# DRAFT Storm Water Pollution Prevention Plan

## Phillips 66 – Santa Maria Refinery Rail Project

Traditional Project Risk Level 1

**WDID#:**

Property Address: 2555 Willow Road, San Luis Obispo County, California 93420

**Estimated Construction Project Dates:**
Start of Construction (August, 2014)
Completion of Construction (June, 2015)

## Qualified SWPPP Practitioner (QSP)

QSP #
Cell:

**Construction Project Manager:**
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*Prepared for*

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Preparation Date: October 2013

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**APPENDICES**



[1] Construction General Permit 2009-0009 DWQ as modified by Order 2010-0014 DWQ (November 16, 2010)

**ACRONYMS**

ac – Acres
A-ESCP – Activity-specific Erosion and Sediment Control Plan
AUS – ARCADIS U.S., Inc.
BAT – Best Available Technology Economically Achievable (non-conventional pollutants)
BCT – Best Conventional Pollution Control Technology (conventional pollutants)
BGS – below ground surface
BMPs – Best Management Practices
CASQA – California Storm Water Quality Association
CCC – California Coastal Commission
CCR – California Code of Regulation
CDEC – California Data Exchange Center
CESSWI – Certified Erosion, Sediment and Storm Water Inspector
CGS – California Geological Survey
CISEC – Certified Inspector of Sediment and Erosion Control
CPESC – Certified Professional in Erosion and Sediment Control
COC – Chain of Custody
COI – Change of Information
CPESC – Certified Professional in Erosion and Sediment Control
CSMP – Construction Site Monitoring Program
EPA – Environmental Protection Agency
HSG – Hydrologic Soils Group
LRP – Legally Responsible Person
MDL – Method Detection Limit
MS4 – Municipal Separate Storm Sewer System
NAL – Numeric Action Level
NEL – Numeric Effluent Limit
NOAA – National Oceanic and Atmospheric Administration
NOI – Notice of Intent
NOT – Notice of Termination
NOV – Notice of Violation
NPDES – National Pollutant Discharge Elimination System
NRCS – Natural Resource Conservation Service
P66 – Phillips 66 Company
PRDs – Permit Registration Documents
QA/QC – Quality Assurance/ Quality Control
QAPrP – Quality Assurance Program Plan
QSD/QSP – Qualified Storm Water Developer/ Practitioner
REAP – Rain Event Action Plan
RTC – Release to Construct
RWQCB - Regional Water Quality Control Board
SMARTS - Storm Water Multiple Application and Report Tracking System
SMR – Santa Maria Refinery
SWAMP – Storm Water Ambient Monitoring Program
SWPM – Storm Water Project Manager
SWPPP – Storm Water Pollution Prevention Plan
SWRCB – State Water Resources Control Board
US EPA – United States Environmental Protection Agency
WDID – Waste Discharge Identification Number
WPCD – Water Pollution Control Drawing

## 1.0 SWPPP Requirements

### 1.1 Introduction

ARCADIS-US (AUS) prepared this Storm Water Pollution Prevention Plan (SWPPP) on behalf of Phillips 66 Company (P66) for modification of the existing rail spur currently on the southwest side of the Santa Maria Refinery (SMR) located in unincorporated San Luis Obispo County, California. The Project will include an eastward extension of the existing rail spur as well as a railcar unloading facility. Trains will use this facility as a means to deliver crude oil to the SMR for processing. The unloaded material will be transferred from the new unloading facility to existing crude-oil storage tanks via a new on-site above-ground pipeline. The unloading area will also include employee facilities such as a restroom.

This Project is subject to the requirements listed in the National Pollutant Discharge Elimination System (NPDES No. CAS000002) General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (General Permit), Order No. 2009-0009-DWQ[2] (Appendix Q). This Project qualifies as a Traditional Risk Level 1 Project per Attachment C of the Construction General Permit (see Appendix Q). Specific construction activities include extending the existing rail spur on the southwest side of the refinery, adding an unloading facility, on-site pipelines, and a restroom. Additionally, an existing agricultural road will be improved as an unpaved eastern Emergency Vehicle Access route between the eastern end of the rail spur and Highway 1.

As specified in Attachment C of Order No. 2009-0009-DWQ, this SWPPP was prepared by a QSD and the SWPPP is designed to address the following objectives:

- Pollutants and their sources, including sources of sediment, associated with Project construction activity are controlled;
- Non-storm water discharges are identified and either eliminated, controlled, or treated;
- Best Management Practices (BMPs) are effective and result in the reduction or elimination of pollutants in storm water discharges and authorized non-storm water discharges from the Project during construction; and
- Stabilization BMPs installed to reduce or eliminate pollutants after construction are complete, effective and maintained.

### 1.2 Permit Registration Documents (PRDs)

Once the Notice of Intent (NOI) application has been prepared and submitted, it shall be filed in Appendix A along with the receipt letter for the NOI from the Regional Water Quality Control Board (RWQCB) once received. The Waste Discharge Identification Number (WDID) shall be added to the cover page of this SWPPP as well.

To obtain coverage under Order No. 2009-0009-DWQ, project related Permit Registration Documents (PRDs) must be submitted to the State Water Resources Control Board (SWRCB) through the Storm Water Multi-Application and Report Tracking System (SMARTS) and certified by an individual designated as the Legally Responsible Person (LRP). Jerry Stumbo, Refinery Manager, will be the LRP for the Project. Listed below are the PRD items that must be submitted:

[2] Construction General Permit 2009-0009 DWQ as modified by Order 2010-0014 DWQ (November 16, 2010)

- NOI and WDID authorization (Appendix A);
- Risk Assessment (Appendix A)
- Site Maps (Figures 1 and SW-2);
- Site Water Pollution Control Drawings (WPCDs- Figures SW-1 through SW-16);
- Annual Fee (only required when invoice is due or if there is a change in acreage);
- SWPPP;
- LRP electronic certification (online through SMARTS); and
- Project Contact Information (Section 6).

Project dischargers who submit PRDs indicating their intention to be regulated under the provisions of Order No. 2009-0009-DWQ shall identify which Level (1, 2, or 3) is applicable to their specific project. Determination of risk level is based on Project sediment and receiving water risk per Section VIII of the General Permit. This Project is classified as having a Low Sediment Risk and a Low Receiving Water Risk, resulting in a Risk Level 1 risk classification (See Section 2.3 and Appendix A for additional details). In the event construction dates or locations change, the Project Risk Level shall be re-determined and the SWPPP shall be amended on an ongoing basis. Any changes or re-submittals of the PRD's shall be filed in Appendix B of the SWPPP.

### 1.3 SWPPP Availability and Implementation

The SWPPP will be available at the site during working hours while construction is occurring. The SWPPP shall be implemented concurrently with the start of ground disturbing activities. A copy of the SWPPP and required records will be made available upon request of a State or municipal inspector or the United States Environmental Protection Agency (US EPA). An electronic copy of the SWPPP will also be maintained and updated as necessary. The SWPPP shall be implemented concurrently with ground disturbing activities until areas are appropriately stabilized in accordance with the terms of the General Permit.

### 1.4 SWPPP Amendments

This SWPPP will be amended:

- Whenever there is a change in construction or operations (e.g. change in construction scope, locations, schedule, etc.), which may affect the discharge of pollutants to surface waters, groundwater(s), or a municipal separate storm sewer system (MS4);
- If any condition of the Permit is violated or the general objective of reducing or eliminating pollutants in storm water discharges has not been achieved. Revisions must be filed within the SWPPP on-site binder. If the RWQCB determines a Permit violation has occurred, the SWPPP shall be amended according to the request by the RWQCB; and when deemed necessary by the RWQCB or local regulatory agencies.
- When deemed necessary by the Owner.
- When there is a reduction or increase in total disturbed acreage (General Permit Section II Part C).
- When BMPs do not meet the objectives of reducing or eliminating pollutants in storm water discharges.
- When there is a change in the Project duration that changes the Project's risk level.

The following items will be included in each amendment:

- A listing of the date of initial preparation; and
- Date of each amendment.

SWPPP amendments will be completed by and signed off by a QSD. SWPPP amendments will be uploaded into SMARTS, and attached/filed in Appendix C of the on-site SWPPP.

### 1.5 Retention of Records

Records of monitoring information are required to be maintained for a period of at least three years from the date generated, unless the RWQCB requests that records be maintained longer.

### 1.6 Required Non-Compliance Reporting

Risk Level 1 dischargers are not subject to Numeric Action Level (NAL) Exceedance Reporting. If a Notice of Non-Compliance (Appendix E) is necessary, it will be submitted by P66 Environmental personnel only. If planned changes in construction activity will result in non-compliance with the General Permit, the discharger is required to give advance notice to the RWQCB and local storm water management agency. If a discharge occurs or if the Project receives a written Notice of Violation (NOV) or order from a regulatory agency, the contractor will immediately notify the Project QSP and the P66 Project Manager (PM). The contractor will provide a written report to the QSP (Section 6.1), the QSD, and the P66 PM within 24 hours. The QSP will then notify the Refinery Manager and will file a written report to them within 7 days of occurrence, or as specified in the Special Provisions.

The report to P66 will contain the following items:

- The date, time, location, nature of operation, and type of unauthorized discharge, including the cause or nature of the notice or order;
- The control measures (BMPs) deployed before the discharge event, or prior to receiving the notice or order;
- The date of deployment and type of control measures (BMPs) deployed after the discharge event, or after receiving the notice or order, including additional measures and/or corrective actions installed or planned to reduce or prevent re-occurrence; and
- An implementation and maintenance schedule for any affected BMPs.

### 1.7 Annual Report

Order No. 2009-0009-DWQ requires dischargers to prepare, certify, and electronically submit an Annual Report no later than 1 September of each year beginning in 2014, unless otherwise directed by the RWQCB. Annual Report documents will be filed in Appendix H of the SWPPP once submitted and approved. Reporting requirements are identified in Section XVI of Order No. 2009-0009-DWQ and include:

1. A summary and evaluation of sampling and analysis results, including copies of laboratory reports;
2. The analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit shall be reported as "less than the method detection limit");
3. A summary of corrective actions taken during the compliance year;

4. Identification of any compliance activities or corrective actions that were not implemented;
5. A summary of violations of the General Permit;
6. The names of individuals who performed the facility inspections, sampling, visual observation (inspections), and/or measurements;
7. The date, place, time of facility inspections, sampling, visual observation (inspections), and/or measurements, including precipitation (rain gauge); and
8. The visual observation and sample collection exception records and reports.

## 1.8 Changes to Permit Coverage

Order No. 2009-0009-DWQ Section II.C allows a permittee to reduce or increase the total acreage covered under the General Permit through the Change of Information (COI) process when:

- A portion of the Project is complete and/or conditions for termination of coverage have been met;
- When ownership of a portion of the Project is sold to a different entity; or
- When new acreage is added to the Project.

To change the acreage covered, the discharger must electronically file modifications to PRDs. The modifications include a revised NOI, a site map, SWPPP revisions as appropriate, and a certification that new landowners (if applicable) have been notified of applicable requirements to obtain permit coverage. The certification statement will include the name, address, phone number, and e-mail address of any applicable new landowner in accordance with the requirements of the General Permit. The submittal is required within 30 days of a reduction or increase in total disturbed area or change in ownership. Submitted modifications to PRDs will be included in Appendix B of this SWPPP.

## 1.9 Notice of Termination

Order No. 2009-0009-DWQ Section II. D. requires a Notice of Termination (NOT) be submitted electronically via the SMARTS system when construction activities for the Project are complete and soil stabilization requirements have been met. Filing a NOT certifies that all General Permit requirements have been met.

A project site is considered complete when the following conditions for termination of coverage have been met:

- For purposes of "final stabilization," the site will not pose any additional sediment discharge risk than it did prior to the commencement of construction activity;
- There is no potential for construction-related storm water pollutants to be discharged into site runoff;
- Final stabilization has been reached;
- Construction materials and wastes have been disposed of properly;
- Compliance with the Post-Construction Standards in Section XIII of the General Permit has been demonstrated;
- Required post-construction storm water management measures have been installed and a long-term maintenance plan has been established;

- All construction-related equipment, materials and any temporary BMPs no longer needed are removed from the site.
- The site is in compliance with local storm water management requirements; and
- The LRP certifies the NOT and approval for termination from the appropriate RWQCB office has been received.

The Project discharger shall ensure disturbed areas of the construction site are stabilized prior to termination of coverage under the General Permit. The NOT must demonstrate through photos, RUSLE or RUSLE2, or results of testing and analysis that the site meets all of the conditions above and the final stabilization condition is attained by one of the following methods:

a. "70% final cover method," no computational proof required;
b. "RUSLE or RUSLE2 method," computational proof required; or
c. "Custom method", the discharger shall demonstrate in some other manner than a or b, above, that the site complies with the "final stabilization" requirement in Order Section II.D.1.a.

Final stabilization for the purposes of submitting the NOT or to support COI revisions supporting a change of acreage is achieved when soil disturbing activities are completed and one of the following criteria is met:

- In disturbed areas that were vegetated prior to construction activities of the Project, the area disturbed must be re-established to provide vegetative cover equivalent to 70 percent coverage of the preconstruction conditions. Where preconstruction vegetation covers less than 100 percent of the surface, such as in arid areas, the 70 percent coverage criterion is adjusted as follows: if the preconstruction vegetation covers 50 percent of the ground surface, 70 percent of 50 percent (.70 X .50=.35) would require a minimum of 35 percent total surface coverage; or
- Where preconstruction cover consisted of a hardscape (e.g. a building footprint or slab), at least 70 percent of the preconstruction hardscape portion of the site must be stabilized; or
- Where preconstruction cover consisted of hardscape and vegetation, the previous two requirements will be combined. For example, if the preconstruction vegetation covers 50 percent and preconstruction hardscape covers 10 percent, the stabilization method will provide a minimum of 70 percent of the preconstruction vegetation cover plus the hardscape cover (0.70 X 0.50 = 0.35; total cover = 0.35 + 0.10 = 45 percent); or
- Where no vegetation is present prior to construction, the site is returned to its original line and grade and/or compacted to achieve stabilization.
- Stabilization shall be achieved by the protocol discussed below in Section 1.9.1.

Percentages of pre-construction vegetative coverage are approximated based on review of aerial and ground level photos of the Project site under pre-construction conditions. Percentages of pre-construction hardscape, where applicable, are determined by measuring the area of pre-construction hardscape in rooftop and non-rooftop form, which is then entered in the post-construction water balance worksheet columns, then dividing the total pre-construction hardscape area by the disturbance area for the Project. At least 70 percent of the sum of the percentages is multiplied by the disturbance area for the Project to determine the approximate restoration/stabilization area requirements. Note that preservation of existing vegetation contributes to the restoration area, thus reducing the actual restoration efforts required to stabilize a work site and terminate coverage.

#### 1.9.1 Site-Wide Stabilization Protocol

Permanent soil stabilization for the Project will be undertaken upon final completion of Project activities within each individual work area throughout the site as described above. Potential ecological impacts associated with the Project are prescribed in the Coastal Dune Scrub Habitat Restoration Plan (HRP) (ARCADIS 2013) which details proposed mitigation measures to address installation of an extension to the existing rail spur at the SMR.

Outside of the Project hardscape and permanent structure installations, habitat restoration and enhancement are planned to actively restore temporary impact areas disturbed by Project activities. The habitat restoration activities are dictated by conditions associated with the Coastal Development Permit to be issued by the California Coastal Commission (CCC), as well as by conditions mandated by the County of San Luis Obispo (the County).

The mitigation approach to address impacts to native botanical resources combines immediate active revegetation and restoration activities coupled with weed eradication and specific plantings for screening purposes. Coastal dune scrub will be seeded using a seed mix comprised of locally collected native seed comprising dune scrub dominants and associates and aggressive weed abatement treatments will be used in restored areas in order to maintain reduced cover by invasive exotics and allow the native riparian vegetation to become reestablished and dominant. Container plantings of trees and shrubs for screening purposes will be planted according to the methods outlined in the HRP and irrigated until established.

## 2.0 Project Information

### 2.1 Project and Site Description

Phillips 66 proposes to extend the existing rail spur on the southwest side of the refinery, to add an unloading facility, on-site pipelines, and a restroom (see Figure SW-13). Additionally, an existing agricultural road will be improved as an unpaved eastern Emergency Vehicle Access route between the eastern end of the rail spur and Highway 1. The tracks and unloading facilities will be designed to accommodate trains of approximately 80 tank cars and associated locomotives in unit trains or manifest train configurations. These trains will deliver crude oil to the facility for processing. The unloaded material will be transferred to the existing storage tanks via a new pipeline that will be constructed across the existing coke storage area and along an existing internal refinery road. The Project will occur entirely within the existing Phillips 66 boundary.

The existing SMR facility processes crude oil into semi-refined liquid products, petroleum coke, elemental sulfur, and fuel gas used onsite. Primary processes at the SMF include:

• tankage for petroleum liquids;
• refining process equipment;
• petroleum coke storage and handling;
• electricity generation;
• process water treatment; and
• elemental sulfur handling.

These existing processes involve raw material storage, atmospheric pressure distillation, vacuum distillation, delayed coking, product storage, and product shipping. Secondary processes include a Refinery fuel gas system, a relief flare system, steam production, sulfur recovery, and oily water treatment.

The proposed Project will also include work within the existing refinery connecting and upgrading existing infrastructure. This includes adding a new electricity cable to an existing pipeway and adding a new fire water pipeline to an existing pipe rack. The rails on the existing rail spur will also be replaced.

The new rail spur lines will extend from the terminus of the current spur. The unloading facility will be located at the end of the existing coke storage area and along an existing internal refinery road.

### *Acreage Breakdown*

Collectively, the entire Project, including temporary and permanent impacts, will affect approximately 49.3 acres. Of this area, a significant portion occurs within the existing refinery:

- 21.0 acres (42.6% of total) occurs within the existing disturbed and refinery areas
- 28.3 acres occur in undeveloped areas and include portions of the rail extension, the new pipeline, and the secondary emergency vehicle access road.

As noted above, a significant portion of the impacts will be temporary during construction and affected plant communities will be returned to pre-Project conditions following completion of construction.

The construction and permanent facilities will affect the acreages shown in Table 1.

| Area | Construction Disturbance Area (temporary and permanent), acres |
|---|---|
| Rail Spur and Unloading Facility | 40.7 |
| New Pipeline | 4.8 |
| Secondary Emergency Vehicle Access | 1.6 |
| Temporary Construction Staging and Laydown Area | 2.2 |
| | |
| Total Area | 49.3 |

***Project Components***

The proposed Project will consist of the following components:

- Rail Spur Modifications,
- Mainline Turnout,
- Unloading Facility,
- Unloading System,
- Fire Protection and Safety System,
- Pipeline,
- Access Roads,
- Secondary Emergency Vehicle Access,
- Security Fence,
- Spill Containment and Response Facilities, and
- Support Buildings

Each of these is described below.

*Rail Spur Modifications*

Modification of the existing rail spur will include constructing up to five parallel tracks, each long enough to hold an entire train (as the tracks extend east, some sets will merge). The existing rail spur on the southern portion of the property currently provides rail access to the coke storage area and will provide a common entry point for the new tracks. Two tracks will surround an unloading rack and then will come together to form a common track that extends to the east of the loading area to allow for the entire train to be parked off of the mainline track and unloaded. Three additional tracks will extend the full length of the rail spur and run parallel to the unloading area to accommodate additional trains if needed.

*Mainline Turnout*

Unit train service will not require substantial changes to the turnout from the Union Pacific mainline running north-south adjacent to the refinery. The turnout guides trains off the mainline onto the refinery's rail spur. Union Pacific may require a small change in the angle of the turnout; however, if required, the construction of the new turnout will be a minor change from the current configuration and the construction will occur entirely within the existing disturbed track area. Because other trains continually pass through the Arroyo Grande/Santa Maria area on the Union Pacific mainline, the turnout must allow a unit train to clear the mainline without stopping. The existing rails will be replaced as part of the Project.

*Unloading Facility*

The unloading facility will include an access platform and a system of pumps and meters, suction lines from the railcars, steam lines, and a common pipeline leading to the refinery's existing tank farm. The access platform will run parallel to the track, with an individual gangway and safety cage

*Unloading System*

The unloading facility will be equipped with a 24-car unloading system with individual positive displacement pumps. The unloading rack will be configured to unload two 12-car strings simultaneously. The 600-foot-long center platform will provide access to the tops of the railcars.

*Fire Protection and Safety System*

A new fire protection and safety system will be installed for the unloading rack, consisting of fire detection equipment, safety showers, eyewash stations, pumps, hydrants, controls and piping. The unloading rack will be equipped with a foam sprinkler deluge system and firewater monitors with foam generators at the unloading rack periphery. The foam spray system will require a foam concentrate storage tank.

The Project will also include a secondary Emergency Vehicle Access route from the eastern end of the rail spur to Highway 1, which is discussed below in Section 2.3.8.

*Pipeline*

Downstream of the meter assembly, a new 24-inch above ground pipeline will be routed along an existing internal dirt road on the Phillips 66 property between the unloading facility and the refinery to connect with the existing crude oil storage tanks. This dirt road accommodates periodic on-site traffic only associated with refinery personnel traveling at low-speeds. The line will be approximately 3,300 feet in length.

*Access Roads*

Paved access roads will be constructed near the unloading rack (1.7 acres). Crushed miscellaneous base will be used around the rail spur for access by operations, safety, and maintenance crews. The road surrounding the rail spur will be 24 feet in width along the southern side of the spur and 12 feet in width along the northern side for a total of 4.6 acres. Appropriately sized turn-around areas meeting County and CalFire standards and a mid-way track crossing are also included to maximize efficiency in the event of an emergency.

*Secondary Emergency Vehicle Access*

An eastern Emergency Vehicle Access route will be constructed from the eastern end of the rail spur 3,000 feet to Highway 1 following existing agricultural roads. Total area of the emergency access road will be 1.6 acres including 1 foot shoulders (with 0.6 acres currently an existing dirt roadway). The secondary access road will be improved with crushed miscellaneous base (most likely decomposed granite or comparable surfacing) to support emergency vehicles as prescribed by CalFire but will not be paved.

*Security Fence*

As required by the U.S. Department of Homeland Security, an extension of the existing chain link fencing topped with barbed wire will be required around the periphery of the new tracks. Additional lighting will also be required, though light will be shielded down to minimize glare in adjacent areas. Lighting will be 30 feet high.

*Spill Containment and Response Facilities*

Drain boxes will feed below-grade 16-inch-diameter drain lines routed to two parallel 30,000 gallon rectangular storage tanks (approximately 60,000 gallons total volume) located in a vault for containment. Two pumps will transfer any contained oil/water through a new pipeline into the existing refinery's oily water system. The system will be sized to contain the contents of one rail car as well as the foam and water that will be released from the fire suppression system.

*Support Buildings*

The unloading facility will include a small parking area and restroom facilities. Both men's and women's restroom facilities will be served by potable water and a septic system within the Project footprint for wastewater disposal. All septic system components will be constructed in accordance with applicable State and County regulations and State Regional Water Quality Control Board standards.

### 2.1.1 Existing Site Drainage

The Project site is located on a sandy coastal plain (the Nipomo Mesa) approximately 2.3 miles from the Pacific coastline. Site topography is composed of gently rolling vegetated sand dunes with a general gradient toward the south. The elevation of the Project site ranges from approximately 75 to 150 feet above mean sea level (msl). Surface drainage at the site currently flows to the south towards Little Oso Flaco Creek and Oso Flaco Creek. Due to the high permeability of site soils, stormwater at the Project site tends to infiltrate before concentrating as surface flow, which is typical for most of the Project site.

Stormwater discharges from the site are considered direct discharges, as defined by the State Water Board, into Oso Flaco Lake, and the receiving waters of Little Oso Flaco Creek and Oso Flaco Creek. These three water bodies are not listed for water quality impairment for sediment on the most recent 303(d)-list. However, water quality in the Oso Flaco Creek watershed has been found by the Central Coast RWQCB to be impaired by several pollutants, including pesticides, nitrate and excessive sediment (Coastal San Luis Resource Conservation District) and is listed as impaired for unknown sediment toxicity. Existing site topography, drainage patterns, and stormwater inlets are shown on the SMR Sewer and Water System Map (Appendix F) and on the Water Pollution Control Drawings (Figures SW-1 to SW-16).

*Site-specific NPDES Permit and Associated Waste Discharge Requirements*

The SMR facility maintains two separate collection systems, one for process wastewater and contact stormwater, and the other for non-contact stormwater. Process wastewater and precipitation runoff from the oil storage tank dikes and the Operating units is collected in the process water sewer system. This wastewater flows by gravity to a wastewater treatment plant. Site remediation groundwater is also treated at the wastewater facility. The wastewater treatment plant includes three oil/water separators, two surge tanks, dissolved air floatation, a trickling filter, an aeration system, and a secondary clarifier. Sludge generated during the treatment processes is recycled at the adjacent Carbon Plant coking facility. Treated wastewater is discharged to the Pacific Ocean in accordance with the site-specific NPDES permit and associated waste discharge requirements (see Appendix F). The wastewater treatment plant is designed and permitted to discharge up to 0.570 million gallons per day (MGD).

Precipitation runoff from streets and unimproved areas, not subject to oil spills, is collected in a non-contact stormwater sewer system and flows by gravity to an infiltration/evaporation pond. This non-contact stormwater is not discharged to the receiving water (refer to Appendix F for a map of the stormwater drainage and process wastewater piping systems). Approximately 1.89 acres of the project disturbance area has the potential to drain to the refinery's storm drainage system and percolation basin, and approximately 0.19 acres of the project disturbance area will drain to the refinery's process wastewater treatment system. The remainder of the project disturbance area is anticipated to infiltrate with the potential to runoff to nearby receiving waters with the exception of runoff from the unload area canopy, which will be retained by the proposed retention basin.

#### 2.1.2 Site Soils, Geology and Groundwater

The watershed's soils are primarily loamy sand or sandy loam, with moderate to very high erosion potential (USDA-SCS, 1977). The formations are predominantly unconsolidated and easily eroded Cenozoic sediments of Pliocene through Eocene age. The soils derived from these formations are highly erodible and easily weathered. A Geotechnical Engineering Report was prepared for the Project site by Earth Systems Pacific and is included in Appendix E.

Groundwater generally occurs approximately 40 feet below ground surface at the site.

### 2.2 Storm Water Run-on from Offsite Areas

Order No. 2009-0009-DWQ, Attachment C requires dischargers to effectively manage run-on within the site. The Project site is characterized by moderately vegetated (50 to 75 percent cover) dune sands that exhibit gradual rolling hill topography. The soil's high capacity for infiltration and the gradual topography at the site mitigate most potential run-on impacts; however, measures will be implemented in locations where concentrated flow is anticipated to manage potential run-on from tributary watersheds adjacent to the site. Based on review of the local topography and field investigation, the greatest potential for offsite run-on would result from a significant downpour that saturated soils in nearby areas and spread as sheet flow onto the Project work area. For this reason, silt fences (SE-1), fiber rolls (SE-5) or equivalent have been specified in targeted locations where the potential for concentrated flow is greatest. If additional points of run on are observed during site field inspections, the QSP will work with the QSD to amend the SWPPP and specify additional appropriate perimeter protection BMPs, which will be shown on the SWPPP Water Pollution Control Drawings (WPCDs). Areas of anticipated concentrated run-on are few, though locations that are anticipated to convey more concentrated flow will also be protected with check dams as appropriate (SE-4).

Topography in the disturbance area gradually slopes due south. If at any time during the Project run-on/runoff is observed and additional perimeter controls are needed, they will be installed immediately. Erosion (soil binders and management of existing vegetation and stockpiles) and sediment (fiber rolls and gravel bags) BMPs are expected to be sufficient to protect the site from run-on. Additional BMPs to control run-on are not anticipated to be required. In the event run-on controls are deemed necessary, run-on from offsite areas shall be directed away from disturbed areas. Storm water run-on calculations are included in Appendix A.

### 2.3 Findings of Construction Site Risk Determination

All project dischargers who submit PRDs indicating their intention to be regulated under the provisions of Order No. 2009-0009-DWQ shall identify which Risk Level (1, 2, or 3) is applicable to their specific project. To determine the Project Risk, the discharger shall calculate the site's sediment risk and receiving water risk during periods of soil exposure (i.e. grading and site stabilization) and use the calculated risks to determine a Risk Level using either the GIS map or the site specific option as described in Attachment C of Order No. 2009-0009-DWQ.

The Risk Determination worksheet prepared for this Project is included in Appendix B of this document and the determinations are summarized below.

- The GIS Map Method[1] was employed for determining the LS Factor for this Risk Determination.
- The K Factor was obtained from the Natural Resources Conservation Service (NRCS) Web Soil Survey. The site is located on "Dune Land" and "Oceano Sand" soil types, which have rock-free K factors of 0.15 and 0.20, respectively. The K factor of 0.20 was conservatively selected for this determination.
- The R factor is based on a conservative construction schedule starting on July 29, 2014 and ending on July 14, 2015, which contains the entire anticipated construction schedule.
- The Receiving Water for the site is Little Oso Flaco Creek and Oso Flaco Creek that discharge to Oso Flaco Lake, which are not listed as impaired for sediment nor do they have the beneficial uses of COLD, SPAWN, and MIGRATORY. Little Oso Flaco Creek, Oso Flaco Creek, and Oso Flaco Lake do not have current Total Maximum Daily Load (TMDL) requirements.

| | |
|---|---|
| Sediment Risk Factor (R*K*LS) | Low (3.05) |
| R Factor | 34.69 |
| K Factor | 0.20 |
| LS Factor | 0.44 |
| Receiving Water Risk Factor | Low |
| Combined (Project) Risk Level | Level 1 |

This SWPPP was prepared to comply with the General Permit Risk Level 1 requirements listed in Attachment C of Order No. 2009-0009-DWQ. Risk Level 1 projects are not subject to NALs. In the event construction dates or locations change, the project Risk Level shall be re-calculated and the SWPPP shall be amended as necessary.

[1] Using the SWRCB SMARTS system the Length-Slope (LS) Factor, Soil Erodibility (K) Factor and Receiving Water Risk are automatically populated based on the project schedule and location. See Appendix B for additional details.

## 2.4 Construction Schedule

The overall construction is anticipated to occur over a period of 9 to 10 months. In some cases, portions of the individual tasks below will occur concurrently. The anticipated construction schedule is listed below. For the purposes of this SWPPP, the schedule has been grouped into two main phases:

**Phase 1 – Mass Grading and Soil Disturbance:**

- Demolition – August 2014 (1 month)
- Turnout track replacement (if needed) – August 2014 (1 month)
- Grading – September – December 2014 (4 months)
- Soil Transport – September –December 2014 (4 months)

**Phase 2 – Construction and Stabilization:**

- Construction of Rail – Mid December 2014 – Mid January 2015 (1 month)
- Construction of Pipeline - January – April 2015 (4 months)
- Construction Unloading Area – January – April 2015 (4 months)
- Commissioning/Turnover – May – June 2015 (2 months)

## 2.5 Potential Construction Site Pollutant Sources

The following is a list of construction materials and activities that have the potential to contribute pollutants, other than sediment, to storm water run-off:

- Vehicle use, storage, and emergency maintenance;
- Equipment use, storage and maintenance;
- Material delivery, use and storage;
- Railroad track construction;
- Concrete footing construction;
- Asphalt apron construction;
- Sanitary/ Septic Wastes;
- Petroleum coke; and
- Dust suppression.

Construction activities that have potential to contribute sediment to storm water discharges include:

- Excavation and grading;
- Trenching for pipeline and conduit installation;
- Potential loading of excess spoils for transport off site; and
- Development and restoration access routes and staging areas.

Locations of BMPs for the Project are identified on the Water Pollution Control Drawings (Figures SW1 to SW16). The list of potential pollutant sources, associated construction activities, and areas of the site identified where BMPs will be implemented is included in Appendix K. Copies of the California Stormwater Quality Association (CASQA) BMP Handbook

Fact Sheets for the BMPs selected, or potentially needed for this Project are included in Appendix P. The pollutants and potential pathways have been considered during the development of the BMPs in accordance with General Permit requirements.

### 2.6 Identification of Potential Non-Storm water Discharges

Order No. 2009-0009-DWQ (Attachment C) requires dischargers to identify and manage potential non-storm water discharges (where not otherwise required to be under a Regional Water Quality permit) and that discharges be eliminated, controlled, or treated. Management of potential non-storm water discharges that apply to the Project include:

- Implementing measures to control non-storm water discharges during construction;
- Designate equipment and supply staging and storage areas at least 100 feet from any swale or drainage way. All vehicle parking, routine equipment maintenance, fueling, minor repair, concrete mixer washout areas, and soil and material stockpiles shall be done in these designated areas only;
- Applying water to disturbed soils to manage dust throughout the Project alignment. Water used for dust control within the Project shall consist of potable water. If non-potable water will be used for dust control, California Department of Health Services and Regional Water Quality Control Board requirements may apply. Water shall be applied to the Project site using trucks equipped with spray systems, or hoses equipped with a positive means of shutoff. Water shall be applied daily or as often as necessary when disturbing dry soils to ensure effectiveness;
- Washing vehicles in such a manner as to prevent non-storm water discharges to surface waters or MS4 drainage systems,
- Cleaning streets in such a manner as to prevent unauthorized non-storm water discharges from reaching surface water or MS4 drainage systems; and

## 3.0 Best Management Practices

### 3.1 Schedule for BMP Implementation

The Project is proposed to occur over approximately 11 months (see Section 2.4). BMPs will require implementation, modification and/or maintenance throughout the course of the Project to reflect the construction schedule and weather conditions. In addition, Project dischargers shall ensure inactive areas (areas of construction activity that have been disturbed and are not scheduled to be re-disturbed for at least 14 days) are stabilized.

Prior to Construction Activities:

- Vehicle and equipment storage and maintenance areas shall be established prior to mobilizing equipment and construction materials to the site;
- Perimeter sediment controls shall be installed around applicable construction area perimeters; and
- Stockpile protection devices such as plastic sheeting, tarps, geotextile blankets, gravel bags, fiber rolls, etc. shall be stored on-site prior to the construction activities.

During Construction Activities:

- Fiber rolls shall be placed around stockpile areas, and stockpiles shall be secured with tarps or erosion control blankets secured with gravel bags at the end of each work day and prior to anticipated storm events;
- Sanitary facilities, hazardous waste and other fluids shall be located within appropriate secondary containment facilities;
- Stabilized construction access to large work areas shall be maintained. If trackout is observed during the Project, additional measures shall be implemented or street sweeping frequency shall be increased;
- Dust control shall be implemented as necessary to limit fugitive dust;
- Aggregate surfacing shall be placed over graded areas equal to at least 70 percent of the pre-existing vegetative or pavement coverage for stabilization as soon as feasible depending on biological assessment of potential impacts on sensitive habitat and in accordance with the Draft Restoration and Stabilization Plan (RSP) (Appendix D); and
- The integrity of installed BMPs shall be maintained.

Post Construction Activities:

- Installed BMPs not expected to remain on-site (i.e. temporary fiber rolls, temporary geotextile blankets, rumble racks, trench plates, gravel bags etc.) shall be removed from the site following stabilization.
- Disturbed soils shall be restored/re-graded to match pre-construction conditions and stabilized either through revegetation methods or with an approved permeable rock base; and
- All construction related materials shall be removed from the site following the Project activities.

## 3.2 Erosion and Sediment Control

This SWPPP was developed to meet the requirements of a Risk Level 1 project under Order No. 2009-0009-DWQ[1] Attachment C ([1]Construction General Permit 2009-0009-DWQ as modified by Order 2010-0014 DWQ & 2012-0006-DWQ). In addition, Risk Level 1 dischargers shall minimize or prevent pollutants in storm water discharges and authorized non-storm water discharges through the use of controls, structures, and management practices that achieve Best Available Technology Economically Achievable (BAT) for toxic and non-conventional pollutants and Best Conventional Pollution Control Technology (BCT) for conventional pollutants.

The BMPs selected to meet these standards are shown on the WPCD Figures SW1 through SW16 as described below.

The following BMP descriptions are applicable to activities associated with the two following general categories of activities taking place on the site as specified in the area specific WPCD Figures:

- Mass Grading

- Stabilization and Improvements Construction

A summary of potential BMPs associated with the Project activities is presented below in Table 2.

**Table 2 - BMP Summary List**

| Items | Brief Description | Figure Number | SWPPP Text Section |
|---|---|---|---|
| **Erosion Control** | | | |
| EC-1 | Scheduling | - | Section 3.2 |
| EC-2 | Preservation of Existing Vegetation | SW-9, 14, 15 | Section 3.2 |
| EC-4 | Hydroseeding | - | Section 3.2 |
| EC-5 | Soil Binders | - | Section 3.2 |
| **Sediment Control** | | | |
| SE-1 | Silt Fence | SW-6, 13 | Section 3.2 |
| SE-4 | Check Dam | SW-6, 13 | Section 3.2 |
| SE-5 | Fiber Rolls | SW-3 to 15 | Section 3.2 |
| SE-7 | Street Sweeping | SW-3, 9, 10 | Section 3.2 |
| SE-10 | Storm Drain Inlet Protection | SW-3, 5, 6, 10, 12, 13 | Section 3.2 |
| **Tracking Control** | | | |
| TC-1 | Stabilized Construction Entrance/Exit | SW-9 | Section 3.2 |
| TC-2 | Stabilized Construction Roadway | - | Section 3.2 |
| **Wind Erosion and Dust Control** | | | |
| WE-1 | Wind Erosion Control | - | Section 3.2 |
| **Non-Stormwater Management Control** | | | |
| NS-1 | Water Conservation Practices | SW-5, 6, 12, 13 | Section 3.3 |
| NS-3 | Paving and Grinding Operations | SW-13, 14 | Section 3.3 |
| NS-6 | Illicit Connection/Discharges | SW-5, 6, 12, 13 | Section 3.3 |
| NS-8 | Vehicle and Equipment Cleaning | SW-5, 6, 12, 13 | Section 3.3 |
| NS-9 | Vehicle and Equipment Fueling | SW-5, 6, 12, 13 | Section 3.3 |
| NS-10 | Vehicle and Equipment Maintenance | SW-5, 6, 12, 13 | Section 3.3 |
| NS-12 | Concrete Curing | SW-6, 10, 11, 13 | Section 3.3 |
| NS-13 | Concrete Finishing | SW-6, 10, 11, 13 | Section 3.3 |
| **Waste Management and Materials Pollution Control** | | | |
| WM-1 | Material Delivery and Storage | SW-5, 6, 12, 13 | Section 3.3 |
| WM-2 | Material Use | SW-5, 6, 12, 13 | Section 3.3 |
| WM-3 | Stockpile Management | SW-5, 6, 12, 13 | Section 3.3 |
| WM-4 | Spill Prevention and Control | SW-5, 6, 12, 13 | Section 3.3 |
| WM-5 | Solid Waste Management | SW-5, 6, 12, 13 | Section 3.3 |
| WM-6 | Hazardous Waste Management | SW-5, 6, 12, 13 | Section 3.3 |
| WM-7 | Contaminated Soil Management | SW-5, 6, 12, 13 | Section 3.3 |
| WM-8 | Concrete Waste Management | SW-6, 10, 11, 13 | Section 3.3 |
| WM-9 | Sanitary/Septic Waste Management | SW-5, 6, 12, 13 | Section 3.3 |
| WM-10 | Liquid Waste Management | SW-5, 6, 12, 13 | Section 3.3 |

### 3.2.1 Erosion Control

Erosion control, also referred to as soil stabilization, consists of source control measures designed to prevent soil particles from becoming detached and suspended in storm water runoff. Soil stabilization BMPs protect the soil surface by covering and/or binding soil particles and reducing storm water contact with disturbed soil. Appropriately targeted site preparation and erosion control BMPs will be installed for any work involving soil disturbance that will result in exposed soil surfaces during the rainy season. On manufactured grades that may be subject to rill or gully formation during rain events, a combination of hydroseeding with wood fiber for erosion prevention, and the use of erosion control blankets, fiber rolls (wattles), and silt fences may be utilized to address potential erosion issues on Site. To reduce erosion hazards, grading will be minimized, runoff and sediment control structures used, and/or permanent plant cover will be established on side slopes following construction. All temporary fill will be removed at Project completion and the area restored to approximate pre-Project contours and topography. The locations of soil disturbing construction activities, such as excavation and soil stockpiles, will be determined during construction and noted on the construction drawings. Following completion of construction all disturbed soils shall be stabilized in accordance with the final stabilization criteria specified in the General Permit.

The following items are required erosion control measures for Project dischargers (Order No. 2009-0009-DWQ[1] Attachment C):

- Project dischargers shall implement effective wind erosion control.
- Project dischargers shall provide effective soil cover for inactive areas (areas of construction activity that have been disturbed and are not scheduled to be re-disturbed for at least 14 days), all finished slopes, utility backfill, and completed lots.
- Project dischargers shall limit the use of plastic materials when more sustainable, environmentally friendly alternatives exist. Where plastic materials are deemed necessary, the discharger shall consider the use of plastic materials resistant to solar degradation.

The following CASQA BMP Fact Sheets are included in Appendix P to provide guidance on erosion controls used on the Project.

- <u>EC-1, Scheduling:</u> The weather forecast will be monitored and BMPs will be inspected and maintained prior to forecasted storm events. Construction activities with potential to disturb soil will be minimized prior to and during storm events.

- <u>EC-2, Preservation of Existing Vegetation (PEV):</u> Existing vegetation (e.g., bushes/shrubs) located exterior to the limits of the disturbance area will be preserved wherever feasible in accordance with the biological BMPs prescribed by the site-specific biological report, which assess the quantity and quality of habitat. Vegetation to be preserved within these areas will be marked or flagged so it is not disturbed (see figures SW-9, 14 and 15).

- <u>EC-4, Hydroseeding:</u> To establish permanent stabilization on disturbance areas, hydroseeding, seeding, or planting with plant species that are native to the Site will be implemented throughout the Project area. Seeding will be coordinated with the Project

Biologist to ensure proper placement and selection of new seeding and/or container plant installation.

- EC-5, Soil Binders: Soil binders may be used for temporary or interim soil stabilization to control wind or water erosion while vegetative stabilization establishes. Soil binders may be used as part of stockpile stabilization and for areas where earthwork has temporarily stopped and will resume shortly.

- EC-7, Geotextiles and Mats: Geotextiles and mats (including plastic) may be placed over stockpiles and areas anticipated to be re-disturbed (regardless of whether or not construction will resume before 14 days as mentioned above) to provide short term stabilization. Geotextiles may also be incorporated into final stabilization and shall not contain monofilament fibers or materials. Only 100 % biodegradable coconut fiber mesh blankets shall be used.

The revegetation and stabilization objectives discussed in the Draft Restoration and Stabilization Plan (RSP) (ARCADIS, 2013) will supplement overall erosion control on the Project site in a more permanent capacity. The primary goal of restoration is to reestablish central dune scrub at the Site, as well as to enhance native habitat through a reduction in cover by native weeds. Container plantings of trees and shrubs for screening purposes will be also planted according to the methods outlined in the RSP and irrigated until established.

### 3.2.2 Wind Erosion and Dust Controls

The following CASQA BMP Fact Sheet is included in Appendix P to provide guidance on wind erosion controls used on the Project:

- WE-1, Wind Erosion Control: Wind Erosion Control will be implemented to reduce airborne particles. As necessary, water will be applied to keep soil moist and control dust during soil disturbing activities. Water shall be applied at rates that moisten the soil but do not generate runoff. If non-potable or reclaimed water (including water removed from trenches) is used for dust control, the sources and discharges must meet California Department of Health Services water reclamation criteria and the RWQCB requirements. Non-potable water shall not be conveyed in tanks or drain pipes that will be used to convey potable water and there shall be no connection between potable and non-potable supplies. Non-potable tanks, pipes, and other conveyances should be marked, "NON-POTABLE WATER- DO NOT DRINK." For heavily trafficked times and along the access roads of active work areas, onsite vehicle traffic will be limited to 10 mph or less.

- WM-3, Stockpile Management, will augment WE-1 by securing covers over stockpiles to prevent wind dispersal of sediment or debris.

Additional wind erosion and dust control measures include additional water application during the interim phase at a work site between completion of construction and the beginning of stabilization efforts. Contractors will also consider the use of supplemental dust palliative soil binders include non-sodium lignosulfonates ("tree sap") and Acidulated Soybean Oil Soapstock, which are effective, biodegradable alternatives to chloride and bituminous compounds that are more frequently used. These products can be applied once work has ceased at a site that will be awaiting revegetation for final stabilization. Other potentially compatible dust palliative products could also include microbiological binders (cryptogams, blue-green algae inoculants, enzyme slurries) and polymers (polyvinyl acrylics and acetates).

### 3.2.3 Run-on BMPs

Due to the relatively flat topography and high infiltration rate of the Project location, appreciable run-on issues are not anticipated. Established vegetation, high soil infiltration rates, and planned perimeter sediment controls (SE-5, Fiber Rolls) are anticipated to be sufficient to control run-on from off-site areas. Silt fences (SE-1) may be used as necessary to direct surface flow away from disturbed areas and check dams (SE-4) may be implemented to spread flow and prevent erosion in areas of observed concentrated flow during rain events. Additional BMPs are not anticipated to be required to control for run-on.

### 3.2.4 Sediment Controls

Sediment controls are intended to complement and enhance the selected soil stabilization (erosion control) measures by intercepting and settling out soil particles that have been detached and transported by the force of water. Temporary sediment control BMP materials will be maintained and stored on-site throughout the duration of the Project to allow immediate deployment in the case of an unexpected rain event.

The following items are required sediment control measures for Risk Level 1 dischargers (Order No. 2009-0009-DWQ[1], Attachment C):

- Dischargers shall establish and maintain effective perimeter controls and stabilize all construction entrances and exits to sufficiently control erosion and sediment discharges from the site. Fiber rolls (SE-5) will serve as a perimeter control for the Project.

- On sites where sediment basins are to be used, Risk Level 1 dischargers shall, at minimum, design sediment basins according to the method provided in CASQA's Construction BMP Guidance Handbook (Sediment basins are not anticipated to be used for the Project).

The following CASQA BMP Fact Sheets are included in Appendix P to provide guidance on sediment controls used on the Project.

- <u>SE-1, Silt Fence:</u> While all work areas will contain fencing for preservation of existing vegetation, some situations may call for the installation of silt fencing to prevent transport of sediment in run-off from a disturbance area. Silt fences may be incorporated as a measure to protect existing storm drainage conveyances as part of SE-10 (see figures SW-6 and 13).

- <u>SE-4, Check Dam:</u> Check dams shall be installed to prevent erosion by reducing the velocity of potential flow and promote sediment behind the dam. A series of check dams may be applied to generally increase their effectiveness. A sediment trap (SE-3) may be placed immediately upstream of the check dam to increase sediment removal efficiency (see figures SW-6 and 13).

- <u>SE-5, Fiber Rolls:</u> Fiber rolls shall be installed around applicable substation perimeters for perimeter sediment control. Fiber rolls shall be placed around stockpiles left on site overnight and prior to the onset of a rain event (see figures SW-3 to 15).

- <u>SE-7, Street Sweeping:</u> Street sweeping shall be implemented on an as-needed basis on affected nearby paved roadways for the duration of the Project. If trackout, sediment or construction materials are observed on paved roads, hand brooms or mechanical street sweeping will be performed by the end of each day. Washing of streets with water is prohibited (see figures SW-3, 9 and 10).

- SE-10, Storm Drain Inlet Protection: Existing storm drain or drainage channel inlets shall be protected from sediment in run-off to prevent potential discharge of pollution to the storm drainage facility. Storm drain inlet protection applies to drainage inlets in the vicinity of agricultural treatment units or large-scale remediation system installations that have the potential to discharge run-off to the drainage inlets (see figures SW-3, 5, 6, 10, 12 and 13).

#### 3.2.5 Tracking Controls

Construction entrances/exits will be inspected daily. If trackout is observed on asphalt paved roads during construction activities, the following requirements will apply:

- Washing of streets is prohibited;
- Road vacuuming may occur as necessary to keep paved areas clear of soil and debris, at a minimum to the extent that naturally accumulates on the roads;
- If street-vacuuming equipment is ineffective, either by design or mechanical condition, it will be replaced with equipment or operations that adequately address the needs of the Project; and
- A suitable site will be selected for disposal of accumulated sediment.

The following CASQA BMP Fact Sheets are included in Appendix P to provide guidance on tracking controls used on the Project.

- TC-1, Stabilized Construction Entrances/Exits: A stabilized entrance will be used where non-pre-existing construction site access roads or construction site entrances meet paved roadways. If street sweeping alone is insufficient to control trackout, street sweeping along with a rumble rack constructed to the requirements provided in Fact Sheet TC-1 (Section 3.2.4, SE-7) will be sufficient to control tracking (see figure SW-9).

- TC-2, Stabilized Construction Roadway: Roadways within the Project area shall be watered after grading in order to control dust.

### 3.3 Non-Storm Water and Materials Management

Non-storm water management consists of pollution control measures not related to the erosion and sediment control aspects of this SWPPP. Non-storm water BMPs are intended to prevent or reduce pollutants from entering the adjacent surface water. Training will be provided to contractor and sub-contractor construction crews regarding BMPs to prevent construction materials and wastes from contributing to water pollution. Implementation and specific locations of non-storm water control BMPs will be drawn on the WPCDs as work progresses. The QSP and site superintendent will periodically review construction activities at the site and review BMP implementation plans with subcontractors as necessary. The following CASQA BMP Fact Sheets are included in Appendix P to provide guidance on Good Site Management, Waste Management and Materials Pollution Control, and Vehicle Storage and Maintenance used on the Project. No landscaping materials will be implemented during the restoration phase of the

Project; therefore, good housekeeping requirements for landscape materials were not considered in the list below:

- <u>NS-1, Water Conservation Practices:</u> Activities that use water during construction on a project should be performed in a manner that avoids causing erosion and/or the transport of pollutants off-site. Maintenance of equipment should include repairs of leaks in water hoses and fittings. Operations which require the use of water should be monitored during activities to identify and prevent unnecessary discharges of water (see figures SW-5, 6, 12 and 13).

  - Water supplies shall be checked for leaks and repaired promptly;
  - Avoid the use of water to clean construction areas. Do not use water to clean pavement;
  - Washing of vehicles shall be conducted in such a manner as to prevent non-storm water discharges to surface waters or MS4 drainage systems;
  - Paved areas shall be swept;
  - Direct construction water run-off to areas where it can infiltrate into the ground, when feasible;
  - Apply water for dust control in accordance with WE-1, "Wind Erosion Control" (Section 3.2.2);
  - Potable water discharges shall be approved by the local regulatory agency, where required; and
  - When potable water discharges occur they shall be made in a manner that prevents introduction of sediment, turbidity or other pollutants to the discharge.

- <u>NS-3, Paving and Grinding Operations:</u> Any paving operations shall be scheduled to avoid anticipated precipitation events. Contractors, sub-contractors and workers involved in concrete work shall be trained and aware of proper use and cleanup procedures for the materials they are using (see figures SW-13 and 14).

- <u>NS-6, Illicit Connection/Discharge:</u> Contractors and Project personnel shall notify Phillips 66 if illegally deposited materials or illicit connections are observed within the Project vicinity. Phillips 66 shall document the materials or activity, determine the appropriate course of action to take and shall be responsible for notifying federal state and local authorities as necessary (see figures SW-5, 6, 12 and 13).

- <u>NS-8, NS-9, and NS-10, Vehicle and Equipment Cleaning, Fueling and Maintenance:</u> Vehicle and equipment cleaning, fueling and maintenance shall occur off-site whenever feasible. If these activities must occur onsite, they shall occur within the staging area and appropriate facilities shall be created for the activity. An adequate supply of drip pans, absorbent materials and spill kits will be stored in Project vehicles in the event they are needed for a spill response or cleanup. Equipment and vehicles will be maintained in good working condition and checked regularly for leaks. If a leak is found that cannot be repaired on-site, the equipment/vehicles will be removed from the site (see figures SW-5, 6, 12 and 13).

- <u>NS-12, and NS-13, Concrete Curing and Concrete Finishing:</u> Concrete foundations and footings for new equipment will be constructed on site. Cement work immediately prior to or during rain events shall be avoided. The washout of cement and concrete from delivery vehicles must occur off-site whenever feasible and must be into manufactured and self-contained washout facilities (in the staging areas) if no other option is available. The location of washout facilities shall be added to the Water Pollution Control Drawings if these activities occur (see figures SW-6, 10, 11 and 13).

- WM-1, and WM-2, Material Delivery, Storage and Use: Materials typically delivered to sites include construction materials, backfill/patching materials, and petroleum products such as fuel, oil and grease. These materials are typically used soon after delivery. Minimize exposure of construction materials to precipitation with the exception of materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, bricks, etc.). Chemicals shall be stored in watertight containers or in a completely enclosed storage shed. In the event fuel, chemicals or hazardous materials are stored on-site, the materials will have secondary containment and regular inspections will be conducted on the designated area. Employees and subcontractors will be trained on the proper storage, handling and use of these materials (see figures SW-5, 6, 12 and 13).

- WM-3, Stockpile Management: Stockpiles include materials delivered and stored (including soil stockpiles) at the sites for construction of the Project. If soil stockpiles remain on-site overnight, stockpiles shall be placed no closer than 50 feet from any watercourse and shall be bermed and covered when not actively in use to protect against wind and rain. If stockpiles are anticipated to contain "Non-visible Pollutants" (cement) care should be taken to ensure storm water does not come in contact with the stockpiles. Stockpiling on paved surfaces shall be avoided during inclement weather, or shall be placed on plastic sheeting. All stockpiles shall be securely covered, and encircled with fiber roll at the end of each work day and prior to anticipated storm events (see figures SW-5, 6, 12 and 13).

- WM-4, Spill Prevention and Control: A spill prevention and control protocol shall be implemented. Equipment and materials for cleanup of spills shall be available on-site at all times and appropriate spill response personnel shall be assigned and trained for hazardous substances associated with the Project activities. Typical construction site spill kits include: sorbent pads, sorbent booms, sorbent socks, granular sorbent, neoprene drain cover, disposable bags, shovel, broom, safety goggles, nitrile gloves, disposable coveralls, and 55-gallon poly drum or equivalent storage container. Spill prevention shall consist of education/training on material storage, protection on existing spills, spill clean-up procedures for minor, semi-significant and significant/hazardous spills, reporting/notification requirements and vehicle and equipment maintenance and fueling restrictions. Spills must be cleaned up and all contaminated materials must be collected and disposed of off-site in conformance with local, state and federal regulations. Spills must not be buried or washed with water. Liquid and powder products must be stored under covers with secondary containment features. Spills that occur onsite must be reported to the on-site Phillips 66 representative immediately (see figures SW-5, 6, 12 and 13).

- WM-5, Solid Waste Management: Prevent discharges from waste disposal containers to storm water systems or receiving water by covering waste disposal containers at the end of every business day and during rain events. Regular removal or replacement of waste disposal containers shall be scheduled for the duration of the Project. It is anticipated that waste will be removed from the Project sites on a daily basis within Phillips 66 and contractor vehicles (see figures SW-5, 6, 12 and 13).

- WM-6, Hazardous Waste Management: Chemicals shall be stored in watertight containers or in a completely enclosed storage shed. In the event fuel, chemicals or hazardous materials including septic waste are stored on-site, the materials will have secondary containment and regular inspections will be conducted on the designated area. Employees and subcontractors will be trained on the proper storage, handling and use of these materials (see figures SW-5, 6, 12 and 13).

- WM-7, Contaminated Soil Management: No areas of contaminated soil are known or were observed on the site, however it is possible that contamination may be discovered or spills could create contaminated soils. Should potentially contaminated soils be discovered, work in the immediate vicinity will halt and Phillips will be contacted to determine necessary actions. Signs of contamination include: soil staining, discolorations, odors, unnatural physical properties (excessive cohesion, or lack thereof) etc. (see figures SW-5, 6, 12 and 13).

- WM-8, Concrete Waste Management: Concrete foundations and footings for equipment will be constructed on site along with a concrete access road. Concrete work immediately prior to or during rain events shall be avoided. The washout of concrete from delivery vehicles must occur off-site whenever feasible and must be into manufactured and self-contained washout facilities (in the staging areas) if no off-site option is available. The washout facilities shall be located in staging areas. All contractors, sub-contractors and workers involved in concrete work shall be trained and aware of proper use and cleanup procedures for the materials they are using (see figures SW-6, 10, 11 and 13).

- WM-9, Sanitary/Septic Waste Management: Temporary sanitary facilities will be maintained in good working order, shall be located at least 50 feet away from drainage facilities or watercourses and shall be provided some form of secondary containment (trailer mounted facilities shall be parked over drip pans or equivalent while onsite if they are not equipped with onboard secondary containment). When subjected to high winds or risk of high winds, temporary sanitary facilities shall be secured to prevent overturning. Regular waste collection will be scheduled for the site and access to the facilities shall be provided for maintenance contractors so trackout will not occur (see figures SW-5, 6, 12 and 13).

- WM-10, Liquid Waste Management: Effort shall be made to control any potential run-off that may discharge from the site. While it is not anticipated that the drag-drip irrigation system would disperse too much potentially contaminated groundwater, there is still a possibility for leaks in hoses and pipes to occur, creating substantial runoff. All potentially contaminated water-containing facilities should be protected with secondary containment with perimeter control (see figures SW-5, 6, 12 and 13).

## 3.4 Post-Construction Storm Water Measures

The SMR Rail Project will not discharge into an MS4. Therefore, the Post-Construction Standards as discussed in Section XIII and Appendix 2 of the General Permit apply to the Project. The Post-Construction Standards took effect on September 2, 2012.

Section XIII requires applicable dischargers to submit with the NOI a map and water balance worksheets to demonstrate the impacts of the Project on runoff volume during storm events up to the 85th percentile storm event and emulate or improve the pre-Project hydrology through the use of structural and non-structural BMPs.

The current Project scope primarily involves the creation of impervious surfaces. The overall Project site has been divided into 6 sub-watersheds that are separated based on where runoff is received. Sub-watersheds that drain to adjacent soils to capitalize on the soil's high infiltration rate demonstrate compliance with the post-construction requirements through the use of the Post-Construction Water Balance Calculator, which is submitted in the "Post-construction" tab in SMARTS. Sub-watersheds that discharge runoff to a constructed storage facility such as a basin or tank comply with the post-construction requirements through supporting documentation that demonstrates that the constructed storage facilities can contain the $85^{th}$ percentile storm event.

The site sub-watersheds are as follows:

1. <u>Pipeway Work in the SMR Facility Proper</u>
   This sub-watershed contains all pipeway work inside the existing Santa Maria Refinery Facility. Areas without curbs in the Facility Proper such as the vicinity of the pipeway generally drain to adjacent soils where runoff infiltrates. Compliance is demonstrated with the use of the Post-Construction Water Balance Calculator.

2. <u>Pipeline Corridor</u>
   This sub-watershed includes a graded pipe rack corridor between the Unloading Area and the Facility Proper. Runoff from this drainage area will flow to adjacent bare native soil as it is not in a curbed area, except for a short trench segment that is part of a separate sub-watershed. Compliance is demonstrated through the use of the Post-Construction Water Balance Calculator.

3. <u>Unloading Area Vicinity</u>
   Graded surfaces near the Unloading Area on the west side of the proposed rail spur in the Waste Coke Area will discharge to adjacent surface soils and will be allowed to infiltrate. This sub-watershed includes the paved access road, parking areas, and restroom. It does not include curbed equipment pads, the Unloading Area canopy roof, or the retention basin. Compliance is demonstrated through the use of the Post-Construction Water Balance Calculator.

4. <u>Railroad Spur and Emergency Access Road</u>
   This sub-watershed is comprised of the graded railroad spur east of the Waste Coke Area and widened emergency access road. This sub-watershed contains the majority of Project grading with finish surfaces composed mostly of re-vegetated native soil and a gravel road with the railroad tracks contributing the only proposed impervious surfaces in this sub-watershed. Compliance will be demonstrated using the Post-Construction Water Balance Calculator.

5. <u>Curbed Equipment Pads in Unloading Area</u>
   Specific concrete equipment pads in the Unloading Area are designed to drain to holding tanks, which regulate flow to the SMR Facility's oil-water separator and NPDES-Permitted contact water treatment system that discharges to the Pacific Ocean.

Supporting documentation demonstrating retention of the runoff volume from the 85$^{th}$ percentile storm event in the holding tanks justifies compliance with post-construction requirements.

6. Unloading Area Canopy Roof
   Runoff from the roof canopy over the Unloading Area will be collected in downspouts that discharge to an infiltration basin adjacent to the Unloading Area that is used solely for the roof canopy (an earthen berm around the basin prevents sheet flow into it). Supporting documentation demonstrating retention of the runoff volume from the 85$^{th}$ percentile storm event justifies compliance with post-construction requirements.

Based on output from the Post-Construction Water Balance Calculator and demonstrated retention of the 85$^{th}$ percentile storm event where applicable, the Project is not required to implement additional structural or non-structural post-construction measures to emulate pre-Project hydrology. However, given the stabilization requirements associated with the Project restoration plan, some measures that may serve as post-construction storm water measures may be implemented to stabilize disturbance areas. As part of the site restoration and re-vegetation efforts, the soil surface in disturbed areas will be scarified to reduce dry bulk density and keep infiltration rates high.

Post-construction storm water measures for the Project include placement of mulch, seeding, and/or planting with native species to cover at least 70 percent of the pre-existing vegetative coverage in accordance with Section 1.9 of this SWPPP. To qualify for NOT acceptance, the Project discharger shall ensure all criteria listed in Section 1.9 of this SWPPP are met. In addition, in order to terminate permit coverage, a long-term maintenance plan designed for a minimum of five years shall be established in accordance with Section II.D.f of the General Permit to ensure that post-construction storm water measures are adequately maintained.

## 4.0 BMP Inspection and Maintenance

A site specific Construction Site Monitoring Program (CSMP) is provided in Section 7.0 of this SWPPP. At a minimum, the site will be visually inspected weekly by the QSP or by trained personnel under the QSP's direction, during working hours, and in conjunction with other daily activities in areas where active construction is occurring. During weekly inspections, Risk Level 1 dischargers shall verify that the BMPs for storm water and non-storm water specified in this SWPPP are being implemented in areas where active construction is occurring (including staging areas). A monitoring program is required for Risk Level 1 projects for inspecting temporary and permanent stabilization BMPs after active construction is completed.

Inspection activities shall continue until adequate permanent stabilization is established and, in areas where re-vegetation is chosen, until stabilization is established in accordance with Sections 1.9 and 3.4 of this SWPPP. During visual inspections, BMPs shall be inspected for any maintenance issues, effectiveness, failure, or potential for failure. Inspections may be discontinued in non-active construction areas where soil-disturbing activities are completed and final stabilization is achieved (e.g. paving is completed, substructures are installed, vegetation meets minimum cover requirements for final stabilization, or other stabilization requirements are met).

Section G.4 in Attachment C of the General Permit requires an inspection checklist be completed for each pre- and post-rain event inspection and every 24-hour period during a qualifying rain event. A tracking or follow-up procedure must also follow any inspection that identifies deficiencies in BMPs. The cause of the deficiency will be determined and documented on a Construction Site Report Inspection Form provided in Appendix K of this SWPPP, and design changes or repair or replacement of the BMP will be initiated within 72 hours of identifying the deficiency. If an inspection recommends corrective action and it is not implemented immediately, a copy of the completed Construction Site Inspection Checklist will be provided to the QSP within 24 hours and the PM shall be notified. The QSP shall contact the PM to confirm implementation.

The QSP shall keep abreast of weather forecasts from the National Oceanographic and Atmospheric Administration (NOAA) website http://www.srh.noaa.gov. The Site rain gauge shall be used or precipitation amounts for the nearest rain gauge (NWS Station San Luis Harbor – OX1SL, located approximately 13.3 miles NW from the Project location) can be obtained at: http://www.wrh.noaa.gov/mesowest/getobext.php?wfo=lox&sid=OX1SL&num=72&raw=0.

BMP inspections, maintenance and repair during the Project will be performed by the QSP or by personnel trained by the QSP under the QSP's supervision. Inspections will be conducted as follows:

- Weekly in active Project areas;
- Within 48 hours prior to and following qualifying storm events;
- Once each 24 hours during qualifying storm events;
- When there is reason to believe a non-visible pollutant discharge may occur; and
- At any other time(s) or intervals of time specified in the contract documents.

Blank and completed inspection Construction Site Inspection Report forms are included in Appendix L. The inspection forms include:

- The date of the inspection and the date the inspection report was written;
- The inspectors name, title and signature;
- Weather information, including presence or absence of precipitation, estimate of beginning of qualifying storm event, duration of event, time elapsed since last storm, and approximate amount of rainfall in inches;
- Site information, including stage of construction, activities completed, and approximate area of the site exposed;
- Descriptions of the inspected BMPs and any deficiencies;
- If the construction site is safely accessible during inclement weather, list the observations of BMPs: erosion controls, sediment controls, chemical and waste control, and non-storm water controls. Otherwise, list the results of visual inspections at relevant outfalls, discharge points, downstream locations and any projected maintenance activities;
- Report the presence of noticeable odors or of any visible sheen on the surface of any discharges;
- Corrective actions taken, such as BMPs that were fixed or additional BMPs that were implemented; and
- Photographs taken during storm event inspections. Photographs are required and must be submitted into SMARTS every third storm event.

### 4.1 Rain Event Action Plans

Rain Event Action Plans (REAPs) are not required for Risk Level 1 Project dischargers.

## 5.0 Training

As required by Order No. 2009-0009-DWQ, Section VII, this SWPPP was developed by a QSD and the SWPPP must be implemented by a QSP for permitted sites. The QSD and QSP must meet the training requirements in accordance with Order 2009-0009-DWQ, Section VII.

The QSD shall ensure SWPPPs are written, amended and certified. The QSD shall only be qualified as a QSD by completing a State Water Board-sponsored or approved QSD training course within two years after the adoption date of Order 2009-0009-DWQ (by 2 September 2011) and obtaining a minimum of one of the following certifications:

- A California registered professional civil engineer;
- A California registered geologist or engineering geologist;
- A California registered landscape architect;
- A professional hydrologist registered through the American Institute of Hydrology;
- A Certified Professional in Erosion and Sediment Control (CPESC);
- A Certified Professional in Storm Water Quality (CPSWQ); or
- A professional in erosion and sediment control registered through the National Institute for Certification in Engineering Technologies.

The QSP will have responsibility for the SWPPP implementation, BMP maintenance, and daily BMP site inspections. The QSP shall ensure BMPs required by Order No. 2009-0009-DWQ, Attachment C are implemented. A QSP is responsible for non-storm water and storm water visual observations, sampling and analysis. The QSP may delegate tasks to employees trained by the QSP with adequate supervision and oversight. A training log showing training of various personnel is provided in Appendix L. The QSP shall only be qualified as a QSP by completing a State Water Board-sponsored or approved QSP training course within two years after the adoption date of Order 2009-0009-DWQ (by 2 September 2011) and obtaining a minimum of one of the following certifications:

- A certified erosion, sediment and storm water inspector (CESSWI); or
- A certified inspector of sediment and erosion control (CISEC).

One of the most effective methods to maintain compliance with Storm Water Quality requirements is training and distribution of information to jobsite personnel. Informal training may include tailgate site briefings to be conducted as needed (i.e. new jobsite personnel, placement of new BMPs, address non-compliance) by the QSP or other QSP-trained party and may include discussions of the following BMPs:

- Erosion Control
- Sediment Control
- Non-Storm Water
- Waste Management and Materials Pollution Control

Records for personnel attending tailgate trainings will be maintained on-site. Trainings shall be documented and records shall be retained in Appendix M of the SWPPP.

## 6.0 Responsible Parties and Operators

### 6.1 Responsible Parties

The P66 Project Manager assigned to this Project is:

| | | | |
|---|---|---|---|
| **P66 PM:** | James O. Anderson<br>2555 Willow Road<br>Arroyo Grande, CA 93420 | Contact phone: | (805) 343-3224 |

The P66 Supervisor of Health, Environment and Compliance is:

| | | | |
|---|---|---|---|
| **P66 HSE:** | Kristen Kopp<br>2555 Willow Road<br>Arroyo Grande, CA 93420 | Contact phone: | (805) 343-3241 |

Order No. 2009-0009-DWQ, Section VII requires a Legally Responsible Person (LRP) and a QSP be assigned to projects subject to the requirements listed in the General Permit. The LRP will be required to certify documents uploaded into the SMARTS database.

Under Order No. 2009-0009-DWQ, the following personnel for the Project will be assigned:

| | | | |
|---|---|---|---|
| **LRP:** | Jerry D. Stumbo, Refinery Manager<br>2555 Willow Road<br>Arroyo Grande, CA 93420 | Contact phone: | (805) 343-3273 |
| **QSP:** | | Contact phone: | |
| **QSP Assistant:** | | Contact phone: | |

The QSP shall have primary responsibility and authority for the implementation, maintenance, and inspections described in the SWPPP. The QSP will be available throughout the duration of the Project. Duties of the QSP include but are not limited to:

- Ensuring compliance with the SWPPP and the General Permit;
- Implementing elements of the SWPPP, including but not limited to:
    - Prompt and effective erosion and sediment control measures.
    - Non-storm water management materials and waste management activities such as: monitoring discharges, if any, dewatering, diversion devices; general site clean-up; vehicle and equipment cleaning; fueling and maintenance; spill control; ensuring that no non-storm water discharges occur in quantities which will have an adverse effect on receiving waters or storm drain systems.
    - Pre-storm inspections, storm event inspections, and post-storm inspections;

- Visual observations as specified in the monitoring plan;
- Routine inspections as specified in the Project's specifications or described in the SWPPP;
- Preparing annual compliance certification and/or annual report for the LRP;
- Ensuring elimination of unauthorized discharges;
- Mobilizing crews to make immediate repairs to the control measures;
- Coordinate to assure necessary corrections and repairs are made immediately, and the Project complies with the SWPPP, the General Permit and approved plans;
- Submitting Notices of Discharge and reports of Illicit Connections or Illegal Discharges;
- Oversee maintenance practices identified in the BMPs and in the SWPPP;
- Identify any deficiencies in the SWPPP and correct them; and
- Ensure changes in construction plans are addressed in the SWPPP.

The QSD assigned for this Project is:

| | | | |
|---|---|---|---|
| **QSD:** | Tim J. Rumbolz, CPESC, QSD #24202<br>ARCADIS-US<br>2550 North 1st Street, Suite 200<br>San Jose, CA 95131 | Contact phone: | (408) 797-2009 |

The QSD will assist the QSP with SWPPP compliance, train personnel, and make revisions and/or amendments to the SWPPP. The QSD will also be available to provide support to the LRP upon request.

### 6.2 Contractor List

A Contractor/Subcontractor contact log is provided in Appendix N of the SWPPP. The log shall be updated with on-site contractor and subcontractor contact information.

## 7.0 Construction Site Monitoring Program

### 7.1 Purpose

The CSMP included in this SWPPP was prepared to provide guidance and compliance for a Risk Level 1 construction project per the requirements of Order No. 2009-0009-DWQ, Attachment C. The CSMP may be revised as necessary to reflect Project revisions or RWQCB requirements, and includes monitoring and reporting procedures and instructions, as well as inspection requirements. The monitoring program CSMP must be implemented at the appropriate level to protect water quality at all times throughout the duration of the Project.

Risk Level 1 sites are required, if possible, to install an on-site rain gauge to verify on-site precipitation conditions. If site conditions cannot accommodate an on-site rain gauge or if an installed on-site rain gauge malfunctions, then precipitation amounts for the nearest rain gauge (NWS Station San Luis Harbor – OX1SL, located approximately 13.3 miles NW from the Project location) can be obtained at:
http://www.wrh.noaa.gov/mesowest/getobext.php?wfo=lox&sid=OX1SL&num=72&raw=0.

## 7.2 Risk Level 1 Inspection Requirements

Order No. 2009-0009-DWQ, Attachment C lists the following inspection requirements for Risk Level 1 dischargers:

- Inspections are conducted by qualified and trained personnel (Name(s) and contact number(s) of assigned personnel are listed in Section 6.1).
- Inspections of active areas shall be performed weekly. Visual Inspections shall be conducted during work hours. Areas that are complete, have permanent stabilization and have had a final inspection to confirm the permanent stabilization has been completed and/or established, no longer require inspections.
- Inspections shall be conducted for the site before, during, and after storm events during work hours and photographs shall be submitted to the SMARTS database every three storm events. Before and after storm event inspections shall be documented on a Construction Site Inspection Report Form (Appendix I).
- Daily visual inspections shall verify: (1) appropriate BMPs for storm and non-storm water are implemented in areas where active construction is occurring (including staging areas), (2) Project excavations are closed (or equivalent measures are implemented) at the end of each workday; (3) spoils are properly protected and road surfaces are cleaned of excavated material at the end of each workday; (4) hazardous construction materials and chemicals are properly stored in protective containers; and (5) areas disturbed during construction are either returned to pre-construction conditions or an equivalent protection is used at the end of each workday.
- Inspections may be discontinued in areas where final soil stabilization is achieved (e.g. paving is completed, substructures are installed, vegetation meets minimum cover requirements for final stabilization, or other stabilization requirements are met).

## 7.3 Safety

Dischargers are not required to conduct visual observation (inspections) under the following conditions:

- During dangerous weather conditions such as flooding and electrical storms;
- Outside of scheduled business hours; and
- When access to the site is unsafe due to storm events.

If no required visual observations are collected due to the above exceptions, the discharger shall include an explanation in the SWPPP and the Annual Report documenting why the visual observations were not conducted.

## 7.4 Visual Monitoring (Weekly Inspections)

Risk Level 1 dischargers are required to visually inspect the site weekly during work hours and in conjunction with other activities in areas where active construction is occurring. Inspections must be conducted by either the QSP or Project trained personnel. During the course of the visual monitoring activities, both storm water and non-storm water BMPs must be inspected to ensure they are both effective and implemented appropriately, and are in place in areas where active construction is occurring (including staging areas).

#### 7.4.1 Qualifying Pre-, During-, and Post-Storm Event Inspections

The trained inspection personnel will perform pre-storm inspections when at least 50% chance of precipitation is forecasted. During-storm event inspections shall be conducted when rain is occurring. Post-storm inspections shall be performed following a rain event. The inspections will be conducted during normal business hours of the construction site and shall be incorporated into the visual site inspections. Photographs shall be taken and uploaded to the SWRCB's SMARTS website once every three rain events. The General Permit requires dischargers use the weather forecasts from NOAA, which can be obtained at http://forecast.weather.gov/MapClick.php?lat=35.046225&lon=-120.592460#.UhKlcpySJdW.

The trained inspection personnel will visually observe the following during pre-storm inspections:

- All storm water drainage areas to identify any spills, leaks, or uncontrolled pollutant sources. If needed, the discharger shall implement appropriate corrective actions.
- All BMPs to identify whether they have been properly implemented in accordance with the SWPPP. If needed, the discharger shall implement appropriate corrective actions.
- Any storm water storage and containment areas to detect leaks and ensure maintenance of adequate freeboard.
- Inspections will be documented using the Construction Site Inspection Form provided in Appendix K.

### 7.5 Non-Visible Pollutant Monitoring

Sampling and analysis for non-visible pollutants is required when:

- There is reason to believe a breach, malfunction, failure and/or leak of any BMP has occurred as a result of construction activities and the pollutant could potentially be discharged with storm water runoff; and
- Implementation of BMPs failed to occur.

Non-visible pollutants in site discharges may result from materials that:

- Are being used in construction activities;
- Are stored on the construction site;
- Were spilled during construction operations and are not cleaned up by the next rain event;
- Were stored (or used) in a manner that presented the potential for a release of material during past land use activities;
- Were spilled during previous land use activities and were not cleaned up; or
- Were applied to soil as part of past land use.

If inspections indicate the potential for the discharge of non-visible pollutants, Risk Level 1 dischargers are required to collect water quality samples for non-visible pollutants that may discharge from the site. Risk Level 1 dischargers shall implement sampling and analysis requirements to monitor non-visible pollutants associated with (1) construction sites; (2) activities producing pollutants that are not visually detectable in storm water discharges; and (3) activities that could cause or contribute to an exceedance of water quality objectives in the receiving waters. For specific sample collection, handling, documentation procedures, and analysis, reference sections 7.6.4 through 7.6.6.

- Risk Level 1 dischargers shall collect samples down-gradient from discharge locations where the visual observations were made triggering the monitoring, and which can be safely accessed. For sites where sampling and analysis is required, personnel trained in water quality sampling procedures shall collect storm water samples.
- If sampling for non-visible pollutant parameters is required, Risk Level 1 dischargers shall ensure samples are analyzed for parameters indicating the presence of pollutants identified in the pollutant source assessment required in Section B.5. of Order No. 2009-0009 Attachment C, which states: "Risk Level 1 Dischargers shall conduct an assessment and create a list of potential pollutant sources and identify any areas of the site where additional BMPs are necessary to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges. This potential pollutant list shall be kept with the SWPPP and shall identify all non-visible pollutants which are known, or should be known, to occur on the construction site."
- If discharge of non-visible pollutants is suspected or there is an observed discharge from a breach, malfunction or leakage, sampling is required and Risk Level 1 dischargers shall collect samples <u>during the first two hours</u> of discharge from rain events that occur during business hours and which generate run-off.
- Risk Level 1 dischargers shall ensure a sufficiently large sample of storm water that has not come into contact with the disturbed soil or the materials stored or used on-site (uncontaminated sample) will be collected for comparison with the discharge sample. Samples shall be collected during the first two hours of discharge from rain events that occur during daylight hours and which generate runoff.
- Risk Level 1 dischargers shall compare the uncontaminated sample to the samples of discharge using field analysis or through laboratory analysis. Analyses may include, but are not limited to, indicator parameters such as: pH, specific conductance, dissolved oxygen, conductivity, salinity, and Total Dissolved Solids (TDS).
- For laboratory analyses, all sampling, sample preservation, and other analyses must be conducted according to test procedures pursuant to 40 C.F.R. Part 136. Risk Level 1 dischargers shall ensure field samples are collected and analyzed according to manufacturer specifications of the sampling devices employed. Portable meters shall be calibrated according to manufacturer's specifications.
- Risk Level 1 dischargers shall ensure all field and/or analytical data are kept in the SWPPP document.

## 7.6 Monitoring Locations

Sampling locations are based on proximity to expected non-visible pollutant storage, occurrence or use, accessibility for sampling, and other factors in accordance with the applicable regulatory requirements. Sampling locations for run-on and runoff of the Project site will be determined based on the location of active construction and potential threat to water quality.

### 7.6.1 Monitoring Preparation

Prior to the rainy season, qualified sampling personnel and alternates will review the CSMP.

An adequate stock of monitoring supplies and equipment for monitoring non-visible pollutants will be available on the Project site prior to a sampling event. Monitoring supplies and equipment will be stored in a cool-temperature environment that will not come into contact with rain or direct sunlight. Supplies maintained at the Project site will include but are not limited to:

- Powder-free nitrile gloves;
- Sample collection equipment;
- Coolers;
- Appropriate number or volume of lab-provided sampling bottles;
- Labels;
- Re-sealable storage bags;
- Paper towels;
- Rain gear;
- Ice;
- Sampling activity log forms; and
- Chain of Custody (COC) forms.

#### 7.6.2 Sample Collection and Handling

The General Permit requires dischargers to designate and train personnel to collect, maintain and ship water quality samples in accordance with the Surface Water Ambient Monitoring Program (SWAMP) 2008 Quality Assurance Program Plan (QAPrP), which is available at http://www.swrcb.ca.gov/water_issues/programs/swamp/tools.shtml#qa. Sampling methods and handling procedures are described below. Adherence to SWAMP sampling guidance (and these procedures) provides for consistent, reproducible, and accurate results. For some constituents, especially trace metals, trace organics, and organic carbon, sampling protocols are very important as contamination of samples due to incorrect sampling procedures is possible. Design of the field sampling procedures should carefully consider contamination potential from sample location, sampling techniques, and sample handling. The QSP or personnel trained by the QSP shall be trained in the appropriate site specific methods specified in this CSMP.

