDL

TSS, TDS			
Quality Control	Frequency	Acceptance Criteria	Corrective Action
• Balance Calibration	• Before use	• ± 1%	• Recalibrate
• Method Blank	• 1 per batch of 20 samples	• < RL or per QAPP	• No action if samples ND or ≥10X RL • RX samples ≤ 10X RL • RX Batch
• LCS/LCSD	• 1 per batch of 20 samples	• Within control limits	• RX Batch
• Sample Dup	• 1 per batch of 20 samples	• RPD = 20%	• RX Sample
• MDL	• Annual	• See SOP SF-QA-1218 current revision	• RX MDL

Total Residue, Settleable Solids			
Quality Control	Frequency	Acceptance Criteria	Corrective Action
• Balance Calibration	• Before use	• ± 1%	• Recalibrate
• Method Blank	• 1 per batch of 20 samples	• < RL or per QAPP	• No action if samples ND or ≥10X RL • RX samples ≤ 10X RL • RX Batch
• LCS/LCSD	• 1 per batch of 20 samples	• Within control limits	• RX Batch
• Sample Dup	• 1 per batch of 20 samples	• RPD = 20%	• RX Sample
• MDL	• Annual	• See SOP SF-QA-1218 current revision	• RX MDL

Appendix 5. Glossary/Acronyms

Glossary:

Acceptance Criteria:
Specified limits placed on characteristics of an item, process, or service defined in requirement documents. (ASQC)

Accreditation:

The process by which an agency or organization evaluates and recognizes a laboratory as meeting certain predetermined qualifications or standards, thereby accrediting the laboratory. In the context of the National Environmental Laboratory Accreditation Program (NELAP), this process is a voluntary one. (NELAC)

Accrediting Authority:
The Territorial, State, or Federal Agency having responsibility and accountability for environmental laboratory accreditation and which grants accreditation (NELAC) [1.5.2.3]

Accuracy:
The degree of agreement between an observed value and an accepted reference value. Accuracy includes a combination of random error (precision) and systematic error (bias) components which are due to sampling and analytical operations; a data quality indicator. (QAMS)

Analyst:
The designated individual who performs the “hands-on” analytical methods and associated techniques and who is the one responsible for applying required laboratory practices and other pertinent quality controls to meet the required level of quality. (NELAC)

Assessment:
The evaluation process used to measure or establish the performance, effectiveness, and conformance of an organization and/or its systems to defined criteria (to the standards and requirements of NELAC). (NELAC)

Assessment Criteria:
The measures established by NELAC and applied in establishing the extent to which an applicant is in conformance with NELAC requirements. (NELAC)

Assessment Team:
The group of people authorized to perform the on-site inspection and proficiency testing data evaluation required to establish whether an applicant meets the criteria for NELAP accreditation. (NELAC)

Assessor:
One who performs on-site assessments of accrediting authorities and laboratories’ capability and capacity for meeting NELAC requirements by examining the records and other physical evidence for each one of the tests for which accreditation has been requested. (NELAC)
Audit:

A systematic evaluation to determine the conformance to quantitative and qualitative specifications of some operational function or activity. (EPA-QAD)

Batch:
Environmental samples which are prepared and/or analyzed together with the same process and personnel, using the same lot(s) of reagents. A preparation batch is composed of one to 20 environmental samples of the same matrix, meeting the above mentioned criteria and with a maximum time between the start of processing of the first and last sample in the batch to be 24 hours. An analytical batch is composed of prepared environmental samples (extracts, digestates or concentrates) and /or those samples not requiring preparation, which are analyzed together as a group using the same calibration curve or factor. An analytical batch can include samples originating from various environmental matrices and can exceed 20 samples. (NELAC Quality Systems Committee)

Blank:
A sample that has not been exposed to the analyzed sample stream in order to monitor contamination during sampling, transport, storage or analysis. The blank is subjected to the usual analytical and measurement process to establish a zero baseline or background value and is sometimes used to adjust or correct routine analytical results. (ASQC)

Blind Sample:
A sample for analysis with a composition known to the submitter. The analyst/laboratory may know the identity of the sample but not its composition. It is used to test the analyst's or laboratory's proficiency in the execution of the measurement process.

Calibration:
To determine, by measurement or comparison with a standard, the correct value of each scale reading on a meter, instrument, or other device. The levels of the applied calibration standard should bracket the range of planned or expected sample measurements. (NELAC)

Calibration Curve:
The graphical relationship between the known values, such as concentrations, of a series of calibration standards and their instrument response. (NELAC)

Calibration Method:
A defined technical procedure for performing a calibration. (NELAC)

Calibration Standard:
A substance or reference material used to calibrate an instrument (QAMS)

Certified Reference Material (CRM):
A reference material one or more of whose property values are certified by a technically valid procedure, accompanied by or traceable to a certificate or other documentation which is issued by a certifying body. (ISO Guide 30–2.2)

Chain of Custody:
An unbroken trail of accountability that ensures the physical security of samples and includes the signatures of all who handle the samples. (NELAC) [5.12.4]

Clean Air Act:
The enabling legislation in 42 U>S>C> 7401 et seq., Public Law 91-604, 84 Stat. 1676 Pub. L. 95-95, 91 Stat., 685 and Pub. L. 95-190, 91 Stat., 1399, as amended, empowering EPA to promulgate air quality standards, monitor and enforce them. (NELAC)

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA/SUPERFUND):
The enabling legislation in 42 U.S.C. 9601-9675 et seq., as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), 42 U.S.C. 9601 et seq., to eliminate the health and environmental threats posed by hazardous waste sites. (NELAC)

Compromised Samples:
Those samples which are improperly sampled, insufficiently documented (chain of custody and other sample records and/or labels), improperly preserved, collected in improper containers, or exceeding holding times when delivered to a laboratory. Under normal conditions, compromised samples are not analyzed. If emergency situation require analysis, the results must be appropriately qualified. (NELAC)

Confidential Business Information (CBI):
Information that an organization designates as having the potential of providing a competitor with inappropriate insight into its management, operation or products. NELAC and its representatives agree to safeguarding identified CBI and to maintain all information identified as such in full confidentiality.

Confirmation:
Verification of the identity of a component through the use of an approach with a different scientific principle from the original method. These may include, but are not limited to:

Second column confirmation
Alternate wavelength
Derivatization
Mass spectral interpretation
Alternative detectors or
Additional Cleanup procedures

(NELAC)

Conformance:
An affirmative indication or judgement that a product or service has met the requirements of the relevant specifications, contract, or regulation; also the state of meeting the requirements. (ANSI/ASQC E4-1994)

Corrective Action:
The action taken to eliminate the causes of an existing nonconformity, defect or other undesirable situation in order to prevent recurrence. (ISO 8402)

Data Audit:

A qualitative and quantitative evaluation of the documentation and procedures associated with environmental measurements to verify that the resulting data re of acceptable quality (i.e., that they meet specified acceptance criteria). (NELAC)

Data Reduction:
The process of transforming raw data by arithmetic or statistical calculations, standard curves, concentration factors, etc., and collation into a more useable form. (EPA-QAD)

Deficiency:
An unauthorized deviation from acceptable procedures or practices, or a defect in an item. (ASQC)

Detection Limit:
The lowest concentration or amount of the target analyte that can be identified, measured, and reported with confidence that the analyte concentration is not a false positive value. See Method Detection Limit. (NELAC)

Document Control:
The act of ensuring that documents (and revisions thereto) are proposed, reviewed for accuracy, approved for release by authorized personnel, distributed properly, and controlled to ensure use of the correct version at the location where the prescribed activity if performed. (ASQC)

Duplicate Analyses:
The analyses or measurements of the variable of interest performed identically on two subsamples of the same sample. The results from duplicate analyses are used to evaluate analytical or measurement precision but not the precision of sampling, preservation or storage internal to the laboratory. (EPA-QAD)

Environmental Detection Limit (EDL):
The smallest level at which a radionuclide in an environmental medium can be unambiguously distinguished for a given confidence interval using a particular combination of sampling and measurement procedures, sample size, analytical detection limit, and processing procedure. The EDL shall be specified for the 0.95 or greater confidence interval. The EDL shall be established initially and verified annually for each test method and sample matrix. (NELAC Radioanalysis Subcommittee)

Equipment Blank:
Sample of analyte-free media which has been used to rinse common sampling equipment to check effectiveness of decontamination procedures. (NELAC)

External Standard Calibration:
Calibrations for methods that do not utilize internal standards to compensate for changes in instrument conditions.

Federal Insecticide, Fungicide and Rodenticide Act (FIFRA):
The enabling legislation under 7 U.S.C. 135 et seq., as amended, that empowers the EPA to register insecticides, fungicides, and rodenticides. (NELAC)

Federal Water Pollution Control Act (Clean Water Act, CWA):
The enabling legislation under 33 U.S.C. 1251 et seq., Public Law 92-50086 Stat 816, that empowers EPA to set discharge limitations, write discharge permits, monitor, and bring enforcement action for non-compliance. (NELAC)

Field Blank:
Blank prepared in the field by filing a clean container with pure de-ionized water and appropriate preservative, if any, for the specific sampling activity being undertaken (EPA OSWER)

Field of Testing:
NELAC's approach to accrediting laboratories by program, method and analyte. Laboratories requesting accreditation for a program-method-analyte combination or for an up-dated/improved method are required to submit to only that portion of the accreditation process not previously addressed (see NELAC, section 1.9ff). (NELAC)

Finding:
An assessment conclusion that identifies a condition having a significant effect on an item or activity. As assessment finding is normally a deficiency and is normally accompanied by specific examples of the observed condition. (NELAC)

Holding Times (Maximum Allowable Holding Times):
The maximum times that samples may be held prior to analyses and still be considered valid or not compromised. (40 CFR Part 136)

Inspection:
An activity such as measuring, examining, testing, or gauging one or more characteristics of an entity and comparing the results with specified requirements in order to establish whether conformance is achieved for each characteristic. (ANSI/ASQC E4-1994)

Internal Standard:
A known amount of standard added to a test portion of a sample and carried through the entire measurement process as a reference for evaluating and controlling the precision and bias of the applied analytical test method. (NELAC)

Internal Standard Calibration:
Calibrations for methods that utilize internal standards to compensate for changes in instrument conditions.

Instrument Blank:
A clean sample (e.g., distilled water) processed through the instrumental steps of the measurement process; used to determine instrument contamination. (EPA-QAD)

Instrument Response:
Instrument response is normally expressed as either peak area or peak height however it may also reflect a numerical representation of some type of count on a detector (e.g. Photomultiplier tube, or Diode array detector) and is used in this document to represent all types.

Laboratory:

A defined facility performing environmental analyses in a controlled and scientific manner. (NELAC)

Laboratory Control Sample (however named, such as laboratory fortified blank, spiked blank, or QC check sample):
A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes, taken through all preparation and analysis steps. Where there is no preparation taken for an analysis (such as in aqueous volatiles), or when all samples and standards undergo the same preparation and analysis process (such as Phosphorus), there is no LCS. It is generally used to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system.

An LCS shall be prepared at a minimum of 1 per batch of 20 or less samples per matrix type per sample extraction or preparation method except for analytes for which spiking solutions are not available such as total suspended solids, total dissolved solids, total volatile solids, total solids, pH, color, odor, temperature, dissolved oxygen or turbidity. The results of these samples shall be used to determine batch acceptance.

Note: NELAC standards allow a matrix spike to be used in place of this control as long as the acceptance criteria are as stringent as for the LCS. (NELAC)

Laboratory Duplicate:
Aliquots of a sample taken from the same container under laboratory conditions and processed and analyzed independently. (NELAC)

Least Squares Regression (1st Order Curve):
The least squares regression is a mathematical calculation of a straight line over two axes. The y axis represents the instrument response (or Response ratio) of a standard or sample and the x axis represents the concentration. The regression calculation will generate a correlation coefficient (r) that is a measure of the "goodness of fit" of the regression line to the data. A value of 1.00 indicates a perfect fit. In order to be used for quantitative purposes, r must be greater than or equal to 0.99 for organics and 0.995 for inorganics.

Limit of Detection (LOD):
An estimate of the minimum amount of a substance that an analytical process can reliably detect. An LOD is analyte- and matrix-specific and may be laboratory dependent. (Analytical Chemistry, 55, p.2217, December 1983, modified) See also Method Detection Limit.

Manager (however named):
The individual designed as being responsible for the overall operation, all personnel, and the physical plant of the environmental laboratory. A supervisor may report to the manager. In some cases, the supervisor and the manager may be the same individual. (NELAC)

Matrix:
The component or substrate that contains the analyte of interest. For purposes of batch and QC requirement determinations, the following matrix distinctions shall be used:

Aqueous: Any aqueous sample excluded from the definition of Drinking Water matrix or Saline/Estuarine source. Includes surface water, groundwater, effluents, and TCLP or other extracts.

Non-aqueous Liquid: any organic liquid with <15% settleable solids... it should read <15%.

Drinking Water: any aqueous sample that has been designated as a potable or potential potable water source.

Saline/Estuarine: any aqueous sample from an ocean or estuary, or other salt water source such as the Great Salt Lake.

Non-aqueous Liquid: any organic liquid with ,15% settleable solids.

Biological Tissue: any sample of a biological origin such as fish tissue, shellfish, or plant material. Such samples shall be grouped according to origin.

Solids: includes soils, sediments, sludges, and other matrices with >15% settleable solids.

Chemical Waste: a product or by-product of an industrial process that results in a matrix not previously defined.

Air: whole gas or vapor samples including those contained in flexible or rigid wall containers and the extracted concentrated analytes of interest from a gas or vapor that are collected with a sorbant tube, impinger solution, filter, or other device. (NELAC)

Matrix Spike (spiked sample or fortified sample):

Prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. Matrix spikes are used, for example, to determine the effect of the matrix on a method's recovery efficiency.

Matrix spikes shall be performed at a frequency of one in 20 samples per matrix type per sample extraction or preparation method except for analytes for which spiking solutions are not available such as, total suspended solids, total dissolved solids, total volatile solids, total solids, pH, color, odor, temperature, dissolved oxygen or turbidity. The selected sample(s) shall be rotated among client samples so that various matrix problems may be noted and/or addressed. Poor performance in a matrix spike may indicate a problem with the sample composition and shall be reported to the client whose sample was used for the spike. (QAMS)

Matrix Spike Duplicate (spiked sample or fortified sample duplicate):
A second replicate matrix spike is prepared in the laboratory and analyzed to obtain a measure of the precision of the recovery for each analyte.

Matrix spike duplicates or laboratory duplicates shall be analyzed at a minimum of 1 in 20 samples per matrix type per sample extraction or preparation method. The laboratory shall document their procedure to select the use of an appropriate type of duplicate. The selected sample(s) shall be rotated among client samples so that various matrix problems may be noted

and/or addressed. Poor performance in the duplicates may indicate a problem with the sample composition and shall be reported to the client whose sample was used for the duplicate. (QAMS)

Method Blank:
A sample of a matrix similar to the batch of associated samples (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences are present at concentrations that impact the analytical results for sample analyses. (NELAC)

Method Detection Limit:
The minimum concentration of a substance (an analyte) that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte. (40 CFR Part 136, Appendix B)

National Environmental Laboratory Accreditation Conference (NELAC):
A voluntary organization of State and Federal environmental officials and interest groups purposed primarily to establish mutually acceptable standards for accrediting environmental laboratories. A subset of NELAP. (NELAC)

National Environmental Laboratory Accreditation Program (NELAP):
The overall National Environmental Laboratory Accreditation Program of which NELAC is a part. (NELAC)

Negative Control:
Measures taken to ensure that a test, its components, or the environment do not cause undesired effects, or produce incorrect test results. (NELAC)

NELAC Standards:
The plan of procedures for consistently evaluating and documenting the ability of laboratories performing environmental measurements to meet nationally defined standards established by the National Environmental Laboratory Accreditation Conference. (NELAC)

Performance Audit:
The routine comparison of independently obtained qualitative and quantitative measurement system data with routinely obtained data in order to evaluate the proficiency of an analyst or laboratory. (NELAC)

Performance Based Measurement System (PBMS):
A set of processes wherein the data quality needs, mandates or limitations of a program or project are specified and serve as criteria for selecting appropriate test methods to meet those needs in a cost-effective manner. (NELAC)

Positive Control:
Measures taken to ensure that a test and/or its components are working properly and producing correct or expected results from positive test subjects. (NELAC)

Precision:

The degree to which a set of observations or measurements of the same property, obtained under similar conditions, conform to themselves; a data quality indicator. Precision is usually expressed as standard deviation, variance or range, in either absolute or relative terms. (NELAC)

Preservation:
Refrigeration and/or reagents added at the time of sample collection (or later) to maintain the chemical and/or biological integrity of the sample. (NELAC)

Proficiency Testing:
A means of evaluating a laboratory's performance under controlled conditions relative to a given set of criteria through analysis of unknown samples provided by an external source. (NELAC) [2.1]

Proficiency Testing Program:
The aggregate of providing rigorously controlled and standardized environmental samples to a laboratory for analysis, reporting of results, statistical evaluation of the results and the collective demographics and results summary of all participating laboratories. (NELAC)

Proficiency Test Sample (PT):
A sample, the composition of which is unknown to the analyst and is provided to test whether the analyst/laboratory can produce analytical results within specified acceptance criteria. (QAMS)

Quality Assurance:
An integrated system of activities involving planning, quality control, quality assessment, reporting and quality improvement to ensure that a product or service meets defined standards of quality with a stated level of confidence. (QAMS)

Quality Assurance [Project] Plan (QAPP):
A formal document describing the detailed quality control procedures by which the quality requirements defined for the data and decisions pertaining to a specific project are to be achieved. (EAP-QAD)

Quality Control:
The overall system of technical activities which purpose is to measure and control the quality of a product or service so that it meets the needs of users. (QAMS)

Quality Control Sample:
An uncontaminated sample matrix spiked with known amounts of analytes from a source independent from the calibration standards. It is generally used to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system. (EPA-QAD)

Quality Manual:
A document stating the management policies, objectives, principles, organizational structure and authority, responsibilities, accountability, and implementation of an agency, organization, or laboratory, to ensure the quality of its product and the utility of its product to its users. (NELAC)

Quality System:
A structured and documented management system describing the policies, objectives, principles, organizational authority, responsibilities, accountability, and implementation plan of an organization for ensuring quality in its work processes, products (items), and services. The quality system provides the framework for planning, implementing, and assessing work performed by the organization and for carrying out required QA and QC (ANSI/ASQC-E-41994)

Quantitation Limits:
The maximum or minimum levels, concentrations, or quantities of a target variable (e.g., target analyte) that can be quantified with the confidence level required by the data user. (NELAC)

Range:
The difference between the minimum and the maximum of a set of values. (EPA-QAD)

Reagent Blank (method reagent blank):
A sample consisting of reagent(s), without the target analyte or sample matrix, introduced into the analytical procedure at the appropriate point and carried through all subsequent steps to determine the contribution of the reagents and of the involved analytical steps. (QAMS)

Reference Material:
A material or substance one or more properties of which are sufficiently well established to be used for the calibration of an apparatus, the assessment of a measurement method, or for assigning values to materials. (ISO Guide 30-2.1)

Reference Method:
A method of known and documented accuracy and precision issued by an organization recognized as competent to do so. (NELAC)

Reference Standard:
A standard, generally of the highest metrological quality available at a given location, from which measurements made at that location are derived. (VIM-6.0-8)

Replicate Analyses:
The measurements of the variable of interest performed identically on two or more sub-samples of the same sample within a short time interval. (NELAC)

Requirement:
Denotes a mandatory specification; often designated by the term “shall”. (NELAC)

Resource Conservation and Recovery Act (RCRA):
The enabling legislation under 42 USC 321 et seq. (1976), that gives EPA the authority to control hazardous waste from the “cradle-to-grave”, including its generation, transportation, treatment, storage, and disposal. (NELAC)

Safe Drinking Water Act (SDWA):
The enabling legislation, 42 USC 300f et seq. (1974), (Public Law 93-523), that requires the EPA to protect the quality of drinking water in the U.S. by setting maximum allowable contaminant levels, monitoring, and enforcing violations. (NELAC)

Sample Duplicate:
Two samples taken from and representative of the same population and carried through all steps of the sampling and analytical procedures in an identical manner. Duplicate samples are used to assess variance of the total method including sampling and analysis. (EPA-QAD)

Second Order Polynomial Curve (Quadratic): The 2^{nd} order curves are a mathematical calculation of a slightly curved line over two axis. The y axis represents the instrument response (or Response ratio) of a standard or sample and the x axis represents the concentration. The 2^{nd} order regression will generate a coefficient of determination (COD or r^2) that is a measure of the "goodness of fit" of the quadratic curvature the data. A value of 1.00 indicates a perfect fit. In order to be used for quantitative purposes, r^2 must be greater than or equal to 0.99.

Selectivity:
(Analytical chemistry) the capability of a test method or instrument to respond to a target substance of constituent in the presence of non-target substances. (EPA-QAD)

Sensitivity:
The capability of a method or instrument to discriminate between measurement responses representing different levels (e.g., concentrations) of a variable of interest. (NELAC)

Spike:
A known mass of target analyte added to a blank, sample or sub-sample; used to determine recovery efficiency or for other quality control purposes.

If the mandated or requested test method does not specify the spiking components, the laboratory shall spike all reportable components to be reported in the Laboratory Control Sample and Matrix Spike. However, in cases where the components interfere with accurate assessment (such as simultaneously spiking chlordane, toxaphene and PCBs in Method 608), the test method has an extremely long list of components or components are incompatible, a representative number (at a minimum 10%) of the listed components may be used to control the test method. The selected components of each spiking mix shall represent all chemistries, elution patterns and masses permit specified analytes and other client requested components. However, the laboratory shall ensure that all reported components are used in the spike mixture within a two-year time period.. (NELAC)

Standard:
The document describing the elements of laboratory accreditation that has been developed and established within the consensus principles of NELAC and meets the approval requirements of NELAC procedures and policies. (ASQC)

Standard Operating Procedures (SOPs):
A written document which details the method of an operation, analysis, or action whose techniques and procedures are thoroughly prescribed and which is accepted as the method for performing certain routine or repetitive tasks. (QAMS)

Standardized Reference Material (SRM):

A certified reference material produced by the U.S. National Institute of Standards and Technology or other equivalent organization and characterized for absolute content, independent of analytical method. (EPA-QAD)

Supervisor (however named):
The individual(s) designated as being responsible for a particular area or category of scientific analysis. This responsibility includes direct day-to-day supervision of technical employees, supply and instrument adequacy and upkeep, quality assurance/quality control duties, and ascertaining that technical employees have the required balance of education, training and experience to perform the required analyses. (NELAC)

Surrogate:
A substance with properties that mimic the analyte of interest. It is unlikely to be found in environment samples and is added to them for quality control purposes.

Surrogate compounds must be added to all samples, standards, and blanks, for all organic chromatography methods except when the matrix precludes its use or when a surrogate is not available. Poor surrogate recovery may indicate a problem with sample composition and shall be reported to the client whose sample produced poor recovery. (QAMS)

Systems Audit (also Technical Systems Audit):
A thorough, systematic, qualitative on-site assessment of the facilities, equipment, personnel, training, procedures, record keeping, data validation, data management, and reporting aspects of a total measurement system. (EPA-QAD)

Technical Director:
Individuals(s) who has overall responsibility for the technical operation of the environmental testing laboratory. (NELAC)

Test:
A technical operation that consists of the determination of one or more characteristics or performance of a given product, material, equipment, organism, physical phenomenon, process, or service according to a specified procedure. The result of a test is normally recorded in a document sometimes called a test report or a test certificate. (ISO/IEC Guide 2-12.1, amended)

Test Method:
An adoption of a scientific technique for a specific measurement problem, as documented in a laboratory SOP. (NELAC)

Toxic Substances Control Act (TSCA):
The enabling legislation in 15 USC 2601 et seq., (1976) that provides for testing, regulating, and screening all chemicals produced or imported into the United States for possible toxic effects prior to commercial manufacture. (NELAC)

Traceability:
The property of a result of a measurement whereby it can be related to appropriate standards, generally international or national standards, through an unbroken chain of comparisons. (VIM-6.12)

Uncertainty:
A parameter associated with the result of a measurement that characterizes the dispersion of the value that could reasonably be attributed to the measured value.

United States Environmental Protection Agency (EPA):
The Federal governmental agency with responsibility for protecting public health and safeguarding and improving the natural environment (i.e., the air, water, and land) upon which human life depends. (US-EPA)

Validation:
The process of substantiating specified performance criteria. (EPA-QAD)

Verification:
Confirmation by examination and provision of evidence that specified requirements have been met. (NELAC)

NOTE: In connection with the management of measuring equipment, verification provides a means for checking that the deviations between values indicated by a measuring instrument and corresponding known values of a measured quantity are consistently smaller than the maximum allowable error defined in a standard, regulation or specification peculiar to the management of the measuring equipment.

The result of verification leads to a decision either to restore in service, to perform adjustment, to repair, to downgrade, or to declare obsolete. In all cases, it is required that a written trace of the verification performed shall be kept on the measuring instrument's individual record.

Work Cell:
A well-defined group of analysts that together perform the method analysis. The members of the group and their specific functions within the work cell must be fully documented. (NELAC)

Acronyms:

BS – Blank Spike
BSD – Blank Spike Duplicate
CAR – Corrective Action Report
CCV – Calibration Verification
CF – Calibration Factor
CFR – Code of Federal Regulations
COC – Chain of Custody
CRS – Change Request Form
DOC – Demonstration of Capability
DQO – Data Quality Objectives
DU – Duplicate
DUP - Duplicate
EHS – Environment, Health and Safety
EPA – Environmental Protection Agency
GC - Gas Chromatography
GC/MS - Gas Chromatography/Mass Spectrometry
HPLC - High Performance Liquid Chromatography
ICP - Inductively Coupled Plasma Atomic Emission Spectroscopy
ICV – Initial Calibration Verification
IDL – Instrument Detection Limit
IH – Industrial Hygiene
IS – Internal Standard
LCS – Laboratory Control Sample
LCSD – Laboratory Control Sample Duplicate
LIMS – Laboratory Information Management System
MDL – Method Detection Limit
MS – Matrix Spike
MSD – Matrix Spike Duplicate
MSDS - Material Safety Data Sheet
NELAC - National Environmental Laboratory Accreditation Conference
NELAP - National Environmental Laboratory Accreditation Program
PT – Performance Testing
QAM – Quality Assurance Manual
QA/QC – Quality Assurance / Quality Control
QAPP – Quality Assurance Project Plan
RF – Response Factor
RPD – Relative Percent Difference
RSD – Relative Standard Deviation
SD – Standard Deviation
SOP: Standard Operating Procedure
TAT – Turn-Around-Time
VOA – Volatiles
VOC – Volatile Organic Compound

Appendix 6.

Laboratory Certifications, Accreditations, Validations

TestAmerica San Francisco maintains certifications, accreditations, certifications, and validations with numerous state and national entities. Programs vary but may include on-site audits, reciprocal agreements with another entity, performance testing evaluations, review of the QA Manual, Standard Operating Procedures, Method Detection Limits, training records, etc. At the time of this QA Manual revision, the laboratory has accreditation/certification/licensing with the following organizations:

Organization	Certificate Number	Organization	Certificate Number
CA ELAP	2496		

The certificates and parameter lists (which may differ) for each organization may be found on the corporate web site, the laboratory's public server, the final report review table, and in the following offices: QA, marketing, and project management.

Claims of Accreditation Status

TestAmerica San Francisco has agreed to make only valid claims as to its accreditation/certification status by any authority by ensuring that the expiration dates are not exceeded and the method-specific scope or parameter lists are supportable, as required by each. Any false claims would be reported to that authority. The agreement covers the use of the authority's name, such as "Authority-Accredited," logo, or certificate number. The only valid proof of accreditation/certification is the current certificate and scope of the authority. It is the responsibility of the laboratory to make these documents available to all staff, and it is the staff's duty to reference only the current documents.

A report with scope and non-scope analytes may only be presented on the same report if the non-accredited results are clearly and unambiguously identified. No report with non-scope analytes may be associated with the logo, “Authority accredited” phrase, or the certificate number. Only the analytes specified by a unique method are valid within the scope. There shall be no intentional misleading of the users of the laboratory’s services in this regard.

No opinions and/or interpretations based on results outside the laboratory’s scope may be presented on a document referenced by “Authority-accredited, the logo, or the certificate number. If these are made, they must be written in a separate letter which is not endorsed by the authority.

The “Authority-accredited” logo may only be affixed to equipment calibrated by a laboratory that is accredited by the authority. If calibration labels contain the logo, they must also show the calibration laboratory’s name or its certificate number, the instrument’s unique identification, the date of the last calibration, and a cross-reference to the last calibration certificate.

Should the company decide to use the “Authority-accredited” logo in marketing activities, no misrepresentation may occur. Only reference to the accredited scope at a specific laboratory site is allowed. If any “Authority-accredited” language is used in proposals or quotations, any non-scope analytes must be clearly denoted as not accredited by that authority. The same is true for any use of laboratory letterhead with the “Authority-accredited” wording or logo. The logo may not be affixed to any material, item, product, part, or packaging, thereby implying accreditation status to that piece. In literature, any use of the logo must be positioned adjacent to the accredited laboratory’s name and clearly state that the presence of the logo does not imply certification/approval of the products tested. At no time may the logo appear to suggest that a person is accredited. Misrepresentation of accreditation status is never allowed and must be reported if it occurs. If in doubt, the idea of the logo’s use may be presented to the authority for approval.

If accreditation is terminated or suspended, the laboratory will immediately cease to use the “Authority-accredited” wording, the logo, or the certificate number reference in any way and inform clients impacted by the change.

Appendix 7. Data Qualifiers

Flag	Flag Description	Condition
*	ISTD response or retention time outside acceptable limits	ISTD Area High
*	ISTD response or retention time outside acceptable limits	ISTD Area Low
*	ISTD response or retention time outside acceptable limits	ISTD RT Fail
*	LCS, LCSD, MS, MSD, SD or Surrogate exceeds the control limits	Duplicate RPD
*	LCS, LCSD, MS, MSD, SD or Surrogate exceeds the control limits	LCS Rec Hi
*	LCS, LCSD, MS, MSD, SD or Surrogate exceeds the control limits	LCS Rec Low
*	LCS, LCSD, MS, MSD, SD or Surrogate exceeds the control limits	LCS Recovery
*	LCS, LCSD, MS, MSD, SD or Surrogate exceeds the control limits	LCSD High
*	LCS, LCSD, MS, MSD, SD or Surrogate exceeds the control limits	LCSD Low
*	LCS, LCSD, MS, MSD, SD or Surrogate exceeds the control limits	LCSD Percent RPD
*	LCS, LCSD, MS, MSD, SD or Surrogate exceeds the control limits	LCSD Recovery
*	LCS, LCSD, MS, MSD, SD or Surrogate exceeds the control limits	MS Rec Hi
*	LCS, LCSD, MS, MSD, SD or Surrogate exceeds the control limits	MS Rec Low
*	LCS, LCSD, MS, MSD, SD or Surrogate exceeds the control limits	MS Recovery
*	LCS, LCSD, MS, MSD, SD or Surrogate exceeds the control limits	MSD Rec HI
*	LCS, LCSD, MS, MSD, SD or Surrogate exceeds the control limits	MSD Rec Low
*	LCS, LCSD, MS, MSD, SD or Surrogate exceeds the control limits	MSD Recovery
*	LCS, LCSD, MS, MSD, SD or Surrogate exceeds the control limits	MSD RPD
*	LCS, LCSD, MS, MSD, SD or Surrogate exceeds the control limits	SD Recovery
*	LCS, LCSD, MS, MSD, SD or Surrogate exceeds the control limits	SUR Rec Hi
*	LCS, LCSD, MS, MSD, SD or Surrogate exceeds the control limits	SUR Rec Low
*	LCS, LCSD, MS, MSD, SD or Surrogate exceeds the control limits	Surrogate Recovery
*	SD: Serial dilution exceeds the control limits.	SD Recovery
+	MSA correlation coefficient is less than 0.995.	MSA CC < 0.995
<	Not detected at or above the reporting limit	Not Detected
^	ICV,CCV,ICB,CCB, ISA, ISB, CRI, CRA or MRL standard: Instrument related QC exceeds the control limits.	CCB Result Detected
^	ICV,CCV,ICB,CCB, ISA, ISB, CRI, CRA or MRL standard: Instrument related QC exceeds the control limits.	CCV Rec Hi

^	ICV,CCV,ICB,CCB, ISA, ISB, CRI, CRA or MRL standard: Instrument related QC exceeds the control limits.	CCV Rec Low
^	ICV,CCV,ICB,CCB, ISA, ISB, CRI, CRA or MRL standard: Instrument related QC exceeds the control limits.	CRA Fail
^	ICV,CCV,ICB,CCB, ISA, ISB, CRI, CRA or MRL standard: Instrument related QC exceeds the control limits.	CRA recovery high
^	ICV,CCV,ICB,CCB, ISA, ISB, CRI, CRA or MRL standard: Instrument related QC exceeds the control limits.	CRA recovery low
^	ICV,CCV,ICB,CCB, ISA, ISB, CRI, CRA or MRL standard: Instrument related QC exceeds the control limits.	CRI Fail
^	ICV,CCV,ICB,CCB, ISA, ISB, CRI, CRA or MRL standard: Instrument related QC exceeds the control limits.	CRI Recovery High
^	ICV,CCV,ICB,CCB, ISA, ISB, CRI, CRA or MRL standard: Instrument related QC exceeds the control limits.	CRI Recovery Low
^	ICV,CCV,ICB,CCB, ISA, ISB, CRI, CRA or MRL standard: Instrument related QC exceeds the control limits.	ICB Result Detected
^	ICV,CCV,ICB,CCB, ISA, ISB, CRI, CRA or MRL standard: Instrument related QC exceeds the control limits.	ICSA Recovery High
^	ICV,CCV,ICB,CCB, ISA, ISB, CRI, CRA or MRL standard: Instrument related QC exceeds the control limits.	ICSA Recovery Low
^	ICV,CCV,ICB,CCB, ISA, ISB, CRI, CRA or MRL standard: Instrument related QC exceeds the control limits.	ICSAB Recovery High
^	ICV,CCV,ICB,CCB, ISA, ISB, CRI, CRA or MRL standard: Instrument related QC exceeds the control limits.	ICSAB Recovery Low
^	ICV,CCV,ICB,CCB, ISA, ISB, CRI, CRA or MRL standard: Instrument related QC exceeds the control limits.	ICSB Recovery
^	ICV,CCV,ICB,CCB, ISA, ISB, CRI, CRA or MRL standard: Instrument related QC exceeds the control limits.	ICV Rec Hi
^	ICV,CCV,ICB,CCB, ISA, ISB, CRI, CRA or MRL standard: Instrument related QC exceeds the control limits.	ICV Rec LOW
^	ICV,CCV,ICB,CCB, ISA, ISB, CRI, CRA or MRL standard: Instrument related QC exceeds the control limits.	ISCA Recovery
^	ICV,CCV,ICB,CCB, ISA, ISB, CRI, CRA or MRL standard: Instrument related QC exceeds the control limits.	MRL Fail Low
4	MS, MSD: The analyte present in the original sample is 4 times greater than the matrix spike concentration; therefore, control limits are not applicable.	Analyte 4X MS
A	The tentatively identified compound is a suspected aldol-condensation product.	Aldol Condensation
B	Compound was found in the blank and sample.	PB Result Detected
b	Result Detected in the USB	USB Result Detected
C	Pesticide identification was confirmed by GC/MS.	Confirmed GCMS
D	Surrogate or matrix spike recoveries were not obtained because the extract was diluted for analysis; also compounds analyzed at a dilution may be flagged with a D.	From a Dilution
E	Result exceeded calibration range, secondary dilution required.	Off scale high
E	The reported value is estimated because of the presence of interference based on serial dilution analysis.	SD Recovery
F	Duplicate RPD exceeds the control limit	Duplicate RPD
g	Result fails applicable drinking water standards	Other - refer to flag

h	Alternate peak selection upon analytical review.	Alternate Peak Selected
H	Sample was prepped or analyzed beyond the specified holding time	Sample Analyzed out of HT
H	Sample was prepped or analyzed beyond the specified holding time	Sample Prepped out of HT
HF	Field parameter with a holding time of 15 minutes	Sample HT is Immediate and is flagged.
I	Indicates the presence of an interference, recovery is not calculated.	Not Reported - Interference
J	Indicates an Estimated Value for TICs	Estimated Result TIC -Manual Flag
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.	Estimated Result
L	A negative instrument reading lower than the absolute value of the reporting limit	Negative Reading < ABS(RL)
N	MS, MSD: Spike recovery exceeds upper or lower control limits.	MS Rec Hi
N	MS, MSD: Spike recovery exceeds upper or lower control limits.	MS Rec Low
N	MS, MSD: Spike recovery exceeds upper or lower control limits.	MSD Rec HI
N	MS, MSD: Spike recovery exceeds upper or lower control limits.	MSD Rec Low
N	This flag indicates the presumptive evidence of a compound.	Presumptive Evidence
ND	Compound not detected.	Not Detected
P	The lower of the two values is reported when the % difference between the results of two GC columns is greater than 40%	Dual Column RPD over 40%
Q	Result was qualitatively confirmed, but not quantitated.	Presented but not quantitated
R	The instrument was not calibrated for this compound. A non-detect indicates that the characteristic ions were not present and the compound was not qualitatively identified. No controls were present to determine either sample preparation efficiency or the instrument sensitivity for the compound. As a result, the limit of detection is not known and the reported concentrations are estimates.	Analyte Qualitatively Screened For
S	Result was determined by the Method of Standard Additions	Result Determined by MSA
s	SCB Recovery High	Seed Control Blank Rec Hi
s	SCB Recovery Low	Seed Control Blank Rec Lo
T	Result is a tentatively identified compound (TIC) and an estimated value.	Tentatively Identified Compound
U	Indicates the analyte was analyzed for but not detected.	Below Lower Limit
U	Indicates the analyte was analyzed for but not detected.	Not Detected
W	PS: Post-digestion spike was outside control limits	Post Spike Hi
W	PS: Post-digestion spike was outside control limits	Post Spike Low
Y	The chromatographic response resembles a typical fuel pattern.	Resembles Fuel Pattern
Z	The chromatographic response does not resemble a typical fuel pattern.	Does Not Resemble Fuel Pattern

APPENDIX B

CALIFORNIA STATE

ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM BRANCH

CERTIFICATE OF ENVIRONMENTAL ACCREDITATION

Is hereby granted to

TESTAMERICA SAN FRANCISCO

SAN FRANCISCO

1220 QUARRY LANE

PLEASANTON, CA 94566

Scope of the certificate is limited to the
"Fields of Testing"
which accompany this Certificate.

