Terranext 9838 Old Placerville Road, Suite 100 Sacramento, CA 95827-3559



December 5, 1996

Project No. 05100269

Ms. Jennifer Eberle
Alameda County Health Care Services Agency
Department of Environmental Health
Division of Hazardous Materials
1131 Harbor Bay Parkway
Alameda, California 94501

**Re: Request for Site Closure**
**Southern Pacific Transportation Company**
**5th Avenue and 7th Street Property - Oakland, California**

Dear Ms. Eberle:

Terranext, on behalf of Southern Pacific Transportation Company (SPTCo), is requesting closure for the SPTCo property located at 5th Avenue and 7th Street, Oakland, California (Figure 1, Attachment A). The following paragraphs summarize site investigation and monitoring results to date and then evaluate the 5th Avenue and 7th Street site in terms of the proposed criteria for a low risk soil site. Results of fourth quarter 1995 ground water monitoring and recent ground water grab sampling at the site, not previously published, are included.

**Summary of Site Investigation and Ground Water Monitoring**

During February of 1989, Canonie Environmental Services Corporation (Canonie) removed four underground storage tanks (USTs) from the 5th Avenue and 7th Street site — two 7,000 gallon diesel USTs and two 7,000 gallon Bunker C oil USTs. Laboratory analyses of subsurface soil samples collected adjacent to the USTs prior to tank removal indicated a maximum concentration of total extractable petroleum hydrocarbons (TEPH) of 16,000 milligrams per kilogram (mg/kg). Figure 2 (Attachment A) shows the former location of the USTs within the site. When the USTs were removed, soil was excavated to a depth of approximately 12 feet below ground surface (bgs). Approximately 500 cubic yards of potentially hydrocarbon impacted soil was excavated and subsequently disposed of off site. Records from the UST removal indicate that no water entered the excavation in the three days that it remained open and that there was no visual indication of petroleum hydrocarbon impact to soil in the sidewalls and floor of the excavation. Six soil samples collected from the floor of the excavation (12 feet bgs) indicated maximum concentrations of 12 mg/kg TEPH and 43 mg/kg total recoverable petroleum hydrocarbons (TRPH). Six soil samples collected from 2 feet below the excavation floor (14 feet bgs) were composited into two

samples and analyzed for polychlorinated biphenyls (PCBs). PCBs were not detected in either sample. The excavation was subsequently backfilled with clean imported fill.

In April of 1994, Terranext (then Industrial Compliance [IC]), at the request of the Alameda County Health Care Services Agency - Department of Environmental Health - Division of Hazardous Materials (Alameda County), undertook a soil and ground water investigation of the 5th Avenue and 7th Street site on behalf of SPTCo. A total of three soil borings were drilled and then converted to monitoring wells MW-1, MW-2 and MW-3 (Figure 2, Attachment A). Soil samples from the borings were analyzed for total petroleum hydrocarbons in the diesel range (TPH-D) and in the motor oil range (TPH-MO). Neither TPH-D or TPH-MO was detected in the single soil sample analyzed from each boring. The newly installed monitoring wells were sampled shortly after completion and the ground water samples analyzed for TPH-D, TPH-MO, volatile organic compounds (benzene, toluene, ethylbenzene, xylenes [BTEX], 1,2-dichloroethane and ethylene dibromide), sodium chloride and total dissolved solids. TPH-D, TPH-MO and volatile organic compounds were not found at detectable levels. Sodium chloride concentration in site ground water ranged from 61 milligrams per liter (mg/L) in MW-1 to 300 mg/L in MW-3. Total dissolved solids ranged from 460 mg/L in MW-2 to 680 mg/L in MW-3.

what about TPH G (no gas stored)

Quarterly ground water monitoring was initiated at the site in August of 1994 (third quarter 1994) and continued through the fourth quarter of 1995, a total of six quarterly monitoring events. The analytical suite for monitoring consisted of TPH-D, TPH-MO, BTEX, sodium chloride and total dissolved solids. Analysis of sodium chloride and total dissolved solids was discontinued following the second quarter 1995 monitoring event. Analytical results from ground water monitoring are summarized in Table 1 (Attachment B). TPH-D and BTEX compounds were not detected in any of the site monitoring wells over the period of monitoring. TPH-MO was detected once in MW-2 (third quarter 1994) at a concentration of 0.75 mg/L.[1] Over the five sampling events when it was analyzed, sodium chloride ranged from a low of 25 mg/L (MW-1; fourth quarter 1994) to a high of 1,200 mg/L (MW-3; third quarter 1994). Total dissolved solids ranged from 370 mg/L (MW-2; fourth quarter 1994 and first quarter 1995) to 3,700 mg/L (MW-3; third quarter 1994).

Water level elevation data for the period of monitoring indicates that the ground water flow direction has varied from north and northeast to south. The predominant direction of ground water flow has been to the northeast and this flow direction is shown on Figure 2

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1 Reported concentration was at the method detection limit. It is further noted that the analytical sensitivity used for third quarter 1994 samples at this and several other Oakland area SPTCo sites was different than that used for previous and subsequent monitoring. A number of TPH detections that have not been verified by subsequent monitoring were reported for third quarter 1994 samples by this laboratory.

(Attachment A). The hydraulic gradient has ranged from 0.002 to 0.025. The calculated average hydraulic gradient is 0.01. Historical ground water elevation contour maps are provided in Attachment C.

At the time of the initial site investigation and installation of monitoring wells, it was assumed that the USTs had been located just to the ~~southeast~~ SW of MW-1 (Figure 2, Attachment A). This location was based on figures included in the Canonie UST removal report. Review of other figures in the files for the UST removal and review of rail yard maps provided by SPTCo indicated that the USTs had actually been located about 230 feet to the west of the originally assumed location. This revised location is also shown on Figure 2 (Attachment A).

The change in location of the former USTs meant that MW-1 was actually on the order of 250 feet downgradient of the former USTs rather than only about 100 feet downgradient. To obtain data to better characterize potential hydrocarbon impact to ground water closer to the former tanks, three ground water grab samples were collected on November 17 and 22, 1995 (GWS-1, GWS-2 and GWS-3) and a single ground water grab sample (GWS-4) was collected on March 14, 1996. The location of these ground water grab samples is shown on Figure 2 (Attachment A).

The sample points for all four ground water grab samples were hydraulically driven using a limited access rig (Precision Sampling Incorporated) with 2.5-inch diameter outer drive casing. The soil was continuously cored and logged during sample point installation. GWS-1, GWS-2 and GWS-3 were advanced to a depth of 10 feet bgs; GWS-4 was advanced to a depth of 13.5 feet bgs. The subsurface soil at each sample point was recorded on boring logs which are included as Attachment D. At GWS-1, GWS-2 and GWS-4, railroad ballast consisting of well to poorly sorted gravel was encountered to depths of 1.5 to 3 feet bgs. At GWS-3, 1 foot of asphalt and baserock was observed at the surface. At all four sample points, well graded sand, interpreted to be artificial fill, extended from the base of the ballast to a depth of 4.5 feet to 5 feet bgs. Native sediments consisting of clay with lenses of sand and sandy clay were encountered below the sand fill and extended to total depth.

The ground water grab sample locations were prepared by inserting 1-inch diameter Schedule 40 polyvinyl chloride (PVC) casing and screen with 0.010 inch slot and then withdrawing the drive casing. The ground water grab samples were collected using disposable bailers after sufficient water had entered each temporary casing. After collection, the ground water samples were appropriately labelled, placed in iced coolers, and transferred under standard chain-of-custody protocol to the selected analytical laboratory. Each of the temporary ground water sampling points were abandoned following sample collection. Abandonment consisted

of removal of the well casing and screen and filling the borehole to land surface with a cement/bentonite grout.

Samples GWS-1, GWS-2 and GWS-3 were sent to Analytical Technologies, Inc. (ATI) and analyzed for TPH-D and TPH-MO by United States Environmental Protection Agency (EPA) Method 8015 Modified and for BTEX by EPA Method 8020. ATI also prepared tables of concentrations within standard fuel carbon ranges for each sample. Sample GWS-4 was sent to Friedman & Bruya, Inc. and analyzed for TPH-D by EPA Method 8015 Modified. The method range was extended to include motor oil range compounds. The sample was also split — half of the sample was analyzed as received from the field; the other half of the sample was filtered and then run through a silica gel column prior to analysis. Research has demonstrated that TPH detections in samples can result from positive interference to the measurement caused by either petroleum that adheres to particulates ("sediment") in the sample or non-petroleum (biogenic) compounds; filtering and/or a silica gel cleanup can be effective in removing the interferences from the sample prior to analysis.[2]

Analytical results for the ground water grab samples are summarized on Figure 2 (Attachment A) and listed in Table 1 (Attachment B). Copies of chain-of-custody forms and laboratory data sheets, including bar graphs for standard fuel carbon ranges, are included as Attachment E. Benzene and ethylbenzene were not detected in any of the three samples analyzed. Toluene and xylenes at concentrations just above the detection limit were reported in GWS-3 and GWS-1, respectively. The analytical laboratory indicated that the reported value for xylenes in GWS-1 may be falsely elevated due to sample matrix interference.

Petroleum hydrocarbons in the diesel range were detected in GWS-1 and GWS-2 at concentrations of 9.0 mg/L and 8.4 mg/L, respectively. Petroleum hydrocarbons in the motor oil range were detected in GWS-1 and GWS-2 at concentrations of 2.5 mg/L and 3.1 mg/L, respectively. Petroleum hydrocarbons were not detected in GWS-3, the furthest downgradient grab sampling point, however, due to high sediment content in the sample, the analytical laboratory noted that the extraction process may not have been efficient and the results may be falsely low due to matrix interference.

