project. In 1985, the Regional Board issued Cleanup and Abatement Orders (CAOs) to 15 refineries in the Region, including Golden West, requiring subsurface assessment and groundwater characterization at their refineries. Subsequently, the Regional Board issued three additional CAOs to Golden West for assessment, monitoring and cleanup of LNAPL and related pollutants in soil and groundwater that originated from the Site. The most recent CAO, Order No. R4-2004-0020 was issued to Golden West on August 24, 2004. Since 1997, the Regional Board has also executed six prospective purchasers agreements related to the redevelopment of the Site.

Since its acquisition of the refinery in 1983, Golden West has conducted site assessment, LNAPL removal, limited soil excavation, and groundwater monitoring at the Site. The remedial activities conducted within the 269-acre property were primarily focused on the commercial and industrial redevelopment of the Site. Currently, Golden West is operating on-site soil vapor extraction systems to remediate petroleum hydrocarbons and volatile organic compounds (VOCs) in the unsaturated zone. Golden West is also removing LNAPL from on-site and off-site wells in the Semi-Perched and Artesia Aquifers. Golden West also gauges water levels in the Semi-Perched and Artesia Aquifers and collects groundwater samples from selected wells in the Artesia Aquifer to monitor the total petroleum hydrocarbons, oxygenates and VOCs on a semi-annual schedule.

The Site is located in the Central Basin pressure area of the Los Angeles Coastal Plain. The uppermost water bearing zone is the Semi-Perched Aquifer. This aquifer occurs both on and off site, but is laterally discontinuous in some areas. The Semi-Perched Aquifer is present in the southern part of the South Tank Farm and extends off site in the southwest direction. The groundwater in the Semi-Perched Aquifer is encountered at depths ranging between 20 and 50 feet below ground surface (bgs) and flows toward the southwest. The Artesia Aquifer is a continuous water bearing zone which occurs both on site and off site. The groundwater in the Artesia Aquifer is encountered between 65 and 100 feet bgs and generally flows toward the northeast.

II. LNAPL Plume in the Semi-Perched Aquifer

Since the discovery of LNAPL at the Site in 1979, Golden West and its predecessors conducted multiple subsurface investigations to characterize and monitor the identified waste plumes originating from the Site. The southern extent of the LNAPL plume in the Semi-Perched Aquifer from the South Tank Farm to well PO-16 was already defined by 1992. Isolated pools of LNAPL within water bearing zones in the Semi-Perched Aquifer were also identified in wells P-4, P-6, P-14 of the West Tank Farm and in well P-3 of the Processing Unit Area. A laterally continuous plume of LNAPL in the Semi-Perched Aquifer has been consistently mapped as extending approximately 3000 feet from the South Tank Farm in the down-gradient direction beyond Rosecrans Boulevard. The presence of the LNAPL plume in the South Tank Farm and area to the south of the Site is congruent with those areas in which the Semi-Perched Aquifer is present. The orientation of the plume extending to the south of the Site is also consistent with the groundwater flow direction of the Semi-Perched Aquifer.

Golden West has submitted a number of reports to the Regional Board that include maps of the LNAPL plume. All of the maps submitted prior to the Report, indicate only one LNAPL plume originating from the Site and extending off site to the south to well PO-16. Figure 1 depicting the various LNAPL plume maps submitted to the Regional Board over time is attached. A review of the well gauging data collected since 1985, indicates that the amount of LNAPL measured in individual on-site and off-site wells varies with time, and there is a general trend of decreasing

amount of LNAPL in most wells. This trend is attributable to many factors but mainly due to the removal of primary sources by dismantling of the refinery beginning in 1997 and continuous removal of LNAPL by Golden West.

It is also observed that in many wells, the LNAPL thickness, which was measured up to a few feet in a well at one time decreased to zero feet before the LNAPL came back in that well after some time. For example, LNAPL was measured at 4.1 feet in well B-13 in 1985 and it decreased to zero feet in 1995. In 1997 the LNAPL was again measured at 4.08 feet in well B-13 then its thickness decreased to 0.02 foot in 2005. In 2006, the LNAPL came back again into the well at 1.50 feet. The LNAPL was measured at zero feet in well B-13 during the latest well gauging event in March 2013. The variable LNAPL thickness measured in individual wells is also attributable to the well design and location, subsurface lithology, fluctuations in groundwater level, gradient and LNAPL saturation.

The shape of the LNAPL plume presented on plume maps is also dependent upon the interpretation of the data. In the 2008-GWRC Semi-Perched Aquifer LNAPL plume map on Figure 1 (attached), the plume is shown as isolated pools around off-site wells PO-16, B-16, B-13 and CCW. In Figure 1, Golden West has drawn the 2008 GWRC Semi-Perched Aquifer LNAPL plume into isolated blobs of LNAPL around each of the aforementioned four wells. The groundwater well CCW is located approximately 400 feet and B-13 is located approximately 1000 feet from the former refinery in the downgradient direction. Groundwater wells B-16 and PO-16 are located approximately 1,400 feet and 2,100 feet, respectively from well B-13 further in the downgradient direction. Due to the large distance between the wells, there is not adequate well control available to confirm the absence of LNAPL in the areas between these wells. In contrast, a better interpretation would be to draw a contiguous LNAPL plume connecting wells PO-16, B-16, B-18, MYTNN, B-13 and the wells located inside South Tank Farm, as reported by Golden West and its consultant since 1980s. Regional Board staff also noted that 0.29 foot of LNAPL was measured in well MYTNN during September 22, 2008 well gauging event but Golden West did not include well MYTNN to draw the Semi Perched LNAPL plume map. LNAPL has been consistently measured in MYTNN since it was installed in 1986. Another Semi-Perched Aquifer well B-18 is located between wells B-16 and B-13. More than 2-feet of LNAPL were consistently measured in well B-18 since its installation in 1986 until 1989 when Golden West stopped gauging this well due to site access.

There is no reason to believe that LNAPL is not present in the area of the former well B-18 without installation of replacement wells to confirm it. In 1992, Golden West installed well AO-16 in the vicinity of well B-18; however, Well AO-16 is screened in the Artesia Aquifer while the LNAPL in this area occurs within the Semi-Perched Aquifer. As expected, Golden West has been gauging well AO-16 since 1992 and consistently reporting the absence of LNAPL in groundwater. Another example of fluctuating thickness of LNAPL is seen in the Artesia Aquifer well AO-8. In 1990 when the well was installed, the LNAPL thickness in the well was measured at 4.81 feet. The LNAPL thickness increased to 16.29 feet in 1992 before it dropped to zero feet in 1996. In March 2011, 15.69 feet of LNAPL was measured in the well. During the March 2013 well gauging event, zero feet of LNAPL was measured in AO-8.

In its Report, SGI does not dispute the presence of a continuous LNAPL plume extending from the South Tank Farm across Rosecrans Boulevard, but asserts that the portion of the plume originating from the Site extends off site only to few hundred feet. SGI claims that the LNAPL found in off-site downgradient wells B-13, MYTNN, B-16 and PO-16 in the Semi-Perched Aquifer is attributable to non-refinery sources. To support its claim, SGI relies on visual

observation, LNAPL finger printing and of the presence of other underground storage tank sites and oil conveyance pipelines in the area.
SGI collected LNAPL samples from five wells in the Semi-Perched Aquifer located incrementally farther away from the South Tank Farm in the downgradient direction. Well STF-16 is located at the boundary of the South Tank Farm; B-13 is located approximately 1,000 feet from Well STF-16, MYTNN is located approximately 2,000 feet from Well STF-16, B-16 is located approximately 2,300 feet from Well STF-16 and PO-16 is located approximately 3,000 feet from Well STF-16. Zymax Laboratory (Zymax) analyzed the five samples for chemical finger printing. All five samples were analyzed for Methylcyclopentadienyl Manganese Tricarbonyl, Ethylene Dibromide and organic lead speciation. Samples from STF-16, B-13 and MYTNN wells were additionally analyzed for C3-C44 whole oil and oxygenate blending agent.

1. Visual Observation

SGI describes the LNAPL found in wells STF-16, B-13, MYTNN, B-16 and PO-16 as visually distinct from one another based on the color and appearance of the samples. The SGI Report also references the Off Site Semi-perched Zone Cone Penetrometer/Hydropunch Investigation Report (CPT Report) by TriHydro Corporation (THC) dated September 18, 1991. In the CPT Report, THC also describes LNAPL collected from some hydropunch locations near Rosecrans Avenue and along Carmenita Road as "fresh" or "less-weathered" as compared to "more weathered" LNAPL collected at other locations close to the Site, based upon visual inspection. THC then suggests that there are localized hydrocarbon sources other than the former refinery. Similarly, SGI's Report attributes the LNAPL in the downgradient wells to a source other than the refinery operations.

SGI was not consistent in its use of visual observation to categorize the source of LNAPL. For example, in the Report, SGI described the product from both STF-16 and MYTNN wells as black and weathered, but also argued that LNAPL in MYTNN belongs to a plume that is distinct from the refinery plume.

More importantly, however, visual observation and color of LNAPL is not a reliable criterion to determine the age or source of a release. The color of the dye added during refining operations degrades with time, so using color to determine the source of a release is questionable, particularly in weathered products. In the latest fingerprinting report dated March 3, 2012, Zymax concludes that LNAPL from the three wells (STF-16, B-13, and MYTNN) is severely weathered. Zymax did not utilize color and appearance of the LNAPL samples to differentiate between fresh or weathered products, but rather, utilized chemical fingerprinting such as alkyl lead speciation and absence of oxygenates to reach a more reliable conclusion.

2. Finger-printing

Lead Compounds:

SGI also claims that LNAPL in the B-16 and PO-16 wells is from a different source than the LNAPL found in STF-16, B-13, and MYTNN based on the unique presence of two lead compounds. Zymax analyzed LNAPL samples from STF-16, B-13, MYTNN, B-16 and PO-16 to quantify five alkyl lead compounds consisting of tetraethyl lead (TEL), tetramethyl lead (TML), trimethylethyl lead (TMEL), dimethyldiethyl lead (DMDEL) and methyltriethyl lead (MTEL). TML was absent in all samples. TEL and MTEL were present in all five samples. TMEL and DMDEL were quantified only in the samples from B-16 and PO-16. In contrast to SGI, Zymax never claimed in its report that the LNAPL in the B-16 and PO-16 wells is from a different source than

LNAPL found in STF-16, B-13, and MYTNN. Zymax only estimated the age of gasoline based on the presence of alkyl lead in the samples to be between 1960 and 1992.

The analysis for alkyl lead compounds is a useful method to estimate the age of leaded gasoline. Refineries began using TEL as an anti-knocking agent and to boost the octane rating in gasoline in the 1920s. Its use as an additive peaked in 1959. After the discovery of TML in 1960, refineries introduced the use of all five alkyl lead compounds in leaded gasoline. But after 1985, TEL again became the dominant lead additive. In California, the manufacture of leaded gasoline was discontinued in 1992. The amount and type of alkyl lead in gasoline varied based on gasoline demand, price, regulations, and other factors specific to each refinery. The only certainty the presence of alkyl lead in LNAPL samples provides is that the gasoline was formulated between approximately 1920 and 1992, but most likely between 1960 and 1992. This time frame matches that of operations at the Golden West Refinery, which produced refined products between 1930.s and 1992.

Additional Fingerprinting Analyses:

Based on the results of the fingerprinting and visual observations from STF-16, B-13 and MYTNN wells, SGI asserts that there are three types of LNAPL plumes in the Semi-Perched Aquifer from three separate releases. SGI concludes that the source of LNAPL in STF-16 is from the Site, but that the plume extends only a few hundred feet beyond the Site. The LNAPL in B-13 and MYTNN forms a second distinct plume, and the LNAPL in B-16 and PO-16 is from a third distinct plume. SGI identifies these three plumes separately on Figure 11 of the Report. According to SGI, the LNAPL in B-13 and MYTNN, and inB-16 and PO-16 (the second and third plumes) is from non-refinery sources.

Zymax identifies LNAPL found in all three wells, STF-16, B-13 and MYTNN, as severely weathered gasoline, degraded #2 diesel or #2 fuel oil. Zymax also identifies the higher iso-octane/methycyclohexane ratio in the STF-16 sample and concludes that the gasoline in STF-16 is from a different release than that found in B-13 and MYTNN. But the differences in iso-octane/methycyclohexane ratio in the samples only indicate differences in the formulation of the refined products that were produced and discharged at the Site. The iso-octane/methycyclohexane ratio is also affected by weathering of the LNAPL. Because a refinery produces differently formulated products over time, the Golden West Refinery is a likely source of LNAPL in all three wells.

To support its claim that hydrocarbon in semi-perched groundwater south of the refinery is from off-site sources and does not originate from the refinery, SGI also cites interpretation of the LNAPL found in Semi-Perched wells provided by THC in its reports, previously submitted to the Regional Board. The THC reports do not, however, only support SGI's interpretation. In a report dated April 26, 1990 (April 1990 Report), THC describes the free-floating hydrocarbon found in the Semi-Perched Aquifer and Artesia Aquifer. THC characterized the LNAPL based upon the analytical results of samples collected from 15 wells in the Semi-Perched Aquifer and 16 wells in the Artesia Aquifer located on and off site. THC states that LNAPL in well P-6, located in the West Tank Farm, and LNAPL in well P-9, located in the central South Tank Farm, likely originated from different sources than the LNAPL found in the remainder of the South Tank Farm. THC described the LNAPL in well P-3, located in the Processing Unit Area as similar to the LNAPL found in the South Tank Farm wells. These results show that there is considerable variation amongst LNAPL samples collected from wells located in different areas of the refinery, though all of the sampled LNAPL is attributable to releases that occurred at the Site. Furthermore, THC states that the characteristics of free-floating hydrocarbon in the South Tank

Farm and south of the refinery are similar. This statement includes LNAPL collected from B-13 and MYTNN located as far as 2,000 feet south of the refinery.
In the Report, SGI made a reference to the "California Leaking Underground Fuel Tank (LUFT) Historical Analysis" (LUFT study) by Rice et al. SGI reported that according to the LUFT study the benzene contaminated groundwater plumes at 90% of the sites extended to 255 feet or less, and the median plume length was 101 feet.

In the Report, SGI then used the LUFT study to claim that the plume originating from the Site does not extend more than few hundred feet off-site. According to SGI, the previous investigations were conducted on the premise that dissolved phase plumes migrate long distances and resulted in the installation and subsequent monitoring of numerous on-site and off-site wells for which redundant and irrelevant data was accumulated. SGI also states that most of the wells southwest of the refinery are located within other suspected contamination source areas at a distance, which is beyond from the typical distances of migration. SGI used its understanding of the plume migration to disregard historical data collected by Golden West and its consultants over the last several decades in order to propose and justify removal and destruction of Semi-Perched Aquifer and Artesia Aquifer wells.

The LUFT study cited by SGI was a study of the impacts due to leaks from underground storage tanks at gas station sites, and not of leaks from large refineries. The LUFT Study was focused on the length of dissolved phase groundwater plume resulting from a fuel hydrocarbon source, which is defined based upon the benzene concentration dissolved in groundwater. In the LUFT study, a benzene concentration of 10 micrograms per liter (µg/L) was used to define the length of a dissolved groundwater plume. The Site is a former refinery and not a gas station. There is already a 3000 foot long LNAPL plume that continues to act as a source for the dissolved phase groundwater plume. There is very limited data available for the dissolved benzene concentration in groundwater at the site. The analytical results form 1992 and/or 2002 sampling events indicate that benzene was detected at 13 µg/L in a sample collected from well PO-5 in 2002. Well PO-5 is located downgradient from the known southernmost portion of the LNAPL plume in PO-16. The on-site and off-site Semi-Perched wells were never sampled regularly. Therefore a comprehensive groundwater monitoring program is needed for on-site and off-site wells.

The evidence submitted by SGI does not refute the Regional Board's conclusion that the LNAPL found in the Semi-Perched Aquifer both on and off site consists of various types of refined products released from the historical operations at the former Golden West Refinery. The visual observations and chemical fingerprinting of LNAPL collected from wells located both on- and off-site exhibit more similarities and only minor differences among the LNAPL samples, indicating that the former Golden West Refinery site is the likely source of the entire LNAPL plume.

SGI also fails to observe the distinction between identifying successive on-site releases as separate from one another, and concluding that they are from different sources. For example, there were hundreds of above ground tanks, some over five million gallons in capacity at the former Golden West Refinery that are documented as storing refined products including gasoline and diesel #2 fuel oil. If any tanks had a small leak, the product stored in those tanks would continue to contribute to the LNAPL plume. Over time, a tank can release different types of refined products manufactured at the refinery and stored in the tank over its life. This explains minor differences in chemical fingerprinting and appearance of the LNAPL. Zymax identified these differences as the basis to label the LNAPL samples to be from separate releases, but not necessarily from separate sources.

3. Other possible sources of LNAPL

SGI provides a list of sites identified as other possible sources of the LNAPL found in the Semi-Perched Aquifer to the south of the Site. SGI developed this list based upon its review of historical records and files in the possession of the City of Santa Fe Springs, the City of Norwalk, and the Regional Board. In Table 3 of the Report, SGI lists seventeen addresses of businesses as well as petroleum product pipelines located in the vicinity of the former refinery. The businesses include current or former locations of underground storage tanks (USTs) and gas stations. According to SGI, these sites or the petroleum product pipelines are the source of the off-site LNAPL plume in the Semi-Perched Aquifer.

The evidence submitted by SGI that the off-site LNAPL plume in the Semi-Perched Aquifer was caused by discharges from the alleged source sites is not sufficient to dispute existing evidence that the plume was caused, at least in significant part, by discharges at the Site.

First, some of the alleged source sites are located hundreds of feet from the known location of the off-site LNAPL plume. For example, United Rentals is located approximately 1,400 feet east of the LNAPL plume, an ARCO station is located approximately 1,300 feet east of the LNAPL plume, a Shell station is located approximately 1,700 feet west of the LNAPL plume and an UNOCAL station is located approximately 900 feet west of the LNAPL plume. The historical data presented by Golden West does not provide a conclusive link between the alleged offsite sources to the Semi-Perched LNAPL plume. In contrast, well gauging and sampling suggests that the Semi-Perched LNAPL plume had migrated over time to 3,000 feet from the Site in the hydraulically down-gradient (south-southwest) direction.

Second, SGI did not provide any evidence of a leak from any of the alleged sources of sufficient size to have caused a plume of the magnitude of the off-site LNAPL plume. The size of the plume is, however, commensurate with discharges from the refinery over the term of its operation. Refinery operations took place at the Site between the 1930s and 1992. Storage and blending of different petroleum products continued at the Site until 1997. There were numerous sources of LNAPL present within the 269-acre refinery boundaries throughout the refinery's operational life. These sources include, but are not limited to, hundreds of above ground storage tanks with capacity as large as 5,628,000 gallons and underground product pipelines. After the demolition of the refinery, TPH, VOCs and lead impacted soil remain onsite acting as a source for groundwater contamination as well as threat to human health. For example, Golden West's consultants estimated that the amount of LNAPL discharged at the Site into the Semi-Perched Aquifer was between 3,360,000 and 10,080,000 gallons.[1]

III. Groundwater Monitoring Program

Under the current groundwater monitoring program Golden West monitors 133 groundwater wells on a semi-annual basis for the presence of LNAPL and changes in groundwater levels. In addition, Golden West samples 11 wells in the Artesia Aquifer for laboratory analyses. Currently, groundwater samples are analyzed for total petroleum hydrocarbons, oxygenates and VOCs.

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[1] These figures were reported to the Regional Board in the May 10, 2000 Addendum to the Conceptual Design Report by England & Associates (England & Associates Conceptual Design Report).

In its Report, SGI proposes a revised groundwater monitoring and sampling program. The revised program would discontinue monitoring of some wells and substitute alternate wells in the semi-annual sampling program. SGI also proposes to abandon a number of wells in the Artesia and Semi-Perched Aquifers. SGI proposes to abandon wells in the Semi-Perched Aquifer located to the south of the refinery, on the premise that the off-site LNAPL plume did not result from discharges at the Site.

1. History of Groundwater Monitoring at the Site

Since the discovery of LNAPL in groundwater at the Site in 1979, approximately 243 groundwater wells have been installed both on and off site by Golden West and its predecessors. The purposes of these wells were to delineate and monitor the LNAPL and dissolved phase groundwater plumes in both aquifers, and for certain select wells, to remove LNAPL from the groundwater. Over time, Golden West has destroyed approximately 100 of these wells. Some, but not all, of the destroyed wells were replaced. At the present time there are 141 groundwater wells, located both on and off site.

The groundwater sampling and monitoring program conducted by Golden West has not provided adequate groundwater data for the Regional Board to accurately monitor changes in the thickness and extent of LNAPL and dissolved phase plumes in the Semi-Perched and Artesia Aquifers, nor to determine the appropriate scope and methods of clean-up and abatement of the plumes. The data gaps are mostly due to the failure of Golden West and its predecessors to monitor all the groundwater wells installed at the Site. In addition, a number of wells located within the plumes were destroyed. Some of these wells were replaced with questionable screen intervals and locations.

For example, some wells in the Artesia Aquifer were destroyed even though monitoring indicated the presence of high concentrations of benzene, toluene or methyl tert butyl alcohol (MTBE).[2] Golden West destroyed other groundwater wells in the Artesia Aquifer without collecting any groundwater samples.[3] In other instances, Golden West has not sampled wells in the Artesia Aquifer that have not been destroyed and are available for sampling.[4] In addition, the screen intervals of some of the existing wells that are monitored appear to be inappropriate, producing samples that will fail to detect the LNAPL and dissolved phase plumes even if the plumes are present.

Data gaps are particularly prevalent with respect to the Semi-Perched Aquifer, for which there is very little monitoring data. Golden West's current monitoring program for the Semi-Perched Aquifer only includes gauging of fluid levels and removal of LNAPL from few wells. Only a few Semi-Perched Aquifer wells have been sampled, and sampling was only done in 1992 and 2002. Golden West does not currently monitor the Semi-Perched Aquifer for pollutants such as petroleum hydrocarbons and VOCs. SGI proposes only one well in the Semi-Perched Aquifer for future groundwater sampling. This well P-10 is located upgradient and outside the dissolved groundwater plume. In fact, SGI proposes to remove wells in the Semi-Perched Aquifer located south of the refinery based on its assertion that the LNAPL plume to the south of the Site

[2] Artesia wells A-2, A-9, and A-57 are examples of such wells.

[3] These wells include A-12A, A-13, A-14, A-14A, A-15, A-18, A-19, A-20, A-23, A-25, A-28, , A-31A, A-41, A-49, A-50, A-51, and AO-13.

[4] These wells include A-3A, A-22A, A-24A, A-30A, A-56A, A-64, A-65, and A-66 .

originated from off-site sources. As discussed previously in this letter, however, the weight of the available evidence shows that the off-site LNAPL plume did result from discharges originating at the Site and Golden West is responsible for monitoring and abating both the on-site and off-site portions of the LNAPL plume.

The *Conceptual Design Report* dated February 24, 2000, *Conceptual Design Addendum-Dissolved Phase Remediation* dated May 10, 2000,and the *Final Design Report* dated May 18, 2001, all prepared by England & Associates, proposed Monitored Natural Attenuation (MNA) in conjunction with LNAPL removal as the remedial approach for the dissolved phase groundwater plume. In the *Fate and Transport Modeling* report dated September 2002 by TRC, the dissolved phase plume was considered rapidly approaching steady-state conditions. TRC benzene, toluene, ethylbenzene and xylenes concentration within the 3,000 feet LNAPL plume as the source for dissolved phase groundwater plume, which was measured at variable distances from the leading edge of the LNAPL plume. TRC also recommended continued monitoring for verification. As indicated by its name, MNA requires monitoring of the chemicals of concern not only for plume migration and stability, but also natural attenuation parameters to confirm its occurrence. Based on the reports submitted, Golden West did not monitor MNA parameters and conducted regular sampling of the dissolved phase plume in the Semi-Perched Aquifer.

In addition, continued presence of LNAPL and very high concentrations in dissolved phase after several decades suggest that even a potentially stable plume may require active cleanup. The concentrations of contaminants such as benzene and MTBE dissolved in the Semi-Perched Aquifer and the Artesia Aquifer are at levels that require active cleanup. The California Department of Public Health maximum contaminant levels (MCLs) for benzene and MTBE are 1 micrograms per liter (µg/L) and 13 µg/L, respectively. The analytical results of groundwater samples collected from Semi-Perched and Artesia aquifer wells confirm that concentrations of benzene and MTBE in groundwater exceed their respective MCLs. Based on the limited data, benzene was detected at concentrations of 18,000 µg/L and 29,000 µg/L in the Semi-Perched and Artesia aquifers, respectively. MTBE was detected at a concentration of 14,500 µg/L in the Artesia Aquifer. According to the Basin Plan, the beneficial uses of groundwater beneath the Site and the vicinity include municipal use. Therefore, cleanup of impacted groundwater to the MCLs is required. Appropriate groundwater sampling is also necessary to monitor the groundwater contaminant plume behavior and to determine the most effective means of cleanup and abatement of the existing contaminant plume and efficacy of completed clean-up activities to protect beneficial uses.

4. Conclusions

The results of the chemical fingerprinting, combined with the operational and regulatory history of the refinery and hydrogeology of the Site, supports the conclusion that the former Golden West Refinery site is the source of the 3000 foot long off-site LNAPL plume in the Semi-Perched Aquifer. The LNAPL samples collected from on- and off-site wells since early 1980s consist of characteristically variable refined products. During its active period, the refinery produced a variety of refined products including gasoline, diesel, and fuel oil. The variability in color and appearance, and therefore age, of the releases is best explained as the result of releases of different types of products that were produced and stored at the Site during the operational history of the refinery, rather than the result of releases from off-site sources. In the May 2000, Addendum to the Conceptual Design Report, England & Associates states "The refinery produced petroleum products such as gasoline, diesel and jet fuel over 70 years of operation. Over time, the refinery used and produced a wide range of materials with the potential to adversely affect groundwater". The operational history of the former refinery and the on-site and

off-site data collected by the Golden West and its predecessors, corroborates that the Site is the most logical source of the LNAPL plume in the Semi-Perched and Artesia Aquifers.

The current groundwater monitoring program is inadequate in addressing the LNAPL and dissolved phase groundwater plumes in the Semi-Perched and Artesia Aquifers. The proposed modifications in the Report are incomplete and not acceptable to the Regional Board. Furthermore, there are data gaps that require installation of additional wells in Semi-perched and Artesia Aquifers to completely characterize the entire LNAPL and dissolved phase groundwater plumes originating from the former Golden West refinery site.

If you have any questions, please contact Mr. Adnan Siddiqui (project manager) at (213) 576-6812 (asiddiqui@waterboards.ca.gov) or Dr. Arthur Heath, Section Chief at (213) 576-6725 (aheath@waterboards.ca.gov).

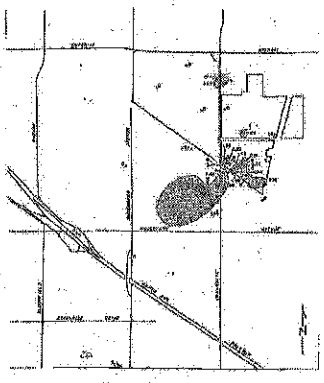
Sincerely,

Samuel Unger

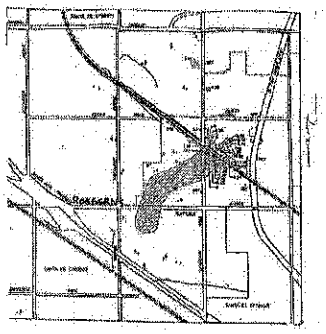
Samuel Unger, PE
Executive Officer

Attachment: Figure 1, 1990-2008 LNAPL Plume Maps in Semi-Perched Aquifer

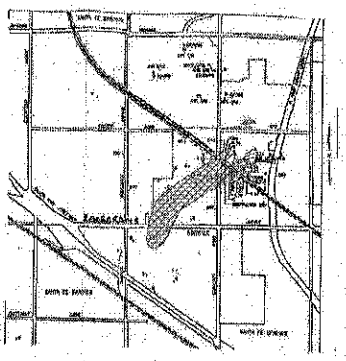
CC: Steve Armann, USEPA (via e-mail)
Katherine Baylor, USEPA (via e-mail)



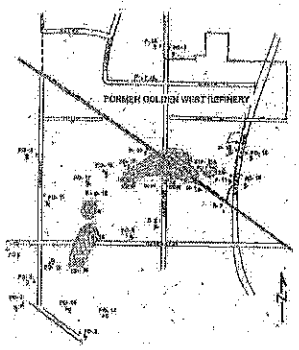
1990 - TRC



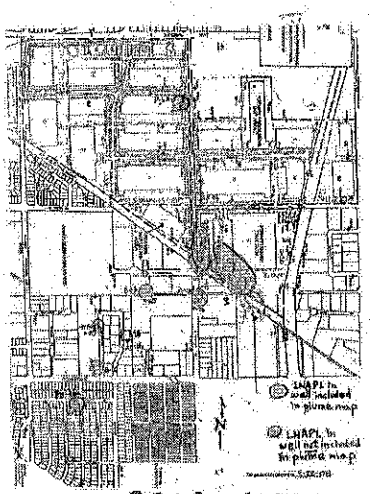
1995 - TRC



2000 - GWRC



2006 - GWRC



2008 - GWRC

Figure 1

Extent of LNAPL Plume

In Semi-Perched Aquifer

EXHIBIT 12

GOLDEN WEST REFINING COMPANY

September 12, 2013

O.134498

Dr. Arthur Heath
Mr. Adnan Siddiqui
Los Angeles Regional Water Quality Control Board, 320 W. 4th Street, Suite 200
Los Angeles, CA 90013

Global ID No. **SL373412444**

RE: FORMER GOLDEN WEST REFINERY
SLIC No. 227: Submission in Compliance with CAO R4-2004-0020
Response to LARWQCB letter dated July 30, 2013

Dear Mr. Heath and Mr. Siddiqui:

Enclosed, please find a copy of the *Comments to: Response to Groundwater Program Review Cleanup and Abatement Order No. R4-2004-0020, RWQCB July 30, 2013(Response Letter)* prepared by The Source Group, Inc. (SGI) and dated September 6, 2013 for the former Golden West Refinery (GWRC) located in Santa Fe Springs, CA (the Site). The SGI Response Letter sets forth a rebuttal to the statements made in the Regional Water Quality Control Board – Los Angeles Region (LARWQCB) letter dated July 30, 2013 that misstate the historical operations at the former GWRC and its contribution to the extent of the existing hydrocarbon plume/light non-aqueous phase liquid (LNAPL) in the semi-perched (SP) groundwater zone up to more than 3,000 feet south of the GWRC property.

GWRC has an unblemished record of full compliance and cooperation with the LARWQCB for 30 years, including years when GWRC was in bankruptcy. Notwithstanding the clear and incontrovertible evidence provided by SGI (a well respected and qualified expert) that GWRC is not the sole source of the offsite contamination, LARWQCB staff has thus far chosen to ignore the evidence. It almost appears that GWRC is being punished for its 30 years of full compliance and cooperation by giving LARWQCB staff a convenient target for an expansion of GWRC's responsibility.

Instead, GWRC submits, LARWQCB should fairly judge the clear evidence and pursue the other likely sources of the offsite contamination. The surrounding area is and has been filled with heavy industrial uses as well as significant pipeline activity. It is unacceptable that LARWQCB has chosen to ignore scientific evidence that points to other sources.

In addition to the detailed analyses and information provided by SGI in the attached letter, we would like to emphasize the following aspects:

- The very high likelihood of multiple offsite sources having contributed to the LNAPL plume was demonstrated in the past by GWRC and its consultants (I.e. THC in February 1995; SGI in March 2012) by providing technical evidence including : chemical analyses and visual observation of LNAPL samples collected from different wells within the LNAPL plume; identification of numerous

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potential sources south of the GWRC's property; and the size of the plume being unusually large (>3,000 feet) for a plume allegedly originating from only one source.
By contrast, the LARWQCB's allegation that GWRC is the solely responsible party for the entire LNAPL plume in the semi-perched water zone south of the GWRC property is based on disregard of the objective evidence and subjective interpretations.
Based on a preconceived assumption (without any evidence) that GWRC was the only source for the entire plume, other potential responsible parties received regulatory closures for their cases, and/or letters of comfort, instead of being required to delineate their plume and thus filling the gaps currently noticed by the LARWQCB.

- It appears that different consultants historically performing subsurface investigations on behalf of GWRC, have strictly focused on following the LARWQCB's directives, and during each phase of investigation related to the LNAPL plume, their reports were limited to presenting the findings of their investigations with little to no interpretations, thus ignoring the existence and contribution of any other potential offsite sources to the LNAPL plume.
  The lack of requirements from LARWQCB and other regulatory agencies for further investigations by other potential contributors to the offsite LNAPL plume perpetuated the false general belief that all local groundwater contamination should be assigned to GWRC.
  When consultants such as TriHydro Corporation (THC), in their *"Hydrocarbon Analyses of Free Product, STF-GWRC"* dated February 2, 1995, presented technical evidence in support of their conclusion that based on chemical analyses and visual observation performed in 1991 and 1995, the LNAPL samples collected from different wells installed in the SP groundwater zone south of the GWRC site indicated the existence of other offsite sources, the LARWQCB ignored their findings and conclusion, and continued to hold GWRC as the solely responsible party for the entire LNAPL plume.
  Twenty two (22) years later, The Source Group Inc. (SGI) re-analyzed LNAPL samples collected from different SP wells and presented a similar well supported conclusion with respect to the existence of other offsite sources, in their *"Groundwater Program Review Report"* (GWPRR) dated March 12, 2012.
  Unexpectedly, 16 months later, on July 30, 2013 the LARWQCB responded to the March 12, 2012 GWPRR disagreeing again with the conclusion that the other offsite sources may have significantly contributed to the LNAPL plume. However, as pointed out by SGI and GWRC, it appears that the LARWQCB staff is ignoring the clear evidence, and simply takes the convenient and easy path by failing to pursue the other likely sources of the offsite contamination.
  It appears that LARWQCB was and continues to be focused on GWRC as the sole responsible party, perhaps because GWRC always obeyed orders and directives, and that LARWQCB is unwilling to look for other potential sources, such as the pipeline corridor under Carmenita Road, near Cambridge Street, and others identified by SGI in their March 2012 GWPRR.
  Since the recent requirements by LARWQCB started to exceed the practical and fair scope of work being carried out by GWRC, arbitrarily selected as the solely responsible party by the LARWQCB, we believe that it is the time to reconsider and limit GWRC's responsibility, based on the technical evidence and stop apportioning of blame to GWRC due to old and erroneous assumptions.

- The LARWQCB's assumption that *"hundreds of above ground tanks"* operating within the former GWRC property may have released different products at different times into the SP groundwater zone, is not supported by the evidence which shows that:
    - The SP groundwater zone which was and remains discontinuous and limited in lateral and vertical extent, is not present beneath the entire Site, but instead is only present beneath the southern portion of the former South Tank Farm (STF).
    - From all the ASTs historically operating within the entire GWRC, only nine (9) were located in the southern portion of the STF, and therefore the potential sources of LNAPL released to the SP groundwater zone must be limited to those nine (9) ASTs formerly located in the southern portion of the STF and above the SP zone footprint. Further all but two (2) of the nine (9) ASTs in the relevant area had "no recorded release" as set forth in detail below.
      Documents indicate the following details for the nine ASTs present above the SP zone in the southern portion of the STF:

        - AST 13412 – Crude charge 08/83 to 09/89; Unifiner charge after 10/89 – No releases recorded.
        - AST 13413 – Finished gasoline late '70; inactive (08/83-12/87); Slop (12/87-07/91); Impound water after 1991. No releases recorded.
        - AST 13414 – Finished gasoline through 1987; Hydro charge (8/83-7/91); Impound water after 08/91. No releases recorded.
        - AST 13415 – Finished gasoline until 1979; Slop Oil after 1979. In 1979 a water test discovered a floor leak.
        - AST 13416 – Crude through 1949; Gasoline through 1976; Unifining charge (1983-1989); Inactive since 10/89. New floor installed in 1976.
        - AST 13417 – Crude thru 1955; Gasoline through 1977; Hydro charge (8/83-9/89); Impound water since 10/88. No releases recorded.
        - AST 13418 – FCC feed. No releases recorded.
        - AST 13419 – Low-octane. Gasoline. No releases recorded
        - AST 13420 – High-octane. Gasoline. No releases recorded

- Since January of 1992 no crude oil processing has taken place at the GWRC, so at a minimum, it has been more than 21 years since any releases could have theoretically occurred from one or more of the nine ASTs located at the southern portion of the former STF. If GWRC had been the only source of the LNAPL present in the SP zone, it would be expected that the LNAPL present in the SP groundwater zone beneath the Site would be identical to the LNAPL in offsite wells given the minimum of 21 years of potential downgradient migration. The fact that the product in offsite SP wells located 600 – 1,000 feet from the southern border of the STF does not match (either visually or chemically) the on-Site SP wells (indicated by the differences in samples collected from the onsite well STF-16 and the offsite well B-13) is a strong evidence demonstrating that the LNAPL in the onsite and offsite wells is from different sources.

- Typically the LARWQCB would consider all sources when assessing a potential commingled plume and the parties for individual sources of contamination would be partially, if not equally, responsible for assessment, monitoring and remediation. In the case of the LNAPL plume south of

the GWRC, the LARWQCB and other regulatory agencies have disregarded the numerous offsite sources when directing assessment, monitoring and remediation activities. This approach by LARWQCB is particularly troublesome in light of the clear evidence and the heavy industrial and pipeline usage in the immediate area of the plume.

- As you well know, GWRC has worked extremely hard to maintain full compliance for the Site and proposed and implemented numerous assessment activities and corrective actions to address the contamination that may have originated from the operation of the former Golden West Refinery. It is obvious that GWRC is responsible for a part (and only a part) of the LNAPL plume south of the Site. In no way should GWRC be held responsible for the entire offsite LNAPL plume.

During the past 30+ years, GWRC fulfilled and exceeded all investigation and remediation requirements issued by the LARWQCB through different CAOs, and other regulatory documents, and GWRC's compliance was consistently recognized by the LARWQCB. In fact, the redevelopment project at the former refinery has been lauded by the State of California as an outstanding Brownfield redevelopment, including the project's close and cooperative work with the LARWQCB.
As acknowledged by the LARWQCB in the July 30, 2013 letter, *"a review of the well gauging data collected since 1985, indicates that the amount of LNAPL measured in individual on-site and off-site wells varies with time, and there is a general decreasing amount of LNAPL in most wells" (last paragraph page 2 and first paragraph page 3).*
The above quoted statement confirms that all the past directives issued by the LARWQCB and implemented by GWRC were adequate and effective for delineation, monitoring and mitigation of the LNAPL plume, and consequently no supplemental investigation and monitoring activities are necessary, but contrary it is expected that based on the recognized reduction of the LNAPL plume, a reduction of the monitoring / remediation efforts should follow.

Since we are very troubled by the LARWQCB's failure to fairly accept the evidence, we would like to consider the LARWQCB's response letter dated July 30, 2013 as a debatable point of view, without any future aggravating consequences for GWRC.. If you should have any questions regarding this submission, please call Simon at (562) 921-3581, Ext. 260, or Chris at Ext. 390.

Respectfully submitted,

Simon Tregurtha
Project Manager, GWRC

Chris Panaitescu
General Manager, GWRC

Cc: File
Moshe Sassover (GWRC)

Comments to: *Response to Groundwater Program Review Cleanup and Abatement Order No. R4-2004-0020*, RWQCB July 30, 2013

Former Golden West Refinery
Santa Fe Springs, California

04-GWRC

Prepared For:

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Prepared By:

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September 6, 2013

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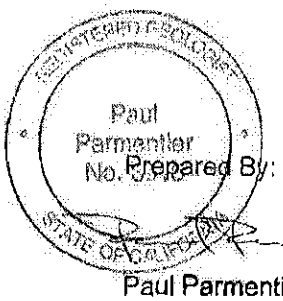

Paul Parmentier
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Reviewed By:

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EXECUTIVE SUMMARY

On July 30, 2013, the Los Angeles Regional Water Quality Control Board (RWQCB) presented the Golden West Refining Company (GWRC) Comments (RWQCB Comments) to the March 2012 Groundwater Program Review (SGI Report) prepared by The Source Group, Inc. (SGI).

In response to the RWQCB Comments, this document presents specific response to the RWQCB comments.

The RWQCB Comments included specific discussions of the groundwater monitoring program and technical evaluation of the off-site Semi-Perched Groundwater Zone. In response, the attached document and its attached documentation prepared by SGI present detailed technical responses to RWQCB Comments. The SGI response can be summarized as follows:

- Although the RWQCB Comments characterize the current GWRC groundwater monitoring program as insufficient, it should be noted that GWRC has been in full compliance with the current and previous CAOs, and has submitted more than 40 groundwater monitoring reports to RWQCB without any notice of non-compliance (see Comments # 20, 24, 25, and 28).
- The RWQCB Comments repeatedly (Comments # 21, 22, and 23) appears to characterize GWRC's abandonment and re-drilling of monitoring wells as questionable. As documented in Comment # 21, all well abandonment and re-drilling were completed after RWQCB approval, including recently as April 2013.
- The RWQCB Comments also appear to describe inadequate remediation by GWRC (Comments # 3, 19, 28), however SGI notes that (1) GWRC has been in full compliance of RWQCB's CAO and other requirements, (2) DTSC, OEHHA and the City of Santa Fe Springs, along with RWQCB have approved all risk assessment, remedial action plans and on-going remediation efforts, and (3) the redevelopment of the former GWRC refinery resulted in a much faster pace and larger scope of remediation much more effective than any operating refinery by allowing for full removal of primary sources (refinery ASTs, USTs, pipelines), and secondary sources (shallow soil), and installation of in-situ remediation systems more effective than operating refineries.
- The RWQCB Comments also discuss non-GWRC sources of LNAPL in the Semi-Perched Zones south of the former GWRC refinery. Besides the significant pipelines source discussed below, SGI also points out (Comment # 15) that

regulatory agencies appeared to readily dismiss evidence of on-site contamination at sites south of the refinery as caused by the GWRC refinery, and this lack of regulatory requirement for follow-up investigation has resulted in significant data gaps at former UST sites south of the former GWRC refinery.

- The review by RWQCB of the SGI Report included numerous detailed technical comments on the visual appearance and fingerprinting data for the Semi-Perched Groundwater Zone (Comments # 8 – 14), and despite the reported variations in appearance and chemical composition, the RWQCB attributed the LNAPL plume in the Semi-Perched Groundwater Zone south of the former refinery to releases at the former GWRC refinery. However, SGI believes that the data instead demonstrate unequivocally that the multiple pipelines under Carmenita Road just south of the former GWRC refinery could have been the major contributor to the LNAPL plume in the Semi-Perched Zone, and that investigation by the pipeline operators is required. The enclosed document and its attachments present detailed responses to the RWQCB Comments to allow RWQCB to further evaluate the likelihood of the LNAPL contribution by the pipeline and other non-GWRC sources.

RESPONSE TO COMMENTS

This document presents The Source Group, Inc's (SGI) response to the July 30, 2013, Regional Water Quality Control Board's (RWQCB) comments to the March 2012 Groundwater Program Review (SGI Report) prepared by SGI for the former Golden West Refining Company (GWRC) refinery site located at 13539 Foster Road in Santa Fe Springs CA (RWQCB Case No. SCP No. 0227A).

Our responses to the RWQCB comments presented herein demonstrate that: (1) GWRC has always been in full compliance with RWQCB requirements and (2) the RWQCB's allegation that the former refinery was the primary source of LNAPL in the Semi-Perched groundwater zone extending more than 3,000 feet, from the southern edge of the former South Tank Farm is not supported by the evidence provided in the March 2012 Groundwater Program Review Report, which documented the existence of multiple offsite sources, including the Carmenita Road pipelines as a likely source of LNAPL.

In the text below, the selected text sections from the RWQCB letter are presented in italics, followed by SGI's comments.

1. RWQCB Comment:

1. Site and History Background - 2nd Paragraph

In 1979, when Gulf Oil Company owned and operated the refinery, light non-aqueous phase liquid (LNAPL) was discovered during the construction of the Carmenita Road underpass project. In 1985, the Regional Board issued Cleanup and Abatement Orders (CAOs) to 15 refineries in the Region, including Golden West...

Response:

Gulf Oil, which operated the refinery prior to GWRC, conducted the initial investigation and remedial efforts after the 1979 discovery of LNAPL at the proposed Carmenita underpass, starting in 1979. After taking ownership of the refinery, GWRC continued the Gulf efforts and conducted all groundwater monitoring, assessment and remedial activities in full compliance with LARWQCB and other regulatory agencies directives, issued before and after the issuance of the first CAO.

2. RWQCB Comment:

I. Site and History Background - 2nd Paragraph

...the Regional Board issued three additional CAOs, the most recent CAO, Order No. R4-2004-0020 was issued to Golden West on August 24, 2004.

Response:

The CAOs were issued by the LARWQCB over the past 30 years either as a result of changing the use of the GWRC's property and financial responsibility, or due to the expiration of the previous CAO. Historical CAOs included text that indicated full compliance by GWRC as seen in the following examples: sections on page 5 of the CAO R4-2004-0020 (attached for reference as Attachment 1) *"... to reflect the compliance progress achieved by the Discharger"* (referring to CAO 91-079); and *"The discharger complied with the 10-year timetable"* (referring to CAO 93-082).

3. RWQCB Comment:

I. Site and History Background - 3rd Paragraph

Golden West has conducted site assessment, LNAPL removal, limited soil excavation, and groundwater monitoring at the Site. The remedial activities conducted within the 269-acre property were primarily focused on the commercial and industrial redevelopment of the Site.

Response:

The redevelopment of the site, which started in 1997, provided an opportunity for expanding remediation, by including primary source removal and secondary source removal, actions not readily implemented at an operating refinery. In addition to enhanced source removal, the redevelopment also provided a unique opportunity to implement some very efficient remediation activities not available at a refinery with on-going operations.

But it should be noted that GWRC initiated and conducted investigation and remediation activities long before 1997 when the redevelopment began. The pre-1997 assessment and remediation activities have been conducted under the LARWQCB oversight, and periodically reported to the RWQCB. For example, in the 1986 *"Hydrocarbon Mitigation Program Report"*, GWRC reported the installation of 54 wells by 1986 and removal of 6,231 barrels of LNAPL; and, as reported in the October 19, 1988 *"Groundwater Management Report"*, by October 1988, approximately 12,948 barrels of LNAPL were removed from Semi-Perched and Artesia wells, including from a LNAPL removal barrier installed at the southern edge of the South Tank Farm in order to stop the potential offsite migration of the LNAPL plume. The investigation, monitoring and remediation activities were conducted by GWRC prior to any redevelopment, included on-site and off-site activities, and were conducted under RWQCB oversight. The redevelopment of the property beginning in 1997 was an opportunity to diversify and expand the remediation actions to areas not accessible during the refinery operation.

4. RWQCB Comment:

II. LNAPL Plume in the Semi-Perched Aquifer - 1st Paragraph

The presence of the LNAPL plume in the South Tank Farm and area to the south of the Site…

Response:

It should be noted that the limited lateral extent of the Semi-Perched Zone must also be considered when evaluating the potential source areas affecting that groundwater zone. Of all the historical GWRC refinery storage tanks, only the following nine ASTs were located above the footprint of the Semi-Perched Zone present beneath the South Tank Farm (STF): 13412; 13413; 13414; 13415; 13416; 13417; 13418; 13419; 13420, and consequently only these former ASTs should be considered as potential AST sources of the LNAPL in the Semi-Perched zone. See also Comment #13.

5. RWQCB Comment:

II. LNAPL Plume in the Semi-Perched Aquifer - 2nd Paragraph

Golden West has submitted a number of reports to the Regional Board that include maps of the LNAPL plume. All of the maps submitted prior to the Report, indicate only one LNAPL plume originating from the Site and extending off site to the south to well PO-16.

Response:

Not all submitted maps indicate one contiguous LNAPL plume. Although initial historical maps reported for the off site LNAPL plume were contoured as a single plume, recent maps depicted separate plumes, for example as shown for the years 2006 and 2008 on the maps included in the July 30, 2013 RWQCB's figure 1. From 2006 through 2013, GWRC has been illustrating individual offsite plumes, and the individual plume locations were depicted based upon the groundwater monitoring data and the knowledge of former offsite leaking UST sites reported to regulatory agencies.

It appears that based on a preconceived assumption that the entire >3,000 foot LNAPL plume originated from the former GWRC, other potential UST responsible parties with reported unauthorized releases were not required to fully delineate their plumes, and most of those cases may have been prematurely closed.

The lack of requirements for full delineation, monitoring and sampling by other offsite responsible parties and contributors to the LNAPL plume in the area limited the availability of monitoring points that could provide additional information on the lateral extent and

source of the off-site LNAPL. The regulatory agencies appeared to disregard findings of contamination following UST removals and attributed any underlying soil or groundwater contamination to GWRC, thus not requiring follow up investigation by these UST owners. An example of such regulatory position is included as Attachment 2. See also comment #16.

6. RWQCB Comment:

II. LNAPL Plume in the Semi-Perched Aquifer - 2nd Paragraph

A review of the well gauging data collected since 1985, indicates that the amount of LNAPL measured in individual on-site and off-site wells varies with time, and there is a general trend of decreasing amount of LNAPL in most wells. This trend is attributable to many factors but mainly due to the removal of primary sources by dismantling of the refinery beginning in 1997 and continuous removal of LNAPL by Golden West.

Response:

The LNAPL removal program is constantly monitored and dynamically adjusted by GWRC by changing the frequency of LNAPL removal in individual wells according to the recorded LNAPL thickness, and this explains the fluctuation of LNAPL levels in individual wells.

The removal of LNAPL by GWRC from the offsite wells has had a recognized positive effect on reducing the LNAPL thickness; however it is unlikely that the removal of sources at the refinery site itself would have had any direct effect on the LNAPL thickness in wells located thousands of feet from the refinery.

7. RWQCB Comment:

II. LNAPL Plume in the Semi-Perched Aquifer - 5th Paragraph

In 1992, Golden West installed well AO-16 in the vicinity of well B-18; however, Well AO-16 is screened in the Artesia Aquifer while the LNAPL in this area occurs within the Semi-Perched Aquifer. As expected, Golden West has been gauging well AO-16 since 1992 and consistently reporting the absence of LNAPL in groundwater.

Response:

GWRC has consistently and accurately reported separate maps for Artesia LNAPL and Semi-Perched LNAPL plumes, with no direct or implied misleading of the RWQCB. GWRC's logs reported for well AO-16 clearly indicate that the Semi-Perched groundwater zone encountered at AO-16 appeared contaminated.

8. RWQCB Comment:

II.1. Visual Observation - 1st Paragraph

The SGI Report also references the Off Site Semi-perched Zone Penetrometer/Hydropunch Investigation Report (CPT Report) by TriHydro Corporation (THC) dated September 18, 1991. In the CPT Report, THC also describes LNAPL collected from some hydropunch locations near Rosecrans Avenue and along Carmenita Road as "fresh" or "less-weathered" as compared to "more weathered" LNAPL collected at other locations close to the Site, based upon visual inspection. THC then suggests that there are localized hydrocarbon sources other than the former refinery. Similarly, SGI's Report attributes the LNAPL in the downgradient wells to a source other than the refinery operations.

Response:

As pointed out by RWQCB, observations of hydrocarbon sources other than the refinery were noted as early as 1991 and recently (2011), with two different consulting firms reaching similar conclusions in a span of 22 years (TriHydro Corporation, 1991 CPT Report and SGI, 2012).

9. RWQCB Comment:

II.1. Visual Observation – 2nd Paragraph

SGI was not consistent in its use of visual observation to categorize the source of LNAPL. For example, in the Report, SGI described the product from both STF-16 and MYTNN wells as black and weathered, but also argued that LNAPL in MYTNN belongs to a plume that is distinct from the refinery plume.

Response:

The similarity in LNAPL color in wells MYTNN and STF-16 does not justify assigning these distant products to a single source and a single plume. Wells MYTNN and STF-16 with black product are approximately 1,900 feet apart, and well B-13, which is located almost exactly in the middle between MYTNN and STF-16, contains an amber color product. SGI understands that the color of LNAPL is not a precise indicator of the chemical source, and therefore supplemented its data analysis by chemical fingerprinting. However it is not clear how products with clear distinct visual characteristics can be interpreted to represent a single, contiguous LNAPL plume.

10. RWQCB Comment:

II.2. Finger-printing - 2nd Paragraph
Lead Compounds:

This time frame matches that of operations at the Golden West Refinery, which produced refined products between 1930s and 1992.

Response:

This time frame also matches the operation of non-GWRC industrial sites in the area, and particularly also matches the operational history of pipelines south of the Refinery. Currently, three oil companies report the presence of pipelines in that vicinity: Paramount Petroleum, Chevron and Plains Exploration. Pipelines are known to be prone to occasional leaks, and the presence of this high density of pipelines has not been assessed as a possible source of the off-site LNAPL. It is our opinion that the operators of these pipelines have the responsibility to assess conditions around their pipelines and to determine any contribution to soil and groundwater contamination from these lines.

In addition, it appears inappropriate to consider all products manufactured or stored within the entire former GWRC as potential sources for LNAPL in the Semi-Perched zone, but only the products stored in the nine ASTs formerly located above the Semi-Perched zone footprint should be considered as potentially impacting the Semi-Perched zone.

11. RWQCB Comment:

II. Additional Fingerprinting Analyses - 2nd Paragraph

Zymax identifies LNAPL found in all three wells, STF-16, B-13 and MYTNN, as severely weathered gasoline, degraded #2 diesel or #2 fuel oil. Zymax also identifies the higher isooctane/methycyclohexane ratio in the STF-16 sample and concludes that the gasoline in STF-16 is from a different release than that found in B-13 and MYTNN. But the differences in isooctane/methycyclohexane ratio in the samples only indicate differences in the formulation of the refined products that were produced and discharged at the Site. The isooctane/methycyclohexane ratio is also affected by weathering of the LNAPL. Because a refinery produces differently formulated products over time, the Golden West Refinery is a likely source of LNAPL in all three wells.

Response:

The variability in product type produced at the former GWRC refinery is not the only possible explanation for the variability in LNAPL in wells: multiple sources (UST,

pipelines) or various types of products pumped through pipelines over time can produce the same variability in LNAPL as observed in the wells. Without specific and concrete evidence excluding releases of fuel from off-site pipelines, it is premature and inaccurate to conclude that GWRC is the only likely source of the LNAPL in the Rosecrans/Fidel area and south of the GWRC site.

12. RWQCB Comment:

II. Additional Fingerprinting Analyses - 6th Paragraph

The visual observations and chemical fingerprinting of LNAPL collected from wells located both on- and off-site exhibit more similarities and only minor differences among the LNAPL samples, indicating that the former Golden West Refinery site is the likely source of the entire LNAPL plume.

Response:

While similarities are expected for all petroleum hydrocarbon products, this broad statement by RWQCB is contradicted by the differences in color and chemistry documented in multiple reports and the RWQCB statement assigns the source of LNAPL to the refinery without acknowledging the reasonable possibility that multiple pipelines at the southern edge of the former GWRC refinery are potential sources for the observed LNAPL.

13. RWQCB Comment:

II. Additional Fingerprinting Analyses -7th Paragraph

... there were hundreds of above ground tanks..."

Response:

As noted in Comment 4, only the nine ASTs located in the southwestern part of the South Tank Farm could have impacted the Semi Perched groundwater zone. Attachment 3 presents the location of the South Tank Farm ASTs overlying the Semi-Perched Zone.

14. RWQCB Comment:

II. Additional Fingerprinting Analyses - 7th Paragraph

Over time, a tank can release different types of refined products manufactured at the refinery and stored in the tank over its life. This explains minor differences in chemical fingerprinting and appearance on the LNAPL. Zymax identified these differences as the

basis to label the LNAPL samples to be from separate releases, but not necessarily from separate sources.

Response:

It is significant to note that, as SGI pointed out in the 2012 report after multiple successive releases of product over time, the product found in wells farthest from the former GWRC refinery would be expected to display evidence of more degradation than product found in wells closest to the former GWRC refinery, contrary to the observations of dark, degraded product in on-site well STF-16 and as amber, apparently fresher product in B-13 southwest of Carmenita Road. Multiple off site sources cannot be dismissed as the more likely cause of the differences observed in the LNAPL samples collected from different wells.

15. RWQCB Comment:

II.3. Other possible sources of LNAPL – 2nd Paragraph

The evidence submitted by SGI that the off-site LNAPL plume in the Semi-Perched Aquifer was caused by discharges from the alleged source sites is not sufficient to dispute existing evidence that the plume was caused at least in significant part, by discharges at the Site.

Response:

It should again be noted that the limited information regarding most or all of the documented off-site potential sources south of the former GWRC site is largely due to the minimal assessment requirements issued by the regulatory agencies overseeing the UST removals or other site investigations at these facilities. As discussed in the SGI Report, and in Attachment 2, contamination found at sites south of the refinery was rapidly dismissed by regulatory agencies as attributable to GWRC, resulting in no further investigation of sites with potential LNAPL releases. The statement that GWRC is the source for the entire plume is an assumption rather than "existing evidence".

16. RWQCB Comment:

II.3. Other possible sources of LNAPL – 3rd Paragraph

In contrast, well gauging and sampling suggests that the Semi-Perched LNAPL plume had migrated over time to 3,000 feet from the Site in the hydraulically down-gradient (south-southwest) direction.

Response:

In addition to off-site discrete UST sources, a release of product under pressure from a pipeline would be expected to result in a rapid, widely spread LNAPL plume, followed by reduced lateral migration after the pipeline was fixed. The LNAPL plume observed south of the GWRC refinery is consistent with such a pipeline release. Historical releases of fuel from the pipelines must be investigated.

17. RWQCB Comment:

II.3. Other possible sources of LNAPL – 4th Paragraph

Second, SGI did not provide any evidence of a leak from any of the alleged sources of sufficient size to have caused a plume of the magnitude of the off-site LNAPL plume.

Response:

The presence of multiple pipelines at the south edge of the former GWRC refinery represents significant potential sources of LNAPL, particularly if releases occurred from an active pipeline under pressure. The potential pressure of leaks from large ASTs at the refinery (less than 100 psi) is much smaller than the pressure in operating pipelines of 600 to 1,000 psi. (http://www.nrcan.gc.ca/energy/sources/natural-gas/pipeline-faq/2248).

SGI's opinion is that it is premature for the LARWQCB to assign the entire LNAPL responsibility to GWRC without completing an evaluation of all potential sources, particularly the pipeline corridor under Carmenita Road near Cambridge Street.

18. RWQCB Comment:

II.3. Other possible sources of LNAPL - 4th Paragraph

...hundreds of above ground storage tanks....

Response:

See Comment No. 13 above.

19. RWQCB Comment:

II.3. Other possible sources of LNAPL - 4th Paragraph

After the demolition of the refinery, TPH, VOCs, and lead impacted soil remain onsite acting as a source for groundwater contamination as well as threat to human health...

Response:

The demolition of the former GWRC refinery was followed by remediation activities directed and supervised by the RWQCB and other agencies. The redevelopment of each area of the former GWRC refinery was specifically authorized by the RWQCB and other regulatory agencies, only after the lateral and vertical delineations were completed to the satisfaction of the RWQCB, after the shallow soil remediation was conducted and the confirmation samples confirmed the completion, after the Health Risk Assessment indicated acceptable risk for commercial scenario and after the remedial action plans for deep impacted soil were approved. The estimated costs for the remediation were provided to RWQCB, which required GWRC to document its financial reserve for these remediation efforts prior to issuing authorization to proceed with redevelopment.

All directives and requirements were fulfilled and exceeded by GWRC, and GWRC's expenditures for remediation also exceeded the initially reserved funds.

The RWQCB general statement that the remaining TPH, VOCs, and lead-impacted soil is a source for groundwater contamination as well as a threat to human health is not based on facts and is contrary to the RWQCB's issuance of multiple authorizations to develop the site, approval of remedial plans, and also to the approval of GWRC's actions by all other entities involved in this redevelopment project, such as: the City of Santa Fe Springs, Office of Environmental and Human Health (OEHHA) and the Department of Toxic Substances Control (DTSC).

The residual TPH and VOC's were specifically addressed during each phase of development. The concentrations of lead in soil were tested during each phase of soil remediate in all areas of the refinery: for example, the Waste Discharge Requirements for the Marketing Area redevelopment (Order No. R4 2006-0037) listed specific requirements for lead and tetraethyl lead in soil, and GWRC complied with the required lead target levels during all phases of soil investigation and remediation. In addition, the WDR requirements also included sampling of specific groundwater monitoring wells for a range of contaminants including lead and other metals, and GWRC complied with testing for these contaminants.

It should also be noted that lead concentrations were measured as part of the groundwater monitoring events from numerous wells at the site from 1987 to 2011, and monitoring for dissolved lead was discontinued with RWQCB approval (See also Comment #24).

In addition to Pb, VOCs and TPH, GWRC also completed in 2004 a site-wide evaluation of emergent chemicals in response to a December 2, 2003 RWQCB request for Emergent Chemicals Subsurface Investigation.

Based on multiple risk assessments including soil gas surveys, the refinery presents no significant risks to human health. GWRC continues conducting remediation and monitoring to ensure protection of groundwater quality.

20. RWQCB Comment:

III. Groundwater Monitoring Program
III.1. History of Groundwater Monitoring at the Site - 2nd Paragraph

The groundwater sampling and monitoring program conducted by Golden West has not provided adequate groundwater data for the Regional Board to accurately monitor changes in the thickness and extent of LNAPL and dissolved phase plumes in the Semi-Perched and Artesia Aquifers, or to determine the appropriate scope and methods of clean-up and abatement of the plumes.

Response:

The groundwater monitoring and sampling programs have always been approved by and reported to the RWQCB, and RWQCB has not provided negative comments to none of the more than 40 reports submitted since the early 1990's. On the contrary, GWRC proposed updated monitoring programs in April 1991, December 1993, 2002 and August 2004, and RWQCB approved the proposed revisions. GWRC has complied with all the required monitoring programs issued and/or approved by the RWQCB.

21. RWQCB Comment:

III. Groundwater Monitoring Program
III.1. History of Groundwater Monitoring at the Site - 2nd Paragraph

Some of these wells were replaced with questionable screen intervals and locations.

Response:

In accordance with the multiple CAOs, all well abandonments and replacements were completed with RWQCB pre-approval, and were reported to RWQCB without resulting complaints or requests for modifications. For example, see RWQCB letters dated November 10, 1999; September 19, 2003; April 2004; September 29, 2004; October 14 and 17, 2005; March 2006; October 6, 2008; July and August 2009; and April 2013 approving well network modifications (Attachment 4).

22. RWQCB Comment:

III. Groundwater Monitoring Program
III.1. History of Groundwater Monitoring at the Site - 3rd Paragraph

In addition, the screen intervals of some of the existing wells that are monitored appear to be inappropriate, producing samples that will fail to detect the LNAPL and dissolved phase plumes even if the plumes are present.

Response:

As described in Attachment 5, Table 1, which contains a tabulated evaluation of the screening interval of all monitoring wells, out of 141 groundwater wells, only eight wells (A-35, A-42, A-43, AO-2, AO-10, AO-11, GW-1 and P-10) have a screening interval occasionally extending below the upper groundwater surface elevation. As discussed in that attachment, these localized screening intervals discrepancies do not represent a significant data gap in the effectiveness of the overall monitoring of the LNAPL and dissolved phase plumes.

23. RWCQB Comment:

III. Groundwater Monitoring Program
III.1. History of Groundwater Monitoring at the Site - 3rd Paragraph

For example, some wells in the Artesia Aquifer were destroyed even though monitoring indicated the presence of high concentrations of benzene, toluene or methyl tert butyl alcohol (MTBE). Golden West destroyed other groundwater wells in the Artesia Aquifer without collection any groundwater samples. In other instances, Golden West has not sampled wells in the Artesia Aquifer that have not been destroyed and are available for sampling.