The QSP or trained personnel will collect at least one sample by placing a separate lab-provided sample container directly into a stream of water downgradient from and within close proximity to the potential non-visible pollutant discharge location, determined during visual inspections. This separate lab-provided sample container will be used to collect water, which will be transferred to sample bottles for laboratory analysis. The upgradient and uncontaminated background samples should be collected prior to collecting the downgradient samples to minimize cross-contamination. The sampling personnel will collect the water upgradient of where they are standing. At each sampling event, in-field pH, temperature, conductivity, turbidity and dissolved oxygen parameters shall be collected and documented.

Once the separate lab-provided sample container is filled, the water sample will be poured directly into sample bottles provided by the laboratory for the analyte(s) being monitored. To maintain sample integrity and prevent cross-contamination, sampling collection personnel will:

- Wear a clean pair of surgical gloves prior to the collection and handling of each sample at each location.
- Avoid contaminating the inside of the sample bottle by preventing it from coming into contact with any material other than the water sample.
- Discard sample bottles or sample lids that have been dropped onto the ground prior to sample collection.

- Not leave the cooler lid open for an extended period of time once samples are placed inside.
- Not sample near a running vehicle where exhaust fumes may impact the sample.
- Not touch the exposed end of a sampling tube, if applicable.
- Avoid allowing rainwater to drip from rain gear or other surfaces into sample bottles.
- Not eat, smoke, or drink during sample collection.
- Not sneeze or cough in the direction of an open sample bottle.
- Minimize the exposure of the samples to direct sunlight, as sunlight may cause biochemical transformation of the sample to take place.
- Decontaminate sampling equipment prior to sample collection using a TSP-soapy water wash, distilled water rinse, and final rinse with distilled water.
- Dispose of decontamination water/soaps appropriately (i.e. do not discharge them into receiving water).

Immediately following sample collection, sample bottles for laboratory analytical testing will be capped, labeled, documented on a COC form provided by the analytical laboratory, sealed in a re-sealable storage bag, placed in a cooler with ice, as near to 4 degrees Celsius as practicable, and deliverable within 24 hours to the following P66 approved California state-certified laboratory:

| **LABORATORY NAME:** | BC Laboratories, Inc. |
|---|---|
| LOCATION: | 4100 Atlas Court, Bakersfield, CA 93308 |
| PHONE: | (800) 878-4911 |
| CONTACT NAME: | Molly Meyers (661) 825-4250 |

#### 7.6.3 Sample Documentation Procedures

Original data documented on sample bottle identification labels, Chain of Custody (COC) forms, sampling activity logs, and inspection checklists will be recorded using waterproof ink. Copies of the COC form, sample documents, and documents prepared for the Annual Report will be located in Appendix H. If an error is made on an accountable document, the individual will make corrections by lining through the error and entering the correct information. The erroneous information will not be obliterated. Corrections will be initialed and dated. Sampling and field analysis activities will be documented using the following:

- Sample Bottle Identification Labels: Sampling personnel will attach an identification label to each sample bottle. At a minimum, the following information will be recorded on the label, as appropriate:

  - Project name
  - Project number
  - Unique sample identification number and location. (Example: RO-ON-1).
  - Quality assurance/quality control (QA/QC) samples should be identified similarly using a unique sample number or designation (Example: RO-ON-1-DUP).
  - Collection date/time (No time applied to QA/QC samples)
  - Analysis constituent

- Sampling Activity Logs: A log of sampling events will identify:
    - Sampling date
    - Separate times for collected samples and QA/QC samples recorded to the nearest minute
    - Unique sample identification number and location
    - Analysis constituent
    - Names of sampling personnel
    - Weather conditions (including precipitation amount)
    - Field analysis results
    - Other pertinent data
- Chain of Custody (COC) forms – samples to be analyzed by a laboratory will be accompanied by a COC form provided by the laboratory. Only the sample collectors will sign the COC form over to the lab. COC procedures will be strictly adhered to for QA/QC purposes.

#### 7.6.4 Sample Analysis

Appendix K lists the specific sources and types of potential non-visible pollutants that may be present on the Project site and the applicable water quality indicator constituent(s) for that pollutant. Each contractor should review the actual products brought to the Project site for any additions to this list.

### 7.7 Watershed Monitoring Option

The watershed monitoring option is not applicable to Risk Level 1 dischargers.

### 7.8 Quality Assurance and Quality Control

An effective QA/QC plan will be implemented as part of the CSMP to ensure analytical data can be used with confidence. QA/QC procedures to be initiated include:

- Construction Site Inspection Report Form;
- Clean sampling techniques;
- Sample COCs; and
- Data verification.

#### 7.8.1 Construction Site Inspection Report Form

Sampling information to be included in the Construction Site Inspection Form (Appendix L) includes the date and time of water quality sample collections, sampling personnel, sample container identification numbers, and types of samples that were collected. Field observations should be noted for abnormalities at the sampling location. Field measurements for pH, temperature, dissolved oxygen, conductivity and turbidity should also be recorded at the time of sample collection.

#### 7.8.2 Clean Sampling Techniques

Clean sampling techniques involve the use of certified clean containers for sample collection and clean powder-free nitrile gloves during sample collection and handling. As discussed previously, adoption of a clean sampling approach will minimize the chance of field contamination and questionable data results.

#### 7.8.3 Chain of Custody

The COC tracks samples from collection through analysis to ensure the validity of the sample. Sample COC procedures include the following:

- Proper labeling of samples;
- Use of COC forms for samples; and
- Prompt sample delivery to the analytical laboratory.

#### 7.8.4 Data Verification

After analytical results are received from the analytical laboratory, the data will be verified to assess whether it is complete, accurate and the appropriate QA/QC requirements were met. Data should be verified as soon as the data reports are received.

The reviewer will check the data for outlier values and follow up with the laboratory. Occasionally typographical errors, unit reporting errors, or incomplete results are reported and should be easily detected. These errors need to be identified, clarified and corrected quickly by the laboratory. Attention should be paid to data that is an order of magnitude or more different than similar locations, or is inconsistent with previous data from the same location. For laboratory analyses, the US EPA establishes QA/QC checks and acceptable criteria. These data are typically reported along with the sample results. Data reviewers should evaluate the reported QA/QC data to check for contamination, precision, and accuracy. When QA/QC checks are outside acceptable ranges, the laboratory must flag the data, and usually provides an explanation of the potential impact to the sample results. The reviewer will check the data set for outlier values and, accordingly, confirm results and re-analyze samples where appropriate. Sample re-analysis should only be undertaken when it appears some part of the QA/QC resulted in a value outside of the expected range. Initial data, even if outside the expected range, may not be discounted unless the analytical laboratory identifies the required QA/QC criteria were not met. If this occurs, a written statement from the analytical laboratory regarding the validity of the sample results should be obtained.

Field logs will be checked to make sure required measurements were completed and appropriately documented. Crews may occasionally miss-record a value. Reported values that appear out of the typical range or inconsistent should be followed up on immediately to identify potential reporting or equipment problems.

Equipment calibration notations should be verified for outlier data and, if appropriate, equipment calibrations should be checked after sampling. Observations noted on the field logs can also help to identify potential interferences. Notations should be made of any errors and actions taken to correct the equipment or recording errors. When using field meters, it is important to record the value and then make note of any possible meter failures or interferences that could include the need to:

- Recalibrate;
- Replace the battery;
- Problems with the sample container; or
- Fouled probes.

### 7.9 Reporting Requirements

Dischargers are required to prepare and electronically submit an Annual Report no later than 1 September each year using the SMARTS system. The Annual Reports must be certified in accordance with the Special Provisions in Order No. 2009-0009-DWQ. Annual Report documents will be filed within the SWPPP in Appendix H. The Annual Report must include the following storm water monitoring information for Risk Level 1:

- A summary and evaluation of sampling and analysis results, including original laboratory reports;
- The analytical method(s), method reporting unit(s), and method detection limits (MDL[s]) of each analytical parameter (analytical results that are less than the MDL must be reported as “less than the MDL” or “<MDL”);
- A summary of corrective actions taken during the compliance year;
- Identification of any compliance activities or corrective actions that were not implemented;
- A summary of violations of the General Permit;
- The individual(s) who performed facility inspections, sampling, visual observation (inspections), and/or measurements;
- The date, place, time of facility inspections, sampling, visual observation (inspections), and/or measurements, including precipitation (rain gauge);
- The visual observations and sample collection exception records and reports; and
- Authorized non-storm water discharges.

A summary of the required documents, in addition to the CSMP, is included in Section 1.7 of this SWPPP. Additionally, Section 1.7 includes the procedures that will be followed to submit the Annual Report.

## 8.0 Record Retention

Dischargers must retain records of storm water monitoring information and copies of reports (including Annual Reports) for a period of at least three years from the date of submittal or longer if required by the RWQCB. Records are to be kept on site while construction is ongoing. These records include:

- The date, place, and time of facility inspections, sampling, visual observations (inspections), and/or measurements, including precipitation;
- The individual(s) who performed the facility inspections, sampling, visual observations (inspections), and /or measurements;
- The date and approximate time of analyses;
- The individual(s) who performed the analyses;
- A summary of analytical results from the last three years, the method detection limits and reporting limits, and the analytical techniques or methods used;
- Rain gauge readings from site inspections;
- QA/QC records and results;

- Non-storm water discharge inspections and visual observations (inspections) and storm water discharge visual observation records;
- Visual observation and sample collection exemptions records;
- NAL Exceedance Reports and NEL Violation Reports;
- The records of any corrective actions and follow-up activities that resulted from analytical results, visual observations (inspections), or inspections; and
- Results of field measurements and laboratory analyses must be kept in the SWPPP.

## 9.0 References


- California Storm Water Best Management Practices Handbook – Construction, November 2009.

- Caltrans Storm Water Quality Handbook, Project Planning and Design Guide, Construction Site Best Management Practices (BMPs) Manual, November 2000.

- Natural Resource Conservation Service (NRCS), 2012. Soils Report: Mojave River Area, San Bernardino County, California. June.

- State Water Resources Control Board (SWRCB) Order No. 2009-0009-DWQ, National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000002, Waste Discharge Requirements (WDRs) for Discharges of Storm water Runoff Associated with Construction Activity, 2009, as modified by Order 2010-0014 DWQ (November 16, 2010).

## Figures

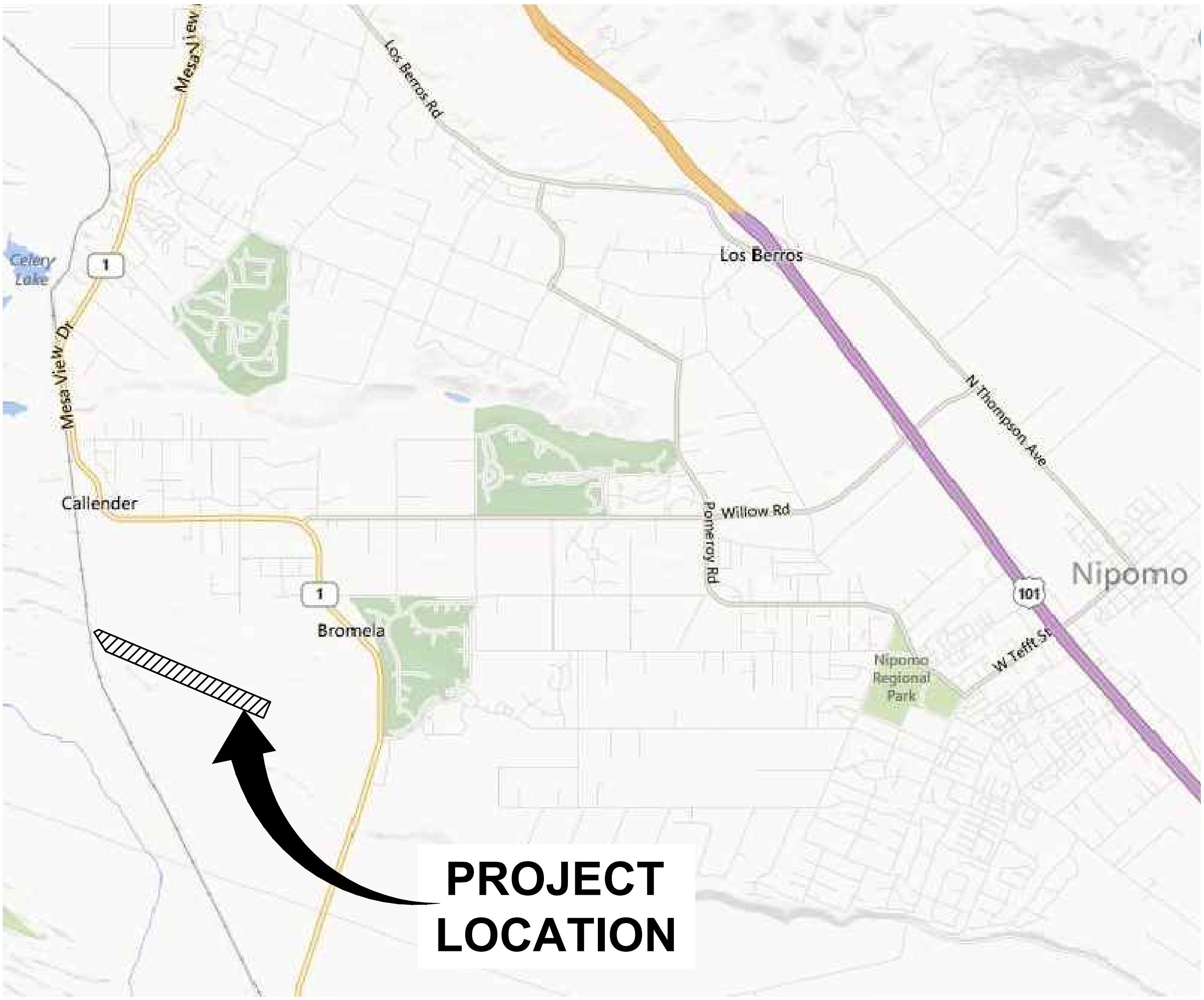


IMAGE SOURCE: BING MAPS 2013

0 5500' 11000'

GRAPHIC SCALE


PHILLIPS 66 COMPANY
SAN LUIS OBISPO COUNTY, CALIFORNIA
**SANTA MARIA REFINERY RAIL PROJECT**
**STORM WATER POLLUTION PREVENTION PLAN**

**SITE VICINITY MAP**

ARCADIS

FIGURE
**1**

CITY:(Reqd) DIV/GROUP:(Reqd) DB:(Reqd) LD:(Opt) PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
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PROJECTNAME: ----

IMAGE SOURCE: BING MAPS 2014

0 700 Feet

PHILLIPS 66 COMPANY
SAN LUIS OBISPO COUNTY, CALIFORNIA
**SANTA MARIA REFINERY RAIL PROJECT**
**STORM WATER POLLUTION PREVENTION PLAN**

**PROJECT SITE PLAN OVERVIEW WITH AERIAL PHOTOGRAPH**

ARCADIS

FIGURE
**2**

CITY:(Reqd) DIV/GROUP:(Reqd) DB:(Reqd) LD:(Opt) PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
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X-IMPROVEMENTS AERIAL.png
X-SITE BACKGROUND AERIAL2.png
X TBLOCK EC Detail 6.tif
X-TOPO map.png
5632_RAIL LAYOUT

GENERAL NOTES:

1. THESE DRAWINGS ARE INTENDED TO BE USED IN CONJUNCTION WITH THE PROJECT STORMWATER POLLUTION PREVENTION PLAN (SWPPP) AND SUPPORTING REFERENCE MATERIAL. IN ADDITION, THESE DRAWINGS SHALL REFLECT UPDATES AND MODIFICATIONS AS DETERMINED BY MONITORING ACTIVITIES.
2. THE INFORMATION ON THESE DRAWINGS ARE ACCURATE FOR WATER POLLUTION CONTROL PURPOSES ONLY.
3. PUBLIC ACCESS TO THE WORK SITE SHALL BE RESTRICTED.
4. ALL CONTRACTORS AND SUBCONTRACTORS WILL IMPLEMENT A POLICY OF "ZERO EXPOSURE" OF NON-VISIBLE POLLUTANTS TO STORMWATER RUN-ON OR RUN-OFF.
5. WORK VEHICLES SHALL BE RESTRICTED TO WORK AREAS OR ACCESS ROUTES ONLY.
6. STOCKPILES, CONSTRUCTION MATERIAL, AND WASTE MATERIALS SHALL BE PROTECTED FROM CONTACT WITH STORMWATER. STOCKPILES AND WASTE CONTAINERS SHALL BE COVERED AT THE END OF EACH WORKDAY AND PRIOR TO RAIN EVENTS.
7. CONSTRUCTION WASTE AND HAZARDOUS WASTE SHALL BE CONTAINED IN APPROPRIATE COVERED WASTE RECEPTACLES AND DISPOSED OF ON A REGULAR SCHEDULE.
8. THE SITE SHALL BE KEPT FREE FROM LITTER AND DEBRIS.
9. DRAWINGS SHALL BE UPDATED AND MAINTAINED IN THE ON-SITE SWPPP AND ELECTRONIC FILES.
10. ACTUAL SITE CONDITIONS, SCHEDULING OF OPERATIONS, METHODS OF OPERATION, AND WEATHER IMPACT THE EFFECTIVENESS OF THIS SWPPP. THE PERSONNEL RESPONSIBLE FOR DAILY ACTIVITIES ON THIS SITE SHALL REVIEW THIS SWPPP PRIOR TO COMMENCING WORK.
11. EXISTING WASTE COKE MATERIAL SHALL NOT BE TRANSPORTED OUT OF THE DESIGNATED AREA BY ANY MEANS.

INSTALLATION NOTES:

1. (SE-1, SE-5) LINEAR SEDIMENT CONTROLS (I.E. FIBER ROLL OR SILT FENCE) SHALL BE INSTALLED AT THE PERIMETER OF WORK AREAS AND ALONG ACCESS ROADS. LINEAR SEDIMENT CONTROLS SHALL BE INSTALLED AS SHOWN ON THESE DRAWINGS AT A MINIMUM, OR AS DEEMED APPROPRIATE BY THE QSP.
2. (TC-1) STABILIZED CONSTRUCTION ENTRANCE/EXIT SHALL BE LOCATED AT THE INTERSECTION OF UNPAVED ACCESS AND PAVED ROADS. (SE-7) PAVED ROADS SHALL BE INSPECTED DAILY AND SWEPT WHEN NECESSARY TO REMOVE SEDIMENT TRACKOUT.
3. (NS-3) PAVING AND GRINDING LOCATIONS WILL BE EQUIPPED WITH SPILL KITS AND CONTAINMENT. SLURRY FROM SAWCUTTING WILL NOT BE ALLOWED TO FLOW OFF SITE.
4. (NS-12) CONCRETE CURING PROCEDURES SHALL AVOID OVERSPRAYING AND MINIMIZE DRIFT OF CURING COMPOUNDS.
5. (NS-13) CONCRETE FINISHING. CONTAMINATED WATER FROM CONCRETE FINISHING SHALL BE DISPOSED OF PROPERLY.
6. (WM-3) ACTIVE STOCKPILES SHALL BE COVERED AT: THE END OF EACH DAY, WHEN NOT BEING USED, AND WHEN THE NATIONAL WEATHER SERVICE PREDICTS A 50% OR GREATER CHANCE OF PRECIPITATION.
7. (WM-8) CONCRETE WASTE MANAGEMENT. WASHOUT WILL OCCUR ONLY IN DESIGNATED AREAS WITH CONTAINMENT.
8. (WM-9) PORTABLE TOILETS SHALL HAVE CONTAINMENT AND BE SECURED TO PREVENT TIPPING. LOCATIONS WILL BE DETERMINED IN THE FIELD.

# LEGEND

- PROPOSED LINEAR SEDIMENT CONTROL (SC-1 OR SC-5)
- PROPOSED GRAVEL BAG CHECK DAM
- PROPOSED STABILIZED CONSTRUCTION ENTRANCE/EXIT
- SHEET FLOW DIRECTION ARROW
- PROPOSED CONCRETE
- PROPOSED ASPHALT PAVING
- PROPOSED GRAVEL SURFACES/ROADS
- PROPOSED GRAVEL EMERGENCY ACCESS ROAD
- PROPOSED RAILROAD TRACK
- TRIBUTARY DRAINAGE AREA LIMITS
- PROJECT POST-CONSTRUCTION SUB-WATERSHED LIMITS

DRAWING INDEX



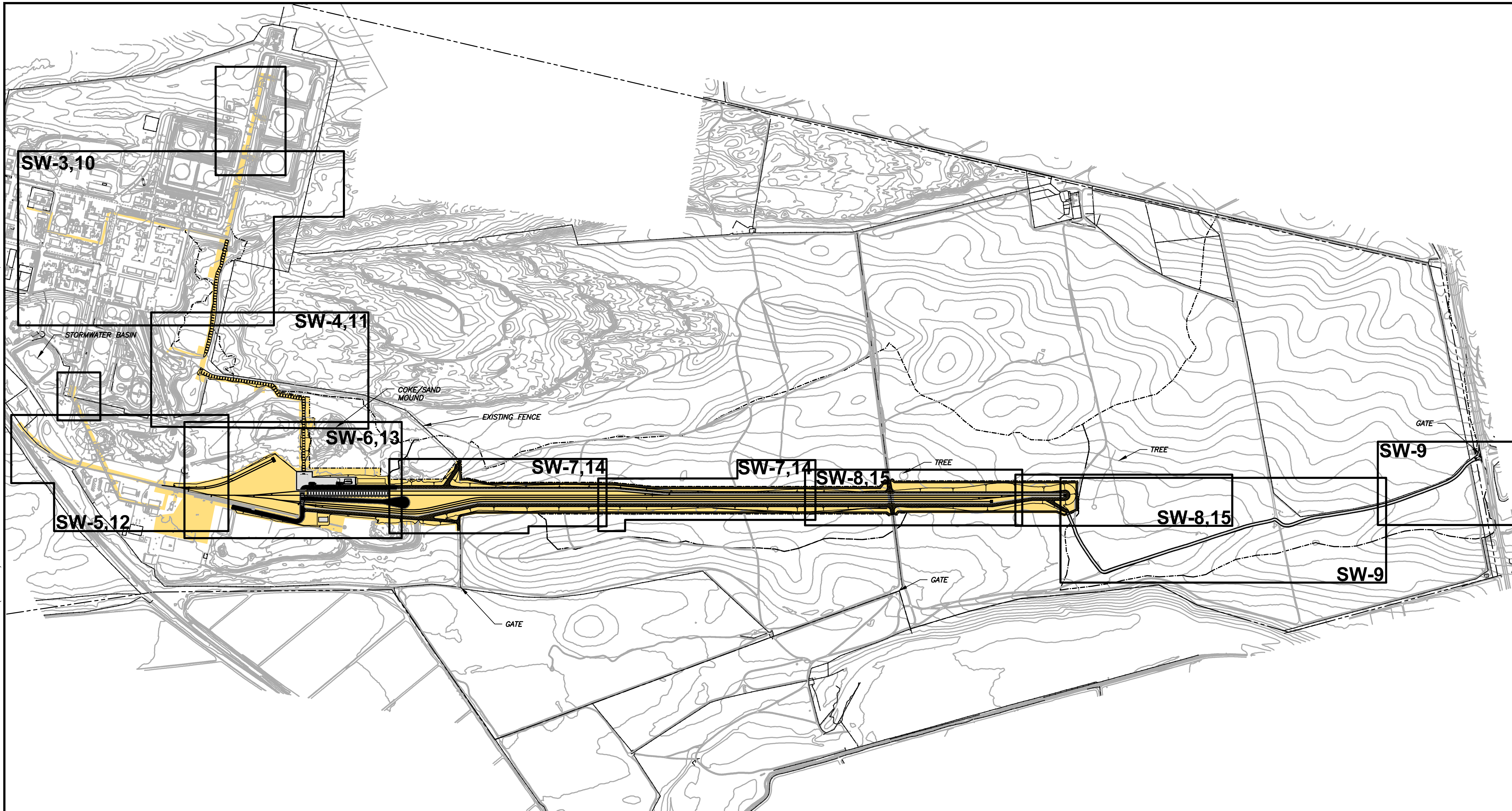
0 700 Feet

PHILLIPS 66 COMPANY
SAN LUIS OBISPO COUNTY, CALIFORNIA
**SANTA MARIA REFINERY RAIL PROJECT**
**STORM WATER POLLUTION PREVENTION PLAN**

**WATER POLLUTION CONTROL DRAWINGS**
**BMP NOTES & LEGEND**

ARCADIS

FIGURE
**SW-1**

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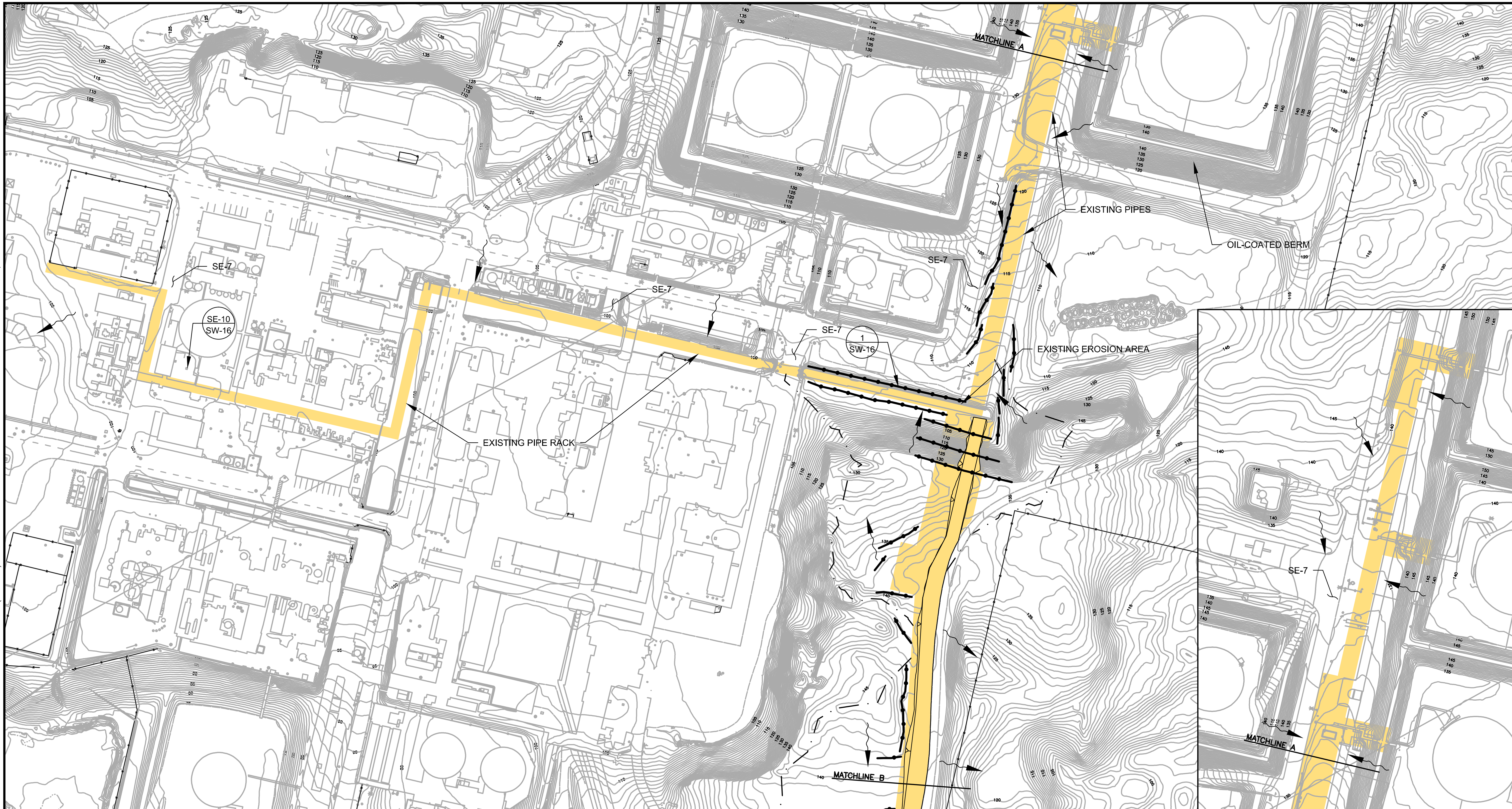
PHILLIPS 66 COMPANY
SAN LUIS OBISPO COUNTY, CALIFORNIA
**SANTA MARIA REFINERY RAIL PROJECT**
**STORM WATER POLLUTION PREVENTION PLAN**

**WATER POLLUTION CONTROL DRAWINGS**
**KEY MAP**

ARCADIS

FIGURE
**SW-2**

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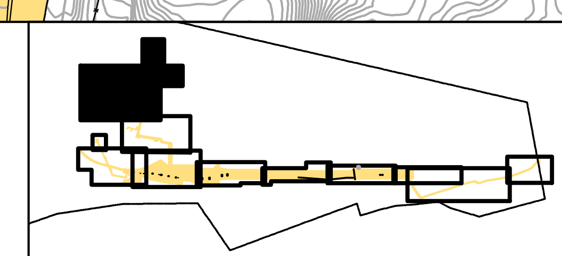

KEY MAP

PHILLIPS 66 COMPANY
SAN LUIS OBISPO COUNTY, CALIFORNIA
**SANTA MARIA REFINERY RAIL PROJECT**
**STORM WATER POLLUTION PREVENTION PLAN**

**WATER POLLUTION CONTROL DRAWINGS**
**MASS GRADING PHASE**

ARCADIS

FIGURE
**SW-3**

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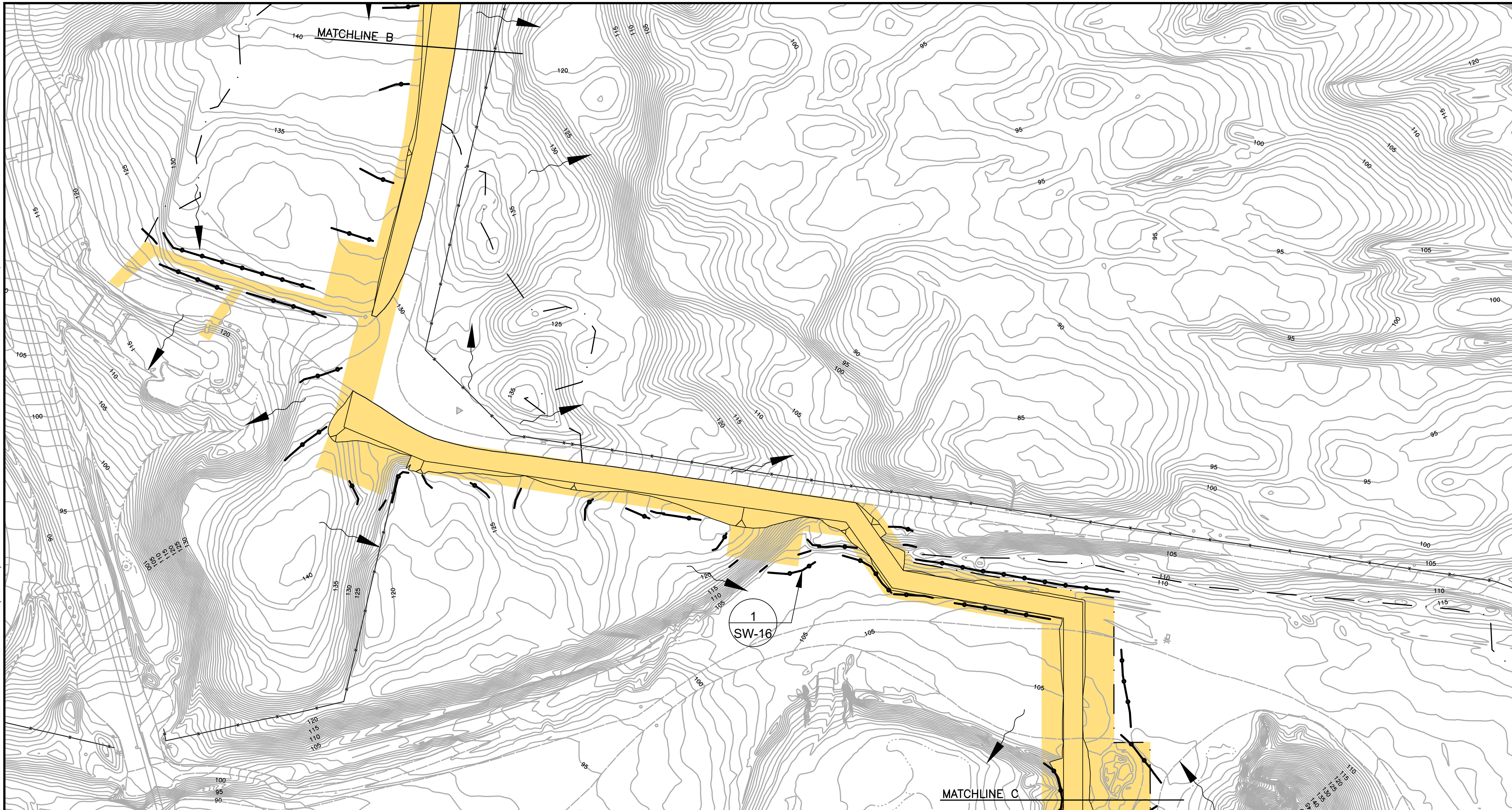


0 100 Feet

KEY MAP

PHILLIPS 66 COMPANY
SAN LUIS OBISPO COUNTY, CALIFORNIA
**SANTA MARIA REFINERY RAIL PROJECT**
**STORM WATER POLLUTION PREVENTION PLAN**

**WATER POLLUTION CONTROL DRAWINGS**
**MASS GRADING PHASE**

ARCADIS

FIGURE
**SW-4**





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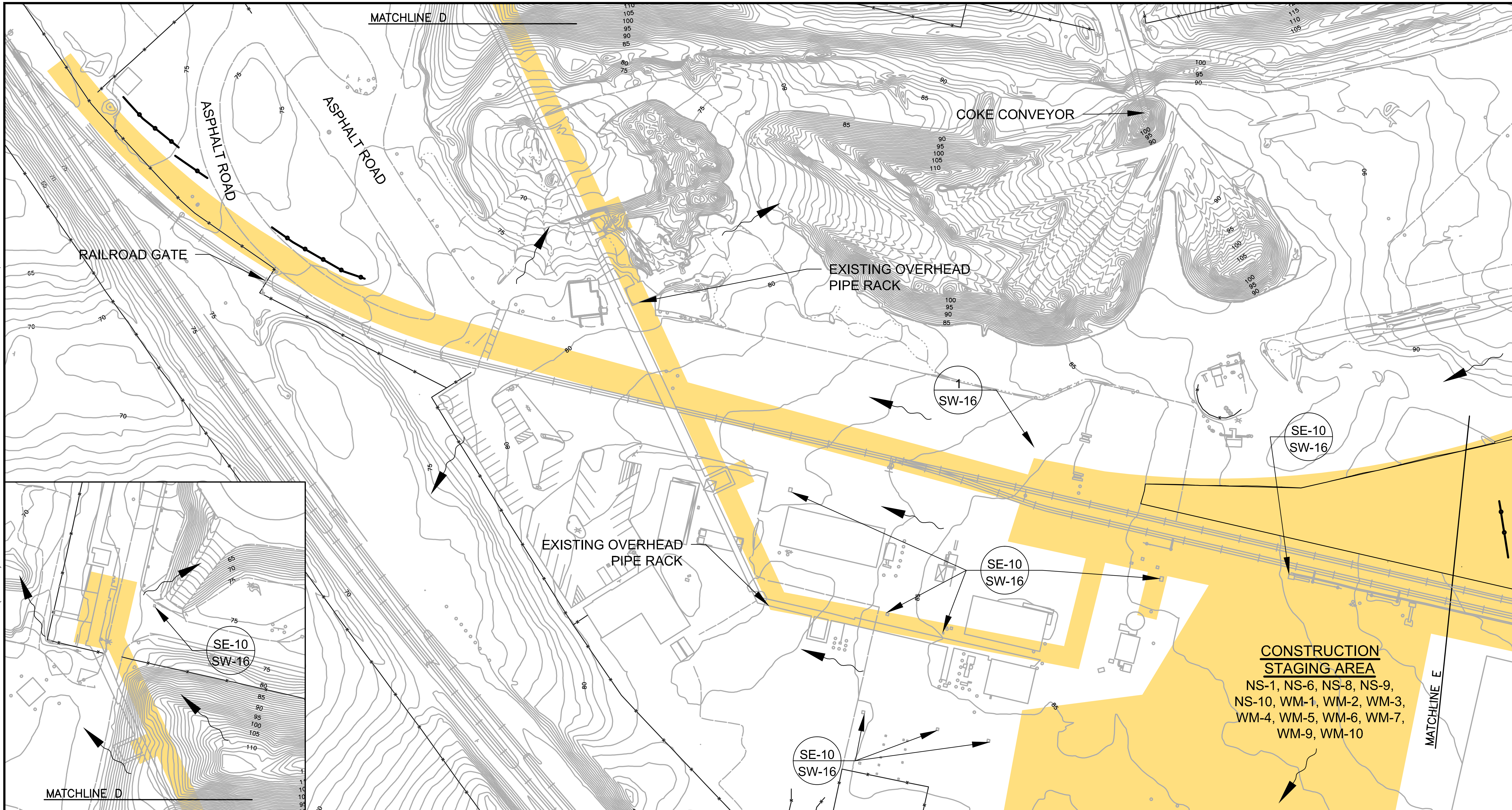
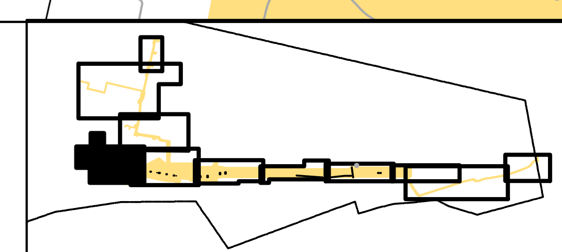
X-SITE BACKGROUND
X-TBLOCK
X-TOPO
5632_RAIL LAYOUT



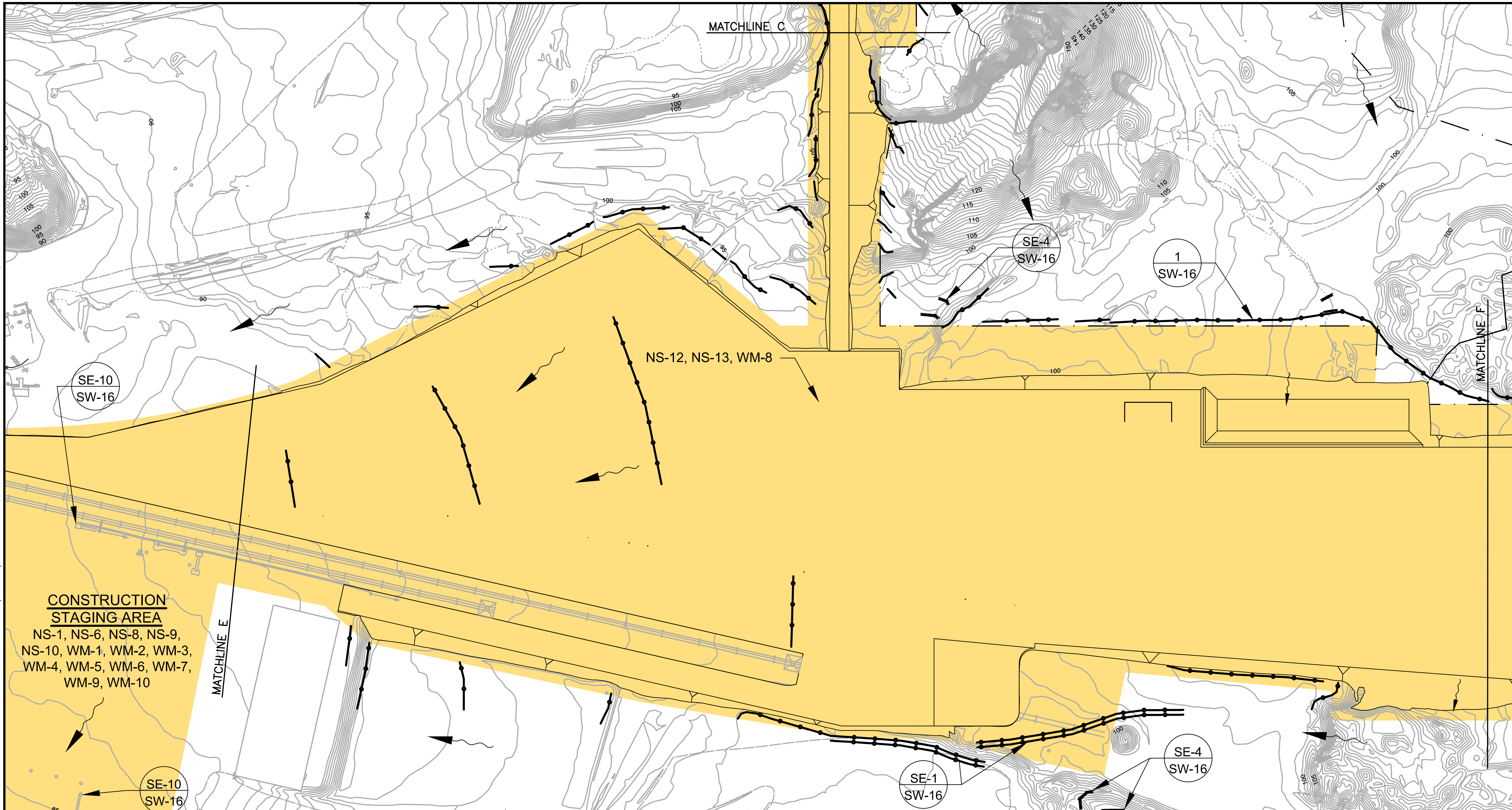
KEY MAP

PHILLIPS 66 COMPANY
SAN LUIS OBISPO COUNTY, CALIFORNIA
**SANTA MARIA REFINERY RAIL PROJECT**
**STORM WATER POLLUTION PREVENTION PLAN**

**WATER POLLUTION CONTROL DRAWINGS**
**MASS GRADING PHASE**

ARCADIS

FIGURE
**SW-5**

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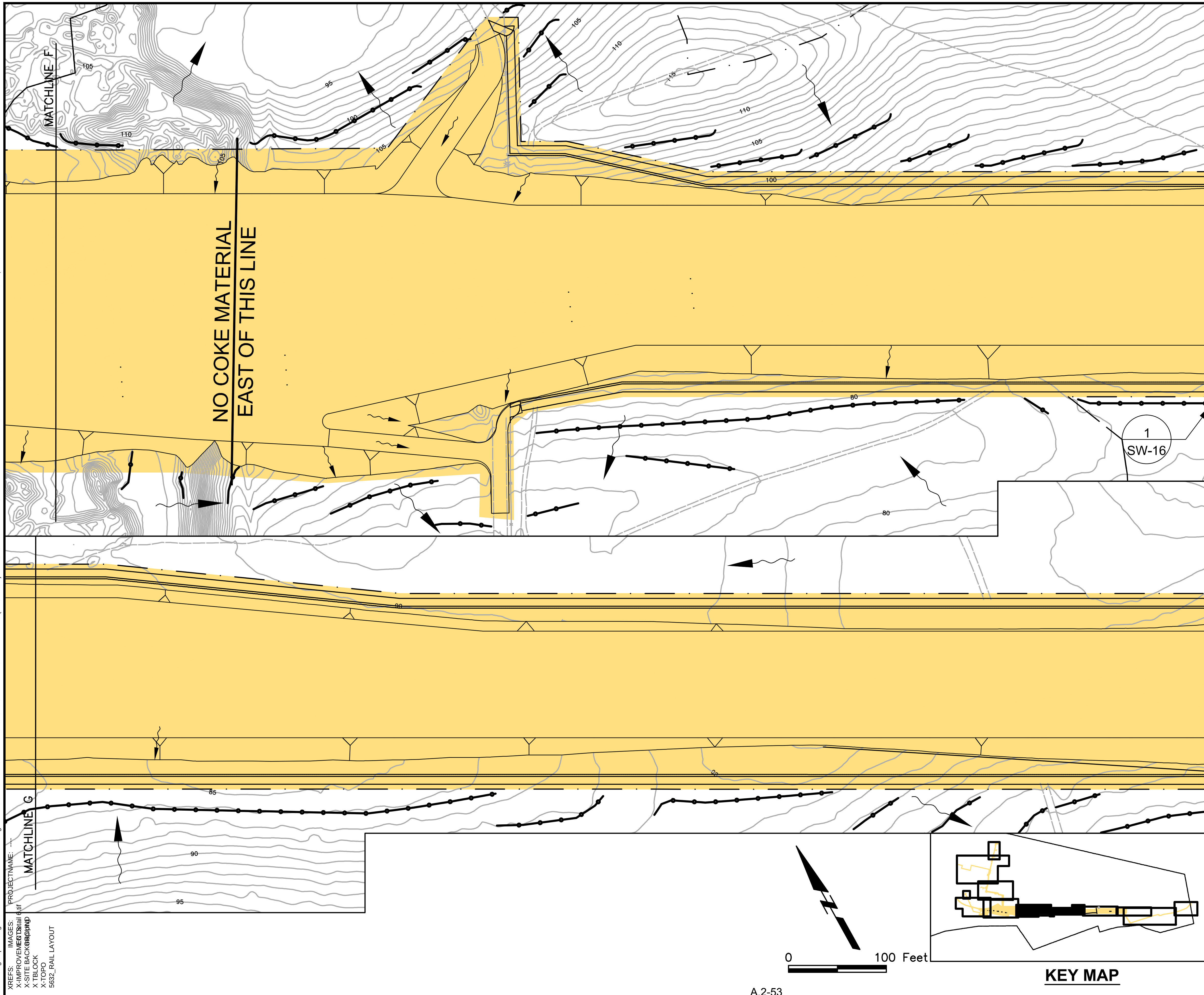
PHILLIPS 66 COMPANY
SAN LUIS OBISPO COUNTY, CALIFORNIA
**SANTA MARIA REFINERY RAIL PROJECT**
**STORM WATER POLLUTION PREVENTION PLAN**

**WATER POLLUTION CONTROL DRAWINGS**
**MASS GRADING PHASE**

ARCADIS

FIGURE
**SW-6**




PHILLIPS 66 COMPANY
SAN LUIS OBISPO COUNTY, CALIFORNIA
**SANTA MARIA REFINERY RAIL PROJECT**
**STORM WATER POLLUTION PREVENTION PLAN**

**WATER POLLUTION CONTROL DRAWINGS**
**MASS GRADING PHASE**

ARCADIS

FIGURE
**SW-7**

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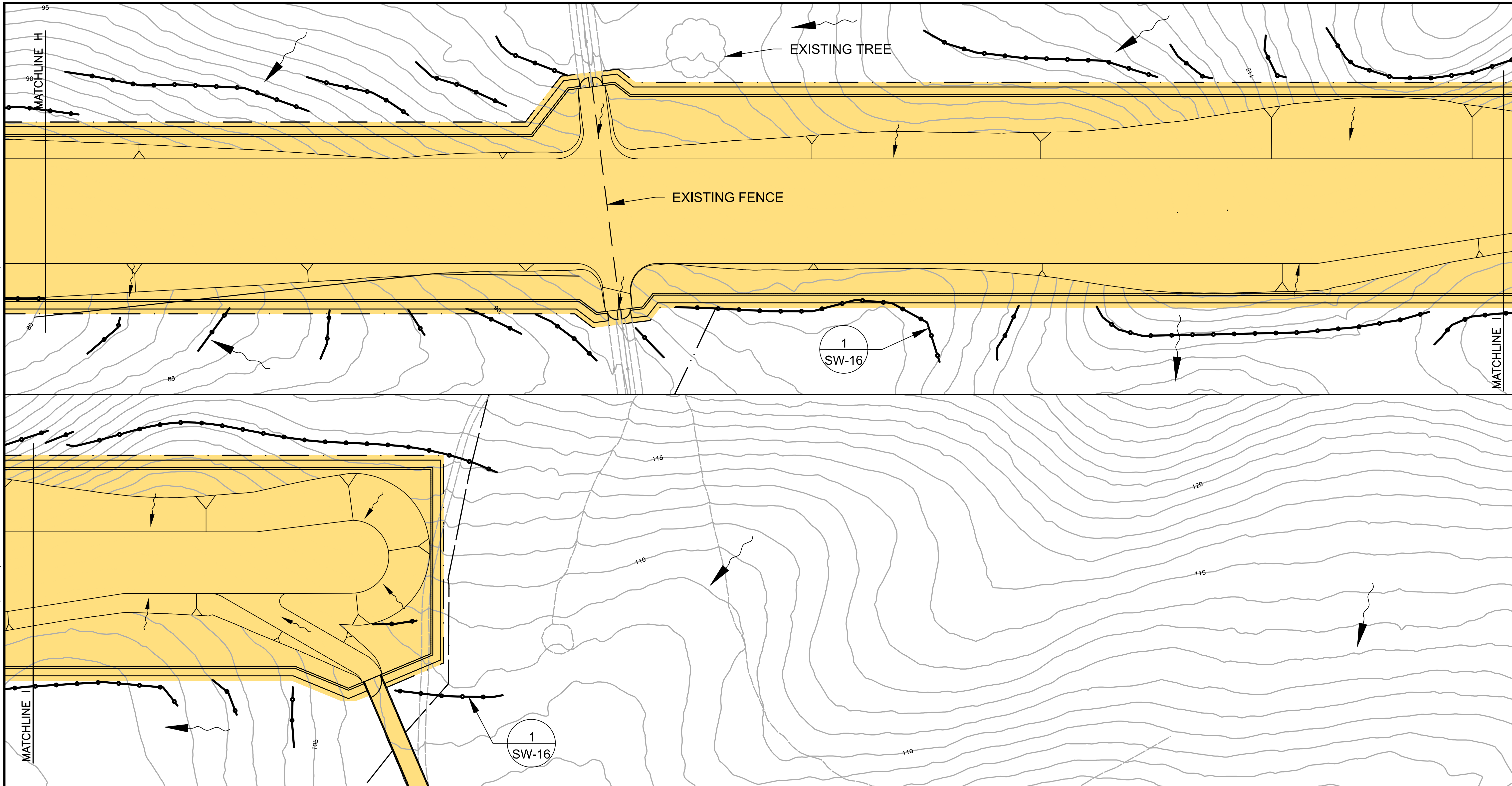
5632_RAIL LAYOUT

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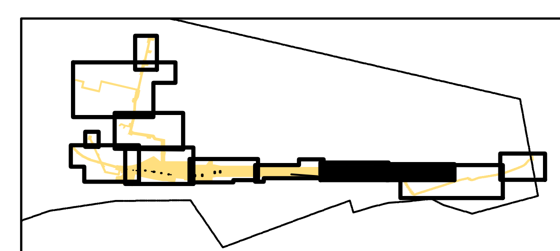


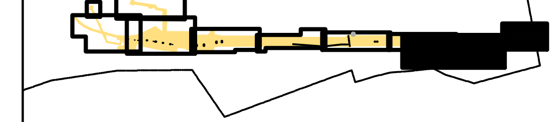
KEY MAP

PHILLIPS 66 COMPANY
SAN LUIS OBISPO COUNTY, CALIFORNIA
**SANTA MARIA REFINERY RAIL PROJECT**
**STORM WATER POLLUTION PREVENTION PLAN**

**WATER POLLUTION CONTROL DRAWINGS**
**MASS GRADING PHASE**

ARCADIS

FIGURE
**SW-8**

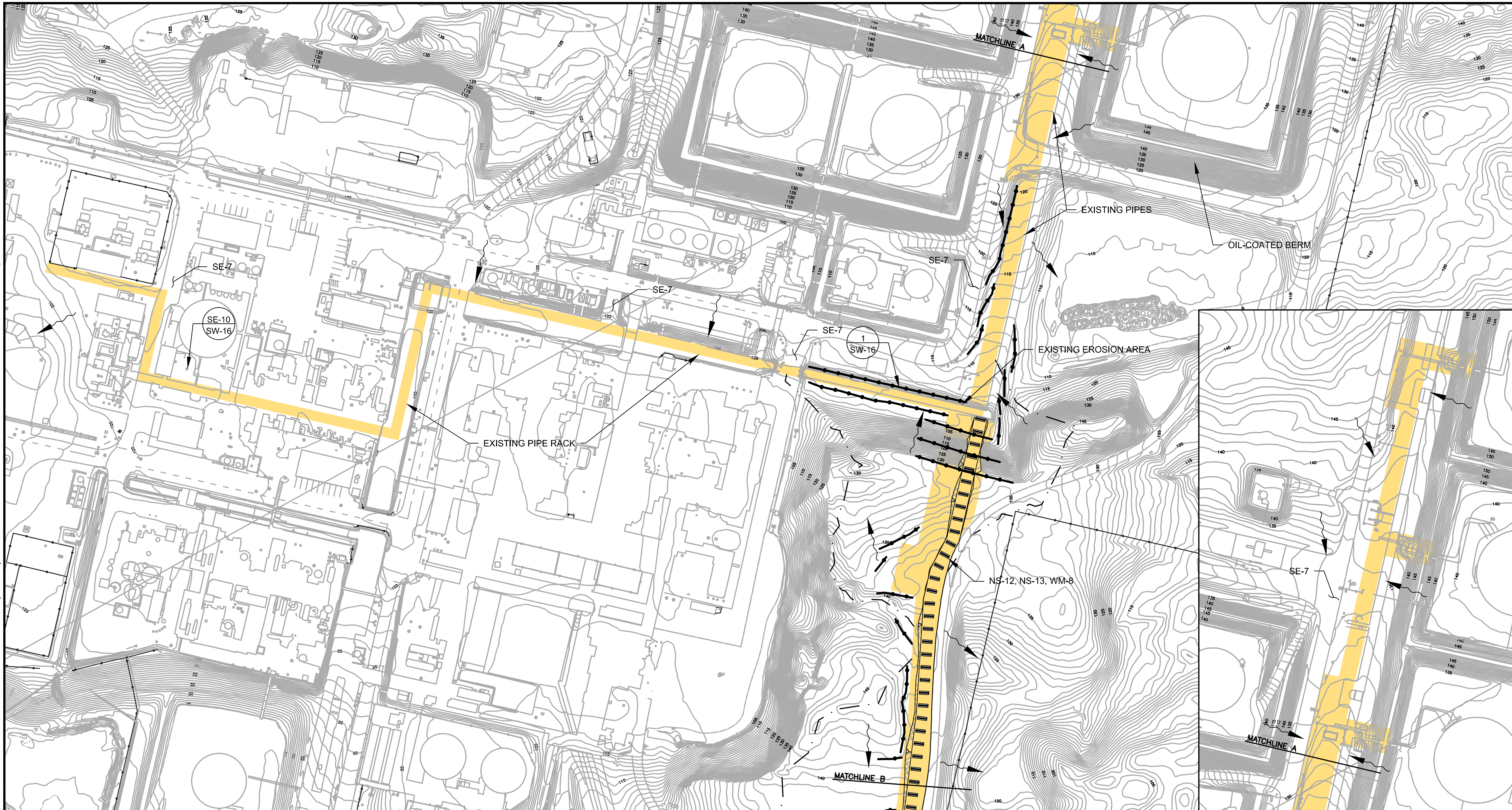
KEY MAP

PHILLIPS 66 COMPANY
SAN LUIS OBISPO COUNTY, CALIFORNIA
**SANTA MARIA REFINERY RAIL PROJECT**
**STORM WATER POLLUTION PREVENTION PLAN**

**WATER POLLUTION CONTROL DRAWINGS**
**MASS GRADING PHASE**

ARCADIS

FIGURE
**SW-9**

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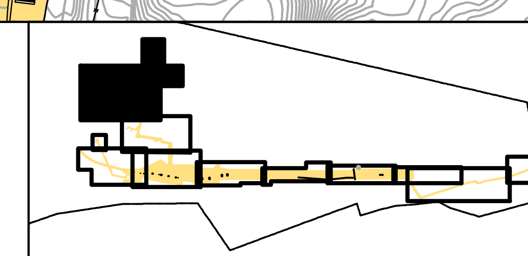

**KEY MAP**

PHILLIPS 66 COMPANY
SAN LUIS OBISPO COUNTY, CALIFORNIA
**SANTA MARIA REFINERY RAIL PROJECT**
**STORM WATER POLLUTION PREVENTION PLAN**

**WATER POLLUTION CONTROL DRAWINGS**
**IMPROVEMENTS CONSTRUCTION PHASE**

ARCADIS

FIGURE
**SW-10**

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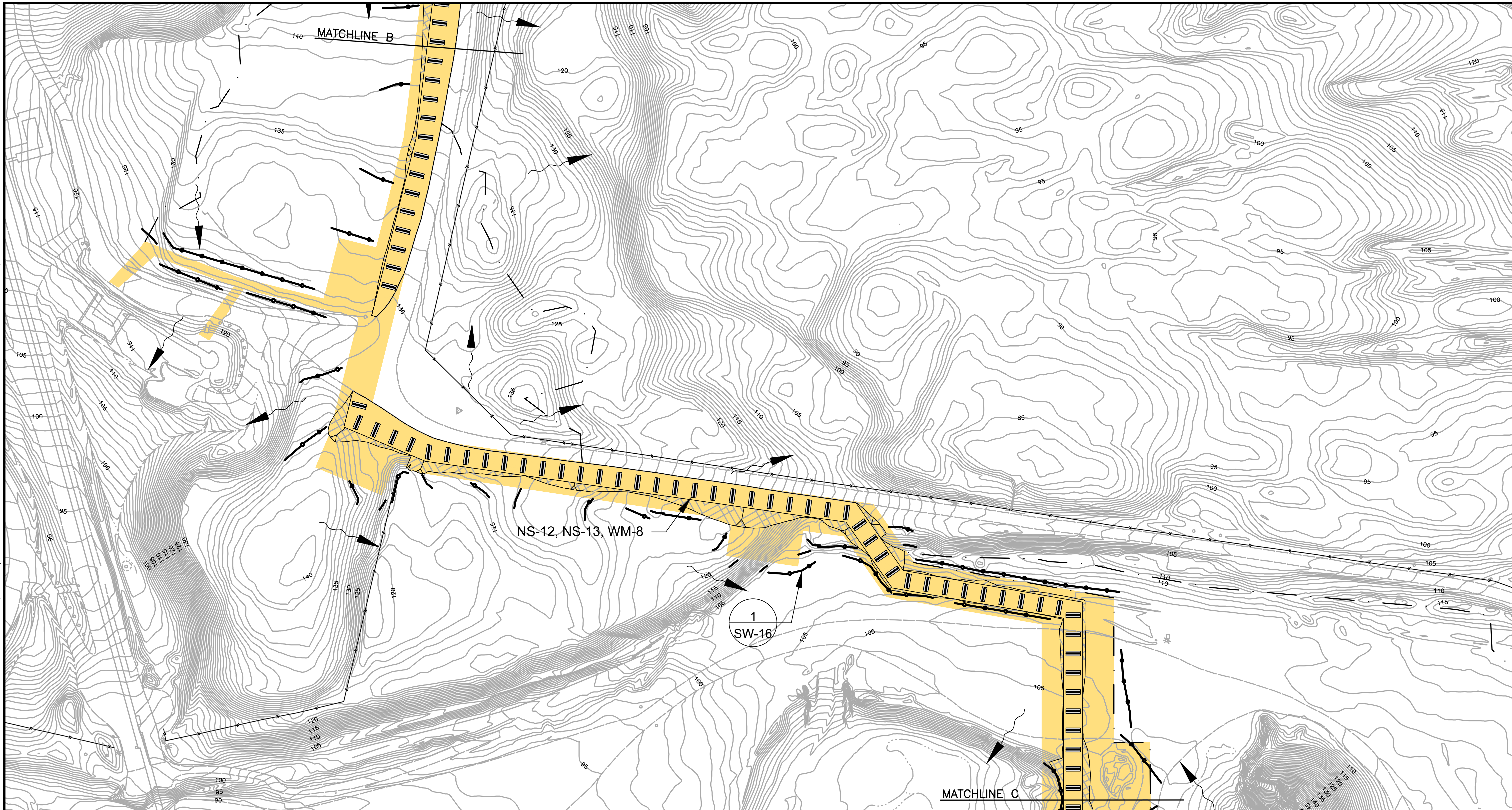
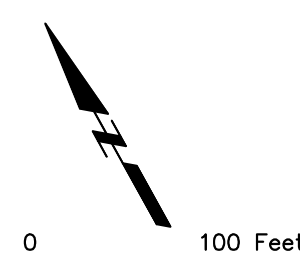
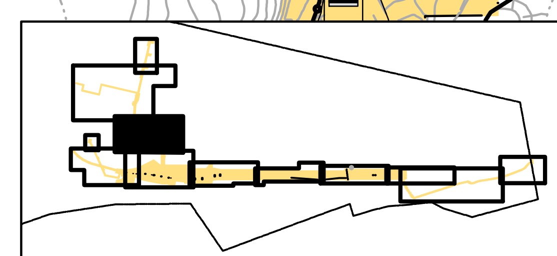
X TBLOCK
X-TOPO
5632_RAIL LAYOUT



KEY MAP

PHILLIPS 66 COMPANY
SAN LUIS OBISPO COUNTY, CALIFORNIA
**SANTA MARIA REFINERY RAIL PROJECT**
**STORM WATER POLLUTION PREVENTION PLAN**

**WATER POLLUTION CONTROL DRAWINGS**
**IMPROVEMENTS CONSTRUCTION PHASE**

ARCADIS

FIGURE
**SW-11**

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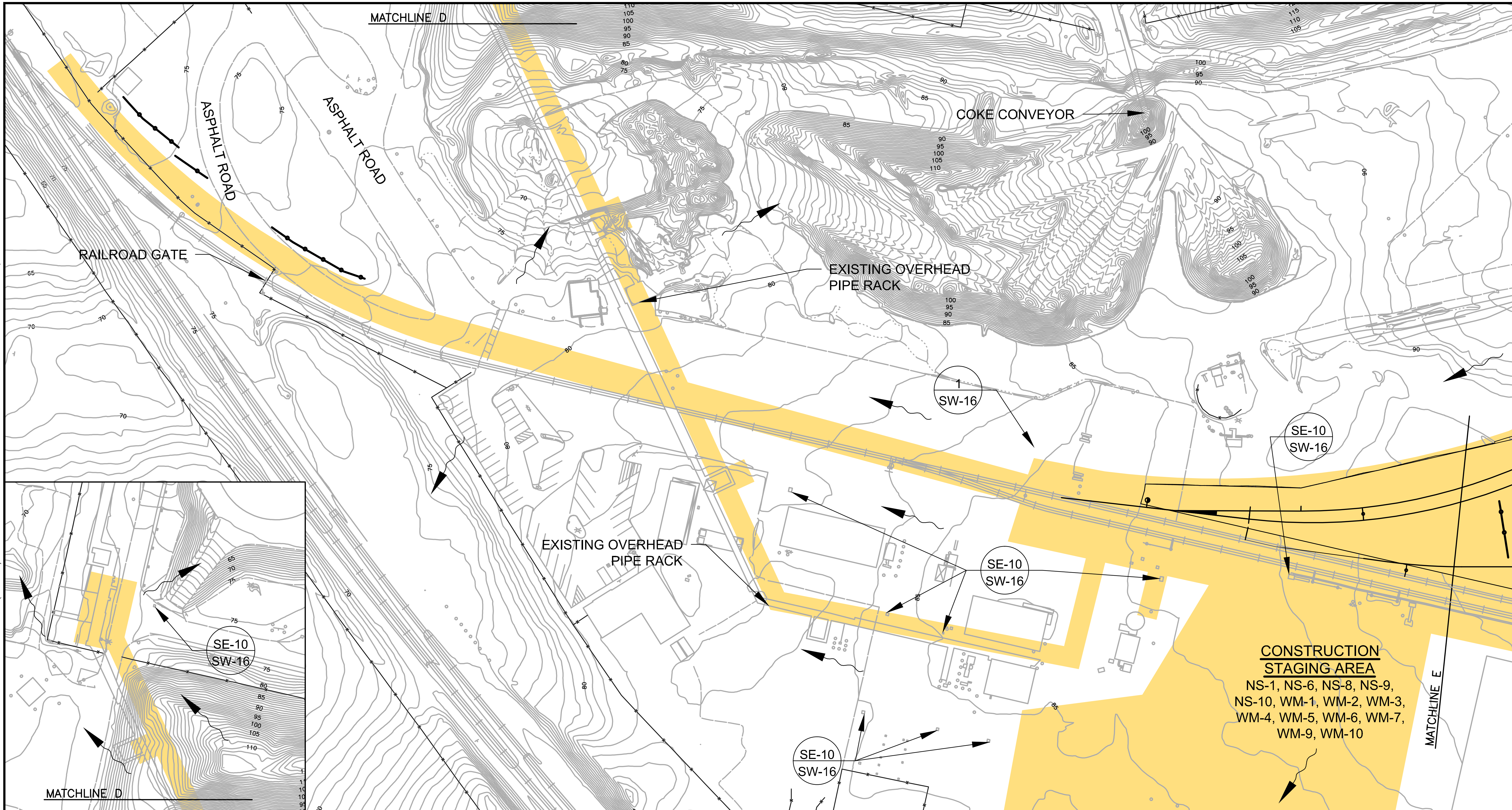


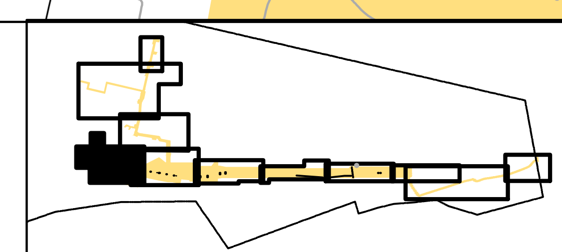

KEY MAP

PHILLIPS 66 COMPANY
SAN LUIS OBISPO COUNTY, CALIFORNIA
**SANTA MARIA REFINERY RAIL PROJECT**
**STORM WATER POLLUTION PREVENTION PLAN**

**WATER POLLUTION CONTROL DRAWINGS**
**IMPROVEMENTS CONSTRUCTION PHASE**

ARCADIS

FIGURE
**SW-12**





PLOTTED: 10/16/2013 8:23 AM BY: OBERBAUER, PAUL
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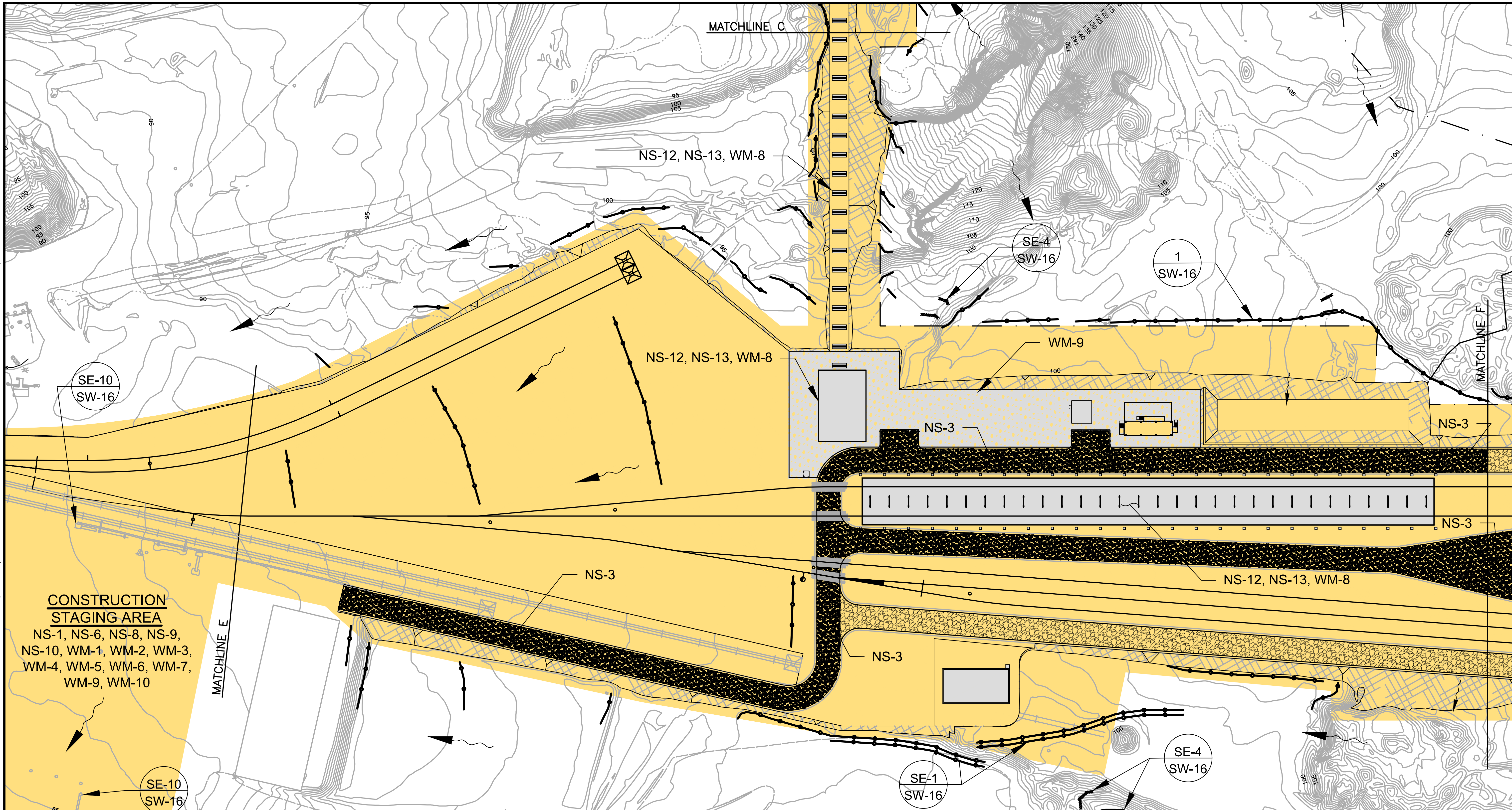



KEY MAP

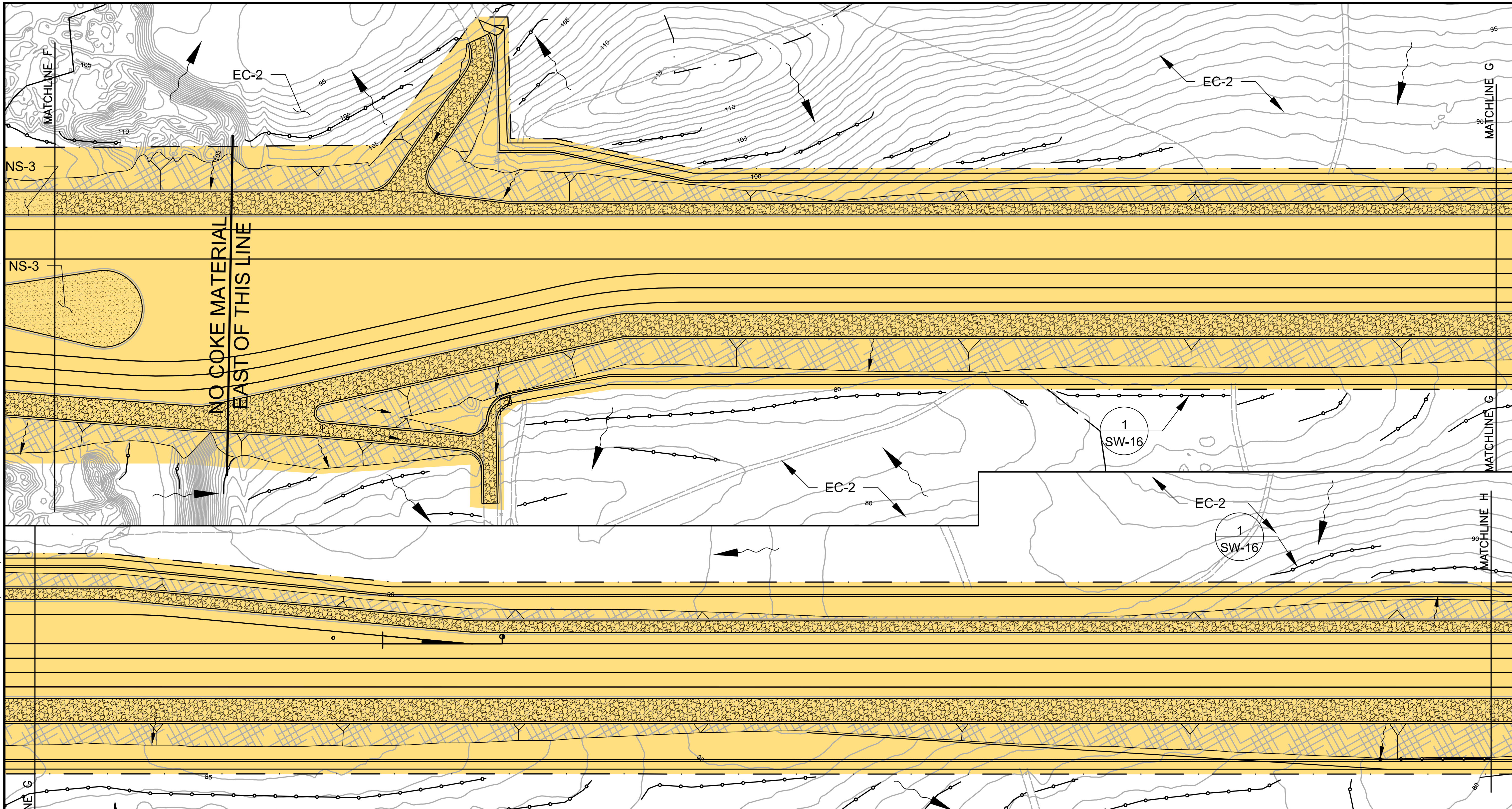
PHILLIPS 66 COMPANY
SAN LUIS OBISPO COUNTY, CALIFORNIA
**SANTA MARIA REFINERY RAIL PROJECT**
**STORM WATER POLLUTION PREVENTION PLAN**

**WATER POLLUTION CONTROL DRAWINGS**
**IMPROVEMENTS CONSTRUCTION PHASE**

ARCADIS

FIGURE
**SW-13**

Phillips SMR Rail Project EIR

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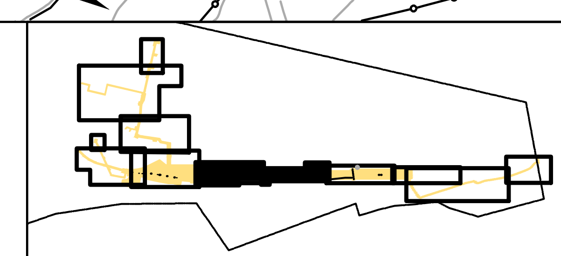

KEY MAP

PHILLIPS 66 COMPANY
SAN LUIS OBISPO COUNTY, CALIFORNIA
**SANTA MARIA REFINERY RAIL PROJECT**
**STORM WATER POLLUTION PREVENTION PLAN**

**WATER POLLUTION CONTROL DRAWINGS**
**IMPROVEMENTS CONSTRUCTION PHASE**

ARCADIS

FIGURE
**SW-14**

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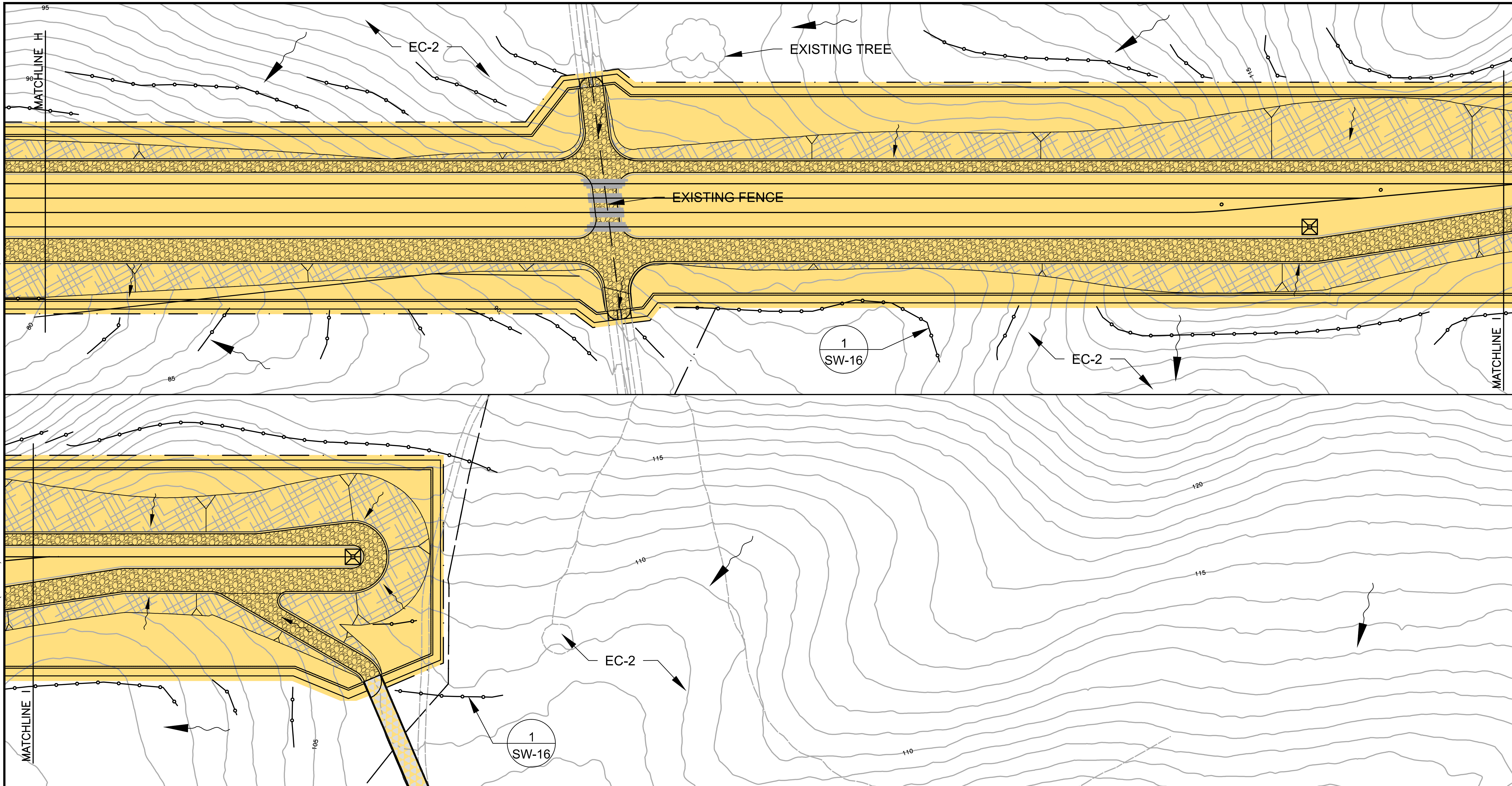
X TBLOCK
X-TOPO
5632_RAIL LAYOUT




PHILLIPS 66 COMPANY
SAN LUIS OBISPO COUNTY, CALIFORNIA
**SANTA MARIA REFINERY RAIL PROJECT**
**STORM WATER POLLUTION PREVENTION PLAN**

**WATER POLLUTION CONTROL DRAWINGS**
**IMPROVEMENTS CONSTRUCTION PHASE**

ARCADIS

FIGURE
**SW-15**





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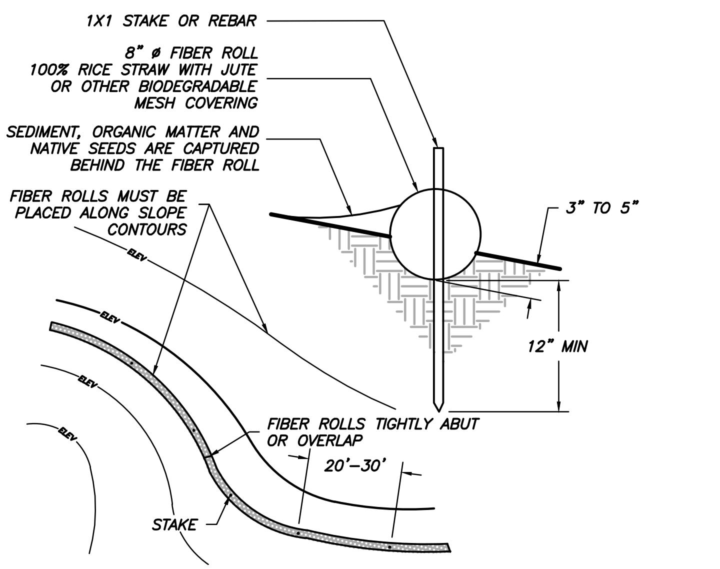
X TBLOCK
X-TOPO
5632_RAIL LAYOUT

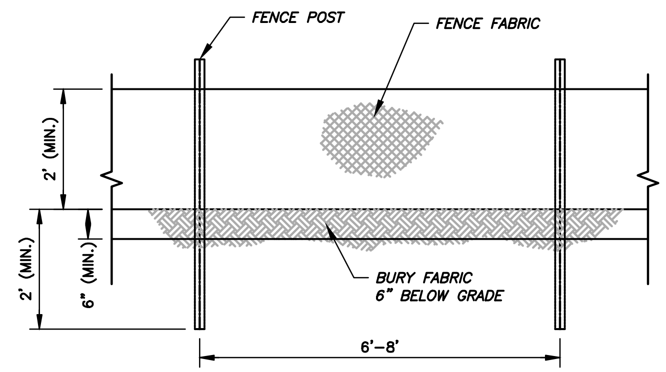



NOTES:

1. INSPECT AND REPAIR FIBER ROLL AFTER EACH STORM EVENT AND REMOVE MATERIAL WHEN NECESSARY.
2. REMOVED SEDIMENT SHALL BE DEPOSITED TO AN AREA THAT WILL NOT CONTRUBUTE SEDIMENT OFF–SITE AND CAN BE PERMANENTLY STABILIZED.
3. FIBER ROLLS SHALL BE PLACED ALONG CONTOURS SUCH THAT SHEET FLOW CANNOT CONTINUE FOR MORE THAN 20 LF BEFORE REACHING ANOTHER FIBER ROLL ON SLOPES OF 0–25% AND 15 LF FOR 25–50%.

