DOCKETED	
Docket Number:	85-AFC-01C
Project Title:	Compliance - Watson Cogeneration Company AFC
TN #:	238772
Document Title:	Annual Compliance Report- 2019
Description:	Annual Compliance Report- 2019
Filer:	Anwar Ali
Organization:	Watson Cogen Company
Submitter Role:	Applicant
Submission Date:	7/9/2021 1:29:30 PM
Docketed Date:	7/9/2021

Watson Cogeneration Company
22850 South Wilmington Avenue
Carson, CA 90740-6203

Darrin Fost
Business Manager
310.816.8812

October 19, 2020

Mr. Anwar Ali
Compliance Project Manager
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814

Subject: **2019 Annual Compliance Report**
Watson Cogeneration Project (85-AFC-01C)

Dear Mr. Ali,

Attached is the Annual Compliance Report for 2019 pursuant to the requirements of the California Energy Commission's Conditions of Certification for the Watson Cogeneration Company.

If you have any questions regarding this report, please contact me via telephone at (310) 816-8812 or via e-mail at DFost@Marathonpetroleum.com.

Sincerely,

Darrin Fost

Darrin Fost
Business Manager
Watson Cogeneration Company

AIR QUALITY CONDITIONS OF CERTIFICATION

AQ-25 A continuous monitoring system must be installed and operated to monitor and record the fuel consumption and the mass ratio of steam-to-fuel for each fuel being fired in each gas Turbines 1, 2, 3, 4 and 5. This system must be accurate to within +5.0 percent and calibrated once every 12 months.

Verification: The owner/operator shall maintain records of continuous fuel consumption and the steam-to-fuel mass ratio monitoring. These records will be maintained on file for at least two years and shall be made available to the SCAQMD and CEC staff upon request. CEM Relative Accuracy Test report will be submitted to the CEC annually.

Response: Instrumentation is in place for the purpose of continuous monitoring and recording of fuel consumption and steam injection to each of the four gas turbines at the facility (#5 was never constructed). The systems undergo regular calibration. A summary of fuel consumption and steam injection to each of the turbines is included below.

AQ-25	Unit 91					Unit 92				
	NG/RFG	Butane	Total Fuel	DeNOx Steam	Steam : Fuel	NG/RFG	Butane	Total Fuel	DeNOx Steam	Steam : Fuel
	lb/sec	lb/sec	lb/sec	lb/sec	Ratio	lb/sec	lb/sec	lb/sec	lb/sec	Ratio
Jan-19	11.426	0.264	11.513	14.604	1.216	11.660	0.585	12.372	14.759	1.192
Feb-19	11.333	0.181	11.513	14.034	1.216	11.653	0.642	12.372	14.751	1.192
Mar-19	11.618	0.164	11.513	13.995	1.216	11.683	0.719	12.372	14.793	1.192
Apr-19	11.333	0.181	11.513	13.995	1.216	11.653	0.719	12.372	14.751	1.192
May-19	11.333	0.181	11.513	13.995	1.216	11.653	0.719	12.372	14.751	1.192
Jun-19	11.292	0.266	11.513	13.966	1.216	11.538	0.651	12.372	14.697	1.192
Jul-19	10.548	0.327	11.513	12.704	1.216	10.974	0.518	12.372	14.484	1.192
Aug-19	11.300	0.230	11.513	14.061	1.216	11.595	0.646	12.372	14.681	1.192
Sep-19	11.324	0.181	11.513	13.995	1.216	11.653	0.719	12.372	14.751	1.192
Oct-19	11.305	0.409	11.714	14.010	1.196	6.329	0.406	6.735	8.095	1.963
Nov-19	11.514	0.321	11.836	14.294	1.208	10.650	0.696	11.346	12.704	1.120
Dec-19	11.573	0.326	11.899	14.300	1.202	10.905	0.696	11.601	13.104	1.129
	Unit 93					Unit 94				
	NG/RFG	Butane	Total Fuel	DeNOx Steam	Steam : Fuel	NG/RFG	Butane	Total Fuel	DeNOx Steam	Steam : Fuel
	lb/sec	lb/sec	lb/sec	lb/sec	Ratio	lb/sec	lb/sec	lb/sec	lb/sec	Ratio
Jan-19	11.219	0.503	11.946	13.902	1.172	4.801	0.052	11.408	6.188	1.242
Feb-19	11.294	0.620	11.946	14.005	1.172	11.418	0.000	11.408	14.258	1.242
Mar-19	11.317	0.628	11.946	13.855	1.172	11.408	0.047	11.408	14.174	1.242
Apr-19	11.317	0.628	11.946	14.005	1.172	11.408	0.000	11.408	14.174	1.242
May-19	11.317	0.628	11.946	14.005	1.172	11.408	0.000	11.408	14.174	1.242
Jun-19	9.945	0.576	11.946	12.244	1.172	11.273	0.083	11.408	13.967	1.242
Jul-19	10.361	0.516	11.946	12.598	1.172	10.681	0.152	11.408	13.140	1.242
Aug-19	11.222	0.577	11.946	13.873	1.172	11.286	0.190	11.408	14.061	1.242
Sep-19	11.317	0.628	11.946	14.005	1.172	11.408	0.000	11.408	14.174	1.242
Oct-19	10.753	0.539	11.292	13.099	1.161	11.173	0.214	11.387	13.752	1.208
Nov-19	11.171	0.442	11.613	13.575	1.169	11.374	0.116	11.491	14.016	1.220
Dec-19	11.172	0.512	11.684	13.497	1.155	11.466	0.170	11.636	14.082	1.210

AQ-42 No more than one of the cogeneration units 1, 2, 3, 4 or 5 shall startup or shutdown in any one day. For Turbine Trains 1, 2, 3 and 4, start up shall not exceed 8 hours and shutdown shall not exceed 4 hours. For Turbine Train 5, neither start up nor shutdown shall exceed 4 hours in duration.

Verification: The owner/operator shall maintain an operation log for the facility which, at a minimum, will identify startup and shutdown occurrences for each cogeneration unit. The owner/operator shall submit in its Annual Compliance Report to the CEC a summary of the operational log demonstrating compliance with this condition 5. (97-0924-4; 88-0525-18b)

Response: In the 2019 calendar year, APPC/Watson had 13 startups and 13 shutdowns. No startups exceeded an 8 hour duration and no shutdowns exceeded a 4 hour duration. Startup and shutdown dates shown in the tables below.

Incident Description for February 28, 2019 - At 11:58 AM on 2/28/2019, Unit 94 began a planned shutdown to address an economizer tube leak. Four hours later, at approximately 4:00 PM, an unplanned, immediate, forced outage was taken on Unit 93 due to a fuel leak on a control valve. At approximately 9:10 PM, Unit 94 was restarted to ensure reliable operation of the Facility.

Incident Description for October 28, 2019 - At 10:56 AM on 10/28/2019, Unit 93 underwent an unplanned, immediate forced outage due to a unit trip during a fuel switch. The unit was restarted later that same day at approximately 9:15 PM.

AQ-42: Shutdown Summary - 2019		
Unit	**Date**	**Duration < 4 Hours**
91	4/16/2019	Yes
91	7/12/2019	Yes
91	9/7/2019	Yes
92	5/9/2019	Yes
92	6/8/2019	Yes
92	10/11/2019	Yes
93	2/28/2019	Yes
93	6/24/2019	Yes
93	6/28/2019	Yes
93	10/28/2019	Yes
94	1/11/2019	Yes
94	2/28/2019	Yes
94	3/1/2019	Yes

AQ-42: Startup Summary - 2019		
Unit	**Date**	**Duration < 8 Hours**
91	4/23/2019	Yes
91	7/14/2019	Yes
91	9/8/2019	Yes
92	5/13/2019	Yes
92	6/9/2019	Yes
92	10/25/2019	Yes
93	3/1/2019	Yes
93	6/24/2019	Yes
93	7/1/2019	Yes
93	10/28/2019	Yes
94	1/31/2019	Yes
94	2/28/2019	Yes
94	3/3/2019	Yes

AQ-43 The duct burner of the cogeneration units 1, 2, 3, 4 and 5 shall not be fired during the startup mode of operation.

Verification: The owner/operator shall maintain an operation log for the facility which, at minimum will identify the hours of operation of the duct burners. The owner/operator shall submit in its Annual Compliance Report to the CEC a summary of the operational log demonstrating compliance with this condition.

Response: During the 2019 calendar year, APPC/Watson had 13 startups. Duct burners were not fired during the startup mode of operation for any of the 13 startup events. Startup dates shown in the table below.

AQ-43: Startup Summary - 2019		
Unit	**Date**	**Duct Fuel After Startup**
91	4/23/2019	Yes
91	7/14/2019	Yes
91	9/8/2019	Yes
92	5/13/2019	Yes
92	6/9/2019	Yes
92	10/25/2019	Yes
93	3/1/2019	Yes
93	6/24/2019	Yes
93	7/1/2019	Yes
93	10/28/2019	Yes
94	1/31/2019	Yes
94	2/28/2019	Yes
94	3/3/2019	Yes

BIOLOGICAL RESOURCES CONDITIONS OF CERTIFICATION

BIO-3 APPC shall monitor daily the zinc content, total volume and duration of all discharges from the ARC0 Watson Refinery into the Dominguez Channel, which contain commingled cogeneration project cooling tower blowdown. The initial period of monitoring shall cover the first three years during which water is discharged into the Dominguez Channel. The need for subsequent monitoring will be determined by the CEC based on an evaluation of the zinc content of samples collected during the first three years of discharge. APPC shall take remedial action if monitored zinc levels exceed the EPA standard for salt water aquatic life.

Verification: APPC shall notify the CEC within 30 days of any discharge which exceeds EPA levels for zinc describing the cause of the exceedance and action taken to prevent similar occurrences. APPC shall submit written reports for the first three years during which APPC discharges to Dominguez Channel. The report shall contain the date, time, volume, duration and zinc content of the discharge. These reports can be appended to the annual compliance report for the years during which discharges to Dominguez Channel occurred. The reports shall be Submitted to the CEC and the Port of Los Angeles.

Response: APPC/Watson does not have its own NPDES permit. Low Volume Waste (LVW; boiler blowdown) from the Cogen are authorized to be discharged to the Dominguez Channel under the Tesoro Los Angeles Refinery – Carson Operations NPDES permit (Order No. R4-2015-0295, NPDES No. CA0000680). Zinc is listed in the permit with an effluent limitation; therefore, a discharge would be analyzed for zinc. A copy of the annual NPDES report has been included at the end of this annual compliance report.

COGENERATION CONDITIONS OF CERTIFICATION

COG-1 ARCO Petroleum Products Company (APPC) shall operate the facility as a cogeneration system in accordance with the definition of cogeneration contained in PRC Section 25134(a) and (b) and Title 18 CFR, Section 292.205(a)(1) and (a)(2)(i)(B).

Verification: APPC shall file with the CEC during each calendar year an annual report in which monthly average values of the following plant operating parameters will be given:

a. Gas turbine, MW (gross) at the generator terminals for each unit
b. Gas turbine operating hours for each unit
c. For each CTG and each HRSG duct burner provide fuel input including:
    - type, natural gas, refinery gas or butane
    - rate, lb/hr
    - heating value (low), Btu/lb
    - firing hours
d. Inlet air flow, lb/hr
e. Combustion turbine exhaust gas temperature, Deg F
f. NOx steam injection rate, lb/hr
g. Stack exiting flue gas temperature, Deg F
h. Steam turbine, MW (gross)

i. Steam turbine operating hours
j. Plant auxiliary load, MW (total)
k. For the process steam:
    - process steam demand, lb/hr
    - demand hours
    - process steam temperature (Deg F), quality (%), pressure (PSIA)and enthalpy (Btu/lb) at plant boundary
l. Feedwater rate (lb/hr), temperature (Deg F)
m. Condensate return rate (lb/hr), temperature (Deg F)
n. Process steam from auxiliary boilers, lb/hr; auxiliary boiler's operating hours

Or APPC may, with CEC concurrence, submit the following operating parameters:

o. Monthly fuel use (includes quantity and Btu value) as evidenced by an invoice from the gas supplier
p. Monthly electrical sales (includes kWh) as evidenced by an invoice to Southern California Edison Company
q. Monthly steam sales (includes quantity and Btu value) as evidenced by an invoice (or equivalent) to APPC
r. If the rate of items o, p, or q above differs by more than +5, +15, and +10 percent, respectively, from rated conditions, APPC shall provide, at the specific written request of the CEC Staff, an explanation of such anomaly
s. Feedwater rate (lb/hr) and temperature (Deg F)
t. Condensate return rate (lbs/hr) and temperature (Deg F)
u. Process steam from auxiliary boilers, lb/hr; auxiliary boiler's operating hours.

Not less than thirty (30) days prior to the scheduled date for the CEC Decision on the AFC, APPC shall notify the CEC of APPC's preference for either conditions a-n, or o-u.

This report shall also provide information for each month on any partial or total power and/or process steam production curtailment, including duration of curtailment and reasons for curtailment. The report shall be certified by the plant manager.

Response: Monthly average values of the above listed plant operating parameters are included in the tables below. Please note that parameter n. (auxiliary boilers) is not applicable, as there are no auxiliary boilers at this location.

COG-1 (a-n)	Unit 91													
Subsection:	a	b	c								d	e	f	g
			GTG					HRSG			Inlet	GTG	DeNOx	Stack
			NG/RFG	Butane	Total	HHV	Firing	NG/RFG	HHV	Firing	Air Flow	Exhaust	Steam	Exhaust
	MW	Op Hours	lb/hr	lb/hr	lb/hr	BTU/lb	Hours	lb/hr	BTU/lb	Hours	lb/hr	deg F	lb/sec	deg F
Jan-19	88.5	745	41132	950	41449	19708	745	137.5	19708	745	2293699	1026	14.6	335
Feb-19	89.0	673	40799	650	41449	20256	673	58.8	20256	648	2293699	1017	14.0	338
Mar-19	88.0	744	41824	589	41449	19998	744	75.5	19998	744	2293699	1023	14.0	338
Apr-19	72.0	670	40799	650	41449	22667	670	3.2	22667	261	2293699	854	14.0	300
May-19	86.6	745	40799	650	41449	22734	745	34.8	22734	477	2293699	1017	14.0	339
Jun-19	86.3	721	40652	958	41449	20558	721	114.0	20558	721	2293699	1029	14.0	336
Jul-19	79.8	711	37973	1179	41449	20826	711	70.9	20826	739	2293699	981	12.7	330
Aug-19	83.9	745	40679	827	41449	20376	745	85.4	20376	745	2293699	1031	14.1	337
Sep-19	80.2	697	40765	650	41449	20644	697	55.3	20644	595	2293699	1000	14.0	334
Oct-19	84.7	745	40699	1471	42170	20577	745	132.4	20577	742	2293699	1029	14.0	337
Nov-19	86.1	722	41451	1157	42608	20486	722	77.8	20486	710	2293699	1022	14.3	339
Dec-19	87.2	744	41662	1173	42835	20512	744	76.6	20512	744	2293699	1020	14.3	339
COG-1 (a-n)	Unit 92													
Subsection:	a	b	c								d	e	f	g
			GTG					HRSG			Inlet	GTG	DeNOx	Stack
			NG/RFG	Butane	Total	HHV	Firing	NG/RFG	HHV	Firing	Air Flow	Exhaust	Steam	Exhaust
	MW	Op Hours	lb/hr	lb/hr	lb/hr	BTU/lb	Hours	lb/hr	BTU/lb	Hours	lb/hr	deg F	lb/sec	deg F
Jan-19	87.9	745	41974	2105	44538	19708	745	140.2	19708	745	2293699	1032	14.8	345
Feb-19	88.7	673	41950	2311	44538	20256	673	61.1	20256	672	2293699	1027	14.8	347
Mar-19	87.7	744	42059	2588	44538	19998	744	73.2	19998	742	2293699	1031	14.8	347
Apr-19	85.7	721	41950	2588	44538	22667	721	52.0	22667	653	2293699	1021	14.8	347
May-19	76.2	663	41950	2588	44538	22734	663	51.3	22734	609	2293699	929	14.8	323
Jun-19	84.2	701	41537	2344	44538	20558	701	97.8	20558	710	2293699	1007	14.7	343
Jul-19	85.3	745	39507	1865	44538	20826	745	85.8	20826	745	2293699	1039	14.5	346
Aug-19	85.4	745	41743	2325	44538	20376	745	88.5	20376	745	2293699	1040	14.7	347
Sep-19	84.8	721	41950	2588	44538	20644	721	86.5	20644	721	2293699	1042	14.8	347
Oct-19	75.0	324	22786	1461	24246	20577	324	35.4	20577	467	2293699	697	8.1	198
Nov-19	80.0	722	38339	2505	40844	20486	722	66.3	20486	722	2293699	973	12.7	342
Dec-19	82.6	744	39257	2505	41762	20512	744	77.2	20512	744	2293699	978	13.1	342
COG-1 (a-n)	Unit 93													
Subsection:	a	b	c								d	e	f	g
			GTG					HRSG			Inlet	GTG	DeNOx	Stack
			NG/RFG	Butane	Total	HHV	Firing	NG/RFG	HHV	Firing	Air Flow	Exhaust	Steam	Exhaust
	MW	Op Hours	lb/hr	lb/hr	lb/hr	BTU/lb	Hours	lb/hr	BTU/lb	Hours	lb/hr	deg F	lb/sec	deg F
Jan-19	82.0	745	40390	1812	43004	19708	745	145.3	19708	745	2293699	1021	13.9	342
Feb-19	82.7	665	40658	2234	43004	20256	665	68.4	20256	665	2293699	1014	14.0	345
Mar-19	79.9	734	40742	2262	43004	19998	734	83.7	19998	733	2293699	991	13.9	342
Apr-19	78.4	721	40742	2262	43004	22667	721	56.7	22667	721	2293699	1013	14.0	346
May-19	78.3	745	40742	2262	43004	22734	745	68.3	22734	745	2293699	1013	14.0	345
Jun-19	70.2	654	35801	2072	43004	20558	654	88.0	20558	673	2293699	928	12.2	332
Jul-19	77.8	739	37298	1858	43004	20826	739	84.9	20826	745	2293699	994	12.6	338
Aug-19	79.8	745	40398	2078	43004	20376	745	91.4	20376	745	2293699	1022	13.9	346
Sep-19	77.8	721	40742	2262	43004	20644	721	92.6	20644	721	2293699	1026	14.0	346
Oct-19	77.2	733	38711	1940	40651	20577	733	131.3	20577	745	2293699	1026	13.1	345
Nov-19	81.1	722	40216	1592	41808	20486	722	84.0	20486	722	2293699	1018	13.6	347
Dec-19	81.4	744	40219	1844	42063	20512	744	80.5	20512	744	2293699	1017	13.5	348
COG-1 (a-n)	Unit 94													
Subsection:	a	b	c								d	e	f	g
			GTG					HRSG			Inlet	GTG	DeNOx	Stack
			NG/RFG	Butane	Total	HHV	Firing	NG/RFG	HHV	Firing	Air Flow	Exhaust	Steam	Exhaust
	MW	Op Hours	lb/hr	lb/hr	lb/hr	BTU/lb	Hours	lb/hr	BTU/lb	Hours	lb/hr	deg F	lb/sec	deg F
Jan-19	31.5	277	17282	188	41070	19708	277	42.0	19708	599	2293699	418	6.2	193
Feb-19	88.4	664	41104	0	41070	20256	664	56.2	20256	662	2293699	1021	14.3	344
Mar-19	81.0	693	41070	170	41070	19998	693	67.5	19998	691	2293699	962	14.2	329
Apr-19	84.1	721	41070	0	41070	22667	721	44.0	22667	547	2293699	1012	14.2	347
May-19	84.2	745	41070	0	41070	22734	745	39.0	22734	490	2293699	1014	14.2	348
Jun-19	84.1	721	40584	300	41070	20558	721	88.0	20558	539	2293699	1028	14.0	346
Jul-19	82.3	745	38453	547	41070	20826	745	81.4	20826	745	2293699	1031	13.1	347
Aug-19	82.5	745	40628	683	41070	20376	745	88.6	20376	745	2293699	1032	14.1	348
Sep-19	82.0	721	41070	0	41070	20644	721	87.0	20644	721	2293699	1033	14.2	348
Oct-19	83.5	745	40222	770	40992	20577	745	133.0	20577	745	2293699	1032	13.8	348
Nov-19	85.1	722	40948	419	41367	20486	722	79.9	20486	722	2293699	1026	14.0	350
Dec-19	86.4	744	41276	613	41889	20512	744	76.3	20512	744	2293699	1023	14.1	351

COG-1 (a-n)	STG 1		STG 2		Plant Load	600# Steam				150# Steam			
Subsection:	h	i	h	i	j	k				k			
	MW	Hours	MW	Hours	MW	mlb/hr	Hours	PSIG	deg F	mlb/hr	Hours	PSIG	deg F
Jan-19	0	0	20	745	83	1057	744	621	750	17	744	161	494
Feb-19	0	17	18	666	84	1075	672	622	750	10	672	161	471
Mar-19	3	105	15	657	80	1112	744	621	750	9	744	161	482
Apr-19	25	721	15	608	51	733	720	621	746	17	720	156	472
May-19	24	745	13	540	60	820	744	621	748	9	744	162	484
Jun-19	21	721	0	0	84	1135	720	622	750	6	720	162	477
Jul-19	22	745	0	0	82	1110	744	622	750	8	744	162	501
Aug-19	20	745	0	0	85	1132	744	622	750	10	744	162	510
Sep-19	8	270	14	493	86	1085	720	621	750	10	720	161	493
Oct-19	16	605	4	139	88	1018	744	619	750	10	744	161	498
Nov-19	11	393	6	259	85	1064	720	620	750	11	720	161	494
Dec-19	8	327	10	418	87	1090	744	620	750	13	744	162	500

COG-1 (a-n)	Total Feedwater		Total Condensate		Aux
Subsection:	l	l	m	m	n
	mlb/hr	deg F	mlb/hr	deg F	
Jan-19	1621	250	376	-	N/A
Feb-19	1716	250	401	-	N/A
Mar-19	1668	250	549	-	N/A
Apr-19	1508	250	370	-	N/A
May-19	1562	250	387	-	N/A
Jun-19	1683	250	497	-	N/A
Jul-19	1662	250	492	-	N/A
Aug-19	1695	250	451	-	N/A
Sep-19	1647	250	430	-	N/A
Oct-19	1511	250	439	-	N/A
Nov-19	1650	250	430	-	N/A
Dec-19	1647	250	450	-	N/A

DEMAND CONFORMANCE CONDITIONS OF CERTIFICATION

DC-2 The Energy Commission shall retain jurisdiction to require ARCO to periodically report on the performance of its facility and the payments made by SCE to purchase power from the facility.

Verification: On an annual basis following construction, ARCO shall report the monthly generation provided to SCE and the monthly payments received from SCE. Payments shall be disaggregated by capacity (firm and as-available), start-up and energy. ARCO shall provide the CEC a copy of the Prescribed Dispatch Schedule for the facility.

Response: Monthly values for generation provided to SCE and monthly payments disaggregated by capacity (firm and as-available) are included in the table below. Watson no longer follows a Prescribed Dispatch Schedule from SCE. All power is baseload firm under current PPA.

DC-2: Event Summary 2019				
Month	**SCE Sales Volume** *MWh*	**Energy Payment** *$*	**Capacity Payment - Firm** *$*	**Capacity Payment - As Available** *$*
Jan-19	160,490	$7,770,399.41	$249,377.88	$0.00
Feb-19	180,502	$16,616,076.38	$359,000.47	$0.00
Mar-19	194,063	$8,908,891.29	$356,872.02	$0.00
Apr-19	210,980	$6,267,297.78	$359,000.47	$0.00
May-19	217,502	$6,328,373.45	$359,000.47	$0.00
Jun-19	178,007	$4,864,266.48	$3,790,011.12	$0.00
Jul-19	188,273	$5,888,458.83	$3,790,656.14	$0.00
Aug-19	189,329	$6,096,157.53	$3,790,946.48	$0.00
Sep-19	180,288	$6,797,577.28	$3,790,382.20	$0.00
Oct-19	162,394	$6,228,362.51	$330,716.86	$0.00
Nov-19	186,984	$8,730,196.03	$356,824.88	$0.00
Dec-19	194,415	$10,251,544.03	$357,289.48	$0.00
Total	**2,243,226**	**$94,747,601.00**	**$17,890,078.47**	**$0.00**

PUBLIC HEALTH CONDITIONS OF CERTIFICATION

PH-2 APPC shall comply with all emission regulations established by the U.S. Environmental Protection Agency (EPA), South Coast Air Quality Management District (SCAQMD), and the California Air Resources Board (CARB) regarding the use of a non-chromium treatment method as an anti-fouling/corrosive agent in the cooling towers, and the prohibition of Hexavalent Chromium additives.

Verification: APPC shall submit to the CEC, within the Annual Compliance Report, documentation of their compliance with all EPA, SCAQMD, and CARB emission regulations for use of antifouling/corrosive agents in the cooling towers.

Response: In compliance with EPA, SCAQMD and CARB emission regulations for the use of antifouling/corrosive agents in cooling towers, APPC/Watson does not use any chemical products that contain chromium in its cooling towers. It is currently using Nalco 3D TRASAR 3DT199, a non-chromium product, as an anti-fouling agent in its cooling towers.

POWER PLANT RELIABILITY CONDITIONS OF CERTIFICATION

RELI-3 APPC shall file with the CEC an annual report documenting the plant availability and capacity factors achieved.

Verification: Beginning with commercial operation, APPC shall file an annual report containing the following:

a. Operating hours, outage hours, cause of outage and downtime for each piece of major equipment including the following:
   - Combustion turbine/generators - Heat recovery steam generators
   - Feedwater pumps

- Steam turbine/generators
- Condensers
- Condensate pumps
- Cooling water pumps
- Controls

b. For each forced outage, a precise identification of the equipment whose failure resulted in the forced outage and the resulting forced outage hours.
c. Identification of equipment or other causes (such as curtailment) for which planned outage was instituted in any given month.
d. Annual plant availability and capacity factors, per EPRI definitions.

Response: Information regarding operating hours, outage causes, downtime and annual plant availability and capacity factors are shown in the two tables below.

RELI-3: Power Plant Reliability - 2019

CEC Generator Unit ID	Event Type	Start Date	End Date	Duration	Cause Code	Verbal Description
GN91	MO - Maintenance	04/16/2019 21:02 PPT	04/17/2019 14:00 PPT	16:58	3970 - Distributive Control System (DCS)	Replace bad PDAO card.
GN91	ME - Maintenance Extension	04/17/2019 14:00 PPT	04/18/2019 09:23 PPT	19:23	5414 - Compressor diaphragms/vanes	Inlet guide vane hydraulic oil leak repair.
GN91	MO - Maintenance	07/12/2019 23:17 PPT	07/14/2019 09:37 PPT	34:20:00	5013 - Compressor casing and bolts	Added seal to compressor casing to improve performance.
GN91	U1 - Forced - Immediate	09/07/2019 12:19 PPT	09/08/2019 12:39 PPT	24:20:00	5001 - Inlet air vanes / nozzles	Tripped on inlet guide vane reading malfunction.
GN92	MO - Maintenance	05/09/2019 23:49 PPT	05/13/2019 10:42 PPT	82:53:00	3834 - Auxiliary boiler tube leaks	Boiler tube leak repair.
GN92	U2 - Forced - Delayed	06/08/2019 14:27 PPT	06/09/2019 10:48 PPT	20:21	5110 - Lube oil system - general	Lube oil leak caused fire in turbine compartment.
GN92	PO - Planned	10/11/2019 21:22 PPT	10/25/2019 18:13 PPT	332:51:00	5670 - Hot end inspection A	Hot Gas Path Inspection
GN93	U2 - Forced - Delayed	02/28/2019 16:00 PPT	03/01/2019 10:25 PPT	18:25	5041 - Fuel piping and valves A	Butane balance line on control valve leak
GN93	U1 - Forced - Immediate	06/24/2019 08:29 PPT	06/25/2019 02:49 PPT	18:20	3649 - Other AC instrument power problems	Loss of control cab power while working on pump caused unit to trip offline.
GN93	MO - Maintenance	06/28/2019 08:29 PPT	07/01/2019 05:36 PPT	69:07:00	5013 - Compressor casing and bolts	Added compressor casing seal.
GN93	U1 - Forced - Immediate	10/28/2019 10:56 PPT	10/28/2019 22:17 PPT	11:21	5041 - Fuel piping and valves A	Tripped after transferring to butane
GN94	PO - Planned	01/11/2019 21:07 PPT	01/22/2019 14:36 PPT	257:29:00	5670 - Hot end inspection A	Hot Gas Path Inspection
GN94	PE - Planned Extension	01/22/2019 14:36 PPT	01/31/2019 09:34 PPT	210:58:00	3624 - Generator Voltage Supply System	Generator ground issue. Needed rewinding.
GN94	MO - Maintenance	02/28/2019 11:58 PPT	02/28/2019 22:50 PPT	10:52	3340 - LP heater tube leaks	Economizer tube leak repair. Needed to be restarted early after another unit tripped
GN94	MO - Maintenance	03/01/2019 11:45 PPT	03/03/2019 16:00 PPT	52:15:00	3340 - LP heater tube leaks	Rescheduled economizer leak repair after GTG 93 restarted.
GN95	RS - Reserve Shutdown	01/01/2019 00:00 PPT	02/27/2019 15:58 PPT	1383:58:00	0000 - Reserve shutdown	
GN95	RS - Reserve Shutdown	02/28/2019 10:14 PPT	03/22/2019 16:07 PPT	532:53:00	0000 - Reserve shutdown	
GN95	RS - Reserve Shutdown	03/22/2019 18:15 PPT	03/27/2019 15:42 PPT	117:27:00	0000 - Reserve shutdown	
GN95	RS - Reserve Shutdown	09/11/2019 10:30 PPT	09/20/2019 08:48 PPT	214:18:00	0000 - Reserve shutdown	
GN95	RS - Reserve Shutdown	09/21/2019 10:01 PPT	10/06/2019 18:09 PPT	368:08:00	0000 - Reserve shutdown	
GN95	RS - Reserve Shutdown	11/17/2019 08:23 PPT	12/18/2019 09:02 PPT	744:39:00	0000 - Reserve shutdown	
GN96	RS - Reserve Shutdown	03/28/2019 09:49 PPT	04/05/2019 16:26 PPT	198:37:00	0000 - Reserve shutdown	
GN96	RS - Reserve Shutdown	05/23/2019 13:24 PPT	09/10/2019 12:00 PPT	2638:36:00	0000 - Reserve shutdown	
GN96	RS - Reserve Shutdown	10/07/2019 06:33 PPT	11/17/2019 09:29 PPT	987:56:00	0000 - Reserve shutdown	
GN96	RS - Reserve Shutdown	12/18/2019 10:34 PPT	01/01/2020 00:00 PPT	325:26:00	0000 - Reserve shutdown	

RELI-3: Operating Hours and Availiability - 2019

Generator Unit ID	2019 Operating Hours	2019 Availability
GN91	8,665	98.9%
GN92	8,323	95.1%
GN93	8,658	98.8%
GN94	8,231	94.1%
GN95	5,373	61.0%
GN96	4,608	53.0%
2019 Annual Plant Availability		83.47%
2019 Capacity Factor		84.38%

PUBLIC AND WORKER SAFETY CONDITIONS OF CERTIFICATION

SAFETY-11 APPC and the Los Angeles County Fire Department shall annually reexamine the fire protection program.

Verification: APPC shall note and summarize the joint re-examination to the fire protection program in its annual compliance report to the CEC.

Response: APPC/Watson and a 3rd-party contractor who specializes in fire protection systems perform bi-annual inspections of all five zones for each GTG & Butane Skid. Additionally, monthly inspections are performed on our area monitors and extinguishers.

SAFETY-13 APPC shall facilitate onsite worker safety inspections conducted by Cal/DOSH during construction and operation of the facility when an employee complaint has been received.

Verification: APPC shall request Cal/DOSH to notify the CEC in writing in the event of a violation that will involve Cal/DOSH action affecting the construction and operation schedule and shall notify the CEC of the necessary corrective action. APPC shall note any Cal/DOSH inspections and actions in its periodic compliance reports.

Response: In the calendar year of 2019, APPC/Watson Cogen has not had any violations or nor received any complaints that would need to be reported to Cal/DOSH.

TRAFFIC AND TRANSPORTATION CONDITIONS OF CERTIFICATION

TRANS-1 ARCO Petroleum Products Corporation (APPC) shall comply with the California Department of Transportation (Caltrans) and Los Angeles County restrictions on oversize or overweight vehicles using state, county and City of Carson roadways. APPC shall obtain overload permits, as necessary, from Caltrans and the County of Los Angeles.

Verification: APPC shallow in its annual compliance report, notify the California Energy Commission (CEC) of any overload permits obtained from Caltrans and the County of Los Angeles.

Response: In the 2019 calendar year, APPC/Watson is not aware of any overload permits being obtained from Caltrans and the County of Los Angeles.

TRANS-2 APPC shall comply with the City of Carson encroachment and excavation permit and franchise requirements for installation of utility services (transmission line, natural gas pipeline) of the proposed project in or over city-owned rights-of-way.

Verification: APPC shall, in its annual compliance report, notify the CEC that the requirements for obtaining encroachment and excavation permits from the City of Carson have been satisfied. APPC shall file any required or requested information with the City of Carson.

Response: In the 2019 calendar year, APPC/Watson is not aware of any filings for encroachment and/or excavation permits from the City of Carson.

WASTE MANAGEMENT CONDITIONS OF CERTIFICATION

WASTE-5 If APPC intends to store hazardous wastes on-site for more than 90 days, it shall obtain a determination from DHS that the requirements of a hazardous waste facility have been satisfied. Storage of such wastes shall be in accordance with DHS regulations. APPC shall file any required or requested information with the Los Angeles County Fire Department, Hazardous Materials Unit.

Verification: APPC shall notify the CEC in the Annual Compliance Report if APPC applies for, or obtains, a Hazardous Waste Facility permit.

Response: APPC/Watson does not store bulk hazardous waste onsite for more than 90 days and therefore does not require a Hazardous Waste Facility Permit.

WASTE-6 APPC shall ensure that hazardous wastes are hauled by a permitted hazardous wastes hauler and disposed of in a proper manner at a site permitted by DHS and the Regional Water Quality Control Board, Los Angeles Region, for the disposal of hazardous wastes.

Verification: In the Annual Compliance Report, APPC shall submit to the CEC a verification that hazardous wastes have been transported by a DHS-licensed hazardous waste hauler, and that the wastes were disposed of at appropriate sites.

Response: Hazardous waste generated by APPC/Watson is transported by a DTSC licensed hazardous waste hauler and is disposed of in a proper manner at permitted hazardous waste facilities.

WATER QUALITY CONDITIONS OF CERTIFICATION

WQ-4 The project owner shall provide a copy of the revised or new National Pollutant Discharge Elimination System Permit for the Watson Cogeneration Project and the ARCO Los Angeles Refinery approved by the Los Angeles Regional Water Quality Control Board to the CEC Compliance Project Manager. The project owner shall also provide a copy of the annual monitoring report required by the NPDES Permit for all wastewater, with the exception of stormwater runoff, that is commingled with cooling tower blowdown from the Watson Cogeneration Plant and discharged to the Dominguez Channel.

Verification: The project owner shall provide a copy of the new NPDES Permit to the CEC Compliance Project Manager within one month of its approval by the Los Angeles Regional Water Quality Control Board. Annual NPDES Permit monitoring reports shall be provided to the CEC Compliance Project Manager with the annual compliance report.

Response: Annual NPDES reports for the Carson facility are submitted electronically on the California Integrated Water Quality System (CIWQS). A copy of the annual NPDES report has

been included at the end of this annual compliance report. A copy of the updated NPDES permit can be provided if requested by the CEC.

WATER RESOURCES CONDITIONS OF CERTIFICATION

WATER-3 The project owner will demonstrate that all feasible and practical measures to reduce additional water demand have been incorporated into the design of the fifth train. The measures may include, but are not limited to, recycling and reuse.

Verification: The project owner shall submit a report discussing all measures, whether adopted or not, considered to reduce project water demand. This report shall be contained in the first annual compliance report following the start of operation of the fifth train.

Response: Water-3 is not applicable as APPC/Watson did not construct a fifth train.

Robert Nguyen
Environmental Department

Tesoro Refining & Marketing Company LLC
A subsidiary of Marathon Petroleum Corporation

Los Angeles Refinery – Carson Operations
2350 E. 223rd Street
Carson, California 90810
310-816-8100

January 24, 2020

NPDES Permit No. CA0000680
Order No. R4-2015-0259

VIA Certified Mail
Return Receipt Requested

NO DISCHARGE DURING REPORTING PERIOD

California Regional Water Quality Control Board
Los Angeles Region
320 W. 4th Street, Suite 200
Los Angeles, CA 90013

Re: **2019 Annual NPDES Self-Monitoring Report**
Tesoro Refining and Marketing Company LLC
Los Angeles Refinery – Carson Operations
1801 East Sepulveda Boulevard, Carson, California
Reporting Period: January 1, 2019 – December 31, 2019

To Whom It May Concern:

Please find enclosed the Annual NPDES Self-Monitoring Report for the Tesoro Los Angeles Refinery – Carson Operations for the period of January 1, 2019 through December 31, 2019.

During the 2019 reporting period all process wastewater and wastewater commingled with storm water was discharged to the Los Angeles Sanitation District (LACSD) in compliance with Industrial Wastewater Permit No. 21299. Discharge of Low Volume Waste, NPDES Oder No. R4-2015-0259, did not commence during the 2019 reporting period to the Dominguez Channel from any of the permitted Outfalls.

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.

If you have any questions, please contact me by phone at 310-847-5645 or by email at RTNguyen@marathonpetroleum.com.

Robert Nguyen
Environmental Manager

Enclosure

cc: File 4E03

ecc: Q:\EHNS\ENV\ENV FILES\4 - WATER\4E - REPORTING - NOTIFICATIONS\4E2a - NPDES CA0000680 (WDR) - Compliance File 5424\Reporting Period 2016-2021\2019\Annual Report

NPDES Annual Self-Monitoring Report

Tesoro Refining & Marketing Company LLC
Tesoro Los Angeles Refinery – Carson Operations
1801 East Sepulveda Boulevard
Carson, California 90749

NPDES Permit No. CA0000680
Order No. R4-2015-0259

Reporting Period:
January 1, 2019 – December 31, 2019

Report Prepared On:
January 24, 2020

Table of Contents

Attachments

Part 1 – Compliance Summary

1. NPDES Permit Compliance Summary

   There were no discharges of Low Volume Wastes through Discharge Points 001, 002, 003, 004 or 005 or Process Wastewater Commingled with Storm Water and Boiler Blowdown through Discharge Points 003 or 004 to the Dominguez Channel at the Los Angeles Refinery – Carson Operations (LARC) in calendar year 2019. Therefore, there were no violations of the discharge limits or Waste Discharge Requirements (WDRs).

2. NPDES Incident Release Report

   See Table 1 for any incidental releases to the Dominguez Channel Estuary during calendar year 2019.

TABLE 1: 2019 Spills to the Dominguez Channel

Date	Time	Material	Spill Amount	Comments
1/11/2019	14:15	Sulfur Plant Soot	8.3 lbs	A vessel was over pressured with nitrogen and released built-up carbon soot.
5/9/2019	11:45	Hydrocarbon Sheen	Sheen	Source was not identified
10/3/2019	9:20	Hydrocarbon Sheen	Sheen	LAR was not identified as the source

Part 2 – Summary of Monitoring Parameters

1. Presentation of Effluent Monitoring Data

   There were no discharges of Low Volume Wastes through Discharge Points 001, 002, 003, 004 or 005 or Process Wastewater Commingled with Storm Water and Boiler Blowdown through Discharge Points 003 or 004 to the Dominguez Channel Estuary at LARC in calendar year 2019. Therefore, no effluent monitoring was required.

2. Changes in Discharge

   There were no discharges of Low Volume Wastes through Discharge Points 001, 002, 003, 004 or 005 or Process Wastewater Commingled with Storm Water and Boiler Blowdown through Discharge Points 003 or 004 to the Dominguez Channel at LARC in

calendar year 2019. There were no changes in the discharge as described in Order R4-2015-0259.

Part 3 – Other Monitoring

1. SWPPP, BMPP, and Spill Contingency Plan and Effectiveness Report

   There were no discharges of Low Volume Wastes through Discharge Points 001, 002, 003, 004 or 005 or Process Wastewater Commingled with Storm Water and Boiler Blowdown through Discharge Points 003 or 004 to the Dominguez Channel Estuary at LARC in calendar year 2019. Therefore, there were no issues with the effectiveness of the SWPPP, BMPP, or Spill Contingency Plan.

   However, internal policy dictates the annual review of all facility environmental plans. The Storm Water Pollution Prevention Plan (SWPPP) and Best Management Practices Plan (BMPP) were reviewed in July 2019. The Spill Contingency Plan (Spill Prevention Control & Countermeasure (SPCC) Plan) was reviewed in September 2019 with amendments planned for completion by July 31, 2020.

2. Chemical Use Report

   See Table 2 for the chemical usage report summarizing the quantities of all chemicals which are used at the facility and which are discharged or have the potential to be discharged. There were no discharges of Low Volume Wastes, including chemicals, through Discharge Points 001, 002, 003, 004 or 005 to the Dominguez Channel Estuary at LARC in calendar year 2019. The Refinery diverts cooling tower blowdown, boiler blowdown, and commingled storm water / wastewater to the wastewater treatment system before discharging to the Los Angeles County Sanitation District (LACSD Permit No. 21299).

TABLE 2: Chemical Usage Report

Product ID	Chemical Name / Common Name	Amount	Units
3DT129	Corrosion Inhibitor/Phosphate	134,188	LBS
Ultam 120	Neutralizing Amine	330,980	LBS
7357.33	Molybdate	18,869	LBS
71D5Plus.11	CW Antifoam	10,1075	LBS
73550	Biodispersant/ Surfactant	44,666	LBS
7330	Non-oxidizing Biocide/Isothiazolin	1,707	LBS
1338	Biocide/Bromine	40,279	LBS

TABLE 2: Chemical Usage Report			
Product ID	**Chemical Name / Common Name**	**Amount**	**Units**
8735	BFW Alkalinity	69,340	LBS
1742.33	Scale Inhibitor	57,446	LBS
72350.33	Neutralizing Amine	9,610	LBS
1720.91	Oxygen Scavanger	69,005	LBS
22341.91	Scale Inhibitor	65,424	LBS
352.33	Neutralizing Amine	4,730	LBS
EC1001A.31	Alkalinity Source	76,175	LBS
22310	NexGuard® 22310 / Boiler Water Internal Treatment	99,033	LBS
3DT180	3D Trasar™ 3DT180 / Cooling Water Treatment	6,316	LBS
3DT304	3D Trasar™ 3DT304 / Cooling Water Treatment	402,417	LBS
3DT184	3D Trasar™ 3DT184 / Corrosion Inhibitor	5,209	LBS
3DT199	3D Trasar™ 3DT199 / Cooling Water Treatment	8,342	LBS
3DT391	3D Trasar™ 3DT391	36,603	LBS
Eliminox	NALCO® Eliminox / Oxygen Scavenger	68,567	LBS
N/A	Bleach[1]	4,094,166	LBS
N/A	Sulfuric Acid[2]	1,187	LBS

3. Receiving Water Monitoring

   There were no discharges of Low Volume Wastes through Discharge Points 001, 002, 003, 004 or 005 or Process Wastewater Commingled with Storm Water and Boiler Blowdown through Discharge Points 003 or 004 to the Dominguez Channel Estuary at LARC in calendar year 2019. Therefore, no receiving water sampling and associated visual observation was required.

   Visual observations of the upstream and downstream receiving water sampling points was performed during 2019. Visual observations were performed at least monthly during

[1] This quantity assumes 20% of total annual facility bleach usage for use in cooling towers and boilers.
[2] This quantity assumes 1% of total annual facility sulfuric acid usage for use in cooling towers and boilers.

January through December. No findings related to facility operations were reported on the visual observation logs.

4. Annual Comprehensive Compliance Evaluation

   The Annual Comprehensive Compliance Evaluation (ACCE) was conducted by qualified personnel on January 21, 2020. See Attachment 1 for documentation.

5. Storm Water / Rainfall Monitoring

   The daily rainfall data for calendar year 2019 are included in Attachment 2.

6. Sediment Monitoring

   Although there were no discharges of Low Volume Wastes through Discharge Points 001, 002, 003, 004 or 005 or Process Wastewater Commingled with Storm Water and Boiler Blowdown through Discharge Points 003 or 004 to the Dominguez Channel at LARC in calendar year 2019, sediment monitoring was conducted on September 25-26, and December 16, 2019. A copy of the report is included in Attachment 3.

Certification

We report that there were no discharges of Low Volume Wastes through Discharge Points 001, 002, 003, 004 or 005 or Process Wastewater Commingled with Storm Water and Boiler Blowdown through Discharge Points 003 or 004 at LARC to the Dominguez Channel during the reporting period of January 1, 2019 – December 31, 2019, under the above-mentioned order.

"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."

Robert Nguyen
(Print Name)

Environmental Manager
(Title)

Certified via CIWQS
(Signature)

Attachment 1

FORM 3 – ANNUAL COMPREHENSIVE FACILITY COMPLIANCE EVALUATION (ANNUAL EVALUATION)

Evaluation Date:	1/24/20	**Inspector's Name:**	Amber Ballrot Nate Burk	**Inspector's Title:**	Env. Compliance Specialist Water Compliance Specialist	**Inspector's Signature:**	

Has it been 8-16 months since the last Annual Evaluation?	☑ YES ☐ NO ☐ N/A
Was a review of all sampling, visual observations, and inspection records conducted during the previous reporting year?	☑ YES ☐ NO ☐ N/A
Were all industrial activities and associated potential pollutants sources inspected for evidence of, or the potential for, entering the storm water conveyance system?	☑ YES ☐ NO ☐ N/A
Were all drainage areas previously identified as having no exposure to industrial activities and materials inspected?	☑ YES ☐ NO ☐ N/A
Was all equipment used to implement BMPs inspected?	☑ YES ☐ NO ☐ N/A
Were all BMPs inspected?	☑ YES ☐ NO ☐ N/A
Was the Storm Water Pollution Prevention Plan and Monitoring Implementation Plan reviewed?	☑ YES ☐ NO ☐ N/A
Are revisions to the Storm Water Pollution Prevention Plan and Monitoring Implementation Plan needed?	☑ YES ☐ NO ☐ N/A

Section/Page Number	**Date Revised or Planned Date of Revision**	**Revision Description**
SWPPP 3.1	7/15/2019	Modify Pollution Prevention Team
SWPPP 4.0	"	Modify discharge point information
SWPPP 8.2.2, 8.2.3 8.0, 8.3	"	Modify BMPs, adding Level 2 BMPs
MIP. 2.0, 2.1, 2.7	"	Modify discharge and sample point explanations
MIP 4.1	"	Add watershed impairment assessment

FORM 3 (Continued) – ANNUAL COMPREHENSIVE FACILITY COMPLIANCE EVALUATION (ANNUAL EVALUATION)

Potential Pollutant Source/Industrial Activity (as identified in your SWPPP)					
Northeast Facility Area	Have any BMPs not been fully implemented?	☐ YES ☑ NO	If yes, to any of the three questions, complete the next two columns of this form.	Describe deficiencies in BMPs or BMP implementation	Describe additional/revised BMPs or corrective actions and their date(s) of implementation
	Are any BMPs not effective in reducing and preventing pollutants in storm water discharges and NSWDs?	☐ YES ☑ NO			
	Are additional/revised BMPs necessary?	☐ YES ☑ NO			
Potential Pollutant Source/Industrial Activity (as identified in your SWPPP)					
INEOS	Have any BMPs not been fully implemented?	☐ YES ☑ NO	If yes, to any of the three questions, complete the next two columns of this form.	Describe deficiencies in BMPs or BMP implementation	Describe additional/revised BMPs or corrective actions and their date(s) of implementation
	Are any BMPs not effective in reducing and preventing pollutants in storm water discharges and NSWDs?	☐ YES ☑ NO			
	Are additional/revised BMPs necessary?	☐ YES ☑ NO			
Potential Pollutant Source/Industrial Activity (as identified in your SWPPP)					
Southeast Facility Area	Have any BMPs not been fully implemented?	☐ YES ☑ NO	If yes, to any of the three questions, complete the next two columns of this form.	Describe deficiencies in BMPs or BMP implementation	Describe additional/revised BMPs or corrective actions and their date(s) of implementation
	Are any BMPs not effective in reducing and preventing pollutants in storm water discharges and NSWDs?	☐ YES ☑ NO			
	Are additional/revised BMPs necessary?	☐ YES ☑ NO			

Attach an explanation page if more room is needed.
Please make copy of form if more rows are needed.

FORM 3 (Continued) – ANNUAL COMPREHENSIVE FACILITY COMPLIANCE EVALUATION (ANNUAL EVALUATION)

Potential Pollutant Source/Industrial Activity (as identified in your SWPPP)					
Northwest Facility Area	Have any BMPs not been fully implemented?	☐ YES ☑ NO	If yes, to any of the three questions, complete the next two columns of this form.	Describe deficiencies in BMPs or BMP implementation	Describe additional/revised BMPs or corrective actions and their date(s) of implementation
	Are any BMPs not effective in reducing and preventing pollutants in storm water discharges and NSWDs?	☐ YES ☑ NO			
	Are additional/revised BMPs necessary?	☐ YES ☑ NO			
Potential Pollutant Source/Industrial Activity (as identified in your SWPPP)					
Tank Farms	Have any BMPs not been fully implemented?	☐ YES ☑ NO	If yes, to any of the three questions, complete the next two columns of this form.	Describe deficiencies in BMPs or BMP implementation	Describe additional/revised BMPs or corrective actions and their date(s) of implementation
	Are any BMPs not effective in reducing and preventing pollutants in storm water discharges and NSWDs?	☐ YES ☑ NO			
	Are additional/revised BMPs necessary?	☐ YES ☑ NO			
Potential Pollutant Source/Industrial Activity (as identified in your SWPPP)					
Loading Racks	Have any BMPs not been fully implemented?	☐ YES ☑ NO	If yes, to any of the three questions, complete the next two columns of this form.	Describe deficiencies in BMPs or BMP implementation	Describe additional/revised BMPs or corrective actions and their date(s) of implementation
	Are any BMPs not effective in reducing and preventing pollutants in storm water discharges and NSWDs?	☐ YES ☑ NO			
	Are additional/revised BMPs necessary?	☐ YES ☑ NO			

Attach an explanation page if more room is needed.
Please make copy of form if more rows are needed.

Attachment 2

Explanation of the Preliminary Monthly Climate Data (F6) Product

These data are preliminary and have not undergone final quality control by the National Climatic Data Center (NCDC). Therefore, these data are subject to revision. Final and certified climate data can be accessed at the NCDC - http://www.ncdc.noaa.gov.