Response:

As described in the response to Comments No. 2 and 22, all groundwater well abandonments and replacements and also groundwater monitoring activities have been performed since the 1990's in accordance with the CAOs, without any notices of deficiency from the RWQCB. Attachment 6 presents a tabulated summary of the extensive monitoring data set, including chemical analyses, collected by GWRC for the site (Table 2, Attachment 6). That table documents the continuous collection of samples from upgradient, selected central wells and downgradient Artesia wells. The table also presents comments for each well. Attachment 7 contains a summary of dissolved Pb analyses that document the extensive set of historical analyses that were reported to RWQCB and were the basis for discontinuation of analysis for Pb in groundwater.

24. RWQCB Comment:

III. Groundwater Monitoring Program
III.1. History of Groundwater Monitoring at the Site - 4th Paragraph

Golden West's current monitoring program for the Semi-Perched Aquifer only includes gauging of fluid levels and removal of LNAPL from few wells. Only a few Semi-Perched Aquifer wells have been sampled, and sampling was only done in 1992 and 2002. Golden West does not currently monitor the Semi-Perched Aquifer for pollutants such as petroleum hydrocarbons and VOCs.

Response:

GWRC is in full compliance with the CAO monitoring requirements, with current monitoring focused on the LNAPL and dissolved plumes downgradient extent in the Artesia Aquifer and LNAPL in the Semi-Perched Zone. As required by the CAO, the sampling performed by GWRC also includes sampling of the semi-perched groundwater zone's Carmenita Sump influent, which provides a direct effective measurement of the chemical composition of the Semi-Perched groundwater captured at the southern edge of the refinery by the Carmenita Underpass groundwater extraction system. That information is included in every GWRC monitoring report.

25. RWQCB Comment:

III. Groundwater Monitoring Program
III.1. History of Groundwater Monitoring at the Site - 5th Paragraph

Based on the reports submitted, Golden West did not monitor MNA parameters and conducted regular sampling of the dissolved phase plume in the Semi-Perched Aquifer.

Response:

GWRC conducted an MNA parameter study in 2002, and submitted a report that was accepted by RWQCB. With the demonstrated stability of the plume, and the remaining presence of LNAPL, additional MNA testing should be postponed until after LNAPL removal to the maximum practical extent.

The past and current monitoring of Semi-Perched wells has been and is performed in full compliance with the CAO monitoring requirements.

26. RWQCB Comment:

III. Groundwater Monitoring Program
III.1. History of Groundwater Monitoring at the Site - 6th Paragraph

According to the Basin Plan, the beneficial uses of groundwater beneath the Site and the vicinity include municipal use. Therefore, cleanup of impacted groundwater to the MCLs is required. Appropriate groundwater sampling is also necessary to monitor the groundwater contaminant plume behavior and to determine the most effective means of cleanup and abatement of the existing contaminant plume of completed clean-up activities to protect beneficial use

Response:

In the evaluation of the beneficial use of groundwater beneath the site and the requirement to clean up the groundwater to the MCLs, it is our opinion that the provisions of the "Low Threat UST Case Closure Policy" (LTCP) in effect beginning August 17, 2012, should be applicable to this site. The applicability of the LTCP to non-UST cases is confirmed by the Policy itself, which contains the following clarification:

"While this policy does not specifically address other petroleum release scenarios such pipelines or above ground storage tanks, if a particular site with a different petroleum release scenario exhibits attributes similar to those which this policy addresses, the criteria for closure evaluation of these non-UST sites should be similar to those in this policy" (Section "Preamble", 2nd page, 2nd paragraph).

Currently, there are no production wells within one mile from the Site, and the area has an available public water system, which makes the GWRC site eligible for low risk closure under the LTCP, after other conditions are met.

The current GWRC groundwater monitoring program is focused on monitoring the GWRC site impact to groundwater by sampling key inner wells and a series of downgradient sentinel wells in the Artesia Aquifer. The absence of contamination in deeper aquifers was also documented by deep Artesia drilling and sampling, and by repeated sampling of three former on-site deep water supply wells (as also listed in Attachment 6).

After the removal of LNAPL to the extent practicable, GWRC may be required to evaluate the dissolved phase, conduct MNA testing and further technically document the stability of the plume to obtain closure after demonstrating that the site poses a low threat to human health and environment.

27. RWQCB Comment:

IV. Conclusions - 1st Paragraph

The variability in color and appearance, and therefore age, of the releases is best explained as the result of releases of different types of products that were produced and stored at the Site during the operational history of the refinery, rather than the result of releases from off-site sources.

Response:

The variability in color, appearance and interpreted age of the LNAPL plume can be better explained by pipeline(s) releases in the Carmenita/Cambridge/Carmenita Underpass vicinity, based on the supportive evidence of difference in product type between off-site wells and STF wells, and the large volume of the LNAPL plume in off-site wells and distance between wells with LNAPL (See also Comments 11 and 12).

28. RWQCB Comment:

IV. Conclusions - 2nd Paragraph

The current groundwater monitoring program is inadequate in addressing the LNAPL and dissolved phase groundwater plumes in the Semi-Perched and Artesia Aquifers. The proposed modifications in the Report are incomplete and not acceptable to the Regional Board. Furthermore, there are data gaps that require installation of additional wells in Semi-perched and Artesia Aquifers to completely characterize the entire LNAPL and dissolved phase groundwater plumed originating from the former Golden West refinery site.

Response:

GWRC has complied with the CAO requirements for groundwater monitoring for over 30 years. The network of monitoring wells and monitoring programs were repeatedly approved by the RWQCB at the issuance of new CAOs, modifications of well network, and upon review of 40+ quarterly and semi-annual reports since the early 1990s. The existing network of Artesia wells include full sampling of approved perimeter sentinel wells at the downgradient edge of the site. The southern, downgradient Semi-Perched groundwater contamination zone is actively captured and treated by the Carmenita Sump system (known as GW-9). The previously submitted demonstration of natural attenuation of the Semi-Perched plumes resulted in a monitoring program of the Rosecrans/Fidel Semi-perched groundwater that focuses on gauging and monitoring for LNAPL migration, in compliance with the CAO, which requirements were found by the RWQCB, GWRC and SGI as being appropriate and suitable for the current condition of the Site.

Conclusion

The RWQCB's detailed review of the SGI Report presents arguments that various interpretations of LNAPL appearance, fingerprinting and source areas can be made with existing data. SGI strongly believes that the contribution of the pipelines on Carmenita Road as well as off-site discrete source locations remains a very likely cause of the LNAPL plume.

SGI respectfully recommends that the RWQCB direct the owners of the pipelines to evaluate soil and groundwater conditions around their pipelines.

As a follow-up to RWQCB's comment on the apparent inadequacy of the proposed groundwater monitoring program (Comment #28), SGI is preparing a revised proposed groundwater monitoring program, which will be submitted to RWQCB under a separate cover.

Attachments:

Attachment 1: CAO R4-2004-0020, page 5 highlighted.

Attachment 2: Example of regulatory response to UST contamination south of GWRC

Attachment 3: Map of Above Ground Storage Tanks in South Tank Farm over the Semi-Perched Groundwater Zone

Attachment 4: RWQCB approval letters of groundwater monitoring well network modifications

Attachment 5: Evaluation of Monitoring Well Screening Intervals

Attachment 6: Summary of Historical Groundwater Chemical Analyses

Attachment 7: Summary of Dissolved Lead Analysis during Groundwater Monitoring

Attachment 1

CAO R4-2004-0020, page 5 highlighted

California Regional Water Quality Control Board

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Terry Tamminen
Secretary for Environmental Protection

Arnold Schwarzenegger
Governor

August 24, 2004

Mr. Chris Panaitescu
Golden West Refining Company
13116 Imperial Hwy
Santa Fe Springs, CA 90670

CERTIFIED MAIL
RETURN RECEIPT REQUESTED
Claim No. 7003 3110 0003 3258 0716

CLEANUP AND ABATEMENT ORDER NO. R4-2004-0020 - GOLDEN WEST REFINING COMPANY - 13539 FOSTER ROAD, SANTA FE SPRINGS, CALIFORNIA (CAO NO. 93-082, SLIC NO. 227; SITE ID NO. 2040073)

Dear Mr. Panaitescu

Enclosed is Cleanup and Abatement Order (CAO) No. R4-2004-0020 directing Golden West Refining Company (GWRC) to assess, cleanup, and abate the effects of contamination discharged to soil and groundwater at the subject facility in the city of Santa Fe Springs, California. This Order is issued under section 13304 of the California Water Code. Should GWRC fail to comply with any provision of this Order, it may be subject to further enforcement action, including injunction and civil monetary remedies, pursuant to appropriate California Water Code sections including, but not limited to, sections 13268, 13304, 13308, and 13350.

Pursuant to California Water Code section 13320, GWRC may seek review of this Order by filing a petition with the State Water Resources Control Board (State Board). Such a petition must be received by the State Board, located at 1001, I Street, Sacramento, California 95814, within 30 days of the date of this Order.

If you have any questions regarding this matter, please contact Ms. Thizar Tintut-Williams at (213) 576-6723 or Dr. Rebecca Chou, Unit Chief, at (213) 576-6733.

Sincerely,

Jonathan Bishop
Interim Executive Officer

Enclosures
Cleanup and Abatement Order No. R4-2004-0020
Attachment A – Time Schedule
Appendix A-1 – Site Plan
Appendix A-2 – Plot Plan

PAGE 5

In February 1985, The Regional Board issued CAO No. 85-17, which required the Discharger to conduct subsurface investigations and site assessments to detect and characterize groundwater contamination beneath the respective facilities. In April 1991, CAO No. 91-079, issued administratively by the Executive Officer, required that the Discharger implement soil and groundwater investigations to determine the extent of contaminant migration, and remediate site-derived soil and groundwater contamination. CAO No. 91-079 was amended to reflect the compliance progress achieved by the Discharger, update the Cleanup and Investigation Activity Schedule, and continue the Regional Board oversight of the remaining cleanup activities.

On July 31, 1992, the Discharger filed a petition for reorganization under Chapter 11 of the U.S. Bankruptcy Code in the United States Bankruptcy Court. Cleanup and Abatement Order No. 93-082 was issued administratively by the Executive Officer on December 21, 1993, and amended and superseded Order No. 91-079. This CAO requires the Discharger primarily to cleanup on-site and off-site groundwater contamination originating from the Site. It also requires the Discharger to implement a source elimination program to detect leakage from above ground tanks and underground pipelines, identify free product in the vadose zone, if any, and remediate any free product in a timely manner.

The CAO No. 93-082 included a ten-year time schedule with annual planned expenditures specified as contained in the Discharger's Plan of Reorganization (Plan). The Plan was approved by the U.S. Bankruptcy Court on February 16, 1995, and became effective on February 28, 1995. Reorganized, the Discharger emerged from bankruptcy, and has been performing its obligations under CAO No. 93-082. The Discharger complied with the 10-year timetable for source elimination program documented in the CAO No. 93-082.

12. **Sources of Information:** The sources for the evidence summarized above include but are not limited to:

    a) Various technical reports submitted by the Discharger or its representatives to Regional Board staff from 1984 through August 2004.

    b) Site inspections, meetings, letters, and telephone communications between Regional Board staff and the Discharger and/or its representatives from 1984 through January 2004. Discharger has complied with the requirements of the previous CAO No. 93-082, and continues to cooperate well with Regional Board staff.

CONCLUSIONS

13. **Pollution of Waters of the State:** The unauthorized discharge of chemical wastes by the Discharger's predecessors and/or Discharger was not permitted and is in violation of water quality objectives established in the ***Basin Plan***. The past activities of the Discharger's predecessors and/or the Discharger have contaminated the underlying soils and polluted groundwater.

Attachment 2

Example of regulatory response to UST contamination south of GWRC

California Regional Water Quality Control Board

Los Angeles Region

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Alan C. Lloyd, Ph.D.
Agency Secretary

320 W. 4th Street, Suite 200, Los Angeles, California 90013
Phone (213) 576-6600 FAX (213) 576-6640 - Internet Address: http://www.waterboards.ca.gov/losangeles

Arnold Schwarzenegger
Governor

May 24, 2005

Mr. Bradford P. Christian
Colliers Seeley
2400 E. Ketella Avenue, Suite 950
Anaheim, CA 92806

Dear Mr. Christian:

COMFORT LETTER - BEAR STATE REFRIGERATION COMPANY, 13139 ROSECRANS AVENUE, SANTA FE SPRINGS (SLIC NO. 0465)

Reference is made to your inquiry of the California Regional Water Quality Control Board's (Regional Board) letter, "No Further Action", dated April 12, 1996, issued to Mr. Mel Nelson. You contacted the Regional Board staff that you have a customer who has an interest on purchasing the above-referenced property and that the bank would like to assure that the Regional Board does not have an outstanding issue relating to the property.

On May 13, 2005, you informed (via fasimile) the Regional Board staff that the bank brought to your attention that the groundwater underneath the property was found impacted in 1988 with a petroleum product similar to aviation fuel. Therefore, the bank referred you to the Regional Board for further site assessment and remediation.

Note that the above-referenced property is located south of former oil field site, Golden West Refinery. In 1985, the Regional Board issued a cleanup and abatement order (CAO) No. 85-17 requiring the Golden West Refining Company (GWRC) to conduct a subsurface investigation and site assessment to characterize groundwater pollution beneath the refinery. In April 1991, CAO No. 91-079, issued administratively by the Executive Officer, required that GWRC implement soil and groundwater investigations to determine the extent of contaminant migration, and remediate site-derived soil and groundwater contamination.

From the investigation and monitoring of the extent of the groundwater contamination by GWRC, there is a free-phase hydrocarbon impacted groundwater in a vicinity of the above-subject property (See attached Figure). GWRC has been actively removing free-phase petroleum hydrocarbons from the groundwater and monitoring free-phase petroleum hydrocarbons from the semi-perched (i.e., 20 to 50 feet below ground surface [bgs]) and Artesia aquifers (80 to 100 feet bgs).

The Regional Board's letter (Copy attached), dated February 5, 1996, issued to Mr. Mel Nelson indicated, *...the original releases from the dispenser and underground tank areas on-site were likely to be insignificant compared to the large quantity of free-phase petroleum-hydrocarbon migrating onto the subject site from upgradient off-site sources and that these soil releases have been satisfactorily remediated.* On April 12, 1996, the Regional Board issued a "No Further Action" letter (Copy attached) to Mr. Mel Nelson. Unless there is new site related information that suggests that the subject site requires a new investigation, our April 12, 1996, "No Further Action" letter is still valid.

If you have any questions regarding this matter, please contact Ms. Thizar Tintut-Williams at (213) 576-6723 or Mr. Arthur Heath at (213) 576-6725.

Sincerely,

Jonathan S. Bishop
Executive Officer

Enclosures: Figure III-1 Free Phase Hydrocarbons (Golden West Refining, Santa Fe Springs, CA)
The Regional Board's letter, dated February 5, 1996
The Regional Board's letter, dated April 12, 1996

cc: Mr. Tom Hall – City of Santa Fe Springs Fire Department
Mr. Chris Panaitescu – Golden West Refining Company
Mr. Paul Parmentier, Golden West Refining Company

/ttw

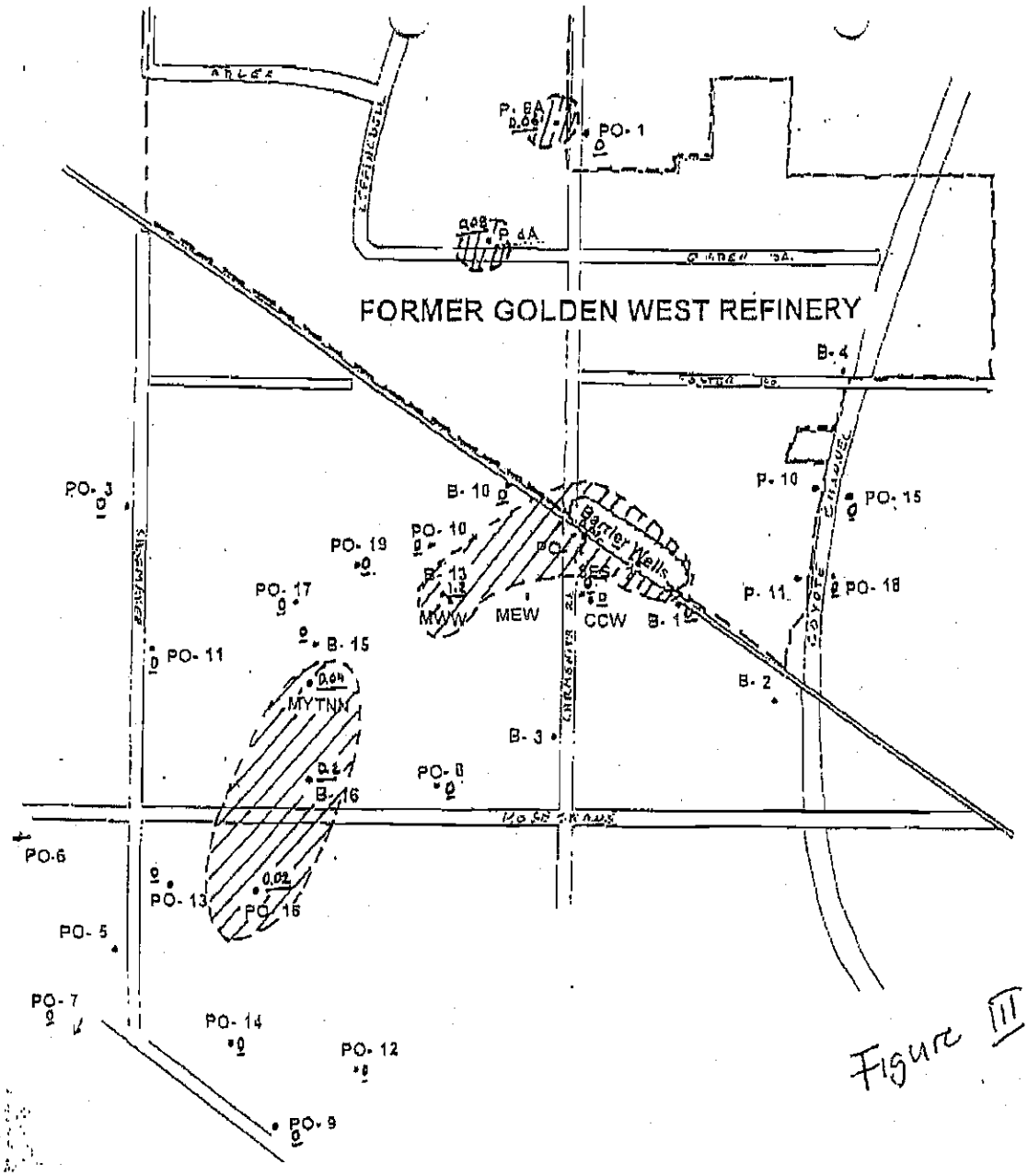


Figure III-1

N

November 2004

- PO-10 Semi-Perched Groundwater Monitoring Well

0.02 Free-phase hydrocarbon thickness (ft)

Former Golden West Refinery
Santa Fe Springs, CA

Figure 1 Free-phase Hydrocarbon
Semi-Perched Groundwater Zone

STATE OF CALIFORNIA - CALIFORNIA ENVIRONMENTAL P[illegible]ON AGENCY
PETE WILSON, Governor

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION
101 CENTRE PLAZA DRIVE
MONTEREY PARK, CA 91754-2156
(213) 266-7500
FAX: (213) 266-7600

February 5, 1996

Mr. Mel Nelson
35755 Singing Falls
Temecula, CA 92592

BEAR STATE REFRIGERATION COMPANY, 13139 ROSECRANS AVENUE SANTA FE SPRINGS - NO FURTHER ACTION LETTER (FILE NO. 100.315)

Reference is made to your subsurface investigation report, submitted to this Regional Board by the Kendall/Adams Group on January 18, 1996. Based on the information provided to date, the following are our determinations:

1. Total petroleum hydrocarbon (TPH) and aromatic volatile organic compounds (VOCs) were below detection limits for the soil samples collected on December 18, 1995. Specifically, it appears that clean soils were backfilled into the upper portion of the former underground tank excavations. Analyses of soil samples collected from the upper 5 feet in the former dispenser and northern underground tank excavations and in the upper 10 feet in the southeastern underground tank excavation were below method detection limits for total petroleum hydrocarbons, benzene, toluene, ethylbenzene, and xylene.

2. In October 1988, up to 803 mg/kg TPH-gasoline and 6.35 mg/kg benzene were identified 12 feet below ground surface (bgs) at the bottom of the southernmost underground tank and three feet below the fuel dispenser at the site. An excavation in the area of the dispenser and southernmost tank was extended to 27 feet below ground surface and was backfilled with the excavated soils, which had been aerated.

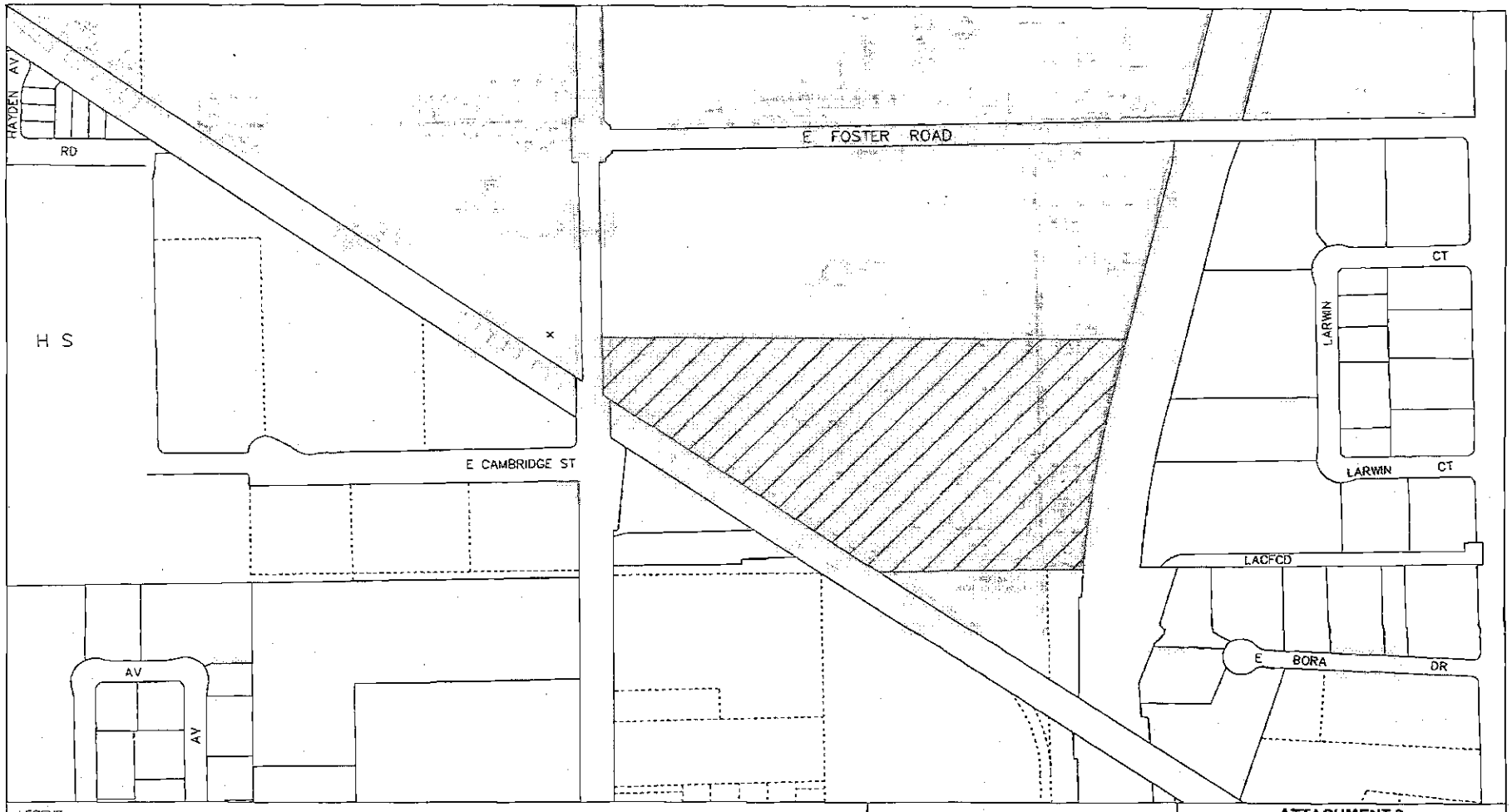
3. Free-phase hydrocarbon similar to aviation fuel was identified in the bottom of the 27 foot deep excavation. This free-phase petroleum-hydrocarbon is clearly from off-site sources and is present beneath the subject site in significant quantity. Historical gaugings of a near-by monitoring well (PO-16) indicate that this free-phase petroleum-hydrocarbon was as high as 17.4 feet below ground surface. Perched ground water is currently at a depth of 21.98 feet bgs.

We have determined that the original releases from the dispenser and underground tank areas on-site were likely to be insignificant compared to the large quantity of free-phase petroleum-hydrocarbon migrating onto the subject site from upgradient off-site sources and that these soil releases have been satisfactorily remediated.

Based upon the above, no further action will be required regarding investigation and remediation for the former underground tank release(s). We will issue a case closure letter, in accordance with Tittle 23, California Code of Regulations, Division 3, Chapter 16, Section 2721(e), after we receive a letter, signed by you, granting reasonable access to your site for investigation and remediation of contaminated soils and ground water by others.

Attachment 3

Map of Above Ground Storage Tanks in South Tank Farm over the Semi-Perched Groundwater Zone



LEGEND

AREA OF SOUTH TANK FARM UNDERLAIN BY SEMI-PERCHED GROUNDWATER

N

GOLDEN WEST REFINERY
SANTA FE SPRINGS, CA

PROJECT NO.	DATE	DRAWN BY	APP. BY
04-GWRC-004	08/27/12		

ATTACHMENT 3
SOUTHWEST TANK FARM
FOOTPRINT OF SEMI-PERCHED GROUNDWATER ZONE

SGI environmental THE SOURCE GROUP, INC.
1962 FREEMAN AVENUE
SIGNAL HILL, CA 90755

FIGURE 1

Attachment 4

RWQCB approval letters of groundwater monitoring well network modifications

California Regional Water Quality Control Board
Los Angeles Region

Winston H. Hickox
Secretary for Environmental Protection

320 W. 4th Street, Suite 200, Los Angeles, California 90013
Phone (213) 576-6600 FAX (213) 576-6640
Internet Address: http://www.swrcb.ca.gov/~rwqcb4

Gray Davis
Governor

1,14315

M.S.
D.S.
M.G
C.P

November 10, 1999

Mr. Chris Panaitescu
General Manager
Golden West Refining Company
13539 E. Foster Road
P.O. Box 2128
Santa Fe Springs, CA 90670

GROUNDWATER PROGRAMS REVIEW AND REQUEST TO PLUG AND ABANDON SELECTED GROUNDWATER MONITORING WELLS WEST TANK FARM DEVELOPMENT PROGRAM – ZONES A2, D1, AND D2, AND PROCESS UNIT DEMOLITION ZONES F2 AND F4, GOLDEN WEST REFINING COMPANY, SANTA FE SPRINGS (CLEANUP AND ABATEMENT ORDER NO. 93-082; SLIC NO. 227)

Dear Mr. Panaitescu:

Reference is made to the previously submitted Groundwater Programs Review dated January 27, 1999, prepared by your environmental consultant, Kennedy/Jenks Consultants, for the subject site. In addition, on May 7, 1999, you requested this Regional Board's approval for abandoning selected groundwater monitoring wells located in the west tank farm development and process unit demolition areas.

Board staff has completed the review for these submittals. It has been brought to our attention that a number of groundwater monitoring wells has been abandoned during site development in West Tank Farm and in Process Unit Area without our approval. In the future, you are required to obtain an approval from this Regional Board prior to abandoning any groundwater monitoring wells.

You are approved to proceed with the proposed groundwater programs and the subsequent request subject to the following conditions and additional requirements:

Groundwater Programs Review

1. All groundwater monitoring wells which detected free phase hydrocarbon and are located within the footprint of the building must be replaced. Therefore, groundwater monitoring wells P-3 and A-46 in the process unit area and A-26 and either P-6 or P-14 in the west tank farm area, need to be relocated as close as possible to the free phase hydrocarbon plume and as close as practical to the immediate groundwater downgradient direction. In addition, you are required to submit a map, on or before December 31, 1999, which depicts the extent of the free phase hydrocarbon plume in the semi-perched and artesian aquifers beneath the site for our evaluation. Free phase hydrocarbon in the groundwater shall be removed, to the maximum extent possible, prior to the construction of the building.

2. Please provide the information for the previously abandoned groundwater monitoring well A-23 in the west tank farm area regarding the location and sampling results along with the rationale for abandonment.

1st par.

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Phone (213) 576-6600 FAX (213) 576-6640 - Internet Address: http://www.swrcb.ca.gov/rwqcb4

September 19, 2003

1, 30748
[illegible]

Mr. Chris Panaitescu
Golden West Refining Company
13116 Imperial Hwy
Santa Fe Springs, CA 90670

[illegible]
GWRC

FILE

WORKPLAN FOR MONITORING WELL REINSTALLATION, GOLDEN WEST REFINING COMPANY, AREA Q - 13539 FOSTER ROAD, SANTA FE SPRINGS, CALIFORNIA (CAO NO. 93-082, SLIC NO. 227; SITE ID NO. 2040073)

Dear Mr. Panaitescu:

The Los Angeles Regional Water Quality Control Board (Regional Board) staff have received and reviewed the July 21, 2003, "Request to abandon and relocate 2 monitoring wells, Area Q (workplan)", submitted by you for the above referenced site. Two existing monitoring wells, A-38 and A-39 will be abandoned and this workplan proposes locations and methodology of the re-installation of two new wells in Area Q of the above referenced site.

Redevelopment of the Golden West Refining Company (GWRC) site began in 1998. In February 1999, GWRC submitted a "Groundwater Program Review (Review)" for abandonment of monitoring wells during the development of the site. This Workplan is submitted as a requirement of the Regional Board's approval on November 10, 1999. GWRC installed two wells, A-38 and A-39 in the Artesia aquifer in Area Q as downgradient wells. These wells were installed as downgradient monitoring points for Process Unit Area (PUA) and have been under the sampling and monitoring program per Cleanup and Abatement Order (CAO) 93-082. The replacement wells locations were selected in conjunction with September 2002, Fate and Transport Modeling report, prepared by TRC, and also designed to monitor the periphery of the dissolved-phase plume in the property boundary of the PUA area. The new locations for the wells are outside of the footprint of the proposed buildings in the Area Q of the site.

Based on our review of the information submitted, you are authorized to implement the workplan with the following conditions:

1. We will require an additional well to monitor the groundwater within the Artesia Aquifer near the Los Coyote Creek Channel in between proposed A-38A and A-39A locations in Area Q of the subject site.

2. A California licensed land surveyor must survey all proposed groundwater monitoring wells to a benchmark of known elevation above mean sea level. The survey report, signed by the licensee, shall be included in the installation report.

3. All work must be performed by or under the direction of a registered geologist, certified engineering geologist, or registered civil engineer. A statement is required in the report that the registered

1st page

California Regional Water Quality Control Board

Los Angeles Region

Over 51 Years Serving Coastal Los Angeles and Ventura Counties

Recipient of the 2001 *Environmental Leadership Award* from Keep California Beautiful

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Phone (213) 576-6600 FAX (213) 576-6640 - Internet Address: http://www.swrcb.ca.gov/rwqcb4

Terry Tamminen
Secretary for
Environmental
Protection

Arnold Schwarzenegger
Governor

April 2, 2004

Mr. Chris Panaitescu
Golden West Refining Company
13116 Imperial Hwy
Santa Fe Springs, CA 90670

REQUEST TO ABANDON AND RELOCATE MONITORING WELLS IN SOUTH TANK FARM, GOLDEN WEST REFINING COMPANY-13539 FOSTER ROAD, SANTA FE SPRINGS, CALIFORNIA (CAO NO. 93-082, SLIC NO. 217; SITE ID NO. 2040073)

Dear Mr. Panaitescu:

The Los Angeles Regional Water Quality Control Board (Regional Board) staff have received and reviewed the December 9, 2003, "Request to abandon and relocate monitoring wells, South Tank Farm," (workplan) submitted by you for the above referenced site.

The South Tank Farm (STF) is approximately 41 acres and divided into six zones (Zones H1 through H6). On March 12, 2003, Regional Board staff approved the workplan for preliminary assessment of the STF area. The STF is currently under soil remediation and redevelopment is scheduled to occur in the near future.

In January 1999, Golden West Refining Company (GWRC) submitted "Groundwater Program Review Plan (Plan)" to the Regional Board for abandonment and relocation of selected wells within the refinery site. The Plan was based on findings from years of groundwater monitoring and remediation, and on the anticipated footprints of the future buildings planned for the redevelopment of the site. On November 10, 1999, the Regional Board staff approved the Plan as proposed.

GWRC proposed to abandon seventeen (17) wells and relocate seven (7) wells as shown in attached Table 1C. Under the new proposed building development at the STF area, eleven (11) wells will be under the proposed building and will require abandonment and relocation. The following is a summary of the well abandonment and relocation request:

1. Five (5) wells were approved for abandonment in 1999.These wells are A-9, A-33, STF-8B, STF-9A, and STF-10.

2. Two (2) wells, P-2 and P-9 were approved for relocation in 1999.

3. Four (4) additional wells require approval for abandonment and relocation. These wells are STF-8A, 9B, 11A and 12.

1st page only
Ct'd

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Terry Tamminen
Secretary for Environmental Protection

Arnold Schwarzenegger
Governor

1.S0691

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OCT 06 2004

ENVIRONMENTAL
GWRC

File

September 29, 2004

Mr. Chris Panaitescu
Golden West Refining Company
13116 Imperial Hwy
Santa Fe Springs, CA 90670

Dear Mr. Panaitescu:

REQUEST TO ABANDON AND RELOCATE MONITORING WELLS IN SOUTH TANK FARM, PHASE 2, - GOLDEN WEST REFINING COMPANY, 13539 FOSTER ROAD, SANTA FE SPRINGS, CALIFORNIA (CAO NO. R4-2004-0020, SLIC NO. 227; SITE ID NO. 2040073)

The Los Angeles Regional Water Quality Control Board (Regional Board) staff have received and reviewed the "Request to abandon and relocate monitoring wells, South Tank Farm, Phase 2", dated May 26, 2004, for the above referenced site.

In January 1999, Golden West Refining Company (GWRC) submitted "Groundwater Program Review Plan (Plan)" to the Regional Board for abandonment and relocation of selected wells within the refinery site. The Plan was based on findings from years of groundwater monitoring and remediation and the anticipated footprints of the future buildings planned for the redevelopment of the site. On November 10, 1999, the Regional Board staff approved the Plan as proposed.

On April 2, 2004, the Regional Board approved your request, dated December 9, 2003, to abandon and relocate 11 monitoring wells in South Tank Farm (STF) in the area of the footprint of a proposed future building for the site. On July 20, 2004, GWRC submitted "Report of Abandonment of monitoring wells, South Tank Farm, Phase 1," that the first phase of monitoring well abandonment in the STF had been completed.

In the western and eastern parts of the STF area, 24 wells remain in areas of upcoming construction. Therefore, the GWRC proposed to abandon the following twelve (12) wells and relocate thirteen (13) wells as shown in attached Table 1C and Figure 1. The following is a summary of the well abandonment and relocation request:

1. All nine (9) semi-perched and all three (3) Artesia wells were approved for abandonment in 1999. These wells are STF-5A, STF-5B, STF-6A, STF-6B, STF-6C, STF-7A, STF-7B, STF-7C, STF-7D, A-45, A-47, and DA-1.

2. Five (5) wells, STF-1, STF-40, STF-41, STF-42, and A-10 were approved for relocation in 1999.

3. Eight (8) additional wells, P-10, P-11, STF-2, STF-3, STF-14, A-34, A-35, and A-48 require approval for relocation.

1st page only
cld

California Regional Water Quality Control Board

Los Angeles Region

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Alan C. Lloyd, Ph.D.
Agency Secretary

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Arnold Schwarzenegger
Governor

October 13, 2005

1,601247
RECEIVED FILE
OCT 19 2005
ENVIRONMENTAL
GWRC

Mr. Chris Panaitescu
Golden West Refining Company
13116 Imperial Highway
Santa Fe Springs, CA 90670

Dear Mr. Panaitescu:

REQUEST TO ABANDON OFFSITE MONITORING WELLS - GOLDEN WEST REFINING COMPANY, 13539 FOSTER ROAD, SANTA FE SPRINGS, CALIFORNIA (CAO NO. R4-2004-0020, SLIC NO. 227; SITE ID NO. 2040073)

The Los Angeles Regional Water Quality Control Board (Regional Board) staff have received and reviewed the "Well abandonment request from off-site property owner", dated October 5, 2005, for the above referenced site. You requested to abandon two off-site monitoring wells, MWW and MEW, located south of Golden West Refining Company property.

These two groundwater monitoring wells have been monitored since 1985 and recorded some free product in the wells. However, since last three years no free product has been detected in the wells, and the wells are mostly dry for last two years; therefore, you requested to abandon the wells.

Based on the review of your submittal, we approve your request to abandon the monitoring wells, MWW and MEW. Please follow the proper well abandonment procedures as stated in Department of Water Resources Bulletin 74-90. After you complete the proper abandonment procedures for the above referenced wells in the area, please submit the abandonment report to the Regional Board by **January 31, 2006.**

Please note that we may require additional monitoring wells to be installed in the future. We will evaluate the location and requirements for additional wells in the area as deem necessary.

If you have any questions regarding this matter, please contact Ms. Thizar Tintut-Williams at (213) 576-6723, or Dr. Rebecca Chou, Unit Chief at (213) 576-6733.

Sincerely,

Jonathan Bishop
Executive Officer

Attachments: Table 1. Summary of Historical Gauging data, Wells MEW and MWW
Figure 1-2. Location of Monitoring Wells

1st page only
cfd

cc: see Mailing List

California Regional Water Quality Control Board

Los Angeles Region

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Agency Secretary

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Arnold Schwarzenegger
Governor

October 14, 2005

1R512218

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OCT 19 2005
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GWRC

File

Mr. Chris Panaitescu
Golden West Refining Company
13116 Imperial Highway
Santa Fe Springs, CA 90670

Dear Mr. Panaitescu:

REVIEW OF MONITORING WELLS INSTALLATION WORK PLAN IN SOUTH TANK FARM AREA - GOLDEN WEST REFINING COMPANY, 13539 FOSTER ROAD, SANTA FE SPRINGS, CALIFORNIA (CAO NO. R4-2004-0020, SLIC NO. 227; SITE ID NO. 2040073)

The Los Angeles Regional Water Quality Control Board (Regional Board) staff have received and reviewed the "Workplan for Monitoring Well Installation, South Tank Farm", dated August 30, 2005, for the above referenced site. The work plan proposes installation of ten monitoring wells in South Tank Farm (STF) area.

On April 2, 2004, and September 29, 2004, the Regional Board approved Golden West Refining Company (GWRC) to abandon some groundwater monitoring wells due to redevelopment activities in the STF area, and to relocate nineteen groundwater monitoring wells. However, five groundwater monitoring wells located along the edge of the STF (P-10, P-11, A-34, A-35, and A-48) were temporarily buried and protected below grade during site construction, and now have been re-constructed to grade.

Currently forty-eight groundwater monitoring wells exist at the STF (Table 1). This work plan proposes to relocate and install ten groundwater monitoring wells, P2A, P9A, STF-1A, STF-2A, STF-3A, STF-11AA, STF-12A, STF-41A, STF-42A, and A-10A, and not to install four wells, STF-8A, STF-9B, STF-14, and STF-40 which would result in duplicate locations, STF-1A, P2A, STF-42A, and STF-2A, respectively (See Table 2 and Figure 1).

We authorize you to implement the work plan as proposed with the following conditions:

1. A California licensed land surveyor must survey all proposed groundwater-monitoring wells to a benchmark of known elevation above mean sea level. The survey report, signed by the licensee, shall be included in the installation report.

2. The construction and development of groundwater monitoring well must comply with requirement described in the Title 23, California Code of Regulation, Division 3, Chapter 16, Section No. 2649.

3. All work must be performed by or under the direction of a registered geologist, certified engineering geologist, or registered civil engineer. A statement is required in the report that the registered professional in direct responsible charge actually supervised or personally conducted all work associated with the project. All technical submittals must contain a wet ink signature and seal by one of the registered professionals.

4. All necessary permits must be obtained from the appropriate agencies prior to the start of work.

1st page of 8

California Regional Water Quality Control Board

Los Angeles Region

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Agency Secretary

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Arnold Schwarzenegger
Governor

October 17, 2005

1-61249
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OCT 19 2005
ENVIRONMENTAL
GWRC

file

Mr. Chris Panaitescu
Golden West Refining Company
13116 Imperial Highway
Santa Fe Springs, CA 90670

Dear Mr. Panaitescu:

REVIEW OF MONITORING WELLS INSTALLATION WORK PLAN IN PROCESSING UNIT AREA - GOLDEN WEST REFINING COMPANY, 13539 FOSTER ROAD, SANTA FE SPRINGS, CALIFORNIA (CAO NO. R4-2004-0020, SLIC NO. 227; SITE ID NO. 2040073)

The Los Angeles Regional Water Quality Control Board (Regional Board) staff have received and reviewed the "Workplan for Monitoring Well Installation, Areas J, K, L, Processing Unit Area", dated June 1, 2004, for the above referenced site. The work plan proposes installation of eight monitoring wells in the Processing Unit Area (PUA).

The work plan was prepared in response to the Regional Board's November 10, 1999, letter for Golden West Refining Company (GWRC)'s *Groundwater Program Review*, dated February 4, 1999, for installation of new wells in the redevelopment area at PUA. The Regional Board had approved installation of three wells, AL-01, AL-02, and AL-03, in Area L as part of the 2003 Remediation Action Plan approval, and GWRC had already installed these wells in September 2004 and included in 2004 quarterly report.

Therefore, only five groundwater monitoring wells in areas J and K are remained to be installed among your proposed work plan. This work plan proposes to relocate and install five groundwater monitoring wells, A-12, A-29, A-30, A-31, and A-46, in areas J and K, and not to install A-1 and A-2, which would result in duplicate locations, NW-3 (existing) and A-46A, respectively (See Table 1 and Figure 1).

We authorize you to implement the work plan as proposed with the following conditions:

1. A California licensed land surveyor must survey all proposed groundwater-monitoring wells to a benchmark of known elevation above mean sea level. The survey report, signed by the licensee, shall be included in the installation report.

2. The construction and development of groundwater monitoring well must comply with requirement described in the Title 23, California Code of Regulation, Division 3, Chapter 16, Section No. 2649.

3. All work must be performed by or under the direction of a registered geologist, certified engineering geologist, or registered civil engineer. A statement is required in the report that the registered professional in direct responsible charge actually supervised or personally conducted all work associated with the project. All technical submittals must contain a wet ink signature and seal by one of the registered professionals.

1st page only

California Regional Water Quality Control Board
Los Angeles Region

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Agency Secretary

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Arnold Schwarzenegger
Governor

March 3, 2006

Mr. Chris Panaitescu
Golden West Refining Company
13116 Imperial Highway
Santa Fe Springs, CA 90670

Dear Mr. Panaitescu:

APPROVAL OF WORK PLAN TO ABANDON AND RELOCATE WELLS IN MARKETING AREA - GOLDEN WEST REFINING COMPANY, 13539 FOSTER ROAD, SANTA FE SPRINGS, CALIFORNIA (CAO NO. R4-2004-0020, SLIC NO, 227; SITE ID NO. 2040073)

The Los Angeles Regional Water Quality Control Board (Regional Board) staff have received and reviewed, *Workplan for Well Abandonment and Re-Drilling, Former Marketing Area*, dated December 22, 2005, for the above referenced site. You requested to abandon groundwater wells that are located under the future building and reinstall them after the construction activities are completed. This work plan modifies the groundwater well network in the Marketing Area in accordance with the Regional Board's November 10, 1999, approval letter.

Based on the future building footprint, you propose the following (Figure 1) in the work plan:

1. Abandon groundwater well no. A-43;
2. Abandon groundwater wells A-16 and A-17 and relocate them after the construction is complete;
3. Temporarily protect wells A6R, A-8, and A-52 by cutting and plugging the casing below grade during building construction with the intent to re-construct the well head after the construction is completed; and
4. Install two additional groundwater wells for groundwater remediation after the site redevelopment.

Based on the information submitted, we approve your request to abandon the groundwater wells, A-43, A-16, and A-17, and protect wells A6R, A-8, and A-52. Please follow the proper well abandonment procedures as stated in Department of Water Resources Bulletin 74-90. After completing the proper abandonment procedures for the above referenced wells in the area, please submit a well abandonment report to the Regional Board by **July 15, 2006.**

Please note that you are required to submit a work plan for reinstallation of groundwater monitoring wells in the Marketing Area within sixty (60) days after the building is constructed. The work plan shall include information regarding well location and construction details. We may require additional monitoring wells to be installed in the future. We will evaluate the location and requirements for additional wells in the Marketing Area as deem necessary.

1st page only
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California Regional Water Quality Control Board
Los Angeles Region

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Linda S. Adams
Cal/EPA Secretary

Arnold Schwarzenegger
Governor

October 6, 2008

Mr. Chris Panaitescu
Golden West Refining Company
13116 Imperial Highway
Santa Fe Springs, CA 90670

APPROVAL OF REQUEST TO ABANDON GROUNDWATER MONITORING WELLS - GOLDEN WEST REFINING COMPANY, 13539 FOSTER ROAD, SANTA FE SPRINGS, CALIFORNIA (CAO NO. R4-2004-0020, SLIC NO. 227; SITE ID NO. 2040073)

Dear Mr. Panaitescu:

The Los Angeles Regional Water Quality Control Board (Regional Board) staff have received and reviewed, the *Request for Abandonment of Groundwater Monitoring Wells*, dated February 7, 2008, for the above referenced site. You requested to abandon fifteen groundwater monitoring wells, B-4, B-5, NW-1, NW-2, NW-4, MW-3, AO-17, AO-22, PO-15, PO-18, A-12A, A-14A, A-31A, AO-1, and GW-3. These proposed fifteen groundwater monitoring wells have several years of water level measurements and the remaining 137 groundwater monitoring wells will continue to maintain the quality and gradient of groundwater contour maps produced in future semi-annual groundwater monitoring reports.

Based on the review of your submittal, we approve your request to abandon the monitoring wells. Please follow the proper well abandonment procedures as stated in California Department of Water Resources Bulletin 74-90, *California Well Standards*. After you complete the proper abandonment procedures for the above referenced wells in the area, please submit the abandonment report including a copy of well destruction permit, to the Regional Board by **June 1, 2009**. Please note that we may require additional monitoring wells to be installed in the future. We will evaluate the location and requirements for additional wells in the area as deem necessary.

Pursuant to section 13350 of the California Water Code, failure to submit the required report by the due date may result in civil liability penalties administratively imposed upon you by the Regional Board in an amount up to five thousand dollars ($5,000) for each day the required technical report is not received.

If you have any questions regarding this matter, please contact Ms. Thizar Tintut-Williams at (213) 576-6723.

Sincerely,

Tracy J. Egoscue
Executive Officer

Attachment: Figure 1. for proposed groundwater monitoring wells location for abandonment

California Regional Water Quality Control Board

Los Angeles Region

Linda S. Adams.
Cal/EPA Secretary

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Arnold Schwarzenegger
Governor

July 9, 2009

Mr. Chris Panaitescu
Thrifty Oil Company/Golden West Refining Company
13116 Imperial Highway
Santa Fe Springs, CA 90670

APPROVAL OF REQUEST FOR GROUNDWATER MONITORING WELL ABANDONMENT AT SOUTH TANK FARM – GOLDEN WEST REFINERY AT 13539 FOSTER ROAD, SANTA FE SPRINGS, CALIFORNIA 90670 (SCP NO. 0227A, SITE ID NO. 2040073, CAO NO. R4-2004-0020)

Dear Mr. Panaitescu:

The Los Angeles Regional Water Quality Control Board (Regional Board) staff received and reviewed the *Workplan for Groundwater Well Relocation and Soil Gas Survey, Former Golden West Refinery South Tank Farm, Building S Southern Extension* (Work Plan), dated June 19, 2009, for the above-referenced site. Golden West Refining Company (GWRC) is planning on expanding the existing Building S to the south. Prior to the construction of this expansion, GWRC is proposing the following work in this Work Plan: (1) abandon two groundwater monitoring wells; (2) collect soil gas samples to evaluate shallow soil gas concentrations and evaluate potential pathways for vapor intrusion in the area where the expansion of the Building S will take place; and (3) relocate two groundwater monitoring wells down gradient.

Please note that in this letter, the Regional Board is only addressing Item no. 1 for abandonment of two groundwater monitoring wells. The Regional Board will be responding to the rest of the items of the Work Plan in a separate letter(s) upon completion of the review.

Pursuant to California Water Code 13304, Cleanup and Abatement Order No. R4-2004-0020 and based on our review of the information submitted, you are authorized to abandon the groundwater monitoring wells, STF-11A and STF-12A, provided the following requirements are met:

1. As required for all technical work performed at the site, all work must be performed by or under the direction of a California registered professional geologist, registered certified specialty geologist, or registered civil engineer, per California Business and Professions Code Sections 6735, 7835, and 7835.1. All technical submittals must contain the wet ink signature and seal of one of the registered professionals.
2. Prior to the start of work, all necessary permits, including well permits, shall be obtained from appropriate agencies. Copies of the agency-approved permits must be included in the final report submitted to the Regional Board.
3. Contaminated soil and water generated, if any, during drilling and sampling shall be managed in accordance with appropriate regulations.
4. Properly manifest and dispose of all wastes generated during field activities in conformation with the State and Federal regulations. Copies of the manifest for waste disposal shall be included in the reports submitted to the Regional Board.
5. Notify Regional Board staff at least 72 hours before you start the proposed fieldwork.

1st page only

California Regional Water Quality Control Board

Los Angeles Region

Linda S. Adams.
Cal/EPA Secretary

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Arnold Schwarzenegger
Governor

August 6, 2009

Mr. Chris Panaitescu
Thrifty Oil Company/Golden West Refining Company
13116 Imperial Highway
Santa Fe Springs, CA 90670

APPROVAL OF REQUEST FOR GROUNDWATER MONITORING WELLS RELOCATION AND SOIL GAS SAMPLING AT SOUTH TANK FARM – GOLDEN WEST REFINERY AT 13539 FOSTER ROAD, SANTA FE SPRINGS, CALIFORNIA 90670 (SCP NO. 0227A, SITE ID NO. 2040073, CAO NO. R4-2004-0020)

Dear Mr. Panaitescu:

The Los Angeles Regional Water Quality Control Board (Regional Board) staff received and reviewed the *Workplan for Groundwater Well Relocation and Soil Gas Survey, Former Golden West Refinery South Tank Farm, Building S Southern Extension* (Work Plan), dated June 19, 2009, for the above-referenced site. Golden West Refining Company (GWRC) is planning on expanding the existing Building S to the south. Prior to the construction of this expansion, GWRC is proposing the following work in this Work Plan: (1) abandon two groundwater monitoring wells; (2) collect soil gas samples to evaluate shallow soil gas concentrations and evaluate potential pathways for vapor intrusion in the area where the expansion of the Building S will take place; and (3) relocate two groundwater monitoring wells down gradient.

On July 9, 2009, the Regional Board approved Item no. 1 for abandonment of two groundwater monitoring wells. In this letter, the Regional Board is addressing the remainder Item nos. 2 and 3 for a collection of soil gas samples and relocation of two groundwater monitoring wells.

Pursuant to California Water Code 13304, Cleanup and Abatement Order No. R4-2004-0020 and based on our review of the information submitted, you are authorized to implement the Work Plan provided the following requirements are met:

1. As required for all technical work performed at the site, all work must be performed by or under the direction of a California registered professional geologist, registered certified specialty geologist, or registered civil engineer, per California Business and Professions Code Sections 6735, 7835, and 7835.1. All technical submittals must contain the wet ink signature and seal of one of the registered professionals.
2. Prior to the start of work, all necessary permits, including well permits, shall be obtained from appropriate agencies. Copies of the agency-approved permits must be included in the final report submitted to the Regional Board.
3. Contaminated soil and water generated, if any, during drilling and sampling shall be managed in accordance with appropriate regulations.
4. Properly manifest and dispose of all wastes generated during field activities in conformation with the State and Federal regulations. Copies of the manifest for waste disposal shall be included in the reports submitted to the Regional Board.

California Regional Water Quality Control Board

Los Angeles Region

Linda S. Adams.
Cal/EPA Secretary

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Arnold Schwarzenegger
Governor

February 4, 2010

Mr. Chris Panaitescu
Thrifty Oil Company/Golden West Refining Company
13116 Imperial Highway
Santa Fe Springs, CA 90670

APPROVAL OF REQUEST FOR GROUNDWATER MONITORING WELL RELOCATION AT SOUTH TANK FARM – GOLDEN WEST REFINERY AT 13539 FOSTER ROAD, SANTA FE SPRINGS, CALIFORNIA 90670 (SCP NO. 0227A, SITE ID NO. 2040073, CAO NO. R4-2004-0020)

Dear Mr. Panaitescu:

Los Angeles Regional Water Quality Control Board (Regional Board) staff received and reviewed the *Revised Replacement Well Locations*, dated January 21, 2010, for the above-referenced site. You have proposed different locations for replacement wells STF-11B and STF-12B due to the configuration of the site.

Based on our review of the information submitted, you are authorized to install the replacement wells at the locations you requested in Figure 1 (Attached). Please note that requirements set forth in our previous approval letter, dated August 6, 2009, related to the well installation are still in effect. In addition, you are required to submit a well installation, development and survey reports to this Regional Board by **30 days after the completion of the well installation date.**

Pursuant to section 13350 of the California Water Code, failure to submit the required report by the due dates may result in civil liability penalties administratively imposed upon you by the Regional Board in an amount up to five thousand dollars ($5,000) for each day the report is not received.

If you have any questions, please contact Ms. Thizar Tintut-Williams at (213) 576-6723 or twilliams@waterboards.ca.gov.

Sincerely,

Tracy J. Egoscue
Executive Officer

Attachment: Figure 1: Location of Existing and Proposed Relocation Groundwater Wells

cc: List

CALIFORNIA
Water Boards

Edmund G. Brown Jr.
GOVERNOR

Matthew Rodriquez
SECRETARY FOR
ENVIRONMENTAL PROTECTION

Los Angeles Regional Water Quality Control Board

April 4, 2013

Mr. Chris Panaitescu
Golden West Refining Company
13116 Imperial Highway
Santa Fe Springs, CA 90670

Certified Mail
Return Receipt Requested
Claim No. 7011 3500 0003 5491 1183

SUBJECT: APPROVAL TO DESTROY GROUNDWATER MONITORING WELL PO-9 PURSUANT TO CLEANUP AND ABATEMENT ORDER NO. R4-2004-0020

SITE: GOLDEN WEST REFINING COMPANY – 13539 FOSTER ROAD, SANTA FE SPRINGS, CALIFORNIA (SCP NO. 0227A, SITE ID NO. 2040073)

Dear Mr. Panaitescu:

The California Regional Water Quality Control Board (Regional Board), Los Angeles Region, is the State regulatory agency with primary responsibility for the protection of groundwater and surface water quality for all beneficial uses within major portions of Los Angeles and Ventura Counties, including the referenced site. To accomplish this, the Regional Board issues cleanup and investigative orders authorized by the Porter Cologne Water Quality Control Act (California Water Code (Water Code), Division 7).

The Regional Board has completed its review of the request sent via electronic mail (e-mail) to the Regional Board on March 26, 2013. In the e-mail you requested to destroy groundwater monitoring well PO-9.

Groundwater monitoring well PO-9 is part of a groundwater gauging and monitoring program, which includes approximately 70 wells screened in the Semi-perched Aquifer. Well PO-9 is located at the intersection of Fidel Avenue and Firestone Boulevard in the City of Norwalk. The 5 Freeway runs parallel to Firestone Boulevard. According to the e-mail, well PO-9 is located within the Caltrans 5 Freeway expansion project. Caltrans has closed the area around well PO-9 and plans to excavate the area. Based on the information provided, Regional Board staff concluded that your request for destroying well PO-9 is reasonable and it is approved with the following additions:

1. You shall destroy groundwater monitoring well PO-9 in accordance with the California Department of Water Resources, Bulletin 74-81 and Bulletin 74-90, California Well Standards.

2. All work shall be conducted according to a site-specific health and safety plan in compliance with California Occupational Safety and Health Agency, Health and Safety Code, Title 8, California Code of Regulations, Section 5192 and other appropriate sections.