The analytical results from GWS-4 show a large difference in petroleum hydrocarbon content between the unfiltered sample with no silica gel cleanup and the filtered sample with silica gel cleanup. The unfiltered/no silica gel cleanup sample had a reported TPH-D concentration of 120 mg/L and a reported TPH-MO concentration of 180 mg/L. The filtered with silica

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2 Zemo, D. A. and Synowiec, K. A., 1995, TPH Detections in Ground Water - Identification and Elimination of Positive Interferences: Proceedings - Petroleum Hydrocarbons and Organic Chemicals in Ground Water Conference, NGWA/API, Houston, Texas, pp. 257-271.

gel cleanup sample had a reported TPH-D concentration of 0.69 mg/L and a reported TPH-MO concentration of 0.88 mg/L. These results suggest that the detected petroleum hydrocarbons are primarily associated with and sorbed to particulate matter in the samples and are not dissolved and/or that a significant percentage of the hydrocarbons in the samples are polar (not petroleum) and are likely biodegradation byproducts. The results from GWS-4 demonstrate that site ground water is not significantly impacted by dissolved TPH and the mass reported as petroleum is largely (if not totally) due to interferences to the Method 8015 measurement.

**Evaluation of 5th Avenue and 7th Street Site as a Low Risk Soil Case**

The State Water Resources Control Board (SWRCB) has recommended changes to the policies which direct local agencies in overseeing the cleanup of leaking underground fuel tank (LUFT) sites. These recommended changes are in response to an October 1995 report by Lawrence Livermore National Laboratory (LLNL) that challenged the effectiveness of the current LUFT regulations and presented recommendations for reform. Following the LLNL recommendations, the SWRCB, in a letter dated December 8, 1995, recommended seeking closure for low risk soil sites, and closure, or at most monitoring, for low risk ground water sites. Monitoring would be conducted, if necessary, to demonstrate that the plume is stable.

In a memorandum entitled: *Regional Board Supplemental Instructions to State Water Board, December 8, 1995, Interim Guidance on Required Cleanup at Low Risk Fuel Sites*, dated January 5, 1996, the California Regional Water Quality Control Board, San Francisco Bay Region (Regional Board) defined six criteria for low risk soil and ground water sites. The following paragraphs evaluate the 5th Avenue and 7th Street site in terms of the criteria proposed by the Regional Board as necessary to characterize a site as a low risk soil site. The six criteria are numbered and appear in boldface italic.

***1. The leak has been stopped and ongoing sources, including free product, have been removed or remediated.***

Potential ongoing sources of petroleum hydrocarbons have been removed. Four USTs were removed from the site during February of 1989. A total of approximately 500 cubic yards of potentially hydrocarbon impacted soil was removed from the wall and floor areas of the former UST excavation and subsequently disposed of off site. Subsequent confirmation samples from the floor of the excavation showed low concentrations of residual petroleum hydrocarbons (12 ppm TEPH and 43 ppm TRPH). No free product was reported to have

been encountered during the UST removal. No free product has been observed in any of the site monitoring wells.

The USTs removed from this site were reported to have contained diesel fuel and Bunker C oil. Bunker C oil is highly insoluble and immobile in a subsurface environment. Fresh diesel fuel contains some soluble compounds but these are rapidly depleted with weathering. Weathered diesel, such as would be anticipated at this site, is also relatively insoluble and immobile in a subsurface environment. Any residual petroleum associated with the tanks is clearly not providing a "source" of dissolved constituents to ground water.

***2. The site has been adequately characterized.***

Both soil and ground water conditions at the site have been characterized during previous investigation, remediation and monitoring activities. Soil conditions have been characterized using analytical data from soil samples collected prior to and immediately following UST removal in February 1989 and soil samples collected during drilling of three borings for installation of site monitoring wells in April of 1994. Field observation of site soil conditions also occurred during installation of borings for ground water grab sampling in November 1995 (three borings) and March 1996 (one boring). The combined data and field observations indicate that hydrocarbon-affected soil was limited to the immediate vicinity of the former USTs and that most of this soil was removed and disposed of off site immediately after removal of the USTs in 1989.

Ground water conditions have been characterized using analytical data from quarterly sampling of three ground water monitoring wells, two essentially upgradient (MW-2 and MW-3) and one downgradient of the former UST location (MW-1). The downgradient monitoring well is approximately 250 feet from the present assumed former UST location. Quarterly monitoring was conducted from the third quarter of 1994 through the fourth quarter of 1995, a total of six quarterly monitoring events. Ground water conditions have also been characterized via four ground water grab samples collected in late 1995 and early 1996, at distances ranging from approximately 10 feet up to approximately 120 feet downgradient from the former UST location.

***3. Little or no ground water impact currently exists and no contaminants are found at levels above established MCLs or other applicable water quality objectives.***

Ground water monitoring data from the 5th Avenue and 7th Street site demonstrate that petroleum hydrocarbon impact to ground water is very localized and that none of the petroleum hydrocarbons detected in site ground water exceed or even approach established

maximum contaminant levels (MCLs) for drinking water. The single detections of toluene and xylenes in the ground water samples from GWS-3 and GWS-1, respectively, were both at concentrations more than two orders of magnitude below State of California Department of Health Services MCLs (see discussion for Criterion 5). Diesel and motor oil range hydrocarbons have been detected in site ground water, however, no MCL has been established for TPH. It is also noted that the concentrations of diesel and motor oil range hydrocarbons encountered in site ground water are very low. Following filtration and silica gel cleanup, the reported concentration of diesel range hydrocarbons in the ground water samples from GWS-4 was 0.69 mg/L; the reported concentration of motor oil range hydrocarbons was 0.88 mg/L.

Regarding the applicability of water quality objectives or criteria, it is noted that shallow ground water beneath the site, and in fact throughout the Oakland area, is not used for municipal or domestic purposes. It is also likely that shallow ground water beneath the 5th Avenue and 7th Street site need not be considered a potential municipal or domestic water supply source. While only one of 14 analyses for total dissolved solids exceeds 3,000 mg/L, the cutoff for a potential municipal or domestic water supply source established by State Water Resources Control Board Resolution 88-63 (Resolution 88-63), the average reported total dissolved solids for the three site monitoring wells is 872 mg/L. This value is well in excess of the 500 mg/L level established as a recommended MCL for drinking water by the California Department of Health Services. Considering all of the preceding, MCLs and other drinking water or use criteria are not applicable to site ground water. Analytical results for ground water samples from each of the sampling locations within the 5th Avenue and 7th Street site are listed in Table 1 (Attachment B); the most recent analytical result for each ground water sampling location is shown on Figure 2 (Attachment A).

***4. No water wells, deeper drinking water aquifers, surface water, or other sensitive receptors are likely to be impacted.***

Given that ground water is not significantly impacted and there is no dissolved phase "plume", none of the potential receptors listed above are likely to be impacted. Also, as previously noted, shallow ground water in the Oakland area is not used for municipal or domestic purposes. A well survey from the Alameda County Public Works Agency indicates that there are no drinking water wells within a ¼-mile radius of the site. Alameda County requires a minimum 50-foot sanitary seal for municipal and industrial water supply wells and a 20-foot sanitary seal for domestic and irrigation wells. The minimally impacted ground water at the 5th Avenue and 7th Street site is very shallow (static water level varies from 2 feet to 8 feet bgs) and would not enter any properly constructed water supply well

The only other potential receptor(s) for constituents in ground water are aquatic organisms in the Oakland Inner Harbor, located approximately 900 feet to the southwest. As discussed previously, the predominant ground water flow direction at the site appears to be to the northeast and there is no significant impact to ground water. For these reasons, it is very unlikely that the waters of the Oakland Inner Harbor will be impacted.

***5. The site presents no significant risk to human health.***

The site presents no significant risk to human health because the site is in an industrial area of the City of Oakland and most of the petroleum hydrocarbon affected soil has been removed. Risk assessments[3] at other sites have demonstrated that weathered diesel and other heavy petroleum products pose little health risk even at elevated concentrations (1,000 to 100,000 mg/kg) under industrial/commercial scenarios.

Comparison of site data to State of California or United States Environmental Protection Agency (USEPA) health-risk-based standards or criterion supports a conclusion of no significant risk. For example, BTEX has not been detected in any of the soil samples analyzed and thus concentrations of benzene, toluene, ethylbenzene and xylenes obviously are less than USEPA Region IX preliminary soil remediation goals for either an industrial or a residential use scenario. For information, these preliminary soil remediation goals are listed below.

| | Region IX Preliminary Remediation Goal* (mg/kg) | |
|---|---|---|
| **Chemical** | **Residential PRG** | **Industrial PRG** |
| Benzene | 1.4 | 3.2 |
| Toluene | 1,900 | 2,800 |
| Ethylbenzene | 690 | 690 |
| Xylenes | 990 | 990 |

* USEPA Region IX Preliminary Remediation Goals (PRGs), September 1, 1995.

A comparison of the maximum detected concentrations (single detections) of toluene and xylenes in site ground water to State of California Department of Health Services MCLs is

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3 Geomatrix Consultants, Inc., November 22, 1995, *Remedial Investigation and Baseline Risk Assessment Report, Former Berry & Linden Operable Unit, 2401 Peralta Street, Oakland, California*.

presented below. The other components of BTEX, benzene and ethylbenzene, have not been detected in site ground water.

| Chemical | Maximum Detected Concentration (µg/L) | California MCLs* (µg/L) |
|---|---|---|
| Toluene | 0.84 ✓ | 150 |
| Xylenes | 1.3 ✓ | 1,750 |

* California Regional Water Quality Control Board - Central Valley Region, July 1995, *A Compilation of Water Quality Goals*.

This comparison shows that the detected concentrations of toluene and xylenes are on the order of two to three orders of magnitude less than the established MCLs. This indicates that the detected concentrations of toluene and xylenes in site ground water would not pose a significant health risk even if the water was used as a drinking water source, which it is not.