Continued accredited status depends on successful completion of on-site, proficiency testing studies, and payment of applicable fees.

This Certificate is granted in accordance with provisions of Section 100825, et seq. of the Health and Safety Code.

Certificate No.: **2705**

Expiration Date: **06/30/2010**

Effective Date: **07/01/2008**

Richmond, California
subject to forfeiture or revocation

George C. Kulasingam, Ph.D., Chief
Environmental Laboratory Accreditation Program Branch

CALIFORNIA DEPARTMENT OF PUBLIC HEALTH
ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM
Accredited Fields of Testing

TESTAMERICA SAN FRANCISCO
SAN FRANCISCO
1220 QUARRY LANE
PLEASANTON, CA 94566

Lab Phone (925) 484-1919

Certificate No: 2705 **Renew Date: 06/30/2010**

Field of Testing: 102 - Inorganic Chemistry of Drinking Water

102.030	001	Bromide	EPA 300.0
102.030	003	Chloride	EPA 300.0
102.030	005	Fluoride	EPA 300.0
102.030	006	Nitrate	EPA 300.0
102.030	007	Nitrite	EPA 300.0
102.030	010	Sulfate	EPA 300.0
102.045	001	Perchlorate	EPA 314.0
102.100	001	Alkalinity	SM2320B
102.120	001	Hardness	SM2340B
102.130	001	Conductivity	SM2510B
102.140	001	Total Dissolved Solids	SM2540C
102.150	001	Chloride	SM4110B
102.150	002	Fluoride	SM4110B
102.150	003	Nitrate	SM4110B
102.150	004	Nitrite	SM4110B
102.150	006	Sulfate	SM4110B
102.163	001	Chlorine, Free and Total	SM4500-Cl G
102.240	001	Phosphate, Ortho	SM4500-P E
102.270	001	Surfactants	SM5540C
102.520	001	Calcium	EPA 200.7
102.520	002	Magnesium	EPA 200.7
102.520	003	Potassium	EPA 200.7
102.520	004	Silica	EPA 200.7
102.520	005	Sodium	EPA 200.7
102.520	006	Hardness (calc.)	EPA 200.7

Field of Testing: 103 - Toxic Chemical Elements of Drinking Water

103.130	001	Aluminum	EPA 200.7
103.130	003	Barium	EPA 200.7
103.130	004	Beryllium	EPA 200.7
103.130	005	Cadmium	EPA 200.7
103.130	007	Chromium	EPA 200.7
103.130	008	Copper	EPA 200.7
103.130	009	Iron	EPA 200.7
103.130	011	Manganese	EPA 200.7
103.130	012	Nickel	EPA 200.7

As of 06/25/2009 , this list supersedes all previous lists for this certificate number.
Customers: Please verify the current accreditation standing with the State.

103.130	015	Silver	EPA 200.7
103.130	017	Zinc	EPA 200.7
103.130	018	Boron	EPA 200.7
103.160	001	Mercury	EPA 245.1
103.310	001	Chromium (VI)	EPA 218.6

Field of Testing: 104 - Volatile Organic Chemistry of Drinking Water

104.040	000	Volatile Organic Compounds	EPA 524.2
104.040	001	Benzene	EPA 524.2
104.040	007	n-Butylbenzene	EPA 524.2
104.040	008	sec-Butylbenzene	EPA 524.2
104.040	009	tert-Butylbenzene	EPA 524.2
104.040	010	Carbon Tetrachloride	EPA 524.2
104.040	011	Chlorobenzene	EPA 524.2
104.040	015	2-Chlorotoluene	EPA 524.2
104.040	016	4-Chlorotoluene	EPA 524.2
104.040	019	1,3-Dichlorobenzene	EPA 524.2
104.040	020	1,2-Dichlorobenzene	EPA 524.2
104.040	021	1,4-Dichlorobenzene	EPA 524.2
104.040	022	Dichlorodifluoromethane	EPA 524.2
104.040	023	1,1-Dichloroethane	EPA 524.2
104.040	024	1,2-Dichloroethane	EPA 524.2
104.040	025	1,1-Dichloroethene	EPA 524.2
104.040	026	cis-1,2-Dichloroethene	EPA 524.2
104.040	027	trans-1,2-Dichloroethene	EPA 524.2
104.040	028	Dichloromethane	EPA 524.2
104.040	029	1,2-Dichloropropane	EPA 524.2
104.040	033	cis-1,3-Dichloropropene	EPA 524.2
104.040	034	trans-1,3-Dichloropropene	EPA 524.2
104.040	035	Ethylbenzene	EPA 524.2
104.040	037	Isopropylbenzene	EPA 524.2
104.040	039	Naphthalene	EPA 524.2
104.040	041	N-propylbenzene	EPA 524.2
104.040	042	Styrene	EPA 524.2
104.040	044	1,1,2,2-Tetrachloroethane	EPA 524.2
104.040	045	Tetrachloroethene	EPA 524.2
104.040	046	Toluene	EPA 524.2
104.040	048	1,2,4-Trichlorobenzene	EPA 524.2
104.040	049	1,1,1-Trichloroethane	EPA 524.2
104.040	050	1,1,2-Trichloroethane	EPA 524.2
104.040	051	Trichloroethene	EPA 524.2
104.040	052	Trichlorofluoromethane	EPA 524.2
104.040	054	1,2,4-Trimethylbenzene	EPA 524.2
104.040	055	1,3,5-Trimethylbenzene	EPA 524.2

104.040	056	Vinyl Chloride	EPA 524.2
104.040	057	Xylenes, Total	EPA 524.2
104.045	001	Bromodichloromethane	EPA 524.2
104.045	002	Bromoform	EPA 524.2
104.045	003	Chloroform	EPA 524.2
104.045	004	Dibromochloromethane	EPA 524.2
104.045	005	Trihalomethanes	EPA 524.2
104.050	002	Methyl tert-butyl Ether (MTBE)	EPA 524.2
104.050	004	tert-Amyl Methyl Ether (TAME)	EPA 524.2
104.050	005	Ethyl tert-butyl Ether (ETBE)	EPA 524.2
104.050	006	Trichlorotrifluoroethane	EPA 524.2
104.050	007	tert-Butyl Alcohol (TBA)	EPA 524.2
104.050	008	Carbon Disulfide	EPA 524.2
104.050	009	Methyl Isobutyl Ketone	EPA 524.2

Field of Testing: 108 - Inorganic Chemistry of Wastewater

108.090	001	Residue, Volatile	EPA 160.4
108.110	001	Turbidity	EPA 180.1
108.112	001	Boron	EPA 200.7
108.112	002	Calcium	EPA 200.7
108.112	003	Hardness (calc.)	EPA 200.7
108.112	004	Magnesium	EPA 200.7
108.112	005	Potassium	EPA 200.7
108.112	007	Sodium	EPA 200.7
108.120	001	Bromide	EPA 300.0
108.120	002	Chloride	EPA 300.0
108.120	003	Fluoride	EPA 300.0
108.120	004	Nitrate	EPA 300.0
108.120	005	Nitrite	EPA 300.0
108.120	006	Nitrate-nitrite	EPA 300.0
108.120	008	Sulfate	EPA 300.0
108.265	001	Phosphorus, Total	EPA 365.3
108.323	001	Chemical Oxygen Demand	EPA 410.4
108.381	001	Oil and Grease	EPA 1664A
108.390	001	Turbidity	SM2130B
108.410	001	Alkalinity	SM2320B
108.420	001	Hardness (calc.)	SM2340B
108.430	001	Conductivity	SM2510B
108.440	001	Residue, Total	SM2540B
108.441	001	Residue, Filterable	SM2540C
108.442	001	Residue, Non-filterable	SM2540D
108.443	001	Residue, Settleable	SM2540F
108.465	001	Chlorine	SM4500-Cl G
108.490	001	pH	SM4500-H+ B

108.531	001	Dissolved Oxygen	SM4500-O G
108.541	001	Phosphorus, Total	SM4500-P E
108.590	001	Biochemical Oxygen Demand	SM5210B
108.591	001	Carbonaceous BOD	SM5210B
108.602	001	Chemical Oxygen Demand	SM5220D
108.640	001	Surfactants	SM5540C
108.720	001	Dissolved Oxygen	ASTM D888-92A

Field of Testing: 109 - Toxic Chemical Elements of Wastewater

109.010	001	Aluminum	EPA 200.7
109.010	002	Antimony	EPA 200.7
109.010	003	Arsenic	EPA 200.7
109.010	004	Barium	EPA 200.7
109.010	005	Beryllium	EPA 200.7
109.010	007	Cadmium	EPA 200.7
109.010	009	Chromium	EPA 200.7
109.010	010	Cobalt	EPA 200.7
109.010	011	Copper	EPA 200.7
109.010	012	Iron	EPA 200.7
109.010	013	Lead	EPA 200.7
109.010	015	Manganese	EPA 200.7
109.010	016	Molybdenum	EPA 200.7
109.010	017	Nickel	EPA 200.7
109.010	019	Selenium	EPA 200.7
109.010	021	Silver	EPA 200.7
109.010	023	Thallium	EPA 200.7
109.010	024	Tin	EPA 200.7
109.010	026	Vanadium	EPA 200.7
109.010	027	Zinc	EPA 200.7
109.104	001	Chromium (VI)	EPA 218.6
109.190	001	Mercury	EPA 245.1
109.825	001	Iron	SM3500-Fe D (18th/19th)

Field of Testing: 110 - Volatile Organic Chemistry of Wastewater

110.040	040	Halogenated Hydrocarbons	EPA 624
110.040	041	Aromatic Compounds	EPA 624
110.040	042	Oxygenates	EPA 624
110.040	043	Other Volatile Organics	EPA 624

Field of Testing: 111 - Semi-volatile Organic Chemistry of Wastewater

111.101	032	Polynuclear Aromatic Hydrocarbons	EPA 625
111.101	034	Phthalates	EPA 625
111.101	036	Other Extractables	EPA 625
111.273	001	Oil and Grease	EPA 1664A

Field of Testing: 114 - Inorganic Chemistry of Hazardous Waste

114.010	001	Antimony	EPA 6010B
114.010	002	Arsenic	EPA 6010B
114.010	003	Barium	EPA 6010B
114.010	004	Beryllium	EPA 6010B
114.010	005	Cadmium	EPA 6010B
114.010	006	Chromium	EPA 6010B
114.010	007	Cobalt	EPA 6010B
114.010	008	Copper	EPA 6010B
114.010	009	Lead	EPA 6010B
114.010	010	Molybdenum	EPA 6010B
114.010	011	Nickel	EPA 6010B
114.010	012	Selenium	EPA 6010B
114.010	013	Silver	EPA 6010B
114.010	014	Thallium	EPA 6010B
114.010	015	Vanadium	EPA 6010B
114.010	016	Zinc	EPA 6010B
114.103	001	Chromium (VI)	EPA 7196A
114.106	001	Chromium (VI)	EPA 7199
114.140	001	Mercury	EPA 7470A
114.141	001	Mercury	EPA 7471A
114.240	001	Corrosivity - pH Determination	EPA 9040B
114.241	001	Corrosivity - pH Determination	EPA 9045C

Field of Testing: 115 - Extraction Test of Hazardous Waste

115.020	001	Toxicity Characteristic Leaching Procedure (TCLP)	EPA 1311
115.030	001	Waste Extraction Test (WET)	CCR Chapter11, Article 5, Appendix II

Field of Testing: 116 - Volatile Organic Chemistry of Hazardous Waste

116.020	031	Ethanol and Methanol	EPA 8015B
116.080	000	Volatile Organic Compounds	EPA 8260B
116.080	120	Oxygenates	EPA 8260B
116.100	001	Total Petroleum Hydrocarbons - Gasoline	LUFT GC/MS
116.100	010	BTEX and MTBE	LUFT GC/MS

Field of Testing: 117 - Semi-volatile Organic Chemistry of Hazardous Waste

117.010	001	Diesel-range Total Petroleum Hydrocarbons	EPA 8015B
117.110	000	Extractable Organics	EPA 8270C
117.210	000	Organochlorine Pesticides	EPA 8081A
117.220	000	PCBs	EPA 8082

Field of Testing: 120 - Physical Properties of Hazardous Waste

120.070	001	Corrosivity - pH Determination	EPA 9040B
120.080	001	Corrosivity - pH Determination	EPA 9045C

APPENDIX C

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 6010B Metals (Soil & Waste)
TestAmerica San Francisco

Type: CRI **Created:** 10/3/2007 5:07:00PM **Active:** 1/1/2007 5:07:12PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Ag		50	150		%
Al		50	150		%
As		50	150		%
Au		50	150		%
B		50	150		%
Ba		50	150		%
Be		50	150		%
Ca		50	150		%
Cd		50	150		%
Co		50	150		%
Cr		50	150		%
Cu		50	150		%
Fe		50	150		%
K		50	150		%
Mg		50	150		%
Mn		50	150		%
Mo		50	150		%
Na		50	150		%
Ni		50	150		%
Pb		50	150		%
Sb		50	150		%
Sc (IS)		50	150		%
Se		50	150		%
Si		50	150		%
Sn		50	150		%
Sr		50	150		%
Ti		50	150		%
Tl		50	150		%
V		50	150		%
Y		50	150		%
Zn		50	150		%

Type: CVREC **Created:** 10/3/2007 5:07:00PM **Active:** 1/2/2007 5:07:24PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Zn		90	110		%
Y		90	110		%
V		90	110		%
Tl		90	110		%
Ti		90	110		%
Sr		90	110		%
Sn		90	110		%
Si		90	110		%
Se		90	110		%
Sc (IS)		90	110		%
Sb		90	110		%
Pb		90	110		%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 6010B Metals (Soil & Waste)
TestAmerica San Francisco

Type: CVREC **Created:** 10/3/2007 5:07:00PM **Active:** 1/2/2007 5:07:24PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Ni		90	110		%
Na		90	110		%
Mo		90	110		%
Mn		90	110		%
Mg		90	110		%
K		90	110		%
Fe		90	110		%
Cu		90	110		%
Cr		90	110		%
Co		90	110		%
Cd		90	110		%
Ca		90	110		%
Be		90	110		%
Ba		90	110		%
B		90	110		%
Au		90	110		%
As		90	110		%
Al		90	110		%
Ag		90	110		%

Type: DLCK **Created:** 2/15/2008 3:03:00PM **Active:** 10/1/2007 3:02:47PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Ag		10	200		%
Al		10	200		%
As		10	200		%
Au		10	200		%
B		10	200		%
Ba		10	200		%
Be		10	200		%
Ca		10	200		%
Cd		10	200		%
Co		10	200		%
Cr		10	200		%
Cu		10	200		%
Fe		10	200		%
K		10	200		%
Mg		10	200		%
Mn		10	200		%
Mo		10	200		%
Na		10	200		%
Ni		10	200		%
Pb		10	200		%
Sb		10	200		%
Sc (IS)		10	200		%
Se		10	200		%
Sn		10	200		%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 6010B Metals (Soil & Waste)
TestAmerica San Francisco

Type: DLCK **Created:** 2/15/2008 3:03:00PM **Active:** 10/1/2007 3:02:47PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Sr		10	200		%
Ti		10	200		%
Si		10	200		%
Tl		10	200		%
V		10	200		%
Y		10	200		%
Zn		10	200		%

Type: ICSABREC **Created:** 10/3/2007 5:08:00PM **Active:** 1/1/2007 5:07:37PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Zn		80	120		%
Y		80	120		%
V		80	120		%
Tl		80	120		%
Ti		80	120		%
Sn		80	120		%
Sr		80	120		%
Se		80	120		%
Si		80	120		%
Sc (IS)		80	120		%
Sb		80	120		%
Pb		80	120		%
Ni		80	120		%
Mo		80	120		%
Na		80	120		%
Mn		80	120		%
Mg		80	120		%
K		80	120		%
Fe		80	120		%
Cu		80	120		%
Cr		80	120		%
Co		80	120		%
Cd		80	120		%
Ca		80	120		%
Be		80	120		%
Ba		80	120		%
B		80	120		%
Au		80	120		%
As		80	120		%
Ag		80	120		%
Al		80	120		%

Type: ICSARL **Created:** 10/27/2008 2:48:00PM **Active:** 1/1/2008 2:51:23PM **Exp:**
Initial Prep: 1 **Unit:** mL **Final Prep:** 50 **Unit:** mL **Fac:** 50

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 6010B Metals (Soil & Waste)
TestAmerica San Francisco

Type: ICSARL **Created:** 10/27/2008 2:48:00PM **Active:** 1/1/2008 2:51:23PM **Exp:**
Initial Prep: 1 **Unit:** mL **Final Prep:** 50 **Unit:** mL **Fac:** 50

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Al	2				NONE
Ag	2				NONE
As	2				NONE
Au	2				NONE
B	2				NONE
Ba	2				NONE
Be	2				NONE
Ca	2				NONE
Cd	2				NONE
Co	2				NONE
Cr	2				NONE
Cu	2				NONE
Fe	2				NONE
K	2				NONE
Mg	2				NONE
Mn	2				NONE
Na	2				NONE
Mo	2				NONE
Ni	2				NONE
Pb	2				NONE
Sb	2				NONE
Sc (IS)					NONE
Si	2				NONE
Se	2				NONE
Sr	2				NONE
Sn	2				NONE
Ti	2				NONE
Tl	2				NONE
V	2				NONE
Y					NONE
Zn	2				NONE

Type: ICVHREC **Created:** 2/15/2008 3:04:00PM **Active:** 10/1/2007 3:04:25PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Zn		95	105		%
Y		95	105		%
V		95	105		%
Tl		95	105		%
Ti		95	105		%
Sn		95	105		%
Sr		95	105		%
Se		95	105		%
Si		95	105		%
Sc (IS)		95	105		%
Sb		95	105		%
Pb		95	105		%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 6010B Metals (Soil & Waste)
TestAmerica San Francisco

Type: ICVHREC **Created:** 2/15/2008 3:04:00PM **Active:** 10/1/2007 3:04:25PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Ni		95	105		%
Mo		95	105		%
Na		95	105		%
Mn		95	105		%
Mg		95	105		%
K		95	105		%
Fe		95	105		%
Cu		95	105		%
Cr		95	105		%
Co		95	105		%
Cd		95	105		%
Ca		95	105		%
Be		95	105		%
Ba		95	105		%
B		95	105		%
Au		95	105		%
As		95	105		%
Ag		95	105		%
Al		95	105		%

Type: ICVREC **Created:** 10/3/2007 5:08:00PM **Active:** 1/1/2007 5:07:49PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Al		90	110		%
Ag		90	110		%
Au		90	110		%
As		90	110		%
B		90	110		%
Ba		90	110		%
Be		90	110		%
Ca		90	110		%
Cd		90	110		%
Co		90	110		%
Cr		90	110		%
Fe		90	110		%
Cu		90	110		%
K		90	110		%
Mg		90	110		%
Mn		90	110		%
Mo		90	110		%
Na		90	110		%
Ni		90	110		%
Pb		90	110		%
Sb		90	110		%
Sc (IS)		90	110		%
Si		90	110		%
Se		90	110		%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 6010B Metals (Soil & Waste)
TestAmerica San Francisco

Type: ICVREC **Created:** 10/3/2007 5:08:00PM **Active:** 1/1/2007 5:07:49PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Sr		90	110		%
Sn		90	110		%
Ti		90	110		%
Tl		90	110		%
V		90	110		%
Y		90	110		%
Zn		90	110		%

Type: LCSREC **Created:** 1/9/2008 4:26:00PM **Active:** 1/10/2008 1:54:16PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Zn		80	120		%
Y					%
V		80	120		%
Tl		80	120		%
Ti		80	120		%
Sn		80	120		%
Sr					%
Se		80	120		%
Si		80	120		%
Sc (IS)					%
Sb		80	120		%
Pb		80	120		%
Ni		80	120		%
Na		80	120		%
Mo		80	120		%
Mn		80	120		%
Mg		80	120		%
K		80	120		%
Fe		80	120		%
Cr		80	120		%
Cu		80	120		%
Co		80	120		%
Cd		80	120		%
Ca		80	120		%
Be		80	120		%
Ba		80	120		%
B		80	120		%
As		80	120		%
Au		80	120		%
Ag		80	120		%
Al		80	120		%

Type: LCSRPD **Created:** 6/22/2005 12:42:00PM **Active:** 6/27/2005 5:32:25PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 6010B Metals (Soil & Waste)
TestAmerica San Francisco

Type: LCSRPD **Created:** 6/22/2005 12:42:00PM **Active:** 6/27/2005 5:32:25PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Ag				20	%
Au				20	%
Al				20	%
As				20	%
B				20	%
Ba				20	%
Be				20	%
Ca				20	%
Calcium hardness as calcium					%
Cd				20	%
Co				20	%
Cu				20	%
Cr				20	%
Hardness as calcium carbonate				20	%
Fe				20	%
K				20	%
Mg				20	%
Mn				20	%
Mo				20	%
Na				20	%
Ni				20	%
Pb				20	%
Sb				20	%
Sc (IS)				20	%
Si				20	%
Se				20	%
Sr				20	%
Sn				20	%
Ti				20	%
Tl				20	%
Y				20	%
V				20	%
Zn				20	%

Type: LSRMRC **Created:** 1/10/2008 1:57:00PM **Active:** 1/10/2008 2:05:00PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Zn		62	110		%
Y					%
V		67	123		%
Ti		60	120		%
Tl		64	124		%
Sn		60	120		%
Sr					%
Se		63	126		%
Si		60	120		%
Sc (IS)					%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 6010B Metals (Soil & Waste)
TestAmerica San Francisco

Type: LSRMRC **Created:** 1/10/2008 1:57:00PM **Active:** 1/10/2008 2:05:00PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Pb		62	113		%
Sb		11	101		%
Ni		65	117		%
Na		69	127		%
Mo		62	128		%
Mn		63	116		%
Mg		65	117		%
K		54	107		%
Fe		55	126		%
Cr		67	121		%
Cu		68	126		%
Co		64	133		%
Cd		67	118		%
Ca		69	105		%
Be		56	102		%
Ba		61	117		%
B		60	120		%
As		69	119		%
Au		60	120		%
Al		36	135		%
Ag		51	130		%

Type: MDL **Created:** 6/22/2005 12:42:00PM **Active:** 6/27/2005 5:33:40PM **Exp:**
Initial Prep: 1 **Unit:** g **Final Prep:** 50 **Unit:** mL **Fac:** 50

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Ag	0.0076				mg/Kg
Al	0.2843				mg/Kg
Au	1.0				mg/Kg
As	0.083				mg/Kg
B	0.0139				mg/Kg
Ba	0.0044				mg/Kg
Be	0.0009				mg/Kg
Ca	0.4521				mg/Kg
Calcium hardness as calcium					mg/Kg
Cd	0.0059				mg/Kg
Co	0.0086				mg/Kg
Cu	0.0689				mg/Kg
Cr	0.0222				mg/Kg
Fe	1.0746				mg/Kg
Hardness as calcium carbonate					mg/Kg
K	13.7				mg/Kg
Mg	0.437				mg/Kg
Mn	0.0315				mg/Kg
Mo	0.0085				mg/Kg
Na	1.56				mg/Kg
Ni	0.0503				mg/Kg
Sb	0.0547				mg/Kg

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 6010B Metals (Soil & Waste)
TestAmerica San Francisco

Type: MDL **Created:** 6/22/2005 12:42:00PM **Active:** 6/27/2005 5:33:40PM **Exp:**
Initial Prep: 1 **Unit:** g **Final Prep:** 50 **Unit:** mL **Fac:** 50

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Pb	0.0288				mg/Kg
Sc (IS)					mg/Kg
Si	1.0				mg/L
Se	0.0453				mg/Kg
Sr	0.0082				mg/Kg
Sn	1.0				mg/L
Tl	0.0759				mg/Kg
Ti	1.0				mg/L
V	0.0068				mg/Kg
Y					mg/Kg
Zn	0.2228				mg/Kg

Type: MDRPD **Created:** 3/14/2008 3:49:00PM **Active:** 3/1/2008 3:48:45PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Zn				20	%
Y				20	%
V				20	%
Ti				20	%
Tl				20	%
Sn				20	%
Sr				20	%
Se				20	%
Si				20	%
Sc (IS)				20	%
Pb				20	%
Sb				20	%
Ni				20	%
Na				20	%
Mo				20	%
Mn				20	%
Mg				20	%
K				20	%
Fe				20	%
Cr				20	%
Cu				20	%
Co				20	%
Cd				20	%
Ca				20	%
Be				20	%
B				20	%
Ba				20	%
As				20	%
Au				20	%
Al				20	%
Ag				20	%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 6010B Metals (Soil & Waste)
TestAmerica San Francisco

Type: MRLREC **Created:** 2/15/2008 3:06:00PM **Active:** 9/1/2007 3:06:06PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Ag		95	105		%
Al		95	105		%
Au		95	105		%
As		95	105		%
Ba		95	105		%
B		95	105		%
Be		95	105		%
Ca		95	105		%
Cd		95	105		%
Co		95	105		%
Cu		95	105		%
Cr		95	105		%
Fe		95	105		%
K		95	105		%
Mg		95	105		%
Mn		95	105		%
Mo		95	105		%
Na		95	105		%
Ni		95	105		%
Sb		95	105		%
Pb		95	105		%
Sc (IS)		95	105		%
Si		95	105		%
Se		95	105		%
Sr		95	105		%
Sn		95	105		%
Tl		95	105		%
Ti		95	105		%
V		95	105		%
Y		95	105		%
Zn		95	105		%

Type: MSREC **Created:** 6/22/2005 12:42:00PM **Active:** 6/27/2005 5:33:46PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Zn		75	125		%
Y					%
V		75	125		%
Ti		75	125		%
Tl		75	125		%
Sn		75	125		%
Sr		75	125		%
Se		75	125		%
Si		75	125		%
Sc (IS)					%
Pb		75	125		%
Sb		75	125		%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 6010B Metals (Soil & Waste)
TestAmerica San Francisco

Type: MSREC **Created:** 6/22/2005 12:42:00PM **Active:** 6/27/2005 5:33:46PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Ni		75	125		%
Na		75	125		%
Mo		75	125		%
Mn		75	125		%
Mg		75	125		%
K		75	125		%
Hardness as calcium carbonate		75	125		%
Fe		75	125		%
Cr		75	125		%
Cu		75	125		%
Co		75	125		%
Cd		75	125		%
Calcium hardness as calcium		75	125		%
Ca		75	125		%
Be		75	125		%
B		75	125		%
Ba		75	125		%
As		75	125		%
Au		75	125		%
Al		75	125		%
Ag		75	125		%

Type: MSRPD **Created:** 6/22/2005 12:42:00PM **Active:** 6/27/2005 5:34:19PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Ag				20	%
Al				20	%
Au				20	%
As				20	%
Ba				20	%
B				20	%
Be				20	%
Ca				20	%
Calcium hardness as calcium					%
Cd				20	%
Co				20	%
Cu				20	%
Cr				20	%
Fe				20	%
Hardness as calcium carbonate				20	%
K				20	%
Mg				20	%
Mn				20	%
Mo				20	%
Na				20	%
Ni				20	%
Sb				20	%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 6010B Metals (Soil & Waste)
TestAmerica San Francisco

Type: MSRPD **Created:** 6/22/2005 12:42:00PM **Active:** 6/27/2005 5:34:19PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Pb				20	%
Sc (IS)				20	%
Se				20	%
Si				20	%
Sr				20	%
Sn				20	%
Tl				20	%
Ti				20	%
V				20	%
Y				20	%
Zn				20	%

Type: PDS **Created:** 2/15/2008 3:07:00PM **Active:** 9/1/2007 3:07:10PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Zn		75	125		%
Y		75	125		%
V		75	125		%
Ti		75	125		%
Tl		75	125		%
Sn		75	125		%
Sr		75	125		%
Si		75	125		%
Se		75	125		%
Sc (IS)		75	125		%
Pb		75	125		%
Sb		75	125		%
Ni		75	125		%
Na		75	125		%
Mo		75	125		%
Mn		75	125		%
Mg		75	125		%
K		75	125		%
Fe		75	125		%
Cr		75	125		%
Cu		75	125		%
Co		75	125		%
Cd		75	125		%
Ca		75	125		%
Be		75	125		%
B		75	125		%
Ba		75	125		%
As		75	125		%
Au		75	125		%
Al		75	125		%
Ag		75	125		%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 6010B Metals (Soil & Waste)
TestAmerica San Francisco

Type: RL **Created:** 6/22/2005 12:46:00PM **Active:** 6/27/2005 5:34:57PM **Exp:**
Initial Prep: 1 **Unit:** g **Final Prep:** 50 **Unit:** mL **Fac:** 50

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Ag	0.2				mg/Kg
Al	2.0				mg/Kg
Au	1.0				mg/L
As	0.2				mg/Kg
Ba	0.2				mg/Kg
B	25				mg/Kg
Be	0.1				mg/Kg
Ca	2.0				mg/Kg
Cd	0.1				mg/Kg
Calcium hardness as calcium					mg/Kg
Co	0.1				mg/Kg
Cu	1.0				mg/Kg
Cr	0.5				mg/Kg
Fe	2.0				mg/Kg
K	40				mg/Kg
Hardness as calcium carbonate					mg/Kg
Mg	2.0				mg/Kg
Mn	0.5				mg/Kg
Mo	0.5				mg/Kg
Na	10				mg/Kg
Ni	0.5				mg/Kg
Sb	0.4				mg/Kg
Pb	0.2				mg/Kg
Sc (IS)					mg/Kg
Se	0.25				mg/Kg
Si	1.0				mg/L
Sr	1.0				mg/Kg
Sn	1.0				mg/L
Tl	0.2				mg/Kg
Ti	1.0				mg/L
V	0.2				mg/Kg
Y					mg/Kg
Zn	1.0				mg/Kg

Type: S1 **Created:** 2/15/2008 3:01:00PM **Active:** 11/1/2007 3:01:13PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Zn		95	105		%
Y		95	105		%
V		95	105		%
Ti		95	105		%
Tl		95	105		%
Sn		95	105		%
Sr		95	105		%
Si		95	105		%
Se		95	105		%
Sc (IS)		95	105		%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 6010B Metals (Soil & Waste)
TestAmerica San Francisco

Type: S1 **Created:** 2/15/2008 3:01:00PM **Active:** 11/1/2007 3:01:13PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Pb		95	105		%
Sb		95	105		%
Ni		95	105		%
Na		95	105		%
Mo		95	105		%
Mg		95	105		%
Mn		95	105		%
K		95	105		%
Fe		95	105		%
Cu		95	105		%
Co		95	105		%
Cr		95	105		%
Cd		95	105		%
Ca		95	105		%
Be		95	105		%
B		95	105		%
Ba		95	105		%
As		95	105		%
Au		95	105		%
Al		95	105		%
Ag		95	105		%

Type: S2 **Created:** 2/15/2008 3:02:00PM **Active:** 10/1/2007 3:01:50PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Ag		95	105		%
Al		95	105		%
Au		95	105		%
As		95	105		%
Ba		95	105		%
B		95	105		%
Be		95	105		%
Ca		95	105		%
Cd		95	105		%
Cr		95	105		%
Co		95	105		%
Cu		95	105		%
Fe		95	105		%
K		95	105		%
Mn		95	105		%
Mg		95	105		%
Mo		95	105		%
Na		95	105		%
Ni		95	105		%
Sb		95	105		%
Pb		95	105		%
Sc (IS)		95	105		%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 6010B Metals (Soil & Waste)
TestAmerica San Francisco

Type: S2 **Created:** 2/15/2008 3:02:00PM **Active:** 10/1/2007 3:01:50PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Se		95	105		%
Si		95	105		%
Sr		95	105		%
Sn		95	105		%
Tl		95	105		%
Ti		95	105		%
V		95	105		%
Y		95	105		%
Zn		95	105		%

Type: SD **Created:** 7/1/2008 1:04:00PM **Active:** 1/1/2008 1:03:47PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Zn				10	%
Y				10	%
V				10	%
Ti				10	%
Tl				10	%
Sn				10	%
Sr				10	%
Si				10	%
Se				10	%
Sc (IS)				10	%
Pb				10	%
Sb				10	%
Ni				10	%
Na				10	%
Mo				10	%
Mg				10	%
Mn				10	%
K				10	%
Fe				10	%
Cu				10	%
Co				10	%
Cr				10	%
Cd				10	%
Ca				10	%
Be				10	%
B				10	%
Ba				10	%
As				10	%
Au				10	%
Al				10	%
Ag				10	%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 6010B Metals (Soil & Waste)
TestAmerica San Francisco

Type: XMDL **Created:** 6/22/2009 2:09:00PM **Active:** 6/22/2009 2:09:37PM **Exp:**
Initial Prep: 1 **Unit:** mL **Final Prep:** 1 **Unit:** mL **Fac:** 1

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Ag	0.0076				mg/Kg
Al	0.2843				mg/Kg
Au	1.0				mg/Kg
As	0.083				mg/Kg
Ba	0.0044				mg/Kg
B	0.0139				mg/Kg
Be	0.0009				mg/Kg
Ca	0.4521				mg/Kg
Co	0.0086				mg/Kg
Cd	0.0059				mg/Kg
Cu	0.0689				mg/Kg
Cr	0.0222				mg/Kg
Fe	1.0746				mg/Kg
Mg	0.437				mg/Kg
K	13.7				mg/Kg
Mo	0.0085				mg/Kg
Mn	0.0315				mg/Kg
Na	1.56				mg/Kg
Ni	0.0503				mg/Kg
Pb	0.0288				mg/Kg
Sc (IS)					mg/Kg
Sb	0.0547				mg/Kg
Si	1.0				mg/L
Se	0.0453				mg/Kg
Sn	1.0				mg/L
Sr	0.0082				mg/Kg
Tl	0.0759				mg/Kg
Ti	1.0				mg/L
V	0.0068				mg/Kg
Y					mg/Kg
Zn	0.2228				mg/Kg

Type: XRL **Created:** 6/22/2009 2:13:00PM **Active:** 6/22/2009 2:13:55PM **Exp:**
Initial Prep: 1 **Unit:** mL **Final Prep:** 1 **Unit:** mL **Fac:** 1

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Zn	1.0				mg/Kg
Y					mg/Kg
V	0.2				mg/Kg
Ti	1.0				mg/Kg
Tl	0.2				mg/Kg
Sr	1.0				mg/Kg
Sn	1.0				mg/Kg
Si	1.0				mg/Kg
Sc (IS)					mg/Kg
Se	0.4				mg/Kg
Pb	0.2				mg/Kg
Sb	0.4				mg/Kg

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 6010B Metals (Soil & Waste)
TestAmerica San Francisco

Type: XRL **Created:** 6/22/2009 2:13:00PM **Active:** 6/22/2009 2:13:55PM **Exp:**
Initial Prep: 1 **Unit:** mL **Final Prep:** 1 **Unit:** mL **Fac:** 1

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Ni	0.5				mg/Kg
Mo	0.5				mg/Kg
Na	10				mg/Kg
Mg	2.0				mg/Kg
Mn	0.5				mg/Kg
Fe	2.0				mg/Kg
K	40				mg/Kg
Cu	1.0				mg/Kg
Co	0.1				mg/Kg
Cr	0.5				mg/Kg
Cd	0.1				mg/Kg
Be	0.1				mg/Kg
Ca	2.0				mg/Kg
B	25				mg/Kg
Ba	0.2				mg/Kg
As	2.0				mg/Kg
Au	1.0				mg/Kg
Ag	0.2				mg/Kg
Al	2.0				mg/Kg

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 6010B Metals (Total Water)
TestAmerica San Francisco

Type: CRI **Created:** 6/25/2008 2:11:00PM **Active:** 1/1/2008 2:10:53PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Mn		50	150		%
Mo		50	150		%
Au		50	150		%
Ag		50	150		%
Co		50	150		%
Ni		50	150		%
Ca		50	150		%
Al		50	150		%
Si		50	150		%
Mg		50	150		%
Se		50	150		%
Sb		50	150		%
Zn		50	150		%
V		50	150		%
K		50	150		%
Tl		50	150		%
Cu		50	150		%
Cr		50	150		%
As		50	150		%
Fe		50	150		%
Sc (IS)		50	150		%
Y		50	150		%
Cd		50	150		%
Na		50	150		%
Ba		50	150		%
Sr		50	150		%
B		50	150		%
Be		50	150		%
Pb		50	150		%
Ti		50	150		%
Sn		50	150		%

Type: CVREC **Created:** 10/3/2007 4:56:00PM **Active:** 1/1/2007 4:55:36PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Mn		90	110		%
Mo		90	110		%
Au		90	110		%
Ag		90	110		%
Co		90	110		%
Ni		90	110		%
Ca		90	110		%
Al		90	110		%
Si		90	110		%
Mg		90	110		%
Se		90	110		%
Sb		90	110		%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 6010B Metals (Total Water)
TestAmerica San Francisco

