

**CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION**

ORDER No. R2-2015-0046

**UPDATED WASTE DISCHARGE REQUIREMENTS and
RESCISSION OF ORDER No. R2-2005-0026**

**PHILLIPS 66 COMPANY
SAN FRANCISCO REFINERY
1380 SAN PABLO AVENUE
RODEO, CONTRA COSTA COUNTY**

The California Regional Water Quality Control Board, San Francisco Bay Region, hereinafter the Water Board, finds that:

OWNERSHIP AND LOCATION

1. Phillips 66 Company (hereinafter called Phillips 66 or the Discharger) owns and operates the San Francisco Refinery (Refinery), located at 1380 San Pablo Avenue, Rodeo (Fig. 1). The Refinery encompasses an area of approximately 1,100 acres consisting of a 495-acre active area of the Refinery, where all its facilities and equipment are located, and another 600 acres of undeveloped land (Fig. 2). The two most prominent topographic features at the Refinery are Tormey Hill Ridge, which extends along the northeastern boundary, and the central valley that lies between Tormey Hill Ridge and lower hills to the southwest. The majority of the Refinery is constructed on a valley (the Central Valley). The northwestern boundary of the Refinery is located along the shoreline of San Pablo Bay. Approximately 95% of the area included within the Refinery's boundaries drains along the Central Valley toward San Pablo Bay, with the remainder flowing northward into Cañada del Cierbo Valley (Fig. 3).

PURPOSE OF ORDER UPDATE

2. The Water Board issues Waste Discharge Requirements (WDRs) to refineries to regulate discharges to land pursuant to California Code of Regulations (CCR) title 27 (Title 27) and section 13263 of the California Water Code (CWC). This Order accomplishes the following:
 - a. Rescinds and supersedes outdated WDRs;
 - b. Updates Refinery ownership information to reflect a name change;
 - c. Updates the requirements for continued maintenance and monitoring of designated waste management units (WMUs) (which include ponds or impoundments); and
 - d. Updates the Self-Monitoring and Reporting Program (SMP) for detecting potential releases from the WMUs. The Discharger has requested to combine into a single SMP the detection monitoring conducted at the Refinery in accordance with these WDRs and the corrective action monitoring conducted pursuant to Site Cleanup Requirements Order No. R2-2006-0065.

REGULATORY HISTORY

3. Industrial wastes from the Refinery historically were discharged into areas subsequently designated by the Water Board as WMUs pursuant to Title 27. The Water Board has adopted

WDRs to regulate such discharges associated with designated WMUs. In addition, the Water Board has adopted Site Cleanup Requirements (SCRs) to require cleanup of spills and leaks, including WMUs that require corrective action.

4. The Water Board has regulated water quality at the Refinery under the following orders:
 - a. WDRs Order No. 89-090 required further investigation of WMUs and to increase perimeter monitoring;
 - b. SCR Order No. 93-046 specified cleanup requirements for investigation and cleanup of spills, leaks, and contamination of soil and groundwater pursuant to CWC §13304;
 - c. WDR update Order No. 97-027 required further investigation and remediation of soil and groundwater, as well as enhancement of the Refinery's groundwater containment systems;
 - d. WDR update Order No. R2-2005-0026 updated the SMP monitoring schedule and provided a status update on WMUs and management systems;
 - e. SCR Order No. R2-2006-0065 rescinded Order No. 93-046 and required the Discharger to evaluate efficacy of groundwater control and light non-aqueous phase liquid recovery at the Refinery. SCR Order No. R2-2006-0065 was amended by R2-2012-0081 to include Phillips 66 Company as a Discharger; and
 - f. Order No. R2-2011-0027 reissued the Refinery's NPDES permit, which regulates the discharge of treated refinery wastewater and stormwater runoff, non-contact once-through cooling water, demineralizer regeneration wastewater, and stormwater runoff from sections of Interstate 80 and San Pablo Avenue that adjoin the Refinery. The Refinery is not covered by an industrial stormwater permit because rain and runoff from operation areas are collected, treated, and discharged under the NPDES permit.

SITE DESCRIPTION AND HISTORY

5. Petroleum refining operations began at the Refinery in 1896. The Refinery processes crude oil into a variety of products including butane, several grades of gasoline, diesel fuel, jet fuel, fuel oil, petroleum coke, and sulfur. Lubricating oil and wax were manufactured at this facility in the past, although these operations ceased in 1997. Wastewater from the refining processes, and most of the stormwater that is generated during rainfall events, is contained by the Refinery sewer system and routed to the Unit 100 Waste Water Treatment Plant (WWTP) for treatment and discharge pursuant to the Refinery's NPDES permit.
6. Currently, the Refinery receives crude oil and other feedstocks by vessels and pipelines and delivers refined products to customers via tanker barge, rail cars, trucks, and pipelines. The facility includes approximately 100 above-ground storage tanks that store crude oil and refined products, as well as several industrial water tanks. The total maximum petroleum storage capacity is about 8,500,000 barrels (42 gallons/barrel). Daily crude-oil throughput consists of approximately 100,000 barrels.
7. Wastes generated from the refining and manufacturing processes were historically disposed of at various WMUs throughout the Refinery or sent to offsite disposal facilities.

8. The Refinery has undergone several changes in ownership and names, as follows:
 - a. 1896 to 1997: Unocal Corporation
 - b. 1997 to 2001: Tosco Corporation
 - c. 2001 to 2002: Phillips Petroleum
 - d. 2002 to 2012: ConocoPhillips Company
 - e. 2012 to present: Phillips 66 Company
9. In December 2003, ConocoPhillips Company purchased the former Pacific Gas and Electric Company (PG&E) Oleum Power Plant, which is located in the interior of the western side of the Refinery (see Fig. 5 of the SMP). The former PG&E Oleum Power Plant property and Outfall Ditch are now part of the Refinery and subject to this Order, with the exception of a small relay structure that PG&E maintains ownership of in the central portion of the property.

Geologic Setting

10. The Refinery is located on the gently west-sloping valley floor and nearby upland areas associated with an east-west trending syncline. The axis of the syncline dips to the west towards San Pablo Bay, with the northern limb dipping almost vertically and the southern limb dipping at an approximately 35 degree angle. The general stratigraphic sequence of lithologic units underlying the Refinery are fill, unconsolidated Bay sediments (Bay Mud, Bay Sand, Older Bay Mud), Montezuma Formation, Pinole Tuff and associated clastic sediments, and San Pablo Group bedrock units.
11. The distribution of these geologic units influences the occurrence of groundwater aquifers at the Refinery. In some areas Bay Mud or Bay Sand are absent. There is also considerable spatial variation in the thickness of these units. An accurate understanding of the subsurface lithology is necessary for conducting subsurface investigations and for placement of groundwater monitoring and extraction wells.
12. Fill material derived from the historic development of the area is present in many areas of the Refinery. Fill is most commonly encountered in the Refinery's San Pablo Bay perimeter where the intertidal margins of the Bay were reclaimed and developed by previous landowners. It is also found in interior Refinery work areas where terraces for new structures were developed on the sloping topography, and along the margin of the Interstate 80 highway viaduct.
13. In the area of the Refinery property along the Bay margin, fill is underlain by late Pleistocene to Holocene-age Bay sediments that include a complex distribution of Bay Mud and Bay Sand, determined by the environment in which the sediments were deposited. The typical sequence is approximately 10 feet of Bay Mud overlying a thicker accumulation of Bay Sand, and an underlying unit of older Bay Mud; however there are areas where some of these units are absent. The Bay Muds are typically clay or silty clays with localized areas of partially-decayed vegetation or peat. The lithology of the Bay Sand is spatially variable and ranges from very fine sand or silt to medium or coarse sand. The coarsest Bay Sand is generally found in the area of present-day San Pablo Avenue.

14. The Bay sediments appear to overlie the nearly flat-lying Montezuma Formation in the area of San Pablo Avenue. The Montezuma Formation is of early Pleistocene age and has been characterized as a series of estuarine and continental deposits, including poorly indurated pebbly gravels, sand, and silts. The Montezuma Formation outcrops along the Refinery access road that extends past the south side of the former PG&E Oleum Power Plant site and at the small hill south of the Effluent Safety Basin (ESB) and the Refinery property (See Fig. 5 of the SMP).
15. The remainder of the Refinery is comprised of bedrock associated with the Pliocene Pinole Tuff and underlying Miocene San Pablo Group. These units have been deformed and provide the structural basis of the aforementioned syncline. They range from andesitic tuffs of the Pinole tuff to shales and sandstones of the Neroly and Cierbo formations.
16. Two buried valleys beneath the Bay Front area include thicker accumulations of Bay sediments. These two valleys are bayward extensions of buried drainages that generally followed the synclinal axis of the San Pablo Group. The larger valley lies beneath the Primary Storm Basin (PSB) and Main Storm Basin (MSB) (as shown on Fig. 5 of the SMP) and extends underneath the ESB. The other extends from just south of the former PG&E site towards the ESB, where the two merge.
17. The area bounded by current San Pablo Avenue, the railroad tracks, and the former PG&E Outfall Ditch was a low-lying embayment before the railroad tracks were constructed in the mid-1880s. The placement of the tracks spanned the intertidal area and effectively isolated it from San Pablo Bay forming an interior wetland. The area was systematically developed during the first half of the 1900s with different episodes of fill that brought the area to current grade.

Seismicity

18. The Refinery is located approximately mid-way between the active Hayward and Concord-Green Valley faults. The closest active fault to the Refinery is the Hayward fault, located approximately 7 miles southwest. The Hayward Fault Zone is the southern extension of a fracture zone that includes the Rodgers Creek fault (north of San Pablo Bay), the Healdsburg fault (Sonoma County), and the Maacama fault (Mendocino County). The Hayward fault trends to the northwest within the East Bay, extending from San Pablo Bay in Richmond, 60 miles south to San Jose, where it converges with the Calaveras fault, a similar type fault that extends north to Suisun Bay. Historically, the Hayward fault generated two sizable earthquakes, both in the 1800s. The USGS Working Group on California Earthquake Probabilities includes the Hayward–Rodgers Creek Fault Systems in the list of those faults that have the highest probability of generating earthquakes of M 6.7 and greater.

Hydrogeology and Hydrology

19. The Refinery is not located within a State-designated groundwater basin; however two unofficial groundwater basins underlie (or partially underlie) the Refinery. The main groundwater basin, referred to as the Refinery Groundwater Basin for identification, includes the entire area south/southwest of Tormey Hill Ridge, including the Central Valley and Bay Front areas. The groundwater gradient typically follows topography, such that groundwater migrates to the southwest off Tormey Hill Ridge and then northwest through the Central Valley toward San Pablo

Bay. The smaller Tormey Groundwater Basin is the area located northeast of Tormey Hill Ridge extending down into Cañada del Cierbo. This basin has a northeast sloping groundwater gradient within the Refinery boundary toward the bottom of Cañada del Cierbo and the ephemeral creek present in portions of it. This basin underlies a small portion of the upper tank farm (Fig. 2).

20. The groundwater surface elevation in Zone 3 (east of Interstate 80) ranges from 120 to 300 feet above mean sea level and slopes from the hills northwestward towards the Central Valley. The water-bearing zone is generally fractured sandstone. In Zone 2 (between Interstate 80 and San Pablo Avenue), the groundwater surface elevation occurs from less than 10 feet above mean sea level in the PSB/MSB area up to 200 feet above mean sea level along Tormey Ridge. Groundwater flow is generally to the southwest along Tormey Ridge and to the northwest in the Central Valley. South of the former PG&E Outfall Ditch (Fig. 3), the water table occurs from 6 to 10 feet above mean sea level along most areas of the Bay Front, with a gradient towards San Pablo Bay. North of the former PG&E Outfall Ditch, groundwater occurs at similar depths, with gradients generally west to northwest towards San Pablo Bay.
21. There are two water-bearing zones near the Bay Front. The upper aquifer is referred to as the A-Zone and the deeper aquifer is called the B-Zone. The A-Zone aquifer is primarily located in fill and in Bay Mud deposits; however it occurs in Bay Sand where the Bay Mud is absent. The lower B-Zone aquifer occurs below the Bay Mud in fine to very fine-grained Bay Sand deposits of variable thickness. The Bay Sand of the B-Zone becomes finer and less hydraulically conductive near the Bay Front.

Waste Management Units

22. The Refinery contains both active and inactive WMUs regulated under Title 27. Active WMUs include process water surface impoundments that are still used by the Refinery. All WMUs that were used for land disposal of wastes are inactive (Fig. 2). The attached SMP has been updated in accordance with the *Final Revised Groundwater Self-Monitoring Plan* (Trihydro, 2015) available on GeoTracker.
 - a. Process water surface impoundments regulated under these WDRs include:
 - i. *Main Storm Basin (MSB)*: The MSB is the only active impoundment regulated by these WDRs. The MSB, with a capacity of 7.2 million gallons and an estimated size of approximately 3.82 acres, is used as an overflow catchment for the PSB (a surface impoundment regulated by the Department of Toxic Substances Control (DTSC), see description under finding 22.c.ii) and is therefore used rarely (2.5 feet freeboard below the PSB ground level). The MSB has shotcrete earthen sides and an earthen bottom. Periodically, hazardous concentrations of petroleum-associated volatile organic compounds (VOCs), specifically benzene, are measured in the PSB. However, the volume of stormwater required for overflow use of the MSB provides sufficient dilution that concentrations fall below hazardous but at times above water quality objectives, which is why it is regulated under these WDRs.
 - ii. *Effluent Safety Basin (ESB)*: The ESB is regulated by the Water Board under the Refinery's NPDES permit, Order No. R2-2011-0027. The ESB is used to temporarily store

non-contact, once-through cooling salt water and stormwater originating from various places including the salvage yard, the main parking lot, undeveloped areas of the Refinery (non-process areas), a limited portion of San Pablo Avenue and nearby residential Rodeo, and a portion of Interstate 80. Water stored in the ESB is discharged to San Pablo Bay through the E-003 outfall.

- b. Inactive solid WMUs (which the Discharger refers to as Inactive Waste Sites, or IWSs) regulated under these WDRs:
- i. *Inactive Waste Site 4*: IWS 4 is located in the central portion of the Refinery, east of the PSB and MSB. IWS 4 occupies approximately 20.5 acres and was reportedly used for disposal of petroleum-contaminated sediment potentially containing leaded tank-bottom sludge prior to 1950. The unit was closed in the 1950's, and there is little documentation of closure. The site was reportedly covered with clean fill of unknown thickness, and much of the site is currently paved. Based on previous subsurface investigations (Woodward-Clyde, 1992), the base of the waste soil is approximately 8 to 10 feet below ground surface. The site lies at the base of a cut-slope to the east that slopes steeply toward the west. Previous groundwater monitoring programs identified chemicals of concern at IWS 4 as dissolved lead and total petroleum hydrocarbons. An updated detection monitoring plan for IWS 4 dated April 22, 2013, was approved by the Water Board and includes bis(2)-ethylhexyl phthalate and dissolved lead as Monitoring Parameters (MPs, constituents monitored at least annually) for the eight groundwater monitoring wells sampled on a semi-annual basis, due to mobility and potential toxicity. The revision was necessary because an August 2010 investigation revealed that the WMU is larger than expected.
 - ii. *Inactive Waste Sites 5 and 8*: IWS 5 (approximately 0.35 acre, Fig. 2) and IWS 8 (approximately 0.2 acre) are located adjacent to each other in the northwest portion of the Refinery near the San Pablo Bay shoreline and were last used and presumably closed in the 1940s. Documentation of closure is unavailable. IWS 5 was reportedly used for disposal of leaded gasoline tank bottom sludges. IWS 8 was reportedly used for the disposal of acid sludge. The two inactive waste sites were reportedly covered with fill before being paved and are now used for storage, salvage operations, and contractor work areas. Continuous monitoring conducted as part of the detection monitoring plan (DMP) indicated that contaminants have migrated from these WMUs, and therefore these units are undergoing corrective action. A downgradient Main Interceptor Trench and B-Zone Extraction System were installed to contain and remove groundwater contaminants from IWS 5 and 8. The units are regulated by a Corrective Action Monitoring Program (CAMP) under SCR Order No. R2-2006-0065. IWS 5 and 8 are also included in this Order due to their historical and ongoing waste discharges affecting groundwater. Therefore, the two sites are regulated under both WDRs and SCRs. Dissolved metals (arsenic, barium, cadmium, chromium, and lead), VOCs, pH, and total petroleum hydrocarbons as diesel (TPH-D) are the MPs for the ten groundwater monitoring wells included in the CAMP associated with the Refinery's SCRs. IWS 5 and 8 are the only WMUs currently in corrective action.
 - iii. *Inactive Waste Sites 6, 6A, and 6B*: IWS 6 (approximately 55.9 acres), 6A (approximately 2.6 acres), and 6B (approximately 9.4 acres) are located southeast of the Refinery plant

area and southeast of Interstate 80 in Zone 3. IWS 6 and 6A were reportedly closed in the 1960s; there is no information available on when IWS 6B was closed. IWS 6B is located closest to the freeway with IWS 6 and 6A directly to the east. IWS 6 occupies the north-facing slope of a large hill and an adjacent hill to the west. IWS 6A is located immediately west of Site 6, but is flat-lying and underlain by fill from the construction of Interstate Highway 80. IWS 6B is located on the western edge of IWS 6A and occupies the lower reach of a north-facing slope, bounded by drainages on the east and west sides.