Although a qualitative assessment of site data indicates that the site presents no significant risk to human health, a risk-based corrective action (RBCA) Tier 1 evaluation has been performed to more fully evaluate risk. The RBCA method was recently developed to assess the potential risk posed to human health and the environment at sites having had a petroleum release. The RBCA method was developed by the American Society for Testing and Materials (ASTM) and published in November 1995 as *Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites, ASTM Designation E 1739-95*, (ASTM Guide). The RBCA method is currently being implemented at many federal, state and local agencies. It is assumed the reader has had some prior familiarity and experience with the RBCA method for this discussion.

The following evaluation does not include discussion of the Site Assessment and Site Classification steps, these steps have already been addressed in the above text and in previous investigations and reports. This evaluation only compares maximum detected site constituents to a set of conservative risk-based screening levels (RBSL) to assess whether site conditions satisfy criteria for site closure.

Based on the site's data, four chemicals of concern (COCs) for soil (benzene, ethylbenzene, toluene, and total xylenes) and two COCs for ground water (toluene, and total xylenes) can be established. COCs for this discussion are any constituents having been detected at or above the laboratory method reporting limit. The following tables present a comparison of the maximum detected COC concentration to residential RBSL values for two potential direct

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pathways; 1) soil ingestion, inhalation of vapors, and dermal contact, and 2) potable ground water ingestion. Note that the following residential RBSL values were taken from the ASTM Guide (ASTM Guide Table X2.1). The equations and default parameters used to calculate the residential RBSL values are shown in Attachment F. The parameter values used to calculate the RBSL values are very conservative as compared to actual site conditions. The RBSL concentrations presented below are lower than would be calculated for actual site conditions.

Clayton

**Comparison of Maximum Detected Concentrations of Chemicals in Soil to Risk-Based Screening Levels**

| Chemical | Maximum Detected Soil Concentration (mg/kg) | RBSL Surficial Soil (Ingestion, Inhalation of Vapors, and Dermal Contact) (mg/kg) |
|---|---|---|
| Benzene | 1.4 | 5.82 |
| Ethylbenzene | 1,900 | 7,830 |
| Toluene | 690 | 13,300 |
| Xylenes | 990 | RES |

Taken from PRG, see P. 8

2.9 Tier I RBSL

**RES** The risk level of $1x10^{-6}$ is not exceeded for pure compound at any concentration

**Comparison of Maximum Detected Concentrations of Chemicals in Ground Water to Risk-Based Screening Levels**

| Chemical | Maximum Detected Ground Water Concentration (µg/L) | RBSL Ground Water Ingestion (µg/L) |
|---|---|---|
| Toluene | 0.84 | 7,300 |
| Xylenes | 1.3 | 73,000 |

The above tables show that all COCs are several orders of magnitude below calculated RBSLs. This result indicates that the site poses little risk to human health

*6. The site presents no significant risk to the environment.*

The site presents no significant risk to the environment because it is located in an industrial area of the City of Oakland and there are no known wetlands, endangered species habitats or sensitive receptors in the immediate site vicinity. As noted in Criterion 4, the closest environmentally sensitive area is the Oakland Inner Harbor which is located 900 feet to the southwest. Impact to ground water at the site has been shown to be minimal and localized and the predominant direction of ground water flow is to the northeast, away from the Oakland Inner Harbor.

**Conclusions and Request for Closure**

Based on the above discussion, the 5th Avenue and 7th Street site clearly meets the six criteria defining a low risk soil case. The recommended management strategy for such cases is closure. Given that all available information indicates that conditions at the 5th Avenue and 7th Street site meet the guidelines for closure as a low risk soil case, SPTCo/Terranext request that Alameda County close the site.

If you have any questions regarding this request for closure, please contact the undersigned at (510) 238-9540 or (916) 369-8971 or Mr. Mike Grant of SPTCo at (415) 541-2838.

Sincerely,

TERRANEXT (510) 553 0600

James B. Ackerman, R.G.
Project Geologist

Richard L. Bateman, R.G.
Principal Hydrogeologist

JBA/RLB/dao

Attachments

cc: Mr. Mike Grant, Southern Pacific Transportation Company (with attachments)

bcc: Mr. Winston Zirjacks, Terranext (without attachments)
Mr. Carl Taylor, Terranext (with attachments)
Ms. Janice Hubbard, Terranext (with attachments)

# ATTACHMENT A

# SITE MAPS

# ATTACHMENT B

# SUMMARY OF GROUND WATER ANALYTICAL RESULTS

# TABLE 1
# SUMMARY OF GROUND WATER ANALYTICAL RESULTS

| Sample Location | Date Sampled | TEPH (mg/L) | | Volatile Organic Compounds[c] (µg/L) | | | | Sodium Chloride[d] (mg/L) | Total Dissolved Solids[e] (mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| | | Diesel[a] | Motor Oil[b] | Benzene | Toluene | Ethylbenzene | Xylenes | | |
| MW-1 | 04/28/94 | <0.05 | <0.20 | <0.5 | <0.5 | <0.5 | <0.5 | 61 | 530 |
| | 08/16/94 | <0.12 | <0.75 | <0.3 | <0.3 | <0.5 | <0.5 | 86 | 600 |
| | 11/09/94 | <0.05 | <0.50 | <0.5 | <0.5 | <0.5 | <0.5 | 25 | 470 |
| | 02/16/95[f] | NS | NS | NS | NS | NS | NS | NS | NS |
| | 05/11/95 | <0.05 | <0.50 | <0.5 | <0.5 | <0.5 | <0.5 | 46 | 550 |
| | 08/08/95 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | NA | NA |
| | 12/08/95 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | NA | NA |
| MW-2 | 04/28/94 | <0.05 | <0.20 | <0.5 | <0.5 | <0.5 | <0.5 | 77 | 460 |
| | 08/16/94 | <0.12 | 0.75 | <0.3 | <0.3 | <0.5 | <0.5 | 170 | 690 |
| | 11/10/94 | <0.05 | <0.50 | <0.5 | <0.5 | <0.5 | <0.5 | 35 | 370 |
| | 02/16/95 | <0.05 | <0.50 | <0.5 | <0.5 | <0.5 | <0.5 | 190 | 370 |
| | 05/11/95 | <0.05 | <0.50 | <0.5 | <0.5 | <0.5 | <0.5 | 112 | 490 |
| | 08/08/95 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | NA | NA |
| | 12/08/95 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | NA | NA |
| MW-3 | 04/28/94 | <0.05 | <0.20 | <0.5 | <0.5 | <0.5 | <0.5 | 300 | 680 |
| | 08/16/94 | <0.12 | <0.75 | <0.3 | <0.3 | <0.5 | <0.5 | 1,200 | 3,700 |
| | 11/10/94 | <0.05 | <0.50 | <0.5 | <0.5 | <0.5 | <0.5 | 140 | 620 |
| | 02/16/95 | <0.05 | <0.50 | <0.5 | <0.5 | <0.5 | <0.5 | 630 | 1,330 |
| | 05/11/95 | <0.05 | <0.50 | <0.5 | <0.5 | <0.5 | <0.5 | 692 | 1,350 |
| | 08/08/95 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | NA | NA |
| | 12/08/95 | <0.05 | <0.05 | <0.5 | <0.5 | <0.5 | <0.5 | NA | NA |
| GWS-1 | 11/17/95 | 9.0 | 2.5 | <0.5 | <0.5 | <0.5 | 1.3[g] | NA | NA |
| GWS-2 | 11/17/95 | 8.4 | 3.1 | <0.5 | <0.5 | <0.5 | <1.0 | NA | NA |
| GWS-3 | 11/22/95 | <0.05[h] | | <0.5 | 0.84 | <0.5 | <1.0 | NA | NA |
| GWS-4 (Unfiltered No Silica Gel Cleanup) | 03/04/96 | 120 | 180[i] | NA | NA | NA | NA | NA | NA |
| GWS-4 (Filtered Silica Gel Cleanup) | 03/04/96 | 0.69 | 0.88[i] | NA | NA | NA | NA | NA | NA |
| Cal DHS MCLs | | NE | NE | 1 | 150 | 700 | 1,750 | NE | 500 |



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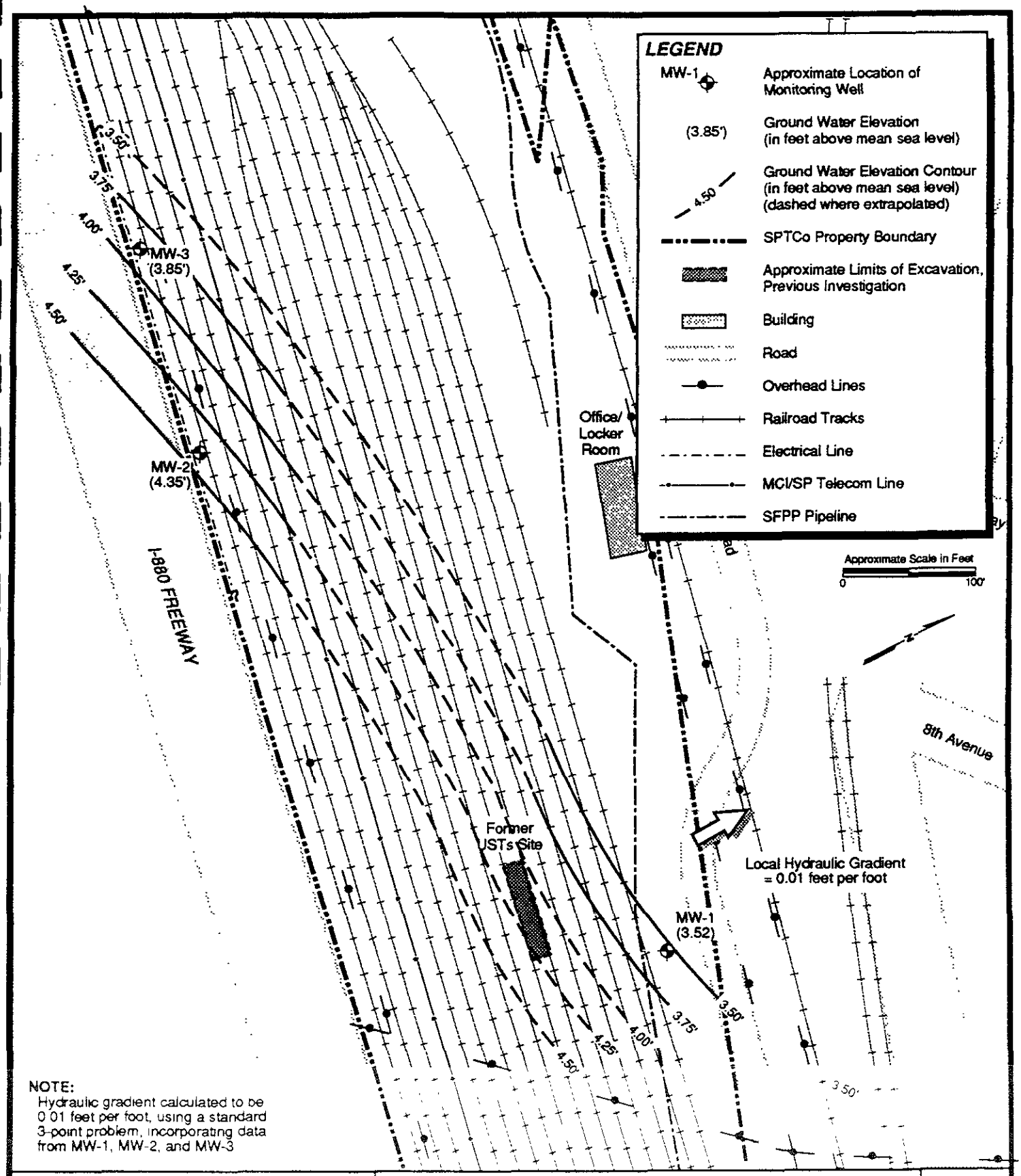
# TABLE 1 (continued)
# SUMMARY OF GROUND WATER ANALYTICAL RESULTS