1st floor only
R'd

Attachment 5:
Evaluation of Monitoring Well Screening Intervals

Attachment 5
Evaluation of Well Screen Intervals
Former Golden West Refinery
Santa Fe Springs, California

Well	Area	Monitoring/ Sampling Date	Monitoring Parameters		Elevation		Well Screen Interval (feet above mean sea level)	Water or Product Above Screen (Yes/No)	COMMENT
			DTP	DTW	Casing	GW Elevation			
			(feet)	(feet)	(feet)	(feet)			
A-3A	WTF	03/20/13	NP	81.05	98.01	16.96	33.01 - 8.01	No	
A-4A	WTF	03/21/13	NP	73.25	96.16	22.91	41.16 - 6.16	No	
A-5A	WTF	03/21/13	NP	70.30	92.87	22.57	37.87 - 12.87	No	
A-6R	MA	03/20/13	NP	67.70	90.85	23.15	29.6 - (-0.4)	No	
A-7	STF	03/22/13	NP	68.41	86.49	18.08	23.99 - 3.49	No	
A-8	MA	03/20/13	NP	65.08	87.65	22.57	24.3 - 4.3	No	
A-10A	STF	03/21/13	61.50	63.83	88.98	26.91	43.98 - 13.98	No	
A-11A	PUA	03/20/13	NP	61.03	91.77	30.74	46.77 - 16.77	No	
A-16R	MA	03/20/13	67.50	69.18	92.13	24.22	45.13 - 10.13	No	
A-17R	MA	03/21/13	NP	64.52	90.58	26.06	47.58 - 12.58	No	
A-18A	WTF	03/20/13	NP	69.76	94.50	24.74	40 - 15	No	
A-21A	WTF	03/21/13	NP	78.64	97.23	18.59	34.23 - 9.23	No	
A-22A	WTF	03/20/13	NP	79.35	100.19	20.84	37.19 - 12.19	No	
A-24A	WTF	03/20/13	NP	78.50	96.83	18.33	32.33 - 7.33	No	
A-25	WTF	03/20/13	NP	77.29	91.41	14.12	19 - (-1)	No	
A-26A	WTF	03/20/13	NP	77.75	95.60	17.85	30.6 - 5.6	No	
A-27A	WTF	03/20/13	NP	71.95	91.16	19.21	32.16 - 7.16	No	
A-29A	PUA	03/20/13	NP	90.92	97.62	6.70	22.62 - (-7.38)	No	
A-30A	PUA	03/20/13	NP	89.80	97.30	7.50	12.72 - (-17.28)	No	
A-32	STF	03/20/13	NP	71.75	90.46	18.71	22.2 - 2.2	No	
A-32E	STF	03/20/13	71.45	71.49	app 90	app 19	26 - 1	No	
A-32W	STF	03/20/13	NP	72.20	app 90	app 19	27 - 2	No	
A-34	STF	03/20/13	NP	84.47	89.92	5.45	11.1 - (-8.9)	No	
A-35	STF	03/20/13	NP	69.95	86.72	16.77	12.4 - (-7.6)	Yes	Groundwater 4.4 feet above screen interval. Note that well AO-20 downgradient to the east had no product 1992 to 2009, when AO-20 was abandoned.
A-37A	PUA	03/20/13	88.04	90.28	94.14	5.55	24.14 - (-5.86)	No	
A-38A	PUA	03/21/13	NP	97.52	105.20	7.68	13.11 - (-16.89)	No	
A-39A	PUA	03/21/13	NP	101.32	104.81	3.49	19.86 - (-10.14)	No	
A-42	STF	03/20/13	72.60	72.97	90.99	18.30	13.3 - (-16.7)	Yes	Groundwater 5 ft above screen interval. Not an important data gap: known LNAPL area, surrounded by other wells
A-43	MA	03/20/13	NP	75.33	91.06	15.73	0.6 - (-9.4)	Yes	Groundwater 15 ft above screen interval. Not an important data gap: known LNAPL, surrouned by other wells

Attachment 5
Evaluation of Well Screen Intervals
Former Golden West Refinery
Santa Fe Springs, California

Well	Area	Monitoring/ Sampling Date	Monitoring Parameters		Elevation		Well Screen Interval (feet above mean sea level)	Water or Product Above Screen (Yes/No)	COMMENT
			DTP	DTW	Casing	GW Elevation			
			(feet)	(feet)	(feet)	(feet)			
A-44	STF	03/20/13	68.61	71.41	88.05	16.75	32 - 2	No	
A-46A	PUA	03/20/13	NP	79.57	94.08	14.51	34.08 - 4.08	No	
A-48	STF	03/20/13	NP	85.25	91.04	5.79	8.8 - (-31.2)	No	
A-52	MA	03/20/13	NP	66.70	90.62	23.92	25 - 5	No	
A-56A	WTF	03/20/13	NP	83.35	102.84	19.49	28.34 - 8.34	No	
A-60	PUA	03/20/13	NP	105.75	111.83	6.08	24.74 - (-5.26)	No	
A-61	PUA	03/20/13	NP	83.12	95.86	12.74	31.86 - 1.86	No	
A-62	PUA	03/20/13	59.65	59.72	91.82	32.15	46.82 - 16.82	No	
A-63	PUA	03/20/13	NP	75.03	94.42	19.39	39.42 - 9.42	No	
A-64	PUA	03/20/13	NP	87.57	94.38	6.82	14.39 - (-15.61)	No	
A-65	PUA	03/20/13	NP	93.08	98.59	5.51	30.59 - 0.59	No	
A-66	PUA	03/20/13	NP	73.95	99.83	25.88	44.83 - 14.83	No	
A-67	PUA	03/20/13	NP	81.23	92.63	11.40	27.63 - (-2.37)	No	
A-71	PUA	03/20/13	80.60	83.90	95.17	13.76	31.17 - 1.17	No	
A-72	PUA	03/20/13	73.82	78.29	93.78	18.86	26.78 - (-3.22)	No	
A-73	PUA	03/20/13	65.94	67.94	94.26	27.83	44.26 - 14.26	No	
AL-1	PUA	03/20/13	NP	92.45	98.75	6.30	21.63 - (-13.37)	No	
AL-2	PUA	03/20/13	NP	92.73	99.12	6.39	22.02 - (-12.98)	No	
AL-3	P	03/20/13	NP	94.97	101.09	6.12	24 - (-11)	No	
AO-2	OS	03/22/13	NP	69.83	85.56	15.73	14.8 - (-5.2)	Yes	Groundwater only about 1 ft above screen interval.
AO-3	OS	03/20/13	NP	64.63	89.64	25.01	28.1 - (-1.9)	No	
AO-6	OS	03/20/13	NP	62.05	83.29	21.24	24.3 - 4.3	No	
AO-7	OS	03/20/13	NP	81.58	96.10	14.52	30.2 - (-19.8)	No	
AO-8	OS	03/20/13	FILM	81.86	94.93	13.07	31.2 - (-18.8)	No	
AO-9	OS	03/20/13	NP	86.98	96.86	9.88	28.5 - (-11.5)	No	
AO-10	OS	03/21/13	NP	84.11	87.54	3.43	-2 - (-32)	Yes	Groundwater fluctuates and is often within screened interval. Well concentrations consistently ND. Not a data gap.
AO-11	OS	03/21/13	NP	82.41	86.08	3.67	-1.7 - (-31.7)	Yes	Groundwater fluctuates and is often within screened interval. Well concentrations consistently ND. Not a data gap.
AO-12	OS	03/20/13	NP	57.90	81.11	23.21	27.6 - (-12.4)	No	
AO-14	OS	03/20/13	63.55	71.35	85.00	19.54	25.4 - 0.4	No	
AO-16	OS	03/20/13	NP	57.74	81.01	23.27	26.3 - (-3.7)	No	

Attachment 5
Evaluation of Well Screen Intervals
Former Golden West Refinery
Santa Fe Springs, California

Well	Area	Monitoring/ Sampling Date	Monitoring Parameters		Elevation		Well Screen Interval (feet above mean sea level)	Water or Product Above Screen (Yes/No)	COMMENT
			DTP	DTW	Casing	GW Elevation			
			(feet)	(feet)	(feet)	(feet)			
AO-18	OS	03/20/13	NP	66.83	81.39	14.56	16 - (-14)	No	
AO-20	OS	03/20/13	NP	63.70	86.24	22.54	28.9 - (-6.1)	No	
AO-21	OS	03/21/13	NP	97.74	101.92	4.18	8.1 - (-21.9)	No	
B-1	OS	03/20/13	NP	18.70	87.37	68.67	81.6 - 61.6	No	
B-2	OS	03/20/13	DRY	-	83.97	-	63.8 - 43.8	-	
B-3	OS	03/20/13	DRY	-	83.28	-	54.28 - 34.28	-	
B-10	OS	03/20/13	NP	24.60	87.65	63.05	77.76 - 57.76	No	
B-13	OS	03/20/13	NP	21.90	85.11	63.21	75.09 - 55.09	No	
B-15	OS	03/20/13	NP	24.12	84.73	60.61	74.73 - 54.73	No	
B-16	OS	03/20/13	NP	23.65	82.18	58.53	72.22 - 52.22	No	
Carm Sump		03/25/13	-	-	-	-		-	
CCW	OS	03/20/13	21.18	21.72	85.33			-	
GW-1	OS	03/20/13	NP	77.58	93.03	15.45	13.03 - (-6.97)	Yes	Groundwater 2 ft above screen interval. Well is surrounded by other wells with appropriate screened intervals (GW-2, AO-7, AO-8, A-25A). Not a data gap
GW-2	OS	03/20/13	NP	91.10	96.53	5.43	16.53 - (-3.47)	No	
MW-2A	WTF	03/21/13	NP	94.85	101.71	6.86	21.71 - 1.71	No	
MYTNN	OS	03/20/13	23.54	23.82	83.26			-	
NW-3	OS	03/20/13	NO ACCESS	-	105.96	-	10.8 - (-9.2)	-	
OW-2	OS	03/20/13	NP	20.45	87.14	66.69	72.14 - 57.14	No	
OW-3	OS	03/20/13	24.05	25.33	87.78	63.42	73.78 - 59.78	No	
P-1	STF	03/22/13	20.48	21.42	86.51	65.80	72.2 - 52.2	No	
P-2A	STF	03/20/13	22.27	23.60	88.29	65.69	78.1 - 63.1	No	
P-4A	WTF	03/20/13	DRY	-	96.33	-	53.33 - 48.33	-	
P-6A	WTF	03/20/13	NP	60.51	95.52	35.01	49.52 - 34.52	No	
P-9A	STF	03/20/13	22.83	23.07	88.68	65.79	73.68 - 56.68	No	
P-10	STF	03/20/13	NP	20.10	89.95	69.85	68.8 - 58.8	Yes	Upgradient semi-perched well. Not a significant data gap.
P-11	STF	03/20/13	NP	18.45	86.73	68.28	69.8 - 59.8	No	
P-12	STF	03/20/13	24.00	25.40	87.16	62.84	67.6 - 57.6	No	
P-13	STF	03/20/13	25.94	28.09	87.80	61.33	75.4 - 55.4	No	
PO-1	OS	09/20/13	NP	36.18	94.34	58.16	76.6 - 56.6	No	

Attachment 5
Evaluation of Well Screen Intervals
Former Golden West Refinery
Santa Fe Springs, California

Well	Area	Monitoring/ Sampling Date	Monitoring Parameters		Elevation		Well Screen Interval (feet above mean sea level)	Water or Product Above Screen (Yes/No)	COMMENT
			DTP	DTW	Casing	GW Elevation			
			(feet)	(feet)	(feet)	(feet)			
PO-3	OS	03/20/13	DRY	-	86.89	-	76.4 - 56.4	-	
PO-4	OS	03/20/13	21.68	23.68	85.13	62.96	68.5 - 59	No	
PO-5	OS	03/20/13	DRY	-	79.63	-	54.9 - 34.9	-	
PO-7	OS	03/20/13	NP	34.62	80.19	45.57	50.5 - 30.5	No	
PO-8	OS	03/20/13	NP	25.10	81.40	56.30	65.2 - 55.2	No	
PO-9	OS	03/20/13	NP	32.20	75.48	43.28	53.9 - 33.9	No	
PO-10	OS	03/20/13	NP	22.18	85.13	62.95	66 - 51	No	
PO-11	OS	03/20/13	NP	32.05	86.29	54.24	69.2 - 54.2	No	
PO-12	OS	03/20/13	NP	25.36	79.76	54.40	60.5 - 40.5	No	
PO-13	OS	03/20/13	NP	45.05	81.32	36.23	56.5 - 36.5	-	Possibly dry hole with no semi-perched water.
PO-14	OS	03/20/13	NP	33.54	79.03	45.49	55.5 -35.5	No	
PO-16	OS	03/20/13	23.51	23.53	80.37	56.86	61 - 46	No	
PO-19	OS	03/20/13	NP	23.98	85.29	61.31	71.5 - 46.5	No	
SFS-2	OS	03/20/13	NP	21.82	86.65			-	
STF-1A	STF	03/20/13	22.04	24.25	88.12	65.54	73.12 - 58.12	No	
STF-2A	STF	03/20/13	27.35	28.13	92.98	65.44	77.98 - 62.98	No	
STF-3A	STF	03/20/13	21.58	23.20	87.62	65.64	77.62 - 62.62	No	
STF-11B	STF	03/22/13	20.63	24.55	87.32	65.73	77.32 - 62.32	No	
STF-12B	STF	03/22/13	19.30	20.70	86.33	66.69	71.33 - 56.33	No	
STF-15	STF	03/20/13	25.38	28.10	91.04	64.99	76 - 56	No	
STF-16	STF	03/20/13	24.45	26.65	88.00	63.01	76 - 56	No	
STF-17	STF	03/20/13	24.65	26.74	87.61	62.45	76 - 56	No	
STF-18	STF	03/20/13	24.10	26.50	87.55	62.86	74 - 54	No	
STF-19	STF	03/20/13	NP	25.00	90.48	65.48	75 - 55	No	
STF-20	STF	03/20/13	24.90	25.00	87.19	62.27	75 - 55	No	
STF-21	STF	03/20/13	25.20	25.37	87.04	61.80	75 - 55	No	
STF-22	STF	03/20/13	24.90	26.87	86.96	61.58	75 - 55	No	
STF-23	STF	03/20/13	24.60	25.35	86.95	62.17	77 - 57	No	
STF-24	STF	03/20/13	23.62	24.08	86.70	62.97	76 - 56	No	
STF-25	STF	03/20/13	NP	22.85	88.85	66.00	77 - 57	No	

Attachment 5
Evaluation of Well Screen Intervals
Former Golden West Refinery
Santa Fe Springs, California

Well	Area	Monitoring/ Sampling Date	Monitoring Parameters		Elevation		Well Screen Interval (feet above mean sea level)	Water or Product Above Screen (Yes/No)	COMMENT
			DTP	DTW	Casing	GW Elevation			
			(feet)	(feet)	(feet)	(feet)			
STF-26	STF	03/20/13	21.50	23.90	88.00	65.91	77 - 57	No	
STF-27	STF	03/20/13	NP	21.70	87.55	65.85	76 - 56	No	
STF-28	STF	03/20/13	20.90	23.90	87.57	65.94	77 - 57	No	
STF-29	STF	03/20/13	NP	21.45	87.60	66.15	74 - 54	No	
STF-30	STF	03/20/13	NP	21.45	87.70	66.25	74 - 54	No	
STF-31	STF	03/22/13	20.90	20.98	87.73	66.81	74 - 54	No	
STF-32	STF	03/22/13	NP	21.37	87.53	66.16	74 - 54	No	
STF-33	STF	03/22/13	20.35	21.50	87.31	66.68	76 - 56	No	
STF-34	STF	03/22/13	NP	20.20	87.21	67.01	76 - 56	No	
STF-35	STF	03/22/13	20.27	20.45	87.01	66.70	78 - 58	No	
STF-36	STF	03/22/13	NP	20.10	86.77	66.67	76 - 56	No	
STF-37	STF	03/22/13	NP	20.90	86.64	65.74	76 - 56	No	
STF-38	STF	03/22/13	19.72	20.62	86.63	66.69	76 - 56	No	
STF-39	STF	03/22/13	NP	20.51	87.15	66.64	76 - 56	No	
STF-41A	STF	03/20/13	NP	27.03	92.71	65.68	77.61 - 62.61	No	
STF-42A	STF	03/20/13	NO ACCESS	-	91.91	-	79.61 - 61.91	-	
TW-1	STF	03/22/13	NP	23.95	87.60	63.65	76.7 - 56.7	No	

Note:
DTP = Depth To Product
DTW = Depth To Water
DTB = Depth To Bottom
PT = Product Thickness
GW = Groundwater

- = Not analyzed / Not available
< = Less than detection level indicated
J = Flag indicating value between MDL & PQL
NP = No free product

Attachment 6
Summary of Historical Groundwater Chemical Analyses

Table 2.A
Evaluation of Chemical Analyses Data to 2011
Existing Wells
Former Golden West Refinery
Santa Fe Springs, California

Well	Artesia	Semi-Perched	Location		Number of Analyses -time period	Comments
			Onsite	Offsite		
WELL # A-3A	x		x		none	redundant with AD-21
WELL # A-4A	x		x		6 events 2008-2011	not sampled during occasional Kinder Morgan product present - upgradient well
WELL # A-5A	x		x		16 events 2003-2011	upgradient well
WELL # A-6R	x		x		3 events 1995 - 2011	free product but sampled - surrounded by other wells
WELL # A-7	x		x		23 events 1985 to 2001	free product but sampled - surrounded by other wells
WELL # A-8	x		x		4 events 2006 - 2008	free product but sampled - surrounded by other wells
WELL # A-10A	x		x		11 events 2006-2011	well sampled as downgradient extent of M.A. MBE plumes
WELL # A-11A	x		x		none	free product, surrounded by other wells
WELL # A-16R	x		x		none	free product, surrounded by other wells
WELL # A-17R	x		x		5 events 2009-2011	sampled for M.A. MBE plumes
WELL # A-18A	x		x		6 events 2005-2009	-
WELL # A-21A	x		x		18 events 2003-2011	Sampled for WTF MBF plume
WELL # A-22A	x		x		none	no free product, but in central part of WTF, surrounded by other wells
WELL # A-24A	x		x		none	no free product, but in central part of WTF, surrounded by other wells
WELL # A-26A	x		x		1 event 2006	rare free product in initial gauging
WELL # A-27A	x		x		1 event 2008	occasional free product
WELL # A-29A	x		x		6 events 2005 -2008	Sampled as downgradient from WTF MBE plume
WELL # A-30A	x		x		none	near A-30 that had ND or very low benzene-upgradient well
WELL # A-31A	x		x		none	near A-30 that had ND or very low benzene-upgradient well
WELL # A-32	x		x		1 event 2002	free product area
WELL # A-32E	x		x		none	free product - surrounded by the other wells
WELL # A-32W	x		x		none	free product - surrounded by the other wells
WELL # A-34	x		x		1 event 1992	-
WELL # A-35	x		x		1 event 1990	early free product
WELL # A-37A	x		x		none	free product, surrounded by other wells
WELL # A-38A	x		x		14 events 2005-2011	downgradient well
WELL # A-39A	x		x		14 events 2005-2011	downgradient well
WELL # A-42	x		x		none	free product, surrounded by other wells
WELL # A-43	x		x		1 event 2001	-
WELL # A-44	x		x		none	free product
WELL # A-45A	x		x		none	previous A 45 had free product
WELL # A-48	x		x		6 events 2005-2008	-
WELL # A-52	x		x		none	occasional free product
WELL # A-56A	x		x		none	upgradient of WTF-near A-56
WELL # A-60	x		x		2 events 2005	-
WELL # A-61	x		x		2 events 2006 2008	-
WELL # A-62	x		x		none	free product, surrounded by other wells
WELL # A-63	x		x		none	occasional free product
WELL # A-64	x		x		none	within PUA- surrounded by other wells
WELL # A-65	x		x		none	within PUA- surrounded by other wells
WELL # A-66	x		x		none	within PUA- surrounded by other wells
WELL # A-67	x		x		none	free product, surrounded by other wells
WELL # A-71	x		x		none	free product, surrounded by other wells
WELL # A-72	x		x		none	free product, surrounded by other wells
WELL # A-73	x		x		none	free product, surrounded by other wells
WELL # AL-1	x		x		4 events 2004-2005	Sampling discontinued after RWQCB approval
WELL # AL-2	x		x		4 events 2004-2005	Sampling discontinued after RWQCB approval
WELL # AL-3	x		x		4 events 2004-2005	Sampling discontinued after RWQCB approval

Table 2 A
Evaluation of Chemical Analyses Data to 2011
Existing Wells
Former Golden West Refinery
Santa Fe Springs, California

Well	Artesia	Semi-Perched	Location		Number of Analyses -time period	Comments
			Onsite	Offsite		
WELL # MW-2A	x		x		12 events 2003-2011	upgradient well
WELL # GW-1	x			x	none	free product, surrounded by other wells
WELL # GW-2	x			x	1 event 1987	-
WELL # AO-2	x			x	2 events 1991 1992	-
WELL # AO-3	x			x	1 event 1992	upgradein well
WELL # AO-5	x			x	13 events 1991-2010	upgradein well
WELL # AO-7	x			x	10 events 1992-2002	-
WELL # AO-8	x			x	none	free product, surrounded by other wells
WELL # AO-9	x			x	13 events 1992-2008	northern lateral extent
WELL # AO-10	x			x	20 events 1992-2011	downgradient sentinel well
WELL # AO-11	x			x	20 events 1992-2011	downgradient sentinel well
WELL # AO-12	x			x	1 event 1992	upgradient well
WELL # AO-14	x			x	1 event 1992	upgradient well
WELL # AO-15	x			x	1 event 1992	upgradient well
WELL # AO-18	x			x	22 events 1992 - 2005	southeastern extent well
WELL # AO-20	x			x	9 events 1992-2009	upgradient west well
WELL # AO-21	x			x	39 events 1992-2011	upgradient north well
WELL # NW-1	x			x	none	neighbor site
WELL # NW-2	x			x	none	neighbor site
WELL # NW-3	x			x	9 events 2002-2008	neighbor site
WELL # NW-4				x	none	neighbor site
WELL # NW-5	x			x	none	neighbor site
WELL # OW-2		x	x		none	free product, surrounded by other wells
WELL # OW-3		x	x		none	free product, surrounded by other wells
WELL # P-1		x	x		none	free product, surrounded by other wells
WELL # P-2A		x	x		none	free product, surrounded by other wells
WELL # P-4A		x	x		none	early free product, surrounded be other wells
WELL # P-5A		x	x		none	free product, surrounded by other wells
WELL # P-9A		x	x		none	free product, surrounded by other wells
WELL # P-10		x	x		none	upgradient well
WELL # P-11		x	x		none	free product, surrounded by other wells
WELL # P-12		x	x		none	free product, surrounded by other wells
WELL # P-13		x	x		1 event 2002	free product, surrounded by other wells
WELL # B-1		x		x	none	off-site
WELL # B-2		x		x	none	dry
WELL # B-3		x		x	none	dry
WELL # B-4		x		x	none	dry
WELL # B-5		x		x	none	dry
WELL # B-10		x		x	none	off-site
WELL # B-13		x		x	1 event 2002	free product
WELL # B-15		x		x	1 event 2002	-
WELL # B-16		x		x	1 event 2002	free product
WELL # B-18		x		x	none	free product
WELL # CCW		x		x	1 event 2002	-
WELL # PO-2		x		x	none	off-site
WELL # PO-4		x		x	none	free product
WELL # PO-7		x		x	none	off-site
WELL # PO-8		x		x	none	off-site
WELL # PO-9		x		x	2 events 1992 2002	nd-downgradient southern well
WELL # PO-10		x		x	1 event 1992	nd-northwestern well
WELL # PO-11		x		x	none	dry?

Table 2 A
Evaluation of Chemical Analyses Data to 2011
Existing Wells
Former Golden West Refinery
Santa Fe Springs, California

Well	Artesia	Semi-Perched	Location		Number of Analyses -time period	Comments
			Onsite	Offsite		
WELL # PO-12		x		x	2 events 1992 2002	nd
WELL # PO-13		x		x	1 event 2002	very low concentration-lateral SW extent
WELL # PO-14		x		x	2 events 1992 2002	nd- very low-downgradient southern well
WELL # PO-16		x		x	1 event 2002	free product, surrounded by other wells
WELL # PO-17		x		x	2 events 1992-2002	very low
WELL # PO-19		x		x	1 event 1992	nd, upgradient, lateral northwestern extent
WELL # SFS-2		x		x	2009.00	early free product
WELL # STF-1A		x	x		none	free product, surrounded by other wells
WELL # STF-2A		x	x		none	free product, surrounded by other wells
WELL # STF-3A		x	x		none	free product, surrounded by other wells
WELL # STF-11B		x	x		none	in area of free product
WELL # STF-12B		x	x		none	free product, surrounded by other wells
WELL # STF-15		x	x		none	free product, surrounded by other wells
WELL # STF-16		x	x		none	free product, surrounded by other wells
WELL # STF-17		x	x		none	free product, surrounded by other wells
WELL # STF-18		x	x		none	free product, surrounded by other wells
WELL # STF-19		x	x		none	free product, surrounded by other wells
WELL # STF-20		x	x		none	free product, surrounded by other wells
WELL # STF-21		x	x		none	free product, surrounded by other wells
WELL # STF-22		x	x		none	free product, surrounded by other wells
WELL # STF-23		x	x		none	free product, surrounded by other wells
WELL # STF-24		x	x		none	free product, surrounded by other wells
WELL # STF-25		x	x		none	free product, surrounded by other wells
WELL # STF-26		x	x		none	free product, surrounded by other wells
WELL # STF-27		x	x		none	free product, surrounded by other wells
WELL # STF-28		x	x		none	free product, surrounded by other wells
WELL # STF-29		x	x		none	free product, surrounded by other wells
WELL # STF-30		x	x		none	free product, surrounded by other wells
WELL # STF-31		x	x		none	free product, surrounded by other wells
WELL # STF-32		x	x		none	free product, surrounded by other wells
WELL # STF-33		x	x		none	free product, surrounded by other wells
WELL # STF-34		x	x		none	free product, surrounded by other wells
WELL # STF-35		x	x		none	free product, surrounded by other wells
WELL # STF-36		x	x		none	free product, surrounded by other wells
WELL # STF-37		x	x		none	free product, surrounded by other wells
WELL # STF-38		x	x		none	free product, surrounded by other wells
WELL # STF-39		x	x		none	free product, surrounded by other wells
WELL # STF-41A		x	x		none	near area of free product, surrounded by other wells
WELL # STF-42A		x	x		none	free product, surrounded by other wells
WELL # TW-1		x	x		1 event 1992	free product, surrounded by other wells
WELL # TW-2		x	x		1 event 1992	free product, surrounded by other wells
FORMER GW PRODUCTION WELL - WW-3	x		x		18 events 1986-2002	nd
FORMER GW PRODUCTION WELL - WW-7	x		x		15 events 1987-1998	almost all nd
FORMER GW PRODUCTION WELL - WW-8	x		x		11 events 1986-2000	nd

Notes:

– Artesia sentinel wells A0-A5949, SD-11; A-38A; A-39A sampled semi-annually
-- MBE plume in MTF Artesia Wells monitored by sampling A-21A
– MBE plume in M.A. Artesia Wells monitored by sampling A-17R

Table 2B
Evaluation of Chemical Analyses Data to 2011
Abandoned Wells
Former Golden West Refinery
Santa Fe Springs, California

Well	Artesia	Semi-Perched	Location		Number of Sampling Event for Analysis-range of years	comment to analyses summary
			Onsite	Offsite		
WELL # A-1	x		x		40 '85 - 2000	-
WELL # A-2	x		x		36 '85 to 1999	-
WELL # A-3	x		x		35 '85 to 2000	-
WELL # A-4	x		x		30 '85 to 1998	-
WELL # A-5	x		x		25 '85 to 1998	-
WELL # A-6	x		x		none	free product
WELL # A-9	x		x		3 1992 - 2002	occasional free product
WELL # A-10	x		x		2 1994 - 2003	early free product, center of STF
WELL # A-11	x		x		none	free product
WELL # A-12	x		x		none	free product
WELL # A-12A	x		x		none	no free product, but within PUA near wells with free product
WELL # A-13	x		x		none	no free product, but within PUA near wells with free product
WELL # A-14	x		x		none	no free product, but within PUA near wells with free product
WELL # A-14A	x		x		none	no free product, but within PUA near wells with free product
WELL # A-15	x		x		none	no free product, other wells drilled further downgradient
WELL # A-16	x		x		1 in 2001	free product
WELL # A-17	x		x		6 2001 - 2005	free product
WELL # A-18	x		x		none	no free product, but in central part of refinery near area with free product
WELL # A-19	x		x		none	no free product, but in central part of refinery near area with free product
WELL # A-20	x		x		none	no free product, but in central part of refinery near area with free product
WELL # A-21	x		x		20 1989 - 1998	-
WELL # A-22	x		x		13 1993-1999	-
WELL # A-23	x		x		none	no free product, but in central part of WTF
WELL # A-24	x		x		12 1994 - 1999	-
WELL # A-25	x		x		none	no free product, but in central part of WTF
WELL # A-26	x		x		2 1990-1992	-
WELL # A-27	x		x		none	occasional free product
WELL # A-28	x		x		none	no free product, but in central part of refinery near area with free product
WELL # A-29	x		x		none	no free product, but in central part of refinery near area with free product
WELL # A-30	x		x		5 1992 -2000	-
WELL # A-31	x		x		1 1992	near A-30 that had ND or very low benzene-upgradient
WELL # A-33	x		x		1 2002	free product
WELL # A-36	x		x		12 1994-1999	-
WELL # A-37	x		x		2 1990-1992	early free produt
WELL # A-38	x		x		10 1991-2003	-
WELL # A-39	x		x		10 1991-2003	-
WELL # A-40	x		x		1 1998	center of WTF-one analysis ND
WELL # A-41	x		x		none	center of WTF-surrounded by other wells
WELL # A-45	x		x		4 2001-2004	-
WELL # A-46	x		x		none	occasional free product
WELL # A-47	x		x		none	occasional free product
WELL # A-49	x		x		none	within PUA-srrounded by other wells
WELL # A-50	x		x		none	within PUA-srrounded by other wells
WELL # A-51	x		x		none	within PUA-srrounded by other wells
WELL # A-53	x		x		15 1993-2000	-
WELL # A-54	x		x		12 1993-1998	-
WELL # A-55	x		x		14 1994-2000	-
WELL # A-56	x		x		14 1994-2000	-
WELL # A-57	x		x		13 1994-1999	-
WELL # MW-2	x		x		13 1992-1999	-

Table 2B
Evaluaiton of Chemical Analyses Data to 2011
Abandoned Wells
Former Golden West Refinery
Santa Fe Springs, California

Well	Artesia	Semi-Perched	Location		Number of Sampling Event for Analysis-range of years	comment to analyses summary
			Onsite	Offsite		
WELL # DA-1	x		x		1 1990	deep well- ND
WELL # DA-2	x		x		1 1990	deep well- ND
WELL # DA-3	x		x		1 1990	deep well- ND
WELL # GW-3	x			x	2 1987-2002	?
WELL # MW-3	x		x		13 1993-1999	-
WELL # AO-1	x			x	none	within area of known early LNAPL
WELL # AO-5	x			x	1 1992	-
WELL # AO-13	x			x	none	duplicate with AO-21
WELL # AO-15	x			x	2 1992 2002	-
WELL # AO-17	x			x	11 1992-2002	-
WELL # AO-19	x			x	5 1992-2004	-
WELL # AO-22	x			x	13 1992 2005	-
WELL # OW-1		x	x		none	free product
WELL # OW-4		x	x		none	free product
WELL # P-2		x	x		none	free product
WELL # P-3		x	x		none	free product
WELL # P-4		x	x		none	free product
WELL # P-5		x	x		none	localized zone
WELL # P-6		x	x		none	free product
WELL # P-7		x	x		none	localized zone
WELL # P-8		x	x		none	localized zone
WELL # P-9		x	x		1 2002	free product
WELL # P-14		x	x		1 2002	free product
WELL # MEW		x		x	none	early free product
WELL # MWW		x		x	none	free product
WELL # MYTNN		x		x	1 2002	-
WELL # PO-1		x		x	2 1991 2002	off-site
WELL # PO-3		x		x	none	off-site
WELL # PO-5		x		x	5 1992 - 2002	off-site
WELL # PO-6		x		x	none	off-site
WELL # PO-15		x		x	2 1992 2002	nd
WELL # PO-18		x		x	none	dry
WELL # STF-1		x	x		none	free product
WELL # STF-2		x	x		none	free product
WELL # STF-3		x	x		none	free product
WELL # STF-5A		x	x		none	free product
WELL # STF-6A		x	x		none	rare free product
WELL # STF-7D		x	x		none	rare free product
WELL # STF-8B		x	x		none	free product
WELL # STF-9B		x	x		none	rare free product
WELL # STF-10		x	x		none	rare free product
WELL # STF-11A		x	x		none	free product
WELL # STF-11AA		x	x		none	free product
WELL # STF-12		x	x		none	rare free product
WELL # STF-12A		x	x		none	free product
WELL # STF-13		x	x		none	in area of free product
WELL # STF-14		x	x		none	rare free product
WELL # STF-40		x	x		none	free product
WELL # STF-41		x	x		none	free product
WELL # STF-42		x	x		none	free product

Table 2B
Evaluaiton of Chemical Analyses Data to 2011
Abandoned Wells
Former Golden West Refinery
Santa Fe Springs, California

Well	Artesia	Semi-Perched	Location		Number of Sampling Event for Analysis-range of years	comment to analyses summary
			Onsite	Offsite		
WELL # TW-1		x	x		1 1992	free product
WELL # TW-2		x	x		1 1992	free product
FORMER GW PRODUCTION WELL - WW-3	x		x		18 1996-2002	nd
FORMER GW PRODUCTION WELL - WW-7	x		x		15 1987-1990	almost all nd
FORMER GW PRODUCTION WELL - WW-8	x		x		11 1996-2000	nd

Attachment 7

Summary of Dissolved Lead Analysis during Groundwater Monitoring

Attachment 7 - Table 3
Summary of Dissolved Pb Analyses
Former Golden West Refinery - Santa Fe Springs, CA

WELL	Period of Pb Analysis
WELL # A-1	1987-2000
WELL # A-2	1988-1999
WELL # A-3	1988-2000
WELL # A-3A	2003-2011
WELL # A-4	1988-1998
WELL # A-4A	2003-2011
WELL # A-5	1988-1998
WELL # A-5A	2009
WELL # A-7	1988-2001
WELL # A-8	2007
WELL # A-21	1989-1998
WELL # A-22	1993-1999
WELL # A-24	1994-1999
WELL # A-53	1993-2000
WELL # A-54	1993-1998
WELL # A-55	1994-2000
WELL # A-56	1994-2000
WELL # A-57	1994-1999
WELL # AL-1	2004
WELL # AL-2	2004
WELL # AL-3	2004
WELL # AO-21	1993-2004
WELL # MW-2	1993-1998
WELL # MW-3	1993-1998
WELL # NW-3	2002-2004
FORMER GW PRODUCTION WELL - WW-3	1996-2001
FORMER GW PRODUCTION WELL - WW-7	1987-1990
FORMER GW PRODUCTION WELL - WW-8	1996-2000

EXHIBIT 13

SOIL VAPOR SURVEY REPORT

Rosecrans/Fidel Area

Prepared For:

Golden West Refining Company
13116 Imperial Hwy
Santa Fe Springs, CA 90670

Prepared By:

SGI environmental THE SOURCE GROUP, INC.

1962 Freeman Avenue
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September 18, 2013

REGISTERED GEOLOGIST Paul Parmentier No. 5915 STATE OF CALIFORNIA

Prepared By:

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

1.0 INTRODUCTION

On behalf of the Golden West Refining Company (GWRC), The Source Group, Inc. (SGI), conducted a soil vapor survey in the vicinity of the Rosecrans and Fidel Avenues, south of the former Golden West Refinery (Refinery), located in the city of Santa Fe Springs, California (Figure 1).

This soil vapor survey was conducted in accordance with SGI's *Revised Soil Vapor Investigation Work Plan*, dated July 9, 2013 and conditionally approved by the Regional Water Quality Control Board (RWQCB) on July 23, 2013. SGI's *Revised Soil Vapor Investigation Work Plan* had been submitted in response to the RWQCB's June 14, 2013 conditional approval of SGI's *Offsite Soil Vapor Survey Work Plan*, dated January 21, 2013.

The objectives of the soil vapor survey were to (1) evaluate the potential health risks for vapor intrusion and (2) to fill a data gap regarding the characterization of soil vapor south of the former Refinery.

Site Background

The former Golden West Refinery property is located in the city of Santa Fe Springs, California, near crude-oil producing fields, but no oil and gas drilling activities are reported to have occurred on this site.

The residential areas in the vicinity of Rosecrans and Fidel Avenues are underlain by a plume of Light Non-Aqueous Phase Liquids (LNAPL) that extends north to the commercial area near Cambridge Court/Carmenita Road and adjoins the southern edge of the former GWRC South Tank Farm. Groundwater monitoring wells drilled in the Rosecrans/Fidel area by the City of Santa Fe Springs, GWRC and others have been monitored since the 1980's by GWRC.

In 2012, GWRC submitted to RWQCB a report prepared by SGI ("Groundwater Monitoring Program Review", SGI, March 2012) that presented previous and recent information on the LNAPL plume south of the former GWRC refinery, including demonstrated variations in the distribution of LNAPL appearance and chemical fingerprinting. That report also listed a series of former underground storage tank (UST) sites and identified the presence of multiple pipelines near the Carmenita Road/Cambridge Court intersection, that are likely a significant potential source for the LNAPL extending to the Rosecrans/Fidel area.

Site Geology and Hydrogeology in the West Tank Farm Area

The geology, lithology, and hydrogeology of the area have been documented through multiple phases of site investigations, evaluations, and studies that have included soil borings, cone penetrometer testing (CPT) soundings, well installations, vertical groundwater contamination assessments, aquifer tests, groundwater modeling, and natural attenuation evaluations. A significant network of monitoring wells, composed of over 130 wells, exists at the former Refinery and extends offsite.

The semi-perched groundwater zone extends from the southern part of the former GWRC South Tank Farm, and is found at a depth of approximately 20 feet below ground surface (ft bgs). The semi-perched groundwater zone is laterally limited, with a groundwater gradient to the southwest. The lateral extent of LNAPL and dissolved hydrocarbons have been previously delineated, and studies by GWRC, along with over 30 years of monitoring, have demonstrated that the hydrocarbon plume is stable and naturally attenuated.

As part of the redevelopment of the former Refinery, GWRC conducted three on-site soil vapor surveys along the southern edge of the Refinery, including one soil vapor survey in the Marketing Area west of Carmenita Road and two soil vapor surveys in the former GWRC South Tank Farm, east of Carmenita Road. These soil vapor surveys were each conducted following a RWQCB-approved work plan that had been prepared based on very detailed site investigation and post-excavation confirmation sampling, and designed to include sampling locations in areas of suspected high contamination levels. The results were submitted to RWQCB which subsequently authorized building construction, as the soil vapor benzene concentrations reported in the soil vapor samples for each of the three surveys indicated no significant concerns for potential human health risks to site receptors from vapor intrusion.

The RWQCB requested in June 2012 that GWRC conduct a soil vapor survey over the footprint of the semi-perched groundwater zone south of the former Refinery, including the commercial area southwest of the former Refinery and the residential Rosecrans/Fidel Avenues area.

2.0 SOIL VAPOR SAMPLING

A soil vapor survey was completed in the Rosecrans/Fidel area from August 19 through August 21, 2013, by Optimal Technology (Optimal) under oversight by SGI, and following notification of RWQCB who also conducted a field inspection on August 20, 2013.

Sampling Locations

Soil vapor samples were collected from eleven locations in the Cambridge/Carmenita to Rosecrans/Fidel area (Figure 1). The sample locations (RF-1 through RF-11) were in street areas or sidewalks, and access was obtained from the City of Norwalk and City of Santa Fe Springs. Six sampling locations (RF-1 through RF-6 were located in the residential Rosecrans/Fidel Avenues area. Five sampling locations (RF-7 through RF-11) were located in the commercial area southwest of the former Refinery.

Methodology

The following sections provide a description of pre-field activities and soil vapor probe installation, sampling, and abandonment.

2.1.1 Pre-field Activities

In accordance with 29 CFR 1910.120, a site-specific health and safety plan (HASP) was prepared for the soil vapor survey activities. All involved personnel, including on-site subcontractors and regulatory personnel, were required to familiarize themselves with and sign the HASP in an attempt to minimize safety hazards. The HASP identified the specific chemical compounds that may be encountered at the Site (BTEX and oxygenates), and presented the chemical properties and a task-specific health and safety risk analysis.

The following pre-field activities were completed prior to mobilization to the field:

- Permits were secured from the City of Norwalk and City of Santa Fe Springs for all soil vapor sampling locations (Appendix A).
- The sampling locations were cleared of underground utilities on August 7, 2013 by Carlsbad, California-based SubSurface Surveys & Associates, Inc. (SubSurface) and by Underground Service Alert (USA). A copy of SubSurface's geophysical report is provided in Appendix B.

The sampling schedule was communicated to the RWQCB on August 2, 2013.

2.1.2 Soil Vapor Probe Installation and Sampling

Methodologies used for the soil vapor survey were consistent with the DTSC/RWQCB's April 2012 *Advisory – Active Soil Gas Investigation* guidance document (2012 Advisory) and followed the Work Plan. Detailed probe installation and sampling methodologies are included in Optimal's summary report (attached as Appendix C). The purging (vacuum, flow rates, and purge volume

testing), sampling, and analyses procedures were performed in accordance with the 2012 Advisory.

From August 19 to 21, 2013, using a Geoprobe direct-push probe at each location, two borings were drilled to 5 ft bgs and 15 ft bgs respectively. A single soil vapor probe and a dual soil vapor probe were installed at each location at 5 ft bgs; and 10 ft bgs and 15 ft bgs respectively, resulting in a total of 33 probes in 22 borings. The probes were labeled and temporarily protected by a traffic cone during each day of the soil vapor survey.

As reported in Appendix C, testing for potential leaks from atmospheric air was performed using isobutane. Based on the initial purge test conducted on August 19, 2013 at the 5-feet deep probe RF-11, a three-volume purge volume was selected for the soil vapor survey. Three duplicate samples were also collected and analyzed at locations RF-3, RF-4 and RF-9 with no discrepancy reported from the initial sample.

After at least two hours of equilibration following probe installation, the soil vapor samples were collected and analyzed on-site by the California state-certified mobile laboratory by EPA Method 8260B for benzene, toluene, ethylbenzene, and xylenes (collectively, BTEX); methyl tert-butyl ether (MtBE), and gasoline (TPHg; 5-feet deep samples) at a method detection limit below each analyte's shallow soil vapor California Human Health Screening Levels (CHHSLs) for residential and commercial land use.

In addition to TPHg, the 5-feet soil vapor samples were also analyzed for methane, oxygen, and hydrogen sulfide using a Landtec GEM 2000 Plus gas multi-meter (Landtec). The field work and data interpretation were supervised by Professional Geologist Paul Parmentier.

During the soil vapor survey, soil samples were collected from two soil vapor probe locations (one at each end of the LNAPL plume) at two soil vapor sampling depth intervals (5 ft bgs and 15 ft bgs) to evaluate the physical character of the subsurface. These four soil samples (RF-11-5, RF-11-15, RF-1-5, and RF-1-15) were analyzed for physical properties (i.e., soil grain-size diameter and moisture content). The soil physical properties analytical report is provided in Appendix C.

2.1.3 Soil Vapor Probe Abandonment

After completion of the soil vapor analyses, each probe was removed from the ground, the sampling hole was sealed with cement slurry, and the surface was restored with asphalt or soil consistent with the surrounding site surface.

3.0 RESULTS AND INTERPRETATION

A summary of the soil vapor survey results and interpretation are discussed in the following sections.

Analytical Results Summary

The results of the analysis for BTEX, MtBE, TPHg, isobutane (tracer gas), oxygen, hydrogen sulfide, and methane in the soil vapor samples are presented on Figure 1 and Table 1, and laboratory reports are included in Appendix C.

The results indicate that BTEX, TPHg, and methane were not detected above method reporting limits in all soil vapor probes in the residential Rosecrans/Fidel Avenues area, (RF-1 to RF-6) at all depths. In the commercial area southwest of the former Refinery and north of Rosecrans, five soil vapor probes (RF-7 to RF-11) were installed. TPHg and methane were detected in only three of the soil vapors probes (RF-7, RF-8, and RF-10) at various depths. Benzene and ethylbenzene were detected at only one location (RF-7) about 1700 feet from the edge of the former GWRC refinery. Benzene was detected in soil vapor samples RF-7-5', RF-7-10', and RF-7-15' at concentrations of 0.72, 0.97, and 1.14 micrograms per liter (µg/L), respectively. Ethylbenzene was detected in soil vapor samples RF-7-5', RF-7-10', and RF-7-15' at concentrations of 0.62, 23.82, and 61.72 µg/L. Toluene, xylenes, and MtBE were not detected in any soil vapor probes, including the commercial area.

The results of methane analyses at location RF-7 at a depth of 5 feet also indicate a methane concentration of 163,000 parts per million (ppm) and detectable hydrogen sulfide (H_2S) in sample RF-7-5'. The presence of benzene and ethylbenzene concentrations in soil vapor at location RF-7 is further evaluated in Section 3.2.

The concentration of oxygen in the 5-ft sample at RF-7 was reported at 12.5 percent (%). That value is higher than the reference concentration of 4% reported as a minimum value for active bioremediation of BTEX in technical documents such as the low-threat UST Case Closure Policy (RWQCB, Nov 2012). This observation indicates that soil vapors of biodegradable petroleum hydrocarbons are being actively degraded at the 5-ft depth interval.

It should also be noted that the two locations between RF-7 and the former Refinery (RF-10 and RF-11) contained no detectable BTEX, MtBE, or H_2S soil vapor concentrations at any depth, indicating that the shallow soil vapor hydrocarbons reported at RF-7 are not the result of migration from the former Refinery.

Vapor Intrusion Modeling

Despite the indication that the shallow hydrocarbons found in soil vapor at location RF-7 are not the result of migration from the former Refinery, and therefore are not the responsibility of GWRC, SGI conducted further evaluation of the benzene and ethylbenzene concentrations detected in soil vapor. SGI utilized the Johnson and Ettinger (1991) model for subsurface vapor intrusion into

buildings (J&E Model) to estimate any potential human health risk due to benzene and ethylbenzene detected at the soil vapor probe location RF-7. The modeling addresses chemical sources in soil vapor under current conditions. Specifically, the modeling includes calculations for migration of soil vapor to the soil surface and mixing with indoor air for the potential receptor.

3.1.1 Model Input Parameters

The soil physical properties from the site-specific samples and the results of the soil gas testing were evaluated using the USEPA Johnson and Ettinger model. The particle size distribution analyses results were used to determine the appropriate Soil Conservation Service (SCS) soil textural classification within the Site. Using Figure 3 of the User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings (USEPA; 2004), the particle size distribution of the soil samples collected from RF-11 at 5 ft bgs and 15 ft bgs reflects the "sandy loam" SCS soil textural classification. The soil samples collected from RF-1 at 5 ft bgs and 15 ft bgs reflect the "silty loam" and "loam" SCS soil textural classification, respectively. Due to the proximity of soil vapor probe location RF-11 to RF-7, the vadose zone at 5 and 15 ft bgs at RF-7 was assumed to be a sandy loam (SL). The model default soil dry bulk density and porosity values for sandy loam were used in the model. The soil dry bulk density was 1.62 grams per cubic centimeter (g/cm^3). The total, water-filled, and air-filled porosity were 0.387, 0.103, and 0.284, respectively.

Default chemical properties supplied by the vapor intrusion model were used for the dimensionless Henry's Law constant, organic carbon-water partition coefficient (Koc), and molecular diffusion coefficients in air and water, D_i and D_w, for benzene.

The following table summarizes the soil properties input into the Johnson and Ettinger model (USEPA, 2004) for vapor migration from soil vapor to indoor air.

LASC – Vapor Migration from Soil Vapor to Indoor Air		
Subsurface Properties	**Symbol**	**Assumed Value**
Depth Below Grade to Bottom of Enclosed Space Floor (CalEPA [2011] default)	L_F	15 cm
Soil Vapor Sampling Depth Below Grade		
5 feet bgs	L_S	152 cm
10 feet bgs	L_S	305 cm
15 feet bgs	L_S	457 cm
Average Soil Temperature (CalEPA [2011] default)	T_s	24°C
Vadose Zone Soil Vapor Permeability (CalEPA [2011] default)	k_v	1.00E-08 cm^2
Stratum A - Vadose Zone Soil Properties		
Vadose Zone SCS Soil Type	- -	Sandy loam (SL)
Vadose Zone Soil Dry Bulk Density (CalEPA [2011] default)	ρ_b	1.62 g/cm^3
Vadose Zone Soil Total Porosity (CalEPA [2011] default)	θ_T	0.387
Vadose Zone Soil Water-Filled Porosity (CalEPA [2011] default)	θ_w	0.103
Enclosed Space Floor Thickness (CalEPA [2011] default)	L_{crack}	10 cm

LASC – Vapor Migration from Soil Vapor to Indoor Air		
Subsurface Properties	**Symbol**	**Assumed Value**
Soil-Building Pressure Differential (CalEPA [2011] default)	ΔP	40 g/cm-s^2
Enclosed Space Floor Length (CalEPA [2011] default)	L_B	1,000 cm
Enclosed Space Floor Width (CalEPA [2011] default)	W_B	1,000 cm
Enclosed Space Height (CalEPA [2011] default)	H_B	244 cm
Floor-Wall Seam Crack Width (CalEPA [2011] default)	w	0.1 cm
Indoor Air-Exchange Rate		
Commercial/Industrial Land Use (CalEPA [2011] default)	ER	1 per hour
Average Vapor Flow Rate into Building (CalEPA [2011] default)	Q_{soil}	5 L/m
Commercial/Industrial Land Use		
Averaging Time for Carcinogens	AT_C	70 years
Averaging Time for Noncarcinogens	AT_{NC}	25 years
Exposure Duration	ED	25 years
Exposure Frequency	EF	250 days/year
Exposure Time	ET	8 hours/day

Notes:
g/cm-s^2 = gram per centimeter per square second
L/m = liter per minute

3.1.2 Results

Using the exposure factors listed above and toxicity values provided by the model, the model estimates the HQ and excess cancer risk for benzene detected in soil vapor. Risk characterization results for the indoor commercial/industrial worker receptor based on soil vapor data collected at probe RF-7 are presented in the following table.

Inhalation of Benzene and Ethylbenzene Volatilizing from Soil Vapor into Indoor Air		
Basis	**Hazard Index**	**Excess Cancer Risk**
Soil Vapor Data Detected at 5 feet bgs	0.003	1×10^{-6}
Soil Vapor Data Detected at 10 feet bgs	0.004	2×10^{-6}
Soil Vapor Data Detected at 15 feet bgs	0.005	3×10^{-6}

The spreadsheets containing the results of the Johnson and Ettinger (1991) model, for subsurface vapor intrusion into buildings (USEPA, 2004) from soil vapor for commercial/industrial exposures at probe RF-7 are presented in Appendix D.

The risk characterization results for the hypothetical indoor commercial/industrial worker receptor indicated that the estimated hazard index (HI) values for noncancer adverse health effects do not

exceed the USEPA recommended target HI of one (1; USEPA, 1989) and the estimated excess cancer risks are equal to or slightly greater than 1×10^{-6}, which is the most stringent end of the USEPA risk management range of one-in-one-million (1×10^{-6}) to one-in-ten thousand (1×10^{-4}). Therefore the benzene and ethylbenzene concentrations measured at location RF-7 do not pose a significant human health risk to the indoor commercial/industrial worker receptor.

4.0 CONCLUSIONS

The investigation of soil vapor concentrations in the area of Rosecrans/Fidel Avenues was completed following the approved work plan and RWQCB conditions.

The results of the August 2013 soil vapor sampling and analysis at soil vapor probes RF-1 through RF-6 indicate that BTEX, TPHg, MtBE, and methane in soil vapor do not pose a significant health risk from vapor intrusion to the residential areas, as analytical results are all non-detect and detection limits are below soil vapor CHHSLs for residential land use. The results of the soil vapor sampling and analysis at soil vapor probes RF-8 through RF-11 indicate that BTEX, TPHg, MtBE, and methane in soil vapor do not pose a significant health risk from vapor intrusion to the commercial areas, as analytical results are all non-detect and detection limits are below soil vapor CHHSLs for commercial land use.

Only one location (RF-7) in the commercial area north of Rosecrans Avenue contained detectable benzene and ethylbenzene concentrations. To further evaluate any potential vapor intrusion impacts from benzene and ethylbenzene concentrations in soil vapor, the J&E Model was used. The estimated values for noncancer adverse health effects do not exceed the USEPA recommended target HI of one (1; USEPA, 1989) and the estimated excess cancer risks are equal to or slightly greater than 1×10^{-6}, which is the most stringent end of the USEPA risk management range of one-in-one-million (1×10^{-6}) to one-in-ten thousand (1×10^{-4}).

The presence of shallow hydrocarbons at location RF-7 is interpreted to be due to a localized, non-GWRC source. This conclusion is strongly supported by the absence of detectable hydrocarbon concentrations in the soil vapors collected from soil vapor probes RF-10 and RF-11 located between the former GWRC refinery and RF-7.

The results of the investigation indicate that the soil vapor concentrations south of the former Refinery have been defined and that there are no significant human health risks from vapor intrusion.

5.0 LIMITATIONS

This document was prepared for the exclusive use of the Golden West Refining Company (GWRC) and the Los Angeles Regional Water Quality Control Board (RWQCB) for the express purpose of complying with a client or regulatory directive for environmental investigation or restoration. SGI and GWRC must approve any re-use of this work product in whole or in part for a different purpose or by others in writing. If any such unauthorized use occurs, it shall be at the user's sole risk without liability to SGI or GWRC. To the extent that this report is based on information provided to SGI by third parties, including GWRC, their direct contractors, previous workers, and other stakeholders, SGI cannot guarantee the completeness or accuracy of this information, even where efforts were made to verify third-party information. SGI has exercised professional judgment to collect and present findings and opinions of a scientific and technical nature. The opinions expressed are based on the conditions of the Site existing at the time of the field investigation, current regulatory requirements, and any specified assumptions. The presented findings and recommendations in this report are intended to be taken in their entirety to assist GWRC and RWQCB personnel in applying their own professional judgment in making decisions related to the property. SGI cannot provide conclusions on environmental conditions outside the completed scope of work. SGI cannot guarantee that future conditions will not change and affect the validity of the presented conclusions and recommended work. No warranty or guarantee, whether expressed or implied, is made with respect to the data or the reported findings, observations, conclusions, and recommendations.

6.0 REFERENCES

CalEPA. 2011. DTSC Screening-Level Model for Soil Gas Contamination. Department of Toxic Substances Control. Last Modified December 6.

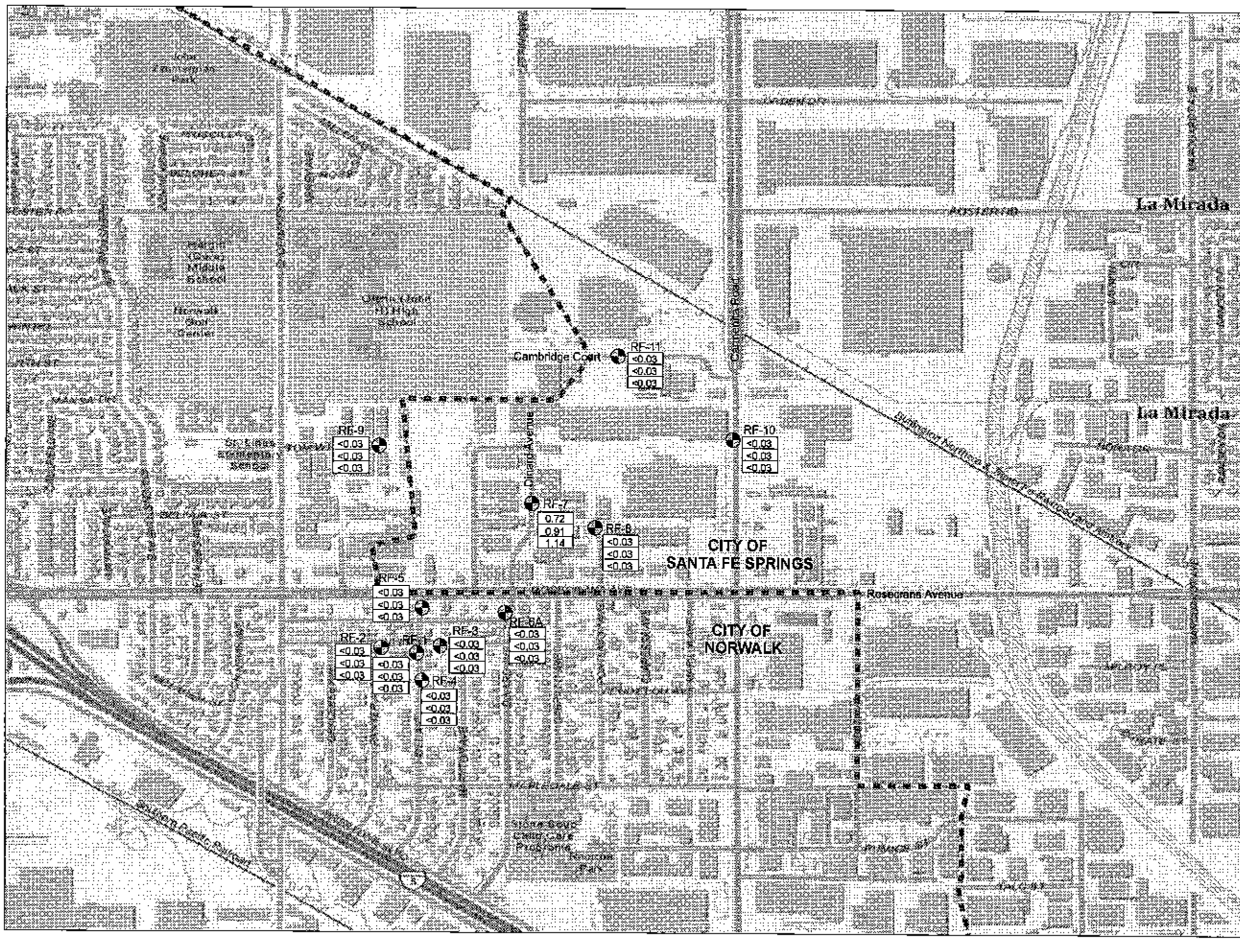
Johnson, P.C. and R.A. Ettinger. 1991. Heuristic Model for Predicting the Intrusion Rate of Contaminant Vapors into Buildings. Environmental Science and Technology. Vol. 25, No. 8, pp. 1445-52.

Regional Water Quality Control Board, 2013. *Approval of Off-Site Soil Vapor Survey Workplan Pursuant to CAO R4-2004-0020 and June 21, 2102 Amendment.* June 14.

SGI, 2013 *Vapor Survey Workplan, Vicinity South of Intersection of Rosecrans and Fidel Avenues.* January 21

USEPA. 2004. User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings. Office of Emergency and Remedial Response. February.

FIGURES



LEGEND

RF-5 SOIL GAS SAMPLING LOCATION

CITY BOUNDARY

BENZENE CONCENTRATION IN SOIL GAS AT (ug/L):

<0.03	5 FT BGS
<0.03	10 FT BGS
<0.03	15 FT BGS

PROJECT NO:	DATE:	DRAWN BY:	APPROVED BY:
04-GWRC-001	09/13/13	A. DISMAN	P. PARMENTIER

0 150 300 600 900 1,200 Feet

SOIL GAS SAMPLING LOCATIONS AND BENZENE CONCENTRATIONS

ROSECRANS/FIDEL AREA
NORWALK, CALIFORNIA

N

1962 Freeman Avenue
Signal Hill, California 90765
(562) 597-1055

FIGURE 1

TABLE

TABLE 1
SUMMARY OF SOIL VAPOR ANALYTICAL RESULTS
Former Golden West Refinery
Santa Fe Springs, CA

Sample ID	Sample Depth (ft bgs)	Date Sampled/ Measured	Benzene (ug/L)	Toluene (ug/L)	Ethylbenzene (ug/L)	m,p-Xylene (ug/L)	o-Xylene (ug/L)	Methyl tert-Butyl Ether (ug/L)	TPHg (ug/L)	Isobutane (Tracer Gas) (ug/L)	Oxygen (%)	Hydrogen Sulfide (ppm)	Methane (ppm)	Comments
CHHSL - Residential, Shallow Soil Gas			0.036	140	0.42	317	318	4.0	--	--	--	--	--	
RF-1-5'	5	08/20/13	<0.03	<1.00	<0.40	<1.00	<1.00	<1.00	<5.00	<1.00	19.2	<1	<1,000	
RF-1-10'	10	08/20/13	<0.03	<1.00	<0.40	<1.00	<1.00	<1.00	--	<1.00	--	--	--	
RF-1-15'	15	08/20/13	<0.03	<1.00	<0.40	<1.00	<1.00	<1.00	--	<1.00	--	--	--	
RF-2-5'	5	08/21/13	<0.03	<1.00	<0.40	<1.00	<1.00	<1.00	<5.00	<1.00	19.2	<1	<1,000	
RF-2-10'	10	08/21/13	<0.03	<1.00	<0.40	<1.00	<1.00	<1.00	--	<1.00	--	--	--	
RF-2-15'	15	08/21/13	<0.03	<1.00	<0.40	<1.00	<1.00	<1.00	--	<1.00	--	--	--	
RF-3-5'	5	08/21/13	<0.03	<1.00	<0.40	<1.00	<1.00	<1.00	<5.00	<1.00	17.6	<1	<1,000	
RF-3-10'	10	08/21/13	<0.03	<1.00	<0.40	<1.00	<1.00	<1.00	--	<1.00	--	--	--	
RF-3-15	15	08/21/13	<0.03	<1.00	<0.40	<1.00	<1.00	<1.00	--	<1.00	--	--	--	
RF-3-15' Dup	15	08/21/13	<0.03	<1.00	<0.40	<1.00	<1.00	<1.00	--	<1.00	--	--	--	
RF-4-5'	5	08/20/13	<0.03	<1.00	<0.40	<1.00	<1.00	<1.00	<5.00	<1.00	19	<1	<1,000	
RF-4-10'	10	08/20/13	<0.03	<1.00	<0.40	<1.00	<1.00	<1.00	--	<1.00	--	--	--	
RF-4-15'	15	08/20/13	<0.03	<1.00	<0.40	<1.00	<1.00	<1.00	--	<1.00	--	--	--	
RF-4-15' Dup	15	08/20/13	<0.03	<1.00	<0.40	<1.00	<1.00	<1.00	--	<1.00	--	--	--	
RF-5-5'	5	08/20/13	<0.03	<1.00	<0.40	<1.00	<1.00	<1.00	<5.00	<1.00	18.9	<1	<1,000	
RF-5-10'	10	08/20/13	<0.03	<1.00	<0.40	<1.00	<1.00	<1.00	--	<1.00	--	--	--	
RF-5-15'	15	08/20/13	<0.03	<1.00	<0.40	<1.00	<1.00	<1.00	--	<1.00	--	--	--	
RF-6-5'	5	08/21/13	<0.03	<1.00	<0.40	<1.00	<1.00	<1.00	<5.00	<1.00	19.7	<1	<1,000	
RF-6-10'	10	08/21/13	<0.03	<1.00	<0.40	<1.00	<1.00	<1.00	--	<1.00	--	--	--	
RF-6-15'	15	08/21/13	<0.03	<1.00	<0.40	<1.00	<1.00	<1.00	--	<1.00	--	--	--	

TABLE 1
SUMMARY OF SOIL VAPOR ANALYTICAL RESULTS
Former Golden West Refinery
Santa Fe Springs, CA

Sample ID	Sample Depth (ft bgs)	Date Sampled/ Measured	Benzene (ug/L)	Toluene (ug/L)	Ethylbenzene (ug/L)	m,p-Xylene (ug/L)	o-Xylene (ug/L)	Methyl tert-Butyl Ether (ug/L)	TPHg (ug/L)	Isobutane (Tracer Gas) (ug/L)	Oxygen (%)	Hydrogen Sulfide (ppm)	Methane (ppm)	Comments
CHHSL - Commercial/Industrial, Shallow Soil			0.122	378	1.4	887	879	13.4	--	--	--	--	--	
RF-7-5'	5	08/19/13	0.72	<1.00	0.62	<1.00	<1.00	<1.00	388.18	<1.00	12.6	36	163,000	
RF-7-10'	10	08/19/13	0.97	<1.00	23.82	<1.00	<1.00	<1.00	--	<1.00	--	--	--	
RF-7-10' Dil.	10	08/19/13	0.91	<1.00	23.11	<1.00	<1.00	<1.00	--	<1.00	--	--	--	Sample re-analyzed using dilution
RF-7-15'	15	08/19/13	1.14	<1.00	61.72	<1.00	<1.00	<1.00	--	<1.00	--	--	--	
RF-8-5'	5	08/19/13	<0.03	<1.00	<0.40	<1.00	<1.00	<1.00	<5.00	<1.00	6	<1	<1,000	
RF-8-10'	10	08/19/13	<0.03	<1.00	<0.40	<1.00	<1.00	<1.00	--	<1.00	--	--	--	
RF-8-15'	15	08/19/13	<0.03	<1.00	<0.40	<1.00	<1.00	<1.00	--	<1.00	--	--	--	
RF-9-5'	5	08/19/13	<0.03	<1.00	<0.40	<1.00	<1.00	<1.00	<5.00	<1.00	12.6	<1	<1,000	
RF-9-10'	10	08/19/13	<0.03	<1.00	<0.40	<1.00	<1.00	<1.00	--	<1.00	--	--	--	
RF-9-15'	15	08/19/13	<0.03	<1.00	<0.40	<1.00	<1.00	<1.00	--	<1.00	--	--	--	
RF-9-15' Dup	15	08/19/13	<0.03	<1.00	<0.40	<1.00	<1.00	<1.00	--	<1.00	--	--	--	
RF-10-5'	5	08/20/13	<0.03	<1.00	<0.40	<1.00	<1.00	<1.00	<5.00	<1.00	18.6	<1	<1,000	
RF-10-10'	10	08/20/13	<0.03	<1.00	<0.40	<1.00	<1.00	<1.00	--	<1.00	--	--	--	
RF-10-15'	15	08/20/13	<0.03	<1.00	<0.40	<1.00	<1.00	<1.00	--	<1.00	--	--	--	
RF-11-5' PT1V	5	08/19/13	<0.03	<1.00	<0.40	<1.00	<1.00	<1.00	<5.00	<1.00	17.5	<1	<1,000	Purge test, one purge volume
RF-11-5' PT3V	5	08/19/13	<0.03	<1.00	<0.40	<1.00	<1.00	<1.00	<5.00	<1.00	17.5	<1	<1,000	Purge test, three purge volumes
RF-11-5' PT10V	5	08/19/13	<0.03	<1.00	<0.40	<1.00	<1.00	<1.00	<5.00	<1.00	17.5	<1	<1,000	Purge test, ten purge volumes
RF-11-10'	10	08/19/13	<0.03	<1.00	<0.40	<1.00	<1.00	<1.00	--	<1.00	--	--	--	
RF-11-15'	15	08/19/13	<0.03	<1.00	<0.40	<1.00	<1.00	<1.00	--	<1.00	--	--	--	
BLANK-1	N/A	08/19/13	<0.03	<1.00	<0.40	<1.00	<1.00	<1.00	<5.00	<1.00	21.9	<1	<1,000	
BLANK-2	N/A	08/20/13	<0.03	<1.00	<0.40	<1.00	<1.00	<1.00	--	<1.00	21.9	<1	<1,000	
BLANK-3	N/A	08/21/13	<0.03	<1.00	<0.40	<1.00	<1.00	<1.00	--	<1.00	21.9	<1	<1,000	

Notes:
Benzene,toluene, ethylbenzene, m,p-xylene, o-xylene, methyl tert-butyl ether, and TPHg analyzed by Modified EPA Method 8260B
Oxygen, hydrogen sulfide, and methane measured using Landtec GEM 2000 Plus
ft bgs = feet below ground surface
ug/L = micrograms per liter
ppm = parts per million
CHHSL = California Human Health Screening Levels, Soil Gas
-- = not applicable or not analyzed/measured
RF-1-5': 5 foot-deep probe at location RF-1
<0.03 = not detected at or above the indicated laboratory reporting limit.
Dup = duplicate sample

APPENDIX A

CITY PERMITS

City of Norwalk
Community Development Department

WHITE - ORIGINAL
YELLOW - INSPECTOR
PINK - STREET DIV.
GOLDENROD - APPLICANT

CONSTRUCTION PERMIT

No. 13-292 DATE 7-31-13
Void if work not commenced in 60 days

ISSUANCE FEE	
☐ CONCRETE IMPROVEMENTS	
☒ EXCAVATION	539.00
☐ BOND APPROVED (refunded one year after completion)	
☐ POOL COMPANY	
☐ OTHER	
☐ DEPOSIT	
TOTAL	539.00
RECEIPT No.	C2-1092
WORK ORDER No.	

PERMITTEE The Source Group
(PLEASE PRINT name of person, firm, or corporation for whom application is made)

CITY BUSINESS LICENSE NO. 758173 STATE LICENSE NO.

IN CONSIDERATION OF THE GRANTING OF THIS PERMIT IT IS FURTHER AGREED BY THE APPLICANT THAT THE CITY OF NORWALK AND ANY OFFICER OR EMPLOYEE HEREOF SHALL BE SAVED HARMLESS BY THE APPLICANT FROM ANY LIABILITY OR RESPONSIBILITY FOR ANY ACCIDENT, LOSS OR DAMAGE TO PERSONS OR PROPERTY, HAPPENING OR OCCURRING AS THE PROXIMATE RESULT OF ANY OF THE WORK UNDERTAKEN UNDER THE TERMS OF THIS APPLICATION, AND THE PERMIT OR PERMITS WHICH MAY BE GRANTED IN RESPONSE THERETO, AND THAT ALL OF SAID LIABILITIES ARE HEREBY ASSUMED BY THE APPLICANT. WORK WILL BE DONE ACCORDING TO STATE LAW AND CITY ORDINANCES.

LOCATION OF WORK 13068, 14435 Flora; 13054 & 13112 Lickett; 13102 & 13142 Rosecrans; 13055 Toni WHITE

PERMISSION IS HEREBY GRANTED FOR:

INSTALLATION	LENGTH	WIDTH	DESCRIPTION (Type of surface, depth)
Construct / Remove 7 soil piezos in earth planter. Restore improvement in like kind			

INSURANCE VERIFIED ____ INT.

APPROVED PLANNING DEPT. ____ INT.