IWS 6, 6A, and 6B were used as disposal sites for Refinery wastes. IWS 6 was used for disposal of wastewater primary treatment sludge, slop oil emulsion solids, and oily tank-bottom sludges from 1954 to 1964. IWS 6A was used as a depository for dredge spoils from the ESB in the late 1960s. Documentation of closure is unavailable; however, based on previous subsurface investigations (Woodward-Clyde, 1992), the depths of waste are believed to be generally less than seven feet across all three sites, and the depth of fill cover is believed to be less than one foot. TPH-D and dissolved lead are the MPs for the eight groundwater monitoring wells included under the IWS 6, 6A, and 6B DMP associated with these WDRs.

- iv. *Inactive Waste Site 6C*: IWS 6C occupies approximately 14.58 acres in the southeastern portion of the Refinery and underlies the Bulk Container Storage Unit (BCSU) and Tanks 106, 107, 156, and 180. The area is currently covered by pavement. This site was used in the 1950s prior to the construction of the BCSU and tankage. Investigation activities in the area indicated the presence of petroleum hydrocarbon-impacted soils beneath the BCSU. Although the origin of the material placed on IWS 6C is not known, the contaminants present in subsurface soils included petroleum coke waste, TPH, lead, mercury, total petroleum hydrocarbons as motor oil (TPH-mo), and PCBs. Dissolved lead, dissolved mercury, and TPH-d are the MPs for the three groundwater monitoring wells included under the IWS 6C DMP.
- v. *Inactive Waste Site 7*: IWS 7, which is approximately 2.91 acres, is located in a gently sloping area along the Tormey Hill Ridge, partially within the Tormey Hill groundwater basin just southeast of the seasonal product storage tanks on the southeast part of the Refinery. IWS 7 was used for the disposal of oily tank-bottom sludges from 1960 to 1973. Oily wastes applied to the surface of the site were later covered with a layer of clean fill approximately one foot deep. When IWS 7 was closed in 1973, the dikes that surrounded the unit were bulldozed inward as cover material. Based on previous subsurface investigations (Woodward-Clyde, 1992), the total depth of wastes is believed to be less than seven feet. Dissolved arsenic, barium, chromium, lead, and TPH-d are the MPs for the five groundwater monitoring wells included under the IWS 7 DMP.
- vi. *Inactive Waste Sites 9A and 9B*: IWS 9A (approximately 22.08 acres) and 9B (approximately 6.82 acres) are located on the southeast side of Interstate 80 in Zone 3 of the Refinery. These units are south of IWS 7 and east of the Land Treatment Area (discussed in finding 22.c.iii). IWS 9A is located on a southwest-facing slope, and IWS 9B is located on a small northwest-trending spur ridge. IWS 9A and IWS 9B were used in the 1950s and 1960s for disposal of wastewater, primary treatment sludge, slop oil

emulsion solids, and oily tank-bottom sludges. Wastes were spread on the surface and tilled into the soil. Closure presumably occurred in the 1960s and closure documentation is not available. However, based on previous subsurface investigations (Woodward-Clyde, 1992), the depth of waste at IWS 9A and IWS 9B is generally believed to be less than six feet. Dissolved lead, dissolved mercury, and TPH-D are the MPs for the five groundwater monitoring wells included under the IWS 9A and 9B DMP.

c. Inactive WMUs not regulated under these WDRs include:

- i. *Inactive Waste Sites 2 and 3*: IWS 2 and 3 were located north of the upper tank farm (Fig. 2), where the Groundwater Basin Divide separates the Refinery Groundwater Basin from the Tormey Hill Groundwater Basin. Both sites are located in the Tormey Hill Groundwater Basin. These sites were clean-closed in 1985 under the direction of the Department of Health Services (Unocal, 1987). No evidence was identified for contaminant migration into Cañada del Cierbo (Tormey Hill Groundwater Basin). Because IWS 2 and 3 were clean-closed, they are not monitored under these WDRs.
- ii. *Primary Storm Basin (PSB)*: The PSB is a closed impoundment regulated by DTSC under a Resource Conservation and Recovery Act (RCRA)-equivalent Hazardous Waste Facility Post-Closure Permit (CAD 009108705). Although closed, the PSB is used occasionally to receive emergency discharges of hazardous wastewater. The PSB is located adjacent to the MSB and the Unit 100 WWTP. In 1996, a subsurface investigation around the MSB indicated hydrocarbon contamination in soil and groundwater around the PSB and MSB. The petroleum hydrocarbons are believed to be associated with historical handling of hydrocarbon mixtures in the early Refinery wastewater treatment operations and not with active releases from the current wastewater treatment unit; therefore the PSB area is regulated under the SCRs and not these WDRs. The PSB/MSB extraction system was installed in 1997. As part of the closure process, the 2.3 million gallon capacity basin was retrofitted with a synthetic liner system comprised of a geomembrane top liner and underlying leachate collection/leak detection geogrid net above the existing concrete substrate that forms the impoundment.
- iii. *Land Treatment Area (LTA)*: The LTA is located near the eastern perimeter of the Refinery and south of the seasonal tank farm (Fig. 2). Historically, the LTA was used to dispose of biologically degradable refinery waste. The LTA was closed in 1988 and is regulated under a RCRA-equivalent Hazardous Waste Facility Post Closure Permit (CAD 009108705) by DTSC. Groundwater monitoring data indicates groundwater quality downgradient or beneath the unit in the vicinity of the LTA is not affected. The Post Closure Permit requires groundwater and vadose zone monitoring as well as routine maintenance and inspections. The existing Post Closure Permit term expired in April 2014, and a new Permit Application was initially submitted in September 2013. Subsequent revisions to the Permit Application were made in September 2014 and February 2015, which are under review by DTSC. The existing permit requires groundwater monitoring and sampling in June 2016 and June 2021. The new schedule (as proposed in the revised Permit Application) includes annual groundwater monitoring and sampling.

Historical Releases and Remedial Actions

23. Portions of the Refinery are also regulated under SCR Order No. R2-2006-0065. That order (as amended by Order No. R2-2012-0081) describes Areas of Concern (AOCs) and remedial actions taken or planned to address contamination of soil or groundwater at the Refinery. Monitoring associated with the SCRs has been included and updated in the attached SMP. Justification for the modifications is provided in the *Final Revised Groundwater Self-Monitoring Plan* (Trihydro, 2015) available on GeoTracker.
24. Historical releases and associated remedial actions at the Refinery include multiple AOCs that are addressed in the SCRs. These areas are evaluated under a CAMP as part of the SCRs (see figures in the attached SMP). Additions to the CAMP were made in the attached SMP. AOCs at the Refinery include the following (which are described in detail in the SCRs):
- a. Effluent Safety Basin (ESB);
 - b. Inactive Waste Sites (IWS) 5 and 8;
 - c. E-003 Discharge Area;
 - d. Unit 100 Wastewater Treatment Facility;
 - e. Former PG&E Saltwater Intake;
 - f. Former PG&E Outfall Ditch;
 - g. Gasoline Blending Unit 76 Area; and
 - h. Tank 302 and Well 181 Area.
25. Free-Phase Petroleum Hydrocarbon Recovery Program Areas: Pursuant to the SCRs, recovery of Free-Phase Petroleum Hydrocarbon is conducted periodically or continuously, depending upon the volume and recoverability. Areas of the Refinery undergoing continuous recovery that are not addressed by the Interceptor Trench System (the perimeter total fluids extraction system, which provides hydraulic control of groundwater at the perimeter) include (see figures in the attached SMP):
- a. Tank 302 Area;
 - b. Primary and Main Storm Basin;
 - c. Unit 76 Active Skimmer;
 - d. Tank 100;
 - e. Marine Terminal Area; and
 - f. Area 6 (seep mitigation).

Groundwater Monitoring Program

26. Groundwater monitoring at the Refinery is performed to achieve multiple objectives and is conducted pursuant to two Title 27 programs: detection monitoring and corrective action monitoring, as described below. The attached SMP includes *detection monitoring* associated with the WMUs covered under this Order and *corrective action monitoring* required for the AOCs under the SCRs. The SMP also incorporates monitoring required by the DTSC permits and wells associated with various voluntary investigation and evaluations programs at the Refinery that are not specifically defined under a regulatory order, directive, or permit.

27. As detailed in the *Final Revised Groundwater Self-Monitoring Plan* (Trihydro, 2015), the SMP has been modified to provide consistent and meaningful water quality data for the monitoring area of the Refinery. Some of the Refinery's monitoring wells have been in place and routinely monitored since the 1980s and are no longer useful based on current site conditions, general concentration trends, or installation of replacement wells, and therefore were removed from the SMP. The approach used to revise the SMP included a multivariate evaluation to identify the wells to be retained, removed, or added to optimize the groundwater monitoring program. The two primary elements of the SMP (detection monitoring and corrective action monitoring) are described in findings 28 and 29.
28. Detection Monitoring Program (DMP): The purpose of this program is to monitor groundwater downgradient of WMUs to identify, as early as possible, a potential release to groundwater. The waste materials in each WMU have been evaluated to identify constituents with the potential to contaminate groundwater and to produce a list of Constituents of Concern (COCs), which are monitored once every five years, and Monitoring Parameters (MPs), which are the most mobile constituents, and are therefore monitored more frequently.

Detection of a COC or MP at a Point of Compliance (POC) well indicates a potential leak from a WMU, triggering retesting, evaluation, and potentially corrective action. A POC well is located at the hydraulically downgradient limit of the WMU and extends through the uppermost aquifer, which is most likely to be impacted by a release from the WMU. Interwell statistical analysis (comparing up- or side-gradient water quality to water quality downgradient of the WMU) is typically employed; however there are instances where intrawell statistical analysis is necessary due to upgradient contamination.

With the exception of wells for IWS 5 and 8 (which are in the CAMP), the methods for statistically evaluating data for the WDR (DMP) program wells consist of comparison to the intrawell 95% Upper Prediction Limit (UPL), in conjunction with the intrawell Mann-Kendall trend test, used to verify that there are no trends in the recent background data prior to performing the UPL evaluation. The UPL test will be used to calculate a limit from historical background data for each well, based on the mean/median and variability of that data, with the limit's value based and dependent upon on an expected retest of one sample, to verify any initial exceedance. If a current sample exhibits a concentration in excess of the UPL, the subject groundwater well will be re-sampled within 30 days of discovery of the exceedance to verify the exceedance result. An exceedance is verified if the re-sampled concentration is above the UPL, at which corrective action is initiated.

The Mann-Kendall trend test is also an intrawell test and is used to evaluate for statistically significant trends, at a specified confidence level. The analysis determines the number of time-ordered increases and decreases in the data (from sample to sample) and compares that to a tabulated value to determine if a statistically significant trend exists. The test is not impacted by the magnitude of the differences between data points, only by the "direction" of each difference. Use of the intrawell 95% UPL and Mann-Kendall trend analysis is intended to minimize the potential for false positives (indication of a release when none exists) while remaining protective of the environment.

DMP groundwater monitoring wells have been grouped geographically such that several WMUs are monitored by a single group of wells. Below is a list and brief description of well groupings. Details and figures are provided in the attached SMP:

- a. Primary Storm Basin (PSB);
- b. Main Storm Basin (MSB);
- c. IWS 4;
- d. IWS 5 and 8;*
- e. IWS 6, 6A, 6B;
- f. IWS 6C;
- g. IWS 7; and
- h. IWS 9A and 9B.

*Historic releases from IWS 5 and 8 are monitored under the CAMP.

29. Corrective Action Monitoring Program (CAMP): The purpose of this program is to monitor the status of historic spills that have impacted groundwater, to evaluate the effectiveness of remedial actions that have been implemented, and to ensure that contamination is not migrating away from an impacted area. In contrast to detection monitoring in which groundwater results are typically non-detect, corrective action monitoring tracks the concentrations of known groundwater contaminants over time to evaluate the effectiveness of corrective actions. The CAMP in the attached SMP has been revised according to these principles.

The AOCs and the WMUs (currently IWS 5 and 8) that have known releases to groundwater are evaluated under the CAMP. The evaluation of the data includes applying a Mann-Kendall trend test to evaluate for statistically significant increasing or decreasing trends at a 95% confidence level. The identification of increasing or decreasing trends is a key factor in evaluating effectiveness of the corrective action.

Groundwater wells monitored under the SCR are organized into geographic areas associated with AOCs as summarized below (see SMP for figures):

- a. Releases from IWS 5 and IWS 8;
- b. Refinery Groundwater Basin Perimeter (RGBP);
- c. Downgradient Trench Perimeter (DGTP); and
- d. Former PG&E Oleum Power Plant.

BASIN PLAN

30. The Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) is the 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 Water Board and approved by the State Water Resources Control Board (State Water Board), the Office of Administrative Law, and U.S. EPA, where required.

ANTIDegradation Policy

31. Title 40 of the Code of Federal Regulations, part 131.12, requires that State water quality standards include an anti-degradation policy consistent with the federal policy. The State Water Board established California's anti-degradation policy through State Water Board Resolution 68-16, which is deemed to incorporate the federal anti-degradation policy where the federal policy applies. Resolution 68-16 requires that existing water quality be maintained unless degradation is justified based on specific findings. The Basin Plan implements, and incorporates by reference, both the State and federal anti-degradation policies. This Order is consistent with both the State and federal anti-degradation policies because it does not allow degradation.

BENEFICIAL USES AND SOURCES OF DRINKING WATER

32. The Refinery is not located in a designated groundwater basin. However, there are two minor groundwater basins that underlie (or partially underlie) the Refinery (Refinery Groundwater Basin and Tormey Groundwater Basin; see finding 19). There is no historical, existing, or planned use of groundwater as a source of drinking water at the Refinery. However, groundwater at the Refinery must be considered for future use as drinking water, which shall be considered in the development of cleanup standards and water quality protection standards (WQPS).

Groundwater does have the potential to discharge into San Pablo Bay. Therefore, the surface water beneficial uses named in the Basin Plan for that water body are applicable to groundwater in POC monitoring wells.

33. The potential beneficial uses of groundwater are:

- a. Industrial process and service supply;
- b. Agricultural water supply; and
- c. Municipal and domestic supply.

34. The existing and potential beneficial uses of surface water in San Pablo Bay 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; and
- k. Navigation.

CALIFORNIA ENVIRONMENTAL QUALITY ACT

35. Adoption of this Order is exempt from the California Environmental Quality Act (CEQA). Under CEQA Guidelines section 15061(b)(3), CEQA applies only to projects that have the potential for causing a significant effect on the environment. Where it can be seen with certainty that there is no

possibility that the activity in question may have a significant effect on the environment, the activity is not subject to CEQA. This Order requires the Discharger to continue site monitoring and maintenance activities, and these will not result in any additional actions that may have an effect on the environment beyond the existing baseline conditions. In addition, this action is an Order pertaining to an existing facility. There is no expansion of use beyond that existing under prior orders. For these reasons, the project is exempt from the application of CEQA pursuant to CCR title 14, section 15301.

NOTICE AND MEETING

36. The Water Board has notified the Discharger and interested persons of its intent to update the Refinery's WDRs and has provided them with an opportunity for a public hearing and an opportunity to submit their written views and recommendations.

37. The Water Board, at a public meeting, heard and considered all comments pertaining to this update of the Refinery's WDRs.

IT IS HEREBY ORDERED pursuant to the authority in CWC §§13263 and 13267 and Title 27 that the Discharger shall meet the applicable provisions contained in Title 27 and shall comply with the following:

A. PROHIBITIONS

1. Migration of pollutants through subsurface transport to waters of the State is prohibited.
2. There shall be no discharge of wastes to surface waters except as permitted under the NPDES permits.
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 CWC §13050(l) and (m), nor degrade the quality of waters of the State or of the United States.
4. The creation of any new WMU is prohibited without prior Water Board amendment of these WDRs.
5. The relocation of wastes to or from WMUs is prohibited without prior Water Board staff written concurrence and shall not create a condition of pollution or nuisance as defined in CWC §13050(l) and (m). Wastes shall not be relocated to any location where they can be discharged into waters of the State or of the United States.
6. Excavation within or reconfiguration of any existing WMU is prohibited without prior concurrence of Water Board staff. Minor excavation or reconfiguration activities such as for installation of signs or minor routine maintenance and repair do not require prior Water Board staff concurrence.