WFO Monthly/Daily Climate Data

```
000
CXUS56 KLOX 011655
CF6LGB
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

                                        STATION:   LONG BEACH AIRPORT CA
                                        MONTH:     JANUARY
                                        YEAR:      2019
                                        LATITUDE:   33 49 N
                                        LONGITUDE: 118  9 W

  TEMPERATURE IN F:       :PCPN:    SNOW:  WIND      :SUNSHINE: SKY     :PK WND
==============================================================================
1   2   3   4   5  6A  6B    7    8   9   10  11  12  13   14  15   16   17  18
                                    12Z  AVG MX 2MIN
DY MAX MIN AVG DEP HDD CDD  WTR  SNW DPTH SPD SPD DIR MIN PSBL S-S WX    SPD DR
==============================================================================

 1  62  46  54  -2  11   0 0.00  0.0    0  6.6 17  90   M    M   0        25  90
 2  63  38  51  -5  14   0 0.00  0.0    0  2.4 10 300   M    M   0        13 240
 3  68  42  55  -1  10   0 0.00  0.0    0  3.5 10 300   M    M   0        13 290
 4  63  41  52  -4  13   0 0.00  0.0    0  2.0 10 220   M    M   0        14 200
 5  59  49  54  -2  11   0 0.78    M    0  5.1 24 300   M    M   5 13     34 310
 6  62  48  55  -1  10   0 0.04    M    0  4.5 13 300   M    M   4 1      17 300
 7  62  52  57   1   8   0 0.12  0.0    0  4.3 13 100   M    M   7 1      15  70
 8  72  49  61   4   4   0 0.00  0.0    0  3.5  9 200   M    M   0        14  40
 9  67  48  58   1   7   0 0.00  0.0    0  3.5 15 290   M    M   2 1      18 290
10  64  48  56  -1   9   0 0.00  0.0    0  2.6 12 190   M    M   2 18     14 190
11  64  53  59   2   6   0 0.00  0.0    0  4.3 10 160   M    M   6 18     13 160
12  63  50  57   0   8   0 0.69  0.0    0  3.7 16  50   M    M   7 13     20  50
13  62  45  54  -3  11   0 0.00  0.0    0  1.7  7  50   M    M   0 1      10 200
14  59  52  56  -1   9   0 1.05  0.0    0  5.2 16 130   M    M   8 1      22 120
15  62  50  56  -1   9   0 0.93  0.0    0  6.8 17  90   M    M   8 1      22  50
16  62  55  59   2   6   0 0.98  0.0    0  7.0 17 120   M    M  10 1      22 140
17  64  56  60   3   5   0 0.59  0.0    0  7.9 15 220   M    M   8 1      22 220
18  65  53  59   2   6   0   T   0.0    0  3.9  9 200   M    M   6 12     12 200
19  79  49  64   7   1   0 0.00  0.0    0  3.5 10 320   M    M   0 1      12 320
20  75  52  64   7   1   0 0.00  0.0    0  6.9 21 290   M    M   0        27 260
21  65  51  58   1   7   0 0.00  0.0    0 15.8 25 310   M    M   0        33 270
22  69  43  56  -1   9   0 0.00  0.0    0  3.3 13 300   M    M   0        14 310
23  68  43  56  -1   9   0 0.00  0.0    0  3.6 10 290   M    M   0        13 300
24  78  46  62   5   3   0 0.00  0.0    0  3.7  9 220   M    M   0        13 200
25  78  47  63   6   2   0 0.00  0.0    0  5.5 13 300   M    M   0        15 310
26  79  49  64   7   1   0 0.00  0.0    0  4.4 13 260   M    M   0        16 270
27  76  49  63   6   2   0 0.00  0.0    0  2.1 10 190   M    M   0        12 190
28  74  48  61   4   4   0 0.00  0.0    0  1.3 10 180   M    M   1 18     13 180
29  69  53  61   4   4   0 0.00  0.0    0  3.7 10 150   M    M   1 18     13 160
30  67  54  61   4   4   0 0.00  0.0    0  3.2 10 200   M    M   2 18     13 200
31  61  51  56  -1   9   0 1.24  0.0    0  4.5 17  70   M    M   8 1238   21  60
==============================================================================
SM 2081 1510       213   0  6.42     0.0 139.8          M       85
==============================================================================
AV 67.1 48.7                                4.5 FASTST   M    M   3    MAX(MPH)
```

```
                                MISC ---->    25   M                  34    M
================================================================================
NOTES:
# LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6) , PAGE 2

                                          STATION:  LONG BEACH AIRPORT CA
                                          MONTH:    JANUARY
                                          YEAR:     2019
                                          LATITUDE:   33 49 N
                                          LONGITUDE: 118  9 W

[TEMPERATURE DATA]      [PRECIPITATION DATA]       SYMBOLS USED IN COLUMN 16

AVERAGE MONTHLY: 57.9   TOTAL FOR MONTH:   6.42    1 = FOG OR MIST
DPTR FM NORMAL:   1.2   DPTR FM NORMAL:    3.82    2 = FOG REDUCING VISIBILITY
HIGHEST:    79 ON 26,19 GRTST 24HR  1.24 ON 31-31      TO 1/4 MILE OR LESS
LOWEST:     38 ON  2                               3 = THUNDER
                        SNOW, ICE PELLETS, HAIL    4 = ICE PELLETS
                        TOTAL MONTH:   0.0 INCH    5 = HAIL
                        GRTST 24HR     0.0         6 = FREEZING RAIN OR DRIZZLE
                        GRTST DEPTH:   0           7 = DUSTSTORM OR SANDSTORM:
                                                       VSBY 1/2 MILE OR LESS
                                                   8 = SMOKE OR HAZE
[NO. OF DAYS WITH]      [WEATHER - DAYS WITH]      9 = BLOWING SNOW
                                                   X = TORNADO
MAX 32 OR BELOW:   0    0.01 INCH OR MORE:   9
MAX 90 OR ABOVE:   0    0.10 INCH OR MORE:   8
MIN 32 OR BELOW:   0    0.50 INCH OR MORE:   7
MIN  0 OR BELOW:   0    1.00 INCH OR MORE:   2

[HDD (BASE 65) ]
TOTAL THIS MO.   213    CLEAR  (SCALE 0-3)  20
DPTR FM NORMAL   -46    PTCLDY (SCALE 4-7)   9
TOTAL FM JUL 1   426    CLOUDY (SCALE 8-10)  2
DPTR FM NORMAL  -253

[CDD (BASE 65) ]
TOTAL THIS MO.     0
DPTR FM NORMAL    -3    [PRESSURE DATA]
TOTAL FM JAN 1     0    HIGHEST SLP 30.35 ON 23
DPTR FM NORMAL     0    LOWEST  SLP 29.85 ON 29

[REMARKS]
#FINAL-01-19#
```

[Explanation of the Preliminary Monthly Climate Data (F6) Product]

These data are preliminary and have not undergone final quality control by the National Climatic Data Center (NCDC). Therefore, these data are subject to revision. Final and certified climate data can be accessed at the NCDC - http://www.ncdc.noaa.gov.

WFO Monthly/Daily Climate Data

```
000
CXUS56 KLOX 011758
CF6LGB
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

                                              STATION:   LONG BEACH AIRPORT CA
                                              MONTH:     FEBRUARY
                                              YEAR:      2019
                                              LATITUDE:   33 49 N
                                              LONGITUDE: 118  9 W

  TEMPERATURE IN F:        :PCPN:    SNOW:  WIND       :SUNSHINE: SKY     :PK WND
==============================================================================
1   2   3   4   5  6A  6B    7    8   9   10  11  12  13   14  15   16   17  18
                                    12Z  AVG MX 2MIN
DY MAX MIN AVG DEP HDD CDD  WTR  SNW DPTH SPD SPD DIR MIN PSBL S-S WX    SPD DR
==============================================================================

 1  62  48  55  -2  10   0    T    M    0  4.0 10 180   M    M   3 18     13 180
 2  62  50  56  -1   9   0 1.39  0.0    0  7.8 29 140   M    M   8 1      37 150
 3  60  50  55  -2  10   0 0.27  0.0    0  5.0 15 240   M    M   8 18      M  M
 4  61  52  57   0   8   0 0.37  0.0    0  6.6 17 210   M    M   7 18     23 200
 5  57  47  52  -5  13   0 0.11    M    0  8.6 20 250   M    M   5 1       M  M
 6  58  40  49  -8  16   0 0.00  0.0    0  7.4 18 300   M    M   0        21 300
 7  62  40  51  -6  14   0 0.00  0.0    0  2.9  9 300   M    M   0        12 200
 8  62  40  51  -6  14   0 0.00  0.0    0  3.4 13 230   M    M   0        16 230
 9  61  45  53  -4  12   0 0.15    M    0  4.6 20 340   M    M   3 18     26 330
10  59  46  53  -4  12   0 0.10    M    0  7.1 18 280   M    M   6 18     24 210
11  59  38  49  -8  16   0 0.00  0.0    0  3.5 12 210   M    M   0        19 160
12  69  38  54  -3  11   0 0.00  0.0    0  2.4  8 210   M    M   0 8      13 130
13  60  51  56  -1   9   0 0.19  0.0    0  6.5 18 110   M    M   8 18     24 110
14  63  53  58   0   7   0 2.25  0.0    0  8.7 20 260   M    M   9 18     28 260
15  61  49  55  -3  10   0 0.16    M    0  4.7 16 280   M    M   7 18     21 280
16  62  48  55  -3  10   0 0.00  0.0    0 13.1 23 290   M    M   1        30 310
17  58  43  51  -7  14   0 0.01    M    0 11.2 25 300   M    M   4 8      35 280
18  59  39  49  -9  16   0    T    M    0  5.8 26  70   M    M   1        33  60
19  58  37  48 -10  17   0 0.00  0.0    0  3.9 13 200   M    M   0        16 210
20  59  40  50  -8  15   0 0.06    M    0  6.7 20 270   M    M   5 8      27 260
21  58  42  50  -8  15   0 0.00  0.0    0  4.7 23 330   M    M   3 18     27 330
22  60  37  49  -9  16   0 0.00  0.0    0  4.1 16 220   M    M   0 18     20 270
23  62  42  52  -6  13   0 0.00  0.0    0  3.5 12 300   M    M   0        14 180
24  68  45  57  -1   8   0 0.00  0.0    0  3.4 15 290   M    M   0 8      18 310
25  64  47  56  -2   9   0 0.00  0.0    0  3.3  9 190   M    M   0 18     20 130
26  63  47  55  -3  10   0 0.00  0.0    0  3.8  9  10   M    M   4 128    14 200
27  64  52  58   0   7   0    T  0.0    0  3.9 12 220   M    M   8 18     15 200
28  66  56  61   3   4   0    T  0.0    0  5.0 10 330   M    M   8 18     14 180
==============================================================================
SM 1717 1262       325   0  5.06     0.0 155.6          M       98
==============================================================================
AV 61.3 45.1                                5.6 FASTST   M    M   4    MAX(MPH)
                                  MISC ---->  # 29 140                # 37  150
==============================================================================
NOTES:
```

LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6) , PAGE 2

STATION: LONG BEACH AIRPORT CA
MONTH: FEBRUARY
YEAR: 2019
LATITUDE: 33 49 N
LONGITUDE: 118 9 W

[TEMPERATURE DATA]

AVERAGE MONTHLY: 53.2
DPTR FM NORMAL: -4.4
HIGHEST: 69 ON 12
LOWEST: 37 ON 22,19

[PRECIPITATION DATA]

TOTAL FOR MONTH: 5.06
DPTR FM NORMAL: 1.97
GRTST 24HR 2.25 ON 14-14

SNOW, ICE PELLETS, HAIL
TOTAL MONTH: 0.0 INCH
GRTST 24HR 0.0
GRTST DEPTH: 0

SYMBOLS USED IN COLUMN 16

1 = FOG OR MIST
2 = FOG REDUCING VISIBILITY TO 1/4 MILE OR LESS
3 = THUNDER
4 = ICE PELLETS
5 = HAIL
6 = FREEZING RAIN OR DRIZZLE
7 = DUSTSTORM OR SANDSTORM: VSBY 1/2 MILE OR LESS
8 = SMOKE OR HAZE
9 = BLOWING SNOW
X = TORNADO

[NO. OF DAYS WITH]

MAX 32 OR BELOW: 0
MAX 90 OR ABOVE: 0
MIN 32 OR BELOW: 0
MIN 0 OR BELOW: 0

[WEATHER - DAYS WITH]

0.01 INCH OR MORE: 11
0.10 INCH OR MORE: 9
0.50 INCH OR MORE: 2
1.00 INCH OR MORE: 2

[HDD (BASE 65)]

TOTAL THIS MO. 325
DPTR FM NORMAL 113
TOTAL FM JUL 1 751
DPTR FM NORMAL -140

CLEAR (SCALE 0-3) 15
PTCLDY (SCALE 4-7) 11
CLOUDY (SCALE 8-10) 2

[CDD (BASE 65)]

TOTAL THIS MO. 0
DPTR FM NORMAL -5
TOTAL FM JAN 1 0
DPTR FM NORMAL -8

[PRESSURE DATA]

HIGHEST SLP 30.33 ON 23
LOWEST SLP 29.59 ON 21

[REMARKS]
#FINAL-02-19#

[Explanation of the Preliminary Monthly Climate Data (F6) Product]

These data are preliminary and have not undergone final quality control by the National Climatic Data Center (NCDC). Therefore, these data are subject to revision. Final and certified climate data can be accessed at the NCDC - http://www.ncdc.noaa.gov.

WFO Monthly/Daily Climate Data

```
000
CXUS56 KLOX 011155
CF6LGB
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

                                        STATION:   LONG BEACH AIRPORT CA
                                        MONTH:     MARCH
                                        YEAR:      2019
                                        LATITUDE:   33 49 N
                                        LONGITUDE: 118  9 W
```

TEMPERATURE IN F:							:PCPN:	SNOW:		WIND			:SUNSHINE:		SKY		:PK WND	
1	2	3	4	5	6A	6B	7	8	9	10	11	12	13	14	15	16	17	18
									12Z	AVG MX 2MIN								
DY	MAX	MIN	AVG	DEP	HDD	CDD	WTR	SNW	DPTH	SPD	SPD	DIR	MIN	PSBL	S-S	WX	SPD	DR
1	65	58	62	4	3	0	0.00	0.0	0	4.5	12	200	M	M	6	18	13	200
2	63	56	60	1	5	0	0.85	0.0	0	7.0	15	170	M	M	10	1	24	170
3	64	56	60	1	5	0	0.05	0.0	0	5.5	12	300	M	M	10	18	14	290
4	63	52	58	-1	7	0	0.00	0.0	0	4.8	12	220	M	M	5		16	200
5	66	48	57	-2	8	0	0.10	M	0	4.1	23	290	M	M	5	18	27	290
6	61	56	59	0	6	0	0.86	0.0	0	7.4	17	160	M	M	9	18	26	160
7	63	52	58	-1	7	0	0.01	0.0	0	6.0	16	290	M	M	6	1	20	290
8	61	49	55	-4	10	0	0.01	M	0	9.0	22	280	M	M	3		28	290
9	62	48	55	-4	10	0	0.00	0.0	0	6.2	16	300	M	M	2		21	280
10	61	48	55	-4	10	0	0.00	0.0	0	3.9	13	310	M	M	3		17	180
11	68	48	58	-1	7	0	0.02	M	0	4.0	15	320	M	M	5	8	18	80
12	70	53	62	3	3	0	0.00	0.0	0	7.0	21	270	M	M	4	8	26	290
13	65	50	58	-1	7	0	0.00	0.0	0	3.8	13	200	M	M	3	18	18	210
14	73	47	60	1	5	0	0.00	0.0	0	6.8	20	70	M	M	0		28	80
15	78	47	63	3	2	0	0.00	0.0	0	3.7	13	300	M	M	0		17	40
16	81	50	66	6	0	1	0.00	0.0	0	3.5	15	280	M	M	0	8	18	290
17	85	54	70	10	0	5	0.00	0.0	0	5.3	17	290	M	M	0		20	280
18	72	55	64	4	1	0	0.00	0.0	0	3.9	12	190	M	M	1	1	15	170
19	63	54	59	-1	6	0	0.00	0.0	0	6.2	14	180	M	M	9	128	18	160
20	66	56	61	1	4	0	T	0.0	0	7.7	21	300	M	M	6	35	25	300
21	61	52	57	-3	8	0	0.08	0.0	0	5.1	15	300	M	M	4	8	18	220
22	65	49	57	-3	8	0	0.00	0.0	0	4.5	13	300	M	M	3	8	17	190
23	67	54	61	1	4	0	0.00	0.0	0	4.7	15	290	M	M	6		20	290
24	70	54	62	2	3	0	0.00	0.0	0	4.5	14	300	M	M	3	18	16	300
25	77	51	64	4	1	0	0.00	0.0	0	6.0	18	300	M	M	0	18	23	280
26	73	50	62	2	3	0	0.00	0.0	0	4.6	13	310	M	M	0	8	16	290
27	72	56	64	4	1	0	0.00	0.0	0	6.5	20	300	M	M	5	18	23	300
28	70	55	63	3	2	0	0.00	0.0	0	7.0	18	290	M	M	2	18	24	290
29	72	52	62	2	3	0	0.00	0.0	0	5.5	18	290	M	M	0		22	300
30	82	52	67	6	0	2	0.00	0.0	0	4.2	18	290	M	M	0	18	22	290
31	84	54	69	8	0	4	0.00	0.0	0	3.8	18	290	M	M	0		23	290
SM	2143	1616		139	12	1.98		0.0	166.8				M		110			
AV	69.1	52.1								5.4	FASTST		M	M	4	MAX(MPH)		

MISC ----> # 23 290 # 28 290

NOTES:
LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6) , PAGE 2

STATION: LONG BEACH AIRPORT CA
MONTH: MARCH
YEAR: 2019
LATITUDE: 33 49 N
LONGITUDE: 118 9 W

[TEMPERATURE DATA]

AVERAGE MONTHLY: 60.6
DPTR FM NORMAL: 1.0
HIGHEST: 85 ON 17
LOWEST: 47 ON 15,14

[PRECIPITATION DATA]

TOTAL FOR MONTH: 1.98
DPTR FM NORMAL: 0.11
GRTST 24HR 0.86 ON 6- 6

SNOW, ICE PELLETS, HAIL
TOTAL MONTH: 0.0 INCH
GRTST 24HR 0.0
GRTST DEPTH: 0

SYMBOLS USED IN COLUMN 16

1 = FOG OR MIST
2 = FOG REDUCING VISIBILITY TO 1/4 MILE OR LESS
3 = THUNDER
4 = ICE PELLETS
5 = HAIL
6 = FREEZING RAIN OR DRIZZLE
7 = DUSTSTORM OR SANDSTORM: VSBY 1/2 MILE OR LESS
8 = SMOKE OR HAZE
9 = BLOWING SNOW
X = TORNADO

[NO. OF DAYS WITH]

MAX 32 OR BELOW: 0
MAX 90 OR ABOVE: 0
MIN 32 OR BELOW: 0
MIN 0 OR BELOW: 0

[WEATHER - DAYS WITH]

0.01 INCH OR MORE: 8
0.10 INCH OR MORE: 3
0.50 INCH OR MORE: 2
1.00 INCH OR MORE: 0

[HDD (BASE 65)]

TOTAL THIS MO. 139
DPTR FM NORMAL -40
TOTAL FM JUL 1 890
DPTR FM NORMAL -180

CLEAR (SCALE 0-3) 16
PTCLDY (SCALE 4-7) 11
CLOUDY (SCALE 8-10) 4

[CDD (BASE 65)]

TOTAL THIS MO. 12
DPTR FM NORMAL 2
TOTAL FM JAN 1 12
DPTR FM NORMAL -6

[PRESSURE DATA]

HIGHEST SLP 30.22 ON 28
LOWEST SLP 29.74 ON 12

[REMARKS]
#FINAL-03-19#

[Explanation of the Preliminary Monthly Climate Data (F6) Product]

These data are preliminary and have not undergone final quality control by the National Climatic Data Center (NCDC). Therefore, these data are subject to revision. Final and certified climate data can be accessed at the NCDC - http://www.ncdc.noaa.gov.

WFO Monthly/Daily Climate Data

```
000
CXUS56 KLOX 011655
CF6LGB
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

                                                STATION:   LONG BEACH AIRPORT CA
                                                MONTH:     APRIL
                                                YEAR:      2019
                                                LATITUDE:   33 49 N
                                                LONGITUDE: 118  9 W
```

TEMPERATURE IN F:							:PCPN:	SNOW:		WIND			:SUNSHINE:		SKY		:PK WND	
1	2	3	4	5	6A	6B	7	8	9	10	11	12	13	14	15	16	17	18
									12Z	AVG	MX	2MIN						
DY	MAX	MIN	AVG	DEP	HDD	CDD	WTR	SNW	DPTH	SPD	SPD	DIR	MIN	PSBL	S-S	WX	SPD	DR
1	82	59	71	10	0	6	0.00	0.0	0	3.9	12	200	M	M	0		16	220
2	69	59	64	3	1	0	0.00	0.0	0	8.0	14	180	M	M	5		21	140
3	67	57	62	1	3	0	0.00	0.0	0	6.1	14	300	M	M	3		19	210
4	68	57	63	2	2	0	T	0.0	0	5.6	15	220	M	M	7	8	20	200
5	68	57	63	2	2	0	0.00	0.0	0	6.5	17	300	M	M	5		M	M
6	71	58	65	4	0	0	0.00	0.0	0	5.5	16	290	M	M	4		21	250
7	80	57	69	8	0	4	0.00	0.0	0	4.6	17	300	M	M	0		20	290
8	88	60	74	12	0	9	0.00	0.0	0	4.3	17	300	M	M	0	8	20	300
9	75	60	68	6	0	3	0.00	0.0	0	12.7	39	330	M	M	0	18	49	340
10	77	58	68	6	0	3	0.00	0.0	0	16.1	25	280	M	M	0		33	290
11	72	52	62	0	3	0	0.00	0.0	0	5.3	17	300	M	M	0	8	20	300
12	76	53	65	3	0	0	0.00	0.0	0	6.5	22	290	M	M	1	18	27	280
13	80	55	68	6	0	3	0.00	0.0	0	4.6	16	310	M	M	1	18	19	290
14	77	54	66	4	0	1	0.00	0.0	0	5.5	14	310	M	M	2	128	17	310
15	65	53	59	-3	6	0	0.00	0.0	0	6.3	14	180	M	M	4	18	18	180
16	69	57	63	1	2	0	T	0.0	0	4.9	18	290	M	M	6		23	280
17	76	53	65	2	0	0	0.00	0.0	0	5.9	20	290	M	M	0		24	300
18	83	55	69	6	0	4	0.00	0.0	0	5.4	16	310	M	M	0	18	20	300
19	75	57	66	3	0	1	0.00	0.0	0	5.1	17	290	M	M	4	18	21	300
20	67	58	63	0	2	0	0.00	0.0	0	5.5	13	310	M	M	7		16	200
21	69	56	63	0	2	0	0.00	0.0	0	5.9	14	300	M	M	5		26	240
22	73	53	63	0	2	0	0.00	0.0	0	5.1	14	280	M	M	1		19	280
23	73	57	65	2	0	0	0.00	0.0	0	4.8	13	150	M	M	2	1	16	150
24	70	58	64	0	1	0	0.00	0.0	0	5.9	10	200	M	M	4		16	200
25	75	58	67	3	0	2	0.00	0.0	0	5.1	12	300	M	M	3		14	320
26	72	58	65	1	0	0	0.00	0.0	0	4.9	12	300	M	M	5		M	M
27	69	59	64	0	1	0	0.00	0.0	0	5.1	13	300	M	M	10		15	200
28	69	59	64	0	1	0	0.00	0.0	0	4.6	14	200	M	M	7		18	200
29	68	57	63	-1	2	0	0.02	0.0	0	6.1	14	220	M	M	7		18	210
30	68	58	63	-1	2	0	0.00	0.0	0	5.7	13	280	M	M	7		16	310

```
================================================================================
SM 2191 1702        32  36  0.02     0.0 181.5          M      100
================================================================================
AV 73.0 56.7                                  6.1 FASTST   M    M   3    MAX(MPH)
                                  MISC ---->  # 39 330                # 49  340
================================================================================
NOTES:
# LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6) , PAGE 2

                                          STATION:  LONG BEACH AIRPORT CA
                                          MONTH:    APRIL
                                          YEAR:     2019
                                          LATITUDE:   33 49 N
                                          LONGITUDE: 118  9 W

[TEMPERATURE DATA]      [PRECIPITATION DATA]       SYMBOLS USED IN COLUMN 16

AVERAGE MONTHLY: 64.9   TOTAL FOR MONTH:   0.02    1 = FOG OR MIST
DPTR FM NORMAL:   2.5   DPTR FM NORMAL:   -0.58    2 = FOG REDUCING VISIBILITY
HIGHEST:    88 ON  8    GRTST 24HR  0.02 ON 29-29      TO 1/4 MILE OR LESS
LOWEST:     52 ON 11                               3 = THUNDER
                        SNOW, ICE PELLETS, HAIL    4 = ICE PELLETS
                        TOTAL MONTH:   0.0 INCH    5 = HAIL
                        GRTST 24HR     0.0         6 = FREEZING RAIN OR DRIZZLE
                        GRTST DEPTH:   0           7 = DUSTSTORM OR SANDSTORM:
                                                       VSBY 1/2 MILE OR LESS
                                                   8 = SMOKE OR HAZE
[NO. OF DAYS WITH]      [WEATHER - DAYS WITH]      9 = BLOWING SNOW
                                                   X = TORNADO
MAX 32 OR BELOW:   0    0.01 INCH OR MORE:   1
MAX 90 OR ABOVE:   0    0.10 INCH OR MORE:   0
MIN 32 OR BELOW:   0    0.50 INCH OR MORE:   0
MIN  0 OR BELOW:   0    1.00 INCH OR MORE:   0

[HDD (BASE 65) ]
TOTAL THIS MO.    32    CLEAR  (SCALE 0-3)  13
DPTR FM NORMAL   -74    PTCLDY (SCALE 4-7)  16
TOTAL FM JUL 1   922    CLOUDY (SCALE 8-10)  1
DPTR FM NORMAL  -254

[CDD (BASE 65) ]
TOTAL THIS MO.    36
DPTR FM NORMAL     7    [PRESSURE DATA]
TOTAL FM JAN 1    48    HIGHEST SLP 30.17 ON  7
DPTR FM NORMAL     1    LOWEST  SLP 29.75 ON 12

[REMARKS]
#FINAL-04-19#
```

[Explanation of the Preliminary Monthly Climate Data (F6) Product]

These data are preliminary and have not undergone final quality control by the National Climatic Data Center (NCDC). Therefore, these data are subject to revision. Final and certified climate data can be accessed at the NCDC - http://www.ncdc.noaa.gov.

WFO Monthly/Daily Climate Data

```
000
CXUS56 KLOX 011655
CF6LGB
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

                                                STATION:   LONG BEACH AIRPORT CA
                                                MONTH:     MAY
                                                YEAR:      2019
                                                LATITUDE:   33 49 N
                                                LONGITUDE: 118  9 W
```

TEMPERATURE IN F:							:PCPN:	SNOW:	WIND				:SUNSHINE:		SKY		:PK WND	
1	2	3	4	5	6A	6B	7	8	9	10	11	12	13	14	15	16	17	18
									12Z	AVG	MX	2MIN						
DY	MAX	MIN	AVG	DEP	HDD	CDD	WTR	SNW	DPTH	SPD	SPD	DIR	MIN	PSBL	S-S	WX	SPD	DR
1	72	53	63	-1	2	0	0.00	0.0	0	6.0	16	290	M	M	1		23	310
2	73	56	65	1	0	0	0.00	0.0	0	5.2	14	310	M	M	2		18	290
3	70	58	64	-1	1	0	0.00	0.0	0	5.9	13	180	M	M	3		16	180
4	70	60	65	0	0	0	0.00	0.0	0	5.3	13	300	M	M	5		16	180
5	70	60	65	0	0	0	T	0.0	0	7.5	16	300	M	M	8		19	220
6	70	59	65	0	0	0	T	0.0	0	7.6	18	300	M	M	7		22	300
7	69	58	64	-1	1	0	T	0.0	0	5.3	13	190	M	M	7		20	180
8	68	61	65	0	0	0	0.00	0.0	0	4.9	10	290	M	M	10		13	280
9	69	61	65	0	0	0	0.00	0.0	0	4.6	13	210	M	M	10		15	210
10	68	60	64	-1	1	0	0.01	0.0	0	3.3	10	130	M	M	9	1	13	130
11	77	58	68	3	0	3	0.00	0.0	0	5.8	18	300	M	M	2		22	300
12	71	60	66	1	0	1	0.00	0.0	0	4.7	13	180	M	M	5		16	230
13	70	62	66	0	0	1	0.00	0.0	0	5.8	10	200	M	M	9		13	180
14	73	61	67	1	0	2	0.00	0.0	0	5.8	13	300	M	M	6		17	300
15	69	62	66	0	0	1	0.00	0.0	0	5.4	12	280	M	M	9		15	250
16	70	57	64	-2	1	0	0.25	0.0	0	12.9	26	280	M	M	5	1	34	290
17	73	54	64	-2	1	0	0.00	0.0	0	5.5	20	280	M	M	0		25	270
18	70	55	63	-3	2	0	0.01	0.0	0	5.7	14	200	M	M	3		19	210
19	68	53	61	-5	4	0	0.18	0.0	0	8.9	23	290	M	M	6	1	29	290
20	71	57	64	-2	1	0	T	0.0	0	9.2	18	290	M	M	3		25	300
21	69	58	64	-2	1	0	T	0.0	0	9.6	24	290	M	M	5		30	280
22	71	56	64	-2	1	0	T	0.0	0	7.4	22	290	M	M	2	3	27	290
23	67	58	63	-3	2	0	0.00	0.0	0	6.6	14	180	M	M	7		18	160
24	74	55	65	-1	0	0	0.00	0.0	0	7.6	18	300	M	M	0	8	23	320
25	69	56	63	-3	2	0	0.00	0.0	0	5.8	14	220	M	M	2		21	210
26	62	57	60	-6	5	0	0.05	0.0	0	7.7	14	290	M	M	10	18	17	260
27	69	51	60	-6	5	0	0.00	0.0	0	6.4	14	310	M	M	1		20	290
28	70	54	62	-4	3	0	0.00	0.0	0	5.2	13	310	M	M	0		17	190
29	74	59	67	1	0	2	0.00	0.0	0	5.4	17	300	M	M	0		19	300
30	74	58	66	-1	0	1	0.00	0.0	0	4.8	12	200	M	M	5	18	16	160

```
31  70  58  64  -3   1   0 0.00  0.0    0  4.7 13 210   M    M   8 18     17 220
=============================================================================
SM 2180 1785        34  11  0.50     0.0 196.4          M      150
=============================================================================
AV 70.3 57.6                                  6.3 FASTST   M    M   5    MAX(MPH)
                                  MISC ---->  # 26 280               # 34  290
=============================================================================
NOTES:
# LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6) , PAGE 2

                                          STATION:  LONG BEACH AIRPORT CA
                                          MONTH:    MAY
                                          YEAR:     2019
                                          LATITUDE:   33 49 N
                                          LONGITUDE: 118  9 W

[TEMPERATURE DATA]      [PRECIPITATION DATA]       SYMBOLS USED IN COLUMN 16

AVERAGE MONTHLY: 64.0   TOTAL FOR MONTH:   0.50    1 = FOG OR MIST
DPTR FM NORMAL:  -1.6   DPTR FM NORMAL:    0.29    2 = FOG REDUCING VISIBILITY
HIGHEST:    77 ON 11    GRTST 24HR  0.25 ON 16-16      TO 1/4 MILE OR LESS
LOWEST:     51 ON 27                               3 = THUNDER
                        SNOW, ICE PELLETS, HAIL    4 = ICE PELLETS
                        TOTAL MONTH:   0.0 INCH    5 = HAIL
                        GRTST 24HR     0.0         6 = FREEZING RAIN OR DRIZZLE
                        GRTST DEPTH:   0           7 = DUSTSTORM OR SANDSTORM:
                                                       VSBY 1/2 MILE OR LESS
                                                   8 = SMOKE OR HAZE
[NO. OF DAYS WITH]      [WEATHER - DAYS WITH]      9 = BLOWING SNOW
                                                   X = TORNADO
MAX 32 OR BELOW:   0    0.01 INCH OR MORE:   5
MAX 90 OR ABOVE:   0    0.10 INCH OR MORE:   2
MIN 32 OR BELOW:   0    0.50 INCH OR MORE:   0
MIN  0 OR BELOW:   0    1.00 INCH OR MORE:   0

[HDD (BASE 65) ]
TOTAL THIS MO.    34    CLEAR  (SCALE 0-3)  12
DPTR FM NORMAL    -3    PTCLDY (SCALE 4-7)  13
TOTAL FM JUL 1   956    CLOUDY (SCALE 8-10)  6
DPTR FM NORMAL  -257

[CDD (BASE 65) ]
TOTAL THIS MO.    11
DPTR FM NORMAL   -45    [PRESSURE DATA]
TOTAL FM JAN 1    59    HIGHEST SLP 30.09 ON  7
DPTR FM NORMAL   -44    LOWEST  SLP 29.70 ON 22

[REMARKS]
#FINAL-05-19#
```

[Explanation of the Preliminary Monthly Climate Data (F6) Product]

These data are preliminary and have not undergone final quality control by the National Climatic Data Center (NCDC). Therefore, these data are subject to revision. Final and certified climate data can be accessed at the NCDC - [http://www.ncdc.noaa.gov].

WFO Monthly/Daily Climate Data

284
CXUS56 KLOX 011655
CF6LGB
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

STATION: LONG BEACH AIRPORT CA
MONTH: JUNE
YEAR: 2019
LATITUDE: 33 49 N
LONGITUDE: 118 9 W

TEMPERATURE IN F:							:PCPN:		SNOW:	WIND			:SUNSHINE:		SKY		:PK WND	
1	2	3	4	5	6A	6B	7	8	9	10	11	12	13	14	15	16	17	18
DY	MAX	MIN	AVG	DEP	HDD	CDD	WTR	SNW	12Z DPTH	AVG SPD	MX SPD	2MIN DIR	MIN	PSBL	S-S	WX	SPD	DR
1	67	60	64	-3	1	0	0.00	0.0	0	5.1	10	180	M	M	9	8	13	220
2	67	60	64	-3	1	0	T	0.0	0	5.6	13	310	M	M	10	18	14	310
3	71	60	66	-1	0	1	0.00	0.0	0	5.6	13	210	M	M	9		23	270
4	70	60	65	-2	0	0	0.00	0.0	0	4.3	13	210	M	M	8		20	220
5	70	60	65	-2	0	0	0.00	0.0	0	4.7	12	180	M	M	8	1	16	190
6	72	61	67	0	0	2	0.00	0.0	0	5.6	14	200	M	M	7	1	18	190
7	71	61	66	-1	0	1	T	0.0	0	5.3	12	200	M	M	8		16	190
8	74	62	68	0	0	3	0.00	0.0	0	5.4	13	170	M	M	5		21	240
9	84	62	73	5	0	8	0.00	0.0	0	5.7	15	310	M	M	2		19	310
10	95	62	79	11	0	14	0.00	0.0	0	5.0	16	300	M	M	0	8	18	310
11	88	64	76	8	0	11	0.00	0.0	0	5.3	12	190	M	M	1	1	14	190
12	83	63	73	5	0	8	0.00	0.0	0	6.4	13	320	M	M	4	1	17	300
13	72	62	67	-1	0	2	0.00	0.0	0	5.2	13	300	M	M	7	18	16	180
14	70	62	66	-2	0	1	0.00	0.0	0	4.6	12	210	M	M	8		17	180
15	73	64	69	0	0	4	0.00	0.0	0	6.1	15	300	M	M	8		17	290
16	72	64	68	-1	0	3	0.00	0.0	0	4.7	14	300	M	M	10	8	17	300
17	71	63	67	-2	0	2	0.00	0.0	0	5.2	13	190	M	M	8		17	200
18	71	62	67	-2	0	2	0.00	0.0	0	5.6	12	200	M	M	9		15	190
19	79	65	72	3	0	7	0.00	0.0	0	6.0	14	200	M	M	6	8	18	200
20	73	63	68	-2	0	3	0.00	0.0	0	5.8	12	210	M	M	9		16	190
21	72	61	67	-3	0	2	0.03	0.0	0	6.0	13	210	M	M	9	18	17	210
22	76	63	70	0	0	5	0.00	0.0	0	6.6	16	290	M	M	6		20	290
23	77	63	70	0	0	5	0.00	0.0	0	6.5	16	300	M	M	5		19	300
24	74	62	68	-2	0	3	0.00	0.0	0	5.2	12	200	M	M	8	1	16	210
25	71	63	67	-3	0	2	0.00	0.0	0	4.6	12	200	M	M	10		14	150
26	74	64	69	-2	0	4	0.00	0.0	0	6.3	13	300	M	M	6		19	190
27	78	65	72	1	0	7	0.00	0.0	0	5.6	13	300	M	M	4	8	17	300
28	80	64	72	1	0	7	0.00	0.0	0	5.9	14	300	M	M	3		19	200
29	86	62	74	3	0	9	0.00	0.0	0	4.9	13	300	M	M	0	18	16	210
30	87	64	76	5	0	11	0.00	0.0	0	5.8	16	310	M	M	0		19	310
SM	2268	1871			2	127	0.03		0.0	164.7			M		187			
AV	75.6	62.4								5.5	FASTST		M	M	6		MAX(MPH)	
								MISC ---->		# 16	300						23	M

NOTES:
LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6) , PAGE 2

STATION: LONG BEACH AIRPORT CA
MONTH: JUNE
YEAR: 2019
LATITUDE: 33 49 N
LONGITUDE: 118 9 W

[TEMPERATURE DATA]

AVERAGE MONTHLY: 69.0
DPTR FM NORMAL: 0.1
HIGHEST: 95 ON 10
LOWEST: 60 ON 5, 4

[PRECIPITATION DATA]

TOTAL FOR MONTH: 0.03
DPTR FM NORMAL: -0.04
GRTST 24HR 0.03 ON 21-21

SNOW, ICE PELLETS, HAIL
TOTAL MONTH: 0.0 INCH
GRTST 24HR 0.0
GRTST DEPTH: 0

SYMBOLS USED IN COLUMN 16

1 = FOG OR MIST
2 = FOG REDUCING VISIBILITY TO 1/4 MILE OR LESS
3 = THUNDER
4 = ICE PELLETS
5 = HAIL
6 = FREEZING RAIN OR DRIZZLE
7 = DUSTSTORM OR SANDSTORM: VSBY 1/2 MILE OR LESS
8 = SMOKE OR HAZE
9 = BLOWING SNOW
X = TORNADO

[NO. OF DAYS WITH]

MAX 32 OR BELOW: 0
MAX 90 OR ABOVE: 1
MIN 32 OR BELOW: 0
MIN 0 OR BELOW: 0

[WEATHER - DAYS WITH]

0.01 INCH OR MORE: 1
0.10 INCH OR MORE: 0
0.50 INCH OR MORE: 0
1.00 INCH OR MORE: 0

[HDD (BASE 65)]

TOTAL THIS MO. 2
DPTR FM NORMAL -4
TOTAL FM JUL 1 958
DPTR FM NORMAL -261

CLEAR (SCALE 0-3) 5
PTCLDY (SCALE 4-7) 15
CLOUDY (SCALE 8-10) 10

[CDD (BASE 65)]

TOTAL THIS MO. 127
DPTR FM NORMAL 6
TOTAL FM JAN 1 186
DPTR FM NORMAL -38

[PRESSURE DATA]

HIGHEST SLP 30.02 ON 28
LOWEST SLP 29.84 ON 16

[REMARKS]
#FINAL-06-19#

[Explanation of the Preliminary Monthly Climate Data (F6) Product]

These data are preliminary and have not undergone final quality control by the National Climatic Data Center (NCDC). Therefore, these data are subject to revision. Final and certified climate data can be accessed at the NCDC - http://www.ncdc.noaa.gov.

WFO Monthly/Daily Climate Data

```
000
CXUS56 KLOX 011655
CF6LGB
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

                                              STATION:   LONG BEACH AIRPORT CA
                                              MONTH:     JULY
                                              YEAR:      2019
                                              LATITUDE:   33 49 N
                                              LONGITUDE: 118  9 W

  TEMPERATURE IN F:        :PCPN:    SNOW:  WIND      :SUNSHINE: SKY     :PK WND
==========================================================================
1   2   3   4   5  6A  6B    7    8   9   10  11  12  13   14  15   16   17  18
                                    12Z  AVG MX 2MIN
DY MAX MIN AVG DEP HDD CDD  WTR  SNW DPTH SPD SPD DIR MIN PSBL S-S WX    SPD DR
==========================================================================

 1  84  63  74   2   0   9 0.00  0.0    0  5.4 13 310   M    M   0        15 280
 2  80  64  72   0   0   7 0.00  0.0    0  6.8 13 300   M    M   2        15 300
 3  76  65  71  -1   0   6 0.00  0.0    0  6.7 13 160   M    M   4        16 180
 4  79  65  72   0   0   7 0.00  0.0    0  6.4 14 300   M    M   5 8      17 310
 5  79  65  72   0   0   7 0.00  0.0    0  6.2 14 290   M    M   5 8      17 220
 6  74  65  70  -2   0   5 0.00  0.0    0  5.8 13 190   M    M   6 8      18 180
 7  74  64  69  -3   0   4 0.00  0.0    0  6.6 13 190   M    M   7 8      16 200
 8  74  65  70  -3   0   5 0.00  0.0    0  6.9 15 200   M    M   7        18 210
 9  82  65  74   1   0   9 0.00  0.0    0  5.9 15 300   M    M   4        20 300
10  83  64  74   1   0   9 0.00  0.0    0  5.7 15 290   M    M   1 8      17 290
```

11	83	64	74	1	0	9	0.00	0.0	0	5.2	14	210	M	M	1	18	18	200
12	84	66	75	2	0	10	0.00	0.0	0	5.3	12	310	M	M	3	8	16	200
13	74	65	70	-3	0	5	0.00	0.0	0	5.6	12	190	M	M	6	18	15	190
14	85	65	75	2	0	10	0.00	0.0	0	4.9	12	310	M	M	4	8	16	290
15	85	65	75	2	0	10	0.00	0.0	0	4.1	13	190	M	M	4	18	19	170
16	77	64	71	-2	0	6	0.00	0.0	0	6.6	12	130	M	M	4	18	17	220
17	74	68	71	-3	0	6	0.00	0.0	0	6.8	13	150	M	M	6		M	M
18	82	65	74	0	0	9	0.00	0.0	0	5.7	13	290	M	M	4		19	290
19	80	65	73	-1	0	8	0.00	0.0	0	6.1	15	310	M	M	3		18	300
20	83	67	75	1	0	10	0.00	0.0	0	7.0	16	300	M	M	4		23	280
21	85	65	75	1	0	10	0.00	0.0	0	7.0	14	290	M	M	0		19	320
22	84	66	75	1	0	10	0.00	0.0	0	4.5	13	300	M	M	2		16	210
23	96	70	83	9	0	18	T	0.0	0	6.7	18	290	M	M	0		23	290
24	99	73	86	12	0	21	0.00	0.0	0	5.6	17	150	M	M	0		20	160
25	97	73	85	11	0	20	0.01	0.0	0	5.8	15	290	M	M	0		18	280
26	93	72	83	9	0	18	0.00	0.0	0	5.8	14	290	M	M	0	8	18	190
27	93	70	82	8	0	17	0.00	0.0	0	5.2	14	310	M	M	0		18	300
28	79	67	73	-1	0	8	0.00	0.0	0	5.7	13	200	M	M	0		17	210
29	83	67	75	1	0	10	0.00	0.0	0	4.5	12	180	M	M	4		16	160
30	78	68	73	-1	0	8	0.00	0.0	0	6.5	14	180	M	M	4		17	200
31	85	68	77	3	0	12	0.00	0.0	0	5.9	14	300	M	M	4	8	16	300
SM	2564	2058			0	303	0.01		0.0	183.0			M		94			
AV	82.7	66.4								5.9	FASTST		M	M	3	MAX(MPH)		
								MISC ---->			18	M				23	M

NOTES:
LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6) , PAGE 2

STATION: LONG BEACH AIRPORT CA
MONTH: JULY
YEAR: 2019
LATITUDE: 33 49 N

LONGITUDE: 118 9 W

[TEMPERATURE DATA]

AVERAGE MONTHLY: 74.6
DPTR FM NORMAL: 1.3
HIGHEST: 99 ON 24
LOWEST: 63 ON 1

[PRECIPITATION DATA]

TOTAL FOR MONTH: 0.01
DPTR FM NORMAL: -0.02
GRTST 24HR 0.01 ON 25-25

SNOW, ICE PELLETS, HAIL
TOTAL MONTH: 0.0 INCH
GRTST 24HR   0.0
GRTST DEPTH: 0

SYMBOLS USED IN COLUMN 16

1 = FOG OR MIST
2 = FOG REDUCING VISIBILITY
    TO 1/4 MILE OR LESS
3 = THUNDER
4 = ICE PELLETS
5 = HAIL
6 = FREEZING RAIN OR DRIZZLE
7 = DUSTSTORM OR SANDSTORM:
    VSBY 1/2 MILE OR LESS
8 = SMOKE OR HAZE
9 = BLOWING SNOW
X = TORNADO

[NO. OF DAYS WITH]

MAX 32 OR BELOW: 0
MAX 90 OR ABOVE: 5
MIN 32 OR BELOW: 0
MIN 0 OR BELOW: 0

[WEATHER - DAYS WITH]

0.01 INCH OR MORE: 1
0.10 INCH OR MORE: 0
0.50 INCH OR MORE: 0
1.00 INCH OR MORE: 0

[HDD (BASE 65)]

TOTAL THIS MO.   0
DPTR FM NORMAL   0
TOTAL FM JUL 1   0
DPTR FM NORMAL   0

CLEAR (SCALE 0-3) 14
PTCLDY (SCALE 4-7) 17
CLOUDY (SCALE 8-10) 0

[CDD (BASE 65)]

TOTAL THIS MO.   303
DPTR FM NORMAL   49
TOTAL FM JAN 1   489
DPTR FM NORMAL   11

[PRESSURE DATA]

HIGHEST SLP 30.06 ON 10
LOWEST SLP 29.77 ON 12

[REMARKS]
#FINAL-07-19#

[Explanation of the Preliminary Monthly Climate Data (F6) Product]

These data are preliminary and have not undergone final quality control by the National Climatic Data Center (NCDC). Therefore, these data are subject to revision. Final and certified climate data can be accessed at the NCDC - http://www.ncdc.noaa.gov.

WFO Monthly/Daily Climate Data

```
000
CXUS56 KLOX 020337
CF6LGB
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

                                                STATION:   LONG BEACH AIRPORT CA
                                                MONTH:     AUGUST
                                                YEAR:      2019
                                                LATITUDE:   33 49 N
                                                LONGITUDE: 118  9 W

  TEMPERATURE IN F:        :PCPN:    SNOW:  WIND       :SUNSHINE: SKY     :PK WND
=================================================================================
1   2   3   4   5  6A  6B    7    8   9   10  11  12  13   14  15   16   17  18
                                     12Z  AVG MX 2MIN
DY MAX MIN AVG DEP HDD CDD  WTR  SNW DPTH SPD SPD DIR MIN PSBL S-S WX    SPD DR
=================================================================================

 1  87  66  77   3   0  12 0.00  0.0    0  5.2 15 300   M    M   2 8      18 290
 2  91  66  79   5   0  14 0.00  0.0    0  5.3 13 320   M    M   0        17 190
 3  87  68  78   4   0  13 0.00  0.0    0  4.2 12 210   M    M   2 8      15 180
 4  87  67  77   3   0  12 0.00  0.0    0  5.2 13 300   M    M   2 8      16 300
 5  88  66  77   3   0  12 0.00  0.0    0  5.8 17 300   M    M   2 18     21 290
 6  90  67  79   5   0  14 0.00  0.0    0  6.4 16 300   M    M   3        20 310
```

7	82	67	75	1	0	10	0.00	0.0	0	5.9	14	300	M	M	5		17	310
8	86	66	76	2	0	11	0.00	0.0	0	5.4	13	300	M	M	5	8	16	300
9	82	65	74	0	0	9	0.00	0.0	0	5.6	13	290	M	M	3	8	15	280
10	82	64	73	-1	0	8	0.00	0.0	0	5.0	13	290	M	M	2		18	170
11	79	65	72	-2	0	7	0.00	0.0	0	5.9	12	290	M	M	2	18	16	200
12	79	65	72	-2	0	7	0.00	0.0	0	5.1	12	170	M	M	4	18	16	200
13	88	64	76	2	0	11	0.00	0.0	0	5.4	13	300	M	M	3	18	15	320
14	89	64	77	3	0	12	0.00	0.0	0	5.8	14	300	M	M	4	18	16	300
15	89	64	77	3	0	12	0.00	0.0	0	5.4	13	310	M	M	4	18	16	300
16	78	64	71	-3	0	6	0.00	0.0	0	5.8	12	180	M	M	5	8	16	180
17	77	66	72	-2	0	7	0.00	0.0	0	5.7	12	180	M	M	6		16	210
18	82	67	75	1	0	10	0.00	0.0	0	5.9	13	300	M	M	4		17	190
19	84	66	75	1	0	10	0.00	0.0	0	5.6	17	290	M	M	3		19	290
20	88	64	76	2	0	11	0.00	0.0	0	5.7	14	300	M	M	0		17	290
21	92	65	79	5	0	14	0.00	0.0	0	4.2	13	300	M	M	0		16	310
22	76	68	72	-2	0	7	0.00	0.0	0	6.9	13	210	M	M	5	18	17	150
23	77	69	73	-1	0	8	0.00	0.0	0	6.3	12	170	M	M	4		17	140
24	91	68	80	6	0	15	0.00	0.0	0	4.6	13	290	M	M	0		16	310
25	93	69	81	7	0	16	0.00	0.0	0	4.9	15	310	M	M	0		18	300
26	89	70	80	6	0	15	0.00	0.0	0	4.9	12	310	M	M	0		14	200
27	83	70	77	3	0	12	0.00	0.0	0	5.1	10	150	M	M	1		15	170
28	79	71	75	1	0	10	0.00	0.0	0	4.9	12	300	M	M	3		16	190
29	90	70	80	6	0	15	0.00	0.0	0	5.9	16	280	M	M	0		20	290
30	92	71	82	8	0	17	0.00	0.0	0	5.0	16	310	M	M	0		19	300
31	93	69	81	7	0	16	0.00	0.0	0	5.5	15	300	M	M	1	8	17	300

SM	2650	2071			0	353	0.00		0.0	168.6			M		75			

AV	85.5	66.8								5.4	FASTST		M	M	2		MAX(MPH)	
								MISC	---->	#	17	300				#	21	290

NOTES:
LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6) , PAGE 2

STATION: LONG BEACH AIRPORT CA
MONTH: AUGUST
YEAR: 2019
LATITUDE: 33 49 N
LONGITUDE: 118 9 W

[TEMPERATURE DATA]

AVERAGE MONTHLY: 76.2
DPTR FM NORMAL: 1.8
HIGHEST: 93 ON 31,25
LOWEST: 64 ON 20,16

[PRECIPITATION DATA]

TOTAL FOR MONTH: 0.00
DPTR FM NORMAL: -0.03
GRTST 24HR 0.00 ON 31-31

SNOW, ICE PELLETS, HAIL
TOTAL MONTH: 0.0 INCH
GRTST 24HR 0.0
GRTST DEPTH: 0

SYMBOLS USED IN COLUMN 16

1 = FOG OR MIST
2 = FOG REDUCING VISIBILITY TO 1/4 MILE OR LESS
3 = THUNDER
4 = ICE PELLETS
5 = HAIL
6 = FREEZING RAIN OR DRIZZLE
7 = DUSTSTORM OR SANDSTORM: VSBY 1/2 MILE OR LESS
8 = SMOKE OR HAZE
9 = BLOWING SNOW
X = TORNADO

[NO. OF DAYS WITH]

MAX 32 OR BELOW: 0
MAX 90 OR ABOVE: 8
MIN 32 OR BELOW: 0
MIN 0 OR BELOW: 0

[WEATHER - DAYS WITH]

0.01 INCH OR MORE: 0
0.10 INCH OR MORE: 0
0.50 INCH OR MORE: 0
1.00 INCH OR MORE: 0

[HDD (BASE 65)]

TOTAL THIS MO. 0
DPTR FM NORMAL 0
TOTAL FM JUL 1 0
DPTR FM NORMAL 0

CLEAR (SCALE 0-3) 17
PTCLDY (SCALE 4-7) 14
CLOUDY (SCALE 8-10) 0

[CDD (BASE 65)]
TOTAL THIS MO. 353
DPTR FM NORMAL   63   [PRESSURE DATA]
TOTAL FM JAN 1 842   HIGHEST SLP M ON M
DPTR FM NORMAL   74   LOWEST SLP 29.69 ON 22

[REMARKS]
#FINAL-08-19#

[Explanation of the Preliminary Monthly Climate Data (F6) Product]

These data are preliminary and have not undergone final quality control by the National Climatic Data Center (NCDC). Therefore, these data are subject to revision. Final and certified climate data can be accessed at the NCDC - http://www.ncdc.noaa.gov.