Type: CVREC **Created:** 10/3/2007 4:56:00PM **Active:** 1/1/2007 4:55:36PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Zn		90	110		%
V		90	110		%
K		90	110		%
Tl		90	110		%
Cu		90	110		%
Cr		90	110		%
As		90	110		%
Fe		90	110		%
Sc (IS)		90	110		%
Y		90	110		%
Cd		90	110		%
Na		90	110		%
Ba		90	110		%
Sr		90	110		%
B		90	110		%
Be		90	110		%
Pb		90	110		%
Ti		90	110		%
Sn		90	110		%

Type: ICSABREC **Created:** 9/21/2007 3:43:00PM **Active:** 1/8/2007 3:42:46PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Mn		80	120		%
Mo		80	120		%
Au		80	120		%
Ag		80	120		%
Co		80	120		%
Ni		80	120		%
Ca		80	120		%
Al		80	120		%
Si		80	120		%
Mg		80	120		%
Se		80	120		%
Sb		80	120		%
Zn		80	120		%
V		80	120		%
K		80	120		%
Tl		80	120		%
Cu		80	120		%
Cr		80	120		%
As		80	120		%
Fe		80	120		%
Sc (IS)		80	120		%
Y		80	120		%
Cd		80	120		%
Na		80	120		%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 6010B Metals (Total Water)
TestAmerica San Francisco

Type: ICSABREC **Created:** 9/21/2007 3:43:00PM **Active:** 1/8/2007 3:42:46PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Ba		80	120		%
Sr		80	120		%
B		80	120		%
Be		80	120		%
Pb		80	120		%
Ti		80	120		%
Sn		80	120		%

Type: ICSARL **Created:** 10/27/2008 2:49:00PM **Active:** 1/1/2008 2:52:24PM **Exp:**
Initial Prep: 50 **Unit:** mL **Final Prep:** 50 **Unit:** mL **Fac:** 1

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Mn	2				NONE
Mo	2				NONE
Au	2				NONE
Ag	2				NONE
Co	2				NONE
Ni	2				NONE
Ca	2				NONE
Al	2				NONE
Si	2				NONE
Mg	2				NONE
Se	2				NONE
Sb	2				NONE
Zn	2				NONE
V	2				NONE
K	2				NONE
Tl	2				NONE
Cu	2				NONE
Cr	2				NONE
As	2				NONE
Fe	2				NONE
Sc (IS)					NONE
Y					NONE
Cd	2				NONE
Na	2				NONE
Ba	2				NONE
Sr	2				NONE
B	2				NONE
Be	2				NONE
Pb	2				NONE
Ti	2				NONE
Sn	2				NONE

Type: ICVREC **Created:** 10/3/2007 4:55:00PM **Active:** 1/1/2007 4:55:22PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 6010B Metals (Total Water)
TestAmerica San Francisco

Type: ICVREC **Created:** 10/3/2007 4:55:00PM **Active:** 1/1/2007 4:55:22PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Mn		90	110		%
Mo		90	110		%
Au		90	110		%
Ag		90	110		%
Co		90	110		%
Ni		90	110		%
Ca		90	110		%
Al		90	110		%
Si		90	110		%
Mg		90	110		%
Se		90	110		%
Sb		90	110		%
Zn		90	110		%
V		90	110		%
K		90	110		%
Tl		90	110		%
Cu		90	110		%
Cr		90	110		%
As		90	110		%
Fe		90	110		%
Sc (IS)		90	110		%
Y		90	110		%
Cd		90	110		%
Na		90	110		%
Ba		90	110		%
Sr		90	110		%
B		90	110		%
Be		90	110		%
Pb		90	110		%
Ti		90	110		%
Sn		90	110		%

Type: LCSREC **Created:** 1/10/2008 2:32:00PM **Active:** 1/10/2008 2:40:32PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Mn		80	120		%
Mo		80	120		%
Au		80	120		%
Ag		80	120		%
Co		80	120		%
Ni		80	120		%
Ca		80	120		%
Al		80	120		%
Si		80	120		%
Mg		80	120		%
Se		80	120		%
Sb		80	120		%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 6010B Metals (Total Water)
TestAmerica San Francisco

Type: LCSREC **Created:** 1/10/2008 2:32:00PM **Active:** 1/10/2008 2:40:32PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Zn		80	120		%
V		80	120		%
K		80	120		%
Tl		80	120		%
Cu		80	120		%
Cr		80	120		%
As		80	120		%
Fe		80	120		%
Sc (IS)					%
Y					%
Cd		80	120		%
Na		80	120		%
Ba		80	120		%
Sr					%
B		80	120		%
Be		80	120		%
Pb		80	120		%
Ti		80	120		%
Sn		80	120		%

Type: LCSRPD **Created:** 6/22/2005 12:23:00PM **Active:** 1/1/2005 4:56:34PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Mn				20	%
Mo				20	%
Hardness as calcium carbonate				20	%
Au				20	%
Ag				20	%
Co				20	%
Ni				20	%
Ca				20	%
Al				20	%
Si				20	%
Calcium hardness as calcium				20	%
Mg				20	%
Se				20	%
Sb				20	%
Zn				20	%
V				20	%
K				20	%
Tl				20	%
Cu				20	%
Cr				20	%
As				20	%
Fe				20	%
Sc (IS)				20	%
Y				20	%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 6010B Metals (Total Water)
TestAmerica San Francisco

Type: LCSRPD **Created:** 6/22/2005 12:23:00PM **Active:** 1/1/2005 4:56:34PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Cd				20	%
Na				20	%
Ba				20	%
Sr				20	%
B				20	%
Be				20	%
Pb				20	%
Ti				20	%
Sn				20	%

Type: MDL **Created:** 6/22/2005 12:26:00PM **Active:** 1/1/2005 4:56:40PM **Exp:**
Initial Prep: 50 **Unit:** mL **Final Prep:** 50 **Unit:** mL **Fac:** 1

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Mn	0.0014				mg/L
Mo	0.0008				mg/L
Hardness as calcium carbonate	1				mg/L
Au	0.0023				mg/L
Ag	0.0019				mg/L
Co	0.0003				mg/L
Ni	0.0008				mg/L
Ca	0.0374				mg/L
Al	0.0167				mg/L
Si	0.0083				mg/L
Calcium hardness as calcium	1				mg/L
Mg	0.0259				mg/L
Se	0.0071				mg/L
Sb	0.0018				mg/L
Zn	0.0041				mg/L
V	0.0007				mg/L
K	0.0730				mg/L
Tl	0.0035				mg/L
Cu	0.0009				mg/L
Cr	0.0006				mg/L
As	0.0015				mg/L
Fe	0.0251				mg/L
Sc (IS)					mg/L
Y					mg/L
Cd	0.0002				mg/L
Na	0.0295				mg/L
Ba	0.0007				mg/L
Sr	0.0001				mg/L
B	0.0010				mg/L
Be	0.0002				mg/L
Pb	0.0023				mg/L
Ti	0.0012				mg/L
Sn	0.0011				mg/L

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 6010B Metals (Total Water)
TestAmerica San Francisco

Type: MSREC **Created:** 6/22/2005 12:24:00PM **Active:** 1/1/2005 4:56:47PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Mn		75	125		%
Mo		75	125		%
Hardness as calcium carbonate		75	125		%
Au		75	125		%
Ag		75	125		%
Co		75	125		%
Ni		75	125		%
Ca		75	125		%
Al		75	125		%
Si		75	125		%
Calcium hardness as calcium		75	125		%
Mg		75	125		%
Se		75	125		%
Sb		75	125		%
Zn		75	125		%
V		75	125		%
K		75	125		%
Tl		75	125		%
Cu		75	125		%
Cr		75	125		%
As		75	125		%
Fe		75	125		%
Sc (IS)					%
Y					%
Cd		75	125		%
Na		75	125		%
Ba		75	125		%
Sr		75	125		%
B		75	125		%
Be		75	125		%
Pb		75	125		%
Ti		75	125		%
Sn		75	125		%

Type: MSRPD **Created:** 6/22/2005 12:24:00PM **Active:** 1/1/2005 4:56:53PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Mn				25	%
Mo				25	%
Hardness as calcium carbonate				25	%
Au				25	%
Ag				25	%
Co				25	%
Ni				25	%
Ca				25	%
Al				25	%
Si				25	%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 6010B Metals (Total Water)
TestAmerica San Francisco

Type: MSRPD **Created:** 6/22/2005 12:24:00PM **Active:** 1/1/2005 4:56:53PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Calcium hardness as calcium				25	%
Mg				25	%
Se				25	%
Sb				25	%
Zn				25	%
V				25	%
K				25	%
Tl				25	%
Cu				25	%
Cr				25	%
As				25	%
Fe				25	%
Sc (IS)				25	%
Y				25	%
Cd				25	%
Na				25	%
Ba				25	%
Sr				25	%
B				25	%
Be				25	%
Pb				25	%
Ti				25	%
Sn				25	%

Type: RL **Created:** 6/22/2005 12:30:00PM **Active:** 1/1/2005 4:56:59PM **Exp:**
Initial Prep: 50 **Unit:** mL **Final Prep:** 50 **Unit:** mL **Fac:** 1

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Mn	0.02				mg/L
Mo	0.01				mg/L
Hardness as calcium carbonate	2.0				mg/L
Au	0.01				mg/L
Ag	0.005				mg/L
Co	0.002				mg/L
Ni	0.01				mg/L
Ca	0.2				mg/L
Al	0.2				mg/L
Si	0.05				mg/L
Calcium hardness as calcium	2				mg/L
Mg	0.2				mg/L
Se	0.02				mg/L
Sb	0.01				mg/L
Zn	0.02				mg/L
V	0.01				mg/L
K	1				mg/L
Tl	0.01				mg/L
Cu	0.02				mg/L
Cr	0.01				mg/L

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 6010B Metals (Total Water)
TestAmerica San Francisco

Type: RL **Created:** 6/22/2005 12:30:00PM **Active:** 1/1/2005 4:56:59PM **Exp:**
Initial Prep: 50 **Unit:** mL **Final Prep:** 50 **Unit:** mL **Fac:** 1

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
As	0.005				mg/L
Fe	0.2				mg/L
Sc (IS)					mg/L
Y					mg/L
Cd	0.002				mg/L
Na	0.5				mg/L
Ba	0.005				mg/L
Sr	0.005				mg/L
B	0.01				mg/L
Be	0.002				mg/L
Pb	0.005				mg/L
Ti	0.01				mg/L
Sn	0.01				mg/L

Type: S1 **Created:** 7/1/2008 1:04:00PM **Active:** 1/1/2008 1:04:22PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Mn		95	105		%
Mo		95	105		%
Au		95	105		%
Ag		95	105		%
Co		95	105		%
Ni		95	105		%
Ca		95	105		%
Al		95	105		%
Si		95	105		%
Mg		95	105		%
Se		95	105		%
Sb		95	105		%
Zn		95	105		%
V		95	105		%
K		95	105		%
Tl		95	105		%
Cu		95	105		%
Cr		95	105		%
As		95	105		%
Fe		95	105		%
Sc (IS)		95	105		%
Y		95	105		%
Cd		95	105		%
Na		95	105		%
Ba		95	105		%
Sr		95	105		%
B		95	105		%
Be		95	105		%
Pb		95	105		%
Ti		95	105		%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 6010B Metals (Total Water)
TestAmerica San Francisco

Type: S1 **Created:** 7/1/2008 1:04:00PM **Active:** 1/1/2008 1:04:22PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Sn		95	105		%

Type: S2 **Created:** 7/1/2008 1:05:00PM **Active:** 1/1/2008 1:04:34PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Mn		95	105		%
Mo		95	105		%
Au		95	105		%
Ag		95	105		%
Co		95	105		%
Ni		95	105		%
Ca		95	105		%
Al		95	105		%
Si		95	105		%
Mg		95	105		%
Se		95	105		%
Sb		95	105		%
Zn		95	105		%
V		95	105		%
K		95	105		%
Tl		95	105		%
Cu		95	105		%
Cr		95	105		%
As		95	105		%
Fe		95	105		%
Sc (IS)		95	105		%
Y		95	105		%
Cd		95	105		%
Na		95	105		%
Ba		95	105		%
Sr		95	105		%
B		95	105		%
Be		95	105		%
Pb		95	105		%
Ti		95	105		%
Sn		95	105		%

Type: SD **Created:** 7/1/2008 1:05:00PM **Active:** 1/1/2008 1:04:45PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Mn				10	%
Mo				10	%
Au				10	%
Ag				10	%
Co				10	%
Ni				10	%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 6010B Metals (Total Water)
TestAmerica San Francisco

Type: SD **Created:** 7/1/2008 1:05:00PM **Active:** 1/1/2008 1:04:45PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Ca				10	%
Al				10	%
Si				10	%
Mg				10	%
Se				10	%
Sb				10	%
Zn				10	%
V				10	%
K				10	%
Tl				10	%
Cu				10	%
Cr				10	%
As				10	%
Fe				10	%
Sc (IS)				10	%
Y				10	%
Cd				10	%
Na				10	%
Ba				10	%
Sr				10	%
B				10	%
Be				10	%
Pb				10	%
Ti				10	%
Sn				10	%

Type: XMDL **Created:** 6/22/2009 2:05:00PM **Active:** 6/22/2009 2:05:27PM **Exp:**
Initial Prep: 1 **Unit:** mL **Final Prep:** 1 **Unit:** mL **Fac:** 1

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Mn	0.0014				mg/L
Mo	0.0008				mg/L
Au	0.0023				mg/L
Ag	0.0019				mg/L
Co	0.0003				mg/L
Ni	0.0008				mg/L
Ca	0.0374				mg/L
Al	0.0167				mg/L
Si	0.0083				mg/L
Mg	0.0259				mg/L
Se	0.0071				mg/L
Sb	0.0018				mg/L
Zn	0.0041				mg/L
V	0.0007				mg/L
K	0.0730				mg/L
Tl	0.0035				mg/L
Cu	0.0009				mg/L
Cr	0.0006				mg/L

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 6010B Metals (Total Water)
TestAmerica San Francisco

Type: XMDL **Created:** 6/22/2009 2:05:00PM **Active:** 6/22/2009 2:05:27PM **Exp:**
Initial Prep: 1 **Unit:** mL **Final Prep:** 1 **Unit:** mL **Fac:** 1

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
As	0.0015				mg/L
Fe	0.0251				mg/L
Sc (IS)					mg/L
Y					mg/L
Cd	0.0002				mg/L
Na	0.0295				mg/L
Ba	0.0007				mg/L
Sr	0.0001				mg/L
B	0.0010				mg/L
Be	0.0002				mg/L
Pb	0.0023				mg/L
Ti	0.0012				mg/L
Sn	0.0011				mg/L

Type: XRL **Created:** 6/22/2009 2:02:00PM **Active:** 6/22/2009 2:02:14PM **Exp:**
Initial Prep: 1 **Unit:** mL **Final Prep:** 1 **Unit:** mL **Fac:** 1

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Mn	0.02				mg/L
Mo	0.01				mg/L
Au	0.01				mg/L
Ag	0.005				mg/L
Co	0.002				mg/L
Ni	0.01				mg/L
Ca	0.2				mg/L
Al	0.2				mg/L
Si	0.05				mg/L
Mg	0.2				mg/L
Se	0.02				mg/L
Sb	0.01				mg/L
Zn	0.02				mg/L
V	0.01				mg/L
K	1				mg/L
Tl	0.01				mg/L
Cu	0.02				mg/L
Cr	0.01				mg/L
As	0.005				mg/L
Fe	0.2				mg/L
Sc (IS)					mg/L
Y					mg/L
Cd	0.002				mg/L
Na	0.5				mg/L
Ba	0.005				mg/L
Sr	0.005				mg/L
B	0.01				mg/L
Be	0.002				mg/L
Pb	0.005				mg/L
Ti	0.01				mg/L

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 6010B Metals (Total Water)
TestAmerica San Francisco

Type: XRL **Created:** 6/22/2009 2:02:00PM **Active:** 6/22/2009 2:02:14PM **Exp:**
Initial Prep: 1 **Unit:** mL **Final Prep:** 1 **Unit:** mL **Fac:** 1

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Sn	0.01				mg/L

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8081A SOLID 3550B
TestAmerica San Francisco

Type: LCSREC **Created:** 6/5/2008 11:59:00AM **Active:** 6/5/2008 12:05:20PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
gamma-BHC (Lindane)		58	120		%
Aldrin		54	120		%
Heptachlor		54	120		%
Endrin		53	120		%
4,4'-DDT		51	120		%
Dieldrin		59	120		%

Type: LCSRPD **Created:** 6/5/2008 11:59:00AM **Active:** 6/5/2008 12:07:21PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
gamma-BHC (Lindane)				20	%
Aldrin				20	%
Heptachlor				20	%
Endrin				20	%
4,4'-DDT				20	%
Dieldrin				20	%

Type: MDL **Created:** 6/15/2005 2:36:00PM **Active:** 6/27/2005 3:45:05PM **Exp:**
Initial Prep: 30 **Unit:** g **Final Prep:** 10 **Unit:** mL **Fac:** 0.333333

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
1-Bromo-2-nitrobenzene	0.1				ug/Kg
gamma-BHC (Lindane)	0.83				ug/Kg
Endosulfan sulfate	0.48				ug/Kg
Tetrachloro-m-xylene	0.1				ug/Kg
Chlordane (technical) Peak 1	1.8				ug/Kg
Endrin aldehyde	0.78				ug/Kg
Toxaphene Peak 5	6.809				ug/Kg
beta-BHC	0.97				ug/Kg
Mirex	0.2				ug/Kg
Endosulfan I	0.19				ug/Kg
Chlordane (technical) Peak 2	1.8				ug/Kg
Chlordane (technical) Peak 4	1.8				ug/Kg
Aldrin	0.17				ug/Kg
gamma-Chlordane	0.19				ug/Kg
Toxaphene Peak 4	6.809				ug/Kg
Chlordane (technical) Peak 3	1.8				ug/Kg
Chlordane (technical) Peak 5	1.8				ug/Kg
Toxaphene Peak 1	6.809				ug/Kg
Toxaphene Peak 2	6.809				ug/Kg
Methoxychlor	0.28				ug/Kg
Endosulfan II	0.39				ug/Kg
Heptachlor epoxide	0.41				ug/Kg
Endrin ketone	0.33				ug/Kg
alpha-BHC	0.47				ug/Kg
4,4'-DDD	0.38				ug/Kg
Heptachlor	0.50				ug/Kg

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8081A SOLID 3550B
TestAmerica San Francisco

Type: MDL **Created:** 6/15/2005 2:36:00PM **Active:** 6/27/2005 3:45:05PM **Exp:**
Initial Prep: 30 **Unit:** g **Final Prep:** 10 **Unit:** mL **Fac:** 0.333333

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Hexachlorobenzene	0.2				ug/Kg
Endrin	0.28				ug/Kg
4,4'-DDT	0.80				ug/Kg
Toxaphene	6.809				ug/Kg
Toxaphene Peak 3	6.809				ug/Kg
Pentachloronitrobenzene	0.2				ug/Kg
alpha-Chlordane	0.11				ug/Kg
DCB Decachlorobiphenyl	0.1				ug/Kg
4,4'-DDE	0.18				ug/Kg
Dieldrin	0.20				ug/Kg
Chlordane (technical)	1.8				ug/Kg
delta-BHC	0.46				ug/Kg
Kepone	0.2				ug/Kg

Type: MSREC **Created:** 6/5/2008 12:04:00PM **Active:** 6/5/2008 12:05:42PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
gamma-BHC (Lindane)		58	120		%
Aldrin		53	120		%
Heptachlor		52	120		%
Endrin		32	143		%
4,4'-DDT		17	144		%
Dieldrin		46	130		%

Type: MSRPD **Created:** 6/15/2005 2:33:00PM **Active:** 6/27/2005 3:53:56PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
gamma-BHC (Lindane)				20	%
Endosulfan sulfate				20	%
Tetrachloro-m-xylene				20	%
Endrin aldehyde				20	%
beta-BHC				20	%
Endosulfan I				20	%
Aldrin				20	%
gamma-Chlordane				20	%
Methoxychlor				20	%
Endosulfan II				20	%
Heptachlor epoxide				20	%
Endrin ketone				20	%
alpha-BHC				20	%
4,4'-DDD				20	%
Heptachlor				20	%
Endrin				20	%
4,4'-DDT				20	%
Toxaphene				20	%
alpha-Chlordane				20	%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8081A SOLID 3550B
TestAmerica San Francisco

Type: MSRPD **Created:** 6/15/2005 2:33:00PM **Active:** 6/27/2005 3:53:56PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
DCB Decachlorobiphenyl				20	%
4,4'-DDE				20	%
Dieldrin				20	%
Chlordane (technical)				20	%
delta-BHC				20	%

Type: RL **Created:** 6/15/2005 2:41:00PM **Active:** 6/27/2005 3:54:11PM **Exp:**
Initial Prep: 30 **Unit:** g **Final Prep:** 10 **Unit:** mL **Fac:** 0.333333

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
1-Bromo-2-nitrobenzene	2.0				ug/Kg
gamma-BHC (Lindane)	2.0				ug/Kg
Endosulfan sulfate	2.0				ug/Kg
Tetrachloro-m-xylene	2.0				ug/Kg
Endrin aldehyde	2.0				ug/Kg
beta-BHC	2.0				ug/Kg
Mirex	2.0				ug/Kg
Endosulfan I	2.0				ug/Kg
Aldrin	2.0				ug/Kg
gamma-Chlordane	2.0				ug/Kg
Methoxychlor	2.0				ug/Kg
Endosulfan II	2.0				ug/Kg
Heptachlor epoxide	2.0				ug/Kg
Endrin ketone	2.0				ug/Kg
alpha-BHC	2.0				ug/Kg
4,4'-DDD	2.0				ug/Kg
Heptachlor	2.0				ug/Kg
Hexachlorobenzene	2.0				ug/Kg
Endrin	2.0				ug/Kg
4,4'-DDT	2.0				ug/Kg
Toxaphene	40.0				ug/Kg
Pentachloronitrobenzene	2.0				ug/Kg
alpha-Chlordane	2.0				ug/Kg
DCB Decachlorobiphenyl	2.0				ug/Kg
4,4'-DDE	2.0				ug/Kg
Dieldrin	2.0				ug/Kg
Chlordane (technical)	40.0				ug/Kg
delta-BHC	2.0				ug/Kg
Kepone	4.0				ug/Kg

Type: SUREC **Created:** 6/5/2008 11:57:00AM **Active:** 6/5/2008 12:06:03PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Tetrachloro-m-xylene		54	109		%
DCB Decachlorobiphenyl		27	136		%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8081A SOLID 3550B
TestAmerica San Francisco

Type: XMDL **Created:** 6/12/2009 4:37:00PM **Active:** 6/12/2009 4:36:38PM **Exp:**
Initial Prep: 30 **Unit:** g **Final Prep:** 10 **Unit:** mL **Fac:** 0.333333

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
1-Bromo-2-nitrobenzene	0.1				ug/Kg
gamma-BHC (Lindane)	0.83				ug/Kg
Endosulfan sulfate	0.48				ug/Kg
Tetrachloro-m-xylene	0.1				ug/Kg
Chlordane (technical) Peak 1	1.8				ug/Kg
Endrin aldehyde	0.78				ug/Kg
Toxaphene Peak 5	6.809				ug/Kg
beta-BHC	0.97				ug/Kg
Mirex	0.2				ug/Kg
Endosulfan I	0.19				ug/Kg
Chlordane (technical) Peak 2	1.8				ug/Kg
Chlordane (technical) Peak 4	1.8				ug/Kg
Aldrin	0.17				ug/Kg
gamma-Chlordane	0.19				ug/Kg
Toxaphene Peak 4	6.809				ug/Kg
Chlordane (technical) Peak 3	1.8				ug/Kg
Chlordane (technical) Peak 5	1.8				ug/Kg
Toxaphene Peak 1	6.809				ug/Kg
Toxaphene Peak 2	6.809				ug/Kg
Methoxychlor	0.28				ug/Kg
Endosulfan II	0.39				ug/Kg
Heptachlor epoxide	0.41				ug/Kg
Endrin ketone	0.33				ug/Kg
alpha-BHC	0.47				ug/Kg
4,4'-DDD	0.38				ug/Kg
Heptachlor	0.50				ug/Kg
Hexachlorobenzene	0.2				ug/Kg
Endrin	0.28				ug/Kg
4,4'-DDT	0.80				ug/Kg
Toxaphene	6.809				ug/Kg
Toxaphene Peak 3	6.809				ug/Kg
Pentachloronitrobenzene	0.2				ug/Kg
alpha-Chlordane	0.11				ug/Kg
DCB Decachlorobiphenyl	0.1				ug/Kg
4,4'-DDE	0.18				ug/Kg
Dieldrin	0.20				ug/Kg
Chlordane (technical)	1.8				ug/Kg
delta-BHC	0.46				ug/Kg
Kepone	0.2				ug/Kg

Type: XRL **Created:** 4/27/2009 1:25:00PM **Active:** 1/1/2009 1:25:25PM **Exp:**
Initial Prep: 30 **Unit:** g **Final Prep:** 10 **Unit:** mL **Fac:** 0.333333

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
1-Bromo-2-nitrobenzene	2.0				ug/g
gamma-BHC (Lindane)	2.0				ug/Kg
Endosulfan sulfate	2.0				ug/Kg
Tetrachloro-m-xylene	2.0				ug/Kg

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8081A SOLID 3550B
TestAmerica San Francisco

Type: XRL **Created:** 4/27/2009 1:25:00PM **Active:** 1/1/2009 1:25:25PM **Exp:**
Initial Prep: 30 **Unit:** g **Final Prep:** 10 **Unit:** mL **Fac:** 0.333333

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Endrin aldehyde	2.0				ug/Kg
beta-BHC	2.0				ug/Kg
Mirex					ug/g
Endosulfan I	2.0				ug/Kg
Aldrin	2.0				ug/Kg
gamma-Chlordane	2.0				ug/Kg
Methoxychlor	2.0				ug/Kg
Endosulfan II	2.0				ug/Kg
Heptachlor epoxide	2.0				ug/Kg
Endrin ketone	2.0				ug/Kg
alpha-BHC	2.0				ug/Kg
4,4'-DDD	2.0				ug/Kg
Heptachlor	2.0				ug/Kg
Hexachlorobenzene					ug/g
Endrin	2.0				ug/Kg
4,4'-DDT	2.0				ug/Kg
Toxaphene	40.0				ug/Kg
Pentachloronitrobenzene					ug/g
alpha-Chlordane	2.0				ug/Kg
DCB Decachlorobiphenyl	2.0				ug/Kg
4,4'-DDE	2.0				ug/Kg
Dieldrin	2.0				ug/Kg
Chlordane (technical)	40.0				ug/Kg
delta-BHC	2.0				ug/Kg
Kepone					ug/g

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8081A WATER 3510C
TestAmerica San Francisco

Type: LCSREC **Created:** 6/5/2008 11:55:00AM **Active:** 6/5/2008 12:06:20PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
gamma-BHC (Lindane)		46	121		%
Aldrin		44	120		%
Heptachlor		17	128		%
Endrin		15	138		%
4,4'-DDT		46	120		%
Dieldrin		43	120		%

Type: LCSRPD **Created:** 6/5/2008 11:55:00AM **Active:** 6/5/2008 12:06:41PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
gamma-BHC (Lindane)				20	%
Aldrin				20	%
Heptachlor				20	%
Endrin				20	%
4,4'-DDT				20	%
Dieldrin				20	%

Type: MDL **Created:** 6/15/2005 2:14:00PM **Active:** 6/27/2005 4:14:14PM **Exp:**
Initial Prep: 1 **Unit:** L **Final Prep:** 10 **Unit:** mL **Fac:** 0.01

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
1-Bromo-2-nitrobenzene	0.1				ug/L
gamma-BHC (Lindane)	0.006				ug/L
Endosulfan sulfate	0.010				ug/L
Tetrachloro-m-xylene	0.1				ug/L
Chlordane (technical) Peak 1	0.40				ug/L
Endrin aldehyde	0.016				ug/L
Toxaphene Peak 5	0.39				ug/L
beta-BHC	0.010				ug/L
Mirex	0.06				ug/L
Endosulfan I	0.006				ug/L
Chlordane (technical) Peak 2	0.40				ug/L
Chlordane (technical) Peak 4	0.40				ug/L
Aldrin	0.005				ug/L
gamma-Chlordane	0.006				ug/L
Toxaphene Peak 4	0.39				ug/L
Chlordane (technical) Peak 3	0.40				ug/L
Chlordane (technical) Peak 5	0.40				ug/L
Toxaphene Peak 1	0.39				ug/L
Toxaphene Peak 2	0.39				ug/L
Methoxychlor	0.006				ug/L
Endosulfan II	0.014				ug/L
Heptachlor epoxide	0.006				ug/L
Endrin ketone	0.010				ug/L
alpha-BHC	0.006				ug/L
4,4'-DDD	0.015				ug/L
Heptachlor	0.003				ug/L

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8081A WATER 3510C
TestAmerica San Francisco

Type: MDL **Created:** 6/15/2005 2:14:00PM **Active:** 6/27/2005 4:14:14PM **Exp:**
Initial Prep: 1 **Unit:** L **Final Prep:** 10 **Unit:** mL **Fac:** 0.01

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Hexachlorobenzene	0.06				ug/L
Endrin	0.011				ug/L
4,4'-DDT	0.023				ug/L
Toxaphene	0.39				ug/L
Toxaphene Peak 3	0.39				ug/L
Pentachloronitrobenzene	0.06				ug/L
alpha-Chlordane	0.008				ug/L
DCB Decachlorobiphenyl	0.1				ug/L
4,4'-DDE	0.006				ug/L
Dieldrin	0.009				ug/L
Chlordane (technical)	0.40				ug/L
delta-BHC	0.006				ug/L
Kepone	0.13				ug/L

Type: MSREC **Created:** 6/15/2005 2:04:00PM **Active:** 6/27/2005 4:14:24PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
gamma-BHC (Lindane)		46	135		%
Endosulfan sulfate		65	135		%
Tetrachloro-m-xylene		65	135		%
Endrin aldehyde		65	135		%
beta-BHC		65	135		%
Endosulfan I		65	135		%
Aldrin		44	135		%
gamma-Chlordane		65	135		%
Methoxychlor		65	135		%
Endosulfan II		65	135		%
Heptachlor epoxide		65	135		%
Endrin ketone		65	135		%
alpha-BHC		65	135		%
4,4'-DDD		65	135		%
Heptachlor		17	135		%
Endrin		13	135		%
4,4'-DDT		46	135		%
Toxaphene		65	135		%
alpha-Chlordane		65	135		%
DCB Decachlorobiphenyl		65	135		%
4,4'-DDE		65	135		%
Dieldrin		43	135		%
Chlordane (technical)		65	135		%
delta-BHC		65	135		%

Type: MSRPD **Created:** 6/15/2005 2:04:00PM **Active:** 6/27/2005 4:14:32PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
gamma-BHC (Lindane)				20	%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8081A WATER 3510C
TestAmerica San Francisco

Type: MSRPD **Created:** 6/15/2005 2:04:00PM **Active:** 6/27/2005 4:14:32PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Endosulfan sulfate				20	%
Tetrachloro-m-xylene				20	%
Endrin aldehyde				20	%
beta-BHC				20	%
Endosulfan I				20	%
Aldrin				20	%
gamma-Chlordane				20	%
Methoxychlor				20	%
Endosulfan II				20	%
Heptachlor epoxide				20	%
Endrin ketone				20	%
alpha-BHC				20	%
4,4'-DDD				20	%
Heptachlor				20	%
Endrin				20	%
4,4'-DDT				20	%
Toxaphene				20	%
alpha-Chlordane				20	%
DCB Decachlorobiphenyl				20	%
4,4'-DDE				20	%
Dieldrin				20	%
Chlordane (technical)				20	%
delta-BHC				20	%

Type: RL **Created:** 6/15/2005 2:19:00PM **Active:** 6/27/2005 4:14:43PM **Exp:**
Initial Prep: 1 **Unit:** L **Final Prep:** 10 **Unit:** mL **Fac:** 0.01

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
1-Bromo-2-nitrobenzene	0.06				ug/L
gamma-BHC (Lindane)	0.06				ug/L
Endosulfan sulfate	0.06				ug/L
Tetrachloro-m-xylene	0.06				ug/L
Endrin aldehyde	0.06				ug/L
beta-BHC	0.06				ug/L
Mirex	0.06				ug/L
Endosulfan I	0.06				ug/L
Aldrin	0.06				ug/L
gamma-Chlordane	0.06				ug/L
Methoxychlor	0.06				ug/L
Endosulfan II	0.06				ug/L
Heptachlor epoxide	0.06				ug/L
Endrin ketone	0.06				ug/L
alpha-BHC	0.06				ug/L
4,4'-DDD	0.06				ug/L
Heptachlor	0.06				ug/L
Hexachlorobenzene	0.06				ug/L
Endrin	0.06				ug/L
4,4'-DDT	0.06				ug/L

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8081A WATER 3510C
TestAmerica San Francisco

Type: RL **Created:** 6/15/2005 2:19:00PM **Active:** 6/27/2005 4:14:43PM **Exp:**
Initial Prep: 1 **Unit:** L **Final Prep:** 10 **Unit:** mL **Fac:** 0.01

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Toxaphene	1.0				ug/L
Pentachloronitrobenzene	0.06				ug/L
alpha-Chlordane	0.06				ug/L
DCB Decachlorobiphenyl	0.06				ug/L
4,4'-DDE	0.06				ug/L
Dieldrin	0.06				ug/L
Chlordane (technical)	1.0				ug/L
delta-BHC	0.06				ug/L
Kepone	0.13				ug/L

Type: SUREC **Created:** 6/5/2008 11:52:00AM **Active:** 6/5/2008 12:07:09PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Tetrachloro-m-xylene		48	113		%
DCB Decachlorobiphenyl		31	121		%

Type: XMDL **Created:** 6/12/2009 4:57:00PM **Active:** 6/12/2009 4:55:47PM **Exp:**
Initial Prep: 1 **Unit:** L **Final Prep:** 10 **Unit:** mL **Fac:** 0.01

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
1-Bromo-2-nitrobenzene	0.1				ug/L
gamma-BHC (Lindane)	0.006				ug/L
Endosulfan sulfate	0.010				ug/L
Tetrachloro-m-xylene	0.1				ug/L
Chlordane (technical) Peak 1	0.40				ug/L
Endrin aldehyde	0.016				ug/L
Toxaphene Peak 5	0.39				ug/L
beta-BHC	0.010				ug/L
Mirex	0.06				ug/L
Endosulfan I	0.006				ug/L
Chlordane (technical) Peak 2	0.40				ug/L
Chlordane (technical) Peak 4	0.40				ug/L
Aldrin	0.005				ug/L
gamma-Chlordane	0.006				ug/L
Toxaphene Peak 4	0.39				ug/L
Chlordane (technical) Peak 3	0.40				ug/L
Chlordane (technical) Peak 5	0.40				ug/L
Toxaphene Peak 1	0.39				ug/L
Toxaphene Peak 2	0.39				ug/L
Methoxychlor	0.006				ug/L
Endosulfan II	0.014				ug/L
Heptachlor epoxide	0.006				ug/L
Endrin ketone	0.010				ug/L
alpha-BHC	0.006				ug/L
4,4'-DDD	0.015				ug/L
Heptachlor	0.003				ug/L
Hexachlorobenzene	0.06				ug/L

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8081A WATER 3510C
TestAmerica San Francisco

Type: XMDL **Created:** 6/12/2009 4:57:00PM **Active:** 6/12/2009 4:55:47PM **Exp:**
Initial Prep: 1 **Unit:** L **Final Prep:** 10 **Unit:** mL **Fac:** 0.01

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Endrin	0.011				ug/L
4,4'-DDT	0.023				ug/L
Toxaphene	0.39				ug/L
Toxaphene Peak 3	0.39				ug/L
Pentachloronitrobenzene	0.06				ug/L
alpha-Chlordane	0.008				ug/L
DCB Decachlorobiphenyl	0.1				ug/L
4,4'-DDE	0.006				ug/L
Dieldrin	0.009				ug/L
Chlordane (technical)	0.40				ug/L
delta-BHC	0.006				ug/L
Kepone	0.13				ug/L

Type: XRL **Created:** 4/27/2009 3:07:00PM **Active:** 1/1/2009 3:07:10PM **Exp:**
Initial Prep: 1 **Unit:** L **Final Prep:** 10 **Unit:** mL **Fac:** 0.01

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
1-Bromo-2-nitrobenzene	0.06				ug/L
gamma-BHC (Lindane)	0.06				ug/L
Endosulfan sulfate	0.06				ug/L
Tetrachloro-m-xylene	0.06				ug/L
Endrin aldehyde	0.06				ug/L
beta-BHC	0.06				ug/L
Mirex	0.06				ug/L
Endosulfan I	0.06				ug/L
Aldrin	0.06				ug/L
gamma-Chlordane	0.06				ug/L
Methoxychlor	0.06				ug/L
Endosulfan II	0.06				ug/L
Heptachlor epoxide	0.06				ug/L
Endrin ketone	0.06				ug/L
alpha-BHC	0.06				ug/L
4,4'-DDD	0.06				ug/L
Heptachlor	0.06				ug/L
Hexachlorobenzene	0.06				ug/L
Endrin	0.06				ug/L
4,4'-DDT	0.06				ug/L
Toxaphene	1.0				ug/L
Pentachloronitrobenzene	0.06				ug/L
alpha-Chlordane	0.06				ug/L
DCB Decachlorobiphenyl	0.06				ug/L
4,4'-DDE	0.06				ug/L
Dieldrin	0.06				ug/L
Chlordane (technical)	1.0				ug/L
delta-BHC	0.06				ug/L
Kepone	0.13				ug/L

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Full List Soils
TestAmerica San Francisco