| | |
|---|---|
| **a** | Analyzed by EPA Method 8015 Modified (April 1994 samples analyzed by EPA Method 8260). |
| **b** | Analyzed by EPA method 8015 Modified (April 1994 samples analyzed by EPA Method 8270). |
| **c** | Analyzed by EPA Method 8020 (April 1994 samples analyzed by EPA Method 8270). |
| **d** | Sodium chloride concentrations determined by calculation, after analyzing for sodium and chloride separately. |
| **e** | Total dissolved solids analyzed by EPA Method 160.1 |
| **f** | MW-1 was not sampled on February 16, 1995, due to inaccessibility resulting from construction activities. |
| **g** | Value may be falsely elevated due to sample matrix interference. |
| **h** | As a result of high sediment content, the 8015 Modified extraction process was suspect and results may be falsely low due to matrix interference. The sample was not speciated as separate diesel or motor oil range hydrocarbons. |
| **i** | Quantification over extended diesel range ($C_{12}$ to $C_{36}$) rather than standard motor oil range ($C_{18}$ to $C_{26}$). |
| **j** | California Department of Health Services (DHS) Maximum Contaminant Levels (MCLs) for drinking water (California Regional Water Quality Control Board [Regional Board], July, 1995, Compilation of Water Quality Goals). |
| **k** | California DHS secondary (recommended) MCL for drinking water (California Regional Board, July, 1995, Compilation of Water Quality Goals). |
| **TEPH** | Total extractable petroleum hydrocarbons |
| **NA** | Not analyzed |
| **NE** | No MCL established. |
| **NS** | Not sampled. |
| **mg/L** | Milligrams per liter |
| **µg/L** | Micrograms per liter |
| **<** | Indicates the constituent was not detected at or above the reporting or method detection limit as listed. |

# ATTACHMENT C

# GROUND WATER ELEVATION CONTOUR MAPS




NOTE:
Hydraulic gradient calculated to be 0 01 feet per foot, using a standard 3-point problem, incorporating data from MW-1, MW-2, and MW-3

Industrial Compliance
A Subsidiary of SP Environmental Systems, Inc.

| | | | |
|---|---|---|---|
| Project No.: | 05100269 | Date | 08/01/94 |
| Drawn By | Patti Decker | Checked By | James G. Jensen |

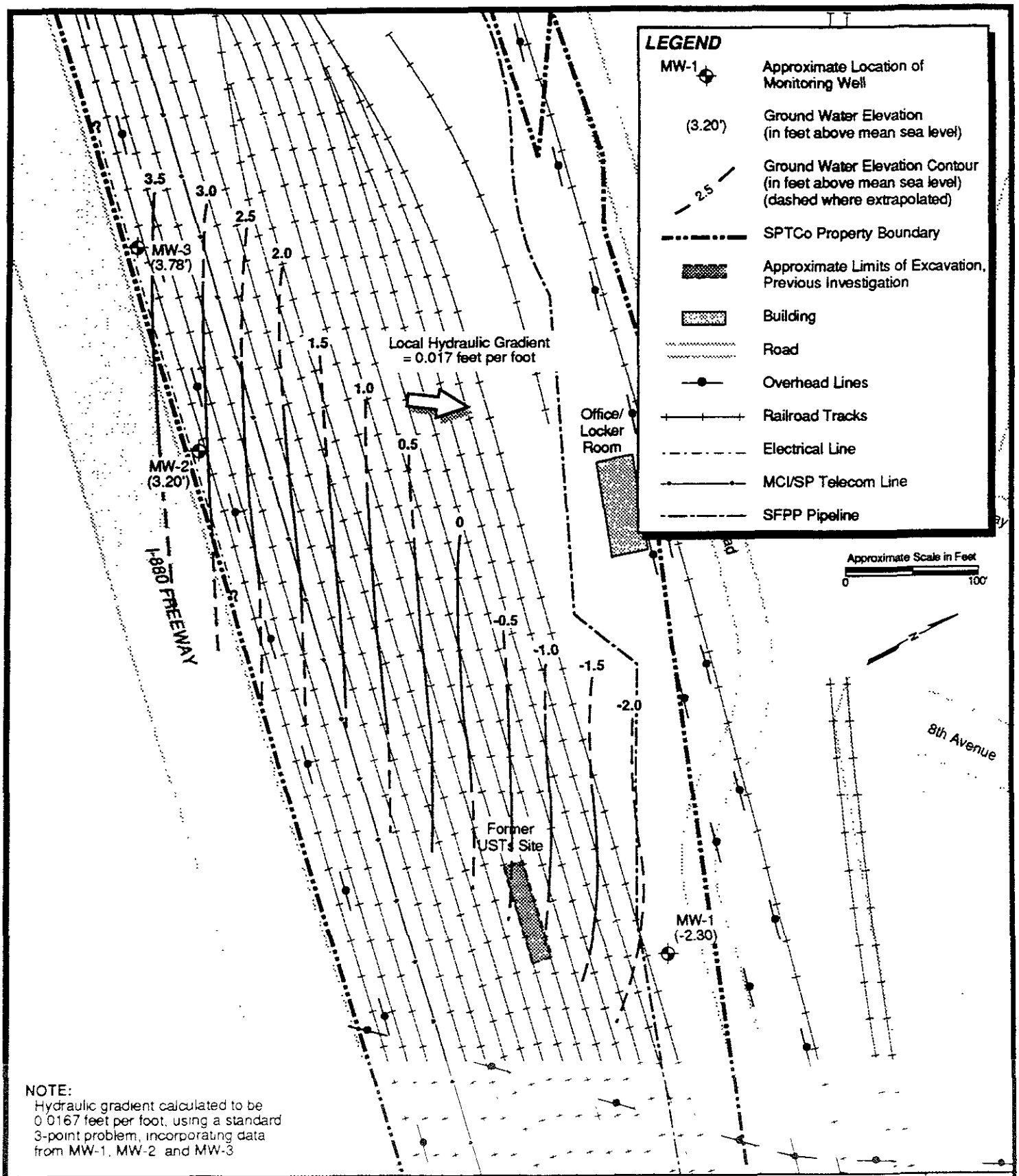
# CONTOUR MAP OF GROUND WATER ELEVATIONS WITH HYDRAULIC GRADIENT, APRIL, 1994 SOUTHERN PACIFIC TRANSPORTATION COMPANY 5TH AVENUE AND 7TH STREET PROPERTY OAKLAND, CALIFORNIA

Figure 8

Page No. 28

Scale as shown

Oak-269/SI 0894/F 08 #200




NOTE:
Hydraulic gradient calculated to be 0 0167 feet per foot, using a standard 3-point problem, incorporating data from MW-1, MW-2 and MW-3

