DOCKETED

Docket Number:	13-AFC-01
Project Title:	Alamitos Energy Center
TN #:	201522
Document Title:	Alamitos Retention Basin Closure Plans
Description:	N/A
Filer:	Cenne Jackson
Organization:	California Energy Commission
Submitter Role:	Commission Staff
Submission Date:	1/9/2014 3:50:09 PM
Docketed Date:	1/9/2014

Jamison and Associates, Inc.

SOUTHERN CALIFORNIA EDISON

DRAFT CLOSURE PLAN

ALAMITOS GENERATING STATION

RETENTION BASIN SITE,

LOS ANGELES COUNTY, CALIFORNIA

December 2011

Jamison and Associates, Inc.
PO Box 34802
Reno, NV 89533

CLOSURE PLAN FOR THE WASTEWATER RETENTION BASIN SITE AT THE ALAMITOS GENERATING STATION

December 2011

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Cecil R. House, Senior Vice President

William M. Messner, Acting Director, Environment, Health & Safety

Randall S. Weidner, Project Manager

The undersigned certifies that all interpretative work conducted in support of this document was conducted in accordance with DTSC and USEPA guidance.

Dennis Jamison, CHG #471

The undersigned certifies that all investigative work conducted in support of this document was conducted in accordance with DTSC-approved work plans.

Patrick Hamilton, CEG #998

CONTENTS

Tables

Figures

Appendices

INTRODUCTION

In 1996, Southern California Edison Company (Edison) implemented a Water Quality Monitoring Program in response to a Final Judgment pursuant to a Stipulation, handed down by the Superior Court of California, Los Angeles County, Number BC 121219 on February 1, 1995. The Stipulation alleged that Edison had stored hazardous wastes in non-permitted wastewater retention basins at their electrical generating stations in southern California. Edison agreed to close these basins according to Chapter 15 of Title 22, California Code of Regulations. The Alamitos Generating Station is one of the facilities cited in the agreement (Location shown on **Figures 1** and **2**).

This Closure Plan and associated documents are being prepared in accordance with the Stipulation, which uses the terms "retention basin" and "boiler chemical cleaning basin" to describe the units being closed. These terms are equivalent to the term "surface impoundment" in Title 22. For purposes of the Closure Plan, the terms "retention basin" or "retention basin site" are used. The term retention basin site is intended to be broader, and includes the basins, pipelines and their associated appurtenances. The retention basin site (waste management unit), is the subject of this Closure Plan.

There are three wastewater retention basins and a boiler chemical cleaning basin located along the eastern edge of the Alamitos site immediately adjacent to the San Gabriel River (**Figures 3, 4**). Wastewater generated at the various station facilities is conveyed to these basins through a series of pipelines. The North and Central retention basins were installed in the 1960s. The South Basin was constructed in the mid-1960s. The Boiler Chemical Cleaning Basin (BCCB) was constructed in 1978. The North, Central and South retention basins were originally constructed with an asphaltic concrete liner. In the 1980s, a single layer of a synthetic liner (Hypalon) was installed at each of the retention basins using the existing asphalt liner as a base. The BCCB was retrofitted in late 1989 with a double liner of high-density polyethylene (HDPE) and a leachate collection system.

The retention basins are currently used to collect and store non-hazardous wastewater from the facility. The BCCB was used to temporarily hold (for less than 30 days) non-hazardous acidic cleaning solutions from the removal of corrosion and mineral deposits from the boiler tubes. The BCCB is no longer used since a new process of boiler cleaning was instigated.

This Closure Plan is organized into sections that cover facility and waste descriptions, previous and future site characterization activities, and plans and standards for any site remediation that may be required. The closure process described herein envisions an evaluation of site data using statistical analysis and risk assessment to determine if remedial action is needed to protect human and ecological receptors and the environment.

The sections below are based on Department of Toxic Substances Control (DTSC) guidance for surface-impoundment closure plans (DTSC, 2006). The purpose of the Closure Plan is to allow DTSC and public review of the proposed plans, standards, and contingencies for remediating the retention basin site, if necessary, at the Alamitos Generating Station. Once the Closure Plan is approved, Edison will implement the plan under the guidance and direction of DTSC. After the site is fully evaluated, a Closure Certification Report will be generated to document the closure process and demonstrate that the standards set forth in this Closure Plan were achieved. The Closure Certification Report will be approved by DTSC before the site closure is considered complete.

1. FACILITY IDENTIFICATION

Site Name: Alamitos Generating Station (wastewater retention basin site)

Edison USEPA Identification Number: CAD009694795

Contact Person (Project Manager): Randall Weidner (626) 462-8739

Facility and Mailing Address: 690 N. Studebaker Road, Long Beach, CA 90803

Facility Owner and Operator: AES Alamitos LLC

Nature of Business: Generation of Electricity

The Alamitos Generating Station (the station), in Long Beach, California, has six steam electric power generating units with a design capacity of 2,093 megawatts. The location of the generating station is shown on **Figures 1** and **2**.

The station discharges up to 1,283 million gallons per day (MGD) of wastes consisting of once-through cooling water from the power generating units (accounting for approximately 1,271 MGD), sanitary wastes, and other wastes from three retention basins (totaling approximately 12 MGD). The retention basins are described in Section 3.1 of this Closure Plan. The once-through cooling water is drawn from the Los Cerritos Channel to the west of the station. All of these wastes are discharged into the San Gabriel River (California Regional Water Quality Control Board, Los Angeles Region [LARWQCB], 2000).

Edison sold the station to AES in 1998, but retained responsibility under the contract of sale for environmental liability associated with the past operation of the retention basins during the period of Edison's ownership. This liability resulted from the past practice of temporarily storing boiler chemical cleaning wastes in the retention basins prior to 1996.

Note that Edison is closing the Hazardous Waste Management Unit (HWMU) but is not physically closing the retention basin site, which is necessary for continued operation of the station. Thus, the basins will remain in operation after the HWMU is closed.

2. FACILITY LOCATION

The station is located on the California coast, on the east side of the City of Long Beach in Los Angeles County (**Figure 1**). The station property has an area of approximately 126 acres. The retention basin site is a subset of the station property as shown on **Figure 3**.

2.1 CLIMATE AND SURFACE HYDROLOGY

The station is on the southern margin of the Los Angeles Coastal Plain and has a Mediterranean type climate. This includes warm, dry summers and cool, wet winters. Precipitation occurs mainly during the period from November through April. The Los Angeles County Flood Control District (LACFCD) maintains a precipitation recording station located about three miles west of the generating station. The records indicate the average annual precipitation, normalized to 100 years, is 11.7 inches (Dames and Moore, 1986).

The San Gabriel River is immediately east of the generating station, while the Los Cerritos Channel is immediately west of the station. The retention basins are about 150 feet due west of the San Gabriel River. Los Cerritos Channel discharges into Alamitos Bay, while the San Gabriel River discharges into the Pacific Ocean, approximately 1.5 miles from the generating station (Tetra Tech, 2008). Normal daily tidal fluctuations in the ocean range from 4 to 7 feet between high and low tides (Tidelines Inc., 1996). Coastal currents are influenced by a combination of tide, wind, thermal structure, and local bathymetry.

2.1.1 TIDAL INFLUENCE

Nine Detection Monitoring wells were installed and six existing wells were redeveloped, as originally presented in the "Well Completion Report, Alamitos Generating Station" (Hamilton, 1997). This investigation included a tidal influence study, performed on each well. A transducer and datalogger were installed in each well and allowed to record for at least thirty days to capture the maximum high and minimum low tides.

The data indicate there is a maximum water level fluctuation of 0.65 feet in the monitoring wells that are close to the channel and have pierced a substantial sand layer. All but two wells showed some response to the tidal changes. Most of the wells demonstrated no lag time between the tidal change and the response in the water level.

2.2 HYDROGEOLOGY

A complete study of the hydrogeology beneath the station property is presented in a report prepared by Dames & Moore titled, "Hydrogeologic Assessment Report [HAR], Alamitos Generating Station" (January 27, 1986). Additional information on the local hydrogeology is given in a seawater barrier improvement report prepared by the Orange County Water District (OCWD) titled "Geologist's Report, Alamitos Barrier Improvement Project, Construction Unit

12" dated December 30, 1997. The discussion below presents a summary of the near-surface hydrogeologic units, which are the most critical to the groundwater monitoring program.

2.2.1 LITHOLOGY

The site is directly underlain by Holocene alluvial deposits of the Bellflower Aquitard and Pleistocene continental and marine deposits of the San Pedro formation. The Holocene deposits consist of discontinuous beds of sand, silt, clay, and gravel which are commonly unconsolidated. The San Pedro Formation consists of a series of aquifers and aquitards composed of unconsolidated and semi-consolidated sand, silt, clay, and gravel sediments. The San Pedro Formation has a maximum thickness of approximately 2,000 feet in this area.

The Bellflower aquitard is the uppermost hydrologic unit beneath the basin. The HAR and OCWD reports describe the Bellflower aquitard as being composed of continental flood plain and marsh deposits that overlie coarser channel deposits of the Artesia (Recent) Aquifer, the uppermost fresh water aquifer. The Bellflower aquitard consists of silty clay and clayey silt underlain by interbedded silty sand, silt, clay, and gravel. The basal portion of the aquitard is reported as composed of gravel and in hydraulic communication with the underlying Artesia (Recent) Aquifer. The aquitard layer has a reported thickness of about fifty feet. In comparison, the forty-three monitoring wells at the retention basin site generally range in depth from approximately 25 to 30 feet (Table 1 of Hamilton, 2011). Thus, these monitoring wells are screened in the Bellflower aquitard.

The materials encountered by the forty-three monitoring wells show the non-continuous nature of the sediment layers. Figure 2 of Hamilton, 1997 is a lithologic section derived from the well bore-hole logs. The section illustrates the lithologic formations below the retention basins. To simplify the sections, some of the silty sand-sandy silt mixtures were combined into one unit and units of less than two feet in thickness were ignored. This level of detail can be observed in the logs contained in Appendix 1 of the report. The location of the sections is shown on Figure 1 of Hamilton, 1997.

The section indicates the lithology below the basins is a complex of interfingered deposits of sand, silty sand, silty clay, and clay. The lower 15 feet is dominated by layers of the following deposits: gray sand; plastic, gray clay; and plastic, dark gray silty clay. The sand and silty clay are distinguished by the presence of organic material in the form of roots. The silty clay layer appears to trend through the entire section.

The upper 15 feet of the section is a very complex layering of deposits of sand, silty sand, sandy silt, clay, and fill material. The colors vary between tan, brown, and gray. Some layers contain gravel while others have a high content of organic material.

2.2.2 GROUNDWATER

Groundwater flow in the upper most fresh water aquifer, the Artesia (Recent) Aquifer, is controlled by a seawater intrusion barrier, named the Alamitos Barrier Project, operated by the LACFCD. The Alamitos site is on the seaward side of this barrier. The project has injected fresh water into a series of wells since 1965. One of the lines of injection wells is immediately north of the Alamitos site. The HAR (1996) and the OCWD barrier report (1997) both show increased chloride concentrations in the aquifers beneath the site area. Therefore, the groundwater aquifers beneath the site have been sacrificed to seawater intrusion.

The groundwater gradient in the Bellflower Aquitard beneath the site is discussed below. As reported in the HAR (Dames and Moore, 1987), the average linear groundwater flow velocity of the Bellflower Aquitard is estimated to be 0.15 to 0.35 feet per day. The groundwater gradient in the Artesia (Recent) Aquifer is estimated at 0.0009 to 0.013 foot per foot. The average linear groundwater flow velocity of the Artesia (Recent) Aquifer is estimated to be 1.7 to 4.1 feet per day (Dames and Moore, 1987). More recent values of the groundwater gradient are discussed below.

2.2.3 GROUNDWATER GRADIENT

From the inception of the project (1996) through the 2003 monitoring year, the groundwater gradient beneath the site was controlled by an extraction well operated by the LACFCD as part of the Alamitos Barrier Project, developed to prevent sea water intrusion into fresh water aquifers in a regional area which includes the site. This extraction well is located near the northeast corner of the South Basin. The LACFCD personnel stated the extraction well was constantly pumping during the seven year period at an average rate of 135 gpm. They indicated the only down time for the pumping operation was for short periods, seven to ten days, during well maintenance.

When the extraction well was pumping, it established a consistent influence on the groundwater surface in the shallow aquifer below the basins. The water table beneath the basins has varied from twelve to eighteen feet below the ground surface since 1995. The calculated slope of the gradient was different over the site depending on the permeability of the sediments and proximity to the extraction well. The area beneath the North and Central basins contained materials of very low permeability, resulting in a groundwater slope ranging from 0.006 to 0.008 foot per foot. Closer to the extraction well, the slope increased to about 0.03 foot per foot beneath the BCCB. The gradient below the South Basin ranged from 0.007 to 0.009 foot per foot towards the extraction well.

In January 2004, the extraction well was found to be inactive. An inquiry to the LACFCD determined that the well had been shut down on December 31, 2003 and would most likely not be activated in the future. Without the applied stress on the groundwater caused by the

extraction well, the measured gradient in the aquitard during the subsequent several sampling events showed some variations. The depression in the groundwater surface at the extraction well was no longer present. However, the plotted water level data displayed a slight depression in the area of well AW-10 on the northwest side of the South Basin. This area is directly west of the extraction well. This depression had been observed in the past while the extraction well was being serviced. The gradient pattern shifted to a more easterly direction with a flatter slope. Gradient reversals were also observed during the March and June sampling events in 2005. During these reversal periods, the gradients were in a westerly direction with a slope of 0.001 foot per foot. Analytical groundwater sample data indicated these gradient reversals had short durations, since the data did not reflect any changes in groundwater chemistry.

After about eighteen months, the groundwater gradient stabilized to a consistent easterly configuration which has remained to the present. Due to uncertainty as to the identity of upgradient and downgradient wells before 2006, statistical results obtained using only groundwater samples collected in 2006 and later years are believed to be most representative (refer to Section **4.5.2**).

This present groundwater gradient configuration shows a slight difference in patterns beneath the North, Central, and BCCB basins compared to that beneath the South Basin. The groundwater beneath the three northern basins flows to the east with a slope of 0.003 foot per foot. At several sampling events a low ridge was observed on the data between the BCCB and South basins.

The gradient pattern beneath the South Basin is dominated by a depression in the groundwater surface centering at well AW-27. This is located on the east side of the basin. This depression has created an eastward gradient across the South Basin with a slope as high as of 0.015 foot per foot. Over the past few years, a seasonal phenomenon has occurred with the gradient pattern for the South Basin. The gradient at the June and September (summer) sampling events showed the depression in the gradient contours at well AW-27. However, the depression shifts westward to the area of wells AW-10 and AW-43 at the December and March (winter) sampling events. This "winter" depression has the same configuration as that observed when the county extraction well was shut down during maintenance activities. The "winter" depression is shallower than the "summer" depression measured at well AW-27. The analytical groundwater data does not show any changes to the groundwater chemistry related to the shift in the location of the depression.

3. FACILITY DESIGN

The Alamitos facility consists of six electrical generating units paired in three separate structures (**Figures 3** and **4**). Most of the station property is graded dirt or graded and paved with asphalt. All precipitation is directed to storm drains. Details of the individual retention basin site facilities are described below.

3.1 RETENTION BASINS

There are three wastewater retention basins and a boiler chemical cleaning basin located along the eastern edge of the Alamitos site immediately adjacent to the San Gabriel River (**Figures 3** and **4**). The purpose of the three retention basins is to collect and store non-hazardous wastewater from the facility and to allow the wastewater to be metered systematically to a discharge point (San Gabriel River) under the provisions of a National Pollutant Discharge Elimination System (NPDES) permit. By design, the North Basin collects wastewater from power generating Units 1 and 2; the Central Basin receives water from Units 3 and 4; while the South Basin receives discharge from Units 5 and 6. However, over the years, a series of pipes was installed to connect the basins so wastewater could be transferred from any basin to another, if necessary. The source of the wastewater includes water from oil/water separators and sediment traps that receive floor and yard drain water, air preheater wash water, demineralizer regenerant, reverse osmosis backwash and membrane reject water, and boiler blowdown water. Sources of influent to the South Basin also include fuel pipeline hydrostatic test water.

The BCCB temporarily contained wastewater generated from the acid cleaning of the facility's boilers prior to treatment and discharge. Prior to the construction of the BCCB, boiler chemical cleaning wastewater was discharged directly into the Central Basin. When the BCCB was constructed in 1978, boiler chemical wastewater was first discharged to the BCCB and treated in the BCCB mobile treatment unit. The treated water was then discharged to the Central Basin. This process was discontinued in 1996.

The North and Central basins were constructed in the early 1960's. These two equally-sized basins have the following dimensions: 160 feet wide by 160 feet long with a depth of 8 feet. The two basins have a designed capacity of 830,000 gallons. An east-west trending splitter wall separates the Central Basin into two equally-sized cells. Each cell can be isolated and used separately if necessary. The two cells are connected by imbedded pipes at the common pump sump along the western wall. The South Basin was constructed in the mid-1960s. This basin is 335 feet long and 90 feet wide with a depth of 7 feet. The designed capacity is 725,000 gallons.

These three retention basins were originally constructed with a two to three inch thick asphaltic concrete liner. In the late 1980's, the basins were retrofitted with a single layer of

a synthetic liner (Hypalon) installed over the existing asphalt liner. A two inch layer of sand was placed over the asphalt liner to protect the thin Hypalon from being pierced by the aggregate composing the asphalt.

A fourth basin was constructed as a BCCB. This basin was constructed in 1978. The basin is comprised of two unequally-sized sub-basins that are hydraulically connected by a pipe. The northern, rectangular, sub-basin is approximately 190 feet long and 68 feet wide, with a capacity of 286,000 gallons. The southern, square, sub-basin is approximately 114 feet in dimension, with a capacity of 264,000 gallons. The boiler chemical cleaning waste treatment process was to place a filter press on the dike separating the two sub-basins. The chemical waste would be pumped from the boiler to the press, which separated the solids from the liquid. The liquid would then drain into the sub-basins. The two sub-basins were originally lined with a four-inch thick layer of hydraulic asphaltic concrete. They were retrofitted in 1989 with two layers of 80 mil HDPE, surrounding a layer of geofabric. The geofabric drains to a leachate collection system.

3.2 PIPELINES AND SUMPS

During the production of steam for electrical power generation, the boiler tubes could become coated with mineral deposits from the water. The coating would cause the heating cycle to become less efficient. When this occurred, an acid wash would be performed within the boiler. This was performed by injecting an acid solution into the boiler tubes. The waste material from each pair of units was conveyed to an oil/water separator (Section **3.2.2**) and then through pipelines to the basins. The location of these pipelines is shown on **Figure 3**.

Alamitos Generating Station used residual fuel oil to create heat up until the 1970s, when air quality regulations forced utilities to use cleaner burning natural gas. Burning fuel oil led to the deposit of residues on the boiler walls and on the exterior of the boiler tubes. These deposits caused a reduction in the efficiency of the heat transfer in the tubes. A process called fireside wash was used to clean the deposits from the boiler when it was determined necessary. This was performed by externally washing the boilers tubes with station water.

The boiler acid wash and fireside wash processes could have generated wastewater containing metals, polynuclear aromatic hydrocarbons (PAHs), and low pH values. The station discontinued the use of these processes in 1996.

3.2.1 WATER TREATMENT FACILITY

This section provides details on the water treatment facility and its appurtenances at the retention basin site. Prior to 1991, the station operated a demineralizer to produce ultra-clean water for the steam system. This process used both acid and caustic materials. The regeneration wastewater was collected in a small sump south of the South Basin (**Figure 3**), associated with the treatment facility. The dimension of the sump is 8 feet by 8 feet with a

depth of 8 feet. During the process, this sump would often contain water with a low pH value. The station discontinued this process in 1991 and presently uses a portable reverse osmosis system. The sump is presently used to collect regeneration water from the reverse osmosis unit. This wastewater contains concentrations of general anions and cations similar to those generated in home reverse osmosis units.

In 1996, an integrity test was performed on the sump. The results of the test were presented in a report titled "Sump Integrity Report" dated December 19, 1996 (Southern California Edison, 1996). It was determined that the sump had not leaked low pH water to the soil.

3.2.2 OIL/WATER SEPARATORS AND SEDIMENT TRAPS

The station has three oil/water separators. Each separator is adjacent to one of the three pairs of power generating units described in Section **3**. Wastewater discharged from the units passes through the separators and the treated wastewater flows into the pipeline network as shown on **Figure 3**.

The oil/water separators associated with Units 1 & 2 and Units 5 & 6 also function as sediment traps that remove sediments entrained in the wastewater. These sediments are derived primarily from floor and yard drains (as well as the other wastewater sources listed in Section **3.1** and **3.2**). Units 3 and 4 each have a separate sediment trap (**Figure 3**). Wastewater flows from these two traps to a common oil/water separator for Units 3 and 4.

4. DESCRIPTION OF HAZARDOUS WASTE CONSTITUENTS

This section presents available information on boiler chemical cleaning waste that was used at the station, and the investigation methods used to detect this waste in environmental media at the retention basin site.

Constituents of Concern (COCs) are the waste constituents, reaction products, and hazardous constituents that are reasonably expected to be in or derived from waste contained in the regulated unit (California Code of Regulations, 22 CCR s 66264.93). In this case the regulated unit is the retention basin site. Inorganic COCs present at concentrations that are statistically elevated with respect to site-specific background levels become Constituents of Potential Concern (COPCs) and are carried forward into a health risk assessment (DTSC, 1997). In addition, detected volatile organic compounds (VOCs), PAHs, dioxins, and total petroleum hydrocarbons (TPH) become COPCs unless the regulated unit is not the source of this contamination (Section **4.5**) or the percentage of detections is determined by DTSC to be statistically insignificant.

Accordingly, inorganic chemicals found in site investigation samples are termed "elevated" if their concentrations are determined through statistical analyses to be significantly higher than corresponding background levels. Background evaluations consist of the comparison of statistically-determined average inorganic chemical concentrations in site soil and groundwater with average concentrations in samples unaffected by site operations (i.e., background). Chemicals that are detected at high concentrations are not necessarily elevated if their background concentrations are also detected at high levels. Chloride in coastal groundwater is an example of this situation. Summary statistics for soil and groundwater inorganic COC concentrations in site investigation samples are presented in **Tables 1** and **3**.

Statistical analyses for all inorganic COCs in **Tables 1** and **3** will be presented in the Closure Certification Report, to be issued following site evaluation [as described in Section **16**]. Prior to DTSC approval of Edison's application for site closure, concentrations of all COPCs will have to meet the Closure Performance Standards described in Section **11** or **19**.

4.1 LIST OF COMPOUNDS

Appendix **A** provides a representative analysis of boiler chemical cleaning waste. The chemicals generally associated with boiler chemical cleaning include the following: copper, nickel, vanadium, and zinc. The chemicals with the highest concentrations (greater than 1 milligram per liter [mg/l]) in Appendix **A** are: total chromium, copper, fluorine, lead, molybdenum, nickel, and zinc. PAHs, dioxins, and TPH will be added to the COC list for future sampling as detailed in Section **8**. PAHs and dioxins have been analyzed in groundwater annually since September 1999 (Section **4.4**).

4.2 LIST OF TEST METHODS

Analytical test methods used to evaluate COCs, including the metal and VOC chemicals listed in Appendix **A,** are shown in **Table 6** and discussed in Section **9**. In summary, metals are analyzed in soil and groundwater samples collected at the retention basin site, and VOCs are consistently analyzed in soil and groundwater samples. In addition, PAHs will be analyzed in future soil matrix samples. PAHs, dioxins, and TPH will be analyzed in sediment trap residue (Section **8**). Dioxins and TPH may be further characterized, as detailed in Section **8**. Soil gas will be analyzed in the future (Section **8**).

4.3 LIST OF SIGNIFICANT HAZARDOUS WASTE CONSTITUENTS

Not all chemicals in the representative analysis of boiler chemical cleaning waste (Appendix **A**) were detected in soil and groundwater characterization samples collected at the retention basin site. However, the existing soil characterization and groundwater monitoring annual report (Hamilton 2011) show that those chemicals with the highest concentrations in Appendix **A** were detected in analyses of soil and groundwater characterization samples collected at the site. Details are provided in Sections **4.5.1** and **4.5.2**, respectively.

A preliminary assessment was performed for the metals having the highest concentrations in boiler chemical cleaning waste (listed at the end of Section **4.1**), by reviewing concentrations for these metals in onsite soil and groundwater samples (**Tables 1** and **3**, respectively). The assessment indicated that these metals have higher maximum concentrations in soil from the compliance area (defined below in Section **4.5.1**) than in corresponding background samples. In addition, lead, molybdenum, and nickel have higher maximum concentrations in groundwater from the compliance area than in corresponding background samples.

4.4 HISTORY OF CHEMICAL STORAGE AND USE

Presently, the retention basins are used to collect and store non-hazardous wastewater from the station. The wastewater, containing minor amounts of oil, grease, and suspended solids, is systematically mixed with spent cooling water and discharged to the San Gabriel River under the provisions of an NPDES permit.

Historically, metal COCs such as nickel and vanadium were concentrated in the acidic wash solutions described in Section **3.2** and were temporarily stored in the BCCB and/or Central Basin. The use of hydrochloric acid for boiler cleaning was discontinued in 1996 and the BCCB was placed out of service. During boiler chemical cleaning operations, the BCCB and/or Central Basin were used to temporarily hold (for less than 30 days) acidic cleaning solutions containing the removed corrosion and mineral deposits from the boiler tubes. The acidic waste material was removed from the basins using a vacuum truck and carried to an off-site disposal facility.

PAHs, dioxins, and TPH may be found in the residue from burning fuel oil. TPH could potentially be released from sources such as lubricating oil leaks from the units. The use of fuel oil at Alamitos was discontinued in the 1970s. The collection areas for sediments or liquids that could potentially contain PAHs, dioxins, and TPH are the oil/water separators and sediment traps (Section **3.2**). Since September 1999, PAHs and dioxins have been analyzed in annual Appendix IX groundwater samples (Section **4.5.2**) at the retention basin site but none were detected.

4.5 BACKGROUND AND SITE INVESTIGATION

This section describes existing soil and groundwater investigations of the retention basin site, which produced the data shown in **Tables 1** through **5**. Following the completion of the latest investigation, DTSC requested additional investigation of PAHs and soil gas at the site. General descriptions of these additional investigations to be performed by Edison under this Closure Plan are presented in Sections **8** and **10**.

4.5.1 SOIL CHARACTERIZATION

Characterization investigations pursuant to the Stipulation were conducted to determine if the basins or associated conveyance system (pipelines) had released wastewater to the underlying soil. If a release was detected, the nature and extent of the contamination was to be investigated. Sampling investigations at the retention basin site began with groundwater monitoring in 1996 (Section **4.5.2**). Soil sampling began in 1995 and continued intermittently through 2010.

The sampling plans, methods, and analytical results will be presented in a draft Soil Characterization Report. It is referenced in Appendix **C** of the Closure Plan and will be submitted to the DTSC.

For purposes of this Closure Plan, the area where historical boiler chemical cleaning operations may have led to contamination is defined as the "compliance area". This includes the retention basins, pipelines, sumps, and associated downgradient area (**Figure 3**). The background area is the part of the retention basin site that is upgradient of the compliance area (**Figures 4, 5**).