Type: LCSREC **Created:** 6/3/2008 9:08:00AM **Active:** 6/9/2008 12:00:00AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Chlorobenzene-d5					%
C4-C10		70	130		%
Hexachloroethane		70	130		%
1,2-Dichlorobenzene		73	126		%
Carbon disulfide		10	175		%
n-Heptane		70	130		%
Iodomethane		70	130		%
n-Decane		70	130		%
2-Chlorotoluene		75	131		%
1,4-Difluorobenzene					%
trans-1,4-Dichloro-2-butene		70	130		%
1,2,3-Trichloropropane		62	156		%
Carbon tetrachloride		54	141		%
2-Hexanone		44	158		%
Xylenes, Total		70	130		%
3-Chloro-1-propene		70	130		%
cis-1,3-Dichloropropene		46	139		%
Chlorobenzene		70	121		%
Vinyl chloride		62	120		%
Propionitrile		70	130		%
sec-Butylbenzene		64	137		%
Dibromomethane		65	131		%
C13		70	130		%
C6-C12		70	130		%
Acetone		37	171		%
Isopropyl alcohol		70	130		%
m-Xylene & p-Xylene		70	130		%
Isopropyl ether		70	130		%
1,2,4-Trichlorobenzene		49	144		%
2-Nitropropane		70	130		%
2-Methyl-2-propanol		70	130		%
Styrene		58	135		%
Chlorobromomethane		65	128		%
Dichlorobromomethane		64	135		%
1,3-Dichlorobenzene		73	128		%
Benzene		72	120		%
Chloroethane		61	125		%
2-Chloroethyl vinyl ether		70	130		%
trans-1,3-Dichloropropene		55	131		%
Acrolein		64	165		%
1,2,3-Trichlorobenzene		58	138		%
N-Propylbenzene		71	130		%
o-Xylene		68	125		%
Tetrahydrofuran		70	130		%
C6-C10		70	130		%
Isobutyl alcohol		70	130		%
1,4-Dichlorobenzene-d4					%
2-Chloro-1,3-butadiene		70	130		%
Ethanol		70	130		%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Full List Soils
TestAmerica San Francisco

Type: LCSREC **Created:** 6/3/2008 9:08:00AM **Active:** 6/9/2008 12:00:00AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
4-Bromofluorobenzene		70	130		%
4-Isopropyltoluene		69	134		%
Pentane		70	130		%
Methacrylonitrile		70	130		%
n-Butylbenzene		60	145		%
1,1-Dichloropropene		67	128		%
Paraldehyde		70	130		%
cis-1,2-Dichloroethene		68	131		%
1,2,3-Trimethylbenzene		70	130		%
Fluorobenzene		70	130		%
2-Methylpentane		70	130		%
1,1,2,2-Tetrachloroethane		75	131		%
1,2,4-Trimethylbenzene		64	140		%
Toluene		72	120		%
Hexane		70	130		%
Naphthalene		45	146		%
Cyclohexanone		70	130		%
1,3,5-Trimethylbenzene		67	134		%
1,3-Dichloropropane		74	127		%
Chloroform		67	125		%
4-Chlorotoluene		76	129		%
Chlorodibromomethane		60	140		%
Dichlorodifluoromethane		38	120		%
1,1,2-Trichloroethane		68	132		%
BFB		70	130		%
Tert-amyl methyl ether		70	130		%
1,2-Dichlorobenzene-d4					%
Toluene-d8 (Surr)					%
tert-Butylbenzene		63	134		%
Chloromethane		50	131		%
Methylene Chloride		63	129		%
Dibromofluoromethane (Surr)					%
Methyl methacrylate		70	130		%
1,1-Dichloroethene		64	129		%
Isopropylbenzene		70	130		%
C7-C12		70	130		%
1,2-Dichloroethane		73	122		%
1,2-Dichloroethane-d4 (Surr)					%
Acrylonitrile		62	148		%
4-Methyl-2-pentanone (MIBK)		51	140		%
Tetrachloroethene		67	128		%
C5-C12		70	130		%
1,1,1-Trichloroethane		57	133		%
2,2-Dichloropropane		63	130		%
Benzyl chloride		70	130		%
Ethylene Dibromide		66	135		%
1,1,2-Trichloro-1,2,2-trifluoroethane		52	126		%
Bromoform		58	132		%
1,2-Dibromo-3-Chloropropane		57	130		%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Full List Soils
TestAmerica San Francisco

Type: LCSREC **Created:** 6/3/2008 9:08:00AM **Active:** 6/9/2008 12:00:00AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Trichlorofluoromethane		61	127		%
Trichloroethene		66	125		%
Tentatively Identified Compound		70	130		%
Bromobenzene		77	121		%
2-Butanone (MEK)		41	158		%
1,2-Dichloropropane		65	133		%
1,4-Dioxane		70	130		%
Tert-butyl ethyl ether		70	130		%
Methyl tert-butyl ether		69	125		%
1,4-Dichlorobenzene		72	122		%
1,1,1,2-Tetrachloroethane		64	133		%
Ethylbenzene		65	130		%
TBA-d9 (IS)					%
trans-1,2-Dichloroethene		70	130		%
Hexachlorobutadiene		58	132		%
Dodecane		70	130		%
1,1-Dichloroethane		67	126		%
Butane		70	130		%
Dioxane-d8 (IS)					%
Acetonitrile		70	130		%
Vinyl acetate		52	170		%
Ethyl methacrylate		70	130		%
Bromomethane		56	124		%
Epichlorohydrin		70	130		%
C4-C12		70	130		%

Type: LCSRPD **Created:** 11/15/2007 5:18:00PM **Active:** 11/15/2007 5:19:25PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Chlorobenzene-d5				20	%
C4-C10				20	%
Hexachloroethane				20	%
1,2-Dichlorobenzene				20	%
Carbon disulfide				20	%
n-Heptane				20	%
Iodomethane				20	%
n-Decane				20	%
2-Chlorotoluene				20	%
1,4-Difluorobenzene				20	%
trans-1,4-Dichloro-2-butene				20	%
1,2,3-Trichloropropane				20	%
Carbon tetrachloride				20	%
2-Hexanone				20	%
Xylenes, Total				20	%
3-Chloro-1-propene				20	%
cis-1,3-Dichloropropene				20	%
Chlorobenzene				20	%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Full List Soils
TestAmerica San Francisco

Type: LCSRPD **Created:** 11/15/2007 5:18:00PM **Active:** 11/15/2007 5:19:25PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Vinyl chloride				20	%
Propionitrile				20	%
sec-Butylbenzene				20	%
Dibromomethane				20	%
C13				20	%
C6-C12				20	%
Acetone				20	%
Isopropyl alcohol				20	%
m-Xylene & p-Xylene				20	%
Isopropyl ether				20	%
1,2,4-Trichlorobenzene				20	%
2-Nitropropane				20	%
2-Methyl-2-propanol				20	%
Styrene				20	%
Chlorobromomethane				20	%
Dichlorobromomethane				20	%
1,3-Dichlorobenzene				20	%
Benzene				20	%
Chloroethane				20	%
2-Chloroethyl vinyl ether				20	%
trans-1,3-Dichloropropene				20	%
Acrolein				20	%
1,2,3-Trichlorobenzene				20	%
N-Propylbenzene				20	%
o-Xylene				20	%
Tetrahydrofuran				20	%
C6-C10				20	%
Isobutyl alcohol				20	%
1,4-Dichlorobenzene-d4				20	%
2-Chloro-1,3-butadiene				20	%
Ethanol				20	%
4-Bromofluorobenzene				20	%
4-Isopropyltoluene				20	%
Pentane				20	%
Methacrylonitrile				20	%
n-Butylbenzene				20	%
1,1-Dichloropropene				20	%
Paraldehyde				20	%
cis-1,2-Dichloroethene				20	%
1,2,3-Trimethylbenzene				20	%
Fluorobenzene				20	%
2-Methylpentane				20	%
1,1,2,2-Tetrachloroethane				20	%
1,2,4-Trimethylbenzene				20	%
Toluene				20	%
Hexane				20	%
Naphthalene				20	%
Cyclohexanone				20	%
1,3,5-Trimethylbenzene				20	%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Full List Soils
TestAmerica San Francisco

Type: LCSRPD **Created:** 11/15/2007 5:18:00PM **Active:** 11/15/2007 5:19:25PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
1,3-Dichloropropane				20	%
Chloroform				20	%
4-Chlorotoluene				20	%
Chlorodibromomethane				20	%
Dichlorodifluoromethane				20	%
1,1,2-Trichloroethane				20	%
BFB				20	%
Tert-amyl methyl ether				20	%
1,2-Dichlorobenzene-d4				20	%
Toluene-d8 (Surr)				20	%
tert-Butylbenzene				20	%
Chloromethane				20	%
Methylene Chloride				20	%
Dibromofluoromethane (Surr)				20	%
Methyl methacrylate				20	%
1,1-Dichloroethene				20	%
Isopropylbenzene				20	%
C7-C12				20	%
1,2-Dichloroethane				20	%
1,2-Dichloroethane-d4 (Surr)				20	%
Acrylonitrile				20	%
4-Methyl-2-pentanone (MIBK)				20	%
Tetrachloroethene				20	%
C5-C12				20	%
1,1,1-Trichloroethane				20	%
2,2-Dichloropropane				20	%
Benzyl chloride				20	%
Ethylene Dibromide				20	%
1,1,2-Trichloro-1,2,2-trifluoroethane				20	%
Bromoform				20	%
1,2-Dibromo-3-Chloropropane				20	%
Trichlorofluoromethane				20	%
Trichloroethene				20	%
Tentatively Identified Compound				20	%
Bromobenzene				20	%
2-Butanone (MEK)				20	%
1,2-Dichloropropane				20	%
1,4-Dioxane				20	%
Tert-butyl ethyl ether				20	%
Methyl tert-butyl ether				20	%
1,4-Dichlorobenzene				20	%
1,1,1,2-Tetrachloroethane				20	%
Ethylbenzene				20	%
TBA-d9 (IS)				20	%
trans-1,2-Dichloroethene				20	%
Hexachlorobutadiene				20	%
Dodecane				20	%
1,1-Dichloroethane				20	%
Butane				20	%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Full List Soils
TestAmerica San Francisco

Type: LCSRPD **Created:** 11/15/2007 5:18:00PM **Active:** 11/15/2007 5:19:25PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Dioxane-d8 (IS)				20	%
Acetonitrile				20	%
Vinyl acetate				20	%
Ethyl methacrylate				20	%
Bromomethane				20	%
Epichlorohydrin				20	%
C4-C12				20	%

Type: MDL **Created:** 9/1/2005 10:54:00AM **Active:** 6/14/2005 10:56:11AM **Exp:**
Initial Prep: 5 **Unit:** g **Final Prep:** 10 **Unit:** mL **Fac:** 2

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Chlorobenzene-d5					ug/Kg
C4-C10	0.1				ug/Kg
Hexachloroethane	1.02				ug/Kg
1,2-Dichlorobenzene	0.36				ug/Kg
Carbon disulfide	0.46				ug/Kg
n-Heptane					ug/Kg
Iodomethane	0.60				ug/Kg
n-Decane					ug/Kg
2-Chlorotoluene	0.28				ug/Kg
1,4-Difluorobenzene					ug/Kg
trans-1,4-Dichloro-2-butene	0.60				ug/Kg
1,2,3-Trichloropropane	0.31				ug/Kg
Carbon tetrachloride	0.14				ug/Kg
2-Hexanone	2.62				ug/Kg
Xylenes, Total	0.52				ug/Kg
3-Chloro-1-propene	0.1				ug/Kg
cis-1,3-Dichloropropene	0.33				ug/Kg
Chlorobenzene	0.35				ug/Kg
Vinyl chloride	0.53				ug/Kg
Propionitrile	2.90				ug/Kg
sec-Butylbenzene	0.43				ug/Kg
Dibromomethane	0.29				ug/Kg
C13					ug/Kg
C6-C12	0.1				ug/Kg
Acetone	6.10				ug/Kg
Isopropyl alcohol	2.86				ug/Kg
m-Xylene & p-Xylene	0.33				ug/Kg
Isopropyl ether	0.1				ug/Kg
1,2,4-Trichlorobenzene	0.25				ug/Kg
2-Nitropropane	0.1				ug/Kg
2-Methyl-2-propanol	0.1				ug/Kg
Styrene	0.18				ug/Kg
Chlorobromomethane	0.38				ug/Kg
Dichlorobromomethane	0.38				ug/Kg
1,3-Dichlorobenzene	0.22				ug/Kg
Benzene	0.30				ug/Kg

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Full List Soils
TestAmerica San Francisco

Type: MDL **Created:** 9/1/2005 10:54:00AM **Active:** 6/14/2005 10:56:11AM **Exp:**
Initial Prep: 5 **Unit:** g **Final Prep:** 10 **Unit:** mL **Fac:** 2

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Chloroethane	0.45				ug/Kg
2-Chloroethyl vinyl ether	0.69				ug/Kg
trans-1,3-Dichloropropene	0.15				ug/Kg
Acrolein	1.26				ug/Kg
1,2,3-Trichlorobenzene	0.42				ug/Kg
N-Propylbenzene	0.37				ug/Kg
o-Xylene	0.19				ug/Kg
Tetrahydrofuran	0.72				ug/Kg
C6-C10	0.1				ug/Kg
Isobutyl alcohol	5.78				ug/Kg
1,4-Dichlorobenzene-d4					ug/Kg
2-Chloro-1,3-butadiene	0.1				ug/Kg
Ethanol	18.0				ug/Kg
4-Bromofluorobenzene	0.1				ug/Kg
4-Isopropyltoluene	0.41				ug/Kg
Pentane					ug/Kg
Methacrylonitrile	0.52				ug/Kg
n-Butylbenzene	0.40				ug/Kg
1,1-Dichloropropene	0.33				ug/Kg
Paraldehyde	2.34				ug/Kg
cis-1,2-Dichloroethene	0.37				ug/Kg
1,2,3-Trimethylbenzene					ug/Kg
Fluorobenzene					ug/Kg
2-Methylpentane					ug/Kg
1,1,2,2-Tetrachloroethane	0.31				ug/Kg
1,2,4-Trimethylbenzene	0.37				ug/Kg
Toluene	0.20				ug/Kg
Hexane					ug/Kg
Naphthalene	0.80				ug/Kg
Cyclohexanone	0.40				ug/Kg
1,3,5-Trimethylbenzene	0.31				ug/Kg
1,3-Dichloropropane	0.39				ug/Kg
Chloroform	0.28				ug/Kg
4-Chlorotoluene	0.27				ug/Kg
Chlorodibromomethane	0.24				ug/Kg
Dichlorodifluoromethane	0.48				ug/Kg
1,1,2-Trichloroethane	0.37				ug/Kg
BFB					ug/Kg
Tert-amyl methyl ether	0.1				ug/Kg
1,2-Dichlorobenzene-d4					ug/Kg
Toluene-d8 (Surr)	0.1				ug/Kg
tert-Butylbenzene	0.16				ug/Kg
Chloromethane	0.48				ug/Kg
Methylene Chloride	0.65				ug/Kg
Dibromofluoromethane (Surr)					ug/Kg
Methyl methacrylate	0.56				ug/Kg
1,1-Dichloroethene	0.31				ug/Kg
Isopropylbenzene	0.52				ug/Kg
C7-C12	0.1				ug/Kg

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Full List Soils
TestAmerica San Francisco

Type: MDL **Created:** 9/1/2005 10:54:00AM **Active:** 6/14/2005 10:56:11AM **Exp:**
Initial Prep: 5 **Unit:** g **Final Prep:** 10 **Unit:** mL **Fac:** 2

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
1,2-Dichloroethane	0.10				ug/Kg
1,2-Dichloroethane-d4 (Surr)	0.1				ug/Kg
Acrylonitrile	0.68				ug/Kg
4-Methyl-2-pentanone (MIBK)	2.62				ug/Kg
Tetrachloroethene	0.27				ug/Kg
C5-C12	0.1				ug/Kg
1,1,1-Trichloroethane	0.54				ug/Kg
2,2-Dichloropropane	0.31				ug/Kg
Benzyl chloride	0.16				ug/Kg
Ethylene Dibromide	1.43				ug/Kg
1,1,2-Trichloro-1,2,2-trifluoroethane	2.081				ug/Kg
Bromoform	0.31				ug/Kg
1,2-Dibromo-3-Chloropropane	0.58				ug/Kg
Trichlorofluoromethane	0.20				ug/Kg
Trichloroethene	0.31				ug/Kg
Tentatively Identified Compound	0.1				ug/Kg
Bromobenzene	0.40				ug/Kg
2-Butanone (MEK)	3.96				ug/Kg
1,2-Dichloropropane	0.25				ug/Kg
1,4-Dioxane	8.44				ug/Kg
Tert-butyl ethyl ether	0.1				ug/Kg
Methyl tert-butyl ether	0.26				ug/Kg
1,4-Dichlorobenzene	0.36				ug/Kg
1,1,1,2-Tetrachloroethane	0.28				ug/Kg
Ethylbenzene	0.36				ug/Kg
TBA-d9 (IS)					ug/Kg
trans-1,2-Dichloroethene	0.16				ug/Kg
Hexachlorobutadiene	0.36				ug/Kg
Dodecane					ug/Kg
1,1-Dichloroethane	0.27				ug/Kg
Butane					ug/Kg
Dioxane-d8 (IS)	0.1				ug/Kg
Acetonitrile	7.28				ug/Kg
Vinyl acetate	1.06				ug/Kg
Ethyl methacrylate	0.33				ug/Kg
Bromomethane	0.32				ug/Kg
Epichlorohydrin	5.0				ug/Kg
C4-C12	0.1				ug/Kg

Type: MDLV **Created:** 7/20/2009 3:04:00PM **Active:** 7/20/2008 3:03:58PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Chlorobenzene-d5		1	500		%
C4-C10		1	500		%
Hexachloroethane		1	500		%
1,2-Dichlorobenzene		1	500		%
Carbon disulfide		1	500		%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Full List Soils
TestAmerica San Francisco

Type: MDLV **Created:** 7/20/2009 3:04:00PM **Active:** 7/20/2008 3:03:58PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
n-Heptane		1	500		%
Iodomethane		1	500		%
n-Decane		1	500		%
2-Chlorotoluene		1	500		%
1,4-Difluorobenzene		1	500		%
trans-1,4-Dichloro-2-butene		1	500		%
1,2,3-Trichloropropane		1	500		%
Carbon tetrachloride		1	500		%
2-Hexanone		1	500		%
Xylenes, Total		1	500		%
3-Chloro-1-propene		1	500		%
cis-1,3-Dichloropropene		1	500		%
Chlorobenzene		1	500		%
Vinyl chloride		1	500		%
Propionitrile		1	500		%
sec-Butylbenzene		1	500		%
Dibromomethane		1	500		%
C13		1	500		%
C6-C12		1	500		%
Acetone		1	500		%
Isopropyl alcohol		1	500		%
m-Xylene & p-Xylene		1	500		%
Isopropyl ether		1	500		%
1,2,4-Trichlorobenzene		1	500		%
2-Nitropropane		1	500		%
2-Methyl-2-propanol		1	500		%
Styrene		1	500		%
Chlorobromomethane		1	500		%
Dichlorobromomethane		1	500		%
1,3-Dichlorobenzene		1	500		%
Benzene		1	500		%
Chloroethane		1	500		%
2-Chloroethyl vinyl ether		1	500		%
trans-1,3-Dichloropropene		1	500		%
Acrolein		1	500		%
1,2,3-Trichlorobenzene		1	500		%
N-Propylbenzene		1	500		%
o-Xylene		1	500		%
Tetrahydrofuran		1	500		%
C6-C10		1	500		%
Isobutyl alcohol		1	500		%
1,4-Dichlorobenzene-d4		1	500		%
2-Chloro-1,3-butadiene		1	500		%
Ethanol		1	500		%
4-Bromofluorobenzene		1	500		%
4-Isopropyltoluene		1	500		%
Pentane		1	500		%
Methacrylonitrile		1	500		%
n-Butylbenzene		1	500		%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Full List Soils
TestAmerica San Francisco

Type: MDLV **Created:** 7/20/2009 3:04:00PM **Active:** 7/20/2008 3:03:58PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
1,1-Dichloropropene		1	500		%
Paraldehyde		1	500		%
cis-1,2-Dichloroethene		1	500		%
1,2,3-Trimethylbenzene		1	500		%
Fluorobenzene		1	500		%
2-Methylpentane		1	500		%
1,1,2,2-Tetrachloroethane		1	500		%
1,2,4-Trimethylbenzene		1	500		%
Toluene		1	500		%
Hexane		1	500		%
Naphthalene		1	500		%
Cyclohexanone		1	500		%
1,3,5-Trimethylbenzene		1	500		%
1,3-Dichloropropane		1	500		%
Chloroform		1	500		%
4-Chlorotoluene		1	500		%
Chlorodibromomethane		1	500		%
Dichlorodifluoromethane		1	500		%
1,1,2-Trichloroethane		1	500		%
BFB		1	500		%
Tert-amyl methyl ether		1	500		%
1,2-Dichlorobenzene-d4		1	500		%
Toluene-d8 (Surr)		1	500		%
tert-Butylbenzene		1	500		%
Chloromethane		1	500		%
Methylene Chloride		1	500		%
Dibromofluoromethane (Surr)		1	500		%
Methyl methacrylate		1	500		%
1,1-Dichloroethene		1	500		%
Isopropylbenzene		1	500		%
C7-C12		1	500		%
1,2-Dichloroethane		1	500		%
1,2-Dichloroethane-d4 (Surr)		1	500		%
Acrylonitrile		1	500		%
4-Methyl-2-pentanone (MIBK)		1	500		%
Tetrachloroethene		1	500		%
C5-C12		1	500		%
1,1,1-Trichloroethane		1	500		%
2,2-Dichloropropane		1	500		%
Benzyl chloride		1	500		%
Ethylene Dibromide		1	500		%
1,1,2-Trichloro-1,2,2-trifluoroethane		1	500		%
Bromoform		1	500		%
1,2-Dibromo-3-Chloropropane		1	500		%
Trichlorofluoromethane		1	500		%
Trichloroethene		1	500		%
Tentatively Identified Compound		1	500		%
Bromobenzene		1	500		%
2-Butanone (MEK)		1	500		%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Full List Soils
TestAmerica San Francisco

Type: MDLV **Created:** 7/20/2009 3:04:00PM **Active:** 7/20/2008 3:03:58PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
1,2-Dichloropropane		1	500		%
1,4-Dioxane		1	500		%
Tert-butyl ethyl ether		1	500		%
Methyl tert-butyl ether		1	500		%
1,4-Dichlorobenzene		1	500		%
1,1,1,2-Tetrachloroethane		1	500		%
Ethylbenzene		1	500		%
TBA-d9 (IS)		1	500		%
trans-1,2-Dichloroethene		1	500		%
Hexachlorobutadiene		1	500		%
Dodecane		1	500		%
1,1-Dichloroethane		1	500		%
Butane		1	500		%
Dioxane-d8 (IS)		1	500		%
Acetonitrile		1	500		%
Vinyl acetate		1	500		%
Ethyl methacrylate		1	500		%
Bromomethane		1	500		%
Epichlorohydrin		1	500		%
C4-C12		1	500		%

Type: MSREC **Created:** 6/11/2008 12:35:00PM **Active:** 6/11/2008 12:35:25PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Chlorobenzene-d5		70	130		%
C4-C10		70	130		%
Hexachloroethane		70	130		%
1,2-Dichlorobenzene		70	130		%
Carbon disulfide		70	130		%
n-Heptane		70	130		%
Iodomethane		70	130		%
n-Decane		70	130		%
2-Chlorotoluene		70	130		%
1,4-Difluorobenzene		70	130		%
trans-1,4-Dichloro-2-butene		70	130		%
1,2,3-Trichloropropane		70	130		%
Carbon tetrachloride		70	130		%
2-Hexanone		70	130		%
Xylenes, Total		70	130		%
3-Chloro-1-propene		70	130		%
cis-1,3-Dichloropropene		70	130		%
Chlorobenzene		70	130		%
Vinyl chloride		70	130		%
Propionitrile		70	130		%
sec-Butylbenzene		70	130		%
Dibromomethane		70	130		%
C13		70	130		%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Full List Soils
TestAmerica San Francisco

Type: MSREC **Created:** 6/11/2008 12:35:00PM **Active:** 6/11/2008 12:35:25PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
C6-C12		70	130		%
Acetone		70	130		%
Isopropyl alcohol		70	130		%
m-Xylene & p-Xylene		70	130		%
Isopropyl ether		70	130		%
1,2,4-Trichlorobenzene		70	130		%
2-Nitropropane		70	130		%
2-Methyl-2-propanol		70	130		%
Styrene		70	130		%
Chlorobromomethane		70	130		%
Dichlorobromomethane		70	130		%
1,3-Dichlorobenzene		70	130		%
Benzene		70	130		%
Chloroethane		70	130		%
2-Chloroethyl vinyl ether		70	130		%
trans-1,3-Dichloropropene		70	130		%
Acrolein		70	130		%
1,2,3-Trichlorobenzene		70	130		%
N-Propylbenzene		70	130		%
o-Xylene		70	130		%
Tetrahydrofuran		70	130		%
C6-C10		70	130		%
Isobutyl alcohol		70	130		%
1,4-Dichlorobenzene-d4		70	130		%
2-Chloro-1,3-butadiene		70	130		%
Ethanol		70	130		%
4-Bromofluorobenzene		70	130		%
4-Isopropyltoluene		70	130		%
Pentane		70	130		%
Methacrylonitrile		70	130		%
n-Butylbenzene		70	130		%
1,1-Dichloropropene		70	130		%
Paraldehyde		70	130		%
cis-1,2-Dichloroethene		70	130		%
1,2,3-Trimethylbenzene		70	130		%
Fluorobenzene		70	130		%
2-Methylpentane		70	130		%
1,1,2,2-Tetrachloroethane		70	130		%
1,2,4-Trimethylbenzene		70	130		%
Toluene		70	130		%
Hexane		70	130		%
Naphthalene		70	130		%
Cyclohexanone		70	130		%
1,3,5-Trimethylbenzene		70	130		%
1,3-Dichloropropane		70	130		%
Chloroform		70	130		%
4-Chlorotoluene		70	130		%
Chlorodibromomethane		70	130		%
Dichlorodifluoromethane		70	130		%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Full List Soils
TestAmerica San Francisco

Type: MSREC **Created:** 6/11/2008 12:35:00PM **Active:** 6/11/2008 12:35:25PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
1,1,2-Trichloroethane		70	130		%
BFB		70	130		%
Tert-amyl methyl ether		70	130		%
1,2-Dichlorobenzene-d4		70	130		%
Toluene-d8 (Surr)		70	130		%
tert-Butylbenzene		70	130		%
Chloromethane		70	130		%
Methylene Chloride		70	130		%
Dibromofluoromethane (Surr)		70	130		%
Methyl methacrylate		70	130		%
1,1-Dichloroethene		70	130		%
Isopropylbenzene		70	130		%
C7-C12		70	130		%
1,2-Dichloroethane		70	130		%
1,2-Dichloroethane-d4 (Surr)		70	130		%
Acrylonitrile		70	130		%
4-Methyl-2-pentanone (MIBK)		70	130		%
Tetrachloroethene		70	130		%
C5-C12		70	130		%
1,1,1-Trichloroethane		70	130		%
2,2-Dichloropropane		70	130		%
Benzyl chloride		70	130		%
Ethylene Dibromide		70	130		%
1,1,2-Trichloro-1,2,2-trifluoroethane		70	130		%
Bromoform		70	130		%
1,2-Dibromo-3-Chloropropane		70	130		%
Trichlorofluoromethane		70	130		%
Trichloroethene		70	130		%
Tentatively Identified Compound		70	130		%
Bromobenzene		70	130		%
2-Butanone (MEK)		70	130		%
1,2-Dichloropropane		70	130		%
1,4-Dioxane		70	130		%
Tert-butyl ethyl ether		70	130		%
Methyl tert-butyl ether		70	130		%
1,4-Dichlorobenzene		70	130		%
1,1,1,2-Tetrachloroethane		70	130		%
Ethylbenzene		70	130		%
TBA-d9 (IS)		70	130		%
trans-1,2-Dichloroethene		70	130		%
Hexachlorobutadiene		70	130		%
Dodecane		70	130		%
1,1-Dichloroethane		70	130		%
Butane		70	130		%
Dioxane-d8 (IS)		70	130		%
Acetonitrile		70	130		%
Vinyl acetate		70	130		%
Ethyl methacrylate		70	130		%
Bromomethane		70	130		%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Full List Soils
TestAmerica San Francisco

Type: MSREC **Created:** 6/11/2008 12:35:00PM **Active:** 6/11/2008 12:35:25PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Epichlorohydrin		70	130		%
C4-C12		70	130		%

Type: MSRPD **Created:** 11/15/2007 5:35:00PM **Active:** 11/15/2007 5:36:39PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Chlorobenzene-d5				20	%
C4-C10				20	%
Hexachloroethane				20	%
1,2-Dichlorobenzene				20	%
Carbon disulfide				20	%
n-Heptane				20	%
Iodomethane				20	%
n-Decane				20	%
2-Chlorotoluene				20	%
1,4-Difluorobenzene				20	%
trans-1,4-Dichloro-2-butene				20	%
1,2,3-Trichloropropane				20	%
Carbon tetrachloride				20	%
2-Hexanone				20	%
Xylenes, Total				20	%
3-Chloro-1-propene				20	%
cis-1,3-Dichloropropene				20	%
Chlorobenzene				20	%
Vinyl chloride				20	%
Propionitrile				20	%
sec-Butylbenzene				20	%
Dibromomethane				20	%
C13				20	%
C6-C12				20	%
Acetone				20	%
Isopropyl alcohol				20	%
m-Xylene & p-Xylene				20	%
Isopropyl ether				20	%
1,2,4-Trichlorobenzene				20	%
2-Nitropropane				20	%
2-Methyl-2-propanol				20	%
Styrene				20	%
Chlorobromomethane				20	%
Dichlorobromomethane				20	%
1,3-Dichlorobenzene				20	%
Benzene				20	%
Chloroethane				20	%
2-Chloroethyl vinyl ether				20	%
trans-1,3-Dichloropropene				20	%
Acrolein				20	%
1,2,3-Trichlorobenzene				20	%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Full List Soils
TestAmerica San Francisco

Type: MSRPD **Created:** 11/15/2007 5:35:00PM **Active:** 11/15/2007 5:36:39PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
N-Propylbenzene				20	%
o-Xylene				20	%
Tetrahydrofuran				20	%
C6-C10				20	%
Isobutyl alcohol				20	%
1,4-Dichlorobenzene-d4				20	%
2-Chloro-1,3-butadiene				20	%
Ethanol				20	%
4-Bromofluorobenzene				20	%
4-Isopropyltoluene				20	%
Pentane				20	%
Methacrylonitrile				20	%
n-Butylbenzene				20	%
1,1-Dichloropropene				20	%
Paraldehyde				20	%
cis-1,2-Dichloroethene				20	%
1,2,3-Trimethylbenzene				20	%
Fluorobenzene				20	%
2-Methylpentane				20	%
1,1,2,2-Tetrachloroethane				20	%
1,2,4-Trimethylbenzene				20	%
Toluene				20	%
Hexane				20	%
Naphthalene				20	%
Cyclohexanone				20	%
1,3,5-Trimethylbenzene				20	%
1,3-Dichloropropane				20	%
Chloroform				20	%
4-Chlorotoluene				20	%
Chlorodibromomethane				20	%
Dichlorodifluoromethane				20	%
1,1,2-Trichloroethane				20	%
BFB				20	%
Tert-amyl methyl ether				20	%
1,2-Dichlorobenzene-d4				20	%
Toluene-d8 (Surr)				20	%
tert-Butylbenzene				20	%
Chloromethane				20	%
Methylene Chloride				20	%
Dibromofluoromethane (Surr)				20	%
Methyl methacrylate				20	%
1,1-Dichloroethene				20	%
Isopropylbenzene				20	%
C7-C12				20	%
1,2-Dichloroethane				20	%
1,2-Dichloroethane-d4 (Surr)				20	%
Acrylonitrile				20	%
4-Methyl-2-pentanone (MIBK)				20	%
Tetrachloroethene				20	%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Full List Soils
TestAmerica San Francisco

Type: MSRPD **Created:** 11/15/2007 5:35:00PM **Active:** 11/15/2007 5:36:39PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
C5-C12				20	%
1,1,1-Trichloroethane				20	%
2,2-Dichloropropane				20	%
Benzyl chloride				20	%
Ethylene Dibromide				20	%
1,1,2-Trichloro-1,2,2-trifluoroethane				20	%
Bromoform				20	%
1,2-Dibromo-3-Chloropropane				20	%
Trichlorofluoromethane				20	%
Trichloroethene				20	%
Tentatively Identified Compound				20	%
Bromobenzene				20	%
2-Butanone (MEK)				20	%
1,2-Dichloropropane				20	%
1,4-Dioxane				20	%
Tert-butyl ethyl ether				20	%
Methyl tert-butyl ether				20	%
1,4-Dichlorobenzene				20	%
1,1,1,2-Tetrachloroethane				20	%
Ethylbenzene				20	%
TBA-d9 (IS)				20	%
trans-1,2-Dichloroethene				20	%
Hexachlorobutadiene				20	%
Dodecane				20	%
1,1-Dichloroethane				20	%
Butane				20	%
Dioxane-d8 (IS)				20	%
Acetonitrile				20	%
Vinyl acetate				20	%
Ethyl methacrylate				20	%
Bromomethane				20	%
Epichlorohydrin				20	%
C4-C12				20	%

Type: RL **Created:** 9/1/2005 10:55:00AM **Active:** 6/13/2005 10:56:04AM **Exp:**
Initial Prep: 5 **Unit:** g **Final Prep:** 10 **Unit:** mL **Fac:** 2

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Chlorobenzene-d5	0.5				ug/Kg
C4-C10	50				ug/Kg
Hexachloroethane	0.5				ug/Kg
1,2-Dichlorobenzene	5				ug/Kg
Carbon disulfide	5				ug/Kg
n-Heptane	0.5				ug/Kg
Iodomethane	0.5				ug/Kg
n-Decane	0.5				ug/Kg
2-Chlorotoluene	5				ug/Kg
1,4-Difluorobenzene	0.5				ug/Kg

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Full List Soils
TestAmerica San Francisco

Type: RL **Created:** 9/1/2005 10:55:00AM **Active:** 6/13/2005 10:56:04AM **Exp:**
Initial Prep: 5 **Unit:** g **Final Prep:** 10 **Unit:** mL **Fac:** 2

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
trans-1,4-Dichloro-2-butene	0.5				ug/Kg
1,2,3-Trichloropropane	5				ug/Kg
Carbon tetrachloride	5				ug/Kg
2-Hexanone	50				ug/Kg
Xylenes, Total	10				ug/Kg
3-Chloro-1-propene	0.5				ug/Kg
cis-1,3-Dichloropropene	5				ug/Kg
Chlorobenzene	5				ug/Kg
Vinyl chloride	5				ug/Kg
Propionitrile	0.5				ug/Kg
sec-Butylbenzene	5				ug/Kg
Dibromomethane	10				ug/Kg
C13	0.5				ug/Kg
C6-C12	50				ug/Kg
Acetone	50				ug/Kg
Isopropyl alcohol	0.5				ug/Kg
m-Xylene & p-Xylene	5				ug/Kg
Isopropyl ether	0.5				ug/Kg
1,2,4-Trichlorobenzene	5				ug/Kg
2-Nitropropane	0.5				ug/Kg
2-Methyl-2-propanol	0.5				ug/Kg
Styrene	5				ug/Kg
Chlorobromomethane	20				ug/Kg
Dichlorobromomethane	5				ug/Kg
1,3-Dichlorobenzene	5				ug/Kg
Benzene	5				ug/Kg
Chloroethane	10				ug/Kg
2-Chloroethyl vinyl ether	5				ug/Kg
trans-1,3-Dichloropropene	5				ug/Kg
Acrolein	200				ug/Kg
1,2,3-Trichlorobenzene	5				ug/Kg
N-Propylbenzene	5				ug/Kg
o-Xylene	5				ug/Kg
Tetrahydrofuran	10				ug/Kg
C6-C10	50				ug/Kg
Isobutyl alcohol	0.5				ug/Kg
1,4-Dichlorobenzene-d4	0.5				ug/Kg
2-Chloro-1,3-butadiene	0.5				ug/Kg
Ethanol	0.5				ug/Kg
4-Bromofluorobenzene	5				ug/Kg
4-Isopropyltoluene	5				ug/Kg
Pentane	0.5				ug/Kg
Methacrylonitrile	0.5				ug/Kg
n-Butylbenzene	5				ug/Kg
1,1-Dichloropropene	5				ug/Kg
Paraldehyde	0.5				ug/Kg
cis-1,2-Dichloroethene	5				ug/Kg
1,2,3-Trimethylbenzene	0.5				ug/Kg
Fluorobenzene	0.5				ug/Kg

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Full List Soils
TestAmerica San Francisco

Type: RL **Created:** 9/1/2005 10:55:00AM **Active:** 6/13/2005 10:56:04AM **Exp:**
Initial Prep: 5 **Unit:** g **Final Prep:** 10 **Unit:** mL **Fac:** 2