WFO Monthly/Daily Climate Data

```
191
CXUS56 KLOX 091155
CF6LGB
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

                                              STATION:   LONG BEACH AIRPORT CA
                                              MONTH:     SEPTEMBER
                                              YEAR:      2019
                                              LATITUDE:   33 49 N
                                              LONGITUDE: 118  9 W

  TEMPERATURE IN F:        :PCPN:    SNOW:  WIND      :SUNSHINE: SKY     :PK WND
=================================================================================
1   2   3   4   5  6A  6B    7    8   9   10  11  12  13   14  15   16   17  18
                                     12Z  AVG MX 2MIN
DY MAX MIN AVG DEP HDD CDD  WTR  SNW DPTH SPD SPD DIR MIN PSBL S-S WX    SPD DR
=================================================================================

 1  80  67  74   0   0   9 0.00  0.0    0  5.0 14 180   M    M   4 18     17 190
 2  91  70  81   7   0  16 0.00  0.0    0  4.6 12 200   M    M   0        16 150
 3  95  74  85  11   0  20 0.00  0.0    0  5.3 14 300   M    M   0        17 290
 4  98  74  86  12   0  21 0.00  0.0    0  5.5 20 160   M    M   0        27 160
 5  94  73  84  10   0  19 0.00  0.0    0  5.2 12 300   M    M   0 8      16 190
 6  93  72  83   9   0  18 0.00  0.0    0  4.3 16 300   M    M   1 18     19 300
```

7	91	69	80	6	0	15	0.00	0.0	0	5.1	17	300	M	M	0		21	300
8	78	65	72	-2	0	7	0.00	0.0	0	5.6	14	200	M	M	1		17	200
SM	720	564			0	125	0.00		0.0	40.5			M		6			
AV	90.0	70.5								5.1	FASTST		M	M	1	MAX(MPH)		
								MISC ---->			20	M				27	M	

NOTES:
LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6) , PAGE 2

STATION: LONG BEACH AIRPORT CA
MONTH: SEPTEMBER
YEAR: 2019
LATITUDE: 33 49 N
LONGITUDE: 118 9 W

[TEMPERATURE DATA]

AVERAGE MONTHLY: 80.3
DPTR FM NORMAL: 6.2
HIGHEST: 98 ON 4
LOWEST: 65 ON 8

[PRECIPITATION DATA]

TOTAL FOR MONTH: 0.00
DPTR FM NORMAL: -0.01
GRTST 24HR 0.00 ON 8- 8

SNOW, ICE PELLETS, HAIL
TOTAL MONTH: 0.0 INCH
GRTST 24HR 0.0
GRTST DEPTH: 0

SYMBOLS USED IN COLUMN 16

1 = FOG OR MIST
2 = FOG REDUCING VISIBILITY TO 1/4 MILE OR LESS
3 = THUNDER
4 = ICE PELLETS
5 = HAIL
6 = FREEZING RAIN OR DRIZZLE
7 = DUSTSTORM OR SANDSTORM: VSBY 1/2 MILE OR LESS
8 = SMOKE OR HAZE
9 = BLOWING SNOW

[NO. OF DAYS WITH]

[WEATHER - DAYS WITH]

X = TORNADO

MAX 32 OR BELOW:	0	0.01 INCH OR MORE:	0
MAX 90 OR ABOVE:	6	0.10 INCH OR MORE:	0
MIN 32 OR BELOW:	0	0.50 INCH OR MORE:	0
MIN 0 OR BELOW:	0	1.00 INCH OR MORE:	0

[HDD (BASE 65)]

TOTAL THIS MO.	0	CLEAR (SCALE 0-3)	7
DPTR FM NORMAL	0	PTCLDY (SCALE 4-7)	1
TOTAL FM JUL 1	0	CLOUDY (SCALE 8-10)	0
DPTR FM NORMAL	0		

[CDD (BASE 65)]

TOTAL THIS MO.	125		
DPTR FM NORMAL	53	[PRESSURE DATA]	
TOTAL FM JAN 1	967	HIGHEST SLP M ON M	
DPTR FM NORMAL	127	LOWEST SLP 29.75 ON	4

[REMARKS]

[Explanation of the Preliminary Monthly Climate Data (F6) Product]

These data are preliminary and have not undergone final quality control by the National Climatic Data Center (NCDC). Therefore, these data are subject to revision. Final and certified climate data can be accessed at the NCDC - http://www.ncdc.noaa.gov.

WFO Monthly/Daily Climate Data

528
CXUS56 KLOX 011655
CF6LGB
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

STATION: LONG BEACH AIRPORT CA
MONTH: OCTOBER
YEAR: 2019
LATITUDE: 33 49 N
LONGITUDE: 118 9 W

TEMPERATURE IN F:							:PCPN:	SNOW:	WIND			:SUNSHINE:		SKY		:PK WND	
1	2	3	4	5	6A	6B	7	8	9	10	11	12	13	14	15	16	17	18
									12Z	AVG	MX	2MIN						
DY	MAX	MIN	AVG	DEP	HDD	CDD	WTR	SNW	DPTH	SPD	SPD	DIR	MIN	PSBL	S-S	WX	SPD	DR
1	75	57	66	-4	0	1	0.00	0.0	0	4.2	13	310	M	M	1		18	230
2	84	58	71	1	0	6	0.00	0.0	0	3.9	17	290	M	M	0		20	300
3	78	58	68	-2	0	3	0.00	0.0	0	3.8	13	300	M	M	0		16	310
4	78	57	68	-2	0	3	0.00	0.0	0	3.4	12	300	M	M	0		15	190
5	83	58	71	1	0	6	0.00	0.0	0	3.5	13	300	M	M	0		14	300
6	89	58	74	5	0	9	0.00	0.0	0	3.6	14	310	M	M	0		17	310
7	88	60	74	5	0	9	0.00	0.0	0	3.6	13	310	M	M	0	8	16	280
8	78	59	69	0	0	4	0.00	0.0	0	3.9	10	310	M	M	0	128	14	210
9	73	63	68	-1	0	3	0.00	0.0	0	4.5	10	180	M	M	8		14	180
10	81	66	74	5	0	9	0.00	0.0	0	5.2	13	100	M	M	3		19	90
11	91	57	74	5	0	9	0.00	0.0	0	5.5	18	80	M	M	0		23	80
12	86	58	72	4	0	7	0.00	0.0	0	3.6	14	290	M	M	0		17	300
13	74	57	66	-2	0	1	0.00	0.0	0	3.5	13	200	M	M	0		17	170
14	75	61	68	0	0	3	0.00	0.0	0	4.2	14	300	M	M	2		16	220
15	86	58	72	4	0	7	0.00	0.0	0	4.2	17	290	M	M	0	18	20	290
16	91	60	76	8	0	11	0.00	0.0	0	3.7	13	310	M	M	1	18	M	M
17	79	64	72	4	0	7	0.00	0.0	M	4.6	M	M	M	M	6	18	M	M
18	80	60	70	2	0	5	0.00	0.0	M	3.6	17	300	M	M	1		21	290
19	79	57	68	1	0	3	0.00	0.0	0	3.1	12	200	M	M	0		14	180
20	90	59	75	8	0	10	0.00	0.0	0	2.8	14	190	M	M	1	18	16	200
21	96	62	79	12	0	14	0.00	0.0	0	4.5	15	290	M	M	0		18	290
22	99	61	80	13	0	15	0.00	0.0	0	3.8	16	290	M	M	0		19	290
23	87	61	74	7	0	9	0.00	0.0	0	2.6	9	210	M	M	0	8	12	200
24	99	60	80	14	0	15	0.00	0.0	0	6.0	17	110	M	M	0		23	100
25	98	66	82	16	0	17	0.00	0.0	0	5.0	16	300	M	M	0		19	300
26	86	60	73	7	0	8	0.00	0.0	0	4.6	12	150	M	M	1		16	170
27	71	61	66	0	0	1	0.00	0.0	0	6.9	16	160	M	M	8		22	150
28	81	54	68	2	0	3	0.00	0.0	0	3.9	14	280	M	M	0		20	280
29	71	53	62	-4	3	0	0.00	0.0	0	3.5	14	180	M	M	0		19	190
30	77	53	65	0	0	0	0.00	0.0	0	9.7	25	80	M	M	0	8	30	80
31	83	50	67	2	0	2	0.00	0.0	0	6.1	13	300	M	M	0	8	16	60
SM	2586	1826			3	200	0.00		0.0	135.0			M		32			
AV	83.4	58.9								4.4	FASTST		M	M	1		MAX(MPH)	

MISC ----> # 25 80 # 30 80

NOTES:
LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6) , PAGE 2

STATION: LONG BEACH AIRPORT CA
MONTH: OCTOBER
YEAR: 2019
LATITUDE: 33 49 N
LONGITUDE: 118 9 W

[TEMPERATURE DATA]

AVERAGE MONTHLY: 71.2
DPTR FM NORMAL: 3.5
HIGHEST: 99 ON 24,22
LOWEST: 50 ON 31

[PRECIPITATION DATA]

TOTAL FOR MONTH: 0.00
DPTR FM NORMAL: -0.63
GRTST 24HR 0.00 ON 31-31

SNOW, ICE PELLETS, HAIL
TOTAL MONTH: 0.0 INCH
GRTST 24HR 0.0
GRTST DEPTH: 0

SYMBOLS USED IN COLUMN 16

1 = FOG OR MIST
2 = FOG REDUCING VISIBILITY TO 1/4 MILE OR LESS
3 = THUNDER
4 = ICE PELLETS
5 = HAIL
6 = FREEZING RAIN OR DRIZZLE
7 = DUSTSTORM OR SANDSTORM: VSBY 1/2 MILE OR LESS
8 = SMOKE OR HAZE
9 = BLOWING SNOW
X = TORNADO

[NO. OF DAYS WITH]

MAX 32 OR BELOW: 0
MAX 90 OR ABOVE: 7
MIN 32 OR BELOW: 0
MIN 0 OR BELOW: 0

[WEATHER - DAYS WITH]

0.01 INCH OR MORE: 0
0.10 INCH OR MORE: 0
0.50 INCH OR MORE: 0
1.00 INCH OR MORE: 0

[HDD (BASE 65)]

TOTAL THIS MO. 3
DPTR FM NORMAL -17
TOTAL FM JUL 1 3
DPTR FM NORMAL -18

CLEAR (SCALE 0-3) 28
PTCLDY (SCALE 4-7) 3
CLOUDY (SCALE 8-10) 0

[CDD (BASE 65)]

TOTAL THIS MO. 200
DPTR FM NORMAL 95
TOTAL FM JAN 1 1378
DPTR FM NORMAL 274

[PRESSURE DATA]

HIGHEST SLP M ON M
LOWEST SLP 29.69 ON M

[REMARKS]
#FINAL-10-19#

[Explanation of the Preliminary Monthly Climate Data (F6) Product]

These data are preliminary and have not undergone final quality control by the National Climatic Data Center (NCDC). Therefore, these data are subject to revision. Final and certified climate data can be accessed at the NCDC - http://www.ncdc.noaa.gov.

WFO Monthly/Daily Climate Data

```
000
CXUS56 KLOX 020658
CF6LGB
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

                                        STATION:   LONG BEACH AIRPORT CA
                                        MONTH:     NOVEMBER
                                        YEAR:      2019
                                        LATITUDE:   33 49 N
                                        LONGITUDE: 118  9 W

  TEMPERATURE IN F:       :PCPN:    SNOW:  WIND      :SUNSHINE: SKY     :PK WND
==============================================================================
1   2   3   4   5  6A  6B    7    8   9   10  11  12  13   14  15   16   17  18
                                    12Z  AVG MX 2MIN
DY MAX MIN AVG DEP HDD CDD  WTR  SNW DPTH SPD SPD DIR MIN PSBL S-S WX    SPD DR
==============================================================================

 1  84  50  67   2   0   2 0.00  0.0    0  4.5 12 300   M    M   0        13 300
 2  85  50  68   3   0   3 0.00  0.0    0  2.2 12 290   M    M   0 8      14 300
 3  77  50  64   0   1   0 0.00  0.0    0  2.7 10 310   M    M   1 128    12 180
 4  84  50  67   3   0   2 0.00  0.0    0  3.0 14 290   M    M   2 128    16 290
 5  78  51  65   1   0   0 0.00  0.0    0  3.5 13 310   M    M   1 128    15 300
 6  68  54  61  -3   4   0 0.00  0.0    0  2.8  8 170   M    M   6 128    11 180
 7  75  56  66   2   0   1 0.00  0.0    0  3.1 12 300   M    M   5 18     13 300
 8  86  53  70   7   0   5 0.00  0.0    0  3.8 13 300   M    M   2 18     14 310
 9  90  54  72   9   0   7 0.00  0.0    0  3.2 16 280   M    M   0        21 290
10  69  59  64   1   1   0 0.00  0.0    0  4.1  8 230   M    M   6 18     12 140
11  68  58  63   0   2   0 0.00  0.0    0  3.7 10 200   M    M   5 18     13 200
12  73  58  66   4   0   1 0.00  0.0    0  5.3 13 300   M    M   5 18     15 300
13  70  57  64   2   1   0 0.00  0.0    0  3.5 16 290   M    M   5 18     19 290
14  71  54  63   1   2   0 0.00  0.0    0  3.7 15 300   M    M   2 18     18 310
15  70  54  62   0   3   0 0.00  0.0    0  3.0 14 310   M    M   3 18     16 310
16  79  51  65   4   0   0 0.00  0.0    0  3.1 10 310   M    M   0 128    13 320
17  93  53  73  12   0   8 0.00  0.0    0  3.9 13 300   M    M   2 12     16  10
18  92  56  74  13   0   9 0.00  0.0    0  4.1 13 290   M    M   0        15 290
19  75  58  67   7   0   2    T  0.0    0  4.1 13 160   M    M   4 3      17 150
20  62  52  57  -3   8   0 0.38  0.0    0  7.0 20 200   M    M   9 138    25 200
21  65  51  58  -2   7   0    T  0.0    0  3.5  9 180   M    M   4        13 170
22  70  50  60   0   5   0 0.00  0.0    0  2.8 13 300   M    M   0        14 300
23  77  53  65   5   0   0 0.00  0.0    0  3.7 15 290   M    M   0        17 290
24  76  52  64   5   1   0 0.00  0.0    0  3.3 16 290   M    M   0        19 290
25  65  47  56  -3   9   0 0.00  0.0    0  4.1 14 140   M    M   3        19 150
26  67  49  58  -1   7   0 0.00  0.0    0  3.6 13 290   M    M   2 1      15 290
27  58  50  54  -5  11   0 0.18  0.0    0  6.6 18 290   M    M   7 1      23 300
28  51  45  48 -10  17   0 2.18    M    0  7.9 20  50   M    M  10 18     24  50
29  58  41  50  -8  15   0 0.10    M    0  4.5 21 290   M    M   4 1      29 290
30  59  43  51  -7  14   0 0.02    M    0  2.7  8 340   M    M   5 1      11  80
==============================================================================
SM 2195 1559       108  40  2.86     0.0 117.0          M       93
==============================================================================
AV 73.2 52.0                                3.9 FASTST   M    M   3    MAX(MPH)
                                 MISC ---->  # 21 290               # 29  290
```

```
================================================================================
NOTES:
# LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6) , PAGE 2

                                        STATION:  LONG BEACH AIRPORT CA
                                        MONTH:    NOVEMBER
                                        YEAR:     2019
                                        LATITUDE:   33 49 N
                                        LONGITUDE: 118  9 W

[TEMPERATURE DATA]      [PRECIPITATION DATA]       SYMBOLS USED IN COLUMN 16

AVERAGE MONTHLY: 62.6   TOTAL FOR MONTH:   2.86    1 = FOG OR MIST
DPTR FM NORMAL:   1.2   DPTR FM NORMAL:    1.86    2 = FOG REDUCING VISIBILITY
HIGHEST:    93 ON 17    GRTST 24HR  2.18 ON 28-28      TO 1/4 MILE OR LESS
LOWEST:     41 ON 29                               3 = THUNDER
                        SNOW, ICE PELLETS, HAIL    4 = ICE PELLETS
                        TOTAL MONTH:   0.0 INCH    5 = HAIL
                        GRTST 24HR     0.0         6 = FREEZING RAIN OR DRIZZLE
                        GRTST DEPTH:   0           7 = DUSTSTORM OR SANDSTORM:
                                                       VSBY 1/2 MILE OR LESS
                                                   8 = SMOKE OR HAZE
[NO. OF DAYS WITH]      [WEATHER - DAYS WITH]      9 = BLOWING SNOW
                                                   X = TORNADO
MAX 32 OR BELOW:   0    0.01 INCH OR MORE:   5
MAX 90 OR ABOVE:   3    0.10 INCH OR MORE:   4
MIN 32 OR BELOW:   0    0.50 INCH OR MORE:   1
MIN  0 OR BELOW:   0    1.00 INCH OR MORE:   1

[HDD (BASE 65) ]
TOTAL THIS MO.   108    CLEAR  (SCALE 0-3)  17
DPTR FM NORMAL   -20    PTCLDY (SCALE 4-7)  11
TOTAL FM JUL 1   111    CLOUDY (SCALE 8-10)  2
DPTR FM NORMAL   -38

[CDD (BASE 65) ]
TOTAL THIS MO.    40
DPTR FM NORMAL    19    [PRESSURE DATA]
TOTAL FM JAN 1  1418    HIGHEST SLP 30.20 ON 30
DPTR FM NORMAL   293    LOWEST  SLP 29.53 ON 20

[REMARKS]
#FINAL-11-19#
```

[Explanation of the Preliminary Monthly Climate Data (F6) Product]

These data are preliminary and have not undergone final quality control by the National Climatic Data Center (NCDC). Therefore, these data are subject to revision. Final and certified climate data can be accessed at the NCDC - http://www.ncdc.noaa.gov.

WFO Monthly/Daily Climate Data

```
000
CXUS56 KLOX 011655
CF6LGB
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

                                        STATION:   LONG BEACH AIRPORT CA
                                        MONTH:     DECEMBER
                                        YEAR:      2019
                                        LATITUDE:   33 49 N
                                        LONGITUDE: 118  9 W

  TEMPERATURE IN F:       :PCPN:    SNOW:  WIND      :SUNSHINE: SKY     :PK WND
=============================================================================
1   2   3   4   5  6A  6B    7    8   9   10  11  12  13   14  15   16   17  18
                                    12Z  AVG MX 2MIN
DY MAX MIN AVG DEP HDD CDD  WTR  SNW DPTH SPD SPD DIR MIN PSBL S-S WX    SPD DR
=============================================================================

 1  63  49  56  -2   9   0 0.00  0.0    0  1.9  7 310   M    M   1        13 290
 2  69  46  58   0   7   0 0.00  0.0    0  2.9 10 300   M    M   0        12 300
 3  64  51  58   1   7   0    T  0.0    0  1.4  8 220   M    M   3 8      10 200
 4  63  53  58   1   7   0 0.82  0.0    0  4.5 13 330   M    M   7 1      16 150
 5  67  49  58   1   7   0 0.00  0.0    0  2.1  7 310   M    M   3 12      9 230
 6  65  50  58   1   7   0 0.09  0.0    0  3.1  9 120   M    M   4 1      12 120
 7  67  59  63   6   2   0    T  0.0    0  2.9  9 140   M    M   9        11 190
 8  65  56  61   4   4   0 0.03  0.0    0  4.3 14 290   M    M   7 18     19 230
 9  67  50  59   3   6   0 0.00  0.0    0  1.7  9 130   M    M   3 128    11 200
10  66  48  57   1   8   0 0.00  0.0    0  1.4  8 200   M    M   1 1      11 200
11  66  46  56   0   9   0 0.00  0.0    0  2.9 10 300   M    M   1 128    13 300
12  69  50  60   4   5   0 0.00  0.0    0  1.8  8 180   M    M   0 18     10 150
13  66  50  58   2   7   0 0.00  0.0    0  2.2 10 310   M    M   5 128    12 180
14  65  51  58   2   7   0    T  0.0    0  3.8 18 260   M    M   7 18     24 260
15  65  47  56   0   9   0 0.00  0.0    0 10.3 26 320   M    M   0        30 310
16  70  43  57   1   8   0 0.00  0.0    0  7.9 18  80   M    M   0        27  90
17  69  42  56   0   9   0 0.00  0.0    0  8.7 22  80   M    M   0        32  60
18  64  39  52  -4  13   0 0.00  0.0    0  3.2 14 290   M    M   1        17 290
19  67  40  54  -2  11   0 0.00  0.0    0  1.2  8 310   M    M   0         9 290
20  76  45  61   5   4   0 0.00  0.0    0  4.6 12 330   M    M   0        14 330
21  71  47  59   3   6   0 0.00  0.0    0  1.0  6 200   M    M   0         8 120
22  64  48  56   0   9   0 0.24    M    0  5.6 16  40   M    M   3 1      19  40
23  56  48  52  -4  13   0 1.28    M    0  6.9 18  80   M    M   9 1      25  80
24  60  44  52  -4  13   0 0.00  0.0    0  4.3 14 260   M    M   2 1      19 260
25  59  43  51  -5  14   0 1.03    M    0  6.3 20 110   M    M   6 13     28 160
26  55  45  50  -6  15   0 1.14    M    0  5.9 25  50   M    M   6 1      32  50
27  60  40  50  -6  15   0 0.00  0.0    0  1.7 12 200   M    M   0 1      14 200
28  60  42  51  -5  14   0 0.00  0.0    0  2.0  9 180   M    M   2        13 160
29  60  43  52  -4  13   0 0.00  0.0    0  1.4  8 200   M    M   0 18     10 200
30  64  49  57   1   8   0 0.00  0.0    0  4.1 18 120   M    M   4        23 110
31  73  46  60   4   5   0 0.00  0.0    0  2.2  9 240   M    M   1        13  50
=============================================================================
SM 2015 1459       271   0  4.63     0.0 114.2          M       85
=============================================================================
AV 65.0 47.1                                3.7 FASTST   M    M   3    MAX(MPH)
```

MISC ----> # 26 320 # 32 60

NOTES:
LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6) , PAGE 2

STATION: LONG BEACH AIRPORT CA
MONTH: DECEMBER
YEAR: 2019
LATITUDE: 33 49 N
LONGITUDE: 118 9 W

[TEMPERATURE DATA]

AVERAGE MONTHLY: 56.0
DPTR FM NORMAL: -0.3
HIGHEST: 76 ON 20
LOWEST: 39 ON 18

[PRECIPITATION DATA]

TOTAL FOR MONTH: 4.63
DPTR FM NORMAL: 2.68
GRTST 24HR 1.28 ON 23-23

SNOW, ICE PELLETS, HAIL
TOTAL MONTH: 0.0 INCH
GRTST 24HR 0.0
GRTST DEPTH: 0

SYMBOLS USED IN COLUMN 16

1 = FOG OR MIST
2 = FOG REDUCING VISIBILITY TO 1/4 MILE OR LESS
3 = THUNDER
4 = ICE PELLETS
5 = HAIL
6 = FREEZING RAIN OR DRIZZLE
7 = DUSTSTORM OR SANDSTORM: VSBY 1/2 MILE OR LESS
8 = SMOKE OR HAZE
9 = BLOWING SNOW
X = TORNADO

[NO. OF DAYS WITH]

MAX 32 OR BELOW: 0
MAX 90 OR ABOVE: 0
MIN 32 OR BELOW: 0
MIN 0 OR BELOW: 0

[WEATHER - DAYS WITH]

0.01 INCH OR MORE: 7
0.10 INCH OR MORE: 5
0.50 INCH OR MORE: 4
1.00 INCH OR MORE: 3

[HDD (BASE 65)]

TOTAL THIS MO. 271
DPTR FM NORMAL 0
TOTAL FM JUL 1 382
DPTR FM NORMAL -38

[CDD (BASE 65)]

TOTAL THIS MO. 0
DPTR FM NORMAL -1
TOTAL FM JAN 1 1418
DPTR FM NORMAL 292

CLEAR (SCALE 0-3) 19
PTCLDY (SCALE 4-7) 10
CLOUDY (SCALE 8-10) 2

[PRESSURE DATA]

HIGHEST SLP 30.27 ON 17
LOWEST SLP 29.73 ON 26

[REMARKS]
#FINAL-12-19#

Attachment 3

Dominguez Channel Estuary
September 2019
Sediment Monitoring Report

Prepared for:
Tesoro Refining & Marketing Company LLC
Los Angeles Refinery – Carson Operations
1801 East Sepulveda Boulevard
Carson, CA 90745

Prepared by:
WGR Southwest, Inc.
11021 Winners Circle, Suite 101
Los Alamitos, CA 90720

Date:
November 1, 2019

TESORO REFINING & MARKETING COMPANY LLC
LOS ANGELES REFINERY – CARSON OPERATIONS
DOMINGUEZ CHANNEL ESTUARY SEDIMENT MONITORING REPORT 2019

TABLE OF CONTENTS

TABLES

FIGURES

ATTACHMENTS

1.0 Introduction

On behalf of Tesoro Refining & Marketing Company LLC Los Angeles Refinery – Carson Operations (Tesoro LAR Carson), WGR Southwest, Inc. (WGR) conducted sediment monitoring of the Dominguez Channel Estuary in accordance with National Pollutant Discharge Elimination System Waste Discharge Requirements Permit Number CA0000680 Order Number R4-2015-0259 (WDR Permit). As required in Table E-7 of WDR Permit Attachment E, Monitoring and Reporting Program Number 5424 (MRP No. 5424), sediment monitoring is required at least once a year for all parameters and at least twice a year for Chronic Toxicity regardless of Tesoro LAR Carson discharge associated with the WDR Permit[1]. Therefore, this report constitutes sediment monitoring for the first event of 2019, where the sediment samples collected were analyzed for all required parameters and all required monitoring (i.e. field observations and field analyses) was completed.

2.0 Sediment Monitoring

As shown in Figure 1, the WDR Permit designates seven sediment monitoring locations: SED-001, SED-002, SED-003, SED-004, SED-005, SED-006, and SED-007. WGR field personnel utilized an Ekman dredge and a Horiba U-50 Series Multi-Parameter Meter. According to historic Tesoro LAR Carson Sediment Monitoring Reports, samplers have been unable to collect sediment samples from SED-001 since 2003, SED-002 since 2003, SED-003 since 2009, SED-004 since 2009, and have only infrequently been able to collect sediment samples from SED-005 since 2009.

Sediment monitoring was attempted at all designated sediment monitoring locations on September 25-26, 2019. As detailed in the field logs (see Attachment 1), sediment samples and associated monitoring could only be feasibly completed at three of the seven sediment monitoring locations. Table 2.0 provides a summary of the field observations and analyses.

Table 2.0: Sediment Monitoring Field Observation and Analyses

Sample ID	Field Observations			Field Analyses					
	Sediment Description	Biological Matter	Pollutants	pH (SU)	Salinity (PPT)	DO (mg/L)	SC (mS/Cm)	Turbidity (NTU)	Flow
SED-001	Not Sampled	Not Sampled	Not Sampled	--	--	--	--	--	--
SED-002	Not Sampled	Not Sampled	Not Sampled	--	--	--	--	--	--
SED-003	Not Sampled	Not Sampled	Not Sampled	--	--	--	--	--	--

[1] Tesoro LAR Carson did not discharge under the WDR Permit during the 2019 calendar year.

Table 2.0: Sediment Monitoring Field Observation and Analyses										
Sample ID	Field Observations			Field Analyses					
	Sediment Description	Biological Matter	Pollutants	pH (SU)	Salinity (PPT)	DO (mg/L)	SC (mS/Cm)	Turbidity (NTU)	Flow
SED-004	Not Sampled	Not Sampled	Not Sampled	--	--	--	--	--	--
SED-005	Dark in color and some odor	Algae, sticks and grass	Some trash/debris	8.07	25.1	5.55	39.6	3.7	--
SED-006	Dark in color and moderate biological odor	Rocks and twigs	Some trash/debris	7.98	23.5	5.43	37.2	1.4	--
SED-007	Dark color and strong biological odor	Vegetation and sticks	Some trash/debris	7.80	21.7	4.07	34.5	13.5	--
DO: Dissolved Oxygen SC: Specific Conductance									

3.0 Laboratory Results

Table 2.0 summarizes the field observations and analyses for the September 2019 sediment monitoring event. Laboratory results are summarized in Attachment 2. The Eurofins Calscience laboratory report is in Attachment 3 and the Aquatic Bioassay laboratory report is in Attachment 4. Data validation reports for these laboratory analytical reports are in Attachment 5 and Attachment 6.

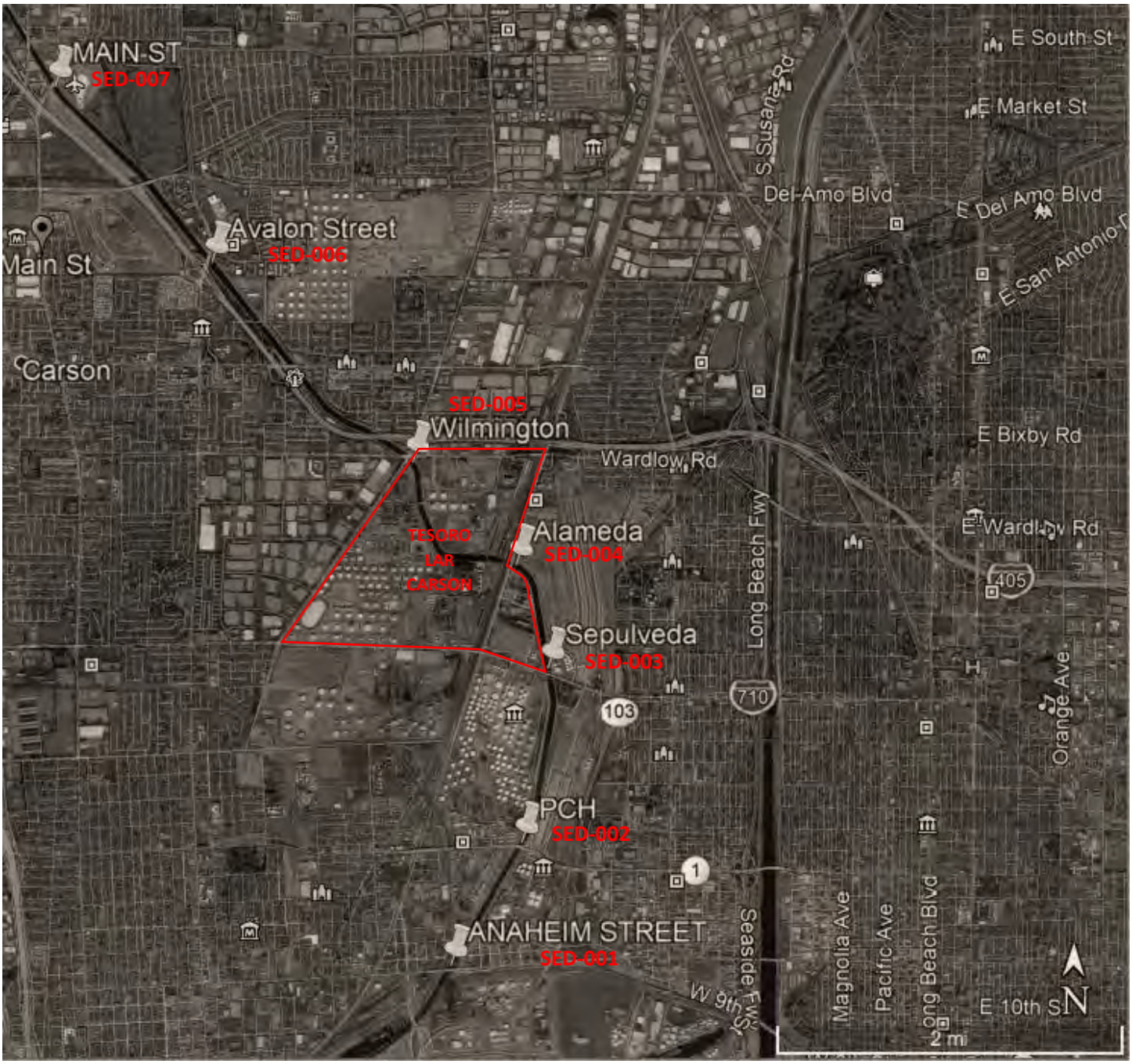
4.0 Executive Summary

Receiving water sediment monitoring and analysis was conducted independent of any discharge from Tesoro LAR Carson. Pollutant concentrations demonstrated in this report are not associated with any contribution from Tesoro LAR Carson to the receiving water. There are no pollutant concentration limits associated with this type of sampling as prescribed by the WDR Permit. Receiving water sediment monitoring and analysis was completed in compliance with the WDR Permit Attachment E, MRP No. 5424. As noted in the Organic/Inorganic Analytical Validation Report and the Sediment Bioassay Data Validation Report included in Attachment 5 and 6, respectively, analytical data obtained for this sampling event was deemed acceptable. No instances of non-compliance were identified.

FIGURE 1

DOMINGUEZ CHANNEL ESTUARY
SEDIMENT MONITORING LOCATIONS

Figure 1: Dominguez Channel Estuary Sediment Monitoring Locations



ATTACHMENT 1

SEDIMENT MONITORING
FIELD LOGS

WGR Southwest, Inc. Field Log	Page 1 of 16 Date: 9-25-2019
Project Name: LARC Sediment Sampling	Field Personnel: Amber Ballrot
Project Number: 021.APC.01	Field Personnel: Joe Rodriguez

Field Conditions/Project Discrepancies:
Cloudy | sunny, water in channel

Time	Field Notes
7:00a	Pack up equipment at WGR office, Los Alamitos, load into work truck, discuss PPE and safety requirements
8:15a	Arrive SED-007 sampling location. Water in channel appears to be flowing ~~inland~~ downstream. Trash along channel and water is murky in color with floating solids/algaes.
	Measured 98 ft from the southeast corner of the bridge northward along the pedestrian walkway - this is the location of the first sampling attempt.
	Measured from top of water line to bottom of bridge railing = 23.3 feet
	Measured from bottom of bridge railing to bottom of channel = 23.3 + 12.6 = 35.9 feet
	First sediment sample provided some dark sediment containing biological matter and residual water. STRONG ODOR.
	Third pull was mostly grass. Moved 3 ft north.
8:57a	Sixth pull completed. Attempted to fill jars/bags, need more
9:13a	Begin seventh pull of sediment 3 feet south, while simultaneously collecting receiving water flow from top of water line for Horiba probe measurements.
9:19a	Horiba meter measurements: ~~6.56 pH; 34.9 mS/cm; 5.7 NTU; 7.19 mg/L DO; 21.7 ppt~~; 7.8 pH; 34.5 mS/cm; 13.5 NTU; 4.07 mg/L DO; 21.7 ppt
9:32a	Complete tenth pull and continue filling sample containers
9:44a	Finished sample collection and started decon of equipment
9:49a	finished decon of equipment and pack up for next point
10:05a	arrive SED-006 area, find appropriate parking and unpack equipment
10:15a	measure from northeast corner of bridge southward along pedestrian walkway - 133 ft to sample location measured from mid railing of bridge to top of water line = 24.6 feet; bottom of channel = 29.6 + 19 = 43.6 feet

WGR Southwest, Inc. Field Log	Page 2 of 6 Date: 9-25-2019
Project Name: LARC Sediment Sampling	Field Personnel: Amber Ballard
Project Number: 021.APC.01	Field Personnel: Joe Rodriguez

Field Conditions/Project Discrepancies:
Cloudy/sunny, water in channel

Time	Field Notes
	-SED-006 continued-
	Some trash along channel along w/vegetation
	water flowing downstream (wind causing inland surface waves)
10[23] a	after some maneuvering around fenceline along
	pedestrian walkway/bridge, collect first sediment
	sample
10[30] a	collect water sample, again after maneuvering around
	the fenceline
10[48] a	conduct Horiba measurements = 7.98 pH; 37.2 mS/cm;
	1.4 NTU; 5.43 mg/L DO; 23.5 ppt
10[50] a	on seventh drop of dredge, one of two wire snap
	fixtures (that hold dredge open until sample collection)
	broke off the dredge and was lost in the channel
11[00] a	fill collection containers w/ sediment sample volume
	obtained before dredge malfunction to assess next steps
	sediment is dark in color, less of an odor than SED-007
	some biological matter, rocks and twigs
11[10] a	attempt additional sample collections w/ partially
	malfunctioned dredge to check whether half of
	a trap is sufficient to collect - it was not.
	set up secondary dredge, which requires two people
	w/ two ropes to operate the dredge and pin release.
	must thread ropes and maneuver around fence line
	(much more difficult than first dredge which was
	equipped w/ a hand release "messenger" on the rope
	to snap close the trap)
11[40] a	failed attempt at using second dredge - pin operated by
	second person unsuccessfully released / rope snapped.
	contacting Pine for replacement dredge and
	taking lunch.
12[00] p	visited Home Depot for replacement parts, assembled new piece

WGR Southwest, Inc. Field Log		Page 3 of 6
		Date: 9-25-2019
Project Name: LHPC Sediment Sampling	Field Personnel: Amber Ballrot	
Project Number: 021.APC.01	Field Personnel: Joe Rodriguez	
Field Conditions/Project Discrepancies: clouds dissipating, sunny, water in channel		

Time	Field Notes
	- SED-006 continued -
1 45 p	lunch
1 45 p	return to SED-006 to finish sample collection (verified with lab that volume collected prior to dredge malfunction was insufficient)
1 50 p	continue sediment sampling efforts
	collect five sample pulls and empty into remainder of containers.
2 15 p	decon equipment and move onto next point.
2 40 p	arrive SED-005
	measure from northeast corner of bridge 121 feet southward to sample point
	25.5 ft from top of bridge railing to top of water, and 41.7 ft to bottom of channel (16.2+25.5=41.7ft)
	some trash in channel, mostly stuck in oil boom to north side, vegetation and rocks along edges
	water flowing ~~downstream~~ inland?, winds causing inland ripples
	tide lower than earlier in day, evidenced by wet banks
	murky water, few feet ~~of~~ visibility
2 45 p	start sampling sediment, first pull provided dark sediment, filled w/ biomatter incl. algae and sticks/grasses
3 15 p	after 7 attempts and only moderate sample volume, moved to north side of bridge over channel (moved 3' laterally along bridge each attempt)
	measured 68 feet from east side of bridge westward to new sample point
	first pull provided sufficient sample volume to continue
3 40 p	collect water for Horiba measurements: 8.07 pH; 39.6 mS/cm; 3.7 NTU; 5.55 mg/L DO; 25.1 ppt
	successfully pulled eight additional sample collections
3 50 p	transfer in sample containers
	head to next point

WGR Southwest, Inc. Field Log		Page 4 of 6 Date: 9-25-2019
Project Name: LARC Sediment Sampling	Field Personnel: Amber Ballrot	
Project Number: 021.ARC.01	Field Personnel: Joe Rodriguez	

Field Conditions/Project Discrepancies:

slightly cloudy, mostly sunny, water in channel

Time	Field Notes
4 15 p	SED-004, arrive
	water murky, not much trash, vegetation and rocks along channel edge
	fence line similar (but more complete / shielding) to SED-006
	measure 65 feet from southeast corner of bridge northward to sample location
	measured from middle of bridge fence to ~~top~~ of water line = 20.4 feet; to channel bottom ~ 36 feet
	first two sediment sample attempts pulled up mirror sediment and some shells, sticks and rocks
	moved north about 10 feet and continued
	next two sediment sample attempts also unsuccessful
	moved 10 feet south of original point and continued
	next two sediment sample attempts also unsuccessful
4 45 p	pack up equipment, ~~don't bother measuring to channel floor as no samples were taken~~
5 23 p	arrive back at office, decon all equipment and fill waters for next day
5 45 p	end of day

WGR Southwest, Inc. Field Log		Page 5 of 6 Date: 9-26-2019
Project Name: LHPC Sediment Sampling	Field Personnel: Amber Ballot	
Project Number: 021.APC.01	Field Personnel: Joe Rodriguez	

Field Conditions/Project Discrepancies:

cloudy, sun rising, water in channel

Time	Field Notes
7[00]a	Pack up equipment at WGR office, Los Alamitos, load into work truck, discuss PPE and safety requirements
8[00]a	arrive SED-003 sampling location.
	water in channel, wind causing inland ripples, actual flow direction appears inland, tide appears high
	some trash in channel, water murky, vegetation
	and rocks along channel edges
	measured from northwest corner of bridge southward
	106 feet to sample point location.
	measured from top of bridge railing to top of water
	line = 18 feet ; to bottom of channel = 18 + 15.4 = 33.4 feet
	first sediment sample pull produced no sediment,
	only shells and sticks ; second pull, the same
	move 10 feet south and continue sample attempts
	next two sediment samples unsuccessful, only
	provided sediment-coated vegetation, shells, rocks, debris
	move 10 feet north of original sample location and
	continue sample attempts
	next two sediment samples same as last two
8[20]a	pack up / decon equipment and move to next sample
	location
8[40]a	after some maneuvering through/around private roads, find
	the appropriate pull-off area for SED-002. No access via
	bridge due to 8-10 foot high fence across entirety of
	only pedestrian walkway. Also assessed channel banks
	and no sediment sampling locations feasible. Photo taken.
	move onto next sample location.
8[55]a	arrive to SED-001 area, find parking, pack up equipment
	into wagon as sample location is far from available
	parking

WGR Southwest, Inc. Field Log		Page 6 of 6
		Date: 9-26-2019
Project Name: LHPC Sediment Sampling	Field Personnel: Amber Ballrot	
Project Number: 021.APC.01	Field Personnel: Joe Rodriguez	
Field Conditions/Project Discrepancies:		

Time	-SED-001 continued- Field Notes
	measure from ~~SW corner of Anaheim St and Signal Ave, as bridge northwest corner of bridge~~ (which spans the channel and railroad tracks on each side of the channel) southward feet to sample location
	measure from bridge railing to top of water line = 50 feet
	measure from bridge railing to bottom of channel = 50 + 36.4 = 86.4 feet
9:10 a	attempt two samples and only retrieved minor amount of shells and rocks
	move 10 feet north and continue sampling attempts
	two additional attempts also unsuccessful, pulled nothing
	move 10 feet south of original sample location and continue sampling attempts
	two additional attempts proved unsuccessful, pulled nothing
	pack up equipment
9:40	head back to office
10:05	arrive office and unload essentials, prepare for sample delivery
	end of field day

ATTACHMENT 2

SEDIMENT MONITORING
LABORATORY RESULT SUMMARY TABLE
AND
PARTICLE GRAIN SIZE SUMMARY TABLE

Sample ID	SED-001	SED-002	SED-003	SED-004	SED-005	SED-006	SED-007
Date Sampled	NS	NS	NS	NS	9/25/2019	9/25/2019	9/25/2019
Time Sampled	NS	NS	NS	NS	16:00	14:00	10:00
Total Metals							
Cadmium (EPA 6020) (mg/Kg)	NS	NS	NS	NS	ND	0.877	2.64
Chromium (EPA 6020) (mg/Kg)	NS	NS	NS	NS	35.6	57.1	67.1
Copper (EPA 6020) (mg/Kg)	NS	NS	NS	NS	56.5	106	164
Lead (EPA 6020) (mg/Kg)	NS	NS	NS	NS	43.7	77.8	151
Nickel (EPA 6020) (mg/Kg)	NS	NS	NS	NS	13.7	23.3	35.3
Zinc (EPA 6020) (mg/Kg)	NS	NS	NS	NS	220	519	960
Mercury (EPA 7471A) (mg/Kg)	NS	NS	NS	NS	0.165	0.0837	0.139
Volatile/Semi-Volatile Organic Compounds							
Chlordane (EPA 8081A) (ug/Kg)	NS	NS	NS	NS	28	16	35
DDT (EPA 8081A) (ug/Kg, sum of 4,4'-DDT, 2,4'-DDT, 4,4'-DDE, 2,4'-DDE, 4,4'-DDD, and 2,4'-DDD)	NS	NS	NS	NS	41.4	29.5	25.3
PCBs (EPA 8082) (ug/Kg, sum of Arochlor 1016, Arochlor 1221, Arochlor 1232, Arochlor 1242, Arochlor 1248, Arochlor 1254, and Arochlor 1260)	NS	NS	NS	NS	385	450	1220
PAHs (EPA 8270C) (mg/Kg, sum of acenaphthene, anthracene, 1,2-benzanthracene, 3,4-benzofluoranthene, benzo(k)fluoranthene, 1,12-benzoperylene, benzo(a)pyrene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, and pyrene)	NS	NS	NS	NS	1.898	2.082	39.4
Total Petroleum Hydrocarbons (EPA 8015B) (mg/Kg)	NS	NS	NS	NS	74	140	240
Sediment Grain Size (ASTM D4464)	Refer to Attachment 2, Table 2						
Total Organic Carbon (EPA 9060A) (mg/Kg)	NS	NS	NS	NS	30,400	25,400	46,900
Tributyltin (Krone et al.) (ug/Kg)	NS	NS	NS	NS	ND	ND	ND
Chronic Toxicity							
Eohaustorius estuarius (NOEC in mg/L)	NS	NS	NS	NS	100%	100%	100%
Mytilus galloprovincialis (NOEC in mg/L)	NS	NS	NS	NS	100%	100%	100%

NS = Not Sampled
ND = Non-Detect
NOEC = No Observed Effect Concentration

Sample ID	Mean Grain Size (mm)	Particle Size Distribution (Weight Percent)								
		Total Silt & Clay (0 - 0.0626 mm)	Clay (< 0.00391 mm)	Silt (0.00391 - 0.0625 mm)	Very Fine Sand (0.0625 - 0.125 mm)	Fine Sand (0.125 - 0.25 mm)	Medium Sand (0.25 - 0.5 mm)	Coarse Sand (0.5 - 1 mm)	Very Coarse Sand (1 - 2 mm)	Gravel (>2 mm)
SED-001	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SED-002	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SED-003	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SED-004	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SED-005	0.061	66.90	11.68	55.23	12.53	19.57	1.00	ND	ND	ND
SED-006	0.727	8.69	0.91	7.77	6.47	17.40	14.17	21.00	32.28	ND
SED-007	0.328	8.94	0.83	8.11	6.07	24.52	41.05	19.33	0.09	ND

NS = Not Sampled
ND = Non-Detect

ATTACHMENT 3

SEDIMENT MONITORING
EUROFINS CALSCIENCE
ANALYTICAL LABORATORY REPORT

ANALYTICAL REPORT

Eurofins Calscience LLC
7440 Lincoln Way
Garden Grove, CA 92841
Tel: (714)895-5494

Laboratory Job ID: 570-8761-1
Client Project/Site: Tesoro LA Refinery

For:
WGR Southwest Inc
11021 Winners Circle
Suite 101
Los Alamitos, California 90720

Attn: Amber Ballrot

Authorized for release by:
10/11/2019 5:55:47 PM

Xuan Dang, Project Manager I
(714)895-5494
xuandang@eurofinsus.com

Table of Contents

Definitions/Glossary

Client: WGR Southwest Inc
Project/Site: Tesoro LA Refinery

Job ID: 570-8761-1

Qualifiers

GC/MS Semi VOA

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

GC Semi VOA

Qualifier	Qualifier Description
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.
E	Result exceeded calibration range.
F1	MS and/or MSD Recovery is outside acceptance limits.
F2	MS/MSD RPD exceeds control limits
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
p	The %RPD between the primary and confirmation column/detector is >40%. The lower value has been reported.
X	Surrogate is outside control limits

Metals

Qualifier	Qualifier Description
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.
F1	MS and/or MSD Recovery is outside acceptance limits.
F2	MS/MSD RPD exceeds control limits
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

General Chemistry

Qualifier	Qualifier Description
^	ICV,CCV,ICB,CCB, ISA, ISB, CRI, CRA, DLCK or MRL standard: Instrument related QC is outside acceptance limits.
F1	MS and/or MSD Recovery is outside acceptance limits.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Job ID: 570-8761-1

Laboratory: Eurofins Calscience LLC

Narrative

Job Narrative
570-8761-1

Comments
No additional comments.

Receipt
The samples were received on 9/26/2019 12:08 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 5.2º C.

GC/MS Semi VOA
Method(s) 8270C SIM: The method blank for preparation batch 570-23315 and analytical batch 570-23777 contained Benzo[a]anthracene above the method detection limit. This target analyte concentration was less than the reporting limit (RL); therefore, re-extraction and/or re-analysis of samples was not performed.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC Semi VOA
Method(s) 8081A: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for preparation batch 570-23256 and 570-23333 and analytical batch 570-24191 were outside control limits.
Due to the additional level of 4,4'-DDE, 4,4'-DDT, and 4,4'-DDD present in the spiked samples, the concentration of 4,4'-DDE , 4,4'-DDT, and 4,4'-DDD in the MS/MSD was above the instrument calibration range. The associated laboratory control sample (LCS) recovery was within acceptance limits therefor, the data have been reported and qualified.

Method(s) 8081A: Surrogate Tetrachloro-m-xylene recovery for the following sample was outside control limits: SED-007 (570-8761-3). Evidence of matrix interference is present; therefore, re-extraction was not performed. Surrogate was passed on 5X dilution run

Method(s) 8082: The following samples appears to contain polychlorinated biphenyls (PCBs); however, due to weathering or other environmental processes, Arolcor 1248 pattern in the sample does not closely match of the laboratory's Aroclor 1248 standard used for instrument calibration: SED-005 (570-8761-1), SED-006 (570-8761-2) and SED-007 (570-8761-3). Due to the poor match with the Aroclor standard(s), there is increased qualitative and quantitative uncertainty associated with this result.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Metals
Method(s) 6020: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for preparation batch 570-23210 and analytical batch 570-23477 were outside control limits. Sample matrix interference and/or non-homogeneity are suspected because the associated laboratory control sample (LCS) recovery was within acceptance limits.

Method(s) 6020: Due to the high concentration of Chromium, Copper, Lead, Zinc, the matrix spike / matrix spike duplicate (MS/MSD) for preparation batch 570-23210 and analytical batch 570-23477 could not be evaluated for accuracy and precision. The associated laboratory control sample / laboratory control sample duplicate (LCS/LCSD) met acceptance criteria.

Method(s) 6020: Due to the high concentration of Chromium, Copper, Lead, Zinc, the matrix spike / matrix spike duplicate (MS/MSD) for preparation batch 570-23210 and analytical batch 570-23477 could not be evaluated for accuracy and precision. The associated laboratory control sample / laboratory control sample duplicate (LCS/LCSD) met acceptance criteria.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

General Chemistry
Method(s) 9060A: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for the following sample associated with analytical batch 570-23330 were outside control limits: (570-8832-A-1), (570-8832-A-1 MS) and (570-8832-A-1 MSD). The associated laboratory control sample (LCS) recovery met acceptance criteria.

Method(s) D4464: Shell debris in samples may affect results.