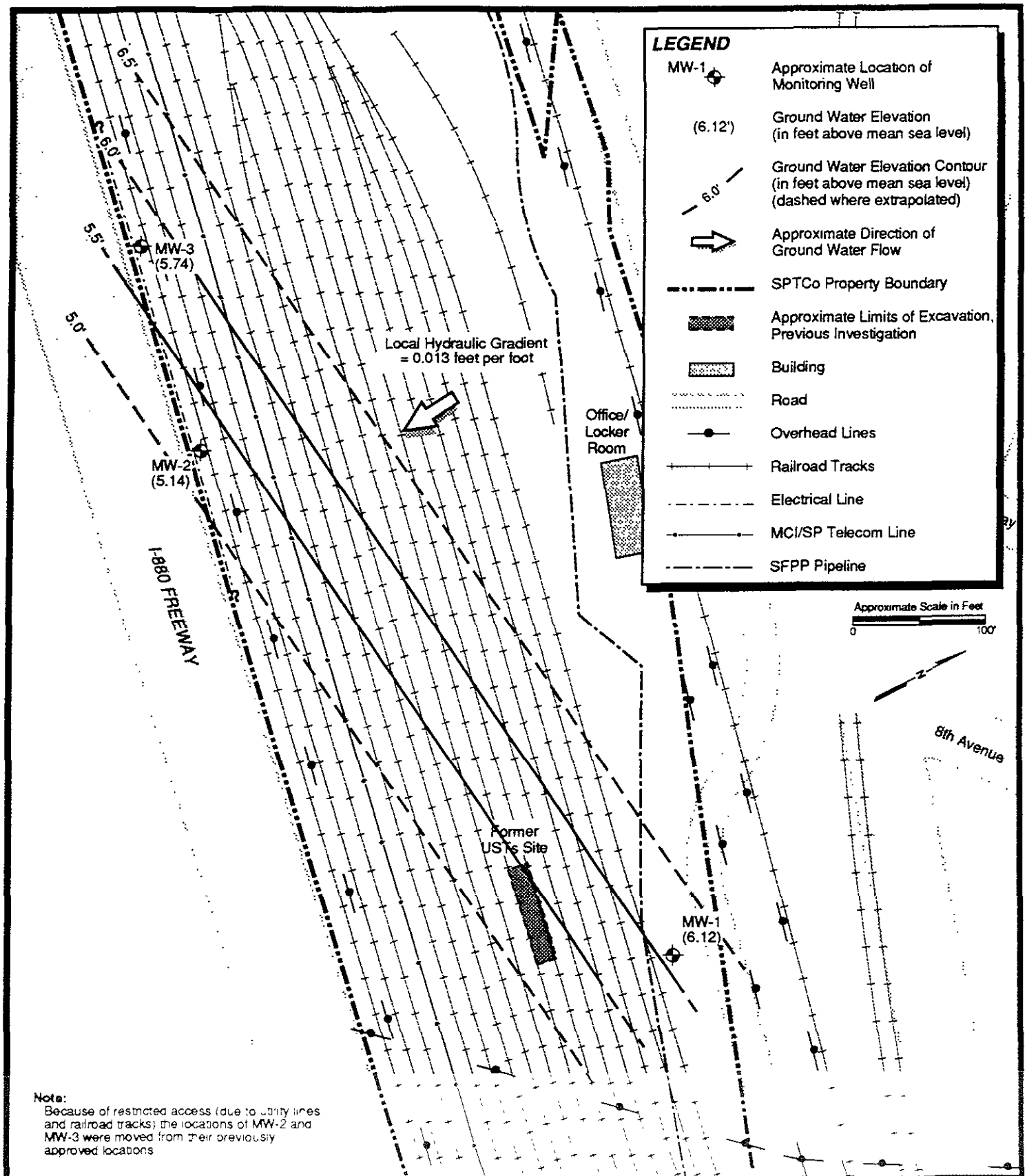
Industrial Compliance
A Subsidiary of SP Environmental Systems Inc

CONTOUR MAP OF GROUND WATER ELEVATIONS
AUGUST, 1994
SOUTHERN PACIFIC TRANSPORTATION COMPANY
5TH AVENUE AND 7TH STREET PROPERTY
OAKLAND, CALIFORNIA

| | | | |
|---|---|---|---|
| Project No | 05100269 | Date | 12/01/94 |
| Drawn By | Patti Decker | Checked By | James Ackerman |

Figure 4
Page No 9
Scale as shown

Oak 269-Q394GW F 04 #300




Note:
Because of restricted access (due to utility lines and railroad tracks) the locations of MW-2 and MW-3 were moved from their previously approved locations

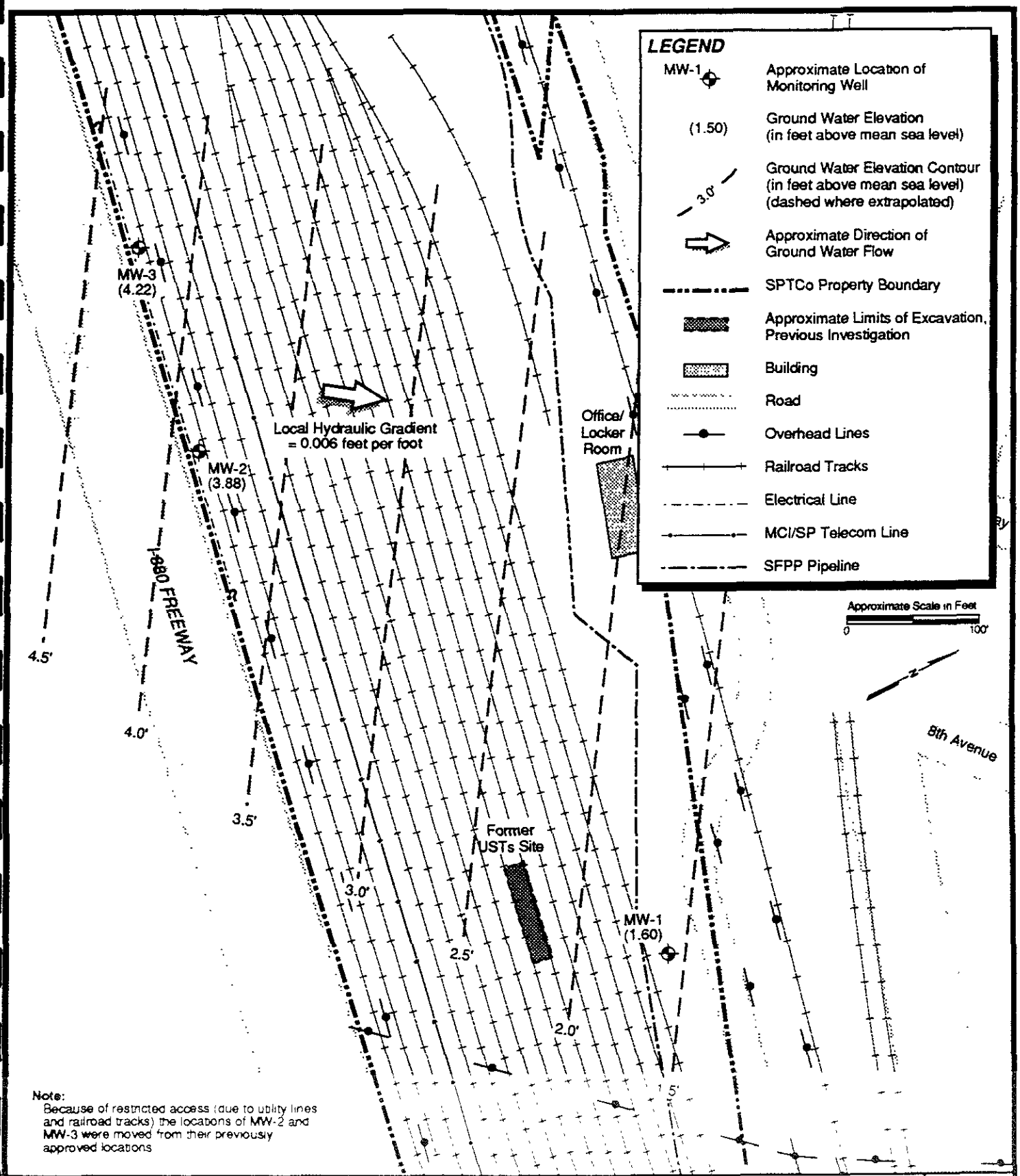
Industrial Compliance
A Subsidiary of SP Environmental Systems, Inc

# CONTOUR MAP OF GROUND WATER ELEVATION NOVEMBER, 1994 SOUTHERN PACIFIC TRANSPORTATION COMPANY 5TH AVENUE AND 7TH STREET PROPERTY OAKLAND, CALIFORNIA

| | |
|---|---|
| Project No. 05100269 | Date 02/13/95 |
| Drawn By Patti Decker | Checked By Richard Bateman |

Figure 4
Page No 9
Scale as shown

Oak 269/Q494GW/F 04 #300




Note:
Because of restricted access (due to utility lines and railroad tracks) the locations of MW-2 and MW-3 were moved from their previously approved locations

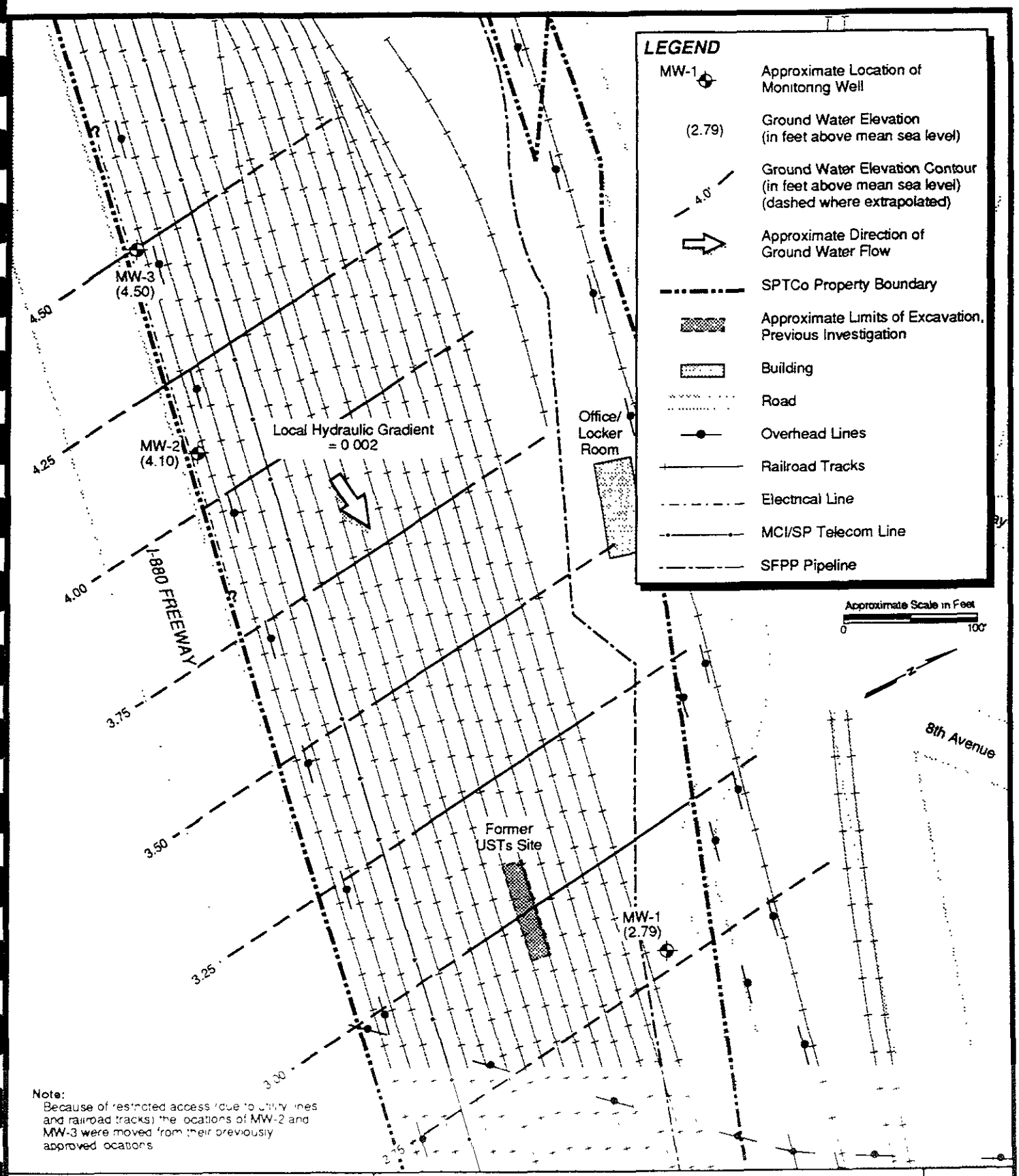
Industrial Compliance
A Subsidiary of SP Environmental Systems, Inc