FILE REFERENCE
ASSIGNED INSPECTOR Ken
WORK STARTED
WORK ACCEPTED
INSPECTOR

☐ PLANS ARE ATTACHED ☐ PREJOB MEETING REQUIRED ____ DATE

- The permitee shall make all necessary arrangements and be responsible for the protection and/or moving of poles, guys, fire hydrants and other surface and subsurface objects.
- All work shall be done in accordance with the latest edition of "The Standard Specifications for Public Works Construction" and City Plans.
- Traffic control shall conform to the "Work Area Traffic Control Handbook" and the following:

- Notify Fire and Sheriff Departments 24 hours prior to lane closures.
  FIRE: 863-0214 SHERIFF: 863-8711
- The following requirement sheets are attached:

☐ EXCAVATION ☐ POOL COMPANY ☐ CONCRETE IMPROVEMENTS ☐ OTHER

24 HOUR NOTICE: Required before starting work or requesting inspection — 562/929-5723

APPROVED ____
Community Development Dept.- Engineering Division

IS VALID ONLY WHEN APPROVED AND FEE PAID

APPLICANT Carlos Vera
(Please Print)
MAILING ADDRESS 1962 Eritsman Ave
CITY Signal Hill ZIP CODE 90755
PHONE 562 597-1055
SIGNED ____

This permit must be on the job site at all times.

- [x] Permittee Copy
- [ ] Inspector Copy
- [ ] Finance Copy / AR
- [ ] File Copy

EXCAVATION PERMIT
CITY OF SANTA FE SPRINGS

Permit No. X-10780

Permitee: THE SOURCE GROUP

Contact: PAUL PARMENTIER Telephone: 562 597-1055

Address: 1962 FREEMAN AVE, SIGNAL HILL, CA. 90755

PERMITTEE HEREBY MAKES APPLICATION TO CONSTRUCT THE FOLLOWING IN THE PUBLIC HIGHWAYS, SUBJECT TO THE PROVISIONS REQUIRED BY CITY OF SANTA FE SPRINGS ORDINANCE NO. 164 AND ANY SPECIFIED REQUIREMENTS ATTACHED HERETO.

IN CONSIDERATION OF THE GRANTING OF THIS PERMIT, IT IS AGREED BY THE APPLICANT THAT THE CITY OF SANTA FE SPRINGS AND ANY OFFICIAL OR EMPLOYEE THEREOF SHALL BE SAVED HARMLESS BY THE APPLICANT FROM ANY LIABILITY OR RESPONSIBILITY OCCURRING AS THE PROXIMATE RESULT OF ANY WORK UNDERTAKEN UNDER THE TERMS OF THIS APPLICATION AND THE PERMIT OR PERMITS WHICH MAY BE GRANTED IN RESPONSE THERETO, AND THAT ALL SAID LIABILITIES ARE HEREBY ASSUMED BY THE APPLICANT. IT IS FURTHER AGREED THAT IF ANY TANK, PIPE, CONDUIT, DUCT OR TUNNEL PLACED IN THE EXCAVATION OR OBSTRUCTION FOR WHICH THIS PERMIT IS ISSUED INTERFERES WITH THE FUTURE USE OF THE HIGHWAY BY THE GENERAL PUBLIC, THEN THE APPLICANT AND HIS SUCCESSORS OR ASSIGNS WILL AT HIS OWN EXPENSE REMOVE SUCH TANK, PIPE, CONDUIT, DUCT, OR TUNNEL, OR RELOCATE AT A LOCATION DESIGNATED BY THE DIRECTOR OF PUBLIC WORKS OF THE CITY OF SANTA FE SPRINGS.

THIS PERMIT IS REVOCABLE AT THE OPTION OF THE DIRECTOR OF PUBLIC WORKS.

Description of Work: SOIL SAMPLING

Location: SEE ATTACHED MAP. 14106 Portlaney, 13938 Dinard, 13220 Cambias, [illegible]

Starting Date: 8-26-13 Completion Date: 8-30-13

City Business Lic. #: 019620000 Exp. Date: 2-28-2014 State Lic. #: 758173

Fees	Amount
Engineering & Inspection Fee	$202.00
Issuance Fee	$50.00
Insurance Certificate Review Fee	—
Traffic Control Review Fee	—
TOTAL FEE	$252.00

Issuance

The undersigned guarantees that if the backfill or street surface fails within two years from the time repairs are made, he shall pay the cost to the City for repairing said backfill or street surface.

- [ ] Signed: ________ (Owner or Authorized Agent)

Approved By: ________ Date: 7/31/13

Inspection

Date	Description of Work	No. Hrs.

Working Hours: Monday - Friday 9:00 AM to 3:30 PM
(Unless noted otherwise below)

- [ ] Monday - Friday: ______ AM to ______ PM
- [ ] Other: ______

Finance

	Amount
To be billed	
Work Order #: 110-397-4530-AC00	

Know what's **below.** **Call 811 before you dig.** www.digalert.org

NO DUMPING THIS DRAINS TO OCEAN

24 HOUR
NOTICE BEFORE STARTING WORK IS REQUIRED
Engr. Office: (562) 409-7540
Inspector: (562) 477-6029

** All Traffic Control plans shall comply with **
the latest MUTCD Standards or WATCH Manual

Note: This Permit is VOID if work is not started within 60 days and continued to completion. City must be notified 24 hours prior to the placement of any base or pavement surface.

07-31-13 10L8890 CHECK 252.00

APPENDIX B

SUBSURFACE SURVEYS & ASSOCIATES, INC.'S GEOPHYSICAL REPORT

SubSurface Surveys & Associates, Inc.
An Applied Geophysical Company

2075 Corte Del Nogal, Suite W
Carlsbad, California 92011

Office: (760) 476-0492
Fax: (760) 476-0493

August 14th, 2013

The Source Group, Inc.
1962 Freeman Avenue
Signal Hill, California 90755

Project Number: 13-338

Attn: **Paul Parmentier**

Re: Geophysical Survey, 13 Boreholes, multiple properties near Rosecrans Ave and Carmenita Rd, Santa Fe Springs, California.

This report is to present the results of our geophysical survey carried out over portions of multiple properties located near the intersection of Rosecrans Avenue and Carmenita Road in Santa Fe Springs, California (Figure 1), on August 7th, 2013. Purpose of the survey was to locate and identify, insofar as possible, piping, conduit, and other buried features that may exist in the vicinity of thirteen (13) specific locations designated for future drilling activities.

A combination of electromagnetic induction (EM), magnetometry, and ground penetrating radar (GPR) were applied to the search. A utility locator with line tracing capabilities was also brought to the field and used where risers exist onto which a signal could be impressed and traced.

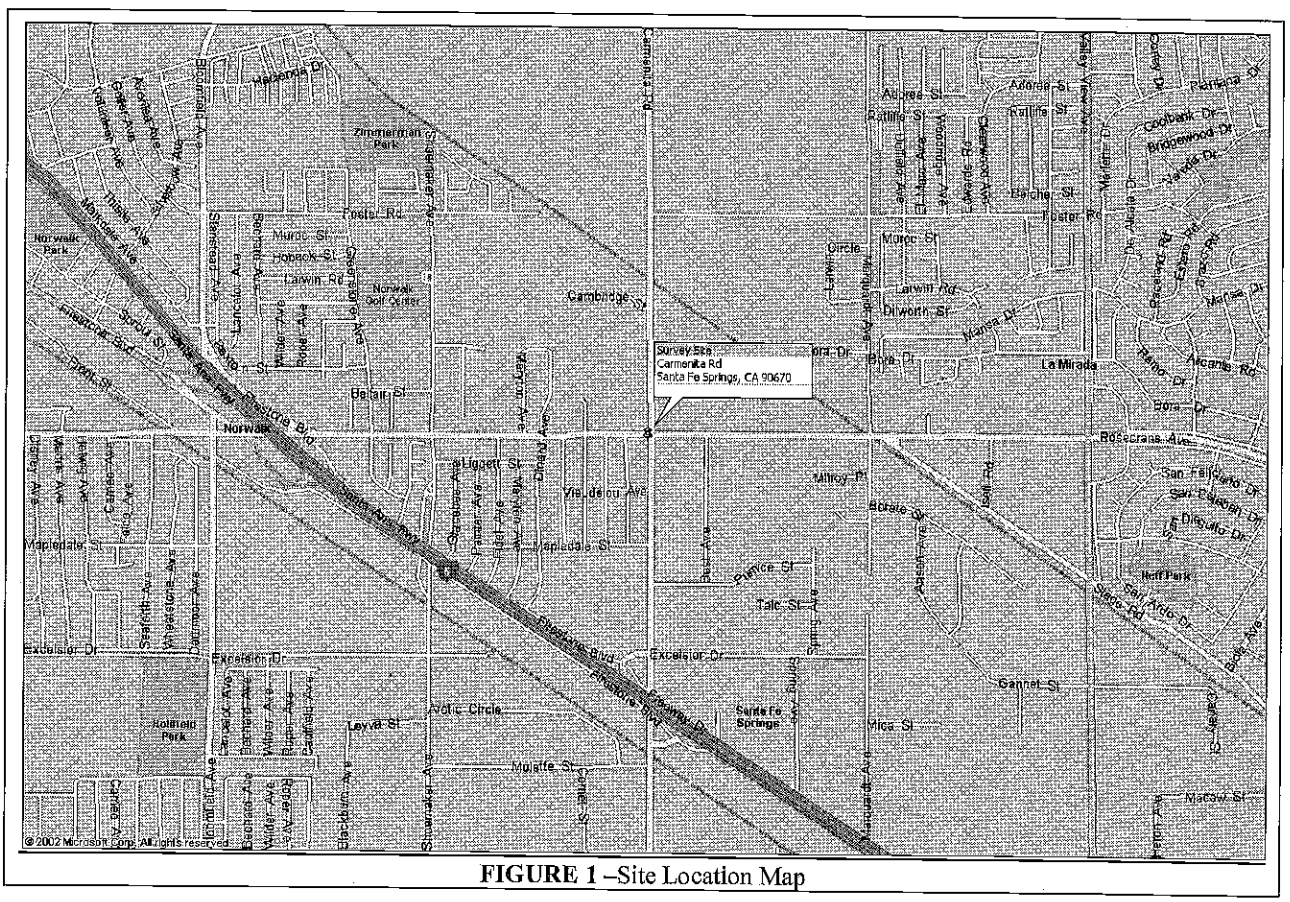


FIGURE 1 –Site Location Map

Survey Design – The area to be surveyed, along with the specific borehole locations, were indicated on a map provided in the field by the client. The magnetic gradiometer, line tracer, EM61, M-Scope and GPR were traversed systematically over each borehole along the eight lines of the standard search pattern (Figure 2), wherein, there are two sets of three parallel lines, mutually orthogonal, and two diagonals, all centered on the marked drill location. Adjacent parallel lines are approximately 5 feet apart, and each line is approximately 20 feet long, access permitting. Other traverses were taken, access permitting, for detailing and confirmation where anomalous conditions were found.

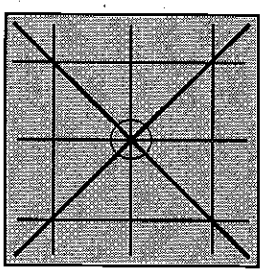


Figure 2: Standard search pattern around target

Hard copy of the EM data was not acquired, that is, discrete readings on the nodes of a grid were not recorded that could be put into a contoured map format. Rather, the instruments' meters were read continuously, and in real-time, during each traverse. This free-traversing method allowed for immediate detection of anomalous objects and facilitated the opportunity to investigate them further, without first having to download data in the office. The lack of hard copy for EM data sets does not degrade the quality of the survey in any way. Hard copy merely provides a basis for report documentation of these geophysical fields, if such documentation is needed.

The line tracers were used to impress signals onto pipes, generally through accessible risers and tracer wires when present, to delineate the lines' locations and orientations. The instruments were also used in passive mode, configured to detect 60 Hz electrical signals and other common radio-frequency signals.

A Geonic's model EM61 and a Fischer M-Scope was used for the EM sampling. A Sensors and Software Noggin Ground Penetrating Radar unit with a 500 MHz antenna produced the radar images. The magnetic gradiometer was a Schonstedt GA-52, and a Metrotech 9890 and RIDGID SR-60 SeekTech utility locator rounded out the tools applied.

Brief Description of the Geophysical Methods Applied - The line locator is used to passively detect energized high voltage electric lines and electrical conduit (50-60 Hz), VLF signals (14-22 kHz), as well as to actively trace other utilities. Where risers are present, the utility locator transmitter can be connected directly to the object, and a signal (9.8-82 kHz) is sent traveling along the conductor, pipe, conduit, etc. In the absence of a riser, the transmitter can be used to impress an input signal on the utility by induction. In either case, the receiver unit is tuned to the input signal, and is used to actively trace the signal along the pipe's surface projection.

The magnetic gradiometer has two flux gate magnetic fixed sensors that are passed closely to and over the ground. When not in close proximity to a magnetic object, that is, only in the earth's field, the instrument emits a sound signal at a low frequency. When the instrument passes over a buried iron or steel object, so that locally there is a high magnetic gradient, the frequency of the emitted sound increases. The frequency is a function of the gradient between the two sensors.

The EM61 instrument is a high resolution, time-domain device for detecting buried conductive objects. It consists of a powerful transmitter that generates a pulsed primary magnetic field when its coils are energized, which induces eddy currents in nearby conductive objects. The decay of the eddy currents, following the input pulse, is measured by the coils, which in turn serve as receiver coils. The decay rate is measured for two coils, mounted concentrically, one above the other. By making the measurements at a relatively long time interval (measured in milliseconds) after termination of the primary pulse, the response is nearly independent of the electrical conductivity of the ground. Thus, the instrument is a super-sensitive metal detector. Due to its unique coil arrangement, the response curve is a single well-defined positive peak directly over a buried conductive object. This facilitates quick and accurate location of targets.

The GPR instrument beams energy into the ground from its transducer/antenna, in the form of electromagnetic waves. A portion of this energy is reflected back to the antenna at a boundary in the subsurface across which there is an electrical contrast. The instrument produces a continuous record of the reflected energy as the antenna is traversed across the ground surface. The greater the electrical contrast, the higher the amplitude of the returned energy. The radar wave travels at a velocity unique to the material properties of the ground being investigated, and when these velocities are known, the two-way travel times can be converted to depth. The depth of penetration and image resolution produced are a function of ground electrical conductivity and dielectric constant.

The M-Scope device energizes the ground by producing an alternating primary magnetic field with AC current in a transmitting coil. If conducting materials are within the area of influence of the primary field, AC eddy currents are induced to flow in the conductors. A receiving coil senses the secondary magnetic field produced by these eddy currents, and outputs the response to a meter in the form of ground conductivity values for the M-Scope. The strength of the secondary field is a function of the conductivity of the object, say a pipe, tank or cluster of drums, its size, and its depth and position relative to the instrument's two coils. Conductive objects, to a depth of approximately 7 feet for the M-Scope are sensed. The devices are also somewhat focused; that is, they are more sensitive to conductors below the instrument than they are to conductors off to the side.

Interpretation and Conclusions - The interpretation took place in real time as the survey progressed, and accordingly, the findings of our investigation were marked on the ground cover with spray chalk paint at the site, and further documented with site photographs of each surveyed borehole location (Figures 3-15).

The EM and magnetic instruments were effective at locating and delineating metallic objects and utilities over the search area. GPR was useful at detecting both metallic and non-metallic lines and utilities. According to principles of physics, radar penetration is a function of soil conductivity and dielectric constant. At this site, local conditions were unfavorable for radar penetration due to the nature of the soil and materials covering the survey areas. This resulted in radar penetration down to approximately 2.0 feet bgs.

Piping and utilities detected during the survey were marked with spray chalk paint on the ground cover, using green for sanitary sewer/storm drain, blue for water, orange for communications, red for electric, yellow for gas and white for lines of unknown utility type.

Once all detectable buried cultural objects were marked and accounted for, our findings were discussed in the field with the client, at the conclusion of the survey. After our findings were discussed each borehole was then repositioned, if applicable, to be at least three feet from any line and/or utility detected in the vicinity. The boreholes were then marked cleared by Subsurface Surveys and Associates with a white circle, a white feather marker and a yellow "SSS". Please refer to the photographs along with the markings in the field for a better

representation of our findings.

Limitations and Further Recommendations - It should be understood that limitations inherent in geophysical instruments and/or surveying techniques exist at all sites, and nearly all sites exhibit conditions under which instruments might not perform optimally. Consequently, the detection of buried objects in all circumstances **cannot be guaranteed**. Such limitations are numerous and include, but are not limited to, rebar-reinforced ground cover, abrupt changes in ground cover type, above-ground obstacles preventing full traverses or traverses in one direction only, above-ground conductive objects interfering with instrument signal, nearby powerlines or EM transmitters, highly conductive background soil conditions, limiting GPR penetration, non-metallic targets, shallower or larger objects shielding deeper or smaller targets, tracing signal jumping from one line to another, and inaccessible risers, cleanouts, valve boxes, and manholes. If one or more geophysical instrument is rendered ineffective and cannot be utilized, the quality of the survey can be somewhat degraded.

For the above reasons, and in the interest of maximum safety, we encourage our clients to take advantage of Underground Service Alert (USA), Dig Alert, or other similar services, when possible. Furthermore, we recommend hand-auguring and the use of a drilling method known as air knifing and vacuum extraction, when feasible or if applicable to this project. These methods may significantly limit damage to underground pipes, conduits, and utilities that might not have been detectable during the course of this survey. Please bear in mind, that geophysical surveying is only one of several levels of protection that is available to our clients.

SubSurface Surveys may include maps in some reports. While they are an accurate general representation of the site and our findings, they are not of engineering quality (i.e., measured and mapped by a licensed land surveyor).

SubSurface Surveys and Associates makes no guarantee either expressed or implied regarding the accuracy of the findings and interpretations present. And, in no event will SubSurface Surveys and Associates be liable for any direct, indirect, special, incidental, or consequential damages resulting from interpretations and opinions presented herewith.

All data acquired in these surveys are in confidential file in this office, and are available for review by your staff, or by us at your request, at any time. We appreciate the opportunity to participate in this project. Please call, if there are questions.

Bret Herman
Staff Geophysicist

Travis Crosby, GP# 1044
Staff Geophysicist

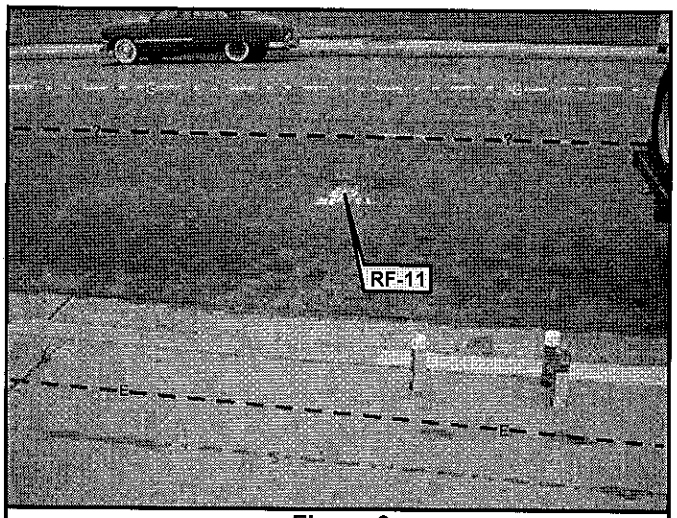


Figure 3

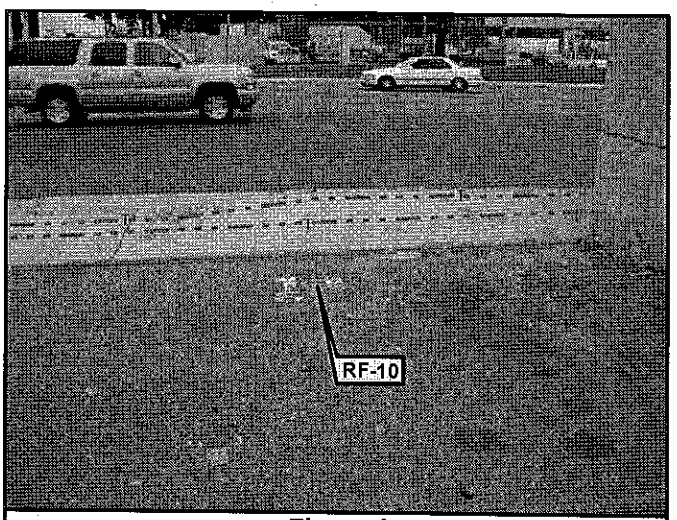


Figure 4

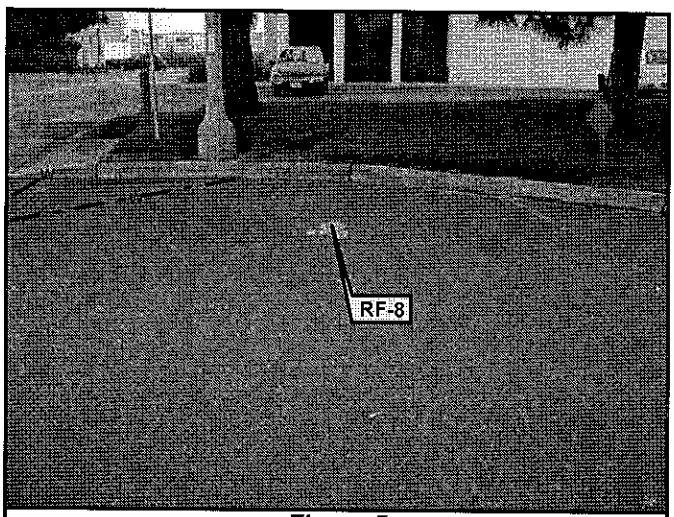
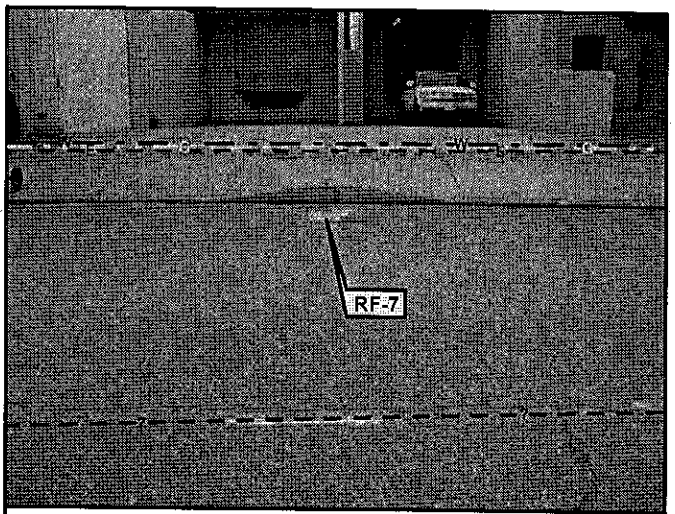


Figure 5



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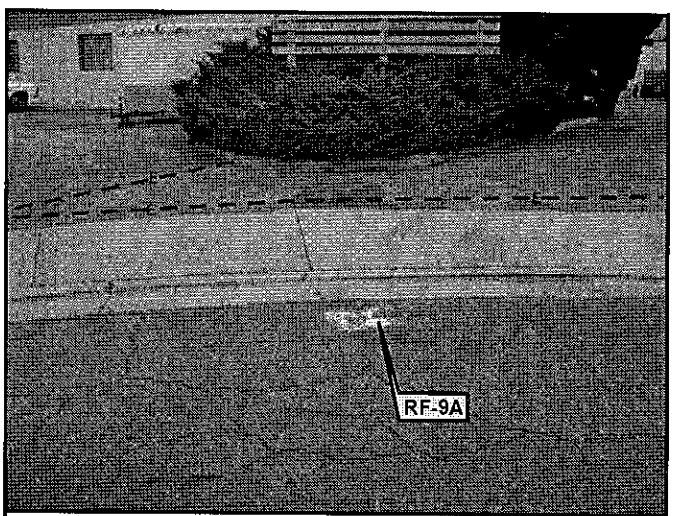

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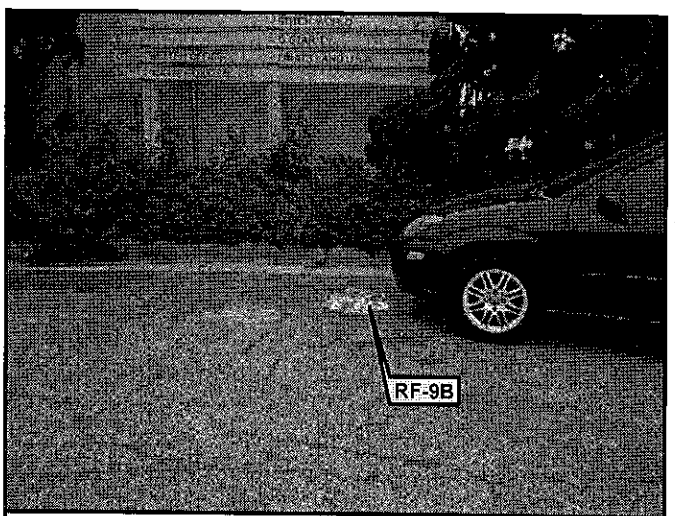

Figure 8

Sub Surface Surveys	SITE: multiple properties near Rosecrans Ave and Carmenita Rd Santa Fe Springs, California	TITLE: Site Photographs	SURVEY DATE: August 7th, 2013
		PREPARED FOR: The Source Group	SSS PROJECT NO: 13-338

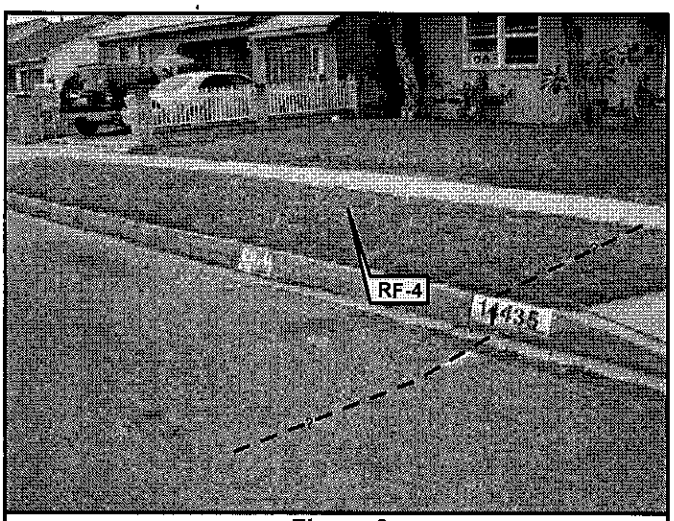

Figure 9

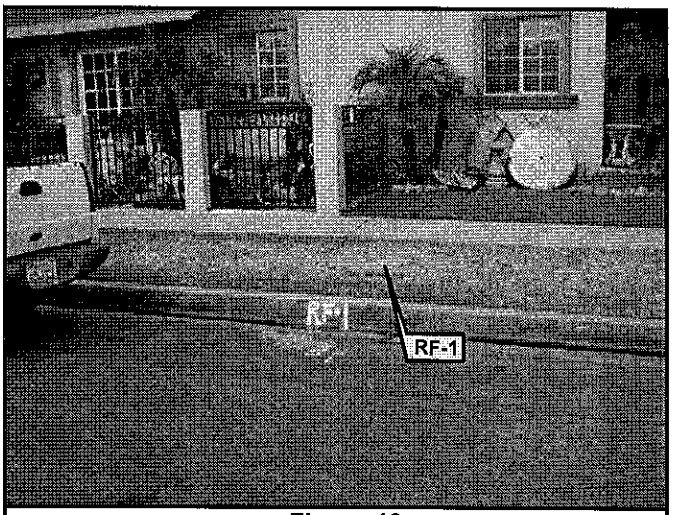

Figure 10

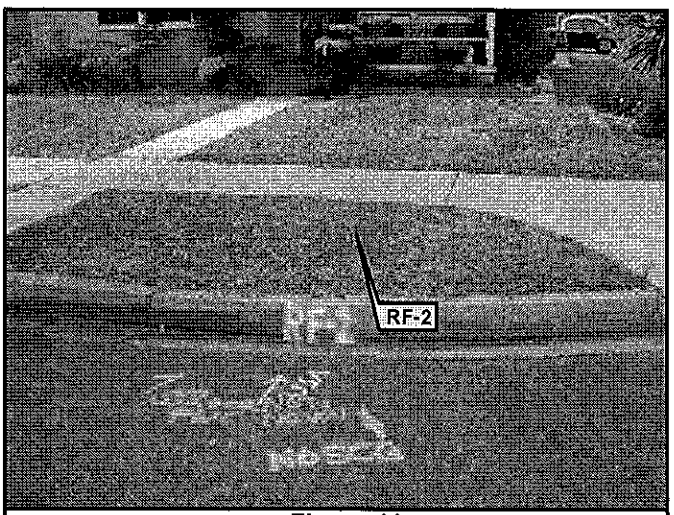

Figure 11

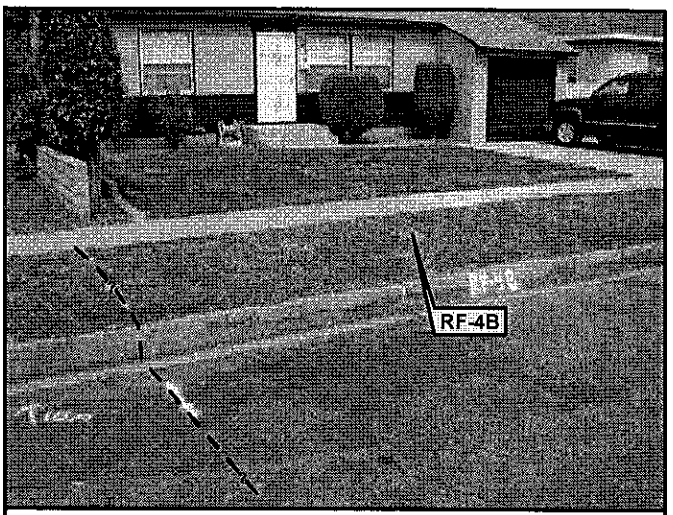

Figure 12

Figure 13

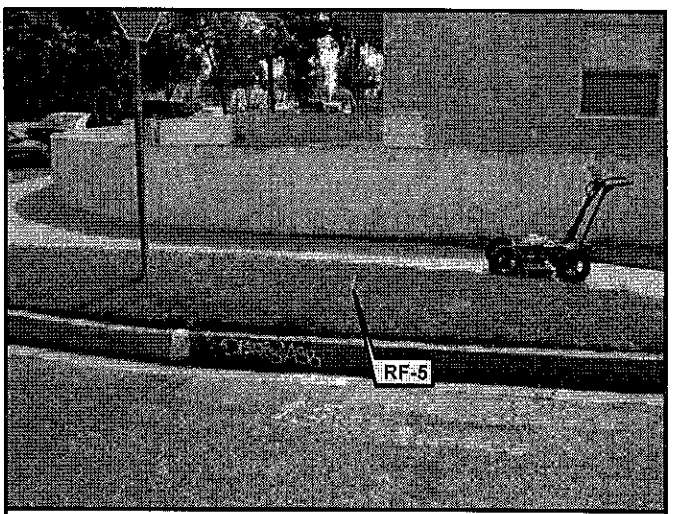

Figure 14

Sub Surface Surveys	SITE: multiple properties near Rosecrans Ave and Carmenita Rd Santa Fe Springs, California	TITLE: Site Photographs	SURVEY DATE: August 7th, 2013
		PREPARED FOR: The Source Group	SSS PROJECT NO: 13-338

Figure 15

NO PHOTO

NO PHOTO

NO PHOTO

NO PHOTO

NO PHOTO

Sub Surface Surveys	SITE: multiple properties near Rosecrans Ave and Carmenita Rd Santa Fe Springs, California	TITLE: Site Photographs	SURVEY DATE: August 7th, 2013
		PREPARED FOR: The Source Group	SSS PROJECT NO: 13-338

APPENDIX C

OPTIMAL TECHNOLOGY'S SOIL VAPOR SAMPLING SUMMARY and ANALYTICAL REPORT and PTS SOIL TESTING RESULTS

OPTIMAL TECHNOLOGY
Specializing in Environmental Field Services

August 22, 2013

Mr. Paul Parmentier
The Source Group, Inc.
1962 Freeman Avenue
Signal Hill, CA 90755

Dear Mr. Parmentier:

This letter presents the results of the soil vapor investigation conducted by Optimal Technology (Optimal), for The Source Group, Inc. on August 19-21, 2013. The study was performed at and around the Rosecrans / Fidel Area, Norwalk, California.

Optimal was contracted to perform a soil vapor survey at this site to screen for possible chlorinated solvents and aromatic hydrocarbons. The primary objective of this soil vapor investigation was to determine if soil vapor contamination is present in the subsurface soil.

Gas Sampling Method

Gas sampling was performed by hydraulically pushing soil gas probes to a depth of 5.0-15.0 feet below ground surface (bgs). One-quarter inch Nylaflow tubing was installed at depth in a one-foot sand pack. Hydrated bentonite filled the hole from the top of the sand pack to the surface. An electric rotary hammer drill was used to drill a 1.0-inch diameter hole through the overlying surface to allow probe placement when required. The same electric hammer drill was used to push probes in areas of resistance during placement.

At each sampling location an electric vacuum pump set to draw 0.2 liters per minute (L/min) of soil vapor was attached to the probe and purged prior to sample collection. Vapor samples were obtained in SGE gas-tight syringes by drawing the sample through a luer-lock connection which connects the sampling probe and the vacuum pump. Samples were immediately injected into the gas chromatograph/purge and trap after collection. New tubing was used at each sampling point to prevent cross contamination.

All analyses were performed on a laboratory grade Hewlett Packard model 5890 Series II gas chromatograph equipped with a Hewlett Packard model 5971 Mass Spectra Detector and Tekmar LSC 2000 Purge and Trap. An SGE capillary column using helium as the carrier gas was used to perform all analysis. All results were collected on a personal computer utilizing Hewlett Packard's 5971 MS and chromatographic data collection and handling system. Additionally, a Landtec GEM 2000 Plus was used to test for Methane and Hydrogen Sulfide.

Quality Assurance

5-Point Calibration
The initial five point calibration consisted of 20, 50, 100, 200 and 500 ul injections of the calibration standard. A calibration factor on each analyte was generated using a best fit line method using the HP data system. If the r^2 factor generated from this line was not greater than 0.990, an additional five point calibration would have been performed. Method reporting limits were calculated to be 0.01-1.0 micrograms per Liter (ug/L) for the individual compounds.

A daily calibration check and end of run calibration check was performed by preparing a calibration solution from a pre-mixed standard supplied by CPI International. The standard contained common halogenated solvents and aromatic hydrocarbons. The individual compound concentrations in the standards ranged between 0.025 nanograms per microliter (ng/ul) and 0.25 ng/ul.

Sample Replicates
A replicate analysis (duplicate) was run to evaluate the reproducibility of the sampling system and instrument. The difference between samples did not vary more than 20%.

Equipment Blanks
Blanks were run at the beginning of each workday and after calibrations. The blanks were collected using an ambient air sample. These blanks checked the septum, syringe, GC column, GC detector and the ambient air. Contamination was not found in any of the blanks analyzed during this investigation. Blank results are given along with the sample results.

Tracer Gas
A tracer gas was applied to the soil gas probes at each point of connection in which ambient air could enter the sampling system. These points include the top of the sampling probe where the tubing meets the probe connection and the surface bentonite seals. Isobutane was used as the tracer gas, found in common shaving cream. No Isobutane was found in any of the samples collected.

Purge Volume Test
"Purge volume" is the total internal volume of the sampling probe. Three separate purge volumes were tested: 1, 3, and 10 volumes. It was found that 3 volumes were best for this soil vapor survey.

Scope of Work

To achieve the objective of this investigation a total of 39 vapor samples were collected from 11 locations at the site. Sampling depths, vacuum readings, purge volume and sampling volumes are given on the analytical results page. All the collected vapor samples were analyzed on-site using Optimal's mobile laboratory.

Subsurface Conditions

Subsurface soil conditions at this site were predominately silty-sand from ground surface to 15.0 feet bgs. These soil conditions offered sampling flows at 0" water vacuum. Depth to groundwater was unknown at the time of the investigation.

Results

See the table of analytical results included with this report.

Disclaimer

All conclusions presented in this letter are based solely on the information collected by the soil vapor survey conducted by Optimal Technology. Soil vapor testing is only a subsurface screening tool and does not represent actual contaminant concentrations in either the soil and/or groundwater. We enjoyed working with you on this project and look forward to future projects. If you have any questions please contact me at (877) 764-5427.

Sincerely,

Attila Baly
Project Manager

OPTIMAL TECHNOLOGY
Specializing in Environmental Field Services

SOIL VAPOR RESULTS

Site Name: Rosecrans / Fidel Area, Norwalk, CA
Analyst: A. Baly **Collector:** A. Baly
Method: Modified EPA 8260B

Lab Name: Optimal Technology
Inst. ID: HP-5890 Series II
Detector: HP-5971 Mass Spectrometer

Date: 8/19/13

SAMPLE ID	BLANK-1	RF-11-5' PT1V	RF-11-5' PT3V	RF-11-5' PT10V	RF-11-10'	RF-11-15'	RF-8-5'	RF-8-10'
Sampling Depth (Ft.)	N/A	5.0	5.0	5.0	10.0	15.0	5.0	10.0
Purge Volume (ml)	N/A	55	160	550	245	325	160	245
Vacuum (in. of Water)	N/A	0	0	0	0	0	0	0
Injection Volume (ul)	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000
Dilution Factor	1	1	1	1	1	1	1	1

COMPOUND	REP. LIMIT	CONC (ug/L)	CONC (ug/L)	CONC (ug/L)	CONC (ug/L)	CONC (ug/L)	CONC (ug/L)	CONC (ug/L)	CONC (ug/L)
Benzene	0.03	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	1.00	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	0.40	ND	ND	ND	ND	ND	ND	ND	ND
m/p-Xylene	1.00	ND	ND	ND	ND	ND	ND	ND	ND
o-Xylene	1.00	ND	ND	ND	ND	ND	ND	ND	ND
MTBE	1.00	ND	ND	ND	ND	ND	ND	ND	ND
Isobutane (Tracer Gas)	1.00	ND	ND	ND	ND	ND	ND	ND	ND

Note: ND = Below Listed Reporting Limit; PT3V = Purge Test Volume

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OPTIMAL TECHNOLOGY
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SOIL VAPOR RESULTS

Site Name: Rosecrans / Fidel Area, Norwalk, CA
Analyst: A. Baly **Collector:** A. Baly
Method: Modified EPA 8260B

Lab Name: Optimal Technology
Inst. ID: HP-5890 Series II
Detector: HP-5971 Mass Spectrometer

Date: 8/19/13

SAMPLE ID	RF-8-15'	RF-7-5'	RF-7-10'	RF-7-10' Dil.	RF-7-15'	RF-9-5'	RF-9-10'	RF-9-15'
Sampling Depth (Ft.)	15.0	5.0	10.0	10.0	15.0	5.0	10.0	15.0
Purge Volume (ml)	325	160	245	245	325	160	245	325
Vacuum (in. of Water)	0	0	0	0	0	0	0	0
Injection Volume (ul)	50,000	50,000	50,000	1,000	1,000	50,000	50,000	50,000
Dilution Factor	1	1	1	50	50	1	1	1

COMPOUND	REP. LIMIT	CONC (ug/L)	CONC (ug/L)	CONC (ug/L)	CONC (ug/L)	CONC (ug/L)	CONC (ug/L)	CONC (ug/L)	CONC (ug/L)
Benzene	0.03	ND	**0.72**	**0.97**	**0.91**	**1.14**	ND	ND	ND
Toluene	1.00	ND	**ND**	ND	ND	ND	ND	ND	ND
Ethylbenzene	0.40	**ND**	**0.62**	**23.82**	**23.11**	**61.72**	ND	ND	ND
m/p-Xylene	1.00	ND	ND	ND	ND	ND	ND	ND	ND
o-Xylene	1.00	ND	ND	ND	ND	ND	ND	ND	ND
MTBE	1.00	ND	ND	ND	ND	ND	ND	ND	ND
Isobutane (Tracer Gas)	1.00	ND	ND	ND	ND	ND	ND	ND	ND

Note: ND = Below Listed Reporting Limit; OS = Off the electronic scale of detector

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SOIL VAPOR RESULTS

Site Name: Rosecrans / Fidel Area, Norwalk, CA
Analyst: A. Baly **Collector:** A. Baly
Method: Modified EPA 8260B

Lab Name: Optimal Technology
Inst. ID: HP-5890 Series II
Detector: HP-5971 Mass Spectrometer

Date: 8/19/13

SAMPLE ID	RF-9-15' Dup							
Sampling Depth (Ft.)	15.0							
Purge Volume (ml)	325							
Vacuum (In. of Water)	0							
Injection Volume (ul)	50,000							
Dilution Factor	1							

COMPOUND	REP. LIMIT	CONC (ug/L)							
Benzene	0.03	ND							
Toluene	1.00	ND							
Ethylbenzene	0.40	ND							
m/p-Xylene	1.00	ND							
o-Xylene	1.00	ND							
MTBE	1.00	ND							
Isobutane (Tracer Gas)	1.00	ND							

Note: ND = Below Listed Reporting Limit

OPTIMAL TECHNOLOGY
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SOIL VAPOR RESULTS

Site Name: Rosecrans / Fidel Area, Norwalk, CA
Analyst: A. Baly **Collector:** A. Baly
Method: Modified EPA 8260B

Lab Name: Optimal Technology
Inst. ID: HP-5890 Series II
Detector: HP-5971 Mass Spectrometer

Date: 8/20/13

SAMPLE ID	BLANK-2	RF-10-5'	RF-10-10'	RF-10-15'	RF-5-5'	RF-5-10'	RF-5-15'	RF-1-5'
Sampling Depth (Ft.)	N/A	5.0	10.0	15.0	5.0	10.0	15.0	5.0
Purge Volume (ml)	N/A	160	245	325	160	245	325	160
Vacuum (in. of Water)	N/A	0	0	0	0	0	0	0
Injection Volume (ul)	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000
Dilution Factor	1	1	1	1	1	1	1	1

COMPOUND	REP. LIMIT	CONC (ug/L)	CONC (ug/L)	CONC (ug/L)	CONC (ug/L)	CONC (ug/L)	CONC (ug/L)	CONC (ug/L)	CONC (ug/L)
Benzene	0.03	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	1.00	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	0.40	ND	ND	ND	ND	ND	ND	ND	ND
m/p-Xylene	1.00	ND	ND	ND	ND	ND	ND	ND	ND
o-Xylene	1.00	ND	ND	ND	ND	ND	ND	ND	ND
MTBE	1.00	ND	ND	ND	ND	ND	ND	ND	ND
Isobutane (Tracer Gas)	1.00	ND	ND	ND	ND	ND	ND	ND	ND

Note: ND = Below Listed Reporting Limit

OPTIMAL TECHNOLOGY
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SOIL VAPOR RESULTS

Site Name: Rosecrans / Fidel Area, Norwalk, CA
Analyst: A. Baly **Collector:** A. Baly
Method: Modified EPA 8260B

Lab Name: Optimal Technology
Inst. ID: HP-5890 Series II
Detector: HP-5971 Mass Spectrometer

Date: 8/20/13
Page: 5 of 7

SAMPLE ID	RF-1-10'	RF-1-15'	RF-4-5'	RF-4-10'	RF-4-15'	RF-4-15' Dup		
Sampling Depth (Ft.)	10.0	15.0	5.0	10.0	15.0	15.0		
Purge Volume (ml)	245	325	160	245	325	325		
Vacuum (in. of Water)	0	0	0	0	0	0		
Injection Volume (ul)	50,000	50,000	50,000	50,000	50,000	50,000		
Dilution Factor	1	1	1	1	1	1		

COMPOUND	REP. LIMIT	CONC (ug/L)	CONC (ug/L)	CONC (ug/L)	CONC (ug/L)	CONC (ug/L)	CONC (ug/L)		
Benzene	0.03	ND	ND	ND	ND	ND	ND		
Toluene	1.00	ND	ND	ND	ND	ND	ND		
Ethylbenzene	0.40	ND	ND	ND	ND	ND	ND		
m/p-Xylene	1.00	ND	ND	ND	ND	ND	ND		
o-Xylene	1.00	ND	ND	ND	ND	ND	ND		
MTBE	1.00	ND	ND	ND	ND	ND	ND		
Isobutane (Tracer Gas)	1.00	ND	ND	ND	ND	ND	ND		

Note: ND = Below Listed Reporting Limit

OPTIMAL TECHNOLOGY
Specializing in Environmental Field Services

SOIL VAPOR RESULTS

Site Name: Rosecrans / Fidel Area, Norwalk, CA
Analyst: A. Baly **Collector:** A. Baly
Method: Modified EPA 8260B

Lab Name: Optimal Technology
Inst. ID: HP-5890 Series II
Detector: HP-5971 Mass Spectrometer

Date: 8/21/13

SAMPLE ID	BLANK-3	RF-2-5'	RF-2-10'	RF-2-15'	RF-6-5'	RF-6-10'	RF-6-15'	RF-3-5'
Sampling Depth (Ft.)	N/A	5.0	10.0	15.0	5.0	10.0	15.0	5.0
Purge Volume (ml)	N/A	160	245	325	160	245	325	160
Vacuum (in. of Water)	N/A	0	0	0	0	0	0	0
Injection Volume (ul)	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000
Dilution Factor	1	1	1	1	1	1	1	1

COMPOUND	REP. LIMIT	CONC (ug/L)	CONC (ug/L)	CONC (ug/L)	CONC (ug/L)	CONC (ug/L)	CONC (ug/L)	CONC (ug/L)	CONC (ug/L)
Benzene	0.03	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	1.00	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	0.40	ND	ND	ND	ND	ND	ND	ND	ND
m/p-Xylene	1.00	ND	ND	ND	ND	ND	ND	ND	ND
o-Xylene	1.00	ND	ND	ND	ND	ND	ND	ND	ND
MTBE	1.00	ND	ND	ND	ND	ND	ND	ND	ND
Isobutane (Tracer Gas)	1.00	ND	ND	ND	ND	ND	ND	ND	ND

Note: ND = Below Listed Reporting Limit

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SOIL VAPOR RESULTS

Site Name: Rosecrans / Fidel Area, Norwalk, CA
Analyst: A. Baly **Collector:** A. Baly
Method: Modified EPA 8260B

Lab Name: Optimal Technology
Inst. ID: HP-5890 Series II
Detector: HP-5971 Mass Spectrometer

Date: 8/21/13

SAMPLE ID	RF-3-10'	RF-3-15'	RF-3-15' Dup					
Sampling Depth (Ft.)	10.0	15.0	15.0					
Purge Volume (ml)	245	325	325					
Vacuum (in. of Water)	0	0	0					
Injection Volume (ul)	50,000	50,000	50,000					
Dilution Factor	1	1	1					

COMPOUND	REP. LIMIT	CONC (ug/L)	CONC (ug/L)	CONC (ug/L)					
Benzene	0.03	ND	ND	ND					
Toluene	1.00	ND	ND	ND					
Ethylbenzene	0.40	ND	ND	ND					
m/p-Xylene	1.00	ND	ND	ND					
o-Xylene	1.00	ND	ND	ND					
MTBE	1.00	ND	ND	ND					
Isobutane (Tracer Gas)	1.00	ND	ND	ND					

Note: ND = Below Listed Reporting Limit

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OPTIMAL TECHNOLOGY
Specializing in Environmental Field Services

SOIL VAPOR RESULTS

Site Name: Rosecrans / Fidel Area, Norwalk, CA
Analyst: A. Baly **Collector:** A. Baly
Method: Modified EPA 8260B

Lab Name: Optimal Technology
Inst. ID: HP-5890 Series II
Detector: HP-5971 Mass Spectrometer

Date: 8/19/13

SAMPLE ID	BLANK-1	RF-11-5' PT1V	RF-11-5' PT3V	RF-11-5' PT10V	RF-8-5'	RF-7-5'	RF-9-5'	
Sampling Depth (Ft.)	N/A	5.0	5.0	5.0	5.0	5.0	5.0	
Purge Volume (ml)	N/A	55	160	550	160	160	160	
Vacuum (in. of Water)	N/A	0	0	0	0	0	0	
Injection Volume (ul)	50,000	50,000	50,000	50,000	50,000	50,000	50,000	
Dilution Factor	1	1	1	1	1	1	1	

COMPOUND	REP. LIMIT	CONC (ug/L)	CONC (ug/L)	CONC (ug/L)	CONC (ug/L)	CONC (ug/L)	CONC (ug/L)	CONC (ug/L)	
TPH-g	5.00	ND	ND	ND	ND	ND	**368.18**	ND	
Isobutane (Tracer Gas)	1.00	ND	ND	ND	ND	ND	ND	ND	

Note: ND = Below Listed Reporting Limit; PT3V = Purge Test Volume

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OPTIMAL TECHNOLOGY
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SOIL VAPOR RESULTS

Site Name: Rosecrans / Fidel Area, Norwalk, CA
Analyst: A. Baly **Collector:** A. Baly
Method: Modified EPA 8260B

Lab Name: Optimal Technology
Inst. ID: HP-5890 Series II
Detector: HP-5971 Mass Spectrometer

Date: 8/20/13

SAMPLE ID	BLANK-2	RF-10-5'	RF-5-5'	RF-1-5'	RF-4-5'			
Sampling Depth (Ft.)	N/A	5.0	5.0	5.0	5.0			
Purge Volume (ml)	N/A	160	160	160	160			
Vacuum (in. of Water)	N/A	0	0	0	0			
Injection Volume (ul)	50,000	50,000	50,000	50,000	50,000			
Dilution Factor	1	1	1	1	1			

COMPOUND	REP. LIMIT	CONC (ug/L)	CONC (ug/L)	CONC (ug/L)	CONC (ug/L)	CONC (ug/L)			
TPH-g	5.00	ND	ND	ND	ND	ND			
Isobutane (Tracer Gas)	1.00	ND	ND	ND	ND	ND			

Note: ND = Below Listed Reporting Limit

OPTIMAL TECHNOLOGY
Specializing in Environmental Field Services

SOIL VAPOR RESULTS

Site Name: Rosecrans / Fidel Area, Norwalk, CA
Analyst: A. Baly **Collector:** A. Baly
Method: Modified EPA 8260B

Lab Name: Optimal Technology
Inst. ID: HP-5890 Series II
Detector: HP-5971 Mass Spectrometer

Date: 8/21/13

SAMPLE ID	BLANK-3	RF-2-5'	RF-6-5'	RF-3-5'				
Sampling Depth (Ft.)	N/A	5.0	5.0	5.0				
Purge Volume (ml)	N/A	160	160	160				
Vacuum (in. of Water)	N/A	0	0	0				
Injection Volume (ul)	50,000	50,000	50,000	50,000				
Dilution Factor	1	1	1	1				

COMPOUND	REP. LIMIT	CONC (ug/L)	CONC (ug/L)	CONC (ug/L)	CONC (ug/L)				
TPH-g	5.00	ND	ND	ND	ND				
Isobutane (Tracer Gas)	1.00	ND	ND	ND	ND				

Note: ND = Below Listed Reporting Limit

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OPTIMAL TECHNOLOGY
Specializing in Environmental Field Services

SOIL VAPOR RESULTS

Site Name: Rosecrans / Fidel Area, Norwalk, CA
Analyst: A. Baly **Collector:** A. Baly

Lab Name: Optimal Technology
Inst. ID: Landtec GEM2000 Plus

Date: 8/19/13

SAMPLE ID	BLANK-1	RF-11-5' PT1V	RF-11-5' PT3V	RF-11-5' PT10V	RF-8-5'	RF-7-5'	RF-9-5'	
Sampling Depth (Ft.)	N/A	5.0	5.0	5.0	5.0	5.0	5.0	
Purge Volume (ml)	N/A	55	160	550	160	160	160	
Vacuum (in. of Water)	N/A	0	0	0	0	0	0	

COMPOUND	REP. LIMIT	CONC (PPM)	CONC (PPM)	CONC (PPM)	CONC (PPM)	CONC (PPM)	CONC (PPM)	CONC (PPM)	
Hydrogen Sulfide	1	ND	ND	ND	ND	ND	**35**	ND	
Methane	1000	ND	ND	ND	ND	ND	**163,000**	ND	

Note: ND = Below Listed Reporting Limit; PT3V = Purge Test Volume

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OPTIMAL TECHNOLOGY
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SOIL VAPOR RESULTS

Site Name: Rosecrans / Fidel Area, Norwalk, CA
Analyst: A. Baly **Collector:** A. Baly

Lab Name: Optimal Technology
Inst. ID: Landtec GEM2000 Plus

Date: 8/20/13

SAMPLE ID	BLANK-2	RF-10-5'	RF-5-5'	RF-1-5'	RF-4-5'			
Sampling Depth (Ft.)	N/A	5.0	5.0	5.0	5.0			
Purge Volume (ml)	N/A	160	160	160	160			
Vacuum (in. of Water)	N/A	0	0	0	0			

COMPOUND	REP. LIMIT	CONC (PPM)	CONC (PPM)	CONC (PPM)	CONC (PPM)	CONC (PPM)			
Hydrogen Sulfide	1	ND	ND	ND	ND	ND			
Methane	1000	ND	ND	ND	ND	ND			

Note: ND = Below Listed Reporting Limit

OPTIMAL TECHNOLOGY
Specializing in Environmental Field Services

SOIL VAPOR RESULTS

Site Name: Rosecrans / Fidel Area, Norwalk, CA
Analyst: A. Baly **Collector:** A. Baly

Lab Name: Optimal Technology
Inst. ID: Landtec GEM2000 Plus

Date: 8/21/13

SAMPLE ID	BLANK-3	RF-2-5'	RF-6-5'	RF-3-5'				
Sampling Depth (Ft.)	N/A	5.0	5.0	5.0				
Purge Volume (ml)	N/A	160	160	160				
Vacuum (in. of Water)	N/A	0	0	0				

COMPOUND	REP. LIMIT	CONC (PPM)	CONC (PPM)	CONC (PPM)	CONC (PPM)				
Hydrogen Sulfide	1	ND	ND	ND	ND				
Methane	1000	ND	ND	ND	ND				

Note: ND = Below Listed Reporting Limit

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SOIL VAPOR RESULTS

Site Name: Rosecrans / Fidel Area, Norwalk, CA
Analyst: A. Baly **Collector:** A. Baly

Lab Name: Optimal Technology
Inst. ID: Landtec GEM2000 Plus

Date: 8/19/13

SAMPLE ID	BLANK-1	RF-11-5' PT1V	RF-11-5' PT3V	RF-11-5' PT10V	RF-8-5'	RF-7-5'	RF-9-5'	
Sampling Depth (Ft.)	N/A	5.0	5.0	5.0	5.0	5.0	5.0	
Purge Volume (ml)	N/A	55	160	550	160	160	160	
Vacuum (in. of Water)	N/A	0	0	0	0	0	0	

COMPOUND	REP. LIMIT	CONC (%)	CONC (%)	CONC (%)	CONC (%)	CONC (%)	CONC (%)	CONC (%)	
Carbon Dioxide	0.1%	**0.1%**	**1.9%**	**1.9%**	**1.9%**	**12.4%**	**8.1%**	**6.0%**	
Oxygen	0.1%	**21.9%**	**17.5%**	**17.5%**	**17.5%**	**6.0%**	**12.6%**	**12.8%**	

Note: ND = Below Listed Reporting Limit; PT3V = Purge Test Volume

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Analyst: A. Baly **Collector:** A. Baly

Lab Name: Optimal Technology
Inst. ID: Landtec GEM2000 Plus

Date: 8/20/13

SAMPLE ID	BLANK-2	RF-10-5'	RF-5-5'	RF-1-5'	RF-4-5'		
Sampling Depth (Ft.)	N/A	5.0	5.0	5.0	5.0		
Purge Volume (ml)	N/A	160	160	160	160		
Vacuum (in. of Water)	N/A	0	0	0	0		

COMPOUND	REP. LIMIT	CONC (%)	CONC (%)	CONC (%)	CONC (%)	CONC (%)		
Carbon Dioxide	0.1%	**0.1%**	**1.6%**	**1.7%**	**1.8%**	**1.9%**		
Oxygen	0.1%	**21.9%**	**16.8%**	**18.9%**	**19.2%**	**19.0%**		

Note: ND = Below Listed Reporting Limit

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SOIL VAPOR RESULTS

Site Name: Rosecrans / Fidel Area, Norwalk, CA
Analyst: A. Baly **Collector:** A. Baly

Lab Name: Optimal Technology
Inst. ID: Landtec GEM2000 Plus

Date: 8/21/13

SAMPLE ID	BLANK-3	RF-2-5'	RF-6-5'	RF-3-5'			
Sampling Depth (Ft.)	N/A	5.0	5.0	5.0			
Purge Volume (ml)	N/A	160	160	160			
Vacuum (in. of Water)	N/A	0	0	0			

COMPOUND	REP. LIMIT	CONC (%)	CONC (%)	CONC (%)	CONC (%)			
Carbon Dioxide	0.1%	**0.1%**	**2.1%**	**1.6%**	**3.0%**			
Oxygen	0.1%	**21.9%**	**19.2%**	**19.7%**	**17.6%**			

Note: ND = Below Listed Reporting Limit

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PTS Laboratories, Inc.

8100 Secura Way • Santa Fe Springs, CA 90670
Telephone (562) 347-2500 • Fax (562) 907-3610

September 11, 2013

Paul Parmentier
The Source Group, Inc.
1962 Freeman Ave
Signal Hill, CA 90755

Re: PTS File No: 43539
Physical Properties Data
Golden West Refinery Co.; 04-GWRC-004

Dear Mr. Parmentier:

Please find enclosed report for Physical Properties analyses conducted upon samples received from your Golden West Refinery Co.; 04-GWRC-004 project. All analyses were performed by applicable ASTM, EPA, or API methodologies. An electronic version of the report has previously been sent to your attention via the internet. The samples are currently in storage and will be retained for thirty days past completion of testing at no charge. Please note that the samples will be disposed of at that time. You may contact me regarding storage, disposal, or return of the samples.

PTS Laboratories appreciates the opportunity to be of service. If you have any questions or require additional information, please contact Rachel Spitz at (562) 347-2504.

Sincerely,
PTS Laboratories, Inc.

Michael Mark Brady, P.G.
District Manager

Encl.

PTS Laboratories

Project Name: Golden West Refinery Co.
Project Number: 04-GWRC-004

PTS File No: 43539
Client: The Source Group, Inc.

TEST PROGRAM - 20130821

CORE ID	Depth ft.	Core Recovery ft.	Grain Size Analysis	Moisture Content ASTM D2216				Notes
		Plugs:	Grab	Grab				
Date Received: 20130821								
RF-11-5	5	0.65	X	X				
RF-11-15	15	0.65	X	X				
RF-1-5	5	0.65	X	X				
RF-1-15	15	0.65	X	X				
TOTALS:	4 cores	2.60	4	4				4

Laboratory Test Program Notes

Contaminant identification: _____

Standard TAT for basic analysis is 10 business days.

ASTM D422: Dry Sieve only, Hydrometer analysis must be requested prior to initiating tests. Additional costs would apply.

PTS Laboratories

PTS File No: 43539
Client: The Source Group, Inc.

WATER (MOISTURE) CONTENT OF SOIL OR ROCK BY MASS

(METHODOLOGY: ASTM D 2216)

PROJECT NAME: Golden West Refinery Co.
PROJECT NO: 04-GWRC-004

SAMPLE ID	DEPTH, ft	ANALYSIS DATE	ANALYSIS TIME	MATRIX	TARE WEIGHT, grams	WET SAMPLE + TARE WT., grams	DRY SAMPLE + TARE WT., grams	MOISTURE CONTENT, % dry weight
RF-11-5	5	20130903	1610	Soil	15.52	44.68	42.98	6.2
RF-11-15	15	20130903	1610	Soil	15.33	41.53	37.92	16.0
RF-1-5	5	20130903	1610	Soil	15.41	49.06	46.29	9.0
RF-1-15	15	20130903	1610	Soil	15.50	42.72	39.98	11.2

PTS Laboratories, Inc.