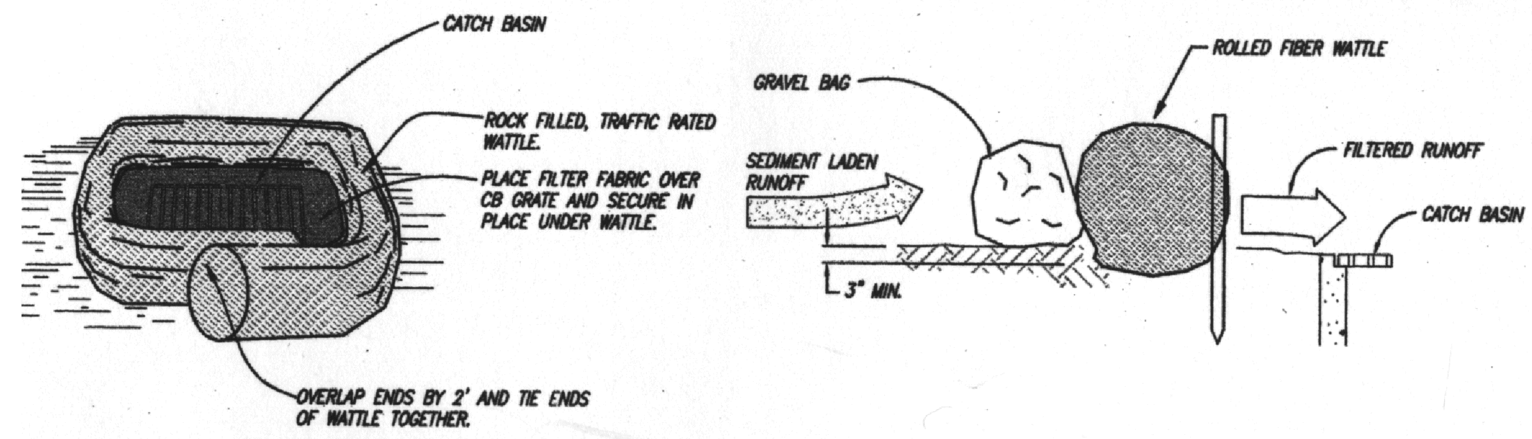
## FIBER ROLL DETAIL (SE-5) 1

NOT TO SCALE



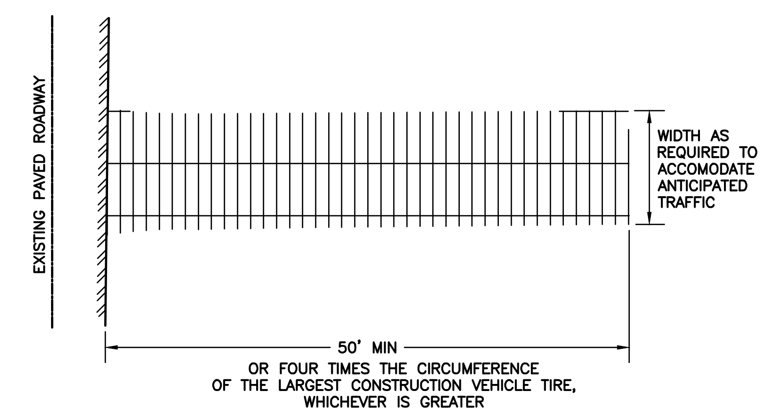

## SILT FENCE DETAIL SE-1

NOT TO SCALE




## INLET PROTECTION (TYP) SE-10

NOT TO SCALE




PLAN
NTS

## STABILIZED CONSTRUCTION ENTRANCE/EXIT TC-1

NOT TO SCALE

PHILLIPS 66 COMPANY
SAN LUIS OBISPO COUNTY, CALIFORNIA
**SANTA MARIA REFINERY RAIL PROJECT**
**STORM WATER POLLUTION PREVENTION PLAN**

**WATER POLLUTION CONTROL DRAWINGS**
**BMP NOTES & LEGEND**

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FIGURE
**SW-16**

## Appendix A

PERMIT REGISTRATION
DOCUMENTS AND
CALCULATIONS

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California 95131
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Fax 408 456 0320
**www.arcadis-us.com**

ENVIRONMENT

Central Coast Regional Water Quality Control Board
895 Aerovista Place, Suite 101
San Luis Obispo, CA. 93401-7906

Subject:
Phillips 66 Santa Maria Refinery Rail Project SWPPP - Low Receiving Water Risk Justification

Date:
September 12, 2013

Contact:
Tim Rumbolz, CPESC, QSD
Phone:
408-797-2009

Email:
Timothy.Rumbolz@arcadis-us.com

Our ref:
04597003.0000.00009

To Whom It May Concern:

In preparation for the Storm Water Pollution Prevention Plan (SWPPP) for the Phillips 66 Santa Maria Refinery Rail Project ("the project"), ARCADIS prepared a project risk determination that concluded that the project's receiving waters are low risk water bodies, contrary to the default conclusion of high risk for the project location in the Stormwater Multiple Applications Tracking System (SMARTS). The receiving waters in the project's watershed include Little Oso Flaco Creek, Oso Flaco Creek, and Oso Flaco Lake, which discharges to the Pacific Ocean (see attached Watershed Map obtained from the Coastal San Luis Resource Conservation District).

**Conditions for High Receiving Water Risk**

According to the California Station Construction General Permit ("General Permit"; Order 2009-0009-DWQ amended by 2010-0014-DWQ & 2012-0006-DWQ), a receiving water of a site must either be listed as impaired for sediment, have an active total maximum daily load (TMDL) for sediment, or have the beneficial uses of COLD, SPAWN, and MIGRATORY ("high risk beneficial uses", all three must be listed to be considered high risk).

Per the Central Coast Region Basin Plan and interactive Section 303(d) map, Oso Flaco Creek is listed as impaired for sediment toxicity, but not for sediment. Annalisa Kihara of the State Water Resources Control Board indicated in a telephone conversation on September 4, 2013 that impairment for sediment toxicity is different than impairment for sediment.

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Central Coast Regional
Water Quality Control
Board
September 12, 2013

**Project Receiving Waters**

**Little Oso Flaco Creek**
Sediment impairment: No
Sediment TMDL: No
High Risk Beneficial Uses: Not in Basin Plan
Receiving Water Risk: **Low**

**Oso Flaco Creek**
Sediment impairment: No
Sediment TMDL: No
High Risk Beneficial Uses: None
Receiving Water Risk: **Low**

**Oso Flaco Lake**
Sediment impairment: No
Sediment TMDL: No
High Risk Beneficial Uses: SPAWN
Receiving Water Risk: **Low**

(Please refer to attached excerpts from 303(d) Impaired Water Bodies list and the Basin Plan for listed impairments and beneficial uses of the receiving waters).

Therefore, ARCADIS proposes that the receiving water risk for the project is Low.

Sincerely,

Tim J. Rumbolz, CPESC #7361, QSD #24202
Project Environmental Engineer


1
101
227
Legend
CSLRCD Boundary
Morro Creek Watershed
Morro Bay Watershed
San Luis Obispo Creek Watershed
Pismo Creek Watershed
Arroyo Grande Creek Watershed
Nipomo Creek Watershed
Oso Flaco Lake Watershed
Santa Maria River Watershed
Project Location

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | ◦ Unknown Nonpoint Source | | | | |
| | | | | • Low Dissolved Oxygen<br>◦ Agriculture<br>◦ Removal of Riparian Vegetation<br>◦ Unknown Nonpoint Source | 3.9 Miles | 2010 | 5A | 2013 |
| | | | | • Nitrate<br>◦ Agriculture<br>◦ Removal of Riparian Vegetation<br>◦ Unknown Nonpoint Source | 3.9 Miles | 2010 | 5A | 2013 |
| | | | | • Temperature, water<br>◦ Agriculture<br>◦ Removal of Riparian Vegetation<br>◦ Unknown Nonpoint Source | 3.9 Miles | 2010 | 5A | 2013 |
| | | | | • Turbidity<br>◦ Agriculture<br>◦ Removal of Riparian Vegetation | 3.9 Miles | 2010 | 5A | 2013 |
| | | | | • Unknown Toxicity<br>◦ Agriculture<br>◦ Unknown Nonpoint Source | 3.9 Miles | 2010 | 5A | 2013 |
| 3 | Harkins Slough | River & Stream | 30510013 / 18060002 | • Chlorophyll-a<br>◦ Source Unknown | 7.3 Miles | 2010 | 5A | 2021 |
| | | | | • Low Dissolved Oxygen<br>◦ Source Unknown | 7.3 Miles | 2010 | 5A | 2021 |
| | | | | • Pathogens<br>◦ Source Unknown | 7.3 Miles | 2010 | 5B | 2007 |
| 3 | Jalama Creek | River & Stream | 31510051 / 18060013 | • Chloride<br>◦ Grazing-Related Sources<br>◦ Natural Sources | 10 Miles | 2010 | 5A | 2021 |
| | | | | • Sodium<br>◦ Grazing-Related Sources<br>◦ Natural Sources | 10 Miles | 2010 | 5A | 2021 |
| 3 | Las Tablas Creek | River & Stream | 30981293 / 18060005 | • Metals<br>◦ Surface Mining | 5.7 Miles | 1990 | 5A | 2021 |
| 3 | Las Tablas Creek, North Fork | River & Stream | 30981290 / 18060005 | • Metals<br>◦ Surface Mining | 6.5 Miles | 1990 | 5A | 2021 |
| 3 | Las Tablas Creek, South Fork | River & Stream | 30981290 / 18060006 | • Metals<br>◦ Surface Mining | 4.7 Miles | 1990 | 5A | 2021 |
| 3 | Little Oso Flaco Creek | River & Stream | 31210030 / 18060008 | • Fecal Coliform<br>◦ Source Unknown | 1.8 Miles | 2010 | 5A | 2013 |
| | | | | • Nitrate<br>◦ Agriculture<br>◦ Groundwater Loadings | 1.8 Miles | 2010 | 5A | 2013 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | • Sediment Toxicity<br>∘ Agriculture | 1.8 Miles | 2010 | 5A | 2013 |
| | | | | • Unknown Toxicity<br>∘ Agriculture | 1.8 Miles | 2010 | 5A | 2013 |
| 3 | Llagas Creek (above Chesbro Reservoir) | River & Stream | 30520014 / 18060002 | • Temperature, water<br>∘ Source Unknown | 9.4 Miles | 2010 | 5A | 2021 |
| | | | | • pH<br>∘ Source Unknown | 9.4 Miles | 2010 | 5A | 2021 |
| 3 | Llagas Creek (below Chesbro Reservoir) | River & Stream | 30530020 / 18060002 | • Chloride<br>∘ Nonpoint Source<br>∘ Point Source<br>*Impaired section for Chlorides is located downstream of confluence with Miller Slough (approximately 1 mile of stream near Southside Drive).* | 16 Miles | 2002 | 5A | 2021 |
| | | | | • Chlorpyrifos<br>∘ Agriculture<br>∘ Source Unknown | 16 Miles | 2010 | 5A | 2021 |
| | | | | • Electrical Conductivity<br>∘ Source Unknown | 16 Miles | 2010 | 5A | 2021 |
| | | | | • Escherichia coli (E. coli)<br>∘ Source Unknown | 16 Miles | 2010 | 5A | 2011 |
| | | | | • Fecal Coliform<br>∘ Natural Sources<br>∘ Nonpoint Source<br>∘ Pasture Grazing-Riparian and/or Upland<br>*Impaired section for Fecal Coliform is located between the confluence with Church Creek and the confluence with Pajaro River (approximately 9.5 miles of stream length).* | 16 Miles | 2002 | 5A | 2011 |
| | | | | • Low Dissolved Oxygen<br>∘ Agricultural Return Flows<br>∘ Habitat Modification<br>∘ Irrigated Crop Production<br>∘ Municipal Point Sources<br>*This listing was made by USEPA.* | 16 Miles | 2002 | 5A | 2021 |
| | | | | • Nutrients<br>∘ Agricultural Return Flows<br>∘ Agriculture<br>∘ Agriculture-irrigation tailwater<br>∘ Agriculture-storm runoff<br>∘ Habitat Modification<br>∘ Irrigated Crop Production<br>∘ Municipal Point Sources<br>∘ Nonpoint Source<br>∘ Pasture Grazing-Riparian and/or Upland<br>∘ Unknown Point Source<br>∘ Urban Runoff/Storm Sewers<br>*Nutrients Medium 16 Impaired section for Nutrients is located between the confluence with Church Creek and the confluence with Pajaro River (approximately 9.5 miles of stream length).* | 16 Miles | 1996 | 5B | 2006 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | • Sediment Toxicity<br>◦ Agriculture<br>◦ Other Urban Runoff | 10 Miles | 2010 | 5A | 2013 |
| | | | | • Sodium<br>◦ Source Unknown | 10 Miles | 2010 | 5A | 2013 |
| | | | | • Temperature, water<br>◦ Agriculture<br>◦ Grazing-Related Sources<br>◦ Removal of Riparian Vegetation | 10 Miles | 2010 | 5A | 2013 |
| | | | | • Turbidity<br>◦ Agriculture<br>◦ Grazing-Related Sources<br>◦ Removal of Riparian Vegetation | 10 Miles | 2010 | 5A | 2013 |
| | | | | • Unknown Toxicity<br>◦ Agriculture<br>◦ Grazing-Related Sources<br>◦ Other Urban Runoff<br>◦ Removal of Riparian Vegetation | 10 Miles | 2010 | 5A | 2013 |
| 3 | Oso Flaco Creek | River & Stream | 31210030 / 18060008 | • Ammonia (Unionized)<br>◦ Agriculture<br>◦ Unknown Nonpoint Source | 6.3 Miles | 2006 | 5A | 2013 |
| | | | | • Chloride<br>◦ Agriculture<br>◦ Source Unknown | 6.3 Miles | 2010 | 5A | 2013 |
| | | | | • Fecal Coliform<br>◦ Agriculture<br>◦ Natural Sources<br>◦ Source Unknown | 6.3 Miles | 2002 | 5A | 2013 |
| | | | | • Nitrate<br>◦ Agriculture<br>◦ Groundwater Loadings | 6.3 Miles | 2002 | 5A | 2013 |
| | | | | • Sediment Toxicity<br>◦ Agriculture<br>◦ Unknown Nonpoint Source | 6.3 Miles | 2010 | 5A | 2013 |
| | | | | • Sodium<br>◦ Agriculture<br>◦ Unknown Nonpoint Source | 6.3 Miles | 2010 | 5A | 2013 |
| | | | | • Unknown Toxicity<br>◦ Agriculture<br>◦ Unknown Nonpoint Source | 6.3 Miles | 2010 | 5A | 2013 |
| 3 | Oso Flaco Lake | Lake & Reservoir | 31210030 / 18060008 | • Dieldrin<br>◦ Agriculture<br>◦ Source Unknown | 56 Acres | 2006 | 5A | 2013 |
| | | | | • Nitrate<br>◦ Agriculture | 56 Acres | 2002 | 5A | 2013 |
| 3 | Pacheco Creek | River & | 30540021 / | • Fecal Coliform<br>◦ Agriculture | 25 Miles | 2010 | 5A | 2120 |

Table 2-1. Identified Uses of Inland Surface Waters

| Waterbody Names | MUN | AGR | PRO | IND | GWR | REC1 | REC2 | WILD | COLD | WARM | MIGR | SPWN | BIOL | RARE | EST | FRESH | NAV | POW | COMM | AQUA | SAL | SHELL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| White Lake " " | | | | | X | X | X | X | | X | | X | | X | | | | | X | | | |
| Mud Lake " " | | | | | X | X | X | X | | X | | X | | X | | | | | X | | | |
| Black Lake " " | | | | | X | X | X | X | | X | | X | | X | | | | | X | | | |
| Dune Lakes Marsh Area " " | | | | | X | X | X | X | | X | | X | | X | | | | | X | | | |
| **CARRIZO PLAIN HYDROLOGIC UNIT** | | | | | | | | | | | | | | | | | | | | | | |
| San Diego Creek | X | X | | | X | X | X | X | | X | | | X | X | | X | | | X | | | |
| Soda Lake | | | | X | | | X | X | | X | | | X | X | | | | | X | | | |
| **SANTA MARIA HYDROLOGIC UNIT** | | | | | | | | | | | | | | | | | | | | | | |
| Oso Flaco Lake | | | | | X | X | X | X | | X | | X | X | X | | | X | | X | | | |
| Oso Flaco Creek | X | X | | | X | X | X | X | | X | | | X | X | | X | | | X | | | |
| Santa Maria River Estuary | | | | | X | X | X | X | | X | X | X | X | X | X | | | | X | | | X |
| Santa Maria River | X | X | | X | X | X | X | X | X | X | X | | | X | | X | | | X | | | |
| Corralitos Canyon Creek | X | X | | | | X | X | X | | | | | | | | | | | X | | | |
| Sisquoc River, downstream | X | X | | X | X | X | X | X | X | X | X | X | | | | | | | X | | | |
| Sisquoc River, upstream | X | | | | X | X | X | X | X | | X | X | X | X | | | | | X | | | |
| Cuyama River, downstream | X | X | | | X | X | X | X | | X | | | | X | | | | | X | | | |
| Twitchell Reservoir | X | X | | | X | | X | X | | X | | | | X | | X | | | X | | | |
| Cuyama River, upstream | X | X | X | X | X | X | X | X | X | X | | X | | X | | X | | | X | | | |
| Alamo Creek | X | X | | | X | X | X | X | X | X | | X | | X | | | | | X | | | |
| Huasna River | X | X | | | X | X | X | X | | X | | | | X | | | | | X | | | |
| Orcutt Creek | X | X | | | X | X | X | X | X | | | | | X | X | X | | | X | | | |
| **SAN ANTONIO HYDROLOGIC UNIT** | | | | | | | | | | | | | | | | | | | | | | |
| Shuman Canyon Creek | X | X | | | | X | X | X | | X | | X | | | X | X | | | X | | | |
| Casmalia Canyon Creek | X | X | | | | X | X | X | | X | | X | | | | | | | X | | | |
| San Antonio Creek Estuary | | | | | X | X | X | X | X | X | X | X | X | X | X | | | | X | | | X |
| San Antonio Creek | X | X | | | X | X | X | X | X | X | X | X | | X | | X | | | X | | | |
| Barka Slough | | | | | X | X | X | X | | X | | X | | X | X | | | | X | | | X |
| **SANTA YNEZ HYDROLOGIC UNIT** | | | | | | | | | | | | | | | | | | | | | | |
| Santa Ynez River Estuary | | | | | | X | X | X | | X | X | X | X | X | X | | | | X | | | X |
| Santa Ynez River, downstream | X | X | X | X | X | X | X | X | X | X | X | X | | X | | X | | | X | | | |
| Graves Wetland | | | | | | X | X | X | | X | | X | | | | | | | X | | | |
| Lompoc Canyon | X | X | | X | X | X | X | X | | X | | | | | | | | | X | | | |
| La Salle Canyon Creek | X | X | | | X | X | X | X | | X | | | | | | | | | X | | | |
| Sloans Canyon Creek | X | | | | X | X | X | X | | X | | | | | | | | | X | | | |

| Sediment Risk Factor Worksheet | Entry |
|---|---|
| **A) R Factor** | |
| Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-min intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S. Refer to the link below to determine the R factor for the project site.<br>http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm | |
| **R Factor Value** | 34.685 |
| **B) K Factor (weighted average, by area, for all site soils)** | |
| The soil-erodibility factor K represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition. Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff. Use Site-specific data must be submitted.<br>Site-specific K factor guidance | |
| **K Factor Value** | 0.2 |
| **C) LS Factor (weighted average, by area, for all slopes)** | |
| The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction. As the hillslope gradient increases, the velocity and erosivity of runoff increases. Use the LS table located in separate tab of this spreadsheet to determine LS factors. Estimate the weighted LS for the site prior to construction.<br>LS Table | |
| **LS Factor Value** | 0.43617859 |
| **Watershed Erosion Estimate (=RxKxLS) in tons/acre** | 3.025770879 |
| **Site Sediment Risk Factor**<br>Low Sediment Risk: < 15 tons/acre<br>Medium Sediment Risk: >=15 and <75 tons/acre<br>High Sediment Risk: >= 75 tons/acre | **Low** |

| Receiving Water (RW) Risk Factor Worksheet | Entry | Score |
|---|---|---|
| **A. Watershed Characteristics** | **yes/no** | |
| A.1. Does the disturbed area discharge (either directly or indirectly) to a **303(d)-listed waterbody impaired by sediment** (For help with impaired waterbodies please visit the link below) or has a **USEPA approved TMDL implementation plan for sediment**?:<br>http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml<br>**OR**<br>A.2. Does the disturbed area discharge to a waterbody with designated beneficial uses of SPAWN & COLD & MIGRATORY? (For help please review the appropriate Regional Board Basin Plan)<br>http://www.waterboards.ca.gov/waterboards_map.shtml | **no** | **Low** |

Region 1 Basin Plan

Region 2 Basin Plan

Region 3 Basin Plan

Region 4 Basin Plan

Region 5 Basin Plan

Region 6 Basin Plan

Region 7 Basin Plan

Region 8 Basin Plan

Region 9 Basin Plan

# Combined Risk Level Matrix

| Receiving Water Risk | Sediment Risk: Low | Sediment Risk: Medium | Sediment Risk: High |
|---|---|---|---|
| Low | Level 1 | Level 2 | Level 2 |
| High | Level 2 | Level 2 | Level 3 |

| | |
|---|---|
| **Project Sediment Risk:** | **Low** |
| **Project RW Risk:** | **Low** |
| **Project Combined Risk:** | **Level 1** |

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**Site-specific R-Factor Calculation and K Factor Documentation**
**Phillips 66 Santa Maria Refinery Rail Project**
**August, 2013**

A site specific R-Factor calculation was prepared for the Phillips 66 Santa Maria Refinery Rail Project SWPPP Notice of Intent (NOI) due to EPA Rainfall Erosivity Calculator maintenance, utilizing the EPA Storm Water Phase II Final Rule-Construction Rainfall Erosivity Waiver guidance as directed by the State Water Resources Control Board (SWRCB).

- Figure 1 was referenced to determine the Erosivity Index (EI) Zone, which is 25 based on the Site's location.

- Figure 4 was referenced to interpolate the Isoerodent Value based on the Site's location, which was estimated to be 35.

- The start date is August 2014, which is conservatively 58.5% for EI zone 25. End date is anticipated to be June 2015, which is 57.6% for EI zone 25.

**R-Factor Calculation**
**Start: July 29, 2014**
**End: July 14, 2015**
<u>Figure 1 - Erosivity Index Zone Map</u>: EI Zone = 25
<u>Table 1 - Erosivity Index Table</u>:
EI percentage July 29, 2014 (58.5%) to December 31, 2014 (100%) = 41.5%
EI percentage January 1, 2015 (0%) to July 14, 2015 (57.6%) = 57.6%
Total Percentage: 41.5% + 57.6% = 99.1%
<u>Figure 4 - Isoerodent Map of California</u>: Interpolated annual erosion index = 35
**R-Factor: 35 x 99.1% = 34.685**

Attachments:

Attachment A - SWRCB Explanation Letter
Figure 1 - Erosivity Index Zone Map
Figure 4 - Isoerodent Map of California
Table 1 - Erosivity Index Table

Imagine the result

United States Environmental Protection Agency | Office of Water (4203) | EPA 833-F-00-014
Revised March 2012
Fact Sheet 3.1[1]

# Stormwater Phase II Final Rule

## Construction Rainfall Erosivity Waiver

The 1972 amendments to the Federal Water Pollution Control Act, later referred to as the Clean Water Act (CWA), prohibit the discharge of any pollutant to navigable waters of the United States unless the discharge is authorized by a National Pollutant Discharge Elimination System (NPDES) permit. Because construction site stormwwater runoff can contribute significantly to water quality problems, the Phase I Stormwater Rule imposed a requirement that all construction sites with a planned land disturbance of 5 acres or more obtain an NPDES permit and implement stormwater runoff control plans. Phase II extends the requirements of the stormwater program to sites of between 1 and 5 acres. The Rainfall erosivity waiver allows permitting authorities to waive those sites that do not have adverse water quality impacts.

### What is Erosivity?

Erosivity is the term used to describe the potential for soil to wash off disturbed, devegetated earth during storms. The potential for erosion is in part determined by the soil type and geology of the site. For instance, dense, clay-like soils on a glacial plain will erode less readily when it rains than will sandy soils on the side of a hill. Another important factor is the amount and force of precipitation expected during the time the earth will be exposed. While it is impossible to predict the weather several months in advance of construction, for many areas of the country, there are definite optimal periods, such as a dry season when rain tends to fall less frequently and with less force. When feasible, this is the time to disturb the earth, so that the site can be stabilized by the time the seasonal wet weather returns. There are many other important factors to consider in determining erosivity, such as freeze/thaw cycles and snow pack.

### How Is Site Erosivity Determined?

The Universal Soil Loss Equation (USLE) was developed by the U.S. Department of Agriculture (USDA) in the 1950s to help farmers conserve their valuable topsoil. The methodology for determining if a site qualifies for the erosivity waiver provided in this guide is based on the *USDA Handbook 703 - Predicting Soil Erosion by Water: A Guide to Conservation Planning With the Revised Universal Soil Loss Equation (RUSLE)*, dated January 1997. (Note that a more updated version of USLE, the Revised USLE, Version 2 (RUSLE2), is available and can be used as an alternative method for determining if a site qualifies for the erosivity waiver. Information about the RUSLE2 computer program is provided later in this fact sheet.)

Using a computer model supported by decades' worth of soil and rainfall data, USDA established estimates of annual erosivity values (R factors) for sites throughout the country. These R factors are used as surrogate measures of the impact that rainfall had on erosion from a particular site. They have been mapped using isoerodent contours, as shown in Figures 2 through 5.

USDA developed the Erosivity Index Table (EI Table, provided here in Table 1), to show how the annual erosivity factor is distributed throughout the year in two-week increments. Table 1 is based on 120 rainfall distribution zones for the continental U.S. Detailed instructions for calculating a project R factor are provided later in this fact sheet.

**Stormwater Phase II Final Rule Fact Sheet Series**



[1] This revised fact sheet corrects errors identified in calculating the R factor from the 2001 version, and includes updated information about the USLE.

The Stormwater Phase II rule allows permitting authorities to waive NPDES requirements for small construction sites if the value of the rainfall erosivity factor is less than 5 during the period of construction activity (see § 122.26(b)(15)(i)(A)). Note that the permitting authority has the option to not allow waivers for small construction activity.

If the R factor for the period of construction calculates to less than 5, and the permitting authority allows the use of the waiver, the site owner may apply for a waiver under the low rainfall erosivity provision of the applicable EPA or State NPDES regulations. When applying, owners are encouraged to consider other site-specific factors, such as proximity to water resources and the sensitivity of receiving waters to sedimentation impacts. The small construction operator must certify to the permitting authority that the construction activity will take place during a period when the rainfall erosivity factor is less than 5.

The start and end dates used for the construction activity will be the initial date of disturbance and the anticipated date when the site will have achieved final stabilization as defined by the permit, respectively. If the construction continues beyond this period, the operator will need to recalculate the Erosivity Index for the site based on this new ending date (but keeping the old start date) and either resubmit the certification form or apply for NPDES permit coverage.

## What Other Factors Can Affect Waiver Availability and Eligibility?

EPA has established the R factor of less than 5 as the criteria for determining waiver eligibility. However, since the intent is to waive only those construction activities that will not adversely impact water quality, State and Tribal permitting authorities have considerable discretion in determining where, when, and how to offer it. They can establish an R factor threshold lower than 5, or they can suspend the waiver within an area where watersheds are known to be heavily impacted by, or sensitive to, sedimentation. They can also suspend the waiver during certain periods of the year. They may opt not to offer the waiver at all. NOTE: This waiver is not available to sites that will disturb more than 5 acres of land (large construction).

## What if My Site Is Not Eligible?

If your site is not eligible for a waiver, you must submit a Notice of Intent, or whichever type of application is required, to obtain coverage under the applicable NPDES construction stormwater permit, and comply with its requirements. For information about EPA's Construction General Permit (CGP), see http://www.epa.gov/npdes/stormwater/cgp. State program information is available at http://cfpub.epa.gov/npdes/contacts.cfm?program_id=6&type=STATE.

## Examples

### 1. Construction started and completed in one calendar year.

*Find the R factor value of a construction site in Denver, Colorado. Assume the site will be disturbed from March 10 to May 10 of the same year.*

The EI distribution zone is 84 (Figure 1). Referring to Table 1, the project period will span from March 1 (from Table 1, the closest date prior to the actual March 10 start date) to May 15 (from Table 1, the closest date after the actual May 10 end date). The difference in values between these two dates is 9.7% (9.9 - 0.2 = 9.7). Since the annual erosion index for this location is about 45 (interpolated from Figure 2), the R factor for the scheduled construction project is 9.7% of 45, or 4.4.

Because 4.4 is less than 5, the operator of this site would be able to seek a waiver under the low rainfall erosivity provision.

### 2. Construction spanning two calendar years.

*Find the R factor value for a construction site in Pittsburgh, Pennsylvania. Assume the site will be disturbed from August 1 to April 15.*

The EI distribution zone is 111 (Figure 1). Referring to Table 1, the project period will span from July 29 (from Table 1, the closest date prior to the actual August 1 start date) to April 15. The difference in values between July 29 and December 31 is 35% (100 - 65.0 = 35.0). The difference between January 1 and April 15 is 8%. The total percentage EI for this project is 43% (35 + 8 = 43). Since the annual erosion index for this location is 112 (interpolated from Figure 2), the R factor for the scheduled construction is 43% of 112, or 48.

Since 48 is greater than 5, the operator of this site would not be able to seek a waiver under the low rainfall erosivity provision.

## How Do I Compute the R factor for My Project?

1. Estimate the construction start date. This is the day you expect to begin disturbing soils, including grubbing, stockpiling, excavating, and grading activities.
2. Estimate the day you expect to achieve final stabilization, as defined by your permitting authority's regulations or NPDES construction stormwater permit, over all previous disturbed areas. This is your construction end date.
3. Refer to Figure 1 to find your Erosivity Index (EI) Zone based on your geographic location.

4. Refer to Table 1, the Erosivity Index (EI) Table. Find the number of your EI Zone in the left column. Locate the EI values for the dates that correspond to the project start and end dates you identified in Steps 1 and 2. If your specific date is not on the table, either interpolate between dates to obtain your %EI value, or use the closest date prior to your proposed start date and the closest date after your proposed end date. Subtract the start value from the end value to find the % EI for your site. The maximum annual EI value for a project is 100%. NOTE: If your project lasts for one year or more, your EI value is 100%.
5. Refer to the appropriate Isoerodent Map (Figures 2 through 5). Interpolate the annual isoerodent value for your area. This is the annual R factor for your site.
6. Multiply the percent value obtained in Step 4 by the annual isoerodent value obtained in Step 5. This is the R factor for your scheduled project.

## Can I Use a Personal Computer to Calculate the R factor?

The computer program used by USDA to evaluate erosion potential is called the Revised Universal Soil Loss Equation, or RUSLE. The current version of RUSLE (RUSLE2) is a Windows-based model that uses extensive databases that are geographically-linked. RUSLE2 can be used to calculate the R factor for a proposed construction site; however, RUSLE2 can require a large investment of time to set up. RUSLE2 can be downloaded free of charge from the Internet at http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm. Note that RUSLE2 is an upgrade of RUSLE, and contains more detailed data. Therefore, your calculated R factor may differ based on whether you calculate your R factor using the methods specified above, which utilizes data from *USDA Handbook 703 - Predicting Soil Erosion by Water: A Guide to Conservation Planning With the Revised Universal Soil Loss Equation (RUSLE)*, January 1997, or whether you calculate your R factor using the more updated RUSLE2. EPA notes that either method of calculation is acceptable for determining eligibility for the construction rainfall erosivity waiver.

## Where Can I Get Help?

- A copy of "Chapter 2, Rainfall-Runoff Erosivity Factor (R)" from the *USDA Handbook 703 - Predicting Soil Erosion by Water: A Guide to Conservation Planning With the Revised Universal Soil Loss Equation (RUSLE)*, January 1997, is available on EPA's web site at http://www.epa.gov/npdes/pubs/ruslech2.pdf.
- Information about RUSLE2, and a download of the program, is available at http://fargo.nserl.purdue.edu/rusle2_dataweb/.
- Your local USDA Service Center may be able to provide assistance with calculating R factors and other conservation-related issues. To find the office nearest you, go to http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/contact/local.

**For Additional Information**

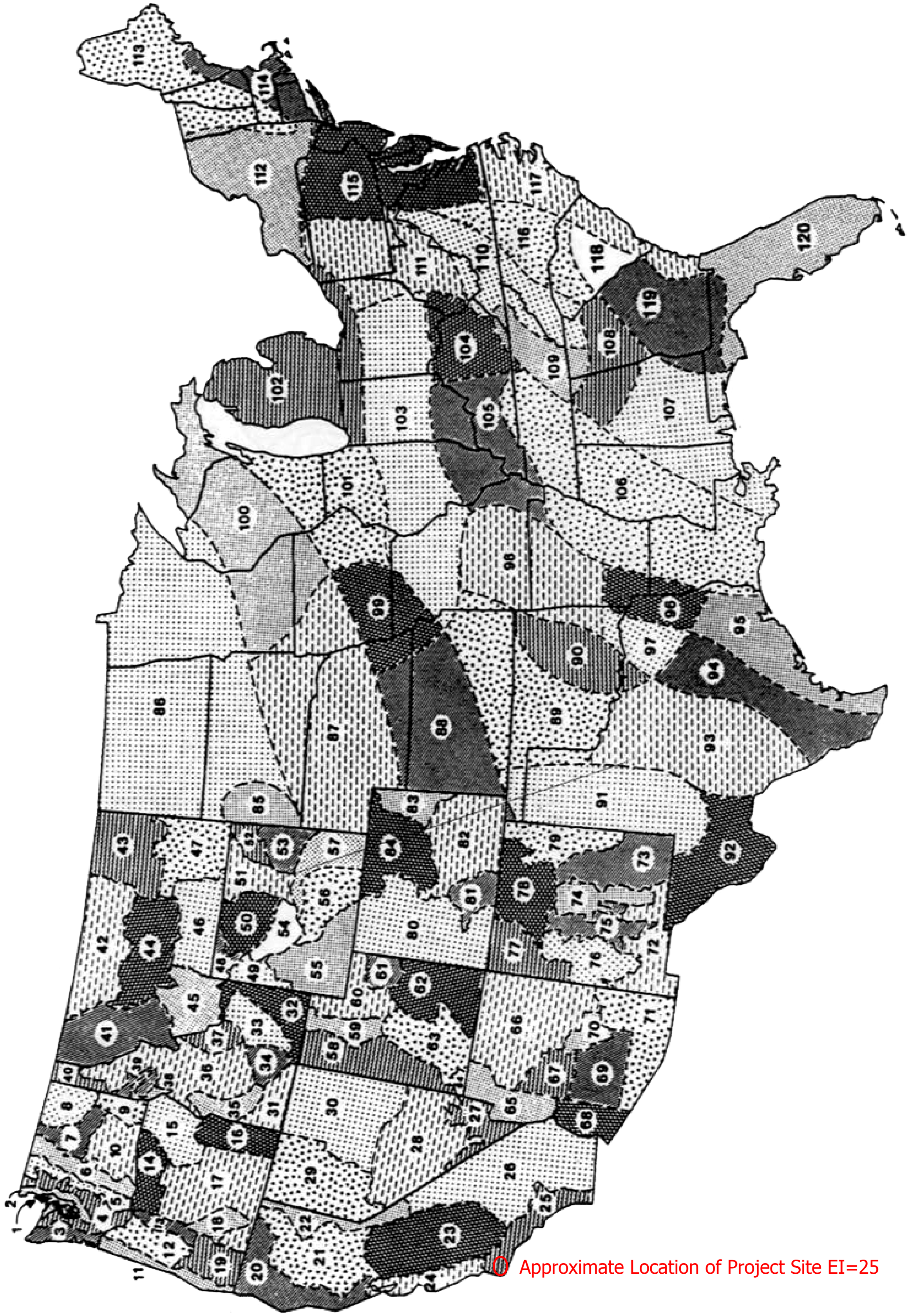
***Reference Documents***

Stormwater Phase II Final Rule Fact Sheet Series
- Internet: cfpub.epa.gov/npdes/stormwater/swfinal.cfm

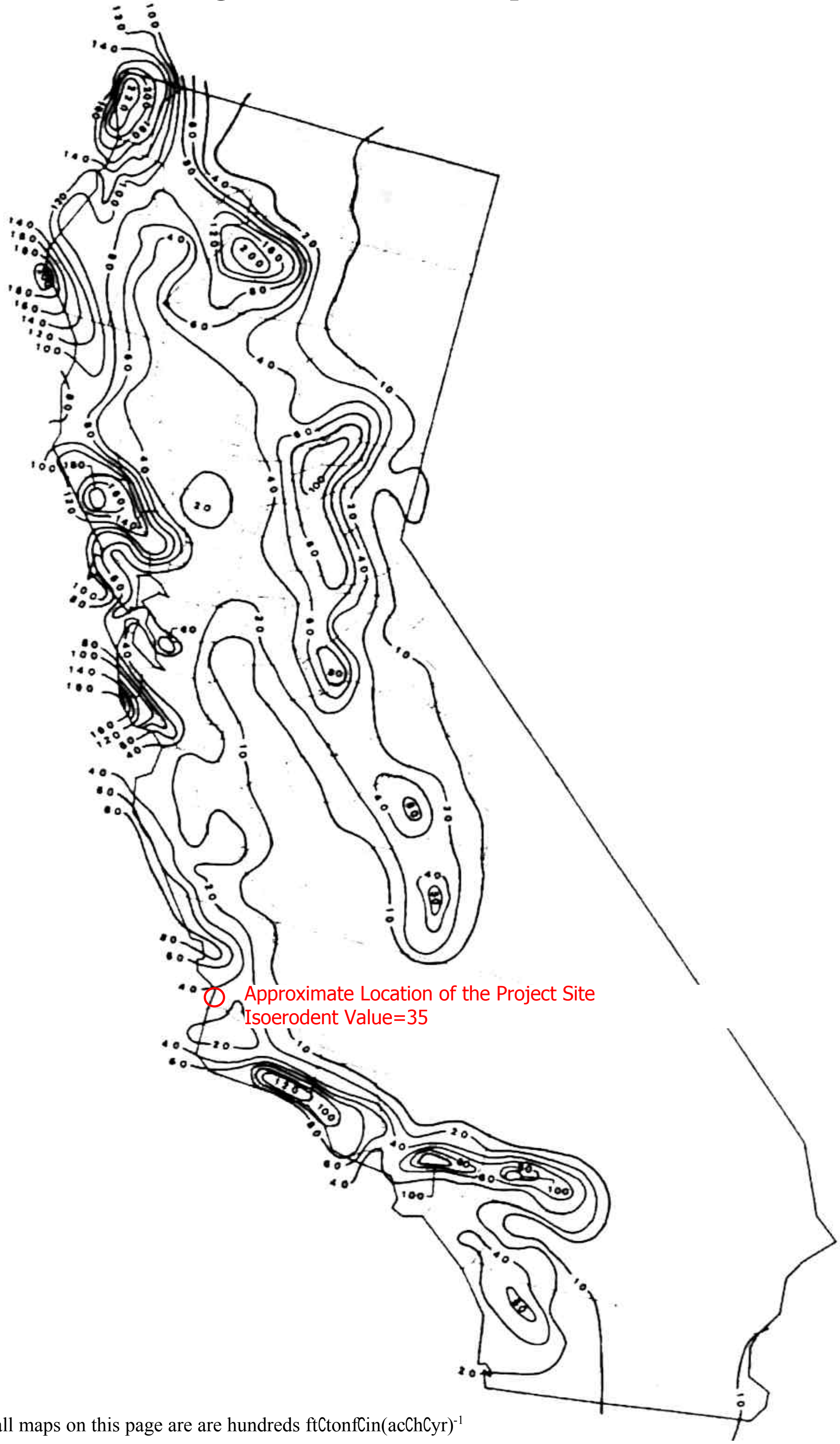
Stormwater Phase II Final Rule (64 *FR* 68722)
- Internet: www.epa.gov/npdes/regulations/phase2.pdf
- Contact the U.S. EPA Water Resource Center (Phone: (202) 564-9545)

*Agricultural Handbook Number 703, Predicting Soil Erosion by Water: A Guide to Conservation Planning With the Revised Universal Soil Loss Equation (RUSLE)*, Chapter 2, pp. 21-64, January 1997.
- Internet: www.epa.gov/npdes/pubs/ruslech2.pdf

# Figure 1. Erosivity Index Zone Map



# Figure 4. Isoerodent Map of California



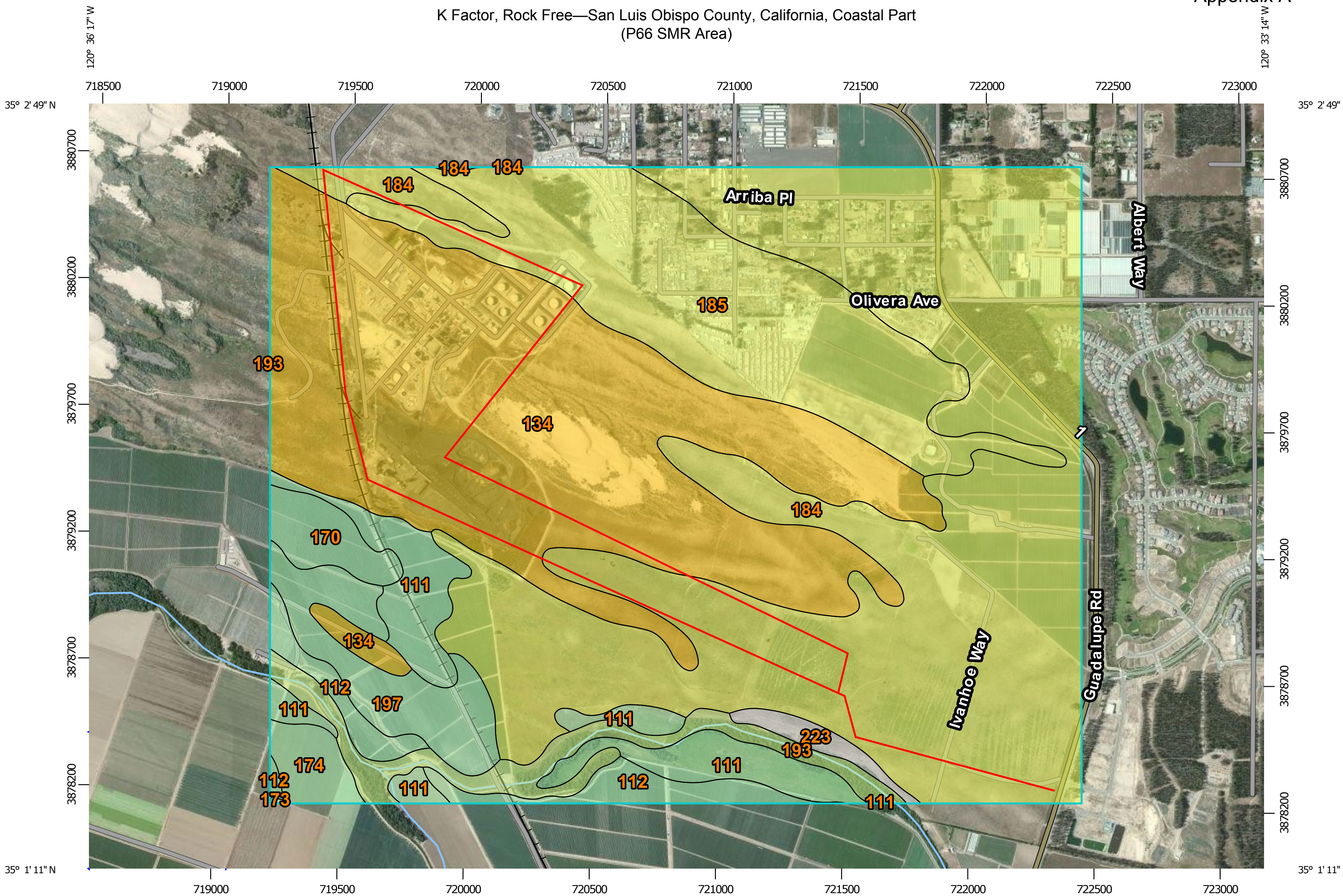

Note: Units for all maps on this page are are hundreds ftCtonfCin(acChCyr)$^{-1}$

# Table 1. Erosivity Index (%EI Values extracted from USDA Manual 703)

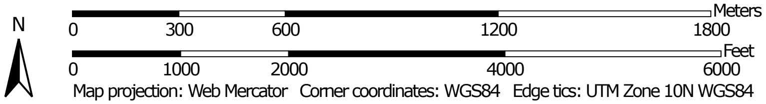
All values are at the end of the day listed below - Linear interpolation between dates is acceptable.
EI as a percentage of Average Annual R Value Computed for Geographic Areas Shown in Figure 1

| Month | Jan | Jan | Jan | Feb | Mar | Mar | Mar | Apr | Apr | May | May | Jun | Jun | Jul | Jul | Aug | Aug | Sept | Sept | Oct | Oct | Nov | Nov | Dec | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Day | 1 | 16 | 31 | 15 | 1 | 16 | 31 | 15 | 30 | 15 | 30 | 14 | 29 | 14 | 29 | 13 | 28 | 12 | 27 | 12 | 27 | 11 | 26 | 11 | 31 |
| EI Zone | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 0 | 4.3 | 8.3 | 12.8 | 17.3 | 21.6 | 25.1 | 28 | 30.9 | 34.9 | 39.1 | 42.6 | 45.4 | 48.2 | 50.8 | 53 | 56 | 60.8 | 66.8 | 71 | 75.7 | 82 | 89.1 | 95.2 | 100 |
| 2 | 0 | 4.3 | 8.3 | 12.8 | 17.3 | 21.6 | 25.1 | 28.0 | 30.9 | 34.9 | 39.1 | 42.6 | 45.4 | 48.2 | 50.8 | 53.0 | 56.0 | 60.8 | 66.8 | 71.0 | 75.7 | 82.0 | 89.1 | 95.2 | 100 |
| 3 | 0 | 7.4 | 13.8 | 20.9 | 26.5 | 31.8 | 35.3 | 38.5 | 40.2 | 41.6 | 42.5 | 43.6 | 44.5 | 45.1 | 45.7 | 46.4 | 47.7 | 49.4 | 52.8 | 57.0 | 64.5 | 73.1 | 83.3 | 92.3 | 100 |
| 4 | 0 | 3.9 | 7.9 | 12.6 | 17.4 | 21.6 | 25.2 | 28.7 | 31.9 | 35.1 | 38.2 | 42.0 | 44.9 | 46.7 | 48.2 | 50.1 | 53.1 | 56.6 | 62.2 | 67.9 | 75.2 | 83.5 | 90.5 | 96.0 | 100 |
| 5 | 0 | 2.3 | 3.6 | 4.7 | 6.0 | 7.7 | 10.7 | 13.9 | 17.8 | 21.2 | 24.5 | 28.1 | 31.1 | 33.1 | 35.3 | 38.2 | 43.2 | 48.7 | 57.3 | 67.8 | 77.9 | 86.0 | 91.3 | 96.9 | 100 |
| 6 | 0 | 0.0 | 0.0 | 0.5 | 2.0 | 4.1 | 8.1 | 12.6 | 17.6 | 21.6 | 25.5 | 29.6 | 34.5 | 40.0 | 45.7 | 50.7 | 55.6 | 60.2 | 66.5 | 75.5 | 85.6 | 95.9 | 99.5 | 99.9 | 100 |
| 7 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.2 | 4.9 | 8.5 | 13.9 | 19.0 | 26.0 | 35.4 | 43.9 | 48.8 | 53.9 | 64.5 | 73.4 | 77.5 | 80.4 | 84.8 | 89.9 | 96.6 | 99.2 | 99.7 | 100 |
| 8 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.9 | 3.6 | 7.8 | 15.0 | 20.2 | 27.4 | 38.1 | 49.8 | 57.9 | 65.0 | 75.6 | 82.7 | 86.8 | 89.4 | 93.4 | 96.3 | 99.1 | 100.0 | 100.0 | 100 |
| 9 | 0 | 0.8 | 3.1 | 4.7 | 7.4 | 11.7 | 17.8 | 22.5 | 27.0 | 31.4 | 36.0 | 41.6 | 46.4 | 50.1 | 53.4 | 57.4 | 61.7 | 64.9 | 69.7 | 79.0 | 89.6 | 97.4 | 100.0 | 100.0 | 100 |
| 10 | 0 | 0.3 | 0.5 | 0.9 | 2.0 | 4.3 | 9.2 | 13.1 | 18.0 | 22.7 | 29.2 | 39.5 | 46.3 | 48.8 | 51.1 | 57.2 | 64.4 | 67.7 | 71.1 | 77.2 | 85.1 | 92.5 | 96.5 | 99.0 | 100 |
| 11 | 0 | 5.4 | 11.3 | 18.8 | 26.3 | 33.2 | 37.4 | 40.7 | 42.5 | 44.3 | 45.4 | 46.5 | 47.1 | 47.4 | 47.8 | 48.3 | 49.4 | 50.7 | 53.6 | 57.5 | 65.5 | 76.2 | 87.4 | 94.8 | 100 |
| 12 | 0 | 3.5 | 7.8 | 14.0 | 21.1 | 27.4 | 31.5 | 35.0 | 37.3 | 39.8 | 41.9 | 44.3 | 45.6 | 46.3 | 46.8 | 47.9 | 50.0 | 52.9 | 57.9 | 62.3 | 69.3 | 81.3 | 91.5 | 96.7 | 100 |
| 13 | 0 | 0.0 | 0.0 | 1.8 | 7.2 | 11.9 | 16.7 | 19.7 | 24.0 | 31.2 | 42.4 | 55.0 | 60.0 | 60.8 | 61.2 | 62.6 | 65.3 | 67.6 | 71.6 | 76.1 | 83.1 | 93.3 | 98.2 | 99.6 | 100 |
| 14 | 0 | 0.7 | 1.8 | 3.3 | 6.9 | 16.5 | 26.6 | 29.9 | 32.0 | 35.4 | 40.2 | 45.1 | 51.9 | 61.1 | 67.5 | 70.7 | 72.8 | 75.4 | 78.6 | 81.9 | 86.4 | 93.6 | 97.7 | 99.3 | 100 |
| 15 | 0 | 0.0 | 0.0 | 0.5 | 2.0 | 4.4 | 8.7 | 12.0 | 16.6 | 21.4 | 29.7 | 44.5 | 56.0 | 60.8 | 63.9 | 69.1 | 74.5 | 79.1 | 83.1 | 87.0 | 90.9 | 96.6 | 99.1 | 99.8 | 100 |
| 16 | 0 | 0.0 | 0.0 | 0.5 | 2.0 | 5.5 | 12.3 | 16.2 | 20.9 | 26.4 | 35.2 | 48.1 | 58.1 | 63.1 | 66.5 | 71.9 | 77.0 | 81.6 | 85.1 | 88.4 | 91.5 | 96.3 | 98.7 | 99.6 | 100 |
| 17 | 0 | 0.0 | 0.0 | 0.7 | 2.8 | 6.1 | 10.7 | 12.9 | 16.1 | 21.9 | 32.8 | 45.9 | 55.5 | 60.3 | 64.0 | 71.2 | 77.2 | 80.3 | 83.1 | 87.7 | 92.6 | 97.2 | 99.1 | 99.8 | 100 |
| 18 | 0 | 0.0 | 0.0 | 0.6 | 2.5 | 6.2 | 12.4 | 16.4 | 20.2 | 23.9 | 29.3 | 37.7 | 45.6 | 49.8 | 53.3 | 58.4 | 64.3 | 69.0 | 75.0 | 86.6 | 93.9 | 96.6 | 98.0 | 100.0 | 100 |
| 19 | 0 | 1.0 | 2.6 | 7.4 | 16.4 | 23.5 | 28.0 | 31.0 | 33.5 | 37.0 | 41.7 | 48.1 | 51.1 | 52.0 | 52.5 | 53.6 | 55.7 | 57.6 | 61.1 | 65.8 | 74.7 | 88.0 | 95.8 | 98.7 | 100 |
| 20 | 0 | 9.8 | 18.5 | 25.4 | 30.2 | 35.6 | 38.9 | 41.5 | 42.9 | 44.0 | 45.2 | 48.2 | 50.8 | 51.7 | 52.5 | 54.6 | 57.4 | 58.5 | 60.1 | 63.2 | 69.6 | 76.7 | 85.4 | 92.4 | 100 |
| 21 | 0 | 7.5 | 13.6 | 18.1 | 21.1 | 24.4 | 27.0 | 29.4 | 31.7 | 34.6 | 37.3 | 39.6 | 41.6 | 43.4 | 45.4 | 48.1 | 51.3 | 53.3 | 56.6 | 62.4 | 72.4 | 81.3 | 88.9 | 94.7 | 100 |
| 22 | 0 | 1.2 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 2.2 | 3.9 | 4.6 | 6.4 | 14.2 | 32.8 | 47.2 | 58.8 | 69.1 | 76.0 | 82.0 | 87.1 | 96.7 | 99.9 | 99.9 | 99.9 | 99.9 | 100 |
| 23 | 0 | 7.9 | 15.0 | 20.9 | 25.7 | 31.1 | 35.7 | 40.2 | 43.2 | 46.2 | 47.7 | 48.8 | 49.4 | 49.9 | 50.7 | 51.8 | 54.1 | 57.7 | 62.8 | 65.9 | 70.1 | 77.3 | 86.8 | 93.5 | 100 |
| 24 | 0 | 12.2 | 23.6 | 33.0 | 39.7 | 47.1 | 51.7 | 55.9 | 57.7 | 58.6 | 58.9 | 59.1 | 59.1 | 59.2 | 59.2 | 59.3 | 59.5 | 60.0 | 61.4 | 63.0 | 66.5 | 71.8 | 81.3 | 89.6 | 100 |
| 25 | 0 | 9.8 | 20.8 | 30.2 | 37.6 | 45.8 | 50.6 | 54.4 | 56.0 | 56.8 | 57.1 | 57.1 | 57.2 | 57.6 | 58.5 | 59.8 | 62.2 | 65.3 | 67.5 | 68.2 | 69.4 | 74.8 | 86.6 | 93.0 | 100 |
| 26 | 0 | 2.0 | 5.4 | 9.8 | 15.6 | 21.5 | 24.7 | 26.6 | 27.4 | 28.0 | 28.7 | 29.8 | 32.5 | 36.6 | 44.9 | 55.4 | 65.7 | 72.6 | 77.8 | 84.4 | 89.5 | 93.9 | 96.5 | 98.4 | 100 |
| 27 | 0 | 0.0 | 0.0 | 1.0 | 4.0 | 5.9 | 8.0 | 11.1 | 13.0 | 14.0 | 14.6 | 15.3 | 17.0 | 23.2 | 39.1 | 60.0 | 76.3 | 86.1 | 89.7 | 90.4 | 90.9 | 93.1 | 96.6 | 99.1 | 100 |
| 28 | 0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.5 | 1.5 | 3.3 | 7.2 | 11.9 | 17.7 | 21.4 | 27.0 | 37.1 | 51.4 | 62.3 | 70.6 | 78.8 | 84.6 | 90.6 | 94.4 | 97.9 | 99.3 | 100.0 | 100 |
| 29 | 0 | 0.6 | 0.7 | 0.7 | 0.7 | 1.5 | 3.9 | 6.0 | 10.5 | 17.9 | 28.8 | 36.6 | 43.8 | 51.5 | 59.3 | 68.0 | 74.8 | 80.3 | 84.3 | 88.8 | 92.7 | 98.0 | 99.8 | 99.9 | 100 |
| 30 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.8 | 2.8 | 7.9 | 14.2 | 24.7 | 35.6 | 45.4 | 52.2 | 58.7 | 68.5 | 77.6 | 84.5 | 88.9 | 93.7 | 96.2 | 97.6 | 98.3 | 99.6 | 100 |
| 31 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 1.0 | 3.5 | 9.9 | 15.7 | 26.4 | 47.2 | 61.4 | 65.9 | 69.0 | 77.2 | 86.0 | 91.6 | 94.8 | 98.7 | 100.0 | 100.0 | 100.0 | 100.0 | 100 |
| 32 | 0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.6 | 2.2 | 4.3 | 9.0 | 14.2 | 23.3 | 34.6 | 46.3 | 54.2 | 61.7 | 72.9 | 82.5 | 89.6 | 93.7 | 98.2 | 99.7 | 99.9 | 99.9 | 99.9 | 100 |
| 33 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.6 | 2.3 | 4.2 | 8.8 | 16.1 | 30.0 | 46.9 | 57.9 | 62.8 | 66.2 | 72.1 | 79.1 | 85.9 | 91.1 | 97.0 | 98.9 | 98.9 | 98.9 | 98.9 | 100 |
| 34 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.8 | 7.3 | 10.7 | 15.5 | 22.0 | 29.9 | 35.9 | 42.0 | 48.5 | 56.9 | 67.0 | 76.9 | 85.8 | 91.2 | 95.7 | 97.8 | 99.6 | 100.0 | 100.0 | 100 |
| 35 | 0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.5 | 10.2 | 15.9 | 22.2 | 27.9 | 34.7 | 43.9 | 51.9 | 56.9 | 61.3 | 67.3 | 73.9 | 80.1 | 85.1 | 89.6 | 93.2 | 98.2 | 99.8 | 99.8 | 100 |

K Factor, Rock Free—San Luis Obispo County, California, Coastal Part
(P66 SMR Area)




Map Scale: 1:21,300 if printed on A landscape (11" x 8.5") sheet.




Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

## MAP LEGEND

**Area of Interest (AOI)**

Area of Interest (AOI)

**Soils**

**Soil Rating Polygons**

.02

.05

.10

.15

.17

.20

.24

.28

.32

.37

.43

.49

.55

.64

Not rated or not available

**Soil Rating Lines**

.02

.05

.10

.15

.17

.20

.24

.28

.32

.37

.43

.49

.55

.64

Not rated or not available

**Soil Rating Points**

.02

.05

.10

.15

.17

.20

.24

.28

.32

.37

.43

.49

.55

.64

Not rated or not available

**Water Features**

Streams and Canals

**Transportation**

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

**Background**

Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Luis Obispo County, California, Coastal Part
Survey Area Data: Version 4, Jan 2, 2008

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 7, 2010—Jun 10, 2010

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

# K Factor, Rock Free

| K Factor, Rock Free— Summary by Map Unit — San Luis Obispo County, California, Coastal Part (CA664) | | | | |
|---|---|---|---|---|
| **Map unit symbol** | **Map unit name** | **Rating** | **Acres in AOI** | **Percent of AOI** |
| 111 | Camarillo sandy loam | .28 | 99.8 | 5.0% |
| 112 | Camarillo loam, drained | .28 | 48.4 | 2.4% |
| 134 | Dune land | .15 | 591.0 | 29.5% |
| 170 | Marimel silty clay loam, drained | .28 | 28.0 | 1.4% |
| 173 | Mocho fine sandy loam | .28 | 0.3 | 0.0% |
| 174 | Mocho loam | .28 | 21.7 | 1.1% |
| 184 | Oceano sand, 0 to 9 percent slopes | .20 | 788.3 | 39.4% |
| 185 | Oceano sand, 9 to 30 percent slopes | .20 | 280.6 | 14.0% |
| 193 | Psamments and Fluvents, wet | .24 | 60.4 | 3.0% |
| 197 | Salinas silty clay loam, 0 to 2 percent slopes | .28 | 69.5 | 3.5% |
| 223 | Xerorthents, escarpment | | 13.3 | 0.7% |
| **Totals for Area of Interest** | | | **2,001.2** | **100.0%** |

## Description

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

"Erosion factor Kf (rock free)" indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

## Rating Options

*Aggregation Method:* Dominant Condition

*Component Percent Cutoff:* *None Specified*

*Tie-break Rule:* Higher

*Layer Options (Horizon Aggregation Method):* Surface Layer (Not applicable)

**Run-on Calculations**

**Q = C*i*A**
**C**[1] **0.3**
**i**[2] **0.4**

| Work Area | Tributary Drainage Area | Approx. Drainage Area (ac) | Peak Run-on Flow (cfs) | Length of Disturbance Fronting Drainage Area (ft) | Run-on Flow per Foot (cfs/ft) | Run-on Flow per Foot (gpm/ft) |
|---|---|---|---|---|---|---|
| East Emergency Access Road | North Side | 110.221 | **13.23** | 3353 | 0.0039 | **1.77** |
| | South Side | 17.018 | **2.04** | 3374 | 0.0006 | **0.27** |
| Rail Spur | North Side | 52.703 | **6.32** | 5604 | 0.0011 | **0.51** |
| | South Side | 12.551 | **1.51** | 2698 | 0.0006 | **0.25** |
| Pipeline (North Portion) | West Side | 2.627 | **0.32** | 1373 | 0.0002 | **0.10** |
| | East Side | 1.455 | **0.17** | 907 | 0.0002 | **0.09** |
| Unload Area/ Pipeline (South Portion) | North/East Side | 6.826 | **0.82** | 1465 | 0.0006 | **0.25** |

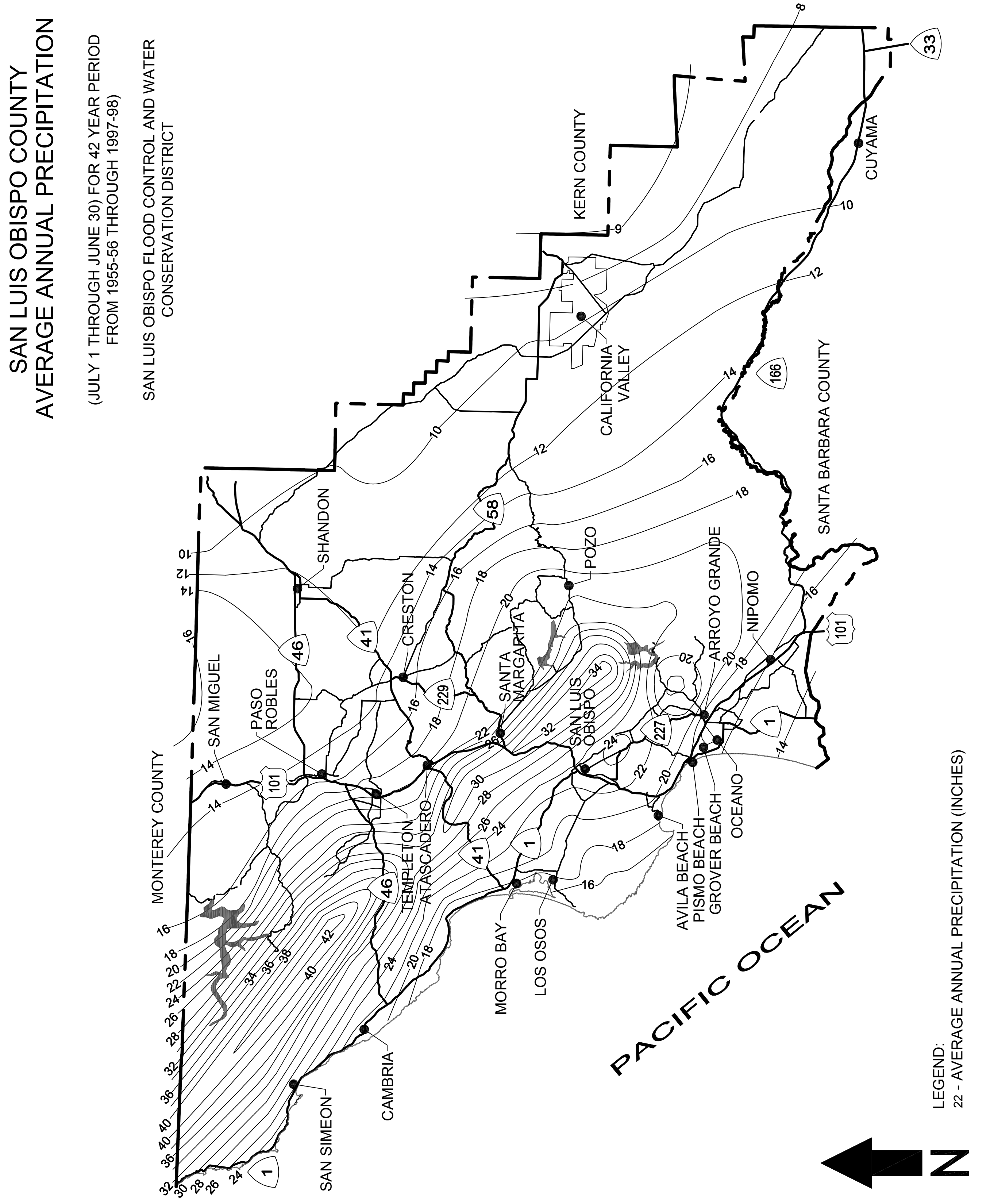
Notes:
1. Runoff coefficient value for pervious areas computed using the San Luis Obispo County 2011 Public Improvement Standards Figure H-3a.

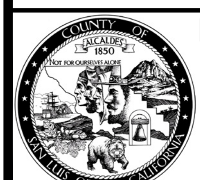
Relief = 0.14
Soil Infiltration = 0.04
Vegetal Cover = 0.06
Surface Storage = 0.06
Total = 0.30

2. Rainfall Intensity determined using the San Luis Obispo County 2011 Public Improvement Standards Figures H-1 and H-4 for the 10-year, 6-hour design storm event for areas receiving 14" to 17" mean annual precipitation per Figure H-1.

Revisions

| Description | Approved | Date | Description | Approved | Date |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |



DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION

# AVERAGE ANNUAL RAINFALL

| Scale: | Adopted: |
|---|---|
| NTS | 2011 |
| Drawing No: H-1 | |
| Sheet No: 1 OF 1 | |

| Revisions | | | | | |
|---|---|---|---|---|---|
| Description | Approved | Date | Description | Approved | Date |
| CORRECT TO MATCH HWY. DES. MAN. | REM | NOV 07 | | | |
| | | | | | |

## TABLE 2: RATIONAL METHOD STANDARD RUNOFF COEFFICIENTS FOR UNDEVELOPED AREAS

| | EXTREME | HIGH | NORMAL | LOW |
|---|---|---|---|---|
| RELIEF | 0.28 TO 0.35 STEEP, RUGGED TERRAIN WITH AVERAGE SLOPES ABOVE 30% | 0.20 TO 0.28 HILLY, WITH AVERAGE SLOPES OF 10% TO 30% | 0.14 TO 0.20 ROLLING, WITH AVERAGE SLOPE OF 5% TO 10% | 0.08 TO 0.14 RELATIVELY FLAT LAND, WITH AVERAGE SLOPES OF 0% TO 5% |
| SOIL INFILTRATION | 0.12 TO 0.16 NO EFFECTIVE SOIL COVER, EITHER ROCK OR THIN MANTLE OF NEGLIGIBLE INFILTRATION CAPACITY | 0.08 TO 0.12 SLOW TO TAKE UP WATER, CLAY OR SHALLOW LOAM SOILS OF LOW INFILTRATION CAPACITY, IMPERFECTLY OR POORLY DRAINED | 0.06 TO 0.08 NORMAL; WELL DRAINED LIGHT OR MEDIUM TEXTURED SOILS, SANDY LOAMS, SILT AND SILT LOAMS | 0.04 TO 0.06 HIGH; DEEP SAND OR OTHER SOILS THAT TAKES UP WATER READILY, VERY LIGHT WELL DRAINED SOILS |
| VEGETAL COVER | 0.12 TO 0.16 NO EFFECTIVE PLANT COVER, BARE OR VERY SPARSE COVER | 0.08 TO 0.12 POOR TO FAIR; CULTIVATION CROPS, OR POOR NATURAL COVER, LESS THAN 20% OF DRAINAGE AREA OVER GOOD COVER | 0.06 TO 0.08 FAIR TO GOOD; ABOUT 50% OF AREA IN GOOD GRASSLAND OR WOODLAND, NOT MORE THAN 50% OF AREA IN CULTIVATED CROPS | 0.04 TO 0.06 GOOD TO EXCELLENT; ABOUT 90% OF DRAINAGE AREA IN GOOD GRASSLAND, WOODLAND, OR EQUIVALENT COVER |
| SURFACE STORAGE | 0.10 TO 0.12 NEGLIGIBLE SURFACE DEPRESSIONS FEW AND SHALLOW; DRAINAGE WAYS STEEP AND SMALL, NO MARSHES | 0.08 TO 0.10 LOW; WELL DEFINED SYSTEM OF SMALL DRAINAGE WAYS, NO PONDS OR MARSHES | 0.06 TO 0.08 NORMAL; CONSIDERABLE SURFACE STORAGE, LAKES AND POND MARSHES | 0.04 TO 0.06 HIGH; SURFACE STORAGE, HIGH; DRAINAGE SYSTEM NOT SHARPLY DEFINED; LARGE FLOOD PLAIN STORAGE OR LARGE NUMBER OF PONDS OR MARSHES |

(REFERENCES FIGURE 819.2A OF HIGHWAY DESIGN MANUAL)

### EXAMPLE:

GIVEN: AN UNDEVELOPED WATERSHED CONSISTING OF:
1. ROLLING TERRAIN WITH AVERAGE SLOPES OF 5%
2. CLAY SOILS
3. GOOD GRASSLAND AREA
4. NORMAL SURFACE DEPRESSIONS

FIND: THE RUNOFF COEFFICIENT FOR THE ABOVE WATERSHED

SOLUTION:
1. RELIEF = 0.14
2. SOIL INFILTRATION = 0.08
3. VEGETAL COVER = 0.04
4. SURFACE STORAGE = 0.06

ANSWER: THE RUNOFF COEFFICIENT, C = 0.32

COUNTY OF SAN LUIS OBISPO, CALIFORNIA · ALCALDES 1850 · NOT FOR OURSELVES ALONE

DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION

# RUNOFF COEFFICIENTS FOR UNDEVELOPED AREAS

Scale:

Adopted: 2011

Drawing No: H-3a

Sheet No: 2 OF 2

| Revisions | | | | | |
|---|---|---|---|---|---|
| Description | Approved | Date | Description | Approved | Date |
| | | | | | |
| | | | | | |

TABLE 1: ANNUAL RAINFALL < 14":

| Recurrence Interval (Years) | Duration | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 10 Min | 15 Min | 30 Min | 1 Hr | 2 Hr | 3 Hr | 6 Hr | 10 Hr |
| 2 | 1.00 | 0.90 | 0.60 | 0.40 | 0.26 | 0.22 | 0.18 | 0.14 |
| 5 | 1.40 | 1.20 | 0.80 | 0.50 | 0.37 | 0.32 | 0.25 | 0.20 |
| 10 | 1.70 | 1.40 | 1.00 | 0.60 | 0.44 | 0.38 | 0.30 | 0.23 |
| 25 | 2.00 | 1.70 | 1.10 | 0.70 | 0.54 | 0.47 | 0.37 | 0.28 |
| 50 | 2.20 | 1.90 | 1.30 | 0.80 | 0.60 | 0.53 | 0.44 | 0.34 |
| 100 | 2.40 | 2.10 | 1.40 | 0.90 | 0.65 | 0.59 | 0.48 | 0.36 |

TABLE 2: ANNUAL RAINFALL 14" TO 17":

| Recurrence Interval (Years) | Duration | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 10 Min | 15 Min | 30 Min | 1 Hr | 2 Hr | 3 Hr | 6 Hr | 10 Hr |
| 2 | 1.30 | 1.10 | 0.80 | 0.50 | 0.35 | 0.30 | 0.23 | 0.18 |
| 5 | 1.90 | 1.60 | 1.10 | 0.70 | 0.49 | 0.42 | 0.33 | 0.26 |
| 10 | 2.30 | 1.90 | 1.30 | 0.80 | 0.60 | 0.51 | 0.40 | 0.30 |
| 25 | 2.60 | 2.20 | 1.50 | 1.00 | 0.71 | 0.63 | 0.50 | 0.38 |
| 50 | 3.00 | 2.50 | 1.70 | 1.10 | 0.81 | 0.74 | 0.60 | 0.47 |
| 100 | 3.20 | 2.70 | 1.90 | 1.20 | 0.90 | 0.80 | 0.65 | 0.49 |

TABLE 3: ANNUAL RAINFALL 18" TO 21":

| Recurrence Interval (Years) | Duration | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 10 Min | 15 Min | 30 Min | 1 Hr | 2 Hr | 3 Hr | 6 Hr | 10 Hr |
| 2 | 1.70 | 1.40 | 1.00 | 0.65 | 0.44 | 0.37 | 0.29 | 0.22 |
| 5 | 2.30 | 1.90 | 1.30 | 0.85 | 0.60 | 0.52 | 0.41 | 0.33 |
| 10 | 2.80 | 2.40 | 1.60 | 1.03 | 0.74 | 0.64 | 0.50 | 0.38 |
| 25 | 3.20 | 2.70 | 1.90 | 1.20 | 0.92 | 0.80 | 0.64 | 0.50 |
| 50 | 3.70 | 3.10 | 2.10 | 1.40 | 1.05 | 0.92 | 0.74 | 0.58 |
| 100 | 4.00 | 3.40 | 2.30 | 1.50 | 1.13 | 1.00 | 0.80 | 0.62 |

TABLE 4: ANNUAL RAINFALL 22" TO 28":

| Recurrence Interval (Years) | Duration | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 10 Min | 15 Min | 30 Min | 1 Hr | 2 Hr | 3 Hr | 6 Hr | 10 Hr |
| 2 | 2.10 | 1.80 | 1.20 | 0.77 | 0.55 | 0.47 | 0.36 | 0.28 |
| 5 | 2.80 | 2.50 | 1.70 | 1.05 | 0.76 | 0.64 | 0.52 | 0.42 |
| 10 | 3.60 | 3.00 | 2.10 | 1.30 | 0.92 | 0.81 | 0.64 | 0.48 |
| 25 | 3.90 | 3.50 | 2.40 | 1.50 | 1.10 | 0.98 | 0.78 | 0.60 |
| 50 | 4.50 | 3.90 | 2.60 | 1.70 | 1.28 | 1.15 | 0.94 | 0.72 |
| 100 | 5.00 | 4.30 | 2.90 | 1.85 | 1.40 | 1.25 | 0.98 | 0.76 |

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DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION

# RAINFALL INTENSITY DATA

Scale:

Adopted: 2011

Drawing No: H-4

Sheet No. 1 OF 1

# Appendix B

SUBMITTED CHANGES TO PRDS

This appendix is Empty at NOI

## Appendix C

SWPPP AMENDMENT LOG

**APPENDIX C**

**Phillips 66 Santa Maria Refinery Rail Project**

**SWPPP Amendment Log**

| No. | Date | Prepared By | Description | QSD Signature |
|---|---|---|---|---|
| 1 | | | | ________________ |
| 2 | | | | ________________ |
| 3 | | | | ________________ |
| 4 | | | | ________________ |
| 5 | | | | ________________ |
| 6 | | | | ________________ |
| 7 | | | | ________________ |

## Appendix D

SITE RESTORATION PLAN

Imagine the result

PHILLIPS 66

# Central Dune Scrub Habitat Restoration and Enhancement Plan

**Santa Maria Refinery Rail Project, San Luis Obispo County, California**

**APNs: #092-401-011, #092-401-013, #092-411-005**

ARCADIS

**Central Dune Scrub Habitat Restoration and Enhancement Plan**

Santa Maria Refinery Rail Project, San Luis Obispo County, California

Mary Carroll
Senior Ecologist

Greg McGowan
Principal Ecologist

Prepared for:
Phillips 66

Prepared by:
ARCADIS U.S., Inc.
735 Tank Farm Road
Suite 150
San Luis Obispo, CA 93401
Add phone

Date:
July13, 2013

ARCADIS

# Table of Contents

## Tables



## Figures



## Appendices

## Acronyms and Abbreviations

| | |
|---|---|
| CDFW | California Department of Fish and Wildlife |
| cm | centimeter |
| CNDDB | California Natural Diversity Database |
| CNPS | California Native Plant Society |
| CSC | California Special Concern Species |
| CE | California-listed Endangered Species |
| CT | California-listed Threatened Species |
| ºF | degrees Fahrenheit |
| FE | Federally-listed Endangered Species |
| FSC | Federal Special Concern Species |
| FT | Federally-listed Threatened Species |
| GPS | Global Positioning System |
| ha | hectare |
| km | kilometer |
| m | meter |
| USGS | United States Geological Survey |

## 1. Executive Summary

This Coastal Dune Scrub Habitat Restoration Plan (HRP) details proposed mitigation measures to address potential ecological impacts associated with installation of an extension to an existing rail spur to facilitate rail delivery of crude oil to the Phillips 66 Santa Maria Refinery (the Site).The Site is located near Highway 1 on the Nipomo Mesa in Arroyo Grande, San Luis Obispo County, California (Figure 1).

Anticipated impacts within central dune scrub habitat includes 25.2 acres (10.2 hectares [ha]) for rail lines, 2.1 acres (0.9 ha) for new pipeline, and 0.7 acres (0.3 ha) for expansion of the emergency vehicle access corridor (EVA road), for a total of 28.1 acres (11.4 ha). Of these impacts, 18.7 acres (7.6 ha) are permanent impacts and 9.4 acres (3.8 ha) are temporary impacts. Habitat restoration and enhancement are planned to actively restore temporary impact areas disturbed by project activities. The habitat restoration activities are dictated by conditions associated with the Coastal Development Permit to be issued by the California Coastal Commission (CCC), as well as by conditions mandated by the County of San Luis Obispo (the County).

The mitigation approach to address impacts to native botanical resources combines immediate active revegetation and restoration activities coupled with weed eradication and specific plantings for screening purposes. This restoration plan provides for 9.4 acres (3.8 ha) of active restoration activities. Coastal dune scrub will be seeded using a seed mix comprised of locally collected native seed comprising dune scrub dominants and associates and aggressive weed abatement treatments will be used in restored areas in order to maintain reduced cover by invasive exotics and allow the native riparian vegetation to become reestablished and dominant. Container plantings of trees and shrubs for screening purposes will be planted according to the methods outlined in this HRP and irrigated until established.

An introduction to the project and methodology used in characterizing biological resources on Site are discussed in Sections 2 and 3. Sensitive resource protection measures are described in Section 4. Details of proposed habitat restoration are covered in Sections 5 through 9, including restoration methods, quantifiable performance standards, monitoring criteria, scheduling, and contingencies; proposed restoration areas are shown in Figure 3. Tables 1-4 provide additional details on the proposed restoration seed mix, performance criteria, performance criteria measuring methods, and the restoration implementation and monitoring schedule.