Edison has performed several soil investigations to characterize the soil beneath and around the perimeter of the retention basins at the Alamitos generating station. A complete listing of these soil investigations is shown in the draft Soil Characterization Report for the retention basin site (refer to Section **8** and Hamilton, Draft**,** Table 1). A total of four hundred and sixty-five soil samples have been collected from one hundred and fifty-one borings beneath and adjacent to the basins and within background soil areas. The locations of compliance bore-holes for the existing soil investigations are shown on **Figure 6**. The bore-hole locations and

their identifications are shown for each basin on **Figures 7** through **10**. The four areas where background soil samples were collected are shown on **Figure 4**.

The first soil samples were collected in 1995. During monitoring well installation for the Detection Monitoring Program, the DTSC geologist inspected a dry, Central Basin liner. He noted two small holes in the liner and requested soil samples be collected in the area of these holes. Three additional bore-hole sites were selected to collect data to compare with the data from the known potential leak areas.

The initial investigations to collect soil samples from beneath each of the basins, on a grid pattern, occurred in late 1997 and early 1998. In 1999, after a review of soil matrix and groundwater analytical data from beneath the Central Basin, the DTSC directed Edison to perform a soil vapor survey adjacent to the northern sector of the basin, because VOCs had been detected in both soil and groundwater samples from beneath the basin. Phase 1 and 2 soil vapor surveys were performed in November and December 1999, respectively (Hamilton, 2000a). The soil vapor probe locations are shown on **Figure 11**.

Soil samples were collected from bore-holes around the perimeter of the basins in 2007. A study of the background soil constituents and concentrations was performed as part of the 2007 investigation to create a dataset for comparison with the characterization data.

Edison began an investigation of the nature and extent of the VOC contamination beneath the Central Basin in late 2009. Inorganic COCs that were analyzed in the soil matrix samples during this characterization program are listed in **Table 1**. All soil samples were analyzed for COC metals using the United States Environmental Protection Agency (USEPA) Methods 6020 and 7471A (**Table 6**). PAHs were not analyzed in these soil matrix samples.

Edison's grid of soil borings was extended outward from the retention basin site until a significant attenuation in contaminant concentration (approaching background levels) was observed. A statistical summary of background concentrations for metals in soil is presented in **Table 1**. At the outermost soil sample locations, concentrations of the key metals associated with boiler chemical cleaning (e.g., nickel and vanadium) were attenuated to within the maximum background concentrations in virtually every case. Arsenic was also attenuated to within the maximum background concentrations.

A statistical summary of concentrations for VOCs detected in soil matrix samples is presented in **Table 2**.

As noted above, Edison performed a soil vapor survey at the northern and eastern boundary of the Central Basin (Hamilton, 2000a) at the request of DTSC because VOCs had been detected in both soil matrix and groundwater samples from beneath the basin. The investigation followed the guidance for active soil gas investigations prepared by the LARWQCB, dated February 25, 1997. The purpose of the investigation was to determine if contaminated soil

vapor was contained in the soils adjacent to the basin and, if present, what were the maximum concentrations of the constituents in the soil vapor, as well as their areal extent.

A number of VOCs were detected adjacent to the north and east of the basin. They included the following compounds: 1,1-Dichloroethane (1,1-DCA), 1,1-Dichloroethene (1,1-DCE), 1,2-Dichloroethene (1,2-DCE), , Trichloroethane (TCA), Trichloroethene (TCE), tetrachloroethene (PCE), and Vinyl Chloride (VC). The VOCs were primarily detected on the north with a small lobe of VC and DCE on the east side of the basin. The detected VOCs (e.g., VC) are primarily daughter products from the breakdown of TCE. To the best of Edison's knowledge, the original source TCE was released in the 1970s and 1980s before the basins were re-lined with Hypalon. This source is believed to be inactive at present. A statistical summary of concentrations for each compound detected in soil vapor samples is presented in **Table 5**. Future soil gas sampling is proposed in Section **8**.

4.5.2 GROUNDWATER MONITORING

The Stipulation required that site characterization investigations pursuant to 22 CCR 66265.98 begin at the facility in 1996.

A Detection Monitoring Program began with the installation of nine monitoring wells in 1995. These wells were combined with six existing wells that had been installed in 1986 (2 wells) and 1994 (4 wells) for various unrelated investigations. Between December 1996 and September 1997, quarterly groundwater sampling events occurred at thirteen of these fifteen monitoring wells. The resultant data indicated that an Evaluation Monitoring Program was required to study the nature and extent of contamination detected. This was accomplished by the installation of twenty-four additional compliance wells in two phases during the 1999 (12 wells) and 2001 (12 wells) sampling years. Four additional background monitoring wells were installed in 2006. The present well array contains forty-three wells of which two are only used for gradient measurements.

Quarterly sampling reports have been submitted to the DTSC after each sampling event except for the December events. The field data for the December events are incorporated into the Annual Groundwater Monitoring Report for that sampling year. Part of the evaluation monitoring process is the analytical testing of groundwater samples for the constituents listed in Appendix IX to Chapter 14 of Title 22 of the CCR. The Appendix IX list has been included with the routine COC list on an annual basis since it was first performed at the September 1999 sampling event.

The most recent Annual Groundwater Monitoring Report (Hamilton, 2011) includes analytical results through December 2010. Based on the stable groundwater gradient data and trends described in Section **2.2.3**, statistical summaries of analytical data were generated for the period of 2006 through 2010. These summaries represent current groundwater conditions and

are presented in **Tables 3** and **4**. Accordingly, the groundwater analytical data presented in this Closure Plan for 1) general characterization of the basin area and 2) proposed inclusion in future detection of potential impacts and assessment of corresponding risks for the entire retention basin site, were sampled during the time period of 2006 through 2010.

The annual report is referenced in Appendix **C** of this Closure Plan and was submitted to the DTSC along with other existing characterization reports.

The annual reports include gradient plots of the groundwater elevation data measured during the sampling events over the year and a tabular presentation of the analytical data derived from the samples collected during the events. Report tables, time-series plots and hydrographs also contain water-level and analytical data from previous sampling events dating back to project inception to allow for data comparison.

The sampling plans, methods, and analytical results are presented in the Water Quality Monitoring Program and Sampling and Analysis Plan (SAP) (Hamilton, 1996 and 2000b), and the most recent Annual Groundwater Monitoring Report (Hamilton, 2011). These documents are referenced in Appendix **C** of this Closure Plan.

As described below, the scope of the groundwater monitoring program increased over the study period from the original nine wells to include forty-three well locations as shown on **Figure 5**. The Annual Groundwater Monitoring Report describes construction details for each of the monitoring wells (Table 1 of Hamilton, 2011). All monitoring wells included in the sampling program, except the eight background wells and two undesignated wells (AW-8 and AW-9), are within the compliance area (**Figure 5** of this Closure Plan).

Note that for purposes of this Closure Plan, upgradient wells and borings are considered to represent background conditions, regardless of the concentrations observed, and downgradient wells and borings are considered to represent compliance conditions, regardless of the concentrations observed. Wells AW-8 and AW-9 are undesignated with respect to background or compliance conditions because the gradient direction at these wells is uncertain. These criteria were used in developing the summary groundwater concentration statistics for the period of 2006 through 2010 (**Tables 3** and **4**).

5. ESTIMATE AND MANAGEMENT OF MAXIMUM INVENTORY

No hazardous waste was stored in the retention basins and appurtenances during the period of characterization (1996 to 2010). The current owner/operator does not have a permit to store hazardous waste in the retention basins. Wastewater is stored and released under the previously noted NPDES permit.

In 1996, Edison discontinued the process that could have created hazardous waste at the station. It was this presumed hazardous waste that was allegedly stored in the retention basins.

The maximum potential historical inventory (i.e., the maximum potential inventory before 1996) is equal to the combined volume of the four basins or 2.94 MG. The individual basins have the following capacities: 830,000 gallons each, for the North and Central Basins; 286,000 plus 264,000 gallons for the BCCB; and 725,000 gallons for the South Basin (Section 3.1). This combined capacity represents the estimated maximum potential inventory that would exist if all four basins were filled with hazardous wastewater at the same time (prior to 1978 the BCCB had not been constructed, thus the maximum potential historical inventory before 1978 was 2.4 MG). Note that operational safety policy has been to generally keep the basin(s) below fifty percent of capacity. However, the value of 2.94 MG is useful as a theoretical upper limit on the historical inventory of hazardous wastewater stored at the retention basin site.

6. DECONTAMINATION PROCEDURES FOR EQUIPMENT, STRUCTURES, AND BUILDINGS

The retention basins are emptied and cleaned as a routine operational procedure to remove stormwater sediments, algae, and other solids. These materials are removed by the station operator to maintain full retention basin storage capacity. Edison considers it unlikely that any residual contamination is present in the basin sediments since the basins have not stored hazardous wastewater for up to 15 years (Section **3.1**). It is Edison's opinion that the cleaning process described below would effectively remove residual contamination if it were present in the basin sediments. Details of this process are given below.

The retention basins are cleaned by the current owner, as needed. The last cleaning of the Central Basin was conducted jointly by SCE and AES Alamitos LLC in 2010, in order to prepare the basin for additional soil characterization.

The typical cleaning process involves draining of the clear liquids to another basin, and then pumping out the residual liquid/solid sludge with a vacuum truck. Alternatively, the material can be left to dry, then shoveled up and placed in bins. The sludge, or solid, is tested for hazardous characteristics, as defined in Title 22 of the CCR, and then transported to an appropriate disposal facility. Once the retention basin is cleaned and the liner passes an inspection by a liner contractor, it is placed back into service.

The waste characterization from the latest Central Basin cleaning indicates the material is non-hazardous (Calscience Environmental Laboratories, Inc., 2010a and 2010b). AES Alamitos LLC reported that the South Basin was cleaned two years previously, and the removed material was also characterized as non-hazardous (M. Linares, AES Alamitos LLC; pers. comm., 2011).

The BCCB stores only the rainwater that falls into the basin.

Decontamination of the basin liners is not considered necessary. Comprehensive leachability testing of similar liner material from the former Edison Long Beach Generating Station (Komex, 2005) indicated there were no leachable constituents within the liner samples that represented a potential health risk to ecological or human receptors.

Water has continuously flowed through the pipelines leading to the retention basins, due to normal operation of the station over the period of approximately 15 years since hazardous wastes were last stored in the basins. Due to the operational flow, there should be no sediments from this period remaining in the pipelines.

The oil-water separator sumps connected to the pipelines and basins (**Figure 3**) potentially could contain residual sediments from the period when hazardous wastes were stored in the basins. Decontamination procedures will include: inspection, characterization sampling (Section **8**), solids removal, pressure washing, and testing (confirmation sampling) of the wash

water and solids. Based on the list of COCs established for this site, confirmation samples will be tested for those constituents that were previously detected during site characterization. Decontamination wash water and solids will be removed and properly disposed, based on the results of the analytical testing.

7. CONFIRMATION SAMPLING PLAN FOR CONTAINMENT STRUCTURES, TANKS, AND EQUIPMENT

Edison believes that confirmation sampling at the retention basin site applies only to the oil/water separators and sediment traps, since the basins and pipelines no longer contain sediments from the time period when the site facilities were used for storing hazardous waste. Details on the cleaning of facilities at the retention basin site are given in Section **6** above.

Confirmation sampling will be performed in the oil/water separators and sediment traps, by testing the wash water after the oil/water separators and sediment traps are cleaned, and comparing it to the wash water source, which will also be tested for the COCs. If solids are collected during the confirmation sampling, they will be sampled along with the wash water. The wash water and any solids will be analyzed as described in Section **6**, in consultation with DTSC. The analytical methods listed in **Table 6** will be used, as appropriate.

8. SOIL SAMPLING PLAN

This section describes plans for additional characterization of the soil matrix and new characterization of soil gas at the retention basin site. Existing investigations that produced the data shown in **Tables 1, 2,** and **5** are described in Section **4.5.1**. The plans discussed below are in response to DTSC requests following completion of the existing soil investigation (2010). General descriptions of future work plans are provided here. Detailed Work Implementation Plans will be developed based on the concepts presented in this section, in consultation with DTSC, after this Closure Plan is approved.

Edison believes the soil beneath the retention basins has been fully characterized with the exceptions of: 1) PAHs in the soil matrix, 2) PAHs, dioxins, and TPH in sediment trap residue, and 3) soil gas characterization.

The existing characterization reports have been reviewed by DTSC. Edison has concluded that the soil characterizations are sufficient to allow Edison to proceed with a Closure Plan.

The DTSC staff (2010) requested two additional investigations to complete the retention basin site characterization: 1) a soil vapor survey adjacent to each of the basins, the pipelines, and associated oil/water separators and sediment traps, and 2) a soil matrix survey beneath the pipelines conveying wastewater to and from the retention basins.

The existing soil vapor survey described in Section **4.5.1** was performed in 1999 using guidance that is no longer applicable. Therefore, a new soil vapor survey should be performed that investigates each of the four retention basins using the most recent guidance.

Edison intends to collect soil gas samples within the retention basin and pipeline areas as part of the comprehensive risk assessment described in this Closure Plan. The soil gas samples will be analyzed for VOCs (including naphthalene). This will allow evaluation of the potential risk due to sub-surface vapor intrusion to indoor air and the resulting cumulative risk under future land-use conditions.

A soil matrix survey beneath the pipelines conveying wastewater to and from the retention basins is also required. This would include all system pipelines for the boiler chemical cleaning and fireside wash processes outside of the boiler foundation. The demineralizer system will be investigated since waste from that system was conveyed to the basins. It would also include any oil/water separators and sediment traps associated with these pipelines. The location of the pipelines, oil/water separators, and sediment traps are shown on **Figure 3**.

The analytical methods proposed for future soil and soil gas samples are described in Section **4.2**.

As stated above, the 1999 soil vapor survey used guidance that is no longer applicable. Therefore, results of that investigation (summarized in **Table 5**) will be superseded by the proposed soil gas investigation. Results of the 1999 soil vapor survey will not be used for further analyses.

The designed collection areas for sediments that could potentially contain PAHs, dioxins, and TPH are sediment traps and oil-water separators associated with the electrical generating units (Section **3.2.2**). Suspended PAHs may also potentially be present along the pipeline alignment if leakage has occurred. Edison intends to investigate and assess PAHs in soil along the pipeline, appurtenances such as the oil/water separators and sediment traps, and beneath the basins, where necessary, in order to support risk assessments for these chemicals.

With respect to dioxins and TPH, Edison will sample the residue from all sediment traps and oil-water separators that act as sediment, or oil, traps. If either of these constituents are detected in sediment trap residues at levels exceeding screening criteria, then dioxins and TPH will be further sampled in consultation with DTSC.

After completing the soil gas and additional soil matrix sampling investigations (proposed above), a comprehensive report on soil characterization will be completed and submitted to DTSC for review and approval. The report will describe the methodology and present the analytical results of existing and proposed soil characterization activities at the retention basin site, including a chronological summary of all soil investigations at the site. The combined datasets, including results of existing and proposed soil matrix investigations, will be used for statistical analyses and risk assessments of current site conditions (i.e., conditions that do not include the effects of potential remediation).

9. ANALYTICAL TEST METHODS

Analytical test methods used for soil and groundwater samples collected during the field investigations completed to date (Section **4**) are summarized in **Table 6**. The analytical tests for soil matrix and groundwater samples were performed by Weck Laboratories, Inc, an Environmental Laboratory Accreditation Program (ELAP) certified lab. The analytical tests for soil vapor samples were performed by HydroGeoSpectrum (mobile laboratory) and Calscience Environmental Laboratory (Summa Canisters). As described in Section 8, collection of new soil gas data to replace the 1999 data is proposed.

Soil samples collected at the retention basin site were analyzed for metals using USEPA methods shown in **Table 6** (Hamilton, 2008). Soil samples were analyzed for VOCs using USEPA Method 8260B.

Groundwater samples collected at the retention basin site were analyzed for metals using the USEPA methods shown in **Table 6** (Hamilton, 2011). Groundwater samples were analyzed for VOCs using USEPA Method 8260B. Groundwater samples for the annual Appendix IX sampling events were analyzed for VOCs, semi-volatile organic compounds (SVOCs), organochlorine pesticides, organophosphorus pesticides, chlorinated herbicides, dioxins/furans, and polychlorinated biphenyls (PCBs) using USEPA Methods 8260B, 8270M, 8081A, 8141, 8151, 8280, and 8082, respectively.

Potential future test methods for VOCs, PAHs, dioxins, and TPH are shown in **Table 6**.

Analytical test methods for future analyses will be the same as the methods described above unless they are subject to future changes in test methodology**.** It is assumed that future analyses would have method detection limits that meet risk-based criteria, such as California Human Health Screening Levels (CHHSLs) in soil and soil gas and drinking water criteria in groundwater**.**

10. GROUNDWATER SAMPLING PLAN

This section describes plans for additional characterization of groundwater at the retention basin site. Existing investigations that produced the data shown in **Tables 3** and **4** are described in Section **4.5.2**. The plans discussed below are consistent with DTSC requests following completion of the existing soil investigation in 2010. Although the time period for groundwater monitoring data summarized in **Tables 3 and 4** extends only through December 2010, the groundwater sampling and reporting programs have continued to present without interruption.

Edison will continue to sample and report groundwater in accordance with the Water Quality Monitoring Plan (WQMP) (Hamilton, 1996) and SAP (Hamilton, 2000b) until site closure. The sampling and analytical plans are subject to future changes, (e.g., by increasing PAHs to a quarterly basis), if requested by DTSC.

11. CLOSURE PERFORMANCE STANDARDS (CLEANUP LEVELS)

Standards for closing the retention basin site to meet clean closure (unrestricted land use standards) are described below along with the Conceptual Site Model (CSM). Clean closure can be achieved in accordance with Closure Performance Standards either by: 1) Demonstrating that no COPCs are identified at the retention basin site through site characterization and statistical analysis, 2) Demonstrating that COPCs identified at the retention basin site are below risk-based criteria, or 3) Demonstrating that COPCs identified at the retention basin site were remediated to concentrations that are below background or risk-based criteria. Background concentrations for metals and organics in soil and groundwater are presented in **Tables 1** through **4**. The distinction between the terms "COC" and "COPC", along with the definition of "background" concentrations, are explained in Section **4**.

All COCs (listed in **Tables 1** through **5**) that have been or will be analyzed for and reported in the site characterization reports will be evaluated for site closure, in addition to any new COCs. Each inorganic COC can potentially become a COPC according to the DTSC criteria for identifying statistically elevated chemical concentrations (Section **4**).

Figure 12 is a CSM that illustrates the potential exposure routes from the points of chemical release at the retention basin site to human and ecological receptors. Under current (2011) land use conditions, the potential human receptors are industrial workers and construction workers. Under future unrestricted land use conditions (i.e., after the station is decommissioned and removed), a resident is considered as a hypothetical human receptor in order to support closure evaluations. Potential exposure routes to aquatic and terrestrial ecological receptors will be evaluated under both current and future land use conditions.

Currently, three of the basins are lined with an asphaltic concrete base covered by a single layer of Hypalon synthetic liner. The BCCB is currently lined with an asphaltic concrete base covered by a double layer of a synthetic HDPE liner surrounding a geofabric leachate collection system (Section **3.1**). The remainder of the retention basin site around the basins is partially covered by rock and is partially bare dirt. These conditions suggest that current workers could potentially contact (i.e., ingestion or dermal contact) surface soil and any associated COPCs, although it is unlikely that industrial workers would have access to subsurface soil, where releases from the basins are likely to be located. The basin liners would also be likely to eliminate worker exposure to COPCs in groundwater beneath the basins or pipelines. Indirect contact pathways through inhalation of dust-borne particulates or inhalation of subsurface vapors intruding into indoor air could possibly be complete, although the airborne dust pathway is likely to be insignificant and the indoor air pathway is likely incomplete as there are no nearby buildings where indoor vapors could accumulate. The approximate extent of the pipelines is shown on **Figure 3**. Based on this approximate

pipeline route it is considered unlikely that there are any indoor workspaces currently above the pipelines. Thus, it is assumed that there are no in-ground foundations that vapors could accumulate beneath and that the indoor air exposure pathway is currently incomplete.

Current construction workers could potentially contact surface and subsurface soils and be exposed to COPCs through ingestion, dermal contact, dust inhalation, or outdoor vapor inhalation should construction activities occur at the retention basin site. Although these pathways are shown as potentially complete on **Figure 12**, they are likely to be very limited under current conditions. Currently, the groundwater ingestion route is incomplete for industrial and construction workers because the potable water at the station is supplied by the local municipality. Also, it is assumed that current and future construction workers are unlikely to be exposed to COPCs in groundwater by dermal contact with groundwater, as depth to groundwater ranges approximately from 11 to 14 feet below land surface.

Given the highly developed nature of the station property, terrestrial ecological receptors are not likely to be present on the site. Therefore, no contact by ecological receptors with COPCs in soil is likely to occur under current conditions.

Under future conditions, it is assumed that the site will have no basins, liners, pipelines or sumps and the surface will be unpaved. A future resident is assumed, hypothetically, to come into contact with the surface and subsurface soil (assuming subsurface soils are disturbed and re-distributed at the surface), and inhale airborne dust particulates and indoor vapors intruding from the subsurface. Future industrial and construction workers are assumed, hypothetically, to be exposed through the same soil-related routes as a resident, except that construction workers are assumed to be exposed to outdoor air and not indoor air.

Additional sampling and analysis of soil matrix and soil gas is proposed for the retention basin site, including collection of soil vapor samples around the basin and pipelines. The results of these sampling efforts will be used to evaluate risks for current and future industrial and construction workers and for future residents who may contact soils beneath the basin site and for future industrial workers and residents potentially exposed to sub-surface vapor intruding into indoor air.

Since groundwater at this site is on the seaward side of the Alamitos Gap seawater intrusion barrier (Frary and Mattar, 2010), the groundwater beneath the site is not likely to be a potential drinking water supply source in the future. This is consistent with the finding that the total dissolved solids (TDS) in groundwater at the site typically exceed the LARWQCB's drinking water criterion of 3,000 mg/L. TDS concentrations ranging from approximately 10,000 to 20,000 mg/L were sampled from monitoring wells between the North Basin and the BCCB (Hamilton 2010). Nevertheless, to be health protective since the groundwater has not

been dedesignated by the LARWQCB (1998). It is assumed that future groundwater exposures for residents may occur, as shown on **Figure 12**.

Based on long-term monitoring of the groundwater, it is concluded that groundwater has moved from west to east, likely at a moderately low flow velocity, since June 2005 (Hamilton, 2005). Thus, groundwater may be discharging into the estuarine portion (LARWQCB, 1998) of the San Gabriel River east of the site. Groundwater discharge could, therefore, potentially result in complete exposure pathways for ecological receptors, such as plankton, benthic invertebrates, epibenthic invertebrates, and fish through uptake and for shorebirds through ingestion of prey (see river water on **Figure 12**). This will be examined in a scoping ecological risk assessment performed for COPCs identified in groundwater. Due to the discharge of groundwater to the river, it is anticipated that water quality criteria protective of ecological receptors and possibly for human consumption of estuarine organisms, such as the most protective criteria for estuarine organisms in the California Toxics Rule (CTR) (USEPA, 2000) will become the primary closure performance standards for these receptors.

As described in Section **3**, nonhazardous wastewater containing minor amounts of oil, grease, and suspended solids, is stored in the retention basins. The wastewater from the basins is comingled with cooling water from the station and discharged to the San Gabriel River under the provisions of NPDES permit CA0001139 (LARWQCB, 2000). Therefore, although there is a possibility that chemicals and water in the retention basins may be released to the San Gabriel River under current conditions, this discharge would be substantially diluted, resulting in insignificant exposure pathways for ecological receptors. Therefore, wastewater is not likely to be a secondary source.

Under future conditions the site is likely to continue to be used for industrial purposes, although it is possible that unrestricted land use could result in other types of development at the site. As such, it is likely that future ecological receptors would be the same as under current conditions. Assuming the highly developed nature of the station property continues under future conditions, sensitive terrestrial receptors are not likely to be present on the site as illustrated on **Figure 12**. Potential exposure routes from the retention basins to aquatic and terrestrial receptors will be determined through a scoping ecological risk assessment, supplemented, as appropriate, with chemical and biological monitoring conducted in support of the NPDES permit and in consultation with DTSC. The scoping ERA will examine whether the estuarine receptors could be exposed to COPCs in groundwater discharging into the river through uptake or ingestion of food items (see **Figure 12**).

Additional information would be collected during the proposed on-site sampling. The additional information will be used to modify the CSM based on any determinations indicating that future conditions differ from those depicted in **Figure 12**. If additional complete

exposure routes are identified, an evaluation will be performed to confirm that closure performance standards are met to achieve protection of ecological receptors and the environment. Demonstration of compliance with the closure performance standards will include evaluations of COPC concentrations in the subsurface media for the entire retention basin site (e.g., using average COPC concentrations) and examination of the effects of any dilution caused by transport prior to discharge to the estuarine environment. If necessary, based on the results of the evaluation and consultation with DTSC, additional evaluations would be performed.

The initial (primary) closure performance standards for metals in the soil and groundwater are the corresponding background levels. However, for groundwater, the standards protective of human health and ecological receptors may be greater than background concentrations. These standards would be compared to determine which is most protective (i.e., the drinking water MCLs or ecologically protective criteria in the CTR (USEPA, 2000)). In the event that it is not technically feasible to remediate metals to background concentrations, the closure performance standards will be as follows:

1. For the site soil, the closure performance standard will be health risk-based criteria for unrestricted closure. USEPA guidance indicates that a cumulative carcinogenic risk range between 1 in 1,000,000 and 1 in 10,000 (1×10^{-6} and 1×10^{-4}) is considered to be protective of public health. The lower end of this risk range is typically applied to residential situations and is considered the point of departure by the USEPA and DTSC. Accordingly, the human health risk-based criteria for carcinogens will be based on a target carcinogenic risk of 1×10^{-6} (cumulative for all COPCs) and the human health risk-based criteria for noncarcinogens will be based on a target hazard index of 1. A risk assessment will be performed and presented in the Closure Certification Report to demonstrate whether site conditions meet this standard (Section **16**).
2. For groundwater, the closure performance standards protective of humans will be the lower of either the drinking water MCLs or water quality criteria protective of human consumption of estuarine organisms in the CTR (USEPA, 2000).
3. For groundwater, the closure performance standards protective of ecological receptors will be those protective of estuarine organisms in the CTR (USEPA, 2000). Closure Performance Standards for protection of terrestrial ecological receptors, if any, will be developed in consultation with DTSC.

A Closure Certification Report (Section **16**) will be generated to demonstrate that the closure performance standards described in this section are met.

In the event that clean closure is not achieved, an LUC and an Implementation and Enforcement Plan (IEP), consistent with closure to industrial standards, will be prepared for

approval by DTSC as described in Section **19**. Closure performance standards for protection of ecological receptors in Section **19** are the same as described above.

12. SOIL AND GROUNDWATER REMOVAL/CLEANUP PROCEDURES

The overall remediation strategy (if needed) would be to use Edison's characterization data, for statistical analyses and risk assessments, to identify the specific contaminants and locations that require remediation to achieve the site's closure performance standards.