The Source Group, Inc.
PTS File No: 43539

PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D422/D4464M)

PROJECT NAME: Golden West Refinery Co.
PROJECT NO: 04-GWRC-004

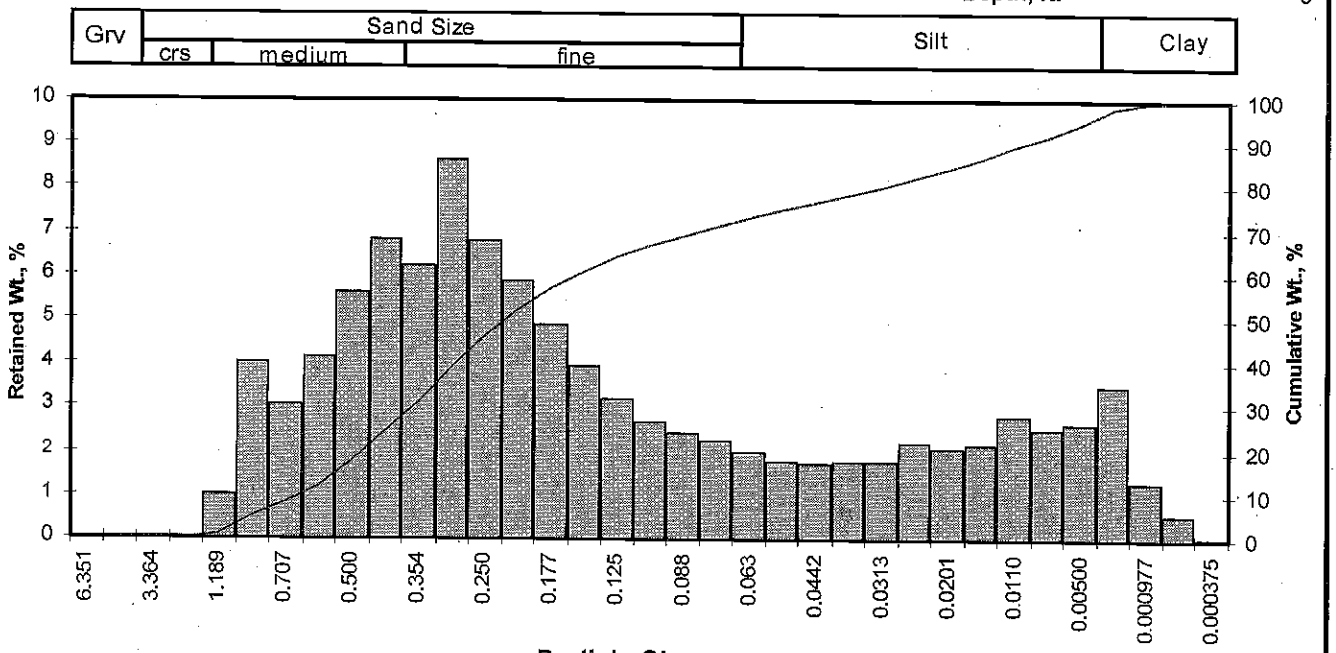
Sample ID	Depth, ft.	Mean Grain Size Description (1)	Median Grain Size mm	Particle Size Distribution, wt. percent						Silt & Clay
				Gravel	Sand Size			Silt	Clay	
					Coarse	Medium	Fine			
RF-11-5	5	Fine sand	0.223	0.00	0.00	24.63	46.70	23.31	5.36	28.67
RF-11-15	15	Fine sand	0.075	0.00	0.00	1.70	48.61	45.54	4.15	49.69
RF-1-5	5	Silt	0.066	0.00	0.00	0.00	43.54	50.52	5.93	56.46
RF-1-15	15	Fine sand	0.069	0.00	0.00	1.64	45.56	46.15	6.66	52.81

(1) Based on Mean from Trask

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	The Source Group, Inc.	**PTS File No:**	43539
Project:	Golden West Refinery Co.	**Sample ID:**	RF-11-5
Project No:	04-GWRC-004	**Depth, ft:**	5



Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	1.00	1.00	1.00
0.0331	0.841	0.25	20	4.03	4.03	5.03
0.0278	0.707	0.50	25	3.06	3.06	8.09
0.0234	0.595	0.75	30	4.14	4.14	12.23
0.0197	0.500	1.00	35	5.60	5.60	17.83
0.0166	0.420	1.25	40	6.80	6.80	24.63
0.0139	0.354	1.50	45	6.19	6.19	30.82
0.0117	0.297	1.75	50	8.61	8.61	39.43
0.0098	0.250	2.00	60	6.77	6.77	46.20
0.0083	0.210	2.25	70	5.85	5.85	52.05
0.0070	0.177	2.50	80	4.86	4.86	56.91
0.0059	0.149	2.75	100	3.94	3.94	60.85
0.0049	0.125	3.00	120	3.18	3.18	64.03
0.0041	0.105	3.25	140	2.67	2.67	66.70
0.0035	0.088	3.50	170	2.41	2.41	69.11
0.0029	0.074	3.75	200	2.22	2.22	71.33
0.0025	0.063	4.00	230	1.97	1.97	73.30
0.0021	0.053	4.25	270	1.76	1.76	75.06
0.00174	0.0442	4.50	325	1.71	1.71	76.77
0.00146	0.0372	4.75	400	1.75	1.75	78.52
0.00123	0.0313	5.00	450	1.77	1.77	80.29
0.000986	0.0250	5.32	500	2.18	2.18	82.47
0.000790	0.0201	5.64	635	2.06	2.06	84.53
0.000615	0.0156	6.00		2.16	2.16	86.69
0.000435	0.0110	6.50		2.80	2.80	89.49
0.000308	0.00781	7.00		2.51	2.51	92.00
0.000197	0.00500	7.65		2.64	2.64	94.64
0.000077	0.00195	9.00		3.48	3.48	98.12
0.000038	0.000977	10.00		1.29	1.29	99.41
0.000019	0.000488	11.00		0.54	0.54	99.95
0.000015	0.000375	11.38		0.05	0.05	100.00
TOTALS				100.00	100.00	100.00

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	0.25	0.0332	0.843
10	0.62	0.0257	0.653
16	0.92	0.0208	0.529
25	1.26	0.0164	0.416
40	1.77	0.0115	0.293
50	2.16	0.0088	0.223
60	2.70	0.0061	0.154
75	4.24	0.0021	0.053
84	5.56	0.0008	0.021
90	6.60	0.0004	0.010
95	7.78	0.0002	0.005

Measure	Trask	Inman	Folk-Ward
Median, phi	2.16	2.16	2.16
Median, in.	0.0088	0.0088	0.0088
Median, mm	0.223	0.223	0.223
Mean, phi	2.09	3.24	2.88
Mean, in.	0.0092	0.0042	0.0054
Mean, mm	0.234	0.106	0.136
Sorting	2.805	2.320	2.302
Skewness	0.664	0.464	0.478
Kurtosis	0.283	0.625	1.038
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

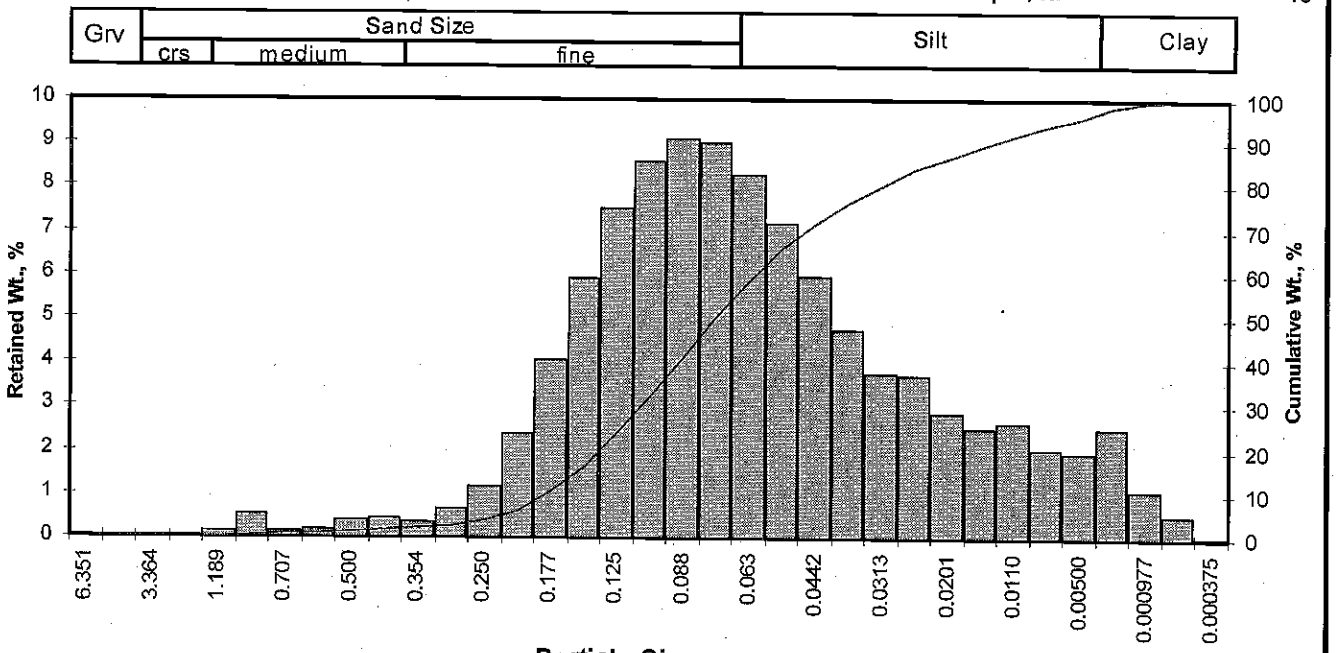
Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	24.63
Fine Sand	200	46.70
Silt	>0.005 mm	23.31
Clay	<0.005 mm	5.36
	Total	100

Phone: (562) 907-3607
Fax: (562) 907-3610

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	The Source Group, Inc.	**PTS File No:**	43539
Project:	Golden West Refinery Co.	**Sample ID:**	RF-11-15
Project No:	04-GWRC-004	**Depth, ft:**	15



Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.11	0.11	0.11
0.0331	0.841	0.25	20	0.50	0.50	0.61
0.0278	0.707	0.50	25	0.11	0.11	0.72
0.0234	0.595	0.75	30	0.16	0.16	0.88
0.0197	0.500	1.00	35	0.37	0.37	1.25
0.0166	0.420	1.25	40	0.45	0.45	1.70
0.0139	0.354	1.50	45	0.35	0.35	2.05
0.0117	0.297	1.75	50	0.64	0.64	2.69
0.0098	0.250	2.00	60	1.15	1.15	3.84
0.0083	0.210	2.25	70	2.35	2.35	6.19
0.0070	0.177	2.50	80	4.03	4.03	10.22
0.0059	0.149	2.75	100	5.92	5.92	16.14
0.0049	0.125	3.00	120	7.48	7.48	23.62
0.0041	0.105	3.25	140	8.57	8.57	32.20
0.0035	0.088	3.50	170	9.11	9.11	41.31
0.0029	0.074	3.75	200	9.00	9.00	50.31
0.0025	0.063	4.00	230	8.28	8.28	58.59
0.0021	0.053	4.25	270	7.16	7.16	65.75
0.00174	0.0442	4.50	325	5.94	5.94	71.69
0.00146	0.0372	4.75	400	4.76	4.76	76.46
0.00123	0.0313	5.00	450	3.76	3.76	80.22
0.000986	0.0250	5.32	500	3.72	3.72	83.94
0.000790	0.0201	5.64	635	2.85	2.85	86.79
0.000615	0.0156	6.00		2.49	2.49	89.28
0.000435	0.0110	6.50		2.64	2.64	91.92
0.000308	0.00781	7.00		2.01	2.01	93.93
0.000197	0.00500	7.65		1.92	1.92	95.85
0.000077	0.00195	9.00		2.50	2.50	98.35
0.000038	0.000977	10.00		1.08	1.08	99.43
0.000019	0.000488	11.00		0.52	0.52	99.95
0.000015	0.000375	11.38		0.05	0.05	100.00
TOTALS				100.00	100.00	100.00

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	2.12	0.0090	0.230
10	2.49	0.0070	0.178
16	2.74	0.0059	0.149
25	3.04	0.0048	0.122
40	3.46	0.0036	0.091
50	3.74	0.0029	0.075
60	4.05	0.0024	0.060
75	4.67	0.0015	0.039
84	5.33	0.0010	0.025
90	6.14	0.0006	0.014
95	7.36	0.0002	0.006

Measure	Trask	Inman	Folk-Ward
Median, phi	3.74	3.74	3.74
Median, in.	0.0029	0.0029	0.0029
Median, mm	0.075	0.075	0.075
Mean, phi	3.64	4.04	3.94
Mean, in.	0.0032	0.0024	0.0026
Mean, mm	0.080	0.061	0.065
Sorting	1.761	1.292	1.439
Skewness	0.923	0.228	0.305
Kurtosis	0.251	1.027	1.314
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	1.70
Fine Sand	200	48.61
Silt	>0.005 mm	45.54
Clay	<0.005 mm	4.15
	Total	100

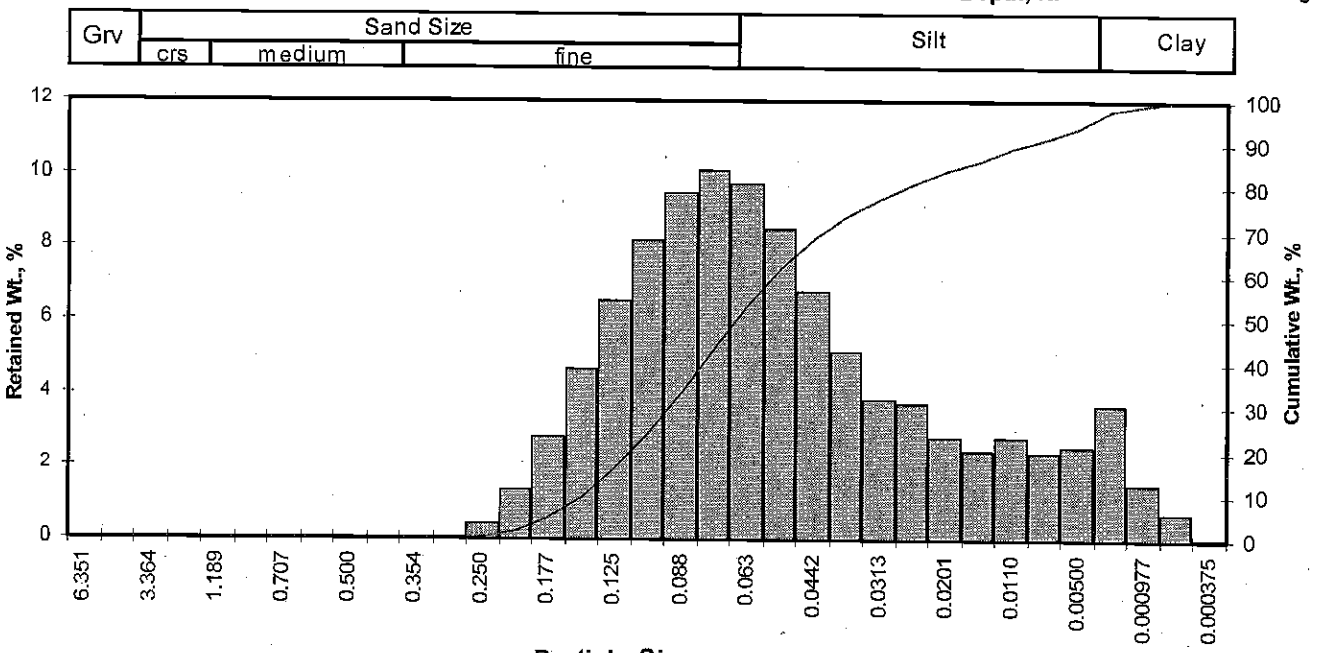
Phone: (562) 907-3607

Fax: (562) 907-3610

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	The Source Group, Inc.	**PTS File No:**	43539
Project:	Golden West Refinery Co.	**Sample ID:**	RF-1-5
Project No:	04-GWRC-004	**Depth, ft:**	5



Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.05	0.05	0.05
0.0098	0.250	2.00	60	0.42	0.42	0.47
0.0083	0.210	2.25	70	1.37	1.37	1.84
0.0070	0.177	2.50	80	2.81	2.81	4.65
0.0059	0.149	2.75	100	4.66	4.66	9.30
0.0049	0.125	3.00	120	6.50	6.50	15.80
0.0041	0.105	3.25	140	8.18	8.18	23.98
0.0035	0.088	3.50	170	9.47	9.47	33.45
0.0029	0.074	3.75	200	10.10	10.10	43.54
0.0025	0.063	4.00	230	9.71	9.71	53.25
0.0021	0.053	4.25	270	8.47	8.47	61.72
0.00174	0.0442	4.50	325	6.76	6.76	68.47
0.00146	0.0372	4.75	400	5.11	5.11	73.58
0.00123	0.0313	5.00	450	3.85	3.85	77.43
0.000986	0.0250	5.32	500	3.70	3.70	81.13
0.000790	0.0201	5.64	635	2.78	2.78	83.91
0.000615	0.0156	6.00		2.44	2.44	86.35
0.000435	0.0110	6.50		2.79	2.79	89.14
0.000308	0.00781	7.00		2.38	2.38	91.52
0.000197	0.00500	7.65		2.55	2.55	94.07
0.000077	0.00195	9.00		3.65	3.65	97.71
0.000038	0.000977	10.00		1.52	1.52	99.23
0.000019	0.000488	11.00		0.70	0.70	99.93
0.000015	0.000375	11.38		0.07	0.07	100.00
TOTALS				100.00	100.00	100.00

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	2.52	0.0069	0.174
10	2.78	0.0057	0.146
16	3.01	0.0049	0.124
25	3.28	0.0041	0.103
40	3.66	0.0031	0.079
50	3.92	0.0026	0.066
60	4.20	0.0021	0.054
75	4.84	0.0014	0.035
84	5.65	0.0008	0.020
90	6.68	0.0004	0.010
95	7.99	0.0002	0.004

Measure	Trask	Inman	Folk-Ward
Median, phi	3.92	3.92	3.92
Median, in.	0.0026	0.0026	0.0026
Median, mm	0.066	0.066	0.066
Mean, phi	3.86	4.33	4.19
Mean, in.	0.0027	0.0020	0.0022
Mean, mm	0.069	0.050	0.055
Sorting	1.720	1.324	1.491
Skewness	0.906	0.312	0.401
Kurtosis	0.251	1.067	1.433
Grain Size Description (ASTM-USCS Scale)		Silt (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	43.54
Silt	>0.005 mm	50.52
Clay	<0.005 mm	5.93
	Total	100

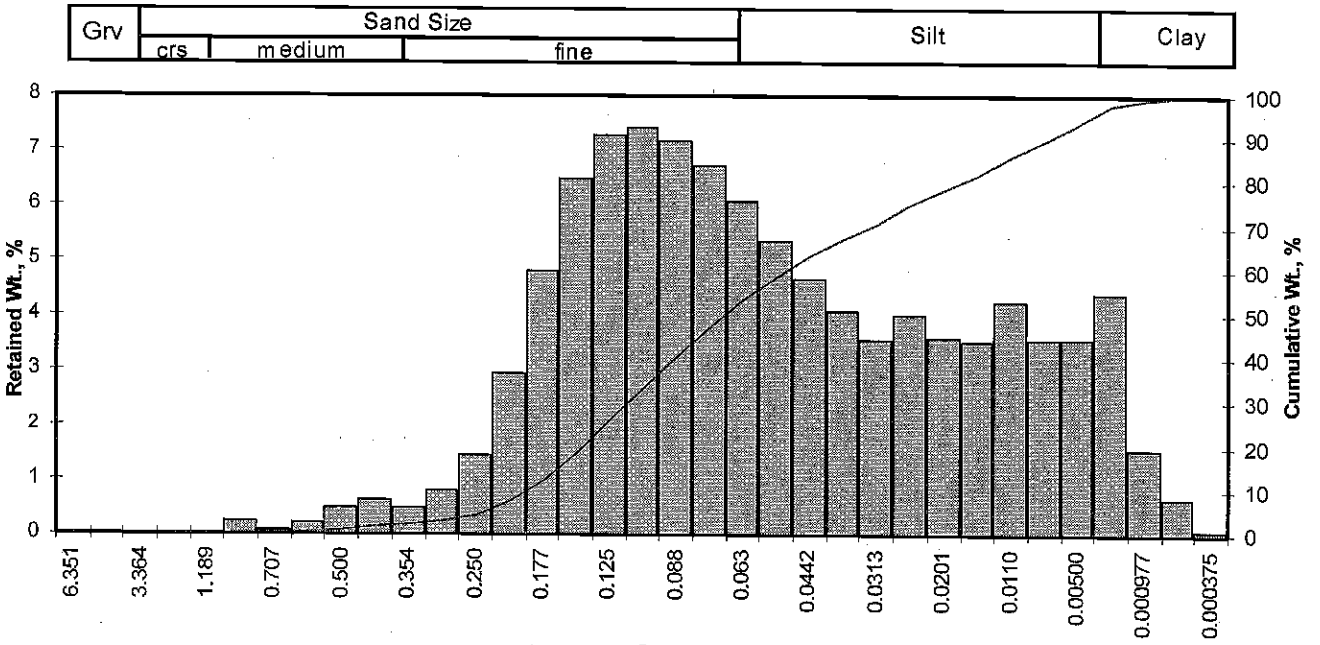
Phone: (562) 907-3607

Fax: (562) 907-3610

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	The Source Group, Inc.	**PTS File No:**	43539
Project:	Golden West Refinery Co.	**Sample ID:**	RF-1-15
Project No:	04-GWRC-004	**Depth, ft:**	15



Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.01	0.01	0.01
0.0331	0.841	0.25	20	0.24	0.24	0.25
0.0278	0.707	0.50	25	0.08	0.07	0.33
0.0234	0.595	0.75	30	0.20	0.20	0.53
0.0197	0.500	1.00	35	0.50	0.50	1.03
0.0166	0.420	1.25	40	0.61	0.61	1.64
0.0139	0.354	1.50	45	0.47	0.47	2.11
0.0117	0.297	1.75	50	0.81	0.81	2.92
0.0098	0.250	2.00	60	1.46	1.46	4.38
0.0083	0.210	2.25	70	2.94	2.94	7.32
0.0070	0.177	2.50	80	4.80	4.80	12.12
0.0059	0.149	2.75	100	6.47	6.47	18.59
0.0049	0.125	3.00	120	7.29	7.29	25.87
0.0041	0.105	3.25	140	7.43	7.43	33.30
0.0035	0.088	3.50	170	7.18	7.18	40.48
0.0029	0.074	3.75	200	6.71	6.71	47.19
0.0025	0.063	4.00	230	6.07	6.07	53.26
0.0021	0.053	4.25	270	5.35	5.35	58.61
0.00174	0.0442	4.50	325	4.67	4.67	63.28
0.00146	0.0372	4.75	400	4.06	4.06	67.34
0.00123	0.0313	5.00	450	3.56	3.56	70.90
0.000986	0.0250	5.32	500	4.01	4.01	74.91
0.000790	0.0201	5.64	635	3.57	3.57	78.48
0.000615	0.0156	6.00		3.53	3.53	82.01
0.000435	0.0110	6.50		4.25	4.25	86.26
0.000308	0.00781	7.00		3.54	3.54	89.80
0.000197	0.00500	7.65		3.54	3.54	93.34
0.000077	0.00195	9.00		4.39	4.39	97.73
0.000038	0.000977	10.00		1.56	1.56	99.29
0.000019	0.000488	11.00		0.65	0.65	99.94
0.000015	0.000375	11.38		0.06	0.06	100.00
TOTALS				100.00	100.00	100.00

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	2.05	0.0095	0.241
10	2.39	0.0075	0.191
16	2.65	0.0063	0.159
25	2.97	0.0050	0.128
40	3.48	0.0035	0.089
50	3.87	0.0027	0.069
60	4.32	0.0020	0.050
75	5.33	0.0010	0.025
84	6.23	0.0005	0.013
90	7.04	0.0003	0.008
95	8.16	0.0001	0.004

Measure	Trask	Inman	Folk-Ward
Median, phi	3.87	3.87	3.87
Median, in.	0.0027	0.0027	0.0027
Median, mm	0.069	0.069	0.069
Mean, phi	3.71	4.44	4.25
Mean, in.	0.0030	0.0018	0.0021
Mean, mm	0.076	0.046	0.053
Sorting	2.264	1.792	1.821
Skewness	0.822	0.322	0.364
Kurtosis	0.280	0.703	1.061
Grain Size Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	1.64
Fine Sand	200	45.56
Silt	>0.005 mm	46.15
Clay	<0.005 mm	6.66
	Total	100

Phone: (562) 907-3607

Fax: (562) 907-3610

PTS Laboratories, Inc.

CHAIN OF CUSTODY RECORD

PAGE OF

COMPANY	The Source Group, Inc Signal Hill, CA 90755
ADDRESS	1962 Freeman Ave
CITY	Signal Hill, CA
ZIP CODE	90755
PROJECT MANAGER	Paul Parmentier
PROJECT NAME	Golden West Refining Co.
PHONE NUMBER	562-597-1055
PROJECT NUMBER	04-GWRC-004
FAX NUMBER	pparmentier@thesourcegroup.net
SITE LOCATION	13116 Imperial Hwy, Santa Fe Springs, CA
SAMPLER SIGNATURE	

PO#

TURNAROUND TIME
24 HOURS ☐ 5 DAYS ☐
48 HOURS ☐ NORMAL ☒
72 HOURS ☐
OTHER: _____

SAMPLE INTEGRITY (CHECK):
INTACT X ON ICE ____

PTS QUOTE NO.

PTS FILE: 43539

ANALYSIS REQUEST

SAMPLE ID NUMBER	DATE	TIME	DEPTH, FT	NUMBER OF SAMPLES	SOIL PROPERTIES PACKAGE	HYDRAULIC CONDUCTIVITY PACKAGE	PORE FLUID SATURATIONS PACKAGE	TCEQ/TNRCC PROPERTIES PACKAGE	CAPILLARITY PACKAGE	FLUID PROPERTIES PACKAGE	PHOTOLOG: CORE PHOTOGRAPHY	MOISTURE CONTENT, ASTM D2216	POROSITY: TOTAL, API RP40	POROSITY: EFFECTIVE, ASTM D425M	SPECIFIC GRAVITY, ASTM D854	BULK DENSITY (DRY), API RP40 or ASTM D2937	AIR PERMEABILITY, API RP40	HYDRAULIC CONDUCTIVITY, EPA9100, API RP40, D5084	GRAIN SIZE DISTRIBUTION, ASTM D422/4464M	TOC: WALKLEY-BLACK	ATTERBERG LIMITS, ASTM D4318	COMMENTS
RF-11-5	8/19/13	0830	5'	1	"							X							X			
RF-11-15	8/19/13	0855	15'	1								X							X			
RF-1-5	8/20/13	0925	5'	1								X							X			
RF-1-15	8/20/13	0910	15'	1								X							X			
			78°F																			

1. RELINQUISHED BY	2. RECEIVED BY	3. RELINQUISHED BY	4. RECEIVED BY
COMPANY The Source Group, Inc	COMPANY PTS CARLS	COMPANY	COMPANY
DATE 8/21/13 TIME 1600	DATE 8/21/13 TIME 1600	DATE TIME	DATE TIME

PTS Laboratories, Inc.

CHAIN OF CUSTODY RECORD

PAGE OF

COMPANY	The Source Group, Inc ~~Signal Hill, CA 90755~~
ADDRESS	1962 Freeman Ave
CITY	Signal Hill, CA
ZIP CODE	90755
PROJECT MANAGER	Paul Parmentier
PROJECT NAME	Golden West Refining Co.
PHONE NUMBER	562-597-1055
PROJECT NUMBER	04-GWRC-004
FAX NUMBER	pparmentier@thesourcegroup.net
SITE LOCATION	13116 Imperial Hwy, Santa Fe Springs, CA
SAMPLER SIGNATURE	

SAMPLE ID NUMBER	DATE	TIME	DEPTH, FT	NUMBER OF SAMPLES	SOIL PROPERTIES PACKAGE	HYDRAULIC CONDUCTIVITY PACKAGE	PORE FLUID SATURATIONS PACKAGE	TCEQ/TNRCC PROPERTIES PACKAGE	CAPILLARITY PACKAGE	FLUID PROPERTIES PACKAGE	PHOTOLOG: CORE PHOTOGRAPHY	MOISTURE CONTENT, ASTM D2216	POROSITY: TOTAL, API RP40	POROSITY: EFFECTIVE, ASTM D425M	SPECIFIC GRAVITY, ASTM D854	BULK DENSITY (DRY), API RP40 or ASTM D2937	AIR PERMEABILITY, API RP40	HYDRAULIC CONDUCTIVITY, EPA9100, API RP40, D5084	GRAIN SIZE DISTRIBUTION, ASTM D422/4464M	TOC: WALKLEY-BLACK	ATTERBERG LIMITS, ASTM D4318	COMMENTS
RF-11-5	8/19/13	0830	5'	1								X							X			
RF-11-15	8/19/13	0855	15'	1								X							X			
RF-1-5	8/20/13	0925	5'	1								X							X			
RF-1-15	8/20/13	0910	15'	1								X							X			
			78°F																			

ANALYSIS REQUEST

PO#

TURNAROUND TIME
24 HOURS ☐ 5 DAYS ☐
48 HOURS ☐ NORMAL ☑
72 HOURS ☐
OTHER: _____

SAMPLE INTEGRITY (CHECK):
INTACT X ON ICE ____

PTS QUOTE NO.

PTS FILE: 43539

1. RELINQUISHED BY	2. RECEIVED BY	3. RELINQUISHED BY	4. RECEIVED BY
COMPANY: The Source Group, Inc	COMPANY: PTS CARLS	COMPANY	COMPANY
DATE: 8/21/13 TIME: 1600	DATE: 8/21/13 TIME: 1600	DATE TIME	DATE TIME

APPENDIX D

JOHNSON and ETTINGER RISK MODEL

SOIL VAPOR AT 5 FEET BELOW GROUND SURFACE

DATA ENTRY SHEET

SG-ADV
Version 3.1; 02/04

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
71432	7.20E+02			Benzene

MORE

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (°C)	ENTER Totals must add up to value of Ls (cell F24) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
15	152	24	152	0	0			1.00E-08

MORE

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SL	1.62	0.387	0.109								

MORE

ENTER Enclosed space floor thickness, L_{Fslab} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm-s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	1	5

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Exposure time, ET (hours/day)
70	25	25	250	8

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Molecular weight, MW (g/mol)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
8.80E-02	9.80E-06	5.54E-03	25	7,342	353.24	562.16	78.11	2.9E-05	3.0E-02

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. ($\mu g/m^3$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
7.88E+08	137	0.284	ERROR	ERROR	#N/A	#N/A	#N/A	1.00E-08	4,000	7.20E+02	6.78E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	7,977	5.29E-03	2.17E-01	1.80E-04	8.88E-03	0.00E+00	0.00E+00	8.88E-03	137

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	7.20E+02	1.25	8.33E+01	8.88E-03	5.00E+03	1.40E+08	5.38E-04	3.87E-01	2.9E-05	3.0E-02

END

RESULTS SHEET

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
9.2E-07	2.9E-03

SCROLL DOWN TO "END"

END

DATA ENTRY SHEET

SG-ADV
Version 3.1; 02/04

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
100414	6.20E+02			Enter Parameters

MORE

ENTER Depth below grade to bottom of enclosed space floor, L_f (cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_s (°C)	ENTER Totals must add up to value of L_T (cell F24) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)		ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
15	152	24	152	0	0			1.00E-08

MORE

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SL	1.62	0.387	0.103								

MORE

ENTER Enclosed space floor thickness, L_{slab} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm-s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	1	5

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Exposure time, ET (hours/day)
70	25	25	250	8

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Molecular weight, MW (g/mol)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.50E-02	7.80E-06	7.86E-03	25	8,501	409.34	617.20	106.17	2.5E-06	1.0E+00

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, T (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. ($\mu g/m^3$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
7.88E+08	137	0.284	ERROR	ERROR	#N/A	#N/A	#N/A	1.00E-08	4.000	6.20E+02	6.78E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} ($atm-m^3/mol$)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	9.994	7.43E-03	3.05E-01	1.80E-04	7.57E-03	0.00E+00	0.00E+00	7.57E-03	137

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	6.20E+02	1.25	8.33E+01	7.57E-03	5.00E+03	3.63E+09	4.90E-04	3.04E-01	2.5E-06	1.0E+00

END

RESULTS SHEET

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
6.2E-08	6.9E-05

SCROLL DOWN TO "END"

END

SOIL VAPOR AT 10 FEET BELOW GROUND SURFACE

DATA ENTRY SHEET

SG-ADV
Version 3.1; 02/04

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	ENTER Soil gas conc., C_g (ppmv)	Chemical
71432	9.70E+02		Benzene

MORE

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Soil gas sampling depth below grade, L_A (cm)	ENTER Average soil temperature, T_S (°C)	ENTER Totals must add up to value of L_T (cell F24) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)		ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
15	304.8	24	304.8	0	0			1.00E-08

MORE

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SL	1.62	0.387	0.103								

MORE

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm-s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	1	5

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Exposure time, ET (hours/day)
70	25	25	250	8

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Molecular weight, MW (g/mol)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
8.80E-02	9.80E-06	5.54E-03	25	7,342	353.24	562.16	78.11	2.9E-05	3.0E-02

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, T (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. ($\mu g/m^3$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
7.88E+08	289.8	0.284	ERROR	ERROR	#N/A	#N/A	#N/A	1.00E-08	4,000	9.70E+02	6.78E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, ΔH_{vTS} (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	7,977	5.29E-03	2.17E-01	1.80E-04	8.88E-03	0.00E+00	0.00E+00	8.88E-03	289.8

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	9.70E+02	1.25	8.33E+01	8.88E-03	5.00E+03	1.40E+08	3.31E-04	3.21E-01	2.9E-05	3.0E-02

END

RESULTS SHEET

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
7.6E-07	2.4E-03

SCROLL DOWN TO "END"

END

DATA ENTRY SHEET

SG-ADV
Version 3.1; 02/04

Reset to Defaults

Soil Gas Concentration Data

Chemical CAS No. (numbers only, no dashes)	Soil gas conc., C_g (µg/m³)	Soil gas conc., C_g (ppmv)	Chemical
100414	2.38E+04		Ethylbenzene

MORE

Depth below grade to bottom of enclosed space floor, L_F (cm)	Soil gas sampling depth below grade, L_s (cm)	Average soil temperature, T_s (°C)	Totals must add up to value of L_R (cell F24): Thickness of soil stratum A, h_A (cm)	Thickness of soil stratum B, (Enter value or 0) h_B (cm)	Thickness of soil stratum C, (Enter value or 0) h_C (cm)	Soil stratum A SCS soil type (used to estimate soil vapor permeability)	User-defined stratum A soil vapor permeability, k_v (cm²)
15	304.8	24	304.8	0	0		1.00E-08

MORE

Stratum A SCS soil type (Lookup Soil Parameters)	Stratum A soil dry bulk density, ρ_b^A (g/cm³)	Stratum A soil total porosity, n^A (unitless)	Stratum A soil water-filled porosity, θ_w^A (cm³/cm³)	Stratum B SCS soil type (Lookup Soil Parameters)	Stratum B soil dry bulk density, ρ_b^B (g/cm³)	Stratum B soil total porosity, n^B (unitless)	Stratum B soil water-filled porosity, θ_w^B (cm³/cm³)	Stratum C SCS soil type (Lookup Soil Parameters)	Stratum C soil dry bulk density, ρ_b^C (g/cm³)	Stratum C soil total porosity, n^C (unitless)	Stratum C soil water-filled porosity, θ_w^C (cm³/cm³)
SL	1.62	0.387	0.103								

MORE

Enclosed space floor thickness, L_{concr} (cm)	Soil-bldg. pressure differential, ΔP (g/cm-s²)	Enclosed space floor length, L_B (cm)	Enclosed space floor width, W_B (cm)	Enclosed space height, H_B (cm)	Floor-wall seam crack width, w (cm)	Indoor air exchange rate, ER (1/h)	Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	1	5

Averaging time for carcinogens, AT_c (yrs)	Averaging time for noncarcinogens, AT_{nc} (yrs)	Exposure duration, ED (yrs)	Exposure frequency, EF (days/yr)	Exposure time, ET (hours/day)
70	25	25	250	8

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Molecular weight, MW (g/mol)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.50E-02	7.80E-06	7.86E-03	25	8,501	409.34	617.20	106.17	2.5E-06	1.0E+00

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, T (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, η_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, η_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, η_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. ($\mu g/m^3$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
7.88E+08	289.8	0.284	ERROR	ERROR	#N/A	#N/A	#N/A	1.00E-08	4,000	2.38E+04	6.78E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} ($atm-m^3/mol$)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	9,994	7.43E-03	3.05E-01	1.80E-04	7.57E-03	0.00E+00	0.00E+00	7.57E-03	289.8

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	2.38E+04	1.25	8.33E+01	7.57E-03	5.00E+03	3.63E+09	2.93E-04	6.99E+00	2.5E-06	1.0E+00

END

RESULTS SHEET

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
1.4E-06	1.6E-03

SCROLL DOWN TO "END"

END

SOIL VAPOR AT 15 FEET BELOW GROUND SURFACE

DATA ENTRY SHEET

SG-ADV
Version 3.1; 02/04

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_{sg} (µg/m³)	ENTER Soil gas conc., C_{sg} (ppmv)	Chemical
71432	1.14E+03		Benzene

MORE

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (°C)	ENTER Totals must add up to value of L_s (cell F24) Thickness of soil stratum A, h_A (cm)	Thickness of soil stratum B, (Enter value or 0) h_B (cm)	Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	ENTER User-defined stratum A soil vapor permeability, k_v (cm²)
15	457.2	24	457.2	0	0		1.00E-08

MORE

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm³)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm³/cm³)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm³)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm³/cm³)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm³)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm³/cm³)
SL	1.62	0.387	0.103								

MORE

ENTER Enclosed space floor thickness, L_{slab} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s²)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	1	5

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Exposure time, ET (hours/day)
70	25	25	250	8

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, ΔH_{vb} (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Molecular weight, MW (g/mol)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
8.80E-02	9.80E-06	5.54E-03	25	7,342	353.24	562.16	78.11	2.9E-05	3.0E-02

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. ($\mu g/m^3$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
7.88E+08	442.2	0.284	ERROR	ERROR	#N/A	#N/A	#N/A	1.00E-08	4,000	1.14E+03	6.78E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	7,977	5.29E-03	2.17E-01	1.80E-04	8.88E-03	0.00E+00	0.00E+00	8.88E-03	442.2

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe') (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.14E+03	1.25	8.33E+01	8.88E-03	5.00E+03	1.40E+08	2.39E-04	2.72E-01	2.9E-05	3.0E-02

END

RESULTS SHEET

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
6.4E-07	2.1E-03

SCROLL DOWN TO "END"

END

DATA ENTRY SHEET

SG-ADV
Version 3.1: 02/04

Reset to Defaults

Soil Gas Concentration Data

Chemical CAS No. (numbers only, no dashes)	Soil gas conc., C_g (ug/m³)	Soil gas conc., C_n (ppmv)	Chemical
100414	6.17E+04		

MORE

Depth below grade to bottom of enclosed space floor, L_F (cm)	Soil gas sampling depth below grade, L_s (cm)	Average soil temperature, T_s (°C)	Totals must add up to value of Ls (cell F24)			Soil stratum A SCS soil type (used to estimate soil vapor permeability)		User-defined stratum A soil vapor permeability, k_v (cm^2)
			Thickness of soil stratum A, h_A (cm)	Thickness of soil stratum B, (Enter value or 0) h_B (cm)	Thickness of soil stratum C, (Enter value or 0) h_C (cm)			
15	457.2	24	457.2	0	0			1.00E-08

MORE

Stratum A SCS soil type (Lookup Soil Parameters)	Stratum A soil dry bulk density, ρ_b^A (g/cm³)	Stratum A soil total porosity, n^A (unitless)	Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	Stratum B SCS soil type (Lookup Soil Parameters)	Stratum B soil dry bulk density, ρ_b^B (g/cm³)	Stratum B soil total porosity, n^B (unitless)	Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	Stratum C SCS soil type (Lookup Soil Parameters)	Stratum C soil dry bulk density, ρ_b^C (g/cm³)	Stratum C soil total porosity, n^C (unitless)	Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
SL	1.62	0.387	0.103								

MORE

Enclosed space floor thickness, L_{floor} (cm)	Soil-bldg. pressure differential, ΔP (g/cm-s²)	Enclosed space floor length, L_B (cm)	Enclosed space floor width, W_B (cm)	Enclosed space height, H_B (cm)	Floor-wall seam crack width, w (cm)	Indoor air exchange rate, ER (1/h)	Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	1	5

Averaging time for carcinogens, AT_C (yrs)	Averaging time for noncarcinogens, AT_{NC} (yrs)	Exposure duration, ED (yrs)	Exposure frequency, EF (days/yr)	Exposure time, ET (hours/day)
70	25	25	250	8

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Molecular weight, MW (g/mol)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.50E-02	7.80E-06	7.86E-03	25	8,501	409.34	617.20	106.17	2.5E-06	1.0E+00

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, T (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. ($\mu g/m^3$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
7.88E+08	442.2	0.284	ERROR	ERROR	#N/A	#N/A	#N/A	1.00E-08	4,000	6.17E+04	6.78E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, ΔH_{vTS} (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	9,994	7.43E-03	3.05E-01	1.80E-04	7.57E-03	0.00E+00	0.00E+00	7.57E-03	442.2

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	6.17E+04	1.25	8.33E+01	7.57E-03	5.00E+03	3.63E+09	2.10E-04	1.29E+01	2.5E-06	1.0E+00

END

RESULTS SHEET

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
2.6E-06	3.0E-03

SCROLL DOWN TO "END"

END

EXHIBIT 14

SGI environmental THE SOURCE GROUP, INC.

October 7, 2013

Mr. Adnan Siddiqui
Los Angeles Regional Water Quality Control Board
320 West 4th Street, Suite 200
Los Angeles, CA 90013

Subject: Revised Groundwater Monitoring Program Review
Cleanup and Abatement Order No. R4-2004-0020
Golden West Refining Company – 13539 Foster Road, Santa Fe Springs, CA
(SCP No. 0227A, Site ID# 2040073)

Dear Mr. Siddiqui,

In a letter dated July 30, 2013, the Los Angeles Regional Water Quality Control Board (RWQCB) commented on the March 2012 Groundwater Program Review (SGI Report) prepared by The Source Group, Inc. (SGI) for the former Golden West Refinery Company (GWRC) located in Santa Fe Springs, CA (Site).

On September 12, 2013, GWRC submitted a "*Response to LARWQCB letter dated July 30, 2013*" which included "*Comments to: Response to Groundwater Program Review Cleanup and Abatement Order No. R4-2004-0020, RWQCB July 30, 2013*" prepared by SGI and dated September 6, 2013, indicating that a revised groundwater monitoring program would be prepared and submitted to the RWQCB. This document presents the proposed revisions to the currently approved groundwater monitoring program for the former GWRC Site.

Figures 1 and 2 indicate the wells that are currently being sampled on a semi-annual basis and additional wells that SGI proposes to add to the current groundwater monitoring program. Table 1 presents the sampling frequency, analysis and rational for the wells to be included in the proposed revised groundwater monitoring program.

Figure 1 indicates those Artesia wells that SGI proposes be included in the revised groundwater sampling program. In order to provide additional on-site monitoring points in the Artesia aquifer, SGI proposes sampling 8 additional wells, which will increase the total Artesia wells being sampled from 10 to 18 wells. As shown in Figure 1 and listed on Table 1, the sentinel downgradient wells A-38A, A-39A, AO-10 and AO-11 will be supplemented by the additional well AL-3 which is proposed to be sampled on a semi-annual basis. Wells within the refinery property and at the lateral edge of the plume (wells A-17R, A-21A, A-10A) will be supplemented by the additional wells A-5A, A-29A, A-48 and AO-18 which will also be sampled

semi-annually. Upgradient and side-gradient wells AO-21, MW-2A and A-4A, with additional wells A-3A, AO-6 and AO-20 will be sampled annually.

Figure 2 illustrates the proposed monitoring program changes in the Semi-Perched zone. The current program includes sampling of upgradient semi-perched well PO-10, and of the Carmenita Sump. As indicated in previous reports submitted to the LARWQCB, the Carmenita sump groundwater flow results from a groundwater capture zone at the southern edge of the former refinery and the current semi-annual sampling of the GWRC Carmenita Sump Groundwater Remediation System inlet location provides significantly relevant monitoring data for a large area.

As previously stated, GWRC and SGI strongly disagree with the full assignment of the LNAPL plume south of the former refinery to GWRC, and believe that this assignment was not technically justified by the RWQCB. With respect to the RWQCB's concern about the plume located in the area of Cambridge Court, Rosecrans and Fidel Avenues, GWRC proposes a single round of sampling of the Semi-Perched groundwater zone which would include sampling periphery wells PO-5, PO-12, PO-13, PO-14 and PO-19. This sampling would be conducted as part of the upcoming semi-annual Q1 2014 groundwater sampling event.

As previously described in the March 2012 SSGI Report, groundwater monitoring well PO-7 installed in May 1989 was drilled at a location more than a mile from the GWRC refinery and adjacent to the petroleum storage tank farm located near the corner of Excelsior Drive and Norwalk Blvd. SGI believes that the groundwater sampling data collected from well PO-7 have no relevance to the former GWRC property and should not be associated with the GWRC monitoring program. SGI proposes destroying well PO-7 after acquiring County of Los Angeles permits and the necessary access agreement.

The proposed updated groundwater monitoring program detailed above will provide an enhanced set of data and will lead to a better understanding of the Site groundwater plumes and the relevance of wells included in the current ongoing semi-annual monitoring program. With your permission, GWRC will implement this program during the upcoming monitoring event set for the first quarter of 2014.

If you have any questions, please call us at (562) 597-1055.

Sincerely,

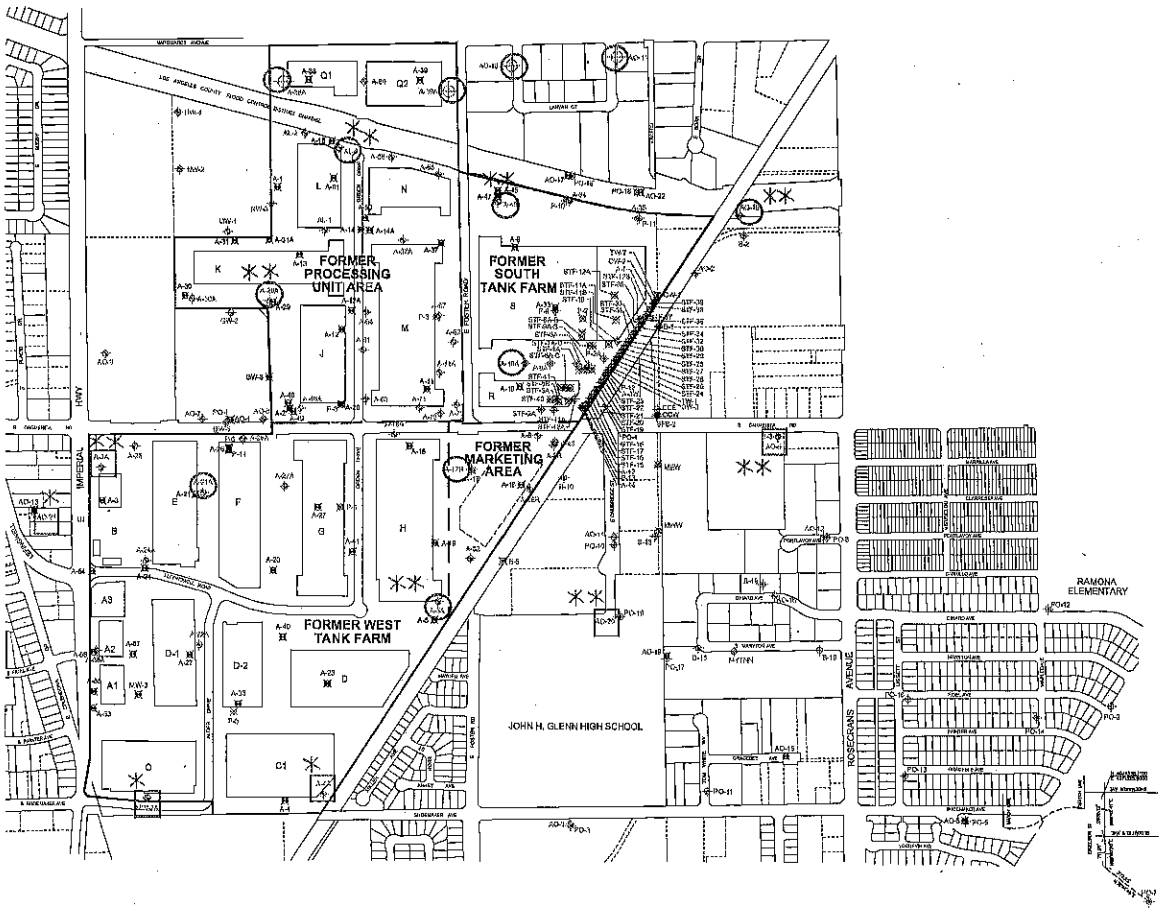
The Source Group, Inc.

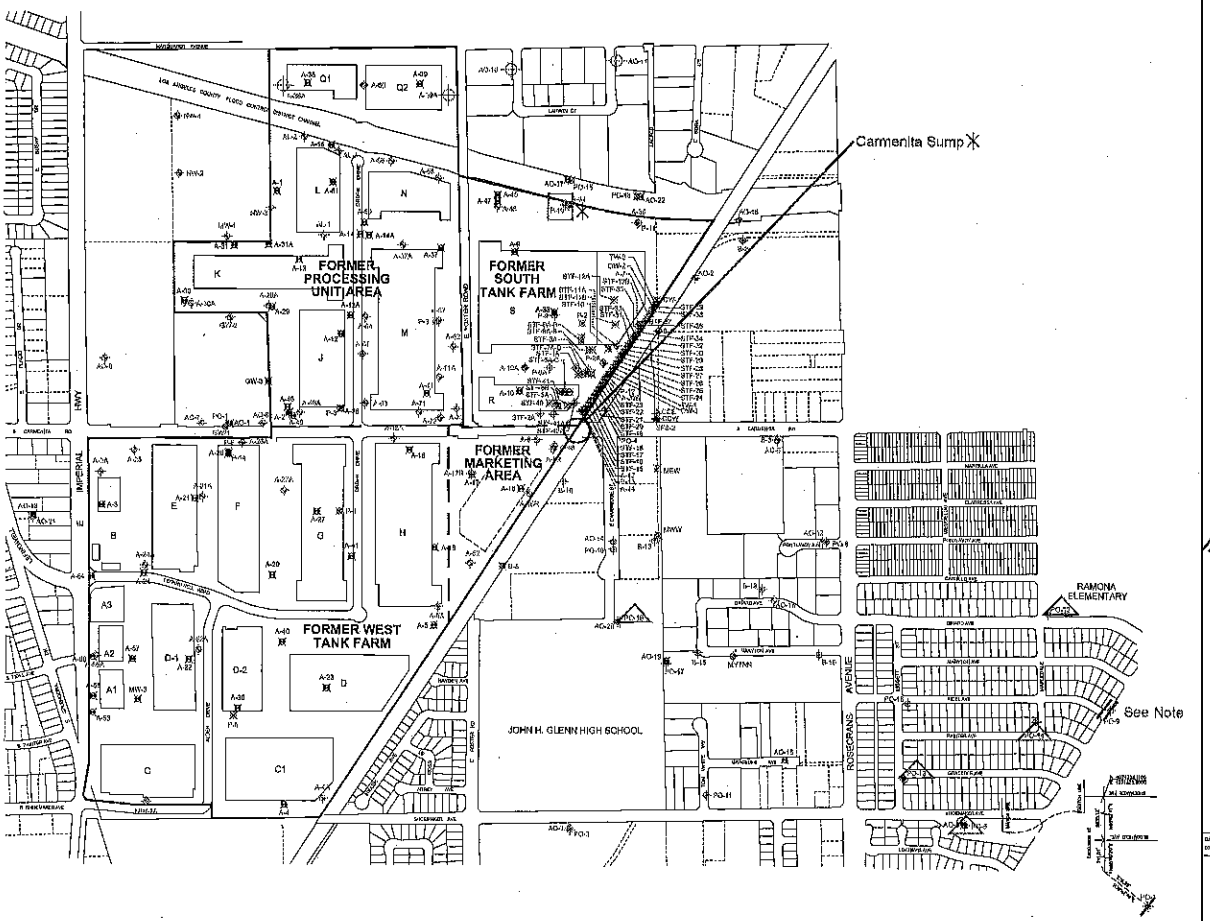
Paul Parmentier, P.G. 3915
Principal Hydrogeologist

Neil Irish
Principal Geologist

cc: Chris Panaitescu, Golden West Refining Company

Attachments: Figure 1: Revised Groundwater Monitoring Program, Artesia Groundwater Zones
Figure 2: Revised Groundwater Monitoring Program, Semi-Perched Groundwater Zones
Table 1: Revised Groundwater Monitoring Program


FORMER PROCESSING UNIT AREA
FORMER SOUTH TANK FARM
FORMER MARKETING AREA
FORMER WEST TANK FARM
JOHN H. GLENN HIGH SCHOOL
RAMONA ELEMENTARY
IMPERIAL HWY
ROSECRANS AVENUE
LEGEND
GROUNDWATER MONITORING WELL (ZONE A)
ABANDONED GROUNDWATER MONITORING WELL (ZONE A)
GROUNDWATER MONITORING WELL (ZONE B/F)
ABANDONED GROUNDWATER MONITORING WELL (ZONE B/F)
NEW BUILDING
FORMER FOUR REFINERY AREAS
ARTESIA SENTINEL WELL
GWRD PROPERTY BOUNDARY
Proposed Semi-Annual Sampling
Proposed Annual Sampling
Currently Sampled Semi-Annually to be Sampled Annually
Not Currently Sampled
APPROXIMATE SCALE IN FEET
PROPOSED ARTESIA GROUNDWATER MONITORING
GOLDEN WEST REFINERY
SANTA FE SPRINGS, CALIFORNIA
SGI
THE SOURCE GROUP, INC.
FIGURE 1



LEGEND

- GROUNDWATER MONITORING WELL (ZONE A)
- ABANDONED GROUNDWATER MONITORING WELL (ZONE A)
- GROUNDWATER MONITORING WELL (ZONE BP)
- ABANDONED GROUNDWATER MONITORING WELL (ZONE BP)
- D-1 NEW BUILDING
- FORMER FOUR REFINERY AREAS
- ARTESIA SENTINEL WELL
- GWRO PROPERTY BOUNDARY
- Proposed Semi-Annual Sampling
- Proposed Annual Sampling
- Proposed Q1 2014 Sampling
- Well PO-7 proposed to be Abandoned
- Currently Sampled Semi-Annually
- Note: PO-9 Previously Abandoned in 2013

APPROXIMATE SCALE IN FEET

PROPOSED SEMI-PERCHED GROUNDWATER MONITORING

GOLDEN WEST REFINERY
SANTA FE SPRINGS, CALIFORNIA

SGI The Source Group, Inc.

FIGURE 2

TABLE 1
Proposed Groundwater Monitoring Program
Former Golden West Refinery

Sampling of Selected Wells, Semi-Annually to Annually				
Well No.	**Current Sampling**	**Proposed Sampling Frequency**	**Recommended Analyses**	**Rationale**
MW-2A	Semi-annually	Annually	TPH, BTEX, Oxygenates	Upgradient Well
A-48	--	Semi-annually	TPH, BTEX, Oxygenates	Downgradient of A-17R and STF
A-4A	Semi-annually	Annually	TPH, BTEX, Oxygenates	Upgradient Well
A-21A	Semi-annually	Semi-annually	TPH, BTEX, Oxygenates	MtBE Local Plume
A-29A	--	Semi-annually	TPH, BTEX, Oxygenates	Downgradient of A-21A
A-17R	Semi-annually	Semi-annually	TPH, BTEX, Oxygenates	MtBE Local Plume
A-10A	Semi-annually	Semi-annually	TPH, BTEX, Oxygenates	Downgradient of A-17R
AO-18	--	Semi-annually	TPH, BTEX, Oxygenates	Southeastern Edge of Plume
A-38A	Semi-annually	Semi-annually	TPH, BTEX, Oxygenates	Downgradient Sentinel Well
A-39A	Semi-annually	Semi-annually	TPH, BTEX, Oxygenates	Downgradient Sentinel Well
AL-3	--	Semi-annually	TPH, BTEX, Oxygenates	Additional Downgradient Sentinel Well
A-3A	--	Annually	TPH, BTEX, Oxygenates	Northern Edge of Plume
AO-10	Semi-annually	Semi-annually	TPH, BTEX, Oxygenates	Downgradient Sentinel Well
AO-11	Semi-annually	Semi-annually	TPH, BTEX, Oxygenates	Downgradient Sentinel Well
AO-20	--	Annually	TPH, BTEX, Oxygenates	Upgradient Artesia Well and lateral extent of LNAPL
AO-21	Semi-annually	Annually	TPH, BTEX, Oxygenates	Northern Edge of Plume
AO-6	--	Annually	TPH, BTEX, Oxygenates	Upgradient Artesia Well
A-5A	--	Semi-annually	TPH, BTEX, Oxygenates	Western Edge of Marketing Area MtBE Plume, Downgradient Edge of West Tank Farm.
Carmenita Sump	Semi-annually	Semi-annually	TPH, BTEX, Oxygenates	Representative of Semi-Perched STF Groundwater
P-10	Semi-annually	Annually	TPH, BTEX, Oxygenates	Upgradient Semi-Perched Well
Q1 2014: Sampling of PO-5, PO-12 to PO14 and PO 19				Confirmation of Lateral Delineation and of Plume Stability
PO-7	--	--	--	Proposed abandonment - monitoring well more than one mile from GWRC - irrelevant to GWRC

EXHIBIT 15

GOLDEN WEST REFINING COMPANY

June 23, 2014

O.142199

Mr. Adnan Siddiqui
CRWQCB, Los Angeles
320 W. 4th Street, Suite 200
Los Angeles, CA 90013

RE: ***Former Golden West Refinery***
13539 Foster Road
Santa Fe Springs, California 90670
Semi-Annual Groundwater Monitoring Report (January -July 2014)

Dear Mr. Siddiqui:

Presented herein is the Semi-Annual Groundwater Monitoring Report (January –July 2014) for the former Golden West Refinery, located at 13539 Foster Road, Santa Fe Springs, California **(Figure 1)**. This report presents the results of the groundwater monitoring and sampling, and a brief description of hydrocarbon recovery activities conducted during the First Semester 2014 (January –July 2014). Golden West Refining Company (GWRC) has retained the services of Earth Management Company (EMC) to conduct semi-annual monitoring, sampling, and hydrocarbon recovery activities at this site.

If you should have any questions, please call us at (562) 921-3581, Ext. 260 (Simon), Ext. 325 (Larry), or Ext. 390 (Chris).

Respectfully submitted,

PROFESSIONAL GEOLOGIST • SIMON TREGURTHA • Exp. 8-31-15 • NO. 9089 • STATE OF CALIFORNIA

Simon Tregurtha
Professional Geologist No. 9089
Project Manager, GWRC

PROFESSIONAL GEOLOGIST ★ LARRY HIGINBOTHAM ★ Exp. 04/30/15 ★ No. 5497 ★ STATE OF CALIFORNIA

Larry Higinbotham
Professional Geologist No. 5497

Chris Panaitescu
General Manager, GWRC

Cc: File
Nicole. R. Gleason (King Williams & Gleason LLP)

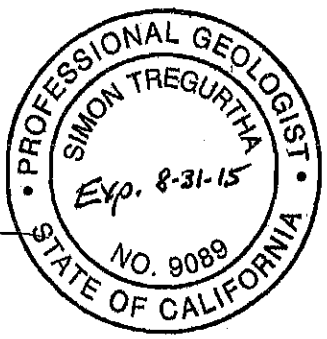
13116 Imperial Highway, P.O. BOX 2128, Santa Fe Springs, CA 90670-0138
Tel (562) 921-3581 • Fax (562) 921-7510

SEMI-ANNUAL
GROUNDWATER MONITORING REPORT
(January –July 2014)

Submitted
by:

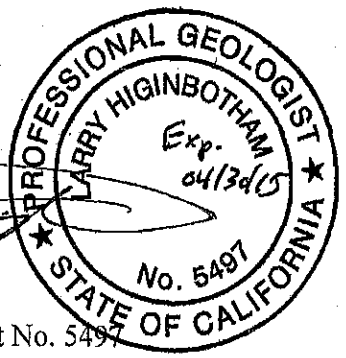
Golden West Refining Company
13116 Imperial Hwy
Santa Fe Springs, CA 90670

Prepared by:



Simon Tregurtha
Professional Geologist No. 9089
Project Manager, GWRC

Reviewed by:



Larry Higinbotham
Professional Geologist No. 5497

Chris Panaitescu
General Manager, GWRC

1.0 INTRODUCTION

Presented in this Semi-Annual Groundwater Monitoring Report (January –July 2014) are the results of recent groundwater monitoring, sampling, and remediation conducted at Golden West Refining Company's (GWRC's) former refinery (the Site) located in Santa Fe Springs, CA. These activities were performed in compliance with Cleanup and Abatement Order (CAO) No. R4-2004-0020, the LARWQCB letter dated October 11, 2005, Resolution No. R06-004, Waste Discharge Requirements Order No. R4-2006-0037, and Monitoring and Reporting Program CI-9023 and included:

- Semi-Annual groundwater monitoring consisting of fluid-level monitoring to identify changes in the free- and dissolved-phase hydrocarbon plumes and to calculate the gradient and estimate the groundwater flow direction;
- Semi-Annual groundwater sampling of selected wells;
- Extraction of LNAPL from semi-perched and Artesia groundwater zones;
- Operation of the soil vapor extraction systems in the West Tank Farm (WTF), South Tank Farm (STF);
- Operation of the groundwater remediation and soil vapor extraction systems in the STF groundwater barrier area;
- Operation of the groundwater remediation system in the Processing Unit Area (PUA); and
- Operation of the SVE systems in the PUA and Marketing Area (MA)

Results of groundwater monitoring, sampling, and remediation activities have been reported on a semi-annual basis since the initiation of the *Groundwater Management Program* in 1993. The recovery of hydrocarbons was reported in detail in previous semi-annual reports; however, this and future semi-annual reports will only present a brief description of hydrocarbon recovery operations, as a detailed description of the remediation results are reported under separate cover in the site-wide status update/remediation quarterly report, under a format approved by the RWQCB.

1.1 Site History

The former Golden West Refinery property is located in the city of Santa Fe Springs, California, near crude oil-producing fields, but no oil and gas drilling activities are reported to have occurred on this site. In 1925, Wilshire Oil Company ("Wilshire") purchased the Refinery Property and built storage facilities with more than seven (7) million barrels capacity. In 1936, Wilshire constructed an oil refinery located east of Carmenita Road and north of East Foster Road, where gasoline and other finished petroleum products were manufactured. In 1960, Gulf Oil Corporation ("Gulf") purchased the Refinery Property from Wilshire. Gulf refined crude oil into finished gasoline, heavy fuel oils, diesel fuel and asphalt. In 1983, GWRC purchased the Refinery Property from Gulf. GWRC operated the refinery process unit until February 1992, when crude oil processing operations were suspended. Only fuel transport operations were conducted by GWRC at the Refinery Property from February 1992 to August 1997.

The refinery facility (depicted in **Figures 1 and 2)** was formerly divided into four areas which included the:

- Process Unit Area (PUA);
- West Tank Farm (WTF);
- South Tank Farm (STF); and
- Marketing Area (MA).

The former PUA, located in the northeastern part of the former refinery property, was utilized as the main processing area. The former STF and WTF areas were used for storage and blending of crude oil, intermediate products, and finished products. These finished products were then loaded and distributed in the MA.

Starting in 1997, the WTF, STF, PUA, and MA have been entirely demolished and redeveloped into light manufacturing industrial and commercial warehouse facilities. During each site redevelopment, all primary potential contaminant sources (storage tanks, piping, processing units, etc) were removed, along with secondary sources of contamination (impacted shallow soils).

1.2 Groundwater Monitoring

Two shallow groundwater zones have been identified under the site. The uppermost water-bearing zone is the Semi-Perched zone and is found locally at depths ranging from 20 to 50 feet bgs in the Bellflower Formation in the southern part of the STF and extends southwest off-site, with a general southwesterly gradient direction. Underlying the Semi-Perched zone, the Artesia Aquifer is found in the Lakewood Formation at a depth of approximately 65-100 ft below grade. This groundwater zone also shows local mounding and local lateral discontinuities, and generally has an easterly groundwater gradient.

During this reporting period, as part of routine groundwater monitoring, GWRC conducted the following activities:

- Fluid levels were measured in all accessible monitoring wells in both groundwater zones to estimate the direction and gradient of groundwater flow;
- Free-phase hydrocarbon occurrence and thickness were monitored; and
- Selected monitoring wells were sampled and analyzed.

The locations of on- and off-site monitoring wells completed in the Semi-perched and Artesia groundwater zones are shown on **Figure 2. Figure 3** illustrates the Semi-Perched zone and Artesia aquifer barrier wells along the southern boundary of the STF.

1.3 Hydrocarbon Recovery

Hydrocarbon recovery has been conducted at the GWRC facility utilizing several different recovery methods which have included: extensive soil removal, LNAPL removal by hand bailing or by automatic equipment, portable pumping units and vapor extraction. Hydrocarbon recovery is reported in detail in the site-wide quarterly report, submitted under separate cover.

During this reporting period GWRC operated: SVE systems GW-6, GW-7 (located in the WTF), GW-9 (located in the MA), GW-10 and GW-11 (located in the STF), and GW-13 (located in the PUA); LNAPL recovery systems GW-10 (located in the STF) and GW-12 (located in the PUA); and Groundwater Pump and Treat system GW-9 (located in the MA).

Groundwater extracted from the City of Santa Fe Springs' Carmenita Sump pumping system is treated by the Groundwater Pump and Treat system GW-9 before being discharged into the sewer.

Details of free-phase liquid hydrocarbon recovery activities are provided in **Section 3.**

2.0 GROUNDWATER FLOW

GWRC monitors water bearing zones that underlie the property on a semi-annual basis. Groundwater gauging in all monitoring wells for the current reporting period was conducted on April 1, 2 and 3, 2014, and selected wells were sampled on April 3, 2014. Data collected during semi-annual activities is used to determine groundwater flow directions and gradient variations from each zone.

Results of groundwater gauging and sampling are listed in **Tables 1 and 2.** Field gauging data are included in **Appendix A.**

2.1 Semi-Perched Water-Bearing Zone

The Semi-perched water-bearing zone is locally encountered at depths ranging from approximately 20 ft bgs in most areas to 45 feet bgs locally. This laterally discontinuous zone is unconfined and occurs both on and off GWRC property. The soils in this zone are composed of clay and silt, with lenticular sand and gravel layers. The sand and gravel layers are saturated in some areas within and south of the GWRC property and forms the Semi-perched zone. Where these lenticular sands and gravel layers are not underlain by less-permeable clay and silt layers, the Semi-perched zone is absent (TriHydro, 1991).

The Semi-perched zone appears to be laterally continuous beneath the southern section of the STF and southwest offsite the property. Groundwater elevations in the Semi-perched zone measured during the First Semester 2014 semi-annual groundwater monitoring event were generally similar to those observed during the previous monitoring event. The dominant groundwater flow direction in this area and in this groundwater zone remained predominantly to the southwest under a hydraulic gradient of approximately 0.004 ft/ft, which is generally consistent with previous monitoring periods. Groundwater elevations and flow directions for this First Semester 2014 monitoring event are shown on **Figure 4.**

2.2 Artesia Aquifer

The Artesia Aquifer is the uppermost nearly continuous water-bearing zone underlying the Site, encountered at depths ranging from approximately 65 feet bgs southwest of the site to over 100 feet bgs east of the Site. Although the Artesia Aquifer appears to be relatively continuous laterally, historical groundwater gauging data indicates significant changes in groundwater elevation within the aquifer suggesting local discontinuities or perching conditions at depth under the site within this aquifer's depth interval.