Job ID: 570-8761-1 (Continued)

Laboratory: Eurofins Calscience LLC (Continued)

SED-005 (570-8761-1), SED-006 (570-8761-2) and SED-007 (570-8761-3)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Organic Prep
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Detection Summary

Client: WGR Southwest Inc
Project/Site: Tesoro LA Refinery

Job ID: 570-8761-1

Client Sample ID: SED-005

Lab Sample ID: 570-8761-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Anthracene - DL	0.037	J	0.10	0.0067	mg/Kg	5	☼	8270C SIM	Total/NA
1,2-Benzanthracene - DL	0.13	B	0.10	0.011	mg/Kg	5	☼	8270C SIM	Total/NA
Benzo[a]pyrene - DL	0.18		0.10	0.014	mg/Kg	5	☼	8270C SIM	Total/NA
3,4-Benzofluoranthene - DL	0.24		0.10	0.015	mg/Kg	5	☼	8270C SIM	Total/NA
Benzo[k]fluoranthene - DL	0.15		0.10	0.016	mg/Kg	5	☼	8270C SIM	Total/NA
1,12-Benzoperylene - DL	0.21		0.10	0.015	mg/Kg	5	☼	8270C SIM	Total/NA
Chrysene - DL	0.24		0.10	0.0078	mg/Kg	5	☼	8270C SIM	Total/NA
Dibenz(a,h)anthracene - DL	0.049	J	0.10	0.011	mg/Kg	5	☼	8270C SIM	Total/NA
Fluoranthene - DL	0.24		0.10	0.0097	mg/Kg	5	☼	8270C SIM	Total/NA
Fluorene - DL	0.012	J	0.10	0.0084	mg/Kg	5	☼	8270C SIM	Total/NA
Indeno[1,2,3-cd]pyrene - DL	0.12		0.10	0.013	mg/Kg	5	☼	8270C SIM	Total/NA
2-Methylnaphthalene - DL	0.016	J	0.10	0.0072	mg/Kg	5	☼	8270C SIM	Total/NA
Naphthalene - DL	0.018	J	0.10	0.0078	mg/Kg	5	☼	8270C SIM	Total/NA
Phenanthrene - DL	0.092	J	0.10	0.0085	mg/Kg	5	☼	8270C SIM	Total/NA
Pyrene - DL	0.29		0.10	0.0075	mg/Kg	5	☼	8270C SIM	Total/NA
C23-C24	8.0	J	10	7.1	mg/Kg	1	☼	8015B	Total/NA
C25-C28	18		10	7.1	mg/Kg	1	☼	8015B	Total/NA
C29-C32	18		10	7.1	mg/Kg	1	☼	8015B	Total/NA
C33-C36	13		10	7.1	mg/Kg	1	☼	8015B	Total/NA
C6-C44	74		10	7.1	mg/Kg	1	☼	8015B	Total/NA
2,4'-DDD	1.3		0.99	0.18	ug/Kg	1		8081A	Total/NA
2,4'-DDE	2.2	J p	5.0	0.42	ug/Kg	1		8081A	Total/NA
4,4'-DDD	9.9		5.0	0.53	ug/Kg	5		8081A	Total/NA
4,4'-DDE	17		5.0	0.72	ug/Kg	5		8081A	Total/NA
4,4'-DDT	11		5.0	1.5	ug/Kg	5		8081A	Total/NA
Chlordane	28		5.0	0.69	ug/Kg	1		8081A	Total/NA
Aroclor-1248	210		20	2.4	ug/Kg	1	☼	8082	Total/NA
Aroclor-1254	91		20	2.3	ug/Kg	1	☼	8082	Total/NA
Aroclor-1260	84		20	4.7	ug/Kg	1	☼	8082	Total/NA
Chromium	35.6		21.0	1.23	mg/Kg	100	☼	6020	Total/NA
Copper	56.5		10.5	1.22	mg/Kg	100	☼	6020	Total/NA
Lead	43.7		10.5	1.44	mg/Kg	100	☼	6020	Total/NA
Nickel	13.7		10.5	1.34	mg/Kg	100	☼	6020	Total/NA
Zinc	220		52.4	8.31	mg/Kg	100	☼	6020	Total/NA
Mercury	0.165		0.165	0.0116	mg/Kg	1	☼	7471A	Total/NA
Carbon, Total Organic	30400	^	1020	355	mg/Kg	1	☼	9060A	Total/NA
Clay(less than 0.00391 mm)	11.68		0.01	0.01	%	1		D4464	Total/NA
Fine Sand (0.125 to 0.25mm)	19.57		0.01	0.01	%	1		D4464	Total/NA
Medium Sand (0.25 to 0.5 mm)	1.00		0.01	0.01	%	1		D4464	Total/NA
Silt (0.00391 to 0.0625mm)	55.23		0.01	0.01	%	1		D4464	Total/NA
Total Silt and Clay (0 to 0.0626mm)	66.90		0.01	0.01	%	1		D4464	Total/NA
Very Fine Sand (0.0625 to 0.125 mm)	12.53		0.01	0.01	%	1		D4464	Total/NA

Client Sample ID: SED-006

Lab Sample ID: 570-8761-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Anthracene - DL	0.037	J	0.14	0.0093	mg/Kg	5	☼	8270C SIM	Total/NA
1,2-Benzanthracene - DL	0.14	B	0.14	0.015	mg/Kg	5	☼	8270C SIM	Total/NA
Benzo[a]pyrene - DL	0.18		0.14	0.019	mg/Kg	5	☼	8270C SIM	Total/NA
3,4-Benzofluoranthene - DL	0.23		0.14	0.020	mg/Kg	5	☼	8270C SIM	Total/NA
Benzo[k]fluoranthene - DL	0.17		0.14	0.023	mg/Kg	5	☼	8270C SIM	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: SED-006 (Continued)

Lab Sample ID: 570-8761-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
1,12-Benzoperylene - DL	0.19		0.14	0.020	mg/Kg	5	☼	8270C SIM	Total/NA
Chrysene - DL	0.27		0.14	0.011	mg/Kg	5	☼	8270C SIM	Total/NA
Dibenz(a,h)anthracene - DL	0.045	J	0.14	0.015	mg/Kg	5	☼	8270C SIM	Total/NA
Fluoranthene - DL	0.31		0.14	0.013	mg/Kg	5	☼	8270C SIM	Total/NA
Indeno[1,2,3-cd]pyrene - DL	0.11	J	0.14	0.017	mg/Kg	5	☼	8270C SIM	Total/NA
2-Methylnaphthalene - DL	0.012	J	0.14	0.010	mg/Kg	5	☼	8270C SIM	Total/NA
Naphthalene - DL	0.027	J	0.14	0.011	mg/Kg	5	☼	8270C SIM	Total/NA
Phenanthrene - DL	0.13	J	0.14	0.012	mg/Kg	5	☼	8270C SIM	Total/NA
Pyrene - DL	0.40		0.14	0.010	mg/Kg	5	☼	8270C SIM	Total/NA
C23-C24	14		14	9.9	mg/Kg	1	☼	8015B	Total/NA
C25-C28	34		14	9.9	mg/Kg	1	☼	8015B	Total/NA
C29-C32	37		14	9.9	mg/Kg	1	☼	8015B	Total/NA
C33-C36	28		14	9.9	mg/Kg	1	☼	8015B	Total/NA
C37-C40	15		14	9.9	mg/Kg	1	☼	8015B	Total/NA
C6-C44	140		14	9.9	mg/Kg	1	☼	8015B	Total/NA
2,4'-DDD	1.3	p	1.0	0.18	ug/Kg	1		8081A	Total/NA
2,4'-DDE	2.3	J p	5.0	0.42	ug/Kg	1		8081A	Total/NA
4,4'-DDD	8.3		5.0	0.53	ug/Kg	5		8081A	Total/NA
4,4'-DDE	16		5.0	0.72	ug/Kg	5		8081A	Total/NA
4,4'-DDT	1.6	p	1.0	0.30	ug/Kg	1		8081A	Total/NA
Chlordane	16	E p	5.0	0.69	ug/Kg	1		8081A	Total/NA
Aroclor-1248	210		28	3.3	ug/Kg	1	☼	8082	Total/NA
Aroclor-1254	110		28	3.2	ug/Kg	1	☼	8082	Total/NA
Aroclor-1260	130		28	6.6	ug/Kg	1	☼	8082	Total/NA
Cadmium	0.877	J	2.80	0.336	mg/Kg	20	☼	6020	Total/NA
Chromium	57.1		5.61	0.328	mg/Kg	20	☼	6020	Total/NA
Copper	106		2.80	0.325	mg/Kg	20	☼	6020	Total/NA
Lead	77.8		2.80	0.384	mg/Kg	20	☼	6020	Total/NA
Nickel	23.3		2.80	0.359	mg/Kg	20	☼	6020	Total/NA
Zinc	519		14.0	2.22	mg/Kg	20	☼	6020	Total/NA
Mercury	0.0837	J	0.238	0.0167	mg/Kg	1	☼	7471A	Total/NA
Carbon, Total Organic	25400	^	1400	487	mg/Kg	1	☼	9060A	Total/NA
Clay(less than 0.00391 mm)	0.91		0.01	0.01	%	1		D4464	Total/NA
Coarse Sand (0.5mm to 1mm)	21.00		0.01	0.01	%	1		D4464	Total/NA
Fine Sand (0.125 to 0.25mm)	17.40		0.01	0.01	%	1		D4464	Total/NA
Medium Sand (0.25 to 0.5 mm)	14.17		0.01	0.01	%	1		D4464	Total/NA
Silt (0.00391 to 0.0625mm)	7.77		0.01	0.01	%	1		D4464	Total/NA
Total Silt and Clay (0 to 0.0626mm)	8.69		0.01	0.01	%	1		D4464	Total/NA
Very Coarse Sand (1 to 2mm)	32.28		0.01	0.01	%	1		D4464	Total/NA
Very Fine Sand (0.0625 to 0.125 mm)	6.47		0.01	0.01	%	1		D4464	Total/NA

Client Sample ID: SED-007

Lab Sample ID: 570-8761-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Acenaphthene - DL	0.20		0.19	0.0096	mg/Kg	5	☼	8270C SIM	Total/NA
Acenaphthylene - DL	17		0.95	0.81	mg/Kg	25	☼	8270C SIM	Total/NA
Anthracene - DL	3.4		0.19	0.013	mg/Kg	5	☼	8270C SIM	Total/NA
1,2-Benzanthracene - DL	1.9	B	0.19	0.021	mg/Kg	5	☼	8270C SIM	Total/NA
Benzo[a]pyrene - DL	5.4		0.19	0.026	mg/Kg	5	☼	8270C SIM	Total/NA
3,4-Benzofluoranthene - DL	2.6		0.19	0.028	mg/Kg	5	☼	8270C SIM	Total/NA
Benzo[k]fluoranthene - DL	2.8		0.19	0.031	mg/Kg	5	☼	8270C SIM	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: SED-007 (Continued)

Lab Sample ID: 570-8761-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
1,12-Benzoperylene - DL	1.6		0.19	0.028	mg/Kg	5	☼	8270C SIM	Total/NA
Chrysene - DL	1.8		0.19	0.015	mg/Kg	5	☼	8270C SIM	Total/NA
Dibenz(a,h)anthracene - DL	0.40		0.19	0.020	mg/Kg	5	☼	8270C SIM	Total/NA
Fluoranthene - DL	1.8		0.19	0.018	mg/Kg	5	☼	8270C SIM	Total/NA
Fluorene - DL	1.4		0.19	0.016	mg/Kg	5	☼	8270C SIM	Total/NA
Indeno[1,2,3-cd]pyrene - DL	1.1		0.19	0.024	mg/Kg	5	☼	8270C SIM	Total/NA
1-Methylnaphthalene - DL	0.17	J	0.19	0.014	mg/Kg	5	☼	8270C SIM	Total/NA
2-Methylnaphthalene - DL	0.35		0.19	0.014	mg/Kg	5	☼	8270C SIM	Total/NA
Naphthalene - DL	0.30		0.19	0.015	mg/Kg	5	☼	8270C SIM	Total/NA
Phenanthrene - DL	1.1		0.19	0.016	mg/Kg	5	☼	8270C SIM	Total/NA
Pyrene - DL	15		0.95	0.071	mg/Kg	25	☼	8270C SIM	Total/NA
C23-C24	22		19	14	mg/Kg	1	☼	8015B	Total/NA
C25-C28	54		19	14	mg/Kg	1	☼	8015B	Total/NA
C29-C32	58		19	14	mg/Kg	1	☼	8015B	Total/NA
C33-C36	49		19	14	mg/Kg	1	☼	8015B	Total/NA
C37-C40	29		19	14	mg/Kg	1	☼	8015B	Total/NA
C6-C44	240		19	14	mg/Kg	1	☼	8015B	Total/NA
2,4'-DDE	2.6	J p	5.0	0.42	ug/Kg	1		8081A	Total/NA
4,4'-DDD	6.8	p	5.0	0.53	ug/Kg	5		8081A	Total/NA
4,4'-DDE	13		5.0	0.72	ug/Kg	5		8081A	Total/NA
4,4'-DDT	2.9	p	0.99	0.30	ug/Kg	1		8081A	Total/NA
Chlordane	35	E p	5.0	0.69	ug/Kg	1		8081A	Total/NA
Aroclor-1248	540		38	4.5	ug/Kg	1	☼	8082	Total/NA
Aroclor-1254	290		38	4.4	ug/Kg	1	☼	8082	Total/NA
Aroclor-1260	390		38	8.9	ug/Kg	1	☼	8082	Total/NA
Cadmium	2.64	J	3.87	0.464	mg/Kg	20	☼	6020	Total/NA
Chromium	67.1		7.74	0.452	mg/Kg	20	☼	6020	Total/NA
Copper	164		3.87	0.449	mg/Kg	20	☼	6020	Total/NA
Lead	151		3.87	0.530	mg/Kg	20	☼	6020	Total/NA
Nickel	35.3		3.87	0.495	mg/Kg	20	☼	6020	Total/NA
Zinc	960		19.3	3.07	mg/Kg	20	☼	6020	Total/NA
Mercury	0.139	J	0.319	0.0225	mg/Kg	1	☼	7471A	Total/NA
Carbon, Total Organic	46900	^	1910	665	mg/Kg	1	☼	9060A	Total/NA
Clay(less than 0.00391 mm)	0.83		0.01	0.01	%	1		D4464	Total/NA
Coarse Sand (0.5mm to 1mm)	19.33		0.01	0.01	%	1		D4464	Total/NA
Fine Sand (0.125 to 0.25mm)	24.52		0.01	0.01	%	1		D4464	Total/NA
Medium Sand (0.25 to 0.5 mm)	41.05		0.01	0.01	%	1		D4464	Total/NA
Silt (0.00391 to 0.0625mm)	8.11		0.01	0.01	%	1		D4464	Total/NA
Total Silt and Clay (0 to 0.0626mm)	8.94		0.01	0.01	%	1		D4464	Total/NA
Very Coarse Sand (1 to 2mm)	0.09		0.01	0.01	%	1		D4464	Total/NA
Very Fine Sand (0.0625 to 0.125 mm)	6.07		0.01	0.01	%	1		D4464	Total/NA

This Detection Summary does not include radiochemical test results.

Method: 8270C SIM - PAHs (GC/MS SIM) - DL

Client Sample ID: SED-005
Date Collected: 09/25/19 16:00
Date Received: 09/26/19 12:08

Lab Sample ID: 570-8761-1
Matrix: Solid

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acenaphthene	ND		0.10	0.0051	mg/Kg	☼	10/02/19 16:36	10/04/19 21:01	5
Acenaphthylene	ND		0.10	0.086	mg/Kg	☼	10/02/19 16:36	10/04/19 21:01	5
Anthracene	**0.037**	**J**	0.10	0.0067	mg/Kg	☼	10/02/19 16:36	10/04/19 21:01	5
1,2-Benzanthracene	**0.13**	**B**	0.10	0.011	mg/Kg	☼	10/02/19 16:36	10/04/19 21:01	5
Benzo[a]pyrene	**0.18**		0.10	0.014	mg/Kg	☼	10/02/19 16:36	10/04/19 21:01	5
3,4-Benzofluoranthene	**0.24**		0.10	0.015	mg/Kg	☼	10/02/19 16:36	10/04/19 21:01	5
Benzo[k]fluoranthene	**0.15**		0.10	0.016	mg/Kg	☼	10/02/19 16:36	10/04/19 21:01	5
1,12-Benzoperylene	**0.21**		0.10	0.015	mg/Kg	☼	10/02/19 16:36	10/04/19 21:01	5
Chrysene	**0.24**		0.10	0.0078	mg/Kg	☼	10/02/19 16:36	10/04/19 21:01	5
Dibenz(a,h)anthracene	**0.049**	**J**	0.10	0.011	mg/Kg	☼	10/02/19 16:36	10/04/19 21:01	5
Fluoranthene	**0.24**		0.10	0.0097	mg/Kg	☼	10/02/19 16:36	10/04/19 21:01	5
Fluorene	**0.012**	**J**	0.10	0.0084	mg/Kg	☼	10/02/19 16:36	10/04/19 21:01	5
Indeno[1,2,3-cd]pyrene	**0.12**		0.10	0.013	mg/Kg	☼	10/02/19 16:36	10/04/19 21:01	5
1-Methylnaphthalene	ND		0.10	0.0072	mg/Kg	☼	10/02/19 16:36	10/04/19 21:01	5
2-Methylnaphthalene	**0.016**	**J**	0.10	0.0072	mg/Kg	☼	10/02/19 16:36	10/04/19 21:01	5
Naphthalene	**0.018**	**J**	0.10	0.0078	mg/Kg	☼	10/02/19 16:36	10/04/19 21:01	5
Phenanthrene	**0.092**	**J**	0.10	0.0085	mg/Kg	☼	10/02/19 16:36	10/04/19 21:01	5
Pyrene	**0.29**		0.10	0.0075	mg/Kg	☼	10/02/19 16:36	10/04/19 21:01	5

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorobiphenyl (Surr)	*85*		*22 - 130*	*10/02/19 16:36*	*10/04/19 21:01*	*5*
Nitrobenzene-d5 (Surr)	*53*		*20 - 145*	*10/02/19 16:36*	*10/04/19 21:01*	*5*
p-Terphenyl-d14 (Surr)	*99*		*33 - 147*	*10/02/19 16:36*	*10/04/19 21:01*	*5*

Client Sample ID: SED-006
Date Collected: 09/25/19 14:00
Date Received: 09/26/19 12:08

Lab Sample ID: 570-8761-2
Matrix: Solid

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acenaphthene	ND		0.14	0.0070	mg/Kg	☼	10/02/19 16:36	10/04/19 21:20	5
Acenaphthylene	ND		0.14	0.12	mg/Kg	☼	10/02/19 16:36	10/04/19 21:20	5
Anthracene	**0.037**	**J**	0.14	0.0093	mg/Kg	☼	10/02/19 16:36	10/04/19 21:20	5
1,2-Benzanthracene	**0.14**	**B**	0.14	0.015	mg/Kg	☼	10/02/19 16:36	10/04/19 21:20	5
Benzo[a]pyrene	**0.18**		0.14	0.019	mg/Kg	☼	10/02/19 16:36	10/04/19 21:20	5
3,4-Benzofluoranthene	**0.23**		0.14	0.020	mg/Kg	☼	10/02/19 16:36	10/04/19 21:20	5
Benzo[k]fluoranthene	**0.17**		0.14	0.023	mg/Kg	☼	10/02/19 16:36	10/04/19 21:20	5
1,12-Benzoperylene	**0.19**		0.14	0.020	mg/Kg	☼	10/02/19 16:36	10/04/19 21:20	5
Chrysene	**0.27**		0.14	0.011	mg/Kg	☼	10/02/19 16:36	10/04/19 21:20	5
Dibenz(a,h)anthracene	**0.045**	**J**	0.14	0.015	mg/Kg	☼	10/02/19 16:36	10/04/19 21:20	5
Fluoranthene	**0.31**		0.14	0.013	mg/Kg	☼	10/02/19 16:36	10/04/19 21:20	5
Fluorene	ND		0.14	0.012	mg/Kg	☼	10/02/19 16:36	10/04/19 21:20	5
Indeno[1,2,3-cd]pyrene	**0.11**	**J**	0.14	0.017	mg/Kg	☼	10/02/19 16:36	10/04/19 21:20	5
1-Methylnaphthalene	ND		0.14	0.010	mg/Kg	☼	10/02/19 16:36	10/04/19 21:20	5
2-Methylnaphthalene	**0.012**	**J**	0.14	0.010	mg/Kg	☼	10/02/19 16:36	10/04/19 21:20	5
Naphthalene	**0.027**	**J**	0.14	0.011	mg/Kg	☼	10/02/19 16:36	10/04/19 21:20	5
Phenanthrene	**0.13**	**J**	0.14	0.012	mg/Kg	☼	10/02/19 16:36	10/04/19 21:20	5
Pyrene	**0.40**		0.14	0.010	mg/Kg	☼	10/02/19 16:36	10/04/19 21:20	5

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorobiphenyl (Surr)	*73*		*22 - 130*	*10/02/19 16:36*	*10/04/19 21:20*	*5*
Nitrobenzene-d5 (Surr)	*46*		*20 - 145*	*10/02/19 16:36*	*10/04/19 21:20*	*5*

Method: 8270C SIM - PAHs (GC/MS SIM) - DL (Continued)

Client Sample ID: SED-006
Date Collected: 09/25/19 14:00
Date Received: 09/26/19 12:08

Lab Sample ID: 570-8761-2
Matrix: Solid

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
p-Terphenyl-d14 (Surr)	*95*		*33 - 147*	*10/02/19 16:36*	*10/04/19 21:20*	*5*

Client Sample ID: SED-007
Date Collected: 09/25/19 10:00
Date Received: 09/26/19 12:08

Lab Sample ID: 570-8761-3
Matrix: Solid

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acenaphthene	**0.20**		0.19	0.0096	mg/Kg	☼	10/02/19 16:36	10/04/19 21:40	5
Acenaphthylene	**17**		0.95	0.81	mg/Kg	☼	10/02/19 16:36	10/08/19 15:08	25
Anthracene	**3.4**		0.19	0.013	mg/Kg	☼	10/02/19 16:36	10/04/19 21:40	5
1,2-Benzanthracene	**1.9**	**B**	0.19	0.021	mg/Kg	☼	10/02/19 16:36	10/04/19 21:40	5
Benzo[a]pyrene	**5.4**		0.19	0.026	mg/Kg	☼	10/02/19 16:36	10/04/19 21:40	5
3,4-Benzofluoranthene	**2.6**		0.19	0.028	mg/Kg	☼	10/02/19 16:36	10/04/19 21:40	5
Benzo[k]fluoranthene	**2.8**		0.19	0.031	mg/Kg	☼	10/02/19 16:36	10/04/19 21:40	5
1,12-Benzoperylene	**1.6**		0.19	0.028	mg/Kg	☼	10/02/19 16:36	10/04/19 21:40	5
Chrysene	**1.8**		0.19	0.015	mg/Kg	☼	10/02/19 16:36	10/04/19 21:40	5
Dibenz(a,h)anthracene	**0.40**		0.19	0.020	mg/Kg	☼	10/02/19 16:36	10/04/19 21:40	5
Fluoranthene	**1.8**		0.19	0.018	mg/Kg	☼	10/02/19 16:36	10/04/19 21:40	5
Fluorene	**1.4**		0.19	0.016	mg/Kg	☼	10/02/19 16:36	10/04/19 21:40	5
Indeno[1,2,3-cd]pyrene	**1.1**		0.19	0.024	mg/Kg	☼	10/02/19 16:36	10/04/19 21:40	5
1-Methylnaphthalene	**0.17**	**J**	0.19	0.014	mg/Kg	☼	10/02/19 16:36	10/04/19 21:40	5
2-Methylnaphthalene	**0.35**		0.19	0.014	mg/Kg	☼	10/02/19 16:36	10/04/19 21:40	5
Naphthalene	**0.30**		0.19	0.015	mg/Kg	☼	10/02/19 16:36	10/04/19 21:40	5
Phenanthrene	**1.1**		0.19	0.016	mg/Kg	☼	10/02/19 16:36	10/04/19 21:40	5
Pyrene	**15**		0.95	0.071	mg/Kg	☼	10/02/19 16:36	10/08/19 15:08	25

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorobiphenyl (Surr)	*84*		*22 - 130*	*10/02/19 16:36*	*10/04/19 21:40*	*5*
2-Fluorobiphenyl (Surr)	*90*		*22 - 130*	*10/02/19 16:36*	*10/08/19 15:08*	*25*
Nitrobenzene-d5 (Surr)	*90*		*20 - 145*	*10/02/19 16:36*	*10/04/19 21:40*	*5*
Nitrobenzene-d5 (Surr)	*82*		*20 - 145*	*10/02/19 16:36*	*10/08/19 15:08*	*25*
p-Terphenyl-d14 (Surr)	*104*		*33 - 147*	*10/02/19 16:36*	*10/04/19 21:40*	*5*
p-Terphenyl-d14 (Surr)	*97*		*33 - 147*	*10/02/19 16:36*	*10/08/19 15:08*	*25*

Method: Organotins SIM - Organotins (GC/MS SIM)

Client Sample ID: SED-005
Date Collected: 09/25/19 16:00
Date Received: 09/26/19 12:08

Lab Sample ID: 570-8761-1
Matrix: Solid

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Tributyltin	ND		6.0	3.0	ug/Kg	☼	10/02/19 20:08	10/08/19 15:06	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Tripentyltin	*59*		*27 - 135*	*10/02/19 20:08*	*10/08/19 15:06*	*1*

Client Sample ID: SED-006
Date Collected: 09/25/19 14:00
Date Received: 09/26/19 12:08

Lab Sample ID: 570-8761-2
Matrix: Solid

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Tributyltin	ND		8.2	4.1	ug/Kg	☼	10/02/19 20:23	10/08/19 15:23	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Tripentyltin	*46*		*27 - 135*	*10/02/19 20:23*	*10/08/19 15:23*	*1*

Client Sample ID: SED-007
Date Collected: 09/25/19 10:00
Date Received: 09/26/19 12:08

Lab Sample ID: 570-8761-3
Matrix: Solid

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Tributyltin	ND		11	5.7	ug/Kg	☼	10/02/19 20:23	10/08/19 15:41	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Tripentyltin	*47*		*27 - 135*	*10/02/19 20:23*	*10/08/19 15:41*	*1*

Method: 8015B - Diesel Range Organics (DRO) (GC)

Client Sample ID: SED-005
Date Collected: 09/25/19 16:00
Date Received: 09/26/19 12:08

Lab Sample ID: 570-8761-1
Matrix: Solid

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
C6 as C6	ND		10	7.1	mg/Kg	☼	10/02/19 09:36	10/02/19 17:15	1
C7 as C7	ND		10	7.1	mg/Kg	☼	10/02/19 09:36	10/02/19 17:15	1
C8 as C8	ND		10	7.1	mg/Kg	☼	10/02/19 09:36	10/02/19 17:15	1
C9-C10	ND		10	7.1	mg/Kg	☼	10/02/19 09:36	10/02/19 17:15	1
C11-C12	ND		10	7.1	mg/Kg	☼	10/02/19 09:36	10/02/19 17:15	1
C13-C14	ND		10	7.1	mg/Kg	☼	10/02/19 09:36	10/02/19 17:15	1
C15-C16	ND		10	7.1	mg/Kg	☼	10/02/19 09:36	10/02/19 17:15	1
C17-C18	ND		10	7.1	mg/Kg	☼	10/02/19 09:36	10/02/19 17:15	1
C19-C20	ND		10	7.1	mg/Kg	☼	10/02/19 09:36	10/02/19 17:15	1
C21-C22	ND		10	7.1	mg/Kg	☼	10/02/19 09:36	10/02/19 17:15	1
C23-C24	**8.0**	**J**	10	7.1	mg/Kg	☼	10/02/19 09:36	10/02/19 17:15	1
C25-C28	**18**		10	7.1	mg/Kg	☼	10/02/19 09:36	10/02/19 17:15	1
C29-C32	**18**		10	7.1	mg/Kg	☼	10/02/19 09:36	10/02/19 17:15	1
C33-C36	**13**		10	7.1	mg/Kg	☼	10/02/19 09:36	10/02/19 17:15	1
C37-C40	ND		10	7.1	mg/Kg	☼	10/02/19 09:36	10/02/19 17:15	1
C41-C44	ND		10	7.1	mg/Kg	☼	10/02/19 09:36	10/02/19 17:15	1
C6-C44	**74**		10	7.1	mg/Kg	☼	10/02/19 09:36	10/02/19 17:15	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
n-Octacosane (Surr)	*100*		*61 - 145*	*10/02/19 09:36*	*10/02/19 17:15*	*1*

Client Sample ID: SED-006
Date Collected: 09/25/19 14:00
Date Received: 09/26/19 12:08

Lab Sample ID: 570-8761-2
Matrix: Solid

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
C6 as C6	ND		14	9.9	mg/Kg	☼	10/02/19 09:36	10/02/19 19:02	1
C7 as C7	ND		14	9.9	mg/Kg	☼	10/02/19 09:36	10/02/19 19:02	1
C8 as C8	ND		14	9.9	mg/Kg	☼	10/02/19 09:36	10/02/19 19:02	1
C9-C10	ND		14	9.9	mg/Kg	☼	10/02/19 09:36	10/02/19 19:02	1
C11-C12	ND		14	9.9	mg/Kg	☼	10/02/19 09:36	10/02/19 19:02	1
C13-C14	ND		14	9.9	mg/Kg	☼	10/02/19 09:36	10/02/19 19:02	1
C15-C16	ND		14	9.9	mg/Kg	☼	10/02/19 09:36	10/02/19 19:02	1
C17-C18	ND		14	9.9	mg/Kg	☼	10/02/19 09:36	10/02/19 19:02	1
C19-C20	ND		14	9.9	mg/Kg	☼	10/02/19 09:36	10/02/19 19:02	1
C21-C22	ND		14	9.9	mg/Kg	☼	10/02/19 09:36	10/02/19 19:02	1
C23-C24	**14**		14	9.9	mg/Kg	☼	10/02/19 09:36	10/02/19 19:02	1
C25-C28	**34**		14	9.9	mg/Kg	☼	10/02/19 09:36	10/02/19 19:02	1
C29-C32	**37**		14	9.9	mg/Kg	☼	10/02/19 09:36	10/02/19 19:02	1
C33-C36	**28**		14	9.9	mg/Kg	☼	10/02/19 09:36	10/02/19 19:02	1
C37-C40	**15**		14	9.9	mg/Kg	☼	10/02/19 09:36	10/02/19 19:02	1
C41-C44	ND		14	9.9	mg/Kg	☼	10/02/19 09:36	10/02/19 19:02	1
C6-C44	**140**		14	9.9	mg/Kg	☼	10/02/19 09:36	10/02/19 19:02	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
n-Octacosane (Surr)	*98*		*61 - 145*	*10/02/19 09:36*	*10/02/19 19:02*	*1*

Method: 8015B - Diesel Range Organics (DRO) (GC)

Client Sample ID: SED-007
Date Collected: 09/25/19 10:00
Date Received: 09/26/19 12:08

Lab Sample ID: 570-8761-3
Matrix: Solid

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
C6 as C6	ND		19	14	mg/Kg	☼	10/02/19 09:36	10/02/19 19:23	1
C7 as C7	ND		19	14	mg/Kg	☼	10/02/19 09:36	10/02/19 19:23	1
C8 as C8	ND		19	14	mg/Kg	☼	10/02/19 09:36	10/02/19 19:23	1
C9-C10	ND		19	14	mg/Kg	☼	10/02/19 09:36	10/02/19 19:23	1
C11-C12	ND		19	14	mg/Kg	☼	10/02/19 09:36	10/02/19 19:23	1
C13-C14	ND		19	14	mg/Kg	☼	10/02/19 09:36	10/02/19 19:23	1
C15-C16	ND		19	14	mg/Kg	☼	10/02/19 09:36	10/02/19 19:23	1
C17-C18	ND		19	14	mg/Kg	☼	10/02/19 09:36	10/02/19 19:23	1
C19-C20	ND		19	14	mg/Kg	☼	10/02/19 09:36	10/02/19 19:23	1
C21-C22	ND		19	14	mg/Kg	☼	10/02/19 09:36	10/02/19 19:23	1
C23-C24	**22**		19	14	mg/Kg	☼	10/02/19 09:36	10/02/19 19:23	1
C25-C28	**54**		19	14	mg/Kg	☼	10/02/19 09:36	10/02/19 19:23	1
C29-C32	**58**		19	14	mg/Kg	☼	10/02/19 09:36	10/02/19 19:23	1
C33-C36	**49**		19	14	mg/Kg	☼	10/02/19 09:36	10/02/19 19:23	1
C37-C40	**29**		19	14	mg/Kg	☼	10/02/19 09:36	10/02/19 19:23	1
C41-C44	ND		19	14	mg/Kg	☼	10/02/19 09:36	10/02/19 19:23	1
C6-C44	**240**		19	14	mg/Kg	☼	10/02/19 09:36	10/02/19 19:23	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
n-Octacosane (Surr)	*86*		*61 - 145*	*10/02/19 09:36*	*10/02/19 19:23*	*1*

Method: 8081A - Organochlorine Pesticides (GC)

Client Sample ID: SED-005
Date Collected: 09/25/19 16:00
Date Received: 09/26/19 12:08

Lab Sample ID: 570-8761-1
Matrix: Solid

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,4'-DDD	**1.3**		0.99	0.18	ug/Kg		10/02/19 17:47	10/07/19 15:17	1
2,4'-DDE	**2.2**	**J p**	5.0	0.42	ug/Kg		10/02/19 17:47	10/07/19 15:17	1
2,4'-DDT	ND		0.99	0.089	ug/Kg		10/02/19 17:47	10/07/19 15:17	1
4,4'-DDD	**9.9**		5.0	0.53	ug/Kg		10/02/19 17:47	10/07/19 16:00	5
4,4'-DDE	**17**		5.0	0.72	ug/Kg		10/02/19 17:47	10/07/19 16:00	5
4,4'-DDT	**11**		5.0	1.5	ug/Kg		10/02/19 17:47	10/07/19 16:00	5
Chlordane	**28**		5.0	0.69	ug/Kg		10/02/19 17:47	10/07/19 15:17	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Tetrachloro-m-xylene	*128*	*p*	*25 - 145*	*10/02/19 17:47*	*10/07/19 15:17*	*1*
Tetrachloro-m-xylene	*131*		*25 - 145*	*10/02/19 17:47*	*10/07/19 16:00*	*5*
DCB Decachlorobiphenyl (Surr)	*143*		*24 - 168*	*10/02/19 17:47*	*10/07/19 15:17*	*1*
DCB Decachlorobiphenyl (Surr)	*150*		*24 - 168*	*10/02/19 17:47*	*10/07/19 16:00*	*5*

Client Sample ID: SED-006
Date Collected: 09/25/19 14:00
Date Received: 09/26/19 12:08

Lab Sample ID: 570-8761-2
Matrix: Solid

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,4'-DDD	**1.3**	**p**	1.0	0.18	ug/Kg		10/02/19 17:47	10/07/19 15:31	1
2,4'-DDE	**2.3**	**J p**	5.0	0.42	ug/Kg		10/02/19 17:47	10/07/19 15:31	1
2,4'-DDT	ND		1.0	0.090	ug/Kg		10/02/19 17:47	10/07/19 15:31	1
4,4'-DDD	**8.3**		5.0	0.53	ug/Kg		10/02/19 17:47	10/07/19 16:14	5
4,4'-DDE	**16**		5.0	0.72	ug/Kg		10/02/19 17:47	10/07/19 16:14	5
4,4'-DDT	**1.6**	**p**	1.0	0.30	ug/Kg		10/02/19 17:47	10/07/19 15:31	1
Chlordane	**16**	**E p**	5.0	0.69	ug/Kg		10/02/19 17:47	10/07/19 15:31	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Tetrachloro-m-xylene	*93*	*p*	*25 - 145*	*10/02/19 17:47*	*10/07/19 15:31*	*1*
Tetrachloro-m-xylene	*68*		*25 - 145*	*10/02/19 17:47*	*10/07/19 16:14*	*5*
DCB Decachlorobiphenyl (Surr)	*154*	*p*	*24 - 168*	*10/02/19 17:47*	*10/07/19 15:31*	*1*
DCB Decachlorobiphenyl (Surr)	*126*		*24 - 168*	*10/02/19 17:47*	*10/07/19 16:14*	*5*

Client Sample ID: SED-007
Date Collected: 09/25/19 10:00
Date Received: 09/26/19 12:08

Lab Sample ID: 570-8761-3
Matrix: Solid

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,4'-DDD	ND		0.99	0.18	ug/Kg		10/02/19 17:47	10/07/19 15:45	1
2,4'-DDE	**2.6**	**J p**	5.0	0.42	ug/Kg		10/02/19 17:47	10/07/19 15:45	1
2,4'-DDT	ND		0.99	0.089	ug/Kg		10/02/19 17:47	10/07/19 15:45	1
4,4'-DDD	**6.8**	**p**	5.0	0.53	ug/Kg		10/02/19 17:47	10/07/19 16:28	5
4,4'-DDE	**13**		5.0	0.72	ug/Kg		10/02/19 17:47	10/07/19 16:28	5
4,4'-DDT	**2.9**	**p**	0.99	0.30	ug/Kg		10/02/19 17:47	10/07/19 15:45	1
Chlordane	**35**	**E p**	5.0	0.69	ug/Kg		10/02/19 17:47	10/07/19 15:45	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Tetrachloro-m-xylene	*184*	*p X*	*25 - 145*	*10/02/19 17:47*	*10/07/19 15:45*	*1*
Tetrachloro-m-xylene	*130*		*25 - 145*	*10/02/19 17:47*	*10/07/19 16:28*	*5*
DCB Decachlorobiphenyl (Surr)	*160*	*p*	*24 - 168*	*10/02/19 17:47*	*10/07/19 15:45*	*1*
DCB Decachlorobiphenyl (Surr)	*166*		*24 - 168*	*10/02/19 17:47*	*10/07/19 16:28*	*5*

Method: 8082 - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Client Sample ID: SED-005
Date Collected: 09/25/19 16:00
Date Received: 09/26/19 12:08

Lab Sample ID: 570-8761-1
Matrix: Solid

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aroclor-1016	ND		20	4.1	ug/Kg	☼	10/02/19 17:47	10/04/19 14:18	1
Aroclor-1221	ND		20	13	ug/Kg	☼	10/02/19 17:47	10/04/19 14:18	1
Aroclor-1232	ND		20	4.7	ug/Kg	☼	10/02/19 17:47	10/04/19 14:18	1
Aroclor-1242	ND		20	3.3	ug/Kg	☼	10/02/19 17:47	10/04/19 14:18	1
Aroclor-1248	**210**		20	2.4	ug/Kg	☼	10/02/19 17:47	10/04/19 14:18	1
Aroclor-1254	**91**		20	2.3	ug/Kg	☼	10/02/19 17:47	10/04/19 14:18	1
Aroclor-1260	**84**		20	4.7	ug/Kg	☼	10/02/19 17:47	10/04/19 14:18	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
DCB Decachlorobiphenyl (Surr)	*120*		*24 - 168*	*10/02/19 17:47*	*10/04/19 14:18*	*1*
Tetrachloro-m-xylene (Surr)	*91*		*25 - 145*	*10/02/19 17:47*	*10/04/19 14:18*	*1*

Client Sample ID: SED-006
Date Collected: 09/25/19 14:00
Date Received: 09/26/19 12:08

Lab Sample ID: 570-8761-2
Matrix: Solid

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aroclor-1016	ND		28	5.7	ug/Kg	☼	10/02/19 17:47	10/04/19 14:36	1
Aroclor-1221	ND		28	18	ug/Kg	☼	10/02/19 17:47	10/04/19 14:36	1
Aroclor-1232	ND		28	6.6	ug/Kg	☼	10/02/19 17:47	10/04/19 14:36	1
Aroclor-1242	ND		28	4.6	ug/Kg	☼	10/02/19 17:47	10/04/19 14:36	1
Aroclor-1248	**210**		28	3.3	ug/Kg	☼	10/02/19 17:47	10/04/19 14:36	1
Aroclor-1254	**110**		28	3.2	ug/Kg	☼	10/02/19 17:47	10/04/19 14:36	1
Aroclor-1260	**130**		28	6.6	ug/Kg	☼	10/02/19 17:47	10/04/19 14:36	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
DCB Decachlorobiphenyl (Surr)	*143*		*24 - 168*	*10/02/19 17:47*	*10/04/19 14:36*	*1*
Tetrachloro-m-xylene (Surr)	*111*		*25 - 145*	*10/02/19 17:47*	*10/04/19 14:36*	*1*

Client Sample ID: SED-007
Date Collected: 09/25/19 10:00
Date Received: 09/26/19 12:08

Lab Sample ID: 570-8761-3
Matrix: Solid

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aroclor-1016	ND	F2 F1	38	7.7	ug/Kg	☼	10/02/19 17:47	10/04/19 14:54	1
Aroclor-1221	ND		38	24	ug/Kg	☼	10/02/19 17:47	10/04/19 14:54	1
Aroclor-1232	ND		38	8.9	ug/Kg	☼	10/02/19 17:47	10/04/19 14:54	1
Aroclor-1242	ND		38	6.2	ug/Kg	☼	10/02/19 17:47	10/04/19 14:54	1
Aroclor-1248	**540**		38	4.5	ug/Kg	☼	10/02/19 17:47	10/04/19 14:54	1
Aroclor-1254	**290**		38	4.4	ug/Kg	☼	10/02/19 17:47	10/04/19 14:54	1
Aroclor-1260	**390**		38	8.9	ug/Kg	☼	10/02/19 17:47	10/04/19 14:54	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
DCB Decachlorobiphenyl (Surr)	*133*		*24 - 168*	*10/02/19 17:47*	*10/04/19 14:54*	*1*
Tetrachloro-m-xylene (Surr)	*101*		*25 - 145*	*10/02/19 17:47*	*10/04/19 14:54*	*1*

Method: 6020 - Metals (ICP/MS)

Client Sample ID: SED-005
Date Collected: 09/25/19 16:00
Date Received: 09/26/19 12:08

Lab Sample ID: 570-8761-1
Matrix: Solid

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		10.5	1.26	mg/Kg	☼	10/02/19 13:30	10/02/19 21:27	100
Chromium	**35.6**		21.0	1.23	mg/Kg	☼	10/02/19 13:30	10/02/19 21:27	100
Copper	**56.5**		10.5	1.22	mg/Kg	☼	10/02/19 13:30	10/02/19 21:27	100
Lead	**43.7**		10.5	1.44	mg/Kg	☼	10/02/19 13:30	10/02/19 21:27	100
Nickel	**13.7**		10.5	1.34	mg/Kg	☼	10/02/19 13:30	10/02/19 21:27	100
Zinc	**220**		52.4	8.31	mg/Kg	☼	10/02/19 13:30	10/02/19 21:27	100

Client Sample ID: SED-006
Date Collected: 09/25/19 14:00
Date Received: 09/26/19 12:08

Lab Sample ID: 570-8761-2
Matrix: Solid

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	**0.877**	**J**	2.80	0.336	mg/Kg	☼	10/02/19 13:30	10/02/19 21:45	20
Chromium	**57.1**		5.61	0.328	mg/Kg	☼	10/02/19 13:30	10/02/19 21:45	20
Copper	**106**		2.80	0.325	mg/Kg	☼	10/02/19 13:30	10/02/19 21:45	20
Lead	**77.8**		2.80	0.384	mg/Kg	☼	10/02/19 13:30	10/02/19 21:45	20
Nickel	**23.3**		2.80	0.359	mg/Kg	☼	10/02/19 13:30	10/02/19 21:45	20
Zinc	**519**		14.0	2.22	mg/Kg	☼	10/02/19 13:30	10/02/19 21:45	20

Client Sample ID: SED-007
Date Collected: 09/25/19 10:00
Date Received: 09/26/19 12:08

Lab Sample ID: 570-8761-3
Matrix: Solid

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	**2.64**	**J**	3.87	0.464	mg/Kg	☼	10/02/19 13:30	10/02/19 21:48	20
Chromium	**67.1**		7.74	0.452	mg/Kg	☼	10/02/19 13:30	10/02/19 21:48	20
Copper	**164**		3.87	0.449	mg/Kg	☼	10/02/19 13:30	10/02/19 21:48	20
Lead	**151**		3.87	0.530	mg/Kg	☼	10/02/19 13:30	10/02/19 21:48	20
Nickel	**35.3**		3.87	0.495	mg/Kg	☼	10/02/19 13:30	10/02/19 21:48	20
Zinc	**960**		19.3	3.07	mg/Kg	☼	10/02/19 13:30	10/02/19 21:48	20

Client: WGR Southwest Inc
Project/Site: Tesoro LA Refinery

Job ID: 570-8761-1

Method: 7471A - Mercury (CVAA)

Client Sample ID: SED-005
Date Collected: 09/25/19 16:00
Date Received: 09/26/19 12:08

Lab Sample ID: 570-8761-1
Matrix: Solid

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.165		0.165	0.0116	mg/Kg	☼	10/02/19 16:00	10/02/19 19:06	1

Client Sample ID: SED-006
Date Collected: 09/25/19 14:00
Date Received: 09/26/19 12:08

Lab Sample ID: 570-8761-2
Matrix: Solid

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.0837	J	0.238	0.0167	mg/Kg	☼	10/02/19 16:00	10/02/19 19:08	1

Client Sample ID: SED-007
Date Collected: 09/25/19 10:00
Date Received: 09/26/19 12:08

Lab Sample ID: 570-8761-3
Matrix: Solid

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.139	J	0.319	0.0225	mg/Kg	☼	10/02/19 16:00	10/02/19 19:10	1

General Chemistry

Client Sample ID: SED-005
Date Collected: 09/25/19 16:00
Date Received: 09/26/19 12:08

Lab Sample ID: 570-8761-1
Matrix: Solid

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon, Total Organic	30400	^	1020	355	mg/Kg	☼		10/02/19 11:25	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	51.1		0.1	0.1	%			10/01/19 09:00	1

Client Sample ID: SED-006
Date Collected: 09/25/19 14:00
Date Received: 09/26/19 12:08

Lab Sample ID: 570-8761-2
Matrix: Solid

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon, Total Organic	25400	^	1400	487	mg/Kg	☼		10/02/19 11:25	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	64.3		0.1	0.1	%			10/01/19 09:00	1

Client Sample ID: SED-007
Date Collected: 09/25/19 10:00
Date Received: 09/26/19 12:08

Lab Sample ID: 570-8761-3
Matrix: Solid

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon, Total Organic	46900	^	1910	665	mg/Kg	☼		10/02/19 11:25	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	73.9		0.1	0.1	%			10/01/19 09:00	1

Method: D4464 - Particle Size Distribution of Catalytic Material (Laser light scattering)

Client Sample ID: SED-005
Date Collected: 09/25/19 16:00
Date Received: 09/26/19 12:08

Lab Sample ID: 570-8761-1
Matrix: Solid

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Clay(less than 0.00391 mm)	11.68		0.01	0.01	%			10/04/19 14:53	1
Coarse Sand (0.5mm to 1mm)	ND		0.01	0.01	%			10/04/19 14:53	1
Fine Sand (0.125 to 0.25mm)	19.57		0.01	0.01	%			10/04/19 14:53	1
Gravel (greater than 2 mm)	ND		0.01	0.01	%			10/04/19 14:53	1
Medium Sand (0.25 to 0.5 mm)	1.00		0.01	0.01	%			10/04/19 14:53	1
Silt (0.00391 to 0.0625mm)	55.23		0.01	0.01	%			10/04/19 14:53	1
Total Silt and Clay (0 to 0.0626mm)	66.90		0.01	0.01	%			10/04/19 14:53	1
Very Coarse Sand (1 to 2mm)	ND		0.01	0.01	%			10/04/19 14:53	1
Very Fine Sand (0.0625 to 0.125 mm)	12.53		0.01	0.01	%			10/04/19 14:53	1

Client Sample ID: SED-006
Date Collected: 09/25/19 14:00
Date Received: 09/26/19 12:08

Lab Sample ID: 570-8761-2
Matrix: Solid

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Clay(less than 0.00391 mm)	0.91		0.01	0.01	%			10/04/19 14:53	1
Coarse Sand (0.5mm to 1mm)	21.00		0.01	0.01	%			10/04/19 14:53	1
Fine Sand (0.125 to 0.25mm)	17.40		0.01	0.01	%			10/04/19 14:53	1
Gravel (greater than 2 mm)	ND		0.01	0.01	%			10/04/19 14:53	1
Medium Sand (0.25 to 0.5 mm)	14.17		0.01	0.01	%			10/04/19 14:53	1
Silt (0.00391 to 0.0625mm)	7.77		0.01	0.01	%			10/04/19 14:53	1
Total Silt and Clay (0 to 0.0626mm)	8.69		0.01	0.01	%			10/04/19 14:53	1
Very Coarse Sand (1 to 2mm)	32.28		0.01	0.01	%			10/04/19 14:53	1
Very Fine Sand (0.0625 to 0.125 mm)	6.47		0.01	0.01	%			10/04/19 14:53	1

Client Sample ID: SED-007
Date Collected: 09/25/19 10:00
Date Received: 09/26/19 12:08

Lab Sample ID: 570-8761-3
Matrix: Solid

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Clay(less than 0.00391 mm)	0.83		0.01	0.01	%			10/04/19 14:53	1
Coarse Sand (0.5mm to 1mm)	19.33		0.01	0.01	%			10/04/19 14:53	1
Fine Sand (0.125 to 0.25mm)	24.52		0.01	0.01	%			10/04/19 14:53	1
Gravel (greater than 2 mm)	ND		0.01	0.01	%			10/04/19 14:53	1
Medium Sand (0.25 to 0.5 mm)	41.05		0.01	0.01	%			10/04/19 14:53	1
Silt (0.00391 to 0.0625mm)	8.11		0.01	0.01	%			10/04/19 14:53	1
Total Silt and Clay (0 to 0.0626mm)	8.94		0.01	0.01	%			10/04/19 14:53	1
Very Coarse Sand (1 to 2mm)	0.09		0.01	0.01	%			10/04/19 14:53	1
Very Fine Sand (0.0625 to 0.125 mm)	6.07		0.01	0.01	%			10/04/19 14:53	1

PARTICLE SIZE SUMMARY

(ASTM D422 / D4464M)

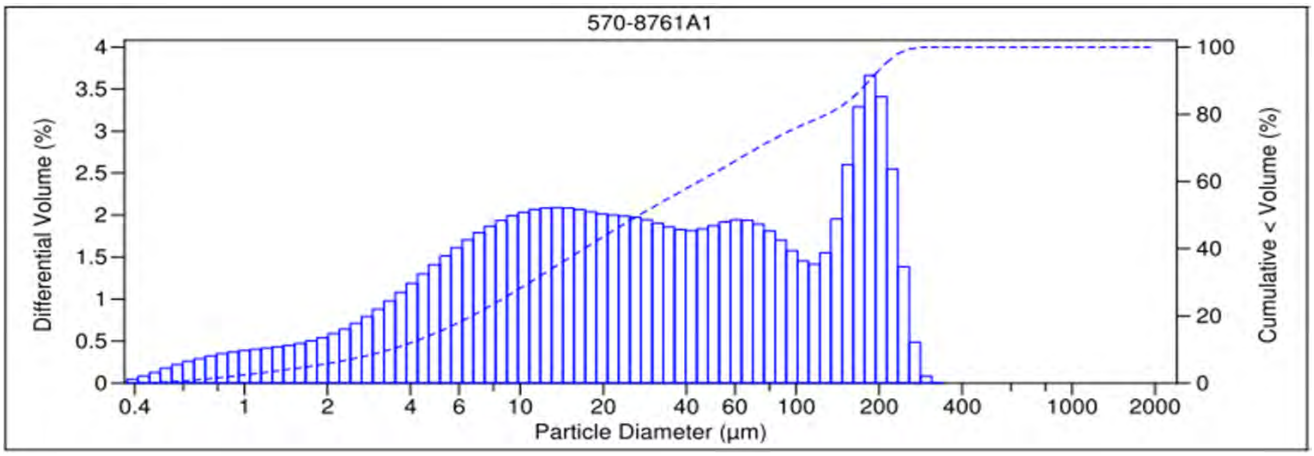
WGR Southwest, Inc.