12.1 SOIL REMOVAL/CLEANUP PROCEDURES

The closure performance standards (Sections **11** and **19**) and supporting statistical analyses and risk assessments may indicate that soil excavation should be performed. Candidate COPCs that could potentially drive soil removal action will be identified and the basis for removal described in a Work Implementation Plan (WIP), as described below.

If soil removal is required, the following procedures would be used. A work plan for soil removal would be developed and submitted to the DTSC for approval. The work plan would include a soil management plan with a health and safety plan (HaSP). Confirmation soil samples would be collected from the walls and bottom of the excavation(s) on approximate twenty foot centers, with a minimum of one sample on each sidewall. The samples would be analyzed for the COPCs identified through statistical and risk analysis of the characterization data, in consultation with DTSC. The analytical methods listed in **Table 6** would be used, as appropriate.

If analyses of the confirmation samples show that the closure performance standards have not been met, then additional soil may be excavated laterally and vertically to the water table. The confirmation sampling would be repeated as well.

The completed excavation would be backfilled with clean, compacted fill (for which characterization samples would also be collected and analyzed). The basin liner would be repaired as necessary. The remediation equipment would be decontaminated by pressure washing. Decontamination wash water and residue would be characterized and removed for disposal at an offsite permitted facility.

The excavated soil would be characterized in accordance with the CCR Title 22 and disposed of at an appropriate facility, based on a determination of whether or not it is hazardous. If this waste is determined to be hazardous, it would not be stored onsite for more than 90 days. Soil removal, transport, and cleanup procedures would conform to DTSC guidelines. A WIP would be prepared and approved by DTSC prior to initiation of cleanup.

The Closure Certification Report (Section **16**) will provide comprehensive documentation of the evaluation of any chemicals that may require remediation, soil removal actions, cleanup confirmation, and post-remedial risk assessment.

12.2 GROUNDWATER REMOVAL/CLEANUP PROCEDURES

The closure performance standards (Section **11**) and supporting statistical analyses and risk assessments may indicate that groundwater remediation should be performed. In this case a WIP would be developed for review and approval by DTSC. The methodology and extent of the remediation defined in the WIP would be determined based on the results of the data evaluation described above. The remedial objective would be to meet the closure performance standards defined in Section **11** or **19**.

Ongoing groundwater monitoring (Section **15**) would serve as confirmation sampling to evaluate the efficacy of the remedial action on meeting the site's Closure Performance Standards for groundwater. Groundwater samples will be collected and analyzed according to the existing WQMP and Sampling and Analysis Plan (Hamilton, 1996 and 2000b) to demonstrate attainment of the groundwater cleanup standards. When attainment is achieved, the Closure Certification Report (Section **16**) would provide a comprehensive assessment of any chemicals that require remediation, as well as documentation of necessary remedial actions, and demonstration of attainment of the groundwater cleanup standards.

12.3 CULTURAL AND BIOLOGICAL RESOURCES

12.3.1 CULTURAL RESOURCES

Edison will conduct a cultural resources records search at the South Central Coastal Information Center (SCCIC) of a half-mile radius around the generating station (or retention basin site). The records at the SCCIC contain information collected from the California Historical Resources Information System and include the locations of previous cultural resources surveys and archaeological sites as well as listings in the National Register of Historic Places (NRHP), California Register of Historical Resources (CRHR), California Historic Landmarks (CHL), and California Points of Historic Interest (CPHI).

Previous cultural resources surveys conducted within a half–mile radius of the project area will be identified. Any previous studies encompassing the generating station or retention basin site will be identified. The findings of the applicable studies will be described with attention to whether they can be considered Historic Evaluations of the station and whether the station or any of its components qualifies for listing in the NRHP as a historic resource or as a historic resource under applicable guidelines (Section 15064.5 (a) (2)¬(3)) of California Environmental Quality Act (CEQA). New resources identified in the cultural resource surveys will also be examined to determine whether the station or its components could qualify as historic resources. Thus, the cultural resources records search will determine the presence or absence of sensitive cultural resources, including CRHR- and NRHP-eligible resources, on the property.

The studies will also be examined to determine if there are any recorded prehistoric or historical-period archaeological resources within a half-mile radius of the generating station. The potential effects of activities at the retention basin site on nearby historical period buildings and structures will also be identified.

Finally, to ensure that any historic resources are not impacted by any earth moving activities (if proposed), Edison will have an archeologist present during those activities, if necessary. The work plan to conduct any proposed earth moving activities will include descriptions of appropriate 'project control measures' in the event that cultural resources are encountered during those activities. Such control measures will also include the procedures to follow should human remains be unearthed during excavation, including those specified in State Health and Safety Code Section 7050.5, which states that "…no further disturbance shall occur until the County Coroner has made the necessary findings as to origin and distribution pursuant to Public Resources Code Section 5097.98."

12.3.2 BIOLOGICAL RESOURCES

Biological characterization of the retention basin site and the surrounding habitats will be conducted as part of the proposed scoping ecological risk assessment (Section 11). This biological characterization will be based on available biological reports prepared for the facility, including available NPDES Receiving Water Monitoring Reports, and studies on the ecology of the regional aquatic and marine environments. For the species of regulatory concern (threatened, endangered, and sensitive species), local occurrences will be obtained from a query of the California Natural Diversity Database (CNDDB). Sensitive habitats that may occur near the Alamitos Generation Station will also be identified.

The common species that may occur in the environment near the site will also be identified. The station is located along the San Gabriel River, which discharges into the nearshore environment of open water, sandy or soft sediments, and hard substratum (e.g. rip-rap along the river shore). The species likely to be present in these habitats include phytoplankton, zooplankton, ichthyoplankton, benthic infauna (e.g., polychaete worms) and epifauna (e.g., crabs or shrimp), and fish. Birds present near the site may consist of marshbirds, shorebirds, waterbirds, and seabirds. Shorebirds are likely the most common birds present along the beach near the site, where they typically feed on invertebrates living in the sandy beach.

Several marine mammals may be transitory visitors to waters offshore of the site; these may include the California sea lion (*Zalophus californicus*), harbor seal (*Phoca vitulina*), gray whale (*Eschrichtius robustus*), and several species of dolphin.

Species of regulatory concern include federally and California state-listed threatened or endangered species, candidate species, or California Species of Special Concern. Any species of regulatory concern that occur in the vicinity of the site will be identified in the scoping

ecological risk assessment. However, as discussed above, it is unlikely that the station offers any habitats suitable for foraging, nesting, or refuge habitat for any special status animals, plants, or invertebrates.

Depending on the results of the scoping assessment, if suitable habitat for species of regulatory concern is determined to be present on or near the retention basin site and there is a potential impact to a listed species, consultation with the US Fish and Wildlife Service may be required. Guidelines and avoidance measures would be identified, if appropriate, prior to conducting any ground disturbing work activities.

13. CLOSURE COST ESTIMATE

A cost estimate for performing the Closure activities is described in Appendix **D**. Since elevated metals have been detected in soil beneath the Central Basin, and 1,4-dioxane concentrations in groundwater exceed the California drinking water notification level, preliminary estimates have been made for soil and groundwater remedial actions, in conformance with Financial Assurance requirements. At this time, it has not been demonstrated to what extent soil or groundwater remediation will be necessary. If the statistical evaluation and risk assessment identify COPCs that exceed the Closure Performance Standards, a comprehensive remedial WIP will be developed along with a cost estimate. This information would be used to update the Financial Assurance Document included in Section **14** and Appendix **E**. The total current (2011) estimated closure cost is $3,707,000 (**Table D-1**).

14. FINANCIAL RESPONSIBILITY

A copy of the 2011 annual statement of financial assurance is included in Appendix **E**.

15. CLOSURE IMPLEMENTATION SCHEDULE

The time frame for any potential remedial activities would be based on the approved closure plan date, completion of proposed site characterization activities (Sections **8** through **10**) and determination of the necessity for remedial action during the statistical analysis and risk assessment phase following approval of the Closure Plan. If remedial action is required, an implementation schedule would be developed during the preparation of a remedial WIP.

Assuming remedial action is required, post-remediation groundwater monitoring to track the effectiveness of the remedy would continue for a period of up to five years to assess progress toward meeting the Closure Performance Standards (Section **11**).

Progress reports and /or continued quarterly groundwater monitoring reports would be submitted during that assessment period, as required by DTSC.

Details concerning the contingency plan that would be followed if the Closure Performance Standards could not be met within five years are presented below (Section **19**).

If the presumed remedy is found to be effective in meeting the standards within five years, groundwater monitoring to confirm clean conditions would continue for a period consistent with CCR 66265.96. The groundwater monitoring network could be modified (streamlined) depending on the timeframe for certification of the presumed remedy.

After Edison demonstrates that the Closure Performance Standards (Section **11** or **19**) have been met, a Closure Certification Report will be prepared within six months for DTSC review.

16. CLOSURE CERTIFICATION REPORT REQUIREMENTS

The Closure Certification Report will document the results of site characterization activities, potential remediation activities, statistical analyses to identify (post-remediation) COPCs, and risk assessments used to quantify the achievement of Closure Performance Standards for the site. Data and evaluation to document that the site's Closure Performance Standards have been met for soil and groundwater will be presented. Note that the CSM (**Figure 12**) and list of COPCs would be re-evaluated to account for post-remediation data such as the results of confirmation sampling.

17. PERSONAL PROTECTIVE EQUIPMENT (WORKER HEALTH AND SAFETY)

Assuming remedial action is required, a HaSP for performing these activities at the retention basin site would be prepared by the remediation contractor and approved by DTSC prior to commencement of any field work.

A HaSP covering subsurface construction work at the site (performed by or for AES Alamitos LLC) would be incorporated into a potential LUC for the site as described in Section **19**.

18. SITE SECURITY

The station is an operating facility and is gated and guarded to prevent unauthorized access. The site is surrounded by fences that are eight feet high, with outward-facing barbed-wire extensions. The site also has an electronic surveillance system.

19. CONTINGENCY POST-CLOSURE PLAN

Soil and groundwater data collected at the retention basin site will first be evaluated to assess the potential for compliance with the Closure Performance Standards for clean closure, discussed in Section **11**. Depending on the results of the risk assessment (Section **11**), it is possible the site will be closed to industrial standards with a LUC for protection of human health. The area to be considered under a LUC would also be defined on the basis of the risk assessment results. A soil management plan may be needed whenever asphalt is removed or when soil in the area of the LUC is disturbed.

In the event that remedial action is performed (Section **12**), updated site data following completed investigation/remediation would be used for a Contingency Post-Closure Plan assessment.

Under the Contingency Post-Closure Plan, Edison would close the retention basin site to meet industrial closure (restricted land use standards). A LUC and an IEP would be provided for approval by DTSC. An outline for the post-closure groundwater monitoring plan is presented below in Appendix **B**.

Industrial closure can be achieved in accordance with Closure Performance Standards either by demonstrating that no COPCs are identified for the retention basin site, or, alternatively, if one or more COPCs are identified, by performing a risk assessment demonstrating that the resulting risk levels for the COPCs are within prescribed standards for industrial site closure.

The distinction between the terms "COC" and "COPC", along with the definition of "background" concentrations, are explained in Section **4**.

The suite of COCs analyzed and reported in the site characterization reports (listed in **Tables 1** through **5**) will be evaluated for site closure. Each COC can potentially become a COPC according to the DTSC criteria for identifying statistically elevated chemical concentrations (Section **4**).

Closure Performance Standards for the retention basin site would be expressed in terms of risk, by requiring that risk levels for human receptors potentially exposed to the identified COPCs are within USEPA and DTSC prescribed standards for industrial closure. USEPA guidance indicates that a carcinogenic risk probability between 1 in 10,000 and 1 in 1,000,000 (1×10^{-4} and 1×10^{-6}) is considered to be both safe and protective of public health. Accordingly, a carcinogenic risk probability of 1×10^{-5} will be adopted to be protective of future industrial workers. A hazard index of 1 will be used as the target criterion for evaluating potential non-carcinogenic health effects. The contribution of background levels of VOCs and PAHs (and dioxins and TPH as appropriate) to cumulative risk will also be described.

Current construction workers could potentially contact surface and subsurface soils and be exposed to COPCs through ingestion, dermal contact, dust inhalation or outdoor vapor inhalation should construction activities occur at the retention basin site. Thus, although these pathways are shown as potentially complete on **Figure 12**, they are likely to be very limited. Protective measures will be specified in a HaSP before subsurface work is performed at the retention basin site (Section **17**). If necessary, the LUC would include a HaSP for construction worker protection.

Industrial closure performance standards for groundwater could differ from those described in Section **11,** primarily those addressing human health protection. Assuming that closure to drinking water MCLs may not be achieved, the standards protective of humans will be the water quality criteria protective of human consumption of estuarine organisms in the CTR (USEPA, 2000). Also a LUC would be provided to restrict groundwater extraction for use as a drinking water source or for purposes other than groundwater monitoring. The ecological and environmental closure performance standards would include water quality criteria, such as the most protective criteria for estuarine organisms in the CTR (USEPA, 2000). These would be used to examine any constituents that may reach the estuarine environment east of the site in the future.

Industrial closure performance standards for the retention basin site are summarized below:

a. The closure performance standard for metals in soil will be background, or the risk-based concentration for industrial site closure (as noted above and based on **Figure 12**), whichever is greater.

b. In the event that remedial action is performed, risk-based closure standards will be developed as needed if additional complete exposure routes are identified after updating the CSM to account for additional investigation or any post-remediation data. Thus, **Figure 12** would be updated under this scenario.

The CSM may be modified based on any determinations indicating that future conditions differ from those depicted in **Figure 12**. If additional complete exposure routes are identified, closure performance standards may need to be met to achieve protection of human and ecological receptors and the environment, as described above.

A Closure Certification Report (Section **16**) will be generated to demonstrate that the above closure performance standards are met.

If the Closure Performance Standards for industrial closure are not met, then a Post-Closure Permit Application will be submitted.

Tables

Table 1
Summary of Frequency of Occurrence of Metal COCs in Basin (Compliance) and Background Soils
1995 through 2010
Alamitos Generating Station

		Soil - Compliance[1,2]					Soil - Background[3]				
Parameter	**Units**	**Number of Samples**	**Number of Non-detects**	**Percent Detects**	**Minimum Detected Concentration**	**Maximum Detected Concentration**	**Number of Samples**	**Number of Non-detects**	**Percent Detects**	**Minimum Detected Concentration**	**Maximum Detected Concentration**
Antimony	mg/kg	411	41	90%	0.10	6.4	54	4	93%	0.25	1.8
Arsenic	mg/kg	411	10	98%	1.3	66	54	0	100%	3.2	26
Barium	mg/kg	411	0	100%	27	823	54	0	100%	84	250
Beryllium	mg/kg	411	10	98%	0.10	1.1	54	0	100%	0.27	0.95
Cadmium	mg/kg	411	93	77%	0.04	1.2	54	9	83%	0.05	0.44
Chromium, total	mg/kg	411	0	100%	5.5	163	54	0	100%	15	45
Chromium VI	mg/kg	345	344	0.3%	0.25	3.6	54	54	0%	-	-
Cobalt	mg/kg	411	0	100%	1.7	46	54	0	100%	6.1	19
Copper	mg/kg	411	0	100%	6.7	2,600	54	0	100%	12	51
Lead	mg/kg	411	0	100%	2.0	270	54	0	100%	3.8	23
Mercury	mg/kg	401	111	72%	0.005	0.55	54	6	89%	0.005	0.12
Molybdenum	mg/kg	411	1	100%	0.10	71	54	0	100%	0.63	7.7
Nickel	mg/kg	411	0	100%	2.6	1,500	54	0	100%	13	38
Selenium	mg/kg	411	373	9%	0.04	1.8	54	41	24%	0.25	0.70
Silver	mg/kg	411	350	15%	0.04	2.8	54	48	11%	0.05	0.19
Thallium	mg/kg	401	334	17%	0.05	0.86	54	54	0%	-	-
Vanadium	mg/kg	411	0	100%	7.8	3,410	54	0	100%	39	79
Zinc	mg/kg	411	0	100%	14	500	54	0	100%	40	110

Definitions

- = Parameter 100% Non-detect.

COC - chemical of concern

Notes:

[ ] - Detected < 10%

1 - Compliance samples represent the North Basin (NB), Central Basin (CB), Boiler Chemical Cleaning Basin (BCCB) and South Basin (SB).

2 - A total of 133 borings were sampled in this area; NB (30 borings), CB (51 borings), BCCB (18 borings) and SB (34 borings).

3 - Background samples were collected from 18 borings.

Table 2
Summary of Detected Organic Compounds in Basin (Compliance) and Background Soils
1995 through 2010
Alamitos Generating Station

		Soil - Compliance[1,2]					Soil - Background[3]				
Parameter	**Units**	**Number of Samples**	**Number of Non-detects**	**Percent Detects**	**Minimum Detected Concentration**	**Maximum Detected Concentration**	**Number of Samples**	**Number of Non-detects**	**Percent Detects**	**Minimum Detected Concentration**	**Maximum Detected Concentration**
Acetone	mg/kg	294	200	32%	0.001	0.19	54	47	13%	0.01	0.039
Benzo(a)anthracene	mg/kg	30	28	7%	0.046	0.052	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	30	28	7%	0.04	0.051	-	-	-	-	-
Benzene	mg/kg	410	365	11%	0.001	0.06	54	48	11%	0.003	0.0082
2-Butanone	mg/kg	410	377	8%	0.001	0.05	54	54	0%	-	-
Chlorobenzene	mg/kg	410	408	0.5%	0.001	0.008	54	54	0%	-	-
Chrysene	mg/kg	30	28	7%	0.038	0.048	-	-	-	-	-
1,2-Dichlorobenzene	mg/kg	410	408	0.5%	0.001	0.15	54	54	0%	-	-
1,4-Dichlorobenzene	mg/kg	410	409	0.2%	0.001	0.005	54	54	0%	-	-
1,1-Dichloroethane	mg/kg	410	403	2%	0.001	0.31	54	54	0%	-	-
1,1-Dichloroethene	mg/kg	410	403	2%	0.001	17	54	54	0%	-	-
cis-1,2-Dichloroethene	mg/kg	410	345	16%	0.001	9.7	54	54	0%	-	-
Ethylbenzene	mg/kg	410	407	1%	0.001	0.009	54	54	0%	-	-
Fluoranthene	mg/kg	30	28	7%	0.041	0.044	-	-	-	-	-
Isopropylbenzene	mg/kg	411	410	0.2%	0.001	0.009	54	54	0%	-	-
m,p-Xylene	mg/kg	410	405	1%	0.001	0.03	54	54	0%	-	-
Naphthalene-8260	mg/kg	411	409	0.5%	0.003	0.05	54	54	0%	-	-
n-Butylbenzene	mg/kg	411	410	0.2%	0.001	0.02	54	54	0%	-	-
n-Propylbenzene	mg/kg	411	409	0.5%	0.001	0.02	54	54	0%	-	-
o-Xylene	mg/kg	410	405	1%	0.001	0.02	54	54	0%	-	-
p-Isopropyltoluene	mg/kg	334	333	0.3%	0.001	0.01	54	54	0%	-	-
Pyrene	mg/kg	30	29	3%	0.039	0.039	-	-	-	-	-
sec-Butylbenzene	mg/kg	411	410	0.2%	0.001	0.02	54	54	0%	-	-
Tetrachloroethene	mg/kg	410	395	4%	0.001	65	54	54	0%	-	-
Toluene	mg/kg	410	372	9%	0.001	0.13	54	49	9%	0.003	0.0081
trans-1,2-Dichloroethene	mg/kg	410	367	10%	0.001	26	54	54	0%	-	-
1,1,1-Trichloroethane	mg/kg	410	407	0.7%	0.001	2.6	54	54	0%	-	-
Trichloroethene	mg/kg	410	354	14%	0.001	45	54	54	0%	-	-
1,2,4-Trimethylbenzene	mg/kg	411	406	1%	0.001	0.04	54	54	0%	-	-
1,3,5-Trimethylbenzene	mg/kg	411	409	0.5%	0.001	0.03	54	54	0%	-	-
Vinyl chloride	mg/kg	410	382	7%	0.001	0.11	54	54	0%	-	-

Definitions

- = Parameter 100% Non-detect.

Notes:

- Detected < 10%

1 - Compliance samples represent the North Basin (NB), Central Basin (CB), Boiler Chemical Cleaning Basin (BCCB) and South Basin (SB).

2 - A total of 133 borings were sampled in this area; NB (30 borings), CB (51 borings), BCCB (18 borings) and SB (34 borings).

3 - Background samples were collected from 18 borings.

Table 3
Summary of Frequency of Occurrence of Metal COCs and TDS in Basin (Compliance) and Background Groundwater
2006 - 2010
Alamitos Generating Station

		Groundwater - Compliance[1,2]					Groundwater - Background[1,3]				
Parameter	**Units**	**Number of Samples**	**Number of Non-detects**	**Percent Detects**	**Minimum Detected Concentration**	**Maximum Detected Concentration**	**Number of Samples**	**Number of Non-detects**	**Percent Detects**	**Minimum Detected Concentration**	**Maximum Detected Concentration**
Antimony	ug/l	549	549	0%	-	-	128	128	0%	-	-
Arsenic	ug/l	549	410	25%	1	20.0	128	62	52%	1	16
Barium	ug/l	549	0	100%	17	480	128	0	100%	19	220
Beryllium	ug/l	561	530	6%	0.25	11.0	134	123	8%	0.25	1.8
Cadmium	ug/l	560	457	18%	0.25	4.1	128	109	15%	0.25	4.7
Chromium,total	ug/l	549	319	42%	0.50	580.0	128	85	34%	0.50	12
Cobalt	ug/l	606	138	77%	0.21	98	127	44	65%	0.25	79
Copper	ug/l	549	375	32%	1.25	62	128	108	16%	1.25	11
Lead	ug/l	549	540	2%	0.50	3	128	127	1%	0.50	1.3
Mercury	ug/l	512	512	0%	-	-	116	115	1%	0.05	15.0
Molybdenum	ug/l	549	3	99%	0.25	73	128	3	98%	0.25	30
Nickel	ug/l	549	72	87%	2	3,500	128	28	78%	2	220
Selenium	ug/l	549	443	19%	1	21	128	109	15%	1	7.6
Silver	ug/l	550	545	1%	0.50	2.8	128	128	0%	-	-
TDS	ug/l	549	0	100%	4.6E+05	4.7E+07	128	0	100%	4.1E+05	2.1E+07
Thallium	ug/l	549	549	0%	-	-	128	128	0%	-	-
Vanadium	ug/l	549	534	3%	1.25	26.0	128	114	11%	1.25	6.7
Zinc	ug/l	549	482	12%	5	350	128	101	21%	5	120

Definitions

- = Parameter 100% Non-detect.
COC - chemical of concern
TDS - total dissolved solids

Notes:

[ ] - Detected < 10%

1 - Groundwater samples collected and analyzed from Quarter 1 2006 through Quarter 4 2010.

2 - Compliance samples represent Basin (North Basin, Central Basin, Boiler Chemical Cleaning Bain, and South Basin) Monitoring Wells.

3 - Background wells consist of AW-13, AW-40, AW-7, AW-41, AW-42, AW-10, AW-43, and AW-39; all others are compliance, except AW-8 and AW-9.

Table 4
Summary of Detected Organic Compounds in Basin (Compliance) and Background Groundwater
2006 - 2010
Alamitos Generating Station

		Groundwater - Compliance[1,2]					Groundwater - Background[1,3]				
Parameter	Units	Number of Samples	Number of Non-detects	Percent Detects	Minimum Detected Concentration	Maximum Detected Concentration	Number of Samples	Number of Non-detects	Percent Detects	Minimum Detected Concentration	Maximum Detected Concentration
Benzene	ug/l	156	155	1%	0.50	20	43	43	0%	-	-
Bromochloromethane	ug/l	548	548	0%	-	-	112	112	0%	-	-
Bromoform	ug/l	306	305	0%	0.50	1.4	33	33	0%	-	-
Chloroform	ug/l	550	548	0%	0.50	0.56	112	110	2%	0.50	5.7
Dibromochloromethane	ug/l	548	548	0%	-	-	112	112	0%	-	-
1,1-Dichloroethane	ug/l	552	452	18%	0.50	4.1	113	86	24%	0.50	3.6
1,2-Dichloroethane	ug/l	548	548	0%	-	-	112	112	0%	-	-
1,1-Dichloroethene	ug/l	558	541	3%	0.50	2.8	112	103	8%	0.50	2.2
cis-1,2-Dichloroethene	ug/l	554	374	32%	0.50	300.0	112	94	16%	0.50	180
1,1-Dichloropropene	ug/l	548	548	0%	-	-	112	112	0%	-	-
1,4-Dioxane	ug/l	560	134	76%	0.25	640.0	112	52	54%	0.25	54
Hexachlorobutadiene	ug/l	548	548	0%	-	-	112	112	0%	-	-
Isopropylbenzene	ug/l	548	548	0%	-	-	112	112	0%	-	-
Naphthalene	ug/l	548	548	0%	-	-	112	112	0%	-	-
Tetrachloroethene	ug/l	548	548	0%	-	-	112	112	0%	-	-
Toluene	ug/l	549	548	0.2%	0.50	0.5	112	112	0%	-	-
trans-1,2-Dichloroethene	ug/l	548	520	5%	0.50	4.8	112	101	10%	0.50	15
1,2,3-Trichlorobenzene	ug/l	548	548	0%	-	-	112	112	0%	-	-
1,2,4-Trichlorobenzene	ug/l	548	548	0%	-	-	112	112	0%	-	-
1,1,1-Trichloroethane	ug/l	548	547	0.2%	0.50	1	112	112	0%	-	-
Trichloroethene	ug/l	553	511	8%	0.50	4.7	112	104	7%	0.50	1.3
Vinyl Chloride	ug/l	548	512	7%	0.50	13	112	112	0%	-	-

Definitions

- = Parameter 100% Non-detect.

Notes:

1 - Groundwater samples collected and analyzed from Quarter 1 2006 through Quarter 4 2010.

2 - Compliance samples represent Basin (North Basin, Central Basin, Boiler Chemical Cleaning Bain, and South Basin) Monitoring Wells.

3 - Background wells consist of AW-13, AW-40, AW-7, AW-41, AW-42, AW-10, AW-43, and AW-39; all others are compliance, except AW-8 and AW-9.

Table 5
Summary of Detected VOCs in Soil Vapor
November and December 1999
Alamitos Generating Station

		Compliance[1,2,3]				
Chemical	**Units**	**Number of Samples**	**Number of Non-detects**	**Percent Detects**	**Minimum Detected Concentration**	**Maximum Detected Concentration**
Acetone	ug/L	55	54	2	6.7	6.7
1,1-Dichloroethane	ug/L	55	32	42	0.50	13
1,1-Dichloroethene	ug/L	55	32	42	0.60	20
1,2-Dichloroethene	ug/L	55	33	40	0.50	183
Tetrachloroethene	ug/L	55	42	24	0.60	3.3
Toluene	ug/L	55	54	2	0.50	0.5
1,1,1-Trichloroethane	ug/L	55	33	40	0.50	44
Trichloroethene	ug/L	55	38	31	0.50	18
Vinyl Chloride	ug/L	55	40	27	8.4	274
Xylenes	ug/L	55	53	4	1.8	2

Notes:

Detected < 10%

1 - Compliance soil vapor samples represent the Central Basin.