7. 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.
8. The discharge of hazardous waste at the Refinery is prohibited. For the purpose of this Order, the term "hazardous waste" is as defined in Title 27 §20164.
9. The discharge of leachate or wastewater (including from surface impoundments, process waters, and runoff from the Refinery's operation 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 pursuant to Title 27 §20200(2)(b).
10. Activities associated with subsurface investigations and cleanup that will cause significant adverse migration of pollutants are prohibited.
11. If it is determined that a surface impoundment is leaking or there is a failure which causes a threat to water quality, there shall be no discharges to that surface impoundment, and any residual liquids and sludge shall be removed expeditiously.
12. 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 the post-closure maintenance period, pursuant to Title 27 §20310(a).
13. The Discharger shall not cause the following conditions to exist in waters of the State at any place outside of the Refinery:
 - a. Surface Waters
 - 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. Groundwater
 - i. Degradation of groundwater quality and/or substantial worsening of existing groundwater impacts; and

- ii. Subsurface migration of pollutants associated with Phillips 66 Company's operations to waters of the State is prohibited.

B. SPECIFICATIONS

Reporting Specifications

1. All technical reports submitted pursuant to this Order shall be prepared under the supervision of and signed under penalty of perjury by a California registered civil engineer, registered geologist, and/or certified engineering geologist.
2. The Discharger shall continue the DMP for groundwater beneath the Refinery, pursuant to Title 27 §20430. The Discharger shall periodically evaluate the DMP to determine if monitoring is achieving the program goals. The SMP attached to this Order is intended to constitute the DMP for the Refinery.
3. At any time, the Discharger may file a written request (including supporting documentation) with the 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.

WMU Specifications

4. WMUs at the Refinery 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.
5. The Discharger shall notify the 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.
6. The Discharger shall maintain the WMUs so as to prevent a statistically significant increase in water quality parameters at POCs as provided in Title 27 §20420.
7. The Discharger shall maintain the WMUs to prevent discharges, such that the units do not constitute a pollution source.
8. Pipeline discharges to active surface impoundments shall be either equipped with devices, or fail-safe operating procedures, to prevent overfilling. The surface impoundments shall maintain at least two feet of freeboard, except during and immediately after a storm event or WWTP upset.
9. The Discharger shall have continuing responsibility for correcting any problems that arise in the future as a result of waste discharge or related operations or site use.

10. 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 referenced in this Order.
11. WMUs shall be closed according to a closure plan prepared according to all applicable requirements of Title 27 and approved by the Executive Officer.
12. 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.
13. The Discharger shall install, maintain in good working order, and operate efficiently any monitoring system necessary to assure compliance with these WDRs.
14. If it is determined by the Executive Officer, based on groundwater monitoring information, that water quality at or beyond the POC wells becomes degraded, the Discharger will be required to submit and implement a site-specific groundwater corrective action proposal.
15. The Discharger shall operate the WMUs 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.

Monitoring Specifications

16. 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 compliance of WMU ponds with updated WQPS (See Provision C.3).
17. Any additional monitoring wells installed at the Refinery 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.
18. All borings for monitoring wells shall be continuously cored. The drill holes shall be logged during drilling under the direct supervision of a California professional geologist whose signature appears on the corresponding well log. Logs of monitoring wells shall be filed with the State Department of Water Resources. All information related to well construction shall be submitted to the Water Board upon well completion.
19. The groundwater sampling and analysis program shall ensure that groundwater quality data are representative of the groundwater in the area that is monitored.

Soil Contamination

20. The Discharger shall notify the Water Board of any soil contamination not previously identified in subsurface investigations that is discovered during any subsurface investigation or excavation work conducted on Refinery property that may potentially adversely impact water quality. In 2007, a soils management plan was approved by the Water Board to direct the reuse and disposal of onsite soils (*Facility-Wide Soil Management Plan*, MWH 2007).

C. 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 Water Board orders or court orders requiring corrective action or imposing civil monetary liability.
2. **Authority**: All technical and monitoring reports required by this Order are requested pursuant to CWC §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 §13268.
3. **Self-Monitoring and Reporting Program (SMP)**: The Discharger shall comply with the SMP attached to this Order (Part A and Part B). Part B of the SMP references the approved Groundwater Monitoring Program (GMP), which is intended to constitute a detection monitoring plan pursuant to Title 27 §20420, and is designed to identify significant water quality impacts from the specified WMU and demonstrate compliance with the WQPS established pursuant to Title 27 §20390 for the WMU. The SMP may be amended as necessary at the discretion of the Executive Officer. Reports shall be submitted semi-annually by **March 31** and **August 31** of each year.

COMPLIANCE DATE: Immediately

4. **Revision of the Groundwater Monitoring Program**: The Discharger shall submit an updated GMP, acceptable to the Executive Officer, based on any planned construction or earthwork at the Refinery that may result in the abandonment, destruction, or relocation of any groundwater monitoring well that is part of the GMP program. The update shall also include relevant updates to the monitoring objectives, sampling procedures and frequency, analytical methods used, and any impacts or changes to the surface water monitoring program.

COMPLIANCE DATE: 90 Days after Work is Complete

5. **Long-Term Flood Protection Report**: The Discharger shall submit a report, acceptable to the Executive Officer, for long-term flood and/or sea level rise protection at the Refinery. The report shall include a consideration of feasible options for achieving protection from the 100-year flood to account for rising sea levels and increased flood frequency and intensity. The report shall consider the methods developed by the San Francisco Bay Conservation and Development Commission to predict and protect against future flooding. The report shall be

updated every five years throughout the operational life of the site with the most recently available and credible information at the time of the update.

COMPLIANCE DATE: June 30, 2016, and every five years thereafter

6. Change in Discharge: In the event of a material change in the character, location, or volume of a discharge, the Discharger shall file with the Water Board a new Report of Waste Discharge (CWC §13260). A material change includes, but is not limited to, the following:
 - a. Addition of a major industrial waste discharge to a 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 that 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; or
 - d. Increase in flow to a WMU or water body beyond that specified in the WDRs.

COMPLIANCE DATE: 120 days prior to any material change

7. Financial Assurance: The Discharger shall submit to the 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 releases that may be required for all WMUs at the Refinery. 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: May 31, 2016, and every five years thereafter

8. 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 the WMUs (CWC §13263).
9. Change in Ownership: In the event of any change in control or ownership of the site 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 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. Any change in the Discharger

named on this Order requires an update or amendment to the WDRs by action of the Board. 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 Water Board. Failure to submit the request shall be considered a discharge without requirements, a violation of CWC §13263 and §13267.

COMPLIANCE DATE: 30 days after a change in site control or ownership

10. Revision: This Order is subject to 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 Water Board will review this Order periodically and may revise its requirements when necessary (CWC §13263).
11. Submittal Revisions: Where the 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 Water Board, it shall promptly submit such facts or information (CWC §13260 and §13267).
12. 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 §13263(g)).
13. Operations 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 §13263(f)).
14. Reporting Requirements: All reports submitted pursuant to this Order must be in accordance with the State Water Board-adopted regulations requiring electronic report and data submittal to the State's GeoTracker database (CCR §§3890-3895). Email notification should be provided to Regional Water Board staff whenever a file is uploaded to GeoTracker. In addition, the Discharger shall submit hard copies of reports to Regional Water Board staff.

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 sampling point for which data is reported, accurate to within 1 meter and referenced to a minimum of two reference points from the California Spatial Reference System, if available, unless specified in the SMP;
- 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 sampling point or depth and length of screened interval for any permanent monitoring well;
 - g. PDF copies of boring logs; and
 - h. PDF copies of all reports, workplans, 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 professional civil engineer or a professional geologist.
15. 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 Water Board staff may undertake during the review process. 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.
16. Reporting of Hazardous Substances 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 Water Board by calling (510) 622-2369 during regular office hours (Monday through Friday, 8 a.m. – 5 p.m.); and
 - ii. The California Office of Emergency Services (Cal OES) at (800) 852-7550.
 - b. A written report shall be filed with the 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; and
- vii. The persons/agencies notified.

This reporting is in addition to reporting to Cal OES as required by the Health and Safety Code.

17. 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 OES 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 §8574.7) of the Government Code and immediately notify the 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 §13271 unless the Discharger is in violation of a prohibition in the Basin Plan (CWC §13271(a)).

18. Release Reporting Requirements: In the case of a release (as defined in Provision C.17 above), the following must be provided to the 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.

19. 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; and
- 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 §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 §13263 and §13267).

20. Entry and Inspection: The Discharger shall allow Water Board staff, 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 §13267).

21. 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 §404 of the federal Clean Water Act and discharge subject to a general NPDES permit) must file an NPDES permit application with the Water Board (40 CFR §122.21).

22. 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 professional engineer registered in California 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 §2230).

23. 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 §13263(f)).
24. Document Distribution: Copies of correspondence, technical reports, and other documents pertaining to compliance with this Order shall be provided to the Water Board and any other interested agencies.
25. General Prohibition: Neither the treatment nor the discharge of waste shall create a pollution, contamination or nuisance, as defined by CWC §13050, CWC §13263, and Cal. Health & Safety Code §5411.
26. 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 surface impoundment. Damage to any WMU or surface impoundment, 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 two weeks 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 Water Board's Spill Hotline at (510) 622-2369 and by sending an email to Rb2SpillReports@waterboards.ca.gov In addition, report to Cal OES at (800) 852-7550.

27. 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.

29. This Order supersedes and rescinds Order No. R2-2005-0026.

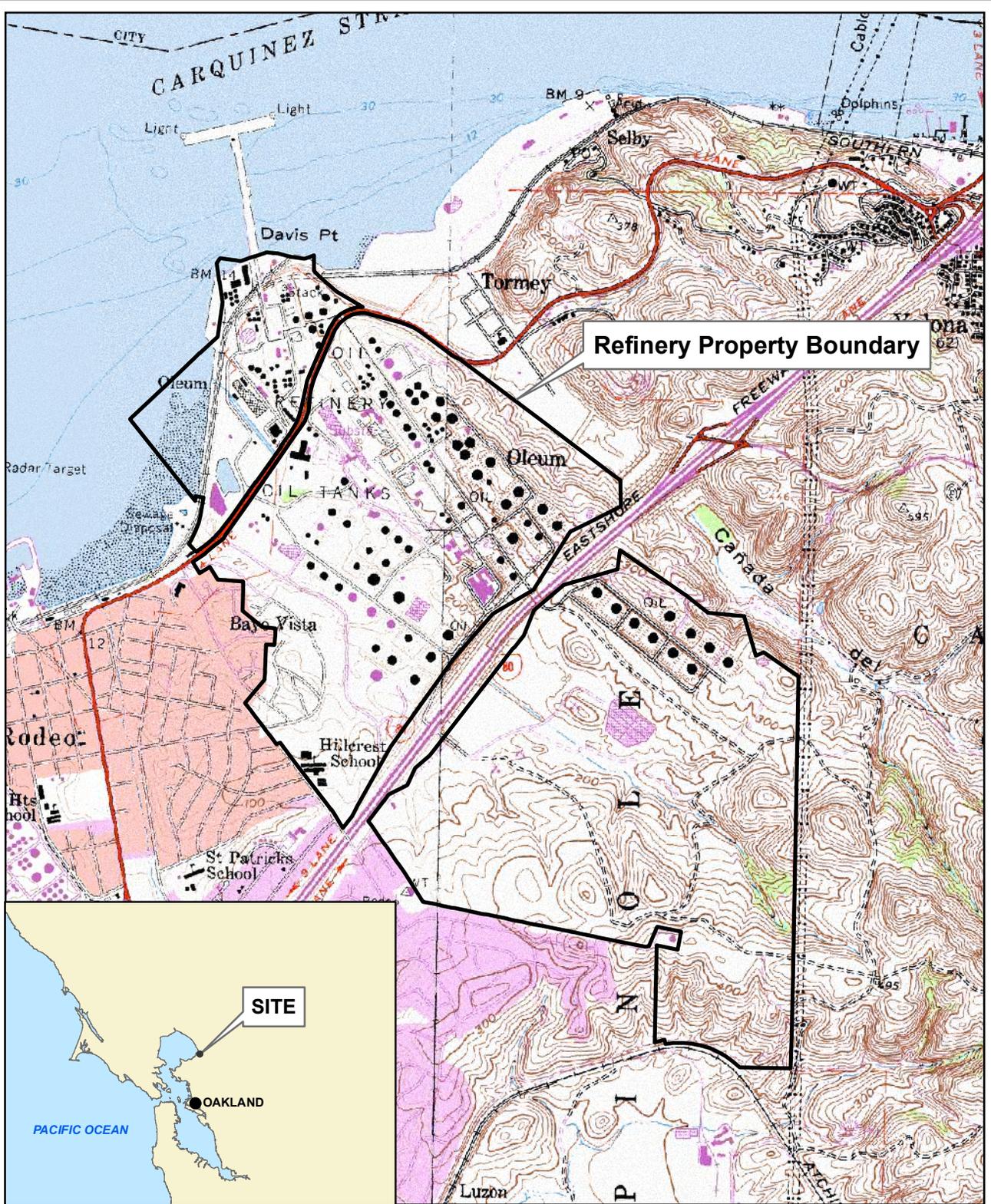
30. This Order is subject to Water Board review and updating, as necessary, to comply with changing State or federal laws, regulations or policies, or guidelines; changes in the Water Board's Basin Plan; or changes in discharge characteristics.

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 November 18, 2015.

Bruce H. Wolfe
Executive Officer

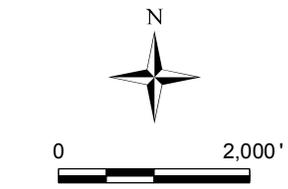
Attachments:

- Figure 1 - Site Location
- Figure 2 - Site Plan
- Figure 3 - Groundwater Flow Direction
- Self-Monitoring and Reporting Program, Part A and B



Refinery Property Boundary

SITE



SOURCE: USGS 7.5' QUAD SHEET
BENICIA & MARE ISLAND, CA
PHOTOREVISED 1980

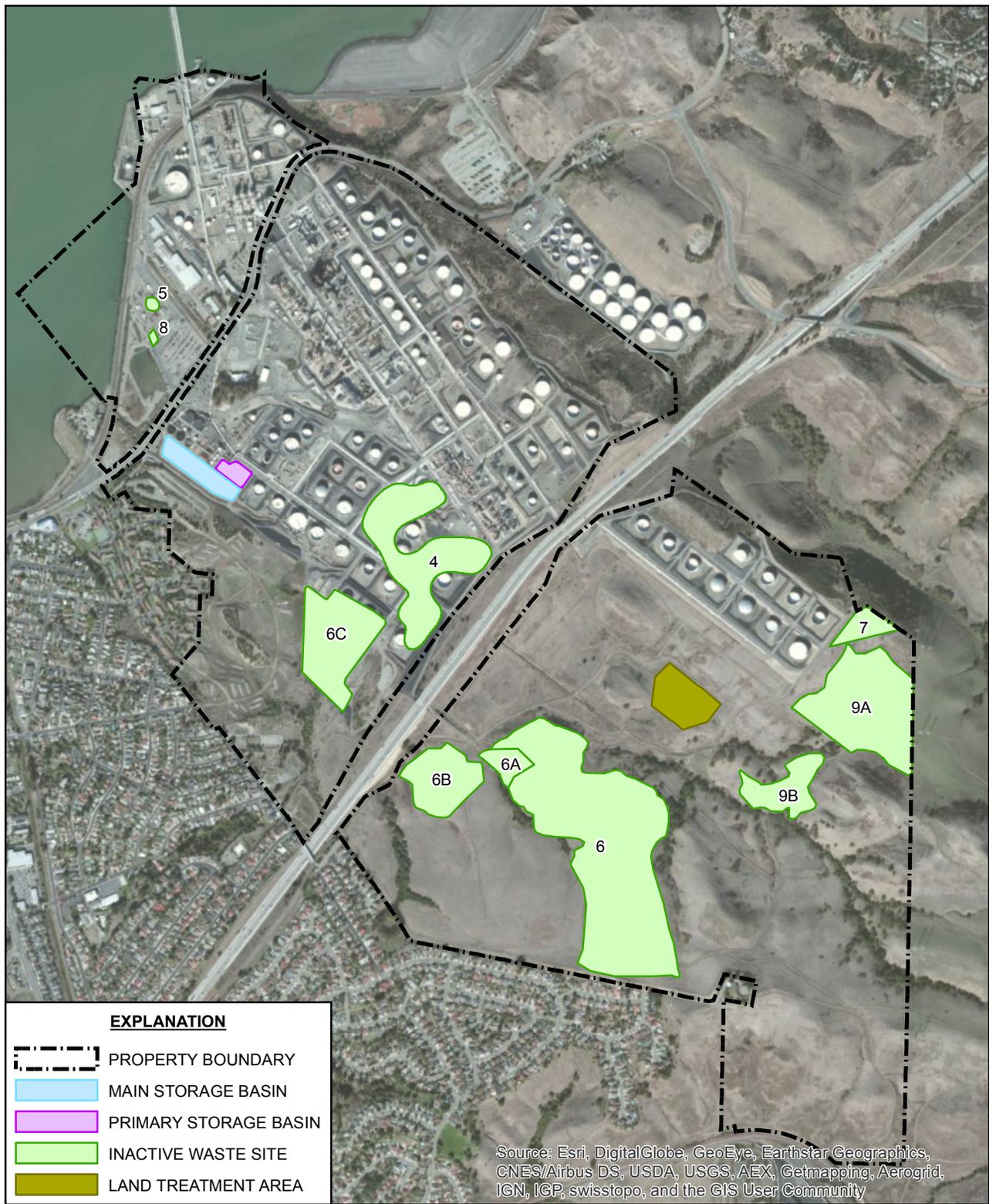
Trihydro
CORPORATION
1252 Commerce Drive
Laramie, WY 82070
www.trihydro.com
(P) 307/745.7474 (F) 307/745.7729