Date Sampled:	09/25/19
Date Received:	09/26/19
Work Order No:	570-8761
Date Analyzed:	10/03/19
Method:	ASTM D4464M

Project:

Sample ID	Depth ft	Description	Mean Grain Size mm
SED-005		Silt	0.061

Particle Size Distribution, wt by percent								
Total Gravel	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Silt	Clay	Total Silt & Clay
0.00	0.00	0.00	1.00	19.57	12.53	55.23	11.68	66.90



V 3.0

PARTICLE SIZE SUMMARY

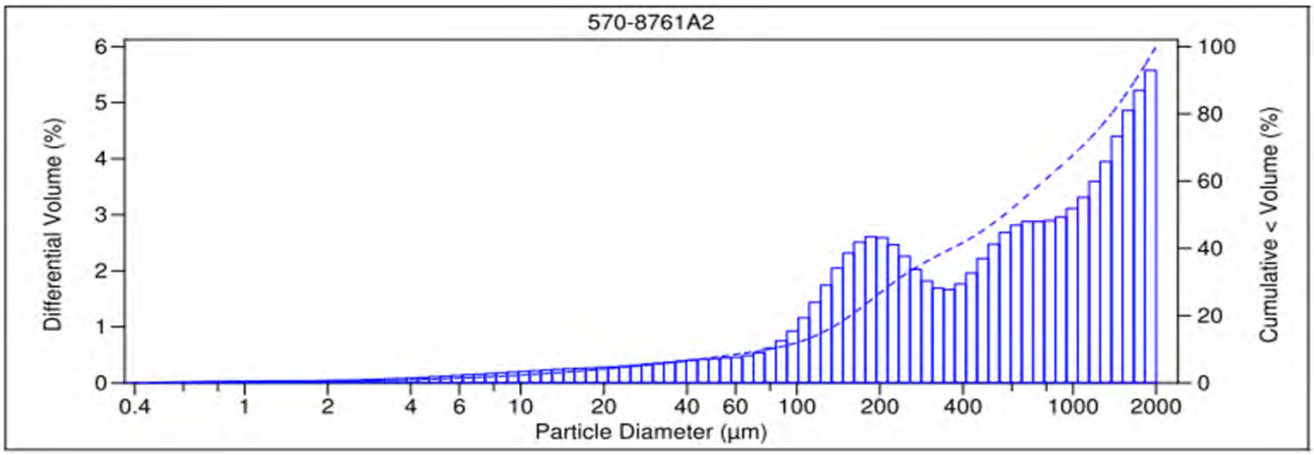
(ASTM D422 / D4464M)

WGR Southwest, Inc.	Date Sampled:	09/25/19
	Date Received:	09/26/19
	Work Order No:	570-8761
	Date Analyzed:	10/03/19
	Method:	ASTM D4464M

Project:

Sample ID	Depth ft	Description	Mean Grain Size mm
SED-006		Coarse Sand	0.727

Particle Size Distribution, wt by percent								
Total Gravel	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Silt	Clay	Total Silt & Clay
0.00	32.28	21.00	14.17	17.40	6.47	7.77	0.91	8.69



V 3.0

PARTICLE SIZE SUMMARY

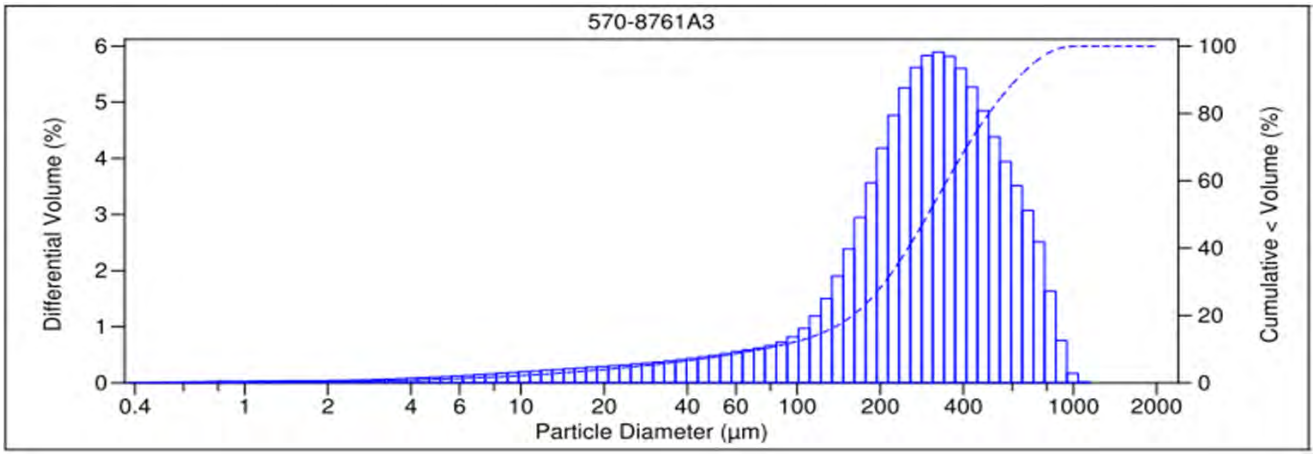
(ASTM D422 / D4464M)

WGR Southwest, Inc.	Date Sampled:	09/25/19
	Date Received:	09/26/19
	Work Order No:	570-8761
	Date Analyzed:	10/03/19
	Method:	ASTM D4464M

Project:

Sample ID	Depth ft	Description	Mean Grain Size mm
SED-007		Medium Sand	0.328

Particle Size Distribution, wt by percent								
Total Gravel	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Silt	Clay	Total Silt & Clay
0.00	0.09	19.33	41.05	24.52	6.07	8.11	0.83	8.94



V 3.0

Surrogate Summary

Client: WGR Southwest Inc
Project/Site: Tesoro LA Refinery

Job ID: 570-8761-1

Method: 8270C SIM - PAHs (GC/MS SIM)

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)		
Lab Sample ID	Client Sample ID	FBP (22-130)	NBZ (20-145)	TPHd14 (33-147)
570-8761-1 - DL	SED-005	85	53	99
570-8761-1 MS - DL	SED-005	85	54	95
570-8761-1 MSD - DL	SED-005	84	53	93
570-8761-2 - DL	SED-006	73	46	95
570-8761-3 - DL	SED-007	84	90	104
570-8761-3 - DL	SED-007	90	82	97
LCS 570-23315/2-A	Lab Control Sample	86	68	96
MB 570-23315/1-A	Method Blank	86	59	97

Surrogate Legend

FBP = 2-Fluorobiphenyl (Surr)
NBZ = Nitrobenzene-d5 (Surr)
TPHd14 = p-Terphenyl-d14 (Surr)

Method: Organotins SIM - Organotins (GC/MS SIM)

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)
Lab Sample ID	Client Sample ID	TPTT (27-135)
570-8761-1	SED-005	59
570-8761-2	SED-006	46
570-8761-3	SED-007	47
570-8761-3 MS	SED-007	56
570-8761-3 MSD	SED-007	67
LCS 570-23682/2-A	Lab Control Sample	71
MB 570-23682/1-A	Method Blank	44

Surrogate Legend

TPTT = Tripentyltin

Method: 8015B - Diesel Range Organics (DRO) (GC)

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)
Lab Sample ID	Client Sample ID	OTCSN1 (61-145)
570-8761-1	SED-005	100
570-8761-2	SED-006	98
570-8761-3	SED-007	86
570-8872-A-8-A MS	Matrix Spike	98
570-8872-A-8-B MSD	Matrix Spike Duplicate	100
LCS 570-23135/2-A	Lab Control Sample	100
MB 570-23135/1-A	Method Blank	102

Surrogate Legend

OTCSN = n-Octacosane (Surr)

Surrogate Summary

Client: WGR Southwest Inc
Job ID: 570-8761-1
Project/Site: Tesoro LA Refinery

Method: 8081A - Organochlorine Pesticides (GC)

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)	
		TCX1	DCB1
Lab Sample ID	Client Sample ID	(25-145)	(24-168)
570-8761-1	SED-005	128 p	143
570-8761-1	SED-005	131	150
570-8761-1 MS	SED-005	131 p	162 p
570-8761-1 MSD	SED-005	123 p	142
570-8761-2	SED-006	93 p	154 p
570-8761-2	SED-006	68	126
570-8761-3	SED-007	184 p X	160 p
570-8761-3	SED-007	130	166
LCS 570-23333/2-A	Lab Control Sample	91	105
MB 570-23333/1-A	Method Blank	90	105

Surrogate Legend

TCX = Tetrachloro-m-xylene

DCB = DCB Decachlorobiphenyl (Surr)

Method: 8082 - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)	
		DCB2	TCX2
Lab Sample ID	Client Sample ID	(24-168)	(25-145)
570-8761-1	SED-005	120	91
570-8761-2	SED-006	143	111
570-8761-3	SED-007	133	101
570-8761-3 MS	SED-007	137	98
570-8761-3 MSD	SED-007	145 p	107
LCS 570-23333/5-A	Lab Control Sample	124	103
MB 570-23333/1-A	Method Blank	125	102

Surrogate Legend

DCB = DCB Decachlorobiphenyl (Surr)

TCX = Tetrachloro-m-xylene (Surr)

Method: 8270C SIM - PAHs (GC/MS SIM)

Lab Sample ID: MB 570-23315/1-A
Matrix: Solid
Analysis Batch: 23777

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 23315

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acenaphthene	ND		0.010	0.00051	mg/Kg		10/02/19 16:36	10/04/19 16:30	1
Acenaphthylene	ND		0.010	0.0085	mg/Kg		10/02/19 16:36	10/04/19 16:30	1
Anthracene	ND		0.010	0.00067	mg/Kg		10/02/19 16:36	10/04/19 16:30	1
1,2-Benzanthracene	0.001143	J	0.010	0.0011	mg/Kg		10/02/19 16:36	10/04/19 16:30	1
Benzo[a]pyrene	ND		0.010	0.0014	mg/Kg		10/02/19 16:36	10/04/19 16:30	1
3,4-Benzofluoranthene	ND		0.010	0.0015	mg/Kg		10/02/19 16:36	10/04/19 16:30	1
Benzo[k]fluoranthene	ND		0.010	0.0016	mg/Kg		10/02/19 16:36	10/04/19 16:30	1
1,12-Benzoperylene	ND		0.010	0.0015	mg/Kg		10/02/19 16:36	10/04/19 16:30	1
Chrysene	ND		0.010	0.00078	mg/Kg		10/02/19 16:36	10/04/19 16:30	1
Dibenz(a,h)anthracene	ND		0.010	0.0011	mg/Kg		10/02/19 16:36	10/04/19 16:30	1
Fluoranthene	ND		0.010	0.00097	mg/Kg		10/02/19 16:36	10/04/19 16:30	1
Fluorene	ND		0.010	0.00084	mg/Kg		10/02/19 16:36	10/04/19 16:30	1
Indeno[1,2,3-cd]pyrene	ND		0.010	0.0012	mg/Kg		10/02/19 16:36	10/04/19 16:30	1
1-Methylnaphthalene	ND		0.010	0.00072	mg/Kg		10/02/19 16:36	10/04/19 16:30	1
2-Methylnaphthalene	ND		0.010	0.00072	mg/Kg		10/02/19 16:36	10/04/19 16:30	1
Naphthalene	ND		0.010	0.00078	mg/Kg		10/02/19 16:36	10/04/19 16:30	1
Phenanthrene	ND		0.010	0.00084	mg/Kg		10/02/19 16:36	10/04/19 16:30	1
Pyrene	ND		0.010	0.00075	mg/Kg		10/02/19 16:36	10/04/19 16:30	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorobiphenyl (Surr)	*86*		*22 - 130*	*10/02/19 16:36*	*10/04/19 16:30*	*1*
Nitrobenzene-d5 (Surr)	*59*		*20 - 145*	*10/02/19 16:36*	*10/04/19 16:30*	*1*
p-Terphenyl-d14 (Surr)	*97*		*33 - 147*	*10/02/19 16:36*	*10/04/19 16:30*	*1*

Lab Sample ID: LCS 570-23315/2-A
Matrix: Solid
Analysis Batch: 23777

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 23315

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Acenaphthene	0.100	0.07628		mg/Kg		76	53 - 125
Acenaphthylene	0.100	0.08878		mg/Kg		89	50 - 123
Anthracene	0.100	0.07295		mg/Kg		73	50 - 132
1,2-Benzanthracene	0.100	0.08330		mg/Kg		83	50 - 133
Benzo[a]pyrene	0.100	0.08589		mg/Kg		86	50 - 134
3,4-Benzofluoranthene	0.100	0.08700		mg/Kg		87	50 - 142
Benzo[k]fluoranthene	0.100	0.09236		mg/Kg		92	49 - 150
1,12-Benzoperylene	0.100	0.08284		mg/Kg		83	50 - 130
Chrysene	0.100	0.08175		mg/Kg		82	51 - 129
Dibenz(a,h)anthracene	0.100	0.08472		mg/Kg		85	50 - 133
Fluoranthene	0.100	0.07606		mg/Kg		76	55 - 127
Fluorene	0.100	0.07924		mg/Kg		79	55 - 127
Indeno[1,2,3-cd]pyrene	0.100	0.08202		mg/Kg		82	50 - 148
1-Methylnaphthalene	0.100	0.07309		mg/Kg		73	54 - 132
2-Methylnaphthalene	0.100	0.07724		mg/Kg		77	50 - 127
Naphthalene	0.100	0.07298		mg/Kg		73	51 - 129
Phenanthrene	0.100	0.07018		mg/Kg		70	50 - 122
Pyrene	0.100	0.07680		mg/Kg		77	50 - 134

Method: 8270C SIM - PAHs (GC/MS SIM) (Continued)

Lab Sample ID: LCS 570-23315/2-A
Matrix: Solid
Analysis Batch: 23777

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 23315

Surrogate	LCS %Recovery	LCS Qualifier	Limits
2-Fluorobiphenyl (Surr)	86		22 - 130
Nitrobenzene-d5 (Surr)	68		20 - 145
p-Terphenyl-d14 (Surr)	96		33 - 147

Method: 8270C SIM - PAHs (GC/MS SIM) - DL

Lab Sample ID: 570-8761-1 MS
Matrix: Solid
Analysis Batch: 23777

Client Sample ID: SED-005
Prep Type: Total/NA
Prep Batch: 23315

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Acenaphthene - DL	ND		0.201	0.1750		mg/Kg	☼	87	29 - 137
Acenaphthylene - DL	ND		0.201	0.2115		mg/Kg	☼	105	29 - 131
Anthracene - DL	0.037	J	0.201	0.2081		mg/Kg	☼	85	26 - 134
1,2-Benzanthracene - DL	0.13	B	0.201	0.2852		mg/Kg	☼	78	24 - 150
Benzo[a]pyrene - DL	0.18		0.201	0.3503		mg/Kg	☼	86	29 - 149
3,4-Benzofluoranthene - DL	0.24		0.201	0.4009		mg/Kg	☼	78	21 - 153
Benzo[k]fluoranthene - DL	0.15		0.201	0.3270		mg/Kg	☼	87	28 - 148
1,12-Benzoperylene - DL	0.21		0.201	0.3712		mg/Kg	☼	80	20 - 148
Chrysene - DL	0.24		0.201	0.3992		mg/Kg	☼	78	25 - 145
Dibenz(a,h)anthracene - DL	0.049	J	0.201	0.2227		mg/Kg	☼	86	20 - 132
Fluoranthene - DL	0.24		0.201	0.3971		mg/Kg	☼	78	20 - 151
Fluorene - DL	0.012	J	0.201	0.1885		mg/Kg	☼	88	36 - 132
Indeno[1,2,3-cd]pyrene - DL	0.12		0.201	0.2502		mg/Kg	☼	65	20 - 154
1-Methylnaphthalene - DL	ND		0.201	0.1633		mg/Kg	☼	81	34 - 136
2-Methylnaphthalene - DL	0.016	J	0.201	0.1752		mg/Kg	☼	79	29 - 137
Naphthalene - DL	0.018	J	0.201	0.1475		mg/Kg	☼	64	20 - 150
Phenanthrene - DL	0.092	J	0.201	0.2381		mg/Kg	☼	72	20 - 144
Pyrene - DL	0.29		0.201	0.4645		mg/Kg	☼	88	20 - 150

Surrogate	MS %Recovery	MS Qualifier	Limits
2-Fluorobiphenyl (Surr) - DL	85		22 - 130
Nitrobenzene-d5 (Surr) - DL	54		20 - 145
p-Terphenyl-d14 (Surr) - DL	95		33 - 147

Lab Sample ID: 570-8761-1 MSD
Matrix: Solid
Analysis Batch: 23777

Client Sample ID: SED-005
Prep Type: Total/NA
Prep Batch: 23315

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Acenaphthene - DL	ND		0.201	0.1720		mg/Kg	☼	85	29 - 137	2	28
Acenaphthylene - DL	ND		0.201	0.2147		mg/Kg	☼	107	29 - 131	1	32
Anthracene - DL	0.037	J	0.201	0.2045		mg/Kg	☼	83	26 - 134	2	27
1,2-Benzanthracene - DL	0.13	B	0.201	0.2871		mg/Kg	☼	79	24 - 150	1	24
Benzo[a]pyrene - DL	0.18		0.201	0.3509		mg/Kg	☼	86	29 - 149	0	22
3,4-Benzofluoranthene - DL	0.24		0.201	0.4210		mg/Kg	☼	88	21 - 153	5	26
Benzo[k]fluoranthene - DL	0.15		0.201	0.3450		mg/Kg	☼	96	28 - 148	5	26
1,12-Benzoperylene - DL	0.21		0.201	0.3545		mg/Kg	☼	71	20 - 148	5	27

Method: 8270C SIM - PAHs (GC/MS SIM) - DL (Continued)

Lab Sample ID: 570-8761-1 MSD
Matrix: Solid
Analysis Batch: 23777

Client Sample ID: SED-005
Prep Type: Total/NA
Prep Batch: 23315

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chrysene - DL	0.24		0.201	0.3972		mg/Kg	☼	77	25 - 145	1	28
Dibenz(a,h)anthracene - DL	0.049	J	0.201	0.2194		mg/Kg	☼	84	20 - 132	1	26
Fluoranthene - DL	0.24		0.201	0.3946		mg/Kg	☼	77	20 - 151	1	26
Fluorene - DL	0.012	J	0.201	0.1864		mg/Kg	☼	87	36 - 132	1	27
Indeno[1,2,3-cd]pyrene - DL	0.12		0.201	0.2464		mg/Kg	☼	63	20 - 154	2	25
1-Methylnaphthalene - DL	ND		0.201	0.1600		mg/Kg	☼	80	34 - 136	2	29
2-Methylnaphthalene - DL	0.016	J	0.201	0.1737		mg/Kg	☼	78	29 - 137	1	31
Naphthalene - DL	0.018	J	0.201	0.1460		mg/Kg	☼	64	20 - 150	1	33
Phenanthrene - DL	0.092	J	0.201	0.2492		mg/Kg	☼	78	20 - 144	5	27
Pyrene - DL	0.29		0.201	0.4668		mg/Kg	☼	89	20 - 150	0	32

Surrogate	*MSD %Recovery*	*MSD Qualifier*	*Limits*
2-Fluorobiphenyl (Surr) - DL	*84*		*22 - 130*
Nitrobenzene-d5 (Surr) - DL	*53*		*20 - 145*
p-Terphenyl-d14 (Surr) - DL	*93*		*33 - 147*

Method: Organotins SIM - Organotins (GC/MS SIM)

Lab Sample ID: MB 570-23682/1-A
Matrix: Solid
Analysis Batch: 24307

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 23682

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Tributyltin	ND		3.0	1.5	ug/Kg		10/02/19 20:08	10/07/19 19:00	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Tripentyltin	*44*		*27 - 135*	*10/02/19 20:08*	*10/07/19 19:00*	*1*

Lab Sample ID: LCS 570-23682/2-A
Matrix: Solid
Analysis Batch: 24307

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 23682

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Tetrabutyltin			100	75.62		ug/Kg		76	40 - 142		
Tributyltin			100	59.63		ug/Kg		60	33 - 147		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
Tripentyltin	*71*		*27 - 135*

Lab Sample ID: 570-8761-3 MS
Matrix: Solid
Analysis Batch: 24481

Client Sample ID: SED-007
Prep Type: Total/NA
Prep Batch: 23682

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Tetrabutyltin	ND		370	191.9		ug/Kg	☼	52	33 - 129		
Tributyltin	ND		370	161.2		ug/Kg	☼	44	34 - 142		

Method: Organotins SIM - Organotins (GC/MS SIM) (Continued)

Lab Sample ID: 570-8761-3 MS
Matrix: Solid
Analysis Batch: 24481

Client Sample ID: SED-007
Prep Type: Total/NA
Prep Batch: 23682

Surrogate	MS %Recovery	MS Qualifier	Limits
Tripentyltin	*56*		*27 - 135*

Lab Sample ID: 570-8761-3 MSD
Matrix: Solid
Analysis Batch: 24481

Client Sample ID: SED-007
Prep Type: Total/NA
Prep Batch: 23682

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Tetrabutyltin	ND		368	230.3		ug/Kg	☼	63	33 - 129	18	36
Tributyltin	ND		368	188.9		ug/Kg	☼	51	34 - 142	16	50

Surrogate	MSD %Recovery	MSD Qualifier	Limits
Tripentyltin	*67*		*27 - 135*

Method: 8015B - Diesel Range Organics (DRO) (GC)

Lab Sample ID: MB 570-23135/1-A
Matrix: Solid
Analysis Batch: 23170

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 23135

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
C6 as C6	ND		5.0	3.6	mg/Kg		10/02/19 09:36	10/02/19 13:02	1
C7 as C7	ND		5.0	3.6	mg/Kg		10/02/19 09:36	10/02/19 13:02	1
C8 as C8	ND		5.0	3.6	mg/Kg		10/02/19 09:36	10/02/19 13:02	1
C9-C10	ND		5.0	3.6	mg/Kg		10/02/19 09:36	10/02/19 13:02	1
C11-C12	ND		5.0	3.6	mg/Kg		10/02/19 09:36	10/02/19 13:02	1
C13-C14	ND		5.0	3.6	mg/Kg		10/02/19 09:36	10/02/19 13:02	1
C15-C16	ND		5.0	3.6	mg/Kg		10/02/19 09:36	10/02/19 13:02	1
C17-C18	ND		5.0	3.6	mg/Kg		10/02/19 09:36	10/02/19 13:02	1
C19-C20	ND		5.0	3.6	mg/Kg		10/02/19 09:36	10/02/19 13:02	1
C21-C22	ND		5.0	3.6	mg/Kg		10/02/19 09:36	10/02/19 13:02	1
C23-C24	ND		5.0	3.6	mg/Kg		10/02/19 09:36	10/02/19 13:02	1
C25-C28	ND		5.0	3.6	mg/Kg		10/02/19 09:36	10/02/19 13:02	1
C29-C32	ND		5.0	3.6	mg/Kg		10/02/19 09:36	10/02/19 13:02	1
C33-C36	ND		5.0	3.6	mg/Kg		10/02/19 09:36	10/02/19 13:02	1
C37-C40	ND		5.0	3.6	mg/Kg		10/02/19 09:36	10/02/19 13:02	1
C41-C44	ND		5.0	3.6	mg/Kg		10/02/19 09:36	10/02/19 13:02	1
C6-C44	ND		5.0	3.6	mg/Kg		10/02/19 09:36	10/02/19 13:02	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
n-Octacosane (Surr)	*102*		*61 - 145*	*10/02/19 09:36*	*10/02/19 13:02*	*1*

Lab Sample ID: LCS 570-23135/2-A
Matrix: Solid
Analysis Batch: 23170

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 23135

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Diesel Range Organics [C10-C28]	400	444.4		mg/Kg		111	67 - 121

Method: 8015B - Diesel Range Organics (DRO) (GC) (Continued)

Lab Sample ID: LCS 570-23135/2-A
Matrix: Solid
Analysis Batch: 23170

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 23135

Surrogate	LCS %Recovery	LCS Qualifier	Limits
n-Octacosane (Surr)	*100*		*61 - 145*

Lab Sample ID: 570-8872-A-8-A MS
Matrix: Solid
Analysis Batch: 23170

Client Sample ID: Matrix Spike
Prep Type: Total/NA
Prep Batch: 23135

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Diesel Range Organics [C10-C28]	ND		395	414.0		mg/Kg		105	33 - 153		

Surrogate	MS %Recovery	MS Qualifier	Limits
n-Octacosane (Surr)	*98*		*61 - 145*

Lab Sample ID: 570-8872-A-8-B MSD
Matrix: Solid
Analysis Batch: 23170

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA
Prep Batch: 23135

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Diesel Range Organics [C10-C28]	ND		396	416.1		mg/Kg		105	33 - 153	0	32

Surrogate	MSD %Recovery	MSD Qualifier	Limits
n-Octacosane (Surr)	*100*		*61 - 145*

Method: 8081A - Organochlorine Pesticides (GC)

Lab Sample ID: MB 570-23333/1-A
Matrix: Solid
Analysis Batch: 24191

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 23333

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,4'-DDD	ND		1.0	0.18	ug/Kg		10/02/19 17:47	10/07/19 14:20	1
2,4'-DDE	ND		5.0	0.42	ug/Kg		10/02/19 17:47	10/07/19 14:20	1
2,4'-DDT	ND		1.0	0.090	ug/Kg		10/02/19 17:47	10/07/19 14:20	1
4,4'-DDD	ND		1.0	0.11	ug/Kg		10/02/19 17:47	10/07/19 14:20	1
4,4'-DDE	ND		1.0	0.14	ug/Kg		10/02/19 17:47	10/07/19 14:20	1
4,4'-DDT	ND		1.0	0.30	ug/Kg		10/02/19 17:47	10/07/19 14:20	1
Chlordane	ND		5.0	0.69	ug/Kg		10/02/19 17:47	10/07/19 14:20	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Tetrachloro-m-xylene	*90*		*25 - 145*	*10/02/19 17:47*	*10/07/19 14:20*	*1*
DCB Decachlorobiphenyl (Surr)	*105*		*24 - 168*	*10/02/19 17:47*	*10/07/19 14:20*	*1*

Method: 8081A - Organochlorine Pesticides (GC) (Continued)

Lab Sample ID: LCS 570-23333/2-A
Matrix: Solid
Analysis Batch: 24191

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 23333

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
4,4'-DDD			5.00	5.709		ug/Kg		114	50 - 135		
4,4'-DDE			5.00	5.261		ug/Kg		105	50 - 135		
4,4'-DDT			5.00	5.948		ug/Kg		119	50 - 135		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
Tetrachloro-m-xylene	*91*		*25 - 145*
DCB Decachlorobiphenyl (Surr)	*105*		*24 - 168*

Lab Sample ID: 570-8761-1 MS
Matrix: Solid
Analysis Batch: 24191

Client Sample ID: SED-005
Prep Type: Total/NA
Prep Batch: 23333

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
4,4'-DDD	7.1	F1	4.98	18.41	E F1	ug/Kg		228	50 - 135		
4,4'-DDE	17	E F1	4.98	32.48	E F1	ug/Kg		317	50 - 135		
4,4'-DDT	7.3	F1	4.98	17.50	E F1	ug/Kg		204	50 - 135		

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
Tetrachloro-m-xylene	*131*	*p*	*25 - 145*
DCB Decachlorobiphenyl (Surr)	*162*	*p*	*24 - 168*

Lab Sample ID: 570-8761-1 MSD
Matrix: Solid
Analysis Batch: 24191

Client Sample ID: SED-005
Prep Type: Total/NA
Prep Batch: 23333

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
4,4'-DDD	7.1	F1	4.98	18.85	E F1	ug/Kg		237	50 - 135	2	25
4,4'-DDE	17	E F1	4.98	30.79	E F1	ug/Kg		283	50 - 135	5	25
4,4'-DDT	7.3	F1	4.98	14.54	E F1	ug/Kg		145	50 - 135	19	25

Surrogate	*MSD %Recovery*	*MSD Qualifier*	*Limits*
Tetrachloro-m-xylene	*123*	*p*	*25 - 145*
DCB Decachlorobiphenyl (Surr)	*142*		*24 - 168*

Method: 8082 - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Lab Sample ID: MB 570-23333/1-A
Matrix: Solid
Analysis Batch: 23692

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 23333

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aroclor-1016	ND		10	2.0	ug/Kg		10/02/19 17:47	10/04/19 13:06	1
Aroclor-1221	ND		10	6.3	ug/Kg		10/02/19 17:47	10/04/19 13:06	1
Aroclor-1232	ND		10	2.3	ug/Kg		10/02/19 17:47	10/04/19 13:06	1
Aroclor-1242	ND		10	1.6	ug/Kg		10/02/19 17:47	10/04/19 13:06	1
Aroclor-1248	ND		10	1.2	ug/Kg		10/02/19 17:47	10/04/19 13:06	1
Aroclor-1254	ND		10	1.2	ug/Kg		10/02/19 17:47	10/04/19 13:06	1
Aroclor-1260	ND		10	2.3	ug/Kg		10/02/19 17:47	10/04/19 13:06	1

Method: 8082 - Polychlorinated Biphenyls (PCBs) by Gas Chromatography (Continued)

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
DCB Decachlorobiphenyl (Surr)	125		24 - 168	10/02/19 17:47	10/04/19 13:06	1
Tetrachloro-m-xylene (Surr)	102		25 - 145	10/02/19 17:47	10/04/19 13:06	1

Lab Sample ID: LCS 570-23333/5-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 23692 — **Prep Batch: 23333**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aroclor-1016	20.0	21.91		ug/Kg		110	50 - 135
Aroclor-1260	20.0	23.56		ug/Kg		118	50 - 135

Surrogate	LCS %Recovery	LCS Qualifier	Limits
DCB Decachlorobiphenyl (Surr)	124		24 - 168
Tetrachloro-m-xylene (Surr)	103		25 - 145

Lab Sample ID: 570-8761-3 MS — **Client Sample ID: SED-007**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 23692 — **Prep Batch: 23333**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Aroclor-1016	ND	F2 F1	75.1	347.6	F1	ug/Kg	☼	463	50 - 135
Aroclor-1260	510	E	75.1	378.5	4	ug/Kg	☼	-180	50 - 135

Surrogate	MS %Recovery	MS Qualifier	Limits
DCB Decachlorobiphenyl (Surr)	137		24 - 168
Tetrachloro-m-xylene (Surr)	98		25 - 145

Lab Sample ID: 570-8761-3 MSD — **Client Sample ID: SED-007**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 23692 — **Prep Batch: 23333**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Aroclor-1016	ND	F2 F1	75.4	282.7	F1 F2	ug/Kg	☼	375	50 - 135	48	20
Aroclor-1260	510	E	75.4	397.9	4	ug/Kg	☼	-154	50 - 135	5	20

Surrogate	MSD %Recovery	MSD Qualifier	Limits
DCB Decachlorobiphenyl (Surr)	145	p	24 - 168
Tetrachloro-m-xylene (Surr)	107		25 - 145

Method: 6020 - Metals (ICP/MS)

Lab Sample ID: MB 570-23210/1-A ^20 — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 23477 — **Prep Batch: 23210**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.985	0.118	mg/Kg		10/02/19 13:30	10/02/19 20:31	20
Chromium	ND		1.97	0.115	mg/Kg		10/02/19 13:30	10/02/19 20:31	20
Copper	ND		0.985	0.114	mg/Kg		10/02/19 13:30	10/02/19 20:31	20
Lead	ND		0.985	0.135	mg/Kg		10/02/19 13:30	10/02/19 20:31	20
Nickel	ND		0.985	0.126	mg/Kg		10/02/19 13:30	10/02/19 20:31	20

Method: 6020 - Metals (ICP/MS) (Continued)

Lab Sample ID: MB 570-23210/1-A ^20
Matrix: Solid
Analysis Batch: 23477

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 23210

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	ND		4.93	0.781	mg/Kg		10/02/19 13:30	10/02/19 20:31	20

Lab Sample ID: LCS 570-23210/2-A ^20
Matrix: Solid
Analysis Batch: 23477

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 23210

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Cadmium	24.4	24.17		mg/Kg		99	80 - 120
Chromium	24.4	23.77		mg/Kg		97	80 - 120
Copper	24.4	23.94		mg/Kg		98	80 - 120
Lead	24.4	23.73		mg/Kg		97	80 - 120
Nickel	24.4	23.97		mg/Kg		98	80 - 120
Zinc	24.4	25.74		mg/Kg		106	80 - 120

Lab Sample ID: LCSD 570-23210/3-A ^20
Matrix: Solid
Analysis Batch: 23477

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 23210

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Cadmium	24.8	26.34		mg/Kg		106	80 - 120	9	20
Chromium	24.8	25.48		mg/Kg		103	80 - 120	7	20
Copper	24.8	25.66		mg/Kg		104	80 - 120	7	20
Lead	24.8	25.69		mg/Kg		104	80 - 120	8	20
Nickel	24.8	25.45		mg/Kg		103	80 - 120	6	20
Zinc	24.8	27.92		mg/Kg		113	80 - 120	8	20

Lab Sample ID: 570-8764-A-1-B MS ^100
Matrix: Solid
Analysis Batch: 23477

Client Sample ID: Matrix Spike
Prep Type: Total/NA
Prep Batch: 23210

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Cadmium	5.25	F1 F2	25.6	33.37		mg/Kg		110	85 - 121
Chromium	141	F2	25.6	152.6	4	mg/Kg		45	20 - 182
Copper	211	F2	25.6	852.6	4	mg/Kg		2502	25 - 157
Lead	1330	F2	25.6	1534	4	mg/Kg		776	62 - 134
Nickel	35.4	F2	25.6	65.99		mg/Kg		119	46 - 154
Zinc	947	F2	25.6	1231	4	mg/Kg		1108	23 - 173

Lab Sample ID: 570-8764-A-1-C MSD ^100
Matrix: Solid
Analysis Batch: 23477

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA
Prep Batch: 23210

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Cadmium	5.25	F1 F2	25.8	25.03	F1 F2	mg/Kg		77	85 - 121	29	12
Chromium	141	F2	25.8	116.5	4 F2	mg/Kg		-95	20 - 182	27	15
Copper	211	F2	25.8	203.4	4 F2	mg/Kg		-30	25 - 157	123	22
Lead	1330	F2	25.8	1012	4 F2	mg/Kg		-1252	62 - 134	41	23
Nickel	35.4	F2	25.8	52.73	F2	mg/Kg		67	46 - 154	22	15
Zinc	947	F2	25.8	875.8	4 F2	mg/Kg		-276	23 - 173	34	18

Method: 7471A - Mercury (CVAA)

Lab Sample ID: MB 570-23284/1-A
Matrix: Solid
Analysis Batch: 23303

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 23284

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.0877	0.00618	mg/Kg		10/02/19 16:00	10/02/19 18:52	1

Lab Sample ID: LCS 570-23284/2-A
Matrix: Solid
Analysis Batch: 23303

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 23284

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.820	0.7876		mg/Kg		96	85 - 121

Lab Sample ID: LCSD 570-23284/3-A
Matrix: Solid
Analysis Batch: 23303

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 23284

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Mercury	0.862	0.8427		mg/Kg		98	85 - 121	7	10

Lab Sample ID: 570-8501-A-5-D MS
Matrix: Solid
Analysis Batch: 23303

Client Sample ID: Matrix Spike
Prep Type: Total/NA
Prep Batch: 23284

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.0144	J	0.862	0.8012		mg/Kg		91	71 - 137

Lab Sample ID: 570-8501-A-5-E MSD
Matrix: Solid
Analysis Batch: 23303

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA
Prep Batch: 23284

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Mercury	0.0144	J	0.820	0.7772		mg/Kg		93	71 - 137	3	14

Method: 9060A - Organic Carbon, Total (TOC)

Lab Sample ID: MB 570-23330/4
Matrix: Solid
Analysis Batch: 23330

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon, Total Organic	ND	^	500	174	mg/Kg			10/02/19 11:25	1

Lab Sample ID: LCS 570-23330/5
Matrix: Solid
Analysis Batch: 23330

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Carbon, Total Organic	30000	24360	^	mg/Kg		81	80 - 120

Method: 9060A - Organic Carbon, Total (TOC) (Continued)

Lab Sample ID: LCSD 570-23330/10
Matrix: Solid
Analysis Batch: 23330

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Carbon, Total Organic			30000	28510	^	mg/Kg		95	80 - 120	16	20

Lab Sample ID: 570-8832-A-1 MS
Matrix: Solid
Analysis Batch: 23330

Client Sample ID: Matrix Spike
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Carbon, Total Organic	1900	F1 ^	29000	23070	F1 ^	mg/Kg	☼	73	75 - 125		

Lab Sample ID: 570-8832-A-1 MSD
Matrix: Solid
Analysis Batch: 23330

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Carbon, Total Organic	1900	F1 ^	29300	23270	F1 ^	mg/Kg	☼	73	75 - 125	1	25

Method: Moisture - Percent Moisture

Lab Sample ID: 570-8761-1 DU
Matrix: Solid
Analysis Batch: 22809

Client Sample ID: SED-005
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Percent Moisture	51.1			52.9		%				4	10

GC/MS Semi VOA

Cleanup Batch: 22920

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-8761-1 - DL	SED-005	Total/NA	Solid	Homogenize Prep	
570-8761-1	SED-005	Total/NA	Solid	Homogenize Prep	
570-8761-2 - DL	SED-006	Total/NA	Solid	Homogenize Prep	
570-8761-2	SED-006	Total/NA	Solid	Homogenize Prep	
570-8761-3 - DL	SED-007	Total/NA	Solid	Homogenize Prep	
570-8761-3	SED-007	Total/NA	Solid	Homogenize Prep	
570-8761-1 MS - DL	SED-005	Total/NA	Solid	Homogenize Prep	
570-8761-1 MSD - DL	SED-005	Total/NA	Solid	Homogenize Prep	
570-8761-3 MS	SED-007	Total/NA	Solid	Homogenize Prep	
570-8761-3 MSD	SED-007	Total/NA	Solid	Homogenize Prep	

Prep Batch: 23315

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-8761-1 - DL	SED-005	Total/NA	Solid	3541	22920
570-8761-2 - DL	SED-006	Total/NA	Solid	3541	22920
570-8761-3 - DL	SED-007	Total/NA	Solid	3541	22920
MB 570-23315/1-A	Method Blank	Total/NA	Solid	3541	
LCS 570-23315/2-A	Lab Control Sample	Total/NA	Solid	3541	
570-8761-1 MS - DL	SED-005	Total/NA	Solid	3541	22920
570-8761-1 MSD - DL	SED-005	Total/NA	Solid	3541	22920

Prep Batch: 23682

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-8761-1	SED-005	Total/NA	Solid	Organotin Prep	22920
570-8761-2	SED-006	Total/NA	Solid	Organotin Prep	22920
570-8761-3	SED-007	Total/NA	Solid	Organotin Prep	22920
MB 570-23682/1-A	Method Blank	Total/NA	Solid	Organotin Prep	
LCS 570-23682/2-A	Lab Control Sample	Total/NA	Solid	Organotin Prep	
570-8761-3 MS	SED-007	Total/NA	Solid	Organotin Prep	22920
570-8761-3 MSD	SED-007	Total/NA	Solid	Organotin Prep	22920

Analysis Batch: 23777

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-8761-1 - DL	SED-005	Total/NA	Solid	8270C SIM	23315
570-8761-2 - DL	SED-006	Total/NA	Solid	8270C SIM	23315
570-8761-3 - DL	SED-007	Total/NA	Solid	8270C SIM	23315
MB 570-23315/1-A	Method Blank	Total/NA	Solid	8270C SIM	23315
LCS 570-23315/2-A	Lab Control Sample	Total/NA	Solid	8270C SIM	23315
570-8761-1 MS - DL	SED-005	Total/NA	Solid	8270C SIM	23315
570-8761-1 MSD - DL	SED-005	Total/NA	Solid	8270C SIM	23315

Analysis Batch: 24307

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 570-23682/1-A	Method Blank	Total/NA	Solid	Organotins SIM	23682

GC/MS Semi VOA (Continued)

Analysis Batch: 24307 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 570-23682/2-A	Lab Control Sample	Total/NA	Solid	Organotins SIM	23682

Analysis Batch: 24407

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-8761-3 - DL	SED-007	Total/NA	Solid	8270C SIM	23315

Analysis Batch: 24481

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-8761-1	SED-005	Total/NA	Solid	Organotins SIM	23682
570-8761-2	SED-006	Total/NA	Solid	Organotins SIM	23682
570-8761-3	SED-007	Total/NA	Solid	Organotins SIM	23682
570-8761-3 MS	SED-007	Total/NA	Solid	Organotins SIM	23682
570-8761-3 MSD	SED-007	Total/NA	Solid	Organotins SIM	23682

GC Semi VOA

Cleanup Batch: 22920

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-8761-1	SED-005	Total/NA	Solid	Homogenize Prep	
570-8761-2	SED-006	Total/NA	Solid	Homogenize Prep	
570-8761-3	SED-007	Total/NA	Solid	Homogenize Prep	

Prep Batch: 23135

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-8761-1	SED-005	Total/NA	Solid	3550C	22920
570-8761-2	SED-006	Total/NA	Solid	3550C	22920
570-8761-3	SED-007	Total/NA	Solid	3550C	22920
MB 570-23135/1-A	Method Blank	Total/NA	Solid	3550C	
LCS 570-23135/2-A	Lab Control Sample	Total/NA	Solid	3550C	
570-8872-A-8-A MS	Matrix Spike	Total/NA	Solid	3550C	
570-8872-A-8-B MSD	Matrix Spike Duplicate	Total/NA	Solid	3550C	

Analysis Batch: 23170

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-8761-1	SED-005	Total/NA	Solid	8015B	23135
570-8761-2	SED-006	Total/NA	Solid	8015B	23135
570-8761-3	SED-007	Total/NA	Solid	8015B	23135
MB 570-23135/1-A	Method Blank	Total/NA	Solid	8015B	23135
LCS 570-23135/2-A	Lab Control Sample	Total/NA	Solid	8015B	23135
570-8872-A-8-A MS	Matrix Spike	Total/NA	Solid	8015B	23135
570-8872-A-8-B MSD	Matrix Spike Duplicate	Total/NA	Solid	8015B	23135

Cleanup Batch: 23256

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-8761-1	SED-005	Total/NA	Solid	Homogenize Prep	
570-8761-2	SED-006	Total/NA	Solid	Homogenize Prep	
570-8761-3	SED-007	Total/NA	Solid	Homogenize Prep	

GC Semi VOA (Continued)

Cleanup Batch: 23256 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-8761-1 MS	SED-005	Total/NA	Solid	Homogenize Prep	
570-8761-1 MSD	SED-005	Total/NA	Solid	Homogenize Prep	
570-8761-3 MS	SED-007	Total/NA	Solid	Homogenize Prep	
570-8761-3 MSD	SED-007	Total/NA	Solid	Homogenize Prep	

Prep Batch: 23333

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-8761-1	SED-005	Total/NA	Solid	3541	23256
570-8761-2	SED-006	Total/NA	Solid	3541	23256
570-8761-3	SED-007	Total/NA	Solid	3541	23256
MB 570-23333/1-A	Method Blank	Total/NA	Solid	3541	
LCS 570-23333/2-A	Lab Control Sample	Total/NA	Solid	3541	
LCS 570-23333/5-A	Lab Control Sample	Total/NA	Solid	3541	
570-8761-1 MS	SED-005	Total/NA	Solid	3541	23256
570-8761-1 MSD	SED-005	Total/NA	Solid	3541	23256
570-8761-3 MS	SED-007	Total/NA	Solid	3541	23256
570-8761-3 MSD	SED-007	Total/NA	Solid	3541	23256

Analysis Batch: 23692

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-8761-1	SED-005	Total/NA	Solid	8082	23333
570-8761-2	SED-006	Total/NA	Solid	8082	23333
570-8761-3	SED-007	Total/NA	Solid	8082	23333
MB 570-23333/1-A	Method Blank	Total/NA	Solid	8082	23333
LCS 570-23333/5-A	Lab Control Sample	Total/NA	Solid	8082	23333
570-8761-3 MS	SED-007	Total/NA	Solid	8082	23333
570-8761-3 MSD	SED-007	Total/NA	Solid	8082	23333

Analysis Batch: 24191

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-8761-1	SED-005	Total/NA	Solid	8081A	23333
570-8761-1	SED-005	Total/NA	Solid	8081A	23333
570-8761-2	SED-006	Total/NA	Solid	8081A	23333
570-8761-2	SED-006	Total/NA	Solid	8081A	23333
570-8761-3	SED-007	Total/NA	Solid	8081A	23333
570-8761-3	SED-007	Total/NA	Solid	8081A	23333
MB 570-23333/1-A	Method Blank	Total/NA	Solid	8081A	23333
LCS 570-23333/2-A	Lab Control Sample	Total/NA	Solid	8081A	23333
570-8761-1 MS	SED-005	Total/NA	Solid	8081A	23333
570-8761-1 MSD	SED-005	Total/NA	Solid	8081A	23333

Metals

Cleanup Batch: 22920

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-8761-1	SED-005	Total/NA	Solid	Homogenize Prep	
570-8761-2	SED-006	Total/NA	Solid	Homogenize Prep	

Metals (Continued)

Cleanup Batch: 22920 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-8761-3	SED-007	Total/NA	Solid	Homogenize Prep	

Prep Batch: 23210

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-8761-1	SED-005	Total/NA	Solid	3050B	22920
570-8761-2	SED-006	Total/NA	Solid	3050B	22920
570-8761-3	SED-007	Total/NA	Solid	3050B	22920
MB 570-23210/1-A ^20	Method Blank	Total/NA	Solid	3050B	
LCS 570-23210/2-A ^20	Lab Control Sample	Total/NA	Solid	3050B	
LCSD 570-23210/3-A ^20	Lab Control Sample Dup	Total/NA	Solid	3050B	
570-8764-A-1-B MS ^100	Matrix Spike	Total/NA	Solid	3050B	
570-8764-A-1-C MSD ^100	Matrix Spike Duplicate	Total/NA	Solid	3050B	

Prep Batch: 23284

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-8761-1	SED-005	Total/NA	Solid	7471A	22920
570-8761-2	SED-006	Total/NA	Solid	7471A	22920
570-8761-3	SED-007	Total/NA	Solid	7471A	22920
MB 570-23284/1-A	Method Blank	Total/NA	Solid	7471A	
LCS 570-23284/2-A	Lab Control Sample	Total/NA	Solid	7471A	
LCSD 570-23284/3-A	Lab Control Sample Dup	Total/NA	Solid	7471A	
570-8501-A-5-D MS	Matrix Spike	Total/NA	Solid	7471A	
570-8501-A-5-E MSD	Matrix Spike Duplicate	Total/NA	Solid	7471A	

Analysis Batch: 23303

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-8761-1	SED-005	Total/NA	Solid	7471A	23284
570-8761-2	SED-006	Total/NA	Solid	7471A	23284
570-8761-3	SED-007	Total/NA	Solid	7471A	23284
MB 570-23284/1-A	Method Blank	Total/NA	Solid	7471A	23284
LCS 570-23284/2-A	Lab Control Sample	Total/NA	Solid	7471A	23284
LCSD 570-23284/3-A	Lab Control Sample Dup	Total/NA	Solid	7471A	23284
570-8501-A-5-D MS	Matrix Spike	Total/NA	Solid	7471A	23284
570-8501-A-5-E MSD	Matrix Spike Duplicate	Total/NA	Solid	7471A	23284

Analysis Batch: 23477

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-8761-1	SED-005	Total/NA	Solid	6020	23210
570-8761-2	SED-006	Total/NA	Solid	6020	23210
570-8761-3	SED-007	Total/NA	Solid	6020	23210
MB 570-23210/1-A ^20	Method Blank	Total/NA	Solid	6020	23210
LCS 570-23210/2-A ^20	Lab Control Sample	Total/NA	Solid	6020	23210
LCSD 570-23210/3-A ^20	Lab Control Sample Dup	Total/NA	Solid	6020	23210
570-8764-A-1-B MS ^100	Matrix Spike	Total/NA	Solid	6020	23210
570-8764-A-1-C MSD ^100	Matrix Spike Duplicate	Total/NA	Solid	6020	23210

General Chemistry

Analysis Batch: 22809

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-8761-1	SED-005	Total/NA	Solid	Moisture	

General Chemistry (Continued)

Analysis Batch: 22809 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-8761-2	SED-006	Total/NA	Solid	Moisture	
570-8761-3	SED-007	Total/NA	Solid	Moisture	
570-8761-1 DU	SED-005	Total/NA	Solid	Moisture	

Cleanup Batch: 22920

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-8761-1	SED-005	Total/NA	Solid	Homogenize	
				Prep	
570-8761-2	SED-006	Total/NA	Solid	Homogenize	
				Prep	
570-8761-3	SED-007	Total/NA	Solid	Homogenize	
				Prep	

Analysis Batch: 23330

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-8761-1	SED-005	Total/NA	Solid	9060A	22920
570-8761-2	SED-006	Total/NA	Solid	9060A	22920
570-8761-3	SED-007	Total/NA	Solid	9060A	22920
MB 570-23330/4	Method Blank	Total/NA	Solid	9060A	
LCS 570-23330/5	Lab Control Sample	Total/NA	Solid	9060A	
LCSD 570-23330/10	Lab Control Sample Dup	Total/NA	Solid	9060A	
570-8832-A-1 MS	Matrix Spike	Total/NA	Solid	9060A	
570-8832-A-1 MSD	Matrix Spike Duplicate	Total/NA	Solid	9060A	

Geotechnical

Analysis Batch: 23878

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
570-8761-1	SED-005	Total/NA	Solid	D4464	
570-8761-2	SED-006	Total/NA	Solid	D4464	
570-8761-3	SED-007	Total/NA	Solid	D4464	

Lab Chronicle

Client: WGR Southwest Inc
Project/Site: Tesoro LA Refinery

Job ID: 570-8761-1

Client Sample ID: SED-005

Date Collected: 09/25/19 16:00
Date Received: 09/26/19 12:08

Lab Sample ID: 570-8761-1

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Cleanup	Homogenize Prep	DL				22920	10/01/19 13:25	C4LT	ECL 1
Total/NA	Prep	3541	DL		20.3 g	2 mL	23315	10/02/19 16:36	UM1W	ECL 1
Total/NA	Analysis	8270C SIM	DL	5			23777	10/04/19 21:01	AJ2Q	ECL 1
	Instrument ID: GCMSAAA									
Total/NA	Cleanup	Homogenize Prep					22920	10/01/19 13:25	C4LT	ECL 1
Total/NA	Prep	Organotin Prep			10.27 g	5 mL	23682	10/02/19 20:08	OM8W	ECL 1
Total/NA	Analysis	Organotins SIM		1			24481	10/08/19 15:06	AJ2Q	ECL 1
	Instrument ID: GCMSY									
Total/NA	Cleanup	Homogenize Prep					22920	10/01/19 13:25	C4LT	ECL 1
Total/NA	Prep	3550C			10.21 g	10 mL	23135	10/02/19 09:36	UFLU	ECL 1
Total/NA	Analysis	8015B		1			23170	10/02/19 17:15	N5Y3	ECL 1
	Instrument ID: GC47									
Total/NA	Cleanup	Homogenize Prep					23256	10/02/19 14:30	C4LT	ECL 1
Total/NA	Prep	3541			20.2 g	2 mL	23333	10/02/19 17:47	UM1W	ECL 1
Total/NA	Analysis	8081A		1			24191	10/07/19 15:17	UHHN	ECL 1
	Instrument ID: GC44									
Total/NA	Cleanup	Homogenize Prep					23256	10/02/19 14:30	C4LT	ECL 1
Total/NA	Prep	3541			20.2 g	2 mL	23333	10/02/19 17:47	UM1W	ECL 1
Total/NA	Analysis	8081A		5			24191	10/07/19 16:00	UHHN	ECL 1
	Instrument ID: GC44									
Total/NA	Cleanup	Homogenize Prep					23256	10/02/19 14:30	C4LT	ECL 1
Total/NA	Prep	3541			20.2 g	2 mL	23333	10/02/19 17:47	UM1W	ECL 1
Total/NA	Analysis	8082		1			23692	10/04/19 14:18	UHHN	ECL 1
	Instrument ID: GC58									
Total/NA	Cleanup	Homogenize Prep					22920	10/01/19 13:25	C4LT	ECL 1
Total/NA	Prep	3050B			1.95 g	100 mL	23210	10/02/19 13:30	I3IN	ECL 1
Total/NA	Analysis	6020		100			23477	10/02/19 21:27	UFLE	ECL 1
	Instrument ID: ICPMS05									
Total/NA	Cleanup	Homogenize Prep					22920	10/01/19 13:25	C4LT	ECL 1
Total/NA	Prep	7471A			0.62 g	100 mL	23284	10/02/19 16:00	MD3A	ECL 1
Total/NA	Analysis	7471A		1			23303	10/02/19 19:06	I3IN	ECL 1
	Instrument ID: HG7									
Total/NA	Cleanup	Homogenize Prep					22920	10/01/19 13:25	C4LT	ECL 1
Total/NA	Analysis	9060A		1	203.0 mg	203.0 mg	23330	10/02/19 11:25	CY2M	ECL 1
	Instrument ID: TOC10									
Total/NA	Analysis	Moisture		1			22809	10/01/19 09:00	KAP4	ECL 2
	Instrument ID: NOEQUIP									
Total/NA	Analysis	D4464		1			23878	10/04/19 14:53	C4LT	ECL 1
	Instrument ID: NOEQUIP									

