Richmond Refinery Landfarms 1-5 RCRA Post-Closure Permit Renewal Part B Application

Chevron USA
841 Chevron Way
Richmond, California

September 7, 2012

CERTIFICATION

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

Certified this 30 day of Aug, 2012 in Richmond, California.

Dave Feiglstok
Richmond Refinery Health, Environment and Safety Manager
Chevron USA

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1.0 Introduction

1.1 Purpose

This Part B application is provided for renewal of the *Hazardous Waste Facility Post-Closure Permit* for Landfarms 1-5, which are situated within the Chevron USA Inc, Richmond Refinery. The California Department of Toxic Substances Control (DTSC) issued the *Hazardous Waste Facility Post-Closure Permit* (DTSC, 2003) for Landfarms 1-5 on March 4, 2003, with an effective date beginning on March 7, 2003, and expiration date of March 7, 2013. A copy of the current Post-Closure Permit is provided in Appendix A.

1.2 Document Organization and Contents

This is the first Part B application submitted for renewal of the current Permit. This Part B application reflects the current conditions of the Landfarms and has been prepared in accordance with the permit application requirements of Title 22, California Code of Regulations (CCR), Article 2. A permit completeness checklist is provided in Appendix B, cross referencing the regulatory requirements with their respective location in this Part B application.

1.3 Site Contact Information

Facility Owner: Chevron USA Inc
6001 Bollinger Canyon Road
San Ramon, California, 94583

Facility Operator: Chevron USA Inc
841 Chevron Way
Richmond, California, 94801

Facility Contact; Mr. Dave Feiglstok
Chevron USA Inc

2.0 General Facility Description [22 CCR 66270.14(b)(1), 66270.14(b)(13), and 66264.118(b)(3)]

2.1 Location

Landfarms 1-5 are situated within the Chevron USA Inc Richmond Refinery, 841 Chevron Way, Richmond, Contra Costa County, California. A site location map is provided as Figure 1. A site detail map of Landfarm 1 is provided as Figure 2, and Figure 3 shows site details for Landfarms 2-5. The landfarms cover approximately 29 acres of the 2,900 acre refinery property , are zoned for general industrial use, and are situated more than 1,900 feet from the nearest (eastern) property boundary. The refinery is bordered to the south by the Interstate 580 freeway (I-580), to the east by the Richmond Parkway, and to the west and north by San Pablo Bay. Access to Landfarms 1 through 5 is through secured Gates 31 and 91.

2.2 Facility History

Landfarms 1 through 5 operated between mid-1970s to 1987. Landfarms 1-4 were built over existing ponds and Landfarm 5 was built over fill. Historical landfills underlie portions of Landfarms 1 through 5. Prior to the start of landfarming operations, 7 to 20 feet of fill were placed at each of the landfarms. The fill material originated from a

variety of sources, including adjacent pond and channel dredging and soil from the San Pablo Tank Farm construction activities.

After submitting a hazardous waste permit to the U.S. Environmental Protection Agency (U.S. EPA), Chevron was notified on February 10, 1987) that the landfarms did not qualify for the permit. On March 31, 1988, Chevron submitted the original *Closure/Post-Closure Plan for the Richmond Refinery Landfarm* (Chevron USA Inc., 1988) to the U.S. EPA and California Environmental Protection Agency Department of Toxic Substances Control (DTSC). On February 27, 1996, Chevron presented their revised conceptual plan for closing the landfarms to the DTSC in a meeting with Ms. Wei Wei Chui (DTSC), Mr. Tony Morales (DTSC), Ms. Elizabeth Christian (RWQCB) and Mr. Ron Leach (U.S. EPA). The closure plan was revised and resubmitted on May 5, 1996 (Chevron USA Inc., 1996) and again on May 28, 1997 (Chevron USA Inc., 1997). DTSC approved the *Revised Closure Plan* on March 19, 1998 (DTSC, 1998).

Chevron completed construction of the vegetative cap as described in the closure plan in the summer of 1999, and submitted the *Landfarm Closure Construction Completion Certification Report* on September 30, 1999 (Chevron U.S.A Inc., 1999). On September 19, 2000, DTSC issued the approval of the Closure Certification for Landfarms 1 through 5. Chevron submitted the *Post-Closure Permit Application for Landfarms 1 through 5* on March 20, 2000 (Chevron USA Inc., 2000), and a *Revised Post-Closure Permit Application for the Landfarm Units 1 through 5 at Chevron Richmond Refinery* on January 7, 2002 (Chevron USA Inc., 2002).

2.3 Physical Description of the Facility

Landfarms 1-5, the five former land treatment units that are the subject of this permit renewal, were closed in accordance with the *Revised Closure Plan* and completed with vegetative caps. Details of the Landfarms construction are available in *Landfarm Closure Construction Completion Certification Report* (Chevron USA Inc., 1999). Since the time of the closure of Landfarms 1-5 in 1999, the vegetation has been maintained and the poplar trees become well-established. No substantial modifications have been made to the cap since the submittal of the *Revised Post-Closure Permit Application* on January 7, 2002 (Chevron USA Inc., 2002a). Oblique aerial photographs of Landfarms 1 and Landfarms 2-5 are included as Figures 4 and 5, respectively.

2.3.1 Geology and Hydrogeology [22 CCR 66270.14(b)(11)(F)]

The *Refinery-Wide Report of Waste Discharge (ROWD)* (D&M, 1988) presents a description of the Refinery's regional hydrogeology. Local conditions, such as stratigraphy and hydraulic properties, are described in site-specific reports. The following is a brief summary of the pertinent hydrogeologic conditions detailed in those reports.

There are four physiographic provinces within the Refinery: the Flats Zone; Ridge Zone; Transition Zone; and Alluvial Zone. Landfarms 1-5 are located within the Flats Zone. In the Flats Zone, the Refinery is underlain by up to six main water-bearing zones within a vertical sedimentary sequence overlying Franciscan Complex bedrock. The two uppermost water-bearing zones are evaluated under the current groundwater monitoring program. The uppermost water-bearing zone is designated as the "A" Zone, which is separated from the second water-bearing zone ("C" Zone) by estuarine deposits (Bay Mud) that act as an aquitard. The "A" Zone is composed of low- to medium-permeability heterogeneous fill materials, including clays, silts, sands, gravels and some man-made debris, such as concrete. The "C" Zone is composed of clayey and sandy alluvial deposits interbedded with clayey estuarine deposits. Sand and silt lenses occur at varying depths within the "C" Zone and are generally not laterally continuous (BEDM, 1991).

As required by Regional Water Quality Control Board (RWQCB) Orders R2-2011-0036 (RWQCB, 2011), and R2-2012-0015 (RWQCB, 2012), groundwater elevation measurements are collected semi-annually at wells and sumps located throughout the refinery for use in preparing groundwater elevation contour maps. These maps illustrate the groundwater elevations and can be used to evaluate groundwater flow patterns across the refinery. Results of the groundwater monitoring were recently presented to the DTSC in the August 31, 2012 *Semi-Annual Monitoring Report, First Semester 2012, Refinery-Wide Groundwater Monitoring Program and Landfarms Post-Closure Monitoring Program* (SAIC, 2012a).

Water levels are collected in accordance with the *Revised Standard Operating Procedures for the Richmond Refinery, Groundwater Monitoring* (SOPs) (URS, 2002a).

Groundwater flow velocities in both the "A" and "C" Zones vary widely across the Refinery. Historically, ranges of groundwater velocity have been calculated and presented in the monitoring reports. Calculated ranges for groundwater flow velocity at the Refinery are as follows:

Zone	Groundwater Velocity Range
"A" Zone	0.0007 to 1,810 feet/year
"C" Zone	0.01 to 279 feet/year

The "A" Zone velocities were calculated using a hydraulic conductivity range of $1 \cdot 10^{-8}$ to $1 \cdot 10^{-2}$ centimeters per second (cm/sec) (typical of clay to sand), a hydraulic gradient range of 0.0055 to 0.035 feet per foot (ft/ft), and an effective porosity range of 0.08 to 0.20. The "C" Zone velocities were calculated based on a hydraulic conductivity range of $1 \cdot 10^{-6}$ to $1 \cdot 10^{-2}$ cm/sec (clay to sand), a hydraulic gradient range of 0.0008 to 0.0054 ft/ft, and an effective porosity range of 0.08 to 0.2. The wide range in flow velocities is due in large part to two factors:

1) Locally variable "A" Zone hydraulic gradients are affected by GPS water level drawdown.
2) Heterogeneous soil and fill types beneath the Refinery (fill, sands, silts and clays) have widely varied hydraulic conductivities and porosities.

Water levels are collected from 28 "A" Zone/"C" Zone well pairs to assess Refinery-wide vertical hydraulic gradients. Vertical gradients across the Refinery vary locally due to GPS and other features affecting "A" and "C" Zone water levels. The vertical gradient is generally upward along the eastern edge of the San Pablo Ridge, in the vicinity of the Effluent Sector and around the Landfarms 2-5 GPS alignments and Landfill 15. A downward gradient was observed in the area of Landfarm No. 1 and the area south of the 50/100-Foot channel to the Castro Sector. Locally there is an upward gradient along the alignment of the 50/100-Foot Channel.

Monitoring for the presence of free-phase liquid hydrocarbons (FPLH) is conducted in accordance with the *Free-Phase Liquid Petroleum Hydrocarbon Recovery Evaluation Plan* (Chevron USA Inc., 2000b). FPLH is typically recovered using passive absorbent pads at wells containing measurable thicknesses of greater than 0.5 feet. Currently, 34 wells at the Refinery are visited bi-weekly as a part of the hydrocarbon recovery program to maximize the volume of hydrocarbon recovered. In addition, hydrocarbon is recovered using a vacuum truck from several sumps in the interior of Landfill 15 and from five recovery wells connected to the GPS system on the northwest side of Landfarm 2. Hydrocarbon is also recovered from the Alkane Recovery System and GPS sumps containing FPLH.

2.3.2 Grading and Surface Water Drainage

The final cover precipitation and drainage run-off control features were designed to control a 24-hour storm event with a 25-year recurrence interval in conformance with the requirement cited in 22 CCR 66265.272(c). The final cover on the surface of the landfarms is sloped and built to a sufficient elevation to provide drainage of rainfall and to prevent localized ponding. The system has also been designed such that, if the capacity of the drainage system is exceeded, the overflow will run away from the closure units and will not inundate the final cover. The lowest elevation of the closed landfarms is Elevation +9.0 feet (RRD). This elevation is above the anticipated maximum 100-year flood elevation of +8.6 feet. Hence, inundation of the final cover should not occur. The sites are not adjacent to any significant water bodies, so wave overtopping is also not an issue. Due to the topography of the adjacent areas, run-off from other areas is unlikely to impact the landfarms. In the event that a more severe storm was to occur, the Refinery would implement inspection and repair operations similar to those outlined in the *Landfarms Post Earthquake Inspection and Corrective Action Plan* (Chevron USA Inc, 1995).

Run-on is not considered to be an issue for the landfarms as the sites are mounds with drainage ditches located at the perimeter located above the maximum anticipated flood level. Surface runoff from the exterior slopes of the closure units is collected in the lined perimeter drainage ditches and directed to the Refinery's stormwater retention basins.

2.3.3 Groundwater Capture and Management

Chevron has implemented groundwater corrective action at the site by installing and operating the Groundwater Protection System (GPS) in compliance with RWQCB Waste Discharge Order (WDO) No. 93-109 (rescinded in June 2000 as part of Waste Discharge Requirement (WDR) No. 00-43). The objective of the GPS for the entire Refinery, including the landfarms areas, is to establish and maintain a physical or hydraulic barrier to prevent the off-site movement of potentially contaminated "A" Zone groundwater. The GPS includes a perimeter system that consists of either extraction trenches, or a combination of low-permeability soil/bentonite barrier walls with either extraction trenches or extraction wells located upgradient (with respect to groundwater flow) of the barrier walls. Groundwater is continually pumped from the trenches to the refinery's effluent treatment system, and the resulting hydraulic depression establishes and maintains a capture zone intended to prevent migration of potentially contaminated groundwater past the GPS alignment.

Infiltration through the final cover is ultimately collected in the GPS extraction trenches and extraction wells, or in the shallow drainage collection trench south of Landfarms 2 through 5.

2.4 Facility Setting and Topographic Map [22 CCR 66270.14(b)(18) and 66270.14(c)(3)]

A topographic map showing the site setting, topography, surface water drainage patterns and other relevant information is provided in Appendix C. The map also shows surrounding land uses for a distance of at least 2000 feet around the landfarms, structures, access roads, and monitoring wells that are included in the landfarm post-closure monitoring program.

The landfarms are surrounded by unpaved roadways, which are used primarily by landfarms maintenance personnel. Chain-link barriers surround the landfarms, which prevent any vehicle access onto the vegetative caps.

2.5 Wind Rose Diagram [22 CCR 66.270.14(b)(18)(E)]

A wind rose diagram constructed using hourly wind speed and direction data collected at the Richmond Refinery weather station is presented on the topographic map (Appendix C).

2.6 Floodplain Information [22 CCR 66264.18(b) and 66270.14(b)(11)]

The most current copy of the FEMA FIRM map is included in Appendix D, but it is not accurate with respect to current Facility topography and controls such as dike elevations. The Landfarms are located outside of the 100-year floodplain, based on an evaluation of the topographic elevations along the refinery perimeter completed by BEDM in 1988, and presented in the ROWD. The extent of flooding expected from the 100-year flood within the refinery is shown in Section 3 of the ROWD report, and also presented on the Topographic Map included in Appendix C.

2.7 Seismic Requirements [22 CCR 66270.14(b)(11)(A)]

The seismic standards requirements do not apply to Landfarms 1 through 5 as they are not new facilities or are not undergoing substantial modification.

The DTSC has previously requested that Chevron have a procedure in place for inspection of the closed Landfarms following the event of an earthquake that generates ground shaking of Modified Mercali Intensity V or greater at or near the landfarms. An event of this intensity is generally described as "Felt by nearly everyone; many awakened. Some dishes, windows, etc. broken; a few instances of cracked plaster; unstable objects overturned. Disturbances of trees, poles and other tall objects sometimes noticed." To address this request, Chevron prepared the *Landfarms Post Earthquake Inspection and Corrective Action Plan* which was part of the *Revised Landfarms*

Closure Plan submitted on May 5, 1996 (Chevron USA Inc. 1996) and the *Revised Post-Closure Permit Application for the Landfarm Units 1 through 5* submitted on January 7, 2002 (Chevron USA Inc., 2002). A copy of the *Landfarms Post Earthquake Inspection and Corrective Action Plan* along with as-built Landfarm 1-5 construction drawings are provided in Appendix E.

2.8 Wastes Received at the Facility

The landfarms were in operation for the biological treatment of oily wastes generated from on-site petroleum processing. During the period of operation, wastes (including hazardous wastes K049, K051 and K169) were applied to the surface of the landfarms and tilled into the top 6 to 12 inches of fill. The principal wastes applied were oil/water separator sludges (Landfarms 1, 2, 4 and 5), non-leaded tank bottoms (Landfarms 1, 2, 3 and 4), oil/water mixtures, algae water, pond sediments and oily dirt.

Additional information pertaining to wastes that had been placed at Landfarms 1-5 prior to closure is presented in Section 2.2.3 of the *Revised Landfarms Closure Plan (Chevron USA Inc., 1997)*, which is included as Appendix F.

2.9 Contact Person for the Post-Closure Care Period

During the post-closure period, the contact person will be the Richmond Refinery Health, Environment and Safety (HES) Manager located at:

Chevron Richmond Refinery
P.O. Box 1272
Richmond, California 94802
Attention: Richmond Refinery HES Manager
Telephone: (925) 842-1000

3.0 Post-Closure Notices [22 CCR 66264.119]

Post-closure notices as required per 22 CCR 66264.119 were recorded on July 10, 2000. Copies of the notification to the City of Richmond and Contra Costa County Recorder's Office are provided in Appendix G.

4.0 Compliance with Other Federal Laws [22 CCR 66270.3]

Chevron has determined that the project is in compliance with other Federal Laws, and a copy of the determination is provided as Appendix H.

5.0 Closure Plan and Report [22 CCR 66270.14(b)(13)]

5.1 Closure Plan

Chevron submitted the original *Landfarms Closure Plan* to the U.S. EPA and DTSC on March 31, 1988 (Chevron U.S.A Inc. 1988). On February 27, 1996, Chevron presented a revised conceptual plan for closing the landfarms to the DTSC in a meeting with Ms. Wei Wei Chui (DTSC), Mr. Tony Morales (DTSC), Ms. Elizabeth Christian (RWQCB) and Mr. Ron Leach (U.S. EPA). The *Revised Landfarms Closure Plan* was submitted to the DTSC on May 5, 1996, December 30, 1996 and May 28, 1997, and approved by the DTSC on March 19, 1998.

These closure plans were prepared to conform with State regulations 22 CCR 66265 and Federal regulations 40 CFR 265, both of which address the closure of interim status land treatment facilities. As required by the DTSC 1988 Stipulation & Order (HWCA 87/88-019), and the U.S. EPA 1988 Consent Agreement (RCRA 09-88-0005), the closure plan was developed following the guidelines set forth in the U.S.EPA's *Guidance Manual on Hazardous Waste Land Treatment Closure / Post-Closure* (U .S. EPA Guidance Document) April 1987.

The closure units were designed to reduce surface water infiltration through the surface of the landfarms' fill and soil and to prevent lateral off-site migration of "A" Zone groundwater from the landfarms. The performance standards for this closure are spelled out in 22 CCR 66265.111, which require that the facilities be closed in a manner that:

- Minimizes the need for further maintenance; and
- Controls, minimizes or eliminates, to the extent necessary to protect human health and the environment, post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated rainfall or runoff, or waste decomposition products to the ground or surface waters or to the atmosphere.

Additional regulatory objectives for the closure of land treatment facilities, as spelled out in 22 CCR 66265.280(a), are:

- Prevention of the migration of hazardous waste and hazardous waste constituents from the treated area into the groundwater;
- Prevention of the release of contaminated runoff from the facility into surface water;
- Prevention of the release of airborne particulate contaminants caused by wind erosion; and
- Compliance with Section 66265.276 concerning the growth of food-chain crops.

In compliance with applicable regulations, Chevron elected to close the landfarms by establishing a final vegetated cover over the units. As discussed with the DTSC (February 27, 1996 Landfarms presentation), the final vegetative cover over the closure units consists of a minimum of 12 inches of vegetated fill.

During closure, the landfarms were regraded into low mounds to facilitate surface drainage and improve the visual appearance of the sites. The landfarms soils were lightly compacted and/or recompacted with light tracked equipment to support the construction of the final cover while still allowing for easy vegetation root penetration. The final grades were designed to divert rainfall runoff away from the former landfarms sites. Infiltration into the landfarms soils is reduced by the improved surface grading and the surface vegetation, which take up water by evapotranspiration. The inclusion of a layer of clean soil over the entire landfarms area serves to prevent run-off from direct contact with the wastes and also to prevent wind erosion of the wastes.

The physical design of the closure units was based on results of settlement analyses, slope stability analyses for both static and dynamic cases, and groundwater protection analyses. The precipitation and drainage control systems were designed to handle runoff from a 24-hour storm event with a 25-year recurrence interval.

5.2 Certification of Closure

Chevron completed construction of the vegetative cap as described in the closure plan in the summer of 1999, and submitted the *Landfarm Closure Construction Completion Certification Report* on September 30, 1999 (Chevron USA Inc., 1999). On September 19, 2000, DTSC issued the approval of the Closure Certification for Landfarms 1 through 5.

6.0 Post-Closure Plan [22 CCR 66270.14(b)(13), 66264.118 and 66264.280]

6.1 Written Plan

Post-closure maintenance, inspection and monitoring procedures are described in the *Revised Post-Closure Monitoring Plan* dated September 4, 2012 (Chevron USA Inc., 2012), which is presented in Appendix I. This plan updates the procedures for monitoring of vegetation growth and soil fertility that were presented in the previous *Post-Closure Monitoring Plan* dated January 7, 2002 (Chevron U.S.A Inc., 2002). Because the vegetation on the landfarms caps is now well-established, a cessation of visual inspection of vegetation condition and soil fertility sampling and analysis is warranted. Chevron will continue to monitor soil moisture during the dry months to

ensure that over-irrigation that could potentially percolate through the cap and reach wastes does not occur. Maintenance of the vegetation, landfarm cap, run-on and run-off structures and groundwater monitoring will continue to be conducted in accordance with the *Revised Post-Closure Monitoring Plan.*

6.2 Monitoring and Maintenance Activities [22 CCR 66264.118(b)(1), 66264.118(b)(2)]

The monitoring activities described in the *Revised Post-Closure Monitoring Plan* include cap integrity inspections, soil moisture measurements during the dry season, groundwater monitoring (performed in accordance with RWQCB Orders), surface water drainage system integrity and performance evaluations, free-phase hydrocarbon thickness measurements and recovery, and annual cap settlement surveys. These monitoring and maintenance activities have been designed to ensure that cap integrity, final cover and other containment systems are maintained during the post-closure period. The monitoring and inspection schedules for the programs conducted at the landfarms are compiled on Table 1.

6.2.1 Water Quality Monitoring and Reporting

Pursuant to SB 1082, the RWQCB has been designated as the lead agency for purposes of RCRA groundwater monitoring (and corrective action as identified in Section 13). Results of groundwater sample analyses, evaluation of the operation of the GPS, calculation of free-phase hydrocarbon recovery, and discussion of facility maintenance are presented in the periodic monitoring reports prepared in accordance with RWQCB Waste Discharge Requirements (WDR) Order No. R2-2011-0036 and Site Cleanup Requirements (SCR) Order R2-2012-0015, which are presented in Appendix J. Results of groundwater quality and corrective action effectiveness monitoring were recently presented to the DTSC in the August 31, 2012 *Semi-Annual Monitoring Report, First Semester 2012, Refinery-Wide Groundwater Monitoring Program and Landfarms Post-Closure Monitoring Program* (SAIC, 2012) report which is not reproduced herein.

There are two types of monitoring being conducted in accordance with the Orders in the area of the landfarms as follows:

- Corrective Action Monitoring of the uppermost hydrostratigraphic unit (A-Zone) is conducted to verify the effectiveness of the GPS in controlling lateral migration of contaminated A-Zone groundwater toward the point of compliance. Additionally, the Corrective Action Monitoring program includes groundwater sample collection and analyses for selected parameters at the A-Zone wells listed in the Orders. The locations of the A-Zone monitoring piezometers/sumps that are associated with Landfarms monitoring are shown on the topographic map included in Appendix C.
- Detection Monitoring of the deeper C-Zone hydrostratigraphic unit beneath the Landfarms is conducted to provide an early indication of a release into the C-Zone groundwater which directly underlies the A-Zone. Detection monitoring involves measuring the chemical concentrations of selected parameters in wells, and evaluation of data following the procedures of the *Statistical Evaluation Plan for the Landfarm Area, Groundwater Self-Monitoring and Reporting Program* dated October 18, 2002 (URS, 2002b) (Appendix K)

Water Quality Protection Standard (WQPS) Concentration Limits (CLs) have been developed for the Site constituents of concern and monitoring parameters and are presented in the Orders. For constituents that have never been detected at the Site, the CLs are the Practical Quantitation Limit (PQL) for the laboratory test method for that constituent. For those constituents that were historically detected, the CLs were developed statistically using an intra-well comparison method. A compilation of CLs developed for A- and C-zone monitoring wells is presented in the Orders. The groundwater sample results are compared against the established CLs. A noted exceedence of a CL is verified by two subsequent sampling events, and the groundwater data further evaluated to detect whether a statistically-significant upward concentration is present. If the exceedence of the CL is confirmed by the additional sampling, a notification to the RWQCB is required. The results of the trend evaluation and any CL exceedences are reported to the RWQCB and DTSC in the groundwater monitoring reports.

6.2.2 Inapplicability of Vadose Zone Monitoring [22 CCR 66264.97(d)]

As described in the October 31, 2002 memorandum to the DTSC, there is no separation between residual landfarms wastes and groundwater, and as a result, there is no vadose zone present beneath the landfarms, and no vadose zone monitoring is currently conducted. A copy of the memorandum is included in Appendix L.

6.2.3 Inapplicability of Surface Water Monitoring [22 CCR 66264.97(c)(1)]

The Landfarms are situated within the active Chevron Richmond Refinery, within a drainage basin that is managed under the Facility's NPDES permit, and no natural streams or surface water bodies are located that could potentially be affected by a release of wastes from the units. The Landfarms are surrounded bylined swales, and any precipitation runoff from the capped surfaces is directed to the Facility's effluent treatment system for treatment prior to discharge in accordance with the conditions of the NPDES permit. Monitoring of surface water is not a required monitoring program included in the current Post-Closure Permit. The current NPDES permit (R2-2011-0049) is included as Appendix J.

6.3 Amendment of Plan [22 CCR 66264.118(d)]

During the post-closure period, Chevron understands that it may submit a written notification of or request for a permit modification to authorize a change to the post-closure plan. The written notification or request will include a copy of the amended post-closure plan for review and approval by the DTSC.

7.0 Security

7.1 Security Requirements [22 CCR 66264.14 and 66270.14(b)(4)]

Access to the landfarms area is controlled by the Environmental Operations Section of the Refinery's Utilities/Environmental Area Business Unit (ABU). Security measures utilized by the Environmental Section are designed to prevent unknowing or unauthorized access to the landfarms. All visitors are required to check in at the ABU control room before entry into any operational units within the Refinery as described in the Refinery Instructions (RI-375). Areas within the ABU are patrolled by operators or by Chevron Plant Protection. Any unauthorized personnel will be questioned and asked to leave the ABU or the Refinery. The environmental sections security measures are designed to prevent unknowing or unauthorized access to the landfarms. Areas of the Refinery that do not border the Bay waters are secured by a 6-foot-tall cyclone fence, which is generally topped by three rows of barbed wire. Signs are located at regular intervals on the fence.

All unguarded gates are locked and only assigned Refinery personnel have access.

The perimeter of the Refinery is routinely patrolled by Chevron Plant Protection to inspect gates and fences and to spot any unauthorized persons within Chevron Property.

Entry for Refinery personnel and approved contractors is through gates staffed by Security Personnel. Visitors to the Refinery must enter and exit through guarded gates, and must be cleared by authorized personnel prior to entry.

Warning signs are posted at 100-foot intervals around the perimeter of each landfarm. These signs are posted in English and Spanish and bear the following wording:

CAUTION
HAZARDOUS WASTE
STORAGE AREA
UNAUTHORIZED PERSONS
KEEP OUT

CUIDADO
ZONA DE RESIDUOS
PELIGROSOS
PROHIBA LA ENTRADA A
PERSONAS NO AUTORIZADAS

7.2 Emergency Preparedness

It is the responsibility of the on shift Battalion Chief to act as the Incident Commander and the Refinery Shift Leader to act as the Emergency Coordinator, in consultation with EOD personnel, to determine the degree of refinery-wide response to emergency incidents. Should implementation of emergency procedures occur, the Incident Commander and the Emergency Coordinator will then carry out the emergency procedures as outlined in the Emergency Procedures Manual. At least one primary emergency coordinator is available at all times.

External communication equipment includes several telephones located in nearby Operations Control Office buildings that are available to all Chevron personnel and visitors. In the event of an electrical or telephone failure, the offices are equipped with battery-operated two-way backup radios. RI-470 includes a description and listing of the On-Call Emergency Personnel. Individual names, addresses, and phone numbers of all on-call personnel are available at the Refinery Shift Coordinators office and at the Chevron Fire Department dispatcher's office.

Personnel near the landfarms are notified of emergency situations by the activation of evacuation sirens and speakers located throughout the Refinery. Sirens are located on the east and west boundaries of the facility so they can be heard by all individuals working within and just outside the operational areas (including areas near the landfarms). The sirens are tested on a scheduled weekly/monthly basis (inner-refinery tests are weekly and community alarm tests are monthly) by the Refinery Emergency Services Group. Additionally, there is also an intercom system located in all occupied buildings throughout the Refinery.

7.2.1 Emergency Equipment [22 CCR 66270.14(a) and (b)]

Although no emergency equipment is stored directly on the landfarms themselves, Chevron is well prepared to respond in the case of major emergencies:

- Emergency equipment includes firefighting equipment, first-aid equipment, respirators, protective clothing, and spill response and control equipment.
- The equipment is inspected on a weekly/monthly basis to ensure proper operation and adequate supplies.
- Equipment that does not pass inspection is noted on the appropriate checklist and repaired/replaced as soon as possible.
- Personal protection equipment (PPE) such as hard hats, gloves, and safety glasses, etc., are required for all respondents and readily available.
- Reusable items are decontaminated, dried, and properly replaced in the proper storage location after use.
- Self-contained breathing apparatus (SCBA) are stored in carrying cases or on designated storage racks.
- Safety showers and eyewashes are located throughout the facility.
- Dry chemical fire extinguishers and foam units with hoses are located throughout the facility.
- Dry chemical fire extinguishers are tested and, if necessary, recharged annually and a tag affixed that indicates the date of the test.
- All foam units and fire hoses are inspected to ensure that they are in good condition.
- Emergency communication equipment (radios) are in daily use, and readily available.

7.2.2 Water and Fire Control [22 CCR 66264.32(c) and (d)]

Fire protection equipment is accessible through the Richmond Refinery Chevron Fire Department located within the refinery. Fire hydrants are located at strategic locations throughout the facility, including near the landfarms. A series of surface water swales that direct stormwater throughout the facility can be used to manage and capture water generated during fire-fighting efforts, and that water then treated and discharged under the existing NPDES permit.

7.2.3 Post Fire Erosion Control

Following a fire that has the potential to affect the vegetative cap, the landfarm will be inspected to ensure that the potential for erosion and the exposure of wastes is prevented.

8.0 Testing and Maintenance of Equipment [22 CCR 66264.33]

Facility communications, alarm systems, fire protection, spill control and decontamination equipment are tested and maintained to ensure their proper operation and availability in time of emergency. The equipment is inspected (per established schedule) on a weekly/monthly basis to ensure proper operation and maintain adequate supplies. Equipment that does not pass inspection is noted on the appropriate checklist and repaired/replaced as soon as possible.

9.0 Arrangements with Emergency Agencies [22 CCR 66264.37]

The Richmond Refinery is fully equipped to respond to all emergencies, and is engaged with multiple emergency agencies to assure an adequate response:

- Since 1983, the Richmond Refinery Chevron Fire Department has coordinated and participated in a continuing fire training program with the Richmond Fire Department.
- A mutual aid agreement exists in which both fire departments agree to respond to emergencies when requested.
- Chevron Richmond Refinery is a member of the Petro-chemical mutual organization. This organization is comprised of Industrial, Municipal, Government and other private organizations with a focus on Emergency Mutual Aid assistance and sharing of lessons learned.
- The Chevron Richmond Refinery is a member of the Petrochemical Mutual Aid committee that includes the regional ambulance and air ambulance companies for this area. They are invited on-site for drills and training.
- The Chevron Fire Department is a State-recognized fire department with State-certified firefighter/emergency medical technicians.
- The Chevron Fire Department has met with Doctors Medical Center, San Pablo campus (formerly Brookside Hospital). In particular, meeting with their burn coordinator to discuss the chemicals and hazards associated with the refinery.

10.0 Contingency Plan [22 CCR 66270.14(b)(7)]

The facility's Contingency Plan is designed to minimize hazards to human health or the environment from fires, explosions, or any release of hazardous waste or hazardous waste constituents to air, soil, or surface water. The Contingency Plan:

- Details the refinery emergency response organization, and the responsibilities and authority of each member of the team.
- Describes the emergency communication systems and outside agencies notification procedures.

The Contingency Plan is implemented immediately whenever there is a fire, explosion, or release of hazardous waste which could threaten human health or the environment. The decision to implement the plan is made by the Emergency Coordinator identified in Section 7.2.

Implementation of the plan is not required for responding to incidental releases of hazardous waste or hazardous constituents where the waste can be absorbed, neutralized, or otherwise controlled at the time of release by employees in the immediate release area or by Maintenance personnel.

After the occurrence of a potentially damaging event, the landfarms closure facilities will be inspected by EOD and potentially other Refinery personnel and temporary repairs will be performed as necessary to the closure facilities as soon as is practicable. Chevron will immediately notify the DTSC of suspected releases of wastes or waste byproducts to the environment as a result of a major natural event. As soon as practicable, Chevron will have a qualified engineer perform an inspection of the facility. The engineer will identify damage and recommend appropriate repairs. Chevron will then implement the repairs in a timely manner. On completion of the repair work, Chevron will prepare and submit a report to the DTSC identifying what damage occurred and certifying that appropriate repairs have been completed. A copy of the inspector's findings and recommendations will be included in the document.

10.1 Procedures to Update Contingency Plan

The contingency plan will be amended/updated as necessary whenever:

- Management conducts a required after-the-event critique of the response and recommends amendments to the plan,
- The Refinery permit is revised,
- The Refinery changes in a way that materially increases the potential for fires, explosions, or releases of hazardous waste or hazardous waste constituents, or changes the response necessary in an emergency,
- The list of Emergency Coordinators changes, or
- The list of emergency equipment changes.

11.0 Financial Assurance and Guarantee for Post-Closure [66270.14(b)(16) and 66270.14(b)(17)]

Chevron annually updates the post-closure care cost estimate for Landfarms 1-5 in accordance with 22 CCR 66264.144 and includes these costs in the required annual corporate guarantee of financial assurance. A copy of the current post-closure care cost estimate for Landfarms 1-5 in 2012 dollars is included in Appendix M. If this cost estimate is updated in future years, as opposed to applying the annual inflation process, Chevron will provide DTSC with the updated cost estimate. A copy of the March 23, 2012 letter of Financial Assurance for Closure and Post-Closure Care and Liability Coverage is also included in Appendix M.

12.0 Training Programs [22CCR 66270.14(b)(12)]

Personnel trained to maintain and inspect the landfarms during the post-closure period work under the direction of either the Chevron EMC project manager or Refinery HES manager. Job positions and responsibilities at the landfarms include:

- Operations/Maintenance Personnel: responsible for vegetation monitoring and maintenance, water level measurements, hydrocarbon recovery, groundwater recovery and operation of the GPS, and the repair of pumps and discharge piping.
- Refinery EOD liaison: responsible for scheduled cap inspections.
- Field Sampling Technicians: responsible for collecting groundwater samples as required under the RWQCB Orders.

Training includes initial and refresher sessions and addresses the following topics:

- Contingency Plan Implementation
- Behavior-Based Safety Program
- Emergency Procedures
- Hazardous Waste Management Training

Staff, including subcontractors, whose job duties include work at the landfarms receive training as described in this plan. In addition, the operation / maintenance personnel receive supplemental training including on-the-job training.

Training must be completed before assuming field duties at the facility. Operations/maintenance personnel receive annual Hazardous Waste Operations (HAZWOPER) refresher training as required by 29 CFR 1910.120. The Project Manager reviews pertinent compliance issues at the facility with the operations/maintenance staff and new regulations or operating procedures are introduced.

A Behavior-Based Safety Program has been in effect since 2003 and is an active, ongoing program designed to remind site workers that safe behaviors are of the greatest priority. Staff is encouraged to modify written work practices to incorporate safer actions, and every person working on the facility is empowered to stop any other person on the facility if they believe a task is being performed unsafely. Each employee is required to attend monthly safety meetings, where safety procedures are reviewed. Team leaders hold daily "tailgate" safety meetings with operating/maintenance personnel which emphasize safety issues relating to the particular task to be performed that day.

Training records are compiled by the EMC Project Manager for Chevron employees, and subcontractor managers for the respective subcontractor staff. These records are maintained both in paper form and electronic files per 22 CCR 66264.16.

13.0 Solid Waste Management Units and Corrective Action [22 CCR 66270.14(d)(1),(2)]

Pursuant to SB 1082, the RWQCB has been designated as the lead agency for purposes of RCRA groundwater monitoring and corrective action. Several Site Cleanup Requirements (SCR) and Waste Disposal Requirements (WDR) Orders have been issued since 1990 that required corrective actions at the facility, and these have been satisfied and rescinded. Currently, two RWQCB Orders are in effect for the facility that describe the required monitoring programs, including monitoring in the vicinity of Landfarms 1-5 and these are Waste Discharge Requirements Order R2-2011-0035 and Site Cleanup Requirements Order R2-2012-0015. Copies of these two current Orders are included in Appendix J.

14.0 Additional Information

Additional information related to the Landfarms 1-5 post-closure will be submitted to the DTSC as requested.

15.0 References

Chevron USA Inc., 1988, *Closure/Post-Closure Plan for the Richmond Refinery Landfarm*, Richmond Refinery, California, March 31.

Chevron USA Inc., 1995, *Landfarms Closure Plan*, for Chevron USA Products Company, June 21.

Chevron USA Inc., 1996, *Revised Landfarms Closure Plan*, for Chevron USA Products Company, May 5.

Chevron USA Inc., 1997, *Revised Landfarms Closure Plan*, for Chevron USA Products Company, May 28.

Chevron USA Inc., 1999, *Landfarm Closure Construction Completion Certification Report*, Richmond Refinery, California, September 30.

Chevron USA Inc., 2000a, *Post-Closure Permit Application for Landfarms 1 through 5 at Chevron Richmond Refinery*, March 20.

Chevron USA Inc., 2000b, *Free-Phase Liquid Petroleum Hydrocarbon Recovery Evaluation Plan, Chevron Richmond Refinery*, December 11.

Chevron USA Inc., 2002a, *Revised Post-Closure Permit Application for the Landfarm Units 1 through 5 at Chevron Richmond Refinery*, January 7.

Chevron USA Inc., 2002b, *Revised Landfarms Post-Closure Monitoring Plan*, January 7.

Chevron USA Inc., 20012, *Revised Landfarms Post-Closure Monitoring Plan*, September 4.

D&M, 1988, *Refinery-Wide Report of Waste Discharge, Richmond Refinery, California, Chevron USA Inc.*, August 31.

DTSC, 1998, *Approval of the Closure and Post-Closure Plan for the Landfarms 1-5*, Chevron Richmond Refinery, March 19.

DTSC, 2003, *Final Hazardous Waste Facility Post-Closure Permit, Landfarms 1-5, Chevron Richmond Refinery,* March 4.

RWQCB, 2011, *Order No. R2-2011-0036, Updated Waste Discharge Requirements for the Chevron Products Company, Chevron Richmond Refinery, Richmond, Contra Costa Country*, June 14.

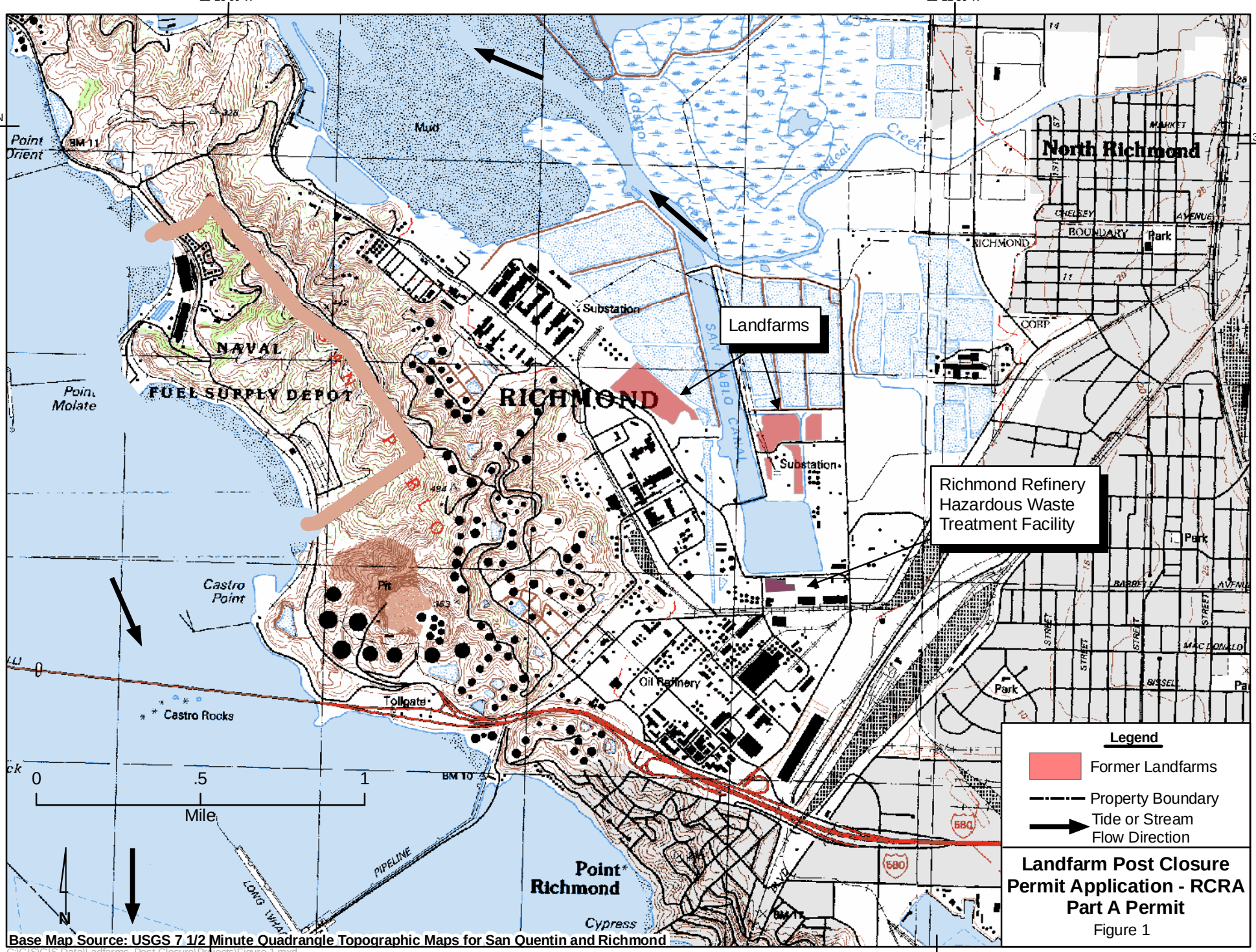
RWQCB, 2012, *Order No. R2-2012-0015, Site Cleanup Requirements for the Chevron Products Company, Chevron Richmond Refinery, Richmond, Contra Costa County*, February 13.

SAIC, 2012, *Semi-Annual Monitoring Report, First Semester 2012, Refinery-Wide Groundwater Monitoring Program and Landfarms Post-Closure Monitoring Program*. August 31.

URS, 2002a, *Revised Standard Operating Procedures for the Richmond Refinery, Groundwater Monitoring*, August 13.

URS, 2002b, *Statistical Evaluation Plan for the Landfarm Area, Groundwater Self-Monitoring and Reporting Program,* October 18.

Figures



Base Map Source: USGS 7 1/2 Minute Quadrangle Topographic Maps for San Quentin and Richmond

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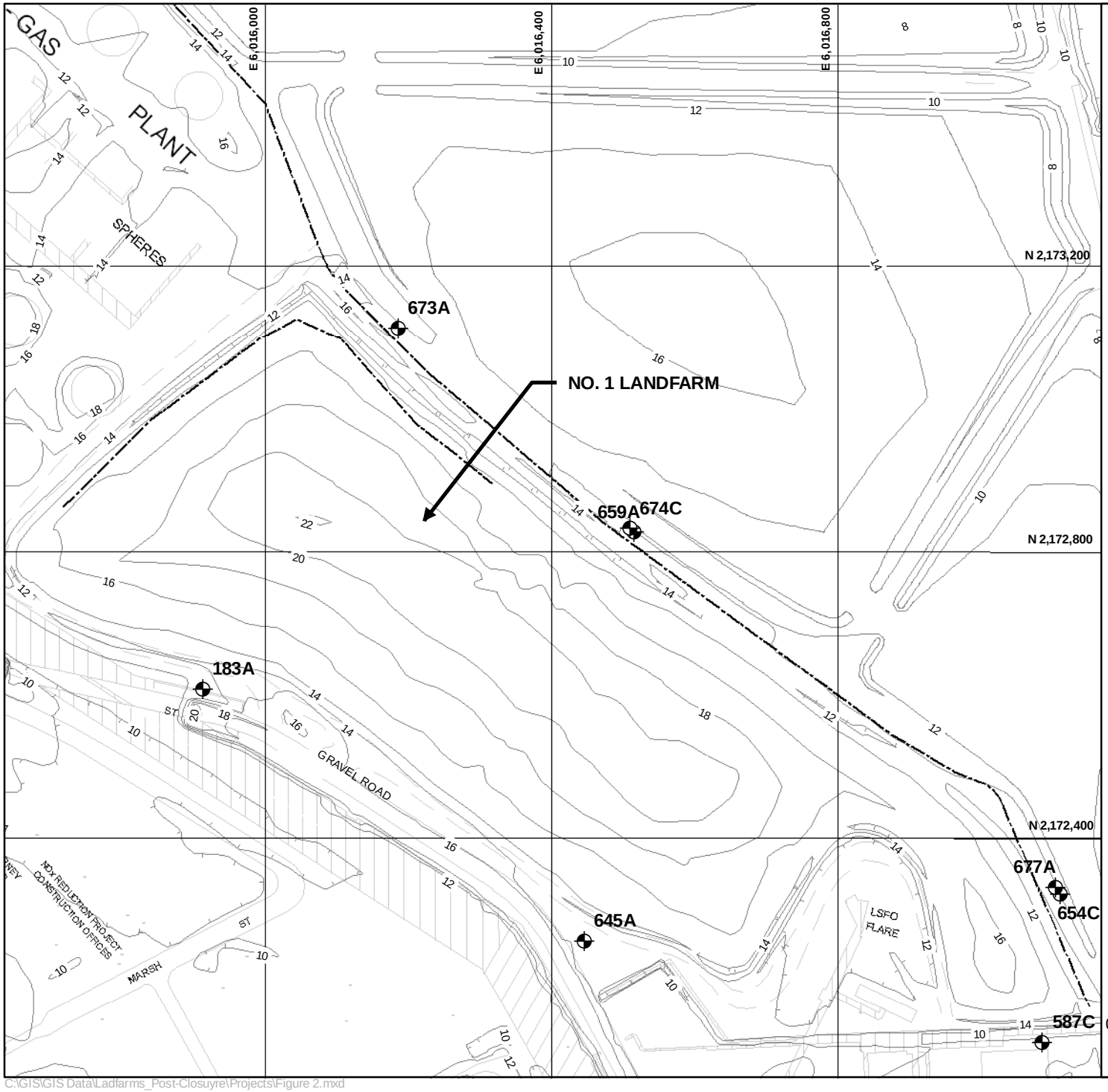

N

NOTES

1. EXISTING CONTOUR LINES ARE AT 2-FOOT INTERVALS BASED ON AERIAL PHOTOGRAPH DATED JUNE 2008

LEGEND

CURRENT GPS EXTRACTION TRENCH

LANDFARM POST CLOSURE GROUNDWATER MONITORING WELL

EXISTING CONTOUR

0 200 400 Feet

NO. 1 LANDFARM SITE DETAIL MAP

Figure 2

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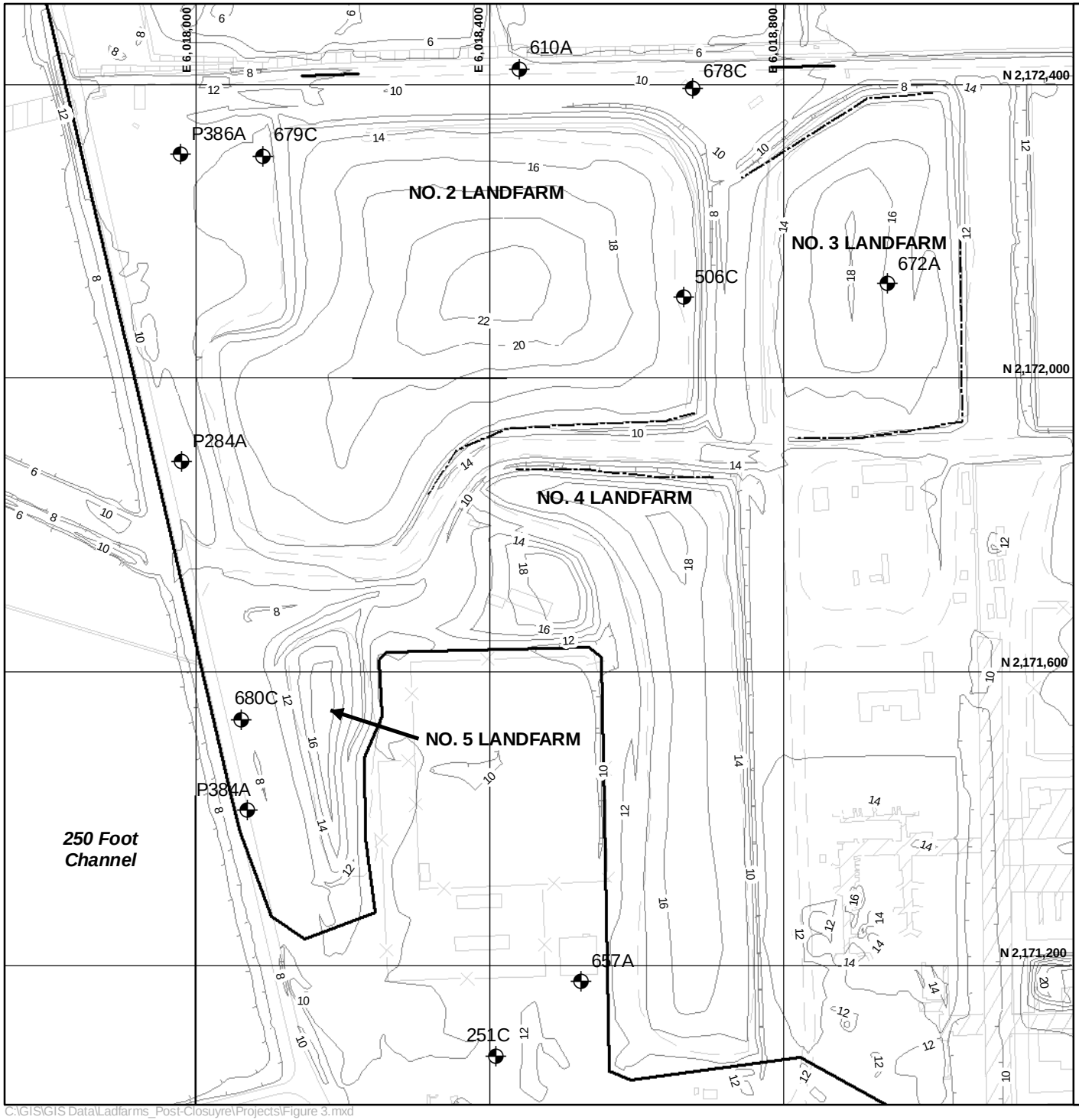

N

NOTES

1. EXISTING CONTOUR LINES ARE AT 2-FOOT INTERVALS BASED ON AERIAL PHOTOGRAPH DATED JUNE 2008

LEGEND

- CURRENT GPS EXTRACTION TRENCH
- CURRENT GPS BARRIER WALL
- LANDFARM POST CLOSURE GROUNDWATER MONITORING WELL
- EXISTING CONTOUR

0 200 400 Feet

NO. 2 THROUGH NO. 5 LANDFARM SITE DETAIL MAP

Figure 3

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Oblique Aerial View of Landfarm 1 (D81 - Historical Land Treatment Unit)
Richmond Refinery Landfarms 1-5 RCRA Post-Closure Permit Renewal

Figure 4

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Oblique Aerial View of Landfarms 2-5 (D81 - Historical Land Treatment Unit)
Richmond Refinery Landfarms 1-5 RCRA Post-Closure Permit Renewal

Figure 5

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Table

Table 1
Landfarms Post-Closure Inspection, Maintenance and Monitoring Activities Schedule
Richmond Refinery Landfarms 1-5 RCRA Post-Closure Permit Renewal Application

Task	Current Responsible Party	Form	Monthly	Quarterly	Semi-Annually	Annually	Biennially	Every 5 Years	After Heavy Rain	As Needed
Soil Moisture Inspection	Goebel	YES								X
Vegetation Maintenance	Goebel									X
Settlement Monitoring	SAIC					X				
Soil Cover Inspection - Cap Condition	SAIC					X				
Soil Cover Inspection - Erosion	WDO	YES							X	
Soil Cover Inspection - General	WDO	YES	X							
Surface Drainage - NPDES	SAIC					X				
Surface Drainage - Maintenance of Drainage Structures	WDO	YES							X	
LNAPL Measurement	SAIC				X					
Piezometer Monitoring	SAIC				X					
Groundwater Quality - Parameters Monitoring	SAIC					X				
Groundwater Quality - COC Monitoring	SAIC							X		
Inspection Report	SAIC					X				

Appendix A
Hazardous Waste Facility Post-Closure Permit (March 4, 2003)

California Environmental Protection Agency
Department of Toxic Substances Control

HAZARDOUS WASTE FACILITY POST-CLOSURE PERMIT

Facility Name and Location:
Chevron USA Inc. Richmond Refinery
841 Chevron Way
Richmond, California 94801-0627

Facility Owner:
Chevron USA Inc.
575 Market Street
San Francisco, CA 94105

Facility Operator:
Chevron Environmental Management Company
6001 Bollinger Canyon Road
San Ramon, CA 94583-2324

Permit Number: 02-BRK-05

Facility EPA ID No.:
CAD 009 114 919

Effective Date:
March 7, 2003

Expiration Date:
March 7, 2013

Permit Modification History:
None

Pursuant to Section 25200 of the California Health and Safety Code, this RCRA-equivalent Hazardous Waste Facility Post-Closure Permit is hereby issued to Chevron USA Inc. Richmond Refinery. The issuance of this Permit is subject to the conditions set forth in Attachment A and the approved Part "B" Application. The Attachment A consists of 23 pages.

ORIGINAL SIGNED BY

Mohinder S. Sandhu, P.E. , Chief
Standardized Permits and Corrective Action Branch
Hazardous Waste Management Program

March 4, 2003
Date

Attachment "A"
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PART I. DEFINITIONS

All terms used in this Permit shall have the same meaning as those terms have in the California Health and Safety Code, Division 20, Chapter 6.5 and title 22, California Code of Regulations Division 4.5, unless expressly provided otherwise by this Permit.

1. "DTSC" as used in this Permit means the California Department of Toxic Substances Control.

2. "Permittee" as used in this Permit means the Facility Owner and Operator.

3. "HSC" as used in this Permit means the California Health and Safety Code.

4. "CCR" as used in this Permit means the California Code of Regulations.

5. Unless explicitly stated otherwise, all references to items in this Permit shall refer only to items occurring within the same part.

PART II. DESCRIPTION OF THE FACILITY AND OWNERSHIP

1. NAME

The facility name is Chevron USA Inc. Richmond Refinery, 841 Chevron Way, Richmond, California 94801-0627 (hereafter "Facility" or "Refinery").

2. OWNER

The facility owner is Chevron USA Inc., 575 Market Street, San Francisco, California 94105 (hereafter "Owner").

3. OPERATOR

The facility operator is Chevron Environmental Management Company, 6001 Bollinger Canyon Road, San Ramon, California 94583-2324.(hereafter "Operator").

4. LOCATION

Chevron Richmond Refinery Landfarms 1 through 5 are located within the eastern section of the refinery property boundary in the western Contra Costa County, City of Richmond (Refer to Figure 1). Landfarms 1 through 5 cover 29 acres of the 2,900 acres of Refinery property. The Landfarms, zoned as general industrial use, are approximately 1,900 feet from the nearest (eastern) property boundary. The Refinery is bordered to the south by Interstate-580 (I-580), to the east by the Richmond Parkway and to the west and north by San Pablo Bay. Access to Landfarms 1 through 5 is through secured Gate 31. Landfarm 1 can be reached through Channel Street; Landfarms 2, 3, 4, and 5 can be accessed through Ammonia Street and Basin Street, all within the Refinery compound.

5. DESCRIPTION

The Permittee operated Landfarms 1 through 5 between the mid-1970s and 1987. Landfarming was conducted at that time to promote biodegradation of oily wastes (liquid and solid) generated from on-site petroleum processing. Landfarms 1 through 4 were built over existing ponds and Landfarm 5 was built on top of a fill. Historical landfills underlie portions of Landfarms 1 through 5. Prior to start of Landfarming operations, 7 to 20 feet of fill was placed at each of the Landfarms. The fill material originated from adjacent pond and channel dredging and from soil generated by the San Pablo Tank Farm construction activities. During Landfarming, wastes were applied to the surface of the Landfarms and tilled into the top 6 to 12 inches of fill. The principal wastes applied were oil/water separator sludge, leaded and non-leaded tank bottoms, and oil/water mixtures.

U.S. Environmental Protection Agency (U.S. EPA) and DTSC notified the Permittee on February 10, 1987 that Landfarms 1 through 5 did not qualify for a hazardous waste permit because the Landfarms lacked adequate separation between the treatment zone and the seasonal high groundwater table (about one foot below ground surface). In January 1988, U.S. EPA issued to the Permittee a Consent Agreement and Final Order (No. RCRA 09-88-005) to ensure that the Landfarms were closed in accordance with applicable U.S. EPA regulations. DTSC followed by issuing a Stipulation and Order (HWCA 87/99-019) to ensure that the Landfarms were closed in accordance with the applicable California regulations.

On March 31, 1988, the Permittee submitted to DTSC the original "Landfarms Closure Plan". A "Revised Closure Plan" was submitted on May 5, 1996. DTSC approved, with conditions, the "Revised Closure Plan" on March 19, 1998. Closure activities and construction of vegetative cover over the Landfarm units, as described in the approved "Revised Closure Plan", began in May 1998. The Landfarms have been regraded into low mounds to facilitate surface drainage and improve the appearance of the sites. The Landfarm soils were lightly compacted and/or recompacted with light truck equipment to support the construction of the final cover while allowing for easy vegetation root penetration. The final grades are designed to divert rainfall runoff away from the Landfarm sites. Infiltration of water into the Landfarm soils is reduced by the improved surface grading and surface vegetation. The top 12 inches of a vegetative soil layer consists of 6-inch thick clean fill layer overlain by a 6-inch thick relatively loose, nutrient-rich topsoil layer. This prevents run-off from direct contact with the wastes and also prevents wind erosion of the wastes.

On September 30, 1999, the Permittee submitted to DTSC the "Landfarms Closure Construction Completion Certification Report". On September 19, 2000, DTSC issued the approval of the Closure Certification for Landfarms 1 through 5. The Permittee submitted the "Post-Closure Permit Application for Landfarms 1 through 5" on March 20, 2000. A revised "Post-Closure Permit Application" was submitted on January 7, 2002.

The "RCRA Facilities Investigation (RFI) Report" dated November 1992 indicated that soils beneath Landfarms 1 through 5 and the "A" Zone groundwater in its vicinity are impacted by volatile organic compounds (including benzene, ethyl benzene, toluene, xylene), semi-volatile organic compounds (including fluorene, phenanthrene, 1-methyl naphthalene, 2- methyl naphthalene), total volatile hydrocarbon as gasoline (TVH-gasoline), total extractable hydrocarbon as diesel (TEH-diesel), and metals (including chromium, lead, nickel, vanadium). Monitoring activities indicate that free-phase hydrocarbons are present in "A" Zone groundwater in the vicinity of Landfarms 1 through 5. These monitoring activities also indicate that "C" Zone groundwater has not been impacted.

In response to the California Regional Water Quality Control Board, San Francisco Bay Region (RWQCB) Waste Discharge Requirements (WDR) Order No. 89-175, the Permittee developed and constructed a Groundwater Protection System (GPS) for the Refinery. As part of an overall Refinery-wide GPS, groundwater extraction trenches were installed along the down gradient perimeter of the Landfarms. The Landfarms' GPS also serves as corrective action for the landfills that underlie portions of the Landfarms. The purpose of the GPS is to establish and maintain a physical or hydraulic barrier to prevent the off-site movement of potentially contaminated "A" Zone groundwater.

In response to RWQCB WDR Order No. 00-043 (WDR #00-043), the Permittee developed and implemented the Free-Phase Liquid Petroleum Hydrocarbon Recovery Evaluation Plan for the Facility. The Plan includes the area of Landfarms 1 through 5.

6. FACILITY SIZE AND TYPE FOR FEES

The Facility is categorized as a large post-closure facility for purposes of HSC, Section 25205.19.

PART III. GENERAL CONDITIONS

1. PERMIT APPLICATION DOCUMENTS

The Part "A" Application and Part "B" Application for Landfarms 1 through 5 at Chevron USA Inc. Richmond Refinery dated January 7, 2002 and the following documents are hereby approved and made a part of this Permit by reference (the "Application"):

(a) "Landfarms Post Earthquake Inspection and Corrective Action Plan", dated November 1996,

(b) "Revised Landfarms Closure Plan", dated May 28, 1997,

(c) "Revised Landfarms Post-Closure Monitoring Plan", dated January 7, 2002,

(d) "Groundwater Monitoring Program and Standard Operating Procedures", Chevron U.S.A. Products Company, Richmond, California, dated August 13, 2002,

(e) "Revised Table 1 to Groundwater Monitoring Program Standard Operating Procedures", Chevron U.S.A. Products Company, Richmond, California, submitted with a cover letter dated October 31, 2002 (Standard Operating Procedures),

(f) "Statistical Evaluation Plan for Groundwater Self-Monitoring and Reporting Program, WDR #00-043, Chevron Richmond, California, dated October 18, 2002 (Statistical Evaluation Plan).

2. EFFECT OF PERMIT

(a) The Permittee shall comply with the provisions of the California Health and Safety Code, and Division 4.5 of title 22, California Code of Regulations (title 22, Cal. Code Regs.). DTSC's issuance of this Permit does not release the Permittee from any liability or duty imposed by federal or state statutes or regulations or local ordinances, except the obligation to obtain this Permit. The Permittee shall obtain the permits required by other governmental agencies, including but not limited to, the applicable land use planning, zoning, hazardous waste, air quality, water quality, and solid waste management laws for the construction and/or operation of the Facility.

(b) The Permittee is permitted to monitor and maintain the post-closure facility in accordance with the conditions of this Permit. Any treatment or storage of hazardous wastes not specifically authorized in this Permit is strictly prohibited.

(c) Compliance with the terms of this Permit does not constitute a defense to any action brought under any other law governing protection of public health or the environment, including, but not limited to, one brought for any imminent and substantial endangerment to human health or the environment.

(d) DTSC's issuance of this Permit does not prevent DTSC from adopting or amending regulations that impose additional or more stringent requirements than those in existence at the time this Permit is issued and does not prevent the enforcement of these requirements against the Permittee.

(e) Failure to comply with any term or condition set forth in the Permit in the time or manner specified herein will subject the Permittee to possible enforcement action including but not limited to penalties pursuant to California Health and Safety Code section 25187.

(f) In addition, failure to submit any information required in connection with the Permit, or falsification and/or misrepresentation of any submitted information, is grounds for revocation of this Permit (title 22, Cal. Code of Regs., section 66270.43).

(g) In case of conflicts between the Operation Plan and the Permit, the Permit conditions take precedence.

(h) This Permit includes and incorporates by reference any conditions of WDR #00-043, including the attached Groundwater Corrective Action Self-monitoring and Reporting Program (SMP Attachment), and any subsequent approved modifications issued by the RWQCB to the Facility, and any conditions imposed pursuant to section 13227 of the Water Code.

3. COMPLIANCE WITH CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

A Notice of Exemption has been prepared in accordance with the requirements of Public Resources Code Section 21000 et seq. and the CEQA Guidelines, section 15061(b)(3) et seq. of title 14, California Code of Regulations.

4. POST-CLOSURE CARE AND ENVIRONMENTAL MONITORING

(a) As required by the approved "Revised Landfarms Post-Closure Monitoring Plan", the Permittee shall continue all operations (including pH control) necessary to enhance degradation and transformation and sustain immobilization of constituents of concern in the treatment zone to the extent that such measures are consistent with other post-closure care activities;

(b) The Permittee shall maintain run-on control system capable of preventing run-on onto the treatment zone during peak discharge from at least a 24-hour, 25-year storm as required by the approved "Revised Landfarms Post-Closure Monitoring Plan";

(c) The Permittee shall maintain the run-off management system to collect, control, and properly manage at the least, the water volume resulting from a 24-hour, 25-year storm as required by the approved "Revised Landfarms Post-Closure Monitoring Plan";

(d) As required by the approved "Revised Landfarms Post-Closure Monitoring Plan", the Permittee shall control the release of airborne contaminants to below hazardous or nuisance levels or other levels as necessary to protect human health or the environment.

(e) The Permittee shall control wind dispersal of hazardous waste as required by the approved "Revised Landfarms Post-Closure Monitoring Plan";

(f) The Permittee shall maintain the vegetative cover over closed portions of Landfarms 1 through 5 as required by the approved "Revised Landfarms Post-Closure Monitoring Plan";

(g) The Permittee shall maintain and operate the GPS as required by WDR #00-043;

(h) The Permittee shall implement the Free-Phase Liquid Hydrocarbon Recovery Evaluation Plan as required by WDR #00-043;

(i) The Permittee shall conduct groundwater monitoring for Landfarms 1 through 5 as required by the approved "Revised Landfarms Post-Closure Monitoring Plan" and the SMP Attachment:

(1) The Permittee shall institute a corrective action monitoring program for the "A" Zone as required by the approved "Revised Landfarms Post-Closure Monitoring Plan" and the SMP Attachment,

(2) The Permittee shall institute a detection monitoring program for the "C" Zone as required by the approved "Revised Landfarms Post-Closure Monitoring Plan" and the SMP Attachment,

(3) The Permittee shall comply with the notification and verification resampling requirements of title 22, CCR section 66264.98(j),

(4) The Permittee shall conduct verification resampling within 45 days of identifying potential evidence of a release as indicated by any of the following:

(A) One organic compound that exceeds its practical quantitation limit,

(B) Two or more organic compounds that show a trace or stronger indication of a release,

(C) An inorganic parameter that exceeds the background-derived concentration limit, or

(D) Other evidence as identified by the Permittee or DTSC.

(5) The Permittee shall comply with the requirements of title 22 CCR section 66264.98(k),

(6) The Permittee shall apply a water quality protection standard consisting of:

(A) The monitoring parameters and constituents of concern identified in Table 4 of the SMP Attachment;

(B) The concentration limits for the "A" Zone specified in Table 4 of the SMP Attachment;

(C) The concentration limits for the "C Zone specified in the "Statistical Evaluation Plan for the Landfarm Area" and SMP Attachment,

(D) A point of compliance at the hydraulically down-gradient limit of Landfarm 1 and at the hydraulically down gradient limits of Landfarms 2 through 5; and

(E) The monitoring points specified in Table 3 of the SMP Attachment.

(7) The compliance period for Landfarms 1 through 5 shall be a minimum of 30 years.

(8) The Permittee shall establish, operate, and maintain a groundwater monitoring program that complies with title 22 CCR section 66264.97.

(A) The Permittee shall conduct groundwater monitoring as required by the SMP Attachment and the approved "Revised Landfarms Post-Closure Monitoring Plan".

(B) The Permittee shall follow the sampling and analytical procedures specified in the approved "Groundwater Monitoring Program Standard Operating Procedures", Chevron U.S.A. Products Company, Richmond, California dated August 13, 2002 and its revised Table 1 submitted with a cover letter dated October 31, 2002.

(C) The Permittee shall use the statistical procedures specified in the approved "Landfarms Statistical Evaluation Plan for Groundwater Self-Monitoring and Reporting Program", Chevron Refinery, Richmond, California dated October 18, 2002.

(D) The Permittee shall submit groundwater monitoring reports as required by the SMP Attachment.

(j) The Permittee shall submit to DTSC all reports, notifications, and other submittal which are required by the approved "Revised Landfarms Post-Closure Monitoring Plan", approved "Landfarms Post Earthquake Inspection and Corrective Action Plan", and the SMP Attachment in accordance with the applicable schedules specified in the "Post-Closure Permit Application".

(k) Unless and until changed by written notification from DTSC to the Permittee, all reports, notifications, or other submissions that are required by this Permit shall be sent by certified mail or hand delivered, during working hours to the office of:

Branch Chief
Standardized Permits and Corrective Action Branch
Department of Toxic Substances Control
700 Heinz Avenue, Suite 200
Berkeley, California 94710-2721

(l) Unless and until changed by written notification from DTSC to the Permittee, all monitoring reports that are required by this Permit shall be sent by certified mail or hand delivered during working hours to the office of:

Unit Chief
Geological Services Unit
Northern California Region, Sacramento Office
Department of Toxic Substances Control
8800 Cal Center Drive
Sacramento, California 95826-3200

PART IV. PERMITTED UNITS AND ACTIVITIES

This Permit authorizes post-closure care of the Facility units listed below. The Permittee shall not treat, or store or otherwise manage hazardous waste in any of the following units unless otherwise specified in this Part IV. Any modifications to a unit or activity authorized by this Permit require the written approval of DTSC in accordance with the permit modification procedures set forth in title 22, California Code of Regulations.

UNIT NAME:

Landfarm Unit 1

LOCATION:

Landfarm Unit 1 is adjacent to and north of Channel Street, south of No. 1 Oxidation Pond and east of the 250-foot Channel located within Chevron USA Inc. Richmond Refinery (See Figures 1, 2 and 4).

ACTIVITY TYPE:

Post-Closure Care

ACTIVITY DESCRIPTION:

Maintain the vegetation and vegetative cover on the Landfarm, monitor the soil moisture, soil nutrients and soil pH of the vegetative cover, maintain and protect the Groundwater Protection System (GPS), and monitor the concentration of the constituents of concern in the Landfarm's groundwater.

PHYSICAL DESCRIPTION:

Landfarm Unit 1 consists of 13.5 acres, the largest of the five Landfarms located at Chevron USA Inc. Richmond Refinery. Prior to Landfarm operation, imported fill ranging from 10 to 25 feet thick, was placed at the site. To evaluate the vertical and horizontal extent of residual oil in the soil, reconnaissance survey of the site, consisting of soil core and soil pore liquid sampling, was conducted. Results of this survey indicated that the treatment zone extended from 3 to 7 feet below ground surface.

WASTE SOURCES:

Oily wastes generated from on-site petroleum manufacturing.

WASTE TYPES:

Oily wastes generated from on-site manufacturing of petroleum, including non-leaded and leaded tank bottoms, oil/water separator sludge and spent catalyst beads.

RCRA HAZARDOUS WASTE CODES:

K051, K049, K169

UNIT NAME:

Landfarm Unit 2

LOCATION:

Landfarm Unit 2 is adjacent to Landfarm Units 3, 4, and 5. It is south of the Water Enhancement Wetlands Project and east of the 250-foot Channel located within Chevron USA Inc. Richmond Refinery (See Figures 1, 3 and 4).

ACTIVITY TYPE:

Post-Closure Care

ACTIVITY DESCRIPTION:

Maintain the vegetation and vegetative cover on the Landfarm, monitor the soil moisture, soil nutrients and soil pH of the vegetative cover, maintain and protect the Groundwater Protection System (GPS), and monitor the concentration of the constituents of concern in the Landfarm's groundwater.

PHYSICAL DESCRIPTION:

Landfarm Unit 2 consists of 8 acres. Prior to Landfarm operation, imported fill ranging from 10 to 25 feet thick, was placed at the site. To evaluate the vertical and horizontal extent of residual oil in the soil, reconnaissance survey of the site, consisting of soil core and soil pore liquid sampling, was conducted. Results of this survey indicated that the treatment zone extended from 3 to 5.5 feet below ground surface.

WASTE SOURCES:

Oily wastes generated from on-site petroleum manufacturing.

WASTE TYPES:

Oily wastes generated from on-site manufacturing of petroleum, including oil/water separator sludge and phthalic anhydride bottoms.

RCRA HAZARDOUS WASTE CODES:

K051, K049, K169

UNIT NAME:

Landfarm Unit 3

LOCATION:

Landfarm Unit 3 is south of the Water Enhancement Wetlands Project and east of Landfarm Unit 2 located within Chevron USA Inc. Richmond Refinery (See Figures 1, 3 and 4).

ACTIVITY TYPE:

Post-Closure Care

ACTIVITY DESCRIPTION:

Maintain the vegetation and vegetative cover on the Landfarm, monitor the soil moisture, soil nutrients and soil pH of the vegetative cover, maintain and protect the Groundwater Protection System (GPS), and monitor the concentration of the constituents of concern in the Landfarm's groundwater.

PHYSICAL DESCRIPTION:

Landfarm Unit 3 consists of 3.5 acres. Prior to Landfarm operation, imported fill ranging from 10 to 25 feet thick, was placed at the site. To evaluate the vertical and horizontal extent of residual oil in the soil, reconnaissance survey of the site, consisting of soil core and soil pore liquid sampling, was conducted. Results of this survey indicated that treatment zone extended from 1 to 5 feet below ground surface.

WASTE SOURCES:

Oily wastes generated from on-site petroleum manufacturing.

WASTE TYPES:

Oily wastes generated from on-site manufacturing of petroleum, including non-leaded tank bottoms and oil/water separator sludge.

RCRA HAZARDOUS WASTE CODES:

K051, K049, K169

UNIT NAME:

Landfarm Unit 4

LOCATION:

Landfarm Unit 4 is south of Landfarm Unit 2 within Chevron USA Inc. Richmond Refinery (See Figures 1, 3 and 4).

ACTIVITY TYPE:

Post-Closure Care

ACTIVITY DESCRIPTION:

Maintain the vegetation and vegetative cover on the Landfarm, monitor the soil moisture, soil nutrients and soil pH of the vegetative cover, maintain and protect the Groundwater Protection System (GPS), and monitor the concentration of the constituents of concern in the Landfarm's groundwater.

PHYSICAL DESCRIPTION:

Landfarm Unit 4 consists of 3 acres. Prior to Landfarm operation, imported fill ranging from 10 to 25 feet thick, was placed at the site. To evaluate the vertical and horizontal extent of residual oil in the soil, reconnaissance survey of the site, consisting of soil core and soil pore liquid sampling, was conducted. Results of this survey indicated that the treatment zone extended from 3½ to 5 feet below ground surface.

WASTE SOURCES:

Oily wastes generated from on-site petroleum manufacturing.

WASTE TYPES:

Oily wastes generated from on-site manufacturing of petroleum, including non-leaded tank bottoms and oil/water separator sludge.

RCRA HAZARDOUS WASTE CODES:

K051, K049, K169

UNIT NAME:

Landfarm Unit 5

LOCATION:

Landfarm Unit 5 is south of Landfarm Unit 2 and east of the 250-foot Channel located within Chevron USA Inc. Richmond Refinery (See Figures 1, 3 and 4).

ACTIVITY TYPE:

Post-Closure Care

ACTIVITY DESCRIPTION:

Maintain the vegetation and vegetative cover on the Landfarm, monitor the soil moisture, soil nutrients and soil pH of the vegetative cover, maintain and protect the Groundwater Protection System (GPS), and monitor the concentration of the constituents of concern in the Landfarm's groundwater.

PHYSICAL DESCRIPTION:

Landfarm Unit 5 consists of 1 acre, the smallest of the five Landfarms located at Chevron USA Inc. Richmond Refinery. Prior to Landfarm operation, imported fill ranging from 10 to 25 feet thick, was placed at the site. To evaluate the vertical and horizontal extent of residual oil in the soil, reconnaissance survey of the site, consisting of soil core and soil pore liquid sampling, was conducted. Results of this survey indicated that the treatment zone extended from 2 to 4 feet below ground surface.

WASTE SOURCES:

Oily wastes generated from on-site petroleum manufacturing.

WASTE TYPES:

Oily wastes generated from on-site manufacturing of petroleum, including oil/water separator sludge.

RCRA HAZARDOUS WASTE CODES:

K051, K049, K169

PART V. SPECIAL CONDITIONS WHICH APPLY TO LANDFARM UNITS 1 THROUGH 5

1. As required by the approved "Revised Landfarm Post-Closure Monitoring Plan" dated January 7, 2003, the Permittee shall survey quarterly the vegetative cover of the Landfarms to evaluate and identify the appearance of the vegetation on each Landfarm. Symptoms of drought stress, chlorosis (indicative of nutrient deficiency) or need for irrigation, fertilization, mowing and/or reseeding shall be noted, and maintenance care shall be made to address the observations during the survey. The observation and the resulting effectiveness shall be documented in the Semi-annual Landfarm Status Report.

2. The Permittee shall monitor soil pH and soil nutrients (nitrate, ammonium, and phosphate) semi-annually within each Landfarm following the approved "Revised Landfarm Post-Closure Monitoring Plan".

3. The Permittee shall maintain an electronically controlled stationary sprinkler system to irrigate Landfarm Units 2 through 5, as well as a portion of Landfarm Unit 1 and a self propelled linear sprinkler system for the remaining portion of Landfarm Unit 1. Treated Refinery effluent water that meets the National Pollutant Discharge Elimination System (NPDES) permit requirements will be used for irrigation. The target soil moisture content shall be between 6 and 20 percent. The Permittee shall monitor soil moisture weekly during dry season (May to September) and quarterly thereafter. The Permittee shall modify the frequencies and amounts of irrigation as needed based on the results of weekly inspections. The results of soil monitoring shall be included in the Semi-Annual Landfarms Status Report.

4. As required by the approved "Revised Landfarm Post-Closure Monitoring Plan", the Permittee shall have a qualified engineer inspect the vegetative cover of the Landfarms annually, between September 15 and October 15, prior to the onset of the rainy season, for signs of differential settlement which may cause ponding. If differential settlement has occurred, the surface will be regraded within 30 days to maintain positive drainage. The Permittee shall also perform inspections of the vegetative cover monthly and after a major rainfall event. Records of all inspections and repairs shall be maintained at the Facility.

5. As required by the approved "Revised Landfarm Post-Closure Monitoring Plan", the Permittee shall inspect the drainage swales and culverts annually, between September 15 and October 15, before the rainy season, for cracking, clogging, and erosion. The pumps shall also be inspected and tested annually. If deficiencies are found, they will be corrected within 30 days.

6. In the event that the Landfarms experience the occurrence of the Maximum Credible Earthquake resulting in damage to the vegetative cover and equipment, the Permittee shall evaluate the impact of the earthquake and repair any damage following the approved "Landfarms Post-Earthquake Inspection and Corrective Action Plan". The Permittee shall immediately inspect the Landfarms and verbally report the results of the inspection to DTSC within 18 hours of the event. A written report which includes the information listed in the approved "Landfarms Post-Earthquake Inspection and Corrective Action Plan" shall be submitted to DTSC within 15 days of the incident.

PART VI. CORRECTIVE ACTION

1. The Permittee is conducting corrective action at the Facility under the oversight of the U.S. EPA pursuant to Consent Agreement and Final Order, RCRA 09-88-005, January 20, 1988.

2. In the event the Permittee identifies an immediate or potential threat to human health and/or the environment, discovers new releases of hazardous waste and/or hazardous constituents, or discovers new Solid Waste Management Units (SWMUs) not previously identified, the Permittee shall notify DTSC orally within 24 hours of discovery and notify DTSC in writing within 10 days of such discovery summarizing the findings including the immediacy and magnitude of any potential threat to human health and/or the environment.

3. DTSC may require the Permittee to conduct corrective action to address any immediate or potential threats to human health and/or the environment or newly identified SWMUs or releases of hazardous waste and/or hazardous constituents. Corrective action will be carried out under either a Corrective Action Consent Agreement or Corrective Action Enforcement Order pursuant to California Health and Safety Code, Section 25187.

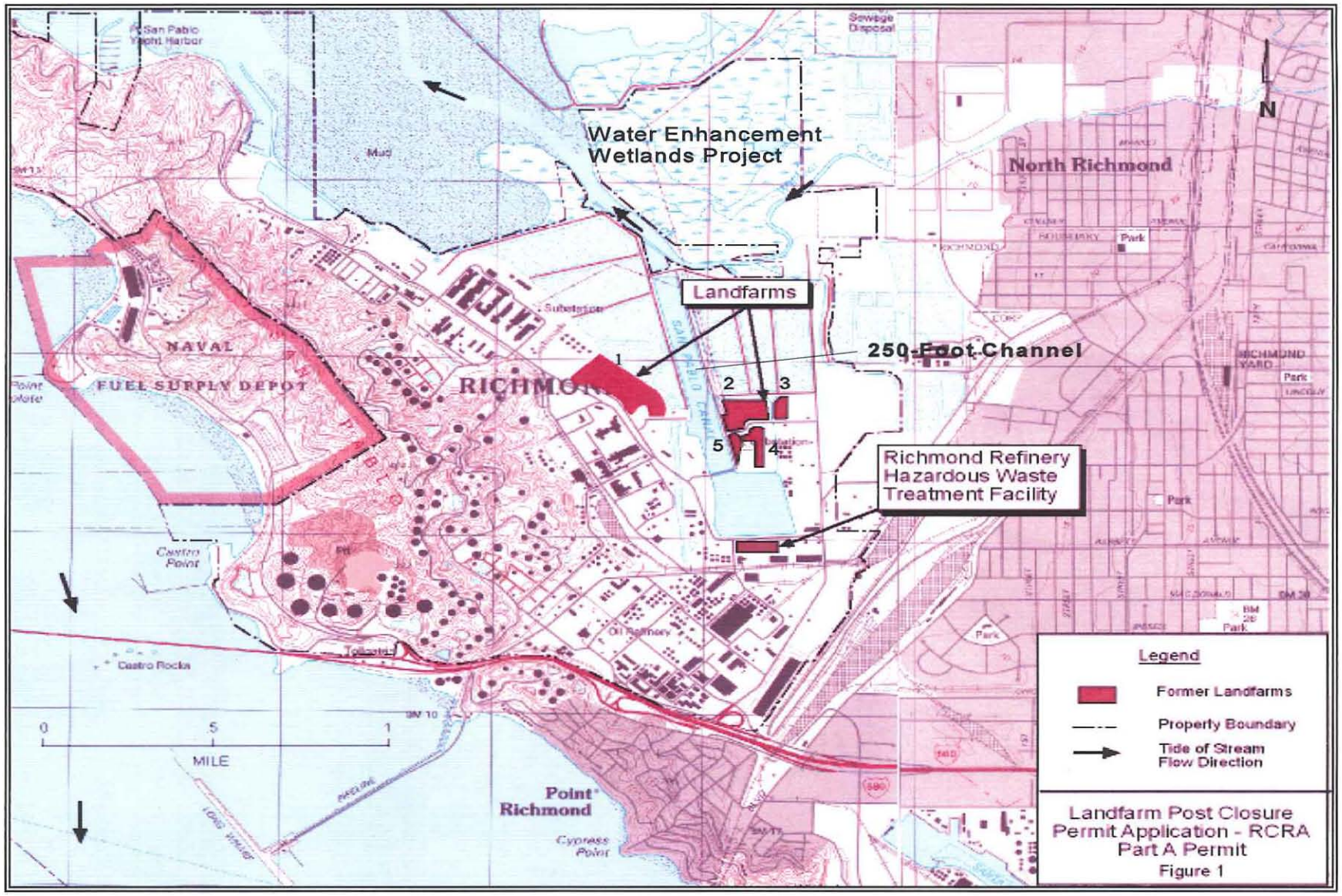

Figure 1. Location map, Chevron USA Inc. Richmond Refinery Landfarms 1 through 5, Richmond, California

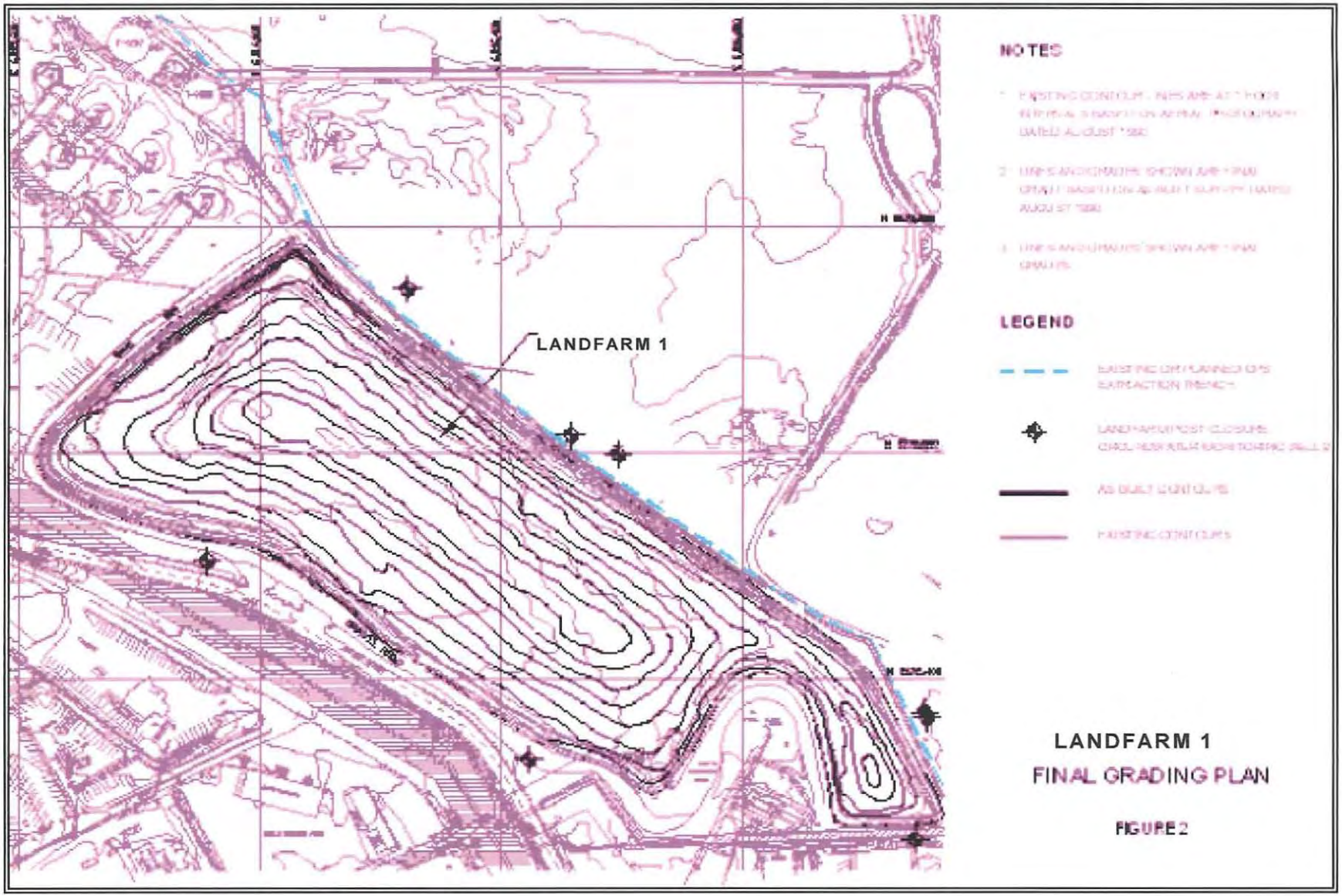

Figure 2. Site Map, Chevron USA Inc. Richmond Refinery Landfarm 1.

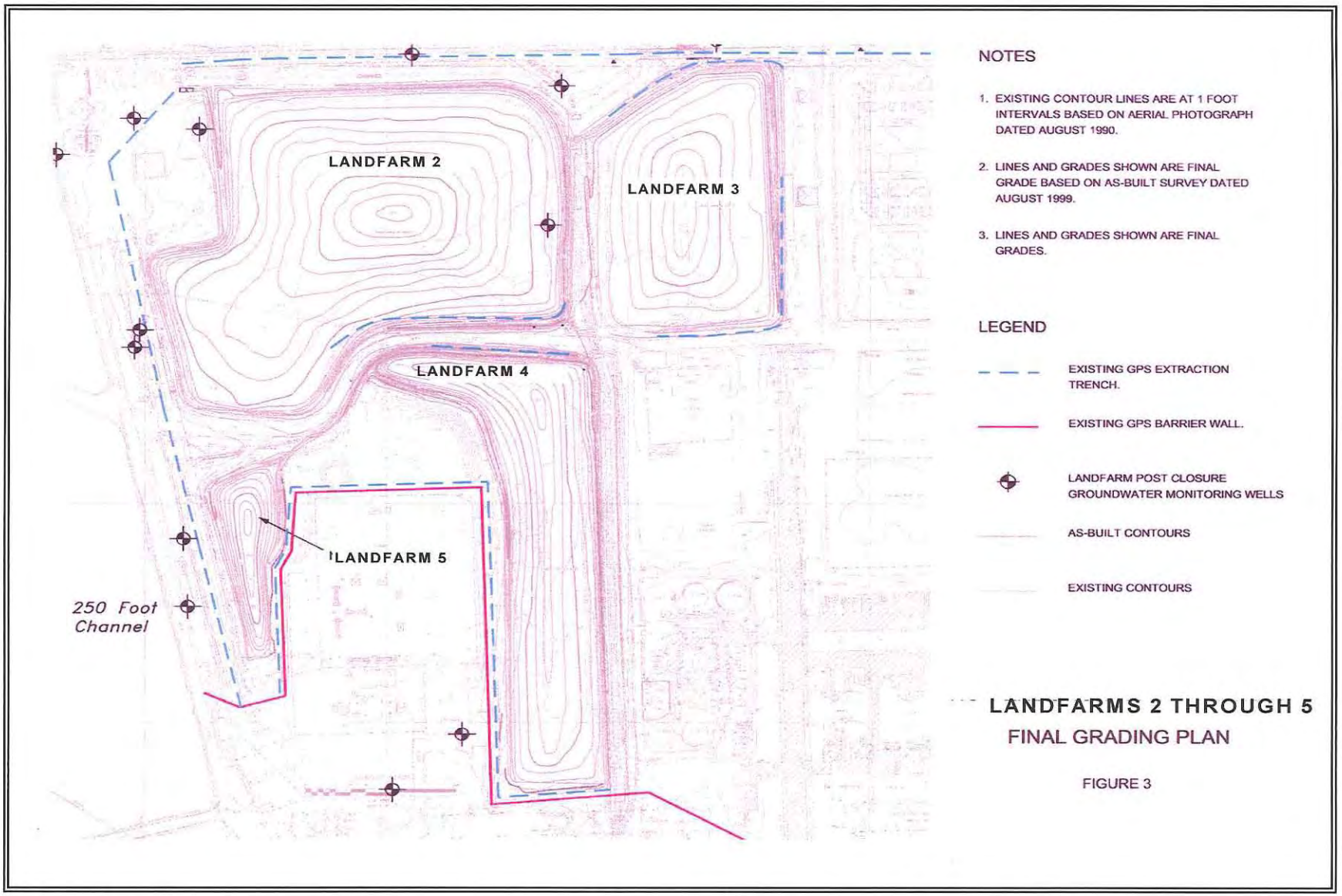

Figure 3. Chevron USA Inc. Richmond Refinery Landfarms 2 through 5.

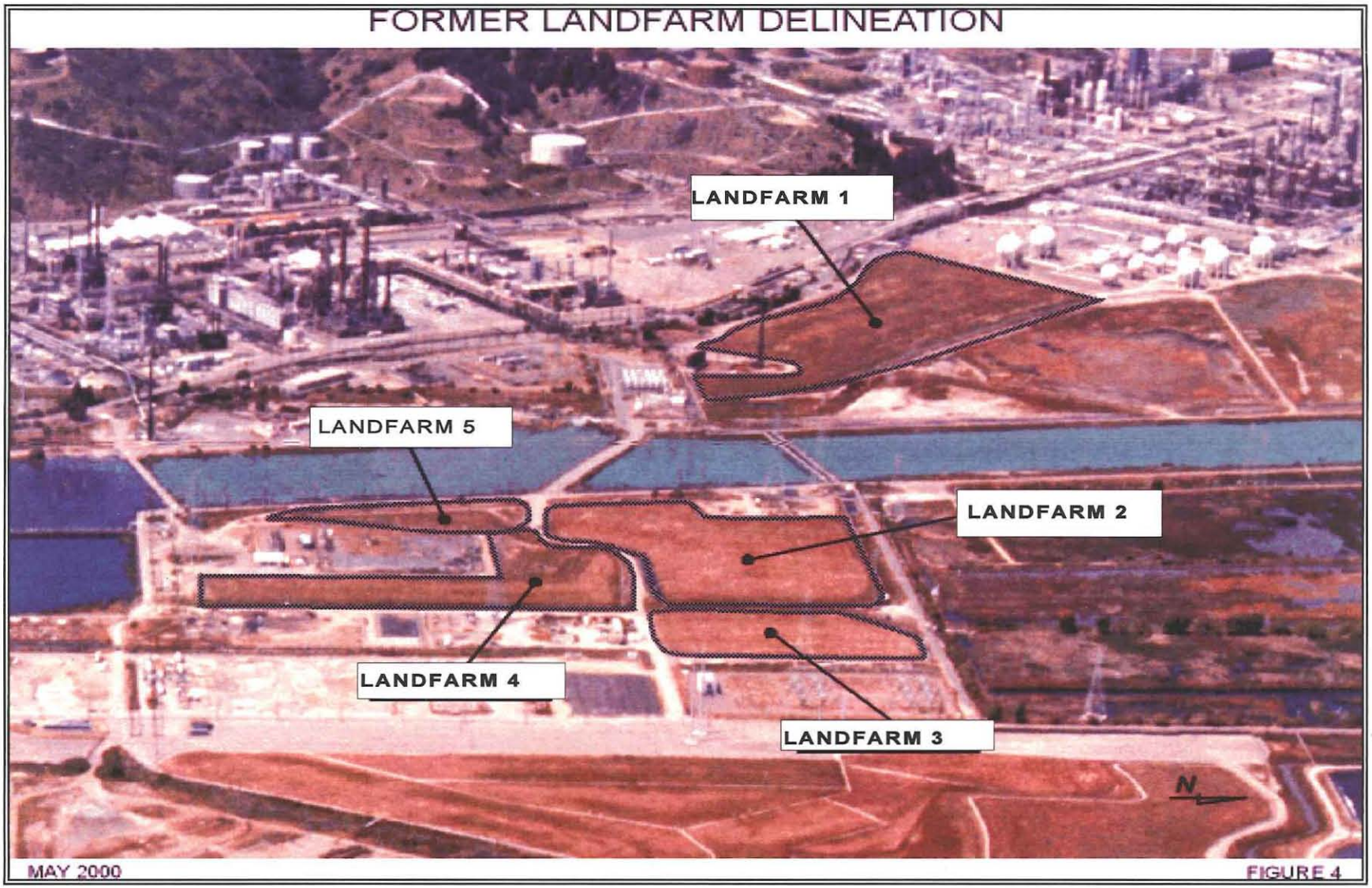

Figure 4. Aerial Photo, Chevron USA Inc. Richmond Refinery Landfarms 1 through5, Richmond, California

Appendix B
Permit Completeness Checklist

PERMIT

COMPLETENESS

CHECKLIST

PART “B”

APPLICATION CHECKLIST

FOR

FULL RCRA PERMIT

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SECTION B. FACILITY DESCRIPTION	Part B Submittal - Section 2, Appendix C
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SECTION D. PROCESS INFORMATION	
D1 - CONTAINERS	NA
D2 - TANKS	NA
D3 - WASTE PILES	NA
D4 - SURFACE IMPOUNDMENTS	NA
D5 - INCINERATORS	NA
D6 - LANDFILLS	NA
D7 - LAND TREATMENT	Part B - Section 2.3; Appendices F and I
D8 - MISCELLANEOUS TREATMENT	NA
D9 - BOILERS/INDUSTRIAL FURNACES	NA
D10 - CONTAINMENT BUILDINGS	NA
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SECTION M. ARTICLE 27, AIR EMISSION STANDARDS FOR PROCESS VENTS (SUBPART AA)	NA
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SECTION O. AIR EMISSION STANDARDS FOR CONTAINERS, TANKS, AND SURFACE IMPOUNDMENTS (SUBPART CC)	NA
SECTION P. EXPOSURE INFORMATION	NA

PERMIT COMPLETENESS CHECKLIST

SECTION A. PART A GENERAL INFORMATION REQUIREMENTS

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
A-1	Description of Activities Conducted which Require Facility to Obtain a Permit under the Resource Conservation and Recovery Act (RCRA), and Brief Description of Nature of the Business	270.13(a),(m)	66270.13(a),(m)		Part A	
A-2	Name, Mailing Address, and Location of Facility for which the Application is Submitted, including a Topographic Map	270.13(b),(l)	66270.13(b),(l)		Part A	
A-3	Up to Four Standard Industrial Classification Codes which Best Reflect the Products or Services Provided by the Facility	270.13(c)	66270.13(c)		Part A	
A-4	Operator/Owner's Name, Address, Telephone Number, and Ownership Status	270.13(d),(e)	66270.13(d),(e)	Ownership status must include status as federal, state, private, public, or other entity.	Part A	
A-5	Facility is New, Existing, or Located on Indian Lands	270.13(f),(g)	66270.13(f),(g)	Description must include information on whether this is a first or revised application with date of last signed permit application.	Part A Part B - Section 1.1	

PERMIT COMPLETENESS CHECKLIST

SECTION A. PART A GENERAL INFORMATION REQUIREMENTS

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
A-6	Description of Processes to be Used for Treating, Storing, and Disposing of Hazardous Waste	270.13(i)	66270.13(i)	Description must include design capacity for these items.	Part A Part B - Section 5.1	
A-7	Specification of the Hazardous Wastes Listed or Designated Under CCR, chapter 11	270.13(j)	66270.13(j)	Specifications must include estimate on quantity of waste to be treated, stored, or disposed of.	Part A Part B - Section 5.1	
A-8	Listing of all Permits or Construction Approvals Received or Applied for	270.13(k)	66270.13(k)	Permits include the following programs: Hazardous Waste Management under RCRA; Underground Injection Control under the Solid Waste Disposal Act; Prevention of Significant Deterioration, Nonattainment Program, and National Emissions Standards for Hazardous Pollutants under the Clean Air Act; ocean dumping permits under the Marine Protection Research and Sanctuaries Act; dredge and fill permits under Section 404 of the Clean Water Act; or other relevant environmental permits including state permits.	Part A	

Notes:

[a] Considerations in addition to the requirements presented in the regulations.

[b] For each requirement, this column must indicate one of the following: NA for not applicable, IM for information missing, or the exact location of the information in the application.

[c] If application is deficient in an area, prepare a comment describing the deficiency, attach it to the checklist, and reference the comment in this column.

PERMIT COMPLETENESS CHECKLIST

SECTION B. FACILITY DESCRIPTION

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
B-1	General Description	270.14(b)(1)	66270.14(b)(1)		Section 2.0	
B-2	Topographic Map	270.14	66270.14(b)(18)	Show a distance of 1,000 feet around the unit at a scale of 1 inch to not more than 200 feet (multiple maps may be submitted at this scale), and should be similar to Part A topographic map.	Appendix C	
B-2a	General Requirements	270.14(b)(19)	66270.14		Appendix C	
	Scale and Date	270.14(b)(19)(i)	66270.14(b)(18)(A)	Other scales may be used if justified.	Appendix C	
	The 100-Year Flood Plain Area	270.14(b)(19)(ii)	66270.14(b)(18)(B)		Appendix C	
	Surface Waters	270.14(b)(19)(iii)	66270.14(b)(18)(C)		Appendix C	
	Surrounding Land Use	270.14(b)(19)(iv)	66270.14(b)(18)(D)		Appendix C	
	Wind Rose	270.14(b)(19)(v)	66270.14(b)(18)(E)		Appendix C	
	Map Orientation	270.14(b)(19)(vi)	66270.14(b)(18)(F)		Appendix C	
	Legal Boundaries	270.14(b)(19)(vii)	66270.14(b)(18)(G)		Appendix C	
	Access Control	270.14(b)(19)(viii)	66270.14(b)(18)(H)		Appendix C	
	Injection and Withdrawal Wells (On Site and Off Site)	270.14(b)(19)(ix)	66270.14(b)(18)(I)		NA	
	Buildings and Other Structures	270.14(b)(19)(x)	66270.14(b)(18)(J)	66270.14(b)(19)(x) for example list.	Appendix C	
	Drainage and Flood Control Barriers	270.14(b)(19)(xi)	66270.14(b)(18)(K)		Appendix C	

PERMIT COMPLETENESS CHECKLIST

SECTION B. FACILITY DESCRIPTION

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
	Location of the Treatment or Disposal Unit(s) and Decontamination Areas	270.14(b)(19)(xii)	66270.14(b)(19)(L)		Appendix C	
	Location of Solid Waste Management Units	270.14(d)(1)(i)	66270.14(d)(1)(A)		Appendix C	
B-2b	Additional Information on the Topographic Map for Land Disposal Facilities	270.14(c)(3)	66270.14(c)(3)		Section 2.3	
	Uppermost Aquifer and Hydraulically Connected Aquifers Beneath Facility Property	270.14(c)(2)	66270.14(c)(2)		Section 2.3	
	Groundwater Flow Direction	270.14(c)(2)	66270.14(c)(2)		Section 2.3	
	Waste Management Areas	270.14(c)(3)	66270.14(c)(3)		Appendix C	
	Property Boundaries	270.14(c)(3)	66270.14(c)(3)		Appendix C	
	Point of Compliance Location	270.14(c)(3); 264.95	66270.14(c)(3); 66264.95	Point of compliance is defined in 66264.95.	Appendix C	
	Location of Groundwater Monitoring Wells	270.14(c)(3); 264.97	66270.14(c)(3); 66264.97		Appendix C	
	Extent of any Groundwater Contaminant Plume	270.14(c)(4)(i)	66270.14(c)(4)(A)		Section 2.3	
B-3	Facility Location Information	270.14(b)(11); 264.18	66270.14(b)(11); 66264.18		NA	

PERMIT COMPLETENESS CHECKLIST

SECTION B. FACILITY DESCRIPTION

	Section and Requirement	Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
B-3a	Seismic Requirements	270.14(b)(11)(i), (ii); 264.18(a)	66270.14(b)(11)(A); 66264.18(a)	Seismic requirements applicable only to new facilities.	NA	
	Political Jurisdiction in which Facility is Proposed to be Located	270.14(b)(11)(i)	66270.14(b)(11)(A)		NA	
	New Facility must be Located at Least 200 feet from a Fault which has had Displacement in Holocene Time	270.14(b)(11)(ii); 264.18(a)	66270.14(b)(11)(A); 66264.18(a)		NA	
B-3b	Flood Plain Requirements	270.14(b)(11)(iii), (iv); 264.18(b)	66270.14(b)(11)(C), (D); 66264.18(b)		Section 2.6	
	Copy of Federal Insurance Administration or other Flood Map	270.14(b)(11)(iii)	66270.14(b)(11)(C)	Reference source used to determine whether facility is located in 100-year flood plain.	Section 2.6 and Appendix D	
B-3b(1)	Demonstration that Facility is Designed, Constructed, Operated, and Maintained to Prevent Washout, or Detailed Description of Procedures to be Followed to Remove Hazardous Waste to Safety before Facility is Flooded	270.14(b)(11)(iv); 264.18(b)	66270.14(b)(11)(D); 66264.18(b)	Flood plain requirements applicable if facility is located in 100-year flood plain.	NA	

PERMIT COMPLETENESS CHECKLIST

SECTION B. FACILITY DESCRIPTION

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
B-3b(1)(a)	Engineering Analysis to Indicate the Various Hydrodynamic and Hydrostatic Forces Expected to Result from the 100-Year Flood Plain	270.14(b)(11)(iv); 264.18(b)	66270.14(b)(11)(D); 66264.18(b)	Flood plain requirements applicable if facility is located in 100-year flood plain.	NA	
	Demonstration that no Adverse Effects will Result from Failure to Remove Waste by Providing:	270.14(b)(11)(iv); 264.18(b)(1)	66270.14(b)(11)(D); 66264.18(b)(1)	Flood plain requirements applicable if facility is located in 100-year flood plain.	NA	
	Volume and Physical and Chemical Characteristics of the Waste in the Facility	270.14(b)(11)(iv); 264.18(b)(1)(ii)(A)	66264.18(b)(1)	Flood plain requirements applicable if facility is located in 100-year flood plain.	NA	
	Concentration of Hazardous Constituents that Would Potentially Affect Surface Waters as a Result of Washout	270.14(b)(11)(iv); 264.18(b)(ii)(B)	66264.18(b)	Flood plain requirements applicable if facility is located in 100-year flood plain.	NA	
	Impact of such Concentration on Current or Potential uses of, and Water Quality Standards Established for, the Affected Surface Waters	270.14(b)(11)(iv); 264.18(b)(ii)(C)	66264.18(b)	Flood plain requirements applicable if facility is located in 100-year flood plain.	NA	

PERMIT COMPLETENESS CHECKLIST

SECTION B. FACILITY DESCRIPTION

	Section and Requirement	Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
	Impact of Hazardous Constituents on the Sediments of Affected Surface Waters, or the Soils of the 100-Year Flood Plain, that could Result from Washout	270.14(b)(11)(iv); 264.18(b)(ii)(D)	66264.18(b)	Flood plain requirements applicable if facility is located in 100-year flood plain.	NA	
	Plan and Schedule for Future Compliance	270.14(b)(11)(v)	66270.14(b)(11)(E)	Flood plain requirements applicable if facility is located in 100-year flood plain and not in compliance with 66264.18(b).	NA	
B-4	Traffic Patterns	270.14(b)(10)	66270.14(b)(10)	Show turns across traffic lanes and stacking lanes, if appropriate.	Appendix C	
	Estimate of Number and Types of Vehicles around the Facility	270.14(b)(10)	66270.14(b)(10)		Section 2.4	
	Traffic Control Signs and Signals	270.14(b)(10)	66270.14(b)(10)		Section 2.4	
	Road Surface Composition and Load-Bearing Capacity	270.14(b)(10)	66270.14(b)(10)		Section 2.4	

Notes:

[a] Considerations in addition to the requirements presented in the regulations.

[b] For each requirement, this column must indicate one of the following: NA for not applicable, IM for information missing, or the exact location of the information in the application.

[c] If application is deficient in an area, prepare a comment describing the deficiency, attach it to the checklist, and reference the comment in this column.

PERMIT COMPLETENESS CHECKLIST

SECTION C. WASTE CHARACTERISTICS

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
C-1	Chemical and Physical Analyses	270.14(b)(2); 264.13(a)	66270.14(b)(2); 66264.13(a)	Data generated by testing the waste, published data on the waste, or data gathered from similar processes may be used.	Note: unit is in post-closure care, so Section C requirements are not directly applicable. See information provided in the Closure Plan (Appendix F), which has been implemented, and the Post-Closure Monitoring Plan (Appendix I).	
C-1a	Containerized Waste	270.15(b)(1); 264.172	66270.15(b); 66264.172	Demonstrate that waste is compatible with container construction materials and the location is in compliance with the buffer zone requirements.		
C-1b	Waste in Tank Systems	270.16(a); 264.190(a); 264.191(b)(2); 264.192(a)(2)	66270.16(a); 66264.190(a); 66264.192(c)(2)	A written assessment by an independent engineer to demonstrate that tank construction materials are compatible with waste stored in tank.		
C-1c	Waste in Piles	270.18(a); 264.250(c)(1), (4)	66270.18(a); 66264.250(c)(1), (4)			
C-1d	Landfilled Wastes	270.21(a) 264.13(c)(3); 264.314	66270.21(a) 66264.314	Demonstrate that sorbent materials are non-biodegradable.		
C-1e	Wastes Incinerated and Wastes used in Performance Tests	270.19(c); 270.62(b); 264.341	66270.19(c); 66270.62(b); 66264.341			
C-1f	Wastes to be Land Treated	270.20(b)(4); 264.271(a)(1), (2); 264.272; 264.276, Part 261 Appendix VIII	66270.20(b)(4); 66264.271(a)(1), (2); 66264.272; Chapter 11 Appendix VIII	If food-chain crops will be grown in or on treatment zone, identify hazardous constituents reasonably expected to be in or derived from waste.		
C-1g	Wastes in Miscellaneous Treatment Units	270.23(d)	66270.23(d)	Demonstrate the effectiveness of the treatment.		

PERMIT COMPLETENESS CHECKLIST

SECTION C. WASTE CHARACTERISTICS

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
C-1h	Wastes in Boilers and Industrial Furnaces	270.66(c); 266.102(b)	66270.66(c); 66266.102(b)		See Page C-1 comment.	
C-1i	Wastes on Drip Pads	270.26; 264.570	66270.26; 66264.570			
C-2	Waste Analysis Plan	270.14(b)(3); 264.13(b),(c)	66270.14(b)(3); 66264.13(b),(c)	Waste Analysis Plan should be provided in a table format that clearly shows the fingerprint and Waste Profile analyses that will be conducted for each waste stream, the waste management units that will be managing wastes, any applicable concentration limits, sampling methods, etc.		
C-2a	Parameters and Rationale	270.14(b)(3); 264.13(b)(1)	66270.14(b)(3); 66264.13(b)(1)			
C-2b	Test Methods	270.14(b)(3); 264.13(b)(2)	66270.14(b)(3); 66264.13(b)(2)			
C-2c	Sampling Methods	270.14(b)(3); 264.13(b)(3)	66270.14(b)(3); 66264.13(b)(3)			
C-2d	Frequency of Analyses	270.14(b)(3); 264.13(b)(4)	66270.14(b)(3); 66264.13(b)(4)			
C-2e	Additional Requirements for Wastes Generated Off Site	270.14(b)(3); 264.13 (b)(5), (c); 264.73(b)	66270.14(b)(3); 66264.13 (b)(5), (c); 66264.73(b)	Describe statistical method used to determine a representative sample of incoming waste.		
C-2f	Additional Requirements for Ignitable, Reactive, or Incompatible Wastes	270.14(b)(3); 264.13(b)(6); 264.17	66270.14(b)(3); 66264.13(b)(6); 66264.17			

PERMIT COMPLETENESS CHECKLIST

SECTION C. WASTE CHARACTERISTICS

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
C-2g	Additional Requirements Pertaining to BIF Facilities	270.22; 266.102(e)(6)(ii)(C),(e)(6)(iii)	66270.22; 66266.102(e)(6)(B)3.,(e)(6)(C)		See Page C-1 comment.	
C-3	Waste Analysis Requirements Pertaining to Land Disposal Restrictions	270.14(b)(3); 264.13; 264.73; Part 268	66270.14(b)(3); 66264.13; 264.73; Chapter 18			
C-3a	Waste Analysis	270.14(a); 264.13(a)(1); 268.1; 268.7; 268.9; 268.32 - 268.37; 268.41 - 268.43	66270.14(a); 66264.13(a)(1); 66268.1; 66268.9; 66268.32 - 66268.37; 66268.41 - 66268.43			
C-3a(1)	Spent Solvent and Dioxin Wastes	270.14(a); 264.13(a)(1); 268.2(f)(1); 268.7; 268.30; 268.31	66270.14(a); 66264.13(a)(1); 66268.30; 66268.31			
C-3a(2)	California List Wastes	270.14(a); 264.13(a)(1); 268.7; 268.32; 268.42(a); RCRA Section 3004(d)	66270.14(a); 66264.13(a)(1); 66268.32; 66268.42(a)			
C-3a(3)	Listed Wastes	270.14(a); 264.13(a)(1); 268.7; 268.33 - 268.36; 268.41 - 268.43	66270.14(a); 66264.13(a)(1); 66268.33 - 66268.36; 66268.41 - 66268.43			

PERMIT COMPLETENESS CHECKLIST

SECTION C. WASTE CHARACTERISTICS

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
C-3a(4)	Characteristic Wastes	270.14(a); 264.13(a)(1); 268.7, 268.9; 268.37; Part 268 Appendix I, IX	66270.14(a); 66264.13(a)(1); 66268.9; 66268.37; Chapter 18, Appendix I, VIII	Characteristic D008 lead nonwastewater and D004 arsenic nonwastewater may use EP toxicity test to determine compliance with treatment standards.	See Page C-1 comment.	
C-3a(5)	Radioactive Mixed Waste	270.14(a); 264.13(a); 268.7; 268.35(c),(d); 268.36(d); 268.42(d)	66270.14(a); 66264.13(a); 66268.35(c),(d); 66268.36(d); 66268.42(d)	Hazardous debris containing radioactive waste must comply with treatment standards specified in 66268.45.		
C-3a(6)	Leachates	270.14(a); 264.13(a); 268.35(a)	66270.14(a); 66264.13(a); 66268.35(a)	Leachate that originates from newly identified waste is not coded as F039 waste, but is labeled with newly listed waste code from which it is derived.		
C-3a(7)	Lab Packs	270.14(a); 264.13(a); 268.7(a)(7),(8); 268.42(c); Part 268 Appendix IV	66270.14(a); 66264.13(a); 66268.42(c); Chapter 18 Appendix IV	Lab packs containing California list polychlorinated biphenyls (PCB) or dioxins must be treated according to special incineration requirements detailed in 268.42(a).		
C-3a(8)	Contaminated Debris	270.13(n); 268.2(g); 268.7; 268.9; 268.36; 268.45	66270.13(n); 66268.9; 66268.36; 66268.45			
C-3a(9)	Waste Mixtures and Wastes with Overlapping Requirements	270.14(a); 264.13(a)(1); 268.7; 268.9; 268.41; 268.43; 268.45(a)	66270.14(a); 66264.13(a)(1); 66268.9; 66268.41; 66268.43; 66268.45(a)	Waste that carries more than one characteristic or listed waste code must be treated to the most stringent treatment requirement for each hazardous waste constituent of concern.		

PERMIT COMPLETENESS CHECKLIST

SECTION C. WASTE CHARACTERISTICS

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
C-3a(10)	Dilution and Aggregation of Wastes	270.14(a); 268.3	66270.14(a); 66268.3		See Page C-1 comment.	
C-3b	Notification, Certification, and Recordkeeping Requirements	270.14(a); 264.13; 264.73; 268.7; 268.9(d)	66270.14(a); 66264.13; 66264.73; 66268.7 66268.9			
C-3b(1)	Retention of Generator Notices and Certifications	270.14(a); 264.13; 268.7(a)	66270.14(a); 66264.13; 66268.7(a)			
C-3b(2)	Notification and Certification Requirements for Treatment Facilities	270.14(a); 264.13; 268.7(b)	66270.14(a); 66264.13; 66268.7(b)			
C-3b(3)	Notification and Certification Requirements for Land Disposal Facilities	270.14(a); 264.13; 268.7(c)(1)	66270.14(a); 66264.13; 66268.7(c)(1)			
C-3b(4)	Wastes Shipped to Subtitle C Facilities	270.14(a); 264.13; 268.7(a),(b)(6)	66270.14(a); 66264.13; 66268.7(a),(b)(6)			
C-3b(5)	Wastes Shipped to Subtitle D Facilities	270.14(a); 264.13; 268.7(d); 268.9(d)	66270.14(a); 66264.13; 66268.7(d); 66268.9(d)			
C-3b(6)	Recyclable Materials	270.14(a); 264.13; 268.7(b)(7)	66270.14(a); 66264.13; 66268.7(b)(7)			
C-3b(7)	Recordkeeping	270.14(a); 264.13; 264.73; 268.7(a)(5),(a)(6),(a)(7), (d)	66270.14(a); 66264.13; 264.73; 66268.7(a)(5),(a)(6),(a)(7), (d)	Recycling facilities must keep records of name and location of each entity receiving hazardous waste-derived product.		

PERMIT COMPLETENESS CHECKLIST

SECTION C. WASTE CHARACTERISTICS

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
C-3c	Requirement Pertaining to the Storage of Restricted Wastes	270.14(a); 264.73; 268.50	66270.14(a); 66264.73; 66268.50		See Page C-1 comment.	
C-3c(1)	Restricted Wastes Stored in Containers	270.14(a); 264.73; 268.50(a)(2)(i)	66270.14(a); 66264.73; 66268.50(a)(2)(A)			
C-3c(2)	Restricted Wastes Stored in Tanks	270.14(a); 264.73; 268.50(a)(2)(ii)	66270.14(a); 66264.73; 66268.50(a)(2)(B)			
C-3c(3)	Storage of Liquid PCB Wastes	270.14(a); 264.73; 268.50(f)	66270.14(a); 66264.73; 66268.50(f)			
C-3d	Exemptions, Extensions, and Variances to Land Disposal Restrictions					
C-3d(1)	Case-by-Case Extensions to an Effective Date	270.14(b)(21); 268.5	66270.14(b)(20); 66268.5			
C-3d(2)	Exemption from Prohibition	270.14(b)(21); 268.6	66270.14(b)(20); 66268.6			
C-3d(3)	Variance from a Treatment Standard	270.14(a); 264.73; 268.7; 268.44	66270.14(a); 66264.73; 66268.7; 66268.44			
C-3d(4)	Requirements for Surface Impoundments Exempted from Land Disposal Restrictions	270.14(a); 264.13(b)(7); 268.4; 268.14	66270.14(a)			
C-3d(4)(a)	Exemption for Newly Identified or Listed Wastes	270.14(a); 264.13; 268.14	66270.14(a); 66264.13			

PERMIT COMPLETENESS CHECKLIST

SECTION C. WASTE CHARACTERISTICS

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
C-3d(4)(b)	Treatment of Wastes	270.14(a); 264.13; 268.4(a)(1),(b)	66270.14(a); 66264.13		See Page C-1 comment.	
C-3d(4)(c)	Sampling and Testing	270.14(a); 264.13(b)(6); 268.4(a)(2)(i),(iv)	66270.14(a); 66264.13			
C-3d(4)(d)	Annual Removal of Residues	270.14(a); 264.13(b)(7)(iii); 268.4(a)(2)(ii)	66270.14(a); 66264.13			
C-3d(4)(e)	Design Requirements	270.14(a); 264.13; 268.4(a)(3),(4)	66270.14(a); 66264.13			

Notes:

[a] Considerations in addition to the requirements presented in the regulations.

[b] For each requirement, this column must indicate one of the following: NA for not applicable, IM for information missing, or the exact location of the information in the application.

[c] If application is deficient in an area, prepare a comment describing the deficiency, attach it to the checklist, and reference the comment in this column.

PERMIT COMPLETENESS CHECKLIST

SECTION D. PROCESS INFORMATION - LANDFILLS

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-6	Landfills	270.21; 264.300 - 264.317	66270.21; 66264.300 - 66264.317		Note: unit is in post-closure care, so Section D requirements are not directly applicable. A list of wastes received is presented in Section 2.8 B. Also see information provided in the Closure Plan (Appendix F), which has been implemented, and the Post-Closure Monitoring Plan (Appendix I).	
D-6a	List of Wastes	270.21(a)	66270.21(a)			
D-6b(1)	Exemption Based on Existing Portion	270.21(b)(1); 264.301(a)	66270.21(b)(1); 66264.301(a)	Existing portions of landfills that have waste in place on November 8, 1984, and will have only vertical expansion are exempted from liner system requirements. Provide plan showing limits of existing portion.		
D-6b(2)	Exemption Based on Alternative Design and Location	270.21(b)(1); 264.301(d)	66270.21(b)(1); 66264.301(b)			
D-6b(3)	Exemption for Replacement Landfill Unit	270.21(b)(1); 264.301(f)	66270.21(b)(1); 66264.301(l)			
D-6b(4)	Exemption for Monofills	270.21(b)(1); 264.301(e)	66270.21(b)(1); 66264.301(e)			
D-6b(5)	Groundwater Monitoring Exemption	270.21(c); 264.90(b)(2)	66270.21(d); 66264.90			
D-6b(5)(a)	Engineered Structure	270.21(c); 264.90(b)(2)(i)	66270.21(d); 66264.90	Provide design data showing that unit for which exemption is sought is an engineered structure.		

PERMIT COMPLETENESS CHECKLIST

SECTION D. PROCESS INFORMATION - LAND TREATMENT

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-7a(3)(a)	Toxicity Testing	270.20(a)(2); 264.272(b)	66270.20(a)(2); 66264.272(b)	Describe acute toxicity test procedures used to estimate impact of waste application or waste constituents on soil biota responsible for waste treatment.	Note: unit is in post-closure care, so Section D requirements are not directly applicable. A list of wastes received is presented in Section 2.8 of the Part B. Also see information provided in the Closure Plan (Appendix F), which has been implemented, and the Post-Closure Monitoring Plan (Appendix I).	
D-7a(3)(b)	Field Plot Testing	270.20(a)(2),(3); 264.272(b),(c)	66270.20(a)(2),(3); 66264.272(b),(c)	Describe field plot studies used to demonstrate treatability of waste(s) or waste constituents.		
D-7a(3)(c)	Laboratory Testing	270.20(b)(2),(3); 264.272(b),(c)	66270.20(b)(2),(3); 66264.272(b),(c)	Describe laboratory test methods used to demonstrate treatability of waste(s) or waste constituents.		
D-7b	Land Treatment Program	270.20(b); 264.271	66270.20(b); 66264.271	Describe characteristics and operating conditions of land treatment unit(s) to be permitted.		
D-7b(1)	List of Wastes	270.20(b)(1); 264.271(b)	66270.20(b)(1); 66264.271(b)			
D-7b(2)	Operating Procedures	270.20(b)(2); 264.273(a)	66270.20(b)(2); 66264.273(a)	Describe operating procedures used to assure uniform and complete degradation, transformation, and immobilization.		
D-7b(2)(a)	Waste Application Rates	270.20(b)(2)(i); 264.273(a)(1)	66270.20(b)(2)(A); 66264.273(a)(1)	Identify rate and frequency of waste application and concentration of limiting constituents in waste.		
D-7b(2)(b)	Waste Application Methods	270.20(b)(2)(i); 264.273(a)(1)	66270.20(b)(2)(A); 66264.273(a)(1)	Describe method(s) used to apply and incorporate waste into treatment zone.		

PERMIT COMPLETENESS CHECKLIST

SECTION D. PROCESS INFORMATION - LAND TREATMENT

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-7b(2)(c)	Control of Soil pH	270.20(b)(2)(ii); 264.273(a)(2)	66270.20(b)(2)(B); 66264.273(a)(2)	Identify acceptable limits of soil pH and describe rationale for those limits. Describe how soil pH will be measured and adjusted, including a schedule for the same.	See page D-1 note.	
D-7b(2)(d)	Enhancement of Microbial or Chemical Reactions	270.20(b)(2)(iii); 264.273(a)(3)	66270.20(b)(2)(C); 66264.273(a)(3)	Describe measures used to enhance treatment, including method and frequency of such measures (e.g., fertilization, microbial inoculations, soil aeration).		
D-7b(2)(e)	Control of Soil Moisture	270.20(b)(2)(iv); 264.273(a)(4)	66270.20(b)(2)(D); 66264.273(a)(4)	Identify limits on soil moisture content. Describe how soil moisture will be monitored and adjusted, if necessary.		
D-7c	Unsaturated Zone Monitoring Plan	270.20(b)(3); 264.278	66270.20(b)(3); 66264.278	Submit unsaturated zone monitoring plan describing measures used to determine if hazardous wastes have migrated from treatment zone.		
D-7c(1)	Soil-Pore Liquid Monitoring	270.20(b)(3); 264.278	66270.20(b)(3); 66264.278(a)	Describe program for sampling and analysis of soil-pore liquid to detect migration of dissolved constituents below treatment zone.		
D-7c(1)(a)	Sampling Location	270.20(b)(3)(ii); 264.278(b), (d)	66270.20(b)(3)(B); 66264.278(b), (d)	Identify sampling locations and indicate that samples will be collected immediately below treatment zone.		
D-7c(1)(b)	Sampling Frequency	270.20(b)(3)(i); 264.278(e)	66270.20(b)(3)(A); 66264.278(e)	Provide schedule for sampling soil-pore liquid.		
D-7c(1)(c)	Sampling Equipment	270.20(b)(3)(i); 264.278(e)	66270.20(b)(3)(A); 66264.278(e)	Identify equipment used to obtain soil-pore liquid samples.		

PERMIT COMPLETENESS CHECKLIST

SECTION D. PROCESS INFORMATION - LAND TREATMENT

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-7c(1)(d)	Sampling Equipment Installation	270.20(b)(3)(i); 264.278(e)	66270.20(b)(3)(A); 66264.278(e)	Describe procedures used to install soil-pore liquid monitoring devices.	See page D-1 note.	
D-7c(1)(e)	Sampling Procedures	270.20(b)(3)(i); 264.278(e)(1),(2)	66270.20(b)(3)(A); 66264.278(e)(1),(2)			
D-7c(1)(f)	Analytical Procedures	270.20(b)(3)(iii); 264.278(e)(3)	66270.20(b)(3)(C); 66264.278(e)(3)	Identify analytical procedures used to determine concentration of hazardous constituents in soil-pore liquid samples.		
D-7c(1)(g)	Chain of Custody	270.20(b)(3)(iv); 264.278(e)(4)	66270.20(b)(3)(D); 66264.278(e)(4)			
D-7c(1)(h)	Background Values	270.20(b)(3)(v); 264.278(c)	66270.20(b)(3)(E); 66264.278(c)	Describe sampling and analytical program used to establish background soil-pore liquid concentrations of hazardous constituents. Provide background data, if available.		
D-7c(1)(i)	Statistical Methods	270.20(b)(3)(vi); 264.278(f)	66270.20(b)(3)(F); 66264.278(f)	Describe statistical methods that will be used to determine differences between background and treatment zone concentrations of hazardous constituents.		
D-7c(1)(j)	Justification of Principle Hazardous Constituents	270.20(b)(3)(vii); 264.278(a)(2)	66270.20(b)(3)(G); 66264.278(a)(2)	Provide suggested list of Article 11, Appendix VIII hazardous constituents to be monitored for in soil-pore liquids.		
D-7c(2)	Soil Core Monitoring	270.20(b)(3); 264.278	66270.20(b)(3); 66264.278	Describe program for monitoring soil cores to detect migration of hazardous constituents below treatment zone.		

PERMIT COMPLETENESS CHECKLIST

SECTION D. PROCESS INFORMATION - LAND TREATMENT

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-7c(2)(a)	Sampling Location	270.20(b)(3)(ii); 264.278(b),(d)	66270.20(b)(3)(B); 66264.278(b),(d)	Identify sampling locations and indicate that soil cores will be collected immediately below treatment zone.	See page D-1 note.	
D-7c(2)(b)	Sampling Frequency	270.20(b)(3)(i); 264.278(e)	66270.20(b)(3)(A); 66264.278(e)	Provide schedule for sampling soil.		
D-7c(2)(c)	Sampling Equipment	270.20(b)(3)(i); 264.278(e)	66270.20(b)(3)(A); 66264.278(e)	Identify equipment used to sample soil cores.		
D-7c(2)(d)	Sampling Procedures	270.20(b)(3)(i); 264.278(e)(1),(2)	66270.20(b)(3)(A); 66264.278(e)(1),(2)			
D-7c(2)(e)	Analytical Procedures	270.20(b)(3)(iii); 264.278(e)(3)	66270.20(b)(3)(C); 66264.278(e)(3)	Identify analytical methods used to determine concentration of hazardous constituents in soil core samples.		
D-7c(2)(f)	Chain of Custody	270.20(b)(3)(iv); 264.278(e)(4)	66270.20(b)(3)(D); 66264.278(e)(4)			
D-7c(2)(g)	Background Values	270.20(b)(3)(v); 264.278(c)	66270.20(b)(3)(E); 66264.278(c)	Describe sampling and analytical program used to establish background soil core concentrations of hazardous constituents. Provide background data, if available.		
D-7c(2)(h)	Statistical Methods	270.20(b)(3)(vi); 264.278(f)	66270.20(b)(3)(F); 66264.278(f)	Describe statistical methods that will be used to determine differences between background and treatment zone concentrations of hazardous constituents.		
D-7c(2)(i)	Justification of Principal Hazardous Constituents	270.20(b)(3)(vii); 264.278(a)(2)	66270.20(b)(3)(G); 66264.278(a)(2)	Provide suggested list of Article 11, Appendix VIII hazardous constituents to be monitored for in soil core samples.		

PERMIT COMPLETENESS CHECKLIST

SECTION D. PROCESS INFORMATION - LAND TREATMENT

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-7d	Treatment Zone Description	270.20(b)(5); 264.271(c)	66270.20(b)(5); 66264.271(c)	Identify dimensions of treatment zone.	See page D-1 note.	
D-7d(1)	Horizontal and Vertical Dimensions	270.20(b)(5); 264.271(c)	66270.20(b)(5); 66264.271(c)			
D-7d(2)	Soil Survey	270.20(b)(2); 264.272(c)(1)(iv)	66270.20(b)(2); 66264.272(c)(1)(D)	Provide map or plat plan delineating horizontal boundaries of treatment zone and all soil series occurring within treatment zone.		
D-7d(3)	Soil Series Descriptions	270.20(b)(2); 264.272(c)(1)(iv)	66270.20(b)(2); 66264.272(c)(1)(D)	Submit description of each soil series identified within treatment zone.		
D-7d(4)	Soil Sampling Data	270.20(b)(2); 264.272(c)(1)(iv)	66270.20(b)(2); 66264.272(c)(1)(D)			
D-7d(5)	Seasonal High Water Table	270.20(b); 264.271(c)(2)	66270.20(b)	Identify depth to seasonal high water table and source of that data.		
D-7e	Unit Design, Construction, Operation, and Maintenance	270.20(c); 264.273	66270.20(c); 66264.273	Describe design, construction, operation, and maintenance of runon, runoff, and wind dispersal controls.		
D-7e(1)	Runon Control	270.20(c)(1); 264.273(c)	66270.20(c)(1); 66264.273(c)	Submit scale drawing of unit showing any runon controls used.	Part A	
D-7e(2)	Runoff Control	270.20(c)(1); 264.273(c)	66270.20(c)(1); 66264.273(c)	Describe runoff collection and control system.	Section 2.3	
D-7e(3)	Minimizing Hazardous Constituent Run-off	270.20(c)(3); 264.273(b)	66270.20(c)(3); 66264.273(b)		Section 2.3	

PERMIT COMPLETENESS CHECKLIST

SECTION D. PROCESS INFORMATION - LAND TREATMENT

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
D-7e(4)	Management of Accumulated Run-on and Run-off	270.20(c)(4); 264.273(e)	66270.20(c)(4); 66264.273(e)	Describe fate of collected surface water, including sampling and analysis protocols for determining contaminant levels.	Section 2.3	
D-7e(5)	Control of Wind Dispersal	270.20(c)(6); 264.273(f)	66270.20(c)(6); 66264.273(f)		See page D-1 note.	
D-7f	Special Waste Management Plan for Land Treatment Units Containing Wastes F020, F021, F022, F023, F026, and F027	270.20(i); 264.283	66270.20(g); 66264.283	Provide plan describing how land treatment units containing referenced waste are, or will be, designed, constructed, operated, and maintained to protect human health and environment.		
D-7f(1)	Waste Description	270.20(i)(1); 264.283(a)(1)	66270.20(g)(1); 66264.283(a)(1)			
D-7f(2)	Soil Description	270.20(i)(2); 264.283(a)(2)	66270.20(g)(2); 66264.283(a)(2)			
D-7f(3)	Mobilizing Properties	270.20(i)(3); 264.283(a)(3)	66270.20(g)(3); 66264.283(a)(3)			
D-7f(4)	Additional Management Techniques	270.20(i)(4); 264.283(a)(4)	66270.20(g)(4); 66264.283(a)(4)			
D-7g	Incompatible Wastes	270.20(h); 264.282	66270.20(f); 66264.282	Indicate that incompatible waste will not be placed in, or on, the same treatment zone.		

Notes:

[a] Considerations in addition to the requirements presented in the regulations.

[b] For each requirement, this column must indicate one of the following: NA for not applicable, IM for information missing, or the exact location of the information in the application.

[c] If application is deficient in an area, prepare a comment describing the deficiency, attach it to the checklist, and reference the comment in this column.

PERMIT COMPLETENESS CHECKLIST

SECTION E. GROUNDWATER MONITORING

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
E-1	Exemption from Groundwater Protection Requirements	270.14(c)	66270.14(c)		As described in the Part B, Section 6.2.1, the RWQCB has been designated as the lead agency for purposes of RCRA groundwater monitoring pursuant to SB 1082. Two RWQCB issued orders are in effect - Waste Discharge Requirements (WDR) Order No. R2-2011-0036 and Site Cleanup Requirements (SCR) Order R2-2012-0015, which are presented in Appendix J.	
E-1a	Waste Piles	270.18(b); 264.90(b)(2), (5)	66270.18(b)(1)(A);			
E-1b	Landfill	270.14(c); 264.90(b)(2)	66270.14(c);			
E-1c	No Migration	270.14(c); 264.90(b)(4)	66270.14(c);			
E-1d	Drip Pad	270.26(b); 264.90(b)(2)	66270.26(b);			
E-2	Interim Status Groundwater Monitoring Data	270.14(c)(1)	66270.14(c)(1)			
E-2a	Description of Wells	270.14(c)(1)	66270.14(c)(1)	A copy of topographic map provided for 66270.14(b) on which location and identification of each interim status monitoring well is indicated. Details of design and construction of each interim status monitoring well.		
E-2b	Description of Sampling and Analysis Procedures	270.14(c)(1); 265.92	66270.14(c)(1); 66265.91	A copy of facility's groundwater sampling and analysis plan.		
E-2c	Monitoring Data	270.14(c)(1); 265.92	66270.14(c)(1); 66265.91	Provide all interim status monitoring results.		

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SECTION E. GROUNDWATER MONITORING

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
E-2d	Statistical Procedures	270.14(c)(1); 265.93	66270.14(c)(1); 66265.97(e)(9)(E)	Provide information relating to statistical procedures.	See page E-1 comment.	
E-2e	Groundwater Assessment Plan	270.14(c)(1); 265.93(d)(2)	66270.14(c)(1); 66265.93	If required, based on statistical comparison results, provide specific plan for groundwater quality assessment program along with results obtained from implementation of plan.		
E-3	General Hydrogeologic Information	270.14(c)(2)	66270.14(c)(2)	Include description of regional and site-specific geologic and hydrogeological setting.	Section 2.3	
E-4	Topographic Map Requirements	270.14(c)(2), (3),(4)(i)	66270.14(c)(2), (3),(4)(A)		Appendix C	
E-5	Contaminant Plume Description	270.14(c)(2), (4),(7)	66270.14(c)(2), (4),(7)		See page E-1 comment.	
E-6	General Monitoring Program Requirements	270.14(c)(5); 264.90(b)(4); 264.97	66270.14(c)(5); 66264.97			
E-6a	Description of Wells	270.14(c)(5); 264.97(a),(b),(c)	66270.14(c)(5); 66264.97			
E-6b	Description of Sampling and Analysis Procedures	270.14(c)(5); 264.97(d),(e),(f)	66270.14(c)(5); 66264.97			
E-6c	Procedures for Establishing Background Quality	270.14(c)(5); 264.97(a)(1),(g)	66270.14(c)(5); 66264.97			

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SECTION E. GROUNDWATER MONITORING

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
E-6d	Statistical Procedures	270.14(c)(5); 264.97(h), (i)(1),(5),(6)	66270.14(c)(5); 66264.97		See page E-1 comment and Appendix K	
E-6d(1)	Parametric Analysis of Variance (ANOVA)	270.14(c)(5); 264.97(h)(1), (i)(2)	66270.14(c)(5); 66264.97			
E-6d(2)	Nonparametric ANOVA (based on ranks)	270.14(c)(5); 264.97(h)(2), (i)(2)	66270.14(c)(5); 66264.97			
E-6d(3)	Tolerance or Prediction Interval Procedure	270.14(c)(5); 264.97(h)(3), (i)(4)	66270.14(c)(5); 66264.97			
E-6d(4)	Control Chart Approach	270.14(c)(5); 264.97(h)(4), (i)(3)	66270.14(c)(5); 66264.97			
E-6d(5)	Alternative Approach	270.14(c)(5); 264.97(h)(5),(i)	66270.14(c)(5); 66264.97			
E-7	Detection Monitoring Program	270.14(c)(6); 264.91(a)(4); 264.98	66270.14(c)(6); 66264.91(a)(1); 66264.98		See page E-1 comment.	
E-7a	Indicator Parameters, Waste Constituents, Reaction Products to be Monitored	270.14(c)(6) (i); 264.98(a)	66270.14(c)(6) 66264.98(a)			
E-7b	Groundwater Monitoring System	270.14(c)(6) (ii); 264.97(a) (2),(b),(c); 264.98(b)	66270.14(c)(6); 66264.97; 66264.98(b)	Identify number, location, and depth of each well, and describe well construction materials.		

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SECTION E. GROUNDWATER MONITORING

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
E-7c	Background Groundwater Concentration Values for Proposed Parameters	270.14(c)(6)(iii); 264.97(g); 264.98(c), (d)	66270.14(c)(6)(C); 66264.97; 66264.98		See page E-1 comment.	
E-7d	Proposed Sampling and Analysis Procedures	270.14(c)(6)(iv); 264.97(d),(e),(f); 264.98(d),(e), (f)	66270.14(c)(6)(D); 66264.97; 66264.98			
E-7e	Statistically Significant Increase in any Constituent or Parameter Identified at any Compliance Point Monitoring Well	270.14(c)(6); 264.98(g); Part 264 Appendix IX	66270.14(c)(6); 66264.98(g); chapter 14, Appendix IX		See page E-1 comment and Appendix K.	
E-8	Compliance Monitoring Program	270.14(c)(7); 264.99	66270.14(c)(7); 66264.99		See page E-1 comment.	
E-8a	Waste Description	270.14(c)(7)(i)	66270.14(c)(7)(A)	Description must include historical records of volumes, types, and chemical composition of waste placed in units in waste management areas.		
E-8b	Characterization of Contaminated Groundwater	270.14(c)(7)(ii)	66270.14(c)(7)(B)			
E-8c	Hazardous Constituents to be Monitored in Compliance Program	270.14(c)(7)(iii); 264.98(g)(3); 264.99(a)(1)	66270.14(c)(7) 66264.98; 66264.99			

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SECTION E. GROUNDWATER MONITORING

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
E-8d	Concentration Limits	270.14(c)(7)(iv); 264.94, 264.97(g),(h); 264.99(a)(2)	66270.14(c)(7) 66264.94, 66264.97; 66264.99		See page E-1 comment.	
E-8e	Alternate Concentration Limits	270.14(c)(7)(iv); 264.94(b); 264.99 (a)(2)	66270.14(c)(7); 66264.94(b); 66264.99	Provide justification for establishing alternate concentration limits. Justification must address the following two factors.		
E-8e(1)	Adverse Effects on Groundwater Quality	270.14(c)(7)(iv); 264.94(b)(1)	66270.14(c)(7); 66264.94(b)			
E-8e(2)	Potential Adverse Effects	270.14(c)(7)(iv); 264.94(b)(2)	66270.14(c)(7); 66264.94(b)			
E-8f	Engineering Report Describing Groundwater Monitoring Systems	270.14(c)(7)(v); 264.95; 264.97(a)(2), (b),(c); 264.99(b)	66270.14(c)(7); 66264.95; 66264.97; 66264.99	Provide details supporting representative nature of groundwater quality at background monitoring points and compliance monitoring point.		
E-8g	Proposed Sampling and Statistical Analysis Procedures for Groundwater Data	270.14(c)(7)(vi); 264.97 (d),(e),(f); 264.99(c) - (g)	66270.14(c)(7); 66264.97; 66264.99			
E-8h	Groundwater Protection Standard Exceeded at Compliance Point Monitoring Well	270.14(c)(8); 264.99(h),(i)	66264.99			

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SECTION E. GROUNDWATER MONITORING

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
E-9	Corrective Action Program	270.14(c)(8); 264.99(j); 264.100	66270.14(c)(8); 66264.99; 66264.100		See page E-1 comment.	
E-9a	Characterization of Contaminated Groundwater	270.14(c)(8)(i)	66270.14(c)(8)			
E-9b	Concentration Limits	270.14(c)(8)(ii); 264.94; 264.100(a)(2)	66270.14(c)(8); 66264.94; 66264.100			
E-9c	Alternate Concentration Limits	270.14(c)(8)(ii); 264.94(b); 264.100(a)(2)	66270.14(c)(8); 66264.94(b); 66264.100	Provide justification for establishing alternate concentration limits. Justification must address the following two factors.		
E-9c(1)	Adverse Effects on Groundwater Quality	270.14(c)(8); 264.94(b)(1)	66270.14(c)(8); 66264.94(b)			
E-9c(2)	Potential Adverse Effects	270.14(c)(8); 264.94(b)(2)	66270.14(c)(8); 66264.94(b)			

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SECTION E. GROUNDWATER MONITORING

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
E-9d	Corrective Action Plan	270.14(c)(8)(iii); 264.100(b)	66270.14(c)(8); 66264.100(b)	Provide detailed plans and engineering report on corrective actions proposed for facility, including maps of engineered structures, construction details, plans for removing waste, description of treatment technologies, effectiveness of correction program, description of reinjection system, additional hydrogeologic data, operation and maintenance plans, and closure and post-closure plans.	See page E-1 comment.	
E-9e	Groundwater Monitoring Program	270.14(c)(8)(iv); 264.100(d)	66270.14(c)(8) 66264.100(d)			
E-9e(1)	Description of Monitoring System	270.14(c)(7)(v), (8)	66270.14(c)(7), (8)			
E-9e(2)	Description of Sampling and Analysis Procedures	270.14(c)(7)(v), (8)	66270.14(c)(7), (8)			
E-9e(3)	Monitoring Data and Statistical Analysis Procedures	270.14(c)(7)(v), (8)	66270.14(c)(7), (8)			
E-9e(4)	Reporting Requirements	270.14(c)(7); 264.100(g)	66270.14(c)(7); 66264.100			

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SECTION E. GROUNDWATER MONITORING

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
E-10	Groundwater Monitoring Well Design	264.97(c)	66264.97(c)	Wells must be designed in accordance with American Society for Testing and Materials standards. Any well within loess must be designed to minimize turbidity.	See page E-1 comment.	

Notes:

[a] Considerations in addition to the requirements presented in the regulations.

[b] For each requirement, this column must indicate one of the following: NA for not applicable, IM for information missing, or the exact location of the information in the application.

[c] If application is deficient in an area, prepare a comment describing the deficiency, attach it to the checklist, and reference the comment in this column.

PERMIT COMPLETENESS CHECKLIST

SECTION F. PROCEDURES TO PREVENT HAZARDS

Section and Requirement	Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
F-1a Waiver	270.14(b)(4); 264.14	66270.14(b)(4); 66264.14	Owner/operator must prevent unknowing entry, and minimize unauthorized entry of persons or livestock unless can demonstrate:	Section 7.1	
F-1a(1) Injury to Intruder	270.14(b)(4); 264.14	66270.14(b)(4); 66264.14(a)(1)	Assure physical contact with waste, structure, or equipment will not injure unknowing intruder.	Section 7.1	
F-1a(2) Violation Caused by Intruder	270.14(b)(4); 264.14	66270.14(b)(4); 66264.14(a)(2)	Assure disturbance of waste or equipment by unauthorized intruder will not cause a violation.	Section 7.1	
F-1b Security Procedures and Equipment	270.14(b)(4); 264.14	66270.14(b)(4); 66264.14	Unless waiver is granted, facility must have surveillance system or a barrier to entry.	Section 7.1	
F-1b(1) 24-Hour Surveillance System	270.14(b)(4); 264.14	66270.14(b)(4); 66264.14(b)(1)	Monitor/camera, guards, or personnel must continuously monitor or control access to active parts of facility.	Section 7.1	
F-1b(2)(a) Barrier	270.14(b)(4); 264.14	66270.14(b)(4); 66264.14(b)(2)(A)	This item required if 24-hour surveillance system is not feasible. Describe artificial or natural barrier.	NA	
F-1b(2)(b) Means to Control Entry	270.14(b)(4); 264.14	66270.14(b)(4); 66264.14(b)(2)(B)	This item required if 24-hour surveillance system is not feasible.	NA	
F-1b(3) Warning Signs	270.14(b)(4); 264.14	66270.14(b)(4); 66264.14	Signs in english must be posted at each entrance, and be legible from 25 feet.	Section 7.1	

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SECTION F. PROCEDURES TO PREVENT HAZARDS

Section and Requirement	Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
F-2 Inspection Schedule	270.14(b)(5); 264.15	66270.14(b)(5); 66264.15	Inspection is required for monitoring equipment, safety emergency equipment, communication and alarm systems, decontamination equipment, security devices, and operating and structural equipment.	Section 7.1	
F-2a General Inspection Requirements	270.14(b)(5); 264.15(a),(b); 264.33	66270.14(b)(5); 66264.15(a),(b); 66264.33		Section 8.0	
F-2a(1) Types of Problems	270.14(b)(5); 264.15(b)(3)	66270.14(b)(5); 66264.15(b)(3)	Inspection checklist must identify types of problem.	Section 8.0	
F-2a(2) Frequency of Inspections	270.14(b)(5); 264.15(b)(4)	66270.14(b)(5); 66264.15(b)(4)	Based on rate of deterioration of equipment and probability of environmental or human health incident.	Section 8.0	
F-2a(3) Schedule of Remedial Action	270.14(b)(5); 264.15(c)	66270.14(b)(5); 66264.15(c)	Owner/operator must immediately remedy any deterioration or malfunction of equipment or structures to ensure problem does not lead to environmental or human health hazard.	Section 8.0	
F-2a(4) Inspection Log	270.14(b)(5); 264.15(d)	66270.14(b)(5); 66264.15(d)	Provide example log or summary.	Section 8.0	
F-2b Specific Process Inspection Requirements	270.14(b)(5)	66270.14(b)(5)		NA	
F-2b(1) Container Inspection	270.14(b)(5); 264.174	66270.14(b)(5); 66264.174	Inspect at least weekly.	NA	

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SECTION F. PROCEDURES TO PREVENT HAZARDS

Section and Requirement	Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
F-2b(2) Tank System Inspection	270.14(b)(5); 264.195	66270.14(b)(5); 66264.195(a)	Owner/operator must develop schedule and inspect at least once daily.	NA	
F-2b(2)(a) Tank System External Corrosion and Releases	270.14(b)(5); 264.195(b)(1)	66270.14(b)(5); 66264.195(b)(1)	Owner/operator must inspect that aboveground portion and check for corrosion.	NA	
F-2b(2)(b) Tank System Construction Materials and Surrounding Area	270.14(b)(5); 264.195(b)(3)	66270.14(b)(5); 66264.195(b)(3)	Observe construction materials and area around external portion for signs of release of hazardous waste.	NA	
F-2b(2)(c) Tank System Overfilling Control Equipment	270.14(b)(5); 264.195(a)	270.14(b)(5); 66264.195(a)	Develop and follow schedule for inspection of overfill controls.	NA	
F-2b(2)(d) Tank System Monitoring and Leak Detection Equipment	270.14(b)(5); 264.195(b)(2)	66270.14(b)(5); 66264.195(b)(2)	Analyze data gathered from monitoring equipment to ensure tank is operating according to design.	NA	
F-2b(2)(e) Tank System Cathodic Protection	270.14(b)(5); 264.195(c)	66270.14(b)(5); 66264.195(c)	Inspect according to schedule.	NA	
F-2b(3) Waste Pile Inspection	270.14(b)(5); 270.18(d); 264.254(b)	66270.14(b)(5); 66270.18(d); 66264.254(b)	Describe how waste pile will be inspected weekly and after storms.	NA	
F-2b(3)(a) Runon and Runoff Control System	270.14(b)(5); 264.254(b)(1)	66270.14(b)(5); 66264.254(b)(1)	Inspections should identify deterioration, malfunction, or improper operation of control system.	NA	
F-2b(3)(b) Wind Dispersal System	270.14(b)(5); 264.254(b)(2)	66270.14(b)(5); 66264.254(b)(2)	Facility should inspect proper function of wind dispersal system.	NA	

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SECTION F. PROCEDURES TO PREVENT HAZARDS

Section and Requirement	Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
F-2b(3)(c) Leachate Collection and Removal System	270.14(b)(5); 270.18 (d); 264.254(b)(3),(c)	66270.14(b)(5); 66270.18 (d); 66264.254(b)(3),(c)	Determine whether there is leachate present in functioning double liner system.	NA	
F-2b(4) Surface Impoundment Inspection	270.14(b)(5); 270.17(c); 264.226(b),(c)	66270.14(b)(5); 66270.17(c); 66264.226(b),(c)	Describe how each surface impoundment will be inspected to meet requirements of monitoring and inspection and waiver requirement.	NA	
F-2b(4)(a) Condition Assessment	270.14(b)(5); 264.226(b)	66270.14(b)(5); 66264.226(b)	Describe how surface impoundment will be inspected weekly and after storms.	NA	
F-2b(4)(a)(1) Overtopping Control System	270.14(b)(5); 264.226(b)(1)	66270.14(b)(5); 66264.226(b)(1)	Inspect for deteriorating, malfunction, or improper operation of control system.	NA	
F-2b(4)(a)(2) Impoundment Contents	270.14(b)(5); 264.226(b)(2)	66270.14(b)(5); 66264.226(b)(2)	Inspect for sudden drop in level of impoundment contents.	NA	
F-2b(4)(a)(3) Dikes and Containment Devices	270.14(b)(5); 264.226(b)(3)	66270.14(b)(5); 66264.226(b)(3)	Inspect for severe erosion in containment devices.	NA	
F-2b(4)(b) Structural Integrity	270.14(b)(5); 264.226(c)	66270.14(b)(5); 66264.226(c)	Specify procedure for assessing integrity of surface impoundments.	NA	
F-2b(4)(c) Leak Detection System	270.14(b)(5); 270.17(c); 264.226(d)	66270.14(b)(5); 66270.17(c); 66264.226(d)	Describe how double liner system and leak detection system will be inspected.	NA	
F-2b(5)(a) Incinerator and Associated Equipment	270.14(b)(5); 264.347(b)	66270.14(b)(5); 66264.347(b)	Describe procedures for daily visual inspection of incinerator and associated equipment.	NA	

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SECTION F. PROCEDURES TO PREVENT HAZARDS

Section and Requirement	Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
F-2b(5)(b) Incinerator Waste Feed Cutoff System and Alarms	270.14(b)(5); 264.347(c)	66270.14(b)(5); 66264.347(c)	Describe procedure and frequency of testing emergency waste feed cutoff system.	NA	
F-2b(6) Landfill Inspection	270.14(b)(5); 264.303(b)	66270.14(b)(5); 66264.303(b)	For operating landfill, describe how it will be inspected weekly and after storms.	NA	
F-2b(6)(a) Runon and Runoff Control System	270.14(b)(5); 264.303(b)(1)	66270.14(b)(5); 66264.303(b)(1)	Deterioration, malfunction, or improper operation of runon and runoff control system.	NA	
F-2b(6)(b) Wind Dispersal Control System	270.14(b)(5); 264.303(b)(2)	66270.14(b)(5); 66264.303(b)(2)	Proper functioning of wind dispersal control systems, where present.	NA	
F-2b(6)(c) Leachate Collection and Removal System	270.14(b)(5); 264.303(b)(3), (c)	66270.14(b)(5); 66264.303(b)(3), (c)	In properly functioning double liner system, is there a presence of leachate? Leak detection required under 66264.301(c) or 66264.301(d) must record amount of leakage from each system weekly.	NA	
F-2b(7) Land Treatment Facility Inspection	270.14(b)(5); 264.273(g)	66270.14(b)(5); 66264.273(g)	Describe how land treatment facility will be inspected weekly and after storms.	Appendix I	
F-2b(7)(a) Runon and Runoff Control System	270.14(b)(5); 264.273(g)(1)	66270.14(b)(5); 66264.273(g)(1)		Appendix I	
F-2b(7)(b) Wind Dispersal Control System	270.14(b)(5); 264.273(g)(2)	66270.14(b)(5); 66264.273(g)(2)		Appendix I	
F-2b(8) Miscellaneous Unit Inspections	270.14(b)(5); 264.602	66270.14(b)(5); 66264.602	Provide inspection program that ensures compliance with standards in 66264.601 and 66270.23.	NA	

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SECTION F. PROCEDURES TO PREVENT HAZARDS

Section and Requirement	Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
F-2b(9) Boilers and Industrial Furnaces (BIF) Inspection	270.14(b)(5); 264.15; 266.102(a)(2)(ii),(e)(8); 266.111(e)(3)	66270.14(b)(5); 66264.15; 66266.102(a)(2)(B),(e)(8); 66266.111(e)(3)	Demonstrate that BIF will be visually inspected daily, automatic waste feed cutoff inspected at least weekly, and direct transfer area at least once an hour when waste is being transferred.	NA	
F-2b(10) Containment Building Inspection	270.14(b)(5); 264.1101(c)(3),(4)	66270.14(b)(5); 66264.1101(c)(3),(4)	Demonstrate owner/operator will inspect and document at least weekly, monitoring equipment, leak detection equipment, containment building, and surrounding areas for waste releases.	NA	
F-2b(11) Drip Pad Inspection	270.14(b)(5); 264.574	66270.14(b)(5); 66264.574	Demonstrate that the drip pad owner/operator will inspect and document at least weekly and after storms, the leak detection and collection equipment, the drip pad surface, and the runon and runoff control systems for evidence of deterioration, malfunction, improper operation, or leakage of hazardous waste.	NA	
F-3 Waiver or Documentation of Preparedness and Prevention Requirements	270.14(b)(6) 264.32(a) - (d)	66270.14(b)(6) 66264.32(a) - (d)	Facility must submit justification for any waiver to requirements of this section.	NA	
F-3(a) Equipment Requirements	270.14(b); 264.32	66270.14(b); 66264.32		Section 7.2	

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SECTION F. PROCEDURES TO PREVENT HAZARDS

Section and Requirement	Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
F-3(a)(1) Internal Communication	270.14(b); 264.32(a)	66270.14(b); 66264.32(a)	Describe internal communication or alarm system used to provide immediate emergency instruction to personnel.	Section 7.2	
F-3(a)(2) External Communication	270.14(b); 264.32(b)	66270.14(b); 66264.32(b)	Describe device for summoning emergency assistance from local police, fire, or state/local emergency response.	Section 7.2	
F-3(a)(3) Emergency Equipment	270.14(b); 264.32(c)	66270.14(b); 66264.32(c)	Demonstrate that portable fire extinguishers, fire control equipment, spill control equipment, and decontamination equipment are available.	Section 7.2	
F-3(a)(4) Water and Fire Control	270.14(b); 264.32(d)	66270.14(b); 66264.32(d)	Demonstrate facility has adequate fire control systems, water volume and pressure, foaming equipment, automatic sprinklers, etc.	Section 7.2	
F-3(a)(5) Testing and Maintenance of Equipment	270.14(b); 264.33	66270.14(b); 66264.33	Demonstrate communication, alarm, fire control equipment, spill control equipment, and decontamination equipment are tested and maintained.	Section 8.0	
F-3(a)(6) Access to Communication or Alarm System	270.14(b); 264.34	66270.14(b); 66264.34	When waste is being hauled, all personnel must have access to internal alarm or communication device.	NA	
F-3(b) Aisle Space Requirement	270.14(b); 264.35	66270.14(b); 66264.35	Aisle space is required for unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment in case of emergency.	NA	

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SECTION F. PROCEDURES TO PREVENT HAZARDS

Section and Requirement	Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
F-3(c) Documentation of Arrangements with:	270.14(b); 264.37	66270.14(b); 66264.37	Owner/operator must make arrangements, as appropriate, with type of waste and hazard potential, for the potential need for services.	Section 9.0	
F-3(c)(1) Police/Fire Department	270.14(b); 264.37(a)(1)	66270.14(b); 66264.37(a)(1)	Arrange to familiarize local fire department and police with facility.	Section 9.0	
F-3(c)(2) Emergency Response Teams	270.14(b); 264.37(a)(2), (a)(3)	66270.14(b); 66264.37(a)(2), (a)(3)		Section 9.0	
F-3(c)(3) Local Hospitals	270.14(b); 264.37(a)(4)	66270.14(b); 66264.37(a)(4)	Arrange to familiarize local hospital with properties of hazardous waste and possible types of injury or illness to expect.	Section 9.0	
F-3(c)(4) Document Agreement Refusal	270.14(b); 264.37(b)	66270.14(b); 66264.37(b)	Document refusal to enter into a coordination agreement.	NA	
F-4 Prevention Procedures, Structures, and Equipment	270.14	66270.14			
F-4(a) Unloading Procedures	270.14(b)(8)(i)	66270.14(b)(8)(A)	Describe procedure used to prevent hazards in unloading operations. Identify possible loading and unloading hazards, and document steps taken to minimize or eliminate possibility of these hazards.	NA	In post-closure
F-4(b) Runoff	270.14(b)(8)(ii)	66270.14(b)(8)(B)	Describe procedure used to prevent runoff from hazardous waste handling areas.	NA	In post-closure

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SECTION F. PROCEDURES TO PREVENT HAZARDS

Section and Requirement	Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
F-4(c) Water Supplies	270.14(b)(8) (iii)	66270.14(b)(8) (C)	Describe procedure, structures, equipment used to prevent contamination of water supply.	NA	In post-closure
F-4(d) Equipment and Power Failure	270.14(b)(8) (iv)	66270.14(b)(8) (D)	Describe procedure used to mitigate the effects of equipment failure and power outages.	NA	In post-closure
F-4(e) Personnel Protection Procedures	270.14(b)(8)(v)	66270.14(b)(8)(E)	Describe procedure, structures, equipment used to prevent contamination of personnel to hazardous waste.	Appendix I	
F-4(f) Procedures to Minimize Releases to the Atmosphere	270.14(b)(8) (vi)	66270.14(b)(8) (F)	Describe procedure, structures, equipment used to prevent hazardous waste releases to the atmosphere.	NA	In post-closure
F-5 Prevention of Reaction of Ignitable, Reactive, and Incompatible Waste	270.14(b)(9)	66270.14(b)(9)		NA	
F-5a Precautions to Prevent Ignition or Reaction of Ignitable or Reactive Wastes	270.14(b)(9); 264.17(a),(b)	66270.14(b)(9); 66264.17(a),(b)	Waste must be protected from sources of ignition or reaction. Describe precautions taken by facility to prevent actual ignition, including sources of spontaneous ignition and radiant heat. Owner/operator must designate safe areas for smoking and open flames. Post signs where hazard exists.	NA	In post-closure

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SECTION F. PROCEDURES TO PREVENT HAZARDS

Section and Requirement	Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
F-5b General Precautions for Handling Ignitable or Reactive Waste and Mixing of Incompatible Waste	270.14(b)(9); 264.17(a)	66270.14(b)(9); 66264.17(a)	Describe precautions taken by facility to prevent reactions that generate heat, produce flammable byproducts, cause risk of fire or explosion, threaten structural integrity, or pose threat to human life or the environment.	NA	In post-closure
F-5b(1) Documentation of Adequacy of Procedures	270.14(b); 264.17(c)	66270.14(b); 66264.17(c)	Published literature, trial test, waste analyses, or similar processes may be used.	NA	In post-closure
F-5c Management of Ignitable or Reactive Wastes in Containers	270.15(c); 264.176	66270.15(b); 66264.176	Demonstrate that ignitable containers are at least 15 meters from facility property line.	NA	
F-5d Management of Incompatible Wastes in Containers	270.15(d); 264.177	66270.15(c); 66264.177	Describe procedures that ensure incompatible wastes and materials are not placed in same container.	NA	
F-5e Management of Ignitable or Reactive Wastes in Tank Systems	270.16(j); 264.198	66270.16(j); 66264.198	Describe operation procedures and how facility treats waste so it is no longer ignitable or how facility stores ignitable or reactive waste.	NA	
F-5f Management of Incompatible Wastes in Tank Systems	270.16(j); 264.199	66270.16(j); 66264.199	Demonstrate that incompatible waste and materials are not stored in same tank.	NA	
F-5g Management of Ignitable or Reactive Wastes Placed in Waste Piles	270.18(g); 264.256	66270.18(g); 66264.256	If waste is reactive or ignitable, describe how handling process will render waste pile nonreactive and/or nonignitable.	NA	

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SECTION F. PROCEDURES TO PREVENT HAZARDS

Section and Requirement	Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
F-5h Management of Incompatible Wastes Placed in Waste Piles	270.18(h); 264.257	66270.18(h); 66264.257	Document how hazardous waste piles of incompatible materials are separated to render them nonreactive.	NA	
F-5i Management of Ignitable or Reactive Wastes in Surface Impoundments	270.17(h); 264.229	66270.17(h); 66264.229	If waste is reactive or ignitable, describe how handling process will render surface impoundments nonreactive and/or nonignitable.	NA	
F-5j Management of Incompatible Wastes in Surface Impoundments	270.17(h); 264.230	66270.17(h); 66264.230	Document how hazardous surface impoundments of incompatible materials are separated to render them nonreactive.	NA	
F-5k Management of Ignitable or Reactive Wastes Placed in Landfills	270.21(f); 264.312	66270.21(f); 66264.312	If waste is reactive or ignitable, describe how handling process will prevent reaction or ignition to landfills.	NA	
F-5l Management of Incompatible Wastes Placed in Landfills	270.21(g); 264.313	66270.21(g); 66264.313	Document how hazardous landfills of incompatible materials are separated to render them nonreactive.	NA	
F-5m Management of Ignitable or Reactive Wastes Placed in Land Treatment Units	270.20(g); 264.281	66270.20(g); 66264.281	If waste is reactive or ignitable, describe how handling process will render land treatment units nonreactive and/or nonignitable.	NA	In post-closure
F-5n Management of Incompatible Wastes Placed in Land Treatment Units	270.20(h); 264.282	66270.20(h); 66264.282	Document how land treatment unit piles of incompatible materials are separated to render them nonreactive.	NA	In post-closure

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SECTION F. PROCEDURES TO PREVENT HAZARDS

Section and Requirement	Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
F-5o Management of Incompatible Wastes Placed in Containment Buildings	270.14(a); 264.1101(a)(3)	66270.14(a); 66264.1101(a)(3)	Subsections include design, primary and secondary containment, barriers to prevent migration, leak detection, and facility logs.	NA	

Notes:

[a] Considerations in addition to the requirements presented in the regulations.

[b] For each requirement, this column must indicate one of the following: NA for not applicable, IM for information missing, or the exact location of the information in the application.

[c] If application is deficient in an area, prepare a comment describing the deficiency, attach it to the checklist, and reference the comment in this column.