FIGURE 1

SITE LOCATION

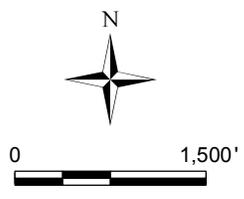
**PHILLIPS 66
SAN FRANCISCO REFINERY
RODEO, CALIFORNIA**

| | | | | |
|--------------|----------------|-------------------|---------------|------------------------------------|
| Drawn By: CF | Checked By: TK | Scale: 1" = 2000' | Date: 5/28/15 | File: SFR_Fig1_Site_Loc_201505.mxd |
|--------------|----------------|-------------------|---------------|------------------------------------|



| EXPLANATION | |
|-------------|-----------------------|
| | PROPERTY BOUNDARY |
| | MAIN STORAGE BASIN |
| | PRIMARY STORAGE BASIN |
| | INACTIVE WASTE SITE |
| | LAND TREATMENT AREA |

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



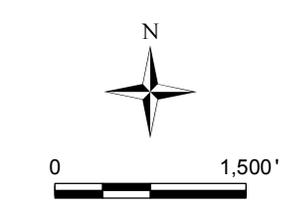
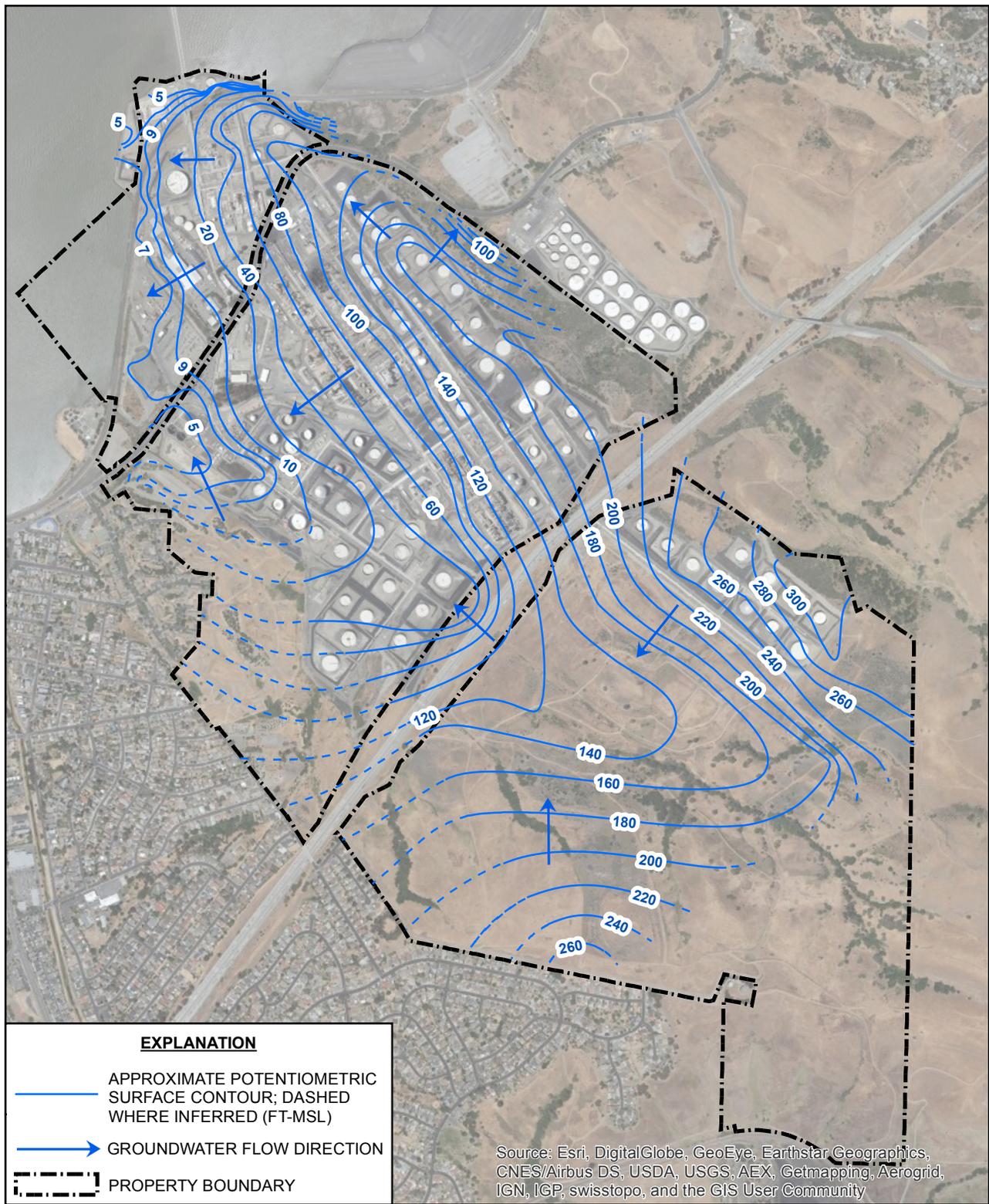
Trihydro
CORPORATION
1252 Commerce Drive
Laramie, WY 82070
www.trihydro.com
(P) 307/745.7474 (F) 307/745.7729

FIGURE 2

SITE PLAN

PHILLIPS 66
SAN FRANCISCO REFINERY
RODEO, CALIFORNIA

| | | | | |
|--------------|----------------|-------------------|---------------|-------------------------------------|
| Drawn By: DH | Checked By: DP | Scale: 1" = 1500' | Date: 5/28/15 | File: SFR_Fig2_Site_Plan_201505.mxd |
|--------------|----------------|-------------------|---------------|-------------------------------------|



NOTES:
 • FT MSL = FEET MEAN SEA LEVEL.

Trihydro
 CORPORATION
 1252 Commerce Drive
 Laramie, WY 82070
 www.trihydro.com
 (P) 307/745.7474 (F) 307/745.7729

FIGURE 3

GROUNDWATER FLOW DIRECTION

**PHILLIPS 66
 SAN FRANCISCO REFINERY
 RODEO, CALIFORNIA**

| | | | | |
|--------------|----------------|-------------------|--------------|-----------------------------------|
| Drawn By: DH | Checked By: DP | Scale: 1" = 1500' | Date: 8/3/15 | File: SFR_Fig3_GW_Flow_201505.mxd |
|--------------|----------------|-------------------|--------------|-----------------------------------|

**CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION**

REVISED SELF-MONITORING AND REPORTING PROGRAM

FOR

**PHILLIPS 66 COMPANY
SAN FRANCISCO REFINERY
1380 SAN PABLO AVENUE
RODEO, CONTRA COSTA COUNTY**

ORDER NO. R2-2015-0046

CONSISTS OF PART A AND PART B

Revised November 18, 2015

PART A

This combined Self-Monitoring and Reporting Program (SMP) specifies monitoring and reporting programs necessary to fulfill obligations under the Waste Discharge Requirements (WDRs, Order No. R2-2015-0046) and Site Cleanup Requirements (SCRs, Order No. R2-2006-0065), including:

1. General monitoring requirements for landfills and waste management units under the WDRs (Part A);
2. General monitoring requirements related to cleanup activities performed under the SCRs (Part A);
3. Self-monitoring report content and format (Part A);
4. Self-monitoring report submittal frequency and schedule (Part B);
5. Monitoring locations, parameters, analytes and frequency for programs under the WDRs (Part B); and
6. 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 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, Phillips 66 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 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 Water Board staff. Analytical testing of environmental media required by this SMP shall be performed by a 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 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, including 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 from 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;
2. Infrastructure associated with remedial actions, including the interceptor trench systems, free phase petroleum hydrocarbon removal systems (skimmers, vacuum trucks, etc.) and total fluid extraction systems. This includes perimeter inspections along San Pablo Bay at low tide to search for signs of failure in the perimeter containment system, such as product or sheen in Bay water, sediments, or seeps; and
3. Stormwater management system elements such as perimeter drainage and diversion channels, ditches and downchutes, and detention and sedimentation ponds or collection tanks. This is particularly important for WMUs east of Interstate 80, where stormwater is not treated.

Quality Assurance/Quality Control (QA/QC) Sample Monitoring

Phillips 66 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 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 vertical gradients;
 - f. Groundwater elevations;
 - g. Current analytical results (including analytical method and detection limits for each constituent);
 - h. Historical analytical results (including at least the past five years in the annual report unless otherwise requested); and
 - i. 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 groundwater extraction system and free phase petroleum hydrocarbon recovery program, 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:
 - i. Data interpretations (including of trends, especially in the context of potential correlation to the modified waste acceptance criteria);
 - ii. Conclusions;
 - iii. Recommendations;
 - iv. Newly implemented or planned investigations and remedial measures;
 - v. Data anomalies;
 - vi. Variations from protocols;

- vii. Condition of wells; and
 - viii. Effectiveness of remedial actions, including the interceptor trench systems, free phase petroleum hydrocarbon removal systems (skimmers, vacuum trucks, etc.) and total fluid extraction systems.
5. Appendices: The following information shall be provided as appendices in electronic format only unless requested otherwise by Water Board staff and unless the information is already contained in an SAP or SOP approved by 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 Water Board covering the previous calendar year's two semi-annual monitoring periods. 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 previous 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. Hardcopies:
 - a. Technical reports/plans submitted by the Discharger in compliance with the Prohibitions, Specifications, and Provisions of this Order shall be submitted to the Water Board on the schedule specified herein. Hard copies of these reports/plans shall consist of a letter report that includes the following:
 - i. Identification of any obstacles that may threaten compliance with the schedule;
 - ii. 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;
 - iii. In the SMRs, an evaluation of the current groundwater monitoring system and a proposal for modifications as appropriate; and

- iv. A signed transmittal letter and professional certification by a registered California professional engineer or professional geologist.
- b. All application reports or information to be submitted to the Executive Officer shall be signed and certified as follows:
 - i. For a corporation – by a principle executive officer or the level of vice-president or an appropriate delegate;
 - ii. For a partnership or sole proprietorship – by a general partner or the proprietor, respectively; or
 - iii. For a municipality, State, federal, or other public agency – by either a principal executive officer or ranking elected official.
- c. At the case manager’s discretion, the full text of the report, data tables, and appendices can be omitted from the hardcopy. However, any page, including figures, with significant color or size greater than 8.5 x 11 shall be submitted in hardcopy along with the executive summary and certification, as described above.

2. 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. Well locations;
- b. Groundwater elevation contours;
- c. Inferred groundwater flow direction(s); Identify wells containing phase-separated product;
- d. Known or probable contaminant sources;
- e. Extent of dissolved chemical constituents presented in map layout (e.g., isoconcentration maps, chemical box data maps); and
- f. 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:

- a. Vertical and lateral extent of contamination;
- b. Contaminant sources;
- c. Geologic structures;
- d. Soil lithology;
- e. Water table/piezometric surfaces;
- f. Sample locations;
- g. Sample analytical results; and

- h. Subsurface utilities and any other potential natural or manmade conduits for contaminant migration.

3. 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.

4. 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. CONTINGENCY 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 Water Board by calling the Spill Hotline at 510-622-2369 and by sending an email to Rb2SpillReports@waterboards.ca.gov. The Discharger shall submit a written report with the 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 Water Board within seven working days of determining that a statistically significant exceedance of the water quality protection standard (WQPS) detailed in Part B.1.A is measured.
3. Phillips 66 shall immediately re-sample at the compliance point where the exceedance was observed, evaluate the result against the historical dataset. If re-sampling and analysis confirm the exceedance through statistical analysis, Phillips 66 shall document this in the text of the next semi-annual report and notify the Water Board in writing within 21 days of re-sampling. In this letter, Phillips 66 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 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 31 of each year
Annual Report: Due March 31 of each year

Groundwater shall be sampled and analyzed as detailed in Tables 1a, 1b, 2a, and 2b. Monitoring well locations are shown on Figures 1 through 7. All semi-annual, annual and 5-year monitoring cycles referenced in Tables 2a and 2b are to commence with the monitoring report due on March 31, 2016.

Detection Monitoring Program (DMP): Groundwater analyses shall be conducted in accordance with Tables 1a and 2a, and the WQPSs as discussed below, and 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 on a quarterly basis until a statistically significant dataset is established.

WQPSs for detection monitoring pursuant to the WDRs will be intrawell performance based concentration limits, calculated for each monitoring event from historical data (95% Upper Prediction Limit (UPL)) in conjunction with Mann-Kendall trend tests to verify that there are no trends in recent background data. The UPL test will be used to calculate a limit from historical background data for each DMP well (Table 1a), based on the mean/median and variability of that data, with the limit's value based and dependent upon on an expected retest of one sample, to verify any initial exceedance. That is, if a current sample exhibits a concentration in excess of the UPL, the subject groundwater well will be re-sampled within 30 days of discovery of the exceedance to verify the exceedance result. Only if the re-sampled concentration is above the UPL, will the exceedance be verified.

This statistical approach represents a transition, in some cases from interwell to intrawell analysis. A thorough evaluation was conducted to ensure that there does not currently exist a condition of contamination due to the WMUs (other than IWS 5 and 8, which are being remediated and evaluated under the corrective action monitoring program). The results of this evaluation are included in *Final Revised Groundwater Self-Monitoring Plan* (Trihydro, 2015).

Corrective Action Monitoring Program (CAMP): Groundwater analyses shall be conducted in accordance with Tables 1b and 2b, and 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 on a quarterly basis until a statistically significant dataset is established.

An intrawell Mann-Kendall trend test will be used to evaluate data for wells sampled under the CAMP (Tables 1b and 2b) to identify statistically significant increasing or decreasing trends at a 95% confidence level. A decreasing trend should indicate that the contaminant is degrading. An increasing trend may indicate that a contaminant is migrating, suggesting that the area requires further evaluation.

This statistical approach represents a transition in some cases from interwell to intrawell analysis, in some cases due to upgradient contamination. A thorough evaluation was conducted to ensure that all areas of concern (AOCs) are well characterized and defined and will be adequately monitored under this program. The results of this evaluation are included in *Final Revised Groundwater Self-Monitoring Plan* (Trihydro, 2015).

B. FACILITIES MONITORING: Observe quarterly, report semi-annually

Semi-Annual Report: Due August 31 and March 31 of each year
Annual Report: Due March 31 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:

- a. Waste containment systems (including San Pablo Bay perimeter control systems);
- b. Waste treatment systems (including groundwater remedial systems);
- c. Surface water retention basins;
- d. Perimeter shoreline along San Pablo Bay at low tide
- e. Leak detection systems (where applicable); and
- f. Leachate/groundwater management facilities and secondary containment where applicable.

2. GROUNDWATER CONTAINMENT AND TREATMENT SYSTEM PERFORMANCE MONITORING

Phillips 66 shall measure the water level in each corrective action monitoring well and in a sufficient number of wells or piezometers both upgradient and downgradient of the extraction systems (excluding skimmer systems and manual hydrocarbon recovery program) to demonstrate continuous maintenance of a hydraulic depression in the extraction systems (inward hydraulic gradient). To demonstrate effectiveness, Phillips 66 shall include the following for each extraction system in the semi-annual SMRs:

- a. Contour maps of 2nd and 4th quarter groundwater elevation data;
- b. Tabular presentation of the average water level data at each operating extraction sump or recovery well;
- c. A narrative summary of the performance during the reporting period; and,
- d. An estimate of the volume of groundwater extracted during the reporting period.

3. ONSITE OBSERVATIONS/POST-CLOSURE MAINTENANCE AND MONITORING

Closed WMUs shall be inspected annually by a registered California professional engineer or professional 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. Phillips 66 shall perform appropriate repairs for these areas prior to the rainy season. In addition, Phillips 66 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. Phillips 66 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. FREE PHASE LIQUID HYDROCARBON (FPLH) RECOVERY SUMMARY

Phillips 66 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 shall be indicated on the map next to the well. Recovery of FPLH will be performed in accordance with the approved recommendations described in the *Investigation and Site Conceptual Models for High Priority LNAPL Study Areas* (Trihydro, 2012) and *Investigation and Site Conceptual Models for Inland LNAPL Study Areas* (Trihydro, 2012). 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.