| | |
|---|---|
| Project No.: 05100269 | Date: 04/21/95 |
| Drawn By: Patti Decker | Checked By: Richard Bateman |

# CONTOUR MAP OF GROUND WATER ELEVATION FEBRUARY, 1995 SOUTHERN PACIFIC TRANSPORTATION COMPANY 5TH AVENUE AND 7TH STREET PROPERTY OAKLAND, CALIFORNIA

Figure 3
Page No 8
Scale as shown

Oak-269/O195GW/F 03 #300




Note:
Because of restricted access (due to utility lines and railroad tracks) the locations of MW-2 and MW-3 were moved from their previously approved locations

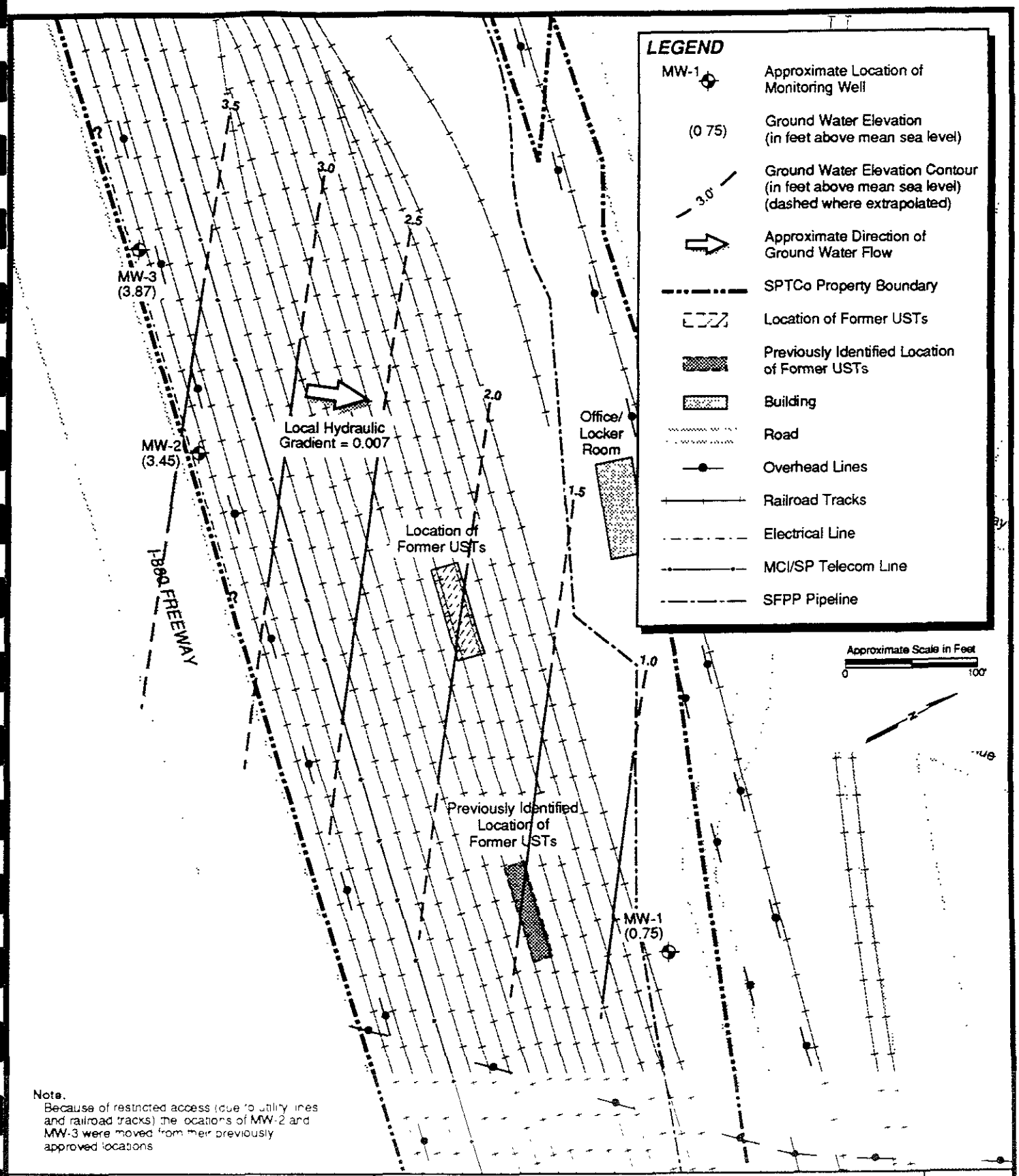
Industrial Compliance
A Subsidiary of SP Environmental Systems, Inc

| | | | |
|---|---|---|---|
| Project No. | 05100269 | Date | 06/28/95 |
| Drawn By | Patti Decker | Checked By | Richard Bateman |

# CONTOUR MAP OF GROUND WATER ELEVATION MAY, 1995 SOUTHERN PACIFIC TRANSPORTATION COMPANY 5TH AVENUE AND 7TH STREET PROPERTY OAKLAND, CALIFORNIA

Figure 2
Page No. 5
Scale as shown

Oak-269/Q295GW/F 02 #300




Note:
Because of restricted access (due to utility lines and railroad tracks) the locations of MW-2 and MW-3 were moved from their previously approved locations.

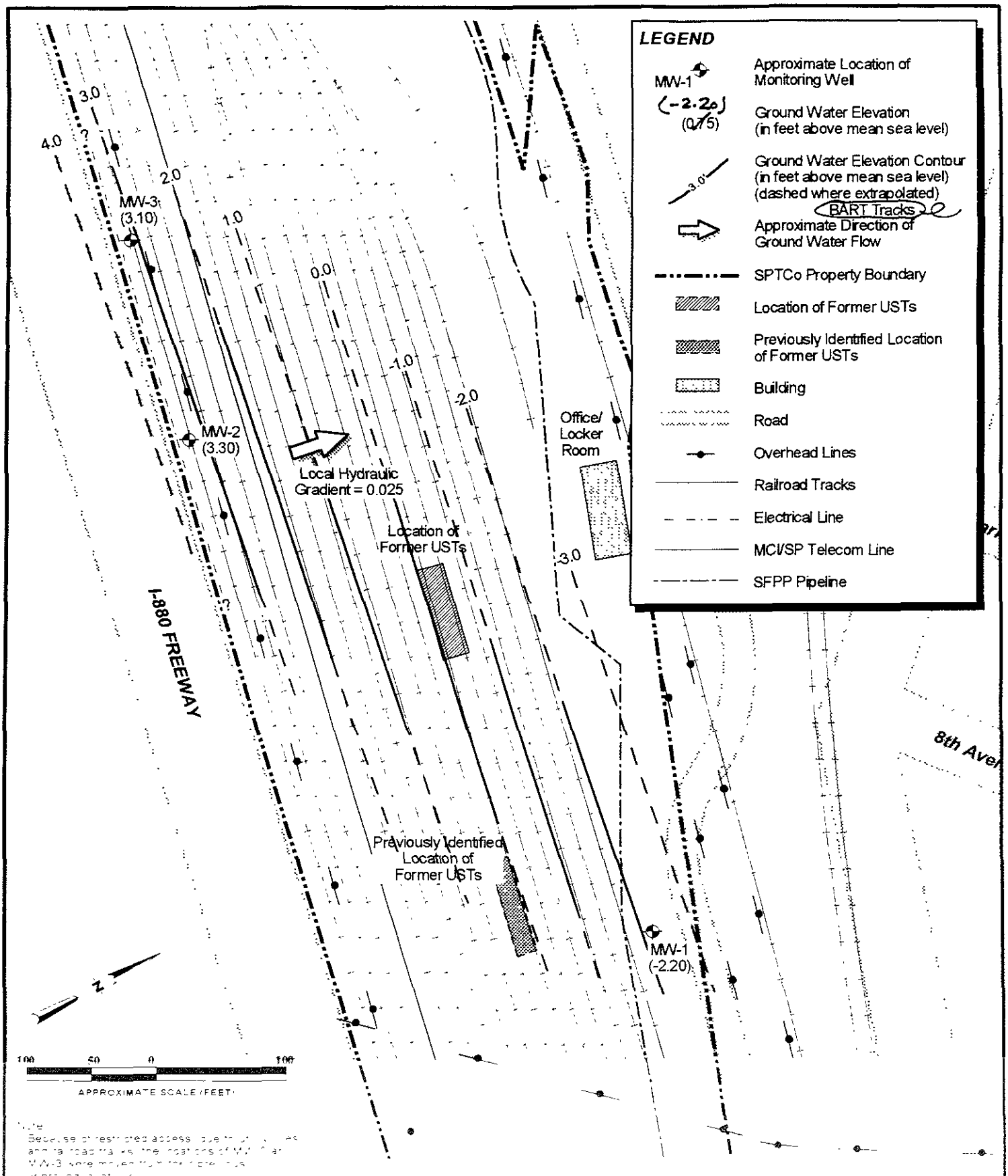
Industrial Compliance
A Subsidiary of SP Environmental Systems, Inc.