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SECTION G. CONTINGENCY PLAN

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
G-1	Contingency Plan	270.14(b)(7)	66270.14(b)(7)		Section 10.0	
G-2	Emergency Coordinators	270.14(b)(7); 264.52(d); 264.55	66270.14(b)(7); 66264.52(d); 66264.55	There must at least be one primary emergency coordinator available at all times.	Section 7.1	
G-3	Implementation	270.14(b)(7); 264.52(a); 264.56(d)	66270.14(b)(7); 66264.52(a); 66264.56(d)	Emergency coordinator to determine that facility has had a release, fire, or explosion that could threaten human health or the environment outside facility.	Section 10.0	
G-4	Emergency Actions	270.14(b)(7); 264.56	66270.14(b)(7); 66264.56		Section 10.0	
G-4a	Notification	270.14(b)(7); 264.56(a)	66270.14(b)(7); 66264.56(a)	Describe the method for immediate notification of facility personnel and necessary state and local agencies.	Section 10.0	
G-4b	Identification of Hazardous Materials	270.14(b)(7); 264.56(b)	66270.14(b)(7); 66264.56(b)	Observation, records or manifest, or chemical analysis may be used by emergency coordinator.	Section 10.0	
G-4c	Assessment	270.14(b)(7); 264.56(c),(d)	66270.14(b)(7); 66264.56(c),(d)	Direct and indirect effects must be considered.	Section 10.0	
G-4d	Control Procedures	270.14(b)(7); 264.52(a)	66270.14(b)(7); 66264.52(a)	Contingency plan must describe actions facility personnel must take in response to fires, explosions, or any unplanned release of hazardous waste to air, soil, or surface water.	Section 10.0	

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Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
G-4e	Prevention of Recurrence of Spread of Fires, Explosions, or Releases	270.14(b)(7); 264.56(e)	66270.14(b)(7); 66264.56(e)	Measures must include stopping processes and operations, collecting and containing release of waste, and removing or isolating containers.	Section 10.0	
G-4e(1)	Monitor for Leaks, Pressure Buildup, Gas Generation or Ruptures of Released Material	270.14(b)(7); 264.56(f)	66270.14(b)(7); 66264.56(f)	This item applies if facility stops operations.	NA	
G-4f	Storage, Treatment, and Disposal of Released Material	270.14(b)(7); 264.56(g)	66270.14(b)(7); 66264.56(g)	After emergency, emergency coordinator must provide for treating, storing, and disposing of recovered waste.	Section 10.0	
G-4g	Incompatible Waste	270.14(b)(7); 264.56(h)(1)	66270.14(b)(7); 66264.56(h)(1)	Until cleanup is complete, assure that incompatible waste is not stored together.	Section 10.0	
G-4h	Post-Emergency Equipment Management	270.14(b)(7); 264.56(h)(2)	66270.14(b)(7); 66264.56(h)(2)	Decontamination is required for emergency equipment.	Section 10.0	
G-4h(1)	Notification of Federal, State and Local Authorities before Resuming Operations	270.14(b)(7); 264.56(i)	66270.14(b)(7); 66264.56(i)	Federal or state authorities must be notified within 15 days of occurrence.	Section 10.0	
G-4i	Container Spills and Leakage	270.14(b)(7); 264.52; 264.71	66270.14(b)(7); 66264.52; 66264.71	Specify procedures to be used when responding to container spills and leakage.	NA	

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Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
G-4j	Tank Spills and Leakage			For a tank or containment system from which there has been a leak or spill:	NA	
G-4j(1)	Stopping Waste Addition	270.14(b)(7); 264.196(a)	66270.14(b)(7); 66264.196	Document that the owner/operator will immediately stop the flow of hazardous waste.	NA	
G-4j(2)	Removing Waste	270.14(b)(7); 264.196(b)	66270.14(b)(7); 66264.196	Owner/operator will, within 24 hours after leak detected, remove waste and allow inspection and repair of the tank system to be performed.	NA	
G-4j(3)	Containment of Visible Releases	270.14(b)(7); 264.196(c)	66270.14(b)(7); 66264.196	Specify that a visual inspection of a release will be conducted, demonstrate further mitigation of leak will be prevented, and visible contamination will be removed and disposed of properly.	NA	
G-4j(4)	Notification Reports	270.14(b)(7); 264.196(d)	66270.14(b)(7); 66264.196	Demonstrate that any release to the environment will be reported to regional administrator within 24 hours of detection.	NA	
G-4j(5)	Provisions of Secondary Containment, Repair, or Closure	270.14(b)(7); 264.196(e)	66270.14(b)(7); 66264.196	Provision of secondary containment repair, otherwise closure is required.	NA	
G4-k	Surface Impoundment Spills and Leakage	270.14(b)(7); 264.227	66270.14(b)(7); 66264.227	Surface impoundments must be removed from service when:	NA	

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SECTION G. CONTINGENCY PLAN

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
G4-k(1)	Emergency Repairs	270.14(b)(7); 264.227	66270.14(b)(7); 66264.227	Describe procedures for removing surface impoundments from service.	NA	
G4-k(1)(a)	Stopping Waste Addition	270.14(b)(7); 264.227(b)(1)	66270.14(b)(7); 66264.227(b)(1)	Procedures for stopping waste addition to the impoundment.	NA	
G4-k(1)(b)	Containing Leaks	270.14(b)(7); 264.227(b)(2)	66270.14(b)(7); 66264.227(b)(2)	Procedures for containing leak.	NA	
G4-k(1)(c)	Stopping Leaks	270.14(b)(7); 264.227(b)(3)	66270.14(b)(7); 66264.227(b)(3)	Procedures for stopping leak.	NA	
G4-k(1)(d)	Preventing Catastrophic Failure	270.14(b)(7); 264.227(b)(4)	66270.14(b)(7); 66264.227(b)(4)	Procedures to stop or prevent catastrophic failure.	NA	
G4-k(1)(e)	Emptying the Impoundment	270.14(b)(7); 264.227(b)(5)	66270.14(b)(7); 66264.227(b)(5)	Procedures for emptying impoundment, if necessary.	NA	
G4-k(2)	Certification	270.14(b)(7); 264.226 (c); 264.227(d)(1)	66270.14(b)(7); 66264.226 (c); 66264.227(d)(1)	Procedures for recertifying a dike's structural integrity if impoundment is removed from service due to actual or imminent failure.	NA	
G4-k(3)	Repairs as a Result of Sudden Drop	270.14(b)(7); 264.227(d)(2)	66270.14(b)(7); 66264.227(d)(2)	Procedures to follow if impoundment is removed from service due to sudden drop in liquid level of the following:	NA	
G4-k(3)(a)	Existing Portions of Surface Impoundment	270.14(b)(7); 264.227(d)(2)(i)	66270.14(b)(7); 66264.227(d)(2)(A)	Installation of liner for any existing portion of impoundment.	NA	
G4-k(3)(b)	Other Portions of the Surface Impoundment	270.14(b)(7); 264.227(d)(2)(ii)	66270.14(b)(7); 66264.227(d)(2)(B)	Certification by qualified engineer for other than existing portions of the impoundment.	NA	

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SECTION G. CONTINGENCY PLAN

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
G4-l	Containment Building Leaks	270.14(b)(7); 264.1101(c)(3)	66270.14(b)(7); 66264.1101(c)(3)	Through active life of building if owner/operator detects condition that could lead to release of hazardous waste.	NA	
G-4l(1)	Repair of Containment Building	270.14(b)(7); 264.1101(c)(3)	66270.14(b)(7); 66264.1101(c)(3)	Within 7 days of detection, owner/operator must contact regional administrator. Enter record of discovery, remove contaminated portion of building from service, determine repair steps, and establish schedule for repair.	NA	
G-4l(2)	Certification Following Repair	270.14(b)(7); 264.1101(c)(3)(iii)	66270.14(b)(7); 66264.1101(c)(3)	Upon completion of repairs owner/operator must notify regional administrator.	NA	
G-4m	Drip Pad Spills and Leakage	270.14(b)(7); 264.573(m)	66270.14(b)(7); 66264.573(m)	Throughout the active life of the drip pad, if a condition is detected that may have or has caused a release of hazardous waste, it must be repaired within a reasonably prompt period of time.	NA	
G-4m(1)	Stopping Waste Addition	270.14(b)(7); 264.573(m)(1)(ii)	66270.14(b)(7); 66264.573(m)(1)(B)	Upon detection of leakage in the leak detection system, immediately remove the affected portion of the drip pad from service.	NA	
G-4m(2)	Determine Appropriate Cleanup and Repair	270.14(b)(7); 264.573(m)(1)(iii)	66270.14(b)(7); 66264.573(m)(1)(C)	Establish a schedule for accomplishing the repairs.	NA	

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SECTION G. CONTINGENCY PLAN

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
G-4m(3)	Notification	270.14(b)(7); 264.573(m)(1)(iv)	66270.14(b)(7); 66264.573(m)(1) (D)	Within 24 hours after discovery of the condition, notify the Regional Administrator or state director. Within 10 working days, provide written notice and a description of the repairs to be made to the drip pad.	NA	
G-4m(4)	Certification	270.14(b)(7); 264.573(m)(3)	66270.14(b)(7); 66264.573(m)(3)	Upon completing all repairs and clean up, provide certification signed by an independent, qualified registered PE.	NA	
G-5	Emergency Equipment	270.14(b)(7); 264.52(e)	66270.14(b)(7); 66264.52(e)		Section 8.0	
G-6	Arrangements with Local Authorities	270.14(b)(7); 264.37; 264.52(c)	66270.14(b)(7); 66264.37; 66264.52(c)	Police and fire departments, hospitals, and emergency response teams must be notified by owner/operator. Document refusal to enter into a coordination agreement.	Section 9.0	
G-7	Evacuation Plan for Facility Personnel	270.14(b)(7); 264.52(f)	66270.14(b)(7); 66264.52(f)	Evacuation plans must include evacuation signals and primary and alternate evacuation routes.	Section 7.2	

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SECTION G. CONTINGENCY PLAN

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
G-8	Required Report Procedures for Recordkeeping and Reporting to Federal Authority	270.14(b)(7); 264.56(j)	66270.14(b)(7); 66264.56(j)	Owner/operator must note on operation record the time, date and details of incidents which require implementation of contingency plan.	Section 10.0	
G-9	Location and Distribution of Contingency Plan	270.14(b)(7); 264.53	66270.14(b)(7); 66264.53	Copy of contingency plan must be maintained at facility and submitted to	Section 10.0	

Notes:

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SECTION H. PERSONNEL TRAINING

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
H-1	Outline of Introductory and Continuing Training Programs	270.14(b)(12); 264.16(a)(1)	66270.14(b)(12); 66264.16(a)(1)	Facility personnel must successfully complete classroom or on-the-job training which will allow them to responsibly perform in their positions.	Section 12.0	
H-1a	Job Title/Job Description	270.14(b)(12); 264.16(d)1), (d)(2)	66270.14(b)(12); 66264.16(d)1), (d)(2)	Owner or operator must maintain records of job titles, names of employees, job descriptions, and types and amounts of training given to employees.	Section 12.0	
H-1b	Description of How Training will be Designed to Meet Actual Job Tasks	270.14(b)(12); 264.16(c),(d) (3)	66270.14(b)(12); 66264.16(c),(d) (3)	Training must be conducted by a qualified person; there must also be an annual review of the training.	Section 12.0	
H-1c	Training Director	270.14(b)(12); 264.16(a)(2)	66270.14(b)(12); 66264.16(a)(2)	Program must be directed by person trained in hazardous waste procedures.	Section 12.0	
H-1d	Relevance of Training to Job Position	270.14(b)(12); 264.16(a)(2)	66270.14(b)(12); 66264.16(a)(2)	Training must include instruction on hazardous waste procedures relevant to each employee's position.	Section 12.0	
H-1e	Training for Emergency Response	270.14(b)(12); 264.16(a)(3)	66270.14(b)(12); 66264.16(a)(3)	Personnel must minimally be familiar with emergency procedures, emergency equipment, and emergency systems.	Section 12.0	
H-2	Maintenance of Training Records/Copy of Personnel Training Documents	270.14(b)(12); 264.16(b),(d) (4),(e)	66270.14(b)(12); 66264.16(b),(d) (4),(e)	Training records on current personnel must be kept until closure of facility. Training must be completed within 6 months after date of employment.	Section 12.0	

Notes:

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PERMIT COMPLETENESS CHECKLIST

SECTION I. CLOSURE POST-CLOSURE FINANCIAL REQUIREMENTS

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
I-1	Closure Plans	270.14(b)(13)	66270.14(b)(13)		Closure was completed in 1999 and on Sept 19, 2000 the DTSC issued the approval of the Closure Certification. The Closure Plan is provided in Appendix F and the Post-Closure Monitoring Plan is provided in Appendix I.	
I-1a	Closure Performance Standard	270.14(b)(13); 264.111	66270.14(b)(13); 66264.111	Describe how closure: minimizes the need for further maintenance; controls, minimizes, or eliminates the post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off, or hazardous waste decomposition products to the ground or surface waters or to the atmosphere; and complies with the closure requirements of Chapter 14, Article 7 and unit-specific closure requirements.		
I-1b	Time and Activities Required for Partial Closure and Final Closure Activities	270.14(b)(13); 264.112(b)(1) through 264.112(b)(7)	66270.14(b)(13); 66264.112(b)(1) through 66264.112(b)(7)	Describe the time and all activities required for: partial closure, if applicable; final closure; and maximum extent of operation that will be active during life of facility.		
I-1c	Maximum Waste Inventory	270.14(b)(13); 264.112(b)(3)	66270.14(b)(13); 66264.112(b)(3)			
I-1d	Schedule for Closure	270.14(b)(13); 264.112(b)(6)	66270.14(b)(13); 66264.112(b)(6)			
I-1(d)(1)	Time Allowed for Closure	270.14(b)(13); 264.112(b)(2); 264.113(a) and (b)	66270.14(b)(13); 66264.112(b)(2); 66264.113(a) and (b)			
I-1d(1)(a)	Extension for Closure Time	270.14(b)(13); 264.113(a) and (b)	66270.14(b)(13); 66264.113(a) and (b)			

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SECTION I. CLOSURE POST-CLOSURE FINANCIAL REQUIREMENTS

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
I-1e	Closure Procedures	270.14(b)(13); 264.112; 264.114	66270.14(b)(13); 66264.112; 66264.114		See page I-1 comment.	
I-1e(1)	Inventory Removal	270.14(b)(13); 264.112(b)(3)	66270.14(b)(13); 66264.112(b)(3)	Discuss methods for removing, transporting, treating, storing, or disposing of all hazardous wastes and identify the type(s) of off-site hazardous waste management units to be used.		
I-1e(2)	Disposal or Decontamination of Equipment, Structure, and Soils	270.14(b)(13); 264.112(b)(4); 264.114	66270.14(b)(13); 66264.112(b)(4); 66264.114	Provide a detailed description of the steps needed to decontaminate or dispose of all facility equipment and structures.		
I-1e(3)	Closure of Disposal Units/Contingent Closures	270.14(b)(13)	66270.14(b)(13)			
I-1e(3)(a)	Disposal Impoundments	270.14(b)(13); 264.228(a)(2)	66270.14(b)(13); 66264.228(a)(2)			
I-1e(3)(a)(i)	Elimination of Liquids	270.14(b)(13)	66270.14(b)(13); 66264.228(a)(2)(A)			
I-1e(3)(a)(ii)	Waste Stabilization	270.14(b)(13); 264.228(a)(2)(ii)	66270.14(b)(13); 66264.228(a)(2)(B)			

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Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
I-1e(3)(b)	Cover Design	270.14(b)(13); 264.228(a)(2)(iii);264.310(a)	66270.14(b)(13); 66264.228(a)(2)(C); 66264.310(a)		See page I-1 comment.	
I-1e(3)(c)	Minimization of Liquid Migration	270.14(b)(13); 264.228(a)(2)(iii)(A); 264.310(a)(1)	66270.14(b)(13); 66264.228(a)(2)(C)1; 66264.310(a)(1)	Draft RCRA Guidance Document entitled Landfill (Design--Liner Systems and Final Cover (1982), suggests the following design for landfill cover systems (from top to bottom): a vegetated top cover, with a minimum of 24 inches of topsoil; a middle drainage layer (at least one foot thick with a saturated conductivity of not less than 1 x 10^{-3} cm/sec) overlain by a geotextile filter fabric or graded granular filter; and a low permeability bottom layer consisting of two components: an upper component of at least a 20 mil synthetic membrane protected above and below by at least six inches of bedding material, a lower component of at least 24 inches of low permeability (maximum hydraulic conductivity of 1 x 10^{-7} cm/sec) soil emplaced in lifts not exceeding six inches. For cover designs different than EPA-recommended designs, provide engineering calculations showing the proposed cover will provide long-term minimization of liquid migration through the cover.		
I-1e(3)(d)	Maintenance Needs	270.14(b)(13); 264.228(a)(2)(iii)(B); 264.310(a)(2)	66270.14(b)(13); 66264.228(a)(2)(C)2; 66264.310(a)(2)			

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SECTION I. CLOSURE POST-CLOSURE FINANCIAL REQUIREMENTS

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
I-1e(3)(e)	Drainage and Erosion	270.14(b)(13); 264.228(a)(2)(iii)(C); 264.310(a)(3)	66270.14(b)(13); 66264.228(a)(2)(C)3; 66264.310(a)(3)	The following information should be provided: data demonstrating that the proposed final slopes will not cause significant cover erosion; description of drainage materials and their permeabilities; engineering calculations demonstrating free drainage of precipitation off of and out of the cover; and estimation of the potential for drainage-layer clogging.	See page I-1 comment.	
I-1e(3)(f)	Settlement and Subsidence	270.14(b)(13); 264.228(a)(2)(iii)(D); 264.310(a)(4)	66270.14(b)(13); 66264.228(a)(2)(C)4; 66264.310(a)(4)	Include the following information: potential foundation compression; potential soil liner compression; and potential waste consolidation and compression resulting from waste dewatering, biological oxidation and chemical conversion of solids to liquids.		
I-1e(3)(g)	Cover Permeability	270.14(b)(13); 264.228(a)(2)(iii)(E); 264.310(a)(5)	66270.14(b)(13); 66264.228(a)(2)(C)5; 66264.310(a)(6)			
I-1e(3)(h)	Freeze/Thaw Effects	270.14(b)(13); 264.228(a)(2)(iii); 264.310(a)	66270.14(b)(13); 66264.310(a)	Identity the average depth of frost penetration and describe the effects of freeze/thaw cycles on the cover.		
I-1e(4)	Closure of Containers	270.14(b)(13); 264.178; 264.112(b)(3); 270.14(b)(13	66270.14(b)(13); 66264.178; 66264.112(b)(3)	Address the following: hazardous waste removal and disposal; container decontamination and disposal; site decontamination and disposal including linings, soil, and washes; maximum inventory.		

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Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
I-1e(5)	Closure of Tanks	270.14(b)(13); 264.197; 264.112(b)(3)	66270.14(b)(13); 66264.197	The description should address the following: waste removal from tanks and equipment; decontamination of all components; verification of decontamination; disposal of wastes and residues; and maximum inventory.	NA	
I-1e(6)	Closure of Waste Piles	270.14(b)(13); 270.18(h); 264.258	66270.14(b)(13); 66270.18(h); 66264.258	The description must address the following: procedure and criteria for determining whether or not decontamination has been successful; and sampling and analytical techniques.	NA	
I-1e(7)	Closure of Surface Impoundments	270.14(b)(13); 270.17(f); 264.228(a)(1), (2), and (b)	66270.14(b)(13); 66270.17(f); 66264.228(a)(1), (2), and (b)	Surface impoundments without liners or with liners that do not meet the requirements must also provide contingent plans for closure in place and a contingent post-closure plan, except for impoundments requesting a liner exemption in accordance with D-4b.	NA	
I-1e(8)	Closure of Incinerators	270.14(b)(13); 264.351	66270.14(b)(13); 66264.351	Describe how, at closure, all hazardous waste and hazardous waste residues (including, but not limited to, ash, scrubber waters, and scrubber sludges) will be removed from the incinerator, associated ductwork, piping, air pollution control equipment, sumps, and any other structures or operating equipment such as pumps, valves, etc., that have come into contact with the hazardous waste. Alternatively, describe how the incinerator and associated units and equipment will be dismantled and disposed of as a hazardous waste.	NA	

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Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
I-1e(9)	Closure of Landfills	270.14(b)(13); 270.21(e); 264.310(a)	66270.14(b)(13); 66270.21(e); 66264.310(a)	Provide detailed plans and engineering report that describes the final cover components in detail. Cover installation and construction quality assurance procedures should be thoroughly described.	NA	
I-1e(10)	Closure of Land Treatment Facilities	270.14(b)(13); 264.280(a); 270.20(f)	66270.14(b)(13); 66264.280(a); 66270.20(f)		See page I-1 comment.	
I-1e(10)(a)	Continuance of Treatment	270.14(b)(13); 264.280(a)(1) through (7)	66270.14(b)(13); 66264.280(a)(1) through (7)			
I-1e(10)(b)	Vegetative Cover	270.14(b)(13); 270.20(f); 264.280(a)(8)	66270.14(b)(13); 66270.20(f); 66264.280(a)(8)			
I-1e(11)	Closure of Miscellaneous Units	270.14(b)(13); 270.23(a)(2)	66270.14(b)(13); 66270.23(a)(2); 66264.601		NA	

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Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
I-1e(12)	Closure of Boilers and Industrial Furnaces	270.14(b)(13); 266.102(a)(2)(vii)	66270.14(b)(13); 66266.102(a)(2)(G)	Describe how, at closure, all hazardous waste and hazardous waste residues (including, but not limited to, ash, scrubber waters, and scrubber sludges) will be removed from the BIF unit, associated ductwork, piping, air pollution control equipment, sumps and any other structures or operating equipment such as pumps, valves, etc., that have come into contact with hazardous wastes. Alternatively, describe how the BIF and associated equipment will be dismantled and disposed of. If any wastes, waste residues, contaminated components, subsoils, structures or equipment remain after closure, provide plans for closing the BIF unit as a landfill and provide a post-closure care plan.	NA	
I-1e(13)	Closure of Containment Buildings	270.14(b)(13); 264.1102	66270.14(b)(13); 66264.1102	Show that at closure all hazardous waste, hazardous waste residues, contaminated containment system, contaminated subsoils, and all structures and equipment contaminated with waste and leachate will be removed. If any wastes, waste residues, contaminated components, subsoils, structures or equipment remain after closure, provide plans for closing the containment building as a landfill and provide a post-closure care plan.	NA	
I-2	Post-Closure Plans	270.14(b)(13)	66270.14(b)(13)		Appendix I	

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Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
I-2a	Inspection Plan	270.14(b)(13); 264.118(a); 264.197(b); 264.197(c)(2); 264.226(d)(2); 264.228(b); 264.228(c)(1)(ii); 264.258(b); 264.258(c)(1)(ii); 264.303(c); 264.310(b)	66270.14(b)(13); 66264.118(a); 66264.197(b); 66264.197(c)(2); 66264.226(d)(2); 66264.228(b); 66264.228(c)(1)(B); 66264.258(b); 66264.258(c)(1)(B); 66264.303(c); 66264.310(b)	Rationale for determining the length of time between inspections should be provided.	Appendix I	
I-2b	Monitoring Plan	270.14(b)(13); 264.118(b)(1); 264.197(b); 264.197(c)(2); 264.226(d)(2); 264.228(b); 264.228(c)(1)(ii); 264.258(b); 264.258(c)(1)(ii); 264.303(c); 264.310(b)	66270.14(b)(13); 66264.118(b)(1); 66264.197(b); 66264.197(c)(2); 66264.226(d)(2); 66264.228(b); 66264.228(c)(1)(B); 66264.258(b); 66264.258(c)(1)(B); 66264.303(c); 66264.310(b)		Appendix I Appendix J	

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Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
I-2c	Maintenance Plan	270.14(b)(13); 264.118(b)(2); 264.197(b); 264.197(c)(2); 264.228(b); 264.228(c)(1)(ii); 264.258(b); 264.258(c)(1)(ii); 264.310(b)	66270.14(b)(13); 66264.118(b)(2); 66264.197(b); 66264.197(c)(2); 66264.228(b); 66264.228(c)(1)(B); 66264.258(b); 66264.258(c)(1)(B); 66264.310(b)	Describe the preventative and corrective maintenance procedures, equipment procedures, equipment requirements and material needs.	Appendix I	
I-2d	Land Treatment	270.14(b)(13); 264.280(c)	66270.14(b)(13); 66264.280(c)	Describe the operation, inspection, and maintenance programs to be used at the closed facility.	Appendix I	
I-2e	Post-Closure Care for Miscellaneous Units	270.14(b)(13); 270.23(a)(3); 264.603	66270.14(b)(13); 66270.23(a)(3); 66264.603		NA	
1-2f	Post-Closure Security	270.14(b)(13); 264.117(b) and (c)	66270.14(b)(13); 66264.117(b) and (c)	Demonstrate that for property where hazardous wastes remain after partial or final closure, post-closure use must never be allowed to disturb the integrity of the final cover, liner(s), or any other components of the containment system, or the function of the facility's monitoring system.	Section 7.1	
I-2g	Post-Closure Contact	270.14(b)(13); 264.118(b)(3)	66270.14(b)(13); 66264.118(b)(3)		Section 2.9	
I-3	Notices Required for Disposal Facilities	270.14(b)(13)	66270.14(b)(13)		See page I-1 comment.	

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Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
I-3a	Certification of Closure	270.14(b)(13); 264.115; 264.280	66270.14(b)(13); 66264.115; 66264.280(b)		Section 5.2	
I-3b	Survey Plat	270.14(b)(13); 264.116	66270.14(b)(13); 66264.116		Appendix G	
I-3c	Post-Closure Certification	270.14(b)(13); 264.120	66270.14(b)(13); 66264.120		Section 5.2	
I-3d	Post-Closure Notices	270.14(b)(13); 270.14(b)(14); 264.119	66270.14(b)(13); 66270.14(b)(14); 66264.119		Appendix G	
I-4	Closure Cost Estimate	270.14(b)(15); 264.142	66270.14(b)(15); 66264.142	Estimate must equal final cost estimate. Estimate must be based on third party closing facility and may use on-site disposal if capacity will exist over life of facility. Estimate must be adjusted for annual inflation as stated in 66264.142(b). Estimates may not assume zero cost for hazardous waste handling, and may not incorporate salvage value, facility structures/equipment, land, or other facility assets as offsets.	Appendix M	
I-5	Financial Assurance for Closure	270.14(b)(15); 264.143; 264.151	66270.14(b)(15); 66264.143		Appendix M	
I-5a	Closure Trust Fund	270.14(b)(15); 264.143(a); 264.151(a)(1)	66270.14(b)(15); 66264.143(a)	Provide copy of fund agreement.	NA	

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Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
I-5b	Surety Bond	270.14(b)(15); 264.143(b), (c); 264.151 (b),(c)	66270.14(b)(15); 66264.143(b), (c)		NA	
I-5b(1)	Surety Bond Guaranteeing Payment into a Closure Trust Fund	270.14(b)(15); 264.143(b); 264.151(b)	66270.14(b)(15); 66264.143(b)	Must provide bond or standby trust agreement. Bond must guarantee owner/operator will fund standby trust fund or provide financial assurance equal to penal sum.	NA	
I-5b(2)	Surety Bond Guaranteeing Performance of Closure	270.14(b)(15); 264.143(c); 264.151(c)	66270.14(b)(15); 66264.143(c)		NA	
I-5(c)	Closure Letter of Credit	270.14(b)(15); 264.143(d); 264.151(d)	66270.14(b)(15); 66264.143(d)	Requires letter of credit for 1 year equal to amount of closure.	NA	
I-5(d)	Closure Insurance	270.14(b)(15); 264.143(e); 264.151(e)	66270.14(b)(15); 66264.143(e)		NA	
I-5(e)	Financial Test and Corporate Guarantee for Closure	270.14(b)(15); 264.143(f); 264.151(f),(h)	66270.14(b)(15); 66264.143(f)	Signed letter by owner/operator or chief financial officer as specified in 66264.151(f),(h) of applicant financial statement. If a parent corporation is guaranteeing closure care, corporate guarantee must accompany.	NA	
I-5(f)	Alternative Financial Mechanism	270.14(b)(15); 264.143(g)	66270.14(b)(15); 66264.143(g)	Financial assurance instruments must meet requirements stated in 66264.143 (a),(b),(c),(d) or (e) that include trust funds, surety bonds, letter of credit, and insurance, respectively.	NA	

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Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
I-5(g)	Use of Multiple Financial Mechanism for Multiple Facilities	270.14(b)(15); 264.143(h)	66270.14(b)(15); 66264.143(h), (i)	Provide financial assurance mechanism showing amount of funds assured.	NA	
I-6	Post-Closure Cost Estimate	270.14(b)(16); 264.144	66270.14(b)(16); 66264.144	Estimate must be based on third party closing facility and may use on-site disposal if capacity will exist over life of facility. Estimate must be adjusted for annual inflation as stated in 66264.142(b).	Appendix M	
I-7	Financial Assurance Mechanism for Post Closure Care	270.14(b)(16); 264.145; 264.151	66270.14(b)(16); 66264.145		Appendix M	
I-7a	Post-Closure Trust Fund	270.14(b)(16); 264.145(a); 264.151(a)(1)	66270.14(b)(16); 66264.145(a)		NA	
I-7b	Surety Bond	270.14(b)(16); 264.145(b),(c); 264.151(b),(c)	66270.14(b)(16); 66264.145(b),(c)	66264.145(b),(c) spells out requests for owner/ operator for adjusting estimates, inflation, and reporting to regional administrator.	NA	
I-7b(1)	Surety Bond Guaranteeing Payment into a Post-Closure Trust Fund	270.14(b)(16); 264.145(b); 264.151(b)	66270.14(b)(16); 66264.145(b)	Must provide bond or standby trust agreement before beginning final closure of the facility. Bond must guarantee owner/operator will fund a standby trust fund or provide financial assurance equal to penal sum.	NA	
I-7b(2)	Surety Bond Guaranteeing Performance of Closure	270.14(b)(16); 264.145(c); 264.151(c)	66270.14(b)(16); 66264.145(c)		NA	

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Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
I-7(c)	Post-Closure Letter of Credit	270.14(b)(16); 264.145(d); 264.151(d)	66270.14(b)(16); 66264.145(d)	Requires letter of credit for 1 year equal to amount of post-closure cost.	NA	
I-7(d)	Post-Closure Insurance	270.14(b)(16); 264.145(e); 264.151(e)	66270.14(b)(16); 66264.145(e); 66264.151(e)		Appendix M	
I-7(e)	Financial Test and Corporate Guarantee for Post-Closure Care	270.14(b)(16); 264.145(f); 264.151(f),(h)	66270.14(b)(16); 66264.145(f)		Appendix M	
I-7(f)	Alternative Financial Mechanism for Postclosure Care	270.14(b)(16); 264.145(g)	66270.14(b)(16); 66264.145(g)	Provide copy of financial assurance mechanisms. Combined financial assurance must be at least equal to post-closure cost estimate.	NA	
I-7(g)	Use of Multiple Financial Mechanism per facility	270.14(b)(16); 264.145(h)	66270.14(b)(16); 66264.145(h)	Provide copy of financial assurance mechanisms for more than one facility. Amount must be no less than sum of funds that would be available if separate mechanism had been established and maintained for each facility. NOTE: Use subsection 66264.145(i) for a financial mechanism for multiple facilities for postclosure care.	NA	
I-8	Liability Requirements	270.14(b)(17); 264.147	66270.14(b)(17); 66264.147		Appendix M	

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Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
I-8a	Coverage for Sudden Accidental Occurrences	270.14(b)(17); 264.147(a)	66270.14(b)(17); 66264.147(a)	Coverage must be maintained for sudden accidental occurrences in the amount of $1 million per occurrence with an annual agreement of at least $2 million.	Appendix M	
I-8a(1)	Endorsement of Certification	270.14(b)(17); 264.147(a)(1)	66270.14(b)(17); 66264.147(a)(1)		Appendix M	
I-8a(2)	Financial Test and Corporate Guarantee for Liability Coverage	270.14(b)(17); 264.147(a)(2), (f),(g); 264.151(f),(g)	66270.14(b)(17); 66264.147(a)(2), (f),(g);		Appendix M	
I-8a(3)	Use of Multiple Financial Mechanism	270.14(b)(17); 264.147(a)(3)	66270.14(b)(17); 66264.147(a)(3)	Submit items demonstrating liability coverage specified in I-8a(1) and I-8a(2). Amount of coverage must total at least minimum amount required by 66264.147(a).	NA	
I-8b	Coverage for Nonsudden Accidental Occurrences	270.14(b)(17); 264.147(b)	66270.14(b)(17); 66264.147(b)	For high risk storage facilities, surface impoundments, land disposal, land treatment facilities, liability coverage must be maintained in the amount of at least $3 million per occurrence. Annual aggregate at least $6 million.	Appendix M	
I-8b(1)	Endorsement or Certification	270.14(b)(17); 264.147(b)(1)	66270.14(b)(17); 66264.147(b)(1)	Submit signed duplicate original of Hazardous Waste Facility Liability Endorsement.	Appendix M	
I-8b(2)	Financial Test or Corporate Guarantee for Liability Coverage	270.14(b)(17); 264.147(b)(2); 264.151(f),(g)	66270.14(b)(17); 66264.147(b)(2);		Appendix M	

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Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
I-8b(3)	Use of Multiple Insurance Mechanism	270.14(b)(17); 264.147(b)(3)	66270.14(b)(17); 66264.147(b)(3)	Submit items demonstrating liability coverage specified in I-8a(1) and I-8a(2). Amount of coverage must total at least minimum amount required by 66264.147(b).	NA	
I-8c	Requests for Variance	270.14(b)(17); 264.147(c)	66270.14(b)(17); 66264.147(c)	Request for adjusted level of required liability must be supported by information which demonstrates 66264.147(a) or (b) are not consistent with degree and duration of risk associated with treatment, storage, or disposal at facility or group of facilities.	NA	
I-9	Use of State Required Mechanisms	270.14(b)(18)	66270.14(b)(18)		NA	
I-9a	Use of State Required Mechanisms	270.14(b)(18); 264.149	66270.14(b)(18); 66264.149	When state has regulations equivalent or greater liability requirements for financial assurance for closure post-closure submit copy of state-required financial mechanism.	NA	
I-9b	State Assumption of Responsibility	270.14(b)(18); 264.150	66270.14(b)(18);	If state assumes legal responsibility for compliance with closure, post-closure, or liability requirements there must be a letter submitted from state specifying assumption of responsibilities and amounts of liability. coverage assured by state....	NA	

Notes:

[a] Considerations in addition to the requirements presented in the regulations.

[b] For each requirement, this column must indicate one of the following: NA for not applicable, IM for information missing, or the exact location of the information in the application.

[c] If application is deficient in an area, prepare a comment describing the deficiency, attach it to the checklist, and reference the comment in this column.

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SECTION J. SOLID WASTE MANAGEMENT UNITS

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
J-1	Characterize the Solid Waste Management Unit (SWMU)	270.14(d)(1)	66270.14(d)(1)	Describe methodology used to determine that no existing or former SWMUs exist at facility if applicable.	Section 13.0	
J-2	Releases	270.14(d)(2)	66270.14(d)(2)	Provide following information concerning releases: date of release; type, quantity, and nature of release; groundwater monitoring and other analytical data; physical evidence of stressed vegetation; historical evidence of releases; any state, local, or federal enforcement action that may address releases; any public citizen complaints that indicate a release; and any other information showing the migration of the release. Describe methodology used to determine that releases from SWMUs are not present.	Section 13.0	

Notes:

[a] Considerations in addition to the requirements presented in the regulations.

[b] For each requirement, this column must indicate one of the following: NA for not applicable, IM for information missing, or the exact location of the information in the application.

[c] If application is deficient in an area, prepare a comment describing the deficiency, attach it to the checklist, and reference the comment in this column.

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SECTION K. OTHER FEDERAL LAWS

Section and Requirement	Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See attached Comment Number[c]
K-1 Other Federal Laws	270.14(b)(20), 270.3	66270.14(b)(19), 66270.3	Demonstrate compliance with requirements of applicable Federal laws such as the Wild and Scenic Rivers Act, National Historic Preservation Act of 1966, Endangered Species Act, Coastal Zone Management Act, and Fish and Wildlife Coordination Act.	Appendix H	

Notes:

[a] Considerations in addition to the requirements presented in the regulations.

[b] For each requirement, this column must indicate one of the following: NA for not applicable, IM for information missing, or the exact location of the information in the application.

[c] If application is deficient in an area, prepare a comment describing the deficiency, attach it to the checklist, and reference the comment in this column.

PERMIT COMPLETENESS CHECKLIST

SECTION L. PART B CERTIFICATION

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
L-1	Part B Certification	270.11	66270.11		Follows Cover Page	

Notes:

[a] Considerations in addition to the requirements presented in the regulations.

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PERMIT COMPLETENESS CHECKLIST

SECTION M. ARTICLE 27, AIR EMISSION STANDARDS FOR PROCESS VENTS (SUBPART AA)

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
M-1	Definition of Process Vent	270.14(a); 264.1030; 264.1031	66260.10; 66270.14(a); 66264.1030	A process vent is any open-ended pipe or stack that is vented to atmosphere either directly, through a vacuum-producing system, or through a tank.	Entire Section is NA	
M-2	Applicability—Process Vents Associated with the Following Six Operations that Manage Hazardous Waste with Organic Concentrations of at Least 10 Parts per Million by Weight if these Operations are Conducted in; a Unit Subject to the Permitting Requirements of 270; a Unit (including a Hazardous Waste Recycling Unit) that is Not Exempt from Permitting Under 262.34(a) and is Located at a Hazardous Waste Management Facility Otherwise Subject to Permitting Requirements; and a Unit that is Exempt from Permitting Under 262.34(a)	270.14(a); 264.1030(b); 264.1031	66260.10; 66270.14(a); 66264.1030(b)	Concentrations should be determined by a time-weighted average annually or when waste or process changes.	NA	

PERMIT COMPLETENESS CHECKLIST

SECTION M. ARTICLE 27, AIR EMISSION STANDARDS FOR PROCESS VENTS (SUBPART AA)

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
M-2a	Distillation—a Batch or Continuous Operation Which Separates One or More Feed Stream(s) into Two or More Exit Streams, Each Exit Stream Having Component Concentrations Different from Those in the Feed Stream(s)	270.24(b)(3); 264.1030(b); 264.1031	66260.10; 66270.24(b)(3); 66264.1030(b)	Include process description.	NA	
M-2b	Fractionation—a Distillation Operation or Method Used to Separate a Mixture of Several Volatile Components of Different Boiling Points in Successive Stages	270.24(b)(3); 264.1030(b); 264.1031	66260.10; 66270.24(b)(3); 66264.1030(b)	Include process description.	NA	
M-2c	Thin-Film Evaporation—a Distillation Operation that Employs a Heating Surface Consisting of a Large Diameter Tube that May be Either Straight or Tapered, Horizontal or Vertical	270.24(b)(3); 264.1030(b); 264.1031	66260.10; 66270.24(b)(3); 66264.1030(b)	Include process description.	NA	
M-2d	Solvent Extraction—an Operation or Method of Separation in Which a Solid or Solution Contacts a Liquid Solvent (The Two Being Mutually Insoluble) to Preferentially Dissolve and Transfer One or More Components into the Solvent	270.24(b)(3); 264.1030(b); 264.1031	66260.10; 66270.24(b)(3); 66264.1030(b)	Include process description.	NA	

PERMIT COMPLETENESS CHECKLIST

SECTION M. ARTICLE 27, AIR EMISSION STANDARDS FOR PROCESS VENTS (SUBPART AA)

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
M-2e	Air Stripping—a Desorption Operation Employed to Transfer One or More Volatile Components from a Liquid Mixture into a Gas (Air) Either with or Without the Application of Heat to the Liquid	270.24(b)(3); 264.1030(b); 264.1031	66260.10; 66270.24(b)(3); 66264.1030(b)	Include process description.	NA	
M-2f	Stream Stripping—a Distillation Operation in Which Vaporization of the Volatile Constituents of a Liquid Mixture Takes Place by the Introduction of Steam Directly into the Charge.	270.24(b)(3); 264.1030(b); 264.1031	66260.10; 66270.24(b)(3); 66264.1030(b)	Include process description.	NA	
M-3a	Reduce Total Organic Emission below 1.4 Kilogram per Hour (3 Pounds per Hour) and 2.8 Million Grams per Year (3.1 Tons per Year), <u>or</u>	270.24(b); 264.1032(a)(1),(c)	66270.24(b); 66264.1032(a)(1),(c)	Engineering calculations or performance tests may be used to determine vent emissions and emissions reductions or total organic compound concentrations achieved by add-on control devices.	NA	
M-3b	Reduce Total Organic Emissions of 95 Percent by Weight with the Use of a Control Device	270.24(b); 264.1032(a)(2),(b)	66270.24(b); 66264.1032(a)(2),(b)	Engineering calculations or performance tests may be used to determine vent emissions and emissions reductions or total organic compound concentrations achieved by add-on control devices.	NA	

PERMIT COMPLETENESS CHECKLIST

SECTION M. ARTICLE 27, AIR EMISSION STANDARDS FOR PROCESS VENTS (SUBPART AA)

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
M-3c	Reduce Emissions for Various Control Devices with Closed-vent Systems under the Following Operational Conditions:	270.24(b); 264.1032(a - b); 264.1033 (b - j)	66270.24(b); 66264.1032(a - b); 66264.1033 (b - j)	Closed-vent systems are optional devices, but shall comply with regulations if they are used.	NA	
M-3c(1)	Control Device Involving Vapor Recovery (Condenser or Adsorber) Shall Recover at Least 95 Percent by Weight of the Organic Vapors	270.24(b); 264.1032(a) (1),(b)	66270.24(b); 66264.1032(a) (1),(b)	A less than 95 percent recovery is permissible if control devices meet emission limits set in 66264.1032(a)(1).	NA	
M-3c(2)	Enclosed Combustion Device (A Vapor Incinerator, Boiler, or Process Heater) Shall Recover at Least 95 Percent by Weight of Organic Emissions	270.24(d); 264.1033(c)	66270.24(d); 66264.1033(c)	The device shall achieve 20 parts per million by weight or 1/2 second residence time at 760 EC.	NA	
M-3c(3)	A Flare Shall Operate under the Following Four Conditions: (1) No Visible Emissions, (2) a Flame Present at all Times, (3) an Acceptable Net Heating Value, and (4) Appropriate Exit Velocity	270.24(d); 264.1033(d)	66270.24(d); 66264.1033(d)		NA	
M-4	Inspection Readings Shall Be Conducted at Least Daily. Vent Stream Flow Information Shall be Provided at Least Hourly.	270.24(d); 264.1033(f) (1),(3)	66270.24(d); 66264.1033(f) (1),(3)		NA	

PERMIT COMPLETENESS CHECKLIST

SECTION M. ARTICLE 27, AIR EMISSION STANDARDS FOR PROCESS VENTS (SUBPART AA)

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
M-4a	Continuous Monitoring for the Following Control Devices:	270.24(d); 264.1033(f)(2)	66270.24(d); 66264.1033(f)(2)		NA	
M-4a(1)	Thermal Vapor Incinerator (One Temperature Sensor).	270.24(d); 264.1033(f)(2)(i)	66270.24(d); 66264.1033(f)(2)(A)	Sensor shall have accuracy of ± 1 percent EC or ± 0.5 EC, whichever is greater.	NA	
M-4a(2)	Catalytic Vapor Incinerator (Two Temperature Sensor)	270.24(d); 264.1033(f)(2)(i)	6270.24(d); 66264.1033(f)(2)(A)	Sensor shall have accuracy of ± 1 percent EC or ± 0.5 EC, whichever is greater.	NA	
M-4a(3)	Flare (Heat Sensing Device)	264.1033(f)(2)(iii)	66264.1033(f)(2)(C)		NA	
M-4a(4)	Boiler or Process Heater with Heater Input Capacity Equal or Greater than 44 Megawatts (Recorder Which Indicates Good Combustion Practices)	270.24(d); 264.1033(f)(2)(v)	66270.24(d); 66264.1033(f)(2)(E)		NA	
M-4a(5)	Condenser (Device with Recorder to Measure the Concentration of Organic Compounds in the Condenser Exhaust Vent Stream or Temperature Monitoring Device Equipped with Recorder to Measure Temperature in the Condenser Exhaust Vent Stream)	270.24(d); 264.1033(f)(2)(vi)	66270.24(d); 66264.1033(f)(2)(F)	Sensor shall have accuracy of ± 1 percent EC or ± 0.5 EC, whichever is greater.	NA	

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SECTION M. ARTICLE 27, AIR EMISSION STANDARDS FOR PROCESS VENTS (SUBPART AA)

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
M-4a(6)	Carbon Adsoprtion System (Device to Measure Organic Vapors or a Recorder that Verifies Predetermined Regeneration Cycle)	270.24(d); 264.1033(f)(2)(vii)	66270.24(d); 66264.1033(f)(2)(G)		NA	
M-4b	Alternate Monitoring of Control Device	270.24(c); 264.1033(i)	66270.24(c); 66264.1033(i)	Describe measurement of applicable monitoring parameters.	NA	
M-4c	Inspection of the Following Control Devices:	270.24(d); 264.1033(g - h)	66270.24(d); 66264.1033(g - h)		NA	
M-4c(1)	Regenerable Carbon Adsorption System	270.24(d); 264.1033(g)	66270.24(d); 66264.1033(g)	Carbon replacement schedule must be acceptable.	NA	
M-4c(2)	Nonregenerable Carbon Adsoprtion System	270.24(d); 264.1033(h)	66270.24(d); 66264.1033(h)	Carbon shall be replaced when breakthrough is observed or on an acceptable schedule.	NA	
M-5	Basic Design and Operation				NA	
M-5a	The Closed-Vent System Shall be Designed to Operate According to Either of the Following:	270.24(d); 264.1033(k)	66270.24(d); 66264.1033(k)		NA	
M-5a(1)	With No Detectable Emissions	270.24(d); 264.1033(k)(1)	66270.24(d); 66264.1033(k)(1)	Emissions shall be less than 500 parts per million above background.	NA	

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SECTION M. ARTICLE 27, AIR EMISSION STANDARDS FOR PROCESS VENTS (SUBPART AA)

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
M-5a(2)	At a Pressure below Atmospheric Pressure	270.24(d); 264.1033(k)(2)	66270.24(d); 66264.1033(k)(2)	System shall be equipped with at least one pressure gauge or other measurement device that can be read from a readily accessible location to verify negative pressure is being maintained in system during operation.	NA	
M-5b	Owner/operator Shall Monitor and Inspect Each System	270.24(d); 264.1033(1)	66270.24(d); 66264.1033(1)		NA	
M-5c	Closed-Vent System Shall be Operated at all Times When Emissions May be Vented to Them.	270.24(d); 264.1033(m)	66270.24(d); 66264.1033(m)		NA	
M-5d	Carbon Adsorption System Used to Control Air Pollutant Emissions	270.24(d); 264.1033(n)	66270.24(d); 66264.1033(n)	Owner/operator must document that all carbon that is a hazardous waste and removed from the control device is managed in one of these approved manners: 66264.1033(n)(1), (2), or (3).	NA	
M-6	Any Components of a Closed-Vent System that are Designated as Unsafe to Monitor are Exempt from the Monitoring Requirements of 66264.1033(l)(1)(A)2. if Certain Conditions are Met.	270.24(d); 264.1033(o)	66270.24(d); 66264.1033(o)	66270.24 applies to system if its components are unsafe to monitor and it adheres to written plan that requires monitoring using the procedures in 66264.1033(l)(1)(B)2. as frequently as practicable during safe-to-monitor times.	NA	

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SECTION M. ARTICLE 27, AIR EMISSION STANDARDS FOR PROCESS VENTS (SUBPART AA)

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
M-7a	Owner/operator Complies with Record Keeping Requirements	270.24(d); 264.1033; 264.1035	66270.24(d); 66264.1033; 66264.1035	Depending on the type of control devices and closed vent systems used, various records must be maintained in the facility operating record.	NA	
M-7b	Semiannual Report is Submitted According to Subpart AA Requirements	270.14(a); 264.1036	66270.14(a); 66264.1036	A semiannual report is only required if a control device operates outside the design specifications.	NA	
M-7c	Implementation Schedule is Provided	270.24(a); 264.1033(a)(2)	66270.24(a); 66264.1033(a)(2)	A schedule shall be provided when facilities cannot install a closed-vent system and control device to comply with Chapter 14 on date facility is subject to requirements.	NA	
M-7d	Performance Test Plan is Provided	270.24(c); 264.1035(b)(3)	66270.24(c); 66264.1035(b)(3)	A performance test plan shall be provided where owner/operator applies for permission to use control device other than thermal vapor incinerator, catalytic vapor incinerator, flare, boiler, process heater, condenser, or carbon adsorption system, and chooses to use test data to determine organic removal efficiency achieved by control device.	NA	

Notes:

[a] Considerations in addition to the requirements presented in the regulations.

[b] For each requirement, this column must indicate one of the following: NA for not applicable, IM for information missing, or the exact location of the information in the application.

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PERMIT COMPLETENESS CHECKLIST

SECTION N. ARTICLE 28, AIR EMISSION STANDARDS FOR EQUIPMENT LEAKS (SUBPART BB)

Section and Requirement	Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
N-1a Applicability	270.14(a); 270.25; 264.1050(b),(d)	66270.14(a); 66270.25; 66264.1050(b),(d)	Except as otherwise specified, this subpart applies to equipment that contains or contacts hazardous waste with organic concentrations of at least 10 percent by weight that are managed in one of the following: if these operations are conducted in; a unit subject to the permitting requirements of chapter 20; a unit (including a hazardous waste recycling unit) that is not exempt from permitting under 66262.34(a) and is located at a hazardous waste management facility otherwise subject to permitting requirements; and a unit that is exempt from permitting under 66262.34(a) such as a 90-day tank or container.	Entire Section is NA	
N-1b Definition of Equipment	270.14(a); 270.25; 264.1031; 264.1051	66260.10; 66270.14(a); 66270.25; 66264.1051	Examples include: valve, pump, compressor, pressure relief device, sampling connection system, open-ended valve or line, or flange.	NA	

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SECTION N. ARTICLE 28, AIR EMISSION STANDARDS FOR EQUIPMENT LEAKS (SUBPART BB)

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
N-1c	Equipment in a Vacuum or Equipment that Contains or Contacts Hazardous Waste with an Organic Concentration of at Least 10 Percent by Weight for a Period of Less than 300 Hours per Calendar Year is Excluded from Requirements at 66264.1052 to 66264.1060.	270.14(a); 270.25; 264.1050(f)	66270.14(a); 66270.25; 66264.1050(f)	Equipment shall be identified in a log in facility's operating record as required by 66264.1064(g) in order to qualify for exclusion.	NA	
N-2a	Monthly Monitoring for Leaks	270.25(d); 264.1052(a)(1)	66270.25(d); 66264.1052(a)(1)		NA	
N-2b	Visual Inspection for Pump Seal Leakage on a Weekly Basis	270.25(d); 264.1052(a)(2)	66270.25(d); 66264.1052(a)(2)		NA	
N-2c	Leak Detection	270.25(d); 264.1052(b); 264.1063	66270.25(d); 66264.1052(b); 66264.1063	Leak detected if: (1) leak detection instrument reads 10,000 parts per million (ppm) or greater, or (2) there are indications of liquid dripping from the pump seal.	NA	
N-2d	Leak Repair as Soon as Practicable	270.25(d); 264.1052(c); 264.1059	66270.25(d); 66264.1052(c); 66264.1059	Repairs are to be made within 15 calendar days after detection. Repair extensions are allowed under conditions specified in 66264.1059.	NA	

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SECTION N. ARTICLE 28, AIR EMISSION STANDARDS FOR EQUIPMENT LEAKS (SUBPART BB)

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
N-2e	Specific Exceptions to these Standards	270.25(d); 264.1052(d - f)	66270.25(d); 66264.1052(d - f)	Exceptions to these standards are dual mechanical seal systems or no detectable emissions.	NA	
N-3a	Barrier Fluid Pressure Greater than the Compressor Stuffing Box Pressure	270.25(d); 264.1053(b)(1)	66270.25(d); 66264.1053(b)(1)		NA	
N-3b	Barrier Fluid System Connected by a Closed-Vent System to a Control Device as Described in Articl 27	270.25(d); 264.1053(b)(2)	66270.25(d); 66264.1053(b)(2)		NA	
N-3c	No Detectable Atmospheric Emissions of Hazardous Contaminants from the Barrier System	270.25(d); 264.1053(b)(3)	66270.25(d); 66264.1053(b)(3)		NA	
N-3d	Sensors Checked Daily or an Audible Alarm Checked Monthly	270.25(d); 264.1053(d - c)	66270.25(d); 66264.1053(d - c)		NA	
N-3e	Leak Detection	270.25(d); 264.1053(f)	66270.25(d); 66264.1053(f)	A leak is detected if sensor indicates failure of: (1) seal system, or (2) barrier fluid system.	NA	

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SECTION N. ARTICLE 28, AIR EMISSION STANDARDS FOR EQUIPMENT LEAKS (SUBPART BB)

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
N-3f	Leak Repair as Soon as Practicable	270.25(d); 264.1053(g)(1); 264.1059	66270.25(d); 66264.1053(g)(1); 66264.1059	Repairs are to be made within 15 calendar days after detection. Repair extensions are allowed under conditions specified in 66264.1059.	NA	
N-3g	Specific Exceptions to these Standards	270.25(d); 264.1053(h - i)	66270.25(d); 66264.1053(h - i)	Exceptions to these standards are certain closed vent systems or no detectable emissions.	NA	
N-4a	Except During Pressure Releases, No Pressure Relief Device Shall Release Detectable Emissions	270.25(d); 264.1054(a)	66270.25(d); 66264.1054(a)	Emissions shall be less than 500 ppm above background levels.	NA	
N-4b	As soon as practicable, but no later than 24 hrs after a Pressure Release, No Detectable Emissions Shall Emanate from Pressure Released Device. 40 CFR states within 5 Calendar Days after a Pressure Release, No Detectable Emissions shall Emanate from Pressure Released Device	270.25(d); 264.1054(b)	66270.25(d); 66264.1054(b)	Emissions shall be less than 500 ppm above background levels.	NA	
N-4c	Specific Exceptions to These Standards	270.25(d); 264.1054(c)	66270.25(d); 66264.1054(c)	Exceptions to these standards are certain closed vent systems.	NA	

PERMIT COMPLETENESS CHECKLIST

SECTION N. ARTICLE 28, AIR EMISSION STANDARDS FOR EQUIPMENT LEAKS (SUBPART BB)

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
N-5a	Each Sampling Connecting System Shall Be Equipped with a Closed-Purge, Closed Loop, or Closed-Vent System. Closed-Vent Systems and Control Devices are also Subject to 66264.1033	270.25(d); 264.1055 (a - b); 264.1060	66270.25(d); 66264.1055 (a - b); 66264.1060	Each closed-purge, closed-loop, or closed-vent system shall either: (1) return purged process fluid directly to process line, (2) collect and recycle purged process liquid, or (3) be designed and operated to capture and transport all purged process fluid to a waste management unit or control device that satisfies applicable requirements.	NA	
N-5b	Exemption for Qualified Sampling Systems	270.25(d); 264.1055(c)	66270.25(d); 66264.1055(c)	In situ sampling systems and sampling systems without purges are exempt from requirements of 66264.1055(a),(b).	NA	
N-6a	Open-Ended Valve or Line	270.25(d); 264.1056(a), (c)	66270.25(d); 66264.1056(a), (c)	A double block or bleed system must comply with the open-ended valve or line requirements.	NA	
N-6b	Second Valve	270.25(d); 264.1056(b)	66270.25(d); 66264.1056(b)	A second valve shall be operated such that primary valve shall be closed before second valve is opened.	NA	
N-7	Monitoring Schedule Based on Detection of Leaks and Predetermined Schedule	270.25(d); 264.1057(a - e)	66270.25(d); 66264.1057(a - e)	A reading of 10,000 ppm denotes a detected leak.	NA	

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SECTION N. ARTICLE 28, AIR EMISSION STANDARDS FOR EQUIPMENT LEAKS (SUBPART BB)

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
N-7d	Specific Exceptions to the Monitoring Schedule	270.25(d); 264.0157 (f - h); 264.1061; 264.1062	66270.25(d); 66264.1052 (f - h); 66264.1061; 66264.1062	Exceptions to schedule include unsafe-to-monitor valves, no detectable emissions, and difficult-to-monitor valves.	NA	
N-8a	Monitoring	270.25(d); 264.1058(a); 264.1063(b)	66270.25(d); 66264.1058(a); 66264.1063(b)	Monitoring is required within 5 days after leak is found by sight, sound, smell, or other detection method.	NA	
N-8b	Leak Detection	270.25(d); 264.1058(b)	66270.25(d); 66264.1058(b)	A leak is detected if a leak detection instrument reads 10,000 ppm or greater.	NA	
N-8c	Leak Repair as Soon as Practicable	270.25(d); 264.1058(c); 264.1059	66270.25(d); 66264.1058(c); 66264.1059	Repairs are to be made within 15 calendar days after detection. The first attempt at repair shall be made no later than 5 calendar days after each leak is detected. Repair extensions are allowed under conditions specified in 66264.1059.	NA	
N-8d	Any Connector that is Inaccessible or is Ceramic or Ceramic-Lined is Exempt from the Monitoring Requirements of 66264.1058(a) and 66264.1064	270.25(d); 264.1058(e)	66270.25(d); 66264.1058(e)	Examples of ceramic-lined connectors include porcelain, glass, or glass-lined connectors.	NA	

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SECTION N. ARTICLE 28, AIR EMISSION STANDARDS FOR EQUIPMENT LEAKS (SUBPART BB)

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
N-9	Specific Allowances for Delay of Repair for Various Types of Equipment	270.25(d); 264.1059	66270.25(d); 66264.1059		NA	
N-10	When Closed-Vent Systems and Control Devices are Used, they Must Comply with the Requirements in Article 27	270.25(e); 264.1033; 264.1060	66270.25(e); 66264.1033; 66264.1060		NA	
N-11	An Owner/Operator may Elect to Comply with this Alternative Monitoring Program	270.25(e); 264.1061	66270.25(e); 66264.1061	No greater than 2 percent of the valves are allowed to leak per monitoring period.	NA	
N-12	An Owner/Operator may Elect to Comply with this Alternative Work Practice	270.25(e); 264.1062	66270.25(e); 66264.1062	Relief of monitoring frequency is allowed if less than 2 percent of the valves are leaking.	NA	
N-13	Owner Complies with Recordkeeping Requirements	270.25(a); 264.1064	66270.25(a); 66264.1064	Depending on the type of requirement, various records must be maintained in the facility operating record.	NA	
N-13a	Semiannual Report	270.25(a); 264.1065	66270.25(a); 66264.1065	A semiannual report is only required if leaks from equipment have gone unrepaired or a control device operates outside the design specifications.	NA	

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SECTION N. ARTICLE 28, AIR EMISSION STANDARDS FOR EQUIPMENT LEAKS (SUBPART BB)

Section and Requirement	Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
N-13b Implementation Schedule	270.25(b)	66270.25(b)	An implementation schedule shall be provided if facility cannot install closed-vent system and control device to comply with provisions of Chapter 14, Article 28, on the effective date that facility becomes subject to provisions of Chapter 14 and 15.	NA	
N-13c Performance Test Plan	270.25(c)	66270.25(c)	A performance test plan shall be provided if the owner/operator applies for permission to use a control device for other than a thermal vapor incinerator, flare, boiler, process heater, condenser, or carbon adsorption system and chooses to use test data to determine the organic removal efficiency achieved by the control device.	NA	

Notes:

[a] Considerations in addition to the requirements presented in the regulations.

[b] For each requirement, this column must indicate one of the following: NA for not applicable, IM for information missing, or the exact location of the information in the application.

[c] If application is deficient in an area, prepare a comment describing the deficiency, attach it to the checklist, and reference the comment in this column.

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SECTION O. AIR EMISSION STANDARDS FOR CONTAINERS, TANKS, AND SURFACE IMPOUNDMENTS (SUBPART CC)

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
O-1	Standards Apply to All Facilities That Treat, Store, or Dispose of Hazardous Waste in Tanks, Surface Impoundments, or Containers Subject to chapter 14, articles 9, 10 or 11, Except as Provided Otherwise	270.14(a); 270.27; 264.1080 (a) - (d)	66270.14(a); 66270.27; 66264.1080 (a) - (d)	Exclusions from 66264.1080(a) are listed at 66264.1080(b) (e.g., a container that has a design capacity less than or equal to 0.1 cubic meters [m^3]).	Entire Section is NA	
O-2	Following is a List of Units that are Exempt from the 66264.1084-66264.1087 Standards:	270.14(a); 270.27; 264.1082(c)	66270.14(a); 66270.27; 66264.1082(c)		NA	
O-2a	A Tank, Surface Impoundment, or Container for Which All Hazardous Waste Entering the Unit Has an Average Volatile Organic Concentration at the Point of Waste Origination of less than 500 Parts per Million by Weight (ppmw)	270.14(a); 270.27; 264.1082(c)(1)	66270.14(a); 66270.27; 66264.1082(c)(1)	Waste determination procedures are specified at 66264.1083.	NA	
O-2b	A Tank, Surface Impoundment, or Container for Which the Organic Content of all the Hazardous Waste Entering the Waste Management Unit has been Reduced by an Organic Destruction or Removal Process that Achieves Specified Criteria	270.14(a); 270.27; 264.1082(c)(2)	66270.14(a); 66270.27; 66264.1082(c)(2)	Waste determination procedures are specified at 66265.1084(b)(2)-(b)(9).	NA	

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Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
O-2c	A Tank Used for Biological Treatment of Hazardous Waste that Destroys or Degrades the Organics Contained in the Hazardous Waste such that the Requirements of 66264.1082(c)(2)(D) are Met	270.14(a); 270.27; 264.1082(c)(3)	66270.14(a); 66270.27; 66264.1082(c)(3)	Waste determination procedures are specified at 66264.1083(b) and 66264.1083(a).	NA	
O-2d	A Tank, Surface Impoundment or Container for Which all Hazardous Waste Placed in the Unit Meets Applicable Organic Concentration Limits or has been Treated by Appropriate Treatment Technology	270.14(a); 270.27; 264.1082(c)(4)	66270.14(a); 66270.27; 66264.1082(c)(4)	Waste determination procedures are specified at chapter 18.	NA	
O-2e	A Tank Located Inside an Enclosure Vented to a Control Device that is Used for Bulk Feed of Hazardous Waste to a Waste Incinerator that Meets Specified Criteria	270.14(a); 270.27; 264.1082(c)(5)	66270.14(a); 66270.27; 66264.1082(c)(5)	Design and operation of the control device and enclosure shall satisfy 40 CFR, Part 61, Subpart FF; 52.741, Appendix B; and other conditions as specified.	NA	
O-3	Several Waste Determination Procedures are Explained in Detail and Must be Followed in Order to Demonstrate the Various article 30 and/or Control Requirements	270.14(a); 270.27; 264.1083; 265.1084	66270.14(a); 66270.27; 66264.1083; 66265.1084	In general, an owner or operator need not undergo waste determination procedures unless they are pursuing an exemption from the chapter14, Article 30 (Subpart CC regulations.)	NA	

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Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
O-4	Tanks that Satisfy the Conditions at 264.1084(b)(1)(i-iii) Can Use Tank Level 1 or Tank Level 2 Controls. Tanks that do not Satisfy Conditions Shall Use Tank Level 2 Controls	270.14(a); 270.27; 264.1084(b)(1), (2)	66270.14(a); 66270.27; 66264.1084(b)(1), (2)		NA	
O-5a	The Conditions at 66264.108(b)(1)(A-C) Provide that Hazardous Waste in the Tank Shall:	270.14(a); 270.27; 264.1084(b)(1)	66270.14(a); 66270.27; 66264.1084(b)(1)		NA	
O-5a(1)	Have Maximum Organic Vapor Pressure Which is less than Maximum Organic Vapor Pressure Limit for Tank's Design Capacity Category	270.14(a); 270.27; 264.1084(b)(1)(i)	66270.14(a); 66270.27; 66264.1084(b)(1)(A)		NA	
O-5a(2)	Not be Heated to Temperature Greater than Temperature at Which Maximum Organic Vapor Pressure of Waste is Determined for Purposes of Compliance	270.14(a); 270.27; 264.1084(b)(1)(ii)	66270.14(a); 66270.27; 66264.1084(b)(1)(B)		NA	
O-5a(3)	Not be Treated Using a Waste Stabilization Process, as Defined in 66260.10	270.14(a); 270.27; 264.1084(b)(1)(iii)	66270.14(a); 66270.27; 66264.1084(b)(1)(C)	A waste stabilization process includes mixing hazardous waste with binders or other materials, and curing resulting hazardous waste and binder mixture.	NA	

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Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
O-5b	Maximum Organic Vapor Pressure Determination	270.14(a); 270.27; 264.1084(c) (1)	66270.14(a); 66270.27; 66264.1084(c)(1)	Must be determined before first time waste placed in tank, and retested whenever changes could cause it to increase above the maximum vapor pressure limit [66264.1084(b)(1)(A)].	NA	
O-5b(1)	Tank Level 1. Owner/Operator Shall Equip Tanks with Fixed Roof and Closure Devices as Needed	270.14(a); 270.27; 264.1084(c)(2), (3)	66270.14(a); 66270.27; 66264.1084(c)(2), (3)	Fixed roof/closure devices shall form continuous barrier over entire waste in tank; contain no visible open spaces between roof section joints or between interface of roof edge and tank wall; contain openings with closure devices or closed-vent system; and be made of suitable materials.	NA	
O-5b(2)	Tank Level 2. Owner/Operator Shall Use One of the Following Tanks:	270.14(a); 270.27; 264.1084(d)	66270.14(a); 66270.27; 66264.1084(d)		NA	
O-5b(2)(i)	Fixed Roof Tank Equipped with Internal Floating Roof	270.27(a)(1); 264.1084(d)(1), (e)	66270.27(a)(1); 66264.1084(d)(1), (e)	Internal floating roof shall be designed to float on liquid surface, except when supported by leg supports; be equipped with continuous seal between tank wall and floating roof edge; and meet other design specifications.	NA	

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Section and Requirement	Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
O-5b(2)(ii) Tank Equipped with an External Floating Roof	270.27(a)(1); 264.1084(d)(2), (f)	66270.27(a)(1); 66264.1084(d)(2), (f)	External floating roof shall be designed to float on all liquid surface, except when supported by leg supports; be equipped with two continuous seals; and meet other design specifications.	NA	
O-5b(3) Tank Vented Through Closed-Vent System to a Control Device	270.14(a); 270.27; 264.1084(d)(3), (g)	66270.14(a); 66270.27; 66264.1084(d)(3), (g)	Fixed roof/closure devices shall form continuous barrier over entire liquid surface; be made of suitable materials; and satisfy 66264.1087 standards.	NA	
O-5c Pressure Tank	270.14(a); 270.27; 264.1084(d)(4), (h)	66270.14(a); 66270.27; 66264.1084(d)(4), (h)	Tank shall be designed not to bend to atmosphere as result of compression of vapor headspace in tank, and be equipped with closure devices as needed.	NA	
O-5d Tank Located Inside an Enclosure that is Vented Through a Closed-Vent System to an Enclosed Combustion Control Device	270.14(a); 270.27; 264.1084(d)(5), (1)	66270.14(a); 66270.27; 66264.1084(d)(5), (1)	Tank shall be located in enclosure that is vented through closed vent system to enclosed combustion device, and enclosure shall be equipped with safety devices as needed.	NA	

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Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
O-5e	Tank Level 1. Owner/Operator Shall:	270.14(a); 270.27; 264.1084(c)(1),(3)	66270.14(a); 66270.27; 66264.1084(c)(1),(3)		NA	
O-5e(1)	Determine Maximum Organic Vapor Pressure for Hazardous Waste Initially and Whenever Changes could Cause the Vapor Pressure to Increase Above the Maximum Organic Vapor Pressure Limit	270.14(a); 270.27; 264.1084(c)(1)	66270.14(a); 66270.27; 66264.1084(c)(1)	Maximum organic vapor pressure shall be determined using 66264.1083(c) procedures.	NA	
O-5e(2)	Ensure that, Whenever Hazardous Waste is in Tank, the Fixed Roof is Installed with Each Closure Device Secured in Closed Position			Exceptions are listed at 66264.1084(c)(3)(A-C).	NA	
O-5e(3)	Inspect the Air Emission Control Equipment	270.14(a); 270.27; 264.1084(c)(4)	66270.14(a); 66270.27; 66264.1084(c)(4)		NA	
O-5f	Tank Level 2. Owner/Operators Shall Adhere to the Following Operating Procedures for Each Unit Type:	270.14(a); 270.27; 264.1084(e)	66270.14(a); 66270.27; 66264.1084(e)		NA	

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Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
O-5f(1)	Fixed Roof Tank Equipped with Internal Floating Roof	270.14(a); 270.27; 264.1084(e) (2),(3)	66270.14(a); 66270.27; 66264.1084(e)(2),(3)	When floating roof is resting on leg supports, filling, emptying, or refilling shall be continuous and completed as soon as practical; when roof is floating, automatic bleeder vents shall be set closed; and prior to filling, openings in roof shall be secured. Inspect the floating roof.	NA	
O-5f(2)	Tank Equipped with an External Floating Roof	270.14(a); 270.27; 264.1084(f)(2),(3)	66270.14(a); 66270.27; 66264.1084(f)(2),(3)	When floating roof is resting on leg supports, filling, emptying, or refilling shall be continuous and completed as soon as practical; when closure device is open for access, equipment and devices shall be closed and secured as specified; and seals shall provide a continuous and complete cover as specified. Inspect the floating roof.	NA	

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Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
O-5f(3)	Tank Vented Through Closed-Vent System to a Control Device	270.14(a); 270.27; 264.1084(g)(2), (3)	66270.14(a); 66270.27; 66264.1084(g)(2), (3)	When hazardous waste is in tank, fixed roof shall be installed with closure devices secured in closed position and vapor headspace underneath fixed roof vented to control device, except as specified. Inspect and monitor the air emission control equipment.	NA	
O-5f(4)	Pressure Tank	270.14(a); 270.27; 264.1084(h)(2), (3)	66270.14(a); 66270.27; 66264.1084(h)(2), (3)	When hazardous waste is in tank, it shall be operated as closed system that does not vent to atmosphere, except to avoid an unsafe condition.	NA	
O-5f(5)	Tank Located Inside an Enclosure that is Vented Through a Closed-Vent System to an Enclosed Combustion Control Device	270.27(a)(3), 264.1084(i)	66270.27(a)(3), 66264.1084(i)	Enclosure shall be operated in accordance with 40 CFR, 52.741, Appendix B, and comply with applicable closed-vent requirements. Safety devices may be operated as needed. Inspect and monitor the system and control device.	NA	
O-5f(6)	Shall be Conducted Using Continuous Hard-Piping or Another Closed System that Does Not Allow Exposure of Hazardous Waste to Environment	270.14(a); 270.27; 264.1084(j)(1)	66270.14(a); 66270.27; 66264.1084(j)(1)	Requirements do not apply under the conditions specified at 66264.1084(j)(2).	NA	

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Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
O-6a	Owner/Operators Shall Install Either of the Following Controls:	270.14(a); 270.27; 264.1085(b)(d)	66270.14(a); 66270.27; 66264.1085(b)(d)		NA	
O-6a(1)	Floating Membrane Cover	270.27(a)(4); 264.1085 (b)(1), (c)(1)	66270.27(a)(4); 66264.1085 (b)(1), (c)(1)	Floating membrane cover shall float on liquid surface and form continuous barrier over entire liquid; be made of synthetic membrane material; contain no visible open spaces; and be equipped with closure devices and cover drains as needed.	NA	
O-6a(2)	Cover That Is Vented Through a Closed-Vent System to a Control Device	270.14(a); 270.27; 264.1085(b)(2) and (d)(2)	66270.14(a); 66270.27; 66264.1085(b)(2) and (d)(2)	Cover/closure devices shall form continuous barrier over entire liquid surface; be equipped with closure device; be made of suitable material; and be designed in compliance with 66264.1087.	NA	
O-6b	Owner/Operators Shall Adhere to the Following Operating Procedures for Each Control Type:	270.14(a); 270.27; 264.1085(c), (d)	66270.14(a); 66270.27; 66264.1085(c), (d)		NA	

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Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
O-6b(1)	Floating Membrane Cover	270.14(a); 270.27; 264.1085(c)(2), (3)	66270.14(a); 66270.27; 66264.1085(c)(2), (3)	When hazardous waste is in surface impoundment, floating membrane cover shall float on liquid, and each closure device shall be secured in closed position, except as specified. Inspect the cover.	NA	
O-6b(2)	Cover that is Vented Through a Closed-Vent System to a Control Device	270.14(a); 270.27; 264.1085(d) (2), (3)	66270.14(a); 66270.27; 66264.1085(d) (2), (3)	When hazardous waste is in surface impoundment, cover shall be installed with each closure device secured in closed position and vapor headspace underneath the cover vented to control device, except as specified. Closed-vent system and control device shall be operated in accordance with 66264.1087. Inspect and monitor the control device.	NA	
O-7	Shall be Conducted Using Continuous Hard-Piping or Another Closed System	270.14(a); 270.27; 264.1085(c)(1)	66270.14(a); 66270.27; 66264.1085(c)(1)	Requirements do not apply under conditions specified at 66264.1085(e)(2).	NA	
O-8a	Container Level 1 Standards Apply to:	270.14(a); 270.27; 264.1086(b)(1)	66270.14(a); 66270.27; 66264.1086(b)(1)		NA	

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Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
O-8a(1)	Container with Design Capacity Greater than 0.1 m^3 and less than or Equal to 0.46 m^3	270.14(a); 270.27; 264.1086(b)(1)(i)	66270.14(a); 66270.27; 66264.1086(b)(1)(A)		NA	
O-8a(2)	Container with Design Capacity Greater than 0.46 m^3 that is not in Light Material Service	270.14(a); 270.27; 264.1086(b)(1)(ii)	66270.14(a); 66270.27; 66264.1086(b)(1)(B)		NA	
O-8ab	Container Level 2 Standards Apply to Container with a Design Capacity Greater than 0.46 m^3 that is in Light Material Service	270.14(a); 270.27; 264.1086(b)(1)(iii)	66270.14(a); 270.27; 66264.1086(b)(1)(C)		NA	
O-8c	Container Level 3 Standards Apply to Container with Design Capacity Greater than 0.1 m^3 that is Used for Stabilization	270.14(a); 270.27; 264.1086(b)(2)	66270.14(a); 66270.27; 66264.1086(b)(2)	Level 3 standards apply at those times during waste stabilization process when hazardous waste in container is exposed to atmosphere.	NA	
O-9	Identify Each Container Area Subject to Article 30 (Subpart CC)	270.27(a)(2)	66270.27(a)(2)		NA	
O-9a	Container Level 1. A Container Using Level 1 Controls is Defined as One of the Following:	270.27(a)(2); 264.1086(c)(1)	66270.27(a)(2); 66264.1086(c)(1)		NA	
O-9a(1)	Container that Meets Department of Transportation Regulations on Packaging	270.27(a)(2); 264.1086(c) (1)(i),(f)	66270.27(a)(2); 66264.1086(c) (1)(A),(f)	Container shall meet Part 178 or Part 179 and be managed in accordance with Parts 107, 172, 173, and 180.	NA	

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Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
O-9a(2)	Container Equipped with Cover and Closure Devices	270.27(a)(2); 264.1086(c)(1)(ii),(2)	66270.27(a)(2); 66264.1086(c)(1)(B),(2)	Container shall be equipped with covers and closure devices, as needed.	NA	
O-9a(3)	Open-Top Container Equipped with Organic-Vapor Suppressing Barrier	270.27(a)(2); 264.1086(c)(1)(iii),(2)	66270.27(a)(2); 66264.1086(c)(1)(C),(2)	Container shall be equipped with covers and closure devices, as needed.	NA	
O-9b	Container Level 2. A Container Using Level 2 Controls is Defined as One of the Following:	270.27(a)(2); 264.1086(d)(1)(f),(g)	66270.27(a)(2); 66264.1086(d)(1)(f), (g)		NA	
O-9b(1)	Container that Needs Department of Transportation (DOT) Regulations on Packaging	270.27(a)(2); 264.1086(d)(1)(i),(f)	66270.27(a)(2); 66264.1086(d)(1)(A),(f)	Containers shall meet Part 178 or Part 179, and be managed in accordance with Parts 107, 172, 173, and 180.	NA	
O-9b(2)	Container that Operates with No Detectable Organic Emissions	270.27(a)(2); 264.1086(d)(1)(ii),(g)	66270.27(a)(2); 66264.1086(d)(1)(B),(g)	Owner/operator shall follow the procedures at 66264.1086(g) and 66265.1084(d) to determine no detectable organic emissions.	NA	
O-9b(3)	Container that has been Demonstrated Within the Preceding 12 Months to be Vapor-Tight	270.27(a)(2); 264.1086(d)(1)(iii) and (h)	66270.27(a)(2); 66264.1086(d)(1)(C) and (h)	Owner/operator shall follow procedures at 66264.1086(h) and 40 CFR, Part 60, Appendix A, Method 27 to demonstrate container is vapor-tight.	NA	

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Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
O-9c	Container Level 3. A Container Using Level 3 Controls is Defined as One of the Following:	270.27(a)(2); 264.1086(e)(1), (2)	66270.27(a)(2); 66264.1086(e)(1), (2)		NA	
O-9c(1)	Container that is Vented Directly Through a Closed-Vent System to a Control Device	270.27(a)(2); 264.1086(e)(1)(i)	66270.27(a)(2); 66264.1086(e)(1)(A)	The closed-vent system and control device shall be designed in accordance with 66264.1087. Safety devices may be installed as needed.	NA	
O-9c(2)	Container that is Vented Inside an Enclosure Which is Exhausted Through a Closed-Vent System to a Control Device	270.27(a)(2); 270.27(a)(3); 264.1086(e)(1)(ii)	66270.27(a)(2); 66270.27(a)(3); 66264.1086(e)(1)(B)	The container/enclosure must be designed in accordance with 40 CFR, 52.741, Appendix B and 66264.1087. Safety devices may be installed as needed.	NA	
O-10a	Container Level 1. Owner/Operators Shall Install Covers and Closure Devices for the Container and Secure and Maintain Each Closure Device in Closed Position, Except as Specified	270.14(a); 270.27; 264.1086(c)(3), (4)	66270.14(a); 66270.27; 66264.1086(c)(3), (4)	The closure device or cover may be opened for the purpose of adding or removing hazardous waste or for maintenance or to avoid unsafe conditions.	NA	

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Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
O-10b	Container Level 2. Owner/Operator Shall Install All Covers and Closure Devices for the Container and Maintain and Secure Each Closure Device in Closed Position, Except as Specified	270.14(a); 270.27; 264.1086(d)(2), (3)	66270.14(a); 66270.27; 66264.1086(d)(2), (3)	Transfer of hazardous waste in or out of container shall be conducted in such a manner as to minimize exposure to atmosphere, as practical. The closure device or cover may be opened for the purpose of adding or removing hazardous waste or for maintenance or to avoid unsafe conditions.	NA	
O-10c	Container Level 3. Owner/Operators Shall Operate the System in Accordance with 52.741, Appendix B; 66264.1087; and 66265.1081, as Needed	270.14(a); 270.27; 264.1086(e) (3),(4), (5)	66270.14(a); 66270.27; 66264.1086(e)(3),(4)& (5)		NA	
O-11a	Standards Apply to Each Closed-Vent System and Control Device Used to Control Air Emissions under Chapter 14; Article 30	270.14(a); 270.27; 264.1087(a)	66270.14(a); 66270.27; 66264.1087(a)		NA	
O-11(b)	Closed-Vent Systems Shall:	270.27(a)(5); 264.1087(b)	66270.27(a)(5); 66264.1087(b)		NA	
O-11b(1)	Route Gases, Vapors, and Fumes to Control Device	270.27(a); 264.1087(b)(1)	66270.27(a); 66264.1087(b)(1)		NA	

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Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
O-11b(2)	Be Designed and Operated in Accordance with 66264.1033(k)	270.27(a); 264.1087(b)(2)	66270.27(a); 66264.1087(b)(2)	The Chapter 14, Article 27 standards for closed-vent systems must be satisfied.	NA	
O-11b(3)	Meet the Requirements for Bypass Devices, if Applicable	270.27(a); 264.1087(b)(3)	66270.27(a); 66264.1087(b)(3)	Each bypass device shall be equipped with either a flow indicator or a seal or locking device.	NA	
O-12a	The Control Device Shall be One of the Following:	270.27(a)(5); 264.1087(c)(1)	66270.27(a)(5); 66264.1087(c)(1)		NA	
O-12a(1)	A Control Device Designed and Operated to Reduce Total Organic Content on Inlet Vapor Stream Vented to the Control Device by at Least 95 Percent by Weight	270.27(a)(5); 264.1087(c)(1)(i)	66270.27(a)(5); 66264.1087(c)(1)(A)	Owner/operator shall demonstrate compliance using either performance test or design analysis, except as specified.	NA	
O-12a(2)	An Enclosed Combustion Device	270.27(a)(5); 264.1087(c)(1)(ii)	66270.27(a)(5); 66264.1087(c)(1)(B)	Owner/operator shall demonstrate compliance using either performance test or design analysis, except as specified. Control device shall be designed and operated in accordance with 66264.1033(c).	NA	
O-12a(3)	A Flare	270.27(a)(5); 264.1087(c)(1)(iii)	66270.27(a)(5); 66264.1087(c)(1)(C)	Owner/operator shall demonstrate compliance using either performance test or design analysis, except as specified.	NA	

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SECTION O. AIR EMISSION STANDARDS FOR CONTAINERS, TANKS, AND SURFACE IMPOUNDMENTS (SUBPART CC)

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
O-12b	Each Closed-Vent System and Control Device Shall Comply with the Operating Requirements of 66264.1087(c)(2)	270.27(a)(5); 264.1087(c)(2)	66270.27(a)(5); 66264.1087(c)(2)	Planned routine maintenance of control device shall not exceed 240 hours per year; system malfunctions shall be corrected as soon as practicable; and system shall be operated such that gases, vapors, or fumes are not actively vented to control device during planned maintenance or system malfunction, except as specified.	NA	
O-12c	A Carbon Adsorption System	270.27(a)(5); 264.1087(c)(3)	66270.27(a)(5); 66264.1087(c)(3)	Carbon replacement and removal shall follow prescribed requirements in 66264.1033(g), (h), and (n).	NA	
O-12d	Each Control Device Shall be Operated and Maintained in Accordance with 66264.1033(j), Except for Certain Devices Identified (e.g., Flare)	270.27(a)(5); 264.1087(c)(4)	66270.27(a)(5); 66264.1087(c)(4)	66264.1033(j) requires the owner/operator to prepare documentation describing the control device's operation and to identify the process parameter(s) that indicate its proper operation and maintenance.	NA	

PERMIT COMPLETENESS CHECKLIST

SECTION O. AIR EMISSION STANDARDS FOR CONTAINERS, TANKS, AND SURFACE IMPOUNDMENTS (SUBPART CC)

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
O-12e	The Owner/Operator Shall Demonstrate that a Control Device Achieves the Performance Requirements Using a Performance Test or Design Analysis, Except for Specific Devices Identified (e.g., flare)	270.27(a)(5); 264.1087(c)(5)	66270.27(a)(5); 66264.1087(c)(5)	For performance test, owner/operator shall use the test specified at 66264.103(c). For design analysis, owner/operator shall use an analysis that meets requirements specified at 66264.1035(b)(4)(C).	NA	
O-12f	If Design Analysis is Not Sufficient, then a Performance Test is Required	270.27(a)(5); 264.1087(c) (6)	66270.27(a)(5); 66264.1087(c)(6)		NA	
O-12h	Inspect and Monitor the Control Device	270.27(a)(5); 264.1087(c) (7)	66270.27(a)(5); 66264.1087(c)(7)	Control devices shall be inspected and monitored at least once a day.	NA	
O-13	Each Tank, Surface Impoundment and Container Shall be Inspected, Monitored, and Repaired in Accordance with the Chapter 14, Article 30 Requirements	270.27; 264.1088	66270.27; 66264.1088	Inspection, monitoring and repair requirements specific to each unit are located in the standards sections of the regulation 66264.1084 through 66264.1087. Owner/operator shall develop and implement written plan and schedule to perform inspections and monitoring required. The plan and schedule shall be incorporated into facility's inspection plan.	NA	

PERMIT COMPLETENESS CHECKLIST

SECTION O. AIR EMISSION STANDARDS FOR CONTAINERS, TANKS, AND SURFACE IMPOUNDMENTS (SUBPART CC)

Section and Requirement		Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
O-14	Each Owner/Operator Shall Comply with the Recordkeeping Requirements Specified at 66264.1089	270.27; 264.1089	66270.27; 66264.1089	Except as specified, records shall be maintained in facility's operating record for a minimum of 3 years. Various records are required depending on the type of unit and control device.	NA	
O-14a	Each of the Following Owner/Operators Shall Comply with the Reporting Requirements at 66264.1090:	270.27; 264.1090	66270.27; 66264.1090		NA	
O-14a(1)	Each Owner/Operator Managing Hazardous Waste in a Tank, Surface Impoundment, or Container Exempted from Using Air Emission Controls under 66264.1082(c)	270.27; 264.1090(a)	66270.27; 66264.1090(a)	Owner/operator shall report to DTSC each noncompliance identified under 66264.1082(c).	NA	
O-14a(2)	Each Owner/operator Using Air Emission Controls on a Tank in Accordance with 66264.1084(c)	270.27; 264.1090(b)	66270.27; 66264.1090(b)	Owner/operator shall report to DTSC each noncompliance identified under 66264.1084(b).	NA	
O-14a(3)	Each Owner/operator Using a Control Device in Accordance with 66264.1087	270.27; 264.1090 (c),(d)	66270.27; 66264.1090(c),(d)	Owner/operator shall submit semiannual written report to DTSC, except as specified.	NA	
O-14b	Each Owner/Operator shall Provide an Emission Monitoring Plan	270.27(a)(6)	66270.27(a)(6)	Applies to Method 21 and control device monitoring methods.	NA	

PERMIT COMPLETENESS CHECKLIST

SECTION O. AIR EMISSION STANDARDS FOR CONTAINERS, TANKS, AND SURFACE IMPOUNDMENTS (SUBPART CC)

Section and Requirement	Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
O-14c Article 30 Implementation Plan	270.27(a)(7)	66270.27(a)(7)	Required when facility cannot comply with Chapter 14, Article 30 by date of permit issuance.	NA	

Notes:

[a] Considerations in addition to the requirements presented in the regulations.

[b] For each requirement, this column must indicate one of the following: NA for not applicable, IM for information missing, or the exact location of the information in the application.

[c] If application is deficient in an area, prepare a comment describing the deficiency, attach it to the checklist, and reference the comment in this column.

RCRA I.D. No.: CAD 009 114 919 Facility Name: CHEVRON USA INC RICHMOND REFINERY

PERMIT COMPLETENESS CHECKLIST

SECTION P. EXPOSURE INFORMATION

Section and Requirement	Federal Regulation	State Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
P-1 Information on the Potential for the Public to be Exposed to Releases. At a Minimum, this must include: C reasonably foreseeable potential releases C potential pathways of human exposure C potential magnitude and nature of exposure	270.10(j)	66270.10(j)	The federal requirement is for surface impoundments and land disposal units.	NA	

Notes:

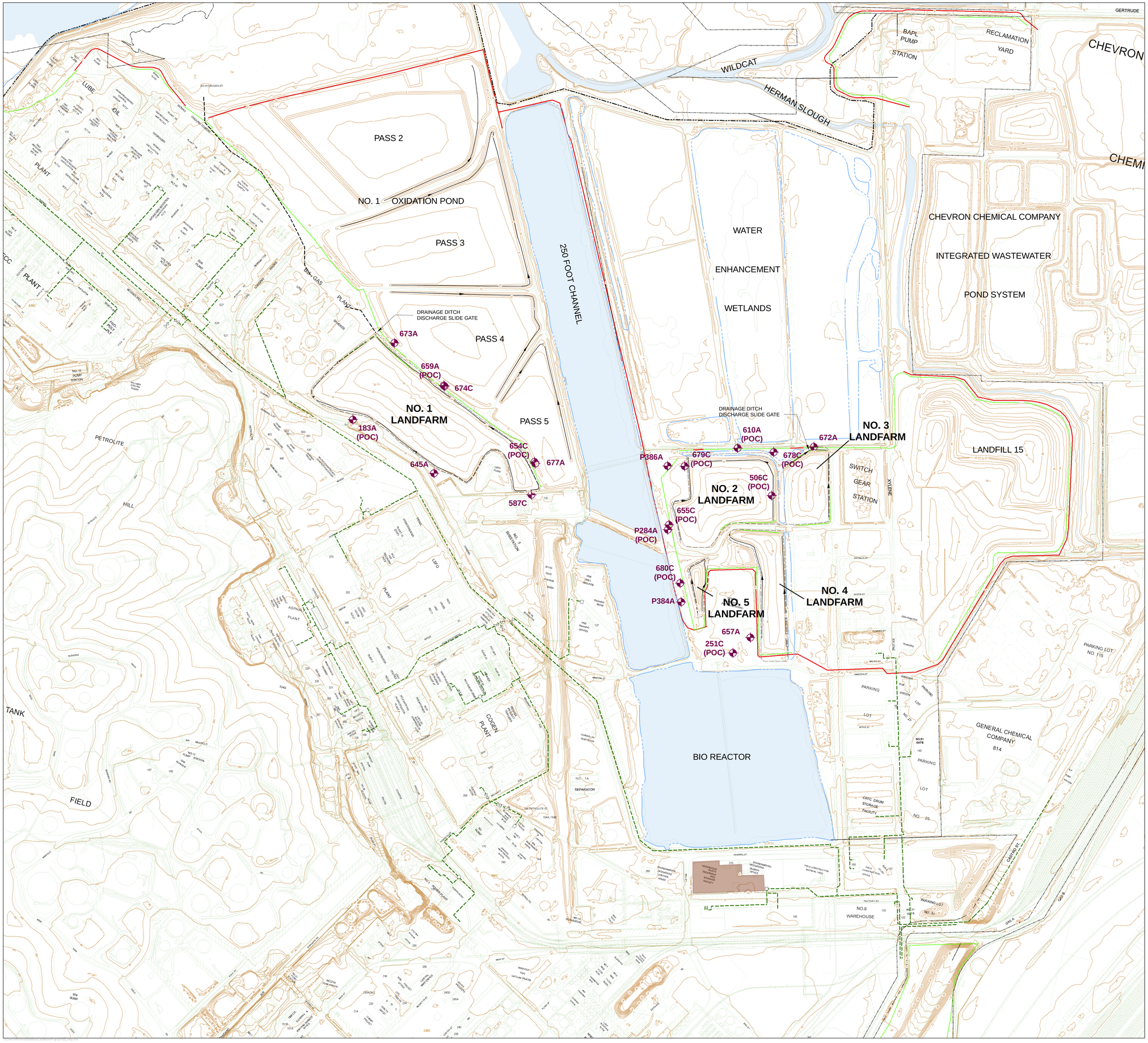
[a] Considerations in addition to the requirements presented in the regulations.

[b] For each requirement, this column must indicate one of the following: NA for not applicable, IM for information missing, or the exact location of the information in the application.

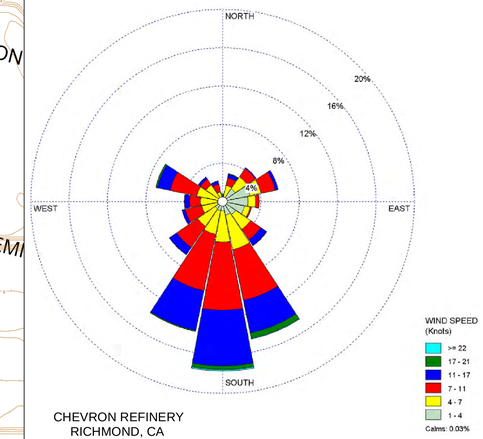
[c] If application is deficient in an area, prepare a comment describing the deficiency, attach it to the checklist, and reference the comment in this column.

Reviewer: _____

Appendix C
Topographic Map



2011 CHEVRON REFINERY WIND ROSE



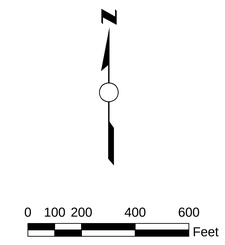
CHEVRON REFINERY
RICHMOND, CA
DATES: 1/1/11-12/31/11

LEGEND:

- PROPERTY LINE
- SURFACE WATERS AND / OR INTERMITTENT STREAMS
- CHAIN BOUNDARY AROUND LANDFARMS
- DRAINAGE DITCH
- 100 YEAR FLOOD PLAIN BOUNDARY (AS PUBLISHED IN BEDM REFINERY-WIDE REPORT OF WASTE DISCHARGE VOLUME 1 DATED AUGUST 31, 1988.)
- MONITORING AND POINT OF COMPLIANCE (POC) WELLS
- HAZARDOUS WASTE TREATMENT FACILITY
- GPS BARRIER WALL
- GPS TRENCH
- SANITARY SEWER SYSTEM
- STORM WATER SYSTEM

NOTE:

UPDATED FLOODPLAIN FROM ROWD SUBMITTED



TOPOGRAPHIC MAP

Post-Closure Permit Application
for Landfarm Units 1 through 5
Chevron Richmond Refinery
Richmond, California

Appendix D
FIRM Map

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

METER

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0210F

FIRM

FLOOD INSURANCE RATE MAP

CONTRA COSTA COUNTY, CALIFORNIA
AND INCORPORATED AREAS

PANEL 210 OF 602
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CONTRA COSTA COUNTY	060025	0210	F
RICHMOND, CITY OF	060035	0210	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06013C0210F

EFFECTIVE DATE
JUNE 16, 2009

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

Appendix E
Landfarms Post-Earthquake Inspection and Corrective Action Plan with As-Built Construction Drawings (November 1996/September 1999)

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Appendix A Construction Drawings (To be included after closure is completed)

N.1.0 INTRODUCTION

Bechtel Environmental, Inc and Dames & Moore (BEDM) have prepared this Landfarms Post Earthquake Inspection and Corrective Action Plan to comply with a request by the California Environmental Protection Agency Department of Toxic Substances Control (DTSC). The request was transmitted to Chevron in the DTSCs *Notice of Deficiency (NOD) for the Revised Closure / Post-Closure Plan, Richmond Refinery Landfarm Nos. 1 Through 5, Chevron U.S.A. Products Company, Richmond, California, 94801, EPA ID. No CAD 009 114 919,* dated August 15, 1995. This plan is currently presented as a part of the Landfarms Closure Plan and will be converted into a stand-alone document when the closure is completed. This document will necessarily reference the as-built configuration of the Landfarms. Hence, several of the drawing references will be modified in the future, and Appendix A, which will include copies of the as-built construction drawings, is not included at this time.

This plan is designed to be implemented by the Environmental Operations Section of the Refinery's Utilities/Environmental Area Business Unit (U/E) in the event of any earthquake that generates ground shaking of Modified Mercalli Intensity V or greater at or near the landfill. An event of this intensity is generally described as follows: "Felt by nearly everyone; many awakened. Some dishes, windows, etc., broken; a few instances of cracked plaster; unstable objects overturned. Disturbances of trees, poles, and other tall objects sometimes noticed. Pendulum clocks may stop."

This plan discusses the containment facilities that may be impacted at the former waste disposal sites by static and seismic deformations of the Landfarms due to an earthquake. The plan also addresses the corrective actions to be taken in the event of damage due to an earthquake. On completion of site closure, this plan will be revised to include the new closure features.

This plan was prepared under the supervision of Mr. Mark J. Wahler, California Registered Engineer No. C-35633.

N.2.0 POTENTIALLY IMPACTED FACILITIES

The following sections discuss the major elements of the Landfarms containment systems that may be impacted by a major seismic event. Appendix A to this plan contains copies of the design and as-built drawings for the elements discussed in this plan (to be completed following closure of the landfarms). The nature of the facilities and contaminants at this site are such that fires or explosions are unlikely. Furthermore, there is little likelihood of release of hazardous wastes that would pose an immediate threat to human health or the environment. The only potential releases would occur if either the GPS discharge lines ruptured, resulting in a discharge of the extracted groundwater to the ground, or if heavy rains washed soils out of the closure unit through a rupture of the cover. In either case, the release would likely be contained within the Refinery and would not likely to release constituents at levels that would cause a short-term risk to either people or the environment.

N.2.1 Groundwater Extraction Trench

The extraction trench is a subsurface structure consisting of a geotextile-fabric-wrapped gravel drain. This feature is somewhat flexible and is only likely to be disrupted by a deep slope failure of the landfill. As discussed in the Landfarms Closure Plan, the maximum foreseeable displacement along a failure surface is approximately equal to the width of the trench, indicating that the trench may not be functional immediately after the event and may require repair. If the fabric is torn, fines from the adjacent soils may enter the trench and eventually clog it. This condition would become obvious during the routine monitoring of the trench piezometers and pumping rates and could be corrected at that time.

The extraction sumps are durable elements and, as with the trench, are only likely to be damaged by a general slope failure during a major event. Limited distortion of the sump or well casing would not significantly impair the operation of the trench or well. If the casing is crushed or severed completely, it may become impossible to operate a pump within the sump or well.

A failure of some or all of the extraction system may result in a slow rise in the groundwater level within the site. Since the normal operating level of the system is below the level of groundwater outside the site, BEDM anticipates a considerable time would pass before the groundwater level rose sufficiently to create an outward gradient from the site or over-top the wall. This time should be sufficient to repair the system.

N.2.2 Groundwater Monitoring Wells and Piezometers

The groundwater monitoring wells and piezometers at the Landfarms could be disrupted by a significant ground rupture. Since these features are only used to monitor water quality in the "A" and "C" Zones and the long-term effectiveness of the containment system, there would be no significant immediate consequences if they were to be damaged during an earthquake.

N.2.3 Groundwater Extraction Pumps and Controllers

The pumps are suspended in the sumps and extraction wells and would be immersed in water under normal operating conditions. The sturdy construction combined with the damping effect of the water in the sumps should prevent damage from any movement during an earthquake. The attached hoses will have sufficient slack to accommodate any movements.

The controllers are mounted above grade (see drawings D-318641, D-318643, D-318651, D-318652, D-782424, D-782425, D-782441 and D-782442 in Appendix A) and are connected to the pumps with stainless steel tubing. The system is flexible and is unlikely to be damaged. However, if damage does occur, it would most likely consist of a separated piping connection and should be readily visible.

The failure of some or all of the pumps would have the same consequences as the failure of the trench or wells themselves, which was discussed above in Section 2.2.

N.2.4 Compressed Air Supply Lines

The compressed air supply required to run the pumps and their controllers is supplied through an above-grade 2-inch galvanized steel pipe (see Appendix A). A shutoff valve for the No. 1 Landfarm system is at the air filters located just north of the end of the LPG loading tracks. (see drawings D-318640 and D-318641 in Appendix A). A shutoff valve for the Nos. 2 through 5 Landfarm systems is with the air filter located near the southwest corner of the Electrical Switchgear Station, which is just east of No. 3 Landfarm (see drawings D-782439 and D-782441 in Appendix A). The connections from the air line to the pump controllers include a shutoff valve. The line is flexible and the worst anticipated occurrence during a substantial earthquake would be the lines bouncing off their supports. If the lines were to break, the rupture should be readily apparent and easy to repair.

The air supply lines are carbon steel pipes that are connected to the existing Refinery compressed air system. It is likely that, during a major seismic event, the Refinery's compressed air system will go out of service, resulting in a loss of supply to the extraction sumps. If this were to occur, the pumps would simply cease operating.

N.2.5 Groundwater Transfer Lines

The discharge lines for the extraction pumps are carbon steel lines that parallel the compressed air supply lines within the Landfarms area and are equipped with similar sets of valves. As with the air lines, in the unlikely event that the line is ruptured during a major earthquake, the damage should be readily apparent and easily repaired. Most likely, an event strong enough to rupture the discharge lines would also disable the compressed air supply system, which would in turn stop the pumps. Hence, only the water contained within the discharge line at the time of the event would be available to drain from the line. Water draining from a broken line would flow into an existing swale from which it can be recovered.

The discharge line ultimately drains to the Refinery's No. 1A Separator. A major seismic event may put the separator out of service for awhile.

N.2.6 Stormwater Transfer System

The stormwater transfer system for No. 1 Landfarm consists of a several permanently installed submersible pumps connected to a 4-inch line that discharges to the No. 1 Oxidation Pond, First Pass. The transfer system for Nos. 2 through 5 Landfarm consists of gravity-feed culverts that discharge to either the Refinery effluent treatment system or the Richmond Refinery water-enhanced wetlands. Damage to this system due to an earthquake is unlikely, but would be readily detected and could easily be repaired. Damage to this system would only be of consequence if a significant rainfall were to occur before the system could be repaired.

N.2.7 Final Cover

The final cover over the Landfarms is vegetated layer intended to promote the biodegredation of hydrocarbons remaining in the old Landfarms soils and to reduce rainwater infiltration into the old Landfarms soils. The cover consists of a one-foot layer of vegetated fill, as shown on Drawing D-767519. If permanent displacements of the Landfarms cover occurs during the earthquake, the fill layer is likely to crack, creating an entry path for rainwater infiltration into the underlying materials. This is only of concern if it is raining. The nature of the underlying materials is such that they do not impose an immediate health hazard simply by being exposed.

N.3.0 POST EARTHQUAKE INSPECTION

Due to the relatively low immediate consequences of earthquake-induced damage to the Landfarms containment systems when compared to the balance of the Refinery, the inspection of the systems has been divided into two phases. The first phase would be performed as soon as an U/E operator could be spared from potentially more critical matters, and would consist of a quick inspection to ascertain if the systems had sustained major damage that might result in an immediate release of potentially contaminated groundwater to the ground surface. The second phase would consist of a more thorough inspection to ascertain if any less significant damage had occurred. If other post-earthquake demands on the operator are not urgent, the first phase can be skipped and only the more thorough inspection be performed.

N.3.1 Phase I Inspection

The intent of this initial inspection is to evaluate whether the extraction system should be shut off immediately and remain off until a more careful inspection can be performed or repairs completed. The system is to be shut down if any of the following conditions exist:

- Compressed air service to the Landfarms is discontinued.
- The No. 1A Separator is out of service.

- The discharge pipeline is ruptured, either at the Landfarms or at any point between the Landfarms and the No. 1A Separator.
- The compressed air header at the Landfarms is ruptured.

The locations for the system's shutoff valves were described in Section N.2.4. When shutting off the system, the compressed air valve should be closed first and then the water discharge line. When restarting the system, the discharge valve should be opened first, followed by the compressed air valve.

In addition, an individual pump is to be shut off if either its air supply line or discharge line is ruptured between the valve and the pump.

N.3.2 Phase I Inspection Procedure

The inspection of the the Landfarms containment systems shall be performed by an operator who is familiar with the system. During the course of the Phase I inspection, the operator shall keep a record of his observations and actions. The record should include observations of ground ruptures, damage to service roads, pipeway supports, etc. After an earthquake, inspect the system as follows:

- Ascertain, if possible, if either the No. 1A Separator is out of service or if compressed air service to either of the Landfarms areas has been discontinued. If either or both have occurred, proceed to the Landfarms system in question, shut off the extraction system, and discontinue Phase I of the inspection.

- By vehicle, visually inspect the above-ground air supply and groundwater discharge line piping at each Landfarm, starting at one end of the system and proceeding along the system. If any breaks in the main discharge line or main compressed air line are seen, shut off the extraction system and discontinue Phase I of the inspection. If any breaks in an individual pump's discharge line or compressed air line are seen, shut off that pump.

- Inspect the first sump to ascertain if compressed air is being supplied to this sump. If no compressed air is being supplied to the pump, shut off the extraction system and discontinue Phase I of the inspection.

- Proceed by vehicle to inspect the discharge lines. Observe where the line enters or exits any below-grade pipe sleeves to ascertain if the line is ruptured within the sleeve. If any breaks are detected, shut off the extraction system and discontinue Phase I of the inspection.

N.3.3 Phase II Inspection

The Phase II inspection is intended to be a more thorough inspection of the containment system. As with Phase I, the operator shall keep a written record of his observations during the inspection. After an earthquake, inspect the system as follows:

- Starting at one end of the groundwater extraction system, carefully inspect the full length of the system. Carefully look for any evidence of damage or leakage, with particular emphasis on the following items. Carefully check the system to ensure that:

- The air supply and groundwater discharge pipelines are leak-free.

- The pipelines are still properly located on all supports.

- The pumps and pump controllers are undamaged and remain functional.

    - There is no evidence of a major slope failure that may have damaged any of the slurry walls, extraction trenches, extraction wells, monitoring wells, piezometers, or stormwater retention dikes.
    - All sumps, wells, and piezometers appear to be intact.

- If a leak is discovered in the air supply line or discharge line for a specific pump, or if the pump or controller are not functioning properly, take the following actions:
    - Immediately shut off the air supply to the individual pump.
    - Shut off the discharge line from the individual pump.
    - Request maintenance to repair the problem in a expeditious manner and restart the pump.

- If a leak is discovered in the main air supply line or discharge lines, take the following actions:
    - Immediately shut off the air supply to the entire system.
    - Shut off the discharge line from the entire system.
    - Request maintenance to repair the problem in a expeditious manner and restart the system.

- If the lines have fallen off their supports or if other non-critical damage is noted, request maintenance to repair the problem.
- If there is evidence of a major slope failure that may have disrupted the slurry walls or extraction trenches, take the following actions:
    - Immediately shut off the air supply to the entire system.
    - Shut off the discharge line from the entire system.
    - Advise engineering[1] and the Environmental and Safety Division (ESD) of the problem.

- If there is evidence of a major slope failure that may have disrupted one or more extraction well, take the following actions:
    - Immediately shut off the air supply to the affected well.
    - Shut off the discharge line from the affected well.
    - Advise engineering[1] and ESD of the problem.

- If there is evidence that any of the monitoring wells or piezometers have been damaged beyond repair, advise engineering[1] and ESD of the problem.
- If the stormwater transfer system has been damaged, request maintenance to repair the problem.

- Carefully inspect the surfaces of the Landfarms for cracking of the vegetated fill. If any damage is observed, advise engineering[1] and ESD of the problem.

- If there is evidence that the vegetated cover is damaged and rainfall is imminent, sandbags shall be placed such that any surface runoff will be diverted away from the damaged area.

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[1] Engineering refers to the Waste Discharge Order (WDO) Project engineering manager if the WDO project is still ongoing, or to the Refinery engineering manager if not.

N.3.4 Inspection Reporting

ESD will be prepared to provide the DTSC with a verbal report of the results of inspection of the system within 18 hours of the event. The report will contain a summary of any damage observed, any temporary steps taken to mitigate the damage, and will describe what plans have been made to effect permanent repairs. U/E will provide ESD the information necessary to prepare this report. The information is to be provided on weekdays to ESD's Environmental Supervisor for Hazardous Waste and Groundwater and to ESD's On-Call Public and Environmental Affairs Officer on weekends and holidays. If there is either a release of the extracted groundwater to the ground or a washout of soils from beneath the cover liner, several State agencies will need to be notified as follows:

Immediately notify the State Office of Emergency Services at 1-800-852-7552 and report the following information:

- the name and telephone number of the person reporting the incident;
- the name and address of the facility;
- the time and type of incident (e.g., release);
- name and quantity of material(s) involved, to the extent known;
- the extent of injuries (caused by the release), if any; and
- the possible hazards to human health, or the environment, outside of the facility.

Within 15 days of the incident, ESD shall submit a written report on the incident to the DTSC. The report shall include:

- the name, address, and telephone number of the owner or operator;
- the name, address, and telephone number of the facility;
- the date, time, and type of incident (e.g., release);
- name and quantity of material(s) involved;
- the extent of injuries (caused by the release), if any;
- an assessment of actual or potential hazards to human health, or the environment, where this is applicable; and
- the estimated quantity and disposition of recovered material that resulted from the incident.

A written summary of the damage is to be provided to ESD and the Waste Discharge Order Project (WDO) engineering manager (if the WDO project is still ongoing) within one week of the earthquake event.

N.4.0 CORRECTIVE ACTION PLAN

Most of the actions required to correct minor damage to the system are included in the inspection procedures described above. However, repair of below-grade structures, such as extraction trenches, low-permeability cover elements, and monitoring wells, is beyond the knowledge and experience of the Refinery's maintenance crews. These items are discussed in the following sections. This work will be performed under the direction of the WDO engineering manager if the WDO project is still ongoing, or the Refinery engineering manager if not.

N.4.1 Monitoring Wells or Piezometers

Any monitoring well or piezometer that is damaged beyond repair will be properly abandoned and replaced within four months of its destruction.

N.4.2 Extraction Trench

If the extraction trench has been disrupted by a slope failure, it will be necessary to repair the damaged section in order to avoid an excessive inflow of fines from the surrounding soils. Depending on the actual nature of the damage, two courses of action may be taken: 1) the damaged portion of the trench can be excavated and repaired, or 2) a sand-bentonite plug could be installed in the trench and, if needed, additional sumps could be installed to control the groundwater.

N.4.3 Extraction Sump

If an individual extraction sump becomes unusable due to excessive distortion and there is an adjacent, undamaged sump that is currently not being pumped, that sump can be substituted for the damaged sump. If no alternate sump is available, a new sump will be installed into the extraction trench. The old sump will be left in place as it will not interfere with the operation of the trench.

N.4.4 Final Cover

If there is evidence that the vegetated fill cover layer has cracked, it will be necessary repair the damage. If the surface has become sufficiently distorted such that it no longer drains freely, additional grading should be performed to restore proper surface drainage.

N.4.5 Corrective Action Reporting

On completion of any required work, ESD will advise the DTSC that all repairs have been completed. If the damage is such that the repaired containment system deviates significantly from the original design, engineering (WDO or Refinery) will prepare and submit to the DTSC an addendum to the Landfarms Closure Certification Report.

N.5.0 REFERENCES

Bechtel Environmental, Inc. and Dames & Moore (BEDM), 1996, *Landfarms Closure Plan*, September 15.

Appendix A

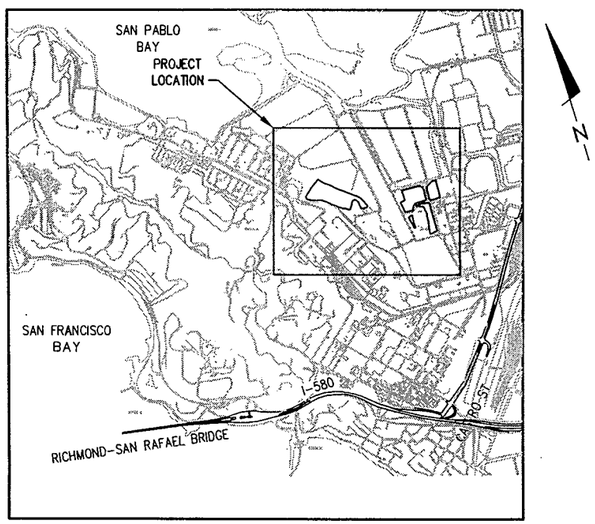
Construction Drawings

Chevron

RICHMOND REFINERY
RICHMOND, CALIFORNIA

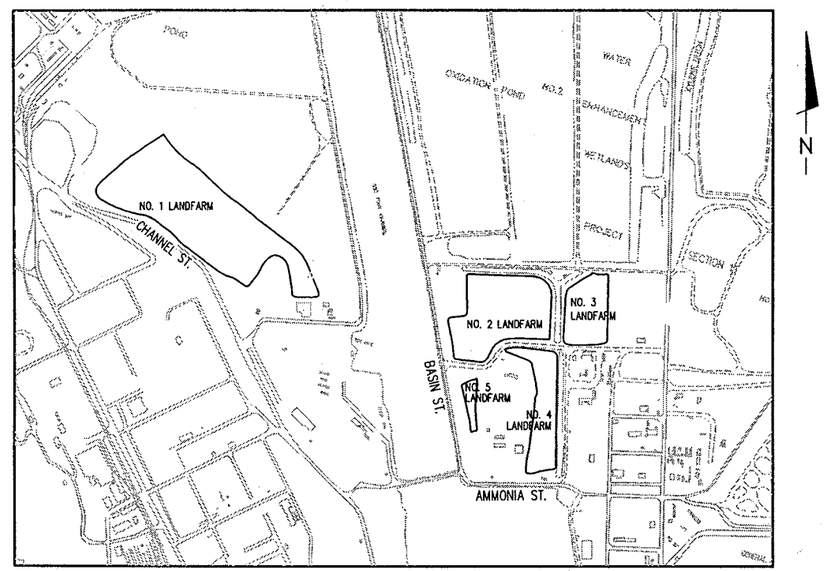
WASTE DISCHARGE ORDER PROJECT

GROUNDWATER PROTECTION SYSTEM
LANDFARMS CLOSURE PLAN
LANDFARMS NO. 1 THROUGH 5



LOCATION MAP

0 2000
Scale in Feet



VICINITY MAP

0 500
Scale in Feet

DWG. NO.	TITLE
D-767522	NO. 1 LANDFARM – GPS PUMP LOCATIONS
D-767523	NO. 2 THROUGH 5 LANDFARMS – GPS PUMP LOCATIONS
D-767524	PUMP INSTALLATION SCHEMATIC
D-767525	NO. 1 LANDFARM – SUMP NO. S-83071
D-767526	NO. 2 LANDFARM – SUMP NO. S-83070
D-767527	NO. 3 LANDFARM – SUMP NO. S-83069
D-767528	NO. 3 LANDFARM – SUMP NO. S-83068
D-767529	NO. 4 LANDFARM – SUMP NO. S-83067
D-767530	PUMP INSTALLATION DETAILS 1
D-767531	PUMP INSTALLATION DETAILS 2
D-767532	CONCRETE BASE DETAIL

GENERAL NOTES

1. COORDINATES SHOWN ARE BASED ON 1983 NORTH AMERICAN DATUM (N.A.D.) COORDINATE SYSTEM.

2. ELEVATIONS SHOWN ARE BASED ON RICHMOND REFINERY DATUM. ELEVATION 0.00' EQUALS ELEVATION -2.17' NATIONAL GEODETIC VERTICAL DATUM (NGVD).

3. ALL CONSTRUCTION SHALL CONFORM TO THESE PLANS AND SPECIFICATIONS.

4. THE TYPES, LOCATIONS, SIZES AND/OR DEPTHS OF EXISTING UTILITIES AS SHOWN ON THESE DRAWINGS ARE FROM THE BEST INFORMATION AVAILABLE. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR THE COMPLETENESS OR ACCURACY OF THE DELINEATION OF SAID UTILITIES NOR FOR THE EXISTENCE OF OTHER BURIED OBJECTS OR UTILITIES WHICH MAY BE ENCOUNTERED BUT WHICH ARE NOT SHOWN ON THESE DRAWINGS.

5. THE CONTRACTOR IS RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING STRUCTURES, UTILITIES, AND FACILITIES. ANY DAMAGE TO EXISTING FACILITIES BY THE CONTRACTOR OR HIS SUBCONTRACTORS SHALL BE RESTORED (TO AND EQUAL OR BETTER CONDITION) OR REPLACED (TO AN EQUAL OR BETTER CONDITION) AT NO COST TO THE COMPANY.

6. THE CONTRACTOR IS RESPONSIBLE FOR ALL EROSION CONTROL REQUIREMENTS. CONTRACTOR SHALL IMPLEMENT ANY NECESSARY BEST MANAGEMENT PRACTICES AS OUTLINED IN THE PROJECT SPECIFICATIONS OR AS DIRECTED BY THE ENGINEER.

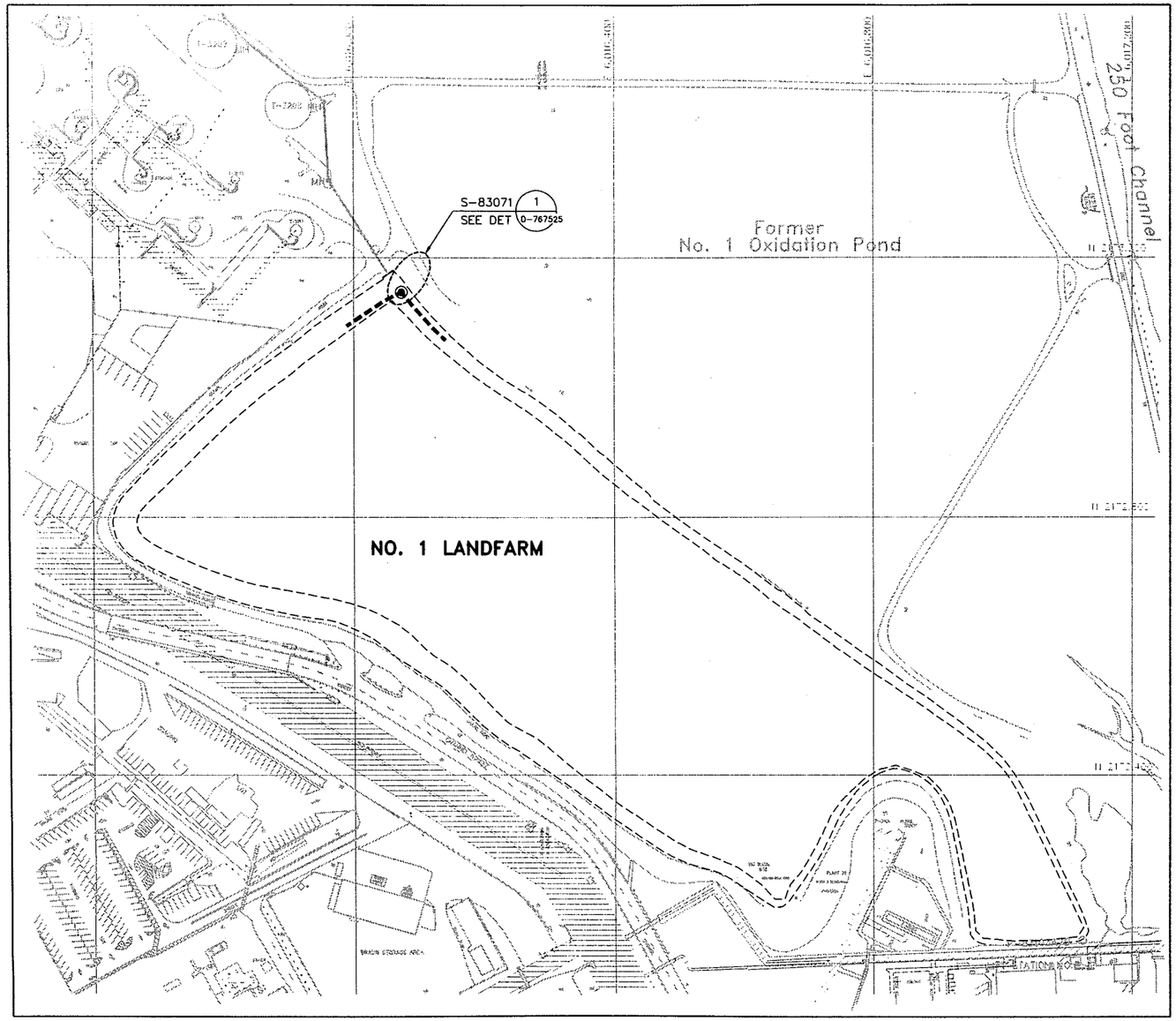
7. ALL HDPE ELBOWS AND TEES SHALL BE FLANGED.

AS BUILT
SEPTEMBER 1999

REGISTERED PROFESSIONAL ENGINEER
ADAMS M. [illegible]
No. C-[illegible]
EXP. 12/31/02
CIVIL
STATE OF CALIFORNIA

DAMES & MOORE
GROUP
A DAMES & MOORE GROUP COMPANY
SAN FRANCISCO, CA.

42100001 \CHEV-R\S83\GPS\ASBUILT\COVER 071897 1:1 0909991 CIK



NOTES:

1. CONTOURS AND GRADES ARE NOT SHOWN FOR CLARITY.
2. LOCATION OF EXISTING GPS TRENCHES ARE APPROXIMATE.

ABBREVIATIONS:

ø, DIA	DIAMETER
BGS	BELOW GROUND SURFACE
CS	CARBON STEEL
CY	CUBIC YARDS
E	EAST
EF	EACH FACE
EL	ELEVATION
EOR	EDGE OF ROAD
EX	EXISTING
EWEF	EACH WAY, EACH FACE
GALV.	GALVANIZED
GPS	GROUNDWATER PROTECTION SYSTEM
HDPE	HIGH DENSITY POLYETHYLENE
MAX.	MAXIMUM
MIN.	MINIMUM
IE.	INVERT ELEVATION
INV	INVERT
LF	LINEAL FOOT
NO.	NUMBER
N	NORTH
O.C.	ON CENTER
SCH	SCHEDULE
SD	STORM DRAIN LINES
SS	STAINLESS STEEL
STA	STATION
TYP	TYPICAL

LEGEND:

- EXISTING GPS EXTRACTION TRENCH
- DAYLIGHT LINE OF EXISTING V-DITCH
- EXISTING SUMP / NEW PUMP LOCATION

REGISTERED PROFESSIONAL ENGINEER THOMAS M. GREEN No. C 68296 EXP. 6/30/01 CIVIL STATE OF CALIFORNIA

N

0 100
Scale In Feet

Waste Discharge Order Project
DAMES & MOORE
A DAMES & MOORE GROUP COMPANY
JOB NO. 42100-001-043

REFERENCE DRAWINGS

NO. 1 LANDFARM – FINISHED GRADING PLAN	D-767512
NO. 1 LANDFARM – DITCH PLAN	D-767514

REVISIONS

0	ISSUE FOR CONSTRUCTION NO. 1-5 LANDFARMS 12/98	CIK
1	AS-BUILT 9/15/99	AGP

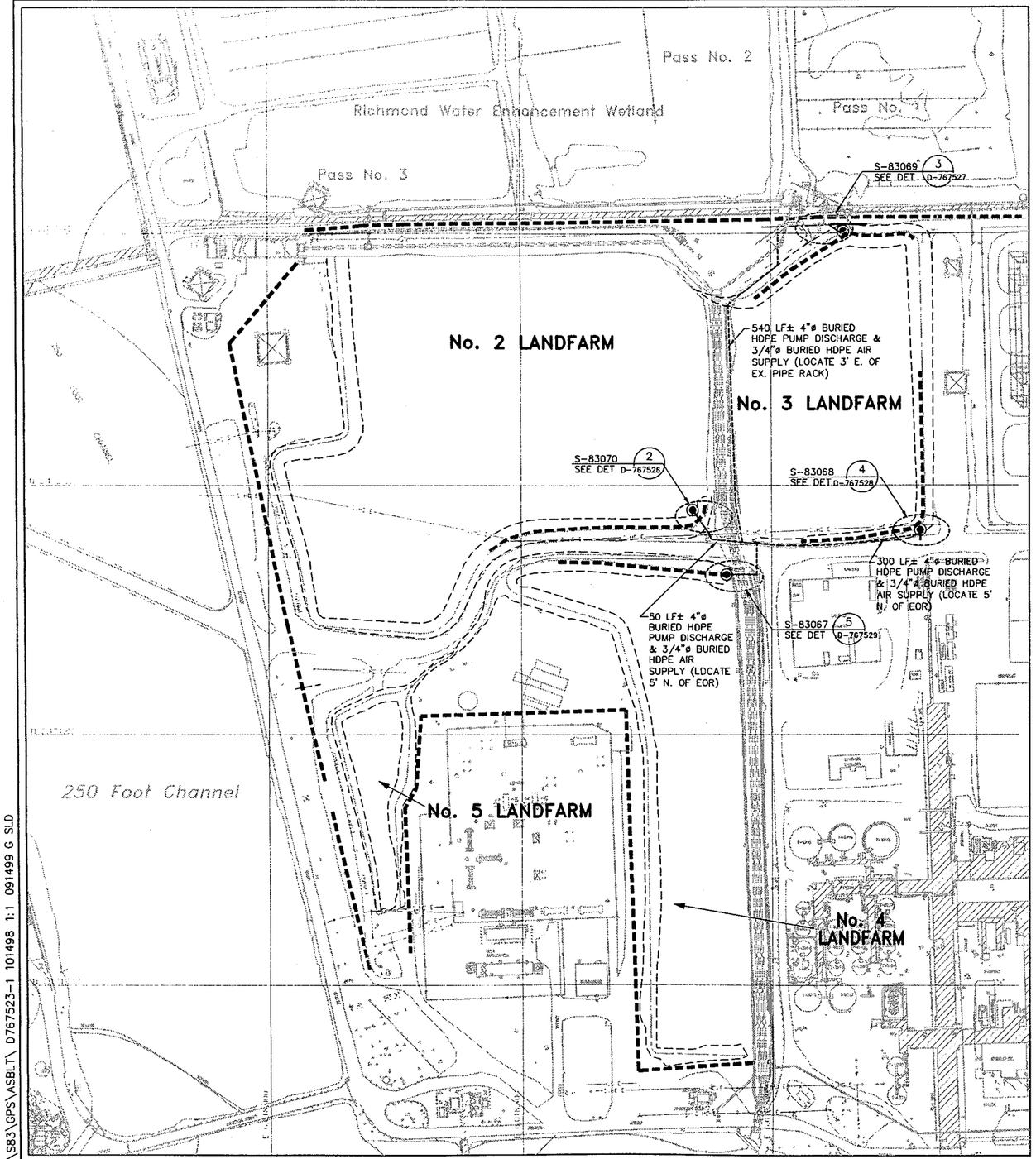
Chevron
Richmond Refinery

SCALE AS NOTED DR. C. KOSSA DR. APP. DATE OCT. 1998 APPROVED
ENGR. ENGR. DEPT.
OPR'G. DEPT.

NO. 1 LANDFARM-GPS PUMP LOCATIONS
SECTOR 83: LANDFARMS
GROUNDWATER PROTECTION SYSTEM
UTILITIES/ENVIRONMENTAL ABU

A W.O. S.O. D-767522-1

42100001 \CHEV_R\S83\GPS\ASBUILT\ D767522-1 091798 1:1 091099 G SLD



NOTES:

1. SEE DETAILS FOR PIPE LENGTHS IN VICINITY OF SUMPS.
2. HDPE PUMP DISCHARGE LINE OVER 100 LINEAL FEET IN LENGTH SHALL HAVE A FLANGED SECTION AT LEAST EVERY 100 LINEAL FEET.
3. CONTOURS AND GRADES ARE NOT SHOWN FOR CLARITY.
4. LOCATION OF EXISTING GPS EXTRACTION TRENCHES ARE APPROXIMATE.

LEGEND:

- EXISTING GPS EXTRACTION TRENCH
- DAYLIGHT LINE OF EXISTING V-DITCH
- EXISTING SUMP / NEW PUMP LOCATION
- EXISTING OVERHEAD ELECTRICAL LINE
- EXISTING UNDERGROUND ELECTRICAL LINE

REGISTERED PROFESSIONAL ENGINEER THOMAS M. PRIOLT No. C 70099 Date 10/8/99 CIVIL STATE OF CALIFORNIA

N

0 100
Scale In Feet

Waste Discharge Order Project
DAMES & MOORE
A DAMES & MOORE GROUP COMPANY
JOB NO. 42100-001-043

REFERENCE DRAWINGS		
NO. 2 THROUGH 5 LANDFARMS – FINISHED GRADING PLAN	D-767515	
NO. 2 THROUGH 5 LANDFARMS – DITCH PLAN	D-767518	

REVISIONS		
0 ISSUE FOR CONSTRUCTION NO. 1-5 LANDFARMS 12/98	CIK	
1 AS-BUILT 9/15/99	AGP	

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Richmond Refinery

SCALE AS NOTED DR. C. KOSSA DR. APP. DATE OCT. 1998 APPROVED
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NO.2 THROUGH 5 LANDFARMS – GPS PUMP LOCATIONS
SECTOR 83: LANDFARMS
GROUNDWATER PROTECTION SYSTEM
UTILITIES/ENVIRONMENTAL ABU

A W.O. S.O. D-767523-1

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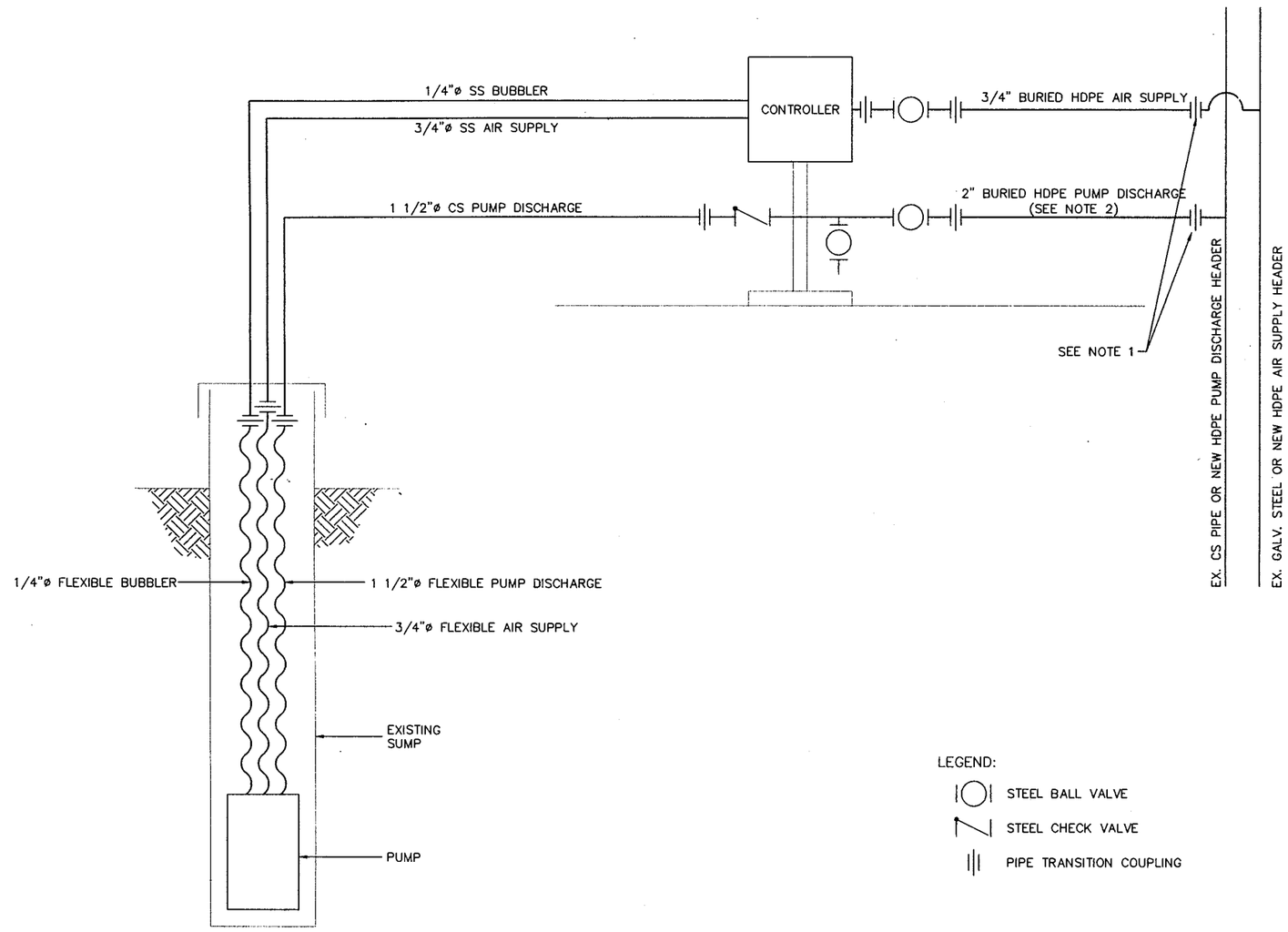

LEGEND:

STEEL BALL VALVE

STEEL CHECK VALVE

PIPE TRANSITION COUPLING

NOTES:

1. TRANSITION COUPLINGS AT CONNECTION TO GPS HEADERS ARE ONLY NECCESSARY WHEN CONNECTING TO EXISTING METAL MAIN LINES. SEE SUMP DETAILS 1 THROUGH 5 FOR SITE SPECIFIC DETAILS.
2. PIPE SHALL BE CS FOR SUMP S-83071.
3. SEE D-767530 AND D-767531 FOR PUMP INSTALLATION DETAILS.

REGISTERED PROFESSIONAL ENGINEER THOMAS M. [illegible] No. C 58205 EXP. [illegible] CIVIL STATE OF CALIFORNIA

Waste Discharge Order Project
DAMES & MOORE
GROUP
A DAMES & MOORE GROUP COMPANY
JOB NO. 42100-001-043

REFERENCE DRAWINGS

0	ISSUE FOR CONSTRUCTION NO. 1-5 LANDFARMS 12/98	CIK	
1	AS-BUILT 9/15/99	AGP	

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SCALE AS NOTED DR. C. KOSSA DR. APP. DATE OCT. 1998
ENGR. TWS ENGR. DEPT.
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PUMP INSTALLATION SCHEMATIC
SECTOR 83: LANDFARMS
GROUNDWATER PROTECTION SYSTEM
UTILITIES/ENVIRONMENTAL ABU

A W.O. S.O. D-767524-1

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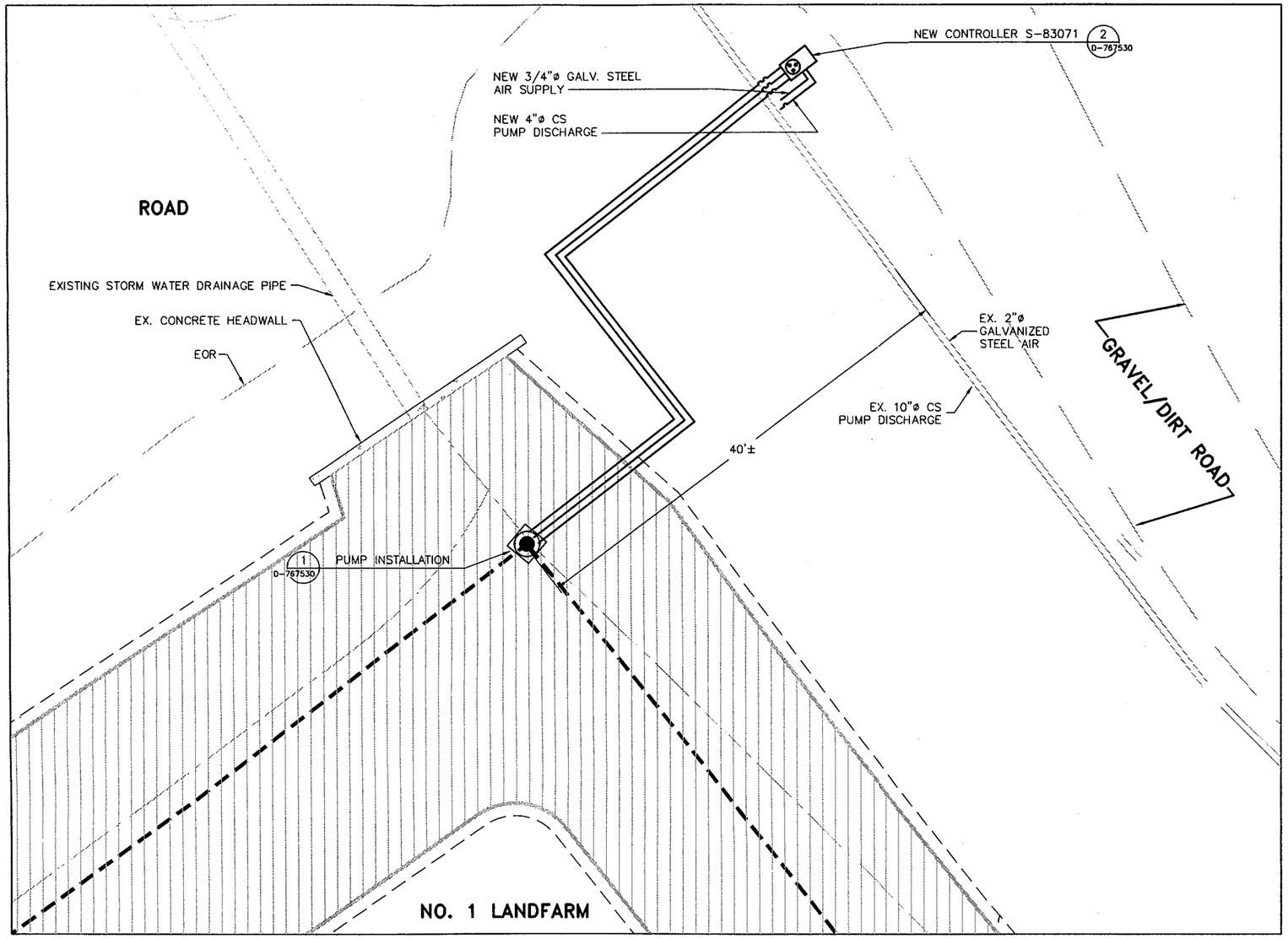

DETAIL 1 / D-767522
S-83071

NOTES:

1. NOTE PRESENCE OF EXISTING OVERHEAD AND UNDERGROUND UTILITY LINES.
2. CONTOURS AND GRADES ARE NOT SHOWN FOR CLARITY.
3. LOCATION OF EXISTING GPS EXTRACTION TRENCHES ARE APPROXIMATE.

LEGEND:

- EX. GPS EXTRACTION TRENCH
- EX. ROAD
- CENTERLINE OF EX. V-DITCH
- DAYLIGHT LINE OF EX. V-DITCH
- EX. HDPE V-DITCH LINER
- EX. SUMP / NEW PUMP LOCATION
- EX. ABOVE GROUND PIPELINE
- EX. BURIED PIPELINE
- NEW ABOVE GROUND PIPELINE
- CONTROLLER LOCATION

REGISTERED PROFESSIONAL ENGINEER THOMAS M. [illegible] No. C 59265 EXP. 6/30/[illegible] CIVIL STATE OF CALIFORNIA

N

0 5
Approximate Scale In Feet

Waste Discharge Order Project
DAMES & MOORE
A DAMES & MOORE GROUP COMPANY
JOB NO. 42100-001-043

REFERENCE DRAWINGS	
LFM1-STORM WATER PIPING	D-782416-1
LFM1-STORM WATER PIPING	D-782417-1
LFM1-HEADWALL PLAN & SECTIONS	D-782418-1
LFM1-OUTFALL & MANHOLE DETAILS	D-782419-1

REVISIONS		
0	ISSUE FOR CONSTRUCTION NO. 1-5 LANDFARMS 12/98	CIK
1	AS-BUILT 9/15/99	AGF

Chevron
Richmond Refinery

SCALE AS NOTED DR. C. KOSSA DR. APP. [illegible] DATE OCT. 1998 APPROVED
ENGR. TLS ENGR. DEPT.
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92499SLD

NO. 1 LANDFARM - SUMP NO. S-83071
SECTOR 83: LANDFARMS
GROUNDWATER PROTECTION SYSTEM
UTILITIES/ENVIRONMENTAL ABU

A W.O. S.O. D-767525-1

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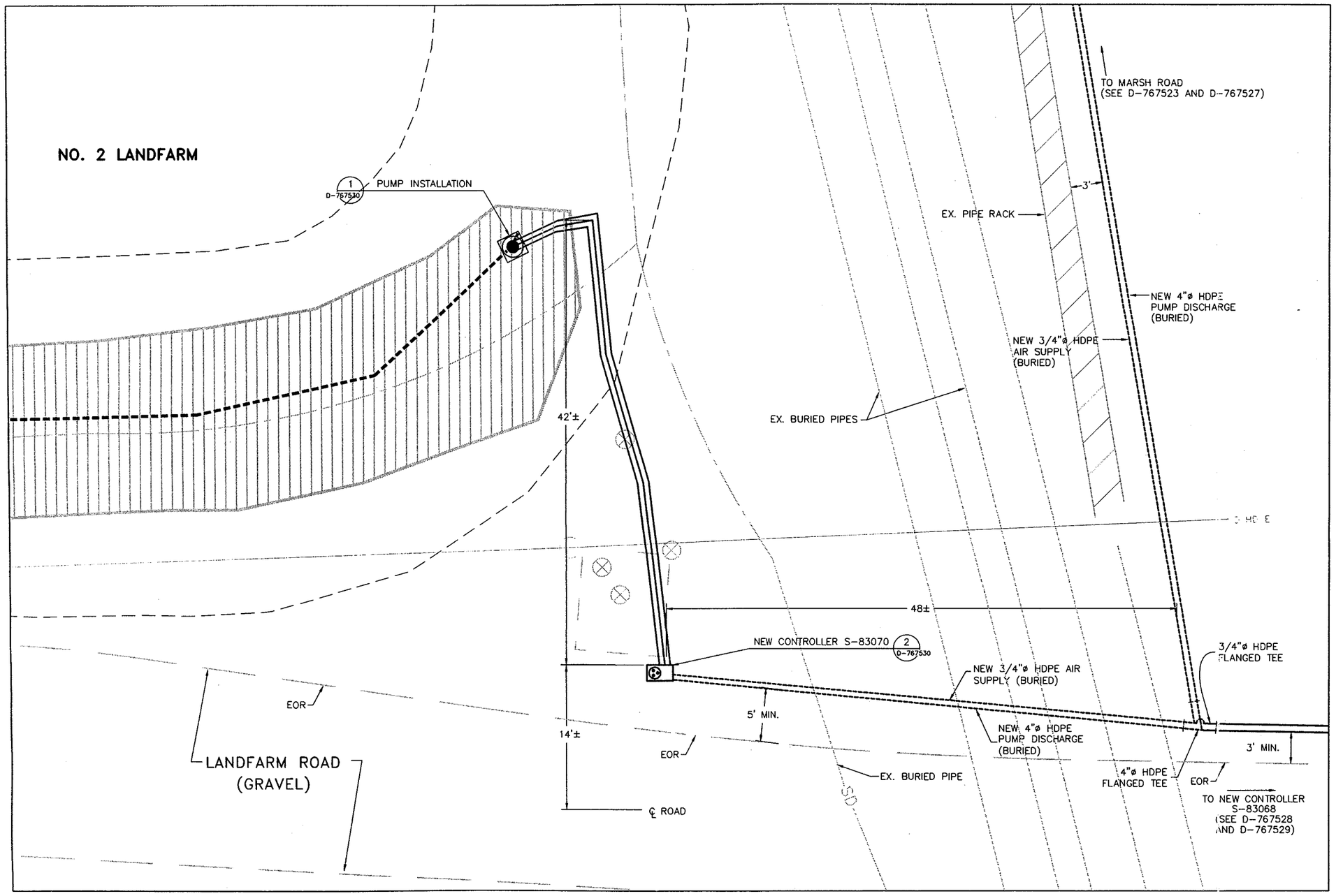

DETAIL 2 D-767523
S-83070

NOTES:

1. NOTE PRESENCE OF EXISTING OVERHEAD AND UNDERGROUND UTILITY LINES.
2. ALL NEW HDPE PIPING TO BE BURIED.
3. CONTOURS AND GRADES ARE NOT SHOWN FOR CLARITY.
4. LOCATION OF EXISTING GPS EXTRACTION TRENCHES ARE APPROXIMATE.

LEGEND:

- EX. GPS EXTRACTION TRENCH
- EX. ROAD
- CENTERLINE OF EX. V-DITCH
- DAYLIGHT LINE OF EX. V-DITCH
- EX. OVERHEAD ELECTRICAL
- EX. HDPE V-DITCH LINER
- EX. SUMP / NEW PUMP LOCATION
- EX. ABOVE GROUND PIPELINE
- EX. BURIED PIPELINE
- NEW ABOVE GROUND PIPELINE
- NEW BURIED PIPELINE
- CONTROLLER LOCATION

REGISTERED PROFESSIONAL ENGINEER THOMAS M. GRIFFITH No. C 58205 EXP. 6/30/03 CIVIL STATE OF CALIFORNIA

N

0 5
Approximate Scale In Feet

DCM GROUP

Waste Discharge Order Project

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY
JOB NO. 42100-001-043

REFERENCE DRAWINGS	
LFM1-STORM WATER PIPING	D-782416-1
LFM1-STORM WATER PIPING	D-782417-1
LFM1-HEADWALL PLAN & SECTIONS	D-782418-1
LFM1-OUTFALL & MANHOLE DETAILS	D-782419-1

REVISIONS		
0	ISSUE FOR CONSTRUCTION NO. 1-5 LANDFARMS 12/98	CIK
1	AS-BUILT 9/15/99	AGP

Chevron
Richmond Refinery

92499SLD

SCALE AS NOTED DR. C. KOSSA DR. APP. DATE OCT. 1998
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NO. 2 LANDFARM – SUMP NO. S-83070
SECTOR 83: LANDFARMS
GROUNDWATER PROTECTION SYSTEM
UTILITIES/ENVIRONMENTAL ABU

A W.O. S.O. D-767526-1

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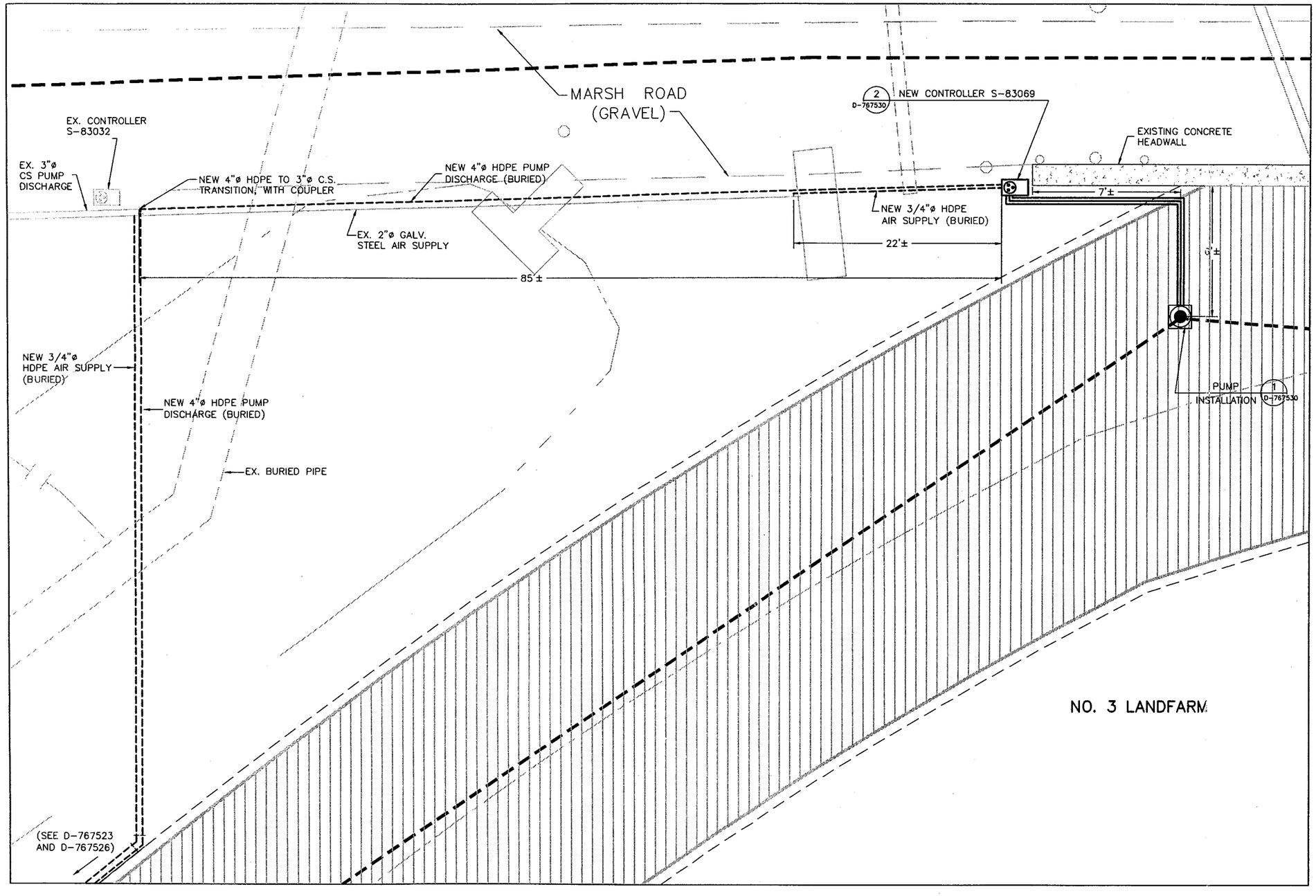

DETAIL 3 D-767523
S-83069

NOTES:

1. NOTE PRESENCE OF EXISTING OVERHEAD AND UNDERGROUND UTILITY LINES.
2. ALL NEW HDPE PIPING TO BE BURIED.
3. CONTOURS AND GRADES ARE NOT SHOWN FOR CLARITY.
4. LOCATION OF EXISTING GPS EXTRACTION TRENCHES ARE APPROXIMATE.

LEGEND:

- EX. GPS EXTRACTION TRENCH
- EX. ROAD
- CENTERLINE OF EX. V-DITCH
- DAYLIGHT LINE OF EX. V-DITCH
- EX. OVERHEAD ELECTRICAL
- EX. HDPE V-DITCH LINER
- EX. SUMP / NEW PUMP LOCATION
- EX. ABOVE GROUND PIPELINE
- EX. BURIED PIPELINE
- NEW ABOVE GROUND PIPELINE
- NEW BURIED PIPELINE
- CONTROLLER LOCATION

REGISTERED PROFESSIONAL ENGINEER
No. C 58295
EXP. 6/30/00
CIVIL
STATE OF CALIFORNIA

N

0 5
Approximate Scale In Feet

Waste Discharge Order Project
DAMES & MOORE
A DAMES & MOORE GROUP COMPANY
JOB NO. 42100-001-043

REFERENCE DRAWINGS	
LFM1-STORM WATER PIPING	D-782416-1
LFM1-STORM WATER PIPING	D-782417-1
LFM1-HEADWALL PLAN & SECTIONS	D-782418-1
LFM1-OUTFALL & MANHOLE DETAILS	D-782419-1

REVISIONS		
0	ISSUE FOR CONSTRUCTION NO. 1-5 LANDFARMS 12/98	CIK
1	AS-BUILT 9/15/99	AGP

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Richmond Refinery

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92699SLD

NO. 3 LANDFARM – SUMP NO. S-83069
SECTOR 83: LANDFARMS
GROUNDWATER PROTECTION SYSTEM
UTILITIES/ENVIRONMENTAL ABU

A W.O. S.O. D-767527-1

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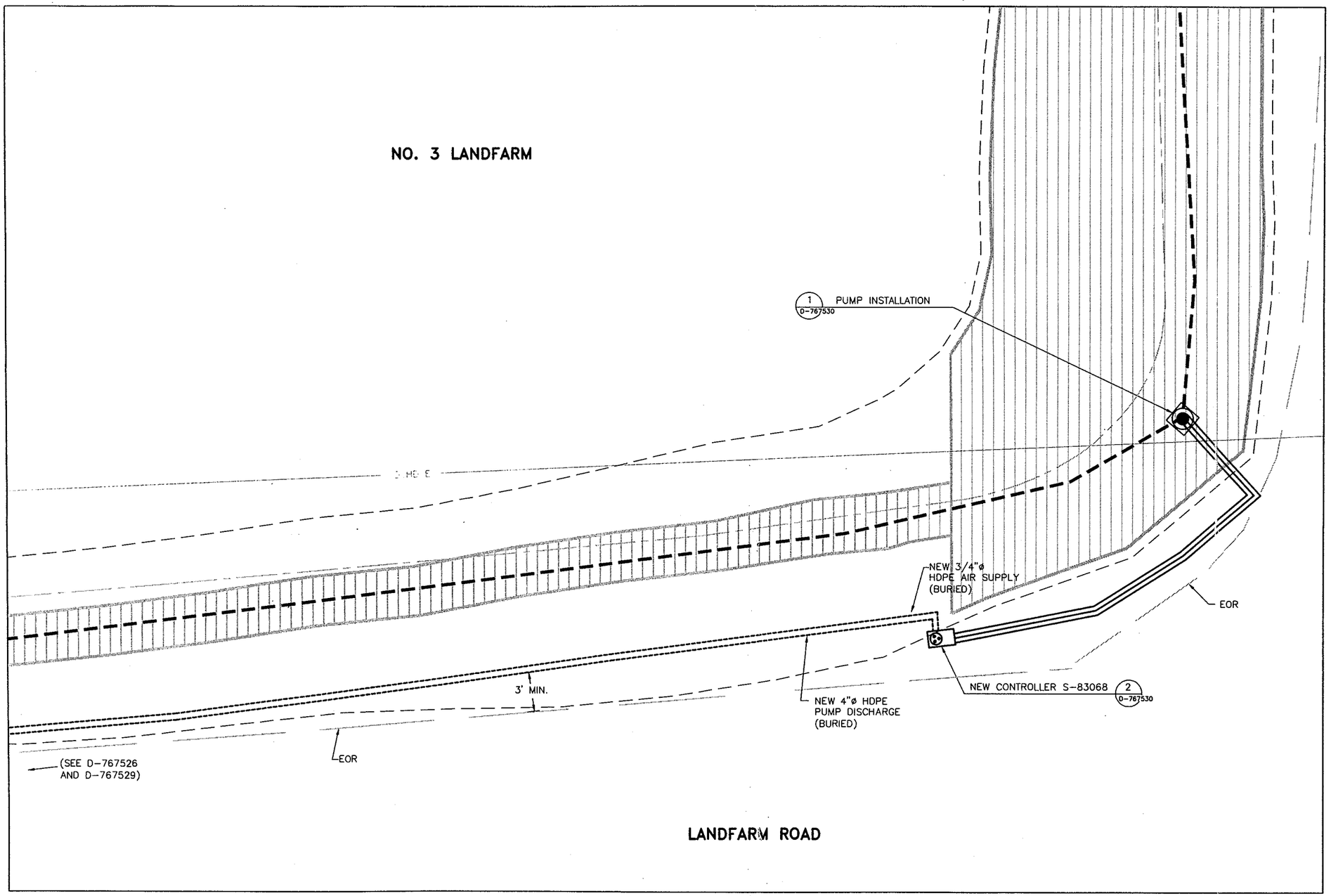

DETAIL 4 / D-767523
S-83068

NOTES:

1. NOTE PRESENCE OF EXISTING OVERHEAD AND UNDERGROUND UTILITY LINES.
2. ALL NEW HDPE PIPING TO BE BURIED.
3. CONTOURS AND GRADES ARE NOT SHOWN FOR CLARITY.
4. LOCATION OF EXISTING GPS EXTRACTION TRENCHES ARE APPROXIMATE.

LEGEND:

- EX. GPS EXTRACTION TRENCH
- EX. ROAD
- CENTERLINE OF EX. V-DITCH
- DAYLIGHT LINE OF EX. V-DITCH
- EX. OVERHEAD ELECTRICAL
- EX. HDPE V-DITCH LINER
- EX. SUMP / NEW PUMP LOCATION
- EX. ABOVE GROUND PIPELINE
- EX. BURIED PIPELINE
- NEW ABOVE GROUND PIPELINE
- NEW BURIED PIPELINE
- CONTROLLER LOCATION

REGISTERED PROFESSIONAL ENGINEER THOMAS M. BRETT No. C 55285 EXP. 6/30/07 CIVIL STATE OF CALIFORNIA

N

0 5
Approximate Scale In Feet

DCM GROUP
Waste Discharge Order Project
DAMES & MOORE
A DAMES & MOORE GROUP COMPANY
JOB NO. 42100-001-043

REFERENCE DRAWINGS	
LFM1-STORM WATER PIPING	D-782416-1
LFM1-STORM WATER PIPING	D-782417-1
LFM1-HEADWALL PLAN & SECTIONS	D-782418-1
LFM1-OUTFALL & MANHOLE DETAILS	D-782419-1

REVISIONS		
0	ISSUE FOR CONSTRUCTION NO. 1-5 LANDFARMS 12/98	CIK
1	AS-BUILT 9/15/99	AGF

Chevron
Richmond Refinery

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NO. 3 LANDFARM – SUMP NO. S-83068
SECTOR 83: LANDFARMS
GROUNDWATER PROTECTION SYSTEM
UTILITIES/ENVIRONMENTAL ABU

A W.O. S.O. D-767528-1

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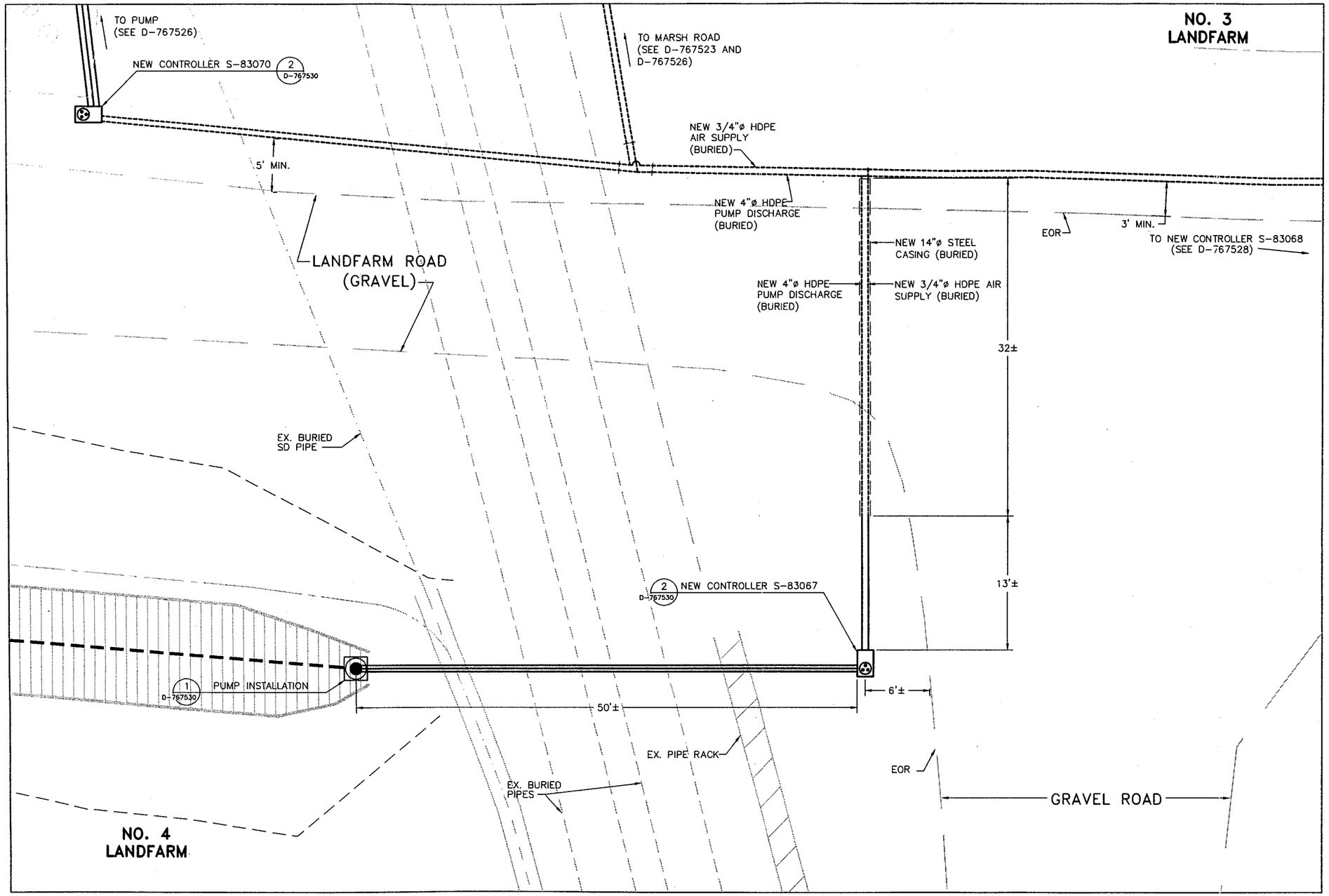

DETAIL 5 / D-767523
S-83067

NOTES:

1. NOTE PRESENCE OF EXISTING OVERHEAD AND UNDERGROUND ELECTRICAL LINES.
2. ALL NEW HDPE PIPING TO BE BURIED.
3. CONTOURS AND GRADES ARE NOT SHOWN FOR CLARITY.
4. LOCATION OF EXISTING GPS EXTRACTION TRENCHES ARE APPROXIMATE.

LEGEND:

- EX. GPS EXTRACTION TRENCH
- EX. ROAD
- CENTERLINE OF EX. V-DITCH
- DAYLIGHT LINE OF EX. V-DITCH
- EX. OVERHEAD ELECTRICAL
- EX. HDPE V-DITCH LINER
- EX. SUMP / NEW PUMP LOCATION
- EX. ABOVE GROUND PIPELINE
- EX. BURIED PIPELINE
- NEW ABOVE GROUND PIPELINE
- NEW BURIED PIPELINE
- NEW BURIED CASING
- CONTROLLER LOCATION

N

0 5
Approximate Scale In Feet

REGISTERED PROFESSIONAL ENGINEER
No. C 68286, EXP. 6/30/02
CIVIL
STATE OF CALIFORNIA

Waste Discharge Order Project
DAMES & MOORE
A DAMES & MOORE GROUP COMPANY
JOB NO. 42100-001-043

REFERENCE DRAWINGS		
LFM1-STORM WATER PIPING	D-782416-1	
LFM1-STORM WATER PIPING	D-782417-1	
LFM1-HEADWALL PLAN & SECTIONS	D-782418-1	
LFM1-OUTFALL & MANHOLE DETAILS	D-782419-1	

REVISIONS		
0 ISSUE FOR CONSTRUCTION NO. 1-5 LANDFARMS 12/98	CIK	
1 AS-BUILT 9/15/99	AGF	

Chevron
Richmond Refinery

SCALE AS NOTED DR. C. KOSSA DR. APP. SLD DATE OCT. 1998 APPROVED
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NO. 4 LANDFARM - SUMP NO. S-83067
SECTOR 83: LANDFARMS
GROUNDWATER PROTECTION SYSTEM
UTILITIES/ENVIRONMENTAL ABU

A W.O. S.O. D-767529-1

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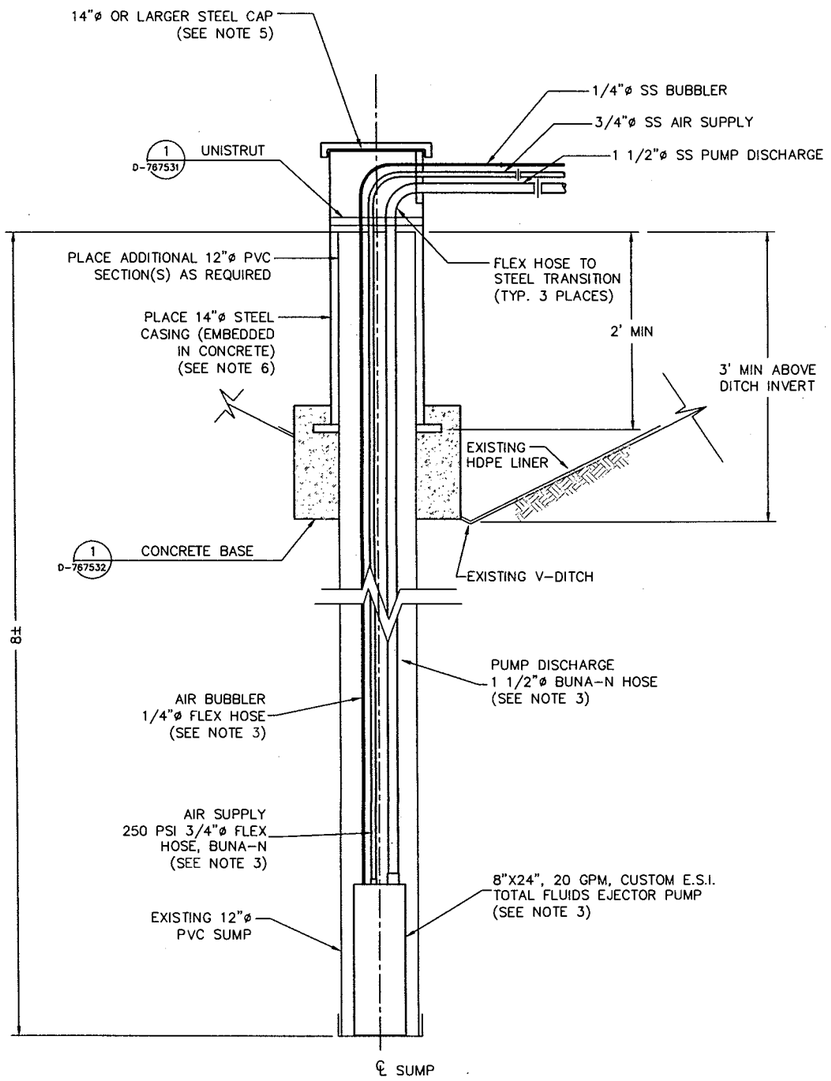
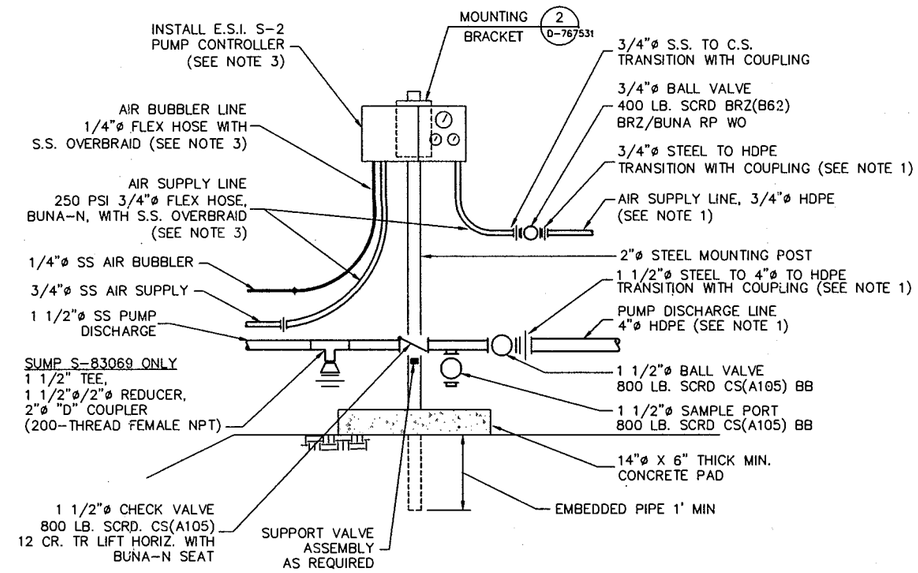


DETAIL 1

PUMP INSTALLATION — D-767525, D-767526, D-767527, D-767528, D-767529

NOT TO SCALE

NOTE: THIS DETAIL FOR SUMPS S-83067, S-83068, S-83069, S-83070 AND S-83071.



DETAIL 2

NEW CONTROLLER — D-767525, D-767526, D-767527, D-767528, D-767529

NOT TO SCALE

NOTE: THIS DETAIL FOR CONTROLLERS S-83067, S-83068, S-83069, S-83070 AND S-83071.

NOTES:

1. 3/4"ø AIR SUPPLY AND 4"ø PUMP DISCHARGE LINES SHALL BE CARBON STEEL FOR SUMP S-83071, AND HDPE FOR ALL OTHER SUMP LOCATIONS.
2. NEW HDPE AIR SUPPLY AND PUMP DISCHARGE SHALL BE LAID ON GROUND OR BURIED (SEE DWGS. D-767522 THROUGH D-767529). CONTRACTOR SHALL PROVIDE AND INSTALL PIPELINES AND FITTINGS NECESSARY TO CONNECT THE NEW BURIED LINES TO THE EXISTING ABOVE GROUND GPS LINES.
3. ITEMS SUPPLIED BY PUMP MANUFACTURER.
4. FINISHED ELEVATION OF TOP OF CONCRETE SLAB AND TOP OF STEEL CASING TO BE DETERMINED BY THE FIELD ENGINEER.
5. CONTRACTOR SHALL SIZE STEEL CAP APPROPRIATELY.
6. STEEL CASING SHALL HAVE SLOTS CUT TO SEAT THE UNISTRUT AND FOR HOSES AND ANCHOR CABLE

REGISTERED PROFESSIONAL ENGINEER — No. C 58265, EXP. 6/30/02, CIVIL, STATE OF CALIFORNIA

Waste Discharge Order Project
DAMES & MOORE
A DAMES & MOORE GROUP COMPANY
JOB NO. 42100-001-043

REFERENCE DRAWINGS

REVISIONS		
0 ISSUE FOR CONSTRUCTION NO. 1-5 LANDFARMS 12/98	CIK	
1 AS-BUILT 9/15/99	AGP	

Chevron — Richmond Refinery

SCALE AS NOTED — DR. C. KOSSA — DR. APP. — DATE OCT. 1999 — APPROVED
ENGR. TMS — ENGR. DEPT.
OPR'G. DEPT.

PUMP INSTALLATION DETAILS 1
SECTOR 83: LANDFARMS
GROUNDWATER PROTECTION SYSTEM
UTILITIES/ENVIRONMENTAL ABU

A — W.O. — S.O. — D-767530-1

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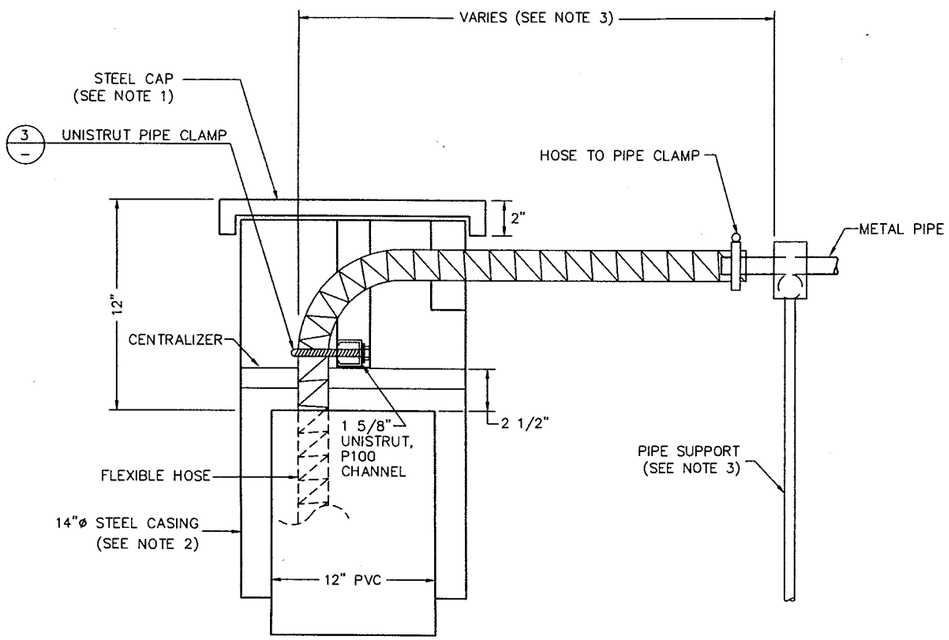
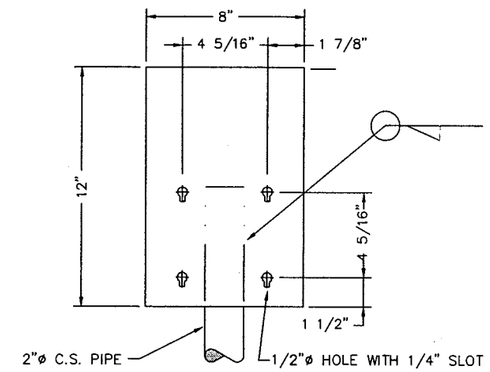


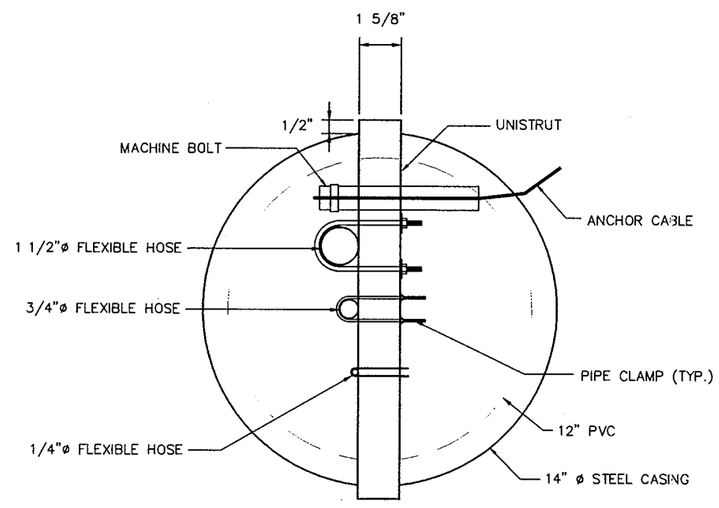
DETAIL 1 (D-767530)
UNISTRUT

NOT TO SCALE



DETAIL 2 (D-767530)
MOUNTING BRACKET

NOT TO SCALE



DETAIL 3 (–)
UNISTRUT PIPE CLAMP

NOT TO SCALE

NOTES:

1. CONTRACTOR SHALL SIZE STEEL CAP.
2. STEEL CASING SHALL HAVE SLOTS CUT TO SEAT THE UNISTRUT, HOSES, AND ANCHOR CABLES.
3. CONTRACTOR SHALL PROVIDE SUFFICIENT SUPPORTS FOR PUMP DISCHARGE PIPES BETWEEN THE SUMP AND THE SUBHEADER OR HEADER. PIPE SUPPORT LOCATIONS SHALL BE DETERMINED BY THE FIELD ENGINEER.
4. CONTRACTOR SHALL CONFIRM DIMENSIONS OF MOUNTING BRACKETS WITH THE MANUFACTURER AND INSTALL PER MANUFACTURER'S RECOMMENDATIONS.

REGISTERED PROFESSIONAL ENGINEER
No. C 58286
EXP. 6/30/02
CIVIL
STATE OF CALIFORNIA

Waste Discharge Order Project
DAMES & MOORE
A DAMES & MOORE GROUP COMPANY
JOB NO. 42100-001-043

REFERENCE DRAWINGS

REVISIONS

0	ISSUE FOR CONSTRUCTION NO. 1-5 LANDFARMS 12/98	CIK		
1	AS-BUILT 9/15/99	AGP		

Chevron
Richmond Refinery

SCALE AS NOTED DR. C. KOSSA DR. APP. DATE OCT. 1998 APPROVED
ENGR. ENGR. DEPT.
OPR'G. DEPT.

92899SLD

PUMP INSTALLATION DETAILS 2
SECTOR 83: LANDFARMS
GROUNDWATER PROTECTION SYSTEM
UTILITIES/ENVIRONMENTAL ABU

A W.O. S.O. D-767531-1

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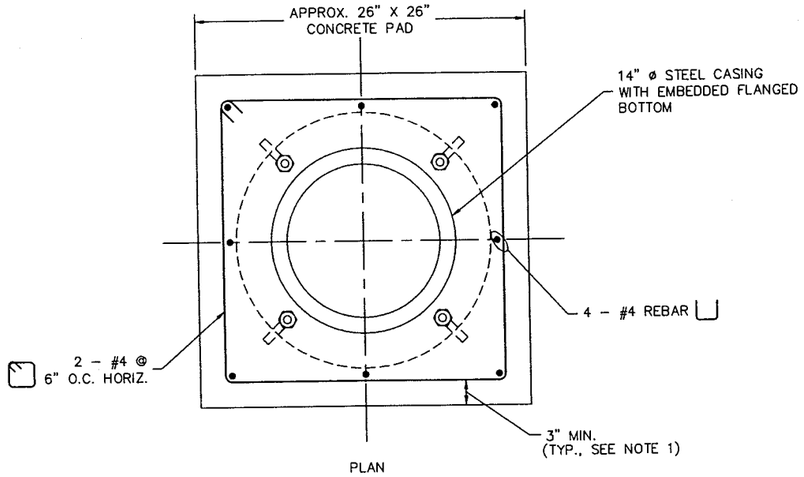
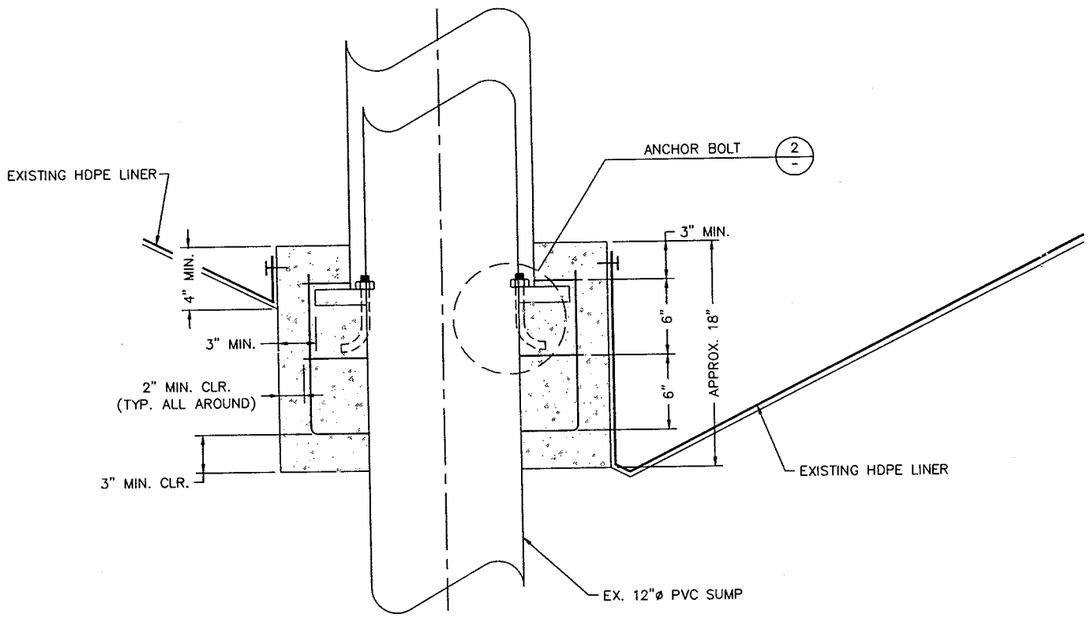


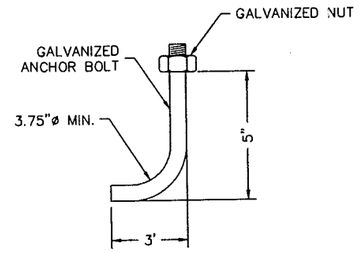
PLAN



SECTION

DETAIL 1
CONCRETE BASE D-767530-0

NOT TO SCALE



DETAIL 2
ANCHOR BOLT

NOTES:

1. MINIMUM CLEARANCE TO REINFORCEMENT SHALL BE 3" WHEN CAST AGAINST SOIL AND 2" ELSEWHERE (UNLESS OTHERWISE NOTED).

2. REBARS SHALL BE GRADE 60 STEEL AND BE DEFORMED BARS.

Waste Discharge Order Project
DAMES & MOORE
A DAMES & MOORE GROUP COMPANY
JOB NO. 42100-001-043

REFERENCE DRAWINGS

REVISIONS

0	ISSUE FOR CONSTRUCTION NO. 1-5 LANDFARMS 12/98	CIK	
1	AS-BUILT 9/15/99	AGP	

Chevron
Richmond Refinery

SCALE AS NOTED DR. C. KOSSA DR. APP. DATE MAR. 1999
ENGR. DR. ENGR. DEPT.
OPR'G. DEPT.