2 - A total of 55 soil vapor borings were sampled.

3 - Data source is Hamilton, 2000a

Table 6
Analytical Methods, Practical Quantitation Limits
Alamitos Generating Station

Monitoring Parameter	Soil (1995 - 2010)		Soil Gas (1999)		Groundwater (2006-2010)	
	EPA Method	Practical Quantitation Limit	EPA Method	Practical Quantitation Limit	EPA Method	Practical Quantitation Limit
General Minerals						
pH	9045C	-	-	-	SM4500 H + B	0.1
Nitrate	9056	2 mg/l	-	-	353.2	2 mg/l
Aluminum	6010B	3 - 100 mg/kg	-	-	200.8	10 ug/l
Chloride	9056	2 - 4 mg/l	-	-	300.0	0.5 mg/l
Fluoride	9056	0.5 - 1 mg/l	-	-	300.0	0.05 - 0.5 mg/l
Magnesium	-	0.7 - 45 mg/kg	-	-	-	-
Manganese	6010B	2.5 - 50 mg/kg	-	-	200.7	10 ug/l
TDS	-	-	-	-	SM2540C	10 mg/l
Metals						
Antimony	6020	0.2 - 5 mg/kg	-	-	200.8	2.5 ug/l
Arsenic	6020	0.2 - 5 mg/kg	-	-	200.8	2 ug/l
Barium	6020	0.7 - 1 mg/kg	-	-	200.8	2.5 ug/l
Beryllium	6020	0.087 - 0.7 mg/kg	-	-	200.8	0.3 - 0.5 ug/l
Cadmium	6020	0.087 - 0.7 mg/kg	-	-	200.8	0.5 ug/l
Total Chromium	6020	0.5 - 1.5 mg/kg	-	-	200.8	1 ug/l
Chromium VI	7199	0.5 - 2.5 mg/kg	-	-	-	-
Cobalt	6020	0.1 - 2.5 mg/kg	-	-	200.8	0.2 - 0.5 ug/l
Copper	6020	0.43 - 1.5 mg/kg	-	-	200.8	2.5 ug/l
Iron	6010B	7 - 625 mg/kg	-	-	200.7	20 ug/l
Lead	6020	0.43 - 1.5 mg/kg	-	-	200.8	1 ug/l
Mercury	7471A	0.009 - 0.01 mg/kg	-	-	245.1	0.1 ug/l
Molybdenum	6020	0.17 - 2.5 mg/kg	-	-	200.8	0.5 ug/l
Nickel	6020	0.43 - 2.5 mg/kg	-	-	200.8	4 ug/l
Selenium	6020	0.43 - 0.5 mg/kg	-	-	200.8	2 ug/l
Silver	6020	0.07 - 0.7 mg/kg	-	-	200.8	0.5 - 1 ug/l
Thallium	6020	0.1 - 0.5 mg/kg	-	-	200.8	1 ug/l
Vanadium	6020	0.87 - 7.5 mg/kg	-	-	200.8	2.5 ug/l
Zinc	6020	1 - 5 mg/kg	-	-	200.8	10 ug/l
Organics						
VOCs	8260	2.5 - 500 ug/kg	8260B	0.5 ug/l	8260B	0.5 - 1 ug/l
PAHs	8270	0.036 - 1.9 mg/kg	NA	NA	8270C	0.16 - 0.35 ug/l
1,4-Dioxane	-	-	-	-	8270M	0.5 ug/l
Dioxins	8280	future[1,2]	-	-	8280	20 - 50 pg/l
TPH	8015C	future[1,2]	8015C	future[1,2]	8015C	future[1,2]

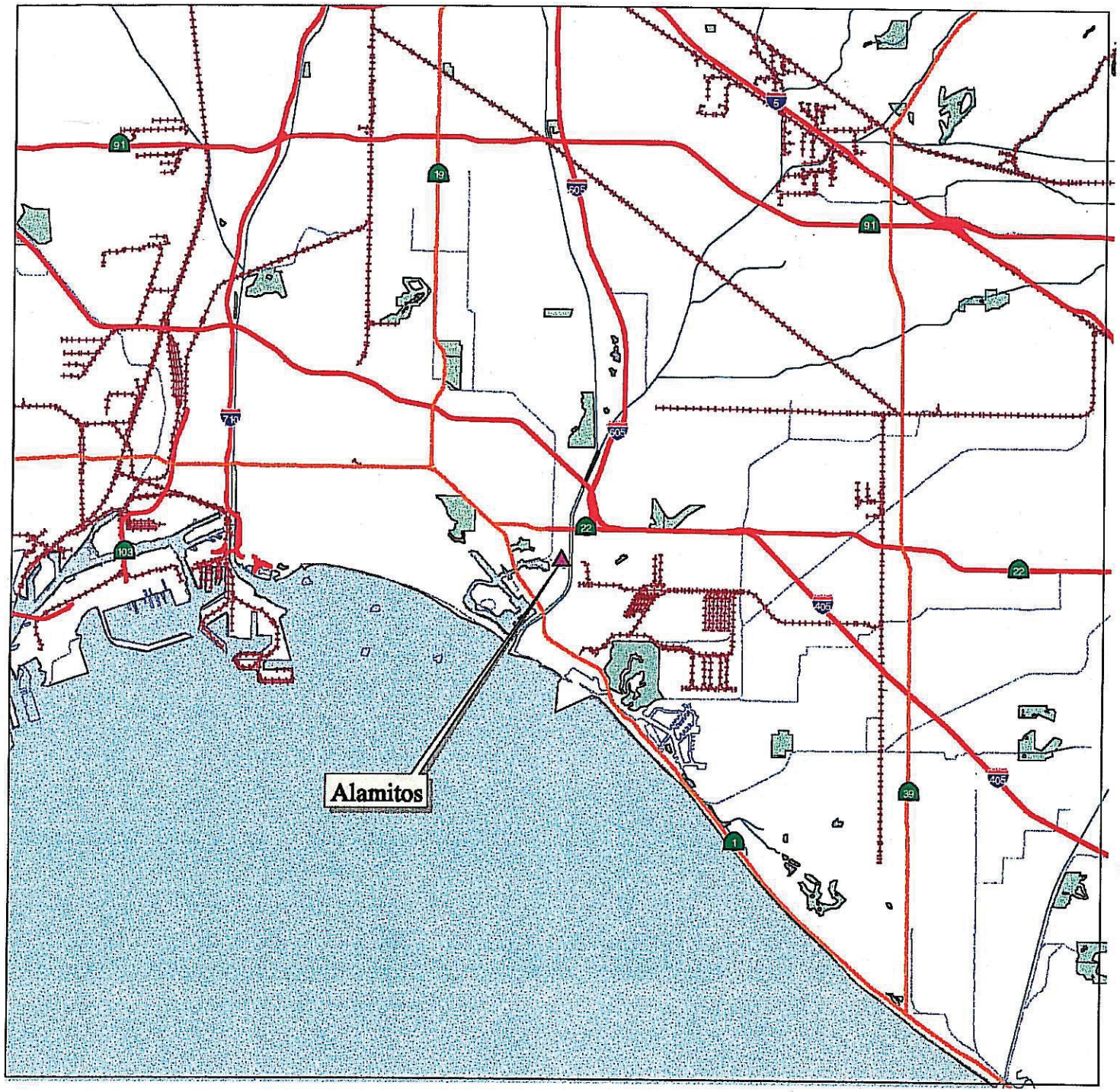
Notes:

1 - Methods for future analyses are subject to future changes in test methodology

2 - It is assumed that future analyses would have method detection limits that meet risk-based criteria, such as CHHSLs in soil and drinking water criteria in groundwater

NA - Not Applicable (naphthalene is part of the VOC analysis)

Figures



Target Property

Target Property: Alamitos Generation Facility

Source: Thomas Bros. Street Data

Map Number:	ga010823404
Issued For:	D. Chupa
Projection:	Nad83/UTM/Zone 11
Approved By:	D. Chupa
Checked By:	D. Chupa/Jim Schaefle
Project Lead:	Pat Turner
Supervisor:	Greta Bellis
Created By:	Jim Schaefle
Date:	11/07/01

N

C&GS

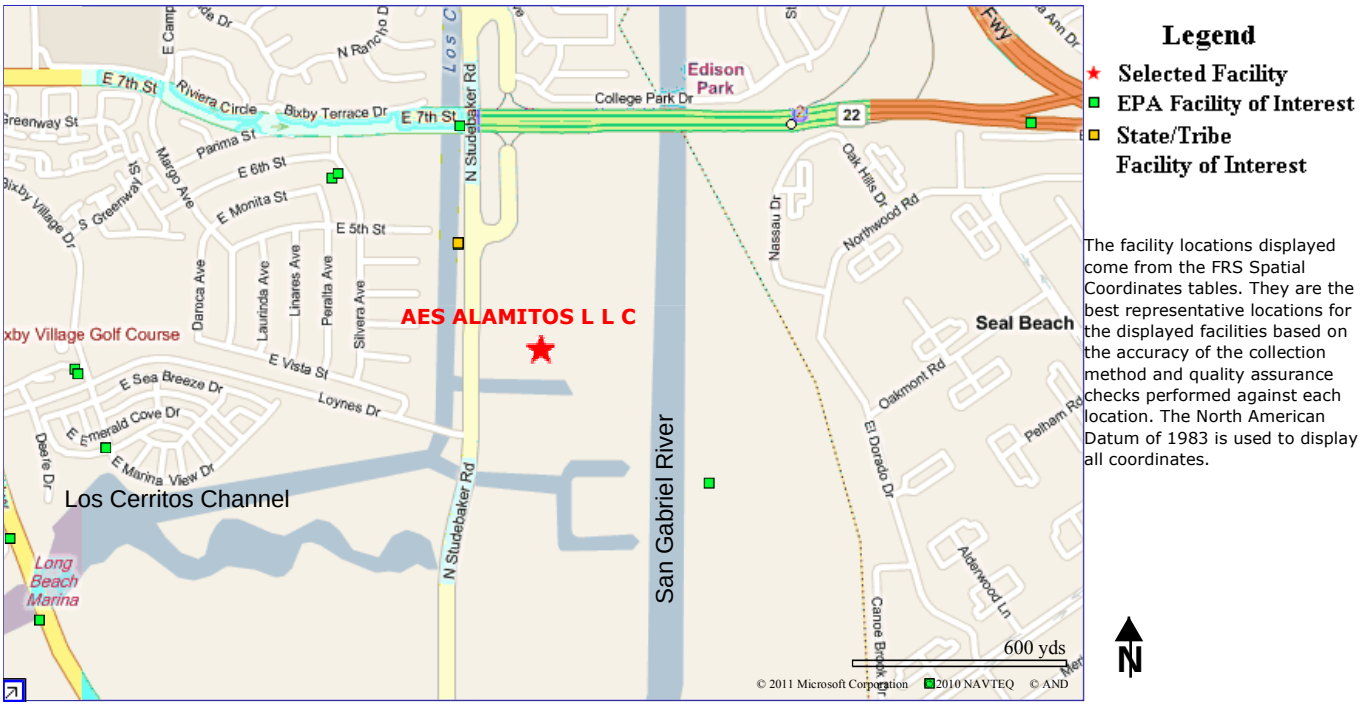
SOUTHERN CALIFORNIA EDISON

An EDISON INTERNATIONAL Company

(Hamilton, 2011)

Regional Location Map, Alamitos Generating Station **FIGURE 1**

AES ALAMITOS L L C
690 NORTH STUDEBAKER ROAD
LONG BEACH CA 90803-2221
Latitude: 33.768889 Longitude: -118.101111



Legend

- ★ **Selected Facility**
- ■ **EPA Facility of Interest**
- ■ **State/Tribe Facility of Interest**

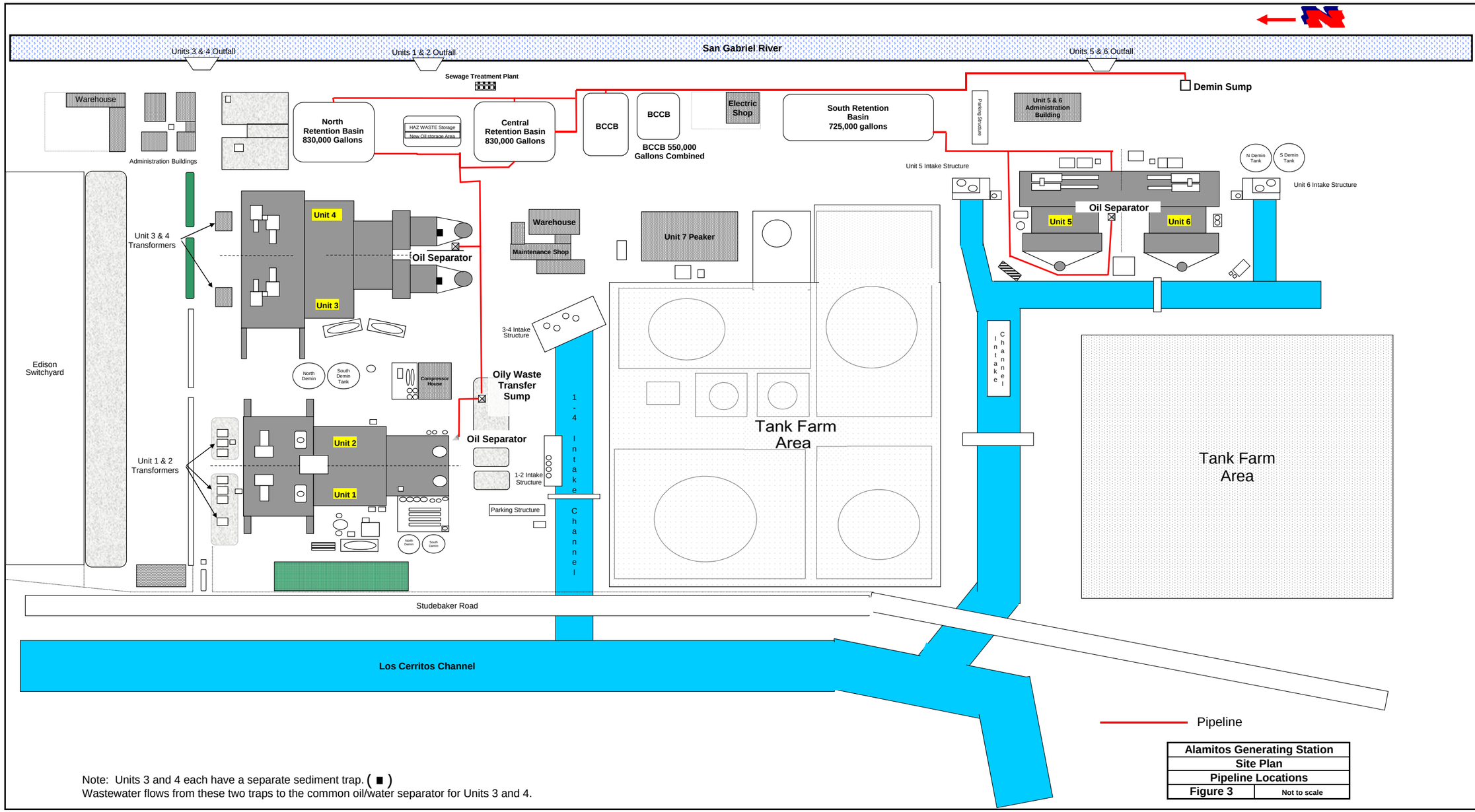
The facility locations displayed come from the FRS Spatial Coordinates tables. They are the best representative locations for the displayed facilities based on the accuracy of the collection method and quality assurance checks performed against each location. The North American Datum of 1983 is used to display all coordinates.

The latitude and longitude coordinates above come from the Envirofacts Locational Reference Tables (LRT). The method used to derive the Most Accurate Coordinates was INTERPOLATION-PHOTO. These coordinates correspond to CENTER OF FACILITY and represent the best location for the facility.

Query executed on JUN-24-2011

Figure 2
Site Location Map

(USEPA, 2011b) http://iaspub.epa.gov/enviro/lrt_viewer.map_page?sys_acrnm=PCS&sys_id=CA0001139



Note: Units 3 and 4 each have a separate sediment trap. (■)
Wastewater flows from these two traps to the common oil/water separator for Units 3 and 4.

Alamitos Generating Station	
Site Plan	
Pipeline Locations	
Figure 3	Not to scale

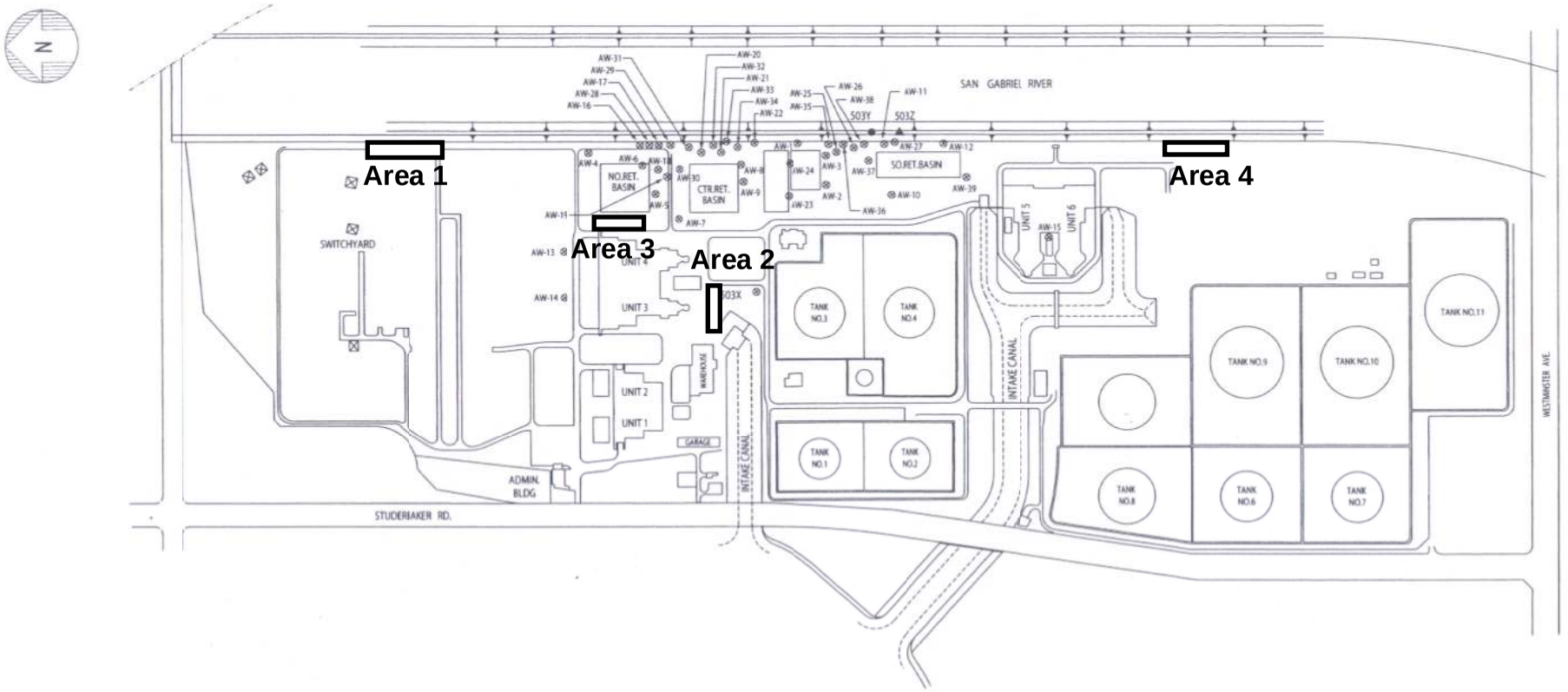
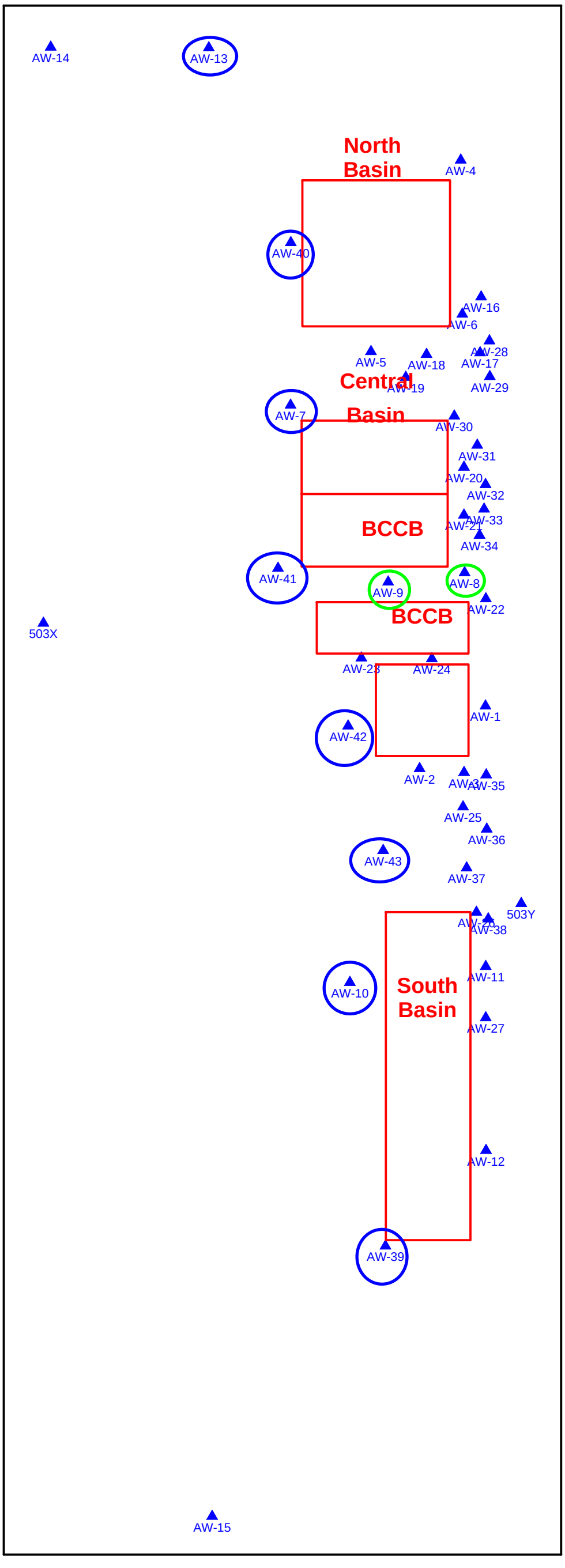


FIGURE 4

Alamitos Generating Station

Location of Background Boring Areas

Location of Groundwater Monitoring Wells
Alamitos Generating Station



Location of Groundwater Sampling Wells

Retention Basin

AW-37 Compliance Monitoring Well

AW-41 Background Monitoring Well

AW-9 Undesignated Monitoring Well

N

0 100 200 300 400

Feet

Figure 5

Base Map Source: Hamilton (2011)

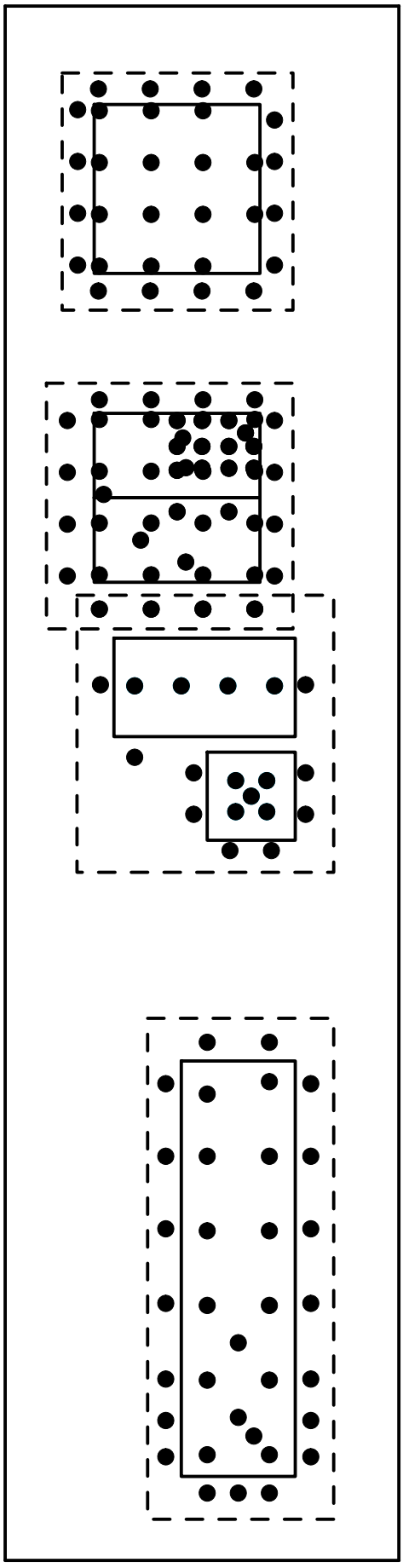
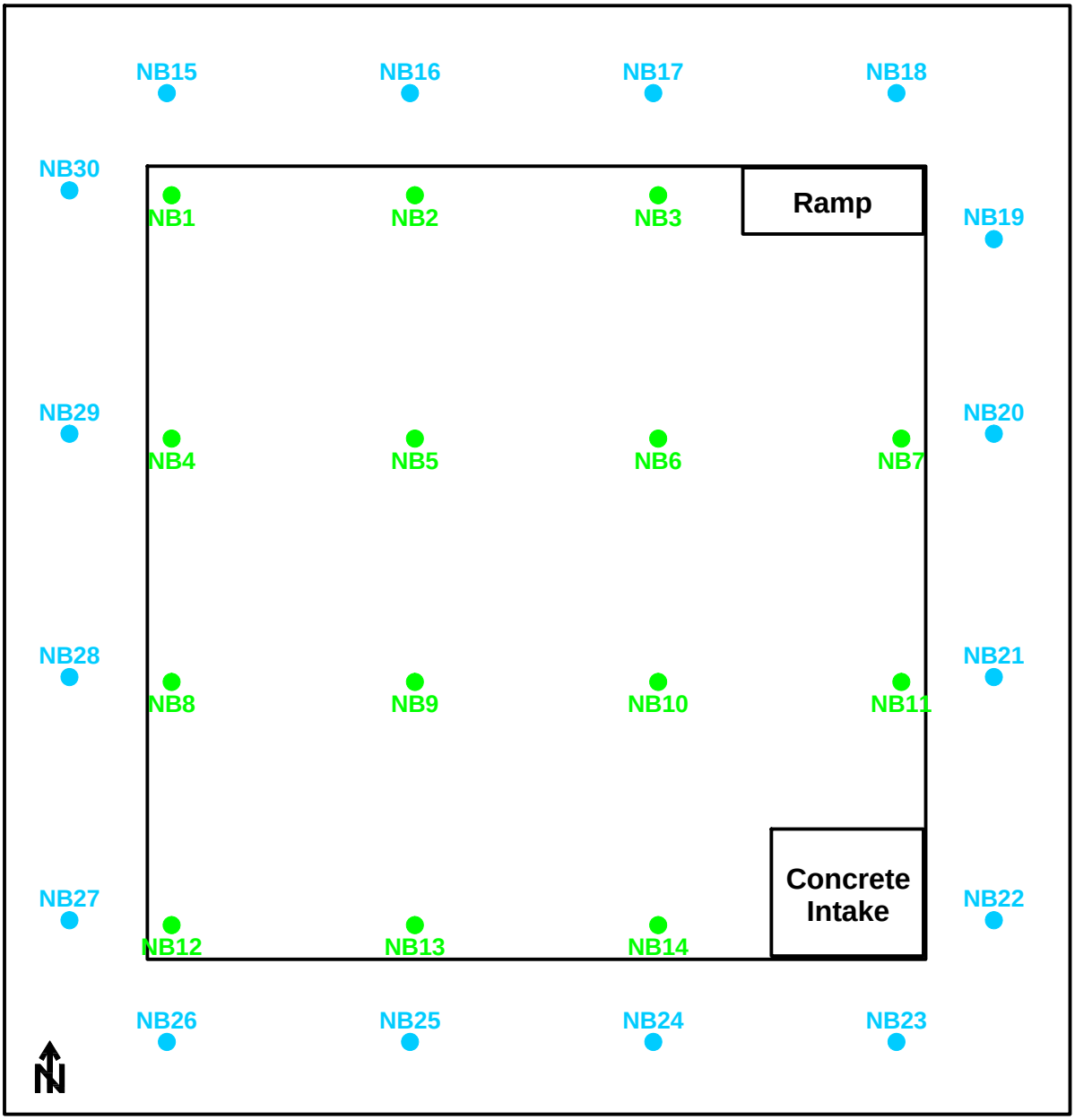