## 2. Introduction

The Phillips 66 Santa Maria Refinery (SMR) Rail Project Site (the Site) consists of three assessor's parcels within the South County Planning Area of San Luis Obispo County (APN #092-401-011, #092-401-013, #092-411-005). The approximately 1,875-acre (758.8 ha) property is located on Highway 1 approximately 5 miles ( 8.05 km) south of the intersection of Highway 1 and Halcyon Road on the Nipomo Mesa in Arroyo Grande, San Luis Obispo County, California (Figure 1). The project Site is a small portion of the SMR property and is currently used for industrial operations and cattle grazing.

The SMR property is bordered to the north by agricultural fields, industrial facilities, and residential housing. It is bordered to the south by agriculture, by residential development to the east, and by undeveloped coastal dunes to the west. The proposed rail spur extends the existing spur through the coke processing area and to the east through the grazing area. Additionally, a covered offloading rack will be constructed and an above ground pipeline will convey material from the offloading rack to the existing storage tanks at the SMR (Figure 2). The proposed development consists of extending the existing rail spur by approximately 2600 yards (2377 m). The width of the rail spur disturbance envelope is expected to be approximately 250 feet (76 m) in width. The length of the pipeline is approximately 3300 feet. The width of the pipeline disturbance envelope has been conservatively estimated at 25 feet (7.5 m) in width. However, the above ground pipeline installation follows an existing road is not likely to actually require disturbance of that entire area.

The approximate construction areas are summarized below:

- <u>2305 yards (2110 m) – Length of spur extension (including approximately 815 yards within the existing industrial coke plant area)</u>

- <u>270-feet (82m) – Approximate width of construction area for rail extension (note that much of the area would only be affected temporarily).</u>

- <u>775-yards (710 m) – Length of new pipeline from the unloading facility to the internal refinery (note that an additional 400 yards will be constructed within the existing refinery connecting to the existing storage tanks).</u>

- <u>25-feet (7.5 m) – Approximate width of temporary construction area for pipeline installation</u>

Acreage Breakdown (including temporary and permanent):

- <u>38.6 acres (15.6 ha) – Rail Spur and Unloading Facility</u>

- 4.1 acres (1.7 ha) – New Pipeline (mostly temporary impacts)
- 1.7 acres (0.7 ha) – Secondary Emergency Vehicle Access
- 4.5 acres (1.8 ha) – Internal Refinery Piping and Existing Track Upgrade

Collectively, the entire project, including temporary and permanent impacts, would affect approximately 48.9 acres. Of this area, a significant portion occurs within the existing refinery:

- 21.9 acres (8.9 ha, 45% of total) occurs within the existing industrial refinery area
- 27 acres (10.9 ha) occur in undeveloped areas and include portions of the rail extension, the new pipeline, and the secondary emergency vehicle access road.

A total of 25.2 acres (10.2 ha) of central dune scrub will be disturbed during installation of new rail lines, 2.1 acres (0.9 ha) for installation of new pipeline, and 0.7 acres (0.3 ha) for expansion of the EVA access route, with a total of 18.7 acres (7.6 ha) of permanent impacts and 9.4 acres (3.8 ha) of temporary impacts to central dune scrub. Following rail construction activities, habitat restoration will be conducted to replace and enhance impacted native resources according to the County of San Luis Obispo Condition xxx.

This HRP has been written to detail the requirements, methods, and quantifiable performance criteria for restoration of sensitive ecological resources temporarily impacted by the project, restoration of temporarily disturbed habitat at the Site, installation of container plantings of trees and shrubs for screening purposes, and implementation of ecological resource protection measures during rail construction activities. Methods are outlined for protection and monitoring of sensitive biological resources at the Site as required by the County of San Luis Obispo and the CCC. Specifically, measures described in this plan are aimed at further reducing impacts to wildlife and sensitive habitats and plants during rail construction activities.

## 3. Methods

ARCADIS utilized a variety of study methods to develop this restoration plan. These are described in more detail below.

Desktop Data Search: Prior to performing the field work, ARCADIS reviewed documents concerning the Site and the surrounding areas, including a search of the California Natural Diversity Database (CNDDB; California Department of Fish and Wildlife [CDFW] 2013) for the United States Geological Survey (USGS) 7.5-minute series Oceano topographic quadrangle and the adjacent quadrangles (Arroyo Grande NE, Guadalupe, Nipomo, Santa Maria, Tar Spring Ridge, Orcutt, Casmalia, and

Pismo Beach). The California Native Plant Society's (CNPS) Electronic Inventory of Rare and Endangered Vascular Plants (CNPS 2013) was also queried for appropriate habitat within the Oceano quadrangle and adjacent quadrangles (Appendix A). Aerial photographs from approximately the last 20 years were also reviewed to better understand the history of the Site. Other resources employed for this assessment included various state and federal regulations, consultation with other local botanists about issues in the area, and ARCADIS' direct experience on the Site and in the surrounding area including a previous biological site assessment nearby for a ConocoPhillips project (LFR 2005). ARCADIS biologists also interviewed a local rancher who has a long history tending cattle on the Site.

Botanical Surveys: ARCADIS botanical surveys encompass documentation of species composition, abundance, relative distribution, and community composition (including dominants, associates, and uncommon elements). The survey is intended to characterize the vegetation types, record all plant species observed, and ascertain the likelihood for the occurrence of sensitive species in areas not observed during the survey by ARCADIS. Physiographic features are noted and correlated with plant distributions. The survey area encompassed the proposed rail line extension options and surrounding areas, which were verified using global positioning system (GPS) coordinates of the route options in the field. Surveys were conducted on October 9 and November 13, 2012 and on April 29, June 11, and 21, 2013.

All plant species found in a recognizable condition during ARCADIS' surveys were recorded and are listed in Appendix B. Nomenclature follows the Jepson Manual: Vascular Plants of California, Second Edition (Baldwin et al. 2012). In addition, pertinent volumes of the Flora of North America (Flora of North America Editorial Committee, eds. 1993+) and a regional flora (Hoover 1970) were also used for plant identification. It is important to note that the list of vascular plant species on the Site presented in this report may not be comprehensive. California Natural Diversity Database sensitive resource locations, coupled with sensitive resources mapped by others (e.g., the San Luis Obispo Land Conservancy) and during the ARCADIS 2012-2013 surveys were also studied.

Invasive weed species are summarized in Appendix C, along their current invasiveness status, according to the California Invasive Plant Council (Cal-IPC 2006).

Vegetation Mapping: ARCADIS mapped and characterized all vegetation in the study areas based on direct field observations and with aerial photograph interpretation for surrounding buffer areas. Vegetation was mapped at the both the community and alliance level, according to CNPS/CDFW mapping protocols described in the CNPS A Manual of California Vegetation (Sawyer et al. 2009) and digitized using ArcGIS software. Vegetation types are characterized by using Sawyer et al. (2009), Holland (1986), and the CDFW natural communities list (2010) and are shown in Figure 3.

A botanical assessment summarizes the results of these findings (ARCADIS 2013).

## 4. Sensitive Resource Protection Measures Required during Rail Construction Activities

Rail construction activities have the potential to permanently degrade native habitat by creating corridors for invasive exotics and disturbing existing vegetation. Soil disturbance along the edges of coastal dune habitats caused by grading, material storage, or vehicle traffic may displace existing stabilized vegetation or soil, which in turn may be replaced or invaded by more aggressive weed species. Without proper erosion control, movement of sediment from bare, unstable soils during rainfall may cause increases in the amounts of material deposited in nearby undisturbed native habitat. Rail construction activities can potentially harm wildlife or plants that are close to the development area.

This section lists measures to protect sensitive resources during rail construction activities. These measures are also addressed in the botanical assessment for the project (ARCADIS 2013) and in the conditions of approval for the project permits. Because these measures protect both botanical and wildlife resources, a general discussion on resource protection measures for all biological resources at the Site is included below.

- Limit disturbance of upland habitat – To the extent feasible, the disturbance areas should be minimized.

- Construction protection plan – A concise plan that details the resource protection measures and provides maps of protected areas shall be prepared prior to the start of construction. The plan shall be specifically written for the construction personnel.

- Employee environmental awareness training (EAT) program shall be developed – Employee environmental awareness training program shall be developed prior to initiation of the project. This program shall be used to train employees and contractors relative to the environmental protection measures of the projects detailed in the construction training plan. If new contractors are brought to the Site after initial EAT is conducted, they shall be provided with EAT, as needed. The Phillips 66 project team shall ensure that the plan is followed during field work and all members shall have authority to stop work if appropriate measures are not being implemented. A final report shall also be prepared detailing the implementation and efficacy of the mitigation and take avoidance measures. This report shall be submitted to all interested agencies involved in the projects.

- Pre-construction EAT shall be conducted – A pre-construction EAT shall be held ten days prior to project implementation with representatives from the County of San Luis Obispo, key construction personnel, and other pertinent agency and applicant personnel. An onsite training session for all project personnel working on Site shall be conducted by a County-approved biologist to notify the personnel of the type and location of sensitive resources in the area, the proposed protection measures, and to identify the delineated work areas, as outlined in the employee EAT plan. At a minimum, the training shall include: a description of the sensitive species on Site and their habitats; the provisions of the Endangered Species Act; the necessity for adhering to the provisions of the Act; the penalties associated with violating the provisions of the Act; the specific measures that are being implemented to conserve the sensitive resources on Site while rail construction activities are occurring; and the boundaries within which the project activities are to be accomplished.

- Construction monitoring - A Biological (Construction) Monitor who is a qualified biologist familiar with the project area shall be present during initial site preparation and all initial ground disturbance activities, such as vegetation removal and grading, as well as for initiation of each phase of the project to ensure that sensitive species are not present in the project area; see Section 4.2 below for more details.

- Capture and release of wildlife during construction - Whenever possible, common wildlife and wildlife species of special concern may be captured and immediately re-located by a **qualified biologist** to similar habitat outside the working area. If federal or state-listed species are identified, then work shall cease in that location until the appropriate agencies can be contacted for further instruction.

- Pre-construction surveys - To help protect sensitive resources in the vicinity of the project, pre-construction reconnaissance-level biological surveys shall occur prior to initial clearing for the construction activities. The pre-construction surveys shall occur no more than two weeks prior to initial clearing activity and shall allow sufficient time for work schedule changes or addition of protection measures (i.e. additional fencing, wildlife exclusion measures) that may be necessary to avoid impacts to common and sensitive biological resources. The goal of the surveys shall be to identify common or sensitive status wildlife and plant species in the work area and, if possible, determine methods by which impacts to these species can be further avoided. Additionally, pre-construction surveys for Nipomo Mesa lupine should be conducted each spring prior to construction between January and June to confirm that no individuals occur within or adjacent to the work areas.

  Pre-construction surveys shall occur prior to initial clearing activity for each phase of construction if construction is phased. An approved biologist shall conduct pre-construction reconnaissance level surveys of the disturbance area during each phase of the construction project to determine the presence of common species, the potential capture and relocation of individual animals, and to determine a likely escape route for these species.

It is critical that all construction personnel involved in clearing activities are aware that pre-construction biological surveys must be completed prior to each and every phase of initial clearing associated with the project. Good communication between the project manager and the project biologist is essential to ensure that surveys are conducted at the proper time.

- Temporary fencing and work site delineation - The boundaries of all work areas, including access roads and staging areas, shall be delineated on the grading plans. Sensitive habitats and resources adjacent to work areas shall be clearly delineated for avoidance on grading plans and in the field. All disturbance areas shall be clearly delineated in the field with fencing or flagging prior to any disturbance activities, including grading, grubbing, and clearing. Any native shrublands located within 25 feet (8 m) of proposed disturbance shall be temporarily fenced prior to any ground disturbance and such fencing is to remain in place throughout all grading and construction. Fencing shall be shown on all grading plans. No earth disturbance shall occur outside of the approved construction activities envelope.

- Temporary access roads – Temporary access roads should be limited to the fewest number possible to reduce impacts to biological resources. Temporary access roads and staging areas should be restored to pre-project conditions following project completion.

- Staging and stockpiling - All staging and stockpiling shall be limited to the existing paved or disturbed surfaces to the maximum extent feasible. No staging shall occur within the sensitive habitats or the designated buffer zones.

- Equipment maintenance – Equipment/vehicle maintenance/repairs shall be performed off-site or restricted to pre-designated areas.

- Spill protection measures – Engineering design shall include measures for spill containment such as berms and other structures to contain any released fluids or combinations of released fluids and other materials.

- Dispose of all waste in covered containers - All waste, garbage, and trash shall be maintained in covered containers and disposed of as specified in the Project's Waste Management Plan and in accordance with local and state regulations. Staging areas shall be cleaned-up and restored to pre-project conditions within 30-days of project completion.

- Do not feed or harass wildlife – Feeding, handling, or harassment of wildlife shall not be allowed. Pets shall not be allowed onsite.

- Restoration plan - Areas disturbed as a result of rail construction activities shall be restored to pre-disturbance conditions with native vegetation in accordance with a Habitat HRP, as outlined in Sections 5 through 9 of this document. These restoration measures will be implemented in areas subjected to temporary impacts, such as cut and fill slopes, or elsewhere on the SMR property. All seed and/or propagules shall be locally collected from sources as close to the project area as possible. Appropriate erosion control measures will be utilized for slope stabilization where necessary.

  Any native vegetation that is inadvertently disturbed during project activities shall be restored in addition to but consistent with the restoration described below.

## 4.1 Measures to Protect Wildlife

Activities associated with development of the Site may bring construction personnel and equipment within close proximity to many wildlife species on the Site at one time or another during the construction phase. In general, construction personnel should avoid interactions with any wildlife species encountered on the job Site. In cases where wildlife species may be injured or killed by project activities, construction personnel should divert work to another area, refer the sighting to the job foreman and the Biological Monitor, and continue working in the area only after the animal has been relocated by the Biological Monitor or has left the work area on its own.

The wildlife protection measures are intended to reduce potential impacts to both common and sensitive wildlife species to a less than significant level and to prevent impacts to these species whenever possible. All construction personnel working on the project, especially during the clearing phase, should understand that protection of sensitive habitat, plants, and wildlife is of the utmost priority and failure to do so may result in expulsion from the job Site as well as legal consequences involving fines for violation of the California Department of Fish and Wildlife Code and/or the State or Federal Endangered Species Act.

To help protect wildlife species in the vicinity of the project, pre-construction wildlife surveys shall occur prior to initial clearing of the Site for the development. The pre-construction wildlife surveys shall occur no more than two weeks prior to initial clearing activity and shall allow sufficient time for work schedule changes and or additional protection measures (i.e. additional fencing, wildlife exclusion measures) that may be necessary to avoid impacting common and sensitive wildlife occurring on the Site. Wildlife surveys shall consist of canvassing the project area scheduled for clearing on foot while looking for signs (burrows, nests, tracks, etc.) or direct observation of special status wildlife species. The goal of the surveys shall be to identify common or sensitive status wildlife species in the work area and if possible determine methods by which impacts to these species can be avoided.

Pre-construction wildlife surveys shall occur prior to initial clearing activity for each phase of construction. It is critical that all construction personnel involved in clearing activities are aware that pre-construction wildlife surveys must be completed prior to each and every phase of initial clearing associated with the project. Good communication between the rail construction personnel and the Biological Monitor is essential to ensure that surveys are conducted at the proper time.

The presence of any state or federally-listed species within the work area shall be addressed as detailed in the Biological Opinions (USFWS and NMFS) and in the 1602 permit application, respectively. Biologists handling or surveying for listed species shall have all necessary Endangered Species Act permits or authorizations. If incidental take of a protected species occurs, the Biological Monitor shall verbally notify USFWS and/or CDFW as well as Phillips 66 and the County, conduct an evaluation, and submit a report to all parties within one week of the incident. Within three (3) working days of the incident, a report shall be submitted to all agencies including the date, time, location of the carcass, a photograph, cause of death, if known, and any other pertinent information. Care shall be taken in handling dead specimens to preserve biological material in the best possible state for later analysis.

Whenever possible, common wildlife and wildlife species of special concern may be captured and relocated to similar habitat outside the working area by the Biological Monitor, provided that agency approval has been obtained. If federal or state-listed species are identified, then work shall cease in that location until the agencies can be contacted for further instruction.

In addition to the measures discussed above, the following measures are also intended to avoid impacts to sensitive wildlife species during construction.

- The Biological Monitor, who shall be a County-approved biologist, shall conduct pre-construction reconnaissance level surveys of the disturbance area during each phase of the construction project to determine the presence of common species, the potential capture and relocation of individual animals, and to determine a likely escape route for these species. The Biological Monitor shall delineate and survey a construction corridor for project personnel. Staging areas and pipeline access routes will be flagged or fenced prior to project commencement. The Biological Monitor will ensure that personnel are adhering to mitigation and avoidance measures as well as address any biological issues that may arise on a day to day basis. The biological monitor will interact directly with Phillip 66's site supervisor and the site health and safety office to ensure that biological issues and mitigation measures are followed per the conditions of the various permits and the area-specific work plan. Should a change in conditions or requirements become necessary, the biological monitor has complete "stop-work authority" to shut down construction activities while the issue is resolved and documented. The safety of the workers and property will be considered before any changes to mitigation and avoidance measures are implemented.

- The Biological Monitor shall be present on the Site on a regular basis to ensure that sensitive species are not present in the project area.

- The Biological Monitor shall conduct an EAT session for project personnel prior to implementation of construction activities. At a minimum, the training shall include: a description of potential sensitive wildlife species on Site and their habitats; the provisions of the Endangered Species Act; the necessity for adhering to the provisions of the Act; the penalties associated with violating the provisions of the Act; the specific measures that are being implemented to conserve potential sensitive wildlife species while construction is occurring; and the boundaries within which the project activities are to be accomplished.

- Appropriate barriers (i.e., silt fencing as described below) shall be established to minimize the movement of wildlife into the construction zone. The construction zone shall be flagged and fenced through the riparian corridor, using silt fencing at least two feet tall subject to the approval of the project biologist. The fencing shall be installed at least one week prior to any construction activities. It shall have no gaps, it shall be keyed into the substrate, and it shall be regularly inspected and maintained. Once the construction zones have been fenced and cleared, they shall then be surveyed daily prior to any construction activities and periodically throughout the day for any red-legged frogs. If found, the animals shall be relocated outside of the construction zone with approval from USFWS. The Biological Monitor shall also inspect the fencing and implement measures to reduce or eliminate injury and mortality of any other resident native wildlife species.

- Where feasible, initial ground disturbances shall avoid the bird breeding season between February 1 and August 15. Pre-construction nesting bird surveys of the Site shall be conducted during February or March at least two weeks prior to the start of ground clearing or grading activity and results shall be submitted to appropriate agencies for review. If nesting bird surveys are conducted outside of these months, agency approval (CCC, County of San Luis Obispo) must be obtained. Results shall include specific information on any nesting activities and will refine avoidance areas to exclude areas that are not adequate to support nesting. Biological activities that involve disturbances within

500 feet (152 m) of an active raptor nest and/or 100 feet (30 m) of an active passerine nest shall be avoided or further evaluated to determine if the proposed activity may affect breeding behavior.

## 4.2 Biological Monitoring and Reporting

Construction monitoring during initial disturbance is required to protect resources during construction and to identify any feasible impact avoidance, minimization, and erosion control measures that may be implemented in addition to the existing requirements.

To ensure that the minimum amount of habitat is disturbed during construction, initial flagging, fencing, and grading shall be inspected by the Construction Monitor. The Construction Monitor shall be on site to sufficiently monitor the protection measures detailed in this document. It is anticipated that monitoring will be most frequent during preparatory and initial site clearing work then will decrease in frequency once the mass grading has disturbed all of the topsoil within the construction activities area or a particular phase of work. The monitor shall be on-site (or shall spot check) during initial site-walks with contractors and crew orientation meeting(s) and during oak tree/native habitat/sensitive species protective fence installation. The Construction Monitor will be consulted regarding any necessary modifications to protection measures or modifications to grading design or infrastructure alignment.

Monthly reports shall be prepared throughout the rail construction activities to document the status of development, status of conditions, incidents of non-compliance (if any) and their results, as well as any other pertinent or requested data.

# 5. Habitat Restoration Plan

This section of the plan describes the materials and methodology for undertaking all restoration at the Site. The primary goal of restoration is to reestablish central dune scrub at the Site, as well as to enhance native habitat through a reduction in cover by native weeds. Container plantings of trees and shrubs for screening purposes will be also planted according to the methods outlined in this HRP and irrigated until established.

Species chosen for seeding and/or planting are characteristic of native vegetation at the Site. The restoration shall be subject to five years of maintenance and monitoring and must achieve quantifiable performance standards to ensure successful establishment of plantings and weed removal. Plantings shall be replaced and/or the plan shall be altered if criteria are not met. If success criteria are not met after five years, monitoring and maintenance shall continue on year to year basis until criteria are met as determined by a County-approved biologist.

The restoration activities described in the following sections have been designed to conserve soil and reduce erosion, protect existing wildlife and native plants at the Site, remove invasive exotic plant species with the potential to spread in the area, and reestablish native vegetation that is self-sustainable and that reflects the characteristics of adjacent native vegetation.

The restoration approach for the Phillips 66 Rail Construction Project explicitly embraces adaptive management to maximize restoration success based on Site-specific situations.

## 5.1 Responsible Party and Restoration Goals

The party responsible for implementation of this HRP for temporarily and permanently disturbed habitat is the Phillips 66. The party responsible for the maintenance and monitoring of restored areas is also Phillips 66.

Habitat restoration and preservation at the Site is based on the following goals:

- To maintain and enhance habitat for both rare and common species disturbed by the project;
- To maintain and enhance healthy self-sustaining plant communities with the physical and biological characteristics of adjoining undisturbed habitat, allowing for biotic flows and exchange;
- To restore the quality of native habitats on the Site through the reduction or elimination of the most serious invasive weeds to enhance ecosystem value and function.

These goals will guide the approach to restoring temporarily disturbed habitat (no permanent impacts are anticipated). Specific objectives and techniques to meet these goals, success criteria, monitoring requirements, and contingency plans are provided in the following sections and are also provided in Tables 1-4.

Work in the restoration areas will be conducted by two entities: the Restoration Manager (ARCADIS) and the landscape installation/maintenance contractor (Landscape Contractor). The Landscape Contractor may actually be represented by two entities, a weed eradication contractor and a hydroseeding contractor; for simplicity, these two entities will be referred to as the Landscape Contractor in this section. All contractors will be reviewed by and report to the Restoration Manager, who will provide a recommendation to Phillips 66 for contractor selection. Each party will have specific tasks associated with the Phillips 66 SMR restoration project. These tasks are described in detail below, with the party that is responsible for each task noted in parenthesis.

Many of the sections that follow are comprised simply of bulleted lists for clarity and simplicity during implementation of the scope of work described in this HRP.

The major restoration-related tasks covered within this HRP to be carried out by the Restoration Manager include:

- Establishment of restoration areas on Site
- Identification of photopoints in each restoration area
- Conduct initial reference site and restoration area monitoring
- Staking/marking of weed treatment areas prior to initiation of weed control efforts
- Seed and propagules collection
- Oversight of all restoration activities conducted by Landscape Contractor
- Hand broadcast of seed within restoration areas, where needed
- Regular restoration monitoring and associated reporting
- Planning for future restoration work as needed

The major restoration-related tasks covered within this HRP to be carried out by the Landscape Contractor include the following:

- Initial and ongoing weed removal in restoration areas
- Seeding in targeted areas
- Planting of cuttings according to specifications included in this HRP
- Irrigation installation, if needed
- Ongoing maintenance of restoration areas

## 5.2 Habitat Temporarily Disturbed During Construction

Pipeline removal activities are expected to result in temporary disturbances to 9.4 acres (3.8 ha) of central dune scrub vegetation. It is anticipated that the rail construction activities may result in other minor temporary impacts. Temporary disturbances can be minimized by following the resource protection measures outlined in Section 4. Actual field conditions and rail construction requirements will ultimately determine the extent of disturbance. All impacts must be mitigated in accordance with this HRP. Onsite monitoring during rail construction will quantify final impacts for reporting to the County of San Luis Obispo and to the California Coastal Commission and will be used to adjust final mitigation acreages, if necessary. Final project impacts will be quantified in the field using a GPS unit with submeter accuracy in order to determine impact acreages in each vegetation type. A project biologist will characterize the vegetation of areas subject to unexpected impacts with detailed field notes and photographs, documenting dominant and sensitive species, as well as weed infestations in the disturbance area or nearby. These data will be described in the report narrative, on figures, and in an impact table.

Anticipated impacts within central dune scrub habitat includes 25.2 acres for rail lines, 2.1 acres for new pipeline, and 0.7 acres for expansion of the emergency vehicle access corridor (EVA road), for a total of 28.1 acres. Of these impacts, 18.7 acres (7.6 ha) are permanent impacts and 9.4 acres (3.8 ha) are temporary impacts.

The mitigation approach proposed to address project impacts is focused on restoration of native plant species within disturbance envelopes, with additional weeding in a 50-foot buffer around the seeded and/or planted areas. Proposed mitigation for temporary impacts will result in seeding of a total of xx acres (0.8 hectares) of central dune scrub and an additional xx acres (x ha) of weed abatement in a 50-foot buffer around the seeded area. All native vegetation subject to temporary disturbance shall be incorporated into the restoration area to be weeded and/or seeded, under supervision of the Restoration Manager.

Temporarily disturbed areas will be seeded with a central dune scrub mix utilizing locally collected seeds, where possible. Central dune scrub species become established quickly in disturbed areas from seed, enabling deep root systems of dominant shrubs to penetrate into native soil upon germination. Species chosen for the seed mix are characteristic of central dune scrub vegetation in the project area (Table 1). Methods for seed collection and application are described in Sections 5.5 and 5.6. Methods for weed abatement are summarized in Section 5.3 and cutting placement in Section 5.7.

No native trees are targeted for removal during construction activities. Native tree species will be planted for screening in designated areas and these plantings are a component of this HRP.

## 5.3 Weed Abatement Plan

Non-native and invasive plant species shall be removed from within the project disturbance footprints in addition to weed abatement carried out in restoration areas and their associated buffer areas; these areas shall be maintained in a weed-free condition for the duration of the monitoring period (five years).

Invasive weeds are recognized as threatening biological diversity on a worldwide basis, second only to habitat fragmentation and loss (Sala et al., 2000). Impacts by weeds on native ecosystems in the coastal California are far-reaching and complex. Weeds reduce the biological functions of native ecosystems, interfering with the growth and reproduction of many native species. They can out-compete and exclude native species and alter nutrient cycles, hydrology, and wildfire frequency. Some hybridize with native plants, altering specialized genetic features that enable the native plant to survive in a given environment (Bossard et al., 2000). The control of invasive weeds is one of greatest threats to native ecosystems, and among the highest priorities for land managers (Pickart and Sawyer, 1998).

Dune systems are particularly susceptible to invasion by non-native weeds, due to frequent natural and human-caused disturbances in these areas, coupled with the natural openings between native species (Pickart and Sawyer, 1998). Intentional plantings of invasive species such as European beach grass and iceplant for dune stabilization efforts have exacerbated the problem.

Seventeen weedy species currently degrading habitat at the Site are listed by the California Invasive Plant Council as plants that threaten wildlands; all non-native species found at the Site are listed in Appendix C, along with their current Cal-IPC status (California Invasive Plant Council, 2006). Among these plants, five are categorized as highly invasive and posing major threats to native habitats: European beach grass (*Ammophila arenaria*), ice plant (*Carpobrotus edulis*), pampas grass (*Cortaderia* jubata), veldt grass (*Ehrharta calycina*), and red brome (*Bromus madritensis* subsp. *rubens*). An additional twelve pose moderate threats to native habitats as a whole.

All weeds will be removed within project disturbance areas. In addition, weeds will be removed in restoration areas as well as in a 50-foot buffer surrounding the seeded areas, for a total of xx acres (y ha).

### 5.3.1 Specific Weed Treatments

All weed treatment will be marked in the field by ARCADIS prior to weed treatment. Weed treatments shall be done on foot by the Landscape Contractor, in consultation with the Restoration Manager.

A summary of characteristics of the most noxious weeds and potentially applicable treatment methods is provided below .

**Veldt grass (*Ehrharta calycina*):** Veldt grass covers vast areas of central dune scrub, especially in previously disturbed areas. Veldt grass is a perennial clump-forming grass with flat, green to reddish-purple-tinged, glaucous leaves three to eight inches long. The leaves are often wrinkled partway along the margins. The inflorescence extends above the leaves in a loose panicle about four to six inches long; the entire plant is one and one-half to three feet tall.

Veldt grass occurs in sandy soils and spreads rapidly into scrub and open habitats. It has covered dune habitats along the Central Coast in the last few decades. Once established, it can inhibit or prevent germination and establishment of native dune scrub species, converting the habitat to non-native grassland. It is considered the most serious threat to sand dunes of the central coast of California (Bossard et al., 2000).

Manual removal has yielded mixed results due to the quantity of seed in the soil and the enhanced germination of that seed following disturbance. Care must be taken to remove all parts of the plant.

Due to the small amount of veldt grass currently at the Site, however, this may be an efficient means of removal.

The most effective chemical treatment is glyphosphate with an added surfactant. Other herbicides that have aided in treatment include fluazifop-p-butyl (Fusilade DX®, a monocot-specific herbicide) for foliar spot-treating plants before seeds are produced. Depending on the season of treatment, it has been suggested that seeds be collected by first clipping and bagging the inflorescences prior to herbicide application to reduce the quantity of seeds added to the seed bank.

**Ice plant (*Carpobrotus edulis* and *C. chilensis*):** Iceplant forms large mats in portions of the site and is a major problem in California coastal dune systems. Iceplant is a prostrate succulent perennial that roots at the nodes and often forms dense mats covering large areas. Its distinctive three-sided leaves make recognition easy. *Carpobrotus edulis* produces numerous linear yellowish to pinkish “petals” in flowers that are 2.5 to 6 inches in diameter, whereas flowers produced by *C. chilensis* are smaller (1.5 to 2.5 inches) and deep magenta. The two species readily form hybrids. Ice plant is particularly aggressive in sandy soils and spreads both vegetatively and by seeds. Iceplant has been utilized extensively in soil stabilization projects.

Iceplant suppresses the growth of both native seedlings and mature native shrubs. A single individual can form dense mats over 30 feet wide. Removal of iceplant increases water availability to native species, and enhances the biomass and reproductive success of natives as well (Pickart and Sawyer, 1998). It also aids in build-up of organic matter, which can result in establishment of non-native plants that normally would not be able to tolerate sandy soils.

Iceplant is easily removed by hand pulling. Because the plant grows roots and shoots from most nodes, all live shoot segments must be removed from contact with the soil to prevent resprouting. Solarizing iceplant patches by covering them with clear or black plastic for three months or more has also proven effective. Mechanical removal by bobcat or tractor is efficient for areas in which there are no sensitive resources.

Chemical control includes treatment with glyphosphate with an added surfactant to enhance foliar penetration. Adding an acidifier to hard water before mixing with glyphosate can increase the effectiveness of the treatment (Bossard et al., 2000). Subsequent growth from seedlings needs to be controlled over successive years.

Iceplant removal efforts have been underway at Morro Strand State Beach, where eradication from the foredunes has been almost completely accomplished using glyphosphate at a minimum concentration of 2% plus surfactant (California Department of Parks and Recreation, 2005).

**European beach grass (*Ammophila arenaria*):** European beach grass is found in limited quantities at the site. It is a perennial rhizomatous grass native to Europe that forms clumped stems, with thick, elongate, in-rolled leaves from 12 to 40 inches in length. The flowers are arranged in dense spikes that may be found among the leaves.

European beach grass spreads primarily by rhizomes, which can grow at the rate of about 6.5 feet per month. The tough rhizomes tolerate submergence in both fresh and sea water, and can survive for days or even weeks and then sprout on a new shore when washed up. They also are able to withstand up to 3 feet a year of sand burial (Bossard et al., 2000).

The density of European beach grass above-ground vegetative cover and below-ground root mass drastically reduces the presence of native plant and wildlife species, especially on the windward side of dunes. European beach grass cover also reduces sand movement to dunes immediately behind the foredunes. Impacts to natural dune ecosystems are severe in the presence of this aggressive species.

European beach grass can be removed by digging at any time of year. Resprouting is most vigorous when the ground is warm from early spring through fall, so removal during the warm season is recommended. The perimeter of any area to be treated should be trenched so that rhizomes are severed to inhibit reinvasion from adjacent populations. Weekly to monthly digging, coupled with sifting with rakes to remove rhizome fragments, have greatly reduced populations in other locations (Pickart and Sawyer, 1998). Research shows that less follow-up treatment is required if the first-year treatments are conducted weekly, then gradually reduced to monthly (Bossard et al., 2000). Ongoing efforts and revegetation are necessary to prevent other weeds such as iceplant from replacing the European beach grass.

Mechanical removal using heavy equipment has also been effective in removing European beach grass if followed by hand pulling of resprouts the year after excavation (Pickart and Sawyer, 1998). “Sand-sculpting” has been carried out in Oregon to remove European beach grass and re-contour the foredunes to enhance nesting habitat for western snowy plovers; excess sand and plant remains were deposited on the beach to be carried away by tides (Pickart and Sawyer, 1998).

Chemical control of European beach grass includes treatment with glyphosphate at concentrations of 4 to 10 % with an added surfactant to enhance foliar penetration. In a nearby restoration project, repeated applications were necessary for complete eradication of European beach grass (Vince Cicero, personal communication; Jodi Isaacs, personal communication). Although the liquid soil fumigant form of metham is also effective, it kills all soil organisms (Bossard et al., 2000).

European beach grass removal efforts have been underway since 2000 at Morro Strand State Beach, where three acres of foredune European beach grass colonies have been eliminated using glyphosphate at a minimum concentration of 9% plus surfactant (California Department of Parks and Recreation, 2005).

**Pampas grass (*Cortaderia jubata, C. selloana*):** Pampas grass is found in limited quantities at the site, especially in moist locations. Pampas grass is a perennial grass that forms large clumps, or tussocks, that reach six to twenty or more feet tall. The leaves are three to six feet in length, slightly V-shaped in cross section, with sharp, scabrous margins. Each tussock produces numerous elongate inflorescences, each with a distinctive plumed panicle at the end of stalks that rise above the tussock. These plumes consist of many hairy flowers, and generally are pinkish in *Cortaderia jubata*, and light violet to slivery white in *C. selloana*.

An individual inflorescence can produce 100,000 seeds and large clumps can produce a million or more seeds. Plants can also reproduce vegetatively. The roots of *C. selloana* can occupy a soil volume of 1,100 square feet, spreading out to thirteen feet in diameter and eleven and one-half feet in depth, providing a huge competitive drain on water availability to native species. Its rapid growth and accumulation of above- ground and below-ground biomass allow it to acquire light, moisture, and nutrients that would be used by other plants (Bossard et al., 2000).

Mechanical treatment methods include using a backhoe, shovel, mattock, chainsaw, or weedeater. In all cases, the plumes should be removed first and bagged and removed. Chainsaws or weedeaters are effective if they are used to chop up the plant into manageable pieces before digging out. Although some weed control professionals suggest soaking the crown with diesel oil or other compounds to kill the plants, this is strictly prohibited under this restoration plan. Another method that has proven to be effective is use of a winch and choker. A small choker cable is set around the base of a large clump of pampas grass and hooked up to an electric winch mounted on a pickup or other vehicle and the entire plant is pulled out of the ground (Roja, 1998).

Chemical control includes treatment with glyphosphate with an added surfactant to enhance foliar penetration. Other herbicides that have been shown to be effective include imazapyr and flauzifop. A new formulation of imazapyr, called Habitat, is used in wetland environments and requires less coverage than glyphosphate (David Chang, personal communication). Once plants are killed, they may be removed mechanically or left in place.

**Red brome (*Bromus madritensis* subsp. *rubens*):** Red brome is scattered in various locations at the site, especially near access roadways. Red brome is an invasive annual grass that germinates with fall rains. By spring it reaches several inches to two feet in height and produces fan shaped inflorescences that become purplish at maturing, fading to reddish-tan after the plant dies. The long awns on the flowers are distinctive, and the upwards-pointing florets are attached all around the peduncle.

Red brome is highly flammable, increasing risk of fire where it is found. Due to its invasive nature, it can convert habitats such as dune scrub into non-native grassland if infestations are heavy.

Hand pulling is effective with small infestations such as those in the dune scrub. The most effective chemical treatment is glyphosphate with an added surfactant.

**Other weeds (thistles, mustards, etc):** Most other weedy species at the Site are herbaceous species with enlarged taproots. Manual removal is effective if it precedes seed set, with the entire plant being pulled out by the roots. Chemical control with glyphosphate is also successful and will be used only if manual removal proves ineffective, with the advanced approval of the Restoration Manager.

### 5.3.2 Weed Removal Guidelines

The Contractor selected to perform initial and ongoing weed removal must have prior experience in identifying native and non-native plants, and must be able to distinguish between these two categories of plants at the Site. Weed treatment activities can potentially result in undesirable disturbance to native vegetation. All access must be on foot and weed treatment crews should adhere to previously disturbed corridors. Prior to weed treatment activities, the weed treatment contractor must receive approval from the Restoration Manager for all proposed access routes to weed treatment areas.

A brief written weed removal plan will be submitted by the Landscape Contractor in charge of weed eradiation for review by the Restoration Manager. This plan will provide concurrence with all details herein or will identify recommended measures to modify the plan for improved success.

It is expected that weed removal will be accomplished primarily by application of herbicides as described above. The following guidelines shall be followed by the Contractor for the duration of the project (five years):

- The Landscape Contractor shall provide  the Restoration Manager with a description of all herbicides to be used at the Site, including application rates and dilution; manufacturer's name; application equipment and methods, and a Material Safety Data Sheet (MSDS) for each herbicide intended for use; measures to protect the public, including signs, barriers, notifications, etc; measures to avoid spraying native plants; measures to avoid discharge into creek water; statement that the herbicide(s) is approved by state and federal agencies in the environment at the project Site.
- For all potential weed removal treatments, the Landscape Contractor must be able to remove weeds in a precise and environmentally sensitive manner so as not to affect adjacent native species (through over-spray, herbicide drift, etc.). The Landscape Contractor must avoid use of excessive amounts of herbicides that could be transported to adjacent plants, nearby surface water, or cause accidental spills and releases. Herbicides used near drainages need to be approved by the Restoration Manager as appropriate for use near water sources and must be applied during the dry season (April 15-November 1).

- The Landscape Contractor must provide written copies verifying that the applicator is licensed to apply the herbicide(s) in question.
- Herbicides shall not be sprayed when winds exceed 15 miles per hour. Herbicide application may employ backpack units with a narrow spray to minimize drift and accidental spraying of native species. As an alternative, a drip or wick application technique may be used to treat the weeds, since this technique largely avoids spraying of non-target plants because drift and overspray of the herbicide rarely occurs. Drip or wick application may be employed in windy conditions since this technique does not result in drift of material.
    - A dye shall be included in all applied herbicide to facilitate tracking.
    - Non-targeted plants shall not be mechanically removed or sprayed or receive drift from nearby spraying. If necessary, plastic shields should be used to avoid overspray.

## 5.4 Site Preparation

The primary tasks associated with Site preparation include staking/marking of the restoration areas for weed control and seeding. Erosion control measures shall be installed, as needed.

### 5.4.1 Erosion Control

Erosion control measures will be taken as needed, especially on manufactured grades that may be subject to rill or gully formation during rain events. A combination of hydroseeding with wood fiber for erosion prevention (see Section 5.6), and the use of erosion control blankets, fiber rolls (wattles), and silt fences may be utilized to address potential erosion issues on Site.

#### 5.4.1.1 Erosion Control Blankets

Erosion control blankets shall be used at the Site on steep manufactured slopes where necessary. Installation of erosion control blankets shall occur after hydroseeding following these guidelines:

- Use 100 % biodegradable coconut fiber mesh blanket, such as North American Green SC-150BN or GreenFix Double Net Coconut CF 072RR or CF 0728, (0.5 to 0.7 lbs per square yard, 100% biodegradable jute fiber netting on both sides).
- Staples shall be made of biodegradable steel wire for anchoring, bent U-shaped with a throat width of 1 to 2 inches, with an effective driving depth of not less than 6 inches.
- Erosion Control Blankets shall be placed on the banks of the designated restoration areas within 3 days of completion of hydroseeding.

- The blankets are a temporary stabilizing measure. They are biodegradable and will be left in place.
- The blankets shall be rolled down the banks, from the top of the banks to the toe of the slope, or to the top of the fiber rolls, when present.

#### 5.4.1.2 Fiber Rolls or Wattles

Fiber rolls or wattles shall be used at the Site on steep manufactured slopes where necessary. Installation of fiber rolls or wattles shall occur after hydroseeding and erosion control blanket installation following these guidelines:

- Use 100% biodegradable coconut fiber or straw and coconut fiber rolls, 12 inches in diameter, 25 feet long, and 5 to 7 pounds per cubic yard.
- Wood stakes. One end shall be cut diagonally and the other end will be flat (cut horizontally).
- Rope twine shall be machine-spun bristle coir, minimum thickness ¼", and minimum breaking strength of 90 pounds.
- The Contractor shall excavate a shallow trench 6 inches below grade where wattles will be placed. An Abney level (or equivalent) shall be used while placing each wattle to ensure they are on contour. Soil excavated in trenching should be placed on the uphill side of the wattle. Fiber rolls shall be placed in the trench with the ends of the fiber rolls butted together. Runoff must not be allowed to run under or around the wattle. The stakes shall be pounded into the ground at a diagonal angle on both sides of the roll at 3-foot spacing. The top of the stakes should extend above the fiber roll by 3 inches. Twine shall be used to secure rolls to stakes.
- In areas requiring erosion control blankets, the trench for the Fiber Rolls should be excavated prior to laying down the erosion control blanket.

#### 5.4.1.3 Silt Fence or Straw Bale Barrier Option for Erosion Control

In the event that runoff and sedimentation exceed the limits of the erosion control blankets and fiber rolls, installation of silt fences and/or straw bale barriers may be required to contain sediments in rapidly eroding areas. Such erosion control measures shall be installed in consultation with the Restoration Manager on an as needed basis.

## 5.5 Seed Collection and Storage

Seed material shall be collected on Site, as available. This will ensure genetic integrity in local populations. Commercial seed shall be used if needed but shall be obtained from the nearest collection locality to the Site.

Seed material shall be collected during the appropriate season for the plant. The Restoration Manager will be responsible for overseeing seed collection and properly storing and labeling the seed. Purity and germination will be determined prior to sowing.

Seed of some species are not viable for long storage periods. For these species, collection shall occur in the late summer and fall immediately prior to seeding. Seed shall be applied between October 1 and December 15, if possible.

## 5.6 Seed Application

Seeding will be accomplished by primarily by hydroseed application and supplemented by broadcast seeding of sensitive annual species. The central dune scrub seed mix includes a combination of native shrubs, subshrubs, perennial grasses, and an annual (Table 1). Leguminous species included in the seed mix that require pretreatment in order to germinate shall be provided with that pretreatment.

Because of the scale of the planting area, seed will be applied as hydroseed in a two-step process to improve seed/soil contact and protect seed from bird predation.

First Step: Apply seed mix with 500 pounds per acre of flexible growth medium (FlexTerra), 1000 pounds per acre of compost, 500 pounds per acre of slow-release organic fertilizer (Biosol 7-2-3), and 60 pounds per acre of mycorrhizal fungi (AM-120). Legumes shall be inoculated with appropriate inoculant at 2 pounds inoculant per 100 pounds of seed.

Second Step: Apply second top-coating (without seed) of 2000 pounds per acre of flexible growth medium (FlexTerra) and 500 pounds per acre of compost. The second application shall provide consistent, uniform coverage of approximately 1/8 inch over the entire area, especially the tops and toes of any slopes.

The hydroseed work shall be conducted by a reputable hydroseed contractor, who will be required to hydroseed using the seed mix and application rate specified above. Mechanical agitation of hydroseed equipment is required in order to properly mix ingredients.

Hydroseeding shall be carried out in two passes in conjunction with recommendations by the hydroseed contractor. Unless otherwise specified and agreed by the Restoration Manager, a hose should be used for the first pass, working across the area by hand. For the second pass, a cannon may be aimed straight at the restoration seeding area. Because the first pass is by hand, it can be perpendicular to the cannon so that there is both a vertical and horizontal pass to increase coverage.

To avoid inadvertent introduction of weeds, the hydroseed contractor shall rinse the tank, all hoses, and all nozzles prior to arrival at the Site. The Restoration Manager must be present during hydroseeding, and shall check seed bag tags to verify that the appropriate seed mix is used and inspect the hydroseed tank (if possible) both prior to seeding and at the end of the day. The hydroseed contractor shall provide the Restoration Manager with the seed list from the contractor's prior job in case unusual species are noted on the slope during germination that may have been left in a poorly cleaned tank or other application equipment.

Hand broadcast of seed will also be used as a seeding technique to improve the diversity of native herbaceous species on the Site. Hand seeding shall be performed by the Restoration Manager. Seed shall be hand cast and raked into soil; if needed, seed may be covered with a light mulch. Seeding shall occur prior to rain events to increase seed germination success.

## 5.7 Irrigation

Seeding shall occur in fall to coincide with the advent of seasonal rains to avoid the need for supplemental irrigation. In the event that seasonal rains are of insufficient quantity or duration water trucks with a boom and/or hoses may be utilized as a temporary irrigation measure. The decision to initiate supplemental irrigation shall be made by the Restoration Manager. In the event that contingency measures are implemented for unanticipated impacts to native grassland and/or native trees, restoration plantings shall be irrigated by infrequent deep watering, as directed by the Restoration Manager.

## 5.8 Site Maintenance

The restoration area shall be maintained in optimal condition for promoting the long-term viability and vigor of all restoration plantings and recolonization by native species. The Maintenance Period is five years in duration, beginning immediately after initial weed control and seeding, and continuing for five years thereafter.

### 5.8.1 Site Maintenance Description

The Restoration Manager shall ensure that plantings, weeding, and erosion control performance standards are met through Site maintenance activities during the maintenance period. These activities include weed eradication; reseeding, if needed; irrigation, if needed; repairs and maintenance of erosion control materials and other materials, if needed; general Site housekeeping and cleanup; and the general care and nurturing of seedlings, cuttings, and native plants within the restoration areas.

Seeded areas that are bare or found to be unhealthy because of poor maintenance practices will be replaced according to the Restoration Manager's direction.

No off-road vehicles (including mules/gators/ATVs) will be permitted in the restoration area unless approved by the Restoration Manager. Wheelbarrows or equivalent will be used to transport tools and other supplies within the restoration area.

Native plants (shrubs, sub-shrubs, herbaceous species) already exist in the restoration areas. Care must be taken to avoid these plants when working.

### 5.8.2 Site Maintenance Watering - Option

The Restoration Manager may be responsible for watering areas that have been seeded or in which cuttings have been placed if so directed by the Restoration Manager. The need, frequency, and duration of watering shall depend on current weather patterns and Site-specific soil moisture conditions.

- Watering, if needed, shall provide an adequate supply of moisture to the entire root zone of each plant during the normal growth period of the plant. Irrigation for plantings shall be supplied as infrequent, deep waterings, as determined by the Restoration Manager.
- At no time shall water be applied in a manner that causes erosion, damage to plants, runoff, or damage to existing or colonizing vegetation.

### 5.8.3 Site Maintenance Weed Control

The Restoration Manager is responsible for keeping all designated weed-treatment restoration areas free of weeds for the duration of the Maintenance Period according to these specifications and as described in Section 5.3.

- Throughout the Maintenance Period, weeds shall be removed before reaching 4 inches (10 cm) in height or forming flower heads.
- Dead weed material shall be bagged and removed from the Site during each weeding event.

## 6. Restoration Monitoring and Reporting

A long-term maintenance and monitoring program is required to assess progress on completion of tasks, to ensure quality control, and to hasten implementation of corrective actions as needed. A robust maintenance and monitoring program greatly increases the overall success and cost effectiveness of a restoration project. The Restoration Manager or their designee will carry out the monitoring and oversee the maintenance.

The monitoring program includes pre-project monitoring and post-implementation monitoring. Monitoring will address the progress of the project and the various categories of established success criteria.

A detailed monitoring log must be maintained for each visit that includes the specific task, date, observer(s), and monitoring details. Monitoring of weed control efforts and techniques, seeding, and germination and establishment of seeded native species all require monitoring. The log and/or related memoranda will include comparisons of collected data to the success criteria; discussions of all problems encountered and probable reasons why success criteria might not be attained; discussions of all activities conducted to remediate planting areas which failed to meet targeted levels; and recommendations to minimize future mortality, excessive weeds, slow plant growth, and unanticipated impacts to the restoration area.

Weed treatment areas will be monitored for cover by weeds and native species, as well as recruitment by natives as weed density diminishes. Presence of any new invasive weeds also requires careful documentation and immediate action.

Areas that are seeded will have two phases of monitoring, conducted during and after seeding. The Restoration Manager is responsible for documentation of seed germination rates and composition, indications of animal damage, weed establishment and control efforts, and potential erosion problems. Data gathered should be analyzed and recorded by the Restoration Manager and corrective measures identified if needed.

Photographs will be taken from established photo-points during each phase of the project and once a year, in spring. Photograph locations will be noted on Site plans submitted with the report.

At the end of the first restoration season, a report will be prepared to document all activities accomplished during the year. Subsequent annual reports will summarize monitoring data collected each succeeding year and compare results against the performance criteria to evaluate restoration success. The annual reports will include recommended maintenance activities and corrective measures, if needed, and specify when such measures will be implemented. Annual reports will be due to the County of San Luis Obispo and the California Coastal Commission on an annual basis. Any additional recommended maintenance activities and corrective measures, if needed, are subject to approval by the County and CCC.

The four primary monitoring and reporting requirements are described below:

1. **Monitoring During Site Preparation, Weed Control Efforts, and Other Initial Phases:** The Restoration Manager will visit the Site as needed throughout the initial active Site preparation phases of the restoration project to ensure that the steps outlined above are implemented correctly. Weed abatement activities should be implemented as soon as this HRP is approved, as described above.

2. **Monitoring During Seeding:** The Site will be inspected prior t seeding to flag the restoration areas and document vegetation cover as well as during seeding to locate areas seeded, to document seeding procedures, and to evaluate initial germination and establishment of seedlings.

3. **Monitoring After Seeding and Weed Control Treatments**: Site visits will be conducted every two weeks during the first month following initial weed control and seeding efforts, with monthly visits for the remaining eleven months of the first year. The weed treatment and seeded areas will be carefully monitored for survival of invasive weeds, as well as survival or mortality of nearby natives, and recruitment of new native and/or weed species. This monitoring is critical for adaptive management, a process in which the findings from direct monitoring provide the evidence and basis for rapid management change or support as needed. Monitoring will guide possible implementation of contingency measures if necessary such as wind protection, erosion control, additional seeding, and/or additional weed control. At the discretion of the Restoration Manager, monitoring frequency will be reduced to quarterly visits in subsequent years. Seeded areas will be monitored following seeding and evaluated at the completion of the first growing season to confirm germination success and initial establishment of native species.

4. **Annual Reporting.** An annual report describing the work completed to date and the monitoring results will be presented to the County of San Luis Obispo and the California Coastal Commission on an annual basis (five annual reports).

5. **Final Report.** The final report will document restoration success relative to the performance standards defined in this HRP. If an aspect of the restoration has been unsuccessful, a revised or supplemental restoration program will be submitted within 90 days to address any restoration deficiencies.

## 6.1 Restoration Monitoring Requirements

The restoration areas will be monitored for the following criteria, utilizing the performance targets outlined in Table 2, where relevant:

- Exotic species management
- Inventory of the flora
- Percent of bare ground (annual quantitative monitoring)
- Percent vegetative cover (annual quantitative monitoring)
- Plant density (annual quantitative monitoring)
- Plant health (qualitative)
- Plant size (qualitative)
- Evidence of erosion or burying of plants
- Evidence of wildlife usage
- Hydrology (qualitative)

If onsite conditions fail to meet performance targets, then the Restoration Manager will take corrective steps. Where needed, the Restoration Manager may broadcast additional seed, place additional cuttings, and/or direct the Landscape Contractor to conduct additional weed eradication or install remedial erosion control measures. If unforeseen problems are encountered or there are significant deviations from performance targets, the Restoration Manager will consult with agencies having regulatory oversight for a discussion of contingency measures.

As described in Section 7, monitoring will also include reference areas. Reference areas provide useful comparative information on seasonal growth patterns, weed infestations, and species diversity. The reference areas will not be monitored as frequently as the restoration areas, but will be monitored at project initiation and in Year 3; they will be more thoroughly surveyed if it appears that a region-wide issue is affecting the restoration success. Regional issues negatively affecting restoration success that cannot be feasibly controlled by the restoration team shall not constitute failure to meet restoration objectives and may result in modified performance standards to reflect reasonable goals consistent with conditions in the reference areas.

Monitoring will continue for five years. If performance criteria have not been met by five years, monitoring, maintenance, and remedial actions as determined necessary for attainment of performance criteria shall be continued. Contingency measures are described in Section 8.

## 7. Performance Criteria and Reference Site Data Collection

The general goal of the HRP is to provide functional habitat value for native plants and animals within the restoration area, with weed constituents significantly lower than current levels. Performance criteria are provided to measure progress toward this goal. Performance criteria and measurement methods are provided in Tables 5 and 6.

These performance criteria will be periodically measured by the Restoration Manager during the monitoring period to determine if progress towards the final standards is being made. Failure to meet the annual performance standards will result in an assessment of causative factors and potential remedial solutions. The Restoration Manager will specify the activities necessary to achieve the performance standards, which may include additional seeding, Site and plant protection, increased weed control, or erosion control efforts. Contingency measures for failure to meet performance standards are provided in Section 8.

At the time of plant installation, a reference area in the vicinity of the restoration areas shall be established for monitoring of undisturbed central dune scrub in order to make comparisons with the restoration area. The reference area shall be similar to the restoration areas in elevation, slope, aspect, size, and soil type. Photo documentation will be made at the time of baseline data collection from permanently established photopoints. The reference site will be sampled in the same manner described in Table 3.

Data collected from the reference site will be compared to performance criteria developed for the restoration sites in Table 2. This will ensure that the performance criteria are appropriate and reasonable, and that yearly targets are attainable. Performance targets may be modified by the Restoration Manager with approval of the County of San Luis Obispo and the California Coastal Commission.

## 8. Contingency Measures

As with any restoration project, it is difficult to anticipate all potentially negative influences on restoration success. However, several issues are commonly problematic for restoration projects, and contingency measures have been developed to address these issues should they come up. These measures are intended to address issues specifically associated with the HRP for the project and not to address regional issues that impact all plants in the area (e.g., major pest infestation, extreme heat, etc.). Potential contingencies include:

**Predation by Animals:**

Gophers/Ground Squirrels/Rabbits/Deer – No protection of the restoration area is currently proposed to prevent predation by gophers, ground squirrels, rabbits, deer, or other herbivores. If animal damage is a significant problem, an active control program may be developed.

**Predation by Insects:**

Insects – No protection of restoration areas is currently proposed from predation by insects. If insect damage is a significant problem, an active treatment program may be developed.

**Weeds:**

Aggressive monitoring and maintenance – If continued weed infestation is occurring and or new weed species are invading the area, the frequency and type of weed maintenance will be increased or modified. Weed problems will be addressed through removal and or treatment of weeds depending on the species and the location.

**Erosion:**

Erosion – If yearly targets set for erosion in the restoration area are not met, the eroded areas shall be repaired and re-seeded as necessary. Erosion control measures may include installation of erosion control blankets, wattles, straw bales, or other measures.

## 9. Implementation Schedule

Table 4 provides an overview of the steps required to implement this HRP and the projected schedule. Final timing for restoration activities will be subject to approval by the Restoration Manager and will depend on agency approval and implementation schedules.

The schedule for the restoration program is identified by season (summer, fall, spring, winter) over a period of five years. Year 1 is the start of the program when initial Site preparation, initial weed control, and seed collection will be carried out, followed by subsequent restoration activities and then monitoring and report preparation. Contingency actions and remedial measures are not specified in the schedule since they would occur at different times, and only on an as-needed basis. If performance criteria are not met by the end of five years, monitoring shall continue until attainment of performance criteria. The timing of all monitoring and maintenance activities may vary from year to year depending on seasonal and environmental conditions. Annual monitoring reports will be prepared and submitted by December 31 of each year for the duration of the project.

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## Appendix E

SITE SOILS REPORT

# DRAFT
# GEOTECHNICAL ENGINEERING REPORT
# PHILLIPS 66 UNIT CRUDE TRAIN FACILITY
# SANTA MARIA REFINERY, 2555 WILLOW ROAD
# ARROYO GRANDE, CALIFORNIA

September 5, 2013

Prepared for
Wallace Group

Prepared by

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DRAFT

September 5, 2013

FILE NO.: SL-15825-SE

Mr. Tom Zehnder, P.E.
Wallace Group
612 Clarion Court
San Luis Obispo, CA 93401

PROJECT: PHILLIPS 66 UNIT CRUDE TRAIN FACILITY
SANTA MARIA REFINERY
2555 WILLOW ROAD
ARROYO GRANDE, CALIFORNIA

SUBJECT: Geotechnical Engineering Report

CONTRACT REF: Terms of Agreement between The Design Professional and Sub-Consultant, Phillips 66 Unit Crude Train Project Geotechnical Engineering Services, Santa Maria Refinery, 2555 Willow Road, Arroyo Grande, California, by Wallace Group, Doc. No. TKZ: 0660-0040, dated June 25, 2013

Dear Mr. Zehnder:

As per the referenced agreement, this DRAFT geotechnical engineering report has been prepared for use in the development of plans and specifications for the Phillips 66 Unit Crude Train Facility at the Santa Maria Refinery in Arroyo Grande, California. Preliminary geotechnical engineering recommendations for site preparation; grading; utility trenches; the railroad bed; foundations; buried vault walls; interior slabs-on-grade, exterior pedestrian flatwork, and PCC pavement; asphalt concrete pavement and gravel roadway sections; drainage and maintenance; the storm water basin; and observation and testing are presented herein. Also included are the results of percolation testing for the effluent disposal field and storm water basin. An electronic copy of this DRAFT report is being furnished for your use. Please review this DRAFT report and provide comments upon which a final version will be based. As requested, an electronic copy is also being provided as indicated below.

We appreciate the opportunity to have provided professional services for this project and look forward to working with you again in the future. If there are any questions concerning this report, please do not hesitate to contact the undersigned.

Sincerely,

Earth Systems Pacific

DRAFT

Judd J. King, G.E.
Senior Engineer

Copy: Spec Services, Inc.: Attn: Mr. Rob Randig, P.E. (email)

Doc. No.: 1309-016.SER/sb

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## 1.0 INTRODUCTION AND SITE SETTING

The proposed project will consist of enhancing the existing rail spur that connects to the Union Pacific Rail Road (UPRR) main line at the Phillips 66 Santa Maria Refinery in Arroyo Grande, California. The Santa Maria Refinery facility consists of two main areas. The northern area (in reference to Plant North on the Vicinity Map in Appendix A) consists of the oil refining units where crude oil is processed to remove gasses, sulphur and carbon (herein referred to as "coke"). The southern area consists of the carbon plant which is currently used to load railcars and tractor trailers for the distribution of the removed coke. The purpose of the unit crude train project is to provide another avenue by which crude oil is delivered to the refinery for processing and shipping. Based upon discussions pertaining to the project with Mr. Robert Randig, P.E. of SPEC Services (the project's design engineer) and iterations of preliminary design plans, the project will include:

- Expansion of the existing spur to include new rail lines that will provide two modes of service. A set of two new tracks will extend to the northeast to serve the carbon plant for use in transporting coke via railcar. A southern set of tracks will be constructed which will continue to the east for approximately 7,000 feet. This system will be used for the unloading of crude oil unit train cars and will use five sets of parallel railroad tracks. The two southern tracks will be used for staging of full and empty tanker railcars, the center track will be used for locomotive staging and maneuvering, and the northern two tracks will be used for off-loading of the tanker railcars. With the exception of the unloading canopy area (see below), the planned area of disturbance for the majority of the track will be approximately 200 feet wide and extend the length of the proposed tracks.

  The western portion of the tracks will vary in elevation from 81 feet up to a plateau of 94 feet which will be maintained throughout the unit crude train unloading facility. Cuts and fills up to 25 feet are planned for the overall project. The railroad bed will consist of a subballast section that is used to support the ballast section upon which ties and rails are constructed.

- A 625-foot long and 56-foot wide clear span steel-framed canopy will be constructed to cover the unloading facility area. Pipe racks, pumps, equipment and personnel gangways will also be constructed on separate foundations under the canopy. The area under the canopy will be surfaced with concrete or asphalt. For the purposes of this report, we have assumed that column loads for the track canopy and other equipment will be on the order of 25 kips (dead plus live loads) or less. Individual spread footing foundations are planned for the canopy columns and associated equipment.

- An open top concrete vault will be constructed south of the unloading facility. It will be used to hold three secondary containment vessels that capture contact water from the unloading facility. We understand that the vault will be a cast-in-place reinforced concrete structure that will have a depth of approximately 10 feet and a footprint of 47 feet by 64 feet. Retaining walls up to 10 feet will be incorporated into the vault.

- Other equipment pads will be constructed throughout the project to support electrical switchgear, crude oil metering, and pumps. A small restroom building with an adjacent effluent disposal field will also be constructed. All of these pads will lie north of the proposed rail lines and canopy structure. Loads on equipment pads are assumed to be approximately 2 ksf and line loads on continuous footings have been assumed to be around 2 klf.

- A storm water percolation basin will be constructed east of the equipment pads. The basin will have a planned depth of approximately 5 feet and will be used to allow storm water to percolate into the ground.

- Construction of a 4,000 foot long elevated pipeline, supported on pipe racks, to convey crude oil from the unloading facility north to the existing refinery. The pipe racks are planned to be supported on a series of spread foundations that will be constructed every 10 to 20 feet along the route.

- Erection of a perimeter security fence and lighting. Poles for fencing and lighting are expected to be supported on drilled pier (caisson) foundations.

- Several roadways for security, equipment, and emergency access. Roadway surfaces will entail aggregate base, asphalt concrete (AC), and Portland cement concrete (PCC). Most of the roadways will provide access around the rails, equipment, and canopy areas; however, an emergency vehicle access will also be constructed east of the rails to Desperado Place which eventually connects to Highway 1. This access road will be surfaced with aggregate base.

The western portion of the new rails will traverse the southern area of the facility, near the existing carbon plant where coke has been stored and staged for transport over several years. As of the time of preparing this report, much of the coke had been removed from the proposed project area. Photo 1 depicts the conditions during our field investigation within the carbon plant area. Several stockpiles of soil and coke were present throughout the area. Evidence of fill is also prevalent along the southern boundary of this area where a 15 to 20 foot tall slope descends to a perimeter access roadway that traverses the southern edge of the property. Based upon a review of available groundwater information from the State of California Geotracker website (2013), a number of monitoring wells are scattered throughout the coke storage area (Stantec, 2013).

Photo 1: Looking east toward proposed canopy area

East of the existing coke area, the eastern portion of tracks will be constructed through fallow land. This area has been used for livestock grazing and is generally void of improvements. The terrain generally undulates with topography that varies from flat to 20 percent slopes. Vegetation generally consists of chaparral consisting of brush and seasonal grasses. No apparent water courses or other drainage features were visible.

## 2.0 SCOPE OF SERVICES

The scope of work for this geotechnical engineering report included a general site reconnaissance, subsurface exploration, percolation testing, laboratory analysis of soil samples, geotechnical analysis of the data, and the preparation of this report. The analysis and subsequent recommendations were based, in part, upon verbal information and preliminary plans provided by SPEC Services, the project's design engineer.

A percolation test was performed in the area where the effluent disposal system is planned. The percolation test was intended to comply with Section 19.07.025 of the San Luis Obispo County Building and Construction Ordinance (2012). In the area where the storm water retention basin is planned, percolation tests were also performed. The results of the tests were tabulated and conclusions developed regarding the *general* suitability of the areas tested for effluent disposal and storm water percolation. However, specific evaluation of the results as they pertain to location, sizing, and design of the effluent disposal system and storm water percolation basin is the responsibility of others.

This report and recommendations are intended to comply with applicable requirements of Sections 1803.2 through 1803.6, and J104.3 of the 2010 California Building Code (CBC), UPRR Engineering Standards (2009), AREMA Manual for Railway Engineering- Chapter 1, Parts 1 and 2 (2005) and common geotechnical engineering practice in this area under similar conditions at this time. The test procedures were accomplished in general conformance with the standards noted, as modified by common geotechnical engineering practice in this area under similar conditions at this time.

Preliminary geotechnical engineering recommendations for site preparation; grading; utility trenches; the railroad bed; foundations; buried vault walls; interior slabs-on-grade, exterior pedestrian flatwork, and PCC pavement; asphalt concrete pavement and gravel roadway sections; drainage and maintenance; the storm water basin; and observation and testing are presented herein. As there may be geotechnical issues yet to be resolved, the geotechnical engineer should be retained to provide consultation as the design progresses, and to review project plans as they near completion to assist in verifying that pertinent geotechnical issues have been addressed and to aid in conformance with the intent of this report.

It is our intent that this report be used exclusively by the client to form the geotechnical basis of the design of the project and in the preparation of plans and specifications. Application beyond this intent is strictly at the user's risk. If future property owners wish to use this report, such use will be allowed to the extent the report is applicable, only if the user agrees to be bound by the same contractual conditions as the original client, or contractual conditions that may be applicable at the time of the report's use.

This report does not address issues in the domain of contractors such as, but not limited to, site safety, loss of volume due to stripping of the site, shrinkage of soils during compaction, excavatability, temporary slope angles, construction means and methods, etc. Analyses of site geology and of the soil for lead or mold potential, asbestos (naturally occurring or man-made) radioisotopes, hydrocarbons, or chemical properties (other than geotechnical corrosivity) are beyond the scope of this report. Evaluation of ancillary features such as temporary access roads, flag poles, signage, and nonstructural fills are all not within our scope and are also not addressed.

In the event that there are any changes in the nature, design, or location of improvements, or if any assumptions used in the preparation of this report prove to be incorrect, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and the conclusions of this report verified or modified in writing by the geotechnical engineer. The criteria presented in this report are considered preliminary until such time as any peer review or review by any jurisdiction has been completed, conditions are observed by the geotechnical engineer in the field during construction, and the recommendations have been verified as appropriate, or modified in writing by the geotechnical engineer.

## 3.0 FIELD INVESTIGATION

To assess subsurface conditions and retrieve soil samples, 14 borings were drilled in the proposed improvement areas on July 8 through 11, 2013. The borings were drilled to maximum depths ranging from 21.5 to 51.5 feet. The approximate locations of the borings are shown on the Boring and Percolation Test Location Map in Appendix A. Approximate surface elevations of each boring are noted on the boring logs. Surface elevations and the locations of the borings were surveyed by Wallace Group. A CME-55 drill rig equipped with a 6-inch outside diameter hollow stem auger and an automatic trip hammer for sampling was used to drill the borings. As the borings were drilled, soil samples were retrieved using a ring-lined barrel sampler (ASTM D 3550-01/07, with shoe similar to D 2937-04) and Standard Penetration Tests were conducted at selected depths (ASTM D 1586-11). Bulk soil samples were also obtained from the auger cuttings. Following drilling of the borings, the holes were backfilled with auger cuttings.

Soils encountered in the borings were categorized and logged in general accordance with the Unified Soil Classification System and ASTM D 2488-11. Logs of the borings are presented in Appendix A, along with a boring log legend. In reviewing the boring logs and legend, the reader should recognize that the legend is intended as a guideline only, and there are a number of conditions that may influence the soil characteristics as observed during excavation. These include, but are not limited to, the presence of cobbles or boulders, cementation, variations in soil moisture, presence of groundwater, and other factors. Consequently, the logger must exercise judgment in interpreting soil characteristics, possibly resulting in soil descriptions that vary somewhat from the legend.

Percolation Tests –Effluent Disposal

A percolation test was performed at the site of the planned effluent disposal area west of the restroom. The test consisted of an exploratory boring (Boring 11) and four shallow percolation test holes. The shallow test holes ranged in depth from 4 to 9 feet; the exploratory boring was drilled to 31.5 feet. The approximate locations of the exploratory borings and test holes are also shown on the Boring and Percolation Test Location Map. The percolation test holes for the effluent disposal field were logged during drilling and are designated on the map as Test Holes A through D (see Percolation Test Logs in Appendix B). As required by the ordinance (San Luis Obispo County, 2012), the test holes were drilled with an 8-inch diameter hollow stem auger using the same drill rig as the borings described previously. A 3-inch diameter perforated pipe was installed into each of the test holes and the annulus around the pipe filled with gravel to reduce caving of the holes and infiltration of soil into the pipe.

The test borings were filled with water and allowed to saturate for the required period. Following the saturation period, the boring and test holes were checked for the presence of free subsurface water; none was found. The test holes were then refilled with approximately 1.5 to 2.5 feet of water and the tests initiated. Readings of the change in water level were recorded at 0.5 to 9 minute intervals for a period of 1 hour. Percolation test data are presented in Appendix B.

Percolation Tests – Storm Water Basin

In the storm water percolation basin area, percolation testing was also performed. The percolation test consisted of five test holes that ranged in depth from 3 to 15 feet. The approximate locations of the test holes are shown on the Boring and Percolation Test Location Map in Appendix A. The percolation test holes for the storm water basin are designated on the map as Test Holes E through I. Logs of the borings are also presented in Appendix B. They were drilled with the same 8-inch diameter hollow stem auger and drill rig as the percolation test holes.

The test borings were cased with perforated PVC pipe, the annular spaces backfilled with gravel, and the borings saturated. They were filled to approximately 1 foot below the surface and the water level was maintained for 10 minutes (i.e. kept at a constant head). At the end of the 10-minute period, filling was discontinued and the volume of water that had flowed into each hole was recorded. From this point on, tests were conducted as a falling head test and measurements were taken as the water level dropped. The percolation test results (constant

and falling head) were tabulated; the data are presented in Appendix B; the test results are also summarized along with the percolation test results. Please see the "Percolation Test Results" section of this report for a discussion of the results.
Following percolation testing, all of the PVC pipes were removed and the test borings were backfilled with auger cuttings.

## 4.0 LABORATORY ANALYSIS

Selected ring samples were tested for unit weight and moisture (ASTM D 2937-10, as modified for ring liners). Grain sizes were determined on four samples by performing sieve/hydrometer analysis (ASTM D 422-63/07). Two samples were tested to determine angle of shearing resistance (ASTM D 3080/D3080M-11); one of the samples was remolded to 90 percent of maximum dry density prior to testing. Three ring samples were tested for one-dimensional consolidation (ASTM D 2435/D2435M-11) ant three bulk samples were tested for maximum density and optimum moisture (ASTM D 1557-12). One bulk sample was tested for resistance to deformation under repeated loading, or R-value (ASTM 2844-07el, Cal 301). The geotechnical laboratory test results are presented in Appendix C.

Two soil samples were also submitted to CERCO Analytical, of Concord, California for soil corrosivity testing. The results of soil corrosivity tests are provided in Appendix C along with a brief discussion of the results.

## 5.0 GENERAL SUBSURFACE PROFILE

In several of the areas drilled, coke was found at the surface. This material was logged as a dark gray to black loose fill material which closely resembled poorly graded sand, derived from the refinery. It was recovered in Borings 5 through 14 and in all of the percolation test borings. Where encountered, the coke ranged in thickness from 1 to 8 feet.

At the surface beyond the carbon plant area and below the coke, soils encountered consisted of poorly graded dune sands. They were generally light brown to brown in the upper horizons; with depth, color variations to pale brown, red brown or orange brown typically occurred. Conditions were loose at the surface, and the density increased with depth. Dense to very dense conditions were encountered in several borings at depth.

At the time of drilling, the upper soils were dry, and became increasingly moist with depth. Free subsurface water was encountered Borings 2, 3 and 4 at depths ranging from 30 to 38.5 feet below existing grade. Based on monitoring well data reviewed, subsurface water depths likely vary from 50 to 6 feet below existing grade at the carbon plant area (Stantec, 2013).

## 6.0 CONCLUSIONS

In our opinion, the site is suitable from a geotechnical engineering standpoint, for the proposed project. The use of conventional spread and/or continuous foundations is considered suitable to support structures, equipment and other improvements. The primary concerns from a geotechnical engineering standpoint are the presence of coke deposits within the project areas, the potential for differential settlement, and the highly erodible nature of site soils. Discussions pertaining to grading, erosion, liquefaction and dry sand settlement, railroad bed design and percolation testing are presented.

### Grading

Coke fill was found in all of the locations drilled within the existing carbon plant (Borings 5 through 14). In addition, several stockpiles of coke, and poorly graded sand mixed with coke were observed throughout the unloading track area. Cycles of stockpiling and removing material from this area have occurred over several years; however, the coke fill material was never intended to support structures. Furthermore, soil conditions encountered in the borings at the elevations of proposed improvements had varied moisture and density characteristics. Such varied conditions could lead to a degree of settlement that could stress and possibly damage building foundations, resulting in cracks and displacement. To reduce this potential, a program of overexcavation, moisture conditioning, and recompaction of the upper soils in the railroad bed, structure, and site improvement areas is recommended to provide appropriately uniform soil moisture and density, and to reduce settlement potential.

Blended soil samples of coke and poorly graded sand were taken during our investigation and tested in the laboratory. The coke material has lower maximum dry densities and higher optimum moisture contents than the poorly graded dune sand. However, from a geotechnical standpoint, it is considered suitable to be used as fill material within structure, railroad beds, and any other improvement areas provided it is properly moisture conditioned and placed as compacted engineered fill. We understand that project constraints require that the coke material stay in the area where it has been processed.

<u>Erosion</u>

The surface soils are considered to be highly erodible. Concentrated runoff will likely cause significant damage to slopes, exposed soil surfaces, and improvements if not properly controlled. This project will entail grading that will create cut and fill slope faces with significant areas that are exposed to erosion both by precipitation and wind. There are a number of options for reducing erosion. These include: increasing the soil density, placement of erosion control

Photo 2: Erosion control measures on existing slopes using vegetation

blankets, establishing vegetation (as seen in Photo 2), chemical treatment, overbuilding and regrading, and other methods. Regardless, caution should be exercised to protect the soil from erosion *during* and *following* construction. Proper control of site drainage is also critical to reduce the effects of erosion. Swales, drainage inlets, mid-slope benches, and other improvements should all be incorporated into the design to control runoff and reduce the potential for erosion.

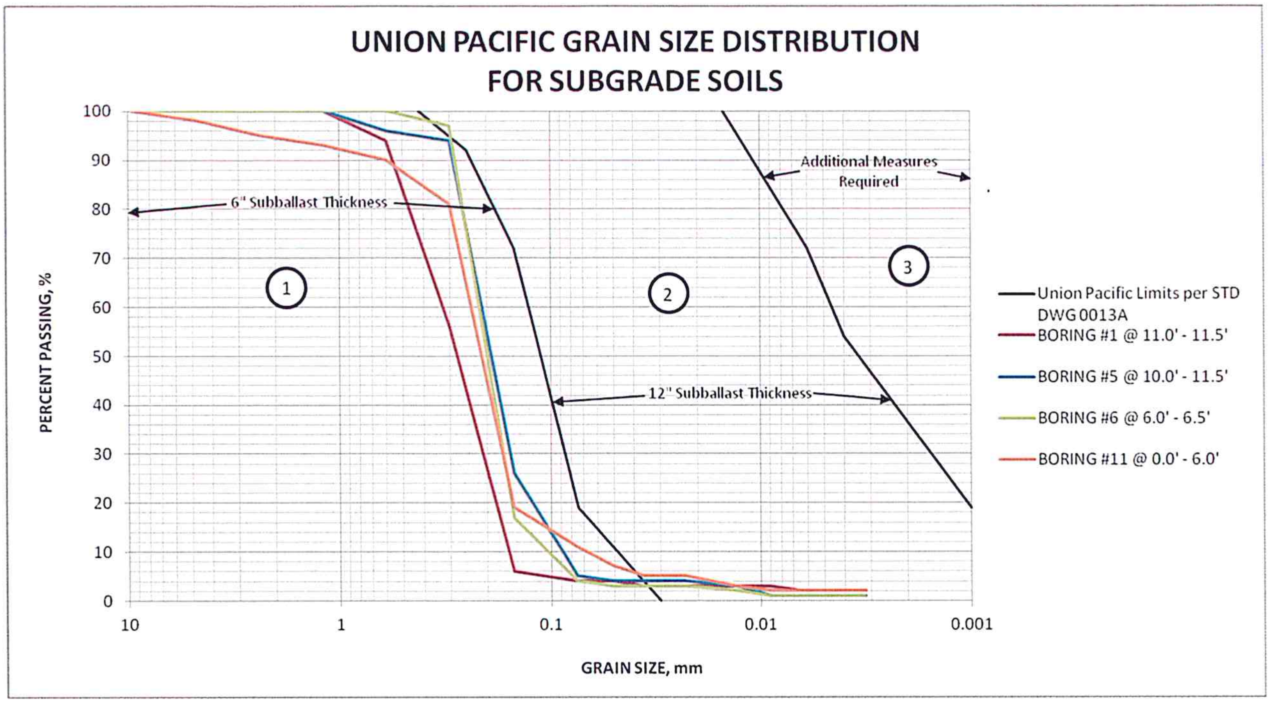
<u>Liquefaction and Dry Sand Settlement</u>

The term liquefaction refers to a phenomenon that tends to occur in saturated soils of low density and that have grain sizes within a certain range, usually fine- to medium-grained poorly graded sands, silty sands, and silts. During liquefaction, the energy from the earthquake causes the water pressure within the pores of the soil to increase. The increase in water pressure decreases the friction between the soil grains, allowing the soil grains to move relative to one another. During this state, the soil will behave as a viscous liquid, temporarily losing its ability to support foundations and other improvements. As the pressure is released, the soils typically settle in a process called "dynamic settlement." Dynamic settlement can cause damage to structures and other surface and subsurface improvements. In addition, the potential for settlement of dry sands during a seismic event depends on the density of the sand and the characteristics of the seismic event. Dry sand settlement can cause a loss of soil support below foundations which can stress and possibly damage building foundations, resulting in cracks and displacement.

The potentials for liquefaction and dry sand settlement during a seismic event were analyzed. In the borings drilled during our investigation, groundwater was encountered at depths of 30 to 38.5 feet below the surface (at an elevation of approximately 50 feet) which is 45 feet below the planned finish grade of the overall facility. Groundwater elevations presented in monitoring reports (Stantec, 2013) indicate that elevations vary from 43 to 48 feet. Furthermore, soils were generally loose near the surface, but became medium dense at relatively shallow depths to very dense with increasing depth. Based upon the subsurface soil conditions analyzed, the potential for liquefaction and dry sand settlement to adversely affect this project is considered very low.

Railroad Bed Design

Design documents from UPRR (2009) and AREMA (2005) were reviewed in preparing this report. Railroad beds consist of five main features: subgrade, subballast, ballast, ties, and track. From a geotechnical standpoint, the subgrade soils affect the thickness of the subballast that is placed under the ballast for the ties that support the track. In order to select the subballast thickness, subgrade soils were analyzed for grain size distribution using sieve and hydrometer testing (ASTM D 422-63/07). The results of the tests were plotted on a reconstruction of the chart from UPRR Standard Drawing No. 0013A and are presented in the graphic below.




Based upon the test results, a subballast thickness of 6 inches is required below the specified 8-inch ballast section per UPRR Standard Drawing 0003 "Roadbed Section for Industrial Track Construction" (UPRR, 2009).

Percolation Test Results

The table below summarizes the apparent stabilized percolation rates for each hole tested for the effluent disposal field. The tabulated data are presented in Appendix B.

| Test No. | Depth, ft. | Apparent Stabilized Percolation Rate, minutes/inch |
|---|---|---|
| A | 8.5 | Less than 1 |
| B | 8.0 | Less than 1 |
| C | 4.5 | Less than 1 |
| D | 4.0 | 1.5 |

Test D was slower than the other three tests. It was observed that some of the coke had infiltrated into the bottom of the test hole, which appeared to "plug" and significantly reduce the percolation rates. Based upon these results, the site soils are generally considered to have fast percolation potential; however, the coke material can greatly reduce the percolation rates of the underlying dune sand.