APPROVED

91399SLD

CONCRETE BASE DETAIL
SECTOR 83: LANDFARMS
GROUNDWATER PROTECTION SYSTEM
UTILITIES/ENVIRONMENTAL ABU

A W.O. S.O. D-767532-1

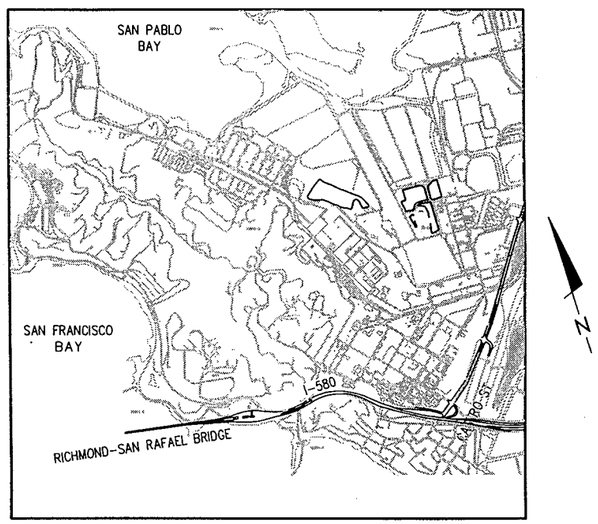
42100001 \CHEV-R\S83\GPS\ASBLT\D767532-1 030599 1:1 090999J.CIK

Chevron

RICHMOND REFINERY
RICHMOND, CALIFORNIA

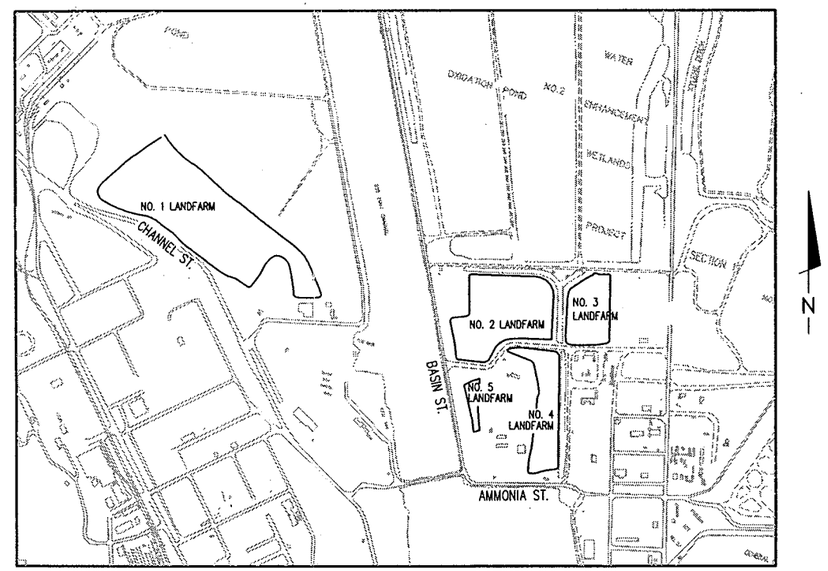
WASTE DISCHARGE ORDER PROJECT

LANDFARMS CLOSURE PLAN
LANDFARMS NO. 1 THROUGH 5



LOCATION MAP

0 2000
Scale in Feet



VICINITY MAP

0 500
Scale in Feet

DWG. NO.	TITLE
D-767512-1	NO. 1 LANDFARM - FINISHED GRADING PLAN
D-767513-1	NO. 1 LANDFARM - SECTIONS
D-767514-1	NO. 1 LANDFARM - DITCH PLAN
D-767515-1	NO. 2 THROUGH 5 LANDFARMS - FINISHED GRADING PLAN
D-767516-1	NO. 2 THROUGH 5 LANDFARMS - SECTIONS
D-767517-1	NO. 2 THROUGH 5 LANDFARMS - SECTIONS AND DETAILS
D-767518-1	NO. 2 THROUGH 5 LANDFARMS - DITCH PLAN
D-767519-1	NO. 1 AND 3 LANDFARMS - STORMWATER DRAIN PLANS
D-318549-1	NO. 3 LANDFARM - STORMWATER DRAIN DETAILS
D-318600-1	NO. 1 LANDFARM - IRRIGATION PLAN
D-318601-1	NO. 2 THROUGH 5 LANDFARMS - IRRIGATION PLAN
D-318602-1	NO. 1 THROUGH 5 LANDFARMS - MISCELLANEOUS DETAILS
D-318603-1	NO. 1 THROUGH 5 LANDFARMS - MISC. IRRIGATION DETAILS
D-782119	EXTRACTION WELLS AND MONITORING WELLS DETAILS

GENERAL NOTES

1. COORDINATES SHOWN ARE BASED ON 1983 NORTH AMERICAN DATUM (N.A.D.) COORDINATE SYSTEM

2. ELEVATIONS SHOWN ARE BASED ON RICHMOND REFINERY DATUM. ELEVATION 0.00' EQUALS ELEVATION -2.17' NATIONAL GEODETIC VERTICAL DATUM (NGVD)

3. HYDROSEED ALL DISTURBED AREAS PER PROJECT SPECIFICATION RS-781.

4. ALL CONSTRUCTION SHALL CONFORM TO THESE PLANS AND SPECIFICATIONS.

5. THE TYPES, LOCATIONS, SIZES AND/OR DEPTHS OF EXISTING UTILITIES AS SHOWN ON THESE DRAWINGS ARE FROM THE BEST INFORMATION AVAILABLE. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR THE COMPLETENESS OR ACCURACY OF THE DELINEATION OF SAID UTILITIES NOR FOR THE EXISTENCE OF OTHER BURIED OBJECTS OR UTILITIES WHICH MAY BE ENCOUNTERED BUT WHICH ARE NOT SHOWN ON THESE DRAWINGS.

6. THE CONTRACTOR IS RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING STRUCTURES, UTILITIES, AND FACILITIES. ANY DAMAGE TO EXISTING FACILITIES BY THE CONTRACTOR OR HIS SUBCONTRACTORS SHALL BE RESTORED (TO AND EQUAL OR BETTER CONDITION) OR REPLACED (TO AN EQUAL OR BETTER CONDITION) AT NO COST TO THE COMPANY.

7. THE CONTRACTOR IS RESPONSIBLE FOR ALL EROSION CONTROL REQUIREMENTS. CONTRACTOR SHALL IMPLEMENT ANY NECESSARY BEST MANAGEMENT PRACTICES AS OUTLINED IN THE PROJECT SPECIFICATIONS OR AS DIRECTED BY THE ENGINEER.

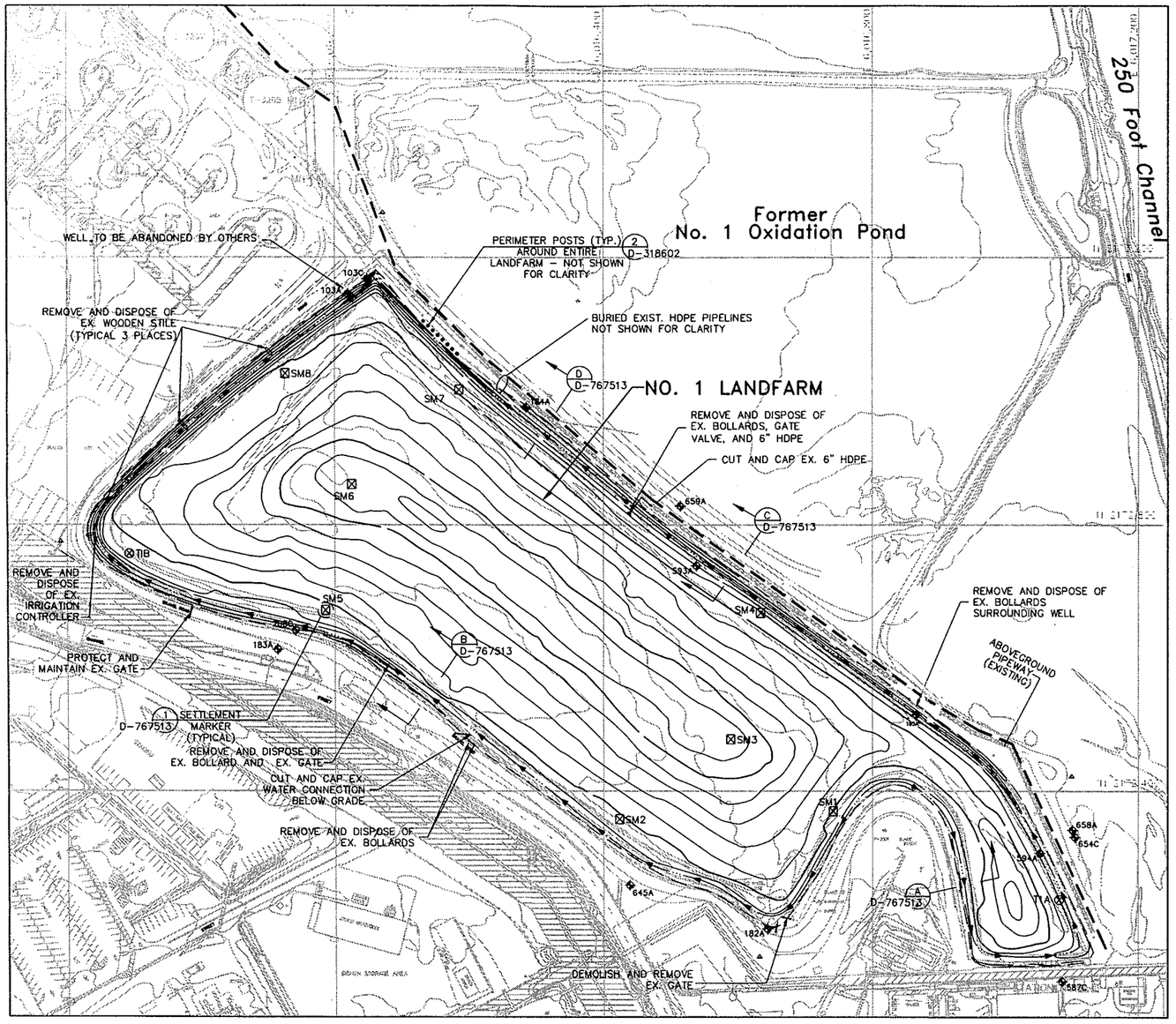
8. IT IS THE INTENTION OF THESE PLANS AND PROJECT SPECIFICATION TO PROVIDE A BALANCED CUT AND FILL DESIGN. EXISTING COUNTOURS MAY DIFFER FROM THOSE SHOWN. DITCH ALIGNMENT SHOWN IS DESIGNED TO PROVIDE THE CLOSEST APPROXIMATE TO A BALANCED CUT AND FILL. ADJUSTMENTS TO THIS ALIGNMENT, AS APPROVED BY THE ENGINEER, ARE PERMISSIBLE TO MAINTAIN NECESSARY CLEARANCE REQUIREMENTS FOR EXISTING STRUCTURES. THE SLOPE OF CAPS MAY ALSO BE VARIED TO YIELD A BALANCED DESIGN, BUT MAY NOT BE LESS THAN 4% SHOWN OR GREATER THAN 10%.

AS-BUILT
SEPTEMBER 1999

REGISTERED PROFESSIONAL ENGINEER
THOMAS M. SWEET
No. C 58265
EXP.
CIVIL
STATE OF CALIFORNIA

DCM GROUP
DAMES & MOORE
A DAMES & MOORE GROUP COMPANY
SAN FRANCISCO, CA.

19000900\CHEV-R\S83\LFARMS\ASBUILT\COVER 071897 1:1 082399B AGP



SETTLEMENT MARKER LOCATION

ID	NORTHING	EASTING
SM1	2172370.02	6016741.13
SM2	2172357.91	6016423.56
SM3	2172478.08	6016590.09
SM4	2172668.33	6016634.56
SM5	2172672.11	6015985.62
SM6	2172860.94	6016024.76
SM7	2173002.96	6016183.78
SM8	2173027.68	6015927.79

TENSIOMETER LOCATION

ID	NORTHING	EASTING
T1A	2172237.46	6017081.94
T1B	2172756.88	6015693.07

NOTES:

1. EXISTING CONTOUR LINES ARE AT 1 FOOT INTERVALS BASED ON AERIAL PHOTOGRAPHS DATED AUGUST 1990.
2. LINES AND GRADES SHOWN ARE FINAL GRADES BASED ON AS-BUILT SURVEY DATED AUGUST 1999.
3. LINES AND GRADES SHOWN ARE FINAL GRADES.
4. CONTRACTOR WILL REMOVE EXISTING IRRIGATION SYSTEM PRIOR TO START OF WORK.
5. ANY WELLS WITHIN DISTURBED AREA OF LANDFARMS NOT LABELED "TO BE ABANDONED" SHALL BE RESTORED TO PREVIOUS CONDITION AS PER D-782119.

LEGEND:

- EXISTING OR PLANNED GPS EXTRACTION TRENCH
- EXISTING GROUNDWATER MONITORING WELL
- CENTERLINE OF PROPOSED DITCH
- DAYLIGHT LINE OF PROPOSED DITCH
- SM — SETTLEMENT MARKER LOCATION
- T1 — TENSIOMETER LOCATION
- AS-BUILT CONTOURS
- EXISTING CONTOURS

N

0 100
Scale In Feet

ABBREVIATIONS:

ø, DIA	DIAMETER
BGS	BELOW GROUND SURFACE
CLR	CLEARANCE
CMP	CORRUGATED METAL PIPE
CSP	CARBON STEEL PIPE
CY	CUBIC YARDS
DWOP	DEEP WATER OUTFALL PROJECT
E	EAST
EF	EACH FACE
EL	ELEVATION
EW	EACH WAY
EX	EXISTING
EWEF	EACH WAY, EACH FACE
HDPE	HIGH DENSITY POLYETHYLENE
MAX.	MAXIMUM
MIN.	MINIMUM
IE.	INVERT ELEVATION
INV	INVERT
LF	LINEAL FOOT
NO.	NUMBER
N	NORTH
O.C.	ON CENTER
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
SCH	SCHEDULE
STA	STATION
TAN	TANGENT
TYP	TYPICAL
U.V.	ULTRA-VIOLET

REGISTERED PROFESSIONAL ENGINEER THOMAS M. SCHMIDT No. C 58265 EXP. 6/30/01 CIVIL STATE OF CALIFORNIA

Waste Discharge Order Project
DAMES & MOORE
GROUP
A DAMES & MOORE GROUP COMPANY
JOB NO. 42100-001-043

REFERENCE DRAWINGS

NO. 1 LANDFARM – SECTIONS	D-767513
NO. 1 LANDFARM – DITCH PLAN	D-767514
NO. 1 LANDFARM – IRRIGATION PLAN	D-318600
EXTRACTION WELLS & MONITORING WELLS DETAILS	D-782119

REVISIONS

0 ISSUED FOR CONSTRUCTION	5/11/98	CIK
1 AS-BUILT	9/15/98	SLD

Chevron
Richmond Refinery

SCALE AS NOTED DR. C.KOSSA DR. APP. DATE 9/29/99 APPROVED
ENGR. ENGR. DEPT.
OPR'G. DEPT.

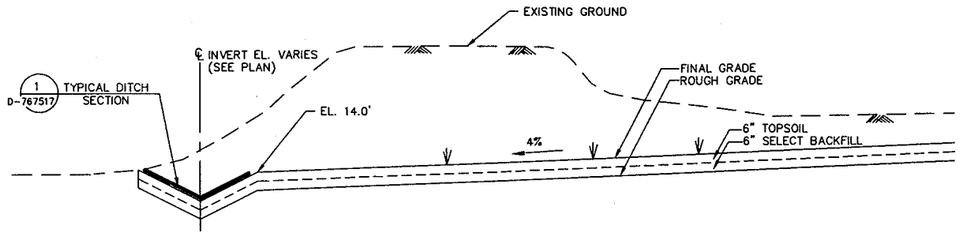
C92899SLD

NO. 1 LANDFARM – FINISHED GRADING PLAN
SECTOR 83: LANDFARMS
LANDFARMS CLOSURE PLAN
UTILITIES/ENVIRONMENTAL ABU

S W.O. S.O.

D-767512-1

19000900\CHEV-R\S83\LFARMS\ASBUILT\D7675121 062697 1:1 092199 B SLD XREF:LF1BASE

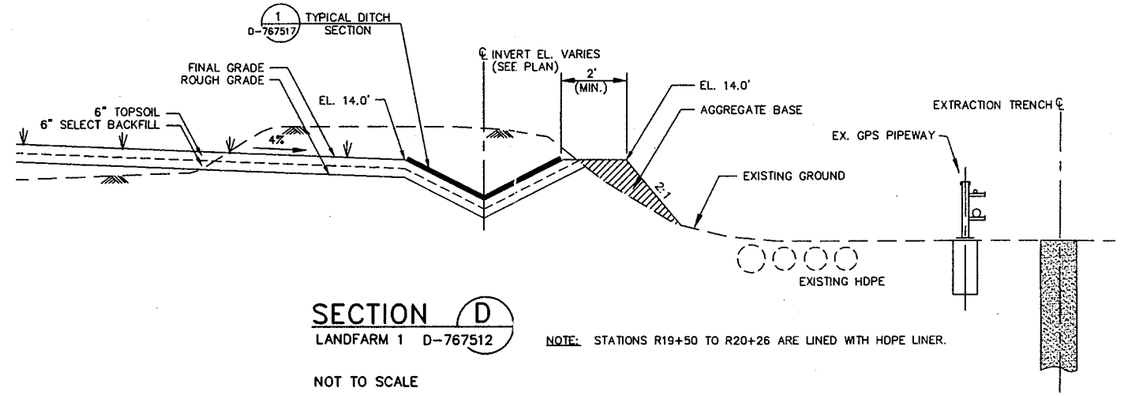


TYPICAL SECTION A

LANDFARM 1 D-767512

STA L0+00 TO STA L2+75
STA R0+00 TO STA R5+25

NOT TO SCALE

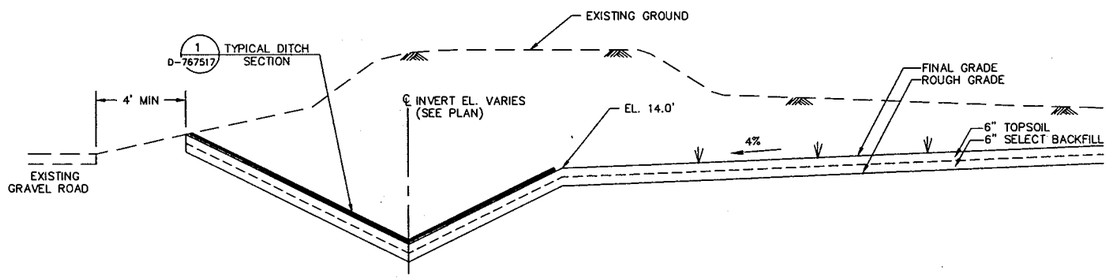


SECTION D

LANDFARM 1 D-767512

NOTE: STATIONS R19+50 TO R20+26 ARE LINED WITH HDPE LINER.

NOT TO SCALE



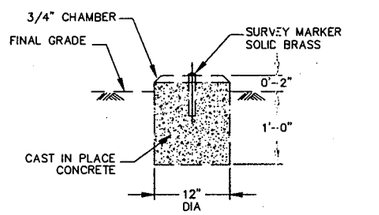
TYPICAL SECTION B

LANDFARM 1 D-767512

NOTE: STATIONS L15+00 TO L20+36 ARE LINED WITH HDPE LINER INSTEAD OF CURLEX.
STATIONS L2+75 TO L15+00 CONFORM TO THE TYPICAL DITCH SECTION.

STA L2+75 TO L20+36

NOT TO SCALE

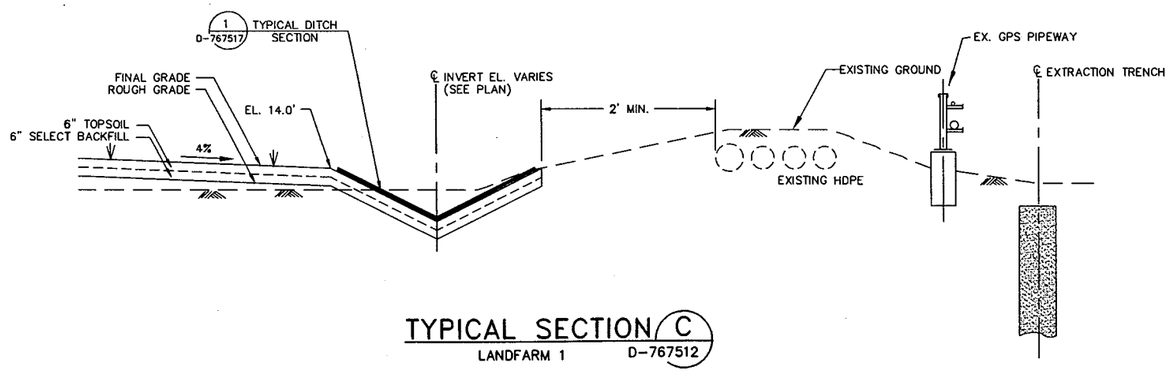


SEE NOTES 1 AND 2.

DETAIL 1/1

SETTLEMENT MARKER D-767512 / D-767515

NOT TO SCALE



TYPICAL SECTION C

LANDFARM 1 D-767512

STA R5+25 TO R16+50

NOT TO SCALE

NOTES:

1. FOR SETTLEMENT MARKER LOCATIONS SEE SETTLEMENT MARKER TABLES, DRAWING D-767512 AND D-767515
2. CONTRACTOR SHALL LABEL EACH SETTLEMENT MARKER WITH CORRESPONDING NUMBER AS SHOWN ON PLAN VIEWS. NUMBER SHALL BE STAMPED INTO TOP OF BRASS SURVEY MARKER.

REGISTERED PROFESSIONAL ENGINEER THOMAS H. DIXON No. C 49286 EXP. 6/30/02 CIVIL STATE OF CALIFORNIA

Waste Discharge Order Project
DAMES & MOORE
A DAMES & MOORE GROUP COMPANY
JOB NO. 42100-001-043

REFERENCE DRAWINGS		
NO. 1 LANDFARM – FINISHED GRADING PLAN	D-767512	
NO. 1 LANDFARM – DITCH PLAN	D-767514	
NO. 1 LANDFARM – IRRIGATION PLAN	D-318600	

REVISIONS		
0 ISSUED FOR CONSTRUCTION	5/11/98	CIK
1 AS BUILT	9/15/98	SLD

Chevron
Richmond Refinery

SCALE AS SHOWN DR. RLS DR. APP. SLD DATE 9/28/97 APPROVED
ENGR. TMS ENGR. DEPT.
OPR'G. DEPT.

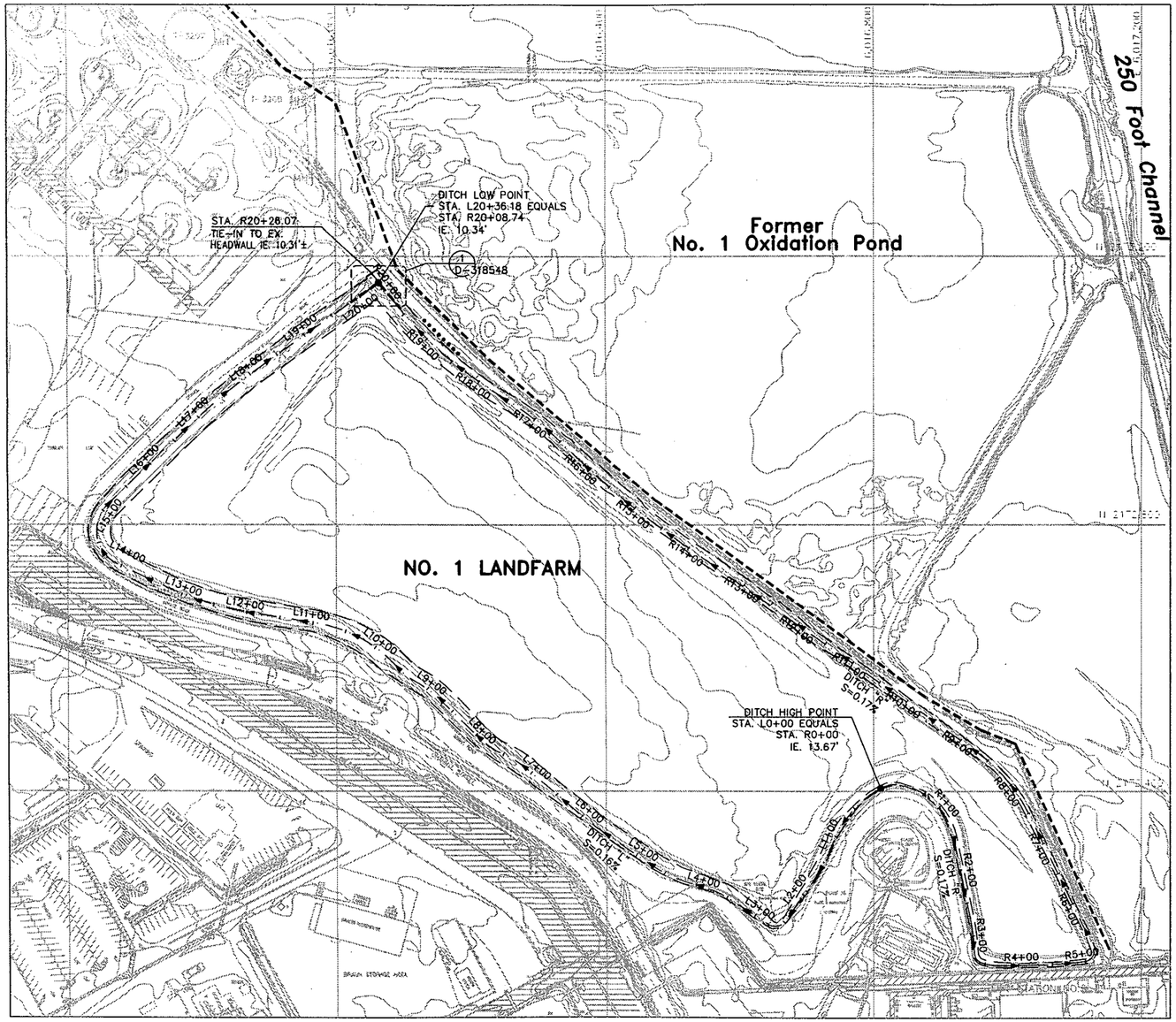
092899SLD

NO. 1 LANDFARM – SECTIONS
SECTOR 83: LANDFARMS
LANDFARMS CLOSURE PLAN
UTILITIES/ENVIRONMENTAL ABU

W.O.
S.O.

D-767513-1

19000900\CHEV-R\S83\LFARMS\ASBUILT\D7675131 071497 1:1 092799 B AGP



LAYOUT DATA – DITCH "L"			
STATION	TAN. LENGTH BEARING / RADIUS	LENGTH	INCLUDED ANGLE
L0+00.00*			
	152.00'	98.20'	37°01'00" (L)
L0+98.20			
	30.00' S 24°27'47" W		
L1+28.20			
	300.00'	57.16'	10°55'00" (R)
L1+85.36			
	63.00' S 35°22'47" W		
L2+48.36			
	18.00'	27.51'	87°33'00" (R)
L2+75.87			
	70.00' N 57°04'13" W		
L3+45.87			
	135.00'	38.29'	16°15'00" (L)
L3+84.16			
	28.00' N 73°19'13" W		
L4+12.16			
	200.00'	61.67'	17°40'00" (R)
L4+73.83			
	83.00' N 55°39'13" W		
L5+56.83			
	400.00'	40.61'	05°49'00" (R)
L5+97.44			
	116.00' N 49°50'13" W		
L7+13.44			
	115.00'	35.48'	17°40'30" (L)
L7+48.92			
	100.00'	38.94'	22°16'30" (R)
L7+87.86			
	88.00' N 44°12'13" W		
L8+75.86			
	150.00'	39.20'	14°58'30" (L)
L9+15.06			
	11.00' N 60°10'43" W		
L9+26.06			
	80.00'	24.69'	17°41'00" (R)
L9+50.75			
	10.00' N 42°29'43" W		
L9+60.75			
	200.00'	133.40'	38°15'00" (L)
L10+94.15			
	105.00' N 80°52'43" W		
L11+99.15			
	450.00'	124.09'	15°48'00"(R)
L13+23.24			
	82.50' N 64°54'43" W		
L14+05.74			
	55.00'	106.45'	110°53'30"(R)
L15+12.19			
	180.00' N 45°58'47" E		
L16+92.19			
	800.00'	121.01'	08°40'00" (R)
L18+13.20			
	222.98' N 54°38'47" E		
L20+36.18			

*L0+00 = N2172405.04, E6016810.24
S61°28'47"W

LAYOUT DATA – DITCH "R"			
STATION	TAN. LENGTH BEARING / RADIUS	LENGTH	INCLUDED ANGLE
R0+00.00*			
	50.00'	39.53'	45°17'54" (R)
R0+39.53			
	105.00'	112.97'	61°33'43" (R)
R1+52.50			
	127.00' S 11°34'36" E		
R2+79.50			
	180.00'	23.45'	07°27'52" (R)
R3+02.95			
	23.00' S 04°06'44" E		
R3+25.95			
	17.00'	20.19'	68°03'36" (L)
R3+46.14			
	80.00'	26.81'	19°12'15" (L)
R3+72.95			
	70.00' N 88°37'27" E		
R4+42.95			
	300.00'	25.23'	04°49'05" (L)
R4+68.18			
	31.00' N 83°48'22" E		
R4+99.18			
	15.50'	29.69'	109°45'01" (L)
R5+28.87			
	225.00' N 25°56'39" W		
R7+53.87			
	235.00'	117.74'	28°42'24" (L)
R8+71.61			
	550.00' N 54°39'02" W		
R14+21.61			
	1300.00'	219.26'	09°39'48" (R)
R16+40.87			
	500.00'	119.77'	13°43'29" (L)
R17+60.64			
	600.00'	217.93'	20°49'37" (R)
R19+78.57			
	47.50' N 37°54'06" W		
R20+26.07			

*R0+00 = N2172405.04, E6016810.24
N61°28'47"E

NOTES:

1. EXISTING CONTOUR LINES ARE AT 1 FOOT INTERVALS BASED ON AERIAL PHOTOGRAPHS DATED AUGUST 1990.
2. THE LAYOUT DATA TABLES FOR DITCHES "L" AND "R" AND THE DITCH LOW AND HIGH POINTS INDICATE DESIGN LOCATIONS, AND DO NOT REFLECT AS-BUILT LOCATIONS OF THE DITCH CENTERLINE ARE AS SHOWN ON THE PLAN.
3. STATIONS ARE BASED ON DESIGN CENTERLINES OF THE DITCHES.
4. LOCATIONS OF EXISTING GPS EXTRACTION TRENCH WITHIN THE LANDFARM LIMITS ARE APPROXIMATE.

LEGEND:

- EXISTING OR PLANNED GPS EXTRACTION TRENCH
- CENTERLINE OF PROPOSED DITCH
- DAYLIGHT LINE OF PROPOSED DITCH

N

0 100
Scale in Feet

REGISTERED PROFESSIONAL ENGINEER
THOMAS M. GRANT
REG. NO. C 58969
EXP. 6/30/01
CIVIL
STATE OF CALIFORNIA

DCM GROUP

Waste Discharge Order Project
DAMES & MOORE
A DAMES & MOORE GROUP COMPANY
JOB NO. 42100-001-043

REFERENCE DRAWINGS	
NO. 1 LANDFARM – FINISHED GRADING PLAN	D-767512
NO. 1 LANDFARM – SECTIONS	D-767513
NO. 1 LANDFARM – IRRIGATION PLAN	D-318600
EXTRACTION WELLS & MONITORING WELLS DETAILS	D-782119

REVISIONS		
0 ISSUED FOR CONSTRUCTION	5/11/98	CIK
1 AS-BUILT	9/15/99	SLD

Chevron
Richmond Refinery

SCALE AS NOTED DR. C.KOSSA DR. APP. DATE 9/22/99 APPROVED
ENGR. DEPT.
OPR'G. DEPT.

092899SLD

NO. 1 LANDFARM – DITCH PLAN
SECTOR 83: LANDFARMS
LANDFARMS CLOSURE PLAN
UTILITIES/ENVIRONMENTAL ABU

W.O.
S.O.

D-767514-1

19000900\CHEV-R\S83\LFARMS\ASBUILT\D7675141 062697 1:1 092799 C SLD XREF:LF1BASE

SETTLEMENT MARKER LOCATION

AREA LOCATION	ID	NORTHING	EASTING
NO. 2 LANDFARM	SM01	2171780.12	6018201.63
	SM02	2171933.20	6018204.05
	SM03	2171883.53	6018065.66
	SM04	2172124.17	6018144.65
	SM05	2172127.24	6018348.05
	SM06	2172340.12	6018400.02
	SM07	2172133.11	6018466.16
	SM08	2172124.79	6018679.29
	SM09	2171950.04	6018494.27
NO. 3 LANDFARM	SM10	2171927.97	6018904.04
	SM11	2171976.81	6018762.10
	SM12	2172056.32	6018891.97
	SM13	2172198.10	6018890.01
	SM14	2172234.96	6018762.38
	SM15	2172367.19	6018909.27
	SM16	2172238.02	6019022.86
	SM17	2172018.19	6019028.89
NO. 4 LANDFARM	SM18	2171099.80	6018686.95
	SM19	2171164.75	6018683.06
	SM20	2171156.15	6018619.09
	SM21	2171143.96	6018748.43
	SM22	2171773.11	6018574.23
	SM23	2171777.05	6018648.91
	SM24	2171859.13	6018482.19
	SM25	2171798.88	6018729.02
NO. 5 LANDFARM	SM26	2171330.00	6018191.89
	SM27	2171594.20	6018124.60
	SM28	2171597.32	6018166.86
	SM29	2171637.08	6018153.07
	SM30	2171622.99	6018215.01

TENSIOMETER LOCATION

AREA LOCATION	ID	NORTHING	EASTING
NO. 2 LANDFARM	T2	2171787.15	6018090.34
NO. 3 LANDFARM	T3	2172294.18	6018793.85
NO. 4 LANDFARM	T4	2171102.42	6018624.89
NO. 5 LANDFARM	T5	2171616.16	6018201.85

NOTES:

1. EXISTING CONTOUR LINES ARE AT 1 FOOT INTERVALS BASED ON AERIAL PHOTOGRAPHS DATED AUGUST 1990.
2. LINES AND GRADES SHOWN ARE FINAL GRADES AT 1 FOOT INTERVALS BASED ON AS-BUILT SURVEY DATED AUGUST 1999.
3. CONTRACTOR WILL REMOVE EXISTING IRRIGATION SYSTEM PRIOR TO START OF WORK.
4. ANY WELLS WITHIN DISTURBED AREA OF LANDFARMS NOT LABELED "TO BE ABANDONED" SHALL BE RESTORED TO PREVIOUS CONDITION AS PER D-782119.
5. EXISTING CONTOURS SHOWN ARE NOT VALID IN NORTHERN PORTION OF NO. 4 LANDFARM DUE TO PLACEMENT OF EXCESS FILL. MATERIAL CAN BE USED AS GENERAL BACKFILL, AFTER PROCESSING TO CONFORM TO PROJECT SPECIFICATIONS.
6. NOTE PRESENCE OF EXISTING OVERHEAD AND UNDERGROUND ELECTRICAL LINES.

LEGEND:

- EXISTING GPS EXTRACTION TRENCH
- EXISTING GPS BARRIER WALL
- EXISTING OVERHEAD ELECTRICAL LINE
- EXISTING UNDERGROUND ELECTRICAL LINE
- EXISTING GROUNDWATER MONITORING WELL
- PROPOSED STORM DRAINAGE PIPE
- DAYLIGHT LINE OF PROPSED DITCH
- SM SETTLEMENT MARKER LOCATION
- T2 TENSIOMETER LOCATION
- EXISTING CONTOURS
- AS-BUILT CONTOURS

N

0 100
Scale in Feet

REGISTERED PROFESSIONAL ENGINEER THOMAS M. SHULT CIVIL STATE OF CALIFORNIA EXP. 6/30/02

Waste Discharge Order Project
DAMES & MOORE
A DAMES & MOORE GROUP COMPANY
JOB NO. 42100-001-043

REFERENCE DRAWINGS

NO. 2 THROUGH 5 LANDFARMS - SECTIONS	D-767516
NO. 2 THROUGH 5 LANDFARMS - SECTIONS	D-767517
NO. 2 THROUGH 5 LANDFARMS - DITCH PLAN	D-767518
NO. 2 THROUGH 5 LANDFARMS - IRRIGATION PLAN	D-318601
EXTRACTION WELLS & MONITORING WELLS DETAILS	D-782119

REVISIONS

0 ISSUED FOR CONSTRUCTION	5/11/98	CIK
1 AS BUILT	9/15/99	SLD

Chevron
Richmond Refinery

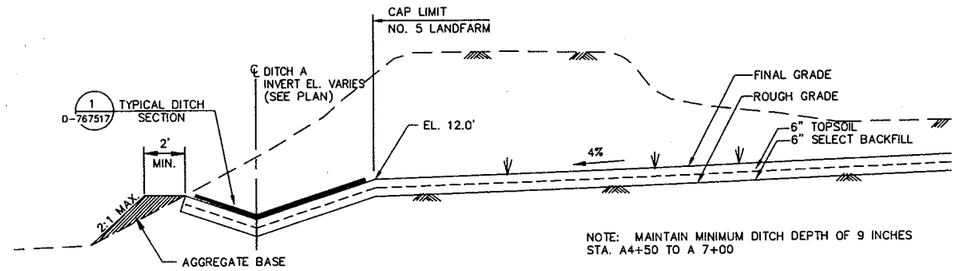
SCALE AS NOTED DR. C. KOSSA DR. APP. SLD DATE 9/20/99 APPROVED
ENGR. TMS ENGR. DEPT.
OPR'G. DEPT.

092699SLD

NO. 2 THROUGH 5 LANDFARMS - FINISHED GRADING PLAN
SECTOR 83: LANDFARMS
LANDFARMS CLOSURE PLAN
UTILITIES/ENVIRONMENTAL ABU

S W.O. S.O. D-767515-1

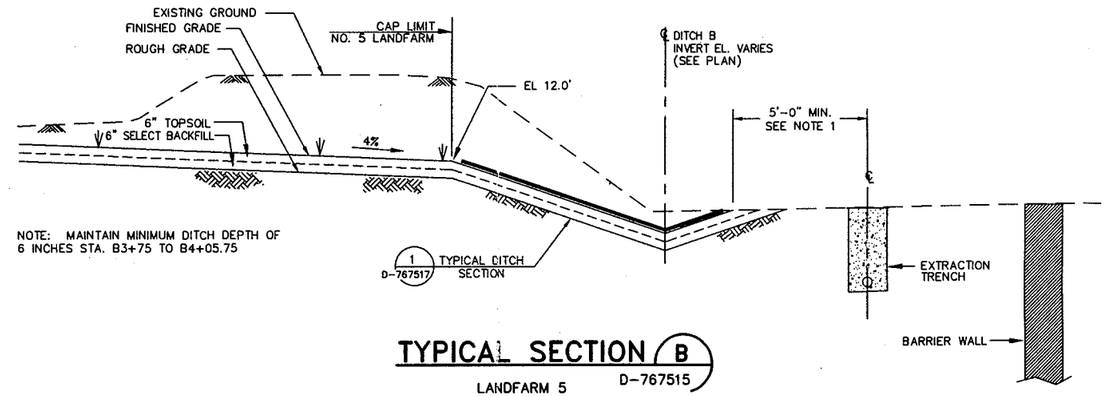
42100001\CHEV-R\S83\LFARMS\ASBUILT\D7675151 0627971:1 092799 B SLD



TYPICAL SECTION A

D-767515

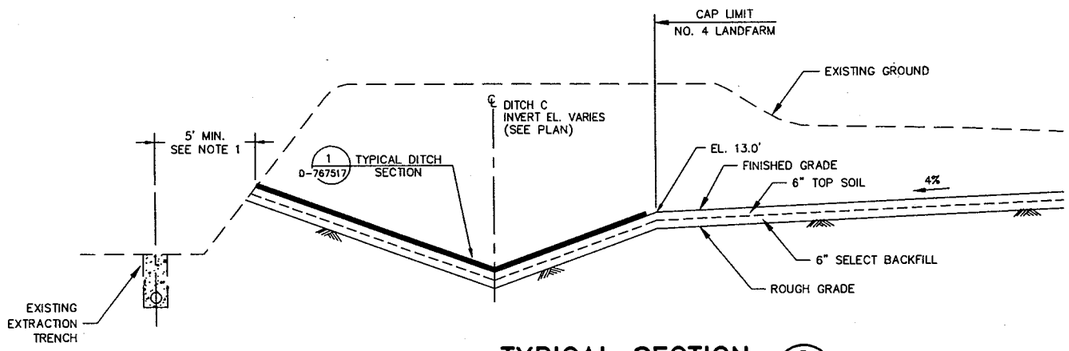
LANDFARM 5
STA A0+00 TO STA A5+00
NOT TO SCALE



TYPICAL SECTION B

D-767515

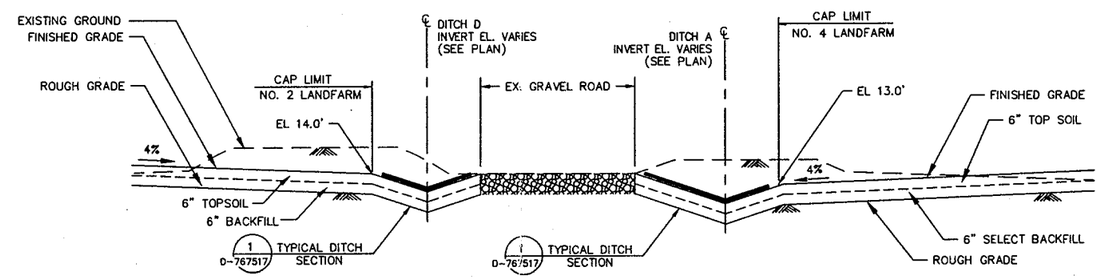
LANDFARM 5
DITCH B
NOT TO SCALE



TYPICAL SECTION C

D-767515

LANDFARM 4
STA C0+00 TO STA C7+00
NOT TO SCALE

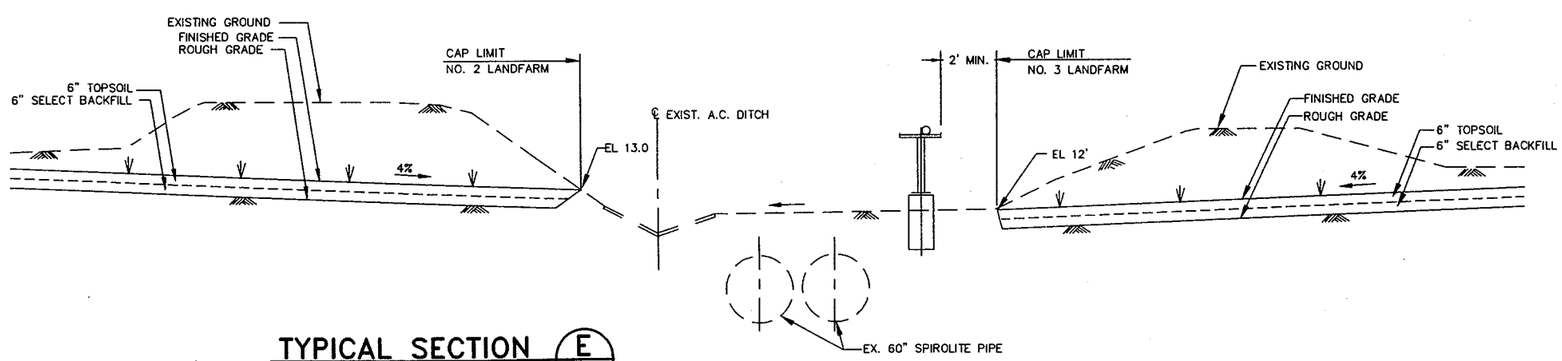


TYPICAL SECTION D

D-767515

LANDFARM 2 AND 4
NOT TO SCALE

NOTE: STATIONS A7+00 TO A10+62 AND STATIONS D0+00 TO D7+28 ARE LINED WITH HDPE LINER.



TYPICAL SECTION E

D-767515

LANDFARM 2 AND 3
NOT TO SCALE

NOTES:

1. ADJUST DITCH SIDE SLOPES TO MEET CLEARANCE CRITERIA, MAXIMUM OF 2:1 SLOPE.

REGISTERED PROFESSIONAL ENGINEER THOMAS M. [illegible] No. C 58205 EXP. 6/30/02 CIVIL STATE OF CALIFORNIA

DCM GROUP

Waste Discharge Order Project
DAMES & MOORE
A DAMES & MOORE GROUP COMPANY
JOB NO. 42100-001-043

REFERENCE DRAWINGS		
NO. 2 THRU 5 LANDFARMS – FINISHED GRADING PLAN	D-767515	
NO. 2 THRU 5 LANDFARMS – DITCH PLAN	D-767518	
NO. 2 THRU 5 LANDFARMS – IRRIGATION PLAN	D-318601	

REVISIONS		
0 ISSUED FOR CONSTRUCTION	5/11/98	CIK
1 AS BUILT	9/15/99	SLD

Chevron
Richmond Refinery

092899SLD

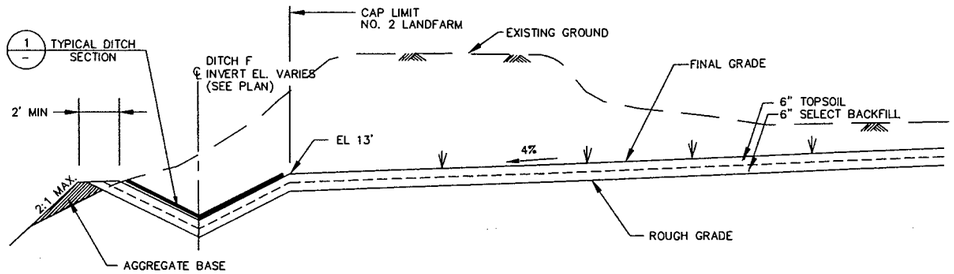
SCALE AS NOTED DR. C. KOSSA DR. APP. DATE 9/29/99 APPROVED
ENGR. TMS ENGR. DEPT.
OPR'G. DEPT.

NO. 2 THROUGH 5 LANDFARMS – SECTIONS
SECTOR 83: LANDFARMS
LANDFARMS CLOSURE PLAN
UTILITIES/ENVIRONMENTAL ABU

W.O.
S.O.

D-767516-1

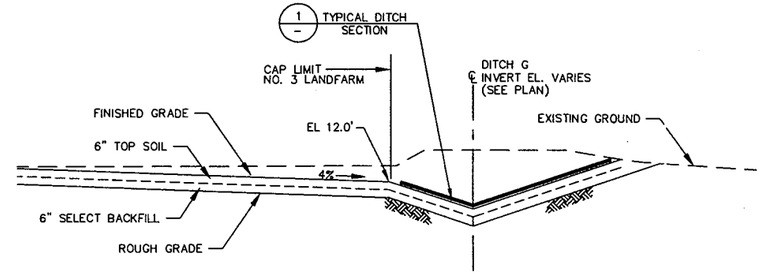
19000900\CHEV-R\S83\LFARMS\ASBUILT\D7675161 071597 1:1 092799 B sld



TYPICAL SECTION F

LANDFARM 2
DITCH F
D-767515

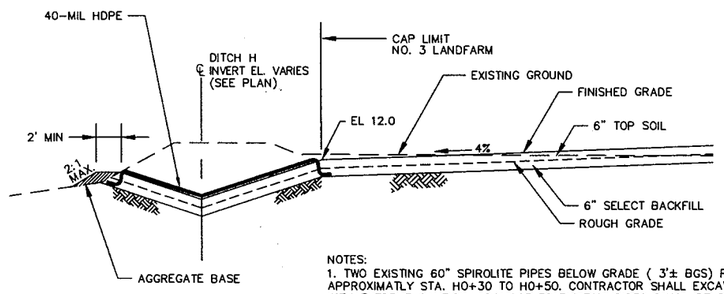
NOT TO SCALE



TYPICAL SECTION G

LANDFARM 3
DITCH G
D-767515

NOT TO SCALE



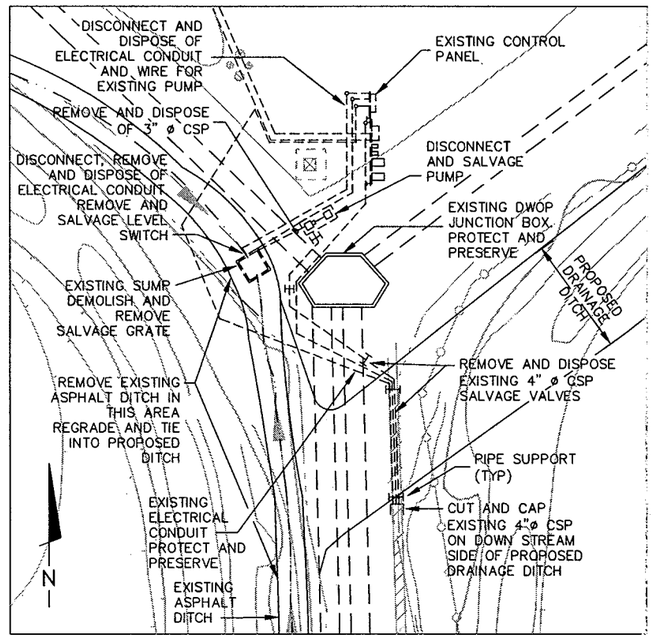
NOTES:
1. TWO EXISTING 60" SPIROLITE PIPES BELOW GRADE (3'± BGS) FROM APPROXIMATLY STA. H0+30 TO H0+50. CONTRACTOR SHALL EXCAVATE WITH EXTREME CAUTION. DAMAGE TO EXISTING PIPES SHALL BE REPAIRED BY CONTRATOR AT NO COST TO COMPANY.

2. MAINTAIN MINIMUM DITCH DEPTH OF 8 INCHES STA H0+00 TO H2+80.

TYPICAL SECTION H

LANDFARM 3
DITCH H
D-767515

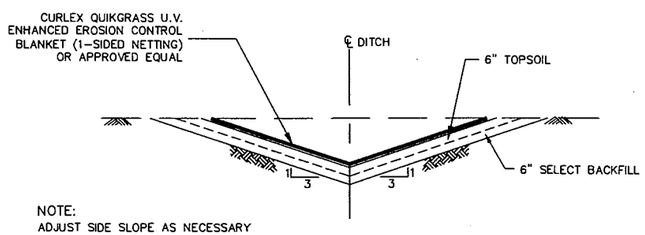
NOT TO SCALE



DETAIL 2

REMOVE CATCH BASIN AND PUMP
D-767515

NOT TO SCALE



NOTE:
ADJUST SIDE SLOPE AS NECESSARY TO MEET CLEARANCE CRITERIA, MAX. OF 2:1 SLOPE.

DETAIL 1 1 1

TYPICAL DITCH SECTION
D-767513 / D-767516

NOT TO SCALE

NOTES:

REGISTERED PROFESSIONAL ENGINEER THOMAS M. [illegible] No. C 58265 Exp. 6/30/02 CIVIL STATE OF CALIFORNIA

Waste Discharge Order Project
DAMES & MOORE GROUP
A DAMES & MOORE GROUP COMPANY
JOB NO. 42100-001-043

REFERENCE DRAWINGS		
NO. 2 THRU 5 LANDFARMS – FINISHED GRADING PLAN	D-767515	
NO. 2 THRU 5 LANDFARMS – DITCH PLAN	D-767518	
NO. 2 THRU 5 LANDFARMS – IRRIGATION PLAN	D-318601	

REVISIONS			
0 ISSUED FOR CONSTRUCTION	5/11/98	CIK	
1 AS BUILT	9/15/99	SLD	

Chevron
Richmond Refinery

SCALE AS NOTED DR. RLS DR. APP. SLD DATE 9/22/99 APPROVED
ENGR. JMS ENGR. DEPT.
OPR'G. DEPT.

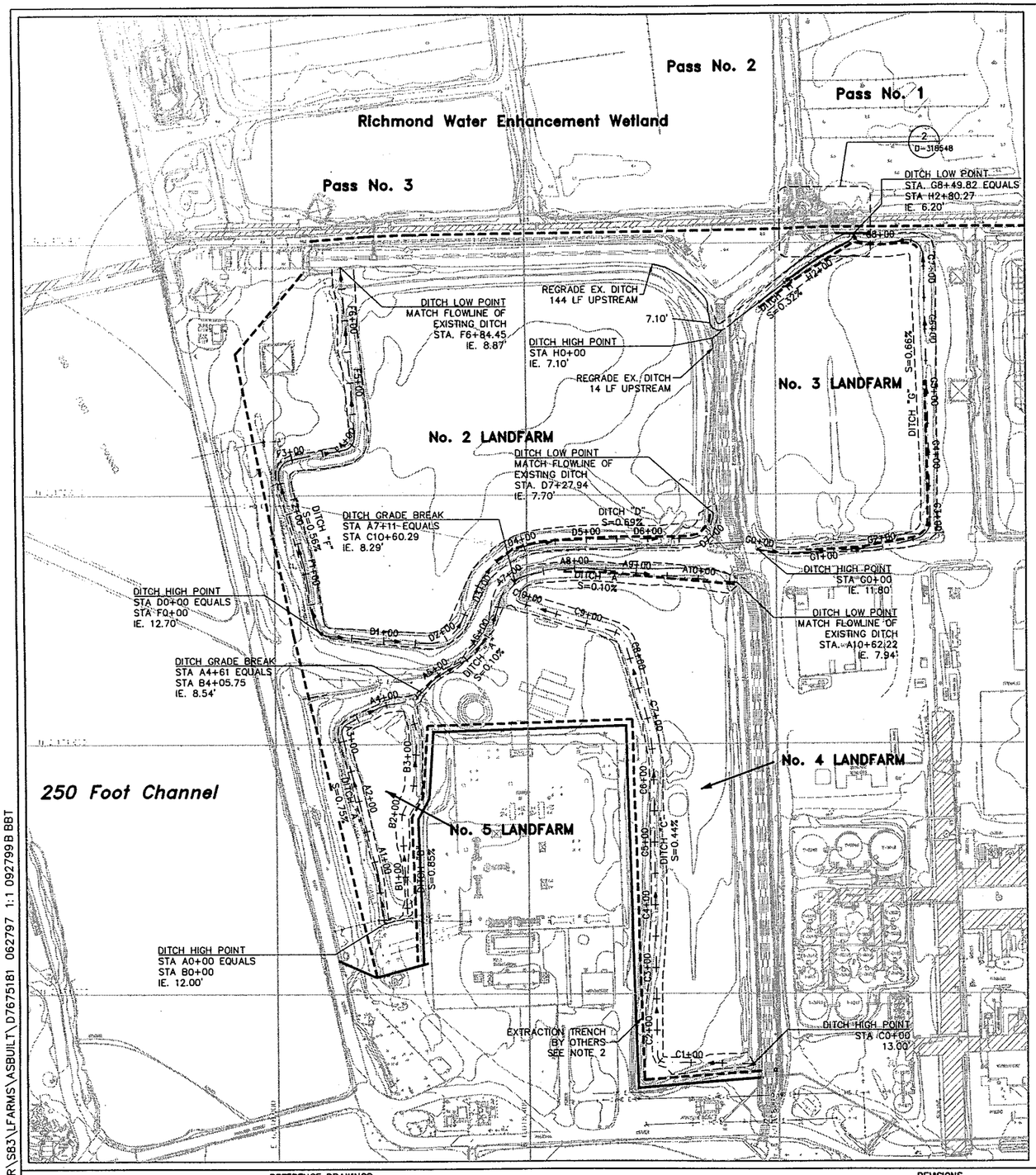
92895SLD

NO. 2 THROUGH 5 LANDFARMS – SECTIONS AND DETAILS
SECTOR 83: LANDFARMS
LANDFARMS CLOSURE PLAN
UTILITIES/ENVIRONMENTAL ABU

W.O. ____
S.O. ____

D-767517-1

19000900\CHEV-R\S83\LFARMS\ASBUILT\D7675171 1:1071497 092799 A SLD



LAYOUT DATA – DITCH "A"			
STATION	TAN. LENGTH BEARING RADIUS	LENGTH	INCLUDED ANGLE
A0+00*			
	2.52'	2.90'	65°48'49" (R)
A0+02.90			
	62.93' N 07°03'23" W		
A0+65.83			
	150.00'	17.36'	06°37'56" (L)
A0+83.19			
	227.50' N 13°41'19" W		
A3+10.69			
	15.00'	20.02'	76°28'46" (R)
A3+30.71			
	57.00' N 62°47'27" E		
A3+87.71			
	60.00'	24.54'	23°25'59" (R)
A4+12.25			
	75.00'	62.10'	47°26'18" (L)
A4+74.35			
	90.00'	41.26'	26°16'09" (R)
A5+15.61			
	144.00'	137.35'	54°38'56" (L)
A6+52.96			
	62.00'	72.00'	66°32'16" (R)
A7+24.96			
	369.50'	120.40'	18°40'13" (R)
A8+45.36			
	216.86' N 84°23'10" E		
A10+62.22			

*A0+00 = N2171313.50, E6018172.50
TAN = N 72°56'39" W

LAYOUT DATA – DITCH "B"			
STATION	TAN. LENGTH BEARING RADIUS	LENGTH	INCLUDED ANGLE
B0+00*			
	2.52'	1.47'	33°27'24" (L)
B0+01.47			
	11.50' N 73°35'57" E		
B0+12.97			
	100.00'	15.56'	08°54'46" (R)
B0+28.53			
	8.00'	11.95'	85°36'35" (L)
B0+40.48			
	152.00' N 03°05'52" W		
B1+92.48			
	24.00'	12.44'	29°41'32" (R)
B2+04.92			
	26.00' N 26°35'40" E		
B2+30.92			
	50.00'	19.32'	22°08'34" (L)
B2+50.24			
	66.00' N 04°27'07" E		
B3+16.24			
	100.00'	37.75'	21°37'44" (L)
B3+53.99			
	45.00'	51.76'	65°54'08" (R)
B4+05.75			

*B0+00 = N2171313.50, E6018172.50
TAN = S 72°56'39" E

LAYOUT DATA – DITCH "C"			
STATION	TAN. LENGTH BEARING RADIUS	LENGTH	INCLUDED ANGLE
C0+00*			
	143.50' N 88°52'55" W		
C1+43.50			
	10.00'	15.43'	88°23'31" (R)
C1+58.93			
	459.00' N 00°29'24" W		
C6+17.93			
	200.00'	23.66'	06°46'39" (L)
C6+41.59			
	38.00' N 07°16'04" W		
C6+79.59			
	200.00'	31.48'	09°01'09" (L)
C7+11.07			
	115.50' N 16°17'13" W		
C8+26.57			
	26.00'	25.53'	56°15'18" (L)
C8+52.10			
	153.89' N 72°32'31" W		
C10+05.99			
	22.50'	54.30'	138°17'06" (R)
C10+60.29			

*C0+00 = N2171088.00, E6018759.00

LAYOUT DATA – DITCH "D"			
STATION	TAN. LENGTH BEARING RADIUS	LENGTH	INCLUDED ANGLE
D0+00*			
	25.00'	14.09'	32°17'41" (L)
D0+14.09			
	150.50' S 85°35'03" E		
D1+64.59			
	60.00'	72.83'	69°33'02" (L)
D2+37.42			
	60.00' N 24°51'56" E		
D2+97.42			
	125.00'	127.97'	58°39'33" (R)
D4+25.39			
	980.00'	110.20'	06°26'34" (R)
D5+35.59			
	129.00' N 89°58'02" E		
D6+64.59			
	40.00'	63.35'	90°44'18" (L)
D7+27.94			

*D0+00 = N2171779.00, E6018074.00
TAN = S 53°17'72" E

LAYOUT DATA – DITCH "F"			
STATION	TAN. LENGTH BEARING RADIUS	LENGTH	INCLUDED ANGLE
F0+00*			
	25.00'	18.90'	43°19'28" (R)
F0+18.90			
	73.83' N 09°57'48" W		
F0+92.73			
	200.00'	19.39'	05°33'15" (L)
F1+12.12			
	146.13' N 15°30'43" W		
F2+58.25			
	25.00'	40.71'	93°18'11" (R)
F2+98.96			
	86.00' N 79°44'20" E		
F3+84.96			
	20.00'	29.40'	84°12'51" (L)
F4+14.36			
	270.09' N 04°28'31" W		
F6+84.54			

*F0+00 = N2171779.00, E6018074.00
TAN = N 53°17'72" W

LAYOUT DATA – DITCH "G"			
STATION	TAN. LENGTH BEARING RADIUS	LENGTH	INCLUDED ANGLE
G0+00*			
	285.16.'	65.78'	13°12'58" (L)
G0+65.78			
	89.82' N 86°32'46" E		
G1+65.60			
	397.97'	90.75	13°03'54" (L)
G2+56.35			
	29.74'	38.79'	74°44'55" (L)
G2+95.14			
	422.37' N 01°16'01" W		
G7+17.51			
	25.00'	43.61'	99°56'52" (L)
G7+61.12			
	207.44.'	72.28'	19°57'51" (R)
G8+33.40			
	11.58'	16.42'	81°15'05" (R)
G8+49.82			

*G0+00 = N2171912.00, E6018770.00
TAN = S78°13'46"E

LAYOUT DATA – DITCH "H"			
STATION	TAN. LENGTH BEARING RADIUS	LENGTH	INCLUDED ANGLE
H0+00*			
	161.49' N 52°11'58" E		
H1+61.49			
	462.81'	105.59'	13°04'18" (R)
H2+67.08			
	11.58'	13.19'	65°16'15" (L)
H2+80.27			

*H0+00 = N2172248.50, E6018700.00

N

0 100
Scale In Feet

NOTES:

1. EXISTING CONTOUR LINES ARE AT 1 FOOT INTERVALS BASED ON AERIAL PHOTOGRAPHS DATED AUGUST 1990.
2. CONTRACTOR SHALL COORDINATE ALL GRADING AND EARTH WORK FROM STA. C0+00 TO C7+00 AND B0+25 TO B3+50 WITH EXTRACTION TRENCH INSTALLATION CONTRACTOR.
3. THE DITCH LAYOUT TABLES, LOW AND HIGH POINTS, SLOPES AND CENTERLINES INDICATE DESIGN LOCATIONS AND DO NOT REFLECT AS-BUILT CONDITIONS.
4. STATIONS ARE BASED ON DESIGN CENTERLINES OF THE DITCHES.
5. LOCATION OF EXISTING GPS EXTRACTION TRENCH WITHIN THE LANDFARM LIMITS ARE APPROXIMATES.

LEGEND:

- EXISTING OR PLANNED GPS EXTRACTION TRENCH
- EXISTING OR PLANNED GPS BARRIER WALL
- CENTERLINE OF PROPOSED DITCH
- DAYLIGHT LINE OF PROPSED DITCH

REGISTERED PROFESSIONAL ENGINEER THOMAS M. No. C 35265 EXP. 6/30/00 CIVIL STATE OF CALIFORNIA

Waste Discharge Order Project
DAMES & MOORE
A DAMES & MOORE GROUP COMPANY
JOB NO. 42100-001-043

REFERENCE DRAWINGS	
NO.2 THRU 5 LANDFARMS – FINISHED GRADING PLAN	D-767515
NO. 2 THROUGH 5 LANDFARMS – SECTIONS	D-767516
NO. 2 THROUGH 5 LANDFARMS – SECTIONS	D-767517
NO. 2 THROUGH 5 LANDFARMS – IRRIGATION PLAN	D-318601
EXTRACTION WELLS & MONITORING WELLS DETAILS	D-782119

REVISIONS		
0 ISSUED FOR CONSTRUCTION	5/11/98	CIK
1 AS BUILT	9/15/99	SLD

Chevron
Richmond Refinery

SCALE AS NOTED DR. C. KOSSA DR. APP. SLD DATE 9/20/99 APPROVED
ENGR. DEPT.
OPR'G. DEPT.

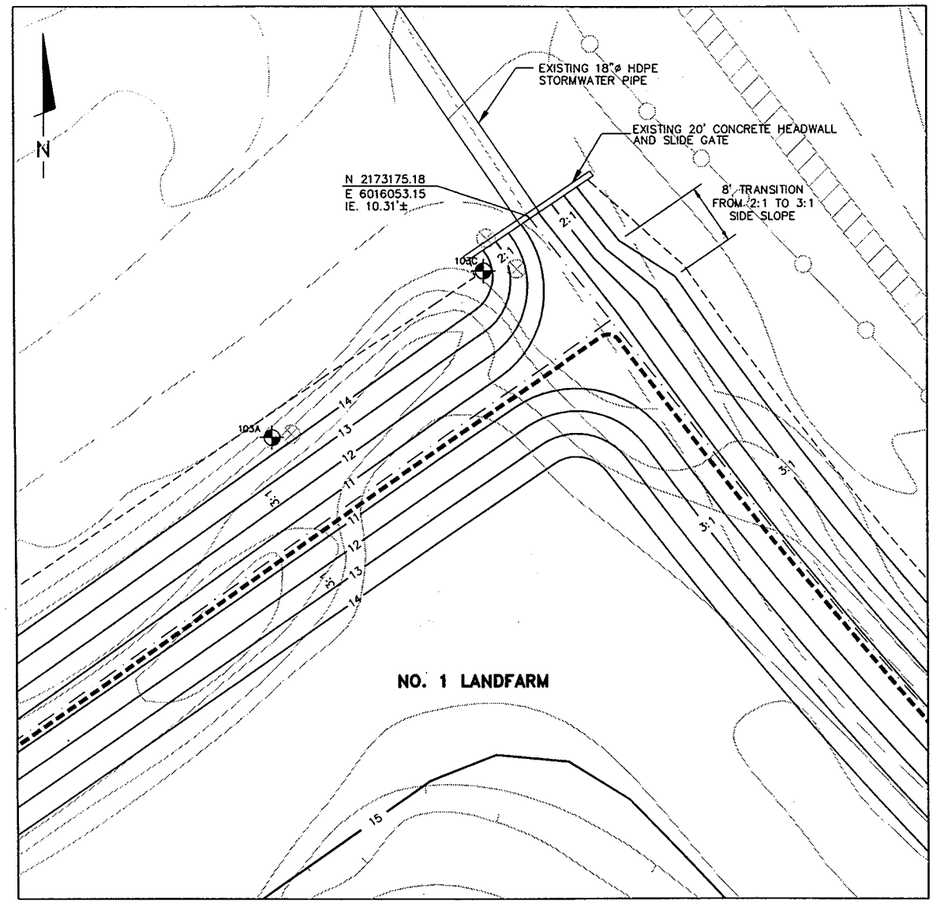
092699SLD

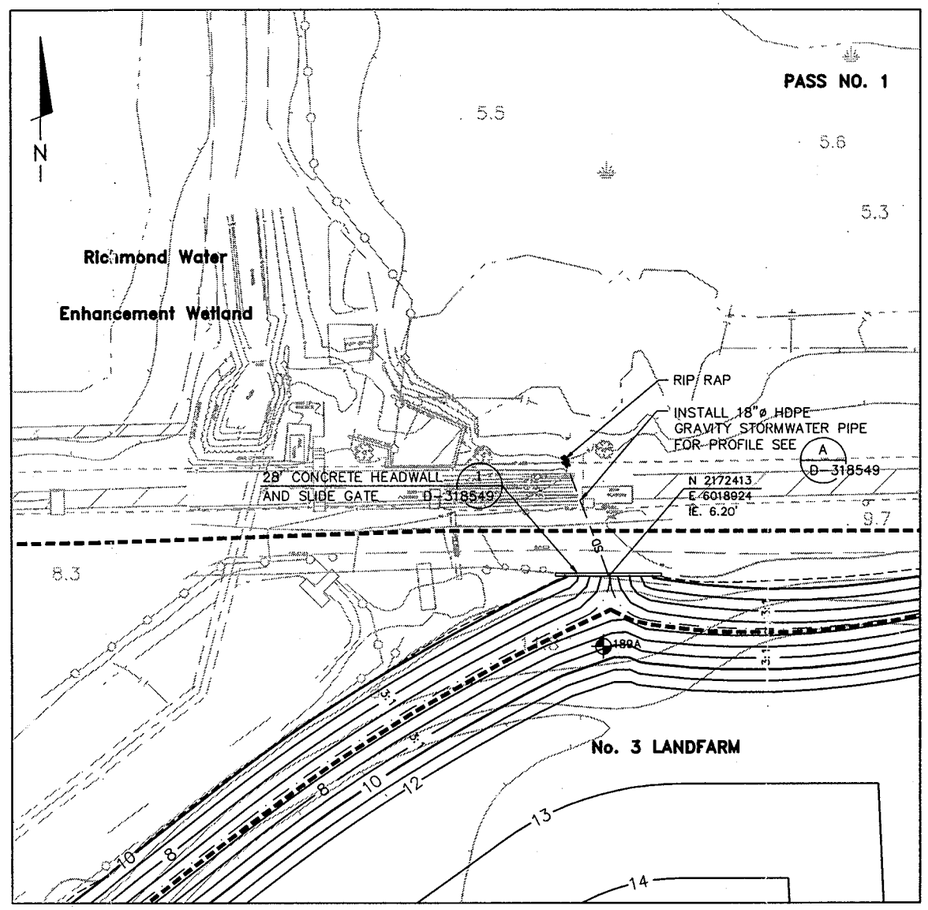
NO. 2 THROUGH 5 LANDFARMS – DITCH PLAN
SECTOR 83: LANDFARMS
LANDFARMS CLOSURE PLAN
UTILITIES/ENVIRONMENTAL ABU

W.O.
S.O.

D-767518-1

42100001\CHEV-R\SB3\LFARMS\ASBUILT\D7675181 062797 1:1 092799B BBT





DETAIL 1
OUTLET GRADING NO. 1 LANDFARM D-767514

0 10
Scale In Feet

DETAIL 2
OUTLET GRADING NO. 3 LANDFARM D-767518

0 20
Scale In Feet

NOTES:

1. ELEVATIONS SHOWN ARE ORIGINAL DESIGN ELEVATIONS AND DO NOT NECESSARILY REFLECT AS-BUILT ELEVATIONS.
2. LOCATION OF EXISTING GPS EXTRACTION TRENCHES WITHIN THE LANDFARMS ARE APPROXIMATES.

LEGEND:

- EXISTING OR PLANNED GPS EXTRACTION TRENCH
- EXISTING GROUNDWATER MONITORING WELL
- SD — PROPOSED STORM DRAINAGE PIPE
- CENTERLINE OF PROPOSED DITCH
- DAYLIGHT LINE OF PROPOSED DITCH

REGISTERED PROFESSIONAL ENGINEER THOMAS M. STREET No. C 38265 EXP. 6/30/02 CIVIL STATE OF CALIFORNIA

DCM GROUP
Waste Discharge Order Project
DAMES & MOORE
A DAMES & MOORE GROUP COMPANY
JOB NO. 42100-001-043

REFERENCE DRAWINGS			
NO. 1 LANDFARM – FINISHED GRADING PLAN	D-767512	NO. 2 THRU 5 LANDFARMS – DITCH PLAN	D-767518
NO. 1 LANDFARM – SECTIONS	D-767513	NO. 1 LANDFARM – IRRIGATION PLAN	D-318600
NO. 1 LANDFARM – DITCH PLAN	D-767514	NO. 2 THRU 5 LANDFARMS – IRRIGATION PLAN	D-318601
NO. 2 THRU 5 LANDFARMS – FINISHED GRADING PLAN	D-767515		
NO. 2 THROUGH 5 LANDFARMS – SECTIONS	D-767516		
NO. 2 THROUGH 5 LANDFARMS – SECTIONS	D-767517		

REVISIONS		
0 ISSUE FOR CONSTRUCTION	5/11/98	CIK
1 AS BUILT	9/15/99	SLD

Chevron
Richmond Refinery

SCALE AS NOTED DR. C. KOSSA DR. APP. DATE 9/20/99 APPROVED
ENGR. ENGR. DEPT.
OPR'G. DEPT.

092899SLD

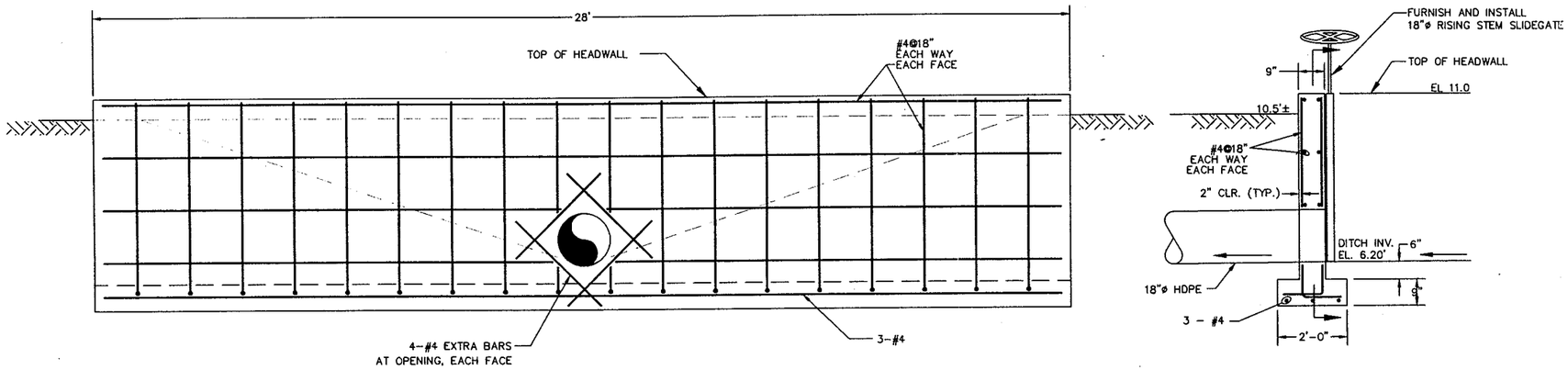
NO. 1 AND 3 LANDFARMS – STORMWATER DRAIN PLANS
SECTOR 83: LANDFARMS
LANDFARMS CLOSURE PLAN
UTILITIES/ENVIRONMENTAL ABU

W.O.
S.O.

D-767519-1

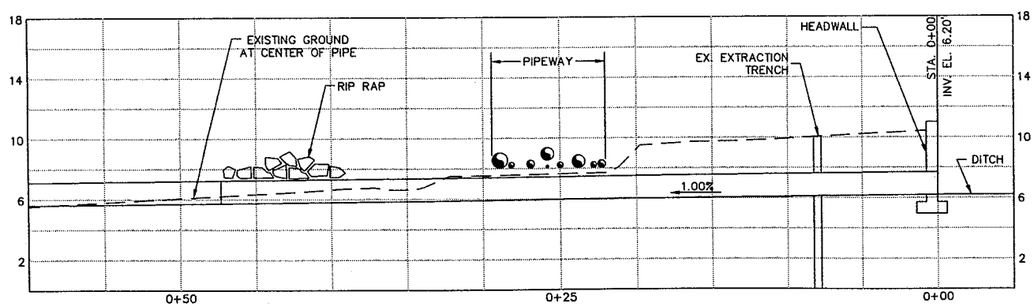
42100001 \CHEV-R\S83\LFARMS\ASBUILT\ D7675191 080497 1:1 092799 C SLD

NOTES



DETAIL 1 / HEADWALL D-767519

0 2
Scale In Feet



PROFILE A / D-767519

0 5
Scale In Feet

REFERENCE DRAWINGS

REVISIONS

A	ISSUED FOR CONSTRUCTION	4/10/98	CIK	
1	AS-BUILT	9/15/99	AGP	

Chevron
Richmond Refinery

SCALE AS NOTED DR. C. KOSSA DR. APP. ELD DATE 9/22/99 APPROVED
ENGR. TWS ENGR. DEPT.
OPR'G. DEPT.

92899SLD

NO. 3 LANDFARM - STORMWATER DRAIN DETAILS
SECTOR 83: LANDFARMS
LANDFARMS CLOSURE PLAN
UTILITIES/ENVIRONMENTAL ABU

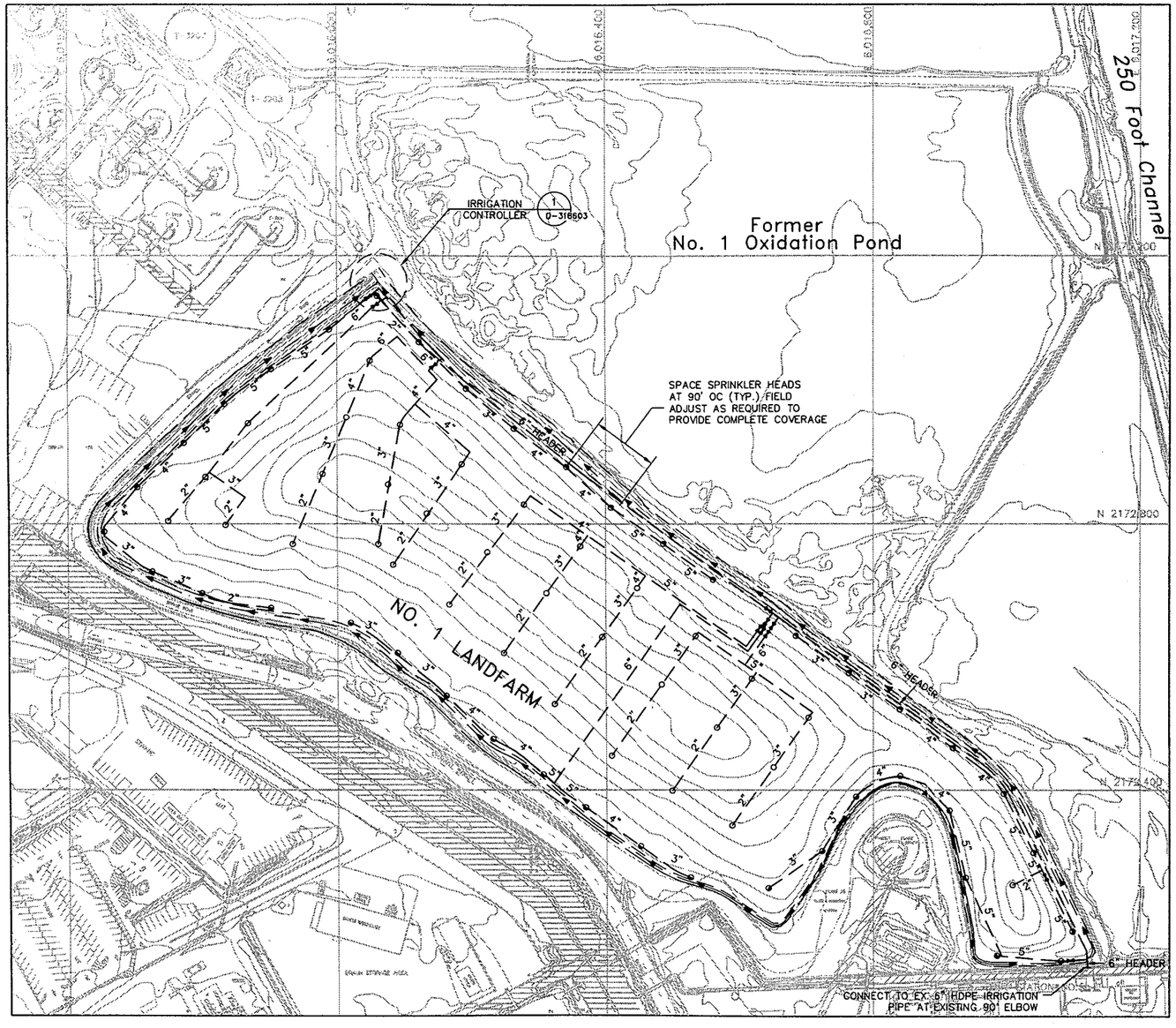
W.O.
S.O.

D-318549-1

Waste Discharge Order Project
DAMES & MOORE
GROUP
A DAMES & MOORE GROUP COMPANY
JOB NO. 42100-001-043

REGISTERED PROFESSIONAL ENGINEER THOMAS W. SCHMIDT No. C 58069 EXP. 6/30/02 CIVIL STATE OF CALIFORNIA

42100001 \CHEV-R\S83\LFARMS\ASBLT\ D3185491 071597 1:1 092799A CIK



NOTES:

1. CONTOUR LINES AND GRADE SHOWN ARE FINAL GRADES BASED ON AS-BUILT SURVEY DATED AUGUST 1999.

LEGEND

- PROPOSED DITCH
- 360-DEGREE SPRAY SPRINKLER HEAD
- 180-DEGREE SPRAY SPRINKLER HEAD
- 270-DEGREE SPRAY SPRINKLER HEAD
- 3" IRRIGATION PIPE AND SIZE

N

0 100
Scale in Feet

REGISTERED PROFESSIONAL ENGINEER THOMAS M. JOYCE No. C 58255 EXP. 6/30/07 CIVIL STATE OF CALIFORNIA

DAMES & MOORE GROUP

Waste Discharge Order Project

DAMES & MOORE

A DAMES & MOORE GROUP COMPANY

JOB NO. 42100-001-043

REFERENCE DRAWINGS	
NO. 1 LANDFARM – FINISHED GRADING PLAN	D-767512
NO. 1 LANDFARM – SECTIONS	D-767513
NO. 1 LANDFARM – DITCH PLAN	D-767514

REVISIONS		
0 ISSUED FOR CONSTRUCTION	5/11/98	CIK
1 AS BUILT	9/15/99	SLD

Chevron
Richmond Refinery

SCALE AS NOTED DR. C. KOSSA DR. APP. DATE 9/22/99 APPROVED
ENGR. ENGR. DEPT.
OPR'G. DEPT.

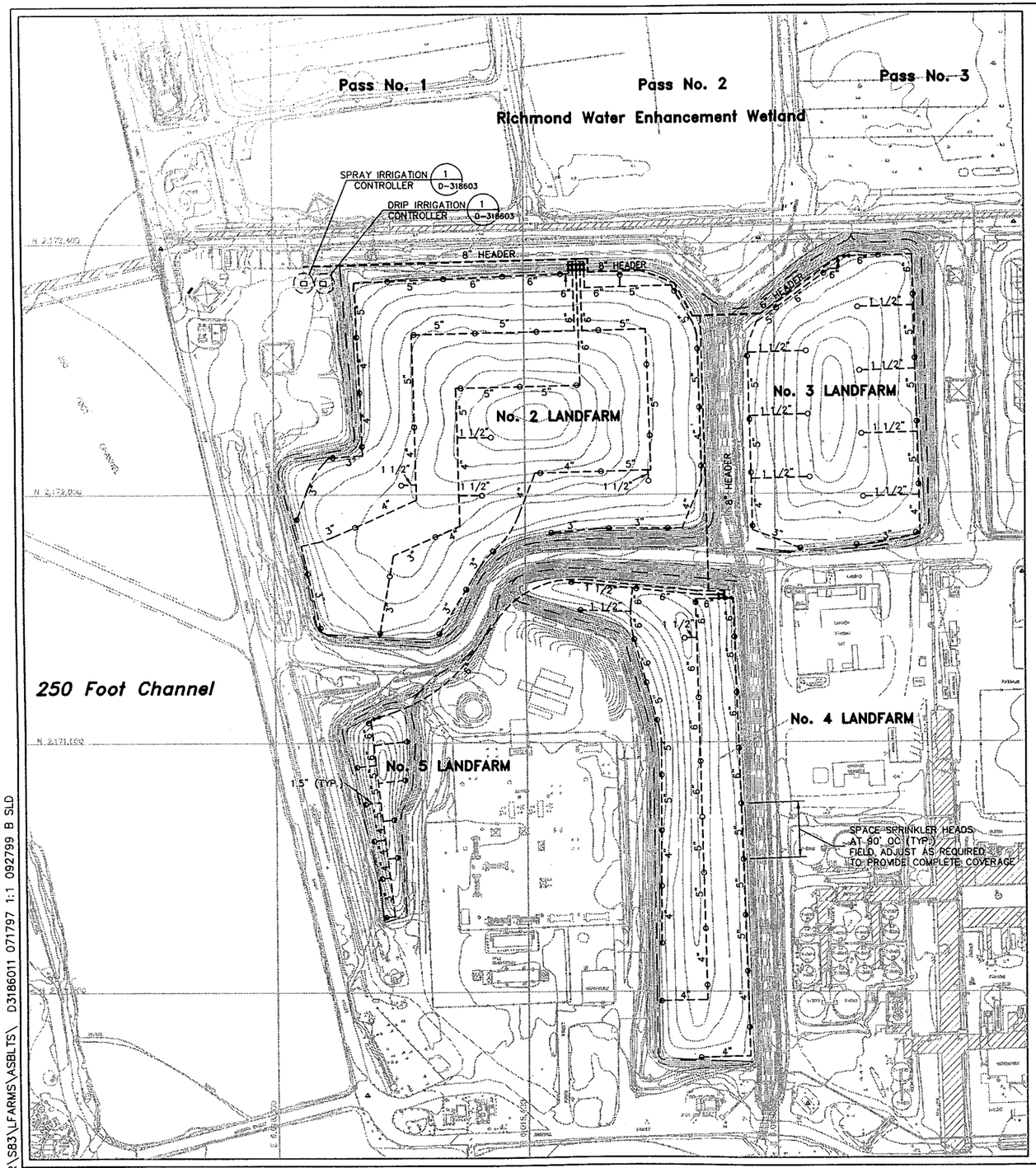
92899SLD

NO. 1 LANDFARM – IRRIGATION PLAN
SECTOR 83: LANDFARMS
LANDFARMS CLOSURE PLAN
UTILITIES/ENVIRONMENTAL ABU

S W.O. S.O.

D-318600-1

42100001 \CHEV_R\S83\LFARMS\ASBUILT\ D3186001 071797 1:1 092899 B SLD



NOTES:

1. CONTOUR LINES AND GRADE SHOWN ARE FINAL GRADES BASED ON AS-BUILT SURVEY DATED AUGUST 1999.

LEGEND:

- PROPOSED DITCH
- EXISTING GROUNDWATER MONITORING WELL
- 360-DEGREE SPRAY SPRINKLER HEAD
- 180-DEGREE SPRAY SPRINKLER HEAD
- 90-DEGREE SPRAY SPRINKLER HEAD
- 3" IRRIGATION PIPE AND SIZE

N

0 100
Scale In Feet

REGISTERED PROFESSIONAL ENGINEER THOMAS M. GREEN No. C 58245 EXP. 6/30/02 CIVIL STATE OF CALIFORNIA

Waste Discharge Order Project
DAMES & MOORE
DCM GROUP
A DAMES & MOORE GROUP COMPANY
JOB NO. 42100-001-043

REFERENCE DRAWINGS		
NO. 2 THRU 5 LANDFARMS – FINISHED GRADING PLAN	D-767515	
NO. 2 THRU 5 LANDFARMS – SECTIONS	D-767516	
NO. 2 THRU 5 LANDFARMS – SECTIONS	D-767517	
NO. 2 THRU 5 LANDFARMS – DITCH PLAN	D-767518	

REVISIONS		
0 ISSUED FOR CONSTRUCTION	5/11/98	CIK
1 AS BUILT	9/15/99	SLD

Chevron
Richmond Refinery

092899SLD

SCALE AS NOTED DR. C. KOSSA DR. APP. SLD DATE 9/28/99 APPROVED
ENGR. TMS ENGR. DEPT.
OPR'G. DEPT.

NO. 2 THROUGH 5 LANDFARMS – IRRIGATION PLAN
SECTOR 83: LANDFARMS
LANDFARMS CLOSURE PLAN
UTILITIES/ENVIRONMENTAL ABU

W.O. ____
S.O. ____

D-318601-1

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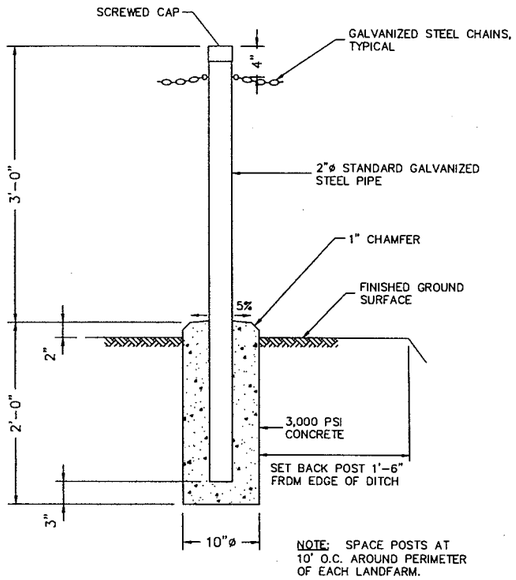
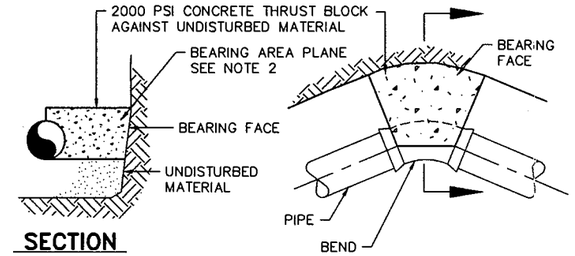


NOTE: SPACE POSTS AT 10' O.C. AROUND PERIMETER OF EACH LANDFARM.

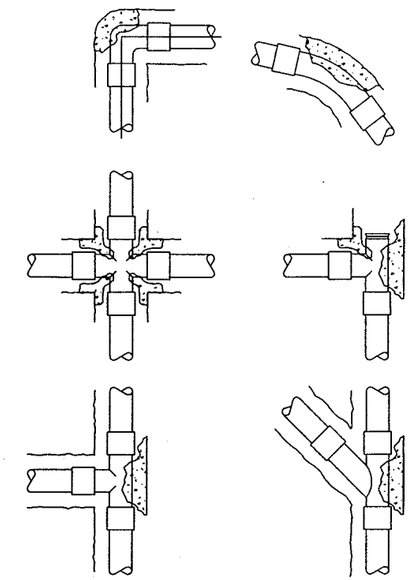
DETAIL 2/D-767512 2/D-767515

PERIMETER POST

NOT TO SCALE



SECTION



NOTES:

1. ALL PIPE BENDS SHALL BE BACKED UP WITH A CONCRETE THRUST BLOCK, CONCRETE 2000 psi, BETWEEN THE PIPE AND UNDISTURBED MATERIAL.
2. ALL THRUST BLOCKS SHALL HAVE A MINIMUM AREA OF 1 SF. MAJOR BENDS SHALL HAVE A BEARING AREA ACCORDING TO THE FOLLOWING SCHEDULE:

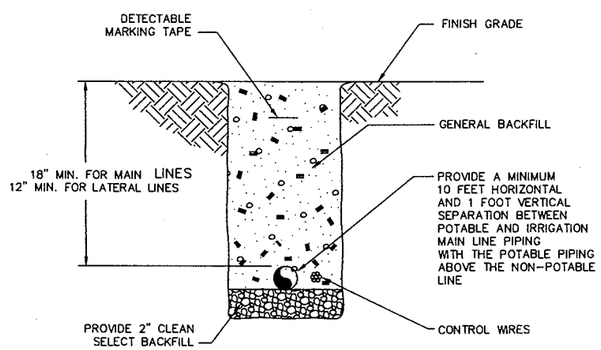
	ANGLE OF BEND			
	11.25	22.5	45	90
SIZE	BEARING AREA			
2"ø	1.0 SF	1.0 SF	1.0 SF	1.0 SF
3"ø	1.0 SF	1.0 SF	1.0 SF	1.0 SF
4"ø	1.0 SF	1.0 SF	1.0 SF	1.0 SF
6"ø	1.0 SF	1.0 SF	1.0 SF	1.6 SF
8"ø	1.0 SF	1.0 SF	1.5 SF	2.8 SF

3. BEARING AREA REQUIRED ON VERTICAL PLANE 90° TO RADIUS PLANE PASSING THROUGH MIDPOINT OF BEND.
4. THE SIZES OF THRUST BLOCKS ARE BASED ON 100 PSI TEST PRESSURE AND 2500 PSF PASSIVE SOIL STRENGTH.
5. THE CONTRACTOR SHALL NOTIFY THE ENGINEER AFTER EXCAVATION OF EACH BEND EQUAL TO OR LARGER THAN 11.25° IN ORDER TO OBTAIN A CONFIRMATION OF THE PASSIVE SOIL STRENGTH.
6. FOR VERTICAL UP-THRUST BLOCKS, PLACE #5 REBAR WITH 3" COVER AND 5" HOOKS AROUND FITTINGS AND EMBEDDED INTO CONCRETE. USE A MINIMUM OF 4 CY OF CONCRETE WITH A HORIZONTAL BEARING AREA OF 2 SF. PLACE VERTICAL UP-THRUST BLOCKS WHERE THRUST ON THE FITTING IS UP OR USE RESTRAINED JOINT FOR 18" IN EACH DIRECTION.
7. FOR DOWN THRUST FITTINGS USE TYPICAL THRUST BLOCK UNDER FITTING.

TYPICAL DETAIL

THRUST BLOCKING

NOT TO SCALE



TYPICAL DETAIL

PIPE TRENCH

NOT TO SCALE

REGISTERED PROFESSIONAL ENGINEER THOMAS M. BRUST No. C 68261 EXP. 6/30/07 CIVIL STATE OF CALIFORNIA

DCM GROUP — Waste Discharge Order Project
DAMES & MOORE
A DAMES & MOORE GROUP COMPANY
JOB NO. 42100-001-043

REFERENCE DRAWINGS	
NO. 1 LANDFARM – FINISHED GRADING PLAN	D-767512
NO. 1 LANDFARM – DITCH PLAN	D-767514
NO. 2 THRU 5 LANDFARMS – FINISHED GRADING PLAN	D-767515
NO. 2 THRU 5 LANDFARMS – DITCH PLAN	D-767518
NO. 1 LANDFARM – IRRIGATION PLAN	D-318600
NO. 2 THRU 5 LANDFARMS – IRRIGATION PLAN	D-318601

REVISIONS		
0 ISSUED FOR CONSTRUCTION	5/11/98	CIK
1 AS BUILT	9/15/99	SLD

Chevron
Richmond Refinery

SCALE AS NOTED DR. C. KOSSA DR. APP. EAD DATE 9/28/99 APPROVED
ENGR. TMS ENGR. DEPT.
OPR'G. DEPT.

092899SLD

NO. 1 THROUGH 5 LANDFARMS – MISCELLANEOUS DETAILS
SECTOR 83: LANDFARMS
LANDFARMS CLOSURE PLAN
UTILITIES/ENVIRONMENTAL ABU

W.O. ____
S.O. ____

D-318602-1

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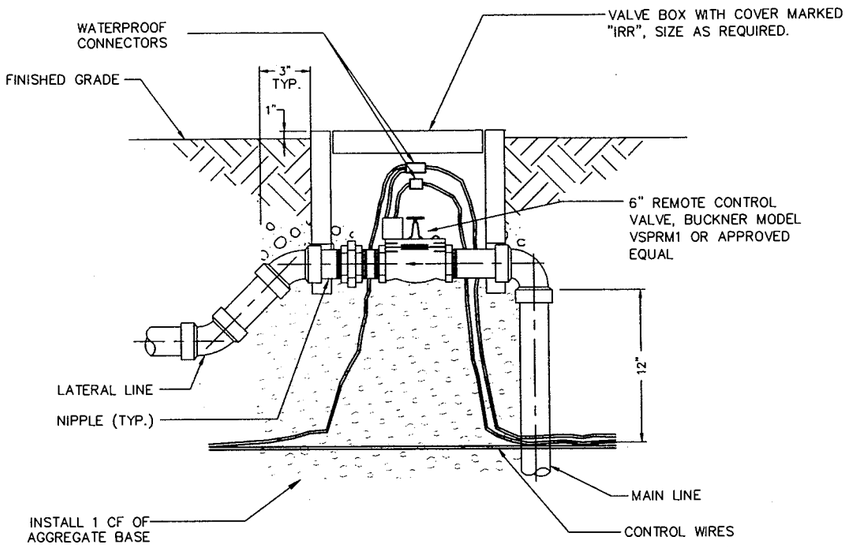
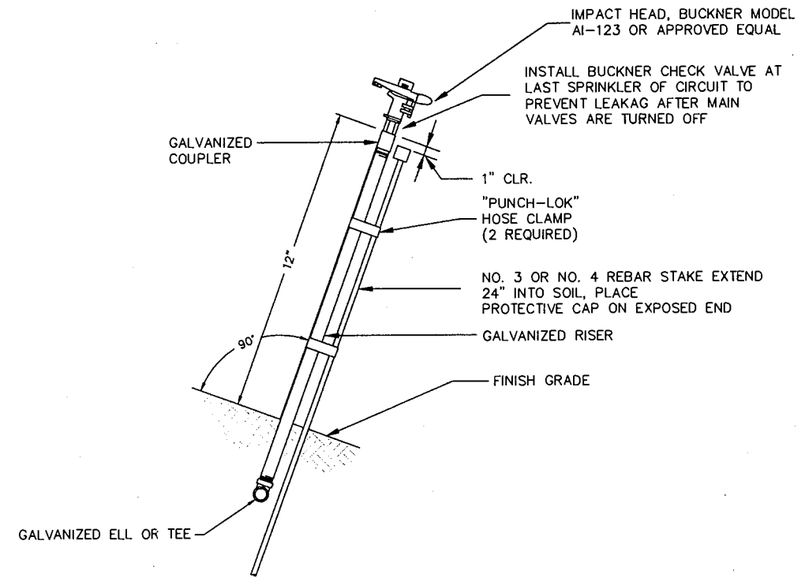


TYPICAL DETAIL

REMOTE CONTROL VALVE

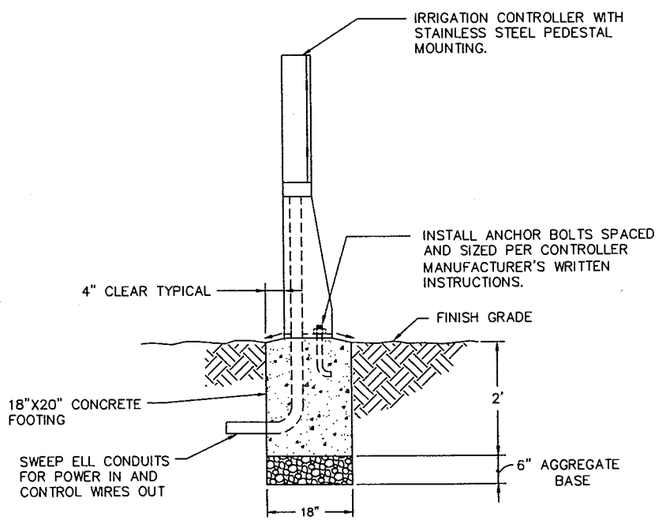
NOT TO SCALE



TYPICAL DETAIL

SPRINKLER HEAD ON SLOPE

NOT TO SCALE



DETAIL 1 D-318600 / 1 D-318601

ELECTRICAL IRRIGATION CONTROLLER

NOT TO SCALE

NOTES:

1. AFTER INSTALLATION APPLY 2 COATS OF RUSTOLEUM 5737 IVY GREEN PAINT.
2. DISCONNECT, DEMOLISH, AND REMOVE EXISTING IRRIGATION CONTROLLERS AT LANDFARMS 1 AND 2. REMOVE EXISTING CONDUIT TO A LEVEL TO ALLOW CONSTRUCTION OF CAP. CONNECT NEW CONTROLLERS TO EXISTING POWER SUPPLY.
3. INSTALL IRRITROL SYSTEMS, IBOC PLUS SOLAR-POWERED CONTROLLER TO CONTROL BOTH SPRAY AND DRIP IRRIGATION SYSTEMS ON LANDFARM NO. 1.
4. INSTALL BUCKNER, MODEL MD-8 TO CONTROL THE DRIP IRRIGATION SYSTEM ON LANDFARM NOS. 2 THROUGH 5.
5. INSTALL BUCKNER, MODEL MD-12 TO CONTROL THE SPRAY IRRIGATION SYSTEM ON LANDFARM NOS. 2 THROUGH 5.

REGISTERED PROFESSIONAL ENGINEER THOMAS M. SHEET No. C 58265 EXP. CIVIL STATE OF CALIFORNIA

Waste Discharge Order Project

DAMES & MOORE

DCM GROUP — A DAMES & MOORE GROUP COMPANY

JOB NO. 42100-001-043

REFERENCE DRAWINGS	
NO. 1 LANDFARM – IRRIGATION PLAN	D-318600
NO. 2 THRU 5 LANDFARMS – IRRIGATION PLAN	D-318601

REVISIONS		
0 ISSUED FOR CONSTRUCTION	5/11/98	CIK
1 AS BUILT	9/15/99	SLD

Chevron — Richmond Refinery

SCALE AS NOTED DR. C. KOSSA DR. APP. DATE 9/28/99 APPROVED

ENGR. ENGR. DEPT.

OPR'G. DEPT.

092899SLD

NO. 1 THROUGH 5 LANDFARMS – MISC. IRRIGATION DETAILS

SECTOR 83: LANDFARMS

LANDFARMS CLOSURE PLAN

UTILITIES/ENVIRONMENTAL ABU

W.O.

S.O.

D-318603-1

19000900\CHEV-R\S83\LFARMS\D3186031 062697 1:1 092799B SLD

Appendix F
Revised Landfarms Closure Plan (May 28, 1997)

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

Richmond, California
May 28, 1997

221 Main Street, Suite 600
San Francisco, CA 94105-1917
415 896 5858 Tel
415 882 9261 Fax

Mr. Pete Duda
Chevron Products Company
841 Chevron Way
Richmond, CA 94802-0627

Waste Discharge Order Project
Response to Comments from the DTSC
Landfarms Closure Plan

Dear Mr. Duda,

In response to a facsimile transmitted to us by the Department of Toxic Substances Control (DTSC) on April 24, 1997, we have prepared some minor revisions to the Landfarm Closure Plan. Our responses reflect a telephone discussion between Mr. Tony Morales of the DTSC and myself on May 2, 1997 during which we discussed each issue and agreed on what would be an acceptable level of response for each. Based on my discussions with Mr. Morales, he requests that Chevron forward the revised pages to him so he can replace them in the current Closure Plan document. In general, our responses consist of including more detailed information on parameters used to conduct the various analyses and including references for specific information presented in the report. Specific responses are presented below. In each case, the DTSC comment is presented first in italics and our response follows. In their transmittal, the DTSC identified the page and section number for each comment. In preparing our responses, we attempted to retain the original pagination. However, in a few instances, that was not practical, and we have noted the revised locations in our responses.

Comment 1: Page 8, Section 2.2.4, 1988-1995 Bioremediation Activities.

A. *What work on optimization of soil condition has been done up to the present? What kind of soil amendment material has been added? Has the effect of addition of amendment materials been assessed?*
B. *What are the common metals involved in petroleum processing other than Cr, Pb, Ni and V?*
C. *What is the meaning of "Foru metals" on the fifth line, second paragraph?*
D. *Are there histogram plots showing the trend of contaminant concentrations vis time?*

Response to Comment 1: The text in Section 2.2.4was revised to reference the Bioremediation Activities Report (BEDM, 1992) and the Landfarm (Soil) Sampling and Analysis Plan (BEDM, 1993). The text was further revised to state that these reports addressed work done to optimize soil conditions, addition of soil amendments, identify and detect contaminants (including metals), and histogram plots of concentrations vs. time. "Foru" was a typographical error and should have read "four".

Comment 2: Page 13, Section 3.2, 1st line, Plates 3 and 4.
Abbreviation "RRD" is used but no explanation is given. It is suggested that a list of acronyms be compiled and included in the closure plan.
Groundwater levels of monitoring wells should be presented on geologic cross sections A-A' and B-B' (Plates 3 and 4) and also groundwater line of A zone should be included.
Response to Comment 2: We have reviewed the document to verify that all acronyms were defined. In addition, we have provided a list of acronyms that can be inserted into the Closure Plan immediately following the Table of Contents. We have also revised the text to refer the reader to a detailed discussion of groundwater conditions in Section 3.3. The cross sections were not revised to include "A" Zone groundwater levels because of the variable nature of water levels at any one time and the fact that the cross sections were intended to depict site stratigraphy rather than groundwater conditions.

Comment 3: Page 13, Section 3.2.1, Fill
This section describes that Landfarms were underlain by several ponds that were backfilled. No further details on locations, sizes, and depths of the ponds, and their uses. Those important information should be presented.
Response to Comment 3: We revised the text to refer the reader to the Bioremediation Activities Report (BEDM 1992) and the RCRA Facilities Investigation for the Landfill under Landfarms report (BEDM, 1992) for a description of the ponds formerly underlying the Landfarms.

Comment 4: Page 14, Section 3.3, Summary Table of Hydraulic Parameters.
The assumed horizontal permeabilities show in this table is not site specific hydraulic parameters. Presentation of site specific parameters is more important. From the unit illustrated, the horizontal permeability heading is likely meaning hydraulic conductivity. Presentation of a range of measured hydraulic conductivities, hydraulic gradients, flow velocities, mean and median values would be more meaningful. The last column shows average horizontal velocity in ft/day. To prevent confusion, the heading should indicates if they are Darcy velocity of $V=Ki$, or the average linear pore velocity of $Vp = Ki/n$. If the listed velocities are the Darcy velocity, the conversion factor used could be wrong.
Response to Comment 4: We have clarified in the text that the velocity calculated is the average linear horizontal flow velocity and have included the equation. We have further defined the parameters and their sources used to calculate the velocity.

Comment 5: Page 15, Section 3.3, Last paragraph
It states that the B Zone aquifer underlying the site is located at an approximate depth of 100 ft, and chemical test results have shown that B Zone is effectively separated from overlying water-bearing units (A and C Zones) by a thick layer of estuarine clay. It also points out the hydraulic gradient of B Zone is upward to the upper A and C Zones. The above mentioned statements are very convincing. However, the Owner/Operator should elaborate more on the chemical test results, and provide more recent data on the upward hydraulic gradient of B Zone. A question may be raised if there is a easy pathway, such as fault zone, joints or cracks connecting the upper Zones and B Zone. With the presence of DNAPLs in the Landfarms, what is the chance of contaminants migrating to the B Zone aquifer? An assessment of such condition should be performed.
Response to Comment 5: We have revised the text to include a statement indicating that we do not expect natural features such as faults to influence the downward migration of constituents from the "A" and "C" Zones to the "B" Zone. We have also clarified that the constituents of concern are light non-aqueous phase liquids which tend to float as opposed to dense non-aqueous phase liquids which tend to sink.

Comment 6: Page 15, Section 3.4.1, "A" Water Table Zone, Plate 3-7
Piezometers are scattered and separated from each other for more than 200 ft. On Plate 3-7, groundwater levels in a number of piezometers were not measured. With scarcity of groundwater level information, all available information should be collected and used to construct a groundwater table map.
Response to Comment 6: We have revised the text on Page 33, Post Closure Monitoring, to state that Chevron will monitor as many piezometers in the Landfarms area as is practical to develop a representative picture of the water table.

Comment 7: Plate 3-8
The 9ft contour line surround No. 2 Landfarm is wrong, it should be a 10 ft contour line.
Response to Comment 7: We have revised the Plate as requested.

Comment 8: Page 15, Section 3.4.1, "A" Water Table Zone, 3rd and 4th Paragraphs
The third paragraph in this section states that overall "A" Zone flow in the Flats Zone at the Refinery is northwest toward the Bay, and that once the vegetative cover becomes fully established, the local mounding of the water table will likely be reduced and the gradient will resume an overall northwesterly direction under No. 1 Landfarm. In fact under No. 1 Landfarm, the general groundwater flow direction is currently northeast. Even after placement of vegetative cover, the groundwater flow direction may not be changed toward northwest

direction, because of the topography (see Plate 3-8, "A" Zone water Table Map). This paragraph also mentioned a Bioreactor and a Water Enhancement Wetlands Project, however, the locations and the reference map were not stated.

The range and average hydraulic conductivities of "A" zone are presented in the fourth paragraph. Methods adopted to determine these hydraulic conductivities and number of data collected, and the average hydraulic conductivity of how many data should be described in the text so that the reviewer can have some sense of data quality.
Response to Comment 8: (New page 16, second paragraph) We have revised the text to present the correct groundwater flow direction and have included a reference to Plate 2-4 which includes the location of the features in question (Plate 2-4 was not revised).

We have addressed the second part of the comment in our Response to Comment 4, above.

Comment 9: Page 16, Section 3.4.2, "C" Zone
It is noticed that there are only few monitoring wells in "C" zone. There is no hydraulic conductivity data of "C" zone in No. 1 Landfarm.
Response to Comment 9: We have revised the last paragraph of the Section 3.4.2 text to include a reference to the "C" Zone Investigation reports which include all of the data requested.

Comment 10: Page 16, Section 3.4.3, Bay Mud Aquitard
Peat zones and lenticular sand layers occur commonly in Bay Mud everywhere in the San Francisco Bay area. Occurrence of these permeable units in the landfarm areas has not been described and assessment of these units becoming a possible easy path way has not been presented. This section describe the hydraulic conductivity of Bay Mud being approximately equal to or less than 1.0 x 10-7 cm/sec. which appears to be an assumption not a measured value. Moreover, it states that the integrity of this low-permeability barrier is evidenced by the confined conditions and upward hydraulic gradient from the "C" Zone into the "A" Zone. This statement needs to be supported by cluster wells information. Examining the groundwater table maps of "A" Zone (Plate 3-8) against the "C" Zone (Plate 3-9), the stated upward hydraulic gradient from "C" to "A" is not convincing.
Response to Comment 10: (New page 17, last paragraph of Section 3.4.3) The text has been revised to include a discussion of Peat layers within the Bay Mud and their significance with respect to the closure plan details. The text has also been revised to include additional supporting evidence that the Bay Mud provides an effective barrier between the "A" and "C" Zones.

Comment 11: Page 16, Section 3.5, Landfarms Groundwater Monitoring Program
The stated 5 background monitoring well locations should be shown on a map and presented.
Response to Comment 11: (New page 17, Section 3.5) Plate 1-1 has been revised to include the 5 background wells and a reference to the Plate has been added to the text.

Comment 12: Page 17, Section 3.6, Corrective Action
Barrier walls are mentioned in this section, however, it cannot be found on the maps. The barrier wall locations should be exhibited clearly on a map or referred to a certain map.

A small groundwater mound is present in the northwest corner, not in the northeast corner, of the No. 1 Landfarm.
Response to Comment 12: (New page 18) A reference to Plate 3-10 has been included in the text (second paragraph) and the location of the groundwater mound has been revised (third paragraph).

Comment 13: Page 17, Section 3.6, Corrective Action, 3rd Paragraph
This paragraph describes groundwater mounding on Landfarms and predicts that once the groundwater levels have stabilized, predominant groundwater flow direction should resume toward the GPS extraction trenches. The groundwater mounding is attributed to irrigation activities. It may be pointed out that groundwater level normally follows ground surface slope in nature. The groundwater mounding at Landfarms may be due to hydraulic conductivity, low hydraulic gradient, and the resultant slow groundwater flow. Regardless of local groundwater mounding, the general groundwater flow will be toward the GPS.
Response to Comment 13: (New page 18, third paragraph) The text has been revised to include the requested wording.

Comment 14: Page 18, Last Sentence
It states that chemical monitoring in "C" Zone verifies that water quality below the Bay Mud at the point of compliance has not been degraded. The chemical data of "C" Zone is not presented nor referred to a specific report.
Response to Comment 14: (New page 18 - a, last sentence) The text has been revised to include a reference to the "C" Zone Investigation reports.

Comment 15: Page 22, Section 4.2.4.1, General:
The quoted Drawing D-767519 in Appendix J is not included, neither the drawing showing the cross section details of the final grading for No. 2 Landfarm through No. 5 Landfarm. Apparently some drawings are missing in Appendix J.

Response to Comment 15: Text has been revised to reflect the correct current drawing numbers. No drawings were missing from Appendix J.

Comment 16: Page 24, Section 4.3, Closure Unit Design
This section states that the drainage control systems are designed to be capable of handling a 25-year and 24 hours storm. An additional assessment should be performed to ascertain no possible serious damages to the protection systems and the environment if a heavier storm occurs.
Response to Comment 16: A discussion of the consequences of and contingency planning for a storm with a recurrence interval of greater than 25 years has been added to the first paragraph of the text for Section 4.3.

Comment 17: Page 32, Section 5.8, Free-Phase Hydrocarbon Monitoring and Recovery
The monitoring and recovery processes stated in this section appear reasonable and technically feasible.
Response to Comment 17: None required

Comment 18: Page 33, 2nd Paragraph, Last Sentence
The statement that chemical monitoring in the "C" Zones verifies that water quality below the Bay Mud at the point of compliance has not been degraded, requires further scrutiny.
Response to Comment 18: A reference to the "C" Zone Investigations has been added to the sentence in question.

Comment 19: Plates 3-3, 3-4, 3-5, and 3-10
Some wells and a borehole shown on geological cross sections A-A' and B-B' are not plotted on Plates 3-3 nor on Plate 3-10. The following cannot be found:
1) *GW-184C;*
2) *GW-181C which is likely GW-587C;*
3) *B-3*
4) *GW-190A*
5) *GW-104B*

The above wells and a boring should be shown on Plates 3-3 and 3-10.
Response to Comment 19: The missing well and boring locations have been added to Plate 3-3, Plate 3-10 is intended to show only those wells that are part of the current LGMP. GW-181C was abandoned and replaced by GW-587C several years ago.

Comment 20: Appendix A
Calculation of ground settlement for 50 years along 2 sections is presented in the appendix. Input parameters are listed, nevertheless, how those data are collected or cited from somewhere are not described. The listed coefficients of consolidation have wrong units (Ex., instead of 6.0 ft/yr, it should be 6.0 sqft/yr). More detained theoretical background involved in the calculation should be presented. Estimated settlements along A-A' and B-B' sections are presented, however, the reviewer is unable to validate the estimated values of settlement because important background information is missing. From the data presented, it appears that consolidation of Old Bay Mud and existing fills were not estimated. It will help reviewer if a schematic drawing of consolidation is added in Plates 2 and 3.

Response to Comment 20: The text has been revised to present the background of the parameters selected for analysis and elaborate further on the rational for the calculations (Section A1.0, third paragraph and Section A2.0, third paragraph). The DTSC agreed that a schematic drawing of consolidation was not required. Plates A-2 and A-3 were revised to show the correct units for the coefficients of consolidation.

Comment 21: Appendix B, Geotechnical Evaluation - Slope Stability
This portion of the report presents the results of static and dynamic slope stability analyses using computer models. Only two sections, A-A' and B-B' were analyzed, and it appears that a judgment call was involved in selection of the two sections and the slide circles. More sections should have been analyzed. The input parameters in the computer program calculations are not presented, therefore, the reviewer is unable to determine the adequacy of the analysis.
Response to Comment 21: The first paragraph of the text has been revised to discuss the rational behind the limited number of surfaces analyzed and the basis of the parameters selected. The parameters used in the analysis have been included in a new Table B-1), with the former Table B-1 becoming Table B-2.present the parameters selected for analysis, their basis, and background information on the calculation. The DTSC agreed that additional analysis were not necessary.

Comment 22: Appendix C, Seismic Hazard Study
Plate 6-1 shows most of the active faults surrounding the site, however, San Pablo fault which is closest to the site is not shown on the plate. In the text on page 6-2, it states that the fault has been classified as inactive and in conformance with interpretation of the 1975 US Geological survey and the 1975 California Division of Mines and Geology publications. I have checked a more recent 1994 Fault Activity Map of California, Division of Mines and Geology, for an

interpretation of the San Pablo fault and find that is classified as a pre-Quarternary fault consistent with the above interpretation.
Response to Comment 22: We have revised Section 3.0 of the parent document to this Appendix to include the information from the 1994 Fault Activity Map confirming that the San Pablo fault is inactive (Appendix C is reprinted from an earlier document and was not modified).

Comment 23: Appendix D Hydrogeologic Evaluation - Infiltration
Evaluation of infiltration is performed using the US EPA HELP model. The input parameters for the model are listed in Tables D-1 and D-2. Total subsurface inflow is assumed to be zero which may be re-evaluated. According to the Plate 3-8, A-Zone Water Table Map there is subsurface inflow from the eastern edge of the San Potrero-San Pablo Ridge. The inflow could be insignificant, nevertheless, it should be evaluated. In Table D-2, input parameters are listed with four significant figures which are presumably meaningless.
Response to Comment 23: The text has been revised to address the issue of subsurface flow (Section 2.4, second paragraph). The number of significant figures presented on Table D-2 were taken directly from the HELP model documentation and are not intended to imply that level of accuracy. As the parameters are inter-related, rounding them prior to performing the analyses may have caused some conflicts. The text was revised to indicate the source of the values. The DTSC agreed that additional analysis to evaluate the impact of sub surface flow would not significantly impact the findings of the analyses and were not necessary.

Comment 24: Appendix E, hydrogeologic Evaluation - Erosion
Soil erosion at the Landfarms are predicted by an equation developed by Wischmeier and Smith (1965). The methodology is adequate, however, some of the parameters involved in calculation are not presented in the appendix. Those parameters are described on page E-2, however, the numerical numbers, for example, M for particle size parameter, b for soil structural code, and c for the profile-permeability class are not presented. All parameters used in calculation should be presented.
Response to Comment 24: The text in Section E.2.2 has been revised to present the parameters selected for analysis.

Other Changes / Additions:
- The table of contents was revised to reflect the changes made to the text;
- The document history on page 1 was updated to reflect changes since the original submittal;
- Pages 36 and 37 include new references; and
- Plate 1-1 was modified to include the locations of the five background wells.

We trust these revisions meet your requirements. If you have any questions regarding our responses or the DTSC comments, please call myself in our San Jose office at (408) 451-1133 or Mark Wahler in our San Francisco office at (415) 243-3734.

Very truly yours,
DAMES & MOORE

Randolph C. Brandt, R.G.
Project Coordinator

Attachment

cc: Mark Wahler, D&M
Don Kinkela, ESD
WDO Project File
SFO Project File

December 30, 1996
Richmond, California

P.J. Duda
Chevron Products Company
841 Chevron Way
Richmond, California 94802

Waste Discharge Order Project
Revised Landfarm Closure Plan
Landfill Landfarm Sector

Dear Mr. Duda,

Transmitted with this letter is a copy of the third version of the Revised Landfarm Closure Plan. This plan replaces the earlier revised plans dated June 21, 1995 and September 14, 1995. The first revised plan was prepared by Bechtel Environmental, Inc. and Dames & Moore, Inc. (BEDM) at the request of Chevron and in response to a letter dated March 17, 1995 from the California Environmental Protection Agency Department of Toxic Substances Control (DTSC) requesting closure of the Landfarms. That plan was revised based on review comments made by the DTSC and was resubmitted in September, 1995. The September version was rescinded on January 24, 1996 by Chevron based upon a decision to pursue closing the Landfarms with a vegetative cover. No comments were received by Chevron from the DTSC on the September version of the plan.

Chevron and BEDM presented the revised conceptual plan elements to the DTSC in a meeting with Ms. Wei Wei Chui and Mr. Tony Morales on February 27, 1996. This meeting was also attended by representatives of the U.S. EPA, and the RWQCB.

A follow-up meeting was held on May 14, 1996 with Mr. Tony Morales and Dr. Stanley Sun of the DTSC to clarify several issues and identify areas where the DTSC needed additional information. It was agreed at the meeting that Chevron would submit a series of interim documents discussing various aspects of the proposed closure plan at roughly monthly intervals. This schedule was intended to allow the DTSC time to evaluate each aspect of the plan on an individual basis. Hence, when the Revised Closure Plan was submitted at the end 1996, it would contain nothing of significance that the DTSC had not already seen, thereby resulting in a quick and smooth approval process. The interim and other related documents submitted by Chevron to the DTSC consisted of the following:

- *Proposed GPS Effluent Water Sampling Plan* (dated May 6, 1996). The GPS sampling plan was developed to document that groundwater being extracted by GPS from the vicinity of the Landfarms was characteristically non-hazardous. Actual sampling of the GPS effluent began

in July, 1996 and is still ongoing. Results for samples collected through September 26 are presented in Appendix M.

- *Proposed Interim Vegetation Plan for Nos. 1 through 5 Landfarms* (dated May 23, 1996). The plan specified criteria and procedures that will be used to promote continued subsurface biodegradation at the Landfarms until the Post-Closure Maintenance Plan contained in this Revised Closure Plan is approved by the DTSC.

- *Final Cap Design Proposal* (dated July 26, 1996) contained preliminary versions of Sections 4.0, 4.1 and 4.2, Table 4-2, Plates 4-1 and 4-2, Drawings D-367512, D-367513, and D-367515, and Appendix O to this report.

- *Response to DTSC Comments on Landfarms Closure Plan - GPS and Related Issues* (dated September 12, 1996). This document addressed several GPS related issues that Dr. Sun, DTSC geologist, expressed interest in at the May 14 meeting. These issues included: 1) the ability of GPS to influence the presence of free phase hydrocarbon in wells that exist within the Landfarms footprint; 2) the apparent lack of piezometric monitoring points along the upgradient boundary of the No. 1 Landfarm; and 3) the effects of water in the 250-foot Channel on the ability of the GPS to maintain a hydraulic barrier along the western border of the Nos. 2 and 5 Landfarms.

On November 7, 1996, Mr. Morales of the DTSC forwarded Dr. Sun's review comments on the above referenced September 12 document. We have incorporated several of Dr. Sun's comments in the Revised Closure Plan and recommend that Chevron address the remaining issues in a separate document. Dr. Sun presented his comments in the form of six bulleted items. Our responses to each of his bulleted items are as follows:

Bullet one: As the LNAPLs are contained within GPS and can not cross its alignment, the issue of LNAPL floater and how it responds to fluctuating water levels is only urgent if the GPS does not perform properly. BEDM recommends that Chevron propose evaluating the LNAPL issue as part of post-closure groundwater monitoring and has prepared the attached plan accordingly.

Bullet two: We have added a plan for periodic recovery of LNAPLs with vacuum trucks as Section 5.8 in the Revised Closure Plan.

Bullet three: Information on the design of GPS is included in Sections 3.6 and 4.3.3 and Appendix J of the Closure Plan. If Dr. Sun wishes additional information, BEDM recommends Chevron refer him to the *Groundwater Protection System Engineering Report* (BEDM, 1991) and the RWQCB's *Order No. 93-109, Waste Discharge Requirements for: Chevron U.S.A., Inc., Richmond Refinery, Richmond, Contra Costa County* (December 1, 1993). The first document describes the GPS in detail while the second discusses the regulatory basis for the acceptance of GPS.

Bullet four: We have placed two "A" Zone compliance wells between the No. 1 Landfarm and the No. 1 Oxidation Pond's fourth and fifth passes. These wells, along with the four installed on the other three sides of the No. Landfarm will give the six wells that Dr. Sun requested.

Bullets five and six: BEDM recommends that these two items be addressed separately from the Closure Plan. Bullet five is easily handled by sending the requested material. Bullet six will require a brief letter report which BEDM would be happy to help Chevron prepare.

We have prepared the attached closure plan to comply with the general prescriptive standards of Title 22 of the California Code of Regulations for closure of land treatment units. This plan is intended to replace and supersede the original closure plau prepared by Chevron Research and Technology Company, dated March 31, 1988.

This letter also transmitts a draft version of a completed CEQA Initial Study checklist (the actual checklist must be prepared by the DTSC). Included is one 3.5 inch floppy disk containing the document in Word Perfect 5.1 format, as requested by Mr. Morales of the DTSC. As discussed with Mr. Sedgwick, we have not prepared a copy of a DTSC closure plan checklist with cross references to the appropriate sections of this Closure Plan. Apparently, such checklists are prepared iudependently by each region of the DTSC on an as-needed basis and we have not yet located a version of the checklist relevant to Land Treatment Units and suitable for submittal to the local DTSC. We would be pleased to prepare a cross-referenced checklist if one can be identified. In addition, we have provided Chevron with a draft (dated December 23) version of the Screening Risk Assessment requested by the DTSC in their letter of September 20, 1996. We will finalize the risk assessment document after we have received Chevron's review comments.

We trust this plan meets your requirements. If you have any questions regarding this plan, please call me at extension 2-4965.

M.J. Wahler, P.E.
Site Investigation Manager

L05404/MJW

Attachments

cc: R.C. Brandt
G.E. Martinez
C.J. Hunt/J.E. Sedgwick

REVISED
LANDFARMS CLOSURE PLAN

Prepared for:

CHEVRON PRODUCTS COMPANY
RICHMOND, CALIFORNIA

December 30, 1996

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1.0 INTRODUCTION

Presented in this document is the Revised Closure Plan for the Nos. 1 through 5 Landfarms at the Chevron Richmond Refinery located in Richmond, California (Plate 1-1). This plan was prepared by Bechtel Environmental, Inc. and Dames & Moore (BEDM) at the request of Chevron. This revised plan supersedes the previous closure plans submitted by Chevron dated March 31, 1988, June 7,1995, and September 24, 1995. This plan presents a revised closure approach that was presented to the California EPA Department of Toxic Substances Control (DTSC) at a meeting on February 27, 1996. As discussed in Section 1.1, Chevron has submitted several documents discussing various elements of the proposed plan to the DTSC for their review in advance of the submittal of this plan. All of these elements have been incorporated into this document.

This revised plan provides a history of activities to date and summarizes the facility and hydrogeologic conditions. The plan also presents details of the Landfarms closure and post-closure activities, the closure and post-closure cost estimate, and evidence of the financial assurance.

1.1 History of Landfarms Activities

Between the mid 1970s and 1987, Chevron conducted landfarming operations at five locations within the Refinery. The landfarming was designed to promote biodegradation of oily soils that had been generated within the Refinery from various operations.

On November 12, 1980, Chevron submitted Part A of the hazardous waste permit application for the Refinery, which included the five Landfarms. Subsequently, in February 1981, Chevron submitted Part B of the hazardous waste permit application as requested by the U.S. Environmental Protection Agency (U.S. EPA). Revisions to both Part A and Part B of the Resource Conservation and Recovery Act (RCRA) permit application were submitted in August 1984. On February 10, 1987, Chevron was notified that the Landfarms did not qualify for a hazardous waste permit because some of the permit conditions could not be met. In response to this condition, Chevron entered into a Consent Agreement with the U.S. EPA and DTSC to close the landfarm units.

Chevron submitted the original *Landfarms Closure Plan* on March 31, 1988, and initiated closure of the Landfarms under that plan in the first quarter of 1988. This plan included a Biodegradation Activities Plan that outlined details of how the Landfarms would be managed during the closure period to degrade organic residues in the soil. The closure period was estimated to require approximately five years. The plan also included a groundwater monitoring plan to evaluate the condition of the groundwater during the closure period. As part of the plan implementation, BEDM conducted a Reconnaissance Survey to evaluate the vertical and horizontal extent of residual oil in the Landfarms soils. This survey consisted of soil core sampling and soil pore liquid sampling. The results of the survey indicated that the zone of landfarm influence ranged from 3 to 7 feet below ground surface (bgs) in No. 1 Landfarm, 3 to 5-1/2 feet in No. 2 Landfarm, 1 to 5 feet in No. 3 Landfarm, 3-1/2 to 5 feet in No. 4 Landfarm, and 2 to 4 feet in No. 5 Landfarm (BEDM, January 9, 1989). Results of the pore water testing indicated that concentrations were not statistically different from background levels. The study concluded that the time required to biodegrade the remaining constituents could range from 2.3 to 8.2 years, based on the presence of relatively immobile

polynuclear aromatic hydrocarbons (PAHs).

In response to the Regional Water Quality Control Board (RWQCB), San Francisco Bay Region's *Order No. 89-175, Revised Waste Discharge Requirements for: Chevron U.S.A., Inc., Richmond Refinery, Richmond, Contra Costa County*, Chevron and BEDM developed and constructed a Groundwater Protection System (GPS) for the Refinery. The objective of the GPS for the entire Refinery, including the Landfarms areas, is to establish and maintain a physical or hydraulic barrier to prevent the off-site movement of potentially contaminated near-surface groundwater. Construction of GPS elements in the vicinity of the Landfarms began in 1990 and are scheduled to be completed in 1997. Details of the GPS are discussed in Section 3.6 of this document.

On July 13, 1990, BEDM submitted the *Landfarm Biodegradation Study Report* presenting the progress of biodegradation activities to date (BEDM, July 13, 1990). The study consisted of compiling and evaluating monthly surface soil data to establish a baseline oil concentration value against which future data and trends could be compared. Based on the results of this study, BEDM recommended modifications to the Biodegradation Activities Plan.

On February 27, 1992, BEDM submitted the *Landfarms Bioremediation Assessment Report*. The purpose of the assessment was to evaluate, with existing data, the effectiveness of biodegradation and to propose additional modifications to the Biodegradation Activities Plan. The report concluded that, although the total oil concentrations were decreasing at a very slow rate, biodegradation was likely to have been continuing. However, due to the nature of analytical methods used, the degree of biodegradation could not be quantified. Recommendations were made by BEDM regarding modifications to the Biodegradation Activities Plan and were subsequently implemented.

On August 10, 1993, BEDM submitted the *Landfarms Sampling and Analysis Report*. The purpose of the investigation was to further evaluate the effectiveness of hydrocarbon biodegradation based on a comparison of the current data with the 1988 Reconnaissance Survey data. Results of this assessment indicated that the parameters analyzed were within the target range of levels necessary to support active hydrocarbon biodegradation. Based on these results, it was concluded that the Landfarms had been operating as an active biodegradation unit and had been effective in reducing petroleum wastes applied to the ground surface prior to 1987. However, the degree to which constituents had been degraded suggested that biodegradation activities may have reached a point of diminishing returns. Therefore, BEDM recommended that landfarming activities be discontinued and the Landfarms be permanently closed.

On March 17, 1995, the DTSC issued a letter requesting a revised closure plan for the Landfarms (Letter from Lester Kaufman of DTSC to P.S. Williams of Chevron). Chevron requested BEDM to prepare a closure plan in response to the DTSC's request. The revised Closure Plan was submitted on June 21, 1995. The DTSC reviewed the plan for technical adequacy and issued a *Notice of Deficiency (NOD) for the Revised Closure / Post-Closure Plan, Richmond Refinery Landfarm Nos. 1 Through 5, Chevron U.S.A. Products Company, Richmond, California, 94801 EPA ID. No CAD 009 114 919* on August 15, 1995.

At Chevron's request, BEDM prepared a second revision to the Landfarms closure plan, which was submitted to the DTSC on September 14, 1995. Following discussions with the DTSC, Chevron reconsidered their

closure options in relation to a detailed review of the regulatory requirements for closure of land treatment units and requested the DTSC to discontinue reviewing the September 1995 plan. Chevron presented their revised conceptual plan to the DTSC in a meeting with Ms. Wei Wei Chui and Mr. Tony Morales of the DTSC, Elizabeth Christian of the Regional Water Quality Control Board (RWQCB), San Francisco Bay Region, and Mr. Ron Leach of the U.S. EPA on February 27, 1996. After reaching tentative consensus with the DTSC on the revised closure plan elements, Chevron requested BEDM to prepare this final revised closure plan. In the interim, the DTSC requested that Chevron submit documents on the following subjects for the DTSC's review for the purpose of expediting approval of this plan:

A vegetation plan for the interim period prior to closure;

A GPS effluent sampling plan to evaluate the nature of the groundwater being removed from the Landfarms;

The proposed final cover design;

The plan for free phase hydrocarbon recovery;

Piezometric monitoring around No. 1 Landfarm; and

The impact of the 250-Foot Channel on the Nos. 2 and 5 Landfarms.

Consistent with the decision to close the Landfarms, active biodegradation activities were modified and Chevron submitted the *Proposed Interim Vegetation Plan for Nos. 1 through 5 Landfarms* (BEDM) to the DTSC on May 23, 1996. The plan specified the criteria and procedures that will be used to assure continued subsurface biodegradation at the Landfarms until the Post-Closure Maintenance Plan, contained in this Revised Closure Plan, is approved by the DTSC and implemented by Chevron.

BEDM then prepared the *Proposed GPS Effluent Water Sampling Plan* (dated May 6, 1996), which has been transmitted to the DTSC by Chevron. The GPS sampling plan was developed to document that the groundwater being extracted from the vicinity of the Landfarms was non-hazardous. The results of this sampling plan to-date are discussed in Section 3.7 of this document.

The *Final Cap Design Proposal* (dated July 26, 1996) contained preliminary versions of Sections 4.0, 4.1 and 4.2, Table 4-2, Plates 4-1 and 4-2, Drawings D-367512, D-367513, and D-367515, and Appendix O to this report. The design drawings have been revised to those submitted earlier to reflect changes in the surface drainage plan.

2.0 FACILITY CONDITIONS

2.1 General Refinery Information

The Landfarms are located within Chevron's Richmond Refinery. The Richmond Refinery is situated on 2,800 acres roughly bounded by Castro Street to the East, Interstate Highway 580 to the South, and San Pablo Bay to the West and North. A map showing the location of the Refinery is presented on Plate 1-1.

The Refinery street address is:

Chevron Products Company
Richmond Refinery
841 Chevron Way
Richmond, Contra Costa County
California 94801

The Refinery Mailing address is:

Chevron Products Company
Richmond Refinery
P.O. Box 1272
Richmond, California 94802-0272
phone: (510) 242-3000

The facility is within the Richmond Township:

Range	1 North 5 East
Sections	2, 3, 4, 9, 10, 11, 14, 15, 16, 34, and 35
Principle Meridian	Mt. Diablo Base Meridian
Zoning	M-3 Heavy Industrial

The Richmond Refinery is situated at 37 degrees, 56 minutes, 30 seconds, N. latitude and 122 degrees, 23 minutes, 30 seconds, W. longitude. The entire refinery is located between:

Latitude:	37 degrees, 55 minutes, 17 seconds, to 37 degrees, 58 minutes, 30 seconds
Longitude:	122 degrees, 22 minutes, 31 seconds, to 122 degrees, 25 minutes, 31 seconds

The principal products provided by this facility can best be described by the following Standard Industrial Classification (SIC) Directory codes:

2911	Petroleum Refinery
2869	Industrial Organic Chemicals
2819	Industrial Inorganic Chemicals

A discussion of the Hazardous Waste Management Units located within the Refinery is contained in Part A of the RCRA permit application submitted by the Refinery in November 1980, and its revision submitted in August 1984.

2.2 Landfarms Information

2.2.1 General Description

The Landfarms facility covers approximately 29 acres. The facility is made up of five separate areas

designated Nos. 1 through 5 Landfarms. The locations of the five Landfarms are shown on Plate 1-1. All of the Landfarms areas are internal to the Refinery and are not adjacent to the perimeter of the Refinery. The approximate size of each Landfarm is as follows:

No. 1 Landfarm	13.5 acres
No. 2 Landfarm	8 acres
No. 3 Landfarm	3.5 acres
No. 4 Landfarm	3 acres
No. 5 Landfarm	1 acre

The Landfarms are comprised of imported fill that was placed at the site prior to landfarm operation. The thickness of this fill ranges from 10 to 25 feet. The perimeter of each Landfarm is encircled by an above-grade berm designed to minimize access and surface water runon/runoff. A typical cross section of these perimeter berms is presented on Plate 2-1. The interior surface of each Landfarm is generally about 3 feet above the surrounding grade elevation, and is graded to control runoff. Plate 2-2 shows the existing topography for No. 1 Landfarm and Plate 2-3 shows the topography for Nos. 2 through 5 Landfarms.

Access to the Landfarms facility is controlled by the Environmental Operations Section of the Refinery's Utilities/Environmental Area Business Unit (ABU). The Environmental Section's security measures are designed to prevent unknowing or unauthorized access to the Landfarms facility.

Areas of the Refinery that do not border the Bay waters are secured by a 6-foot-high cyclone fence, which is generally topped by three rows of barbed wire. The only unfenced landward access to the Refinery is across Herman Slough from the property of Chevron Chemical Company, to which the public does not have access.

All unguarded gates are locked. In the case of the railroad gate, access is controlled electronically. Locked gates fall into two categories:

- Single-locked gates to which only assigned Refinery personnel have access; or
- Double-locked gates (cowboy locks) to which assigned Refinery personnel have access, as well as outside personnel who must service equipment within the area protected by the gate.

Routine entry for Refinery personnel and approved contractors is through guarded gates. Visitors to the Refinery must enter and exit through guarded gates, and must be cleared by authorized personnel prior to entry.

Warning signs are posted at 100-foot intervals around the perimeter of each Landfarm. These signs are posted in English and Spanish and bear the following wording:

CAUTION
HAZARDOUS WASTE
STORAGE AREA

UNAUTHORIZED PERSONS

KEEP OUT

CUIDADO
ZONA DE RESIDUOS
PELIGROSOS

PROHIBA LA ENTRADA A
PERSONAS NO AUTORIZADAS

These signs are yellow and black, which is consistent with the general Refinery usage for caution signs. They each measure 10 inches high by 14 inches wide, and bear 2-1/2-inch yellow letters for the word "CAUTION" against a black background. The balance of the text is in 3/4-inch black letters against a yellow background.

2.2.2 Regulatory Status

As summarized above, Chevron submitted Part A of the RCRA hazardous waste permit application for the Richmond Refinery in November 1980 and Part B of the permit application in February 1984. Revisions to both Part A and Part B of the RCRA permit application were submitted in August 1984. The U.S. EPA, the California Department of Health Services (now the DTSC), and the RWQCB subsequently determined that the Landfarms did not qualify for a RCRA hazardous waste permit, primarily because the Landfarms lacked adequate separation between the treatment zone and the seasonal high groundwater table. The U.S. EPA then issued a Consent Agreement and Final Order in January 1988 to ensure that the Landfarms are closed in accordance with applicable U.S. EPA regulations. The DTSC followed by issuing a Stipulation and Order to ensure that the Landfarms are closed in accordance with applicable California regulations. Chevron ceased all waste applications to the Landfarms in 1987 and submitted a Closure Plan to the U.S. EPA, DTSC, and RWQCB in April 1988.

In summary, the following orders and permits are directly applicable to the site:

California Environmental Protection Agency Department of Toxic Substances Control (DTSC), 1988, *Stipulation and Order (Docket No. HWCA 87/88-019)*, March 23 (transmittal letter dated April 1, 1988).

California Regional Water Quality Control Board, San Francisco Bay Region (RWQCB), 1993, Order No. 93-109, Order to Revise and Rescind Order No. 89-175, Waste Discharge Requirements for: Chevron U.S.A., Inc., Richmond Refinery, Richmond, Contra Costa County, September 15.

DTSC, 1992, Hazardous Waste Facility Permit for a Hazardous Waste Treatment and Storage Facility, September 10.

United States Environmental Protection Agency, Region 9 (U.S.EPA), 1988, Agreement and Final Order, RCRA 09-88-0005, January 20.

U.S.EPA, 1990, Administrative Order on Consent (Docket No. RCRA-09-89-0010), June 18.

In addition, the Refinery's treated effluent water is governed by a National Pollutant Discharge Elimination System (NPDES) permit administered by the RWQCB (Order No. 92-111).

2.2.3 Waste Characteristics

For discussion purposes, the Landfarms were divided into three areas. Area I includes No. 1 Landfarm, Area II includes Nos. 2, 4, and 5 Landfarms, and Area III includes No. 3 Landfarm. The Landfarms were in operation for the biological treatment of oily wastes generated form on-site petroleum processing from the mid-1970's to 1987. The principle wastes applied were oil/water separator sludge (Nos. 1, 2, 4, and 5 Landfarms), non-leaded tank bottoms (Nos. 1, 2, 3, and 4 Landfarms), oil/water mixtures, algae water, pond sediments and oily dirt. When in operation, wastes were applied to the surface of the Landfarms and tilled into the top 6 to 12 inches. Prior to 1980, no data are available on waste application rates to the Landfarms. Since 1980, a total of 188,000 tons of waste were applied to the Landfarms. The characterization of the Landfarms wastes presented herein is based on the results presented in the *Landfarms (Soil) Sampling and Analysis Report* (BEDM, August 10, 1993). Additional information on the waste application history can also be found in the 1993 document.

Waste characterization was evaluated based on four criteria: ignitability, corrosivity, reactivity and toxicity. The definitions used in this investigation for the characterization of hazardous waste are defined in California Code of Regulations, Title 22, and are summarized below:

- Ignitability: A substance is considered hazardous when the flash point is below 140° F (60° C).
- Corrosivity: A substance is considered hazardous when the pH is less than or equal to 2.0, or greater than or equal to 12.5.
- Reactivity: A substance is considered hazardous if, when exposed to conditions of pH between 2.0 and 12.5, toxic gases (hydrogen sulfide [H_2S] and hydrogen cyanide [HCN]) are generated at levels that present a danger to human health or the environment. The current EPA action levels are 500 mg/kg for H_2S and 250 mg/kg for HCN.
- Toxicity: A substance is considered hazardous when the total metals concentration is greater than the corresponding Total Threshold Limit Concentration (TTLC) value or when the soluble metal concentration, following the Waste Extraction Test (WET), is greater than the corresponding Soluble Threshold Limit Concentration (STLC) value.

2.2.3.1 Area I

The flash point was above the ignitability criterion of 140° F in all Area I samples. The corrosivity measurements were recorded between pH 5.1 and pH 8.4. Hydrogen cyanide was not detected in any of the

samples. Area I reported 8 detections of hydrogen sulfide ranging from 4.5 mg/kg to 150 mg/kg.

There were no metals detections greater than the TTLC value in Area I. Only 1 sample had a WET result greater than the respective STLC value. Mercury in 1 sample was above the STLC value of 0.2 mg/L at a concentration of 0.25 mg/L. This value is considered suspect because the total concentration of mercury was insufficient to account for a soluble concentration of 0.25 mg/L.

Based on an evaluation of the vertical distribution of constituents in soils samples, the zone of influence of the Landfarms wastes ranges from 3 to 7 feet bgs.

2.2.3.2 Area II

All Area II samples had a flash point above the ignitability criterion of 140° F. The corrosivity measurements were recorded between pH 5.6 and pH 8.1. Hydrogen cyanide was not detected in any of the samples; there were, however, 6 detections of hydrogen sulfide ranging from 4 mg/kg to 196 mg/kg. There were no metals detections greater than the TTLC value in Area II. No WET sample results were greater than the respective STLC value.

No samples in Area II were found to exceed hazardous waste characterization criteria. The zone of influence in Area II ranges from 2 to 5.5 feet bgs.

2.2.3.3 Area III

All Area III samples had a flash point above the ignitability criterion of 140° F. The corrosivity measurements were recorded between pH 5.1 and pH 7.8. Hydrogen cyanide and hydrogen sulfide were not detected in any of the samples. There were no metals detections greater than the TTLC value in Area III. No WET sample results were greater than the respective STLC value.

No samples in Area III were found to exceed hazardous waste characterization criteria. The zone of influence in Area III ranges from 1 to 5 feet bgs.

2.2.3.4 Soil Physical Characteristicss

Physical testing and field observations of the Landfarms soil texture suggested the soils are fine-grained silts and clays, with some residues of construction debris from the original fill. Based on the fine-grained nature of both upper and lower fill, the permeability of the fill strata to both liquids and gases is relatively low. As a result, slow infiltration and areas of ponded water have been observed at the Landfarms during precipitation cycles. Comparing the observed soil moisture content to the field capacity (defined as the soil moisture content of a well-drained soil 2 to 3 days after saturation) suggests that most soil samples were at or above the field capacity moisture content. This fact along with the estimate of the air-filled pore space suggest that the Landfarms soils are poorly drained, possibly limiting the gaseous transport from the surface to the subsurface soils.

2.2.4 1988-1995 Bioremediation Activities

Landfarms activities in the period from 1988 to 1995 were performed in accordance with the U.S. EPA Refinery Landfarm Consent Agreement (January 1988), the California Environmental Protection Agency (California EPA) Stipulation and Order (April 1988), and subsequent negotiations with the California EPA (now DTSC). The objective of the landfarming activities performed in that period was to optimize soil physical, chemical and biologic conditions in order to maximize biodegradation of organic wastes. The Landfarms operations included regularly scheduled soil tilling, irrigation, runoff control, addition of soil amendments, and a soil and groundwater monitoring program.

The Landfarms Soil Monitoring Program was conducted in accordance with the 1988 Landfarms Closure Plan to document the progress of bioremediation and to guide Landfarms watering and fertilizing practices. The monitoring program, in its final form, included monthly soil sampling for pH, oil content, moisture content, and microbe count; and quarterly for specific conductance, phenol, total phenolics, total organic carbon (TOC), and foru metals: chromium, lead, nickel, and vanadium. The results of these tests were compiled quarterly in the Landfarm Soil and Groundwater Monitoring Program Reports and submitted to the U.S. EPA, the DTSC, and the RWQCB. Information on the chemical and agricultural characterization of the Landfarms soils is contained in the quarterly reprots, as well as in the *Landfarms (Soil) Sampling and Analysis Report* (BEDM, August 10, 1993), and are not repeated in this document.

2.2.5 Interim Vegetation Plan Activities

As outlined in the interim vegetation plan, Chevron is in the process of optimizing a vegetated surface on the Landfarm soils to promote continued biodegredation of the residual waste constituents until the final closure cover is installed. The activities currently performed on the Landfarms fall into the two general categories that include operations and monitoring. The objectives of the Landfarms operations are to: 1) continue degrading residual organic waste constituents present in the Landfarms soils (primarily in the top 12 inches of the soil); 2) maintain conditions that reduce the potential for metals to become solublized in the soil; and 3) prevent the erosion of the Landfarms soils and berms by wind and water. The objectives of monitoring include: a) tracking the types and concentrations of organic and inorganic hazardous waste constituents in the groundwater; and b) assessing the need for soil amendments to promote the growth of surface vegetation. A brief description of the interim vegetation plan is presented below.

2.2.5.1 Interim Landfarms Vegetation Activities

Vegetation Status Monitoring - A survey of the vegetated surface of the Landfarms is performed quarterly to evaluate plant germination, irrigation, and the need for fertilization, mowing and reseeding. The surveys identify the appearance and nature of vegetative cover on the surface of each Landfarm, symptoms of drought stress, chlorosis (indicative of nutrient deficiency), and the need for mowing and/or reseeding. Maintenance modifications, such as fertilizing, reseeding, and/or irrigation, will be made to address observations made during the surveys and promote a healthy vegetated surface. These modifications and their resulting effectiveness will be documented in Semi-Annual Landfarms Status Letters.

Mowing / Reseeding - The composition and extent of vegetation present on each Landfarm will largely

determine the need to mow and/or reseed. Winter annual grasses such as oats (*Aventa sativa*) and ryegrass (*Poa annua*) normally set seed in spring and early summer and then turn brown and die. If mowed and irrigated, some winter annuals will stay green longer into the summer. Mowing winter annuals would be coupled with over-seeding with common perennial grass/legume mixtures used to maintain year-round vegetative cover. The grass/legume mixture recommended for over-seeding or reseeding Landfarm soils includes:

"Alta" tall fescue (*Festuca arundinacea*);
Rose clover (*Trifolium prateuse*);
White clover (*Trifolium repens*);
Birdsfoot trefoil (*Lotus corniculatus*);
Blue wildrye (*Elymus glaucus*);
Creeping wild rye (*Elymus triticoides*);
Bermuda grass (*Cynodon dactylon*): and
California brome (*Bromus carinatus*).

These species are adapted to the Northern California climate and soils, and have been used by various State agencies for vegetation projects.

Irrigation - Irrigation is supplied to the Landfarms soils to enhance seed germination and to meet plant water requirements throughout the warm months when plant evapotranspiration requirements exceed rainfall. An electronically controlled stationary sprinkler system is used to irrigate Nos. 2 through 5 Landfarms as well as a portion of the No. 1 Landfarm. The balance of the No. 1 Landfarm is irrigated with a self-propelled linear sprinkler system. Treated Refinery effluent water that meets the NPDES permit requirements for discharge is used as the water supply for irrigation. Consistent with the current Biodegradation Activities Plan, the target soil moisture content is between 6 and 20 percent. To ensure that the irrigation schedule is adequate, soil moisture monitoring is conducted as part of the soil monitoring program (see Section 2.2.3.3). Results of the soil moisture monitoring will be included in the *Semi-Annual Landfarms Status Reports*.

Stormwater Runoff and Run-on Control - The surface of each Landfarm is graded to control the runoff of rainwater. The interior grading of the Landfarms causes rainwater to pond in a single low area in each Landfarm. When rainwater has ponded in the Landfarms, it is pumped out for treatment in the Refinery effluent treatment system. The first stormwater of the season is sampled and analyzed to verify its suitability for discharge to the Refinery effluent treatment system. Historical results have confirmed that the chemical nature of the stormwater meets effluent treatment system requirements.

Surface water run-on at the Landfarms is prevented by means of above-grade berms that encircle the perimeter of each Landfarm. These berms prevent stormwater in the adjacent areas from running onto the surface of the Landfarms.

General Maintenance - In addition to the above-mentioned activities, the Landfarms are surveyed weekly to check the integrity of the berms and the general condition of the facility. Berms are repaired if any erosion is

observed. The vegetative cover on the berms, warning signs, and operating equipment are also regularly maintained.

2.2.5.2 Monitoring

Soil Monitoring Program - The objective of the Soil Monitoring Program is to document maintenance of soil nutrients, pH, and to evaluate soil conditions for plant growth. To meet these objectives, Chevron will collect a minimum of one sample per acre within each Landfarm from the surface to 1 foot below ground surface (bgs) on a quarterly basis. The sample locations will be identified and sampled in accordance with the Landfarms Quarterly Soil Monitoring procedures included in the initial Closure Plan (Chevron, 1988). The collected samples will be analyzed for the following:

Water soluble ammonia by EPA method 365.3;

Total acid soluble potassium by EPA method 6010;

Water soluble orthophosphate by EPA method 300.0;

Acid hydrolyzed phosphate by EPA method 365.3;

Soil pH; and

Total heterotrophic bacteria enumeration (semi-annually only).

In addition to the quarterly monitoring, weekly monitoring of the soil moisture will be conducted at locations where there is evidence of insufficient irrigation and/or dry soil. The irrigation plan will be adjusted as necessary to address areas of insufficient soil moisture.

Groundwater Monitoring Program - Quarterly groundwater sampling is performed for the Landfarms facility. The results of the chemical analyses performed on the samples are presented in the Landfarms Groundwater Monitoring Program Quarterly Reports that are submitted to the U.S. EPA, DTSC, and the RWQCB. The groundwater monitoring program involves the sampling of 24 Landfarms area monitoring wells and 5 background monitoring wells. A summary of the Landfarms Groundwater Monitoring Program is presented in Section 3.5 below.

It has been generally recognized by Chevron and the various regulatory agencies that there is no physical separation between the wastes in and under the Landfarms and the first underlying groundwater table, leaving no clean vadose zone to monitor for the migration of constituents. Therefore neither the U.S.EPA nor the DTSC require Chevron to perform vadose zone monitoring. Section 3.6 discusses the corrective actions Chevron has implemented for the potentially contaminated "A" Zone groundwater.

2.2.5.3 Reporting

The results of the quarterly reconnaissance of the Landfarms vegetation and surface soil conditions will be presented to the DTSC in the Semi-Annual Status Letter. The status letter will summarize observations of the Landfarms vegetation and soils analysis, coupled with a description of the modifications made to the operating procedures including mowing, reseeding, irrigation cycles, microbial counts, and fertilizer requirements in response to the quarterly results received.

2.3 Climatology

The marine climate at the Refinery is characterized by prolonged, essentially rainless periods during half of the year, with most of the precipitation falling between the months of November and March. Based on the rainfall data collected between 1950 and 1994 at the City of Richmond's City Hall, which is located 2-1/4 miles southwest of the site, the mean annual precipitation is 22.0 inches. The maximum annual recorded rainfall is 45.77 inches and occurred between July 1, 1982 and June 30, 1983. The minimum annual recorded rainfall is 9.05 inches and occurred between July 1, 1975 and June 30, 1976. The maximum recorded 24-hour rainfall is 6.83 inches, recorded on January 4, 1982.

As presented in the U.S. Department of Commerce Technical Paper No. 40, Rainfall Frequency Atlas of the United States for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 years (May, 1961), the precipitation depth for a 24-hour event with a 100-year return frequency at the Refinery is 5.6 inches. Precipitation duration-frequency curves are not available for a 1,000-year recurrence interval. Therefore, the rainfall value for a 1,000-year return period, 24-hour event was extrapolated from the data prepared by the U.S. Department of Commerce for recurrence intervals of 1, 2, 5, 10, 25, 50, and 100 years. The extrapolated depth of precipitation was calculated to be 7.4 inches, as presented in the *Landfill 15 Facilities Construction Workplan* (BEDM, April 30, 1992).

Castro Creek is located in the eastern portion of the Refinery (Plate 2-4). The current flood hazard rating maps for Castro Creek (FEMA, 1978), adjusted for more recent tidal elevation data (United States Corps of Engineers, 1984) indicate that the still water level in Castro Creek is not expected to rise above an elevation of 8.6 feet Richmond Refinery Datum (RRD) during a 100-year storm event (Elevation 0 RRD corresponds to Elevation -2.2 feet National Geodetic Vertical Datum of 1929).

2.4 Surface Water

As described in the *Refinery-Wide Report of Waste Discharge (ROWD*, Dames & Moore, August 31, 1988), several surface water bodies exist within a one-mile radius of the Richmond Refinery perimeter. Those identified include the saline waters of the San Francisco and San Pablo Bays, and the man-made shipping harbor channel, Santa Fe Channel, and the Lauritzen Canal. Wildcat Creek and San Pablo Creek are two tidally influenced freshwater streams located northeast of the Refinery. Castro Creek is located on the boundary between the Chevron Refinery property and the Chevron Chemical property. Two marsh areas are located north of the Refinery between San Pablo Creek and Wildcat Creek. These contain many small tidal tributaries that drain and feed the marshes. Seasonal changes in surface water and representative chemical analyses are discussed in the *1988 Refinery-Wide ROWD*.

The surface water bodies that lie in the vicinity of the Landfarms facility are: Castro Creek (800 feet from No. 3 Landfarm), Herman Slough (2,000 feet from No. 3 Landfarm), Wildcat Creek (2,500 feet from No. 3 Landfarm), and Castro Cove (2,500 feet from No. 1 Landfarm). These surface water features lie in the north and eastern portions of the Refinery, to the north of the Landfarms (Plate 2-4).

3.0 GEOLOGIC AND HYDROGEOLOGIC CONDITIONS

The regional geologic setting of the Richmond Refinery is described in detail in the *1988 Refinery-Wide ROWD*. Excerpts of the geology section as it pertains to this closure plan are included in the following sections. The seismic setting section from the *1988 Refinery-Wide ROWD* is included in its entirety in Appendix C. A supplementary section discussing the expected Maximum Credible Earthquake (MCE) for the site can be found in Section B.2.2.2 of Appendix B.

3.1 Regional Geology

The Refinery is located within a localized northwest trending graben, or trough, along the eastern margin of San Francisco Bay, as shown on Plate 3-1. Franciscan bedrock below the graben has been down-dropped along the now inactive San Pablo Fault, which parallels the eastern face of the Potrero-San Pablo Ridge, and along the Hayward Fault Zone, which forms the western scarp of the Berkeley Hills.

Throughout the Pleistocene, there were cycles of sea level rise and fall. Because the site is located near the edge of the inundated zone, in an area that is nearly level, even minor fluctuations in the Bay water level would have resulted in extensive interfingering of alluvial and estuarine sediments as the site area underwent episodic shallow flooding. Because of uncertainty surrounding the stratigraphic classification of the Pleistocene bay and alluvial sediments, the interfingering alluvial and estuarine deposits underlying the site have been identified only in terms of their environments of deposition rather than by correlation with deposits in other parts of the Bay. The Refinery can be subdivided geologically into two areas: the Bay margins and the Potrero-San Pablo Ridge.

3.1.1 Bay Margin Area

In general, the developed portions of the Refinery in the flat Bay Margin zone are underlain by a layer of fill that ranges in thickness between 2 and 15 feet. Below the fill is a layer of soft silty clay with organic matter known as Young Bay Mud. The upper 2 to 3 feet of the Young Bay Mud layer are generally peat-rich. The configuration of the bottom of the Bay Mud seems to define a northwest trending valley that parallels the Potrero-San Pablo Ridge and an east-west trending valley through the center of the Refinery (Dames & Moore, 1981). The thickness of the Bay Mud under the Refinery ranges from 60 feet, below the No. 1 Oxidation Pond northwest dike, to 4 feet, below the Kelham Warehouse parking lot near the junction of Interstate 580 and Castro Street. East of Castro Street and toward the Potrero-San Pablo Ridge, the Bay Mud pinches out, and it is not present in areas landward of and higher than the 1898 shoreline. In these areas, recent fill is underlain by alluvium.

In areas where the Young Bay Mud is present, it is underlain by 3 to 15 feet of a stiff silty clay known as Old Bay Mud, which is underlain in turn by a thick sequence of interfingering alluvial fan and estuary deposits over Franciscan bedrock. The Young Bay Mud and Old Bay Mud are the most recent estuary layers in the alluvial/estuarine sequence described below.

The alluvial deposits are highly variable, ranging from brown and grayish-brown silty clays to silty sands with occasional fine gravel lenses. This variability reflects two major processes. The first is the internal depositional regime of the alluvial fans, which are formed as sediment is gradually eroded from hills and deposited in a series of poorly sorted sheet wash deposits. In general, coarser gravel and sands are deposited

in the upper, or proximal, part of the fan, while silts and clays are deposited out along the more flat-lying, distal portion of the fan. The second process takes place as runoff channels on the fan surface further transport and sort sediments of varying size, and large storms carry pulses of coarse sediment onto the distal end of the fan.

The basic alluvial fan structure has been complicated by sea level changes that may be related to Pleistocene glacial cycles. As sea level rises and falls, the fan base level changes so that the boundaries of the proximal and distal environments, gradational in any case, are constantly migrating. In addition, the fans that overlapped in the Refinery area originated from two sources, the Berkeley Hills to the east acting as the major sedimentary source with the Potrero-San Pablo ridge yielding smaller quantities of material.

The estuary deposits generally consist of brownish-gray to gray silty clays and clayey silts that were deposited in the shallow marine environment of the early Bay. These clays can be calcareous and frequently contain shell fragments. Localized thin sandy deposits within the estuarine sequence could represent former tidal inlets or channels within the estuary environment. Because the Refinery is located near present and past Bay shorelines, the estuary sediments frequently contain an alluvial component. In general, the shallow, near-shore environment receives an influx of alluvial sands and silts, which are then reworked by current action and benthic organisms.

Bedrock under the Refinery consists of sandstones and siltstones of the Franciscan Formation, and its depth is variable. It can be found at the surface in the form of the Potrero-San Pablo Ridge.

3.1.2 Potrero-San Pablo Ridge

The ridge areas are typically underlain by thin soil and colluvium, over bedrock. The colluvium typically consists of gravelly clay with angular rock fragments. In downslope areas near the flatland, it is anticipated there will be alluvial deposits as described in Section 3.1.1, which may be locally covered by structural fills, overlying colluvium. The underlying bedrock consists of sandstones and shales of the Franciscan assemblage.

3.2 Site-Specific Geology

Based on the regional geologic setting described above, the Refinery has been divided into four physiographic/geologic provinces: the “Flats”, the “Ridge”, the “Alluvial”, and the “Transition” Zones (Plate 3-2). The Flats Zone comprises the flatland Bay Margin areas adjacent to San Pablo Bay that were once marshlands. The Ridge Zone comprises the San Pablo Ridge above an elevation of approximately +50 feet RRD. The Alluvial Zone comprises flatland areas of alluvial fan deposits, derived from the Berkeley Hills, east of the Refinery. The Transition Zone is the area that separates the Flats Zone from the Alluvial Zone and the Ridge Zone.

The Landfarms are located in the Flats Zone of the Refinery. Site stratigraphy in this area is interpreted from observation of surface conditions and the evaluation of data obtained from monitoring wells and borings drilled during the Landfarms Reconnaissance Survey (Dames & Moore, January 9, 1989) and previous studies in the vicinity. The locations of geologic cross sections through the Landfarms are shown on Plate 3-3. The stratigraphy beneath No. 1 Landfarm is shown on Plate 3-4. The stratigraphy beneath Nos. 3 and 4 Landfarms is shown on Plate 3-5.

The stratigraphic units within this area consist of fill that is underlain, in order, by Young Bay Mud, Old Bay Mud, interfingering alluvial and estuarine deposits, and Franciscan bedrock. Bedrock was not encountered in any of the borings drilled within the area and none of these borings extended through the alluvial/estuarine deposits. Therefore, the actual thickness of the alluvial/estuarine deposits beneath this area is unknown. The presence of bedrock is inferred based on borings drilled elsewhere in the Refinery and on exposures in the adjacent hills. Bedrock probably occurs at a depth greater than 200 feet beneath the Landfarms. The artificial fill and underlying units are discussed below.

3.2.1 Fill

Fill at the Landfarms generally consists of two stratigraphically distinct layers that differ in color, grain size, and material type. The upper layer, or Landfarms fill, is 1.5 to 7.5 feet thick and consists of dark gray to brown silty clay with black mottling, plant roots, and scattered gravel and sand. Currently, each Landfarm fill zone is tilled and watered and has soil amendments added to promote biodegradation. The lower fill layer (the fill underlying the upper Landfarms fill) ranges from 3 to 19 feet, and is generally composed of gravelly to silty clay with variable amounts of gravel, sand, silt, man-made materials such as brick, concrete and glass, and pockets of black, soft sludge (silty clay saturated with oily and tarry substances). The present location of the northwestern part of the No. 1 Landfarm and the Isomax Plant area to the north of the No. 1 Landfarm and the present Nos. 2 through 4 Landfarms areas were underlain by several ponds that were backfilled. A detailed summary of the history and a chemical characterization of the landfills are presented in the *RCRA Facilities Investigation for the Landfills Under Isomax and No. 1 Landfarm and Landfill Under Nos. 2 and 3 Landfarms* (BEDM, November 24, 1992). The pockets of sludge found within the lower fill probably represent old fill material and oily wastes within the ponds. Portions of the lower fills have been historically described as "the Landfills beneath the Landfarms."

3.2.2 Young Bay Mud

The Young Bay Mud underlies the fill, overlies the Old Bay Mud, and ranges between 5 and 30 feet in thickness beneath the Landfarms. The Young Bay Mud generally consists of dark brown to dark gray, soft to medium-stiff silty clay that contains varying percentages of organic material, peat, and occasional sandy units. Trace to abundant amounts of peat are present in the upper 1 to 7 feet of the Young Bay Mud and are referred to as the Peaty Bay Mud unit. The available stratigraphic data suggest that the Young Bay Mud thins in a southeasterly direction toward Castro Street and in a southwesterly direction toward San Pablo Ridge.

3.2.3 Old Bay Mud

The Old Bay Mud is generally stiffer than the overlying Young Bay Mud and ranges from 1 to 15 feet thick beneath the Landfarms. The Old Bay Mud consists of bluish to greenish gray, medium-stiff to stiff silty clay that contains organic material and local trace amounts of sand. The Old Bay Mud also thins to the southeast toward Castro Street, and to the southwest toward San Pablo Ridge.

3.2.4 Alluvial/Estuarine Deposits

The alluvial and estuarine deposits are interfingered, laterally variable, and generally stiffer and more

consolidated than the overlying Bay Mud deposits. The alluvial sediments range from silty clays and sandy silts to silty sands, and vary from brown to olive-gray in color. The estuarine deposits are commonly finer grained, consisting of silty clays with local sand lenses and traces of gravel. Color may vary from dark gray to mottled orange, brown and gray. Lenses of coarse material within the estuarine deposits probably represent former tidal channels or inlets. The complex interfingering of the alluvial and estuarine deposits is related to periods of submergence and emergence of the shoreline environment during past fluctuations in sea level.

3.3 Regional Hydrogeology

Six water-bearing zones (designated A through F) have been identified in the unconsolidated sediments beneath the Refinery (Dames & Moore, 1981). Four of the uppermost zones (designated A, C, B, and D in order with increasing depth) have been investigated by means of observation wells, water sampling, and chemical analyses. Each of the zones is separated by a layer of either Bay Mud or estuarine clay, which acts as an aquitard between water-bearing units.

In general, groundwater flows to the northeast, from the San Pablo Hills toward San Pablo Bay, and to the northwest from the Berkeley Hills toward San Francisco Bay. Groundwater flow rates are relatively low beneath the Refinery due to the heterogeneity and low permeability of the sediments in each of the water-bearing units. Hydraulic characteristics for the upper units were investigated by Dames & Moore (Dames & Moore, 1985, 1988) and were used to estimate average flow rates for the various units. A summary of the aquifer properties and average flow rates is presented below.

ZONE	CASE	HORIZONTAL PERMEABILITY[1] (CM/SEC)	AVERAGE HYDRAULIC GRADIENT (FT/FT)	AVERAGE HORIZONTAL VELOCITY (FT/DAY)
A	Minimum	1.0×10^{-7}	0.001	9.5×10^{-7}
A	Maximum	1.3×10^{-2}	0.001	1.2×10^{-1}
C	Minimum	1.0×10^{-7}	0.003	1.9×10^{-6}
C	Maximum	1.3×10^{-2}	0.003	2.3×10^{-1}
B	Minimum	1.0×10^{-6}	0.001	9.4×10^{-6}
B	Maximum	3.0×10^{-2}	0.001	2.8×10^{-1}

1. Wells with slow recharge and untested aquiclude layers were assigned a horizontal permeability of 1.0×10^{-7} cm/sec.

The two water bearing zones nearest the surface of the Landfarms ("A" Zone and "C" Zone) contain brackish water, have never been suitable for use as drinking water, and can not be practically used for any beneficial

purpose. The uppermost potentially usable "aquifer" underlying the site occurs at an approximate depth of 100 feet ("B" Zone). Chemical test results have shown that this water-bearing zone is effectively separated from overlying water-bearing units by a thick layer of estuarine clay and is more representative of fresh water as opposed to the brackish water typical of the shallower water-bearing units. This distinction is enhanced by hydraulic separation due to an upward component of the groundwater gradient from the lower "B" Zone into the upper "A" and "C" Zones.

3.4 Site-Specific Hydrogeology

Two upper groundwater zones appear to be continuous across the Landfarms areas. For the purposes of this report, and to be consistent with other groundwater studies in this area, we have designated the zones "A" and "C," with increasing depth.

3.4.1 "A" Water Table Zone

The "A" Zone, or water table zone, is a brackish water-bearing zone that is usually encountered at depths less than 15 feet bgs. The "A" Zone water table contour maps for this zone during the second quarter 1996 are shown on Plates 3-6 and 3-7. A Refinery-wide contour map for the second quarter of 1996 is presented on Plate 3-8.

Soils within the "A" Zone typically consist of fill materials and the upper organic-rich portion of the Young Bay Mud, referred to as Peaty Bay Mud. These "A" Zone soils are underlain by the peat-free portion of Young Bay Mud and Old Bay Mud. The "A" Zone matrix is highly variable, consisting of silty, sandy and gravelly clay with low to moderate hydraulic conductivities and silty sand and gravel with moderate to high hydraulic conductivities. The Peaty Bay Mud may be orders of magnitude more permeable than the relatively peat-free Bay Mud and, therefore, is considered to be part of the "A" Zone. The peat-free portion of the Young Bay Mud and the Old Bay Mud together act as a low-permeability barrier, or aquitard, between the "A" and "C" Zones.

Overall "A" Zone flow in the Flats Zone at the Refinery is northwest toward the Bay. However, local mounding of groundwater occurs in the vicinity of the Landfarms. This mounding, due to watering activities on the Landfarms, causes local reversals in gradient. Once the proposed Landfarm vegetative cover becomes fully established and acts to reduce infiltration, the local mounding of the water table will likely be reduced and the gradient will resume an overall northwesterly direction under No. 1 Landfarm. Groundwater flow under Nos. 2 through 5 Landfarms will be toward the existing and planned groundwater extraction systems. Other anthropogenic features that affect the configuration of the water table surface in the vicinity of the Landfarms include the 250-Foot Channel, the Bioreactor, and the Water Enhancement Wetlands Project.

Groundwater flow in the "A" Zone beneath the Landfarms is expected to be relatively slow due to the low hydraulic conductivity of the fill material. Based on aquifer tests conducted in 6 wells in the No. 1 Landfarm area and 9 wells in the Nos. 2 through 5 Landfarms area, hydraulic conductivities in the No. 1 Landfarm area range from 2.52×10^{-5} cm/sec to greater than 10^{-3} cm/sec, with an average of 2.0×10^{-4} cm/sec. Hydraulic conductivities in the Nos. 2 through 5 Landfarms area range from 1.4×10^{-7} cm/sec to greater than 10^{-3} cm/sec,

with an average of $1.8x10^{-5}$ cm/sec. As can be seen on Plates 3-6, 3-7, and 3-8, the groundwater gradient across the Landfarms away from the influence of GPS is relatively flat and, when coupled with the low hydraulic conductivity, suggests a slow component of groundwater flow.

3.4.2 "C" Zone

The "C" Zone is a brackish water-bearing zone underlying the Bay Mud and generally occurring between approximately 20 and 110 feet bgs in the Landfarms areas. The "C" Zone comprises a stratigraphic interval between aquitards that separates it from the overlying "A" Zone and the underlying "B" Zone and is comprised primarily of lower-permeability alluvial and estuarine silts and clays. A number of intermittent sandy lenses occur at different depths and locations within the "C" Zone deposits. In general, these sandy lenses do not appear to be laterally continuous. The "C" Zone water level contour map for the second quarter 1996 is shown on Plate 3-9. In general, "C" Zone water levels indicate a lateral gradient toward the southeast beneath the No. 1 Landfarm and to the west beneath the Nos. 2 through 5 Landfarms.

Groundwater flow in the "C" Zone beneath the Landfarms is also expected to be relatively slow for the same reasons as in the "A" Zone. Based on aquifer tests conducted on 2 wells in the Nos. 2 through 5 Landfarms, hydraulic conductivities ranged from $5.5x10^{-4}$ cm/sec, to $9.7x10^{-4}$ cm/sec, with an average of $7.6x10^{-4}$ cm/sec. As seen on Plates 3-9, the groundwater gradient across the Landfarms is relatively flat and, when coupled with the low hydraulic conductivity, suggests a slow component of groundwater flow.