Figure 6
Soil Boring Locations
Retention Basins
Alamitos Generating Station

Soil Boring Locations -- North Basin
Alamitos Generating Station

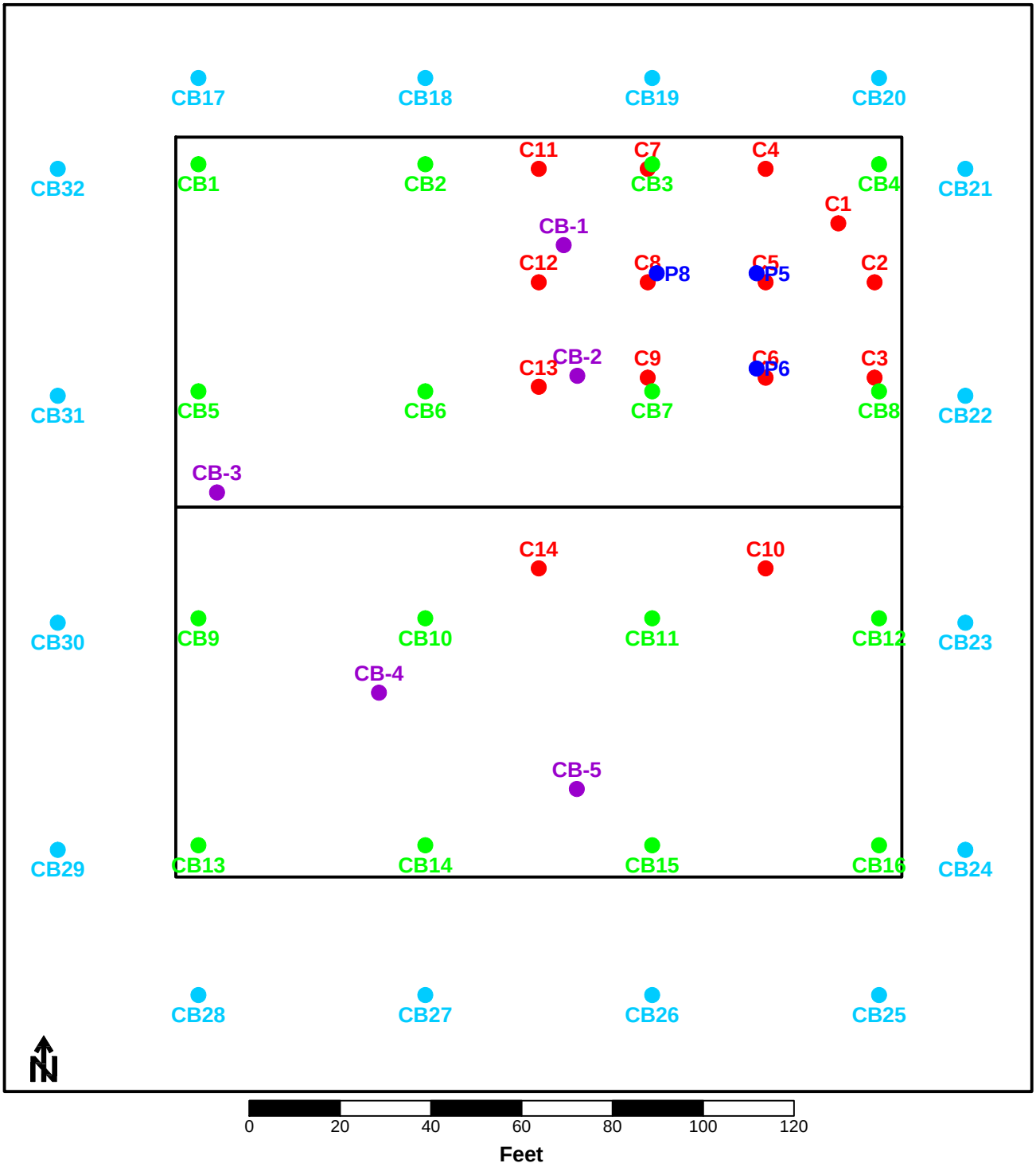


1997 Investigation

2007 Investigation

Figure 7

Soil Boring and Piezometer Locations -- Central Basin
Alamitos Generating Station



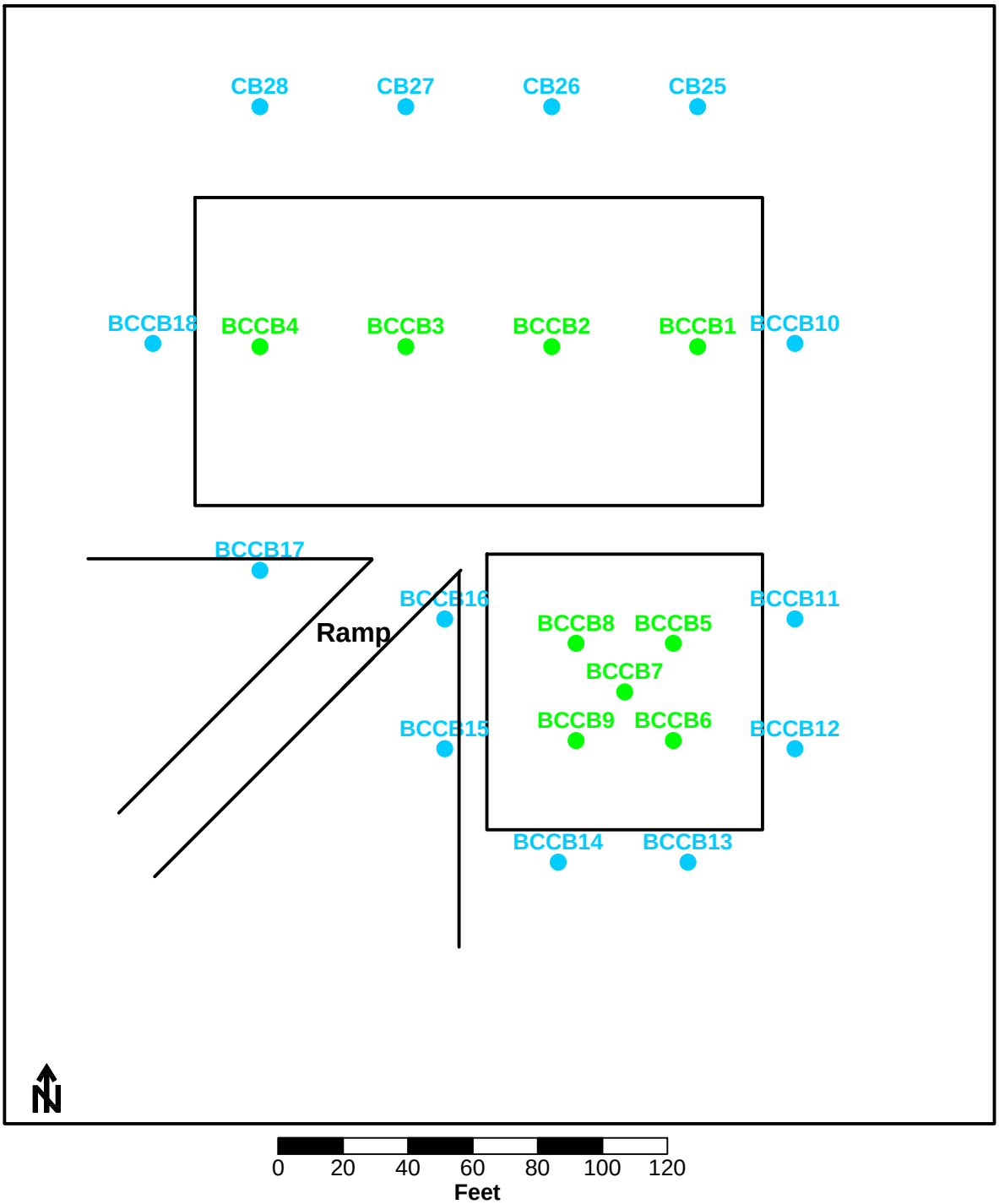
● Piezometer to Perched Groundwater

● 1995 Investigation ● 2007 Investigation

● 1998 Investigation ● 2009-2010 Investigation

Figure 8

Soil Boring Locations -- BCCB
Alamitos Generating Station



1997 Investigation

2007 Investigation

Figure 9

Soil Boring Locations -- South Basin
Alamitos Generating Station

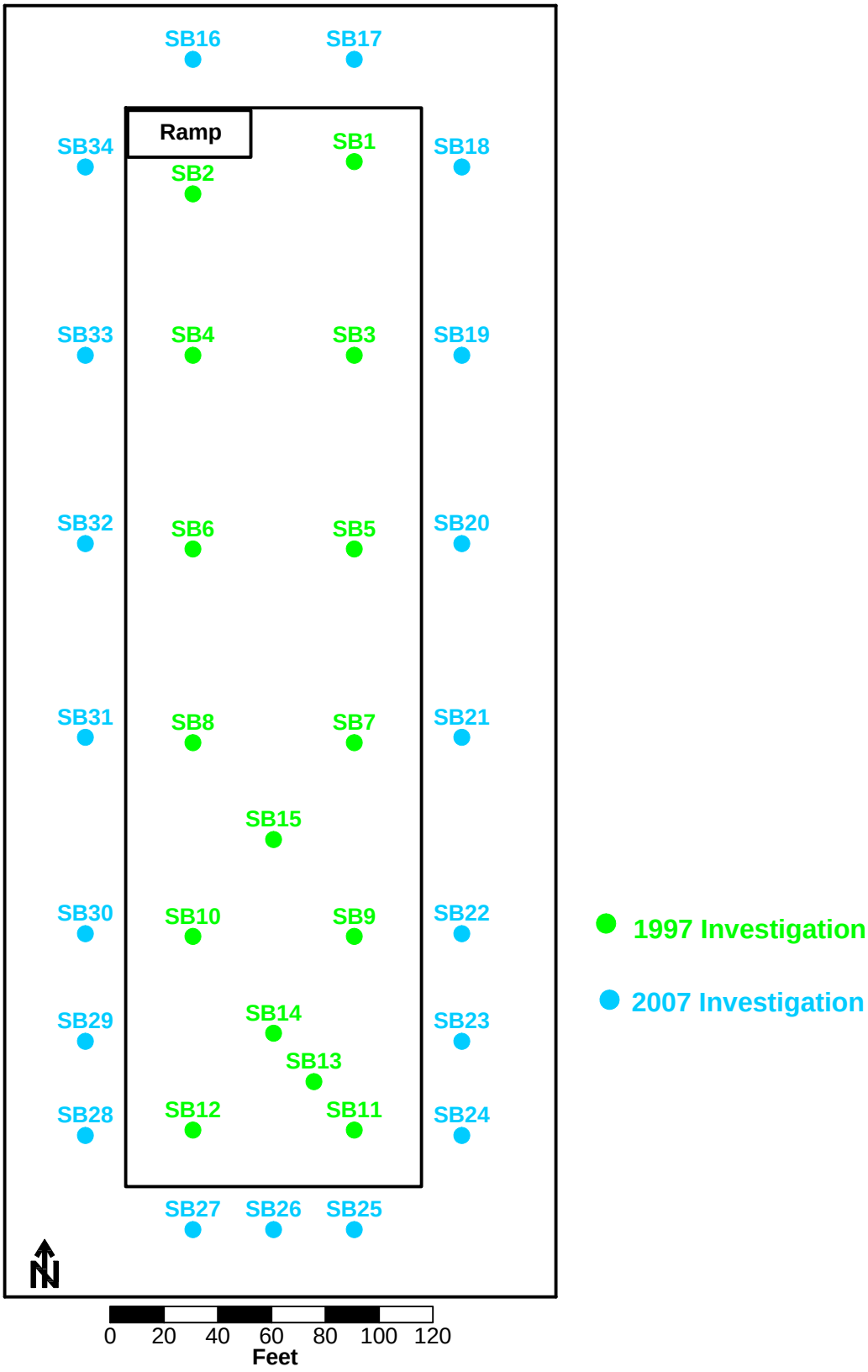
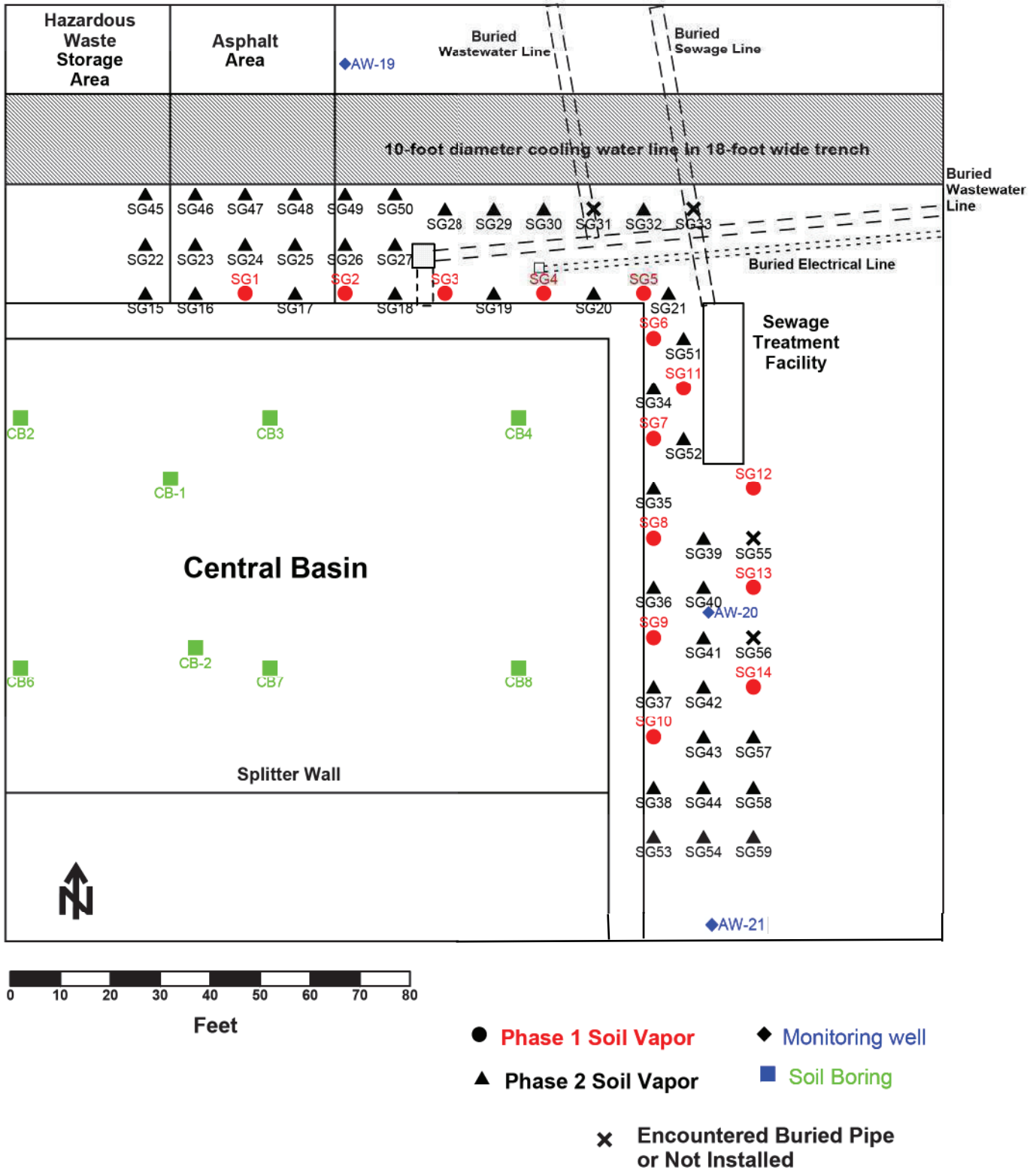


Figure 10

Soil Vapor Survey
Central Basin -- Alamitos



(Hamilton, 2000a)

Figure 11

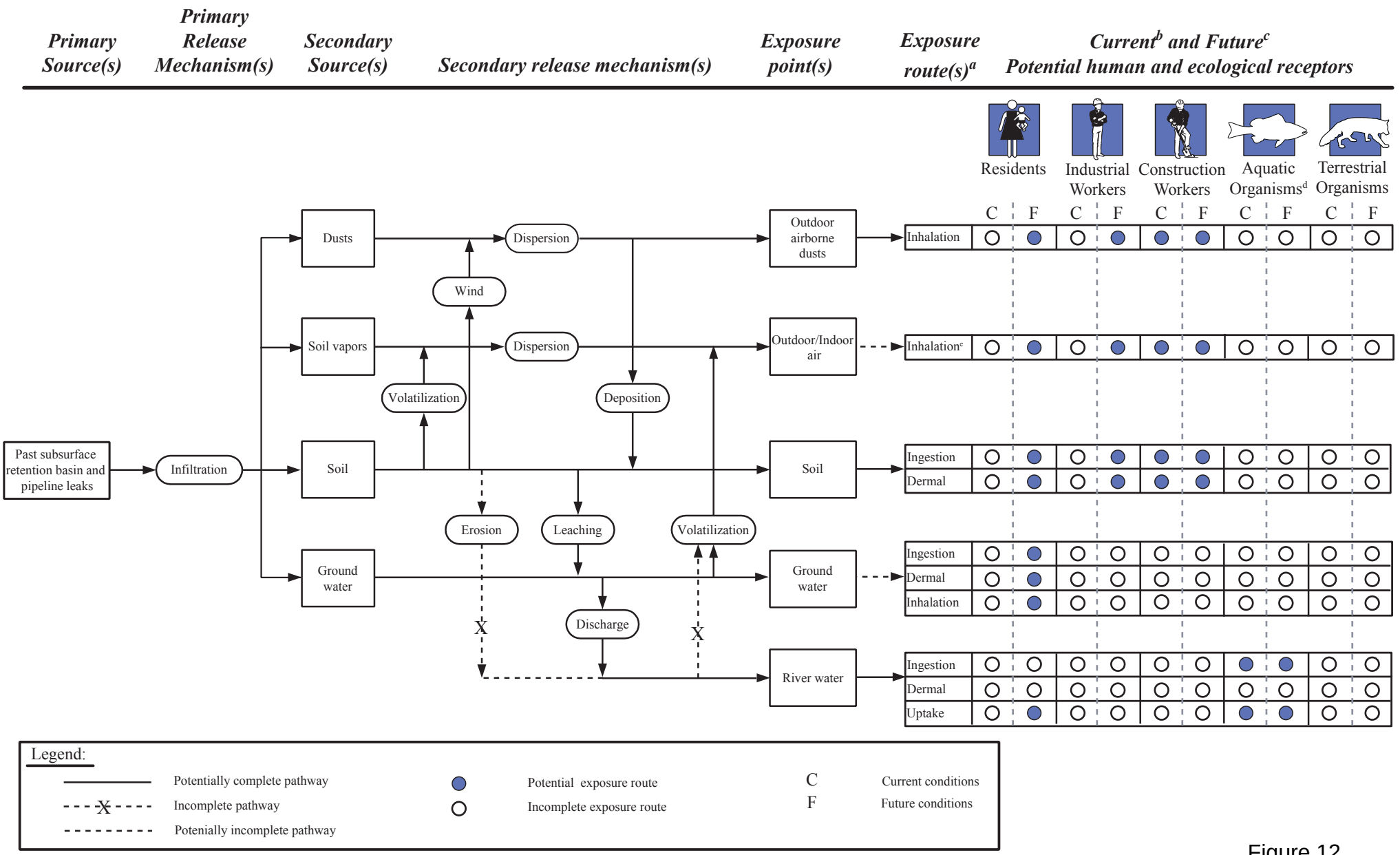


Figure 12

Notes:

a) Exposure routes were based on data available in 2011. Thus, future exposure routes may change depending on any additional data obtained.
b) Current receptor based on 2011 site conditions
c) Future receptor based on site conditions that could potentially exist after the generating station is decommissioned and removed.
d) Includes plankton, benthic invertebrates, epibenthic invertebrates, fish, and shorebirds.
e) Indoor air exposure for residents and industrial workers; outdoor air exposure for construction workers.

Human Health and Ecological Conceptual site model (CSM) for current and future site use based on current site conditions.

Appendices

Appendix A REPRESENTATIVE CHEMICAL ANALYSIS BOILER CHEMICAL CLEANING WASTE

TABLE 4.2-1

RESULTS[a] OF CHEMICAL ANALYSES OF BOILER CLEANING WASTES

Sample I.D.	STLC[b]	L-DCS-85-9F[c]	L-DCS-85-9FF[c]	L-DCS-85-9S[d]	L-DCS-85-9V[d]
Date Sampled:	--	5/15-16/85	7/20-21/85	6/3/85	7/5/85
Sb	15	0.002	<0.002	0.005	<0.002
As	5.0	0.008	<0.001	<0.001	<0.001
Ba	100	0.091	0.16	<0.012	0.023
Be	0.75	<0.004	<0.004	<0.004	<0.004
Cd	1.0	0.003	<0.003	<0.003	<0.003
Cr VI	5	<0.015	0.019	<0.015	0.017
Cr	560	0.25	1.3	0.65	3.3
Co	80	0.34	0.20	<0.026	0.12
Cu	25	114 [34][e]	52 [37][e]	0.008	<0.007
F	180	127	110	50	100
Pb	5.0	1.4	<0.002	<0.05	<0.002
Hg	0.2	0.0004	<0.0003	<0.0003	<0.0003
Mo	350	0.054	0.082	0.54	2.2
Ni	20	29 [29][e]	1.5	0.13	0.93
Se	1.0	<0.001	<0.001	<0.001	<0.001
Ag	5	0.012	<0.005	<0.005	<0.005
Ti	7.0	<0.005	<0.005	<0.005	<0.005
V	24	0.047	0.35	<0.015	0.19
Zn	250	17	16	0.066	0.38
Aldrin	0.14	ND (<0.02)	ND (<0.005)	ND (<0.001)	ND (<0.005)
Alpha-BHC	--	ND (<0.02)	ND (<0.005)	ND (<0.001)	ND (<0.005)
Beta-BHC	--	ND (<0.02)	ND (<0.005)	ND (<0.001)	ND (<0.005)
Delta-BHC	--	ND (<0.02)	ND (<0.005)	ND (<0.001)	ND (<0.005)
Gamma-BHC (Lindane)	0.4	ND (<0.02)	ND (<0.005)	ND (<0.001)	ND (<0.005)
Chlordane	0.25	ND (<0.04)	ND (<0.01)	ND (<0.002)	ND (<0.01)
p,p' DDD	0.1	ND (<0.02)	ND (<0.005)	ND (<0.001)	ND (<0.005)
p,p' DDE	0.1	ND (<0.02)	ND (<0.005)	ND (<0.001)	ND (<0.005)
p,p' DDT	0.1	ND (<0.02)	ND (<0.005)	ND (<0.001)	ND (<0.005)
2,4 - D	10	ND (<1.0)	ND (<0.1)	ND (<0.02)	ND (<0.01)
Dieldrin	0.8	ND (<0.02)	ND (<0.005)	ND (<0.001)	ND (<0.005)
Dioxin	0.001	ND (<0.002)	ND (<0.001)	ND (<0.001)	ND (<0.0005)
Endosulfan I(alpha)	--	ND (<0.02)	ND (<0.005)	ND (<0.001)	ND (<0.005)
Endosulfan II(beta)	--	ND (<0.02)	ND (<0.005)	ND (<0.001)	ND (<0.005)
Endosulfan sulfate	--	ND (<0.02)	ND (<0.005)	ND (<0.001)	ND (<0.005)
Endrin	0.02	ND (<0.02)	ND (<0.005)	ND (<0.001)	ND (<0.005)
Endrin Aldehyde	--	ND (<0.02)	ND (<0.005)	ND (<0.001)	ND (<0.005)
Heptachlor	0.47	ND (<0.02)	ND (<0.005)	ND (<0.001)	ND (<0.005)
Heptachlor Epoxide	--	ND (<0.02)	ND (<0.005)	ND (<0.001)	ND (<0.005)
Kepone	2.1	ND (<0.02)	ND (<0.005)	ND (<0.001)	ND (<0.005)
Pentachlorophenol	1.7	ND (<0.25)	ND (<0.02)	ND (<0.025)	ND (<0.2)
Toxaphene	0.5	ND (<0.1)	ND (<0.025)	ND (<0.005)	ND (<0.025)
Trichloroethylene	204	0.0005	NA	0.0021	ND (<0.0005)
2,4,5 - TP(Silvex)	1.0	ND (<0.2)	ND (<0.02)	ND (<0.004)	ND (<0.02)
2,4,5 - T(Acetic Acid)	--	ND (<0.2)	ND (<0.02)	ND (<0.004)	ND (<0.02)
Arochlor 1016	5.0	ND (<0.02)	ND (<0.005)	ND (<0.001)	ND (<0.005)
Arochlor 1221	5.0	ND (<0.04)	ND (<0.01)	ND (<0.002)	ND (<0.01)
Arochlor 1232	5.0	ND (<0.02)	ND (<0.005)	ND (<0.001)	ND (<0.005)
Arochlor 1242	5.0	ND (<0.02)	ND (<0.005)	ND (<0.001)	ND (<0.005)
Arochlor 1248	5.0	ND (<0.02)	ND (<0.005)	ND (<0.001)	ND (<0.005)
Arochlor 1254	5.0	ND (<0.02)	ND (<0.005)	ND (<0.001)	ND (<0.005)
Arochlor 1260	5.0	ND (<0.02)	ND (<0.005)	ND (<0.001)	ND (<0.005)

NA Not analyzed.
ND Not detected, detection limit in ( ).
a Results in milligrams/liter (mg/l).
b Soluble Threshold Limit Concentration (mg/l) from California Administrative Code Title 22, Division 4, Chapter 30, Article 11.
c Sample of boiler cleaning waste for drum-type boiler.
d Sample of boiler cleaning waste for once-through boiler.
e Results in [ ] are from WET analysis.