In the storm water percolation basin constant head percolation testing resulted in introducing 0.6 to 1.7 $ft^3$ of water over a period of 10 minutes at 2 to 4 feet of head height above the bottom of the boring. Falling head tests resulted in infiltration rates from about 18 to 864 inches per hour. The faster rates were recorded when the head heights were greater in the test holes. These test results indicate a high rate of infiltration but also rates that are greatly influenced by the head that the water is under and possibly other factors.

With the exception of the carbon plant area, the site is predominantly surfaced with dune sand materials that are generally considered to have good percolation characteristics. However, percolation ponds that have been constructed on the Nipomo Mesa have experienced plugging after a few rainfall events. Finer grained materials (silts and clays) tend to concentrate and form a barrier within the basins, thus requiring scarification of the bottom and periodic removal of the silt and clay layer as a part of a maintenance program.

The tabulated data derived from percolation testing for the effluent disposal field and percolation basin are presented in Appendix B. It should be noted, however, that the test results only indicate the percolation rates at the specific location and under specific conditions. Sound engineering judgment should be exercised in extrapolating the test results for other conditions or locations. With regards to the storm water percolation basin, technical design references vary in methods they present for using these types of test results. However, most references include reduction and/or correction factors for several parameters including, but not limited to, size of the LID system relative to the test volume, number of tests conducted, variability in the soil profile, anticipated silt loading, anticipated biological buildup, anticipated long-term maintenance, and other factors. Typically, in aggregate these factors range from about 2.5 to 50 depending upon the method used; the final determination of the means by which these data are used is left to the design engineer. Furthermore, compaction of the soil in system and basin areas, installation of landscaping, irrigation in system or basin area, surface runoff in the area, and design of the system or basin are all factors (among others) that affect performance of the system (basin). It is incumbent upon the design engineer, the contractor, and the user to capitalize upon, and preserve, the soil's natural percolation potential to provide a system (basin) that functions as intended.

## 7.0 PRELIMINARY GEOTECHNICAL ENGINEERING RECOMMENDATIONS

These recommendations are applicable to the improvements as discussed in the "Introduction and Site Setting" section of this report. If any improvements not previously noted are included, the geotechnical engineer should be contacted for revised recommendations. Unless otherwise recommended, the following definitions are used in the recommendations presented below:

- **Railroad Bed Areas –** Defined as the area detailed on UPRR Engineering Standards Roadbed Section for Industrial Tracks (STD DWG 0003) and STD DWG 0001B and extending a minimum of 2 feet horizontally beyond the extents.

- **Structure Areas –** Structure Areas are defined as the area within and extending a minimum of 5 feet beyond the perimeter foundation for the structure. Structures include the covered canopy, restroom, electrical enclosure pad, crude oil meters, and unloading racks. The structure area for the oily water containment vault includes the footprint of the vault structure.

- **Pipe Support Foundation Areas –** Pipe Support Foundation Areas are defined as the area within and extending a minimum of 2 feet beyond the perimeter foundation for pipe supports for the main crude lines to the plant. These do not include the unloading racks within the covered canopy area.

- **AC, PCC, and Aggregate Base Areas –** Defined as the entire areas of the AC, PCC, or Aggregate Base areas and extending 1 foot beyond in all directions.

- **Grading Area –** The Grading Area is defined as the entire area to be graded including the railroad bed areas, structure areas, pipe support foundation areas, and all exterior flatwork, AC, PCC, and roadway areas.

- **Road and Railroad Bed Subgrade:** The elevation of the surface upon which aggregate base will be placed for vehicle roadways and the elevation of the surface upon which the subballast will be placed for the railroad.

- **Pad Grade:** The elevation of a pad as shown on the grading plans; if no elevation is shown on the grading plans, the elevation to which the grading contractor typically will place compacted fill in the structure areas. Does not include any sand, gravel layer, or aggregate base specified under slabs or exterior flatwork.

- **Existing Grade:** Elevations of the site that existed as of the date of this report.
- **Moisture Conditioned:** Soil moisture content adjusted to optimum moisture content, or just above, prior to application of compactive effort.
- **Compacted/Recompacted:** Soils placed in level lifts not exceeding 8 inches in loose thickness and compacted to a minimum of 90 percent of maximum dry density. Based on maximum dry density by ASTM D 1557-12 and field density by ASTM D 6938-10, or other methods acceptable to the geotechnical engineer and jurisdiction.

**Site Preparation**

1. The ground surface throughout the grading area should be prepared for grading by removing all vegetation, large roots, fill, coke, debris, and other deleterious materials.

2. Existing utility lines that will not remain in service should be either removed or properly abandoned. The appropriate method of utility abandonment will depend upon the type and depth of the utility. Existing monitoring wells within the grading area should be properly abandoned or mitigated to allow for planned construction to commence. Recommendations for abandonment can be made as necessary.

3. Voids created by the removal of materials or utilities described above and extending below the recommended depth of overexcavation should be called to the attention of the geotechnical engineer. No fill should be placed unless the underlying soil has been observed by the geotechnical engineer.

**Grading**

1. Following site preparation, soil in *railroad bed areas* should be overexcavated to a depth of 2 feet below subgrade elevation or 3 feet below existing grade, whichever is deeper. The resulting surface should be scarified to a minimum depth of 12 inches, moisture conditioned and recompacted prior to placement of fill. Prior to the placement of any fill, the bottom of the overexcavation should also be proofrolled with heavy rubber-tired equipment and observed by the geotechnical engineer. Fill within the upper 3 feet of railroad bed areas should be compacted to a minimum of 95 percent maximum dry density; all other fill in railroad bed areas should be compacted to a minimum of 90 percent.

2. Following site preparation, soil in <u>*structure areas*</u> should be overexcavated to a level plane at a depth of 2 feet below planned bottom of footing elevation or 3 feet below existing grade, whichever is deeper. The overexcavation depth should take into consideration the depth of any deepened foundation elements such as deepened areas for shear walls, grade beams, etc. The resulting surface should be scarified to a minimum depth of 12 inches, moisture conditioned and recompacted prior to placement of fill.

3. Following site preparation, soil in <u>*pipe support foundation areas*</u> should be overexcavated to a depth of 1 foot below planned bottom of footing elevation or elevation or 2 feet below existing grade, whichever is deeper. The resulting surface should be scarified to a minimum depth of 12 inches, moisture conditioned and recompacted prior to placement of fill.

4. Following site preparation, AC, PCC, and aggregate base areas should be overexcavated to 1 foot below subgrade elevation and the subgrade should be scarified to a minimum depth of 12 inches, moisture conditioned, and recompacted to a minimum of 95 percent of maximum dry density. If fill is required to reach subgrade elevation, following site preparation the exposed soil surface should be scarified to a minimum depth of 12 inches, moisture conditioned, and recompacted prior to placement of fill.

5. Where fill will be placed on existing slopes that are steeper than 10 percent, the slope should be cut into level benches a maximum of every 3 vertical feet into competent soil, as recommended by the geotechnical engineer during construction. The benches should be a minimum of 8 feet wide and angled 2 to 3 percent back into the slope. Where fill will be placed on slopes that are steeper than 20 percent, a keyway should be constructed at the toe of the fill. The keyway should be a minimum of 10 feet wide, angled 2 to 3 percent back into the slope, and should penetrate a minimum of 2 feet into competent soil, as recommended by the geotechnical engineer.

6. Soil exposed in the bottoms of keyways and benches should be scarified a minimum of 12 inches, moisture conditioned, and recompacted. At the discretion of the geotechnical engineer, back drains may be required to be constructed in keyways and on benches. A Typical Bench and Keyway Detail is included in Appendix D.

7. In grading areas other than railroad bed, structures, pipe support foundations, AC, PCC, and aggregate base areas, the soil should be scarified to a minimum depth of 12 inches, moisture conditioned, and recompacted.

8. In all grading areas, the removed soil or other similar soils may be used as moisture conditioned and properly compacted fill up to pad elevation, subgrade, or finish grade, as appropriate. It should be noted that the existing coke material that has been staged in the western portion of the site has mostly been removed. Based upon the borings the thickness of this material probably ranges from about 1 to 8 feet; however, thicker areas may be encountered during grading. This material may be used as general fill provided it is thoroughly mixed with the dune sand.

9. Permanent *fill* slopes should not exceed a 2:1 (horizontal to vertical) slope angle. During construction, fill slopes should be over built a minimum of 3 horizontal feet and cut back to a firm, compacted face. While *cut* slopes are considered grossly stable at 2:1, they may be prone to localized sloughing and significant erosion. To enhance erosion protection, cut slopes may be excavated beyond planned cut face and rebuilt as fill slopes at 2:1. The geotechnical engineer should be contacted if this option is to be considered. Without reconstruction, permanent cut slopes should be cut at 2.5:1 or flatter. Regardless, all *cut* and *fill* slopes should be aggressively protected from erosion during and following construction. Further discussion of erosion control is provided in the "Drainage and Maintenance" section of this report.

10. A minimum of 12 inches of Class 2 aggregate base (Caltrans, 2010) should be placed under heavily loaded equipment pads and exterior flatwork areas subject to vehicle loading.

11. Materials used as fill should be cleaned of all debris and any rocks larger than 3 inches in maximum dimension. When fill material includes rocks, the rocks should be placed in a sufficient soil matrix to ensure that voids caused by nesting of the rocks will not occur and that the fill can be properly compacted. Voids created by dislodging rocks and/or debris during scarification should be backfilled and recompacted, and the dislodged materials should be removed from the work area.

12. In AC, PCC, and aggregate base areas, the upper 12 inches of subgrade and all aggregate base should be compacted to a minimum of 95 percent of maximum dry density. Subgrade and aggregate base should be firm and unyielding when proofrolled with heavy, rubber-tired grading equipment prior to continuing construction.

13. If the soils are overly moist so that they become unstable, or if the minimum recommended compaction cannot be readily achieved, drying the soil to near optimum moisture content may be necessary. Placement of gravel layers or geotextiles may also be necessary to help stabilize unstable soils. Additional overexcavation may also be recommended to correct unstable conditions or if soft or loose conditions are encountered during grading.

14. The recommended soil moisture content should be maintained throughout construction. Failure to maintain the soil moisture content can result in cracks and disturbance, which are an indication of degradation of the soil compaction. If cracks are allowed to develop, or if soils near improvements such as foundations, flatwork, pavement, curbs, etc. are otherwise disturbed, damage to those improvements may result. Soils that have cracked or are otherwise disturbed should be removed, moisture conditioned, and compacted.

**Utility Trenches**

1. Utility trenches adjacent to foundations should not be excavated within the zone of foundation influence, as shown in Typical Detail A in Appendix D.

2. Utilities that must pass beneath a foundation should be placed with properly compacted utility trench backfill and the foundation should be designed to span the trench.

3. A select, noncorrosive, granular, easily compacted material should be used as bedding and shading immediately around utilities, and as backfill to pad grade, finish grade, or subgrade as appropriate.

4. In general, trench backfill should be compacted a minimum of 90 percent of maximum dry density. A minimum of 95 percent of maximum dry density should be obtained in the upper foot of subgrade and in all aggregate base in roadways, and the upper 3 feet under railroad beds. Prior to applying compactive effort, soils should be moisture conditioned. Trench backfill should be placed in level lifts not exceeding 6 inches in loose thickness and compacted to the minimums recommended above.

5. Compaction of trench backfill by jetting or flooding is not recommended at this site. However, to aid in *encasing* utility conduits, particularly corrugated drain pipes, and multiple, closely-spaced conduits in a single trench in the bedding and shading material, jetting or flooding may be useful. Flooding or jetting should only be attempted with extreme caution, and any jetting operation should be subject to review by the geotechnical engineer.

6. Long-term settlement of properly compacted select trench backfill should be assumed to be about 0.25 to 0.5 percent of the depth of the backfill. Improvements that are constructed over or near trenches should be designed to accommodate the potential for settlement.

7. The recommendations of this section are minimums only, and may be superseded by the engineer based upon soil corrosivity, the recommendations of pipe manufacturers or utility companies, or the requirements of UPRR or Phillips 66.

**Railroad Bed**

1. Following grading of railroad bed areas as recommended in Paragraph 1 of the "Grading" section, the subgrade should be compacted to a minimum of 95 percent of maximum dry density. The subgrade should also be firm and unyielding when proofrolled with heavy, rubber-tired grading equipment prior to continuing construction. Proofrolling of subgrade by the contractor should be observed by the geotechnical engineer.

2. After the geotechnical engineer has reviewed the subgrade surface, a minimum of 6 inches of subballast should be placed, moisture conditioned, and compacted to a minimum of 95 percent of maximum dry density. Subballast should conform to the gradation requirements on Standard Drawing 0010C "Ballast & Subballast Gradation Table" from UPRR, dated February 13, 2006.

3. Following placement of the subballast, a minimum of 8 inches of Class 2 ballast material should be placed below rail ties. The Class 2 ballast should conform to the gradation requirements on Standard Drawing 0010C "Ballast & Subballast Gradation Table" from UPRR, dated February 13, 2006.

4. Any planned vehicle crossings that traverse the railroad tracks should be designed in accordance with UPRR guidelines.

**Foundations**

Three types of foundations are anticipated for this project. The canopy, pipe racks and restroom will likely utilize continuous and/or spread footings. The electrical equipment pads, crude oil metering pad, and containment vault will use thickened slab-on-grade foundations. Lastly, light poles and fences will use some type of drilled pier (caisson) foundation. All of which are addressed below.

Structures (Canopy, Pipe Racks, and Restroom Building)

1. Continuous and spread (pad) footings bearing in recompacted soil as recommended in the "Grading" section of this report may be used to support the proposed structures. Minimum footing depth should be 18 inches below lowest grade within 5 feet of the foundation.

2. Minimum continuous footing reinforcement should consist of two No. 4 rebar, one at the top and one at the bottom.

3. Footings bearing in recompacted soil may be designed using maximum allowable bearing capacities of 2,000 psf dead load and 2,750 psf dead plus live loads. Using these criteria, maximum settlement and differential settlement are expected to be on the order of 5/8-inch and 1/2-inch in 25 feet, respectively.

Equipment Pads (Electrical, Crude Oil Meters, Containment Vault, etc.)

1. Equipment pad slab-on-grade foundations should have a minimum thickness of 6 full inches, and should be reinforced, at a minimum, by No. 4 rebar placed at 12 inches on-center each way. Provided that the slabs are underlain by a minimum of 12 inches of Class 2 aggregate base, the slab design may be based upon a subgrade modulus ($K_{30}$) of 325 pci (psi/in). Equipment pads may also be designed for a bearing pressure of 2,000 psf (dead plus live). Using these criteria, maximum settlement of equipment pads is expected to be on the order of 1/2-inch and differential settlement on the order of 3/8-inch in 25 feet.

2. The use of vapor retarders below equipment pad slab-on-grade foundations is left to the engineer (see "Interior Slabs-on-Grade, Exterior Pedestrian Flatwork, and PCC Pavement" section). Due to the heavy loads, the use of sand below equipment pads to aid in curing is not recommended unless the subgrade modulus is reduced to 250 pci in the design.

Caisson Foundations (Light Poles and Fencing)

1. Drilled, cast-in-place concrete caissons may be used to support light poles and fencing. Caisson dimensions and reinforcement should be in accordance with the requirements of the engineer. A minimum diameter of 24 inches is recommended for the caissons.

2. Caissons should be designed to derive support from skin friction against the soil. The upper 1 foot of soil should be neglected in the calculation of compression and tension loads. Soil may be assigned the following allowable skin friction values for axial loads.

| Depth, ft | Allowable Skin Friction Values, psf (compression) | Allowable Skin Friction Values, psf (tension) |
|---|---|---|
| 0-1 | NA | NA |
| 1-6 | 300 | 150 |
| 6+ | 750 | 300 |

3. Caisson foundations should have a minimum embedment of 6 feet below existing grade. Using these values, settlement is expected to be negligible.

4. The upper 1 foot of soil should be neglected in the calculation of compression and tension loads. An ultimate passive equivalent fluid pressure of 275 pcf may be assumed from a depth of 1 to 6 feet, and 400 pcf below 6 feet to determine the lateral capacity of the caissons. This value may be increased with depth to a maximum of 4,000 psf. Lateral resistance of caissons may be assumed to act across 1.5 caisson diameters. Factors of safety have not been included in these values.

5. As caissons will be designed utilizing only skin friction for support, it will not be necessary to thoroughly clean the bottom of the excavations; however, excessive slough should be removed prior to concrete placement. The poorly graded sand site soils are *highly* prone to caving and sloughing. Casing or other means may be necessary to stabilize the caisson excavations. Furthermore, reinforcement and concrete should be placed in caissons on the same day that they are drilled. Skin friction design values assume "fresh" conditions of the sidewalls. In addition, the potential for slouging and caving of excavations increases as the duration that the excavation is left open increases.

6. Caissons should not deviate from a plumb line at the centerline by more than 2 percent of the caisson's length, from the top to the point of interest.

7. Use of a tremie may also be necessary to if the reinforcement in the caisson requires a tight pattern that will restrict the free fall of the concrete without segregation. Reinforcing bars and temporary racking bars to support the cage should be designed to accommodate a tremie pipe. Free subsurface water was not encountered during the field exploration; however it might be during construction, particularly if construction occurs during or just following the rainy season. The tremie method is described in detail in Appendix D.

8. Concrete used in caissons should be placed at a slump between 4 and 6 inches in dry excavations and between 7 and 9 inches if placed under water.

<u>Foundations - General</u>

1. Allowable bearing capacities may be increased by one-third when transient loads such as wind or seismicity are included. Foundations may be designed using the following seismic parameters which are based, in part, on a latitude of 35.034 degrees north, and a longitude of 120.589 degrees west, as taken from the Google Earth web site (2013):

| | |
|---|---|
| Site Classification (CBC Table 1613.5.2) | D |
| Mapped Spectral Accelerations | |
| 0.2 second period - $S_S$ | 1.29g |
| 1.0 second period – $S_1$ | 0.455g |
| Design Response Spectral Acceleration | |
| 0.2 second period - $S_{DS}$ | 0.861g |
| 1.0 second period – $S_{D1}$ | 0.469g |

2. Lateral capacity is based on the assumption that backfill adjacent to foundations is properly compacted. With the exception of caisson foundations, a passive equivalent fluid pressure of 300 pcf, and a friction factor of 0.35 may be used in the design of foundations to resist lateral loads. The passive resistance and friction may be used in combination without reduction to either factor. Factors of safety have not been included in these values.

3. Foundation excavations, including caissons, should be observed by the geotechnical engineer prior to placement of reinforcing steel or concrete. Footing excavations should be moistened to optimum moisture content, or just above, and no desiccation cracks should be present prior to concrete placement.

**Buried Vault Walls**

1. Excavations for buried vault walls may be backfilled with native sand soil, import sand, or crushed gravel (0.75-inch). Site sand soils used as backfill should be moisture conditioned, placed in level lifts not exceeding 6 inches in loose thickness, and compacted to a minimum of 90 percent of maximum dry density. Gravel (if used) should be placed in maximum 8-inch lifts and compacted with a vibrating plate compactor, or other suitable means, as the gravel is placed. If crushed gravel is used as backfill, it should be fully encased in filter fabric conforming to Caltrans Section 88-1.02B – Class C to reduce the potential for infiltration of the soil into the gravel.

2. Long-term settlement of properly compacted sand or gravel backfill should be assumed to be about 0.25 to 0.5 percent of the depth of the backfill. Improvements that are constructed over backfill should be designed to accommodate the estimated settlement. It is assumed that wall heights will be on the order of 10 feet or less.

3. To reduce settlement, backfill could be compacted to 95 percent of maximum dry density and the backfill could be allowed to sit for an extended period of time prior to constructing improvements over the backfill.

4. Design of the walls of the buried containment vault structure for lateral loads should be based on the following *undrained* soil parameters for poorly graded sand (native) or gravel backfill of the structure. As we are unaware of any provision for drains to be installed around the perimeter of the vault to reduce any hydrostatic loading, saturation of soils around the vault could occur. As a result, undrained design parameters for sand or gravel backfill provided below should be used for the entire depth of the walls for the buried vault:

   Active equivalent fluid pressure ....................................................72 pcf
   At-rest equivalent fluid pressure ....................................................88 pcf
   Passive equivalent fluid pressure ..................................................185 pcf

5. No surcharges are taken into consideration in the above values. No factors of safety, load factors or other factors have been applied to the above equivalent fluid pressure values.

6. While the provision should be made to design the buried vault for undrained soil conditions, designing for buoyancy forces due to uplift is *not* considered necessary.

7. Chapter 18 of the 2010 CBC identifies the need for determining earthquake loads on buried structures and retaining walls. Such criteria are typically developed based upon the Mononobe-Matsuo (1929) and Okabe methods (1926) as modified by Seed and Whitman (1970). This methodology has been the accepted geotechnical standard for development of seismic parameters for retaining wall design for over 35 years. In October, 2010, a professional paper was published in the Journal of Geotechnical and Environmental Engineering that has challenged this generally accepted view. The paper, entitled "Seismic Earth Pressures on Cantilever Retaining Structures" was authored by Linda Al Atik, Ph.D. and Nicholas Sitar, Ph.D. of the University of California at Berkeley. The paper was also presented, in association with several prominent structural and geotechnical engineers, at the Structural Engineering Association of California (SEAOC) 2010 Convention (Lew, et. al. 2010). In their research, the paper's authors were able to model gravitational forces through the use of centrifuge modeling at U.C. Davis, an element that was lacking in previous studies. Among other findings, they concluded that the effects of seismic soil loading on retaining walls are negligible for peak ground acceleration of less than about 0.4g. As the preliminary peak ground acceleration (PGA) at the site was found to be 0.34g (derived by dividing the $S_{DS}$ value of 0.861 by 2.5 per CBC Section 1803.5.12.2), we believe that the findings of Atik and Sitar apply to the project at this point. Therefore, design of the buried vault walls for seismic soil loading is not considered necessary.

8. The recommended lateral earth pressures are applicable to retained surfaces that are horizontal. If the structure will retain ascending slopes, walls should be designed for an additional equivalent fluid pressure of 1 pcf for the active case and 1.5 pcf for the at-rest case, for every two degrees of slope inclination.

9. To reduce shrinkage cracks in concrete, the concrete aggregates should be of appropriate size and proportion, the water/cement ratio should be low, the concrete should be properly placed and finished, contraction joints should be installed, and the concrete should be properly cured.

**Interior Slabs-on-Grade, Exterior Pedestrian Flatwork, and PCC Pavement**

Interior Slabs-on-Grade

1. Lightly loaded interior slabs-on-grade for the restroom building should have a minimum thickness of 4 full inches. Reinforcement size, placement, and slab dowels should be as directed by the architect/engineer; minimum slab reinforcement should consist of No. 3

rebar placed at 18 inches on-center each way. At a minimum, the slabs should be dowelled to footings and grade beams by No. 3 dowels lapped to the slab reinforcement at maximum 18-inch spacing.

2. Heavy capacity slabs-on-grade should have a minimum thickness of 6 full inches, and should be reinforced, at a minimum, by No. 4 rebar placed at 12 inches on-center each way. Provided that the slab is underlain by a minimum of 12 inches of Class 2 aggregate base, the slab design may be based upon a subgrade modulus of 325 pci.

3. Due to the current use of impermeable floor coverings, water-soluble flooring adhesives, and the speed at which buildings are now constructed, moisture vapor transmission through interior slabs is a much more common problem than in past years. Where moisture vapor transmitted from the underlying soil would be undesirable, the slabs should be protected from subsurface moisture vapor. A number of options for vapor protection are discussed below; however, the means of vapor protection, including the type and thickness of the vapor retarder, if specified, are left to the discretion of the architect/engineer.

4. Several recent studies including those of ACI Committees 302 and 306 have concluded that excess water above the vapor retarder increases the potential for moisture damage to floor coverings and could increase the potential for mold growth or other microbial contamination. The studies also concluded that it is preferable to eliminate the typical sand layer beneath the slab and place the slab concrete in direct contact with a "Class A" vapor retarder, particularly during wet weather construction. However, placing the concrete directly on the vapor retarder requires special attention to using the proper vapor retarder (see discussion below), a very low water-cement ratio in the concrete mix, appropriate admixtures, and special finishing and curing techniques.

5. Probably the next most effective option would be the use of vapor-inhibiting admixtures in the slab concrete mix and/or application of a sealer to the surface of the slab. This would also require special concrete mixes and placement procedures, depending upon the recommendations of the admixture or sealer manufacturer.

6. For interior slabs-on-grade, another option that may be a reasonable compromise between effectiveness and cost considerations is the use of a subslab vapor retarder protected by a sand layer. If a "Class A" vapor retarder (see discussion below) is specified, the retarder can be placed directly on pad grade. The retarder should be covered with a minimum 2 inches of *clean* sand. If a less durable vapor retarder is specified (i.e. ASTM E 1745-09, Class B or C), a minimum of 4 inches of clean sand should be provided on top of pad grade, and the retarder should be placed in the center of the clean sand layer. Clean sand is defined as a well or poorly graded sand (ASTM D 2488-09a) of which less than three percent passes the No. 200 sieve.

7. If sand and a vapor retarder are preferred under any equipment or heavy capacity slabs, the design subgrade modulus should be reduced to 250 pci regardless if the layer is 2 or 4 inches thick.

8. Where specified, vapor retarders should conform to ASTM Standard E 1745-09. This standard specifies properties for three performance classes; Class A, B and C. The appropriate class should be selected based on the sensitivity of floor coverings to moisture intrusion and the potential for damage to the vapor retarder during placement of slab reinforcement and concrete.

9. Regardless of the underslab vapor retarder selected, proper installation of the retarder is critical for optimum performance. All seams must be properly lapped, and all seams and utility penetrations properly sealed in accordance with the vapor retarder manufacturer's recommendations.

10. Positive drainage away from the restroom building and other structures should be maintained, see the "Drainage and Maintenance" section for additional discussion of this issue. If water is allowed to pond near the structures, it may seep into the ground and migrate laterally through cracks or utility penetrations in the foundation, ultimately gaining access above the retarder. The presence of water above the retarder could potentially result in vapor transmission through the slab for months or years. Any sand between the vapor retarder and the slab should be moistened only as necessary to promote concrete curing. Saturation of the sand should be avoided, as the excess moisture could also result in vapor transmission through the slab for months or years.

Exterior Pedestrian Flatwork

1. Exterior pedestrian flatwork should have a minimum thickness of 4 full inches. Reinforcement size, placement, and slab dowels should be as directed by the engineer; pedestrian flatwork may be doweled to adjacent foundations or left "free floating" at the engineer's discretion.

PCC Pavement

1. PCC pavement for vehicles (light and heavy) should be designed by the engineer using a subgrade modulus ($K_{30}$) of 325 pci, provided that the pavement is underlain by a minimum of 12 inches of Class 2 aggregate base, as described under the "Grading" section of this report. Thickness, reinforcing, and doweling of PCC pavement is left to the discretion of the engineer. At a minimum, PCC pavement should have a minimum thickness of 6 full inches and should be reinforced with No. 4 rebar placed at 18 inches on-center each way.

2. Finished PCC pavement surfaces should be sloped to freely drain toward appropriate drainage facilities. Water should not be allowed to stand or pond on or adjacent to pavement or other improvements as it could infiltrate into the aggregate base and/or subgrade, causing premature pavement deterioration.

3. To provide stability for curbs, they should be set back a minimum distance equal to one-third the height of any adjacent descending slope, but not less than 5 feet from the tops of slopes. Alternately, curbs may be deepened to provide stability. The geotechnical engineer should review, on an individual basis, any situation where curbs must be deepened to meet this recommendation.

General

1. To reduce shrinkage cracks in concrete, the concrete aggregates should be of appropriate size and proportion, the water/cement ratio should be low, the concrete should be properly placed and finished, contraction joints should be installed, and the concrete should be properly cured. Concrete materials, placement, and curing specifications should be at the direction of the architect/engineer; ACI 302.1R-04 is suggested as a resource for the architect/engineer in preparing such specifications.

**Asphalt Concrete Pavement and Gravel Roadway Sections**

Asphalt Concrete Pavement

The following AC pavement sections are based upon an R-value, or resistance to deformation under repeated loading, of 50. The tested R-value of a soil sample was 65; however, the Caltrans Highway Design Manual (2012), Section 614.3 limits subgrade R-values to 50 in design of flexible pavements for roadways. Therefore, the R-value test result of 65 (see Appendix C) was reduced to 50 in calculating the design sections. The pavement sections are also based on assumed Traffic Indices (TI) of 5.0 through 8.0. Determination of the appropriate TI for specific areas of the project is left to others. The calculated aggregate base and AC thicknesses are for compacted material. Normal Caltrans construction tolerances should apply.

| R-value | Traffic Index | AC (in.) | Class 2 Base (in) |
|---|---|---|---|
| 50 | 5.0 | 2.75 | 4.0 |
| 50 | 5.5 | 3.00 | 4.0 |
| 50 | 6.0 | 3.25 | 4.0 |
| 50 | 6.5 | 3.75 | 4.5 |
| 50 | 7.0 | 4.00 | 4.5 |
| 50 | 7.5 | 4.25 | 5.5 |
| 50 | 8.0 | 4.50 | 6.0 |

1. In all roadway areas, the upper 12 inches of subgrade and all aggregate base should be compacted to a minimum of 95 percent of maximum dry density. Subgrade and aggregate base should be firm and unyielding when proofrolled with heavy, rubber-tired grading equipment prior to continuing construction.

2. Finished roadway surfaces should be sloped to freely drain toward appropriate drainage facilities. Water should not be allowed to stand or pond on or adjacent to pavement or other improvements as it could infiltrate into the aggregate base and/or subgrade, causing premature pavement deterioration.

3. To reduce migration of surface drainage into the subgrade, maintenance of pavement areas is critical. Any cracks that develop in the pavement should be promptly sealed. Rodents should be aggressively controlled near pavement areas and shoulders should be maintained to provide sheet flow away from the edges of the pavement.

4. UPRR or Phillips 66 may have additional requirements for pavement that could take precedence over the above recommendations.

Gravel Roadways

1. The following gravel roadway sections for all weather access roads are based upon a subgrade R-value, or resistance to deformation under repeated loading, of 50. The recommended design section for the gravel roadway was generally based upon the Gravel Roads Maintenance and Design Manual from the U.S. Department of Transportation (FHWA, 2000) assuming a equivalent single-axle load (ESAL) of 5,000 and a surface rutting depth of 1 inch. We have assumed that the gravel roads will be used by light vehicles such as pick-up trucks and passenger cars. Thicker sections may be required if areas will be subject to heavy loads from large trucks, loaders, forklifts, etc.

| Subgrade R-Value | Woven Geotextile Used* | **Surface Material Thickness, in** | |
|---|---|---|---|
| | | Decomposed Granite, minimum R-value = 45 | Class 2 Base, minimum R-value = 78 |
| 50 | NO | 12 | 10 |
| 50 | YES | 8 | 6 |

* Caltrans Standard Specification Section 88-1.02O – Class B1

2. The upper 12 inches of subgrade and all gravel roadway materials should be compacted to a minimum of 95 percent of maximum dry density. Subgrade and aggregate base should be firm and unyielding when proofrolled with heavy, rubber-tired grading equipment prior to continuing construction.

3. Roadway surfaces should slope toward drainage facilities such that rapid runoff will occur. Water should not be allowed to stand or pond on or adjacent to the access road as it could infiltrate into the aggregate base and/or subgrade, causing premature roadway deterioration.

4. Periodic maintenance of the gravel roadway should be expected to be necessary. Maintenance could include removal of soft areas and replacement with new gravel base, placement of thicker sections of gravel base in problem areas, and replacement of material as it erodes due to vehicular traffic and seasonal precipitation.

**Drainage and Maintenance**

1. Unpaved ground surfaces should be *graded during construction* and, per Section 1804.3 of the CBC, *finish graded* to direct surface runoff away from foundations, slopes, and other improvements at a minimum 5 percent grade for a minimum distance of 10 feet. If

this is not feasible due to the terrain, property lines, or other factors, swales with improved surfaces, area drains, or other drainage features should be provided to divert drainage away from these areas.

2. Paved surfaces should provide positive drainage away from foundations, slopes and other improvements. Drains should be provided for areas adjacent to structures that would not otherwise freely drain.

3. The eaves of the structures should be provided with roof gutters. Runoff from roof gutters, downspouts, area drains, weep holes, etc., should discharge to an appropriate outlet in a nonerosive manner away from foundations and other improvements in accordance with the requirements of the governing agencies. Erosion protection should be placed at all discharge points unless the discharge is to a pavement surface.

4. The site soils are highly erodible. Siginificant damage to slopes, improvements, and other features could occur during and following construction if erosion protection measures are not taken. To reduce erosion damage it is essential that the surface soils, particularly those disturbed during construction, be stabilized by vegetation or other means *during and following construction.* Care should be taken to establish and maintain vegetation. The landscaping and exterior flatwork should be installed to maintain the surface drainage recommended above.

5. Additional erosion protection measures could include the use of erosion control blankets, hydroseeding, rebuilding of cut slopes, and chemical treatment of soils along the edges of embankments.

6. To reduce the potential for erosion, disruption of drainage patterns, and undermining of foundations and other improvements, rodent activity should be aggressively controlled.

**Storm Water Basin**

1. Percolation testing in the basin area indicates that the poorly graded sand below the coke fill has good percolation characteristics. The basin should be constructed such that coke material is not exposed on the interior sides or bottom of the basin. If coke is exposed in the basin, the percolation potential will be greatly reduced.

2. Following excavation to grade, the bottom of the basin should be scarified to a depth of 12 inches below grade. Scarification should be performed such that recompaction of soils is avoided to the degree practicable.

3. The interior slopes of the storm water basin should not exceed a 4:1 slope and exterior slope faces should not exceed a 2.5:1 slope. If plans require any steeper slopes, the geotechnical engineer should review the plans and make recommendations for such slopes on an individual basis. Maintenance of slopes is likely to be required until vegetation is established and after major storms or trains of storms.

4. It is suggested that silt traps, weirs, oil separators, stilling basins, filters, etc., be provided in the storm drain system to trap silt, oil, etc., to the degree practicable, and to maintain a reasonably clear flow into the basin. This will enhance the performance of the percolation characteristics of the basin.

5. Maintenance of the basin will be critical to its continued function. All silt, clay, debris, oil, chemical residue, coke, organic residue, etc. should be removed from the basin on a frequent basis, but no less than each fall, prior to the rainy season, and any time that a buildup of such material begins to affect the function of the basin.

6. The basin should be monitored during and after storms. Initially, it should be monitored on a frequent basis until it can be determined that the basin is functioning properly. Once it has been established that the basin is functioning as designed, monitoring can be less frequent, however, it should still be monitored after major storms or trains of storms.

7. Runoff from the site should be aggressively controlled to reduce erosion and subsequent deposition in the basin. Silt fences, straw bales and wattles should be utilized to retain silt and sediment and to allow the water entering the basin to be as clear as practicable. This will be particularly important during construction and until vegetation is well established or other erosion control measures are completed.

**Observation and Testing**

1. It must be recognized that the recommendations contained in this report are based on a limited number of exploratory borings and rely on continuity of the subsurface conditions encountered. Therefore, the geotechnical engineer should be retained to provide

consultation during the design phase, to review plans as they near completion, to interpret this report during construction, and to provide construction monitoring in the form of testing and observation.

2. At a minimum, the following items should be reviewed, tested, or observed by the geotechnical engineer:

    - Stripping and clearing of vegetation
    - Overexcavation, scarification, moisture conditioning, and recompaction
    - Fill quality, placement, moisture conditioning, and compaction
    - Utility trench backfill
    - Buried vault wall backfill
    - Foundation excavations
    - Railroad bed subgrade and subballast proofrolling
    - Pavement subgrade and aggregate base proofrolling

3. A program of quality control should be developed prior to beginning grading. The contractor or project manager should determine any additional inspection items required by the engineer, UPRR, Phillips 66, or the governing jurisdiction.

4. Special inspection of should be provided as per appropriate requirements of Section 1704.7 and Table 1704.7 of the CBC; the special inspector should be under the direction of the geotechnical engineer. At a minimum, the following should be inspected by the special inspector:

    - Stripping and clearing of vegetation
    - Removal of existing fill
    - Overexcavation as recommended
    - Utility trench backfill
    - Fill quality, placement, moisture conditioning, and compaction
    - Railroad bed subgrade and subballast
    - Foundation excavations (conventional and caisson)
    - Storm water basin construction
    - Buried vault backfill

5 A program of quality assurance should be developed prior to beginning construction. At a minimum, the program should include all geotechnical items shown on the testing and inspection schedule of the approved plans. It should also include any additional inspection items required by the engineer, UPRR, Phillips 66, or the governing jurisdiction. These items should be discussed at a preconstruction conference among a representative of the owner, the geotechnical engineer, special inspector, the client, and contractors. The geotechnical engineer should be notified at least 48 hours prior to beginning grading operations.

6. Locations and frequency of compaction tests should be as per the recommendation of the geotechnical engineer at the time of construction. The recommended test location and frequency may be subject to modification by the geotechnical engineer, based upon soil and moisture conditions encountered, size and type of equipment used by the contractor, the general trend of the results of compaction tests, or other factors.

7. The geotechnical engineer should be notified at least 48 hours prior to beginning construction operations. If Earth Systems Pacific is not retained to provide construction observation and testing services, it shall not be responsible for the interpretation of the information by others or any consequences arising there from.

## 8.0 CLOSURE

Our intent was to perform the investigation in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing in the locality of this project under similar conditions. No representation, warranty, or guarantee is either expressed or implied. This report is intended for the exclusive use by the client as discussed in the "Scope of Services" section. Application beyond the stated intent is strictly at the user's risk.

This report is valid for conditions as they exist at this time for the type of project described herein. The conclusions and recommendations contained in this report could be rendered invalid, either in whole or in part, due to changes in building codes, regulations, standards of geotechnical or construction practice, changes in physical conditions, or the broadening of knowledge.

If changes with respect to project type or location become necessary, if items not addressed in this report are incorporated into plans, or if any of the assumptions used in the preparation of this report are not correct, the geotechnical engineer shall be notified for modifications to this report. Any items not specifically addressed in this report should comply with the CBC and the requirements of the governing jurisdiction.

The preliminary recommendations of this report are based upon geotechnical conditions encountered at the site, and may be augmented by additional requirements of the architect/engineer, or by additional recommendations provided by the soils engineer based on peer or jurisdictional reviews, or conditions exposed at the time of construction.

This document, the data, conclusions, and recommendations contained herein are the property of Earth Systems Pacific. This report shall be used in its entirety, with no individual sections reproduced or used out of context. Copies may be made only by Earth Systems Pacific, the client, and the client's authorized agents for use exclusively on the subject project. Any other use is subject to federal copyright laws and the written approval of Earth Systems Pacific.

Thank you for this opportunity to have been of service. If you have any questions, please feel free to contact this office at your convenience.

End of Text.

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# APPENDIX A

Vicinity Map
Boring and Percolation Test Location Map
Boring Log Legend
Boring Logs


Base Map Taken from Google Earth, 2013

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# VICINITY MAP

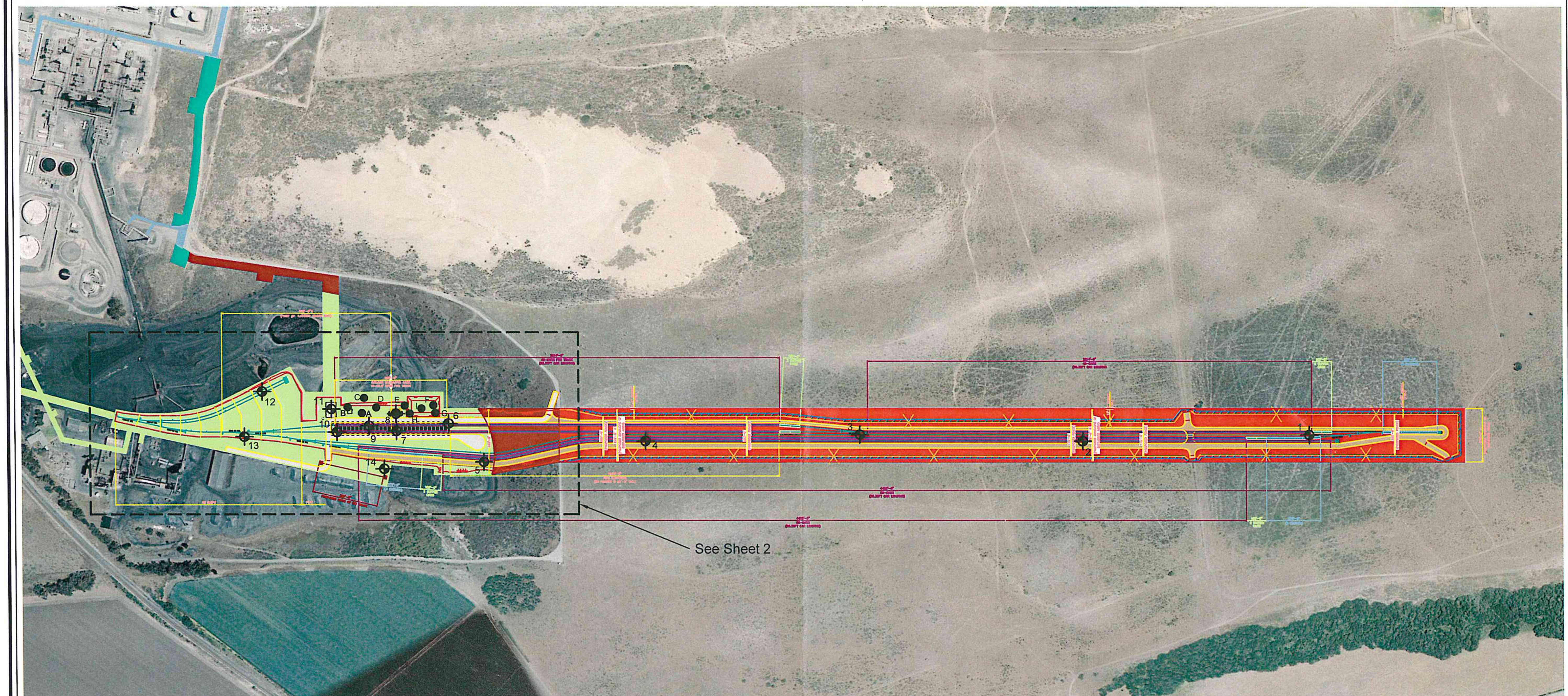
## PHILLIPS 66 UNIT CRUDE TRAIN FACILITY
## SANTA MARIA REFINERY

2555 Willow Road
Arroyo Grande, California

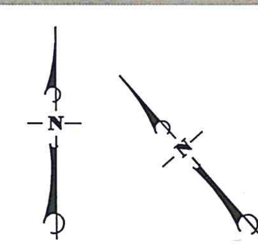
Earth Systems Pacific
4378 Old Santa Fe Road
San Luis Obispo, CA 93401-8116
(805) 544-3276 • FAX (805) 544-1786
E-mail: esp@earthsys.com

August 30, 2013 QF SL-15825-SE

PHILLIPS 66 UNIT CRUDE TRAIN FACILITY-083013VicinityMap




Base Map by SPEC Services, Dated 6/6/2013




0 250 500
SCALE: 1" = 500'

DRAFT

LEGEND

14 Boring Location (Approx.)

Percolation Test Location (Approx.)

# BORING AND PERCOLATION TEST LOCATION MAP

## PHILLIPS 66 UNIT CRUDE TRAIN FACILITY
## SANTA MARIA REFINERY

2555 Willow Road
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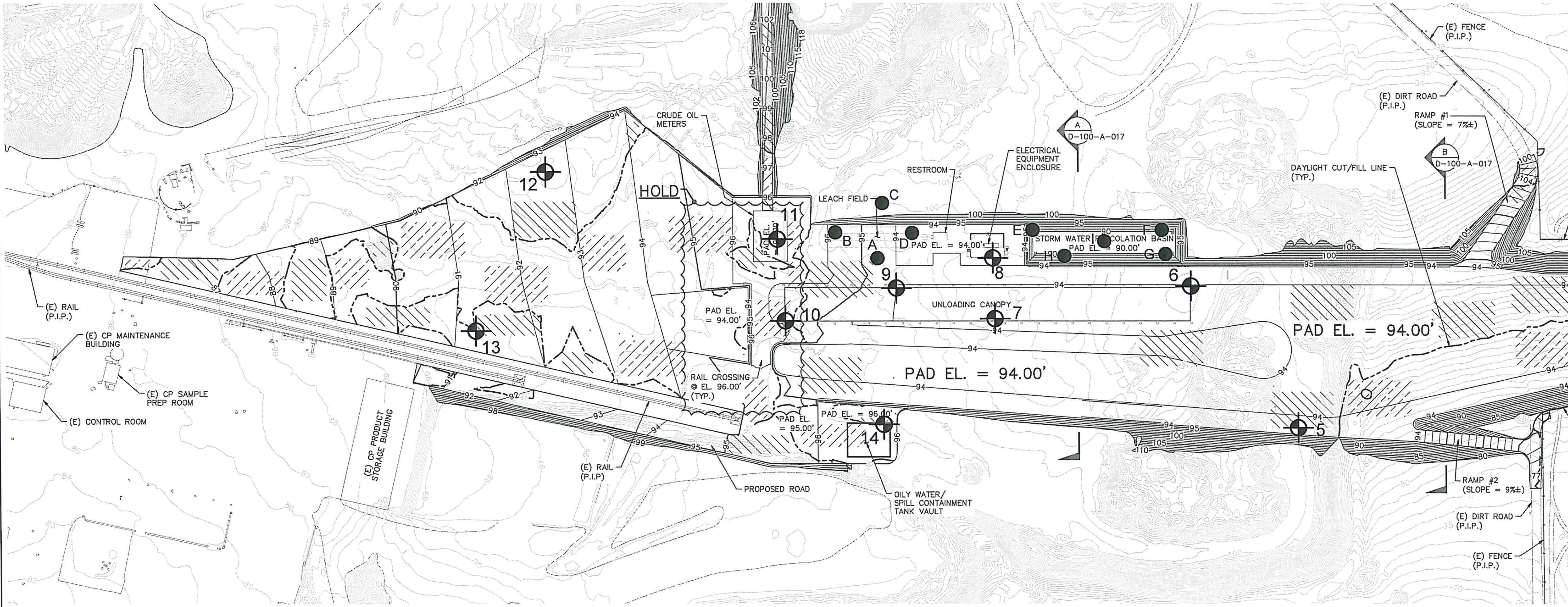
SHEET 1 OF 2

PHILLIPS 66 UNIT CRUDE TRAIN FACILITY–083013Borings Sheet 1




Base Map by SPEC Services, Dated 8/30/2013

Plant True

LEGEND

14 Boring Location (Approx.)

Percolation Test Location (Approx.)

NOT TO SCALE

# BORING AND PERCOLATION TEST LOCATION MAP

## PHILLIPS 66 UNIT CRUDE TRAIN FACILITY
## SANTA MARIA REFINERY

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SHEET 2 OF 2



PHILLIPS 66 UNIT CRUDE TRAIN FACILITY-083013Borings Sheet 2

Earth Systems Pacific

# BORING LOG LEGEND

| SAMPLE / SUBSURFACE WATER SYMBOLS | GRAPH. SYMBOL |
|---|---|
| CALIFORNIA MODIFIED | |
| STANDARD PENETRATION TEST (SPT) | |
| SHELBY TUBE | |
| BULK | |
| SUBSURFACE WATER DURING DRILLING | |
| SUBSURFACE WATER AFTER DRILLING | |

## SOIL CLASSIFICATION SYSTEM

| MAJOR DIVISIONS | | GROUP SYMBOL | TYPICAL DESCRIPTIONS | GRAPH. SYMBOL |
|---|---|---|---|---|
| COARSE GRAINED SOILS | MORE THAN HALF OF MATERIAL IS TESTED OR JUDGED TO BE LARGER THAN #200 SIEVE SIZE | GW | WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES | |
| | | GP | POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES | |
| | | GM | SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES, NON-PLASTIC FINES | |
| | | GC | CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES, PLASTIC FINES | |
| | | SW | WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES | |
| | | SP | POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES | |
| | | SM | SILTY SANDS, SAND-SILT MIXTURES, NON-PLASTIC FINES | |
| | | SC | CLAYEY SANDS, SAND-CLAY MIXTURES, PLASTIC FINES | |
| FINE GRAINED SOILS | HALF OR MORE OF MATERIAL IS TESTED OR JUDGED TO BE SMALLER THAN #200 SIEVE SIZE | ML | INORGANIC SILTS AND VERY FINE SANDS, SILTY, CLAYEY FINE SANDS, CLAYEY SILTS WITH SLIGHT PLASTICITY | |
| | | CL | INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS | |
| | | OL | ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY | |
| | | MH | INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY, SILTY SOILS, ELASTIC SILTS | |
| | | CH | INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS | |
| | | OH | ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS | |
| | | PT | PEAT AND OTHER HIGHLY ORGANIC SOILS | |

## OBSERVED MOISTURE CONDITION

| DRY | SLIGHTLY MOIST | MOIST | VERY MOIST | WET |
|---|---|---|---|---|
| LITTLE/NO MOISTURE | JUDGED BELOW OPTIMUM | JUDGED ABOUT OPTIMUM | JUDGED OVER OPTIMUM | SATURATED |

## TYPICAL CONSISTENCY

| COARSE GRAINED SOILS | | | FINE GRAINED SOILS | | |
|---|---|---|---|---|---|
| BLOWS/FOOT | | DESCRIPTIVE TERM | BLOWS/FOOT | | DESCRIPTIVE TERM |
| SPT | CA SAMPLER | | SPT | CA SAMPLER | |
| 0-10 | 0-16 | LOOSE | 0-2 | 0-3 | VERY SOFT |
| 11-30 | 17-50 | MEDIUM DENSE | 3-4 | 4-7 | SOFT |
| 31-50 | 51-83 | DENSE | 5-8 | 8-13 | MEDIUM STIFF |
| OVER 50 | OVER 83 | VERY DENSE | 9-15 | 14-25 | STIFF |
| | | | 16-30 | 26-50 | VERY STIFF |
| | | | OVER 30 | OVER 50 | HARD |

## GRAIN SIZES

| U.S. STANDARD SERIES SIEVE | | | | CLEAR SQUARE SIEVE OPENING | | |
|---|---|---|---|---|---|---|
| # 200 | # 40 | # 10 | # 4 | 3/4" | 3" | 12" |

| SILT & CLAY | SAND | | | GRAVEL | | COBBLES | BOULDERS |
|---|---|---|---|---|---|---|---|
| | FINE | MEDIUM | COARSE | FINE | COARSE | | |

## TYPICAL ROCK HARDNESS

| MAJOR DIVISIONS | TYPICAL DESCRIPTIONS |
|---|---|
| EXTREMELY HARD | CORE, FRAGMENT, OR EXPOSURE CANNOT BE SCRATCHED WITH KNIFE OR SHARP PICK; CAN ONLY BE CHIPPED WITH REPEATED HEAVY HAMMER BLOWS |
| VERY HARD | CANNOT BE SCRATCHED WITH KNIFE OR SHARP PICK; CORE OR FRAGMENT BREAKS WITH REPEATED HEAVY HAMMER BLOWS |
| HARD | CAN BE SCRATCHED WITH KNIFE OR SHARP PICK WITH DIFFICULTY (HEAVY PRESSURE); HEAVY HAMMER BLOW REQUIRED TO BREAK SPECIMEN |
| MODERATELY HARD | CAN BE GROOVED 1/16 INCH DEEP BY KNIFE OR SHARP PICK WITH MODERATE OR HEAVY PRESSURE; CORE OR FRAGMENT BREAKS WITH LIGHT HAMMER BLOW OR HEAVY MANUAL PRESSURE |
| SOFT | CAN BE GROOVED OR GOUGED EASILY BY KNIFE OR SHARP PICK WITH LIGHT PRESSURE, CAN BE SCRATCHED WITH FINGERNAIL; BREAKS WITH LIGHT TO MODERATE MANUAL PRESSURE |
| VERY SOFT | CAN BE READILY INDENTED, GROOVED OR GOUGED WITH FINGERNAIL, OR CARVED WITH KNIFE; BREAKS WITH LIGHT MANUAL PRESSURE |

## TYPICAL ROCK WEATHERING

| MAJOR DIVISIONS | TYPICAL DESCRIPTIONS |
|---|---|
| FRESH | NO DISCOLORATION, NOT OXIDIZED |
| SLIGHTLY WEATHERED | DISCOLORATION OR OXIDATION IS LIMITED TO SURFACE OF, OR SHORT DISTANCE FROM; SOME FRACTURES PRESENT; FELDSPAR CRYSTALS ARE DULL |
| MODERATELY WEATHERED | DISCOLORATION OR OXIDATION EXTENDS FROM FRACTURES, USUALLY THROUGHOUT; Fe-Mg MINERALS ARE "RUSTY"; FELDSPAR CRYSTALS ARE "CLOUDY" |
| INTENSELY WEATHERED | DISCOLORATION OR OXIDATION THROUGHOUT; FELDSPAR AND Fe-Mg MINERALS ARE ALTERED TO CLAY TO SOME EXTENT OR CHEMICAL ALTERATION PRODUCES IN SITU DISAGGREGATION |
| DECOMPOSED | DISCOLORATION OR OXIDATION THROUGHOUT, BUT RESISTANT MINERALS SUCH AS QUARTZ MAY BE UNALTERED; FELDSPAR AND Fe-Mg MINERALS ARE COMPLETELY ALTERED TO CLAY |

drafting/masters/Boring Log Legend091608.dwg

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**Earth Systems Pacific**

## Boring No. 1



LOGGED BY: K. Martinez
DRILL RIG: CME - 55 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger
Surface Elevation: 109' +/-
JOB NO.: SL-15825-SE
DATE: 07/11/13

**PHILLIPS 66 UNIT CRUDE TRAIN FACILITY**
**SANTA MARIA REFINERY**
**2555 Willow Road**
**Arroyo Grande, California**

| DEPTH (feet) | USCS CLASS | SYMBOL | SOIL DESCRIPTION | INTERVAL (feet) | SAMPLE TYPE | DRY DENSITY (pcf) | MOISTURE (%) | BLOWS PER 6 IN. |
|---|---|---|---|---|---|---|---|---|
| 0 | SP | | POORLY GRADED SAND: brown, loose, dry, fine grained (Dune sand) | | | | | |
| 4.5 | | | light brown | | | | | |
| 7 | | | light brown/orange brown mottled, medium dense, slightly moist | | | | | |
| 10 | | | | 10.0 - 11.5 | SPT | | | 4 7 10 |
| 16 | | | red brown, dense | | | | | |
| 20 | | | | 20.0 - 21.5 | SPT | | | 8 15 19 |
| 21 | | | light brown/orange brown mottled | | | | | |
| 24 | | | pale brown/orange brown mottled, medium dense, moist | | | | | |
| 25 | | | | 25.0 - 26.5 | Ring Sample | 100.5 | 4.7 | 7 15 20 |

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Appendix E

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# Earth Systems Pacific

## Boring No. 1

LOGGED BY: K. Martinez
DRILL RIG: CME - 55 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger
Surface Elevation: 109' +/-


JOB NO.: SL-15825-SE
DATE: 07/11/13

**PHILLIPS 66 UNIT CRUDE TRAIN FACILITY**
**SANTA MARIA REFINERY**
**2555 Willow Road**
**Arroyo Grande, California**

| DEPTH (feet) | USCS CLASS | SYMBOL | SOIL DESCRIPTION | INTERVAL (feet) | SAMPLE TYPE | DRY DENSITY (pcf) | MOISTURE (%) | BLOWS PER 6 IN. |
|---|---|---|---|---|---|---|---|---|
| 27 | SP | | POORLY GRADED SAND: as above | | | | | |
| 30 | | | | 30.0 - 31.5 | ● | | | 8 13 16 |
| 35 | | | red brown/orange brown mottled, dense | 35.0 - 36.5 | ■ | 104.7 | 13.8 | 12 20 32 |
| 40 | | | | 40.0 - 41.5 | ● | | | 6 14 17 |
| 41.5 | | | End of Boring @ 41.5'<br>No subsurface water encountered | | | | | |

LEGEND: ■ Ring Sample ○ Grab Sample □ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

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## Earth Systems Pacific

**Boring No. 2**

PAGE 1 OF 2

LOGGED BY: K. Martinez
DRILL RIG: CME - 55 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger
Surface Elevation: 83' +/-
JOB NO.: SL-15825-SE
DATE: 07/11/13

**PHILLIPS 66 UNIT CRUDE TRAIN FACILITY**
**SANTA MARIA REFINERY**
**2555 Willow Road**
**Arroyo Grande, California**

SOIL DESCRIPTION

| DEPTH (feet) | USCS CLASS | SYMBOL | SOIL DESCRIPTION | INTERVAL (feet) | SAMPLE TYPE | DRY DENSITY (pcf) | MOISTURE (%) | BLOWS PER 6 IN. |
|---|---|---|---|---|---|---|---|---|
| 0 - 3 | SP | | POORLY GRADED SAND: brown, loose, dry, fine grained (Dune sand) | | | | | |
| 3 - 5.5 | | | light brown, medium dense | 5.0 - 6.5 | Ring Sample | 109.6 | 0.9 | 6 9 11 |
| 5.5 - 10.5 | | | pale brown | 10.0 - 11.5 | SPT | | | 5 7 12 |
| 10.5 - 14 | | | pale brown/orange brown mottled, slightly moist | | | | | |
| 14 - 18.5 | | | light brown/orange brown mottled, dense | 15.0 - 16.5 | Ring Sample | 102.1 | 5.7 | 9 20 31 |
| 18.5 - 23.5 | | | red brown/orange brown mottled, moist | 20.0 - 21.5 | SPT | | | 8 14 16 |
| 23.5 - | | | very dense | 25.0 - 26.5 | Ring Sample | 99.2 | 6.6 | 21 50/6.0" |

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

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**Earth Systems Pacific**

Boring No. 2

LOGGED BY: K. Martinez | PAGE 2 OF 2
DRILL RIG: CME - 55 with Automatic Hammer | JOB NO.: SL-15825-SE
AUGER TYPE: 6" Hollow Stem Auger | Surface Elevation: 83' +/- | DATE: 07/11/13

**PHILLIPS 66 UNIT CRUDE TRAIN FACILITY**
**SANTA MARIA REFINERY**
**2555 Willow Road**
**Arroyo Grande, California**

| DEPTH (feet) | USCS CLASS | SYMBOL | SOIL DESCRIPTION | INTERVAL (feet) | SAMPLE TYPE | DRY DENSITY (pcf) | MOISTURE (%) | BLOWS PER 6 IN. |
|---|---|---|---|---|---|---|---|---|
| 27 | SP | | POORLY GRADED SAND: as above | | | | | |
| 28 | | | very moist | | | | | |
| 30 | | | wet | 30.0 - 31.5 | SPT | | | 17 25 30 |
| 35 | | | | 35.0 - 36.5 | Ring Sample | 105.5 | 19.6 | 13 39 50 |
| 40 | | | | 40.0 - 41.5 | SPT | | | 20 30 39 |
| 41.5 | | | End of Boring @ 41.5'<br>Subsurface water encountered @ 30.0' | | | | | |

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

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Appendix E

# Earth Systems Pacific

## Boring No. 3

LOGGED BY: K. Martinez
DRILL RIG: CME - 55 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

PAGE 1 OF 2
JOB NO.: SL-15825-SE
Surface Elevation: 89' +/-
DATE: 07/11/13

**PHILLIPS 66 UNIT CRUDE TRAIN FACILITY**
**SANTA MARIA REFINERY**
**2555 Willow Road**
**Arroyo Grande, California**

| DEPTH (feet) | USCS CLASS | SYMBOL | SOIL DESCRIPTION | INTERVAL (feet) | SAMPLE TYPE | DRY DENSITY (pcf) | MOISTURE (%) | BLOWS PER 6 IN. |
|---|---|---|---|---|---|---|---|---|
| 0 | SP | | POORLY GRADED SAND: brown, loose, dry, fine grained (Dune sand) | | | | | |
| 4 | | | pale brown, medium dense, slightly moist | | | | | |
| 5 | | | | 5.0 - 6.5 | Ring Sample | 101.5 | 1.3 | 5 8 12 |
| 9 | | | red brown | | | | | |
| 10 | | | | 10.0 - 11.5 | Ring Sample | 104.2 | 3.4 | 7 12 16 |
| 11 | | | light brown/red brown mottled | | | | | |
| 15 | | | | 15.0 - 16.5 | SPT | | | 6 8 9 |
| 15.5 | | | pale brown/orange brown mottled | | | | | |
| 20 | | | | 20.0 - 21.5 | Ring Sample | 95.1 | 5.2 | 6 12 18 |
| 25 | | | | 25.0 - 26.5 | SPT | | | 5 10 15 |
| 25.5 | | | red brown, moist | | | | | |
| 26 | | | pale brown/orange brown mottled | | | | | |

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

## Earth Systems Pacific

**Boring No. 3**
PAGE 2 OF 2
JOB NO.: SL-15825-SE
DATE: 07/11/13

LOGGED BY: K. Martinez
DRILL RIG: CME - 55 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger
Surface Elevation: 89' +/-

**PHILLIPS 66 UNIT CRUDE TRAIN FACILITY**
**SANTA MARIA REFINERY**
**2555 Willow Road**
**Arroyo Grande, California**

| DEPTH (feet) | USCS CLASS | SYMBOL | SOIL DESCRIPTION | SAMPLE DATA: INTERVAL (feet) | SAMPLE TYPE | DRY DENSITY (pcf) | MOISTURE (%) | BLOWS PER 6 IN. |
|---|---|---|---|---|---|---|---|---|
| 27 | SP | | POORLY GRADED SAND: as above | | | | | |
| 29 | | | light brown/orange brown mottled, dense | | | | | |
| 30 | | | | 30.0 - 31.5 | Ring Sample | 98.1 | 4.7 | 12 37 40 |
| 33 | | | red brown, very moist | | | | | |
| 35 | | | | 35.0 - 36.5 | SPT | | | 10 18 26 |
| 38.5 | | | wet | | | | | |
| 39.5 | | | very dense | | | | | |
| 40 | | | | 40.0 - 41.5 | SPT | | | 11 31 50 |
| 41.5 | | | End of Boring @ 41.5'<br>Subsurface water encountered @ 38.5' | | | | | |

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

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# Earth Systems Pacific

## Boring No. 4



LOGGED BY: K. Martinez
DRILL RIG: CME - 55 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger
Surface Elevation: 85' +/-
JOB NO.: SL-15825-SE
DATE: 07/11/13

**PHILLIPS 66 UNIT CRUDE TRAIN FACILITY**
**SANTA MARIA REFINERY**
**2555 Willow Road**
**Arroyo Grande, California**

| DEPTH (feet) | USCS CLASS | SYMBOL | SOIL DESCRIPTION | INTERVAL (feet) | SAMPLE TYPE | DRY DENSITY (pcf) | MOISTURE (%) | BLOWS PER 6 IN. |
|---|---|---|---|---|---|---|---|---|
| 0 | SP | | POORLY GRADED SAND: brown, loose, dry, fine grained (Dune sand) | | | | | |
| 2 | | | light brown | | | | | |
| 7 | | | medium dense, slightly moist | | | | | |
| 10 | | | | 10.0 - 11.5 | Ring Sample | 101.6 | 5.1 | 5 11 17 |
| 11 | | | light brown/red brown mottled | | | | | |
| 15 | | | | 15.0 - 16.5 | SPT | | | 7 14 25 |
| 16.5 | | | pale brown, dense | | | | | |
| 19 | | | pale brown/orange brown mottled | | | | | |
| 20 | | | | 20.0 - 21.5 | Ring Sample | 100.4 | 4.4 | 17 30 49 |
| 24.5 | | | very dense | 25.0 - 26.5 | SPT | | | 7 23 34 |
| 26 | | | pale brown | | | | | |

LEGEND: ■ Ring Sample ○ Grab Sample □ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

## Earth Systems Pacific

## Boring No. 4



LOGGED BY: K. Martinez
DRILL RIG: CME - 55 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger
Surface Elevation: 85' +/-
JOB NO.: SL-15825-SE
DATE: 07/11/13

**PHILLIPS 66 UNIT CRUDE TRAIN FACILITY**
**SANTA MARIA REFINERY**
**2555 Willow Road**
**Arroyo Grande, California**

| DEPTH (feet) | USCS CLASS | SYMBOL | SOIL DESCRIPTION | INTERVAL (feet) | SAMPLE TYPE | DRY DENSITY (pcf) | MOISTURE (%) | BLOWS PER 6 IN. |
|---|---|---|---|---|---|---|---|---|
| 27 | SP | | POORLY GRADED SAND: as above | | | | | |
| 30 | | | | 30.0 - 31.5 | Ring Sample | 100.1 | 4.1 | 17 37 50 |
| 31.5 | | | orange brown, moist | | | | | |
| 35 | | | dense, very moist | 35.0 - 36.5 | SPT | | | 12 20 23 |
| 38 | | | wet | | | | | |
| 39 | | | very dense | | | | | |
| 40 | | | | 40.0 - 41.5 | Ring Sample | 110.7 | 17.0 | 19 36 50/4.0" |
| 41.5 | | | End of Boring @ 41.5'<br>Subsurface water encountered @ 38.0' | | | | | |

LEGEND: Ring Sample ◯ Grab Sample ☐ Shelby Tube Sample ● SPT





NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

## Earth Systems Pacific

# Boring No. 5

PAGE 1 OF 1

LOGGED BY: K. Martinez
DRILL RIG: CME - 55 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger
Surface Elevation: 101' +/-
JOB NO.: SL-15825-SE
DATE: 07/10/13

**PHILLIPS 66 UNIT CRUDE TRAIN FACILITY**
**SANTA MARIA REFINERY**
**2555 Willow Road**
**Arroyo Grande, California**

| DEPTH (feet) | USCS CLASS | SYMBOL | SOIL DESCRIPTION | SAMPLE DATA: INTERVAL (feet) | SAMPLE TYPE | DRY DENSITY (pcf) | MOISTURE (%) | BLOWS PER 6 IN. |
|---|---|---|---|---|---|---|---|---|
| 0 | | | COKE: dark gray to black, loose, dry (Fill) | | | | | |
| 7.5 | | | | 7.5 - 9.0 | Ring Sample | 101.6 | 2.2 | 3, 6, 8 |
| 8 | SP - SM | | POORLY GRADED SAND WITH SILT: light brown, loose, slightly moist, fine grained (Dune sand) | | | | | |
| 10 | | | | 10.0 - 11.5 | SPT | | | 3, 3, 5 |
| 10.5 | | | red brown | 8.0 - 12.0 | Grab Sample | | | |
| 13 | | | medium dense | | | | | |
| 15 | | | light brown/red brown mottled | 15.0 - 16.5 | Ring Sample | 98.9 | 2.4 | 5, 13, 15 |
| 20 | | | | 20.0 - 21.5 | SPT | | | 5, 7, 12 |
| 21.5 | | | End of Boring @ 21.5'<br>No subsurface water encountered | | | | | |

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT



NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

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**Earth Systems Pacific**

## Boring No. 6

LOGGED BY: K. Martinez
DRILL RIG: CME - 55 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger

Surface Elevation: 99' +/-

PAGE 1 OF 2
JOB NO.: SL-15825-SE
DATE: 07/09/13

**PHILLIPS 66 UNIT CRUDE TRAIN FACILITY**
**SANTA MARIA REFINERY**
**2555 Willow Road**
**Arroyo Grande, California**

| DEPTH (feet) | USCS CLASS | SYMBOL | SOIL DESCRIPTION | INTERVAL (feet) | SAMPLE TYPE | DRY DENSITY (pcf) | MOISTURE (%) | BLOWS PER 6 IN. |
|---|---|---|---|---|---|---|---|---|
| 0–2 | | | COKE: dark gray to black, loose, dry (Fill) | | | | | |
| 2–4 | SP | | POORLY GRADED SAND: dark brown, loose, slightly moist, fine grained, trace fine gravel (Dune sand) | | | | | |
| 4–18 | | | light brown, medium dense, gravel ends | 5.0 - 6.5 | Ring Sample | 99.0 | 3.2 | 7 16 21 |
| | | | | 10.0 - 11.5 | Ring Sample | 97.5 | 3.7 | 5 9 12 |
| | | | | 15.0 - 16.5 | Ring Sample | 101.8 | 2.2 | 7 12 21 |
| 18–21 | | | red brown | 20.0 - 21.5 | SPT | | | 5 8 11 |
| 21–26 | | | light brown/red brown mottled | | | | | |

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT





NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

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**Earth Systems Pacific**

## Boring No. 6

LOGGED BY: K. Martinez
DRILL RIG: CME - 55 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger
Surface Elevation: 99' +/-


JOB NO.: SL-15825-SE
DATE: 07/09/13

**PHILLIPS 66 UNIT CRUDE TRAIN FACILITY**
**SANTA MARIA REFINERY**
**2555 Willow Road**
**Arroyo Grande, California**

| DEPTH (feet) | USCS CLASS | SYMBOL | SOIL DESCRIPTION | SAMPLE DATA: INTERVAL (feet) | SAMPLE TYPE | DRY DENSITY (pcf) | MOISTURE (%) | BLOWS PER 6 IN. |
|---|---|---|---|---|---|---|---|---|
| 27 | SP | | POORLY GRADED SAND: as above | | | | | |
| 28 | | | | | | | | |
| 29 | | | dense | | | | | 9 |
| 30 | | | | 30.0 - 31.5 | SPT | | | 23 |
| 31 | | | | | | | | 37 |
| 32 | | | End of Boring @ 31.5'<br>No subsurface water encountered | | | | | |
| 33 | | | | | | | | |
| 34 | | | | | | | | |
| 35 | | | | | | | | |
| 36 | | | | | | | | |
| 37 | | | | | | | | |
| 38 | | | | | | | | |
| 39 | | | | | | | | |
| 40 | | | | | | | | |
| 41 | | | | | | | | |
| 42 | | | | | | | | |
| 43 | | | | | | | | |
| 44 | | | | | | | | |
| 45 | | | | | | | | |
| 46 | | | | | | | | |
| 47 | | | | | | | | |
| 48 | | | | | | | | |
| 49 | | | | | | | | |
| 50 | | | | | | | | |
| 51 | | | | | | | | |
| 52 | | | | | | | | |
| 53 | | | | | | | | |

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

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## Earth Systems Pacific

# Boring No. 7

LOGGED BY: K. Martinez
DRILL RIG: CME - 55 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger
Surface Elevation: 101' +/-


JOB NO.: SL-15825-SE
DATE: 07/09/13

**PHILLIPS 66 UNIT CRUDE TRAIN FACILITY**
**SANTA MARIA REFINERY**
**2555 Willow Road**
**Arroyo Grande, California**

| DEPTH (feet) | USCS CLASS | SOIL DESCRIPTION | INTERVAL (feet) | SAMPLE TYPE | DRY DENSITY (pcf) | MOISTURE (%) | BLOWS PER 6 IN. |
|---|---|---|---|---|---|---|---|
| 0 | | COKE: dark gray to black, loose, dry (Fill) | 0.0 - 1.5 | ○ | | | |
| 2 | SP | POORLY GRADED SAND: light brown, loose, slightly moist, fine grained (Dune sand) | | | | | |
| 4 | | medium dense | 5.0 - 6.5 | ■ | 99.5 | 2.8 | 6 10 13 |
| 7 | | brown | | | | | |
| 9 | | light brown | 10.0 - 11.5 | ■ | 98.1 | 2.8 | 5 10 13 |
| | | | 15.0 - 16.5 | ■ | 98.0 | 3.7 | 5 8 11 |
| 16 | | red brown | | | | | |
| | | | 20.0 - 21.5 | ● | | | 5 8 11 |

LEGEND: ■ Ring Sample ○ Grab Sample □ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

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# Earth Systems Pacific

## Boring No. 7



LOGGED BY: K. Martinez
DRILL RIG: CME - 55 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger
Surface Elevation: 101' +/-
JOB NO.: SL-15825-SE
DATE: 07/09/13

**PHILLIPS 66 UNIT CRUDE TRAIN FACILITY**
**SANTA MARIA REFINERY**
**2555 Willow Road**
**Arroyo Grande, California**

| DEPTH (feet) | USCS CLASS | SYMBOL | SOIL DESCRIPTION | INTERVAL (feet) | SAMPLE TYPE | DRY DENSITY (pcf) | MOISTURE (%) | BLOWS PER 6 IN. |
|---|---|---|---|---|---|---|---|---|
| 27 | SP | | POORLY GRADED SAND: as above | | | | | |
| 28 | | | light brown/red brown mottled | | | | | |
| 30 | | | | 30.0 - 31.5 | ● | | | 7<br>11<br>13 |
| 37 | | | red brown/pale brown mottled, dense | | | | | |
| 40 | | | | 40.0 - 41.5 | ● | | | 10<br>16<br>26 |
| 47 | | | very dense | | | | | |
| 50 | | | | 50.0 - 51.5 | ● | | | 15<br>31<br>40 |
| 51.5 | | | End of Boring @ 51.5'<br>No subsurface water encountered | | | | | |

LEGEND: ■ Ring Sample ○ Grab Sample □ Shelby Tube Sample ● SPT





NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

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## Earth Systems Pacific

**Boring No. 8**

LOGGED BY: K. Martinez
DRILL RIG: CME - 55 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger
Surface Elevation: 101' +/-


JOB NO.: SL-15825-SE
DATE: 07/09/13

**PHILLIPS 66 UNIT CRUDE TRAIN FACILITY**
**SANTA MARIA REFINERY**
**2555 Willow Road**
**Arroyo Grande, California**

| DEPTH (feet) | USCS CLASS | SOIL DESCRIPTION | INTERVAL (feet) | SAMPLE TYPE | DRY DENSITY (pcf) | MOISTURE (%) | BLOWS PER 6 IN. |
|---|---|---|---|---|---|---|---|
| 0 | | COKE: dark gray to black, loose, dry (Fill) | | | | | |
| 1 | SP | POORLY GRADED SAND: light brown, loose, slightly moist, fine grained (Dune sand) | | | | | |
| 3 | | brown, medium dense | | | | | |
| 5 | | | 5.0 - 6.5 | Ring Sample | 99.1 | 4.8 | 4 / 7 / 11 |
| 7 | | light brown | | | | | |
| 10 | | | 10.0 - 11.5 | Ring Sample | 101.1 | 3.8 | 6 / 11 / 15 |
| 15 | | | 15.0 - 16.5 | Ring Sample | 99.3 | 5.3 | 6 / 9 / 12 |
| 18 | | red brown | | | | | |
| 20 | | | 20.0 - 21.5 | SPT | | | 4 / 6 / 10 |
| 24 | | yellow brown | | | | | |
| 25 | | | 25.0 - 26.5 | SPT | | | 5 / 10 / 14 |

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

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**Earth Systems Pacific**

Boring No. 8

LOGGED BY: K. Martinez
DRILL RIG: CME - 55 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger


JOB NO.: SL-15825-SE
Surface Elevation: 101' +/-
DATE: 07/09/13

**PHILLIPS 66 UNIT CRUDE TRAIN FACILITY**
**SANTA MARIA REFINERY**
**2555 Willow Road**
**Arroyo Grande, California**

| DEPTH (feet) | USCS CLASS | SYMBOL | SOIL DESCRIPTION | SAMPLE DATA: INTERVAL (feet) | SAMPLE TYPE | DRY DENSITY (pcf) | MOISTURE (%) | BLOWS PER 6 IN. |
|---|---|---|---|---|---|---|---|---|
| 27 | SP | | POORLY GRADED SAND: as above | | | | | |
| 28 | | | | | | | | |
| 29 | | | light brown/red brown mottled | | | | | 5 |
| 30 | | | | 30.0 - 31.5 | ● | | | 8 |
| 31 | | | | | | | | 11 |
| 32 | | | End of Boring @ 31.5'<br>No subsurface water encountered | | | | | |
| 33 | | | | | | | | |
| 34 | | | | | | | | |
| 35 | | | | | | | | |
| 36 | | | | | | | | |
| 37 | | | | | | | | |
| 38 | | | | | | | | |
| 39 | | | | | | | | |
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| 41 | | | | | | | | |
| 42 | | | | | | | | |
| 43 | | | | | | | | |
| 44 | | | | | | | | |
| 45 | | | | | | | | |
| 46 | | | | | | | | |
| 47 | | | | | | | | |
| 48 | | | | | | | | |
| 49 | | | | | | | | |
| 50 | | | | | | | | |
| 51 | | | | | | | | |
| 52 | | | | | | | | |
| 53 | | | | | | | | |

LEGEND: ■ Ring Sample ○ Grab Sample □ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

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**Earth Systems Pacific**

## Boring No. 9

LOGGED BY: K. Martinez

DRILL RIG: CME - 55 with Automatic Hammer

AUGER TYPE: 6" Hollow Stem Auger

Surface Elevation: 98' +/-

PAGE 1 OF 1

JOB NO.: SL-15825-SE

DATE: 07/10/13

**PHILLIPS 66 UNIT CRUDE TRAIN FACILITY**
**SANTA MARIA REFINERY**
**2555 Willow Road**
**Arroyo Grande, California**

| DEPTH (feet) | USCS CLASS | SYMBOL | SOIL DESCRIPTION | SAMPLE DATA: INTERVAL (feet) | SAMPLE TYPE | DRY DENSITY (pcf) | MOISTURE (%) | BLOWS PER 6 IN. |
|---|---|---|---|---|---|---|---|---|
| 0 – 1.5 | | | COKE: dark gray to black, loose, dry (Fill) | | | | | |
| 1.5 | SP | | POORLY GRADED SAND: light brown, loose, slightly moist, fine grained (Dune sand) | | | | | |
| 4 | | | medium dense | 5.0 - 6.5 | ■ | 97.7 | 4.0 | 6 11 14 |
| | | | | 10.0 - 11.5 | ■ | 97.5 | 5.2 | 6 12 15 |
| | | | | 15.0 - 16.5 | ■ | 95.1 | 5.9 | 6 13 22 |
| 18 | | | light brown/red brown mottled | 20.0 - 21.5 | ● | | | 5 9 12 |
| 21.5 | | | End of Boring @ 21.5'<br>No subsurface water encountered | | | | | |

LEGEND: ■ Ring Sample ○ Grab Sample □ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Appendix E

DRAFT

# Earth Systems Pacific

## Boring No. 10

LOGGED BY: K. Martinez
DRILL RIG: CME - 55 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger


JOB NO.: SL-15825-SE
Surface Elevation: 96' +/-
DATE: 07/09/13

**PHILLIPS 66 UNIT CRUDE TRAIN FACILITY**
**SANTA MARIA REFINERY**
**2555 Willow Road**
**Arroyo Grande, California**

| DEPTH (feet) | USCS CLASS | SYMBOL | SOIL DESCRIPTION | INTERVAL (feet) | SAMPLE TYPE | DRY DENSITY (pcf) | MOISTURE (%) | BLOWS PER 6 IN. |
|---|---|---|---|---|---|---|---|---|
| 0 | | | COKE: dark gray to black, loose, dry (Fill) | | | | | |
| 3 | SP | | POORLY GRADED SAND: dark brown, loose, slightly moist, fine grained (Dune sand) | | | | | |
| 4.5 | | | light brown, medium dense | 5.0 - 6.5 | Ring Sample | 96.5 | 3.0 | 5 8 11 |
| 9 | | | red brown | 10.0 - 11.5 | Ring Sample | 100.4 | 3.0 | 5 8 9 |
| 14 | | | light brown/red brown mottled | 15.0 - 16.5 | Ring Sample | 102.4 | 2.7 | 5 10 13 |
| | | | | 20.0 - 21.5 | SPT | | | 5 10 11 |

LEGEND: Ring Sample  Grab Sample  Shelby Tube Sample  SPT





NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

## Earth Systems Pacific

# Boring No. 10



LOGGED BY: K. Martinez
DRILL RIG: CME - 55 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger
Surface Elevation: 96' +/-
JOB NO.: SL-15825-SE
DATE: 07/09/13