3.4.3 Bay Mud Aquitard

The "A" and "C" Zone are separated by Young and Old Bay Mud units that collectively range from approximately 5 feet to 30 feet thick beneath the Landfarms, as stated above. The permeability of the Bay Mud is approximately equal to or less than $1.0x10^{-7}$ cm/sec. The Bay Mud acts essentially as a low-permeability layer providing an effective barrier to the downward vertical movement of potentially contaminated groundwater. The integrity of this low-permeability barrier is evidenced by the confined conditions and upward hydraulic gradient from the "C" Zone into the "A" Zone.

3.5 Landfarms Groundwater Monitoring Program

The Landfarms Groundwater Monitoring Program (LGMP) is implemented in conjunction with the Refinery-wide Groundwater Monitoring Program (RGMP). The LGMP is designed to comply with the U.S. EPA and DTSC Consent Agreements and the California Code of Regulations (CCR) Title 23, Article 5 requirements for corrective action monitoring programs. The LGMP corrective action monitoring program includes 24 on-site groundwater monitoring wells located at Nos. 1 through 5 Landfarms and 5 background wells. Monitoring is conducted on a quarterly basis. Details of the monitoring program are summarized in the sections below.

3.5.1 Monitoring Points, Constituents, and Frequencies

The LGMP includes 19 "A" Zone wells and 5 "C" Zone wells located on site and 3 "A" Zone and 2 "C" Zone

background wells located off site. The on-site wells are shown on Plate 3-10. The off-site wells are located north and east of the Refinery property. Water levels, free-phase hydrocarbon thicknesses, and chemical constituents are monitored on a quarterly basis in all 29 LGMP wells. Metals, VOCs, and SVOCs are tested for in those wells that do not contain free-phase hydrocarbons. A detailed list of the specific chemical constituents is presented on Table 3-1.

3.5.2 Concentration Limits/Groundwater Quality

The results of the chemical testing are compared quantitatively against both background levels and historical levels within each respective well. The most recent data reported are for the second quarter 1996 and were reported in the *Landfarms Groundwater Monitoring Program, Second Quarter 1996 Report* (Chevron, September 27, 1996). Results for the third quarter 1996 will be submitted on or before December 29, 1996. This information is included as part of this Closure Plan by reference.

3.6 Corrective Action

As part of the overall Refinery-wide Groundwater Protection System (GPS), groundwater extraction trenches were installed along the downgradient perimeter of the Landfarms between 1990 and 1993. The Landfarms GPS also serves as corrective action for the Landfills that underlie portions of the Landfarms (see Section 3.2.1). The objective of the GPS for the entire Refinery, including the Landfarms areas, is to establish and maintain a physical or hydraulic barrier to prevent the off-site movement of potentially contaminated "A" Zone groundwater. The GPS includes a perimeter system that consists of either extraction trenches, or a combination of soil/bentonite barrier walls with either extraction trenches or extraction wells. Groundwater is continually pumped from the trenches and wells to treatment facilities, and the resulting hydraulic depression establishes and maintains a capture zone intended to prevent the migration of potentially contaminated groundwater past the GPS alignment. The associated physical barriers are intended to provide secondary containment for the hydraulic barriers, and to provide additional protection to wetlands or water bodies from the effects of groundwater extraction. The laterally extensive Bay Mud deposit constitutes the floor of the system and restricts the flow of groundwater from the "A" Zone to the "C" Zone. The GPS concept and details were approved by the RWQCB as appropriate corrective action for potentially contaminated "A" Zone groundwater.

The major GPS groundwater control features for the Landfarms are: 1) a laterally extensive deposit of low-permeability Bay Mud underlying the entire Landfarms site; 2) a physical barrier (soil-bentonite slurry wall) to the northeast adjacent to Castro Creek and to the south of Nos. 2 through 5 Landfarms (the southern wall is partially constructed and is scheduled for completion in 1997); 3) an "A" Zone hydraulic barrier (groundwater extraction trench or extraction well) between the northeast perimeter of No. 1 Landfarm, along the north and west perimeter of Nos. 2 through 5 Landfarms, and in the gap in the new barrier wall where it crosses the Deep Water Outfall Project (DWOP) pipelines; 4) a transfer system for extracted groundwater; and 5) a potentiometric and water quality monitoring system sufficient to evaluate the effectiveness of the GPS. The northeastern-most end of the Nos. 2 through 5 Landfarms groundwater extraction trench is tied into the Landfill 15 extraction trench and the southeastern-most end of the new barrier wall to the south of Nos. 2 through 5 Landfarms is tied to the Landfill 15 barrier wall, providing a continuous barrier completely around

the Nos. 2 through 5 Landfarms. This configuration provides hydraulic control and in some areas physical control on the downgradient and cross gradient sides of the Landfarms.

The design of the extraction trenches and wells was based on the groundwater flow characteristics of the "A" Zone water-bearing unit. In general, groundwater flows to the north in the vicinity of Nos. 2 through 5 Landfarms with localized mounding directly beneath the Landfarms. This mounding is likely due to irrigation activities, described in Section 2.2.3 above, and should gradually decrease in size after vegetative cover is placed over the surface of the Landfarms. Once the groundwater levels have stabilized, predominant groundwater flow direction should resume toward the GPS extraction trenches. Groundwater flow in the vicinity of No. 1 Landfarm is generally to the northeast, directly toward GPS. A small mound is present in the northeast corner of the No. 1 Landfarm, which is also suspected to be an artifact of irrigation activities. Regardless of the source, the small mound in No. 1 Landfarm does not significantly affect the groundwater flow in the area.

The groundwater extraction trenches are approximately 1.5 to 2 feet wide and extend to a depth of approximately 2 feet into non-peaty Young Bay Mud. The trenches are excavated through sheet piles using a backhoe, lined with geotextile filter fabric and backfilled with coarse-grained drain rock. A groundwater extraction sump is placed approximately every 100 to 150 linear feet along the trench. The sumps are typically 12-inch-diameter Schedule 40 carbon steel pipe, screened with 1/4-inch by 6-inch slots across the entire length of the casing. The groundwater extraction wells, to be constructed behind the short gap where the new barrier wall south of the Nos. 2 through 5 Landfarms crosses the DWOP pipelines alignment (drawing D-318541), will consist of 12-inch-diameter slotted PVC casing extended approximately 13 feet bgs.

A shallow drainage trench will be located directly adjacent to the new barrier wall south of Nos. 2 through 5 Landfarms on the Landfarms side and extending from the Nos. 2-5 Landfarms GPS to the DWOP pipelines (drawing D-318541). The drainage trench will be designed to intercept groundwater migrating south from the Landfarms area that may otherwise build up and over-top the barrier wall. The drainage trench will differ from GPS extraction trenches in that it will not penetrate to Bay Mud, and will not be designed to affect a hydraulic barrier; rather it will be designed to maintain groundwater levels at least one foot below the top of the barrier wall. The trench will include a perforated drain pipe that will drain the intercepted groundwater to strategically placed sumps. Water collected in the sumps will be pumped to the Refinery's effluent system for treatment.

The groundwater transfer system consists of interconnected air ejector pumps placed in each of the sumps, pump controllers, piping, and associated instrumentation. The designed groundwater extraction rate from the Landfarms extraction trenches is 200 gpm for No. 1 Landfarm and 240 gpm for Nos. 2 through 5 Landfarms. Actual extraction rates during the first quarter of 1996 for No. 1 Landfarm averaged 70 gallons per minute (gpm) with a maximum recorded rate of 146 gpm; rates for the Nos. 2 and 3 Landfarms trench averaged 45 gpm with a maximum recorded rate of 70 gpm; and rates for the Nos. 2 and 5 Landfarms trench averaged 41 gpm with a recorded maximum of 85 gpm. Details of the groundwater extraction trenches and transfer system are included in Appendix J.

Based on chemical analytical data for groundwater samples from wells in the area of the Landfarms GPS, the

extracted groundwater is non-hazardous and is compatible with the Refinery's effluent treatment system. Therefore, the extracted groundwater is routed through nearby oil-water separators to remove and recycle the recoverable free-phase hydrocarbons. The water then flows to the Refinery's Bioreactor, where it is further treated prior to discharge through the deep water outfall pipeline into San Pablo Bay under the Refinery's NPDES permit.

The Environmental Operations Section of the Refinery's Utilities/Environmental Area Business Unit (U/E) is responsible for operating and maintaining the GPS. Environmental Operations Section personnel visually inspect all pipelines and controllers several times a week to assure that the system is operating properly. The design of the GPS extraction system, with pumps located at roughly 200-foot intervals, is inherently redundant. Hence the malfunction of any one pump is not expected to significantly reduce the effectiveness of the system at containing the Landfarms groundwater as the groundwater normally recovered by the malfunctioning pump would flow laterally towards the adjacent pumps until the pump could be repaired or replaced. The Refinery maintains a supply of spare pumps, so pump replacement could be performed in a matter of hours. If needed, Refinery personnel would supplement the GPS pumps with temporary air or diesel powered pumps.

The effectiveness of the GPS in containing “A” Zone groundwater is monitored and reported to the RWQCB, DTSC, and the U.S. EPA as part of the Refinery-wide Groundwater Monitoring Program (RGMP). The scope of the RGMP is specified in the Monitoring and Reporting Program of RWQCB Order 93-109. "A" Zone piezometric monitoring is performed as part of the RGMP to demonstrate that a hydraulic barrier is maintained by the GPS at the perimeter of the closure units. Chemical monitoring in the "A" Zone supplements piezometric monitoring and assists in evaluating the effectiveness over time of the GPS corrective action. Chemical monitoring in the "C" Zone verifies that water quality below the Bay Mud at the point of compliance has not been degraded.

3.7 GPS Effluent Water Quality Monitoring

As part of preliminary discussions regarding closure details for the Landfarms, the DTSC requested Chevron evaluate the GPS effluent water to verify that it was indeed compatible with the Refinery's effluent treatment system and should not be subject to RCRA leachate requirements. As has been confirmed in discussions with DTSC staff, if the water collected from the GPS in the vicinity of the Landfarms tests to be characteristically non-hazardous, the water is considered non-hazardous and can be routed directly to the Refinery NPDES treatment system without pre-treatment, even accepting the DTSC's position that leachate may be co-mingled with the groundwater.

To evaluate the potentially hazardous nature of the extracted water, BEDM developed a sampling methodology, chemical testing program, and data analysis methodology that followed the general guidelines presented in the "Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities" (February, 1989). Details of the evaluation program were presented to the DTSC with Chevron's letter dated May 6, 1996 *Waste Discharge Order Project, Richmond Refinery Landfarm Closure, Proposed GPS Effluent Water Sampling Plan*. Briefly, the program consists of collecting a statistically representative number of time-integrated composite effluent samples from several locations along the Landfarms GPS and evaluating the samples for hazardous waste criteria as specified in 22CCR261. Sixteen sampling rounds from the four locations shown on Plate 3-11 were proposed in Chevron's letter. Chemical testing is being conducted by CEL of Richmond, California. The effluent water samples are being tested for hazardous waste characteristic criteria including:

- Ignitability (flash point less than 60°C (140° F);
- Corrosivity (pH less than or equal to 2 or greater than 12.5);
- Reactivity (in terms of reactive cyanide and reactive sulfide); and
- Toxicity (by the Toxicity Characteristic Leaching Procedure (TCLP), 96-hour acute aquatic toxicity test (as described in "Static Acute Bioassay Procedures for hazardous Waste Samples," California Department of Fish and Game, Water Pollution Control Laboratory, revised November 1988) and the California Waste Extraction Test (WET) (22 CCR methodology).

Seven sampling rounds have been completed to date, with the first round having been collected on July 11, 1996 and the most recent on October 25, 1996 (due to equipment problems, only location GPS-1 was sampled in the second round). The most recent set of results presented in this document was for samples collected on September 26, 1996. A complete list of the chemical analyses being performed on the water is presented in Table 3-2, and the maximum levels of each constituent tested to-date are presented in Table 3-3.

As shown in Table 3-3, of the metals analyzed by the TCLP, barium was detected in samples from all four sampling points at concentrations up to 0.810 mg/L, and selenium at two locations at concentrations up to 0.014 mg/L, all well below the regulatory limits. For the WET metals, arsenic was detected at location 3 with concentrations up to 0.384 mg/L; barium was detected in all samples, with concentrations up to 1.35 mg/L; chromium at three locations at concentrations up to 0.084 mg/L; cobalt was detected at two locations at

concentrations up to 0.084 mg/L; copper was detected at least once at each location at concentrations up to 0.592 mg/L; molybdenum at each location with concentrations up to 0.304 mg/L; lead was detected in one sample from location 4 at a concentration of 0.103 mg/L; mercury and nickel were detected at location three at concentrations up to 0.459 ug/L and 0.144 mg/L respectively; selenium was detected at three locations at concentrations up to 0.005 mg/L; vanadium was detected at all locations at concentrations up to 0.122 mg/L; and zinc was detected at each of the locations at concentrations up to 3.90 mg/L. All of the detected WET metals were at concentrations below the regulatory limits. Only one of the samples collected contained detectable amounts of reactive cyanide or sulfide. The measured pH values ranged from 7.06 to 8.17, all well within the limits for corrosivity. No volatile organic compounds of concern were detected in any of the samples. Only one semi-volatile organic compound was detected (pentachlorophenol at 0.0277 mg/L). No samples failed the acute aquatic toxicity or flash point tests.

The chemical test data will be evaluated according to the statistical procedures outlined in the *"Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities"* guidance manual. The methods, procedures, and results of the sampling will be submitted in a letter report to the DTSC within eight weeks of collecting the last sample.

3.8 Free-Phase Hydrocarbons

In accordance with the current Waste Discharge Order (WDO, 1992), Chevron evaluates the presence and recoverability of free-phase hydrocarbons (LNAPLs) in wells throughout the Refinery. As part of this evaluation program, BEDM conducted studies to measure and track the trends of hydrocarbon accumulation in the Landfarms monitoring wells, assess the recoverability of the hydrocarbon by conducting LNAPL recharge tests and performed hydrocarbon fingerprint analyses. Based on the results of the evaluations, Chevron implemented an LNAPL recovery program whereby LNAPLs were extracted from several of the wells within the Landfarms footprint on a regular basis. The frequency of recovery ranged from weekly to quarterly, dependent on the rate of LNAPL recovery observed in each well. Recovery of LNAPLs by vacuum trucks was discontinued in mid-1995 because the thickness of free-phase hydrocarbons was consistently less than ½ foot in the interior wells and the GPS in the area of the Landfarms had become fully operational. Based on results of LNAPL thickness monitoring performed since mid-1995, Chevron has proposed to re-institute periodic LNAPL recovery within the Landfarms, as discussed in Section 5.8.

4.0 LANDFARMS CLOSURE ACTIVITIES

Presented in this section is a discussion of the closure elements for the Richmond Refinery Landfarms. This includes a discussion of the closure strategy, the closure design, and the closure schedule. This closure plan was prepared to conform with State regulations 22CCR66265 and Federal regulations 40CFR265, both of which address the closure of interim status land treatment facilities. As required by the DTSC 1988 Stipulation & Order (HWCA 87/88-019), and the EPA 1988 Consent Agreement (RCRA 09-88-0005), this plan has been developed following the guidelines set forth in the EPA's *Guidance Manual on Hazardous Waste Land Treatment Closure / Post-Closure,* (EPA Guidance Document) April 1987.

4.1 Closure Plan Design

Based on the site and waste characteristics as detailed in Sections 2.0 and 3.0, a site closure plan was developed for the Landfarms. At Chevron's direction, this plan was based on in-place closure of the Landfarms, which is one of the options that the applicable regulations provide for.

The proposed closure units have been designed to reduce surface water infiltration through the surface of the Landfarms fills and soils and to prevent lateral off-site migration of "A" Zone groundwater from the Landfarms sites. The performance standards for this closure are spelled out in 22 CCR 66265.111, which require that the facilities be closed in a manner that:

> Minimizes the need for further maintenance; and
>
> Controls, minimizes or eliminates, to the extent necessary to protect human health and the environment, post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated rainfall or runoff, or waste decomposition products to the ground or surface waters or to the atmosphere.

In compliance with applicable regulations, Chevron has elected to close the Landfarms by establishing a final vegetated cover over the units. As discussed in Section 3.4.1 of the EPA Guidance Document, the use of vegetation as the final surface cover is highly recommended by the EPA. A major reason for this preference is cited in Section 3.4.1.2 of the EPA Guidance Document, which states "an advantage of closing the HWLT (Hazardous Waste Land Treatment) unit by establishing a vegetative cover is that the wastes are left in place and continued treatment of any remaining constituents can occur in the soil system."

Chevron considered and rejected closing the Landfarms with low-permeability caps (essentially as if they were landfills) for much the same reasons stated cited in Section 3.4.2.2 of the EPA Guidance Document. The same section also states that the use of capping as a closure method for a HWLT unit is not recommended by the EPA.

Additional regulatory objectives for the closure of land treatment facilities, as spelled out in 22 CCR 66265.280(a), are:

> Prevention of the migration of hazardous waste and hazardous waste constituents from the treated area into the groundwater;
>
> Prevention of the release of contaminated runoff from the facility into surface water;
>
> Prevention of the release of airborne particulate contaminants caused by wind erosion; and
>
> Compliance with Section 66265.276 concerning the growth of food-chain crops.

The remainder of this section discusses the closure of the five Landfarms located within the Chevron Richmond Refinery. Section 5.0 presents the post-closure monitoring and maintenance plan and Section 5.2 contains a discussion of post-closure site usage. The drawings referred to in this section (e.g., D-767512) can be found in Appendix J, Construction Drawings.

4.2 Closure Unit Description

4.2.1 Closure Unit Configuration and Topography

To accommodate the final cover configuration of the Landfarms, the surface soils will be graded to improve the stability of the perimeter slopes and to allow for settlement of the final cover while maintaining proper drainage. Grading will involve cutting in some areas and using the cut material as fill in other areas, with clean imported fill used to make up shortfalls in the required fill volumes. Fill material will be placed in 8-inch or 12-inch lifts and compacted as described in Section 4.2.4, below. In areas of cut, and areas where existing grade is adequate, the soil will be scarified 6 inches and compacted as described in Section 4.2.4. The specifications for earthwork are contained in Appendix H.

4.2.2 Overall Configuration - No. 1 Landfarm

The No. 1 Landfarm site is bounded by a GPS extraction trench along its northeastern perimeter. As shown on Plate 4-1, Layout of Proposed Closure Units, the final cover will extend to the outer toe of the existing containment dike on the perimeter of the site, an area of approximately 13 acres. The closed Landfarm will be in the form of a low ridge with gentle slopes. A concrete-lined surface runoff collection ditch will be provided on the perimeter of the Landfarms to collect surface runoff and route it to the Refinery's clean stormwater impoundment system. The cover will be vegetated with grasses, shrubs, and trees designed to optimize post-closure biodegredation of remaining constituents.

The final cover design and planned drainage control features are described in Sections 4.2.4 and 4.2.5, below. The existing GPS facilities in the Landfarms area were described earlier, in Section 3.6.

4.2.3 Overall Configuration - Nos. 2, 3, 4, and 5 Landfarms

The Nos. 2, 3, 4, and 5 Landfarms closure units will consist of a final cover constructed over the entire footprint of each Landfarm and over most of the existing perimeter dikes, as shown on Plate 4-1. The site containing the four Landfarms is bounded by GPS facilities along its western, southern, and northern perimeters, with Landfill 15 and its GPS facilities to the east. The final cover will extend to the outer toes of the existing containment dikes on most of the landfarm perimeters, an area of approximately 23 acres. As with No. 1 Landfarm, a concrete-lined surface runoff collection ditch will be provided on the perimeter of the Landfarms to collect surface runoff and route it to the Refinery's clean stormwater impoundment system. The cover will be vegetated with grasses, shrubs, and trees designed to optimize post-closure biodegredation of remaining constituents.

The existing and proposed GPS facilities in the Landfarms area, the final cover design, and planned drainage control features, are described below.

4.2.4 Final Cover Configuration

4.2.4.1 General

As mentioned above, the cover design consists of a vegetated surface. Sections illustrating the final

engineered cover design are provided on drawing D-767519 (Appendix J). As discussed with the DTSC (February 27, 1996 Landfarms presentation), the final vegetative cover over the closure units will consist of a minimum of 12 inches of vegetated fill (see Detail 4 on drawing D-757519, Appendix J). The extent of the final cover is shown in plan view for No. 1 Landfarm on the Closure Unit Finished Grading Plan, drawing D-767512, and for Nos. 2 through 5 Landfarms on drawing D-767515.

The Landfarms will be regraded into low mounds to facilitate surface drainage and improve the visual appearance of the sites. The Landfarm soils will be lightly compacted or recompacted with light tracked equipment to support the construction of the final cover while still allowing for easy vegetation root penetration. The final grades are designed to divert rainfall runoff away from the former Landfarms sites. Infiltration into the Landfarms soils will be reduced by the improved surface grading and the surface vegetation, which will take up water by evapotranspiration. The inclusion of a layer of clean soil over the entire Landfarm area will serve to prevent run-off from direct contact with the wastes and also prevent wind erosion of the wastes.

Each of the materials included in the design is described below. A brief description of quality control measures to be used during construction is also provided, with a more complete discussion in Appendices G and H.

4.2.4.2 Perimeter Berms

The portions of the existing perimeter berms that are not spread into the Landfarms areas may require additional compaction to serve as a foundation for the drainage ditches and provide lateral support for the Landfarm soils. The soil will be proof-rolled to locate areas that are soft or loose. These areas will be tested in accordance with ASTM D-1557 to confirm that the materials are compacted to at least 90 percent of maximum dry density to a depth of 2 feet. If the test results indicate that adequate compaction has not been achieved, the materials will be excavated and recompacted.

4.2.4.3 Interior Soils

The fills within the closure units will need to be graded and lightly compacted to support the construction of the final Landfarms cover, but not overcompacted to a degree that will impede the growth of plant roots and inhibit the continued bioremediation of the remaining hydrocarbons. Fill spreading and compaction will be performed on 8-inch lifts by tracked vehicles. The use of heavy equipment or trucks will be minimized where practical.

4.2.4.4 Vegetated Layer

The top 12-inch soil layer of the cover will consist of two layers. The 6-inch-thick lower clean fill layer provides a firm base suitable for supporting future shrubs and trees, while the 6-inch upper layer will be a relatively loose topsoil that is higher in nutrients in order to facilitate initial plant growth. The vegetation specified for the final cover will be similar to the native grasses, plants, and trees. This will result in a low-maintenance cover with limited need for long-term irrigation. Prior to establishing vegetation, an erosion mat will be attached to the final surface on any steep slope that may be susceptible to erosion.

4.2.4.5 Vegetation

The establishment of vegetation on the Landfarms will be conducted in stages based on the growth rate and performance of different plant species in the field. This section presents an overview of the establishment of the vegetation of the Landfarms.

The purpose of establishing vegetation on the Nos. 1 through 5 Landfarms is to reduce soil erosion by water and wind and to increase microbial populations in the vadose zone leading to enhanced biodegradation of remaining petroleum hydrocarbons. Vegetation will be established in three phases, as depicted on Plate 4-2. A variety of plant and tree species will be used in order to draw from the largest population of species adapted to the soils and climatic conditions of the Landfarms. A list of potential plants is listed in Table 4-2. Chevron will not manage any of these plants as crops intended for either human or animal consumption.

The first phase will establish fast-growing grasses and herbaceous plants, capable of tolerating soil and climatic conditions at the Landfarms in order to establish full cover as soon as possible to prevent erosion. Seeding and irrigation of these plants is scheduled to occur immediately on completion of soil placement for the final cover, with the intent to establish the cover prior to the onset of heavy winter rains. The second phase will focus on selecting deeper-rooted perennial herbs that will enter the subsoils in addition to the upper foot of soil. Placement of the plants identified as "intermediate rooted species" on Table 4-2 will occur during the spring following the planting of the shallow-rooted species. Establishment of hybrid poplar trees and other tree species (if appropriate) will be accomplished by transplanting tree seedlings in a fairly dense stand (1,000 to 5,000 trees/acre) while allowing the herbs planted between rows to remain. Placement of the trees will occur after the deeper rooted herbs have become fully established, which is anticipated to be the third year following the completion of the Landfarms cover. In the third phase, the trees will be thinned enough to allow an understory of herbaceous plants to continue to grow.

By manipulating the vegetation, and the associated rooting depths of the different plants, the entire vadose zone soils will be inhabited by roots. Once colonized by a relatively high density of roots, the soil microbial populations will increase and hydrocarbon biodegradation in the subsoils will be greatly enhanced. The subject of plant-aided remediation of hydrocarbon-containing soils has been the subject of extensive research in recent years. A collection of recent documents on this subject is attached as Appendix O to this closure plan.

4.2.4.6 Surface Grading

The final surface of the vegetative portions of the Landfarms will be graded such that the surface will retain at least a 3 percent slope, after settlement, to minimize ponding. The slopes will initially be constructed with 4 percent minimum slopes to accommodate the long-term settlements discussed in Section 4.3.1, as shown on drawings D-767512 and D-767515 (Appendix J). The areas surrounding the closure units will be graded to drain away from the closure units such that any runoff from the surrounding areas will flow away from the Landfarms surfaces.

4.2.5 Surface Drainage Control Facilities

The surface drainage control facilities are shown in plan view on drawing D-767512 for No. 1 Landfarm and drawing D-767515 for Nos. 2 through 5 Landfarms (Appendix J). Surface runoff from the exterior slopes of the closure units will be collected in existing or new lined perimeter drainage ditches. Runoff collected at the Landfarms will be pumped to the Refinery's stormwater retention basins. The design basis for the surface drainage facility is discussed in Section 4.3.4.

4.3 Closure Unit Design

The basis of the vegetation to be established on the final cover of the Landfarms was discussed in Section 4.2.4.5. The physical design of the closure units was based on results of settlement analyses, slope stability analyses for both static and dynamic cases, and groundwater protection analyses. The precipitation and drainage control systems were designed to handle runoff from a 24-hour storm event with a 25-year recurrence interval.

Descriptions of the analyses performed for design of the physical elements of the closure units are provided below. Results of settlement and slope stability analyses are summarized here, and described in detail in Appendices A and B, respectively.

4.3.1 Long-Term Settlements

Analyses were performed to estimate changes in the long-term surface elevations of the completed closure units due to settlements within the underlying Bay Mud. A detailed description of these analyses is provided in Appendix A. Analyses were made for both No. 1 Landfarm and Nos. 2 through 5 Landfarms. Estimated settlements up to approximately 1.4 feet for No. 1 Landfarm and 0.9 feet for Nos. 2 through 5 Landfarms are expected to occur over approximately 50 years following construction. The majority of the settlement is predicted to occur during the first 20 years following construction. Settlements will result from consolidation of the relatively soft peaty and non-peaty Bay Mud that underlie the Landfarms, and is expected to be greatest below the top of the perimeter slope where the new fill thickness will be greatest. Actual long-term settlements will also vary with the thickness and compressibility of the peaty and non-peaty Bay Mud.

The initial maximum and minimum final elevations of the planned closure units are +23.0 and +14.0 feet RRD for No. 1 Landfarm, and +22.5 and +12.0 feet RRD for Nos. 2 through 5 Landfarms. The final range in elevations is estimated to be +14.0 to + 21.6 feet RRD for No. 1 Landfarm and +12.0 to +21.6 feet RRD for Nos. 2 through 5 Landfarms following long-term settlements. The initial elevations were selected to allow for constructing minimum slopes of 4 percent for the vegetated Landfarms areas. Analyses of differential settlements indicate that a reduction in slope of up to 0.8 percent could occur, producing a minimum exterior slope of 3.2 percent.

Following long-term consolidation of the underlying Bay Mud, positive surface drainage will be generally maintained. Some future maintenance may be needed depending on the differential settlements that occur, as discussed in Appendix A. In addition to settlements that may occur due to the underlying Bay Mud, some surface settlement may occur as a result of compression of loosely compacted Landfarms soils due to a variety of possible causes including, but not limited to, the effects of soil saturation, groundwater flow, or surface loading. Settlements due to these causes are difficult to predict due to the variable nature of the materials and

may generate the need for additional future maintenance to maintain surface drainage.

4.3.2 Slope Stability

Both static and dynamic slope stability analyses were performed for the initial configuration of the outer slope, as described in Appendix B. Analyses were performed for conditions at the end of construction. The stability of the system will improve over time when the underlying Bay Mud has undergone long-term settlement and consolidation. Two sections representing the most extreme slopes planned for the perimeter of the closure units were analyzed. One section analyzed is located along the northeast perimeter of No. 1 Landfarm adjacent to the former No. 1 Oxidation Pond, and a second section analyzed is located at No. 3 Landfarm adjacent to the Richmond Water Enhancement Wetland (former No. 2 Oxidation Pond). Results of the stability analyses are summarized in Table B-1 (Appendix B). A discussion of the rationale for selection of these sections, along with the details of the analyses, are included in Appendix B.

On the basis of results of the Newmark Procedure for Dynamic Analyses (Newmark, 1965) presented in Table B-1 (Appendix B), we conclude that the Landfarms closure units will be sufficient to withstand the Maximum Credible Earthquake (MCE), although some of the containment facilities may require repair following such an event.

The analyses indicated that portions of the Landfarms may displace laterally as much as 1 foot during an MCE event due to shear failure in the underlying soft Bay Muds. The potential for damage to the final Landfarms cover is dependent on the actual distribution of movement within the Landfarms fills. The surface may crack as a result of tensile movement. Following a major earthquake, the cover should be inspected for cracks. The cracks can then be filled and the surface re-graded and re-planted, if necessary. It is expected that the impact on the environment from GPS structures would be minor in such an event since the anticipated shear plane would be in the underlying Bay Mud beneath the base of the extraction trenches and the total displacement would be less than the thicknesses of the barrier walls. It is anticipated that repair of groundwater monitoring wells may be necessary following such an event.

4.3.3 Groundwater Protection Analysis

Mobility of constituents within the closure units is anticipated to occur primarily as dissolved constituents within groundwater and also as phase-separated hydrocarbons. The design of the closure unit includes graded slopes to reduce surface water ponding and infiltration. The effect of this cover will be to minimize the amount of water that can infiltrate through the Landfarms and mobilize constituents into the “A” Zone groundwater and reduce the volume of water that the GPS will have to handle. An evaluation of the potential for water to infiltrate through the cover is presented in Appendix D, Hydrologic Evaluation - Infiltration.

As stated above, Chevron has already implemented groundwater corrective action at the site by installing and operating the GPS in compliance with our RWQCB Waste Discharge Order No. 93-109. Based on our evaluation of the groundwater flow characteristics and considering the effects of minimizing irrigation and covering the site, the current configuration of GPS should provide adequate control of potentially contaminated “A” Zone groundwater and collection of free-phase hydrocarbons. Specifically, the Bay Mud should provide an adequate “floor” or horizontal barrier against the downward migration of potentially contaminated “A”

Zone groundwater into the "C" Zone. The groundwater extraction system will create a hydraulic barrier against potentially contaminated "A" Zone groundwater flowing from upgradient locations beneath the Landfarms and off site beyond the downgradient perimeter of the Landfarms. The low-permeability soil-bentonite slurry wall constructed adjacent to Castro Creek, northeast of Nos. 2 through 5 Landfarms, will provide a physical barrier, in addition to the hydraulic barrier, against groundwater migration into the creek.

During the course of discussions related to the formulation of this closure plan, the DTSC requested Chevron install an additional 6 piezometers to better delineate the hydraulic conditions around the No. 1 Landfarm (DTSC letter of November 7, 1996). Chevron installed 4 of these piezometers in November, 1996 at the locations shown on Plate 3-10. Chevron intends to use the 2 proposed Point of Compliance Monitoring Wells (see Section 5.9) as the remaining 2 piezometers. These 2 wells will be located between the No. 1 Landfarms GPS extraction trench and the former No. 1 Oxidation Pond, as shown on Plate 4.3.

Operation and maintenance will continue through the closure and post-closure period by Chevron's Utilities/Environmental Area Business Unit (ABU). The performance and effectiveness of the GPS will be reported to the agencies semi-annually in accordance with the RGMP and the Post-Closure LGMP (see Section 5.9). As necessary, modifications and adjustments will be made to maintain an adequate hydraulic barrier around the perimeter of the closure units. The security provisions for the closure units will be essentially the same as those for the operating Landfarms.

4.3.4 Precipitation and Drainage Control

Design of precipitation and drainage control features of the final cover have been prepared to control a 24-hour storm event with a 25-year recurrence interval in conformance with the requirement cited in 22 CCR 66265.272(c). Details of the design are discussed in Appendix F. Precipitation data for the Landfarms are provided in Section 2.3. The final cover on the surface of the Landfarms area will be sloped and built to a sufficient elevation to provide drainage of rainfall and to prevent localized ponding. The runoff will be routed as described in Section 4.2.5. The system has also been designed such that, if the capacity of the pumps is exceeded, the overflow will run away from the closure units and will not inundate the final cover. Infiltration through the final cover will ultimately be collected in the GPS extraction trenches and extraction wells, or in the shallow drainage collection trench south of Nos. 2 through 5 Landfarms. Based on the results of the infiltration analysis presented in Appendix D, BEDM calculated that, after the vegetative cover is fully established, the typical infiltration would be less than 700,000 gallons per year, with nearly 15,000,000 gallons being consumed by evapotranspiration per year.

The lowest anticipated final elevations of the closed Landfarms is Elevation +9.0 (RRD). This elevation is above the anticipated maximum 100-year flood elevation of +8.6 (see Section 2.3). Hence, inundation of the final cover should not occur. The sites are not adjacent to any significant water bodies, so wave overtopping is also not an issue.

The potential for erosion of the final cover is addressed in Appendix E. The anticipated amount of erosion is generally less than 0.5 tons/acre/year, which is significantly less than the U.S. EPA recommended maximum of 2 tons/acre/year. Minor erosion that does occur will be identified during the annual inspections and will be

promptly repaired. If warranted, an erosion control mat, such as jute netting, can be applied to the steeper slopes that suffer chronic erosion problems.

4.4 Closure Activities

The Refinery schedule for closure of the Landfarms is shown on Table 4-1. The schedule shown is tentative at this time and is dependent on weather conditions, which may impact the earthwork and planting, and regulatory approval of this closure plan. The Refinery plans to construct the Landfarms closure unit elements for all five Landfarms in 1997. If the weather patterns for early 1997 follow normal patterns, then regulatory approval of the plan will need to be received by April, 1997 to achieve this goal. The major steps involved in closing the Landfarms are outlined in the following sections.

Chevron is required by 22 CCR Section 66265.113 (b) to complete final closure activities within 180 days after the approval of the closure plan. Because most of the elements presented in this plan has been previously submitted to the DTSC, BEDM anticipates that the closure plan will be approved in early 1997, which would mean that the closure would have to be completed early in the second half of 1997. The proposed closure plan requires extensive earthwork, which cannot be done when the soils are wet or during periods of significant rainfall. As the first part of the year is likely to be wet and rainy, we do not anticipate starting construction until mid-May, 1997. As shown on Table 4-1, due to the magnitude of the work we do not anticipate completing construction until at least September of 1997, which may be beyond the required 180-day period. If regulatory approvals are not received prior to the summer of 1997, then it may not be prudent to attempt to complete the closure of the Landfarms prior to the onset of winter rains. Rather, some or all of the work would have to be delayed until 1998. In accordance with the regulations, Chevron will submit a request for an extension of the closure period at least 30 days prior to the expiration of the 180-day period if it is needed. The request would document that the closure activities will, of necessity, take longer than 180 days to complete.

Due to the contaminated nature of the soils present at the site, work will be performed using an appropriate health and safety plan. Appendix I contains the plan that Chevron and BEDM propose to use for their personnel at the site. Each contracting firm working on the site will be required to adopt a health and safety plan for their own personnel. The contractor's plans must be at least as stringent as the plan presented in Appendix I.

4.4.1 Facility Decontamination

Prior to closing the Landfarms, the Landfarms operating equipment used during the bioremediation period will be decontaminated. The decontamination will be performed by the Landfarms operations technicians and will consist of triple-rinsing with pressurized water. Decontamination procedures will be performed on existing gravel areas within the berms of each Landfarm. This will allow the rinsate to drain back into the Landfarms. When no longer required, the temporary facilities used to handle stormwater runoff will be rinsed and removed. The Landfarms operating equipment that will be decontaminated includes the following:

- Water Trucks

- Tractor (710) and Disc
- Fertilizer Spreader
- Safety Showers
- Automated Sprinkler System

In addition, several monitoring wells within the Landfarms will need to be abandoned to accommodate the new grades. These will be abandoned in accordance with Contra Costa County and State of California guidelines and procedures. Equipment used in the abandonment will be decontaminated in the same manner as the Landfarms operating equipment.

4.4.2 Final Cover Construction

After all of the existing sprinkler systems have been removed, the construction of the final covers for the Landfarms will proceed as follows:

- Rough-grade the Landfarms soil into the shape of the final closure unit and lightly compact the soil as discussed in Section 4.2.4.1.
- Spread any excess portions of the perimeter containment dikes over the Landfarms soil and grade the Landfarms surfaces (the containment dike soil may be considered as part of the lower 6-inch layer of the final cover fill). Condition and compact the soil as discussed in Section 4.2.4.1.
- Place the final cover fills in vegetated areas.
- Install the new sprinkler system.
- Hydroseed and plant the finished earthen surfaces of the closure unit.

Shrubs and trees will be planted in subsequent years as discussed in Section 4.2.4.5. After the Landfarms soils have been covered, any of the construction equipment that came into contact with the waste material will be decontaminated in a manner similar to that described in Section 4.4.1. All work will be performed in accordance with the drawings and specifications included in Appendix J and H, respectively. In addition, all work will comply with the Construction Quality Assurance (CQA) program outlined in Appendix G and detailed in the specifications.

The existing Landfarms soils will be kept moist during construction operations to control wind erosion. The moisturizing will continue until the soils have been covered with either relocated berm soils or imported clean fill. The perimeter berms will not be removed until a period of dry weather of sufficient length to completely cover the adjacent Landfarm soils is anticipated. This will be done to ensure that run-off from rainfall does not wash any of the Landfarm soils away from the site. Run-on is not considered to be an issue for the Landfarms as the sites are located above the maximum anticipated flood level and the perimeter of the

Landfarms will always be protected by berm soils, even after the berms have been pushed into the Landfarms. In addition, all earthwork is anticipated to be performed during one construction season.

4.4.3 Closure Certification Submittal

The construction of the final cover will be performed under the supervision of an independent qualified professional engineer, registered in California. The engineer will ascertain whether the activities described in Section 4.4.1 have been performed as specified and whether the Landfarms have been closed in a manner consistent with the intent of the approved closure plan. On completion of the hydroseeding, a closure certification report for the Landfarms will be prepared. The report will conform to 22 CCR Section 66265.115 and will be signed by an authorized representative of the facility operator and by the independent professional engineer who supervised the work. The certification report will contain as-built drawings for the closure facilities and will include a summary of the results of quality control testing (details of the quality control testing program are presented in Appendices G and H). In addition, Chevron will notify the DTSC in writing when the Third Phase of the vegetation plan outlined in Section 4.2.4.5 has been implemented.

4.4.4 Post-Closure Notice Submittals

In accordance with 22 CCR Sections 66265.116 and 66265.119, Chevron will prepare a survey plat indicating the locations and dimensions of the Landfarms cells. The survey plat will contain notes describing the nature and quantities, to the best of Chevron's knowledge, of the waste within the closure cells. The plat will also show the locations of two existing permanent survey monuments from which the closed units may be located. These are Refinery monuments Nos. 413 and 2651. Monument No. 413 is located at the intersection of Petrolite and Channel Streets, southwest of the No. 1 Landfarm. Monument No. 2651 is located at the intersection of Ammonia and Toluene Streets, southeast of No. 4 Landfarm. This plat will be filed with the City of Richmond's Planning Department and the DTSC. A copy of the plat will also be attached to the deed for the property.

4.5 Closure Plan Development

The closure plan was prepared to conform with the intent of State Regulations 22CCR66265 and Federal Regulations 40CFR265, both of which address the closure of interim status land treatment facilities. As required by the DTSC 1988 Stipulation & Order, and the EPA 1988 Consent Agreement, this plan has been developed following the guidelines set forth in the EPA's "Guidance Manual on Hazardous Waste Land Treatment Closure / Post-Closure," April 1987. Reproduced below are several key passages from these regulatory documents, which guided Chevron and BEDM in developing this closure plan.

Section 66265.111 of 22CCR, which defines the Closure Performance Standard, states "The owner or operator shall close the facility in a manner that: (a) minimizes the need for further maintenance, and (b) controls, minimizes or eliminates, to the extent necessary to protect human health and the environment, post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated rainfall or run-off, or waste decomposition products to the ground or surface waters or to the atmosphere, and c) complies with the closure regulations of this chapter...". Section 265.111 of 40CFR contains almost identical language.

Section 3.4.1 of the EPA's guidance manual states that, where a cover is to be used, "The use of vegetation as the final surface cover is highly recommended at the HWLT (hazardous waste land treatment) unit to prevent water and wind borne erosion and transport of soil/waste materials, to provide infiltration control into soil, and to allow continued treatment of hazardous constituents." Whereas Section 3.4.2.2 states that "In general, the use of capping as a closure method for a HWLT unit is not recommended. HWLT relies on aerobic soil conditions to degrade applied hazardous waste constituents. Conditions under a cap are likely to become anaerobic, thus inhibiting or preventing additional treatment that could occur during the post-closure period. Anaerobic conditions may also favor the production of toxic compounds (e.g., methylation of mercury and arsenic) and the mobilization of toxic metals."

Section 3.4.1.2 states "An advantage of closing the HWLT unit by establishing a vegetative cover is that the wastes are left in place and continued treatment of any remaining constituents can occur in the soil system. Vegetation will also help to reduce the potential for transport of hazardous constituents from the HWLT unit by control of wind and water erosion and by evapotranspiration, which by decreasing the amount of percolating water, may decrease the transport of hazardous constituents to the groundwater."

To reduce future long-term maintenance and maximize the future biodegradation of the remaining petroleum hydrocarbons within the Landfarms, Chevron has elected to close the Landfarms with a vegetative cover. The potential for direct exposure to the wastes will be reduced by placement of the one-foot thick layer of topsoil over the Landfarm soils and by the use of non-food crop plants in the cover. The primary remaining pathway for waste constituent exposure is the possibility of the transport of constituents into the groundwater by percolating rain or irrigation water. As discussed in Section 3.7, Chevron has been collecting samples of the groundwater captured by the GPS and has found no evidence that constituents are migrating into the groundwater at concentrations that are considered hazardous.

5.0 LANDFARMS POST-CLOSURE MONITORING AND MAINTENANCE PLAN

5.1 General

Post-closure care of the Landfarms will continue after completion of construction of the final closure units. Access to the sites during post-closure will be restricted by the overall Refinery guard and security system maintained by Plant Protection, as discussed in Section 2.2.1. Appropriate warning signs will be placed around the perimeters of the closed Landfarms similar to those discussed in Section 2.2.1. The inspection, monitoring, and maintenance plans that will be followed during the post-closure period are described below.

During the post-closure period, the Chevron contact person will be the Refinery Environmental and Safety Manager located at:

Chevron Products Company
Richmond Refinery
P.O. Box 1272
Richmond, California 94802
Attention: Manager Environmental and Safety Division

(510) 242-1400

Elements of the Landfarms closure units included in the post-closure monitoring plan include: vegetation performance, surface settlement, final cover integrity, surface drainage control facilities, groundwater quality, and GPS piezometric monitoring. Post-closure monitoring for most elements will be performed on an annual basis. Monitoring frequencies that differ from an annual frequency are described below. Results of the monitoring will be compiled on an annual basis. These frequencies will be evaluated annually and modified as appropriate. Monitoring for each of the plan elements is addressed below.

In general, inspection of the Landfarms closure elements will be performed at a minimum of once per year prior to the onset of the rainy season. The inspections will be performed by qualified individuals and will include, but not be limited to, inspections of the final cover (including vegetation), drainage control facilities, piezometers, groundwater monitoring wells, GPS extraction system including pumps and piping, security systems, and for signs of differential settlement that may lead to ponding. The inspectors will prepare reports of their findings and will promptly rectify any deficiencies.

5.2 Post-Closure Usage

No Refinery operations are planned on the Landfarms sites following construction of the final covers. Drawings D-767512 and D-767515 (Appendix J) show the anticipated post-closure configuration of the sites. The only traffic anticipated on the covers of the closure units would be limited to that required to operate and maintain the GPS and the cover vegetation. If, at some time in the future, Chevron plans to use the sites for other purposes, approvals would be required from the appropriate government agencies (the DTSC at a minimum) and additional maintenance may be required to maintain the integrity of the final covers.

5.3 Vegetation Monitoring

An inspection of the vegetated surface of the Landfarms will be performed quarterly, by a qualified person, to evaluate plant germination, irrigation, and the need for fertilization, mowing, and reseeding. The inspection will identify whether the vegetation is adequately covering the surface of each Landfarm, symptoms of drought stress, chlorosis (indicative of nutrient deficiency), and the need for mowing and/or reseeding. Maintenance modifications will be made to address observations made during the inspections, including the need and timing for reseeding and modifications to irrigation and/or mowing schedules. These modifications and their resulting effectiveness will be documented in Chevron's files.

Additionally, the inspector will monitor the growth of the various plants and recommend when it is appropriate to begin the planting of the trees discussed in Section 4.2.4.5.2. The inspector will then monitor the growth of the trees, prepare recommendations on modifying the irrigation plan to encourage deep rooting of the trees, and identify the appropriate time to initiate the third phase of the vegetation plan and begin to thin the trees.

Soil monitoring well be performed semi-annually to document maintenance of soil pH and to evaluate soil conditions for plant growth. To meet these objectives, two samples per acre within each Landfarm will be collected from the surface 0 to 1 foot bgs on a semi-annual basis. The sample locations will be identified and sampled in accordance with the former Landfarms Quarterly Monitoring procedures. The collected samples will be chemically analyzed for the following:

Plant nutrients, which include nitrate, ammonium, and phosphate; and

Soil pH.

In addition to the quarterly monitoring, weekly inspections will be performed during the non-rainy portions of the year to evaluate the effectiveness of irrigation. The soil moisture will be monitored with a field soil moisture monitoring device at locations where there is evidence of insufficient irrigation and/or dry soil. The irrigation plan will be adjusted as necessary to address areas of insufficient soil moisture.

5.4 Vegetation Maintenance

Maintenance practices will vary depending on the type of vegetation. In the initial stages (Phase I), mowing, irrigating, and possibly weeding may be required. When trees are planted in Phase II, the irrigation scheduling and method may be modified to encourage deep rooting of the tree species. As the trees mature

in Phase III, watering the understory herbaceous plants will continue, since the trees will use groundwater.

Fertilizing, mowing, and reseeding will be performed as needed and as recommended as a result of the inspections described in Section 5.3. Irrigation will be supplied to the Landfarms soils to enhance seed germination and to meet plant water requirements throughout the warm months when plant evapotranspiration requirements exceed rainfall. Irrigation frequencies and amounts will be modified as needed based on the results of the weekly inspections.

5.5 Surface Settlement Monitoring

The final cover will be monitored for signs of differential settlement, which may cause ponding. Two existing survey monuments, Refinery Nos. 69 and 115, located on pile-supported structures adjacent to the Landfarms, have been identified to serve as permanent survey control monuments. The current location of monument No. 115 is at the top of sphere base 1694 on Ammonia Street west of Toluene Street and is near Nos. 2 through 5 Landfarms. Monument No. 69 is located on the top of the wall at the northwest corner of Bridge No. 162, which is north of the intersection of Channel Street and Petrolite Street, and is near No. 1 Landfarm. Settlement markers will be installed within the final cover of the Landfarms to monitor settlements. Proposed locations for the markers are shown on drawings D-767512 and D-767515 (Appendix J). The Landfarms surfaces will be inspected on an annual basis for evidence of differential settlement. If differential settlement has occurred and the grades of the final cover will no longer prevent ponding in that area, the surface will be regraded to maintain positive drainage. If warranted, a survey of the settlement monument elevations may be performed to quantify the actual amount of settlement that may have occurred.

5.6 Soil Cover Inspection and Maintenance Program

In addition to supporting the vegetation, the soil cover provides protection from wind and water erosion of the Landfarm soils. An annual inspection of the cover will be performed by a qualified engineer prior to onset of the rainy season. The inspector will identify and recommend appropriate repairs for areas where the soil cover may have become eroded, attacked by rodents, or otherwise damaged, or where the paved areas have become damaged. Repairs will be performed prior to the rainy season. Supplemental monthly inspections will be performed by Chevron at areas that have seen surface usage subsequent to the previous inspection. Damage detected at these or any other times will be promptly repaired. Records of all inspections and repairs will be maintained by the Refinery.

The cover will also be inspected after major rainfall events to identify areas where ponding or excessive erosion has occurred. Areas where ponding or erosion has occurred will be repaired to maintain positive drainage.

5.7 Surface Drainage System

The drainage swales and culverts will be observed for cracking, clogging, erosion, and operating performance. The drainage control system will be monitored annually before the beginning of the rainy season to be sure the surface drainage facilities are intact and clear of debris. The pumps will be inspected and tested annually. After heavy rainfalls, additional inspections will be made to monitor their performance. If deficiencies are found, they will be corrected as soon as practicable.

5.8 Free-Phase Hydrocarbon Monitoring and Recovery

The thickness of LNAPLs in the existing monitoring wells will be measured semi-annually in conjunction with the post-closure LGMP (discussed below). The GPS will provide both effective long term containment for the possible offsite migration of LNAPLs and capture of LNAPLs within the Landfarms areas. The design of the GPS extraction system, with pumps located at roughly 200-foot intervals, is inherently redundent. Hence the malfunction of any one pump is not expected to reduce the effectiveness of the system at containing the LNAPLs within the Landfarms as the groundwater normally recovered by the malfunctioning pump would flow laterally towards the adjacent pumps. However, if the GPS as a whole were to be out-of-service for a period exceeding one week and temporary pumps could not be used to maintain drawdown in the extraction trenches, supplimental LNAPL recovery would be performed with vacuum trucks from the extraction sumps and monitoring wells whenever the measured thickness of LNAPL exceeded six inches.

5.9 Groundwater Quality Monitoring Program

The Post-Closure Landfarms Groundwater Monitoring Program (LGMP) will follow the general framework of the Refinery-wide Groundwater Monitoring Program (RGMP). The scope of the RGMP is specified in the Monitoring and Reporting Program of RWQCB Order 93-109. The post-closure LGMP is designed to provide piezometric and chemical monitoring of the "A" and "C" Zones along the point of compliance. The point of compliance for the Landfarms closure units is the vertical surface located at the downgradient limit of the facility that generally coincides with the GPS.

As reported in previous RGMP reports, the "A" Zone has been historically impacted with petroleum hydrocarbons and metals. In response to this, Chevron has implemented a groundwater pump and treatment system, known as the groundwater protection system (GPS), along the downgradient perimeter of the Refinery as a corrective action on the "A" Zone groundwater. The GPS currently exists along the northeastern boundary of Landfarm No. 1 and along the north, south, and west boundaries of Landfarms Nos. 2 through 5. Because the GPS is a corrective action program, the existing RGMP and the future Post-Closure LGMP for the "A" and "C" Zones will follow the corrective action monitoring program outlined in 22 CCR 66264.100.

The objective of "A" Zone piezometric monitoring is to demonstrate that a hydraulic barrier is maintained by the GPS at the perimeter of the closure units. Chemical monitoring in the "A" Zone supplements piezometric monitoring and assists in evaluating the effectiveness over time of the GPS corrective action. Chemical monitoring in the "C" Zone verifies that water quality below the Bay Mud at the point of compliance has not been degraded.

The point of compliance monitoring wells for piezometric levels includes approximately 400 groundwater monitoring wells, sumps, piezometers, and recovery wells around the Refinery that are monitored on a quarterly basis to document the groundwater gradient and flow patterns in the vicinity of the GPS. Approximately 250 of the 400 monitoring points are monitored semi-annually to document the Refinery-wide groundwater gradient and flow patterns in the "A" and "C" Zones. This will include the four piezometers installed adjacent to No. 1 Landfarm in November 1996, and the additional point of compliance monitoring wells proposed below. The information collected is reported on a semi-annual basis along with the chemical monitoring results, as described below.

The point of compliance monitoring wells for chemical monitoring will be as indicated in the following table.

	POINT OF COMPLIANCE MONITORING WELLS	
LANDFARM AREA	*"A" ZONE WELLS*	*"C" ZONE WELLS*
No. 1	New "A" Zone Well (658A)	103C
	New "A" Zone Well (659A)	New "C" Zone Well (654C)
Nos. 2 - 5	384A	104C
	244A	114C
	551A	186C
	610A	251C
	New "A" Zone Well (657A)	New "C" Zone Well (655C)
		New "C" Zone Well (656C)

The locations of these wells are depicted on Plate 4-3. Logs of the borings and well construction diagrams for the currently existing monitoring wells are included in Appendix J. Wells 654C, 655C, 656C, 657A, 658A, and 659A are being installed during the fall of 1996, their boring logs and completion diagrams will be included in the Closure Certification Report.

Because the GPS is a corrective action monitoring program, the constituents of concern (COC) in the "A" Zone groundwater may exceed background levels at some locations. In light of this condition, it is not practicable to rely on a comparison with background water quality as a measure of effectiveness of corrective action. Rather, maximum allowable concentration limits (MACLs) have been established by the RWQCB as concentration limits against which GPS corrective action effectiveness will be evaluated.

Chemical monitoring at the point of compliance wells will follow two levels of testing. The first level will consist of the list of COCs, which will be monitored on a biennial basis in the first semester of every even-numbered year. The second level is a subset of the COCs (monitoring parameters) and will be monitored semi-annually. The COCs and monitoring parameters are summarized in Table 5-1.

Groundwater samples will be collected by Chevron's Utilities and Environmental Area Business Unit (U/E) personnel. Chemical testing will be conducted by Chevron Environmental Laboratory (CEL), which is a DTSC-certified laboratory. After the results are received from the laboratory, quality assurance checks will be performed on the data to verify accurate results or to identify data quality concerns. The data will then be entered into Chevron's Groundwater Data Storage System (GDS) database for permanent storage.

As supported in RWQCB Order No. 93-109, the MACLs are used to determine when compliance has been

achieved by the GPS. In other words, the MACLs are cleanup goals for corrective action and exceedences may occur until the extraction system has had sufficient time to remediate groundwater in the vicinity.

The MACL for each COC and monitoring parameter is shown on Table 5-1. If a chemical result from the "A" Zone exceeds the MACL and sufficient historical data are available, the results are further evaluated to identify if the concentration is "significant" compared with previous historical results. Statistical analyses of the current and historical analytical data of a particular well will then be used to evaluate concentrations that exceed the MACL. Chemical results from the "C" Zone compliance monitoring wells will be similarly evaluated.

To evaluate whether a release or degradation of groundwater has occurred, other criteria are used in conjunction with the analytical data, since concentrations exceeding an MACL alone would not be indicative of a significant release or necessarily pose an imminent threat to the waters of the State. The other criteria for evaluation of chemical data include: GPS performance, location of the point of compliance well relative to the closure unit, Refinery operations that occurred in the area, and seasonal hydrogeologic conditions. Information generated during the LGMP will be compiled and reported to the DTSC in conjunction with the RGMP on a semi-annual basis.

As discussed above, there is no physical separation between the wastes in the Landfarms and the first underlying groundwater table, leaving no vadose zone to monitor for the migration of constituents. This condition has been historically recognized by Chevron and the various regulatory agencies Therefor, no vadose zone monitoring is currently required, and no post-closure vadose zone monitoring will be performed.

5.10 Completion of Post-Closure Care Certification Submittal

Pursuant to 22 CCR 66265.120, within 60 days of the completion of the established post-closure period, Chevron will submit to DTSC a certification that the post-closure care period for the Landfarms closure units was performed in accordance with this closure plan. The certification will be signed by Chevron and an independent Registered Professional Engineer. Documentation supporting the independent engineer's certification will be kept on site until Chevron is released from financial assurance requirements for post-closure care.

5.11 Major Natural Event Response

In addition to routine wear and tear, the Landfarms closure facilities may be damaged by sudden events, such as earthquakes and major storms. While the nature of the wastes in the closure cells is such that damage would not result in a major release to the environment, prompt attention is advisable. After the occurrence of a potentially damaging event, the Landfarms closure facilities will be inspected by Refinery personnel and temporary repairs will be performed as necessary to the closure facilities as soon as is practicable. Chevron will immediately notify the DTSC of suspected releases of wastes or waste byproducts to the environment as a result of a major natural event. As soon as practicable, Chevron will have a qualified engineer perform an inspection of the facility. The engineer will identify damage and recommend appropriate repairs. Chevron will then implement the repairs in a timely manner. On completion of the repair work, Chevron will prepare and submit a report to the DTSC identifying what damage occurred and certifying that the appropriate repairs

have been completed. A copy of the inspector's findings and recommendations will be included in the document.

The most severe natural event that the facilities might experience would be the occurrence of the Maximum Credible Earthquake (MCE) identified in Appendix C. As discussed in Section 4.3.2, displacements on the order of one foot may occur to the closure units. Displacements of that magnitude may damage the cover and groundwater monitoring and control facilities. To aid Chevron in evaluating the impact of an earthquake and mitigate the damage it may cause to the facilities, BEDM has prepared the Landfarms Post- Earthquake Inspection and Corrective Action Plan, which is included as Appendix N to this document. This contingency plan may be used by Chevron any time the Landfarms incur damage and need not be limited to earthquake response.

6.0 CLOSURE AND POST-CLOSURE ESTIMATED COST

The cost to implement the proposed Landfarms Closure Plan is estimated at $1,930,000. These costs are detailed in Appendix K. Annual post-closure operating, maintenance, and monitoring costs (including GPS and LGMP) are estimated at $90,400. The 30-year projected cost for the operation and maintenance of the Landfarms Closure Units, including an allowance for implementing the contingency plan discussed in Section 5.9, is $2,780,000.

7.0 CERTIFICATION OF FINANCIAL ASSURANCE

Chevron has provided certification of financial assurance demonstrating that they can meet the requirements of closure as specified in this plan. A copy of the certification is included in Appendix L.

8.0 REFERENCES

Bechtel Environmental, Inc. and Dames & Moore (BEDM), 1996, *Final Cap Design Proposal* for Chevron Products Company, July 26.

BEDM, 1996 *Proposed Interim Vegetation Plan for Nos. 1 through 5 Landfarms,* for Chevron Products Company, May 23,.

BEDM, 1996 *Proposed GPS Effluent Water Sampling Plan* (dated May 6, 1996), which has been transmitted to the DTSC by Chevron. The GPS sampling plan was developed to document that the groundwater being extracted from the vicinity of the Landfarms was non-hazardous. The results to-date of this sampling plan are discussed in Section 3.7 of this document.

BEDM, 1995, *Landfarms Closure Plan*, for Chevron U.S.A. Products Company, June 21.

BEDM, 1993, *Landfarms (Soil) Sampling and Analysis Report* , Richmond Refinery, California, for Chevron U.S.A. Products Company, August 10.

BEDM, 1992, *RCRA Facilities Investigation Report for the Landfills Under Isomax and No. 1 Landfarm and Landfill Under Nos. 2 and 3 Landfarms*, Richmond Refinery, California, for Chevron U.S.A. Products

Company, November 24.

BEDM, 1992, *Landfill 15 Facilities Construction Workplan*, Richmond Refinery, California, for Chevron U.S.A. Products Company, April 30.

BEDM, 1992, *Landfarms Bioremediation Assessment Report*, Richmond Refinery, California, for Chevron U.S.A. Products Company, February 27.

BEDM, 1991, *Groundwater Protection System Engineering Report,* for the Chevron U.S.A. Inc., Richmond, California, December 20.

BEDM, 1990, *Landfarm Biodegradation Study Report,* for the Chevron U.S.A., Inc. Richmond, California, July 13.

Chevron Products Company, 1996, *Landfarms Soil and Groundwater Monitoring Program Second Quarter 1996 Report,* September 27.

Chevron U.S.A. Inc., 1988, Engineering Technology Department, *Closure/Post Closure Plan for the Richmond Refinery Landfarm*, Richmond Refinery, California, March 31.

Dames & Moore, 1989, *Landfarms Reconnaissance Survey,* Chevron Richmond Refinery for Chevron U.S.A., Job No. 18300-009-114, January 9.

Dames & Moore, 1988, *Refinery-Wide Report of Waste Discharge,* (ROWD) Richmond, California Refinery for Chevron U.S.A. Inc., Job No. 16000-063-03, to RWQCB, August 31.

Dames & Moore, 1985, Final Draft Report - Hydrogeologic Assessment Report, Richmond, California Refinery for Chevron U.S.A. Inc., Job No. 00113-877-03.

Dames & Moore, 1981, *Report, Landfarm Subsurface Investigation,* Richmond Refinery, for Chevron U.S.A. Inc., Job No. 113-531-03, to RWQCB, July 6.

Dames & Moore, 1981, Groundwater Investigation, Richmond, California Refinery for Chevron U.S.A. Inc., Job No. 00113-531-03.

Department of Toxic Substances Control, Cal/EPA (DTSC), 1995, *Notice of Deficiency (NOD) for the Revised Closure / Post-Closure Plan, Richmond Refinery Landfarm Nos. 1 Through 5, Chevron U.S.A. Products Company, Richmond, California, 94801 EPA ID. No CAD 009 114 919*, August 15.

FEMA, 1978, *Flood Insurance Study*, City of Richmond, California.

Regional Water Quality Control Board, San Francisco Bay Region (RWQCB), 1989, Order No. 89-175, Revised Waste Discharge Requirements for: Chevron U.S.A., Inc., Richmond Refinery, Richmond, Contra Costa County, November 20.

Slymen, D.J., de Peyster, A., and Donohoe, R.R., 1994, *Hypothesis Testing with Values Below Detection Limit in Environmental Studies,* Environ. Sci. Techno., 28, No. 5, 898.

United States Corps of Engineers, San Francisco District, 1984, *San Francisco Bay Tidal Stage vs. Frequency Study.*

U.S. Department of Commerce, 1961, *U.S. Department of Commerce Technical Paper No. 40, Rainfall Frequency Atlas of the United States for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 years,* May.

Table 3-1. Groundwater Chemistry and Analyte List
Landfarms Soil and Groundwater Monitoring Program
Landfarms Closure Plan
Chevron Richmond Refinery

General Chemistry
- Conductivity
- pH
- Temperature
- Turbidity

Metals (1)
(EPA Method 6010)
- Chromium
- Lead
- Nickel

Volatile Organic Compounds
(EPA Method 8240)
- Benzene
- Carbon tetrachloride
- Chlorobenzene
- Chloroform
- Ethylbenzene
- Methylene chloride
- Tetrachloroethene
- Toluene
- Trichloroethene
- Total Xylenes
- 1,1,1-Trichloroethane
- 1,1,2-Trichloro-2,2,1-Trifluoroethane (Freon 113)
- 1,1,2-Trichloroethane

Semi-Volatile Organic Compounds
(EPA Method 8270)

Acid Extractable Analytes
- Benzenethiol
- Benzoic acid
- Phenol
- 2-Methylphenol
- 2-Nitrophenol
- 2,4-Dichlorophenol
- 2,4-Dimethylphenol
- 3/4-Methylphenol

Base/Neutral Extractable Analytes
- Anthracene
- Benzo(a)anthracene
- Benzo(a)pyrene
- Benzo(k)fluoranthene
- Benzyl butyl phthalate
- Bis(2-ethylhexyl)phthalate
- Chrysene
- Di-n-butylphthalate
- Fluoranthene
- Naphthalene
- Phenanthrene
- Pyrene
- 1-Methyl naphthalene
- 7,12-Dimethylbenz(a)anthracene

Notes
(1) In addition, well 103A Is only analyzed for organic lead (Method 7420 modified), as outlined in the Groundwater Monitoring Plan, Amendment (Revision #3, May 1, 1989).

Table 3-2. Groundwater Chemistry Analyte List
Landfarms GPS Effluent Sampling
Landfarms Closure Plan
Chevron Richmond Refinery

Volatile Organic Compounds (TCLP)
(Method 8240)

Benzene
2-Butanone (MEK)
Carbon tetrachloride
Chlorobenzene
Chloroform
1,2-Dichloroethane
1,1-Dichloroethylene
1,4-Dichlorobenzene
Tetrachloroethene
Trichloroethylene
Vinyl Chloride

Semi-Volatile Organic Compounds (TCLP)
(Method 8270)

1,4-Dichlorobenzene
2,4-Dinitrotoluene
Hexachlorobenzene
Hexachlorobutadiene
Hexachloroethane
2-Methylphenol
3/4-Methylphenol
Nitrobenzene
Pentachlorophenol
Pyridine
2,4,5-Trichlorophenol
2,4,6-Trichlorophenol

Metals (TCLP)
(Method 6010)

Arsenic
Barium
Cadmium
Chromium
Lead
Mercury (Method 7470)
Selenium (Method 7742)
Silver

Metals (Total)
(Method 6010)

Antimony
Arsenic
Barium
Cadmium
Chromium
Cobalt
Copper
Lead
Mercury (Method 7470)
Molybdenum
Nickel
Selenium (Method 7742)
Silver
Thallium
Vanadium
Zinc

General Parameters

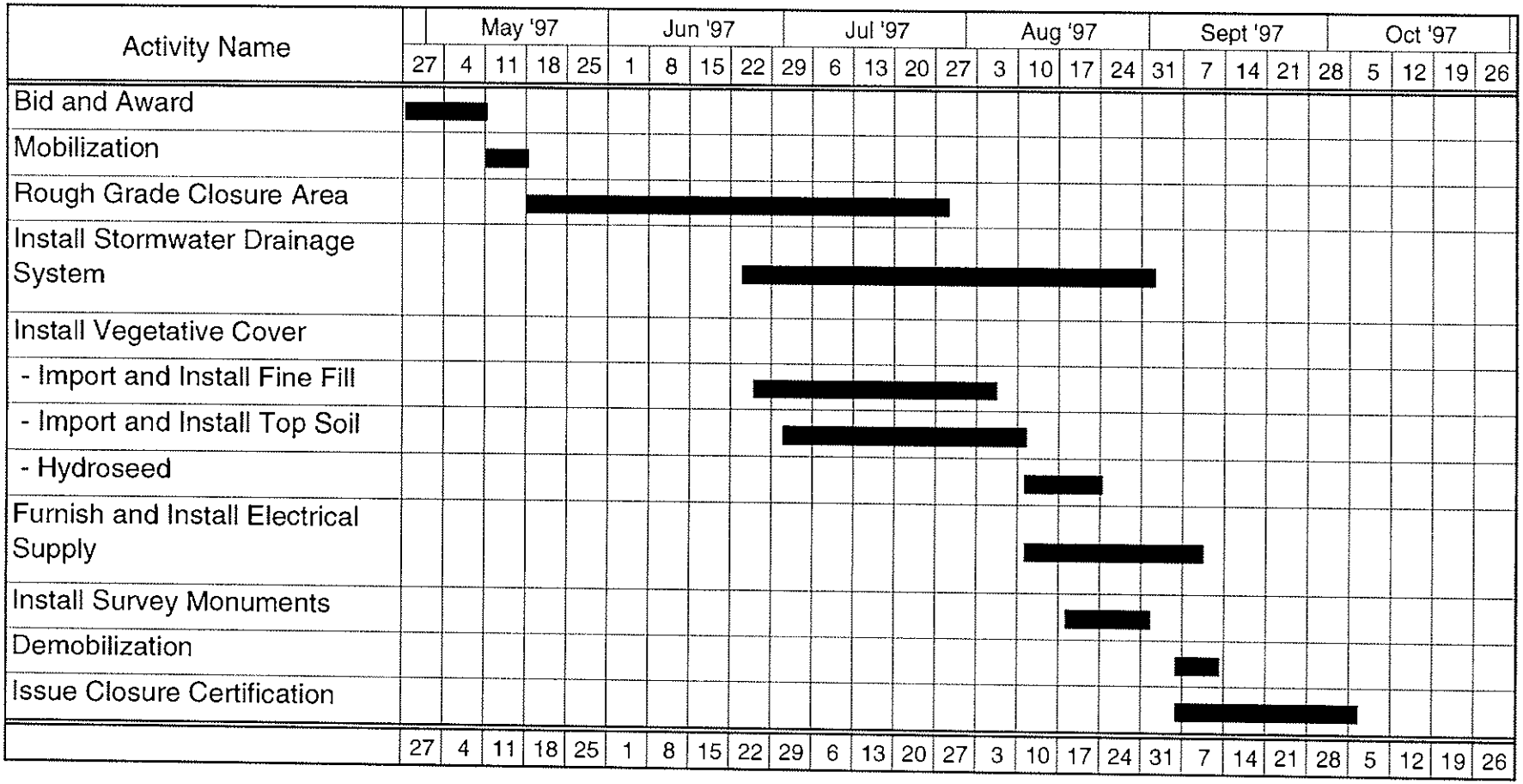
Flash (Method 1020)
pH (Method 9045)
Reactivity (9010A for cyanide and APHA427C for sulfide)

Table 3-3. Summary of Groundwater Chemical Analysis Results
Landfarms GPS Effluent Sampling
Lanfarms Closure Plan
Chevron Richmond Refinery

Analytical Parameters	Reporting Limit	Units	GPS ID: 1	2	3	4	Maximum	Regulatory Values RWQCB MACL	CCR Tittle 22
TCLP Metals									
Barium	0.007	mg/L	0.810	0.092	0.136	0.247	0.810	~	100
Selenium	0.002	mg/L	0.002	*	*	0.014	0.014	0.05	1
Total Metals		mg/L							
Arsenic	0.092	mg/L	*	*	0.384	*	0.384	0.036	5
Barium	0.007	mg/L	0.986	1.080	1.350	0.363	1.350	~	100
Chromium	0.040	mg/L	*	0.047	0.084	0.044	0.084	**	5
Cobalt	0.015	mg/L	*	0.020	0.028	*	0.028	~	80
Copper	0.020	mg/L	0.073	0.054	0.154	0.592	0.592	~	25
Lead	0.084	mg/L	*	*	*	0.103	0.103	0.0056	5
Mercury	0.120	ug/L	*	*	0.459	*	0.459	0.6	200
Molybdenum	0.022	mg/L	0.103	0.033	0.304	0.032	0.304	~	350
Nickel	0.056	mg/L	*	*	0.144	*	0.144	0.0083	20
Selenium	0.002	mg/L	0.005	0.005	0.002	*	0.005	0.05	1
Vanadium	0.010	mg/L	0.031	0.086	0.122	0.027	0.122	~	24
Zinc	0.025	mg/L	0.712	1.730	3.900	1.010	3.900	0.058	250
Volatile Organics									
None									
Semi-volatile Organics									
Pentachlorophenol	0.01	mg/L	*	*	0.028	*	0.028	0.0079	100
Other Parameters									
Reactive Cyanide	0.1	mg/L	*	*	*	0.107	0.107	~	250
pH - minimum			7.42	7.35	7.06	7.13	7.06	6.5	2.0
pH - maximum			7.79	8.17	7.56	7.75	8.17	8.5	12.5

Notes:
* = Analyte not detected above specified reporting limit.
** = MACL for Chromium VI is 0.0028 mg/L.
~ = No regulatory value.
NA = Not Applicable
Only analytical parameters detected above the reporting limits are presented. See Table 3-2 for Analyte List.
RWQCB MACL = Regional Water Quality Control Board, San Francisco Bay Region, Maximum Allowable Concentration Limit.
TCLP = Toxicity Characteristic Leaching Proceedure
STLC = Soluble Threshold Limit Concentration

Table 4-1. Construction Schedule
Landfarms Closure Plan
Chevron Richmond Refinery



Note: The planting of shrubs and trees is not shown on this schedule and will occur in subsequent years.

Table 4-2. List of Potential Plant Species
Landfarms Closure Plan
Chevron Richmond Refinery

SHALLOW ROOTED SPECIES

- Tall fescue (*Festuca arundinacea*)
- Bermuda grass (*Cynadon dactylon*)
- Creeping wild rye (*Elymus triticoides*)
- California brome (*Bromus carinatus*)
- Alfalfa (*Medicago sativa*)
- White clover (*Trifolium repens*)
- Saltgrass (*Distichlis spicata*)
- Annual fescue (*Vulpia myuros*)

INTERMEDIATE ROOTED SPECIES

- Saltbrush (*Atriplex sp.*)
- Coyotebrush (*Baccharis pilularis*)
- Bush Lupine (*Lupinus arboreus*)
- California broom (*Lotus scoparius*)
- California encelia (*Encelia californica*)

DEEP ROOTED SPECIES

- Hybrid Poplar (*Poplus deltoides nigra*)
- Cottonwood (*Populus fremontii*)

- Willow (*Salix sp.*)
- Toyon (*Heteromeles arbutifolia*)

Table 5-1. List of Constituents of Concern, Monitoring Parameters and MACLs
Landfarms Post-Closure Groundwater Monitoring Program
Landfarms Closure Plan
Chevron Richmond Refinery

Constituents of Concern	MACL (mg/L)		Landfarms/Landfills Sector
TVH-Gasoline	1	c	X
TEH-Diesel	1	c	X
Dissolved Sulfide	0.100	c	/
1,2 Dichlorobenzene	18	a	/
1,3 Dichlorobenzene	2.6	a	/
1,4 Dichlorobenzene	0.064	a	/
Benzene	0.021	a	X
Toluene	300	a	X
Halomethanes	0.480	a	/
PAH (Total)	0.015	d	/
Pentachlorophenol	0.0079	a	/
Total Phenolics	0.05	c,d	/
Selenium	0.05	b	/
Arsenic	0.036	b	/
Cadmium	0.0093	b	/
Chromium VI	0.05	b	/
Total Soluble Lead	0.0056	b	X
Mercury	0.0006	d	/
Nickel	0.0083	b	/
Zinc	0.086	b	/
pH	6.5 to 8.5	a	X
Turbidity (NTUs)	N/A	N/A	X
Temperature (°F)	N/A	N/A	X

MACL = Maximum Allowable Concentration Limit (M&RP, December 1, 1993)
/ = Constituent of Concern per Sector
X = Monitoring Parameter per Sector
N/A = Not Applicable
a = California Enclosed Bays and Estuaries Plan, Water Quality Objectives for Enclosed Bays and Estuaries for Protection of Human Health
b = California Enclosed Bays and Estuaries Plan, Water Quality Objectives for Protection of Saltwater Aquatic Life
c = Tentative Value
d = Method Detection Limit
(NTUs) = Nephelometric Turbidity Unit(s)

Appendix G
Post-Closure Notices

Chevron

JUL 20 2000

July 5, 2000

Chevron Products Company
P. O. Box 1272
Richmond, CA 94802-0272

Jeff Hartwig
Environmental and Safety Division Manager
510 242 1400

RECEIVED
JUL 13 2000
RICHMOND
PLANNING-DEPARTMENT

Mr. Martin Jacobsen
City of Richmond Planning Department
2600 Barrett Ave. 2nd Floor City Hall
Richmond, CA 94804

Record of Landfarm Closure at the Richmond Refinery

Dear Mr. Jacobsen:

Chevron is submitting the enclosed record of hazardous wastes disposal within the recently closed Landfarm Treatment Facility that was operated by Chevron in the 1970's and 80's at the Richmond Refinery.

This submission is made for purposes of complying with 22CCR 66265.119 (a). This regulation requires the owner or operator of a closed hazardous waste disposal unit to submit to the local zoning authority (or authority with jurisdiction over local land use) a record of the type, location, and quantity of the hazardous wastes disposed of with each cell or area of the facility. This submission has also been provided to the California Environmental Protection Agency-department of Toxic Substances Control, per 22CCR 66265.119(a).

We are providing two sets of attachments. Would you please stamp one copy as having been received and filed and return it to me in the enclosed, stamped, self-addressed envelope.

If you have any questions regarding this letter, please contact Mr. John MacLeod at (510) 242-2295.

Sincerely,

Jeff Hartwig

Attachments

RECORD OF HAZARDOUS WASTES DISPOSED OF IN CLOSED LANDFARM TREATMENT FACILITY AT THE RICHMOND REFINERY

The Chevron Products Company currently is the owner and operator of the closed Landfarm Treatment Facility. The Landfarms are located on the property which is described in Exhibit A to this Record.

The Landfarms has been closed pursuant to a the *Revised Landfarm Closure Plan* (1997) which was approved by the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC). A certificate of closure was submitted to the DTSC on September 30, 1999.

Pursuant to 22 CCR 66265.119, Chevron is providing this record of the type, location and quantity of hazardous wastes disposed of in the Landfarm Treatment Facility.

Prior to closure, the Landfarms consisted of 5 Landfarm units. The Landfarms were in operation for the biological treatment of oily wastes generated from on-site petroleum processing from the mid 1970's to 1987. The principle wastes applied were oil/water separator sludge (at Nos. 1, 2, 4 and 5 Landfarms), non-leaded tank bottoms (at Nos. 1,2,3 and 4 Landfarms), oil/water mixtures, algae water, pond sediments and oily dirt. When in operation, wastes were applied to the surface of the Landfarms and tilled into the top six to 12 inches. Prior to 1980, no data are available on waste application rates to the Landfarms. Since 1980, a total of 188,000 tons of waste were applied to the Landfarms. The location and dimensions of the units as closed is indicated in the survey plat which is Exhibit B to this Record. The wastes, which remain in the Landfarm after closure, are described in "*Revised Landfarm Closure Plan*". The relevant sections of this plan are Sections 2.2.3 and 2.2.4.

This Record is based on available records and investigations, which have been conducted into the environmental conditions at the Landfarms. The information contained in the Record is, to the best of Chevron's current knowledge and belief, true, accurate and complete.

EXHIBIT "A"

PROPERTY DESCRIPTION

Landfarm 1
Tract 1 , Parcel 3, of the San Pablo Rancho. Recorded March 8, 1918, Book 315, Page 168.
Also known as Assessor Parcel 561-100-013

Landfarms 2-5
Tract 5, Parcel 3, of the San Pablo Rancho. Recorded February 28, 1917, Book 294, Page 255
Also known as APN 561-100 037
Tract 5, Parcel 1, of the San Pablo Rancho. Recorded November 16, 1953, Book 2245, page 538
Also known as APN 561-100-038

RECORDING REQUESTED BY
CHICAGO TITLE COMPANY

RECORDING REQUESTED BY
AND WHEN RECORDED MAIL TO:

c/o Chevron Real Estate Management Company
Robert Vanderlaan, 2613 Camino Ramon Rm 2278
San Ramon, CA 94583

133787-1

CONTRA COSTA Co Recorder Office
STEPHEN L. WEIR, Clerk-Recorder
DOC- 2000-0144183-00
Acct 2- Chicago Title
M, JUL 10, 2000 08:00:00
MIC $1.00 MOD $31.00 REC $35.00
TCF $30.00 NCP $93.00
Ttl Pd $190.00 Nbr-0000037897
kat/R2/1-31

DECLARATION

THIS DECLARATION (the "Declaration") is made as of July 6, 2000, by CHEVRON U.S.A. INC., a Pennsylvania corporation ("Declarant").

1. Declarant is the owner of that certain real property located in Contra Costa County, State of California (the "Property"), which is more particularly described on Exhibit "A" attached hereto.

2. The Property is subject to the terms and conditions of a Revised Landfarms Closure Plan dated December 30, 1996 and revised May 28, 1997, filed with the California Environmental Protection Agency, Department of Toxic Substances Control, Region 2, 700 Heinz Ave., Berkeley, CA 94710. (Closure Plan).

3. In accordance with the Closure Plan, Declarant hereby declares and agrees that the plat attached as Exhibit "B" shall be placed of record with respect to the Property. Additionally, Exhibit "C" is the Post Closure Notice of Hazardous Waste, and Exhibit "D" is the Record of Hazardous Waste.

IN WITNESS WHEREOF, the undersigned Declarant has executed these presents by its officer thereunto duly authorized, this 6 day of July, 2000.

DECLARANT:

CHEVRON U.S.A. INC.,
a Pennsylvania corporation

CHEVRON U.S.A. INC. INCORPORATED AUGUST 9, 1922 PENNSYLVANIA

By: _____

Title: ASSISTANT SECRETARY

CHICAGO TITLE COMPANY HAS FILED THIS INSTRUMENT FOR RECORD AS AN ACCOMMODATION ONLY. IT HAS NOT BEEN EXAMINED AS TO ITS EXECUTION OR AS TO ITS EFFECT UPON TITLE.

EXHIBIT "A"

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Landfarm 1
Tract 1 , Parcel 3, of the San Pablo Rancho. Recorded March 8, 1918, Book 315, Page 168.
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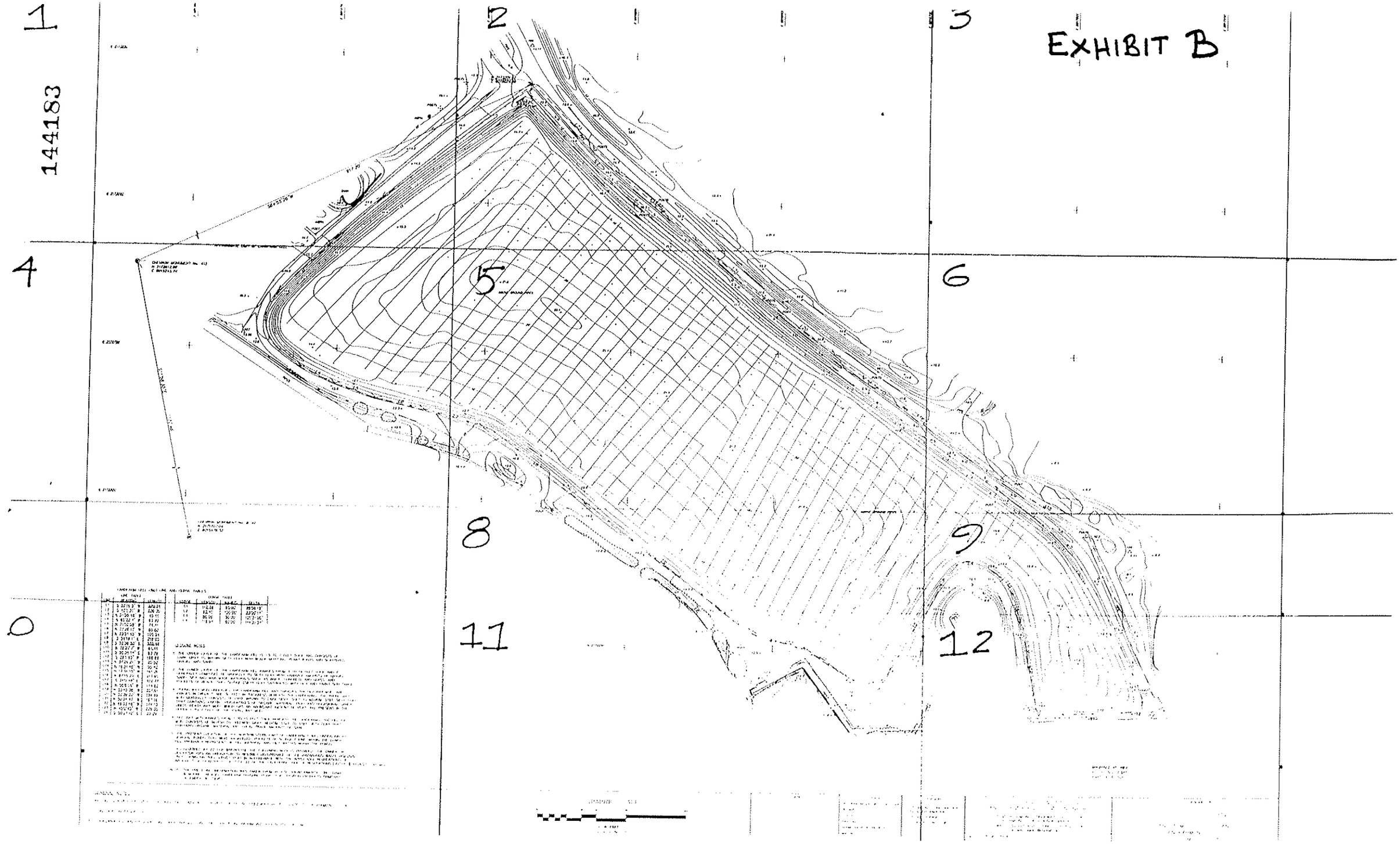
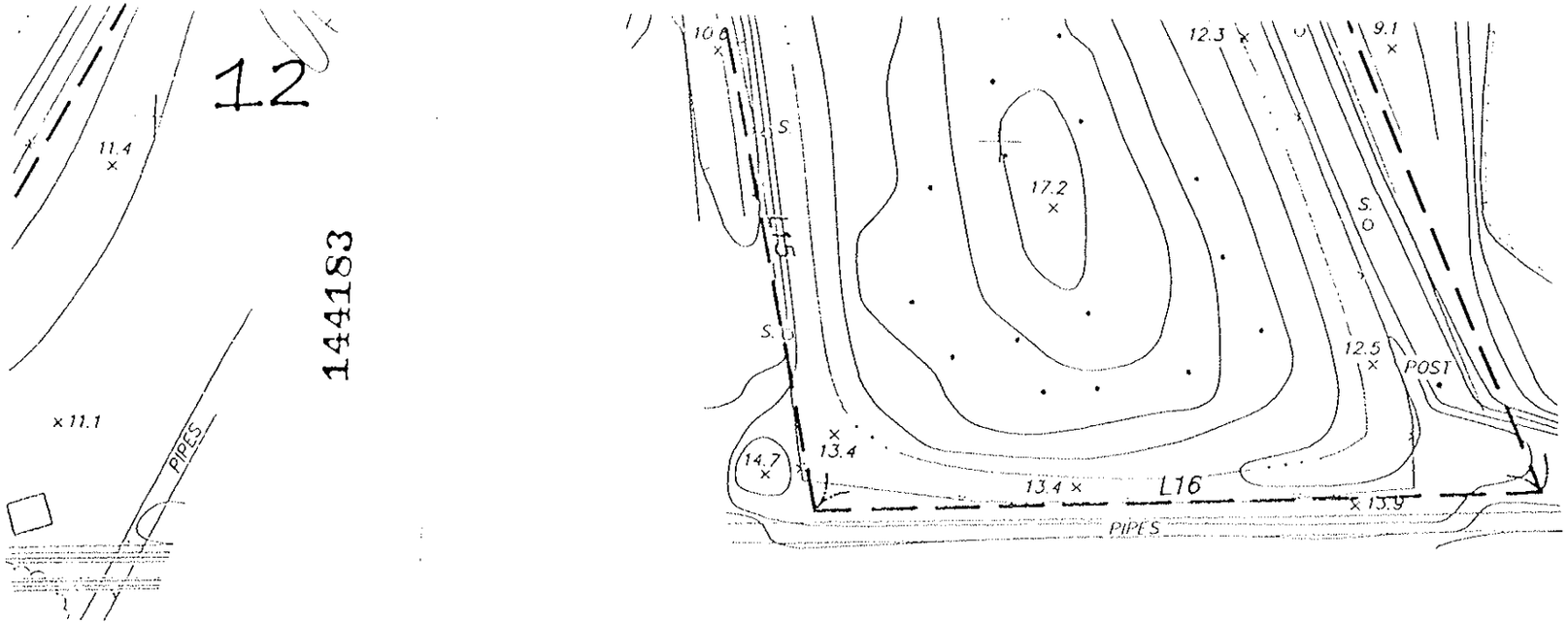
Tract 5, Parcel 1, of the San Pablo Rancho. Recorded November 16, 1953, Book 2245, page 538
Also known as APN 561-100-038

144183

EXHIBIT B





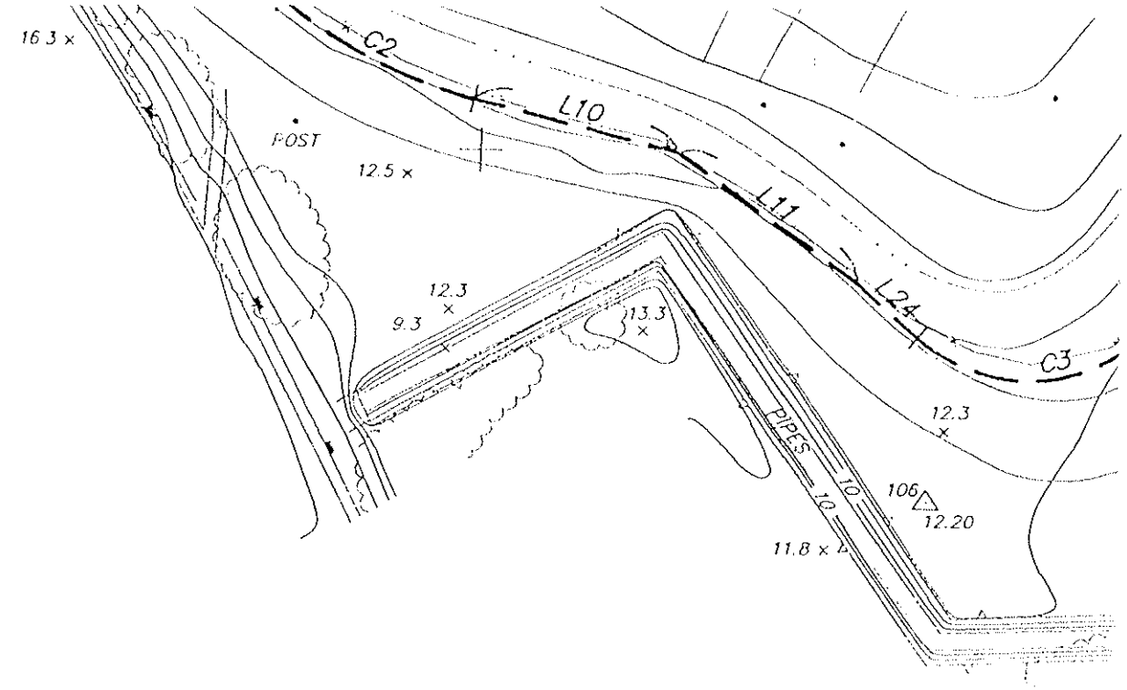
MICHAEL P. REI
R.C.E. No. 13810
EXP. 3/31/01

REVISIONS	KISTER, SAVIO & REI, INC.	DESCRIPTION
10/15/99 ADDED GOE ADD CLOSURE INFORMATION.	LAND SURVEYORS · CIVIL ENGINEERS.	TOPOGRAPHIC SURVEY
11/16/99 CHANGE TITLE	3095 RICHMOND PARKWAY, SUITE 214	LANDFARM CLOSURE PLAN
5/31/00 ADD NOTE #6	RICHMOND, CALIFORNIA 94806	LANDFARM No. 1
	PHONE: (510) 222-4020 FAX: (510) 222-3416	CHEVRON RICHMOND REFINERY
	E-MAIL: kspls@ix.netcom.com	
	FOR: CHEVRON PRODUCTS CO.	
	SCALE: 1" = 50' / JOB No. 9677 AUTH. 99-005	
	DATE: 7/9/99 / DWG. No. 0-/89-1	RICHMOND, CALIFORNIA

11

1441183

N 2177250



GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)

1 inch = 50 ft.

LEGEND

REFERENCE

FIELD BOOK NO. (DR-967)

FILE MAP:

DATE:

POINT No.:

DATAM CHECKED BY REF.

MAP DATE:

10

144183

L4	N 65°22'4" W	63.99'
L5	N 71°10'59" W	74.41'
L6	N 77°26'17" W	85.83'
L7	N 73°51'45" W	105.54'
L8	S 54°19'1" E	216.05'
L9	S 52°36'53" E	332.48'
L10	N 76°27'7" W	61.44'
L11	S 55°34'14" E	63.79'
L12	S 28°1'45" W	168.89'
L13	N 37°26'21" W	25.52'
L14	N 16°31'48" W	55.42'
L15	N 12°34'15" W	161.26'
L16	N 87°15'20" E	213.60'
L17	S 24°0'48" E	322.77'
L18	N 58°6'14" W	174.62'
L19	N 53°45'38" W	357.61'
L20	N 52°39'20" W	139.99'
L21	N 50°34'47" W	167.16'
L22	N 49°33'46" W	174.13'
L23	N 45°0'45" W	209.35'
L24	S 50°27'10" E	23.29'

C4	119.94'	60.00'	114°31'54"

CLOSURE NOTES

1. THE UPPER LAYER OF THE LANDFARM FILL IS 1.5 TO 7 FEET THICK AND CONSISTS OF DARK GRAY TO BROWN SILTY CLAY WITH BLACK MOTTLING, PLANT ROOTS AND SCATTERED GRAVEL AND SAND.

2. THE LOWER LAYER OF THE LANDFARM FILL RANGES FROM 3 TO 19 FEET THICK AND IS GENERALLY COMPOSED OF GRAVELLY TO SILTY CLAY WITH VARIABLE AMOUNTS OF GRAVEL, SAND, SILT AND MAN MADE MATERIALS SUCH AS BRICK, CONCRETE AND GLASS, AND POCKETS OF BLACK, SOFT SLUDGE (SILTY CLAY SATURATED WITH OILY AND TARRY SUBSTANCES).

3. YOUNG BAY MUD UNDERLIES THE LANDFARM FILL AND OVERLIES THE OLD BAY MUD, AND RANGES BETWEEN 5 AND 30 FEET IN THICKNESS BENEATH THE LANDFARMS. THE YOUNG BAY MUD GENERALLY CONSISTS OF DARK BROWN TO DARK GRAY, SOFT TO MEDIUM-STIFF SILTY CLAY THAT CONTAINS VARYING PERCENTAGES OF ORGANIC MATERIAL, PEAT AND OCCASIONAL SANDY UNITS. PEATY BAY MUD, WHICH HAS AN ABUNDANT AMOUNT OF PEAT, ARE PRESENT IN THE UPPER 1 TO 7 FEET OF THE YOUNG BAY MUD.

4. OLD BAY MUD RANGES FROM 1 TO 15 FEET THICK BENEATH THE LANDFARMS. THE OLD BAY MUD CONSISTS OF BLUISH TO GREENISH GRAY, MEDIUM-STIFF TO STIFF SILTY CLAY THAT CONTAINS ORGANIC MATERIAL AND LOCAL TRACE AMOUNTS OF SAND.

5. THE PRESENT LOCATION OF THE NORTHWESTERN PART OF LANDFARM 1 WAS UNDERLAIN BY SEVERAL PONDS THAT WERE BACKFILLED. POCKETS OF SLUDGE FOUND WITHIN THE LOWER FILL PROBABLY REPRESENT OIL FILL MATERIAL AND OILY WASTES WITHIN THE PONDS.

6. AS REQUIRED BY 22 CCR §66265.116, THE FOLLOWING NOTE IS PROVIDED: THE OWNER OR OPERATOR HAS AN OBLIGATION TO RESTRICT DISTURBANCE OF THE HAZARDOUS WASTE DISPOSAL UNIT SHOWN ON THIS SURVEY PLAT IN ACCORDANCE WITH THE APPLICABLE REGULATIONS OF ARTICLE 7 OF CHAPTER 10 OF TITLE 22 OF THE CALIFORNIA CODE OF REGULATIONS [22CCR § 66265.110 et seq.]

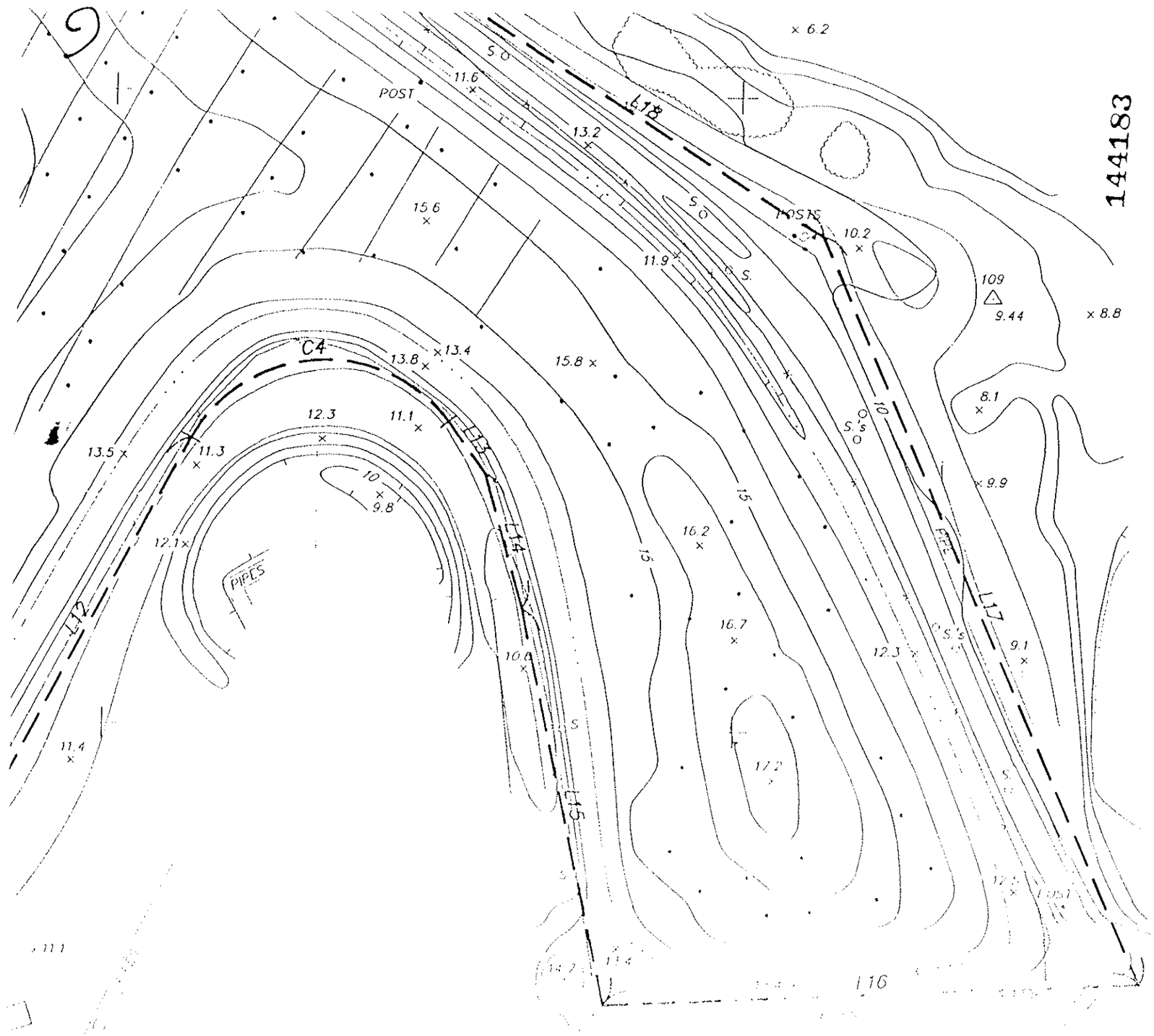
NOTE: THE PRECEDING INFORMATION WAS TAKEN FROM BECHTEL ENVIRONMENTAL, INC. DAMES & MOORE, "REVISED LANDFARM CLOSURE PLAN", FOR CHEVRON PRODUCTS COMPANY, DECEMBER 30, 1996.

GENERAL NOTES

1. AERIAL SURVEY PROVIDED BY KELLOGG AERIAL SURVEYS 4200 N. FREEWAY BLVD. SUITE 3, SACRAMENTO, CA.

2. CONTOUR INTERVAL 1'

3. COORDINATES AND ELEVATIONS ARE BASED ON THE CHEVRON RICHMOND METERLAY DATUM.


144183
POST
POST
PIPES
PIPE
C4
L12
L13
L14
L15
L16
L17
L18
109
6.2
11.6
13.2
15.6
10.2
11.9
9.44
8.8
8.1
13.4
13.8
15.8
12.3
11.1
13.5
11.3
10
9.8
9.9
12.1
16.2
16.7
9.1
12.3
10.0
11.4
17.2

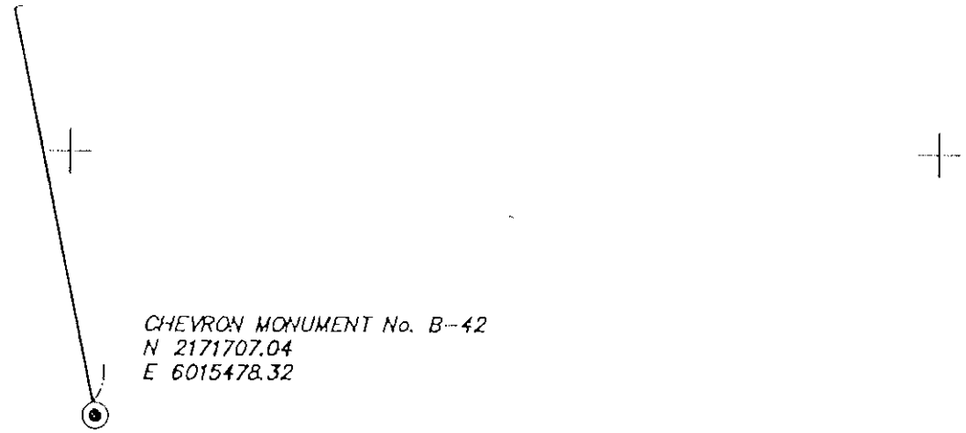
POST
12.9
14.2
17.2
14.3
13.3
16.3
21.4
ABOVE GROUND
20
15
15
L9
C2
L10
L11
L24
C3
N 2172250
POST
12.5
12.3

144183

7

N 2172500

144183



LANDFARM CELL LIMIT LINE AND CURVE TABLES

LINE TABLE		
LINE	BEARING	LENGTH
L1	S 52°16'5" W	320.34'
L2	S 47°1'31" W	236.36'
L3	N 51°56'48" W	45.41'
L4	N 65°22'4" W	63.99'
L5	N 71°10'59" W	74.41'
L6	N 77°26'17" W	85.83'
L7	N 73°51'45" W	105.54'
L8	S 54°19'1" E	216.05'
L9	S 52°36'53" E	332.48'
L10	N 70°27'7" W	61.44'
L11	S 55°34'14" E	63.79'
L12	S 26°1'45" W	108.89'
L13	N 57°[illegible]'21" W	25.52'
L14	N 16°[illegible]'45" W	55.42'
L15	N 12°34'15" W	161.26'
L16	N 87°15'20" E	215.60'
L17	S 24°6'48" E	322.77'
L18	N [illegible]'14" W	174.62'
L19	N [illegible]'38" W	[illegible]
L20	[illegible]	[illegible]
L21	N 52°34'47" W	167.16'
L22	N [illegible]'46" W	174.13'

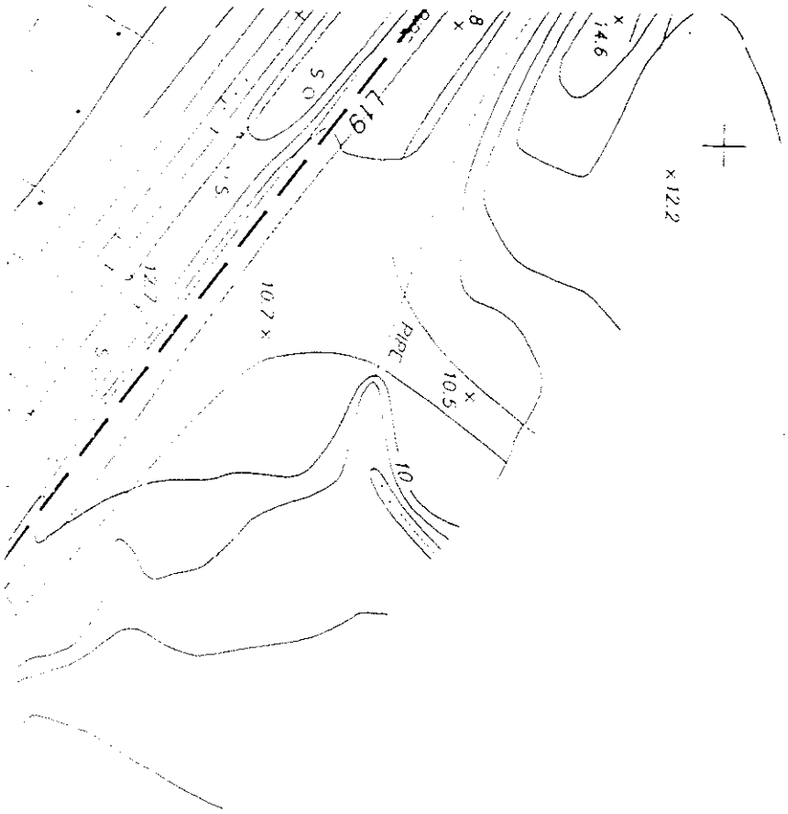
CURVE TABLE			
CURVE	LENGTH	RADIUS	DELTA
C1	112.28'	65.00'	98°58'19"
C2	62.41'	150.00'	23°50'14"
C3	88.59'	50.00'	101°31'05"
C4	119.94'	60.00'	114°31'54"

CLOSURE NOTES

1. THE UPPER LAYER OF THE LANDFARM FILL IS 1.5 TO 7 FEET THICK AND CONSISTS OF DARK GRAY TO BROWN SILTY CLAY WITH BLACK MOTTLING, PLANT ROOTS AND SCATTERED GRAVEL AND SAND.

2. THE LOWER LAYER OF THE LANDFARM FILL RANGES FROM 5 TO 19 FEET THICK AND IS GENERALLY COMPOSED OF GRAVELLY TO SILTY CLAY WITH VARIABLE AMOUNTS OF GRAVEL, SAND, SILT AND MAN MADE MATERIALS SUCH AS BRICK, CONCRETE AND GLASS, AND POCKETS OF BLACK, SOFT SILTY CLAY (SILTY CLAY SATURATED WITH OIL AND TARRY SUBSTANCES)

3. [illegible] BAY MUD UNDERLIES THE LANDFARM FILL AND CONSISTS OF THE [illegible] BAY MUD, AND [illegible] BETWEEN 5 AND 30 FEET [illegible] THE [illegible] BAY MUD GENERALLY CONSISTS OF [illegible] SILT TO [illegible] SILTY CLAY WITH ORGANICS, VARYING PERCENTAGES OF [illegible] MATERIAL, [illegible] SANDY [illegible] BAY MUD, WHICH [illegible] SILT, [illegible] THE [illegible]



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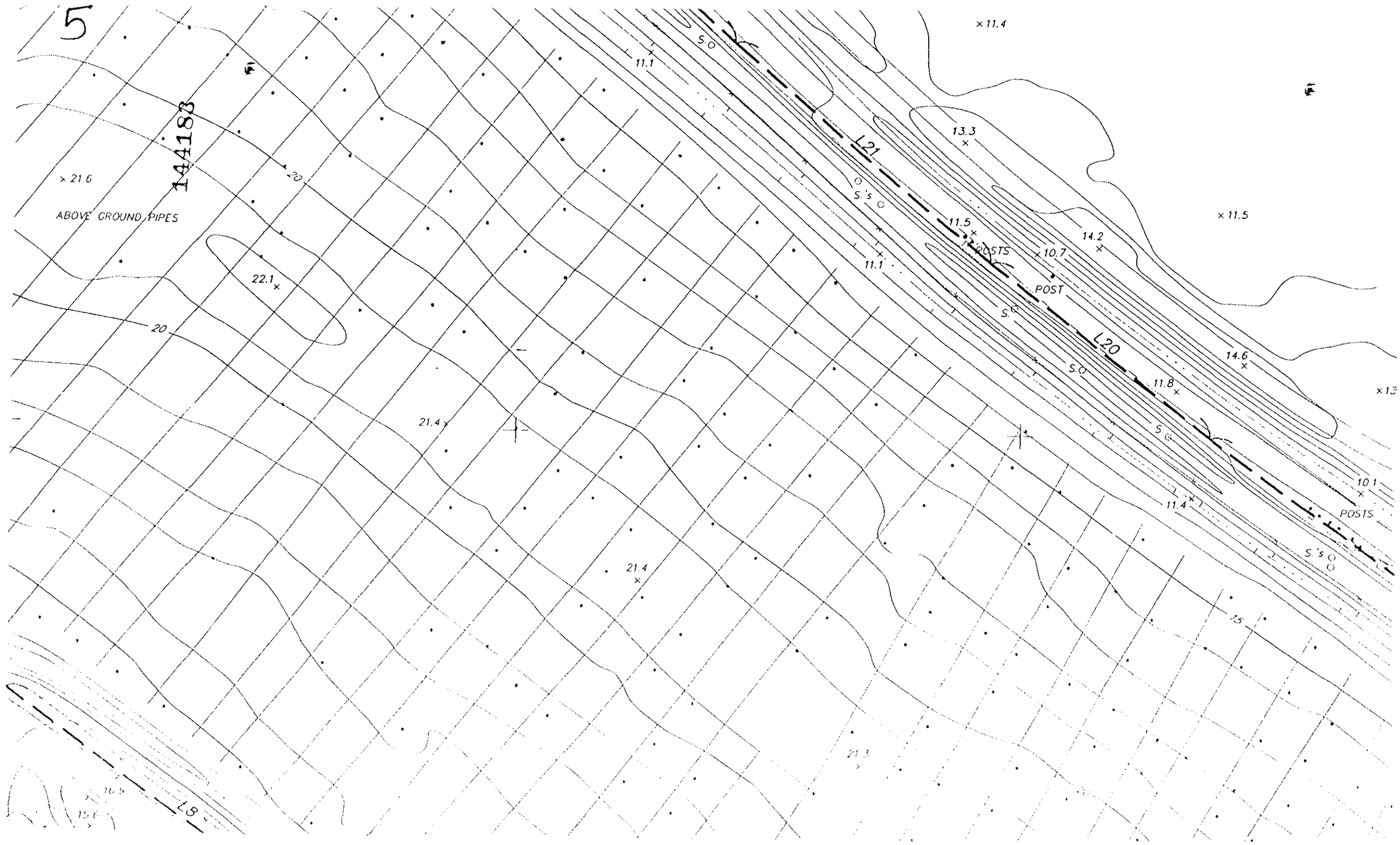
5
144183
ABOVE GROUND PIPES
× 21.6
22.1
20
20
21.4
21.4
11.1
S.O
L21
S.'s
11.5
POSTS
11.1
× 10.7
POST
S.O
L20
S.O
11.8
S.O
11.4
× 11.4
13.3
× 11.5
14.2
14.6
10.1
POSTS
S.'s
15
L8

4

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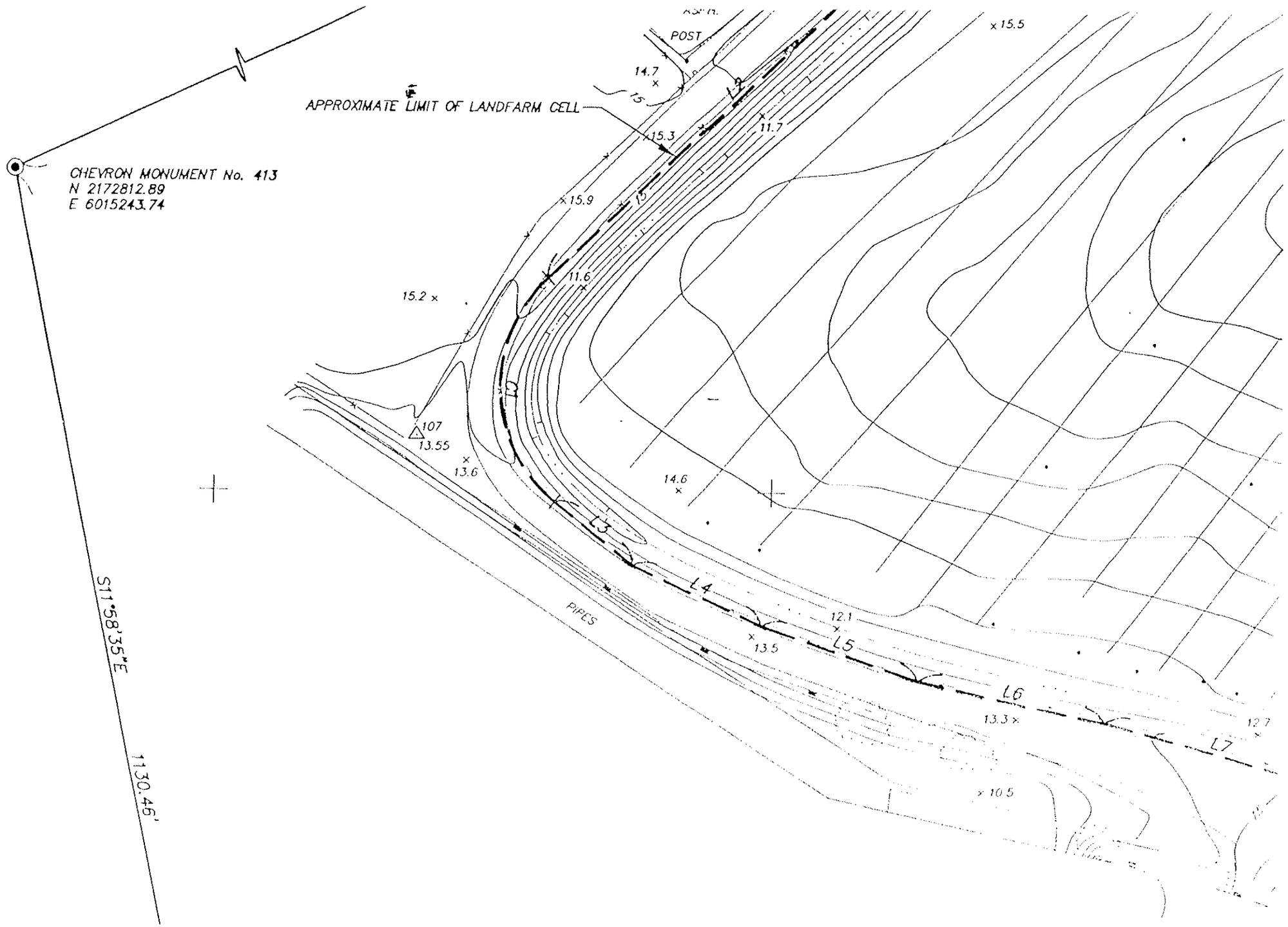
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N 2172750
S11°58'35"E
1130.46'
APPROXIMATE LIMIT OF LANDFARM CELL
POST
14.7
15
15.3
11.7
15.9
15
11.6
15.2
107
13.55
13.6
14.6
L2
L3
L4
L5
L6
L7
12.1
13.5
13.3
12.7
10.5
15.5
PIPES

E 6016750

144183

E 6017000

E 6017250

144183
E 6016250
E 6016500
108
13.17
PIPE
S.O
N 2173201.62
E 6016074.49
10.5
PUMP
15.9
12.5
18.3
14.8
15
16.9
13.6
14.7
L23
PIPE
POSTS
12.7
14.1
10.7
L22
POSTS
15.2
12.9

7

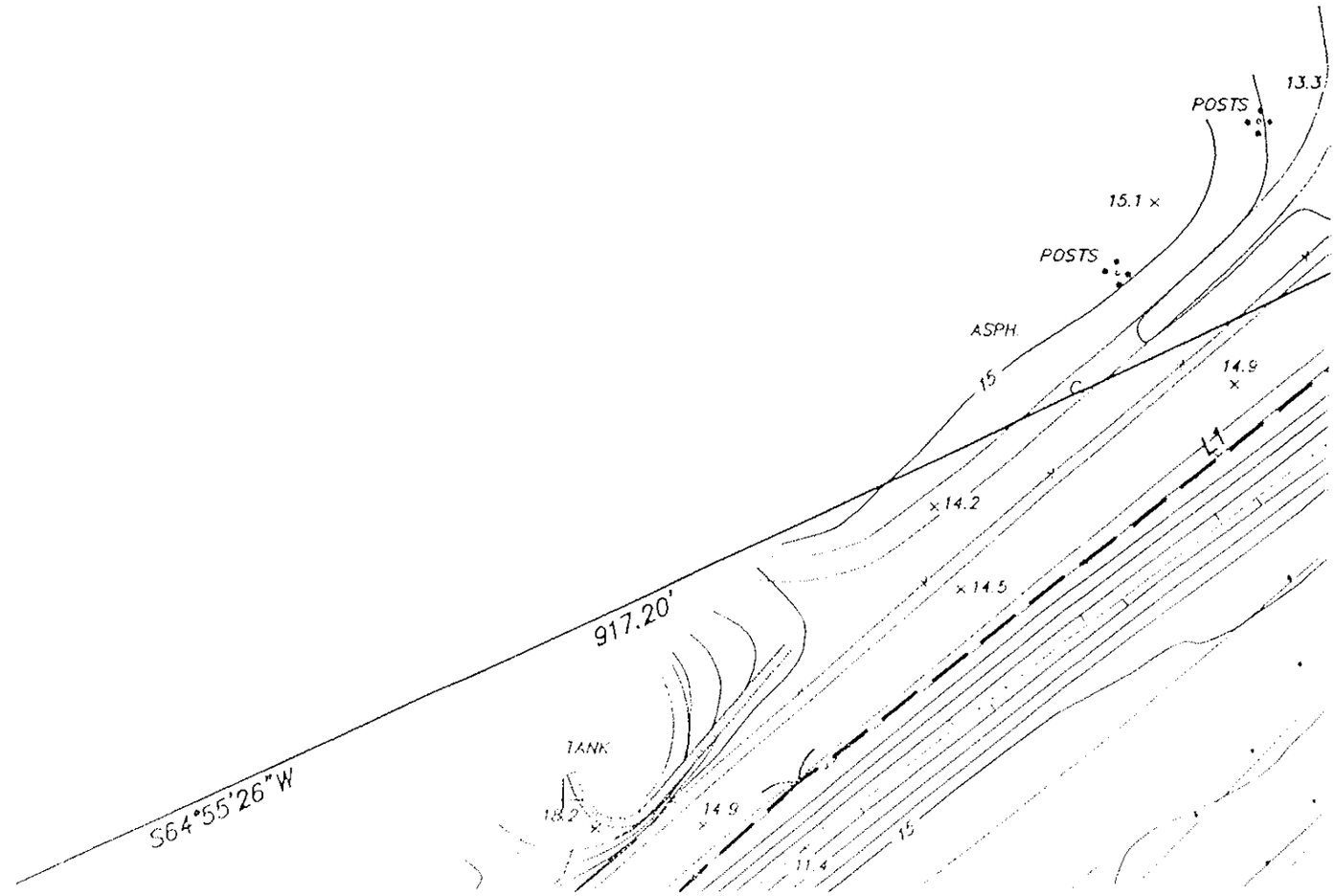
144183

E 6015500

E 6015750

N 2173250

N 2173000



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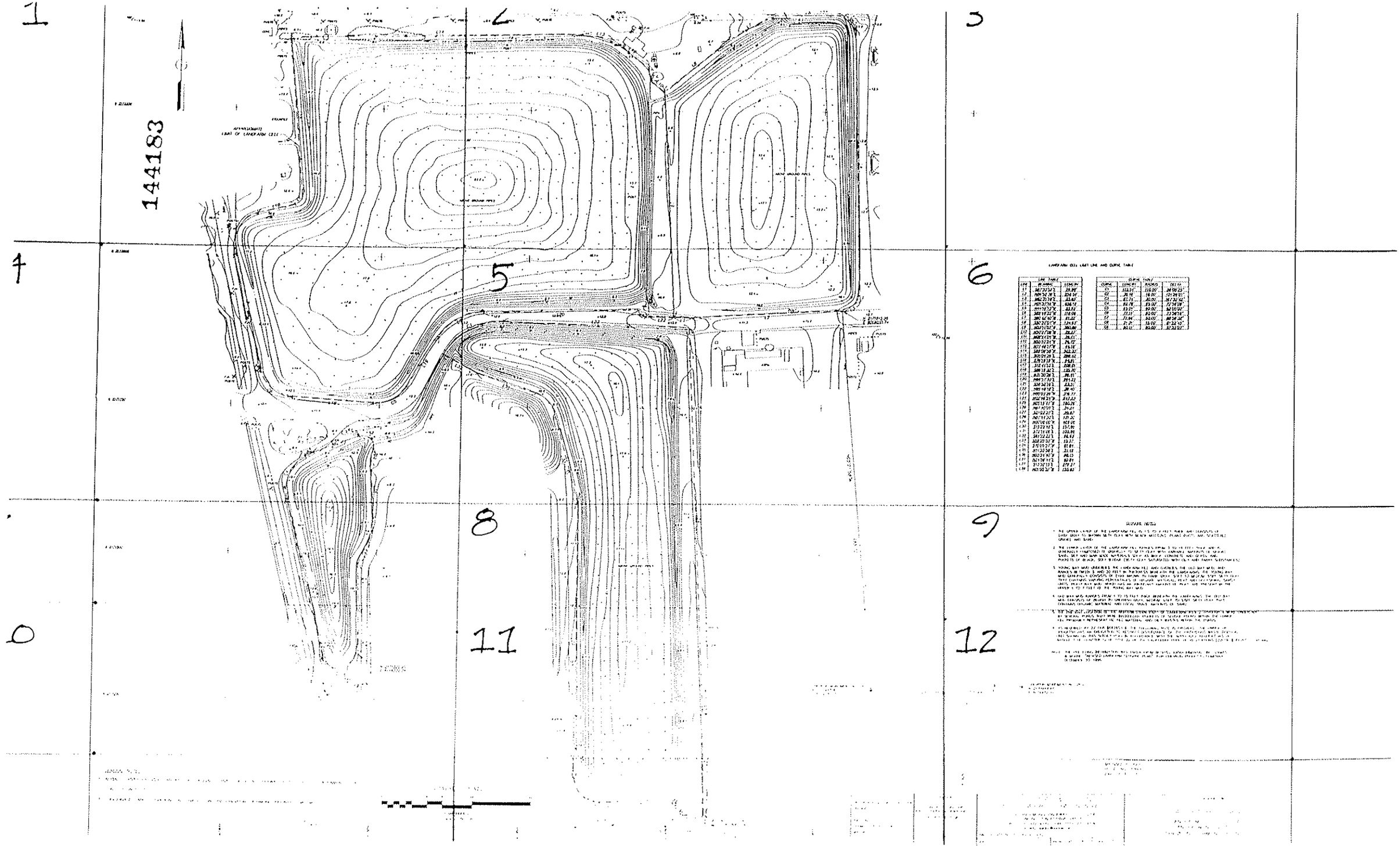


LANDFARM CELL LINE AND CURVE TABLE

LINE TABLE		
LINE	BEARING	LENGTH
L1	S67°23'53"E	25.00'
L2	N89°54'39"E	234.14'
L3	S62°25'39"E	43.44'
L4	N57°27'39"E	436.15'
L5	N57°27'27"E	43.03'
L6	S89°11'27"E	114.04'
L7	S89°45'39"E	41.22'
L8	S87°27'27"E	124.02'
L9	S50°11'27"E	300.00'
L10	S50°27'39"E	25.27'
L11	S89°11'27"E	26.01'
L12	S50°27'27"E	76.77'
L13	S27°44'27"E	13.10'
L14	S89°39'39"E	302.30'
L15	S50°27'27"E	296.62'
L16	S79°11'27"E	25.01'
L17	S14°27'27"E	258.21'
L18	S89°11'27"E	130.35'
L19	S35°39'39"E	39.11'
L20	N89°27'27"E	191.21'
L21	S39°54'39"E	23.31'
L22	S89°54'39"E	39.45'
L23	N89°27'27"E	179.77'
L24	S52°44'27"E	212.23'
L25	S57°11'27"E	138.29'
L26	N89°45'39"E	24.27'
L27	S27°55'27"E	29.67'
L28	S57°11'27"E	137.26'
L29	S57°11'27"E	42.10'
L30	S57°11'27"E	157.95'
L31	S57°11'27"E	150.98'
L32	S57°27'27"E	24.12'
L33	S54°25'27"E	13.17'
L34	S57°27'27"E	41.01'
L35	S57°27'39"E	31.17'
L36	S57°27'27"E	46.13'
L37	S57°27'27"E	52.91'
L38	S57°27'27"E	177.17'
L39	S57°27'27"E	231.42'

CURVE TABLE				
CURVE	LENGTH	RADIUS	TANGENT	
C1	113.17'	116.00'	S67°55'27"	
C2	26.16'	16.00'	S21°39'27"	
C3	43.71'	30.00'	S67°27'27"	
C4	84.78'	53.00'	S77°39'39"	
C5	43.27'	30.00'	S67°27'27"	
C6	77.17'	53.00'	S77°39'39"	
C7	71.84'	53.00'	N89°54'39"	
C8	21.21'	15.00'	S71°27'27"	
C9	84.11'	60.00'	S71°27'27"	

GENERAL NOTES

1. THE UPPER LAYER OF THE LANDFARM FILL IS TO CONSIST MAINLY OF SANDY SILT WITH SOME SILTY SAND MATERIAL. PLANT ROOTS AND SCATTERED GRAVEL AND SAND.

2. THE LOWER LAYER OF THE LANDFARM FILL RANGES FROM 3 TO 10 FEET THICK AND IS COMPRISED OF SANDY SILT WITH SOME SILTY SAND. THIS LAYER MAY ALSO CONTAIN ALL OF THE ABOVE, CONCRETE, AND GRAVEL AND PIECES OF BRICK. THIS LAYER OFTEN CONTAINS SCATTERED WHITE SILT AND FROM SUBSTANCE.

3. YOUNG, WET AREAS (SEEPS) IN THE LANDFARM FILL AND CURVES THE OLD WET AREA RANGES IN WIDTH 3 AND 30 FEET IN THICKNESS BENEATH THE LANDFARMS. THE YOUNG WET AREA GENERALLY CONSISTS OF FINE GRAINED SILTY SAND TO SANDY SILT WITH SOME TRACE CONTENT VARYING PERCENTAGES OF ORGANIC MATERIAL, PLANT MATERIAL, GRAVEL, ROOTS AND BRICK. THE WET AREA IS ABOVE THE ORIGINAL GROUND SURFACE AND THE WET MATERIAL IS ABOUT 1 TO 2 FEET TO THE YOUNG WET AREA.

4. THE OLD WET AREA RANGES FROM 1 TO 10 FEET WIDE BENEATH THE LANDFARMS. THE OLD WET AREA CONSISTS OF SILTY SAND WITH SOME SILT. THE OLD WET AREA MAY CONTAIN ORGANIC MATERIAL, PLANT MATERIAL, GRAVEL, AND SAND.

5. [illegible]

6. [illegible]

7. [illegible]

8. [illegible]

12

144183

NOTE: THE PRECEDING INFORMATION WAS TAKEN FROM BECHTEL ENVIRONMENTAL, INC. DAMES & MOORE, "REVISED LANDFARM CLOSURE PLAN", FOR CHEVRON PRODUCTS COMPANY, DECEMBER 30, 1996.

38°21'15"W 351.99'

CHEVRON MONUMENT No. 2650
N 2170943.47
E 6019472.05

E 6019250

MICHAEL P. REI
R.C.E. No. 13810
EXP. 3/31/01

REGISTERED PROFESSIONAL ENGINEER
MICHAEL P. REI
No. 13810
Exp. 3/31/01
CIVIL
STATE OF CALIFORNIA

REVISIONS
/15/99 AUTH. 99-008
D CLOSURE INFORMATION.
31/00 -ADD NOTE #6

KISTER, SAVIO & REI, INC.
LAND SURVEYORS — CIVIL ENGINEERS
3095 RICHMOND PARKWAY, SUITE 214
RICHMOND, CALIFORNIA 94806
PHONE: (510) 222-4020 FAX: (510) 222-3718
E-MAIL: ksrinc@pacbell.net

FOR: CHEVRON PRODUCTS CO.

SCALE: 1" = 50'

JOB No. 9677 AUTH. 99-008

DATE: 7/9/99

DWG. No. 0-789-2

DESCRIPTION

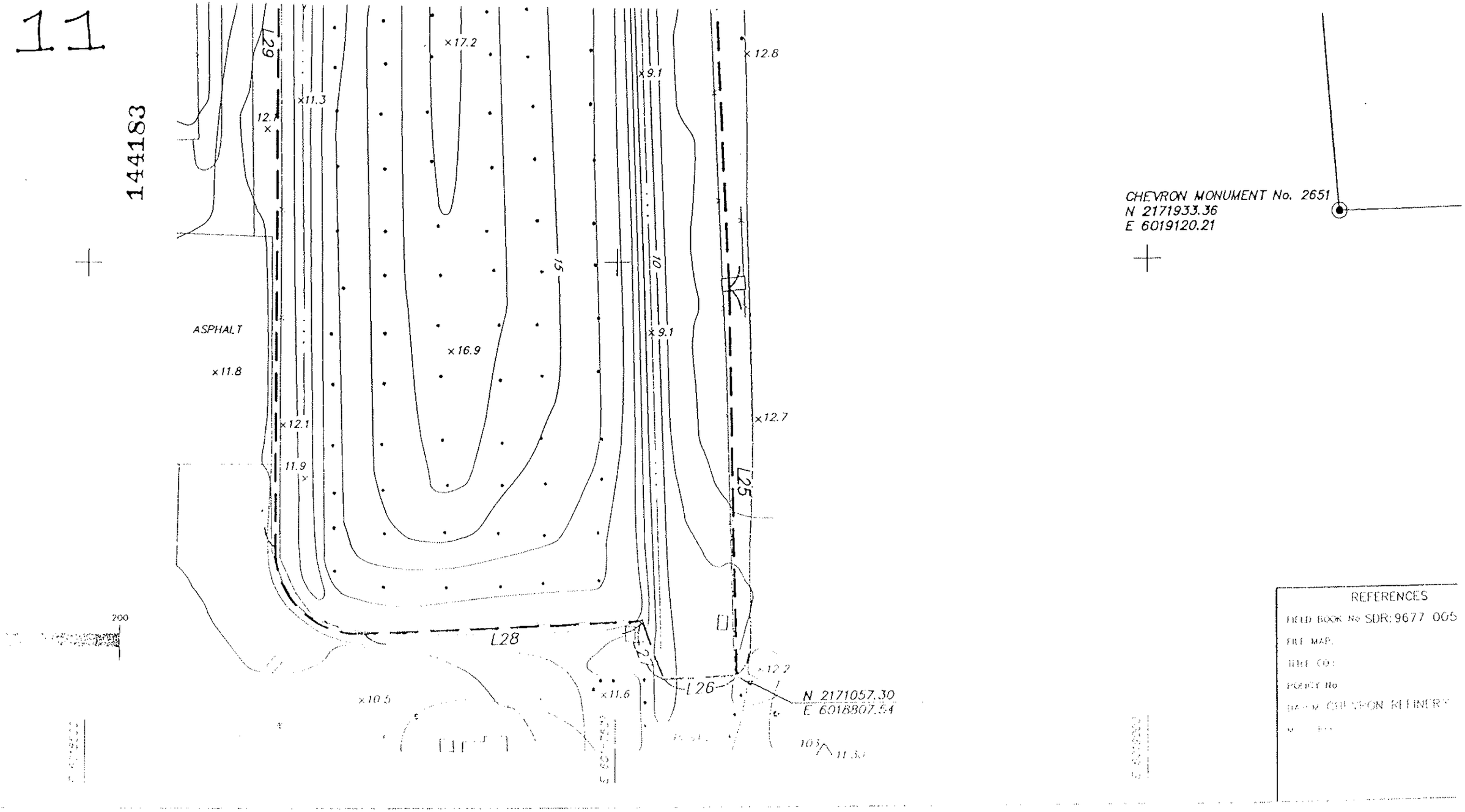
TOPOGRAPHIC SURVEY

LANDFARM CLOSURE PLAN
LANDFARM No. 2-5
CHEVRON RICHMOND REFINERY

RICHMOND, CALIFORNIA

11

144183


CHEVRON MONUMENT No. 2651
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×17.2
×16.9
×11.3
×9.1
×9.1
×12.8
×12.7
×12.1
11.9
×10.5
×11.6
L29
L28
L26
L25
15
10
N 2171057.30
E 6018807.54
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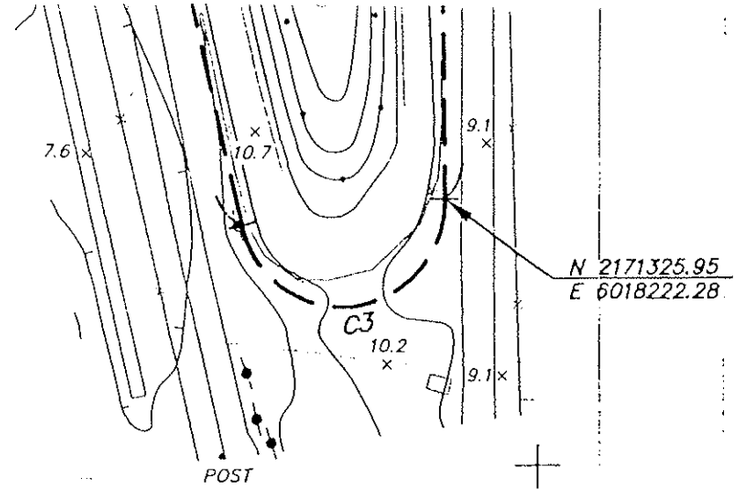
FILE MAP:
TITLE CO:
POLICY No
DATUM CHEVRON REFINERY

10

144183

N 2171250



GENERAL NOTES

1. AERIAL SURVEY PROVIDED BY KELLOGG AREIAL SURVEYS 4200 N. FREEWAY BLVD. SUITE 3, SACRAMENTO, CA.
2. CONTOUR INTERVAL = 1'
3. COORDINATES AND ELEVATIONS ARE BASED ON THE CHEVRON RICHMOND REFINERY DATUM

GRAPHIC SCALE

50 0 25 50 100

(IN FEET)
1 inch = 50 ft

144183

CLOSURE NOTES

1. THE UPPER LAYER OF THE LANDFARM FILL IS 1.5 TO 7 FEET THICK AND CONSISTS OF DARK GRAY TO BROWN SILTY CLAY WITH BLACK MOTTLING, PLANT ROOTS AND SCATTERED GRAVEL AND SAND.

2. THE LOWER LAYER OF THE LANDFARM FILL RANGES FROM 3 TO 19 FEET THICK AND IS GENERALLY COMPOSED OF GRAVELLY TO SILTY CLAY WITH VARIABLE AMOUNTS OF GRAVEL, SAND, SILT AND MAN MADE MATERIALS SUCH AS BRICK, CONCRETE AND GLASS, AND POCKETS OF BLACK, SOFT SLUDGE (SILTY CLAY SATURATED WITH OILY AND TARRY SUBSTANCES).

3. YOUNG BAY MUD UNDERLIES THE LANDFARM FILL AND OVERLIES THE OLD BAY MUD, AND RANGES BETWEEN 5 AND 30 FEET IN THICKNESS BENEATH THE LANDFARMS. THE YOUNG BAY MUD GENERALLY CONSISTS OF DARK BROWN TO DARK GRAY, SOFT TO MEDIUM-STIFF SILTY CLAY THAT CONTAINS VARYING PERCENTAGES OF ORGANIC MATERIAL, PEAT AND OCCASIONAL SANDY UNITS. PEATY BAY MUD, WHICH HAS AN ABUNDANT AMOUNT OF PEAT, ARE PRESENT IN THE UPPER 1 TO 7 FEET OF THE YOUNG BAY MUD.

4. OLD BAY MUD RANGES FROM 1 TO 15 FEET THICK BENEATH THE LANDFARMS. THE OLD BAY MUD CONSISTS OF BLUISH TO GREENISH GRAY, MEDIUM-STIFF TO STIFF SILTY CLAY THAT CONTAINS ORGANIC MATERIAL AND LOCAL TRACE AMOUNTS OF SAND.

5. THE PRESENT LOCATION OF THE NORTHWESTERN PART OF LANDFARM No.s 2 THROUGH 4 WERE UNDERLAIN BY SEVERAL PONDS THAT WERE BACKFILLED. POCKETS OF SLUDGE FOUND WITHIN THE LOWER FILL PROBABLY REPRESENT OIL FILL MATERIAL AND OILY WASTES WITHIN THE PONDS.

6. AS REQUIRED BY 22 CCR §66265.116, THE FOLLOWING NOTE IS PROVIDED: THE OWNER OR OPERATOR HAS AN OBLIGATION TO RESTRICT DISTURBANCE OF THE HAZARDOUS WASTE DISPOSAL UNIT SHOWN ON THIS SURVEY PLAT IN ACCORDANCE WITH THE APPLICABLE REGULATIONS OF ARTICLE 7 OF CHAPTER 10 OF TITLE 22 OF THE CALIFORNIA CODE OF REGULATIONS [22CCR § 66265.110 et seq.]

NOTE: THE PRECEDING INFORMATION WAS TAKEN FROM BECHTEL ENVIRONMENTAL, INC. DAMES & MOORE, "REVISED LANDFARM CLOSURE PLAN", FOR CHEVRON PRODUCTS COMPANY, DECEMBER 30, 1996.

3°21'15"W 351.99'

CHEVRON MONUMENT No. 2650
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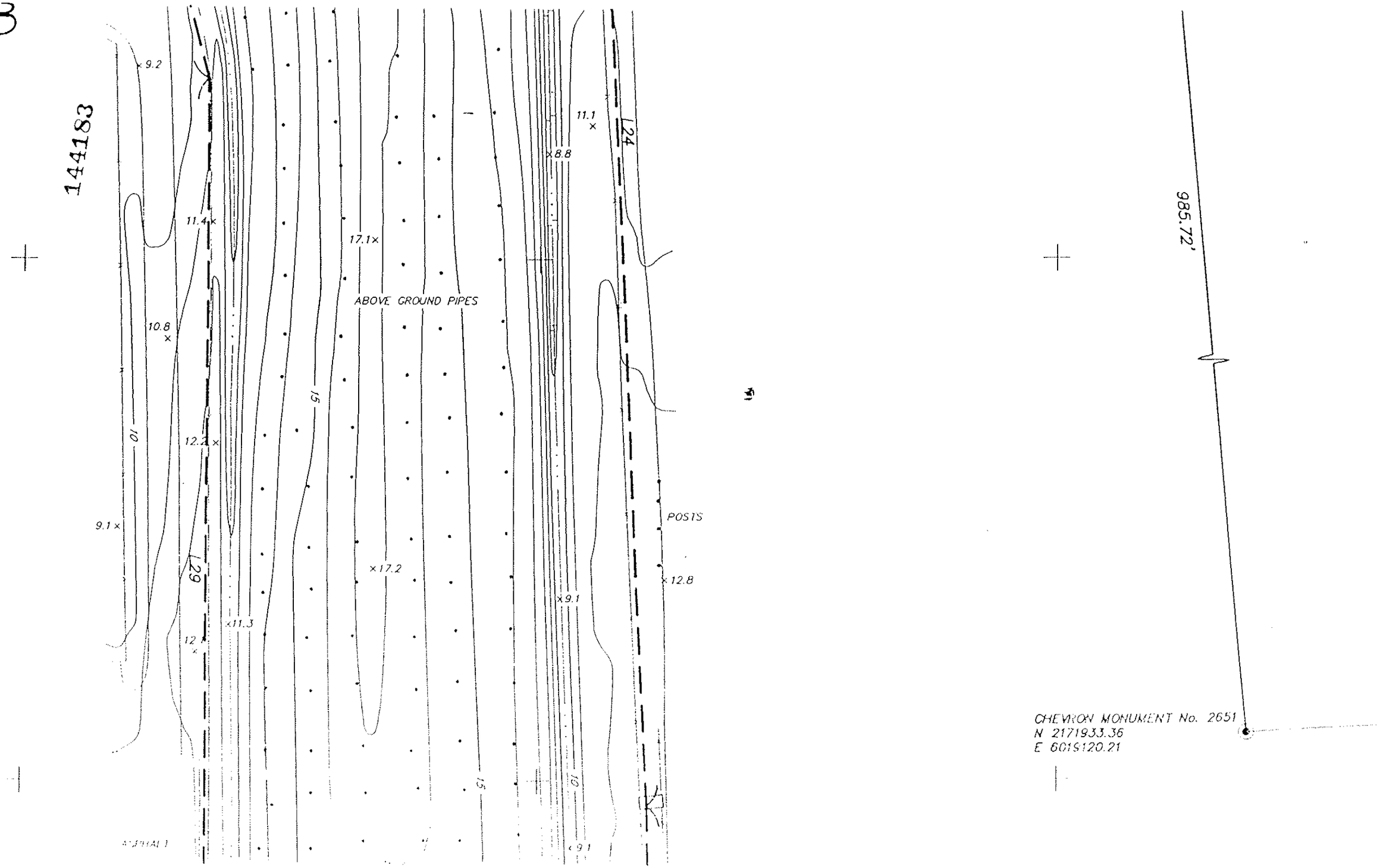
E 6019472.05


144183
9.2
11.1
8.8
124
11.4
17.1
ABOVE GROUND PIPES
10.8
15
10
12.2
9.1
POSTS
129
17.2
12.8
9.1
11.3
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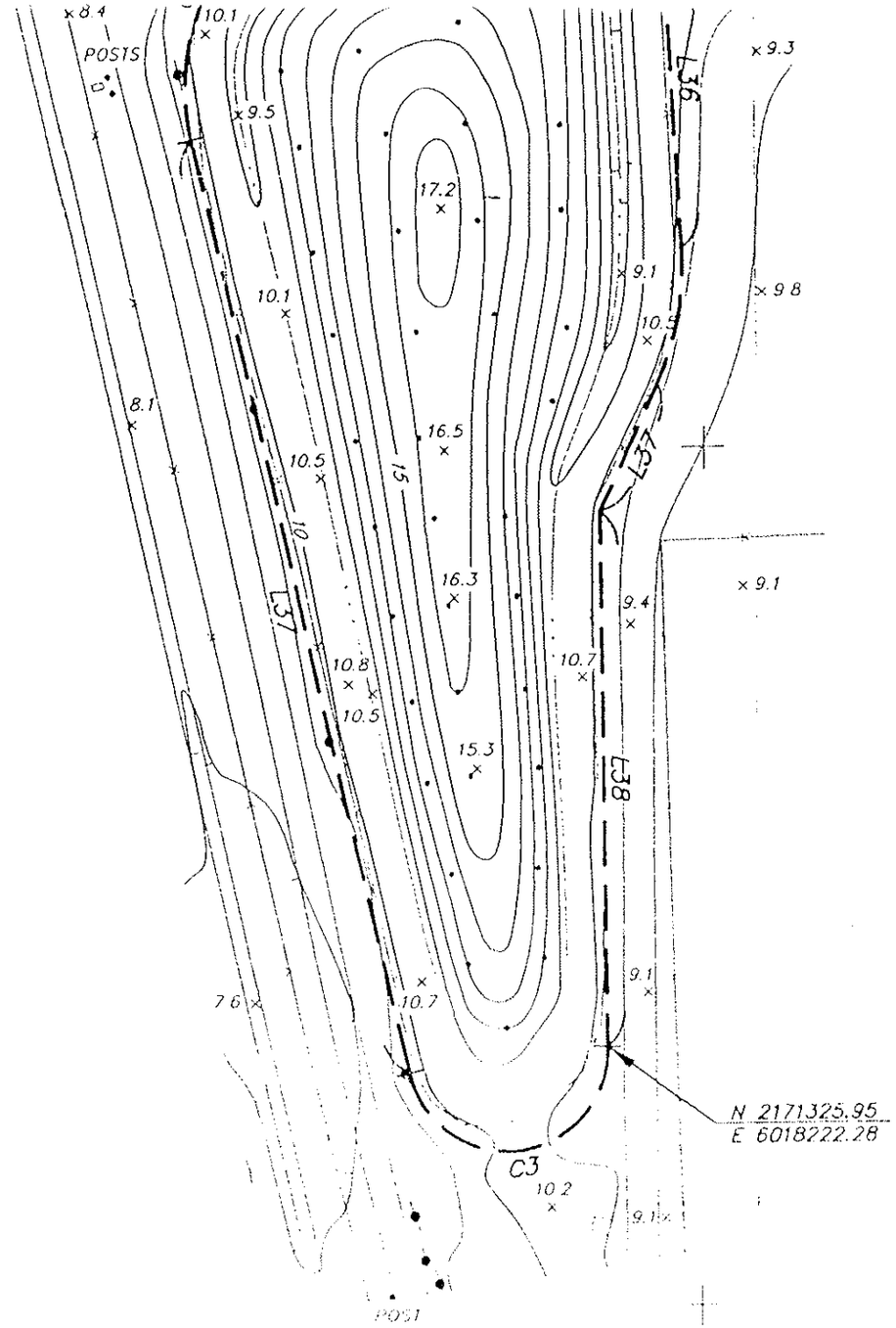
CHEVRON MONUMENT No. 2651
N 2171933.36
E 6019120.21

7

144183

N 2171500



N 2171250

6

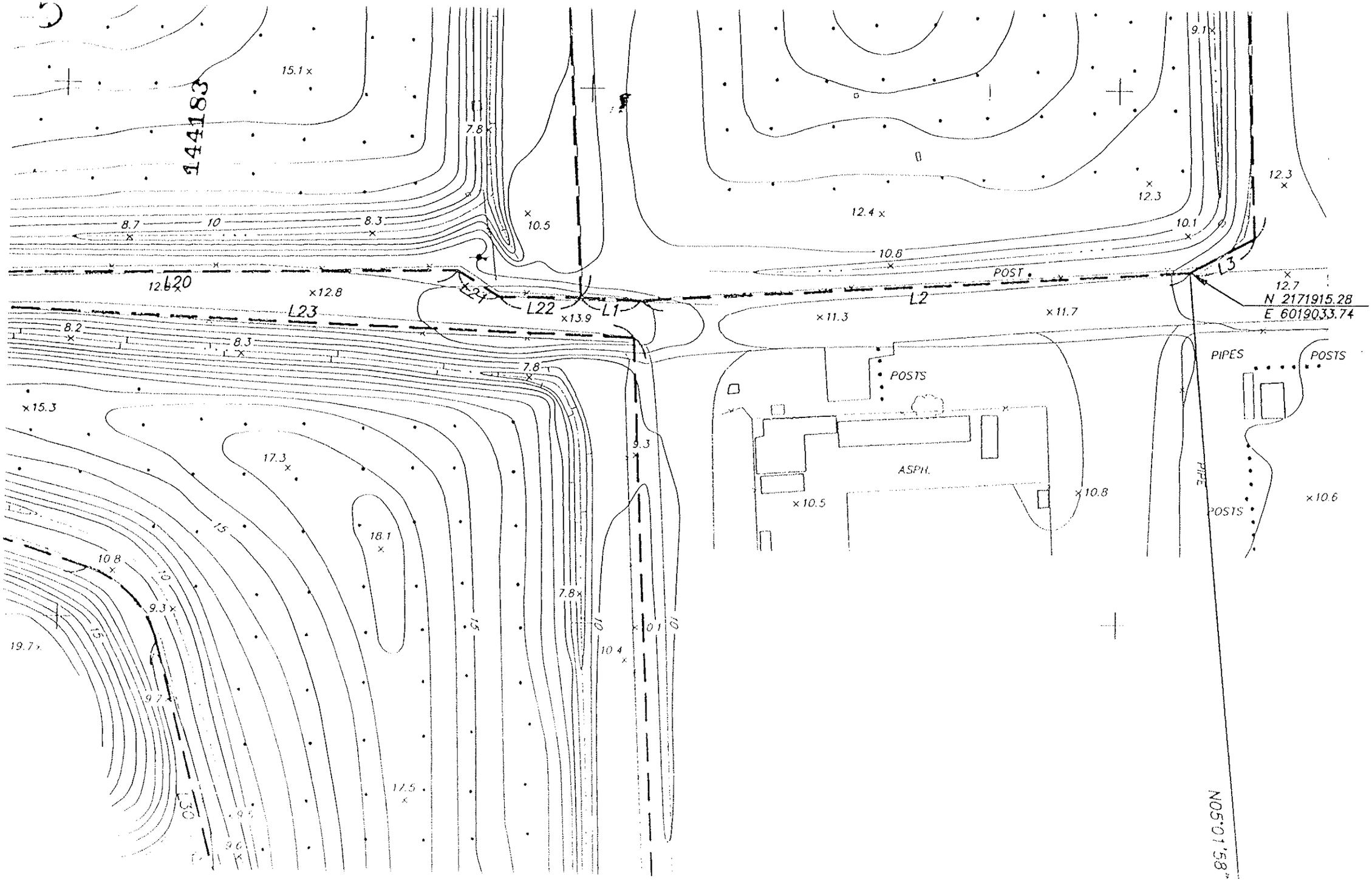
144183

100 △ 12.28

LANDFARM CELL LIMIT LINE AND CURVE TABLE

LINE TABLE		
LINE	BEARING	LENGTH
L1	S87°33'12"E	29.98'
L2	N86°52'39"E	258.59'
L3	N62°31'18"E	33.83'
L4	N01°37'16"W	458.19'
L5	N44°16'13"W	33.92'
L6	S89°49'22"W	119.08'
L7	S60°42'40"W	91.22'
L8	S50°37'07"W	134.63'
L9	N03°11'07"W	380.89'
L10	N50°27'08"W	29.27'
L11	N08°44'04"W	26.01'
L12	N55°10'24"W	74.72'
L13	N77°49'17"W	44.18'
L14	S89°09'58"W	502.33'
L15	S05°04'26"E	269.42'
L16	S76°18'19"W	64.91'
L17	S12°41'13"E	209.01'
L18	S86°19'32"E	135.70'
L19	N31°35'26"E	99.91'
L20	N88°57'33"E	264.22'
L21	S58°52'18"E	23.51'
L22	N89°48'18"E	39.40'
L23	N88°03'28"W	316.77'
L24	N02°46'24"W	647.23'
L25	N01°19'47"W	180.26'
L26	N87°40'05"E	34.24'
L27	S21°02'27"E	28.87'
L28	N87°44'33"E	131.30'
L29	N00°08'00"W	469.06'
L30	S15°25'49"E	157.86'
L31	S72°14'06"E	105.98'
L32	S61°22'22"E	66.63'
L33	S59°25'53"W	15.57'
L34	S70°05'52"W	81.84'
L35	N11°33'58"E	21.19'
L36	N03°34'40"W	99.15'
L37	N24°59'44"E	40.84'
L37	S13°32'15"E	279.27'
L38	N01°05'57"W	15[illegible].45'

CURVE TABLE			
CURVE	LENGTH	RADIUS	DELTA
C1	113.54'	110.00'	59°08'25"
C2	38.16'	18.00'	121°28'01"
C3	87.74'	30.00'	167°33'42"
C4	82.78'	65.00'	72°58'08"
C5	65.01'	60.00'	62°05'02"
C6	77.11'	60.00'	73°38'19"
C7	77.66'	50.00'	88°59'32"
C8	21.31'	15.00'	81°22'45"
C9	90.11'	90.00'	57°22'07"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E 6019033.74
L20
12.8
L23
L24
L22
L1
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11.3
11.7
8.2
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7.8
PIPES
POSTS
POSTS
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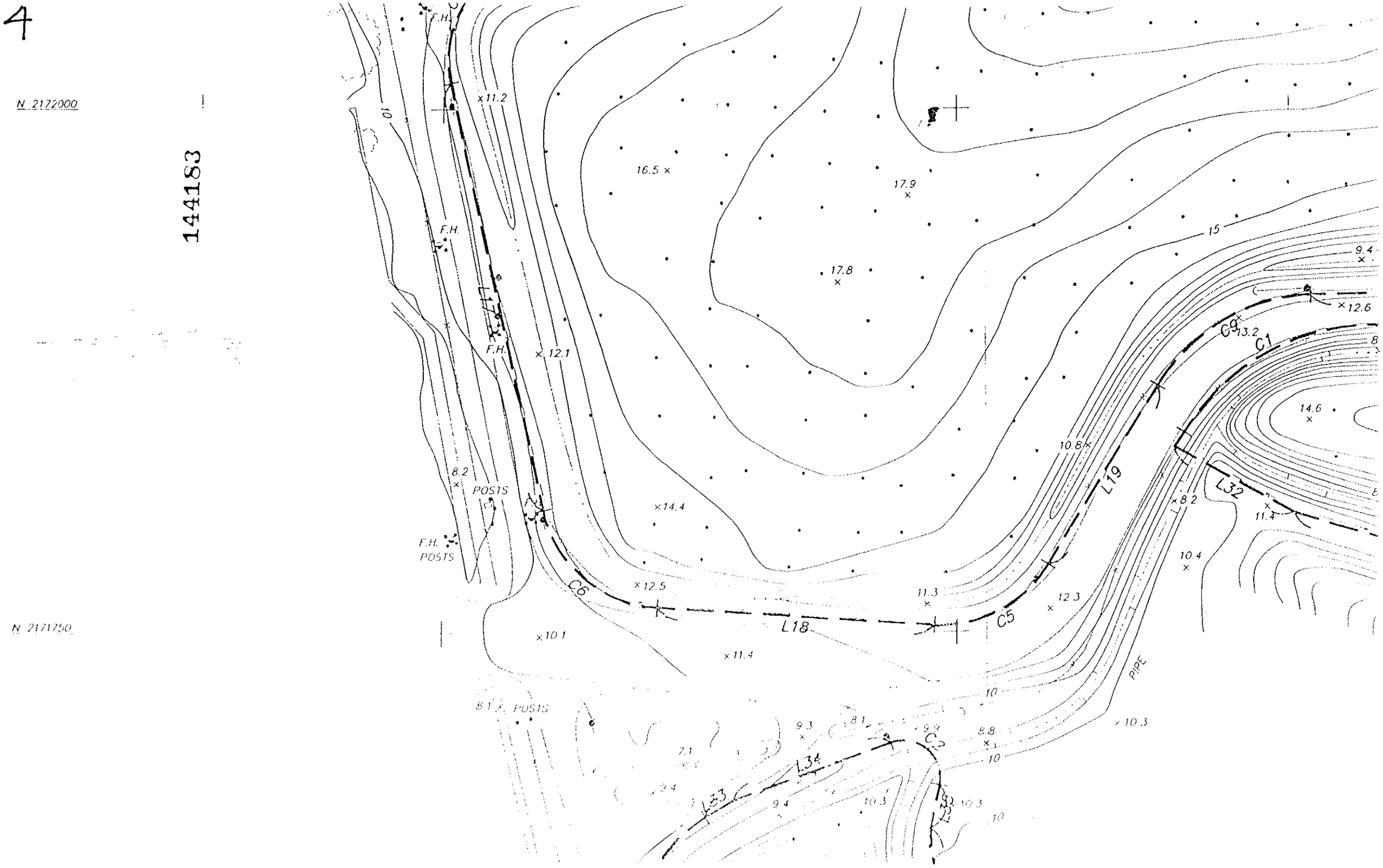
4

144183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POSTS
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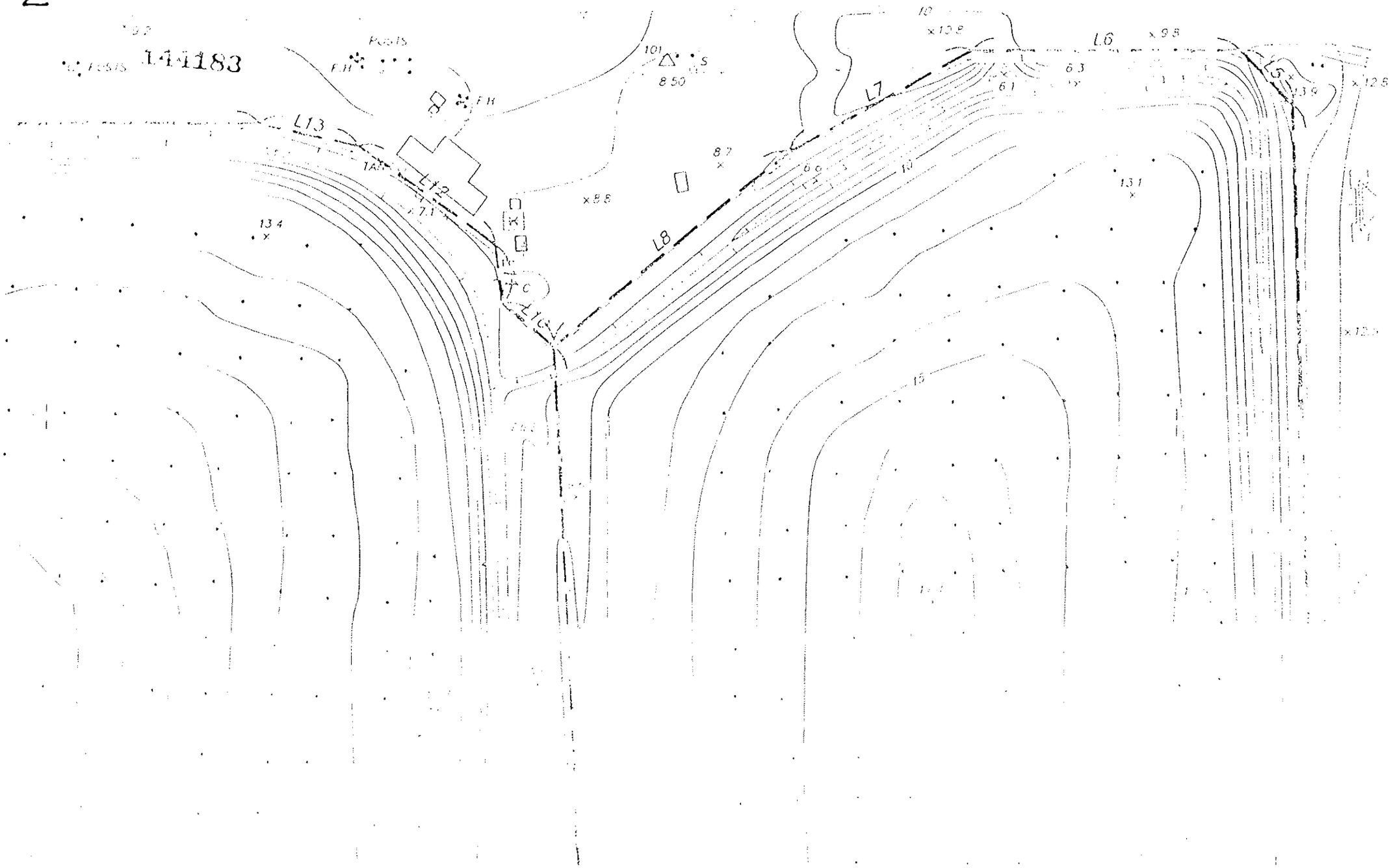

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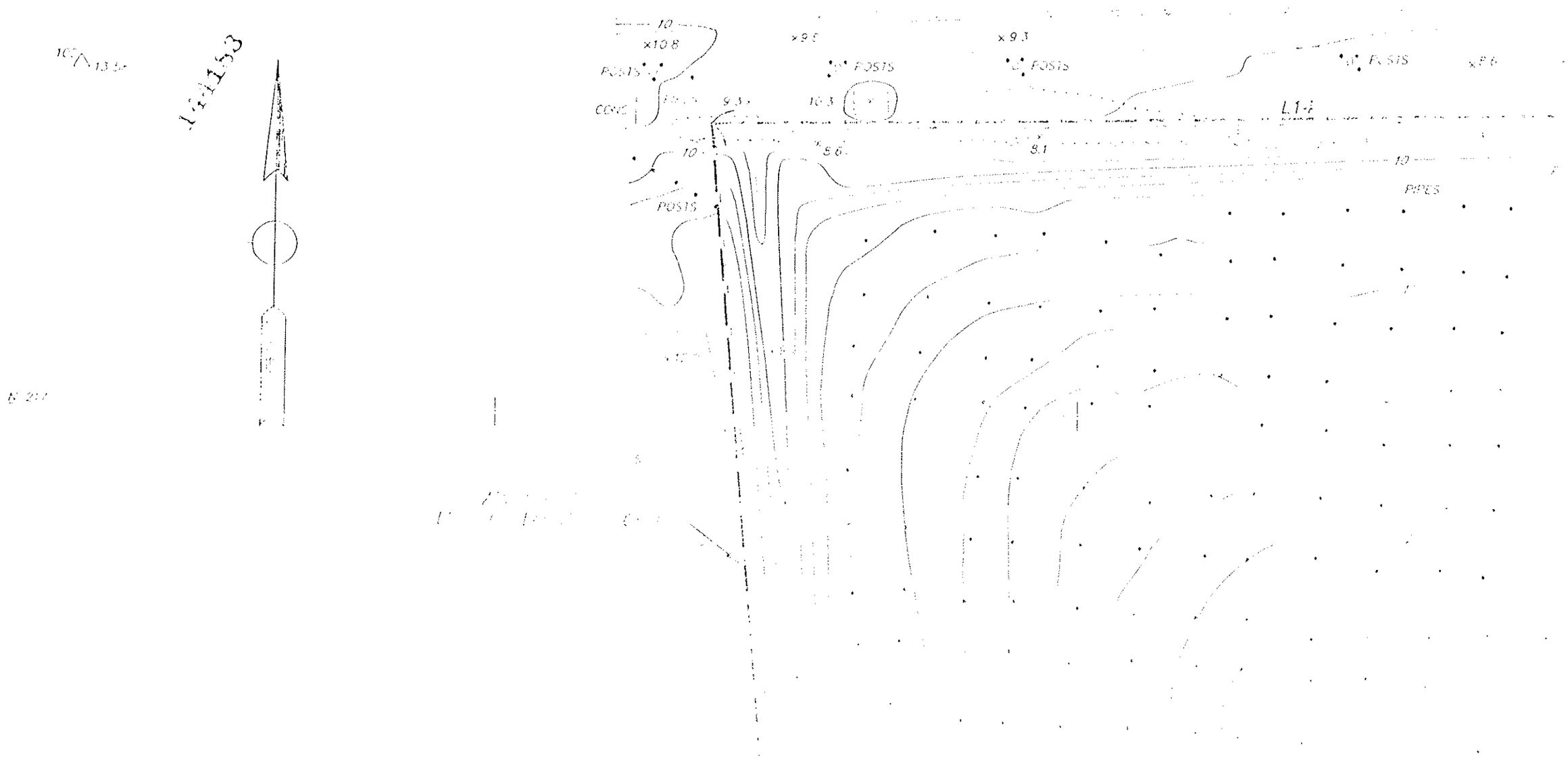
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EXHIBIT C

POST CLOSURE NOTICE OF HAZARDOUS WASTE DISPOSAL UNIT

144183

The Chevron Products Company currently is the owner and operator of the Landfarm Treatment Facility. The Treatment Facility area is located on the property which is described in Exhibit A to this Post-Closure Notice (the "Property").

The Landfarms has been closed pursuant to the *Landfarm Closure Plan* (1997) which was approved by the California Environmental Protection Agency, and Department of Toxic Substances Control (DTSC). A certificate of closure was submitted to the DTSC on or about September 30, 1999.

Pursuant to 22 CCR 66265.119(b) , the Chevron Product Company provides the following notification:

1. The property has been used to manage hazardous wastes.
2. The use of the Property is restricted under Title 22 of the California Code of Regulations [22CCR 66265.110]
3. The survey plat and record of the type, location, and quantity of hazardous wastes disposed of within the Landfarms required by 22 CCR 66265.116 and 66265.119 (a) have been filed or contemporaneously with the recording of this Post-Closure Notice are being filed with the City of Richmond Planning Department on July 5, 2000.

EXHIBIT D

144183

RECORD OF HAZARDOUS WASTES DISPOSED OF IN CLOSED LANDFARM TREATMENT FACILITY AT THE RICHMOND REFINERY

The Chevron Products Company currently is the owner and operator of the closed Landfarm Treatment Facility. The Landfarms are located on the property which is described in Exhibit A to this Record.

The Landfarms has been closed pursuant to a the *Revised Landfarm Closure Plan* (1997) which was approved by the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC). A certificate of closure was submitted to the DTSC on September 30, 1999.

Pursuant to 22 CCR 66265.119, Chevron is providing this record of the type, location and quantity of hazardous wastes disposed of in the Landfarm Treatment Facility.

Prior to closure, the Landfarms consisted of 5 Landfarm units. The Landfarms were in operation for the biological treatment of oily wastes generated from on-site petroleum processing from the mid 1970's to 1987. The principle wastes applied were oil/water separator sludge (at Nos. 1, 2, 4 and 5 Landfarms), non-leaded tank bottoms (at Nos. 1,2,3 and 4 Landfarms), oil/water mixtures, algae water, pond sediments and oily dirt. When in operation, wastes were applied to the surface of the Landfarms and tilled into the top six to 12 inches. Prior to 1980, no data are available on waste application rates to the Landfarms. Since 1980, a total of 188,000 tons of waste were applied to the Landfarms. The location and dimensions of the units as closed is indicated in the survey plat which is Exhibit B to this Record. The wastes which remain in the Landfarm after closure are described in "*Revised Landfarm Closure Plan*". The relevant sections of this plan are Sections 2.2.3 and 2.2.4.

This Record is based on available records and investigations which have been conducted into the environmental conditions at the Landfarms. The information contained in the Record is, to the best of Chevron's current knowledge and belief, true, accurate and complete.

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

144183

State of California

County of Contra Costa } ss.

On July 6, 2000 (Date), before me, Carrie Ho, Notary Public (Name and Title of Officer (e.g., "Jane Doe, Notary Public")),

personally appeared J. J. Ely (Name(s) of Signer(s)),

☒ personally known to me
☐ proved to me on the basis of satisfactory evidence

to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

WITNESS my hand and official seal.

Carrie Ho
Signature of Notary Public

CARRIE HO
Commission # 1264160
Notary Public - California
Contra Costa County
My Comm. Expires May 18, 2004

Place Notary Seal Above

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

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Signer's Name: _____

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☐ Attorney in Fact
☐ Trustee
☐ Guardian or Conservator
☐ Other: _____

RIGHT THUMBPRINT OF SIGNER
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Signer Is Representing: _____

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END OF DOCUMENT

Appendix H
Compliance with Other Federal Laws Determination

Chevron

January 3, 2002

Chevron Products Company
P. O. Box 1272
Richmond, CA 94802-0272

J.W.Hartwig
Manager
Environment, Health and Safety
Phone 510 242 1400

Ms. Cherry Padilla
Department of Toxic Substances Control
700 Heinz Avenue, Suite 200
Berkeley, Ca 94710-

Richmond Refinery Landfarm
Certification per 22 CCR §66270.3

Dear Ms. Padilla:

Closure of the Chevron Richmond Refinery Landfarm is being pursued by the Chevron Environmental Management Company (EMC) on behalf of Chevron Products Company. Pursuant to Chevron's application for a post-closure permit relative to said closure, we have taken note of the requirements of 22 CCR §66270.3, which requires certain certifications of compliance with federal law. After due inquiry, and based on our best knowledge and good-faith beliefs, the undersigned certifies the following:

1. **Wild and Scenic Rivers Act, 16 USC §§1273 *et seq.*** Chevron knows of no wild, scenic or recreational river within the vicinity of the proposed project; therefore, we believe the statute is inapplicable in our circumstances.

2. **National Historic Preservation Act of 1966, 16 USC §§470 *et seq.*** Chevron knows of no properties listed or eligible for listing within the vicinity of the proposed project. We believe that the old Richmond Refinery administration building is so listed; however, it is considerably distant from the proposed project and will be unaffected by it. Consequently, we believe the statute has no applicability in this situation.

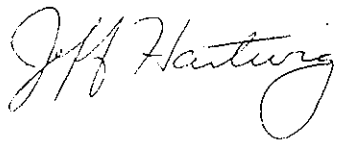
3. **Endangered Species Act, 16 USC §§1531 *et seq.*** Chevron does not know or have reason to know of endangered or threatened species for which the proposed project acts as habitat. To the contrary, we believe closure of the Landfarm will diminish or eliminate any threat to transient life forms in the area. Again, we believe this statute to be inapplicable.

4. **Coastal Zone Management Act, 16 USC §§1451 *et seq.*** According to our reading of the definition of the "coastal zone" contained in Cal. Pub. Res. §30103(a), the proposed project does not lie in the coastal zone. Again, we believe the statute is inapplicable.

5. **Fish and Wildlife Coordination Act, 16 USC §§661 *et seq.*** The proposed project does not contemplate the impoundment, diversion, or other modification of any body of water. Consequently, this last statute is inapplicable as well in our opinion.

We trust that this letter will meet the Department's needs in this matter. Please feel free to contact John MacLeod @ (510) 242-2295 should you have any additional questions.

Sincerely



J.W. Hartwig
Environment, Health and Safety Manager
Chevron Products Co.

Appendix I
Revised Post-Closure Maintenance and Monitoring Plan (September 4, 2012)

REVISED
LANDFARMS
POST CLOSURE
MONITORING PLAN

Prepared by:

Chevron Environmental Management Company

Updated: September 4, 2012

Revised: January 7, 2002

Original: March 11, 1998

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1.0 INTRODUCTION

This *Revised Landfarms Post-Closure Monitoring Plan* updates the January 7, 2002 *Revised Landfarms Post Closure Monitoring Plan* (URS, 2002). This update takes into account the findings from the first 10 years of vegetation growth and soil monitoring at Landfarms 1 through 5, located at the Chevron Richmond Refinery. The as-built conditions of the Landfarms are presented in *Landfarms Closure Construction Completion Certification Report* (Dames & Moore, 2000). This plan was originally prepared by Dames & Moore (BEDM) in March 1998 at the request of Chevron to respond to the California EPA Department of Toxic Substances Control (DTSC) Completeness Determination letter dated December 10, 1997. The 1998 plan was revised in 2002 and discussed the vegetation and topographical conditions present at the site, and how those conditions pertained to post-closure monitoring. The 2002 modifications from the original post-closure monitoring plan, made during closure construction activities were:

- Addition of shallow trench and additional sumps to the Groundwater Protection System (GPS); and
- Planting of grasses, shrubs, and trees in one season rather than planting grasses in the first season and shrubs and trees in the next season.

In compliance with applicable regulations, Chevron closed the Landfarms as Hazardous Waste Land Treatment units (HWLT) by establishing a final vegetated cover over the units. Regulatory objectives for the closure of land treatment facilities, as spelled out in Title 22 California Code of Regulations (CCR) 66265.280(a), are:

- Prevention of the migration of hazardous waste and hazardous waste constituents from the treated area into the groundwater;
- Prevention of the release of contaminated runoff from the facility into surface water;
- Prevention of the release of airborne particulate contaminants caused by wind erosion; and
- Compliance with Section 66265.276 concerning the growth of food-chain crops.