The Artesia Aquifer is composed of fluvial sediments of gravel, fine to coarse sand, and interbedded silt and clay. The lithology of the upper portion of the Artesia Aquifer, where most of the Artesia monitoring wells are completed, is irregular and reflects a complex sequence of interbedded and laterally discontinuous layers of sand, silt, and clay (TriHydro, 1991).

During this reporting period, groundwater in the Artesia Aquifer beneath the site was generally found at depths similar to those observed during the previous monitoring event. Groundwater gradient and direction varies throughout the site and surrounding areas with localized mounding, however, in general the groundwater flow is generally to the east-northeast as shown on **Figure 5.**

3.0 FREE-PHASE LIQUID HYDROCARBONS

GWRC has monitored free-phase hydrocarbon in groundwater since purchasing the Site in August 1983. The current distribution of free-phase hydrocarbons in the Semi-perched zone and Artesia aquifers is illustrated on **Figures 6 and 7.** *Please note that due to the scale of the figures presented in this report (1-inch = 600-feet), the size of the plumes may be exaggerated.*

The area surrounding the Refinery includes multiple commercial and industrial facilities, some of which historically operated gasoline, diesel or waste oil storage tanks. In 2011 and on behalf of GWRC, The Source Group Inc. (SGI) conducted a review of historical records as collected by Environmental Data Resources, and examined files at the City of Santa Fe Springs, Norwalk (through the County of Los Angeles records) and the RWQCB. Results of the 2011 file review were presented in the SGI *Groundwater Monitoring Program Review*, dated March 12, 2012, which also included an evaluation of free product samples that were collected on February 7, 2012, and submitted for laboratory fingerprinting analysis. The SGI Report concluded that the free-phase hydrocarbons in the semi-perched groundwater zone southwest of the refinery can be attributed to off-site sources.

Groundwater sampling and modeling of hydrocarbon concentrations in groundwater beneath the Site were performed by TRC and reported in the September 2002 *Fate and Transport Modeling, Former Golden West Refinery.* Results of modeling in both the Semi-perched zone and Artesia aquifer indicate that the hydrocarbon plumes are stable and decreasing under current remedial conditions and that biodegradation is actively occurring at the site, under sulfate-consuming anaerobic conditions. Simulations of past and future plume migration indicate that migrations of the free- and dissolved-phase plumes are limited, and that the LNAPL removal and groundwater monitoring programs currently in place are adequate if continued to a point of diminishing returns. As reported in 1998 Lawrence Livermore Study (Rice et al, CA LUFT Historical Case Analysis), groundwater contaminated benzene plumes at 90% of the studied 217 sites extended to 255 feet or less, and the median plume length was 101 ft. Based upon the above-mentioned TRC report and the Lawrence Livermore Study, GWRC believes that it is highly unlikely that free and dissolved phase hydrocarbons observed in offsite wells, located more than approximately 500-feet from the boundary of the GWR property, can be attributed to historical refinery activities.

GWRC has maintained two objectives for the hydrocarbon monitoring and recovery program: (1) Monitor and define the extent of subsurface free- and dissolved-phase plumes associated with the former refinery; and (2) Remediate and evaluate the effectiveness of hydrocarbon recovery efforts.

The GWRC hydrocarbon monitoring program has defined the extent of two main plumes of subsurface hydrocarbons: one apparent plume in the semi-perched zone and one apparent deeper plume in the Artesia Aquifer.

3.1 Semi-Perched Water Bearing Zone Free Phase Hydrocarbons

GWRC monitors for hydrocarbon thickness in observation and barrier wells within Semi-perched and Artesia wells as required by CAO R4-2004-0020. Free-phase hydrocarbon thickness in Semi-perched wells is presented in **Tables 1 and 2** and is illustrated on **Figure 6.**

The STF barrier recovery system extracts hydrocarbons from the Semi-Perched zone plume. The barrier extracted free-phase product from Semi-perched wells is pumped to an on-site above ground product

storage tank (AST) installed as part of the upgraded STF barrier system compound GW-10. The SVE system also removes residual LNAPL in vapor phase from the shallow groundwater and soil.
Free-phase hydrocarbons are also extracted by the city's Carmenita under-crossing de-watering sump. The sump consists of lateral conduit piping connected to an automated flood-control drain. Groundwater and occasional free-phase hydrocarbons are recovered from the Semi-perched zone by gravity drainage and collected in a central sump. The fluids are pumped from the city sump to the former Marketing area, where they are treated and discharged to the sanitation sewer under LCASD permit No. 016450.

The current distribution of free-phase product in the off-site wells southwest of the former refinery suggests that the free-phase plume is a combination of plumes, with multiple origins. Off-site wells located within the plume are periodically hand-bailed by GWRC personnel. The product samples removed from the wells show significant visual variations, suggesting multiple hydrocarbon sources along the apparent length of the free-phase plume.

3.2 Artesia Aquifer Free-Phase Hydrocarbons

GWRC monitored all Artesia Aquifer wells (including those in the free-phase recovery program) for depth to water and depth to free-phase hydrocarbon (if present) on a semi-annual schedule and approximately twice-weekly to monthly for wells in the hand-bailing program. Hydrocarbon thickness measurements for the Artesia Aquifer are listed in **Tables 1 and 2** and a map illustrating the thickness and lateral extent of free-phase hydrocarbons in the Artesia aquifer is shown on **Figure 7.** The lateral boundaries of the free-phase hydrocarbons plume in the Artesia Aquifer appear to be similar to previous findings.

The STF Barrier LNAPL remediation system (GW-10) is currently operational and utilizes Artesia and Semi-Perched wells A-7, A-32, A-32E, A-32W, and A-42, and P-2A and P-13.

The PUA Barrier LNAPL remediation system (GW-12) is located in the PUA and has been operational since October 2007. GW-12 consists of a series of five down hole ferret pumps that are connected to through a series of below surface pipes and hoses to a 2,000-gallon above ground storage tank (AST). The down-hole ferret pumps are installed in groundwater monitoring wells A-11A, A-62, A-71, A-72, and A-73 and remove free-phase hydrocarbons from above the Artesia Aquifer.

The volume of free product removed from each water bearing zone and remediation area is reported in our quarterly remediation reports and is based on disposal documentation provided by the offsite disposal facility.

4.0 GROUNDWATER SAMPLING PROGRAM

Currently the groundwater sampling schedule includes collecting and analyzing groundwater samples from 11 wells screened within the Artesia Aquifer groundwater zone (A-4A, A-5A, A-10A, A17R, A-21A, A-38A, A-39A, AO-10, AO-11, AO-21 and MW-2A) as required by CAO No. R4-2004-0020 which replaced CAO No. 93-082 on August 23, 2004. Due to the presence of free product in well A-10A, groundwater samples were not collected from this well and well MW-2A was not sampled as no groundwater was detected in this well (technicians noted that this well was "DRY"). TPHg and TPHd by EPA Method 8015B and for BTEX and oxygenates via EPA Method 8260B was analyzed for the 9 wells that were sampled on April 3, 2014.

5.0 GROUNDWATER QUALITY

During this First Semester 2014 reporting period, GWRC collected groundwater samples from 9 Artesia wells, and from the Carmenita Sump, as representative for the semi-perched groundwater zone. Results of the semi-annual groundwater monitoring and sampling activities are discussed in the following sections. The findings indicate that the contamination of groundwater under the site is relatively consistent with previous monitoring events, indicating plume stability.

5.1 Sampling Procedures

Groundwater sampling activities were performed on April 3, 2014. Prior to sampling, each well was gauged and purged by evacuating at least three casing volumes of water to ensure that representative formation water is produced. Well purging was accomplished using disposable PVC bailers attached to an electrically-driven motor/reel system by a dedicated line. Prior to the initiation of sampling activities and following completion of each location, all sampling equipment was cleaned using a three-step decontamination process. This process included a wash with a biodegradable soap and tap water solution followed by a double-rinse with tap and de-ionized water, respectively. The Carmenita Sump sample was collected from the influent piping from the sump to the GWRC treatment compound prior to treatment. Following well purging and stabilization of pH, conductivity, and temperature, groundwater samples were collected from each of the wells after recovery of at least 80% using a dedicated sampling bailer and line. Samples were then transferred directly from the sampling bailer to appropriately labeled and preserved containers provided by the laboratory. Copies of the laboratory analytical reports and chain-of-custody documentation are presented in **Appendix B.**

5.2 Sample Handling and Analysis

Immediately upon collection, each sample container was labeled and placed on ice in insulated coolers for temporary storage and transportation. The samples were collected by and transported the same day to Associated Laboratories, a California-certified laboratory in Orange, California. Sample-analysis-request/chain-of-custody forms accompanied the samples to the laboratory.

Quality assurance and quality control (QA/QC) for samples collected during this semi-annual sampling event included a trip blank, an equipment blank, and a duplicate. The duplicate sample was collected from well A-21A and submitted without well identification to the laboratory.

5.3 Groundwater Quality Evaluation

The laboratory results are included in **Appendix B.** The results of groundwater analyses are tabulated in the accompanying **Tables 1 and 2.**

The maximum TPHg and benzene concentrations were reported in well A-17R at 82,200 µg/L and 24,000 µg/L, respectively.

MtBE was only detected in two wells above the laboratory detection limits (wells A-17R and A-21A) confirming a localized and defined presence of MtBE in groundwater under the site. MtBE was never part of the refinery process at the site, and was only temporarily used during the last stages of fuel marketing/blending. The presence of MtBE in the WTF area well A-21A is most likely associated with an upgradient source and the presence of MtBE in well A-17R (located in the Marketing Area) is most likely associated with the fuel marketing/blending activities conducted in this area.

The laboratory analytical results for the Carmenita Sump groundwater influent contained detectable concentrations of TPHg, TPHd, benzene, toluene, ethylbenzene, and xylenes at 85,500 µg/L, 25,000 µg/L, 2,900 µg/L, 8,200 µg/L, 2,900 µg/L, and 22,000 µg/L, respectively. MTBE and TBA were not detected above their respective laboratory detection limits in the Carmenita Sump groundwater influent sample.

The dissolved concentrations of TPHg, benzene and MTBE in the Artesia Aquifer are shown in **Figures 8, 9, and 10**, respectively. *Please note that due to the scale of the figures presented in this report (1-inch = 600-feet), the size of the plumes represented by the isoconcentration lines may be exaggerated.*

TBA was only detected above laboratory detection level in 2 (A-17A and A-21A) of the 9 wells sampled this reporting period. The TBA concentrations detected in wells A-17R and A-21A were 12,000 µg/L and 870 µg/L, respectively. TBA was not detected above laboratory detection level in the Carmenita Sump sample this reporting period.

6.0 SUMMARY AND PLANNED ACTIVITIES

Groundwater monitoring and remediation activities performed at the former Golden West Refinery indicate that the groundwater contamination under the site is defined and decreasing. The site is fully redeveloped and free-phase removal activities continue on the Semi-perched zone and the Artesia aquifers. The lateral extents of the free-phase and dissolved hydrocarbon plumes are stable, and previous sampling of the former deeper (Silverado) aquifer confirmed that the vertical delineation was completed by showing that the deeper aquifer is not impacted beneath the site. With the extensive source removal activities completed at the site and the on-going remedial activities by GWRC, the groundwater contamination will continue to be reduced at the site.

GWRC will continue the operation of the existing remediation systems, and will continue to report quarterly on hydrocarbon removal operations as required under the existing CAO No. R4-2004-0020 issued by the LARWQCB in a letter dated August 24, 2004.

The next semi-annual groundwater monitoring and sampling event is scheduled for September 2014.

Closing Comments

Interpretations expressed herein are based solely upon data collected and provided by EMC and Associated Laboratories.

TABLES

TABLE 1 - SUMMARY TABLE
CURRENT PERIOD GROUNDWATER DATA
Former Golden West Refinery - Santa Fe Springs, CA

WELL	AREA	STATUS	Monit./ Sample Date	ANALYTICAL PARAMETERS								MONITORING PARAMETERS				ELEVATION		WELL	
				TPHg (mg/L)	TPHd (mg/L)	B (µg/L)	T (µg/L)	E (µg/L)	X (µg/L)	MTBE (µg/L)	TBA (µg/L)	DTP (feet)	DTW (feet)	DTB (feet)	PT (feet)	CASING (feet)	GW (feet)	DIA (inches)	SCREENED INTERVAL (ft above mean sea level)
A-3A	WTF	INACT	04/02/14	-	-	-	-	-	-	-	-	NP	82.11	88.27	0.00	98.01	15.90	4	8.01 - 33.01
A-4A	WTF	ACT	04/03/14	<0.0066	<0.04	<0.18	<0.24	<0.21	<0.45	<0.19	<5.2	NP	74.99	87.75	0.00	90.16	21.17	4	5.16 - 41.16
A-5A	WTF	ACT	04/03/14	<0.0066	<0.04	<0.18	<0.24	<0.21	<0.45	<0.19	<5.2	NP	71.64	79.65	0.00	92.87	21.23	4	12.87 - 37.87
A-6R	MA	INACT	04/02/14	-	-	-	-	-	-	-	-	NP	66.85	88.97	0.00	90.85	22.00	4	-0.4 - 29.6
A-7	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	69.46	80.96	81.75	0.52	86.49	16.90	4	3.49 - 23.99
A-8	MA	INACT	04/02/14	-	-	-	-	-	-	-	-	65.71	85.80	76.25	0.09	87.65	21.92	4	4.3 - 24.3
A-10A	STF	ACT	04/03/14	-	-	-	-	-	-	-	-	62.56	63.00	73.83	0.44	88.98	26.31	4	13.98 - 43.98
A-11A	PUA	INACT	04/02/14	-	-	-	-	-	-	-	-	60.35	60.70	69.15	0.35	91.77	31.33	4	16.77 - 46.77
A-16R	MA	INACT	04/02/14	-	-	-	-	-	-	-	-	68.07	70.20	79.22	2.13	92.13	23.54	4	10.13 - 45.13
A-17R	MA	ACT	04/03/14	82.20	1.7	24,000	4,700	1,800	6,100	17,000	12,000	NP	65.41	80.21	0.00	90.68	25.17	4	12.68 - 47.68
A-18A	WTF	INACT	04/02/14	-	-	-	-	-	-	-	-	NP	71.22	75.20	0.00	94.50	23.28	4	15 - 40
A-21A	WTF	ACT	04/03/14	26.00	0.82	4,800	<4.8	1,100	3,500	1,200	870	NP	79.83	85.22	0.00	97.23	17.40	4	9.23 - 64.23
A-21A (Duplicate)			04/03/14	23.80	0.59	4,800	<4.8	1,200	3,700	1,200	770	-	-	-	-	-	-	4	9.23 - 34.23
A-22A	WTF	INACT	04/02/14	-	-	-	-	-	-	-	-	NP	81.22	87.72	0.00	100.19	18.97	4	12.19 - 37.19
A-24A	WTF	INACT	04/02/14	-	-	-	-	-	-	-	-	NP	79.69	90.10	0.00	96.83	17.14	4	7.33 - 32.33
A-25	WTF	INACT	04/02/14	-	-	-	-	-	-	-	-	NP	78.81	92.55	0.00	91.41	12.80	4	-1 - 19
A-26A	WTF	INACT	04/02/14	-	-	-	-	-	-	-	-	NP	76.74	89.50	0.00	95.60	16.66	4	5.6 - 30.6
A-27A	WTF	INACT	04/02/14	-	-	-	-	-	-	-	-	NP	73.20	83.75	0.00	91.16	17.98	4	7.16 - 32.16
A-29A	PUA	INACT	04/02/14	-	-	-	-	-	-	-	-	NP	94.34	>100	0.00	97.62	3.28	4	-7.38 - 22.62
A-30A	PUA	INACT	04/02/14	-	-	-	-	-	-	-	-	NP	92.82	>100	0.00	97.30	4.38	4	-17.28 - 12.72
A-32	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	72.65	73.75	85.95	1.10	90.49	17.54	4	2.2 - 22.2
A-32E	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	72.38	73.38	85.88	1.00	-	-	4	1 - 26
A-32W	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	73.20	73.77	81.30	0.57	-	-	4	2 - 27
A-34	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	NP	88.26	-	0.00	89.92	1.64	4	-5.9 - 11.1
A-35	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	NP	71.53	80.52	0.00	86.72	15.19	4	-7.6 - 12.4
A-37A	PUA	INACT	04/02/14	-	-	-	-	-	-	-	-	91.22	95.08	>100	3.86	94.14	1.97	4	-5.86 - 24.14
A-38A	PUA	ACT	04/03/14	<0.0066	<0.04	<0.18	<0.24	<0.21	<0.45	<0.19	<5.2	NP	101.45	119.25	0.00	105.20	3.75	4	-16.69 - 13.11
A-39A	PUA	ACT	04/03/14	<0.0066	<0.04	<0.18	<0.24	<0.21	<0.45	<0.19	<5.2	NP	104.75	115.13	0.00	104.81	0.06	4	-10.14 - 19.86
A-42	STP	INACT	04/02/14	-	-	-	-	-	-	-	-	73.70	74.80	104.90	0.80	90.99	17.09	6	-16.7 - 13.3
A-43	MA	INACT	04/02/14	-	-	-	-	-	-	-	-	NP	76.38	102.07	0.00	91.06	14.68	6	-9.4 - 0.6
A-44	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	69.18	73.55	86.60	4.37	86.05	17.80	4	2 - 32
A-46A	PUA	INACT	04/02/14	-	-	-	-	-	-	-	-	NP	80.62	89.99	0.00	94.08	13.46	4	4.08 - 34.08
A-48	STF	NOACC	04/02/14	-	-	-	-	-	-	-	-	NOACCESS	-	-	-	91.04	-	4	-31.2 - 8.8
A-52	MA	INACT	04/02/14	-	-	-	-	-	-	-	-	NP	67.59	79.77	0.00	90.82	23.03	4	5 - 25
A-56A	WTF	INACT	04/02/14	-	-	-	-	-	-	-	-	NP	84.79	93.65	0.00	102.84	18.05	4	8.34 - 26.34
A-60	PUA	INACT	04/01/14	-	-	-	-	-	-	-	-	NP	108.65	115.30	0.00	111.83	3.18	4	-5.26 - 24.74
A-61	PUA	INACT	04/02/14	-	-	-	-	-	-	-	-	FILM	85.21	93.10	0.00	95.86	10.65	4	1.86 - 31.86
A-62	PUA	INACT	04/02/14	-	-	-	-	-	-	-	-	59.35	59.37	71.10	0.02	91.82	32.47	4	16.82 - 46.82
A-63	PUA	INACT	04/01/14	-	-	-	-	-	-	-	-	NP	78.80	82.70	0.00	94.42	17.62	4	9.42 - 39.42
A-64	PUA	INACT	04/02/14	-	-	-	-	-	-	-	-	NP	91.00	>100	0.00	94.39	3.39	4	-15.61 - 14.39
A-65	PUA	DRY	04/02/14	-	-	-	-	-	-	-	-	DRY	-	98.90	0.00	98.59	-	4	0.59 - 30.59
A-66	PUA	INACT	04/02/14	-	-	-	-	-	-	-	-	NP	74.44	83.45	0.00	99.83	25.39	4	14.83 - 44.83
A-67	PUA	INACT	04/02/14	-	-	-	-	-	-	-	-	83.37	83.77	89.70	0.40	92.63	9.16	4	-2.37 - 27.63
A-71	PUA	INACT	04/01/14	-	-	-	-	-	-	-	-	82.16	83.97	92.02	1.79	95.17	12.65	4	1.17 - 31.17
A-72	PUA	INACT	04/01/14	-	-	-	-	-	-	-	-	74.65	75.85	89.60	1.20	93.78	18.64	4	-3.22 - 26.76
A-73	PUA	INACT	04/01/14	-	-	-	-	-	-	-	-	65.55	65.70	75.50	0.15	94.26	28.67	4	14.26 - 44.26
AL-1	PUA	INACT	04/02/14	-	-	-	-	-	-	-	-	NP	95.76	>100	0.00	98.75	2.99	4	-13.37 - 21.63
AL-2	PUA	INACT	04/02/14	-	-	-	-	-	-	-	-	NP	95.03	>100	0.00	99.12	4.09	4	-12.98 - 22.02
AL-3	PUA	INACT	04/02/14	-	-	-	-	-	-	-	-	NP	97.83	>100	0.00	101.09	3.26	4	-11 - 24
AO-2	OS	INACT	04/01/14	-	-	-	-	-	-	-	-	NP	70.48	90.36	0.00	85.56	15.08	4	-6.2 - 14.8
AO-3	OS	INACT	04/01/14	-	-	-	-	-	-	-	-	NP	66.34	90.00	0.00	89.64	23.30	4	-1.9 - 28.1
AO-6	OS	INACT	04/01/14	-	-	-	-	-	-	-	-	NP	63.00	78.64	0.00	83.29	20.29	4	4.3 - 24.3
AO-7	OS	INACT	04/01/14	-	-	-	-	-	-	-	-	NP	82.58	115.28	0.00	99.10	13.52	4	-19.8 - 30.2
AO-8	OS	INACT	04/01/14	-	-	-	-	-	-	-	-	64.15	64.19	113.50	0.04	94.93	10.77	4	-18.8 - 31.2
AO-9	OS	INACT	04/01/14	-	-	-	-	-	-	-	-	NP	88.64	109.00	0.00	96.86	8.02	4	-11.5 - 28.5
AO-10	OS	ACT	04/03/14	<0.0066	<0.04	<0.18	<0.24	<0.21	<0.45	<0.19	<5.2	NP	87.98	119.30	0.00	87.54	-0.44	4	-32 - -2
AO-11	OS	ACT	04/03/14	<0.0066	<0.04	<0.18	<0.24	<0.21	<0.45	<0.19	<5.2	NP	88.11	117.60	0.00	88.08	-0.03	4	-31.7 - -1.7
AO-12	OS	INACT	04/01/14	-	-	-	-	-	-	-	-	NP	58.15	92.50	0.00	61.11	22.96	4	-12.4 - 27.6
AO-14	OS	INACT	04/01/14	-	-	-	-	-	-	-	-	64.32	74.48	-	10.16	85.00	18.19	4	0.4 - 25.4
AO-16	OS	INACT	04/01/14	-	-	-	-	-	-	-	-	NP	59.20	83.40	0.00	81.01	21.81	4	-3.7 - 26.3
AO-18	OS	INACT	04/01/14	-	-	-	-	-	-	-	-	NP	68.22	94.12	0.00	81.39	13.17	4	-14 - 16
AO-20	OS	NOACC	04/01/14	-	-	-	-	-	-	-	-	NO ACCESS	-	-	-	88.24	-	4	-6.1 - 28.9
AO-21	OS	ACT	04/03/14	<0.0066	<0.04	<0.18	<0.24	<0.21	<0.45	<0.19	<5.2	NP	102.44	118.37	0.00	101.92	-0.52	4	-21.9 - 8.1
B-1	OS	INACT	04/01/14	-	-	-	-	-	-	-	-	NP	20.70	21.46	0.00	87.37	66.67	4	61.6 - 81.6
B-2	OS	NOACC	04/01/14	-	-	-	-	-	-	-	-	NO ACCESS	-	-	-	83.97	-	4	43.8 - 63.8
B-3	OS	DRY	04/01/14	-	-	-	-	-	-	-	-	DRY	-	46.51	-	63.26	-	4	34.26 - 54.26
B-10	OS	INACT	04/01/14	-	-	-	-	-	-	-	-	NP	22.64	35.42	0.00	87.65	65.01	4	57.76 - 77.76
B-13	OS	INACT	04/01/14	-	-	-	-	-	-	-	-	20.66	21.48	23.12	0.82	85.11	64.25	4	56.09 - 76.09
B-15	OS	INACT	04/01/14	-	-	-	-	-	-	-	-	NP	24.66	29.78	0.00	84.73	60.07	4	54.73 - 74.73
B-16	OS	INACT	04/01/14	-	-	-	-	-	-	-	-	24.16	24.24	28.24	0.08	82.18	58.00	4	52.22 - 72.22
Cerm Sump		ACT	04/03/14	86.50	25	2,900	8,200	2,900	22,000	<19	<520	-	-	-	-	-	-	-	-
CCW	OS	INACT	04/01/14	-	-	-	-	-	-	-	-	NP	21.83	25.57	0.00	85.33	63.50	8	-
GW-1	OS	INACT	04/01/14	-	-	-	-	-	-	-	-	NP	76.62	97.70	0.00	93.03	14.41	4	-6.97 - 13.03
GW-2	OS	INACT	04/01/14	-	-	-	-	-	-	-	-	NP	94.56	101.00	0.00	98.53	1.95	-	-3.47 - 16.53
MW-2A	WTF	ACT	04/03/14	-	-	-	-	-	-	-	-	DRY	-	99.11	-	101.71	-	4	1.71 - 21.71
MYTNN	OS	INACT	04/01/14	-	-	-	-	-	-	-	-	24.00	24.23	24.80	0.15	83.26	59.14	8	-
NW-3	OS	NOACC	04/01/14	-	-	-	-	-	-	-	-	NO ACCESS	-	-	-	105.96	-	4	-9.2 - 10.8
OW-2	OS	INACT	04/02/14	-	-	-	-	-	-	-	-	20.81	21.71	25.81	0.90	67.14	66.11	2	57.14 - 72.14
OW-3	OS	INACT	04/02/14	-	-	-	-	-	-	-	-	24.25	26.26	26.55	2.00	87.78	63.04	2	58.78 - 73.78

TABLE 1 - SUMMARY TABLE
CURRENT PERIOD GROUNDWATER DATA
Former Golden West Refinery - Santa Fe Springs, CA

WELL	AREA	STATUS	Monit./ Sample Date	ANALYTICAL PARAMETERS								MONITORING PARAMETERS				ELEVATION		WELL	
				TPHg (mg/L)	TPHd (mg/L)	B (µg/L)	T (µg/L)	E (µg/L)	X (µg/L)	MTBE (µg/L)	TBA (µg/L)	DTP (feet)	DTW (feet)	DTB (feet)	PT (feet)	CASING (feet)	GW (feet)	DIA (inches)	SCREENED INTERVAL (ft above mean sea level)
P-1	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	20.20	27.22	32.87	7.02	98.51	64.59	4	52.2 - 72.2
P-2A	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	22.82	24.93	28.33	2.11	98.29	64.95	4	63.1 - 78.1
P-4A	WTF	DRY	04/02/14	-	-	-	-	-	-	-	-	DRY	-	48.52	-	96.33	-	4	48.33 - 53.33
P-8A	WTF	INACT	04/02/14	-	-	-	-	-	-	-	-	NP	60.26	60.97	0.00	95.52	35.24	4	34.52 - 49.52
P-9A	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	23.18	23.40	29.14	0.22	88.86	65.45	4	58.68 - 73.68
P-10	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	NP	20.05	31.10	0.00	89.95	69.10	4	58.6 - 68.6
P-11	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	NP	19.41	20.36	0.00	86.73	67.32	4	59.8 - 69.8
P-12	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	24.26	28.32	29.30	2.06	87.18	62.42	4	57.6 - 67.6
P-13	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	26.15	28.40	34.90	2.25	87.80	61.10	4	55.4 - 75.4
PO-1	OS	INACT	04/01/14	-	-	-	-	-	-	-	-	NP	36.25	38.50	0.00	94.34	58.09	4	58.6 - 76.6
PO-3	OS	DRY	04/01/14	-	-	-	-	-	-	-	-	DRY	-	30.40	-	88.89	-	4	58.4 - 76.4
PO-4	OS	INACT	04/01/14	-	-	-	-	-	-	-	-	NP	21.88	27.50	0.00	85.13	63.25	4	59 - 68.5
PO-7	OS	INACT	04/01/14	-	-	-	-	-	-	-	-	NP	36.38	50.30	0.00	80.19	43.84	4	30.5 - 50.5
PO-8	OS	INACT	04/01/14	-	-	-	-	-	-	-	-	NP	26.18	28.32	0.00	81.40	56.22	4	55.2 - 65.2
PO-10	OS	INACT	04/01/14	-	-	-	-	-	-	-	-	NP	22.84	35.28	0.00	85.13	62.49	4	51 - 66
PO-11	OS	INACT	04/01/14	-	-	-	-	-	-	-	-	NP	32.10	32.45	0.00	86.29	54.19	4	54.2 - 69.2
PO-12	OS	INACT	04/01/14	-	-	-	-	-	-	-	-	NP	36.28	40.10	0.00	79.76	43.48	4	40.5 - 60.5
PO-13	OS	INACT	04/01/14	-	-	-	-	-	-	-	-	NP	45.04	45.18	0.00	81.32	36.23	4	35.5 - 56.5
PO-14	OS	INACT	04/01/14	-	-	-	-	-	-	-	-	NP	34.04	37.60	0.00	79.03	44.99	4	35.5 - 55.5
PO-15	OS	INACT	04/01/14	-	-	-	-	-	-	-	-	24.24	24.26	33.95	0.02	80.37	56.13	4	46 - 61
PO-19	OS	NOACC	04/01/14	-	-	-	-	-	-	-	-	NO ACCESS	-	-	-	85.29	-	4	48.5 - 71.5
SFS-2	OS	INACT	04/01/14	-	-	-	-	-	-	-	-	NP	22.34	30.64	0.00	89.65	64.31	6	-
STF-1A	STF	NOACC	04/02/14	-	-	-	-	-	-	-	-	NO ACCESS	-		-	86.12	-	4	68.12 - 73.12
STF-2A	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	28.85	29.25	29.74	0.30	92.98	63.98	4	62.98 - 77.98
STF-3A	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	21.88	23.53	24.91	1.67	97.62	85.35	4	62.82 - 72.62
STF-11B	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	21.15	21.45	25.17	0.30	87.32	66.10	4	62.32 - 72.32
STF-12B	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	19.83	19.86	27.62	0.03	88.33	66.49	4	56.33 - 71.33
STF-15	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	25.78	28.08	33.78	2.30	91.04	64.70	4	58 - 76
STF-16	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	24.78	27.20	33.55	2.42	88.00	62.63	4	58 - 78
STF-17	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	24.96	27.19	33.35	2.24	87.61	62.11	4	58 - 78
STF-18	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	24.45	27.05	33.60	2.60	87.55	62.46	4	54 - 74
STF-19	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	NP	26.30	33.95	0.00	90.48	65.18	4	58 - 75
STF-20	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	NP	25.15	31.80	0.00	87.19	62.04	4	55 - 75
STF-21	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	NP	25.50	35.50	0.00	87.04	61.54	4	55 - 75
STF-22	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	25.12	27.48	34.50	2.38	86.98	61.20	4	55 - 75
STF-23	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	25.00	25.17	32.21	0.17	86.95	61.91	4	67 - 77
STF-24	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	23.90	24.98	33.20	1.08	86.70	62.54	4	58 - 76
STF-25	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	NP	23.28	29.85	0.00	86.85	65.57	4	57 - 77
STF-26	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	22.22	22.83	30.15	0.61	88.00	65.63	4	57 - 77
STF-27	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	NP	21.77	28.18	0.00	87.55	65.78	4	56 - 76
STF-28	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	21.20	22.08	29.59	0.88	87.57	66.15	4	57 - 77
STF-29	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	NP	21.81	32.11	0.00	87.80	65.79	4	54 - 74
STF-30	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	22.04	22.18	32.38	0.14	87.70	65.63	4	54 - 74
STF-31	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	20.91	24.80	28.91	3.89	87.73	65.92	4	54 - 74
STF-32	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	NP	21.74	31.87	0.00	87.53	65.79	4	54 - 74
STF-33	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	NP	21.73	29.73	0.00	87.31	65.58	4	56 - 76
STF-34	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	21.15	21.82	29.20	0.67	87.21	65.90	4	56 - 76
STF-35	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	20.70	21.27	24.80	0.57	87.01	65.17	4	58 - 78
STF-36	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	19.96	25.43	29.00	5.47	86.77	65.47	4	56 - 78
STF-37	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	19.76	22.53	28.75	2.77	86.04	66.20	4	58 - 78
STF-38	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	20.37	20.40	27.81	0.03	86.63	66.25	4	58 - 78
STF-39	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	NP	29.00	25.70	0.00	87.15	58.15	4	58 - 78
STF-41A	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	NP	27.26	28.61	0.00	92.71	65.45	4	62.61 - 77.61
STF-42A	STF	NOACC	04/02/14	-	-	-	-	-	-	-	-	NP	25.62	28.55	0.00	91.91	65.09	4	61.91 - 79.91
TW-1	STF	INACT	04/02/14	-	-	-	-	-	-	-	-	24.33	24.68	33.75	0.35	87.60	63.15	0	56.7 - 76.7

NOTE:

ACT	Groundwater well currently used for monitoring
INACT	Groundwater well is NOT included in monitoring program
DRY	Groundwater well is dry and/or cannot be sampled
NOACC	Presently no access to groundwater well
DEST	Well has been properly destroyed, no longer a conduit to subsurface
AB	Groundwater well is abandoned, but not yet destroyed

TPHg	= Total Petroleum Hydrocarbons as gasoline
TPHd	= Total Petroleum Hydrocarbons as diesel
B	= Benzene
T	= Toluene
E	= Ethylbenzene
X	= Total Xylenes

DTP	= Depth To Product
DTW	= Depth To Water
DTB	= Depth To Bottom
PT	= Product Thickness
GW	= Groundwater

"-"	= Not analyzed / Not available
"<"	= Less than detection level indicated
"J"	= Flag indicating value between MDL & PQL
NP	= No free product

Table 2 - Summary of Historical Gauging and Chemical Data

Groundwater Monitoring, Former Golden West Refinery - Santa Fe Springs, CA

DATE	ANALYTICAL PARAMETERS								DEPTH TO PRODUCT	DEPTH TO GROUNDWATER	PRODUCT THICKNESS	CASING ELEVATION	GROUNDWATER ELEVATION
	TPHg (mg/L)	TPHd (mg/L)	BENZENE (µg/L)	TOLUENE (µg/L)	EthylBenzene (µg/L)	XYLENE (µg/L)	MTBE (µg/L)	TBA (µg/L)	(feet)	(feet)	(feet)	(feet)	(feet)
WELL # A-1													
09/24/85	-	-	2.0	1.0	1.0	-	-	-	NP	94.60	0.00	101.04	6.44
06/20/86	-	-	-	-	-	-	-	-	NP	92.17	0.00	101.04	8.87
08/20/86	-	-	1.0	0.4	0.8	-	-	-	NP	92.81	0.00	101.04	8.23
11/07/86	-	-	<1.0	1.0	1.0	-	-	-	NP	92.91	0.00	101.04	8.13
02/28/87	-	-	1.0	1.0	1.0	-	-	-	NP	91.89	0.00	101.04	9.15
04/29/87	-	-	1.0	6.0	2.0	-	-	-	NP	91.80	0.00	101.04	9.24
08/26/87	-	-	2.0	11.0	3.0	20	-	-	NP	93.06	0.00	101.04	7.98
02/08/88	-	-	1.0	1.0	1.0	1.0	-	-	NP	92.66	0.00	101.04	8.38
06/17/88	-	-	1.0	1.0	1.0	1.0	-	-	NP	92.36	0.00	101.04	8.68
09/28/88	-	-	1.0	1.0	1.0	1.0	-	-	NP	92.76	0.00	101.04	8.28
03/29/89	-	-	1.0	1.0	1.0	1.0	-	-	NP	94.21	0.00	101.04	6.83
06/08/89	-	-	1.0	1.0	1.0	1.0	-	-	NP	94.60	0.00	99.57	4.97
09/19/89	-	-	1.0	1.0	1.0	1.0	-	-	NP	95.92	0.00	99.57	3.65
12/13/89	-	-	1.0	1.0	1.0	1.0	-	-	NP	96.83	0.00	99.57	2.74
03/26/90	-	-	1.0	1.0	1.0	1.0	-	-	NP	97.74	0.00	99.57	1.83
06/06/90	-	-	1.0	1.0	1.0	1.0	-	-	NP	98.31	0.00	99.57	1.26
08/28/90	-	-	1.0	1.0	1.0	1.0	-	-	NP	99.25	0.00	99.57	0.32
02/19/91	-	-	1.0	1.0	1.0	1.0	-	-	NP	100.30	0.00	99.57	-0.73
08/18/91	-	-	1.0	4.0	1.0	6.0	-	-	NP	100.51	0.00	99.52	-0.99
11/20/91	-	-	1.0	1.0	1.0	1.0	-	-	NP	101.16	0.00	99.52	-1.64
03/02/92	-	-	1.0	1.0	1.0	1.0	-	-	NP	100.50	0.00	99.52	-0.98
05/28/92	-	-	1.0	1.0	1.0	1.0	-	-	NP	99.91	0.00	99.52	-0.39
08/22/92	-	-	1.0	1.0	1.0	1.0	-	-	NP	100.71	0.00	99.52	-1.19
11/20/92	-	-	1.0	1.0	1.0	1.0	-	-	NP	101.35	0.00	99.52	-1.83
02/27/93	-	-	1.0	1.0	1.0	1.0	-	-	NP	100.58	0.00	99.52	-1.06
05/18/93	-	-	1.0	1.0	1.0	1.0	-	-	NP	99.29	0.00	99.52	0.23
11/01/93	-	-	1.0	1.0	1.0	1.0	-	-	NP	98.71	0.00	99.52	0.81
04/18/94	-	-	1.0	1.0	1.0	1.0	-	-	NP	95.70	0.00	99.52	3.82
11/05/94	-	-	1.0	1.0	1.0	1.0	-	-	NP	94.05	0.00	99.52	5.47
04/20/95	-	-	1.0	1.0	1.0	1.0	-	-	NP	90.85	0.00	99.52	8.67
11/06/95	-	-	1.0	1.0	1.0	1.0	-	-	NP	90.68	0.00	99.52	8.84
04/09/96	-	-	1.0	1.0	1.0	1.0	<0.5	-	NP	87.84	0.00	99.52	11.68
11/11/96	-	-	1.0	1.0	1.0	1.0	-	-	NP	87.10	0.00	99.52	12.42
05/01/97	-	-	18	3.5	1.6	9.8	1.9	-	NP	84.87	0.00	99.52	14.65
11/03/97	-	-	2.6	0.5	0.5	8.7	58	-	NP	85.69	0.00	99.52	13.83
04/20/98	-	-	0.5	0.5	0.5	0.5	-	-	NP	84.32	0.00	99.52	15.20
11/04/98	-	-	0.5	6.4	1.3	1.3	<0.5	-	NP	85.18	0.00	99.52	14.34
04/27/99	-	-	0.5	0.5	0.5	0.5	-	-	NP	83.88	0.00	99.52	15.64
11/05/99	-	-	0.5	0.5	0.5	0.5	<0.5	-	NP	85.70	0.00	99.52	13.82
04/11/00	-	-	1.3	0.7	0.5	0.5	-	-	NP	85.63	0.00	99.52	13.89
11/06/00	-	-	0.5	0.5	0.5	0.5	<0.5	-	NP	87.70	0.00	99.52	11.82
	WELL DESTROYED												
WELL # A-2													
09/24/85	-	-	4,600	1,200	710	-	-	-	NP	81.80	0.00	95.42	13.62
06/20/86	-	-	1,030	2,260	690	-	-	-	NP	80.52	0.00	95.42	14.90
08/20/86	-	-	4,130	770	400	-	-	-	NP	81.27	0.00	95.42	14.15
02/28/87	-	-	-	-	-	-	-	-	NP	80.40	0.00	95.42	15.02
04/29/87	-	-	4,090	1,140	610	-	-	-	NP	80.22	0.00	95.42	15.20
08/26/87	-	-	2,610	510	200	1,120	-	-	80.41	80.55	0.14	95.42	14.98
02/08/88	-	-	5,500	3,700	1,000	5,300	-	-	NP	80.66	0.00	95.42	14.76
03/30/88	-	-	8,000	4,700	740	5,700	-	-	NP	80.43	0.00	95.42	14.99
06/17/88	-	-	6,800	2,300	610	3,000	-	-	NP	80.49	0.00	95.42	14.93
09/28/88	-	-	6,400	590	420	2,300	-	-	NP	81.22	0.00	95.42	14.20
03/29/89	-	-	4,800	30	740	320	-	-	NP	82.19	0.00	95.42	13.23
06/08/89	-	-	7,700	120	1,100	7,900	-	-	NP	82.36	0.00	94.96	12.60
09/19/89	-	-	7,100	1.0	700	280	-	-	NP	83.95	0.00	94.96	11.01
12/13/89	-	-	6,400	500	350	500	-	-	NP	84.48	0.00	94.96	10.48
03/26/90	-	-	7,000	100	100	990	-	-	NP	85.05	0.00	94.96	9.91
06/06/90	-	-	3,000	50	380	52	-	-	NP	85.90	0.00	94.96	9.06
08/28/90	-	-	6,400	50	220	110	-	-	NP	86.08	0.00	94.96	8.88
02/19/91	-	-	5,500	100	180	100	-	-	NP	86.92	0.00	94.96	8.04
08/18/91	-	-	5,900	100	650	100	-	-	NP	87.41	0.00	93.92	6.51
11/20/91	-	-	4,100	30	30	30	-	-	NP	87.69	0.00	93.92	6.23
03/02/92	-	-	3,200	30	50	30	-	-	NP	88.21	0.00	93.92	5.71
05/28/92	-	-	4,000	30	800	40	-	-	NP	88.29	0.00	93.92	5.63
08/22/92	-	-	37,000	300	300	300	-	-	NP	88.68	0.00	93.92	5.24
11/20/92	-	-	3,500	30	30	30	-	-	NP	88.38	0.00	93.92	5.54
02/27/93	-	-	-	-	-	-	-	-	NP	87.67	0.00	93.92	6.25
05/19/93	-	-	3,800	30	530	60	-	-	NP	87.25	0.00	93.92	6.67
11/01/93	-	-	1,600	1.0	400	52	-	-	NP	85.77	0.00	93.92	8.15
04/18/94	-	-	2,600	50	250	410	-	-	NP	83.37	0.00	93.92	10.55
11/05/94	-	-	1,500	41	110	39	-	-	NP	81.42	0.00	93.92	12.50
04/20/95	-	-	1,600	30	32	580	-	-	NP	79.86	0.00	93.92	14.06
11/06/95	-	-	800	74	350	590	-	-	NP	78.59	0.00	93.92	15.33
04/09/96	-	-	2,600	27	560	710	<0.5	-	NP	76.77	0.00	93.92	17.15
11/11/96	-	-	4,500	100	700	200	-	-	NP	76.04	0.00	93.92	17.88
05/01/97	-	-	4,600	10	20	19	-	-	NP	74.61	0.00	93.92	19.31
11/03/97	-	-	4,000	14	470	27	<0.5	-	NP	74.70	0.00	93.92	19.22
04/20/98	-	-	2,700	10	240	20	-	-	NP	73.82	0.00	93.92	20.10
11/04/98	-	-	3,700	9.1	510	3.9	<0.5	-	NP	73.51	0.00	93.92	20.41
04/27/99	-	-	3,300	5.0	290	5.0	-	-	NP	72.76	0.00	93.92	21.16
	WELL DESTROYED												

Table 2 - Summary of Historical Gauging and Chemical Data

Groundwater Monitoring, Former Golden West Refinery - Santa Fe Springs, CA

DATE	ANALYTICAL PARAMETERS								DEPTH TO PRODUCT	DEPTH TO GROUNDWATER	PRODUCT THICKNESS	CASING ELEVATION	GROUNDWATER ELEVATION
	TPHg (mg/L)	TPHd (mg/L)	BENZENE (µg/L)	TOLUENE (µg/L)	EthylBenzene (µg/L)	XYLENE (µg/L)	MTBE (µg/L)	TBA (µg/L)	(feet)	(feet)	(feet)	(feet)	(feet)
WELL # A-3													
09/24/85	-	-	-	-	-	-	-	-	NP	80.30	0.00	98.80	18.50
06/20/86	-	-	3,530	380	3,530	740	-	-	NP	79.28	0.00	98.80	17.52
02/26/87	-	-	-	-	-	-	-	-	79.66	79.70	0.04	98.80	17.13
04/29/87	-	-	1,220	660	660	-	-	-	78.89	78.92	0.03	98.80	17.90
06/26/87	-	-	1,410	570	610	3,430	-	-	78.93	78.95	0.02	98.80	17.87
10/28/87	-	-	3,100	560	1,300	6,300	-	-	NP	79.27	0.00	98.80	17.53
02/08/88	-	-	1,900	170	450	4,500	-	-	NP	79.36	0.00	98.80	17.44
03/30/88	-	-	1,900	50	410	2,700	-	-	NP	79.19	0.00	98.80	17.61
06/17/88	-	-	2,100	43	550	5,500	-	-	NP	79.19	0.00	98.80	17.61
09/28/88	-	-	2,800	28	1,100	8,800	-	-	NP	79.64	0.00	98.80	17.16
03/29/89	-	-	-	-	-	-	-	-	NP	80.90	0.00	98.80	15.90
09/19/89	-	-	3,400	50	590	2,100	-	-	NP	81.47	0.00	95.13	13.66
12/13/89	-	-	2,600	500	630	2,700	-	-	NP	81.90	0.00	95.13	13.23
03/26/90	-	-	2,700	50	790	1,900	-	-	NP	82.43	0.00	95.13	12.70
06/06/90	-	-	1,300	20	380	800	-	-	NP	82.67	0.00	95.13	12.46
08/26/90	-	-	2,500	20	520	1,200	-	-	NP	82.45	0.00	95.13	12.68
12/20/90	-	-	3,100	20	370	1,400	-	-	NP	83.58	0.00	95.13	11.55
02/19/91	-	-	-	-	-	-	-	-	83.19	83.20	0.01	95.13	11.94
06/18/91	-	-	2,700	20	330	1,100	-	-	83.35	83.36	0.01	95.15	11.80
11/20/91	-	-	2,800	20	560	670	-	-	NP	83.55	0.00	95.15	11.60
03/02/92	-	-	2,900	20	900	1,600	-	-	NP	83.90	0.00	95.15	11.26
05/28/92	-	-	2,800	30	810	1,200	-	-	NP	83.17	0.00	95.15	11.98
08/22/92	-	-	3,000	20	670	1,100	-	-	NP	83.33	0.00	95.15	11.82
11/20/92	-	-	2,100	30	30	930	-	-	NP	83.69	0.00	95.15	11.46
02/27/93	-	-	-	-	-	-	-	-	NP	83.38	0.00	95.15	11.77
11/01/93	-	-	2,000	100	570	830	-	-	NP	82.27	0.00	95.15	12.88
02/04/94	-	-	2,200	40	550	950	-	-	NP	81.33	0.00	95.15	13.82
04/18/94	-	-	1,900	100	410	850	-	-	81.25	81.26	0.01	95.15	13.90
11/06/94	-	-	3,700	20	860	1,000	-	-	NP	79.75	0.00	95.15	15.40
04/20/95	-	-	3.0	0.6	27	590	-	-	NP	78.17	0.00	95.15	16.98
11/06/95	-	-	460	6.0	270	626	-	-	NP	76.55	0.00	95.15	18.60
04/09/96	-	-	1,200	0.5	550	610	<0.5	-	NP	75.41	0.00	95.15	19.74
11/11/96	-	-	150	10	220	280	-	-	NP	74.02	0.00	95.15	21.13
04/30/97	-	-	47	0.5	27	190	-	-	NP	72.84	0.00	95.15	22.31
11/04/97	-	-	2.3	0.5	1.7	22	<0.5	-	NP	72.33	0.00	95.15	22.82
04/21/98	-	-	13	21	0.5	18	-	-	NP	71.32	0.00	95.15	23.83
11/05/98	-	-	13	1.1	79	35	-	-	NP	70.62	0.00	95.15	24.53
04/28/99	-	-	4.5	0.5	0.5	32	-	-	NP	70.22	0.00	95.15	24.93
11/01/99	-	-	8	0.8	32	25	<0.5	-	NP	70.84	0.00	95.15	24.31
04/11/00	-	-	16	0.9	562	31	<1.0	-	NP	71.75	0.00	95.15	23.40
	WELL DESTROYED												
WELL # A-3A	Area = WTF												
11/26/03	-	-	-	-	-	-	-	-	NP	77.89	0.00	98.01	20.12
03/30/04	-	-	-	-	-	-	-	-	NP	78.34	0.00	98.01	19.67
11/22/04	-	-	-	-	-	-	-	-	NP	79.25	0.00	98.01	18.76
03/29/05	-	-	-	-	-	-	-	-	NP	79.55	0.00	98.01	18.46
12/06/05	-	-	-	-	-	-	-	-	NP	80.05	0.00	98.01	17.96
04/11/06	-	-	-	-	-	-	-	-	NP	79.76	0.00	98.01	18.25
12/05/06	-	-	-	-	-	-	-	-	NP	78.97	0.00	98.01	19.04
05/01/07	-	-	-	-	-	-	-	-	NP	78.43	0.00	98.01	19.58
03/27/08	-	-	-	-	-	-	-	-	NP	79.05	0.00	98.01	18.96
09/22/08	-	-	-	-	-	-	-	-	NP	79.57	0.00	98.01	18.44
03/26/09	-	-	-	-	-	-	-	-	NP	80.44	0.00	98.01	17.57
10/13/09	-	-	-	-	-	-	-	-	NP	81.27	0.00	98.01	16.74
05/04/10	-	-	-	-	-	-	-	-	NP	81.87	0.00	98.01	16.14
10/06/10	-	-	-	-	-	-	-	-	NP	82.36	0.00	98.01	15.66
03/30/11	-	-	-	-	-	-	-	-	NP	82.60	0.00	98.01	15.41
09/28/11	-	-	-	-	-	-	-	-	NP	82.20	0.00	98.01	15.81
04/03/12	-	-	-	-	-	-	-	-	NP	81.60	0.00	98.01	16.41
09/26/12	-	-	-	-	-	-	-	-	NP	81.13	0.00	98.01	16.88
03/20/13	-	-	-	-	-	-	-	-	NP	81.05	0.00	98.01	16.96
09/25/13	-	-	-	-	-	-	-	-	NP	81.46	0.00	98.01	16.55
04/02/14	-	-	-	-	-	-	-	-	NP	82.11	0.00	98.01	15.90
WELL # A-4													
09/24/85	-	-	1.0	1.0	1.0	-	-	-	NP	74.10	0.00	95.08	20.98
06/20/86	-	-	1.0	1.0	1.0	-	-	-	NP	73.21	0.00	95.08	21.87
11/07/86	-	-	1.0	1.0	1.0	-	-	-	NP	73.28	0.00	95.08	21.80
02/26/87	-	-	-	-	-	-	-	-	NP	73.55	0.00	95.08	21.53
04/29/87	-	-	1.0	1.0	1.0	-	-	-	NP	72.77	0.00	95.08	22.31
06/26/87	-	-	1.0	1.0	1.0	2.0	-	-	NP	72.83	0.00	95.08	22.25
02/08/88	-	-	1.0	1.0	1.0	1.0	-	-	NP	73.37	0.00	95.08	21.71
03/30/88	-	-	1.0	1.0	1.0	1.0	-	-	NP	73.27	0.00	95.08	21.81
06/17/88	-	-	1.0	1.0	1.0	1.0	-	-	NP	73.27	0.00	95.08	21.81
09/28/88	-	-	1.0	1.0	1.0	1.0	-	-	NP	73.73	0.00	95.08	21.35
03/29/89	-	-	1.0	1.0	1.0	1.0	-	-	NP	74.30	0.00	95.08	20.78
06/06/89	-	-	1.0	1.0	1.0	1.0	-	-	NP	74.38	0.00	93.53	19.15
03/26/90	-	-	-	-	-	-	-	-	NP	76.30	0.00	93.53	17.23
02/19/91	-	-	1.0	1.0	1.0	1.0	-	-	NP	76.88	0.00	93.53	16.65
06/18/91	-	-	1.0	1.0	1.0	1.0	-	-	NP	77.03	0.00	93.51	16.48
11/20/91	-	-	1.0	1.0	1.0	1.0	-	-	NP	77.16	0.00	93.51	16.35
03/02/92	-	-	1.0	1.0	1.0	1.0	-	-	NP	78.17	0.00	93.51	15.34
05/28/92	-	-	1.0	1.0	1.0	1.0	-	-	NP	76.93	0.00	93.51	16.58
08/22/92	-	-	1.0	1.0	1.0	1.0	-	-	NP	77.68	0.00	93.51	15.83

Table 2 - Summary of Historical Gauging and Chemical Data

Groundwater Monitoring, Former Golden West Refinery - Santa Fe Springs, CA

DATE	ANALYTICAL PARAMETERS								DEPTH TO PRODUCT	DEPTH TO GROUNDWATER	PRODUCT THICKNESS	CASING ELEVATION	GROUNDWATER ELEVATION
	TPHg (mg/L)	TPHd (mg/L)	BENZENE (µg/L)	TOLUENE (µg/L)	Ethylbenzene (µg/L)	XYLENE (µg/L)	MTBE (µg/L)	TBA (µg/L)	(feet)	(feet)	(feet)	(feet)	(feet)
11/20/92	-	-	1.0	1.0	1.0	1.0	-	-	NP	77.29	0.00	93.51	16.22
02/27/93	-	-	-	-	-	-	-	-	NP	77.00	0.00	93.51	16.51
05/18/93	-	-	1.0	1.0	1.0	1.0	-	-	NP	76.18	0.00	93.51	17.35
11/01/93	-	-	1.0	1.0	1.0	1.0	-	-	NP	75.54	0.00	93.51	17.97
04/18/94	-	-	1.0	1.0	1.0	1.0	-	-	NP	74.13	0.00	93.51	19.38
11/05/94	-	-	2.6	1.0	1.0	1.0	-	-	NP	72.68	0.00	93.51	20.83
04/20/95	-	-	1.0	1.0	1.0	1.0	-	-	NP	71.24	0.00	93.51	22.27
11/06/95	-	-	1.0	1.0	1.0	1.0	-	-	NP	69.77	0.00	93.51	23.74
04/09/96	-	-	1.0	1.0	1.0	1.0	<0.5	-	NP	68.51	0.00	93.51	25.00
11/11/96	-	-	1.0	1.0	1.0	1.0	-	-	NP	67.58	0.00	93.51	25.93
04/30/97	-	-	2.4	0.6	<1.0	<1.0	-	-	NP	66.35	0.00	93.51	27.16
11/03/97	-	-	13.0	<1.0	<1.0	7.4	<0.5	-	NP	66.02	0.00	93.51	27.49
04/20/98	-	-	<1.0	<1.0	<1.0	<1.0	-	-	NP	65.08	0.00	93.51	28.43
11/04/98	-	-	23.0	<1.0	<1.0	<1.0	<0.5	-	NP	63.95	0.00	93.51	29.56
	WELL DESTROYED												
WELL # A-4A	Area = WTF												
11/26/03	-	-	-	-	-	-	-	-	69.95	71.88	1.93	96.16	25.74
03/30/04	-	-	-	-	-	-	-	-	70.23	71.86	1.63	96.16	25.53
11/22/04	-	-	-	-	-	-	-	-	71.66	73.56	1.90	96.16	24.03
03/29/05	-	-	-	-	-	-	-	-	71.75	73.35	1.60	96.16	24.02
12/06/05	-	-	-	-	-	-	-	-	71.88	73.02	1.14	96.16	24.00
04/11/06	-	-	-	-	-	-	-	-	NP	71.52	0.00	96.16	24.64
05/01/07	-	-	-	-	-	-	-	-	NP	70.01	0.00	96.16	26.15
03/27/08	-	-	-	-	-	-	-	-	NP	70.95	0.00	96.16	25.21
09/22/08	-	-	-	-	-	-	-	-	NP	71.85	0.00	96.16	24.31
09/24/08	0.056	0.1	<0.18	<0.24	<0.21	<0.45	<0.19	<5.2	NP	71.84	0.00	96.16	24.32
03/31/09	124	1.3	26,400	7,600	1,730	6,360	35,700	<5.2	72.76	73.23	0.47	96.16	23.28
09/30/09	1.38	8.3	<18.0	<24.0	21.0	<45.0	<19.0	<520.0	73.78	74.15	0.38	96.16	22.30
05/05/10	<0.0066	6.4	<0.18	<0.24	<0.21	<0.45	<0.19	<5.2	74.47	74.50	0.03	96.16	21.66
10/06/10	<0.0066	5.0	<0.18	<0.24	<0.21	<0.45	<0.19	<5.2	NP	75.16	0.00	96.16	21.00
03/31/11	0.083	1.1	<0.18	<0.24	<0.21	<0.45	<0.19	<5.2	NP	75.12	0.00	96.16	21.04
09/29/11	<0.0066	61.0	<0.18	<0.24	<0.21	<0.45	<0.19	<5.2	NP	74.48	0.00	96.16	21.68
04/04/12	<0.0066	1.6	1.8	<0.24	<0.21	<0.45	<0.19	<5.2	NP	73.80	0.00	96.16	22.36
09/27/12	<0.0066	0.58	<0.18	<0.24	<0.21	<0.45	<0.19	<5.2	NP	73.48	0.00	96.16	22.68
03/21/13	<0.0066	0.94	<0.18	<0.24	<0.21	<0.45	<0.19	<5.2	NP	73.25	0.00	96.16	22.91
09/26/13	<0.0066	0.46	<0.18	<0.24	<0.21	<0.45	<0.19	<5.2	NP	74.23	0.00	96.16	21.93
04/03/14	<0.0066	<0.04	<0.18	<0.24	<0.21	<0.45	<0.19	<5.2	NP	74.99	0.00	96.16	21.17
WELL # A-5													
09/24/85	-	-	1.0	1.0	1.0	-	-	-	NP	72.50	0.00	92.65	20.15
06/20/86	-	-	1.0	1.0	1.0	-	-	-	NP	71.26	0.00	92.65	21.39
11/07/86	-	-	1.0	1.0	1.0	-	-	-	NP	71.18	0.00	92.65	21.47
02/26/87	-	-	-	-	-	-	-	-	NP	71.46	0.00	92.65	21.19
04/29/87	-	-	1.0	1.0	1.0	-	-	-	NP	70.77	0.00	92.65	21.88
08/26/87	-	-	1.0	1.0	1.0	0.002	-	-	NP	70.73	0.00	92.65	21.92
02/08/88	-	-	1.0	1.0	1.0	1.0	-	-	NP	71.31	0.00	92.65	21.34
03/30/88	-	-	1.0	1.0	1.0	1.0	-	-	NP	71.18	0.00	92.65	21.47
09/26/88	-	-	1.0	1.0	1.0	1.0	-	-	NP	71.55	0.00	92.65	21.10
03/29/89	-	-	-	-	-	-	-	-	NP	72.96	0.00	92.65	19.69
03/28/90	-	-	-	-	-	-	-	-	NP	74.33	0.00	91.13	16.80
02/19/91	-	-	1.0	1.0	1.0	1.0	-	-	NP	74.96	0.00	91.13	16.17
08/18/91	-	-	1.0	1.0	1.0	1.0	-	-	NP	74.82	0.00	91.09	16.27
11/20/91	-	-	1.0	1.0	1.0	1.0	-	-	NP	75.00	0.00	91.09	16.09
03/02/92	-	-	1.0	1.0	1.0	1.0	-	-	NP	75.54	0.00	91.09	15.55
05/28/92	-	-	1.0	1.0	1.0	1.0	-	-	NP	74.62	0.00	91.09	16.47
08/22/92	-	-	1.0	1.0	1.0	1.0	-	-	NP	74.92	0.00	91.09	16.17
11/20/92	-	-	1.0	1.0	1.0	1.0	-	-	NP	75.15	0.00	91.09	15.94
02/27/93	-	-	-	-	-	-	-	-	NP	75.17	0.00	91.09	15.92
05/18/93	-	-	1.0	1.0	1.0	1.0	-	-	NP	74.33	0.00	91.09	16.76
11/01/93	-	-	1.0	1.0	1.0	1.0	-	-	NP	73.63	0.00	91.09	17.46
04/18/94	-	-	1.0	1.0	1.0	1.0	-	-	NP	72.36	0.00	91.09	18.73
11/05/94	-	-	1.0	1.0	1.0	1.0	-	-	NP	70.87	0.00	91.09	20.22
04/20/95	-	-	1.0	1.0	1.0	1.0	-	-	NP	69.40	0.00	91.09	21.69
11/06/95	-	-	1.0	1.0	1.0	1.0	-	-	NP	67.75	0.00	91.09	23.34
04/09/96	-	-	1.0	1.0	1.0	1.0	<0.5	-	NP	66.69	0.00	91.09	24.40
11/11/96	-	-	1.0	1.0	1.0	1.0	-	-	NP	65.62	0.00	91.09	25.47
04/28/97	-	-	1.9	1.0	1.0	2.1	-	-	NP	64.70	0.00	91.09	26.39
11/03/97	-	-	6.9	2.6	1.7	6.6	<0.5	-	NP	64.05	0.00	91.09	27.04
04/20/98	-	-	1.0	1.0	1.0	1.0	-	-	NP	63.22	0.00	91.09	27.87
	WELL DESTROYED												
WELL # A-5A	Area = WTF												
11/26/03	<0.01	-	1.0	1.0	1.0	1.0	1.0	-	NP	66.95	0.00	92.87	25.92
03/30/04	<0.1	-	1.0	1.0	1.0	1.0	1.0	-	NP	67.34	0.00	92.87	25.53
11/22/04	<0.1	-	1.0	1.0	1.0	1.0	1.0	-	NP	68.41	0.00	92.87	24.46
03/29/05	<0.1	-	1.0	1.0	1.0	1.0	1.0	-	NP	68.83	0.00	92.87	24.04
12/06/05	0.06	-	1.0	<5.0	<5.0	<5.0	<1.0	-	NP	68.97	0.00	92.87	23.90
03/29/06	0.531	-	6.9	<0.1	53.0	6.8	<0.6	-	NP	68.70	0.00	92.87	24.17
12/05/06	4.84	-	1,160	104	292	559	<6.3	-	NP	67.80	0.00	92.87	25.07
04/30/07	4.07	0.2	752	22	40	411	<0.19	-	NP	67.33	0.00	92.87	25.54
09/26/07	4.83	0.37	1,120	91 J	46 J	351	<1.9	<100	NP	67.32	0.00	92.87	25.55
04/22/08	3.9	0.16	849	17 J	95	63	<1.9	<100	NP	67.97	0.00	92.87	24.90
09/24/08	5.38	0.3	989	27 J	141	245	<1.9	<52	NP	68.58	0.00	92.87	24.29
03/31/09	3.57	0.6	1,350	<2.4	176	163	<1.9	<52	NP	69.55	0.00	92.87	23.32
09/30/09	0.534	<0.032	67	<0.24	3.2 J	<0.45	<0.19	<5.2	NP	70.30	0.00	92.87	22.57