Lab Chronicle

Client: WGR Southwest Inc
Project/Site: Tesoro LA Refinery

Job ID: 570-8761-1

Client Sample ID: SED-006

Date Collected: 09/25/19 14:00
Date Received: 09/26/19 12:08

Lab Sample ID: 570-8761-2

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Cleanup	Homogenize Prep	DL				22920	10/01/19 13:25	C4LT	ECL 1
Total/NA	Prep	3541	DL		20.1 g	2 mL	23315	10/02/19 16:36	UM1W	ECL 1
Total/NA	Analysis	8270C SIM	DL	5			23777	10/04/19 21:20	AJ2Q	ECL 1
	Instrument ID: GCMSAAA									
Total/NA	Cleanup	Homogenize Prep					22920	10/01/19 13:25	C4LT	ECL 1
Total/NA	Prep	Organotin Prep			10.20 g	5 mL	23682	10/02/19 20:23	OM8W	ECL 1
Total/NA	Analysis	Organotins SIM		1			24481	10/08/19 15:23	AJ2Q	ECL 1
	Instrument ID: GCMSY									
Total/NA	Cleanup	Homogenize Prep					22920	10/01/19 13:25	C4LT	ECL 1
Total/NA	Prep	3550C			10.10 g	10 mL	23135	10/02/19 09:36	UFLU	ECL 1
Total/NA	Analysis	8015B		1			23170	10/02/19 19:02	N5Y3	ECL 1
	Instrument ID: GC47									
Total/NA	Cleanup	Homogenize Prep					23256	10/02/19 14:30	C4LT	ECL 1
Total/NA	Prep	3541			20.0 g	2 mL	23333	10/02/19 17:47	UM1W	ECL 1
Total/NA	Analysis	8081A		1			24191	10/07/19 15:31	UHHN	ECL 1
	Instrument ID: GC44									
Total/NA	Cleanup	Homogenize Prep					23256	10/02/19 14:30	C4LT	ECL 1
Total/NA	Prep	3541			20.0 g	2 mL	23333	10/02/19 17:47	UM1W	ECL 1
Total/NA	Analysis	8081A		5			24191	10/07/19 16:14	UHHN	ECL 1
	Instrument ID: GC44									
Total/NA	Cleanup	Homogenize Prep					23256	10/02/19 14:30	C4LT	ECL 1
Total/NA	Prep	3541			20.0 g	2 mL	23333	10/02/19 17:47	UM1W	ECL 1
Total/NA	Analysis	8082		1			23692	10/04/19 14:36	UHHN	ECL 1
	Instrument ID: GC58									
Total/NA	Cleanup	Homogenize Prep					22920	10/01/19 13:25	C4LT	ECL 1
Total/NA	Prep	3050B			2.00 g	100 mL	23210	10/02/19 13:30	I3IN	ECL 1
Total/NA	Analysis	6020		20			23477	10/02/19 21:45	UFLE	ECL 1
	Instrument ID: ICPMS05									
Total/NA	Cleanup	Homogenize Prep					22920	10/01/19 13:25	C4LT	ECL 1
Total/NA	Prep	7471A			0.59 g	100 mL	23284	10/02/19 16:00	MD3A	ECL 1
Total/NA	Analysis	7471A		1			23303	10/02/19 19:08	I3IN	ECL 1
	Instrument ID: HG7									
Total/NA	Cleanup	Homogenize Prep					22920	10/01/19 13:25	C4LT	ECL 1
Total/NA	Analysis	9060A		1	206.2 mg	206.2 mg	23330	10/02/19 11:25	CY2M	ECL 1
	Instrument ID: TOC10									
Total/NA	Analysis	Moisture		1			22809	10/01/19 09:00	KAP4	ECL 2
	Instrument ID: NOEQUIP									
Total/NA	Analysis	D4464		1			23878	10/04/19 14:53	C4LT	ECL 1
	Instrument ID: NOEQUIP									

Lab Chronicle

Client: WGR Southwest Inc
Project/Site: Tesoro LA Refinery

Job ID: 570-8761-1

Client Sample ID: SED-007
Date Collected: 09/25/19 10:00
Date Received: 09/26/19 12:08

Lab Sample ID: 570-8761-3
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Cleanup	Homogenize Prep	DL				22920	10/01/19 13:25	C4LT	ECL 1
Total/NA	Prep	3541	DL		20.1 g	2 mL	23315	10/02/19 16:36	UM1W	ECL 1
Total/NA	Analysis	8270C SIM	DL	5			23777	10/04/19 21:40	AJ2Q	ECL 1
	Instrument ID: GCMSAAA									
Total/NA	Cleanup	Homogenize Prep	DL				22920	10/01/19 13:25	C4LT	ECL 1
Total/NA	Prep	3541	DL		20.1 g	2 mL	23315	10/02/19 16:36	UM1W	ECL 1
Total/NA	Analysis	8270C SIM	DL	25			24407	10/08/19 15:08	AJ2Q	ECL 1
	Instrument ID: GCMSAAA									
Total/NA	Cleanup	Homogenize Prep					22920	10/01/19 13:25	C4LT	ECL 1
Total/NA	Prep	Organotin Prep			10.06 g	5 mL	23682	10/02/19 20:23	OM8W	ECL 1
Total/NA	Analysis	Organotins SIM		1			24481	10/08/19 15:41	AJ2Q	ECL 1
	Instrument ID: GCMSY									
Total/NA	Cleanup	Homogenize Prep					22920	10/01/19 13:25	C4LT	ECL 1
Total/NA	Prep	3550C			9.96 g	10 mL	23135	10/02/19 09:36	UFLU	ECL 1
Total/NA	Analysis	8015B		1			23170	10/02/19 19:23	N5Y3	ECL 1
	Instrument ID: GC47									
Total/NA	Cleanup	Homogenize Prep					23256	10/02/19 14:30	C4LT	ECL 1
Total/NA	Prep	3541			20.2 g	2 mL	23333	10/02/19 17:47	UM1W	ECL 1
Total/NA	Analysis	8081A		1			24191	10/07/19 15:45	UHHN	ECL 1
	Instrument ID: GC44									
Total/NA	Cleanup	Homogenize Prep					23256	10/02/19 14:30	C4LT	ECL 1
Total/NA	Prep	3541			20.2 g	2 mL	23333	10/02/19 17:47	UM1W	ECL 1
Total/NA	Analysis	8081A		5			24191	10/07/19 16:28	UHHN	ECL 1
	Instrument ID: GC44									
Total/NA	Cleanup	Homogenize Prep					23256	10/02/19 14:30	C4LT	ECL 1
Total/NA	Prep	3541			20.2 g	2 mL	23333	10/02/19 17:47	UM1W	ECL 1
Total/NA	Analysis	8082		1			23692	10/04/19 14:54	UHHN	ECL 1
	Instrument ID: GC58									
Total/NA	Cleanup	Homogenize Prep					22920	10/01/19 13:25	C4LT	ECL 1
Total/NA	Prep	3050B			1.98 g	100 mL	23210	10/02/19 13:30	I3IN	ECL 1
Total/NA	Analysis	6020		20			23477	10/02/19 21:48	UFLE	ECL 1
	Instrument ID: ICPMS05									
Total/NA	Cleanup	Homogenize Prep					22920	10/01/19 13:25	C4LT	ECL 1
Total/NA	Prep	7471A			0.60 g	100 mL	23284	10/02/19 16:00	MD3A	ECL 1
Total/NA	Analysis	7471A		1			23303	10/02/19 19:10	I3IN	ECL 1
	Instrument ID: HG7									
Total/NA	Cleanup	Homogenize Prep					22920	10/01/19 13:25	C4LT	ECL 1
Total/NA	Analysis	9060A		1	206.6 mg	206.6 mg	23330	10/02/19 11:25	CY2M	ECL 1
	Instrument ID: TOC10									
Total/NA	Analysis	Moisture		1			22809	10/01/19 09:00	KAP4	ECL 2
	Instrument ID: NOEQUIP									
Total/NA	Analysis	D4464		1			23878	10/04/19 14:53	C4LT	ECL 1
	Instrument ID: NOEQUIP									

Lab Chronicle

Client: WGR Southwest Inc
Project/Site: Tesoro LA Refinery

Job ID: 570-8761-1

Laboratory References:

ECL 1 = Eurofins Calscience LLC Lincoln, 7440 Lincoln Way, Garden Grove, CA 92841, TEL (714)895-5494

ECL 2 = Eurofins Calscience LLC Lampson, 7445 Lampson Ave, Garden Grove, CA 92841, TEL (714)895-5494

Accreditation/Certification Summary

Client: WGR Southwest Inc
Project/Site: Tesoro LA Refinery

Job ID: 570-8761-1

Laboratory: Eurofins Calscience LLC

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Arizona	State	AZ0781	03-13-20
California	SCAQMD LAP	17LA0919	11-30-19
California	State	2944	09-29-20
Guam	State	19-004R	10-31-19
Hawaii	State	<cert No.>	07-02-20
Nevada	State	CA00111	07-31-20
Oregon	NELAP	CA300001	01-29-20
Washington	State	C916-18	10-11-19

Method Summary

Client: WGR Southwest Inc
Project/Site: Tesoro LA Refinery

Job ID: 570-8761-1

Method	Method Description	Protocol	Laboratory
8270C SIM	PAHs (GC/MS SIM)	SW846	ECL 1
Organotins SIM	Organotins (GC/MS SIM)	Lab SOP	ECL 1
8015B	Diesel Range Organics (DRO) (GC)	SW846	ECL 1
8081A	Organochlorine Pesticides (GC)	SW846	ECL 1
8082	Polychlorinated Biphenyls (PCBs) by Gas Chromatography	SW846	ECL 1
6020	Metals (ICP/MS)	SW846	ECL 1
7471A	Mercury (CVAA)	SW846	ECL 1
9060A	Organic Carbon, Total (TOC)	SW846	ECL 1
Moisture	Percent Moisture	EPA	ECL 2
D4464	Particle Size Distribution of Catalytic Material (Laser light scattering)	ASTM	ECL 1
3050B	Preparation, Metals	SW846	ECL 1
3541	Automated Soxhlet Extraction	SW846	ECL 1
3541	Automated Soxhlet Extraction (Low Level)	SW846	ECL 1
3550C	Ultrasonic Extraction	SW846	ECL 1
7471A	Preparation, Mercury	SW846	ECL 1
Homogenize Prep	Preparation, Homogenization	None	ECL 1
Organotin Prep	Extraction (Organotins)	None	ECL 1

Protocol References:

ASTM = ASTM International
EPA = US Environmental Protection Agency
Lab SOP = Laboratory Standard Operating Procedure
None = None
SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

ECL 1 = Eurofins Calscience LLC Lincoln, 7440 Lincoln Way, Garden Grove, CA 92841, TEL (714)895-5494
ECL 2 = Eurofins Calscience LLC Lampson, 7445 Lampson Ave, Garden Grove, CA 92841, TEL (714)895-5494

Sample Summary

Client: WGR Southwest Inc
Project/Site: Tesoro LA Refinery

Job ID: 570-8761-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
570-8761-1	SED-005	Solid	09/25/19 16:00	09/26/19 12:08	
570-8761-2	SED-006	Solid	09/25/19 14:00	09/26/19 12:08	
570-8761-3	SED-007	Solid	09/25/19 10:00	09/26/19 12:08	

Tesoro Los Angeles Refinery - Carson Operations Page 1 of 1

Facility Name	City, State (Facility)	Project Manager (Consultant)	Project No. (Consultant)
LA Refinery - Carson Operations	1801 E. Sepulveda Blvd., Carson CA 90749	Chelsea Dreyer	021.APC.01
Facility Contact	**Facility Telephone No.**	**Telephone No. (Consultant)**	**Fax No. (Consultant)**
Nate Busch	(310) 847-3920	(562) 799-8510 ex. 1003	(562) 799-8510
Consultant Company	**Consultant Address**		
WGR Southwest, Inc.	11021 Winners Circle #101 Los Alamitos, California 90720		

Laboratory Name
Eurofins Calscience
7440 Lincoln Way
Garden Grove 92841
(714) 895-5494
Lab Project Manager
Xuan Dang

Sample I.D.	Lab Sample No.	No. of Containers	Matrix: Soil	Water	Air	Other	Prsv.: Yes	No	Sampling Date	Sampling Time	Total Metals (see text box)	Chlordane EPA 8081A	PCBs (EPA 8082 - see text box)	Sediment grain size ASTM D4464	DDT (see text box)	Total Organic Carbon EPA 9060A	TPH EPA 8015B	Tributyltin Krone et al.	PAHs (EPA 8270C - see text box)	FIELD ANALYSES: pH (SU) [6.5-8.5]	Salinity (PPT)	Dissolved Oxygen (mg/L) [mean>7; single>5]	Specific Conductance (mS/Cm)	Turbidity (NTU) [<50]	Flow (units =) [if possible]
~~SED-001~~		~~2~~	X				X				X	X	X	X	X	X	X	X	X						
~~SED-002~~		~~2~~	X				X				X	X	X	X	X	X	X	X	X						
~~SED-003~~		~~2~~	X				X				X	X	X	X	X	X	X	X	X						
~~SED-004~~		~~2~~	X				X				X	X	X	X	X	X	X	X	X						
SED-005		2	X				X		9/25/2019	16:00	X	X	X	X	X	X	X	X	X	8.07	25.1	5.55	39.6	3.7	-
SED-006		2	X				X		9/25/2019	14:00	X	X	X	X	X	X	X	X	X	7.98	23.5	5.43	37.2	1.4	-
SED-007		2	X				X		9/25/2019	10:00	X	X	X	X	X	X	X	X	X	7.80	21.7	4.07	34.5	13.5	-

Total Metals analyzed with EPA 6020:
Cadmium; Chromium; Copper; Lead; Nickel; Zinc
Total Metals analyzed with EPA 7471A:
Mercury
PCBs
Sum of Arochlor 1016, Arochlor 1221, Arochlor 1232, Arochlor 1242, Arochlor 1248, Arochlor 1254, and Arochlor 1260
DDT
Sum of 4,4'-DDT, 2,4'-DDT, 4,4'-DDE, 2,4'-DDE, 4,4'-DDD, and 2,4'-DDD
PAHs
Sum of acenaphthene, anthracene, 1,2-benzanthracene, 3,4-benzofluoranthene, benzo(k)fluoranthene, 1,12-benzoperylene,

Special Detection Limit/Reporting

Please report MDL and RL for all analytes

Duplicate samples must be analyzed at a frequency of 5%

Special QA/QC

Sub'd COC Attch'd:

REMARK

Email Results to:
nbusch@marathonpetroleum.com
cdreyer@wgr-sw.com
aballrot@wgr-sw.com

Sample Received Intact: Yes No

Temperature received: Ice No ice

Relinquished by SAMPLER (Print & Sign Name)	Date	Time	Received by (Print & Sign Name)
Amber Ballrot	9/26/19	12:00p	Ara Horn
Relinquished by (Print & Sign Name)	**Date**	**Time**	**Received by LABORATORY (Print & Sign Name)**
Ara Horn	9-26-19	12:08	EC

570-8761 Chain of Custody

Lab Work No.

Revised 9/23/2019

5.0/5.2 5c6

Login Sample Receipt Checklist

Client: WGR Southwest Inc

Job Number: 570-8761-1

Login Number: 8761
List Number: 1
Creator: Le, Danny

List Source: Eurofins Calscience

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

ATTACHMENT 4

SEDIMENT MONITORING
AQUATIC BIOASSAY
ANALYTICAL LABORATORY REPORT

aquatic bioassay & consulting laboratories, inc

October 25, 2019

Amber Ballrot
WGR Southwest, Inc.
1801 E. Sepulveda Blvd.
Carson, CA 90749

Dear Mrs.Ballrot:

We are pleased to present the enclosed bioassay report. The test was conducted under guidelines prescribed in *Short-Term Methods for Measuring the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms, EPA/R-95/136.* Results were as follows:

CLIENT:	WGR Southwest, Inc.
SAMPLE I.D.:	SED-005
DATE RECEIVED:	9/26/2019
ABC LAB. NO.:	WGR0919.187

CHRONIC MYTILUS SEDIMENT WATER INTERFACE BIOASSAY

NOEC	=	100.00 %
TUc	=	1.00
EC25	=	>100.00 %
EC50	=	>100.00 %

Yours very truly,

Scott Johnson
Laboratory Director

CETIS Summary Report

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	00-2536-6135	**Test Type:**	Development-Survival	**Analyst:**	Joe Freas		
Start Date:	08 Oct-19 12:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Water		
Ending Date:	10 Oct-19 12:00	**Species:**	Mytilus galloprovincialis	**Brine:**			
Test Length:	48h	**Taxon:**	Bivalvia	**Source:**	Carlsbad Aquafarms CA	**Age:**	
Sample ID:	16-1084-4840	**Code:**	WGR0919.187m	**Project:**	021.APC.01		
Sample Date:	25 Sep-19 16:00	**Material:**	Sediment	**Source:**	Bioassay Report		
Receipt Date:	26 Sep-19 12:25	**CAS (PC):**		**Station:**	SED-005		
Sample Age:	12d 20h	**Client:**	WGR Southwest Inc.				

Single Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result	S
11-8180-8464	Combined Proportion Normal	Equal Variance t Two-Sample Test	0.8527	100% passed combined proportion normal	1

Test Acceptability

				TAC Limits			
Analysis ID	**Endpoint**	**Attribute**	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
11-8180-8464	Combined Proportion Normal	PMSD	0.02078	<<	0.25	No	Passes Criteria

Combined Proportion Normal Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	5	0.9553	0.9381	0.9724	0.9361	0.9726	0.0062	0.0139	1.45%	0.00%
100		5	0.9653	0.9471	0.9835	0.9498	0.9863	0.0066	0.0147	1.52%	-1.05%

Combined Proportion Normal Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	0.9635	0.9498	0.9726	0.9361	0.9543
100		0.9635	0.9863	0.9726	0.9498	0.9543

Combined Proportion Normal Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	211/219	208/219	213/219	205/219	209/219
100		211/219	216/219	213/219	208/219	209/219

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	11-8180-8464	**Endpoint:**	Combined Proportion Normal	**CETIS Version:**	CETISv1.9.5
Analyzed:	25 Oct-19 9:57	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Batch ID:	00-2536-6135	**Test Type:**	Development-Survival	**Analyst:**	Joe Freas
Start Date:	08 Oct-19 12:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Water
Ending Date:	10 Oct-19 12:00	**Species:**	Mytilus galloprovincialis	**Brine:**	
Test Length:	48h	**Taxon:**	Bivalvia	**Source:**	Carlsbad Aquafarms CA **Age:**
Sample ID:	16-1084-4840	**Code:**	WGR0919.187m	**Project:**	021.APC.01
Sample Date:	25 Sep-19 16:00	**Material:**	Sediment	**Source:**	Bioassay Report
Receipt Date:	26 Sep-19 12:25	**CAS (PC):**		**Station:**	SED-005
Sample Age:	12d 20h	**Client:**	WGR Southwest Inc.		

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	100% passed combined proportion normal	2.08%

Equal Variance t Two-Sample Test

Control	vs	Conc-%	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Negative Control		100	-1.122	1.86	0.046	8	CDF	0.8527	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
PMSD	0.02078	<<	0.25	No	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0019128	0.0019128	1	1.258	0.2945	Non-Significant Effect
Error	0.0121624	0.0015203	8			
Total	0.0140752		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Levene Equality of Variance Test	0.3679	11.26	0.5610	Equal Variances
	Mod Levene Equality of Variance Test	0.3436	13.75	0.5791	Equal Variances
	Variance Ratio F Test	1.653	23.15	0.6381	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.2693	3.878	0.7075	Normal Distribution
	D'Agostino Skewness Test	0.7935	2.576	0.4275	Normal Distribution
	Kolmogorov-Smirnov D Test	0.1458	0.3025	1.0000	Normal Distribution
	Shapiro-Wilk W Normality Test	0.9453	0.7411	0.6134	Normal Distribution

Combined Proportion Normal Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	5	0.9553	0.9381	0.9724	0.9543	0.9361	0.9726	0.0062	1.45%	0.00%
100		5	0.9653	0.9471	0.9835	0.9635	0.9498	0.9863	0.0066	1.52%	-1.05%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	5	1.36	1.318	1.402	1.355	1.315	1.405	0.01514	2.49%	0.00%
100		5	1.387	1.333	1.441	1.378	1.345	1.453	0.01947	3.14%	-2.03%

Combined Proportion Normal Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	0.9635	0.9498	0.9726	0.9361	0.9543
100		0.9635	0.9863	0.9726	0.9498	0.9543

Angular (Corrected) Transformed Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	1.378	1.345	1.405	1.315	1.355
100		1.378	1.453	1.405	1.345	1.355

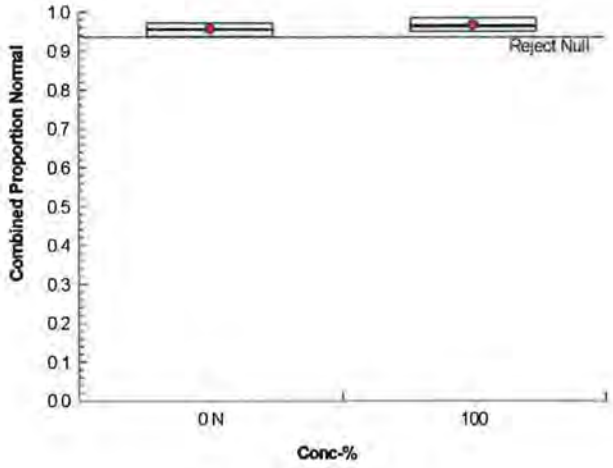
Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

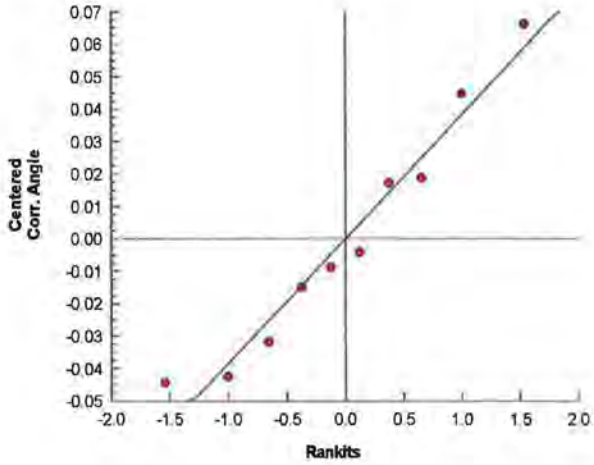
Analysis ID:	11-8180-8464	**Endpoint:**	Combined Proportion Normal	**CETIS Version:**	CETISv1.9.5
Analyzed:	25 Oct-19 9:57	**Analysis:**	Parametric-Two Sample	**Status Level:**	1

Combined Proportion Normal Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	211/219	208/219	213/219	205/219	209/219
100		211/219	216/219	213/219	208/219	209/219

Graphics





Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	00-2536-6135	**Test Type:**	Development-Survival	**Analyst:**	Joe Freas	
Start Date:	08 Oct-19 12:00	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Water	
Ending Date:	10 Oct-19 12:00	**Species:**	Mytilus galloprovincialis	**Brine:**		
Test Length:	48h	**Taxon:**	Bivalvia	**Source:**	Carlsbad Aquafarms CA	**Age:**

Sample ID:	16-1084-4840	**Code:**	WGR0919.187m	**Project:**	021.APC.01	
Sample Date:	25 Sep-19 16:00	**Material:**	Sediment	**Source:**	Bioassay Report	
Receipt Date:	26 Sep-19 12:25	**CAS (PC):**		**Station:**	SED-005	
Sample Age:	12d 20h	**Client:**	WGR Southwest Inc.			

Dissolved Oxygen-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	9.7	8.43	10.97	9.6	9.8	0.09998	0.1414	1.46%	0
100		2	10	8.729	11.27	9.9	10.1	0.1	0.1414	1.41%	0
Overall		4	9.85	9.519	10.18	9.6	10.1	0.1041	0.2082	2.11%	0 (0%)

pH-Units

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
100		2	8.05	7.415	8.685	8	8.1	0.05001	0.07073	0.88%	0
Overall		4	7.975	7.823	8.127	7.9	8.1	0.04787	0.09574	1.20%	0 (0%)

Salinity-ppt

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	34	34	34	34	34	0	0	0.0%	0
100		2	34	34	34	34	34	0	0	0.0%	0
Overall		4	34	34	34	34	34	0	0	0.00%	0 (0%)

Temperature-°C

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
100		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
Overall		4	14.75	14.66	14.84	14.7	14.8	0.02887	0.05774	0.39%	0 (0%)

Mussel Shell Development Test — Aquatic Bioassay & Consulting Labs, Inc.

Dissolved Oxygen-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		9.8					
100				9.9					
0	N	2		9.6					
100				10.1					

pH-Units

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		7.9					
100				8.1					
0	N	2		7.9					
100				8					

Salinity-ppt

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		34					
100				34					
0	N	2		34					
100				34					

Temperature-°C

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		14.8					
100				14.8					
0	N	2		14.7					
100				14.7					

aquatic bioassay & consulting laboratories, inc

October 25, 2019

Amber Ballrot
WGR Southwest, Inc.
1801 E. Sepulveda Blvd.
Carson, CA 90749

Dear Mrs.Ballrot:

We are pleased to present the enclosed bioassay report. The test was conducted under guidelines prescribed in *Short-Term Methods for Measuring the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms, EPA/R-95/136.* Results were as follows:

CLIENT:	WGR Southwest, Inc.
SAMPLE I.D.:	SED-006
DATE RECEIVED:	9/26/2019
ABC LAB. NO.:	WGR0919.188

CHRONIC MYTILUS SEDIMENT WATER INTERFACE BIOASSAY

NOEC	=	100.00 %
TUc	=	1.00
EC25	=	>100.00 %
EC50	=	>100.00 %

Yours very truly,

Scott Johnson
Laboratory Director

CETIS Summary Report

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	00-9754-0668	**Test Type:**	Development-Survival	**Analyst:**	Joe Freas	
Start Date:	08 Oct-19 12:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Water	
Ending Date:	10 Oct-19 12:01	**Species:**	Mytilus galloprovincialis	**Brine:**		
Test Length:	48h	**Taxon:**	Bivalvia	**Source:**	Carlsbad Aquafarms CA	**Age:**
Sample ID:	10-2054-8747	**Code:**	WGR0919.188m	**Project:**	021.APC.01	
Sample Date:	25 Sep-19 14:00	**Material:**	Sediment	**Source:**	Bioassay Report	
Receipt Date:	26 Sep-19 12:25	**CAS (PC):**		**Station:**	SED-006	
Sample Age:	12d 22h	**Client:**	WGR Southwest Inc.			

Single Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result	S
02-7220-2942	Combined Proportion Normal	Equal Variance t Two-Sample Test	0.9879	100% passed combined proportion normal	1

Test Acceptability

				TAC Limits			
Analysis ID	**Endpoint**	**Attribute**	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
02-7220-2942	Combined Proportion Normal	PMSD	0.01642	<<	0.25	No	Passes Criteria

Combined Proportion Normal Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	5	0.9553	0.9381	0.9724	0.9361	0.9726	0.0062	0.0139	1.45%	0.00%
100		5	0.9753	0.9643	0.9864	0.9635	0.9863	0.0040	0.0089	0.91%	-2.10%

Combined Proportion Normal Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	0.9635	0.9498	0.9726	0.9361	0.9543
100		0.9635	0.9726	0.9863	0.9726	0.9817

Combined Proportion Normal Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	211/219	208/219	213/219	205/219	209/219
100		211/219	213/219	216/219	213/219	215/219

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	02-7220-2942	**Endpoint:**	Combined Proportion Normal	**CETIS Version:**	CETISv1.9.5
Analyzed:	25 Oct-19 10:00	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Batch ID:	00-9754-0668	**Test Type:**	Development-Survival	**Analyst:**	Joe Freas
Start Date:	08 Oct-19 12:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Water
Ending Date:	10 Oct-19 12:01	**Species:**	Mytilus galloprovincialis	**Brine:**	
Test Length:	48h	**Taxon:**	Bivalvia	**Source:**	Carlsbad Aquafarms CA **Age:**
Sample ID:	10-2054-8747	**Code:**	WGR0919.188m	**Project:**	021.APC.01
Sample Date:	25 Sep-19 14:00	**Material:**	Sediment	**Source:**	Bioassay Report
Receipt Date:	26 Sep-19 12:25	**CAS (PC):**		**Station:**	SED-006
Sample Age:	12d 22h	**Client:**	WGR Southwest Inc.		

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	100% passed combined proportion normal	1.64%

Equal Variance t Two-Sample Test

Control	vs	Conc-%	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Negative Control		100	-2.774	1.86	0.037	8	CDF	0.9879	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
PMSD	0.01642	<<	0.25	No	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0077194	0.0077194	1	7.693	0.0242	Significant Effect
Error	0.0080275	0.0010034	8			
Total	0.0157468		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Levene Equality of Variance Test	0.04515	11.26	0.8371	Equal Variances
	Mod Levene Equality of Variance Test	0.1066	13.75	0.7552	Equal Variances
	Variance Ratio F Test	1.331	23.15	0.7884	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.2983	3.878	0.6171	Normal Distribution
	D'Agostino Skewness Test	0.1341	2.576	0.8933	Normal Distribution
	Kolmogorov-Smirnov D Test	0.1563	0.3025	0.8510	Normal Distribution
	Shapiro-Wilk W Normality Test	0.9492	0.7411	0.6592	Normal Distribution

Combined Proportion Normal Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	5	0.9553	0.9381	0.9724		0.9361	0.9726	0.0062	1.45%	0.00%
100		5	0.9753	0.9643	0.9864		0.9635	0.9863	0.0040	0.91%	-2.10%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	5	1.36	1.318	1.402		1.315	1.405	0.01514	2.49%	0.00%
100		5	1.415	1.379	1.452		1.378	1.453	0.01312	2.07%	-4.09%

Combined Proportion Normal Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	0.9635	0.9498	0.9726	0.9361	0.9543
100		0.9635	0.9726	0.9863	0.9726	0.9817

Angular (Corrected) Transformed Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	1.378	1.345	1.405	1.315	1.355
100		1.378	1.405	1.453	1.405	1.435

Analysis ID:	02-7220-2942	**Endpoint:**	Combined Proportion Normal	**CETIS Version:**	CETISv1.9.5
Analyzed:	25 Oct-19 10:00	**Analysis:**	Parametric-Two Sample	**Status Level:**	1

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	00-9754-0668	**Test Type:**	Development-Survival	**Analyst:**	Joe Freas	
Start Date:	08 Oct-19 12:01	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Water	
Ending Date:	10 Oct-19 12:01	**Species:**	Mytilus galloprovincialis	**Brine:**		
Test Length:	48h	**Taxon:**	Bivalvia	**Source:**	Carlsbad Aquafarms CA	**Age:**

Sample ID:	10-2054-8747	**Code:**	WGR0919.188m	**Project:**	021.APC.01	
Sample Date:	25 Sep-19 14:00	**Material:**	Sediment	**Source:**	Bioassay Report	
Receipt Date:	26 Sep-19 12:25	**CAS (PC):**		**Station:**	SED-006	
Sample Age:	12d 22h	**Client:**	WGR Southwest Inc.			

Dissolved Oxygen-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	9.7	8.43	10.97	9.6	9.8	0.09998	0.1414	1.46%	0
100		2	9.7	8.43	10.97	9.6	9.8	0.09998	0.1414	1.46%	0
Overall		4	9.7	9.516	9.884	9.6	9.8	0.05773	0.1155	1.19%	0 (0%)

pH-Units

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
100		2	8.05	7.415	8.685	8	8.1	0.05001	0.07073	0.88%	0
Overall		4	7.975	7.823	8.127	7.9	8.1	0.04787	0.09574	1.20%	0 (0%)

Salinity-ppt

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	34	34	34	34	34	0	0	0.0%	0
100		2	34	34	34	34	34	0	0	0.0%	0
Overall		4	34	34	34	34	34	0	0	0.00%	0 (0%)

Temperature-°C

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
100		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
Overall		4	14.75	14.66	14.84	14.7	14.8	0.02887	0.05774	0.39%	0 (0%)

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Dissolved Oxygen-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		9.8					
100				9.8					
0	N	2		9.6					
100				9.6					

pH-Units

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		7.9					
100				8.1					
0	N	2		7.9					
100				8					

Salinity-ppt

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		34					
100				34					
0	N	2		34					
100				34					

Temperature-°C

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		14.8					
100				14.8					
0	N	2		14.7					
100				14.7					

aquatic bioassay & consulting laboratories, inc

October 25, 2019

Amber Ballrot
WGR Southwest, Inc.
1801 E. Sepulveda Blvd.
Carson, CA 90749

Dear Mrs.Ballrot:

We are pleased to present the enclosed bioassay report. The test was conducted under guidelines prescribed in *Short-Term Methods for Measuring the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms, EPA/R-95/136.* Results were as follows:

CLIENT:	WGR Southwest, Inc.
SAMPLE I.D.:	SED-007
DATE RECEIVED:	9/26/2019
ABC LAB. NO.:	WGR0919.189

CHRONIC MYTILUS SEDIMENT WATER INTERFACE BIOASSAY

NOEC	=	100.00 %
TUc	=	1.00
EC25	=	>100.00 %
EC50	=	>100.00 %

Yours very truly,

S. Scott Johnson
Laboratory Director

CETIS Summary Report

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	12-1238-6343	**Test Type:**	Development-Survival	**Analyst:**	Joe Freas		
Start Date:	08 Oct-19 12:02	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Water		
Ending Date:	10 Oct-19 12:02	**Species:**	Mytilus galloprovincialis	**Brine:**			
Test Length:	48h	**Taxon:**	Bivalvia	**Source:**	Carlsbad Aquafarms CA	**Age:**	
Sample ID:	04-8505-2834	**Code:**	WGR0919.189m	**Project:**	021.APC.01		
Sample Date:	25 Sep-19 10:00	**Material:**	Sediment	**Source:**	Bioassay Report		
Receipt Date:	26 Sep-19 12:25	**CAS (PC):**		**Station:**	SED-007		
Sample Age:	13d 2h	**Client:**	WGR Southwest Inc.				

Single Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result	S
10-2114-0353	Combined Proportion Normal	Equal Variance t Two-Sample Test	0.5037	100% passed combined proportion normal	1

Test Acceptability

				TAC Limits			
Analysis ID	**Endpoint**	**Attribute**	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
10-2114-0353	Combined Proportion Normal	PMSD	0.04436	<<	0.25	No	Passes Criteria

Combined Proportion Normal Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	5	0.9553	0.9381	0.9724	0.9361	0.9726	0.0062	0.0139	1.45%	0.00%
100		5	0.9489	0.9114	0.9863	0.9269	1.0000	0.0135	0.0302	3.18%	0.67%

Combined Proportion Normal Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	0.9635	0.9498	0.9726	0.9361	0.9543
100		1.0000	0.9269	0.9406	0.9498	0.9269

Combined Proportion Normal Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	211/219	208/219	213/219	205/219	209/219
100		219/219	203/219	206/219	208/219	203/219

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	10-2114-0353	**Endpoint:**	Combined Proportion Normal	**CETIS Version:**	CETISv1.9.5
Analyzed:	25 Oct-19 10:04	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Batch ID:	12-1238-6343	**Test Type:**	Development-Survival	**Analyst:**	Joe Freas
Start Date:	08 Oct-19 12:02	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Water
Ending Date:	10 Oct-19 12:02	**Species:**	Mytilus galloprovincialis	**Brine:**	
Test Length:	48h	**Taxon:**	Bivalvia	**Source:**	Carlsbad Aquafarms CA **Age:**
Sample ID:	04-8505-2834	**Code:**	WGR0919.189m	**Project:**	021.APC.01
Sample Date:	25 Sep-19 10:00	**Material:**	Sediment	**Source:**	Bioassay Report
Receipt Date:	26 Sep-19 12:25	**CAS (PC):**		**Station:**	SED-007
Sample Age:	13d 2h	**Client:**	WGR Southwest Inc.		

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	100% passed combined proportion normal	4.44%

Equal Variance t Two-Sample Test

Control	vs	Conc-%	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Negative Control		100	-0.009442	1.86	0.089	8	CDF	0.5037	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
PMSD	0.04436	<<	0.25	No	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	5.049E-07	5.049E-07	1	8.915E-05	0.9927	Non-Significant Effect
Error	0.0453072	0.0056634	8			
Total	0.0453077		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Levene Equality of Variance Test	2.408	11.26	0.1593	Equal Variances
	Mod Levene Equality of Variance Test	0.7457	13.75	0.4210	Equal Variances
	Variance Ratio F Test	8.884	23.15	0.0573	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	0.8613	3.878	0.0269	Normal Distribution
	D'Agostino Skewness Test	2.69	2.576	0.0072	Non-Normal Distribution
	Kolmogorov-Smirnov D Test	0.2238	0.3025	0.1761	Normal Distribution
	Shapiro-Wilk W Normality Test	0.8013	0.7411	0.0150	Normal Distribution

Combined Proportion Normal Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	5	0.9553	0.9381	0.9724		0.9361	0.9726	0.0062	1.45%	0.00%
100		5	0.9489	0.9114	0.9863		0.9269	1.0000	0.0135	3.18%	0.67%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	5	1.36	1.318	1.402		1.315	1.405	0.01514	2.49%	0.00%
100		5	1.36	1.235	1.485		1.297	1.537	0.04512	7.42%	-0.03%

Combined Proportion Normal Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	0.9635	0.9498	0.9726	0.9361	0.9543
100		1.0000	0.9269	0.9406	0.9498	0.9269

Angular (Corrected) Transformed Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	1.378	1.345	1.405	1.315	1.355
100		1.537	1.297	1.325	1.345	1.297

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	10-2114-0353	**Endpoint:**	Combined Proportion Normal	**CETIS Version:**	CETISv1.9.5
Analyzed:	25 Oct-19 10:04	**Analysis:**	Parametric-Two Sample	**Status Level:**	1

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	12-1238-6343	**Test Type:**	Development-Survival	**Analyst:**	Joe Freas	
Start Date:	08 Oct-19 12:02	**Protocol:**	EPA/600/R-95/136 (1995)	**Diluent:**	Laboratory Water	
Ending Date:	10 Oct-19 12:02	**Species:**	Mytilus galloprovincialis	**Brine:**		
Test Length:	48h	**Taxon:**	Bivalvia	**Source:**	Carlsbad Aquafarms CA	**Age:**

Sample ID:	04-8505-2834	**Code:**	WGR0919.189m	**Project:**	021.APC.01	
Sample Date:	25 Sep-19 10:00	**Material:**	Sediment	**Source:**	Bioassay Report	
Receipt Date:	26 Sep-19 12:25	**CAS (PC):**		**Station:**	SED-007	
Sample Age:	13d 2h	**Client:**	WGR Southwest Inc.			

Dissolved Oxygen-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	9.7	8.43	10.97	9.6	9.8	0.09998	0.1414	1.46%	0
100		2	9.5	4.418	14.58	9.1	9.9	0.4	0.5657	5.96%	0
Overall		4	9.6	9.034	10.17	9.1	9.9	0.178	0.3559	3.71%	0 (0%)

pH-Units

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
100		2	7.85	5.944	9.756	7.7	8	0.15	0.2121	2.7%	0
Overall		4	7.875	7.675	8.075	7.7	8	0.06292	0.1258	1.60%	0 (0%)

Salinity-ppt

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	34	34	34	34	34	0	0	0.0%	0
100		2	34	34	34	34	34	0	0	0.0%	0
Overall		4	34	34	34	34	34	0	0	0.00%	0 (0%)

Temperature-°C

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
100		2	14.75	14.11	15.39	14.7	14.8	0.05002	0.07075	0.48%	0
Overall		4	14.75	14.66	14.84	14.7	14.8	0.02887	0.05774	0.39%	0 (0%)

Mussel Shell Development Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Dissolved Oxygen-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		9.8					
100				9.1					
0	N	2		9.6					
100				9.9					

pH-Units

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		7.9					
100				8					
0	N	2		7.9					
100				7.7					

Salinity-ppt

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		34					
100				34					
0	N	2		34					
100				34					

Temperature-°C

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		14.8					
100				14.8					
0	N	2		14.7					
100				14.7					

aquatic bioassay & consulting laboratories, inc

October 25, 2019

Amber Ballrot
WGR Southwest, Inc.
1801 E. Sepulveda Blvd.
Carson, CA 90749

Dear Mrs.Ballrot:

We are pleased to present the enclosed bioassay report. The test was conducted under guidelines prescribed in *Methods for Assessing the Toxicity of Sediment-associated Contaminants with Estuarine and Marine Amphipods, Method EPA/600/R-94/025.* Results were as follows:

CLIENT:	WGR Southwest, Inc.
SAMPLE I.D.:	SED-005
DATE RECEIVED:	09/26/2019
ABC LAB. NO.:	WGR0919.187

ACUTE EOHAUSTORIUS SURVIVAL BIOASSAY

NOEC	=	100.00 %
TUc	=	1.00
EC25	=	>100.00 %
EC50	=	>100.00 %

Yours very truly,

DV Scott Johnson
Laboratory Director

CETIS Summary Report

Eohaustorius 10-d Survival and Reburial Sediment Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	09-3560-5522	**Test Type:**	Survival-Reburial	**Analyst:**	Joe Freas
Start Date:	04 Oct-19 12:00	**Protocol:**	EPA/600/R-94/025 (1994)	**Diluent:**	Laboratory Seawater
Ending Date:	14 Oct-19 12:00	**Species:**	Eohaustorius estuarius	**Brine:**	Not Applicable
Test Length:	10d 0h	**Taxon:**	Malacostraca	**Source:**	Northwestern Aquatic Scienc **Age:**
Sample ID:	08-0284-6087	**Code:**	WGR0919.187e	**Project:**	021.APC.01
Sample Date:	25 Sep-19 16:00	**Material:**	Sediment	**Source:**	Bioassay Report
Receipt Date:	26 Sep-19 12:25	**CAS (PC):**		**Station:**	SED-005
Sample Age:	8d 20h	**Client:**	WGR Southwest Inc.		

Single Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result	S
20-1644-3170	Survival Rate	Wilcoxon Rank Sum Two-Sample Test	0.7778	100% passed survival rate	1

Test Acceptability

				TAC Limits			
Analysis ID	**Endpoint**	**Attribute**	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
20-1644-3170	Survival Rate	Control Resp	0.99	0.9	>>	Yes	Passes Criteria

Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	5	0.9900	0.9622	1.0000	0.9500	1.0000	0.0100	0.0224	2.26%	0.00%
100		5	0.9900	0.9622	1.0000	0.9500	1.0000	0.0100	0.0224	2.26%	0.00%

Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	1.0000	1.0000	0.9500	1.0000	1.0000
100		1.0000	1.0000	0.9500	1.0000	1.0000

Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	20/20	20/20	19/20	20/20	20/20
100		20/20	20/20	19/20	20/20	20/20

Eohaustorius 10-d Survival and Reburial Sediment Test

Aquatic Bioassay & Consulting Labs, Inc.

Analysis ID:	20-1644-3170	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	25 Oct-19 9:39	**Analysis:**	Nonparametric-Two Sample	**Status Level:**	1
Batch ID:	09-3560-5522	**Test Type:**	Survival-Reburial	**Analyst:**	Joe Freas
Start Date:	04 Oct-19 12:00	**Protocol:**	EPA/600/R-94/025 (1994)	**Diluent:**	Laboratory Seawater
Ending Date:	14 Oct-19 12:00	**Species:**	Eohaustorius estuarius	**Brine:**	Not Applicable
Test Length:	10d 0h	**Taxon:**	Malacostraca	**Source:**	Northwestern Aquatic Scienc **Age:**
Sample ID:	08-0284-6087	**Code:**	WGR0919.187e	**Project:**	021.APC.01
Sample Date:	25 Sep-19 16:00	**Material:**	Sediment	**Source:**	Bioassay Report
Receipt Date:	26 Sep-19 12:25	**CAS (PC):**		**Station:**	SED-005
Sample Age:	8d 20h	**Client:**	WGR Southwest Inc.		

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	100% passed survival rate	2.76%

Wilcoxon Rank Sum Two-Sample Test

Control	vs	Conc-%	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Negative Control		100	27.5	n/a	2	8	Exact	0.7778	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.99	0.9	>>	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0	0	1	0	1.0000	Non-Significant Effect
Error	0.0206028	0.0025754	8			
Total	0.0206028		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Levene Equality of Variance Test	0	11.26	1.0000	Equal Variances
	Mod Levene Equality of Variance Test	0	13.75	1.0000	Equal Variances
	Variance Ratio F Test	1	23.15	1.0000	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	2.912	3.878	<1.0E-37	Non-Normal Distribution
	D'Agostino Skewness Test	2.495	2.576	0.0126	Normal Distribution
	Kolmogorov-Smirnov D Test	0.4824	0.3025	2.2E-07	Non-Normal Distribution
	Shapiro-Wilk W Normality Test	0.5093	0.7411	4.7E-06	Non-Normal Distribution

Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	5	0.9900	0.9622	1.0000		0.9500	1.0000	0.0100	2.26%	0.00%
100		5	0.9900	0.9622	1.0000		0.9500	1.0000	0.0100	2.26%	0.00%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	5	1.436	1.373	1.499		1.345	1.459	0.02269	3.53%	0.00%
100		5	1.436	1.373	1.499		1.345	1.459	0.02269	3.53%	0.00%

Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	1.0000	1.0000	0.9500	1.0000	1.0000
100		1.0000	1.0000	0.9500	1.0000	1.0000

Angular (Corrected) Transformed Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	1.459	1.459	1.345	1.459	1.459
100		1.459	1.459	1.345	1.459	1.459

Eohaustorius 10-d Survival and Reburial Sediment Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	20-1644-3170	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	25 Oct-19 9:39	**Analysis:**	Nonparametric-Two Sample	**Status Level:**	1

Eohaustorius 10-d Survival and Reburial Sediment Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	09-3560-5522	**Test Type:**	Survival-Reburial	**Analyst:**	Joe Freas
Start Date:	04 Oct-19 12:00	**Protocol:**	EPA/600/R-94/025 (1994)	**Diluent:**	Laboratory Seawater
Ending Date:	14 Oct-19 12:00	**Species:**	Eohaustorius estuarius	**Brine:**	Not Applicable
Test Length:	10d 0h	**Taxon:**	Malacostraca	**Source:**	Northwestern Aquatic Scienc **Age:**

Sample ID:	08-0284-6087	**Code:**	WGR0919.187e	**Project:**	021.APC.01
Sample Date:	25 Sep-19 16:00	**Material:**	Sediment	**Source:**	Bioassay Report
Receipt Date:	26 Sep-19 12:25	**CAS (PC):**		**Station:**	SED-005
Sample Age:	8d 20h	**Client:**	WGR Southwest Inc.		

Dissolved Oxygen-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	10	8.729	11.27	9.9	10.1	0.1	0.1414	1.41%	0
100		2	10.05	9.415	10.69	10	10.1	0.05001	0.07073	0.7%	0
Overall		4	10.03	9.873	10.18	9.9	10.1	0.04787	0.09574	0.96%	0 (0%)

pH-Units

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
100		2	7.75	7.115	8.385	7.7	7.8	0.05001	0.07072	0.91%	0
Overall		4	7.825	7.673	7.977	7.7	7.9	0.04787	0.09574	1.22%	0 (0%)

Salinity-ppt

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	20	20	20	20	20	0	0	0.0%	0
100		2	20	20	20	20	20	0	0	0.0%	0
Overall		4	20	20	20	20	20	0	0	0.00%	0 (0%)

Temperature-°C

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	14.7	13.43	15.97	14.6	14.8	0.09999	0.1414	0.96%	0
100		2	14.7	13.43	15.97	14.6	14.8	0.09999	0.1414	0.96%	0
Overall		4	14.7	14.52	14.88	14.6	14.8	0.05773	0.1155	0.79%	0 (0%)

Eohaustorius 10-d Survival and Reburial Sediment Test — Aquatic Bioassay & Consulting Labs, Inc.

Dissolved Oxygen-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		10.1					
100				10					
0	N	2		9.9					
100				10.1					

pH-Units

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		7.9					
100				7.8					
0	N	2		7.9					
100				7.7					

Salinity-ppt

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		20					
100				20					
0	N	2		20					
100				20					

Temperature-°C

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		14.8					
100				14.8					
0	N	2		14.6					
100				14.6					

aquatic bioassay & consulting laboratories, inc

October 25, 2019

Amber Ballrot
WGR Southwest, Inc.
1801 E. Sepulveda Blvd.
Carson, CA 90749

Dear Mrs.Ballrot:

We are pleased to present the enclosed bioassay report. The test was conducted under guidelines prescribed in *Methods for Assessing the Toxicity of Sediment-associated Contaminants with Estuarine and Marine Amphipods, Method EPA/600/R-94/025.* Results were as follows:

CLIENT:	WGR Southwest, Inc.
SAMPLE I.D.:	SED-006
DATE RECEIVED:	09/26/2019
ABC LAB. NO.:	WGR0919.188

ACUTE EOHAUSTORIUS SURVIVAL BIOASSAY

NOEC	=	100.00 %
TUc	=	1.00
EC25	=	>100.00 %
EC50	=	>100.00 %

Yours very truly,

Scott Johnson
Laboratory Director

CETIS Summary Report

Eohaustorius 10-d Survival and Reburial Sediment Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	09-3543-4630	**Test Type:**	Survival-Reburial	**Analyst:**	Joe Freas
Start Date:	04 Oct-19 12:01	**Protocol:**	EPA/600/R-94/025 (1994)	**Diluent:**	Laboratory Seawater
Ending Date:	14 Oct-19 12:01	**Species:**	Eohaustorius estuarius	**Brine:**	Not Applicable
Test Length:	10d 0h	**Taxon:**	Malacostraca	**Source:**	Northwestern Aquatic Scienc **Age:**
Sample ID:	09-0072-5676	**Code:**	WGR0919.188e	**Project:**	021.APC.01
Sample Date:	25 Sep-19 14:00	**Material:**	Sediment	**Source:**	Bioassay Report
Receipt Date:	26 Sep-19 12:25	**CAS (PC):**		**Station:**	SED-006
Sample Age:	8d 22h	**Client:**	WGR Southwest Inc.		

Single Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result	S
10-8075-7058	Survival Rate	Wilcoxon Rank Sum Two-Sample Test	1.0000	100% passed survival rate	1

Test Acceptability

				TAC Limits			
Analysis ID	**Endpoint**	**Attribute**	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
10-8075-7058	Survival Rate	Control Resp	0.99	0.9	>>	Yes	Passes Criteria

Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	5	0.9900	0.9622	1.0000	0.9500	1.0000	0.0100	0.0224	2.26%	0.00%
100		5	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	-1.01%

Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	1.0000	1.0000	0.9500	1.0000	1.0000
100		1.0000	1.0000	1.0000	1.0000	1.0000

Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	20/20	20/20	19/20	20/20	20/20
100		20/20	20/20	20/20	20/20	20/20

Eohaustorius 10-d Survival and Reburial Sediment Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	10-8075-7058	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	25 Oct-19 9:43	**Analysis:**	Nonparametric-Two Sample	**Status Level:**	1
Batch ID:	09-3543-4630	**Test Type:**	Survival-Reburial	**Analyst:**	Joe Freas
Start Date:	04 Oct-19 12:01	**Protocol:**	EPA/600/R-94/025 (1994)	**Diluent:**	Laboratory Seawater
Ending Date:	14 Oct-19 12:01	**Species:**	Eohaustorius estuarius	**Brine:**	Not Applicable
Test Length:	10d 0h	**Taxon:**	Malacostraca	**Source:**	Northwestern Aquatic Scienc **Age:**
Sample ID:	09-0072-5676	**Code:**	WGR0919.188e	**Project:**	021.APC.01
Sample Date:	25 Sep-19 14:00	**Material:**	Sediment	**Source:**	Bioassay Report
Receipt Date:	26 Sep-19 12:25	**CAS (PC):**		**Station:**	SED-006
Sample Age:	8d 22h	**Client:**	WGR Southwest Inc.		