2.0 CLOSURE UNIT DESCRIPTION

The landfarm closure was designed to allow for continual passive biodegradation of oily soil, to reduce surface water infiltration through the surface of landfarm fills and soils, and to prevent lateral off-site migration of “A” Zone groundwater from landfarm sites. The performance goals for the closure construction are outlined in Title 22 CCR Section 66265.111, which require that facilities be closed in a manner that:

- Minimize the need for further maintenance; and
- Controls, minimizes or eliminates to the extent necessary, post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated rainfall of runoff, or waste decomposition products to the ground or surface waters or to the atmosphere to protect human health and the environment.

The landfarm closure construction activities were completed in the summer of 1999. The following sections discuss the current landfarm configuration and topography, vegetated layer, surface grading, surface drainage control facilities, and groundwater protection system. Please refer to the *Landfarms Closure Construction Completion Certification Report* (Dames & Moore, 2000) for more details.

2.1 CLOSURE UNIT CONFIGURATION AND TOPOGRAPHY

The Landfarms were regraded into low mounds to facilitate surface drainage, improve the stability of the perimeter slopes, allow for settlement of the final cover while maintaining proper drainage, and improve the visual appearance of the sites. Grading involved cutting in some areas and using the cut material as fill in other areas, with clean imported fill used to make up shortfalls in the required fill volumes. A layer of clean soil covers the entire landfarm area and serves to prevent surface run-off from direct contact with waste material and prevent wind erosion of the wastes. Fill within the closure unit was graded and lightly compacted with light tracked equipment to support the construction of the final landfarm cover while allowing penetration of vegetation roots. Fill spreading and compaction were performed in 8-inch lifts by tracked vehicles. Use of heavy equipment and trucks was minimized where practical.

Historical perimeter berms were also regraded to serve as a foundation for drainage ditches and provide lateral support for the landfarm soils. The perimeter berms were evaluated to locate areas that were soft or loose. Placed soil was tested in accordance with ASTM D-1557 to confirm that the materials were compacted to at least 90 percent of maximum dry density to a depth of 2 feet. Refer to Section 2.4 for details on surface drainage control facilities.

2.2 VEGETATED LAYER

The top 12-inch soil layer of the cover consists of two layers. The 6-inch-thick lower clean fill layer provides a firm base suitable for supporting future shrubs and trees. The 6-inch upper layer consists of relatively loose, nutrient-rich topsoil which acts to facilitate initial plant growth. Prior

to establishing vegetation, erosion mats were placed on the steeply sloped areas that were identified as being more susceptible to erosion.

The purpose of establishing vegetation on the Nos. 1 through 5 Landfarms was to reduce soil erosion by water and wind and to increase microbial populations in the vadose zone leading to continued passive biodegradation of remaining petroleum hydrocarbons. The vegetation specified for the final cover was similar to the native grasses, plants, and trees, which resulted in a low-maintenance cover with limited need for long-term irrigation.

A variety of plant and tree species was used in order to draw from the largest population of species adapted to the soils and climatic conditions of the Landfarms. The planting of grasses, shrubs, and trees was completed in summer 1999 rather than vegetating the Landfarms with grasses in the first year and planting shrubs and trees in the subsequent years, as specified in the *Revised Closure Plan* (Dames & Moore, March 1998). Faster growing grasses and herbaceous plants (shrubs) were planted on the Landfarms to minimize wind and water erosion. Trees were planted in a closely spaced grid pattern with the shrubs and trees selected and planted with the intent that the associated rooting depths will inhabit the entire vadose zone. The grasses were selected for their shallow (0-6 inches) depth penetration; the shrubs were selected for their medium (6-12 inches) depth penetration; and the trees were selected for their deep (greater than 12 inches) depth penetration.

2.3 SURFACE GRADING

The final surface of the vegetative portions of the Landfarms were graded with 4 percent minimum slopes to accommodate long-term settlement and are intended to retain 3 percent minimum slopes after settlement. The areas surrounding the closure units were graded to drain away from the closure units such that any runoff from the surrounding areas will flow away from the Landfarms surfaces.

2.4 SURFACE DRAINAGE CONTROL FACILITIES

The as-built surface drainage control facilities are shown in plan view on drawing D-767512-1 for Landfarm 1 and drawing D-767515-1 for Landfarms 2-5, which are included as Appendix A. Surface runoff from the exterior slopes of the closure units is collected in perimeter drainage ditches. More steeply sloped ditch areas were lined and covered with erosion control mats and vegetation to minimize potential erosion. Runoff at the Landfarms is collected within the ditches and routed to the Refinery's clean stormwater impoundment. Runoff collected in the drainage ditches at Landfarm No. 1 flows via gravity through the slide gate and headwall located at the northeast corner of the landfarm and is discharged to the first pass of the No. 1 Oxidation Pond.

Runoff from Landfarm Nos. 2 through 5 drains to the slide gate and headwall north of Landfarm No. 3 and is discharged to Pass No. 3 of the Richmond Refinery Water Enhancement Wetlands (Richmond Wetlands). Runoff generated from the Landfarms is discharged per the Refinery's current National Pollution Discharge Elimination System (NPDES) permit.

2.5 GROUND WATER PROTECTION SYSTEM

As part of the overall Refinery-wide Groundwater Protection System (GPS), groundwater extraction trenches were installed along the downgradient perimeter of the Landfarms between 1990 and 1993. The Landfarms GPS also serves as corrective action for the Landfills that underlie portions of the Landfarms (see Closure Plan, Section 3.2.1). The objective of the GPS for the entire Refinery, including the Landfarms areas, is to establish and maintain a physical or hydraulic barrier to prevent the off-site movement of potentially contaminated "A" Zone groundwater.

During the Landfarm closure construction, additional GPS features were added to control shallow groundwater and to facilitate recovery of light non-aqueous phase liquid (LNAPL) hydrocarbon if encountered in the "A" Zone. Specifically, shallow extraction trenches were installed at five locations, as shown in drawings D-767522-2 and D767523-2 of Appendix B. Polyvinyl chloride (PVC) pipes were installed at low points of the landfarm ditches to serve as groundwater collection sumps. Pneumatically controlled extraction pumps were installed in the sumps to recover "A" Zone groundwater from under the Landfarms.

The GPS includes a perimeter system that consists of either extraction trenches, or a combination of soil/bentonite barrier walls with either extraction trenches or extraction wells (also shown in drawing D-767523-2 of Appendix B). Groundwater is continually pumped from the trenches to treatment facilities, and the resulting hydraulic depression establishes and maintains a capture zone intended to prevent the migration of potentially contaminated groundwater past the GPS alignment. The laterally extensive Bay Mud deposit constitutes the floor of the system and restricts the flow of groundwater from the "A" Zone to the "C" Zone. The GPS concept and details were approved by the RWQCB as appropriate corrective action for potentially contaminated "A" Zone groundwater.

The major GPS groundwater control features for the Landfarms include: 1) a laterally extensive deposit of low-permeability Bay Mud underlying the entire Landfarms site; 2) a physical barrier (soil-bentonite slurry wall) to the northeast adjacent to Castro Creek and to the south of Nos. 2 through 5 Landfarms; 3) an "A" Zone groundwater extraction trench or wells (hydraulic barrier) between the northeast perimeter of No. 1 Landfarm, along the north and west perimeter of Nos. 2 through 5 Landfarms, and in the gap in the barrier wall where it crosses the Deep Water Outfall

Project (DWOP) pipelines; 4) a transfer system for extracted groundwater; and 5) a potentiometric and water quality monitoring system sufficient to evaluate the effectiveness of the GPS. This configuration provides hydraulic control and, in some areas, physical control on the downgradient and cross gradient sides of the Landfarms.

The design of the extraction trenches and wells was based on the groundwater flow characteristics of the "A" Zone water-bearing unit. In general, groundwater flows to the north in the vicinity of Landfarms 2 through 5. Groundwater flow in the vicinity of Landfarm 1 is generally to the northeast, directly toward GPS. Details of the GPS are included in Appendix J of the *Revised Landfarms Closure Plan*, dated December 31, 1996 (BEDM, 1996).

The Environmental Operations Section of the Refinery's Utilities/Environmental Area Business Unit (U/E) is responsible for operating and maintaining the GPS. Environmental Operations Section personnel visually inspect all pipelines and controllers several times a week to assure that the system is operating properly. The design of the GPS extraction system, with pumps located at roughly 200-foot intervals, is inherently redundant. Hence the malfunction of any one pump is does not reduce the effectiveness of the system at containing the Landfarms groundwater as the groundwater normally recovered by the malfunctioning pump will flow laterally towards the adjacent pumps until the pump is repaired or replaced. The Refinery maintains a supply of spare pumps, so pump replacement can be performed in a matter of hours. If needed, Refinery personnel supplement the GPS pumps with temporary air or diesel powered pumps.

The effectiveness of the GPS in containing "A" Zone groundwater is monitored and reported to the RWQCB, DTSC, and the U.S. EPA as part of the Refinery-Wide Groundwater Monitoring Program (RGMP). The scope of the RGMP is specified in the Self-Monitoring and Reporting Program of RWQCB Orders R2-2011-0036 and R2-2012-0015. "A" Zone piezometric monitoring is performed as part of the RGMP to demonstrate that a hydraulic barrier is maintained by the GPS at the perimeter of the closure units. Chemical monitoring in the "A" Zone supplements piezometric monitoring and assists in evaluating the effectiveness over time of the GPS corrective action. Chemical monitoring in the "C" Zone verifies that water quality below the Bay Mud at the point of compliance has not been degraded.

3.0 LANDFARMS POST-CLOSURE MONITORING AND MAINTENANCE PLAN

3.1 GENERAL

The Landfarms post-closure monitoring and maintenance plan includes a variety of qualitative and quantitative monitoring parameters and inspections including surface settlement, final cover integrity, surface drainage control facilities, groundwater quality, and GPS piezometric

monitoring. Post-closure monitoring and reporting for most monitoring tasks are performed on a semi-annual basis. The frequency of monitoring and reporting will be evaluated annually and, if warranted, a recommendation for modification will be submitted to the DTSC and RWQCB for approval.

Access to the sites during post-closure is restricted by the overall Refinery guard and security system maintained by Plant Protection. Appropriate warning signs are placed around the perimeters of the closed Landfarms similar to those discussed in Section 2.2.1 of the Closure Plan.

During the post-closure period, the Chevron contact person is the Refinery Health, Environment and Safety Manager located at:

Chevron USA Inc
Richmond Refinery
P.O. Box 1272
Richmond, California 94802
Attention: Manager HES
(510) 242-4000

In general, inspections of the Landfarms are performed, at a minimum, once per year prior to the onset of the rainy season. The inspections are performed by qualified individuals and include, but are not limited to, observations of the final cover (including vegetation), drainage control facilities, piezometers, groundwater monitoring wells, GPS extraction system including pumps and piping, security systems, and for signs of differential settlement that may lead to ponding. The inspectors prepare an Annual Post Closure Monitoring Report of their findings and correct any maintenance needs or deficiencies.

3.2 POST-CLOSURE USAGE

No Refinery operations are currently planned on the Landfarms sites. Drawings D-767512-1 and D-767515-1 in Appendix A show the as-built post-closure configuration of the Landfarms. The only traffic anticipated on the covers of the closure units would be limited to that required to operate and maintain the GPS and cover vegetation. If, at some time in the future, Chevron plans to use the sites for other purposes, approvals would be required from the appropriate government agencies (the DTSC at a minimum) and additional maintenance may be required to maintain the integrity of the final covers. Monitoring frequencies that differ from an annual frequency are described below.

3.3 VEGETATION MONITORING

An inspection of the vegetated surface of the Landfarms was performed quarterly to ensure the establishment of the poplar trees and to evaluate plant germination, irrigation, and the need for fertilization, mowing, and reseeding. The inspections were intended to identify whether the vegetation was adequately covering the surface of each Landfarm, symptoms of drought stress, chlorosis (indicative of nutrient deficiency), and the need for mowing and/or reseeding. Following 10 years of monitoring the poplar trees are now mature, reseeding is no longer necessary, the irrigation, fertilization and mowing needs are well understood, and a quarterly inspection of the condition of the vegetation is no longer necessary. Additionally, the Landfarms are inspected monthly to assess general maintenance needs, and visible issues with vegetation health can be noted at that time. Any maintenance issues noted during these monthly inspections will be addressed as appropriate.

Soil monitoring was performed semi-annually to document maintenance of soil pH and to evaluate soil nutrient conditions for the poplar trees' growth. After 10 years of growth, the trees are well established. Over this time, soil nutrient monitoring was not helpful in identifying growth problems, and will be discontinued.

Soil moisture measurements are performed as needed to evaluate the effectiveness of irrigation. During the dry season (approximately May through September) these measurements are performed as frequently as weekly. The objective of the soil moisture monitoring is to generate data, which is used to modify the irrigation plan, such that the application of excess irrigation water does not occur. Tensiometers are used to monitor soil moisture levels, and will continue be used to ensure and document that over-watering is not occurring. Tensiometer data will be maintained in Chevron's files.

3.4 VEGETATION MAINTENANCE

Mowing is performed once per year following the end of the rainy season. Irrigation is supplied to the Landfarms soils to meet tree water requirements throughout the dry months when tree evapotranspiration requirements exceed rainfall.

3.5 SURFACE SETTLEMENT MONITORING

The final cover is monitored for signs of differential settlement, which may cause ponding. Two existing survey monuments, Refinery Nos. 69 and 115, located on pile-supported structures adjacent to the Landfarms, were identified to serve as permanent survey control monuments. The current location of monument No. 115 is at the top of sphere base 1694 on Ammonia Street west of

Toluene Street. Monument No. 69 is located on the top of the wall at the northwest corner of Bridge No. 162, which is north of the intersection of Channel Street and Petrolite Street. Settlement markers were installed within the final cover of the Landfarms to monitor settlement. Locations of the markers are shown on drawings D-767512-1 and D-767515-1 in Appendix A. The Landfarm surfaces are inspected and settlement markers surveyed on an annual basis for evidence of differential settlement. If differential settlement has occurred and the grades of the final cover will no longer prevent ponding in that area, the surface will be regraded to maintain positive drainage.

3.6 SOIL COVER INSPECTION AND MAINTENANCE PROGRAM

In addition to supporting the vegetation, the soil cover provides protection from wind and water erosion of the Landfarm soils. An annual inspection of the cover is performed by a qualified engineer prior to onset of the rainy season. The engineer identifies and recommends appropriate repairs for areas where the soil cover may have become eroded, affected by rodent burrows, or otherwise damaged, or where the paved areas have become damaged. Repairs are performed prior to the rainy season. Supplemental monthly inspections are performed by Chevron at areas that have seen surface usage subsequent to the previous inspection. Damage detected at these or any other times are promptly repaired. Records of all inspections and repairs are maintained by the Refinery.

The cover will also be inspected after major rainfall events to identify areas where ponding or erosion may have occurred. Areas where ponding or erosion has occurred will be repaired to maintain positive drainage.

3.7 SURFACE DRAINAGE SYSTEM

The drainage swales and culverts are observed for cracking, clogging, erosion, and operating performance. The drainage control system is monitored annually before the beginning of the rainy season to ensure the surface drainage facilities are intact and clear of debris. The pumps are inspected and tested annually. After heavy rainfall, additional inspections are made to monitor their performance. If deficiencies are found, they will be corrected as soon as practicable.

3.8 FREE-PHASE HYDROCARBON MONITORING AND CONTAINMENT

The thickness of free-phase hydrocarbon, also referred to as light non-aqueous phase liquids (LNAPLs) in the existing monitoring wells is measured and reported as part of the Refinery-Wide Groundwater Monitoring Program (RGMP). The GPS recovers primarily groundwater, but also provides effective long-term containment for the migration of LNAPLs. The design of the GPS

extraction system, with pumps located at roughly 200-foot intervals, is inherently redundant. Hence the malfunction of any one pump is not expected to reduce the effectiveness of the system at containing the LNAPLs within the Landfarms as the groundwater normally recovered by the malfunctioning pump would flow laterally towards the adjacent pumps. However, if the GPS as a whole were to be out-of-service for a period exceeding several days and temporary pumps could not be used to maintain drawdown in the extraction trenches, supplemental LNAPL recovery would be performed with vacuum trucks from the extraction sumps and monitoring wells whenever the measured thickness of LNAPL exceeded six inches. Recovery of LNAPLs encountered as part of the RGMP is evaluated as part of the Free-Phase Liquid Petroleum Hydrocarbon Recovery Evaluation Plan (URS, 2000).

3.9 GROUNDWATER QUALITY MONITORING PROGRAM

The Landfarm Post Closure monitoring program is included as part of the groundwater monitoring program described in RWQCB Orders R2-2011-0036 and R2-2012-0015. In general, the portions of the monitoring program that apply to the Landfarms are designed to provide piezometric and chemical monitoring of the “A” and “C” Zones along the point of compliance. The point of compliance for the Landfarms closure units is the vertical surface located at the downgradient limit of the facility that generally coincides with the GPS.

As reported in previous RGMP reports, the “A” Zone has been historically impacted with petroleum hydrocarbons and metals. In response to this, Chevron has implemented the GPS, along the downgradient perimeter of the Refinery, as a corrective action on the “A” Zone groundwater. Because the GPS is a corrective action program, the updated RGMP for the “A” and portions of the “C” Zone not underlying the Landfarms will follow the corrective action monitoring program outlined in 22 CCR 66264.100, whereas monitoring of “C” Zone groundwater beneath the landfarms is a detection monitoring program under 22 CCR 66264.98.

The objective of “A” Zone piezometric monitoring is to demonstrate that a hydraulic barrier is maintained by the GPS at the perimeter of the closure units. Chemical monitoring in the “A” Zone supplements piezometric monitoring and assists in evaluating the effectiveness over time of the GPS corrective action. Chemical monitoring in the “C” Zone verifies that water quality below the Bay Mud at the point of compliance has not been degraded.

Because the GPS is a corrective action monitoring program, the constituents of concern (COC) in the “A” Zone groundwater may exceed background levels at some locations. In light of this condition, it is not practicable to rely on a comparison with background water quality as a measure of effectiveness of corrective action. Rather, maximum allowable concentration limits (MACLs)

have been established by the RWQCB as concentration limits against which GPS corrective action effectiveness will be evaluated.

As supported in RWQCB Orders R2-2011-0036 and R2-2012-0015, the MACLs are used to determine when compliance has been achieved by the GPS. In other words, the MACLs are cleanup goals for corrective action and exceedences may occur until the extraction system has had sufficient time to remediate groundwater in the vicinity.

If a chemical result from the "A" Zone exceeds the MACL and sufficient historical data are available, the results are further evaluated to identify if the concentration is "significant" compared with previous historical results. Statistical analyses of the current and historical analytical data of a particular well will then be used to evaluate concentrations that exceed the MACL.

To evaluate whether a release or degradation of groundwater has occurred, other criteria are used in conjunction with the analytical data, since concentrations exceeding an MACL alone would not be indicative of a significant release or necessarily pose an imminent threat to the waters of the State. The other criteria for evaluation of chemical data include GPS performance, location of the point of compliance well relative to the closure unit, Refinery operations that occurred in the area, and seasonal hydrogeologic conditions.

As discussed in the Closure Plan, there is no physical separation between the wastes in the Landfarms and the first underlying groundwater table, leaving no vadose zone to monitor for the migration of constituents. This condition has been historically recognized by Chevron and the various regulatory agencies. Therefore, no vadose zone monitoring is currently required, and no post-closure vadose zone monitoring will be performed.

3.10 COMPLETION OF POST-CLOSURE CARE CERTIFICATION SUBMITTAL

Pursuant to 22 CCR 66265.120, within 60 days of the completion of the established post-closure period, Chevron will submit to DTSC a certification that the post-closure care period for the Landfarms closure units was performed in accordance with this post-closure plan. The certification will be signed by Chevron and an independent Registered Professional Engineer. Documentation supporting the independent engineer's certification will be kept on site until Chevron is released from financial assurance requirements for post-closure care.

4.0 REFERENCES

Bechtel Environmental/Dames & Moore, 1996. *Revised Landfarms Closure Plan*, Waste Discharge Order Project, for Chevron Products Company. December 31, 1996.

Bechtel Environmental/Dames & Moore, 1998. *Revised Landfarms Closure Monitoring Plan*, Chevron Products Company, Richmond, California. March 11, 1998.

Dames & Moore, 2000. *Revised Landfarms Closure Construction Completion Certification Report*, Waste Discharge Order Project, for Chevron Products Company. March 27, 2000.

URS, 2000. *Free Phase Liquid Petroleum Hydrocarbon Recovery Evaluation Plan, for Chevron Richmond Refinery*, December 20.

URS. 2002, *Revised Landfarms Post-Closure Monitoring Plan*, Chevron Products Company, Richmond California. January 7.

Appendix J
Regional Water Quality Control Board Orders

California Regional Water Quality Control Board
San Francisco Bay Region

Linda S. Adams
Acting Secretary for Environmental Protection

1515 Clay Street, Suite 1400, Oakland, California 94612
(510) 622-2300 • Fax (510) 622-2460
http://www.waterboards.ca.gov/sanfranciscobay

Edmund G. Brown, Jr.
Governor

ORDER NO. R2-2011-0049
NPDES NO. CA0005134

The following Discharger is subject to waste discharge requirements as set forth in this Order.

Table 1. Discharger Information

Discharger	**Chevron Products Company, a division of Chevron U.S.A. Inc.** **Chevron Chemical Company LLC, and** **General Chemical**
Name of Facility	Richmond Refinery
Facility Address	841 Chevron Way
	Richmond, CA 94801
	Contra Costa County
The United States Environmental Protection Agency (USEPA) and the Regional Water Quality Control Board have classified this discharge as a major discharge.	

Discharges by the Discharger from the discharge points identified below are 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 wastewater	37º 58’ 15” N	122º 25’ 45” W	San Pablo Bay
002	Richmond Long Wharf	37º 55’ 15” N	122º 24’ 30” W	San Francisco Bay
003	Stormwater	37º 57’ 15” N	122º 23’ 30” W	San Pablo Bay
004	Stormwater	37º 57’ 15” N	122º 24’ 45” W	San Francisco Bay
005	Stormwater	37º 57’ 30” N	122º 25’ 30” W	San Francisco Bay
006	Stormwater	37º 57’ 15” N	122º 25’ 15” W	San Francisco Bay
007	Stormwater	37º 57’ 15” N	122º 25’ 15” W	San Francisco Bay
008	Stormwater	37º 57’ 15” N	122º 23’ 30” W	San Pablo Bay
009	Stormwater	37º 56’ 00” N	122º 24’ 15” W	San Francisco Bay
010	Stormwater	37º 57’ 15” N	122º 22’ 45” W	Gertrude Street Ditch to Wildcat Creek to Castro Creek to San Pablo Bay
011	Stormwater	37º 56’ 45” N	122º 22’ 30” W	Castro Creek to San Pablo Bay
012	Stormwater	37º 56’ 45” N	122º 22’ 30” W	Castro Creek to San Pablo Bay
013	Stormwater	37º 57’ 00” N	122º 22’ 45” W	Castro Creek to San Pablo Bay
014	Stormwater	37º 57’ 00” N	122º 22’ 45” W	Castro Creek to San Pablo Bay
015	Stormwater	37º 55’ 60” N	122º 23’ 30” W	38’ Channel to San Pablo Bay

Discharge Point	Effluent Description	Discharge Point Latitude	Discharge Point Longitude	Receiving Water
016	Stormwater	37º 55’ 60” N	122º 23’ 30” W	38’ Channel to San Pablo Bay
017	Stormwater	37º 55’ 45” N	122º 24’ 30” W	San Francisco Bay
018	Stormwater	37º 55’ 45” N	122º 24’ 00” W	San Francisco Bay
019	Stormwater	37º 57’ 30” N	122º 25’ 30” W	San Francisco Bay
020	Stormwater	37º 57’ 15” N	122º 23’ 15” W	Castro Creek to San Pablo Bay
021	Stormwater	37º 56’ 45” N	122º 22’ 30” W	Castro Creek to San Pablo Bay
022	Stormwater	37º 57’ 15” N	122º 22’ 45” W	Gertrude Street Ditch to Wildcat Creek to Castro Creek to San Pablo Bay
023	Stormwater	37º 57’ 15” N	122º 22’ 45” W	Gertrude Street Ditch to Wildcat Creek to Castro Creek to San Pablo Bay

Table 3. Administrative Information

This Order was adopted by the Regional Water Board on:	**July 13, 2011**
This Order shall become effective on:	**September 1, 2011**
This Order shall expire on:	**August 31, 2016**
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:	**180 days prior to the Order expiration date**

I, Bruce H. Wolfe, 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, San Francisco Bay Region, on July 13, 2011.

_____

Bruce H. Wolfe**,** Executive Officer

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I. FACILITY INFORMATION

The following Discharger is subject to the waste discharge requirements as set forth in this Order:

Table 4. Facility Information

Discharger	**Chevron Products Company, a division of Chevron U.S.A. Inc. Chevron Chemical Company LLC, and General Chemical**
Name of Facility	Richmond Refinery
Facility Address	841 Chevron Way Richmond, CA 94801 Contra Costa County
Facility Contact, Title, Phone No.	Michael E. Coyle, General Manager, (510) 242-4400
Mailing Address	P.O. Box 1272, Richmond, CA 94802
Type of Facility	Petroleum Refinery
Facility Flow	Discharge Point No. 001: 27.5 million gallons per day (MGD) (maximum reported daily flow); 6.6 MGD (long-term average flow)

II. FINDINGS

The California Regional Water Quality Control Board, San Francisco Bay Region (hereinafter Regional Water Board), finds:

A. Background. Chevron Products Company, a division of Chevron U.S.A. Inc., Chevron Chemical Company LLC, and General Chemical Corporation (hereinafter Discharger) are currently discharging under Order No. R2-2006-0035 (hereinafter previous Order) and National Pollutant Discharge Elimination System (NPDES) Permit No. CA0005134. Order No. R2-2006-0035 was amended by Order No. R2-2010-0057 which amended requirements for selenium. The Discharger submitted a Report of Waste Discharge dated December 7, 2010, and applied for a reissuance of its NPDES permit to discharge treated industrial wastewater from its wastewater treatment plant, to San Pablo Bay. Further, stormwater and authorized non-stormwater discharges are discharged through 23 discharge locations throughout the Richmond Refinery (hereinafter, Facility) to San Pablo Bay and San Francisco Bay. The discharge is also currently regulated under Order No. R2-2007-0077 (NPDES Permit CA0038849) amended by Order No. R2-2011-0012, which supersedes all requirements on mercury and PCBs from wastewater discharges in the region. This Order does not affect the mercury and PCBs permit.

For purposes of this Order, references to the “Discharger” or “Permittee” in applicable federal and State laws, regulations, plans, or policies are held to be equivalent to references to the Discharger herein.

B. Facility Description. The Discharger owns and operates a petroleum refinery that from May 2007 through April 2008 had a crude-run throughput of approximately 244,000 barrels per day (bbls/day). This Order regulates the discharge of effluent from the Discharger’s wastewater treatment system, and the discharges of all stormwater associated with industrial activity from the Facility to San Pablo Bay and San Francisco Bay.

The Discharger owns and operates a wastewater treatment plant. The treatment system includes three oil and water separators that operate in parallel and treat various process wastewaters throughout the Facility. From the three oil and water separators, wastewater is routed to a bioreactor that consists of four quadrants. The first two quadrants provide biological treatment through aeration, while the next two quadrants are used as settling basins. After the settling basins, the Discharger routes a portion of bioreactor effluent to a water enhancement wetland (Wetland). The remaining bioreactor effluent, and typically all Wetland effluent is routed through granular activated carbon (GAC) before discharge through a deepwater diffuser (average depth of 30 to 50 feet) into San Pablo Bay, approximately 2,000 feet offshore north of Point San Pablo (E-001). The Discharger has the option to discharge a portion of Wetland effluent directly to Discharge Point No. 001 (downstream of the GAC facility) provided Wetland effluent discharges do not exceed a daily maximum of 3 MGD, and do not cause acute toxicity. Attachment B provides a topographic map of the area around the Facility. Attachment C provides a flow schematic of the Facility.

1. **Industrial Recycled Water Use:** The Regional Water Board supports the use of recycled water to minimize the use of fresh potable water. The Discharger utilizes recycled water that has received biological treatment to test its firewater lines. In addition to the use of water drawn from the firewater lines in the fire protection and safety systems (including emergency and non-emergency use), the Discharger also uses firewater in its process, storage, and material transfer areas and routes it back into the wastewater treatment system. During storm events, some firewater may commingle with stormwater runoff. Firewater may also be used for dust control and landscape maintenance within the Facility.

2. **Municipal Recycled Water Use:** The East Bay Municipal Utility District (EBMUD) owns and operates the North Richmond Water Reclamation Plant, which provides tertiary treatment of West County Wastewater District's secondary effluent, to provide high quality recycled water to the Discharger. Further, EBMUD owns and operates the Richmond Advanced Recycled Expansion Facility (RARE), which is located at the Discharger's facility. The RARE facility treats secondary treated effluent from West County Wastewater District onsite with microfiltration and reverse osmosis units. The Discharger uses the recycled water for such things as cooling tower make-up water, boiler make-up water, and landscape irrigation. Recycled water that is used for recycled water pipeline maintenance and cooling-water start-up activities may be discharged directly to the Discharger's wastewater treatment system.

C. Legal Authorities. This Order is issued pursuant to Clean Water Act (CWA) section 402 and implementing regulations adopted by the USEPA, and California Water Code (CWC) Chapter 5.5, Division 7 (commencing with section 13370). It shall serve as an NPDES permit for the point source discharges identified in Table 2. This Order also serves as Waste Discharge Requirements (WDRs) pursuant to CWC Article 4, Chapter 4, Division 7 (commencing with section 13260).

D. Background and Rationale for Requirements. The Regional 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 E and G are also incorporated into this Order.

E. California Environmental Quality Act (CEQA). Pursuant to CWC section 13389, this action to adopt an NPDES permit is exempt from CEQA provisions.

F. Technology-Based Effluent Limitations. CWA section 301(b) and NPDES regulations at Title 40 of the Code of Federal Regulations (CFR) Section 122.44 require permits, at a minimum, to include conditions meeting applicable technology-based requirements and any more stringent effluent limitations necessary to meet applicable water quality standards. Discharges authorized by this Order must meet technology-based requirements USEPA established at 40 CFR 419, *Effluent Limitations Guidelines for the Petroleum Refining Point Source Category*, as well as technology-based requirements established using Best Professional Judgment (BPJ) pursuant to 40 CFR 125.3. A detailed discussion of the development of the technology-based effluent limitations in this Order is included in the Fact Sheet.

G. Water Quality-Based Effluent Limitations. CWA 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 when 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 a 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 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 40 CFR 122.44(d)(1)(vi).

H. Water Quality Control Plans. *The Water Quality Control Plan for the San Francisco Bay Basin* (Basin Plan) is the Regional Water Board's master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State, including surface waters and groundwater. It also includes programs of implementation to achieve water quality objectives. The Basin Plan was adopted by the Regional Water Board and approved by the State Water Resources Control Board (State Water Board), USEPA, and the Office of Administrative Law (OAL), as required.

The Basin Plan implements State Water Board Resolution No. 88-63, which establishes State policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal or domestic supply (MUN). Because of the marine influence on receiving waters of San Francisco Bay, total dissolved solids levels in San Francisco Bay commonly (and often significantly) exceed 3,000 mg/L and thereby meet an exception to State Water Board Resolution No. 88-63. The designation MUN does not apply to San Pablo Bay. Beneficial uses described by the Basin Plan and applicable to San Pablo Bay and San Francisco Bay are listed in Table 5. Requirements of this Order implement the Basin Plan.

Table 5. Beneficial Uses of Receiving Waters

Discharge Point(s)	Receiving Water Name	Beneficial Uses
001, 003, 008, 010 – 014, and 020 – 023	San Pablo Bay	Industrial Service Supply (IND) Ocean, Commercial and Sport Fishing (COMM) Shellfish Harvesting (SHELL) Estuarine Habitat (EST) Fish Migration (MIGR) Preservation of Rare and Endangered Species (RARE) Fish Spawning (SPWN) Wildlife Habitat (WILD) Water Contact Recreation (REC1) Non-Contact Water Recreation (REC2) Navigation (NAV)
002, 004 – 007, 009, and 017 – 019	San Francisco Bay	Industrial Service Supply (IND) Industrial Process Supply (PRO) Ocean, Commercial and Sport Fishing (COMM) Shellfish Harvesting (SHELL) Estuarine Habitat (EST) Fish Migration (MIGR) Preservation of Rare and Endangered Species (RARE) Fish Spawning (SPWN) Wildlife Habitat (WILD) Water Contact Recreation (REC1) Non-Contact Water Recreation (REC2) Navigation (NAV)

The State Water Board's *Water Quality Control Plan for Enclosed Bays and Estuaries – Part 1, Sediment Quality* became effective on August 25, 2009. This plan supersedes other narrative sediment quality objectives, and establishes new sediment quality objectives and related implementation provisions for specifically defined sediments in most bays and estuaries.

I. National Toxics Rule (NTR) and California Toxics Rule (CTR). USEPA adopted the NTR on December 22, 1992, and later amended it on May 4, 1995, and November 9, 1999. About forty criteria in the NTR applied in California. On May 18, 2000, USEPA adopted the CTR. The CTR promulgated new toxics criteria for California and, in addition, incorporated the previously adopted NTR criteria that applied in the State. The CTR was amended on February 13, 2001. These rules contain water quality criteria for priority pollutants.

J. State Implementation Policy. On March 2, 2000, the State Water Board adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (State Implementation Policy or SIP). The SIP became effective on April 28, 2000, with respect to the priority pollutant criteria USEPA promulgated for California through the NTR and to the priority pollutant objectives the Regional Water Board established in the Basin Plan. The SIP became effective on May 18, 2000, with respect to the priority pollutant criteria the USEPA promulgated through the CTR. On February 24, 2005, the State Water Board adopted amendments to the SIP that became effective on July 13, 2005. The SIP establishes implementation provisions

for priority pollutant objectives and provisions for chronic toxicity control. Requirements of this Order implement the SIP.

K. Compliance Schedules and Interim Requirements. The State Water Board adopted Resolution No. 2008-0025 on April 15, 2008, titled *Policy for Compliance Schedules in National Pollutant Discharge Elimination System Permits*. Under limited circumstances, this policy allows the Regional Water Board to grant a compliance schedule based on a Discharger's request and demonstration that it is infeasible to comply immediately with certain effluent limitations. This policy became effective on August 27, 2008. This Order does not include a compliance schedule or interim effluent limitations.

L. Alaska Rule. On March 30, 2000, USEPA revised its regulation that specifies when new and revised State and tribal water quality standards become effective for CWA purposes [65 Fed. Reg. 24641 (April 27, 2000) (codified at 40 CFR 131.21)]. Under the revised regulation (also known as the Alaska Rule), USEPA must approve new and revised standards submitted to USEPA after May 30, 2000, before they can be 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.

M. Stringency of Requirements for Individual Pollutants. This Order contains both technology-based effluent limitations and WQBELs for individual pollutants. This Order's technology-based pollutant restrictions implement the minimum applicable federal technology-based requirements. In addition, this Order contains effluent limitations more stringent than the minimum federal technology-based requirements as necessary to meet water quality standards. These limitations are not more stringent than required by the CWA.

WQBELs have been 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. To the extent that toxic pollutant WQBELs were derived from the CTR, the CTR is the applicable standard pursuant to 40 CFR 131.38. The procedures for calculating the individual WQBELs for priority pollutants are based on the SIP, which was approved by USEPA on May 18, 2000. All beneficial uses and water quality objectives in the Basin Plan were approved under State law and submitted to and approved by USEPA prior to May 30, 2000. Any water quality objectives and beneficial uses submitted to USEPA prior to May 30, 2000, but not approved by USEPA before that date, are nonetheless applicable water quality standards for purposes of the CWA pursuant to 40 CFR 131.21(c)(1). Collectively, this Order's restrictions on individual pollutants are no more stringent than required to implement CWA requirements.

N. Antidegradation Policy. 40 CFR 131.12 requires that state water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy through State Water Board Resolution No. 68-16, which incorporates the federal antidegradation policy where the federal policy applies under federal law and requires that the existing quality of receiving waters be maintained unless degradation is justified based on specific findings. The Basin Plan incorporates by reference and implements both the State and federal antidegradation policies. As discussed in the Fact Sheet, the permitted

discharges are consistent with the antidegradation provisions of 40 CFR 131.12 and State Water Board Resolution No. 68-16.

O. Anti-Backsliding Requirements. CWA sections 402(o)(2) and 303(d)(4) and 40 CFR 122.44(l) prohibit backsliding in NPDES permits. These anti-backsliding provisions require effluent limitations in a reissued permit to be at least as stringent as those in the previous Order, with some exceptions where limitations may be relaxed. Some effluent limitations in this Order are less stringent than those in the previous Order. As discussed in the Fact Sheet, the permitted discharge is consistent with the CWA anti-backsliding requirements and federal regulations.

P. Monitoring and Reporting. 40 CFR 122.48 requires that all NPDES permits specify requirements for recording and reporting monitoring results. CWC sections 13267 and 13383 authorize the Regional Water Board to require technical and monitoring reports. The Monitoring and Reporting Program (Attachment E) establishes monitoring and reporting requirements to implement federal and State requirements.

Q. Standard and Special Provisions. Attachment D contains 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. The Discharger must comply with all Standard Provisions and with those additional conditions that apply pursuant to 40 CFR 122.42. The Regional Water Board has also included in this Order special provisions applicable to the Discharger. The Fact Sheet provides rationales for the special provisions.

R. Provisions and Requirements Implementing State Law. There are no provisions or requirements in this Order that implement State law only.

S. Notification of Interested Parties. The Regional 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 written comments and recommendations. The Fact Sheet provides details regarding the notification.

T. Consideration of Public Comment. The Regional Water Board, in a public meeting, heard and considered all comments pertaining to the discharges authorized by this Order. Details of the Public Hearing are provided in the Fact Sheet.

IT IS HEREBY ORDERED, that this Order supersedes Order No. R2-2006-0035, as amended, except for enforcement purposes, and, in order to meet the provisions contained in CWC Division 7 (commencing with section 13000) and regulations adopted thereunder, and CWA provisions and regulations and guidelines adopted thereunder, the Discharger shall comply with the requirements in this Order.

III. DISCHARGE PROHIBITIONS

A. Discharge of wastewater at a location or in a manner different from that described in this Order is prohibited.

B. The discharge of treated wastewater through Discharge Point No. 001 at any point at which the treated wastewater does not receive an initial dilution of at least 34:1 is prohibited. The

Discharger may reuse a portion of its biologically treated wastewater for onsite landscape irrigation or in the Facility's firewater system, including the Richmond Long Wharf Fire Protection System.

C. The bypass of untreated or partially-treated process wastewater to waters of the United States is prohibited, except as provided for in sections I.G.2 and I.G.4 of Attachment D to this Order and as noted in Prohibition B and Finding B.

D. The discharge of stormwater runoff from the former Chevron Chemical Company Hensley Street Plant site (drainage area for Discharge Point No. 011) to waters of the State is prohibited unless the following conditions occur: during any wet season in which a rainfall event occurs that yields a 24-hour precipitation with a return frequency of 25 years, an amount of stormwater may be discharged equal to that attributable to the precipitation occurring in excess of the 25-year rain fall event.

E. The discharge of stormwater from the Integrated Wastewater Pond (drainage area for Discharge Point No. 013) is prohibited except when it has been demonstrated to the satisfaction of the Executive Officer it contains only stormwater that will not cause or contribute to an exceedances of water quality standards. This demonstration must include measures to ensure that any synthetically-lined surface impoundment is adequately decontaminated.

F. The direct discharge of Wetland effluent to Discharge Point No. 001 (downstream of the GAC facility) is prohibited, unless the Discharger complies with Provision VI.C.4.d of this Order.

IV. EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

A. Effluent Limitations – Discharge Point No. 001

1. Technology-Based Effluent Limitations

a. The Discharger shall maintain compliance with the following effluent limitations at Discharge Point No. 001, with compliance measured at Monitoring Location E-001 as described in the attached Monitoring and Reporting Program (MRP) (Attachment E).

Table 6a. Technology-based Effluent Limitations

Parameter	Units	Effluent Limitations	
		Average Monthly	Maximum Daily
Biochemical Oxygen Demand (BOD) (5-day @ 20 Deg. C)	lbs/day	5,800	11,000
Total Suspended Solids (TSS)	lbs/day	4,800	7,600
Chemical Oxygen Demand (COD)	lbs/day	40,000	78,000
Oil and Grease	lbs/day	1,800	3,400
	mg/L	8	15

Parameter	Units	Effluent Limitations	
		Average Monthly	Maximum Daily
Phenolic Compounds, Total	lbs/day	22	80
Ammonia Nitrogen, Total (as N)	lbs/day	2,200	4,800
Sulfide, Total	lbs/day	32	71
Chromium, Total Recoverable	lbs/day	25	73
Chromium (VI), Total Recoverable	lbs/day	2.1	4.6
pH	s.u.	6.0 – 9.0[1]	

[1] If the Discharger employs continuous pH monitoring (with exception to necessary calibration and maintenance checks), it shall be in compliance with the pH limitation specified herein, provided that both of the following conditions are satisfied: (a) the total time during which pH values are outside the required range shall not exceed 7 hours and 26 minutes in any calendar month, and (b) no individual excursion from the required range of pH values shall exceed 60 minutes.

b. Additional effluent limitation allocations for contaminated runoff commingled with process wastewater are established in addition to the process wastewater mass-based limitations in section IV.A.1.a. When contaminated runoff is discharged through Discharge Point No. 001, a mass of each pollutant in Table 6b below may be added to the limitation for that pollutant in Table 6a. The additional allocation shall be equal to the contaminated runoff flow times the pollutant's concentration in Table 6b.

Table 6b. Additional Contaminated Runoff Effluent Limitation Allocations

Parameter	Units	Average Monthly	Maximum Daily
BOD	mg/L	26	48
TSS	mg/L	21	33
COD	mg/L	180	360
Oil and Grease	mg/L	8	15
Phenolic Compounds, Total	mg/L	0.17	0.35
Chromium, Total Recoverable	mg/L	0.21	0.60
Chromium (VI) Total Recoverable	mg/L	0.028	0.062

c. Additional effluent limitation allocations for ballast water are established in addition to the process wastewater mass-based limitations in section IV.A.1.a. When ballast water is discharged through Discharge Point No. 001, a mass of each pollutant in Table 6c below may be added to the limitation for that pollutant in Table 6a. The additional allocation shall be equal to the ballast water flow times the pollutant's concentration in Table 6c.

Table 6c. Additional Ballast Water Effluent Limitation Allocations

Parameter	Units	Average Monthly	Maximum Daily
BOD	mg/L	26	48
TSS	mg/L	21	33

Parameter	Units	Average Monthly	Maximum Daily
COD	mg/L	240	470
Oil and Grease	mg/L	8	15

2. Effluent Limitations for Toxics Substances

a. The Discharger shall comply with the following effluent limitations at Discharge Point No. 001, with compliance measured at Monitoring Location E-001, as described in the attached MRP (Attachment E):

Table 7. Effluent Limitations for Toxic Substances at Discharge Point No. 001

Parameter	Units	Final Effluent Limitations[1]	
		Average Monthly	Maximum Daily
Cyanide, Total	µg/L	19	45
Copper, Total Recoverable	µg/L	84	120
Lead, Total Recoverable	µg/L	7.0	16
Selenium, Total Recoverable	µg/L	33	34
Dioxin-TEQ	µg/L	1.4×10^{-8}	2.8×10^{-8}
Ammonia Nitrogen, Total (as N)	mg/L	51	150

[1] a. Limitations apply to the average concentration of all samples collected during the averaging period (daily = 24-hour period; monthly = calendar month).

b. All metals limitations are expressed as total recoverable metal.

3. Mass Emission Limitation for Selenium

a. Until implementation of a total maximum daily load (TMDL) is in effect for selenium, the Discharger shall not increase mass loading of selenium to San Pablo Bay through Discharge Point No. 001, with compliance measured at Monitoring Location E-001, as described in the attached MRP (Attachment E).

Selenium mass emissions shall not exceed 0.82 kilograms per day (kg/d) as a running annual average.

The running annual average is the arithmetic average of the current day's mass loads for each of the previous 364 days, as shown in the following example:

$$\text{Annual Mass emission rate (kg/day)} = \frac{3.785}{N}\sum_{i=1}^{N} Q_i C_i$$

where:
N = number of samples analyzed in any calendar year
Q_i = flow rate (MGD) associated with the Ith sample
C_i = selenium concentration (mg/L) associated with the Ith sample.

4. Acute Toxicity

a. The Discharger shall comply with the following effluent limitations at Discharge Point No. 001, with compliance measured at Monitoring Location E-001. Acute bioassays shall be conducted in compliance with MRP section V.A (Attachment E).

The survival of organisms in undiluted effluent shall be:

i. an eleven (11) sample median value of not less than 90 percent survival, and

ii. an eleven (11) sample 90 percentile value of not less than 70 percent survival.

b. These acute toxicity limitations are further defined as follows:

11 sample median: A bioassay test showing survival of less than 90 percent represents a violation of this effluent limitation, if five or more of the past ten or fewer bioassay tests also show less than 90 percent survival.

90th percentile: A bioassay test showing survival of less than 70 percent represents a violation of this effluent limitation, if one or more of the past ten or fewer bioassay tests show less than 70 percent survival.

c. Bioassays shall be performed using the most up-to-date USEPA protocol and the most sensitive species as specified in the MRP. Bioassays shall be conducted in compliance with *Methods for Measuring the Acute Toxicity of Effluents and Receiving Water to Freshwater and Marine Organisms,* currently 5th Edition (EPA-821-R-02-012).

d. If the Discharger can demonstrate to the satisfaction of the Executive Officer that toxicity exceeding the levels cited above is caused by ammonia and that the ammonia in the discharge complies with the ammonia effluent limitations, then such toxicity does not constitute a violation of this effluent limitation.

5. Chronic Toxicity

a. The Discharger shall comply with the following effluent limitations at Discharge Point No. 001, with compliance measured at Monitoring Location E-001. Chronic bioassays shall be conducted in compliance with MRP section V.B (Attachment E).

The survival of bioassay test organisms in the discharge at Discharge Point No. 001 shall be:

i. A three sample median value equal to or less than 10 TUc, and

ii. A single sample value equal to or less than 20 TUc.

b. These chronic toxicity limits are defined as follows:

i. A test sample showing chronic toxicity greater than 10 TUc is a violation of this limitation if one or more of the past two or fewer tests show toxicity greater than 10 TUc.

ii. A TUc equals 100/NOEL. The No Observable Effect Level (NOEL) shall equal to the IC_{25} or EC_{25} (see Attachment E, Appendix E-1). If the IC_{25} or EC_{25} cannot be statistically determined, the NOEL shall equal the No Observable Effect Concentration (NOEC) derived using hypothesis testing. The NOEC is the maximum percent effluent concentration that causes no observable effect on test organisms, based on a critical life stage toxicity test. The NOEL shall be based on a critical life stage test using the most sensitive test species as specified in MRP section V.B (Attachment E). If two compliance test species are specified, compliance shall be based on the maximum TUc value of the discharge samples based on a comparison of TUc values obtained through concurrent testing of the two species.

iii. A test sample showing chronic toxicity greater than 20 TUc represents a violation of this limitation.

c. Test Species and Methods

The Discharger shall conduct routine monitoring with the test species and protocols specified in MRP section V.B (Attachment E). The Discharger shall also perform Chronic Toxicity Screening Phase monitoring as described in the MRP Appendix E-1 (Attachment E). Chronic Toxicity Monitoring Screening Phase Requirements, Critical Life Stage Toxicity Tests and definitions of terms used in the chronic toxicity monitoring are identified in MRP Appendices E-1 and E-2 (Attachment E).

6. Effluent Limitation Adjustments for Recycled Water Use

When the Discharger uses recycled water, adjustments for influent concentrations for constituents in this Order with mass or concentration based effluent limitations shall be granted in the discharge according to the following procedure:

a. The Discharger shall sample and analyze for constituents for which effluent limitation adjustment is sought at least as frequently as is required in the attached Monitoring and Reporting Program (MRP) for that constituent. Influent sampling shall occur at influent sampling station I-001 defined in the MRP.

b. The Discharger shall determine the time interval between introduction of a given constituent of concern in the influent recycled water and the first appearance of the constituent in the final effluent. This determination is subject to approval by the Executive Officer, and must precede any calculation of effluent limitation adjustment for the constituent.

c. Adjustment for copper, lead, selenium, and cyanide will be given as follows:

Concentration Adjustment
Influent concentration multiplied by total influent reclaimed water flow volume for that monitoring interval will yield an influent mass for each constituent, which is valid for that monitoring interval. After the appropriate time lag interval described in IV.A.6.b above, this influent mass of the constituent is then divided by the total effluent flow volume for that monitoring period to give a concentration adjustment for the effluent that will apply for the monitoring interval. The monitoring interval is the time between sampling days. For example, weekly sampling yields a one week monitoring interval. A schematic example follows:

ex. Constituent B is monitored weekly. The lag time is Y days.

Step 1: (Influent concentration of recycled water B- influent concentration of potable water B) x (Total Influent Volume of Reclaimed Water for one week) = (Influent mass of B)

Step 2: (Influent mass of B) / (Discharge Point No. 001 discharge volume for one week, Y days after influent week) = (Concentration adjustment to be subtracted from concentration of constituent in the effluent, valid for that one week period)

The potable water concentrations used in Step 1 can be an average of samples (minimum of one sample) collected over the last year.

d. The application of recycled water adjustments shall not result in effluent limitations greater than the following:

Table 8. Maximum Recycled Water Adjustments

Parameter	Units	Maximum Recycled Water Adjusted Effluent Limitations	
		Average Monthly	Maximum Daily
Cyanide	µg/L	38	90
Copper	µg/L	170	240
Lead	µg/L	13	30
Selenium	µg/L	82	130

e. Adjustment for selenium and technology-based limits listed in Table 6a will be given as follows:

Mass Adjustment
Influent concentration multiplied by total influent reclaimed water volume for that monitoring interval will yield an influent mass for each constituent, which is valid for that monitoring interval. After the appropriate time lag interval described in IV.A.6.b above, this influent mass of the constituent is then divided by the number of days in that monitoring period to give a mass adjustment for the effluent that will apply for the

monitoring interval. The monitoring interval is the time between sampling days. For example, weekly sampling yields a one week monitoring interval. A schematic example follows:

ex. Constituent B is monitored weekly. The lag time is Y days.

Step 1: (Influent concentration of reclaimed water B – influent concentration of potable water B) x (Total Influent Volume of Reclaimed Water for one week) = (Influent mass of B)

Step 2: (Influent mass of B) / (The Number of Days in that monitoring interval) = (Mass adjustment to be subtracted from mass of constituent in the effluent, valid for that one week period)

B. Stormwater Effluent Limitations - Discharge Point Nos. 002 – 023

1. Stormwater discharged at Discharge Point Nos. 002 -023 shall not exceed the effluent limitations in the table below.

Table 9. Effluent Limitations for Stormwater Outfalls

Parameter	Units	Effluent Limitations			
		Average Monthly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
TOC	mg/L	--	110	--	--
Oil and Grease	mg/L	--	15	--	--
pH	s.u.	--	--	6.5	8.5
Visible Oil	--	None observed			
Visible Color	--	None observed			

2. If there is an exceedance of either limitation for TOC or Oil and Grease expressed in Table 9, above, the effluent limitations in Table 10, below, shall become effective for the discharge point where the exceedance occurred and remain in effect until such time the Discharger can demonstrate to the satisfaction of the Executive Officer that the stormwater is not contaminated.

Table 10. Supplemental Effluent Limitations for Stormwater Outfalls

Pollutant	Units	Daily Maximum	30-Day Average[1]
BOD_5	mg/L	48	26
TSS	mg/L	33	21
COD	mg/L	360	180
Oil and Grease	mg/L	15	8.0
Phenolic Compounds	mg/L	0.35	0.17
Total Chromium	mg/L	0.60	0.21
Hexavalent Chromium	mg/L	0.062	0.028

[1] Compliance with the 30-day average limitation shall be determined as a rolling 30-day average. The rolling 30-day average shall be calculated as the arithmetic average of the concentrations detected over the current day and previous 29 days. This limitation shall not apply unless there is sufficient runoff for sampling on at least three out of 30 consecutive days.

V. RECEIVING WATER LIMITATIONS

A. Receiving water limitations are based on water quality objectives in the Basin Plan and are a required part of this Order. The discharges shall not cause the following in waters of the State at any place:

1. Floating, suspended, or deposited macroscopic particulate matter or foams;

2. Bottom deposits or aquatic growths to the extent that such deposits or growths cause nuisance or adversely affect beneficial uses;

3. Alteration of temperature, turbidity, or apparent color beyond present natural background levels;

4. Visible, floating, suspended, or deposited oil and other products of petroleum origin.

5. Toxic or other deleterious substances to be present in concentrations or quantities that cause deleterious effects on wildlife, waterfowl, or other aquatic biota, or render any of these unfit for human consumption, either at levels created in the receiving waters or as a result of biological concentration; and,

B. The discharge of waste shall not cause the following limits to be exceeded in waters of the State within one foot of the water surface:

1.	Dissolved Oxygen	5.0 mg/L, minimum The median dissolved oxygen concentration for any three consecutive months shall not be less than 80% of the dissolved oxygen content at saturation. When natural factors cause concentrations less than that specified above, the discharge shall not cause further reduction in ambient dissolved oxygen concentrations.
2.	Dissolved Sulfide	Natural background levels
3.	pH	6.5 (minimum) to 8.5 (maximum)
4.	Nutrients	Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses.

C. The discharge shall not cause a violation of any water quality standard for receiving waters adopted by the Regional Water Board or the State Water Board as required by the CWA and regulations adopted thereunder. If more stringent applicable water quality standards are

promulgated or approved, the Regional Water Board may revise and modify this Order in accordance with them.

VI. PROVISIONS

A. Standard Provisions

1. Federal Standard Provisions

The Discharger shall comply with Federal Standard Provisions included in Attachment D of this Order.

2. Regional Standard Provisions

The Discharger shall comply with all applicable items of the Regional Standard Provisions and Monitoring and Reporting Requirements (Supplement to Attachment D) for NPDES Wastewater Discharge Permits (Attachment G), including amendments thereto.

B. MRP Requirements

The Discharger shall comply with the MRP (Attachment E) and future revisions thereto, including applicable sampling and reporting requirements in the two standard provisions listed in section VI.A, above.

C. Special Provisions

1. Reopener Provisions

The Regional Water Board may modify or reopen this Order (in accordance with federal regulations) prior to its expiration date in any of the following circumstances as allowed by law:

a. If present or future investigations demonstrate that the discharge governed by this Order will have, or will cease to have, a Reasonable Potential to cause or contribute to adverse impacts on water quality or beneficial uses of the receiving waters.

b. If new or revised water quality objectives (WQOs) or TMDLs come into effect for the San Francisco Bay estuary and contiguous water bodies (whether statewide, regional, or site-specific). In such cases, effluent limitations in this Order will be modified as necessary to reflect updated WQOs and wasteload allocations in TMDLs. Adoption of effluent limitations in this Order is not intended to restrict in any way future modifications based on legally adopted WQOs or TMDLs, or as otherwise permitted under federal regulations governing NPDES permit modifications.

c. If translator or other water quality studies provide a basis for determining that a permit condition should be modified.

d. If an administrative or judicial decision on a separate NPDES permit or WDR addresses requirements similar to this discharge.

e. Or as otherwise authorized by law.

The Discharger may request a permit modification based on the above. The Discharger shall include in any such request an antidegradation and anti-backsliding analysis.

2. Effluent Characterization Study and Report - Discharge Points 001, 003, 008, 009, 018, and 019

a. Study Elements

The Discharger shall continue to characterize and evaluate discharges from the following discharge points to verify that the "no" or "cannot determine" reasonable potential analysis conclusions of this Order remain valid and to inform the next permit reissuance. The Discharger shall collect representative samples of the discharge at the following monitoring stations, as defined in the MRP (Attachment E), at no less than the frequencies specified below:

Discharge Point	Monitoring Station	Frequency
001	E-001	2/year
003	E-003	2/5 years[1]
008	E-008	2/5 years[1]
009	E-009	2/5 years[1]
018	E-018	2/5 years[1]
019	E-019	2/5 years[1]

[1] Monitoring is contingent upon the discharge of stormwater at this discharge point. If no discharge occurs, monitoring is not required.

The samples shall be analyzed for the priority pollutants listed in Table C of the Regional Standard Provisions (Attachment G), except for those priority pollutants with effluent limitations where the MRP already requires monitoring. Compliance with this requirement shall be achieved in accordance with the specifications of Regional Standard Provisions (Attachment G) sections III.A.1 and III.A.2.

The Discharger shall evaluate on an annual basis if concentrations of any priority pollutant increase over past performance. The Discharger shall investigate the cause of any increase. The investigation may include, but need not be limited to, an increase in monitoring frequency, monitoring of internal process streams, and monitoring of influent sources. This requirement may be satisfied through identification of the constituent as a "pollutant of concern" in the Discharger's Pollutant Minimization Program, described in Provision VI.C.3.

b. Reporting Requirements

i. Routine Reporting

The Discharger shall, within 30 days of receipt of analytical results, report in the transmittal letter for the appropriate monthly self-monitoring report the following:

a. Indication that a sample or samples for this characterization study was or were collected; and

b. Identity of any and all priority pollutants detected above or within one order of magnitude of their applicable water quality criteria (see Fact Sheet [Attachment F] Table F-19 for the criteria), together with the detected concentrations of those pollutants.

ii. Annual Reporting

The Discharger shall provide a summary of the annual data evaluation and source investigation in the annual self-monitoring report.

iii. Final Report

The Discharger shall submit a final report that presents all these data to the Regional Water Board no later than 180 days prior to the Order expiration date. The final report shall be submitted with the application for permit reissuance.

c. Ambient Background Receiving Water Study

The Discharger shall collect, or participate in collecting, ambient background receiving water priority pollutant monitoring data necessary to perform reasonable potential analyses and to calculate effluent limitations. The data on the conventional water quality parameters (pH, salinity, and hardness) shall also be sufficient to characterize these parameters in the receiving waters at a point after the discharge has mixed with the receiving waters. This provision may be met through the Collaborative Bay Area Clean Water Agencies Study or a similar ambient monitoring program for San Francisco Bay. This Order may be reopened, as appropriate, to incorporate effluent limitations or other requirements based on these data.

d. Effluent and Receiving Water Selenium Characterization Study

The Discharger shall comply with the following tasks and schedule set forth in Table 11. The Discharger may complete, or cause to be completed, all or some of the required tasks collaboratively. All submittals shall be acceptable to the Executive Officer. Upon request by the Discharger, the Executive Officer may modify the deadlines for the following tasks by no more than three years if good cause exists, such as delays in data collection, sample collection, analytical turnaround, or receipt of third party reports; laboratory QA/QC problems; other factors outside the Discharger's control; or new information that warrants schedule modification. Good cause does not include delays caused by the Discharger, or that could have been reasonably avoided. Any requests for schedule modification shall be in writing with necessary justification. Any approval shall also be in writing.

Table 11. Receiving Waters and Effluent Selenium Characterization Study Tasks and Schedule

Tasks	Compliance Date
1. Submit a study plan for a minimum two-year study that includes the following elements: (a) effluent and receiving water sampling locations (the effluent sampling location may be the existing effluent compliance sampling point; receiving water sampling locations shall be within a 100-foot radius of the outfall to characterize near-field concentrations and speciation); (b) receiving water sampling along transects from the Pacific Ocean (Golden Gate) to the Sacramento River (Rio Vista) and San Joaquin River (USGS Station 757), including sampling in the freshwater portions of the rivers at Vernalis (San Joaquin River) and Freeport (Sacramento River); (c) sampling and analysis protocols (including means to evaluate seasonal conditions under low and high flows from the Sacramento / San Joaquin River Delta, selenium concentrations in the water column and suspended particles, and speciation and particulate selenium content in the effluent); (d) comparison of the proposed protocols and analytical methods to previous sampling efforts; (e) sampling parameters (including, at a minimum, salinity, carbon, nitrogen, and chlorophyll-a in receiving water, and dissolved and particulate selenate, selenite, organic selenides, and elemental selenium concentrations in both effluent and receiving water); (f) data interpretation models and other methods to be used (representing conservative, reasonable worst case conditions); and (g) implementation schedule.	Completed
2. Begin implementation of the study plan developed for Task (1).	Completed
3. Submit a status report for Tasks 1 and 2 containing, at a minimum, monitoring data collected since the beginning of the study, summary of results to date, and necessary updates to the study plan.	February 1, 2012, with annual self-monitoring report
4. Submit a final study report that includes the following elements: (a) sampling results, data interpretation, and conclusions, such as receiving water and mixing zone characterization, seasonal variability, etc.; (b) effluent characterization; (c) determination if there is reasonable potential for selenium in the discharge to violate the Basin Plan's narrative bioaccumulation objective through the use of pertinent models; (d) comparison of near-field selenium water column concentrations to applicable numeric objectives; (e) demonstration of spatial and temporal extent to which the objectives and other relevant guidelines are being exceeded; and (f) determination of whether selenium levels adversely affect food web or wildlife, or contribute to bioaccumulation.	August 15, 2012

e. The Discharger shall perform a dilution modeling study for the deep-water diffuser at Discharge Point 001 and report the results no later than 180 days prior to the expiration date of this Order (the Discharger may report the results with its application for permit reissuance). The study shall use a USEPA-approved modeling program such as Visual

PLUMES or CORMIX and estimate the initial dilution at Discharge Point 001 at slack tide for both the maximum wet-weather discharge and the average daily discharge.

3. Best Management Practices and Pollution Minimization

a. The Discharger shall continue to improve, in a manner acceptable to the Executive Officer, its Pollution Minimization Program to promote minimization of pollutant loadings to the treatment plant and therefore to the receiving waters.

b. The Discharger shall submit an annual report, acceptable to the Executive Officer, no later than February 28 of each year. Each annual report shall include at least the following information:

i. *A brief description of the treatment plant and treatment plant processes.*

ii. *A discussion of the current pollutants of concern.* Periodically, the Discharger shall determine which pollutants are currently a problem and which pollutants may be potential future problems. This discussion shall include the reasons for choosing the pollutants.

iii. *Identification of sources of pollutants of concern.* This discussion shall address how the Discharger intends to estimate and identify sources of pollutants of concern. The Discharger shall also identify sources or potential sources not directly within its ability or authority to control, such as pollutants in the potable water supply and air deposition.

iv. *Identification of tasks to reduce the sources of pollutants of concern.* This discussion shall identify and prioritize tasks to address the Discharger's pollutants of concern. The Discharger may implement tasks themselves or participate in group, regional, or national tasks that will address its pollutants of concern. The Discharger is strongly encouraged to participate in group, regional, or national actions that will address its pollutants of concern whenever it is efficient and appropriate to do so. A time line shall be included for the implementation of each task.

v. *Outreach to employees.* The Discharger shall inform its employees regarding pollutants of concern, potential sources, and how they might be able to help reduce discharge of these pollutants into the treatment facilities. The Discharger may provide a forum for employees to provide input.

vi. *Discussion of criteria used to measure Pollutant Minimization Program and task effectiveness.* The Discharger shall establish criteria to evaluate the effectiveness of its Pollutant Minimization Program. The section shall discuss the specific criteria used to measure the effectiveness of each task in sections VI.C.3.b.iv and v.

vii. *Documentation of efforts and progress.* This discussion shall detail all of the Discharger's activities in the Pollutant Minimization Program during the reporting year.

viii. *Evaluation of Pollutant Minimization Program and task effectiveness.* The Discharger shall use the criteria established in section VI.C.3.b.vi to evaluate the Program's and tasks' effectiveness.

ix. *Identification of specific tasks and time schedules for future efforts.* Based on the evaluation, the Discharger shall describe how it will continue or change its Pollutant Minimization Program tasks to more effectively reduce the loading of pollutants to the treatment plant and subsequently in its effluent.

c. Pollutant Minimization Program for Pollutants with Effluent Limitations

The Discharger shall develop and conduct a Pollutant Minimization Program as further described below when there is evidence that a priority pollutant is present in the effluent above an effluent limitation (e.g., sample results reported as "detected but not quantified" (DNQ) when the effluent limitation is less than the method detection limit (MDL), sample results from analytical methods more sensitive than those methods required by this Order, presence of whole effluent toxicity, health advisories for fish consumption, results of benthic or aquatic organism tissue sampling) and either:

i. A sample result is reported as DNQ and the effluent limitation is less than the reporting level (RL); or

ii. A sample result is reported as not detected (ND) and the effluent limitation is less than the MDL, using SIP definitions.

d. Pollutant Minimization Program Submittals for Pollutants with Effluent Limitations

If triggered by the reasons in section VI.C.3.c., above, the Discharger's Pollutant Minimization Program shall include, but not be limited to, the following actions and submittals acceptable to the Regional Water Board:

i. Annual review and semi-annual monitoring of potential sources of the reportable priority pollutants, which may include fish tissue monitoring and other bio-uptake sampling, or alternative measures approved by the Executive Officer when it is demonstrated that source monitoring is unlikely to produce useful analytical data;

ii. Quarterly monitoring for the reportable priority pollutants in the influent to the wastewater treatment system, or an alternative measure approved by the Executive Officer when it is demonstrated that influent monitoring is unlikely to produce useful analytical data;

iii. Submittal of a control strategy designed to proceed toward the goal of maintaining concentrations of the reportable priority pollutants in the effluent at or below the effluent limitations;

iv. Implementation of appropriate cost-effective control measures for the reportable priority pollutants, consistent with the control strategy; and

v. The annual report required by section VI.C.3.b above shall specifically address the following items:

(a) All Pollutant Minimization Program monitoring results for the previous year;

(b) List of potential sources of the reportable priority pollutants;

(c) A summary of all actions undertaken pursuant to the control strategy; and

(d) A description of actions to be taken in the following year.

4. Other Special Provisions

a. Cyanide Action Plan

The Discharger shall implement monitoring and surveillance, pretreatment, source control, and pollution prevention for cyanide in accordance with the following tasks and time schedule.

Table 12. Cyanide Action Plan

Task	Compliance Date
1. Review Potential Cyanide Contributors The Discharger shall submit an inventory of potential sources of cyanide to Discharge 001.	Completed
2. Implement Cyanide Control Program The Discharger shall submit a plan for and begin implementation of a program to minimize cyanide discharges. The plan shall include the following elements at a minimum: a. Inspect each potential contributor to assess the need to include that contributing source in the control program. b. Prepare an emergency response and monitoring plan to be implemented if a significant cyanide discharge occurs. c. If ambient monitoring shows cyanide concentrations of 1.0 µg/L or higher in the main body of San Francisco Bay, undertake actions to identify and abate cyanide sources responsible for the elevated ambient concentrations.	With annual PMP report due February 28, 2012
3. Implement Additional Cyanide Control Measures If the Regional Water Board notifies the Discharger that ambient monitoring shows cyanide concentrations of 1.0 µg/L or higher in the main body of San Francisco Bay, the Discharger shall commence actions to identify and abate cyanide sources responsible for the elevated ambient concentrations.	Begin implementation within 90-days of notification
4. Report Status of Cyanide Control Program Submit a report to the Regional Water Board documenting implementation of the cyanide control program.	Annually with annual PMP reports due February 28

b. Copper Action Plan

The Discharger shall implement pretreatment, source control, and pollution prevention for copper in accordance with the following tasks and time schedule.

Table 13. Copper Action Plan

Task	Compliance Date
1. Review Potential Copper Sources The Discharger shall submit an inventory of potential copper sources to the treatment plant	With annual pollution prevention report due on February 28, 2012
2. Implement Copper Control Program The Discharger shall submit a plan for and begin implementation of a program to reduce copper discharges identified in Task 1.	July 1, 2012
3. Implement Additional Measures If the Regional Water Board notifies the Discharger that the three-year rolling mean dissolved copper concentration of the receiving water exceeds 3.0 µg/L, the Discharger shall evaluate the effluent copper concentration trend, and if it is increasing, develop and begin implementation of additional measures to control copper discharges.	Begin implementation of additional measures within 90 days of the notification
4. Submit Studies to Reduce Copper Pollutant Impact Uncertainties The Discharger shall submit an updated study plan and schedule to conduct, or cause to be conducted, technical studies to investigate possible copper sediment toxicity and technical studies to investigate sublethal effects on salmonids. Specifically, the Discharger shall include the manner in which the above will be accomplished and describe the studies to be performed with an implementation schedule. To satisfy this requirement, dischargers may collaborate and conduct these studies as a group.	Completed
5. Report Status of Copper Control Program The Discharger shall submit a report documenting copper control program implementation and addressing the effectiveness of the actions taken, including any additional copper controls required by Task 3, above, together with a schedule for actions to be taken in the next 12 months. Additionally, the Discharger shall report the findings and results of the studies completed, planned, or in progress under Task 4. Regarding the Task 4 studies, dischargers may collaborate and provide this information in a single report to satisfy this requirement for an entire group.	Annually with annual pollution prevention reports due February 28

c. Stormwater Pollution Prevention Plan and Annual Report

The Discharger shall submit an updated Stormwater Pollution Prevention Plan (SWPPP) acceptable to the Executive Officer by October 1 of each year. If the Discharger determines that it does not need to update the SWPPP, it shall submit a letter indicating that no revision is necessary and stating the last year it updated the SWPPP. The SWPPP shall comply with the requirements in the Federal Standard Provisions (Attachment D).

The Discharger shall submit an annual stormwater report acceptable to the Executive Officer by July 1 of each year covering data for the previous wet weather season for the

identified stormwater discharge points. The annual stormwater report shall include, at minimum:

i. a tabulated summary of all sampling results and a summary of visual observations taken during inspections;

ii. a comprehensive discussion of the compliance record and any corrective actions taken or planned to ensure compliance with WDRs; and

iii. a comprehensive discussion of source identification and control programs for total suspended solids.

d. Wastewater Discharges from the Wetland

The Discharger may discharge Wetland effluent directly to Discharge Point No. 001 (downstream of the GAC facility) provided Wetland effluent discharges do not exceed a daily maximum of 3 MGD, and Wetland effluent does not cause acute toxicity. To document that Wetland effluent does not cause acute toxicity, the Discharger must show that two consecutive weekly flow-through bioassays demonstrate at least 80% survival. Acute toxicity testing on Wetland effluent shall conform to the requirements in this Order for Discharge Point No. 001 (e.g., test species shall be rainbow trout). Should Wetland toxicity tests show less than 80% survival, the Discharger must route Wetland effluent through its GAC facility before discharging to Discharge Point No. 001. The Discharger may resume discharging Wetland effluent directly to Discharge Point No. 001 after two consecutive Wetland toxicity tests, started at least five days apart, demonstrate at least 80% survival. In case the Discharger decides to route Wetland effluent directly to Discharge Point No. 001, it shall report the daily flow rate of this treated wastewater, and the results of acute toxicity testing.

e. Construction and Development Requirements for Stormwater

These requirements apply to development and construction activities that occur in areas where stormwater is not subject to physical treatment. These requirements do not apply to stormwater that drains to Chevron's wastewater treatment plant or stormwater that is treated in earthen basins via physical settling.

In areas where stormwater is not subject to physical treatment, the Discharger shall obtain coverage under *NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities* Order No. 2009-0009-DWQ.

For potential development in areas within Chevron's refinery that discharge to Discharge Point 020 (City of Richmond's Pump Station), the Discharger must also comply with the City of Richmond's specifications and planning authority so that the City is in compliance with the requirements contained in Provisions C.3 and C.6 of Municipal Regional Storm Water Permit Order No. R2-2009-0074, NPDES No. CAS612008.

VII. COMPLIANCE DETERMINATION

Compliance with effluent limitations for priority pollutants shall be determined using sample reporting protocols defined in Attachment A—Definitions, the MRP (Attachment E), Fact Sheet section VI, and the Regional Standard Provisions (Attachment G). For purposes of reporting and administrative enforcement by the Regional and State Water Boards, the Discharger shall be deemed out of compliance with effluent limitations if the concentration of the priority pollutant in the monitoring sample is greater than the effluent limitation and greater than or equal to the RL.

ATTACHMENT A – DEFINITIONS

Arithmetic Mean (μ), also called the average, is the sum of measured values divided by the number of samples. For ambient water concentrations, the arithmetic mean is calculated as follows:

> Arithmetic mean = $\mu = \Sigma x / n$ where: Σx is the sum of the measured ambient water concentrations, and n is the number of samples.

Average Monthly Effluent Limitation (AMEL): 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): 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.

Bioaccumulative pollutants are those substances taken up by an organism from its surrounding medium through gill membranes, epithelial tissue, or from food and subsequently concentrated and retained in the body of the organism.

Carcinogenic pollutants are substances that are known to cause cancer in living organisms.

Coefficient of Variation (*CV*) is a measure of the data variability and is calculated as the estimated standard deviation divided by the arithmetic mean of the observed values.

Daily Discharge: 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 this Order), 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.

Detected, but Not Quantified (DNQ) are those sample results less than the RL, but greater than or equal to the laboratory's MDL.

Dilution Credit is the amount of dilution granted to a discharge in the calculation of a water quality-based effluent limitation, based on the allowance of a specified mixing zone. It is calculated from the dilution ratio or determined through conducting a mixing zone study or modeling of the discharge and receiving water.

Effluent Concentration Allowance (ECA) is a value derived from the water quality criterion/objective, dilution credit, and ambient background concentration that is used, in conjunction with the coefficient of variation for the effluent monitoring data, to calculate a long-term average (LTA) discharge concentration. The ECA has the same meaning as wasteload allocation (WLA) as used in USEPA guidance (Technical Support Document For Water Quality-based Toxics Control, March 1991, second printing, EPA/505/2-90-001).

Enclosed Bays means indentations along the coast that enclose an area of oceanic water within distinct headlands or harbor works. Enclosed bays include all bays where the narrowest distance between the headlands or outermost harbor works is less than 75 percent of the greatest dimension of the enclosed portion of the bay. Enclosed bays include, but are not limited to, Humboldt Bay, Bodega Harbor, Tomales Bay, Drake's Estero, San Francisco Bay, Morro Bay, Los Angeles-Long Beach Harbor, Upper and Lower Newport Bay, Mission Bay, and San Diego Bay. Enclosed bays do not include inland surface waters or ocean waters.

Estimated Chemical Concentration is the estimated chemical concentration that results from the confirmed detection of the substance by the analytical method below the ML value.

Estuaries means waters, including coastal lagoons, located at the mouths of streams that serve as areas of mixing for fresh and ocean waters. Coastal lagoons and mouths of streams that are temporarily separated from the ocean by sandbars shall be considered estuaries. Estuarine waters shall be considered to extend from a bay or the open ocean to a point upstream where there is no significant mixing of fresh water and seawater. Estuarine waters include, but are not limited to, the Sacramento-San Joaquin Delta, as defined in California Water Code section 12220, Suisun Bay, Carquinez Strait downstream to the Carquinez Bridge, and appropriate areas of the Smith, Mad, Eel, Noyo, Russian, Klamath, San Diego, and Otay rivers. Estuaries do not include inland surface waters or ocean waters.

Inland Surface Waters are all surface waters of the State that do not include the ocean, enclosed bays, or estuaries.

Instantaneous Maximum Effluent Limitation: 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: 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).

Maximum Daily Effluent Limitation (MDEL) means the highest allowable daily discharge of a pollutant, over a calendar day (or 24-hour period). For pollutants with limitations expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the daily discharge is calculated as the arithmetic mean measurement of the pollutant over the day.

Median is the middle measurement in a set of data. The median of a set of data is found by first arranging the measurements in order of magnitude (either increasing or decreasing order). If the number of measurements (n) is odd, then the median = $X_{(n+1)/2}$. If n is even, then the median = $(X_{n/2} + X_{(n/2)+1})/2$ (i.e., the midpoint between the $n/2$ and $n/2+1$).

Method Detection Limit (MDL) is the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero, as defined in title 40 of the Code of Federal Regulations, Part 136, Attachment B, revised as of July 3, 1999.

Minimum Level (ML) is the concentration 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.

Mixing Zone is a limited volume of receiving water that is allocated for mixing with a wastewater discharge where water quality criteria can be exceeded without causing adverse effects to the overall water body.

Not Detected (ND) are those sample results less than the laboratory's MDL.

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. Discharges to ocean waters are regulated in accordance with the State Water Board's California Ocean Plan.

Persistent pollutants are substances for which degradation or decomposition in the environment is nonexistent or very slow.

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 a priority pollutant(s) 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 Regional 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 California Water Code section 13263.3(d), shall be considered to fulfill the PMP requirements.

Pollution Prevention means any action that causes a net reduction in the use or generation of a hazardous substance or other pollutant that is discharged into water and includes, but is not limited to, input change, operational improvement, production process change, and product reformulation (as defined in California Water Code section 13263.3). Pollution prevention does not include actions that merely shift a pollutant in wastewater from one environmental medium to another environmental medium, unless clear environmental benefits of such an approach are identified to the satisfaction of the State or Regional Water Board.

Reporting Level (RL) is the ML (and its associated analytical method) chosen by the Discharger for reporting and compliance determination from the MLs included in this Order. The MLs included in this Order correspond to approved analytical methods for reporting a sample result that are selected by the Regional Water Board either from SIP Appendix 4 in accordance with SIP section 2.4.2 or established in accordance with SIP section 2.4.3. The ML 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 ML 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 ML in the computation of the RL.

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.

Source of Drinking Water is any water designated as municipal or domestic supply (MUN) in a Regional Water Board Basin Plan.

Standard Deviation (σ) is a measure of variability that is calculated as follows:

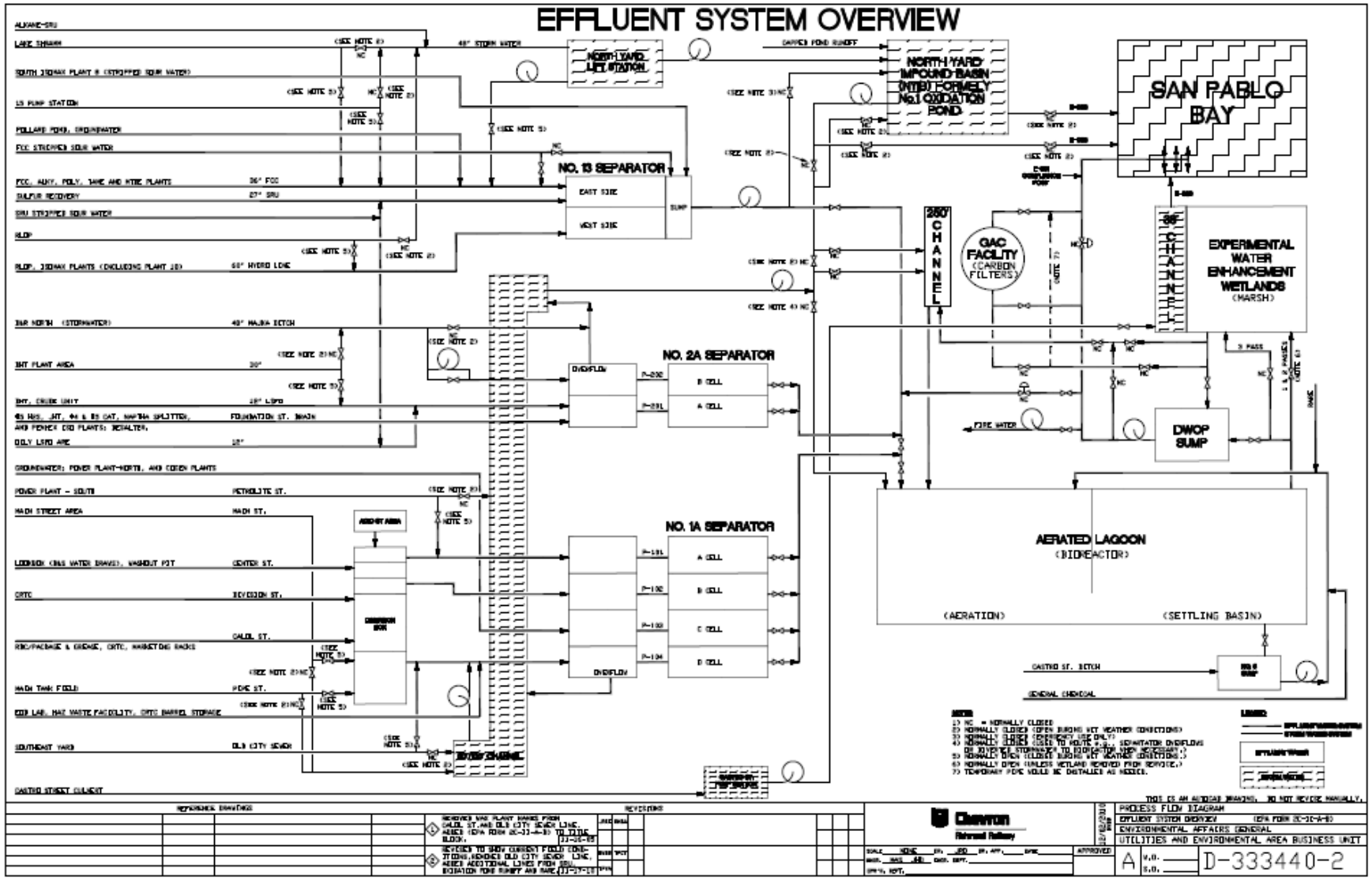
$$\sigma = (\sum[(x - \mu)^2]/(n - 1))^{0.5}$$

where:
x is the observed value;
μ is the arithmetic mean of the observed values; and
n is the number of samples.

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.)

ATTACHMENT B – MAP

ATTACHMENT C – PROCESS FLOW DIAGRAM



ATTACHMENT D – FEDERAL STANDARD PROVISIONS

I. STANDARD PROVISIONS – PERMIT COMPLIANCE

A. Duty to Comply

1. The Discharger must comply with all of the conditions of this Order. Any noncompliance constitutes a violation of the Clean Water Act (CWA) and the California Water Code and is grounds for enforcement action, for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application. (40 CFR § 122.41(a).)

2. The Discharger shall comply with effluent standards or prohibitions established under section 307(a) of the CWA for toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions, even if this Order has not yet been modified to incorporate the requirement. (40 CFR § 122.41(a)(1).)

B. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for a Discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Order. (40 CFR § 122.41(c).)

C. Duty to Mitigate

The Discharger shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this Order that has a reasonable likelihood of adversely affecting human health or the environment. (40 CFR § 122.41(d).)

D. Proper Operation and Maintenance

The Discharger shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Discharger to achieve compliance with the conditions of this Order. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems that are installed by a Discharger only when necessary to achieve compliance with the conditions of this Order (40 CFR § 122.41(e)).

E. Property Rights

1. This Order does not convey any property rights of any sort or any exclusive privileges. (40 CFR § 122.41(g).)

2. The issuance of this Order does not authorize any injury to persons or property or invasion of other private rights, or any infringement of State or local law or regulations. (40 CFR § 122.5(c).)

F. Inspection and Entry

The Discharger shall allow the Regional Water Board, State Water Board, United States Environmental Protection Agency (USEPA), or their authorized representatives (including an authorized contractor acting as their representative), upon the presentation of credentials and other documents, as may be required by law, to (40 CFR § 122.41(i); Wat. Code, § 13383):

1. Enter upon the Discharger's premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this Order (40 CFR § 122.41(i)(1));

2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order (40 CFR § 122.41(i)(2));

3. Inspect and photograph, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order (40 CFR § 122.41(i)(3)); and

4. Sample or monitor, at reasonable times, for the purposes of assuring Order compliance or as otherwise authorized by the CWA or the Water Code, any substances or parameters at any location. (40 CFR § 122.41(i)(4).)

G. Bypass

1. Definitions

a. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility. (40 CFR § 122.41(m)(1)(i).)

b. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities, which causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production. (40 CFR § 122.41(m)(1)(ii).)

2. Bypass not exceeding limitations. The Discharger may allow any bypass to occur which does not cause exceedances of effluent limitations, but only if it is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions listed in Standard Provisions – Permit Compliance I.G.3, I.G.4, and I.G.5 below. (40 CFR § 122.41(m)(2).)

3. Prohibition of bypass. Bypass is prohibited, and the Regional Water Board may take enforcement action against a Discharger for bypass, unless (40 CFR § 122.41(m)(4)(i)):

a. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage (40 CFR § 122.41(m)(4)(i)(A));

b. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent

a bypass that occurred during normal periods of equipment downtime or preventive maintenance (40 CFR § 122.41(m)(4)(i)(B)); and

c. The Discharger submitted notice to the Regional Water Board as required under Standard Provisions – Permit Compliance I.G.5 below. (40 CFR § 122.41(m)(4)(i)(C).)

4. The Regional Water Board may approve an anticipated bypass, after considering its adverse effects, if the Regional Water Board determines that it will meet the three conditions listed in Standard Provisions – Permit Compliance I.G.3 above. (40 CFR § 122.41(m)(4)(ii).)

5. Notice

a. Anticipated bypass. If the Discharger knows in advance of the need for a bypass, it shall submit a notice, if possible at least 10 days before the date of the bypass. (40 CFR § 122.41(m)(3)(i).)

b. Unanticipated bypass. The Discharger shall submit notice of an unanticipated bypass as required in Standard Provisions - Reporting V.E below (24-hour notice). (40 CFR § 122.41(m)(3)(ii).)

H. Upset

Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the Discharger. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation. (40 CFR § 122.41(n)(1).)

1. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of Standard Provisions – Permit Compliance I.H.2 below are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review. (40 CFR § 122.41(n)(2).).

2. Conditions necessary for a demonstration of upset. A Discharger who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence that (40 CFR § 122.41(n)(3)):

a. An upset occurred and that the Discharger can identify the cause(s) of the upset (40 CFR § 122.41(n)(3)(i));

b. The permitted facility was, at the time, being properly operated (40 CFR § 122.41(n)(3)(ii));

c. The Discharger submitted notice of the upset as required in Standard Provisions – Reporting V.E.2.b below (24-hour notice) (40 CFR § 122.41(n)(3)(iii)); and

d. The Discharger complied with any remedial measures required under Standard Provisions – Permit Compliance I.C above. (40 CFR § 122.41(n)(3)(iv).)

3. Burden of proof. In any enforcement proceeding, the Discharger seeking to establish the occurrence of an upset has the burden of proof. (40 CFR § 122.41(n)(4).)

II. STANDARD PROVISIONS – PERMIT ACTION

A. General

This Order may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Discharger for modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any Order condition. (40 CFR § 122.41(f).)

B. Duty to Reapply

If the Discharger wishes to continue an activity regulated by this Order after the expiration date of this Order, the Discharger must apply for and obtain a new permit. (40 CFR § 122.41(b).)

C. Transfers

This Order is not transferable to any person except after notice to the Regional Water Board. The Regional Water Board may require modification or revocation and reissuance of this Order to change the name of the Discharger and incorporate such other requirements as may be necessary under the CWA and the Water Code. (40 CFR § 122.41(l)(3); § 122.61.)

III. STANDARD PROVISIONS – MONITORING

A. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. (40 CFR § 122.41(j)(1).)

B. Monitoring results must be conducted according to test procedures under Part 136 or, in the case of sludge use or disposal, approved under Part 136 unless otherwise specified in Part 503 unless other test procedures have been specified in this Order. (40 CFR § 122.41(j)(4); § 122.44(i)(1)(iv).)

IV. STANDARD PROVISIONS – RECORDS

A. Except for records of monitoring information required by this Order related to the Discharger's sewage sludge use and disposal activities, which shall be retained for a period of at least five years (or longer as required by Part 503), the Discharger shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this Order, for a period of at least three (3) years from the date of the sample, measurement, report or application. This period may be extended by request of the Regional Water Board Executive Officer at any time. (40 CFR § 122.41(j)(2).)

B. Records of monitoring information shall include:

1. The date, exact place, and time of sampling or measurements (40 CFR § 122.41(j)(3)(i));

2. The individual(s) who performed the sampling or measurements (40 CFR § 122.41(j)(3)(ii));

3. The date(s) analyses were performed (40 CFR § 122.41(j)(3)(iii));

4. The individual(s) who performed the analyses (40 CFR § 122.41(j)(3)(iv));

5. The analytical techniques or methods used (40 CFR § 122.41(j)(3)(v)); and

6. The results of such analyses. (40 CFR § 122.41(j)(3)(vi).)

C. Claims of confidentiality for the following information will be denied (40 CFR § 122.7(b)):

1. The name and address of any permit applicant or Discharger (40 CFR § 122.7(b)(1)); and

2. Permit applications and attachments, permits and effluent data. (40 CFR § 122.7(b)(2).)

V. STANDARD PROVISIONS – REPORTING

A. Duty to Provide Information

The Discharger shall furnish to the Regional Water Board, State Water Board, or USEPA within a reasonable time, any information which the Regional Water Board, State Water Board, or USEPA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order or to determine compliance with this Order. Upon request, the Discharger shall also furnish to the Regional Water Board, State Water Board, or USEPA copies of records required to be kept by this Order. (40 CFR § 122.41(h); Wat. Code, § 13267.)

B. Signatory and Certification Requirements

1. All applications, reports, or information submitted to the Regional Water Board, State Water Board, or USEPA shall be signed and certified in accordance with Standard Provisions – Reporting V.B.2, V.B.3, V.B.4, and V.B.5 below. (40 CFR § 122.41(k))

2. All permit applications shall be signed by a responsible corporate officer. For purposes of this provision, a responsible corporate officer means: (i) A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures. (40 CFR § 122.22(a)(1))

3. All reports required by this Order and other information requested by the Regional Water Board, State Water Board, or USEPA shall be signed by a person described in Standard Provisions – Reporting V.B.2 above, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

a. The authorization is made in writing by a person described in Standard Provisions – Reporting V.B.2 above (40 CFR § 122.22(b)(1));

b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.) (40 CFR § 122.22(b)(2)); and

c. The written authorization is submitted to the Regional Water Board and State Water Board. (40 CFR § 122.22(b)(3).)

4. If an authorization under Standard Provisions – Reporting V.B.3 above is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Standard Provisions – Reporting V.B.3 above must be submitted to the Regional Water Board and State Water Board prior to or together with any reports, information, or applications, to be signed by an authorized representative. (40 CFR § 122.22(c).)

5. Any person signing a document under Standard Provisions – Reporting V.B.2 or V.B.3 above shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations." (40 CFR § 122.22(d).)

C. Monitoring Reports

1. Monitoring results shall be reported at the intervals specified in the Monitoring and Reporting Program (Attachment E) in this Order. (40 CFR § 122.22(l)(4).)

2. Monitoring results must be reported on a Discharge Monitoring Report (DMR) form or forms provided or specified by the Regional Water Board or State Water Board for reporting results of monitoring of sludge use or disposal practices. (40 CFR § 122.41(l)(4)(i).)

3. If the Discharger monitors any pollutant more frequently than required by this Order using test procedures approved under Part 136 or, in the case of sludge use or disposal, approved under Part 136 unless otherwise specified in Part 503, or as specified in this Order, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by the Regional Water Board. (40 CFR § 122.41(l)(4)(ii).)

4. Calculations for all limitations, which require averaging of measurements, shall utilize an arithmetic mean unless otherwise specified in this Order. (40 CFR § 122.41(l)(4)(iii).)

D. Compliance Schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements in any compliance schedule of this Order, shall be submitted no later than 14 days following each schedule date. (40 CFR § 122.41(l)(5).)

E. Twenty-Four Hour Reporting

1. The Discharger shall report any noncompliance that may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the Discharger becomes aware of the circumstances. A written submission shall also be provided within five (5) days of the time the Discharger becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. (40 CFR § 122.41(l)(6)(i).)

2. The following shall be included as information that must be reported within 24 hours under this paragraph (40 CFR § 122.41(l)(6)(ii)):

a. Any unanticipated bypass that exceeds any effluent limitation in this Order. (40 CFR § 122.41(l)(6)(ii)(A).)

b. Any upset that exceeds any effluent limitation in this Order. (40 CFR § 122.41(l)(6)(ii)(B).)

3. The Regional Water Board may waive the above-required written report under this provision on a case-by-case basis if an oral report has been received within 24 hours. (40 CFR § 122.41(l)(6)(iii).)

F. Planned Changes

The Discharger shall give notice to the Regional Water Board as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required under this provision only when (40 CFR § 122.41(l)(1)):

1. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in section 122.29(b) (40 CFR § 122.41(l)(1)(i)); or

2. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants that are not subject to effluent limitations in this Order. (40 CFR § 122.41(l)(1)(ii).)

3. The alteration or addition results in a significant change in the Discharger's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including

notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan. (40 CFR§ 122.41(l)(1)(iii).)

G. Anticipated Noncompliance

The Discharger shall give advance notice to the Regional Water Board or State Water Board of any planned changes in the permitted facility or activity that may result in noncompliance with General Order requirements. (40 CFR § 122.41(l)(2).)

H. Other Noncompliance

The Discharger shall report all instances of noncompliance not reported under Standard Provisions – Reporting V.C, V.D, and V.E above at the time monitoring reports are submitted. The reports shall contain the information listed in Standard Provision – Reporting V.E above. (40 CFR § 122.41(l)(7).)

I. Other Information

When the Discharger becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Regional Water Board, State Water Board, or USEPA, the Discharger shall promptly submit such facts or information. (40 CFR § 122.41(l)(8).)

VI. STANDARD PROVISIONS – ENFORCEMENT

A. The Regional Water Board is authorized to enforce the terms of this Order under several provisions of the Water Code, including, but not limited to, sections 13385, 13386, and 13387.

VII. ADDITIONAL PROVISIONS – NOTIFICATION LEVELS

A. Non-Municipal Facilities

Existing manufacturing, commercial, mining, and silvicultural Dischargers shall notify the Regional Water Board as soon as they know or have reason to believe (40 CFR § 122.42(a)):

1. That any activity has occurred or will occur that would result in the discharge, on a routine or frequent basis, of any toxic pollutant that is not limited in this Order, if that discharge will exceed the highest of the following "notification levels" (40 CFR § 122.42(a)(1)):

a. 100 micrograms per liter (µg/L) (40 CFR § 122.42(a)(1)(i));

b. 200 µg/L for acrolein and acrylonitrile; 500 µg/L for 2,4-dinitrophenol and 2-methyl-4,6-dinitrophenol; and 1 milligram per liter (mg/L) for antimony (40 CFR § 122.42(a)(1)(ii));

c. Five (5) times the maximum concentration value reported for that pollutant in the Report of Waste Discharge (40 CFR § 122.42(a)(1)(iii)); or

d. The level established by the Regional Water Board in accordance with section 122.44(f). (40 CFR § 122.42(a)(1)(iv).)

2. That any activity has occurred or will occur that would result in the discharge, on a non-routine or infrequent basis, of any toxic pollutant that is not limited in this Order, if that discharge will exceed the highest of the following “notification levels" (40 CFR § 122.42(a)(2)):

a. 500 micrograms per liter (µg/L) (40 CFR § 122.42(a)(2)(i));

b. 1 milligram per liter (mg/L) for antimony (40 CFR § 122.42(a)(2)(ii));

c. Ten (10) times the maximum concentration value reported for that pollutant in the Report of Waste Discharge (40 CFR § 122.42(a)(2)(iii)); or

d. The level established by the Regional Water Board in accordance with section 122.44(f). (40 CFR § 122.42(a)(2)(iv).)

ATTACHMENT E – MONITORING AND REPORTING PROGRAM

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ATTACHMENT E – MONITORING AND REPORTING PROGRAM (MRP)

40 CFR 122.48 requires that all National Pollution Discharge Elimination System (NPDES) permits specify monitoring and reporting requirements. California Water Code (CWC) sections 13267 and 13383 also authorize the Regional Water Board to require technical and monitoring reports. This MRP establishes monitoring and reporting requirements that implement federal and California regulations.

I. GENERAL MONITORING PROVISIONS

A. The Discharger shall comply with this MRP. The Executive Officer may amend this MRP pursuant to 40 CFR 122.62, 122.63, and 124.5. If any discrepancies exist between the MRP and the Regional Standard Provisions, the MRP prevails.

B. The Discharger shall conduct all monitoring in accordance with Attachment D, section III, as supplemented by Attachment G of this Order. Equivalent test methods must be more sensitive than those specified in 40 CFR 136, must be specified in the permit, and must be approved for use by the Executive Officer, following consultation with the State Water Board Quality Assurance Program.

II. MONITORING LOCATIONS

The Discharger shall monitor at the following locations to demonstrate compliance with the effluent limitations, discharge specifications, and other requirements in this Order.

Table E-1. Monitoring Station Locations

Type of Sampling Location	Monitoring Location Name	Monitoring Location Description
Recycled Water	I-001	Located at any point in the pipe which delivers only recycled water to the facility, but upstream of any wastewater treatment unit, blending point, or point of use.
Treated Wastewater	E-001	At any point in the discharge line from the deep water discharge pump sump such that the sample is representative of treated wastewater.
Richmond Long Wharf (firewater)	E-002	At any point where a representative sample of stormwater and authorized non-stormwater discharges for the drainage area for Discharge Point No. 002 can be obtained prior to discharge.
Stormwater	E-003	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 003 can be obtained prior to discharge.
Stormwater	E-004	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 004 can be obtained prior to discharge.
Stormwater	E-005	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 005 can be obtained prior to discharge.
Stormwater	E-006	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 006 can be obtained prior to discharge.
Stormwater	E-007	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 007 can be obtained prior to discharge.

Type of Sampling Location	Monitoring Location Name	Monitoring Location Description
Stormwater	E-008	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 008 can be obtained prior to discharge.
Stormwater	E-009	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 009 can be obtained prior to discharge.
Stormwater	E-010	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 010 can be obtained prior to discharge.
Stormwater	E-011	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 011 can be obtained prior to discharge.
Stormwater	E-012	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 012 can be obtained prior to discharge.
Stormwater	E-013	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 013 can be obtained prior to discharge.
Stormwater	E-014	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 014 can be obtained prior to discharge.
Stormwater	E-015	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 015 can be obtained prior to discharge.
Stormwater	E-016	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 016 can be obtained prior to discharge.
Stormwater	E-017	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 017 can be obtained prior to discharge.
Stormwater	E-018	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 018 can be obtained prior to discharge.
Stormwater	E-019	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 019 can be obtained prior to discharge.
Stormwater	E-020	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 020 can be obtained prior to discharge.
Stormwater	E-021	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 021 can be obtained prior to discharge.
Stormwater	E-022	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 022 can be obtained prior to discharge.
Stormwater	E-023	At any point where a representative sample of the stormwater discharge for the drainage area for Discharge Point No. 023 can be obtained prior to discharge.
Receiving Water	C-001	At any point that is representative of salinity and hardness near Discharge Point 001. The Discharger may also satisfy this requirement by ensuring such samples are collected by the RMP.

Type of Sampling Location	Monitoring Location Name	Monitoring Location Description
Rainfall	R-1	The nearest official National Weather Service rainfall station, the Discharger's Laboratory rain gauge, or other station acceptable to the Executive Officer.

III. INFLUENT MONITORING REQUIREMENTS

A. Monitoring Location I-001

1. Monitoring at I-001 is only required if the Discharger chooses to apply for recycled water adjustments, as allowed for by Section IV.A.6 Effluent Limitation Adjustment for Recycled Water Use.

Table E-2. Influent Monitoring at I-001

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Recycled Water Flow Rate [1]	MGD	Continuous	Continuous	[2]
Cyanide, Total	µg/L	Grab	1/Month	[2]
Copper, Total Recoverable	µg/L	Grab	1/Month	[2]
Lead, Total Recoverable	µg/L	Grab	1/Month	[2]
Selenium, Total Recoverable	µg/L	Grab	1/Week	[2]
Biochemical Oxygen Demand (BOD) (5-day @ 20 Deg. C)	mg/L	Grab	1/Month	[2]
Total Suspended Solids (TSS)	mg/L	Grab	1/Month	[2]
Chemical Oxygen Demand (COD)	mg/L	Grab	1/Month	[2]
Oil and Grease	mg/L	Grab	1/Month	[2]
Phenolic Compounds, Total	mg/L	Grab	1/Month	[2]
Chromium, Total Recoverable	mg/L	Grab	1/Month	[2]
Chromium (VI), Total Recoverable	mg/L	Grab	1/Month	[2]
Sulfide, Total	mg/L	Grab	1/Month	[2]
Ammonia Nitrogen, Total (as N)	mg/L	Grab	1/Month	[2]

[1] For influent flows, the following information shall also be monitored and reported in the monthly SMRs:

a. Average Monthly Flow (million gallons per day, MGD)
b. Maximum Monthly Flow (MGD)
c. Minimum Monthly Flow (MGD)

[2] Pollutants and pollutant parameters shall be analyzed using the analytical methods described in 40 CFR 136.

IV. EFFLUENT MONITORING REQUIREMENTS

A. Monitoring Location E-001 (Discharge Point No. 001)

1. The Discharger shall monitor Discharge Point No. 001 (treated effluent) from Monitoring Location E-001 as follows:

Table E-3. Effluent Monitoring at E-001

Parameter	Units	Sample Type	Minimum Sampling Frequency	Required Analytical Test Method
Flow Rate [1]	MGD	Continuous	Continuous	[2]
pH [3]	s.u.	Continuous	Continuous	[2]
Temperature	^{o}F	Continuous	Continuous	[2]
BOD	mg/L	C-24	1/Month	[2]
	lbs/day	C-24	1/Month	[2]
TSS	mg/L	C-24	1/Month	[2]
	lbs/day	C-24	1/Month	[2]
COD	mg/L	C-24	1/Month	[2]
	lbs/day	C-24	1/Month	[2]
Oil and Grease	mg/L	Grab	1/Month	[2]
	lbs/day	Grab	1/Month	[2]
Phenolic Compounds, Total	mg/l	C-24	1/Month	[2]
	lbs/day	C-24	1/Month	[2]
Chromium, Total Recoverable[5]	µg/L	C-24	1/Month	[2]
	lbs/day	C-24	1/Month	[2]
Chromium (VI), Total Recoverable	µg/L	Grab	1/Month	[2]
	lbs/day	Grab	1/Month	[2]
Sulfide, Total	mg/L	Grab	1/Month	[2],[6]
	lbs/day	Grab	1/Month	[2],[6]
Ammonia Nitrogen, Total (as N)	mg/L	C-24	1/Month	[2]
	lbs/day	C-24	1/Month	[2]
Acute Toxicity	% Survival	C-24	1/Week	[7]
Chronic Toxicity	TU_c	C-24	1/Quarter	[8]
Copper, Total Recoverable	µg/L	C-24	1/Month	[2]
Lead, Total Recoverable	µg/L	C-24	1/Month	[2]
Selenium, Total Recoverable	µg/L	C-24	1/Week	[9]
	kg/day	C-24	1/Week	[9]
Cyanide, Total	µg/L	Grab	1/Month	[2]
2,3,7,8-TCDD and congeners	ρg/L	C-24	2/Year	[2]
Standard Observations	--	Daily	1/Day	--

[1] For effluent flows, the following information shall also be monitored and reported in the monthly SMRs:

a. Average Monthly Flow (million gallons per day, MGD)
b. Maximum Monthly Flow (MGD)
c. Minimum Monthly Flow (MGD)

[2] Pollutants and pollutant parameters shall be analyzed using the analytical methods described in 40 CFR 136.

[3] If pH is monitored continuously, the minimum and maximum pH values for the month shall be reported in monthly Self-Monitoring Reports (SMRs).

[4] Each oil and grease sample shall consist of a composite sample comprised of three grab samples taken at equal intervals during the sampling date, with each grab sample being collected in a glass container. Each glass container used for sample collection or mixing shall be thoroughly rinsed with solvent rinsing as soon as possible after use, and the solvent rinsing shall be added to the composite sample for extraction and analysis.

[5] The Discharger may, at its option, comply with the limits for hexavalent chromium by using total chromium results. In this case, analysis for hexavalent chromium is waived.

[6] Grab samples shall be collected coincident with composite samples collected for the analysis of regulated parameters.

[7] Acute Bioassay tests shall be performed in accordance with MRP section V.A.

[8] Critical Life Stage Toxicity Tests shall be performed and reported in accordance with the Chronic Toxicity Requirements specified in section V.B of this MRP.

[9] Selenium must be analyzed using methods described in USEPA Method No. 200.8, or Standard Method No. 3114B or 3114C.

B. Discharge Point Nos. 002 – 023

1. The Discharger shall monitor E-002, E-003, E-008 through E-010, E-012, E-014, and E-017 through E-023 as follows:

Table E-4. Schedule of Sampling, Analyses, and Observations for Stormwater

Parameter	Units	Sample Type	Minimum Sampling Frequency	Outfalls
Oil and Grease	mg/L	Grab[1]	At least 2/Year	All[2]
pH	s.u.	Grab[1]	At least 2/Year	All [2]
TOC	mg/L	Grab[1]	At least 2/Year	All [2]
TSS	mg/L	Grab[1]	At least 2/Year	All [2]
Specific Conductance	µmhos/cm	Grab[1]	At least 2/Year	All [2]
Standard Observations	--	Visual	At least 2/Year	All [2]
BOD_5	mg/L	Grab[1]	Daily during storm event	[2]
COD	mg/L	Grab[1]	Daily during storm event	[2]
Phenolic Compounds	mg/L	Grab[1]	Daily during storm event	[2]
Total Chromium	mg/L	Grab[1]	Daily during storm event	[2]
Hexavalent Chromium	mg/L	Grab[1]	Daily during storm event	[2]

[1] At least one grab sample shall be collected within the first 30 minutes of significant flow during a storm event.

[2] If and when the supplemental effluent limitations in Table 10 of this Order become effective in accordance with section IV.B.2 of this Order, the monitoring frequency at the outfalls where the limitations are in effect shall be increased to daily during each storm event.

[3] If and when limits for pollutants in Table 10 of this Order become effective in accordance with Section IV.B.2 of this Order, monitoring shall begin at the outfalls where the limitations are in effect.

[4] Sampling at least twice during the storm season for storm runoff discharges that do not drain to basins shall be during periods when the laboratory is normally staffed.

2. The Discharger shall monitor E-011 and E-013 as follows:

Table E-5. Schedule of Sampling, Analyses, and Observations for Stormwater

Parameter	Units	Sample Type	Minimum Sampling Frequency
Oil and Grease	mg/L	Grab	Each discharge event
pH	s.u.	Grab	Each discharge event
TOC	mg/L	Grab	Each discharge event
TSS	mg/L	Grab	Each discharge event
Specific Conductance	µmhos/cm	Grab	Each discharge event
Remaining Priority Pollutants[1]	µg/L	Grab	First discharge of wet season
Standard Observations	--	Visual	Each discharge event

[1] Priority pollutant sampling shall be conducted as specified in the Regional Standard Provisions (Attachment G). Priority pollutant sampling shall be done at least once, for each wet season, if there is a discharge.

3. The Discharger shall monitor E-004 through E-007 as follows:

Table E-6. Schedule of Sampling, Analyses, and Observations for Stormwater

Parameter	Units	Sample Type	Minimum Sampling Frequency
Oil and Grease	mg/L	Grab	1/5 Years
pH	s.u.	Grab	1/5 Years
TOC	mg/L	Grab	1/5 Years
TSS	mg/L	Grab	1/5 Years
Specific Conductance	µmhos/cm	Grab	1/5 Years
Standard Observations	--	Visual	1/5 Years

V. WHOLE EFFLUENT TOXICITY TESTING

The Discharger shall monitor acute and chronic toxicity at Monitoring Location E-001 as described below.

A. Whole Effluent Acute Toxicity

1. Compliance with the acute toxicity effluent limitations of this Order shall be evaluated by measuring survival of test organisms exposed to 96-hour continuous flow-through bioassays.

2. Test species shall be rainbow trout unless the Executive Officer specifies otherwise in writing.

3. All bioassays shall be performed according to the most up-to-date protocols in 40 CFR 136, currently in *Methods for Measuring the Acute Toxicity of Effluents and Receiving Water to Freshwater and Marine Organisms*, 5th Edition.

4. Monitoring of the bioassay water as specified by the *Methods for Measuring the Acute Toxicity of Effluents and Receiving Water to Freshwater and Marine Organisms*, 5th Edition shall include, on a daily basis, the following parameters: pH, dissolved oxygen, ammonia (if toxicity is observed), temperature, hardness, and alkalinity. These results shall be reported. If the fish survival rate in effluent is less than 70 percent or if the control fish survival rate is

less than 90 percent, the bioassay test shall be restarted as soon as practical with new fish and shall continue back to back until compliance is demonstrated.

B. Whole Effluent Chronic Toxicity

1. Monitoring Requirements

a. *Sampling*. The Discharger shall collect 24-hour composite samples of the effluent at E-001 for critical life stage toxicity testing as indicated below. For toxicity tests requiring renewals, 24-hour composite samples collected on consecutive days are required.

b. *Test Species*. Chronic toxicity shall be monitored using critical life stage tests(s) and the most sensitive test species identified by screening phase testing. The approved test species is a water flea (*Ceriodaphnia dubia).*

c. *Methodology*. Sample collection, handling and preservation shall be in accordance with USEPA protocols. In addition, bioassays shall be conducted in compliance with the most recently promulgated test methods, as shown in Appendix E-1. These are *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms*, currently third edition (EPA-821-R-02-014), and *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms*, currently fourth Edition (EPA-821-R-02-013), with exceptions granted the Discharger by the Executive Officer and the Environmental Laboratory Accreditation Program (ELAP).

d. *Dilution Series.* The Discharger shall conduct tests at 100%, 50%, 25%, 10%, 5%, and 2.5%. The "%" represents percent effluent as discharged.

e. *Accelerated Monitoring*. The Discharger shall accelerate monitoring to occur monthly when either of the following conditions is exceeded:

i. Three sample median value of 10 chronic toxicity units (TUc), or

ii. Single sample maximum value of 20 TUc.

2. Reporting Requirements

a. *Routine Reporting*. Toxicity test results for the current reporting period shall include, at a minimum, for each test:

i. Sample dates

ii. Test initiation date

iii. Test species

iv. End point values for each dilution (e.g., number of young, growth rate, percent survival)

v. NOEC values in percent effluent

vi. IC_{15}, IC_{25}, IC_{40}, and IC_{50} values (or EC_{15}, EC_{25} ... etc.) as percent effluent

vii. TUc values (100/NOEC, 100/IC_{25}, or 100/EC_{25})

viii. Mean percent mortality (±s.d.) after 96 hours in 100% effluent (if applicable)

ix. NOEC and LOEC values for reference toxicant tests

x. IC50 or EC50 values for reference toxicant tests

xi. Available water quality measurements for each test (pH, dissolved oxygen, temperature, conductivity, hardness, salinity, ammonia)

b. *Compliance Summary*. The results of the chronic toxicity testing shall be provided in the self-monitoring report and shall include a summary table of chronic toxicity data from at least three of the most recent samples. The information in the table shall include items listed above under section V.B.2.a of this MRP, specifically item numbers i, ii, iii, vi (IC_{25} or EC_{25}), vii, and viii.

3. Toxicity Reduction Evaluation (TRE)

a. To be ready to respond to toxicity events, the Discharger shall prepare a generic TRE work plan by December 1, 2011. The Discharger shall review and update the work plan as necessary to remain current and applicable to the discharge and discharge facilities.

b. Within 30 days of exceeding either trigger for accelerated monitoring, the Discharger shall submit to the Regional Water Board a specific TRE work plan, which should be the generic work plan revised as appropriate for this toxicity event after consideration of available discharge data.

c. Within 30 days of the date of completion of the accelerated monitoring tests observed to exceed either trigger, the Discharger shall initiate a TRE in accordance with a TRE work plan that incorporates any and all comments from the Executive Officer.

d. The TRE shall be specific to the discharge and be prepared in accordance with current technical guidance and reference materials, including USEPA guidance materials. The TRE shall be conducted as a tiered evaluation process, as summarized below:

i. Tier 1 consists of basic data collection (routine and accelerated monitoring).

ii. Tier 2 consists of evaluation of optimization of the treatment process, including operation practices and in-plant process chemicals.

iii. Tier 3 consists of a toxicity identification evaluation (TIE).

iv. Tier 4 consists of evaluation of options for additional effluent treatment processes.

v. Tier 5 consists of evaluation of options for modifications of in-plant treatment processes.

vi. Tier 6 consists of implementation of selected toxicity control measures, and follow-up monitoring and confirmation of implementation success.

e. The TIE or TRE may be ended at any stage if monitoring finds there is no longer consistent toxicity (complying with requirements of section IV.A.5 of this Order).

f. The objective of the TIE shall be to identify the substance or combination of substances causing the observed toxicity. All reasonable efforts using currently available TIE methods shall be employed.

g. As toxic substances are identified or characterized, the Discharger shall continue the TRE by determining the sources and evaluating alternative strategies for reducing or eliminating the substances from the discharge. All reasonable steps shall be taken to reduce toxicity to levels consistent with chronic toxicity evaluation parameters.

h. Many recommended TRE elements parallel required or recommended efforts of source control, pollution prevention, and stormwater control programs. TRE efforts should be coordinated with such efforts. To prevent duplication of efforts, evidence of complying with requirements or recommended efforts of such programs may be acceptable to comply with TRE requirements.

i. The Regional Water Board recognizes that chronic toxicity may be episodic and identification of causes of, and reduction of, sources of chronic toxicity may not be successful in all cases. Consideration of enforcement by the Regional Water Board will be based, in part, on the Discharger's actions and efforts to identify and control or reduce sources of consistent toxicity.

VI. RECEIVING WATER MONITORING REQUIREMENTS

The Discharger shall conduct receiving water monitoring at C-001 as summarized in the following table.

Table E-7. Receiving Water Monitoring at C-001

Parameter	Units	Sample Type	Minimum Sampling Frequency
Salinity	ppt	Grab	1/Quarter
Hardness	mg/L	Grab	1/Quarter

VII. LEGEND FOR MRP TABLES

Types of Samples

C-24 = composite sample, 24 hours (includes continuous sampling, such as for flows)

Frequency of Sampling

1/Week = once each week
1/Month = once each month
1/Quarter = once each calendar quarter (at about three month intervals)
2/Year = twice each calendar year (at about 6 months intervals, once during dry season, once during wet season)

Parameter and Unit Abbreviations

BOD_5	=	5-day biochemical oxygen demand
COD	=	chemical oxygen demand
TUc	=	chronic toxicity units
°F	=	degrees Fahrenheit
DO	=	dissolved oxygen
µg/L	=	micrograms per liter
µmhos/cm	=	micromhos/centimeter
MG	=	million gallons
MGD	=	million gallons per day
mg/L	=	milligrams per liter
% survival	=	percent survival
PAHs	=	polycyclic aromatic hydrocarbons
lbs/day	=	pounds per day
TSS	=	total suspended solids
s.u.	=	standard pH units

VIII. REPORTING REQUIREMENTS

A. General Monitoring and Reporting Requirements

The Discharger shall comply with all Federal Standard Provisions (Attachment D) and Regional Standard Provisions (Attachment G) related to monitoring, reporting, and recordkeeping.

B. Self Monitoring Reports (SMRs)

1. The Discharger shall electronically submit SMRs using the State Water Board's California Integrated Water Quality System (CIWQS) Program website (http://www.waterboards.ca.gov/ciwqs/index.html). The CIWQS website will provide additional directions for SMR submittal in the event of a service interruption for electronic submittal.

2. SMR Due Dates and Contents. The Discharger shall submit SMRs by the due dates specified below:

a. ***Monthly SMRs —*** Monthly SMRs shall be due 30 days after the end of each calendar month, covering that calendar month. The monthly SMR shall contain the applicable items described in sections V.B and V.C of both Attachments D and G of this Order. See Provision C.2 (Effluent Characterization Study and Report) of this Order for information that must also be reported with the monthly SMR.

b. ***Annual SMR —*** Annual SMRs shall be due February 1 each year, covering the previous calendar year. The annual SMR shall contain the items described in section V.C.1.f of the Regional Standard Provisions (Attachment G), and those specified in the Provisions section of this Order. See also Provision C.2d (Effluent and Receiving Water Selenium Characterization Study) of the Order for requirements to submit reports with the annual SMR.

c. ***Additional Specifications for Submitting SMRs to CIWQS —*** If the Discharger submits SMRs to CIWQS, it shall submit analytical results and other information using one of the following methods:

Table E-8. SMR Reporting for CIWQS

Parameter	Method of Reporting	
	EDF/CDF data upload or manual entry	**Attached File**
All parameters identified in influent, effluent, and receiving water monitoring tables (except Dissolved Oxygen and Temperature)	Required for All Results	
Dissolved Oxygen Temperature	Required for Monthly Maximum and Minimum Results Only (1)	Discharger may use this method for all results or keep records
Cyanide Arsenic Cadmium Chromium Copper Lead Mercury Nickel Selenium Silver Zinc Dioxins and Furans (by U.S. EPA Method 1613)	Required for All Results (2)	
Antimony Berylium Thallium Pollutants by U.S. EPA Methods 601, 602, 608, 610, 614, 624, and 625	Not Required (unless identified in influent, effluent, or receiving water monitoring tables), But Encouraged (1)	Discharger may use this method and submit results with application for permit reissuance, unless data submitted by CDF/EDF upload
Analytical Method	Not Required (Discharger may select "data unavailable") (1)	
Collection Time Analysis Time	Not Required (Discharger may select "0:00") (1)	

Footnotes for Table E-8:

(1) The Discharger shall continue to monitor at the minimum frequency specified in the monitoring tables, keep records of the measurements, and make the records available upon request.

(2) These parameters require EDF/CDF data upload or manual entry regardless of whether monitoring is required by this MRP or other provisions of this Order (except for biosolids, sludge, or ash provisions).

3. Monitoring periods for all required monitoring shall be completed according to the following schedule:

Table E-9. Monitoring Periods and Reporting Schedule

Sampling Frequency	Monitoring Period Begins On…	Monitoring Period
Continuous	Day after permit effective date	All
1/Hour	Day after permit effective date	Hourly
1/Day	Day after permit effective date	Midnight through 11:59 PM or any 24-hour period that reasonably represents a calendar day for purposes of sampling.
1/Week	Sunday following permit effective date or on permit effective date if on a Sunday	Sunday through Saturday
1/Month	First day of calendar month following permit effective date or on permit effective date if that date is first day of the month	1st day of calendar month through last day of calendar month
1/Quarter	Closest of January 1, April 1, July 1, or October 1 following (or on) permit effective date	January 1 through March 31 April 1 through June 30 July 1 through September 30 October 1 through December 31
2/Year	Closest of January 1 or July 1 following (or on) permit effective date	January 1 through June 30 July 1 through December 31
1/Year	January 1 following (or on) permit effective date	January 1 through December 31
2/5 Years or "twice per permit term"	Day after permit effective date	Once within the first 12 months, and once within 12 months prior to applying for permit reissuance.
1/Discharge Event	Anytime during the discharge event or as soon as possible after aware of the event	At a time when sampling can characterize the discharge event

4. The Discharger shall report with each sample result the applicable Reporting Level (RL) and the current Method Detection Limit (MDL), as determined by the procedure in 40 CFR 136.

The Discharger shall report the results of analytical determinations for the presence of chemical constituents in a sample using the following reporting protocols:

a. Sample results greater than or equal to the RL shall be reported as measured by the laboratory (i.e., the measured chemical concentration in the sample).

b. Sample results less than the RL, but greater than or equal to the laboratory's MDL, shall be reported as "Detected, but Not Quantified" or DNQ. The estimated chemical concentration of the sample shall also be reported.

For the purposes of data collection, the laboratory shall write the estimated chemical concentration next to DNQ as well as the words "Estimated Concentration" (may be shortened to "Est. Conc."). The laboratory may, if such information is available, include numerical estimates of the data quality for the reported result. Numerical estimates of data quality may be percent accuracy (± a percentage of the reported value), numerical ranges (low to high), or any other means considered appropriate by the laboratory.

c. Sample results less than the laboratory's MDL shall be reported as "Not Detected" or "ND".

d. Dischargers are to instruct laboratories to establish calibration standards so that the ML (or its equivalent if there is differential treatment of samples relative to calibration standards) is the lowest calibration standard. At no time is the Discharger to use analytical data derived from *extrapolation* beyond the lowest point of the calibration curve.

5. The Discharger shall submit SMRs in accordance with the following requirements:

a. The Discharger shall arrange all reported data in a tabular format. The data shall be summarized to clearly illustrate whether the facility is operating in compliance with effluent limitations. The Discharger is not required to duplicate the submittal of data entered in a tabular format within CIWQS. When electronic submittal of data is required and CIWQS does not provide for entry into a tabular format within the system, the Discharger shall electronically submit the data in a tabular format as an attachment.

b. The Discharger shall attach a cover letter to the SMR. The information in the cover letter shall clearly identify violations of the Waste Discharge Requirements, discuss corrective actions taken or planned, and specify the proposed time schedule for corrective actions. Identified violations shall include a description of the requirement that was violated and a description of the violation.

c. SMRs shall be submitted to the Regional Water Board, signed and certified as required by the Federal Standard Provisions (Attachment D), to the address listed below:

California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, CA 94612
ATTN: NPDES Wastewater Division

C. Discharge Monitoring Reports (DMRs)

1. DMRs shall be signed and certified as required by the Federal Standard Provisions (Attachment D). The Discharger shall submit the original DMR and one copy of the DMR to one of the addresses listed below:

Standard Mail	FedEx/UPS/Other Private Carriers
State Water Resources Control Board Division of Water Quality c/o DMR Processing Center PO Box 100 Sacramento, CA 95812-1000	State Water Resources Control Board Division of Water Quality c/o DMR Processing Center 1001 I Street, 15th Floor Sacramento, CA 95814

2. All discharge monitoring results shall be reported on the official USEPA pre-printed DMR forms (EPA Form 3320-1). Forms that are self-generated will not be accepted unless they follow the exact same format as EPA Form 3320-1.

IX. BYPASS REQUIREMENTS

If the Discharger bypasses any of its treatment units under the conditions stated in section I.G.2 of Attachment D, it shall monitor flows and collect samples daily at affected discharge points for all constituents with effluent limitations (except chronic toxicity) for the duration of the bypass (including acute toxicity using static renewals). Because such discharges may result in noncompliance that may endanger health or the environment, the Discharger shall follow the reporting requirements under of Attachment D, section V.E.1.

APPENDIX E-1
CHRONIC TOXICITY
DEFINITION OF TERMS AND SCREENING PHASE REQUIREMENTS

I. Definition of Terms

A. No observed effect level (NOEL) for compliance determination is equal to IC_{25} or EC_{25}. If the IC_{25} or EC_{25} cannot be statistically determined, the NOEL shall be equal to the NOEC derived using hypothesis testing.

B. Effective concentration (EC) is a point estimate of the toxicant concentration that would cause an adverse effect on a quantal, "all or nothing," response (such as death, immobilization, or serious incapacitation) in a given percent of the test organisms. If the effect is death or immobility, the term lethal concentration (LC) may be used. EC values may be calculated using point estimation techniques such as probit, logit, and Spearman-Karber. EC_{25} is the concentration of toxicant (in percent effluent) that causes a response in 25 percent of the test organisms.

C. Inhibition concentration (IC) is a point estimate of the toxicant concentration that would cause a given percent reduction in a nonlethal, nonquantal biological measurement, such as growth. For example, an IC_{25} is the estimated concentration of toxicant that would cause a 25 percent reduction in average young per female or growth. IC values may be calculated using a linear interpolation method such as USEPA's Bootstrap Procedure.

D. No observed effect concentration (NOEC) is the highest tested concentration of an effluent or a toxicant at which no adverse effects are observed on the aquatic test organisms at a specific time of observation. It is determined using hypothesis testing.

II. Chronic Toxicity Screening Phase Requirements

A. The Discharger shall perform screening phase monitoring:

1. Subsequent to any significant change in the nature of the effluent discharged through changes in sources or treatment, except those changes resulting from reductions in pollutant concentrations attributable to source control efforts, or

2. Prior to permit reissuance. Screening phase monitoring data shall be included in the NPDES permit application for reissuance. The information shall be as recent as possible, but may be based on screening phase monitoring conducted within 5 years before the permit expiration date.

B. Design of the screening phase shall, at a minimum, consist of the following elements:

1. Use of test species specified in **Appendix E-2**, attached, and use of the protocols referenced in those tables, or as approved by the Executive Officer.

2. Two stages:

a. Stage 1 shall consist of a minimum of one battery of tests conducted concurrently. Selection of the type of test species and minimum number of tests shall be based on **Appendix E-2** (attached).

b. Stage 2 shall consist of a minimum of two test batteries conducted at a monthly frequency using the three most sensitive species based on the Stage 1 test results and as approved by the Executive Officer.

3. Appropriate controls.

4. Concurrent reference toxicant tests.

5. Dilution series 100%, 50%, 25%, 10%, 5%, 0 %, where "%" is percent effluent as discharged, or as otherwise approved the Executive Officer.

C. The Discharger shall submit a screening phase proposal acceptable to the Executive Officer. The proposal shall address each of the elements listed above. If within 30 days, the Executive Officer does not comment, the Discharger shall commence with screening phase monitoring.

APPENDIX E-2
SUMMARY OF TOXICITY TEST SPECIES REQUIREMENTS

Critical Life Stage Toxicity Tests for Estuarine Waters

Species	(Scientific Name)	Effect	Test Duration	Reference
Alga	*(Skeletonema costatum)* *(Thalassiosira pseudonana)*	Growth rate	4 days	1
Red alga	*(Champia parvula)*	Number of cystocarps	7–9 days	3
Giant kelp	*(Macrocystis pyrifera)*	Percent germination; germ tube length	48 hours	2
Abalone	*(Haliotis rufescens)*	Abnormal shell development	48 hours	2
Oyster Mussel	*(Crassostrea gigas)* *(Mytilus edulis)*	Abnormal shell development; percent survival	48 hours	2
Echinoderms - Urchins Sand dollar	*(Strongylocentrotus purpuratus, S. franciscanus)* *(Dendraster excentricus)*	Percent fertilization	1 hour	2
Shrimp	*(Mysidopsis bahia)*	Percent survival; growth	7 days	3
Shrimp	*(Holmesimysis costata)*	Percent survival; growth	7 days	2
Topsmelt	*(Atherinops affinis)*	Percent survival; growth	7 days	2
Silversides	*(Menidia beryllina)*	Larval growth rate; percent survival	7 days	3

Toxicity Test References:

1. American Society for Testing Materials (ASTM). 1990. Standard Guide for Conducting Static 96-Hour Toxicity Tests with Microalgae. Procedure E 1218-90. ASTM, Philadelphia, PA.
2. Short-term Methods for Estimating the Chronic Toxicity of Effluent and Receiving Waters to West Coast Marine and Estuarine Organisms. EPA/600/R-95/136. August 1995.
3. Short-term Methods for Estimating the Chronic Toxicity of Effluent and Receiving Waters to Marine and Estuarine Organisms. EPA/600/4-90/003. July 1994.

Critical Life Stage Toxicity Tests for Fresh Waters

Species	(Scientific Name)	Effect	Test Duration	Reference
Fathead minnow	*(Pimephales promelas)*	Survival; growth rate	7 days	4
Water flea	*(Ceriodaphnia dubia)*	Survival; number of young	7 days	4
Alga	*(Selenastrum capricornutum)*	Cell division rate	4 days	4

Toxicity Test Reference:

4. Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, third edition. EPA/600/4-91/002. July 1994.

Toxicity Test Requirements for Stage One Screening Phase

Requirements	Receiving Water Characteristics		
	Discharges to Coast	Discharges to San Francisco Bay[2]	
	Ocean	Marine/Estuarine	Freshwater
Taxonomic diversity	1 plant 1 invertebrate 1 fish	1 plant 1 invertebrate 1 fish	1 plant 1 invertebrate 1 fish
Number of tests of each salinity type: Freshwater[1] Marine/Estuarine	 0 4	 1 or 2 3 or 4	 3 0
Total number of tests	4	5	3

[1] The freshwater species may be substituted with marine species if:

(a) The salinity of the effluent is above 1 part per thousand (ppt) greater than 95 percent of the time, or

(b) The ionic strength (TDS or conductivity) of the effluent at the test concentration used to determine compliance is documented to be toxic to the test species.

[2] (a) Marine/Estuarine refers to receiving water salinities greater than 1 ppt at least 95 percent of the time during a normal water year.

(b) Fresh refers to receiving water with salinities less than 1 ppt at least 95 percent of the time during a normal water year.

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ATTACHMENT F – FACT SHEET

As described in section II of this Order, this Fact Sheet includes the legal requirements and technical rationale that serve as the basis for the requirements of this Order.

This Order has been prepared under a standardized format to accommodate a broad range of discharge requirements for dischargers in California. Only those sections or subsections of this Order that are specifically identified as "not applicable" have been determined not to apply to this Discharger. All other sections or subsections of this Order apply fully to this Discharger.

I. PERMIT INFORMATION

The following table summarizes administrative information related to the Richmond Refinery.

Table F-1. Facility Information

WDID	2 071044001
Discharger	Chevron Products Company, a division of Chevron U.S.A. Inc. Chevron Chemical Company LLC, and General Chemical
Name of Facility	Richmond Refinery
Facility Address	841 Chevron Way
	Richmond, CA 94801
	Contra Costa County
Facility Contact, Title, Phone	Michael E. Coyle, General Manager, (510) 242-4400
Authorized Person to Sign and Submit Reports	Michael E. Coyle, General Manager, (510) 242-4400
Mailing Address	841 Chevron Way, Richmond, CA 94801
Billing Address	PO Box 1272, Richmond, CA 94802
Type of Facility	Petroleum Refinery
Major or Minor Facility	Major
Threat to Water Quality	1
Complexity	1A
Pretreatment Program	No
Reclamation Requirements	N/A
Facility Flow	Discharge Point No. 001: 27.5 million gallons per day (MGD) (maximum reported daily flow); 6.6 MGD (long-term average flow)
Watershed	San Francisco Bay
Receiving Water	San Pablo Bay and San Francisco Bay
Receiving Water Type	Estuarine

A. Chevron Products Company, a division of Chevron U.S.A., Inc, owns and operates the Richmond Refinery (hereinafter Facility). As described in Facility Description II.A, Chevron Chemical Company LLC discharges stormwater under this Order, and General Chemical routes wastewater and stormwater from the production of sulfuric acid to Chevron Products Company's wastewater treatment plant. Chevron Products Company, a division of Chevron U.S.A. Inc., Chevron Chemical Company LLC, and General Chemical are hereinafter collectively referred to as Discharger. 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. The Facility discharges treated wastewater and stormwater to San Pablo Bay and San Francisco Bay, waters of the United States, and is currently regulated by Order No. R2-2006-0035, which was adopted on June 14, 2006. Order No. R2-2006-0035 was amended by Order No. R2-2010-0057 (Amendment of Waste Discharge Requirements for San Francisco Bay Region Refineries), which amended effluent limitations for selenium. The Discharger is also regulated by Order No. R2-2007-0077 (NPDES Permit CA0038849) amended by Order No. R2-2011-0012, which supersedes all requirements on mercury and PCBs from wastewater discharges in the region. This Order does not affect Order No. R2-2007-0077, as amended.

C. The Discharger filed a Report of Waste Discharge and submitted an application for reissuance of its WDRs and NPDES permit on December 7, 2010.

II. FACILITY DESCRIPTION

A. Description of Wastewater Treatment or Controls

The discharge is made up of wastewater from the Chevron Richmond Refinery and General Chemical Corporation, Richmond Works. The major contributor of wastewater to the Facility is from the Chevron Richmond Refinery.

The Discharger owns and operates the Chevron Richmond Refinery, a petroleum refinery that produces a broad range of petroleum products and some petrochemicals. The Discharger reported that from May 2007 through April 2008 the refinery had a crude-run throughput of approximately 244,000 barrels per day (bbls/day). Refinery production rates can fluctuate for a variety of reasons, including maintenance shutdowns. Nonetheless, these data are consistent with more recent production data in 2010 of 228,000 bbls/day. The former Chevron Chemical Company Hensley Street and Castro Street Facility, managed by Chevron Environmental Management Company, is comprised of two locations referred to as the Hensley Street and Castro Street facilities. These locations were formerly used in the manufacture and formulation of fertilizers, pesticides, and fuel additives. These locations ceased operations about 15 years ago. The stormwater discharged from these areas is governed under this Order (Discharge Points 011 to 013). General Chemical, Richmond Works, produces sulfuric acid using spent alkylation acid and elemental sulfur. General Chemical's wastewater along with collected stormwater (which may include water from construction activities) is discharged to the wastewater treatment system for treatment.

The Chevron Richmond Refinery wastewater treatment system consists of an extensive network of drains, trunk lines, separators, and treatment areas servicing numerous plant areas throughout the refinery. Process water as well as non-process water from utility infrastructure and other operations enters the wastewater treatment system from many sources including process units, cooling water tower facilities and blowdown, fresh water treatment facilities (reverse osmosis plant), steam and electrical generation facilities, steam distribution systems, fire protection and safety systems, laboratories, and the General Chemical, Richmond Works, facility, as well as the recovered oil system and groundwater extraction systems. In addition, wastewater may also contain water generated from onsite and offsite activities including construction activities, marketing and pipeline activities, tank wash water, environmental remediation activities, inspection and maintenance activities, and other activities as described in the permit application. The average dry season flow is approximately 6.6 MGD, with wet season flows in excess of 20 MGD due to the introduction of processed stormwater. The Facility discharges treated process wastewater to San Pablo Bay through a submerged outfall and engineered diffuser via Discharge Point No. 001.

Process water is initially treated in one of three API separators (each servicing a distinct area of the refinery). Each separator consists of two or more parallel cells, not all of which are required depending on flow. Therefore, on any given day some cells may constitute auxiliary treatment consistent with 40 CFR 122.41(e). From the API separators, the Discharger routes wastewater to an aggressive biological treatment unit (ABTU) that consists of four quadrants. The first two quadrants provide biological treatment through aeration, while the next two quadrants are used as settling basins. The residence time of the ABTU is between 5 and 14 days. Treated wastewater from the ABTU may be routed to the 96-acre Richmond Refinery Enhancement Wetland pilot treatment facility, which the Discharger maintains as an adjunct effluent treatment process. The remaining bioreactor effluent, and typically all wetland effluent is routed through a granular activated carbon (GAC) facility that consists of 24 GAC vessels on 12 skids that may be operated in series (for normal operation) or parallel (during high flow conditions). The use of GAC units is flow dependent. Not all of the 24 units are typically required, and therefore, some of the single units may be considered auxiliary treatment pursuant to 40 CFR 122.41(e). The GAC facility serves to reduce effluent toxicity with the added benefit of some reduction in metals and hydrocarbons. Effluent is then routed to a compliance sampling station (E-001), and onward to San Pablo Bay. The discharge point is through a deepwater diffuser (average depth of 30 to 50 feet), approximately 2,000 feet offshore north of Point San Pablo. The Discharger has the option to discharge a portion of wetland effluent directly to Discharge Point No. 001 (downstream of the GAC facility) at a point prior to where representative samples for all parameters with effluent limits can be collected on the combined discharge, provided wetland effluent discharges do not exceed a daily maximum of 3 MGD, and do not cause acute toxicity.

Contact stormwater from the Facility is routed to one of the oil and water separators and/or may be sent to the ABTU directly and subsequently treated as described above. Stormwater from non-process industrial areas is collected in retention basins and can be discharged from the basins to the receiving water via several permitted stormwater outfalls discussed below. The stormwater retention basins can also be directed to the wastewater treatment system and/or the ABTU directly. Stormwater may include stormwater from construction activities, provided stormwater is discharged via controlled discharge points and the Discharger has updated its Stormwater Pollution Prevention Plan to show an equivalent level of protection as required by *NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities* Order No. 2009-0009-DWQ.

The Discharger uses tertiary treated recycled water from the East Bay Municipal Utility District's North Richmond Water Reclamation Plant in refinery cooling towers. Further, the East Bay Municipal Utility District owns and operates the Richmond Advanced Recycled Expansion (RARE) Facility, which is located at the Discharger's facility. The RARE facility treats secondary treated effluent from West County Wastewater District's Water Pollution Control Plant through microfiltration and reverse osmosis to produce high-purity recycled water suitable for boiler feedwater. Recycled water used onsite, and reverse osmosis reject water generated onsite may be discharged directly to the Discharger's wastewater treatment system.

B. Description of Stormwater Outfalls

1. **Discharge Point No. 002 (Richmond Long Wharf).** This controlled discharge consists of stormwater that falls on the wharf, and biologically-treated wastewater drawn from the wastewater treatment system. The use of biologically-treated wastewater in the Richmond Refinery fire protection system displaces vast quantities of potable water that would otherwise be required for these activities. The Discharger returns the majority of the water used to the

wastewater treatment plant, except for the portion used at the Richmond Long Wharf. Richmond Long Wharf discharges may also consist of bay water, residual steam condensate, and activities related to water rinsing the exterior of the Richmond Long Wharf pipelines. These routine discharges of biologically-treated wastewater (typically 0.0036 MG to 0.0128 MG) occur during housekeeping activities and tests of, or maintenance on, the fire protection system. The fire system testing discharges have occurred about once each week and last for about 10 minutes.

2. **Discharge Point No. 003 (North Yard Impoundment Basin).** This controlled discharge from an earthen basin consists mainly of stormwater, but other potential non-stormwater sources include incidental estimated quantities of 5,000 gallons of steam condensate, non-contact bay water, groundwater seepage, hydrotest water, and water from fire protection systems that may remain in the basin and mixes with stormwater during the controlled discharges. Hydrotest water is routed to the basin prior to being sent to the ABTU. Stormwater runoff originates from an area of approximately 407 acres from areas within the: Poleyard and Alkane Tankfields and adjacent hill sides; LPG and Ammonia Storage Facilities; Former Oxidation Ponds 2-5, Cracking and Hydroprocessing facilities and processing areas; and Hydropits Cap. The North Yard Impound Basin provides treatment of stormwater via physical settling. Before discharging, Chevron analyzes stormwater samples for compliance with its effluent limits. Once compliance is assured, Chevron opens a valve and discharges stormwater from this basin by gravity to San Pablo Bay. Discharge may also include water from Discharge Point-008.

3. **Discharge Point No. 004 (12-Basin).** This discharge consists of stormwater runoff from an area of approximately 3 acres in the former Point Orient Tankfield. 12-Basin discharges to San Francisco Bay. 12-Basin may also be transferred to the 10-Basin and discharged at Discharge Point No. 006.

4. **Discharge Point No. 005 (11-Basin).** This discharge consists of stormwater runoff from an area of approximately 4 acres located in a former Point Orient Tankfield area. Discharge Point No. 005 discharges into San Francisco Bay.

5. **Discharge Point No. 006 (10-Basin).** This discharge consists of stormwater runoff from an area of approximately 48 acres located in a former Point Orient Tankfield area. In addition, stormwater from 12-Basin (approximately 4 acres) and the Horse Pasture area (approximately 17 acres) may run onto the site. Discharge Point No. 006 discharges into San Francisco Bay.

6. **Discharge Point No. 007 (Horse Pasture, Basin 13).** This discharge consists of stormwater runoff from an area of approximately 17 acres located in a former Point Orient Tankfield area. Discharge Point No. 007 discharges into San Francisco Bay.

7. **Discharge Point No. 008 (Tank Field 100' Channel).** This controlled discharge from an earthen basin consists mainly of stormwater, but other residual sources may include steam condensate, groundwater seepage, hydrotest water, and water from the fire protection system. Hydrotest water is routed to the basin prior to being sent to the ABTU. Runoff originates from an area of approximately 496 acres in and around the Main Tankfield, Distillation and Reforming facilities, Main and South Yard areas, rail car loading areas, former Asphalt Plant area, and Cogeneration Facility. This earthen basin provides treatment of stormwater via

physical settling. Before discharging, Chevron analyzes stormwater samples for compliance with its effluent limits. Once compliance is assured, Chevron opens a valve and discharges stormwater from this basin by gravity to San Pablo Bay. This discharge may also be discharged as part of Discharge Point 003.

8. **Discharge Point No. 009 (8-Basin).** This controlled discharge from an earthen basin consists mainly of stormwater, but other residual sources may include steam condensate, groundwater seepage, hydrotest water, and water from the fire protection system. Hydrotest water is routed to the basin prior to being sent to the ABTU. Runoff originates from an area of approximately 26 acres within the Quarry Tankfield. During unusual circumstances (i.e., emergency based events, special conditions), non-stormwater may be stored in the basin. This non-stormwater will be dealt with in a manner acceptable to the Regional Water Board. This earthen basin provides treatment of stormwater via physical settling. Before discharging, Chevron analyzes stormwater samples for compliance with its effluent limits. Once compliance is assured, Chevron opens a valve and discharges stormwater from this basin by gravity to San Francisco Bay.

9. **Discharge Point No. 010 (Reclamation Area).** This discharge consists of stormwater runoff from an area of approximately 6 acres that is a portion of the Reclamation Yard area. Discharge Point No. 010 discharges into Wildcat Creek via the Gertrude Street Ditch, which then drains to Wildcat Creek, which drains to Castro Creek, a tributary of San Pablo Bay.

10. **Discharge Point No. 011 (Former Chevron Chemical Company Hensley Street Plant Runoff).** This controlled discharge consists mainly of stormwater runoff, but may include water from the following non-stormwater sources: groundwater, irrigation water, and potable water from the firewater system and facility wash downs. The stormwater runoff, which is drained from an area of approximately 36 acres within the former Chevron Chemical Company Hensley Street Plant, is collected at the Castro Acres surge pond (located along the east side of Castro Street).

    Water collected in the Castro Acres surge pond is not permitted to discharge to surface waters under typical rainfall conditions since the stormwater runoff may contain trace contaminants. Typically, the collected water is discharged to the Integrated Wastewater Pond System (IWPS), which provides necessary surge capacity before discharge to the City of Richmond's Wastewater Treatment Plant. However, during periods of high intensity rainfall (i.e., in excess of a 25-year, 24-hour rainfall event), a limited quantity of stormwater from the drainage area may be discharged from the Castro Acres surge pond into Castro Creek via a drainage ditch on the east side of Castro Street, identified as Discharge Point No. 011.

11. **Discharge Point No. 012 (Fertilizer Evaporation Pond).** This discharge consists of stormwater runoff from a clean-filled vegetative capped area. Runoff originates from an area of approximately 19 acres within the former Chevron Chemical Company's Castro Street facility, which was formerly used to manufacture fertilizer. Stormwater from this location is currently routed to the City of Richmond's Wastewater Treatment Plant. In the future, the Discharger may route stormwater from this area directly to Castro Creek.

12. **Discharge Point No. 013 (IWPS**). This discharge consists of stormwater from direct rainfall onto sections of the former Chevron Chemical Company's IWPS, an area of approximately

81 acres of synthetically-lined surface impoundments. Potential non-storm wastewaters include water from irrigation and groundwater. Depending on annual precipitation, various sections of the IWPS could receive flows from the former Chevron Chemical Company's Hensley Street Plant site and the Fertilizer Evaporation Pond. Contributing stormwater runoff from an adjacent 4-acre capped Class II waste management unit (Soil Management Unit No.1) may also commingle with stormwater from the IWPS. Stormwater (and associated non-stormwater discharges) are typically discharged to the City of Richmond's Wastewater Treatment Plant. With approval from the Executive Officer, Chevron may discharge from Discharge Point No. 013 to Castro Creek, a tributary of San Pablo Bay.

13. **Discharge Point No. 014 (Consolidation Area).** This discharge consists of stormwater runoff from a capped waste management unit area of approximately 5 acres. Runoff from the Consolidation Area is discharged to Castro Creek, a tributary of San Pablo Bay.

14. **Discharge Point No. 015 (1-Basin).** This discharge consists of stormwater runoff from an area of approximately 4 acres in a former tankfield area of the Office Hill Tankfield. Order No. R2-2006-0035 had indicated that the 1-Basin discharged through Discharge Point No. 015 to Discharge Point E-020. Historically, the Discharger used the 1-Basin as spill containment for tanks within the area. However, the Discharger has dismantled the tanks and there is no industrial activity in this area. The Discharger has requested that the 1-Basin be permitted to discharge through Discharge Point No. 020. Therefore, this Order requires that the Discharger evaluate compliance for discharges from this area at Discharge Point 020.

15. **Discharge Point No. 016 (2-Basin).** This discharge consists of stormwater runoff from an area of approximately 5 acres in a former tankfield area of the Office Hill Tankfield. Order No. R2-2006-0035 had indicated that the 2-Basin discharged through Discharge Point No. 016 to Discharge Point E-020. Historically, the 2-Basin was used as spill containment for tanks within the area. However, the Discharger has dismantled the tanks and there is no industrial activity in this area. The Discharger has requested that the 2-Basin be permitted to discharge through Discharge Point No. 020. Therefore, this Order requires that the Discharger evaluate compliance for discharges from this area at Discharge Point 020.

16. **Discharge Point No. 017 (3-Basin).** This controlled discharge (including 3A Basin discharge) from an earthen basin consists of stormwater runoff from an area of approximately 7 acres in a former tankfield area of the Office Hill Tankfield. Additional non-stormwater wastewaters include water from the fire protection system. This earthen basin provides treatment of stormwater via physical settling. Before discharging, Chevron analyzes stormwater samples for compliance with its effluent limits. Once compliance is assured, Chevron opens a valve and discharges stormwater from this basin by gravity to San Francisco Bay.

17. **Discharge Point No. 018 (9-Basin).** This controlled discharge from an earthen basin consists mainly of stormwater, but other residual sources may include steam condensate, hydrotest water, and water from the fire protection system. Hydrotest water is routed to the basin prior to being sent to the ABTU. Runoff originates from an area of approximately 29 acres in the Quarry Tankfield. This earthen basin provides treatment of stormwater via physical settling. Before discharging, Chevron analyzes stormwater samples for compliance with its effluent limits. Once compliance is assured, Chevron opens a valve and discharges stormwater from this basin by gravity to San Francisco Bay.

18. **Discharge Point No. 019 (7-Basin**). This controlled discharge from an earthen basin consists mainly of stormwater, but other residual sources may include steam condensate, hydrotest water, and water from the fire protection system. Hydrotest water is routed to the basin prior to being sent to the ABTU. Runoff originates from an area of approximately 20 acres in the SP Hill Tankfield. This earthen basin provides treatment of stormwater via physical settling. Before discharging, Chevron analyzes stormwater samples for compliance with its effluent limits. Once compliance is assured, Chevron opens a valve and discharges stormwater from this basin by gravity to San Francisco Bay.

19. **Discharge Point No. 020 (Castro Street, 1-Basin, 2-Basin).** This discharge consists of stormwater runoff from the City of Richmond's stormwater management system. Specifically, this discharge consists of: (1) stormwater runoff that drains an area of approximately 260 acres at Castro Street; (2) stormwater runoff from an area of approximately 4 acres in a former tankfield area of the Office Hill Tankfield that is collected at 1-Basin; and (3) stormwater runoff from an area of approximately 5 acres in a former tankfield area of the Office Hill Tankfield that is collected at 2-Basin. Stormwater from the three locations and water from the City of Richmond's storm sewers are routed to the Castro Street Pump Station. The Pump Station pumps water to Chevron's 38' Channel, which discharges into Castro Creek, which then flows to San Pablo Bay. In previous Orders, stormwater runoff from 1-Basin and 2-Basin were discharged through Discharge Point Nos. 015 and 016, respectively. However, as explained in section II.F.2 of this Fact Sheet, this Order permits the discharge of stormwater from 1-Basin and 2-Basin through Discharge Point No. 020.

20. **Discharge Point No. 021 (Landfill 15).** This discharge consists of stormwater runoff from a capped waste management unit area of approximately 41 acres. Runoff from Landfill 15 discharges to Castro Creek, a tributary of San Pablo Bay.

21. **Discharge Point No. 022 (Parr-Richmond).** This discharge consists of stormwater runoff from a capped waste management unit area of approximately 24 acres. Runoff from the Parr-Richmond Site discharges to Wildcat Creek and Gertrude Street ditch (which drains to Wildcat Creek). Wildcat Creek drains to Castro Creek, a tributary of San Pablo Bay.

22. **Discharge Point No. 023 (Gertrude Street**). This discharge consists of stormwater runoff from a 3-acre drainage area which collects at the Gertrude Street Ditch. Stormwater in the Gertrude Street Ditch discharges to Wildcat Creek, which drains to Castro Creek, a tributary of San Pablo Bay.

C. Discharge Points and Receiving Waters

The receiving water and the location of the discharge points are shown in Table F-2 below. Compliance monitoring is conducted at Monitoring Locations E-001 through E-023 as described in Attachment E, Monitoring and Reporting Program (MRP). San Pablo Bay is located in the San Pablo Bay Watershed.

Table F-2. Outfall Location

Discharge Point	Effluent Description	Discharge Point Latitude	Discharge Point Longitude	Receiving Water
001	Treated wastewater	37º 58’ 15” N	122º 25’ 45” W	San Pablo Bay
002	Richmond Long Wharf	37º 55’ 15” N	122º 24’ 30” W	San Francisco Bay
003	Stormwater	37º 57’ 15” N	122º 23’ 30” W	San Pablo Bay
004	Stormwater	37º 57’ 15” N	122º 24’ 45” W	San Francisco Bay
005	Stormwater	37º 57’ 30” N	122º 25’ 30” W	San Francisco Bay
006	Stormwater	37º 57’ 15” N	122º 25’ 15” W	San Francisco Bay
007	Stormwater	37º 57’ 15” N	122º 25’ 15” W	San Francisco Bay
008	Stormwater	37º 57’ 15” N	122º 23’ 30” W	San Pablo Bay
009	Stormwater	37º 56’ 00” N	122º 24’ 15” W	San Francisco Bay
010	Stormwater	37º 57’ 15” N	122º 22’ 45” W	Gertrude Street Ditch to Wildcat Creek to Castro Creek to San Pablo Bay
011	Stormwater	37º 56’ 45” N	122º 22’ 30” W	Castro Creek to San Pablo Bay
012	Stormwater	37º 56’ 45” N	122º 22’ 30” W	Castro Creek to San Pablo Bay
013	Stormwater	37º 57’ 00” N	122º 22’ 45” W	Castro Creek to San Pablo Bay
014	Stormwater	37º 57’ 00” N	122º 22’ 45” W	Castro Creek to San Pablo Bay
015	Stormwater	37º 55’ 60” N	122º 23’ 30” W	38’ Channel to San Pablo Bay via 020
016	Stormwater	37º 55’ 60” N	122º 23’ 30” W	38’ Channel to San Pablo Bay via 020
017	Stormwater	37º 55’ 45” N	122º 24’ 30” W	San Francisco Bay
018	Stormwater	37º 55’ 45” N	122º 24’ 00” W	San Francisco Bay
019	Stormwater	37º 57’ 30” N	122º 25’ 30” W	San Francisco Bay
020	Stormwater	37º 57’ 15” N	122º 23’ 15” W	Castro Creek to San Pablo Bay
021	Stormwater	37º 56’ 45” N	122º 22’ 30” W	Castro Creek to San Pablo Bay
022	Stormwater	37º 57’ 15” N	122º 22’ 45” W	Gertrude Street Ditch to Wildcat Creek to Castro Creek to San Pablo Bay
023	Stormwater	37º 57’ 15” N	122º 22’ 45” W	Gertrude Street Ditch to Wildcat Creek to Castro Creek to San Pablo Bay

D. Summary of Existing Requirements and Self-Monitoring Report (SMR) Data

1. **Effluent Limitations and Monitoring Data at Discharge Point No. 001.** Effluent limitations for discharges to San Pablo Bay contained in the previous Order, and representative monitoring data for Discharge Point No. 001 are as follows:

Table F-3. Historical Effluent Limitations and Monitoring Data for Conventional and Non-Conventional Pollutants for Discharge Point No. 001

Parameter	Units	Effluent Limitations		Monitoring Data (From June 2006 to November 2010)[1]	
		Monthly Average	Daily Maximum	Highest Monthly Average	Highest Daily Discharge
Biochemical Oxygen Demand (5-day @ 20 °C) (BOD)	lbs/day	5,100	9,600	3,072	3,072
Total Suspended Solids (TSS)	lbs/day	4,200	6,600	1,471	1,471
Total Organic Carbon (TOC)	lbs/day	11,000	21,000	2,274	2,274
Oil and Grease	lbs/day	1,600	3,000	194	194
	mg/L	8	15	3.53	3.53
Phenolic Compounds	lbs/day	22	70	2.3	2.3
Ammonia as N	lbs/day	1,900	4,200	368	368
Sulfide	lbs/day	28	62	4.2	4.2
Settleable Solids	mL/L-hr	0.1	0.2	<0.1	<0.1
Total Chromium	lbs/day	25	72	1.1	1.1
Hexavalent Chromium	lbs/day	2.1	4.6	0.33	0.33
pH	standard units	6.0 – 9.0		6.1 – 8.9	

NR = Not Reported
[1] As reported in the Report of Waste Discharge.

Table F-4. Historical Effluent Limitations and Monitoring Data for Toxic Pollutants at Discharge Point No. 001

Parameter	Units	Final Limits		Interim Limits[1]		Monitoring Data (From September 2005 to March 2010)
		Daily Maximum	Monthly Average	Daily Maximum	Monthly Average	Highest Daily Concentration
Copper	µg/L	25	13	--	--	6.2
Lead	µg/L	15	7.4	--	--	1.7
Mercury[1]	µg/L	0.046	0.017	--	0.075	0.070
Nickel	µg/L	66	45	--	--	27
Selenium[1]	µg/L	7.4	4.4	34	--	47
Cyanide[1]	µg/L	6.4	3.7	25	--	21
Heptachlor Epoxide	µg/L	0.0018	0.00088	--	--	ND (0.002)[2]
Polychlorinated Biphenyls (PCBs) (Sum) [1]	µg/L	0.00034	0.00017	0.5	--	ND (0.02)[2]
TCDD Equivalents[3]	µg/L	--	--	1.0×10^{-7}	--	4.6×10^{-8}
Acute Toxicity	Percent	--	[4]	--	--	98[5]/98[6]
Chronic Toxicity	TUc	--	[7]	--	--	7.6[8]/8.8[9]

[1] Interim limits were effective until April 27, 2010, for cyanide, selenium, and mercury; and interim limits for PCBs were effective until May 17, 2010. For selenium, Order No. R2-2010-0057 (permit amendment for selenium) required that the Discharger not exceed an annual running average for selenium of 0.92 kg/day. In 2010, the Discharger's annual running average ranged from 0.29 to 0.38 kg/day, which was well below the prescribed mass limit.
[2] Analyte not detected in effluent. Number is the lowest method detection limit (MDL) as reported by the analytical laboratory.
[3] The interim limit shall remain effective until June 30, 2011, or until the Board amends the limits based on site-specific objectives on the Waste Load Allocations in the TMDLs.
[4] The survival of bioassay test organisms in 96-hour bioassays of undiluted effluent shall be: (1) an 11 sample median value of not less than 90% survival; and (2) an 11 sample 90th percentile value of not less than 70% survival.
[5] Minimum 11-sample median percent survival. Compliance data collected between January 2009 and January 2010.
[6] Minimum 11-sample 90th percentile survival. Compliance data collected between January 2009 and January 2010.
[7] The survival of bioassay test organisms in the discharge shall be: (1) a three-sample median value equal to or less than 10 TUc; and (2) a single-sample value equal to or less than 20 TUc.
[8] Maximum three sample median of compliance data collected from August 2006 through December 2009.
[9] Maximum single sample value of compliance data collected from August 2006 through December 2009.

3. Stormwater Data from Discharge Points 002-023

The following tables include the quality of stormwater runoff from June 2006 through November 2010. During this period, the Discharger did not discharge to San Pablo Bay or San Francisco Bay from several discharge points, and therefore, summary data is not available for these outfalls.

a. Discharge Point No. 002, Richmond Long Wharf

Table F-5 – E-002 Monitoring Data

Pollutant	MAX	AVG	Units
HEM[1]	7.5	2.57	mg/L
pH	8.6	7.9	S.U.
Specific Conductance (EC)	44,800	8,519	umhos/cm
Total Organic Carbon	23.9	14.4	mg/L
Total Suspended Solids	105	23.4	mg/L

[1] HEM = Hexane Extractable Material (Oil & Grease)

b. Discharge Point No. 003, North Yard Impound Basin

Table F-6 – E-003 Monitoring Data

Pollutant	MAX	AVG	Units
HEM	3.39	1.02	mg/L
pH	7.43	7.27	S.U.
Specific Conductance (EC)	2070	1402	umhos/cm
Total Organic Carbon	11.86	10.11	mg/L
Total Suspended Solids	74.80	39.95	mg/L

c. Discharge Point Nos. 004 – 007 (10-13 Basins). These basins are located on the west side of the San Pablo Peninsula ridge. In this area, the Discharger indicates that all tanks associated with operations were dismantled, and that all operations ceased by 1996. Because there is no industrial activity and past samples show that discharges from these areas comply with effluent limits, Order No. R2-2006-0035 did not require monitoring of these basins.

d. **Discharge Point No. 008, Tank Field.** The Discharger indicates that operationally it is easier to route stormwater from this area directly to its wastewater treatment plant. For this reason, there were no discharges from this location in the last five years.

e. **Discharge Point No. 009, 8 Basin**

Table F-7 – E-009 Monitoring Data

Pollutant	MAX	AVG	Units
HEM	3.1	0.31	mg/L
pH	8.47	7.99	S.U.
Specific Conductance	1681	891.7	umhos/cm
Total Organic Carbon	22.42	9.14	mg/L
Total Suspended Solids	133	21.41	mg/L

f. **Discharge Point No. 010, Reclamation Area**

Table F-8 – E-010 Monitoring Data

Pollutant	MAX	AVG	Units
HEM	4.82	1.06	mg/L
pH	8.73	8.19	S.U.
Specific Conductance (EC)	578	258	umhos/cm
Total Organic Carbon	9.02	4.12	mg/L
Total Suspended Solids	582	119	mg/L

g. **Discharge Point Nos. 011 – 013**. The Discharger has not discharged from these locations in the last five years. This is because operationally the Discharger has chosen to route stormwater from these locations to the City of Richmond's wastewater treatment plant. To discharge stormwater from Discharge Points 011 and 013, the Discharger must document that it only contains non-contaminated stormwater and receive approval from the Executive Officer.

h. **Discharge Point No. 014, Consolidation Area**

Table F-9 – E-014 Monitoring Data

Pollutant	MAX	AVG	Units
HEM	3.57	3.57	mg/L
pH	8.47	7.74	S.U.
Specific Conductance (EC)	3,590	778	umhos/cm
Total Organic Carbon	39	18	mg/L
Total Suspended Solids	63	13	mg/L

i. **Discharge Point Nos. 015 and 016 (1-Basin and 2-Basin).** During the past five years, the Discharger has chosen to route stormwater from these locations to its wastewater treatment

plant. This is because operationally these are difficult locations to access and collect samples.

j. Discharge Point No. 017, 3-Basin

Table F-10 – E-017 Monitoring Data

Pollutant	MAX	AVG	Units
HEM	1.52	0.38	mg/L
pH	7.32	7.17	S.U.
Specific Conductance (EC)	159	155	umhos/cm
Total Organic Carbon	12.40	10.66	mg/L
Total Suspended Solids	14.00	9.60	mg/L

k. Discharge Point No. 018, 9-Basin

Table F-11 – E-018 Monitoring Data

Pollutant	MAX	AVG	Units
HEM	1.94	0.45	mg/L
pH	8.40	7.99	S.U.
Specific Conductance (EC)	696	587	umhos/cm
Total Organic Carbon	10.37	8.88	mg/L
Total Suspended Solids	43.25	9.98	mg/L

l. Discharge Point No. 019, 7-Basin

Table F-12 – E-019 Monitoring Data

Pollutant	MAX	AVG	Units
HEM	2.21	0.96	mg/L
pH	7.53	7.41	S.U.
Specific Conductance (EC)	2980	1761	umhos/cm
Total Organic Carbon	20.28	13.98	mg/L
Total Suspended Solids	43.50	19.70	mg/L

m. Discharge No. Point 020, Castro Street

Table F-13 – E-020 Monitoring Data

Pollutant	MAX	AVG	Units
HEM	3.0	1.0	mg/L
pH	7.9	7.5	S.U.
Specific Conductance (EC)	4330	2449	umhos/cm
Total Organic Carbon	12.5	7.7	mg/L
Total Suspended Solids	91.2	31.8	mg/L

n. Discharge Point No. 021, Landfill 15

Table F-14 – E-021 Monitoring Data

Pollutant	MAX	AVG	Units
HEM	1.83	0.20	mg/L
pH	8.31	7.95	S.U.
Specific Conductance (EC)	703	363	umhos/cm
Total Organic Carbon	19	8.12	mg/L
Total Suspended Solids	35.60	11.91	mg/L

o. Discharge Point No. 022, Parr-Richmond

Table F-15 – E-022 Monitoring Data

Pollutant	MAX	AVG	Units
HEM	2.27	0.83	mg/L
pH	7.74	7.60	S.U.
Specific Conductance (EC)	56	40	umhos/cm
Total Organic Carbon	3.46	2.30	mg/L
Total Suspended Solids	90	33.88	mg/L

p. Discharge Point No. 023, Gertrude Street

Table F-16 – E-023 Monitoring Data

Pollutant	MAX	AVG	Units
HEM	1.76	0.25	mg/L
pH	7.74	7.40	S.U.
Specific Conductance (EC)	971	288	umhos/cm
Total Organic Carbon	9.36	5.22	mg/L
Total Suspended Solids	27.67	7.37	mg/L

E. Compliance Summary

1. **Compliance and Enforcement.** The Discharger violated its daily maximum effluent limit for selenium in May 2008, and submitted its 2008 Annual Stormwater Report more than 30 days late. To address these violations, the Regional Water Board issued a Notice of Violation, dated February 5, 2009, that also allowed the Discharger to settle these violations by offering a payment of $6,000. The Discharger made payment on June 19, 2009.

   Additionally, the Discharger violated its pH limitation at Discharge Point 010 (Stormwater outfall). On December 12, 2009, the Discharger reported a value of 8.73, which exceeded the maximum pH allowed of 8.5. The Regional Water Board has chosen not to formally address this violation, in part, because the excursion was of a small magnitude, and therefore, was not subject to a mandatory penalty under Section 13385(h) and (i) of the California Water Code.

2. **Reported Spills.** The Discharger reported 24 spills of toxic or hazardous pollutants at the Facility between July 9, 2007, through November 29, 2010. Of the 24 reported spills within

this time frame, six of the spills were directly to the San Francisco Bay. The largest spill to surface waters consisted of 2 gallons of oil and water mixture.

F. Planned Changes

1. **Modification to North Yard Impoundment Basin.** The Discharger plans to make modifications to the North Yard Impound Basin in order to collect stormwater draining from the areas known as Passes 2 through 5. These modifications are being undertaken in order to comply with the requirements of Order No. R2-2006-0078, which requires remediation of sediment in a portion of Castro Cove. These areas were formerly elements of an oxidation pond that is currently being remediated according to general clean closure standards for closure and post-closure site requirements contained in Title 27. Modifications will be made such that surface water from Passes 2 through 5 drain to the North Yard Impoundment Basin. Groundwater will be pumped to the Aggressive Biological Treatment System.

2. **Discharge Point 012.** The Discharger proposes to modify, within the next five years, the location of stormwater discharges at Discharge Point 012. This potential discharge would consist of stormwater runoff from an area of approximately 19 acres within the former Chevron Chemical Company LLC's Castro Street facility that was historically used to manufacture fertilizer until 1996. In 2002, the Discharger filled the former fertilizer pond and topped it with a vegetative cap. The Discharger is proposing to regrade this area so stormwater would drain to a vegetated swale before discharge to Castro Creek. As no industrial activity occurs in this area, the Discharger indicates that the quality of stormwater runoff should be comparable to other undeveloped areas at the facility.

III. APPLICABLE PLANS, POLICIES, AND REGULATIONS

The requirements in this Order are based on the requirements and authorities described in this section.

A. Legal Authorities

This Order is issued pursuant to federal Clean Water Act (CWA) section 402 and implements regulations adopted by United States Environmental Protection Agency (USEPA), and pursuant to California Water Code (CWC) Chapter 5.5, Division 7 (commencing with section 13370). It shall serve as an NPDES permit for point source discharges from this facility to surface waters. This Order also serves as Waste Discharge Requirements (WDRs) pursuant to CWC Article 4, Chapter 4, Division 7 (commencing with section 13260).

B. California Environmental Quality Act (CEQA)

Under CWC section 13389, this action to adopt an NPDES permit is exempt from CEQA provisions.

C. State and Federal Regulations, Policies, and Plans

1. **Water Quality Control Plans.** *The Water Quality Control Plan for the San Francisco Bay Basin* (hereinafter Basin Plan) is the Regional Water Quality Control Board, San Francisco Bay Region's (Regional Water Board's) master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State, including

surface waters and groundwater. It also includes programs of implementation to achieve the water quality objectives. The Basin Plan was duly adopted by the Regional Water Board and approved by the State Water Quality Control Board (State Water Board), the Office of Administrative Law (OAL), and USEPA, as required. Requirements of this Order implement the Basin Plan.

The State Water Board's *Water Quality Control Plan for Enclosed Bays and Estuaries – Part 1, Sediment Quality* became effective on August 25, 2009. This plan supersedes other narrative sediment quality objectives, and establishes new sediment quality objectives and related implementation provisions for specifically defined sediments in most bays and estuaries.

2. **National Toxics Rule (NTR) and California Toxics Rule (CTR).** USEPA adopted the NTR on December 22, 1992, which was amended on May 4, 1995, and November 9, 1999. About forty criteria in the NTR applied in California. On May 18, 2000, USEPA adopted the CTR. The CTR promulgated new toxics criteria for California and, in addition, incorporated the previously adopted NTR criteria that applied in the State. The CTR was amended on February 13, 2001. These rules contain water quality criteria for priority toxic pollutants that apply to San Pablo Bay.

3. **State Implementation Policy.** On March 2, 2000, the State Water Board adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (State Implementation Policy or SIP*).* The SIP became effective on April 28, 2000, with respect to the priority pollutant criteria USEPA promulgated for California through the NTR and to the priority pollutant objectives the Regional Water Board established in the Basin Plan. The SIP became effective on May 18, 2000, with respect to the priority pollutant criteria USEPA promulgated through the CTR. On February 24, 2005, the State Water Board adopted amendments to the SIP that became effective on July 13, 2005. The SIP establishes implementation provisions for priority pollutant objectives and provisions for chronic toxicity control. Requirements of this Order implement the SIP.

4. **Alaska Rule.** On March 30, 2000, USEPA revised its regulation that specifies when new and revised State and tribal water quality standards (WQS) become effective for CWA purposes [65 Fed. Reg. 24641 (April 27, 2000) (codified at 40 CFR 131.21)]. Under the revised regulation (also known as the Alaska Rule), USEPA must approve any new and revised standards submitted to USEPA after May 30, 2000, before they can be 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.

5. **Antidegradation Policy.** 40 CFR 131.12 requires that State water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy through State Water Board Resolution 68-16, which incorporates the federal antidegradation policy where the federal policy applies under federal law. It also requires that existing water quality be maintained unless degradation is justified based on specific findings. The Regional Water Board's Basin Plan implements, and incorporates by reference, both the State and federal antidegradation policies. The permitted discharge must be consistent with the antidegradation provisions of 40 CFR 131.12 and State Water Board Resolution No. 68-16. Antidegradation is discussed further in Fact Sheet section IV.D.2.

6. **Anti-Backsliding Requirements.** CWA sections 402(o)(2) and 303(d)(4) and 40 CFR 122.44(l) prohibit backsliding in NPDES permits. These anti-backsliding provisions require that effluent limitations in a reissued permit be as stringent as those in the previous permits, with some exceptions where limitations may be relaxed. Some effluent limitations in this Order are less stringent than those in the previous Order. Anti-backsliding is discussed further in Fact Sheet section IV.D.1.

D. Impaired Water Bodies on CWA 303(d) List

In November 2006, the USEPA approved a revised list of impaired water bodies prepared by the State [hereinafter referred to as the 303(d) list], prepared pursuant to provisions of CWA section 303(d), which requires identification of specific water bodies where it is expected that water quality standards will not be met after implementation of technology-based effluent limitations on point sources. San Pablo Bay and Central San Francisco Bay are listed as an impaired waterbody for chlordane, DDT, dieldrin, dioxin compounds, invasive species, furan compounds, mercury, PCBs, dioxin-like PCBs, and selenium. The SIP requires final effluent limitations for all 303(d)-listed pollutants to be consistent with total maximum daily loads (TMDLs) and associated waste load allocations. The Regional Water Board plans to adopt TMDLs for pollutants on the 303(d) list. On February 12, 2008, USEPA approved a TMDL for mercury in San Francisco Bay. On March 29, 2010, USEPA approved a TMDL for PCBs in San Francisco Bay. Regional Water Board Order No. R2-2007-0077, as amended, implements these TMDLs.

IV. RATIONALE FOR EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

The CWA requires point source dischargers to control the amount of conventional, non-conventional, and toxic pollutants discharged into waters of the United States. The control of pollutants discharged is established through effluent limitations and other requirements in NPDES permits. There are two principal bases for effluent limitations in the NPDES regulations: 40 CFR 122.44(a) requires that permits include applicable technology-based limitations and standards; and 40 CFR 122.44(d) requires that permits include water quality-based effluent limitations to attain and maintain applicable numeric and narrative water quality criteria to protect the beneficial uses of the receiving water. Where reasonable potential has been established for a pollutant, but there is no numeric objective for the pollutant, water quality-based effluent limitations may be established: (1) using USEPA criteria guidance under CWA section 304(a), supplemented where necessary by other relevant information; (2) on an indicator parameter for the pollutant of concern; or (3) using 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 40 CFR 122.44(d)(1)(vi).

A. Discharge Prohibitions

1. **Discharge Prohibition III.A (No discharge different from that described in this Order):** This prohibition is the same as in the previous Order and is based on 40 CFR 122.21(a), duty to apply, and CWC section 13260, which requires filing a Report of Waste Discharge before discharges can occur. Discharges not described in the Report of Waste Discharge, and subsequently in this Order, are prohibited.

2. **Discharge Prohibition III.B (Discharge that does not receive a minimum 34:1 dilution):** This Order allows a conservative estimate of the actual initial dilution of 34:1 to calculate WQBELs for ammonia. This is discussed further in section IV.C.4.b of this Order. These

WQBELs would not be protective of water quality if the discharge did not actually achieve at least a 34:1 minimum initial dilution, thus this prohibition is necessary and warranted.