**PHILLIPS 66 UNIT CRUDE TRAIN FACILITY**
**SANTA MARIA REFINERY**
**2555 Willow Road**
**Arroyo Grande, California**

| DEPTH (feet) | USCS CLASS | SYMBOL | SOIL DESCRIPTION | SAMPLE DATA: INTERVAL (feet) | SAMPLE TYPE | DRY DENSITY (pcf) | MOISTURE (%) | BLOWS PER 6 IN. |
|---|---|---|---|---|---|---|---|---|
| 27 | SP | | POORLY GRADED SAND: as above | | | | | |
| 28 | | | | | | | | |
| 29 | | | | | | | | 7 |
| 30 | | | dense | 30.0 - 31.5 | ● | | | 12 / 19 |
| 31 | | | | | | | | |
| 32 | | | End of Boring @ 31.5'<br>No subsurface water encountered | | | | | |
| 33 | | | | | | | | |
| 34 | | | | | | | | |
| 35 | | | | | | | | |
| 36 | | | | | | | | |
| 37 | | | | | | | | |
| 38 | | | | | | | | |
| 39 | | | | | | | | |
| 40 | | | | | | | | |
| 41 | | | | | | | | |
| 42 | | | | | | | | |
| 43 | | | | | | | | |
| 44 | | | | | | | | |
| 45 | | | | | | | | |
| 46 | | | | | | | | |
| 47 | | | | | | | | |
| 48 | | | | | | | | |
| 49 | | | | | | | | |
| 50 | | | | | | | | |
| 51 | | | | | | | | |
| 52 | | | | | | | | |
| 53 | | | | | | | | |

LEGEND: ■ Ring Sample ○ Grab Sample □ Shelby Tube Sample ● SPT



NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

DRAFT

Earth Systems Pacific

# Boring No. 11



LOGGED BY: K. Martinez
DRILL RIG: CME - 55 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger
Surface Elevation: 96' +/-
JOB NO.: SL-15825-SE
DATE: 07/10/13

**PHILLIPS 66 UNIT CRUDE TRAIN FACILITY**
**SANTA MARIA REFINERY**
**2555 Willow Road**
**Arroyo Grande, California**

| DEPTH (feet) | USCS CLASS | SYMBOL | SOIL DESCRIPTION | INTERVAL (feet) | SAMPLE TYPE | DRY DENSITY (pcf) | MOISTURE (%) | BLOWS PER 6 IN. |
|---|---|---|---|---|---|---|---|---|
| 0 | | | COKE: dark gray to black, loose, dry (Fill) | | | | | |
| 3 | | | | 0.0 - 6.0 | Grab Sample | | | |
| 4 | SP | | POORLY GRADED SAND: dark brown, loose, slightly moist, fine grained (Dune sand) | | | | | |
| 5 | | | | 5.0 - 6.5 | Ring Sample | 98.9 | 2.9 | 4 6 10 |
| 5.5 | | | light brown, medium dense | | | | | |
| 10 | | | | 10.0 - 11.5 | Ring Sample | 97.0 | 2.7 | 4 8 9 |
| 15 | | | | 15.0 - 16.5 | Ring Sample | 98.0 | 3.2 | 6 13 17 |
| 16 | | | red brown | | | | | |
| 19 | | | light brown/red brown mottled | | | | | |
| 20 | | | | 20.0 - 21.5 | SPT | | | 6 9 11 |

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

## Earth Systems Pacific

# Boring No. 11

LOGGED BY: K. Martinez
DRILL RIG: CME - 55 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger


JOB NO.: SL-15825-SE
Surface Elevation: 96' +/-
DATE: 07/10/13

**PHILLIPS 66 UNIT CRUDE TRAIN FACILITY**
**SANTA MARIA REFINERY**
**2555 Willow Road**
**Arroyo Grande, California**

| DEPTH (feet) | USCS CLASS | SYMBOL | SOIL DESCRIPTION | SAMPLE DATA: INTERVAL (feet) | SAMPLE TYPE | DRY DENSITY (pcf) | MOISTURE (%) | BLOWS PER 6 IN. |
|---|---|---|---|---|---|---|---|---|
| 27–31.5 | SP | | POORLY GRADED SAND: as above | 30.0 - 31.5 | SPT | | | 7 11 17 |
| 31.5 | | | End of Boring @ 31.5'<br>No subsurface water encountered | | | | | |

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT





NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

DRAFT

# Earth Systems Pacific

## Boring No. 12

PAGE 1 OF 1

LOGGED BY: K. Martinez
DRILL RIG: CME - 55 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger
Surface Elevation: 95' +/-

JOB NO.: SL-15825-SE
DATE: 07/10/13

**PHILLIPS 66 UNIT CRUDE TRAIN FACILITY**
**SANTA MARIA REFINERY**
**2555 Willow Road**
**Arroyo Grande, California**

| DEPTH (feet) | USCS CLASS | SOIL DESCRIPTION | INTERVAL (feet) | SAMPLE TYPE | DRY DENSITY (pcf) | MOISTURE (%) | BLOWS PER 6 IN. |
|---|---|---|---|---|---|---|---|
| 0 | | COKE: dark gray to black, loose, dry (Fill) | | | | | |
| 1.5 | SP | POORLY GRADED SAND: light brown, medium dense, slightly moist, fine grained (Dune sand) | | | | | |
| 5 | | | 5.0 - 6.5 | Ring Sample | 98.6 | 4.8 | 4, 8, 12 |
| 10 | | | 10.0 - 11.5 | Ring Sample | 97.6 | 4.8 | 5, 10, 13 |
| 13 | | red brown | | | | | |
| 15 | | | 15.0 - 16.5 | Ring Sample | 95.7 | 5.9 | 5, 8, 10 |
| 18 | | dark red brown | | | | | |
| 20 | | | 20.0 - 21.5 | SPT | | | 3, 5, 6 |
| 21.5 | | End of Boring @ 21.5'<br>No subsurface water encountered | | | | | |

LEGEND: Ring Sample ○ Grab Sample □ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

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## Earth Systems Pacific

# Boring No. 13

LOGGED BY: K. Martinez
DRILL RIG: CME - 55 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger
Surface Elevation: 92' +/-


JOB NO.: SL-15825-SE
DATE: 07/10/13

**PHILLIPS 66 UNIT CRUDE TRAIN FACILITY**
**SANTA MARIA REFINERY**
**2555 Willow Road**
**Arroyo Grande, California**

| DEPTH (feet) | USCS CLASS | SOIL DESCRIPTION | INTERVAL (feet) | SAMPLE TYPE | DRY DENSITY (pcf) | MOISTURE (%) | BLOWS PER 6 IN. |
|---|---|---|---|---|---|---|---|
| 0 - 4 | | COKE: dark gray to black, medium dense, dry (Fill) | | | | | |
| 4 - 5.5 | SP | POORLY GRADED SAND: dark brown, loose, slightly moist, fine grained (Dune sand) | 5.0 - 6.5 | ■ | 99.6 | 2.2 | 9 20 24 |
| 5.5 - 13 | | light brown, medium dense | 10.0 - 11.5 | ■ | 98.5 | 2.5 | 7 14 18 |
| 13 - 16 | | loose | 15.0 - 16.5 | ■ | 95.7 | 2.3 | 4 6 8 |
| 16 - 21.5 | | red brown | 20.0 - 21.5 | ● | | | 3 4 6 |
| 21.5 | | End of Boring @ 21.5'<br>No subsurface water encountered | | | | | |

LEGEND: ■ Ring Sample ○ Grab Sample □ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

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# Earth Systems Pacific

## Boring No. 14

PAGE 1 OF 2

LOGGED BY: K. Martinez
DRILL RIG: CME - 55 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger
Surface Elevation: 97' +/-
JOB NO.: SL-15825-SE
DATE: 07/10/13

**PHILLIPS 66 UNIT CRUDE TRAIN FACILITY**
**SANTA MARIA REFINERY**
**2555 Willow Road**
**Arroyo Grande, California**

| DEPTH (feet) | USCS CLASS | SOIL DESCRIPTION | INTERVAL (feet) | SAMPLE TYPE | DRY DENSITY (pcf) | MOISTURE (%) | BLOWS PER 6 IN. |
|---|---|---|---|---|---|---|---|
| 0 - 1 | | COKE: dark gray to black, loose, dry (Fill) | | | | | |
| 1 - 2 | SP | POORLY GRADED SAND: dark brown, loose, slightly moist, fine grained (Dune sand) | | | | | |
| 2 | | light brown, medium dense | | | | | |
| 5 | | | 5.0 - 6.5 | ■ | 100.4 | 2.8 | 5 10 13 |
| 10 | | | 10.0 - 11.5 | ● | | | 3 6 8 |
| 15 | | | 15.0 - 16.5 | ■ | 101.3 | 2.8 | 6 11 16 |
| 20 | | | 20.0 - 21.5 | ● | | | 6 10 15 |
| 25 | | | 25.0 - 26.5 | ■ | 100.9 | 4.1 | 8 20 23 |

LEGEND: ■ Ring Sample ○ Grab Sample □ Shelby Tube Sample ● SPT





NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

DRAFT

**Earth Systems Pacific**

## Boring No. 14



LOGGED BY: K. Martinez
DRILL RIG: CME - 55 with Automatic Hammer
AUGER TYPE: 6" Hollow Stem Auger
Surface Elevation: 97' +/-
JOB NO.: SL-15825-SE
DATE: 07/10/13

**PHILLIPS 66 UNIT CRUDE TRAIN FACILITY**
**SANTA MARIA REFINERY**
**2555 Willow Road**
**Arroyo Grande, California**

| DEPTH (feet) | USCS CLASS | SYMBOL | SOIL DESCRIPTION | INTERVAL (feet) | SAMPLE TYPE | DRY DENSITY (pcf) | MOISTURE (%) | BLOWS PER 6 IN. |
|---|---|---|---|---|---|---|---|---|
| 27 | SP | | POORLY GRADED SAND: as above | | | | | |
| 28 | | | red brown | | | | | |
| 30 | | | | 30.0 - 31.5 | ● (SPT) | | | 7<br>11<br>13 |
| 31 | | | light brown/red brown mottled | | | | | |
| 32 | | | End of Boring @ 31.5'<br>No subsurface water encountered | | | | | |

LEGEND: Ring Sample ◯ Grab Sample ▭ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

## APPENDIX B

Percolation Test Logs
Percolation Test Results

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**Earth Systems Pacific**

# Percolation Test A

LOGGED BY: K. Martinez
DRILL RIG: CME - 55 with Automatic Hammer
AUGER TYPE: 8" Hollow Stem Auger

PAGE 1 OF 1
JOB NO.: SL-15825-SE
Surface Elevation: 96' +/-
DATE: 07/08/13

**PHILLIPS 66 UNIT CRUDE TRAIN FACILITY**
**SANTA MARIA REFINERY**
**2555 Willow Road**
**Arroyo Grande, California**

| DEPTH (feet) | USCS CLASS | SYMBOL | SOIL DESCRIPTION | INTERVAL (feet) | SAMPLE TYPE | DRY DENSITY (pcf) | MOISTURE (%) | BLOWS PER 6 IN. |
|---|---|---|---|---|---|---|---|---|
| 0 | | | COKE: dark gray to black, loose, dry (Fill) | | | | | |
| 6 | SP | | POORLY GRADED SAND: dark brown, loose, slightly moist, fine grained (Dune sand) | | | | | |
| 7 | | | light brown | | | | | |
| 8.5 | | | End of Boring @ 8.5'<br>No subsurface water encountered | | | | | |

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

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**Earth Systems Pacific**

## Percolation Test B

LOGGED BY: K. Martinez
DRILL RIG: CME - 55 with Automatic Hammer
AUGER TYPE: 8" Hollow Stem Auger

Surface Elevation: 96' +/-

PAGE 1 OF 1
JOB NO.: SL-15825-SE
DATE: 07/08/13

**PHILLIPS 66 UNIT CRUDE TRAIN FACILITY**
**SANTA MARIA REFINERY**
**2555 Willow Road**
**Arroyo Grande, California**

| DEPTH (feet) | USCS CLASS | SYMBOL | SOIL DESCRIPTION | SAMPLE DATA: INTERVAL (feet) | SAMPLE TYPE | DRY DENSITY (pcf) | MOISTURE (%) | BLOWS PER 6 IN. |
|---|---|---|---|---|---|---|---|---|
| 0–5.5 | | | COKE: dark gray to black, loose, dry (Fill) | | | | | |
| 5.5–7 | SP | | POORLY GRADED SAND: dark brown, loose, slightly moist, fine grained (Dune sand) | | | | | |
| 7–9 | | | light brown | | | | | |
| 9 | | | End of Boring @ 9.0'<br>No subsurface water encountered | | | | | |

LEGEND: Ring Sample ◯ Grab Sample ☐ Shelby Tube Sample ● SPT





NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

**Earth Systems Pacific**

## Percolation Test C

LOGGED BY: K. Martinez
DRILL RIG: CME - 55 with Automatic Hammer
AUGER TYPE: 8" Hollow Stem Auger
Surface Elevation: 96' +/-

PAGE 1 OF 1
JOB NO.: SL-15825-SE
DATE: 07/08/13

**PHILLIPS 66 UNIT CRUDE TRAIN FACILITY**
**SANTA MARIA REFINERY**
**2555 Willow Road**
**Arroyo Grande, California**

| USCS CLASS | SOIL DESCRIPTION | INTERVAL (feet) | SAMPLE TYPE | DRY DENSITY (pcf) | MOISTURE (%) | BLOWS PER 6 IN. |
|---|---|---|---|---|---|---|
| | COKE: dark gray to black, loose, dry (Fill) | | | | | |
| SP | POORLY GRADED SAND: dark brown, loose, dry, fine grained (Dune sand) | | | | | |
| | light brown | | | | | |
| | End of Boring @ 4.5'<br>No subsurface water encountered | | | | | |

LEGEND: Ring Sample ◯ Grab Sample ☐ Shelby Tube Sample ● SPT





NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

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## Earth Systems Pacific

# Percolation Test D

LOGGED BY: K. Martinez
DRILL RIG: CME - 55 with Automatic Hammer
AUGER TYPE: 8" Hollow Stem Auger
Surface Elevation: 98' +/-

PAGE 1 OF 1
JOB NO.: SL-15825-SE
DATE: 07/08/13

**PHILLIPS 66 UNIT CRUDE TRAIN FACILITY**
**SANTA MARIA REFINERY**
**2555 Willow Road**
**Arroyo Grande, California**

| DEPTH (feet) | USCS CLASS | SYMBOL | SOIL DESCRIPTION | INTERVAL (feet) | SAMPLE TYPE | DRY DENSITY (pcf) | MOISTURE (%) | BLOWS PER 6 IN. |
|---|---|---|---|---|---|---|---|---|
| 0 | | | COKE: dark gray to black, loose, dry (Fill) | | | | | |
| 1 | SP | | POORLY GRADED SAND: dark brown, loose, dry, fine grained (Dune sand) | | | | | |
| 3 | | | slightly moist | | | | | |
| 4 | | | End of Boring @ 4.0'<br>No subsurface water encountered | | | | | |

LEGEND: Ring Sample ◯ Grab Sample ▭ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

## Earth Systems Pacific

# Percolation Test E

PAGE 1 OF 1

LOGGED BY: K. Martinez
DRILL RIG: CME - 55 with Automatic Hammer
AUGER TYPE: 8" Hollow Stem Auger

JOB NO.: SL-15825-SE
Surface Elevation: 100' +/-
DATE: 07/09/13

**PHILLIPS 66 UNIT CRUDE TRAIN FACILITY**
**SANTA MARIA REFINERY**
**2555 Willow Road**
**Arroyo Grande, California**

| DEPTH (feet) | USCS CLASS | SYMBOL | SOIL DESCRIPTION | INTERVAL (feet) | SAMPLE TYPE | DRY DENSITY (pcf) | MOISTURE (%) | BLOWS PER 6 IN. |
|---|---|---|---|---|---|---|---|---|
| 0–1.5 | | | COKE: dark gray to black, loose, dry (Fill) | | | | | |
| 1.5–5 | SP | | POORLY GRADED SAND: dark brown, loose, slightly moist, fine grained (Dune sand)<br>light brown | | | | | |
| 5 | | | End of Boring @ 5.0'<br>No subsurface water encountered | | | | | |

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

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# Earth Systems Pacific

## Percolation Test F

PAGE 1 OF 1
JOB NO.: SL-15825-SE
DATE: 07/09/13

LOGGED BY: K. Martinez
DRILL RIG: CME - 55 with Automatic Hammer
AUGER TYPE: 8" Hollow Stem Auger
Surface Elevation: 99' +/-

**PHILLIPS 66 UNIT CRUDE TRAIN FACILITY**
**SANTA MARIA REFINERY**
**2555 Willow Road**
**Arroyo Grande, California**

| DEPTH (feet) | USCS CLASS | SYMBOL | SOIL DESCRIPTION | SAMPLE DATA: INTERVAL (feet) | SAMPLE TYPE | DRY DENSITY (pcf) | MOISTURE (%) | BLOWS PER 6 IN. |
|---|---|---|---|---|---|---|---|---|
| 0 | | | COKE: dark gray to black, loose, dry (Fill) | | | | | |
| 1 | SP | | POORLY GRADED SAND: dark brown, loose, slightly moist, fine grained (Dune sand) | | | | | |
| 2 | | | light brown | | | | | |
| 3 | | | brown, moist | | | | | |
| | | | End of Boring @ 3.0' No subsurface water encountered | | | | | |
| 4 | | | | | | | | |
| 5 | | | | | | | | |
| 6 | | | | | | | | |
| 7 | | | | | | | | |
| 8 | | | | | | | | |
| 9 | | | | | | | | |
| 10 | | | | | | | | |
| 11 | | | | | | | | |
| 12 | | | | | | | | |
| 13 | | | | | | | | |
| 14 | | | | | | | | |
| 15 | | | | | | | | |
| 16 | | | | | | | | |
| 17 | | | | | | | | |
| 18 | | | | | | | | |
| 19 | | | | | | | | |
| 20 | | | | | | | | |
| 21 | | | | | | | | |
| 22 | | | | | | | | |
| 23 | | | | | | | | |
| 24 | | | | | | | | |
| 25 | | | | | | | | |
| 26 | | | | | | | | |

LEGEND: Ring Sample ◯ Grab Sample ☐ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

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**Earth Systems Pacific**

## Percolation Test G

LOGGED BY: K. Martinez
DRILL RIG: CME - 55 with Automatic Hammer
AUGER TYPE: 8" Hollow Stem Auger
Surface Elevation: 98' +/-


JOB NO.: SL-15825-SE
DATE: 07/09/13

| DEPTH (feet) | USCS CLASS | SYMBOL | PHILLIPS 66 UNIT CRUDE TRAIN FACILITY SANTA MARIA REFINERY 2555 Willow Road Arroyo Grande, California — SOIL DESCRIPTION | SAMPLE DATA: INTERVAL (feet) | SAMPLE TYPE | DRY DENSITY (pcf) | MOISTURE (%) | BLOWS PER 6 IN. |
|---|---|---|---|---|---|---|---|---|
| 0 | | | COKE: dark gray to black, loose, dry (Fill) | | | | | |
| 2 | SP | | POORLY GRADED SAND: light brown, loose, slightly moist, fine grained (Dune sand) | | | | | |
| 3 | | | brown | | | | | |
| 4 | | | light brown | | | | | |
| | | | End of Boring @ 4.0' No subsurface water encountered | | | | | |

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

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**Earth Systems Pacific**

## Percolation Test H

LOGGED BY: K. Martinez
DRILL RIG: CME - 55 with Automatic Hammer
AUGER TYPE: 8" Hollow Stem Auger
Surface Elevation: 100' +/-

PAGE 1 OF 1
JOB NO.: SL-15825-SE
DATE: 07/09/13

**PHILLIPS 66 UNIT CRUDE TRAIN FACILITY**
**SANTA MARIA REFINERY**
**2555 Willow Road**
**Arroyo Grande, California**

| DEPTH (feet) | USCS CLASS | SYMBOL | SOIL DESCRIPTION | SAMPLE DATA: INTERVAL (feet) | SAMPLE TYPE | DRY DENSITY (pcf) | MOISTURE (%) | BLOWS PER 6 IN. |
|---|---|---|---|---|---|---|---|---|
| 0–2.5 | | | COKE: dark gray to black, loose, dry (Fill) | | | | | |
| 2.5–3.5 | SP | | POORLY GRADED SAND: dark brown, loose, slightly moist, fine grained (Dune sand) | | | | | |
| 3.5–5 | | | light brown, moist | | | | | |
| 5 | | | End of Boring @ 5.0'<br>No subsurface water encountered | | | | | |

Depth scale: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26

LEGEND: Ring Sample, Grab Sample, Shelby Tube Sample, SPT





NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

## PERCOLATION TEST RESULTS

**PROJECT: Phillips 66 Unit Crude Train Facility**

**DATE DRILLED: 07/08/2013** **DATE TESTED: 07/09/2013**

**TESTED BY: JK** **DIAMETER: 8 inches**

**PERCOLATION TEST LOCATION: A** **DEPTH: 8.5 Feet**

**CONSTANT HEAD DATA:** Time = 10 min Volume = 7 gal Rate = 42 gal/hr

| INTERVAL (minutes) | READING (feet) | FALL (feet) | INFILTRATION RATE (min/inch) | INFILTRATION RATE (inches/hr) |
|---|---|---|---|---|
| 0.00 | 7.10 | --- | --- | --- |
| 3.00 | Dry | --- | --- | --- |
| Refill | 5.80 | --- | --- | --- |
| 1.00 | 6.90 | 1.10 | 0.08 | 792 |
| 1.00 | 7.50 | 0.60 | 0.14 | 432 |
| 1.00 | 7.70 | 0.20 | 0.42 | 144 |
| 2.00 | 7.80 | 0.10 | 1.67 | 36 |
| 4.00 | Dry | --- | --- | --- |
| Refill | 5.00 | --- | --- | --- |
| 1.00 | 6.00 | 1.00 | 0.08 | 720 |
| 2.00 | 7.00 | 1.00 | 0.17 | 360 |
| 2.50 | 7.60 | 0.60 | 0.35 | 173 |
| 1.50 | Dry | --- | --- | --- |
| Refill | 4.50 | --- | --- | --- |
| 1.50 | 5.90 | 1.40 | 0.09 | 672 |
| 3.50 | 7.20 | 1.30 | 0.22 | 267 |
| 1.50 | 7.50 | 0.30 | 0.42 | 144 |
| 2.50 | 7.60 | 0.10 | 2.08 | 29 |
| 2.00 | Dry | --- | --- | --- |
| Refill | 5.2 | --- | --- | --- |
| 1.50 | 6.4 | 1.20 | 0.10 | 576 |
| 2.50 | 7.1 | 0.70 | 0.30 | 202 |
| 2.00 | 7.8 | 0.70 | 0.24 | 252 |
| 2.50 | Dry | --- | --- | --- |
| Refill | 4.9 | --- | --- | --- |
| 1.00 | 5.6 | 0.70 | 0.12 | 504 |
| 2.00 | 6.4 | 0.80 | 0.21 | 288 |
| 2.00 | 7.3 | 0.90 | 0.19 | 324 |
| 2.50 | 8.1 | 0.80 | 0.26 | 230 |
| 2.00 | Dry | --- | --- | --- |
| Refill | 5.2 | --- | --- | --- |
| 2.50 | 6.8 | 1.60 | 0.13 | 461 |
| 1.50 | 7.7 | 0.90 | 0.14 | 432 |
| 2.00 | 8.1 | 0.40 | 0.42 | 144 |
| 2.50 | Dry | --- | --- | --- |
| Refill | 5.0 | --- | --- | --- |
| 1.00 | 6.3 | 1.30 | 0.06 | 936 |
| 2.00 | 7.2 | 0.90 | 0.19 | 324 |
| 2.50 | 7.8 | 0.60 | 0.35 | 173 |
| 2.50 | Dry | --- | --- | --- |

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## PERCOLATION TEST RESULTS

**PROJECT: Phillips 66 Unit Crude Train Facility**

**DATE DRILLED: 07/08/2013** **DATE TESTED: 07/09/2013**

**TESTED BY: JK** **DIAMETER: 8 inches**

**PERCOLATION TEST LOCATION: B** **DEPTH: 9.0 Feet**

**CONSTANT HEAD DATA:** Time = 10 min Volume = 5 gal Rate = 30 gal/min

| INTERVAL (minutes) | READING (feet) | FALL (feet) | INFILTRATION RATE (min/inch) | INFILTRATION RATE (inches/hr) |
|---|---|---|---|---|
| 0.00 | 6.30 | --- | --- | --- |
| 2.00 | 8.00 | 1.70 | 0.10 | 612 |
| 1.00 | 8.40 | 0.40 | 0.21 | 288 |
| 1.00 | Dry | --- | --- | --- |
| Refill | 5.80 | --- | --- | --- |
| 1.50 | 7.20 | 1.40 | 0.09 | 672 |
| 3.50 | 8.40 | 1.20 | 0.24 | 247 |
| 2.00 | Dry | --- | --- | --- |
| Refill | 6.00 | --- | --- | --- |
| 2.00 | 7.90 | 1.90 | 0.09 | 684 |
| 2.00 | 8.30 | 0.40 | 0.42 | 144 |
| 2.00 | Dry | --- | --- | --- |
| Refill | 5.30 | --- | --- | --- |
| 1.50 | 6.70 | 1.40 | 0.09 | 672 |
| 3.00 | 7.40 | 0.70 | 0.36 | 168 |
| 2.50 | Dry | --- | --- | --- |
| Refill | 5.40 | --- | --- | --- |
| 2.00 | 6.90 | 1.50 | 0.11 | 540 |
| 1.00 | 7.40 | 0.50 | 0.17 | 360 |
| 3.00 | 7.90 | 0.50 | 0.50 | 120 |
| 1.00 | Dry | --- | --- | --- |
| Refill | 5.60 | --- | --- | --- |
| 2.00 | 6.50 | 0.90 | 0.19 | 324 |
| 3.00 | 7.50 | 1.00 | 0.25 | 240 |
| 1.50 | 8.30 | 0.80 | 0.16 | 384 |
| 1.00 | Dry | --- | --- | --- |
| Refill | 5.90 | --- | --- | --- |
| 1.00 | 7.00 | 1.10 | 0.08 | 792 |
| 2.00 | 7.30 | 0.30 | 0.56 | 108 |
| 1.00 | 8.20 | 0.90 | 0.09 | 648 |
| 1.50 | Dry | --- | --- | --- |
| Refill | 5.50 | --- | --- | --- |
| 2.00 | 6.70 | 1.20 | 0.14 | 432 |
| 2.00 | 7.50 | 0.80 | 0.21 | 288 |
| 2.50 | 8.10 | 0.60 | 0.35 | 173 |
| 1.00 | Dry | --- | --- | --- |
| Refill | 6.10 | --- | --- | --- |
| 2.50 | 7.60 | 1.50 | 0.14 | 432 |
| 1.50 | 8.00 | 0.40 | 0.31 | 192 |
| 1.00 | 8.30 | 0.30 | 0.28 | 216 |
| 2.00 | Dry | --- | --- | --- |
| Refill | 5.70 | --- | --- | --- |
| 1.00 | 6.20 | 0.50 | 0.17 | 360 |
| 2.00 | 7.60 | 1.40 | 0.12 | 504 |
| 2.50 | 8.40 | 0.80 | 0.26 | 230 |
| 1.00 | Dry | --- | --- | --- |

# PERCOLATION TEST RESULTS

**PROJECT: Phillips 66 Unit Crude Train Facility**

**DATE DRILLED: 07/08/2013** **DATE TESTED: 07/09/2013**

**TESTED BY: JK** **DIAMETER: 8 inches**

**PERCOLATION TEST LOCATION: C** **DEPTH: 4.5 Feet**

**CONSTANT HEAD DATA:** Time = 10 min Volume = 8 gal Rate = 48 gal/min

| INTERVAL (minutes) | READING (feet) | FALL (feet) | INFILTRATION RATE (min/inch) | INFILTRATION RATE (inches/hr) |
|---|---|---|---|---|
| 0.00 | 2.90 | --- | --- | --- |
| 0.50 | 3.30 | 0.40 | 0.10 | 576 |
| 0.50 | 3.50 | 0.20 | 0.21 | 288 |
| 0.50 | 3.75 | 0.25 | 0.17 | 360 |
| 0.50 | 3.85 | 0.10 | 0.42 | 144 |
| 0.50 | 3.95 | 0.10 | 0.42 | 144 |
| 0.50 | Dry | --- | --- | --- |
| Refill | 2.10 | --- | --- | --- |
| 2.00 | 3.30 | 1.20 | 0.14 | 432 |
| 0.50 | 3.40 | 0.10 | 0.42 | 144 |
| 1.50 | 3.70 | 0.30 | 0.42 | 144 |
| 0.50 | 3.85 | 0.15 | 0.28 | 216 |
| 0.50 | 4.00 | 0.15 | 0.28 | 216 |
| 1.00 | Dry | --- | --- | --- |
| Refill | 2.45 | --- | --- | --- |
| 0.50 | 2.75 | 0.30 | 0.14 | 432 |
| 0.50 | 3.10 | 0.35 | 0.12 | 504 |
| 1.50 | 3.50 | 0.40 | 0.31 | 192 |
| 3.00 | 4.10 | 0.60 | 0.42 | 144 |
| 1.00 | Dry | --- | --- | --- |
| Refill | 2.00 | --- | --- | --- |
| 0.50 | 2.50 | 0.50 | 0.08 | 720 |
| 0.50 | 2.90 | 0.40 | 0.10 | 576 |
| 0.50 | 3.15 | 0.25 | 0.17 | 360 |
| 1.50 | 3.50 | 0.35 | 0.36 | 168 |
| 1.00 | 3.70 | 0.20 | 0.42 | 144 |
| 1.00 | 3.90 | 0.20 | 0.42 | 144 |
| 2.00 | 4.05 | 0.15 | 1.11 | 54 |
| 0.50 | Dry | --- | --- | --- |
| Refill | 2.00 | --- | --- | --- |
| 0.50 | 2.50 | 0.50 | 0.08 | 720 |
| 0.50 | 2.70 | 0.20 | 0.21 | 288 |
| 1.50 | 3.25 | 0.55 | 0.23 | 264 |
| 1.50 | 3.60 | 0.35 | 0.36 | 168 |
| 3.00 | 3.90 | 0.30 | 0.83 | 72 |
| 1.00 | 4.10 | 0.20 | 0.42 | 144 |

DRAFT

## PERCOLATION TEST RESULTS

**PROJECT: Phillips 66 Unit Crude Train Facility**

**DATE DRILLED: 07/08/2013** **DATE TESTED: 07/09/2013**

**TESTED BY: JK** **DIAMETER: 8 inches**

**PERCOLATION TEST LOCATION: C** **DEPTH: 4.5 Feet**

| INTERVAL (minutes) | READING (feet) | FALL (feet) | INFILTRATION RATE (min/inch) | INFILTRATION RATE (inches/hr) |
|---|---|---|---|---|
| 1.00 | Dry | --- | --- | --- |
| Refill | 2.30 | --- | --- | --- |
| 0.50 | 2.60 | 0.30 | 0.14 | 432 |
| 1.00 | 3.15 | 0.55 | 0.15 | 396 |
| 0.50 | 3.55 | 0.40 | 0.10 | 576 |
| 0.50 | 3.90 | 0.35 | 0.12 | 504 |
| 1.00 | 4.10 | 0.20 | 0.42 | 144 |
| 1.00 | Dry | --- | --- | --- |
| Refill | 2.15 | --- | --- | --- |
| 1.50 | 2.80 | 0.65 | 0.19 | 312 |
| 0.50 | 3.10 | 0.30 | 0.14 | 432 |
| 0.50 | 3.45 | 0.35 | 0.12 | 504 |
| 1.00 | 4.00 | 0.55 | 0.15 | 396 |
| 0.50 | Dry | --- | --- | --- |
| Refill | 2.00 | --- | --- | --- |
| 0.50 | 2.40 | 0.40 | 0.10 | 576 |
| 1.00 | 2.70 | 0.30 | 0.28 | 216 |
| 1.00 | 3.20 | 0.50 | 0.17 | 360 |
| 1.50 | 3.90 | 0.70 | 0.18 | 336 |
| 1.00 | Dry | --- | --- | --- |
| Refill | 2.60 | --- | --- | --- |
| 1.00 | 2.90 | 0.30 | 0.28 | 216 |
| 0.50 | 3.30 | 0.40 | 0.10 | 576 |
| 1.00 | 3.80 | 0.50 | 0.17 | 360 |
| 2.00 | Dry | --- | --- | --- |
| Refill | 2.40 | --- | --- | --- |
| 1.00 | 2.80 | 0.40 | 0.21 | 288 |
| 1.50 | 3.30 | 0.50 | 0.25 | 240 |
| 0.50 | 3.60 | 0.30 | 0.14 | 432 |
| 1.00 | 4.10 | 0.50 | 0.17 | 360 |
| 1.00 | Dry | --- | --- | --- |
| Refill | 2.60 | --- | --- | --- |
| 1.50 | 3.10 | 0.50 | 0.25 | 240 |
| 2.00 | 3.40 | 0.30 | 0.56 | 108 |
| 2.00 | 3.80 | 0.40 | 0.42 | 144 |
| 1.00 | 4.10 | 0.30 | 0.28 | 216 |
| 0.50 | Dry | --- | --- | --- |

DRAFT

## PERCOLATION TEST RESULTS

**PROJECT: Phillips 66 Unit Crude Train Facility**

**DATE DRILLED: 07/08/2013** **DATE TESTED: 07/09/2013**

**TESTED BY: JK** **DIAMETER: 8 inches**

**PERCOLATION TEST LOCATION: D** **DEPTH: 4.0 Feet**

**CONSTANT HEAD DATA:** Time = 10 min Volume = 9 gal Rate = 54 gal/min

| INTERVAL (minutes) | READING (feet) | FALL (feet) | INFILTRATION RATE (min/inch) | INFILTRATION RATE (inches/hr) |
|---|---|---|---|---|
| 0.00 | 1.45 | --- | --- | --- |
| 2.00 | 1.70 | 0.25 | 0.67 | 90 |
| 2.00 | 1.90 | 0.20 | 0.83 | 72 |
| 3.00 | 2.20 | 0.30 | 0.83 | 72 |
| 4.50 | 2.60 | 0.40 | 0.94 | 64 |
| 4.50 | 2.90 | 0.30 | 1.25 | 48 |
| 3.50 | 3.10 | 0.20 | 1.46 | 41 |
| 4.00 | 3.25 | 0.15 | 2.22 | 27 |
| 3.50 | Dry | --- | --- | --- |
| Refill | 2.00 | --- | --- | --- |
| 9.00 | 2.90 | 0.90 | 0.83 | 72 |
| 5.00 | 3.30 | 0.40 | 1.04 | 58 |
| 2.00 | 3.40 | 0.10 | 1.67 | 36 |
| 5.00 | Dry | --- | --- | --- |
| Refill | 1.55 | --- | --- | --- |
| 4.00 | 1.80 | 0.25 | 1.33 | 45 |
| 3.00 | 3.00 | 1.20 | 0.21 | 288 |
| 2.00 | 3.55 | 0.55 | 0.30 | 198 |
| 4.50 | Dry | --- | --- | --- |

DRAFT

## PERCOLATION TEST RESULTS

**PROJECT: Phillips 66 Unit Crude Train Facility**

**DATE DRILLED: 07/09/2013** **DATE TESTED: 07/09/2013**

**TESTED BY: JK** **DIAMETER: 8 inches**

**PERCOLATION TEST LOCATION: E** **DEPTH: 5.0 Feet**

**CONSTANT HEAD DATA:** Time = 10 min Volume = 13 gal Rate = 78 gal/hr

| INTERVAL (minutes) | READING (feet) | FALL (feet) | INFILTRATION RATE (min/inch) | INFILTRATION RATE (inches/hr) |
|---|---|---|---|---|
| 0.00 | 1.70 | --- | --- | --- |
| 0.50 | 2.00 | 0.30 | 0.14 | 432 |
| 0.50 | 2.20 | 0.20 | 0.21 | 288 |
| 0.50 | 2.30 | 0.10 | 0.42 | 144 |
| 0.50 | 2.45 | 0.15 | 0.28 | 216 |
| 0.50 | 2.55 | 0.10 | 0.42 | 144 |
| 1.00 | 2.70 | 0.15 | 0.56 | 108 |
| 1.00 | 2.90 | 0.20 | 0.42 | 144 |
| 0.50 | 3.30 | 0.40 | 0.10 | 576 |
| 0.50 | 3.40 | 0.10 | 0.42 | 144 |
| 0.50 | 3.50 | 0.10 | 0.42 | 144 |
| 0.50 | 3.55 | 0.05 | 0.83 | 72 |
| 1.50 | 3.70 | 0.15 | 0.83 | 72 |
| 1.00 | 3.90 | 0.20 | 0.42 | 144 |
| 1.50 | 4.20 | 0.30 | 0.42 | 144 |
| 2.00 | 4.40 | 0.20 | 0.83 | 72 |
| 4.00 | Dry | --- | --- | --- |
| Refill | 1.60 | --- | --- | --- |
| 1.00 | 2.25 | 0.65 | 0.13 | 468 |
| 1.00 | 2.60 | 0.35 | 0.24 | 252 |
| 1.00 | 2.90 | 0.30 | 0.28 | 216 |
| 1.00 | 3.60 | 0.70 | 0.12 | 504 |
| 1.00 | 3.90 | 0.30 | 0.28 | 216 |
| 1.00 | 4.10 | 0.20 | 0.42 | 144 |
| 1.00 | 4.25 | 0.15 | 0.56 | 108 |
| 1.00 | 4.40 | 0.15 | 0.56 | 108 |
| 1.00 | 4.50 | 0.10 | 0.83 | 72 |
| 2.00 | 4.65 | 0.15 | 1.11 | 54 |
| 3.00 | Dry | --- | --- | --- |

## PERCOLATION TEST RESULTS

**PROJECT: Phillips 66 Unit Crude Train Facility**

**DATE DRILLED: 07/09/2013** **DATE TESTED: 07/09/2013**

**TESTED BY: JK** **DIAMETER: 8 inches**

**PERCOLATION TEST LOCATION: F** **DEPTH: 3.0 Feet**

**CONSTANT HEAD DATA:** Time = 10 min Volume = 5 gal Rate = 30 gal/hr

| INTERVAL (minutes) | READING (feet) | FALL (feet) | INFILTRATION RATE (min/inch) | INFILTRATION RATE (inches/hr) |
|---|---|---|---|---|
| 0.00 | 1.30 | --- | --- | --- |
| 1.00 | 1.50 | 0.20 | 0.42 | 144 |
| 1.00 | 2.00 | 0.50 | 0.17 | 360 |
| 2.00 | 2.70 | 0.70 | 0.24 | 252 |
| 1.50 | Dry | --- | --- | --- |
| Refill | 1.40 | --- | --- | --- |
| 0.50 | 1.50 | 0.10 | 0.42 | 144 |
| 1.00 | 1.90 | 0.40 | 0.21 | 288 |
| 1.50 | 2.30 | 0.40 | 0.31 | 192 |
| 2.50 | 2.90 | 0.60 | 0.35 | 173 |
| 0.50 | Dry | --- | --- | --- |
| Refill | 1.30 | --- | --- | --- |
| 1.00 | 1.45 | 0.15 | 0.56 | 108 |
| 1.00 | 1.60 | 0.15 | 0.56 | 108 |
| 0.50 | 1.90 | 0.30 | 0.14 | 432 |
| 2.50 | 2.40 | 0.50 | 0.42 | 144 |
| 0.50 | 2.60 | 0.20 | 0.21 | 288 |
| 1.50 | 2.90 | 0.30 | 0.42 | 144 |
| 2.00 | Dry | --- | --- | --- |

DRAFT

## PERCOLATION TEST RESULTS

**PROJECT: Phillips 66 Unit Crude Train Facility**

**DATE DRILLED: 07/09/2013** **DATE TESTED: 07/09/2013**

**TESTED BY: JK** **DIAMETER: 8 inches**

**PERCOLATION TEST LOCATION: G** **DEPTH: 4.0 Feet**

**CONSTANT HEAD DATA:** Time = 10 min Volume = 5 gal Rate = 30 gal/hr

| INTERVAL (minutes) | READING (feet) | FALL (feet) | INFILTRATION RATE (min/inch) | INFILTRATION RATE (inches/hr) |
|---|---|---|---|---|
| 0.00 | 1.90 | --- | --- | --- |
| 0.50 | 2.45 | 0.55 | 0.08 | 792 |
| 0.50 | 2.80 | 0.35 | 0.12 | 504 |
| 1.00 | Dry | --- | --- | --- |
| Refill | 1.10 | --- | --- | --- |
| 0.50 | 1.60 | 0.50 | 0.08 | 720 |
| 0.50 | 1.90 | 0.30 | 0.14 | 432 |
| 0.50 | 2.40 | 0.50 | 0.08 | 720 |
| 0.50 | 2.70 | 0.30 | 0.14 | 432 |
| 2.00 | 3.20 | 0.50 | 0.33 | 180 |
| 0.50 | Dry | --- | --- | --- |
| Refill | 0.80 | --- | --- | --- |
| 1.00 | 1.50 | 0.70 | 0.12 | 504 |
| 2.00 | 2.60 | 1.10 | 0.15 | 396 |
| 0.50 | 2.75 | 0.15 | 0.28 | 216 |
| 2.00 | 3.10 | 0.35 | 0.48 | 126 |
| 1.00 | Dry | --- | --- | --- |

## PERCOLATION TEST RESULTS

**PROJECT: Phillips 66 Unit Crude Train Facility**

**DATE DRILLED: 07/09/2013** **DATE TESTED: 07/09/2013**

**TESTED BY: JK** **DIAMETER: 8 inches**

**PERCOLATION TEST LOCATION: H** **DEPTH: 5.0 Feet**

**CONSTANT HEAD DATA:** Time = 10 min Volume = 12 gal Rate = 72 gal/min

| INTERVAL (minutes) | READING (feet) | FALL (feet) | INFILTRATION RATE (min/inch) | INFILTRATION RATE (inches/hr) |
|---|---|---|---|---|
| 0.00 | 2.50 | --- | --- | --- |
| 0.50 | 3.00 | 0.50 | 0.08 | 720 |
| 0.50 | 3.35 | 0.35 | 0.12 | 504 |
| 0.50 | 3.65 | 0.30 | 0.14 | 432 |
| 0.50 | 3.90 | 0.25 | 0.17 | 360 |
| 0.50 | 4.10 | 0.20 | 0.21 | 288 |
| 0.50 | 4.25 | 0.15 | 0.28 | 216 |
| 1.00 | 4.40 | 0.15 | 0.56 | 108 |
| 0.50 | 4.50 | 0.10 | 0.42 | 144 |
| 1.00 | Dry | --- | --- | --- |
| Refill | 2.50 | --- | --- | --- |
| 0.50 | 2.90 | 0.40 | 0.10 | 576 |
| 0.50 | 3.25 | 0.35 | 0.12 | 504 |
| 0.50 | 3.55 | 0.30 | 0.14 | 432 |
| 0.50 | 3.80 | 0.25 | 0.17 | 360 |
| 1.50 | 4.20 | 0.40 | 0.31 | 192 |
| 1.50 | 4.50 | 0.30 | 0.42 | 144 |
| 1.00 | Dry | --- | --- | --- |

## PERCOLATION TEST RESULTS

**PROJECT: Phillips 66 Unit Crude Train Facility**

**DATE DRILLED: 07/09/2013** **DATE TESTED: 07/09/2013**

**TESTED BY: JK** **DIAMETER: 8 inches**

**PERCOLATION TEST LOCATION: I** **DEPTH: 15.0 Feet**

**CONSTANT HEAD DATA:** Time = 10 min Volume = 9 gal Rate = 54 gal/min

| INTERVAL (minutes) | READING (feet) | FALL (feet) | INFILTRATION RATE (min/inch) | INFILTRATION RATE (inches/hr) |
|---|---|---|---|---|
| 0.00 | 11.80 | --- | --- | --- |
| 0.50 | 12.40 | 0.60 | 0.07 | 864 |
| 0.50 | 12.70 | 0.30 | 0.14 | 432 |
| 0.50 | 12.95 | 0.25 | 0.17 | 360 |
| 0.50 | 13.10 | 0.15 | 0.28 | 216 |
| 0.50 | 13.20 | 0.10 | 0.42 | 144 |
| 0.50 | 13.35 | 0.15 | 0.28 | 216 |
| 0.50 | 13.45 | 0.10 | 0.42 | 144 |
| 0.50 | 13.55 | 0.10 | 0.42 | 144 |
| 0.50 | 13.65 | 0.10 | 0.42 | 144 |
| 0.50 | 13.70 | 0.05 | 0.83 | 72 |
| 0.50 | 13.73 | 0.03 | 1.39 | 43 |
| 0.50 | 13.80 | 0.07 | 0.60 | 101 |
| 0.50 | 13.90 | 0.10 | 0.42 | 144 |
| 0.50 | 13.95 | 0.05 | 0.83 | 72 |
| 0.50 | 14.00 | 0.05 | 0.83 | 72 |
| 0.50 | 14.05 | 0.05 | 0.83 | 72 |
| 0.50 | 14.10 | 0.05 | 0.83 | 72 |
| 0.50 | 14.12 | 0.02 | 2.08 | 29 |
| 0.50 | 14.15 | 0.03 | 1.39 | 43 |
| 0.50 | 14.18 | 0.03 | 1.39 | 43 |
| 0.50 | Dry | --- | --- | --- |
| Refill | 11.30 | --- | --- | --- |
| 0.50 | 11.90 | 0.60 | 0.07 | 864 |
| 0.50 | 12.20 | 0.30 | 0.14 | 432 |
| 0.50 | 12.45 | 0.25 | 0.17 | 360 |
| 0.50 | 12.65 | 0.20 | 0.21 | 288 |
| 0.50 | 12.80 | 0.15 | 0.28 | 216 |
| 0.50 | 12.90 | 0.10 | 0.42 | 144 |
| 0.50 | 13.00 | 0.10 | 0.42 | 144 |
| 0.50 | 13.05 | 0.05 | 0.83 | 72 |
| 0.50 | 13.10 | 0.05 | 0.83 | 72 |
| 0.50 | 13.17 | 0.07 | 0.60 | 101 |
| 0.50 | 13.20 | 0.03 | 1.39 | 43 |
| 0.50 | 13.26 | 0.06 | 0.69 | 86 |
| 0.50 | 13.30 | 0.04 | 1.04 | 58 |
| 0.50 | 13.35 | 0.05 | 0.83 | 72 |
| 0.50 | 13.40 | 0.05 | 0.83 | 72 |
| 0.50 | 13.45 | 0.05 | 0.83 | 72 |
| 0.50 | 13.47 | 0.02 | 2.08 | 29 |
| 0.50 | 13.49 | 0.02 | 2.08 | 29 |
| 0.50 | 13.52 | 0.03 | 1.39 | 43 |
| 0.50 | 13.55 | 0.03 | 1.39 | 43 |
| 0.50 | 13.57 | 0.02 | 2.08 | 29 |
| 0.50 | 13.60 | 0.03 | 1.39 | 43 |
| 0.50 | 13.62 | 0.02 | 2.08 | 29 |
| 0.50 | 13.65 | 0.03 | 1.39 | 43 |
| 2.00 | 13.72 | 0.07 | 2.38 | 25 |
| 2.00 | 13.80 | 0.08 | 2.08 | 29 |
| 2.00 | 13.85 | 0.20 | 0.83 | 72 |

## PERCOLATION TEST RESULTS

**PROJECT: Phillips 66 Unit Crude Train Facility**

**DATE DRILLED: 07/09/2013** **DATE TESTED: 07/09/2013**

**TESTED BY: JK** **DIAMETER: 8 inches**

**PERCOLATION TEST LOCATION: I** **DEPTH: 15.0 Feet**

| INTERVAL (minutes) | READING (feet) | FALL (feet) | INFILTRATION RATE (min/inch) | INFILTRATION RATE (inches/hr) |
|---|---|---|---|---|
| 2.00 | 14.03 | 0.18 | 0.93 | 65 |
| 2.00 | 14.16 | 0.13 | 1.28 | 47 |
| 2.00 | 14.27 | 0.11 | 1.52 | 40 |
| 2.00 | Dry | --- | --- | --- |
| Refill | 11.75 | --- | --- | --- |
| 2.00 | 11.88 | 0.13 | 1.28 | 47 |
| 2.00 | 11.94 | 0.06 | 2.78 | 22 |
| 2.00 | 12.02 | 0.08 | 2.08 | 29 |
| 2.00 | 12.09 | 0.07 | 2.38 | 25 |
| 2.00 | 12.16 | 0.07 | 2.38 | 25 |
| 2.00 | 12.22 | 0.06 | 2.78 | 22 |
| 2.00 | 12.27 | 0.05 | 3.33 | 18 |
| 2.00 | 12.35 | 0.08 | 2.08 | 29 |
| 2.00 | 12.40 | 0.05 | 3.33 | 18 |
| 2.00 | 12.48 | 0.08 | 2.08 | 29 |
| 2.00 | 12.52 | 0.04 | 4.17 | 14 |
| 2.00 | 12.58 | 0.06 | 2.78 | 22 |

# APPENDIX C

Geotechnical Laboratory Test Results
Soil Corrosivity Analysis and Test Results (by CERCO Analytical)

Phillips 66 Unit Crude Train Facility SL-15825-SE

## BULK DENSITY TEST RESULTS

**ASTM D 2937-10 (modified for ring liners)**

August 2, 2013

| BORING NO. | DEPTH feet | MOISTURE CONTENT, % | WET DENSITY, pcf | DRY DENSITY, pcf |
|---|---|---|---|---|
| 1 | 26.0 - 26.5 | 4.7 | 105.3 | 100.5 |
| 1 | 36.0 - 36.5 | 13.8 | 119.1 | 104.7 |
| 2 | 6.0 - 6.5 | 0.9 | 110.6 | 109.6 |
| 2 | 16.0 - 16.5 | 5.7 | 107.9 | 102.1 |
| 2 | 26.0 - 26.5 | 6.6 | 105.8 | 99.2 |
| 2 | 36.0 - 36.5 | 19.6 | 126.1 | 105.5 |
| 3 | 6.0 - 6.5 | 1.3 | 102.8 | 101.5 |
| 3 | 11.0 - 11.5 | 3.4 | 107.7 | 104.2 |
| 3 | 21.0 - 21.5 | 5.2 | 100.0 | 95.1 |
| 3 | 31.0 - 31.5 | 4.7 | 102.7 | 98.1 |
| 4 | 11.0 - 11.5 | 5.1 | 106.7 | 101.6 |
| 4 | 21.0 - 21.5 | 4.4 | 104.8 | 100.4 |
| 4 | 31.0 - 31.5 | 4.1 | 104.2 | 100.1 |
| 4 | 41.0 - 41.5 | 17.0 | 129.5 | 110.7 |
| 5 | 8.5 - 9.0 | 2.2 | 103.9 | 101.6 |
| 5 | 16.0 - 16.5 | 2.4 | 101.3 | 98.9 |
| 6 | 6.0 - 6.5 | 3.2 | 102.2 | 99.0 |
| 6 | 11.0 - 11.5 | 3.7 | 101.0 | 97.5 |
| 6 | 16.0 - 16.5 | 2.2 | 104.1 | 101.8 |
| 7 | 6.0 - 6.5 | 2.8 | 102.2 | 99.5 |
| 7 | 11.0 - 11.5 | 2.8 | 100.9 | 98.1 |
| 7 | 16.0 - 16.5 | 3.7 | 101.6 | 98.0 |
| 8 | 6.0 - 6.5 | 4.8 | 103.9 | 99.1 |
| 8 | 11.0 - 11.5 | 3.8 | 104.9 | 101.1 |
| 8 | 16.0 - 16.5 | 5.3 | 104.5 | 99.3 |
| 9 | 6.0 - 6.5 | 4.0 | 101.6 | 97.7 |
| 9 | 11.0 - 11.5 | 5.2 | 102.6 | 97.5 |
| 9 | 16.0 - 16.5 | 5.9 | 100.7 | 95.1 |
| 10 | 6.0 - 6.5 | 3.0 | 99.4 | 96.5 |
| 10 | 11.0 - 11.5 | 3.0 | 103.3 | 100.4 |

Phillips 66 Unit Crude Train Facility SL-15825-SE

## BULK DENSITY TEST RESULTS

**ASTM D 2937-10 (modified for ring liners)**

August 2, 2013

| BORING NO. | DEPTH feet | MOISTURE CONTENT, % | WET DENSITY, pcf | DRY DENSITY, pcf |
|---|---|---|---|---|
| 10 | 16.0 - 16.5 | 2.7 | 105.2 | 102.4 |
| 11 | 6.0 - 6.5 | 2.9 | 101.8 | 98.9 |
| 11 | 11.0 - 11.5 | 2.7 | 99.6 | 97.0 |
| 11 | 16.0 - 16.5 | 3.2 | 101.1 | 98.0 |
| 12 | 6.0 - 6.5 | 4.8 | 103.3 | 98.6 |
| 12 | 11.0 - 11.5 | 4.8 | 102.2 | 97.6 |
| 12 | 16.0 - 16.5 | 5.9 | 101.4 | 95.7 |
| 13 | 6.0 - 6.5 | 2.2 | 101.8 | 99.6 |
| 13 | 11.0 - 11.5 | 2.5 | 101.0 | 98.5 |
| 13 | 16.0 - 16.5 | 2.3 | 98.0 | 95.7 |
| 14 | 6.0 - 6.5 | 2.8 | 103.2 | 100.4 |
| 14 | 16.0 - 16.5 | 2.8 | 104.2 | 101.3 |
| 14 | 26.0 - 26.5 | 4.1 | 105.0 | 100.9 |

Phillips 66 Unit Crude Train Facility SL-15825-SE

## MOISTURE-DENSITY COMPACTION TEST

**ASTM D 1557-12**

PROCEDURE USED: A

August 2, 2013

PREPARATION METHOD: Moist

Boring #5 @ 8.0 - 12.0'

RAMMER TYPE: Mechanical

Light Brown to Red Brown Poorly Graded Sand with Silt (SP-SM)

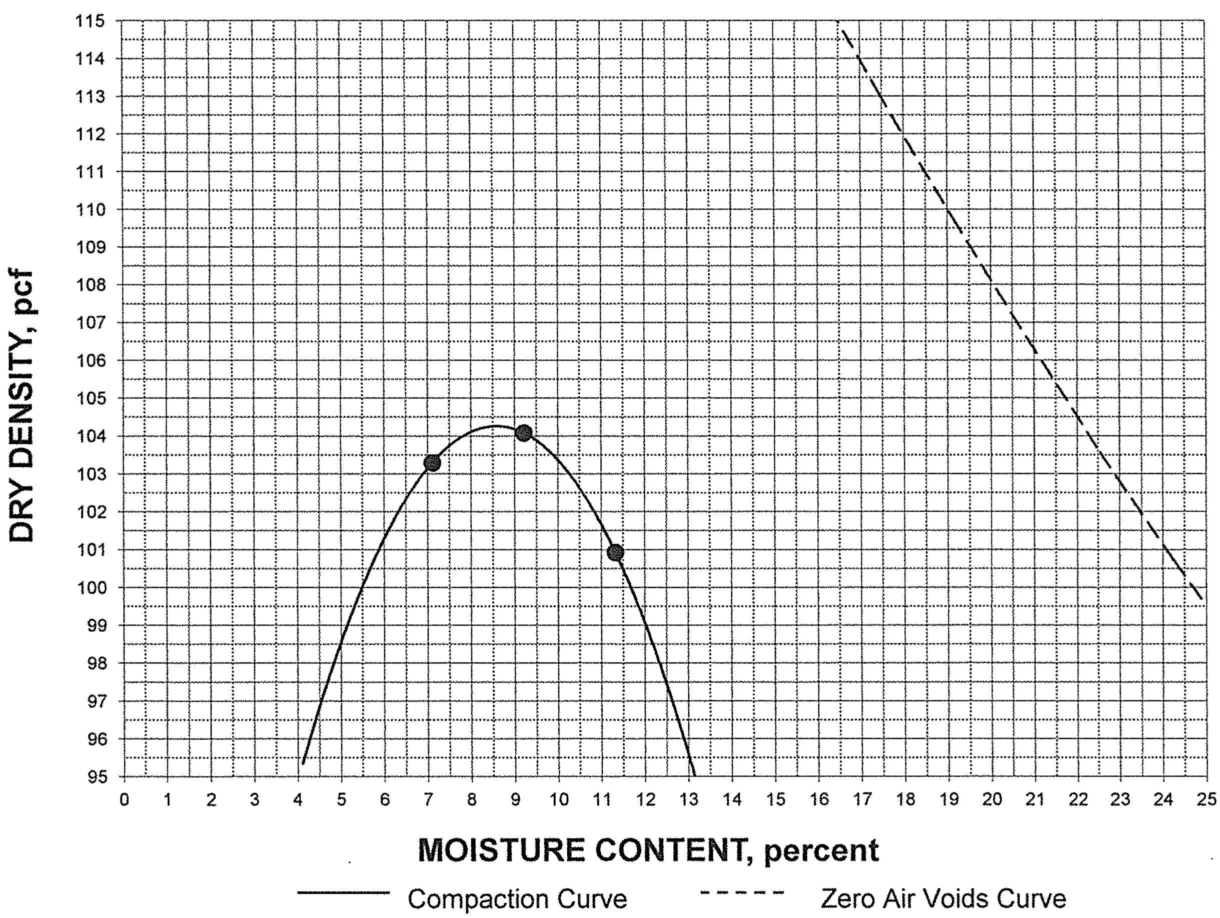
SPECIFIC GRAVITY: 2.65 (assumed)

SIEVE DATA:

| Sieve Size | % Retained (Cumulative) |
|---|---|
| 3/4" | 0 |
| 3/8" | 0 |
| #4 | 0 |

**MAXIMUM DRY DENSITY: 104.3 pcf**

**OPTIMUM MOISTURE: 8.6%**



Phillips 66 Unit Crude Train Facility SL-15825-SE

## MOISTURE-DENSITY COMPACTION TEST

**ASTM D 1557-12**

PROCEDURE USED: A

PREPARATION METHOD: Moist

RAMMER TYPE: Mechanical

SPECIFIC GRAVITY: 2.65 (assumed)

August 2, 2013

Boring #7 @ 0.0 - 1.5'

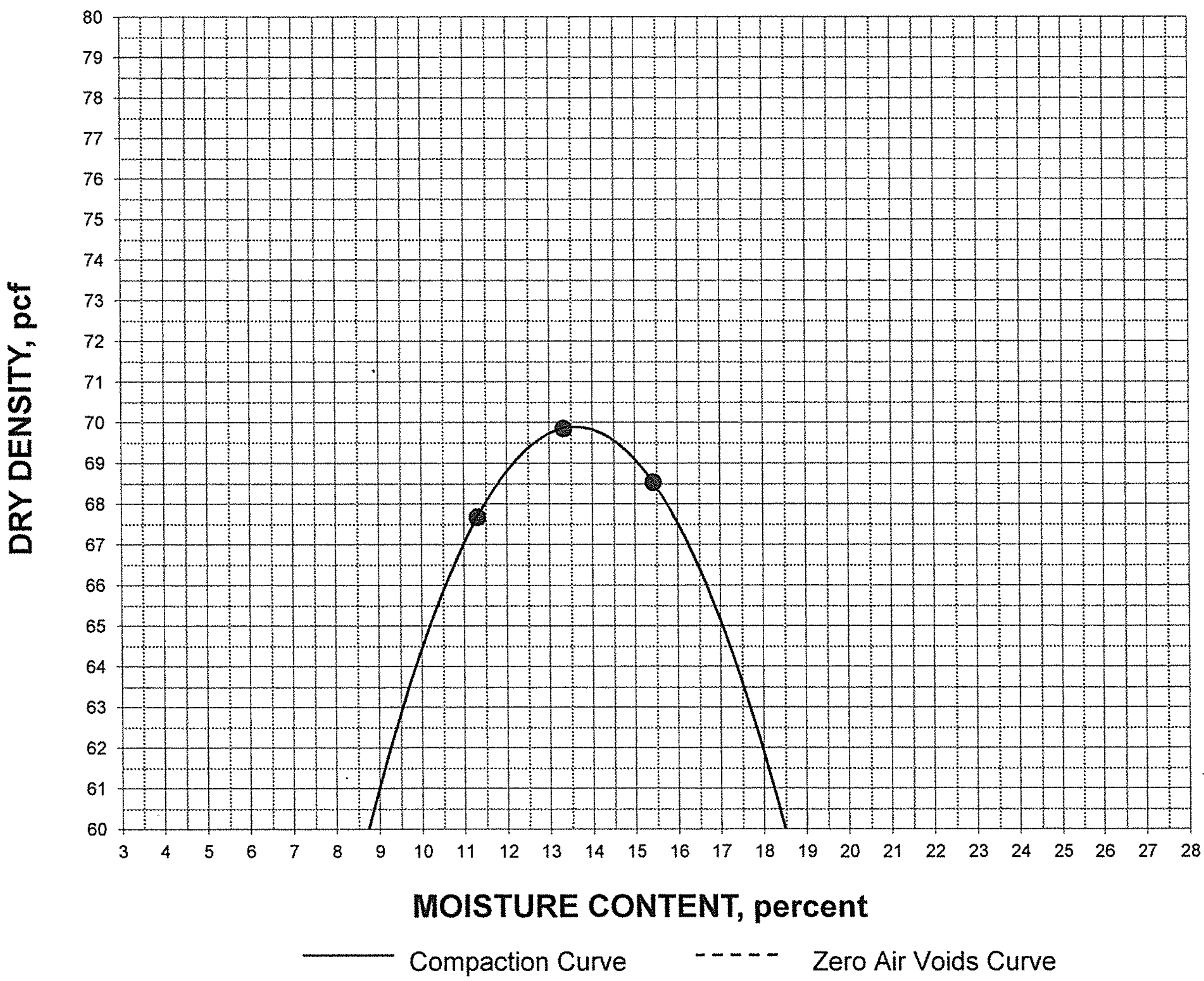
Black Coke [Poorly Graded Sand (SP)]

SIEVE DATA:

| Sieve Size | % Retained (Cumulative) |
|---|---|
| 3/4" | 0 |
| 3/8" | 0 |
| #4 | 12 |

**MAXIMUM DRY DENSITY: 69.9 pcf**

**OPTIMUM MOISTURE: 13.6%**



Phillips 66 Unit Crude Train Facility SL-15825-SE

## MOISTURE-DENSITY COMPACTION TEST

**ASTM D 1557-12**

PROCEDURE USED: A
August 2, 2013

PREPARATION METHOD: Moist
Boring #11 @ 0.0 - 6.0'

RAMMER TYPE: Mechanical
Blend of Coke and Dark Brown Poorly Graded Sand (SP)

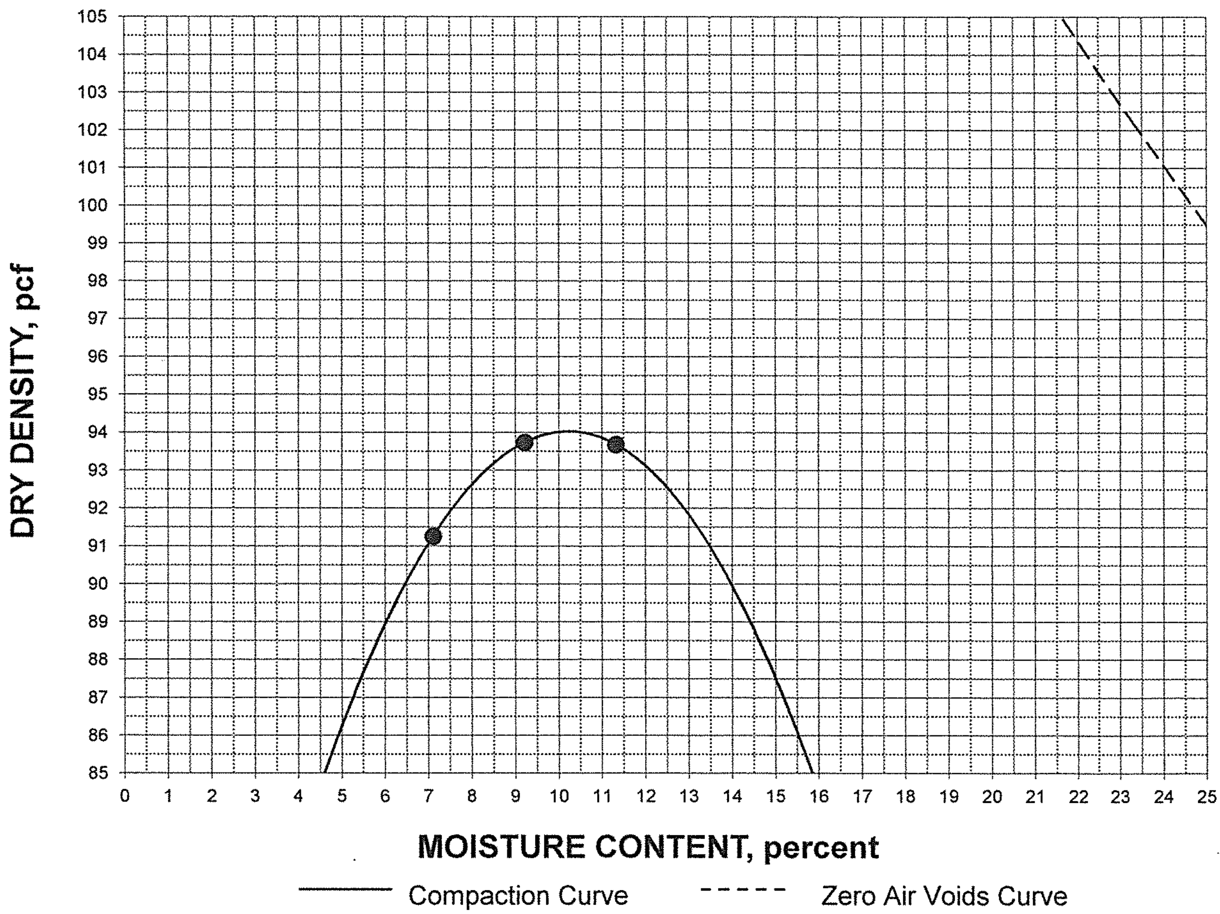
SPECIFIC GRAVITY: 2.65 (assumed)

SIEVE DATA:

| Sieve Size | % Retained (Cumulative) |
|---|---|
| 3/4" | 0 |
| 3/8" | 0 |
| #4 | 2 |

**MAXIMUM DRY DENSITY: 94.0 pcf**

**OPTIMUM MOISTURE: 10.2%**



Phillips 66 Unit Crude Train Facility SL-15825-SE

## PARTICLE SIZE ANALYSIS

**ASTM D 422-63/07**

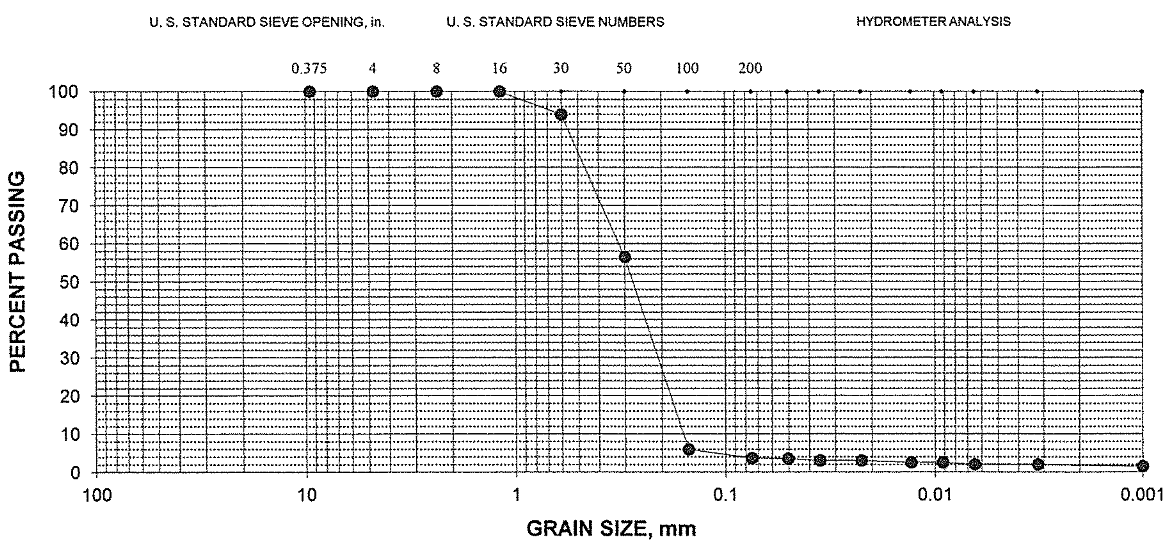
Boring #1 @ 11.0 - 11.5' August 2, 2013

**Poorly Graded Sand (SP)**

Specific Gravity = 2.65 (assumed)

Gravel = 0%; Sand = 96%; Silt = 2%; Clay = 2%

| Sieve size | % Retained | % Passing |
|---|---|---|
| 3/8" (9.5-mm) | 0 | 100 |
| #4 (4.75-mm) | 0 | 100 |
| #8 (2.36-mm) | 0 | 100 |
| #16 (1.18-mm) | 0 | 100 |
| #30 (600-µm) | 6 | 94 |
| #50 (300-µm) | 44 | 56 |
| #100 (150-µm) | 94 | 6 |
| #200 (75-µm) | 96 | 4 |
| **Hydrometer Analysis** | | |
| 50-µm | | 4 |
| 36-µm | | 3 |
| 23-µm | | 3 |
| 13-µm | | 3 |
| 9-µm | | 3 |
| 6.5-µm | | 2 |
| 3.2-µm | | 2 |
| Colloids | | 2 |



Phillips 66 Unit Crude Train Facility SL-15825-SE

# PARTICLE SIZE ANALYSIS

**ASTM D 422-63/07**

Boring #5 @ 10.0 - 11.5'

August 2, 2013

**Poorly Graded Sand with Silt (SP-SM)**

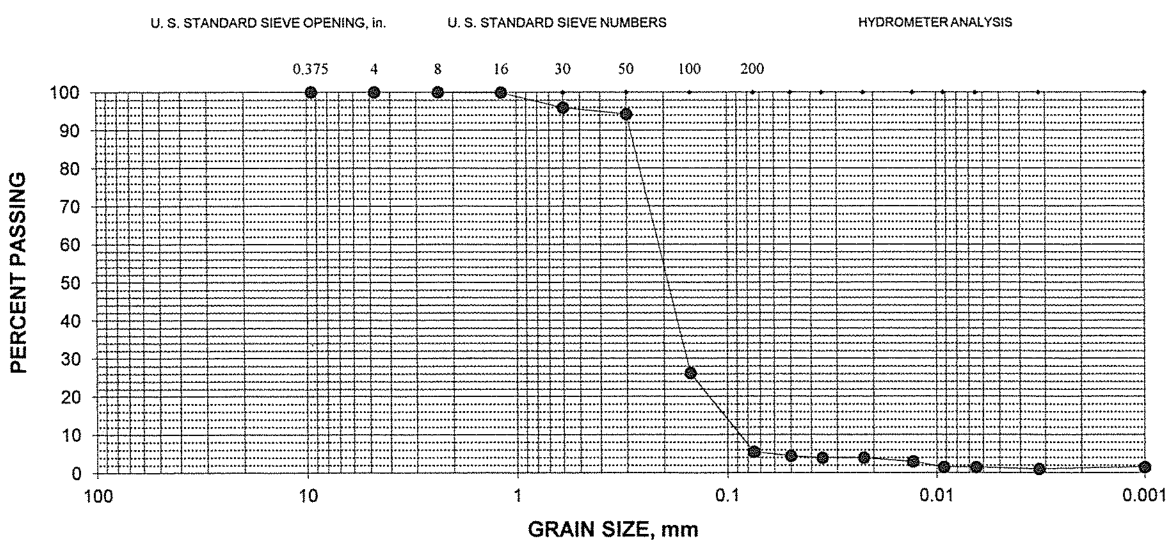
Specific Gravity = 2.65 (assumed)

Gravel = 0%; Sand = 95%; Silt = 4%; Clay = 1%

Cu = 2.4; Cc = 1.3

| Sieve size | % Retained | % Passing |
|---|---|---|
| 3/8" (9.5-mm) | 0 | 100 |
| #4 (4.75-mm) | 0 | 100 |
| #8 (2.36-mm) | 0 | 100 |
| #16 (1.18-mm) | 0 | 100 |
| #30 (600-µm) | 4 | 96 |
| #50 (300-µm) | 6 | 94 |
| #100 (150-µm) | 74 | 26 |
| #200 (75-µm) | 95 | 5 |

| Hydrometer Analysis | |
|---|---|
| 50-µm | 4 |
| 35-µm | 4 |
| 22-µm | 4 |
| 13-µm | 3 |
| 9-µm | 1 |
| 6.5-µm | 1 |
| 3.2-µm | 1 |
| Colloids | 1 |



Phillips 66 Unit Crude Train Facility SL-15825-SE

## PARTICLE SIZE ANALYSIS

**ASTM D 422-63/07**

Boring #6 @ 6.0 - 6.5'

August 2, 2013

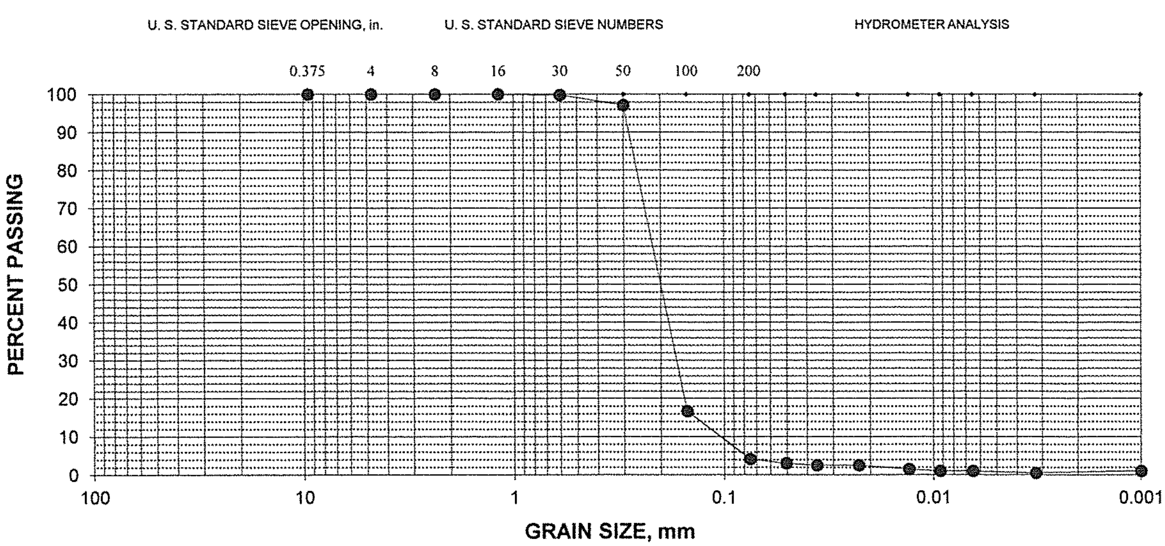
**Poorly Graded Sand (SP)**

Specific Gravity = 2.65 (assumed)

Gravel = 0%; Sand = 96%; Silt = 3%; Clay = 1%

Cu = 2.1; Cc = 1.3

| Sieve size | % Retained | % Passing |
|---|---|---|
| 3/8" (9.5-mm) | 0 | 100 |
| #4 (4.75-mm) | 0 | 100 |
| #8 (2.36-mm) | 0 | 100 |
| #16 (1.18-mm) | 0 | 100 |
| #30 (600-µm) | 0 | 100 |
| #50 (300-µm) | 3 | 97 |
| #100 (150-µm) | 83 | 17 |
| #200 (75-µm) | 96 | 4 |
| **Hydrometer Analysis** | | |
| 50-µm | | 3 |
| 36-µm | | 3 |
| 23-µm | | 3 |
| 13-µm | | 2 |
| 9-µm | | 1 |
| 6.5-µm | | 1 |
| 3.2-µm | | 1 |
| Colloids | | 1 |



Phillips 66 Unit Crude Train Facility SL-15825-SE

## PARTICLE SIZE ANALYSIS

**ASTM D 422-63/07**

Boring #11 @ 0.0 - 6.0' (Blend of Coke and Poorly Graded Sand) August 2, 2013

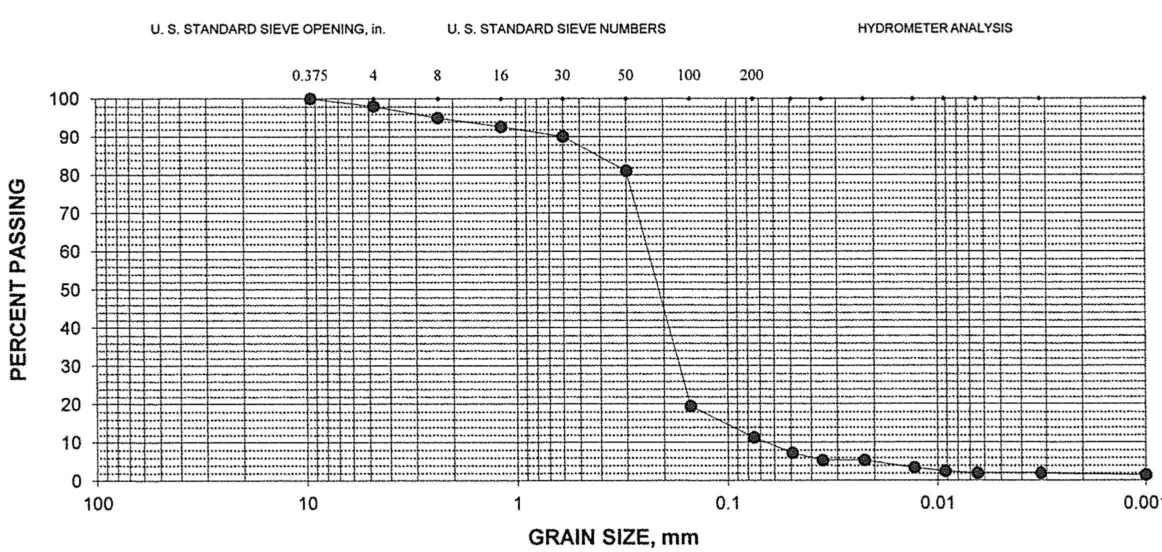
**Poorly Graded Sand with Silt (SP-SM)**

Specific Gravity = 2.65 (assumed)

Gravel = 2%; Sand = 87%; Silt = 9%; Clay = 2%

Cu = 3.6; Cc = 1.8

| Sieve size | % Retained | % Passing |
|---|---|---|
| 3/8" (9.5-mm) | 0 | 100 |
| #4 (4.75-mm) | 2 | 98 |
| #8 (2.36-mm) | 5 | 95 |
| #16 (1.18-mm) | 7 | 93 |
| #30 (600-µm) | 10 | 90 |
| #50 (300-µm) | 19 | 81 |
| #100 (150-µm) | 81 | 19 |
| #200 (75-µm) | 89 | 11 |
| **Hydrometer Analysis** | | |
| 49-µm | | 7 |
| 35-µm | | 5 |
| 22-µm | | 5 |
| 13-µm | | 3 |
| 9-µm | | 2 |
| 6.5-µm | | 2 |
| 3.2-µm | | 2 |
| Colloids | | 1 |