Table 2 - Summary of Historical Gauging and Chemical Data

Groundwater Monitoring, Former Golden West Refinery - Santa Fe Springs, CA

DATE	ANALYTICAL PARAMETERS								DEPTH TO PRODUCT	DEPTH TO GROUNDWATER	PRODUCT THICKNESS	CASING ELEVATION	GROUNDWATER ELEVATION
	TPHg (mg/L)	TPHd (mg/L)	BENZENE (µg/L)	TOLUENE (µg/L)	EthylBenzene (µg/L)	XYLENE (µg/L)	MTBE (µg/L)	TBA (µg/L)	(feet)	(feet)	(feet)	(feet)	(feet)
05/05/10	<0.0066	<0.032	<0.18	<0.24	<0.21	<0.45	<0.19	<5.2	NP	71.20	0.00	92.87	21.67
10/07/10	<0.0066	0.1	<0.18	<0.24	<0.21	<0.45	<0.19	<5.2	NP	79.70	0.00	92.87	13.17
03/31/11	<0.0066	<0.032	<0.18	<0.24	<0.21	<0.45	<0.19	<5.2	NP	71.70	0.00	92.87	21.17
09/29/11	<0.0066	<0.04	<0.18	<0.24	<0.21	<0.45	<0.19	<5.2	NP	71.50	0.00	92.87	21.37
04/04/12	<0.0066	<0.04	<0.18	<0.24	<0.21	<0.45	<0.19	<5.2	NP	70.77	0.00	92.87	22.10
09/27/12	<0.0066	<0.04	<0.18	<0.24	<0.21	<0.45	<0.19	<5.2	NP	70.42	0.00	92.87	22.45
03/21/13	0.145	0.12	1.2	<0.24	<0.21	<0.45	<0.19	<5.2	NP	70.30	0.00	92.87	22.57
09/26/13	<0.0066	<0.04	<0.18	<0.24	<0.21	<0.45	<0.19	<5.2	NP	70.98	0.00	92.87	21.89
04/03/14	<0.0066	<0.04	<0.18	<0.24	<0.21	<0.45	<0.19	<5.2	NP	71.64	0.00	92.87	21.23
WELL # A-6													
09/24/85	-	-	-	-	-	-	-	-	67.10	79.80	12.70	90.04	19.83
06/20/86	-	-	-	-	-	-	-	-	69.41	74.97	5.56	90.04	20.02
02/26/87	-	-	-	-	-	-	-	-	69.02	74.97	5.96	90.04	19.59
03/30/88	-	-	-	-	-	-	-	-	66.75	73.85	4.90	90.04	20.09
03/29/89	-	-	-	-	-	-	-	-	66.50	73.04	4.54	90.04	20.43
03/26/90	-	-	-	-	-	-	-	-	71.06	76.73	5.67	90.93	18.48
02/19/91	-	-	-	-	-	-	-	-	71.79	78.51	6.72	90.93	17.49
12/30/91	-	-	-	-	-	-	-	-	69.69	72.36	2.67	90.92	20.68
03/02/92	-	-	-	-	-	-	-	-	73.79	75.79	2.00	90.92	16.64
08/22/92	-	-	-	-	-	-	-	-	80.67	80.72	0.05	90.92	10.24
02/27/93	-	-	-	-	-	-	-	-	73.60	81.10	7.50	90.92	15.48
04/18/94	-	-	-	-	-	-	-	-	73.08	80.33	7.25	90.92	16.06
	WELL DESTROYED												
WELL # A-6R	Area = MA												
04/20/95	-	-	-	-	-	-	-	-	70.11	73.30	3.19	90.85	19.96
11/08/95	-	-	-	-	-	-	-	-	70.45	74.40	3.95	90.85	19.43
04/09/96	-	-	-	-	-	-	-	-	68.96	69.18	0.22	90.85	21.84
04/30/97	-	-	-	-	-	-	-	-	64.87	69.32	4.45	90.85	24.89
04/21/98	-	-	-	-	-	-	-	-	64.21	65.84	1.63	90.85	26.24
11/02/99	-	-	-	-	-	-	-	-	62.55	63.03	0.48	90.85	28.18
04/11/00	-	-	-	-	-	-	-	-	62.69	63.16	0.47	90.85	28.04
04/05/01	-	-	-	-	-	-	-	-	64.59	64.71	0.12	90.85	26.23
04/01/02	-	-	-	-	-	-	-	-	63.77	65.43	1.66	90.85	26.87
08/07/02	140	-	18000.0	25000.0	2000.0	15000	-	-	-	-	-	-	-
11/01/02	-	-	-	-	-	-	-	-	66.09	66.51	0.42	90.85	25.66
04/01/03	-	-	-	-	-	-	-	-	65.00	65.12	0.12	90.85	25.82
11/01/03	-	-	-	-	-	-	-	-	64.97	65.02	0.05	90.85	25.87
03/30/04	-	-	-	-	-	-	-	-	-	65.29	0.00	90.85	25.56
11/22/04	-	-	-	-	-	-	-	-	film	66.73	0.00	90.85	24.12
03/29/05	-	-	-	-	-	-	-	-	66.41	66.50	0.09	90.85	24.42
12/06/05	-	-	-	-	-	-	-	-	66.71	66.78	0.07	90.85	24.12
03/29/06	701	-	32300.0	34100.0	4590.0	31900	<0.6	-	66.81	66.75	-0.06	90.85	24.05
	well temporarily burried during construction			-	-	-	-	-	-	-	-	-	-
04/30/07	-	-	-	-	-	-	-	-	64.64	65.16	0.34	90.85	25.93
09/26/07	-	-	-	-	-	-	-	-	64.86	65.01	0.15	92.29	27.39
04/22/08	430	18	28300.0	47000.0	43200.0	452000	<475	<25,000	66.86	66.22	0.37	90.85	24.91
09/24/08	-	-	-	-	-	-	-	-	66.23	66.59	0.36	90.85	24.63
03/27/09	-	-	-	-	-	-	-	-	66.74	66.95	0.21	90.85	24.06
10/12/09	-	-	-	-	-	-	-	-	67.27	67.43	0.16	90.85	23.54
05/04/10	-	-	-	-	-	-	-	-	67.85	67.98	0.13	90.85	22.97
10/06/10	-	-	-	-	-	-	-	-	68.44	68.55	0.11	90.85	22.38
03/30/11	-	-	-	-	-	-	-	-	NP	68.53	0.00	90.85	22.32
09/28/11	-	-	-	-	-	-	-	-	NP	68.50	0.00	90.85	22.35
04/03/12	-	-	-	-	-	-	-	-	NP	68.13	0.00	90.85	22.72
09/26/12	-	-	-	-	-	-	-	-	NP	67.73	0.00	90.85	23.12
03/20/13	-	-	-	-	-	-	-	-	NP	67.70	0.00	90.85	23.15
09/26/13	-	-	-	-	-	-	-	-	NP	68.27	0.00	90.85	22.58
04/02/14	-	-	-	-	-	-	-	-	NP	68.85	0.00	90.85	22.00
WELL # A-7	Area = STF S of Foster												
09/24/85	-	-	3000.0	7000.0	-	-	-	-	NP	74.90	0.00	88.59	13.69
06/20/86	-	-	-	-	-	-	-	-	NP	71.86	0.00	88.59	16.73
02/26/87	-	-	-	-	-	-	-	-	NP	71.58	0.00	88.59	17.01
04/29/87	-	-	10200.0	3920.0	4210.0	-	-	-	71.48	71.70	0.22	88.59	17.06
03/30/88	-	-	35000.0	63000.0	5400.0	49000	-	-	71.60	72.29	0.69	88.59	16.62
09/28/88	-	-	3600.0	16000.0	1700.0	24000	-	-	72.03	73.59	1.56	88.59	16.18
03/29/89	-	-	2800.0	6700.0	980.0	9100	-	-	72.50	74.17	1.67	88.59	15.68
03/26/90	-	-					-	-	73.77	75.98	2.21	86.67	12.36
08/16/90	-	-	42000.0	53000.0	2200.0	19000	-	-	74.31	76.71	2.40	86.67	11.77
02/19/91	-	-	4100.0	8900.0	1400.0	11000	-	-	75.05	76.81	1.76	86.67	11.19
08/18/91	-	-	26000.0	35000.0	3200.0	19000	-	-	75.66	76.50	0.84	86.65	10.78
11/20/91	-	-	10000.0	13000.0	1900.0	10000	-	-	75.75	76.10	0.35	86.65	10.81
03/02/92	-	-	14000.0	17000.0	1400.0	8300	-	-	75.42	76.25	0.83	86.65	11.03
05/28/92	-	-	16000.0	20000.0	1000.0	9900	-	-	76.17	77.35	1.18	86.65	10.19
08/22/92	-	-	23000.0	64000.0	7000.0	56000	-	-	75.78	76.09	0.31	86.65	10.79
11/20/92	-	-	5000.0	11000.0	1000.0	7600	-	-	75.70	77.25	1.55	86.65	10.57
02/27/93	-	-	-	-	-	-	-	-	75.33	76.19	0.86	86.65	11.11
11/01/93	-	-	23000.0	39000.0	3100.0	24000	-	-	79.33	82.46	3.13	86.85	6.55
04/18/94	-	-	12000.0	36000.0	3200.0	25000	-	-	73.35	73.37	0.02	86.85	13.30
11/05/94	-	-	4300.0	7500.0	860.0	4900	-	-	72.09	72.20	0.11	86.85	14.53
04/20/95	-	-	1700.0	3400.0	210.0	7300	-	-	NP	70.69	0.00	86.65	15.96
04/09/96	-	-	7600.0	18000.0	1700.0	11000	<0.6	-	68.35	69.25	0.90	86.85	18.08

Table 2 - Summary of Historical Gauging and Chemical Data

Groundwater Monitoring, Former Golden West Refinery - Santa Fe Springs, CA

DATE	ANALYTICAL PARAMETERS								DEPTH TO PRODUCT	DEPTH TO GROUNDWATER	PRODUCT THICKNESS	CASING ELEVATION	GROUNDWATER ELEVATION
	TPHg (mg/L)	TPHd (mg/L)	BENZENE (µg/L)	TOLUENE (µg/L)	EthylBenzene (µg/L)	XYLENE (µg/L)	MTBE (µg/L)	TBA (µg/L)	(feet)	(feet)	(feet)	(feet)	(feet)
11/06/96	-	-	11000.0	13000.0	500.0	7400	-	-	67.36	68.06	0.68	86.65	18.10
04/29/97	-	-	7600.0	13000.0	1200.0	7700	-	-	66.16	66.71	0.53	86.65	20.34
11/03/97	-	-	18000.0	34000.0	2600.0	19000	<0.5	-	66.25	66.77	0.52	86.65	20.27
04/20/98	-	-	12000.0	19000.0	1500.0	20000	-	-	65.35	66.22	0.87	86.65	21.09
11/04/98	-	-	7200.0	14000.0	1300.0	8200	<5.0	-	64.93	66.15	1.22	86.65	21.42
04/16/99	-	-	7300.0	10000.0	810.0	6400	-	-	64.10	64.13	0.03	86.65	22.54
04/10/00	-	-	21400.0	23100.0	2930.0	24610	2.8	-	65.43	65.69	0.26	86.65	21.16
11/08/00	-	-	-	-	-	-	<5.0	-	56.42	56.46	0.04	86.65	30.22
04/26/01	-	-	-	-	-	-	-	-	68.78	68.80	0.02	86.65	17.87
11/12/01	-	-	15000.0	20000.0	1400.0	11000	-	-	67.66	67.70	0.02	86.65	18.97
04/01/02	-	-	-	-	-	-	-	-	-	-	-	86.65	-
11/01/02	-	-	-	-	-	-	-	-	68.32	69.10	0.78	86.65	18.14
04/01/03	-	-	-	-	-	-	-	-	66.15	70.66	2.43	86.65	17.90
11/01/03	-	-	-	-	-	-	-	-	68.99	71.30	2.31	86.65	17.09
03/30/04	-	-	-	-	-	-	-	-	68.99	71.01	2.02	86.65	17.17
11/22/04	-	-	-	-	-	-	-	-	70.03	71.38	1.35	86.65	16.29
03/29/05	-	-	-	-	-	-	-	-	69.85	70.70	0.85	86.65	16.59
12/06/05	-	-	-	-	-	-	-	-	70.03	71.25	1.22	86.65	16.32
04/11/06	-	-	-	-	-	-	-	-	69.58	70.20	0.62	89.16	19.45
12/05/06	-	-	-	-	-	-	-	-	69.11	69.24	0.13	89.16	20.04
05/01/07	-	-	-	-	-	-	-	-	78.40	78.72	0.32	89.16	10.70
09/27/07	-	-	-	-	-	-	-	-	68.56	69.26	0.70	89.16	20.45
03/27/08	-	-	-	-	-	-	-	-	69.20	69.31	0.11	89.16	19.95
09/22/08	-	-	-	-	-	-	-	-	69.80	70.50	0.70	89.16	19.21
03/26/09	-	-	-	-	-	-	-	-	70.27	71.79	1.52	89.16	18.64
10/12/09	-	-	-	-	-	-	-	-	71.13	72.22	1.09	89.16	17.76
05/04/10	-	-	-	-	-	-	-	-	69.84	71.23	1.39	89.16	19.00
10/06/10	-	-	-	-	-	-	-	-	70.42	71.72	1.30	89.16	18.44
03/30/11	-	-	-	-	-	-	-	-	70.25	70.72	0.47	88.49	18.12
09/26/11	-	-	-	-	-	-	-	-	70.11	70.39	0.28	88.49	18.31
04/03/12	-	-	-	-	-	-	-	-	70.19	70.41	0.22	88.49	18.25
09/27/12	-	-	-	-	-	-	-	-	NP	68.63	0.00	86.49	17.86
03/22/13	-	-	-	-	-	-	-	-	NP	68.41	0.00	86.49	18.08
09/25/13	-	-	-	-	-	-	-	-	69.07	69.53	0.46	86.49	17.31
04/02/14	-	-	-	-	-	-	-	-	69.46	69.98	0.52	86.49	16.90
WELL # A-8		Area = MA											
06/20/86	-	-	-	-	-	-	-	-	64.25	71.61	7.36	91.71	25.66
02/26/87	-	-	-	-	-	-	-	-	65.20	71.40	6.20	91.71	24.99
03/30/88	-	-	-	-	-	-	-	-	65.51	68.29	2.78	91.71	25.52
03/29/89	-	-	-	-	-	-	-	-	66.69	67.52	0.83	91.71	24.82
03/26/90	-	-	-	-	-	-	-	-	67.09	72.42	5.33	87.55	19.15
02/19/91	-	-	-	-	-	-	-	-	69.17	70.29	1.12	87.55	18.11
03/02/92	-	-	-	-	-	-	-	-	69.54	74.25	4.71	87.56	16.87
02/27/93	-	-	-	-	-	-	-	-	76.56	76.65	0.09	87.56	10.98
04/19/94	-	-	-	-	-	-	-	-	73.75	74.86	1.13	87.56	13.53
04/20/95	-	-	-	-	-	-	-	-	67.35	67.45	0.10	87.56	20.19
04/08/96	-	-	-	-	-	-	-	-	NP	65.14	0.00	87.56	22.42
04/30/97	-	-	-	-	-	-	-	-	NP	61.58	0.00	87.56	25.98
04/21/98	-	-	-	-	-	-	-	-	NP	60.70	0.00	87.56	26.86
04/26/99	-	-	-	-	-	-	-	-	NP	59.09	0.00	87.65	28.56
04/11/00	-	-	-	-	-	-	-	-	NP	58.33	0.00	87.65	29.32
04/03/01	-	-	-	-	-	-	-	-	59.27	59.31	0.04	87.65	28.37
11/01/02	-	-	-	-	-	-	-	-	59.80	60.08	0.28	87.85	27.78
04/01/03	-	-	-	-	-	-	-	-	NP	59.43	0.00	87.85	28.22
11/01/03	-	-	-	-	-	-	-	-	NP	60.21	0.00	87.85	27.44
11/01/03	-	-	-	-	-	-	-	-	60.21	60.26	0.05	87.85	27.43
03/30/04	-	-	-	-	-	-	-	-	NP	60.73	0.00	87.65	26.92
11/22/04	-	-	-	-	-	-	-	-	NP	62.14	0.00	87.65	25.51
03/29/05	-	-	-	-	-	-	-	-	NP	61.67	0.00	87.66	25.98
12/06/05	-	-	-	-	-	-	-	-	NP	61.67	0.00	87.65	25.98
03/29/06	436	-	20400.0	4360.0	9490.0	112000	<0.5	-	62.34	62.45	0.11	87.65	25.28
	well temporarily burried during construction			-	-	-	-	-	-	-	-	-	-
04/30/07	-	-	-	-	-	-	-	-	61.86	61.88	0.02	87.85	25.79
09/26/07	62.9	5.6	21600.0	643.0	1350.0	2800	372	<1,000	62.08	62.12	0.04	90.83	28.54
04/22/08	59.4	12	18400.0	715.0	1430.0	7840	374	<1,000	62.18	62.20	0.02	87.65	25.47
09/24/08	57.8	18	13700.0	662.0	658.0	4550	381	<520	62.53	62.58	0.05	87.65	25.11
03/27/09	-	-	-	-	-	-	-	-	62.66	62.95	0.07	87.65	24.75
10/12/09	-	-	-	-	-	-	-	-	63.28	63.73	0.45	87.65	24.26
05/04/10	-	-	-	-	-	-	-	-	63.60	64.40	0.80	87.66	23.70
10/06/10	-	-	-	-	-	-	-	-	64.20	66.08	1.88	87.65	22.99
03/30/11	-	-	-	-	-	-	-	-	64.47	66.20	1.73	87.65	22.76
09/26/11	-	-	-	-	-	-	-	-	64.93	65.47	0.54	87.65	22.69
04/03/12	-	-	-	-	-	-	-	-	64.83	65.40	0.57	87.65	22.68
09/26/12	-	-	-	-	-	-	-	-	64.98	65.27	0.29	87.65	22.60
03/20/13	-	-	-	-	-	-	-	-	NP	65.08	0.00	87.65	22.57
09/26/13	-	-	-	-	-	-	-	-	65.25	65.40	0.15	87.65	22.36
04/02/14	-	-	-	-	-	-	-	-	65.71	65.80	0.09	87.66	21.92
WELL # A-9													
08/19/86	-	-	-	-	-	-	-	-	NP	79.43	0.00	88.33	8.90
02/26/87	-	-	-	-	-	-	-	-	NP	78.86	0.00	88.33	9.47
02/08/88	-	-	-	-	-	-	-	-	NP	78.77	0.00	88.33	9.56
03/29/89	-	-	-	-	-	-	-	-	NP	79.83	0.00	88.33	8.50
03/26/90	-	-	-	-	-	-	-	-	NP	80.77	0.00	88.80	8.03

Table 2 - Summary of Historical Gauging and Chemical Data

Groundwater Monitoring, Former Golden West Refinery - Santa Fe Springs, CA

DATE	ANALYTICAL PARAMETERS								DEPTH TO PRODUCT	DEPTH TO GROUNDWATER	PRODUCT THICKNESS	CASING ELEVATION	GROUNDWATER ELEVATION
	TPHg (mg/L)	TPHd (mg/L)	BENZENE (µg/L)	TOLUENE (µg/L)	EthylBenzene (µg/L)	XYLENE (µg/L)	MTBE (µg/L)	TBA (µg/L)	(feet)	(feet)	(feet)	(feet)	(feet)
02/19/91	-	-	-	-	-	-	-	-	NP	80.84	0.00	88.80	8.16
03/02/92	-	-	-	-	-	-	-	-	80.79	82.50	1.71	86.81	5.80
05/28/92	-	-	2600.0	2300.0	150.0	1300	-	-	80.97	86.21	5.84	86.81	5.01
02/27/93	-	-	-	-	-	-	-	-	80.41	86.58	6.17	86.81	4.89
04/18/94	-	-	-	-	-	-	-	-	77.38	77.71	0.33	86.81	9.35
04/20/95	-	-	-	-	-	-	-	-	NP	76.26	0.00	86.81	10.55
04/10/96	-	-	-	-	-	-	-	-	NP	73.45	0.00	86.81	13.36
05/01/97	-	-	-	-	-	-	-	-	NP	71.12	0.00	86.81	15.69
04/24/98	-	-	-	-	-	-	-	-	NP	70.91	0.00	86.81	15.90
04/26/99	-	-	-	-	-	-	-	-	NP	70.38	0.00	86.91	16.53
04/09/00	-	-	-	-	-	-	-	-	NP	72.06	0.00	86.91	14.85
04/03/01	-	-	-	-	-	-	-	-	NP	78.64	0.00	86.91	13.27
11/12/01	-	-	29100.0	-	-	-	<10	-	NP	76.12	0.00	86.91	10.79
04/01/02	-	-	-	-	-	-	-	-	75.62	75.63	0.01	86.91	11.29
08/07/02	120	-	16000.0	14000.0	2100.0	13000	-	-	-	-	-	86.91	-
11/01/02	-	-	-	-	-	-	-	-	NP	78.08	0.00	86.91	8.83
04/01/03	-	-	-	-	-	-	-	-	NP	77.08	0.00	86.91	9.83
11/01/03	-	-	-	-	-	-	-	-	NP	78.66	0.00	86.91	8.25
03/30/04	-	-	-	-	-	-	-	-	NP	78.46	0.00	86.91	8.45
	WELL DESTROYED												
WELL # A-10													
08/19/86	-	-	-	-	-	-	-	-	72.59	79.65	7.06	86.62	14.30
02/26/87	-	-	-	-	-	-	-	-	73.18	79.68	6.50	86.62	13.85
03/30/88	-	-	-	-	-	-	-	-	71.42	76.63	5.21	86.62	15.92
03/29/89	-	-	-	-	-	-	-	-	69.80	77.25	7.75	86.62	17.22
03/26/90	-	-	-	-	-	-	-	-	77.33	81.88	4.55	86.62	10.16
02/19/91	-	-	-	-	-	-	-	-	77.75	81.79	4.04	87.01	8.27
03/02/92	-	-	-	-	-	-	-	-	78.17	82.25	4.08	86.97	7.80
08/22/92	-	-	-	-	-	-	-	-	79.98	81.42	1.46	86.97	6.65
02/27/93	-	-	-	-	-	-	-	-	78.89	79.99	1.10	86.97	7.81
04/18/94	180	-	35000.0	32000.0	1600.0	10600	<100	-	75.33	76.17	0.84	86.97	11.43
04/20/95	-	-	-	-	-	-	-	-	74.14	74.41	0.27	86.97	12.76
04/08/96	-	-	-	-	-	-	-	-	67.30	71.67	4.37	86.97	18.60
05/01/97	-	-	-	-	-	-	-	-	61.45	72.08	10.63	86.97	22.92
04/23/98	-	-	-	-	-	-	-	-	61.41	63.80	2.39	86.97	24.97
04/16/99	-	-	-	-	-	-	-	-	59.66	59.76	0.11	86.97	27.29
11/01/99	-	-	-	-	-	-	-	-	NP	56.09	0.00	86.97	30.88
04/10/00	-	-	-	-	-	-	-	-	NP	56.19	0.00	86.97	30.78
04/03/01	-	-	-	-	-	-	-	-	NP	56.49	0.00	86.97	30.48
11/12/01	-	-	41300.0	-	-	-	<10	-	NP	56.15	0.00	86.97	30.82
04/01/02	-	-	-	-	-	-	-	-	NP	56.34	0.00	86.97	30.63
11/01/02	-	-	-	-	-	-	-	-	NP	56.95	0.00	86.97	30.02
04/01/03	-	-	-	-	-	-	-	-	NP	59.75	0.00	86.97	27.22
11/01/03	160	-	37000.0	37000.0	1700.0	10700	<200	-	NP	59.87	0.00	86.97	27.10
03/30/04	-	-	-	-	-	-	-	-	NP	60.44	0.00	86.97	26.53
	WELL DESTROYED												
WELL # A-10A	Area = STF S of Foster												
03/29/06	259	-	30,700.0	3,960.0	2,980.0	20,500.0	<0.6	-	NP	58.48	0.00	88.98	30.50
12/05/06	294	-	32,800.0	34,700.0	2,200.0	16,000.0	21	-	NP	58.78	0.00	88.98	30.20
04/30/07	208	2.7	33,900.0	37,700.0	2,300.0	17,000.0	<38	-	NP	58.70	0.00	88.98	30.28
09/26/07	197	1.0	31,500.0	40,000.0	2,010.0	19,400.0	<1.9	<100	NP	58.82	0.00	88.98	30.16
04/22/08	199	3.5	36,500.0	43,000.0	2,380.0	18,100.0	<38	<2,000	NP	58.85	0.00	88.98	30.13
09/25/08	185	2.4	30,400.0	30,500.0	1,300 J	15,300.0	<190	<5,200	58.98	59.03	0.05	88.98	29.99
03/31/09	144	3.0	27,800.0	26,200.0	1,330.0	14,200.0	<35	<1,040	59.14	59.21	0.07	88.98	29.82
09/30/09	167	3.0	29,100	33,700	2,050	14,300	<38.0	<1,040.0	NP	59.42	0.00	88.98	29.56
05/05/10	125	3.0	24,600	29,200	1,760	13,800	<38.0	<1040.0	NP	59.56	0.00	88.98	29.42
10/07/10	193	5.0	23,500	30,000	1,650	12,700	<38.0	<1040.0	NP	60.02	0.00	88.98	28.96
03/31/11	209	<0.032	24,000	30,900	2,190	14,400	<38.0	<1040.0	NP	60.28	0.00	88.98	28.70
09/29/11	181	3.20	29,000	34,000	2,000	15,000	<38	<1,040	NP	60.82	0.00	88.98	28.16
04/04/12	188	3.5	29,000	33,000	2,500	15,000	<38	<1040	NP	61.21	0.00	88.98	27.77
09/27/12	-	-	-	-	-	-	-	-	60.94	65.84	4.90	88.98	26.84
03/21/13	-	-	-	-	-	-	-	-	61.50	63.83	2.33	88.98	26.91
09/26/13	-	-	-	-	-	-	-	-	61.98	63.30	1.32	88.98	26.68
04/03/14	-	-	-	-	-	-	-	-	62.56	63.00	0.44	88.98	26.31
WELL # A-11													
08/20/86	-	-	-	-	-	-	-	-	80.19	81.73	1.54	93.71	13.14
02/26/87	-	-	-	-	-	-	-	-	80.20	80.48	0.28	93.71	13.44
03/30/88	-	-	-	-	-	-	-	-	79.76	80.08	0.32	93.71	13.87
03/29/89	-	-	-	-	-	-	-	-	81.08	81.75	0.67	93.71	12.47
03/26/90	-	-	-	-	-	-	-	-	82.58	83.69	1.11	92.01	9.16
11/20/90	-	-	-	-	-	-	-	-	84.03	84.50	0.47	92.01	7.86
02/21/91	-	-	-	-	-	-	-	-	83.94	84.20	0.26	92.01	8.01
03/02/92	-	-	-	-	-	-	-	-	83.50	84.33	0.83	92.00	8.30
02/27/93	-	-	-	-	-	-	-	-	83.30	84.24	0.94	92.00	8.47
04/18/94	-	-	-	-	-	-	-	-	78.85	79.38	0.53	92.00	13.02
04/20/95	-	-	-	-	-	-	-	-	78.30	78.92	0.62	92.00	13.55
04/08/96	-	-	-	-	-	-	-	-	74.90	76.84	1.94	92.00	16.62
05/01/97	-	-	-	-	-	-	-	-	70.63	77.52	6.89	92.00	19.68
04/23/98	-	-	-	-	-	-	-	-	71.00	76.20	5.20	92.00	19.73
04/28/99	-	-	-	-	-	-	-	-	62.52	75.20	12.68	92.00	28.37
	WELL DESTROYED												

Table 2 - Summary of Historical Gauging and Chemical Data

Groundwater Monitoring, Former Golden West Refinery - Santa Fe Springs, CA

DATE	ANALYTICAL PARAMETERS								DEPTH TO PRODUCT	DEPTH TO GROUNDWATER	PRODUCT THICKNESS	CASING ELEVATION	GROUNDWATER ELEVATION
	TPHg (mg/L)	TPHd (mg/L)	BENZENE (µg/L)	TOLUENE (µg/L)	EthylBenzene (µg/L)	XYLENE (µg/L)	MTBE (µg/L)	TBA (µg/L)	(feet)	(feet)	(feet)	(feet)	(feet)
WELL # A-11A	Area = PUA												
04/12/06	-	-	-	-	-	-	-	-	68.95	70.20	11.25	91.77	30.06
12/05/06	-	-	-	-	-	-	-	-	68.25	68.53	10.28	91.77	31.00
05/01/07	-	-	-	-	-	-	-	-	68.67	69.02	7.35	91.77	31.30
09/26/07	-	-	-	-	-	-	-	-	69.05	62.25	3.20	91.77	31.94
03/27/08	-	-	-	-	-	-	-	-	69.33	66.65	9.32	91.77	30.16
09/22/08	-	-	-	-	-	-	-	-	69.28	63.25	3.97	91.77	31.52
03/26/09	-	-	-	-	-	-	-	-	69.22	69.85	0.63	91.77	32.40
10/12/09	-	-	-	-	-	-	-	-	69.13	67.22	6.09	91.77	30.66
05/04/10	-	-	-	-	-	-	-	-	60.47	60.50	0.03	91.77	31.29
10/06/10	-	-	-	-	-	-	-	-	NO ACCESS	-	-	91.77	-
03/30/11	-	-	-	-	-	-	-	-	60.35	61.07	0.72	91.77	31.24
09/28/11	-	-	-	-	-	-	-	-	60.30	60.96	0.66	91.77	31.31
04/03/12	-	-	-	-	-	-	-	-	60.98	61.20	0.24	91.77	30.75
09/26/12	-	-	-	-	-	-	-	-	NO ACCESS	-	-	91.77	-
03/20/13	-	-	-	-	-	-	-	-	NP	61.03	0.00	91.77	30.74
09/25/13	-	-	-	-	-	-	-	-	NO ACCESS	-	-	91.77	-
04/02/14	-	-	-	-	-	-	-	-	60.35	60.70	0.35	91.77	31.33
WELL # A-12													
09/20/86	-	-	-	-	-	-	-	-	NP	80.18	0.00	94.88	14.70
02/26/87	-	-	-	-	-	-	-	-	NP	86.60	0.00	94.88	8.28
02/08/88	-	-	-	-	-	-	-	-	86.86	89.25	2.39	94.88	7.43
03/29/89	-	-	-	-	-	-	-	-	89.13	91.96	2.83	94.88	5.06
03/26/90	-	-	-	-	-	-	-	-	93.69	98.25	4.56	94.62	-0.29
02/19/91	-	-	-	-	-	-	-	-	94.58	95.00	0.42	94.52	-0.16
03/02/92	-	-	-	-	-	-	-	-	94.60	95.33	0.83	93.45	-1.25
09/22/92	-	-	-	-	-	-	-	-	96.33	102.67	6.34	93.45	-4.43
02/27/93	-	-	-	-	-	-	-	-	92.67	95.83	3.16	93.45	0.01
04/18/94	-	-	-	-	-	-	-	-	88.25	91.08	2.83	93.45	4.61
04/20/95	-	-	-	-	-	-	-	-	82.53	86.35	3.82	93.45	9.98
04/09/96	-	-	-	-	-	-	-	-	80.83	80.92	0.09	93.45	12.60
05/01/97	-	-	-	-	-	-	-	-	78.47	79.85	1.38	93.45	14.64
04/22/98	-	-	-	-	-	-	-	-	78.66	78.89	0.01	93.45	14.57
04/28/99	-	-	-	-	-	-	-	-	78.79	78.97	0.18	93.45	14.62
	WELL DESTROYED												
WELL # A-12A													
04/11/06	-	-	-	-	-	-	-	-	NP	90.02	0.00	97.08	7.06
12/05/06	-	-	-	-	-	-	-	-	NP	89.78	0.00	97.08	7.30
05/01/07	-	-	-	-	-	-	-	-	NP	88.13	0.00	97.08	8.95
09/26/07	-	-	-	-	-	-	-	-	NP	91.58	0.00	97.08	5.50
03/27/08	NO ACCESS	-	-	-	-	-	-	-	NO ACCESS	-	-	97.08	-
09/22/08	-	-	-	-	-	-	-	-	NP	94.62	0.00	97.08	2.46
03/26/09	-	-	-	-	-	-	-	-					
12/10/08	WELL DESTROYED												
WELL # A-13													
09/20/86	-	-	-	-	-	-	-	-	NP	92.34	0.00	99.77	7.43
02/26/87	-	-	-	-	-	-	-	-	NP	91.05	0.00	99.77	8.72
02/08/88	-	-	-	-	-	-	-	-	NP	91.66	0.00	99.77	8.11
03/29/89	-	-	-	-	-	-	-	-	NP	93.48	0.00	99.77	6.29
03/26/90	-	-	-	-	-	-	-	-	NP	97.79	0.00	98.39	0.60
02/19/91	-	-	-	-	-	-	-	-	NP	99.54	0.00	98.39	-1.15
03/02/92	-	-	-	-	-	-	-	-	NP	99.60	0.00	98.33	-1.27
11/20/92	-	-	-	-	-	-	-	-	NP	100.89	0.00	98.33	-2.56
02/27/93	-	-	-	-	-	-	-	-	NP	99.12	0.00	98.33	-0.79
04/18/94	-	-	-	-	-	-	-	-	NP	93.39	0.00	98.33	4.94
04/20/95	-	-	-	-	-	-	-	-	NP	88.70	0.00	98.33	9.63
04/10/96	-	-	-	-	-	-	-	-	NP	85.75	0.00	98.33	12.58
04/30/97	-	-	-	-	-	-	-	-	NP	83.45	0.00	98.33	14.88
04/23/98	-	-	-	-	-	-	-	-	NP	83.24	0.00	98.33	15.09
04/26/99	-	-	-	-	-	-	-	-	NP	82.84	0.00	98.33	15.49
04/11/00	-	-	-	-	-	-	-	-	NP	85.15	0.00	98.33	13.18
	WELL DESTROYED												
WELL # A-14													
09/20/86	-	-	-	-	-	-	-	-	NP	95.78	0.00	102.58	6.80
02/26/87	-	-	-	-	-	-	-	-	NP	94.36	0.00	102.58	8.22
02/08/88	-	-	-	-	-	-	-	-	NP	95.02	0.00	102.58	7.56
03/29/89	-	-	-	-	-	-	-	-	NP	96.88	0.00	102.58	5.70
03/26/90	-	-	-	-	-	-	-	-	NP	101.29	0.00	101.16	-0.13
02/19/91	-	-	-	-	-	-	-	-	NP	102.93	0.00	101.16	-1.77
08/18/91	-	-	-	-	-	-	-	-	NP	103.09	0.00	101.09	-1.99
03/02/92	-	-	-	-	-	-	-	-	NP	102.88	0.00	101.09	-1.79
02/27/93	-	-	-	-	-	-	-	-	NP	102.04	0.00	101.09	-0.95
04/18/94	-	-	-	-	-	-	-	-	NP	96.33	0.00	101.09	4.76
04/20/95	-	-	-	-	-	-	-	-	NP	91.74	0.00	101.09	9.35
04/10/96	-	-	-	-	-	-	-	-	NP	88.83	0.00	101.09	12.26
05/01/97	-	-	-	-	-	-	-	-	NP	86.67	0.00	101.09	14.42
04/23/98	-	-	-	-	-	-	-	-	NP	86.64	0.00	101.09	14.45
04/26/99	-	-	-	-	-	-	-	-	NP	86.34	0.00	101.09	14.75
04/11/00	-	-	-	-	-	-	-	-	NP	86.63	0.00	101.09	12.46
	WELL DESTROYED												

Table 2 - Summary of Historical Gauging and Chemical Data

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DATE	ANALYTICAL PARAMETERS								DEPTH TO PRODUCT	DEPTH TO GROUNDWATER	PRODUCT THICKNESS	CASING ELEVATION	GROUNDWATER ELEVATION
	TPHg (mg/L)	TPHd (mg/L)	BENZENE (µg/L)	TOLUENE (µg/L)	EthylBenzene (µg/L)	XYLENE (µg/L)	MTBE (µg/L)	TBA (µg/L)	(feet)	(feet)	(feet)	(feet)	(feet)
WELL # A-14A													
12/12/05	-	-	-	-	-	-	-	-	NP	93.97	0.00	97.76	3.79
04/12/06	-	-	-	-	-	-	-	-	NP	91.82	0.00	97.76	5.94
12/05/06	-	-	-	-	-	-	-	-	NP	91.83	0.00	97.76	5.93
05/01/07	-	-	-	-	-	-	-	-	NP	89.38	0.00	97.76	8.38
09/25/07	-	-	-	-	-	-	-	-	NP	91.60	0.00	97.76	6.16
03/27/08	-	-	-	-	-	-	-	-	NP	91.93	0.00	97.76	5.83
09/22/08	-	-	-	-	-	-	-	-	NP	94.50	0.00	97.76	3.26
12/10/08	WELL DESTROYED												
WELL # A-15													
09/20/86	-	-	-	-	-	-	-	-	NP	99.84	0.00	108.15	8.31
02/26/87	-	-	-	-	-	-	-	-	NP	99.29	0.00	108.15	8.86
02/08/88	-	-	-	-	-	-	-	-	NP	99.64	0.00	108.15	8.51
03/29/89	-	-	-	-	-	-	-	-	NP	101.15	0.00	108.15	7.00
03/26/90	-	-	-	-	-	-	-	-	NP	104.71	0.00	106.18	1.47
02/19/91	-	-	-	-	-	-	-	-	NP	107.19	0.00	106.18	-1.01
03/02/92	-	-	-	-	-	-	-	-	NP	107.36	0.00	106.14	-1.24
02/27/93	-	-	-	-	-	-	-	-	NP	106.92	0.00	106.14	-0.78
04/18/94	-	-	-	-	-	-	-	-	NP	102.33	0.00	106.14	3.81
04/20/95	-	-	-	-	-	-	-	-	NP	97.62	0.00	106.14	8.52
04/10/96	-	-	-	-	-	-	-	-	NP	94.66	0.00	106.14	11.58
04/30/97	-	-	-	-	-	-	-	-	NP	91.80	0.00	106.14	14.34
04/23/98	-	-	-	-	-	-	-	-	NP	91.47	0.00	106.14	14.67
04/26/99	-	-	-	-	-	-	-	-	NP	90.87	0.00	106.14	15.27
04/11/00	-	-	-	-	-	-	-	-	NP	92.77	0.00	106.14	13.37
	WELL DESTROYED												
WELL # A-16													
08/19/86	-	-	-	-	-	-	-	-	63.78	78.50	12.72	87.09	20.19
02/26/87	-	-	-	-	-	-	-	-	63.80	75.16	11.36	87.09	20.51
03/30/88	-	-	-	-	-	-	-	-	NP	66.28	0.00	87.09	20.81
03/29/89	-	-	-	-	-	-	-	-	66.77	66.81	0.04	87.09	20.31
03/26/90	-	-	-	-	-	-	-	-	67.88	68.08	0.20	87.22	19.29
02/25/91	-	-	-	-	-	-	-	-	68.86	69.65	0.79	87.22	18.17
03/02/92	-	-	-	-	-	-	-	-	67.58	75.21	7.63	87.22	17.77
11/20/92	-	-	-	-	-	-	-	-	68.17	74.64	6.47	87.22	17.46
02/27/93	-	-	-	-	-	-	-	-	68.01	74.22	6.21	87.22	17.69
04/18/94	-	-	-	-	-	-	-	-	60.68	69.92	9.34	87.22	24.36
04/20/95	-	-	-	-	-	-	-	-	64.24	68.64	4.40	87.22	21.90
04/09/96	-	-	-	-	-	-	-	-	62.55	62.65	0.10	87.22	24.65
04/30/97	-	-	-	-	-	-	-	-	60.80	61.29	0.49	87.22	26.30
04/21/98	-	-	-	-	-	-	-	-	59.47	60.60	1.13	87.22	27.47
04/26/99	-	-	-	-	-	-	-	-	57.92	58.95	1.03	87.22	29.05
11/02/99	-	-	-	-	-	-	-	-	57.73	57.75	0.02	87.22	29.49
04/11/00	-	-	-	-	-	-	-	-	57.98	58.27	0.29	87.22	29.17
11/13/01	-	-	33,900	-	-	-	<100	-	NP	59.17	0.00	87.22	28.05
04/01/02	-	-	-	-	-	-	-	-	NP	59.40	0.00	87.22	27.82
11/01/02	-	-	-	-	-	-	-	-	NP	60.64	0.00	87.22	26.58
04/01/03	-	-	-	-	-	-	-	-	NP	60.86	0.00	87.22	26.36
11/01/03	-	-	-	-	-	-	-	-	61.72	61.99	-0.03	87.22	25.51
03/30/04	-	-	-	-	-	-	-	-	62.16	62.19	0.03	87.22	25.05
11/22/04	-	-	-	-	-	-	-	-	62.85	62.88	0.03	87.22	24.36
03/29/05	-	-	-	-	-	-	-	-	62.87	62.88	0.01	87.22	24.35
12/06/05	-	-	-	-	-	-	-	-	63.07	63.11	0.04	87.22	24.14
	WELL DESTROYED												
WELL # A-16R	Area = MA												
04/30/07	-	-	-	-	-	-	-	-	64.53	65.87	1.34	-	-
09/26/07	-	-	-	-	-	-	-	-	64.63	66.12	1.49	92.13	27.13
03/27/08	-	-	-	-	-	-	-	-	64.93	66.61	1.68	92.13	26.79
09/22/08	-	-	-	-	-	-	-	-	65.30	67.10	1.80	92.13	26.39
03/26/09	-	-	-	-	-	-	-	-	66.17	66.38	0.21	92.13	25.91
10/12/09	-	-	-	-	-	-	-	-	66.88	67.30	0.42	92.13	25.15
05/04/10	-	-	-	-	-	-	-	-	67.11	69.30	2.19	92.13	24.48
10/06/10	-	-	-	-	-	-	-	-	67.68	69.83	2.15	92.13	23.92
03/30/11	-	-	-	-	-	-	-	-	68.06	69.20	1.14	92.13	23.79
09/28/11	-	-	-	-	-	-	-	-	67.89	68.98	1.09	92.13	23.97
04/03/12	-	-	-	-	-	-	-	-	67.59	69.02	1.43	92.13	24.19
09/26/12	-	-	-	-	-	-	-	-	67.47	69.20	1.73	92.13	24.24
03/20/13	-	-	-	-	-	-	-	-	67.50	69.16	1.66	92.13	24.22
09/26/13	-	-	-	-	-	-	-	-	67.58	69.60	2.02	92.13	24.08
04/02/14	-	-	-	-	-	-	-	-	68.07	70.20	2.13	92.13	23.54
WELL # A-17													
08/19/86	-	-	-	-	-	-	-	-	65.26	67.16	1.88	91.47	25.73
02/26/87	-	-	-	-	-	-	-	-	64.18	70.18	6.00	91.47	25.62
02/08/88	-	-	-	-	-	-	-	-	65.69	65.97	0.28	91.47	25.71
03/29/89	-	-	-	-	-	-	-	-	66.54	66.77	0.23	91.47	24.87
03/26/90	-	-	-	-	-	-	-	-	67.77	67.95	0.18	89.27	21.46
02/25/91	-	-	-	-	-	-	-	-	69.21	69.77	0.56	89.27	19.92
03/02/92	-	-	-	-	-	-	-	-	68.00	72.47	4.47	89.27	20.17
02/27/93	-	-	-	-	-	-	-	-	68.38	72.72	4.34	89.27	19.83
04/18/94	-	-	-	-	-	-	-	-	64.68	68.67	4.09	89.27	23.69
04/20/95	-	-	-	-	-	-	-	-	64.84	66.56	1.72	89.27	24.01
04/09/96	-	-	-	-	-	-	-	-	62.45	62.82	0.37	89.27	26.73

Table 2 - Summary of Historical Gauging and Chemical Data

Groundwater Monitoring, Former Golden West Refinery - Santa Fe Springs, CA

DATE	ANALYTICAL PARAMETERS								DEPTH TO PRODUCT	DEPTH TO GROUNDWATER	PRODUCT THICKNESS	CASING ELEVATION	GROUNDWATER ELEVATION
	TPHg (mg/L)	TPHd (mg/L)	BENZENE (µg/L)	TOLUENE (µg/L)	EthylBenzene (µg/L)	XYLENE (µg/L)	MTBE (µg/L)	TBA (µg/L)	(feet)	(feet)	(feet)	(feet)	(feet)
04/30/97	-	-	-	-	-	-	-	-	60.84	62.13	1.29	89.27	28.11
04/21/98	-	-	-	-	-	-	-	-	59.84	60.14	0.30	89.27	29.28
04/28/99	-	-	-	-	-	-	-	-	58.28	59.73	1.45	89.27	30.63
11/02/99	-	-	-	-	-	-	-	-	58.43	58.57	0.14	89.27	30.61
04/11/00	-	-	-	-	-	-	-	-	58.65	58.80	0.15	89.27	30.58
04/03/01	-	-	-	-	-	-	-	-	NP	58.51	0.00	89.27	30.76
11/13/01	-	-	23,900	-	-	-	23,300	-	NP	59.16	0.00	89.27	30.11
04/01/02	-	-	-	-	-	-	-	-	58.85	58.86	0.01	89.27	30.42
11/01/02	-	-	-	-	-	-	-	-	NP	60.10	0.00	89.27	29.17
04/01/03	-	-	-	-	-	-	-	-	NP	60.48	0.00	89.27	28.79
08/01/03	-	-	16,000	1,700	1,900	9,200	4,900	-	-	-	-	89.27	-
11/01/03	89	-	-	1,300	2,000	28,000	6,500	-	NP	61.42	0.00	89.27	27.85
03/30/04	-	-	-	-	-	-	-	-	62.08	62.12	0.04	89.27	27.18
11/22/04	48	-	21,000	500	1,500	4,080	6,500	-	63.50	63.52	0.02	89.27	25.77
03/29/05	39.2	-	27,900	761	2,020	5,490	6,760	-	-	63.70	0.00	89.27	25.57
12/06/05	89.8	-	24,700	694	1,870	4,030	14,500	-	-	63.28	0.00	89.27	25.99
	WELL DESTROYED												
WELL # A-17R	Area = MA												
04/30/07	-	-	-	-	-	-	-	-	NP	61.74	0.00	-	-
09/28/07	-	-	-	-	-	-	-	-	NP	61.88	0.00	90.58	28.70
03/27/08	-	-	-	-	-	-	-	-	NP	62.12	0.00	90.58	28.46
09/22/08	-	-	-	-	-	-	-	-	NP	62.28	0.00	90.58	28.30
03/31/09	0.196	53	<0.18	<0.24	<0.21	<0.45	<0.19	<5.2	NP	62.53	0.00	90.58	28.05
09/30/09	66.1	0.60	27,400	5,170	1,740	8,660	18,600	857	NP	62.98	0.00	90.58	27.60
05/05/10	87.9	0.50	27,500	4,670	1,920	5,590	14,300	<1040.0	NP	63.58	0.00	90.58	27.00
10/07/10	87	2.0	21,800	3,980	1,290	4,530	8,050	<520.0	NP	80.15	0.00	90.58	10.43
03/31/11	105	1.2	22,800	4,360	1,590	4,960	9,440	<520.0	NP	64.50	0.00	90.58	26.08
09/29/11	97.10	1.50	27,000	5,200	1,800	5,600	10,000	<520	NP	64.53	0.00	90.58	26.05
04/04/12	95.60	<0.6	23,000	5,000	1,600	6,000	9,600	2,000	NP	64.38	0.00	90.58	26.20
09/27/12	90.60	1.7	26,000	5,000	1,600	5,600	12,000	1,800	NP	64.65	0.00	90.58	25.93
03/21/13	97.50	3.1	26,000	5,000	1,700	5,800	12,000	3,000	NP	64.52	0.00	90.58	26.06
09/23/13	103.00	2.6	25,000	5,200	1,800	6,700	16,000	<520	NP	64.77	0.00	90.58	25.81
04/03/14	82.20	1.7	24,000	4,700	1,800	6,100	17,000	12,000	NP	65.41	0.00	90.58	25.17
WELL # A-18													
08/19/86	-	-	-	-	-	-	-	-	NP	65.57	0.00	92.68	27.11
02/26/87	-	-	-	-	-	-	-	-	NP	66.35	0.00	92.68	26.33
09/29/95	-	-	-	-	-	-	-	-	NP	66.51	0.00	92.68	26.17
03/29/89	-	-	-	-	-	-	-	-	NP	67.19	0.00	92.68	25.49
03/26/90	-	-	-	-	-	-	-	-	NP	69.03	0.00	91.28	22.25
01/07/91	-	-	-	-	-	-	-	-	NP	66.92	0.00	91.28	24.36
03/02/92	-	-	-	-	-	-	-	-	NP	68.34	0.00	91.25	22.91
11/20/92	-	-	-	-	-	-	-	-	NP	69.60	0.00	91.25	21.65
02/27/93	-	-	-	-	-	-	-	-	NP	66.85	0.00	91.25	24.40
04/18/94	-	-	-	-	-	-	-	-	65.78	65.79	0.01	91.25	25.47
04/20/95	-	-	-	-	-	-	-	-	NP	63.67	0.00	91.25	27.58
04/09/96	-	-	-	-	-	-	-	-	NP	63.27	0.00	91.25	27.98
05/02/97	-	-	-	-	-	-	-	-	NP	62.00	0.00	91.25	29.25
WELL # A-18A	Area = WTF												
11/26/03	-	-	-	-	-	-	-	-	NP	63.16	0.00	94.50	31.34
03/30/04	-	-	-	-	-	-	-	-	NP	64.92	0.00	94.50	29.58
11/22/04	-	-	-	-	-	-	-	-	NP	65.85	0.00	94.50	28.65
03/29/05	-	-	-	-	-	-	-	-	NP	65.86	0.00	94.50	28.64
12/06/05	-	-	-	-	-	-	-	-	NP	66.01	0.00	94.50	28.49
03/29/06	2.32	-	225	34	3J	33	46	-	NP	67.13	0.00	94.50	27.37
12/05/06	2.21	-	231	16	<0.24	36	37	-	NP	67.53	0.00	94.50	26.97
04/30/07	0.912	0.17	1.2	<0.24	<0.21	7.7	31	-	NP	67.47	0.00	94.50	27.03
09/26/07	2.85	<0.032	674	81	13 J	129	33	<100	NP	67.87	0.00	94.50	26.63
04/22/08	2.63	<0.032	573	42	4.6 J	61	50	<10	NP	68.04	0.00	94.50	26.46
09/24/08	4.37	<0.032	990	<2.4	<2.1	60	30	<52	NP	68.33	0.00	94.50	26.17
03/27/09	-	-	-	-	-	-	-	-	NP	68.45	0.00	94.50	26.05
10/12/09	-	-	-	-	-	-	-	-	NP	68.45	0.00	94.50	26.05
06/04/10	-	-	-	-	-	-	-	-	NP	68.52	0.00	94.50	25.98
10/06/10	-	-	-	-	-	-	-	-	NP	68.17	0.00	94.50	26.33
03/30/11	-	-	-	-	-	-	-	-	NP	69.06	0.00	94.50	25.44
09/28/11	-	-	-	-	-	-	-	-	NP	67.68	0.00	94.50	26.82
04/03/12	-	-	-	-	-	-	-	-	NP	68.03	0.00	94.50	26.47
09/26/12	-	-	-	-	-	-	-	-	NP	69.15	0.00	94.50	25.35
03/20/13	-	-	-	-	-	-	-	-	NP	69.76	0.00	94.50	24.74
09/25/13	-	-	-	-	-	-	-	-	NP	70.17	0.00	94.50	24.33
04/02/14	-	-	-	-	-	-	-	-	NP	71.22	0.00	94.50	23.28
WELL # A-19													
08/19/86	-	-	-	-	-	-	-	-	NP	68.30	0.00	91.32	23.02
02/26/87	-	-	-	-	-	-	-	-	NP	67.91	0.00	91.32	23.41
02/06/88	-	-	-	-	-	-	-	-	NP	67.29	0.00	91.32	24.03
03/26/90	-	-	-	-	-	-	-	-	NP	69.41	0.00	89.77	20.36
02/19/91	-	-	-	-	-	-	-	-	NP	70.30	0.00	89.77	19.47
03/02/92	-	-	-	-	-	-	-	-	NP	70.46	0.00	89.75	19.29
08/22/92	-	-	-	-	-	-	-	-	NP	70.83	0.00	89.75	18.92
02/27/93	-	-	-	-	-	-	-	-	NP	70.64	0.00	89.75	19.11
04/18/94	-	-	-	-	-	-	-	-	NP	67.82	0.00	89.75	21.93
04/20/95	-	-	-	-	-	-	-	-	NP	68.03	0.00	89.75	23.72

Table 2 - Summary of Historical Gauging and Chemical Data

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DATE	ANALYTICAL PARAMETERS								DEPTH TO PRODUCT	DEPTH TO GROUNDWATER	PRODUCT THICKNESS	CASING ELEVATION	GROUNDWATER ELEVATION
	TPHg (mg/L)	TPHd (mg/L)	BENZENE (µg/L)	TOLUENE (µg/L)	EthylBenzene (µg/L)	XYLENE (µg/L)	MTBE (µg/L)	TBA (µg/L)	(feet)	(feet)	(feet)	(feet)	(feet)
04/09/96	-	-	-	-	-	-	-	-	NP	63.88	0.00	89.76	25.87
05/02/97	-	-	-	-	-	-	-	-	NP	62.75	0.00	89.75	27.00
11/05/97	-	-	-	-	-	-	-	-	NP	62.22	0.00	89.75	27.53
	WELL DESTROYED												
WELL # A-20													
08/19/86	-	-	-	-	-	-	-	-	NP	74.65	0.00	93.60	18.95
02/26/87	-	-	-	-	-	-	-	-	NP	74.48	0.00	93.50	19.02
02/08/88	-	-	-	-	-	-	-	-	NP	74.46	0.00	93.50	19.02
03/29/89	-	-	-	-	-	-	-	-	NP	75.38	0.00	93.50	18.12
03/26/90	-	-	-	-	-	-	-	-	NP	76.90	0.00	92.07	15.17
02/19/91	-	-	-	-	-	-	-	-	NP	78.34	0.00	92.07	13.73
03/02/92	-	-	-	-	-	-	-	-	NP	78.60	0.00	92.08	13.48
11/20/92	-	-	-	-	-	-	-	-	NP	78.87	0.00	92.08	13.21
02/27/93	-	-	-	-	-	-	-	-	NP	78.43	0.00	92.08	13.65
04/18/94	-	-	-	-	-	-	-	-	NP	75.90	0.00	92.08	16.18
04/20/95	-	-	-	-	-	-	-	-	NP	72.76	0.00	92.08	19.32
04/09/96	-	-	-	-	-	-	-	-	NP	70.02	0.00	92.08	22.06
04/30/97	-	-	-	-	-	-	-	-	NP	67.60	0.00	92.08	24.48
04/23/98	-	-	-	-	-	-	-	-	NP	66.06	0.00	92.08	26.02
	WELL DESTROYED												
WELL # A-21													
08/20/86	-	-	-	-	-	-	-	-	76.01	77.00	0.99	94.39	18.14
02/26/87	-	-	-	-	-	-	-	-	75.65	78.23	2.38	94.39	17.98
03/29/89	-	-	4600	350	280	3100	-	-	77.23	77.35	0.12	94.39	17.13
09/19/89	-	-	10000	570	700	4200	-	-	77.61	77.62	0.01	92.92	15.11
03/26/90	-	-	-	-	-	-	-	-	NP	78.70	0.00	92.92	14.22
02/25/91	-	-	-	-	-	-	-	-	80.08	80.46	0.38	92.92	12.76
08/18/91	-	-	5200	670	720	4900	-	-	80.04	81.13	1.09	92.92	12.61
11/20/91	-	-	7000	400	600	4400	-	-	80.20	81.31	1.11	92.92	12.45
03/02/92	-	-	4200	200	200	3200	-	-	80.18	80.94	0.76	92.92	12.55
05/28/92	-	-	3500	710	300	4100	-	-	79.98	80.26	0.28	92.92	12.67
08/22/92	-	-	6800	800	900	4500	-	-	80.10	80.83	0.73	92.92	12.64
11/20/92	-	-	3900	70	400	3000	-	-	80.38	81.37	0.99	92.92	12.30
02/27/93	-	-	-	-	-	-	-	-	80.25	80.58	0.33	92.92	12.59
05/18/93	-	-	5200	800	800	1900	-	-	NP	79.62	0.00	92.92	13.30
11/01/93	-	-	5400	40	670	2200	-	-	NP	79.10	0.00	92.92	13.82
02/05/94	-	-	4600	80	670	1800	-	-	NP	78.54	0.00	92.92	14.38
04/18/94	-	-	2100	60	60	3300	-	-	NP	78.10	0.00	92.92	14.82
11/05/94	-	-	2900	20	430	2200	-	-	NP	76.61	0.00	92.92	16.31
04/20/95	-	-	4100	16	300	1520	-	-	NP	74.87	0.00	92.92	18.05
04/10/96	-	-	5000	24	670	-	47	-	NP	72.34	0.00	92.92	20.58
11/11/96	-	-	3200	60	100	400	100	-	NP	71.08	0.00	92.92	21.84
04/30/97	-	-	4500	12	460	360	610	-	NP	69.84	0.00	92.92	23.08
11/04/97	-	-	2100	8.2	110	230	3000	-	NP	69.40	0.00	92.92	23.52
04/21/98	-	-	1100	1.4	0.5	88	13000	-	NP	68.12	0.00	92.92	24.80
11/05/98	-	-	1600	8.2	71	49	56000	-	NP	67.48	0.00	92.92	25.44
	WELL DESTROYED												
WELL # A-21A	Area = WTF												
11/26/03	33	-	5,200	1,800	1,100	5,600	610	-	NP	75.40	0.00	97.23	21.83
03/03/04	46	-	5,900	2,300	1,300	8,500	2,300	-	NP	75.81	0.00	97.23	21.42
11/22/04	22	-	4,900	1,200	1,000	4,600	6,400	-	NP	76.83	0.00	97.23	20.40
03/29/05	23.9	-	6,580	1,530	1,200	5,880	7,310	-	NP	77.22	0.00	97.23	20.01
12/06/05	37.3	-	1,080	140	250	1,070	1,080	-	NP	77.57	0.00	97.23	19.66
03/29/06	60.3	-	5,320	611	1,250	5,280	4,620	-	NP	77.30	0.00	97.23	19.93
12/05/06	45.6	-	5,330	551	1,530	4,800	5,020	-	NP	76.68	0.00	97.23	20.55
04/30/07	44.9	0.60	5,540	311	1,360	5,270	5,250	-	NP	76.03	0.00	97.23	21.20
09/26/07	34.3	0.80	4,360	247	1,220	4,800	3,030	331	NP	75.96	0.00	97.23	21.27
04/22/08	29.5	0.90	5,260	196	1,070	4,510	3,250	<250	NP	76.67	0.00	97.23	20.56
09/24/08	29.9	0.70	4,470	139	1,180	4,070	3,110	383	NP	77.17	0.00	97.23	20.06
03/31/09	17.3	2.20	2,820	<4.8	908	1,000	41	<104	71.43	71.58	0.15	97.23	25.76
3/31/09 (DUP)	16.4	2.60	2,830	<4.8	942	1,050	41	<104	-	-	-	-	-
09/30/09	18.1	1.4	3,240	139	946	1,400	26	<104.0	72.19	72.30	0.11	97.23	25.01
9/30/09 (DUP)	16	1.4	3,250	49 J	933	1,220	38	<104.0	-	-	-	-	-
05/05/10	21.6	0.7	3,390	<4.8	1,080	1,280	22	<104.0	72.82	72.88	0.06	97.23	24.40
5/05/10 (DUP)	21.8	0.9	3,440	<4.8	1,120	1,340	24	<104.0	-	-	-	-	-
10/07/10	31.6	1.4	4,480	116	1,190	4,050	2,260	329	NP	80.02	0.00	97.23	17.21
10/7/10 (DUP)	33.3	1.0	4,280	108	1,200	4,050	2,260	324	-	-	-	-	-
03/31/11	34.9	1.5	4,450	107	1,520	4,750	1,990	<104.0	NP	80.24	0.00	97.23	16.99
3/31/11 (DUP)	36	1.0	4,240	110	1,430	4,230	2,020	<104.0	-	-	-	-	-
09/29/11	28.7	0.8	3,800	89 J	1,200	4,000	1,900	<104	NP	79.85	0.00	97.23	17.38
9/29/11(DUP)	27.5	0.9	3,500	<4.8	<4.8	3,600	1,900	<104	-	-	-	-	-
04/04/12	24	<0.8	4,000	110	1,100	3,600	1,900	<104	NP	79.24	0.00	97.23	17.99
4/04/12 (DUP)	24.8	<0.8	3,100	<4.8	930	3,000	1,800	<104	-	-	-	-	-
09/27/12	24.9	0.37	4,400	99 J	760	3,800	2,100	474	NP	78.78	0.00	97.23	18.45
9/27/12 (DUP)	25.9	0.58	4,200	92 J	730	3,400	1,900	<104	-	-	-	-	-
03/21/13	24	2.2	4,900	94 J	1,100	3,700	1,800	400	NP	78.64	0.00	97.23	18.59
3/21/13 (DUP)	29.20	2.5	5,500	110	1,200	4,000	2,000	430	-	-	-	-	-
09/23/13	26.60	1.3	4,300	<4.8	1,200	4,000	1,400	<104	NP	79.06	0.00	97.23	18.17
9/23/13 (DUP)	25.80	1.1	4,200	<4.8	1,000	3,600	1,300	<104	-	-	-	-	-
04/03/14	26.00	0.62	4,800	<4.8	1,100	3,500	1,200	870	NP	79.83	0.00	97.23	17.40
4/3/14 (DUP)	23.80	0.59	4,600	<4.8	1,200	3,700	1,200	770	-	-	-	-	-