This Order permits discharge of stormwater from 20 outfalls that do not provide an initial dilution of at least 10:1. Though Discharge Prohibition No. 1 of the Basin Plan prohibits discharges having characteristics of particular concern that do not receive a minimum 10:1 initial dilution, the Basin Plan further indicates that the prohibition is to address discharges of treated sewage and other discharges where the treatment process is subject to upset. Since these stormwater discharges do not contain treated sewage or wastewater from a treatment process subject to upset, the prohibition does not apply to these stormwater discharges.

3. **Discharge Prohibition III.C (No bypass or overflow of untreated or partially treated wastewaters):** This prohibition is retained from the previous Order and based on 40 CFR 122.41(m) (see federal Standard Provisions, Attachment D).

4. **Discharge Prohibition III.D (No discharge except during 25-year, 24-hour storm event):** This prohibition is retained from the previous Order. The drainage area for Discharge Point No. 011 includes the site of the former Chevron Chemical Company and may contain contaminated stormwater. This prohibition is necessary to minimize the potential for the discharge of contaminated stormwater.

5. **Discharge Prohibition III.E (No discharge without Executive Officer approval):** This prohibition is retained from the previous Order and is necessary to ensure that contaminated stormwater is not discharged from this basin (Discharge Point 013) in the event of an extreme storm event.

6. **Discharge Prohibition III.F (No discharge of wetland effluent directly to Discharge Point No. 001):** This prohibition is retained from the previous Order and necessary to ensure adequate treatment of wastewater discharged to the receiving water.

B. Technology-Based Effluent Limitations

1. Scope and Authority

CWA section 301(b) and 40 CFR 122.44(a) require that permits include applicable technology-based limitations based on several levels of control:

a. Best practicable treatment control technology (BPT) represents the average of the best performance by plants within an industrial category or subcategory. BPT standards apply to toxic, conventional, and non-conventional pollutants. Conventional pollutants include BOD, TSS, pH, and oil and grease.

b. Best available technology economically achievable (BAT) represents the best existing performance of treatment technologies that are economically achievable within an industrial point source category. BAT standards apply to toxic and non-conventional pollutants.

c. Best conventional control technology (BCT) represents the control from existing industrial point sources of conventional pollutants. The BCT standard is established after considering

the "cost reasonableness" of the relationship between the cost of attaining a reduction in effluent discharge and the benefits that would result, and also the cost effectiveness of additional industrial treatment beyond BPT.

d. New source performance standards (NSPS) represent the best available demonstrated control technology standards for new sources. The intent of NSPS guidelines is to set limitations that represent state-of-the-art treatment technology for new sources.

Where USEPA has not yet developed technology-based standards for a particular industry or a particular pollutant, CWA section 402(a)(1) and 40 CFR 125.3 authorize the use of BPJ to derive technology-based effluent limitations on a case-by-case basis. When BPJ is used, the permit must reflect specific factors outlined at 40 CFR 125.3.

USEPA has established standards of performance (technology-based limitations and standards) for the petroleum refining industry at 40 CFR 419, *Effluent Limitations Guidelines for the Petroleum Refining Point Source Category*. Subpart E of these regulations for the Integrated Subcategory apply to discharges from the Facility and have been used to develop limitations and requirements of this Order.

2. Applicable Technology-Based Effluent Limitations

a. Technology-Based Effluent Limitations – Discharge Point No. 001

i. Process Wastewater Mass-Based Effluent Limitations

40 CFR 419 Subpart E requires that technology-based effluent limitations for Discharge Point No. 001 be derived based on refinery production (the total crude oil throughput of the Facility) and the treatment processes used. The Facility currently operates with a maximum crude oil throughput of 244,000 bbls/day. Attachment F-1 presents the derivation of the production-based effluent limitations based on 40 CFR 419 Subpart E.

ii. Effluent Limitation Allocations for Contaminated Runoff and Ballast Water

Additional effluent limitation allocations for contaminated runoff commingled with process wastewater are developed from requirements in 40 CFR 419.53(f)(2) and 419.52(e)(2). These allocations are in addition to the process wastewater mass-based limitations. A full description of the additional effluent limitation allocations for Discharge Point No. 001 can be found in Attachment F-1 to this Order.

Additional ballast water (i.e., cargo hold wash water) effluent limitation allocations are developed from requirements in 40 CFR 419.52(c), 419.53(d), and 419.54(c). These allocations are in addition to the process wastewater mass-based limitations. A full description of the additional effluent limitation allocations for Discharge Point No. 001 can be found in Attachment F-1 to this Order.

C. Water Quality-Based Effluent Limitations (WQBELs) for Toxic Substances

1. Scope and Authority

a. 40 CFR 122.44(d)(1)(i) requires permits to include WQBELs for pollutants (including toxicity) that are or may be discharged at levels that cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard (Reasonable Potential). The process for determining Reasonable Potential and, when necessary, calculating WQBELs is intended to (1) protect the designated beneficial uses of the receiving water, and (2) achieve applicable WQOs in the CTR, NTR, and the Basin Plan.

b. NPDES regulations and the SIP provide the basis to establish Maximum Daily Effluent Limitations (MDELs).

i. NPDES Regulations. 40 CFR 122.45(d) states "For continuous discharges all permit effluent limitations, standards, and prohibitions, including those necessary to achieve water quality standards, shall *unless impracticable* be stated as maximum daily and average monthly discharge limitations for all discharges other than publicly owned treatment works."

ii. SIP. SIP section 1.4 requires that WQBELs be expressed as MDELs and average monthly effluent limitations (AMELs).

2. Applicable Beneficial Uses and Water Quality Objectives

a. The Basin Plan implements State Water Board Resolution No. 88-63, which establishes State policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal or domestic supply (MUN). Because of the marine influence on receiving waters of San Francisco Bay, total dissolved solids levels in San Francisco Bay commonly (and often significantly) exceed 3,000 mg/L and thereby meet an exception to State Water Board Resolution No. 88-63. The designation MUN does not apply to the San Pablo Bay. Beneficial uses applicable to the San Pablo Bay and Central San Francisco Bay are as follows:

Table F-17. Basin Plan Beneficial Uses

Discharge Point	Receiving Water Name	Beneficial Use(s)
001, 003, 008, 010-014, and 020-023	San Pablo Bay	Industrial Service Supply (IND) Ocean, Commercial and Sport Fishing (COMM) Shellfish Harvesting (SHELL) Estuarine Habitat (EST) Fish Migration (MIGR) Preservation of Rare and Endangered Species (RARE) Fish Spawning (SPWN) Wildlife Habitat (WILD) Water Contact Recreation (REC1) Non-Contact Water Recreation (REC2) Navigation (NAV)

Discharge Point	Receiving Water Name	Beneficial Use(s)
002, 004-007, 009, and 017-019	Central San Francisco Bay	Industrial Service Supply (IND) Industrial Process Supply (PRO) Ocean, Commercial and Sport Fishing (COMM) Shellfish Harvesting (SHELL) Estuarine Habitat (EST) Fish Migration (MIGR) Preservation of Rare and Endangered Species (RARE) Fish Spawning (SPWN) Wildlife Habitat (WILD) Water Contact Recreation (REC1) Non-Contact Water Recreation (REC2) Navigation (NAV)

b. The WQOs applicable to the receiving waters for this discharge are from the Basin Plan; the CTR, established by USEPA at 40 CFR 131.38; and the NTR, established by USEPA at 40 CFR 131.36. Some pollutants have WQOs established by more than one of these three sources.

i. Basin Plan. The Basin Plan specifies numeric WQOs for 10 priority toxic pollutants, as well as narrative WQOs for toxicity and bioaccumulation in order to protect beneficial uses. The pollutants for which the Basin Plan specifies numeric objectives are arsenic, cadmium, hexavalent chromium, copper in freshwater, lead, mercury, nickel, silver, zinc, and cyanide. The Basin Plan's narrative toxicity objective (section 3.3.18) states in part, "[a]ll waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce other detrimental responses in aquatic organisms." The bioaccumulation objective states in part, "[c]ontrollable water quality factors shall not cause a detrimental increase in concentrations of toxic substances found in bottom sediments or aquatic life. Effects on aquatic organisms, wildlife, and human health will be considered."

Effluent limitations and provisions contained in this Order are based on available information to implement these objectives.

ii. CTR. The CTR specifies numeric aquatic life criteria for 23 priority toxic pollutants and numeric human health criteria for 57 priority toxic pollutants. These criteria apply to all inland surface waters and enclosed bays and estuaries of the San Francisco Bay Region, although Basin Plan Tables 3-3 and 3-4 include numeric objectives for certain priority toxic pollutants that supersede CTR criteria north of the Dumbarton Bridge.

iii. NTR. The NTR establishes numeric aquatic life criteria for selenium, numeric aquatic life and human health criteria for 33 other toxic organic pollutants for waters of San Pablo Bay. These NTR criteria apply to San Pablo Bay, the receiving water for Discharge Point No. 001 for this Discharger.

iv. Technical Support Document for Water Quality-Based Toxics Controls. Where numeric objectives have not been established or updated in the Basin Plan, 40 CFR 122.44(d) requires that WQBELs be established based on USEPA criteria,

supplemented where necessary by other relevant information, to attain and maintain narrative WQOs to fully protect designated beneficial uses. To determine the need for WQBELs and establish them when necessary, the Regional Water Board has followed the requirements of applicable NPDES regulations, including 40 CFR 122 and 131, as well as guidance and requirements established by the Basin Plan; USEPA's *Technical Support Document for Water Quality-Based Toxics Control* (the TSD, EPA/505/2-90-001, 1991); and the State Water Board's *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California, 2005* (SIP).

v. **Sediment Quality Objectives.** The Water Quality Control Plan for Enclosed Bays and Estuaries—Part 1, Sediment Quality contains a narrative WQO, "Pollutants in sediments shall not be present in quantities that, alone or in combination, are toxic to benthic communities in bays and estuaries of California." This WQO is to be implemented by integrating three lines of evidence: sediment toxicity, benthic community condition, and sediment chemistry. The Policy requires that if the Regional Water Board determines that a discharge has reasonable potential to cause or contribute to an exceedance of this WQO, it is to impose the WQO as a receiving water limit.

vi. **Basin Plan Receiving Water Salinity Policy and Hardness.** The Basin Plan states that the salinity characteristics (i.e., freshwater vs. saltwater) of the receiving water shall be considered in determining the applicable WQO. Freshwater criteria shall apply to discharges to waters with salinities equal to or less than one ppt at least 95 percent of the time. Saltwater criteria shall apply to discharges to waters with salinities equal to or greater than 10 ppt at least 95 percent of the time in a normal water year. For discharges to water with salinities in between these two categories, or tidally influenced freshwaters that support estuarine beneficial uses, the criteria shall be the lower of the salt or freshwater criteria, (the latter calculated based on ambient hardness), for each substance.

The receiving water for the subject discharge is San Pablo Bay, which is a tidally influenced waterbody, with significant fresh water inflows during the wet weather season. San Pablo Bay is specifically defined as estuarine under the Basin Plan salinity definition. Therefore, the effluent limitations specified in this Order for discharges to San Pablo Bay are based on the lower of the marine and freshwater Basin Plan WQOs and CTR and NTR WQC. Some WQOs and WQC are hardness dependent. Hardness data collected through the RMP are available for water bodies in the San Francisco Bay Region. In determining the WQOs and WQC for this Order, the Regional Water Board used a hardness of 59 mg/L, which is the minimum hardness at the Pinole Point Station observed from 1993-2008. This represents the best available information for hardness of the receiving water after it has mixed with the discharge.

vii. **Site-Specific Metal Translators.** 40 CFR 122.45(c) requires effluent limitations for metals to be expressed as total recoverable metal. Because applicable water quality criteria for the metals are typically expressed in the dissolved form, factors or translators must be used to convert metals concentrations from dissolved to total recoverable and vice versa. In the CTR, USEPA establishes default translators that are used in NPDES permitting activities; however, site-specific conditions, such as water temperature, pH, suspended solids, and organic carbon, greatly impact the form of

metal (dissolved, filterable, or otherwise) present and therefore available in the water to cause toxicity. In general, the dissolved form is more available and more toxic to aquatic life than filterable forms. Site-specific translators can be developed to account for site-specific conditions, thereby preventing exceedingly stringent or under protective water quality objectives.

For deep-water discharges to San Pablo Bay (Discharge Point No. 001), Regional Water Board staff used translators for copper and nickel based on Table 7.2-2 of the Basin Plan and recommendations of the Clean Estuary Partnership's *North of Dumbarton Bridge Copper and Nickel Development and Selection of Final Translators* (2005). These translators are summarized in the table below:

Table F-18. Translators for Copper and Nickel for Deepwater Discharges North of Dumbarton Bridge

	Copper	Nickel
AMEL Translator	0.38	0.27
MDEL Translator	0.66	0.57

In determining the need for and calculating WQBELs for all other metals, Regional Water Board staff used default translators from 40 CFR 131.38(b)(2), Table 2.

3. Determining the Need for WQBELs

40 CFR 122.44(d)(1)(i) requires permits to include WQBELs for all pollutants (non-priority or priority) "which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any narrative or numeric criteria within a State water quality standard" (i.e., which have "Reasonable Potential"). Assessing whether a pollutant has Reasonable Potential is the fundamental step in determining whether or not a WQBEL is required.

a. Reasonable Potential Analysis

Regional Water Board staff used the methods and procedures prescribed in SIP section 1.3 to analyze the effluent and background data and the nature of facility operations to determine if the discharge has Reasonable Potential. The Reasonable Potential Analysis (RPA) compares the effluent data with numeric and narrative WQOs in the Basin Plan, NTR, and CTR.

b. Reasonable Potential Methodology

The RPA projects a maximum effluent concentration (MEC) for each pollutant based on existing data, while accounting for a limited data set and effluent variability. There are three triggers in determining Reasonable Potential.

i. The first trigger is activated if the MEC is greater than the lowest applicable WQO (MEC $\geq$ WQO), which has been adjusted, if appropriate, for pH, hardness, and translator data. If the MEC is greater than the adjusted WQO, then that pollutant has Reasonable Potential, and a WQBEL is required.

ii. The second trigger is activated if the observed maximum ambient background concentration (B) is greater than the adjusted WQO (B > WQO) and the pollutant is detected in any of the effluent samples.

iii. The third trigger is activated if a review of other information determines that a WQBEL is required to protect beneficial uses, even though both MEC and B are less than the WQO. A limitation may be required under certain circumstances to protect beneficial uses.

c. Effluent Data

The RPA was based on the effluent monitoring data collected by the Discharger from July 2006 through August 2010 for most pollutants. Regional Water Board staff analyzed these data and the nature of the discharge to determine if the discharge has Reasonable Potential.

d. Ambient Background Data

Ambient background values are used in the RPA and in the calculation of effluent limitations. For the RPA, ambient background concentrations are the observed maximum detected water column concentrations. The SIP states that for calculating WQBELs, ambient background concentrations are either the observed maximum ambient water column concentrations or, for objectives intended to protect human health from carcinogenic effects, the arithmetic mean of observed ambient water concentrations. The RMP station at Yerba Buena Island, located in the Central Bay, has been monitored for most of the inorganic (CTR constituent numbers 1–15) and some of the organic (CTR constituent numbers 16–126) toxic pollutants, and these data were used as background data in performing this RPA.

The RMP has not analyzed all the constituents listed in the CTR. On May 15, 2003, a group of several San Francisco Bay Region dischargers (known as the Bay Area Clean Water Agencies, or BACWA) submitted a collaborative receiving water study, entitled the *San Francisco Bay Ambient Water Monitoring Interim Report*. This study includes monitoring results from sampling events in 2002 and 2003 for the remaining priority pollutants not monitored by the RMP. The RPA was conducted and the WQBELs were calculated using RMP data from 1993 through 2008 for inorganics and organics at the Yerba Buena Island RMP station, and additional data from the BACWA *Ambient Water Monitoring: Final CTR Sampling Update Report* for the Yerba Buena Island RMP station.

e. RPA Determination

The MECs, most stringent applicable WQOs, and background concentrations used in the RPA are presented in Table F-19, along with the RPA results (yes or no) for each pollutant analyzed. Reasonable Potential was not determined for all pollutants because there are not applicable water quality objectives for all pollutants, and monitoring data were not available for others. The pollutants that exhibit Reasonable Potential for Discharge Point No. 001 are copper, lead, selenium, cyanide, dioxin-TEQ, and ammonia.

Table F-19. Summary of RPA Results – Discharge Point No. 001

CTR #	Priority Pollutants	MEC or Minimum DL [1],[2] (µg/L)	Governing WQO/WQC (µg/L)	Maximum Background or Minimum DL [1],[2] (µg/L)	RPA Results [3]
1	Antimony	1.4	4,300	1.8	No
2	Arsenic	18.26	36	2.46	No
3	Beryllium	0.07	No Criteria	0.215	Ud
4	Cadmium	0.2	1.1	0.13	No
5a	Chromium (III)	Not Available	201	4.4	--
5b	Hexavalent Chromium	8.03	11	4.4	No
6	Copper	6.2	14.2	2.549	Yes[4]
7	Lead	1.7	1.6	0.804	Yes
8	Mercury (303d listed)	0.070	0.025	0.0086	[5]
9	Nickel (303d listed)	27	30	3.73	No
10	Selenium (303d listed)	46.95	5	0.39	Yes
11	Silver	0.19	2.2	0.052	No
12	Thallium	0.05	6.3	0.21	No
13	Zinc	38	86	5.092	No
14	Cyanide	21	2.9	<0.4	Yes
15	Asbestos	Not Available	No Criteria	Not Available	Ud
16	2,3,7,8-TCDD (303d listed)	$<1.4x10^{-7}$	$1.4x10^{-8}$	$8.2x10^{-9}$	No
	Dioxin TEQ (303d listed)	$4.56x10^{-8}$	$1.4x10^{-8}$	$5.3x10^{-8}$	Yes
17	Acrolein	<0.5	780	<0.5	No
18	Acrylonitrile	<0.58	0.66	0.03	No
19	Benzene	<0.03	71	<0.05	No
20	Bromoform	<0.03	360	<0.5	No
21	Carbon Tetrachloride	<0.04	4.4	0.06	No
22	Chlorobenzene	<0.03	21,000	<0.5	No
23	Chlorodibromomethane	<0.03	34	<0.05	No
24	Chloroethane	<0.03	No Criteria	<0.5	Ud
25	2-Chloroethylvinyl ether	<0.1	No Criteria	<0.5	Ud
26	Chloroform	3.4	No Criteria	<0.5	Ud
27	Dichlorobromomethane	<0.04	46	<0.05	No
28	1,1-Dichloroethane	<0.04	No Criteria	<0.05	Ud
29	1,2-Dichloroethane	<0.04	99	0.04	No
30	1,1-Dichloroethylene	<0.07	3.2	<0.5	No
31	1,2-Dichloropropane	<0.03	39	<0.05	No
32	1,3-Dichloropropylene	<0.03	1,700	<0.5	No
33	Ethylbenzene	<0.04	29,000	<0.5	No
34	Methyl Bromide	<0.06	4,000	<0.5	No
35	Methyl Chloride	<0.06	No Criteria	<0.5	Ud
36	Methylene Chloride	<0.08	1,600	22	No
37	1,1,2,2-Tetrachloroethane	<0.04	11	<0.05	No
38	Tetrachloroethylene	0.5	8.85	<0.05	No
39	Toluene	<0.06	200,000	<0.3	No
40	1,2-Trans-Dichloroethylene	<0.06	140,000	<0.5	No
41	1,1,1-Trichloroethane	<0.03	No Criteria	<0.5	Ud
42	1,1,2-Trichloroethane	<0.05	42	<0.05	No
43	Trichloroethylene	<0.05	81	<0.5	No
44	Vinyl Chloride	<0.06	525	<0.5	No
45	2-Chlorophenol	<0.7	400	<1.2	No
46	2,4-Dichlorophenol	<0.7	790	<1.3	No
47	2,4-Dimethylphenol	<0.8	2,300	<1.3	No
48	2-Methyl- 4,6-	<0.6	765	<1.2	No

CTR #	Priority Pollutants	MEC or Minimum DL [1],[2] (µg/L)	Governing WQO/WQC (µg/L)	Maximum Background or Minimum DL [1],[2] (µg/L)	RPA Results [3]
	Dinitrophenol				
49	2,4-Dinitrophenol	<0.6	14,000	<0.7	No
50	2-Nitrophenol	<0.6	No Criteria	<1.3	Ud
51	4-Nitrophenol	<0.6	No Criteria	<1.6	Ud
52	3-Methyl 4-Chlorophenol	<0.6	No Criteria	<1.1	Ud
53	Pentachlorophenol	<0.6	7.9	<1	No
54	Phenol	Not Available	4600000	<1.3	--
55	2,4,6-Trichlorophenol	<0.6	6.5	<1.3	No
56	Acenaphthene	<0.03	2,700	0.00193	No
57	Acenaphthylene	<0.02	No Criteria	0.001285	Ud
58	Anthracene	<0.02	110,000	0.000592	No
59	Benzidine	<1	0.00054	<0.0015	No
60	Benzo(a)Anthracene	<0.02	0.049	0.005315	No
61	Benzo(a)Pyrene	<0.02	0.049	0.00333	No
62	Benzo(b)Fluoranthene	<0.02	0.049	0.00459	No
63	Benzo(ghi)Perylene	0.03	No Criteria	0.004544	Ud
64	Benzo(k)Fluoranthene	<0.02	0.049	0.00177	No
65	Bis(2-Chloroethoxy)Methane	<0.7	No Criteria	<0.3	Ud
66	Bis(2-Chloroethyl)Ether	<0.8	1.4	<0.0002	No
67	Bis(2-Chloroisopropyl)Ether	<0.6	170,000	Not Available	No
68	Bis(2-Ethylhexyl)Phthalate	1.7	5.9	<0.7	No
69	4-Bromophenyl Phenyl Ether	<0.8	No Criteria	<0.23	Ud
70	Butylbenzyl Phthalate	1.5	5,200	0.0056	No
71	2-Chloronaphthalene	<0.9	4,300	<0.3	No
72	4-Chlorophenyl Phenyl Ether	<0.9	No Criteria	<0.3	Ud
73	Chrysene	<0.02	0.049	0.002781	No
74	Dibenzo(a,h)Anthracene	<0.02	0.049	0.00064	No
75	1,2-Dichlorobenzene	<0.03	17,000	<0.3	No
76	1,3-Dichlorobenzene	<0.18	2,600	<0.3	No
77	1,4-Dichlorobenzene	<0.04	2,600	<0.3	No
78	3,3 Dichlorobenzidine	<0.6	0.077	<0.001	No
79	Diethyl Phthalate	<0.6	120,000	<0.21	No
80	Dimethyl Phthalate	<0.7	2,900,000	<0.21	No
81	Di-n-Butyl Phthalate	0.9	12,000	0.016	No
82	2,4-Dinitrotoluene	<0.6	9.1	<0.27	No
83	2,6-Dinitrotoluene	<0.6	No Criteria	<0.29	Ud
84	Di-n-Octyl Phthalate	<0.7	No Criteria	<0.38	Ud
85	1,2-Diphenylhydrazine	<0.6	0.54	0.0037	No
86	Fluoranthene	0.11	370	0.0109	No
87	Fluorene	<0.02	14,000	0.00208	No
88	Hexachlorobenzene	<0.7	0.00077	0.0000221	No
89	Hexachlorobutadiene	<0.7	50	<0.3	No
90	Hexachlorocyclopentadiene	<0.8	17,000	<0.3	No
91	Hexachloroethane	<0.6	8.9	<0.2	No
92	Indeno(1,2,3-cd)Pyrene	<0.02	0.049	0.00398	No
93	Isophorone	<0.7	600	<0.3	No
94	Naphthalene	<0.02	No Criteria	0.01262	Ud

CTR #	Priority Pollutants	MEC or Minimum DL [1],[2] (µg/L)	Governing WQO/WQC (µg/L)	Maximum Background or Minimum DL [1],[2] (µg/L)	RPA Results [3]
95	Nitrobenzene	<0.7	1,900	<0.25	No
96	N-Nitrosodimethylamine	<0.8	8.1	<0.3	No
97	N-Nitrosodi-n-Propylamine	<0.6	1.4	<0.001	No
98	N-Nitrosodiphenylamine	<0.6	16	<0.001	No
99	Phenanthrene	0.06	No Criteria	0.00951	Ud
100	Pyrene	0.09	11,000	0.0194	No
101	1,2,4-Trichlorobenzene	<0.8	No Criteria	<0.3	Ud
102	Aldrin	<0.002	0.00014	0.00000285	No
103	Alpha-BHC	<0.002	0.013	0.000496	No
104	beta-BHC	<0.002	0.046	0.000413	No
105	gamma-BHC	<0.002	0.063	0.000703	No
106	delta-BHC	<0.002	No Criteria	0.000053	Ud
107	Chlordane (303d listed)	<0.005	0.00059	0.000178	No
108	4,4'-DDT (303d listed)	<0.003	0.00059	0.000167	No
109	4,4'-DDE (linked to DDT)	<0.003	0.00059	0.000693	No
110	4,4'-DDD	<0.003	0.00084	0.000313	No
111	Dieldrin (303d listed)	<0.002	0.00014	0.000264	No
112	Alpha-Endosulfan	<0.003	0.0087	0.000031	No
113	beta-Endolsulfan	<0.003	0.0087	0.000069	No
114	Endosulfan Sulfate	<0.002	240	0.0000819	No
115	Endrin	<0.002	0.0023	0.00004	No
116	Endrin Aldehyde	<0.002	0.81	Not Available	No
117	Heptachlor	<0.003	0.00021	0.000019	No
118	Heptachlor Epoxide	<0.002	0.00011	0.000094	No
119-125	PCBs sum (303d listed[6])	<0.02	0.00017	0.00146	[5]
126	Toxaphene	<0.19	0.0002	Not Available	No
	Tributyltin	<0.00019	0.0074	0.00222	No
	Total PAHs	0.54	15	0.0841	No
	Total Ammonia (mg/L)	3.3	1.27	0.2	Yes

[1] The MEC or maximum background concentration is the actual detected concentration unless there is a "<" sign before it, in which case the value shown is the minimum detection level.

[2] The MEC or maximum background concentration is "Not Available" when there are no monitoring data for the constituent.

[3] RPA Results =Yes, if MEC => WQO/WQC, or B > WQO/WQC and MEC is detected;

= No, if MEC and B are < WQO/WQC or all effluent data are undetected;

= Undetermined (Ud), if no criteria have been promulgated;

= Cannot Determine, if there are insufficient data.

[4] Section 7.2.1.2 of the Basin Plan requires that individual NPDES permits for municipal and industrial wastewater treatment facilities include WQBELs for copper.

[5] SIP section 1.3 excludes from its RPA procedure priority pollutants for which a TMDL has been developed. TMDLs have been developed for mercury and PCBs in San Francisco Bay. Mercury and PCBs from wastewater discharges are regulated by NPDES Permit No. CA0038849 (currently Regional Water Board Order No. R2-2007-0077 as amended by Order No. R2-2011-0012), which implements the San Francisco Bay Mercury and PCB TMDLs.

i. **Constituents with limited data.** The Discharger has performed sampling and analysis for the constituents listed in the CTR. This data set was used to perform the RPA. In some cases, Reasonable Potential cannot be determined because effluent data are limited or ambient background concentrations are not available. The Discharger will continue to monitor for these constituents in the effluent using analytical methods that provide the best feasible detection limits. When additional data become available,

further RPA will be conducted to determine whether to add numeric effluent limitations to this Order or to continue monitoring.

ii. **Pollutants with no Reasonable Potential.** WQBELs are not included in this Order for constituents that do not demonstrate Reasonable Potential; however, monitoring for such pollutants is still required. If concentrations of these constituents are found to have increased significantly, section VI.C.2.a of this Order requires the Discharger to investigate the source of the increase. Remedial measures are required if the increase poses a threat to water quality.

f. RPA Determination for Sediment Quality Objectives

Pollutants in some receiving water sediments may be present in quantities that, alone or in combination, are toxic to benthic communities. Efforts are underway to identify stressors causing such conditions. However, to date there is no evidence directly linking compromised sediment conditions to the discharges subject to this Order; therefore, the Regional Water Board cannot draw a conclusion about reasonable potential for the discharges to cause or contribute to exceedances of the sediment quality objectives. Nevertheless, the Discharger continues to participate in the RMP, which monitors San Francisco Bay sediment and seeks to identify stressors responsible for degraded sediment quality. Thus far, the monitoring has provided only limited information about potential stressors and sediment transport. The Regional Water Board is exploring appropriate requirements to impose on the Discharger, along with other dischargers in the region, to obtain additional information that may inform future RPAs.

4. WQBEL Calculations

a. Pollutants with Reasonable Potential

WQBELs were developed for the toxic and priority pollutants that were determined to have Reasonable Potential. The WQBELs were calculated based on appropriate WQOs and the appropriate procedures specified in SIP section 1.4. The WQOs used for each pollutant with Reasonable Potential are discussed below.

b. Dilution Credit

The SIP provides the basis for any dilution credit. Based on a study entitled *In-Situ Measurement of Dilution of Chevron Effluent in San Pablo Bay*, dated November 1987, and prepared by CH2M Hill, the Discharger indicates that the diffuser achieves a field-verified minimum initial dilution of 200:1, and a modeled initial dilution (based on conservative assumptions) of at least 34:1.

Based on RMP monitoring data for San Pablo Bay, there is variability in the receiving water, and the hydrology of the receiving water is very complex. Therefore, it is uncertain how representative the ambient background data used to determine the effluent limitations is. Pursuant to SIP section 1.4.2.1, “dilution credit may be limited or denied on a pollutant-by-pollutant basis….” The detailed basis for each pollutant is explained below.

i. Bioaccumulative Pollutants: For certain bioaccumulative pollutants, dilution credit is significantly restricted or denied. This determination is based on available data on concentrations of these pollutants in aquatic organisms, sediment, and the water column. Selenium, chlordane, DDT, dieldrin, dioxin and furan compounds, dioxin-like PCBs, mercury, and PCBs appear on the CWA section 303(d) list for San Pablo Bay because they impair San Pablo Bay's beneficial uses. The following factors suggest insufficient assimilative capacity in San Pablo Bay for these pollutants.

(a) Bioaccumulative Pollutants Excluding Selenium

Tissue samples taken from fish in San Pablo Bay show the presence of these pollutants at concentrations greater than screening levels (*Contaminant Concentrations in Fish from San Francisco Bay*, San Francisco Estuary Institute, May 1997). The results of the 1994 San Francisco Bay pilot study, presented in *Contaminated Levels in Fish Tissue from San Francisco Bay* (Regional Water Board, 1994) also showed elevated levels of chemical contaminants in fish tissues. The Office of Environmental Health and Hazard Assessment completed a preliminary review of the data in the 1994 report and subsequently issued an interim consumption advisory covering certain fish species in San Francisco Bay due to the levels of some of these pollutants, including dioxins and pesticides (e.g., DDT). This advisory is still in effect. Therefore, dilution credits are denied for bioaccumulative pollutants on the 303(d) list for which there is lack of data on sources and significant uncertainty about how different sources of these pollutants contribute to bioaccumulation.

(b) Selenium

For selenium, San Francisco Bay waterfowl tissue data presented in the State Water Board and California Department of Fish and Game's *Selenium Verification Study*, 1988-1990 (Document 91-2-WQ, May 1991) showed elevated selenium levels in the livers of waterfowl that feed on bottom-dwelling organisms, such as clams. In addition, the Office of Environmental Health and Hazard Assessment issued an advisory in 1987 for consumption of two species of North Bay diving ducks found to have high tissue levels of selenium. This advisory is still in effect. Elevated selenium levels have also been found in the tissue of white sturgeon, which also feed on clams.

This information, together with high uncertainty regarding how different sources of selenium contribute to bioaccumulation, has previously led the Regional Water Board to deny dilution credit for selenium. However, refineries have significantly reduced their discharges of selenium, and altered the chemical forms of the selenium they discharge so the selenium is generally less bioavailable. Also, substantially more information has become available to advance the development of a selenium TMDL for north San Francisco Bay segments. Recent work reduces some uncertainties regarding selenium sources, fate, and transport, and suggests that some assimilative capacity remains in the receiving waters. Based on this preliminary information, Regional Water Board staff concludes that limited dilution credit for selenium may be granted such that existing refinery performance is maintained, pending the completion of a selenium TMDL. This Order grants limited

dilution credits for selenium, but only to a level that maintains existing refinery performance. When a selenium TMDL is completed, the Regional Water Board will amend these limits to be consistent with TMDL wasteload allocations. Granting dilution credits for selenium at this time is appropriate specifically because of the substantial new information about selenium in San Francisco Bay now available. This information does not apply to other pollutants. Therefore, this Order uses a dilution credit of D = 7 (8:1 dilution) to calculate selenium WQBELs. Using this dilution will maintain existing performance, because it is the same dilution granted in the previous permit, as amended by Order No. R2-2010-0057.

ii. Non-bioaccumlative Pollutants: SIP section 1.4.2 allows for limiting the dilution credit. For most non-bioaccumulative pollutants, dilution credit is restricted.

(a) Non-Bioaccumlative Pollutants, Excluding Ammonia

For non-bioaccumulative pollutants (except ammonia), a conservative dilution credit of 10:1 (D = 9) has been assigned for Discharge Point 001 to address uncertainties with mixing. The 10:1 dilution credit is consistent with the previous permit and is also based, in part, on Basin Plan Prohibition 1 (Basin Plan Table 4-1), which prohibits discharges with less than 10:1 dilution.

Based on RMP monitoring data for San Francisco Bay, there is variability in the receiving water, and the hydrology of the receiving water is very complex. Therefore, it is uncertain how representative the ambient background data used to determine the effluent limitations is. Models used to predict dilution have not considered the three dimensional nature of San Francisco Bay currents resulting from the interaction of tidal flushes and seasonal fresh water outflows. Being heavier and colder than fresh water, ocean salt water enters San Francisco Bay on twice-daily tidal cycles, generally beneath the warmer fresh water that flows seaward. When these waters mix and interact, complex circulation patterns occur due to the varying densities of the fresh and ocean waters. The complex patterns occur throughout San Francisco Bay, but are most prevalent in the San Pablo Bay, Carquinez Straight, and Suisun Bay areas. The locations of this mixing and interaction change, depending on the strength of each tide. Additionally, sediment loads from the Central Valley change on a long-term basis, affecting the depth of different parts of San Francisco Bay, resulting in alteration of flow patterns, mixing, and dilution at the outfall.

(b) Ammonia

For ammonia, a non-persistent pollutant, a conservative estimate of actual initial dilution was used to calculate the effluent limitations for Discharge Point 001. This is justified because ammonia quickly disperses and degrades to a non-toxic state, and cumulative toxicity effects are unlikely. As described above, the 1987 field dye tracer studies found an initial dilution of 200:1 and initial dilution modeling estimated an actual initial dilution ratio of at least 34:1 (D = 33). For this Order, the 34:1 dilution ratio was used for calculating WQBELs based on both the acute and chronic objectives. To ensure that the 1987 study and modeling results are still

valid, this Order requires the Discharger to update the study and modeling (see Provision VI.C.2.d of this Order).

c. Calculation of Pollutant-Specific WQBELs - Discharge Point No. 001

i. Copper

(a) *Copper WQOs*. The most stringent applicable WQOs for copper are the Basin Plan's site-specific chronic and acute marine WQOs, 6.0 and 9.4 micrograms per liter (µg/L), respectively, expressed as dissolved metal. Regional Water Board staff converted these WQOs to total recoverable metal using site-specific translators of 0.38 (chronic) and 0.67 (acute). This results in a chronic water quality criterion of 16 µg/L and an acute water quality criterion of 14 µg/L.

(b) *RPA Results*. Even though the MEC for copper of 6.2 µg/L is below the most stringent applicable WQO for this pollutant, this Order establishes effluent limitations. This is because Section 7.2.1.2 of the Basin Plan requires that individual NPDES permits for municipal and industrial wastewater treatment facilities include WQBELs for copper.

(c) C*opper WQBELs*. WQBELs for copper calculated according to SIP procedures using a coefficient of variation (CV) of 0.25 and a dilution credit of D = 9 are an AMEL of 84 µg/L and an MDEL of 120 µg/L. The previous permit contained more stringent limits of an AMEL of 13 µg/L and an MDEL of 25 µg/L.

(d) *Anti-backsliding*. This Order satisfies anti-backsliding requirements because San Francisco Bay is in attainment for copper and, consistent with Section 303(d)(4)(B), the Regional Water Board completed an Antidegradation Analysis for copper when it developed site-specific objectives.

ii. Selenium

(a) *Selenium WQC.* The most stringent applicable WQC for selenium are from the NTR for protection of aquatic life. The NTR establishes a saltwater and freshwater acute criterion of 20 µg/L and chronic criterion of 5.0 µg/L.

(b) *RPA Results.* This Order establishes effluent limitations for selenium because the MEC of 47 µg/L exceeds the most stringent applicable WQC for this pollutant, demonstrating Reasonable Potential by Trigger 1.

(c) *Selenium WQBELs.* Based on a dilution credit of 8:1 (D=7), WQBELs for selenium calculated according to SIP procedure using a CV of 0.36 are an AMEL of 33µg/L and an MDEL of 53 µg/L. The previous permit as amended by Order No. R2-2010-0057 (*Amendment of Waste Discharge Requirements for San Francisco Bay Region Refineries*) contained more stringent limits of an AMEL of 33 µg/L and an MDEL of 34 µg/L.

(d) *Anti-backsliding.* This Order retains the more stringent WQBELs from the previous permit, thereby satisfying anti-backsliding requirements.

iii. Lead

(a) *Lead WQOs.* The most stringent applicable WQOs for lead are the Basin Plan's freshwater acute and chronic objectives for protection of aquatic life of 42 µg/L and 1.6 µg/L, as calculated using the receiving water hardness value of 59 mg/L, as $CaCO_3$.

(b) *RPA Results.* This Order establishes effluent limitations for lead because the MEC of 1.7 µg/L exceeds the most stringent applicable WQO for this pollutant, demonstrating Reasonable Potential by Trigger 1.

(c) *Lead WQBELs.* WQBELs for lead calculated according to SIP procedure using a CV of 0.77 and a dilution credit of D = 9 are an AMEL of 7.0 ug/L and an MDEL of 16 ug/L. The previous permit contained a less stringent limit AMEL of 7.4 µg/L, but a more stringent MDEL of 15 µg/L. This order includes the newly calculated AMEL of 7.0 µg/L and MDEL of 16 µg/L. As a pair, these limits are more stringent than those included in the previous permit. This is because the newly calculated pair of limits should hold the Discharger to a long-term average discharge of 4.1 µg/L compared with 4.7 µg/L under the previous permit.

(d) *Anti-backsliding.* This Order includes more stringent effluent limits than the previous permit, thereby satisfying anti-backsliding requirements.

iv. Cyanide

(a) *Cyanide WQO.* The most stringent applicable WQOs for cyanide are the Basin Plan's site-specific chronic and acute marine WQOs, 2.9 and 9.4 micrograms per liter (µg/L), respectively.

(b) *RPA Results.* This Order establishes effluent limitations for cyanide because the MEC of 21 µg/L exceeds the most stringent applicable WQO for this pollutant, demonstrating Reasonable Potential by Trigger 1.

(c) *Cyanide WQBELs.* Order No. R2-2006-0035 established conditional effluent limitations for cyanide if a SSO for cyanide for all segments of the San Francisco Bay became legally effective. On August 8, 2008, the Regional Water Board sent a letter to the Discharger informing the Discharger that on July 22, 2008, the USEPA approved the cyanide SSO, and the conditional cyanide effluent limitations of an AMEL of 22 µg/L and a MDEL of 38 µg/L were effective.

For this permit reissuance, WQBELs for cyanide were recalculated according to SIP procedure using a CV of 0.87 and a dilution credit of D = 9. The resulting WQBELs were an AMEL of 19 µg/L and an MDEL of 45 µg/L. This order includes the newly calculated AMEL of 19 µg/L and MDEL of 45 µg/L. As a pair, these limits are more stringent than those included in the previous permit. This is because the newly calculated pair of limits should hold the Discharger to a long-term average discharge of 10.5 µg/L compared with 15.6 µg/L under the previous permit.

(d) *Anti-backsliding.* This Order includes more stringent effluent limits than the previous permit, thereby satisfying anti-backsliding requirements

v. Dioxin-TEQ

(a) *Dioxin-TEQ WQO*. The Basin Plan narrative WQO for bioaccumulative substances states:

> *Many pollutants can accumulate on particulates, in sediments, or bioaccumulate in fish and other aquatic organisms. Controllable water quality factors shall not cause a detrimental increase in concentrations of toxic substances found in bottom sediments or aquatic life. Effects on aquatic organisms, wildlife, and human health will be considered.*

Because the consensus of the scientific community is that dioxins and furans associate with particulates, accumulate in sediments, and bioaccumulate in the fatty tissues of fish and other organisms, the Basin Plan's narrative bioaccumulation WQO applies to these pollutants. Elevated levels of dioxins and furans in San Francisco Bay fish tissue demonstrate that the narrative bioaccumulation WQO is not being met. USEPA has therefore included San Francisco Bay as impaired by dioxins and furans in the current CWA section 303(d) listing of receiving waters where WQOs are not being met after imposition of technology-based requirements.

The CTR establishes a numeric WQO for 2,3,7,8-tetrachlorinated dibenzo-p-dioxin (2,3,7,8-TCDD) of 1.4×10^{-8} µg/L to protect human health when aquatic organisms are consumed. When the CTR was promulgated, USEPA stated its support of the regulation of other dioxin and dioxin-like compounds through the use of toxicity equivalencies (TEQs) in NPDES permits. USEPA stated specifically, "For California waters, if the discharge of dioxin or dioxin-like compounds has reasonable potential to cause or contribute to a violation of a narrative criterion, numeric WQBELs for dioxin or dioxin-like compounds should be included in NPDES permits and should be expressed using a TEQ scheme" [65 Fed. Reg. 31682, 31695 (2000)].

This Order uses a TEQ scheme based on a set of toxicity equivalency factors (TEFs) the World Health Organization (WHO) developed in 1998, and a set of bioaccumulation equivalency factors (BEFs) USEPA developed for the Great Lakes region (40 CFR 132, Appendix F), to convert the concentration of any congener of dioxin or furan into an equivalent concentration of 2,3,7,8-TCDD. The CTR criterion is used as a criterion for dioxin-TEQ because dioxin-TEQ represents a toxicity-weighted concentration equivalent to 2,3,7,8-TCDD, thus translating the narrative bioaccumulation objective into a numeric criterion appropriate for the RPA.

To determine if the discharge of dioxin or dioxin-like compounds has reasonable potential to cause or contribute to a violation of the Basin Plan's narrative bioaccumulation WQO, TEFs and BEFs were used to express the measured concentrations of 16 dioxin congeners in effluent and background samples as 2,3,7,8-TCDD. These "equivalent" concentrations were then compared to the CTR

numeric criterion for 2,3,7,8-TCDD (1.4 x 10^{-8} µg/L). Although the 1998 WHO scheme includes TEFs for dioxin-like PCBs, they are not included in this Order's TEQ scheme. The CTR has established a specific water quality standard for PCBs, and dioxin-like PCBs are included in the analysis of total PCBs.

(b) *RPA Results*. To determine if Reasonable Potential exists for dioxin or dioxin-like compounds in this discharge, Regional Water Board staff used TEFs and BEFs to express the measured concentrations of 16 dioxin congeners in effluent and background samples as 2,3,7,8-TCDD. These "equivalent" concentrations were then compared to the CTR numeric criterion for 2,3,7,8-TCDD (1.4 x 10^{-8} µg/L).

This Order establishes effluent limitations for dioxin-TEQ because the MEC (4.56 x 10^{-8} µg/L) exceeds the WQO for dioxin-TEQ translated from the bioaccumulation objective (1.4 x 10^{-8} µg/L), demonstrating Reasonable Potential by Trigger 1.

(c) *WQBELs*. WQBELs for dioxin–TEQ calculated using SIP procedures as guidance, with a CV of 0.6 and no dilution credit, are an AMEL of 1.4 x 10^{-8} µg/L and an MDEL of 2.8 x 10^{-8} µg/L. The previous Order included an interim limitation for dioxin-TEQ of 1.0 x 10^{-7} µg/L (effective until June 30, 2011 or until TMDL wasteload allocations are established and adopted by the Regional Water Board) and no final limitations.

(d) *Anti-backsliding*. Anti-backsliding requirements are satisfied because the previous Order did not contain a final limit for dioxin-TEQ.

vi. Ammonia

(a) *Ammonia WQO*. The Basin Plan contains WQOs for un-ionized ammonia of 0.025 mg/L as an annual median and 0.16 mg/L as a maximum upstream of the San Francisco Bay Bridge. Regional Water Board staff translated these WQOs from un-ionized ammonia concentrations to equivalent total ammonia concentrations (as nitrogen) since (1) sampling and laboratory methods are not available to analyze for un-ionized ammonia; and (2) the fraction of total ammonia that exists in the toxic un-ionized form depends on the pH, salinity, and temperature of the receiving water. To translate the Basin Plan un-ionized ammonia objective, Regional Water Board staff used pH, salinity, and temperature data from 1993 through 2001 from the Yerba Buena Island RMP Station (BC10). Regional Water Board staff used the following equations to determine the fraction of total ammonia that would exist in the toxic un-ionized form in the estuarine receiving water where the various measurements were taken from 1993-2001 (USEPA, 1989, Ambient Water Quality Criteria for Ammonia (Saltwater)–1989, EPA Publication 440/5-88-004):

For salinity > 10 ppt: fraction of NH_3 = $\frac{1}{1+10^{(pK-pH)}}$

Where:

$$pK = 9.245 + 0.116(I) + 0.0324(298 - T) + \frac{0.0415(P)}{(T)}$$

$$I = \text{Molal ionic strength of saltwater} = \frac{19.9273(S)}{(1{,}000 - 1.005109[S])}$$

S = Salinity (parts per thousand)

T = Temperature in degrees Kelvin

P = Pressure (one atmosphere)

Regional Water Board staff then used the 90th percentile and median un-ionized ammonia fractions from 1993 to 2001 to express the acute and chronic un-ionized ammonia WQOs as total ammonia concentrations. This approach is consistent with USEPA guidance on translating dissolved metal WQOs to total recoverable metal WQOs (USEPA, 1996, *The Metals Translator: Guidance for Calculating a Total Recoverable Limit from a Dissolved Criterion,* EPA Publication 823-B-96-007).

The equivalent total ammonia acute and chronic WQOs are 4.93 mg/L and 1.27 mg/L, respectively.

(b) *RPA Results.* Basin Plan section 4.5.5.2 indicates that WQBELs shall be calculated according to the SIP. Basin Plan section 3.3.20 refers to ammonia as a toxic pollutant. Therefore, The SIP methodology was used to perform the RPA and to calculate effluent limitations for ammonia. This Order establishes effluent limitations for total ammonia because the MEC of 3.3 mg/L as nitrogen exceeds the most stringent applicable translated WQO for this pollutant, demonstrating Reasonable Potential by Trigger 1.

(c) *WQBELs.* The total ammonia WQBELs calculated according to SIP procedures using a CV of 1.9 and a dilution of D = 33 are an MDEL of 150 mg/L as N and an AMEL of 51 mg/L as N. Regional Water Board staff made statistical adjustments to the WQBEL calculations because:

- the Basin Plan's chronic WQO for un-ionized ammonia is based on an annual median instead of the typical 4-day average;
- the SIP assumes a 4-day average concentration and monthly sampling frequency of 4 days per month to calculate effluent limitations based on chronic criteria, whereas a 365-day average and a monitoring frequency of 30 days per month, reflecting the actual basis of the WQO and actual sampling frequency, were used here.

These statistical adjustments are supported by USEPA's *Water Quality Criteria; Notice of Availability; 1999 Update of Ambient Water Quality Criteria for Ammonia,* published on December 22, 1999, in the Federal Register.

Following SIP methodology, Regional Water Board staff used the maximum ambient background total ammonia concentration to calculate effluent limitations based on the acute criterion; and the median background total ammonia

concentration to calculate effluent limitations based on the chronic criterion. Because the Basin Plan's chronic un-ionized ammonia objective is an annual median, the median background concentration is more representative of ambient conditions than a daily maximum.

Effluent Limitations for Total Ammonia (as N)		
	AMEL	**MDEL**
Based on Basin Plan	51 mg/L	150 mg/L

(d) *Anti-backsliding.* Anti-backsliding requirements are satisfied because the previous Order did not include total ammonia WQBELs.

d. Effluent Limitation Calculations – Discharge Point No. 001

Table F-20 below summarizes the effluent limitation calculations for Discharge Point No. 001.

Table F-20. Effluent Limitation Calculations for Discharge Point No. 001

PRIORITY POLLUTANTS	**Selenium (303d listed)**	**Copper**	**Lead**	**Cyanide**	**Dioxin-TEQ (303d listed)**	**Total Ammonia (acute)**	**Total Ammonia (chronic)**
Units	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**mg/L N**	**mg/L N**
Basis and Criteria type	CTR Aquatic Life	Basin Plan SSO	CTR Aquatic Life	CTR Aquatic Life	CTR HH	Basin Plan Aquatic Life	Basin Plan Aquatic Life
Criteria -Acute	20	-----	42	-----	-----	4.93	-----
Criteria -Chronic	5.0	-----	1.6	-----	-----	-----	1.27
SSO Criteria –Acute	-----	3.9	-----	9.4	-----	-----	-----
SSO Criteria -Chronic	-----	2.5	-----	2.9	-----	-----	-----
Water Effects ratio (WER)	1	2.4	1	1	1	1	1
Lowest WQO	5.0	14.2	1.6	2.9	1.4E-08	4.93	1.27
Site Specific Translator - MDEL	-----	0.66	-----	-----	-----	-----	-----
Site Specific Translator - AMEL	-----	0.38	-----	-----	-----	-----	-----
Dilution Factor (D) (if applicable)	7	9	9	9	0	33	33
No. of samples per month	4	4	4	4	4	4	30
Aquatic life criteria analysis required? (Y/N)	Y	Y	Y	Y	N	Y	Y
HH criteria analysis required? (Y/N)	N	N	N	Y	Y	N	N
Applicable Acute WQO	20	14	42	9.4	-----	4.93	
Applicable Chronic WQO	5	15.8	1.6	2.9	-----		1.27
HH criteria	-----	-----	-----	2.2E+05	1.40E-08	-----	-----
Background (Maximum Conc for Aquatic Life calc)	0.39	2.55	0.8	0.4	8.20E-09	0.43	0.13

PRIORITY POLLUTANTS	Selenium (303d listed)	Copper	Lead	Cyanide	Dioxin-TEQ (303d listed)	Total Ammonia (acute)	Total Ammonia (chronic)
Units	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**mg/L N**	**mg/L N**
Background (Average Conc for Human Health calc)	-----	-----	-----	0.00	5.00E-08	-----	-----
Is the pollutant on the 303d list and/or bioaccumulative (Y/N)?	Y	N	N	N	Y	N	N
ECA acute	157.3	118.9	409.8	90.4	-----	153	-----
ECA chronic	37.3	135	9.0	25.4	-----	-----	38.9
ECA HH				2.2E+06	1.40E-08		
No. of data points <10 or at least 80 percent of data reported non detect? (Y/N)	N	N	N	N	Y	N	N
Avg of effluent data points	13	3.6	0.6	3.9	---	0.39	0.39
Std Dev of effluent data points	4.5	0.91	0.46	3.4	---	0.73	0.73
CV calculated	0.36	0.25	0.77	0.87	0.6	1.9	1.9
CV (Selected) - Final	0.36	0.25	0.77	0.87	0.6	1.9	1.9
ECA acute mult99	0.48	0.58	0.26	0.23	-----	0.12	-----
ECA chronic mult99	0.67	0.75	0.45	0.42	-----	-----	0.80
LTA acute	75	69	106	21.0	-----	18.8	-----
LTA chronic	25	101	4.1	10.5	-----	-----	31.2
minimum of LTAs	25	69	4.1	10.5	-----	18.8	31.2
AMEL mult95	1.3	1.2	1.7	1.8	3.7	2.7	1.6
MDEL mult99	2.1	1.7	3.9	4.3	13	8.2	8.2
AMEL (aq life)	33	84	7.0	19	-----	51	51
MDEL(aq life)	53	120	16	45	-----	150	250
MDEL/AMEL Multiplier	1.6	1.4	2.3	2.4	3.4	3.0	3.0
AMEL (human hlth)	-----	-----	-----	2.2.E+06	1.4.E-08	-----	-----
MDEL (human hlth)	-----	-----	-----	5.2.E+06	2.8.E-08	-----	-----
minimum of AMEL for Aq. life vs HH	33	84	7.0	19	1.4E-08	51	51
minimum of MDEL for Aq. Life vs HH	53	120	16	45	2.8E-08	150	250
Current limit in permit (30-day average)	33	13	7.4	22	-----	-----	-----
Current limit in permit (daily)	34	25	15	38	1.0E-07	-----	-----
Final limit - AMEL	33	84	7.0	19	1.4E-08	51	51
Final limit - MDEL	34	120	16	45	2.8E-08	150	250

PRIORITY POLLUTANTS	Selenium (303d listed)	Copper	Lead	Cyanide	Dioxin-TEQ (303d listed)	Total Ammonia (acute)	Total Ammonia (chronic)
Units	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**mg/L N**	**mg/L N**
Max Effl Conc (MEC)	47	6.2	1.7	21	4.8E-09	3.346	3.346

5. Selenium Mass Emission Limitation – Discharge Point No. 001

SIP section 2.1.1 states that for bioaccumulative compounds on the 303(d) list, the Regional Water Board should consider whether mass-loading limits should be limited to current levels. The Regional Water Board finds that mass-loading limits are warranted for selenium. The purpose of this mass-loading limit is to further ensure that this Discharger maintains its existing selenium treatment performance, and does not further contribute to impairment of the narrative objective for bioaccumulation in San Pablo Bay, pending a TMDL.

The mass emission limit is based on the average monthly effluent limitation (calculated above) and the long-term average daily effluent flows (as reported in the Report of Waste Discharge). The mass loading limit is calculated using the average monthly effluent limitation, instead of the maximum daily effluent limitation, because the average monthly effluent limitation better represents long-term performance.

The mass loading limit is calculated using the following equation.

Mass Emission (kg/day) = (Flow, MGD)x(Selenium Concentration, mg/L)x3.785
Mass Emission (kg/day) = 6.6 MGD x 0.033 mg/L x 3.785 = 0.82 kg/day

The existing mass emission limitation imposed under Order No. R2-2010-0057 for selenium is 0.92 kg/day as a running annual average. Because the newly-calculated mass emission limit is more stringent than the existing mass emission limits, this Order will require compliance with the more stringent, newly computed mass emission limit of 0.82 kg/day.

The mass emission limit is expressed as a running annual average to be consistent with the limit in the previous Order. The running annual average is the arithmetic average of the current day's mass load and the mass loads for each of the previous 364 days, as shown in the following example:

Annual Mass emission rate (kg/day) = $\frac{3.785}{N}\sum_{i=1}^{N} Q_i C_i$

where:

N = number of samples analyzed in any calendar year
Q_i = flow rate (MGD) associated with the Ith sample
C_i = selenium concentration (mg/L) associated with the Ith sample

Flow (MGD) = Average of monthly plant effluent flows.

Anti-backsliding requirements are satisfied because the mass-loading limit in this Order is more stringent than the mass-loading limit in the previous Order.

6. Whole Effluent Acute Toxicity

This Order includes effluent limitations for whole-effluent acute toxicity for Discharge Point No. 001 that are unchanged from the previous Order and based on the Basin Plan section 4.5.5.3.1. All bioassays are to be performed using the most up-to-date USEPA protocol and the most sensitive species as specified in writing by the Executive Officer based on the most recent screening test results. Bioassays shall be conducted in compliance with *Methods for Measuring the Acute Toxicity of Effluents and Receiving Water to Freshwater and Marine Organisms*, currently 5th Edition (EPA-821-R-02-012), with exceptions granted to the Discharger by the Executive Officer and the Environmental Laboratory Accreditation Program (ELAP) upon the Discharger's request with justification.

7. Whole Effluent Chronic Toxicity

This Order includes effluent limitations for chronic toxicity that are unchanged from the previous Order and based on section 4.5.5.3.2 of the Basin Plan. The permit requirements for chronic toxicity are also consistent with the CTR and SIP section 4, Toxicity Control Provisions.

8. Effluent Limitation Adjustments for Recycled Water Use

This Order provides for effluent limitation adjustments for recycled water use to encourage wastewater recycling, consistent with Basin Plan section 4.16 and State Water Board Resolutions 77-1 and 2009-0011, and to account for the increase in pollutant concentrations that may result.

Discharge Specification IV.A.6 of the previous Order granted effluent limitation adjustments for recycled water use under specific conditions. Provision VI.C.6 of the previous Order required that, prior to obtaining mass or concentration adjustments for recycled water, the Discharger submit a technical report that demonstrated such credits would not cause impairment of the beneficial uses in the vicinity of its discharge. Provision VI.C.6 further required the Discharger to include one or more examples of how the credit calculations would be performed and reported based on site-specific conditions.

Consistent with the requirements of Provision VI.C.6, the Discharger submitted a technical report dated October 2006 titled, *Permit Provision C.6 Recycled Water Credits Technical Report* to the Regional Water Board. On February 20, 2007, by letter, the Regional Water Board approved recycled water adjustments as described in the October 2006 technical report. Relevant findings of the Discharger's October 2006 technical report are summarized below:

a. The Discharger uses approximately 3.4 MGD of tertiary treated recycled water from EBMUD's North Richmond Water Reclamation Plant in refinery cooling towers.

b. The Discharger generates approximately 3.5 MGD of recycled water at the Facility by treating secondary effluent from West County Wastewater District's Water Pollution Control Plant through microfiltration and reverse osmosis suitable for use as boiler feedwater.

c. Two waste streams are produced from the microfiltration and reverse osmosis processes used to treat secondary effluent from West County Wastewater District's Water Pollution Control Plant:

   i. Microfiltration backwash – recycled back to the West County Wastewater District's Water Pollution Control Plant for treatment.

   ii. Reverse osmosis reject water is discharged to the Chevron industrial wastewater treatment system prior to the final compliance monitoring point for Discharge Point No. 001. The quantity of reject water is approximately 0.525 MGD.

d. The pollutant concentrations contained in the North Richmond Water Reclamation Plant's tertiary effluent will be used to calculate the total mass of pollutants for which the Discharger may receive recycled water adjustments (including flows from West County Wastewater District's Water Pollution Control Plant). The use of the higher quality tertiary-treated effluent results in a conservative estimate for the recycled water adjustments.

e. Acute and chronic whole effluent toxicity tests and two priority pollutant scans conducted on reverse osmosis reject water and blended reverse osmosis reject water with the Discharger's effluent indicate that toxicity is not anticipated to contribute to exceedances of water quality objectives.

Consistent with Basin Plan section 4.16 and State Water Board Resolutions 77-1 and 2009-0011, this Order carries over concentration adjustments as described in the Discharger's October 2006 technical report for non-bioaccumulative WQBELs (cyanide, lead, and copper). As dioxins will be regulated through a waste load allocation in a TMDL, additional concentration adjustments for dioxins are not provided in this Order. For selenium, this Order grants a concentration adjustment because recent work has reduced some uncertainties regarding selenium sources, fate, and transport, and suggests that some assimilative capacity remains in the receiving water.

While the Regional Water Board supports the use of recycled water, impacts to water quality must be considered within San Pablo Bay near the discharge location. Thus, it's appropriate to determine maximum recycled water adjustments available for the discharge that will be protective of water quality. As explained in section IV.C.4.b of this Fact Sheet, this Order limits dilution to 10:1 for conservative pollutants, 8:1 for selenium, and does not grant dilution for other bioaccumlative pollutants where there is evidence that they are accumulating to unsafe levels in wildlife. However, it may be infeasible for the Discharger to implement recycled water projects without sufficient adjustments to effluent limits to account for its use of recycled water, thus an appropriate balance that protects the beneficial uses of the receiving water and encourages the continued use of recycled water must be determined. In this case, the Discharger's dilution study shows a minimum dilution of at least 34:1. Since section 1.4.2.2 of the SIP requires that mixing zones be as small as practicable, it is appropriate to consider a dilution factor smaller than that shown in the Discharger's dilution study. In this case, a dilution factor of 20:1 is considered reasonable as a balance between encouraging and supporting reclamation, and protecting water quality. The use of a 20:1 dilution is consistent with the development of the maximum allowable concentrations used in the previous Order to become eligible to receive recycled water adjustments. Maximum effluent limitations with the application of recycled water adjustments have been determined for applicable non-bioaccumulative WQBELs (copper, lead, and cyanide)

and selenium. These values have been calculated based on site-specific objectives, effluent data, and receiving water data (as summarized for the calculation of WQBELs in section IV.C.3 of this Fact Sheet) and applied as maximum effluent limitations available when recycled water adjustments are applied. The applicable maximum effluent limitations with the application of recycled water adjustments are summarized below:

Table F-21. Effluent Limitation Calculations for Discharge Point No. 001

Parameter	Units	Maximum Recycled Water Adjusted Effluent Limitations[1]	
		Average Monthly	Maximum Daily
Cyanide	µg/L	38	90
Copper	µg/L	170	240
Lead	µg/L	13	30
Selenium	µg/L	82	130

The use of recycled water will not increase the mass of pollutants discharged to the San Francisco Bay watershed (i.e., bioaccumlative pollutants will be discharged at the same levels or less than would otherwise be discharged to San Pablo Bay without reclamation), and therefore, the granting of mass adjustments for such pollutants is protective of water quality and consistent with anti-degradation requirements.

Recycled water adjustments shall be determined as specified in section V.A.6 of the Order.

9. Stormwater Limits

Based on the requirements of 40 CFR 419 Subpart B for stormwater discharges, this Order establishes technology-based limitations for Discharge Points 002 – 023. This Order also retains the narrative stormwater limits of no visible oil or color.

If the limitation for total organic carbon (TOC) or oil and grease is exceeded, the additional limitations become immediately effective for the discharge point where that exceedance occurred. Derivation of the stormwater effluent limitations based on 40 CFR 419 Subpart B is presented in detail in Attachment F-1 to this Order. The additional effluent limit on pH of 6.0 to 9.0 from 40 CFR 419 Subpart B is not established by this Order. The Basin Plan pH effluent limit for shallow water discharges of 6.5 to 8.5 is retained instead to satisfy anti-backsliding requirements.

D. Anti-backsliding and Antidegradation

1. Anti-backsliding

CWA sections 402(o)(2) and 303(d)(4) and 40 CFR 122.44(l) prohibit backsliding in NPDES permits. These anti-backsliding provisions require that effluent limitations in a reissued permit be as stringent as those in the previous Order, with some exceptions in which limitations may be relaxed. WQBEL calculations and compliance with anti-backsliding requirements are discussed for each pollutant with a WQBEL in Fact Sheet section IV.C.4.c.

Because the RPA showed no Reasonable Potential for nickel or heptachlor epoxide at Discharge Point No. 001, the limitations in the previous permit are not retained in this Order. State Water Board Order WQ 2001-16 found, “Anti-backsliding does not necessarily dictate that a pollutant that was limited in a prior permit must have a limit in a later permit, even

though the pollutant has never been detected and its discharge does not have the Reasonable Potential to cause or contribute to a water quality standards violation." The logic of State Water Board Order WQ 2001-16 also applies to situations where a pollutant is detected, but no longer triggers reasonable potential. The removal of limits for these pollutants is therefore consistent with State Water Board Order WQ 2001-16 and anti-backsliding requirements.

Technology-based limitations in this Order for Discharge Point 001 are higher (appear less stringent) than corresponding limitations in the previous permit. The method for deriving these limits is presented in the *Effluent Limitations Guidelines for the Petroleum Refining Point Source Category* (40 CFR 419) and is explained in Attachment F-1. The derivation of limits depends on the process configuration of the refinery, which, in turn, depends on the feedstock rate of each process. Based on information provided by the Discharger in its application for permit reissuance, during the term of the previous permit, feedstock rates for certain refinery processes increased, resulting in different "process configuration values" used in the derivation of effluent limitations and higher effluent limitations. In such cases, anti-backsliding requirements under CWA section 402(o)(1) do not apply. This is because the limits are technology-based and were calculated in accordance with federal regulations (40 CFR 419).

2. Antidegradation

Antidegradation policies require that existing water quality be maintained unless degradation is justified based on specific findings. The permitted discharge is consistent with antidegradation policies. This Order continues the level of discharge authorized in the previous Order and thus there will be no degradation of water quality. This is because this Order does not provide for an increase in the permitted design flow or allow for a reduction in the level of treatment.

a. Production-Based Limits

This Order establishes increased technology-based mass loading limits for BOD, TSS, oil and grease, phenolic compounds, ammonia, sulfide, total chromium, and hexavalent chromium consistent with applicable effluent guidelines. This is the result of increased feedstock rates to certain refinery processes that result in the derivation of increased effluent limitations consistent with the applicable effluent guidelines.

In 1990, the State Water Board adopted an administrative procedures update (APU 90-004) that specified guidance to the Regional Water Boards for implementing the State and federal antidegradation policies. The guidance states "… if the Regional Water Board has no reason to believe that existing water quality will be reduced due to the proposed action, no antidegradation analysis is required." The new mass loading limits for BOD, TSS, oil and grease, phenolic compounds, ammonia (as N), sulfide, total chromium, and hexavalent chromium will not result in a significant reduction of water quality.

The total effluent flow rate is a function of production. No increase in production, and therefore in flow, is authorized. These requirements mean that the mass of BOD, TSS, oil and grease, phenolic compounds, ammonia, sulfide, total chromium, and hexavalent chromium discharged is unlikely to increase despite the increased mass loading limitations. The Discharger proposes no changes to its treatment process, and no decrease in treatment is authorized. Furthermore, it is impossible for the Discharger to manipulate its treatment processes to adjust effluent levels of these pollutants independently of others. To maintain

compliance with other effluent limitations, the Discharger will have to at least maintain its existing performance.

The technology-based mass limitations are consistent with applicable statutes and regulations. They are derived from the applicable effluent guidelines for integrated refineries based on Effluent Limitations Guidelines for the Petroleum Refining Point Source Category (40 CFR 419) and represent Best Practicable Control Technology (BPT) and Best Conventional Pollutant Control Technology (BCT). They therefore represent the best practicable treatment or control available. San Pablo Bay meets water quality standards for all pollutants subject to the technology-based mass limits in this Order, and no increase in pollutant loading is likely. The new limits are therefore consistent with federal and State antidegradation policies.

Because antidegradation requirements are met, there will be no lowering of water quality; therefore, further analysis is unnecessary. Findings authorizing degradation are also unnecessary.

V. RATIONALE FOR RECEIVING WATER LIMITATIONS

Receiving water limitations are retained from the previous Order and reflect applicable water quality standards from Basin Plan Chapter 3, with the exception of ammonia. The receiving water limits for ammonia have been removed from this Order to avoid redundancy with the effluent limitations for ammonia at Discharge Point No. 001.

VI. RATIONALE FOR MONITORING AND REPORTING REQUIREMENTS

The principal purposes of a monitoring program by a discharger are to:

- Document compliance with waste discharge requirements and prohibitions,
- Facilitate self-policing in the prevention and abatement of pollution arising from waste discharge, and
- Develop or assist in the development of limitations, discharge prohibitions, national standards of performance, pretreatment and toxicity standards, and other standards, and prepare water and wastewater quality inventories.

The MRP is a standard requirement in almost all NPDES permits issued by the Regional Water Board, including this Order. It contains definitions of terms and sets out requirements for reporting of routine monitoring data in accordance with NPDES regulations, the CWC, and Regional Water Board policies. The MRP also defines the sampling stations and frequency, the pollutants to be monitored, and additional reporting requirements. Pollutants to be monitored include all parameters for which effluent limitations are specified. Monitoring for additional constituents, for which no effluent limitations are established, is also required to provide data for future completion of RPAs.

A. Influent Monitoring

This Order does not require the Discharger to conduct monitoring of Facility influent. However, the Discharger has the option of using recycled water in exchange for adjustments, in which case the

Discharger will need to conduct monitoring of influent at I-001. Optional monitoring for parameters for which recycled water adjustments are available has been established.

B. Effluent Monitoring

The SIP states that the Regional Water Board will require periodic monitoring for pollutants for which criteria or objectives apply and for which no effluent limitations have been established. This Order requires the Discharger to conduct semi-annual monitoring at Monitoring Locations E-001 for all CTR priority pollutants, as discussed in the MRP (Attachment E) and in accordance with the Regional Standard Provisions (Attachment G). The Regional Water Board will use the additional data in the future to conduct an RPA and determine if WQBELs are required.

To demonstrate compliance with effluent limitations, this Order retains most effluent monitoring requirements from the previous Order. Important changes are summarized below.

1. Discharge Point No. 001

Monthly monitoring for COD has been established in order to demonstrate compliance by the Discharger with the newly established effluent limitations for this parameter. Since the Discharger no longer triggers reasonable potential for heptachlor epoxide or nickel, the monitoring frequency for these two parameters has been reduced to semi-annual. Specific requirements for mercury and PCB monitoring have not been retained in the MRP because both of these pollutants are now regulated by Order No. R2-2007-0077, as amended.

2. Discharge Point Nos. 002 – 023

In the Report of Waste Discharge, the Discharger requested permission to discontinue the use of Discharge Point Nos. 015 and 016 and transfer flow from the basins to Discharge Point No. 20. Discharge Point Nos. 015, 016, and 020 each discharge non-industrial stormwater, and each are subject to the same effluent limitations. Therefore, this Order discontinues monitoring of Discharge Point Nos. 015 and 016 and associated monitoring requirements at Monitoring Locations E-015 and 016.

C. Whole Effluent Toxicity Testing Requirements

1. **Acute Toxicity.** Weekly 96-hour bioassay testing is required at Monitoring Location E-001 to demonstrate compliance with the effluent limitation for acute toxicity.

2. **Chronic Toxicity.** Chronic whole effluent toxicity testing is required at Monitoring Location E-001 on a quarterly basis in order to demonstrate compliance with effluent limitations for chronic toxicity.

D. Receiving Water Monitoring

On April 15, 1992, the Regional Water Board adopted Resolution No. 92-043, directing the Executive Officer to implement the San Francisco Bay Regional Monitoring Program for Trace Substances. Subsequently, the Executive Officer required major permit holders in the Region, under authority of CWC section 13267, to report on the water quality of the estuary. These permit holders responded by participating in a collaborative effort through the San Francisco Estuary

Institute. This effort has come to be known as the Regional Monitoring Program (RMP). This Order specifies that the Discharger shall continue to participate in the RMP, which involves collection of data on pollutants and toxicity in the water, sediment, and biota of the estuary.

This Order also requires that the Discharger collect quarterly receiving water samples near its outfall for pH, temperature, dissolved oxygen, ammonia, salinity, and hardness. The purpose of this monitoring is to collect (1) basic information on the quality of receiving waters in the vicinity of the discharge, and (2) recent salinity and hardness data to determine the need for water quality based effluent limits in the next permit reissuance. For this Order, Regional Board staff used a very conservative hardness value of 59 mg/L in the calculation of effluent limits for lead. This value was used because of the limited amount of data available in the vicinity of the discharge point. With the next permit reissuance, it would be appropriate to use the site-specific hardness and salinity data required by this Order.

VII. RATIONALE FOR PROVISIONS

A. Standard Provisions (Provision VI.A)

Federal Standard Provisions, which in accordance with 40 CFR 122.41 and 122.42 apply to all NPDES discharges and must be included in every NPDES permit, are provided in Attachment D of this Order. 40 CFR 122.41(a)(1) and (b) through (n) establish conditions that apply to all state issued NPDES permits. These conditions must be incorporated into the permits either expressly or by reference. If incorporated by reference, a specific citation to the regulations must be included in the Order. 40 CFR 123.25(a)(12) allows the state to omit or modify conditions to impose more stringent requirements. The Regional Standard Provisions (Attachment G) supplement the Federal Standard Provisions. In accordance with 40 CFR 123.25, this Order omits federal conditions that address enforcement authority specified in 40 CFR 122.41(j)(5) and (k)(2) because the enforcement authority under CWC is more stringent. In lieu of these conditions, this Order incorporates by reference CWC section 13387(e).

B. Monitoring and Reporting Requirements (Provision VI.B)

The Discharger is required to monitor the permitted discharges in order to evaluate compliance with permit conditions. Monitoring requirements are contained in the MRP (Attachment E) and the Regional Standard Provisions (Attachment G). This provision requires compliance with these documents and is authorized by 40 CFR 122.41(h) and (j), and CWC section 13267 and 13383.

C. Special Provisions (Provision VI.C)

1. Reopener Provisions

These provisions are based on 40 CFR 122.63 and allow modification of this Order and its effluent limitations as necessary in response to updated WQOs, regulations, or other new relevant information that may be established in the future and other circumstances allowed by law.

2. Special Studies and Additional Monitoring

a. Effluent Characterization Study.

This Order does not include effluent limitations for the selected constituents addressed in the Regional Standard Provisions (Attachment G) that do not demonstrate Reasonable Potential, but this provision requires the Discharger to continue monitoring for these pollutants as described in the Regional Standard Provisions and as specified in the MRP. If concentrations of these constituents increase significantly, the Discharger is required to investigate the sources of the increases and establish remedial measures, if the increases result in reasonable potential to cause or contribute to an excursion above water quality standards. This provision is based on the Basin Plan, the SIP, and CWC 13267.

b. Ambient Background Receiving Water Study.

This provision is based on the Basin Plan, the SIP, CWC 13267 and the Regional Standard Provisions (Attachment G). As indicated in this Order, this requirement may be met by participating in a collaborative study.

c. Effluent and Receiving Water Selenium Characterization Study.

This Order requires the Discharger to characterize: (a) the concentrations and speciation of selenium in effluent and receiving water, (b) the variability of selenium in the discharge, (c) the potential for uptake and conversion of selenium to more bioavailable forms, (d) mixing and dilution in the receiving water, and (e) the ability to comply with any more-stringent selenium criteria that may become effective in the foreseeable future. These requirements are reasonable and warranted because the Discharger discharges selenium into San Pablo Bay. Based on the results of the studies, the Regional Water Board will be able to evaluate better how the Discharger contributes to the selenium impairment of San Francisco Bay. The Regional Water Board may use the data to evaluate dilution credits, characterize selenium bioaccumulation potential and ecological risk, and evaluate receiving water quality with respect to selenium. The Regional Water Board may also use the data to determine whether receiving water quality correlates with seasonal or other environmental factors. CWC 13267 authorizes the Regional Water Board to require these studies.

d. Dilution Modeling Update and Verification. As described in Fact Sheet section IV.C.4.b, the Discharger provided a dilution modeling study in November 1987 (*In-Situ Measurement of Dilution of Chevron Effluent in San Pablo Bay*). There is no compelling evidence that this study's results are not valid as justification for the dilution credits in this permit. However, because it was conducted over 20 years ago, it is reasonable to verify its results with a new updated study for the next permit reissuance.

3. Best Management Practices and Pollution Minimization

The provisions related to PMP development and implementation are based on Basin Plan section 4.12.2 and SIP section 2.4.5.

4. Other Special Provisions

a. Cyanide Action Plan.

This provision is based on Basin Plan section 4.7.2.2. It is necessary to ensure that use of cyanide site-specific objectives is consistent with antidegradation policies.

b. Copper Action Plan.

This provision is based on Basin Plan section 7.2.1.2. It is necessary to ensure that use of copper site-specific objectives is consistent with antidegradation policies.

c. Stormwater Pollution Prevention Plan and Annual Report.

This provision is based on Basin Plan section 4.8, statewide stormwater requirements for industrial facilities, and applicable USEPA regulations. It is retained from the previous Order.

d. Wastewater Discharges from the Wetland.

This provision is based on the Consent Decree *United States v. Chevron Industries Inc.*, Civil No. C98-3966-MEJ and DOJ No. 90-11-3-1398. The Consent Decree required, in part, that Chevron increase the design capacity of its GAC facility to 20 MGD and to use that capacity to treat refinery wastewater, except for 3 MGD, which may be treated by Chevron's wetland as long as wetland effluent meets toxicity standards established in the Consent Decree (i.e., 80% survival).

For the last five years the Discharger has routed all wetland effluent to the GAC facility before discharge to San Pablo Bay; however, the Discharger has indicated that it would like to retain the option to discharge up to 3 MGD of wetland effluent directly to Discharge Point No. 001. To ensure that such a discharge will not pose a threat to water quality, this Order requires, consistent with the Consent Decree, that the Discharger document that wetland effluent that bypasses the GAC facility will not cause acute toxicity and that the quantity is limited to 3 MGD or less.

VIII. PUBLIC PARTICIPATION

The Regional Water Board is considering the issuance of WDRs that will serve as a NPDES permit for the Chevron Richmond Refinery. As a step in the WDR adoption process, the Regional Water Board has developed tentative WDRs. The Regional Water Board encourages public participation in the WDR adoption process.

A. Notification of Interested Parties

The Regional Water Board has notified the Discharger and interested agencies and persons of its intent to prescribe WDRs for the discharge and has provided them with an opportunity to submit their written comments and recommendations. Notification was provided by publication in the Martinez News Gazette on May 12, 2011.

B. Written Comments

Staff determinations are tentative. Interested persons are invited to submit written comments concerning these tentative WDRs. Comments must be submitted either in person or by mail to the Executive Officer at the Regional Water Board at the address on the cover page of this Order, to the attention of Robert Schlipf.

To receive a full response from Regional Water Board staff and to be considered by the Regional Water Board, written comments should be received at the Regional Water Board offices by **5:00 p.m. on June 13, 2011.**

C. Public Hearing

The Regional Water Board will hold a public hearing on the tentative WDRs during its regular Board meeting on the following date and time and at the following location:

Date: July 13, 2011
Time: 9:00 am
Location: Elihu Harris State Office Building
1515 Clay Street, 1st Floor Auditorium
Oakland, CA 94612

Contact: Robert Schlipf**,** (510) 622-2478, email RSchlipf@waterboards.ca.gov

Interested persons are invited to attend. At the public hearing, the Regional Water Board will hear testimony, if any, pertinent to the discharge, WDRs, and permit. Oral testimony will be heard; however, for accuracy of the record, important testimony should be in writing.

Please be aware that dates and venues may change. The Regional Water Board's Web address is http://www.waterboards.ca.gov/sanfranciscobay where one can access the current agenda for changes in dates and locations.

D. Waste Discharge Requirements Petitions

Any aggrieved person may petition the State Water Board to review the decision of the Regional Water Board regarding the WDRs. The petition must be submitted within 30 days of the Regional Water Board's action to the following address:

State Water Resources Control Board
Office of Chief Counsel
P.O. Box 100, 1001 I Street
Sacramento, CA 95812-0100

E. Information and Copying

The Report of Waste Discharge, related documents, tentative effluent limitations and special provisions, comments received, and other information are on file and may be inspected at the address above at any time between 8:30 a.m. and 4:45 p.m., Monday through Friday, except from noon to 1:00 p.m. Copying of documents may be arranged by calling 510-622-2300.

F. Register of Interested Persons

Any person interested in being placed on the mailing list for information regarding the WDRs and NPDES permit should contact the Regional Water Board, reference this facility, and provide a name, address, and phone number.

G. Additional Information

Requests for additional information or questions regarding this order should be directed to Robert Schlipf at 510-622-2478 (e-mail at RSchlipf@waterboards.ca.gov).

ATTACHMENT F-1

Derivation of Technology-Based Effluent Limitations
Chevron Richmond Refinery

References

1. 40 CFR 419 – Integrated Subcategory, *Effluent Limitation Guidelines and New Source Performance Standards for the Petroleum Refining Point Source Category* (2006)

2. *Development Document for Effluent Limitations Guidelines and New Source Performance Standards for the Petroleum Refining Point Source Category*, EPA 440/1-82-014 (1982)

3. *Guide for the Application of Effluent Limitations Guidelines for the Petroleum Refining Industry*, USEPA Office of Water Regulations and Standards (1985)

4. Chevron, Richmond Refinery, NPDES Application for Permit Renewal, NPDES Permit No. CA0005134 (December 7, 2010)

5. Refinery Production Data from NPDES Application for Permit Renewal

Applicable Definitions

Process Waste Water means any water, which, during manufacturing or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, byproduct, or waste product. [40 CFR 401.11(q)]

Runoff means the flow of stormwater resulting from precipitation coming into contact with petroleum refinery property. [40 CFR 419.11(b)]

Contaminated Runoff means runoff that comes into contact with any raw material, intermediate product, finished product, by-product or waste product located on petroleum refinery property.
[40 CFR 419.11(g)]

Background

Effluent Limitations Guidelines (ELGs) for the Integrated Subcategory of the Petroleum Refining Point Source Category at 40 CFR 419 Subpart E are based, in part, on a discharger's production rate. The Discharger's current production rate is 243,970 barrels per day (bbls/day).

Process Wastewaters. The ELGs include limitations for process wastewaters based on best practicable control technology currently available (BPT), best available technology economically achievable (BAT), and best conventional pollutant control technology (BCT). Specific BPT, BAT, and BCT effluent limitations that apply to the Discharger must be derived using methods described by the ELGs and take into account such factors as production rate, as well as refinery processes and configuration. The most stringent of BPT, BAT, and BCT limitations apply.

For derivation of BPT, BAT, and BCT limitations for process wastewaters being discharged at Discharge Point No. 001, size factors and process factors are determined as follows.

Size Factor. At a crude processing rate of 243,970 bbls/day, the appropriate size factors, pursuant to the ELGs at 40 CFR 419.52(b)(1) for BPT, at 40 CFR 419.53(b)(1) for BAT, and at 40 CFR 419.54(b)(1) for BCT, for derivation of technology-based effluent limitations is 1.04

Process Factor. The process configuration for each process is determined by summing the process feedstock rates for each crude, cracking and coking, lube, and asphalt process at the refinery. Each individual feedstock rate is multiplied by the capacity relative to the throughput, and a weight factor specific for each process, to derive a "process configuration," which in turn is used to determine a "process factor" in accordance with the ELGs at 40 CFR 419.52(b) (2) for BPT, at 40 CFR 419.53(b)(2) for BAT, and at 40 CFR 419.54(b)(2) for BCT.

Processes considered in deriving the process factors are those processes within the crude and cracking and coking categories as reported by the Discharger, which correspond to the process groups listed within the *Guide for the Application of Effluent Limitations Guidelines for the Petroleum Refining Industry* (page 19). The Discharger does not include asphalt processes, so this process group is not considered in determining process factors.

Derivation of the process configuration for a production rate of 243,970 bbls/day is shown in the following table:

Table F-1A. Process Configurations for Discharge Point No. 001

Production at 243,970 bbls/day				
Process	**Process Feedstock Rate (x 1,000 bbls/day)**	**Process/ Feedstock Ratio**	**Weight Factor**	**Process Configuration**
Crude				
Atm. Dist.	244.0	1.000		
Vac. Dist.	101.0	0.414		
Desalt.	244.0	1.000		
Total	589.0	2.414	1	= 2.41
Cracking				
Fluid Catalytic Cracking	77.9	0.319		
Hydrocracking	125.8	0.516		
Hydrotreating	108.8	0.446		
Total	312.5	1.281	6	= 7.68
Lube				
Lube Hydrofinishing	30.4	0.124		
Propane Deasphalting	39.6	0.162		
Total	70.0	0.287	13	= 3.73
Reforming and Alkylation Processes	74.4	0.30	0	0
Total Refinery Configuration at 243,970 bbls/day				**13.8**

The process factor, as determined in accordance with 40 CFR 419.52(b)(2) for BPT, 40 CFR 419.53(b)(2) for BAT, 40 CFR 419.54(b)(2) for BCT, is 2.26

To determine BAT limitations for total and hexavalent chromium and phenolic compounds in process wastewaters, the ELGs require consideration of effluent factors and refinery processes. BAT effluent factors are presented at 40 CFR 419.53(c)(1); the refinery processes considered are the crude, cracking and coking, and reforming and alkylation processes, which correspond to those identified within the *Guide for the Application of Effluent Limitations Guidelines for the Petroleum Refining Industry* (page 20).

Contaminated Runoff. The ELGs establish BPT, BAT, and BCT limitations for contaminated runoff, which apply to all stormwater discharges, except stormwater treated and discharged with process wastewaters through Discharge Point 001. ELGs establish effluent limitations for oil and grease and total organic carbon (TOC), and then, if limitations for oil and grease or TOC are exceeded, additional limitations for BOD, TSS, COD, phenolic compounds, total chromium, hexavalent chromium, and pH, found at 40 CFR 419.52(e)(2) and 419.53(f)(2) apply

Determination of Process Wastewater Effluent Limitations at Discharge Point No. 001

BPT. The following table shows the derivation of process wastewater BPT limitations at a production rate of 243,970 bbls/day.

Effluent Limit = (Size Factor)(Process Factor)(Feed Stock Rate)*(Effluent Limit Factor)

Table F-1B. BPT Limitations for Process Wastewaters

	Preliminary Effluent Limitation Factor [1]		Size Factor	Process Factor	Feed Stock Rate	Effluent Limitation [2]	
	Max Daily	Avg Monthly				Max Daily	Avg Monthly
BOD_5	19.2	10.2	1.04	2.26	243.97	11,010	5,849
TSS	13.2	8.4	1.04	2.26	243.97	7,569	4,817
COD	136.0	70	1.04	2.26	243.97	77,986	40,140
Oil & Grease	6.0	3.2	1.04	2.26	243.97	3,441	1,835
Phenolics (4AAP)	0.14	0.068	1.04	2.26	243.97	80	39
Ammonia (as N)	8.3	3.8	1.04	2.26	243.97	4,759	2,179
Sulfide	0.124	0.056	1.04	2.26	243.97	71	32
Total Chromium	0.29	0.17	1.04	2.26	243.97	166	97
Hexavalent Chromium	0.025	0.011	1.04	2.26	243.97	14	6.3
pH	--	--	--	--	--	6.0 – 9.0	

[1] From 40 CFR 419.52(a) (pounds per 1000 bbls of feedstock)
[2] Pounds per day (lbs/day)

BAT. The following table shows the derivation of BAT limitations for process wastewaters at production rates of 243,970 bbls/day.

Table F-1C. BAT Limitations for Process Wastewater

	Preliminary Effluent Limitation Factor [1]		Size Factor	Process Factor	Feed Stock Rate	Effluent Limitation [2]	
	Max Daily	Avg Monthly				Max Daily	Avg Monthly
Production at 243,970 bbls/day							
COD[3]	136	70	1.04	2.26	243.97	77,986	40,140
Ammonia (as N)	8.3	3.8	1.04	2.26	243.97	4,759	2,179
Sulfide	0.124	0.056	1.04	2.26	243.97	71	32

[1] From 40 CFR 419.53(a) (pounds per 1000 bbls of feedstock)
[2] Pounds/day (lbs/day)
[3] In any case in which the applicant can demonstrate that the chloride concentration in the effluent exceeds 1,000 mg/L (1,000 ppm), the Regional Administration may substitute TOC as a parameter in lieu of COD. Effluent limitations for TOC shall be based on effluent data from the plant conrrelating TOC to BOD_5.

BAT limitations for total and hexavalent chromium and phenolic compounds are based on feedstock rates. Figures used in calculations for this Order are shown in the following table.

Table F-1D. Feedstock Rates for Determining BAT Limitations

Refinery Throughput	**243,970 bbls/day**
Crude	
Atmospheric Distillation	244.0
Vacuum Distillation	101.0
Desalting	244.0
Total	**589.0**
Cracking and Coking	
Catalytic Cracking	77.9
Hydrocracking	125.8
Hydrotreating	108.8
Total	**312.5**
Lube	
Lube Hydrofining	30.4
Propane Deasphalting	39.6
Total	**70.0**
Reforming and Alkylation	**74.1**

Based on the total feedstock rates shown above, derivation of BAT limitations for total and hexavalent chromium and phenolic compounds are shown in the following table.

Table F-1E. BAT Limitations for Process Wastewater (Chromium and Phenolics)

Pollutant	Preliminary Effluent Limitations Factor [a]		Feedstock Rate	Effluent Limitations [b]	
	Max Daily	Avg Monthly		Max Daily	Avg Monthly
Production at 243,970 bbls/day					
Phenolic Compounds					
Crude	0.013	0.003	588.98	7.66	1.77
Cracking and Coking	0.147	0.036	312.46	45.93	11.25
Asphalt	0.079	0.019	0.00	0.00	0.00
Lube	0.369	0.090	69.96	25.82	6.30
Reforming and Alkylation	0.132	0.032	74.1	9.78	2.37
Limit (Sum)	---	---	---	**89.18**	**21.68**
Total Chromium					
Crude	0.011	0.004	588.98	6.48	2.36
Cracking and Coking	0.119	0.041	312.46	37.18	12.81
Asphalt	0.064	0.022	0.00	0.00	0.00
Lube	0.299	0.104	69.96	20.92	7.28
Reforming and Alkylation	0.107	0.037	74.1	7.93	2.74
Limit (Sum)	---	---	---	**72.51**	**25.18**
Hexavalent Chromium					
Crude	0.0007	0.0003	588.98	0.41	0.18
Cracking and Coking	0.0076	0.0034	312.46	2.37	1.06
Asphalt	0.0041	0.0019	0.00	0.00	0.00
Lube	0.0192	0.0087	69.96	1.34	0.61
Reforming and Alkylation	0.0069	0.0031	74.1	0.51	0.23
Limit (Sum)	---	---	---	**4.64**	**2.08**

[1] From 40 CFR 419.53(c) (pounds per 1000 bbls of feedstock)
[2] Pounds per day

BCT. The following table shows the derivation of BCT limitations for process wastewaters at production rates of 243,970 bbls/day.

Table F-1F. BCT Limitations for Process Wastewater

Pollutant	Preliminary Effluent Limitations Factor [1]		Size Factor	Process Factor	Feed Stock Rate	Final Effluent Limitations [2]	
	Max Daily	Avg Monthly				Max Daily	Avg Monthly
Production at 243,970 bbls/day							
BOD_5	19.2	10.2	1.04	2.26	243.97	11,010	5,849
TSS	13.2	8.4	1.04	2.26	243.97	7,569	4,817
Oil & Grease	6.0	3.2	1.04	2.26	243.97	3,441	1,835
pH	--	--	--	--	--	6.0 – 9.0	

[1] From 40 CFR 419.54(a) (pounds per 1000 bbls of feedstock)
[2] Pounds per day (lbs/day)

Most Stringent Technology-Based Process Wastewater Effluent Limitations

The following table presents the technology-based process wastewater effluent limitations that apply to the Discharger. The limitations are the most stringent of the BPT, BAT, and BCT limitations required by the ELGs and are expressed in units of lbs/day based on production rates of 243,970 bbls/day.

Table F-1G. Summary of Technology-Based Wastewater Effluent Limitations

	Effluent Limitations [1],[2]	
Pollutant	**Max Daily**	**Avg Monthly**
Production at 243,970 bbls/day		
BOD_5	11,010	5,849
TSS	7,569	4,817
COD	77,986	40,140
Oil & Grease	3,441	1,835
Phenolics (4AAP)	80	22[3]
Ammonia (as N)	4,759	2,179
Sulfide	71	32
Total Cr	73[3]	25[3]
Hex Cr	4.6[3]	2.1[3]
pH	6.0 – 9.0 pH units	

[1] Units are lbs/day
[2] All technology-based limitations for process wastewaters are based on BPT unless otherwise noted.
[3] Based on BAT.

Determination of Effluent Limitation Allocations for Contaminated Runoff

If contaminated stormwater discharges exceed the oil and grease limit (15 mg/L) or the total organic carbon limit (110 mg/L), additional concentration-based limitations for BOD, TSS, COD, phenolics, total chromium, hexavalent chromium, and pH become immediately effective. The effluent limitations for these pollutants are derived from the most stringent of BAT and BPT effluent concentration-based limitations provided in the ELGs. A table summarizing these additional effluent limitations is shown below.

Table F-1H. Additional Stormwater Effluent Limitations

Pollutant	**Units**	**Max Daily[1]**	**Average Monthly[1]**
BOD	mg/L	48	26
TSS		33	21
COD		360	180
Oil and Grease		15	8
Phenolic Compounds		0.35	0.17
Total Chromium		0.60	0.21
Hexavalent Chromium		0.062	0.028
pH	s.u.	6.0 – 9.0	

[1] All effluent limitations reflect BPT requirements from 40 CFR 419.52(e)(2), except limitations for total chromium, which reflect BAT requirements from 40 CFR 419.53(f)(2).

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ATTACHMENT G

REGIONAL STANDARD PROVISIONS, AND MONITORING
AND REPORTING REQUIREMENTS
(SUPPLEMENT TO ATTACHMENT D)

For

NPDES WASTEWATER DISCHARGE PERMITS

March 2010

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CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

REGIONAL STANDARD PROVISIONS, AND MONITORING AND REPORTING REQUIREMENTS (SUPPLEMENT TO ATTACHMENT D)

FOR

NPDES WASTEWATER DISCHARGE PERMITS

APPLICABILITY

This document applies to dischargers covered by a National Pollutant Discharge Elimination System (NPDES) permit. This document does not apply to Municipal Separate Storm Sewer System (MS4) NPDES permits.

The purpose of this document is to supplement the requirements of Attachment D, Standard Provisions. The requirements in this supplemental document are designed to ensure permit compliance through preventative planning, monitoring, recordkeeping, and reporting. In addition, this document requires proper characterization of issues as they arise, and timely and full responses to problems encountered. To provide clarity on which sections of Attachment D this document supplements, this document is arranged in the same format as Attachment D.

I. STANDARD PROVISIONS - PERMIT COMPLIANCE

A. Duty to Comply

Not Supplemented

B. Need to Halt or Reduce Activity Not a Defense

Not Supplemented

C. Duty to Mitigate

This supplements I.C. of Standard Provisions (Attachment D)

1. Contingency Plan

The Discharger shall maintain a Contingency Plan as originally required by Regional Water Board Resolution 74-10 and as prudent in accordance with current municipal facility emergency planning. The Contingency Plan shall describe procedures to ensure that existing facilities remain in, or are rapidly returned to, operation in the event of a process failure or emergency incident, such as employee strike, strike by suppliers of chemicals or maintenance services, power outage, vandalism, earthquake, or fire. The Discharger may combine the Contingency Plan and Spill Prevention Plan into one document. Discharge in violation of the permit where the Discharger has failed to develop and implement a Contingency Plan as described below will be the basis for considering the discharge a

willful and negligent violation of the permit pursuant to California Water Code Section 13387. The Contingency Plan shall, at a minimum, contain the provisions of a. through g. below.

a. Provision of personnel for continued operation and maintenance of sewerage facilities during employee strikes or strikes against contractors providing services.

b. Maintenance of adequate chemicals or other supplies and spare parts necessary for continued operations of sewerage facilities.

c. Provisions of emergency standby power.

d. Protection against vandalism.

e. Expeditious action to repair failures of, or damage to, equipment and sewer lines.

f. Report of spills and discharges of untreated or inadequately treated wastes, including measures taken to clean up the effects of such discharges.

g. Programs for maintenance, replacement, and surveillance of physical condition of equipment, facilities, and sewer lines.

2. Spill Prevention Plan

The Discharger shall maintain a Spill Prevention Plan to prevent accidental discharges and minimize the effects of such events. The Spill Prevention Plan shall:

a. Identify the possible sources of accidental discharge, untreated or partially treated waste bypass, and polluted drainage;

b. Evaluate the effectiveness of present facilities and procedures, and state when they became operational; and

c. Predict the effectiveness of the proposed facilities and procedures, and provide an implementation schedule containing interim and final dates when they will be constructed, implemented, or operational.

This Regional Water Board, after review of the Contingency and Spill Prevention Plans or their updated revisions, may establish conditions it deems necessary to control accidental discharges and to minimize the effects of such events. Such conditions may be incorporated as part of the permit upon notice to the Discharger.

D. Proper Operation & Maintenance

This supplements I.D of Standard Provisions (Attachment D)

1. Operation and Maintenance (O&M) Manual

The Discharger shall maintain an O&M Manual to provide the plant and regulatory personnel with a source of information describing all equipment, recommended operational strategies, process control monitoring, and maintenance activities. To remain a useful and

relevant document, the O&M Manual shall be kept updated to reflect significant changes in treatment facility equipment and operational practices. The O&M Manual shall be maintained in usable condition and be available for reference and use by all relevant personnel and Regional Water Board staff.

2. Wastewater Facilities Status Report

The Discharger shall regularly review, revise, or update, as necessary, its Wastewater Facilities Status Report. This report shall document how the Discharger operates and maintains its wastewater collection, treatment, and disposal facilities to ensure that all facilities are adequately staffed, supervised, financed, operated, maintained, repaired, and upgraded as necessary to provide adequate and reliable transport, treatment, and disposal of all wastewater from both existing and planned future wastewater sources under the Discharger's service responsibilities.

3. Proper Supervision and Operation of Publicly Owned Treatment Works (POTWs)

POTWs shall be supervised and operated by persons possessing certificates of appropriate grade pursuant to Division 4, Chapter 14, Title 23 of the California Code of Regulations.

E. Property Rights

Not Supplemented

F. Inspection and Entry

Not Supplemented

G. Bypass

Not Supplemented

H. Upset

Not Supplemented

I. Other

This section is an addition to Standard Provisions (Attachment D)

1. Neither the treatment nor the discharge of pollutants shall create pollution, contamination, or nuisance as defined by California Water Code Section 13050.

2. Collection, treatment, storage, and disposal systems shall be operated in a manner that precludes public contact with wastewater, except in cases where excluding the public is infeasible, such as private property. If public contact with wastewater could reasonably occur on public property, warning signs shall be posted.

3. If the Discharger submits a timely and complete Report of Waste Discharge for permit reissuance, this permit continues in force and effect until a new permit is issued or the Regional Water Board rescinds the permit.

J. Stormwater

This section is an addition to Standard Provisions (Attachment D)

These provisions apply to facilities that do not direct all stormwater flows from the facility to the wastewater treatment plant headworks.

1. Stormwater Pollution Prevention Plan (SWPP Plan)

The SWPP Plan shall be designed in accordance with good engineering practices and shall address the following objectives:

a. To identify pollutant sources that may affect the quality of stormwater discharges; and

b. To identify, assign, and implement control measures and management practices to reduce pollutants in stormwater discharges.

The SWPP Plan may be combined with the existing Spill Prevention Plan as required in accordance with Section C.2. The SWPP Plan shall be retained on-site and made available upon request of a representative of the Regional Water Board.

2. Source Identification

The SWPP Plan shall provide a description of potential sources that may be expected to add significant quantities of pollutants to stormwater discharges, or may result in non-stormwater discharges from the facility. The SWPP Plan shall include, at a minimum, the following items:

a. A topographical map (or other acceptable map if a topographical map is unavailable), extending one-quarter mile beyond the property boundaries of the facility, showing the wastewater treatment facility process areas, surface water bodies (including springs and wells), and discharge point(s) where the facility's stormwater discharges to a municipal storm drain system or other points of discharge to waters of the State. The requirements of this paragraph may be included in the site map required under the following paragraph if appropriate.

b. A site map showing the following:

(1) Stormwater conveyance, drainage, and discharge structures;

(2) An outline of the stormwater drainage areas for each stormwater discharge point;

(3) Paved areas and buildings;

(4) Areas of actual or potential pollutant contact with stormwater or release to stormwater, including but not limited to outdoor storage and process areas; material loading, unloading, and access areas; and waste treatment, storage, and disposal areas;

(5) Location of existing stormwater structural control measures (i.e., berms, coverings, etc.);

(6) Surface water locations, including springs and wetlands; and

(7) Vehicle service areas.

c. A narrative description of the following:

(1) Wastewater treatment process activity areas;

(2) Materials, equipment, and vehicle management practices employed to minimize contact of significant materials of concern with stormwater discharges;

(3) Material storage, loading, unloading, and access areas;

(4) Existing structural and non-structural control measures (if any) to reduce pollutants in stormwater discharges; and

(5) Methods of on-site storage and disposal of significant materials.

d. A list of pollutants that have a reasonable potential to be present in stormwater discharges in significant quantities.

3. Stormwater Management Controls

The SWPP Plan shall describe the stormwater management controls appropriate for the facility and a time schedule for fully implementing such controls. The appropriateness and priorities of controls in the SWPP Plan shall reflect identified potential sources of pollutants. The description of stormwater management controls to be implemented shall include, as appropriate:

a. Stormwater pollution prevention personnel

Identify specific individuals (and job titles) that are responsible for developing, implementing, and reviewing the SWPP Plan.

b. Good housekeeping

Good housekeeping requires the maintenance of clean, orderly facility areas that discharge stormwater. Material handling areas shall be inspected and cleaned to reduce the potential for pollutants to enter the storm drain conveyance system.

c. Spill prevention and response

Identify areas where significant materials can spill into or otherwise enter stormwater conveyance systems and their accompanying drainage points. Specific material handling procedures, storage requirements, and cleanup equipment and procedures shall be identified, as appropriate. The necessary equipment to implement a cleanup shall be available, and personnel shall be trained in proper response, containment, and cleanup

of spills. Internal reporting procedures for spills of significant materials shall be established.

d. Source control

Source controls include, for example, elimination or reduction of the use of toxic pollutants, covering of pollutant source areas, sweeping of paved areas, containment of potential pollutants, labeling of all storm drain inlets with “No Dumping” signs, isolation or separation of industrial and non-industrial pollutant sources so that runoff from these areas does not mix, etc.

e. Stormwater management practices

Stormwater management practices are practices other than those that control the sources of pollutants. Such practices include treatment or conveyance structures, such as drop inlets, channels, retention and detention basins, treatment vaults, infiltration galleries, filters, oil/water separators, etc. Based on assessment of the potential of various sources to contribute pollutants to stormwater discharges in significant quantities, additional stormwater management practices to remove pollutants from stormwater discharges shall be implemented and design criteria shall be described.

f. Sediment and erosion control

Measures to minimize erosion around the stormwater drainage and discharge points, such as riprap, revegetation, slope stabilization, etc., shall be described.

g. Employee training

Employee training programs shall inform all personnel responsible for implementing the SWPP Plan. Training shall address spill response, good housekeeping, and material management practices. New employee and refresher training schedules shall be identified.

h. Inspections

All inspections shall be done by trained personnel. Material handling areas shall be inspected for evidence of, or the potential for, pollutants entering stormwater discharges. A tracking or follow up procedure shall be used to ensure appropriate response has been taken in response to an inspection. Inspections and maintenance activities shall be documented and recorded. Inspection records shall be retained for five years.

i. Records

A tracking and follow-up procedure shall be described to ensure that adequate response and corrective actions have been taken in response to inspections.

4. Annual Verification of SWPP Plan

An annual facility inspection shall be conducted to verify that all elements of the SWPP Plan are accurate and up-to-date. The results of this review shall be reported in the Annual Report to the Regional Water Board described in Section V.C.f.

K. Biosolids Management

This section is an addition to Standard Provisions (Attachment D)

Biosolids must meet the following requirements prior to land application. The Discharger must either demonstrate compliance or, if it sends the biosolids to another party for further treatment or distribution, must give the recipient the information necessary to ensure compliance.

1. Exceptional quality biosolids meet the pollutant concentration limits in Table III of 40 CFR Part 503.13, Class A pathogen limits, and one of the vector attraction reduction requirements in 503.33(b)(1)-(b)(8). Such biosolids do not have to be tracked further for compliance with general requirements (503.12) and management practices (503.14).

2. Biosolids used for agricultural land, forest, or reclamation shall meet the pollutant limits in Table I (ceiling concentrations) and Table II or Table III (cumulative loadings or pollutant concentration limits) of 503.13. They shall also meet the general requirements (503.12) and management practices (503.14) (if not exceptional quality biosolids) for Class A or Class B pathogen levels with associated access restrictions (503.32) and one of the 10 vector attraction reduction requirements in 503.33(b)(1)-(b)(10).

3. Biosolids used for lawn or home gardens must meet exceptional quality biosolids limits.

4. Biosolids sold or given away in a bag or other container must meet the pollutant limits in either Table III or Table IV (pollutant concentration limits or annual pollutant loading rate limits) of 503.13. If Table IV is used, a label or information sheet must be attached to the biosolids packing that explains Table IV (see 503.14). The biosolids must also meet the Class A pathogen limits and one of the vector attraction reduction requirements in 503.33(b)(1)-(b)(8).

II. STANDARD PROVISIONS – PERMIT ACTION

Not Supplemented

III. STANDARD PROVISIONS – MONITORING

A. Sampling and Analyses

This section is a supplement to III.A and III.B of Standard Provisions (Attachment D)

1. Use of Certified Laboratories

Water and waste analyses shall be performed by a laboratory certified for these analyses in accordance with California Water Code Section 13176.

2. Use of Appropriate Minimum Levels

Table C lists the suggested analytical methods for the 126 priority pollutants and other toxic pollutants that should be used, unless a particular method or minimum level (ML) is required in the MRP.

For priority pollutant monitoring, when there is more than one ML value for a given substance, the Discharger may select any one of the analytical methods cited in Table C for compliance determination, or any other method described in 40 CFR part 136 or approved by USEPA (such as the 1600 series) if authorized by the Regional Water Board. However, the ML must be below the effluent limitation and water quality objective. If no ML value is below the effluent limitation and water quality objective, then the method must achieve an ML no greater than the lowest ML value indicated in Table C. All monitoring instruments and equipment shall be properly calibrated and maintained to ensure accuracy of measurements.

3. Frequency of Monitoring

The minimum schedule of sampling analysis is specified in the MRP portion of the permit.

a. Timing of Sample Collection

(1) The Discharger shall collect samples of influent on varying days selected at random and shall not include any plant recirculation or other sidestream wastes, unless otherwise stipulated by the MRP.

(2) The Discharger shall collect samples of effluent on days coincident with influent sampling unless otherwise stipulated by the MRP or the Executive Officer. The Executive Officer may approve an alternative sampling plan if it is demonstrated to be representative of plant discharge flow and in compliance with all other permit requirements.

(3) The Discharger shall collect grab samples of effluent during periods of day-time maximum peak effluent flows (or peak flows through secondary treatment units for facilities that recycle effluent flows).

(4) Effluent sampling for conventional pollutants shall occur on at least one day of any multiple-day bioassay test the MRP requires. During the course of the test, on at least one day, the Discharger shall collect and retain samples of the discharge. In the event a bioassay test does not comply with permit limits, the Discharger shall analyze these retained samples for pollutants that could be toxic to aquatic life and for which it has effluent limits.

(a). The Discharger shall perform bioassay tests on final effluent samples; when chlorine is used for disinfection, bioassay tests shall be performed on effluent after chlorination-dechlorination; and

(b) The Discharger shall analyze for total ammonia nitrogen and calculate the amount of un-ionized ammonia whenever test results fail to meet the percent survival specified in the permit.

b. Conditions Triggering Accelerated Monitoring

(1) If the results from two consecutive samples of a constituent monitored in a 30-day period exceed the monthly average limit for any parameter (or if the required sampling frequency is once per month and the monthly sample exceeds the monthly average limit), the Discharger shall, within 24 hours after the results are received, increase its sampling frequency to daily until the results from the additional sampling show that the parameter is in compliance with the monthly average limit.

(2) If any maximum daily limit is exceeded, the Discharger shall increase its sampling frequency to daily within 24 hours after the results are received that indicate the exceedance of the maximum daily limit until two samples collected on consecutive days show compliance with the maximum daily limit.

(3) If final or intermediate results of an acute bioassay test indicate a violation or threatened violation (e.g., the percentage of surviving test organisms of any single acute bioassay test is less than 70 percent), the Discharger shall initiate a new test as soon as practical, and the Discharger shall investigate the cause of the mortalities and report its findings in the next self monitoring report (SMR).

(4) The Discharger shall calibrate chlorine residual analyzers against grab samples as frequently as necessary to maintain accurate control and reliable operation. If an effluent violation is detected, the Discharger shall collect grab samples at least every 30 minutes until compliance with the limit is achieved, unless the Discharger monitors chlorine residual continuously. In such cases, the Discharger shall continue to conduct continuous monitoring as required by its permit.

(5) When a bypass occurs (except one subject to provision III.A.3.b.6 below), the Discharger shall monitor flows and collect samples on a daily basis for all constituents at affected discharge points that have effluent limits for the duration of the bypass (including acute toxicity using static renewals), except chronic toxicity, unless otherwise stipulated by the MRP.

(6) Unless otherwise stipulated by the MRP, when a bypass approved pursuant to Attachment D, Standard Provisions, Sections I.G.2 or I.G.4, occurs, the Discharger shall monitor flows and, using appropriate procedures as specified in the MRP, collect and retain samples for affected discharge points on a daily basis for the duration of the bypass. The Discharger shall analyze for total suspended solids (TSS) using 24-hour composites (or more frequent increments) and for bacteria indicators with effluent limits using grab samples. If TSS exceeds 45 mg/L in any composite sample, the Discharger shall also analyze the retained samples for that discharge for all other constituents that have effluent limits, except oil and grease, mercury, dioxin-TEQ, and acute and chronic toxicity. Additionally, at least once each year, the Discharger shall analyze the retained samples for one approved bypass discharge event for all other constituents that have effluent limits, except oil and grease, mercury, dioxin-TEQ, and acute and chronic toxicity. This monitoring shall be in addition to the minimum monitoring specified in the MRP.

c. Stormwater Monitoring

The requirements of this section only apply to facilities that are not covered by an NPDES permit for stormwater discharges and where not all site storm drainage from process areas (i.e., areas of the treatment facility where chemicals or wastewater could come in contact with stormwater) is directed to the headworks. For stormwater not directed to the headworks during the wet season (October 1 to April 30), the Discharger shall:

(1) Conduct visual observations of the stormwater discharge locations during daylight hours at least once per month during a storm event that produces significant stormwater discharge to observe the presence of floating and suspended materials, oil and grease, discoloration, turbidity, and odor, etc.

(2) Measure (or estimate) the total volume of stormwater discharge, collect grab samples of stormwater discharge from at least two storm events that produce significant stormwater discharge, and analyze the samples for oil and grease, pH, TSS, and specific conductance.

The grab samples shall be taken during the first 30 minutes of the discharge. If collection of the grab samples during the first 30 minutes is impracticable, grab samples may be taken during the first hour of the discharge, and the Discharger shall explain in the Annual Report why the grab sample(s) could not be taken in the first 30 minutes.

(3) Testing for the presence of non-stormwater discharges shall be conducted no less than twice during the dry season (May 1 to September 30) at all stormwater discharge locations. Tests may include visual observations of flows, stains, sludges, odors, and other abnormal conditions; dye tests; TV line surveys; or analysis and validation of accurate piping schematics. Records shall be maintained describing the method used, date of testing, locations observed, and test results.

(4) Samples shall be collected from all locations where stormwater is discharged. Samples shall represent the quality and quantity of stormwater discharged from the facility. If a facility discharges stormwater at multiple locations, the Discharger may sample a reduced number of locations if it establishes and documents through the monitoring program that stormwater discharges from different locations are substantially identical.

(5) Records of all stormwater monitoring information and copies of all reports required by the permit shall be retained for a period of at least three years from the date of sample, observation, or report.

d. Receiving Water Monitoring

The requirements of this section only apply when the MRP requires receiving water sampling.

(1) Receiving water samples shall be collected on days coincident with effluent sampling for conventional pollutants.

(2) Receiving water samples shall be collected at each station on each sampling day during the period within one hour following low slack water. Where sampling during lower slack water is impractical, sampling shall be performed during higher slack water. Samples shall be collected within the discharge plume and down current of the discharge point so as to be representative, unless otherwise stipulated in the MRP.

(3) Samples shall be collected within one foot of the surface of the receiving water, unless otherwise stipulated in the MRP.

B. Biosolids Monitoring

This section supplements III.B of Standard Provisions (Attachment D)

When biosolids are sent to a landfill, sent to a surface disposal site, or applied to land as a soil amendment, they must be monitored as follows:

1. Biosolids Monitoring Frequency

Biosolids disposal must be monitored at the following frequency:

Metric tons biosolids/365 days	Frequency
0-290	Once per year
290-1500	Quarterly
1500-15,000	Six times per year
Over 15,000	Once per month
(Metric tons are on a dry weight basis)	

2. Biosolids Pollutants to Monitor

Biosolids shall be monitored for the following constituents:

Land Application: arsenic, cadmium, copper, mercury, molybdenum, nickel, lead, selenium, and zinc

Municipal Landfill: Paint filter test (pursuant to 40 CFR 258)

Biosolids-only Landfill or Surface Disposal Site (if no liner and leachate system): arsenic, chromium, and nickel

C. Standard Observations

This section is an addition to III of Standard Provisions (Attachment D)

1. Receiving Water Observations

The requirements of this section only apply when the MRP requires standard observations of the receiving water. Standard observations shall include the following:

a. *Floating and suspended materials* (e.g., oil, grease, algae, and other macroscopic particulate matter): presence or absence, source, and size of affected area.

b. *Discoloration and turbidity*: description of color, source, and size of affected area.

c. *Odor*: presence or absence, characterization, source, distance of travel, and wind direction.

d. *Beneficial water use*: presence of water-associated waterfowl or wildlife, fisherpeople, and other recreational activities in the vicinity of each sampling station.

e. *Hydrographic condition*: time and height of corrected high and low tides (corrected to nearest National Oceanic and Atmospheric Administration location for the sampling date and time of sample collection).

f. *Weather conditions*:

(1) Air temperature; and

(2) Total precipitation during the five days prior to observation.

2. Wastewater Effluent Observations

The requirements of this section only apply when the MRP requires wastewater effluent standard observations. Standard observations shall include the following:

a. *Floating and suspended material of wastewater origin* (e.g., oil, grease, algae, and other macroscopic particulate matter): presence or absence.

b. *Odor*: presence or absence, characterization, source, distance of travel, and wind direction.

3. Beach and Shoreline Observations

The requirements of this section only apply when the MRP requires beach and shoreline standard observations. Standard observations shall include the following:

a. *Material of wastewater origin*: presence or absence, description of material, estimated size of affected area, and source.

b. *Beneficial use*: estimate number of people participating in recreational water contact, non-water contact, or fishing activities.

4. Land Retention or Disposal Area Observations

The requirements of this section only apply to facilities with on-site surface impoundments or disposal areas that are in use. This section applies to both liquid and solid wastes, whether confined or unconfined. The Discharger shall conduct the following for each impoundment:

a. Determine the amount of freeboard at the lowest point of dikes confining liquid wastes.

b. Report evidence of leaching liquid from area of confinement and estimated size of affected area. Show affected area on a sketch and volume of flow (e.g., gallons per minute [gpm]).

c. Regarding odor, describe presence or absence, characterization, source, distance of travel, and wind direction.

d. Estimate number of waterfowl and other water-associated birds in the disposal area and vicinity.

5. Periphery of Waste Treatment and/or Disposal Facilities Observations

The requirements of this section only apply when the MRP specifies periphery standard observations. Standard observations shall include the following:

a. *Odor*: presence or absence, characterization, source, and distance of travel.

b. *Weather conditions*: wind direction and estimated velocity.

IV. STANDARD PROVISIONS – RECORDS

A. Records to be Maintained

This supplements IV.A of Standard Provisions (Attachment D)

The Discharger shall maintain records in a manner and at a location (e.g., wastewater treatment plant or Discharger offices) such that the records are accessible to Regional Water Board staff. The minimum period of retention specified in Section IV, Records, of the Federal Standard Provisions shall be extended during the course of any unresolved litigation regarding the subject discharge, or when requested by the Regional Water Board or Regional Administrator of USEPA, Region IX.

A copy of the permit shall be maintained at the discharge facility and be available at all times to operating personnel.

B. Records of monitoring information shall include

This supplements IV.B of Standard Provision (Attachment D)

1. Analytical Information

Records shall include analytical method detection limits, minimum levels, reporting levels, and related quantification parameters.

2. Flow Monitoring Data

For all required flow monitoring (e.g., influent and effluent flows), the additional records shall include the following, unless otherwise stipulated by the MRP:

a. Total volume for each day; and

b. Maximum, minimum, and average daily flows for each calendar month.

3. Wastewater Treatment Process Solids

a. For each treatment unit process that involves solids removal from the wastewater stream, records shall include the following:

(1) Total volume or mass of solids removed from each collection unit (e.g., grit, skimmings, undigested biosolids, or combination) for each calendar month or other time period as appropriate, but not to exceed annually; and

(2) Final disposition of such solids (e.g., landfill, other subsequent treatment unit).

b. For final dewatered biosolids from the treatment plant as a whole, records shall include the following:

(1) Total volume or mass of dewatered biosolids for each calendar month;

(2) Solids content of the dewatered biosolids; and

(3) Final disposition of dewatered biosolids (disposal location and disposal method).

4. Disinfection Process

For the disinfection process, these additional records shall be maintained documenting process operation and performance:

a. For bacteriological analyses:

(1) Wastewater flow rate at the time of sample collection; and

(2) Required statistical parameters for cumulative bacterial values (e.g., moving median or geometric mean for the number of samples or sampling period identified in this Order).

b. For the chlorination process, when chlorine is used for disinfection, at least daily average values for the following:

(1) Chlorine residual of treated wastewater as it enters the contact basin (mg/L);

(2) Chlorine dosage (kg/day); and

(3) Dechlorination chemical dosage (kg/day).

5. Treatment Process Bypasses

A chronological log of all treatment process bypasses, including wet weather blending, shall include the following:

a. Identification of the treatment process bypassed;

b. Dates and times of bypass beginning and end;

c. Total bypass duration;

d. Estimated total bypass volume; and

e. Description of, or reference to other reports describing, the bypass event, the cause, the corrective actions taken (except for wet weather blending that is in compliance with permit conditions), and any additional monitoring conducted.

6. Treatment Facility Overflows

This section applies to records for overflows at the treatment facility. This includes the headworks and all units and appurtenances downstream. The Discharger shall retain a chronological log of overflows at the treatment facility and records supporting the information provided in section V.E.2.

C. Claims of Confidentiality – Not Supplemented

V. STANDARD PROVISIONS – REPORTING

A. Duty to Provide Information

Not Supplemented

B. Signatory and Certification Requirements

Not Supplemented

C. Monitoring Reports

This section supplements V.C of Standard Provisions (Attachment D)

1. Self Monitoring Reports

For each reporting period established in the MRP, the Discharger shall submit an SMR to the Regional Water Board in accordance with the requirements listed in this document and at the frequency the MRP specifies. The purpose of the SMR is to document treatment performance, effluent quality, and compliance with the waste discharge requirements of this Order.

a. Transmittal letter

Each SMR shall be submitted with a transmittal letter. This letter shall include the following:

(1) Identification of all violations of effluent limits or other waste discharge requirements found during the reporting period;

(2) Details regarding violations: parameters, magnitude, test results, frequency, and dates;

(3) Causes of violations;

(4) Discussion of corrective actions taken or planned to resolve violations and prevent recurrences, and dates or time schedule of action implementation (if previous reports have been submitted that address corrective actions, reference to the earlier reports is satisfactory);

(5) Data invalidation (Data should not be submitted in an SMR if it does not meet quality assurance/quality control standards. However, if the Discharger wishes to invalidate any measurement after it was submitted in an SMR, a letter shall identify the measurement suspected to be invalid and state the Discharger's intent to submit, within 60 days, a formal request to invalidate the measurement. This request shall include the original measurement in question, the reason for invalidating the measurement, all relevant documentation that supports invalidation [e.g., laboratory sheet, log entry, test results, etc.], and discussion of the corrective actions taken or planned [with a time schedule for completion] to prevent recurrence of the sampling or measurement problem.);

(6) If the Discharger blends, the letter shall describe the duration of blending events and certify whether blended effluent was in compliance with the conditions for blending; and

(7) Signature (The transmittal letter shall be signed according to Section V.B of this Order, Attachment D – Standard Provisions.).

b. Compliance evaluation summary

Each report shall include a compliance evaluation summary. This summary shall include each parameter for which the permit specifies effluent limits, the number of samples taken during the monitoring period, and the number of samples that exceed applicable effluent limits.

c. Results of analyses and observations

(1) Tabulations of all required analyses and observations, including parameter, date, time, sample station, type of sample, test result, method detection limit, method minimum level, and method reporting level, if applicable, signed by the laboratory director or other responsible official.

(2) When determining compliance with an average monthly effluent limitation and more than one sample result is available in a month, the Discharger shall compute the arithmetic mean unless the data set contains one or more reported determinations of detected but not quantified (DNQ) or nondetect (ND). In those cases, the Discharger shall compute the median in place of the arithmetic mean in accordance with the following procedure:

(a) The data set shall be ranked from low to high, reported ND determinations lowest, DNQ determinations next, followed by quantified values (if any). The order of the individual ND or DNQ determinations is unimportant.

(b) 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.

If a sample result, or the arithmetic mean or median of multiple sample results, is below the reporting limit, and there is evidence that the priority pollutant is present in the effluent above an effluent limitation and the Discharger conducts a Pollutant Minimization Program, the Discharger shall not be deemed out of compliance.

(3) Dioxin-TEQ Reporting: The Discharger shall report for each dioxin and furan congener the analytical results of effluent monitoring, including the quantifiable limit (reporting level), the method detection limit, and the measured concentration. The Discharger shall report all measured values of individual congeners, including data qualifiers. When calculating dioxin-TEQ, the Discharger shall set congener concentrations below the minimum levels (ML) to zero. The Discharger shall calculate and report dioxin-TEQs using the following formula, where the MLs, toxicity equivalency factors (TEFs), and bioaccumulation equivalency factors (BEFs) are as provided in Table A:

$$\text{Dioxin-TEQ} = \Sigma\,(C_x \text{ x } TEF_x \text{ x } BEF_x)$$

where: C_x = measured or estimated concentration of congener *x*
TEF_x = toxicity equivalency factor for congener x
BEFx = bioaccumulation equivalency factor for congener *x*

Table A

Minimum Levels, Toxicity Equivalency Factors,
and Bioaccumulation Equivalency Factors

Dioxin or Furan Congener	Minimum Level (pg/L)	1998 Toxicity Equivalency Factor (TEF)	Bioaccumulation Equivalency Factor (BEF)
2,3,7,8-TCDD	10	1.0	1.0
1,2,3,7,8-PeCDD	50	1.0	0.9
1,2,3,4,7,8-HxCDD	50	0.1	0.3
1,2,3,6,7,8-HxCDD	50	0.1	0.1
1,2,3,7,8,9-HxCDD	50	0.1	0.1
1,2,3,4,6,7,8-HpCDD	50	0.01	0.05
OCDD	100	0.0001	0.01
2,3,7,8-TCDF	10	0.1	0.8
1,2,3,7,8-PeCDF	50	0.05	0.2

2,3,4,7,8-PeCDF	50	0.5	1.6
1,2,3,4,7,8-HxCDF	50	0.1	0.08
1,2,3,6,7,8-HxCDF	50	0.1	0.2
1,2,3,7,8,9-HxCDF	50	0.1	0.6
2,3,4,6,7,8-HxCDF	50	0.1	0.7
1,2,3,4,6,7,8-HpCDF	50	0.01	0.01
1,2,3,4,7,8,9-HpCDF	50	0.01	0.4
OCDF	100	0.0001	0.02

d. Data reporting for results not yet available

The Discharger shall make all reasonable efforts to obtain analytical data for required parameter sampling in a timely manner. Certain analyses require additional time to complete analytical processes and report results. For cases where required monitoring parameters require additional time to complete analytical processes and reports, and results are not available in time to be included in the SMR for the subject monitoring period, the Discharger shall describe such circumstances in the SMR and include the data for these parameters and relevant discussions of any observed exceedances in the next SMR due after the results are available.

e. Flow data

The Discharger shall provide flow data tabulation pursuant to Section IV.B.2.

f. Annual self monitoring report requirements

By the date specified in the MRP, the Discharger shall submit an annual report to the Regional Water Board covering the previous calendar year. The report shall contain the following:

(1) Annual compliance summary table of treatment plant performance, including documentation of any blending events;

(2) Comprehensive discussion of treatment plant performance and compliance with the permit (This discussion shall include any corrective actions taken or planned, such as changes to facility equipment or operation practices that may be needed to achieve compliance, and any other actions taken or planned that are intended to improve performance and reliability of the Discharger's wastewater collection, treatment, or disposal practices.);

(3) Both tabular and graphical summaries of the monitoring data for the previous year if parameters are monitored at a frequency of monthly or greater;

(4) List of approved analyses, including the following:

(a) List of analyses for which the Discharger is certified;

(b) List of analyses performed for the Discharger by a separate certified laboratory (copies of reports signed by the laboratory director of that laboratory shall not be submitted but be retained onsite); and

(c) List of "waived" analyses, as approved;

(5) Plan view drawing or map showing the Discharger's facility, flow routing, and sampling and observation station locations;

(6) Results of annual facility inspection to verify that all elements of the SWPP Plan are accurate and up to date (only required if the Discharger does not route all stormwater to the headworks of its wastewater treatment plant); and

(7) Results of facility report reviews (The Discharger shall regularly review, revise, and update, as necessary, the O&M Manual, the Contingency Plan, the Spill Prevention Plan, and Wastewater Facilities Status Report so that these documents remain useful and relevant to current practices. At a minimum, reviews shall be conducted annually. The Discharger shall include, in each Annual Report, a description or summary of review and evaluation procedures, recommended or planned actions, and an estimated time schedule for implementing these actions. The Discharger shall complete changes to these documents to ensure they are up-to-date.).

g. Report submittal

The Discharger shall submit SMRs to:
California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, CA 94612
Attn: NPDES Wastewater Division

h. Reporting data in electronic format

The Discharger has the option to submit all monitoring results in an electronic reporting format approved by the Executive Officer. If the Discharger chooses to submit SMRs electronically, the following shall apply:

(1) *Reporting Method*: The Discharger shall submit SMRs electronically via a process approved by the Executive Officer (see, for example, the letter dated December 17, 1999, "Official Implementation of Electronic Reporting System [ERS]" and the progress report letter dated December 17, 2000).

(2) *Monthly or Quarterly Reporting Requirements*: For each reporting period (monthly or quarterly as specified in the MRP), the Discharger shall submit an electronic SMR to the Regional Water Board in accordance with the provisions of Section V.C.1.a-e, except for requirements under Section V.C.1.c(1) where ERS does not have fields for dischargers to input certain information (e.g., sample time). However, until USEPA approves the electronic signature or other signature technologies, Dischargers that use ERS shall submit a hard copy of the original transmittal letter, an ERS printout of the data sheet, and a violation report (a receipt

of the electronic transmittal shall be retained by the Discharger). This electronic SMR submittal suffices for the signed tabulations specified under Section V.C.1.c(1).

(3) *Annual Reporting Requirements*: Dischargers who have submitted data using the ERS for at least one calendar year are exempt from submitting the portion of the annual report required under Section V.C.1.f(1) and (3).

D. Compliance Schedules

Not supplemented

E. Twenty-Four Hour Reporting

This section supplements V.E of Standard Provision (Attachment D)

1. Spill of Oil or Other Hazardous Material Reports

a. Within 24 hours of becoming aware of a spill of oil or other hazardous material that is not contained onsite and completely cleaned up, the Discharger shall report by telephone to the Regional Water Board at (510) 622-2369.

b. The Discharger shall also report such spills to the State Office of Emergency Services [telephone (800) 852-7550] only when the spills are in accordance with applicable reporting quantities for hazardous materials.

c. The Discharger shall submit a written report to the Regional Water Board within five working days following telephone notification unless directed otherwise by Regional Water Board staff. A report submitted electronically is acceptable. The written report shall include the following:

(1) Date and time of spill, and duration if known;

(2) Location of spill (street address or description of location);

(3) Nature of material spilled;

(4) Quantity of material involved;

(5) Receiving water body affected, if any;

(6) Cause of spill;

(7) Estimated size of affected area;

(8) Observed impacts to receiving waters (e.g., oil sheen, fish kill, water discoloration);

(9) Corrective actions taken to contain, minimize, or clean up the spill;

(10) Future corrective actions planned to be taken to prevent recurrence, and schedule of implementation; and

(11) Persons or agencies notified.

2. Unauthorized Discharges from Municipal Wastewater Treatment Plants[1]

The following requirements apply to municipal wastewater treatment plants that experience an unauthorized discharge at their treatment facilities and are consistent with and supercede requirements imposed on the Discharger by the Executive Officer by letter of May 1, 2008, issued pursuant to California Water Code Section 13383.

a. Two (2)-Hour Notification

For any unauthorized discharges that result in a discharge to a drainage channel or a surface water, the Discharger shall, as soon as possible, but not later than two (2) hours after becoming aware of the discharge, notify the State Office of Emergency Services (telephone 800-852-7550), the local health officers or directors of environmental health with jurisdiction over the affected water bodies, and the Regional Water Board. The notification to the Regional Water Board shall be via the Regional Water Board's online reporting system at www.wbers.net, and shall include the following:

(1) Incident description and cause;

(2) Location of threatened or involved waterway(s) or storm drains;

(3) Date and time the unauthorized discharge started;

(4) Estimated quantity and duration of the unauthorized discharge (to the extent known), and the estimated amount recovered;

(5) Level of treatment prior to discharge (e.g., raw wastewater, primary treated, undisinfected secondary treated, and so on); and

(6) Identity of the person reporting the unauthorized discharge.

b. 24-hour Certification

Within 24 hours, the Discharger shall certify to the Regional Water Board, at www.wbers.net, that the State Office of Emergency Services and the local health officers or directors of environmental health with jurisdiction over the affected water bodies have been notified of the unauthorized discharge.

c. 5-Day Written Report

Within five business days, the Discharger shall submit a written report, via the Regional Water Board's online reporting system at www.wbers.net, that includes, in addition to the information required above, the following:

[1] California Code of Regulations, Title 23, Section 2250(b), defines an unauthorized discharge to be a discharge, not regulated by waste discharge requirements, of treated, partially treated, or untreated wastewater resulting from the intentional or unintentional diversion of wastewater from a collection, treatment or disposal system.

(1) Methods used to delineate the geographical extent of the unauthorized discharge within receiving waters;

(2) Efforts implemented to minimize public exposure to the unauthorized discharge;

(3) Visual observations of the impacts (if any) noted in the receiving waters (e.g., fish kill, discoloration of water) and the extent of sampling if conducted;

(4) Corrective measures taken to minimize the impact of the unauthorized discharge;

(5) Measures to be taken to minimize the chances of a similar unauthorized discharge occurring in the future;

(6) Summary of Spill Prevention Plan or O&M Manual modifications to be made, if necessary, to minimize the chances of future unauthorized discharges; and

(7) Quantity and duration of the unauthorized discharge, and the amount recovered.

d. Communication Protocol

To clarify the multiple levels of notification, certification, and reporting, the current communication requirements for unauthorized discharges from municipal wastewater treatment plants are summarized in Table B that follows.

Table B

Summary of Communication Requirements for Unauthorized Discharges[1] from Municipal Wastewater Treatment Plants

Discharger is required to:	Agency Receiving Information	Time frame	Method for Contact
1. Notify	California Emergency Management Agency (Cal EMA)	As soon as possible, but not later than **2 hours** after becoming aware of the unauthorized discharge.	Telephone – (800) 852-7550 (obtain a control number from Cal EMA)
	Local health department	As soon as possible, but not later than **2 hours** after becoming aware of the unauthorized discharge.	Depends on local health department
	Regional Water Board	As soon as possible, but not later than **2 hours** after becoming aware of the unauthorized discharge.	Electronic[2] www.wbers.net
2. Certify	Regional Water Board	As soon as possible, but not later than	Electronic[3]

[1] California Code of Regulations, Title 23, Section 2250(b), defines an unauthorized discharge to be a discharge, not regulated by waste discharge requirements, of treated, partially treated, or untreated wastewater resulting from the intentional or unintentional diversion of wastewater from a collection, treatment or disposal system.

[2] In the event that the Discharger is unable to provide online notification within 2 hours of becoming aware of an unauthorized discharge, it shall phone the Regional Water Board's spill hotline at (510) 622-2369 and convey the same information contained in the notification form. In addition, within 3 business days of becoming aware of the unauthorized discharge, the Discharger shall enter the notification information into the Regional Water Board's online system in electronic format.

[3] In most instances, the 2-hour notification will also satisfy 24-hour certification requirements. This is because the notification form includes fields for documenting that OES and the local health department have been contacted. In other words, if the Discharger is able

		24 hours after becoming aware of the unauthorized discharge.	www.wbers.net
3. Report	Regional Water Board	Within **5 business days** of becoming aware of the unauthorized discharge.	Electronic[4] www.wbers.net

F. Planned Changes

Not supplemented

G. Anticipated Noncompliance

Not supplemented

H. Other Noncompliance

Not supplemented

I. Other Information

Not supplemented

VI. STANDARD PROVISIONS – ENFORCEMENT

Not Supplemented

VII. ADDITIONAL PROVISIONS – NOTIFICATION LEVELS

Not Supplemented

VIII. DEFINITIONS

This section is an addition to Standard Provisions (Attachment D)

More definitions can be found in Attachment A of this NPDES Permit.

1. Arithmetic Calculations

   a. Geometric mean is the antilog of the log mean or the back-transformed mean of the logarithmically transformed variables, which is equivalent to the multiplication of the antilogarithms. The geometric mean can be calculated with either of the following equations:

to complete all the fields in the notification form within 2 hours, certification requirements are also satisfied. In the event that the Discharger is unable to provide online certification within 24 hours of becoming aware of an unauthorized discharge, it shall phone the Regional Water Board's spill hotline at (510) 622-2369 and convey the same information contained in the certification form. In addition, within 3 business days of becoming aware of the unauthorized discharge, the Discharger shall enter the certification information into the Regional Water Board's online system in electronic format.

[4] If the Discharger cannot satisfy the 5-day reporting requirements via the Regional Water Board's online reporting system, it shall submit a written report (preferably electronically in pdf) to the appropriate Regional Water Board case manager. In cases where the Discharger cannot satisfy the 5-day reporting requirements via the online reporting system, it must still complete the Regional Water Board's online reporting requirements within 15 calendar days of becoming aware of the unauthorized discharge.

$$\text{Geometric Mean} = Anti\log\left(\frac{1}{N}\sum_{i=1}^{N} Log(C_i)\right)$$

or

$$\text{Geometric Mean} = (C_1 * C_2 * \ldots * C_N)^{1/N}$$

Where "N" is the number of data points for the period analyzed and "C" is the concentration for each of the "N" data points.

b. Mass emission rate is obtained from the following calculation for any calendar day:

$$\text{Mass emission rate (lb/day)} = \frac{8.345}{N}\sum_{i=1}^{N} Q_i C_i$$

$$\text{Mass emission rate (kg/day)} = \frac{3.785}{N}\sum_{i=1}^{N} Q_i C_i$$

In which "N" is the number of samples analyzed in any calendar day and "Q_i" and "C_i" are the flow rate (MGD) and the constituent concentration (mg/L) associated with each of the "N" grab samples that may be taken in any calendar day. If a composite sample is taken, "C_i" is the concentration measured in the composite sample and "Q_i" is the average flow rate occurring during the period over which the samples are composited. The daily concentration of a constituent measured over any calendar day shall be determined from the flow-weighted average of the same constituent in the combined waste streams as follows:

$$C_d = \text{Average daily concentration} = \frac{1}{Q_t}\sum_{i=1}^{N} Q_i C_i$$

In which "N" is the number of component waste streams and "Q" and "C" are the flow rate (MGD) and the constituent concentration (mg/L) associated with each of the "N" waste streams. "Q_t" is the total flow rate of the combined waste streams.

c. <u>Maximum allowable mass emission rate</u>, whether for a 24-hour, weekly 7-day, monthly 30-day, or 6-month period, is a limitation expressed as a daily rate determined with the formulas in the paragraph above, using the effluent concentration limit specified in the permit for the period and the specified allowable flow.

d. <u>POTW removal efficiency</u> is the ratio of pollutants removed by the treatment facilities to pollutants entering the treatment facilities (expressed as a percentage). The Discharger shall determine removal efficiencies using monthly averages (by calendar month unless otherwise specified) of pollutant concentration of influent and effluent samples collected at about the same time and using the following equation (or its equivalent):

Removal Efficiency (%) = 100 × [1-(Effluent Concentration/Influent Concentration)]

2. <u>Biosolids</u> means the solids, semi-liquid suspensions of solids, residues, screenings, grit, scum, and precipitates separated from or created in wastewater by the unit processes of a treatment system. It

also includes, but is not limited to, all supernatant, filtrate, centrate, decantate, and thickener overflow and underflow in the solids handling parts of the wastewater treatment system.

3. Blending is the practice of recombining wastewater that has been biologically treated with wastewater that has bypassed around biological treatment units.

4. Bottom sediment sample is (1) a separate grab sample taken at each sampling station for the determination of selected physical-chemical parameters, or (2) four grab samples collected from different locations in the immediate vicinity of a sampling station while the boat is anchored and analyzed separately for macroinvertebrates.

5. Composite sample is a sample composed of individual grab samples collected manually or by an automatic sampling device on the basis of time or flow as specified in the MRP. For flow-based composites, the proportion of each grab sample included in the composite sample shall be within plus or minus five percent (+/-5%) of the representative flow rate of the waste stream being measured at the time of grab sample collection. Alternatively, equal volume grab samples may be individually analyzed with the flow-weighted average calculated by averaging flow-weighted ratios of each grab sample analytical result. Grab samples comprising time-based composite samples shall be collected at intervals not greater than those specified in the MRP. The quantity of each grab sample comprising a time-based composite sample shall be a set of flow proportional volumes as specified in the MRP. If a particular time-based or flow-based composite sampling protocol is not specified in the MRP, the Discharger shall determine and implement the most representative sampling protocol for the given parameter subject to Executive Officer approval.

6. Depth-integrated sample is defined as a water or waste sample collected by allowing a sampling device to fill during a vertical traverse in the waste or receiving water body being sampled. The Discharger shall collect depth-integrated samples in such a manner that the collected sample will be representative of the waste or water body at that sampling point.

7. Flow sample is an accurate measurement of the average daily flow volume using a properly calibrated and maintained flow measuring device.

8. Grab sample is an individual sample collected in a short period of time not exceeding 15 minutes. Grab samples represent only the condition that exists at the time the wastewater is collected.

9. Initial dilution is the process that results in the rapid and irreversible turbulent mixing of wastewater with receiving water around the point of discharge.

10. Overflow is the intentional or unintentional spilling or forcing out of untreated or partially treated wastes from a transport system (e.g., through manholes, at pump stations, and at collection points) upstream from the treatment plant headworks or from any part of a treatment plant facility.

11. Priority pollutants are those constituents referred to in 40 CFR Part 122 as promulgated in the Federal Register, Vol. 65, No. 97, Thursday, May 18, 2000, also known as the California Toxics Rule, the presence or discharge of which could reasonably be expected to interfere with maintaining designated uses.

12. Stormwater means stormwater runoff, snow melt runoff, and surface runoff and drainage. It excludes infiltration and runoff from agricultural land.

13. Toxic pollutant means any pollutant listed as toxic under federal Clean Water Act section 307(a)(1) or under 40 CFR 401.15.

14. Untreated waste is raw wastewater.

15, Waste, waste discharge, discharge of waste, and discharge are used interchangeably in the permit. The requirements of the permit apply to the entire volume of water, and the material therein, that is disposed of to surface and ground waters of the State of California.

Table C

List of Monitoring Parameters and Analytical Methods

CTR No.	Pollutant/Parameter	Analytical Method[5]	Minimum Levels[6] (µg/l)											
			GC	GCMS	LC	Color	FAA	GFAA	ICP	ICP MS	SPGFAA	HYD RIDE	CVAA	DCP
1.	Antimony	204.2					10	5	50	0.5	5	0.5		1000
2.	Arsenic	206.3				20		2	10	2	2	1		1000
3.	Beryllium						20	0.5	2	0.5	1			1000
4.	Cadmium	200 or 213					10	0.5	10	0.25	0.5			1000
5a.	Chromium (III)	SM 3500												
5b.	Chromium (VI)	SM 3500				10	5							1000
	Chromium (total)[7]	SM 3500					50	2	10	0.5	1			1000
6.	Copper	200.9					25	5	10	0.5	2			1000
7.	Lead	200.9					20	5	5	0.5	2			10,000
8.	Mercury	1631 (note)[8]												
9.	Nickel	249.2					50	5	20	1	5			1000
10.	Selenium	200.8 or SM 3114B or C						5	10	2	5	1		1000
11.	Silver	272.2					10	1	10	0.25	2			1000
12.	Thallium	279.2					10	2	10	1	5			1000
13.	Zinc	200 or 289					20		20	1	10			
14.	Cyanide	SM 4500 CN^- C or I				5								
15.	Asbestos (only required for dischargers to MUN waters)[9]	0100.2 [10]												

[5] The suggested method is the USEPA Method unless otherwise specified (SM = Standard Methods). The Discharger may use another USEPA-approved or recognized method if that method has a level of quantification below the applicable water quality objective. Where no method is suggested, the Discharger has the discretion to use any standard method.

[6] Minimum levels are from the *State Implementation Policy*. They are the concentration of the lowest calibration standard for that technique based on a survey of contract laboratories. Laboratory techniques are defined as follows: GC = Gas Chromatography; GCMS = Gas Chromatography/Mass Spectrometry; LC = High Pressure Liquid Chromatography; Color = Colorimetric; FAA = Flame Atomic Absorption; GFAA = Graphite Furnace Atomic Absorption; ICP = Inductively Coupled Plasma; ICPMS = Inductively Coupled Plasma/Mass Spectrometry; SPGFAA = Stabilized Platform Graphite Furnace Atomic Absorption (i.e., USEPA 200.9); Hydride = Gaseous Hydride Atomic Absorption; CVAA = Cold Vapor Atomic Absorption; DCP = Direct Current Plasma.

[7] Analysis for total chromium may be substituted for analysis of chromium (III) and chromium (VI) if the concentration measured is below the lowest hexavalent chromium criterion (11 ug/l).

[8] The Discharger shall use ultra-clean sampling (USEPA Method 1669) and ultra-clean analytical methods (USEPA Method 1631) for mercury monitoring. The minimum level for mercury is 2 ng/l (or 0.002 ug/l).

[9] MUN = Municipal and Domestic Supply. This designation, if applicable, is in the Findings of the permit.

CTR No.	Pollutant/Parameter	Analytical Method[5]	Minimum Levels[6] (µg/l)											
			GC	GCMS	LC	Color	FAA	GFAA	ICP	ICP MS	SPGFAA	HYD RIDE	CVAA	DCP
16.	2,3,7,8-TCDD and 17 congeners (Dioxin)	1613												
17.	Acrolein	603	2.0	5										
18.	Acrylonitrile	603	2.0	2										
19.	Benzene	602	0.5	2										
33.	Ethylbenzene	602	0.5	2										
39.	Toluene	602	0.5	2										
20.	Bromoform	601	0.5	2										
21.	Carbon Tetrachloride	601	0.5	2										
22.	Chlorobenzene	601	0.5	2										
23.	Chlorodibromomethane	601	0.5	2										
24.	Chloroethane	601	0.5	2										
25.	2-Chloroethylvinyl Ether	601	1	1										
26.	Chloroform	601	0.5	2										
75.	1,2-Dichlorobenzene	601	0.5	2										
76.	1,3-Dichlorobenzene	601	0.5	2										
77.	1,4-Dichlorobenzene	601	0.5	2										
27.	Dichlorobromomethane	601	0.5	2										
28.	1,1-Dichloroethane	601	0.5	1										
29.	1,2-Dichloroethane	601	0.5	2										
30.	1,1-Dichloroethylene or 1,1-Dichloroethene	601	0.5	2										
31.	1,2-Dichloropropane	601	0.5	1										
32.	1,3-Dichloropropylene or 1,3-Dichloropropene	601	0.5	2										
34.	Methyl Bromide or Bromomethane	601	1.0	2										
35.	Methyl Chloride or Chloromethane	601	0.5	2										
36.	Methylene Chloride or Dichlorormethane	601	0.5	2										
37.	1,1,2,2-Tetrachloroethane	601	0.5	1										
38.	Tetrachloroethylene	601	0.5	2										
40.	1,2-Trans-Dichloroethylene	601	0.5	1										
41.	1,1,1-Trichloroethane	601	0.5	2										
42.	1,1,2-Trichloroethane	601	0.5	2										
43.	Trichloroethene	601	0.5	2										
44.	Vinyl Chloride	601	0.5	2										
45.	2-Chlorophenol	604	2	5										
46.	2,4-Dichlorophenol	604	1	5										
47.	2,4-Dimethylphenol	604	1	2										
48.	2-Methyl-4,6-Dinitrophenol or Dinitro-2-methylphenol	604	10	5										
49.	2,4-Dinitrophenol	604	5	5										
50.	2-Nitrophenol	604		10										

[10] Determination of Asbestos Structures over 10 [micrometers] in Length in Drinking Water Using MCE Filters, USEPA 600/R-94-134, June 1994.

CTR No.	Pollutant/Parameter	Analytical Method[5]	Minimum Levels[6] (µg/l)											
			GC	GCMS	LC	Color	FAA	GFAA	ICP	ICP MS	SPGFAA	HYD RIDE	CVAA	DCP
51.	4-Nitrophenol	604	5	10										
52.	3-Methyl-4-Chlorophenol	604	5	1										
53.	Pentachlorophenol	604	1	5										
54.	Phenol	604	1	1		50								
55.	2,4,6-Trichlorophenol	604	10	10										
56.	Acenaphthene	610 HPLC	1	1	0.5									
57.	Acenaphthylene	610 HPLC		10	0.2									
58.	Anthracene	610 HPLC		10	2									
60.	Benzo(a)Anthracene or 1,2 Benzanthracene	610 HPLC	10	5										
61.	Benzo(a)Pyrene	610 HPLC		10	2									
62.	Benzo(b)Fluoranthene or 3,4 Benzofluoranthene	610 HPLC		10	10									
63.	Benzo(ghi)Perylene	610 HPLC		5	0.1									
64.	Benzo(k)Fluoranthene	610 HPLC		10	2									
74.	Dibenzo(a,h)Anthracene	610 HPLC		10	0.1									
86.	Fluoranthene	610 HPLC	10	1	0.05									
87.	Fluorene	610 HPLC		10	0.1									
92.	Indeno(1,2,3-cd) Pyrene	610 HPLC		10	0.05									
100.	Pyrene	610 HPLC		10	0.05									
68.	Bis(2-Ethylhexyl)Phthalate	606 or 625	10	5										
70.	Butylbenzyl Phthalate	606 or 625	10	10										
79.	Diethyl Phthalate	606 or 625	10	2										
80.	Dimethyl Phthalate	606 or 625	10	2										
81.	Di-n-Butyl Phthalate	606 or 625		10										
84.	Di-n-Octyl Phthalate	606 or 625		10										
59.	Benzidine	625		5										
65.	Bis(2-Chloroethoxy)Methane	625		5										
66.	Bis(2-Chloroethyl)Ether	625	10	1										
67.	Bis(2-Chloroisopropyl)Ether	625	10	2										
69.	4-Bromophenyl Phenyl Ether	625	10	5										
71.	2-Chloronaphthalene	625		10										
72.	4-Chlorophenyl Phenyl Ether	625		5										
73.	Chrysene	625		10	5									
78.	3,3'-Dichlorobenzidine	625		5										
82.	2,4-Dinitrotoluene	625	10	5										
83.	2,6-Dinitrotoluene	625		5										
85.	1,2-Diphenylhydrazine (note)[11]	625		1										
88.	Hexachlorobenzene	625	5	1										
89.	Hexachlorobutadiene	625	5	1										
90.	Hexachlorocyclopentadiene	625	5	5										
91.	Hexachloroethane	625	5	1										
93.	Isophorone	625	10	1										
94.	Naphthalene	625	10	1	0.2									

[11] Measurement for 1,2-Diphenylhydrazine may use azobenzene as a screen: if azobenzene is measured at >1 ug/l, then the Discharger shall analyze for 1,2-Diphenylhydrazine.

CTR No.	Pollutant/Parameter	Analytical Method[5]	Minimum Levels[6] (µg/l)											
			GC	GCMS	LC	Color	FAA	GFAA	ICP	ICP MS	SPGFAA	HYD RIDE	CVAA	DCP
95.	Nitrobenzene	625	10	1										
96.	N-Nitrosodimethylamine	625	10	5										
97.	N-Nitrosodi-n-Propylamine	625	10	5										
98.	N-Nitrosodiphenylamine	625	10	1										
99.	Phenanthrene	625		5	0.05									
101.	1,2,4-Trichlorobenzene	625	1	5										
102.	Aldrin	608	0.005											
103.	α-BHC	608	0.01											
104.	β-BHC	608	0.005											
105.	γ-BHC (Lindane)	608	0.02											
106.	δ-BHC	608	0.005											
107.	Chlordane	608	0.1											
108.	4,4'-DDT	608	0.01											
109.	4,4'-DDE	608	0.05											
110.	4,4'-DDD	608	0.05											
111.	Dieldrin	608	0.01											
112.	Endosulfan (alpha)	608	0.02											
113.	Endosulfan (beta)	608	0.01											
114.	Endosulfan Sulfate	608	0.05											
115.	Endrin	608	0.01											
116.	Endrin Aldehyde	608	0.01											
117.	Heptachlor	608	0.01											
118.	Heptachlor Epoxide	608	0.01											
119-125	PCBs: Aroclors 1016, 1221, 1232, 1242, 1248, 1254, 1260	608	0.5											
126.	Toxaphene	608	0.5											

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ORDER NO. R2-2011-0036

UPDATED WASTE DISCHARGE REQUIREMENTS
AND RESCISSION OF ORDER NO. 00-043 FOR:

CHEVRON PRODUCTS COMPANY
CHEVRON RICHMOND REFINERY
841 CHEVRON WAY
RICHMOND, CONTRA COSTA COUNTY

The California Regional Water Quality Control Board, San Francisco Bay Region, hereinafter called the Regional Water Board, finds that:

OWNERSHIP AND LOCATION

1. Chevron Products Company, a subsidiary of Chevron USA, Inc., (hereinafter called Chevron or the Discharger) owns and operates the Chevron Richmond Refinery (hereinafter called the refinery). The refinery was built in 1902 and produces a broad range of fuels, lubricants, asphalt and petrochemicals. The 2,900-acre refinery is located along the southern shore of San Pablo Bay in Contra Costa County (Figure 1). The City of Richmond lies to the east of the refinery. To the east and within one mile from the refinery are industrial, residential, and commercial land uses. Certain wastes generated from the refinery's processes have historically been deposited in Waste Management Units within the refinery, prompting the need for these Waste Discharge Requirements (WDRs).

PURPOSE OF ORDER UPDATE

2. This Order rescinds outdated WDRs and updates the requirements for continued maintenance and monitoring of the inactive and closed Waste Management Units, along with the requirements for the Waste Management Unit corrective action and water quality monitoring programs.

REGULATORY HISTORY

3. Prior to this Order, the Regional Water Board regulated the Waste Management Units and the refinery-wide investigations and corrective actions under Order No. 00-043. The refinery-wide investigation and corrective action activities not associated with the Waste Management Units will be addressed under separate Site Cleanup Requirements Order (SCRs).

   Other Orders previously adopted, but now rescinded, for the refinery are:

93-109	Waste Discharge Requirements
93-016	Site Cleanup Requirements for the S.P. Hill Tank Field
92-092	Site Cleanup Requirements for the Alkane Sector
92-010	Waste Discharge Requirements for Landfill 15
91-098	Cease and Desist Order for Pollard Pond and the Hydropits
90-146	Site Cleanup Requirements for Plant l/Additives Plant
89-175	Waste Discharge Requirements
89-011	Cease and Desist Order for the Pollard Pond
88-044	Waste Discharge Requirements
83-13	Waste Discharge Requirements
81-55	Waste Discharge Requirements

4. The Regional Water Board adopted Order No. R2-2006-0035 (NPDES No. CA0005134) on June 14, 2006. This permit regulates the discharge of effluent from the Discharger's wastewater treatment system, and the discharges of all stormwater associated with industrial activity from the refinery to San Pablo and San Francisco bays.

5. Effective July 18, 1997, many provisions of the California Code of Regulations (CCR) for non-hazardous waste were moved from Division 3, Chapter 15 into Title 27, Division 2 (Title 27). Where applicable, the new regulatory citations have been incorporated in this Order.

FACILITY DESCRIPTION AND HISTORY

Hydrogeologic Setting

6. The refinery and its tankfields are located on the peninsula of the Potrero-San Pablo Ridge, which is composed of the steeply dipping Franciscan Complex. The refining of the petroleum products generally occurs on the bay fill areas northeast of the ridge. The southwest side of the ridge consists of steep topography where the Franciscan Complex has been terraced for the placement of aboveground petroleum storage tanks.

7. Past fluctuations in sea level created a complex sedimentary sequence of interfingered estuarine and alluvial fan deposits overlying the Franciscan Complex bedrock. The uppermost deposits are artificially placed bay fill, ranging from approximately 3 feet to approximately 30 feet in depth. The fill materials overlie bay muds, which consist of silt and silty clay with abundant plant matter or peat. The bay muds overlap onto the Franciscan bedrock and thicken bayward.

8. Three hydrogeologic zones have been identified within the top 150 feet of sediments in the flat lying areas of the refinery, the A-Zone, the C-Zone, and the B-Zone, in order of increasing depth.

    a. The A-Zone is the first water bearing zone and consists of artificial fill and the naturally occurring peat rich, bay mud. The water table elevation for this zone is within two to ten feet of the ground surface and generally discharges to the Bay.

    b. The C-Zone is an 80 to 90-foot-thick water bearing zone of interfingered alluvial and estuarine sediments. These sediments generally have low hydraulic conductivity, but sandy, more permeable units occur as channels and lenses. The sand units have not been shown to be contiguous across the site, but do appear to be hydraulically connected. However, based on several years of chemical data there is no indication that the C-Zone groundwater has been significantly impacted. Chevron has concluded that the bay mud has been an effective hydraulic barrier between the A- and C-Zones and has prevented the migration of contaminants in groundwater from the A-Zone to the C-Zone. These results and

conclusions were presented to the Regional Water Board in two reports titled C-Zone Investigation - Phase 1 and Phase 2, dated February 8 and December 20, 1991, respectively, and continue to be supported by groundwater monitoring data collected pursuant to the refinery-wide Self-Monitoring Program.

c. The B-Zone is a relatively permeable unit at approximately 100 feet below the ground surface. It ranges from 5 to 15 feet thick and contains potable water, but has limited production capacity. The B-Zone occurs under artesian conditions and appears to be hydraulically separate from the overlying zones.

9. As shown in Figure 2, the refinery lies in four geomorphic/geologic settings referred to locally as the "Alluvial," "Flats," "Ridge," and "Transition" Zones.

a. The **Alluvial Zone** is defined as the broad area of alluvial fan deposits, derived from the Berkeley Hills, east of the refinery. This zone represents flatland areas in which bay mud was not deposited. The upper portion of the alluvial fan deposit is typically clayey with low permeability.

b. The **Flats Zone** comprises the flatland marsh area bounded by San Pablo Bay to the north and extending south along the northeast side of Potrero-San Pablo Ridge. For the purpose of the refinery's investigations, the inland Flats Zone/Alluvial Zone boundary has been defined to be the 5-foot bay mud isopach (line of equal thickness). Thus, the Flats Zone is typically underlain by at least five feet of bay mud except where removed by excavation or erosion, in local areas of non-deposition, or where displaced by differential settlement of overlying fill.

c. The **Ridge Zone** consists primarily of colluvium (slope wash) overlying deformed Franciscan Complex rocks exposed along Potrero-San Pablo Ridge. The boundary of the Ridge Zone is defined as those areas of Potrero-San Pablo Ridge above the 50-foot elevation contour.

d. The **Transition Zone** is defined as the area that separates the Flats Zone from the Ridge Zones. As described above, the Flats-Transition boundary is defined as the 5-foot bay mud isopach and the Ridge-Transition boundary is defined as the 50-foot elevation contour.

10. Chevron has subdivided the refinery into ten geographic sectors (see Figure 3). Each sector has unique hydrogeology and varying degrees of environmental concern. The sectors are as follows:

    - Landfarms/Landfill 15
    - Castro/Plant 1 Additives
    - North Yard
    - Bayside Sector – North
    - Bayside Sector - South
    - Alkane Sector
    - Effluent
    - Reclamation
    - Pollard
    - Interior "C" Zone or Main Yard

11. Sector boundaries are generally defined by a physiographic boundary separating adjacent sectors, or by the refinery property line. The upgradient sector boundaries for the Alkane, North Yard, and Main Yard sectors correspond to an inferred groundwater drainage divide, which is generally coincident with topographic drainage divides along San Pablo Ridge. The upgradient sector boundaries for the Landfarms/Landfills, Castro, and Reclamation sectors are generally coincident with the refinery property line. The Bayside North and Bayside South sectors include all Chevron properties on the southwestern side of San Pablo Ridge and adjacent to San Francisco Bay. With the exception of the Bayside North and Bayside South sectors (which are on the west side of the San Pablo Ridge), all sites described in this Order are largely contained by the groundwater protection systems, which are described below.

Corrective Action

12. All sectors have impacted soil and/or groundwater from historic releases and corrective action steps have been implemented. Some of the sectors contain Waste Management Units that are either in the Title 27 Corrective Action Monitoring Program or part of the refinery effluent system; these include the Alkane, Reclamation, North Yard, Effluent, and Landfarms/Landfill sectors. Corrective action occurring at sectors comprised of only impacted soil and/or groundwater from historic releases and not associated with Waste Management Units will be addressed by the SCRs presently under development; these include the Pollard, Castro/Plant 1 Additives, Bayside North, Bayside South and Interior C Zone sectors.

13. Chevron has implemented corrective actions to intercept contaminated groundwater at various locations and thus to prevent migration to San Pablo Bay. The corrective actions include systems comprised of varying combinations of slurry walls, extraction trenches and/or extraction wells for hydraulic control at different locations within the refinery. The systems comprised of slurry walls and/or extraction trenches at the Alkane, North Yard, Effluent, Landfarms/Landfill, Reclamation, Pollard, and the

Castro/Plant 1 sectors are referred to collectively as the Groundwater Protection Systems (GPS) (see Figure 4). The GPS establishes and maintains a contiguous capture zone which prevents migration of potentially contaminated A-Zone groundwater past the GPS alignment. The slurry walls were installed where thick and/or highly permeable intervals of A-Zone fill soils are encountered. A low permeability bay mud "floor" inhibits transport of A-Zone contaminants to the underlying C-Zone in the "Flats Zone" of the Refinery (see Figure 13).

14. Approximately 24,700 feet of extraction trench, 18,535 feet of barrier wall, over 200 groundwater extraction sumps, and one groundwater treatment plant have been installed. The extracted groundwater is routed to the refinery's wastewater treatment system and discharged in accordance with existing NPDES permit requirements. The GPS extraction trenches and barrier wall are illustrated in Figure 13.

15. The Regional Water Board has determined that the GPS comprised of the slurry walls and extraction trenches at the Alkane, North Yard, Effluent, Landfarms/Landfill, Reclamation, Pollard, and Castro/Plant 1 sectors is a satisfactory corrective action measure for the containment and removal of contaminated groundwater along the perimeter of the refinery. The corrective action at the Alkane, North Yard, Effluent, Landfarms/Landfill, and the Reclamation sectors are addressed by this Order. Activities associated with the Castro/Plant 1 Additives, Pollard, Bayside North, Bayside South and Interior C Zone sectors will be addressed in separate SCRs. There is a single groundwater monitoring program for all sectors which is contained in both these WDRs and the SCRs.

Waste Management Units

The following is a summary of actions taken at previously-identified Waste Management Units pursuant to previous Regional Water Board orders organized by the refinery sectors subject to this Order.

Landfarms/Landfill Sector

16. Perimeter Groundwater Barrier and Soil cover: A GPS barrier wall and/or extraction trench is at the downgradient edge and largely surrounds this sector, consisting of Landfill 15 and the landfarms (described below, see Figures 8 and 12). The monitoring program (as described in the attached monitoring program) monitors both the performance of the GPS (A-Zone corrective action monitoring) as well as C-Zone wells (corrective action monitoring and detection monitoring for Landfarms No. 2-5) for the monitoring parameters (MP) and Constituents of Concern (COC) noted in the monitoring program. Chevron is responsible for inspection and maintenance of the soil cover and stormwater conveyances for the Landfill 15 and Landfarm soil covers.

17. Landfill 15: Landfill 15 is a 41-acre former tidal marsh area converted for waste disposal use (Figure 8) containing about 270,000 cubic yards of waste. The site was used from the early 1960's to 1987 as an evaporation pond and as a landfill for a

variety of wastes including sludges (separator, paint, and water treatment), oily soil and dredge spoils, resins, catalyst fines, lime, and sulfur. Approximately 13 acres of Landfill 15 were reactivated in 1992 for disposal of treated non-hazardous acidic sludge and dredged bay mud generated from the closure of Pollard Pond. The portion of the landfill that accepted the Pollard Pond closure waste was closed by placement of a multi-layer low-permeability cap. The remaining 28 inactive acres that ceased receiving waste material prior to 1987 were capped in 1996 and 1997. No further closure activities are required.

18. Old Drum Storage Area: This is a 180 ft. by 90 ft. area used for storing up to 2448 drums until 1984. The unit was closed in 1986 and is covered with a concrete cap with stormwater diversion away from the site.

19. Landfarms: Between the 1970's and 1987, Chevron conducted landfarming operations at five locations to promote biodegradation of oily soils. Landfarm No. 1 is 13.5 acres and is located in the North Yard sector. Landfarms No. 2-5 are 8, 3.5,3 and 1 acres, respectively. The landfarms were built by placing clean fill over existing waste which contained slop oil solids, leaded tank bottoms, separator sludge and other wastes. The landfarms were used to biologically treat 30,000 tons per year of non-leaded tank bottom sludge, oil water mixtures and other sludges and contaminated soil. The landfarms have not received waste since 1987. A Final Closure Plan for the landfarms was approved in 1998, and closure was completed the following year, which consisted of importing fill, grading, installation of a vegetative cap and shallow groundwater extraction trenches.

20. Landfill under Landfarms Numbers 2 and 3: The unit held about 80,000 cubic yards of refinery waste, completely within the bounds of both Landfarms No. 2 and No. 3. Landfilling was finished about 1977, with the landfarming beginning in about 1980.

North Yard Sector

21. Perimeter Groundwater Barrier: A GPS barrier wall and extraction trench is at the downgradient edge of Landfarm No. 1 and the North Yard, located in this sector (see Figure 12). The monitoring program (as described in the attached monitoring program) monitors both the performance of the GPS (A-Zone corrective action) as well as C-Zone wells (corrective action monitoring and detection monitoring at Landfarm No. 1) for the MP and COC also noted in the monitoring program. The aboveground tanks in this area also are subject to the inspection and monitoring programs described below.

22. Tetraethyl Lead Site (TEL): This was a 300 cubic yard impoundment formerly used for tank bottom sludges containing TEL. The wastes were removed in 1980. The soil was removed and disposed of as hazardous waste, and, in the early 1980's, Landfarm No. 1 was expanded over the site. Landfarm No. 1 was subsequently closed as noted in Finding 19.

23. Big Wheels Site: This was an 80 cubic yard impoundment for holding slop oil emulsion prior to landfarming. In 1980 it was clean closed, with the wastes and contaminated soil being placed in the landfarms, which were closed as noted above.

24. Landfill Under Isomax and Landfarm No. 1: This holds about 400,000 cubic yards of waste, such as slop oil solids, separator sludge, leaded tank bottoms. Final closure for the landfarms was achieved as noted above.

25. Oil Water Separators 1, 1A, 2, 2A, 13, 15, and Coalescing plate interceptor: The separators have been used to skim off oil, which is returned to product tankage. Solids settle and the effluent is routed to the Bioreactor. The sludge is a listed hazardous waste and formerly was landfarmed, but now is disposed of offsite or is recycled as a supplemental fuel. Separators 1, 2, 15 and CPI were cleaned and backfilled with clean fill.

26. No. 1 Oxidation Pond: There is petroleum hydrocarbon-contaminated soil in the No. 1 Oxidation pond. The 116-acre pond was built in 1959 and was formerly part of the refinery's effluent treatment system until the late 1980's. It is divided into five basins known as passes. Pass 1 was clean closed in 1990 and is now used for stormwater storage. Passes 2-5 contain oily sediment. In 2008, Regional Water Board staff approved a final closure plan that proposed the placing of sediments dredged from Castro Cove and other non-hazardous refinery soil within the pond, then stabilizing this material with cement and fly ash to support a final Title 27 closure cap. The Final Closure Plan was slightly modified in 2009 and again in 2010. This work is expected to be completed during 2011.

27. Lake Rushing and Majka Ditch: These transported stormwater to the No. 2A separator. 300 cubic yards of contaminated soil were removed from the ditch in 1987.

28. Poleyard Tankfield: There are 32 aboveground petroleum storage tanks, with 24 in service with a total volume of 2 million barrels. Most of these tanks have leak detection bottoms. There are a total of six impound basins including Lake Rushing, Lake Schramm (see below) and four others.

29. Lake Schramm: This was formerly an unlined surface impoundment used for disposal of leaded tank bottoms. 1300 cubic yards of leaded tank bottoms were removed in 1981, and the Lake is now lined and used to contain stormwater runoff.

Alkane Sector

30. Perimeter Groundwater Barrier: A GPS barrier wall and extraction trench is at the downgradient edge of the Alkane Sector (see Figure 7). The monitoring program (as described in the attached monitoring program) monitors both the performance of the A- and C-Zone corrective actions noted in the monitoring program. Chevron is

31. Sulfur Recovery Unit Settling Basin: This 3590-gallon basin receives low pH solutions from the sulfur recovery unit, with the supernatant being routed to the wastewater treatment plant.

32. Mud Sump: This unit formerly stored mud and solids that settled at the bottom of the No.13 Separator, but has now been cleaned and backfilled with clean soil.

33. Hydropits: The Hydrolyzing Pits (Hydropits) were three small unlined surface impoundments located on the shore of San Pablo Bay in the Alkane Sector (Figure 7) that historically received wastewater from the refinery's Alkane Plant until 1986. The most significant constituents of this waste stream were neutralized hydrofluoric acid and small amounts of oil containing benzene. Chevron submitted a closure report in 1992. The Hydropits Closure Unit includes a multi-layer cap and the Alkane GPS along the northeastern perimeter of the Hydropits adjacent to Castro Cove. The unit no longer contains liquid hazardous waste and, as such, meets the cease discharge requirements of the Toxic Pits Cleanup Act. No further closure activities are necessary or required for the Hydropits.

34. Schaeffer Slough: This ditch carried the effluent from the Hydropits to the No. 13 Separator for eventual discharge to the wastewater treatment system. The slough has now been closed.

35. No. 13 Separator: This oil/water separator has a volume of 960,000 gallons. In concert with the Mud Sump, it treated oily process water, with the supernatant being routed to the wastewater treatment system.

36. Alkane Plant: There are shallow groundwater plumes containing benzene, fluoride, and free-phase petroleum hydrocarbons originating from the Alkane Plant area (Figure 7). This contamination necessitated source area remediation consisting of free product recovery and groundwater extraction and treatment in addition to implementation of the refinery-wide GPS. In 2001, Chevron started operating eight extraction wells designed to recover floating liquid hydrocarbons and contaminated groundwater in the Alkane Plant plume source area upgradient of the Hydropits Closure Unit and the Alkane Sector GPS. These extraction wells make up the Alkane Plant Groundwater Recovery System. Groundwater and liquid hydrocarbons recovered by the extraction wells are routed to the refinery's wastewater treatment system and is discharged in accordance with existing NPDES permit requirements.

37. Pond 13A: This pond was used to store fluoride salts originating from the Hydroloyzing Pits. It had a capacity of about 28,000 cubic yards and was clean closed in 1992.

38. No. 7 sump: This sump formerly collected stormwater runoff, but is now out of service and is backfilled.

39. Alkane Tankfield: Historically, there were 40 tanks in this tankfield. Currently, no tanks are in active service in this tankfield.

Effluent Sector

40. Perimeter Groundwater Barrier: A GPS barrier wall extends along the 250-foot channel (described below, see Figure 10). The monitoring program (as described in the attached monitoring program) includes A- and C-Zone wells for the evaluation of the performance of the GPS (corrective action).

41. Bioreactor: The Bioreactor was excavated to about -40 feet Mean Sea Level in the early 1900's to be used as a turning basin for ships. Now this 30-acre pond conducts the refinery's secondary wastewater treatment by means of 1100 aerators and a series of baffles.

42. No. 2 Oxidation Pond: This 90-acre pond was historically used for final polishing of NPDES-regulated treated wastewater prior to its discharge to the Bay. The pond was converted to an Experimental Water Enhancement Wetland (Wetland), which is downstream of the biological treatment settling basins (Bioreactor). The treated water from the Wetland and Bioreactor are combined and routed through granular activated carbon, and is discharged in a deep water diffuser, which is the Refinery's NPDES' Point of Compliance under the NPDES permit referenced in Finding 4.

43. 250-foot channel: The 250-foot channel was excavated to about -40 feet MSL in the early 1900's to be used as a shipping channel for the refinery until the 1950's. The channel was then dammed and used as part of the wastewater treatment system until 1987, and now serves to store stormwater and treated process water.

    In 2002, Chevron proposed and implemented interim corrective actions for the channel. These included installation of a High Density Polyethylene barrier, fencing, bank steepening, vegetation control and removal of perching objects used by birds. Chevron also continues collection and removal of oil, and vegetation management and wildlife surveys. Lastly, Chevron conducts water elevation monitoring to assure that there is neither a vertical or lateral gradient allowing for release of contaminated water to either groundwater or the Bay. Ongoing monitoring indicates limited wildlife exposure, that A-Zone groundwater flow is fully contained by the GPS, and that there is largely an upward flow into the channel for the C-Zone water.

44. 50/100 foot channel: This channel conveyed wastewater to the bioreactor. Sampling showed the wastes to be non-hazardous. The channel has been cleaned and converted for use in conveying non-contaminated stormwater to the Bay after sampling.

45. Pond 11: This site received oily waste and paint sludge from the Drum Reconditioning Plant. The site was clean-closed in 1979.

46. Pond 14: This 4,300-cubic yard pond also received waste from the Drum Recondition Plant until 1979. In 1980, all wastes and some underlying soil were removed.

Reclamation Sector

47. Perimeter Groundwater Barrier: A GPS barrier wall and extraction trench largely surrounds the sector's units listed below (see Figure 11). The monitoring program (as described in the attached monitoring program) monitors the performance of the GPS corrective action. Chevron is responsible for inspection and maintenance of the soil cover and stormwater conveyances for the Gertrude Street and Parr-Richmond units.