## CONSOLIDATION TEST

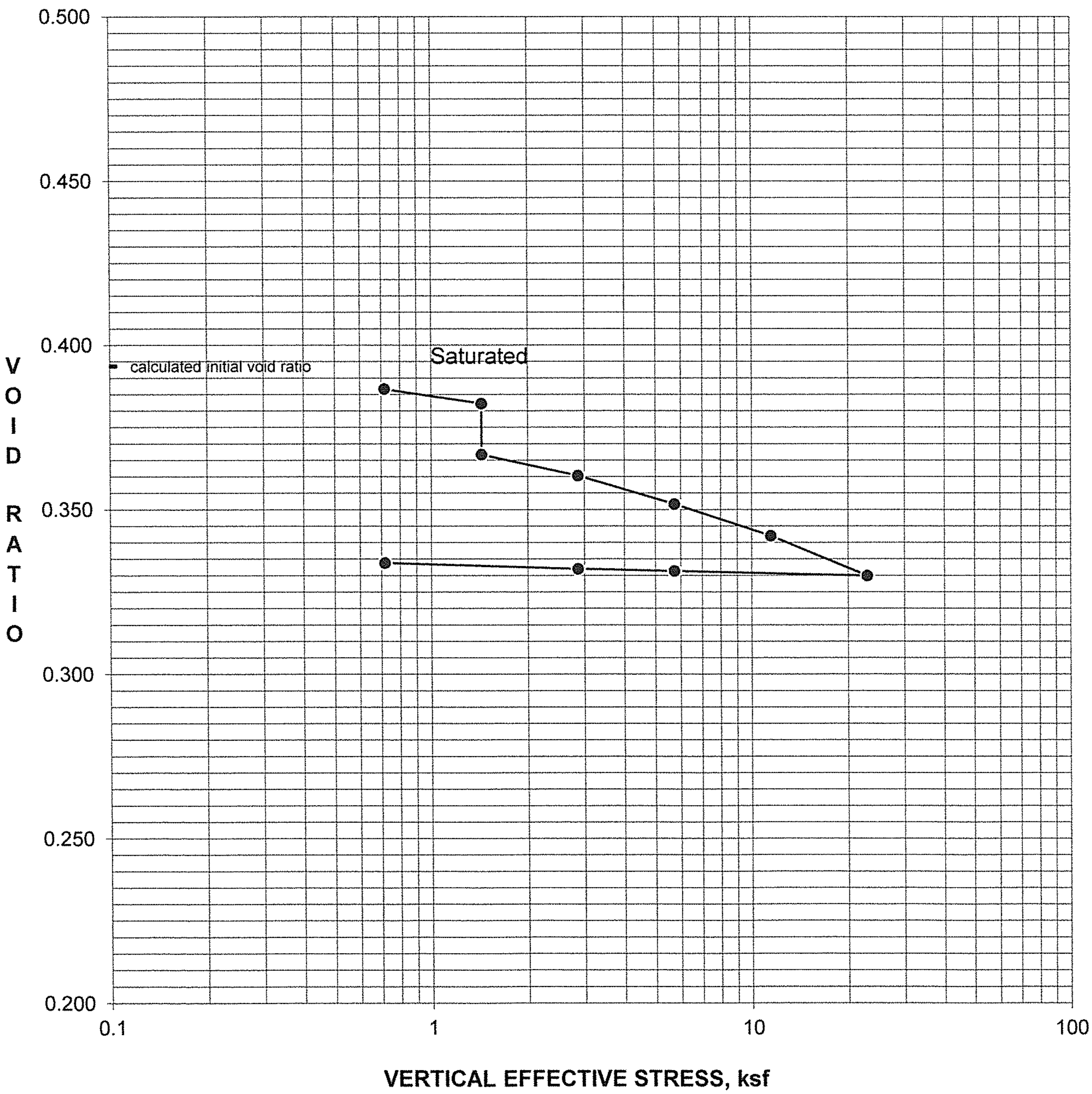
**ASTM D 2435/D2435M-11**

August 2, 2013

Boring #2 @ 6.0 - 6.5'
Poorly Graded Sand (SP)
Ring Sample

DRY DENSITY: 118.7 pcf
MOISTURE CONTENT: 0.9%
SPECIFIC GRAVITY: 2.65 (assumed)
INITIAL VOID RATIO: 0.394

### VOID RATIO vs. NORMAL PRESSURE DIAGRAM



# CONSOLIDATION TEST

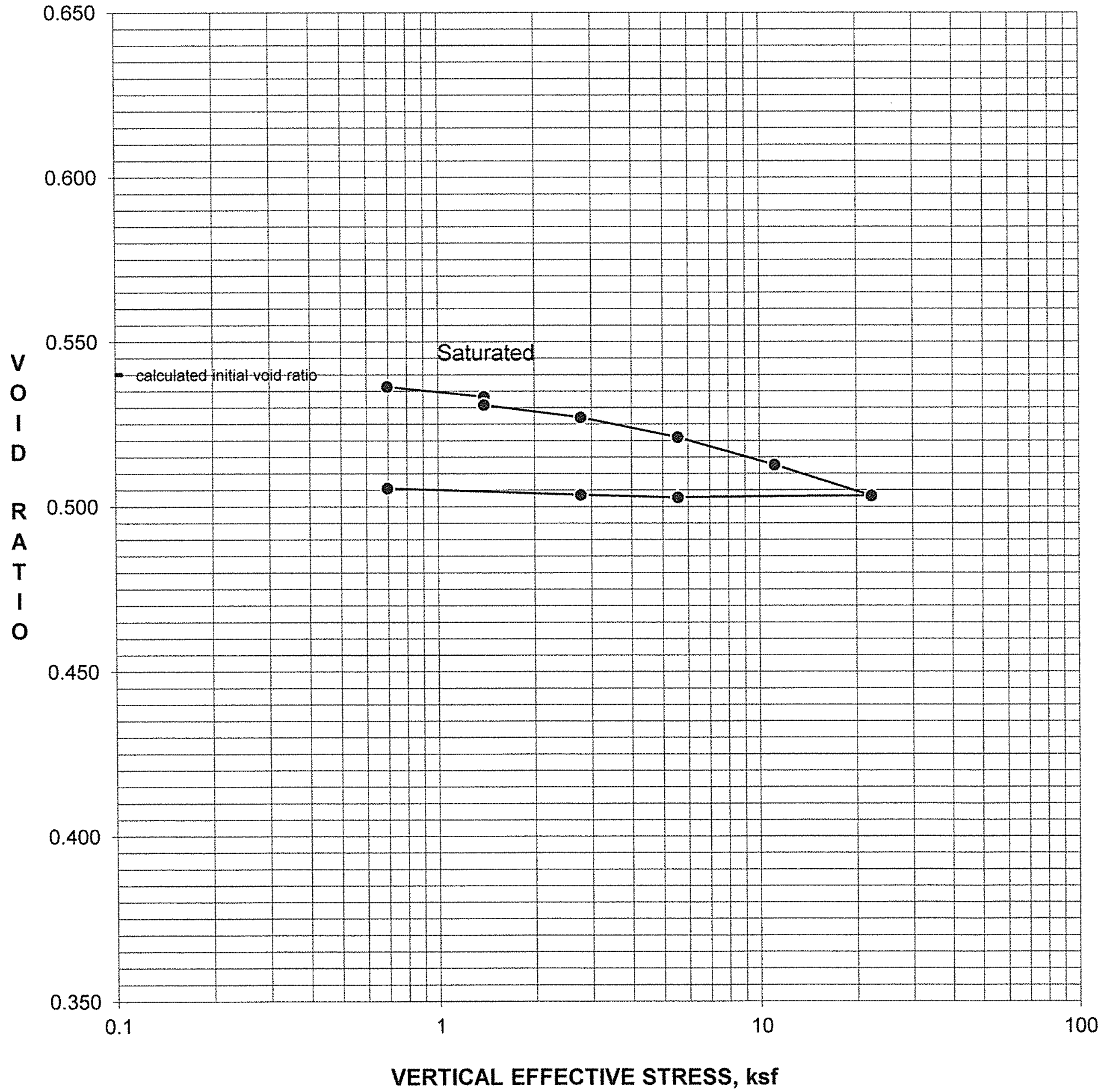
**ASTM D 2435/D2435M-11**

August 2, 2013

Boring #4 @ 11.0 - 11.5'
Poorly Graded Sand (SP)
Ring Sample

DRY DENSITY: 107.4 pcf
MOISTURE CONTENT: 5.1%
SPECIFIC GRAVITY: 2.65 (assumed)
INITIAL VOID RATIO: 0.540

## VOID RATIO vs. NORMAL PRESSURE DIAGRAM



# CONSOLIDATION TEST

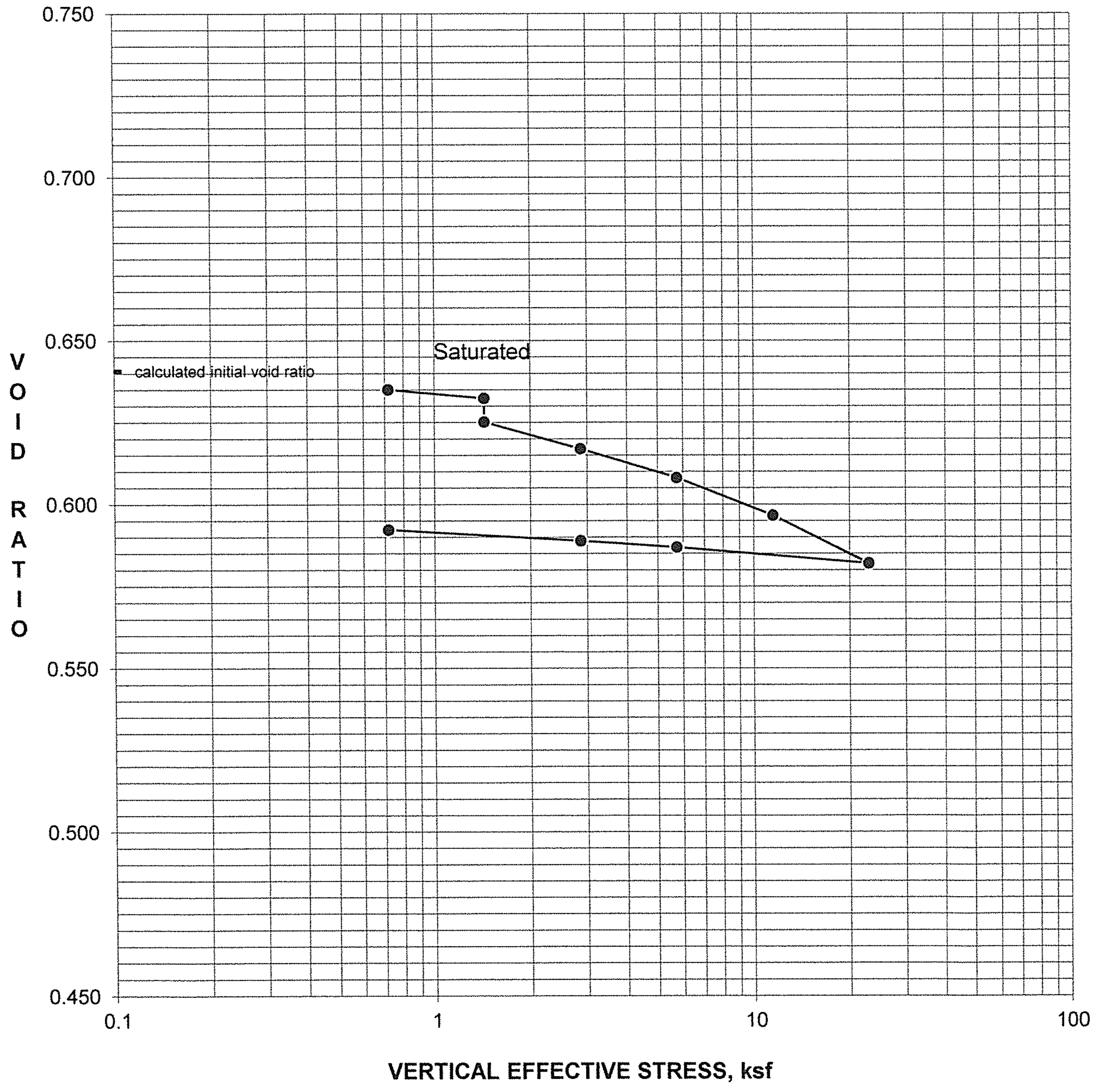
**ASTM D 2435/D2435M-11**

August 2, 2013

Boring #7 @ 16.0 - 16.5'
Poorly Graded Sand (SP)
Ring Sample

DRY DENSITY: 100.8 pcf
MOISTURE CONTENT: 3.7%
SPECIFIC GRAVITY: 2.65 (assumed)
INITIAL VOID RATIO: 0.641

## VOID RATIO vs. NORMAL PRESSURE DIAGRAM



Phillips 66 Unit Crude Train Facility DRAFT SL-15825-SE

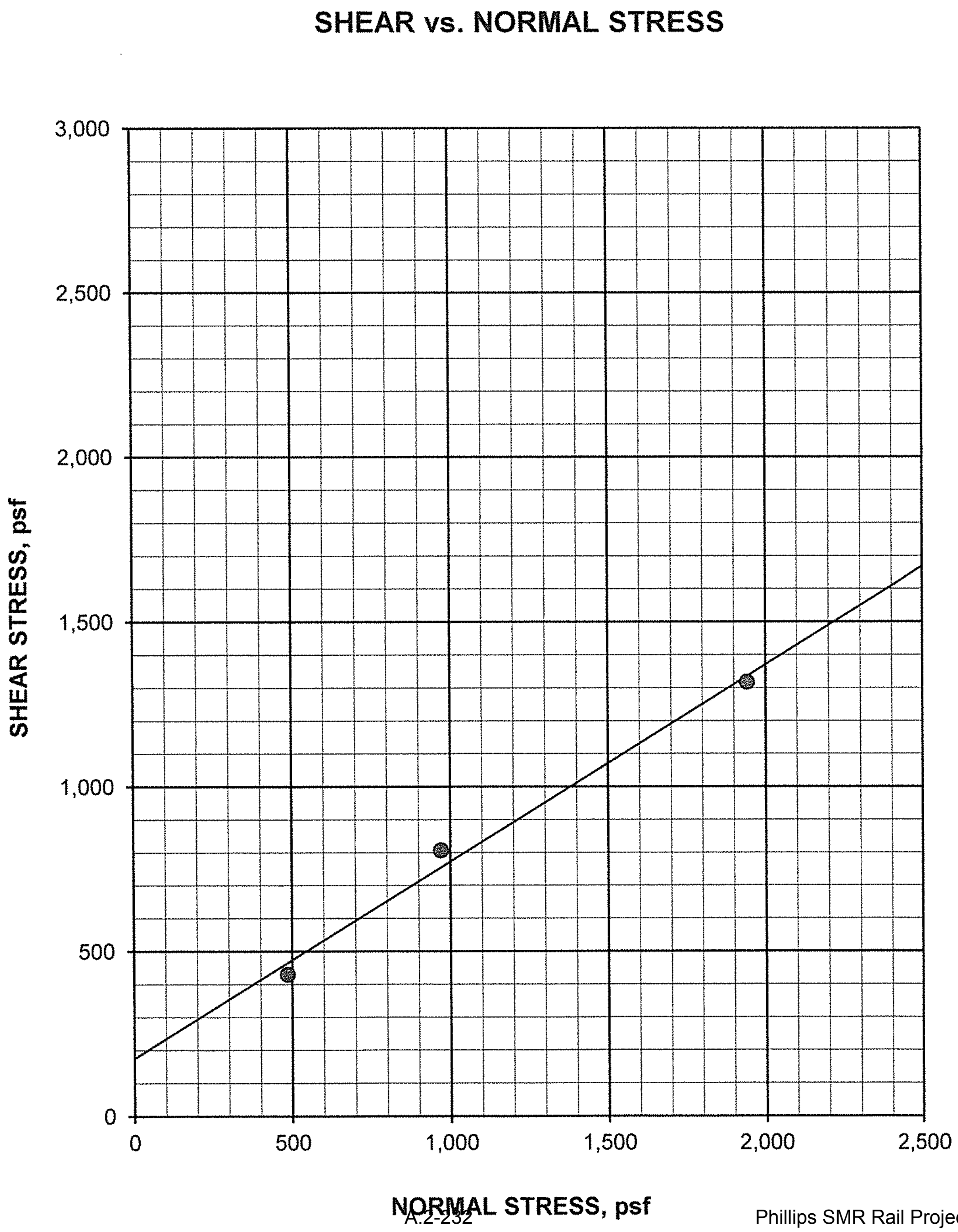
## DIRECT SHEAR

**ASTM D 3080/D3080M-11 (modified for consolidated, undrained conditions)**

August 2, 2013

Boring #6 @ 6.0 - 6.5'
Poorly Graded Sand with Silt (SP-SM)
Ring sample, saturated

INITIAL DRY DENSITY: 98.3 pcf
INITIAL MOISTURE CONTENT: 3.2 %
PEAK SHEAR ANGLE (Ø): 31°
COHESION (C): 175 psf



DRAFT

Phillips 66 Unit Crude Train Facility SL-15825-SE

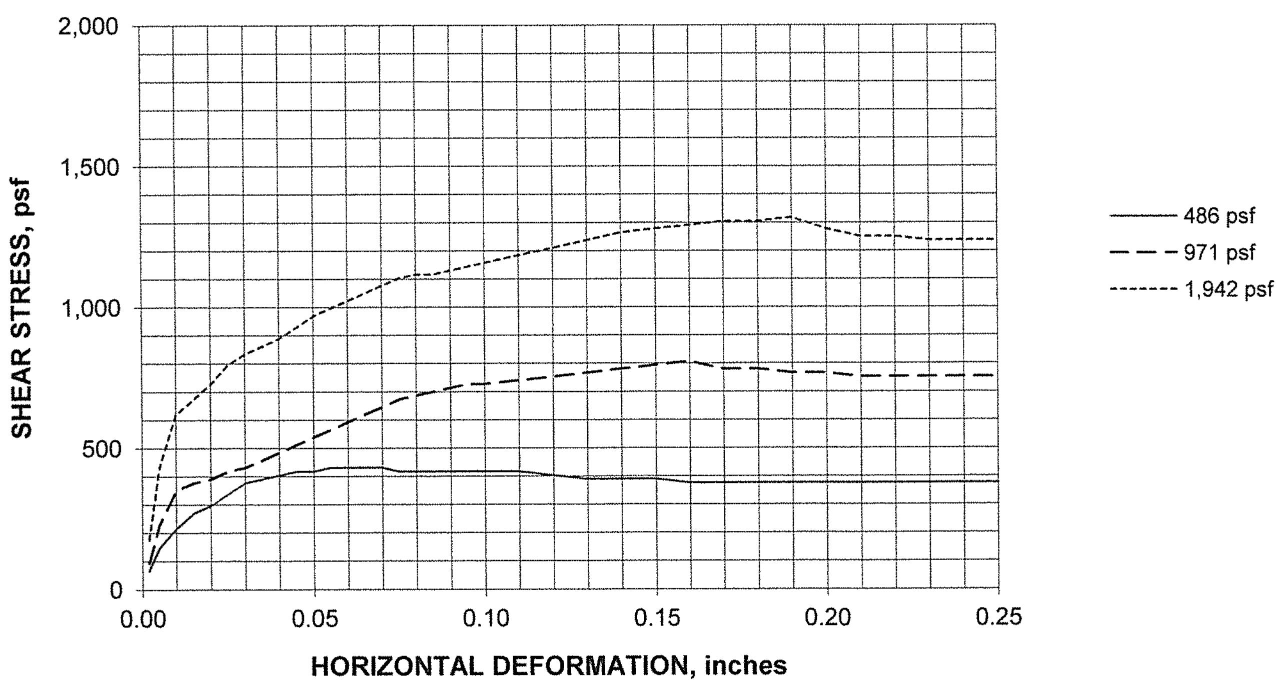
**DIRECT SHEAR continued** **ASTM D 3080/D3080M-11 (modified for consolidated, undrained conditions)**

Boring #6 @ 6.0 - 6.5' August 2, 2013

Poorly Graded Sand with Silt (SP-SM)

Ring sample, saturated SPECIFIC GRAVITY: 2.65 (assumed)

| SAMPLE NO.: | 1 | 2 | 3 | AVERAGE |
|---|---|---|---|---|
| **INITIAL** | | | | |
| WATER CONTENT, % | 3.2 | 3.2 | 3.2 | 3.2 |
| DRY DENSITY, pcf | 98.6 | 98.0 | 98.2 | 98.3 |
| SATURATION, % | 12.5 | 12.3 | 12.4 | 12.4 |
| VOID RATIO | 0.676 | 0.687 | 0.683 | 0.682 |
| DIAMETER, inches | 2.410 | 2.410 | 2.410 | |
| HEIGHT, inches | 1.00 | 1.00 | 1.00 | |
| **AT TEST** | | | | |
| WATER CONTENT, % | 25.7 | 26.0 | 25.7 | |
| DRY DENSITY, pcf | 98.6 | 98.3 | 98.9 | |
| SATURATION, % | 100.0 | 100.0 | 100.0 | |
| VOID RATIO | 0.676 | 0.682 | 0.671 | |
| HEIGHT, inches | 1.00 | 1.00 | 0.99 | |



DRAFT



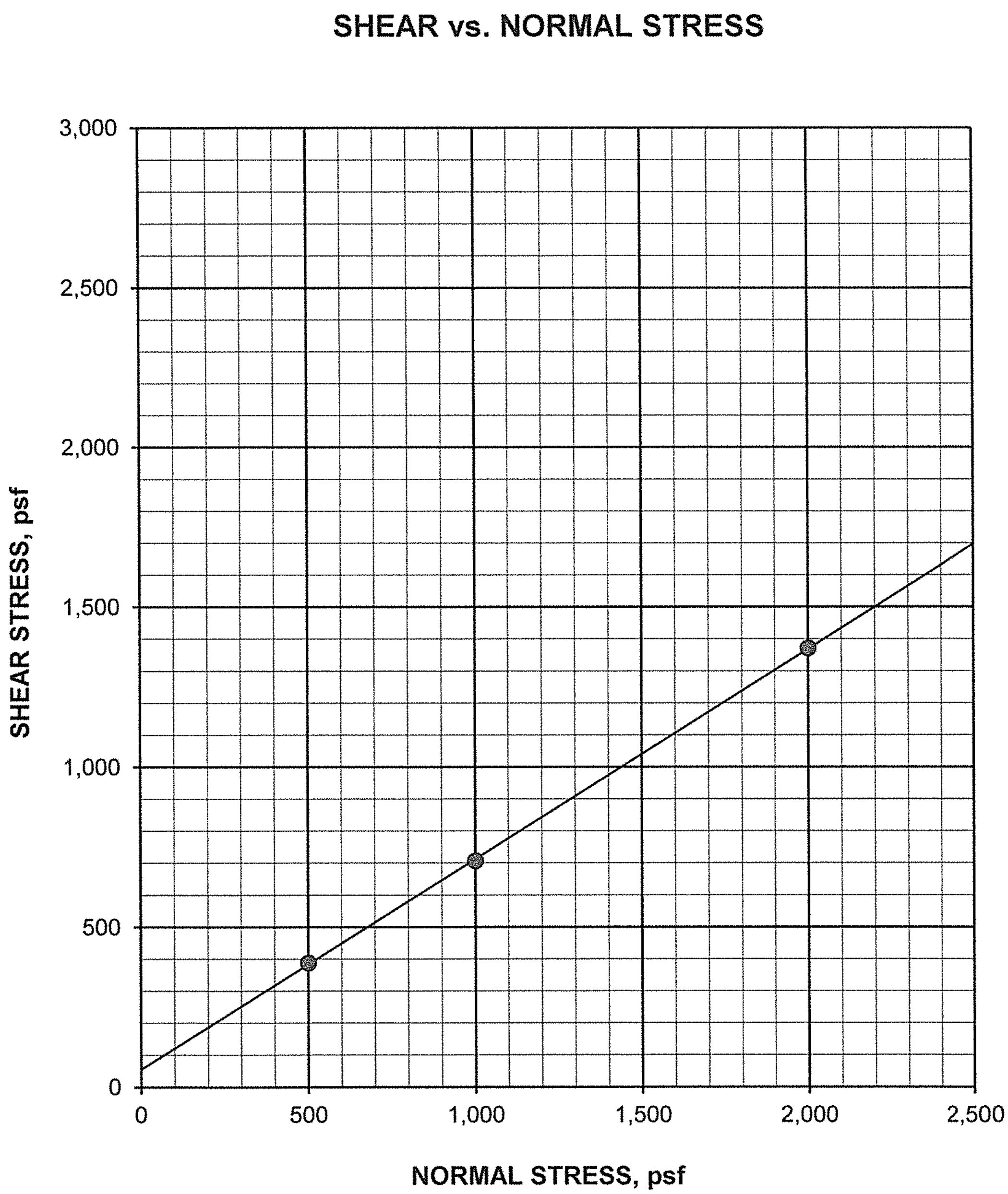
## DIRECT SHEAR

**ASTM D 3080/D3080M-11 (modified for consolidated, undrained conditions)**

August 2, 2013

Boring #11 @ 0.0 - 6.0' (Blend of Coke and Poorly Graded Sand)
Poorly Graded Sand (SP)
Compacted to 90% RC, saturated

INITIAL DRY DENSITY: 84.6 pcf
INITIAL MOISTURE CONTENT: 10.2 %
PEAK SHEAR ANGLE (Ø): 33°
COHESION (C): 55 psf



## DIRECT SHEAR continued

**ASTM D 3080/D3080M-11 (modified for consolidated, undrained conditions)**

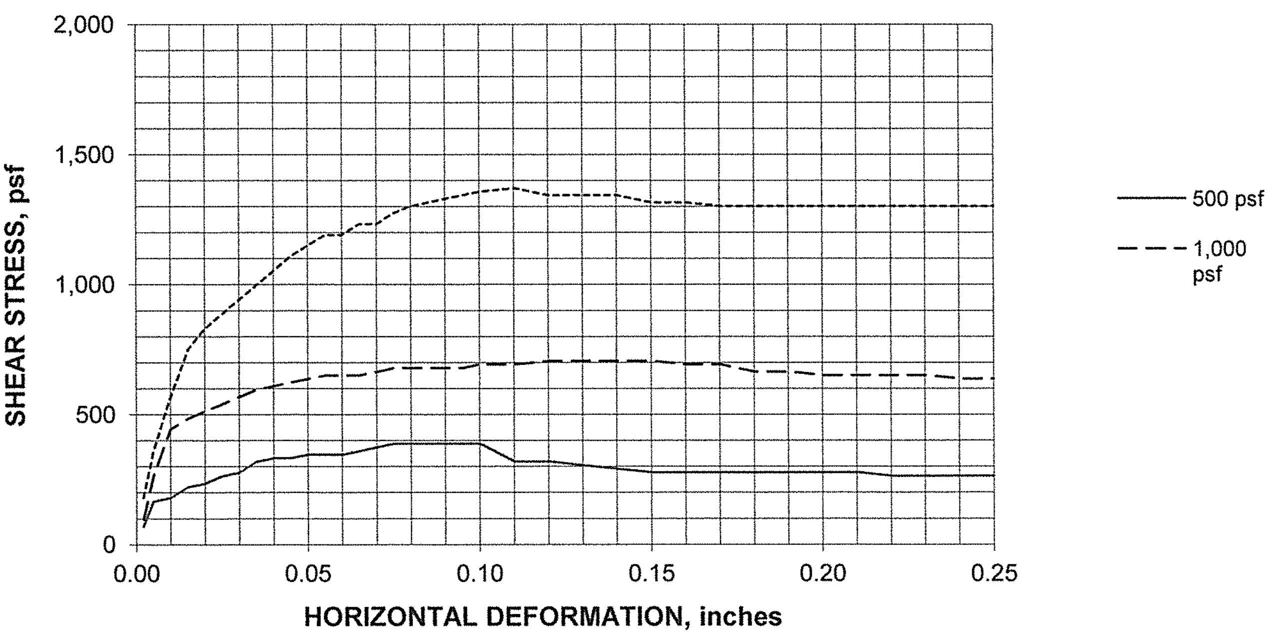
Boring #11 @ 0.0 - 6.0' (Blend of Coke and Poorly Graded Sand) August 2, 2013

Poorly Graded Sand (SP)

Compacted to 90% RC, saturated

SPECIFIC GRAVITY: 2.65 (assumed)

| SAMPLE NO.: | 1 | 2 | 3 | AVERAGE |
|---|---|---|---|---|
| **INITIAL** | | | | |
| WATER CONTENT, % | 10.2 | 10.2 | 10.2 | 10.2 |
| DRY DENSITY, pcf | 84.6 | 84.6 | 84.6 | 84.6 |
| SATURATION, % | 28.3 | 28.3 | 28.3 | 28.3 |
| VOID RATIO | 0.954 | 0.954 | 0.954 | 0.954 |
| DIAMETER, inches | 2.375 | 2.375 | 2.375 | |
| HEIGHT, inches | 1.00 | 1.00 | 1.00 | |
| **AT TEST** | | | | |
| WATER CONTENT, % | 36.3 | 36.3 | 36.0 | |
| DRY DENSITY, pcf | 84.7 | 85.0 | 85.0 | |
| SATURATION, % | 100.0 | 100.0 | 100.0 | |
| VOID RATIO | 0.952 | 0.944 | 0.944 | |
| HEIGHT, inches | 1.00 | 1.00 | 1.00 | |



Phillips 66 Unit Crude Train Facility SL-15825-SE

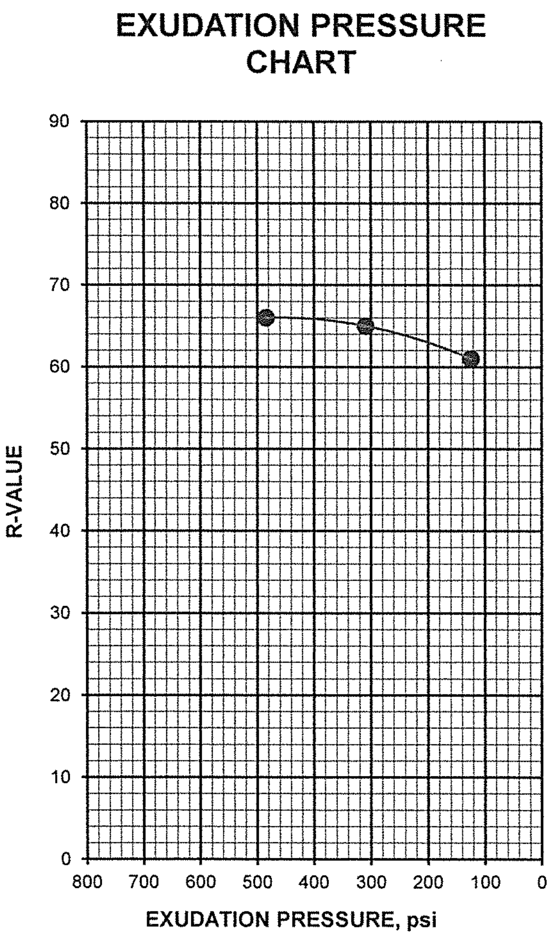
# RESISTANCE '*R*' VALUE AND EXPANSION PRESSURE

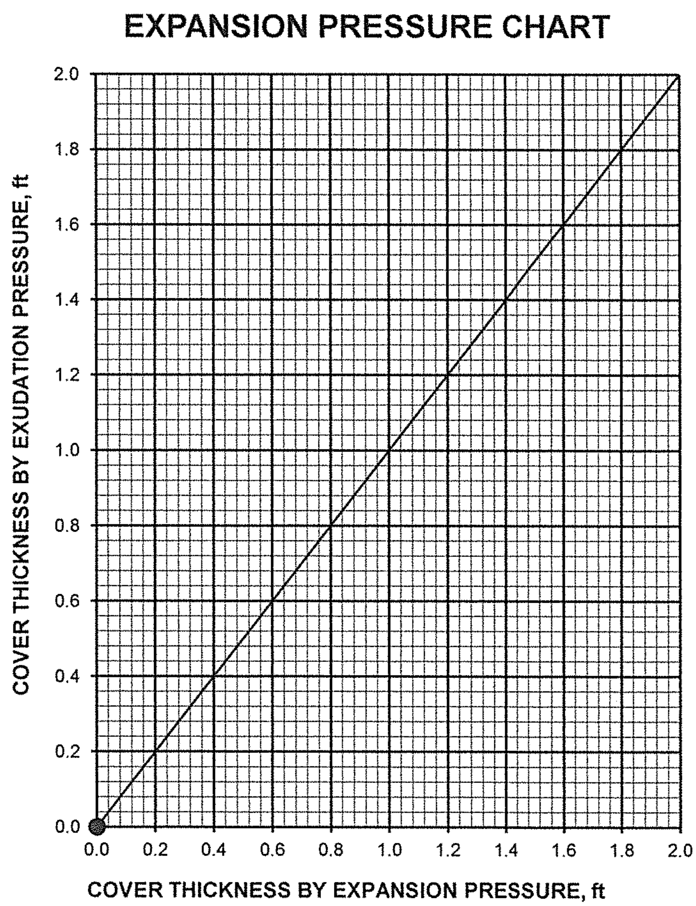
**ASTM D 2844-07**

August 2, 2013

Boring #11 @ 0.0 - 6.0'
Blend Black Coke and
Poorly Graded Sand with Silt (SP-SM)

Dry Density @ 300 psi Exudation Pressure: 106.4-pcf
%Moisture @ 300 psi Exudation Pressure: 13.9%
R-Value - Exudation Pressure: 65
R-Value - Expansion Pressure: N/A
**R-Value @ Equilibrium: 65**



California State Certified Laboratory No. 2153

CERCO analytical
1100 Willow Pass Court, Suite A
Concord, CA 94520-1006
925 **462 2771** Fax. 925 **462 2775**
www.cercoanalytical.com

29 July, 2013

Job No.1307153
Cust. No.11974

Mr. Judd King
Earth Systems Pacific
4378 Santa Fe Road
San Luis Obispo, CA 93401

Subject: Project No.: SL-158/25-SE
Project Name: Phillips 66 Crude Train
Corrosivity Analysis – ASTM Test Methods

Dear Mr. King:

Pursuant to your request, CERCO Analytical has analyzed the soil samples submitted on July 19, 2013. Based on the analytical results, this brief corrosivity evaluation is enclosed for your consideration.

Based upon the resistivity measurements, Sample No.001 is classified as "moderately corrosive" and Sample No.002 is classified as "mildly corrosive". All buried iron, steel, cast iron, ductile iron, galvanized steel and dielectric coated steel or iron should be properly protected against corrosion depending upon the critical nature of the structure. All buried metallic pressure piping such as ductile iron firewater pipelines should be protected against corrosion.

The chloride ion concentrations reflect none detected with a detection limit of 15 mg/kg.

The sulfate ion concentrations ranged from 16 to 87 mg/kg and are determined to be insufficient to damage reinforced concrete structures and cement mortar-coated steel at these locations.

The pH of the soils ranged from 5.8 to 6.2, which does present corrosion problems for buried iron, steel, mortar-coated steel and reinforced concrete structures. Any soils with a pH of <6.0 is considered to be corrosive to buried iron, steel, mortar-coated steel and reinforced concrete structures. Therefore, corrosion prevention measures need to be considered for structures to be placed in this acidic soil.

The redox potentials ranged from 380 to 390-mV, which indicative of potentially "slightly corrosive" soils resulting from anaerobic soil conditions.

This corrosivity evaluation is based on general corrosion engineering standards and is non-specific in nature. For specific long-term corrosion control design recommendations or consultation, please call *JDH Corrosion Consultants, Inc. at (925) 927-6630.*

We appreciate the opportunity of working with you on this project. If you have any questions, or if you require further information, please do not hesitate to contact us.

Very truly yours,
**CERCO ANALYTICAL, INC.**

For Sherri Moore
J. Darby Howard, Jr., P.E.
President

JDH/jdl
Enclosure

California State Certified Laboratory No. 2153

CERCO analytical
1100 Willow Pass Court, Suite A
Concord, CA 94520-1006
925 462 2771 Fax. 925 462 2775
www.cercoanalytical.com

Client: EarthSystems Pacific
Client's Project No.: SL-15825-SE
Client's Project Name: Phillips 66 Crude Train
Date Sampled: 07/09 & 10/13
Date Received: 19-Jul-13
Matrix: Soil
Authorization: Signed Chain of Custody

Date of Report: 29-Jul-2013

| Job/Sample No. | Sample I.D. | Redox (mV) | pH | Conductivity (umhos/cm)* | Resistivity (100% Saturation) (ohms-cm) | Sulfide (mg/kg)* | Chloride (mg/kg)* | Sulfate (mg/kg)* |
|---|---|---|---|---|---|---|---|---|
| 1307153-001 | B7 @ 0'-1.5' | 380 | 5.8 | - | 5,700 | - | N.D. | 87 |
| 1307153-002 | B11 @ 0'-6.0' | 390 | 6.2 | - | 22,000 | | N.D. | 16 |

| | Redox | pH | Conductivity | Resistivity | Sulfide | Chloride | Sulfate |
|---|---|---|---|---|---|---|---|
| Method: | ASTM D1498 | ASTM D4972 | ASTM D1125M | ASTM G57 | ASTM D4658M | ASTM D4327 | ASTM D4327 |
| Detection Limit: | - | - | 10 | - | 50 | 15 | 15 |
| Date Analyzed: | 25-Jul-2013 | 25-Jul-2013 | - | 24-Jul-2013 | - | 25-Jul-2013 | 25-Jul-2013 |

* Results Reported on "As Received" Basis

N.D. - None Detected

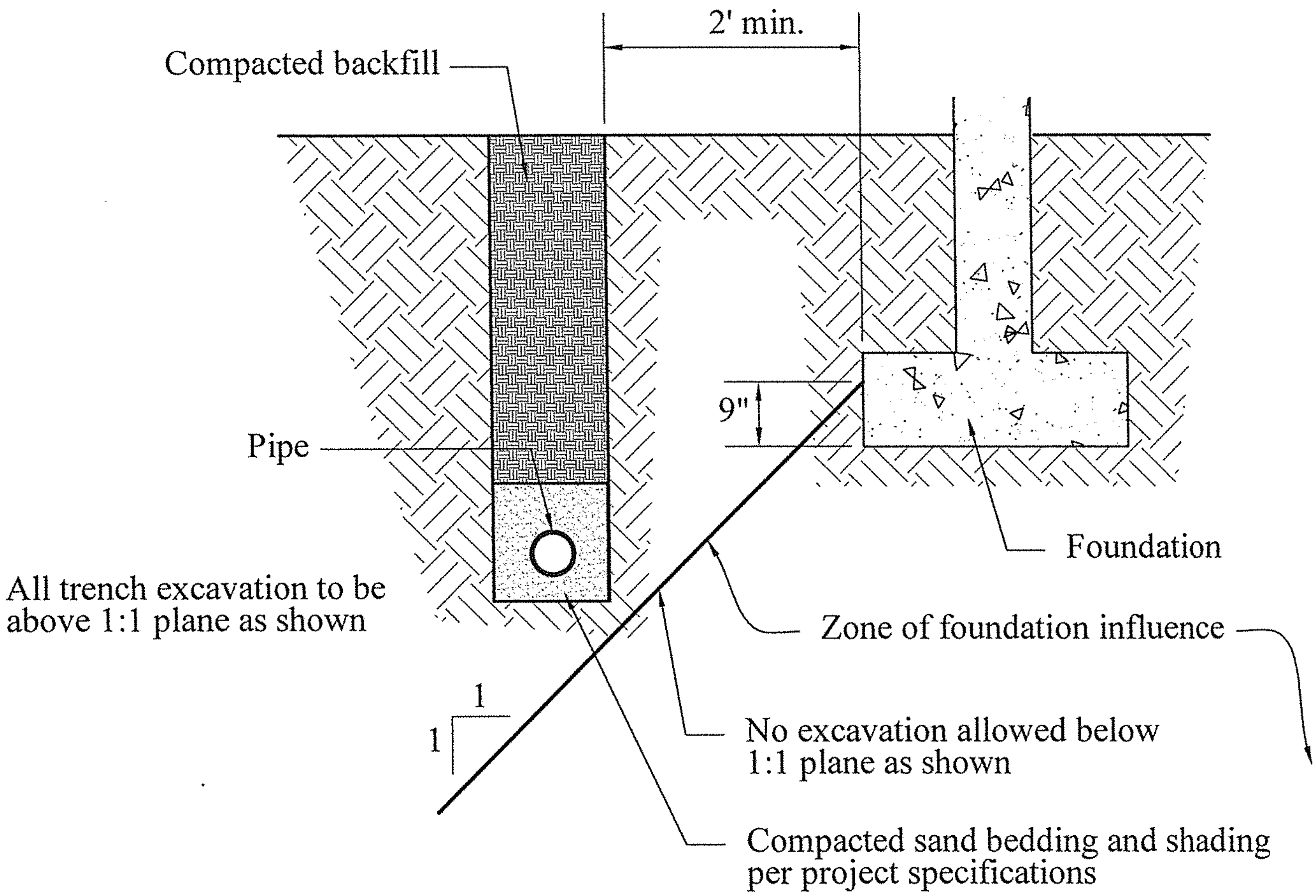
Cheryl McMillen
Laboratory Director

**Quality Control Summary** - All laboratory quality control parameters were found to be within established limits

# APPENDIX D

Typical Detail A: Pipe Placed Parallel to Footing
Typical Keyway and Bench Detail
Tremie Method

# TYPICAL DETAIL A
# PIPE PLACE PARALLEL TO FOUNDATIONS




**SCHEMATIC ONLY**
NOT TO SCALE

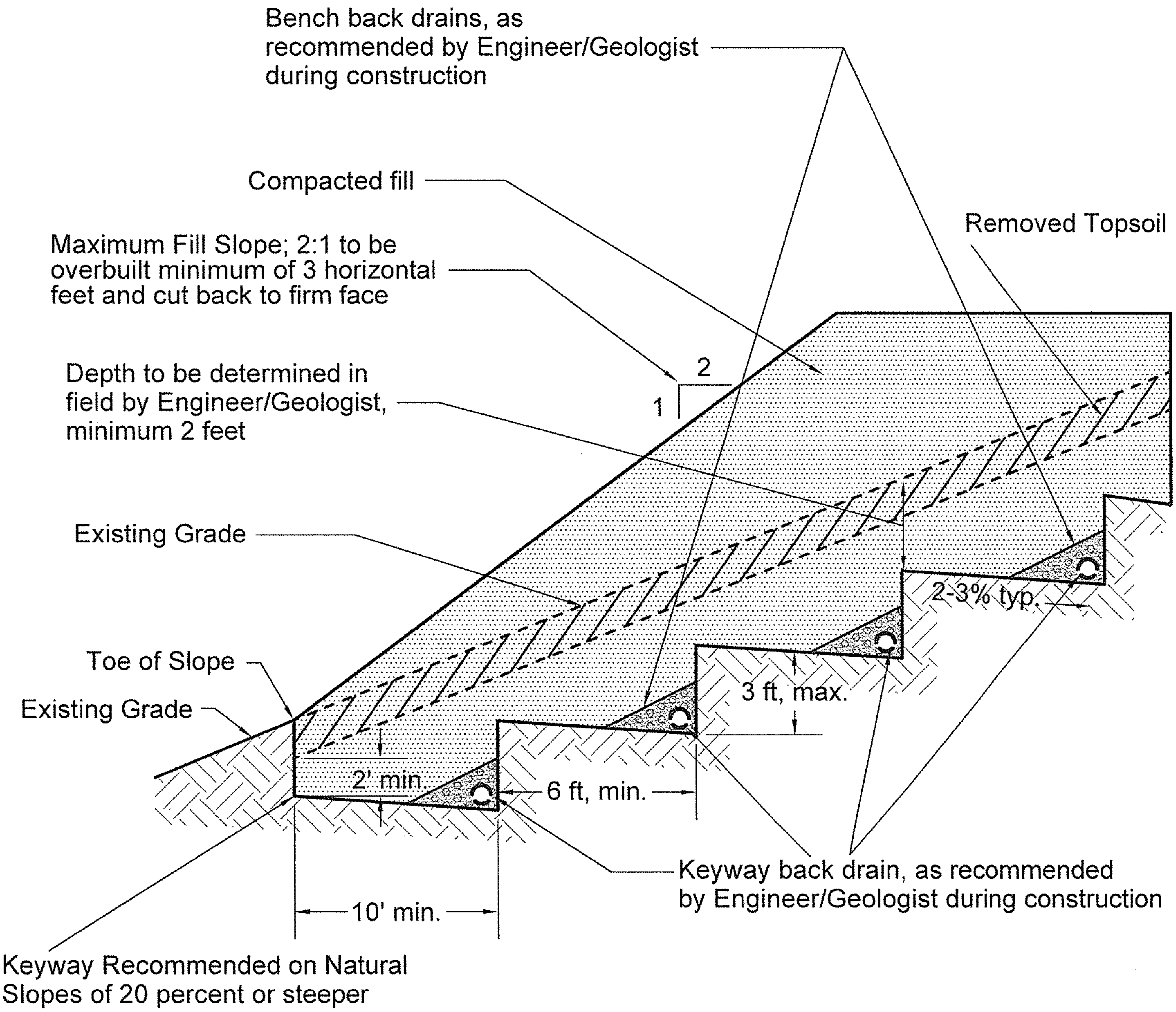
Earth Systems Pacific
4378 Old Santa Fe Road
San Luis Obispo, CA 93401-8116
(805) 544-3276 • FAX (805) 544-1786
E-mail: esp@earthsys.com

# TYPICAL BENCH AND KEYWAY DETAIL

## PHILLIPS 66 UNIT CRUDE TRAIN FACILITY
## SANTA MARIA REFINERY

2555 Willow Road
Arroyo Grande, California

DRAFT




**SCHEMATIC ONLY**
NOT TO SCALE


Earth Systems Pacific
4378 Old Santa Fe Road
San Luis Obispo, CA 93401-8116
(805) 544-3276 • FAX (805) 544-1786
E-mail: esp@earthsys.com


September 3, 2013

SL-15825-SE
PHILLIPS 66 UNIT CRUDE TRAIN FACILITY-090313BenchAndKeyway

# TREMIE METHOD FOR CAISSON (DRILLED SHAFT) FOUNDATION CONSTRUCTION

1. Concrete should be placed in caisson excavations by means of a tremie when the depth of water in the excavation cannot be limited to a maximum of 2 inches, or to the depth specified by the architect/engineer. A tremie should also be used when the freefall of the concrete would result in the concrete striking the rebar or excavation walls as it falls.

2. The concrete should be pumped to the tremie pipe or, if a hopper tremie is to be used, it should be approved by the architect/engineer. An elephant's trunk may be used to direct the fall of the concrete in dry excavations. The elephant's trunk should be of sufficient length to prevent the concrete from striking the rebar or excavation walls as it falls.

3. Concrete for dry excavations should be designed for, and placed at, a slump of 4 to 6 inches. Concrete to be placed below water should be designed for, and placed at, a slump of 7 to 9 inches.

4. The tremie pipe should consist of rigid steel pipe with tight couplings. The tremie pipe should be 4 to 6 inches in diameter and should be longer than the deepest caisson excavation.

5. The tremie pipe should be lowered through the center of the reinforcing, with caution, to within 1 foot of the bottom of the excavation.

6. The hose and tremie pipe should be "slicked" with Portland cement slurry. No clay, bentonite, or other material should be used unless approved by the architect/engineer and soils engineer.

7. Pumping of the concrete should begin immediately after the reinforcing and the tremie pipe have been placed in the excavation and inspected. The tremie pipe should not be raised until the concrete surface in the caisson excavation is at least 5 feet above the bottom of the tremie pipe. The bottom of the tremie pipe should then be kept at least 5 feet below the top of the concrete until the pour is completed.

8. The concrete should be pumped until all muck, laitance, and unsuitable concrete has been lifted above the top of the caisson. All muck, laitance, and unsuitable concrete should be immediately removed from the excavation.

9. Concrete poured at a 6-inch or greater slump should not be vibrated during the pour, unless directed by the architect/engineer. When vibration is required, it should not be started until the concrete pour is completed and the muck, laitance and unsuitable concrete have been removed. At a minimum, the upper 10 feet of the concrete should then be vibrated. Additional concrete may be added as necessary during vibration. The vibrator should not be allowed to contact any reinforcing members.

10. If, during the pour, the tremie pipe has to be removed from the concrete, (e.g., to allow removal of casing), it should be reset at the top of the concrete. The tremie should then be purged as directed, and lowered to at least 5 feet below the top of the concrete as the concrete is being pumped. All degraded concrete should be lifted with the continuing pour and removed from the top of the caisson.

11. The above are general guidelines only, and may be subject to modification by the architect/engineer or soils engineer.

Tremie Gen.

# Appendix F

SITE TREATMENT SYSTEM
DETAILS AND EXCERPTS

**California Regional Water Quality Control Board**
**Central Coast Region**

895 Aerovista Place, Suite 101, San Luis Obispo, California 93401-7906
(805) 549-3147 • Fax (805) 543-0397
http://www.waterboards.ca.gov/centralcoast

**Linda S. Adams.**
*Secretary for Environmental Protection*

**Arnold Schwarzenegger**
*Governor*

September 10, 2007

Kristen Kopp, Supervisor
Health, Environment & Regulatory Compliance
ConocoPhillips Company
2555 Willow Road
Arroyo Grande, CA 93420

Dear Ms. Kopp:

**RENEWED NPDES PERMIT FOR CONOCO-PHILLIPS' SANTA MARIA REFINERY**

At its public meeting on September 7, 2007, the Central Coast Water Board adopted Order No. R3-2007-0002, Waste Discharge Requirements for ConocoPhillips Company, Santa Maria Refinery (reissued NPDES Permit No. CA0000051). The renewed requirements are enclosed. Please review the requirements carefully and note that some modifications to previous monitoring requirements are specified. Changes incorporated into the new permit are described in detail in the Staff Report and Fact Sheet transmitted to you previously. Copy of the permit and associated staff report is also available electronically on our website http://www.swrcb.ca.gov/rwqcb3/Permits/Index.htm.

Thank you for the information and assistance you provided to aid the process of updating this permit. If you have any questions, please call **Sorrel Marks at 805/549-3695** or Harvey Packard at 805/542-4639.

Sincerely,

Roger W. Briggs
Executive Officer

Attachment: Order No. R3-2007-0002

S:/npdes/npdes facilities/san luis obispo co/concophillips/permit R3-2007-0002/07-0002 adopted.ltr
File: ConocoPhillips Task: 102-01

cs: (without attachments)
Terry Fleming, U. S. EPA Region IX, 75 Hawthorne St, San Francisco, CA 94105
SWRCB – DWQ, P. O. Box 100, Sacramento, CA 95812-0100
Ms. Vicki Finn, U. S. Fish & Wildlife Service, 2493 Portola Road, Ventura, CA 93003
Dept. of Fish & Game, 20 Lower Ragsdale Dr. Suite 100, Monterey, CA 93940-5729
Victor Holanda, SLO Co. Planning, Co. Govmt. Center, San Luis Obispo, CA 93401
Dr. Greg Thomas, SLO Co. Envi. Health, P.O. Box 1489, San Luis Obispo, CA 93401
Dan Connally, PG Environmental (via email)

# California Central Coast Water Quality Control Board

Central Coast Region

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Linda S. Adams
*Secretary for Environmental Protection*

Arnold Schwarzenegger
*Governor*

## ORDER NO. R3-2007-0002
## NPDES NO. CA0000051

## WASTE DISCHARGE REQUIREMENTS FOR CONOCOPHILLIPS COMPANY, SANTA MARIA REFINERY

The following Discharger is subject to waste discharge requirements as set forth in this Order:

### Table 1. Discharger Information

| | |
|---|---|
| **Discharger** | **ConocoPhillips Company** |
| **Name of Facility** | **Santa Maria Refinery** |
| **Facility Address** | **2555 Willow Road** |
| | **Arroyo Grande, CA 93420** |
| | **San Luis Obispo County** |
| U.S. Environmental Protection Agency and Central Coast Water Board classify this discharge as a major discharge. | |

The discharge by ConocoPhillips Company from the discharge points identified below is subject to waste discharge requirements as set forth in this Order:

### Table 2. Discharge Location

| Discharge Point | Effluent Description | Discharge Point Latitude | Discharge Point Longitude | Receiving Water |
|---|---|---|---|---|
| 001 | Treated Production Wastewater and Stormwater | 35 ° 02' 37" N | 120° 38' 21" W | Pacific Ocean |

### Table 3. Administrative Information

| | |
|---|---|
| This Order was adopted by the Central Coast Water Board on: | **September 7, 2007** |
| This Order shall become effective on: | **September 7, 2007** |
| This Order shall expire on: | **September 7, 2012** |
| The Discharger shall file a Report of Waste Discharge in accordance with title 23, California Code of Regulations, as application for issuance of new waste discharge requirements no later than: | **March 7, 2012** |

IT IS HEREBY ORDERED, that Order No. R3-2002-0010 is rescinded upon the effective date of this Order except for enforcement purposes, and, in order to meet the provisions contained in division 7 of the Water Code (commencing with section 13000) and regulations adopted thereunder, and the provisions of the federal Clean Water Act (CWA) and regulations and guidelines adopted thereunder, the Discharger shall comply with requirements in this Order.

I, Roger W. Briggs, Executive Officer, do hereby certify that this Order with all attachments is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Central Coast Region (Central Coast Water Board), on September 7, 2007.

Roger W. Briggs, Executive Officer

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## List of Attachments

## I. FACILITY INFORMATION

The following Discharger is subject to waste discharge requirements as set forth in this Order:

**Table 4. Facility Information**

| | |
|---|---|
| **Discharger** | **ConocoPhillips Company** |
| **Name of Facility** | **Santa Maria Refinery** |
| **Facility Address** | **2555 Willow Road** |
| | **Arroyo Grande, CA 93420** |
| | **San Luis Obispo County** |
| **Facility Contact, Title, and Phone** | **Kristen Kopp, Supervisor Health, Environment and Regulatory Compliance, (805) 343-3241** |
| **Mailing Address** | **2555 Willow Road, Arroyo Grande, CA 93420** |
| **Type of Facility** | **Petroleum Refinery (SIC Code 2911)** |
| **Facility Design Flow** | **0.575 million gallons per day (MGD)** |

## II. FINDINGS

The California Water Quality Control Board, Central Coast Region (Central Coast Water Board), finds:

A. **Background.** ConocoPhillips (Discharger) is currently discharging pursuant to Order No. R3-2002-0010, National Pollutant Discharge Elimination System (NPDES) Permit No. CA0000051. The Discharger submitted a Report of Waste Discharge, dated September 29, 2006, and applied for a NPDES permit renewal to discharge dry weather volumes up to 0.570 million gallons per day (MGD) of treated wastewater from the Santa Maria Refinery (Facility) in San Luis Obispo County. For the purposes of this Order, references to the "discharger" or "permittee" in applicable federal and state laws, regulations, plans, or policy are held to be equivalent to references to the Discharger herein.

B. **Facility Description.** The Discharger owns and operates a petroleum refinery with an annual average rate capacity of 44,440 barrels per day. The Facility maintains two separate collection systems, one for process wastewater and contact stormwater, and the other for non-contact stormwater. Process wastewater and precipitation runoff from the oil storage tank dikes and the operating units is collected in the process water sewer system. This wastewater flows by gravity to a wastewater treatment plant. Site remediation (groundwater) is also treated at the wastewater facility. The wastewater treatment plant includes three oil/water separators, two surge tanks, dissolved air floatation, a trickling filter, an Orbal aeration system, and a secondary clarifier. Wastewater is discharged from Discharge Point No. 001 to the Pacific Ocean, a water of the United States. Precipitation runoff from streets and unimproved areas, not subject to oil spills, is collected in a non-contact stormwater sewer system and flows by gravity to an evaporation pond. This non-contact stormwater is not discharged to the receiving water. Sludge generated during the treatment processes is recycled at the adjacent Carbon Plant coking facility. Attachment B provides a map of the area around the facility and Attachment C provides a flow schematic of the facility.

C. **Legal Authorities.** This Order is issued pursuant to section 402 of the federal Clean Water Act (CWA) and implementing regulations adopted by the U.S. Environmental Protection Agency (USEPA) and chapter 5.5, division 7 of the California Water Code (commencing with section 13370). It shall serve as a NPDES permit for point source discharges from this facility to surface waters. This Order also serves as Waste Discharge Requirements (WDR) pursuant to article 4, chapter 4, division 7 of the Water Code (commencing with section 13260).

D. **Background and Rationale for Requirements**. The Central Coast Water Board developed the requirements in this Order based on information submitted as part of the application, through monitoring and reporting programs, and other available information. The Fact Sheet (Attachment F), which contains background information and rationale for Order requirements, is hereby incorporated into this Order and constitutes part of the Findings for this Order. Attachments A through G are also incorporated into this Order.

E. **California Environmental Quality Act (CEQA).** Under Water Code section 13389, this action to adopt an NPDES permit is exempt from the provisions of the CEQA, Public Resources Code sections 21100-21177.

F. **Technology-based Effluent Limitations.** Section 301(b) of the CWA and implementing USEPA permit regulations at 40 CFR 122.44[1] require that permits include conditions meeting applicable technology-based requirements at a minimum, and any more stringent effluent limitations necessary to meet applicable water quality standards. The discharge authorized by this Order must meet minimum federal technology-based requirements based on Effluent Limitations Guidelines and Standards for the Petroleum Point Source Category, 40 CFR Part 419, Subpart B. A detailed discussion of the technology-based effluent limitations development is included in the Fact Sheet (Attachment F).

G. **Water Quality-Based Effluent Limitations.** Clean Water Act section 301(b) and NPDES regulations at 40 CFR 122.44(d) require that permits include limitations more stringent than applicable federal technology-based requirements where necessary to achieve applicable water quality standards.

NPDES regulations at 40 CFR 122.44(d)(1)(i) mandate that permits include effluent limitations for all pollutants that are or may be discharged at levels that have the reasonable potential to cause or contribute to an exceedance of a water quality standard, including numeric and narrative objectives within a standard. Where reasonable potential has been established for a pollutant, but there is no numeric criterion or objective for the pollutant, water quality-based effluent limitations (WQBELs) must be established using: (1) USEPA criteria guidance under CWA section 304(a), supplemented where necessary by other relevant information; (2) an indicator parameter for the pollutant of concern; or (3) a calculated numeric water quality criterion, such as a proposed state criterion or policy interpreting the state's narrative criterion, supplemented with other relevant information, as provided in section 122.44(d)(1)(vi).

[1] All further statutory references are to title 40 of the Code of Federal Regulations unless otherwise indicated.

H. **Water Quality Control Plans.** The Central Coast Water Board adopted a *Water Quality Control Plan for the Central Coast Basin* (Basin Plan) that designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the plan. Section II.A.1 of the Basin Plan states, "The provisions of the State Board's "Water Quality Control Plan for Ocean Waters of California" (Ocean Plan), "Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California" (Thermal Plan), and any revisions thereto shall apply in their entirety to affected waters of the basin." The Basin Plan establishes beneficial uses for the Pacific Ocean receiving water, those beneficial uses include: Industrial water supply; water contact and non-contact recreation, including aesthetic enjoyment; navigation; commercial and sport fishing; mariculture; rare and endangered species; marine habitat; wildlife habitat; and shellfish harvesting. In addition to the provisions included in the Ocean Plan and the Thermal Plan, the Basin Plan establishes water quality objectives for dissolved oxygen, pH, and radioactivity to all ocean waters. Requirements of this Order implement the Basin Plan.

The State Water Board adopted the *Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Water and Enclosed Bays and Estuaries of California* (Thermal Plan) on May 18, 1972, and amended this plan on September 18, 1975. This plan contains temperature objectives for coastal waters and is implemented through the requirements of this Order.

I. **California Ocean Plan.** The State Water Board adopted the *Water Quality Control Plan for Ocean Waters of California, California Ocean Plan* (Ocean Plan) in 1972 and amended it in 1978, 1983, 1988, 1990, 1997, 2000, and 2005. The State Water Board adopted the latest amendment on April 21, 2005, and it became effective on February 14, 2006. The Ocean Plan is applicable, in its entirety, to point source discharges to the ocean. Requirements of this Order implement the Ocean Plan.

J. **Alaska Rule.** On March 30, 2000, USEPA revised its regulation that specifies when new and revised state and tribal water quality standards (WATER QUALITY STANDARDS) become effective for CWA purposes (codified at 40 CFR §131.21; 65 Fed. Reg. 24641; April 27, 2000). Under the revised regulation (also known as the Alaska rule), new and revised standards submitted to USEPA after May 30, 2000, must be approved by USEPA before being used for CWA purposes. The final rule also provides that standards already in effect and submitted to USEPA by May 30, 2000, may be used for CWA purposes, whether or not approved by USEPA.

K. **Stringency of Requirements for Individual Pollutants.** This Order contains both technology-based and water quality-based effluent limitations for individual pollutants. The technology-based effluent limitations consist of restrictions on biochemical oxygen demand ($BOD_5$), total suspended solids (TSS), chemical oxygen demand (COD), oil and grease, phenolic compounds, ammonia (as N), sulfide, total chromium, hexavalent chromium, and pH. Restrictions on $BOD_5$, TSS, COD, oil and grease, phenolic compounds, ammonia (as N), sulfide, total chromium, hexavalent chromium, and pH are discussed in Section IV.B of the Fact Sheet. This Order's technology-based pollutant restrictions implement the minimum, applicable federal technology-based requirements.

Water quality-based effluent limitations have been scientifically derived to implement water quality objectives that protect beneficial uses. Both the beneficial uses and the water quality objectives have been approved pursuant to federal law and are the applicable federal water quality standards. The scientific procedures for calculating the individual water quality-based effluent limitations are based on the Ocean Plan, which was approved by USEPA on February 14, 2006. Collectively, this Order's restrictions on individual pollutants are no more stringent than required to implement the requirements of the CWA.

L. **Antidegradation Policy.** NPDES regulations at 40 CFR 131.12 require that the state water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy in State Water Board Resolution No. 68-16, which incorporates the federal antidegradation policy where the federal policy applies under federal law. Resolution No. 68-16 requires that existing quality of waters be maintained unless degradation is justified based on specific findings. The Central Coast Water Board's Basin Plan implements, and incorporates by reference, both the state and federal antidegradation policies. As discussed in detail in the Fact Sheet, the permitted discharge is consistent with the antidegradation provision of 131.12 and State Water Board Resolution No. 68-16. A statistical analysis of discharge monitoring data conducted according to the 2005 California Ocean Plan determined that there is no reasonable potential for the discharge to exceed or contribute to exceedence of the most stringent applicable water quality objectives for ammonia, antimony, copper, cyanide, lead, mercury, total chromium, and zinc. Consequently, there is no potential for these chemicals to degrade existing receiving water quality or beneficial uses. Removal of numeric effluent limitations for these chemicals is consistent with California's Antidegradation Policy.

M. **Anti-Backsliding Requirements.** CWA sections 402(o)(2) and 303(d)(4) and NPDES regulations at 40 CFR 122.44(l) prohibit backsliding in NPDES permits. These anti-backsliding provisions require effluent limitations in a reissued permit to be as stringent as those in the previous permit, with some exceptions where limitations may be relaxed. Some effluent limitations in this Order are less stringent that those in the previous Order. As discussed in detail in the Fact Sheet this relaxation of effluent limitations is consistent with the anti-backsliding requirements of the CWA and federal regulations.

N. **Endangered Species Act.** This Order does not authorize any act that results in the taking of a threatened or endangered species or any act that is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish and Game Code sections 2050 to 2097) or the Federal Endangered Species Act (16 U.S.C.A. sections 1531 to 1544). This Order requires compliance with effluent limits, receiving water limits, and other requirements to protect the beneficial uses of waters of the state. The discharger is responsible for meeting all requirements of the applicable Endangered Species Act.

O. **Monitoring and Reporting.** NPDES regulations at 40 CFR 122.48 require that all NPDES permits specify requirements for recording and reporting monitoring results. Water Code sections 13267 and 13383 of the CWC authorizes the Central Coast Water Board to require technical and monitoring reports. The Monitoring and Reporting

Program, provided as Attachment E to this Order, establishes monitoring and reporting requirements to implement federal and State requirements.

**P. Standard and Special Provisions.** Standard Provisions, which apply to all NPDES permits in accordance with 40 CFR 122.41, and additional conditions applicable to specified categories of permits in accordance with 40 CFR 122.42, are provided in Attachment D. The Central Coast Water Board has also included in this Order special provisions applicable to the Discharger. A rationale for the special provisions contained in this Order is provided in the attached Fact Sheet.

**Q. Provisions and Requirements Implementing State Law.** The provisions and requirements in subsections IV.B and VI.C of this Order are included to implement state law only. These provisions and requirements are not required or authorized under the federal CWA; consequently, violations of these provisions and requirements are not subject to the enforcement remedies that are available for NPDES violations.

**R. Notification of Interested Parties.** The Central Coast Water Board has notified the Discharger and interested agencies and persons of its intent to prescribe Waste Discharge Requirements for the discharge and has provided them with an opportunity to submit their written comments and recommendations. Details of notification are provided in the Fact Sheet of this Order.

**S. Consideration of Public Comment.** The Central Coast Water Board, in a public meeting, heard and considered all comments pertaining to the discharge. Details of the Public Hearing are provided in the Fact Sheet of this Order.

## III. DISCHARGE PROHIBITIONS

A. Discharge of treated production wastewater and storm runoff to the Pacific Ocean at a location other than Discharge Point No. 001 is prohibited.

B. Discharge of wastewaters not specified in Section II.B of this Order are prohibited.

C. Discharge of untreated wastewater to the ocean is prohibited.

D. Discharge of sanitary wastes to other than a subsurface septic tank/leachfield system is prohibited.

## IV. EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

### A. Effluent Limitations – Discharge Point No. 001

1. The Discharger shall maintain compliance with the following effluent limitations at Discharge Point No. 001, with compliance measured at Monitoring Location EFF-001 as described in the attached MRP:

**Table 5. Final Effluent Limitations for Discharge Point No. 001**

| Parameters | Units | Effluent Limitations | | | |
|---|---|---|---|---|---|
| | | Average Monthly | Maximum Daily | Instantaneous Minimum | Instantaneous Maximum |
| Biochemical Oxygen Demand ($BOD_5$) (5-day @ 20 Deg. C) | lbs/day | 204 | 367 | -- | -- |
| Total Suspended Solids (TSS) | lbs/day | 163 | 256 | -- | -- |
| Chemical Oxygen Demand (COD) | lbs/day | 1,430 | 2,750 | -- | -- |
| Oil and Grease | lbs/day | 59.4 | 111 | -- | -- |
| Phenolic Compounds | lbs/day | 1.06 | 2.7 | -- | -- |
| Ammonia (as N) | lbs/day | 220 | 290 | -- | -- |
| Sulfide | lbs/day | 1.08 | 2.41 | -- | -- |
| Total Chromium | lbs/day | 1.26 | 3.60 | -- | -- |
| Hexavalent Chromium | lbs/day | 0.102 | 0.230 | -- | -- |
| pH | Standard units | -- | -- | 6.0 | 9.0 |

In addition to the effluent limitations contained in Table 5, additional mass loading credits for storm runoff, which is commingled with process wastewater and is treated in the main treatment system and discharged to the Pacific Ocean, may be granted. During wet weather runoff, the following incremental effluent credits shall be added to the effluent limitations specified in Table 5.

**Table 6. Storm Runoff Credits**

| Parameters | Units | Incremental Effluent Credit | |
|---|---|---|---|
| | | Monthly Average | Daily Maximum |
| $BOD_5$ | lbs/1,000 gallons[1] | 0.22 | 0.40 |
| TSS | lbs/1,000 gallons[1] | 0.18 | 0.28 |
| COD | lbs/1,000 gallons[1] | 1.5 | 3.0 |
| Oil and Grease | lbs/1,000 gallons[1] | 0.067 | 0.13 |
| Phenolic Compounds | lbs/1,000 gallons[1] | 0.0014 | 0.0029 |
| Total Chromium | lbs/1,000 gallons[1] | 0.0018 | 0.0050 |
| Hexavalent Chromium | lbs/1,000 gallons[1] | 0.00023 | 0.00052 |

[1] Credit calculated based on measured flow of contaminated storm runoff commingled with process wastewater.

2. The Discharger shall maintain compliance with the following effluent limitations at Discharge Point No. 001, with compliance measured at Monitoring Location EFF-001 as described in the attached MRP, when effluent flow is equal to or less than 0.285 MGD:

**Table 7. Effluent Limitations When Effluent Flow is Equal to or Less Than 0.285 MGD**

| Parameters | Units | Effluent Limitations[1] | | |
|---|---|---|---|---|
| | | Maximum Daily | Instantaneous Maximum | Six-Month Median |
| Arsenic | mg/L | 2.44 | 6.47 | 0.42 |
| | lbs/day | 5.80 | 15.38 | 1.00 |
| Cadmium | mg/L | 0.34 | 0.84 | 0.08 |
| | lbs/day | 0.81 | 2.00 | 0.19 |
| Nickel | mg/L | 1.68 | 4.20 | 0.42 |
| | lbs/day | 4.00 | 9.98 | 1.00 |
| Selenium | mg/L | 5.04 | 12.60 | 1.26 |
| | lbs/day | 11.98 | 29.95 | 2.99 |
| Silver | mg/L | 0.22 | 0.57 | 0.06 |
| | lbs/day | 0.52 | 1.35 | 0.14 |
| Total Chlorine Residual | mg/L | 0.67 | 5.04 | 0.17 |
| | lbs/day | 1.59 | 11.98 | 0.40 |
| Phenolic Compounds (non-chlorinated) | mg/L | 10.08 | 25.20 | 2.52 |
| | lbs/day | 23.96 | 59.90 | 5.99 |
| Chlorinated Phenolics | mg/L | 0.34 | 0.84 | 0.08 |
| | lbs/day | 0.81 | 2.00 | 0.19 |
| Endosulfan[2] | µg/L | 1.51 | 2.27 | 0.76 |
| | lbs/day | 3.59 | 5.40 | 1.81 |
| Endrin | µg/L | 0.34 | 0.50 | 0.17 |
| | lbs/day | 0.81 | 1.19 | 0.40 |
| HCH[3] | µg/L | 0.67 | 1.01 | 0.34 |
| | lbs/day | 1.59 | 2.40 | 0.81 |
| Chronic Toxicity | TUc | 84 | --- | --- |
| Radioactivity | [4] | | | |

[1] Based on a dilution factor of 83:1.
[2] The sum of endosulfan-alpha and endosulfan-beta and endosulfan sulfate.
[3] The sum of alpha, beta, gamma (lindane), and delta isomers of hexachlorocyclohexane.
[4] Not to exceed limits specified in CCR Title 17, Division 1, Chapter 5, Subchapter 4, Group 3, Article 3, Section 30269.

3. The Discharger shall maintain compliance with the following effluent limitations at Discharge Point No. 001, with compliance measured at Monitoring Location EFF-001 as described in the attached MRP, when effluent flow is greater than 0.285 MGD:

**Table 8. Effluent Limitations When Effluent Flow is Greater Than 0.285 MGD**

| Parameters | Units | Effluent Limitations[1] | | |
|---|---|---|---|---|
| | | Maximum Daily | Instantaneous Maximum | Six-Month Median |
| Arsenic | mg/L | 2.00 | 5.32 | 0.35 |
| | lbs/day | 9.59 | 25.51 | 1.68 |
| Cadmium | mg/L | 0.28 | 0.69 | 0.07 |
| | lbs/day | 1.34 | 3.31 | 0.34 |
| Nickel | mg/L | 1.38 | 3.45 | 0.35 |
| | lbs/day | 6.62 | 16.54 | 1.68 |
| Selenium | mg/L | 4.14 | 10.35 | 1.04 |
| | lbs/day | 19.85 | 49.63 | 4.99 |
| Silver | mg/L | 0.18 | 0.47 | 0.05 |
| | lbs/day | 0.86 | 2.25 | 0.24 |
| Total Chlorine Residual | mg/L | 0.55 | 4.14 | 0.14 |
| | lbs/day | 2.64 | 19.85 | 0.67 |
| Phenolic Compounds (non-chlorinated) | mg/L | 8.28 | 20.70 | 2.07 |
| | lbs/day | 39.71 | 99.27 | 9.93 |
| Chlorinated Phenolics | mg/L | 0.28 | 0.69 | 0.07 |
| | lbs/day | 1.34 | 3.31 | 0.34 |
| Endosulfan[2] | µg/L | 1.24 | 1.86 | 0.62 |
| | lbs/day | 5.95 | 8.92 | 2.97 |
| Endrin | µg/L | 0.28 | 0.41 | 0.14 |
| | lbs/day | 1.34 | 1.97 | 0.67 |
| HCH[3] | µg/L | 0.55 | 0.83 | 0.28 |
| | lbs/day | 2.64 | 3.98 | 1.34 |
| Chronic Toxicity | TUc | 69 | --- | --- |
| Radioactivity | [4] | | | |

[1] Based on a dilution factor of 68:1.
[2] The sum of endosulfan-alpha and endosulfan-beta and endosulfan sulfate.
[3] The sum of alpha, beta, gamma (lindane), and delta isomers of hexachlorocyclohexane.
[4] Not to exceed limits specified in CCR Title 17, Division 1, Chapter 5, Subchapter 4, Group 3, Article 3, Section 30269.

4. The Discharger shall maintain compliance with the following applicable flow dependent effluent limitations at Discharge Point No. 001, with compliance measured at Monitoring Location EFF-001 as described in the attached MRP:

**Table 9. Monthly Average Effluent Limitations**

| Parameters | Units | Monthly Average Effluent Limitations | |
|---|---|---|---|
| | | = or < 0.285 MGD | >0.285 MGD |
| Acrolein | mg/L | 18.48 | 15.18 |
| | lbs/day | 43.92 | 72.79 |
| Bis(2-Chloroethoxy) Methane | mg/L | 0.3696 | 0.304 |
| | lbs/day | 88.6 | 1.5 |
| Bis(2-Chloroisopropyl) Ether | mg/L | 100.8 | 82.800 |
| | lbs/day | 8,926.5 | 397.1 |
| Chlorobenzene | mg/L | 47.88 | 39.330 |
| | lbs/day | 113.8 | 188.6 |
| Chromium (III) | g/L | 15.96 | 13.110 |
| | lbs/day | 37,935 | 62,869.0 |
| Di-n-butyl Phthalate | mg/L | 294 | 241.500 |
| | lbs/day | 698.8 | 1,158.1 |
| Dichlorobenzenes[1] | mg/L | 428.4 | 351.900 |
| | lbs/day | 1,018.3 | 1,687.5 |
| Diethyl Phthalate | mg/L | 2,772 | 2,277.00 |
| | lbs/day | 6,588.8 | 10,919.3 |
| Dimethyl Phthalate | g/L | 68.88 | 56.580 |
| | lbs/day | 163,720.9 | 271,329.4 |
| 4,6-Dinitro-2-methylphenol | mg/L | 18.48 | 15.180 |
| | lbs/day | 43.92 | 72.8 |
| 2,4-Dinitrophenol | mg/L | 0.336 | 0.276 |
| | lbs/day | 8.0 | 13.2 |
| Ethylbenzene | mg/L | 344.4 | 282.900 |
| | lbs/day | 818.6 | 1,356.6 |
| Fluoranthene | mg/L | 1.26 | 1.035 |
| | lbs/day | 3.0 | 5.0 |
| Hexachlorocyclopentadiene | mg/L | 4.872 | 4.002 |
| | lbs/day | 11.6 | 19.2 |
| Nitrobenzene | mg/L | 0.4116 | 0.338 |
| | lbs/day | 1.0 | 1.6 |
| Thallium | mg/L | 0.168 | 0.138 |
| | lbs/day | 0.4 | 0.7 |
| Toluene | g/L | 7.14 | 5.865 |
| | lbs/day | 16,971.1 | 28,125.6 |
| Tributyltin | µg/L | 0.1176 | 0.097 |
| | lbs/day | 0.0003 | 0.0004 |
| 1,1,1-Trichloroethane | g/L | 45.36 | 37.260 |
| | lbs/day | 107,816.2 | 178,680.3 |
| Acrylonitrile | µg/L | 8.4 | 6.900 |
| | lbs/day | 0.02 | 0.03 |
| Aldrin | ng/L | 1.848 | 1.518 |
| | lbs/day | $4.4 \times 10^{-6}$ | $7.3 \times 10^{-6}$ |
| Benzene | µg/L | 495.6 | 407.100 |
| | lbs/day | 1.2 | 1.9 |
| Benzidine | µg/L | 0.005796 | 0.005 |
| | lbs/day | $1.4 \times 10^{-5}$ | $2.3 \times 10^{-6}$ |
| Beryllium | µg/L | 2.772 | 2.277 |
| | lbs/day | 0.007 | 0.01 |
| Bis(2-Chloroethyl) Ether | µg/L | 3.78 | 3.105 |
| | lbs/day | 0.009 | 0.01 |

| Parameters | Units | Monthly Average Effluent Limitations | |
|---|---|---|---|
| | | = or < 0.285 MGD | >0.285 MGD |
| | | | |
| Bis(2-Ethlyhexyl) Phthalate | µg/L | 294 | 241.500 |
| | lbs/day | 0.7 | 1.2 |
| Carbon Tetrachloride | µg/L | 75.6 | 62.100 |
| | lbs/day | 0.2 | 0.3 |
| Chlordane[2] | ng/L | 1.932 | 1.587 |
| | lbs/day | $4.5 \times 10^{-6}$ | $7.6 \times 10^{-6}$ |
| Chlorodibromethane | µg/L | 722.4 | 593.400 |
| | lbs/day | 1.7 | 2.8 |
| Chloroform | µg/L | 10,920 | 8,970.000 |
| | lbs/day | 26.0 | 43.0 |
| DDT[3] | ng/L | 14.28 | 11.730 |
| | lbs/day | $3.4 \times 10^{-5}$ | $5.6 \times 10^{-5}$ |
| 1,4-Dichlorobenzene | µg/L | 1,512 | 1,242.000 |
| | lbs/day | 3.6 | 5.9 |
| 3,3'-Dichlorobenzidine | µg/L | 0.6804 | 0.559 |
| | lbs/day | 0.002 | 0.003 |
| 1,2-Dichloroethane | mg/L | 2.352 | 1.932 |
| | lbs/day | 5.6 | 9.3 |
| 1,1-Dichloroethylene | mg/L | 0.0756 | 0.062 |
| | lbs/day | 0.2 | 0.3 |
| Dichlorobromomethane | mg/L | 0.5208 | 0.428 |
| | lbs/day | 1.2 | 2.0 |
| Dichloromethane | mg/L | 37.8 | 31.050 |
| | lbs/day | 89.8 | 148.9 |
| 1,3-Dichloropropene | mg/L | 0.7476 | 0.614 |
| | lbs/day | 1.8 | 2.9 |
| Dieldrin | ng/L | 3.36 | 2.760 |
| | lbs/day | $7.9 \times 10^{-6}$ | $1.3 \times 10^{-5}$ |
| 2,4-Dinitrotoluene | µg/L | 218.4 | 179.400 |
| | lbs/day | 0.5 | 0.9 |
| 1,2-Diphenylhydrazine | µg/L | 13.44 | 11.040 |
| | lbs/day | 0.03 | 0.05 |
| Halomethanes[4] | mg/L | 10.92 | 8.970 |
| | lbs/day | 26.0 | 43.0 |
| Heptachlor | µg/L | 0.0042 | 0.003 |
| | lbs/day | $10.0 \times 10^{-6}$ | $1.6 \times 10^{-5}$ |
| Heptachlor Epoxide | µg/L | 0.00168 | 0.001 |
| | lbs/day | $4.0 \times 10^{-6}$ | $6.6 \times 10^{-6}$ |
| Hexachlorobenzene | ng/L | 17.64 | 14.490 |
| | lbs/day | $4.2 \times 10^{-5}$ | $6.9 \times 10^{-5}$ |
| Hexachlorobutadiene | µg/L | 1,176 | 966.000 |
| | lbs/day | 2.8 | 4.6 |
| Hexachloroethane | µg/L | 210 | 172.500 |
| | lbs/day | 0.5 | 0.8 |
| Isophorone | g/L | 0.06132 | 0.050 |
| | lbs/day | 145.7 | 241.5 |
| N-nitrosodimethylamine | µg/L | 613.2 | 503.700 |
| | lbs/day | 1.5 | 2.4 |
| N-nitrosodi-N-propylamine | µg/L | 31.92 | 26.220 |
| | lbs/day | 0.08 | 0.1 |
| N-nitrosodiphenylamine | µg/L | 210 | 172.500 |
| | lbs/day | 0.5 | 0.8 |

| Parameters | Units | Monthly Average Effluent Limitations | |
|---|---|---|---|
| | | = or < 0.285 MGD | >0.285 MGD |
| PAHs[5] | µg/L | 0.7392 | 0.607 |
| | lbs/day | 0.002 | 0.003 |
| PCBs[6] | ng/L | 1.596 | 1.311 |
| | lbs/day | $3.8 X10^{-6}$ | $6.3 X10^{-6}$ |
| TCDD Equivalents[7] | pg/L | 0.3276 | 0.269 |
| | lbs/day | $7.8 X10^{-10}$ | $1.3 X10^{-9}$ |
| 1,1,2,2-Tetrachloroethane | mg/L | 0.1932 | 0.159 |
| | lbs/day | 0.5 | 0.8 |
| Tetrachloroethylene | mg/L | 0.168 | 0.138 |
| | lbs/day | 0.4 | 0.7 |
| Toxaphene | ng/L | 17.64 | 14.490 |
| | lbs/day | $4.2 X10^{-5}$ | $6.9 X10^{-5}$ |
| Trichloroethylene | µg/L | 2,268 | 1,863.000 |
| | lbs/day | 5.4 | 8.9 |
| 1,1,2-Trichloroethane | mg/L | 0.7896 | 0.649 |
| | lbs/day | 1.9 | 3.1 |
| 2,4,6-Trichlorophenol | µg/L | 24.4 | 20.01 |
| | lbs/day | 0.06 | 0.1 |
| Vinyl Chloride | µg/L | 3,024 | 2,484.000 |
| | lbs/day | 7.2 | 11.9 |

[1] The sum of 1,2- and 1,3-dichlorobenzene.
[2] The sum of chlordane-alpha, chlordane-gamma, chlordane-alpha, chordene-gamma, nonachlor-alpha, nonachlor-gamma, and oxychlordane.
[3] The sum of 4,4'-DDT; 2,4'-DDT; 4,4'-DDE; 2,4'-DDE, 4,4'-DDD, and 2,4'-DDD.
[4] The sum of bromoform, bromomethane, and chloromethane.
[5] Polynuclear Aromatic Hydrocarbons - The sum of acenaphthylene; anthracene; 1,2-benzanthracene; 3,4-benzofluoranthene; benzo[k]fluoranthene; 1,12-benzoperylene; benzo[a]pyrene; chrysene; dibenzo[a,h]anthracene; fluorene; indeno[1,2,3-cd]pyrene; phenanthrene; and pyrene.
[6] Polychlorinated Biphenyls – The sum of chlorinated biphenyls whose analytical characteristics resemble those of Aroclor-1016, Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254, and Aroclor-1260.
[7] The sum of the concentrations of chlorinated dibenzodioxins (2,3,7,8-CDDs) and chlorinated dibenzofurans (2,3,7,8-CDFs) multiplied by their respective toxicity factors, as summarized in Appendix I of the Ocean Plan.