5. CHEMICAL CONSTITUENT MONITORING

- a. Refinery-Wide Groundwater Monitoring Program: Phillips 66 shall sample the compliance monitoring points listed in Tables 1a and 1b for the analytical parameters and at the frequencies listed in Tables 2a and 2b. All monitoring activities, including analytical and QA/QC procedures will be conducted in accordance with the most recent version of Phillips 66's Groundwater Monitoring Program SOP.
- b. Groundwater Monitoring of LNAPL Wells: Light nonaqueous phase liquid (LNAPL) is present in several monitoring wells at the Refinery. A description of these wells and monitoring requirements follows:
 - i. DMP wells with LNAPL include MW-223 and MW-224, both of which are included in the CAMP for IWS 5 and 8.
 - ii. CAMP wells with LNAPL include:
 - 1) Downgradient Trench Perimeter Well Group – EEI-5, EEI-10, MW-188, MW-190, and MW-191, which are all included in the manual hydrocarbon recovery program due to the LNAPL thickness observed and rate of LNAPL recovery after manual removal in the wells.
 - 2) IWS 5 and 8 Well Group – MW-223 and MW-224
 - 3) PG&E Oleum Power Plant Well Group – R000W02
 - 4) Refinery Groundwater Basin Perimeter Well Group – EEI-8, EEI-11 (part of the manual recovery program), EEI-13, MW-150, MW-181, MW-216, and MW-233.
 - iii. Five of the monitoring wells with LNAPL under the CAMP (EEI-5, EEI-10, MW-188, MW-190, and MW-191) are included in the Refinery hydrocarbon recovery program for

removal of LNAPL. Because of the high LNAPL recovery and continued manual recovery of LNAPL, sampling will not be required at monitoring points EEI-5, EEI-10, MW-188, MW-190, and MW-191, unless the wells are removed from the manual hydrocarbon recovery program.

- iv. Three of the monitoring points with LNAPL included in a CAMP (MW-150, MW-181, and MW-233) have LNAPL with high viscosity, preventing both manual extraction of LNAPL and measurement of water level. Due to the physical limitations of groundwater access, sampling will not be required at monitoring points MW-150, MW-181, and MW-233, until groundwater becomes more accessible. Accessibility shall be evaluated periodically and these wells will be maintained in the SMP.
- v. The remaining monitoring points with LNAPL under CAMP (MW-223, MW-224, R000W02, EEI-8, EEI-13, and MW-216) have had persistent LNAPL (e.g., LNAPL observed more than two consecutive quarters) and will therefore be the subject to sample collection every other year for COCs and Appendix IX (if well is POC). For monitoring points with intermittent LNAPL (e.g., not detected during consecutive sampling events), Phillips 66 shall collect samples semi-annually.
- vi. For monitoring points with LNAPL that are to be sampled in accordance with Item v., Phillips 66 shall obtain samples for dissolved phase analysis after purging LNAPL from the well, by low-flow sampling, or by another appropriate method.
- vii. Phillips 66 shall follow the most recent version of the Phillips 66 Groundwater Monitoring Program Standard Operating Procedure.

Attachments:

Table 1a - Monitoring Well Details by Group, Detection Monitoring Program

Table 1b - Monitoring Wells Details by Group, Corrective Action Evaluation Monitoring Program

Table 2a – Chemical Analysis Schedule, Detection Monitoring Program

Table 2b - Chemical Analysis Schedule, Corrective Action Evaluation Monitoring Program

Figure 1 - Refinery Basin Perimeter Wells

Figure 2 - Downgradient Trench Perimeter Wells

Figure 3 - Inactive Waste Sites 5 & 8 Wells

Figure 4 - Former PG&E Oleum Power Plant Wells

Figure 5 - Surface Impoundment Wells

Figure 6 - Inactive Waste Site 4 Wells

Figure 7 - Inactive Waste Sites 6B and 6C Wells

Figure 8 - Inactive Waste Sites 6, 6A, 6B, 7, 9A, and 9B Wells

Figure 9 - Effluent Safety Basin Wells

**Table 1a: List of Monitoring Wells by Group, Detection Monitoring Program
Refinery-Wide Groundwater Monitoring Program**

| Inactive Waste Site 4 | Inactive Waste Site 5&8 | Inactive Waste Site 6 | Inactive Waste Site 6A | Inactive Waste Site 6B | Inactive Waste Site 6C |
|---|--|--|---|---|---|
| A-Zone Upgradient Wells MW-130 MW-289 MW-290 MW-291 | A-Zone Downgradient Wells MW-223 MW-224 MW-225 MW-246 MW-6R | A-Zone Upgradient Wells MW-6-35 | A-Zone Upgradient Wells MW-6-35 | A-Zone Upgradient Wells MW-6B-1 MW-6-35 | A-Zone Upgradient Wells None |
| A-Zone Wells Downgradient Wells MW-136 MW-137 MW-292 MW-293 | B-Zone Downgradient Wells MW-19B MW-247 MW-248 MW-249 MW-2B | A-Zone Downgradient Wells MW-6A-1 MW-6B-3 MW-6-36 MW-226 MW-227 | A-Zone Downgradient Wells MW-6A-1 MW-6B-3 MW-227 | A-Zone Downgradient Wells MW-6B-2 MW-6B-3 | A-Zone Downgradient Wells MW-6C-1 MW-211 MW-6C-2 |
| B-Zone Wells None | | B-Zone Wells None | B-Zone Wells None | B-Zone Wells None | B-Zone Wells None |

**Table 1a: List of Monitoring Wells by Group, Detection Monitoring Program (continued)
Refinery-Wide Groundwater Monitoring Program**

| Inactive Waste Site 7 | Inactive Waste Site 9A | Inactive Waste Site 9B | Primary Safety Basin | Main Safety Basin |
|--|---|---|--|---|
| A-Zone Upgradient Wells MW-228 MW-7-26 MW-7-27 MW-9A-1 | A-Zone Upgradient Wells MW-9A-1 MW-9B-1 | A-Zone Upgradient Wells MW-9A-1 MW-9B-1 | A-Zone Upgradient Wells MW-26A MW-27 | A-Zone Upgradient Wells EEI-21 MW-232 PZ-50 MW-22 |
| A-Zone Downgradient Wells MW-7-28 | A-Zone Downgradient Wells MW-9A-3 MW-9A-4 | A-Zone Downgradient Wells MW-9B-2 | A-Zone Downgradient Wells MW-231 MW-232 MW-24 | A-Zone Downgradient Wells MW-16 MW-9R |
| B-Zone Wells None | B-Zone Wells None | B-Zone Wells None | B-Zone Wells None | B-Zone Wells None |

**Table 1b: List of Monitoring Wells by Group, Corrective Action Evaluation Monitoring Program
Refinery-Wide Groundwater Monitoring Program**

| Downgradient Trench Perimeter | | Effluent Safety Basin | Inactive Waste Site 5 & 8 | PG&E Oleum Power Plan | Refinery Groundwater Basin Perimeter * | | Line 315 |
|--|---|--|---|---|---|---|----------------------------|
| Upgradient Wells None | A-Zone Downgradient Wells (cont'd) | A-Zone Upgradient Wells | A-Zone Downgradient Wells | A-Zone Upgradient Wells | A-Zone Wells EEI-11 EEI-13 EEI-8 | A-Zone Wells (cont'd) PZ-92 PZ-93 PZ-94 PZ-95 | A-Zone Downgradient Wells |
| A-Zone Downgradient Wells EEI-5 EEI-10 MW-158 MW-160 MW-161 MW-165 MW-188 MW-189 MW-190 MW-191 MW-192 MW-193 MW-194 MW-195 MW-215 | MW-221 MW-249 MW-24A B-Zone Downgradient Wells MW-157 MW-159 MW-166 MW-24B | MW-22 A-Zone Downgradient Wells MW-222 | MW-223 MW-224 MW-225 MW-246 MW-6R B-Zone Downgradient Wells MW-19B MW-247 MW-248 MW-249 MW-2B | R00W02 R00W09R R00W10 R00W13 R00W14 A-Zone Downgradient Wells R00W01 R00W11 R00W05 R00W08R | MW-148 MW-150 MW-155 MW-172 MW-175 MW-178 MW-181 MW-196 MW-198 MW-216 MW-217 MW-222 MW-233 MW-269 MW-272 MW-282 MW-29A PZ-28 | MW-177 MW-179 MW-180 MW-197 MW-199 MW-229 MW-230 MW-248 MW-2B MW-29B MW-6R MW-7B | MW-257R MW-118 PZ-57 |

* Upgradient/downgradient designations do not apply.

**Table 2a: Chemical Analysis Schedule, Detection Monitoring Program
Refinery-Wide Groundwater Monitoring Program**

| Well ID | Well Group | Frequency | | | Dissolved As, Ba | Dissolved Cd | Dissolved Ni | Dissolved Pb | Dissolved Hg | Dissolved Cr | VOCs + Oxygenates | SVOCs | TPH-D ⁶ | PCBs |
|---------|------------------|-----------|------|-------------------|---------------------|--------------|--------------|----------------|----------------|----------------|----------------------|----------------|--------------------|------|
| | | 6 Mo | 1 Yr | 5 yr ¹ | | | | | | | | | | |
| MW-130 | IWS 4 | x | x | x | | | | S | | | | S ⁴ | | |
| MW-136 | IWS 4 | x | x | x | | | | S | | | | S ⁴ | | |
| MW-137 | IWS 4 | x | x | x | | | | S | | | | S ⁴ | | |
| MW-289 | IWS 4 | x | x | x | | | | S | | | | S ⁴ | | |
| MW-290 | IWS 4 | x | x | x | | | | S | | | | S ⁴ | | |
| MW-291 | IWS 4 | x | x | x | | | | S | | | | S ⁴ | | |
| MW-292 | IWS 4 | x | x | x | | | | S | | | | S ⁴ | | |
| MW-293 | IWS 4 | x | x | x | | | | S | | | | S ⁴ | | |
| MW-19B | IWS 5&8 | x | x | x | A | A | | A | | A | A | | S | |
| MW-223 | IWS 5&8 | x | x | x | A | A | | A | | A | A | | S | |
| MW-224 | IWS 5&8 | x | x | x | A | A | | A | | A | A | | S | |
| MW-225 | IWS 5&8 | x | x | x | A | A | | A | | A | A | | S | |
| MW-246 | IWS 5&8 | x | x | x | A | A | | A | | A | A | | S | |
| MW-247 | IWS 5&8 | x | x | x | A | A | | A | | A | A | | S | |
| MW-248 | IWS 5&8/ RGBP | x | x | x | A | A | | S ⁵ | | A | S ⁵ | | S | |
| MW-2B | IWS 5&8/ RGBP | x | x | x | A | A | | S ⁵ | | A | S ⁵ | | S | |
| MW-6R | IWS 5&8/ RGBP | x | x | x | A | A | | S ⁵ | | A | S ⁵ | | S | |
| MW-249 | IWS 5&8/ DGTP | x | x | x | S ⁵ | A | | S ⁵ | S ⁵ | S ⁵ | S ⁵ | | S | |
| MW-226 | IWS 6 | | x | x | | | | A | | | | | A | |

**Table 2a: Chemical Analysis Schedule, Detection Monitoring Program
Refinery-Wide Groundwater Monitoring Program**

| Well ID | Well Group | Frequency | | | Dissolved As, Ba | Dissolved Cd | Dissolved Ni | Dissolved Pb | Dissolved Hg | Dissolved Cr | VOCs + Oxygenates | SVOCs | TPH-D ⁶ | PCBs |
|---------|------------------|-----------|------|-------------------|---------------------|--------------|--------------|--------------|--------------|--------------|----------------------|-------|--------------------|------|
| | | 6 Mo | 1 Yr | 5 yr ¹ | | | | | | | | | | |
| MW-6-36 | IWS 6 | | x | x | | | | A | | | | | A | |
| MW-227 | IWS 6, 6A | | x | x | | | | A | | | | | A | |
| MW-6A-1 | IWS 6, 6A | | x | x | | | | A | | | | | A | |
| MW-6-35 | IWS 6, 6A, 6B | | x | x | | | | A | | | | | A | |
| MW-6B-3 | IWS 6, 6A, 6B | | x | x | | | | A | | | | | A | |
| MW-6B-1 | IWS 6B | | x | x | | | | A | | | | | A | |
| MW-6B-2 | IWS 6B | | x | x | | | | A | | | | | A | |
| MW-211 | IWS 6C | | x | x | | | | A | A | | | | A | |
| MW-6C-1 | IWS 6C | | x | x | | | | A | A | | | | A | |
| MW-6C-2 | IWS 6C | | x | x | | | | A | A | | | | A | |
| MW-228 | IWS 7 | | x | x | A | | | A | | A | | | A | |
| MW-7-26 | IWS 7 | | x | x | A | | | A | | A | | | A | |
| MW-7-27 | IWS 7 | | x | x | A | | | A | | A | | | A | |
| MW-7-28 | IWS 7 | | x | x | A | | | A | | A | | | A | |
| MW-9A-1 | IWS 7, 9A, 9B | | x | x | A ⁵ | | | A | A | A | | | A | |
| MW-9A-3 | IWS 9A | | x | x | | | | A | A | A | | | A | |
| MW-9A-4 | IWS 9A | | x | x | | | | A | A | A | | | A | |
| MW-9B-1 | IWS 9A, 9B | | x | x | | | | A | A | A | | | A | |
| MW-9B-2 | IWS 9B | | x | x | | | | A | A | A | | | A | |
| MW-231 | PSB | x | x | x ² | A | | | | | A | S | S | A | |

**Table 2a: Chemical Analysis Schedule, Detection Monitoring Program
Refinery-Wide Groundwater Monitoring Program**

| Well ID | Well Group | Frequency | | | Dissolved As, Ba | Dissolved Cd | Dissolved Ni | Dissolved Pb | Dissolved Hg | Dissolved Cr | VOCs + Oxygenates | SVOCs | TPH-D ⁶ | PCBs |
|---------|-------------|-----------|------|-------------------|---------------------|--------------|--------------|----------------|--------------|--------------|----------------------|-------|--------------------|------|
| | | 6 Mo | 1 Yr | 5 yr ¹ | | | | | | | | | | |
| MW-24 | PSB | x | x | x ² | A | | | | | A | S | S | A | |
| MW-26A | PSB | x | x | x ² | A | | | | | A | S | S | A | |
| MW-27 | PSB | x | x | x ² | A | | | | | A | S | S | A | |
| MW-232 | PSB /MSB | x | x | x ² | A | | | | | A | S | S | A | |
| EEI-21 | MSB | | x | x | A | | | | | A | A | | A | |
| MW-16 | MSB | | x | x | A | | | | | A | A | | A | |
| MW-9R | MSB | | x | x | A | | | | | A | A | | A | |
| PZ-50 | MSB | | x | x | A | | | | | A | A | | A | |
| MW-22 | MSB /ESB | | x | x | A | | | A ⁵ | | A | A | | A | |

Notes:

- 1 - Five Year Sampling will include the following analyses for selected wells: Title 22 Metals (EPA 6010/7470), VOCs and MTBE (EPA 8260B), SVOCs (EPA 8270C), TPH-D with SG cleanup (EPA 3630/8015), TPH-MO with SG cleanup (EPA 3630/8015), pH (EPA 9040), and PCBs (EPA 8082)
- 2 - Wells to be sampled for Appendix IX compounds every five years in addition to the analysis listed under Note 1
- 3 - Analysis for VOCs under EPA method 8260B will include BTEX and Acetone
- 4 - Bis(2-ethylhexyl) phthalate will be analyzed on a semiannual basis, whereas the remaining SVOCs will be analyzed on a 5-year basis
- 5 - Change in sampling frequency is due to the well association with multiple groups
- 6 - Required TPH analyses do not include silica gel extraction

A - Analytes to be requested on an annual basis
 S - Analytes to be requested on a semi-annual basis

Notes continued:

ESB - Effluent Safety Basin

IWS - Inactive Waste Site

MSB - Main Storm Basin

PSB - Primary Storm Basin

RGBP - Refinery Groundwater Basin Perimeter

DGTP - Down Gradient Trench Perimeter

As - Arsenic

Ba - Barium

Cr - Chromium

Hg - Mercury

MTBE - Methyl tert-butyl ether

Ni - Nickel

Pb - Lead

PCBs - Polychlorinated Biphenyl

SVOCs - Semi-Volatile Organic Compounds

TPH-D - Total Petroleum Hydrocarbons as Diesel Fuel

TPH-MO - Total Petroleum Hydrocarbons as Motor Oil

VOCs - Volatile Organic Compounds

**Table 2b: Chemical Analysis Schedule, Corrective Action Evaluation Monitoring Program
Refinery-Wide Groundwater Monitoring Program**

| Well ID | Well Group | Frequency | | | Dissolved As, Ba 6010B | Dissolved Cd 6010B | Dissolved Ni 6010B | Dissolved Pb 6010B | Dissolved Hg 7470A | Dissolved Cr 6010B | VOCs + Oxygenates 8260B ³ | SVOCs 8270C | TPH-D ⁶ 3630/8015 | PCBs 8082 |
|---------|------------|-----------|------|-------------------|---------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|---|----------------|---------------------------------|--------------|
| | | 6 Mo | 1 Yr | 5 yr ¹ | | | | | | | | | | |
| EEI-5 | DGTP | x | x | x | S | | | S | S | S | S | | S | |
| EEI-10 | DGTP | x | x | x | S | | | S | S | S | S | | S | |
| MW-157 | DGTP | x | x | x | S | | | S | S | S | S | | S | |
| MW-158 | DGTP | x | x | x | S | | | S | S | S | S | | S | |
| MW-159 | DGTP | x | x | x | S | | | S | S | S | S | | S | |
| MW-160 | DGTP | x | x | x | S | | | S | S | S | S | | S | |
| MW-161 | DGTP | x | x | x | S | | | S | S | S | S | | S | |
| MW-165 | DGTP | x | x | x | S | | | S | S | S | S | | S | |
| MW-166 | DGTP | x | x | x | S | | | S | S | S | S | | S | |
| MW-188 | DGTP | x | x | x | S | | | S | S | S | S | | S | |
| MW-189 | DGTP | x | x | x | S | | | S | S | S | S | | S | |
| MW-190 | DGTP | x | x | x | S | | | S | S | S | S | | S | |
| MW-191 | DGTP | x | x | x | S | | | S | S | S | S | | S | |
| MW-192 | DGTP | x | x | x | S | | | S | S | S | S | | S | |
| MW-193 | DGTP | x | x | x | S | | | S | S | S | S | | S | |
| MW-194 | DGTP | x | x | x | S | | | S | S | S | S | | S | |
| MW-195 | DGTP | x | x | x | S | | | S | S | S | S | | S | |
| MW-215 | DGTP | x | x | x | S | | | S | S | S | S | | S | |
| MW-221 | DGTP | x | x | x | S | | | S | S | S | S | | S | |
| MW-24A | DGTP | x | x | x | S | | | S | S | S | S | | S | |
| MW-24B | DGTP | x | x | x | S | | | S | S | S | S | | S | |

**Table 2b: Chemical Analysis Schedule, Corrective Action Evaluation Monitoring Program
Refinery-Wide Groundwater Monitoring Program**

| Well ID | Well Group | Frequency | | | Dissolved As, Ba 6010B | Dissolved Cd 6010B | Dissolved Ni 6010B | Dissolved Pb 6010B | Dissolved Hg 7470A | Dissolved Cr 6010B | VOCs + Oxygenates 8260B ³ | SVOCs 8270C | TPH-D ⁶ 3630/8015 | PCBs 8082 |
|---------|--------------|-----------|------|-------------------|---------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|---|----------------|---------------------------------|--------------|
| | | 6 Mo | 1 Yr | 5 yr ¹ | | | | | | | | | | |
| MW-22 | ESB/MSB | | x | x | A | | | A | | A | A | | A | |
| MW-222 | ESB/RGBP | | x | x | A | | | S ⁵ | | A | S ⁵ | | S ⁵ | |
| MW-19B | IWS 5&8 | x | x | x | A | A | | A | | A | A | | S | |
| MW-223 | IWS 5&8 | x | x | x | A | A | | A | | A | A | | S | |
| MW-224 | IWS 5&8 | x | x | x | A | A | | A | | A | A | | S | |
| MW-225 | IWS 5&8 | x | x | x | A | A | | A | | A | A | | S | |
| MW-246 | IWS 5&8 | x | x | x | A | A | | A | | A | A | | S | |
| MW-247 | IWS 5&8 | x | x | x | A | A | | A | | A | A | | S | |
| MW-248 | IWS 5&8/RGBP | x | x | x | A | A | | S ⁵ | | A | S ⁵ | | S | |
| MW-2B | IWS 5&8/RGBP | x | x | x | A | A | | S ⁵ | | A | S ⁵ | | S | |
| MW-6R | IWS 5&8/RGBP | x | x | x | A | A | | S ⁵ | | A | S ⁵ | | S | |
| MW-249 | IWS 5&8/DGTP | x | x | x | S ⁵ | A | | S ⁵ | S ⁵ | S ⁵ | S ⁵ | | S | |
| R00W02 | PG&E OPP | | x | x | A | | | A | | A | A | | A | A |
| R00W11 | PG&E OPP | | x | x | A | | | A | | A | A | | A | A |
| R00W01 | PG&E OPP | | | x | | | | | | | | | | |
| R00W05 | PG&E OPP | | | x | | | | | | | | | | |
| R00W08R | PG&E OPP | | | x | | | | | | | | | | |
| R00W09R | PG&E OPP | | | x | | | | | | | | | | |
| R00W10 | PG&E OPP | | | x | | | | | | | | | | |
| R00W13 | PG&E OPP | | | x | | | | | | | | | | |
| R00W14 | PG&E OPP | | | x | | | | | | | | | | |

**Table 2b: Chemical Analysis Schedule, Corrective Action Evaluation Monitoring Program
Refinery-Wide Groundwater Monitoring Program**

| Well ID | Well Group | Frequency | | | Dissolved As, Ba | Dissolved Cd | Dissolved Ni | Dissolved Pb | Dissolved Hg | Dissolved Cr | VOCs + Oxygenates | SVOCs | TPH-D ⁶ | PCBs |
|---------|------------|-----------|------|-------------------|------------------|--------------|--------------|--------------|--------------|--------------|--------------------|-------|--------------------|------|
| | | 6 Mo | 1 Yr | 5 yr ¹ | 6010B | 6010B | 6010B | 6010B | 7470A | 6010B | 8260B ³ | 8270C | 3630/8015 | 8082 |
| EEl-8 | RGBP | x | x | x | | | | S | | | S | | S | |
| EEl-11 | RGBP | x | x | x | | | | S | | | S | | S | |
| EEl-13 | RGBP | x | x | x | | | | S | | | S | | S | |
| MW-148 | RGBP | x | x | x | | | | S | | | S | | S | |
| MW-150 | RGBP | x | x | x | | | | S | | | S | | S | |
| MW-155 | RGBP | x | x | x | | | | S | | | S | | S | |
| MW-172 | RGBP | x | x | x | | | | S | | | S | | S | |
| MW-175 | RGBP | x | x | x | | | | S | | | S | | S | |
| MW-177 | RGBP | x | x | x | | | | S | | | S | | S | |
| MW-178 | RGBP | x | x | x | | | | S | | | S | | S | |
| MW-179 | RGBP | x | x | x | | | | S | | | S | | S | |
| MW-180 | RGBP | x | x | x | | | | S | | | S | | S | |
| MW-181 | RGBP | x | x | x | | | | S | | | S | | S | |
| MW-196 | RGBP | x | x | x | | | | S | | | S | | S | |
| MW-197 | RGBP | x | x | x | | | | S | | | S | | S | |
| MW-198 | RGBP | x | x | x | | | | S | | | S | | S | |
| MW-199 | RGBP | x | x | x | | | | S | | | S | | S | |
| MW-216 | RGBP | x | x | x | | | | S | | | S | | S | S |
| MW-217 | RGBP | x | x | x | | | | S | | | S | | S | S |
| MW-229 | RGBP | x | x | x | | | | S | | | S | | S | |
| MW-230 | RGBP | x | x | x | | | | S | | | S | | S | |
| MW-233 | RGBP | x | x | x | | | | S | | | S | | S | |

**Table 2b: Chemical Analysis Schedule, Corrective Action Evaluation Monitoring Program
Refinery-Wide Groundwater Monitoring Program**

| Well ID | Well Group | Frequency | | | Dissolved As, Ba 6010B | Dissolved Cd 6010B | Dissolved Ni 6010B | Dissolved Pb 6010B | Dissolved Hg 7470A | Dissolved Cr 6010B | VOCs + Oxygenates 8260B ³ | SVOCs 8270C | TPH-D ⁶ 3630/8015 | PCBs 8082 |
|---------|------------|-----------|------|-------------------|---------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|---|----------------|---------------------------------|--------------|
| | | 6 Mo | 1 Yr | 5 yr ¹ | | | | | | | | | | |
| MW-269 | RGBP | x | x | x | | | | S | | | S | | S | |
| MW-272 | RGBP | x | x | x | | | | S | | | S | | S | |
| MW-282 | RGBP | x | x | x | | | | S | | | S | | S | |
| MW-29A | RGBP | x | x | x | | | | S | | | S | | S | |
| MW-29B | RGBP | x | x | x | | | | S | | | S | | S | |
| MW-7B | RGBP | x | x | x | | | | S | | | S | | S | |
| PZ-28 | RGBP | x | x | x | | | | S | | | S | | S | |
| PZ-92 | RGBP | x | x | x | | | | S | | | S | | S | |
| PZ-93 | RGBP | x | x | x | | | | S | | | S | | S | |
| PZ-94 | RGBP | x | x | x | | | | S | | | S | | S | |
| PZ-95 | RGBP | X | x | x | | | | S | | | S | | S | |
| MW-257R | Line 315 | x | x | x | | | | | | | S ⁷ | | S | |
| MW-118 | Line 315 | x | x | x | | | | | | | S ⁷ | | S | |
| PZ-57 | Line 315 | x | x | x | | | | | | | S ⁷ | | S | |

Notes:

1 - Five Year Sampling will include the following analyses for selected wells: Title 22 Metals (EPA 6010/7470), VOCs and MTBE (EPA 8260B), SVOCs (EPA 8270C), TPH-D with SG cleanup (EPA 3630/8015), TPH-MO with SG cleanup (EPA 3630/8015), pH (EPA 9040), and PCBs (EPA 8082)

2 - Wells to be sampled for Appendix IX compounds every five years in addition to the analysis listed under Note 1

3 - Analysis for VOCs under EPA method 8260B will include BTEX and Acetone

4 - Bis(2-ethylhexyl) phthalate will be analyzed on a semiannual basis, whereas the remaining SVOCs will be analyzed on a 5-year basis

5 - Change in sampling frequency is due to the well association with multiple groups

6 - Required TPH analyses do not include silica gel extraction

7- Include TPH as gasoline by EPA8260B

A - Analytes to be requested on an annual basis

S - Analytes to be requested on a semi-annual basis

Notes (Continued):

ESB - Effluent Safety Basin

IWS - Inactive Waste Site

MSB - Main Storm Basin

PSB - Primary Storm Basin

RGBP - Refinery Groundwater Basin Perimeter

DGTP - Down Gradient Trench Perimeter

As – Arsenic

Ba – Barium

Cr – Chromium

Hg – Mercury

MTBE - Methyl tert-butyl ether

Ni – Nickel

Pb – Lead

PCBs - Polychlorinated Biphenyl

SVOCs - Semi-Volatile Organic Compounds

TPH-D - Total Petroleum Hydrocarbons as Diesel Fuel

TPH-MO - Total Petroleum Hydrocarbons as Motor Oil

VOCs - Volatile Organic Compounds

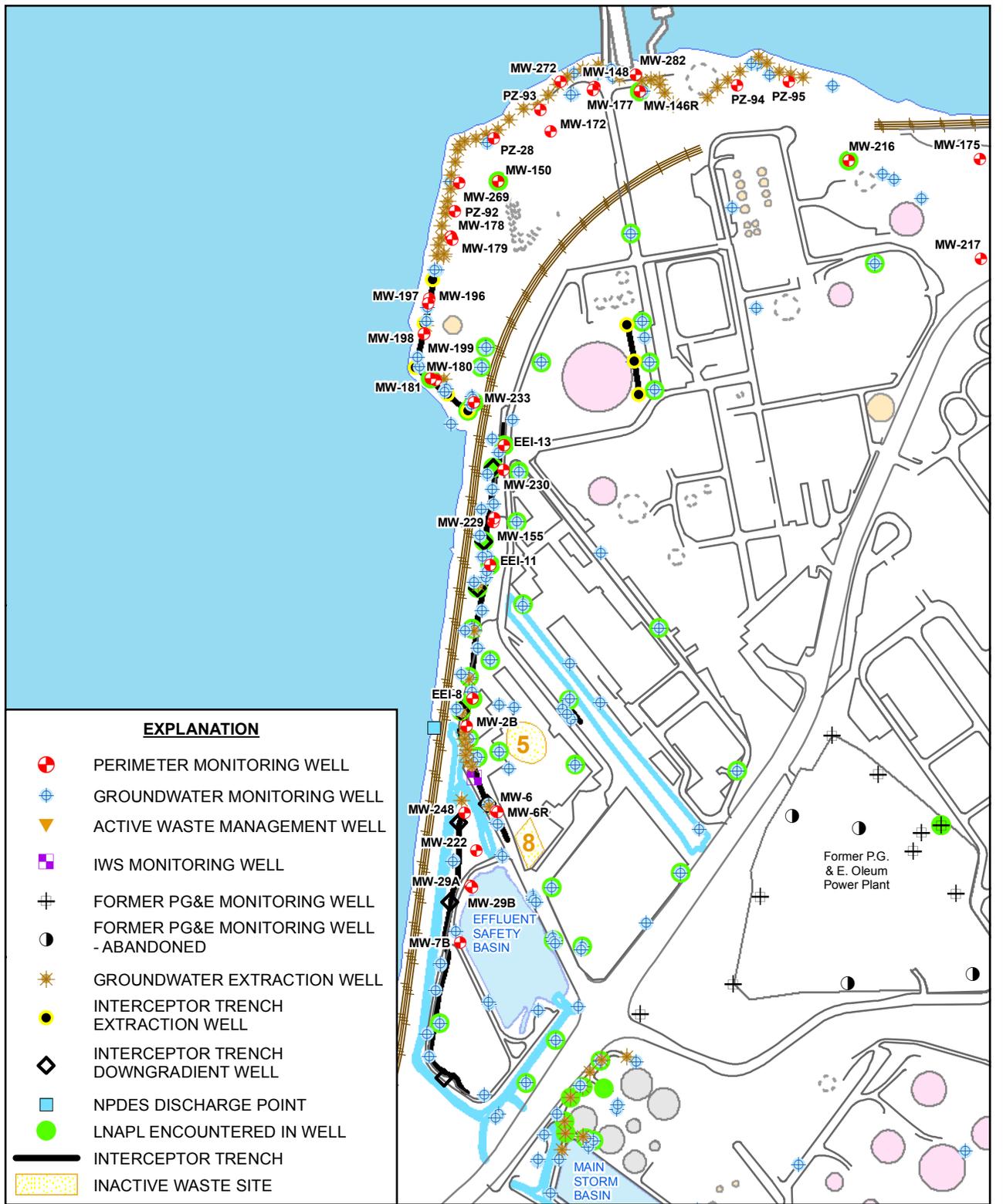
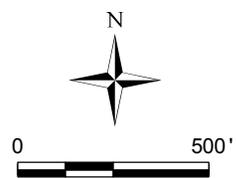