48. Reclamation Yard Site: Chevron bought this site in 1958, which had been the former City of Richmond municipal landfill since 1947 and has a capacity of about 187,500 cubic yards. No waste disposal occurred following Chevron's purchase of the site.

49. Parr-Richmond Site: Chevron bought this site in 1954, which had been used for municipal landfilling and junkyard storage since 1930. A final cover was built over it in 1997.

50. Gertude Street Site: This 3-acre site was purchased by Chevron and then leased to an outside party that used it for auto dismantling and drum reconditioning between 1961 and 1983. The drums were removed in 1983. In 1987, the site was graded and, in 1997, a final cover was installed along with a groundwater extraction trench.

Seismicity

51. Earthquakes posing a threat to the refinery could occur along the Hayward, San Andreas and Calaveras faults. The maximum ground surface acceleration, calculated for soft to medium clay and silt sites, is expected to be 0.35g for an event originating from a Richter Magnitude 6.4 Maximum Probable Earthquake (MPE) at the Hayward fault about 3.7 km east of the site, 0.35g for an event originating from a Richter Magnitude 7.75 MPE at the San Andreas fault located about 24 km west, and 0.35g for an event originating from a Richter Magnitude 6.6 MPE at the Calaveras fault. In an effort to prepare for such an incident, Chevron routinely and systematically reviews all process facilities for potential hazards, including a seismic review of appropriate structures. In accordance with federal, State and local requirements, Chevron also maintains a facility emergency response plan and tsunami contingency plan for the Richmond Long Wharf.

Aboveground Petroleum Storage Tanks

52. Aboveground petroleum storage tanks are required to comply with the requirements of Chapter 6.67 Section 25270 of the Health and Safety Code. In part, the regulations require installation and utilization of a leak detection system for each regulated tank that has the potential to impact groundwater or surface waters. The refinery operates approximately 160 aboveground petroleum storage tanks with a total storage capacity of approximately 600 million gallons. The majority of these tanks now have leak detection bottoms (LDBs), as Chevron has installed LDBs on all new tanks constructed at the refinery and retrofitted old tanks with LDBs if they are kept in service after their steel bottoms need to be replaced.

53. Aboveground petroleum storage tank facilities are also required to have secondary spill containment for the capture of sudden releases from an aboveground petroleum tank. The refinery utilizes several different types of soil berms, spill collection basins and channels located in the tank fields for containment and diversion of petroleum hydrocarbon releases. The primary regulation governing this activity is Code of Federal Regulations 112.7 Spill Prevention Control and Countermeasure Plans (SPCC). The SPCC is designed to prevent spills at petroleum facilities to the maximum extent practicable and mitigate a spill if it occurs.

MONITORING PROGRAMS

54. To record the compliance of the waste management units and surface impoundments described above, Chevron is required to implement the attached monitoring program described in these WDRs. The monitoring program requires groundwater level and chemical monitoring for inorganic and organic MPs and COCs (both terms are further defined in Specification 5, below) along a point of compliance (POC - also defined in Specification 5, below and generally coincident with the GPS where present). The MPs and COCs are typically metals, semivolatile organic compounds, and volatile organic compounds.

55. In the Landfarm areas, the A-Zone monitoring helps demonstrate that the GPS is maintaining a hydraulic barrier and by evaluating the effectiveness of the GPS as a Corrective Action Monitoring Program. The C-Zone monitoring helps verify that water quality below the bay mud at the POC of the landfarms has not been degraded and is considered to be a Detection Monitoring Program. Outside of the Landfarm area, the A-Zone monitoring likewise helps validate the GPS performance as a Corrective Action Monitoring Program, but C-Zone monitoring is considered to be corrective action monitoring.

56. Pursuant to a plan approved by the Regional Water Board in 2002, Chevron performs a statistical evaluation and trend analysis of groundwater well monitoring results, to establish concentration trends and note the overall effectiveness of the remedial actions at the refinery.

57. Chevron also reports on groundwater elevations, flow patterns and velocities, hydrocarbon thicknesses and recovery, and closure unit monitoring, inspection and maintenance activities as part of their monitoring program.

BASIN PLAN

58. The Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) is the Regional Water Board's master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State, including surface waters and groundwater. It also includes programs of implementation to achieve water quality objectives. The Basin Plan was duly adopted by the Regional Water Board and approved by the State Water Resources Control Board (State Water Board), Office of Administrative Law and the U.S. EPA, where required.

BENEFICIAL USES

59. Shallow groundwater beneath the "Flats Zone", which comprises the flatland marsh area bounded by the San Pablo Bay to the north and extending south along the northeast side of the Potrero-San Pablo Ridge, has Total Dissolved Solids (TDS) levels that are significantly higher than the 3000 mg/l (5000 μS/cm electrical conductivity) level which the Regional Water Board (Resolution No. 89-39) set as a maximum for a municipal or domestic water supply in its Sources of Drinking Water Policy. There is no historical, existing or planned use of groundwater as a source of drinking water in either the shallow (A- and C-Zones) or deeper (B-Zone) aquifers in this part of the refinery.

    Groundwater beneath the "Ridge Zone," which is bounded on the south by San Francisco Bay and extends northwest up to the top of the Potrero-San Pablo Ridge (Bayside sectors), is primarily contained in fractured bedrock of the Franciscan Complex. Based on hydraulic conductivity data collected during hydrogeologic investigations of the tankfields in the Bayside North and Bayside South sectors, it is unlikely that a single well could produce an average sustained yield of 200 gallons per day for drinking water supply purposes (State Water Board Resolution No. 88-63, exemption criterion 1(c), and Regional Water Board Resolution No. 89-39). There is no historical, existing or planned use of unconfined groundwater as a source of drinking water in this part of the refinery.

    There is the potential, however, for groundwater on either side of the Potrero-San Pablo Ridge to discharge into San Francisco and San Pablo bays at the shoreline groundwater/surface water interface. Therefore, the surface water beneficial uses named in the Basin Plan for these bodies of water are applicable to groundwater in POC monitoring wells near the shoreline interface.

60. The existing and potential beneficial uses of groundwater underlying the site that is not contained in bedrock and is greater than 100 feet below ground surface are:

a. Industrial process and service supply
b. Agricultural water supply
c. Municipal and domestic supply (however, due to the proximity of the Bay, groundwater at the site contains elevated TDS levels, which render the groundwater nonpotable)

61. The existing and potential beneficial uses of San Francisco and San Pablo bays are:

a. Ocean, commercial, and sport fishing
b. Shellfish harvesting
c. Estuarine habitat
d. Fish migration
e. Preservation of rare and endangered species
f. Fish spawning
g. Wildlife habitat
h. Water contact recreation
i. Non-contact water recreation
j. Industrial service supply
k. Industrial process supply
l. Navigation

CALIFORNIA ENVIRONMENTAL QUALITY ACT

62. This action is an Order to enforce the laws and regulations administered by the Regional Water Board. This action is categorically exempt from the provisions of the California Environmental Quality Act pursuant to Section 15308, Title 14, CCR.

NOTICE AND MEETING

63. The Regional Water Board has notified the Discharger and interested agencies and persons of its intent to amend the WDRs, and has provided them with an opportunity for a public hearing and an opportunity to submit their written views and recommendations.

64. The Regional Water Board, at a public meeting, heard and considered all comments pertaining to this amendment of WDRs.

IT IS HEREBY ORDERED pursuant to the authority in Section 13263 of California Water Code (CWC), Title 27, Division 2, Subdivision 1 of the California Code of Regulations (27CCR), and Chapter 15, Division 3, Title 23 of the CCR (Chapter 15) that the Discharger, its agents, successors, and assigns shall meet the applicable provisions contained in 27CCR, Chapter 15, and Division 7 CWC, and shall comply with the following:

PROHIBITIONS

1. Migration of pollutants through subsurface transport to waters of the State outside of the GPS is prohibited.

2. There shall be no discharge of wastes to surface waters except as permitted under the National Pollutant Discharge Elimination System.

3. The treatment, discharge or storage of materials that may impact the beneficial uses of groundwater or surface water shall not be allowed to create a condition of pollution or nuisance as defined in sections 13050 (l) and (m) of the CWC, nor degrade the quality of waters of the State or of the United States.

4. The creation of any new Waste Management Unit (WMU) is prohibited without prior Regional Water Board staff written concurrence.

5. The relocation of wastes is prohibited without prior Regional Water Board staff written concurrence.

6. The relocation of wastes to or from WMUs shall not create a condition of pollution or nuisance as defined in CWC sections 13050 (l) and (m). Any relocated waste shall not be placed in or allowed to contact ponded water from any source whatsoever. Wastes shall not be relocated to any location where they can be discharged into waters of the State or of the United States.

7. Excavation within or reconfiguration of any existing WMU is prohibited without prior concurrence of Regional Water Board staff. Minor excavation or reconfiguration activities such as for installation of signs or minor landscaping, or for minor routine maintenance and repair do not require prior staff concurrence.

8. Waste shall not be exposed at the surface of any WMU.

9. Disking of WMU covers is prohibited without prior Regional Water Board staff written concurrence. Alternate methods of controlling vegetative growth, which do not affect the integrity of the WMU cap, are preferred.

10. Surface drainage from tributary areas and internal site drainage from surface or subsurface sources shall not contact or percolate through wastes during the life of the site.

11. The discharge of hazardous waste at the facility is prohibited. For the purpose of this Order, the term “hazardous waste” is as defined in Section 20164 of Title 27.

12. The discharge of leachate or wastewater (including from surface impoundments, process waters, and runoff from the plant operations areas) that: 1) have the potential to cause corrosion or decay, or otherwise reduce or impair the integrity of the

containment structures; 2) if mixed or commingled with other wastes in the unit, could produce a violent reaction including heat, pressure, fire, explosion, or the production of toxic by-products; 3) require a higher level of containment than provided by the unit; 4) are "restricted hazardous wastes", or 5) impair the integrity of the containment structures, are prohibited per Section 20200(2)(b) of Title 27.

13. Activities associated with subsurface investigations and cleanup that will cause significant adverse migration of pollutants are prohibited.

14. There shall be no discharges to a surface impoundment, and any residual liquids and sludge shall be removed expeditiously if it is determined the surface impoundment is leaking or there is a failure which causes a threat to water quality.

15. Wastes shall not be disposed in any position where they may migrate from the disposal site to adjacent geologic materials, waters of the State or of the United States during disposal operations, closure, and during the post-closure maintenance period, per Section 20310(a) of Title 27.

16. The Discharger shall not cause the following conditions to exist in waters of the State at any place outside of the GPS:

    a. <u>Surface Waters</u>
        i. Floating, suspended, or deposited macroscopic particulate matter or foam;
        ii. Bottom deposits or aquatic growth;
        iii. Adversely altered temperature, turbidity, or apparent color beyond natural background levels;
        iv. Visible, floating, suspended or deposited oil or other products of petroleum origin; or
        v. Toxic or other deleterious substances to be present in concentrations or quantities that may cause deleterious effects on aquatic biota, wildlife or waterfowl, or that render any of these unfit for human consumption either at levels created in the receiving waters or as a result of biological concentrations.

    b. <u>Groundwater</u>
        i. Further degradation of groundwater quality and/or substantial worsening of existing groundwater impacts; and
        ii. Subsurface migration of pollutants associated with Chevron's operations to waters of the State is prohibited.

SPECIFICATIONS

<u>Reporting Specifications</u>

1. All technical reports submitted pursuant to this Order shall be prepared under the supervision of and signed by a California registered civil engineer, registered geologist, and/or certified engineering geologist.

2. The Discharger shall implement a Detection Monitoring Program (DMP) for the C-Zone groundwater at the Landfarm area, pursuant to CCR Title 27 Section 20420. The Self-Monitoring Program (SMP) attached to this Order is intended to constitute the DMP for the refinery.

3. The Discharger shall also continue the Corrective Action Monitoring Program for the A-Zone groundwater, and the C-Zone groundwater outside of the landfarms, pursuant to CCR Title 27 Section 20430. The program shall be designed to determine if the corrective action measures, such as the operation of the GPS, are functioning and demonstrate compliance with the corrective action program goals. The SMP attached to this Order is intended to constitute the Corrective Action Monitoring Program for the refinery.

4. At any time, the Discharger may file a written request (including supporting documentation) with the Regional Water Board's Executive Officer, proposing modifications to the attached SMP. If the proposed modifications are acceptable, the Executive Officer may issue a letter of approval that incorporates the proposed revisions into the SMP.

Title 27 Compliance Specifications

5. Title 27 requires the Regional Water Board to establish a Water Quality Protection Standard (WQPS) in a WDR order for each WMU covered by that order. The WQPS for the refinery shall include the following:

   (a) Constituents of Concern (COC): Section 20395 of Title 27 defines COCs as "all waste constituents, reaction products, and hazardous constituents that are reasonably expected to be in or derived from waste contained in the Unit." COCs for the refinery include the monitoring parameters identified in the SMP attached to this Order, or any future amendment thereof, and all Appendix II parameters in the federal Subtitle D regulations.

   (b) Monitoring Parameters (MP): MPs, a subset of the COCs, are typically the most mobile and commonly detected COCs in groundwater at a site and are measured on a more frequent basis than the entire list of COCs. The MPs for the refinery shall include, at a minimum, all constituents identified as such in the SMP attached to this Order, or any future amendments thereof. The Discharger may propose modification to the MPs as additional data become available concerning site-specific source characteristics and natural background water quality. However, modifications shall only be made upon written concurrence from the Executive Officer.

   (c) Maximum Allowable Concentration Limits(MACLs): MACLs have been established for each COC listed in Tables 2 and 4 of the SMP. Concentration limits for all COCs detected at the specified monitoring wells are typically established using the background data set pursuant to CCR Title 27 Section

20400. However, use of background data is inappropriate due to the number of releases over the many years of refinery operations, as it may be technologically and/or economically infeasible to cleanup all petroleum refining-related constituents in the groundwater to background concentrations (non-detect for synthetic organics). The MACLs were thus developed to protect the beneficial uses of shallow groundwater beneath the refinery. The applicable beneficial uses with the most stringent water quality objectives are related to shallow groundwater discharge to surface waters of San Francisco Bay and include uses involving the health of aquatic organism receptors in the Bay and humans who consume aquatic organisms from the Bay.

(d) Point of Compliance: Title 27 defines the Point of Compliance (POC) as the "vertical surface located at the hydraulically downgradient limit of the Unit that extends through the uppermost aquifer underlying the Unit." The appropriate POC for the refinery, based on the areal extent of groundwater impacts and the large number of WMUs involved, is the GPS extraction trench/barrier wall system, which maintains a hydraulic capture zone to protect sensitive ecological receptors in the Bay and wetlands adjacent to the refinery. The GPS/POC boundary was established under the following guidelines: 1) at the downgradient perimeters of individual WMUs that require corrective action but are non-contiguous with other A-Zone areas under corrective action (e.g., Pollard Pond, Parr-Richmond site); 2) at the furthest downgradient boundary common to a group of WMUs and/or areas under corrective action (e.g., Landfarms 2-5, Plant l/Additives Plant); or, 3) at the refinery shoreline boundary where A-Zone groundwater contamination not associated with specific WMUs is present.

(e) Monitoring Points: Title 27 defines Monitoring Points as “a well, device, or location specified in the waste discharge requirements at which monitoring is conducted and at which the water quality protection standard applies.” Monitoring Points for compliance with the refinery-wide corrective action and detection monitoring program are identified in the SMP. These monitoring points generally consist of shallow groundwater monitoring wells located downgradient of the GPS extraction well capture zone. Because refinery operations predate collection of groundwater chemistry data, background water quality monitoring locations do not exist at this site; therefore, intra-well statistical comparisons will be used for evaluating trends in concentrations of COCs detected in groundwater monitoring wells. Concentrations of petroleum hydrocarbon-related COCs reported above MACLs are expected to exhibit decreasing trends over time as the GPS continues to operate and natural biodegradation processes take place.

6. The refinery site shall be protected from any washout or erosion of wastes or covering material and from inundation that could occur during a 100 year flood event. Final cover systems for WMUs shall be graded and maintained to promote lateral runoff and prevent ponding and infiltration of water.

7. The Discharger shall notify the Regional Water Board immediately of any failure that threatens the integrity of any containment and/or control facilities, structures, or devices. Any such failure shall be promptly corrected after approval of the method and schedule by the Executive Officer.

8. The Discharger shall maintain the WMUs so as to prevent a statistically significant increase in water quality parameters at POCs as provided in CCR Title 27, Section 20420.

9. The Discharger shall maintain the WMUs to prevent discharges, such that the units do not constitute a pollution source.

10. The Regional Water Board considers the Discharger to have continuing responsibility for correcting any problems that arise in the future as a result of waste discharge or related operations or site use.

11. The Discharger shall comply with all applicable provisions of Title 27 that apply to the closure and post-closure of WMUs and the design and maintenance of surface impoundments including those that are not specifically referred to in this Order.

12. WMUs shall be closed according to a closure plan prepared according to all applicable requirements of Title 27, and approved by the Executive Officer.

Remediation Facility Specifications

13. The Discharger shall **annually demonstrate** (include results in the Annual Report) that all installed groundwater remedial systems including, but not limited to, groundwater containment, treatment, and/or extraction systems are functioning as intended and designed.

14. Containment, collection, drainage, and monitoring systems at the refinery, shall be maintained as long as contaminated waste, soil, or water is present and poses a threat to water quality.

15. The Discharger shall maintain groundwater or remediation devices or design features installed in accordance with this Order such that they continue to operate as intended without interruption, with the exception of periodic maintenance.

16. If the Executive Officer determines the existence of an imminent threat to the beneficial uses of surface or subsurface waters of the State, the Discharger may be required to install additional groundwater monitoring wells and/or undertake corrective action measures, including submittal of a site investigation report.

17. The Discharger shall install any additional groundwater and leachate monitoring devices required to fulfill the terms of any future SMP issued by the Executive Officer.

18. The Discharger shall install, maintain in good working order, and operate efficiently any facility, alarm, groundwater extraction system, or hydraulic/contaminant migration control system necessary to assure compliance with these WDRs.

19. If it is determined by the Executive Officer, based on groundwater monitoring information, that water quality impairment immediately outside the boundary of the GPS continues to degrade, the Discharger will be required to submit and implement a site specific groundwater corrective action proposal.

Monitoring Specifications

20. The Discharger shall conduct monitoring activities according to the SMP attached to this Order and as may be amended by the Executive Officer, to verify the effectiveness of groundwater remediation and containment systems and WMU closure systems.

21. All monitoring wells shall be constructed in a manner that maintains the integrity of the drill hole, prevents cross-contamination of saturated zones, and produces representative groundwater samples from discrete zones within the groundwater zone each well is intended to monitor.

22. All borings for monitoring wells shall be continuously cored. The drill holes shall be logged during drilling under the direct supervision of a registered geologist whose signature appears on the corresponding well log. Logs of monitoring wells shall be filed with the Department of Water Resources. All information used to construct the wells shall be submitted to the Regional Water Board upon completion of the wells.

23. The groundwater sampling and analysis program shall ensure that groundwater quality data are representative of the groundwater in the area that is monitored.

Surface Impoundment Specifications

24. If it is determined by the Executive Officer that any surface impoundment is degrading beneficial uses, there shall be no discharges to a surface impoundment, and residual liquids and sludges shall be removed expeditiously.

25. The impoundments will be operated such that scouring at points of discharge and by wave action at the water line will not degrade the pond containment features.

26. Pipeline discharges to surface impoundments shall be either equipped with devices, or fail-safe operating procedures, to prevent overfilling. The surface impoundments shall always maintain at least two-feet of freeboard.

27. The Discharger shall operate the surface impoundments according to a detailed operating, maintenance, and contingency plan that will include at a minimum,

procedures for routine inspection of the surface impoundments, discharge into a pond, discharge out of a pond, contingency measures if problems with the containment structures are found, and notification of agencies.

Soil Contamination and Excavated Soil Reuse

28. Chevron shall notify the Regional Water Board of any soil contamination, not previously identified in subsurface investigations, discovered during any subsurface investigation or excavation work conducted on refinery property, which may potentially adversely impact water quality. Chevron shall store, reuse, and/or dispose of non-hazardous contaminated soil according to the *Revised Soil Management Plan, Chevron Richmond Refinery, Contra Costa county, California (SAIC, 2008).*

PROVISIONS

1. Compliance: The Discharger shall comply immediately, or as prescribed by the time schedule below, with all Prohibitions, Specifications, and Provisions of this Order. All required submittals must be acceptable to the Executive Officer. Violations may result in enforcement actions, including Regional Water Board orders or court orders requiring corrective action or imposing civil monetary liability, or in modification or revocation of these WDRs by the Regional Water Board [CWC sections 13261, 13267, 13263, 13265, 13268, 13300, 13301, 13304, 13340, and 13350].

2. Authority: All technical and monitoring reports required by this Order are requested pursuant to Section 13267 of the CWC. Failure to submit reports in accordance with schedules established by this Order or failure to submit a report of sufficient technical quality to be acceptable to the Executive Officer may subject the Discharger to enforcement action pursuant to Section 13268 of the CWC.

Reporting Requirements

3. Technical reports/plans, submitted by the Discharger, in compliance with the Prohibitions, Specifications, and Provisions of this Order, shall be submitted to the Regional Water Board on the schedule specified herein. These reports/plans shall consist of a letter report that includes the following:
   a. Identification of any obstacles that may threaten compliance with the schedule,
   b. In the event of non-compliance with any Prohibition, Specification or Provision of this Order, written notification which clarifies the reasons for non-compliance and which proposes specific measures and a schedule to achieve compliance. This written notification shall identify work not completed that was projected for completion, and shall identify the impact of non-compliance on achieving compliance with the remaining requirements of this Order; and
   c. In the SMP reports, an evaluation of the current groundwater monitoring system and a proposal for modifications as appropriate.

4. All application reports or information to be submitted to the Executive Officer shall be signed and certified as follows:
   a. For a corporation – by a principal executive officer or the level of vice-president or an appropriate delegate.
   b. For a partnership or sole proprietorship – by a general partner or the proprietor, respectively.
   c. For a municipality, State, federal, or other public agency – by either a principal executive officer or ranking elected official.

5. All reports submitted pursuant to this Order must be submitted as both hard copies and electronic files in PDF format. The Regional Water Board has implemented a document database that is intended to reduce the need for printed report storage space and streamline the public review process. All electronic files, whether in PDF or spreadsheet format must be submitted via email (only if the file size is under 1MB), or on CD. Email notification should be provided to Regional Water Board staff whenever a file is uploaded to Geotracker (see below).

6. The State Water Board adopted regulations requiring electronic report and data submittal to the State's GeoTracker database (Title 23, Division 3, Chapter 30, Articles 1 and 2, Sections 3890-3895 of the CCR).

   The Discharger is responsible for submitting the following via Geotracker:
   a. All chemical analytical results for soil, water, and vapor samples;
   b. The latitude and longitude of any permanent sampling point for which data is reported, accurate to within 1 meter and referenced to a minimum two reference points from the California Spatial Reference System, if available;
   c. The surveyed elevation relative to a geodetic datum of any permanent sampling point;
   d. The elevation of groundwater in any permanent monitoring well relative to the surveyed elevations;
   e. A site map or maps showing the location of all sampling points;
   f. The depth of the screened interval and the length of screened interval for any permanent monitoring well;
   g. PDF copies of boring logs; and
   h. PDF copies of all reports, workplan and other documents (the document, in its entirety [signature pages, text, figures, tables, etc.] must be saved to a single PDF file) including the signed transmittal letter and professional certification by a California Licensed Civil Engineer or a Registered Geologist.

7. Upon request, monitoring results shall also be provided electronically in Microsoft Excel® to allow for ease of review of site data, and to facilitate data computations and/or plotting that Regional Water Board staff may undertake during the review

process. Data tables submitted in electronic spreadsheet format will not be included in the case of file review and should therefore be submitted on CD and included with the hard copy of the report. Electronic tables shall include the following information:

a. Well designations;

b. Well location coordinates (latitude and longitude);

c. Well construction (including top of well casing elevation, total well depth, screen interval depth below ground surface, screen interval elevation, and a characterization of geology of subsurface the well is located in);

d. Groundwater depths and elevations (water levels);

e. Current analytical results by constituent of concern (including detection limits for each constituent);

f. Historical analytical results (including the past five years unless otherwise requested); and

g. Measurement dates.

Copies of all correspondence, reports, and documents pertaining to compliance with the Prohibitions, Specifications, and Provisions of this Order related to surface impoundments and solid waste units, submitted by the Discharger, shall also be provided to the Contra Costa County Hazardous Materials Program**.**

8. Self-Monitoring Program**:** The Discharger shall comply with the SMP attached to this Order (Part A and Part B). The SMP is intended to constitute both a DMP and a Corrective Action Monitoring Program pursuant to Title 27, sections 20420 and 20430 and is designed to identify significant water quality impacts from the specified WMU and demonstrate compliance with the WQPS established pursuant to Title 27, Section 20390 for the WMU. The SMP may be amended as necessary at the discretion of the Executive Officer.

COMPLIANCE DATE: Immediately

9. Revision of the Self-Monitoring Program: The Discharger shall submit a plan for the revision of the monitoring locations, parameters, frequency and MACLs contained within the SMP attached to this Order (Part B).

COMPLIANCE DATE: December 15, 2011.

10. Contaminated Soil Management Plan: Chevron shall continue to implement the plan, dated August 26, 2008, for managing non-hazardous contaminated soil discovered on refinery property during subsurface investigation or excavation work. This plan includes descriptions of soil sampling, storage, and handling protocols and criteria for reusing non-hazardous contaminated soil within the refinery impacted soils.

11. Final Closure Plan for #1 Oxidation Pond Passes 2 through 5: Chevron shall continue to implement the No. 1 Oxidation Closure Plan, approved by the Regional Water

Board on April 30, 2009. The Plan proposed a final cover system for petroleum hydrocarbon contaminated soil in passes 2 through 5 of #1 Oxidation Pond. Chevron shall submit a final plan documenting the completion of this work.

COMPLIANCE DATE: December 15, 2011

12. Report of Waste Discharge: The Discharger shall submit a technical report, acceptable to the Executive Officer, describing any proposed material change in the character, location, or volume of a discharge, or in the event of a proposed change in use or development of a WMU or landfill (CWC Section 13260(c)). The technical report shall describe the project, identify key changes to the design that may impact any portion of the WMU or landfill, and specify components of the design necessary to maintain integrity of the WMU or landfill cover and prevent water quality impacts.

    COMPLIANCE DATE: 120 days prior to any material change

13. Financial Assurance: The Discharger shall submit to the Regional Water Board evidence of an irrevocable Post-closure Fund acceptable to the Executive Officer, to ensure monitoring, maintenance, and any necessary remediation actions. Every five years, for the duration of the post-closure monitoring period, the Discharger shall submit a report that includes an outline of the financial assurance mechanism and verification that the fund has been created. The fund value shall be supported by calculations, to be included with this submittal, providing cost estimates for all post-closure monitoring, maintenance, repair and replacement of WMU or landfill containment, cover, and monitoring systems.

    Additionally, cost estimates must be provided for corrective action for known or reasonable foreseeable releases that may be required for all WMUs at the facility. The fund value shall be based on the sum of these estimates. The cost estimates and funding shall be updated to reflect change to monitoring systems as they occur. The post-closure maintenance period shall extend as long as the wastes within the WMU pose a threat to water quality.

    COMPLIANCE DATE: Submitted with the 2015 Annual Report then every five years thereafter.

14. Availability: A copy of these WDRs shall be maintained by the Discharger and shall be made available by the Discharger to all employees or contractors performing work (maintenance, monitoring, repair, construction, etc.) at WMUs or groundwater containment systems. (CWC Section 13263)

15. Change in Ownership: In the event of any change in control or ownership of the facility presently owned or controlled by the Discharger, the Discharger shall notify the succeeding owner or operator of the existence of this Order by letter, a copy of which shall be forwarded to the Regional Water Board upon a final change in ownership. To assume operation of this Order, the succeeding owner or operator must

apply in writing to the Executive Officer requesting transfer of this Order within 30 days of the change of ownership. The request must contain the requesting entity's full legal name, mailing address, electronic address, and telephone number of the persons responsible for contact with the Regional Water Board. Failure to submit the request shall be considered a discharge without requirements, a violation of the CWC. (CWC Sections 13267 and 13263)

COMPLIANCE DATE: 30 days after a change in facility control or ownership

16. Revision: This Order is subject to Regional Water Board review and updating, as necessary, to comply with changing State or federal laws, regulations, policies, or guidelines; changes in the Basin Plan; or changes in discharge characteristics. The Regional Water Board will review this Order periodically and may revise its requirements when necessary. (CWC Section 13263).

17. Submittal Revisions: Where a Discharger becomes aware that it failed to submit any relevant facts in a Report of Waste Discharge or submitted incorrect information in a Report of Waste Discharge or in any report to the Regional Water Board, it shall promptly submit such facts or information. (CWC Sections 13260 and 13267)

18. Vested Rights: This Order does not convey any property rights of any sort or any exclusive privileges. The requirements prescribed herein do not authorize the commission of any act causing injury to persons or property, do not protect the Discharger from liability under federal, State or local laws, nor do they create a vested right for the Discharger to continue the waste discharge. (CWC Section 13263(g))

19. Severability: Provisions of these WDRs are severable. If any provisions of these WDRs are found invalid, the remainder of these WDRs shall not be affected. (CWC 9213)

20. Operation and Maintenance: The Discharger shall, at all times, properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) that are installed or used by the Discharger to achieve compliance with conditions of this Order. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls including appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of this Order. (CWC Section 13263(f))

20. Reporting of Hazardous Substance Release: If any hazardous substance is discharged in or on any waters of the State, or discharged or deposited where it probably will be discharged in or on any waters of the State, the Discharger shall:

    a. Report such discharge to the following:

i. The Regional Water Board by calling (510) 622-2300 during regular office hours

(Monday through Friday, 8 a.m. – 5 p.m.); and to

ii. The California Emergency Management Agency (CAL EMA) at (800) 852-7550.

b. A written report shall be filed with the Regional Water Board within five working days.
The report shall describe:

i. The nature of the waste or pollutant.

ii. The estimated quantity involved.

iii. The duration of the incident.

iv. The cause of the release.

v. The estimated size of the affected area, and nature of the effect.

vi. The corrective actions taken or planned, and a schedule of those measures.

vii. The persons/agencies notified.

This reporting is in addition to reporting to CAL EMA that is required pursuant to the Health and Safety Code.

21. Reporting Releases: Except for a discharge that is in compliance with these WDRs, any person who, without regard to intent or negligence, causes or permits any hazardous substance or sewage to be discharged in or on any waters of the State, or discharged or deposited where it is, or probably will be, discharged in or on any waters of the State, shall immediately notify CAL EMA of the discharge in accordance with the spill reporting provision of the State toxic disaster contingency plan adopted pursuant to Article 3.7 (commencing with Section 8574.7) of Chapter 7 of Division 1 of Title 2 of the Government Code, and immediately notify the Regional Water Board of the discharge as soon as:

a. That person has knowledge of the discharge;

b. Notification is possible; and

c. Notification can be provided without substantially impeding cleanup or other emergency measures.

This provision does not require reporting of any discharge of less than a reportable quantity as provided for under subdivisions (f) and (g) of CWC Section 13271 unless the Discharger is in violation of a prohibition in the Basin Plan. [CWC Section 13271(a)]

22. Release Reporting Requirements: In the case of a release defined above the following must be provided to the Regional Water Board within five days of knowledge of the release;

a. Site map illustrating location and approximate size of impacted area;

b. Photographs of the impacted area before and after remediation; and

c. A report detailing the remediation method chosen and its efficacy, and illustrating that the release contingency plan was effective, or else proposing modifications to the contingency plan to increase its effectiveness.

23. Endangerment of Health or the Environment: The Discharger shall report any noncompliance that may endanger human health or the environment. Any such information shall be provided orally to the Executive Officer, or authorized representative, **within 24 hours** from the time the Discharger becomes aware of the circumstances. A written submission shall also be provided within five days of the time the Discharger becomes aware of the circumstances. The written submission shall contain:

a. A description of the noncompliance, and its cause;

b. The period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected;

c. The anticipated time it is expected to continue and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

The Executive Officer, or an authorized representative, may waive the written report on a case-by-case basis if the oral report has been received within 24 hours [CWC sections 13263 and 13267]. The following occurrences must be reported to the Executive Officer within 24 hours:

a. Any bypass from any portion of the treatment facility;

b. Any discharge of industrial products, or treated or untreated wastewater; and

c. Any treatment plant upset that causes the discharge limitation(s) of this Order to be exceeded [CWC sections 13263 and 13267].

24. Entry and Inspection: The Discharger shall allow the Regional Water Board, or an authorized representative upon the presentation of credentials and other documents as may be required by law, to:

a. Enter upon the Discharger's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this Order;

b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order;

c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order; and

d. Sample or monitor at reasonable times, for the purposes of assuring compliance with this order or as otherwise authorized by the CWC, any substances or parameters at any location. (CWC Section 13267)

25. Discharges to Navigable Waters: Any person discharging or proposing to discharge to navigable waters from a point source (except for discharge of dredged or fill material subject to Section 404 of the Clean Water Act and discharge subject to a general NPDES permit) must file an NPDES permit application with the Regional Water Board. (CCR Title 2 Section 22357)

26. Change in Discharge: In the event of a material change in the character, location, or volume of a discharge, the Discharger shall file with this Regional Water Board a new Report of Waste Discharge. (CWC Section 13260). A material change includes, but is not limited to, the following:

    a. Addition of a major industrial waste discharge to discharge of essentially domestic sewage, or the addition of a new process or product by an industrial facility resulting in a change in the character of the waste;

    b. Significant change in disposal method, e.g., change from a land disposal to a direct discharge to water, or change in the method of treatment which would significantly alter the characteristics of the waste;

    c. Significant change in the disposal area, e.g., moving the discharge to another drainage area, to a different water body, or to a disposal area significantly removed from the original area potentially causing different water quality or nuisance problems;

    d. Increase in flow beyond that specified in the WDRs; or

    e. Increase in area or depth to be used for solid waste disposal beyond that specified in the WDRs. (CCR Title 23 Section 2210)

27. Monitoring Devices: All monitoring instruments and devices used by the Discharger to fulfill the prescribed monitoring program shall be properly maintained and calibrated as necessary to ensure their continued accuracy. All flow measurement devices shall be calibrated at least once per year, or more frequently, to ensure continued accuracy of the devices. Annually, the Discharger shall submit to the Executive Officer a written statement signed by a registered professional engineer certifying that all flow measurement devices have been calibrated and will reliably achieve the accuracy required.

    Unless otherwise permitted by the Executive Officer, all analyses shall be conducted at a laboratory certified for such analyses by the State Department of Public Health. The Executive Officer may allow use of an uncertified laboratory under exceptional circumstances, such as when the closest laboratory to the monitoring location is outside State boundaries and therefore not subject to certification. All analyses shall be required to be conducted in accordance with the latest edition of "Guidelines Establishing Test Procedures for Analysis of Pollutants" (40 CFR Part 136) promulgated by U.S. EPA. (CCR Title 23, Section 2230)

28. Treatment: In an enforcement action, it shall not be a defense for the Discharger that it would have been necessary to halt or to reduce the permitted activity in order to maintain compliance with this Order. Upon reduction, loss, or failure of the treatment facility, the Discharger shall, to the extent necessary to maintain compliance with this Order, control production or all discharges, or both, until the facility is restored or an alternative method of treatment is provided. This provision applies, for example, when the primary source of power of the treatment facility fails, is reduced, or is lost. (CWC Section 13263(f)).

29. Document Distribution: Copies of correspondence, technical reports, and other documents pertaining to compliance with this Order shall be provided to the following agencies:

    a. Regional Water Board (all submittals);

    b. Department of Toxic Substances Control (all submittals); and

    c. Contra Costa Health Services, Hazardous Materials Programs (Soils Management Plan only).

    The Executive Officer may modify this distribution list as needed.

30. General Prohibition: Neither the treatment nor the discharge of waste shall create a pollution, contamination or nuisance, as defined by Section 13050 of the CWC. (H&SC Section 5411, CWC Section 13263)

31. Earthquake Inspection: The Discharger shall submit a detailed Post Earthquake Inspection Report acceptable to the Executive Officer, in the event of any earthquake generating ground shaking of Richter Magnitude 7 or greater at or within 30 miles of the refinery. The report shall describe the containment features, groundwater monitoring, and control facilities potentially impacted by the static and seismic deformations of any WMU or groundwater containment system. Damage to any waste containment facility, which may impact State waters, must be reported immediately to the Executive Officer.

    COMPLIANCE DATE: Verbally as soon as the data becomes available and in writing within 72 hours of a triggering seismic event. Any damage that may cause negative impacts to waters of the State must be reported immediately upon discovery to the Spill Hotline at 1-800-852-7550 and by sending an email to Rb2SpillReports@waterboards.ca.gov

32. Maintenance of Records: The Discharger shall retain records of all monitoring information including all calibration and maintenance records, all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this order. Records shall be maintained for a minimum of five years from the date of the sample, measurement, report, or application. This period may be extended during the course of any unresolved litigation regarding this discharge or when requested by the Executive Officer. Records of monitoring information shall include:

a. The date, exact place, and time of sampling or measurements;
b. The individuals who performed the sampling or measurements;
c. The date(s) analyses were performed;
d. The individuals who performed the analyses;
e. The analytical techniques or method used; and
f . The results of such analyses.

33. This Order supersedes and rescinds Order No. 00-043.

34. This Order is subject to Regional Water Board review and updating, as necessary, to comply with changing State or federal laws, regulations or policies, or guidelines; changes in the Regional Water Board's Basin Plan; or changes in discharge characteristics.

I, Bruce H. Wolfe, Executive Officer, do hereby certify that the foregoing is a full, complete, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on June 8, 2011.

_____
Bruce H. Wolfe
Executive Officer

Attachments:

Self-Monitoring and Reporting Program, Part A and B

Figure 1 - Location Map
Figure 2 - Regional Site Map with Geomorphic Boundaries
Figure 3 - Sector Boundaries
Figure 4 - Groundwater Protection System Location Map
Figure 5 - Plant 1 / Additives Plant Cap
Figure 6 - Pollard Sector
Figure 7 - Alkane Sector
Figure 8 - Landfarm/Landfill Sector
Figure 9 - Bayside Sector
Figure 10 - Effluent Sector
Figure 11 - Reclamation Sector
Figure 12 - North Yard Sector
Figure 13 - Groundwater Protection System

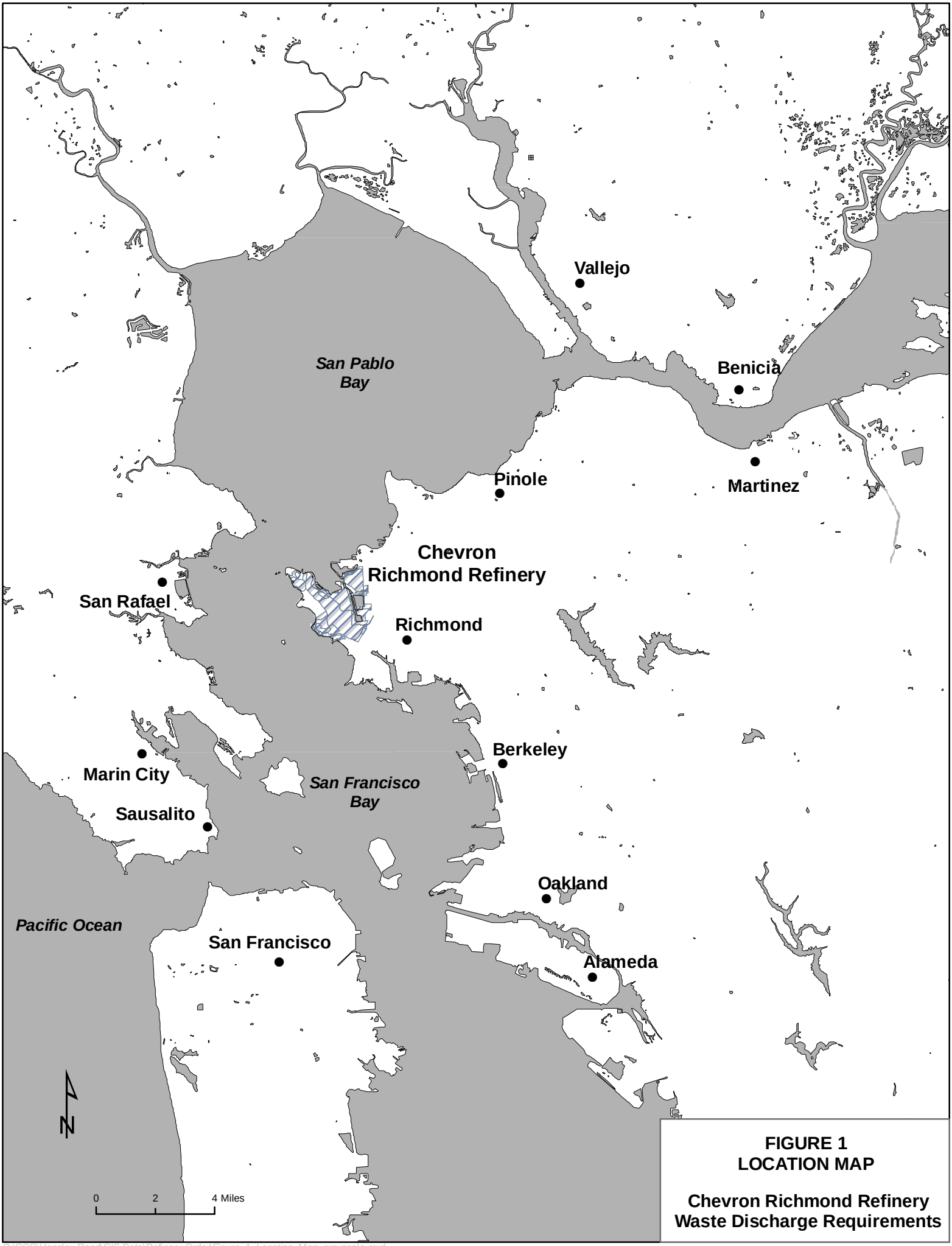


FIGURE 1
LOCATION MAP

Chevron Richmond Refinery
Waste Discharge Requirements

O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_1_Location_Map_grayscale.mxd

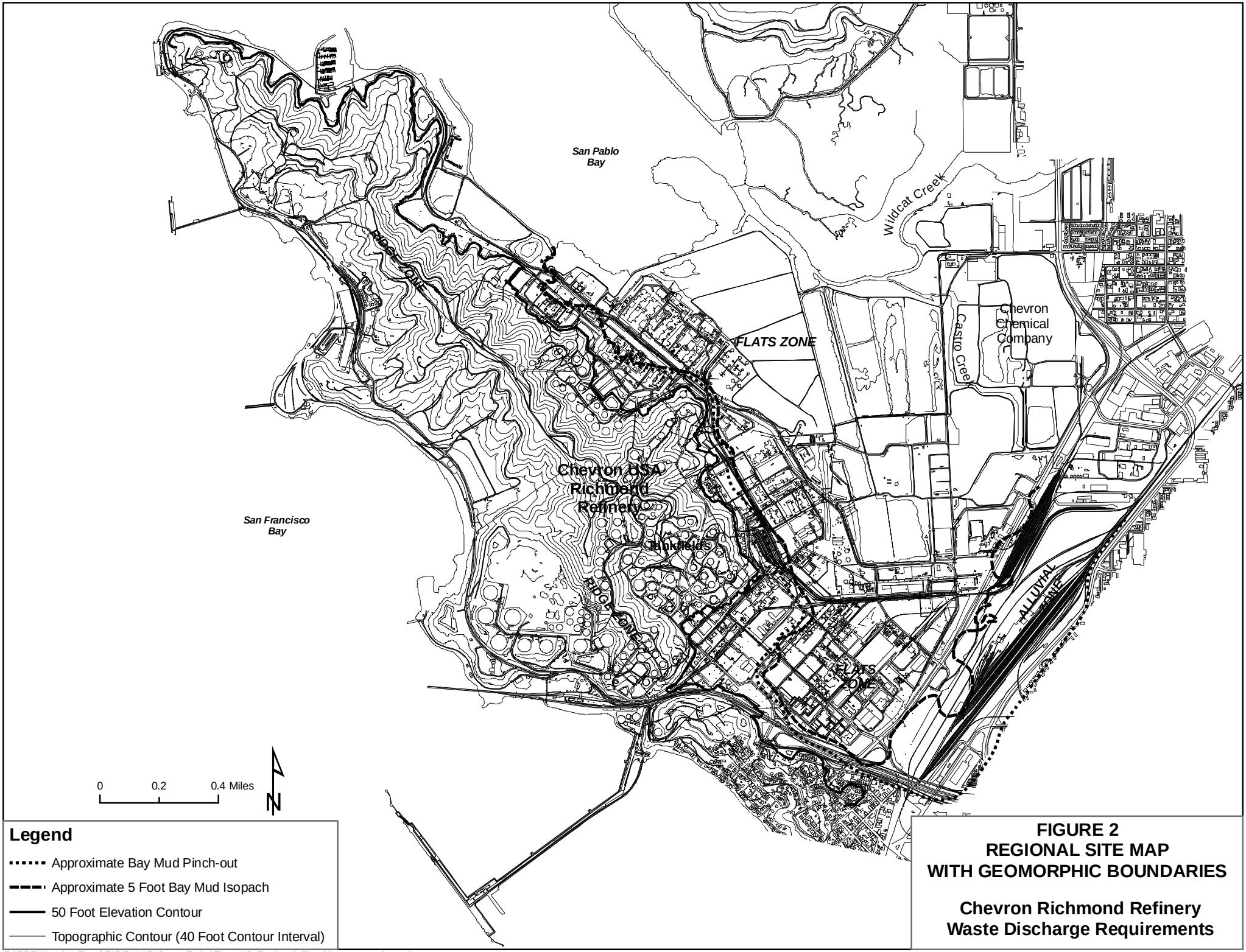


FIGURE 2
REGIONAL SITE MAP
WITH GEOMORPHIC BOUNDARIES

Chevron Richmond Refinery
Waste Discharge Requirements

O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_2_Regional_Site_Map_grayscale.mxd

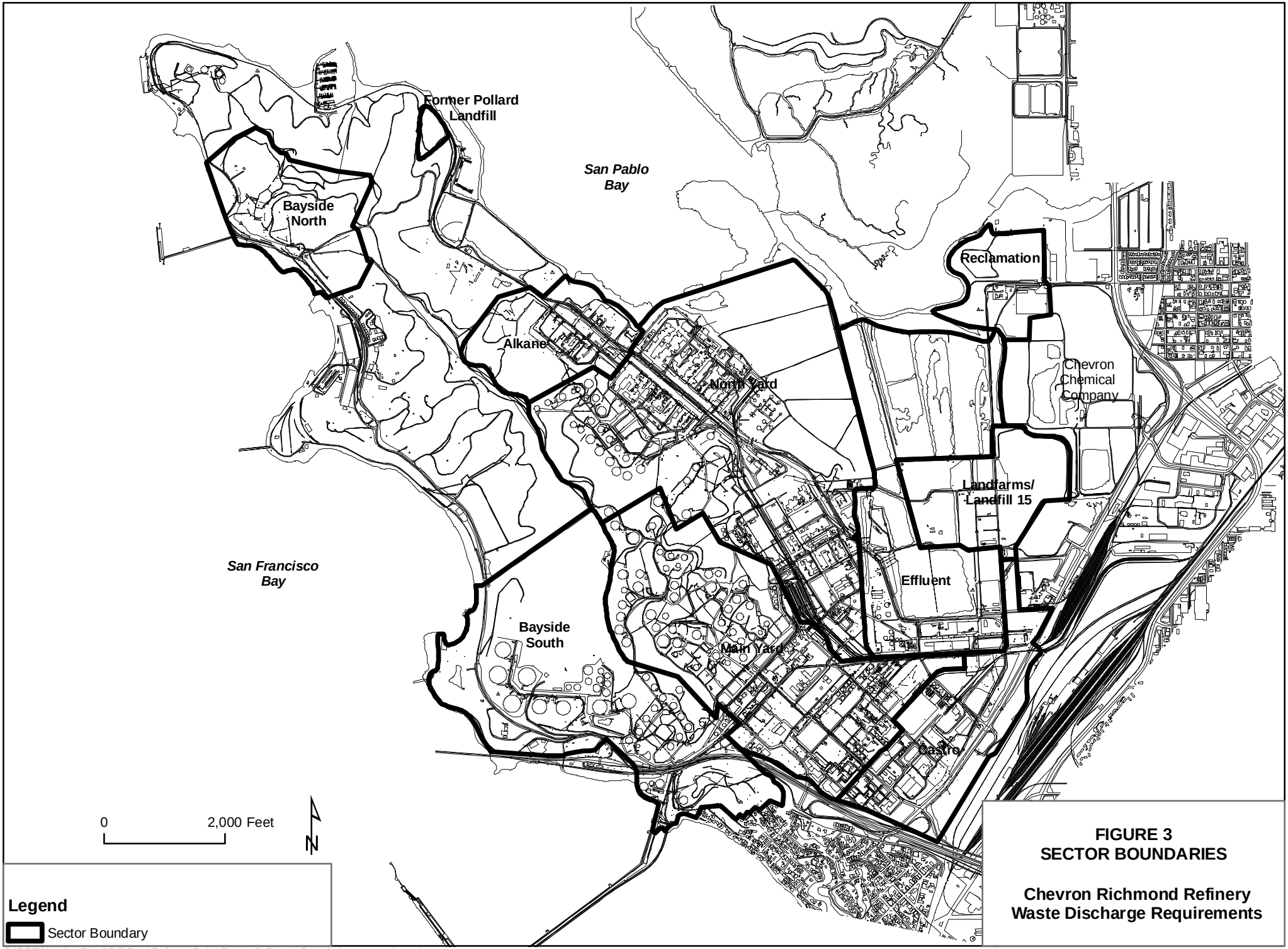
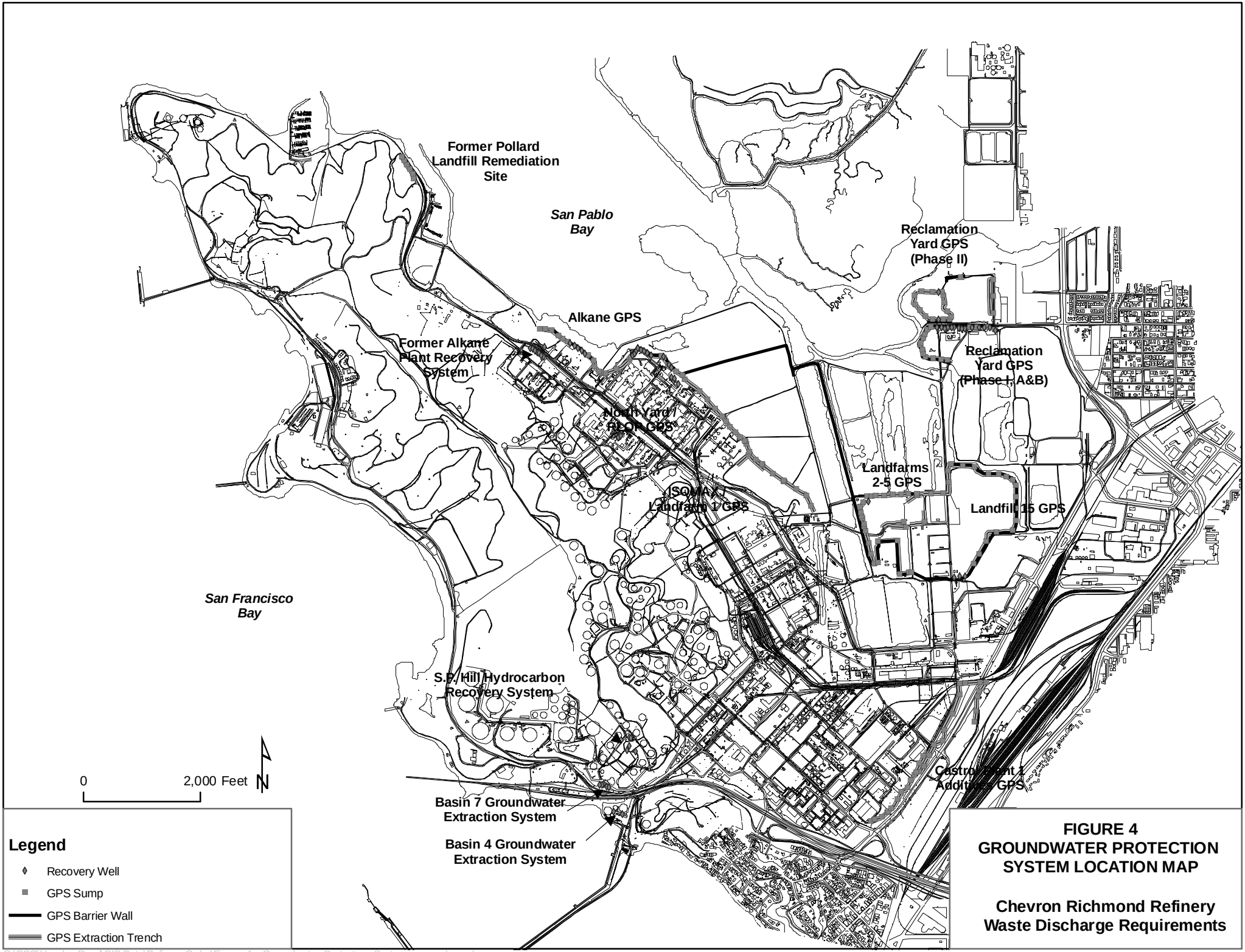
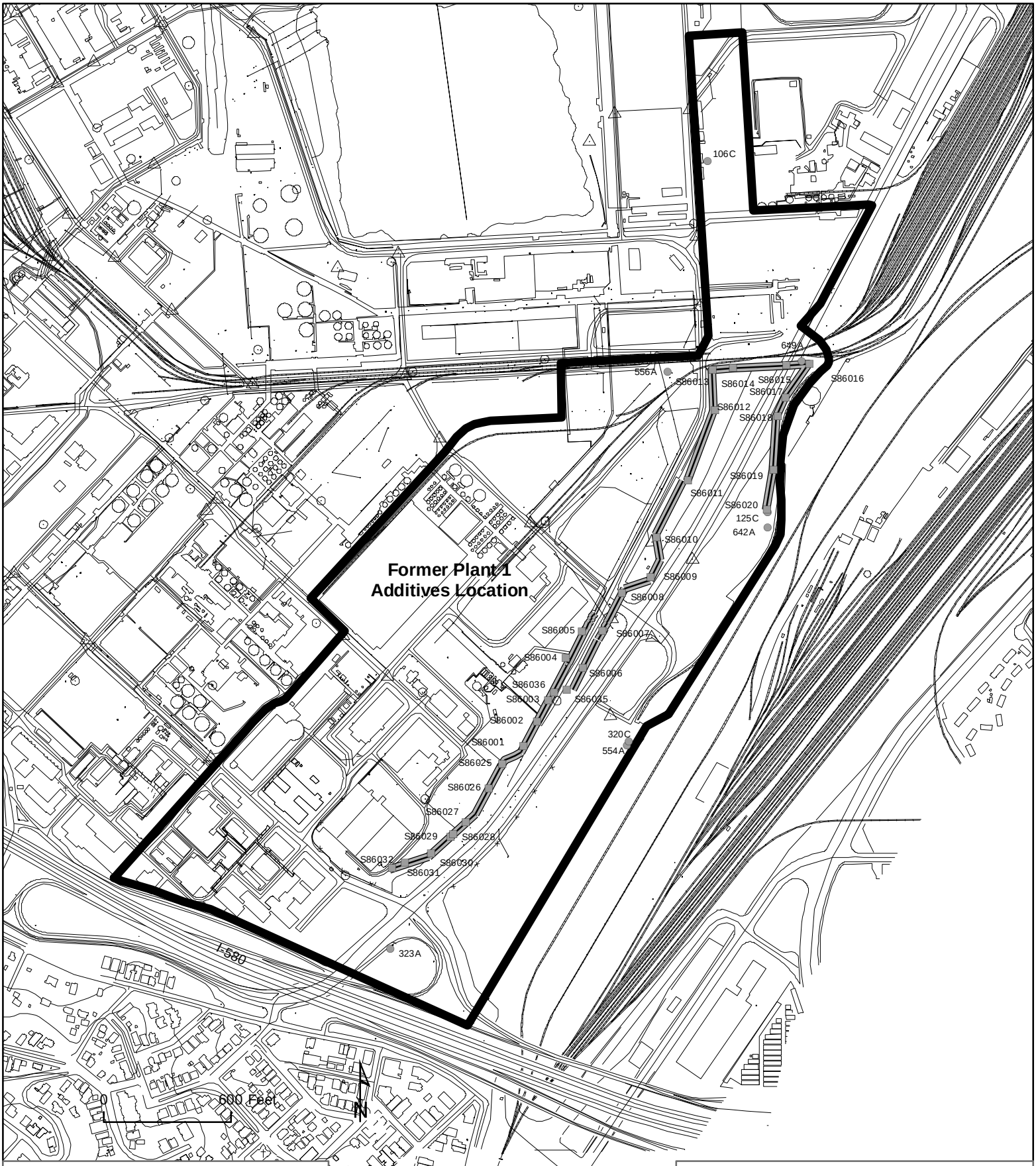


FIGURE 3
SECTOR BOUNDARIES

Chevron Richmond Refinery
Waste Discharge Requirements

O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_3_Sector_Boundaries_grayscale.mxd


Former Pollard Landfill Remediation Site
San Pablo Bay
Reclamation Yard GPS (Phase II)
Alkane GPS
Former Alkane Plant Recovery System
Reclamation Yard GPS (Phase I, A&B)
North Yard / FLOR GPS
Landfarms 2-5 GPS
(SOWA) / Landfarm 1 GPS
Landfill 15 GPS
San Francisco Bay
S.P. Hill Hydrocarbon Recovery System
Castro Point 1 Additional GPS
0
2,000 Feet
N
Basin 7 Groundwater Extraction System
Basin 4 Groundwater Extraction System
Legend
Recovery Well
GPS Sump
GPS Barrier Wall
GPS Extraction Trench
FIGURE 4
GROUNDWATER PROTECTION SYSTEM LOCATION MAP
Chevron Richmond Refinery
Waste Discharge Requirements
O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_4a_Groundwater_Protection_System_grayscale.mxd



Legend

- GPS Sump
- Monitoring Well
- GPS Extraction Trench
- Sector Boundary

FIGURE 5
PLANT 1 / ADDITIVES PLANT CAP

Chevron Richmond Refinery
Waste Discharge Requirements

O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_5_Plant_1_Additives_Plant_Cap_v2.mxd

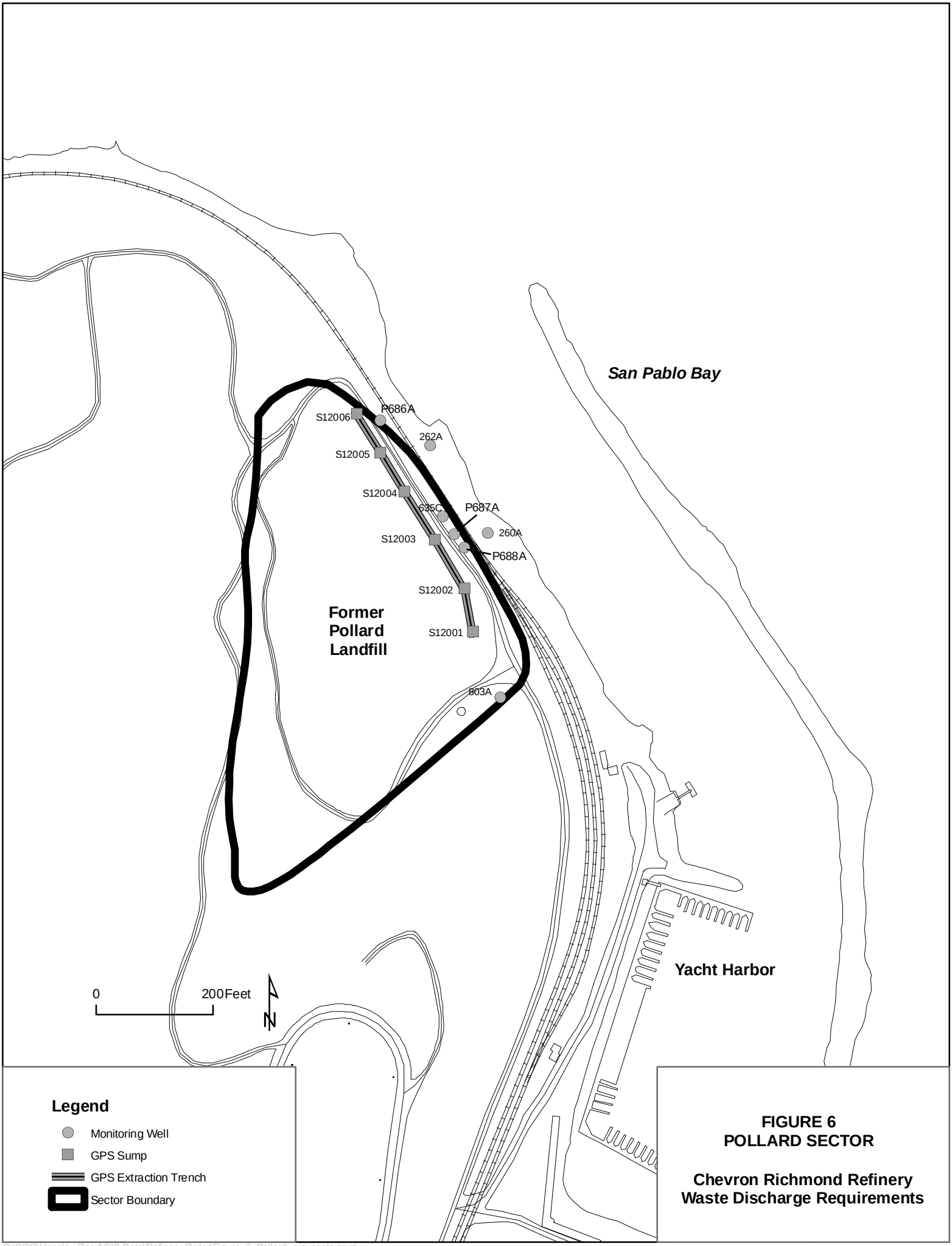


FIGURE 6
POLLARD SECTOR

Chevron Richmond Refinery
Waste Discharge Requirements

O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_6_Pollard_grayscale.mxd

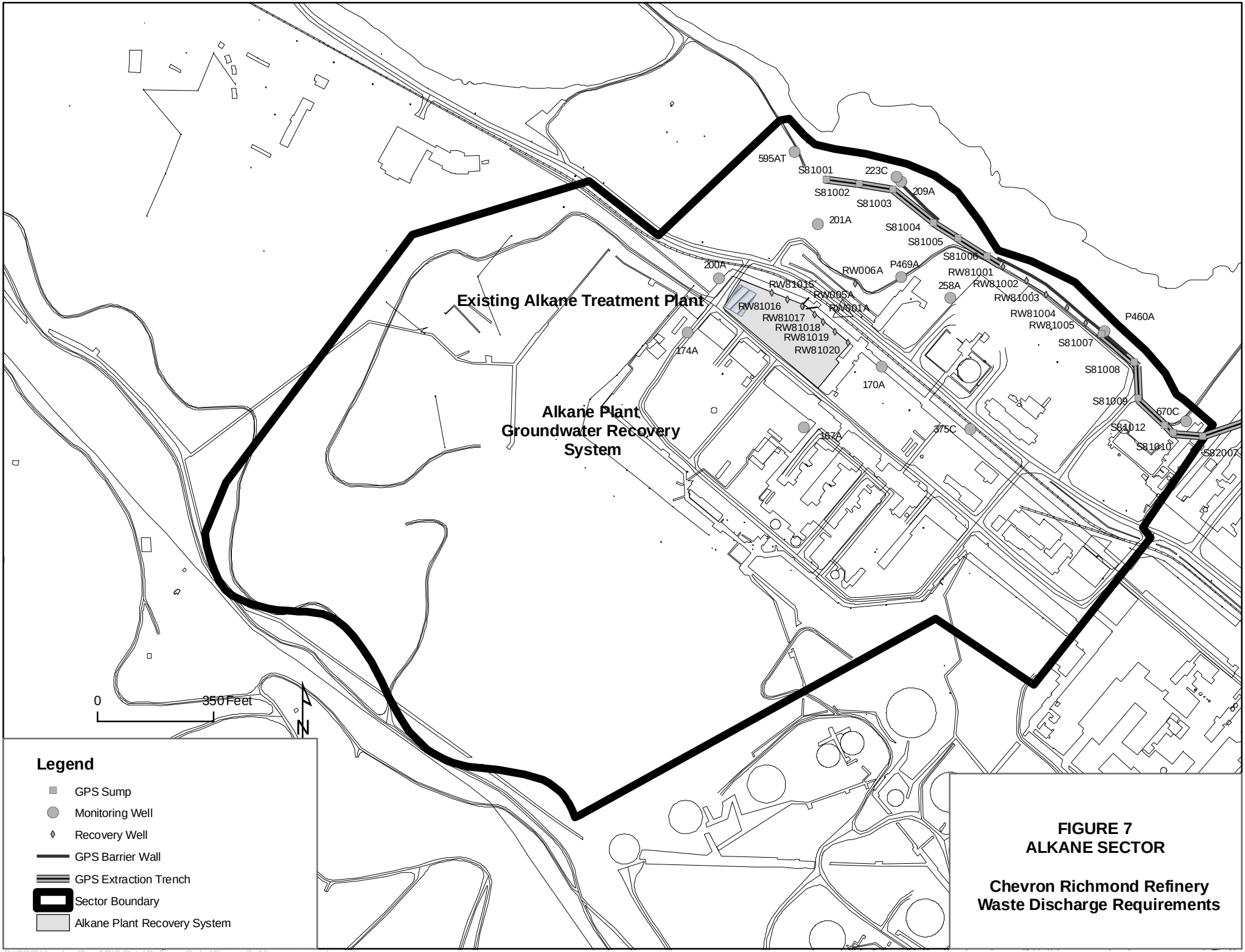


FIGURE 7
ALKANE SECTOR

Chevron Richmond Refinery
Waste Discharge Requirements

O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_7_Alkane_grayscale.mxd

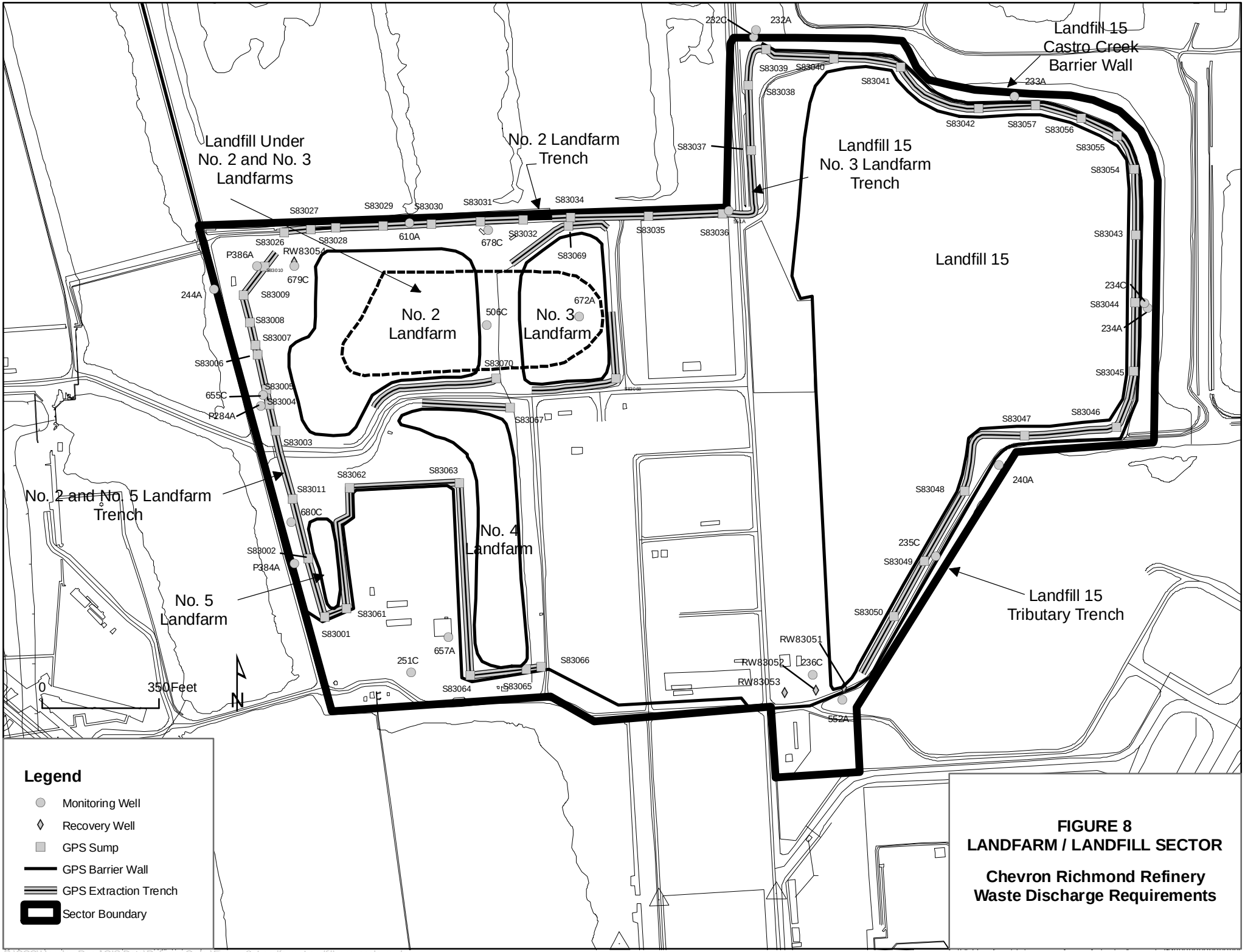


FIGURE 8
LANDFARM / LANDFILL SECTOR

Chevron Richmond Refinery
Waste Discharge Requirements

O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_8_Landfarm_Landfill_grayscale.mxd

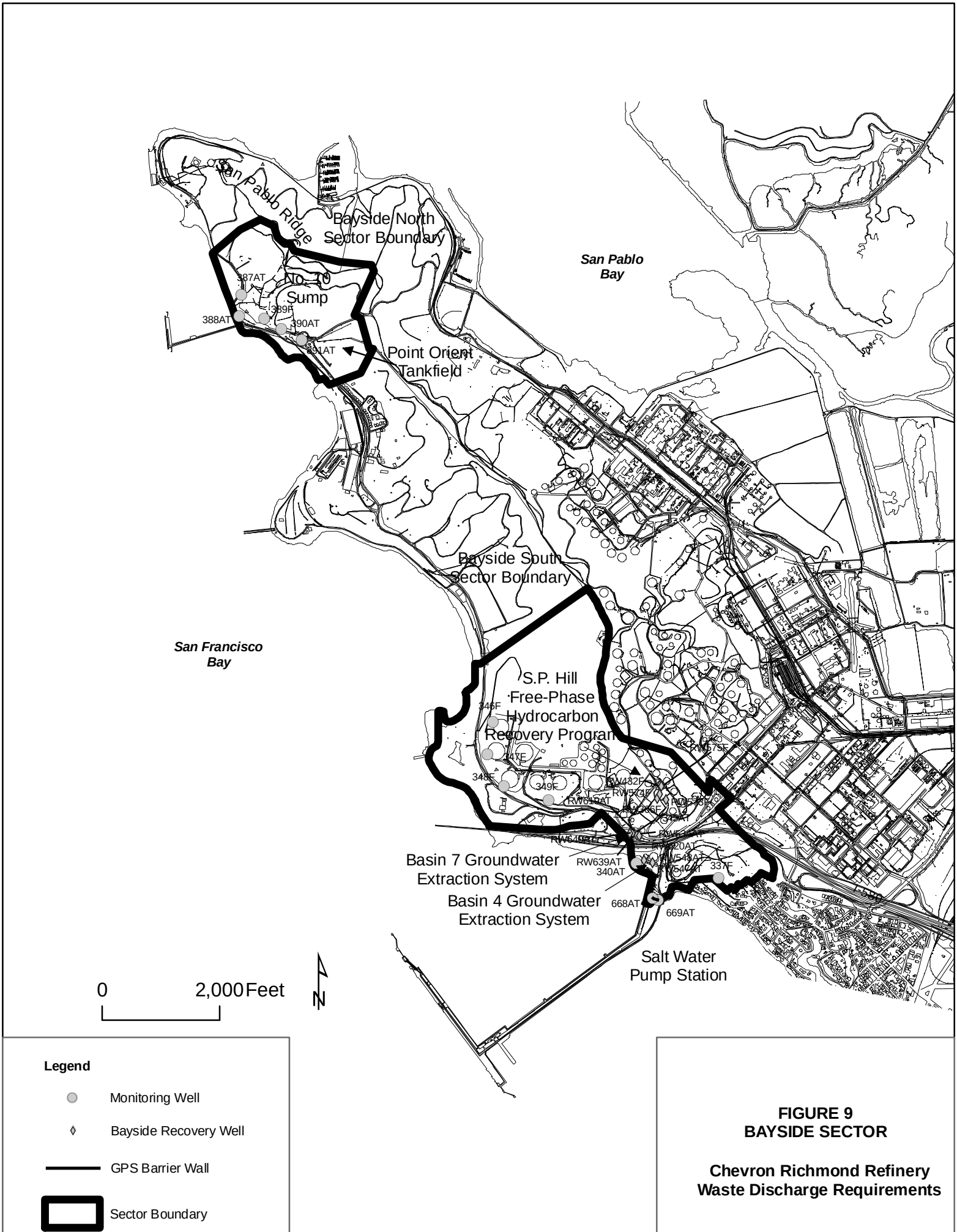
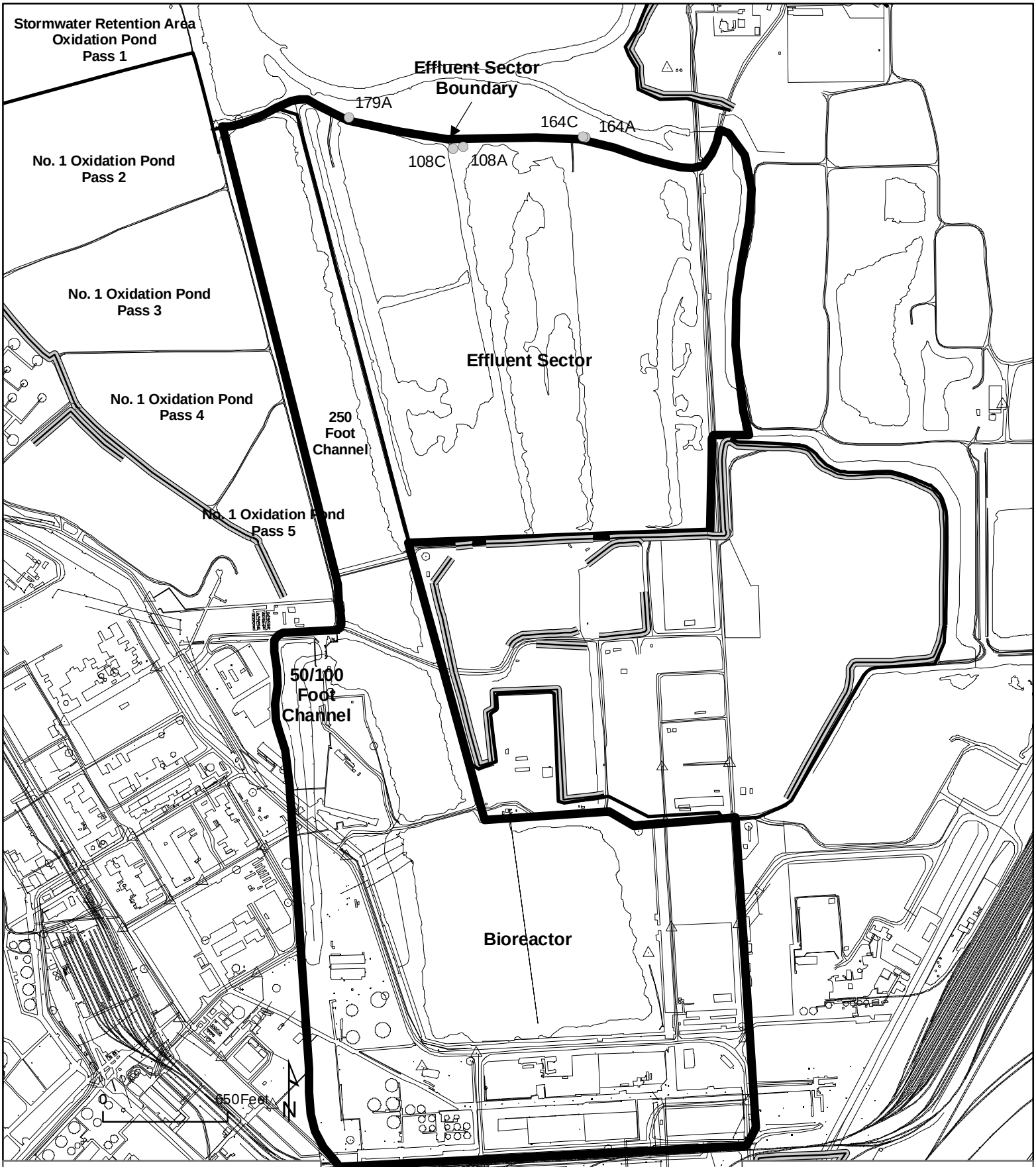


FIGURE 9
BAYSIDE SECTOR

Chevron Richmond Refinery
Waste Discharge Requirements

O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_9_Bayside_grayscale.mxd



Legend

- Monitoring Well
- GPS Barrier Wall
- GPS Extraction Trench
- Sector Boundary

FIGURE 10
EFFLUENT SECTOR

Chevron Richmond Refinery
Waste Discharge Requirements

O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_10_Effluent_Sector_Large_grayscale.mxd

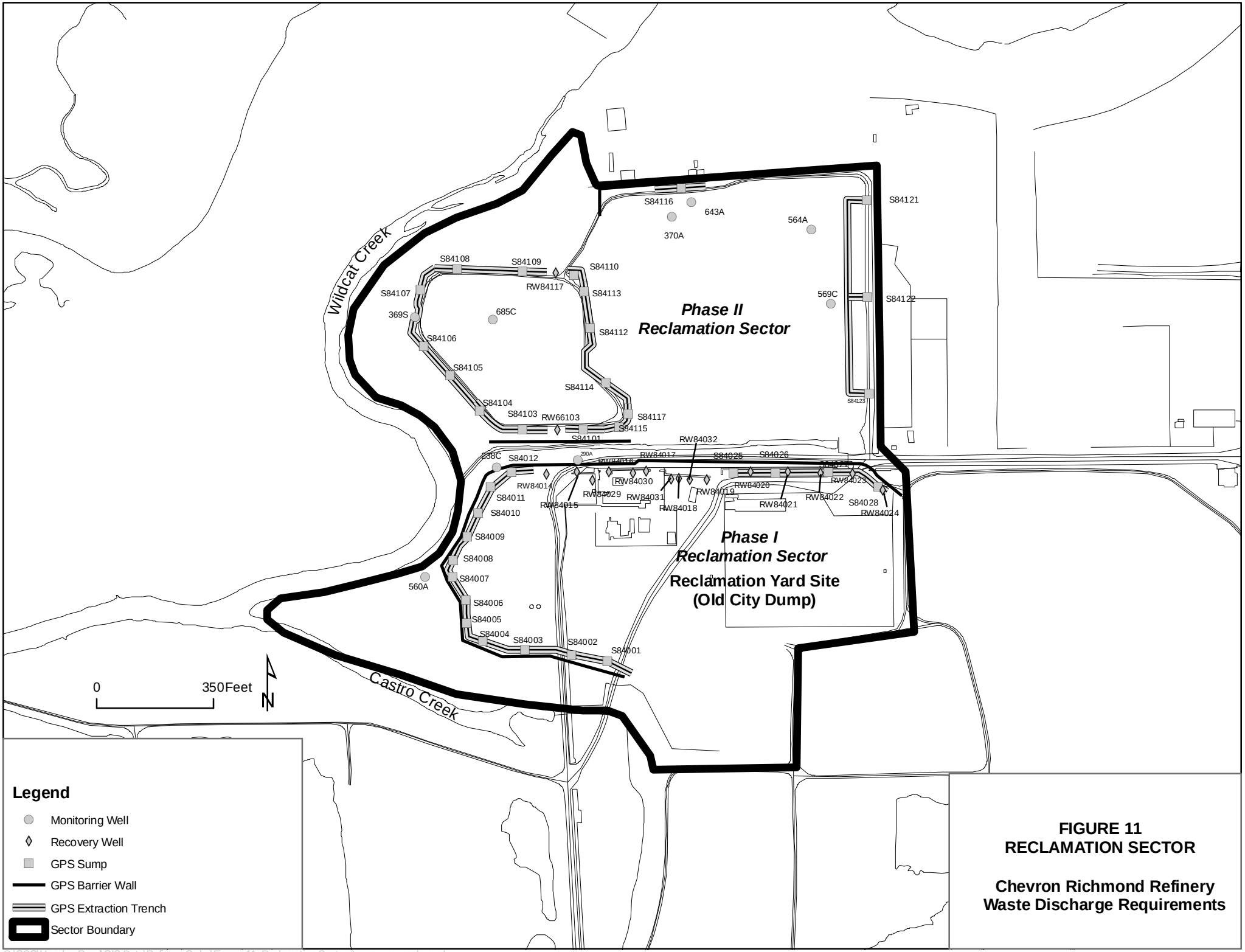


FIGURE 11
RECLAMATION SECTOR

Chevron Richmond Refinery
Waste Discharge Requirements

O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_11_Reclamation Sector_Large_grayscale.mxd

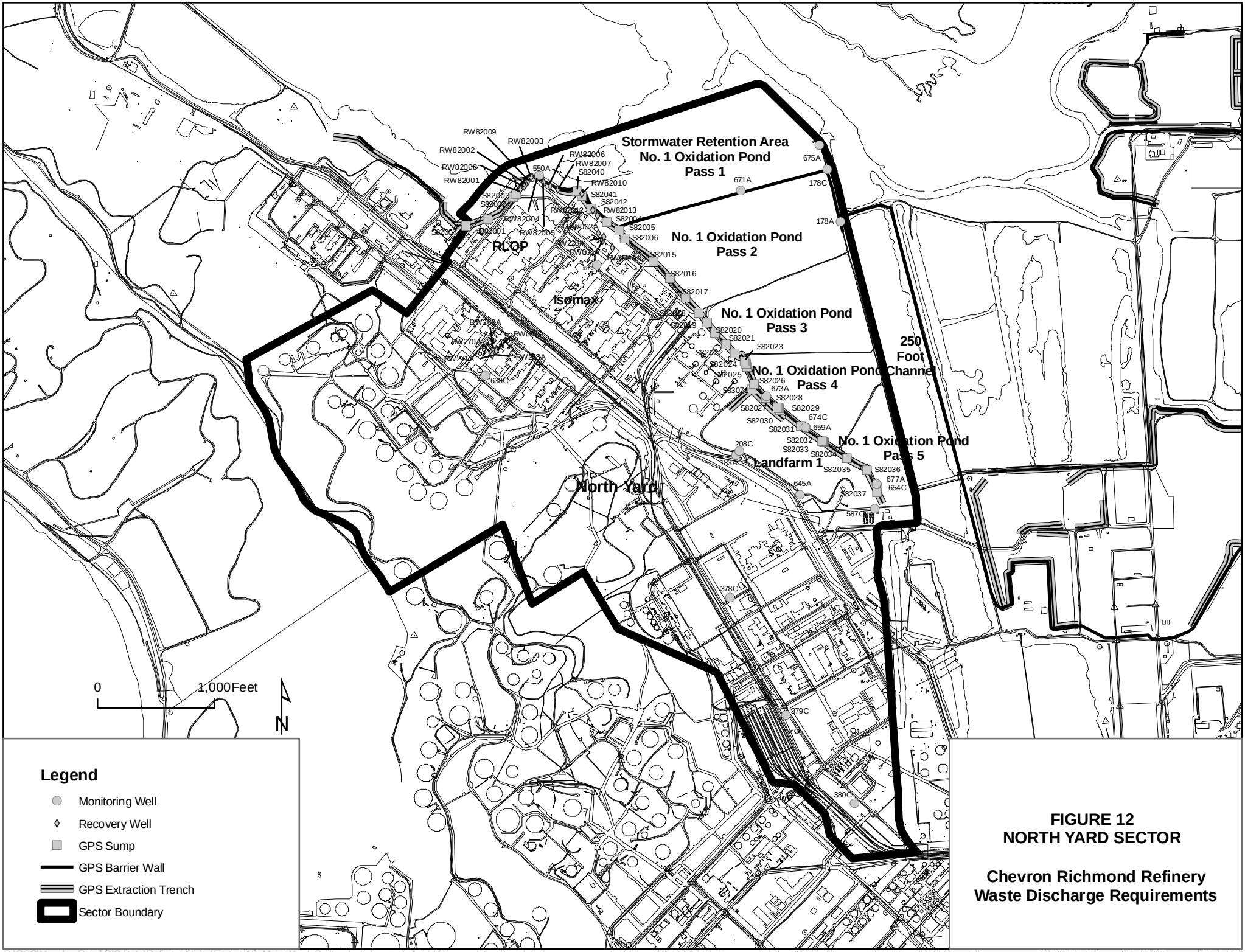
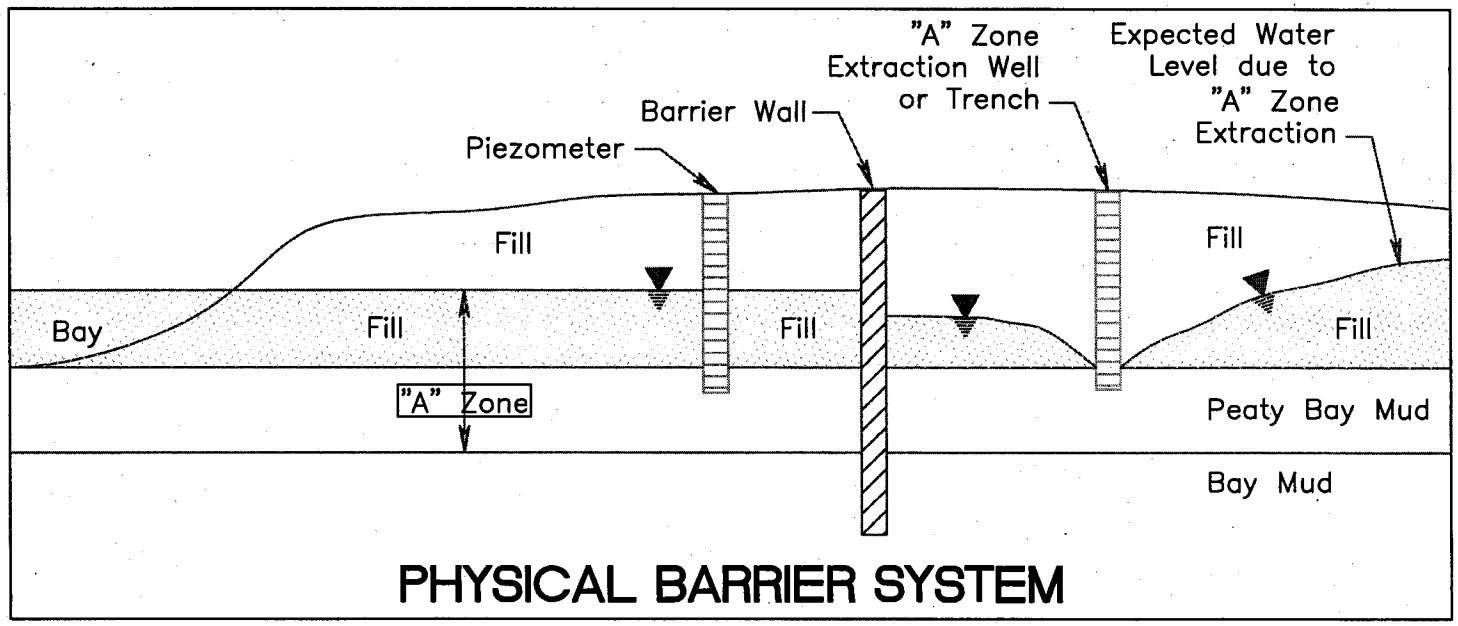
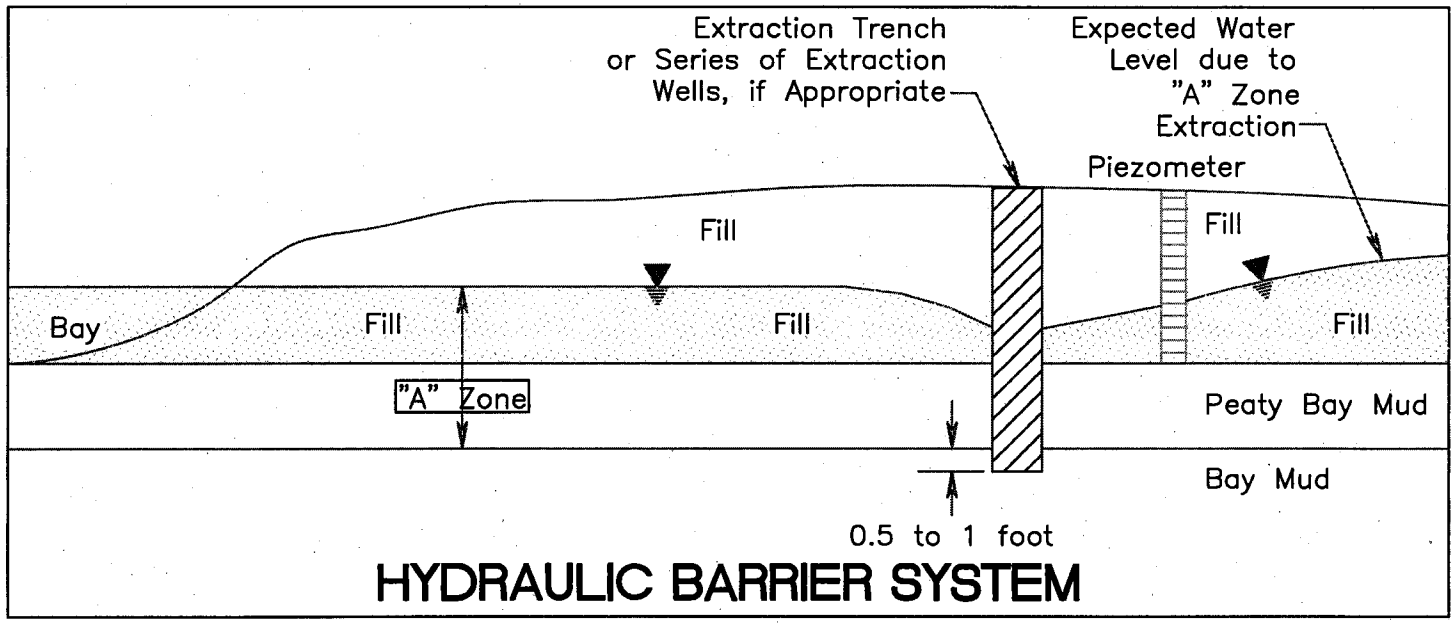


FIGURE 12
NORTH YARD SECTOR

Chevron Richmond Refinery
Waste Discharge Requirements

O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_12_Main_Yard_Sector_Large_grayscale.mxd





GROUNDWATER PROTECTION SYSTEM

Chevron Richmond Refinery
Waste Discharge Requirements

Figure 3

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

SELF-MONITORING AND REPORTING PROGRAM

FOR

CHEVRON PRODUCTS COMPANY
CHEVRON RICHMOND REFINERY
841 CHEVRON WAY
RICHMOND, CONTRA COSTA COUNTY

ORDER NO. R2-2011-0036

CONSISTS OF PART A AND PART B

PART A

This combined Self-Monitoring Program (SMP) specifies monitoring and reporting programs necessary to fulfill obligations under the Waste Discharge Requirements (WDRs) and Site Cleanup Requirements (SCRs), including:

a) General monitoring requirements for landfills and waste management units under the WDRs (Part A);
b) General monitoring requirements related to cleanup activities performed under the SCRs (Part A);
c) Self-monitoring report content and format (Part A);
d) Self-monitoring report submittal frequency and schedule (Part B);
e) Monitoring locations, parameters, analytes and frequency for programs under the WDRs (Part B); and
f) Monitoring locations, parameters, analytes and frequency for programs under the SCRs (Part B).

A. AUTHORITY AND PURPOSE

For discharges of waste to land, water quality monitoring is required pursuant to the California Code of Regulations (CCR), Division 2, Title 27, Subdivision 1, Chapter 3, Subchapter 3, sections 20380 through 20435. The principal purposes of an SMP include: 1) to document compliance with WDRs and prohibitions established by the Regional Water Board, 2) to facilitate self-policing by the discharger in the prevention and abatement of pollution arising from the waste discharge, 3) to develop or assist in the development of effluent standards of performance and toxicity standards, and 4) to assist the discharger in complying with the requirements of Title 27. Additionally, under California Water Code (CWC) Section 13304, Chevron is required to implement corrective actions and monitor the effectiveness of the implemented corrective actions under this combined SMP.

B. MONITORING REQUIREMENTS

Monitoring refers to the observation, inspection, measurement, and/or sampling of environmental media, waste management units (WMUs), containment and control facilities, and waste disposed in each WMU. The monitoring programs designed to evaluate the potential release of wastes from WMUs are included in the WDRs Monitoring Program described in this combined SMP. Monitoring programs designed to evaluate the effectiveness of corrective actions implemented under CWC Section 13304 are also described in the combined SMP. The following defines the types of monitoring that may be required.

Monitoring of Environmental Media

The Regional Water Board may require monitoring of groundwater, surface water, vadose zone, stormwater, leachate, and any other environmental media that may pose a threat to water quality or provide an indication of a water quality threat at the refinery.

Sample collection, storage, and analyses shall be performed according to the most recent version of U.S. EPA-approved methods or in accordance with Groundwater Monitoring Program Standard Operating Procedures (SOP) or subsequent revisions approved by Regional Water Board staff. Analytical testing of environmental media required by this SMP shall be performed by a

California State-approved laboratory for the required analyses. The director of the laboratory whose name appears on the certification shall be responsible for supervising all analytical work in his/her laboratory and shall have signing authority for all laboratory data reports or may designate signing of all such data included in reports submitted to the Regional Water Board.

All monitoring instruments and devices used to conduct monitoring in accordance with this SMP shall be maintained and calibrated as necessary to ensure their continued accuracy. All flow measurement devices shall be calibrated at least once every two years.

Receiving waters refer to any surface water which actually or potentially receives surface or groundwater that pass over, through, or under waste materials or impacted soils. In this case, the groundwater beneath and adjacent to the WMU areas and the surface runoff from the refinery site are considered receiving waters.

Standard Observations

Standard observations refer to observations within the limits of each WMU, at their perimeter, and of the receiving waters beyond their limits. Standard observations include:

1. Waste Management Units:
   a. Evidence of ponded water at any point on the WMU;
   b. Evidence of odors, including their presence or absence, characterization, source, and distance of travel from source; and
   c. Evidence of erosion and/or daylighted waste.

2. Perimeter of Waste Management Units:
   a. Evidence of liquid leaving or entering the WMU, estimated size of affected area and flow rate (show affected area on map);
   b. Evidence of odors, including their presence or absence, characterization, source, and distance of travel from source; and
   c. Evidence of erosion and/or daylighted waste.

3. Receiving Waters:
   a. Floating and suspended materials of waste origin, including their presence or absence, source, and size of affected area;
   b. Discoloration and turbidity: description of color, source, and size of affected area;
   c. Evidence of odors, presence or absence, characterization, source, and distance of travel form source;
   d. Evidence of beneficial use, such as presence of water associated with wildlife;
   e. Estimated flow rate; and
   f. Weather conditions, such as estimated wind direction and velocity, total precipitation.

Facilities Inspections

Facilities inspections refer to the inspection of all containment and control structures and devices associated with the environmental monitoring of the refinery. Containment and control facilities may include the following:

1. Intermediate and final covers; and
2. Storm-water management system elements such as perimeter drainage and diversion channels, ditches and downchutes, and detention and sedimentation ponds or collection tanks;

Quality Assurance/Quality Control (QA/QC) Sample Monitoring

Chevron shall collect duplicate, field blank, equipment blank (if appropriate) and trip blank samples for each monitoring event at the frequency specified in the latest version of the Groundwater Monitoring Program SOP.

C. REPORTING REQUIREMENTS

Reporting responsibilities of waste dischargers under WDRs and SCRs are specified in CWC sections 13225(a), 13267(b), 13383, and 13387(b) and this Regional Water Board's Resolution No.73-16 and Title 27. At a minimum, each Self-Monitoring Report (SMR) shall include the following information:

1. Transmittal Letter: A cover letter transmitting the essential points of the monitoring report shall be included with each monitoring report. The transmittal letter shall discuss any violations during the reporting period and actions taken or planned to correct the problem. The letter shall also certify the completion of all monitoring requirements. The letter shall be signed by the Discharger's principal executive officer or his/her duly authorized representative, and shall include a statement by the official, under penalty of perjury, that the report is true and correct to the best of the official's knowledge.

2. Graphic Presentation: The following maps, figures, and graphs (if applicable) shall be included in each SMR to visually present data collected pursuant to this SMP:
   a. Plan-view maps showing all monitoring and sampling locations, WMUs, containment and control structures, treatment facilities, surface water bodies, and site/property boundaries;
   b. Groundwater level/piezometric surface contour maps for each groundwater-bearing zone of interest showing inferred groundwater gradients and flow directions under/around each WMU, based upon the past and present water level elevations and pertinent visual observations; and
   c. Any other maps, figures, photographs, cross-sections, graphs, and charts necessary to visually demonstrate the appropriateness and effectiveness of sampling, monitoring, characterization, investigation, or remediation activities relative to the goals of this SMP.

3. Tabular Presentation: The following data (if applicable) shall be presented in tabular form and included in each SMR to show a chronological history and allow quick and easy reference:
   a. Well designation;
   b. Well location coordinates (latitude and longitude);
   c. Well construction (including top of well casing elevation, total well depth, screen interval depth below ground surface, and screen interval elevation);
   d. Groundwater depths;
   e. Groundwater elevations;
   f. Current analytical results (including analytical method and detection limits for each constituent);

g. Historical analytical results (including at least the past five years in the annual report unless otherwise requested); and
h. Measurement dates.

4. Compliance Evaluation Summary and Discussion:

a. A summary and certification of completion of all environmental media monitoring, standard observations, and facilities inspections;
b. The quantity and types of wastes captured by the GPS and hydrocarbon recovery program, and the location these wastes were disposed of during the reporting period, if applicable;
c. A description of the waste stream, if applicable;
d. The signature of the laboratory director or his/her designee in laboratory data deliverables indicating that he/she has supervised all analytical work in his/her laboratory; and
e. A discussion of the field and laboratory results that includes the following information:

(1) Data interpretations (including of trends, especially in the context of potential correlation to the modified waste acceptance criteria);
(2) Conclusions;
(3) Recommendations;
(4) Newly implemented or planned investigations and remedial measures;
(5) Data anomalies;
(6) Variations from protocols;
(7) Condition of wells; and
(8) Effectiveness of leachate monitoring and control facilities.

5. Appendices: The following information shall be provided as appendices in electronic format only unless requested otherwise by Regional Water Board staff and unless the information is already contained in an SAP or SOP approved by Regional Water Board staff:

a. New boring and well logs;
b. Method and time of water level measurements;
c. Purging methods and results including the type of pump used, pump placement in the well, pumping rate, equipment and methods used to monitor field pH, temperature, and electrical conductivity, calibration of the field equipment, pH temperature, conductivity, and turbidity measurements, and method of disposing of the purge water;
d. Sampling procedures, field, equipment, and travel blanks, number and description of duplicate samples, type of sample containers and preservatives used, the date and time of sampling, the name of the person actually taking the samples, and any other relevant observations; and
e. Documentation of laboratory results, analytical methods, detection limits and reporting limits, and Quality Assurance/Quality Control (QA/QC) procedures for the required sampling.

D. ANNUAL REPORTING

The Discharger shall submit an annual self-monitoring report to the Regional Water Board covering the previous calendar year. The annual report must summarize all monitoring, investigation, and remedial activities that have occurred in the previous year. The annual report shall include the following information for each monitoring event during the year required pursuant to this SMP, in addition to the transmittal letter and appendices described in Sections C.1, C.2, and C.3 of this SMP:

1. **Graphic Presentation**
   Include site maps (plot plans) for each aquifer or water-bearing zone monitored that are drawn to a scale that remains constant from reporting period to reporting period. Line or bar graphs are helpful to illustrate variations in groundwater elevations, phase-separated product thickness, and dissolved chemical concentrations with time. These maps and graphs shall include the following information:

   a. Known or probable contaminant sources;
   b. Well locations;
   c. Groundwater elevation contours;
   d. Inferred groundwater flow direction(s);
   e. Identify wells containing phase-separated product;
   f. Extent of dissolved chemical constituents presented in map layout (e.g., isoconcentration maps, chemical box data maps, etc.); and
   g. Appropriate analytical results.

   Geologic cross sections are required if new data is available and/or the previous interpretation of subsurface conditions has changed. When required, geologic cross sections shall include the following:

      i. Vertical and lateral extent of contamination;
      ii. Contaminant sources;
      iii. Geologic structures;
      iv. Soil lithology;
      v. Water table/piezometric surfaces;
      vi. Sample locations;
      vii. Sample analytical results; and
      viii. Subsurface utilities and any other potential natural or manmade conduits for contaminant migration.

2. **Tabular Presentation**
   Present all of the following data in one or more tables to show a chronological history and allow quick and easy reference. The table(s) shall include the following information:

   a. Well designations;
   b. Well location coordinates (latitude and longitude);
   c. Well construction (including top of well casing elevation, total well depth, screen interval depth below ground surface, and screen interval elevation);
   d. Groundwater depths;
   e. Groundwater elevations;
   f. Horizontal groundwater gradients;
   g. Vertical groundwater gradients (including comparison wells from different zones);
   h. Phase-separated product elevations;
   i. Phase-separated product thickness;
   j. Current analytical results (including analytical method and detection limits for each constituent);
   k. Historical analytical results for the most recent four sampling events;
   l. Measurement dates;
   m. Groundwater extraction, including:

i. Average daily extraction rate;
ii. Total volume extracted for monitoring period;
iii. Annual cumulative total volume extracted; and

n. Estimate of contaminant volume extracted (reported in gallons) including:

i. Average daily removal rate;
ii. Total volume removed for monitoring period;
iii. Annual cumulative total volume removed.

3. **Discussion**
Provide a discussion of the field and laboratory results that includes the following information:

a. Data Interpretations;
b. Conclusions;
c. Recommendations;
d. Newly implemented or planned investigations and remedial measures;
e. Data anomalies;
f. Variations from protocols; and
g. Conditions of wells.

E. CONTINGENGY REPORTING

1. The Discharger shall report any seepage from the surface of any WMU or discharge prohibited in the WDRs or SCRs immediately after it is discovered to the Regional Water Board by calling the Spill Hotline at 1-800-852-7550 and by sending an email to Rb2SpillReports@waterboards.ca.gov. The Discharger shall submit a written report with the Regional Water Board within five days of discovery of any discharge. The written report shall contain, at a minimum, the following information:

a. A map showing the location(s) of discharge;
b. Approximate flow rate;
c. A description of the nature of the discharge; and
d. Corrective measures underway or proposed.

2. The Discharger shall submit a written report to the Regional Water Board within seven working days of determining that a statistically significant difference occurred in the sample result compared against the historical dataset and above an approved WQPS in a perimeter segment-monitoring well. In addition, evaluation of GPS performance will be reviewed to examine the effectiveness of hydraulic control.

a. Chevron shall immediately re-sample at the compliance point where the exceedence was observed, evaluate the result against the historical dataset and re-analyze if results are not consistent with historical trends.

b. If re-sampling and analysis confirm the exceedence through statistical analysis, Chevron shall document this in the text of the next Annual Report and notify the Regional Water Board in writing within 21 days of re-sampling. In this letter, Chevron shall evaluate whether any re-sampling or additional corrective measures need to be implemented.

F. ELECTRONIC REPORTING

1. **Geotracker Requirements**
The State Water Board has adopted regulations requiring electronic report and data submittal to Geotracker. The text of the regulations can be found at the following URL:
http://www.waterboards.ca.gov/water_issues/programs/ust/electronic_submittal/index.shtml

Parties responsible for cleanup of pollution at sites overseen by the Regional Water Board's Land Disposal Programs are required to submit over the internet, the following information electronically to Geotracker:

a. Groundwater analytical data;
b. Surveyed locations of monitoring wells;
c. Boring logs describing monitoring well construction; and
d. Portable data format (PDF) copies of all reports (the document in its entirety [signature pages, text, figures, tables, etc.] must be saved as a single PDF file).

Note that the Discharger is still responsible for submitting one hard copy of all reports pursuant to this Order. The Regional Water Board may require direct submittal of electronic reports and correspondence in addition to the State Water Board's Geotracker requirements.

2. **Data Tables**
Upon request, monitoring results shall also be provided electronically in Microsoft Excel@ or similar spreadsheet format to provide an easy to review chronological summary of site data, and to facilitate data computations and/or plotting that Water Board staff may undertake during the review process. Data tables submitted in electronic spreadsheet format will not be included in the case file for public review and should therefore be submitted on CD or diskette and included with the print report.
Electronic tables shall include the following information:

a. Well designations;
b. Well location coordinates (latitude and longitude);
c. Well construction (including top of well casing elevation, total well depth, screen interval depth below ground surface, and screen interval elevation);
d. Groundwater depths and elevations (water levels);
e. Phase-separated product thicknesses and elevations;
f. Current analytical results by constituent of concern (including detection limits for each constituent);
g. Historical analytical results (including the past four sampling events); and
h. Measurement dates.

G. MAINTENANCE OF WRITTEN RECORDS

The Discharger shall maintain information required pursuant to this SMP for a minimum of five years. The five-year period of retention shall be extended during the course of any unresolved litigation regarding this discharge or when requested by the Regional Water Board.

PART B: MONITORING AND OBSERVATION SCHEDULE

1. DESCRIPTION OF OBSERVATION STATIONS AND SCHEDULE OF OBSERVATIONS

A. GROUNDWATER MONITORING:

Semi-Annual Reports: Due August 31 and March 1 of each year
Annual Report: Due March 1 of each year

Groundwater shall be sampled and analyzed as detailed in Tables 2 and 4. Monitoring well locations are listed in Tables 1 and 3. Groundwater analyses shall include the following field measurements: pH, temperature, specific conductance, water level, volume purged, number of casings volumes purged, and whether the well went dry during sampling (including measures taken to ensure accuracy of analyses given this condition). Groundwater monitoring wells installed in the future will be sampled and analyzed as detailed in Tables 2 and 4 and on a quarterly basis until a statistically significant dataset is established.

B. FACILITIES MONITORING - **Observe quarterly, report semi-annually**

Semi-Annual Report: Due August 31 and March 1 of each year
Annual Report: Due March 1 of each year

The Discharger shall inspect all facilities to ensure proper and safe operation and report semi-annually. The facilities to be monitored shall include, but not be limited to:

1. Waste Containment systems;
2. Waste treatment systems;
3. Surface water retention basins;
4. Leak detection systems (where applicable); and
5. Leachate/groundwater management facilities and secondary containment where applicable.

2. GPS PERFORMANCE MONITORING

Chevron shall measure the water level in each GPS corrective action monitoring well and in a sufficient number of wells or piezometers both upgadient and downgradient of the GPS to demonstrate continuous maintenance of a hydraulic depression in the GPS trenches (inward hydraulic gradient). To demonstrate the effectiveness of the GPS, Chevron shall include the following for each refinery sector in the semi-annual SMRs:

a. contour maps of 1st and 3rd quarter GPS groundwater elevation data;
b. hydrographs showing water level data (measured at least once per week) at each operating extraction sump or recovery well;
c. a narrative summary of the GPS performance during the reporting period; and,

d. an estimate of the volume of groundwater extracted during the reporting period.

3. ON-SITE OBSERVATIONS/POST-CLOSURE MAINTENANCE AND MONITORING

Closed WMUs (Plant l/Additives Plant, Landfill 15, Landfarms 1-5, the Hydropits, Parr-Richmond Landfill and the Gertrude Street Site) shall be inspected annually by a registered California engineer or geologist prior to the onset of the rainy season. These annual inspections shall include identification of areas of the final covers where the soil has become eroded, attacked by rodents, or otherwise damaged, or where the paved areas have become damaged. Chevron shall perform appropriate repairs for these areas prior to the rainy season. In addition, Chevron shall monitor runoff/run-on control facilities for their effectiveness and overall condition as needed according to weather conditions during the winter months (November through April) and as prescribed in the approved post-closure maintenance/monitoring plan for each individual WMU. Chevron shall maintain records of all inspections and repairs and summarize in each semi-annual monitoring report any repairs made during the corresponding reporting period.

4. ALKANE PLANT PLUME REMEDIATION MONITORING

Chevron shall continue to monitor the Alkane Plant Plume remediation effort in accordance with *the Revised Alkane Plant Plume Remediation Goals Plan* (URS, 2001). The monitoring components of this plan include measuring potentiometric water levels, liquid hydrocarbon thickness, and benzene and fluoride concentrations. Benzene and fluoride concentrations will continue to be measured annually in samples collected from 6 wells (listed in Table 1), located around the perimeter of the plume to verify containment of the plume.

5. FREE-PHASE LIQUID HYDROCARBON (FPLH) RECOVERY SUMMARY

Chevron shall include a map in each semi-annual SMR that shows the locations of all wells within the refinery that contain FPLH. The measured thickness of the FPLH in each well should be indicated on the map next to the well. Recovery of FLPH will be performed in accordance with the procedures described in the *Free-Phase Liquid Petroleum Hydrocarbon Recovery Evaluation Plan, Chevron Richmond Refinery* (URS, 2000). In addition, the SMR shall include a description of FPLH recovery method used, recovery volume data for the reporting period and cumulative recovery data for each active recovery well or system.

6. CHEMICAL CONSTITUENT MONITORING

a. Refinery-Wide Groundwater Monitoring Program: Chevron shall sample the Refinery-Wide Corrective Action Groundwater Monitoring Program compliance monitoring points listed in Table 1 for the analytical parameters and at the frequencies listed in Table 2. All monitoring activities, including analytical and QA/QC procedures will be conducted in accordance with the most recent version of Chevron's Groundwater Monitoring Program Standard Operating Procedure.

b. Landfarm Post-Closure Monitoring Program: Chevron shall sample the Landfarms Post-Closure Monitoring Program monitoring points listed in Table 3 for the analytical parameters and at the frequencies listed in Table 4. All monitoring activities, including analytical and QA/QC procedures will be conducted in accordance with the most recent version of Chevron's Groundwater Monitoring Program Standard Operating Procedure.

Monitoring events for constituents of concern and Appendix IX analyses shall alternate between periods of highest and lowest groundwater levels.

c. Chevron shall sample new wells installed to monitor Landfarms 1 through 5 for COCs and MPs listed in Table 4 over eight consecutive quarters. Within the first year after installation, Chevron shall analyze new wells for the Appendix IX constituents listed in Table 4. Chevron shall add any new compounds detected in new wells to the list of COCs in Table 4.

d. Chevron shall sample the monitoring points listed in Table 3 regardless of the presence of nonaqueous phase liquid as follows:

   i. For monitoring points with persistent nonaqueous phase liquid (e.g., more than two consecutive quarters), Chevron shall collect samples every other year for COCs and Appendix IX (if well is POC). For monitoring points with intermittent nonaqueous phase liquid (e.g., not detected during consecutive quarters), Chevron shall collect samples semi-annually.

   ii. Chevron shall obtain samples for dissolved phase analysis after purging nonaqueous phase liquid from the well, by low-flow sampling, or by another appropriate method.

   iii. Chevron shall follow the most recent version of the Chevron Groundwater Monitoring Program Standard Operating Procedure.

e. Chevron shall monitor “A” Zone monitoring points in Table 3 under a corrective action monitoring program (22 CCR 66264.100).

f. Chevron shall monitor “C” Zone monitoring points in Table 3 under a detection monitoring program (22 CCR 66264.98).

Attachments:

Table 1:	List of Monitoring Wells by Sector, Refinery-Wide Groundwater Monitoring Program
Table 2:	Maximum Allowable Concentration Limits for Constituents of Concern and Monitoring Parameters for the Refinery-Wide Groundwater Monitoring Program
Table 3:	Landfarm Area Monitoring Well Network
Table 4:	Landfarm Post-Closure Monitoring Program, Monitoring Parameters, Constituents of Concern and MACLs

Table 1: List of Monitoring Wells by Sector
Refinery-Wide Groundwater Monitoring Program
Chevron Richmond Refinery

Alkane Sector	Castro and Plant 1/Add. Sector	Landfarms /Landfill 15 Sector	North Yard Sector	Reclamation Yard Sector	Pollard Sector	Effluent Sector	Bayside North	Bayside South	Interior "C" Zone
209A	323A	232A	178A	290A	260A	108A	387AT	346F	208C
P460A	642A	233A	675A	643A	262A	164A	388AT	347F	638C
595AT	554A	234A	550A	370A	803A	179A	389F	348F	378C
223C	556A	240A	377C	560A	635C	108C	390AT	349F	379C
375C	106C	244A	178C	685C		164C	391AT	351CT	380C
670C	125C		671A	238C				345AT	138C
167A*	320C	551A		369S				340AT	382C
170A*	649A	552A		564A				337F	
174A*		232C		569C				RW619AT#	
200A*		234C						RW534AT#	
201A*		235C							
258A*		236C							

Notes:
* Wells associated with Alkane Plant Plume Remediation Monitoring
# Wells with Remediation Monitoring Plan, S.P. Hill Tankfield

Table 2: Maximum Allowable Concentration Levels (MACLS) for Constituents of Concern and Monitoring Parameters for the Chevron Refinery -Wide Groundwater Monitoring Program

Constituents of concern	MACL (µg/l) Unless otherwise noted		Landfarms/landfills Sector	Castro Sector	North Yard Sector	Bayside Sector- North	Bayside Sector- south	Alkane Sector	Effluent Sector	Reclamation Sector	Pollard Sector	Interior "C" zone
TPH-Gas	1200	*	S	S	S	S	S	S	S	S	S	S
TPH- Diesel	640	*	S	S	S	S	S	S	S	S		S
Benzene	46	*	S	S	S	S	S	S	S	S	B	S
MTBE	1800	*	S	S	S	S	S	S	S	S	B	S
Acenaphthene	40	*	B	B	B	B	B	B	B	B	B	
Acenaphthylene	307	*	B	B	B	B	B	B	B	B	B	
Anthracene	21	*	B	B	B	B	B	B	B	B	B	
Benzo(a)pyrene	0.049	*	B	B	B	B	B	B	B	B	B	
Benzo(b)fluoranthene	0.049	*	B	B	B	B	B	B	B	B	B	
Benzo(g,h,i)perylene		*	B	B	B	B	B	B	B	B	B	
Benzo(k)fluoranthene	0.049	*	B	B	B	B	B	B	B	B	B	
Chrysene	0.049	*	B	B	B	B	B	B	B	B	B	
Dibenzo(a,h)anthracene	0.049	*	B	B	B	B	B	B	B	B	B	
Fluoranthene	7.1	*	B	B	B	B	B	B	B	B	B	
Fluorene	39	*	B	B	B	B	B	B	B	B	B	
Indeno(1,2,3-cd)pyrene	0.049	*	B	B	B	B	B	B	B	B	B	
Naphthalene	194	*	B	B	B	B	B	B	B	B	B	
Phenanthrene	19	*	B	B	B	B	B	B	B	B	B	
Pyrene	10	*	B	B	B	B	B	B	B	B	B	
Chlordane	0.00059	*		B						B		
G-BHC (Lindane)	0.063	*		B						B		
Dieldrin	0.0019	*		B						B		
Selenium	5.0	*	B	B	B			S	B	B	B	
Arsenic	36	*	S	B					B	S		
Cadmium	9.3	*	B	B	B			B	B	B	S	B
Chromium VI	50	*	B	B	B			B	B	B	B	B
Lead	5.6	*	S	S	S	S	S	S	S	S		B
Mercury	0.025	*	B						B	B		
Nickel	8.2	*	S	B	S			S	B	S	S	S

Constituents of concern	MACL (µg/l) Unless otherwise noted		Landfarms/landfills Sector	Castro Sector	North Yard Sector	Bayside Sector- North	Bayside Sector- south	Alkane Sector	Effluent Sector	Reclamation Sector	Pollard Sector	Interior "C" zone
Zinc	71	*	S	B	B			B	B	B	S	B
Fluoride	2400	*						S				
Un-ionized Ammonia-N	25	*							B	B		
pH	6.5 to 8.5	*	S	S	S	S	S	S	S	S	S	S
Turbidity (NTUs)	N/A	N/A	S	S	S	S	S	S	S	S	S	S
Temperature	N/A	N/A	S	S	S	S	S	S	S	S	S	S

Notes:
* MACLs to be reviewed and updated by the Discharger per Provision 9

S = Monitoring Parameter per Sector (analyzed semi-annually)
B= Constituent of concern per Section (analyzed during summer/fall reporting period every 2 years (even-numbered years)

N/A = not applicable
(NTUs) = Nephelometric Turbidity Units

Table 3
Landfarm Area Monitoring Well Network

Monitoring Wells for Landfarm Area
"A" Zone Wells
183A (POC)
610A (POC)
645A
657A
659A (POC)
672A
673A
677A
P284A (POC)
P384A
P386A
"C" Zone Wells
251C (POC)
506C (POC)
587C
654C (POC)
655C (POC)
674C
678C (POC)
679C (POC)
680C (POC)

Notes:
POC indicates that well is a point of compliance well.

Table 4
Landfarms Post-Closure Monitoring Program
Monitoring Parameters, Constituents of Concern and MACLs

Constituent	MACL µg/l (2)	MACL Source	"A" zone Well Monitoring Frequency (5)	"C" zone Well Monitoring Frequency (5)
Monitoring Parameters				
pH	6.5 to 8.5	1	S	S
Specific Conductivity	N/A	N/A	S	S
Turbidity	N/A	N/A	S	S
Temperature	N/A	N/A	S	S
Arsenic	36	*	S	S
Lead	5.6	*	S	S
Nickel	8.2	*	S	S
Zinc	71	*	S	S
TPH-Gasoline	1200	*	S	S
TPH-Diesel	640	*	S	S
TPH-Diesel Silica Gel	640	*	S	S
Benzene	46	*	S	S
MTBE	1800	*	S	S
Toluene	5000	*	S	S
Phenolics (Total)	50	*	S	S
Constituents of Concern				
Cadmium, Dissolved	9.3	*	B	B
Chromium VI, Dissolved	50	*	B	B
Mercury, Dissolved	0.025	*	B	B
Selenium, Dissolved	5	*	B	B
Dissolved sulfide	100	*	B	B
Methylene Chloride	1600	*	B	B
Acenaphthene	40	*	B	S
Acenaphthylene	307	*	B	S
Anthracene	21	*	B	S
Benzo(a)anthracene	2.2	*	B	S
Benzo(a)pyrene	0.96	*	B	S
Benzo(b)fluoranthene	0.049	*	B	S
Benzo(g,h,i)perylene	X	*	B	S
Benzo(k)fluoranthene	0.049	*	B	S
Chysene	0.049	*	B	S
Dibenzo(a,h)anthracene	0.049	*	B	S
Fluoranthene	7.1	*	B	S
Fluorene	39	*	B	S
Indeno(1,2,3-cd)pyrene	0.049	*	B	S
Naphthalene	194	*	B	S
Phenanthrene	19	*	B	S
Pyrene	10	*	B	S
Pentachlorophenol	7.9	*	B	B

Constituent	MACL µg/l (2)	MACL Source	"A" zone Well Monitoring Frequency (5)	"C" zone Well Monitoring Frequency (5)
Benzenethiol	5	*	B	B
Benzyl Butyl phthalate	5200	*	B	B
Bis 2-ethylhexyl phthalate	6	*	B	B
Chromium, dissolved	50	*	B	B
Di-n-butyl phthalate	12000	*	B	B
2,4-dimethylphenol	110	*	B	B
Ethylbenzene	29000	*	B	B
1-methylnapthalene	75	*	B	B
7,12-dimethyl benzo(a)anthracene	X	*	B	B
2-methylphenol	XX	*	B	B
3,4-methylphenol	XX	*	B	B
Phenol	2560	*	B	B
Trichloroethene	381	*	B	B
1,1,1-trichloroethane	62	*	B	B
Chlorobenzene	21000	*	B	B
Methyl chrysene	X	*	B	B
Total Xylenes	13	*	B	B
2-methylnaphthalene	2.1	*	B	B
Acetophenone		*	B	B
Barium	1000	*	B	B
Cobalt	3	*	B	B
Copper	3.1	*	B	B
N-Nitrosopiperidine		*	B	B
Silver	0.19	*	B	B
Vanadium	19	*	B	B
Vinyl chloride	3.8	*	B	B
Appendix IX Parameters (3)				
Metals (Methods 6010,7060, 7470)	N/A	N/A	(4)	N/A
SVOCs (Method 8270)	N/A	N/A	(4)	N/A
VOCs (Method 8260)	N/A	N/A	(4)	N/A

Notes:
* MACLs to be reviewed and updated by the Discharger per Provision 9

1. SF Bay Basin Plan, 2010
2. MACL is the maximum allowable concentration limit. Applicable to A-Zone wells only. C-Zone wells evaluated based on background concentrations of inorganic constituents and practical quantization limits for organic constituents.
3. Parameters are listed in Appendix IX to 22CFR 66264 for analysis via Methods 6010, 7060, 7470, 8260, 8270. Appendix IX parameters that are detected, but are not COCs, will be added to the list of COCs for all wells.
4. Bi-annually at POC wells. Every five years at all other wells. Within first year in new wells.
5. Monitoring for COCs and Appendix IX parameters will alternate between highest and lowest groundwater levels.

X=Total PAH concentration less than 0.015 mg/l
XX=Total phenolics concentration less than 0.05 mg/l
PAHS are polynuclear aromatic hydrocarbons
POC is point of compliance
B is biennial or monitoring every other year for non-POC wells
S is semi-annual monitoring at all wells
N/A is not applicable

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ORDER NO. R2-2012-0015

SITE CLEANUP REQUIREMENTS

FOR

CHEVRON PRODUCTS COMPANY
CHEVRON RICHMOND REFINERY
841 CHEVRON WAY
RICHMOND, CONTRA COSTA COUNTY

FINDINGS

The California Regional Water Quality Control Board, San Francisco Bay Region, hereinafter called the Regional Water Board, finds that:

SITE DESCRIPTION

1. Chevron Products Company, a subsidiary of Chevron USA, Inc. (hereinafter called Chevron or the Discharger), owns and operates the Chevron Richmond Refinery (hereinafter called the refinery). The refinery was built in 1902 and produces a broad range of fuels, lubricants, asphalt and petrochemicals. The 2,900-acre refinery is located along the southern shore of San Pablo Bay in Contra Costa County (Figure 1). The City of Richmond lies to the east of the refinery. To the east and within one mile from the facility are industrial, residential, and commercial land uses.

PURPOSE OF ORDER

2. Pursuant to California Water Code (CWC) section 13304, the Site Cleanup Requirements (SCR) in this Order require site investigations be made and continued monitoring of corrective action measures implemented at specified areas of the refinery. This Order requires the Discharger to:
   - Ensure that the remediation systems and respective monitoring programs are operated, evaluated and modified as necessary to ensure the requirements of this Order are met.
   - Continue to evaluate the performance of implemented corrective actions at Pollard Pond, the 250-Foot Channel, S.P. Hill, and the site-wide groundwater control system and hydrocarbon recovery program.

REGULATORY HISTORY

3. On June 16, 2011, the Regional Water Board adopted Updated Waste Discharge Requirements (WDRs) Order No. R2-2011-0036, which specified requirements for continued maintenance and monitoring of inactive and closed waste management units along with requirements for waste management unit corrective action and water quality monitoring programs. This Order shares the same Self-Monitoring and Reporting Program with Order No. R2-2011-0036. Prior to these two orders, the Regional Water Board regulated refinery-wide investigations and corrective action activities under Waste Discharge Requirements Order No. 00-043.

   Other orders previously adopted for the refinery are:

   93-109 Waste Discharge Requirements
   93-016 Site Cleanup Requirements for the S.P. Hill Tankfield
   92-092 Site Cleanup Requirements for the Alkane Sector
   92-010 Waste Discharge Requirements for Landfill 15
   91-098 Cease and Desist Order for Pollard Pond and the Hydropits
   90-146 Site Cleanup Requirements for Plant l/Additives Plant
   89-175 Waste Discharge Requirements

89-011 Cease and Desist Order for the Pollard Pond
88-044 Waste Discharge Requirements
83-13 Waste Discharge Requirements
81-55 Waste Discharge Requirements

4. The Regional Water Board adopted Order No. R2-2011-0049 (NPDES No. CA0005134) on July 13, 2011. This permit regulates the discharge of effluent from the Discharger's wastewater treatment system and the discharges of all stormwater associated with industrial activity from the refinery to San Pablo and San Francisco bays.

FACILITY DESCRIPTION AND HISTORY

Hydrogeologic Setting

5. The refinery and its tankfields are located on the peninsula of the Potrero-San Pablo Ridge, which is composed of the steeply dipping Franciscan Complex. The refining of petroleum products generally occurs on the bay fill areas northeast of the ridge. The southwest side of the ridge consists of steep topography where the Franciscan Complex has been terraced for the placement of aboveground petroleum storage tanks.

6. Past fluctuations in Quaternary sea levels created a complex sedimentary sequence of interfingered estuarine and alluvial fan deposits overlying the Franciscan Complex bedrock. The uppermost deposits are artificially placed bay fill, ranging from approximately 3 feet to approximately 30 feet in depth. The fill materials overlie Bay Muds, which consist of silt and silty clay with abundant plant matter or peat. The Bay Muds overlap onto the Franciscan Complex bedrock and thicken bayward.

7. Three hydrogeologic zones have been identified within the top 150 feet of sediments in the flat lying areas of the refinery, the A-Zone, the C-Zone, and the B-Zone, in order of increasing depth:

   a. The A-Zone is the first water-bearing zone and consists of artificial fill and the naturally occurring peat rich, Bay Mud. The water table elevation for this zone is within 2 to 10 feet of the ground surface and generally discharges to the Bay.

   b. The C-Zone is an 80 to 90-foot-thick water-bearing zone of interfingered alluvial and estuarine sediments. These sediments generally have low hydraulic conductivity, but sandy, more permeable units occur as channels and lenses. The sand units have not been shown to be contiguous across the site but do appear to be hydraulically connected. However, based on several years of chemical data, there is no indication that the C-Zone groundwater has been significantly impacted. Chevron has concluded that the Bay Mud has been an effective hydraulic barrier between the A- and C-zones and has prevented the migration of contaminants in groundwater from the A-Zone to the C-Zone. These results and conclusions were presented to the Regional Water Board in two reports titled C-Zone Investigation - Phase 1 and Phase 2, dated February 8, and December 20, 1991, respectively and continue to be supported by groundwater monitoring data collected pursuant to the refinery-wide Self-Monitoring Program.

c. The B-Zone is a relatively permeable unit at approximately 100 feet below the ground surface. It ranges from 5 to 15 feet thick and contains potable water but has limited production capacity. The B-Zone occurs under artesian conditions and appears to be hydraulically separate from the overlying zones.

8. As shown in Figure 2, the refinery lies in four geomorphic/geologic settings referred to locally as the "Alluvial," "Flats," "Ridge," and "Transition" zones:

   a. The **Alluvial Zone** is defined as the broad area of alluvial fan deposits, derived from the Berkeley Hills, east of the refinery. This zone represents flatland areas in which Bay Mud was not deposited. The upper portion of the alluvial fan deposit is typically clayey with low permeability, except where sandy or silty levee deposits are present and provide conduits for groundwater flow.

   b. The **Flats Zone** comprises the flatland marsh area bounded by San Pablo Bay to the north and extending south along the northeast side of Potrero-San Pablo Ridge. For the purpose of the refinery's investigations, the inland Flats Zone/Alluvial Zone boundary has been defined to be the 5-foot Bay Mud isopach (line of equal thickness). Thus, the Flats Zone is typically underlain by at least five feet of Bay Mud except where removed by excavation or erosion, in local areas of non-deposition, or where displaced by differential settlement of overlying fill.

   c. The **Ridge Zone** consists primarily of colluvium (slope wash) overlying deformed Franciscan Complex rocks exposed along Potrero-San Pablo Ridge. The lower boundary of the Ridge Zone is the 50-foot elevation contour.

   d. The **Transition Zone** is defined as the area that separates the Flats Zone from the Ridge Zone. As described above, the Flats-Transition boundary is defined as the area between the 5-foot Bay Mud isopach and the 50-foot elevation contour.

9. Chevron has subdivided the refinery into ten geographic sectors (see Figure 3). Each sector has unique hydrogeology and varying degrees of environmental concern. The sectors are as follows:

   - Landfarms/Landfill 15
   - Castro/Plant 1/Additives
   - North Yard
   - Bayside Sector – North
   - Bayside Sector - South
   - Alkane Sector
   - Effluent
   - Reclamation
   - Pollard
   - Interior “C” Zone or Main Yard

10. Sector boundaries are generally defined by a physiographic boundary separating adjacent sectors or by the refinery property line. The upgradient sector boundaries for the Alkane, North Yard, and Main Yard sectors correspond to an inferred groundwater drainage divide, which is generally coincident with topographic drainage divides along San Pablo Ridge. The upgradient sector boundaries for the Landfarms/Landfills, Castro, and Reclamation sectors are generally coincident with the refinery property line. The Bayside sectors (North and South) include all Chevron properties on the southwestern side of San Pablo Ridge and adjacent to San Francisco Bay. With the exception of the Bayside sectors, all sites described in this Order are largely contained by the groundwater protection systems, which are described below.

Corrective Action

11. All sectors have impacted soil and/or groundwater from historic releases, and corrective action steps have been implemented. Some of the sectors contain Waste Management Units that are either in the Title 27 Corrective Action Monitoring Program or part of the refinery effluent system; these include the Alkane, Reclamation, North Yard, Effluent, and Landfarms/Landfill sectors. These sectors are regulated by Waste Discharge Requirements Order No. R2-2011-0036. Corrective action occurring at sectors comprised of only impacted soil and/or groundwater from historic releases and not associated with Waste Management Units will be addressed in this Order; these include the Pollard, Castro/Plant 1 Additives, Bayside North, Bayside South and Interior “C” Zone sectors.

12. Chevron has implemented corrective actions to intercept contaminated groundwater at various locations and thus to prevent migration to San Pablo Bay. The corrective actions include systems comprised of varying combinations of slurry walls, extraction trenches and/or extraction wells for hydraulic control at different locations within the refinery. The systems comprised of slurry walls and/or extraction trenches at the Alkane, North Yard, Effluent, Landfarms/Landfill, Reclamation, Pollard, and the Castro/Plant 1 sectors are referred to collectively as the Groundwater Protection Systems (GPS) (see Figure 4). The GPS establishes and maintains a contiguous capture zone which prevents migration of potentially contaminated “A” Zone groundwater past the GPS alignment. The slurry walls were installed where thick and/or highly permeable intervals of “A” Zone fill soils are encountered and were keyed into the underlying Bay Mud unit. The low permeability Bay Mud unit separates contamination in the “A” Zone from the underlying “C” Zone in the "Flats Zone" of the refinery (see Figure 13).

13. Approximately 24,700 feet of extraction trench, 18,535 feet of barrier wall, over 200 groundwater extraction sumps, and one groundwater treatment plant have been installed. The extracted groundwater is routed to the refinery's effluent treatment system and discharged in accordance with existing NPDES permit requirements cited in Finding 4. The GPS extraction trench and barrier wall are illustrated in Figure 13.

14. The Regional Water Board has determined that the GPS comprised of the slurry walls and extraction trenches at the Alkane, North Yard, Effluent, Landfarms/Landfill, Reclamation, Pollard, and Castro/Plant 1 sectors is a satisfactory corrective action measure for the containment and removal of contaminated groundwater along the perimeter of the refinery. The corrective action at the Alkane, North Yard, Effluent, Landfarms/Landfill, and Reclamation

sectors are addressed by Waste Discharge Requirements Order No. R2-2011-0036. Activities associated with the Castro/Plant 1 Additives, Pollard, Bayside North, Bayside South and Interior C Zone sectors are addressed in this SCR. There is a single groundwater monitoring program for all sectors, which is contained in both the WDRs and this SCR.

15. The refinery reports the following GPS performance by sector, as of the beginning of 2011. All portions of the GPS are currently performing as intended:

    Alkane: A continuous hydraulic depression, which indicates that contaminated groundwater is captured prior to offsite discharge, was present along the Alkane GPS, with an average flowrate of 30,000 gallons per day of groundwater.

    Landfill 15: A continuous hydraulic depression was present along the Landfill 15 GPS, with an average flowrate of 36,400 gallons per day of groundwater.

    Landfarms 2 and 5: A continuous hydraulic depression was present along the GPS alignments to the west of Landfarms 2 and 5, with an average flowrate of 16,600 gallons per day of groundwater extracted.

    Landfarms 2 and 3: A continuous hydraulic depression was present along the GPS alignment north of Landfarms 2 and 3, with an average flowrate of 22,600 gallons per day of groundwater extracted.

    North Yard: A continuous hydraulic depression was present along the North Yard GPS, with an average flowrate of 52,000 gallons per day of groundwater.

    Landfarm 1: A continuous hydraulic depression was present along the GPS alignments downgradient of Landfarm 1, with an average flowrate of 50,100 gallons per day of groundwater extracted.

    Castro and Plant 1 Additives: A continuous hydraulic depression was present along the southern alignment of the Castro GPS, with an average flowrate of 26,400 gallons per day of groundwater extracted.

    Reclamation Yard: A hydraulic depression or drawdown was generally present, with an average flowrate of 67,200 gallons per day of groundwater extracted.

    Pollard: An inward hydraulic gradient was present along the edge of the former Pollard Landfill, with an average flowrate of 1100 gallons per day of groundwater extracted.

Summary of Previous Cleanup Actions

16. The following is a summary of corrective actions taken pursuant to previous Regional Water Board orders. All of the previous orders have been rescinded and any remaining open items incorporated into this site-wide order.

17. 250-foot Channel: The channel was excavated between 1900 and 1920 and comprised the original ship channel for the refinery until the 1950's. The channel was then dammed and used as part of the effluent treatment system until 1987 and now serves to store stormwater and treated process water. In 2002, interim corrective actions were required by Order No. 00-043 for the petroleum hydrocarbon contaminated soil contained in the channel. These included installation of a HDPE barrier, fencing, bank steepening, vegetation control and removal of perching objects used by birds. They also included continued collection and removal of oil, vegetation management and wildlife surveys, and water elevation monitoring to assure that there is neither a vertical or lateral gradient allowing for the release of contaminated water to either groundwater outside of the GPS or the Bay. Ongoing monitoring performed in accordance with the *Corrective Action Plan for the 250-Foot Channel* (Chevron, 2002) indicates limited wildlife exposure. Additionally the "A" Zone groundwater flow is fully contained by the GPS, and there is largely an upward vertical hydraulic gradient flow into the channel from the "C" Zone aquifer.

18. Castro/Plant l Additives Plant: Between 1930 and 1970 the Plant 1 Additives Plant was used for formulating and packaging pesticides as well as manufacturing gasoline additives. As a result, soil is contaminated with pesticides, lead and petroleum hydrocarbons. Hazardous levels of chlordane, DDT and soluble lead have been detected in onsite soil. Corrective action completed pursuant to Order No. 91-046 included: installation of an extraction system for containment of contaminated shallow groundwater (GPS), covering a portion of the site with the Richmond Parkway, and placement of a geotextile and asphalt cap (or vegetated fill in some areas) over the non-roadway portions. The combined cover provides a low-permeability cap over the site, and the encompassing groundwater extraction system prevents contaminated shallow groundwater from leaving the site. No further closure activities are necessary or required for the Plant l/Additives Plant, but there is ongoing groundwater monitoring as part of the attached monitoring program.

19. Pollard Pond and the Hydrolyzing Pits: The Toxic Pits Cleanup Act (TPCA) required the closure of hazardous waste surface impoundments in two areas of the refinery, under schedules provided in Order No. 91-098. The first impoundment, known as Pollard Pond, was a 3-acre surface impoundment located in the northwestern portion of the refinery (Figure 6) adjacent to San Pablo Bay that contained sludges with a pH less than 2 and Bay Mud dredge spoils from the refinery yacht harbor.

    Closure activities included excavation and removal of soil contaminated with petroleum hydrocarbons and low-pH hazardous wastes, installation of a GPS groundwater extraction trench at the downgradient boundary of the pond, dismantling of Pollard Dam, and confirmation sampling of soil from the bottom of the former surface impoundment or pond. The remaining 30,000 cubic yards of non-hazardous hydrocarbon contaminated were removed from the site and placed in Landfill 15. Following the clean closure, groundwater in several wells continued to have low pH and elevated concentrations of nickel and zinc. In November and December 2008, Chevron injected 263,000 gallons of calcium polysulfide into 18 boreholes in an attempt to neutralize the remaining soil contamination. Measurable changes to the pH occurred during injection; however, the effects were short-lived and groundwater conditions have returned to

historic low pH levels. Task 15 of this Order requires Chevron to submit remedial plans for additional corrective action at Pollard Pond.

Three additional small unlined surface impoundments, known as the Hydrolyzing Pits (Hydropits), were located along the shore of San Pablo Bay in the Alkane Sector (Figure 7). These pits also received wastewater from the refinery's Alkane Plant until 1986. The most significant constituents of this waste stream were neutralized hydrofluoric acid, fluoride salts, and small amounts of oil containing benzene. Closure involved placing a multi-layer cap and installing the Alkane GPS along the northeastern perimeter of the Hydropits adjacent to Castro Cove. No further closure activities are necessary or required for the Hydropits.

20. Alkane Plant Plume Remediation: Corrective action was required by Order No. 92-092 for shallow groundwater plumes containing benzene, hydrofluoric acid, and free-phase petroleum hydrocarbons, in addition to implementation of the GPS to hydraulically contain shallow contaminated groundwater. Chevron operates eight recovery wells to recover floating liquid hydrocarbons and contaminated groundwater. These recovery wells make up the Alkane Plant Groundwater Recovery System. Groundwater and liquid hydrocarbons recovered by the extraction wells are routed to the refinery's effluent treatment system and discharged in accordance with existing NPDES permit requirements. There is ongoing groundwater monitoring as part of the attached monitoring program.

21. Bayside South/S.P. Hill Tankfield: Corrective action required by Order No. 93-016 consists of the cleanup of contaminated groundwater and removal of free-phase liquid petroleum hydrocarbons under the S.P. Hill Tankfield. Free-phase petroleum hydrocarbons were discovered in 5 wells located in the central portion of the tankfield within a 250-foot radius of each other. Chevron has been recovering free product and some incidental groundwater from these wells since 1994. Free product recovery rates are generally less than one gallon per day. The primary cleanup objective is to recover as much free-phase hydrocarbon product as is technically feasible and cost-effective. Chevron also operates additional extraction wells in basins 4 and 7 to create a hydraulic depression and to capture dissolved petroleum hydrocarbon constituents in groundwater several hundred feet downgradient of the free product recovery system.

22. Bayside North/Point Orient Tankfield: In 1990, aboveground petroleum storage tanks in the Point Orient Tankfield were taken out of service and dismantled, and contaminated soils were removed. There was no evidence of an accumulation of free-phase hydrocarbons on the water table along the perimeter of the tankfield; however, hydrocarbon-contaminated soil was observed beneath the former tanks. Chevron submitted a hydrogeologic investigation for this tankfield on June 23, 1992, which determined that minor soil and groundwater contamination exists at the No.10 Basin. Groundwater monitoring in this area is ongoing.

23. Salt Water Pump Station: In 1998, hydrocarbon sheen was observed on the Bay near the intake of the former Salt Water Pump Station. The source is believed to be from historic pipeline leaks from an adjacent pipeway. In 1999, a soil bentonite barrier was built, and two monitoring wells were installed. Chevron continues visual inspections of the shoreline and monitors the two wells for free product as part of the attached monitoring program. Minor amounts of free product are

occasionally observed in these wells. In May 2011, 0.07 feet of free product were observed in well 668AT, but none was observed in the most recent monitoring report.

MONITORING PROGRAMS

24. To record the compliance of the corrective actions described above, Chevron is required to implement the attached monitoring program described in these Site Cleanup Requirements.

25. Pursuant to a plan approved by the Regional Water Board in 2002, the *Statistical Evaluation Plan for the Landfarm Area, Groundwater Self-Monitoring and Reporting Program, Order No. 00-043*, (URS, 2002), Chevron performs a statistical evaluation and trend analysis of groundwater analytical results obtained from monitoring wells, to assess the effectiveness of the remedial actions at the refinery.

26. Chevron also reports on groundwater elevations, flow patterns and velocities, hydrocarbon thicknesses and recovery, and closure unit monitoring, inspection and maintenance activities as part of its monitoring program.

BASIN PLAN

27. The Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) is the Regional Water Board's master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State, including surface waters and groundwater. It also includes programs of implementation to achieve water quality objectives. The Basin Plan was duly adopted by the Regional Water Board and approved by the State Water Resources Control Board (State Water Board), Office of Administrative Law and U.S. EPA, where required.

28. State Water Board Resolution No. 68-16: State Water Board Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California," applies to this discharger and requires attainment of background levels of water quality, or the highest level of water quality which is reasonable if background levels of water quality cannot be restored. Cleanup levels other than background shall be consistent with the maximum benefit to the people of the State, not unreasonably affect present and anticipated beneficial uses of such water, and not result in exceedance of applicable water quality objectives.

29. State Water Board Resolution No. 92-49: State Water Board Resolution No. 92-49, "Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under California Water Code Section 13304," establishes policies and procedures to be used by the Board when:

- Determining when a person is required to investigate, cleanup, or abate a discharge;
- Concurring with a discharger's selection of cost-effective investigation and remedial measures;
- Overseeing implementation of investigation and remedial measures; and
- Determining schedules for investigation and remedial measures.

30. State Water Board Resolution No. 88-63: The Basin Plan provides that all groundwaters are considered suitable, or potentially suitable, for municipal or domestic water supply (MUN) and that, in making any exceptions, the Regional Water Board will consider the criteria referenced in State Water Board Resolution No. 88-63, "Sources of Drinking Water", where:

    i) The total dissolved solids exceed 3,000 mg/l (5,000 µS/cm, electrical conductivity), and it is not reasonably expected by the Regional Water Board that the groundwater could supply a public water system, or

    ii) There is contamination, either by natural processes or human activity (unrelated to the specific pollution incident), that cannot reasonably be treated for domestic use using best management practices or best economically achievable treatment practices, or

    iii) The water source does not provide sufficient water to supply a single well capable of producing an average, sustained yield of 200 gallons per day.

31. Basis for California Water Code Section 13304 Order: The Discharger has caused or permitted, causes or permits, or threatens to cause or permit waste to be discharged or deposited where it is or probably will be discharged into waters of the State and creates or threatens to create a condition of contamination or nuisance.

BENEFICIAL USES

32. Shallow groundwater beneath the "Flats Zone", which comprises the flatland marsh area bounded by San Pablo Bay to the north and extending south along the northeast side of the Potrero-San Pablo Ridge, has Total Dissolved Solids (TDS) significantly higher than the 3000 mg/l (5000 µS/cm electrical conductivity) level that State Water Board Resolution No. 88-63 set as a maximum for a municipal or domestic water supply in the Sources of Drinking Water Policy. There is no historical, existing or planned use of groundwater as a source of drinking water in either the shallow (A- and C-Zone) or deeper (B-Zone) aquifers in this part of the refinery.

    Groundwater beneath the "Ridge Zone," which is bounded on the south by San Francisco Bay and extends northwest up to the top of the Potrero-San Pablo Ridge (Bayside sectors), is primarily contained in fractured bedrock of the Franciscan Complex. Based on aquifer test data collected during hydrogeologic investigations of the tankfields in the Bayside North and Bayside South sectors, it is unlikely that a single well could produce an average sustained yield of 200 gallons per day for drinking water supply purposes (State Water Board Resolution No. 88-63, exemption criterion 1(c) and Regional Water Board Resolution No. 89-39). There is no historical, existing or planned use of unconfined groundwater as a source of drinking water in this part of the refinery.

    There is the potential, however, for groundwater on either side of the Potrero-San Pablo Ridge to discharge into San Francisco and San Pablo bays at the shoreline groundwater/surface water interface. Therefore, the surface water beneficial uses named in the Basin Plan for these bodies of water are applicable to groundwater in point-of compliance monitoring wells near the shoreline interface.

33. The existing and potential beneficial uses of groundwater underlying the site that is not contained in bedrock and is greater than 100 feet below ground surface are:

    a. Industrial process and service supply
    b. Agricultural water supply
    c. Municipal and domestic supply
       (however due to the proximity of the Bay, groundwater at the site contains elevated TDS levels, which render the groundwater nonpotable).

34. The existing and potential beneficial uses of San Francisco and San Pablo bays are:

    a. Ocean, commercial, and sport fishing
    b. Shellfish harvesting
    c. Estuarine habitat
    d. Fish migration
    e. Preservation of rare and endangered species
    f. Fish spawning
    g. Wildlife habitat
    h. Water contact recreation
    i. Non-contact water recreation
    j. Industrial service supply
    k. Industrial process supply
    l. Navigation

CALIFORNIA ENVIRONMENTAL QUALITY ACT

35. This site has previously been subject to cleanup requirements under Regional Water Board Order Nos. 93-016, 92-092, and 90-146. This Order only requires that the requirements first imposed by these previous orders be continued. Continuing activities previously imposed do not have the potential for significant impacts on the environment. As such, the general rule that the California Environmental Quality Act (CEQA) only applies to projects that have the potential for causing a significant effect on the environment (the "common sense" exemption) applies, and no environmental document needs to be prepared in connection with the adoption of this Order. [Cal. Code Regs., tit. 14, § 15061(b)(3)] Furthermore, this Order does not approve any specific cleanup plan beyond those already imposed by the previous orders, and it is generally the first imposition of a cleanup plan that might result in impacts to the environment. This further supports the application of the "common sense" exemption for adoption of this Order. When a specific cleanup proposal is submitted to the Executive Officer for approval, such proposal must and will be evaluated under CEQA prior to approval.

NOTICE AND MEETING

36. The Regional Water Board has notified the Discharger and interested agencies and persons of its intent to issue Site Cleanup Requirements and has provided them with an opportunity for a public hearing and an opportunity to submit their written views and recommendations.

37. The Regional Water Board, at a public meeting, heard and considered all comments pertaining to this issuance of Site Cleanup Requirements.

IT IS HEREBY ORDERED, pursuant to section 13304 of the California Water Code, that the Discharger (or its agents, successors, or assigns) shall cleanup and abate the effects described in the above findings as follows:

PROHIBITIONS

1. The discharge of wastes or hazardous substances in a manner that will degrade water quality or adversely affect beneficial uses of waters of the State is prohibited.

2. Migration of pollutants through subsurface transport to waters of the State outside of the GPS is prohibited**.**

3. There shall be no discharge of wastes or hazardous substances to surface waters except as permitted under the refinery's current NPDES Permit.

4. Activities associated with the subsurface investigation and cleanup that will cause significant adverse migration of wastes or hazardous substances are prohibited.

5. The storage, handling, treatment, or disposal of polluted soil or groundwater shall not create a nuisance as defined in California Water Code section 13050(m).

6. The Discharger shall not cause the following conditions to exist in waters of the State at any place outside of the GPS:

   a. <u>Surface Waters</u>

      i. Floating, suspended, or deposited macroscopic particulate matter or foam;
      ii. Bottom deposits or aquatic growth;
      iii. Adversely altered temperature, turbidity, or apparent color beyond natural background levels;
      iv. Visible, floating, suspended or deposited oil or other products of petroleum origin; or
      v. Toxic or other deleterious substances to be present in concentrations or quantities that may cause deleterious effects on aquatic biota, wildlife or waterfowl, or which render any of these unfit for human consumption either at levels created in the receiving waters or as a result of biological concentrations.

   b. <u>Groundwater</u>

      i. Further degradation of groundwater quality and/or substantial worsening of existing groundwater impacts; and
      ii. Subsurface migration of pollutants associated with Chevron's operations to waters of the State is prohibited.

TASKS

ALL REQUIRED SUBMITTALS MUST BE ACCEPTABLE TO THE EXECUTIVE OFFICER (SEE PROVISION NO. 1 *COMPLIANCE*)

GPS Requirements

1. Chevron shall continue to extract water from the Groundwater Protection System (GPS) at a rate which eliminates or reverses the bayward migration of contaminants in the uppermost water-bearing zone (the A Zone). Chevron shall also operate the GPS so as to prevent significant threats to the second water-bearing zone (the C Zone). Chevron shall install, if practicable, a physical barrier downgradient of any extraction well(s) or extraction trenches that are producing Bay water at volumes deemed to be unacceptable by the Executive Officer.

   COMPLIANCE DATE: Immediately.

Hydraulic Containment

2. Chevron shall continue to monitor the "A Zone" for contaminants on the downgradient side of the GPS trench/barrier and groundwater levels on both sides of the GPS trench/barrier for the primary purpose of evaluating the effectiveness of the GPS. Chevron shall demonstrate compliance with Task 1 above by submitting, pursuant to the Self-Monitoring and Reporting Program of Order No. R2-2011-0036 attached to this Order, potentiometric water elevation contour maps which graphically demonstrate maintenance of an inward hydraulic gradient into the GPS.

   COMPLIANCE DATE: Immediately.

3. Chevron shall continue to operate the GPS as a corrective action measure for remediation of groundwater contamination along the San Pablo Bay side of the refinery for at least one year after compliance has been achieved with the Maximum Allowable Concentration Limits (MACLs) established by this Order before any reduction or termination of groundwater extraction will be considered.

   COMPLIANCE DATE: Immediately, for at least one year after full compliance with the relevant MACLs.

4. If it is determined by the Executive Officer, based on groundwater monitoring information, that water quality impairment downgradient of the GPS is not improving, or continues to degrade, Chevron will be required to submit additional site-specific groundwater corrective action proposals.

   COMPLIANCE DATE: Six months after notification from the Executive Officer.

5. Components of the GPS Engineering Report pertaining to operation of the system may be amended as appropriate to incorporate changes in technology that will improve operational

efficiency. All proposed changes shall be submitted in writing to the Executive Officer for review and approval.

COMPLIANCE DATE: As needed.

Alkane Plant Plume Remediation

6. Chevron shall continue extracting free-phase hydrocarbons and to remediate dissolved benzene in groundwater, as needed, from the central portion of the Alkane Plant plume area such that contaminants do not migrate further from the source. The contaminant extraction shall be performed until the cleanup levels outlined in the *Revised Alkane Plant Plume Remediation Goals Plan* (URS, 2001) are achieved, and it is demonstrated that further recovery and remediation are no longer technically feasible or cost-effective and that termination of the program will not allow further subsurface migration of either free-phase or dissolved constituent plumes or any other adverse impacts to groundwater or surface water quality. The Alkane Plant plume recovery system currently consists of eight recovery wells.

   COMPLIANCE DATE: Immediately, until Executive Officer approval is received.

S.P. Hill Tankfield Groundwater Cleanup Requirements

7. Chevron shall continue to operate the S.P. Hill Hydrocarbon Recovery System as provided by the *S.P. Hill Tankfield FPLH* (Free-Phase Liquid Petroleum Hydrocarbon) *Recovery Facilities Installation and Startup Report and Remediation Monitoring Plan* (Chevron Products Company, 1994), as modified in a letter to the Regional Water Board dated July 8, 2009. Chevron currently uses four recovery wells and absorbent pads instead of skimmers to remove free product. Chevron will continue to recover free-phase hydrocarbons at S.P. Hill to the extent practicable until it receives approval from the Executive Officer to cease operations.

   COMPLIANCE DATE: Immediately, until Executive Officer approval is received.

8. Chevron shall continue to operate the S.P. Hill Groundwater Recovery Systems in basins 4 and 7 until it receives written approval from the Executive Officer to cease operations. To be eligible for this approval, Chevron must submit a written request certifying that the MACLs for the Bayside Sector - South have not been exceeded in any groundwater monitoring wells sampled per the attached Self-Monitoring Program for at least four consecutive reporting periods.

   COMPLIANCE DATE: Immediately, until Executive Officer approval is received.

Salt Water Pump Station Monitoring Program

9. Chevron shall continue the monitoring and inspection program for the Salt Water Pump Station Area as outlined in the *No. 3 Salt Water Pump Station Monitoring Program* (Chevron Products Company, 1998).

COMPLIANCE DATE: Immediately.

Corrective Action Work Plan 250-foot Channel

10. Chevron shall continue to implement the plan, dated November 2002, for interim corrective action measures for petroleum hydrocarbon-contaminated sediment in the 250 Foot Channel site. The plan evaluated risks to potential human and ecological receptors at this site and included corrective action alternatives designed to minimize any identified risks. The plan shall continue to be implemented until modified by the Executive Officer.

    COMPLIANCE DATE: Immediately, until Executive Officer approval is received.

Free-Phase Liquid Petroleum Hydrocarbon (FPLH) Recovery

11. Chevron shall continue to perform recovery activities, as needed, to remove FPLH from beneath the refinery if FPLHs are found in significant and recoverable quantities during routine monitoring of groundwater wells, in accordance with the *Free Phase Liquid Petroleum Hydrocarbon Recovery Evaluation Plan* (Chevron USA, 2000). Chevron regularly recovers FPLHs using passive absorbent pads at wells containing measureable thicknesses of greater than 0.5 feet. The GPS, where present, is designed to function as a groundwater containment system that captures and prevents offsite migration of dissolved constituents; it is not intended to perform FPLH source control. FPLH recovery may be necessary to reduce the source for dissolved constituents that are introduced via the free-phase.

    COMPLIANCE DATE: Immediately.

Spill Reporting and Documentation of Cleanup

12. Chevron shall notify the Regional Water Board of any reportable quantity (42 gallons or more) of petroleum as defined in Health & Safety Code Chapter 6.67 *Above Ground Storage of Petroleum* that is either spilled or leaked to any unlined ground surface (any surface not protected by a barrier which is impermeable to petroleum products or other constituents which may cause adverse water quality impacts). Verbal notification shall be within one working day of knowledge of the spill and shall be followed by a written description to include the nature, location and volume of the spill, and the total area and/or soil volume affected. In addition, the written report shall include a map which identifies the location of the spill and photographic documentation of the spill area before and after cleanup.

    COMPLIANCE DATE: One day for verbal notification, five days for written notification.

Update Groundwater Self-Monitoring Program

13. Following implementation of each task described above, the Discharger shall review the Order No. R2-2011-0036 Self-Monitoring Program and propose any necessary updates to incorporate new groundwater monitoring wells, extraction systems, and/or sampling parameters. All

sampling protocols and reporting requirements shall be consistent with those described in Order No. R2-2011-0036 (see Attachment A).

COMPLIANCE DATE: As needed.

14. Revision of the Self-Monitoring Program: The Discharger shall submit a plan for the revision of the monitoring locations, parameters, frequency and MACLs contained within the Self-Monitoring Program attached to this Order (Part B). This plan is to be implemented immediately upon Executive Officer approval.

    COMPLIANCE DATE: June 15, 2012.

Pollard Pond Corrective Action

15. Pollard Pond Remedial Action Plan: The Discharger shall submit a plan, acceptable to the Executive Officer, proposing remedial plans to meet all MACLs at the point of compliance for the Pollard Pond.

    COMPLIANCE DATE: May 31, 2012

PROVISIONS

1. Compliance: The Discharger shall comply immediately, or as prescribed by the time schedule contained herein, with all Prohibitions, Tasks, and Provisions of this Order. All required submittals must be acceptable to the Executive Officer. The Discharger must also comply with all conditions of these Site Cleanup Requirements. Violations may result in enforcement actions, including Regional Water Board orders or court orders requiring corrective action or imposing civil monetary liability, or in modification or revocation of this Order by the Regional Water Board. [CWC § 13261, 13262, 13265, 13267, 13268, 13300, 13300, 13301, 13304, 13350].

2. Authority to Request Technical Reports: All technical and monitoring reports required by this Order are requested pursuant to CWC section 13267. Failure to submit reports in accordance with schedules established by this Order or failure to submit a report of sufficient technical quality to be acceptable to the Executive Officer may subject the Discharger to enforcement action pursuant to CWC section 13268.

3. All technical reports submitted pursuant to this Order shall be prepared under the supervision of and signed by a California registered civil engineer, or a California professional geologist.

4. At any time, the Discharger may file a written request (including supporting documentation) with the Executive Officer, proposing modifications to the attached Self-Monitoring Program (SMP). If the proposed modifications are acceptable, the Executive Officer may issue a letter of approval that incorporates the proposed revisions into the SMP.

5. Modifications to Remedial Action Plan: The Discharger shall notify the Executive Officer at least 60 days prior to implementing any proposed major modifications to any approved

Remedial Action Plan, Implementation Schedule, or remediation system. The notification shall include the rationale for any proposed modification.

6. Delayed Compliance: If the Discharger is delayed, interrupted, or prevented from meeting one or more of the completion dates specified for the Tasks, the Discharger shall promptly notify the Executive Officer of the delay and reason for the delay and the Regional Water Board may consider revisions to this Order.

7. Operation and Maintenance (O&M): The Discharger shall, at all times, properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) that are installed or used by the Discharger to achieve compliance with conditions of this Order. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls including appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of this order. [CWC section 13263(f)]

8. Availability: A copy of this Order shall be maintained by the Discharger and shall be made available by the Discharger to all employees or contractors performing work necessary to comply with the Tasks set forth in this Order. [CWC section 13263]

9. Change in Ownership: In the event of any change in control or ownership of the facility presently owned or controlled by the Discharger, the Discharger shall notify the succeeding owner or operator of the existence of this Order by letter, a copy of which shall be forwarded to the Regional Water Board upon a final change in ownership.

   To assume operation of this Order, the succeeding owner or operator must apply in writing to the Executive Officer requesting transfer of this Order within 30 days of the change of ownership. The request must contain the requesting entity's full legal name, mailing address, electronic address, and telephone number of the persons responsible for contact with the Regional Water Board. Failure to submit the request shall be considered a discharge without requirements, a violation of the CWC. [CWC sections 13267 and 13263]

   Due Date: 30 days after a change in facility control or ownership

10. Stormwater**:** The Discharger shall comply with the provisions of the refinery's current NPDES permit for the management, monitoring and discharge of stormwater and wastewater effluent.

11. Reporting of Hazardous Substance Release: If any hazardous substance is discharged in or on any waters of the State, or discharged or deposited where it probably will be discharged in or on any waters of the State, the Discharger shall:

    a. Report such discharge to the following:

       i. The Regional Water Board by calling (510) 622-2369 during regular office hours (Monday through Friday, 8 a.m. – 5 p.m.); and to

       ii. The California Emergency Management Agency at (800) 852-7550.

b. A written report shall be filed with the Regional Water Board within five working days. The report shall describe:

   i. The nature of the waste or pollutant.
   ii. The estimated quantity involved.
   iii. The duration of the incident.
   iv. The cause of the release.
   v. The estimated size of the affected area, and nature of the effect.
   vi. The corrective actions taken or planned and a schedule of those measures.
   vii. The persons/agencies notified.

This reporting is in addition to any reporting to the California Emergency Management Agency that is required pursuant to the Health and Safety Code.

12. Contractor/Consultant Qualifications: All technical documents shall be signed by and stamped with the seal of a California professional geologist, or a California registered civil engineer.

13. Lab Qualifications: All samples shall be analyzed by State-certified laboratories or laboratories accepted by the Board using approved EPA methods for the type of analysis to be performed. All laboratories shall maintain quality assurance/quality control (QA/QC) records for Board review. This provision does not apply to analyses that can only reasonably be performed on-site (e.g., temperature).

14. Document Distribution: Copies of all correspondence, technical reports, and other documents pertaining to compliance with this Order shall be provided to the following entities:

    a) The Regional Water Board, and
    b) The Department of Toxic Substances Control.

    The Executive Officer may modify this distribution list as needed.

15. Submittal Revisions: Where the Discharger becomes aware that it failed to submit any relevant facts in a report or submitted incorrect information in any report to the Regional Water Board, it shall promptly submit such facts or information. [CWC sections 13260 and 13267]

16. Severability: Provisions of these Site Cleanup Requirements are severable. If any provisions of these Requirements are found invalid, the remainder of these Requirements shall not be affected. [CWC 9213]

17. Geotracker Requirements: The State Water Board has adopted regulations requiring electronic report and data-submittal to Geotracker. The text of the regulations can be found at the following URL:

    http://www.waterboards.ca.gov/water_issues/programs/ust/electronic_submittal/index.shtml

    Parties responsible for cleanup of pollution at sites overseen by the Regional Water Board's Land Disposal Programs are required to submit the following information electronically to Geotracker:

a. Groundwater analytical data;
b. Surveyed locations of monitoring wells;
c. Boring logs describing monitoring well construction; and
d. Portable data format (PDF) copies of all reports (the document in its entirety [signature pages, text, figures, tables, etc.] must be saved as a single PDF file).

Note that the Discharger is still responsible for submitting one hard copy of all reports pursuant to this Order. The Regional Water Board may require direct submittal of electronic reports and correspondence in addition to the State Water Board's Geotracker requirements.

18. Entry and Inspection: The Discharger shall allow the Regional Water Board, or an authorized representative upon the presentation of credentials and other documents as may be required by law, to:

a. Enter upon the Discharger's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this Order;
b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order;
c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order; and
d. Sample or monitor at reasonable times, for the purposes of assuring compliance with this Order or as otherwise authorized by the CWC, any substances or parameters at any location. [CWC section 13267]

19. Maintenance of Records: The Discharger shall retain records of all monitoring information including all calibration and maintenance records, all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this Order. Records shall be maintained for a minimum of five years from the date of the sample, measurement, report, or application. This period may be extended during the course of any unresolved litigation regarding this discharge or when requested by the Executive Officer. Records of monitoring information shall include:

a. The date, exact place, and time of sampling or measurements;
b. The individuals who performed the sampling or measurements;
c. The date(s) analyses were performed;
d. The individuals who performed the analyses;
e. The analytical techniques or method used; and
f. The results of such analyses.

20. Report Certification: All application reports or information to be submitted to the Executive Officer shall be signed and certified as follows:

a. For a corporation – by a principal executive officer or the level of vice president.
b. For a partnership or sole proprietorship – by a general partner or the proprietor, respectively.
c. For a municipality, state, federal, or other public agency – by either a principal executive officer or ranking elected official.

A duly authorized representative of a person designated in this provision may sign documents if all of the following are met:

- The authorization is made in writing by a person described in paragraph (a) of this provision;
- The authorization specifies either an individual or position having responsibility for the overall operation of the regulated facility or activity; and
- The written authorization is submitted to the Executive Officer.

Any person signing a document under this Provision shall make the following certification:

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment." [CWC § 13263, 13267, and 13268]

21. Cost Recovery: The Discharger (as applicable) shall be liable, pursuant to California Water Code section 13304 and Health and Safety Code section 25270.9 to the Regional Water Board for all reasonable costs actually incurred by the Regional Water Board to investigate unauthorized discharges of waste and to oversee cleanup of such waste, abatement of the effects thereof, or other remedial action, required by this Order. If the site addressed by this Order is enrolled in a State Water Board-managed reimbursement program, reimbursement shall be made pursuant to this Order and according to the procedures established in that program. Any disputes raised by the Discharger (as applicable) over reimbursement amounts or methods used in that program shall be consistent with the dispute resolution procedures for that program.

22. Periodic Site Cleanup Requirements (SCR) Order Review: The Regional Water Board will review this Order periodically and may revise it when necessary. The Discharger (as applicable) may request revisions and upon review the Executive Officer may recommend that the Board revise these requirements.

I, Bruce H. Wolfe, Executive Officer, do hereby certify that the foregoing is a full, complete, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on February 8, 2012.