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
2-Methylpentane	0.5				ug/Kg
1,1,2,2-Tetrachloroethane	5				ug/Kg
1,2,4-Trimethylbenzene	5				ug/Kg
Toluene	5				ug/Kg
Hexane	0.5				ug/Kg
Naphthalene	10				ug/Kg
Cyclohexanone	50				ug/Kg
1,3,5-Trimethylbenzene	5				ug/Kg
1,3-Dichloropropane	5				ug/Kg
Chloroform	5				ug/Kg
4-Chlorotoluene	5				ug/Kg
Chlorodibromomethane	5				ug/Kg
Dichlorodifluoromethane	10				ug/Kg
1,1,2-Trichloroethane	5				ug/Kg
BFB	0.5				ug/Kg
Tert-amyl methyl ether	0.5				ug/Kg
1,2-Dichlorobenzene-d4	0.5				ug/Kg
Toluene-d8 (Surr)	5				ug/Kg
tert-Butylbenzene	5				ug/Kg
Chloromethane	10				ug/Kg
Methylene Chloride	10				ug/Kg
Dibromofluoromethane (Surr)	0.5				ug/Kg
Methyl methacrylate	0.5				ug/Kg
1,1-Dichloroethene	5				ug/Kg
Isopropylbenzene	5				ug/Kg
C7-C12	50				ug/Kg
1,2-Dichloroethane	5				ug/Kg
1,2-Dichloroethane-d4 (Surr)	5				ug/Kg
Acrylonitrile	200				ug/Kg
4-Methyl-2-pentanone (MIBK)	50				ug/Kg
Tetrachloroethene	5				ug/Kg
C5-C12	50				ug/Kg
1,1,1-Trichloroethane	5				ug/Kg
2,2-Dichloropropane	5				ug/Kg
Benzyl chloride	0.5				ug/Kg
Ethylene Dibromide	5				ug/Kg
1,1,2-Trichloro-1,2,2-trifluoroethane	5				ug/Kg
Bromoform	5				ug/Kg
1,2-Dibromo-3-Chloropropane	5				ug/Kg
Trichlorofluoromethane	5				ug/Kg
Trichloroethene	5				ug/Kg
Tentatively Identified Compound	0.5				ug/Kg
Bromobenzene	5				ug/Kg
2-Butanone (MEK)	50				ug/Kg
1,2-Dichloropropane	5				ug/Kg
1,4-Dioxane	5				ug/Kg
Tert-butyl ethyl ether	0.5				ug/Kg
Methyl tert-butyl ether	5				ug/Kg
1,4-Dichlorobenzene	5				ug/Kg

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Full List Soils
TestAmerica San Francisco

Type: RL **Created:** 9/1/2005 10:55:00AM **Active:** 6/13/2005 10:56:04AM **Exp:**
Initial Prep: 5 **Unit:** g **Final Prep:** 10 **Unit:** mL **Fac:** 2

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
1,1,1,2-Tetrachloroethane	5				ug/Kg
Ethylbenzene	5				ug/Kg
TBA-d9 (IS)	0.5				ug/Kg
trans-1,2-Dichloroethene	5				ug/Kg
Hexachlorobutadiene	5				ug/Kg
Dodecane	0.5				ug/Kg
1,1-Dichloroethane	5				ug/Kg
Butane	0.5				ug/Kg
Dioxane-d8 (IS)	0.5				ug/Kg
Acetonitrile	0.5				ug/Kg
Vinyl acetate	50				ug/Kg
Ethyl methacrylate	0.5				ug/Kg
Bromomethane	10				ug/Kg
Epichlorohydrin	5				ug/Kg
C4-C12	50				ug/Kg

Type: SUREC **Created:** 6/3/2008 1:50:00PM **Active:** 6/9/2008 12:00:00AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Chlorobenzene-d5					%
C4-C10					%
Hexachloroethane					%
1,2-Dichlorobenzene					%
Carbon disulfide					%
n-Heptane					%
Iodomethane					%
n-Decane					%
2-Chlorotoluene					%
1,4-Difluorobenzene		70	130		%
trans-1,4-Dichloro-2-butene					%
1,2,3-Trichloropropane					%
Carbon tetrachloride					%
2-Hexanone					%
Xylenes, Total					%
3-Chloro-1-propene					%
cis-1,3-Dichloropropene					%
Chlorobenzene					%
Vinyl chloride					%
Propionitrile					%
sec-Butylbenzene					%
Dibromomethane					%
C13					%
C6-C12					%
Acetone					%
Isopropyl alcohol					%
m-Xylene & p-Xylene					%
Isopropyl ether					%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Full List Soils
TestAmerica San Francisco

Type: SUREC **Created:** 6/3/2008 1:50:00PM **Active:** 6/9/2008 12:00:00AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
1,2,4-Trichlorobenzene					%
2-Nitropropane					%
2-Methyl-2-propanol					%
Styrene					%
Chlorobromomethane					%
Dichlorobromomethane					%
1,3-Dichlorobenzene					%
Benzene					%
Chloroethane					%
2-Chloroethyl vinyl ether					%
trans-1,3-Dichloropropene					%
Acrolein					%
1,2,3-Trichlorobenzene					%
N-Propylbenzene					%
o-Xylene					%
Tetrahydrofuran					%
C6-C10					%
Isobutyl alcohol					%
1,4-Dichlorobenzene-d4					%
2-Chloro-1,3-butadiene					%
Ethanol					%
4-Bromofluorobenzene		52	130		%
4-Isopropyltoluene					%
Pentane					%
Methacrylonitrile					%
n-Butylbenzene					%
1,1-Dichloropropene					%
Paraldehyde					%
cis-1,2-Dichloroethene					%
1,2,3-Trimethylbenzene					%
Fluorobenzene					%
2-Methylpentane					%
1,1,2,2-Tetrachloroethane					%
1,2,4-Trimethylbenzene					%
Toluene					%
Hexane					%
Naphthalene					%
Cyclohexanone					%
1,3,5-Trimethylbenzene					%
1,3-Dichloropropane					%
Chloroform					%
4-Chlorotoluene					%
Chlorodibromomethane					%
Dichlorodifluoromethane					%
1,1,2-Trichloroethane					%
BFB		70	130		%
Tert-amyl methyl ether					%
1,2-Dichlorobenzene-d4		70	130		%
Toluene-d8 (Surr)		58	130		%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Full List Soils
TestAmerica San Francisco

Type: SUREC **Created:** 6/3/2008 1:50:00PM **Active:** 6/9/2008 12:00:00AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
tert-Butylbenzene					%
Chloromethane					%
Methylene Chloride					%
Dibromofluoromethane (Surr)					%
Methyl methacrylate					%
1,1-Dichloroethene					%
Isopropylbenzene					%
C7-C12					%
1,2-Dichloroethane					%
1,2-Dichloroethane-d4 (Surr)		67	130		%
Acrylonitrile					%
4-Methyl-2-pentanone (MIBK)					%
Tetrachloroethene					%
C5-C12					%
1,1,1-Trichloroethane					%
2,2-Dichloropropane					%
Benzyl chloride					%
Ethylene Dibromide					%
1,1,2-Trichloro-1,2,2-trifluoroethane					%
Bromoform					%
1,2-Dibromo-3-Chloropropane					%
Trichlorofluoromethane					%
Trichloroethene					%
Tentatively Identified Compound					%
Bromobenzene					%
2-Butanone (MEK)					%
1,2-Dichloropropane					%
1,4-Dioxane					%
Tert-butyl ethyl ether					%
Methyl tert-butyl ether					%
1,4-Dichlorobenzene					%
1,1,1,2-Tetrachloroethane					%
Ethylbenzene					%
TBA-d9 (IS)					%
trans-1,2-Dichloroethene					%
Hexachlorobutadiene					%
Dodecane					%
1,1-Dichloroethane					%
Butane					%
Dioxane-d8 (IS)					%
Acetonitrile					%
Vinyl acetate					%
Ethyl methacrylate					%
Bromomethane					%
Epichlorohydrin					%
C4-C12					%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Waters, Air and Leaches
TestAmerica San Francisco

Type: LCSREC **Created:** 6/8/2009 4:09:00PM **Active:** 6/9/2009 12:00:00AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
1,1,1,2-Tetrachloroethane		80	128		%
1,1,1-Trichloroethane		74	135		%
1,1,2,2-Tetrachloroethane		72	146		%
1,1,2-Trichloro-1,2,2-trifluoroethane		66	132		%
1,1,2-Trichloroethane		67	151		%
1,1-Dichloroethane		80	126		%
1,1-Dichloroethene		76	128		%
1,1-Dichloropropene		76	140		%
1,2,3-Trichlorobenzene		66	153		%
1,2,3-Trichloropropane		76	142		%
1,2,3-Trimethylbenzene		70	130		%
1,2,4-Trichlorobenzene		70	143		%
1,2,4-Trimethylbenzene		74	151		%
1,2-Dibromo-3-Chloropropane		64	136		%
1,2-Dichlorobenzene		80	127		%
1,2-Dichlorobenzene-d4		70	130		%
1,2-Dichloroethane		70	133		%
1,2-Dichloroethane-d4 (Surr)		70	130		%
1,2-Dichloropropane		75	138		%
1,3,5-Trimethylbenzene		75	144		%
1,3-Dichlorobenzene		80	128		%
1,3-Dichloropropane		77	140		%
1,4-Dichlorobenzene		80	122		%
1,4-Dichlorobenzene-d4		70	130		%
1,4-Difluorobenzene		70	130		%
1,4-Dioxane		22	37		%
2,2-Dichloropropane		78	140		%
2-Butanone (MEK)		60	140		%
2-Chloro-1,3-butadiene		70	130		%
2-Chloroethyl vinyl ether		34	140		%
2-Chlorotoluene		76	142		%
2-Hexanone		60	140		%
2-Methyl-2-propanol		70	130		%
2-Methylpentane		70	130		%
2-Nitropropane		35	133		%
3-Chloro-1-propene		70	130		%
4-Bromofluorobenzene		70	130		%
4-Chlorotoluene		78	140		%
4-Isopropyltoluene		73	148		%
4-Methyl-2-pentanone (MIBK)		40	168		%
Acetone		60	140		%
Acetonitrile		57	164		%
Acrolein		62	136		%
Acrylonitrile		67	148		%
Benzene		80	130		%
Benzyl chloride		95	132		%
BFB		70	130		%
Bromobenzene		80	128		%
Bromoform		56	144		%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Waters, Air and Leaches
TestAmerica San Francisco

Type: LCSREC **Created:** 6/8/2009 4:09:00PM **Active:** 6/9/2009 12:00:00AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Bromomethane		23	171		%
Butane		70	130		%
C13		70	130		%
C4-C10		70	130		%
C4-C12		70	130		%
C5-C12		70	130		%
C6-C10		70	130		%
C6-C12		70	130		%
C7-C12		70	130		%
Carbon disulfide		38	158		%
Carbon tetrachloride		69	136		%
Chlorobenzene		80	122		%
Chlorobenzene-d5		70	130		%
Chlorobromomethane		80	126		%
Chlorodibromomethane		68	137		%
Chloroethane		51	149		%
Chloroform		78	129		%
Chloromethane		52	136		%
cis-1,2-Dichloroethene		80	136		%
cis-1,3-Dichloropropene		72	148		%
Cyclohexanone		70	130		%
Dibromofluoromethane (Surr)		70	130		%
Dibromomethane		74	137		%
Dichlorobromomethane		74	140		%
Dichlorodifluoromethane		38	142		%
Dioxane-d8 (IS)		70	130		%
Dodecane		70	130		%
Epichlorohydrin		35	169		%
Ethanol		66	160		%
Ethyl methacrylate		80	125		%
Ethylbenzene		80	139		%
Ethylene Dibromide		70	143		%
Fluorobenzene		70	130		%
Hexachlorobutadiene		75	138		%
Hexachloroethane		72	132		%
Hexane		70	130		%
Iodomethane		58	139		%
Isobutyl alcohol		76	132		%
Isopropyl alcohol		78	130		%
Isopropyl ether		80	139		%
Isopropylbenzene		80	120		%
m-Xylene & p-Xylene		70	130		%
Methacrylonitrile		80	155		%
Methyl methacrylate		83	126		%
Methyl tert-butyl ether		66	138		%
Methylene Chloride		80	128		%
n-Butylbenzene		67	160		%
n-Decane		70	130		%
n-Heptane		70	130		%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Waters, Air and Leaches
TestAmerica San Francisco

Type: LCSREC **Created:** 6/8/2009 4:09:00PM **Active:** 6/9/2009 12:00:00AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
N-Propylbenzene		78	144		%
Naphthalene		56	156		%
o-Xylene		80	138		%
Paraldehyde		70	130		%
Pentane		70	130		%
Propionitrile		79	133		%
sec-Butylbenzene		80	144		%
Styrene		73	146		%
TBA-d9 (IS)		70	130		%
Tentatively Identified Compound		70	130		%
Tert-amyl methyl ether		80	131		%
Tert-butyl ethyl ether		70	141		%
tert-Butylbenzene		80	141		%
Tetrachloroethene		80	134		%
Tetrahydrofuran		61	141		%
Toluene		80	126		%
Toluene-d8 (Surr)		70	130		%
trans-1,2-Dichloroethene		80	125		%
trans-1,3-Dichloropropene		74	137		%
trans-1,4-Dichloro-2-butene		62	124		%
Trichloroethene		72	138		%
Trichlorofluoromethane		62	136		%
Vinyl acetate		40	173		%
Vinyl chloride		58	147		%
Xylenes, Total		70	130		%

Type: LCSRPD **Created:** 6/8/2009 4:09:00PM **Active:** 6/9/2009 12:00:00AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Xylenes, Total					%
Vinyl chloride				20	%
Vinyl acetate				20	%
Trichlorofluoromethane				20	%
trans-1,4-Dichloro-2-butene				20	%
Trichloroethene				20	%
trans-1,3-Dichloropropene				20	%
trans-1,2-Dichloroethene				20	%
Toluene-d8 (Surr)					%
Toluene				20	%
Tetrahydrofuran				20	%
Tetrachloroethene				20	%
tert-Butylbenzene				20	%
Tert-amyl methyl ether				20	%
Tert-butyl ethyl ether				20	%
Tentatively Identified Compound					%
Styrene				20	%
TBA-d9 (IS)				20	%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Waters, Air and Leaches
TestAmerica San Francisco

Type: LCSRPD **Created:** 6/8/2009 4:09:00PM **Active:** 6/9/2009 12:00:00AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
sec-Butylbenzene				20	%
o-Xylene				20	%
Propionitrile				20	%
Pentane				20	%
Paraldehyde				20	%
Naphthalene				20	%
N-Propylbenzene				20	%
n-Butylbenzene				20	%
n-Heptane				20	%
n-Decane				20	%
Methylene Chloride				20	%
Methyl tert-butyl ether				20	%
Methacrylonitrile				20	%
Methyl methacrylate				20	%
m-Xylene & p-Xylene					%
Isopropylbenzene				20	%
Isopropyl ether				20	%
Isobutyl alcohol				20	%
Isopropyl alcohol				20	%
Hexachloroethane				20	%
Iodomethane				20	%
Hexane				20	%
Hexachlorobutadiene				20	%
Fluorobenzene				20	%
Ethylene Dibromide				20	%
Ethylbenzene				20	%
Ethyl methacrylate				20	%
Dodecane				20	%
Ethanol				20	%
Epichlorohydrin					%
Dichlorodifluoromethane				20	%
Dioxane-d8 (IS)				20	%
Dibromomethane				20	%
Dichlorobromomethane				20	%
Dibromofluoromethane (Surr)				20	%
Cyclohexanone					%
cis-1,3-Dichloropropene				20	%
cis-1,2-Dichloroethene				20	%
Chloromethane				20	%
Chloroform				20	%
Chlorodibromomethane				20	%
Chloroethane				20	%
Chlorobromomethane				20	%
Chlorobenzene-d5				20	%
Chlorobenzene				20	%
Carbon tetrachloride				20	%
Carbon disulfide				20	%
C7-C12					%
C6-C12					%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Waters, Air and Leaches
TestAmerica San Francisco

Type: LCSRPD **Created:** 6/8/2009 4:09:00PM **Active:** 6/9/2009 12:00:00AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
C5-C12					%
C6-C10					%
C4-C12					%
C4-C10					%
Bromomethane				20	%
C13				20	%
Butane				20	%
Bromoform				20	%
BFB				20	%
Benzyl chloride				20	%
Benzene				20	%
Bromobenzene				20	%
Acrylonitrile				20	%
Acrolein					%
Acetone				20	%
Acetonitrile				20	%
4-Methyl-2-pentanone (MIBK)				20	%
4-Isopropyltoluene				20	%
4-Chlorotoluene				20	%
4-Bromofluorobenzene					%
3-Chloro-1-propene				20	%
2-Nitropropane				20	%
2-Methyl-2-propanol				20	%
2-Methylpentane				20	%
2-Hexanone				20	%
2-Chlorotoluene				20	%
2-Chloroethyl vinyl ether				20	%
2-Chloro-1,3-butadiene				20	%
2-Butanone (MEK)				20	%
2,2-Dichloropropane				20	%
1,4-Dioxane				20	%
1,4-Dichlorobenzene-d4				20	%
1,4-Difluorobenzene				20	%
1,4-Dichlorobenzene				20	%
1,3-Dichloropropane				20	%
1,3-Dichlorobenzene				20	%
1,3,5-Trimethylbenzene				20	%
1,2-Dichloropropane				20	%
1,2-Dichloroethane				20	%
1,2-Dichloroethane-d4 (Surr)					%
1,2-Dichlorobenzene				20	%
1,2-Dichlorobenzene-d4				20	%
1,2-Dibromo-3-Chloropropane				20	%
1,2,4-Trimethylbenzene				20	%
1,2,4-Trichlorobenzene				20	%
1,2,3-Trimethylbenzene				20	%
1,2,3-Trichloropropane				20	%
1,1-Dichloropropene				20	%
1,2,3-Trichlorobenzene				20	%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Waters, Air and Leaches
TestAmerica San Francisco

Type: LCSRPD **Created:** 6/8/2009 4:09:00PM **Active:** 6/9/2009 12:00:00AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
1,1-Dichloroethene				20	%
1,1-Dichloroethane				20	%
1,1,2-Trichloroethane				20	%
1,1,2-Trichloro-1,2,2-trifluoroethane				20	%
1,1,2,2-Tetrachloroethane				20	%
1,1,1-Trichloroethane				20	%
1,1,1,2-Tetrachloroethane				20	%

Type: MDL **Created:** 8/17/2005 11:46:00AM **Active:** 5/10/2005 11:48:33AM **Exp:**
Initial Prep: 40 **Unit:** mL **Final Prep:** 40 **Unit:** mL **Fac:** 1

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
1,1,1-Trichloroethane	0.037				ug/L
1,1,1,2-Tetrachloroethane	0.067				ug/L
1,1,2,2-Tetrachloroethane	0.074				ug/L
1,1,2-Trichloro-1,2,2-trifluoroethane	0.088				ug/L
1,1,2-Trichloroethane	0.107				ug/L
1,1-Dichloroethane	0.046				ug/L
1,1-Dichloroethene	0.054				ug/L
1,1-Dichloropropene	0.050				ug/L
1,2,3-Trichlorobenzene	0.212				ug/L
1,2,3-Trichloropropane	0.070				ug/L
1,2,3-Trimethylbenzene	0.05				ug/L
1,2,4-Trichlorobenzene	0.161				ug/L
1,2,4-Trimethylbenzene	0.045				ug/L
1,2-Dibromo-3-Chloropropane	0.210				ug/L
1,2-Dichlorobenzene-d4	0.05				ug/L
1,2-Dichlorobenzene	0.053				ug/L
1,2-Dichloroethane-d4 (Surr)					ug/L
1,2-Dichloroethane	0.077				ug/L
1,2-Dichloropropane	0.035				ug/L
1,3,5-Trimethylbenzene	0.057				ug/L
1,3-Dichlorobenzene	0.038				ug/L
1,3-Dichloropropane	0.068				ug/L
1,4-Dichlorobenzene	0.050				ug/L
1,4-Difluorobenzene	0.05				ug/L
1,4-Dichlorobenzene-d4	0.05				ug/L
1,4-Dioxane	25.2				ug/L
2,2-Dichloropropane	0.050				ug/L
2-Butanone (MEK)	8.380				ug/L
2-Chloro-1,3-butadiene	0.05				ug/L
2-Chloroethyl vinyl ether	0.148				ug/L
2-Chlorotoluene	0.061				ug/L
2-Hexanone	2.678				ug/L
2-Methyl-2-propanol	0.768				ug/L
2-Methylpentane	0.05				ug/L
2-Nitropropane	0.178				ug/L
3-Chloro-1-propene	0.05				ug/L

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Waters, Air and Leaches
TestAmerica San Francisco

Type: MDL **Created:** 8/17/2005 11:46:00AM **Active:** 5/10/2005 11:48:33AM **Exp:**
Initial Prep: 40 **Unit:** mL **Final Prep:** 40 **Unit:** mL **Fac:** 1

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
4-Bromofluorobenzene					ug/L
4-Chlorotoluene	0.048				ug/L
4-Isopropyltoluene	0.075				ug/L
4-Methyl-2-pentanone (MIBK)	4.457				ug/L
Acetone	2.783				ug/L
Acetonitrile	2.59				ug/L
Acrolein	0.76				ug/L
Acrylonitrile	0.25				ug/L
Benzene	0.050				ug/L
Bromobenzene	0.056				ug/L
Benzyl chloride	0.0948				ug/L
BFB	0.05				ug/L
Bromoform	0.080				ug/L
Butane	0.05				ug/L
C13	0.05				ug/L
Bromomethane	0.489				ug/L
C4-C10	0.05				ug/L
C4-C12	6.04				ug/L
C6-C10	0.05				ug/L
C5-C12	3.56				ug/L
C6-C12	2.63				ug/L
C7-C12	0.05				ug/L
Carbon disulfide	0.078				ug/L
Carbon tetrachloride	0.072				ug/L
Chlorobenzene-d5	0.05				ug/L
Chlorobenzene	0.051				ug/L
Chlorobromomethane	0.073				ug/L
Chlorodibromomethane	0.100				ug/L
Chloroethane	0.119				ug/L
Chloromethane	0.189				ug/L
Chloroform	0.053				ug/L
cis-1,2-Dichloroethene	0.057				ug/L
cis-1,3-Dichloropropene	0.070				ug/L
Cyclohexanone	26.6				ug/L
Dibromofluoromethane (Surr)	0.05				ug/L
Dibromomethane	0.043				ug/L
Dichlorobromomethane	0.042				ug/L
Dichlorodifluoromethane	0.037				ug/L
Dioxane-d8 (IS)	0.05				ug/L
Epichlorohydrin	5				ug/L
Dodecane	0.05				ug/L
Ethanol	30				ug/L
Ethyl methacrylate	0.0598				ug/L
Ethylbenzene	0.041				ug/L
Ethylene Dibromide	0.075				ug/L
Fluorobenzene	0.05				ug/L
Hexachlorobutadiene	0.273				ug/L
Hexachloroethane	0.131				ug/L
Hexane	0.05				ug/L

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Waters, Air and Leaches
TestAmerica San Francisco

Type: MDL **Created:** 8/17/2005 11:46:00AM **Active:** 5/10/2005 11:48:33AM **Exp:**
Initial Prep: 40 **Unit:** mL **Final Prep:** 40 **Unit:** mL **Fac:** 1

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Iodomethane	0.0609				ug/L
Isopropyl alcohol	1.35				ug/L
Isobutyl alcohol	3.32				ug/L
Isopropyl ether	0.025				ug/L
Isopropylbenzene	0.038				ug/L
m-Xylene & p-Xylene	0.055				ug/L
Methacrylonitrile	0.141				ug/L
Methyl methacrylate	0.0934				ug/L
Methylene Chloride	0.121				ug/L
Methyl tert-butyl ether	0.069				ug/L
n-Decane	0.05				ug/L
n-Heptane	0.05				ug/L
n-Butylbenzene	0.100				ug/L
N-Propylbenzene	0.056				ug/L
Naphthalene	0.221				ug/L
Paraldehyde	5.0				ug/L
o-Xylene	0.053				ug/L
Pentane	0.05				ug/L
Propionitrile	0.953				ug/L
sec-Butylbenzene	0.166				ug/L
Styrene	0.075				ug/L
TBA-d9 (IS)	0.05				ug/L
Tentatively Identified Compound					ug/L
Tert-amyl methyl ether	0.0707				ug/L
Tert-butyl ethyl ether	0.0975				ug/L
tert-Butylbenzene	0.050				ug/L
Tetrachloroethene	0.065				ug/L
Tetrahydrofuran	1.322				ug/L
Toluene	0.075				ug/L
Toluene-d8 (Surr)					ug/L
trans-1,2-Dichloroethene	0.070				ug/L
trans-1,3-Dichloropropene	0.057				ug/L
trans-1,4-Dichloro-2-butene	0.111				ug/L
Trichloroethene	0.059				ug/L
Trichlorofluoromethane	0.056				ug/L
Vinyl chloride	0.045				ug/L
Vinyl acetate	0.603				ug/L
Xylenes, Total	0.488				ug/L

Type: MDLV **Created:** 7/20/2009 3:03:00PM **Active:** 7/20/2008 3:03:11PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Xylenes, Total		1	500		%
Vinyl acetate		1	500		%
Vinyl chloride		1	500		%
Trichlorofluoromethane		1	500		%
Trichloroethene		1	500		%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Waters, Air and Leaches
TestAmerica San Francisco

Type: MDLV **Created:** 7/20/2009 3:03:00PM **Active:** 7/20/2008 3:03:11PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
trans-1,4-Dichloro-2-butene		1	500		%
trans-1,3-Dichloropropene		1	500		%
Toluene-d8 (Surr)		1	500		%
trans-1,2-Dichloroethene		1	500		%
Toluene		1	500		%
Tetrahydrofuran		1	500		%
Tetrachloroethene		1	500		%
tert-Butylbenzene		1	500		%
Tert-butyl ethyl ether		1	500		%
Tert-amyl methyl ether		1	500		%
Tentatively Identified Compound		1	500		%
TBA-d9 (IS)		1	500		%
Styrene		1	500		%
Propionitrile		1	500		%
sec-Butylbenzene		1	500		%
o-Xylene		1	500		%
Paraldehyde		1	500		%
Pentane		1	500		%
Naphthalene		1	500		%
N-Propylbenzene		1	500		%
n-Heptane		1	500		%
n-Butylbenzene		1	500		%
n-Decane		1	500		%
Methyl tert-butyl ether		1	500		%
Methylene Chloride		1	500		%
Methyl methacrylate		1	500		%
Methacrylonitrile		1	500		%
m-Xylene & p-Xylene		1	500		%
Isopropyl ether		1	500		%
Isopropylbenzene		1	500		%
Isobutyl alcohol		1	500		%
Isopropyl alcohol		1	500		%
Iodomethane		1	500		%
Hexane		1	500		%
Hexachloroethane		1	500		%
Hexachlorobutadiene		1	500		%
Ethylene Dibromide		1	500		%
Fluorobenzene		1	500		%
Ethylbenzene		1	500		%
Ethyl methacrylate		1	500		%
Ethanol		1	500		%
Dodecane		1	500		%
Epichlorohydrin		1	500		%
Dioxane-d8 (IS)		1	500		%
Dichlorodifluoromethane		1	500		%
Dichlorobromomethane		1	500		%
Dibromomethane		1	500		%
Cyclohexanone		1	500		%
Dibromofluoromethane (Surr)		1	500		%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Waters, Air and Leaches
TestAmerica San Francisco

Type: MDLV **Created:** 7/20/2009 3:03:00PM **Active:** 7/20/2008 3:03:11PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
cis-1,3-Dichloropropene		1	500		%
cis-1,2-Dichloroethene		1	500		%
Chloroform		1	500		%
Chloromethane		1	500		%
Chloroethane		1	500		%
Chlorodibromomethane		1	500		%
Chlorobenzene		1	500		%
Chlorobenzene-d5		1	500		%
Chlorobromomethane		1	500		%
Carbon tetrachloride		1	500		%
Carbon disulfide		1	500		%
C7-C12		1	500		%
C6-C12		1	500		%
C5-C12		1	500		%
C6-C10		1	500		%
C4-C12		1	500		%
C4-C10		1	500		%
C13		1	500		%
Bromoform		1	500		%
Bromomethane		1	500		%
Butane		1	500		%
BFB		1	500		%
Benzyl chloride		1	500		%
Bromobenzene		1	500		%
Benzene		1	500		%
Acrylonitrile		1	500		%
Acrolein		1	500		%
Acetonitrile		1	500		%
Acetone		1	500		%
4-Methyl-2-pentanone (MIBK)		1	500		%
4-Chlorotoluene		1	500		%
4-Isopropyltoluene		1	500		%
4-Bromofluorobenzene		1	500		%
3-Chloro-1-propene		1	500		%
2-Nitropropane		1	500		%
2-Methylpentane		1	500		%
2-Methyl-2-propanol		1	500		%
2-Hexanone		1	500		%
2-Chloroethyl vinyl ether		1	500		%
2-Chlorotoluene		1	500		%
2-Chloro-1,3-butadiene		1	500		%
2-Butanone (MEK)		1	500		%
2,2-Dichloropropane		1	500		%
1,4-Dioxane		1	500		%
1,4-Difluorobenzene		1	500		%
1,4-Dichlorobenzene-d4		1	500		%
1,4-Dichlorobenzene		1	500		%
1,3-Dichlorobenzene		1	500		%
1,3-Dichloropropane		1	500		%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Waters, Air and Leaches
TestAmerica San Francisco

Type: MDLV **Created:** 7/20/2009 3:03:00PM **Active:** 7/20/2008 3:03:11PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
1,3,5-Trimethylbenzene		1	500		%
1,2-Dichloropropane		1	500		%
1,2-Dichloroethane		1	500		%
1,2-Dichloroethane-d4 (Surr)		1	500		%
1,2-Dichlorobenzene-d4		1	500		%
1,2-Dichlorobenzene		1	500		%
1,2,4-Trimethylbenzene		1	500		%
1,2-Dibromo-3-Chloropropane		1	500		%
1,2,4-Trichlorobenzene		1	500		%
1,2,3-Trimethylbenzene		1	500		%
1,2,3-Trichloropropane		1	500		%
1,2,3-Trichlorobenzene		1	500		%
1,1-Dichloropropene		1	500		%
1,1-Dichloroethane		1	500		%
1,1-Dichloroethene		1	500		%
1,1,2-Trichloro-1,2,2-trifluoroethane		1	500		%
1,1,2-Trichloroethane		1	500		%
1,1,2,2-Tetrachloroethane		1	500		%
1,1,1,2-Tetrachloroethane		1	500		%
1,1,1-Trichloroethane		1	500		%

Type: MSREC **Created:** 6/12/2008 3:26:00PM **Active:** 6/12/2008 3:31:48PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
1,1,1-Trichloroethane		60	140		%
1,1,1,2-Tetrachloroethane		60	140		%
1,1,2,2-Tetrachloroethane		60	140		%
1,1,2-Trichloroethane		60	140		%
1,1,2-Trichloro-1,2,2-trifluoroethane		60	140		%
1,1-Dichloroethene		60	140		%
1,1-Dichloroethane		60	140		%
1,1-Dichloropropene		60	140		%
1,2,3-Trichlorobenzene		60	140		%
1,2,3-Trichloropropane		60	140		%
1,2,4-Trichlorobenzene		60	140		%
1,2-Dibromo-3-Chloropropane		60	140		%
1,2,4-Trimethylbenzene		60	140		%
1,2-Dichlorobenzene		60	140		%
1,2-Dichloroethane-d4 (Surr)		60	140		%
1,2-Dichloroethane		60	140		%
1,2-Dichloropropane		60	140		%
1,3,5-Trimethylbenzene		60	140		%
1,3-Dichloropropane		60	140		%
1,3-Dichlorobenzene		60	140		%
1,4-Dichlorobenzene		60	140		%
1,4-Dichlorobenzene-d4		70	130		%
1,4-Dioxane		22	140		%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Waters, Air and Leaches
TestAmerica San Francisco

Type: MSREC **Created:** 6/12/2008 3:26:00PM **Active:** 6/12/2008 3:31:48PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
2,2-Dichloropropane		60	140		%
2-Butanone (MEK)		60	140		%
2-Chloro-1,3-butadiene		60	140		%
2-Chloroethyl vinyl ether		34	140		%
2-Chlorotoluene		60	140		%
2-Hexanone		60	140		%
2-Nitropropane		35	140		%
2-Methyl-2-propanol		60	140		%
3-Chloro-1-propene		60	140		%
4-Bromofluorobenzene		60	140		%
4-Chlorotoluene		60	140		%
4-Isopropyltoluene		60	140		%
4-Methyl-2-pentanone (MIBK)		60	140		%
Acetone		60	140		%
Acetonitrile		60	140		%
Acrolein		60	140		%
Acrylonitrile		57	140		%
Benzene		60	140		%
Benzyl chloride		60	140		%
Bromobenzene		60	140		%
Bromomethane		23	140		%
Bromoform		56	140		%
C4-C10		60	140		%
C4-C12		60	140		%
C5-C12		60	140		%
C6-C10		60	140		%
C6-C12		60	140		%
C7-C12		60	140		%
Carbon disulfide		38	140		%
Carbon tetrachloride		60	140		%
Chlorobromomethane		60	140		%
Chlorobenzene-d5		70	130		%
Chlorobenzene		60	140		%
Chlorodibromomethane		60	140		%
Chloroethane		51	140		%
Chloromethane		52	140		%
Chloroform		60	140		%
cis-1,2-Dichloroethene		60	140		%
cis-1,3-Dichloropropene		60	140		%
Cyclohexanone		60	140		%
Dibromomethane		60	140		%
Dichlorobromomethane		60	140		%
Dichlorodifluoromethane		38	140		%
Dioxane-d8 (IS)		70	130		%
Epichlorohydrin		35	140		%
Ethanol		60	140		%
Ethyl methacrylate		60	140		%
Ethylbenzene		60	140		%
Fluorobenzene		60	140		%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Waters, Air and Leaches
TestAmerica San Francisco

Type: MSREC **Created:** 6/12/2008 3:26:00PM **Active:** 6/12/2008 3:31:48PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Ethylene Dibromide		60	140		%
Hexachlorobutadiene		60	140		%
Hexachloroethane		60	140		%
Iodomethane		58	140		%
Isopropyl ether		60	140		%
Isobutyl alcohol		60	140		%
Isopropyl alcohol		60	140		%
Isopropylbenzene		60	140		%
m-Xylene & p-Xylene		60	140		%
Methacrylonitrile		60	140		%
Methyl methacrylate		60	140		%
Methylene Chloride		40	140		%
Methyl tert-butyl ether		60	138		%
n-Butylbenzene		60	140		%
N-Propylbenzene		60	140		%
Naphthalene		56	140		%
Paraldehyde		60	140		%
o-Xylene		60	140		%
sec-Butylbenzene		60	140		%
Propionitrile		60	140		%
Styrene		60	140		%
TBA-d9 (IS)		70	130		%
Tentatively Identified Compound		60	140		%
Tert-amyl methyl ether		60	140		%
Tert-butyl ethyl ether		60	140		%
tert-Butylbenzene		60	140		%
Tetrachloroethene		60	140		%
Tetrahydrofuran		60	140		%
Toluene		60	140		%
trans-1,2-Dichloroethene		60	140		%
Toluene-d8 (Surr)		60	140		%
trans-1,3-Dichloropropene		60	140		%
trans-1,4-Dichloro-2-butene		60	140		%
Trichloroethene		60	140		%
Trichlorofluoromethane		60	140		%
Vinyl chloride		58	140		%
Vinyl acetate		40	140		%
Xylenes, Total		60	140		%

Type: MSRPD **Created:** 8/17/2005 11:47:00AM **Active:** 5/2/2005 11:48:40AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Xylenes, Total				20	%
Vinyl acetate				20	%
Vinyl chloride				20	%
Trichlorofluoromethane				20	%
Trichloroethene				20	%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Waters, Air and Leaches
TestAmerica San Francisco

Type: MSRPD **Created:** 8/17/2005 11:47:00AM **Active:** 5/2/2005 11:48:40AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
trans-1,4-Dichloro-2-butene				20	%
trans-1,3-Dichloropropene				20	%
trans-1,2-Dichloroethene				20	%
Toluene-d8 (Surr)				20	%
Tetrahydrofuran				20	%
Toluene				20	%
Tetrachloroethene				20	%
tert-Butylbenzene				20	%
Tert-butyl ethyl ether				20	%
Tert-amyl methyl ether				20	%
Tentatively Identified Compound					%
TBA-d9 (IS)				20	%
Styrene				20	%
Propionitrile				20	%
sec-Butylbenzene				20	%
o-Xylene				20	%
Paraldehyde				20	%
Naphthalene				20	%
N-Propylbenzene				20	%
n-Butylbenzene				20	%
Methyl tert-butyl ether				20	%
Methylene Chloride				20	%
Methyl methacrylate				20	%
Methacrylonitrile				20	%
m-Xylene & p-Xylene				20	%
Isopropylbenzene				20	%
Isopropyl alcohol				20	%
Isobutyl alcohol				20	%
Isopropyl ether				20	%
Iodomethane				20	%
Hexachloroethane				20	%
Hexachlorobutadiene				20	%
Ethylene Dibromide				20	%
Fluorobenzene				20	%
Ethylbenzene				20	%
Ethyl methacrylate				20	%
Ethanol				20	%
Epichlorohydrin				20	%
Dioxane-d8 (IS)				20	%
Dichlorodifluoromethane				20	%
Dichlorobromomethane				20	%
Dibromomethane				20	%
Cyclohexanone				20	%
cis-1,2-Dichloroethene				20	%
cis-1,3-Dichloropropene				20	%
Chloroform				20	%
Chloromethane				20	%
Chloroethane				20	%
Chlorodibromomethane				20	%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Waters, Air and Leaches
TestAmerica San Francisco