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	100% passed survival rate	2.12%

Wilcoxon Rank Sum Two-Sample Test

Control	vs	Conc-%	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Negative Control		100	30	n/a	1	8	Exact	1.0000	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.99	0.9	>>	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0012877	0.0012877	1	1	0.3466	Non-Significant Effect
Error	0.0103014	0.0012877	8			
Total	0.0115891		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Levene Equality of Variance Test	7.111	11.26	0.0285	Equal Variances
	Mod Levene Equality of Variance Test	1	13.75	0.3559	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	1.796	3.878	<1.0E-37	Non-Normal Distribution
	D'Agostino Skewness Test	3.335	2.576	8.5E-04	Non-Normal Distribution
	Kolmogorov-Smirnov D Test	0.4	0.3025	6.1E-05	Non-Normal Distribution
	Shapiro-Wilk W Normality Test	0.6247	0.7411	1.1E-04	Non-Normal Distribution

Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	5	0.9900	0.9622	1.0000		0.9500	1.0000	0.0100	2.26%	0.00%
100		5	1.0000	1.0000	1.0000		1.0000	1.0000	0.0000	0.00%	-1.01%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	5	1.436	1.373	1.499		1.345	1.459	0.02269	3.53%	0.00%
100		5	1.459	1.458	1.459		1.459	1.459	0	0.00%	-1.58%

Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	1.0000	1.0000	0.9500	1.0000	1.0000
100		1.0000	1.0000	1.0000	1.0000	1.0000

Angular (Corrected) Transformed Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	1.459	1.459	1.345	1.459	1.459
100		1.459	1.459	1.459	1.459	1.459

Eohaustorius 10-d Survival and Reburial Sediment Test **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	10-8075-7058	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	25 Oct-19 9:43	**Analysis:**	Nonparametric-Two Sample	**Status Level:**	1

Eohaustorius 10-d Survival and Reburial Sediment Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	09-3543-4630	**Test Type:**	Survival-Reburial	**Analyst:**	Joe Freas
Start Date:	04 Oct-19 12:01	**Protocol:**	EPA/600/R-94/025 (1994)	**Diluent:**	Laboratory Seawater
Ending Date:	14 Oct-19 12:01	**Species:**	Eohaustorius estuarius	**Brine:**	Not Applicable
Test Length:	10d 0h	**Taxon:**	Malacostraca	**Source:**	Northwestern Aquatic Scienc **Age:**

Sample ID:	09-0072-5676	**Code:**	WGR0919.188e	**Project:**	021.APC.01
Sample Date:	25 Sep-19 14:00	**Material:**	Sediment	**Source:**	Bioassay Report
Receipt Date:	26 Sep-19 12:25	**CAS (PC):**		**Station:**	SED-006
Sample Age:	8d 22h	**Client:**	WGR Southwest Inc.		

Dissolved Oxygen-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	10	8.729	11.27	9.9	10.1	0.1	0.1414	1.41%	0
100		2	10.2	8.929	11.47	10.1	10.3	0.1	0.1414	1.39%	0
Overall		4	10.1	9.84	10.36	9.9	10.3	0.08165	0.1633	1.62%	0 (0%)

pH-Units

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
100		2	7.85	7.215	8.485	7.8	7.9	0.05	0.07071	0.9%	0
Overall		4	7.875	7.795	7.955	7.8	7.9	0.025	0.05	0.63%	0 (0%)

Salinity-ppt

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	20	20	20	20	20	0	0	0.0%	0
100		2	20	20	20	20	20	0	0	0.0%	0
Overall		4	20	20	20	20	20	0	0	0.00%	0 (0%)

Temperature-°C

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	14.7	13.43	15.97	14.6	14.8	0.09999	0.1414	0.96%	0
100		2	14.7	13.43	15.97	14.6	14.8	0.09999	0.1414	0.96%	0
Overall		4	14.7	14.52	14.88	14.6	14.8	0.05773	0.1155	0.79%	0 (0%)

Eohaustorius 10-d Survival and Reburial Sediment Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Dissolved Oxygen-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		10.1					
100				10.1					
0	N	2		9.9					
100				10.3					

pH-Units

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		7.9					
100				7.9					
0	N	2		7.9					
100				7.8					

Salinity-ppt

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		20					
100				20					
0	N	2		20					
100				20					

Temperature-°C

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		14.8					
100				14.8					
0	N	2		14.6					
100				14.6					

aquatic bioassay & consulting laboratories, inc

October 25, 2019

Amber Ballrot
WGR Southwest, Inc.
1801 E. Sepulveda Blvd.
Carson, CA 90749

Dear Mrs.Ballrot:

We are pleased to present the enclosed bioassay report. The test was conducted under guidelines prescribed in *Methods for Assessing the Toxicity of Sediment-associated Contaminants with Estuarine and Marine Amphipods, Method EPA/600/R-94/025.* Results were as follows:

CLIENT:	WGR Southwest, Inc.
SAMPLE I.D.:	SED-007
DATE RECEIVED:	09/26/2019
ABC LAB. NO.:	WGR0919.189

ACUTE EOHAUSTORIUS SURVIVAL BIOASSAY

NOEC	=	100.00 %
TUc	=	1.00
EC25	=	>100.00 %
EC50	=	>100.00 %

Yours very truly,

Scott Johnson
Laboratory Director

CETIS Summary Report

Eohaustorius 10-d Survival and Reburial Sediment Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	01-9262-0039	**Test Type:**	Survival-Reburial	**Analyst:**	Joe Freas
Start Date:	04 Oct-19 12:02	**Protocol:**	EPA/600/R-94/025 (1994)	**Diluent:**	Laboratory Seawater
Ending Date:	14 Oct-19 12:02	**Species:**	Eohaustorius estuarius	**Brine:**	Not Applicable
Test Length:	10d 0h	**Taxon:**	Malacostraca	**Source:**	Northwestern Aquatic Scienc **Age:**
Sample ID:	04-1241-5260	**Code:**	WGR0919.189e	**Project:**	021.APC.01
Sample Date:	25 Sep-19 10:00	**Material:**	Sediment	**Source:**	Bioassay Report
Receipt Date:	25 Sep-19 12:25	**CAS (PC):**		**Station:**	SED-007
Sample Age:	9d 2h	**Client:**	WGR Southwest Inc.		

Single Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result	S
17-9097-2898	Survival Rate	Wilcoxon Rank Sum Two-Sample Test	0.5000	100% passed survival rate	1

Test Acceptability

				TAC Limits			
Analysis ID	**Endpoint**	**Attribute**	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
17-9097-2898	Survival Rate	Control Resp	0.99	0.9	>>	Yes	Passes Criteria

Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	5	0.9900	0.9622	1.0000	0.9500	1.0000	0.0100	0.0224	2.26%	0.00%
100		5	0.9800	0.9460	1.0000	0.9500	1.0000	0.0123	0.0274	2.79%	1.01%

Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	1.0000	1.0000	0.9500	1.0000	1.0000
100		0.9500	0.9500	1.0000	1.0000	1.0000

Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	20/20	20/20	19/20	20/20	20/20
100		19/20	19/20	20/20	20/20	20/20

CETIS Analytical Report

Eohaustorius 10-d Survival and Reburial Sediment Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	17-9097-2898	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	25 Oct-19 9:47	**Analysis:**	Nonparametric-Two Sample	**Status Level:**	1
Batch ID:	01-9262-0039	**Test Type:**	Survival-Reburial	**Analyst:**	Joe Freas
Start Date:	04 Oct-19 12:02	**Protocol:**	EPA/600/R-94/025 (1994)	**Diluent:**	Laboratory Seawater
Ending Date:	14 Oct-19 12:02	**Species:**	Eohaustorius estuarius	**Brine:**	Not Applicable
Test Length:	10d 0h	**Taxon:**	Malacostraca	**Source:**	Northwestern Aquatic Scienc **Age:**
Sample ID:	04-1241-5260	**Code:**	WGR0919.189e	**Project:**	021.APC.01
Sample Date:	25 Sep-19 10:00	**Material:**	Sediment	**Source:**	Bioassay Report
Receipt Date:	25 Sep-19 12:25	**CAS (PC):**		**Station:**	SED-007
Sample Age:	9d 2h	**Client:**	WGR Southwest Inc.		

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	100% passed survival rate	3.03%

Wilcoxon Rank Sum Two-Sample Test

Control	vs	Conc-%	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Negative Control		100	25	n/a	2	8	Exact	0.5000	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.99	0.9	>>	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0012877	0.0012877	1	0.4	0.5447	Non-Significant Effect
Error	0.0257535	0.0032192	8			
Total	0.0270412		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Levene Equality of Variance Test	1.524	11.26	0.2521	Equal Variances
	Mod Levene Equality of Variance Test	0.4286	13.75	0.5370	Equal Variances
	Variance Ratio F Test	1.5	23.15	0.7040	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	1.329	3.878	0.0014	Non-Normal Distribution
	D'Agostino Skewness Test	1.407	2.576	0.1594	Normal Distribution
	Kolmogorov-Smirnov D Test	0.3643	0.3025	4.8E-04	Non-Normal Distribution
	Shapiro-Wilk W Normality Test	0.7586	0.7411	0.0045	Non-Normal Distribution

Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	5	0.9900	0.9622	1.0000		0.9500	1.0000	0.0100	2.26%	0.00%
100		5	0.9800	0.9460	1.0000		0.9500	1.0000	0.0123	2.79%	1.01%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	5	1.436	1.373	1.499		1.345	1.459	0.02269	3.53%	0.00%
100		5	1.413	1.336	1.491		1.345	1.459	0.0278	4.40%	1.58%

Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	1.0000	1.0000	0.9500	1.0000	1.0000
100		0.9500	0.9500	1.0000	1.0000	1.0000

Angular (Corrected) Transformed Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	1.459	1.459	1.345	1.459	1.459
100		1.345	1.345	1.459	1.459	1.459

Eohaustorius 10-d Survival and Reburial Sediment Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	17-9097-2898	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	25 Oct-19 9:47	**Analysis:**	Nonparametric-Two Sample	**Status Level:**	1

CETIS Measurement Report

Eohaustorius 10-d Survival and Reburial Sediment Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	01-9262-0039	**Test Type:**	Survival-Reburial	**Analyst:**	Joe Freas
Start Date:	04 Oct-19 12:02	**Protocol:**	EPA/600/R-94/025 (1994)	**Diluent:**	Laboratory Seawater
Ending Date:	14 Oct-19 12:02	**Species:**	Eohaustorius estuarius	**Brine:**	Not Applicable
Test Length:	10d 0h	**Taxon:**	Malacostraca	**Source:**	Northwestern Aquatic Scienc **Age:**

Sample ID:	04-1241-5260	**Code:**	WGR0919.189e	**Project:**	021.APC.01
Sample Date:	25 Sep-19 10:00	**Material:**	Sediment	**Source:**	Bioassay Report
Receipt Date:	25 Sep-19 12:25	**CAS (PC):**		**Station:**	SED-007
Sample Age:	9d 2h	**Client:**	WGR Southwest Inc.		

Dissolved Oxygen-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	10	8.729	11.27	9.9	10.1	0.1	0.1414	1.41%	0
100		2	10.15	9.515	10.79	10.1	10.2	0.05	0.0707	0.7%	0
Overall		4	10.08	9.875	10.28	9.9	10.2	0.06292	0.1258	1.25%	0 (0%)

pH-Units

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
100		2	7.8	6.529	9.071	7.7	7.9	0.1	0.1414	1.81%	0
Overall		4	7.85	7.691	8.009	7.7	7.9	0.05	0.1	1.27%	0 (0%)

Salinity-ppt

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	20	20	20	20	20	0	0	0.0%	0
100		2	20	20	20	20	20	0	0	0.0%	0
Overall		4	20	20	20	20	20	0	0	0.00%	0 (0%)

Temperature-°C

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	14.7	13.43	15.97	14.6	14.8	0.09999	0.1414	0.96%	0
100		2	14.7	13.43	15.97	14.6	14.8	0.09999	0.1414	0.96%	0
Overall		4	14.7	14.52	14.88	14.6	14.8	0.05773	0.1155	0.79%	0 (0%)

Eohaustorius 10-d Survival and Reburial Sediment Test — Aquatic Bioassay & Consulting Labs, Inc.

Dissolved Oxygen-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		10.1					
100				10.2					
0	N	2		9.9					
100				10.1					

pH-Units

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		7.9					
100				7.9					
0	N	2		7.9					
100				7.7					

Salinity-ppt

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		20					
100				20					
0	N	2		20					
100				20					

Temperature-°C

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		14.8					
100				14.8					
0	N	2		14.6					
100				14.6					

WGR

Tesoro Los Angeles Refinery - Carson Operations

Facility Name	City, State (Facility)	Project Manager (Consultant)	Project No. (Consultant)
LA Refinery - Carson Operations	1801 E. Sepulveda Blvd., Carson CA 90749	Chelsea Dreyer	021.APC.01
Facility Contact	**Facility Telephone No.**	**Telephone No. (Consultant)**	**Fax No. (Consultant)**
Nate Busch	(310) 847-3920	(562) 799-8510 ex. 1003	(562) 799-8510

Consultant Company: WGR Southwest, Inc.

Consultant Address: 11021 Winners Circle #101 Los Alamitos, California 90720

Laboratory Name
Aquatic Bioassay
29 N Olive Street
Ventura 93001
(805) 643-5621

Sample I.D.	Lab Sample No.	No. of Containers	Matrix: Soil	Water	Air	Other	Prsv.: Yes	No	Sampling Date	Sampling Time	*Eohaustorius estuarius* (EPA 600/R-94/025)	*Mytilus galloprovincialis* (EPA 600/R-95/136)
~~SED-001~~		5	X				X				X	X
~~SED-002~~		5	X				X				X	X
~~SED-003~~		5	X				X				X	X
~~SED-004~~		5	X				X				X	X
SED-005		5	X				X		9/25/19	16:00	X	X
SED-006		5	X				X		9/25/19	14:00	X	X
SED-007		5	X				X		9/25/19	10:00	X	X

.187
.188
.189

Sample bottles required for each sample point:

(2) x 1 liter containers for Eohaustorius
(3) x 1 liter containers for Mytilus

Special Detection Limit/Reporting

Please report MDL and RL for all analytes

Duplicate samples must be analyzed at a frequency of 5%

Special QA/QC

Sub'd COC Attch'd:

REMARK

Email Results to:
nbusch@marathonpetroleum.com
cdreyer@wgr-sw.com
aballrot@wgr-sw.com

Sample Received Intact: (Yes) No

Temperature received: 13.3°C (Ice) No ice

Relinquished by **SAMPLER** (Print & Sign Name)	Date	Time	Received by (Print & Sign Name)
Joseph Rodriguez	9/26/19	1225	E. MARTINEZ
Relinquished by (Print & Sign Name)	**Date**	**Time**	**Received by LABORATORY (Print & Sign Name)**

Lab Work No.

Revised 9/12/2019

ATTACHMENT 5

ORGANIC/INORGANIC
ANALYTICAL VALIDATION REPORT

Tesoro Refining & Marketing LLC
Los Angeles Refinery – Carson Operations
Organic/Inorganic Analytical Validation Report

Table of Contents

Attachments:

1.0 Overview

The Tesoro Refining & Marketing Company LLC, Los Angeles Refinery – Carson Operations (herein facility) collected sediment samples at monitoring locations SED-005, SED-006, and SED-007 on September 25, 2019. Collected samples were submitted to the laboratory on September 26, 2019 for analysis as required in NPDES Permit No. CA0000680 Attachment E, Table E-7.

Sediment monitoring analysis was performed by laboratories certified under the Environmental Laboratory Accreditation Program (ELAP). Sediment chemistry samples were analyzed by Eurofins Calscience, Inc. in Garden Grove California with ELAP accreditation number 2944 and chronic toxicity samples were submitted to Aquatic Bioassay and Consulting Laboratories, Inc. in Ventura, California with ELAP accreditation number 1907. This document presents the analytical validation criteria used to determine the usability of data gathered as result of the sediment monitoring conducted. Analytical data was evaluated based on the validation criteria set forth in the *National Functional Guidelines for Organic Superfund Methods Data Review*, document number USEPA-540-R-2017-002, January 2017, and the *USEPA National Functional Guidelines for Inorganic Superfund Methods Data Review*, document number USEPA 540-R-2017-001, January 2017, as applied to the reported methodology. Sediment monitoring parameters, including the sample type and corresponding analytical method, are listed in Table 1.0 below.

Table 1.0 - Sediment Monitoring Parameters

Parameters	Sample Type	Analytical Method
Cadmium, Total Recoverable	Surface Grab	EPA 6020B
Chlordane	Surface Grab	EPA 8081A
Chromium, Total	Surface Grab	EPA 6020B
Copper, Total Recoverable	Surface Grab	EPA 6020B
Lead, Total Recoverable	Surface Grab	EPA 6020B
Mercury, Total Recoverable	Surface Grab	EPA 7471A
Nickel, Total Recoverable	Surface Grab	EPA 6020B
Zinc, Total Recoverable	Surface Grab	EPA 6020B
PCBs	Surface Grab	EPA 8082A
Sediment Grain Size	Surface Grab	ASTM D4464
Chronic Toxicity	Surface Grab	-
Pesticides	Surface Grab	EPA 8081A
Total Organic Carbon	Surface Grab	EPA 9060A
Total Petroleum Hydrocarbons	Surface Grab	EPA 8015B
Tributyltin	Surface Grab	Krone et. Al.
Polynuclear Aromatic Hydrocarbons	Surface Grab	EPA 8270C

Analytical laboratory report is included in Attachment 3 and Attachment 4 of the Dominguez Channel Estuary September 2019 Sediment Monitoring Report. All of the sediment monitoring parameters listed in Table 1.0 were analytically validated except for Sediment Grain Size and Chronic Toxicity. Data from these analyses do not qualify for environmental data validation guidance procedures. As a result, sediment grain size and chronic toxicity data was assessed for completion using Chain of Custody records and field sample preservation guidelines. Detailed analytical validation for chronic toxicity is provided in the Sediment Bioassay Data Validation Report in Attachment 6 of the Dominguez Channel Estuary September 2019 Sediment Monitoring Report.

Analytical data validation for organic/inorganic parameters determinations are included in the *Dominguez Channel Estuary Sediment Monitoring Organic/Inorganic Analytical Data Validation Form* in Attachment I included in this report.

1.1 Data Assessment

Analytical data validation consisted of evaluating laboratory precision, laboratory accuracy, method compliance, and overall completeness of laboratory data provided. Based on this assessment, it was determined that data obtained for the September 25, 2019 sediment samples at SED-005, SED-006, and SED-007 is acceptable. Data components reviewed during the data review process included:

- Chain of Custody records and holding times
- Sample integrity/case narratives
- Sample results, reporting limits, dilution factors
- Laboratory QA/QC data

A summary of the sediment samples collected are provided in Table 1.0 below:

Table 2.0 – Dominguez Channel Sediment Samples

Sample ID	Sample Date	Sample Time	Laboratory ID
SED-005	September 25, 2019	16:00	570-8761-1
SED-006	September 25, 2019	14:00	570-8761-2
SED-007	September 25, 2019	10:00	570-8761-3

1.2 Overall Data Review Narrative

Analytical data was assessed for precision, accuracy, method compliance and overall completeness. Data review determined these components to be acceptable. There were, however, certain analytical parameters that did not meet matrix spike/matrix spike duplicate recoveries in QA/QC samples as explained in the

attached data validation form. Despite this occurrence, all associated Laboratory Control Sample recoveries were within acceptance limits and, therefore, the data was qualified and deemed acceptable.

[Remainder of page intentionally left blank]

Attachment I

Dominguez Channel Estuary Sediment Monitoring

Inorganic/Organic Analytical Validation Form

Tesoro Refining & Marketing LLC

Los Angeles Refinery - Carson Operations

Dominguez Channel Estuary Sediment Monitoring Organic/Inorganic Analytical Data Validation Form

PROJECT INFORMATION

Project Name: Dominguez Channel Sediment Sampling

Analytical Laboratories: Eurofins Calscience, Inc.
Aquatic Bioassays & Consulting Laboratories Inc.

Sample Collection Date: September 25, 2019

Sample Collection Locations: SED-005, SED-006, SED-007

Data Validator: Ana Horn

Validation Date: October 29, 2019

Signature: Ana Horn

SEDIMENT MONITORING PARAMETERS

Parameters	Sample Type	Analytical Method	Holding Times	Parameter Validation Comments:
Cadmium, Total Recoverable	Surface Grab	EPA 6020B	180 days	All sediment monitoring parameters were analytically validated except for Sediment Grain Size and Chronic Toxicity. Data from these analyses do not qualify for environmental data validation guidance procedures. Grain size and chronic toxicity data was assessed for completion based on Chain of Custody records and field sample preservation procedures.
Chlordane	Surface Grab	EPA 8081A	14 days	
Chromium, Total	Surface Grab	EPA 6020B	180 days	
Copper, Total Recoverable	Surface Grab	EPA 6020B	180 days	
Lead, Total Recoverable	Surface Grab	EPA 6020B	180 days	
Mercury, Total Recoverable	Surface Grab	EPA 7471A	180 days	
Nickel, Total Recoverable	Surface Grab	EPA 6020B	180 days	
Zinc, Total Recoverable	Surface Grab	EPA 6020B	180 days	
PCBs	Surface Grab	EPA 8082A	14 days	
Sediment Grain Size	Surface Grab	ASTM D4464	-	
Chronic Toxicity	Surface Grab	-	-	
Pesticides	Surface Grab	EPA 8081A	14 days	
Total Organic Carbon	Surface Grab	EPA 9060A	28 days	
Total Petroleum Hydrocarbons	Surface Grab	EPA 8015B	14 days	
Tributyltin	Surface Grab	Krone et. Al.	14 days	
Polynuclear Aromatic Hydrocarbons	Surface Grab	EPA 8270C	14 days	

VALIDATION CRITERIA

1. Was the Chain of Custody (COC) form complete for all samples submitted?	☑ YES ☐ NO ☐ N/A	Comments: The Chain of Custody (COC) form submitted to the laboratory is complete. The COC includes sample location information, field parameter results, and laboratory personnel signatures denoting the date and time the samples were relinquished and received by the laboratory.
2. Were ALL of the requested analyses specified in the COC completed by the laboratory?	☑ YES ☐ NO ☐ N/A	Comments: All parameters listed on the COC were analyzed by the laboratory as requested.

Tesoro Refining & Marketing LLC Los Angeles Refinery - Carson Operations Dominguez Channel Estuary Sediment Monitoring Organic/Inorganic Analytical Data Validation Form		
3. Were samples received in good condition and appropriately preserved as required by each analysis?	☑ YES ☐ NO ☐ N/A	Comments: Samples received by the laboratory were received in good condition and were appropriately preserved as required. No sample receipt deficiencies were noted in the laboratory report's Sample Job Narrative.
4. Were the reported analytical methods in compliance with the facility's NPDES permit and/or COC requests?	☑ YES ☐ NO ☐ N/A	Comments: Analytical methods were completed as requested in the COC and are in compliance with the facility's NPDES permit.
5. Were detection limits in accordance with the facility's NPDES permit or analytical method?	☑ YES ☐ NO ☐ N/A	Comments: The method detection limits and reporting limits were reported for each analytical method. Certain analytes required additional dilution due to the high analyte concentration that may have resulted in sample matrix interference and/or non-homogeneity. Sediment results were primarily reported on a dry weight basis except for DDT analyzed by method 8081A. DDT was reported on a wet weight basis.
6. Did the laboratory identify any deficiencies/non-conformances related to the analytical results?	☑ YES ☐ NO ☐ N/A	Comments: A Job Narrative is included in the laboratory report outlining QA/QC issues and the associated resolution observed for results analyzed by method 8081A, 8270C, 6020 and 9060A. QA/QC issues are further discussed in the comment section to questions 11, 14, and 16.
7. Were sample holding times met?	☑ YES ☐ NO ☐ N/A	Comments: Sample holding times were met for all analytical methods. The analytical methods and the corresponding holding time is provided in the Sediment Monitoring Parameter Table above.
8. Were correct concentration units reported?	☑ YES ☐ NO ☐ N/A	Comments: Results reported in dry weight as mg/kg included PAHs analyzed by method EPA 8270C, TPH analyzed by method 8015B, PCBs analyzed by method 8082, total metals analyzed by method 6020, mercury analyzed by method 7471A and total organic carbon analyzed by method 9060A. Results reported in dry weight as ug/kg included PCBs analyzed by method 8082. Results reported in wet weight as ug/kg included DDT analyzed by 8081A. Results are appropriately reported for the sediment matrix analyzed, however, it is important to note the varying units reported for the samples collected. This unit trend is consistent at all three sampling stations.

Tesoro Refining & Marketing LLC Los Angeles Refinery - Carson Operations Dominguez Channel Estuary Sediment Monitoring Organic/Inorganic Analytical Data Validation Form		
9. Were the reporting requirements for flagged data met?	☑ YES ☐ NO ☐ N/A	Comments: Reporting requirements for flagged data were met. Qualifiers included: J - result is less than RL but greater than or equal to MDL and the result is approximate value B - Compound was found in the blank and sample p - The %RPD between the primary and confirmation column/detector is >40%. The lower value was reported F1 - MS and/or MSD recovery is outside acceptance limits F2 - MS/MSD RPD exceeds control limits X - surrogate is outside of control limits Data with the above qualifiers, except for J flag results, are discussed in the comment section to questions 11, 14, and 16.
10. Does the laboratory report include results for only those constituents requested in the COC?	☐ YES ☑ NO ☐ N/A	Comments: Laboratory report includes results for the required parameters as included in Table E-7 of the NPDES Permit; however, the laboratory report includes 5 additional PAH results not requested in the COC including Acenaphthylene, 1-Methylnaphthalene, 2-Methylnaphthalene, Naphthalene, and Phenanthrene. These additional PAH parameters are reported for all three sampling station SED-005, SED-006, SED-007. Data for these parameters are not required and are therefore not accounted for in this data validation.
11. Were laboratory method blank samples free of target analyte contamination?	☐ YES ☑ NO ☐ N/A	Comments: Laboratory method blanks were free of target analyte for all parameters, except 1,2 - Benzanthracene. Method blank results for 1,2-Benzanthracene was J flagged with a result of 0.001146 mg/kg which is between the RL of 0.010 mg/kg and MDL result of 0.0011mg/kg. Since the target analyte was less than the reporting limit, re-extraction of the sample was not performed.
12. Were instrument calibrations within method or data validation control limits?	☐ YES ☐ NO ☑ N/A	Comments: Instrument calibration data was not supplied in the analytical report and, therefore, not included in this analytical data validation analysis.

Tesoro Refining & Marketing LLC Los Angeles Refinery - Carson Operations Dominguez Channel Estuary Sediment Monitoring Organic/Inorganic Analytical Data Validation Form		
13. Were trip blank, field blank, and/or equipment rinse blank samples free of target analyte contamination?	☐ YES ☐ NO ☑ N/A	Comments: Not applicable. Trip blanks, field blanks and/or equipment rinse blank samples were not collected for this project.
14. Were surrogate recoveries within control limits?	☐ YES ☑ NO ☐ N/A	Comments: Surrogate recoveries were within control limits for all sample stations including surrogates used for PAHs, Tributyltin, TPH, and PCBs. Surrogate recovery was within control limits for DDT constituents at Station SED-005 and SED-006. Percent surrogate recovery at Station SED-007 is within control limits for all surrogates except for tetrachloro-m-xylene. Evidence of matrix interference is present; therefore, re-extraction of the surrogate was not performed. As noted in the laboratory Job Narrative, surrogate tetrachloro-m-xylene was passed on the fifth dilution run.
15. Were laboratory control sample recoveries within control limits?	☑ YES ☐ NO ☐ N/A	Comments: Laboratory control sample recoveries were within acceptable control limits for all parameters.

Tesoro Refining & Marketing LLC Los Angeles Refinery - Carson Operations Dominguez Channel Estuary Sediment Monitoring Organic/Inorganic Analytical Data Validation Form		
16. Were Matrix Spike (MS) / Matrix Spike Duplicate (MSD) recoveries within control limits?	☐ YES ☑ NO ☐ N/A	Comments: Matrix Spike (MS) / Matrix Spike Duplicate (MSD) recoveries were within control limits for all parameters except for total metals including cadmium, chromium, copper, lead, nickel and zinc. In addition, MS/MSD recoveries were also above control limits for 4,4'-DDE, 4,4'- DDT, and 4'4 DDD, and Total Organic Carbon. Due to total metals having a relatively high concentration in the matrix spike recovery, these parameters could not be evaluated for accuracy and precision. However, the associated Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD) met the acceptable criteria for these metals and therefore the data is deemed acceptable. MS and MSD for 4,4'-DDE, 4,4'- DDT, and 4'4 DDD are above the MS/MSD control limits due to the additional levels of 4,4'-DDE, 4,4'-DDT, and 4'4 DDD present in the spiked samples remaining above the instrument calibration range. Since the associated LCS/LCSD recovery for 4,4'-DDE, 4,4'- DDT, and 4'4 DDD was within the acceptance limits the data is deemed acceptable. Similarly, the MS/MSD for Total Organic Carbon was outside of the control limits. However, this data is acceptable due to the associated LCS/LCSD recovery meeting acceptance criteria.
17. Were internal standards within method criteria for GC/MS sample analysis?	☐ YES ☐ NO ☑ N/A	Comments: Does not apply to this level of data validation. In addition, GC/MS internal standard data was not supplied in the analytical reports and was therefore not included in this data review.
18. Were 100% of the Electronic Data Deliverable (EDD) concentrations and reporting limits compared to the hardcopy data reports?	☐ YES ☑ NO ☐ N/A	Comments: No EDD was used for this project.

Tesoro Refining & Marketing LLC

Los Angeles Refinery - Carson Operations

Dominguez Channel Estuary Sediment Monitoring Organic/Inorganic Analytical Data Validation Form

PRECISION, ACCURACY, METHOD COMPLIANCE AND COMPLETENESS ASSESSMENT

Precision Determination:	☑ Acceptable	☐ Not Acceptable

Comments: Precision is the measure of variability of individual sample measurements. Laboratory precision was determined by examination of laboratory duplicate results. To evaluate laboratory duplicates for precision the Relative Percent difference (RPD) was used. RPD is defined as the difference between two duplicate samples divided by the mean and expressed as a percent. RPD precision measurements were compared to laboratory QC limits and it was determined that RPDs were within the RPD limits except Aroclor-1016 and Chromium. The associated laboratory control sample / laboratory sample duplicate for these parameters, however, was within acceptance limits. Therefore, data precision obtained for all analyzed parameters was determined to be acceptable.

Accuracy Determination:	☑ Acceptable	☐ Not Acceptable

Comments: Accuracy is the closeness of a measured result to an accepted reference value usually measured as percent recoveries. Laboratory accuracy is a measure of system bias measured by evaluating Lab Control Samples (LCS), Lab Control Sample Duplicate (LCSD), matrix spikes (MS) and/or matrix spike duplicates (MSD), and organic system monitoring compound surrogate percent recoveries (%Rs). Data validation assessments revealed all LCS/LCSD were within acceptable criteria. MS recoveries were within control limits for all parameters except for total metals, 4,4'-DDE, 4,4'- DDT, 4,4'-DDD and Total Organic Carbon as discussed in Question 16. Due to the LCS/LCSD meeting applicable criteria, data accuracy for analyzed parameters was determined to be acceptable.

Method Compliance Determination:	☑ Acceptable	☐ Not Acceptable

Comments: Method compliance was determined by evaluating sample integrity, holding time, reporting limits and laboratory blanks per method specific requirements. Assessment of these factors is presented above in questions 1, 2, 3 and 4. Data validation determined method compliance to be acceptable.

Completeness Determination:	☑ Acceptable	☐ Not Acceptable

Comments: Completeness is the overall ratio of the number of samples planned versus the number of samples with valid analyses. Project completeness was performed by evaluating COC records, laboratory analytical methods, and detection limits as well as sample data results and QC summary reports. Data assessment for the collected samples determined the overall data completeness to be acceptable.

ATTACHMENT 6

SEDIMENT BIOASSAY
DATA VALIDATION REPORT

Tesoro Refining & Marketing LLC
Los Angeles Refinery – Carson Operations
Sediment Bioassay Data Validation Report

Table of Contents

Attachment:

1.0 Chronic Toxicity Test Overview

The Tesoro Refining & Marketing Company LLC, Los Angeles Refinery – Carson Operations (herein facility) collected sediment samples at monitoring locations SED-005, SED-006, and SED-007 as required in National Pollutant Discharge Elimination System (NPDES) No. CA0000680. Sediment samples for chronic toxicity testing were collected on September 25, 2019 and submitted to Aquatic Bioassay & Consulting Laboratories Inc. on September 26, 2019 for analysis. Aquatic Bioassay & Consulting Laboratories has Environmental Laboratory Accreditation Program (ELAP) Certification number 1907.

As required by NPDES No. CA0000680 Attachment E, Section V.A.4, the facility is required to conduct a species sensitivity screening for chronic toxicity testing. To fulfill this requirement, the facility performed two chronic toxicity tests for each sample station using two different sediment species: *Eohaustorius estuarius* and *Mytilus galloprovincialis*. *Eohaustorius estuarius* chronic toxicity testing was performed following EPA 600/R-95/025 *Methods for Assessing the Toxicity of Sediment Associated Contaminants with Estuarine and Marine Amphipods*. The chronic toxicity test with *Eohaustorius estuarius* was conducted over a 10-day period. Overlying water was not renewed, and test organisms were not fed during the duration of the test. *Mytilus galloprovincialis* chronic toxicity testing was performed following EPA 600/R-94/136 *Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organism.* The chronic toxicity test with *Mytilus galloprovincialis* was performed using a 48-hour static non-renewal toxicity test using embryos and larvae of the test species. Aquatic bioassay laboratory results are included in the Dominguez Channel Estuary September 2019 Sediment Monitoring Report in Attachment 4. As demonstrated in the bioassay chronic toxicity test results, both species exhibited no observed effect concentration to the sediment samples at SED-005, SED-006 and SED-007. Based on these results, the facility has opted to utilize *Eohaustorius estuarius* in all future chronic toxicity testing.

2.0 Data Review

A level 2 data verification protocol was used for bioassay validation. The level 2 data review compares bioassay testing holding conditions, test setup, test implementation, and test termination in accordance with bioassay protocols. As part of the level 2 data verification protocol the laboratory was expected to follow all internal quality control procedures as directed in the applicable analytical method. Outcome of the data review for each of the chronic toxicity tests performed is documented in the *Chronic Toxicity QA/QC Bioassay Data Validation Form* included in Attachment I of this report.

Sediment samples at station at SED-005, SED-006, and SED-007 were collected on September 25, 2019 by WGR Southwest Inc. All collected samples were preserved as required and submitted to Aquatic Bioassay and Consulting Laboratories Inc. on

September 26, 2019. A summary of data usability determinations for the chronic toxicity tests performed are described in Section 3.0 and Section 4.0 below.

3.0 *Eohaustorius estuarius* Chronic Toxicity Test

3.1 Sample Collection, Sample Preservation, Chain of Custody

Sediment samples for *E. estuarius* chronic toxicity testing were collected from station SED-005, SED-006, and SED-007 using an Eckman dredge sampler. Sampling equipment was decontaminated prior to use at each station to prevent cross contamination. Field samples were handled with care in order to minimize sediment disturbance and prevent the loss of sample integrity, chemical speciation and chemical equilibrium. Collected samples were maintained at 4°C and a Chain of Custody documenting collected samples was completed and submitted to Aquatic Bioassay & Consulting Laboratories Inc. Chronic toxicity testing was initiated for all samples within the required 14-day holding time for sample collection and analysis. Document review of sample collection, sample preservation and Chain of Custody procedures was deemed acceptable.

3.2 Test Setup

Chronic toxicity testing with *E. estuarius* was completed in accordance with EPA method 600/R-94-025. Organisms used for testing were cultured and supplied by Northwestern Aquatic Sciences in Newport, Oregon. Amphipods ranging in 3-5 mm in size were used, with at least twenty organisms per replicate. Test setup review is provided in the bioassay data validation form attached to this document. Based on a review of laboratory test setup procedures, test set up procedure were deemed acceptable and in accordance with EPA requirements.

3.3 Test Implementation

Test implementation for chronic toxicity testing with *E. estuarius* was completed in accordance with EPA method 600/R-94-025. Water quality measurements were recorded during the duration of the test and were found to be in the acceptable range as specified in the test protocol. Ranges for the water quality measurements are provided in the QA/QC Checklist of Attachment I. No abnormal conditions were observed throughout the duration of the test. Thus, the test implementation was determined to be acceptable and in accordance with EPA requirements.

3.3.1 Test Acceptability Criteria

3.3.1.1 Reference Toxicant

The reference toxicant used during *E. estuarius* chronic toxicity testing was unionized ammonia. The length of the reference

toxicant test was 96 hours. All reference toxicant testing was within the 2 standard deviation quality control limits.

3.3.1.2 Negative Control Samples

Negative control samples demonstrated a 99% survival at all sample stations, which is above the 90% mean acceptability survival criteria. As a result, the negative control sample results are considered acceptable at all sampled stations.

3.4 Reporting

Bioassay results were delivered in an acceptable laboratory report documenting a summary of water quality results, reference toxicity results, test results, statistical calculations and percent mortality. Additional information regarding test setup/test implementation procedures was provided by the laboratory to complete the QA/QC bioassay data validation form. Overall, the reporting component presenting chronic toxicity test results for *E. estuarius* was deemed acceptable.

3.5 Overall Data Usability

Review of laboratory data indicated chronic toxicity testing was performed in accordance in accordance with EPA method 600/R-94-025 as documented in Attachment I. Through the bioassay laboratory report and additional clarification from the laboratory, the bioassay test results at all sample stations was deemed acceptable and in accordance with EPA requirements.

4.0 *Mytilus galloprovincialis* Chronic Toxicity Test

4.1 Sample Collection, Sample Preservation, Chain of Custody

Sediment samples for chronic toxicity testing were collected from station SED-005, SED-006 and SED-007 using an Ekman dredge. Sampling equipment was decontaminated prior to use at each station to prevent cross contamination. Field samples were handled with care in order to minimize sediment disturbance and prevent the loss of sample integrity, chemical speciation and chemical equilibrium. Collected samples were maintained at 4°C and a Chain of Custody documenting collected samples was completed and submitted to Aquatic Bioassay & Consulting Laboratories Inc. Chronic toxicity testing was initiated for all samples within the required 14-day holding time for sample collection and analysis. Review of sample collection, sample preservation and Chain of Custody procedures was deemed acceptable.

4.2 Test Setup

Chronic toxicity testing with *M. galloprovincialis* was completed in accordance with EPA method 600/R-95-136. Organisms used for testing were cultured and

supplied by Carlsbad Aquafarm in Carlsbad, California. Testing was initiated using at least 200 fertilized embryo test organisms. Test setup review is provided in the bioassay data validation form attached to this document. Based on the review of laboratory test setup procedures, test setup procedures were deemed acceptable and in accordance with EPA requirements.

4.3 Test Implementation

Test implementation for chronic toxicity testing with *M. galloprovincialis* was completed in accordance with EPA method 600/R-95-136. Water quality measurements were recorded during the duration of the test and were found to be in the acceptable range as specified in the test protocol. Ranges for the water quality measurements are provided in the QA/QC Checklist of Attachment I. No abnormal conditions were observed throughout the duration of the test. Thus, the test implementation was determined to be acceptable and in accordance with EPA requirements.

4.3.1 Test Acceptability Criteria

Testing performed at all stations demonstrated a Minimum Significant Difference (MSD) less than 25%, which is within the test acceptability criteria. Performance of negative control replicates was similar to test sample performance. Therefore, the chronic toxicity test results were deemed acceptable at all sampled stations.

4.4 Reporting

Bioassay results were delivered in an acceptable laboratory report documenting a summary of water quality results, reference toxicity results, test results, statistical calculations and percent mortality. Additional information regarding test setup/test implementation procedures were provided by the laboratory to complete the QA/QC bioassay data validation form. Overall, the reporting component presenting chronic toxicity test results for *M. galloprovincialis* was deemed acceptable.

4.5 Overall Data Usability

Review of laboratory data indicated chronic toxicity testing was performed in accordance with EPA method 600/R-94-136 as documented in Attachment I. Through the bioassay laboratory report and additional clarification from the laboratory, the bioassay test results at all sample stations was deemed acceptable and in accordance with EPA requirements.

Attachment I

Dominguez Channel Estuary

Sediment Bioassay Data Validation Form

Tesoro Refining & Marketing LLC
Los Angeles Refinery - Carson Operations
Dominguez Channel Estuary Chronic Toxicity QA/QC Bioassay Data Validation

PROJECT INFORMATION			
Project Name:	Dominguez Channel Sediment Sampling		
Analytical Laboratory:	Aquatic Bioassays & Consulting Laboratories Inc.		
Laboratory Technician:	Joe Freas		
Sample Collection Date:	September 25, 2019		
Sample Locations/Lab Number:	SED-005 / WGR019.187 SED-006 / WGR019.188 SED-007 / WGR019.189		
Species/Test Method Referenced:	Eohaustorius estuarius EPA/600/R-94-025	**Test Duration:**	SED-005: October 4, 2019 @12:00 – October 14, 2019 @ 12:00 (10day) SED-006: October 4, 2019 @12:01 – October 14, 2019 @ 12:01 (10day) SED-007: October 4, 2019 @12:02 – October 14, 2019 @ 12:02 (10day)
	Mytilus galloprovincialis EPA/600/R-95-136	**Test Duration:**	SED-005: October 8, 2019 @12:00 – October 12, 2019 @12:00 (48 hr) SED-006: October 8, 2019 @12:01 – October 10, 2019 @12:01 (48 hr) SED-007: October 8, 2019 @12:02 – October 10, 2019 @12:02 (48 hr)
Sample Matrix:	Sediment		
Type of Species:	Estuarine		
Data Validator:	Ana Horn		
Validation Date:	October 31, 2019		
Signature:	Ana Horn		
Problems Noted:	No problems or deficiencies identified. Chronic toxicity testing was performed in accordance with EPA method guidelines.		

EOHAUSTORIUS ESTUARIUS	
Completeness and Holding Conditions:	
Type of Samples Collected: Grab Sediment Samples	Number of Samples Analyzed: 3
Were samples maintained at 4°C and in the dark after collection? Yes	
Did chronic toxicity testing begin within 14 days of sample collection? Yes	
Holding conditions acceptable? Yes	
If holding conditions were not acceptable, explain: N/A	
Quality of Test Organism, Collection and Acclimation:	
Who is the supplier of the test organisms?	Northwestern Aquatic Sciences in Newport Oregon

Tesoro Refining & Marketing LLC Los Angeles Refinery - Carson Operations Dominguez Channel Estuary Chronic Toxicity QA/QC Bioassay Data Validation	
Are organisms field collected or cultured?	Field Collected
If field collected:	
Where was the collection location? Newport, Oregon	
What was the organism collection date? Organism collection date was on 9/25/2019. Organisms were received by the laboratory on 9/27/2019.	
What was the water salinity and temperature at the time of collection? Water salinity at time of collection was 30 ppt. Organisms were acclimated at 25 ppt after collection and later, lab acclimated at 20ppt.	
Was site sediment collected for holding an acclimation purposes? Yes	
Additional Comments: Quality of test organisms and acclimation is deemed acceptable.	
Field Collection Sorting Methods	
Were healthy amphipods placed into 10 cm diameter finger bowls with 2 cm sieved site sediment and seawater of appropriate salinity? Yes, only healthy organisms were used for bioassay testing.	
Were organisms held for 2-10 days? Yes, organisms were held for 7 days.	
Was test sediment sieved through 2 mm sieve or forceps for predator removal? Yes	
Was control sediment sieved twice through 0.5 mm? Yes	
Did control sediment have a 4-hour settling period after each sieving? Yes	
Test Initiation	
Was salinity adjusted in all testing chambers? Yes	
Was overlying ammonia detected? All overlying water was screened for ammonia and results were ND <0.1 mg/L.	
Were there at least 5 replicates per sample? Yes	
Was there at least 20 animals per replicate? Yes	
Was the organism length between 3-5 mm during test initiation? Yes	
Was the overlying water volume 800 mL? Yes	
Were there any water quality adjustments? Yes, water quality measurements were collected during the duration of the test and are provided in the corresponding laboratory report.	
Test Implementation	
Photoperiod for 24 hours? Continuous light was provided.	
Was daily water quality monitoring conducted? Yes.	
What was the overlying daily temperature range (15°C)? The overlying daily temperature was between 14.6-14.8°C.	
Was the daily salinity range 20+/-1 ppt? Yes, salinity range 20ppt.	

Tesoro Refining & Marketing LLC Los Angeles Refinery - Carson Operations Dominguez Channel Estuary Chronic Toxicity QA/QC Bioassay Data Validation	
Was water renewal conducted? No, water remained static and was not renewed over the 10-day exposure period as required in the EPA method.	
Was the overlying daily pH between 7 – 8 standard units? Yes	
What was the overlying ammonia detection (ND)? All overlying water was screened for ammonia and results were ND <0.1 mg/L.	
Were appropriate test changes used (1-liter glass containers with 10 cm diameter)? Yes	
Was water in each test chamber aerated overnight before start and throughout the test? Yes	
Did the water maintain at least more than 90% saturation of dissolved oxygen concentration? Yes	
Test Results and Analysis	
Were the number of amphipods reported for each replicate? Yes	
Was the percent mortality reported for each replicate? Yes	
Was the sample mean for survival reported? Yes, the mean control survival was 98-100%	
QA/QC Samples	
Positive Control	*Negative Control*
Length of reference toxicity test? 96 hours	Negative control response above 90% acceptability criteria? Yes
What reference toxicant was used? Unionized Ammonia	Mean control survival? 99%
Exposure concentrations? Exposure ammonia concentrations were 15.6, 31.2, 62.5, 125.0, 250 mg/L	Did EC 50 fall within lab standards? Yes
Did EC 50 fall within lab standards? Yes	
MYTILUS GALLOPROVINCIALIS	
Completeness and Holding Conditions:	
Type of Samples Collected? Grab Sediment Samples	Number of Samples Analyzed: 3
Were samples maintained at 4°C and < 2 weeks in darkness? Yes	
Did chronic toxicity testing begin within 14 days of sample collection? Yes	
Holding conditions acceptable? Yes	
If holding conditions were not acceptable, explain: N/A	
Organism Collection and Acclimation:	
Who is the supplier of the test organisms? Carlsbad Aquafarms	
Are organisms field collected or cultured? Cultured	
Was there an even sex ratio of brood stock? Yes	
Were organisms maintained at 15°C? Yes	
Were organisms brushed to remove encrusting organisms? Yes, organisms were brushed and rinsed prior to entering spawning tanks.	

Tesoro Refining & Marketing LLC Los Angeles Refinery - Carson Operations Dominguez Channel Estuary Chronic Toxicity QA/QC Bioassay Data Validation
Test Initiation
Were at least 12 test organisms used per test? Testing was initiated using at least 200 fertilized embryo test organisms.
Was spawning successful within the first 30 minutes of beginning spawning process? Yes
If spawning was unsuccessful, were any stimulants (i.e.- algae) used to promote spawning? Not necessary, spawning was successful at test initiation.
Was temperature maintained at 20°C during spawning? Yes, temperature was decreased post spawning
Test Implementation
Was the photoperiod 16 hr. light/8 hr. darkness? Yes
Were appropriate 30 mL chamber used? Yes, for the reference toxicant. Screen tube were utilized for the sediment water interface.
Was initial water quality monitoring conducted? Yes
Did light intensity remain at ambient laboratory conditions? Yes
What was the temperature range of the water? The temperature of the water ranged between 14.7-14.8 degree Celsius
Did dissolved oxygen concentrations remain above 4 mg/l? Yes, dissolved oxygen ranged between 7.9-8.1 mg/L
Did salinity range 30 +/- 2 ppt? Salinity was maintained at 34 ppt
What reference toxicant was used? Unionized ammonia for a 48-hour period. Concentrations included 2.0, 4.0, 6.0, 8.0 and 10.0 ,mg/L
What were the concentrations used for the reference toxicant? Concentrations included 2.0, 4.0, 6.0, 8.0 and 10.0 ,mg/L
Test Results and Analysis
Did mussel embryos show 50% survival in control vials? Yes
Did mussels show 90% normal shell development in surviving controls? Yes
QA/QC Samples
Was a percent MSD of <25% demonstrated? Yes

Dominguez Channel Estuary
December 2019
Sediment Monitoring Report

Prepared for:
Tesoro Refining & Marketing Company LLC
Los Angeles Refinery – Carson Operations
1801 East Sepulveda Boulevard
Carson, CA 90745

Prepared by:
WGR Southwest, Inc.
11021 Winners Circle, Suite 101
Los Alamitos, CA 90720

Date:
January 20, 2020

TESORO REFINING & MARKETING COMPANY LLC
LOS ANGELES REFINERY – CARSON OPERATIONS
DOMINGUEZ CHANNEL ESTUARY SEDIMENT MONITORING REPORT 2019

TABLE OF CONTENTS

TABLES

FIGURES

ATTACHMENTS

1.0 Introduction

On behalf of Tesoro Refining & Marketing Company LLC Los Angeles Refinery – Carson Operations (Tesoro LAR Carson), WGR Southwest, Inc. (WGR) conducted sediment monitoring of the Dominguez Channel Estuary in accordance with National Pollutant Discharge Elimination System Waste Discharge Requirements Permit Number CA0000680 Order Number R4-2015-0259 (WDR Permit). As required in Table E-7 of WDR Permit Attachment E, Monitoring and Reporting Program Number 5424 (MRP No. 5424), sediment monitoring is required at least once a year for all parameters and at least twice a year for Chronic Toxicity regardless of Tesoro LAR Carson discharge associated with the WDR Permit[1]. Therefore, this report constitutes sediment monitoring for the second event of 2019, where the sediment samples collected were analyzed for Chronic Toxicity and required monitoring (i.e. field observations and field analyses) was completed.

2.0 Sediment Monitoring

As shown in Figure 1, the WDR Permit designates seven sediment monitoring locations: SED-001, SED-002, SED-003, SED-004, SED-005, SED-006, and SED-007. WGR field personnel utilized an Ekman dredge and a Horiba U-50 Series Multi-Parameter Meter. According to historic Tesoro LAR Carson Sediment Monitoring Reports, samplers have been unable to collect sediment samples from SED-001 since 2003, SED-002 since 2003, SED-003 since 2009, SED-004 since 2009, and have only infrequently been able to collect sediment samples from SED-005 since 2009.

Sediment monitoring was attempted at all designated sediment monitoring locations on December 16, 2019. As detailed in the field logs (see Attachment 1), sediment samples and associated monitoring could only be feasibly completed at three of the seven sediment monitoring locations. Table 2.0 provides a summary of the field observations and analyses.

Table 2.0: Sediment Monitoring Field Observation and Analyses

Sample ID	Field Observations			Field Analyses[1]					
	Sediment Description	Biological Matter	Pollutants	pH (SU)	Temperature (°C)	DO (mg/L)	SC (mS/Cm)	Turbidity (NTU)	Flow
SED-001	Not Sampled	Not Sampled	Not Sampled	--	--	--	--	--	--
SED-002	Not Sampled	Not Sampled	Not Sampled	--	--	--	--	--	--
SED-003	Not Sampled	Not Sampled	Not Sampled	--	--	--	--	--	--

[1] Tesoro LAR Carson did not discharge under the WDR Permit during the 2019 calendar year.