# CONTOUR MAP OF GROUND WATER ELEVATION AUGUST, 1995 SOUTHERN PACIFIC TRANSPORTATION COMPANY 5TH AVENUE AND 7TH STREET PROPERTY OAKLAND, CALIFORNIA

| | | | |
|---|---|---|---|
| Project No | 05100269 | Date | 09/26/95 |
| Drawn By | Patti Decker | Checked By | Richard Bateman |

Figure 2
Page No 5
Scale as shown

Oak 269/0395GW/F 02 #300




Note
Because of restricted access due to [illegible] as annual road maps, the positions of MW-3 and MW-3 were measured by tape and compass from approximate locations.

| | |
|---|---|
| Project # 05100269 | Figure # |
| Scale As Above | Page # |
| File # Q4GWF02 | Drawn By Patti Decker |
| Date 01/26/96 | Approved By Richard Bateman |

# CONTOUR MAP OF GROUND WATER ELEVATION

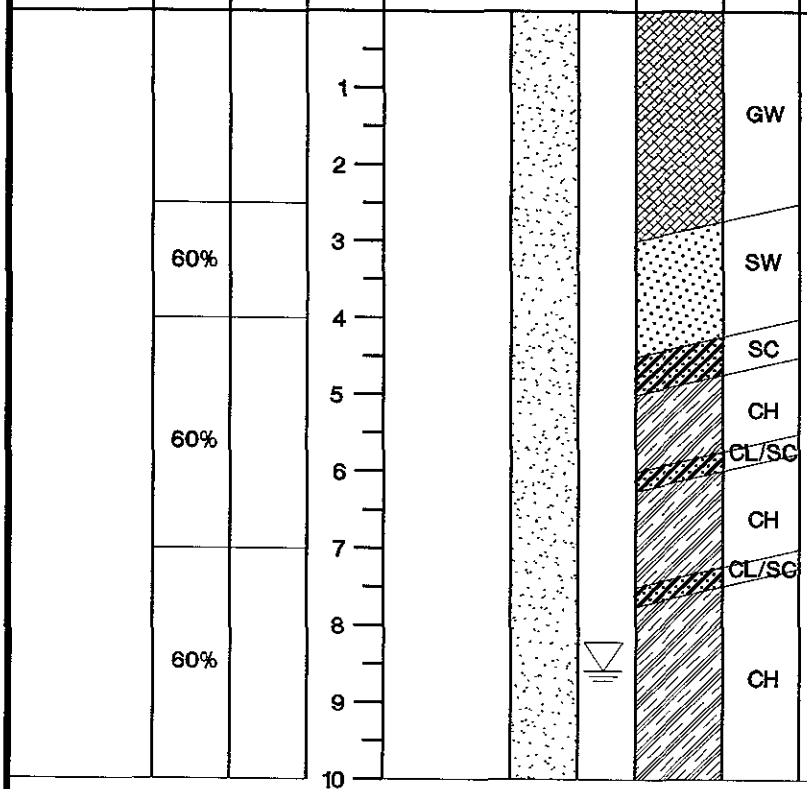
DECEMBER 1995
SOUTHERN PACIFIC TRANSPORTATION COMPANY
5TH AVENUE AND 7TH STREET PROPERTY
OAKLAND, CALIFORNIA

# ATTACHMENT D

## BORING LOGS FOR GROUND WATER GRAB SAMPLE LOCATIONS

# Boring Log

| | | | |
|---|---|---|---|
| **Boring Location:** East Oakland Yard | | **Boring Name:** | GWS-1 |
| **Drilling Company:** Precision | | **Project Name:** | 5th Ave. & 7th St. |
| **Drilling Method:** Direct Push | **Rig Type:** XD-1 | **Project Number:** | 05100269 |
| **Hole Diameter:** 2.5-inches | **Driller:** S. Onorato / **Date:** 11/17/95 | **Logged By:** | James Ackerman |
| **Ground Elevation:** Not Measured | **Water Depth:** 8.62 feet bgs | **Total Depth:** | 10.0 feet bgs |



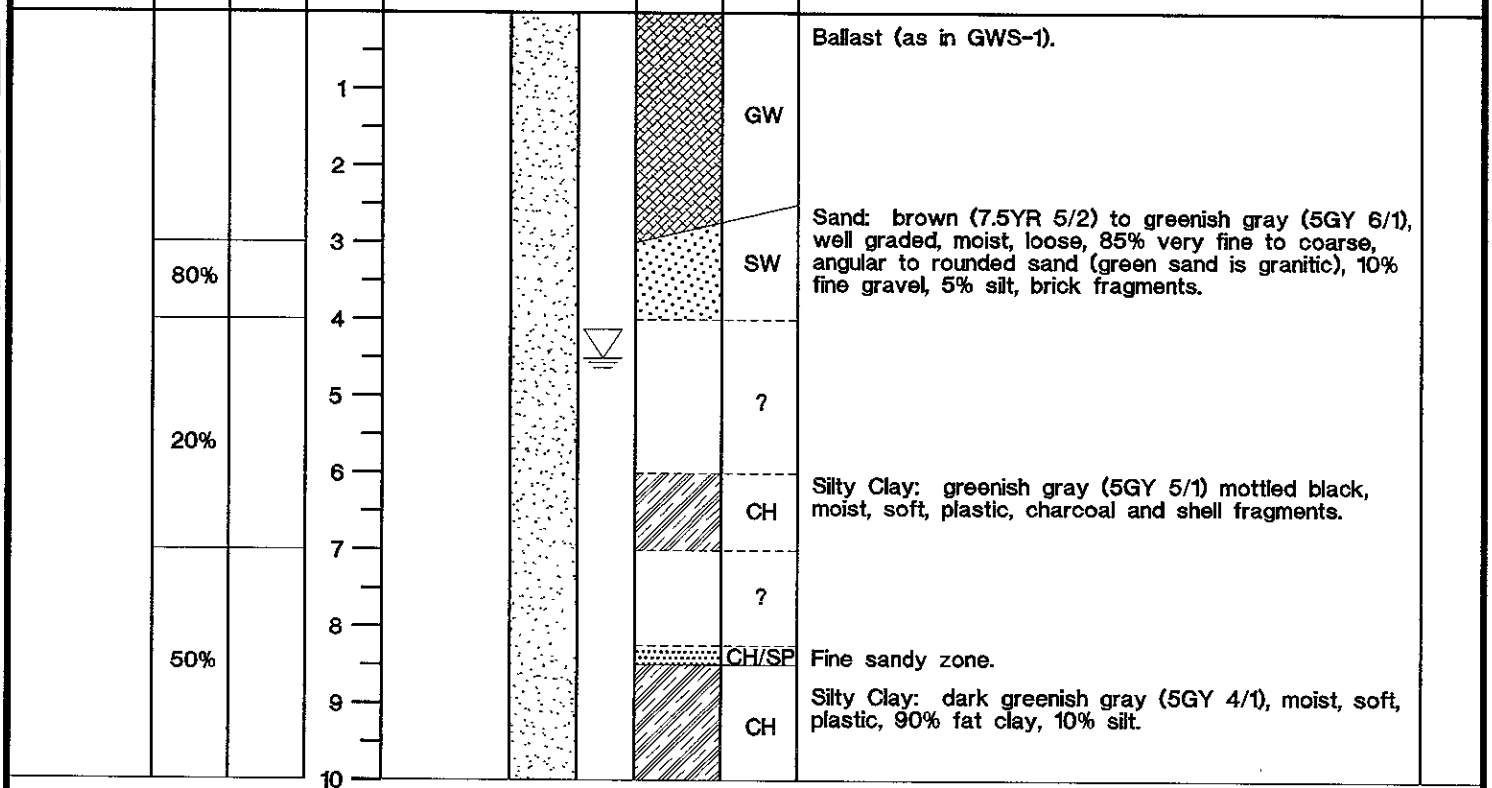

| Sample Description | FID/PID (ppm) |
|---|---|
| Ballast: light geenish gray (5GY 7/1), well sorted gravel, dry, loose, 100% medium to coarse up to 2" diameter, angular to subrounded gravel. | |
| Sand: very dark gray (2.5N 3/), well graded, moist, medium dense, 75% subangular to well rounded, fine to coarse sand, 15% subangular to rounded, fine to medium gravel, 10% clay, glass fragments. | 0.0 |
| See note. | 0.0 |
| Clay: greenish gray (5GY 5/1), mottled black, fat clay, moist, soft, plastic, 80% clay, 20% silt. | 0.0 |
| 2" fine clay sand lense. | |
| Clay: as above, charcoal and rock fragments. | |
| 4" sandy clay lense. | |
| Clay: dark greenish gray (5GY 4/1), moist, stiff, plastic, 95% fat clay, 5% silt, hydrogen sulfide odor, oxidized organic material. | |

Total Depth 10 feet bgs.
Ground water encountered at 8.62 feet bgs.

Note:
Clayey Sand: ~4 to 4.5 feet, greenish gray (5GY 6/1), moist, loose, 80% very fine to fine, rounded to well rounded sand, 20% clay, black streaks.