FIGURE 1

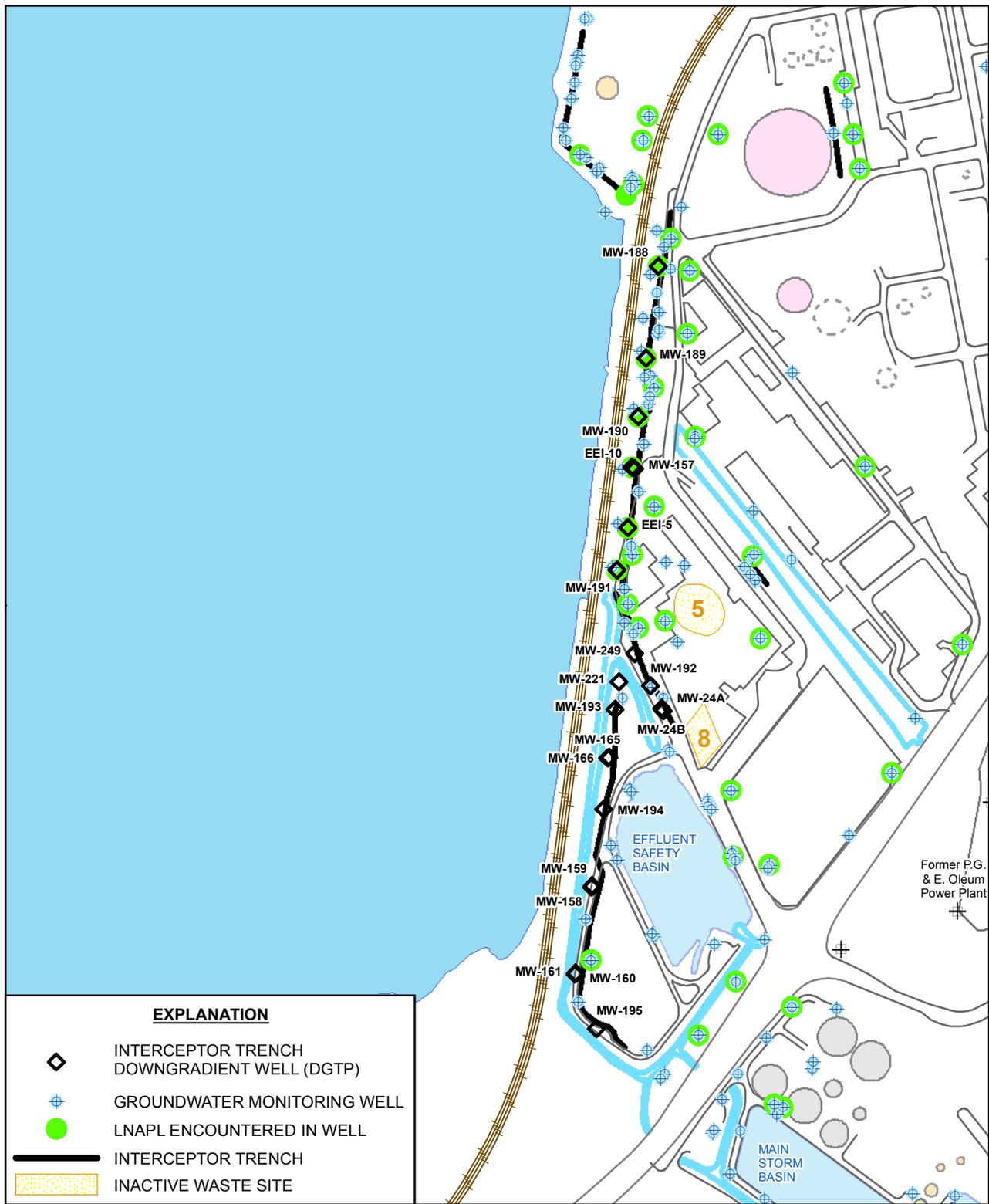
REFINERY BASIN PERIMETER WELLS

**PHILLIPS 66 SAN FRANCISCO REFINERY
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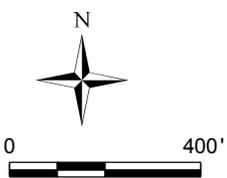
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| | | | | |
|--------------|----------------|------------------|---------------|---------------------------------|
| Drawn By: DH | Checked By: DP | Scale: 1" = 500' | Date: 8/25/15 | File: SFR_Fig1_GW_Perimeter.mxd |
|--------------|----------------|------------------|---------------|---------------------------------|



EXPLANATION

- ◆ INTERCEPTOR TRENCH DOWNGRADIENT WELL (DGTP)
- ⊕ GROUNDWATER MONITORING WELL
- LNAPL ENCOUNTERED IN WELL
- INTERCEPTOR TRENCH
- ▨ INACTIVE WASTE SITE

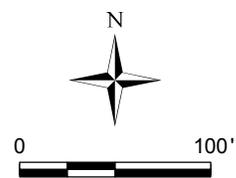
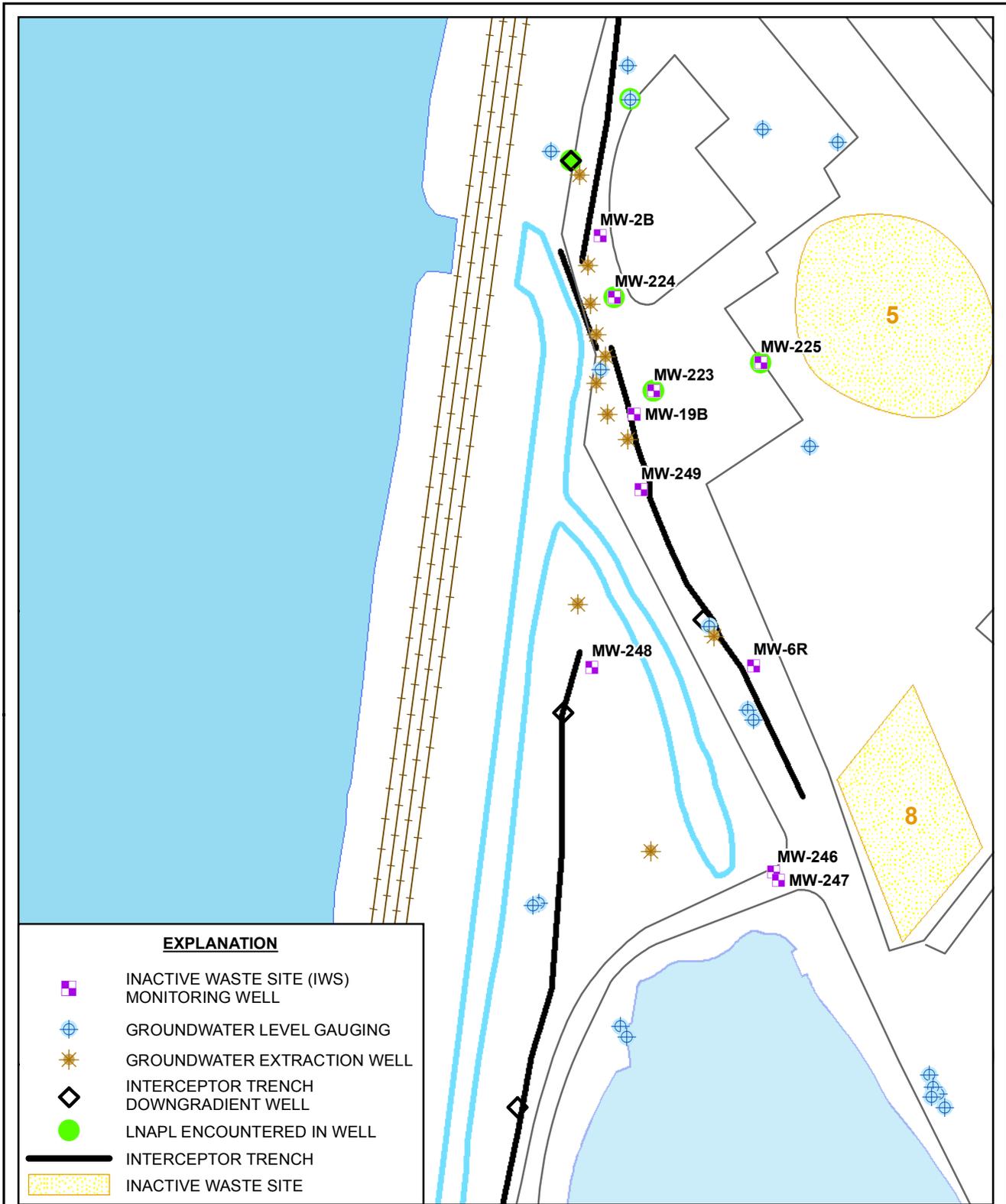


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FIGURE 2

DOWNGRADIENT TRENCH PERIMETER WELLS

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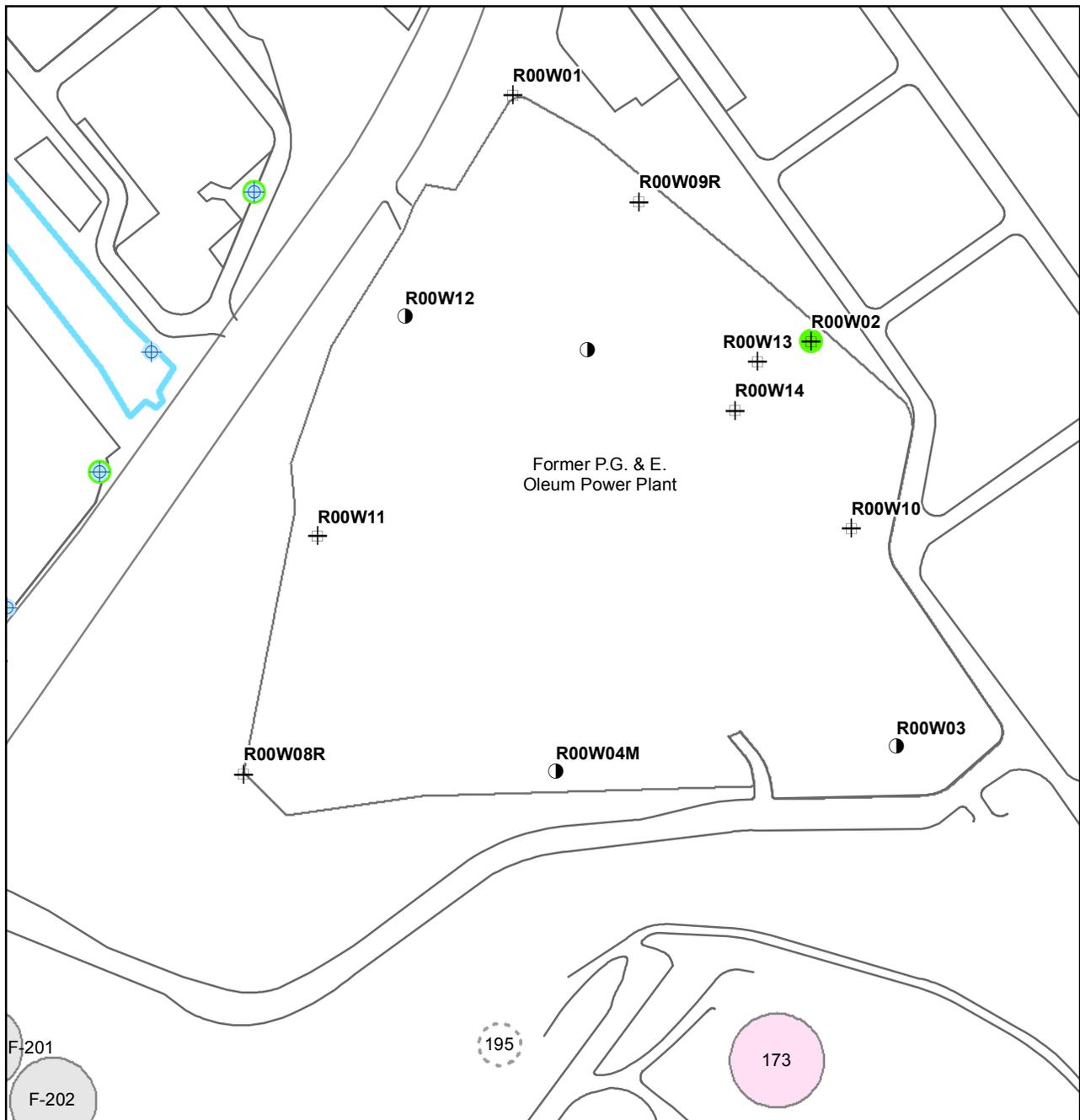



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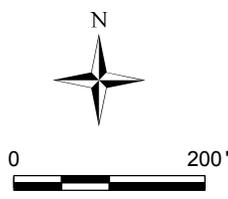
FIGURE 3

INACTIVE WASTE SITES 5 & 8 WELLS

**PHILLIPS 66 SAN FRANCISCO REFINERY
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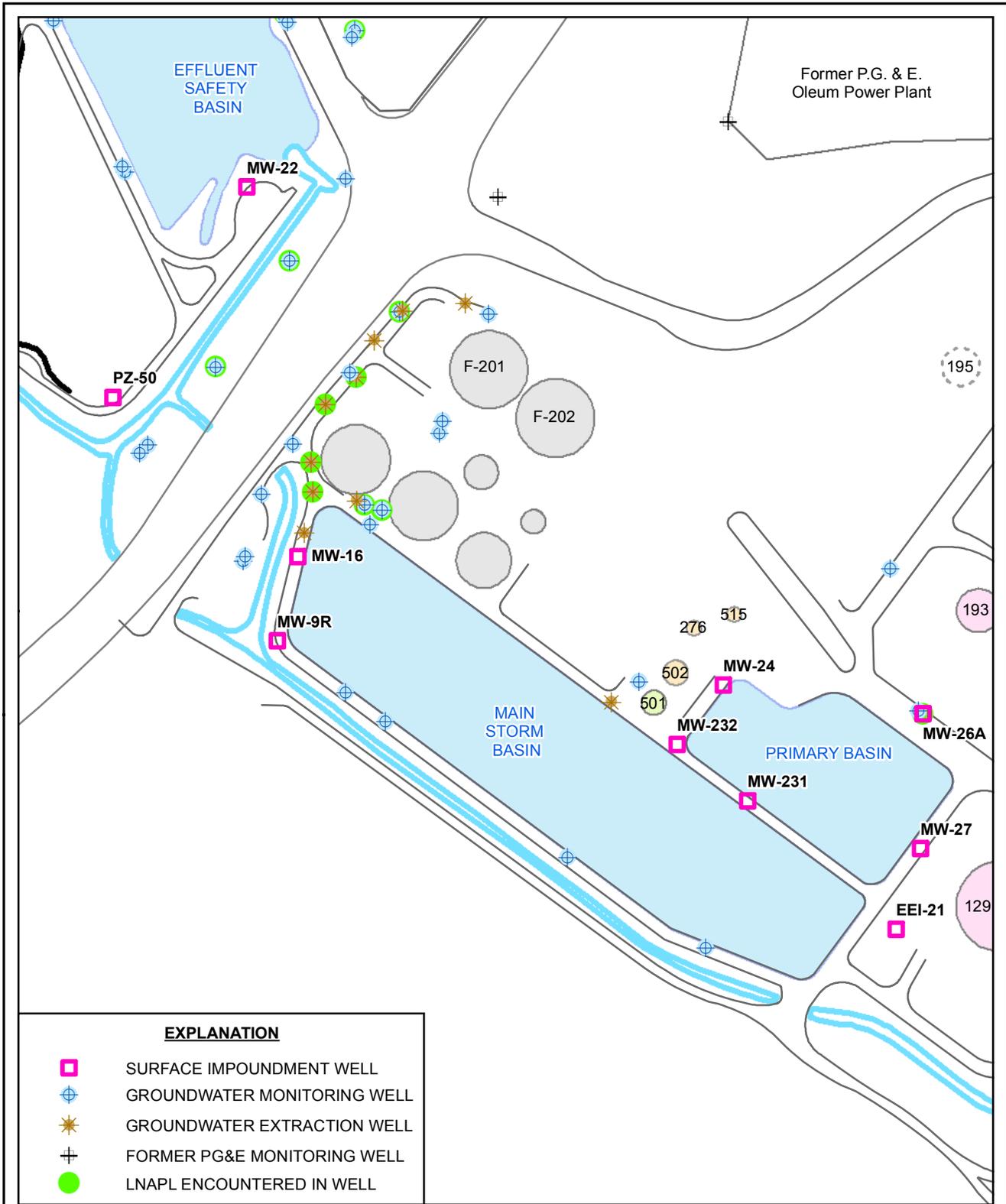


| EXPLANATION | |
|-------------|---|
| | GROUNDWATER MONITORING WELL |
| | FORMER PG&E MONITORING WELL |
| | FORMER PG&E MONITORING WELL - ABANDONED |
| | LNAPL ENCOUNTERED IN WELL |

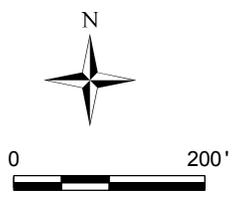


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FIGURE 4
FORMER PG&E OLEUM POWER PLANT WELLS
PHILLIPS 66 SAN FRANCISCO REFINERY
RODEO, CALIFORNIA



| EXPLANATION | |
|-------------|-----------------------------|
| | SURFACE IMPOUNDMENT WELL |
| | GROUNDWATER MONITORING WELL |
| | GROUNDWATER EXTRACTION WELL |
| | FORMER PG&E MONITORING WELL |
| | LNAPL ENCOUNTERED IN WELL |