**B. Land Discharge Specifications.** Discharges of non-contact stormwater to the evaporation/percolation basins shall not cause constituent concentrations in groundwater to exceed limits set forth in Title 22, Chapter 15, Articles 4, 4.5, 5 and 5.5 of the California Code of Regulations or cause a statistically significant increase in constituent concentrations in underlying groundwaters, as determined by samples collected from wells up gradient and down gradient of the percolation ponds.

**C. Reclamation Specifications.** Not applicable to this permit.

## V. RECEIVING WATER LIMITATIONS

**A. Surface Water Limitations.** Receiving water limitations are based on water quality objectives contained in the Basin Plan and Ocean Plan and are a required part of this Order.

1. Floating particulates and grease and oil shall not be visible.
2. The discharge of waste shall not cause aesthetically undesirable discoloration of the ocean surface.

3. Natural light shall not be significantly reduced at any point outside the initial dilution zone as a result of the discharge of waste.

4. The rate of deposition of inert solids and the characteristics of inert solids in ocean sediments shall not be changed such that benthic communities are degraded.

5. The dissolved oxygen concentration shall not at any time fall below 5.0 mg/L or be depressed more than ten percent from that which occurs naturally as a result of the discharge of oxygen demanding waste material.

6. The pH shall not be depressed below 7.0, raised above 8.5, or changed more than 0.2 units from that which occurs naturally.

7. The dissolved sulfide concentrations of wastes in and near sediments shall not be significantly increased above that present under natural conditions.

8. The concentrations of substances with effluent limitations in this Order shall not increase in marine sediments to levels that would degrade indigenous biota.

9. The concentrations of organic materials shall not be increased in marine sediments to a level which would degrade marine life.

10. Nutrient materials shall not cause objectionable aquatic growth or degradation of indigenous biota.

11. Waste discharges to the ocean must be essentially free of substances that will accumulate to toxic levels in marine waters, sediments, or biota.

12. Marine communities, including vertebrate, invertebrate, and plant species, shall not be degraded.

13. The natural taste, odor, and color of fish, shellfish, or other marine resources used for human consumption shall not be altered.

14. The concentration of organic materials in fish, shellfish or other marine resources used for human consumption shall not bioaccumulate to levels that are harmful to human health.

15. The temperature of the discharge shall ensure protection of beneficial uses.

## B. Groundwater Limitations

Groundwater limitations are not included in this permit. Groundwater monitoring, evaluation and follow-up actions are addressed through a separate monitoring agreement.

## VI. PROVISIONS

A. **Standard Provisions.** The Discharger shall comply with all Standard Provisions included in Attachment D of this Order.

B. **Monitoring and Reporting Program (MRP) Requirements.** The Discharger shall comply with the Monitoring and Reporting Program, and future revisions thereto, in Attachment E of this Order. All monitoring shall be conducted according to 40 CFR 136, Guidelines Establishing Test Procedures for Analysis of Pollutants.

C. **Special Provisions**

1. **Reopener Provisions.** This permit may be reopened and modified in accordance with NPDES regulations at 40 CFR 122 and 124, as necessary, to include additional conditions or limitations based on newly available information or to implement any USEPA approved, new, State water quality objective.

2. **Special Studies, Technical Reports and Additional Monitoring Requirements**

a. **Toxicity Reduction Requirements.** If the discharge consistently exceeds a chronic toxicity result of 84 $TU_c$ when effluent flow is equal to or less than 0.285 MGD, or 69 $TU_c$ when effluent flow is greater than 0.285 MGD, the Discharger shall conduct a Toxicity Reduction Evaluation (TRE). The TRE shall include all reasonable steps to identify the source of toxicity. The Discharger shall take all reasonable steps to reduce toxicity to the required level once the source of toxicity is identified.

1) The Discharger shall develop a TRE workplan in accordance with the TRE procedures established by the USEPA in the following guidance manuals:

a) *Generalized Methodology for Conducting Industrial Toxicity Reduction Evaluations* (EPA/600/2-88/070).

b) *Toxicity Identification Evaluation, Phase I* (EPA/600/6-91/005F).

c) *Methods for Aquatic Toxicity Identification Evaluations, Phase II* (EPA/600/R-92/080).

d) *Methods for Aquatic Toxicity Identification Evaluations, Phase III* (EPA/600/R-92/081).

2) The Discharger shall submit the TRE workplan to the Central Coast Water Board within 180 days of the adoption of this Order. The TRE workplan shall be subject to the approval of the Central Coast Water Board and shall be modified as directed by the Central Coast Water Board.

3) Within 15 days of completion of the TRE, the Discharger shall submit the results of the TRE, including a summary of the findings, data generated, a list of corrective actions necessary to achieve consistent compliance with toxicity objectives contained in the Ocean Plan and prevent recurrence of violations

of those limitation, and a time schedule for implementation of such corrective actions. The corrective actions and time schedule shall be modified at the direction of the Executive Officer.

3. **Best Management Practices and Pollution Prevention.** The Discharger has developed a Best Management Practices (BMP) plan which prevents, or minimizes the potential for, release of toxic substances from ancillary activities to the waters of the United States through plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. The Discharger shall implement and update the BMP plan on an ongoing basis to ensure that no contaminated stormwater leaves the facility's property and enters surrounding surface waters.

4. **Construction, Operation and Maintenance Specifications.** Not applicable.

5. **Special Provisions for Municipal Facilities (POTWs Only).** Not applicable.

6. **Other Special Provisions.** Not applicable to this permit.

7. **Compliance Schedules.** Not applicable to this permit.

## VII. COMPLIANCE DETERMINATION

Compliance with the effluent limitations contained in Section IV of this Order will be determined as specified below:

A. **General.** Compliance with effluent limitations for reportable pollutants shall be determined using sample reporting protocols defined in the MRP and Attachment A of this Order. For purposes of reporting and administrative enforcement by the Central Coast and State Water Boards, the Discharger shall be deemed out of compliance with effluent limitations if the concentration of the reportable pollutant in the monitoring sample is greater than the effluent limitation and greater than or equal to the reported Minimum Level (ML).

B. **Multiple Sample Data.** When determining compliance with a measure of central tendency (arithmetic mean, geometric mean, median, etc.) of multiple sample analyses and the data set contains one or more reported determinations of "Detected, but Not Quantified" (DNQ) or "Not Detected" (ND), the Discharger shall compute the median in place of the arithmetic mean in accordance with the following procedure:

1. The data set shall be ranked from low to high, ranking the reported ND determinations lowest, DNQ determinations next, followed by quantified values (if any). The order of the individual ND or DNQ determinations is unimportant.

2. The median value of the data set shall be determined. If the data set has an odd number of data points, then the median is the middle value. If the data set has an even number of data points, then the median is the average of the two values around the middle unless one or both of the points are ND or DNQ, in which case the median value shall be the lower of the two data points where DNQ is lower than a value and ND is lower than DNQ.

## ATTACHMENT A – DEFINITIONS

**Areas of Special Biological Significance (ASBS)** are those areas designated by the State Water Board as ocean areas requiring protection of species or biological communities to the extent that alteration of natural water quality is undesirable. All Areas of Special Biological Significance are also classified as a subset of STATE WATER QUALITY PROTECTION AREAS.

**Average Monthly Effluent Limitation (AMEL)** is the highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

**Average Weekly Effluent Limitation (AWEL)** is the highest allowable average of daily discharges over a calendar week (Sunday through Saturday), calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week.

**Chlordane** shall mean the sum of chlordane-alpha, chlordane-gamma, chlordene-alpha, chlordene-gamma, nonachlor-alpha, nonachlor-gamma, and oxychlordane.

**Chronic Toxicity** is a parameter which shall be used to measure the acceptability of waters for supporting a healthy marine biota until improved methods are developed to evaluate biological response.

a. Chronic Toxicity (TUc) expressed as Toxic Units Chronic (TUc)

$$TUc = \frac{100}{NOEL}$$

b. No Observed Effect Level (NOEL) is expressed as the maximum percent effluent or receiving water that causes no observable effect on a test organism, as determined by the result of a critical life stage toxicity test listed in Ocean Plan Appendix II.

**Daily Discharge** is defined as either: (1) the total mass of the constituent discharged over the calendar day (12:00 am through 11:59 pm) or any 24-hour period that reasonably represents a calendar day for purposes of sampling (as specified in the permit), for a constituent with limitations expressed in units of mass or; (2) the unweighted arithmetic mean measurement of the constituent over the day for a constituent with limitations expressed in other units of measurement (e.g., concentration).

The daily discharge may be determined by the analytical results of a composite sample taken over the course of one day (a calendar day or other 24-hour period defined as a day) or by the arithmetic mean of analytical results from one or more grab samples taken over the course of the day.

For composite sampling, if 1 day is defined as a 24-hour period other than a calendar day, the analytical result for the 24-hour period will be considered as the result for the calendar day in which the 24-hour period ends.

**DDT** shall mean the sum of 4,4'DDT, 2,4'DDT, 4,4'DDE, 2,4'DDE, 4,4'DDD, and 2,4'DDD.

**Degradation** shall be determined by comparison of the waste field and reference site(s) for characteristic species diversity, population density, contamination, growth anomalies, debility, or supplanting of normal species by undesirable plant and animal species. Degradation occurs if there are significant differences in any of three major biotic groups, namely, demersal fish, benthic invertebrates, or attached algae. Other groups may be evaluated where benthic species are not affected, or are not the only ones affected.

**Detected, but Not Quantified (DNQ)** are those sample results less than the reported Minimum Level, but greater than or equal to the laboratory's Method Detection Limit.

**Dichlorobenzenes** shall mean the sum of 1,2- and 1,3-dichlorobenzene.

**Downstream Ocean Waters** shall mean waters downstream with respect to ocean currents.

**Endosulfan** shall mean the sum of endosulfan-alpha and -beta and endosulfan sulfate.

**Halomethanes** shall mean the sum of bromoform, bromomethane (methyl bromide) and chloromethane (methyl chloride).

**HCH** shall mean the sum of the alpha, beta, gamma (lindane) and delta isomers of hexachlorocyclohexane.

**Initial Dilution** is the process that results in the rapid and irreversible turbulent mixing of wastewater with ocean water around the point of discharge.

For a submerged buoyant discharge, characteristic of most municipal and industrial wastes that are released from the submarine outfalls, the momentum of the discharge and its initial buoyancy act together to produce turbulent mixing. Initial dilution in this case is completed when the diluting wastewater ceases to rise in the water column and first begins to spread horizontally.

For shallow water submerged discharges, surface discharges, and non-buoyant discharges, characteristic of cooling water wastes and some individual discharges, turbulent mixing results primarily from the momentum of discharge. Initial dilution, in these cases, is considered to be completed when the momentum induced velocity of the discharge ceases to produce significant mixing of the waste, or the diluting plume reaches a fixed distance from the discharge to be specified by the Central Coast Water Board, whichever results in the lower estimate for initial dilution.

**Instantaneous Maximum Effluent Limitation** is the highest allowable value for any single grab sample or aliquot (i.e., each grab sample or aliquot is independently compared to the instantaneous maximum limitation).

**Instantaneous Minimum Effluent Limitation** is the lowest allowable value for any single grab sample or aliquot (i.e., each grab sample or aliquot is independently compared to the instantaneous minimum limitation).

**Mariculture** is the culture of plants and animals in marine waters independent of any pollution source.

**Material** (a) In common usage: (1) the substance or substances of which a thing is made or composed (2) substantial; (b) For purposes of the Ocean Plan relating to waste disposal, dredging and the disposal of dredged material and fill, MATERIAL means matter of any kind or description which is subject to regulation as waste, or any material dredged from the navigable waters of the United States. See also, DREDGED MATERIAL.

**Maximum Daily Effluent Limitation (MDEL)** is the highest allowable daily discharge of a pollutant.

**MDL (Method Detection Limit)** is the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero, as defined in title 40 CFR 136, Appendix B.

**Minimum Level (ML)** is the concentrations at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method-specified sample weights, volumes and processing steps have been followed.

**Natural Light:** Reduction of natural light may be determined by the Central Coast Water Board by measurement of light transmissivity or total irradiance, or both, according to the monitoring needs of the Central Coast Water Board.

**Not Detected (ND)** are those sample results less than the laboratory's Method Detection Limit.

**Ocean Waters** are the territorial marine waters of the state as defined by California law to the extent these waters are outside of enclosed bays, estuaries, and coastal lagoons. If a discharge outside the territorial waters of the state could affect the quality of the waters of the state, the discharge may be regulated to assure no violation of the Ocean Plan will occur in ocean waters.

**PAHs (polynuclear aromatic hydrocarbons)** shall mean the sum of acenaphthylene, anthracene, 1,2-benzanthracene, 3,4-benzofluoranthene, benzo[k]fluoranthene, 1,12-benzoperylene, benzo[a]pyrene, chrysene, dibenzo[ah]anthracene, fluorene, indeno[1,2,3-cd]pyrene, phenanthrene and pyrene.

**PCBs (polychlorinated biphenyls)** shall mean the sum of chlorinated biphenyls whose analytical characteristics resemble those of Aroclor-1016, Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254 and Aroclor-1260.

**Pollutant Minimization Program (PMP)** means waste minimization and pollution prevention actions that include, but are not limited to, product substitution, waste stream recycling, alternative waste management methods, and education of the public and businesses. The goal of the PMP shall be to reduce all potential sources of Ocean Plan Table B pollutants through pollutant minimization (control) strategies, including pollution prevention measures as appropriate, to maintain the effluent concentration at or below the water quality-based effluent limitation. Pollution prevention measures may be particularly appropriate for persistent bioaccumulative priority pollutants where there is evidence that beneficial uses are being impacted. The Central Coast Water Board may consider cost effectiveness when establishing the requirements of a PMP. The completion and implementation of a Pollution Prevention Plan, if required pursuant to Water Code section 13263.3(d), shall be considered to fulfill the PMP requirements.

**Reported Minimum Level** is the Minimum Level (and its associated analytical method) chosen by the Discharger for reporting and compliance determination from the Minimum Levels included in this Order. The Minimum Levels included in this Order correspond to approved analytical methods for reporting a sample result that are selected by the Central Coast Water Board either from Appendix II of the Ocean Plan in accordance with section III.C.5.a. of the Ocean Plan or established in accordance with section III.C.5.b. of the Ocean Plan. The Minimum Level is based on the proper application of method-based analytical procedures for sample preparation and the absence of any matrix interferences. Other factors may be applied to the Minimum Level depending on the specific sample preparation steps employed. For example, the treatment typically applied in cases where there are matrix-effects is to dilute the sample or sample aliquot by a factor of ten. In such cases, this additional factor must be applied to the Minimum Level in the computation of the reported Minimum Level.

**Satellite Collection System** is the portion, if any, of a sanitary sewer system owned or operated by a different public agency than the agency that owns and operates the wastewater treatment facility that a sanitary sewer system is tributary to.

**Shellfish** are organisms identified by the California Department of Health Services as shellfish for public health purposes (i.e., mussels, clams and oysters).

**Significant Difference** is defined as a statistically significant difference in the means of two distributions of sampling results at the 95 percent confidence level.

**Six-month Median Effluent Limitation** is the highest allowable moving median of all daily discharges for any 180-day period.

**State Water Quality Protection Areas (SWQPAs)** are non-terrestrial marine or estuarine areas designated to protect marine species or biological communities from an undesirable alteration in natural water quality. All AREAS OF SPECIAL BIOLOGICAL SIGNIFICANCE (ASBS) that were previously designated by the State Water Board in Resolution No.s 74-28, 74-32, and 75-61 are now also classified as a subset of State Water Quality Protection Areas and require special protections afforded by the Ocean Plan.

**TCDD Equivalents** shall mean the sum of the concentrations of chlorinated dibenzodioxins (2,3,7,8-CDDs) and chlorinated dibenzofurans (2,3,7,8-CDFs) multiplied by their respective toxicity factors, as shown in the table below.

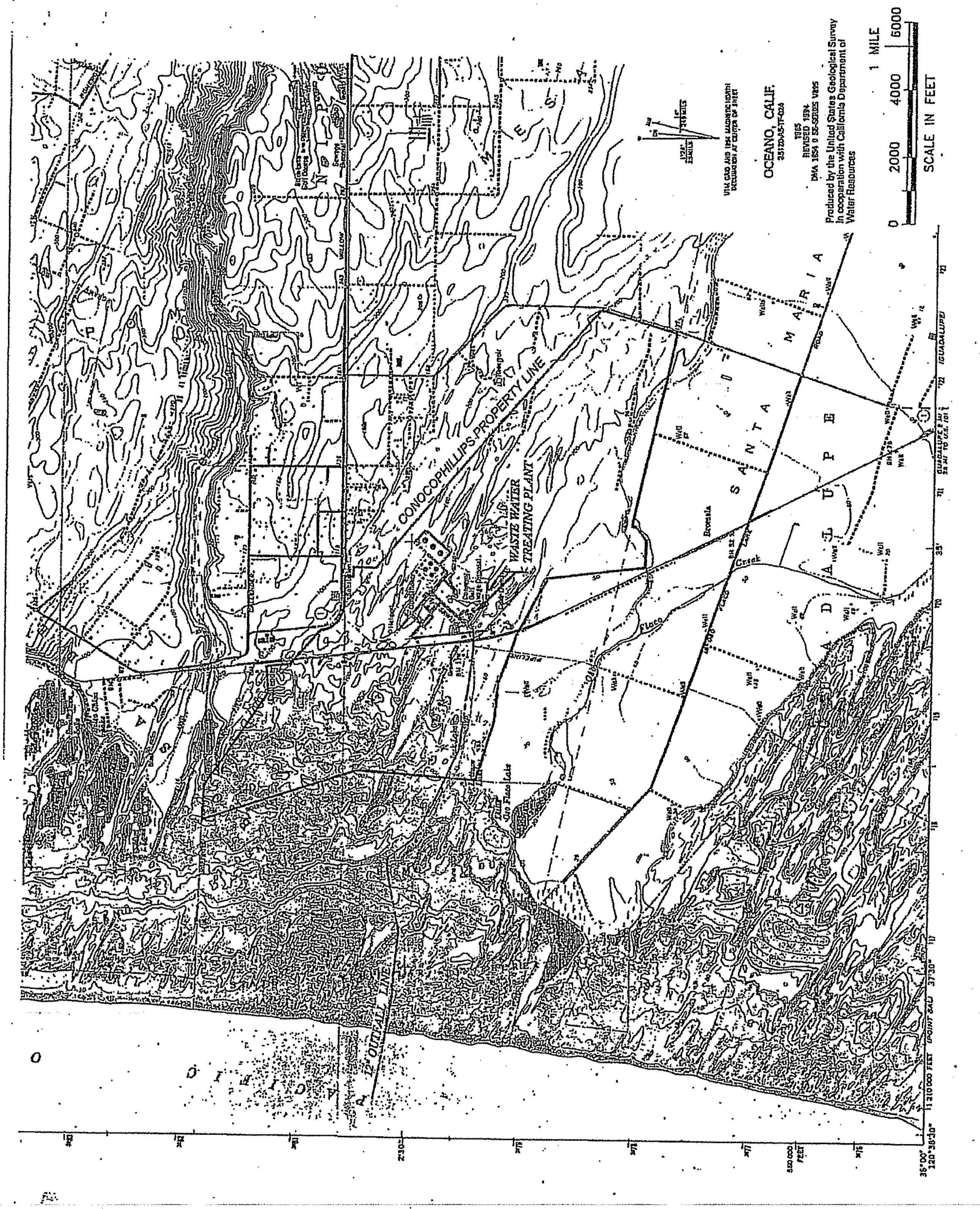
| Isomer Group | Toxicity Equivalence Factor |
|---|---|
| 2,3,7,8-tetra CDD | 1.0 |
| 2,3,7,8-penta CDD | 0.5 |
| 2,3,7,8-hexa CDDs | 0.1 |
| 2,3,7,8-hepta CDD | 0.01 |
| octa CDD | 0.001 |
| 2,3,7,8 tetra CDF | 0.1 |
| 1,2,3,7,8 penta CDF | 0.05 |
| 2,3,4,7,8 penta CDF | 0.5 |
| 2,3,7,8 hexa CDFs | 0.1 |
| 2,3,7,8 hepta CDFs | 0.01 |
| octa CDF | 0.001 |

**Toxicity Reduction Evaluation (TRE)** is a study conducted in a step-wise process designed to identify the causative agents of effluent or ambient toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in toxicity. The first steps of the TRE consist of the collection of data relevant to the toxicity, including additional toxicity testing, and an evaluation of facility operations and maintenance practices, and best management practices. A TOXICITY IDENTIFICATION EVALUATION (TIE) may be required as part of the TRE, if appropriate. (A TIE is a set of procedures to identify the specific chemical(s) responsible for toxicity. These procedures are performed in three phases (characterization, identification, and confirmation) using aquatic organism toxicity tests.)

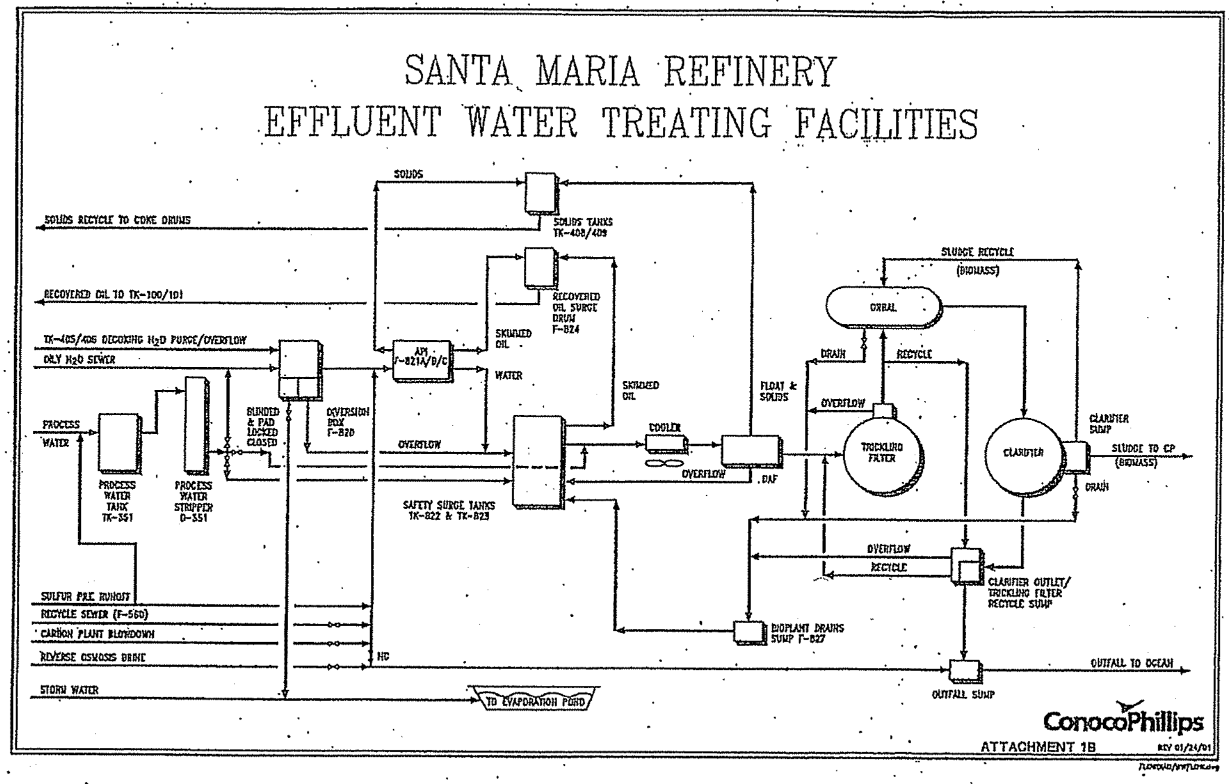
**Waste** as used in the Ocean Plan, waste includes a Discharger's total discharge, of whatever origin, i.e., gross, not net, discharge.

**Water Reclamation** is the treatment of wastewater to render it suitable for reuse, the transportation of treated wastewater to the place of use, and the actual use of treated wastewater for a direct beneficial use or controlled use that would not otherwise occur.

## ATTACHMENT B – MAP



## ATTACHMENT C – FLOW SCHEMATIC



## Appendix G

NOTICE OF NON-COMPLIANCE

Empty for Risk Level 1 Projects

## Appendix H

ANNUAL REPORT DOCUMENTS

This appendix is Empty at NOI

## Appendix I

PHOTO LOG

**PHOTOGRAPHIC LOG**

| Client Name: | Site Location: | Project No. / Task No.: |
|---|---|---|
| Phillips 66 | Santa Maria Refinery Rail Spur | 04597003.0000.00009 |

| Photo No. | Date: |
|---|---|
| 1 | 2013 |

**Description:**
Aerial Pre-existing pipeline area

| Photo No. | Date: |
|---|---|
| 2 | 2013 |

**Description:**
Aerial Pre-existing west area of spur

# PHOTOGRAPHIC LOG

| Client Name: | Site Location: | Project No. / Task No.: |
|---|---|---|
| Phillips 66 | Santa Maria Refinery Rail Spur | 04597003.0000.00009 |

| Photo No. | Date: |
|---|---|
| 3 | 2013 |

**Description:**
Aerial Pre-existing east area of spur

| Photo No. | Date: |
|---|---|
| 4 | 2013 |

**Description:**
Aerial Pre-existing spur area

ARCADIS

# PHOTOGRAPHIC LOG

| Client Name: | Site Location: | Project No. / Task No.: |
|---|---|---|
| Phillips 66 | Santa Maria Refinery Rail Spur | 04597003.0000.00009 |

| Photo No. | Date: |
|---|---|
| 5 | 10/11/2013 |

**Description:**
Future pipeline area with existing pipes

## PHOTOGRAPHIC LOG

| Client Name: | Site Location: | Project No. / Task No.: |
|---|---|---|
| Phillips 66 | Santa Maria Refinery Rail Spur | 04597003.0000.00009 |

| Photo No. | Date: |
|---|---|
| 6 | 10/11/2013 |

**Description:**
Future pipeline area with existing pipes

| Photo No. | Date: |
|---|---|
| 7 | 10/11/2013 |

**Description:**
Future pipeline area with existing access road

| ARCADIS | | PHOTOGRAPHIC LOG |
|---|---|---|
| **Client Name:** Phillips 66 | **Site Location:** Santa Maria Refinery Rail Spur | **Project No. / Task No.:** 04597003.0000.00009 |

| **Photo No.** | **Date:** |
|---|---|
| 8 | 10/11/2013 |

**Description:**
Future pipeline area with existing access road

| **Photo No.** | **Date:** |
|---|---|
| 9 | 10/11/2013 |

**Description:**
Future pipeline area with existing access road

# PHOTOGRAPHIC LOG

| Client Name: | Site Location: | Project No. / Task No.: |
|---|---|---|
| Phillips 66 | Santa Maria Refinery Rail Spur | 04597003.0000.00009 |

| Photo No. | Date: |
|---|---|
| 10 | 10/11/2013 |

**Description:**
Existing coke storage and loading area

| Photo No. | Date: |
|---|---|
| 11 | 10/11/2013 |

**Description:**
Future rail spur area

# PHOTOGRAPHIC LOG

| Client Name: | Site Location: | Project No. / Task No.: |
|---|---|---|
| Phillips 66 | Santa Maria Refinery Rail Spur | 04597003.0000.00009 |

| Photo No. | Date: |
|---|---|
| 12 | 10/11/2013 |

**Description:**
Future rail spur area

| Photo No. | Date: |
|---|---|
| 13 | 10/11/2013 |

**Description:**
Future rail spur area

ARCADIS

# PHOTOGRAPHIC LOG

| Client Name: | Site Location: | Project No. / Task No.: |
|---|---|---|
| Phillips 66 | Santa Maria Refinery Rail Spur | 04597003.0000.00009 |

| Photo No. | Date: |
|---|---|
| 14 | 10/11/2013 |

**Description:**
Future emergency access road with existing road

| Photo No. | Date: |
|---|---|
| 15 | 10/11/2013 |

**Description:**
Existing coke area and rail spur

ARCADIS

# PHOTOGRAPHIC LOG

| Client Name: | Site Location: | Project No. / Task No.: |
|---|---|---|
| Phillips 66 | Santa Maria Refinery Rail Spur | 04597003.0000.00009 |

| Photo No. | Date: |
|---|---|
| 16 | 10/11/2013 |

**Description:**
Existing coke area

| Photo No. | Date: |
|---|---|
| 17 | 10/11/2013 |

**Description:**
Existing coke plant and rail spur

ARCADIS

# PHOTOGRAPHIC LOG

| Client Name: | Site Location: | Project No. / Task No.: |
|---|---|---|
| Phillips 66 | Santa Maria Refinery Rail Spur | 04597003.0000.00009 |

| Photo No. | Date: |
|---|---|
| 18 | 10/11/2013 |

**Description:**
Existing coke plant and rail spur


| Photo No. | Date: |
|---|---|
| 19 | 10/11/2013 |

**Description:**
Existing rail spur entrance to facility

# PHOTOGRAPHIC LOG

| Client Name: | Site Location: | Project No. / Task No.: |
|---|---|---|
| Phillips 66 | Santa Maria Refinery Rail Spur | 04597003.0000.00009 |

| Photo No. | Date: |
|---|---|
| 20 | 10/11/2013 |

**Description:**
Existing coke area

| Photo No. | Date: |
|---|---|
| 21 | 10/11/2013 |

**Description:**
Future rail spur area

ARCADIS

# PHOTOGRAPHIC LOG

| Client Name: | Site Location: | Project No. / Task No.: |
|---|---|---|
| Phillips 66 | Santa Maria Refinery Rail Spur | 04597003.0000.00009 |

| Photo No. | Date: |
|---|---|
| 22 | 10/11/2013 |

**Description:**
Future rail spur area

| Photo No. | Date: |
|---|---|
| 23 | 10/11/2013 |

**Description:**
Future pipeline area with existing access road

# Appendix J

CONSTRUCTION SCHEDULE

**Appendix J – Construction Schedule for Phillips 66 Santa Maria Refinery Rail Project**

The overall construction is anticipated to occur over a period of 9 – 10 months. In some cases, portions of the individual tasks below would occur concurrently. The anticipated construction schedule is listed below.
Estimated Construction Start Date: August 2014
Proposed Construction Completion Date: June 2015
Rainy Season: October - April

| BMPs | Aug. 2014 | Sep. 2014 | Oct. 2014 | Nov. 2014 | Dec. 2014 | Jan. 2015 | Feb. 2015 | Mar. 2015 | Apr. 2015 | May. 2015 | Jun. 2015 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Demolition | X | | | | | | | | | | |
| Turnout Track Replacement (If Needed) | X | | | | | | | | | | |
| Grading | | X | X | X | X | | | | | | |
| Soil Transport | | X | X | X | X | | | | | | |
| Construction of Rail | | | | | | X | | | | | |
| Construction of Pipeline | | | | | | X | X | X | X | | |
| Construction of Unloading Area | | | | | | X | X | X | X | | |
| Commissioning/Turnover | | | | | | | | | | X | X |

## Appendix K

CONSTRUCTION ACTIVITIES,
MATERIALS USED AND
ASSOCIATED POLLUTANTS

**Appendix K – Construction Activities, Materials Used and Associated Pollutants**

| Construction Activity | Site Map | Sediment | Oil, Greases, and Fuels | Miscellaneous Waste |
|---|---|---|---|---|
| Vehicle Uses, Storage, and Emergency Maintenance | Site Plan: SW -2 through SW -16 | | X | X |
| Equipment Uses, Storage, and Maintenance | Site Plan: SW -2 through SW -16 | | X | X |
| Material Delivery, Use, and Storage | Site Plan: SW -2 through SW -16 | | X | X |
| Abrasive Media for Sandblasting Welds | Site Plan: SW -2 through SW -16 | | X | X |
| Asphalt Installation | Site Plan: SW -2 through SW -16 | | X | X |
| Cement Use for Footing and Slabs | Site Plan: SW -2 through SW -16 | | | X |
| Temporary Sanitary Facilities | Site Plan: SW -2 through SW -16 | | | X |
| Trenching and Excavation for Pipeline | Site Plan: SW -2 through SW -16 | X | X | |
| Dust Suppression | Site Plan: SW -2 through SW -16 | X | | |
| Mass Grading | Site Plan: SW -2 through SW -16 | X | X | X |
| Grading Petroleum Coke Material | Site Plan: SW -2 through SW -16 | X | X | |
| Finish Grading Operations | Site Plan: SW -2 through SW -16 | X | X | X |
| Construction of Rail | Site Plan: SW -2 through SW -16 | | X | X |
| Track Replacement | Site Plan: SW -2 through SW -16 | | X | X |

# Potential Pollutants and Testing Guidance Table

| Category | Construction Site Material | Visually Observable? | Pollutant Indicators [2] | Suggested Analyses Field [3] | Laboratory |
|---|---|---|---|---|---|
| **Asphalt Products** (Sections 37, 39, 92, 93, 94, and Special Provisions) | Hot Asphalt | Yes - Rainbow Surface or Brown Suspension | Visually Observable - No Testing Required | | |
| | Asphalt Emulsion | | | | |
| | Liquid Asphalt (tack coat) | | | | |
| | Cold Mix | | | | |
| | Crumb Rubber | Yes – Black, solid material | Visually Observable - No Testing Required | | |
| | Asphalt Concrete (Any Type) | Yes - Rainbow Surface or Brown Suspension | Visually Observable - No Testing Required | | |
| **Cleaning Products** | Acids | No | pH<br>Acidity Anions (acetic acid, phosphoric acid, sulfuric acid, nitric acid, hydrogen chloride) | pH Meter<br>Acidity Test Kit | EPA 150.1 (pH) |
| | | | | | SM 2310B (Acidity) |
| | | | | | EPA 300.0 (Anion) |
| | Bleaches | No | Residual Chlorine | Chlorine | SM 4500-CL G (Res. Chlorine) |
| | Detergents | Yes - Foam | Visually Observable - No Testing Required | | |
| | TSP | No | Phosphate | Phosphate | EPA 365.3 (Phosphate) |
| | Solvents | No | VOC | None | EPA 601/602 or EPA 624 (VOC) |
| | | | SVOC | None | EPA 625 (SVOC) |

| Category | Construction Site Material | Visually Observable? | Pollutant Indicators [2] | Suggested Analyses Field [3] | Laboratory |
|---|---|---|---|---|---|
| **Portland Concrete Cement & Masonry Products** (Section 27, 28, 29, 40, 41, 42, 49, 50, 51, 53, 63, 65, 72, 73, 80, 81, 83, 90, and Special Provisions) | Portland Cement (PCC) | Yes - Milky Liquid | Visually Observable - No Testing Required | | |
| | Masonry products | No | pH | pH Meter Alkalinity or Acidity Test Kit | EPA 150.1 (pH) |
| | | | Alkalinity | | SM 2320 (Alkalinity) |
| | Sealant (Methyl Methacrylate - MMA) | No | Methyl Methacrylate | None | EPA 625 (SVOC) |
| | | | Cobalt | | EPA 200.8 (Metal) |
| | | | Zinc | | |
| | Incinerator Bottom Ash<br>Bottom Ash<br>Steel Slag<br>Foundry Sand<br>Fly Ash<br>Municipal Solid Waste | No | Aluminum<br>Calcium<br>Vanadium<br>Zinc | Calcium Test | EPA 200.8 (Metal)<br>EPA 200.7 (Calcium) |
| | Mortar | Yes - Milky Liquid | Visually Observable - No Testing Required | | |
| | Concrete Rinse Water | Yes - Milky Liquid | Visually Observable - No Testing Required | | |
| | Non-Pigmented Curing Compounds | No | Acidity | pH Meter Alkalinity or Acidity Test Kit | SM 2310B (Acidity) |
| | | | Alkalinity | | SM 2320 (Alkalinity) |
| | | | pH | | EPA 150.1 (pH) |
| | | | VOC | | EPA 601/602 or EPA 624 (VOC) |

Potential Pollutants and Testing Guidance Table

| Category | Construction Site Material | Visually Observable? | Pollutant Indicators [2] | Suggested Analyses Field [3] | Laboratory |
|---|---|---|---|---|---|
| **Landscaping and Other Products** (Section 20, 24, and Special Provisions) | | | SVOC | | EPA 625 (SVOC) |
| | Aluminum Sulfate | No | Aluminum | TDS Meter Sulfate | EPA 200.8 (Metal) |
| | | | TDS | | EPA 160.1 (TDS) |
| | | | Sulfate | | EPA 300.0 (Sulfate) |
| | Sulfur-Elemental | No | Sulfate | Sulfate | EPA 300.0 (Sulfate) |
| | Fertilizers-Inorganic [4] | No | Nitrate | Nitrate | EPA 300.0 (Nitrate) |
| | | | Phosphate | Phosphate | EPA 365.3 (Phosphate) |
| | | | Organic Nitrogen | None | EPA 351.3 (TKN) |
| | | | Potassium | None | EPA 200.8 (Metal) |
| | Fertilizers-Organic | No | TOC | Nitrate | EPA 415.1 (TOC) |
| | | | Nitrate | | EPA 300.0 (Nitrate) |
| | | | Organic Nitrogen | | EPA 351.3 (TKN) |
| | | | COD | | EPA 410.4 (COD) |
| | Natural Earth (Sand, Gravel, and Topsoil) | Yes - Cloudiness and turbidity | Visually Observable - No Testing Required | | |
| | Herbicide | No | Herbicide | None | Check lab for specific herbicide or pesticide |
| | Pesticide | | Pesticide | | |

| Category | Construction Site Material | Visually Observable? | Pollutant Indicators [2] | Suggested Analyses Field [3] | Laboratory |
|---|---|---|---|---|---|
| **Painting Products** (Section 12-3.08, 20-2.32, 50-1.05, 59, 91, and Special Provisions) | Lime | | Alkalinity | pH Meter Alkalinity or Acidity Test Kit | SM 2320 (Alkalinity) |
| | | | pH | | EPA 150.1 (pH) |
| | Paint | Yes | Visually Observable - No Testing Required | | |
| | Paint Strippers | No | VOC | None | EPA 601/602 or EPA 624 (VOC) |
| | | | SVOC | None | EPA 625 (SVOC) |
| | Resins | No | COD | None | EPA 410.4 (COD) |
| | | | SVOC | | EPA 625 (SVOC) |
| | Sealants | No | COD | None | EPA 410.4 (COD) |
| | Solvents | No | COD | None | EPA 410.4 (COD) |
| | | | VOC | | EPA 601/602 or EPA 624 (VOC) |
| | | | SVOC | | EPA 625 (SVOC) |
| | Lacquers, Varnish, Enamels, and Turpentine | No | COD | None | EPA 410.4 (COD) |
| | | | VOC | | EPA 601/602 or EPA 624 (VOC) |
| | | | SVOC | | EPA 625 (SVOC) |
| | Thinners | No | VOC | None | EPA 601/602 or EPA 624 (VOC) |

Potential Pollutants and Testing Guidance Table

| Category | Construction Site Material | Visually Observable? | Pollutant Indicators [2] | Suggested Analyses Field [3] | Laboratory |
|---|---|---|---|---|---|
| | | | COD | | EPA 410.4 (COD) |
| **Portable Toilet Waste Products** | Portable Toilet Waste | Yes | Visually Observable - No Testing Required | | |
| **Contaminated Soil [5]** | Aerially Deposited Lead[3] | No | Lead | None | EPA 200.8 (Metal) |
| | Petroleum | Yes – Rainbow Surface Sheen and Odor | Visually Observable - No Testing Required | | |
| | Mining or Industrial Waste, etc. | No | Contaminant Specific | Contaminant Specific – Check with laboratory | Contaminant Specific – Check with laboratory |
| **Line Flushing Products** | Chlorinated Water | No | Total chlorine | Chlorine | SM 4500-CL G (Res. Chlorine) |
| **Adhesives** | Adhesives | No | COD | None | EPA 410.4 (COD) |
| | | | Phenols | Phenol | EPA 420.1 (Phenol) |
| | | | SVOC | None | EPA 625 (SVOC) |
| **Dust Palliative Products** (Section 18) | Salts (Magnesium Chloride, Calcium Chloride, and Natural Brines) | No | Chloride | Chloride | EPA 300.0 (Chloride) |
| | | | TDS | TDS Meter | EPA 160.1 (TDS) |
| | | | Cations (Sodium, Magnesium, Calcium) | None | EPA 200.7 (Cations) |
| **Vehicle** | Antifreeze and Other Vehicle Fluids | Yes - Colored Liquid | Visually Observable - No Testing Required | | |
| | Batteries | No | Sulfuric Acid | None | EPA 300.0 (Sulfate) |
| | | | Lead | None | EPA 200.8 (Metal) |

| Category | Construction Site Material | Visually Observable? | Pollutant Indicators [2] | Suggested Analyses Field [3] | Laboratory |
|---|---|---|---|---|---|
| | | | pH | pH Meter Alkalinity or Acidity Test Kit | EPA 150.1 (pH) |
| | Fuels, Oils, Lubricants | Yes - Rainbow Surface Sheen and Odor | Visually Observable - No Testing Required | | |
| **Soil Amendment/Stabilization Products** | Polymer/Copolymer [6, 7] | No | Organic Nitrogen | None | EPA 351.3 (TKN) |
| | | | BOD | None | EPA 405.1 (BOD) |
| | | | COD | None | EPA 410.4 (COD) |
| | | | DOC | None | EPA 415.1 (DOC) |
| | | | Nitrate | Nitrate | EPA 300.0 (Nitrate) |
| | | | Sulfate | Sulfate | EPA 300.0 (Sulfate) |
| | | | Nickel | None | EPA 200.8 (Metal) |
| | Straw/Mulch | Yes - Solids | Visually Observable - No Testing Required | | |
| | Lignin Sulfonate | No | Alkalinity | Alkalinity | SM 2320 (Alkalinity) |
| | | | TDS | TDS Meter | EPA 160.1 (TDS) |
| | Psyllium | No | COD | None | EPA 410.4 (COD) |
| | | | TOC | | EPA 415.1 (TOC) |
| | Guar/Plant Gums | No | COD | None | EPA 410.4 (COD) |
| | | | TOC | | EPA 415.1 (TOC) |
| | | | Nickel | | EPA 200.8 (Metal) |
| | Gypsum | No | pH | pH Meter Alkalinity or Acidity Test Kit | EPA 150.1 (pH) |
| | | | Calcium | Calcium | EPA 200.7 (Calcium) |
| | | | Sulfate | Sulfate | EPA 300.0 (Sulfate) |

Potential Pollutants and Testing Guidance Table

| Category | Construction Site Material | Visually Observable? | Pollutant Indicators [2] | Suggested Analyses Field [3] | Laboratory |
|---|---|---|---|---|---|
| | | | Aluminum<br>Barium<br>Manganese<br>Vanadium | None | EPA 200.8 (Metal) |
| **Treated Wood Products** (Section 58, 80-3.01B(2), and Special Provisions) | Ammoniacal-Copper-Zinc-Arsenate (ACZA)<br>Copper-Chromium-Arsenic (CCA)<br>Ammoniacal-Copper-Arsenate (ACA)<br>Copper Naphthenate | No | Arsenic<br>Total Chromium<br>Copper<br>Zinc | Total Chromium | EPA 200.8 (Metal) |
| | Creosote | Yes - Rainbow Surface or Brown Suspension | Visually Observable - No Testing Required | | |
| **Wet Weather Runoff** | Oil and Grease | Yes - Rainbow Surface or Brown Suspension | Visually Observable - No Testing Required | | |
| | Storm Runoff Commingled with Process Wastewater | No | Phenolic Compounds | Total Chromium | EPA 200.8 (Metal) |

| | | | | | |
|---|---|---|---|---|---|
| | | | Hexavalent Chromium | | |
| | | | Total Chromium | | |
| - | | | BOD5 | None | EPA 405.1 (BOD) |
| | | | COD | None | EPA 410.4 (COD) |
| | | | TSS | None | EPA 160.2 (TSS) |

**Notes:**

1. If specific pollutant is known, analyze only for that specific pollutant. See MSDS to verify.
2. For each construction material, test for one of the pollutant indicators. Bolded pollutant indicates lowest analysis cost or best indicator. However, the composition of the specific construction material, if known, is the first criterion for selecting which analysis to use.
3. See www.hach.com, www.lamotte.com, www.ysi.com and www.chemetrics.com for some of the test kits
4. If the type of inorganic fertilizer is unknown, analyze for all pollutant indicators listed.
5. Only if special handling requirements are required in the Standard Special Provisions for aerially deposited lead (ADL)
6. If used with a dye or fiber matrix, it is considered visually observable and no testing is required.
7. Based upon research conducted by Caltrans, the following copolymers/polymers do not discharge pollutants and water quality sampling and analysis is **not** required: Super Tak™, M-Binder™, Fish Stik™, Pro40dc™, Fisch-Bond™, Soil Master WR™, and EarthGuard™.

**Acronyms:**
BOD – Biochemical Oxygen Demand
COD – Chemical Oxygen Demand
DOC – Dissolved Organic Carbon
EPA – Environmental Protection Agency
HACH – Worldwide company that provides advanced analytical systems and technical support for water quality testing.
SM – Standard Method
SVOC – Semi-Volatile Organic Compounds
TDS – Total Dissolved Solids
TKN – Total Kjeldahl Nitrogen
TOC – Total Organic Carbon
TSP – Tri-Sodium Phosphate
TSS – Total Suspended Solid
VOC - Volatile Organic Compounds

**References:**
*Construction Storm Water Sampling and Analysis Guidance Document*, California Stormwater Quality Task Force, October 2001.
*Environmental Impact of Construction and Repair Materials on Surface and Ground Waters, Report 448*, National Cooperative Highway Research Program, 2001.
*Soil Stabilization for Temporary Slopes*, Environmental Programs, California Department of Transportation, October 1, 1999.
*Statewide Storm Water Management Plan*, Division of Environmental Analysis, California Department of Transportation, April 2002.
*Statewide Storm Water Quality Practice Guidelines*, Environmental Program, California Department of Transportation, August 2000.
*Soil Stabilization for Temporary Slopes and District 7 Erosion Control Pilot Study*, June 2000.
*Stormwater Monitoring Protocols, Guidance Manual*, California Department of Transportation, May 2000.

## Appendix L

CONSTRUCTION SITE
INSPECTION REPORT FORM

## *Construction Site Inspection Form*

| | |
|---|---|
| Date and Time of Inspection: | Report Date: |

| Inspection Type: | Weekly ☐ | Before predicted rain ☐ | During rain event ☐ | Following qualifying rain event ☐ | Contained storm water release ☐ | Quarterly non-storm water ☐ | Quarterly non-visible ☐ |
|---|---|---|---|---|---|---|---|

## Site Information

| | |
|---|---|
| Construction Site Name: | |
| Construction stage and Completed activities: | Approximate area Of exposed site: |

## Weather and Observations

| | | |
|---|---|---|
| Date Rain Predicted to Occur: | | Observations: If yes identify location |
| | | Odors Yes ☐ No ☐ |
| Estimated storm beginning: | Estimated storm duration: | Floating Material Yes ☐ No ☐ |
| | | Suspended Material Yes ☐ No ☐ |
| Predicted % chance of rain: | | Sheen Yes ☐ No ☐ |
| Estimated time since last storm: | Rain gauge reading: | Discolorations Yes ☐ No ☐ |
| | | Turbidity Yes ☐ No ☐ |

## Site Inspections

| **Outfalls or BMPs Evaluated** | **Deficiencies Noted** | | |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| Photos Taken: | Yes ☐ | No ☐ | Photo Reference IDs: |

**Corrective Actions Identified** (repairs to begin within 72 hours of identification)

| **Repair Start Date** | **Action** | **Responsible Individual** | **Completion Date** |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

## Inspector Information

| | |
|---|---|
| Inspector Name: | Inspector Title: |
| Signature: | Date: |

| INSPECTION OF BMPs – Checklist | | | | |
|---|---|---|---|---|
| **BMP** | **Yes** | **No** | **N/A** | **Comments** |
| **Preservation of Existing Vegetation** | | | | |
| Is temporary fencing provided to preserve vegetation in areas where no construction activity is planned? | | | | |
| **Erosion Control** | | | | |
| Does the applied temporary erosion control provide 100% coverage for the affected areas? | | | | |
| Are any non-vegetated areas that may require temporary erosion control? | | | | |
| Is the area where erosion controls are used required free from visible erosion? | | | | |
| **Temporary Linear Sediment Barriers (Silt Fence, Fiber Rolls, Sandbag Barriers, etc.)** | | | | |
| Are temporary linear sediment barriers properly installed, functional and maintained? | | | | |
| Are temporary linear sediment barriers free of accumulated litter? | | | | |
| Is the built-up sediment less than 1/3 the height of the barrier? | | | | |
| Are cross barriers installed where necessary and properly spaced? | | | | |
| **Concentrated Flows** | | | | |
| Are concentrated flow paths free of visible erosion? | | | | |
| **Tracking Control** | | | | |
| Is the entrance stabilized to prevent tracking | | | | |
| Is the stabilized entrance inspected daily to ensure that it is working properly | | | | |
| Are points of ingress/egress to public/private roads inspected and swept and vacuumed as needed? | | | | |
| Are all paved areas free of visible sediment tracking or other particulate matter? | | | | |
| **Wind Erosion Control** | | | | |
| Is dust control implemented? | | | | |
| **Vehicle & Equipment Fueling, Cleaning, and Maintenance** | | | | |
| Are vehicle and equipment fueling, cleaning and maintenance areas reasonably clean and free of spills, leaks, or any other deleterious material? | | | | |
| Are vehicle and equipment fueling, cleaning and maintenance activities performed on an impermeable surface in dedicated areas? | | | | |
| If no, are drip pans used? | | | | |
| Are dedicated fueling, cleaning, and maintenance areas located at least 15 m away from downstream drainage facilities and watercourses and protected from run-on and runoff? | | | | |
| Is wash water contained for infiltration/ evaporation and disposed of appropriately? | | | | |
| Is on-site cleaning limited to washing with water (no soap, soaps substitutes, solvents, or steam)? | | | | |
| On each day of use, are vehicles and equipment inspected for leaks and if necessary, repaired? | | | | |
| **Waste Management & Materials Pollution Control** | | | | |
| Are material storage areas and washout areas protected from run-on and runoff, and located at least 15 m from concentrated flows and downstream drainage facilities? | | | | |

| INSPECTION OF BMPs – Checklist | | | | |
|---|---|---|---|---|
| **BMP** | **Yes** | **No** | **N/A** | **Comments** |
| Are all material handling and storage areas clean; organized; free of spills, leaks, or any other deleterious material; and stocked with appropriate clean-up supplies? | | | | |
| Are liquid materials, hazardous materials, and hazardous wastes stored in temporary containment facilities? | | | | |
| Are bagged and boxed materials stored on pallets? | | | | |
| Are hazardous materials and wastes stored in appropriate, labeled containers? | | | | |
| Are proper storage, clean-up, and spill-reporting procedures for hazardous materials and wastes posted in open, conspicuous and accessible locations adjacent to storage areas? | | | | |
| Are temporary containment facilities free of spills and rainwater? | | | | |
| Are temporary containment facilities and bagged/boxed materials covered? | | | | |
| Are temporary concrete washout facilities designated and being used? | | | | |
| Are temporary concrete washout facilities functional for receiving and containing concrete waste and are concrete residues prevented from entering the drainage system? | | | | |
| Do temporary concrete washout facilities provide sufficient volume and freeboard for planned concrete operations? | | | | |
| Are concrete wastes, including residues from cutting and grinding, contained and disposed of off-site or in concrete washout facilities? | | | | |
| Are spills from mobile equipment fueling and maintenance properly contained and cleaned up? | | | | |
| Are sanitation facilities properly maintained, placed and anchored? | | | | |
| Are trash receptacles provided in the yard, field trailer areas, and at locations where workers congregate for lunch and break periods? | | | | |
| Is the site free from litter? Is litter from work areas collected and placed in watertight dumpsters? | | | | |
| Are waste management receptacles free of leaks? | | | | |
| Are the contents of waste management receptacles properly protected from contact with storm water or from being dislodged by winds? | | | | |
| Are waste management receptacles filled at or beyond capacity? | | | | |
| **Illicit Connection/ Discharge** | | | | |
| Is there any evidence of illicit discharges or illegal dumping on the project site? | | | | |
| If yes, has the Owner/Operator been notified? | | | | |
| **Discharge Points** | | | | |
| Are discharge points and discharge flows free from visible pollutants? | | | | |
| Are discharge points free of any significant sediment transport? | | | | |
| **SWPPP Update** | | | | |
| Does the SWPPP and Project Schedule adequately reflect the current site conditions and contractor operations? | | | | |
| Are all BMPs shown on the water pollution control drawings installed in the proper location(s) and according to the details in the SWPPP? | | | | |
| **General** | | | | |
| Are there any other potential concerns at the site? | | | | |

| INSPECTION OF BMPs – Checklist | | | | |
|---|---|---|---|---|
| **BMP** | **Yes** | **No** | **N/A** | **Comments** |
| **Storm Water Monitoring** | | | | |
| Were there any BMPs not properly implemented or breaches, malfunctions, leakages or spills observed which could result in the discharge of pollutants to surface waters that would not be visually detectable in storm water? | | | | |
| If yes, were samples for non-visually detectable pollutants collected pursuant to the sampling and analysis plan during rain events? | | | | |
| If sampling indicated pollution of the storm water, were the leaks, breaches, spills, etc. cleaned up and the contaminated soil properly disposed of? | | | | |
| Were the BMPs maintained or replaced? | | | | |
| If yes, were samples for non-visually detectable pollutants collected pursuant to the sampling and analysis plan in the SWPPP? | | | | |
| If sampling indicated pollution of the storm water by the use of the soil amendments, is there a contingency plan for retention onsite of the polluted storm water? | | | | |
| Did storm water contact stored materials or waste and run off the construction site? (Materials not in watertight containers, etc.) | | | | |

General Notes:

| ***Non-Visible Pollutant Sampling Field Log Sheets*** | | | |
|---|---|---|---|
| Construction Site Name: | Date: | Time Start: | |
| Sampler: | | | |
| Sampling Event Type: | ☐ Storm water | ☐ Non-storm water | ☐ Non-visible pollutant |

| **Field Meter Calibration** | |
|---|---|
| pH Meter ID No./Desc.:<br>Calibration Date/Time: | Turbidity Meter ID No./Desc.:<br>Calibration Date/Time: |

**Field pH and Turbidity Measurements**

| Discharge Location Description | pH | Turbidity | Time |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**Grab Samples Collected**

| Discharge Location Description | Sample Type | Time |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |

| |
|---|
| Additional Sampling Notes: |
| Time End: |

## Appendix M

TRAINING REPORTING FORM

# Phillips 66 Santa Maria Refinery Rail Project
# SWPPP Training Reporting Form

Trainer: ______________________ Date: ______________________

| Name | Company | Training Date | Signature |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

# Appendix N

CONTRACTOR AND
SUBCONTRACTOR LOG

**LIST OF CONTRACTORS AND SUBCONTRACTORS**

Project Name: Phillips 66 Santa Maria Refinery Rail Project

WDID:

| CONTRACTORS | | | | | | |
|---|---|---|---|---|---|---|
| **COMPANY NAME** | **CLIENT** | **CONTACT NAME** | **ADDRESS** | **PHONE NUMBER** | **FIELD PHONE** | **TYPE OF WORK** |
| TBD | | | | | | |
| TBD | | | | | | |
| TBD | | | | | | |

## Appendix O

POST-CONSTRUCTION REQUIREMENTS – WATER BALANCE CALCULATOR AND SUPPORTING DOCUMENTATION

ARCADIS U.S., Inc.
2500 North First Street
Suite 200
San Jose
California 95131
Tel 408 797 2000
Fax 408 456 0320
**www.arcadis-us.com**

ENVIRONMENT

Central Coast Regional Water Quality Control Board
895 Aerovista Place, Suite 101
San Luis Obispo, CA. 93401-7906

Subject:
Phillips 66 Santa Maria Refinery (SMR) Rail Project SWPPP – Supporting Documentation for Satisfying Post Construction Requirements Not Utilizing the Water Balance Calculator

Date:
September 30, 2013

Contact:
Tim Rumbolz, CPESC, QSD
Phone:
408-797-2009

Email:
Timothy.Rumbolz@arcadis-us.com

Our ref:
[Project No.]

To Whom It May Concern:

In preparation for the Storm Water Pollution Prevention Plan (SWPPP) for the Phillips 66 Santa Maria Refinery Rail Project ("the project"), ARCADIS has prepared supporting documentation to satisfy the post-construction requirements of the California State Construction General Permit ("General Permit"; Order 2009-0009-DWQ amended by 2010-0014-DWQ & 2012-0006-DWQ). In accordance with the requirements, the site has been divided into several sub-watersheds, some of which comply with the post-construction run-off requirements using the Post-Construction Water Balance Calculator, and some of which demonstrate retention of additional runoff in the 85$^{th}$ percentile storm event with supporting documentation. Since the Storm water Multiple Applications Tracking System (SMARTS) only permits the selection of one method or the other, supporting documentation for watersheds that comply by demonstrating retention of additional runoff during the 85$^{th}$ percentile storm event have been appended to this letter.

**Project Sub-Watersheds**

The project area has been divided into 5 sub-watersheds that each discharge to a separate location. Please refer to the Water Pollution Control Drawings (WPCDs) to view the project area and the delineated sub-watersheds.

1. Pipeway Work in SMR Facility Proper
   This sub-watershed contains all pipeway work inside the existing Santa Maria Refinery Facility. Areas without curb in the Facility Proper such as the vicinity of the pipeway generally drain to adjacent soils where it infiltrates. Refer to the Post-Construction Water Balance Calculator in the SMARTS tab for demonstrated compliance for this sub-watershed.

2. Pipeline Corridor
This sub-watershed includes a graded pipe rack corridor between the Unloading Area and the Facility Proper. Runoff from this drainage area will not be collected in the on-site treatment system. Compliance is demonstrated through the use of the Post-Construction Water Balance Calculator in the Post-Construction tab on SMARTS.

3. Unloading Area Vicinity
Graded surfaces near the Unloading Area on the west side of the proposed rail spur in the Waste Coke Area will discharge to adjacent surface soils and will be allowed to infiltrate. Compliance is demonstrated through the use of the Post-Construction Water Balance Calculator in the Post-Construction tab on SMARTS.

4. Railroad Spur and Emergency Access Road
This sub-watershed is comprised of the graded railroad spur and widened emergency access road and represents all project disturbance areas not included in other sub-watersheds. This sub-watershed contains the majority of project grading with finish surfaces composed mostly of re-vegetated native soil and a gravel road with the railroad tracks contributing the only proposed impervious surfaces in this sub-watershed. Compliance is demonstrated using the Post-Construction Water Balance Calculator in the post-construction tab on SMARTS.

5. Curbed Equipment Pads in Unloading Area
Specific concrete equipment pads in the Unloading Area are designed to drain to holding tanks which regulate flow to the SMR Facility's oil-water separator and NPDES-Permitted water treatment system that discharges to the Pacific Ocean.

The proposed holding tanks that are designed to meter flow to the site's NPDES-permitted contact water treatment system so as not to overwhelm the existing system have a total volume of 60,000 gallons (per SPEC Services) or 8,021 cubic feet. The total tributary drainage area of the proposed slabs is 8,391 square feet (provided by SPEC Services). According to the 85$^{th}$ Percentile Storm Event Isohyet Map (Central Coast Regional Water Quality Control Board; refer to attached excerpt from map showing the project area), the rainfall depth from the $85^{th}$ Percentile design storm event is 0.95 inches.

Applying this depth to the entire area conservatively assuming that the entire area contributes runoff without infiltration yields a runoff volume of 665 cubic feet for the $85^{th}$ percentile design storm, which is approximately 9 percent of the holding tank volume, sufficiently containing the $85^{th}$ percentile design storm runoff.

runoff volume = (rainfall depth) * (tributary drainage area)

$$[0.95''/(12''/ft)] * 8{,}391 \text{ ft}^2 = 665 \text{ ft}^3 < 8{,}021 \text{ ft}^3$$

6. Unloading Area Canopy Roof

Runoff from the roof canopy over the Unloading Area will be collected in downspouts that discharge to an infiltration basin adjacent to the Unloading Area.

The basin has a design volume of 83,611 gallons plus 1 foot of freeboard (per SPEC Services) or 11,178 cubic feet. The total tributary drainage area of the basin and canopy is 64,571 square feet (provided by SPEC Services). Applying the $85^{th}$ Percentile storm event precipitation depth to the entire area, conservatively assuming that the entire area contributes runoff without infiltration, yields a runoff volume of 5,112 cubic feet of runoff, which is approximately 46 percent of the design volume. Therefore, the runoff is sufficiently contained.

runoff volume = (rainfall depth) * (tributary drainage area)

$$[0.95''/(12''/ft)] * 64{,}571 \text{ ft}^2 = 5{,}112 \text{ ft}^3 < 11{,}178 \text{ ft}^3$$

Sincerely,

Tim J. Rumbolz, CPESC #7361, QSD #24202
Project Environmental Engineer

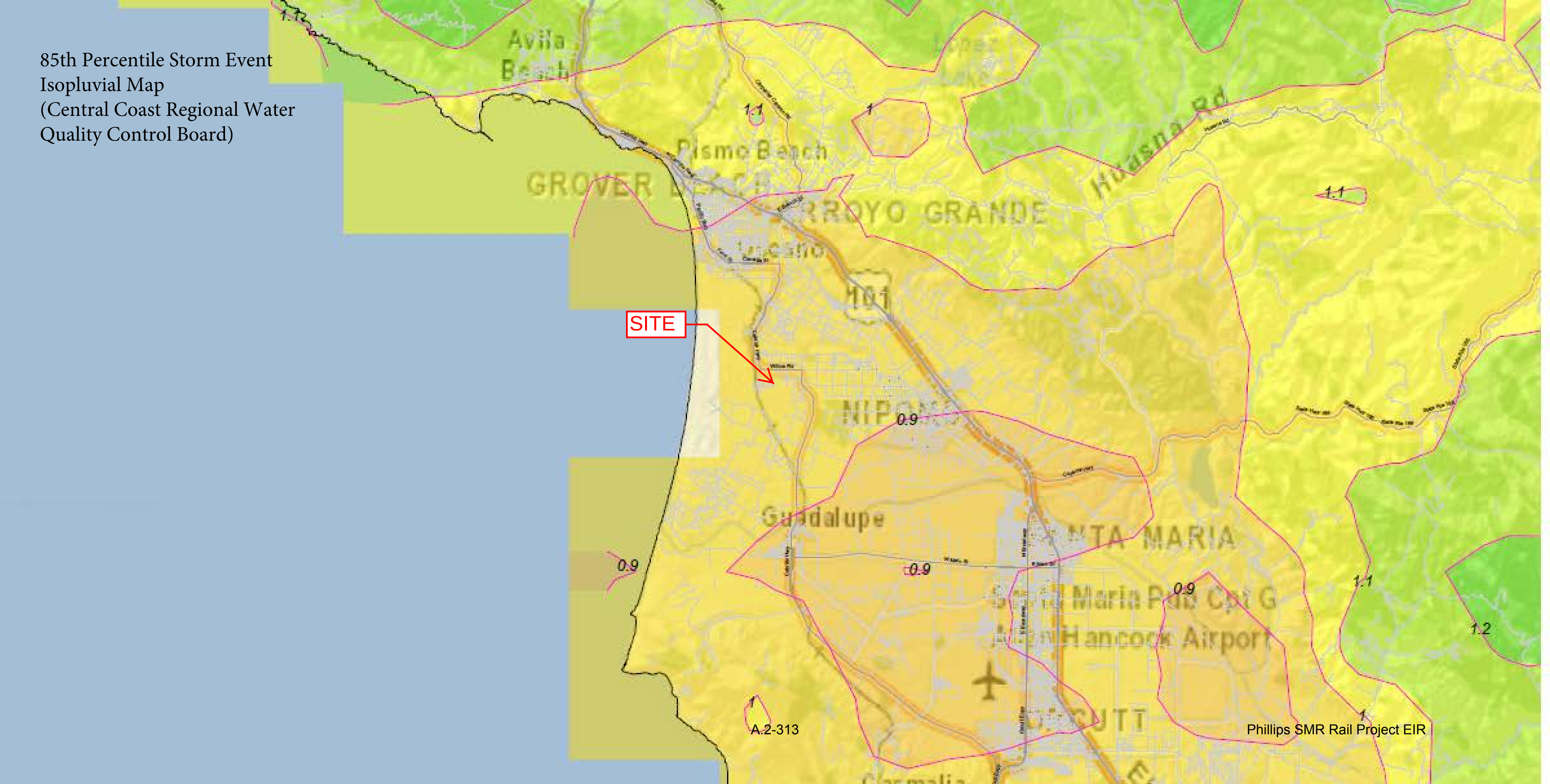

PHILLIPS 66 COMPANY
SAN LUIS OBISPO COUNTY, CALIFORNIA
**SANTA MARIA REFINERY RAIL PROJECT**
**STORM WATER POLLUTION PREVENTION PLAN**

**POST-CONSTRUCTION**
**SU□-WATERSHED MAP**

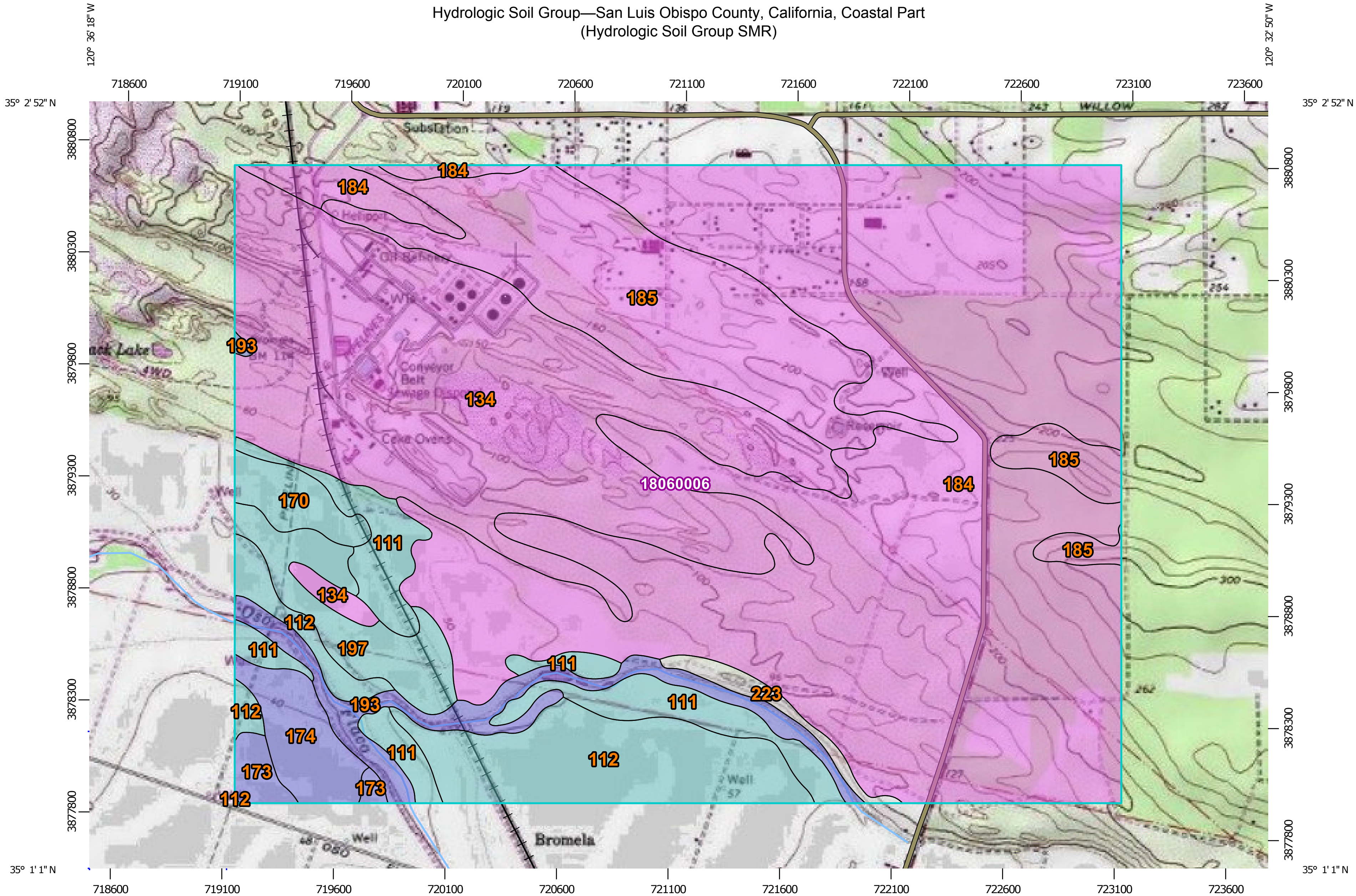
ARCADIS

FIGURE
**PC-1**

85th Percentile Storm Event
Isopluvial Map
(Central Coast Regional Water
Quality Control Board)



Hydrologic Soil Group—San Luis Obispo County, California, Coastal Part
(Hydrologic Soil Group SMR)




Map Scale: 1:24,200 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 350, 700, 1400, 2100

Feet: 0, 1000, 2000, 4000, 6000

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

## MAP LEGEND

**Area of Interest (AOI)**

- Area of Interest (AOI)

**Soils**

**Soil Rating Polygons**

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

**Soil Rating Lines**

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

**Soil Rating Points**

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

**Water Features**

- Streams and Canals
- 8-Digit Hydrologic Units

**Transportation**

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

**Background**

- Topographic Map

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Luis Obispo County, California, Coastal Part
Survey Area Data: Version 4, Jan 2, 2008

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 7, 2010—Jun 10, 2010

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

# Hydrologic Soil Group

| Hydrologic Soil Group— Summary by Map Unit — San Luis Obispo County, California, Coastal Part (CA664) | | | | |
|---|---|---|---|---|
| **Map unit symbol** | **Map unit name** | **Rating** | **Acres in AOI** | **Percent of AOI** |
| 111 | Camarillo sandy loam | C | 124.7 | 4.4% |
| 112 | Camarillo loam, drained | C | 174.2 | 6.2% |
| 134 | Dune land | A | 614.9 | 21.9% |
| 170 | Marimel silty clay loam, drained | C | 32.8 | 1.2% |
| 173 | Mocho fine sandy loam | B | 18.0 | 0.6% |
| 174 | Mocho loam | B | 49.7 | 1.8% |
| 184 | Oceano sand, 0 to 9 percent slopes | A | 1,298.2 | 46.3% |
| 185 | Oceano sand, 9 to 30 percent slopes | A | 325.2 | 11.6% |
| 193 | Psamments and Fluvents, wet | B | 78.5 | 2.8% |
| 197 | Salinas silty clay loam, 0 to 2 percent slopes | C | 72.6 | 2.6% |
| 223 | Xerorthents, escarpment | | 18.1 | 0.6% |
| **Totals for Area of Interest** | | | **2,806.8** | **100.0%** |

## Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

## Rating Options

*Aggregation Method:* Dominant Condition

*Component Percent Cutoff:* *None Specified*

*Tie-break Rule:* Higher

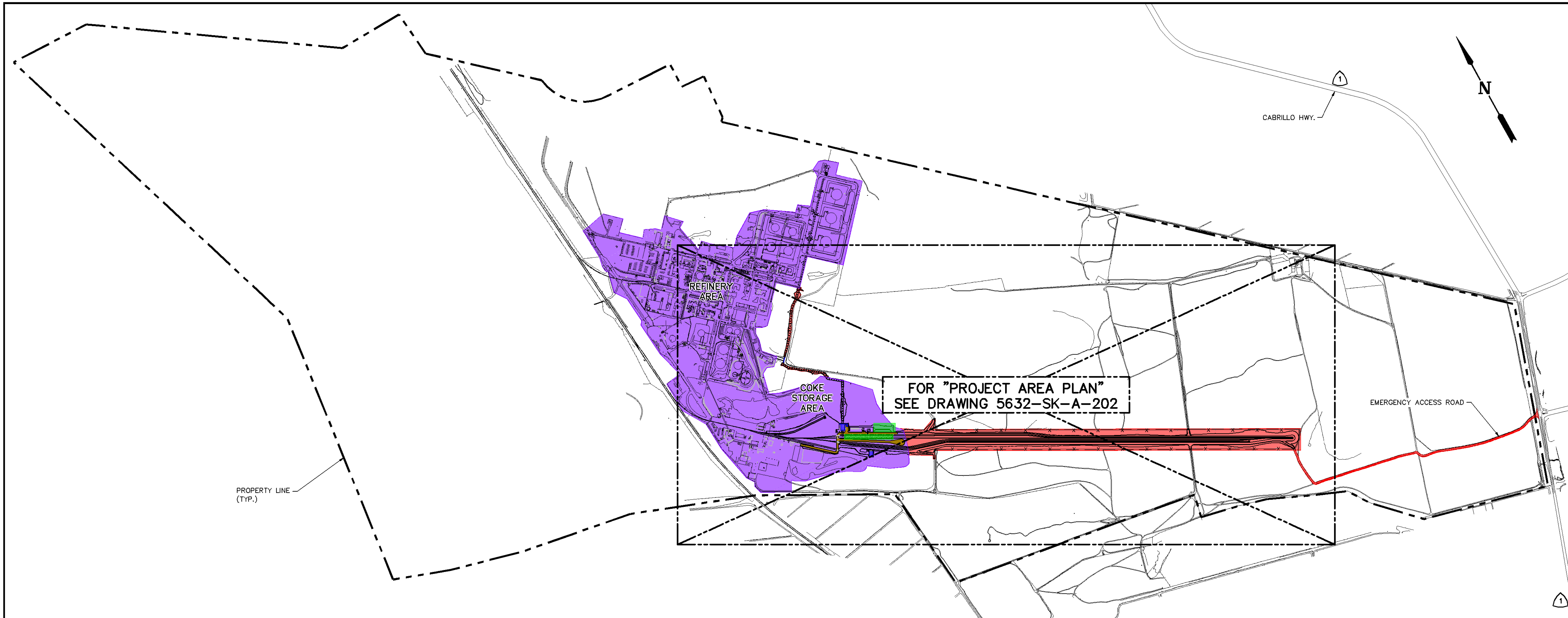
**Phillips 66 Santa Maria Refinery Shallow Dry Bulk Density Results**
Obtained from Draft Geotechnical Report by Earth Systems Pacific 9/5/13

1 pcf = 0.016018 g/cc

**Reported Shallow Result (6.0'-6.5' bgs)**

| Boring | lb/cf | g/cc |
|---|---|---|
| 2 | 109.6 | 1.8 |
| 3 | 101.5 | 1.6 |
| 6 | 99.0 | 1.6 |
| 7 | 99.5 | 1.6 |
| 8 | 99.1 | 1.6 |
| 9 | 97.7 | 1.6 |
| 10 | 96.5 | 1.5 |
| 11 | 98.9 | 1.6 |
| 12 | 98.6 | 1.6 |
| 13 | 99.6 | 1.6 |
| 14 | 100.4 | 1.6 |
| **Average** | **100.0** | **1.6** |

Ideal Bulk Density <1.6, scarification would ensure reduction in bulk density.




SITE PLAN
SCALE: 1"=600'

**AREA QUANTITIES SCHEDULE**

| ITEM | LEGEND | AREA (SQ. FEET) | AREA (ACRES) |
|---|---|---|---|
| PROPERTY LINE | — — — | 73,330,969 SQ. FT. | 1,683.4 ACRES |
| * FACILITY PROPER (PARTIAL TREATMENT) | (purple) | 6,977,559 SQ. FT. | 160.2 ACRES |
| * ESTIMATED TREATED AREA OF FACILITY PROPER (TREATMENT OF CURBED AREAS ONLY) APPROXIMATELY 20% OF FACILITY PROPER | | 1,395,511.7 SQ. FT. | 32.0 ACRES |
| PROJECT AREA (NOT TREATED) | (red) | 1,428,726 SQ. FT. | 32.8 ACRES |
| NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT AREA | (blue) | 8,391 SQ. FT. | 0.2 ACRES |
| BASIN DRAINAGE AREA (PERCOLATION BASIN – CANOPY RAIN ONLY) | (green) | 64,571 SQ. FT. | 1.5 ACRES |
| AC PAVED ROAD/PARKING (NOT TREATED) | (brown) | 64,411 SQ. FT. | 1.5 ACRES |

* = NOT ALL AREAS OF EXISTING FACILITY PROPER ARE CURRENTLY TREATED. FOR ESTIMATED TREATED AREA OF EXISTING FACILITY PROPER SEE "AREA QUANTITIES SCHEDULE" ON THIS DRAWING.

**PROGRESS PRINT**
**SEPTEMBER 23, 2013**

1"=600' 600' 0' 600' 1200'

| NUMBER | SH. | REFERENCE DRAWINGS |
|---|---|---|
| | | |

| REV. NO. | DATE | REVISED | DESTROY ALL PRINTS BEARING EARLIER DATE | REV. BY | CKD. BY | APP'D |
|---|---|---|---|---|---|---|
| A | 9/23/13 | (OPEN REVISION) | | – | – | – |

APPROVED FOR CONSTRUCTION
A. F. E. | DATE | SIGNED

DRAWN BY – CHECKED BY – TRACED BY – TRAC'G. CKD. – APP'D. – APP'D. –
SCALE AS NOTED
DATE 9/23/2013

SPEC Services, Inc.
17101 Bushard Street
Fountain Valley, CA 92708
(714) 963–8077

5632_SK–A–201.dwg (5632–SK–A–201 SWPPP AREAS – SITE PLAN)

PHILLIPS 66 SANTA MARIA REFINERY
RAIL PROJECT
SWPPP AREAS – SITE PLAN

PHILLIPS 66 CO.
Santa Maria Facility

DRAWING NO.
5632–SK–A–201