Type: MSRPD **Created:** 8/17/2005 11:47:00AM **Active:** 5/2/2005 11:48:40AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Chlorobenzene				20	%
Chlorobenzene-d5				20	%
Chlorobromomethane				20	%
Carbon tetrachloride				20	%
Carbon disulfide				20	%
C7-C12					%
C6-C12					%
C6-C10					%
C5-C12					%
C4-C12					%
C4-C10					%
Bromoform				20	%
Bromomethane				20	%
Bromobenzene				20	%
Benzyl chloride				20	%
Benzene				20	%
Acrylonitrile				20	%
Acrolein				20	%
Acetonitrile				20	%
Acetone				20	%
4-Methyl-2-pentanone (MIBK)				20	%
4-Isopropyltoluene				20	%
4-Chlorotoluene				20	%
3-Chloro-1-propene				20	%
4-Bromofluorobenzene				20	%
2-Nitropropane				20	%
2-Methyl-2-propanol				20	%
2-Hexanone				20	%
2-Chlorotoluene				20	%
2-Chloroethyl vinyl ether				20	%
2-Chloro-1,3-butadiene				20	%
2-Butanone (MEK)				20	%
2,2-Dichloropropane				20	%
1,4-Dioxane				20	%
1,4-Dichlorobenzene-d4				20	%
1,4-Dichlorobenzene				20	%
1,3-Dichloropropane				20	%
1,3,5-Trimethylbenzene				20	%
1,3-Dichlorobenzene				20	%
1,2-Dichloropropane				20	%
1,2-Dichloroethane				20	%
1,2-Dichloroethane-d4 (Surr)				20	%
1,2-Dichlorobenzene				20	%
1,2-Dibromo-3-Chloropropane				20	%
1,2,4-Trichlorobenzene				20	%
1,2,4-Trimethylbenzene				20	%
1,2,3-Trichloropropane				20	%
1,2,3-Trichlorobenzene				20	%
1,1-Dichloropropene				20	%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Waters, Air and Leaches
TestAmerica San Francisco

Type: MSRPD **Created:** 8/17/2005 11:47:00AM **Active:** 5/2/2005 11:48:40AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
1,1-Dichloroethane				20	%
1,1,2-Trichloroethane				20	%
1,1-Dichloroethene				20	%
1,1,2,2-Tetrachloroethane				20	%
1,1,2-Trichloro-1,2,2-trifluoroethane				20	%
1,1,1,2-Tetrachloroethane				20	%
1,1,1-Trichloroethane				20	%

Type: RL **Created:** 8/17/2005 11:45:00AM **Active:** 6/21/2005 11:48:26AM **Exp:**
Initial Prep: 40 **Unit:** mL **Final Prep:** 40 **Unit:** mL **Fac:** 1

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
1,1,2,2-Tetrachloroethane	0.5				ug/L
1,1,1-Trichloroethane	0.5				ug/L
1,1,1,2-Tetrachloroethane	0.5				ug/L
1,1,2-Trichloro-1,2,2-trifluoroethane	0.5				ug/L
1,1,2-Trichloroethane	0.5				ug/L
1,1-Dichloroethene	0.5				ug/L
1,1-Dichloroethane	0.5				ug/L
1,1-Dichloropropene	0.5				ug/L
1,2,3-Trichlorobenzene	1.0				ug/L
1,2,3-Trichloropropane	0.5				ug/L
1,2,3-Trimethylbenzene	0.5				ug/L
1,2,4-Trichlorobenzene	1.0				ug/L
1,2,4-Trimethylbenzene	0.5				ug/L
1,2-Dibromo-3-Chloropropane	1.0				ug/L
1,2-Dichlorobenzene	0.5				ug/L
1,2-Dichlorobenzene-d4	0.5				ug/L
1,2-Dichloroethane-d4 (Surr)	0.5				ug/L
1,2-Dichloropropane	0.5				ug/L
1,2-Dichloroethane	0.5				ug/L
1,3,5-Trimethylbenzene	0.5				ug/L
1,3-Dichlorobenzene	0.5				ug/L
1,4-Dichlorobenzene	0.5				ug/L
1,3-Dichloropropane	1.0				ug/L
1,4-Dichlorobenzene-d4	0.5				ug/L
1,4-Difluorobenzene	0.5				ug/L
1,4-Dioxane	100				ug/L
2,2-Dichloropropane	0.5				ug/L
2-Butanone (MEK)	50.0				ug/L
2-Chloro-1,3-butadiene	0.5				ug/L
2-Chloroethyl vinyl ether	1.0				ug/L
2-Chlorotoluene	0.5				ug/L
2-Hexanone	50				ug/L
2-Methyl-2-propanol	4.0				ug/L
2-Methylpentane	0.5				ug/L
2-Nitropropane	5.0				ug/L
3-Chloro-1-propene	0.5				ug/L

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Waters, Air and Leaches
TestAmerica San Francisco

Type: RL **Created:** 8/17/2005 11:45:00AM **Active:** 6/21/2005 11:48:26AM **Exp:**
Initial Prep: 40 **Unit:** mL **Final Prep:** 40 **Unit:** mL **Fac:** 1

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
4-Bromofluorobenzene	0.5				ug/L
4-Isopropyltoluene	1.0				ug/L
4-Chlorotoluene	0.5				ug/L
4-Methyl-2-pentanone (MIBK)	50.0				ug/L
Acetone	50.0				ug/L
Acetonitrile	5.0				ug/L
Acrolein	1.0				ug/L
Acrylonitrile	0.5				ug/L
Benzene	0.5				ug/L
Benzyl chloride	0.5				ug/L
BFB	0.5				ug/L
Bromobenzene	1.0				ug/L
Butane	0.5				ug/L
Bromomethane	1.0				ug/L
Bromoform	1.0				ug/L
C4-C10	50				ug/L
C13	0.5				ug/L
C4-C12	50.0				ug/L
C5-C12	50.0				ug/L
C6-C10	50				ug/L
C6-C12	50.0				ug/L
C7-C12	50				ug/L
Carbon disulfide	5.0				ug/L
Carbon tetrachloride	0.5				ug/L
Chlorobenzene	0.5				ug/L
Chlorobromomethane	1.0				ug/L
Chlorobenzene-d5	0.5				ug/L
Chlorodibromomethane	0.5				ug/L
Chloroethane	1.0				ug/L
cis-1,2-Dichloroethene	0.5				ug/L
Chloromethane	1.0				ug/L
Chloroform	1.0				ug/L
cis-1,3-Dichloropropene	0.5				ug/L
Cyclohexanone	50.0				ug/L
Dibromomethane	0.5				ug/L
Dibromofluoromethane (Surr)	0.5				ug/L
Dichlorobromomethane	0.5				ug/L
Dichlorodifluoromethane	0.5				ug/L
Dioxane-d8 (IS)	0.5				ug/L
Dodecane	0.5				ug/L
Epichlorohydrin	5				ug/L
Ethanol	100				ug/L
Ethyl methacrylate	0.5				ug/L
Ethylbenzene	0.5				ug/L
Ethylene Dibromide	0.5				ug/L
Fluorobenzene	0.5				ug/L
Hexachlorobutadiene	1.0				ug/L
Hexachloroethane	0.5				ug/L
Isobutyl alcohol	5.0				ug/L

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Waters, Air and Leaches
TestAmerica San Francisco

Type: RL **Created:** 8/17/2005 11:45:00AM **Active:** 6/21/2005 11:48:26AM **Exp:**
Initial Prep: 40 **Unit:** mL **Final Prep:** 40 **Unit:** mL **Fac:** 1

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Hexane	0.5				ug/L
Iodomethane	0.5				ug/L
Isopropyl ether	0.5				ug/L
Isopropyl alcohol	5.0				ug/L
Isopropylbenzene	0.5				ug/L
m-Xylene & p-Xylene	1.0				ug/L
Methacrylonitrile	0.5				ug/L
Methyl methacrylate	0.5				ug/L
Methylene Chloride	5.0				ug/L
n-Butylbenzene	1.0				ug/L
Methyl tert-butyl ether	0.5				ug/L
n-Decane	0.5				ug/L
n-Heptane	0.5				ug/L
N-Propylbenzene	1.0				ug/L
Naphthalene	1.0				ug/L
o-Xylene	0.5				ug/L
Paraldehyde	5.0				ug/L
Pentane	0.5				ug/L
sec-Butylbenzene	1.0				ug/L
Propionitrile	5.0				ug/L
Styrene	0.5				ug/L
TBA-d9 (IS)	0.5				ug/L
Tentatively Identified Compound	0.5				ug/L
Tert-amyl methyl ether	0.5				ug/L
Tert-butyl ethyl ether	0.5				ug/L
tert-Butylbenzene	1.0				ug/L
Tetrachloroethene	0.5				ug/L
Tetrahydrofuran	5.0				ug/L
Toluene	0.5				ug/L
Toluene-d8 (Surr)	0.5				ug/L
trans-1,2-Dichloroethene	0.5				ug/L
trans-1,3-Dichloropropene	0.5				ug/L
trans-1,4-Dichloro-2-butene	0.5				ug/L
Trichloroethene	0.5				ug/L
Trichlorofluoromethane	1.0				ug/L
Vinyl chloride	0.5				ug/L
Vinyl acetate	10				ug/L
Xylenes, Total	1.0				ug/L

Type: SUREC **Created:** 6/3/2008 2:07:00PM **Active:** 6/9/2008 12:00:00AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Vinyl acetate					%
Vinyl chloride					%
Xylenes, Total					%
Trichlorofluoromethane					%
Trichloroethene					%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Waters, Air and Leaches
TestAmerica San Francisco

Type: SUREC **Created:** 6/3/2008 2:07:00PM **Active:** 6/9/2008 12:00:00AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
trans-1,4-Dichloro-2-butene					%
trans-1,3-Dichloropropene					%
trans-1,2-Dichloroethene					%
Toluene-d8 (Surr)		70	130		%
Toluene					%
Tetrahydrofuran					%
Tetrachloroethene					%
tert-Butylbenzene					%
Tert-butyl ethyl ether					%
Tert-amyl methyl ether					%
TBA-d9 (IS)					%
Tentatively Identified Compound					%
Styrene					%
Propionitrile					%
sec-Butylbenzene					%
Pentane					%
Paraldehyde					%
o-Xylene					%
Naphthalene					%
N-Propylbenzene					%
n-Heptane					%
n-Decane					%
Methyl tert-butyl ether					%
Methylene Chloride					%
n-Butylbenzene					%
Methyl methacrylate					%
Methacrylonitrile					%
m-Xylene & p-Xylene					%
Isopropylbenzene					%
Isopropyl alcohol					%
Isopropyl ether					%
Iodomethane					%
Hexane					%
Isobutyl alcohol					%
Hexachloroethane					%
Hexachlorobutadiene					%
Fluorobenzene					%
Ethylene Dibromide					%
Ethylbenzene					%
Ethyl methacrylate					%
Ethanol					%
Epichlorohydrin					%
Dodecane					%
Dichlorodifluoromethane					%
Dioxane-d8 (IS)					%
Dichlorobromomethane					%
Dibromofluoromethane (Surr)		70	130		%
Dibromomethane					%
Cyclohexanone					%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Waters, Air and Leaches
TestAmerica San Francisco

Type: SUREC **Created:** 6/3/2008 2:07:00PM **Active:** 6/9/2008 12:00:00AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
cis-1,3-Dichloropropene					%
Chloroform					%
Chloromethane					%
cis-1,2-Dichloroethene					%
Chloroethane					%
Chlorodibromomethane					%
Chlorobenzene-d5					%
Chlorobromomethane					%
Chlorobenzene					%
Carbon tetrachloride					%
C7-C12					%
Carbon disulfide					%
C6-C12					%
C6-C10					%
C5-C12					%
C13					%
C4-C10					%
C4-C12					%
Bromoform					%
Bromomethane					%
Butane					%
Bromobenzene					%
BFB					%
Benzyl chloride					%
Benzene					%
Acrylonitrile					%
Acrolein					%
Acetonitrile					%
Acetone					%
4-Methyl-2-pentanone (MIBK)					%
4-Isopropyltoluene					%
4-Chlorotoluene					%
4-Bromofluorobenzene		67	130		%
3-Chloro-1-propene					%
2-Nitropropane					%
2-Methylpentane					%
2-Methyl-2-propanol					%
2-Hexanone					%
2-Chlorotoluene					%
2-Chloroethyl vinyl ether					%
2-Chloro-1,3-butadiene					%
2,2-Dichloropropane					%
2-Butanone (MEK)					%
1,4-Dioxane					%
1,4-Difluorobenzene		70	130		%
1,4-Dichlorobenzene-d4					%
1,3-Dichloropropane					%
1,4-Dichlorobenzene					%
1,3-Dichlorobenzene					%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8260B_LL Waters, Air and Leaches
TestAmerica San Francisco

Type: SUREC **Created:** 6/3/2008 2:07:00PM **Active:** 6/9/2008 12:00:00AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
1,3,5-Trimethylbenzene					%
1,2-Dichloroethane					%
1,2-Dichloroethane-d4 (Surr)		67	130		%
1,2-Dichloropropane					%
1,2-Dichlorobenzene-d4		70	130		%
1,2-Dichlorobenzene					%
1,2-Dibromo-3-Chloropropane					%
1,2,4-Trimethylbenzene					%
1,2,4-Trichlorobenzene					%
1,2,3-Trimethylbenzene					%
1,2,3-Trichloropropane					%
1,2,3-Trichlorobenzene					%
1,1-Dichloropropene					%
1,1-Dichloroethane					%
1,1-Dichloroethene					%
1,1,2-Trichloroethane					%
1,1,2-Trichloro-1,2,2-trifluoroethane					%
1,1,1,2-Tetrachloroethane					%
1,1,1-Trichloroethane					%
1,1,2,2-Tetrachloroethane					%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8270C SOIL 3550B
TestAmerica San Francisco

Type: LCSREC **Created:** 6/5/2008 2:45:00PM **Active:** 6/9/2008 4:07:39PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
p-Terphenyl-d14					%
Dimethyl phthalate		64	119		%
Hexachloroethane		44	94		%
4-Methylphenol		50	95		%
1,2-Dichlorobenzene		44	92		%
3,3'-Dichlorobenzidine		42	87		%
Naphthalene-d8					%
2,4-Dinitrophenol		21	96		%
Phenol-d5		40	96		%
4-Nitrophenol		54	125		%
Nitrobenzene		48	99		%
2-Chloronaphthalene		52	102		%
Bis(2-chloroethyl)ether		45	92		%
Tributylamine		50	150		%
Anthracene		55	101		%
2,4,5-Trichlorophenol		48	105		%
2,4,6-Trichlorophenol		45	102		%
Indeno[1,2,3-cd]pyrene		56	110		%
Perylene-d12					%
Diethyl phthalate		49	117		%
1,2,4-Trichlorobenzene		47	95		%
2,6-Dinitrotoluene		54	119		%
Phenol		48	90		%
Isophorone		54	100		%
1,3-Dichlorobenzene		41	91		%
Bis(2-ethylhexyl) phthalate		53	98		%
Di-n-butyl phthalate		55	102		%
Butyl benzyl phthalate		53	98		%
1,4-Dichlorobenzene-d4					%
2,4,6-Tribromophenol		43	108		%
4-Chlorophenyl phenyl ether		57	103		%
4-Chloro-3-methylphenol		58	104		%
2,3,4,6-Tetrachlorophenol					%
4,4'-DDD					%
Benzidine_T					%
2,2'-oxybis[1-chloropropane]		70	120		%
Naphthalene		44	92		%
Acenaphthene		50	98		%
2-Methylnaphthalene		49	100		%
Hexachlorobenzene		55	105		%
Benzoic acid		8	35		%
Acenaphthene-d10					%
Pyrene		48	91		%
N-Nitrosodi-n-propylamine		46	98		%
2-Methylphenol		54	97		%
Benzo[b]fluoranthene		56	105		%
Carbofuran					%
1,1'-Biphenyl					%
Fluoranthene		54	102		%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8270C SOIL 3550B
TestAmerica San Francisco

Type: LCSREC **Created:** 6/5/2008 2:45:00PM **Active:** 6/9/2008 4:07:39PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
3-Nitroaniline		50	103		%
Pentachlorophenol_T					%
Benthiocarb					%
4,4'-DDT					%
Phenanthrene		54	100		%
Phenanthrene-d10					%
2,4-Dichlorophenol		49	100		%
Benzo[g,h,i]perylene		56	106		%
Atrazine					%
Azobenzene		52	100		%
Benzo[k]fluoranthene		51	93		%
2,4-Dinitrotoluene		57	110		%
4-Chloroaniline		20	49		%
4,6-Dinitro-2-methylphenol		48	111		%
Hexachlorocyclopentadiene		42	132		%
Chrysene		49	96		%
Alachlor					%
Benzo[a]anthracene		55	91		%
Tentatively Identified Compound					%
Dibenzofuran		55	100		%
2,2'-oxybis(2-chloropropane)					%
4,4'-DDE					%
Pentachlorophenol		35	90		%
2-Nitroaniline		54	105		%
4-Bromophenyl phenyl ether		53	101		%
2-Chlorophenol		48	93		%
Chrysene-d12					%
DFTPP					%
Di(2-ethylhexyl)adipate					%
Benzidine					%
Acenaphthylene		61	129		%
N-Nitrosodiphenylamine		56	105		%
1-Methyl-2-pyrrilidinone					%
Simazine					%
Bis(2-chloroethoxy)methane		46	97		%
4-Nitroaniline		59	114		%
1,4-Dichlorobenzene		40	89		%
Nitrobenzene-d5		38	106		%
Benzo[a]pyrene		55	102		%
Hexachlorobutadiene		44	95		%
Benzyl alcohol		54	102		%
Molinate					%
Di-n-octyl phthalate		53	91		%
Fluorene		54	104		%
Terphenyl-d14		42	100		%
2,4-Dimethylphenol		52	106		%
2-Fluorobiphenyl		39	105		%
Dibenz(a,h)anthracene		58	108		%
2-Nitrophenol		48	99		%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8270C SOIL 3550B
TestAmerica San Francisco

Type: LCSREC **Created:** 6/5/2008 2:45:00PM **Active:** 6/9/2008 4:07:39PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
2-Fluorophenol		32	92		%

Type: LCSRPD **Created:** 6/22/2005 4:29:00PM **Active:** 6/27/2005 11:02:19AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
p-Terphenyl-d14					%
Dimethyl phthalate				35	%
Hexachloroethane				35	%
4-Methylphenol				35	%
1,2-Dichlorobenzene				35	%
N-Nitrosodimethylamine				35	%
3,3'-Dichlorobenzidine				35	%
Naphthalene-d8				35	%
2,4-Dinitrophenol				35	%
Phenol-d5				35	%
4-Nitrophenol				35	%
Nitrobenzene				35	%
2-Chloronaphthalene				35	%
Bis(2-chloroethyl)ether				35	%
Tributylamine				35	%
Anthracene				35	%
2,4,5-Trichlorophenol				35	%
2,4,6-Trichlorophenol				35	%
Indeno[1,2,3-cd]pyrene				35	%
Perylene-d12				35	%
Diethyl phthalate				35	%
1,2,4-Trichlorobenzene				35	%
2,6-Dinitrotoluene				35	%
Phenol				35	%
Isophorone				35	%
1,3-Dichlorobenzene				35	%
Bis(2-ethylhexyl) phthalate				35	%
Di-n-butyl phthalate				35	%
Butyl benzyl phthalate				35	%
1,4-Dichlorobenzene-d4					%
2,4,6-Tribromophenol				35	%
4-Chlorophenyl phenyl ether				35	%
4-Chloro-3-methylphenol				35	%
2,3,4,6-Tetrachlorophenol				20	%
4,4'-DDD					%
Dibenzo[a,h]pyrene				35	%
Benzidine_T					%
2,2'-oxybis[1-chloropropane]				35	%
Naphthalene				35	%
Acenaphthene				35	%
2-Methylnaphthalene				35	%
Hexachlorobenzene				35	%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8270C SOIL 3550B
TestAmerica San Francisco

Type: LCSRPD **Created:** 6/22/2005 4:29:00PM **Active:** 6/27/2005 11:02:19AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Benzoic acid				35	%
Acenaphthene-d10				35	%
Pyrene				35	%
N-Nitrosodi-n-propylamine				35	%
2-Methylphenol				35	%
Benzo[b]fluoranthene				35	%
Carbofuran					%
1,1'-Biphenyl					%
Fluoranthene				35	%
3-Nitroaniline				35	%
Pentachlorophenol_T					%
Benthiocarb					%
4,4'-DDT					%
Phenanthrene				35	%
Phenanthrene-d10				35	%
2,4-Dichlorophenol				35	%
Benzo[g,h,i]perylene				35	%
Atrazine					%
Azobenzene				35	%
Benzo[k]fluoranthene				35	%
2,4-Dinitrotoluene				35	%
4-Chloroaniline				35	%
4,6-Dinitro-2-methylphenol				35	%
Hexachlorocyclopentadiene				35	%
Chrysene				35	%
Alachlor					%
Benzo[a]anthracene				35	%
Tentatively Identified Compound					%
Dibenzofuran				35	%
2,2'-oxybis(2-chloropropane)				35	%
4,4'-DDE					%
Pentachlorophenol				35	%
2-Nitroaniline				35	%
4-Bromophenyl phenyl ether				35	%
2-Chlorophenol				35	%
Chrysene-d12				35	%
1,4-Dioxane				35	%
DFTPP				35	%
Di(2-ethylhexyl)adipate					%
Pyridine				35	%
Benzidine				35	%
Acenaphthylene				35	%
N-Nitrosodiphenylamine				35	%
1-Methyl-2-pyrrilidinone					%
Simazine					%
Bis(2-chloroethoxy)methane				35	%
4-Nitroaniline				35	%
1,4-Dichlorobenzene				35	%
Nitrobenzene-d5				35	%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8270C SOIL 3550B
TestAmerica San Francisco

Type: LCSRPD **Created:** 6/22/2005 4:29:00PM **Active:** 6/27/2005 11:02:19AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Benzo[a]pyrene				35	%
Hexachlorobutadiene				35	%
Benzyl alcohol				35	%
Molinate					%
Di-n-octyl phthalate				35	%
Fluorene				35	%
Terphenyl-d14				35	%
2,4-Dimethylphenol				35	%
2-Fluorobiphenyl				35	%
Dibenz(a,h)anthracene				35	%
2-Nitrophenol				35	%
2-Fluorophenol				35	%

Type: MDL **Created:** 6/22/2005 3:54:00PM **Active:** 6/27/2005 11:04:05AM **Exp:**
Initial Prep: 30 **Unit:** g **Final Prep:** 1 **Unit:** mL **Fac:** 0.033333

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
p-Terphenyl-d14					mg/Kg
Dimethyl phthalate	0.0300				mg/Kg
Hexachloroethane	0.0152				mg/Kg
4-Methylphenol	0.0313				mg/Kg
1,2-Dichlorobenzene	0.0200				mg/Kg
N-Nitrosodimethylamine	0.016				mg/Kg
3,3'-Dichlorobenzidine	0.0119				mg/Kg
Naphthalene-d8					mg/Kg
2,4-Dinitrophenol	0.0123				mg/Kg
Phenol-d5					mg/Kg
4-Nitrophenol	0.0263				mg/Kg
Nitrobenzene	0.0236				mg/Kg
2-Chloronaphthalene	0.0245				mg/Kg
Bis(2-chloroethyl)ether	0.0153				mg/Kg
Tributylamine	0.067				mg/Kg
Anthracene	0.0172				mg/Kg
2,4,5-Trichlorophenol	0.0245				mg/Kg
2,4,6-Trichlorophenol	0.0114				mg/Kg
Indeno[1,2,3-cd]pyrene	0.0208				mg/Kg
Perylene-d12					mg/Kg
Diethyl phthalate	0.0487				mg/Kg
1,2,4-Trichlorobenzene	0.0225				mg/Kg
2,6-Dinitrotoluene	0.0145				mg/Kg
Phenol	0.0170				mg/Kg
Isophorone	0.0224				mg/Kg
1,3-Dichlorobenzene	0.0193				mg/Kg
Bis(2-ethylhexyl) phthalate	0.0475				mg/Kg
Di-n-butyl phthalate	0.0475				mg/Kg
Butyl benzyl phthalate	0.0439				mg/Kg
1,4-Dichlorobenzene-d4					mg/Kg
2,4,6-Tribromophenol	0.014				mg/Kg

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8270C SOIL 3550B
TestAmerica San Francisco

Type: MDL **Created:** 6/22/2005 3:54:00PM **Active:** 6/27/2005 11:04:05AM **Exp:**
Initial Prep: 30 **Unit:** g **Final Prep:** 1 **Unit:** mL **Fac:** 0.033333

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
4-Chlorophenyl phenyl ether	0.0303				mg/Kg
4-Chloro-3-methylphenol	0.0289				mg/Kg
2,3,4,6-Tetrachlorophenol	0.0333				mg/Kg
4,4'-DDD					mg/Kg
Dibenzo[a,h]pyrene	0.0221				mg/Kg
Benzidine_T					mg/Kg
2,2'-oxybis[1-chloropropane]	0.0195				mg/Kg
Naphthalene	0.0194				mg/Kg
Acenaphthene	0.0240				mg/Kg
2-Methylnaphthalene	0.0208				mg/Kg
Hexachlorobenzene	0.0191				mg/Kg
Benzoic acid	0.0075				mg/Kg
Acenaphthene-d10					mg/Kg
Pyrene	0.0144				mg/Kg
N-Nitrosodi-n-propylamine	0.0179				mg/Kg
2-Methylphenol	0.0153				mg/Kg
Benzo[b]fluoranthene	0.0241				mg/Kg
Carbofuran					mg/Kg
1,1'-Biphenyl					mg/Kg
Fluoranthene	0.0195				mg/Kg
3-Nitroaniline	0.0503				mg/Kg
Pentachlorophenol_T					mg/Kg
Benthiocarb					mg/Kg
4,4'-DDT					mg/Kg
Phenanthrene	0.0189				mg/Kg
Phenanthrene-d10					mg/Kg
2,4-Dichlorophenol	0.0287				mg/Kg
Benzo[g,h,i]perylene	0.0222				mg/Kg
Atrazine					mg/Kg
Azobenzene	0.0372				mg/Kg
Benzo[k]fluoranthene	0.0197				mg/Kg
2,4-Dinitrotoluene	0.0214				mg/Kg
4-Chloroaniline	0.0116				mg/Kg
4,6-Dinitro-2-methylphenol	0.0135				mg/Kg
Hexachlorocyclopentadiene	0.0173				mg/Kg
Chrysene	0.0148				mg/Kg
Alachlor					mg/Kg
Benzo[a]anthracene	0.0221				mg/Kg
Tentatively Identified Compound					mg/Kg
Dibenzofuran	0.0259				mg/Kg
2,2'-oxybis(2-chloropropane)	0.0195				mg/Kg
4,4'-DDE					mg/Kg
Pentachlorophenol	0.0199				mg/Kg
2-Nitroaniline	0.0242				mg/Kg
4-Bromophenyl phenyl ether	0.0263				mg/Kg
2-Chlorophenol	0.0199				mg/Kg
Chrysene-d12					mg/Kg
1,4-Dioxane	0.33				mg/Kg
DFTPP					mg/Kg

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8270C SOIL 3550B
TestAmerica San Francisco

Type: MDL **Created:** 6/22/2005 3:54:00PM **Active:** 6/27/2005 11:04:05AM **Exp:**
Initial Prep: 30 **Unit:** g **Final Prep:** 1 **Unit:** mL **Fac:** 0.033333

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Di(2-ethylhexyl)adipate					mg/Kg
Pyridine	0.067				mg/Kg
Benzidine					mg/Kg
Acenaphthylene	0.0267				mg/Kg
N-Nitrosodiphenylamine	0.0133				mg/Kg
1-Methyl-2-pyrrilidinone	0.067				mg/Kg
Simazine					mg/Kg
Bis(2-chloroethoxy)methane	0.0303				mg/Kg
4-Nitroaniline	0.0358				mg/Kg
1,4-Dichlorobenzene	0.0209				mg/Kg
Nitrobenzene-d5					mg/Kg
Benzo[a]pyrene	0.0187				mg/Kg
Hexachlorobutadiene	0.0244				mg/Kg
Benzyl alcohol	0.0168				mg/Kg
Molinate					mg/Kg
Di-n-octyl phthalate	0.0397				mg/Kg
Fluorene	0.0227				mg/Kg
Terphenyl-d14					mg/Kg
2,4-Dimethylphenol	0.0203				mg/Kg
2-Fluorobiphenyl					mg/Kg
Dibenz(a,h)anthracene	0.0062				mg/Kg
2-Nitrophenol	0.0203				mg/Kg
2-Fluorophenol					mg/Kg

Type: MSREC **Created:** 6/5/2008 2:56:00PM **Active:** 6/9/2008 4:08:54PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
p-Terphenyl-d14					%
Dimethyl phthalate		55	116		%
Hexachloroethane		19	93		%
4-Methylphenol		28	100		%
1,2-Dichlorobenzene		25	90		%
3,3'-Dichlorobenzidine		17	96		%
Naphthalene-d8					%
2,4-Dinitrophenol		13	122		%
Phenol-d5					%
4-Nitrophenol		25	147		%
Nitrobenzene		30	99		%
2-Chloronaphthalene		38	97		%
Bis(2-chloroethyl)ether		27	90		%
Tributylamine		50	150		%
Anthracene		47	98		%
2,4,5-Trichlorophenol		38	111		%
2,4,6-Trichlorophenol		25	112		%
Indeno[1,2,3-cd]pyrene		50	105		%
Perylene-d12					%
Diethyl phthalate		48	105		%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8270C SOIL 3550B
TestAmerica San Francisco

Type: MSREC **Created:** 6/5/2008 2:56:00PM **Active:** 6/9/2008 4:08:54PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
1,2,4-Trichlorobenzene		29	92		%
2,6-Dinitrotoluene		55	111		%
Phenol		23	95		%
Isophorone		36	101		%
1,3-Dichlorobenzene		22	86		%
Bis(2-ethylhexyl) phthalate		42	102		%
Di-n-butyl phthalate		46	112		%
Butyl benzyl phthalate		40	106		%
1,4-Dichlorobenzene-d4					%
2,4,6-Tribromophenol					%
4-Chlorophenyl phenyl ether		44	105		%
4-Chloro-3-methylphenol		42	106		%
2,3,4,6-Tetrachlorophenol		53	125		%
4,4'-DDD					%
Benzidine_T					%
2,2'-oxybis[1-chloropropane]		70	120		%
Naphthalene		22	97		%
Acenaphthene		42	90		%
2-Methylnaphthalene		28	101		%
Hexachlorobenzene		48	99		%
Benzoic acid		0	85		%
Acenaphthene-d10					%
Pyrene		35	101		%
N-Nitrosodi-n-propylamine		27	92		%
2-Methylphenol		32	100		%
Benzo[b]fluoranthene		43	100		%
Carbofuran					%
1,1'-Biphenyl					%
Fluoranthene		40	113		%
3-Nitroaniline		39	103		%
Pentachlorophenol_T					%
Benthiocarb					%
4,4'-DDT					%
Phenanthrene		38	107		%
Phenanthrene-d10					%
2,4-Dichlorophenol		17	117		%
Benzo[g,h,i]perylene		43	113		%
Atrazine					%
Azobenzene		48	95		%
Benzo[k]fluoranthene		39	88		%
2,4-Dinitrotoluene		47	107		%
4-Chloroaniline		7	63		%
4,6-Dinitro-2-methylphenol		19	132		%
Hexachlorocyclopentadiene		15	109		%
Chrysene		37	97		%
Alachlor					%
Benzo[a]anthracene		42	102		%
Tentatively Identified Compound					%
Dibenzofuran		43	96		%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8270C SOIL 3550B
TestAmerica San Francisco

Type: MSREC **Created:** 6/5/2008 2:56:00PM **Active:** 6/9/2008 4:08:54PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
2,2'-oxybis(2-chloropropane)					%
4,4'-DDE					%
Pentachlorophenol		7	132		%
2-Nitroaniline		43	103		%
4-Bromophenyl phenyl ether		45	96		%
2-Chlorophenol		16	102		%
Chrysene-d12					%
DFTPP					%
Di(2-ethylhexyl)adipate					%
Benzidine					%
Acenaphthylene		49	120		%
N-Nitrosodiphenylamine		43	107		%
1-Methyl-2-pyrrilidinone					%
Simazine					%
Bis(2-chloroethoxy)methane		28	96		%
4-Nitroaniline		47	120		%
1,4-Dichlorobenzene		21	83		%
Nitrobenzene-d5					%
Benzo[a]pyrene		48	95		%
Hexachlorobutadiene		26	92		%
Benzyl alcohol		28	104		%
Molinate					%
Di-n-octyl phthalate		46	94		%
Fluorene		41	102		%
Terphenyl-d14					%
2,4-Dimethylphenol		36	108		%
2-Fluorobiphenyl					%
Dibenz(a,h)anthracene		49	103		%
2-Nitrophenol		11	116		%
2-Fluorophenol					%

Type: MSRPD **Created:** 6/22/2005 4:30:00PM **Active:** 6/27/2005 9:49:34AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
p-Terphenyl-d14					%
Dimethyl phthalate				35	%
Hexachloroethane				35	%
4-Methylphenol				35	%
1,2-Dichlorobenzene				35	%
N-Nitrosodimethylamine				35	%
3,3'-Dichlorobenzidine				35	%
Naphthalene-d8				35	%
2,4-Dinitrophenol				35	%
Phenol-d5				35	%
4-Nitrophenol				35	%
Nitrobenzene				35	%
2-Chloronaphthalene				35	%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8270C SOIL 3550B
TestAmerica San Francisco

Type: MSRPD **Created:** 6/22/2005 4:30:00PM **Active:** 6/27/2005 9:49:34AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Bis(2-chloroethyl)ether				35	%
Tributylamine				35	%
Anthracene				35	%
2,4,5-Trichlorophenol				35	%
2,4,6-Trichlorophenol				35	%
Indeno[1,2,3-cd]pyrene				35	%
Perylene-d12				35	%
Diethyl phthalate				35	%
1,2,4-Trichlorobenzene				35	%
2,6-Dinitrotoluene				35	%
Phenol				35	%
Isophorone				35	%
1,3-Dichlorobenzene				35	%
Bis(2-ethylhexyl) phthalate				35	%
Di-n-butyl phthalate				35	%
Butyl benzyl phthalate				35	%
1,4-Dichlorobenzene-d4					%
2,4,6-Tribromophenol				35	%
4-Chlorophenyl phenyl ether				35	%
4-Chloro-3-methylphenol				35	%
2,3,4,6-Tetrachlorophenol				20	%
4,4'-DDD					%
Dibenzo[a,h]pyrene				35	%
Benzidine_T					%
2,2'-oxybis[1-chloropropane]				35	%
Naphthalene				35	%
Acenaphthene				35	%
2-Methylnaphthalene				35	%
Hexachlorobenzene				35	%
Benzoic acid				35	%
Acenaphthene-d10				35	%
Pyrene				35	%
N-Nitrosodi-n-propylamine				35	%
2-Methylphenol				35	%
Benzo[b]fluoranthene				35	%
Carbofuran					%
1,1'-Biphenyl					%
Fluoranthene				35	%
3-Nitroaniline				35	%
Pentachlorophenol_T					%
Benthiocarb					%
4,4'-DDT					%
Phenanthrene				35	%
Phenanthrene-d10				35	%
2,4-Dichlorophenol				35	%
Benzo[g,h,i]perylene				35	%
Atrazine					%
Azobenzene				35	%
Benzo[k]fluoranthene				35	%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8270C SOIL 3550B
TestAmerica San Francisco

Type: MSRPD **Created:** 6/22/2005 4:30:00PM **Active:** 6/27/2005 9:49:34AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
2,4-Dinitrotoluene				35	%
4-Chloroaniline				35	%
4,6-Dinitro-2-methylphenol				35	%
Hexachlorocyclopentadiene				35	%
Chrysene				35	%
Alachlor					%
Benzo[a]anthracene				35	%
Tentatively Identified Compound					%
Dibenzofuran				35	%
2,2'-oxybis(2-chloropropane)				35	%
4,4'-DDE					%
Pentachlorophenol				35	%
2-Nitroaniline				35	%
4-Bromophenyl phenyl ether				35	%
2-Chlorophenol				35	%
Chrysene-d12				35	%
1,4-Dioxane				35	%
DFTPP				35	%
Di(2-ethylhexyl)adipate					%
Pyridine				35	%
Benzidine				35	%
Acenaphthylene				35	%
N-Nitrosodiphenylamine				35	%
1-Methyl-2-pyrrilidinone					%
Simazine					%
Bis(2-chloroethoxy)methane				35	%
4-Nitroaniline				35	%
1,4-Dichlorobenzene				35	%
Nitrobenzene-d5				35	%
Benzo[a]pyrene				35	%
Hexachlorobutadiene				35	%
Benzyl alcohol				35	%
Molinate					%
Di-n-octyl phthalate				35	%
Fluorene				35	%
Terphenyl-d14				35	%
2,4-Dimethylphenol				35	%
2-Fluorobiphenyl				35	%
Dibenz(a,h)anthracene				35	%
2-Nitrophenol				35	%
2-Fluorophenol				35	%

Type: RL **Created:** 6/22/2005 4:03:00PM **Active:** 6/27/2005 9:51:24AM **Exp:**
Initial Prep: 30 **Unit:** g **Final Prep:** 1 **Unit:** mL **Fac:** 0.033333

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
p-Terphenyl-d14					mg/Kg
Dimethyl phthalate	0.170				mg/Kg

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8270C SOIL 3550B
TestAmerica San Francisco

Type: RL **Created:** 6/22/2005 4:03:00PM **Active:** 6/27/2005 9:51:24AM **Exp:**
Initial Prep: 30 **Unit:** g **Final Prep:** 1 **Unit:** mL **Fac:** 0.033333