41.9S/1-T4.2-1

Source: Hydrogeologic Assessment Report, El Segundo Generating Station (Dames & Moore, 1986)

Appendix B OUTLINE OF POST-CLOSURE GROUNDWATER SAMPLING PROGRAM, ALAMITOS GENERATING STATION RETENTION BASIN SITE

APPENDIX B – OUTLINE OF POST-CLOSURE GROUNDWATER SAMPLING PROGRAM, ALAMITOS GENERATING STATION RETENTION BASIN SITE

Following are the monitoring goals for the post-closure groundwater sampling program, if required:

1. Verify that any groundwater contamination remains within the monitoring well network (**Figure 5**).
2. Determine the effectiveness of any remediation measures employed to meet closure performance standards.
3. Document clean conditions for three years after the groundwater concentrations reach acceptable levels.

In order to conduct the post-closure groundwater monitoring program, a Sampling and Analysis Plan that includes the following elements will be prepared:

1. Location, Purpose and Construction Details of New Monitoring Wells
2. Field Sampling Equipment
3. Sampling Protocol
    a. List of Wells to be Sampled Quarterly
    b. List of Wells to be Sampled Annually
    c. COC List
4. QA Procedures
5. Reporting

Appendix C BACKGROUND TECHNICAL REPORTS, ALAMITOS GENERATING STATION RETENTION BASIN SITE

Appendix C BACKGROUND TECHNICAL REPORTS, ALAMITOS GENERATING STATION RETENTION BASIN SITE

AES Alamitos, LLC. 2004. Renewal of Waste Discharge Requirements/NPDES Permit - AES Alamitos, LLC – Alamitos Generating Station Located at 690 North Studebaker Road, Long Beach. (Order No. 00-082, NPDES Permit No. CA 0001139). November 12, 2004.

California Regional Water Quality Control Board, Los Angeles Region (LARWQCB). 1994. Water Quality Control Plan, Los Angeles Region, Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties.

California Regional Water Quality Control Board, Los Angeles Region (LARWQCB). 1998. Resolution No. 98-018, Amendment to the Water Quality Control Plan to Incorporate Changes in Beneficial Use Designations for Selected Waters. November 2, 1998.

California Regional Water Quality Control Board, Los Angeles Region (LARWQCB). 2000. Order No. 00-082, NPDES No. CA0001139. Waste Discharge Requirements for AES Alamitos, L.L.C. (Alamitos Generating Station). June 29, 2000.

California Energy Commission. 2010. Status of All Projects. Available online at: http://www.energy.ca.gov/sitingcases/all_projects.html. November 8, 2010.

California Environmental Protection Agency (Cal EPA), Office of Environmental Health Hazard Assessment (OEHHA). 2011. Toxicity criteria database. On-line database available at http://www.oehha.org/risk/chemicalDB/index.asp

California Department of Education (CDE). 2011. California School Directory. Available online at: http://www.cde.ca.gov/re/sd/

Calscience Environmental Laboratories, Inc., 2010a. Analytical Report on AES Alamitos Basin Sludge. June 17, 2010.

Calscience Environmental Laboratories, Inc., 2010b. Analytical Report on AES Basin Sludge. July 12, 2010.

Dames and Moore. 1986. Hydrogeologic Assessment Report, Alamitos Generating Station. Report prepared for Southern California Edison. January 27, 1986.

Department of Toxic Substances Control (DTSC). 1992. Supplemental Guidance for Human Health Multimedia Risk Assessments of Hazardous Waste Sites and Permitted Facilities. Office of the Science Advisor, State of California Department of Toxic Substances Control, Sacramento, CA.

Department of Toxic Substances Control (DTSC). 1996. Guidance for Ecological Risk Assessment at Hazardous Waste Sites and Permitted Facilities. Part A: Overview.

Final. Office of Scientific Affairs, Human and Ecological Risk Section, California Environmental Protection Agency, Sacramento.

Department of Toxic Substances Control (DTSC), 1997. Selecting inorganic constituents as chemicals of potential concern at risk assessments at hazardous waste sites and permitted facilities. Final Policy - Human and Ecological Risk Division. DTSC. February. http://www.dtsc.ca.gov/ScienceTechnology/ftp/backgrnd.pdf.

Department of Toxic Substances Control (DTSC). 1999. Preliminary Endangerment Assessment: Guidance Manual. Second printing.

Department of Toxic Substances Control (DTSC). 2005. Human Health Risk Assessment (HHRA) Note 1. October 27, 2005.

Department of Toxic Substances Control (DTSC). 2006. Basic Elements of a Closure Plan for Surface Impoundments. April. http://www.dtsc.ca.gov/HazardousWaste/Permits/Permit Writers Closure TOC.cfm

Department of Toxic Substances Control (DTSC). 2008. Determination of a Southern California Regional Background Arsenic Concentration in Soil

Frary, M. and Mattar, R. 2010. Alamitos Barrier Project, Annual Report on the Control of Seawater Intrusion, 2009 -2010. Report prepared for Los Angeles Department of Public Works. 2010.

Hamilton, P. 1996. Water Quality Monitoring Program, Alamitos Generating Station. Report prepared for Southern California Edison Company. April 1996.

Hamilton, P. 1997. Well Construction Report, Alamitos Generating Station. Report prepared for Southern California Edison. April 18, 1997.

Hamilton, P. 2000a. Soil Vapor Investigation, Central Basin, Alamitos Generating Station. Report prepared for Southern California Edison Company. April 30, 2000.

Hamilton, P. 2000b. Sampling and Analysis Plan, Wastewater Basin Closure Project. Report prepared for Southern California Edison Company. August 2000.

Hamilton, P. 2005. Quarterly Sampling Report, Second Quarter 2005, Groundwater Evaluation Monitoring Program. Report prepared for Southern California Edison Company. August 30, 2005.

Hamilton, P. 2006. Work Plan for Monitoring Well Installation Phase 3, Alamitos Generating Station. Report prepared for Southern California Edison. August 3, 2006.

Hamilton, P. 2011. Annual Ground Water Monitoring Report, Groundwater Evaluation Monitoring Program with Fourth Quarter 2010 Sampling Data, Alamitos Generating Station. Report prepared for Southern California Edison Company. February 23, 2011.

Hamilton, P. Draft. Soil Characterization Report, Alamitos Generating Station, Retention Basin Site. Report prepared for Southern California Edison. Draft.

Komex, 2005. Final Draft Closure Demonstration Report for the Wastewater Retention Basin at the Long Beach Generating Station, Long Beach California. Report prepared for Southern California Edison. March 17, 2005.

Linares, M. 2011. AES Alamitos LLC; personal communication with R. Weidner, Southern California Edison Company, reporting that the South Basin was cleaned in 2008, and the removed material was characterized as non-hazardous. August, 2011.

Los Angeles County Department of Public Works (LACDPW). 2011. Sea Water Barriers. Available online at: http://ladpw.org/wrd/barriers.

Orange County Water District (OCWD). 1997. Geologist's Report, Alamitos Barrier Improvement Project, Construction Unit 12. December 30, 1997.

Southern California Edison (Edison). 1996. Sump Integrity Report. December 19, 1996.

Tidelines Inc., www.tidelines.com. 1996 Tide Calendar.

U.S. Environmental Protection Agency (USEPA). 1989. Risk Assessment Guidance for Superfund (RAGS). Human Health Evaluation Manual Part A. Office of Emergency and Remedial Response, Washington, D.C. U.S. EPA/540/1-89/002.

U.S. Environmental Protection Agency (USEPA). 1990. National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (Final Rule). 40 CFR Part 300: 55 Federal Register 8666.

U.S. Environmental Protection Agency (USEPA). 1991a. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors. Publication 9285.6-03.

U.S. Environmental Protection Agency (USEPA). 1991b. Risk Assessment Guidance for Superfund: Volume I--Human Health Evaluation Manual, Part B, Development of Risk-based Preliminary Remediation Goals. Office of Emergency and Remedial Response, Washington, D.C. Publication 9285.7-01B.

U.S. Environmental Protection Agency (USEPA). 1992. Supplemental Guidance to RAGS: Calculating the Concentration Term. Office of Emergency and Remedial Response. Publ. 9285.7-081.

U.S. Environmental Protection Agency (USEPA). 1996a. Soil Screening Guidance: Technical Background Document. Office of Emergency and Remedial Response, Washington, D.C. U.S. EPA/540/R-95/128.

U.S. Environmental Protection Agency (USEPA). 1996b. Soil screening guidance: user's guide. Office of Solid Waste and Emergency Response. EPA/540/R-95/018.

U.S. Environmental Protection Agency (USEPA). 1998. Guidelines for Ecological Risk Assessment. U.S. EPA/630/R-95/002F. Risk Assessment Forum, U.S. Environmental Protection Agency, Washington, D.C.

U.S. Environmental Protection Agency (USEPA). 2000. Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California; Rule. Federal Register, 40 CFR Part 131. May 18, 2000. Available online at: http://www.epa.gov/waterscience/standards/rules/ctr/

U.S. Environmental Protection Agency (USEPA). 2002a. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. Solid Waste and Emergency Response. OSWER 9355.4-24.

U.S. Environmental Protection Agency (USEPA). 2002b. Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites. Office of Emergency and Remedial Response. OSWER 9285.6-10. December.

U.S. Environmental Protection Agency (USEPA). 2003. Human Health Toxicity Values in Superfund Risk Assessments. Office of Solid Waste and Emergency Response. OSWER 9285.7-53.

U.S. Environmental Protection Agency (USEPA). 2004. Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). Office of Superfund Remediation and Technology Innovation. EPA/540/R/99/005, OSWER 9285.7-02EP, PB99-963312.

U.S. Environmental Protection Agency (USEPA). 2009. Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part F, Supplemental Guidance for Inhalation Risk Assessment). Office of Superfund Remediation and Technology Innovation. EPA-540-R-070-002, OSWER 9285.7-82. January 2009.

U.S. Environmental Protection Agency (USEPA). 2011a. Integrated Risk Information System (IRIS). On-line database available at: http://www.epa.gov/iris/

U.S. Environmental Protection Agency (USEPA). 2011b. Locational Reference Tables (LRT). On-line map available at: http://iaspub.epa.gov/enviro/lrt_viewer.map_page?sys_acrnm=PCS&sys_id=CA0001139

Appendix D CLOSURE COST ESTIMATE, ALAMITOS GENERATING STATION RETENTION BASIN SITE

Appendix D CLOSURE COST ESTIMATE, ALAMITOS GENERATING STATION RETENTION BASIN SITE

The attached Table D-1 outlines the closure activities and associated costs. These include preparation of the Closure Plan, completion of proposed site characterization activities (Sections **8** through **10**), initial statistical analysis and risk assessment, preparation of Work Implementation Plans, on-site decontamination and cleanup confirmation activities, preparation of the Closure Certification Report (including final statistical analysis and risk assessment), on-going groundwater monitoring during the closure process, and DTSC oversight. The estimate assumes the Closure Certification Report is finalized and approved by the end of 2014.

Table D-1

CLOSURE COST ESTIMATE
Alamitos Generating Station

(February 2011)

STEP #	CLOSURE ACTIVITY	COST ESTIMATE
1	CLOSURE PLAN PREPARATION	
	Draft Plan Preparation	$40,000
	DTSC Oversight	$25,000
2	CLOSURE ACTIVITIES	
	Soil Vapor Survey	$100,000
	Piping & Appurtenances Soil Investigation	$100,000
	Structure Decontamination & Confirmation Sampling	$50,000
	DTSC Oversight	$25,000
3	SOIL REMEDIATION Liner Removal & Repair, Oversight/Monitoring/Sampling Labor, Mobilization & Demobilization, Excavation & Stockpile, Waste Characterization, Confirmation Soil Samples, Backfill & Compaction, Transportation & Waste Disposal (est. 9,000 tons @ $120/ton, plus other costs)	
	Central Basin	$1,150,000
	South Basin	$95,000
	DTSC Oversight	$50,000
4	GROUNDWATER REMEDIATION	
	In-Situ Chemical Oxidation	
	Permitting	$5,000
	Phase 1 Injection	$200,000
	Phase 2 Injection	$200,000
	Monitoring (12 months)	$48,000
	DTSC Oversight	$20,000
5	CLOSURE CERTIFICATION REPORT	
	Statistical Analysis and Risk Assessment Report	$60,000
	Report Preparation	$75,000
	DTSC Oversight	$25,000
6	GROUNDWATER MONITORING	
	2011	$140,000
	2012	$140,000
	2013	$140,000
	2014 (approx. 20% reduction in monitoring)	$112,000
	2015	$112,000
	DTSC Oversight	$25,000
7	RCRA Facility Investigation	$400,000
	DTSC Oversight	$40,000
	SUBTOTAL	$3,377,000
8	CONTINGENCY (~10%)	$330,000
	TOTAL	$3,707,000

Appendix E EDISON FINANCIAL ASSURANCE DOCUMENT

SOUTHERN CALIFORNIA EDISON®
An EDISON INTERNATIONAL® Company

March 31, 2011

Director
Department of Toxic Substances Control
Financial Assurance Unit
8800 Cal Center Drive
Sacramento, California 95826-3200

Re: **Southern California Edison Company**
Financial Assurance Documents for Closure, Post-Closure and Liability

Southern California Edison Company (SCE) is submitting the following documentation supporting the use of a Financial Test and Corporate Guarantee to demonstrate financial assurance at the facilities listed below.

1. Letter from Chief Financial Officer
2. Corporate Guarantee for Closure or Post-Closure Care
3. Guarantee for Liability Coverage
4. Credit Ratings - Standard & Poors and Moody's
5. Excerpts from SCE's 2010 Annual Report:
    a. Report of Independent Registered Public Accounting Firm (pg. 44)
    b. Consolidated Statements of Income (pg. 45)
    c. Consolidated Balance Sheets (pgs. 46 - 47)
    d. Consolidated Statements of Cash Flows (pg. 48)
    e. Consolidated Statements of Changes in Common Shareholder's Equity (pg. 49)
6. Special Report of Independent Accountants
7. Tangible Net Worth Spreadsheet
8. Closure and/or Post-Closure Cost Estimates

The following facilities are owned and operated by SCE and are covered by this documentation.

1. San Onofre Nuclear Generating Station – EPA ID# CAD000630921
   Mixed Waste Storage Area
2. San Bernardino Generating Station – EPA ID#CAD000631150
   Boiler Chemical Cleaning Retention Basin

The following facilities are not owned by SCE but are also covered by this documentation. The current owners are AES Energy Corp., NRG Company, GenOn Energy Corp., Santa Barbara County, Santa Barbara Historical Museum and City of Colton. SCE retains the environmental liability associated with these facilities.

1. AES Alamitos Generating Station Retention Basin – EPA ID# CAD009694795
2. AES Huntington Beach Generating Station Retention Basin – EPA ID# CAD000631085
3. GenOn Cool Water Generating Station Retention Basin – EPA ID# CAD000630905
4. GenOn Etiwanda Generating Station Retention Basin – EPA ID# CAD079548574
5. GenOn Mandalay Generating Station Retention Basin – EPA ID# CAD000630913
6. GenOn Ormond Beach Generating Station Retention Basin – EPA ID# CAD000631036
7. NRG El Segundo Generating Station Retention Basin – EPA ID# CAD000630962
8. NRG Long Beach Generating Station Retention Basin – EPA ID# CAD000631143

2131 Walnut Grove Ave.
Rosemead, CA 91770

7. NRG El Segundo Generating Station Retention Basin – EPA ID# CAD000630962
8. NRG Long Beach Generating Station Retention Basin – EPA ID# CAD000631143
9. Santa Barbara I Manufactured Gas Plant Site – EPA ID# CAC002587830
10. Colton Manufactured Gas Plant Site – EPA ID# None

Should you have any questions or require additional information, please contact me directly at (626) 302-9711.

Sincerely,

S. L. Marsh Jr.

Stanley L. Marsh
Project Manager

Enclosures

Bcc: (w/ Enclosures)
Elaine Chan
Eric Hodder
Marc Luesebrink
Brian Metz
Randall Weidner
Tricia Young

Bcc: (w/o Enclosures)
John Butler
Robert Heckler
MaryJane Johnson
Josh Nichols
Richard Tom

SOUTHERN CALIFORNIA EDISON®

An EDISON INTERNATIONAL® Company

LETTER FROM CHIEF FINANCIAL OFFICER

Director, Department of Toxic Substances Control
Financial Assurance Unit
8800 Cal Center Drive
Sacramento, California 95826-3200

I am the Chief Financial Officer of Southern California Edison Company located at 2244 Walnut Grove Avenue, Rosemead, California, 91770. This letter is in support of the use of the Financial Test to demonstrate financial responsibility for Liability coverage and Closure and/or Post-Closure care as specified in California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8.

The firm identified above is the owner or operator of the following facilities/TTU for which liability coverage for sudden accidental occurrences is being demonstrated through the financial test specified in California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8, sections 66264.147 and 66265.147:

Facility	Location	EPA I.D. No.	Current Liability Coverage
San Onofre Nuclear Generating Station Mixed Waste Storage Area	5000 Pacific Coast Hwy San Clemente, CA 92672	CAD000630921	$2M
San Bernardino Generating Station Boiler Chemical Cleaning Retention Basin	25770 San Bernardino Ave. San Bernardino, CA 92410	CAD000631150	$2M

The firm identified above guarantees, through the guarantee specified in California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8, sections 66264.147 and 66265.147, liability coverage for sudden accidental occurrences at the following facilities/TTU owned or operated by the following:

Facility	Location	EPA I.D. No.	Current Liability Coverage
AES Alamitos Generating Station Owned by AES Energy Corp. Boiler Chemical Cleaning Retention Basin	690 N. Studebaker Rd. Long Beach, CA 90815	CAD009694795	$2M
GenOn Cool Water Generating Station Owned by GenOn Energy Corp. Boiler Chemical Cleaning Retention Basin	37000 Santa Fe Rd. Daggett, CA 92327	CAD000630905	$2M

NRG El Segundo Generating Station Owned by NRG Company Boiler Chemical Cleaning Retention Basin	301 Vista Del Mar El Segundo, CA 90245	CAD000630962	$2M
GenOn Etiwanda Generating Station Owned by GenOn Energy Corp. Boiler Chemical Cleaning Retention Basin	8996 Etiwanda Ave. Rancho Cucamonga, CA 91739	CAD079548574	$2M
AES Huntington Beach Generating Station Owned by AES Energy Corp. Boiler Chemical Cleaning Retention Basin	21730 Newland Ave. Huntington Beach, CA 92646	CAD000631085	$2M
NRG Long Beach Generating Station Owned by NRG Company Boiler Chemical Cleaning Retention Basin	2665 W. Seaside Blvd. Long Beach, CA 90802	CAD000631143	$2M
GenOn Mandalay Generating Station Owned by GenOn Energy Corp. Boiler Chemical Cleaning Retention Basin	373 N. Harbor Blvd. Oxnard, CA 93030	CAD000630913	$2M
GenOn Ormond Beach Generating Station Owned by GenOn Energy Corp. Boiler Chemical Cleaning Retention Basin	6635 S. Edison Dr. Oxnard, CA 93030	CAD000631036	$2M

The firm identified above is engaged in the following substantial business relationships with the owners or operators listed above, AES Energy Corp., NRG Company, and GenOn Energy Corp. receiving the following value in consideration of the guarantee:

> Southern California Edison Co. divested the above named generating stations to their new owners in 1998. All environmental liabilities associated with the Boiler Chemical Cleaning Retention Basins located at these facilities were, however, retained by Southern California Edison Co. as agreed to in the contracts for sale with their respective buyers. This arrangement does not stipulate receiving value in consideration of this guarantee.

1. The firm identified above is the owner or operator of the following facilities/TTUs for which financial assurance for closure and/or post-closure or liability coverage is demonstrated through the financial test as specified in California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8, section 66264.143, subsection (f), section 66264.145, subsection (f), section 66265.143, subsection (e), and section 66265.145, subsection (e). The current closure and/or post-closure cost estimates covered by the test are shown for each facility/TTU:

Facility Name and Address	Closure Estimate	Post-closure Estimate	Liability
San Onofre Nuclear Generating Station 5000 Pacific Coast Highway San Clemente, CA 92672 Mixed Waste Storage Area	$6,158,767	None	$2M
San Bernardino Generating Station 25770 San Bernardino Ave. San Bernardino, CA 92410 Boiler Chemical Cleaning Retention Basin	$145,000	None	$2M
Subtotal (Para. 1)	$6,303,767	None	$4M

2. The firm identified above guarantees through the guarantee as specified in California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8, section 66264.143, subsection (f), section 66264.145, subsection (f), section 66265.143, subsection (e), and section 66265.145, subsection (e), the closure and/or post-closure care or liability coverage of the following facilities/TTUs owned or operated by the guaranteed party. The current cost estimates for the closure or post-closure care so guaranteed are shown for each facility/TTU:

Facility Name and Address	Closure Estimate	Post-closure Estimate	Liability
AES Alamitos Generating Station Owned by AES Energy Corp. 690 N. Studebaker Rd. Long Beach, CA 90815 Boiler Chemical Cleaning Retention Basin	$3,707,000	TBD	$2M
GenOn Cool Water Generating Station Owned by GenOn Energy Corp. 37000 Santa Fe Rd. Daggett, CA 92327 Boiler Chemical Cleaning Retention Basin	$250,000	TBD	$2M
NRG El Segundo Generating Station Owned by NRG Company 301 Vista Del Mar El Segundo, CA 90245 Boiler Chemical Cleaning Retention Basin	$1,390,000	TBD	$2M
GenOn Etiwanda Generating Station Owned by GenOn Energy Corp. 8996 Etiwanda Ave. Rancho Cucamonga, CA 91739 Boiler Chemical Cleaning Retention Basin	$490,000	TBD	$2M

AES Huntington Beach Generating Station Owned by AES Energy Corp. 21730 Newland Ave. Huntington Beach, CA 92646 Boiler Chemical Cleaning Retention Basin	$1,460,000	TBD	$2M
NRG Long Beach Generating Station Owned by NRG Company 2665 W. Seaside Blvd. Long Beach, CA 90802 Boiler Chemical Cleaning Retention Basin	$305,000	TBD	$2M
GenOn Mandalay Generating Station Owned by GenOn Energy Corp. 373 N. Harbor Blvd. Oxnard, CA 93030 Boiler Chemical Cleaning Retention Basin	$1,788,000	TBD	$2M
GenOn Ormond Beach Generating Station Owned by GenOn Energy Corp. 6635 S. Edison Dr. Oxnard, CA 93030 Boiler Chemical Cleaning Retention Basin	$1,366,000	TBD	$2M
Subtotal (Para. 2)	$10,756,000	TBD	$16M

3. In states where the U.S. Environmental Protection Agency is not administering the financial requirements of subpart H of title 40 CFR parts 264 and 265, this firm as owner, operator or guarantor is demonstrating financial assurance for the closure or post-closure care of the following facilities/TTUs through the use of a financial test equivalent or substantially equivalent to the financial test specified in California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8, section 66264.143, subsection (f), section 66264.145, subsection (f), section 66265.143, subsection (e), and section 66265.145, subsection (e). The current closure and/or post-closure cost estimates covered by such a test are shown for each facility/TT:

Site Name and Address	EPA ID Number	Post-Closure Operation & Maint.
Santa Barbara I Manufactured Gas Plant Site 136 E. DelaGuerra St. Santa Barbara, CA 93191	CAC002587830	$705,856
Colton Manufactured Gas Plant Site 160 S. 10th St. Colton, CA 92324	None	$274,070
Subtotal (Para. 3)		$979,926

4. The firm identified above is the owner or operator of the following facilities/TTUs for which financial assurance for closure or, if a disposal facility, post-closure care, is not demonstrated

either to U.S. Environmental Protection Agency or a State through the financial test or any other financial assurance mechanism as specified in California Code of Regulations, title 22, division 4.5, chapters 14 and 15, article 8 or equivalent or substantially equivalent State mechanisms. The current closure and/or post-closure cost estimates not covered by such financial assurance are shown for each facility/TTU:

None

5. The firm is the owner or operator or guarantor of the following Underground Injection Control facilities for which financial assurance for plugging and abandonment is required under 40 CFR part 144 and is assured through a financial test. The current closure cost estimates as specified in 40 CFR144.62 are shown for each facility:

None

The firm is required to file a form 10-K with the Securities and Exchange Commission (SEC) for the latest fiscal year.

The fiscal year of this firm ends on December 31. The figures for the following items marked with an asterisk are derived from this firm's independently audited, year-end financial statements for the latest completed fiscal year, ended December 31, 2010.

This firm is using Part B, Alternative II for Closure or Post-Closure Care and Liability Coverage.

PART B

ALTERNATIVE II

1. ..... Sum of current Closure and Post-Closure cost estimates (Total of all cost estimates shown in the paragraphs of the letter to the Director of the Department of Toxic Substances Control) .....$ 18,039,693

2. ..... Amount of annual aggregate liability coverage to be demonstrated...$ 20,000,000

3. ..... Sum of lines 1 and 2.....$38,039,693

4. Current bond rating (Senior secured) of most recent issuance and name of rating service:
..... S&P: A Moody's: A1

5. ..... Date of issuance of bond	Series 2008A	January 22, 2008
.....	Series 2008B	August 18, 2008
.....	Series 2008C	October 15, 2008
.....	Series 2009A	March 20, 2009
.....	Series 2009B	March 20, 2009
.....	Series 2010A	March 11, 2010
.....	Series 2010B	August 30, 2010
6 ..... Date of maturity of bond	Series 2008A	February 1, 2038
.....	Series 2008B	August 15, 2018
.....	Series 2008C	March 15, 2014
.....	Series 2009A	March 15, 2039
.....	Series 2009B	September 15, 2014
.....	Series 2010A	March 15, 2040
.....	Series 2010B	September 1, 2040

*7. ..... Tangible net worth (if any portion of the closure and post closure cost estimates is included in "total liabilities" on your firm's financial statements, you may add the amount of that portion to this line.) $ 8,306,000,000

*8. ..... Total assets in the United States (required only if less than 90 percent of firm's assets are located in the United States). ..... $ N/A

9. ..... Is line 7 at least $10 million?.....☒ Yes ☐ No

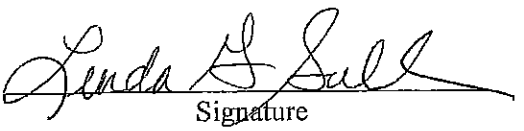
10. ..... Is line 7 at least 6 times line 3?.....☒ Yes ☐ No

*11. ..... Are at least 90 percent of the firm's assets located in the United States? If not, complete line 12.....☒ Yes ☐ No

12. ..... Is line 8 at least 6 times line 3?.....☒ Yes ☐ No

..... I hereby certify that the wording of this letter is identical to the wording as specified in California Code of Regulations, title 22, section 66264.151, subsection (g) and is being executed

in accordance with the requirements of California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8.