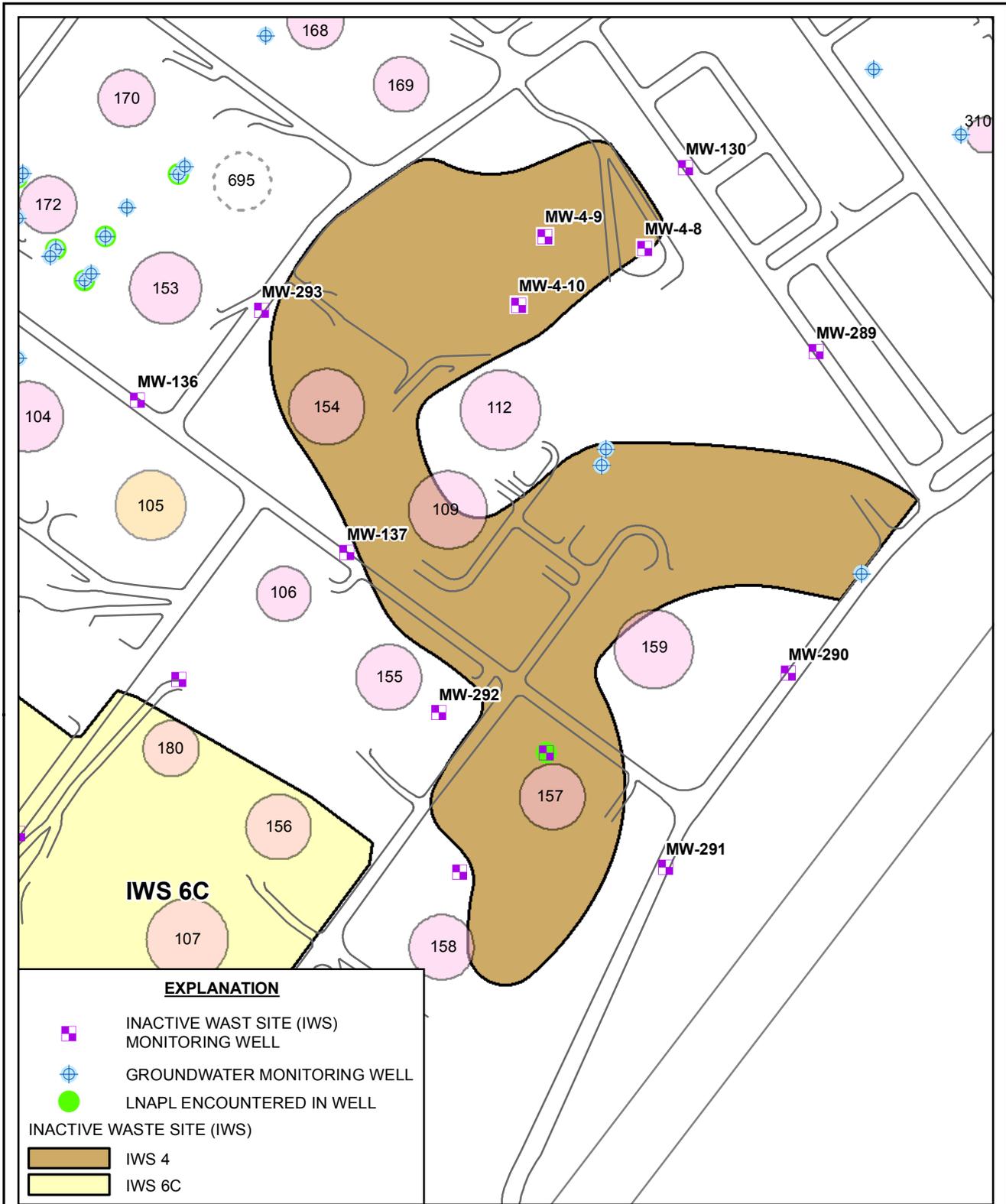



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FIGURE 5

SURFACE IMPOUNDMENT WELLS

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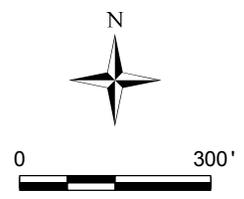


EXPLANATION

- INACTIVE WASTE SITE (IWS) MONITORING WELL
- GROUNDWATER MONITORING WELL
- LNAPL ENCOUNTERED IN WELL

INACTIVE WASTE SITE (IWS)

- IWS 4
- IWS 6C



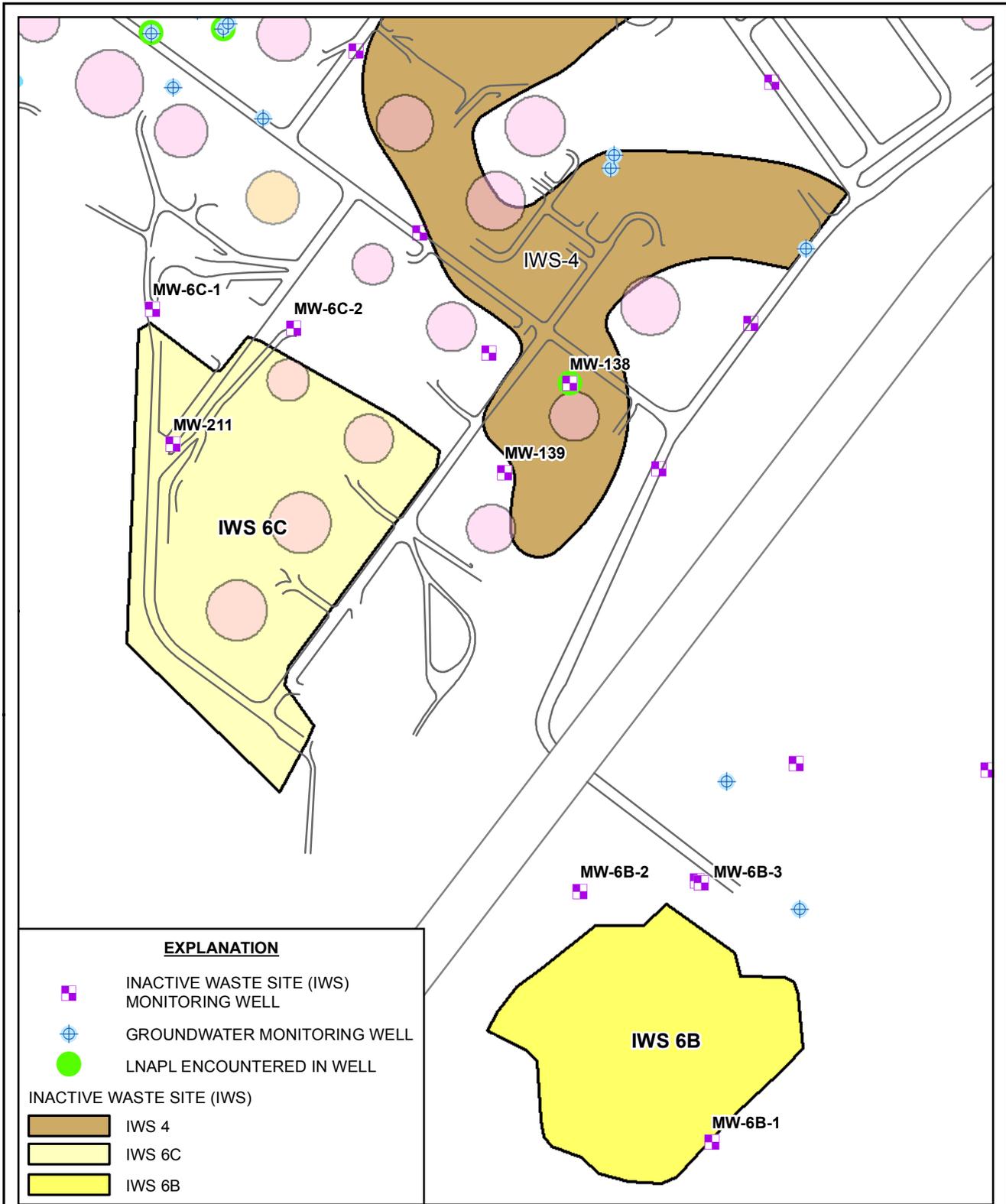
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FIGURE 6

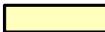
INACTIVE WASTE SITE 4 WELLS

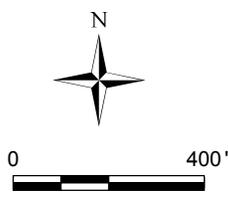
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| | | | | |
|--------------|----------------|------------------|---------------|----------------------------|
| Drawn By: DH | Checked By: DP | Scale: 1" = 300' | Date: 8/25/15 | File: SFR_Fig6_GW_IWS4.mxd |
|--------------|----------------|------------------|---------------|----------------------------|



EXPLANATION

-  INACTIVE WASTE SITE (IWS) MONITORING WELL
 -  GROUNDWATER MONITORING WELL
 -  LNAPL ENCOUNTERED IN WELL
- INACTIVE WASTE SITE (IWS)
-  IWS 4
 -  IWS 6C
 -  IWS 6B

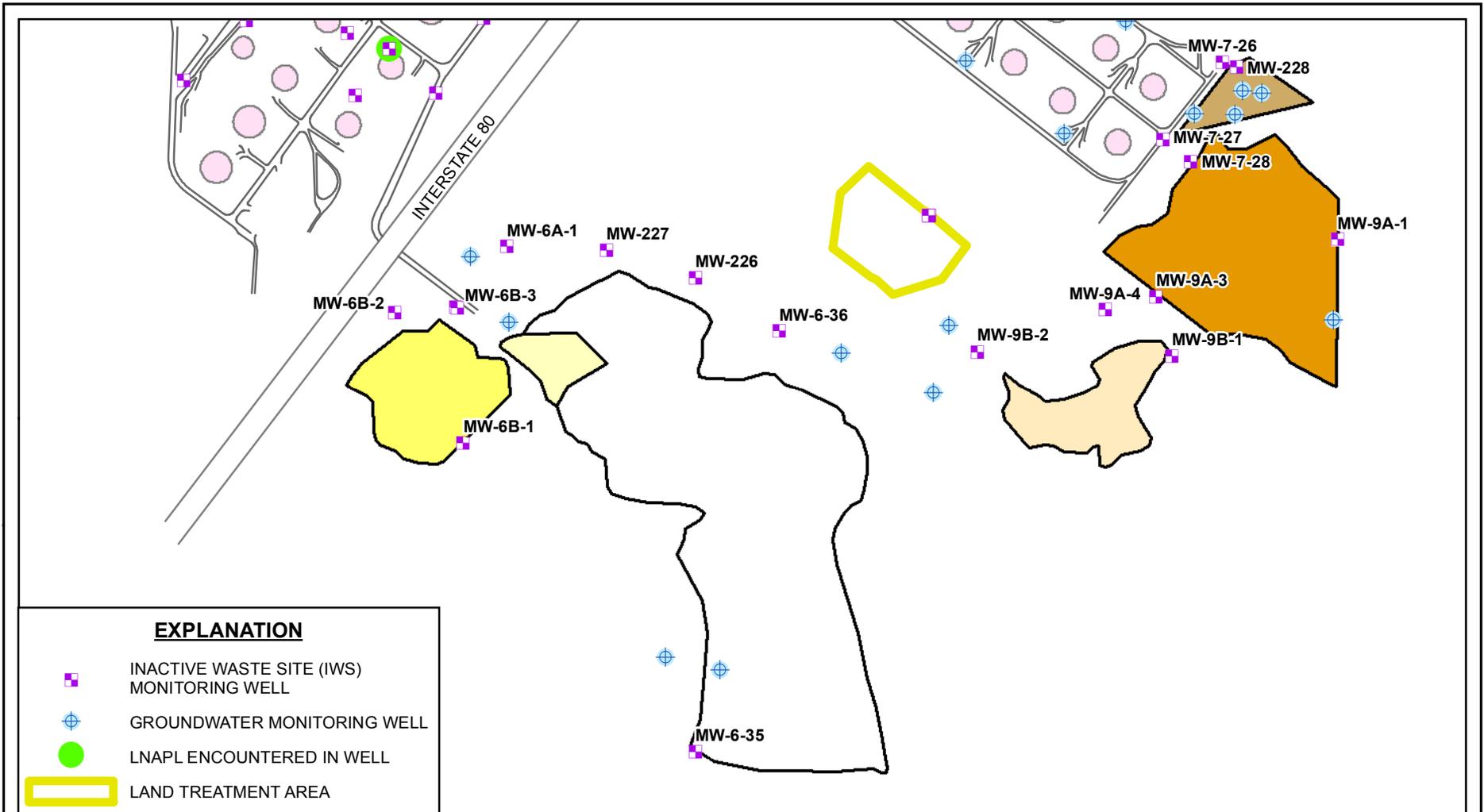



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FIGURE 7

INACTIVE WASTE SITES 6B AND 6C WELLS

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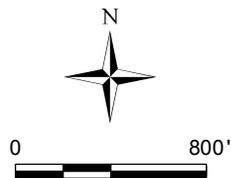


EXPLANATION

- INACTIVE WASTE SITE (IWS) MONITORING WELL
- GROUNDWATER MONITORING WELL
- LNAPL ENCOUNTERED IN WELL
- LAND TREATMENT AREA

INACTIVE WASTE SITE (IWS)

- IWS 6
- IWS 6A
- IWS 6B
- IWS 7
- IWS 9A
- IWS 9B

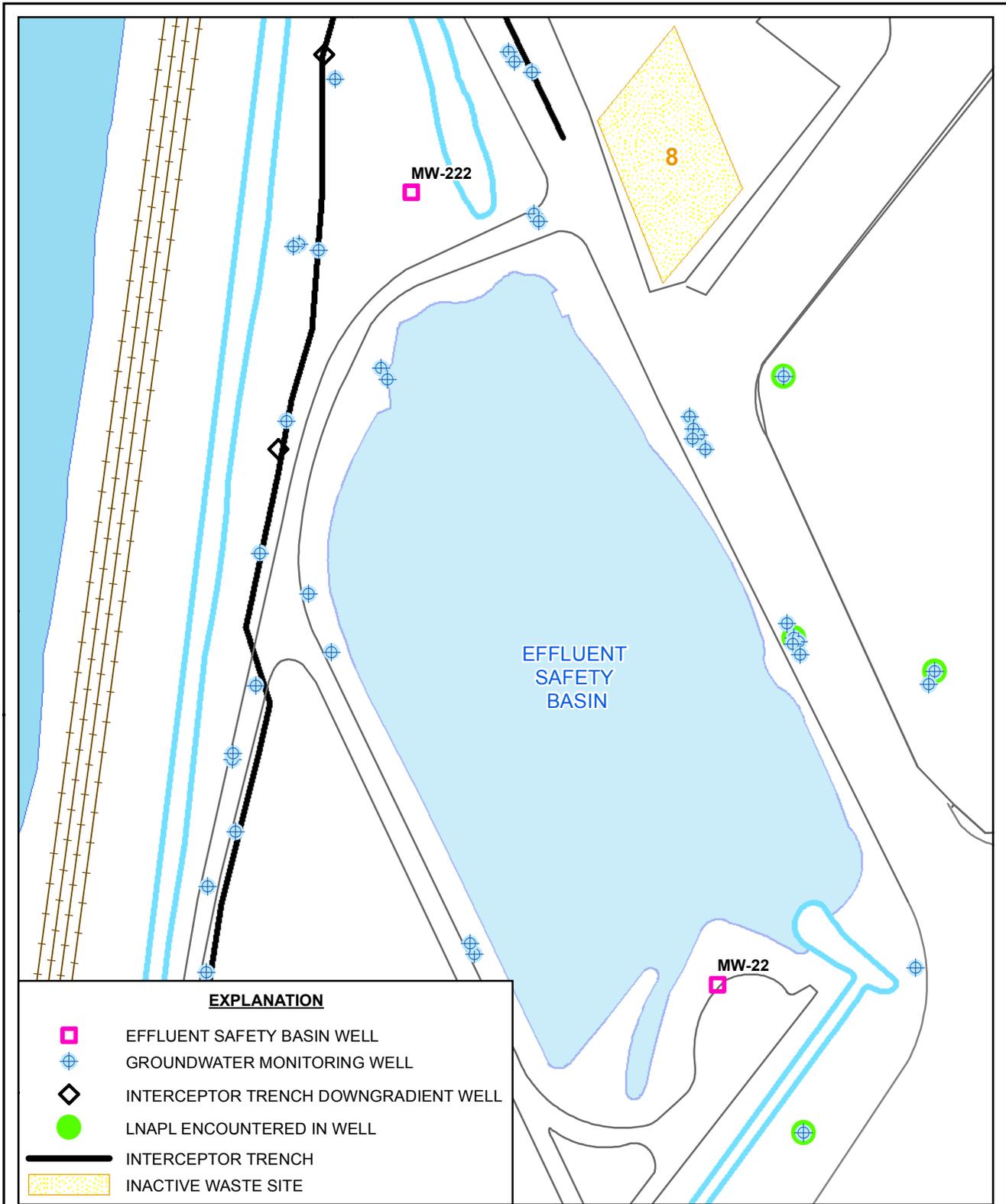


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FIGURE 8

INACTIVE WASTE SITES 6, 6A, 6B, 7, 9A, AND 9B

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| EXPLANATION | |
|-------------|--------------------------------------|
| | EFFLUENT SAFETY BASIN WELL |
| | GROUNDWATER MONITORING WELL |
| | INTERCEPTOR TRENCH DOWNGRAIDENT WELL |
| | LNAPL ENCOUNTERED IN WELL |
| | INTERCEPTOR TRENCH |
| | INACTIVE WASTE SITE |

FIGURE 9

EFFLUENT SAFETY BASIN WELLS

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| | | | | |
|--------------|----------------|------------------|---------------|----------------------------------|
| Drawn By: DH | Checked By: DP | Scale: 1" = 100' | Date: 8/25/15 | File: SFR_Fig9_GW_EffluentSB.mxd |
|--------------|----------------|------------------|---------------|----------------------------------|