Table 2.0: Sediment Monitoring Field Observation and Analyses									
Sample ID	Field Observations			Field Analyses[1]					
	Sediment Description	Biological Matter	Pollutants	pH (SU)	Temperature (°C)	DO (mg/L)	SC (mS/Cm)	Turbidity (NTU)	Flow
SED-004	Not Sampled	Not Sampled	Not Sampled	--	--	--	--	--	--
SED-005	Dark in color and some biological odor	Substantial debris	Trash present	7.55	18.07	8.09	34.1	0.0	--
SED-006	Dark in color and moderate biological odor; limited sediment available for collection	Debris present	No trash present	7.33	15.92	2.62	32.1	0.5	--
SED-007	Dark color and strong biological odor	Leaves present	Trash present	6.14	15.14	11.97	9.67	104	--

DO: Dissolved Oxygen

SC: Specific Conductance

[1] Due to field sampling error, field analyses for salinity were not conducted during this sampling event. Field analyses for temperature are submitted in place of salinity within this report. Field sampling personnel have implemented corrective actions to ensure salinity field analyses are conducted for all future sampling events.

3.0 Laboratory Results

Table 2.0 summarizes the field observations and analyses for the December 2019 sediment monitoring event. Laboratory results are summarized in Attachment 2. The Aquatic Bioassay laboratory report is in Attachment 3. A data validation report for this laboratory analytical report is in Attachment 4.

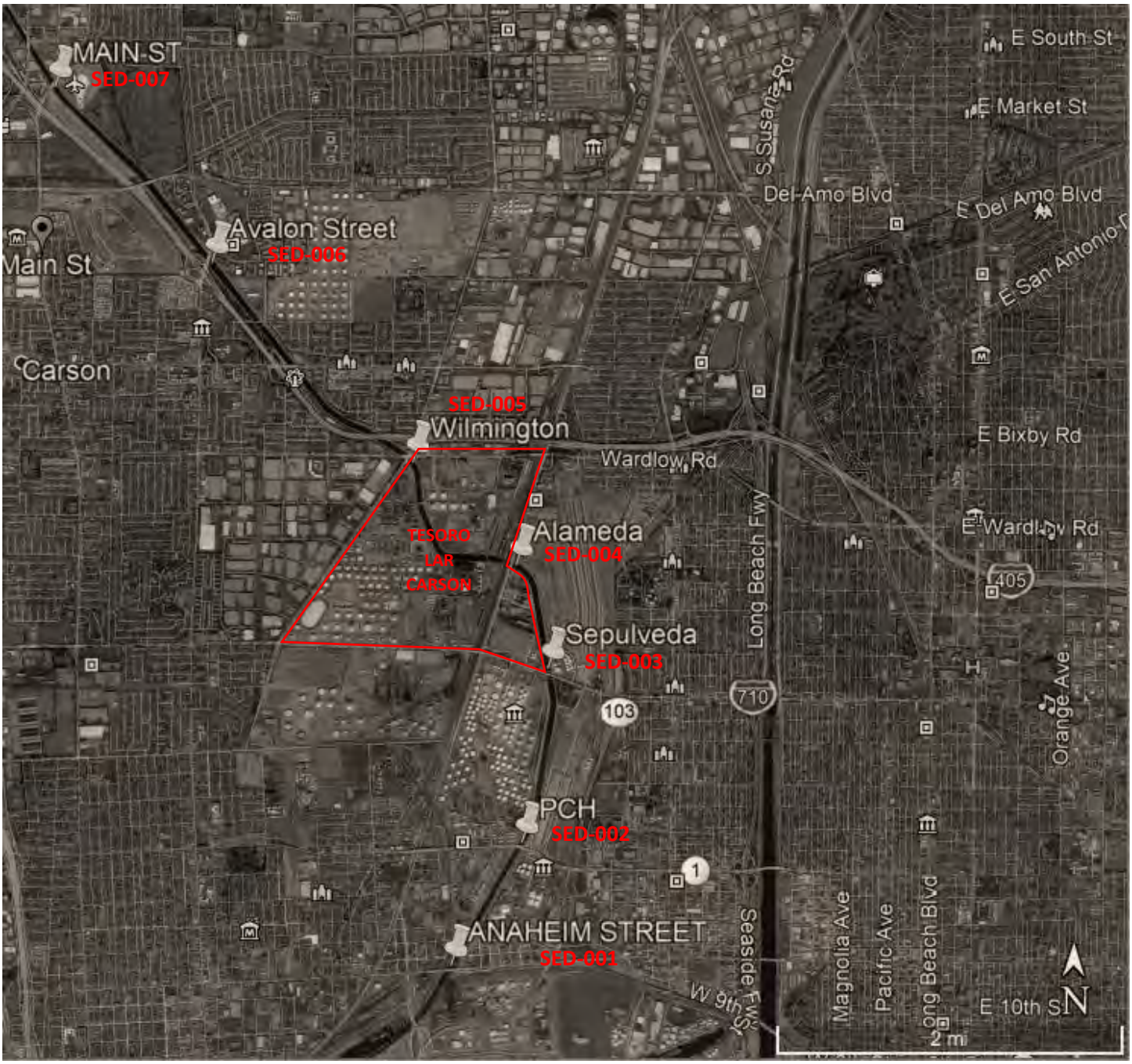
4.0 Executive Summary

Receiving water sediment monitoring and analysis was conducted independent of any discharge from Tesoro LAR Carson. Pollutant concentrations demonstrated in this report are not associated with any contribution from Tesoro LAR Carson to the receiving water. There are no pollutant concentration limits associated with this type of sampling as prescribed by the WDR Permit. Receiving water sediment monitoring and analysis was completed in compliance with the WDR Permit Attachment E, MRP No. 5424. As noted in the Sediment Bioassay Data Validation Report included in Attachment 4, analytical data obtained for this sampling event was deemed acceptable. No instances of non-compliance were identified.

FIGURE 1

DOMINGUEZ CHANNEL ESTUARY
SEDIMENT MONITORING LOCATIONS

Figure 1: Dominguez Channel Estuary Sediment Monitoring Locations



ATTACHMENT 1

SEDIMENT MONITORING
FIELD LOGS

WGR Southwest, Inc. Field Log		Page 1 of 2 Date:
Project Name: LARC Sediment Sampling	Field Personnel: Joseph Rodriguez	
Project Number: 021.APC.01	Field Personnel: Dave Montelongo	
Field Conditions/Project Discrepancies:		

Time	Field Notes
0700	- Gathered supplies @ WGR office. Tested Horiba meter, batteries died, replaced with backups.
0930	- Arrived at SED-007 water is flowing down stream. Substantial trash visible in channel. 11/12
	• 2'6" to bottom of sample point from Top of water
	• 22'7" from Top of bridge to Top of water (108 to center of bridge)
	• 5 Pulls with Dredge from SE side of bridge
	• Horiba meter photo taken
	• Sample had leaves & debris mixed with sediment
1057	- Arrived to SED-006. water flowing down stream.
	• 121 to center of bridge
	• 22'7" to water from top of Bridge
	• Bridge has Rod from fence, placed dredge over.
	• 18'4" to bottom of channel
	• Sediment contains substantial debris
	• Southeast side of bridge
	• 5 pulls from Dredge
	• Horiba Readings ✓
[redacted]	[redacted]
1145	Lunch
1215	- Arrived at SED-005
	• 113 ft to center of Bridge
	• NW corner of Bridge (SW corner was closed to ~~east~~ traffic due to construction
	• 20'8" to top of water from Bridge
	• water dirty with debris & flowing ~~down~~ downstream
	• First 2 pulls recovered small amount of trash & sediment < 20z, will continue to try
	• 15'3" from top of water to bottom

WGR Southwest, Inc. Field Log		Page 2 of 2
		Date:
Project Name: LARC Sediment Sampling	Field Personnel: Joseph Rodriguez	
Project Number: 021.APC.01	Field Personnel: Dave Montelongo	
Field Conditions/Project Discrepancies:		

Time	Field Notes
1240	• After 3 attempts, moved ~~her~~ 10ft, to the west
1~~2~~8	• Attempted 8 more drops with dredge only recovered 1/2 a gallon bag made choice to secure 1/2 gallon & take back to office
1315	- Arrived at SED-004, Sampled @ East side
	• water flowing downward
	• 95 feet to center of bridge
	• 19' 9" from top of bridge to top of water, 30'3 inches to bottom
	• 1st attempt was a few leaves
	• 2nd, 3rd attempt recovered more leaves
	• moved North 10ft, sampled 2 more times with no sediment recovered, packed equipment and moved [redacted] on to SED-003
1340	- Arrived at SED-003
	• 96' 4" to center of Bridge/sample point
	• 19' 5" to top of water, 13 feet to bottom from top of water
	• water flow is downward
	• first 4 attempts not [redacted] successful
	• Tried 2 more times and not successful
	• Packed equipment to move onto next point
1408	- Arrived at SED-002, bridge not accessible because of 10-12 foot Fence
1420	- • 55 feet to top of water line
SED-001 →	31 feet to bottom from top of water
	• water flowing ~~[redacted]~~ downward
	measured 68 ft from RR tracks to sample (Eastward)
	• After 3 attempts packed up equipment
	• Samples attempted @ North end of Bridge

ATTACHMENT 2

SEDIMENT MONITORING
LABORATORY RESULT SUMMARY TABLE

Sample ID	SED-001	SED-002	SED-003	SED-004	SED-005	SED-006	SED-007
Date Sampled	NS	NS	NS	NS	12/16/2019	12/16/2019	12/16/2019
Time Sampled	NS	NS	NS	NS	13:00	11:42	10:36
Total Metals							
Cadmium (EPA 6020) (mg/Kg)	NS	NS	NS	NS	NR	NR	NR
Chromium (EPA 6020) (mg/Kg)	NS	NS	NS	NS	NR	NR	NR
Copper (EPA 6020) (mg/Kg)	NS	NS	NS	NS	NR	NR	NR
Lead (EPA 6020) (mg/Kg)	NS	NS	NS	NS	NR	NR	NR
Nickel (EPA 6020) (mg/Kg)	NS	NS	NS	NS	NR	NR	NR
Zinc (EPA 6020) (mg/Kg)	NS	NS	NS	NS	NR	NR	NR
Mercury (EPA 7471A) (mg/Kg)	NS	NS	NS	NS	NR	NR	NR
Volatile/Semi-Volatile Organic Compounds							
Chlordane (EPA 8081A) (ug/Kg)	NS	NS	NS	NS	NR	NR	NR
DDT (EPA 8081A) (ug/Kg, sum of 4,4'-DDT, 2,4'-DDT, 4,4'-DDE, 2,4'-DDE, 4,4'-DDD, and 2,4'-DDD)	NS	NS	NS	NS	NR	NR	NR
PCBs (EPA 8082) (ug/Kg, sum of Arochlor 1016, Arochlor 1221, Arochlor 1232, Arochlor 1242, Arochlor 1248, Arochlor 1254, and Arochlor 1260)	NS	NS	NS	NS	NR	NR	NR
PAHs (EPA 8270C) (mg/Kg, sum of acenaphthene, anthracene, 1,2-benzanthracene, 3,4-benzofluoranthene, benzo(k)fluoranthene, 1,12-benzoperylene, benzo(a)pyrene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, and pyrene)	NS	NS	NS	NS	NR	NR	NR
Total Petroleum Hydrocarbons (EPA 8015B) (mg/Kg)	NS	NS	NS	NS	NR	NR	NR
Sediment Grain Size (ASTM D4464)	NR						
Total Organic Carbon (EPA 9060A) (mg/Kg)	NS	NS	NS	NS	NR	NR	NR
Tributyltin (Krone et al.) (ug/Kg)	NS	NS	NS	NS	NR	NR	NR
Chronic Toxicity							
Eohaustorius estuarius (NOEC in mg/L)	NS	NS	NS	NS	100%	100%	100%
Mytilus galloprovincialis (NOEC in mg/L)	NS	NS	NS	NS	100%	100%	100%

NS = Not Sampled
NR = Not Required
ND = Non-Detect
NOEC = No Observed Effect Concentration

ATTACHMENT 3

SEDIMENT MONITORING
AQUATIC BIOASSAY
ANALYTICAL LABORATORY REPORT

aquatic bioassay & consulting laboratories, inc

January 17, 2020

Amber Ballrot
WGR Southwest, Inc.
1801 E. Sepulveda Blvd.
Carson, CA 90749

Dear Mrs.Ballrot:

We are pleased to present the enclosed bioassay report. The test was conducted under guidelines prescribed in *Methods for Assessing the Toxicity of Sediment-associated Contaminants with Estuarine and Marine Amphipods, Method EPA/600/R-94/025.* Results were as follows:

CLIENT:	WGR Southwest, Inc.
SAMPLE I.D.:	SED-005
DATE RECEIVED:	12/17/2019
ABC LAB. NO.:	WGR1219.165

ACUTE EOHAUSTORIUS SURVIVAL BIOASSAY

NOEC	=	100.00 %
TUc	=	1.00
EC25	=	>100.00 %
EC50	=	>100.00 %

Yours very truly,

Scott Johnson
Laboratory Director

CETIS Summary Report

Eohaustorius 10-d Survival and Reburial Sediment Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	18-1980-2178	**Test Type:**	Survival-Reburial	**Analyst:**	Joe Freas
Start Date:	18 Dec-19 12:30	**Protocol:**	EPA/600/R-94/025 (1994)	**Diluent:**	Laboratory Seawater
Ending Date:	28 Dec-19 12:30	**Species:**	Eohaustorius estuarius	**Brine:**	Not Applicable
Test Length:	10d 0h	**Taxon:**	Malacostraca	**Source:**	Northwestern Aquatic Scienc **Age:**
Sample ID:	21-0045-7029	**Code:**	WGR1219.165e	**Project:**	021.APC.01
Sample Date:	16 Dec-19 13:00	**Material:**	Sediment	**Source:**	Bioassay Report
Receipt Date:	17 Dec-19 11:30	**CAS (PC):**		**Station:**	SED-005
Sample Age:	48h	**Client:**	WGR Southwest Inc.		

Single Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result	S
08-6987-1074	Survival Rate	Wilcoxon Rank Sum Two-Sample Test	0.7778	100% passed survival rate	1

Test Acceptability

				TAC Limits			
Analysis ID	**Endpoint**	**Attribute**	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
08-6987-1074	Survival Rate	Control Resp	0.99	0.9	>>	Yes	Passes Criteria

Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	5	0.9900	0.9622	1.0000	0.9500	1.0000	0.0100	0.0224	2.26%	0.00%
100		5	0.9900	0.9622	1.0000	0.9500	1.0000	0.0100	0.0224	2.26%	0.00%

Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	0.9500	1.0000	1.0000	1.0000	1.0000
100		1.0000	1.0000	0.9500	1.0000	1.0000

Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	19/20	20/20	20/20	20/20	20/20
100		20/20	20/20	19/20	20/20	20/20

Eohaustorius 10-d Survival and Reburial Sediment Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	08-6987-1074	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	17 Jan-20 10:33	**Analysis:**	Nonparametric-Two Sample	**Status Level:**	1
Batch ID:	18-1980-2178	**Test Type:**	Survival-Reburial	**Analyst:**	Joe Freas
Start Date:	18 Dec-19 12:30	**Protocol:**	EPA/600/R-94/025 (1994)	**Diluent:**	Laboratory Seawater
Ending Date:	28 Dec-19 12:30	**Species:**	Eohaustorius estuarius	**Brine:**	Not Applicable
Test Length:	10d 0h	**Taxon:**	Malacostraca	**Source:**	Northwestern Aquatic Scienc **Age:**
Sample ID:	21-0045-7029	**Code:**	WGR1219.165e	**Project:**	021.APC.01
Sample Date:	16 Dec-19 13:00	**Material:**	Sediment	**Source:**	Bioassay Report
Receipt Date:	17 Dec-19 11:30	**CAS (PC):**		**Station:**	SED-005
Sample Age:	48h	**Client:**	WGR Southwest Inc.		

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	100% passed survival rate	2.76%

Wilcoxon Rank Sum Two-Sample Test

Control	vs	Conc-%	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Negative Control		100	27.5	n/a	2	8	Exact	0.7778	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.99	0.9	>>	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0	0	1	0	1.0000	Non-Significant Effect
Error	0.0206028	0.0025754	8			
Total	0.0206028		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Levene Equality of Variance Test	0	11.26	1.0000	Equal Variances
	Mod Levene Equality of Variance Test	0	13.75	1.0000	Equal Variances
	Variance Ratio F Test	1	23.15	1.0000	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	2.912	3.878	<1.0E-37	Non-Normal Distribution
	D'Agostino Skewness Test	2.495	2.576	0.0126	Normal Distribution
	Kolmogorov-Smirnov D Test	0.4824	0.3025	2.2E-07	Non-Normal Distribution
	Shapiro-Wilk W Normality Test	0.5093	0.7411	4.7E-06	Non-Normal Distribution

Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	5	0.9900	0.9622	1.0000	1.0000	0.9500	1.0000	0.0100	2.26%	0.00%
100		5	0.9900	0.9622	1.0000	1.0000	0.9500	1.0000	0.0100	2.26%	0.00%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	5	1.436	1.373	1.499	1.459	1.345	1.459	0.02269	3.53%	0.00%
100		5	1.436	1.373	1.499	1.459	1.345	1.459	0.02269	3.53%	0.00%

Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	0.9500	1.0000	1.0000	1.0000	1.0000
100		1.0000	1.0000	0.9500	1.0000	1.0000

Angular (Corrected) Transformed Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	1.345	1.459	1.459	1.459	1.459
100		1.459	1.459	1.345	1.459	1.459

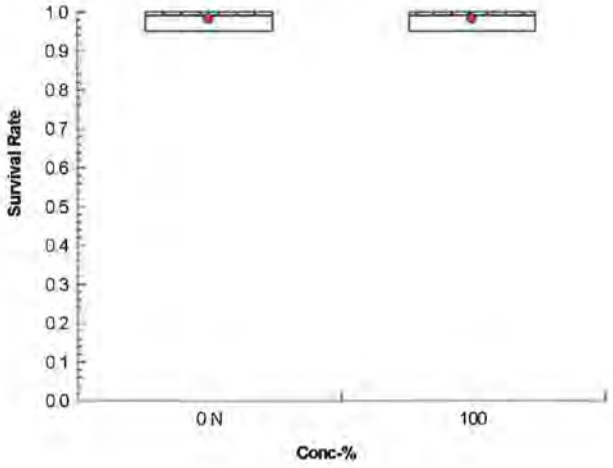
Eohaustorius 10-d Survival and Reburial Sediment Test — **Aquatic Bioassay & Consulting Labs, Inc.**

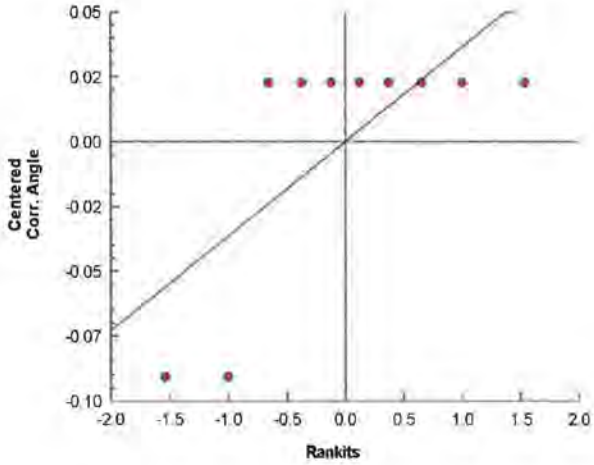
Analysis ID:	08-6987-1074	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	17 Jan-20 10:33	**Analysis:**	Nonparametric-Two Sample	**Status Level:**	1

Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	19/20	20/20	20/20	20/20	20/20
100		20/20	20/20	19/20	20/20	20/20

Graphics





Eohaustorius 10-d Survival and Reburial Sediment Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	18-1980-2178	**Test Type:**	Survival-Reburial	**Analyst:**	Joe Freas
Start Date:	18 Dec-19 12:30	**Protocol:**	EPA/600/R-94/025 (1994)	**Diluent:**	Laboratory Seawater
Ending Date:	28 Dec-19 12:30	**Species:**	Eohaustorius estuarius	**Brine:**	Not Applicable
Test Length:	10d 0h	**Taxon:**	Malacostraca	**Source:**	Northwestern Aquatic Scienc **Age:**

Sample ID:	21-0045-7029	**Code:**	WGR1219.165e	**Project:**	021.APC.01
Sample Date:	16 Dec-19 13:00	**Material:**	Sediment	**Source:**	Bioassay Report
Receipt Date:	17 Dec-19 11:30	**CAS (PC):**		**Station:**	SED-005
Sample Age:	48h	**Client:**	WGR Southwest Inc.		

Dissolved Oxygen-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	10.05	9.415	10.69	10	10.1	0.05001	0.07073	0.7%	0
100		2	10.1	10.08	10.12	10.1	10.1	0	0	0.0%	0
Overall		4	10.08	9.995	10.15	10	10.1	0.025	0.05	0.50%	0 (0%)

pH-Units

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
100		2	8.05	7.415	8.685	8	8.1	0.05001	0.07073	0.88%	0
Overall		4	7.975	7.823	8.127	7.9	8.1	0.04787	0.09574	1.20%	0 (0%)

Salinity-ppt

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	20	20	20	20	20	0	0	0.0%	0
100		2	20	20	20	20	20	0	0	0.0%	0
Overall		4	20	20	20	20	20	0	0	0.00%	0 (0%)

Temperature-°C

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	14.7	13.43	15.97	14.6	14.8	0.09999	0.1414	0.96%	0
100		2	14.7	13.43	15.97	14.6	14.8	0.09999	0.1414	0.96%	0
Overall		4	14.7	14.52	14.88	14.6	14.8	0.05773	0.1155	0.79%	0 (0%)

Eohaustorius 10-d Survival and Reburial Sediment Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Dissolved Oxygen-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		10.1					
100				10.1					
0	N	2		10					
100				10.1					

pH-Units

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		7.9					
100				8.1					
0	N	2		7.9					
100				8					

Salinity-ppt

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		20					
100				20					
0	N	2		20					
100				20					

Temperature-°C

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		14.8					
100				14.8					
0	N	2		14.6					
100				14.6					

aquatic bioassay & consulting laboratories, inc

January 17, 2020

Amber Ballrot
WGR Southwest, Inc.
1801 E. Sepulveda Blvd.
Carson, CA 90749

Dear Mrs.Ballrot:

We are pleased to present the enclosed bioassay report. The test was conducted under guidelines prescribed in *Methods for Assessing the Toxicity of Sediment-associated Contaminants with Estuarine and Marine Amphipods, Method EPA/600/R-94/025.* Results were as follows:

CLIENT:	WGR Southwest, Inc.
SAMPLE I.D.:	SED-006
DATE RECEIVED:	12/17/2019
ABC LAB. NO.:	WGR1219.166

ACUTE EOHAUSTORIUS SURVIVAL BIOASSAY

NOEC	=	100.00 %
TUc	=	1.00
EC25	=	>100.00 %
EC50	=	>100.00 %

Yours very truly,

Scott Johnson
Laboratory Director

CETIS Summary Report

Eohaustorius 10-d Survival and Reburial Sediment Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	02-6590-7584	**Test Type:**	Survival-Reburial	**Analyst:**	Joe Freas
Start Date:	18 Dec-19 12:31	**Protocol:**	EPA/600/R-94/025 (1994)	**Diluent:**	Laboratory Seawater
Ending Date:	28 Dec-19 12:31	**Species:**	Eohaustorius estuarius	**Brine:**	Not Applicable
Test Length:	10d 0h	**Taxon:**	Malacostraca	**Source:**	Northwestern Aquatic Scienc **Age:**
Sample ID:	08-9186-2121	**Code:**	WGR1219.166e	**Project:**	021.APC.01
Sample Date:	16 Dec-19 11:42	**Material:**	Sediment	**Source:**	Bioassay Report
Receipt Date:	17 Dec-19 11:30	**CAS (PC):**		**Station:**	SED-006
Sample Age:	49h	**Client:**	WGR Southwest Inc.		

Single Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result	S
07-0635-0603	Survival Rate	Wilcoxon Rank Sum Two-Sample Test	1.0000	100% passed survival rate	1

Test Acceptability

				TAC Limits			
Analysis ID	**Endpoint**	**Attribute**	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
07-0635-0603	Survival Rate	Control Resp	0.99	0.9	>>	Yes	Passes Criteria

Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	5	0.9900	0.9622	1.0000	0.9500	1.0000	0.0100	0.0224	2.26%	0.00%
100		5	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	-1.01%

Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	0.9500	1.0000	1.0000	1.0000	1.0000
100		1.0000	1.0000	1.0000	1.0000	1.0000

Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	19/20	20/20	20/20	20/20	20/20
100		20/20	20/20	20/20	20/20	20/20

Eohaustorius 10-d Survival and Reburial Sediment Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	07-0635-0603	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	17 Jan-20 10:39	**Analysis:**	Nonparametric-Two Sample	**Status Level:**	1
Batch ID:	02-6590-7584	**Test Type:**	Survival-Reburial	**Analyst:**	Joe Freas
Start Date:	18 Dec-19 12:31	**Protocol:**	EPA/600/R-94/025 (1994)	**Diluent:**	Laboratory Seawater
Ending Date:	28 Dec-19 12:31	**Species:**	Eohaustorius estuarius	**Brine:**	Not Applicable
Test Length:	10d 0h	**Taxon:**	Malacostraca	**Source:**	Northwestern Aquatic Scienc **Age:**
Sample ID:	08-9186-2121	**Code:**	WGR1219.166e	**Project:**	021.APC.01
Sample Date:	16 Dec-19 11:42	**Material:**	Sediment	**Source:**	Bioassay Report
Receipt Date:	17 Dec-19 11:30	**CAS (PC):**		**Station:**	SED-006
Sample Age:	49h	**Client:**	WGR Southwest Inc.		

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	100% passed survival rate	2.12%

Wilcoxon Rank Sum Two-Sample Test

Control	vs	Conc-%	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Negative Control		100	30	n/a	1	8	Exact	1.0000	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.99	0.9	>>	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0012877	0.0012877	1	1	0.3466	Non-Significant Effect
Error	0.0103014	0.0012877	8			
Total	0.0115891		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Levene Equality of Variance Test	7.111	11.26	0.0285	Equal Variances
	Mod Levene Equality of Variance Test	1	13.75	0.3559	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	1.796	3.878	<1.0E-37	Non-Normal Distribution
	D'Agostino Skewness Test	3.335	2.576	8.5E-04	Non-Normal Distribution
	Kolmogorov-Smirnov D Test	0.4	0.3025	6.1E-05	Non-Normal Distribution
	Shapiro-Wilk W Normality Test	0.6247	0.7411	1.1E-04	Non-Normal Distribution

Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	5	0.9900	0.9622	1.0000		0.9500	1.0000	0.0100	2.26%	0.00%
100		5	1.0000	1.0000	1.0000		1.0000	1.0000	0.0000	0.00%	-1.01%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	5	1.436	1.373	1.499		1.345	1.459	0.02269	3.53%	0.00%
100		5	1.459	1.458	1.459		1.459	1.459	0	0.00%	-1.58%

Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	0.9500	1.0000	1.0000	1.0000	1.0000
100		1.0000	1.0000	1.0000	1.0000	1.0000

Angular (Corrected) Transformed Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	1.345	1.459	1.459	1.459	1.459
100		1.459	1.459	1.459	1.459	1.459

Eohaustorius 10-d Survival and Reburial Sediment Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	07-0635-0603	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	17 Jan-20 10:39	**Analysis:**	Nonparametric-Two Sample	**Status Level:**	1

Eohaustorius 10-d Survival and Reburial Sediment Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	02-6590-7584	**Test Type:**	Survival-Reburial	**Analyst:**	Joe Freas
Start Date:	18 Dec-19 12:31	**Protocol:**	EPA/600/R-94/025 (1994)	**Diluent:**	Laboratory Seawater
Ending Date:	28 Dec-19 12:31	**Species:**	Eohaustorius estuarius	**Brine:**	Not Applicable
Test Length:	10d 0h	**Taxon:**	Malacostraca	**Source:**	Northwestern Aquatic Scienc **Age:**

Sample ID:	08-9186-2121	**Code:**	WGR1219.166e	**Project:**	021.APC.01
Sample Date:	16 Dec-19 11:42	**Material:**	Sediment	**Source:**	Bioassay Report
Receipt Date:	17 Dec-19 11:30	**CAS (PC):**		**Station:**	SED-006
Sample Age:	49h	**Client:**	WGR Southwest Inc.		

Dissolved Oxygen-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	10.05	9.415	10.69	10	10.1	0.05001	0.07073	0.7%	0
100		2	10.15	9.515	10.79	10.1	10.2	0.05	0.0707	0.7%	0
Overall		4	10.1	9.97	10.23	10	10.2	0.04082	0.08165	0.81%	0 (0%)

pH-Units

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
100		2	7.85	7.215	8.485	7.8	7.9	0.05	0.07071	0.9%	0
Overall		4	7.875	7.795	7.955	7.8	7.9	0.025	0.05	0.63%	0 (0%)

Salinity-ppt

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	20	20	20	20	20	0	0	0.0%	0
100		2	20	20	20	20	20	0	0	0.0%	0
Overall		4	20	20	20	20	20	0	0	0.00%	0 (0%)

Temperature-°C

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	14.7	13.43	15.97	14.6	14.8	0.09999	0.1414	0.96%	0
100		2	14.7	13.43	15.97	14.6	14.8	0.09999	0.1414	0.96%	0
Overall		4	14.7	14.52	14.88	14.6	14.8	0.05773	0.1155	0.79%	0 (0%)

Eohaustorius 10-d Survival and Reburial Sediment Test — Aquatic Bioassay & Consulting Labs, Inc.

Dissolved Oxygen-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		10.1					
100				10.2					
0	N	2		10					
100				10.1					

pH-Units

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		7.9					
100				7.9					
0	N	2		7.9					
100				7.8					

Salinity-ppt

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		20					
100				20					
0	N	2		20					
100				20					

Temperature-°C

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		14.8					
100				14.8					
0	N	2		14.6					
100				14.6					

aquatic bioassay & consulting laboratories, inc

January 17, 2020

Amber Ballrot
WGR Southwest, Inc.
1801 E. Sepulveda Blvd.
Carson, CA 90749

Dear Mrs.Ballrot:

We are pleased to present the enclosed bioassay report. The test was conducted under guidelines prescribed in *Methods for Assessing the Toxicity of Sediment-associated Contaminants with Estuarine and Marine Amphipods, Method EPA/600/R-94/025.* Results were as follows:

CLIENT:	WGR Southwest, Inc.
SAMPLE I.D.:	SED-007
DATE RECEIVED:	12/17/2019
ABC LAB. NO.:	WGR1219.167

ACUTE EOHAUSTORIUS SURVIVAL BIOASSAY

NOEC	=	100.00 %
TUc	=	1.00
EC25	=	>100.00 %
EC50	=	>100.00 %

Yours very truly,

Scott Johnson
Laboratory Director

CETIS Summary Report

Eohaustorius 10-d Survival and Reburial Sediment Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	07-9448-1575	**Test Type:**	Survival-Reburial	**Analyst:**	Joe Freas
Start Date:	18 Dec-19 12:32	**Protocol:**	EPA/600/R-94/025 (1994)	**Diluent:**	Laboratory Seawater
Ending Date:	28 Dec-19 12:32	**Species:**	Eohaustorius estuarius	**Brine:**	Not Applicable
Test Length:	10d 0h	**Taxon:**	Malacostraca	**Source:**	Northwestern Aquatic Scienc **Age:**
Sample ID:	05-0762-1617	**Code:**	WGR1219.167e	**Project:**	021.APC.01
Sample Date:	16 Dec-19 10:36	**Material:**	Sediment	**Source:**	Bioassay Report
Receipt Date:	17 Dec-19 11:30	**CAS (PC):**		**Station:**	SED-007
Sample Age:	50h	**Client:**	WGR Southwest Inc.		

Single Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result	S
02-8789-2065	Survival Rate	Wilcoxon Rank Sum Two-Sample Test	0.5000	100% passed survival rate	1

Test Acceptability

				TAC Limits			
Analysis ID	**Endpoint**	**Attribute**	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
02-8789-2065	Survival Rate	Control Resp	0.99	0.9	>>	Yes	Passes Criteria

Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	5	0.9900	0.9622	1.0000	0.9500	1.0000	0.0100	0.0224	2.26%	0.00%
100		5	0.9800	0.9460	1.0000	0.9500	1.0000	0.0123	0.0274	2.79%	1.01%

Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	0.9500	1.0000	1.0000	1.0000	1.0000
100		0.9500	0.9500	1.0000	1.0000	1.0000

Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	19/20	20/20	20/20	20/20	20/20
100		19/20	19/20	20/20	20/20	20/20

Eohaustorius 10-d Survival and Reburial Sediment Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Analysis ID:	02-8789-2065	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	17 Jan-20 10:42	**Analysis:**	Nonparametric-Two Sample	**Status Level:**	1
Batch ID:	07-9448-1575	**Test Type:**	Survival-Reburial	**Analyst:**	Joe Freas
Start Date:	18 Dec-19 12:32	**Protocol:**	EPA/600/R-94/025 (1994)	**Diluent:**	Laboratory Seawater
Ending Date:	28 Dec-19 12:32	**Species:**	Eohaustorius estuarius	**Brine:**	Not Applicable
Test Length:	10d 0h	**Taxon:**	Malacostraca	**Source:**	Northwestern Aquatic Scienc **Age:**
Sample ID:	05-0762-1617	**Code:**	WGR1219.167e	**Project:**	021.APC.01
Sample Date:	16 Dec-19 10:36	**Material:**	Sediment	**Source:**	Bioassay Report
Receipt Date:	17 Dec-19 11:30	**CAS (PC):**		**Station:**	SED-007
Sample Age:	50h	**Client:**	WGR Southwest Inc.		

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	100% passed survival rate	3.03%

Wilcoxon Rank Sum Two-Sample Test

Control	vs	Conc-%	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Negative Control		100	25	n/a	2	8	Exact	0.5000	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	0.99	0.9	>>	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0012877	0.0012877	1	0.4	0.5447	Non-Significant Effect
Error	0.0257535	0.0032192	8			
Total	0.0270412		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Levene Equality of Variance Test	1.524	11.26	0.2521	Equal Variances
	Mod Levene Equality of Variance Test	0.4286	13.75	0.5370	Equal Variances
	Variance Ratio F Test	1.5	23.15	0.7040	Equal Variances
Distribution	Anderson-Darling A2 Normality Test	1.329	3.878	0.0014	Non-Normal Distribution
	D'Agostino Skewness Test	1.407	2.576	0.1594	Normal Distribution
	Kolmogorov-Smirnov D Test	0.3643	0.3025	4.8E-04	Non-Normal Distribution
	Shapiro-Wilk W Normality Test	0.7586	0.7411	0.0045	Non-Normal Distribution

Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	5	0.9900	0.9622	1.0000		0.9500	1.0000	0.0100	2.26%	0.00%
100		5	0.9800	0.9460	1.0000		0.9500	1.0000	0.0123	2.79%	1.01%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	N	5	1.436	1.373	1.499		1.345	1.459	0.02269	3.53%	0.00%
100		5	1.413	1.336	1.491		1.345	1.459	0.0278	4.40%	1.58%

Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	0.9500	1.0000	1.0000	1.0000	1.0000
100		0.9500	0.9500	1.0000	1.0000	1.0000

Angular (Corrected) Transformed Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	N	1.345	1.459	1.459	1.459	1.459
100		1.345	1.345	1.459	1.459	1.459

Analysis ID:	02-8789-2065	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv1.9.5
Analyzed:	17 Jan-20 10:42	**Analysis:**	Nonparametric-Two Sample	**Status Level:**	1

Eohaustorius 10-d Survival and Reburial Sediment Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Batch ID:	07-9448-1575	**Test Type:**	Survival-Reburial	**Analyst:**	Joe Freas
Start Date:	18 Dec-19 12:32	**Protocol:**	EPA/600/R-94/025 (1994)	**Diluent:**	Laboratory Seawater
Ending Date:	28 Dec-19 12:32	**Species:**	Eohaustorius estuarius	**Brine:**	Not Applicable
Test Length:	10d 0h	**Taxon:**	Malacostraca	**Source:**	Northwestern Aquatic Scienc **Age:**

Sample ID:	05-0762-1617	**Code:**	WGR1219.167e	**Project:**	021.APC.01
Sample Date:	16 Dec-19 10:36	**Material:**	Sediment	**Source:**	Bioassay Report
Receipt Date:	17 Dec-19 11:30	**CAS (PC):**		**Station:**	SED-007
Sample Age:	50h	**Client:**	WGR Southwest Inc.		

Dissolved Oxygen-mg/L

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	10.05	9.415	10.69	10	10.1	0.05001	0.07073	0.7%	0
100		2	10.15	9.515	10.79	10.1	10.2	0.05	0.0707	0.7%	0
Overall		4	10.1	9.97	10.23	10	10.2	0.04082	0.08165	0.81%	0 (0%)

pH-Units

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	7.9	7.884	7.916	7.9	7.9	0	0	0.0%	0
100		2	8.05	7.415	8.685	8	8.1	0.05001	0.07073	0.88%	0
Overall		4	7.975	7.823	8.127	7.9	8.1	0.04787	0.09574	1.20%	0 (0%)

Salinity-ppt

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	20	20	20	20	20	0	0	0.0%	0
100		2	20	20	20	20	20	0	0	0.0%	0
Overall		4	20	20	20	20	20	0	0	0.00%	0 (0%)

Temperature-°C

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	2	14.7	13.43	15.97	14.6	14.8	0.09999	0.1414	0.96%	0
100		2	14.7	13.43	15.97	14.6	14.8	0.09999	0.1414	0.96%	0
Overall		4	14.7	14.52	14.88	14.6	14.8	0.05773	0.1155	0.79%	0 (0%)

Eohaustorius 10-d Survival and Reburial Sediment Test — **Aquatic Bioassay & Consulting Labs, Inc.**

Dissolved Oxygen-mg/L

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		10.1					
100				10.1					
0	N	2		10					
100				10.2					

pH-Units

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		7.9					
100				8.1					
0	N	2		7.9					
100				8					

Salinity-ppt

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		20					
100				20					
0	N	2		20					
100				20					

Temperature-°C

Conc-%	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		14.8					
100				14.8					
0	N	2		14.6					
100				14.6					

Tesoro Los Angeles Refinery - Carson Operations

Facility Name	City, State (Facility)	Project Manager (Consultant)	Project No. (Consultant)
LA Refinery - Carson Operations	1801 E. Sepulveda Blvd., Carson CA 90749	Chelsea Dreyer	021.APC.01
Facility Contact	**Facility Telephone No.**	**Telephone No. (Consultant)**	**Fax No. (Consultant)**
Nate Busch	(310) 847-3920	(562) 799-8510 ex. 1003	(562) 799-8510

Consultant Company	Consultant Address
WGR Southwest, Inc.	11021 Winners Circle #101 Los Alamitos, California 90720

Laboratory Name
Aquatic Bioassay
29 N Olive Street
Ventura 93001
(805) 643-5621

Sample I.D.	Lab Sample No.	No. of Containers	Matrix: Soil	Water	Air	Other	Prsv.: Yes	No	Sampling Date	Sampling Time	*Eohaustorius estuarius* (EPA 600/R-94/025)	FIELD ANALYSES: pH (SU) [6.5-8.5]	Temperature (Deg. Celsius)	Dissolved Oxygen (mg/L) [mean>7; single>5]	Specific Conductance (mS/cm)	Turbidity (NTU) [<50]	Flow (units =) [if possible]
~~SED-001~~																	
~~SED-002~~																	
~~SED-003~~																	
~~SED-004~~																	
SED-005		1	X				X		12/16/2019	13:00	X	7.55	18.07	8.09	34.1	0.0	--
SED-006		1	X				X		12/16/2019	11:42	X	7.33	15.92	2.62	32.1	0.5	--
SED-007		1	X				X		12/16/2019	10:36	X	6.14	15.14	11.97	9.67	104	--

Sample bottles required for each sample point:
(1) x 1-gallon plastic bag

Special Detection Limit/Reporting

Please report MDL and RL for all analytes

Duplicate samples must be analyzed at a frequency of 5%

Special QA/QC

Sub'd COC Attch'd:

WGR-165
-166
-167

REMARK

Email Results to:
nbusch@marathonpetroleum.com
cdreyer@wgr-sw.com
aballrot@wgr-sw.com

Sample Received Intact: Yes No

Temperature received: Ice No ice

Relinquished by **SAMPLER** (Print & Sign Name): Joseph Rodriguez — Date: 12/17/19 — Time:

Received by (Print & Sign Name): E. MAYUNO 12/17/19 1192

Relinquished by (Print & Sign Name): — Date: — Time:

Received by **LABORATORY** (Print & Sign Name):

Lab Work No.

Revised 12/16/2019

ATTACHMENT 4

SEDIMENT BIOASSAY
DATA VALIDATION REPORT

Tesoro Refining & Marketing LLC
Los Angeles Refinery – Carson Operations
Sediment Bioassay Data Validation Report

Table of Contents

Attachment:

Attachment I – Dominguez Channel Estuary Sediment Bioassay Data Validation Form

1.0 Chronic Toxicity Test Overview

The Tesoro Refining & Marketing Company LLC, Los Angeles Refinery – Carson Operations (herein facility) collected sediment samples at monitoring locations SED-005, SED-006, and SED-007 as required in National Pollutant Discharge Elimination System (NPDES) No. CA0000680. Sediment samples for chronic toxicity testing were collected on December 16, 2019 and submitted to Aquatic Bioassay & Consulting Laboratories Inc. on December 17, 2019 for analysis. Aquatic Bioassay & Consulting Laboratories has Environmental Laboratory Accreditation Program (ELAP) Certification number 1907.

In accordance with NPDES No. CA0000680 Attachment E, Section V.A.4, chronic toxicity samples are required to undergo a species sensitivity screening by concurrently conducting three toxicity tests using the fish, invertebrate and alga species listed in the permit order. Based on the results of the species sensitivity screening, the single species exhibiting the highest percent effect is required to be used for routine monitoring during the permit cycle. The species listed in the permit order, however, are more commonly used to evaluate for effluent chronic toxicity rather than sediment toxicity. Therefore, with laboratory staff and Regional Water Quality Control Board guidance, a species sensitivity screening was conducted for chronic toxicity samples on September 25, 2019 using two different sediment species: *Eohaustorius estuarius* and *Mytilus galloprovincialis*. As explained in the September 25th sediment report, both sediment species exhibited no observed effect concentration to the sediment samples collected from Stations SED-005, SED-006 and SED-007. Given that both species exhibited no toxicity effect, the facility opted to utilize *Eohaustorius estuarius* in all future chronic toxicity testing. Therefore, sediment chronic toxicity samples collected on December 16, 2019 were tested using *Eohaustorius estuarius* in accordance with the guidelines prescribed in Methods for Assessing the Toxicity of Sediment Associated Contaminants with Estuarine and Marine Amphipods, Method EPA/600/R-94/025.

2.0 Data Review

A level 2 data verification protocol was used for bioassay validation. The level 2 data review compares bioassay testing holding conditions, test setup, test implementation, and test termination in accordance with bioassay protocols. As part of the level 2 data verification protocol the laboratory was expected to follow all internal quality control procedures as directed in the applicable analytical method. Outcome of the data review for each of the chronic toxicity tests performed is documented in the *Chronic Toxicity QA/QC Bioassay Data Validation Form* included in Attachment I of this report.

Sediment samples at Stations SED-005, SED-006, and SED-007 were collected on December 16, 2019 by WGR Southwest Inc. All collected samples were preserved as required and submitted to Aquatic Bioassay and Consulting Laboratories Inc. on December 17, 2019. Chronic toxicity tests for all three stations began on December 18,

2019 and concluded on December 28, 2019. A summary of data usability determinations for the chronic toxicity test performed are described in the following section.

3.0 *Eohaustorius estuarius* Chronic Toxicity Test

3.1 Sample Collection, Sample Preservation, Chain of Custody

Sediment samples for *E. estuarius* chronic toxicity testing were collected from Stations SED-005, SED-006, and SED-007 using an Eckman dredge sampler. Sampling equipment was decontaminated prior to use at each station to prevent cross contamination. Field samples were handled with care in order to minimize sediment disturbance and prevent the loss of sample integrity, chemical speciation and chemical equilibrium. Collected samples were maintained at 4°C and a Chain of Custody documenting the collected samples was completed and submitted to Aquatic Bioassay & Consulting Laboratories Inc. Chronic toxicity testing was initiated for all samples within the required 14-day holding time for sample collection and analysis. Document review of sample collection, sample preservation and Chain of Custody procedures was deemed acceptable and in compliance with the facility's Waste Discharge Requirements (WDRs).

3.2 Test Setup

Chronic toxicity testing with *E. estuarius* was completed in accordance with EPA method 600/R-94-025. Organisms used for testing were field collected and supplied by Northwestern Amphipod in Oregon. Amphipods ranging in 3-5 mm in size were used, with at least twenty organisms per replicate. Test setup review is provided in the bioassay data validation form attached to this document. Based on a review of laboratory test setup procedures, test set up procedure were deemed acceptable and in compliance with EPA method requirements.

3.3 Test Implementation

Test implementation for chronic toxicity testing with *E. estuarius* was completed in accordance with EPA method 600/R-94/025. Water quality measurements were recorded during the duration of the test and were found to be in the acceptable range as specified in the test protocol. Ranges for the water quality measurements are provided in the QA/QC Checklist of Attachment I. No abnormal conditions were observed throughout the duration of the test. Thus, the test implementation was determined to be acceptable and in compliance with EPA method requirements.

3.3.1 Test Acceptability Criteria

3.3.1.1 Reference Toxicant

The reference toxicant used during *E. estuarius* chronic toxicity testing was unionized ammonia. The length of the reference toxicant test was 96 hours. All reference toxicant testing was within the two standard deviation quality control limit meeting the test acceptability criteria in compliance with EPA method requirements.

3.3.1.2 Negative Control Samples

Negative control samples demonstrated a 99% survival at all sample stations, which is above the 90% mean acceptability survival criteria. As a result, the negative control sample results are considered acceptable at all sampled stations and in compliance with EPA method requirements.

3.4 Reporting

Bioassay results were delivered in an acceptable laboratory report documenting a summary of water quality results, reference toxicity results, test results, statistical calculations and percent mortality. Additional information regarding test setup/test implementation procedures was provided by the laboratory to complete the QA/QC bioassay data validation form. Overall, the reporting component presenting chronic toxicity test results for *E. estuarius* was deemed acceptable.

3.5 Overall Data Usability

Review of laboratory data indicated chronic toxicity testing was performed in accordance with EPA method 600/R-94/025 as documented in Attachment I. Through the bioassay laboratory report and additional clarification from the laboratory, the bioassay test results at all sample stations was deemed acceptable and in compliance with EPA method requirements.

Attachment I

Dominguez Channel Estuary

Sediment Bioassay Data Validation Form

Tesoro Refining & Marketing LLC
Los Angeles Refinery - Carson Operations
Dominguez Channel Estuary Chronic Toxicity QA/QC Bioassay Data Validation

PROJECT INFORMATION			
Project Name:	Dominguez Channel Sediment Sampling		
Analytical Laboratory:	Aquatic Bioassays & Consulting Laboratories Inc.		
Laboratory Technician:	Joe Freas		
Sample Collection Date:	December 16, 2019		
Sample Locations/Lab Number:	SED-005 / WGR1219.165 SED-006 / WGR1219.166 SED-007 / WGR1219.167		
Species/Test Method Referenced:	Eohaustorius estuarius EPA/600/R-94-025	**Test Duration:**	SED-005: December 18, 2019 @12:30 – December 28, 2019 @ 12:30 (10day) SED-006: December 18, 2019 @12:31 – December 28, 2019 @ 12:31 (10day) SED-007: December 18, 2019 @12:32 – December 28, 2019 @ 12:32 (10day)
Sample Matrix:	Sediment		
Type of Species:	Estuarine		
Data Validator:	Ana Horn		
Validation Date:	January 23, 2020		
Signature:	Ana Horn		
Problems Noted:	No problems or deficiencies identified. Chronic toxicity testing was performed in accordance with EPA method guidelines.		

EOHAUSTORIUS ESTUARIUS	
Completeness and Holding Conditions:	
Type of Samples Collected: Grab Sediment Samples	Number of Samples Analyzed: 3
Were samples maintained at 4°C and in the dark after collection? Yes	
Did chronic toxicity testing begin within 14 days of sample collection? Yes	
Holding conditions acceptable? Yes	
If holding conditions were not acceptable, explain: N/A	
Quality of Test Organism, Collection and Acclimation:	
Who is the supplier of the test organisms?	Northwestern Amphipod in Oregon
Are organisms field collected or cultured?	Field Collected
If field collected:	
Where was the collection location? Oregon	

Tesoro Refining & Marketing LLC Los Angeles Refinery - Carson Operations Dominguez Channel Estuary Chronic Toxicity QA/QC Bioassay Data Validation
What was the organism collection date? Organism were collected on December 10, 2019 and received by the laboratory on December 12, 2019.
What was the water salinity and temperature at the time of collection? Water salinity at the time of collection was 30 ppt. Acclimation after collection began at 20 ppt. Final acclimation in laboratory was from 28 ppt to 20 ppt at 2 ppt/day.
Was site sediment collected for holding and acclimation purposes? Yes, 4L of site sediment was collected and used for acclimation and negative control testing.
Additional Comments: Quality of test organisms, collection, and acclimation is deemed acceptable.
Field Collection Sorting Methods
Were healthy amphipods placed into 10 cm diameter finger bowls with 2 cm sieved site sediment and seawater of appropriate salinity? Yes, only healthy organisms were used for bioassay testing. Health is verified visually on a light table.
Were organisms held for 2-10 days? Yes, organisms were acclimated for 6 days.
Was test sediment sieved through 2 mm sieve or forceps for predator removal? Yes
Was control sediment sieved twice through 0.5 mm? Yes
Did control sediment have a 4-hour settling period after each sieving? Yes
Test Initiation
Was salinity adjusted in all testing chambers? Yes
Was overlying ammonia detected? No overlying ammonia was detected during testing.
Were there at least 5 replicates per sample? Yes
Was there at least 20 animals per replicate? Yes
Was the organism length between 3-5 mm during test initiation? Yes, verified by observation on light table prior to test initiation.
Was the overlying water volume 800 mL? Yes
Were there any water quality adjustments? Yes, water quality measurements were collected during the duration of the test and are provided in the corresponding laboratory report.
Test Implementation
Photoperiod for 24 hours? Yes, continuous light was provided.
Was daily water quality monitoring conducted? Yes
What was the overlying daily temperature range (15°C)? The overlying daily temperature was between 14.6-14.8°C.
Was the daily salinity range 20+/-1 ppt? Yes, salinity range was 20ppt.
Was water renewal conducted? No, water remained static and was not renewed over the 10-day exposure period as required in the EPA method.
Was the overlying daily pH between 7 – 8 standard units? Yes
What was the overlying ammonia detection (ND)? No ammonia was detected during testing.

Tesoro Refining & Marketing LLC Los Angeles Refinery - Carson Operations Dominguez Channel Estuary Chronic Toxicity QA/QC Bioassay Data Validation	
Were appropriate test chambers used (1-liter glass containers with 10 cm diameter)? Yes	
Was water in each test chamber aerated overnight before start and throughout the test? Yes, 24-hour aeration was performed.	
Did the water maintain at least more than 90% saturation of dissolved oxygen concentration? Yes	
Test Results and Analysis	
Were the number of amphipods reported for each replicate? Yes	
Was the percent mortality reported for each replicate? Yes	
Was the sample mean for survival reported? Yes, the mean control survival was 98-100%	
QA/QC Samples	
Positive Control	*Negative Control*
Length of reference toxicity test? 96 hours	Negative control response above 90% acceptability criteria? Yes
What reference toxicant was used? Unionized Ammonia	Mean control survival? 99%
Exposure concentrations? Exposure ammonia concentrations were 0, 15.6, 31.2, 62.5, 125.0, 250 mg/L	Did EC 50 fall within lab standards? Yes
Did EC 50 fall within lab standards? Yes	