Signature

Date: 3/31/11

LINDA G. SULLIVAN, Senior Vice President and Chief Financial Officer

CORPORATE GUARANTEE FOR CLOSURE OR POSTCLOSURE CARE

Department of Toxic Substances Control
Financial Responsibility Section
8800 Cal Center Drive
Sacramento, California 95826

Guarantee made this March 31, 2011 by Southern California Edison Company, a business corporation organized under the laws of the State of California, herein referred to as guarantor, to the Department of Toxic Substances Control (DTSC), obligee, on behalf of our subsidiaries:

San Onofre Nuclear Generating Station	5000 Pacific Coast Highway, San Clemente, CA 92672
San Bernardino Generating Station	25770 San Bernardino Ave., San Bernardino, CA 92410
AES Energy Corp.	690 N. Studebaker Rd., Long Beach, CA 90815 21730 Newland Ave., Huntington Beach, CA 92646
GenOn Energy Corp.	373 N. Harbor Blvd., Oxnard, CA 93030 6635 S. Edison Dr., Oxnard, CA 93030 37000 Santa Fe Rd., Daggett, CA 92327 8996 Etiwanda Ave., Rancho Cucamonga, CA 91739
NRG Company	391 Vista Del Mar, El Segundo, CA 90245 2665 W. Seaside Blvd., Long Beach, CA 90802
Santa Barbara I Manufactured Gas Plant Site	136 E. DelaGuerra St., Santa Barbara, CA 93191
Colton Manufactured Gas Plant Site	160 S. 10th St., Colton, CA 92324

This guarantee is made on behalf of the San Onofre Nuclear Generating Station, San Bernardino Generating Station, AES Energy Corp., NRG Company, GenOn Energy Corp., Santa Barbara County, Santa Barbara Historical Museum and City of Colton which are entities with which the guarantor has a substantial business relationship as defined in California Code of Regulations, title 22, division 4.5, chapter 10, article 2, section 66260.10 to the DTSC.

RECITALS

1. Guarantor meets or exceeds the financial test criteria and agrees to comply with the reporting requirements for guarantors as specified in California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8, section 66264.143, subsection (f), section 66264.145, subsection (f), section 66265.143, subsection (e), and section 66265.145, subsection (e).

2. San Onofre Nuclear Generating Station, San Bernardino Generating Station, AES Energy Corp. NRG Company, GenOn Energy Corp., Santa Barbara County, Santa Barbara Historical

Museum and City of Colton own at least 50 percent of the voting stock of and/or operates the following hazardous waste management facility(ies)/transportable treatment unit(s) (TTU) covered by this guarantee:

Facility Name and Address	EPA ID Number	Closure Cost Estimate	Post-Closure Cost Estimate
San Onofre Nuclear Generating Station Owned by Southern California Edison Co. 5000 Pacific Coast Highway San Clemente, CA 92672 Mixed Waste Storage Area	CAD000630921	$6,158,767	None
San Bernardino Generating Station Owned by Southern California Edison Co. 25770 San Bernardino Ave. San Bernardino, CA 92410 Boiler Chemical Cleaning Retention Basin	CAD000631150	$145,000	None
AES Alamitos Generating Station Owned by AES Energy Corp. 690 N. Studebaker Rd. Long Beach, CA 90815 Boiler Chemical Cleaning Retention Basin	CAD009694795	$3,707,000	TBD
GenOn Cool Water Generating Station Owned by GenOn Energy Corp. 37000 Santa Fe Rd., Daggett, CA 92327 Boiler Chemical Cleaning Retention Basin	CAD000630905	$250,000	TBD
NRG El Segundo Generating Station Owned by NRG Company 301 Vista Del Mar, El Segundo, CA 90245 Boiler Chemical Cleaning Retention Basin	CAD000630962	$1,390,000	TBD
GenOn Etiwanda Generating Station Owned by GenOn Energy Corp. 8996 Etiwanda Ave. Rancho Cucamonga, CA 91739 Boiler Chemical Cleaning Retention Basin	CAD079548574	$490,000	TBD
AES Huntington Beach Generating Station Owned by AES Energy Corp. 21730 Newland Ave. Huntington Beach, CA 92646 Boiler Chemical Cleaning Retention Basin	CAD000631085	$1,460,000	TBD

NRG Long Beach Generating Station Owned by NRG Company 2665 W. Seaside Blvd., Long Beach, CA 90802 Boiler Chemical Cleaning Retention Basin	CAD000631143	$305,000	TBD
GenOn Mandalay Generating Station Owned by Gen On Energy Corp. 373 N. Harbor Blvd., Oxnard, CA 93030 Boiler Chemical Cleaning Retention Basin	CAD000630913	$1,788,000	TBD
GenOn Ormond Beach Generating Station Owned by GenOn Energy Corp. 6635 S. Edison Dr., Oxnard, CA 93030 Boiler Chemical Cleaning Retention Basin	CAD000631036	$1,366,000	TBD
Santa Barbara I Manufactured Gas Plant Site Owned by Santa Barbara County and Santa Barbara Historical Museum 136 E. DelaGuerra St., Santa Barbara, CA 93191	CAC002587830	None	$705,856
Colton Manufactured Gas Plant Site Owned by City of Colton 160 S. 10th St., Colton, CA 92324	None	None	$274,070

3. "Closure plans" and "post-closure plans" as used below refer to the plans maintained as required by California Code of Regulations, title 22, division 4.5, chapters 14 and 15, article 7, for the closure and post-closure care of facilities/TTU(s) as identified above.

4. For value received from San Onofre Nuclear Generating Station, San Bernardino Generating Station, AES Energy Corp., NRG Company, GenOn Energy Corp., Santa Barbara County, Santa Barbara Historical Museum and City of Colton, Guarantor guarantees to DTSC that in the event that San Onofre Nuclear Generating Station, San Bernardino Generating Station, AES Energy Corp., NRG Company, GenOn Energy Corp., Santa Barbara County, Santa Barbara Historical Museum and City of Colton fails to perform closure care of the above facility(ies)/TTUs in accordance with the closure or post-closure plans and other permit or interim status requirements whenever required to do so, the guarantor shall do so or establish a trust fund as specified in California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8, as applicable, in the name of San Onofre Nuclear Generating Station, San Bernardino Generating station, AES Energy Corp., NRG Company, GenOn Energy Corp., Santa Barbara County, Santa Barbara Historical Museum and City of Colton in the amount of the current closure or post-closure cost estimates as specified in California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8.

5. Guarantor agrees that if, at any time during or at the end of any fiscal year before the termination of this guarantee, the guarantor fails to meet the financial test criteria, guarantor shall send within 90 days, by certified mail, notice to DTSC and to San Onofre Nuclear Generating Station, San Bernardino Generating Station, AES Energy Corp., NRG Company, GenOn Energy Corp., Santa Barbara County, Santa Barbara Historical Museum and City of Colton that he or she intends to provide alternate financial assurance as specified in California Code of Regulations, title 22, division

4.5, chapter 14 and 15, article 8 as applicable, in the names of San Onofre Nuclear Generating Station, San Bernardino Generating Station, AES Energy Corp., NRG Company, GenOn Energy Corp., Santa Barbara County, Santa Barbara Historical Museum and City of Colton. Within 120 days after the end of such fiscal year or other occurrence, the guarantor shall establish such alternate financial assurance unless San Onofre Nuclear Generating Station, San Bernardino Generating Station, AES Energy Corp., NRG Company, GenOn Energy Corp., Santa Barbara County, Santa Barbara Historical Museum and City of Colton have done so.

6. The guarantor agrees to notify DTSC by certified mail of a voluntary or involuntary proceeding under Title 11 (Bankruptcy), United States Code, naming guarantor as debtor within ten (10) days after commencement of the proceeding.

7. Guarantor agrees that within 30 days after being notified by DTSC of a determination that guarantor no longer meets the financial test criteria or that he or she is disallowed from continuing as a guarantor of closure or post-closure care, he or she shall establish alternate financial assurance as specified in California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8, as applicable, in the names of San Onofre Nuclear Generating Station, San Bernardino Generating Station, AES Energy Corp., NRG Company, GenOn Energy Corp., Santa Barbara County, Santa Barbara Historical Museum and City of Colton unless San Onofre Nuclear Generating Station, San Bernardino Generating Station, AES Energy Corp., NRG Company, GenOn Energy Corp., Santa Barbara County, Santa Barbara Historical Museum and City of Colton have done so.

8. Guarantor agrees to remain bound under this guarantee notwithstanding any or all of the following: amendment or modification of the closure or post-closure plan, amendment or modification of the permit, the extension or reduction of the time of performance of closure or post-closure, or any other modification or alteration of an obligation of the owner or operator pursuant to California Code of Regulations, title 22, division 4.5.

9. Guarantor agrees to remain bound under this guarantee for as long as San Onofre Nuclear Generating Station, San Bernardino Generating Station, AES Energy Corp., NRG Company, GenOn Energy Corp., Santa Barbara County, Santa Barbara Historical Museum and City of Colton shall comply with the applicable financial assurance requirements of California Code of Regulations, title 22, division 4.5 for the above listed facilities/TTUs, except as provided in paragraph 10 of this agreement.

10. Guarantor may terminate this guarantee 120 days following the receipt of notification, through either registered of certified mail, by DTSC and by San Onofre Nuclear Generating Station, San Bernardino Generating Station, AES Energy Corp., NRG Company, GenOn Energy Corp., Santa Barbara County, Santa Barbara Historical Museum and City of Colton.

11. Guarantor agrees that if San Onofre Nuclear Generating Station, San Bernardino Generating Station, AES Energy Corp., NRG Company, GenOn Energy Corp., Santa Barbara County, Santa Barbara Historical Museum and City of Colton fails to provide alternate financial assurance as specified in California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8, as applicable, and obtain written approval of such assurance from DTSC within 90 days after a notice of cancellation by the guarantor is received by DTSC from guarantor, guarantor shall provide such alternate financial assurance in the names of San Onofre Nuclear Generating Station, San Bernardino Generating Station, AES Energy Corp., NRG Company, GenOn Energy Corp., Santa Barbara County, Santa Barbara Historical Museum and City of Colton.

12. Guarantor expressly waives notice of acceptance of this guarantee by DTSC or by San Onofre Nuclear Generating Station, San Bernardino Generating Station, AES Energy Corp., NRG Company, GenOn Energy Corp., Santa Barbara County, Santa Barbara Historical Museum and City of Colton. Guarantor also expressly waives notice of amendments or modifications of the closure and/or post-closure plan and of amendments or modifications of the facility/TTU permit(s).

The parties hereby certify that the wording of this guarantee is identical to the wording specified in California Code of Regulations, title 22, section 66264.151, subsection (h)(1) and is being executed in accordance with the requirements of California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8.

Effective date: 3/31/2011

Southern California Edison

Signature

LINDA G. SULLIVAN
Senior Vice President and Chief Financial Officer

Signature of witness or notary:

ANN M. DAVEY
Commission # 1848919
Notary Public - California
Los Angeles County
My Comm. Expires Jun 9, 2013

GUARANTEE FOR LIABILITY COVERAGE

Department of Toxic Substances Control
Financial Responsibility Section
8800 Cal Center Drive
Sacramento, California 95826

Guarantee made by March 31, 2011 by Southern California Edison Company a business corporation organized under the laws of the State of California, herein referred to a guarantor. This guarantee is made on behalf of San Onofre Nuclear Generating Station, at 5000 Pacific Coast Highway, San Clemente, CA 92672 and San Bernardino Generating Station at 25770 San Bernardino Ave, San Bernardino, CA 92410; subsidiaries of guarantor. and AES Energy Corp., at 690 N. Studebaker Rd., Long Beach, CA 90815, and 21730 Newland Ave., Huntington Beach, CA 92646; GenOn Energy Corp., at 37000 Santa Fe Rd., Daggett, CA 92327, 8996 Etiwanda Ave., Rancho Cucamonga, CA 91739, 373 N. Harbor Blvd., Oxnard, California 93030, and 6635 S. Edison Dr., Oxnard, CA 93030; and NRG Company at 301 Vista Del Mar, El Segundo, CA 90245 and Long Beach Generating Station at 2665 W. Seaside Blvd., Long Beach, CA 90802; which are entities with which guarantor has a substantial business relationships, as defined in California Code of Regulations, title 22, division 4.5, chapter 10, article 2, section 66260.10, to any and all third parties who have sustained or may sustain bodily injury or property damage caused by sudden accidental occurrences arising from operation of the facility(ies)/transportable treatment unit(s) (TTU) covered by this guarantee.

RECITALS

1. Guarantor meets or exceeds the financial test criteria and agrees to comply with the reporting requirements for guarantors as specified in California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8, sections 66264.147 and 66265.147.

2. San Onofre Nuclear Generating Station owns or operates the following hazardous waste management facility covered by this guarantee:

EPA Identification Number:	CAD000630921
Name:	San Onofre Nuclear Generating Station Mixed Waste Storage Area
Address:	5000 Pacific Coast Highway San Clemente, CA 92672

San Bernardino Generating Station owns or operates the following Boiler Chemical Cleaning Retention Basin facility covered by this guarantee:

EPA Identification Number:	CAD000631150
Name:	San Bernardino Generating Station Boiler Chemical Cleaning Retention Basin
Address:	25770 San Bernardino Ave. San Bernardino, CA 92410

AES Energy Corp. owns or operates the following hazardous waste management facility(ies)/TTU(s) covered by this guarantee:

EPA Identification Number:	CAD009694795
Name:	AES Alamitos Generating Station Boiler Chemical Cleaning Retention Basin
Address:	690 N. Studebaker Rd. Long Beach, CA 90815

EPA Identification Number:	CAD000631085
Name:	AES Huntington Beach Generating Station Boiler Chemical Cleaning Retention Basin
Address:	21730 Newland Ave. Huntington Beach, CA 92646

GenOn Energy Corp. owns or operates the following hazardous waste management facility(ies)/TTU(s) covered by this guarantee

EPA Identification Number:	CAD000630905
Name:	GenOn Cool Water Generating Station Boiler Chemical Cleaning Retention Basin
Address:	37000 Santa Fe Rd. Daggett, CA 92327

EPA Identification Number:	CAD079548574
Name:	GenOn Etiwanda Generating Station Boiler Chemical Cleaning Retention Basin
Address:	8996 Etiwanda Ave. Rancho Cucamonga, CA 91739

EPA Identification Number:	CAD000630913
Name:	GenOn Mandalay Generating Station Boiler Chemical Cleaning Retention Basin
Address:	373 N. Harbor Blvd. Oxnard, CA 93030

EPA Identification Number:	CAD000631036
Name:	GenOn Ormond Beach Generating Station Boiler Chemical Cleaning Retention Basin
Address:	6635 S. Edison Dr. Oxnard, California 93030

NRG Company owns or operates the following hazardous waste management facility(ies)/TTU(s) covered by this guarantee

EPA Identification Number:	CAD000630962
Name:	NRG El Segundo Generating Station Boiler Chemical Cleaning Retention Basin
Address:	301 Vista Del Mar El Segundo, CA 90245

EPA Identification Number:	CAD000631143
Name:	NRG Long Beach Generating Station Boiler Chemical Cleaning Retention Basin
Address:	2665 W. Seaside Blvd. Long Beach, CA 90802

This corporate guarantee satisfies California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8, third-party liability requirements for sudden accidental occurrences in the above-named owner or operator facility(ies)/TTU(s) for coverage in the amount of $1,000,000 per facility/TTU per occurrence and $2,000,000 annual aggregate.

3. For value received from San Onofre Nuclear Generating Station, San Bernardino Generating Station, AES Energy Corp., GenOn Energy Corp., and NRG Company, guarantors guarantee to any and all third parties who have sustained or may sustain bodily injury or property damage caused by sudden accidental occurrences arising from operations of the facilities/TTU(s) covered by this guarantee that in the event that San Onofre Nuclear Generating Station, San Bernardino Generating Station, AES Energy Corporation, GenOn Energy Corp., and NRG Company fails to satisfy a judgement or award based on a determination of liability for bodily injury or property damage to third parties caused by sudden accidental occurrences, arising from the operation of the above-named facility(ies)/TTU(s), or fails to pay an amount agreed to in settlement of a claim arising from or alleged to arise from such injury or damage, the guarantor will satisfy such judgement(s), awards(s), or settlement agreement(s) up to the limits of the coverage identified above.

4. Such obligation does not apply to the following:

(a) Bodily injury or property damage for which San Onofre Nuclear Generating Station, San Bernardino Generating Station, AES Energy Corp., GenOn Energy Corp., and NRG Company is obligated to pay damages by reason of the assumption of liability in a contract or agreement. This exclusion does not apply to liability for damages that San Onofre Nuclear Generating Station, San Bernardino Generating Station, AES Energy Corp., GenOn Energy Corp., and NRG Company would be obligated to pay in the absence of the contract or agreement.

(b) Any obligation of San Onofre Nuclear Generating Station, San Bernardino Generating Station, AES Energy Corp., GenOn Energy Corp., and NRG Company, and under a workers' compensation, disability benefits, or unemployment compensation law or any similar laws.

(c) Bodily injury to:

(1) An employee of San Onofre Nuclear Generating Station, San Bernardino Generating Station, AES Energy Corp., GenOn Energy Corp., and NRG Company, arising from, and in the course of, employment by San Onofre Nuclear Generating Station, San Bernardino Generating Station, AES Energy Corp., GenOn Energy Corp., and NRG Company, or

(2) The spouse, child, parent, brother, or sister of that employee as a consequence of, or arising from, and in the course of employment by San Onofre Nuclear Generating Station, San Bernardino Generating Station, AES Energy Corp, GenOn Energy Corp., and NRG Company. This exclusion applies:

(A) Whether San Onofre Nuclear Generating Station, San Bernardino Generating Station, AES Energy Corp., GenOn Energy Corp., and NRG Company may be liable as an employer or in any other capacity; and

(B) To any obligation to share damages with or repay another person who shall pay damages because of the injury to persons identified in paragraphs (A) and (B).

(d) Bodily injury or property damages arising out of the ownership, maintenance, use, or entrustment to others of any aircraft, motor vehicle, or watercraft.
(e) Property damage to:
(1) Any property owned, rented, or occupied by San Onofre Nuclear Generating Station, San Bernardino Generating Station, AES Energy Corp., GenOn Energy Corp., and NRG Company,
(2) Premises that are sold, given away, or abandoned by San Onofre Nuclear Generating Station, San Bernardino Generating Station, AES Energy Corp., GenOn Energy Corp., and NRG Company, if the property damage arises out of any part of those premises;
(3) Property loaned to San Onofre Nuclear Generating Station, San Bernardino Generating Station AES Energy Corp., GenOn Energy Corp., and NRG Company;
(4) Personal property in the care, custody, or control of San Onofre Nuclear Generating Station, San Bernardino Generating Station, AES Energy Corp., GenOn Energy Corp., and NRG Company:
(5) That particular part of real property on which the San Onofre Nuclear Generating Station, San Bernardino Generating Station, AES Energy Corp., GenOn Energy Corp., and NRG Company, or any contractor or subcontractors working directly or indirectly on behalf of the San Onofre Nuclear Generating Station, San Bernardino Generating Station. AES Energy Corp., GenOn Energy Corp. and NRG Company, are performing operations, if the property damage arises out of these operations.

5. Guarantor agrees that if, at any time during or at the end of any fiscal year before termination of this guarantee, the guarantor fails to meet the financial test criteria, guarantor shall send within ninety (90) days, by certified mail, notice to the Department of Toxic Substances Control (DTSC) and to San Onofre Nuclear Generating Station, San Bernardino Generating Station, AES Energy Corp., GenOn Energy Corp., and NRG Company, that he or she intends to provide alternate liability coverage as specified in California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8, sections 66264.147 and 66265.147, as applicable, in the name of San Onofre Nuclear Generating Station, San Bernardino Generating Station, AES Energy Corp., GenOn Energy Corp., and NRG Company. Within 90 days after the end of such fiscal year, the guarantor shall establish such liability coverage unless San Onofre Nuclear Generating Station, San Bernardino Generating Station, AES Energy Corp., GenOn Energy Corp., and NRG Company have done so.

6. The guarantor agrees to notify the DTSC by certified mail of a voluntary or involuntary proceeding under Title 11 (Bankruptcy), United States Code, naming guarantor as debtor, within ten (10) days after commencement of the proceedings.

7. Guarantor agrees that within thirty (30) days after being notified by the DTSC of a determination that the guarantor no longer meets the financial test criteria or that he or she is disallowed from continuing as a guarantor, he or she shall establish alternate liability coverage as specified in California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8, sections 66264.147 and 66265.147 in the name of San Onofre Nuclear Generating Station, San Bernardino Generating Station, AES Energy Corp., GenOn Energy Corp., and NRG Company, unless the San Onofre Nuclear Generating Station, San Bernardino Generating Station, AES Energy Corp., GenOn Energy Corp., and NRG Company, has done so.

8. Guarantor reserves the right to modify this agreement to take into account amendment or modification of the liability requirements set by California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8, sections 66264.147 and 66265.147, provided that such

modification shall become effective only if DTSC does not disapprove the modification within thirty (30) days of receipt of notification of the modification.

9. Guarantor agrees to remain bound under this guarantee for so long as San Onofre Nuclear Generating Station, San Bernardino Generating Station, AES Energy Corp., GenOn Energy Corp., and NRG Company, shall comply with the applicable requirements of California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8, sections 66264.147 and 66265.147 for the above-listed facility(ies)/TTU(s), except as provided in paragraph 10 of this agreement.

10. Guarantor may terminate this guarantee 120 days following receipt of notification, through certified mail, by DTSC and by San Onofre Nuclear Generating Station, San Bernardino Generating Station, AES Energy Corp., GenOn Energy Corp., and NRG Company.

11. Guarantor hereby expressly waives notice of acceptance of this guarantee by any party.

12. Guarantor agrees that this guarantee is in addition to and does not affect any other responsibility or liability of the guarantor with respect to the covered facility(ies)/TTU(s).

13. The guarantor shall satisfy a third-party liability claim only on receipt of one of the following documents;

(a) Certification from the Principal and the third-party liability claimant(s) that the liability claim should be paid. The certification shall be worded as follows, except that instructions in brackets are to be replaced with the relevant information and the brackets deleted:

CERTIFICATION OF VALID CLAIM

The undersigned, as parties Southern California Edison and Claimant, hereby certify that the claim of bodily injury and/or property damage caused by a sudden accidental occurrence arising from operating San Onofre Nuclear Generating Station Mixed Waste Storage Area; San Bernardino Generating Station Boiler Chemical Cleaning Retention Basin; AES Energy Corp's. Alamitos and Huntington Beach Boiler Chemical Cleaning Retention Basins, GenOn Energy Corp's. Coolwater, Etiwanda, Mandalay and Ormond Beach Boiler Chemical Cleaning Retention and NRG Company's El Segundo and Long Beach Boiler Chemical Cleaning Retention Basins, should be paid in the amount TBD.

Principal

(Notary) Date

Claimant(s)

(Notary) Date

(b) A valid final court order establishing a judgement against the Principal for bodily injury or property damage caused by sudden or nonsudden accidental occurrences arising from the operation of the Principal's facility/TTU or group of facility(ies)/TTU(s).

14. In the event of combination of this guarantee with another mechanism to meet liability requirements, this guarantee will be considered primary coverage.

I hereby certify that the wording of this guarantee is identical to the wording as specified in California Code of Regulations, title 22, section 66264.151, subsection (h)(2) and is being executed in accordance with the requirements of California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8.

Effective date: 3/31/2011

Southern California Edison

Signature

LINDA G. SULLIVAN
Senior Vice President and Chief Financial Officer

Signature of witness or notary:

ANN M. DAVEY
Commission # 1848919
Notary Public - California
Los Angeles County
My Comm. Expires Jun 9, 2013

SOUTHERN CALIFORNIA EDISON®

An *EDISON INTERNATIONAL®* Company

Credit Ratings as of January 21, 2011

	S&P	Moody's	Fitch
Issuer Credit / Long Term Rating	**BBB+**	**A3**	**A-**
Outlook	**Stable**	**Stable**	**Stable**
Effective Date	16-Feb-05	16-Oct-06	02-Jul-09
Short Term / Commercial Paper	**A-2**	**P-2**	**F-1**
Effective Date	13-Aug-07	17-Sep-04	02-Jul-09
Senior Secured	**A**	**A1**	**A+**
Effective Date	02-Sep-09	03-Aug-09	02-Jul-09
Senior Unsecured	**BBB+**	**A3**	**A**
Effective Date	02-Sep-09	07-Nov-09	02-Jul-09
Preferred Stock	**BBB-**	**Baa2**	**BBB+**
Effective Date	12-Sep-09	16-Oct-06	22-Jan-10
Senior Secured Credit Facility		**A3**	
Effective Date		03-Mar-08	

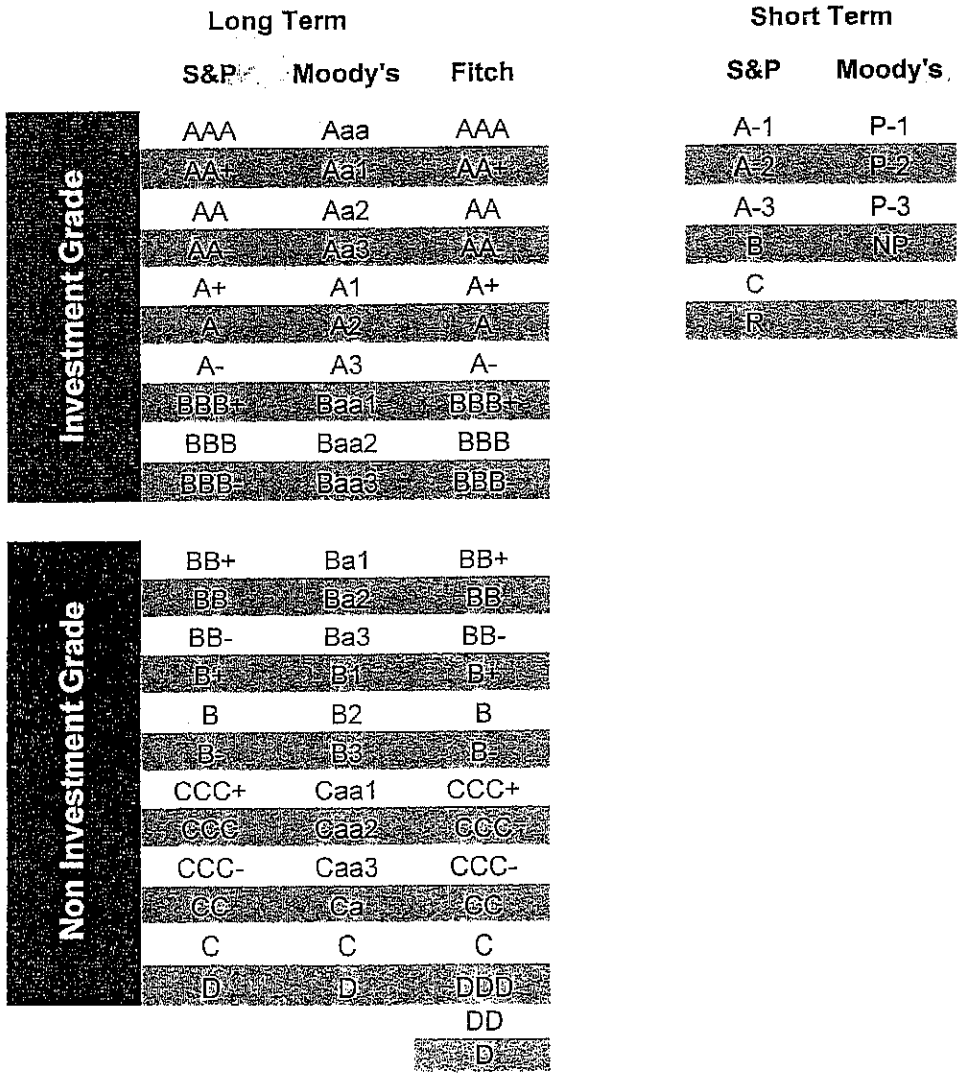

Long Term
S&P
Moody's
Fitch
Investment Grade
AAA
Aaa
AAA
AA+
Aa1
AA+
AA
Aa2
AA
AA-
Aa3
AA-
A+
A1
A+
A
A2
A
A-
A3
A-
BBB+
Baa1
BBB+
BBB
Baa2
BBB
BBB-
Baa3
BBB-
Non Investment Grade
BB+
Ba1
BB+
BB
Ba2
BB
BB-
Ba3
BB-
B+
B1
B+
B
B2
B
B-
B3
B-
CCC+
Caa1
CCC+
CCC
Caa2
CCC
CCC-
Caa3
CCC-
CC
Ca
CC
C
C
C
D
D
DDD
DD
D
Short Term
S&P
Moody's
A-1
P-1
A-2
P-2
A-3
P-3
B
NP
C
R

Table of Contents

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Board of Directors and
Shareholder of Southern California Edison Company

In our opinion, the consolidated financial statements listed in the accompanying index present fairly, in all material respects, the financial position of Southern California Edison Company (the "Company") and its subsidiaries at December 31, 2010 and 2009, and the results of their operations and their cash flows for each of the three years in the period ended December 31, 2010 in conformity with accounting principles generally accepted in the United States of America. In addition, in our opinion, the financial statement schedule listed in the index appearing under Item 15(a)(2) presents fairly, in all material respects, the information set forth therein when read in conjunction with the related consolidated financial statements. These financial statements and financial statement schedule are the responsibility of the Company's management. Our responsibility is to express an opinion on these financial statements based on our audits. We conducted our audits of these statements in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements, assessing the accounting principles used and significant estimates made by management, and evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

As discussed in Note 1 to the consolidated financial statements, the Company changed the manner in which it accounts for variable interest entities and fair value disclosure principles as of January 1, 2010.