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Hexachloroethane	0.067				mg/Kg
4-Methylphenol	0.067				mg/Kg
1,2-Dichlorobenzene	0.067				mg/Kg
N-Nitrosodimethylamine	0.067				mg/Kg
3,3'-Dichlorobenzidine	0.170				mg/Kg
Naphthalene-d8	0.067				mg/Kg
2,4-Dinitrophenol	0.330				mg/Kg
Phenol-d5	0.067				mg/Kg
4-Nitrophenol	0.330				mg/Kg
Nitrobenzene	0.067				mg/Kg
2-Chloronaphthalene	0.067				mg/Kg
Bis(2-chloroethyl)ether	0.067				mg/Kg
Tributylamine	0.067				mg/Kg
Anthracene	0.067				mg/Kg
2,4,5-Trichlorophenol	0.067				mg/Kg
2,4,6-Trichlorophenol	0.067				mg/Kg
Indeno[1,2,3-cd]pyrene	0.067				mg/Kg
Perylene-d12	0.067				mg/Kg
Diethyl phthalate	0.170				mg/Kg
1,2,4-Trichlorobenzene	0.067				mg/Kg
2,6-Dinitrotoluene	0.067				mg/Kg
Phenol	0.067				mg/Kg
Isophorone	0.067				mg/Kg
1,3-Dichlorobenzene	0.067				mg/Kg
Bis(2-ethylhexyl) phthalate	0.330				mg/Kg
Di-n-butyl phthalate	0.170				mg/Kg
Butyl benzyl phthalate	0.170				mg/Kg
1,4-Dichlorobenzene-d4					mg/Kg
2,4,6-Tribromophenol	0.067				mg/Kg
4-Chlorophenyl phenyl ether	0.170				mg/Kg
4-Chloro-3-methylphenol	0.170				mg/Kg
2,3,4,6-Tetrachlorophenol	0.067				mg/Kg
4,4'-DDD					mg/Kg
Dibenzo[a,h]pyrene	0.067				mg/Kg
Benzidine_T					mg/Kg
2,2'-oxybis[1-chloropropane]	0.067				mg/Kg
Naphthalene	0.067				mg/Kg
Acenaphthene	0.067				mg/Kg
2-Methylnaphthalene	0.067				mg/Kg
Hexachlorobenzene	0.067				mg/Kg
Benzoic acid	0.330				mg/Kg
Acenaphthene-d10	0.067				mg/Kg
Pyrene	0.067				mg/Kg
N-Nitrosodi-n-propylamine	0.067				mg/Kg
2-Methylphenol	0.067				mg/Kg
Benzo[b]fluoranthene	0.067				mg/Kg
Carbofuran					mg/Kg
1,1'-Biphenyl					mg/Kg
Fluoranthene	0.067				mg/Kg

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8270C SOIL 3550B
TestAmerica San Francisco

Type: RL **Created:** 6/22/2005 4:03:00PM **Active:** 6/27/2005 9:51:24AM **Exp:**
Initial Prep: 30 **Unit:** g **Final Prep:** 1 **Unit:** mL **Fac:** 0.033333

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
3-Nitroaniline	0.170				mg/Kg
Pentachlorophenol_T					mg/Kg
Benthiocarb					mg/Kg
4,4'-DDT					mg/Kg
Phenanthrene	0.067				mg/Kg
Phenanthrene-d10	0.067				mg/Kg
2,4-Dichlorophenol	0.330				mg/Kg
Benzo[g,h,i]perylene	0.067				mg/Kg
Atrazine					mg/Kg
Azobenzene	0.067				mg/Kg
Benzo[k]fluoranthene	0.067				mg/Kg
2,4-Dinitrotoluene	0.067				mg/Kg
4-Chloroaniline	0.067				mg/Kg
4,6-Dinitro-2-methylphenol	0.330				mg/Kg
Hexachlorocyclopentadiene	0.170				mg/Kg
Chrysene	0.067				mg/Kg
Alachlor					mg/Kg
Benzo[a]anthracene	0.330				mg/Kg
Tentatively Identified Compound					mg/Kg
Dibenzofuran	0.067				mg/Kg
2,2'-oxybis(2-chloropropane)	0.067				mg/Kg
4,4'-DDE					mg/Kg
Pentachlorophenol	0.330				mg/Kg
2-Nitroaniline	0.330				mg/Kg
4-Bromophenyl phenyl ether	0.170				mg/Kg
2-Chlorophenol	0.067				mg/Kg
Chrysene-d12	0.067				mg/Kg
1,4-Dioxane	0.67				mg/Kg
DFTPP	0.067				mg/Kg
Di(2-ethylhexyl)adipate					mg/Kg
Pyridine	0.067				mg/Kg
Benzidine	0.067				mg/Kg
Acenaphthylene	0.067				mg/Kg
N-Nitrosodiphenylamine	0.067				mg/Kg
1-Methyl-2-pyrrilidinone	0.067				mg/Kg
Simazine					mg/Kg
Bis(2-chloroethoxy)methane	0.170				mg/Kg
4-Nitroaniline	0.330				mg/Kg
1,4-Dichlorobenzene	0.067				mg/Kg
Nitrobenzene-d5	0.067				mg/Kg
Benzo[a]pyrene	0.067				mg/Kg
Hexachlorobutadiene	0.067				mg/Kg
Benzyl alcohol	0.170				mg/Kg
Molinate					mg/Kg
Di-n-octyl phthalate	1.0				mg/Kg
Fluorene	0.067				mg/Kg
Terphenyl-d14	0.067				mg/Kg
2,4-Dimethylphenol	0.067				mg/Kg
2-Fluorobiphenyl	0.067				mg/Kg

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8270C SOIL 3550B
TestAmerica San Francisco

Type: RL **Created:** 6/22/2005 4:03:00PM **Active:** 6/27/2005 9:51:24AM **Exp:**
Initial Prep: 30 **Unit:** g **Final Prep:** 1 **Unit:** mL **Fac:** 0.033333

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Dibenz(a,h)anthracene	0.067				mg/Kg
2-Nitrophenol	0.067				mg/Kg
2-Fluorophenol	0.067				mg/Kg

Type: SUREC **Created:** 6/5/2008 2:19:00PM **Active:** 6/9/2008 4:09:03PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Phenol-d5		23	101		%
2,4,6-Tribromophenol		37	114		%
Nitrobenzene-d5		21	98		%
Terphenyl-d14		32	117		%
2-Fluorobiphenyl		38	96		%
2-Fluorophenol		28	98		%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8270C WATER 3510C
TestAmerica San Francisco

Type: LCSREC **Created:** 6/22/2005 3:08:00PM **Active:** 6/27/2005 12:25:16PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
p-Terphenyl-d14					%
Dimethyl phthalate		47	117		%
Hexachloroethane		4	87		%
4-Methylphenol		16	93		%
1,2-Dichlorobenzene		20	89		%
N-Nitrosodimethylamine		12	189		%
3,3'-Dichlorobenzidine		37	111		%
Naphthalene-d8		10	130		%
2,4-Dinitrophenol		51	102		%
Phenol-d5		10	130		%
4-Nitrophenol		26	63		%
Nitrobenzene		27	117		%
2-Chloronaphthalene		26	106		%
Bis(2-chloroethyl)ether		22	113		%
Anthracene		58	114		%
2,4,5-Trichlorophenol		35	112		%
2,4,6-Trichlorophenol		31	118		%
Indeno[1,2,3-cd]pyrene		63	126		%
Perylene-d12		10	130		%
Diethyl phthalate		54	111		%
1,2,4-Trichlorobenzene		20	95		%
2,6-Dinitrotoluene		50	115		%
Phenol		10	49		%
Isophorone		42	118		%
1,3-Dichlorobenzene		18	95		%
Bis(2-ethylhexyl) phthalate		59	111		%
Di-n-butyl phthalate		56	114		%
Butyl benzyl phthalate		37	100		%
1,4-Dichlorobenzene-d4					%
2,4,6-Tribromophenol		10	130		%
4-Chlorophenyl phenyl ether		40	110		%
4-Chloro-3-methylphenol		22	147		%
2,3,4,6-Tetrachlorophenol		50	150		%
Dibenzo[a,h]pyrene		10	130		%
2,2'-oxybis[1-chloropropane]		63	138		%
Naphthalene		22	99		%
Acenaphthene		31	109		%
2-Methylnaphthalene		10	130		%
Hexachlorobenzene		61	104		%
Benzoic acid		7	46		%
Acenaphthene-d10		10	130		%
Pyrene		56	91		%
N-Nitrosodi-n-propylamine		34	108		%
2-Methylphenol		18	100		%
Benzo[b]fluoranthene		55	110		%
Fluoranthene		60	121		%
3-Nitroaniline		40	107		%
Phenanthrene		56	110		%
Phenanthrene-d10		10	130		%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8270C WATER 3510C
TestAmerica San Francisco

Type: LCSREC **Created:** 6/22/2005 3:08:00PM **Active:** 6/27/2005 12:25:16PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
2,4-Dichlorophenol		39	107		%
Benzo[g,h,i]perylene		10	140		%
Azobenzene		49	102		%
Benzo[k]fluoranthene		55	110		%
2,4-Dinitrotoluene		52	113		%
4-Chloroaniline		10	80		%
4,6-Dinitro-2-methylphenol		47	114		%
Hexachlorocyclopentadiene		21	101		%
Chrysene		56	94		%
Benzo[a]anthracene		50	112		%
Tentatively Identified Compound					%
Dibenzofuran		42	97		%
2,2'-oxybis(2-chloropropane)					%
Pentachlorophenol		55	107		%
2-Nitroaniline		31	106		%
4-Bromophenyl phenyl ether		52	111		%
2-Chlorophenol		19	104		%
Chrysene-d12		10	130		%
1,4-Dioxane		10	130		%
DFTPP		10	130		%
Pyridine		0	82		%
Benzidine		10	130		%
Acenaphthylene		33	128		%
N-Nitrosodiphenylamine		56	123		%
Bis(2-chloroethoxy)methane		37	110		%
4-Nitroaniline		56	116		%
1,4-Dichlorobenzene		17	82		%
Nitrobenzene-d5		10	130		%
Benzo[a]pyrene		59	103		%
Hexachlorobutadiene		3	101		%
Benzyl alcohol		21	94		%
Di-n-octyl phthalate		47	118		%
Fluorene		37	104		%
Terphenyl-d14		10	130		%
2,4-Dimethylphenol		42	122		%
2-Fluorobiphenyl		10	130		%
Dibenz(a,h)anthracene		10	130		%
2-Nitrophenol		34	107		%
2-Fluorophenol		10	130		%

Type: LCSRPD **Created:** 6/22/2005 3:08:00PM **Active:** 6/27/2005 12:27:13PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
p-Terphenyl-d14					%
Dimethyl phthalate				35	%
Hexachloroethane				35	%
4-Methylphenol				35	%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8270C WATER 3510C
TestAmerica San Francisco

Type: LCSRPD **Created:** 6/22/2005 3:08:00PM **Active:** 6/27/2005 12:27:13PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
1,2-Dichlorobenzene				35	%
N-Nitrosodimethylamine				35	%
3,3'-Dichlorobenzidine				35	%
Naphthalene-d8				35	%
2,4-Dinitrophenol				35	%
Phenol-d5				35	%
4-Nitrophenol				35	%
Nitrobenzene				35	%
2-Chloronaphthalene				35	%
Bis(2-chloroethyl)ether				35	%
Tributylamine					%
Anthracene				35	%
2,4,5-Trichlorophenol				35	%
2,4,6-Trichlorophenol				35	%
Indeno[1,2,3-cd]pyrene				35	%
Perylene-d12				35	%
Diethyl phthalate				35	%
1,2,4-Trichlorobenzene				35	%
2,6-Dinitrotoluene				35	%
Phenol				35	%
Isophorone				35	%
1,3-Dichlorobenzene				35	%
Bis(2-ethylhexyl) phthalate				35	%
Di-n-butyl phthalate				35	%
Butyl benzyl phthalate				35	%
1,4-Dichlorobenzene-d4					%
2,4,6-Tribromophenol				35	%
4-Chlorophenyl phenyl ether				35	%
4-Chloro-3-methylphenol				31	%
2,3,4,6-Tetrachlorophenol				20	%
4,4'-DDD					%
Dibenzo[a,h]pyrene				35	%
Benzidine_T					%
2,2'-oxybis[1-chloropropane]				35	%
Naphthalene				35	%
Acenaphthene				30	%
2-Methylnaphthalene				35	%
Hexachlorobenzene				35	%
Benzoic acid				35	%
Acenaphthene-d10				35	%
Pyrene				35	%
N-Nitrosodi-n-propylamine				34	%
2-Methylphenol				35	%
Benzo[b]fluoranthene				35	%
Carbofuran					%
1,1'-Biphenyl					%
Fluoranthene				35	%
3-Nitroaniline				35	%
Pentachlorophenol_T					%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8270C WATER 3510C
TestAmerica San Francisco

Type: LCSRPD **Created:** 6/22/2005 3:08:00PM **Active:** 6/27/2005 12:27:13PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Benthiocarb					%
4,4'-DDT					%
Phenanthrene				35	%
Phenanthrene-d10				35	%
2,4-Dichlorophenol				35	%
Benzo[g,h,i]perylene				35	%
Atrazine					%
Azobenzene				35	%
Benzo[k]fluoranthene				35	%
2,4-Dinitrotoluene				35	%
4-Chloroaniline				35	%
4,6-Dinitro-2-methylphenol				35	%
Hexachlorocyclopentadiene				35	%
Chrysene				35	%
Alachlor					%
Benzo[a]anthracene				35	%
Tentatively Identified Compound					%
Dibenzofuran				35	%
2,2'-oxybis(2-chloropropane)					%
4,4'-DDE					%
Pentachlorophenol				35	%
2-Nitroaniline				35	%
4-Bromophenyl phenyl ether				35	%
2-Chlorophenol				25	%
Chrysene-d12				35	%
1,4-Dioxane				35	%
DFTPP				35	%
Di(2-ethylhexyl)adipate					%
Pyridine				35	%
Benzidine				35	%
Acenaphthylene				35	%
N-Nitrosodiphenylamine				35	%
1-Methyl-2-pyrrilidinone					%
Simazine					%
Bis(2-chloroethoxy)methane				35	%
4-Nitroaniline				35	%
1,4-Dichlorobenzene				30	%
Nitrobenzene-d5				35	%
Benzo[a]pyrene				35	%
Hexachlorobutadiene				35	%
Benzyl alcohol				35	%
Molinate					%
Di-n-octyl phthalate				35	%
Fluorene				35	%
Terphenyl-d14				35	%
2,4-Dimethylphenol				35	%
2-Fluorobiphenyl				35	%
Dibenz(a,h)anthracene				35	%
2-Nitrophenol				35	%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8270C WATER 3510C
TestAmerica San Francisco

Type: LCSRPD **Created:** 6/22/2005 3:08:00PM **Active:** 6/27/2005 12:27:13PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
2-Fluorophenol				35	%

Type: MDL **Created:** 6/22/2005 3:37:00PM **Active:** 6/27/2005 12:28:20PM **Exp:**
Initial Prep: 1 **Unit:** L **Final Prep:** 1 **Unit:** mL **Fac:** 0.001

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
p-Terphenyl-d14					ug/L
Dimethyl phthalate	0.462				ug/L
Hexachloroethane	0.204				ug/L
4-Methylphenol	0.436				ug/L
1,2-Dichlorobenzene	0.255				ug/L
N-Nitrosodimethylamine	0.21				ug/L
3,3'-Dichlorobenzidine	0.208				ug/L
Naphthalene-d8					ug/L
2,4-Dinitrophenol	0.593				ug/L
Phenol-d5					ug/L
4-Nitrophenol	0.356				ug/L
Nitrobenzene	0.247				ug/L
2-Chloronaphthalene	0.268				ug/L
Bis(2-chloroethyl)ether	0.300				ug/L
Tributylamine	10				ug/L
Anthracene	0.292				ug/L
2,4,5-Trichlorophenol	0.312				ug/L
2,4,6-Trichlorophenol	0.508				ug/L
Indeno[1,2,3-cd]pyrene	0.389				ug/L
Perylene-d12					ug/L
Diethyl phthalate	0.571				ug/L
1,2,4-Trichlorobenzene	0.451				ug/L
2,6-Dinitrotoluene	0.417				ug/L
Phenol	0.152				ug/L
Isophorone	0.221				ug/L
1,3-Dichlorobenzene	0.211				ug/L
Bis(2-ethylhexyl) phthalate	1.477				ug/L
Di-n-butyl phthalate	0.371				ug/L
Butyl benzyl phthalate	0.301				ug/L
1,4-Dichlorobenzene-d4					ug/L
2,4,6-Tribromophenol					ug/L
4-Chlorophenyl phenyl ether	0.301				ug/L
4-Chloro-3-methylphenol	0.234				ug/L
2,3,4,6-Tetrachlorophenol	0.567				ug/L
4,4'-DDD					ug/L
Dibenzo[a,h]pyrene	0.256				ug/L
Benzidine_T					ug/L
2,2'-oxybis[1-chloropropane]	0.265				ug/L
Naphthalene	0.240				ug/L
Acenaphthene	0.282				ug/L
2-Methylnaphthalene	0.225				ug/L
Hexachlorobenzene	0.324				ug/L

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8270C WATER 3510C
TestAmerica San Francisco

Type: MDL **Created:** 6/22/2005 3:37:00PM **Active:** 6/27/2005 12:28:20PM **Exp:**
Initial Prep: 1 **Unit:** L **Final Prep:** 1 **Unit:** mL **Fac:** 0.001

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Benzoic acid	1.719				ug/L
Acenaphthene-d10					ug/L
Pyrene	0.318				ug/L
N-Nitrosodi-n-propylamine	0.403				ug/L
2-Methylphenol	0.265				ug/L
Benzo[b]fluoranthene	0.324				ug/L
Carbofuran	10				ug/L
1,1'-Biphenyl					ug/L
Fluoranthene	0.231				ug/L
3-Nitroaniline	0.738				ug/L
Pentachlorophenol_T					ug/L
Benthiocarb	10				ug/L
4,4'-DDT					ug/L
Phenanthrene	0.341				ug/L
Phenanthrene-d10					ug/L
2,4-Dichlorophenol	0.291				ug/L
Benzo[g,h,i]perylene	0.377				ug/L
Atrazine	10				ug/L
Azobenzene	0.298				ug/L
Benzo[k]fluoranthene	0.310				ug/L
2,4-Dinitrotoluene	0.285				ug/L
4-Chloroaniline	0.272				ug/L
4,6-Dinitro-2-methylphenol	0.518				ug/L
Hexachlorocyclopentadiene	0.318				ug/L
Chrysene	0.227				ug/L
Alachlor	10				ug/L
Benzo[a]anthracene	0.604				ug/L
Tentatively Identified Compound					ug/L
Dibenzofuran	0.290				ug/L
2,2'-oxybis(2-chloropropane)					ug/L
4,4'-DDE					ug/L
Pentachlorophenol	0.801				ug/L
2-Nitroaniline	0.323				ug/L
4-Bromophenyl phenyl ether	0.274				ug/L
2-Chlorophenol	0.283				ug/L
Chrysene-d12					ug/L
1,4-Dioxane	1.0				ug/L
DFTPP					ug/L
Di(2-ethylhexyl)adipate	10				ug/L
Pyridine	1.27				ug/L
Benzidine	1.856				ug/L
Acenaphthylene	0.342				ug/L
N-Nitrosodiphenylamine	0.359				ug/L
1-Methyl-2-pyrrilidinone	10				ug/L
Simazine	10				ug/L
Bis(2-chloroethoxy)methane	0.234				ug/L
4-Nitroaniline	0.416				ug/L
1,4-Dichlorobenzene	0.268				ug/L
Nitrobenzene-d5					ug/L

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8270C WATER 3510C
TestAmerica San Francisco

Type: MDL **Created:** 6/22/2005 3:37:00PM **Active:** 6/27/2005 12:28:20PM **Exp:**
Initial Prep: 1 **Unit:** L **Final Prep:** 1 **Unit:** mL **Fac:** 0.001

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Benzo[a]pyrene	0.241				ug/L
Hexachlorobutadiene	0.508				ug/L
Benzyl alcohol	0.220				ug/L
Molinate	10				ug/L
Di-n-octyl phthalate	0.642				ug/L
Fluorene	0.277				ug/L
Terphenyl-d14					ug/L
2,4-Dimethylphenol	0.258				ug/L
2-Fluorobiphenyl					ug/L
Dibenz(a,h)anthracene	0.399				ug/L
2-Nitrophenol	0.306				ug/L
2-Fluorophenol					ug/L

Type: MSREC **Created:** 8/8/2006 3:13:00PM **Active:** 4/8/2006 3:12:51PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
p-Terphenyl-d14					%
Dimethyl phthalate		10	130		%
Hexachloroethane		55	100		%
4-Methylphenol		10	130		%
1,2-Dichlorobenzene		49	112		%
3,3'-Dichlorobenzidine		9	212		%
Naphthalene-d8		10	130		%
2,4-Dinitrophenol		10	130		%
Phenol-d5		10	130		%
4-Nitrophenol		1	132		%
Nitrobenzene		55	157		%
2-Chloronaphthalene		10	130		%
Bis(2-chloroethyl)ether		43	126		%
Tributylamine					%
Anthracene		44	118		%
2,4,5-Trichlorophenol		20	120		%
2,4,6-Trichlorophenol		55	129		%
Indeno[1,2,3-cd]pyrene		10	150		%
Perylene-d12		10	130		%
Diethyl phthalate		10	130		%
1,2,4-Trichlorobenzene		44	142		%
2,6-Dinitrotoluene		10	130		%
Phenol		12	89		%
Isophorone		47	180		%
1,3-Dichlorobenzene		17	153		%
Bis(2-ethylhexyl) phthalate		29	136		%
Di-n-butyl phthalate		9	111		%
Butyl benzyl phthalate		10	139		%
1,4-Dichlorobenzene-d4					%
2,4,6-Tribromophenol		10	130		%
4-Chlorophenyl phenyl ether		39	144		%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8270C WATER 3510C
TestAmerica San Francisco

Type: MSREC **Created:** 8/8/2006 3:13:00PM **Active:** 4/8/2006 3:12:51PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
4-Chloro-3-methylphenol		22	147		%
2,3,4,6-Tetrachlorophenol		50	150		%
4,4'-DDD					%
Benzidine_T					%
2,2'-oxybis[1-chloropropane]		50	150		%
Naphthalene		36	119		%
Acenaphthene		56	118		%
2-Methylnaphthalene		10	130		%
Hexachlorobenzene		8	140		%
Benzoic acid		10	130		%
Acenaphthene-d10		10	130		%
Pyrene		52	115		%
N-Nitrosodi-n-propylamine		10	130		%
2-Methylphenol		10	130		%
Benzo[b]fluoranthene		42	140		%
Carbofuran					%
1,1'-Biphenyl					%
Fluoranthene		43	121		%
3-Nitroaniline		10	130		%
Pentachlorophenol_T					%
Benthiocarb					%
4,4'-DDT					%
Phenanthrene		44	125		%
Phenanthrene-d10		10	130		%
2,4-Dichlorophenol		53	121		%
Benzo[g,h,i]perylene		10	140		%
Atrazine					%
Azobenzene		12	89		%
Benzo[k]fluoranthene		26	145		%
2,4-Dinitrotoluene		39	139		%
4-Chloroaniline		10	130		%
4,6-Dinitro-2-methylphenol		53	110		%
Hexachlorocyclopentadiene		10	130		%
Chrysene		42	139		%
Alachlor					%
Benzo[a]anthracene		42	133		%
Tentatively Identified Compound					%
Dibenzofuran		10	130		%
2,2'-oxybis(2-chloropropane)					%
4,4'-DDE					%
Pentachlorophenol		45	125		%
2-Nitroaniline		10	130		%
4-Bromophenyl phenyl ether		10	130		%
2-Chlorophenol		23	134		%
Chrysene-d12		10	130		%
1,4-Dioxane		10	130		%
DFTPP		10	130		%
Di(2-ethylhexyl)adipate					%
Benzidine					%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8270C WATER 3510C
TestAmerica San Francisco

Type: MSREC **Created:** 8/8/2006 3:13:00PM **Active:** 4/8/2006 3:12:51PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Acenaphthylene		54	126		%
N-Nitrosodiphenylamine		14	170		%
1-Methyl-2-pyrrilidinone					%
Simazine					%
Bis(2-chloroethoxy)methane		43	164		%
4-Nitroaniline		10	130		%
1,4-Dichlorobenzene		36	97		%
Nitrobenzene-d5		10	130		%
Benzo[a]pyrene		32	148		%
Hexachlorobutadiene		38	102		%
Benzyl alcohol		10	130		%
Molinate					%
Di-n-octyl phthalate		10	130		%
Fluorene		72	108		%
Terphenyl-d14		10	130		%
2,4-Dimethylphenol		42	109		%
2-Fluorobiphenyl		10	130		%
Dibenz(a,h)anthracene		10	130		%
2-Nitrophenol		45	166		%
2-Fluorophenol		10	130		%

Type: MSRPD **Created:** 8/8/2006 3:14:00PM **Active:** 4/8/2006 3:13:58PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
p-Terphenyl-d14					%
Dimethyl phthalate				35	%
Hexachloroethane				35	%
4-Methylphenol				35	%
1,2-Dichlorobenzene				35	%
3,3'-Dichlorobenzidine				35	%
Naphthalene-d8				35	%
2,4-Dinitrophenol				35	%
Phenol-d5				35	%
4-Nitrophenol				35	%
Nitrobenzene				35	%
2-Chloronaphthalene				35	%
Bis(2-chloroethyl)ether				35	%
Tributylamine					%
Anthracene				35	%
2,4,5-Trichlorophenol				35	%
2,4,6-Trichlorophenol				35	%
Indeno[1,2,3-cd]pyrene				35	%
Perylene-d12				35	%
Diethyl phthalate				35	%
1,2,4-Trichlorobenzene				35	%
2,6-Dinitrotoluene				35	%
Phenol				35	%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8270C WATER 3510C
TestAmerica San Francisco

Type: MSRPD **Created:** 8/8/2006 3:14:00PM **Active:** 4/8/2006 3:13:58PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Isophorone				35	%
1,3-Dichlorobenzene				35	%
Bis(2-ethylhexyl) phthalate				35	%
Di-n-butyl phthalate				35	%
Butyl benzyl phthalate				35	%
1,4-Dichlorobenzene-d4					%
2,4,6-Tribromophenol				35	%
4-Chlorophenyl phenyl ether				35	%
4-Chloro-3-methylphenol				31	%
2,3,4,6-Tetrachlorophenol				20	%
4,4'-DDD					%
Benzidine_T					%
2,2'-oxybis[1-chloropropane]				20	%
Naphthalene				35	%
Acenaphthene				30	%
2-Methylnaphthalene				35	%
Hexachlorobenzene				35	%
Benzoic acid				35	%
Acenaphthene-d10				35	%
Pyrene				35	%
N-Nitrosodi-n-propylamine				34	%
2-Methylphenol				35	%
Benzo[b]fluoranthene				35	%
Carbofuran					%
1,1'-Biphenyl					%
Fluoranthene				35	%
3-Nitroaniline				35	%
Pentachlorophenol_T					%
Benthiocarb					%
4,4'-DDT					%
Phenanthrene				35	%
Phenanthrene-d10				35	%
2,4-Dichlorophenol				35	%
Benzo[g,h,i]perylene				35	%
Atrazine					%
Azobenzene				35	%
Benzo[k]fluoranthene				35	%
2,4-Dinitrotoluene				35	%
4-Chloroaniline				35	%
4,6-Dinitro-2-methylphenol				35	%
Hexachlorocyclopentadiene				35	%
Chrysene				35	%
Alachlor					%
Benzo[a]anthracene				35	%
Tentatively Identified Compound					%
Dibenzofuran				35	%
2,2'-oxybis(2-chloropropane)					%
4,4'-DDE					%
Pentachlorophenol				35	%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8270C WATER 3510C
TestAmerica San Francisco

Type: MSRPD **Created:** 8/8/2006 3:14:00PM **Active:** 4/8/2006 3:13:58PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
2-Nitroaniline				35	%
4-Bromophenyl phenyl ether				35	%
2-Chlorophenol				25	%
Chrysene-d12				35	%
1,4-Dioxane				35	%
DFTPP				35	%
Di(2-ethylhexyl)adipate					%
Benzidine					%
Acenaphthylene				35	%
N-Nitrosodiphenylamine				35	%
1-Methyl-2-pyrrilidinone					%
Simazine					%
Bis(2-chloroethoxy)methane				35	%
4-Nitroaniline				35	%
1,4-Dichlorobenzene				30	%
Nitrobenzene-d5				35	%
Benzo[a]pyrene				35	%
Hexachlorobutadiene				35	%
Benzyl alcohol				35	%
Molinate					%
Di-n-octyl phthalate				35	%
Fluorene				35	%
Terphenyl-d14				35	%
2,4-Dimethylphenol				35	%
2-Fluorobiphenyl				35	%
Dibenz(a,h)anthracene				35	%
2-Nitrophenol				35	%
2-Fluorophenol				35	%

Type: RL **Created:** 6/22/2005 3:31:00PM **Active:** 6/27/2005 12:35:42PM **Exp:**
Initial Prep: 1 **Unit:** L **Final Prep:** 1 **Unit:** mL **Fac:** 0.001

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
p-Terphenyl-d14					ug/L
Dimethyl phthalate	5.0				ug/L
Hexachloroethane	2.0				ug/L
4-Methylphenol	2.0				ug/L
1,2-Dichlorobenzene	2.0				ug/L
N-Nitrosodimethylamine	5.0				ug/L
3,3'-Dichlorobenzidine	5.0				ug/L
Naphthalene-d8	2.0				ug/L
2,4-Dinitrophenol	10.0				ug/L
Phenol-d5	2.0				ug/L
4-Nitrophenol	10.0				ug/L
Nitrobenzene	2.0				ug/L
2-Chloronaphthalene	2.0				ug/L
Bis(2-chloroethyl)ether	2.0				ug/L
Tributylamine	10				ug/L

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8270C WATER 3510C
TestAmerica San Francisco

Type: RL **Created:** 6/22/2005 3:31:00PM **Active:** 6/27/2005 12:35:42PM **Exp:**
Initial Prep: 1 **Unit:** L **Final Prep:** 1 **Unit:** mL **Fac:** 0.001

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Anthracene	2.0				ug/L
2,4,5-Trichlorophenol	2.0				ug/L
2,4,6-Trichlorophenol	2.0				ug/L
Indeno[1,2,3-cd]pyrene	2.0				ug/L
Perylene-d12	2.0				ug/L
Diethyl phthalate	5.0				ug/L
1,2,4-Trichlorobenzene	2.0				ug/L
2,6-Dinitrotoluene	5.0				ug/L
Phenol	2.0				ug/L
Isophorone	2.0				ug/L
1,3-Dichlorobenzene	2.0				ug/L
Bis(2-ethylhexyl) phthalate	10.0				ug/L
Di-n-butyl phthalate	5.0				ug/L
Butyl benzyl phthalate	5.0				ug/L
1,4-Dichlorobenzene-d4					ug/L
2,4,6-Tribromophenol	2.0				ug/L
4-Chlorophenyl phenyl ether	5.0				ug/L
4-Chloro-3-methylphenol	5.0				ug/L
2,3,4,6-Tetrachlorophenol	2.0				ug/L
4,4'-DDD					ug/L
Dibenzo[a,h]pyrene	2.0				ug/L
Benzidine_T					ug/L
2,2'-oxybis[1-chloropropane]	2.0				ug/L
Naphthalene	2.0				ug/L
Acenaphthene	2.0				ug/L
2-Methylnaphthalene	2.0				ug/L
Hexachlorobenzene	2.0				ug/L
Benzoic acid	10.0				ug/L
Acenaphthene-d10	2.0				ug/L
Pyrene	2.0				ug/L
N-Nitrosodi-n-propylamine	2.0				ug/L
2-Methylphenol	2.0				ug/L
Benzo[b]fluoranthene	2.0				ug/L
Carbofuran	10				ug/L
1,1'-Biphenyl					ug/L
Fluoranthene	2.0				ug/L
3-Nitroaniline	5.0				ug/L
Pentachlorophenol_T					ug/L
Benthiocarb	10				ug/L
4,4'-DDT					ug/L
Phenanthrene	2.0				ug/L
Phenanthrene-d10	2.0				ug/L
2,4-Dichlorophenol	5				ug/L
Benzo[g,h,i]perylene	2.0				ug/L
Atrazine	10				ug/L
Azobenzene	2.0				ug/L
Benzo[k]fluoranthene	2.0				ug/L
2,4-Dinitrotoluene	2.0				ug/L
4-Chloroaniline	2.0				ug/L

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8270C WATER 3510C
TestAmerica San Francisco

Type: RL **Created:** 6/22/2005 3:31:00PM **Active:** 6/27/2005 12:35:42PM **Exp:**
Initial Prep: 1 **Unit:** L **Final Prep:** 1 **Unit:** mL **Fac:** 0.001

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
4,6-Dinitro-2-methylphenol	10.0				ug/L
Hexachlorocyclopentadiene	5.0				ug/L
Chrysene	2.0				ug/L
Alachlor	10				ug/L
Benzo[a]anthracene	5				ug/L
Tentatively Identified Compound					ug/L
Dibenzofuran	2.0				ug/L
2,2'-oxybis(2-chloropropane)					ug/L
4,4'-DDE					ug/L
Pentachlorophenol	10.0				ug/L
2-Nitroaniline	10.0				ug/L
4-Bromophenyl phenyl ether	5.0				ug/L
2-Chlorophenol	2.0				ug/L
Chrysene-d12	2.0				ug/L
1,4-Dioxane	2.0				ug/L
DFTPP	2.0				ug/L
Di(2-ethylhexyl)adipate	10				ug/L
Pyridine	20.0				ug/L
Benzidine	10.0				ug/L
Acenaphthylene	2.0				ug/L
N-Nitrosodiphenylamine	2.0				ug/L
1-Methyl-2-pyrrilidinone	10				ug/L
Simazine	10				ug/L
Bis(2-chloroethoxy)methane	5.0				ug/L
4-Nitroaniline	10.0				ug/L
1,4-Dichlorobenzene	2.0				ug/L
Nitrobenzene-d5	2.0				ug/L
Benzo[a]pyrene	2.0				ug/L
Hexachlorobutadiene	2.0				ug/L
Benzyl alcohol	5.0				ug/L
Molinate	10				ug/L
Di-n-octyl phthalate	20				ug/L
Fluorene	2.0				ug/L
Terphenyl-d14	2.0				ug/L
2,4-Dimethylphenol	2.0				ug/L
2-Fluorobiphenyl	2.0				ug/L
Dibenz(a,h)anthracene	2.0				ug/L
2-Nitrophenol	2.0				ug/L
2-Fluorophenol	2.0				ug/L

Type: SUREC **Created:** 6/22/2005 3:08:00PM **Active:** 6/27/2005 12:36:43PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
p-Terphenyl-d14		36	106		%
Dimethyl phthalate					%
Hexachloroethane					%
4-Methylphenol					%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8270C WATER 3510C
TestAmerica San Francisco

Type: SUREC **Created:** 6/22/2005 3:08:00PM **Active:** 6/27/2005 12:36:43PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
1,2-Dichlorobenzene					%
N-Nitrosodimethylamine					%
3,3'-Dichlorobenzidine					%
Naphthalene-d8					%
2,4-Dinitrophenol					%
Phenol-d5		1	47		%
4-Nitrophenol					%
Nitrobenzene					%
2-Chloronaphthalene					%
Bis(2-chloroethyl)ether					%
Anthracene					%
2,4,5-Trichlorophenol					%
2,4,6-Trichlorophenol					%
Indeno[1,2,3-cd]pyrene					%
Perylene-d12					%
Diethyl phthalate					%
1,2,4-Trichlorobenzene					%
2,6-Dinitrotoluene					%
Phenol					%
Isophorone					%
1,3-Dichlorobenzene					%
Bis(2-ethylhexyl) phthalate					%
Di-n-butyl phthalate					%
Butyl benzyl phthalate					%
1,4-Dichlorobenzene-d4					%
2,4,6-Tribromophenol		22	124		%
4-Chlorophenyl phenyl ether					%
4-Chloro-3-methylphenol					%
Dibenzo[a,h]pyrene					%
Naphthalene					%
Acenaphthene					%
2-Methylnaphthalene					%
Hexachlorobenzene					%
Benzoic acid					%
Acenaphthene-d10					%
Pyrene					%
N-Nitrosodi-n-propylamine					%
2-Methylphenol					%
Benzo[b]fluoranthene					%
Fluoranthene					%
3-Nitroaniline					%
Phenanthrene					%
Phenanthrene-d10					%
2,4-Dichlorophenol					%
Benzo[g,h,i]perylene					%
Azobenzene					%
Benzo[k]fluoranthene					%
2,4-Dinitrotoluene					%
4-Chloroaniline					%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 8270C WATER 3510C
TestAmerica San Francisco

Type: SUREC **Created:** 6/22/2005 3:08:00PM **Active:** 6/27/2005 12:36:43PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
4,6-Dinitro-2-methylphenol					%
Hexachlorocyclopentadiene					%
Chrysene					%
Benzo[a]anthracene					%
Dibenzofuran					%
2,2'-oxybis(2-chloropropane)					%
Pentachlorophenol					%
2-Nitroaniline					%
4-Bromophenyl phenyl ether					%
2-Chlorophenol					%
Chrysene-d12					%
1,4-Dioxane					%
DFTPP					%
Pyridine					%
Benzidine					%
Acenaphthylene					%
N-Nitrosodiphenylamine					%
Bis(2-chloroethoxy)methane					%
4-Nitroaniline					%
1,4-Dichlorobenzene					%
Nitrobenzene-d5		6	98		%
Benzo[a]pyrene					%
Hexachlorobutadiene					%
Benzyl alcohol					%
Di-n-octyl phthalate					%
Fluorene					%
Terphenyl-d14		36	106		%
2,4-Dimethylphenol					%
2-Fluorobiphenyl		6	103		%
Dibenz(a,h)anthracene					%
2-Nitrophenol					%
2-Fluorophenol		1	66		%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** DIESEL SOLID 3550B
TestAmerica San Francisco