_____

Bruce H. Wolfe
Executive Officer

==========

FAILURE TO COMPLY WITH THE REQUIREMENTS OF THIS ORDER MAY SUBJECT YOU TO ENFORCEMENT ACTION, INCLUDING BUT NOT LIMITED TO: IMPOSITION OF ADMINISTRATIVE CIVIL LIABILITY UNDER WATER CODE SECTIONS 13268 OR 13350, OR REFERRAL TO THE ATTORNEY GENERAL FOR INJUNCTIVE RELIEF OR CIVIL OR CRIMINAL LIABILITY

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Figures:

Figure 1 - Location Map
Figure 2 - Regional Site Map with Geomorphic Boundaries
Figure 3 - Sector Boundaries
Figure 4 - Groundwater Protection System Location Map
Figure 5 - Plant 1 / Additives Plant Cap
Figure 6 - Pollard Sector
Figure 7 - Alkane Sector
Figure 8 - Landfarm/Landfill Sector
Figure 9 - Bayside Sector
Figure 10 - Effluent Sector
Figure 11 - Reclamation Sector
Figure 12 - North Yard Sector
Figure 13 - Groundwater Protection System

Attachment: Self-Monitoring and Reporting Program, Order No. R2-2012-0015

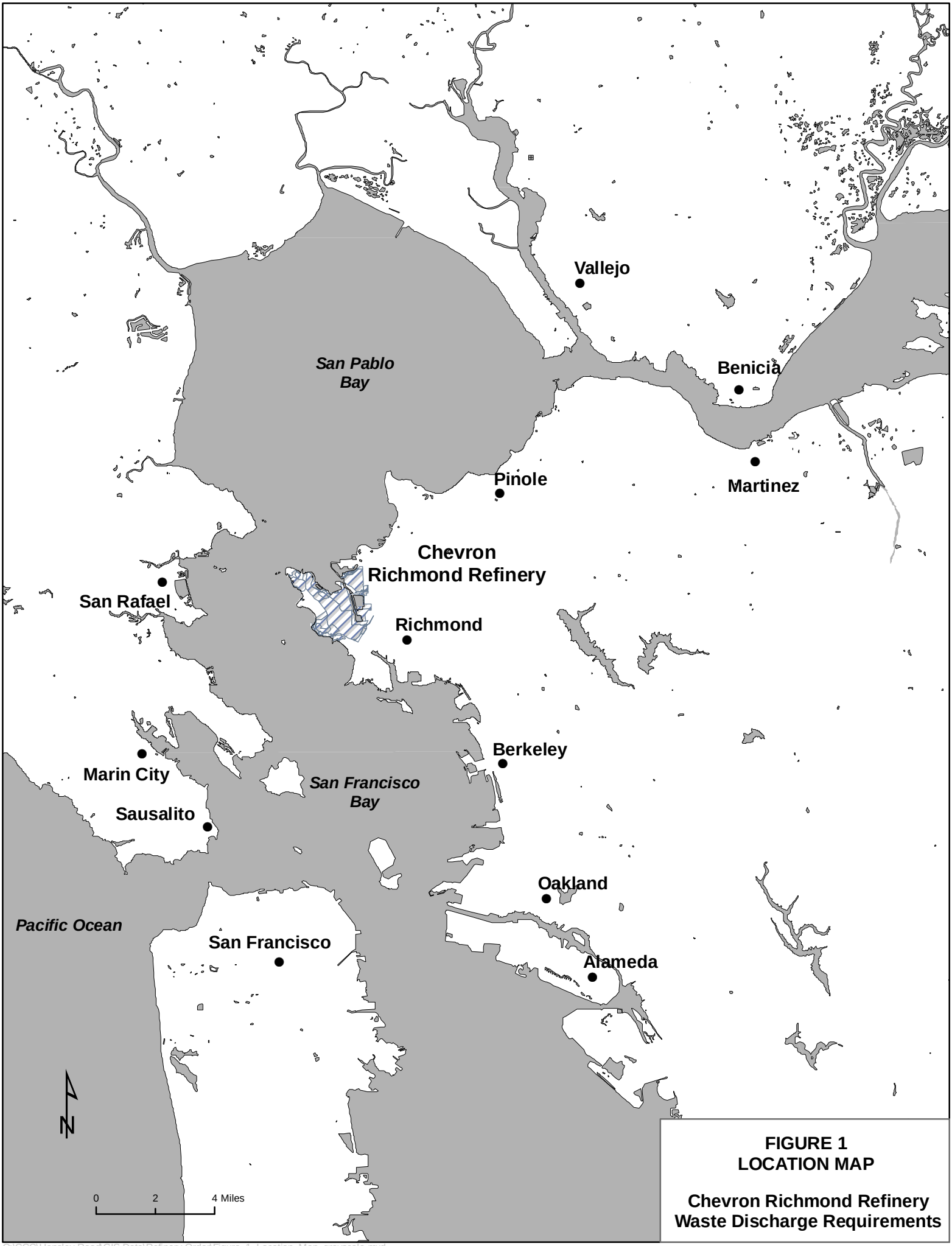


FIGURE 1
LOCATION MAP

Chevron Richmond Refinery
Waste Discharge Requirements

O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_1_Location_Map_grayscale.mxd

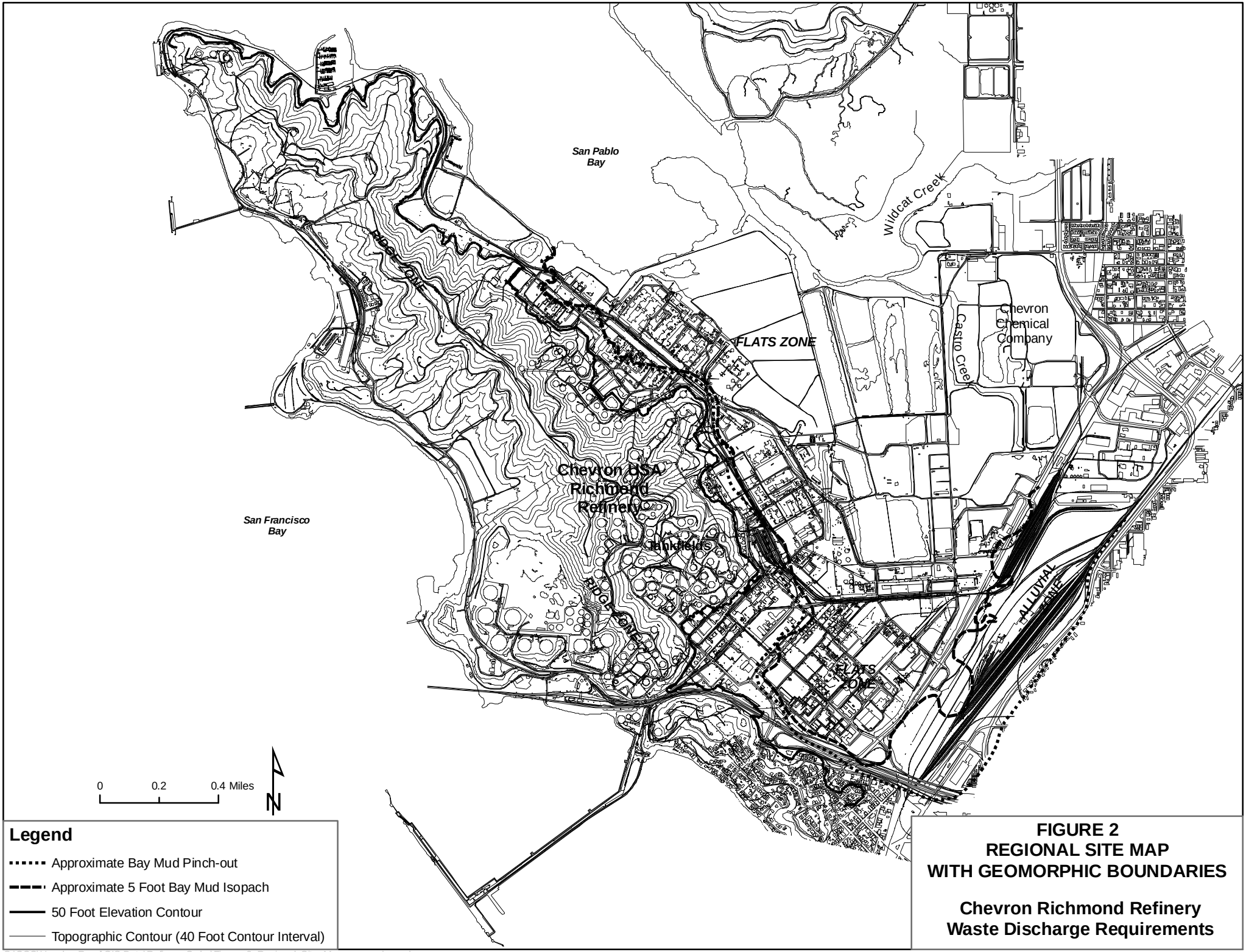


FIGURE 2
REGIONAL SITE MAP
WITH GEOMORPHIC BOUNDARIES

Chevron Richmond Refinery
Waste Discharge Requirements

O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_2_Regional_Site_Map_grayscale.mxd

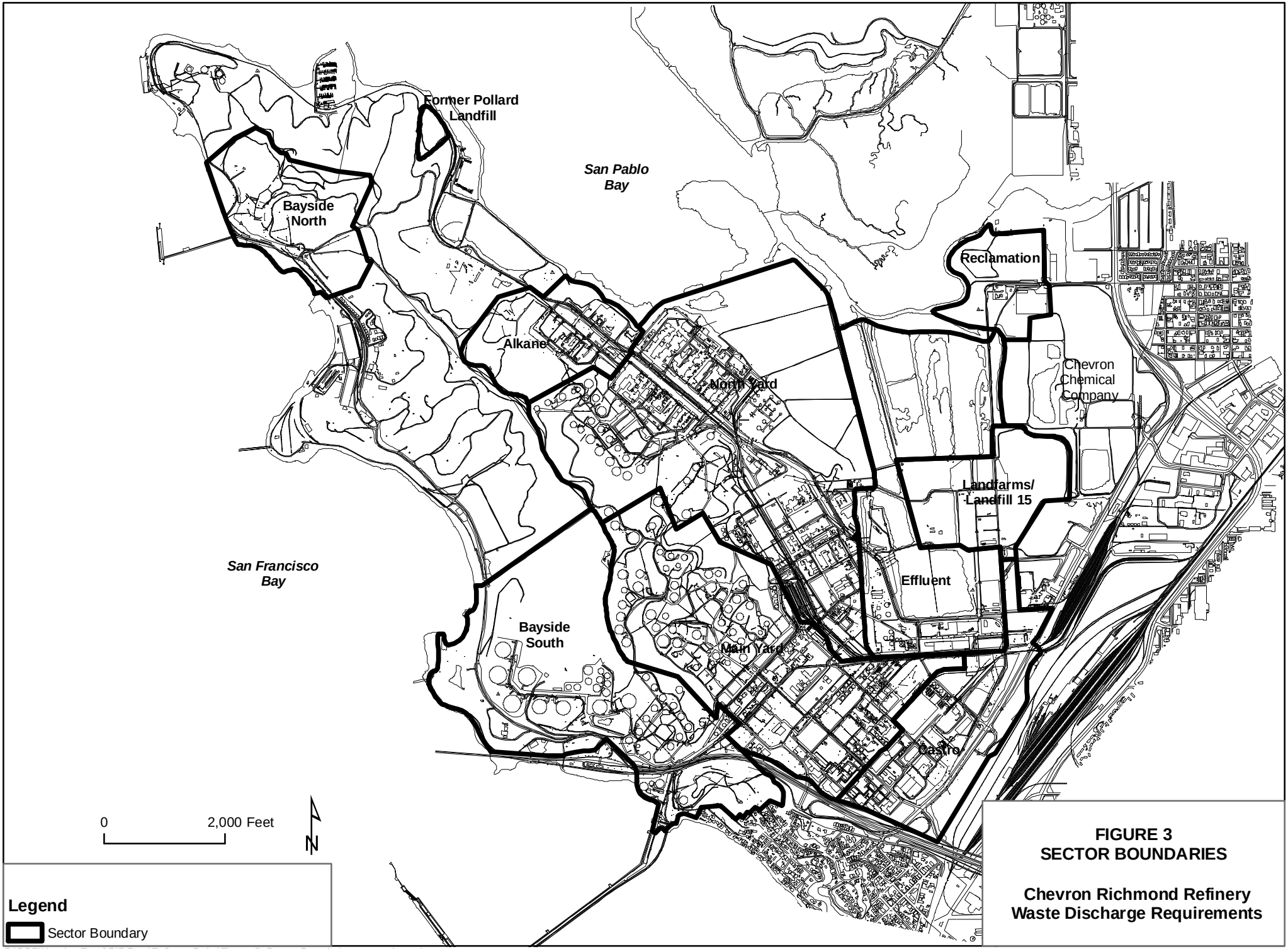
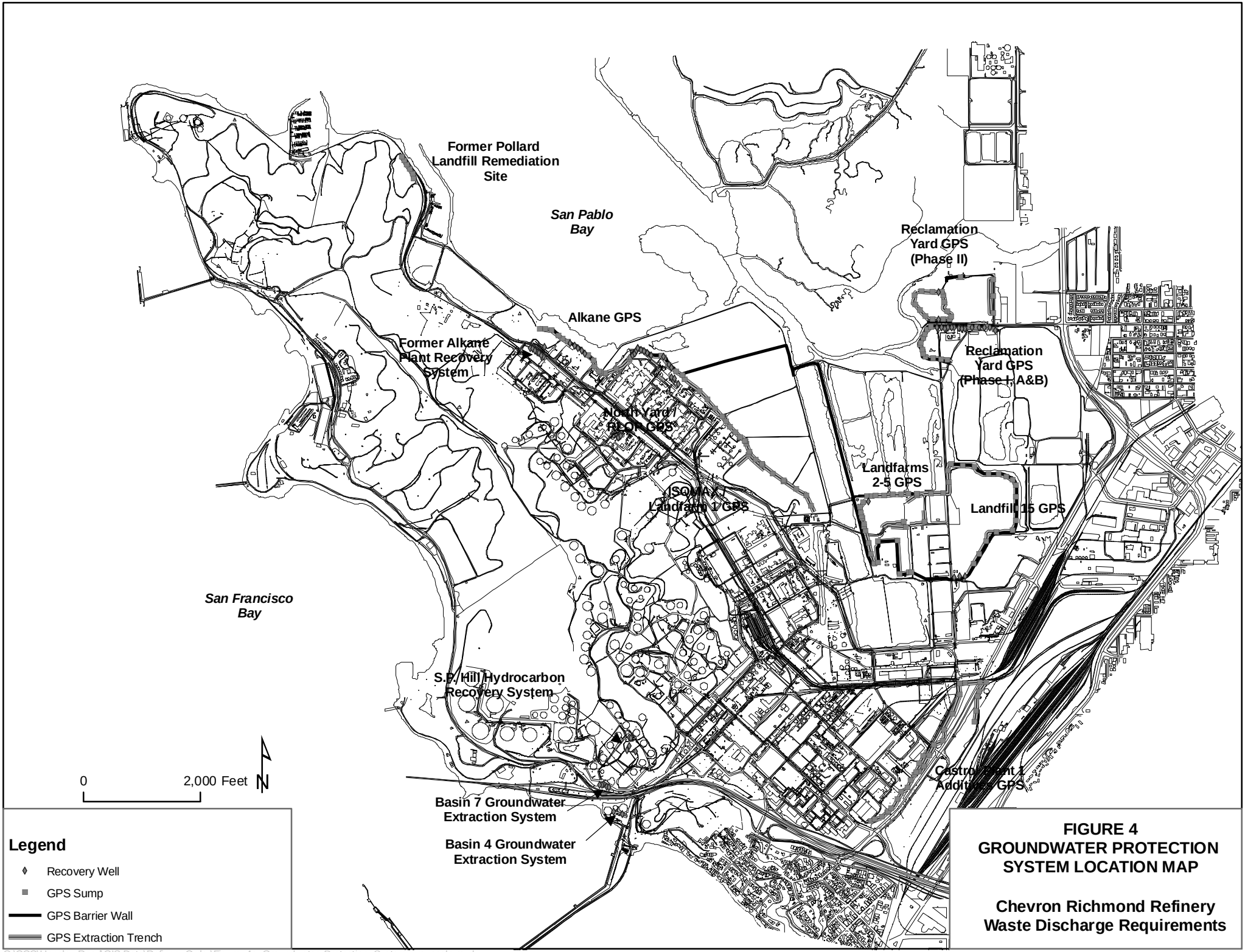
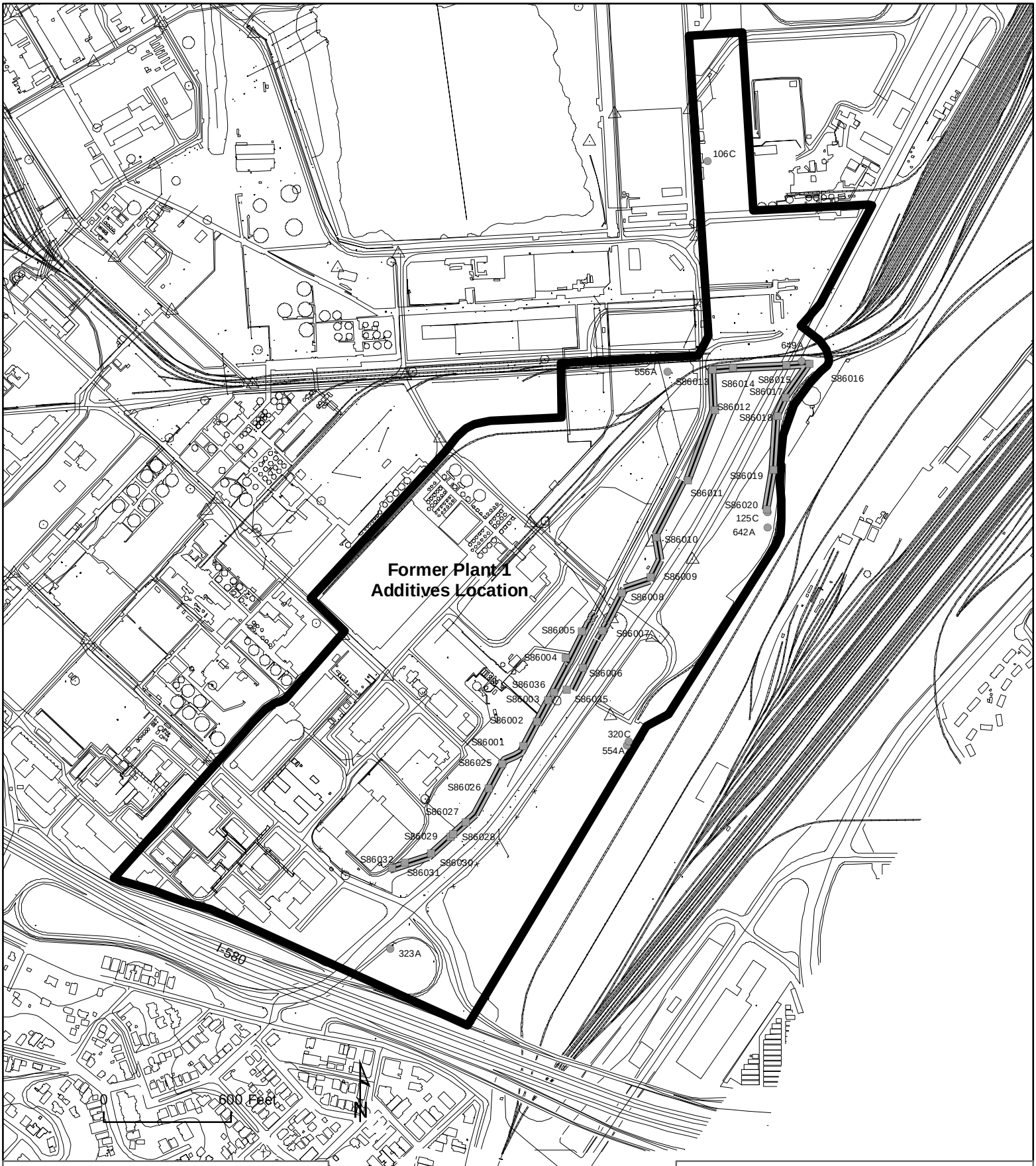


FIGURE 3
SECTOR BOUNDARIES

Chevron Richmond Refinery
Waste Discharge Requirements

O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_3_Sector_Boundaries_grayscale.mxd


Former Pollard Landfill Remediation Site
San Pablo Bay
Reclamation Yard GPS (Phase II)
Alkane GPS
Former Alkane Plant Recovery System
Reclamation Yard GPS (Phase I, A&B)
North Yard / FLOR GPS
Landfarms 2-5 GPS
(SOWA) / Landfarm 1 GPS
Landfill 15 GPS
San Francisco Bay
S.P. Hill Hydrocarbon Recovery System
Castro Point 1 Additional GPS
0
2,000 Feet
N
Basin 7 Groundwater Extraction System
Basin 4 Groundwater Extraction System
Legend
Recovery Well
GPS Sump
GPS Barrier Wall
GPS Extraction Trench
FIGURE 4
GROUNDWATER PROTECTION SYSTEM LOCATION MAP
Chevron Richmond Refinery
Waste Discharge Requirements
O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_4a_Groundwater_Protection_System_grayscale.mxd



Legend

- GPS Sump
- Monitoring Well
- GPS Extraction Trench
- Sector Boundary

FIGURE 5
PLANT 1 / ADDITIVES PLANT CAP

Chevron Richmond Refinery
Waste Discharge Requirements

O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_5_Plant_1_Additives_Plant_Cap_v2.mxd

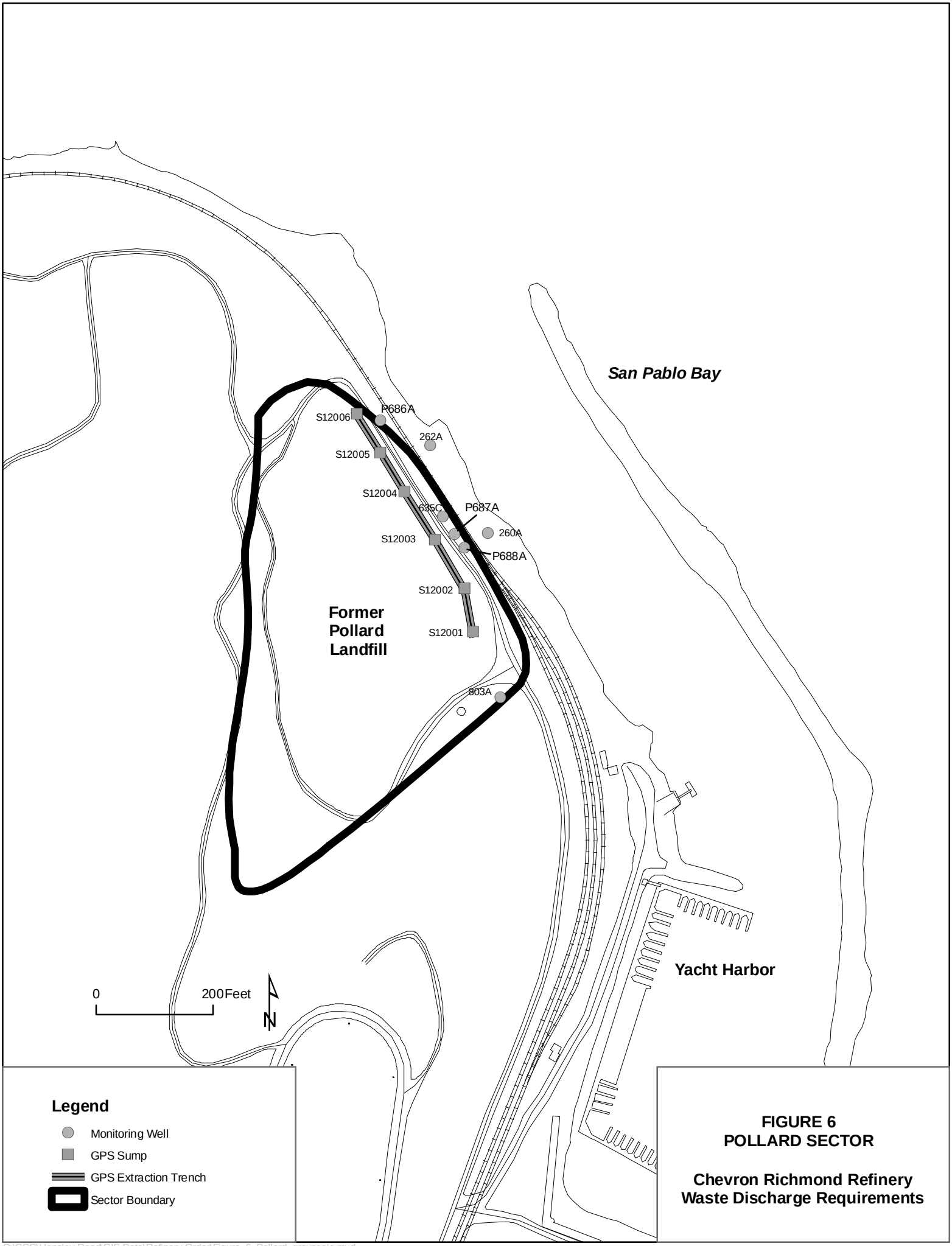


FIGURE 6
POLLARD SECTOR

Chevron Richmond Refinery
Waste Discharge Requirements

O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_6_Pollard_grayscale.mxd

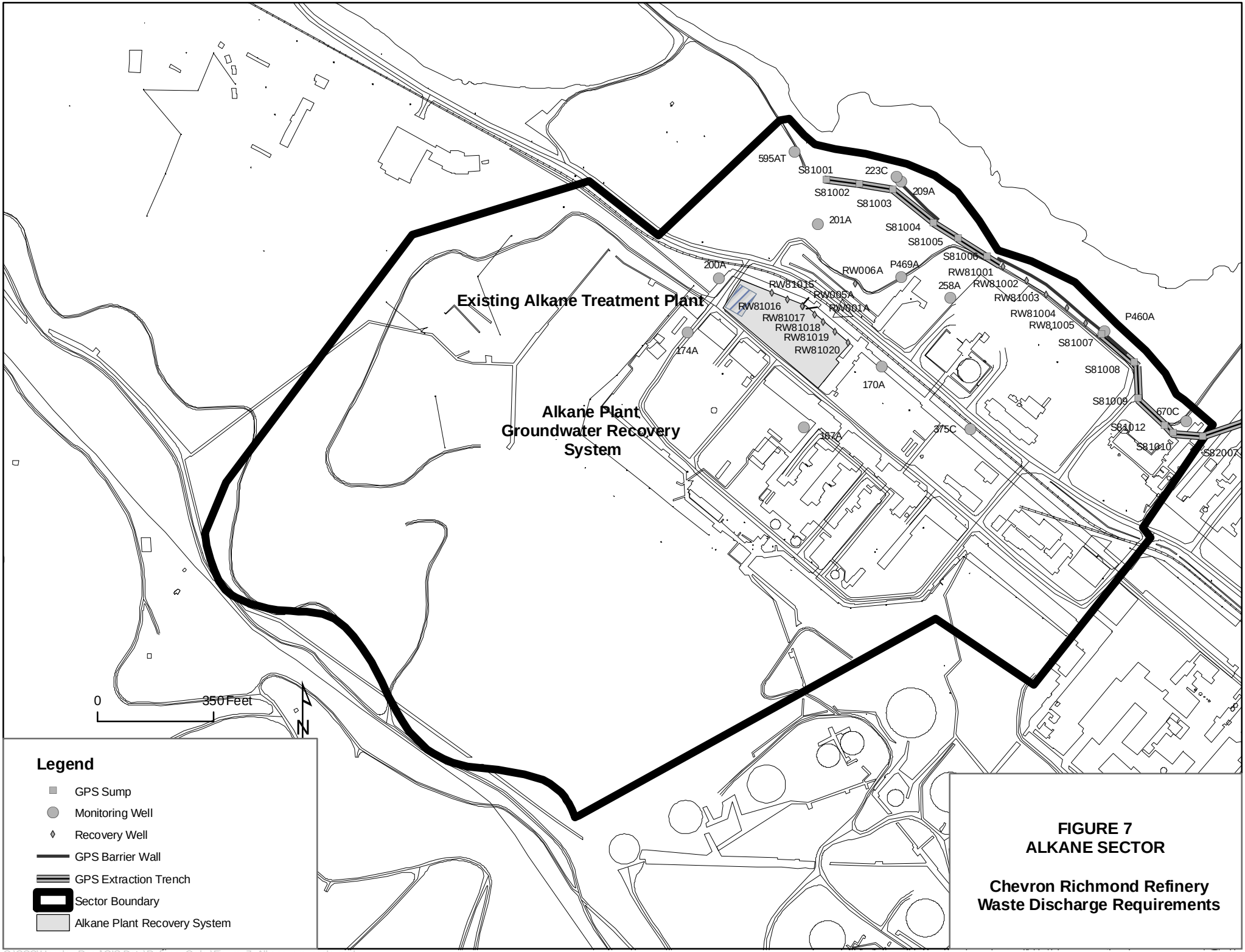


FIGURE 7
ALKANE SECTOR

Chevron Richmond Refinery
Waste Discharge Requirements

O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_7_Alkane_grayscale.mxd

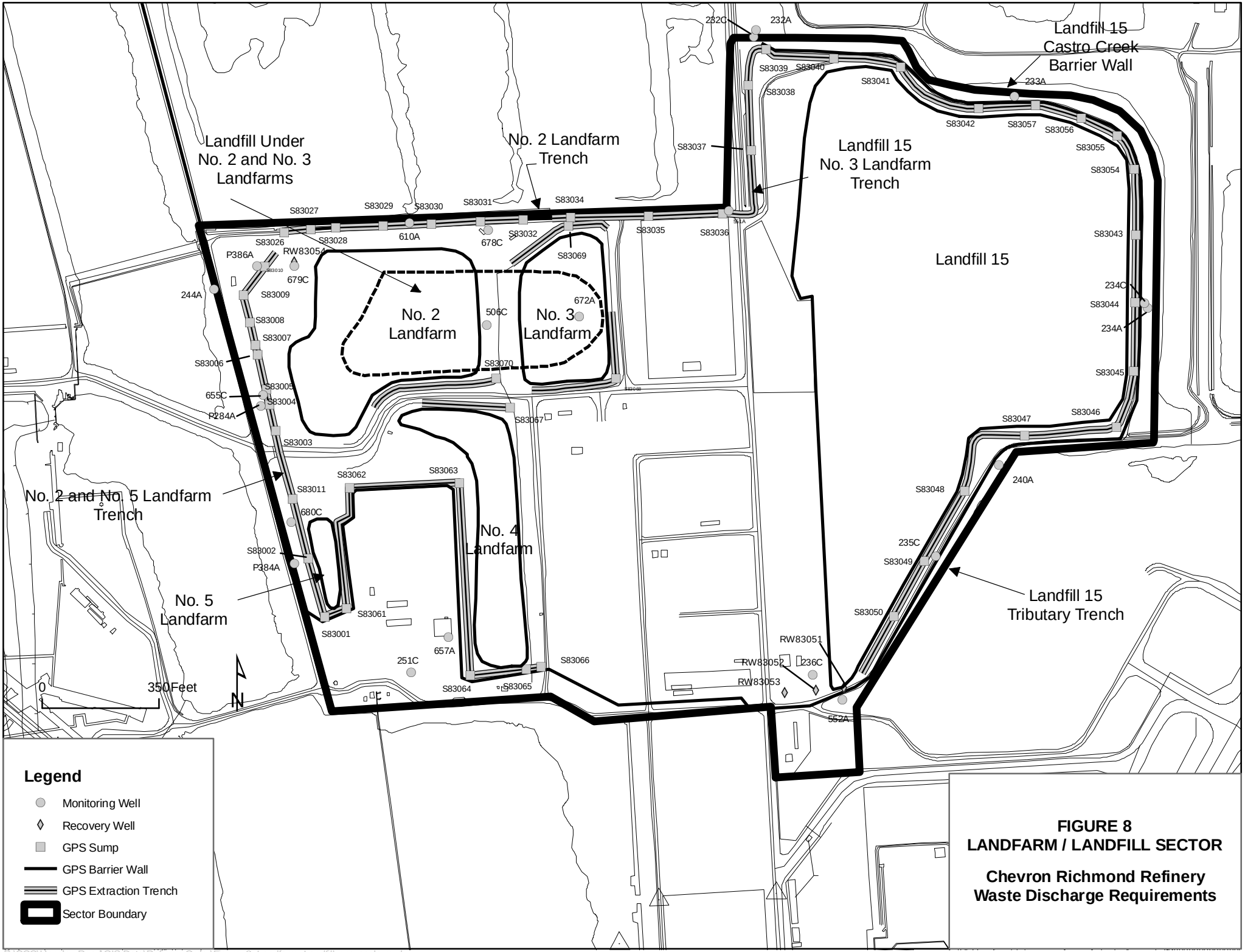


FIGURE 8
LANDFARM / LANDFILL SECTOR

Chevron Richmond Refinery
Waste Discharge Requirements

O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_8_Landfarm_Landfill_grayscale.mxd

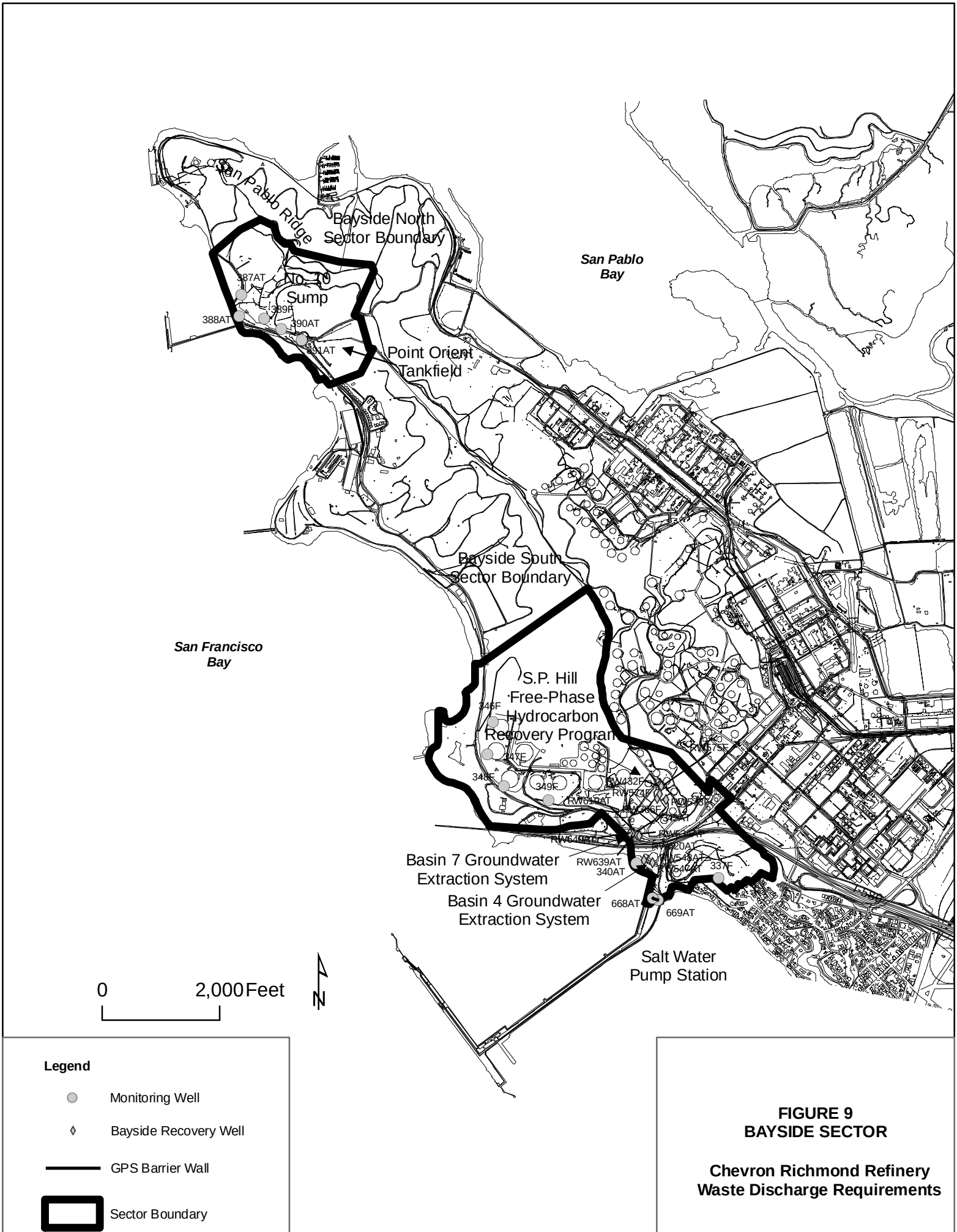
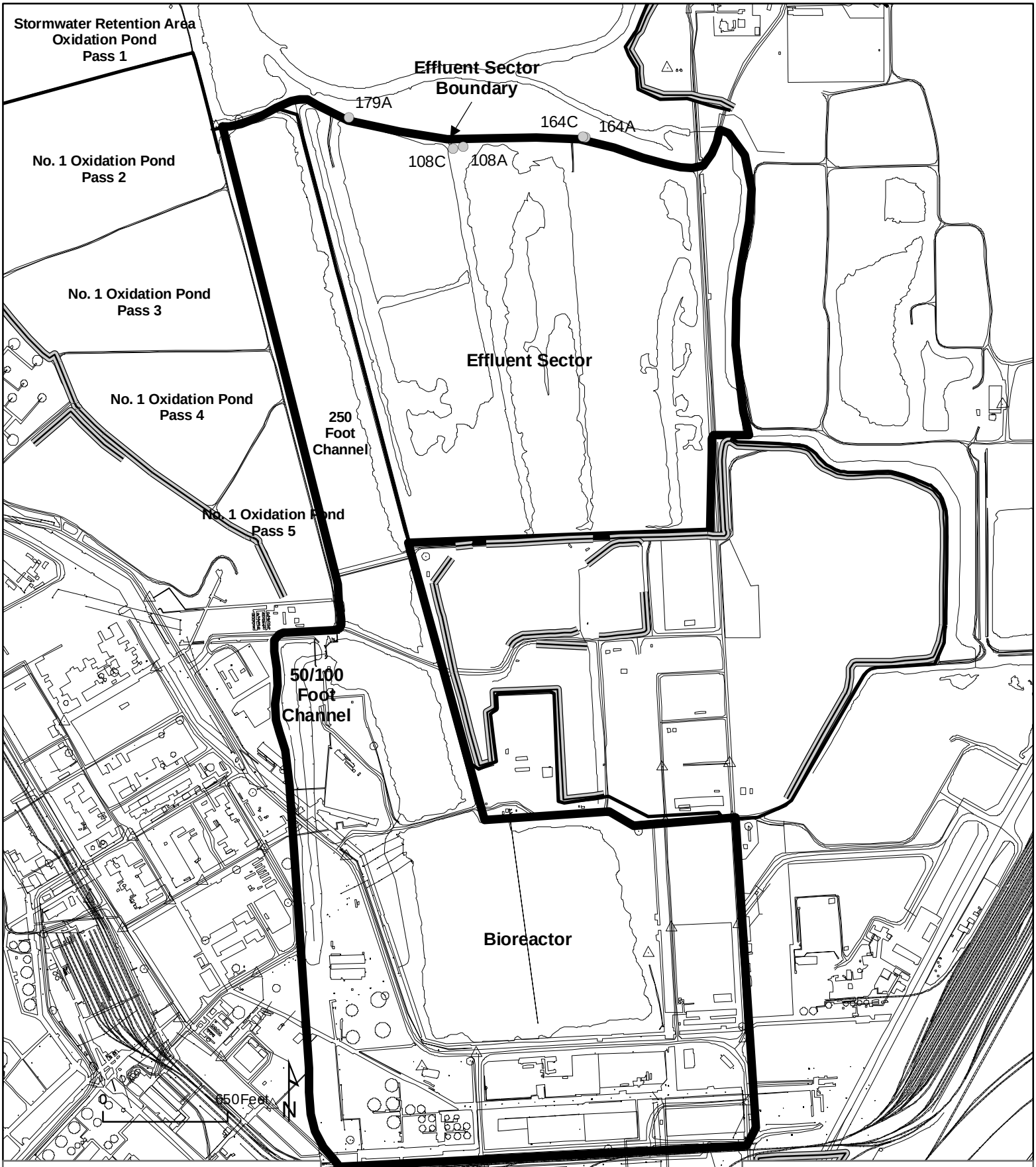


FIGURE 9
BAYSIDE SECTOR

Chevron Richmond Refinery
Waste Discharge Requirements

O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_9_Bayside_grayscale.mxd



Legend

- Monitoring Well
- GPS Barrier Wall
- GPS Extraction Trench
- Sector Boundary

FIGURE 10
EFFLUENT SECTOR

Chevron Richmond Refinery
Waste Discharge Requirements

O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_10_Effluent_Sector_Large_grayscale.mxd

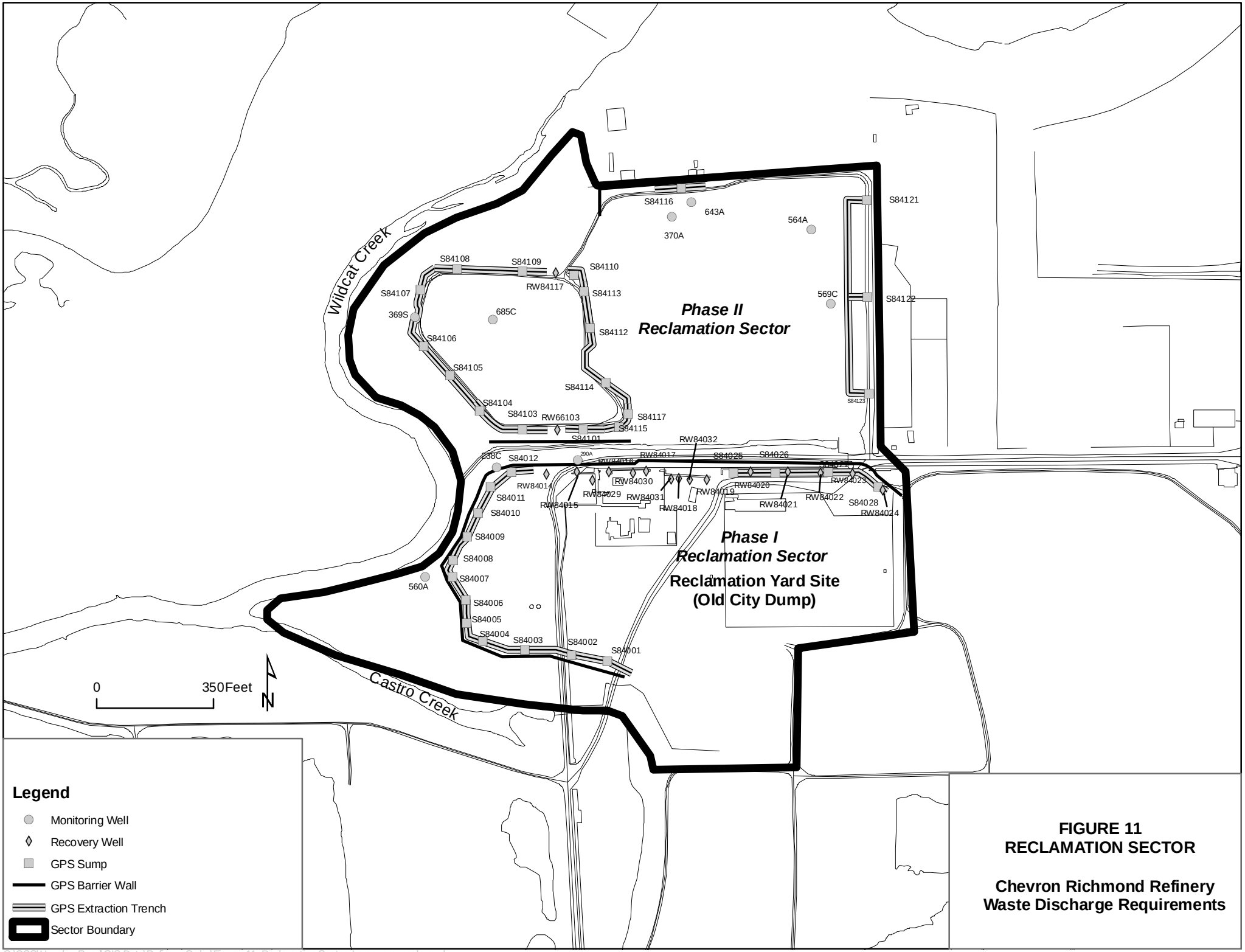


FIGURE 11
RECLAMATION SECTOR

Chevron Richmond Refinery
Waste Discharge Requirements

O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_11_Reclamation Sector_Large_grayscale.mxd

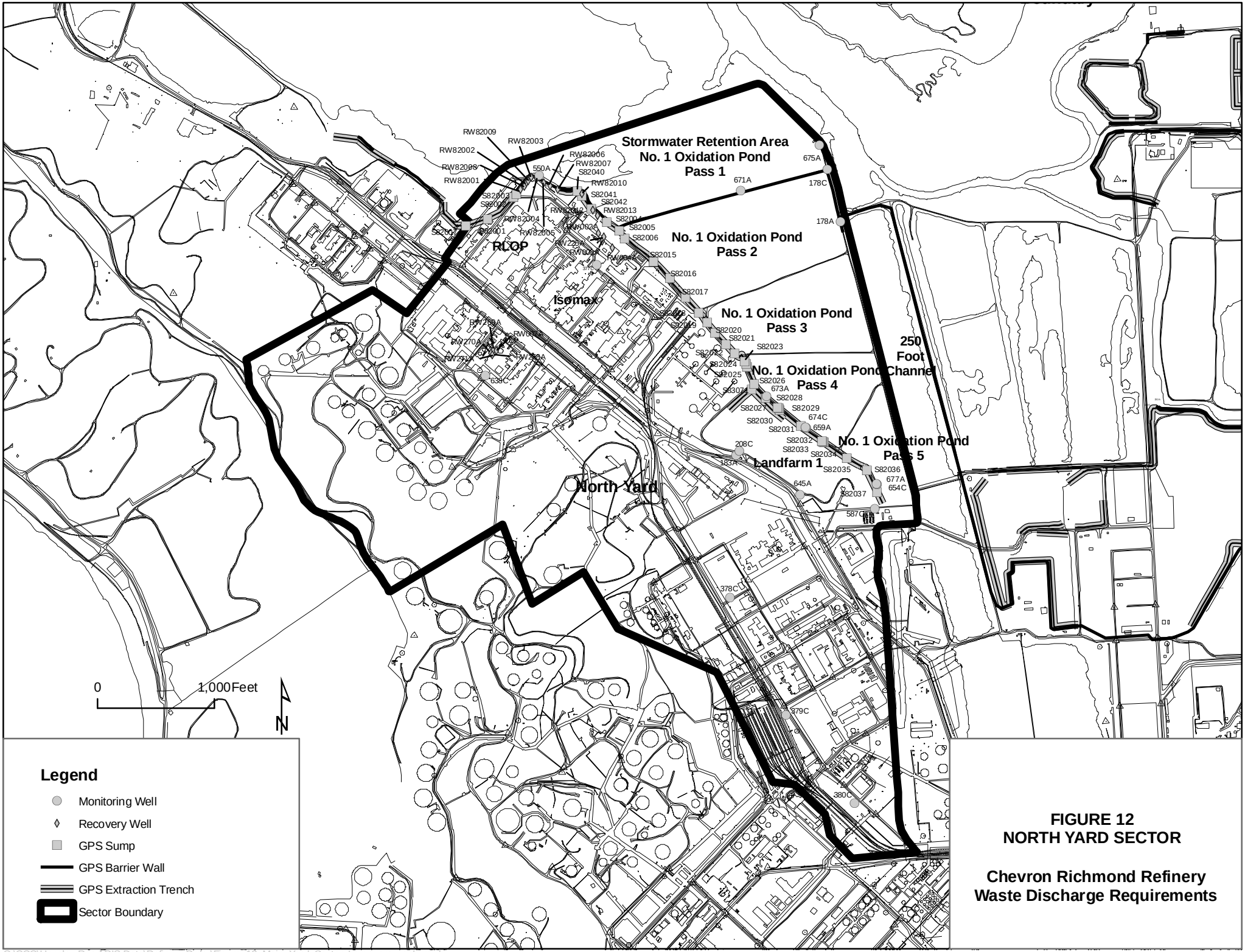
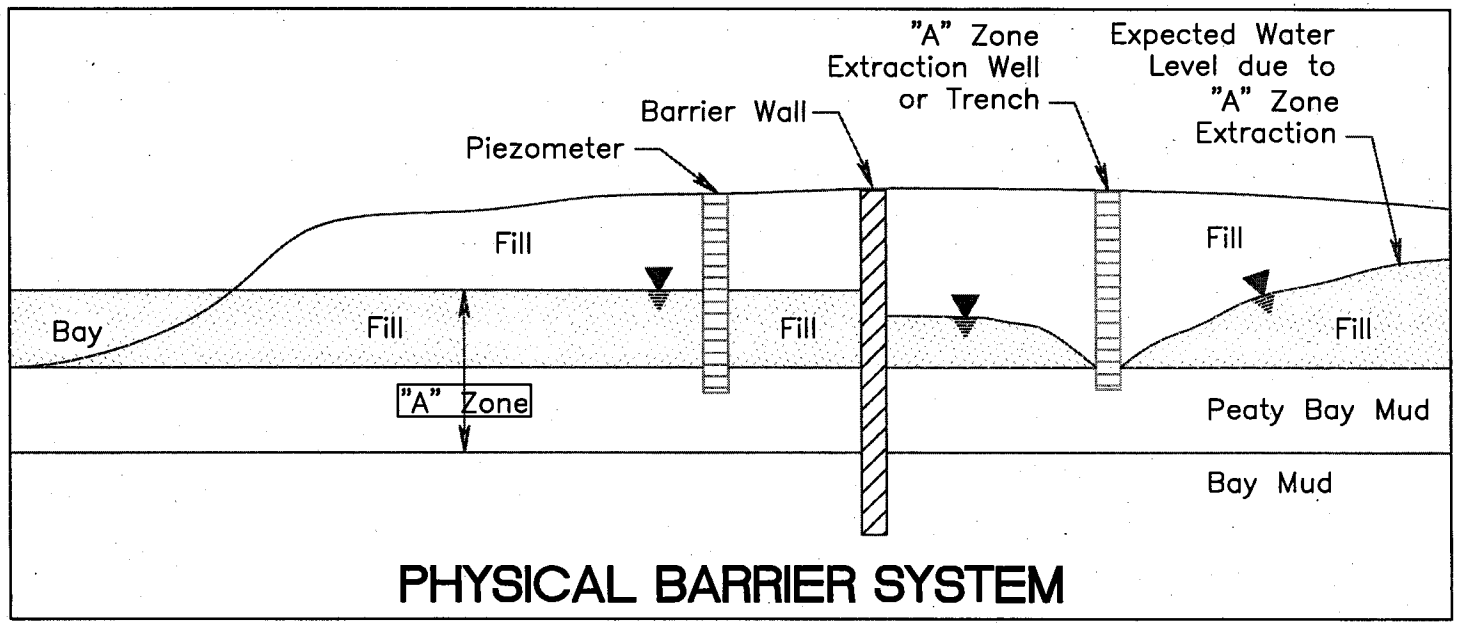
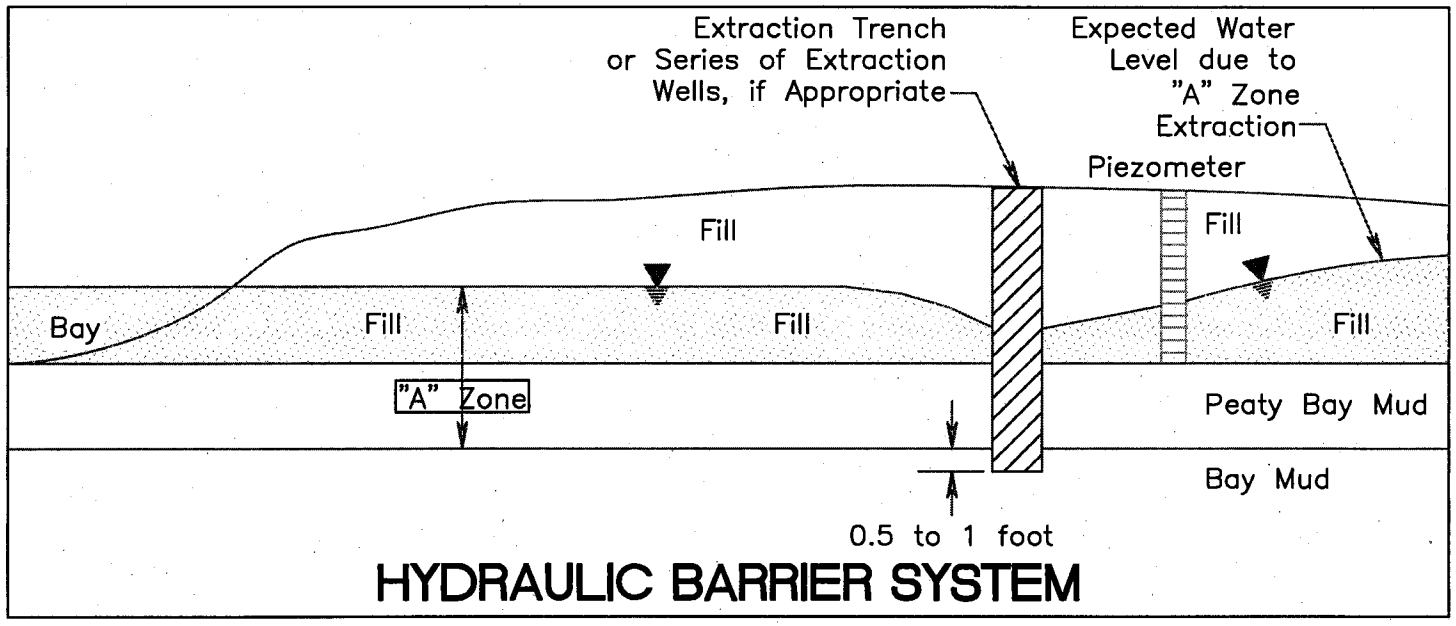


FIGURE 12
NORTH YARD SECTOR

Chevron Richmond Refinery
Waste Discharge Requirements

O:\CCC\Hensley Road\GIS Data\Refinery Order\Figure_12_Main_Yard_Sector_Large_grayscale.mxd





GROUNDWATER PROTECTION SYSTEM

Chevron Richmond Refinery
Waste Discharge Requirements

Figure 3

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

SELF-MONITORING AND REPORTING PROGRAM

FOR

CHEVRON PRODUCTS COMPANY
CHEVRON RICHMOND REFINERY
841 CHEVRON WAY
RICHMOND, CONTRA COSTA COUNTY

ORDER NO. R2-2012-0015

CONSISTS OF PART A AND PART B

PART A

This combined Self-Monitoring Program (SMP) specifies monitoring and reporting programs necessary to fulfill obligations under the Waste Discharge Requirements (WDRs) and Site Cleanup Requirements (SCRs), including:

(a) General monitoring requirements for landfills and waste management units under the WDRs (Part A);
(b) General monitoring requirements related to cleanup activities performed under the SCRs (Part A);
(c) Self-monitoring report content and format (Part A);
(d) Self-monitoring report submittal frequency and schedule (Part B);
(e) Monitoring locations, parameters, analytes and frequency for programs under the WDRs (Part B); and
(f) Monitoring locations, parameters, analytes and frequency for programs under the SCRs (Part B).

A. AUTHORITY AND PURPOSE

For discharges of waste to land, water quality monitoring is required pursuant to the California Code of Regulations (CCR), Division 2, Title 27, Subdivision 1, Chapter 3, Subchapter 3, sections 20380 through 20435. The principal purposes of an SMP include: 1) to document compliance with WDRs and prohibitions established by the Regional Water Board, 2) to facilitate self-policing by the discharger in the prevention and abatement of pollution arising from the waste discharge, 3) to develop or assist in the development of effluent standards of performance and toxicity standards, and 4) to assist the discharger in complying with the requirements of Title 27. Additionally, under California Water Code (CWC) section 13304, Chevron is required to implement corrective actions and monitor the effectiveness of the implemented corrective actions under this combined SMP.

B. MONITORING REQUIREMENTS

Monitoring refers to the observation, inspection, measurement, and/or sampling of environmental media, waste management units (WMUs), containment and control facilities, and waste disposed in each WMU. The monitoring programs designed to evaluate the potential release of wastes from WMUs are included in the WDRs Monitoring Program described in this combined SMP. Monitoring programs designed to evaluate the effectiveness of corrective actions implemented under CWC section 13304 are also described in the combined SMP. The following defines the types of monitoring that may be required.

Monitoring of Environmental Media

The Regional Water Board may require monitoring of groundwater, surface water, vadose zone, stormwater, leachate, and any other environmental media that may pose a threat to water quality or provide an indication of a water quality threat at the refinery.

Sample collection, storage, and analyses shall be performed according to the most recent version

of U.S. EPA-approved methods or in accordance with Groundwater Monitoring Program Standard Operating Procedures (SOP) or subsequent revisions approved by Regional Water Board staff. Analytical testing of environmental media required by this SMP shall be performed by a California State-approved laboratory for the required analyses. The director of the laboratory whose name appears on the certification shall be responsible for supervising all analytical work in his/her laboratory and shall have signing authority for all laboratory data reports or may designate signing of all such data included in reports submitted to the Regional Water Board.

All monitoring instruments and devices used to conduct monitoring in accordance with this SMP shall be maintained and calibrated as necessary to ensure their continued accuracy. All flow measurement devices shall be calibrated at least once every two years.

Receiving waters refer to any surface water which actually or potentially receives surface or groundwater that pass over, through, or under waste materials or impacted soils. In this case, the groundwater beneath and adjacent to the WMU areas and the surface runoff from the refinery site are considered receiving waters.

Standard Observations

Standard observations refer to observations within the limits of each WMU, at their perimeter, and of the receiving waters beyond their limits. Standard observations include:

1. Waste Management Units:
   a. Evidence of ponded water at any point on the WMU;
   b. Evidence of odors, including their presence or absence, characterization, source, and distance of travel from source; and
   c. Evidence of erosion and/or daylighted waste.

2. Perimeter of Waste Management Units:
   a. Evidence of liquid leaving or entering the WMU, estimated size of affected area and flow rate (show affected area on map);
   b. Evidence of odors, including their presence or absence, characterization, source, and distance of travel from source; and
   c. Evidence of erosion and/or daylighted waste.

3. Receiving Waters:
   a. Floating and suspended materials of waste origin, including their presence or absence, source, and size of affected area;
   b. Discoloration and turbidity: description of color, source, and size of affected area;
   c. Evidence of odors, presence or absence, characterization, source, and distance of travel form source;
   d. Evidence of beneficial use, such as presence of water associated with wildlife;
   e. Estimated flow rate; and
   f. Weather conditions, such as estimated wind direction and velocity, total precipitation.

Facilities Inspections

Facilities inspections refer to the inspection of all containment and control structures and devices associated with the environmental monitoring of the refinery. Containment and control facilities may include the following:

1. Intermediate and final covers; and
2. Stormwater management system elements such as perimeter drainage and diversion channels, ditches and downchutes, and detention and sedimentation ponds or collection tanks.

Quality Assurance/Quality Control (QA/QC) Sample Monitoring

Chevron shall collect duplicate, field blank, equipment blank (if appropriate) and trip blank samples for each monitoring event at the frequency specified in the latest version of the Groundwater Monitoring Program SOP.

C. REPORTING REQUIREMENTS

Reporting responsibilities of waste dischargers under WDRs and SCRs are specified in CWC § 13225(a), 13267(b), 13383, and 13387(b) and this Regional Water Board's Resolution No.73-16 and Title 27. At a minimum, each Self-Monitoring Report (SMR) shall include the following information:

1. Transmittal Letter: A cover letter transmitting the essential points of the monitoring report shall be included with each monitoring report. The transmittal letter shall discuss any violations during the reporting period and actions taken or planned to correct the problem. The letter shall also certify the completion of all monitoring requirements. The letter shall be signed by the Discharger's principal executive officer or his/her duly authorized representative, and shall include a statement by the official, under penalty of perjury, that the report is true and correct to the best of the official's knowledge.

2. Graphic Presentation: The following maps, figures, and graphs (if applicable) shall be included in each SMR to visually present data collected pursuant to this SMP:

   a. Plan-view maps showing all monitoring and sampling locations, WMUs, containment and control structures, treatment facilities, surface water bodies, and site/property boundaries;
   b. Groundwater level/piezometric surface contour maps for each groundwater-bearing zone of interest showing inferred groundwater gradients and flow directions under/around each WMU, based upon the past and present water level elevations and pertinent visual observations; and
   c. Any other maps, figures, photographs, cross-sections, graphs, and charts necessary to visually demonstrate the appropriateness and effectiveness of sampling, monitoring, characterization, investigation, or remediation activities relative to the goals of this SMP.

3. Tabular Presentation: The following data (if applicable) shall be presented in tabular form and included in each SMR to show a chronological history and allow quick and easy reference:

a. Well designation;
b. Well location coordinates (latitude and longitude);
c. Well construction (including top of well casing elevation, total well depth, screen interval depth below ground surface, and screen interval elevation);
d. Groundwater depths;
e. Groundwater elevations;
f. Current analytical results (including analytical method and detection limits for each constituent);
g. Historical analytical results (including at least the past five years in the annual report unless otherwise requested); and
h. Measurement dates.

4. Compliance Evaluation Summary and Discussion:

a. A summary and certification of completion of all environmental media monitoring, standard observations, and facilities inspections;
b. The quantity and types of wastes captured by the GPS and hydrocarbon recovery program, and the location these wastes were disposed of during the reporting period, if applicable;
c. A description of the waste stream, if applicable;
d. The signature of the laboratory director or his/her designee in laboratory data deliverables indicating that he/she has supervised all analytical work in his/her laboratory; and
e. A discussion of the field and laboratory results that includes the following information:

(1) Data interpretations (including of trends, especially in the context of potential correlation to the modified waste acceptance criteria);
(2) Conclusions;
(3) Recommendations;
(4) Newly implemented or planned investigations and remedial measures;
(5) Data anomalies;
(6) Variations from protocols;
(7) Condition of wells; and
(8) Effectiveness of leachate monitoring and control facilities.

5. Appendices: The following information shall be provided as appendices in electronic format only unless requested otherwise by Regional Water Board staff and unless the information is already contained in an SAP or SOP approved by Regional Water Board staff:

a. New boring and well logs;
b. Method and time of water level measurements;
c. Purging methods and results including the type of pump used, pump placement in the well, pumping rate, equipment and methods used to monitor field pH, temperature, and electrical conductivity, calibration of the field equipment, pH temperature, conductivity, and turbidity measurements, and method of disposing of the purge water;
d. Sampling procedures, field, equipment, and travel blanks, number and description of duplicate samples, type of sample containers and preservatives used, the date and time of sampling, the name of the person actually taking the samples, and any other relevant observations; and

e. Documentation of laboratory results, analytical methods, detection limits and reporting limits, and Quality Assurance/Quality Control (QA/QC) procedures for the required sampling.

D. ANNUAL REPORTING

The Discharger shall submit an annual self-monitoring report to the Regional Water Board covering the previous calendar year. The annual report must summarize all monitoring, investigation, and remedial activities that have occurred in the previous year. The annual report shall include the following information for each monitoring event during the year required pursuant to this SMP, in addition to the transmittal letter and appendices described in Sections C.1, C.2, and C.3 of this SMP:

1. **Graphic Presentation**
   Include site maps (plot plans) for each aquifer or water-bearing zone monitored that are drawn to a scale that remains constant from reporting period to reporting period. Line or bar graphs are helpful to illustrate variations in groundwater elevations, phase-separated product thickness, and dissolved chemical concentrations with time. These maps and graphs shall include the following information:

   a. Known or probable contaminant sources;
   b. Well locations;
   c. Groundwater elevation contours;
   d. Inferred groundwater flow direction(s);
   e. Identify wells containing phase-separated product;
   f. Extent of dissolved chemical constituents presented in map layout (e.g., isoconcentration maps, chemical box data maps, etc.); and
   g. Appropriate analytical results.

   Geologic cross sections are required if new data is available and/or the previous interpretation of subsurface conditions has changed. When required, geologic cross sections shall include the following:

      i. Vertical and lateral extent of contamination;
      ii. Contaminant sources;
      iii. Geologic structures;
      iv. Soil lithology;
      v. Water table/piezometric surfaces;
      vi. Sample locations;
      vii. Sample analytical results; and
      viii. Subsurface utilities and any other potential natural or manmade conduits for contaminant migration.

2. **Tabular Presentation**
   Present all of the following data in one or more tables to show a chronological history and allow quick and easy reference. The table(s) shall include the following information:

   a. Well designations;
   b. Well location coordinates (latitude and longitude);

c. Well construction (including top of well casing elevation, total well depth, screen interval depth below ground surface, and screen interval elevation);
d. Groundwater depths;
e. Groundwater elevations;
f. Horizontal groundwater gradients;
g. Vertical groundwater gradients (including comparison wells from different zones);
h. Phase-separated product elevations;
i. Phase-separated product thickness;
j. Current analytical results (including analytical method and detection limits for each constituent);
k. Historical analytical results for the most recent four sampling events;
l. Measurement dates;
m. Groundwater extraction, including:

    i. Average daily extraction rate;
    ii. Total volume extracted for monitoring period;
    iii. Annual cumulative total volume extracted; and

n. Estimate of contaminant volume extracted (reported in gallons) including:

    i. Average daily removal rate;
    ii. Total volume removed for monitoring period;
    iii. Annual cumulative total volume removed.

3. **Discussion**
Provide a discussion of the field and laboratory results that includes the following information:

a. Data Interpretations;
b. Conclusions;
c. Recommendations;
d. Newly implemented or planned investigations and remedial measures;
e. Data anomalies;
f. Variations from protocols; and
g. Conditions of wells.

E. CONTINGENGY REPORTING

1. The Discharger shall report any seepage from the surface of any WMU or discharge prohibited in the WDRs or SCRs immediately after it is discovered to the Regional Water Board by calling the Spill Hotline at 1-800-852-7550 and by sending an email to Rb2SpillReports@waterboards.ca.gov. The Discharger shall submit a written report with the Regional Water Board within five days of discovery of any discharge. The written report shall contain, at a minimum, the following information:

a. A map showing the location(s) of discharge;
b. Approximate flow rate;
c. A description of the nature of the discharge; and
d. Corrective measures underway or proposed.

2. The Discharger shall submit a written report to the Regional Water Board within seven working days of determining that a statistically significant difference occurred in the sample result compared against the historical dataset and above an approved WQPS in a perimeter segment-monitoring well. In addition, evaluation of GPS performance will be reviewed to examine the effectiveness of hydraulic control.

   a. Chevron shall immediately re-sample at the compliance point where the exceedence was observed, evaluate the result against the historical dataset and re-analyze if results are not consistent with historical trends.

   b. If re-sampling and analysis confirm the exceedence through statistical analysis, Chevron shall document this in the text of the next Annual Report and notify the Regional Water Board in writing within 21 days of re-sampling. In this letter, Chevron shall evaluate whether any re-sampling or additional corrective measures need to be implemented.

F. ELECTRONIC REPORTING

1. **Geotracker Requirements**
   The State Water Board has adopted regulations requiring electronic report and data submittal to Geotracker. The text of the regulations can be found at the following URL:

   http://www.waterboards.ca.gov/water_issues/programs/ust/electronic_submittal/index.shtml

   Parties responsible for cleanup of pollution at sites overseen by the Regional Water Board's Land Disposal Programs are required to submit the following information electronically to Geotracker:

   a. Groundwater analytical data;
   b. Surveyed locations of monitoring wells;
   c. Boring logs describing monitoring well construction; and
   d. Portable data format (PDF) copies of all reports (the document in its entirety [signature pages, text, figures, tables, etc.] must be saved as a single PDF file).

   Note that the Discharger is still responsible for submitting one hard copy of all reports pursuant to this Order. The Regional Water Board may require direct submittal of electronic reports and correspondence in addition to the State Water Board's Geotracker requirements.

2. **Data Tables**
   Upon request, monitoring results shall also be provided electronically in Microsoft Excel@ or similar spreadsheet format to provide an easy to review chronological summary of site data, and to facilitate data computations and/or plotting that Water Board staff may undertake during the review process. Data tables submitted in electronic spreadsheet format will not be included in the case file for public review and should therefore be submitted on CD or diskette and included with the print report. Electronic tables shall include the following information:

a. Well designations;
b. Well location coordinates (latitude and longitude);
c. Well construction (including top of well casing elevation, total well depth, screen interval depth below ground surface, and screen interval elevation);
d. Groundwater depths and elevations (water levels);
e. Phase-separated product thicknesses and elevations;
f. Current analytical results by constituent of concern (including detection limits for each constituent);
g. Historical analytical results (including the past four sampling events); and
h. Measurement dates.

G. MAINTENANCE OF WRITTEN RECORDS

The Discharger shall maintain information required pursuant to this SMP for a minimum of five years. The five-year period of retention shall be extended during the course of any unresolved litigation regarding this discharge or when requested by the Regional Water Board.

PART B: MONITORING AND OBSERVATION SCHEDULE

1. DESCRIPTION OF OBSERVATION STATIONS AND SCHEDULE OF OBSERVATIONS

A. GROUNDWATER MONITORING:

Semi-Annual Reports: Due August 31 and March 1 of each year
Annual Report: Due March 1 of each year

Groundwater shall be sampled and analyzed as detailed in Tables 2 and 4. Monitoring well locations are listed in Tables 1 and 3. Groundwater analyses shall include the following field measurements: pH, temperature, specific conductance, water level, volume purged, number of casings volumes purged, and whether the well went dry during sampling (including measures taken to ensure accuracy of analyses given this condition). Groundwater monitoring wells installed in the future will be sampled and analyzed as detailed in Tables 2 and 4 and on a quarterly basis until a statistically significant dataset is established.

B. FACILITIES MONITORING - **Observe quarterly, report semi-annually**

Semi-Annual Report: Due August 31 and March 1 of each year
Annual Report: Due March 1 of each year

The Discharger shall inspect all facilities to ensure proper and safe operation and report semi-annually. The facilities to be monitored shall include, but not be limited to:

1. Waste Containment systems;
2. Waste treatment systems;
3. Surface water retention basins;
4. Leak detection systems (where applicable); and
5. Leachate/groundwater management facilities and secondary containment where applicable.

2. GPS PERFORMANCE MONITORING

Chevron shall measure the water level in each GPS corrective action monitoring well and in a sufficient number of wells or piezometers both upgadient and downgradient of the GPS to demonstrate continuous maintenance of a hydraulic depression in the GPS trenches (inward hydraulic gradient). To demonstrate the effectiveness of the GPS, Chevron shall include the following for each refinery sector in the semi-annual SMRs:

a. contour maps of 1st and 3rd quarter GPS groundwater elevation data;

b. hydrographs showing water level data (measured at least once per week) at each operating extraction sump or recovery well;
c. a narrative summary of the GPS performance during the reporting period; and,
d. an estimate of the volume of groundwater extracted during the reporting period.

3. ON-SITE OBSERVATIONS/POST-CLOSURE MAINTENANCE AND MONITORING

Closed WMUs (Plant l/Additives Plant, Landfill 15, Landfarms 1-5, the Hydropits, Parr-Richmond Landfill and the Gertrude Street Site) shall be inspected annually by a registered California engineer or geologist prior to the onset of the rainy season. These annual inspections shall include identification of areas of the final covers where the soil has become eroded, attacked by rodents, or otherwise damaged, or where the paved areas have become damaged. Chevron shall perform appropriate repairs for these areas prior to the rainy season. In addition, Chevron shall monitor runoff/run-on control facilities for their effectiveness and overall condition as needed according to weather conditions during the winter months (November through April) and as prescribed in the approved post-closure maintenance/monitoring plan for each individual WMU. Chevron shall maintain records of all inspections and repairs and summarize in each semi-annual monitoring report any repairs made during the corresponding reporting period.

4. ALKANE PLANT PLUME REMEDIATION MONITORING

Chevron shall continue to monitor the Alkane Plant Plume remediation effort in accordance with *the Revised Alkane Plant Plume Remediation Goals Plan* (URS, 2001). The monitoring components of this plan include measuring potentiometric water levels, liquid hydrocarbon thickness, and benzene and fluoride concentrations. Benzene and fluoride concentrations will continue to be measured annually in samples collected from 6 wells (listed in Table 1), located around the perimeter of the plume to verify containment of the plume.

5. FREE-PHASE LIQUID HYDROCARBON (FPLH) RECOVERY SUMMARY

Chevron shall include a map in each semi-annual SMR that shows the locations of all wells within the refinery that contain FPLH. The measured thickness of the FPLH in each well should be indicated on the map next to the well. Recovery of FLPH will be performed in accordance with the procedures described in the *Free-Phase Liquid Petroleum Hydrocarbon Recovery Evaluation Plan, Chevron Richmond Refinery* (URS, 2000). In addition, the SMR shall include a description of FPLH recovery method used, recovery volume data for the reporting period and cumulative recovery data for each active recovery well or system.

6. CHEMICAL CONSTITUENT MONITORING

a. Refinery-Wide Groundwater Monitoring Program: Chevron shall sample the Refinery-Wide Corrective Action Groundwater Monitoring Program compliance monitoring points listed in Table 1 for the analytical parameters and at the frequencies listed in Table 2. All monitoring activities, including analytical and QA/QC procedures will be conducted in

accordance with the most recent version of Chevron's Groundwater Monitoring Program Standard Operating Procedure.

b. Landfarm Post-Closure Monitoring Program: Chevron shall sample the Landfarms Post-Closure Monitoring Program monitoring points listed in Table 3 for the analytical parameters and at the frequencies listed in Table 4. All monitoring activities, including analytical and QA/QC procedures will be conducted in accordance with the most recent version of Chevron's Groundwater Monitoring Program Standard Operating Procedure. Monitoring events for constituents of concern and Appendix IX analyses shall alternate between periods of highest and lowest groundwater levels.

c. Chevron shall sample new wells installed to monitor Landfarms 1 through 5 for COCs and MPs listed in Table 4 over eight consecutive quarters. Within the first year after installation, Chevron shall analyze new wells for the Appendix IX constituents listed in Table 4. Chevron shall add any new compounds detected in new wells to the list of COCs in Table 4.

d. Chevron shall sample the monitoring points listed in Table 3 regardless of the presence of nonaqueous phase liquid as follows:

   i. For monitoring points with persistent nonaqueous phase liquid (e.g., more than two consecutive quarters), Chevron shall collect samples every other year for COCs and Appendix IX (if well is POC). For monitoring points with intermittent nonaqueous phase liquid (e.g., not detected during consecutive quarters), Chevron shall collect samples semi-annually.

   ii. Chevron shall obtain samples for dissolved phase analysis after purging nonaqueous phase liquid from the well, by low-flow sampling, or by another appropriate method.

   iii. Chevron shall follow the most recent version of the Chevron Groundwater Monitoring Program Standard Operating Procedure.

e. Chevron shall monitor “A” Zone monitoring points in Table 3 under a corrective action monitoring program (22 CCR 66264.100).

f. Chevron shall monitor “C” Zone monitoring points in Table 3 under a detection monitoring program (22 CCR 66264.98).

Attachments:

Table 1: List of Monitoring Wells by Sector, Refinery-Wide Groundwater Monitoring Program
Table 2: Maximum Allowable Concentration Limits for Constituents of Concern and Monitoring Parameters for the Refinery-Wide Groundwater Monitoring Program
Table 3: Landfarm Area Monitoring Well Network
Table 4: Landfarm Post-Closure Monitoring Program, Monitoring Parameters, Constituents of Concern and MACLs

Table 1: List of Monitoring Wells by Sector
Refinery-Wide Groundwater Monitoring Program
Chevron Richmond Refinery

Alkane Sector	Castro and Plant 1/Add. Sector	Landfarms /Landfill 15 Sector	North Yard Sector	Reclamation Yard Sector	Pollard Sector	Effluent Sector	Bayside North	Bayside South	Interior "C" Zone
209A	323A	232A	178A	290A	260A	108A	387AT	346F	208C
P460A	642A	233A	675A	643A	262A	164A	388AT	347F	638C
595AT	554A	234A	550A	370A	803A	179A	389F	348F	378C
223C	556A	240A	377C	560A	635C	108C	390AT	349F	379C
375C	106C	244A	178C	685C		164C	391AT	351CT	380C
670C	125C		671A	238C				345AT	138C
167A*	320C	551A		369S				340AT	382C
170A*	649A	552A		564A				337F	
174A*		232C		569C				RW619AT#	
200A*		234C						RW534AT#	
201A*		235C							
258A*		236C							

Notes:
* Wells associated with Alkane Plant Plume Remediation Monitoring
# Wells with Remediation Monitoring Plan, S.P. Hill Tankfield

Table 2: Maximum Allowable Concentration Levels (MACLS) for Constituents of Concern and Monitoring Parameters for the Chevron Refinery -Wide Groundwater Monitoring Program

Constituents of concern	MACL (µg/l) Unless otherwise noted		Landfarms/landfills Sector	Castro Sector	North Yard Sector	Bayside Sector- North	Bayside Sector- south	Alkane Sector	Effluent Sector	Reclamation Sector	Pollard Sector	Interior "C" zone
TPH-Gas	1200	*	S	S	S	S	S	S	S	S	S	S
TPH- Diesel	640	*	S	S	S	S	S	S	S	S		S
Benzene	46	*	S	S	S	S	S	S	S	S	B	S
MTBE	1800	*	S	S	S	S	S	S	S	S	B	S
Acenaphthene	40	*	B	B	B	B	B	B	B	B	B	
Acenaphthylene	307	*	B	B	B	B	B	B	B	B	B	
Anthracene	21	*	B	B	B	B	B	B	B	B	B	
Benzo(a)pyrene	0.049	*	B	B	B	B	B	B	B	B	B	
Benzo(b)fluoranthene	0.049	*	B	B	B	B	B	B	B	B	B	
Benzo(g,h,i)perylene		*	B	B	B	B	B	B	B	B	B	
Benzo(k)fluoranthene	0.049	*	B	B	B	B	B	B	B	B	B	
Chrysene	0.049	*	B	B	B	B	B	B	B	B	B	
Dibenzo(a,h)anthracene	0.049	*	B	B	B	B	B	B	B	B	B	
Fluoranthene	7.1	*	B	B	B	B	B	B	B	B	B	
Fluorene	39	*	B	B	B	B	B	B	B	B	B	
Indeno(1,2,3-cd)pyrene	0.049	*	B	B	B	B	B	B	B	B	B	
Naphthalene	194	*	B	B	B	B	B	B	B	B	B	
Phenanthrene	19	*	B	B	B	B	B	B	B	B	B	
Pyrene	10	*	B	B	B	B	B	B	B	B	B	
Chlordane	0.00059	*		B						B		
G-BHC (Lindane)	0.063	*		B						B		
Dieldrin	0.0019	*		B						B		
Selenium	5.0	*	B	B	B			S	B	B	B	
Arsenic	36	*	S	B					B	S		
Cadmium	9.3	*	B	B	B			B	B	B	S	B
Chromium VI	50	*	B	B	B			B	B	B	B	B
Lead	5.6	*	S	S	S	S	S	S	S	S		B
Mercury	0.025	*	B						B	B		
Nickel	8.2	*	S	B	S			S	B	S	S	S

Constituents of concern	MACL (µg/l) Unless otherwise noted		Landfarms/landfills Sector	Castro Sector	North Yard Sector	Bayside Sector- North	Bayside Sector- south	Alkane Sector	Effluent Sector	Reclamation Sector	Pollard Sector	Interior "C" zone
Zinc	71	*	S	B	B			B	B	B	S	B
Fluoride	2400	*						S				
Un-ionized Ammonia-N	25	*							B	B		
pH	6.5 to 8.5	*	S	S	S	S	S	S	S	S	S	S
Turbidity (NTUs)	N/A	N/A	S	S	S	S	S	S	S	S	S	S
Temperature	N/A	N/A	S	S	S	S	S	S	S	S	S	S

Notes:
* MACLs to be reviewed and updated by the Discharger per Task 14

S = Monitoring Parameter per Sector (analyzed semi-annually)
B= Constituent of concern per Section (analyzed during summer/fall reporting period every 2 years (even-numbered years)

N/A = not applicable
(NTUs) = Nephelometric Turbidity Units

Table 3
Landfarm Area Monitoring Well Network

Monitoring Wells for Landfarm Area
"A" Zone Wells
183A (POC)
610A (POC)
645A
657A
659A (POC)
672A
673A
677A
P284A (POC)
P384A
P386A
"C" Zone Wells
251C (POC)
506C (POC)
587C
654C (POC)
655C (POC)
674C
678C (POC)
679C (POC)
680C (POC)

Notes:
POC indicates that well is a point of compliance well.

Table 4
Landfarms Post-Closure Monitoring Program
Monitoring Parameters, Constituents of Concern and MACLs

Constituent	MACL µg/l (2)	MACL Source	"A" zone Well Monitoring Frequency (5)	"C" zone Well Monitoring Frequency (5)
Monitoring Parameters				
pH	6.5 to 8.5	1	S	S
Specific Conductivity	N/A	N/A	S	S
Turbidity	N/A	N/A	S	S
Temperature	N/A	N/A	S	S
Arsenic	36	*	S	S
Lead	5.6	*	S	S
Nickel	8.2	*	S	S
Zinc	71	*	S	S
TPH-Gasoline	1200	*	S	S
TPH-Diesel	640	*	S	S
TPH-Diesel Silica Gel	640	*	S	S
Benzene	46	*	S	S
MTBE	1800	*	S	S
Toluene	5000	*	S	S
Phenolics (Total)	50	*	S	S
Constituents of Concern				
Cadmium, Dissolved	9.3	*	B	B
Chromium VI, Dissolved	50	*	B	B
Mercury, Dissolved	0.025	*	B	B
Selenium, Dissolved	5	*	B	B
Dissolved sulfide	100	*	B	B
Methylene Chloride	1600	*	B	B
Acenaphthene	40	*	B	S
Acenaphthylene	307	*	B	S
Anthracene	21	*	B	S
Benzo(a)anthracene	2.2	*	B	S
Benzo(a)pyrene	0.96	*	B	S
Benzo(b)fluoranthene	0.049	*	B	S
Benzo(g,h,i)perylene	X	*	B	S
Benzo(k)fluoranthene	0.049	*	B	S
Chysene	0.049	*	B	S
Dibenzo(a,h)anthracene	0.049	*	B	S
Fluoranthene	7.1	*	B	S
Fluorene	39	*	B	S
Indeno(1,2,3-cd)pyrene	0.049	*	B	S
Naphthalene	194	*	B	S
Phenanthrene	19	*	B	S

Pyrene	10	*	B	S
Pentachlorophenol	7.9	*	B	B
Constituent	**MACL µg/l (2)**	**MACL Source**	**"A" zone Well Monitoring Frequency (5)**	**"C" zone Well Monitoring Frequency (5)**
Benzenethiol	5	*	B	B
Benzyl Butyl phthalate	5200	*	B	B
Bis 2-ethylhexyl phthalate	6	*	B	B
Chromium, dissolved	50	*	B	B
Di-n-butyl phthalate	12000	*	B	B
2,4-dimethylphenol	110	*	B	B
Ethylbenzene	29000	*	B	B
1-methylnapthalene	75	*	B	B
7,12-dimethyl benzo(a)anthracene	X	*	B	B
2-methylphenol	XX	*	B	B
3,4-methylphenol	XX	*	B	B
Phenol	2560	*	B	B
Trichloroethene	381	*	B	B
1,1,1-trichloroethane	62	*	B	B
Chlorobenzene	21000	*	B	B
Methyl chrysene	X	*	B	B
Total Xylenes	13	*	B	B
2-methylnaphthalene	2.1	*	B	B
Acetophenone		*	B	B
Barium	1000	*	B	B
Cobalt	3	*	B	B
Copper	3.1	*	B	B
N-Nitrosopiperidine		*	B	B
Silver	0.19	*	B	B
Vanadium	19	*	B	B
Vinyl chloride	3.8	*	B	B
Appendix IX Parameters (3)				
Metals (Methods 6010,7060, 7470)	N/A	N/A	(4)	N/A
SVOCs (Method 8270)	N/A	N/A	(4)	N/A
VOCs (Method 8260)	N/A	N/A	(4)	N/A

Notes:
* MACLs to be reviewed and updated by the Discharger per Task 14

1. SF Bay Basin Plan, 2010
2. MACL is the maximum allowable concentration limit. Applicable to A-Zone wells only. C-Zone wells evaluated based on background concentrations of inorganic constituents and practical quantization limits for organic constituents.
3. Parameters are listed in Appendix IX to 22CFR 66264 for analysis via Methods 6010, 7060, 7470, 8260, 8270. Appendix IX parameters that are detected, but are not COCs, will be added to the list of COCs for all wells.
4. Bi-annually at POC wells. Every five years at all other wells. Within first year in new wells.
5. Monitoring for COCs and Appendix IX parameters will alternate between highest and lowest groundwater levels.

X=Total PAH concentration less than 0.015 mg/l
XX=Total phenolics concentration less than 0.05 mg/l
PAHS are polynuclear aromatic hydrocarbons
POC is point of compliance
B is biennial or monitoring every other year for non-POC wells
S is semi-annual monitoring at all wells
N/A is not applicable

Appendix K
Statistical Evaluation Plan for Groundwater Self-Monitoring and Reporting Program (October 18, 2002)

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E Summary of Statistical Evaluation Results

F Current PQLs and MDLs of COCs and Appendix IX Parameters

Chevron Products Company is in the process of consolidating the current groundwater monitoring programs for the Landfarm Area and Refinery-Wide units into one program ("Groundwater Self-Monitoring and Reporting Program"). This monitoring program consolidation is being done with the input and concurrence of the California Regional Water Quality Control Board (RWQCB) and the California Department of Toxic Substances Control (DTSC). The consolidated monitoring program is designed to meet the requirements of California Code of Regulations, Title 22, Article 6. The main purpose of this Statistical Evaluation Plan is to describe the statistical methods that will be used to evaluate historic and continued monitoring data as well as the effectiveness of corrective action systems with respect to containing or minimizing (reducing or eliminating) impacts to "A" and "C" Zone groundwater quality.

The groundwater system in the study area consists of two separate zones – the upper "A" Zone and the lower "C" Zone. The specific objectives of the statistical evaluation for these two zones are as follows:

"A" Zone

- Evaluate the effectiveness of the Corrective Action program;
- Assess whether groundwater quality is improving outside the Groundwater Protection System (GPS); and
- Assess whether impacted groundwater is migrating beyond the hydraulic influence of GPS.

"C" Zone

- Evaluate whether groundwater quality is being degraded through migration of specific chemicals of concern (COCs).

Two separate areas are identified in the Landfarm area, namely Landfarm 1 and Landfarms 2 through 5. In Landfarm 1, there will be five monitoring wells in "A" Zone and three monitoring wells in "C" Zone. In Landfarms 2 through 5, there will be six monitoring wells in "A" Zone and six monitoring wells in "C" Zone. Table 1 shows the identification of these wells and some of the associated features. Of the total of twenty monitoring wells, groundwater samples were collected and analyzed in fourteen of them historically, in a period ranging from one to over sixteen years. These historic data will be analyzed and discussed in Section Three.

There are a total of fourteen monitoring parameters and forty constituents of concern (COCs) identified for the Landfarm area. These analytes and their proposed monitoring frequency are listed in Table 4 of the document "Groundwater Self-Monitoring and Reporting Program" by RWQCB. Additional analytes as listed in Appendix IX of 22 CCR 66264 may be added to the list of COCs for all wells if they are detected in the future.

The statistical evaluation methodology follows the guidance provided in the "Guidance Document: Monitoring Requirements for Permitted Hazardous Waste Facilities", prepared by Hazardous Waste Management Program, DTSC (July 2001). The methodology will comply with the performance standards outlined in California Code of Regulations, Title 22, Section 66264.97(e) and also described in Section 2 of Appendix C of the DTSC monitoring guidance document.

Because the monitoring objectives for "A" Zone and "C" Zone are different, different methods of statistical evaluation are appropriate for these two zones and are described separately below.

2.1 STATISTICAL EVALUATION METHODOLOGY FOR "A" ZONE

"A" Zone will be monitored under a Corrective Action Monitoring Program (CAMP). The basic monitoring objective will be to evaluate whether the corrective actions are working. Figure 1 shows the flowchart of the statistical evaluation methodology for "A" Zone. The main steps are:

1. Identify and compile historical groundwater data.
2. Perform exploratory data analysis (EDA).
    - Prepare a table of basic summary statistics for detected monitoring parameters and COCs.
    - Prepare box-and-whisker plots for detected monitoring parameters and COCs.
3. Prepare time series plots for detected monitoring parameters and COCs.
4. If sufficient data are available, evaluate seasonal effects.
5. Where appropriate, perform trend analysis.
6. Evaluate whether CAMP is working or may require changes.

A brief description of each step follows.

1. Identify and compile historical groundwater data.

The historic data will include data collected from 1994 through 2002 (data prior to 1994 may be used if appropriate, particularly if number of sampling periods is less than thirteen, which is the minimum number of samples in the case of non-parametric statistical testing). If there are significant changes in testing parameters or methodologies (such as significant changes in practical quantitation limit (PQL)), more recent data may be used to reflect the current laboratory testing procedures.

The data will be compiled in an electronic spreadsheet application, such as Microsoft Excel, and will include information such as monitoring well identification, sampling date, name of chemical parameter, detected concentration, detection/reporting limit, and data qualifiers, if any.

2. Perform exploratory data analysis (EDA).

The objective of the exploratory data analysis is to discover trends and patterns in the data so that appropriate approaches and limitations in using the datasets could be identified. Both numerical

and graphical methods of EDA may be used. For purposes of EDA, it is appropriate to replace any nondetect values with half of the corresponding PQL in order to obtain less biased summary statistics. The numerical methods will include a table of basic summary statistics such as mean, standard deviation, minimum, median, and maximum, for each combination of wells and monitoring parameters/COCs in "A" Zone. These statistics can be used to make inferences concerning the population from which the sample data were drawn. The first and last sampling dates of each combination of wells and monitoring parameters/COCs will also be provided for temporal references.

Graphical methods may include box-and-whisker plots, histograms, and probability plots. Box-and-whisker plots will be prepared to show the concentrations of each given analyte over different monitoring wells (i.e., a multi-well, single constituent plot). These plots will be used to assess any systematic spatial differences in concentrations in "A" Zone.

3. Prepare time series plots for detected monitoring parameters and COCs.

Time series plots will be prepared to show historical concentrations of each detected analyte for different monitoring wells at the site (again, a multi-well, single constituent plot). For purposes of these plots, it is appropriate to replace nondetect values with PQL (or median PQL if multiple PQLs existed). The plots will be reviewed to assess changes in water quality over time. Any extreme values ("outliers") will be identified and checked for accuracy and relevance. Where appropriate, such values may be revised (e. g., if an error is identified) or excluded from evaluation (if found to be non-representative). For each constituent, the time series plot will show the corresponding maximum allowable concentration limit (MACL) so that concentrations could be compared against these limits.

4. If sufficient data are available, evaluate seasonal effects.

If quarterly data for several years are available, the seasonal effect will be analyzed based on the results of EDA and by preparing (a different set of) box-and-whisker plots for individual seasons to compare season-to-season data distributions. If necessary, a formal test (such as the analysis of variance) will be used to test the significance of any seasonal effects. If systematic seasonal effects are observed and verified, the trend analysis (described in the next step) will be performed taking into account the presence of such effects.

5. Where appropriate, perform trend analysis.

If at least 8 data points are available and the detection rate is more than 25%, we will use the non-parametric Mann-Kendall test (if there are no seasonal effects), or the Seasonal Kendall test (if there are significant seasonal effects) to evaluate time trends. If the number of data points is less than 8, but at least 4, and the detection rate is more than 25%, the trend test may be performed, but its results would be considered to be preliminary and used only for a qualitative assessment. The trend test will not be applied if the number of data points is less than 4 or if the detection rate is less than 25%. In this case, only the time series plots will be used to understand the nature of the data.

If the trend test shows a decreasing trend, this will be taken as an indication that the site-specific corrective action(s) are working effectively in the "A" Zone for the analyte under evaluation. If the data show an increasing trend, the trend will be evaluated again with a verification sample collected within 120 days, or the next monitoring data point if collected within 120 days. If the upward trend is confirmed, further investigation and/or assessment may be conducted to evaluate whether the trend is attributable to site-specific sources or is caused by off-site sources.

6. Evaluate whether CAMP is working or may require changes.

The results of the previous steps will be reviewed to evaluate whether the chemical concentrations are showing a downward trend or appear to be stabilized below the maximum allowable concentration limits (MACLs). Such results will indicate that the site-specific corrective actions are working effectively in "A" Zone. If the results suggest that the corrective actions may not be working (e.g., a consistent upward trend is observed), the scope and nature of the corrective actions may be modified as appropriate.

2.2 STATISTICAL EVALUATION METHODOLOGY FOR "C" ZONE

"C" Zone will be monitored under a Detection Monitoring Program (DMP). The basic monitoring objective will be to detect the earliest possible release of constituents of concern into "C" Zone, if such a release were to occur. The intrawell comparison method will be used to compare recent data against historic ("baseline") data that are verified to be unimpacted by the facility operation. WDR No. 00-043 notes that, based on 13 years of chemical data, there is no indication that the "C" Zone groundwater has been significantly impacted. Therefore, the historic data should provide a reasonable baseline condition of no significant facility impact.

The facility has been in operation for 98 years and the spatial pattern of facility operations and other nearby industrial activities may have changed many times during this period. Therefore, it is not possible to identify background (upgradient) wells close to the site that may not have been impacted by the facility operations or other off-site sources over the years. Furthermore, box-and-whisker plots of the historical data (described in Step 2) confirm the presence of systematic spatial variability on chemical concentrations. For these reasons, the interwell method, in which background limits are established based on upgradient wells, is not appropriate.

Figure 2 shows the flowchart of the statistical evaluation methodology for "C" Zone. The main steps are:

1. Identify and compile historical groundwater data (baseline data).
2. Perform exploratory data analysis (EDA).
    - Prepare a table of basic summary statistics for detected monitoring parameters and COCs.
    - Prepare box-and-whisker plots for detected monitoring parameters and COCs.
    - Prepare time series plots for detected monitoring parameters and COCs.
    - Test for outliers based on graphical displays and outlier test.

- Check for any seasonal effects.

3. Perform trend analysis.
4. Evaluate whether baseline data without a trend can be identified.
5. Develop control charts using the baseline data.
6. Evaluate whether monitoring data are "in control".

A brief description of each step follows.

1. Identify and compile historical groundwater data (baseline data).

This step is identical as Step 1 of Section 2.1.

2. Perform exploratory data analysis (EDA).

The objective of the exploratory data analysis is to discover trends and patterns in the data so that appropriate approaches and limitations in using the datasets could be identified. Both numerical and graphical methods of EDA may be used. For purposes of EDA, it is appropriate to replace any nondetect values with half of the corresponding PQL in order to obtain less biased summary statistics. The numerical methods will include a table of basic summary statistics such as mean, standard deviation, minimum, median, and maximum, for each combination of wells and monitoring parameters/COCs in "C" Zone. These statistics can be used to make inferences concerning the population from which the sample data were drawn. The first and last sampling dates of each combination of wells and monitoring parameters/COCs will also be provided for temporal references.

Graphical methods include box-and-whisker plots, histograms, probability plots, and time series plots. Box-and-whisker plots show the concentrations of a given analyte for wells within the monitoring network in "C" Zone (i.e., a multi-well, single constituent plot). Time series plots will illustrate historical concentrations of a given analyte over a period of time (also a multi-well, single constituent plot). These graphical displays will be used to identify patterns and relationships within the data, confirm or disprove hypotheses, and identify potential problems (such as potential outliers or presence of bi-modal distribution).

If the graphical displays of data indicate the presence of any extreme values ("outliers"), such values will be checked for accuracy and relevance. If necessary, a formal test (such as the Dixon's test) may be used to assess whether one or more data points are potential outliers. Such values may be revised (e. g., if an error is identified) or excluded from evaluation (if found to be non-representative).

Results of EDA will also be used to evaluate any seasonal effects. Box-and-whisker plots will be prepared to compare season-to-season data distributions. If necessary, a formal test (such as the analysis of variance) will be used to test the significance of any seasonal effects. If systematic seasonal effects are observed, the statistical test will be adjusted to account for these effects. For example, as discussed below, the Seasonal Kendall (instead of the Mann-Kendall) test will be used for the trend analysis.

For the organic parameters in the "C" Zone, the California Nonstatistical Method (DTSC 2001) may be used in lieu of Steps 3 through 6 if more than 90% non-detects were observed in the historic ("background") data (WDR Boiler Plate, 1992). In this method, the background limits are based on the PQL. If a compound exceeds its PQL during monitoring, the evaluator will first validate with the laboratory performing the test to ensure that no evidence of sample contamination exists (due to large number of samples tested in this plan) and the QA/QC procedures are followed for the laboratory standard practice. Because of changing PQL over time, historic PQLs will be used for comparison to ascertain that the exceedance is not an artifact of lowered PQLs during monitoring periods and it is evident that the compound in question is above the background value. The current PQLs for all constituents of concern and Appendix IX parameters are listed in Appendix F.

If exceedance of an organic parameter in the "C" Zone has been confirmed, Chevron will notify DTSC and RWQCB within seven days that evidence of a release may have occurred and a verification procedure of resampling will be initiated per California Code of Regulation Title 22, Section 66264.98(j). If the resampling confirms the detection is valid, Chevron may consider increasing the sampling frequency of such a compound in order to develop a valid statistical database. If the compound is proven to be statistically significant above the background limit, further assessment may be implemented as agreed to by Chevron, RWQCB, and/or DTSC.

Other indications of evidence of release may also be evaluated for the organic parameters in the "C" Zone. For example, if two or more compounds are detected at trace levels (i.e., between Method Detection Limit (MDL) and PQL) in the same sampling location, the evaluator will conduct further assessments such as confirming data validation (i.e., verifying that cross contamination or other factors contributing to inaccurate results have not occurred) and confirming QA/QC of the analytical data. Furthermore, historic MDLs and PQLs will be compared with current limits (see Appendix F) before a statistically significant inference can be drawn. Other interpretations of an exceedance of an organic parameter may be considered in the EDA and data analysis process, and professional judgement will be used with caution to determine if evidence of a release exists and to circumvent the possibility of future high false positive rates.

3. Perform trend analysis.

The objective of the trend analysis is to evaluate whether the historic data show a statistically significant trend (upward or downward) over time. If the data show no significant trend, they will be used as baseline data in constructing "control charts" as described in the following steps. The non-parametric Mann-Kendall test will be used to detect trends. Guidance publications provided by USEPA (2000) and Gilbert (1987) recommend the use of this method for evaluating time trends in the data. The Mann-Kendall test is a "robust" test because the data need not to conform to any specific distribution (such as normal or lognormal) and the test accommodates missing values, non-detects, and multiple detection limits (Gilbert, 1987). If seasonal effects are observed, the seasonal Kendall test will be used.

A minimum sample size of eight is generally recommended for any formal statistical test (Gibbons, 1994). If the sample size is less than eight, but more than four, the trend test may be performed, but its results would be considered to be preliminary and used only for a qualitative

assessment. Any non-detect results will be replaced by a value smaller than the smallest detected value (Gilbert, 1987). The trend test will not be applied if the sample size is less than four. In that case, only the EDA results will be used to understand the nature of the data.

4. Evaluate whether baseline data without a trend can be identified.

If the historic data show no significant trend, the dataset will be used as baseline data to develop a control chart. If a trend is evident, an evaluation will be made as to whether consecutive historic data in the more recent period exhibit a significant trend. If this portion of historic data do not show any significant downward or upward trend, they will be used as baseline data to develop a control chart.

If a trend is present consistently in the historic data (i.e., neither all nor a portion of historic data can be evaluated as no trend) and consequently no appropriate baseline data can be identified to develop a control chart, the following analytical steps will be followed:

- If the historic data show a consistent significant downward trend, the parameter will continue to be monitored, and no control chart will be constructed.
- If the historic data show a consistent significant upward trend, the trend will be evaluated again with the next monitoring data point, and no control chart will be constructed at the moment. If the upward trend is confirmed, further investigation and/or assessment may be conducted to evaluate whether the trend is attributable to site-specific sources or it is caused by off-site sources. If the upward trend is not confirmed, the chemical will continue to be monitored.

5. Develop control charts using the appropriate baseline data.

Baseline data that do not show a significant trend will be used to develop a control chart for a given analyte. A control chart is an intra-well (i.e., a single well) method of evaluating whether on-going monitoring data are “in control” based on the limits established using proper baseline data. The use of the intra-well method avoids the influence of any systematic, spatial variability in the groundwater data and thus reduces the potential for false positive and false negative errors (ASTM, 1998; Gibbons, 1994).

The combined Shewhart-CUSUM control charts will be prepared to evaluate the presence of a source and site chemical releases of contamination. The Shewhart control chart is effective in detecting an immediate release, while the CUSUM control chart is effective in detecting a gradual release (i.e., a trend over time).

The control charts will be prepared following the guidelines provided in the ASTM standard (1998) and Gibbons (1994). These guidelines suggest that control charts can be used if the number of baseline data points is at least eight (including both detect and non-detect samples) and the detection frequency is at least 25%. In practice, a larger number of samples and/or a higher detection frequency are more desirable in constructing control charts. Therefore, if the number of samples and/or the detection frequency are close to the minimum requirements, the control chart will be used with caution and provisional judgement will be used before drawing conclusions.

Non-detects are replaced by the PQL (or median PQL if there are multiple detection limits (ASTM, 1998)). Although other methods such as Aitchison's or Cohen's method could be used if the detection frequency is between 15 and 50 percent, the ASTM guidelines suggest that the simpler method of replacing nondetects with PQL is adequate in these cases.

Assumptions of data independence, data distribution, and constant variance will be checked to determine the appropriate test methods (parametric versus nonparametric). Data independence will be checked by analyzing the autocorrelation of data points separated by a specified time lag. Shapiro-Wilk W Test will be used to test the normality of data distribution (USEPA, 2000). If the baseline data are normally distributed, the control charts will be constructed using the actual data. If the data are not normally distributed, but are lognormally distributed, the control charts will be developed using log-transformed values. If the data are neither normally nor lognormally distributed, assuming normal distribution is reasonable because the results are generally robust with regard to moderate deviations from normality. In any case, visual inspection of graphical displays (such as histograms) will be used to confirm distributional assumption. The assumption of constant variance will be checked if there are a sufficient number of data points that could be divided into 2 or 3 groups such that each group has at least 4 data points. A test such as the Levene test can then be applied to check whether the groups can be assumed to have the same variance (USEPA, 2000).

The ASTM standard also recommends the use of verification sampling in order to reduce the false positive and false negative error rates. Each time an initial exceedance of control charts is indicated, the affected well will be resampled for verification within 60 days. The ASTM guidelines suggest that the next monitoring data point, if collected within 60 days, may be used as a verification sample. If the verification sample also exceeds the control chart limits, it is taken as a confirmation of the initial indication. If the verification sample does not exceed the limits, the initial suspect value is replaced with the verification value and the monitoring process will be continued.

If the detection frequency is less than 25% and there are at least 13 baseline samples, one option is to use the "nonparametric prediction limit" method (ASTM, 1998). In this method, the baseline limit is set equal to the maximum observed value that is not an outlier. If all values are nondetect, the baseline limit will be set equal to the PQL (see Appendix F). Future monitoring results consistently greater than the baseline limit will warrant further consideration to evaluate its significance in terms of exceedance of baseline conditions.

If the detection frequency is less than 25% and there are less than 13 samples, neither control chart nor "nonparametric prediction limit" method will be applied. In that case, only the EDA results and time series plots will be used to understand the nature of the data.

6. Evaluate whether monitoring data are "in control".

Each round of monitoring data will be plotted on the control chart. An "out of control" condition will be identified when the data value exceeds the Shewhart control limit or the cumulative sum exceeds the CUSUM control limit. In case of an initial exceedance, the verification sample will be used to confirm the exceedance. This verification sample will be taken within 60 days of the initial indication. If the exceedance is confirmed, further investigation and/or assessment may be

undertaken to evaluate whether the exceedance is site-related or it is due to off-site sources and other causes such as seasonal fluctuations.

As monitoring continues and the process is shown to be "in control," the baseline data can be updated by including all new data that are "in control." The ASTM standard suggests that such updating may be done at a time interval of one or two years. For each update, the mean and standard deviation are recalculated using the expanded data set, and the trend analysis will be performed on the expanded data set to ensure that no gradual upward or downward trends are observed. These updated parameters are then used to construct future control charts.

For those parameters for which the nonparametric prediction limit method is to be used, the data from each new monitoring round will be compared against the applicable baseline limit. This limit is the maximum observed value in the baseline data, or the PQL if all baseline data are nondetect. In case of an initial indication of exceeding the baseline limit, again the verification sampling procedure described above will be followed. In evaluating whether a release has occurred, the results of the nonparametric prediction limit method will be supplemented with a qualitative assessment of time series plots. We will check for such conditions as a consistent pattern of trace level detections, or detection at or above the applicable PQL, of parameters that are not or rarely detected in the baseline data. If such conditions are identified, further evaluations may be undertaken to assess whether the cause is site-related.

The results of statistical analysis of historical data are shown in Appendices A through E. Appendix A is a tabulated summary for all sampled historical groundwater concentrations in the Landfarm area, including elements such as summary statistics, detection rate, and periods of sample collection. Appendix B shows the box-and-whisker plots of the historic data, allowing visual inspection of data distributions for all well-constituent combinations. Appendix C shows the time series plots of all detected monitoring parameters and COCs, which is an essential tool to graphically inspect time trends. Appendix D shows the control charts currently feasible to construct for "C" Zone, based on the number of data points, detection rate, and assumptions required to prepare and evaluate control charts. Appendix E is a summary of all statistical evaluation results, including results for most of the intermediate statistical tests, the preliminary conclusions for the intrawell analysis, and the number of additional samples required in the future in order to perform intrawell analysis (control chart method or nonparametric prediction limit method, for "C" Zone only). A brief discussion of the results follows.

3.1 "A" ZONE

"A" Zone consists of five monitoring wells in Landfarm 1 and six monitoring wells in Landfarms 2 through 5 (see Table 1). Of these 11 wells, two of them are newly installed wells and thus no historic groundwater samples are available for statistical evaluation. Of the nine existing wells, Wells 645A, P386A, and P284A were not sampled historically for groundwater constituents, and again, no statistical evaluation is feasible at this time.

Historic groundwater sample data are available for Wells 183A, 658A, and 659A in Landfarm 1, and for Wells P384A, 610A, and 657A in Landfarms 2 through 5. For Wells 658A and 657A, the sample collection began in 2001 or 2002 and only one or two samples are available. Therefore, only qualitative assessment is performed to understand the nature of the data. In the future, more groundwater samples will be collected for these wells and a statistical evaluation will be feasible.

For the rest of the wells, exploratory data analysis and trend analysis were performed to evaluate if the Corrective Action Monitoring Program (CAMP) is effective, and if any trend, particularly a downward trend, is observed in the groundwater concentrations because of the corrective actions. For those well-constituent combinations with at least 4 data points and the detection rate is greater than 25%, the non-parametric Mann-Kendall Trend Test was performed. No parameter except for temperature showed any seasonal effects. The following monitoring parameters were found to exhibit a significant downward trend:

- Well 183A: Benzene, Nickel
- Well P384A: MTBE
- Well 610A: MTBE, Turbidity

This is taken as an indication that the corrective actions were working effectively for these parameters. Most of the other parameters did not show any trend, which indicated that the groundwater concentrations for these parameters remained stable, except for the following monitoring parameters which appeared to have an upward trend:

- Well 183A: Turbidity, pH

- Well P384A: Specific conductance
- Well 610A: Total Extracted Hydrocarbon-Diesel

Turbidity, pH, and specific conductance are general chemistry data. Any trends in these parameters, in themselves, do not indicate contamination of groundwater. These data may be useful in understanding potential causes of chemical contamination, should data show evidence of such contamination. The upward trend of total extracted hydrocarbon-diesel in Well 610A appears to be marginal, with the p-value of the Mann-Kendall Trend Test at 0.048, which is slightly lower than 0.05 (5% significance level). Nevertheless, these parameters will continue to be monitored.

No significant trends were found for any of the constituents of concern in any of the "A" Zone wells.

3.2 "C" ZONE

"C" Zone consists of three monitoring wells in Landfarm 1 and six monitoring wells in Landfarms 2 through 5 (see Table 1). Of these nine wells, one of them is a newly installed well and thus no historic groundwater samples are available for statistical evaluation. For Well 654C in Landfarm 1, and for Wells 251C, 506C, 655C, and 656C in Landfarms 2 through 5, only limited historic data are available (primarily between 2000 and 2002 and in most cases less than 8 data points), and therefore, the data analysis and statistical evaluation for these wells should be considered provisional and the results should be used for a qualitative assessment with caution. Otherwise, for Well 587C in Landfarm 1 and Wells 104C and 186C in Landfarms 2 through 5, data are generally available between 1994 and 2002 (some data also available prior to 1994), and the number of data points are sufficient for many of the constituents to perform reliable statistical analysis and testing.

For those well-constituent combinations with at least 4 data points and the detection rate is greater than 25%, the non-parametric Mann-Kendall Trend Test was performed. No parameter except for temperature showed any seasonal effect. The following monitoring parameters were found to exhibit a significant downward trend:

- Well 587C: Temperature
- Well 186C: Turbidity
- Well 656C: Turbidity

In addition, the following monitoring parameters appeared to show an upward trend:

- Well 587C: Specific conductance
- Well 104C: Specific conductance
- Well 186C: Specific conductance
- Well 251C: Specific conductance

Again, temperature, turbidity, and specific conductance are general chemistry data. Any trends in these parameters, in themselves, do not indicate contamination of groundwater. These data

may be useful in understanding potential causes of chemical contamination, should data show evidence of such contamination. In any case, these parameters will be monitored in the future.

No significant trends were found for any of the constituents of concern in any of the "C" Zone wells.

For those well-constituent combinations with sufficient number of data points and detection rate, and assumptions for control chart, including data distribution, data independence, and constant variance, are satisfied, their combined Shewhart-Cusum control charts were prepared and shown in Appendix D. The next monitoring sample value will be plotted in the control charts and it will be evaluated whether it is "in control," i.e., within the Shewhart and Cusum control limits.

For those well-constituent combinations with sufficient number of data points but for which the detection rate was too low (less than 25%), the nonparametric prediction limit was determined and shown in Appendix E. The next monitoring sample value will be compared with this baseline limit.

The column "Intrawell Method" in Appendix E indicates the selected intrawell methodology based on the historic data properties, or the status of statistical evaluation if additional data are required. The number of additional samples required to collect in the future is shown in the last two columns, for control chart construction or for determining nonparametric prediction limit, respectively.

Except for nickel, none of the constituents shows a consistent pattern of exceeding their respective MACLs. Nickel does show a consistent pattern of exceeding the MACL in several wells. However, it is the only one showing this pattern, and furthermore, the box-and-whisker plot for nickel shows a substantial spatial variability among the monitoring wells. Based on these facts, the nickel effect may not be facility-related and may represent a historical, baseline pattern.

The following tables and figures are proposed to be included in future semi-annual monitoring reports to address the items specified in the DTSC Guidance Document (DTSC, 2001).

1. A tabulated summary of historic analytical data for the monitoring parameters and detected COCs, as appropriate (see also Appendix A).
2. Box-and-whisker plots for the monitoring parameters and detected COCs, as appropriate (see also Appendix B).
3. Time series plots (see also Appendix C) and control charts (see also Appendix D) for the monitoring parameters and detected COCs, as appropriate.
4. A table summarizing the results of intermediate steps in the statistical evaluation, including tests for data independence, data distribution, and constant variance (see also Appendix E).
5. A flowchart showing proposed methods for determining baseline values of the monitoring parameters and detected COCs, as appropriate (see Figures 1 and 2).
6. A flowchart showing the proposed statistical protocol for the monitoring program (see Figures 1 and 2).
7. Tabulated summary of the proposed statistical methods (see Table 2).
8. Text describing the proposed statistical methods (See the text in the previous sections).

ASTM (1998). "Standard Guide for Developing Appropriate Statistical Approaches for Ground-Water Detection Monitoring Programs." ASTM Guide D6312-98.

DTSC (2001). "Guidance Document – Monitoring Requirements for Permitted Hazardous Waste Facilities."

Gibbons, R. D. (1994). *Statistical Methods for Groundwater Monitoring*. John Wiley & Sons, Inc., New York.

Gilbert, Richard O. (1987). *Statistical Methods for Environmental Pollution Monitoring*. Van Nostrand Reinhold, New York.

USEPA (2000). *Guidance for Data Quality Assessment – Practical Methods for Data Analysis*. USEPA QA/G-9.

WDR Boiler Plate. (1992). Boiler Plate for Article 5 WDR Revisions. Chapter 15 Technical Note #4.

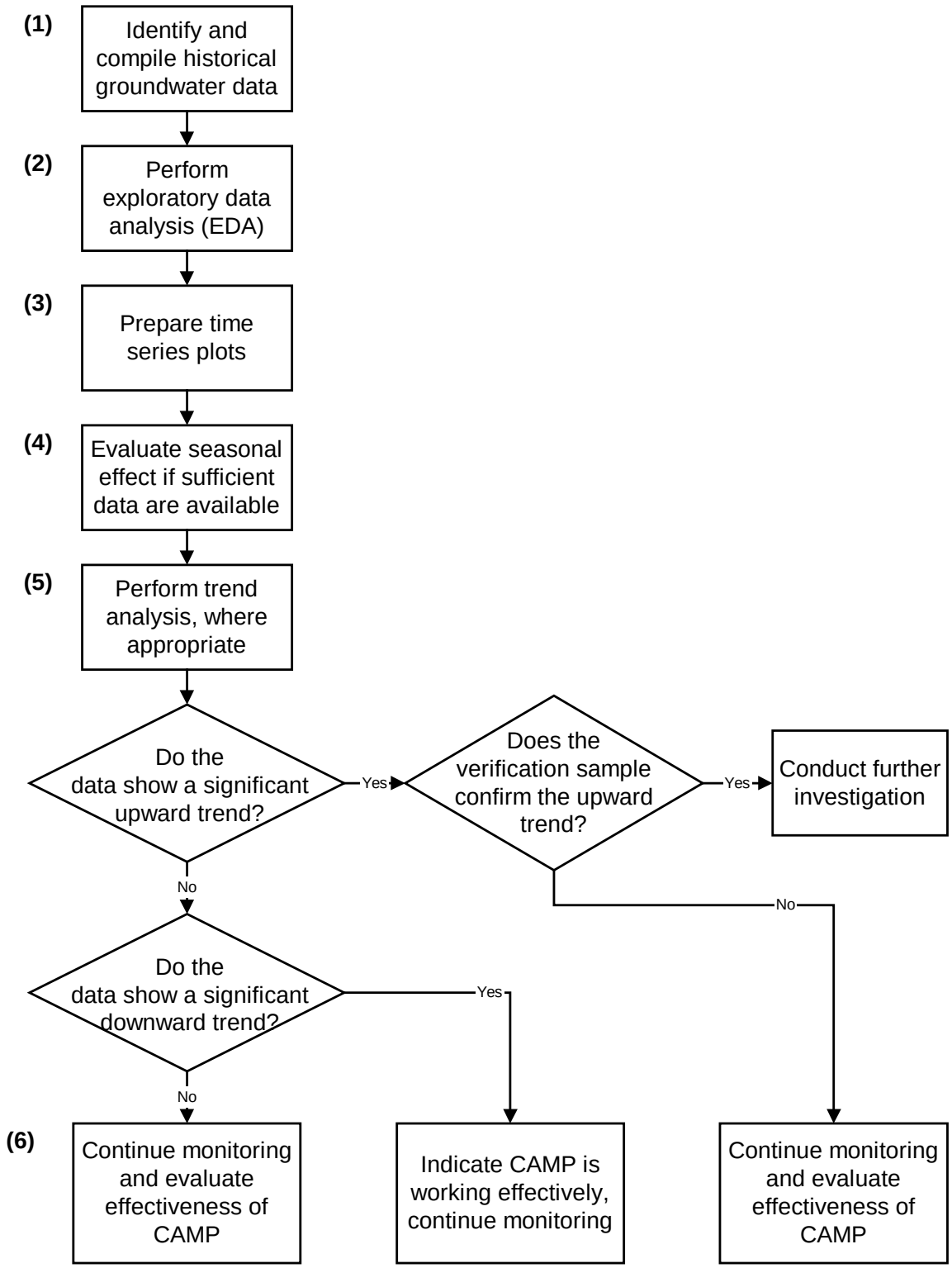


Figure 1. Flowchart of Statistical Evaluation Methodology for "A" Zone

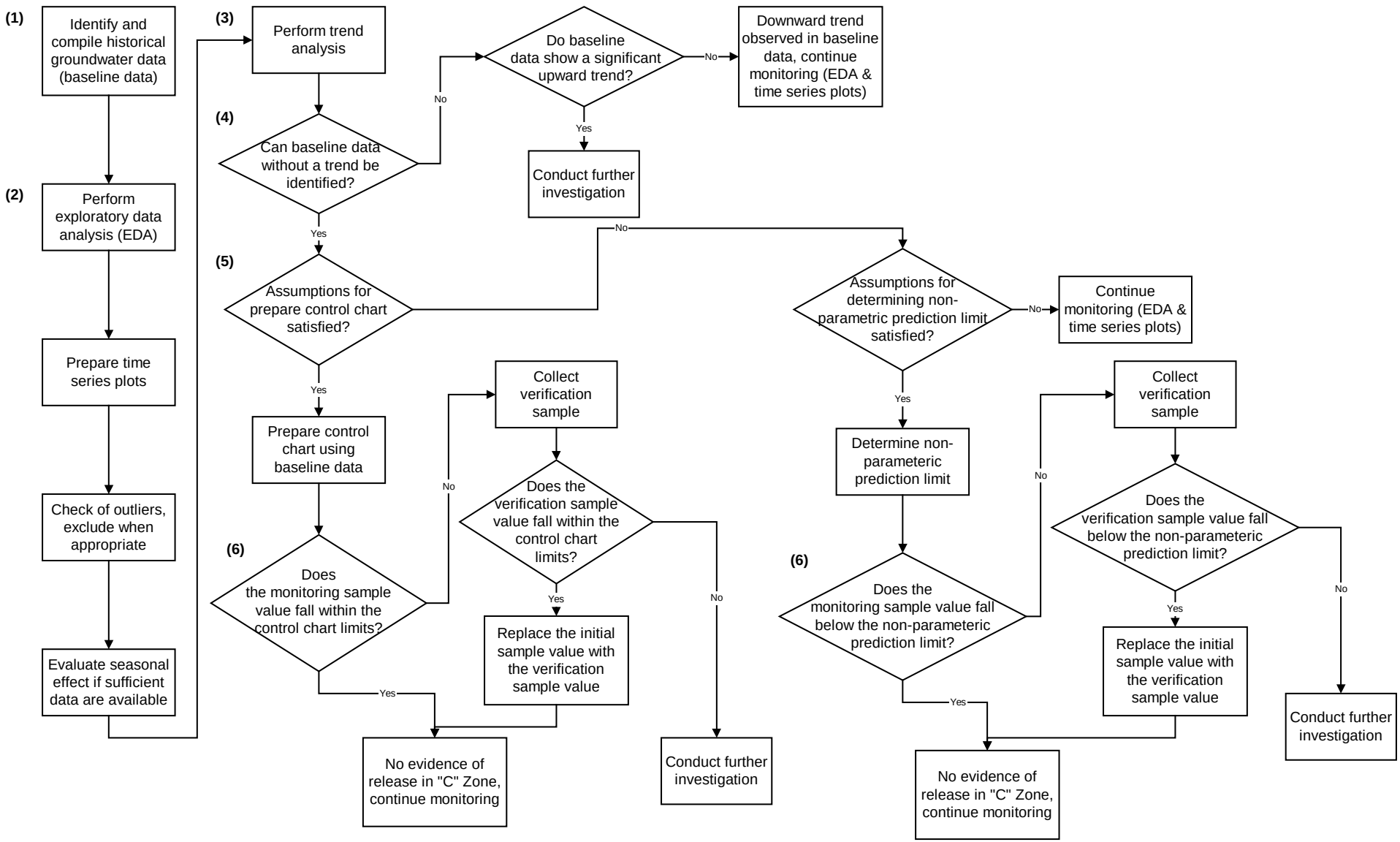


Figure 2. Flowchart of Statistical Evaluation Methodology for "C" Zone

	New Wells?	POC Wells?	Historic Data Available?	Historic Data Time Period
Landfarm 1				
"A" Zone Wells				
New well, north of GPS, near S82027	✓			
183A		✓	✓	1986 - 2002
645A				
658A			✓	2002
659A		✓	✓	2001 - 2002
"C" Zone Wells				
587C		✓	✓	1994 - 2002
654C		✓	✓	2000 - 2002
New well adjacent to 659A	✓	✓		
Landfarms 2 through 5				
"A" Zone Wells				
P384A			✓	1993 - 2002
610A		✓	✓	1994 - 2002
P386A				
657A			✓	2001 - 2002
P284A		✓		
New well, north of GPS, near S83034	✓	✓		
"C" Zone Wells				
104C		✓	✓	1986 - 2002
186C		✓	✓	1986 - 2002
251C		✓	✓	1989 - 2002
506C		✓	✓	1992 -2002
655C		✓	✓	2000 - 2002
656C		✓	✓	2000 - 2002

Notes:
(1) POC indicates that well is a point of compliance well.
(2) GPS is groundwater protection system.

Table 1. Landfarm Area Monitoring Well Network

Statistical Methods	Description	Reference	Software
Mann-Kendall test	The Mann-Kendall test involves computing a statistic S, which is the difference between the number of pairwise slopes that are positive minus the number that are negative. If S is a large positive value, then there is evidence of an increasing trend in the data. If S is a large negative value, then there is evidence of a decreasing trend in the data. The null hypothesis or baseline condition for this test is that there is no temporal trend in the data values, i.e., "H_0: no trend". The alternative condition or hypothesis will usually be either "H_A: upward trend" or "H_A: downward trend."	Gilbert, Richard O. (1987). Statistical Methods for Environmental Pollution Monitoring. Van Nostrand Reinhold, New York. USEPA (2000). Guidance for Data Quality Assessment – Practical Methods for Data Analysis. USEPA QA/G-9.	Microsoft Excel
Control Chart	Combined Shewhart-CUSUM control chart. All sampled data are continually plotted on a Control Chart as they are collected, providing an historical overview of the concentration pattern at the well. When the sample concentration crosses the Shewhart control limit, and/or the cumulative sum of the sample concentrations crosses the CUSUM control limit, the chemical parameter under investigation is declared "out of control."	ASTM (1998). "Standard Guide for Developing Appropriate Statistical Approaches for Ground-Water Detection Monitoring Programs". ASTM Guide D6312-98. Gibbons, R. D. (1994). Statistical Methods for Groundwater Monitoring. John Wiley & Sons, Inc., New York.	SAS Institute/JMP

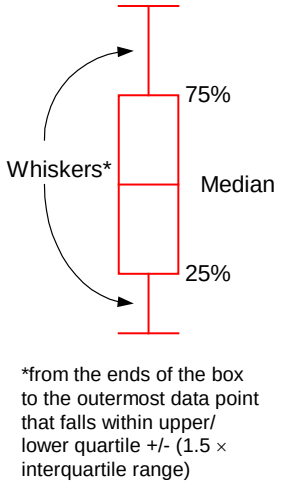
Table 2. Summary of Proposed Statistical Methods

The following tables show the summary statistics of historical groundwater concentrations for "A" Zone and "C" Zone, separately, in the Landfarm area. In most cases, these data are collected between 1994 and 2002, but data prior to 1994 may be incorporated if the sample size may be inadequate for further statistical testing. For each combination of area (Landfarm 1 or Landfarm 2-5), zone ("A" Zone or "C" Zone), well, and constituent, the following information and summary statistics are shown:

- MACL (maximum allowable concentration limit)
- Median PQL (practical quantitation limit; median PQL if multiple PQLs were used throughout the period)
- Number of sampling periods
- Sample mean and sample standard deviation
- Minimum, median, and maximum
- First and last sampling dates

All concentrations are measured in mg/L, except specific conductance in MMHOS, temperature in degree Celsius, turbidity in NTU, and pH in pH scale. Non-detects are replaced with half of the corresponding practical quantitation limit (PQL) for computation of summary statistics (less biased than replaced with full PQL). Trace values (detection between method detection limit (MDL) and PQL) are used as they are recorded. Wells and/or constituents not sampled historically are not shown. A blank cell indicates the particular item is not available.

This appendix shows the box-and-whisker plots of historical groundwater concentrations for "A" Zone and "C" Zone, separately, in the Landfarm area. Each box-and-whisker plot presents the data distribution of a monitoring parameter or constituent of concern across all wells within the zone (i.e., a multi-well, single constituent plot). The key for box-and-whisker plot is as follows:



All concentrations are measured in mg/L, except specific conductance in MMHOS, temperature in degree Celsius, turbidity in NTU, and pH in pH scale. Non-detects are replaced with half of the corresponding practical quantitation limit (PQL). Trace values (detection between method detection limit (MDL) and PQL) are plotted as they are recorded. Wells and/or constituents not sampled historically are not shown.

APPENDIX C

Time Series Plots of Detected Monitoring Parameters and COCs for Landfarm Area Monitoring Wells

This appendix shows the time series plots of historical groundwater concentrations for “A” Zone and “C” Zone, separately, in the Landfarm area. Each time series plot presents the data trend of a monitoring parameter or constituent of concern across all wells within the zone (i.e., a multi-well, single constituent plot). The maximum allowable concentration limit (MACL) for each constituent is also shown when available.

All concentrations are measured in mg/L, except specific conductance in MMHOS, temperature in degree Celsius, turbidity in NTU, and pH in pH scale. When appropriate, logarithmic scale may be used instead of raw scale. Non-detects and trace values (detection between method detection limit (MDL) and practical quantitation limit (PQL)) are replaced with the corresponding PQL (or median PQL if multiple PQLs were used throughout the period); thus, changes in MDL and PQL do not appear as showing a significant trend. Wells and/or constituents with only one sampling period, or 0% detection rate, or not sampled historically are not shown.

This appendix shows the combined Shewhart-Cusum control charts for "C" Zone based on the available historical groundwater samples in the Landfarm area. Each control chart represents a single well-constituent combination. The steps to construct control chart are described in Section 2.2. For $n < 12$, c (a parameter related to the displacement that should be quickly detected) = 1, h (the value against which the cumulative sum will be compared) = 5, and SCL (the upper Shewhart limit that is the number of standard deviation units for an immediate release) = 4.5. For $n \geq 12$, $c = 0.75$, and $h = SCL = 4$ (ASTM, 2000). Summary of intermediate statistical evaluation/testing for preparation of control chart is presented in Appendix E.

All concentrations are measured in mg/L, except specific conductance in MMHOS, temperature in degree Celsius, turbidity in NTU, and pH in pH scale. Non-detects and trace values (detection between method detection limit (MDL) and practical quantitation limit (PQL)) are replaced with the corresponding PQL (or median PQL if multiple PQLs were used throughout the period); thus, changes in MDL and PQL do not appear as showing a significant trend. Only the well-constituent combinations satisfied the control chart assumptions are shown.

In the future, after monitoring samples are collected, they will be analyzed and plotted in the corresponding control charts. If the concentration exceeds the Shewhart Control Limit and/or the cumulative sum exceeds the CUSUM Control Limit, it is an initial indication that the parameter may be "out of control". Verification sampling will be required to confirm the exceedance.

The following tables show a summary of statistical evaluation results for groundwater concentrations in the Landfarm area. Each table presents the results of all monitoring parameters and constituents of concern for a single well.

For "A" Zone wells, the following items are shown:

Exploratory Data Analysis

- MACL (maximum allowable concentration limit)
- Number of historic samples exceeding MACL
- Number of historic sampling periods
- The time period when the historic samples were collected
- Detection rate
- Based on the available data, determine if time series plot is feasible to prepare (see also Appendix C)
- Based on the time series plots, and if necessary, one-way analysis of variance (ANOVA), determine if seasonal effect existed

Trend Analysis (for constituents with at least 4 data points and greater than 25% detection rate)

- Based on the Mann-Kendall Trend Test (or Seasonal Kendall Test), the calculated S statistic
- P-value associated with the S statistic
- Conclusion based on the trend test at 5% significance level

For "C" Zone wells, the following statistical test results are shown in addition to the above items:

Intrawell Analysis

- Based on the exploratory data analysis (EDA), time series plots, and Dixon's Outlier Test, number of outliers excluded from the baseline (historic) data.
- If there are at least 8 data points and the detection rate is greater than 25%, the result of testing the data distribution for parametric assumption (i.e., assumption of normal distribution or lognormal distribution) using Shapiro-Wilk W Test at 5% significance level
- Determine if the control chart is appropriate to construct
- If the control chart is inappropriate to construct, and if there are at least 13 data points, the nonparametric prediction limit
- Intrawell method: based on the historic data properties, the statistical methodology selected or the status of statistical evaluation
- Additional samples required to construct control chart, if currently not available
- Additional samples required to determine nonparametric prediction limit, if currently not available

All concentrations are measured in mg/L, except specific conductance in MMHOS, temperature in degree Celsius, turbidity in NTU, and pH in pH scale. Non-detects and trace values (detection

between method detection limit (MDL) and practical quantitation limit (PQL)) are replaced with the corresponding PQL (or median PQL if multiple PQLs were used throughout the period); thus, changes in MDL and PQL do not appear as showing a significant trend. All well-constituent combinations are shown. A blank cell indicates the particular item is not available or not necessary for statistical evaluation.

APPENDIX F Current PQLs and MDLs of COCs and Appendix IX Parameters

The following tables show the limit of quantitation (LOQ, or called practical quantitation limit (PQL) in this report), method detection limit (MDL), and measuring unit for each COC and Appendix IX parameter. The list is grouped by constituent type: semivolatiles, volatiles, and inorganics. The information is provided by Lancaster Laboratories.

Appendix L
Non-Applicability of Vadose Zone Monitoring Technical Memorandum
(October 31, 2002)

RB0711449

FILE COPY

October 31, 2002

Environmental Management Company
940 Hensley Street
Richmond, CA 94801

Anthony Maciey
Project Manager
510-242-8102

Ms. Cheri Pedilla
Standardized Permits and Corrective Action Branch
700 Heinz Avenue, Suite 200
Berkeley, CA 94710-2721

Non-Applicability of Article 17, Chapter 14, Section 66264.700 (c) Vadose Zone Monitoring, Landfarm Post Closure Permit, Chevron Richmond Refinery

Dear Ms. Pedilla:

ChevronTexaco has attached the requested memorandum with regards to the Non-Applicability of Article 17, Chapter 14, Section 66264.700 (c) Vadose Zone Monitoring for the inclusion in the Landfarm Post Closure Permit.

If you have any questions or comments regarding this memorandom, please call Mr. John MacLeod (510) 242-2295.

Sincerely,

A J Maciey

Anthony J. Maciey
Project Manager
Chevron Environmental Management Co.

Attachment

bcc: WDO Files

008603

URS
500 12th Street, Suite 200
Oakland, CA 94607-4014
Telephone: (510) 874-3080
Facsimile: (510) 874-3268

MEMORANDUM

To:	**John Macleod – Chevron/Texaco**	**From:**	**George Muehleck, RG**
		Office:	**Oakland**
		Date:	**October 21, 2002**

Subject: Non-Applicability of Article 17, Chapter 14, Section 66264.700(c) Vadose Zone Monitoring – Landfarms Post-Closure Permit Application Chevron Richmond California Refinery

Vadose zone monitoring is not proposed in the Landfarms Post-Closure Permit Application and Landfarms Post-Closure Monitoring Plan as a vadose zone does not exist between waste within the Landfarms and first-encountered groundwater (commonly referred to as the "A" Zone at Chevron's Richmond Refinery). Site-specific first water is typically encountered 2 to 6 feet below land surface with waste extending from approximately 2 feet below finish grade to below first water. As such there is no vadose or unsaturated zone separating Landfarm waste from first water. Accordingly, vadose zone monitoring under Article 17, Chapter 14, Section 66264.700(c) is not applicable to the Landfarm sites.

Furthermore, Chevron has demonstrated that waste will not migrate from the Landfarms through:

- closure with a vegetative cover;
- construction, operation and maintenance of a Groundwater Protection System (GPS) (low permeability barrier walls keyed into the top of the Bay Mud and groundwater extraction trenches and wells) to contain, capture and treat unit-specific "A" Zone groundwater within the confines of the GPS and;
- continued self monitoring and reporting under RWQCB Order No. 00-043 – Groundwater Corrective Action Self Monitoring and Reporting Program.

Signed: _____ 10/21/02
George Muehleck, R.G. Date

REGISTERED GEOLOGIST
GEORGE MUEHLECK
No. 5392
exp 6/03
STATE OF CALIFORNIA

Appendix M
Post-Closure Care Cost Estimate and Financial Assurance for Closure and Post-Closure Care and Liability Coverage

Robert D. Mihalovich
Regulatory Affairs Specialist/
Senior Project Manager

Chevron Environmental Management Company
6101 Bollinger Canyon Road
San Ramon, CA 94583
Tel 925-790-3831
rmih@chevron.com

March 23, 2012

Department of Toxic Substances Control
Financial Responsibility Unit
8800 Cal Center Drive, 3rd Floor
Sacramento, CA 95826-3200

Hazardous Waste Sites - California
Financial Assurance for Closure
and Post-Closure Care
and Liability Coverage

Dear Financial Responsibility Unit Representative:

Attached, as required by California regulations, are the following Chevron Corporation items:

1. Financial Test Letter dated March 23, 2012.
2. Corporate Guarantee for Closure and Post-Closure Care.
3. Corporate Guarantee for Liability Coverage
4. 2011 Chevron Form 10-K containing our Report of Independent Registered Public Accounting Firm
5. Accountant's Special Report.
6. Bond Rating Information.

Where applicable, the inflation factor of 2.1% was applied as of February, 2012.

This document provides financial assurance for the following facilities:

CAT 080010283
Chevron U.S.A. Inc.
Westside Disposal Facility (aka EPC Westside)
26244 Highway 33
Fellows, CA 93324

EPA I.D. No. CAD041652090
PureGro Co.
Corcoran Facility
6505 Nevada Ave.
Corcoran, CA 93212

Thomas Ranch
Consent Order
2860 Palisades Drive
Corona, CA 92880

CAD 008336901
Chevron U.S.A. Inc
El Segundo Refinery
P.O. Box 97
El Segundo, CA 90245

CAD 009114919
Chevron U.S.A. Inc.
Richmond Refinery
P.O. Box 1272
Richmond, CA 94802

CAD 043237486
Chevron U.S.A. Inc.
940 Hensley Street
Richmond, CA 94804

Texaco Inc.
Pacific Coast Pipeline Site
67 East Telegraph Road
Fillmore, CA 93016

DTSC Calsites Database 44280006
Chevron Environmental Management Company
Calspray Site
135 Walker Street
Watsonville, CA 95076

Chevron Corporation has no TTUs. It does have one FTU:

CAD 043237486
Chevron U.S.A. Inc.
940 Hensley Street
Richmond, CA 94804

If you have any questions please call me at the number above.

Sincerely,

Robert D. Mihalovich

Enclosures

cc: John MacLeod
Mehagan Hopkins
Leslie Klinchuch
Michael Steinbrecher
Paul Ryan
Martin Swinderman
Jean Wong
Roger Hahn
Lisa Duncan
Richard Sylvia
Todd Bryant, PricewaterhouseCoopers, LLP

Patricia E. Yarrington
Vice President and
Chief Financial Officer

Chevron Corporation
6001 Bollinger Canyon Road
San Ramon, CA 94583-2324
Tel (925) 842-3232
Fax (925) 842-6047

March 23, 2012

Department of Toxic Substances Control
Financial Responsibility Unit
8800 Cal Center Drive
Sacramento, CA 95826-3200

Dear Financial Responsibility Unit Representative:

I am the Chief Financial Officer of Chevron Corporation, 6001 Bollinger Canyon Road, San Ramon, California. This letter is in support of this firm's use of the financial test to demonstrate financial responsibility for liability coverage and closure and/or postclosure care, as specified in California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8.

The firm identified above is the owner or operator of the following facility(ies)/TTU(s) for which liability coverage for both sudden and nonsudden accidental occurrences is being demonstrated through the financial test specified in California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8, sections 66264.147 and 66265.147: None.

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

Facility	Liability Coverage (Per Occur./Annual Aggregate)
CAD 008336901 Chevron U.S.A. Inc. El Segundo Refinery P.O. Box 97 El Segundo, CA 90245	Sudden Occurrences - $1 million/$2 million Non-sudden Occurrences - $3 million/$6 million
CAD 009114919 Chevron U.S.A. Inc. Richmond Refinery P.O. Box 1272 Richmond, CA 94802	Sudden Occurrences - $1 million/$2 million Non-sudden Occurrences - $3 million/$6 million
CAD 043237486 Chevron U.S.A. Inc. 940 Hensley Street Richmond, CA 94804	Sudden Occurrences - $1 million/$2 million Non-sudden occurrences - $3 million/$6 million

CAT 080010283 Chevron U.S.A. Inc. Westside Disposal Facility (aka EPC Westside) 26244 Highway 33 Fellows, CA 93324	Sudden Occurrences - $1 million/$2 million Non-sudden Occurrences - $3 million/$6 million
EPA I.D. No. CAD041652090 PureGro Co. Corcoran Facility 6505 Nevada Ave. Corcoran, CA 93212	Sudden Occurrences – $1 million/$2 million Non-sudden Occurrences – $3 million/$6 million

The firm above is the direct or higher tier parent corporation of the owner or operator and receiving the following value in consideration of the guarantee: one dollar ($1.00).

1. The firm identified above is the owner or operator of the following facilities/TTUs for which financial assurance for closure and/or postclosure or liability coverage is demonstrated through the financial test as specified in California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8 section 66264.143, subsection(f), section 66264.145, subsection (f), section 66265.143, subsection (e), and section 66265.145, subsection (e). The current closure and/or postclosure cost estimates covered by the test are shown for each facility/TTU: None.

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

CAD008336901 Chevron U.S.A. Inc. El Segundo Refinery P.O. Box 97 El Segundo, CA 90245	Closure Post-Closure	$ $	2,918,872 10,849,634
CAT080010283 Chevron U.S.A. Inc. Westside Disposal Facility (aka EPC Westside) 26244 Highway 33 Fellows, CA 93324	Post-Closure	$	1,202,296
CAD009114919 Chevron U.S.A. Inc. Richmond Refinery P.O. Box 1272 Richmond, CA 94802	Closure Post-Closure	$ $	1,408,944 18,250,788

CAD043237486 Chevron U.S.A. Inc. 940 Hensley Street Richmond, CA 94804	Closure Post-Closure	$ $	83,118,583 18,459,338
Thomas Ranch 2798 Palisades Drive Corona, CA 92880	Work	$	1,249,239
CAD041652090 PureGro Co. 6991 Nevada Ave. Corcoran, CA 93212	Work	$	278,323
CA920426434 Guadalupe Oil Field Guadalupe, CA	Work	$	50,000,000
Docket #HSA97/98—005 Calspray Site 135 Walker Street Watsonville, CA 95076	Work	$	626,316

NOTE: Also identified in Attachment A.

3. In States where the U.S. Environmental Protection Agency is not administering the financial requirements of subpart H of 40 CFR parts 264 and 265, this firm as owner or operator or guarantor is demonstrating financial assurance for the closure or postclosure care of the following facilities/TTUs through the use of a test equivalent or substantially equivalent to the financial test specified in the California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8, section 66264.143, subsection(f), section 66264.145, subsection (f), section 66265.43, subsection (e), and section 66265.145, subsection (e). The current closure and/or postclosure cost estimates covered by such a test are shown for each facility/TTU:

   See Attachment A.

4. The firm identified above is the owner or operator of the following facilities/TTUs for which financial assurance for closure or, if a disposal facility, postclosure care, is not demonstrated either to U.S. Environmental Protection Agency or a State through the financial test or any other financial assurance mechanism specified in subpart H of 40 CFR parts 264 and 265, California Code of Regulations, title 22, division 4.5, chapter 14 or 15, article 8 or equivalent or substantially equivalent State mechanisms. The current closure and/or postclosure cost estimates not covered by such financial assurance are shown for each facility/TTU: None.

5. The firm is the owner or operator or guarantor of the following Underground Injection Control facilities for which financial assurance for plugging and abandonment is required under 40 CFR part 144 and is assured through a financial test. The current closure cost estimates are required by 40 CFR 144.62 are shown for each facility:

Injection Well/Address	Plugging and Abandonment Cost Estimate
US EPA Region VIII Four Star Oil & Gas Southern Ute Well #17 Permit # COS 2530-2693 La Plata County, Colorado	$214,000
Chevron U.S.A. Inc. Valencia Canyon #17-2 Permit #2690-03757 La Plata County, Colorado	$236,000
Chevron U.S.A, Inc. Valencia Canyon #1-2 Permit #2581-03532 La Plata County, Colorado	$236,000
Chevron Midcontinent, L.P. Well Name: Clark 4-1 WDW EPC UIC Permit No.: CO20588-03541 La Plata County, Colorado	$206,000
Total current plugging and abandonment	$892,000

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

The fiscal year of this firm ends on December 31. The figures for the following items marked with an asterisk are derived from this firm's independently audited, year-end financial statements for the latest completed fiscal year, ended December 31, 2011.

This firm is using Alternative II for Part B.

ALTERNATIVE II

1. Sum of current closure and postclosure cost estimates	$ 324,031,392
2. Amount of annual aggregate liability coverage to be demonstrated**	$ 42,000,000
3. Sum of lines 1 and 2	$ 366,031,392
4. Current bond rating of most recent issuance and name of rating service:	AA Standard & Poors
5. Date of issuance of bond	March 3, 2009
6. Date of maturity of bond	March 3, 2019
7. Tangible net worth*	$ 117,354,000,000
8. Total assets in the U.S.*	$ 68,114,000,000
9. Is line 7 at least $10 million?	Yes
10. Is line 7 at least 6 times line 3?	Yes
11. Are at least 90 percent of the firm's assets located in the United States? If not, complete line 12.*	No
12. Is line 8 at least 6 times line 3?	Yes

**Includes $2,000,000 annual aggregate for underground storage tanks per 40 CFR part 280 for our Chevron U.S.A. Inc. subsidiary.

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

March 23, 2012

By Patricia E. Yarrington

Patricia E. Yarrington
Vice President and Chief Financial Officer

Patricia E. Yarrington
Vice President and
Chief Financial Officer

Chevron Corporation
6001 Bollinger Canyon Road
San Ramon, CA 94583-2324
Tel (925) 842-3232
Fax (925) 842-6047

CORPORATE GUARANTEE FOR CLOSURE OR POSTCLOSURE CARE

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

Guarantee made this 23rd day of March, 2012, by CHEVRON CORPORATION, a business corporation organized under the laws of the State of Delaware, herein referred to as guarantor, to the Department of Toxic Substances Control (DTSC), obligee, on behalf of our subsidiary CHEVRON U.S.A. INC. of 6001 Bollinger Canyon Road, San Ramon, California.

This guarantee is made on behalf of the Chevron U.S.A. Inc., which is a subsidiary of Chevron Corporation, to the DTSC.

RECITALS

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

2. Chevron U.S.A. Inc. owns at least 50 percent of the voting stock of and/or operates the following hazardous waste management facility(ies)/transportable treatment unit(s) (TTU) covered by this guarantee:

CAD008336901 Chevron U.S.A. Inc. El Segundo Refinery P.O. Box 97 El Segundo, CA 90245	Closure Post-Closure	$ $	2,918,872 10,849,634
CAD009114919 Chevron U.S.A. Inc. Richmond Refinery P.O. Box 1272 Richmond, CA 94802	Closure Post-Closure	$ $	1,408,944 18,250,788
CAD043237486 Chevron U.S.A. Inc. 940 Hensley Street Richmond, CA 94804	Closure Post-Closure	$ $	83,118,583 18,459,338
CAT080010283 Chevron U.S.A. Inc. Westside Disposal Facility (aka EPC Westside)	Post-Closure	$	1,202,296

26244 Highway 33 Fellows, CA 93324			
CAD041652090 PureGro Co. 6991 Nevada Ave. Corcoran, CA 93212	Work	$	278,323
Docket #HSA97/98—005 Calspray Site 135 Walker Street Watsonville, CA 95076	Work	$	626,316

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

4. For value received from Chevron U.S.A. Inc., guarantor guarantees to DTSC that in the event that Chevron U.S.A. Inc. fails to perform closure and postclosure care of the above facility(ies)/TTU(s) in accordance with the closure or postclosure plans and other permit or interim status requirements whenever required to do so, the guarantor shall do so or establish a trust fund as specified in California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8, as applicable, in the name of Chevron U.S.A. Inc. in the amount of the current closure or postclosure cost estimates as specified in California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8.

5. Guarantor agrees that if, at any time during or at the end of any fiscal year before the termination of this guarantee, the guarantor fails to meet the financial test criteria, guarantor shall send within 90 days, by certified mail, notice to DTSC and to Chevron U.S.A. Inc. that he or she intends to provide alternate financial assurance as specified in California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8 as applicable, in the name of Chevron U.S.A. Inc. Within 120 days after the end of such fiscal year or other occurrence, the guarantor shall establish such alternate financial assurance unless Chevron U.S.A. Inc. has done so.

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

7. Guarantor agrees that within 30 days after being notified by DTSC of a determination that guarantor no longer meets the financial test criteria or that he or she is disallowed from continuing as a guarantor of closure or postclosure care, he or she shall establish alternate financial assurance as specified in California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8, as applicable, in the name of Chevron U.S.A. Inc. unless Chevron U.S.A. Inc. has done so.

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

9. Guarantor agrees to remain bound under this guarantee for as long as Chevron U.S.A. Inc. shall comply with the applicable financial assurance requirements of California Code of Regulations, title 22, division 4.5 for the above listed facilities/TTUs, except as provided in paragraph 10 of this agreement.

10. Guarantor may terminate this guarantee by sending notice by certified mail to DTSC and to Chevron U.S.A. Inc., provided that this guarantee may not be terminated unless and until the Chevron U.S.A. Inc. obtains, and DTSC approve(s), alternate closure and/or postclosure care coverage complying with California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8.

11. Guarantor agrees that if Chevron U.S.A. Inc. fails to provide alternate financial assurance as specified in California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8, as applicable, and obtain written approval of such assurance from DTSC within 90 days after a notice of cancellation by the guarantor is received by DTSC from guarantor, guarantor shall provide such alternate financial assurance in the name of Chevron U.S.A. Inc.

12. Guarantor expressly waives notice of acceptance of this guarantee by DTSC or by Chevron U.S.A. Inc. Guarantor also expressly waives notice of amendments or modifications of the closure and/or postclosure plan and of amendments or modifications of the facility/TTU permit(s).

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

Effective date: March 23, 2012

CHEVRON CORPORATION

By Patricia E. Yarrington

Patricia E. Yarrington
Vice President and Chief Financial Officer

By

Assistant Secretary

Patricia E. Yarrington
Vice President and
Chief Financial Officer

Chevron Corporation
6001 Bollinger Canyon Road
San Ramon, CA 94583-2324
Tel (925) 842-3232
Fax (925) 842-6047

GUARANTEE FOR LIABILITY COVERAGE

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

Guarantee made by this 23rd day of March, 2012, by CHEVRON CORPORATION, a business corporation organized under the laws of the State of Delaware, herein referred to as guarantor. This guarantee is made on behalf of Chevron U.S.A. Inc. of 6001 Bollinger Canyon Road, San Ramon, California which is our subsidiary, to any and all third parties who have sustained or may sustain bodily injury or property damage caused by sudden and/or nonsudden accidental occurrences arising from operation of the facility(ies)/transportable treatment unit(s) (TTU) covered by this guarantee.

RECITALS

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

2. Chevron U.S.A. Inc. owns or operates the following hazardous waste management facility(ies)/TTU(s) covered by this guarantee:

Facility	Liability Coverage (Per Occur./Annual Aggregate)
CAD 008336901 Chevron U.S.A. Inc. El Segundo Refinery P.O. Box 97 El Segundo, CA 90245	Sudden Occurrences - $1 million/$2 million Non-sudden Occurrences - $3 million/$6 million
CAD 009114919 Chevron U.S.A. Inc. Richmond Refinery P.O. Box 1272 Richmond, CA 94802	Sudden Occurrences - $1 million/$2 million Non-sudden Occurrences - $3 million/$6 million
CAD 043237486 Chevron U.S.A. Inc. 940 Hensley Street Richmond, CA 94804	Sudden Occurrences - $1 million/$2 million Non-sudden occurrences - $3 million/$6 million

CAT 080010283 Chevron U.S.A. Inc. Westside Disposal Facility (aka EPC Westside) 26244 Highway 33 Fellows, CA 93324	Sudden Occurrences - $1 million/$2 million Non-sudden Occurrences - $3 million/$6 million
EPA I.D. No. CAD041652090 PureGro Co. Corcoran Facility 6991 Nevada Ave. Corcoran, CA 93212	Sudden Occurrences – $1 million/$2 million Non-sudden Occurrences - $3 million/$6 million

This corporate guarantee satisfies California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8, third-party liability requirements for sudden accidental occurrences in the above-named owner or operator facility(ies)/TTU(s) for coverage in the amount of one million dollars ($1,000,000) for each occurrence and two million dollars ($2,000,000) per annual aggregate and for non-sudden accidental occurrences in the above-named owner or operator facility for coverage in the amount of three million dollars ($3,000,000) for each occurrence and six million dollars ($6,000,000) per annual aggregate.

3. For value received from Chevron U.S.A. Inc., guarantor guarantees to any and all third parties who have sustained or may sustain bodily injury or property damage caused by sudden and/or nonsudden accidental occurrences arising from operations of the facility(ies)/TTU(s) covered by this guarantee that in the event that Chevron U.S.A. Inc. fails to satisfy a judgment or award based on a determination of liability for bodily injury or property damage to third parties caused by sudden and/or nonsudden accidental occurrences, arising from the operation of the above-named facility(ies)/TTU(s), or fails to pay an amount agreed to in settlement of a claim arising from or alleged to arise from such injury or damage, the guarantor will satisfy such judgment(s), award(s), or settlement agreement(s) up to the limits of coverage identified above.

4. Such obligation does not apply to the following:

(a) Bodily injury or property damage for which Chevron U.S.A. Inc. is obligated to pay damages by reason of the assumption of liability in a contract or agreement. This exclusion does not apply to liability for damages that Chevron U.S.A. Inc. would be obligated to pay in the absence of the contract or agreement.

(b) Any obligation of Chevron U.S.A. Inc. under a workers' compensation, disability benefits, or unemployment compensation law or any similar laws.

(c) Bodily injury to:

(1) An employee of Chevron U.S.A. Inc. arising from, and in the course of, employment by Chevron U.S.A. Inc.; or

(2) The spouse, child, parent, brother, or sister of that employee as a consequence of, or arising from, and in the course of employment by Chevron U.S.A. Inc. This exclusion applies:

(A) Whether Chevron U.S.A. Inc. may be liable as an employer or in any other capacity; and

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

(d) Bodily injury or property, damages arising out of the ownership, maintenance, use, or entrustment to others of any aircraft, motor vehicle, or watercraft.

(e) Property damage to:

(1) Any property owned, rented, or occupied by Chevron U.S.A. Inc.;

(2) Premises that are sold, given away, or abandoned by Chevron U.S.A. Inc. if the property damage arises out of any part of those premises;

(3) Property loaned to Chevron U.S.A. Inc.;

(4) Personal property in the care, custody, or control of Chevron U.S.A. Inc.;

(5) That particular part of real property on which the Chevron U.S.A. Inc. or any contractor or subcontractors working directly or indirectly on behalf of the Chevron U.S.A. Inc. are performing operations, if the property damage arises out of these operations.

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

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

7. Guarantor agrees that within thirty (30) days after being notified by the DTSC of a determination that the guarantor no longer meets the financial test criteria or that he or she is disallowed from continuing as a guarantor, he or she shall establish alternate liability coverage as specified in California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8, sections 66264.147 and 66265.147 in the name of Chevron U.S.A. Inc., unless the Chevron U.S.A. Inc. has done so.

8. Guarantor reserves the right to modify this agreement to take into account amendment or modification of the liability requirements set by California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8, sections 66264.147 and 66265.147, provided that such modification shall become effective only if DTSC does not disapprove the modification within thirty (30) days of receipt of notification of the modification.

9. Guarantor agrees to remain bound under this guarantee for so long as Chevron U.S.A. Inc. shall comply with the applicable requirements of California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8, sections 66264.147 and 66265.147 for the above-listed facility(ies)/TTU(s), except as provided in paragraph 10 of this agreement.

10. Guarantor may terminate this guarantee by sending notice by certified mail to DTSC, and to Chevron U.S.A. Inc., provided that this guarantee may not be terminated unless and until Chevron U.S.A. Inc. obtains, and DTSC approves alternate liability coverage complying with California Code of Regulations, title 22, division 4.5, chapter 14 and 15, article 8, sections 66264.147 and 66265.147.

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

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

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

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

CERTIFICATION OF VALID CLAIM

The undersigned, as parties [insert principal name] and [insert name and address of third-party claimant(s)], hereby certify that the claim of bodily injury and/or property damage caused by a [insert "sudden" and/or "nonsudden"] accidental occurrence arising from operating [insert Principal's name and facility type(s) hazardous waste "treatment", "storage" or disposal" facility/transportable treatment unit (TTU)] should be paid in the amount of $ [insert dollars].

[Signatures]

Principal

(Notary) Date

[Signatures]

Claimant(s)

(Notary) Date

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

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

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

Effective Date: March 23, 2012

CHEVRON CORPORATION

By Patricia E. Yarrington
Patricia E. Yarrington
Vice President and Chief Financial Officer

By
Assistant Secretary

CHEVRON CORPORATION
ENVIRONMENTAL FINANCIAL RESPONSIBILITY
ATTACHMENT "A"
FY2011 ENDING 12/31/2011

RCRA FACILITIES

CAD008336901 Chevron U.S.A. Inc. El Segundo Refinery P.O. Box 97 El Segundo, CA 90245	Closure Post-Closure	$ $	2,918,872 10,849,634
CAT080010283 Chevron U.S.A. Inc. Westside Disposal Facility (aka EPC Westside) 26244 Highway 33 Fellows, CA 93324	Post-Closure	$	1,202,296
CAD009114919 Chevron U.S.A. Inc. Richmond Refinery P.O. Box 1272 Richmond, CA 94802	Closure Post-Closure	$ $	1,408,944 18,250,788
CAD043237486 Chevron U.S.A. Inc. 940 Hensley Street Richmond, CA 94804	Closure Post-Closure	$ $	83,118,583 18,459,338
HIT160010005 Chevron U.S.A. Inc. Hawaii Refinery P.O. Box 29789 Honolulu, HI 96820	Post-Closure (Land Farm) Post-Closure (Plume Monitoring)	$ $	75,935 1,991,023
ILD041518861 Chevron Environmental Management Company Lockport Plant 301 W. 2nd Street Lockport, IL 60441	Corrective Action Post-Closure	$ $	10,696,359 679,809
LAD034199802 Chevron U.S.A. Inc. P.O. Box 70 Belle Chasse, LA 70037	Post-Closure	$	2,316,237

CHEVRON CORPORATION
ENVIRONMENTAL FINANCIAL RESPONSIBILITY
ATTACHMENT "A"
FY2011 ENDING 12/31/2011

MSD054179403 Chevron U.S.A. Inc. Pascagoula Refinery P.O. Box 1300 Pascagoula, MS 39567	Closure Post-Closure Corrective Action	$ $ $	2,638,000 953,000 6,094,795
NJD081982902 Chevron U.S.A. Inc. Perth Amboy Refinery 1200 State Street Perth Amboy, NJ 08861	Closure Post-Closure	$ $	10,427 3,404,900
NYD091894899 Chevron U.S.A. Inc. Texaco Research Center–Beacon Texaco Fuels and Lubricants Center Old Glenham Road Glenham, NY 12527	Corrective Action	$	22,079,937
OHD004254132 Chevron U.S.A. Inc. Cincinnati Refinery P.O. Box 96 North Bend, OH 45052	Post-Closure (Ohio EPA) Corrective Action (Administrative Order on Consent with U.S. EPA Region 5)	$ $	242,000 11,849,000
TXD007378995 Chevron Environmental Management Co. Amarillo Plant 315 S. Grand Amarillo, TX 79104	Post-Closure Corrective Action	$ $	387,401 4,268,364
TXD010794097 Union Oil Company of California Beaumont Terminal 237 Beaumont Beaumont, TX 77627	Post-Closure Corrective Action	$ $	5,384,033 911,811
UTD092029768 Chevron U.S.A. Inc Salt Lake Refinery 2351 North 1100 West Salt Lake City, UT 84116	Post-Closure Corrective Action	$ $	1,560,000 1,419,000

CHEVRON CORPORATION
ENVIRONMENTAL FINANCIAL RESPONSIBILITY
ATTACHMENT "A"
FY2011 ENDING 12/31/2011

WYD088677943			
Texaco Downstream Properties Inc.			
Casper Plant	Corrective Action	$	11,625,000
P.O. Box 307	Post-Closure	$	5,800,000
Evansville, WY 82636			

CHEVRON CORPORATION
ENVIRONMENTAL FINANCIAL RESPONSIBILITY
ATTACHMENT "A"
FY2011 ENDING 12/31/2011

CERCLA FACILITIES ADMINISTERED BY U.S. EPA

CAD980636781 Texaco Inc. Pacific Coast Pipeline Site 67 East Telegraph Road Fillmore, CA 93016	Work	$	4,000,000
California Dept. of Toxic Substances Control v. Chevron U.S.A Inc. et al Civil Docket No. 98-CV-05412-REC-DLB Purity Oil Sales, Inc. Superfund Site Malaga, CA	Work	$	10,000,000
Thomas Ranch 2798 Palisades Drive Corona, CA 92880	Work	$	1,249,239
VII-JK (CERCLA Remediation Action) Chemplex Site 4010 21st Street Camanche, IA 52730	Work (Unit 1 & Unit 2)	$	3,200,000
Docket No. 2011-12 Mariano Lake Mine Site 15N, 14W/Sections 11 and 12 McKinley County, New Mexico 87313	Work	$	1,000,000
NMD002899094 CERCLA Docket No. 06-09-12 Chevron Mining Inc. Chevron Questa Mine NM Highway 38 Red River Canyon Questa, New Mexico 87556	Work	$	5,000,000
Star Lake Canal Superfund Site Chevron Environmental Management Co. Order on Consent Docket No. 06-02-06 Jefferson County, TX	Work	$	1,590,000
Docket# CERCLA-08-2003-0014 Chevron U.S.A. Inc. Northwest Oil Drain Salt Lake County, UT	Work	$	705,000

CHEVRON CORPORATION
ENVIRONMENTAL FINANCIAL RESPONSIBILITY
ATTACHMENT "A"
FY2011 ENDING 12/31/2011

STATE ADMINISTERED FINANCIAL ASSURANCE

CAD041652090 PureGro Co. 6991 Nevada Ave. Corcoran, CA 93212	Work	$	278,323
CA920426434 Guadalupe Oil Field Guadalupe, CA	Work	$	50,000,000
Docket #HSA97/98—005 Calspray Site 135 Walker Street Watsonville, CA 95076	Work	$	626,316
HSI# 10830 Chemical Specialists and Development, Inc. 2275 Tucker Industrial Rd. Tucker, GA 30084	Corrective Action	$	7,446,000
Site ID No. GD-075-1511/ Permit # P-0112 Chevron U.S.A. Inc. Oak Point Plant Highway 23 – P.O. Box 70 Belle Chasse, LA 70037	Closure	$	3,321,769
CERCLA Docket No. 91-F-90011 Union Oil Company of California Heath Facility (Consent Order) 840 Heath Road Heath, OH 43056	Work	$	4,303,716
SWR No. 30004, Docket No. 97-0404-IHW-E Chevron Environmental Management Company Port Arthur Facility Port Arthur TX	Work	$	715,543

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Report of Independent Accountants

To the Board of Directors of Chevron Corporation:

We have performed the procedures enumerated below, which were agreed to by the management of Chevron Corporation (the "Company"), solely to assist you in respect to certain financial information included in the letter dated March 23, 2012 from the Vice President and Chief Financial Officer of the Company to the Department of Toxic Substances Control - California (the "Letter"). The management of the Company is responsible for the financial information included in the Letter. This agreed-upon procedures engagement was conducted in accordance with attestation standards established by the American Institute of Certified Public Accountants. The sufficiency of these procedures is solely the responsibility of those parties specified in this report. Consequently, we make no representation regarding the sufficiency of the procedures described below either for the purpose for which this report has been requested or for any other purpose.

The procedures and the associated findings are as follows:

1. We recalculated the formulas included in the Letter, Alternative II, at items 1, 3, 9, 10 and 12 to determine mathematical accuracy and found no differences.

2. We compared the Net Worth of the Company at December 31, 2011, as stated in the enclosed Schedule A, to the amount set forth as *Total Equity* in the consolidated financial statements included in the Company's 2011 Annual Report on Form 10-K. We found no difference.

3. We compared the Intangible Assets of the Company at December 31, 2011, as stated in the enclosed Schedule A, to a supporting schedule prepared by the Company from its accounting records. We also recalculated the mathematical accuracy of the supporting schedule. We found no exceptions as a result of the procedures

4. We compared the Tangible Net Worth of the Company, as stated in Schedule A, to the corresponding amount as stated in the Letter, Alternative II at item 7. We found no difference.

5. We compared the Total Assets in the U.S. of the Company at December 31, 2011, which amounted to $68,114,000,000 as stated in the Letter, Alternative II at item 8 to the amount set forth as Total Assets - United States in Note 11 to the consolidated financial statements included in the Company's 2011 Annual Report on Form 10-K. We found no difference.

6. We recalculated the percentage of the Total Assets in the U.S., as stated in 5 above, of the amount set forth as Total Assets in the consolidated balance sheet included in the Company's 2011 Annual Report on Form 10-K and agreed that this percentage is less than 90% as stated in the Letter, Alternative II at item 11.

We were not engaged to and did not conduct an examination, the objective of which would be the expression of an opinion on the specified elements, accounts or items referred to in 1 to 6 above. Accordingly, we do not

PricewaterhouseCoopers LLP, Three Embarcadero Center, San Francisco, CA 94111-4004
T: (415) 498 5000, F: (415) 498 7100, www.pwc.com/us

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express such an opinion. Had we performed additional procedures, other matters might have come to our attention that would have been reported to you.

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

PricewaterhouseCoopers LLP

March 23, 2012

Schedule A

Tangible Net Worth of Chevron Corporation at December 31, 2011.

Net Worth	$ 122,181,000,000
Intangible Assets	(4,827,000,000)
Tangible Net Worth of Chevron Corporation	$ 117,354,000,000

Chevron Corp

BLOOMBERG *

1)	Quantitative Issuer Rtng	A1H

MOODY'S

2)	Outlook	STABLE
3)	Issuer Rating	Aa1
4)	Long Term Rating	Aa1
5)	Foreign Currency LT Debt	WR
6)	Local Currency LT Debt	WR
7)	Senior Unsecured Debt	Aa1
8)	Short Term	P-1

STANDARD & POOR'S

9)	Outlook	STABLE
10)	LT Foreign Issuer Credit	AA
11)	LT Local Issuer Credit	AA
12)	ST Foreign Issuer Credit	A-1+
13)	ST Local Issuer Credit	A-1+

FITCH

14)	Outlook	STABLE
15)	LT Issuer Default Rating	AA
16)	Senior Unsecured Debt	AA
17)	Short Term	F1+
18)	ST Issuer Default Rating	F1+

DBRS

19)	Outlook	STABLE
20)	Senior Unsecured Debt	AA
21)	Short Term	WR

DUFF & PHELPS

22)	Senior Unsecured Debt	WR

* Bloomberg is not a Nationally Recognized Statistical Rating Organization

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UNITED STATES SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

Form 10-K

☑ ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the fiscal year ended **December 31, 2011**

OR

☐ TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the transition period from _____ to _____

Commission File Number 001-00368

Chevron Corporation

(Exact name of registrant as specified in its charter)

Delaware	94-0890210	6001 Bollinger Canyon Road, San Ramon, California 94583-2324
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)	(Address of principal executive offices) (Zip Code)

Registrant's telephone number, including area code (925) 842-1000

Securities registered pursuant to Section 12 (b) of the Act:

Title of Each Class	Name of Each Exchange on Which Registered
Common stock, par value $.75 per share	New York Stock Exchange, Inc.

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act.
Yes ☑ No ☐

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act.
Yes ☐ No ☑

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days.
Yes ☑ No ☐

Indicate by check mark whether the registrant has submitted electronically and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T (§ 232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files). Yes ☑ No ☐

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K (§ 229.405 of this chapter) is not contained herein, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. ☐

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, or a smaller reporting company. See the definitions of "large accelerated filer," "accelerated filer" and "smaller reporting company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer ☑ Accelerated filer ☐ Non-accelerated filer ☐ (Do not check if a smaller reporting company) Smaller reporting company ☐

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Act). Yes ☐ No ☑

Aggregate market value of the voting and non-voting common equity held by non-affiliates computed by reference to the price at which the common equity was last sold, or the average bid and asked price of such common equity, as of the last business day of the registrant's most recently completed second fiscal quarter — $205,986,778,815 (As of June 30, 2011)

Number of Shares of Common Stock outstanding as of February 13, 2012 — 1,976,966,530

DOCUMENTS INCORPORATED BY REFERENCE
(To The Extent Indicated Herein)

Notice of the 2012 Annual Meeting and 2012 Proxy Statement, to be filed pursuant to Rule 14a-6(b) under the Securities Exchange Act of 1934, in connection with the company's 2012 Annual Meeting of Stockholders (in Part III)

See:
http://www.sec.gov/Archives/edgar/data/93410/000095012312002976/f60351e10vk.htm
For Complete Copy

TASK 11 - 20% CONTINGENCY CALCULATION

TASK	DESCRIPTION	30-YEAR COST
1	Groundwater Monitoring	$5,186,640
2	Soil Monitoring	$131,760
3	Earthquake Monitoring and Inspection	$72,977
4	General Inspections	$271,140
5	Cover & Drainage System Mtn	$1,160,400
6	Monitoring System Mtn	$117,500
7	Postclosure Permit Renewals & Annual Fees	$497,000
8	Security	$25,000
9	Overhead and Management Costs	$468,000
10	GPS	$7,278,573
		$15,208,990
	20% Contingency	$3,041,798
	TOTAL	$18,250,788

Chevron Richmond Refinery
Landfarms 1 - 5 Post Closure Care Costs

Task 1 Groundwater and Vadose Zone Monitoring

Item	Post Closure Care Activity	Quantity	UOM	Unit Cost	Annual Cost	30 Year Estimate
1	**Task 1 Groundwater Monitoring** Landfarm groundwater monitoring cost is roughly 40% of total RGMP costs. 2012 RGMP Cost is $432,219 Annual cost = 0.40 * $432,219 = $172,887.60)	1	ea	$172,888	$172,888	$5,186,640
	Task 1 Groundwater and Vadose Zone Monitoring Total Annual Cost				**$172,888**	
	Task 1 Groundwater and Vadose Zone Monitoring Total 30 Year Cost					***$5,186,640***

Chevron Richmond Refinery
Landfarms 1 - 5 Post Closure Care Costs

Task 2 - Surface Water and Soil Monitoring

Item	Post Closure Care Activity	Quantity	Units	Unit Cost	Annual Cost	30 Year Estimate
1	**Irrigation Water Sampling**					
	This Item was originally included because water was supplied from partially-treated refinery effluent. Now water is supplied from the East Bay Municipal Utilities District and does not need sampling.	0	ea	$0	$0	$0
2	**Soil Samples**					
	Previous Post Closure Care Financial Assurance Documents called for 58 samples. Based on Apple Labs 2012 costs, the sample analysis is $12 per sample	58	ea	$12	$696	
	Labor					
	Based on 2012 labor cost the labor to collect the 58 samples is $1,500.00	1	ea	$1,500	$1,500	
				Cost per Event	$2,196	
	Annual Sampling and Analysis Cost					
	Previous Post Closure Care Financial Assurance Documents call for semi-annual sampling	2	ea	$2,196	$4,392	$131,760
	Task 2 - Surface Water and Soil Monitoring Total Annual Cost				**$4,392**	
	Task 2 - Surface Water and Soil Monitoring Total 30 Year Cost					***$131,760***

Chevron Richmond Refinery
Landfarms 1 - 5 Post Closure Care Costs

Task 3 - Earthquake Monitoring and Inspection

Item	Post Closure Care Activity	Quantity	Units	Unit Cost	Annual Cost	30 Year Estimate
1	**Earthquakes**					
	Three earthquake events over 30 years that warrant full site inspection and follow-up reports. Estimate is based on Section N2.0; Potentially Impacted Facilities, of Landfarms Post Earthquake Inspection and Corrective Action. 2002 estimates were $10,000. The 2002 figure was adjusted to 2012 dollars based on DTSC inflation factors.					
		1	lump sum	$12,163	$0	$12,163
2	Number of earthquake events in 30 years that damage GPS piping, appurtances and/or soil cover. Estimate is based on Section N2.0; Potentially Impacted Facilities, of Landfarms Post Earthquake Inspection and Corrective Action. 2002 estimates were $50,000. The 2002 figure was adjusted to 2012 dollars based on DTSC inflation factors.					
		1	lump sum	$60,814	$0	$60,814

Task 3 - Earthquake Monitoring and Inspection Total 30 Year Cost **$72,977**

Chevron Richmond Refinery
Landfarms 1 - 5 Post Closure Care Costs

Task 4 - General Inspections

Item	Post Closure Care Activity	Quantity	Units	Unit Cost	Annual Cost	30 Year Estimate
1	**Inspections**					
	Monthly Inspections					
	Monthly inspections take 3 hr per month for Chevron Operator. Operator hourly rate for 2012 is $78.00 per hr.	36	hr	$78	$2,808	$84,240
	Quarterly Vegetation Inspections					
	Quarterly vegetation inspection costs are based on 8 hrs per quarter for the project engineer to	8	Project Engineer hrs.	$75	$2,400	$72,000
	Annual Visual Cap Inspection					
	Annual inspections are based on 10 hr. for the project engineer and 10 hr. for the senior engineer. (Includes field work and reports per	10	Project Engineer hrs.	$75	$750	$22,500
		10	Senior Engineer hrs.	$108	$1,080	$32,400
2	Annual Settlement Survey					
		1	lump sum	$2,000	$2,000	$60,000
	Task 4 - General Inspections Total Annual Cost				**$9,038**	
	Task 4 - General Inspections Total 30 Year Cost					***$271,140***

Chevron Richmond Refinery
Landfarms 1 - 5 Post Closure Care Costs

Task 5 - Cover and Drainage System Maintenance

Item	Post Closure Care Activity	Quantity	Units	Unit Cost	Annual Cost	30 Year Estimate
1	**Mowing**					
	Equipment Rental					
	Assumes two mowers are needed for the year.	2	mowers	$2,500	$5,000	$150,000
	Labor					
		100	hr	$60	$6,000	$180,000
				Subtotal	*$11,000*	*$330,000*
2	**Weed Eating**					
	Labor					
	Costs are from Goebel at $52.50/hr for labor and $7.50/hr for vehicle.	100	hr	$60	$6,000	$180,000
3	**Irrigation System Maintenance**					
	Labor					
	Costs are from Goebel at $52.50/hr for labor and $7.50/hr for vehicle.	80	hr	$60	$4,800	$144,000
	Parts					
	Estimate based on previous operating experience.	1	lump sum	$150	$150	$4,500
				Subtotal	*$4,950*	*$148,500*
4	**Irrigation System Water**					
	Potable water fee is $3.80 per 1,000 gallons. 2 million gallons are used per year.	2,000	units of 1,000 gallons	$3.80	$7,600	$228,000
5	**Tree Pruning**					
	Labor					
	Costs are from Goebel at $52.50/hr for labor and $7.50/hr for vehicle.	40	hr	$60	$2,400	$72,000
6	**V-Ditch Swale Cleaning**					
	Labor					
	Costs are from Goebel at $52.50/hr for labor and $7.50/hr for vehicle.	100	hr	$60	$6,000	$180,000
7	**HPDE V-Ditch Repairs**					
	Labor					
	Costs are from Goebel at $52.50/hr for labor and $7.50/hr for vehicle.	8	hr	$60	$480	$14,400
	Materials					
	Estimate based on previous operating experience.	1	lump sum	$250	$250	$7,500
				Subtotal	*$730*	*$21,900*
	Task 5 - Cover and Drainage System Maintenance Total Annual Cost				**$38,680**	
	Task 5 - Cover and Drainage System Maintenance Total 30 Year Cost					***$1,160,400***

Chevron Richmond Refinery
Landfarms 1 - 5 Post Closure Care Costs

Task 6 - Monitoring System Maintenance

Item	Post Closure Care Activity	Quantity	Units	Unit Cost	Annual Cost	30 Year Estimate
1	**Well Replacement**					
	"A" Zone Wells Assumption from 2002 financial assutance estimate that 10 "A" Zone wells will be replaced over 30 years	10	ea	$5,000		$50,000
	"C" Zone Wells Assumption from 2002 financial assutance estimate that 10 "C" Zone wells will be replaced over 30 years	10	ea	$6,750		$67,500
	Task 6 - Monitoring System Maintenance Total 30 Year cost					**$117,500**

Chevron Richmond Refinery
Landfarms 1 - 5 Post Closure Care Costs

Task 7 - Postclosure Permit Renewal and Annual Permit Fee

Item	Post Closure Care Activity	Quantity	Units	Unit Cost	Annual Cost	30 Year Estimate
1	**Fees**					
	Annual Fee Based on DTSC Fee Summary, effective Jan. 1, 2011, post closure facility fees for years beyond first 5 years of post closure period.	1	ea	$10,300	$10,300	$309,000
	Permit Renewal Fee Based on DTSC Fee Summary, effective Jan. 1, 2011 for renewal of post closure permit, assume worst case scenario of 80% of new permit fee (0.8 * $54,103).	2	ea	$44,000		$88,000
	Consultant Fee Assumes outside consultant will be used for preparation of applications.	2	ea	$50,000		$100,000
	Task 7 - Postclosure Permit Renewal and Annual Permit Fee Total 30 Year Cost					**$497,000**

Chevron Richmond Refinery
Landfarms 1 - 5 Post Closure Care Costs

Task 8 - Security

Item	Post Closure Care Activity	Quantity	Units	Unit Cost	Annual Cost	30 Year Estimate
1	**Fence**					
	Replace Fence Assumes one-time repair of fence, from 2002 Financial Assurance Estimate.	1	ea	$25,000		$25,000
				Task 8 - Security Total 30 Year Cost		**$25,000**

Chevron Richmond Refinery
Landfarms 1 - 5 Post Closure Care Costs

Task 9 - Overhead and Management Costs

Item	Post Closure Care Activity	Quantity	Units	Unit Cost	Annual Cost	30 Year Estimate
1	**Management Cost**					
	Oversight Approximately 2 hours per weeks are required for EMC management oversight.	104	hr	$150	$15,600	$468,000
	Task 9 - Overhead and Management Costs Total Annual cost				***$15,600***	
	Task 9 - Overhead and Management Costs Total 30 Year Cost					**$468,000**

Chevron Richmond Refinery
Landfarms 1 - 5 Post Closure Care Costs

Task 10 - GPS

Item	Post Closure Care Activity	Quantity	Units	Unit Cost	Annual Cost	30 Year Estimate
1	**Groundwater Protection System**					
	Landfarm Operating Cost Cost is based on 18% of the GPS budget because LF flow is 18% of GPS total flow. 2012 GPS budget values were $149,590 for SAIC labor, $227,446 for Goebel labor, $243,996 for refinery treatment fees and $125,000 for parts and unplanned specialty repairs. Total is $746,032, and 18% of the total is $134,285.76.	1	ea	$134,286	$134,286	$4,028,573
	Water Treatment Plant Assumes an independent wastewater treatment facility will be required in the future. Cost is for design and construction. One-time cost.	1	ea	$250,000		$250,000
	Treatment System O&M Annual O&M estimated costs to operate the independent wastewater treatment facility. Assume 30 years.	1	ea	$100,000	$100,000	$3,000,000
		Task 10 - GPS Total 30 Year Cost				**$7,278,573**