Table 2 - Summary of Historical Gauging and Chemical Data

Groundwater Monitoring, Former Golden West Refinery - Santa Fe Springs, CA

DATE	ANALYTICAL PARAMETERS								DEPTH TO PRODUCT	DEPTH TO GROUNDWATER	PRODUCT THICKNESS	CASING ELEVATION	GROUNDWATER ELEVATION
	TPHg (mg/L)	TPHd (mg/L)	BENZENE (µg/L)	TOLUENE (µg/L)	EthylBenzene (µg/L)	XYLENE (µg/L)	MTBE (µg/L)	TBA (µg/L)	(feet)	(feet)	(feet)	(feet)	(feet)
WELL # A-22													
08/20/86	-	-	-	-	-	-	-	-	NP	78.30	0.00	97.07	18.77
02/26/87	-	-	-	-	-	-	-	-	NP	78.15	0.00	97.07	18.92
02/08/88	-	-	-	-	-	-	-	-	NP	78.00	0.00	97.07	19.07
03/29/89	-	-	-	-	-	-	-	-	NP	78.89	0.00	97.07	18.18
03/26/90	-	-	-	-	-	-	-	-	NP	80.42	0.00	95.64	15.22
02/19/91	-	-	-	-	-	-	-	-	NP	81.92	0.00	95.64	13.72
03/02/92	-	-	-	-	-	-	-	-	NP	82.22	0.00	95.61	13.39
11/20/92	-	-	-	-	-	-	-	-	NP	82.38	0.00	95.61	13.23
02/27/93	-	-	-	-	-	-	-	-	NP	82.04	0.00	95.61	13.57
11/01/93	-	-	1.0	1.0	1.0	2.0	-	-	NP	80.85	0.00	95.61	14.76
02/05/94	-	-	1.0	1.0	1.0	2.0	-	-	NP	80.29	0.00	95.61	15.32
04/18/94	-	-	<3	<3	<3	<6	-	-	NP	79.53	0.00	95.61	16.08
11/05/94	-	-	2.9	1.0	1.0	3.0	-	-	NP	77.95	0.00	95.61	17.66
04/20/95	-	-	3.0	0.5	0.5	1.0	-	-	NP	76.34	0.00	95.61	19.27
11/06/95	-	-	13	0.6	7.4	0.9	-	-	NP	74.74	0.00	95.61	20.87
04/09/96	-	-	7.6	0.5	2.3	1.5	<0.5	-	NP	73.54	0.00	95.61	22.07
11/11/96	-	-	4.0	1.0	1.0	1.0	-	-	NP	72.38	0.00	95.61	23.23
04/30/97	-	-	2.0	0.5	0.5	0.94	-	-	NP	71.14	0.00	95.61	24.47
11/03/97	-	-	20	10	4.0	16	<0.5	-	NP	70.71	0.00	95.61	24.90
04/20/98	-	-	1.7	0.5	0.5	2.3	-	-	NP	69.67	0.00	95.61	25.94
11/05/98	-	-	2500	110	33	240	4500	-	NP	68.73	0.00	95.61	26.88
04/28/99	-	-	<0.5	<0.5	<0.5	<0.5	330	-	NP	68.20	0.00	95.61	27.41
	WELL DESTROYED												
WELL # A-22A	Area = WTF												
11/26/03	-	-	-	-	-	-	-	-	NP	76.71	0.00	100.19	23.48
03/30/04	-	-	-	-	-	-	-	-	NP	77.01	0.00	100.19	23.18
11/22/04	-	-	-	-	-	-	-	-	NP	72.28	0.00	100.19	27.91
03/29/05	-	-	-	-	-	-	-	-	NP	78.49	0.00	100.19	21.70
12/06/05	-	-	-	-	-	-	-	-	NP	78.70	0.00	100.19	21.49
04/11/06	-	-	-	-	-	-	-	-	NP	78.38	0.00	100.19	21.81
12/05/06	-	-	-	-	-	-	-	-	NP	77.57	0.00	100.19	22.62
05/01/07	-	-	-	-	-	-	-	-	NP	77.05	0.00	100.19	23.14
03/27/08	-	-	-	-	-	-	-	-	NP	77.71	0.00	100.19	22.48
09/22/08	-	-	-	-	-	-	-	-	NP	78.37	0.00	100.19	21.82
03/26/09	-	-	-	-	-	-	-	-	NP	79.24	0.00	100.19	20.95
10/13/09	-	-	-	-	-	-	-	-	NP	80.20	0.00	100.19	19.99
05/04/10	-	-	-	-	-	-	-	-	NP	80.78	0.00	100.19	19.41
10/06/10	-	-	-	-	-	-	-	-	NP	81.43	0.00	100.19	18.76
03/30/11	-	-	-	-	-	-	-	-	NP	81.58	0.00	100.19	18.61
09/28/11	-	-	-	-	-	-	-	-	NP	81.17	0.00	100.19	19.02
04/03/12	-	-	-	-	-	-	-	-	NP	80.63	0.00	100.19	19.68
09/26/12	-	-	-	-	-	-	-	-	NP	80.05	0.00	100.19	20.14
03/20/13	-	-	-	-	-	-	-	-	NP	79.35	0.00	100.19	20.84
09/25/13	-	-	-	-	-	-	-	-	NP	80.49	0.00	100.19	19.70
04/02/14	-	-	-	-	-	-	-	-	NP	81.22	0.00	100.19	18.97
WELL # A-23													
08/20/86	-	-	-	-	-	-	-	-	NP	74.62	0.00	94.64	20.02
02/26/87	-	-	-	-	-	-	-	-	NP	74.57	0.00	94.64	20.07
02/08/88	-	-	-	-	-	-	-	-	NP	74.52	0.00	94.64	20.12
03/29/89	-	-	-	-	-	-	-	-	NP	75.45	0.00	94.64	19.19
03/26/90	-	-	-	-	-	-	-	-	NP	77.07	0.00	93.34	16.27
02/19/91	-	-	-	-	-	-	-	-	NP	76.58	0.00	93.34	14.76
03/02/92	-	-	-	-	-	-	-	-	NP	78.75	0.00	93.33	14.58
11/20/92	-	-	-	-	-	-	-	-	NP	79.04	0.00	93.33	14.29
02/27/93	-	-	-	-	-	-	-	-	NP	78.61	0.00	93.33	14.62
04/18/94	-	-	-	-	-	-	-	-	NP	75.51	0.00	93.33	17.82
04/20/95	-	-	-	-	-	-	-	-	NP	72.37	0.00	93.33	20.96
04/09/96	-	-	-	-	-	-	-	-	NP	69.60	0.00	93.33	23.73
05/02/97	-	-	-	-	-	-	-	-	NP	67.38	0.00	93.33	25.95
04/22/98	-	-	-	-	-	-	-	-	NP	66.03	0.00	93.33	27.30
11/03/98	-	-	-	-	-	-	-	-	NP	64.78	0.00	93.33	28.55
	WELL DESTROYED												
WELL # A-24													
02/08/88	-	-	-	-	-	-	-	-	NP	77.26	0.00	98.83	21.57
03/29/89	-	-	-	-	-	-	-	-	NP	78.13	0.00	98.83	20.70
03/26/90	-	-	-	-	-	-	-	-	NP	79.71	0.00	93.76	14.05
02/19/91	-	-	-	-	-	-	-	-	NP	81.10	0.00	93.76	12.66
11/20/92	-	-	-	-	-	-	-	-	NP	81.55	0.00	93.76	12.21
02/27/93	-	-	-	-	-	-	-	-	NP	81.21	0.00	93.76	12.55
02/04/94	-	-	700	30	130	370	-	-	NP	79.58	0.00	93.76	14.18
04/18/94	-	-	750	10	170	250	-	-	NP	79.00	0.00	93.76	14.76
11/05/94	-	-	750	10	95	150	-	-	NP	77.52	0.00	93.76	16.24
04/20/95	-	-	560	1.6	24	100	-	-	NP	76.05	0.00	93.76	17.71
11/06/95	-	-	370	8.1	30	211	-	-	NP	74.03	0.00	93.76	19.73
04/09/96	-	-	950	6	33	280	<0.5	-	NP	73.09	0.00	93.76	20.67
11/11/96	-	-	720	30	30	30	-	-	NP	71.83	0.00	93.76	21.93
04/30/97	-	-	720	3.7	5.1	59	-	-	NP	70.57	0.00	93.76	23.19
11/04/97	-	-	770	3.6	1.5	8.3	<0.5	-	NP	70.15	0.00	93.76	23.61

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Groundwater Monitoring, Former Golden West Refinery - Santa Fe Springs, CA

DATE	ANALYTICAL PARAMETERS								DEPTH TO PRODUCT	DEPTH TO GROUNDWATER	PRODUCT THICKNESS	CASING ELEVATION	GROUNDWATER ELEVATION
	TPHg (mg/L)	TPHd (mg/L)	BENZENE (µg/L)	TOLUENE (µg/L)	EthylBenzene (µg/L)	XYLENE (µg/L)	MTBE (µg/L)	TBA (µg/L)	(feet)	(feet)	(feet)	(feet)	(feet)
04/21/98	-	-	580	0.5	53	31	-	-	NP	68.97	0.00	93.76	24.79
11/05/98	-	-	470	35	140	67	<0.5	-	NP	68.30	0.00	93.76	25.46
04/28/99			230	0.52	68	67	-	-	NP	67.83	0.00	93.76	25.93
	WELL DESTROYED												
WELL # A-24A	Area = WTF												
11/26/03	-	-	-	-	-	-	-	-	NP	75.20	0.00	96.83	21.63
03/30/04	-	-	-	-	-	-	-	-	NP	75.61	0.00	96.83	21.22
11/22/04	-	-	-	-	-	-	-	-	NP	76.63	0.00	96.83	20.20
03/29/05	-	-	-	-	-	-	-	-	NP	76.92	0.00	96.83	19.91
12/08/05	-	-	-	-	-	-	-	-	NP	77.33	0.00	96.83	19.50
04/11/06	-	-	-	-	-	-	-	-	NP	77.00	0.00	96.83	19.83
12/05/06	-	-	-	-	-	-	-	-	NP	76.24	0.00	96.83	20.59
05/01/07	-	-	-	-	-	-	-	-	NP	75.68	0.00	96.83	21.15
03/27/08	-	-	-	-	-	-	-	-	NP	76.31	0.00	96.83	20.52
09/22/08	-	-	-	-	-	-	-	-	NP	76.95	0.00	96.83	19.88
03/26/09	-	-	-	-	-	-	-	-	NP	77.81	0.00	96.83	19.02
10/13/09	-	-	-	-	-	-	-	-	NP	78.72	0.00	96.83	18.11
05/04/10	-	-	-	-	-	-	-	-	NP	79.30	0.00	96.83	17.53
10/06/10	-	-	-	-	-	-	-	-	NP	79.87	0.00	96.83	16.96
03/30/11	-	-	-	-	-	-	-	-	NP	80.08	0.00	96.83	16.75
09/28/11	-	-	-	-	-	-	-	-	NP	79.47	0.00	96.83	17.36
04/03/12	-	-	-	-	-	-	-	-	NP	79.07	0.00	96.83	17.76
09/26/12	-	-	-	-	-	-	-	-	NP	77.58	0.00	96.83	19.25
03/20/13	-	-	-	-	-	-	-	-	NP	78.50	0.00	96.83	18.33
09/25/13	-	-	-	-	-	-	-	-	NP	79.00	0.00	96.83	17.83
04/02/14	-	-	-	-	-	-	-	-	NP	79.69	0.00	96.83	17.14
WELL # A-25	Area = WTF												
02/08/88	-	-	-	-	-	-	-	-	NP	79.62	0.00	99.20	19.58
03/29/89	-	-	-	-	-	-	-	-	NP	80.56	0.00	99.20	18.64
03/26/90	-	-	-	-	-	-	-	-	NP	82.25	0.00	94.14	11.89
02/19/91	-	-	-	-	-	-	-	-	NP	83.53	0.00	94.14	10.61
03/02/92	-	-	-	-	-	-	-	-	NP	83.94	0.00	94.14	10.20
02/27/93	-	-	-	-	-	-	-	-	NP	83.56	0.00	94.14	10.58
04/18/94	-	-	-	-	-	-	-	-	NP	81.53	0.00	94.14	12.61
04/20/95	-	-	-	-	-	-	-	-	NP	78.47	0.00	94.14	15.67
04/09/96	-	-	-	-	-	-	-	-	NP	75.71	0.00	94.14	18.43
04/30/97	-	-	-	-	-	-	-	-	NP	73.05	0.00	94.14	21.09
04/23/98	-	-	-	-	-	-	-	-	NP	71.72	0.00	94.14	22.42
04/27/99	-	-	-	-	-	-	-	-	NP	70.79	0.00	94.14	23.35
05/17/00	-	-	-	-	-	-	-	-	NP	69.69	0.00	91.41	21.72
04/03/01	-	-	-	-	-	-	-	-	NP	71.19	0.00	91.41	20.22
04/01/02	-	-	-	-	-	-	-	-	NP	72.37	0.00	91.41	19.04
11/01/02	-	-	-	-	-	-	-	-	NP	73.61	0.00	91.41	17.80
04/01/03	-	-	-	-	-	-	-	-	NP	73.80	0.00	91.41	17.61
11/26/03	-	-	-	-	-	-	-	-	NP	74.83	0.00	91.41	16.58
03/30/04	-	-	-	-	-	-	-	-	NP	75.25	0.00	91.41	16.16
03/29/05	-	-	-	-	-	-	-	-	NP	76.57	0.00	91.41	14.84
12/08/05	-	-	-	-	-	-	-	-	NP	76.51	0.00	91.41	14.90
04/11/06	-	-	-	-	-	-	-	-	NP	76.68	0.00	91.41	14.73
12/05/06	-	-	-	-	-	-	-	-	NP	76.41	0.00	91.41	15.00
05/01/07	-	-	-	-	-	-	-	-	NP	75.20	0.00	91.41	16.21
03/27/08	-	-	-	-	-	-	-	-	NP	75.82	0.00	91.41	15.59
09/22/08	-	-	-	-	-	-	-	-	NP	76.73	0.00	91.41	14.68
03/26/09	-	-	-	-	-	-	-	-	NP	77.42	0.00	91.41	13.99
10/13/09	-	-	-	-	-	-	-	-	NP	78.28	0.00	91.41	13.13
05/04/10	-	-	-	-	-	-	-	-	NP	78.93	0.00	91.41	12.48
10/06/10	-	-	-	-	-	-	-	-	NP	79.30	0.00	91.41	12.11
03/30/11	-	-	-	-	-	-	-	-	NP	79.30	0.00	91.41	12.11
09/28/11	-	-	-	-	-	-	-	-	NP	79.89	0.00	91.41	11.52
04/03/12	-	-	-	-	-	-	-	-	NP	78.05	0.00	91.41	13.36
09/26/12	-	-	-	-	-	-	-	-	NP	77.47	0.00	91.41	13.94
03/20/13	-	-	-	-	-	-	-	-	NP	77.29	0.00	91.41	14.12
09/25/13	-	-	-	-	-	-	-	-	NP	77.71	0.00	91.41	13.70
04/02/14	-	-	-	-	-	-	-	-	NP	78.61	0.00	91.41	12.80
WELL # A-26													
02/08/88	-	-	-	-	-	-	-	-	NP	77.02	0.00	95.18	18.16
03/29/89	-	-	-	-	-	-	-	-	77.79	78.33	0.54	95.18	17.26
03/26/90	950	-	1600	3300	250	5200	-	-	78.97	80.27	1.30	93.44	14.15
02/19/91	-	-	-	-	-	-	-	-	81.28	81.66	0.38	93.44	12.07
03/02/92	-	-	-	-	-	-	-	-	NP	82.17	0.00	93.44	11.27
05/28/92	-	-	1600	3300	180	5200	-	-	81.35	81.87	0.52	93.44	11.96
02/27/93	-	-	-	-	-	-	-	-	80.44	81.22	0.78	93.44	12.81
05/20/93	-	-	-	-	-	-	-	-	NP	82.75	0.00	93.44	10.69
04/18/94	-	-	-	-	-	-	-	-	NP	80.20	0.00	93.44	13.24
04/20/95	-	-	-	-	-	-	-	-	76.63	76.75	0.12	93.44	16.78
04/09/96	-	-	-	-	-	-	-	-	73.70	73.71	0.01	93.44	19.74

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DATE	ANALYTICAL PARAMETERS								DEPTH TO PRODUCT	DEPTH TO GROUNDWATER	PRODUCT THICKNESS	CASING ELEVATION	GROUNDWATER ELEVATION
	TPHg (mg/L)	TPHd (mg/L)	BENZENE (µg/L)	TOLUENE (µg/L)	EthylBenzene (µg/L)	XYLENE (µg/L)	MTBE (µg/L)	TBA (µg/L)	(feet)	(feet)	(feet)	(feet)	(feet)
04/30/97	-	-	-	-	-	-	-	-	70.86	71.02	0.16	93.44	22.54
04/21/98	-	-	-	-	-	-	-	-	69.33	69.46	0.13	93.44	24.08
11/02/98	-	-	-	-	-	-	-	-	68.67	68.77	0.10	93.44	24.75
	WELL DESTROYED												
WELL # A-26A	Area = WTF												
11/26/03	-	-	-	-	-	-	-	-	NP	74.90	0.00	95.60	20.70
03/30/04	-	-	-	-	-	-	-	-	NP	74.38	0.00	95.60	21.22
11/22/04	-	-	-	-	-	-	-	-	74.78	74.82	0.04	95.60	20.81
03/29/05	-	-	-	-	-	-	-	-	76.42	76.38	-0.04	95.60	19.19
12/06/05	-	-	-	-	-	-	-	-	76.68	76.70	0.02	95.60	18.92
04/11/06	-	-	-	-	-	-	-	-	NP	76.49	0.00	95.60	19.11
12/05/06	-	-	-	-	-	-	-	-	NP	75.86	0.00	95.60	19.74
05/01/07	-	-	-	-	-	-	-	-	NP	75.43	0.00	95.60	20.17
03/27/08	-	-	-	-	-	-	-	-	NP	75.87	0.00	95.60	19.73
09/24/08	1.59	1.7	<0.18	<0.24	172	267	3.4	72	NP	76.43	0.00	95.60	19.17
03/27/09	-	-	-	-	-	-	-	-	NP	77.10	0.00	95.60	18.50
10/12/09	-	-	-	-	-	-	-	-	NP	77.30	0.00	95.60	18.30
05/04/10	-	-	-	-	-	-	-	-	NP	78.40	0.00	95.60	17.20
10/06/10	-	-	-	-	-	-	-	-	NP	78.80	0.00	95.60	16.80
03/30/11	-	-	-	-	-	-	-	-	NP	79.15	0.00	95.60	16.45
09/28/11	-	-	-	-	-	-	-	-	NP	78.13	0.00	95.60	17.47
04/03/12	-	-	-	-	-	-	-	-	NP	78.35	0.00	95.60	17.25
09/28/12	-	-	-	-	-	-	-	-	NP	77.88	0.00	95.60	17.72
03/20/13	-	-	-	-	-	-	-	-	NP	77.75	0.00	95.60	17.85
09/25/13	-	-	-	-	-	-	-	-	NP	78.13	0.00	95.60	17.47
04/02/14	-	-	-	-	-	-	-	-	NP	78.74	0.00	95.60	16.86
WELL # A-27													
02/08/88	-	-	-	-	-	-	-	-	NP	75.93	0.00	94.56	18.63
03/29/89	-	-	-	-	-	-	-	-	76.78	77.04	0.26	94.56	17.72
03/26/90	-	-	-	-	-	-	-	-	78.06	78.26	0.20	92.94	14.83
02/19/91	-	-	-	-	-	-	-	-	78.86	79.10	0.24	92.94	14.02
03/02/92	-	-	-	-	-	-	-	-	77.50	77.75	0.25	92.92	15.36
08/22/92	-	-	-	-	-	-	-	-	79.15	81.42	2.27	92.92	13.21
02/27/93	-	-	-	-	-	-	-	-	76.39	76.41	0.02	92.92	16.53
04/18/94	-	-	-	-	-	-	-	-	72.84	72.85	0.01	92.92	20.08
04/20/96	-	-	-	-	-	-	-	-	NP	71.18	0.00	92.92	21.74
04/09/96	-	-	-	-	-	-	-	-	NP	68.88	0.00	92.92	24.04
05/02/97	-	-	-	-	-	-	-	-	NP	67.42	0.00	92.92	25.50
11/05/97	-	-	-	-	-	-	-	-	66.85	66.86	0.01	92.92	26.07
	WELL DESTROYED												
WELL # A-27A	Area = WTF												
11/26/03	-	-	-	-	-	-	-	-	film	66.88	FILM	91.16	22.30
03/30/04	-	-	-	-	-	-	-	-	69.28	69.36	0.08	91.16	21.86
11/22/04	-	-	-	-	-	-	-	-	70.40	70.61	0.21	91.16	20.71
03/29/05	-	-	-	-	-	-	-	-	70.58	70.65	0.07	91.16	20.56
12/06/05	-	-	-	-	-	-	-	-	70.82	70.88	0.06	91.16	20.33
04/11/06	-	-	-	-	-	-	-	-	NP	70.57	0.00	91.16	20.59
12/05/06	-	-	-	-	-	-	-	-	NP	69.83	0.00	91.16	21.33
05/01/07	-	-	-	-	-	-	-	-	NP	69.27	0.00	91.16	21.89
03/27/08	-	-	-	-	-	-	-	-	NP	69.83	0.00	91.16	21.33
09/24/08	17	0.3	1840	4.1 J	881	975	42	<62	70.56	70.63	0.07	91.16	20.56
03/27/09	-	-	-	-	-	-	-	-	NP	71.32	0.00	91.16	19.84
10/12/09	-	-	-	-	-	-	-	-	NP	72.25	0.00	91.16	18.91
05/04/10	-	-	-	-	-	-	-	-	NP	72.85	0.00	91.16	18.31
10/06/10	-	-	-	-	-	-	-	-	NP	74.37	0.00	91.16	16.79
03/30/11	-	-	-	-	-	-	-	-	NP	73.64	0.00	91.16	17.52
09/28/11	-	-	-	-	-	-	-	-	NP	73.20	0.00	91.16	17.96
04/03/12	-	-	-	-	-	-	-	-	NP	72.53	0.00	91.16	18.63
09/26/12	-	-	-	-	-	-	-	-	NP	72.05	0.00	91.16	19.11
03/20/13	-	-	-	-	-	-	-	-	NP	71.95	0.00	91.16	19.21
09/25/13	-	-	-	-	-	-	-	-	NP	72.49	0.00	91.16	18.67
04/02/14	-	-	-	-	-	-	-	-	NP	73.20	0.00	91.16	17.96
WELL # A-28													
02/08/88	-	-	-	-	-	-	-	-	NP	80.31	0.00	95.08	14.77
03/29/89	-	-	-	-	-	-	-	-	NP	81.69	0.00	95.08	13.39
03/26/90	-	-	-	-	-	-	-	-	NP	84.42	0.00	93.92	9.50
02/19/91	-	-	-	-	-	-	-	-	NP	86.69	0.00	93.92	7.23
03/02/92	-	-	-	-	-	-	-	-	NP	87.54	0.00	92.91	5.37
11/20/92	-	-	-	-	-	-	-	-	NP	88.20	0.00	92.91	4.71
02/27/93	-	-	-	-	-	-	-	-	NP	87.49	0.00	92.91	5.42
04/18/94	-	-	-	-	-	-	-	-	83.21	83.22	0.01	92.91	9.70
04/20/95	-	-	-	-	-	-	-	-	NP	79.37	0.00	92.91	13.54
04/10/96	-	-	-	-	-	-	-	-	NP	76.33	0.00	92.91	16.58
05/01/97	-	-	-	-	-	-	-	-	NP	73.91	0.00	92.91	19.00
04/23/98	-	-	-	-	-	-	-	-	NP	73.23	0.00	92.91	19.68
04/28/99	-	-	-	-	-	-	-	-	NP	72.15	0.00	92.91	20.76
	WELL DESTROYED												

Table 2 - Summary of Historical Gauging and Chemical Data

Groundwater Monitoring, Former Golden West Refinery - Santa Fe Springs, CA

DATE	ANALYTICAL PARAMETERS								DEPTH TO PRODUCT	DEPTH TO GROUNDWATER	PRODUCT THICKNESS	CASING ELEVATION	GROUNDWATER ELEVATION
	TPHg (mg/L)	TPHd (mg/L)	BENZENE (µg/L)	TOLUENE (µg/L)	EthylBenzene (µg/L)	XYLENE (µg/L)	MTBE (µg/L)	TBA (µg/L)	(feet)	(feet)	(feet)	(feet)	(feet)
WELL # A-29													
02/08/88	-	-	-	-	-	-	-	-	NP	89.93	0.00	98.43	8.50
03/29/89	-	-	-	-	-	-	-	-	NP	91.74	0.00	98.43	6.69
03/26/90	-	-	-	-	-	-	-	-	NP	98.10	0.00	97.80	1.70
02/19/91	-	-	-	-	-	-	-	-	NP	97.64	0.00	97.80	0.16
03/02/92	-	-	-	-	-	-	-	-	NP	97.94	0.00	96.73	-0.91
11/20/92	-	-	-	-	-	-	-	-	NP	99.50	0.00	96.73	-2.77
02/27/93	-	-	-	-	-	-	-	-	NP	97.10	0.00	96.73	-0.37
04/18/94	-	-	-	-	-	-	-	-	NP	91.30	0.00	96.73	5.43
04/20/95	-	-	-	-	-	-	-	-	NP	86.61	0.00	96.73	10.12
04/10/96	-	-	-	-	-	-	-	-	NP	85.65	0.00	96.73	11.08
04/30/97	-	-	-	-	-	-	-	-	NP	81.46	0.00	96.73	15.27
04/23/98	-	-	-	-	-	-	-	-	NP	81.10	0.00	96.73	15.63
04/26/99	-	-	-	-	-	-	-	-	NP	80.70	0.00	96.73	16.03
	WELL DESTROYED												
WELL # A-29A	Area = PUA N of Orden												
03/29/06	0.25	-	8	<0.1	2.1J	2.3J	9	-	NP	90.95	0.00	97.62	6.67
12/05/06	0.43	-	1.8	<0.10	<0.24	1.6 J	7.8	-	NP	90.63	0.00	97.62	6.99
04/30/07	0.841	0.25	5.1	<0.24	1.4 J	2.8 J	<0.19	-	NP	88.35	0.00	97.62	9.27
09/26/07	0.258	0.2	3.9	<0.24	<0.21	3.0 J	7.3	1420	NP	90.63	0.00	97.62	6.99
04/22/08	0.544	0.42	1.9	<0.24	<0.21	1.6 J	9	19600	NP	90.95	0.00	97.62	6.67
09/25/08	0.567	0.21	<0.16	<0.24	<0.21	<0.45	6.9	1260	NP	93.47	0.00	97.62	4.15
03/27/09	-	-	-	-	-	-	-	-	NP	93.56	0.00	97.62	4.06
10/12/09	-	-	-	-	-	-	-	-	NP	96.05	0.00	97.62	1.57
05/04/10	-	-	-	-	-	-	-	-	NP	96.30	0.00	97.62	1.32
10/06/10	-	-	-	-	-	-	-	-	NP	97.00	0.00	97.62	0.62
03/30/11	-	-	-	-	-	-	-	-	NP	94.68	0.00	97.62	2.94
09/28/11	-	-	-	-	-	-	-	-	NP	93.55	0.00	97.62	4.07
04/03/12	-	-	-	-	-	-	-	-	NP	90.90	0.00	97.62	6.72
09/26/12	-	-	-	-	-	-	-	-	NP	91.85	0.00	97.62	5.77
03/20/13	-	-	-	-	-	-	-	-	NP	90.92	0.00	97.62	6.70
09/25/13	-	-	-	-	-	-	-	-	NP	93.95	0.00	97.62	3.67
04/02/14	-	-	-	-	-	-	-	-	NP	94.34	0.00	97.62	3.28
WELL # A-30													
02/08/88	-	-	-	-	-	-	-	-	NP	89.95	0.00	99.58	9.63
03/29/89	-	-	-	-	-	-	-	-	NP	91.68	0.00	99.58	7.90
03/26/90	-	-	-	-	-	-	-	-	NP	96.86	0.00	97.93	2.05
02/19/91	-	-	-	-	-	-	-	-	NP	97.96	0.00	97.93	-0.03
03/02/92	-	-	-	-	-	-	-	-	NP	98.18	0.00	97.87	-0.31
05/26/92	-	-	<1.0	<1.0	<1.0	<1.0	-	-	NP	97.79	0.00	97.87	0.08
08/22/92	-	-	-	-	-	-	-	-	NP	99.96	0.00	97.87	-2.09
02/27/93	-	-	-	-	-	-	-	-	NP	97.76	0.00	97.87	0.11
04/18/94	-	-	-	-	-	-	-	-	NP	92.20	0.00	97.87	5.67
04/20/95	-	-	-	-	-	-	-	-	NP	87.68	0.00	97.87	10.19
04/10/96	-	-	-	-	-	-	-	-	NP	84.50	0.00	97.87	13.37
05/01/97	-	-	33	-	-	-	-	-	NP	81.87	0.00	97.87	16.00
04/22/98	-	-	1.1	-	-	-	-	-	NP	81.44	0.00	97.87	16.43
04/29/99	-	-	1.3	-	-	-	-	-	NP	80.60	0.00	97.87	17.27
04/12/00	-	-	2.9	-	-	-	-	-	NP	82.86	0.00	97.87	15.01
	WELL DESTROYED												
WELL # A-30A	Area = PUA N of Orden												
04/12/06	-	-	-	-	-	-	-	-	NP	89.35	0.00	97.30	7.95
12/05/06	-	-	-	-	-	-	-	-	NP	89.08	0.00	97.30	8.22
05/01/07	-	-	-	-	-	-	-	-	NP	87.03	0.00	97.30	10.27
09/26/07	-	-	-	-	-	-	-	-	NP	88.82	0.00	97.30	8.48
03/27/08	-	-	-	-	-	-	-	-	NP	89.11	0.00	97.30	8.19
09/22/08	-	-	-	-	-	-	-	-	NP	91.52	0.00	97.30	5.78
03/26/09	-	-	-	-	-	-	-	-	NP	91.90	0.00	97.30	5.40
10/12/09	-	-	-	-	-	-	-	-	NP	94.40	0.00	97.30	2.90
05/04/10	-	-	-	-	-	-	-	-	NP	93.87	0.00	97.30	3.43
10/06/10	-	-	-	-	-	-	-	-	NP	95.45	0.00	97.30	1.85
03/30/11	-	-	-	-	-	-	-	-	NP	93.65	0.00	97.30	3.65
09/28/11	-	-	-	-	-	-	-	-	NP	92.51	0.00	97.30	4.79
04/03/12	-	-	-	-	-	-	-	-	NP	90.14	0.00	97.30	7.16
09/26/12	-	-	-	-	-	-	-	-	NP	90.60	0.00	97.30	6.70
03/20/13	-	-	-	-	-	-	-	-	NP	89.80	0.00	97.30	7.50
09/25/13	-	-	-	-	-	-	-	-	NP	92.34	0.00	97.30	4.96
04/02/14	-	-	-	-	-	-	-	-	NP	92.92	0.00	97.30	4.38
WELL # A-31													
02/08/88	-	-	-	-	-	-	-	-	NP	88.47	0.00	97.29	8.82
03/29/89	-	-	-	-	-	-	-	-	NP	90.13	0.00	97.29	7.16
03/26/90	-	-	-	-	-	-	-	-	NP	94.08	0.00	95.63	1.55
02/19/91	-	-	-	-	-	-	-	-	NP	96.26	0.00	95.63	-0.63
11/20/91	-	-	-	-	-	-	-	-	NP	98.58	0.00	95.58	-3.00
03/02/92	-	-	-	-	-	-	-	-	NP	96.79	0.00	95.58	-1.21
05/26/92	-	-	<1.0	<1.0	<1.0	<1.0	-	-	NP	95.92	0.00	95.58	-0.34
02/27/93	-	-	-	-	-	-	-	-	NP	96.17	0.00	95.58	-0.59
04/18/94	-	-	-	-	-	-	-	-	NP	90.85	0.00	95.58	4.73
04/20/95	-	-	-	-	-	-	-	-	NP	86.14	0.00	95.58	9.44
04/10/96	-	-	-	-	-	-	-	-	NP	83.02	0.00	95.58	12.56

Table 2 - Summary of Historical Gauging and Chemical Data

Groundwater Monitoring, Former Golden West Refinery - Santa Fe Springs, CA

DATE	ANALYTICAL PARAMETERS								DEPTH TO PRODUCT	DEPTH TO GROUNDWATER	PRODUCT THICKNESS	CASING ELEVATION	GROUNDWATER ELEVATION
	TPHg (mg/L)	TPHd (mg/L)	BENZENE (µg/L)	TOLUENE (µg/L)	EthylBenzene (µg/L)	XYLENE (µg/L)	MTBE (µg/L)	TBA (µg/L)	(feet)	(feet)	(feet)	(feet)	(feet)
04/30/97	-	-	-	-	-	-	-	-	NP	90.45	0.00	95.58	15.13
04/23/98	-	-	-	-	-	-	-	-	NP	90.07	0.00	95.58	15.51
04/28/99	-	-	-	-	-	-	-	-	NP	79.47	0.00	95.58	6.11
	WELL DESTROYED												
WELL # A-31A													
04/12/06	-	-	-	-	-	-	-	-	NP	90.63	0.00	97.10	6.47
12/05/06	-	-	-	-	-	-	-	-	NP	90.14	0.00	97.10	6.96
05/01/07	-	-	-	-	-	-	-	-	NP	88.15	0.00	97.10	8.95
09/26/07	-	-	-	-	-	-	-	-	NP	89.68	0.00	97.10	7.42
03/27/08	-	-	-	-	-	-	-	-	NP	90.18	0.00	97.10	6.92
09/22/08	-	-	-	-	-	-	-	-	NP	92.33	0.00	97.10	4.77
12/10/08	WELL DESTROYED												
WELL # A-32	Area = STF S of Foster												
02/08/88	-	-	-	-	-	-	-	-	72.11	74.77	2.66	91.53	16.77
03/29/89	-	-	-	-	-	-	-	-	72.94	75.75	2.81	91.53	17.90
04/11/90	-	-	-	-	-	-	-	-	74.31	77.44	3.13	91.53	12.58
02/19/91	-	-	-	-	-	-	-	-	75.55	78.65	3.10	91.53	11.35
03/02/92	-	-	-	-	-	-	-	-	75.25	75.92	0.67	91.53	12.17
11/20/92	-	-	-	-	-	-	-	-	76.54	77.71	1.17	91.53	10.75
02/27/93	-	-	-	-	-	-	-	-	76.20	77.30	1.10	91.53	11.11
04/18/94	-	-	-	-	-	-	-	-	74.02	76.98	2.96	91.53	12.83
04/20/95	-	-	-	-	-	-	-	-	71.40	71.82	0.42	91.53	16.08
04/29/97	-	-	-	-	-	-	-	-	66.54	68.63	2.09	91.53	20.53
04/20/98	-	-	-	-	-	-	-	-	65.01	70.01	5.00	91.53	21.36
04/26/99	-	-	-	-	-	-	-	-	64.91	66.02	1.11	91.53	22.40
04/19/00	-	-	-	-	-	-	-	-	64.70	70.31	5.61	91.53	21.51
04/02/01	-	-	-	-	-	-	-	-	66.40	69.86	3.46	91.53	20.33
04/01/02	-	-	-	-	-	-	-	-	67.88	69.70	1.82	91.53	19.26
08/07/02	100	-	27000	21000	1600	9600	-	-	-	-	-	-	-
11/01/02	-	-	-	-	-	-	-	-	69.29	70.14	0.85	91.53	18.09
04/01/03	-	-	-	-	-	-	-	-	69.01	70.59	1.58	91.53	18.18
11/01/03	-	-	-	-	-	-	-	-	69.71	71.87	2.16	91.53	17.34
03/30/04	-	-	-	-	-	-	-	-	71.12	72.97	1.85	-	-71.57
11/22/04	-	-	-	-	-	-	-	-	71.33	72.25	0.92	-	-71.56
03/29/05	-	-	-	-	-	-	-	-	71.25	71.98	0.73	91.53	16.15
12/06/05	-	-	-	-	-	-	-	-	71.47	72.74	1.27	91.53	16.80
05/25/06	-	-	-	-	-	-	-	-	71.11	71.61	0.50	90.46	19.23
12/05/06	-	-	-	-	-	-	-	-	70.61	70.80	0.19	90.46	19.80
05/01/07	-	-	-	-	-	-	-	-	69.90	70.10	0.20	90.46	20.51
09/26/07	-	-	-	-	-	-	-	-	70.15	70.42	0.27	90.46	20.24
03/27/08	-	-	-	-	-	-	-	-	NP	70.61	0.00	90.46	19.85
09/22/08	-	-	-	-	-	-	-	-	71.17	72.75	1.58	90.46	18.90
03/26/09	-	-	-	-	-	-	-	-	72.26	73.36	1.10	90.46	17.93
10/13/09	-	-	-	-	-	-	-	-	NO ACCESS	-	-	90.46	-
05/04/10	-	-	-	-	-	-	-	-	72.98	74.40	1.42	90.46	17.13
10/06/10	-	-	-	-	-	-	-	-	73.40	74.92	1.52	90.46	16.69
03/30/11	-	-	-	-	-	-	-	-	73.35	73.98	0.63	90.46	16.96
09/28/11	-	-	-	-	-	-	-	-	72.95	73.15	0.20	90.46	17.46
04/03/12	-	-	-	-	-	-	-	-	NO ACCESS	-	-	90.46	-
09/26/12	-	-	-	-	-	-	-	-	NP	71.85	0.00	90.46	18.61
03/20/13	-	-	-	-	-	-	-	-	NP	71.75	0.00	90.46	18.71
09/23/13	-	-	-	-	-	-	-	-	72.10	73.05	0.95	90.46	18.13
04/02/14	-	-	-	-	-	-	-	-	72.85	73.75	1.10	90.46	17.54
WELL # A-32E	Area = STF S of Foster												
03/30/04	-	-	-	-	-	-	-	-	71.16	72.88	1.72	-	-
11/22/04	-	-	-	-	-	-	-	-	71.01	72.15	1.14	-	-
03/29/05	-	-	-	-	-	-	-	-	70.91	71.72	0.81	-	-
12/06/05	-	-	-	-	-	-	-	-	71.28	72.15	0.87	-	-
04/11/06	-	-	-	-	-	-	-	-	70.84	71.41	0.57	-	-
12/06/06	-	-	-	-	-	-	-	-	70.33	70.52	0.19	-	-
05/01/07	-	-	-	-	-	-	-	-	69.65	69.85	0.20	-	-
03/27/08	-	-	-	-	-	-	-	-	NP	70.35	0.00	-	-
09/22/08	-	-	-	-	-	-	-	-	69.91	72.81	2.90	-	-
03/26/09	-	-	-	-	-	-	-	-	71.49	72.63	1.14	-	-
10/13/09	-	-	-	-	-	-	-	-	NO ACCESS	-	-	-	-
05/04/10	-	-	-	-	-	-	-	-	73.50	74.61	1.11	-	-
10/06/10	-	-	-	-	-	-	-	-	73.32	74.05	0.73	-	-
03/30/11	-	-	-	-	-	-	-	-	73.08	73.68	0.60	-	-
09/28/11	-	-	-	-	-	-	-	-	72.70	72.82	0.12	-	-
04/03/12	-	-	-	-	-	-	-	-	NO ACCESS	-	-	-	-
09/26/12	-	-	-	-	-	-	-	-	NP	72.05	0.00	-	-
03/20/13	-	-	-	-	-	-	-	-	71.45	71.49	0.04	-	-
09/25/13	-	-	-	-	-	-	-	-	71.80	72.68	0.88	-	-
04/02/14	-	-	-	-	-	-	-	-	72.38	73.38	1.00	-	-
WELL # A-32W	Area = STF S of Foster												
03/30/04	-	-	-	-	-	-	-	-	70.04	71.82	1.78	-	-
11/22/04	-	-	-	-	-	-	-	-	71.33	71.30	-0.03	-	-
03/29/05	-	-	-	-	-	-	-	-	71.27	71.71	0.44	-	-
12/06/05	-	-	-	-	-	-	-	-	70.92	73.15	2.23	-	-
04/11/06	-	-	-	-	-	-	-	-	71.60	72.04	0.44	-	-
12/05/06	-	-	-	-	-	-	-	-	71.10	71.20	0.10	-	-

Table 2 - Summary of Historical Gauging and Chemical Data

Groundwater Monitoring, Former Golden West Refinery - Santa Fe Springs, CA

DATE	ANALYTICAL PARAMETERS								DEPTH TO PRODUCT	DEPTH TO GROUNDWATER	PRODUCT THICKNESS	CASING ELEVATION	GROUNDWATER ELEVATION
	TPHg (mg/L)	TPHd (mg/L)	BENZENE (µg/L)	TOLUENE (µg/L)	EthylBenzene (µg/L)	XYLENE (µg/L)	MTBE (µg/L)	TBA (µg/L)	(feet)	(feet)	(feet)	(feet)	(feet)
05/01/07	-	-	-	-	-	-	-	-	70.39	70.43	0.05	-	-
03/27/08	-	-	-	-	-	-	-	-	71.22	71.51	0.29	-	-
09/22/08	-	-	-	-	-	-	-	-	71.74	72.75	1.01	-	-
03/26/09	-	-	-	-	-	-	-	-	71.88	73.34	1.46	-	-
10/13/09	-	-	-	-	-	-	-	-	NO ACCESS	-	-	-	-
05/04/10	-	-	-	-	-	-	-	-	72.72	74.05	1.33	-	-
10/06/10	-	-	-	-	-	-	-	-	74.02	76.31	2.29	-	-
03/30/11	-	-	-	-	-	-	-	-	73.84	74.25	0.41	-	-
09/28/11	-	-	-	-	-	-	-	-	NP	73.46	0.00	-	-
04/03/12	-	-	-	-	-	-	-	-	NO ACCESS	-	-	-	-
09/26/12	-	-	-	-	-	-	-	-	NP	72.33	0.00	-	-
03/20/13	-	-	-	-	-	-	-	-	NP	72.20	0.00	-	-
09/25/13	-	-	-	-	-	-	-	-	NP	72.80	0.00	-	-
04/02/14	-	-	-	-	-	-	-	-	73.20	73.77	0.57	-	-
WELL # A-33													
02/08/88	-	-	-	-	-	-	-	-	NP	78.34	0.00	92.67	17.33
03/29/89	-	-	-	-	-	-	-	-	75.73	77.33	1.60	92.67	16.55
04/11/90	-	-	-	-	-	-	-	-	77.38	77.58	0.20	88.73	11.30
02/19/91	-	-	-	-	-	-	-	-	78.43	78.63	0.20	88.73	10.25
03/02/92	-	-	-	-	-	-	-	-	78.73	78.83	0.10	88.71	9.98
08/22/92	-	-	-	-	-	-	-	-	87.81	87.92	0.11	88.71	0.87
02/27/93	-	-	-	-	-	-	-	-	78.82	78.85	0.03	88.71	10.08
04/18/94	-	-	-	-	-	-	-	-	NP	77.83	0.00	88.71	10.88
04/20/95	-	-	-	-	-	-	-	-	NP	74.19	0.00	88.71	14.52
04/10/96	-	-	-	-	-	-	-	-	NP	71.72	0.00	88.71	16.99
05/01/97	-	-	-	-	-	-	-	-	NP	69.47	0.00	88.71	19.24
04/21/98	-	-	-	-	-	-	-	-	NP	68.81	0.00	88.71	19.90
04/29/99	-	-	-	-	-	-	-	-	NP	67.87	0.00	88.71	20.84
04/10/00	-	-	-	-	-	-	-	-	68.90	68.91	0.01	88.71	19.81
04/03/01	-	-	-	-	-	-	-	-	NP	70.06	0.00	88.71	18.65
04/01/02	-	-	-	-	-	-	-	-	70.79	71.76	0.97	88.71	17.68
08/07/02	94	-	20,000	13,000	1,000	5,300	-	-	-	-	-	-	-
11/01/02	-	-	-	-	-	-	-	-	71.92	73.07	1.15	88.71	16.51
04/01/03	-	-	-	-	-	-	-	-	71.95	72.50	0.55	88.74	16.66
11/01/03	-	-	-	-	-	-	-	-	72.84	72.95	0.11	88.71	15.84
03/30/04	-	-	-	-	-	-	-	-	72.86	73.85	0.99	88.71	15.61
				WELL DESTROYED									
WELL # A-34	Area = STF S of Foster												
02/08/88	-	-	-	-	-	-	-	-	NP	82.95	0.00	89.68	6.73
03/29/89	-	-	-	-	-	-	-	-	NP	84.94	0.00	89.68	4.74
03/26/90	-	-	-	-	-	-	-	-	NP	91.58	0.00	87.69	-3.89
02/19/91	-	-	-	-	-	-	-	-	90.73	90.83	0.10	87.69	-3.05
03/02/92	-	-	-	-	-	-	-	-	91.09	91.67	0.59	87.68	-3.64
05/28/92	-	-	260	42	7	nd	-	-	91.45	92.79	1.34	87.68	-4.10
08/22/92	-	-	-	-	-	-	-	-	94.25	96.47	2.22	87.68	-7.11
02/27/93	-	-	-	-	-	-	-	-	89.44	89.69	0.25	87.68	-1.82
04/18/94	-	-	-	-	-	-	-	-	NP	88.29	0.00	87.68	1.39
04/20/95	-	-	-	-	-	-	-	-	79.06	79.12	0.06	87.68	8.61
04/09/96	-	-	-	-	-	-	-	-	76.20	76.28	0.08	87.68	11.46
05/01/97	-	-	-	-	-	-	-	-	74.05	74.12	0.07	87.68	13.61
04/21/98	-	-	-	-	-	-	-	-	74.30	74.40	0.10	87.68	13.36
04/29/99	-	-	-	-	-	-	-	-	74.10	74.38	0.28	87.68	13.61
04/10/00	-	-	-	-	-	-	-	-	NP	76.71	0.00	87.68	10.97
04/03/01	-	-	-	-	-	-	-	-	NP	78.20	0.00	87.68	9.48
04/01/02	-	-	-	-	-	-	-	-	-	80.43	0.00	87.68	7.25
11/01/02	-	-	-	-	-	-	-	-	85.02	85.61	0.59	87.68	2.52
04/01/03	-	-	-	-	-	-	-	-		82.30	0.00	87.68	5.38
11/01/03	-	-	-	-	-	-	-	-	85.68	85.76	0.08	87.68	1.98
03/30/04	-	-	-	-	-	-	-	-	-	84.70	0.00	87.68	2.98
11/22/04	-	-	-	-	-	-	-	-	-	-	-	temporarily buried	0.00
03/01/05	-	-	-	-	-	-	-	-	-	-	-	temporarily buried	0.00
12/02/05	-	-	-	-	-	-	-	-	-	86.55	0.00	87.68	-0.87
04/13/06	-	-	-	-	-	-	-	-	NP	84.45	0.00	89.92	5.47
12/05/06	-	-	-	-	-	-	-	-	NP	85.23	0.00	89.92	4.69
05/01/07	-	-	-	-	-	-	-	-	NP	82.24	0.00	89.92	7.68
09/26/07	-	-	-	-	-	-	-	-	NP	85.94	0.00	89.92	3.98
03/27/08	-	-	-	-	-	-	-	-	NP	85.56	0.00	89.92	4.36
09/22/08	-	-	-	-	-	-	-	-	89.47	89.77	0.30	89.92	0.36
03/26/09	-	-	-	-	-	-	-	-	NP	88.30	0.00	89.92	1.62
10/12/09	-	-	-	-	-	-	-	-	91.81	93.31	1.50	89.92	-2.25
05/04/10	-	-	-	-	-	-	-	-	NP	90.00	0.00	89.92	-0.08
10/06/10	-	-	-	-	-	-	-	-	92.30	93.94	1.64	89.92	-2.78
03/30/11	-	-	-	-	-	-	-	-	NP	88.13	0.00	89.92	1.79
09/28/11	-	-	-	-	-	-	-	-	NP	87.41	0.00	89.92	2.51
04/03/12	-	-	-	-	-	-	-	-	NP	84.23	0.00	89.92	5.69
09/26/12	-	-	-	-	-	-	-	-	NO ACCESS	-	-	89.92	-
03/20/13	-	-	-	-	-	-	-	-	NP	84.47	0.00	89.92	5.45
09/25/13	-	-	-	-	-	-	-	-	88.74	89.67	0.93	89.92	0.95
04/02/14	-	-	-	-	-	-	-	-	NP	88.28	0.00	89.92	1.64

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Groundwater Monitoring, Former Golden West Refinery - Santa Fe Springs, CA

DATE	ANALYTICAL PARAMETERS								DEPTH TO PRODUCT	DEPTH TO GROUNDWATER	PRODUCT THICKNESS	CASING ELEVATION	GROUNDWATER ELEVATION
	TPHg (mg/L)	TPHd (mg/L)	BENZENE (µg/L)	TOLUENE (µg/L)	EthylBenzene (µg/L)	XYLENE (µg/L)	MTBE (µg/L)	TBA (µg/L)	(feet)	(feet)	(feet)	(feet)	(feet)
WELL # A-35	Area = STF S of Foster												
02/08/88	-	-	-	-	-	-	-	-	NP	75.46	0.00	89.54	14.08
03/29/89	-	-	-	-	-	-	-	-	75.98	77.23	1.25	89.54	13.25
03/26/90	-	-	40	40	22	330	-	-	78.31	80.44	2.13	87.57	9.74
02/19/91	-	-	-	-	-	-	-	-	NP	80.52	0.00	87.57	7.05
03/02/92	-	-	-	-	-	-	-	-	79.75	79.92	0.17	87.54	7.76
02/27/93	-	-	-	-	-	-	-	-	NP	81.60	0.00	87.54	5.94
04/18/94	-	-	-	-	-	-	-	-	NP	76.33	0.00	87.54	11.21
04/20/95	-	-	-	-	-	-	-	-	NP	74.14	0.00	87.54	13.40
04/08/96	-	-	-	-	-	-	-	-	70.68	70.70	0.02	87.54	16.86
05/01/97	-	-	-	-	-	-	-	-	NP	68.51	0.00	87.54	19.03
04/21/98	-	-	-	-	-	-	-	-	NP	67.64	0.00	87.54	19.90
04/26/99	-	-	-	-	-	-	-	-	NP	66.47	0.00	87.54	21.07
04/10/00	-	-	-	-	-	-	-	-	NP	67.54	0.00	87.54	20.00
04/03/01	-	-	-	-	-	-	-	-	NP	68.71	0.00	87.54	18.83
04/01/02	-	-	-	-	-	-	-	-	NP	69.92	0.00	87.54	17.62
11/01/02	-	-	-	-	-	-	-	-	NP	71.10	0.00	87.54	16.44
04/01/03	-	-	-	-	-	-	-	-	NP	70.95	0.00	87.54	16.59
11/01/03	-	-	-	-	-	-	-	-	NP	71.74	0.00	87.54	15.80
03/30/04	-	-	-	-	-	-	-	-	NP	71.98	0.00	87.54	15.56
11/22/04	-	-	-	-	-	-	-	-	-	-	-	temporarily buried	0.00
03/29/05	-	-	-	-	-	-	-	-	-	-	-	temporarily buried	0.00
12/08/05	-	-	-	-	-	-	-	-	70.43	70.45	0.02	87.64	17.11
04/11/06	-	-	-	-	-	-	-	-	NP	69.80	0.00	86.72	16.92
12/05/06	-	-	-	-	-	-	-	-	NP	69.15	0.00	86.72	17.57
05/01/07	-	-	-	-	-	-	-	-	NP	68.99	0.00	86.72	17.73
09/25/07	-	-	-	-	-	-	-	-	NP	68.73	0.00	86.72	17.99
03/27/08	-	-	-	-	-	-	-	-	NP	69.39	0.00	86.72	17.33
09/22/08	-	-	-	-	-	-	-	-	NO ACCESS	-	-	86.72	-
03/26/09	-	-	-	-	-	-	-	-	NO ACCESS	-	-	86.72	-
10/12/09	-	-	-	-	-	-	-	-	NP	71.85	0.00	86.72	14.87
05/04/10	-	-	-	-	-	-	-	-	NP	72.37	0.00	86.72	14.35
10/06/10	-	-	-	-	-	-	-	-	NP	72.78	0.00	86.72	13.94
03/30/11	-	-	-	-	-	-	-	-	NP	72.51	0.00	86.72	14.21
09/28/11	-	-	-	-	-	-	-	-	NP	71.97	0.00	86.72	14.75
04/03/12	-	-	-	-	-	-	-	-	NP	70.65	0.00	86.72	16.07
09/26/12	-	-	-	-	-	-	-	-	NP	70.08	0.00	86.72	16.64
03/20/13	-	-	-	-	-	-	-	-	NP	69.95	0.00	86.72	16.77
09/25/13	-	-	-	-	-	-	-	-	NP	70.45	0.00	86.72	16.27
04/02/14	-	-	-	-	-	-	-	-	NP	71.53	0.00	86.72	15.19
WELL # A-36													
02/08/88	-	-	-	-	-	-	-	-	NP	72.78	0.00	93.25	20.47
03/29/89	-	-	-	-	-	-	-	-	NP	73.28	0.00	93.25	19.97
03/26/90	-	-	-	-	-	-	-	-	NP	74.96	0.00	91.11	16.15
02/19/91	-	-	-	-	-	-	-	-	NP	76.53	0.00	91.11	14.58
03/02/92	-	-	-	-	-	-	-	-	NP	74.74	0.00	91.09	16.35
02/27/93	-	-	-	-	-	-	-	-	NP	74.10	0.00	91.09	16.99
02/06/94	-	-	0.006	0.0005	<1.0	0.002	-	-	NP	72.75	0.00	91.09	18.34
04/18/94	-	-	<1.0	<1.0	<1.0	<1.0	-	-	NP	71.75	0.00	91.09	19.34
11/05/94	-	-	<1.0	<1.0	<1.0	<1.0	-	-	NP	71.28	0.00	91.09	19.81
04/20/95	-	-	<1.0	<1.0	<1.0	<1.0	-	-	NP	69.48	0.00	91.09	21.61
11/05/95	-	-	<1.0	<1.0	<1.0	<1.0	-	-	NP	67.96	0.00	91.09	23.13
04/09/96	-	-	<1.0	<1.0	<1.0	<1.0	<0.5	-	NP	67.18	0.00	91.09	23.91
11/11/96	-	-	<1.0	<1.0	<1.0	<1.0	-	-	NP	66.23	0.00	91.09	24.86
04/28/97	-	-	<1.0	<1.0	<1.0	<1.0	-	-	NP	65.09	0.00	91.09	26.00
11/03/97	-	-	<1.0	<1.0	<1.0	<1.0	<0.5	-	NP	64.45	0.00	91.09	26.64
04/20/98	-	-	<1.0	<1.0	<1.0	<1.0	-	-	NP	62.95	0.00	91.09	28.14
11/04/98	-	-	3.7	1.1	0.8	2.1	<0.5	-	NP	62.37	0.00	91.09	28.72
05/04/99	-	-	<1.0	<1.0	<1.0	<1.0	-	-	NP	59.14	0.00	91.09	31.95
	WELL DESTROYED												
WELL # A-37													
02/08/88	-	-	-	-	-	-	-	-	90.48	92.65	2.17	99.56	8.55
03/29/89	-	-	-	-	-	-	-	-	92.08	95.77	3.69	99.56	6.58
01/12/90	1200	-	20000	21000	2000	13000	-	-	NP	97.46	0.00	97.81	0.35
08/28/90	-	-	-	-	-	-	-	-	101.04	107.96	6.92	97.81	-4.99
02/19/91	-	-	-	-	-	-	-	-	98.96	104.17	5.19	97.81	-2.44
03/02/92	-	-	-	-	-	-	-	-	98.92	102.67	3.75	97.73	-2.11
05/28/92	-	-	20000	21000	2000	13000	-	-	98.62	104.46	5.84	97.73	-2.32
02/27/93	-	-	-	-	-	-	-	-	97.96	101.17	3.21	97.73	-1.02
04/18/94	-	-	-	-	-	-	-	-	91.08	94.17	3.09	97.73	5.89
04/20/95	-	-	-	-	-	-	-	-	85.98	86.00	0.02	97.73	11.75
04/08/96	-	-	-	-	-	-	-	-	NP	83.27	0.00	97.73	14.46
05/01/97	-	-	-	-	-	-	-	-	NP	80.88	0.00	97.73	16.85
04/22/98	-	-	-	-	-	-	-	-	NP	80.66	0.00	97.73	17.07
04/26/99	-	-	-	-	-	-	-	-	NP	79.81	0.00	97.73	17.92
04/11/00	-	-	-	-	-	-	-	-	NP	82.31	0.00	97.73	15.42
	WELL DESTROYED												
WELL # A-37A	Area = PUA												
04/12/06	-	-	-	-	-	-	-	-	87.86	88.50	0.62	94.14	6.11
12/05/06	-	-	-	-	-	-	-	-	88.42	88.83	0.41	94.14	5.62
05/01/07	-	-	-	-	-	-	-	-	85.82	85.91	0.09	94.14	8.30
09/26/07	-	-	-	-	-	-	-	-	88.53	88.73	0.20	94.14	5.56
03/27/08	-	-	-	-	-	-	-	-	88.49	89.15	0.66	94.14	5.49

Table 2 - Summary of Historical Gauging and Chemical Data

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DATE	ANALYTICAL PARAMETERS								DEPTH TO PRODUCT	DEPTH TO GROUNDWATER	PRODUCT THICKNESS	CASING ELEVATION	GROUNDWATER ELEVATION
	TPHg (mg/L)	TPHd (mg/L)	BENZENE (µg/L)	TOLUENE (µg/L)	EthylBenzene (µg/L)	XYLENE (µg/L)	MTBE (µg/L)	TBA (µg/L)	(feet)	(feet)	(feet)	(feet)	(feet)
09/22/08	-	-	-	-	-	-	-	-	90.77	94.62	3.85	94.14	2.43
03/26/09	-	-	-	-	-	-	-	-	90.77	93.18	2.41	94.14	2.78
10/12/09	-	-	-	-	-	-	-	-	93.68	96.17	2.49	94.14	-0.15
05/04/10	-	-	-	-	-	-	-	-	92.42	95.19	2.77	94.14	1.04
10/08/10	-	-	-	-	-	-	-	-	94.00	98.11	4.11	94.14	-0.87
03/30/11	-	-	-	-	-	-	-	-	91.95	92.26	0.31	94.14	2.11
09/28/11	-	-	-	-	-	-	-	-	90.42	92.81	2.39	94.14	3.13
04/03/12	-	-	-	-	-	-	-	-	87.86	89.74	1.89	94.14	5.83
09/26/12	-	-	-	-	-	-	-	-	NO ACCESS	-	-	94.14	-
03/20/13	-	-	-	-	-	-	-	-	88.04	90.28	2.24	94.14	5.55
09/25/13	-	-	-	-	-	-	-	-	90.66	95.15	4.29	94.14	2.23
04/02/14	-	-	-	-	-	-	-	-	91.22	95.08	3.86	94.14	1.97
WELL # A-38													
02/08/88	-	-	-	-	-	-	-	-	NP	101.16	0.00	108.54	7.38
03/29/89	-	-	-	-	-	-	-	-	NP	102.50	0.00	108.54	6.04
03/26/90	-	-	-	-	-	-	-	-	NP	106.80	0.00	108.64	1.84
02/19/91	-	-	<0.5	-	-	-	-	-	NP	109.00	0.00	108.64	-0.36
11/20/91	-	-	-	-	-	-	-	-	NP	110.63	0.00	108.59	-2.04
03/02/92	-	-	-	-	-	-	-	-	NP	108.63	0.00	108.59	-0.04
05/28/92	-	-	<1.0	<1.0	<1.0	<1.0	-	-	NP	108.62	0.00	108.59	-0.03
02/27/93	-	-	-	-	-	-	-	-	NP	108.17	0.00	108.59	0.42
04/18/94	-	-	-	-	-	-	-	-	NP	103.58	0.00	108.59	5.01
04/20/95	-	-	-	-	-	-	-	-	NP	102.50	0.00	108.59	6.09
04/10/96	-	-	-	-	-	-	-	-	NP	96.88	0.00	108.59	11.71
05/01/97	-	-	-	-	-	-	-	-	NP	93.98	0.00	108.59	14.61
04/22/98	-	-	<0.5	-	-	-	-	-	NP	93.40	0.00	108.59	15.19
04/29/99	-	-	<0.5	-	-	-	-	-	NP	92.57	0.00	108.59	16.02
04/12/00	-	-	0.3	-	-	-	-	-	NP	94.40	0.00	108.59	14.19
04/04/01	-	-	0.3	-	-	-	-	-	NP	96.45	0.00	108.59	12.14
11/14/01	-	-	<1.0	-	-	-	<1.0	-	NP	98.07	0.00	108.59	10.52
04/01/02	-	-	-	-	-	-	-	-	NP	98.54	0.00	108.59	10.05
08/07/02	<0.5	-	3.7	3.4	<1.0	2.7	<1.0	-	-	-	0.00	-	-
11/01/02	-	-	<0.5	<0.5	<0.5	<1.0	-	-	NP	100.68	0.00	108.59	7.91
04/01/03	-	-	<0.5	<0.5	<0.5	<1.0	-	-	NP	100.81	0.00	108.59	7.78
11/01/03	-	-										DESTROYED	
	WELL DESTROYED												
WELL # A-38A	Area = PUA Marquardt												
03/29/05	<0.1	-	<1.0	<1.0	<1.0	<1.0	<1.0	-	NP	98.86	0.00	103.11	4.25
06/28/05	<0.1	-	<1.0	<1.0	<1.0	<1.0	<1.0	-	-	-	-	-	-
12/06/05	<0.05	-	<1.0	<5.0	<5.0	<5.0	<1.0	-	-	100.16	0.00	103.11	2.96
03/29/06	<0.0066	-	<0.3	<0.1	<0.2	<0.3	<0.6	-	NP	97.45	0.00	105.20	7.75
12/05/06	0.02	-	<0.32	2.8 J	<0.24	1.7 J	<0.63	-	NP	96.89	0.00	105.20	8.31
04/30/07	<0.0066	<0.032	<0.18	<0.24	<0.21	<0.45	2.7	-	NP	94.91	0.00	105.20	10.29
09/26/07	<0.0066	<0.032	<0.18	<0.24	<0.21	<0.45	<0.19	<10	NP	97.19	0.00	105.20	8.01
04/22/08	<0.0066	<0.032	<0.18	<0.24	<0.21	<0.45	<0.19	<10	NP	97.79	0.00	105.20	7.41
09/24/08	<0.0066	<0.032	<0.18	<0.24	<0.21	<0.45	<0.19	<5.2	NP	100.50	0.00	105.20	4.70
03/31/09	<0.0066	<0.032	<0.18	<0.24	<0.21	<0.45	<0.19	<5.2	NP	100.83	0.00	105.20	4.37
09/30/09	<0.0066	<0.032	<0.18	<0.24	<0.21	<0.45	<0.19	<5.2	NP	101.37	0.00	105.20	1.83
05/04/10	<0.0066	<0.032	<0.18	<0.24	<0.21	<0.45	<0.19	<5.2	NP	103.45	0.00	105.20	1.75
10/07/10	<0.0066	<0.032	<0.18	<0.24	<0.21	<0.45	<0.19	<5.2	NP	104.47	0.00	105.20	0.73
03/31/11	<0.0066	<0.032	<0.18	<0.24	<0.21	<0.45	<0.19	<5.2	NP	101.80	0.00	105.20	3.40
09/29/11	<0.0066	<0.04	<0.18	<0.24	<0.21	<0.45	<0.19	<5.2	NP	100.72	0.00	105.20	4.48
04/04/12	<0.0066	<0.04	2.7	<0.24	<0.21	<0.45	<0.19	<5.2	NP	97.70	0.00	105.20	7.50
09/27/12	<0.0066	<0.04	1.2	1.4 J	<0.21	1.3 J	<0.19	<5.2	NP	98.60	0.00	105.20	6.60
03/21/13	<0.0066	<0.04	<0.18	<0.24	<0.21	<0.45	<0.19	<5.2	NP	97.52	0.00	105.20	7.68
09/26/13	<0.0066	<0.04	<0.18	<0.24	<0.21	<0.45	<0.19	<5.2	NP	100.69	0.00	105.20	4.51
04/03/14	<0.0066	<0.04	<0.18	<0.24	<0.21	<0.45	<0.19	<5.2	NP	101.45	0.00	105.20	3.75
WELL # A-39													
02/08/88	-	-	-	-	-	-	-	-	NP	106.00	0.00	110.60	5.60
03/29/89	-	-	-	-	-	-	-	-	NP	106.56	0.00	110.60	4.04
03/26/90	-	-	-	-	-	-	-	-	NP	110.63	0.00	110.70	0.07
02/19/91	-	-	1.0	-	-	-	-	-	NP	112.48	0.00	110.70	-1.78
11/20/91	-	-	-	-	-	-	-	-	NP	113.53	0.00	110.67	-2.86
03/02/92	-	-	-	-	-	-	-	-	NP	112.25	0.00	110.67	-1.58
05/28/92	-	-	<1.0	<1.0	<1.0	<1.0	-	-	NP	111.83	0.00	110.67	-1.16
02/27/93	-	-	-	-	-	-	-	-	NP	112.19	0.00	110.67	-1.52
04/18/94	-	-	-	-	-	-	-	-	NP	107.33	0.00	110.67	3.34
04/20/95	-	-	-	-	-	-	-	-	NP	99.64	0.00	110.67	11.03
04/10/96	-	-	-	-	-	-	-	-	NP	99.54	0.00	110.67	11.13
05/01/97	-	-	-	-	-	-	-	-	NP	96.77	0.00	110.67	13.90
04/22/98	-	-	2.0	-	-	-	-	-	NP	96.74	0.00	110.67	13.93
04/29/99	-	-	1.0	-	-	-	-	-	NP	96.10	0.00	110.67	14.57
04/12/00	-	-	0.3	-	-	-	-	-	NP	98.30	0.00	110.67	12.37
04/04/01	-	-	0.3	-	-	-	-	-	NP	100.33	0.00	110.67	10.34
11/14/01	-	-	<1.0	-	-	-	<1.0	-	NP	102.56	0.00	110.67	8.11
04/01/04	-	-	-	-	-	-	-	-	NP	102.34	0.00	110.67	8.33
08/07/02	<0.5	-	3.6	3.2	<1.0	2.7	-	-	-	-	-	-	-
11/01/02	-	-	<0.5	<0.5	<0.5	<1.0	-	-	NP	105.41	0.00	110.67	5.26
04/01/03	-	-	<0.5	<0.5	<0.5	<1.0	-	-	NP	104.60	0.00	110.67	6.07
	WELL DESTROYED												