Type: LCSREC **Created:** 5/26/2005 1:20:00PM **Active:** 1/1/2005 1:24:40PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
C12-C22		50	130		%
C21-C36					%
n-Decane					%
Diesel		50	130		%
C16-C40		50	130		%
n-Hexacosane					%
Heptadecane					%
C9-C36CRD + OTP		50	130		%
C10-C28 + OTP		50	130		%
n-Decanoic Acid (Surr)					%
C21-C40					%
C9-C36		50	130		%
OTP as DRO		50	130		%
C9-C19		40	130		%
C13					%
C9-C25					%
p-Terphenyl					%
n-Nonane					%
C9-C24		50	130		%
C19					%
C12-C24 + OTP		50	130		%
C19-C36		50	130		%
C9-C36TEPH + OTP		50	130		%
o-Terphenyl		50	130		%
n-Docosane					%
C16-C36 ORO		50	130		%
C9-C40		50	130		%
DRO + OTP		50	130		%
C12-C24		50	130		%
C10-C36 + OTP		50	130		%
Bunker Range Organics (C9-C36)		50	130		%
C13-C22 + OTP		50	130		%
Stoddard Solvent		50	130		%
n-Tetracosane					%
#2 Diesel Fuel		50	130		%
C10-C25 + OTP		50	130		%
C40					%
C10-C28		50	130		%
C9-C36HYD + OTP		50	130		%
C24-C36					%
C10-C24					%
C9 - C17					%
C24-C40		50	130		%
C23-C40		50	130		%
C9-C19KR + OTP		50	130		%
n-Octacosane					%
C22-C40					%
Unknown Hydrocarbons					%
C12-C22 + OTP		50	130		%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** DIESEL SOLID 3550B
TestAmerica San Francisco

Type: LCSREC **Created:** 5/26/2005 1:20:00PM **Active:** 1/1/2005 1:24:40PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
C13-C22		50	130		%
C9-C24 + OTP		50	130		%
C25					%
C12-C21		50	130		%
Kerosene		50	130		%
C9-C13		50	130		%
C10-C36		50	130		%
C10-C25		50	130		%
Mineral Spirits		50	130		%
Hydraulic Fluid		50	130		%
C12-C40		50	130		%
Crude Oil Range Organics (C9-C36)		50	130		%
C38 (Surr)					%
Dodecane					%
Hexadecane					%
Tricosane					%
C28-C40		50	130		%
Motor Oil		50	130		%
C9-C19Jet +OTP		50	130		%
C10-C40		50	130		%
n-Hexatriacontane					%
C10-C26		50	130		%

Type: LCSRPD **Created:** 5/26/2005 1:20:00PM **Active:** 1/1/2005 1:24:52PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
C12-C22				35	%
C21-C36					%
Diesel				35	%
C16-C40				35	%
C9-C36CRD + OTP				35	%
C10-C28 + OTP				35	%
n-Decanoic Acid (Surr)					%
C21-C40					%
C9-C36				35	%
OTP as DRO				35	%
C9-C19				35	%
C13					%
p-Terphenyl					%
C9-C24				35	%
C19					%
C12-C24 + OTP				35	%
C19-C36				35	%
C9-C36TEPH + OTP				35	%
o-Terphenyl				35	%
C16-C36 ORO				35	%
C9-C40				35	%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** DIESEL SOLID 3550B
TestAmerica San Francisco

Type: LCSRPD **Created:** 5/26/2005 1:20:00PM **Active:** 1/1/2005 1:24:52PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
DRO + OTP				35	%
C12-C24				35	%
C10-C36 + OTP				35	%
Bunker Range Organics (C9-C36)				35	%
C13-C22 + OTP				35	%
Stoddard Solvent				35	%
#2 Diesel Fuel				35	%
C10-C25 + OTP				35	%
C10-C28				35	%
C9-C36HYD + OTP				35	%
C24-C36				35	%
C24-C40				35	%
C23-C40				35	%
C9-C19KR + OTP				35	%
C22-C40					%
Unknown Hydrocarbons					%
C12-C22 + OTP				35	%
C13-C22				35	%
C9-C24 + OTP				35	%
C12-C21				35	%
Kerosene				35	%
C9-C13				35	%
C10-C36				35	%
C10-C25				35	%
Mineral Spirits				35	%
Hydraulic Fluid				35	%
C12-C40				35	%
Crude Oil Range Organics (C9-C36)				35	%
C38 (Surr)					%
C28-C40				35	%
Motor Oil				35	%
C9-C19Jet +OTP				35	%
C10-C40				35	%
C10-C26				35	%

Type: MDL **Created:** 5/26/2005 1:22:00PM **Active:** 1/1/2005 1:26:46PM **Exp:**
Initial Prep: 30 **Unit:** g **Final Prep:** 5 **Unit:** mL **Fac:** 0.166666

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
C12-C22	0.79				mg/Kg
C21-C36	42				mg/Kg
n-Decane	1				mg/Kg
Diesel	0.460				mg/Kg
C16-C40	3.488				mg/Kg
n-Hexacosane					mg/Kg
Heptadecane					mg/Kg
C9-C36CRD + OTP	0.79				mg/Kg
C10-C28 + OTP	0.79				mg/Kg

Method Limit Group Report

Location Code: 720 **Limit Group Description:** DIESEL SOLID 3550B
TestAmerica San Francisco

Type: MDL **Created:** 5/26/2005 1:22:00PM **Active:** 1/1/2005 1:26:46PM **Exp:**
Initial Prep: 30 **Unit:** g **Final Prep:** 5 **Unit:** mL **Fac:** 0.166666

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
n-Decanoic Acid (Surr)					mg/Kg
C21-C40	42				mg/Kg
C9-C36	0.79				mg/Kg
OTP as DRO	0.79				mg/Kg
C9-C19	0.328				mg/Kg
C13	1				mg/Kg
C9-C25					mg/Kg
p-Terphenyl					mg/Kg
n-Nonane	1				mg/Kg
C9-C24	0.79				mg/Kg
C19	1				mg/Kg
C12-C24 + OTP	0.79				mg/Kg
C19-C36	0.79				mg/Kg
C9-C36TEPH + OTP	0.79				mg/Kg
o-Terphenyl	0.79				mg/Kg
n-Docosane	1				mg/Kg
C16-C36 ORO	3.488				mg/Kg
C9-C40	9.241				mg/Kg
DRO + OTP	0.79				mg/Kg
C12-C24	0.79				mg/Kg
C10-C36 + OTP	0.79				mg/Kg
Bunker Range Organics (C9-C36)	0.79				mg/Kg
C13-C22 + OTP	0.79				mg/Kg
Stoddard Solvent	0.79				mg/Kg
n-Tetracosane	1				mg/Kg
#2 Diesel Fuel	0.79				mg/Kg
C10-C25 + OTP	0.79				mg/Kg
C40	1				mg/Kg
C10-C28	0.460				mg/Kg
C9-C36HYD + OTP	0.79				mg/Kg
C24-C36	3.488				mg/Kg
C10-C24					mg/Kg
C9 - C17					mg/Kg
C24-C40	42				mg/Kg
C23-C40	3.488				mg/Kg
C9-C19KR + OTP	0.79				mg/Kg
n-Octacosane	1				mg/Kg
C22-C40					mg/Kg
Unknown Hydrocarbons					mg/Kg
C12-C22 + OTP	0.79				mg/Kg
C13-C22	0.380				mg/Kg
C9-C24 + OTP	0.79				mg/Kg
C25	1				mg/Kg
C12-C21	42				mg/Kg
Kerosene	0.448				mg/Kg
C9-C13	0.230				mg/Kg
C10-C36	0.79				mg/Kg
C10-C25	0.460				mg/Kg
Mineral Spirits	0.230				mg/Kg

Method Limit Group Report

Location Code: 720 **Limit Group Description:** DIESEL SOLID 3550B
TestAmerica San Francisco

Type: MDL **Created:** 5/26/2005 1:22:00PM **Active:** 1/1/2005 1:26:46PM **Exp:**
Initial Prep: 30 **Unit:** g **Final Prep:** 5 **Unit:** mL **Fac:** 0.166666

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Hydraulic Fluid	0.79				mg/Kg
C12-C40	2.173				mg/Kg
Crude Oil Range Organics (C9-C36)	0.79				mg/Kg
C38 (Surr)					mg/Kg
Dodecane	1				mg/Kg
Hexadecane					mg/Kg
Tricosane	1				mg/Kg
C28-C40	42				mg/Kg
Motor Oil	3.488				mg/Kg
C9-C19Jet +OTP	0.79				mg/Kg
C10-C40	42				mg/Kg
n-Hexatriacontane	1				mg/Kg
C10-C26	0.460				mg/Kg

Type: MSREC **Created:** 5/26/2005 1:20:00PM **Active:** 1/1/2005 1:24:18PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
C12-C22		50	130		%
C21-C36					%
Diesel		50	130		%
C16-C40		50	130		%
C9-C36CRD + OTP		50	130		%
C10-C28 + OTP		50	130		%
n-Decanoic Acid (Surr)					%
C21-C40					%
C9-C36		50	130		%
OTP as DRO		50	130		%
C9-C19		50	130		%
C13					%
p-Terphenyl					%
C9-C24		50	130		%
C19					%
C12-C24 + OTP		50	130		%
C19-C36		50	130		%
C9-C36TEPH + OTP		50	130		%
o-Terphenyl		50	130		%
C16-C36 ORO		50	130		%
C9-C40		50	130		%
DRO + OTP		50	130		%
C12-C24		50	130		%
C10-C36 + OTP		50	130		%
Bunker Range Organics (C9-C36)		50	130		%
C13-C22 + OTP		50	130		%
Stoddard Solvent		50	130		%
#2 Diesel Fuel		50	130		%
C10-C25 + OTP		50	130		%
C10-C28		50	130		%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** DIESEL SOLID 3550B
TestAmerica San Francisco

Type: MSREC **Created:** 5/26/2005 1:20:00PM **Active:** 1/1/2005 1:24:18PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
C9-C36HYD + OTP		50	130		%
C24-C36					%
C24-C40		50	130		%
C23-C40		50	130		%
C9-C19KR + OTP		50	130		%
C22-C40					%
Unknown Hydrocarbons					%
C12-C22 + OTP		50	130		%
C13-C22		50	130		%
C9-C24 + OTP		50	130		%
C12-C21		50	130		%
Kerosene		50	130		%
C9-C13		50	130		%
C10-C36		50	130		%
C10-C25		50	130		%
Mineral Spirits		50	130		%
Hydraulic Fluid		50	130		%
C12-C40		50	130		%
Crude Oil Range Organics (C9-C36)		50	130		%
C38 (Surr)					%
C28-C40		50	130		%
Motor Oil		50	130		%
C9-C19Jet +OTP		50	130		%
C10-C40		50	130		%
C10-C26		50	130		%

Type: MSRPD **Created:** 5/26/2005 1:21:00PM **Active:** 1/1/2005 1:24:07PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
C12-C22				30	%
C21-C36					%
Diesel				30	%
C16-C40				30	%
C9-C36CRD + OTP				30	%
C10-C28 + OTP				30	%
n-Decanoic Acid (Surr)					%
C21-C40					%
C9-C36				30	%
OTP as DRO				30	%
C9-C19				30	%
C13					%
p-Terphenyl					%
C9-C24				30	%
C19					%
C12-C24 + OTP				30	%
C19-C36				30	%
C9-C36TEPH + OTP				30	%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** DIESEL SOLID 3550B
TestAmerica San Francisco

Type: MSRPD **Created:** 5/26/2005 1:21:00PM **Active:** 1/1/2005 1:24:07PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
o-Terphenyl				30	%
C16-C36 ORO				30	%
C9-C40				30	%
DRO + OTP				30	%
C12-C24				30	%
C10-C36 + OTP				30	%
Bunker Range Organics (C9-C36)				30	%
C13-C22 + OTP				30	%
Stoddard Solvent				30	%
#2 Diesel Fuel				30	%
C10-C25 + OTP				30	%
C10-C28				30	%
C9-C36HYD + OTP				30	%
C24-C36				30	%
C24-C40				30	%
C23-C40				30	%
C9-C19KR + OTP				30	%
C22-C40					%
Unknown Hydrocarbons					%
C12-C22 + OTP				30	%
C13-C22				30	%
C9-C24 + OTP				30	%
C12-C21				30	%
Kerosene				30	%
C9-C13				30	%
C10-C36				30	%
C10-C25				30	%
Mineral Spirits				30	%
Hydraulic Fluid				30	%
C12-C40				30	%
Crude Oil Range Organics (C9-C36)				30	%
C38 (Surr)					%
C28-C40				30	%
Motor Oil				30	%
C9-C19Jet +OTP				30	%
C10-C40				30	%
C10-C26				30	%

Type: RL **Created:** 5/26/2005 1:23:00PM **Active:** 1/1/2005 1:23:48PM **Exp:**
Initial Prep: 30 **Unit:** g **Final Prep:** 5 **Unit:** mL **Fac:** 0.166666

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
C12-C22	1.0				mg/Kg
C21-C36	50				mg/Kg
n-Decane	1				mg/Kg
Diesel	1.0				mg/Kg
C16-C40	50				mg/Kg
n-Hexacosane					mg/Kg

Method Limit Group Report

Location Code: 720 **Limit Group Description:** DIESEL SOLID 3550B
TestAmerica San Francisco

Type: RL **Created:** 5/26/2005 1:23:00PM **Active:** 1/1/2005 1:23:48PM **Exp:**
Initial Prep: 30 **Unit:** g **Final Prep:** 5 **Unit:** mL **Fac:** 0.166666

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Heptadecane					mg/Kg
C9-C36CRD + OTP	1.0				mg/Kg
C10-C28 + OTP	1.0				mg/Kg
n-Decanoic Acid (Surr)	1.0				mg/Kg
C21-C40	50				mg/Kg
C9-C36	50				mg/Kg
OTP as DRO	1.0				mg/Kg
C9-C19	1.0				mg/Kg
C13	1				mg/Kg
C9-C25					mg/Kg
p-Terphenyl					mg/Kg
n-Nonane	1				mg/Kg
C9-C24	1.0				mg/Kg
C19	1				mg/Kg
C12-C24 + OTP	1.0				mg/Kg
C19-C36	50				mg/Kg
C9-C36TEPH + OTP	1.0				mg/Kg
o-Terphenyl	1.0				mg/Kg
n-Docosane	1				mg/Kg
C16-C36 ORO	50				mg/Kg
C9-C40	50				mg/Kg
DRO + OTP	1.0				mg/Kg
C12-C24	1.0				mg/Kg
C10-C36 + OTP	1.0				mg/Kg
Bunker Range Organics (C9-C36)	50				mg/Kg
C13-C22 + OTP	1.0				mg/Kg
Stoddard Solvent	1.0				mg/Kg
n-Tetracosane	1				mg/Kg
#2 Diesel Fuel	1.0				mg/Kg
C10-C25 + OTP	1.0				mg/Kg
C40	1				mg/Kg
C10-C28	1.0				mg/Kg
C9-C36HYD + OTP	1.0				mg/Kg
C24-C36	50				mg/Kg
C10-C24					mg/Kg
C9 - C17					mg/Kg
C24-C40	50				mg/Kg
C23-C40	50				mg/Kg
C9-C19KR + OTP	1.0				mg/Kg
n-Octacosane	1				mg/Kg
C22-C40	50				mg/Kg
Unknown Hydrocarbons					mg/Kg
C12-C22 + OTP	1.0				mg/Kg
C13-C22	1.0				mg/Kg
C9-C24 + OTP	1.0				mg/Kg
C25	1				mg/Kg
C12-C21	1				mg/Kg
Kerosene	1.0				mg/Kg
C9-C13	1.0				mg/Kg

Method Limit Group Report

Location Code: 720 **Limit Group Description:** DIESEL SOLID 3550B
TestAmerica San Francisco

Type: RL **Created:** 5/26/2005 1:23:00PM **Active:** 1/1/2005 1:23:48PM **Exp:**
Initial Prep: 30 **Unit:** g **Final Prep:** 5 **Unit:** mL **Fac:** 0.166666

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
C10-C36	1.0				mg/Kg
C10-C25	1.0				mg/Kg
Mineral Spirits	1.0				mg/Kg
Hydraulic Fluid	50				mg/Kg
C12-C40	50				mg/Kg
Crude Oil Range Organics (C9-C36)	50				mg/Kg
C38 (Surr)	50				mg/Kg
Dodecane	1				mg/Kg
Hexadecane					mg/Kg
Tricosane	1				mg/Kg
C28-C40	50				mg/Kg
Motor Oil	50				mg/Kg
C9-C19Jet +OTP	1.0				mg/Kg
C10-C40	50				mg/Kg
n-Hexatriacontane	1				mg/Kg
C10-C26	1.0				mg/Kg

Type: SUREC **Created:** 7/22/2009 12:36:00PM **Active:** 8/6/2009 9:57:27AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
p-Terphenyl		31	114		%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** DIESEL WATER 3510C
TestAmerica San Francisco

Type: LCSREC **Created:** 5/26/2005 11:05:00AM **Active:** 1/1/2005 11:04:50AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
C12-C22		50	130		%
C21-C36					%
n-Decane					%
Diesel		50	130		%
C16-C40		50	130		%
n-Hexacosane					%
Heptadecane					%
C9-C36CRD + OTP					%
C10-C28 + OTP					%
n-Decanoic Acid (Surr)					%
C21-C40		50	130		%
C9-C36		50	130		%
OTP as DRO					%
C9-C19		40	130		%
C13					%
C9-C25		46	123		%
p-Terphenyl					%
n-Nonane					%
C9-C24		50	130		%
C19					%
C12-C24 + OTP					%
C19-C36		50	130		%
C9-C36TEPH + OTP					%
o-Terphenyl		50	130		%
n-Docosane					%
C16-C36 ORO		50	130		%
C9-C40		50	130		%
DRO + OTP					%
C12-C24		46	123		%
C10-C36 + OTP					%
Bunker Range Organics (C9-C36)		50	130		%
C13-C22 + OTP					%
Stoddard Solvent		50	130		%
n-Tetracosane					%
#2 Diesel Fuel		50	130		%
C10-C25 + OTP					%
C40					%
C10-C28		40	150		%
C9-C36HYD + OTP					%
C24-C36		50	130		%
C10-C24		46	123		%
C9 - C17		40	130		%
C24-C40					%
C23-C40		50	130		%
C9-C19KR + OTP					%
n-Octacosane					%
C22-C40					%
Unknown Hydrocarbons					%
C12-C22 + OTP					%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** DIESEL WATER 3510C
TestAmerica San Francisco

Type: LCSREC **Created:** 5/26/2005 11:05:00AM **Active:** 1/1/2005 11:04:50AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
C13-C22		50	130		%
C9-C24 + OTP					%
C25					%
C12-C21		50	130		%
Kerosene		50	130		%
C9-C13					%
C10-C36		50	130		%
C10-C25		40	123		%
Mineral Spirits		50	130		%
Hydraulic Fluid					%
C12-C40		50	130		%
Crude Oil Range Organics (C9-C36)					%
C38 (Surr)					%
Dodecane					%
Hexadecane					%
Tricosane					%
C28-C40		50	130		%
Motor Oil		50	130		%
C9-C19Jet +OTP					%
C10-C40		50	130		%
n-Hexatriacontane					%
C10-C26		46	123		%

Type: LCSRPD **Created:** 5/26/2005 11:01:00AM **Active:** 1/1/2005 11:01:22AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
C12-C22				35	%
C21-C36					%
Diesel				35	%
C16-C40				35	%
C9-C36CRD + OTP					%
C10-C28 + OTP					%
n-Decanoic Acid (Surr)					%
C21-C40				35	%
C9-C36				35	%
OTP as DRO					%
C9-C19				35	%
C13					%
C9-C25				35	%
p-Terphenyl					%
C9-C24				35	%
C19					%
C12-C24 + OTP					%
C19-C36				35	%
C9-C36TEPH + OTP					%
o-Terphenyl				35	%
C16-C36 ORO				35	%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** DIESEL WATER 3510C
TestAmerica San Francisco

Type: LCSRPD **Created:** 5/26/2005 11:01:00AM **Active:** 1/1/2005 11:01:22AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
C9-C40				35	%
DRO + OTP					%
C12-C24				35	%
C10-C36 + OTP					%
Bunker Range Organics (C9-C36)				35	%
C13-C22 + OTP					%
Stoddard Solvent				35	%
#2 Diesel Fuel				35	%
C10-C25 + OTP					%
C10-C28				35	%
C9-C36HYD + OTP					%
C24-C36				35	%
C10-C24				35	%
C9 - C17				35	%
C24-C40					%
C23-C40				35	%
C9-C19KR + OTP					%
C22-C40					%
Unknown Hydrocarbons					%
C12-C22 + OTP					%
C13-C22				35	%
C9-C24 + OTP					%
C12-C21				35	%
Kerosene				35	%
C9-C13					%
C10-C36				35	%
C10-C25				35	%
Mineral Spirits				35	%
Hydraulic Fluid					%
C12-C40				35	%
Crude Oil Range Organics (C9-C36)					%
C38 (Surr)					%
C28-C40				35	%
Motor Oil				35	%
C9-C19Jet +OTP					%
C10-C40				35	%
C10-C26				35	%

Type: MDL **Created:** 5/26/2005 11:11:00AM **Active:** 1/1/2005 11:17:19AM **Exp:**
Initial Prep: 250 **Unit:** mL **Final Prep:** 1 **Unit:** mL **Fac:** 0.004

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
C12-C22	13.4				ug/L
C21-C36					ug/L
n-Decane	25				ug/L
Diesel	16.287				ug/L
C16-C40	95.846				ug/L
C9-C36CRD + OTP					ug/L

Method Limit Group Report

Location Code: 720 **Limit Group Description:** DIESEL WATER 3510C
TestAmerica San Francisco

Type: MDL **Created:** 5/26/2005 11:11:00AM **Active:** 1/1/2005 11:17:19AM **Exp:**
Initial Prep: 250 **Unit:** mL **Final Prep:** 1 **Unit:** mL **Fac:** 0.004

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
C10-C28 + OTP					ug/L
n-Decanoic Acid (Surr)					ug/L
C21-C40	13.4				ug/L
C9-C36	232				ug/L
OTP as DRO	13.4				ug/L
C9-C19	6.985				ug/L
C13	25				ug/L
C9-C25	16.287				ug/L
p-Terphenyl					ug/L
n-Nonane	25				ug/L
C9-C24	13.4				ug/L
C19	25				ug/L
C12-C24 + OTP					ug/L
C19-C36	97.795				ug/L
C9-C36TEPH + OTP					ug/L
o-Terphenyl	13.4				ug/L
n-Docosane	25				ug/L
C16-C36 ORO	95.846				ug/L
C9-C40	95.846				ug/L
DRO + OTP	13.4				ug/L
C12-C24	13.4				ug/L
C10-C36 + OTP					ug/L
Bunker Range Organics (C9-C36)	232				ug/L
C13-C22 + OTP					ug/L
Stoddard Solvent	29				ug/L
n-Tetracosane	25				ug/L
#2 Diesel Fuel	13.4				ug/L
C10-C25 + OTP					ug/L
C40	25				ug/L
C10-C28	16.287				ug/L
C9-C36HYD + OTP					ug/L
C24-C36	95.846				ug/L
C10-C24	16.287				ug/L
C9 - C17	6.985				ug/L
C24-C40					ug/L
C23-C40	95.846				ug/L
C9-C19KR + OTP					ug/L
n-Octacosane	25				ug/L
C22-C40					ug/L
Unknown Hydrocarbons	14.421				ug/L
C12-C22 + OTP					ug/L
C13-C22	14.1421				ug/L
C9-C24 + OTP					ug/L
C25	25				ug/L
C12-C21	13.4				ug/L
Kerosene	10.711				ug/L
C9-C13	5.384				ug/L
C10-C36	13.4				ug/L
C10-C25	16.287				ug/L

Method Limit Group Report

Location Code: 720 **Limit Group Description:** DIESEL WATER 3510C
TestAmerica San Francisco

Type: MDL **Created:** 5/26/2005 11:11:00AM **Active:** 1/1/2005 11:17:19AM **Exp:**
Initial Prep: 250 **Unit:** mL **Final Prep:** 1 **Unit:** mL **Fac:** 0.004

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Mineral Spirits	5.384				ug/L
Hydraulic Fluid					ug/L
C12-C40	13.4				ug/L
Crude Oil Range Organics (C9-C36)	95.846				ug/L
C38 (Surr)					ug/L
Dodecane	25				ug/L
Tricosane	25				ug/L
C28-C40	232				ug/L
Motor Oil	95.846				ug/L
C9-C19Jet +OTP					ug/L
C10-C40	232				ug/L
n-Hexatriacontane	25				ug/L
C10-C26	16.287				ug/L

Type: MSREC **Created:** 5/26/2005 11:02:00AM **Active:** 1/1/2005 11:01:58AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
C12-C22		50	130		%
C21-C36					%
Diesel		50	130		%
C16-C40		50	130		%
C9-C36CRD + OTP					%
C10-C28 + OTP					%
n-Decanoic Acid (Surr)					%
C21-C40		50	130		%
C9-C36		50	130		%
OTP as DRO					%
C9-C19		46	123		%
C13					%
C9-C25		50	130		%
p-Terphenyl					%
C9-C24		46	123		%
C19					%
C12-C24 + OTP					%
C19-C36		50	130		%
C9-C36TEPH + OTP					%
o-Terphenyl		50	130		%
C16-C36 ORO		50	130		%
C9-C40		50	130		%
DRO + OTP					%
C12-C24		50	130		%
C10-C36 + OTP					%
Bunker Range Organics (C9-C36)		50	130		%
C13-C22 + OTP					%
Stoddard Solvent		50	130		%
#2 Diesel Fuel		50	130		%
C10-C25 + OTP					%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** DIESEL WATER 3510C
TestAmerica San Francisco

Type: MSREC **Created:** 5/26/2005 11:02:00AM **Active:** 1/1/2005 11:01:58AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
C10-C28		50	150		%
C9-C36HYD + OTP					%
C24-C36		50	130		%
C10-C24		50	130		%
C9 - C17		50	130		%
C24-C40					%
C23-C40		50	130		%
C9-C19KR + OTP					%
C22-C40					%
Unknown Hydrocarbons					%
C12-C22 + OTP					%
C13-C22		50	130		%
C9-C24 + OTP					%
C12-C21		50	130		%
Kerosene		50	130		%
C9-C13					%
C10-C36		50	130		%
C10-C25		50	130		%
Mineral Spirits		50	130		%
Hydraulic Fluid					%
C12-C40		50	130		%
Crude Oil Range Organics (C9-C36)					%
C38 (Surr)					%
C28-C40		50	130		%
Motor Oil		50	130		%
C9-C19Jet +OTP					%
C10-C40		50	130		%
C10-C26		50	130		%

Type: MSRPD **Created:** 5/26/2005 11:05:00AM **Active:** 1/1/2005 11:05:12AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
C12-C22				30	%
C21-C36					%
Diesel				30	%
C16-C40				30	%
C9-C36CRD + OTP					%
C10-C28 + OTP					%
n-Decanoic Acid (Surr)					%
C21-C40				30	%
C9-C36				30	%
OTP as DRO					%
C9-C19				30	%
C13					%
C9-C25				30	%
p-Terphenyl					%
C9-C24				30	%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** DIESEL WATER 3510C
TestAmerica San Francisco

Type: MSRPD **Created:** 5/26/2005 11:05:00AM **Active:** 1/1/2005 11:05:12AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
C19					%
C12-C24 + OTP					%
C19-C36				30	%
C9-C36TEPH + OTP					%
o-Terphenyl				30	%
C16-C36 ORO				30	%
C9-C40				30	%
DRO + OTP					%
C12-C24				30	%
C10-C36 + OTP					%
Bunker Range Organics (C9-C36)				30	%
C13-C22 + OTP					%
Stoddard Solvent				30	%
#2 Diesel Fuel				30	%
C10-C25 + OTP					%
C10-C28				30	%
C9-C36HYD + OTP					%
C24-C36				30	%
C10-C24				30	%
C9 - C17				30	%
C24-C40					%
C23-C40				30	%
C9-C19KR + OTP					%
C22-C40					%
Unknown Hydrocarbons					%
C12-C22 + OTP					%
C13-C22				30	%
C9-C24 + OTP					%
C12-C21				30	%
Kerosene				30	%
C9-C13					%
C10-C36				30	%
C10-C25				30	%
Mineral Spirits				30	%
Hydraulic Fluid					%
C12-C40				30	%
Crude Oil Range Organics (C9-C36)					%
C38 (Surr)					%
C28-C40				30	%
Motor Oil				30	%
C9-C19Jet +OTP					%
C10-C40				30	%
C10-C26				30	%

Type: RL **Created:** 5/26/2005 11:18:00AM **Active:** 1/1/2005 11:18:48AM **Exp:**
Initial Prep: 250 **Unit:** mL **Final Prep:** 1 **Unit:** mL **Fac:** 0.004

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units

Method Limit Group Report

Location Code: 720 **Limit Group Description:** DIESEL WATER 3510C
TestAmerica San Francisco

Type: RL **Created:** 5/26/2005 11:18:00AM **Active:** 1/1/2005 11:18:48AM **Exp:**
Initial Prep: 250 **Unit:** mL **Final Prep:** 1 **Unit:** mL **Fac:** 0.004

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
C12-C22	50				ug/L
C21-C36					ug/L
n-Decane	50				ug/L
Diesel	50				ug/L
C16-C40	300				ug/L
n-Hexacosane					ug/L
Heptadecane					ug/L
C9-C36CRD + OTP					ug/L
C10-C28 + OTP					ug/L
n-Decanoic Acid (Surr)	50				ug/L
C21-C40	500				ug/L
C9-C36	300				ug/L
OTP as DRO	50				ug/L
C9-C19	50				ug/L
C13	50				ug/L
C9-C25	50				ug/L
p-Terphenyl					ug/L
n-Nonane	50				ug/L
C9-C24	50				ug/L
C19	50				ug/L
C12-C24 + OTP					ug/L
C19-C36	500				ug/L
C9-C36TEPH + OTP					ug/L
o-Terphenyl	50				ug/L
n-Docosane	50				ug/L
C16-C36 ORO	300				ug/L
C9-C40	500				ug/L
DRO + OTP	50				ug/L
C12-C24	50				ug/L
C10-C36 + OTP					ug/L
Bunker Range Organics (C9-C36)	500				ug/L
C13-C22 + OTP					ug/L
Stoddard Solvent	50				ug/L
n-Tetracosane	50				ug/L
#2 Diesel Fuel	50				ug/L
C10-C25 + OTP					ug/L
C40	50				ug/L
C10-C28	50				ug/L
C9-C36HYD + OTP					ug/L
C24-C36	300				ug/L
C10-C24	50				ug/L
C9 - C17	50				ug/L
C24-C40					ug/L
C23-C40	500				ug/L
C9-C19KR + OTP					ug/L
n-Octacosane	50				ug/L
C22-C40					ug/L
Unknown Hydrocarbons	50				ug/L
C12-C22 + OTP					ug/L

Method Limit Group Report

Location Code: 720 **Limit Group Description:** DIESEL WATER 3510C
TestAmerica San Francisco

Type: RL **Created:** 5/26/2005 11:18:00AM **Active:** 1/1/2005 11:18:48AM **Exp:**
Initial Prep: 250 **Unit:** mL **Final Prep:** 1 **Unit:** mL **Fac:** 0.004

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
C13-C22	50				ug/L
C9-C24 + OTP					ug/L
C25	50				ug/L
C12-C21	50				ug/L
Kerosene	50				ug/L
C9-C13	50				ug/L
C10-C36	50				ug/L
C10-C25	50				ug/L
Mineral Spirits	50				ug/L
Hydraulic Fluid					ug/L
C12-C40	500				ug/L
Crude Oil Range Organics (C9-C36)	500				ug/L
C38 (Surr)					ug/L
Dodecane	50				ug/L
Hexadecane					ug/L
Tricosane	50				ug/L
C28-C40	500				ug/L
Motor Oil	300				ug/L
C9-C19Jet +OTP					ug/L
C10-C40	500				ug/L
n-Hexatriacontane	50				ug/L
C10-C26	50				ug/L

Type: SUREC **Created:** 6/6/2007 2:37:00PM **Active:** 6/6/2007 2:38:00PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
C12-C22					%
C21-C36					%
Diesel					%
C10-C28 + OTP					%
n-Decanoic Acid (Surr)					%
C21-C40					%
C9-C36					%
OTP as DRO					%
C9-C19					%
C13					%
p-Terphenyl		23	156		%
C9-C24					%
C19					%
C12-C24 + OTP					%
o-Terphenyl		23	156		%
DRO + OTP					%
C12-C24					%
C10-C36 + OTP					%
C13-C22 + OTP					%
Stoddard Solvent					%
C10-C25 + OTP					%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** DIESEL WATER 3510C
TestAmerica San Francisco

Type: SUREC **Created:** 6/6/2007 2:37:00PM **Active:** 6/6/2007 2:38:00PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
C10-C28					%
C24-C36					%
C24-C40					%
C9-C19KR + OTP					%
C22-C40					%
C12-C22 + OTP					%
C13-C22					%
C9-C24 + OTP					%
C12-C21					%
Kerosene					%
C9-C13					%
C10-C36					%
C10-C25					%
C38 (Surr)					%
C28-C40					%
C9-C19Jet +OTP					%
C10-C40					%
C10-C26					%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 7471 Mercury (Solids/Filters)
TestAmerica San Francisco

Type: CRA **Created:** 6/25/2008 11:35:00AM **Active:** 1/1/2008 11:34:45AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Hg		50	150		%

Type: CVREC **Created:** 2/6/2008 11:10:00AM **Active:** 10/1/2007 11:10:01AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Hg		90	110		%

Type: ICVREC **Created:** 2/6/2008 11:10:00AM **Active:** 9/3/2007 11:10:15AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Hg		90	110		%

Type: LCSREC **Created:** 10/25/2005 9:03:00AM **Active:** 4/25/2005 9:02:51AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Hg		80	120		%

Type: LCSRPD **Created:** 10/25/2005 9:03:00AM **Active:** 4/25/2005 9:03:25AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Hg				20	%

Type: MDL **Created:** 10/25/2005 9:02:00AM **Active:** 3/25/2005 9:01:57AM **Exp:**
Initial Prep: 1 **Unit:** Wipe **Final Prep:** 50 **Unit:** mL **Fac:** 0.05

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Hg	.0025				mg/wipe

Type: MSREC **Created:** 1/17/2008 2:09:00PM **Active:** 1/1/2007 2:09:23PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Hg		75	125		%

Type: MSRPD **Created:** 1/17/2008 2:10:00PM **Active:** 1/1/2007 2:09:40PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Hg				20	%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 7471 Mercury (Solids/Filters)
TestAmerica San Francisco

Type: RL **Created:** 10/25/2005 9:01:00AM **Active:** 5/25/2005 9:00:51AM **Exp:**
Initial Prep: 1 **Unit:** Wipe **Final Prep:** 50 **Unit:** mL **Fac:** 0.05

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Hg	.00005				mg/wipe

Type: XMDL **Created:** 10/5/2006 12:14:00PM **Active:** 9/2/2005 12:14:26PM **Exp:**
Initial Prep: 1 **Unit:** mL **Final Prep:** 1 **Unit:** mL **Fac:** 1

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Hg	.00005				mg/L

Type: XRL **Created:** 10/5/2006 12:15:00PM **Active:** 10/1/2005 12:14:53PM **Exp:**
Initial Prep: 1 **Unit:** mL **Final Prep:** 1 **Unit:** mL **Fac:** 1

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Hg	.00005				mg/L

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 7471A Mercury (Soil)
TestAmerica San Francisco

Type: CRA **Created:** 6/25/2008 11:35:00AM **Active:** 1/1/2008 11:35:21AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Hg		50	150		%

Type: CVREC **Created:** 2/6/2008 11:11:00AM **Active:** 9/1/2007 11:10:52AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Hg		80	120		%

Type: ICVREC **Created:** 2/6/2008 11:11:00AM **Active:** 10/1/2007 11:11:08AM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Hg		90	110		%

Type: LCSREC **Created:** 1/10/2008 3:12:00PM **Active:** 1/10/2008 3:13:46PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Hg		80	120		%

Type: LCSRPD **Created:** 6/20/2005 1:45:00PM **Active:** 6/27/2005 4:26:30PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Hg				20	%

Type: MDL **Created:** 6/20/2005 1:45:00PM **Active:** 6/27/2005 4:27:08PM **Exp:**
Initial Prep: 0.6 **Unit:** g **Final Prep:** 50 **Unit:** mL **Fac:** 83.33333

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Hg	0.0025				mg/Kg

Type: MSREC **Created:** 6/20/2005 1:45:00PM **Active:** 6/27/2005 4:27:15PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Hg		75	125		%

Type: MSRPD **Created:** 6/20/2005 1:45:00PM **Active:** 6/27/2005 4:27:26PM **Exp:**
Initial Prep: 0 **Unit:** **Final Prep:** 0 **Unit:** **Fac:** 0

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Hg				20	%

Method Limit Group Report

Location Code: 720 **Limit Group Description:** 7471A Mercury (Soil)
TestAmerica San Francisco

Type: RL **Created:** 6/20/2005 1:46:00PM **Active:** 6/27/2005 4:27:35PM **Exp:**
Initial Prep: 0.6 **Unit:** g **Final Prep:** 50 **Unit:** mL **Fac:** 83.33333

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Hg	0.02				mg/Kg

Type: XMDL **Created:** 10/5/2006 12:15:00PM **Active:** 10/1/2005 12:15:38PM **Exp:**
Initial Prep: 1 **Unit:** mL **Final Prep:** 1 **Unit:** mL **Fac:** 1

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Hg	0.043				mg/L

Type: XRL **Created:** 10/5/2006 12:16:00PM **Active:** 9/3/2005 12:16:14PM **Exp:**
Initial Prep: 1 **Unit:** mL **Final Prep:** 1 **Unit:** mL **Fac:** 1

Analyte Description	Limit	Rec. Low	Rec. High	Precision	Units
Hg	0.2				mg/L