/s/ PricewaterhouseCoopers LLP
Los Angeles, California
February 28, 2011

Consolidated Statements of Income — Southern California Edison Company

(in millions)	Years ended December 31, 2010	2009	2008
Operating revenue	$ 9,983	$ 9,965	$ 11,248
Fuel	363	721	1,400
Purchased power	2,930	2,751	3,845
Operation and maintenance	3,291	3,154	3,013
Depreciation, decommissioning and amortization	1,273	1,178	1,114
Property and other taxes	263	244	232
Gain on sale of assets	(1)	(1)	(9)
Total operating expenses	8,119	8,047	9,595
Operating income	1,864	1,918	1,653
Interest income	7	11	22
Other income	141	160	101
Interest expense – net of amounts capitalized	(429)	(420)	(407)
Other expenses	(51)	(49)	(123)
Income before income taxes	1,532	1,620	1,246
Income tax expense	440	249	342
Net income	1,092	1,371	904
Less: Net income attributable to noncontrolling interests	—	94	170
Dividends on preferred and preference stock	52	51	51
Net income available for common stock	$ 1,040	$ 1,226	$ 683

Consolidated Statements of Comprehensive Income

(in millions)	Years ended December 31, 2010	2009	2008
Net income	$ 1,092	$ 1,371	$ 904
Other comprehensive income (loss), net of tax:			
Pension and postretirement benefits other than pensions:			
Net gain (loss) arising during period	(9)	(7)	2
Amortization of net (gain) loss included in net income	3	2	(2)
Prior service cost arising during the period	—	—	1
Comprehensive income	1,086	1,366	905
Less: Comprehensive income attributable to noncontrolling interests	—	94	170
Comprehensive income attributable to SCE	$ 1,086	$ 1,272	$ 735

The accompanying notes are an integral part of these consolidated financial statements.

Consolidated Balance Sheets	Southern California Edison Company	
	December 31,	
(in millions)	2010	2009
ASSETS		
Cash and cash equivalents	$ 257	$ 462
Receivables, less allowances of $85 and $53 for uncollectible accounts at respective dates	715	719
Accrued unbilled revenue	442	347
Inventory	332	337
Prepaid taxes	168	33
Derivative assets	87	160
Regulatory assets	378	120
Other current assets	81	151
Total current assets	2,460	2,329
Nuclear decommissioning trusts	3,480	3,140
Other investments	68	67
Total investments	3,548	3,207
Utility property, plant and equipment, net	24,778	21,966
Nonutility property, plant and equipment, net	71	324
Total property, plant and equipment	24,849	22,290
Derivative assets	367	187
Regulatory assets	4,347	4,139
Other long-term assets	335	322
Total long-term assets	5,049	4,648
Total assets	$ 35,906	$ 32,474

The accompanying notes are an integral part of these consolidated financial statements.

Consolidated Balances Sheets — Southern California Edison Company

(in millions, except share amounts)	December 31, 2010	2009
LIABILITIES AND EQUITY		
Current portion of long-term debt	$ —	$ 250
Accounts payable	1,271	1,282
Accrued taxes	45	9
Accrued interest	169	162
Customer deposits	217	238
Derivative liabilities	212	102
Regulatory liabilities	738	367
Other current liabilities	663	637
Total current liabilities	3,315	3,047
Long-term debt	7,627	6,490
Deferred income taxes	4,829	3,651
Deferred investment tax credits	118	97
Customer advances	112	119
Derivative liabilities	449	496
Pensions and benefits	1,838	1,681
Asset retirement obligations	2,507	3,198
Regulatory liabilities	4,524	3,328
Other deferred credits and other long-term liabilities	1,380	1,652
Total deferred credits and other liabilities	15,757	14,222
Total liabilities	26,699	23,759
Commitments and contingencies (Note 9)		
Common stock, no par value (560,000,000 shares authorized; 434,888,104 shares issued and outstanding at each date)	2,168	2,168
Additional paid-in capital	572	551
Accumulated other comprehensive loss	(25)	(19)
Retained earnings	5,572	4,746
Total common shareholder's equity	8,287	7,446
Preferred and preference stock	920	920
Noncontrolling interests	—	349
Total equity	9,207	8,715
Total liabilities and equity	$35,906	$32,474

The accompanying notes are an integral part of these consolidated financial statements.

Consolidated Statements of Cash Flows — Southern California Edison Company

(in millions)	Years ended December 31, 2010	2009	2008
Cash flows from operating activities:			
Net income	$ 1,092	$ 1,371	$ 904
Adjustments to reconcile to net cash provided by operating activities:			
Depreciation, decommissioning and amortization	1,273	1,178	1,114
Regulatory impacts of net nuclear decommissioning trust earnings (reflected in accumulated depreciation)	189	158	(10)
Other amortization	106	109	97
Stock-based compensation	17	13	18
Deferred income taxes and investment tax credits	973	574	131
Changes in operating assets and liabilities:			
Receivables	(25)	(9)	14
Inventory	(11)	28	(74)
Margin and collateral deposits – net of collateral received	2	63	(16)
Prepaid taxes	(135)	178	(66)
Other current assets	(101)	(29)	31
Accounts payable	(166)	43	(107)
Accrued taxes	36	(331)	298
Other current liabilities	118	26	(18)
Derivative assets and liabilities – net	(43)	(413)	634
Regulatory assets and liabilities – net	278	1,457	(2,946)
Other assets	(10)	48	275
Other liabilities	(207)	(395)	1,343
Net cash provided by operating activities	3,386	4,069	1,622
Cash flows from financing activities:			
Long-term debt issued	1,135	750	1,500
Long-term debt issuance costs	(16)	(11)	(20)
Long-term debt repaid	(259)	(154)	(3)
Bonds repurchased	—	(219)	(212)
Preferred stock redeemed	—	—	(7)
Short-term debt financing – net	—	(1,893)	1,393
Settlements of stock-based compensation – net	(5)	4	(15)
Distributions to noncontrolling interests	—	(125)	(236)
Dividends paid	(352)	(351)	(376)
Net cash provided (used) by financing activities	503	(1,999)	2,024
Cash flows from investing activities:			
Capital expenditures	(3,780)	(2,999)	(2,267)
Proceeds from sale of nuclear decommissioning trust investments	1,432	2,217	3,130
Purchases of nuclear decommissioning trust investments and other	(1,651)	(2,416)	(3,137)
Customer advances for construction and other investments	(3)	(21)	(13)
Effect of deconsolidation of variable interest entities	(92)	—	—
Net cash used by investing activities	(4,094)	(3,219)	(2,287)
Net increase (decrease) in cash and cash equivalents	(205)	(1,149)	1,359
Cash and cash equivalents, beginning of year	462	1,611	252
Cash and cash equivalents, end of year	$ 257	$ 462	$ 1,611

The accompanying notes are an integral part of these consolidated financial statements.

Consolidated Statements of Changes in Equity — Southern California Edison Company

(in millions)	Equity Attributable to SCE: Common Stock	Additional Paid-in Capital	Accumulated Other Comprehensive Income (Loss)	Retained Earnings	Preferred and Preference Stock	Noncontrolling Interests	Total Equity
Balance at December 31, 2007	$ 2,168	$ 507	$ (15)	$ 3,568	$ 929	$ 446	$ 7,603
Net income	—	—	—	734	—	170	904
Other comprehensive income	—	—	1	—	—	—	1
Dividends declared on common stock	—	—	—	(400)	—	—	(400)
Dividends declared on preferred and preference stock	—	—	—	(51)	—	—	(51)
Preferred stock redeemed, net of gain	—	2	—	—	(9)	—	(7)
Distributions to noncontrolling interests	—	—	—	—	—	(236)	(236)
Stock-based compensation – net	—	4	—	(19)	—	—	(15)
Noncash stock-based compensation and other	—	19	—	(5)	—	—	14
Balance at December 31, 2008	$ 2,168	$ 532	$ (14)	$ 3,827	$ 920	$ 380	$ 7,813
Net income	—	—	—	1,277	—	94	1,371
Other comprehensive loss	—	—	(5)	—	—	—	(5)
Dividends declared on common stock	—	—	—	(300)	—	—	(300)
Dividends declared on preferred and preference stock	—	—	—	(51)	—	—	(51)
Distributions to noncontrolling interests	—	—	—	—	—	(125)	(125)
Stock-based compensation – net	—	7	—	(3)	—	—	4
Noncash stock-based compensation and other	—	12	—	(4)	—	—	8
Balance at December 31, 2009	$ 2,168	$ 551	$ (19)	$ 4,746	$ 920	$ 349	$ 8,715
Net income	—	—	—	1,092	—	—	1,092
Other comprehensive loss	—	—	(6)	—	—	—	(6)
Deconsolidation of variable interest entities (See Note 3)	—	—	—	—	—	(349)	(349)
Dividends declared on common stock	—	—	—	(200)	—	—	(200)
Dividends declared on preferred and preference stock	—	—	—	(52)	—	—	(52)
Stock-based compensation and other	—	4	—	(9)	—	—	(5)
Noncash stock-based compensation and other	—	17	—	(5)	—	—	12
Balance at December 31, 2010	$ 2,168	$ 572	$ (25)	$ 5,572	$ 920	$ —	$ 9,207

The accompanying notes are an integral part of these consolidated financial statements.

pwc

Report of Independent Accountants

To the Board of Directors of
Southern California Edison Company

We have performed the procedures included in the California Code of Regulations Title 22, Division 4.5, Chapters 14 and 15, Article 8, which were agreed to by the Department of Toxic Substances Control of the State of California and Southern California Edison Company, solely to assist the specified parties in evaluating Southern California Edison Company's compliance with the financial test option as of December 31, 2010, included in the accompanying letter dated March 31, 2011 from Linda G. Sullivan, Senior Vice President and Chief Financial Officer of Southern California Edison Company. Management is responsible for Southern California Edison Company's compliance with those requirements. This agreed-upon procedures engagement was conducted in accordance with attestation standards established by the American Institute of Certified Public Accountants. The sufficiency of these procedures is solely the responsibility of those parties specified in this report. Consequently, we make no representation regarding the sufficiency of the procedures described below either for the purpose for which this report has been requested or for any other purpose.

We performed the following procedures:

We compared the information included in items 7, 8 and 11 under the caption "Part B, Alternative II" in the letter referred to above to the audited consolidated financial statements of Southern California Edison Company as of and for the year ended December 31, 2010, on which we have issued our report dated February 28, 2011, and found such information to be in agreement.

The term "in agreement," for these purposes, indicates that no matters came to our attention to indicate that the referenced amounts or information did not agree to amounts included in, or derived from, the audited financial statements referred to above.

We were not engaged to and did not conduct an examination, the objective of which would be the expression of an opinion on the accompanying letter dated March 31, 2011. Accordingly, we do not express such an opinion. Had we performed additional procedures, other matters might have come to our attention that would have been reported to you.

This report is intended solely for the information and use of the board of directors and management of Southern California Edison Company and the Department of Toxic Substances Control of the State of California, and is not intended to be and should not be used by anyone other than these specified parties.

PricewaterhouseCoopers LLP

PricewaterhouseCoopers LLP
Los Angeles, California
March 31, 2011

Southern California Edison Company
Tangible Net Worth
As of December 31, 2010

(In millions)		
Total assets	$35,906	2010 financial statements filed in Form 10-K, page 46.
Less: Liabilities	26,699	2010 financial statements filed in Form 10-K, page 47.
Total equity	9,207	
Less: Noncontrolling interests	0	
Equity attributable to Southern California Edison	9,207	
Less: Intangible assets	901	See below
Tangible net worth	$8,306	

Intangible assets details: (Actual dollars)

Within Utility property, plant and equipment		
Intangible plant	1,197,194,349	SAP account 1251010
Intangilbe plant not classified	118,023,122	SAP account 1253010
Accum amort for intangible plant	(429,655,003)	SAP account 1256110, 115, 120, 125, 130 , 135, 140 and 140
	885,562,468	
Within Other current assets		
Current portion RTC	1,126,064	SAP account 1181040
Prepaid trnsln license - Morongo	1,054,375	SAP account 1160095
	2,180,439	
Within Other long-term assets		
Prepaid software license	3,828,168	SAP account 1165010
LT portion RTC	9,376,302	SAP account 1185040
	13,204,470	
Total intangible assets	900,947,377	

Southern California Edison Co.
San Onofre Nuclear Generating Station
CAD000630921

CLOSURE PLAN

CLOSURE PLAN DATE: 2023

UPDATED: January 24, 2011

OWNER / OPERATER SIGNATURES AND CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Mary Jane Johnson — 1/28/11
Date

TABLE 4
CLOSURE COST ESTIMATE

Step #	Closure Activity		Cost Estimate
1	Notify DTSC		$ 0
2	Remove All Stored Wastes		
	Manpower (40 man hours @ $50/hr)	$ 2,000	
	Transport / dispose:		
	1000 55-gallon containers mixed waste @ $65/gallon	$ 3,575,000	
	25 Boxes @ $20,282	$507,050	
	50 30-gallon containers mixed waste @ $65/gallon	$ 97,500	
	50 5-gallon containers mixed waste @ $65/gallon	$ 16,250	$4,197,800
	(See Notes 1 & 2)		
3	Sweep / Vacuum Pad		
	Manpower (8 man hours @ $50/hr)	$ 400	$ 400
4	Decontaminate Tank, Pads and Sumps (if required)		
	Rent one (1) 4,000 gallon Portable Tank / Containment (1 mo)	$ 1,000	
	Rent Vacuum Truck (10 hours @ $80/hr)	$ 800	
	Manpower (160 man hours @ $50/hr)	$ 8,000	
	Decontaminate Analytical Costs:		
	4 Concrete Samples @ $500/sample	$ 2,000	
	4 Soil Samples @ $750/sample	$ 3,000	
	1 Rinse Water Sample @ $500	$ 500	
	Transport / Dispose		
	800 Gallons Decontamination Solution @ $65/gal	$ 52,000	
	100 Tons Soil / Concrete (13 boxes) @ $5,122/box	$ 66,586	$ 133,886
	See notes 3 & 4		
5 / 6	Confirmation Sampling / Analysis (Concrete/Soil)		
	Manpower for Sampling (16 man hours @ $50/hr)	$ 800	
	Equipment Rentals	$ 400	
	Analytical Costs:		
	7 Concrete Samples @ $500/sample	$ 3,500	
	21 Soil Samples @ $750/sample	$15,750	
	1 Rinse Water Sample @ $500	$ 500	$ 20,950
7	Certify Closure / Develop Report		$ 2,000
	Project Management		$ 5,000
	SUBTOTAL		$ 4,360,036
	Implicit Price Deflator (Gross National Product) Previous Year's (starting w/ 1997)		$ 1,173,711
	Inflation Factor Current Year 2011(111.036/109.744 = 1.01177)*		$ 65,132
	10% Contingency		$ 559,888
	TOTAL		$ 6,158,767

Note 1: Costs are based on best guess using industry experience from other facilities.

Note 2: Some waste may not have a disposal facility.

Note 3: It has been conservatively assumed that the concrete samples will be analytically determined to be radioactive/hazardous and the removal and offsite disposal of the containment area will be necessary. The top 1/8" to ¼" of the concrete will be decontaminated using CO_2 decontamination procedures. The uncontaminated concrete will be excavated and transported to an out-of-state landfill.

Note 4: Decontamination of conditionally authorized Unit (OCA-6) mixed waste processing tank is less than $10,000, but is incorporated in this closure cost estimate. (Man power is established @ 8 hrs for OCA-6) (Actual cost $2,129).

*Based on www.bea.gov (US Dept. of Commerces Bureau of Economic Analysis).

CONSOLIDATED CLOSURE COST ESTIMATE
SCE GENERATING STATION RETENTION BASINS
(February 2011)

STATION	CLOSURE COST ESTIMATE
Alamitos Generating Station	$3,707,000
Cool Water Generating Station	$250,000
El Segundo Generating Station	$1,390,000
Etiwanda Generating Station	$490,000
Huntington Beach Generating Station	$1,460,000
Long Beach Generating Station	$305,000
Mandalay Generating Station	$1,788,000
Ormond Beach Generating Station	$1,366,000
San Bernardino Generating Station	$145,000
TOTAL	$10,901,000

CLOSURE COST ESTIMATE
Alamitos Generating Station
(February 2011)

STEP #	CLOSURE ACTIVITY	COST ESTIMATE
1	CLOSURE PLAN PREPARATION	
	Draft Plan Preparation	$40,000
	DTSC Oversight	$25,000
2	CLOSURE ACTIVITIES	
	Soil Vapor Survey	$100,000
	Piping & Appurtenances Soil Investigation	$100,000
	Structure Decontamination & Confirmation Sampling	$50,000
	DTSC Oversight	$25,000
3	SOIL REMEDIATION	
	Liner Removal & Repair, Oversight/Monitoring/Sampling Labor, Mobilization & Demobilization, Excavation & Stockpile, Waste Characterization, Confirmation Soil Samples, Backfill & Compaction, Transportation & Waste Disposal (est. 9,000 tons @ $120/ton, plus other costs)	
	Central Basin	$1,150,000
	South Basin	$95,000
	DTSC Oversight	$50,000
4	GROUNDWATER REMEDIATION	
	In-Situ Chemical Oxidation	
	Permitting	$5,000
	Phase 1 Injection	$200,000
	Phase 2 Injection	$200,000
	Monitoring (12 months)	$48,000
	DTSC Oversight	$20,000
5	CLOSURE CERTIFICATION REPORT	
	Statistical Analysis and Risk Assessment Report	$60,000
	Report Preparation	$75,000
	DTSC Oversight	$25,000
6	GROUNDWATER MONITORING	
	2011	$140,000
	2012	$140,000
	2013	$140,000
	2014 (approx. 20% reduction in monitoring)	$112,000
	2015	$112,000
	DTSC Oversight	$25,000
7	RCRA Facility Investigation	$400,000
	DTSC Oversight	$40,000
	SUBTOTAL	$3,377,000
8	CONTINGENCY (~10%)	$330,000
	TOTAL	$3,707,000

CLOSURE COST ESTIMATE
Cool Water Generating Station
(February 2011)

STEP #	CLOSURE ACTIVITY	COST ESTIMATE
1	CLOSURE PLAN PREPARATION	
	Site Investigation	$50,000
	Draft Plan Preparation	$20,000
	Statistical Analysis and Risk Assessment Report	$20,000
	Solar 2 Site Investigation	$25,000
	DTSC Oversight	$25,000
2	CLOSURE ACTIVITIES	
	Structure Decontamination & Confirmation Sampling	$25,000
3	CLOSURE CERTIFICATION REPORT	
	Report Preparation	$50,000
	DTSC Oversight	$10,000
	SUBTOTAL	$225,000
4	CONTINGENCY (~10%)	$25,000
	TOTAL	$250,000

CLOSURE COST ESTIMATE
El Segundo Generating Station
(February 2011)

STEP #	CLOSURE ACTIVITY	COST ESTIMATE
1	CLOSURE ACTIVITIES	
	Structure Decontamination & Confirmation Sampling	$50,000
	Chevron Hydrocarbon Investigation	$50,000
	Statistical Analysis & Risk Assessment	$30,000
	Retention Basin Soil Remediation	
	Work Plan, liner removal & replacement, soil removal, confirmation sampling, soil replacement, and waste disposal	$500,000
	DTSC Oversight	$25,000
2	CLOSURE CERTIFICATION REPORT	
	Report Preparation	$75,000
	DTSC Oversight	$25,000
3	GROUNDWATER MONITORING	
	2011	$75,000
	2012	$75,000
	2013	$75,000
	DTSC Oversight	$10,000
4	RCRA Facility Investigation	$250,000
	DTSC Oversight	$25,000
	SUBTOTAL	$1,265,000
5	CONTINGENCY (~10%)	$125,000
	TOTAL	$1,390,000

CLOSURE COST ESTIMATE
Etiwanda Generating Station
(February 2011)

STEP #	CLOSURE ACTIVITY	COST ESTIMATE
1	CLOSURE ACTIVITIES	
	Structure Decontamination & Confirmation Sampling	$25,000
2	CLOSURE CERTIFICATION REPORT	
	Report Preparation	$60,000
	DTSC Oversight	$30,000
4	GROUNDWATER MONITORING	
	2011	$45,000
	DTSC Oversight	$10,000
5	RCRA Facility Investigation	$250,000
	DTSC Oversight	$25,000
	SUBTOTAL	$445,000
6	CONTINGENCY (~10%)	$45,000
	TOTAL	$490,000

CLOSURE COST ESTIMATE
Huntington Beach Generating Station
(February 2011)

STEP #	CLOSURE ACTIVITY	COST ESTIMATE
1	CLOSURE PLAN PREPARATION	
	Draft Plan Preparation	$30,000
	Statistical Analysis and Risk Assessment Report	$30,000
	DTSC Oversight	$25,000
2	GROUNDWATER REMEDIATION	
	In-Situ Chemical Oxidation	
	Permitting	$5,000
	Phase 1 Injection	$150,000
	Phase 2 Injection	$150,000
	Monitoring (12 months)	$40,000
	DTSC Oversight	$20,000
3	CLOSURE CERTIFICATION REPORT	
	Report Preparation	$75,000
	DTSC Oversight	$25,000
4	GROUNDWATER MONITORING	
	2011	$80,000
	2012	$80,000
	2013	$80,000
	2014	$80,000
	DTSC Oversight	$20,000
5	RCRA Facility Investigation	$400,000
	DTSC Oversight	$40,000
	SUBTOTAL	$1,330,000
6	CONTINGENCY (~10%)	$130,000
	TOTAL	$1,460,000

CLOSURE COST ESTIMATE
Long Beach Generating Station
(February 2011)

STEP #	CLOSURE ACTIVITY	COST ESTIMATE
1	RCRA Facility Investigation DTSC Oversight	$250,000 $25,000
	SUBTOTAL	275,000$
2	CONTINGENCY (~10%)	$30,000
	TOTAL	$305,000

CLOSURE COST ESTIMATE
Mandalay Generating Station
(February 2011)

STEP #	CLOSURE ACTIVITY	COST ESTIMATE
1	SITE REMEDIATION	
	Work Implementation Plan/HASP/Utility Clearance	$100,000
	Soil Remediation	
	Liner Removal & Repair	$20,000
	Oversight/Monitoring/Sampling Labor	$10,000
	Mobilization & Demobilization	$5,000
	Excavation & Stockpile	$48,000
	Waste Characterization	$10,000
	Confirmation Soil Samples	$10,000
	Backfill & Compaction	$80,000
	Transportation & Waste Disposal (Note 1)	$480,000
	Remedial Chemical Injection	$100,000
	DTSC Oversight	$50,000
2	CLOSURE CERTIFICATION REPORT	
	Report Preparation	$75,000
	DTSC Oversight	$25,000
3	GROUNDWATER MONITORING	
	2011	$80,000
	2012	$80,000
	2013	$80,000
	2014(approx. 50% reduction in wells monitored)	$40,000
	2015	$40,000
	DTSC Oversight	$20,000
4	RCRA Facility Investigation	$250,000
	DTSC Oversight	$25,000
	SUBTOTAL	$1,628,000
5	CONTINGENCY	$160,000
	TOTAL	$1,788,000

Note 1: Assumes worst-case where soil is RCRA-hazardous, requiring disposal at Class I landfill.

CLOSURE COST ESTIMATE
Ormond Beach Generating Station
(February 2011)

STEP #	CLOSURE ACTIVITY	COST ESTIMATE
1	GROUNDWATER REMEDIATION	
	Pump & Treat Discharge Permitting	$20,000
	Operation & Maintenance	
	Carbon Change-outs (12 events @ $10,000)	$120,000
	Operation & Maintenance ($4,000/month)	$96,000
	Sampling, Analysis & Reporting ($3,000/month)	$90,000
	DTSC Oversight	$10,000
2	CLOSURE CERTIFICATION REPORT	
	Report Preparation	$75,000
	DTSC Oversight	$25,000
3	GROUNDWATER MONITORING	
	2011	$120,000
	2012	$120,000
	2013 (25% reduction in wells monitored)	$90,000
	2014	$90,000
	2015	$90,000
	DTSC Oversight	$20,000
4	RCRA Facility Investigation	$250,000
	DTSC Oversight	$25,000
	SUBTOTAL	$1,241,000
5	CONTINGENCY (~10%)	$125,000
	TOTAL	$1,366,000

CLOSURE COST ESTIMATE
San Bernardino Generating Station
(February 2011)

STEP #	CLOSURE ACTIVITY	COST ESTIMATE
1	RCRA Facility Investigation DTSC Oversight	$25,000 $5,000
2	Soil Remediation Env. Permitting, Soil Removal and Replacement	 $100,000
	SUBTOTAL	$130,000
3	CONTINGENCY (~10%)	$15,000
	TOTAL	$145,000