# Boring Log

| | | | |
|---|---|---|---|
| **Boring Location:** East Oakland Yard | | | **Boring Name:** GWS-2 |
| **Drilling Company:** Precision | | | **Project Name:** 5th Ave. & 7th St. |
| **Drilling Method:** Direct Push | **Rig Type:** XD-1 | | **Project Number:** 05100269 |
| **Hole Diameter:** 2.5-inches | **Driller:** S. Onorato | **Date:** 11/17/95 | **Logged By:** James Ackerman |
| **Ground Elevation:** Not Measured | **Water Depth:** 4.4 feet bgs | | **Total Depth:** 10.0 feet bgs |




Total Depth 10 feet bgs.
Ground water encountered at 4.4 feet bgs.

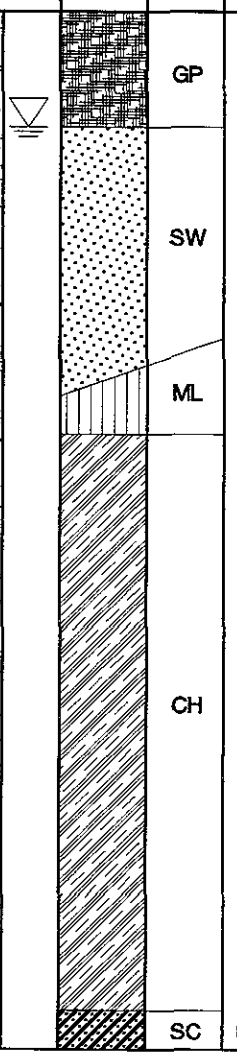
# Boring Log

| | | | | | |
|---|---|---|---|---|---|
| **Boring Location:** | East Oakland Yard | | | **Boring Name:** | GWS-3 |
| **Drilling Company:** | Precision | | | **Project Name:** | 5th Ave. & 7th St. |
| **Drilling Method:** | Direct Push | **Rig Type:** | XD-1 | **Project Number:** | 05100269 |
| **Hole Diameter:** | 2.5-inches | **Driller:** S. Onorato | **Date:** 11/17/95 | **Logged By:** | James Ackerman |
| **Ground Elevation:** | Not Measured | **Water Depth:** | No Water At Time | **Total Depth:** | 10.0 feet bgs |

| Sample Number | Recovery | Blows/ 6-inches | Depth Feet | Boring Detail | Lithology | USCS Log | Sample Description | FID/PID (ppm) |
|---|---|---|---|---|---|---|---|---|
| | 100% | | 0 | | | AC | 6" Asphalt. | |
| | | | 1 | | | BR | 6" Baserock with Sand. | |
| | 30% | | 2 | | | SW | Sand: grayish brown (2.5Y 5/2), well graded, loose, moist, 60% very fine to coarse, angular to well rounded sand, 5% silt, 5% angular to subrounded, fine to coarse gravel (up to 2"). | |
| | | | 3 | | | | | |
| | | | 4 | | | CH/ CL | Sandy Clay: grenish gray (5GY 5/1), moist to wet, soft, loose, 65% fat clay, 35% very fine grained sand, plastic. | |
| | 30% | | 5 | | | | | |
| | | | 6 | | | CL | Silty Clay: olive (5Y 5/3), moist, very stiff, low plasticity, 70% lean clay, 30% silt. | |
| | | | 7 | | | | | |
| | 60% | | 8 | | | SC | Clayey Sand: light yellowish brown (2.5Y 6/4), wet, medium dense, 75% fine to coarse, subangular to rounded sand, 15% lean clay, 10% fine subrounded to well rounded gravel. | |
| | | | 9 | | | CH | Silty Clay: light yellowish brown (2.5Y 6/4), greenish gray (5GY 5/1), soft, moist, 80% fat, plastic clay, 20% silt. | |
| | | | 10 | | | | Total Depth 10 feet bgs. | |

# Boring Log

| | | | |
|---|---|---|---|
| **Boring Location:** East Oakland Yard | | **Boring Name:** | GWS-4 |
| **Drilling Company:** Precision | | **Project Name:** | 5th Ave. & 7th St. |
| **Drilling Method:** Direct Push | **Rig Type:** XD-1 | **Project Number:** | 05100269 |
| **Hole Diameter:** 2.5-inches | **Driller:** Mark Mazza / **Date:** 3/14/96 | **Logged By:** | James Ackerman |
| **Ground Elevation:** Not Measured | **Water Depth:** 1.5 feet bgs | **Total Depth:** | 13.5 feet bgs |



| Sample Number | Recovery | Blows/ 6-inches | Depth Feet | USCS Log | Sample Description | FID/PID (ppm) |
|---|---|---|---|---|---|---|
| | | | 1 | GP | Ballast (as in GWS-1). | |
| | | | 2 | | | |
| | | | 3 | SW | Sand: very dark gray (5Y 3/1), well graded sand, loose, moist, 65% medium to coarse, angular to rounded sand, 25% angular to rounded, fine to coarse gravel. | |
| | 5% | | 4 | | | |
| | | | 5 | ML | Clay: greenish gray (5GY 6/1) with black laminations, lean silt, moist, stiff, 70% silt, 30% clay. | |
| | 80% | | 6 | | Clay: greenish gray (5GY 6/1), moist, soft, 100% fat clay, abundant shell fragments, hydrogen sulfide odor, medium sand zones. | |
| | | | 7 | | | |
| | | | 8 | | | |
| | 80% | | 9 | CH | Clay: as above, no shell fragments, no sand. | |
| | | | 10 | | | |
| | | | 11 | | | |
| | 95% | | 12 | | Clay: as above, oxidized organic matter. | |
| | | | 13 | SC | Clayey Sand: greenish gray (5GY 5/1), moist, medium dense, 70% very fine to medium, round to well rounded sand, 30% clay, abundant shell fragments. | |

Total Depth 13.5 feet bgs.
Ground water encountered at 1.5 feet bgs.

# ATTACHMENT E

# CHAIN-OF-CUSTODY FORMS AND LABORATORY DATA SHEETS FOR GROUND WATER GRAB SAMPLES

SIT291

# CHAIN-OF-CUSTODY RECORD

P.O. Box 24374 Oakland CA 94623-1374

No. 20845

INDUSTRIAL COMPLIANCE • ~~9838 OLD PLACERVILLE ROAD, SUITE 100~~ • ~~SACRAMENTO, CA 95827-9559~~ • ~~510-238-9540~~ ~~510-238-9475~~ Phone ~~916-369-8971~~ • FAX ~~916-369-8370~~

| | |
|---|---|
| PROJECT NAME: 5TH AVE & 7TH ST | PROJECT LOCATION: EAST OAKLAND |
| PROJ NO: 51002.69 | PROJECT CONTACT: JAMES ACKERMAN |
| PROJECT TELEPHONE NO.: (510) 238-9540 | |
| CLIENT'S REPRESENTATIVE: MIKE GRANT | PROJECT MANAGER/SUPERVISOR: CARL TAYLOR |

| ITEM NO. | SAMPLE NUMBER | DATE | TIME | COMP | GRAB | SAMPLE LOCATION (INCLUDE MATRIX AND POINT OF SAMPLE) | NUMBER OF CONTAINERS | ANALYSIS DESIRED (INDICATE SEPARATE CONTAINERS) 8015 Simulated Distillation/JBA 8020 BTEX | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 1 | GWS-1 | 11-17 | 1205 | | X | GROUND WATER SAMPLE WITHIN EAST OAKLAND YARD | 3 | X X | RUN ON RUSH T.A.T.* |
| 2 | GWS-2 | 11-17 | 1215 | | X | ↓ | 3 | X X | |
| 3 | | | | | | | | | |
| 4 | | | | | | | | | |
| 5 | | | | | | | | | |
| 6 | | | | | | | | | |
| 7 | | | | | | | | | |
| 8 | | | | | | | | | |
| 9 | | | | | | | | | |
| 10 | | | | | | | | | |

| TRANSFER NUMBER | ITEM NUMBER | TRANSFERS RELINQUISHED BY | TRANSFERS ACCEPTED BY | DATE | TIME |
|---|---|---|---|---|---|
| 1 | 6 | James Ackerman | | 11/20/ | 9:15 |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |

REMARKS

* RUN FIRST SAMPLE ON RUSH T.A.T. (48 hrs). HOLD ~~P.O.~~ JBA OTHER SAMPLES FOR EXTRACTION PENDING RESULTS OF FIRST SAMPLE RUN

~~P.O.~~ JBA

SAMPLER'S NAME: JAMES ACKERMAN

SAMPLER'S SIGNATURE: James Ackerman

TRANSFER 3

ACCESSION #: 511291 INITIALS: LM

# ATI-SanDiego
## SAMPLE CONDITION UPON RECEIPT CHECKLIST
## (FOR RE-ACCESSIONS, COMPLETE #7 THRU #9)

| | | | |
|---|---|---|---|
| 1 | Does this project require special handling according to NFESC Levels C, D, AFCEE or CLP protocols?<br>If yes, complete a) and b)<br>a) pH sample aliquoted: yes /no /na<br>b) Either 1) Record Bottle Lot #'s:<br>Or 2) Attach Sample Kit Request Form(s) | YES | NO |
| 2 | Number of Coolers Received<br>If more than one cooler received attach Multiple Cooler Documentation Form (MCD)<br>Indicate "see MCD" on Item 11 below | 1 | |
| 3 | Are custody seals required for this project ? | YES | N/A |
| | a) are Custody Seals present on Cooler(s) ? | YES | NO |
| | If yes, are seals intact ? | YES | NO |
| | b) are Custody Seals present on the sample ? | YES | NO |
| | If yes, are seals intact ? | YES | NO |
| 4 | Is there a Chain-Of-Custody (COC)* per cooler ?<br>if not, if a problem is found indicate which samples/test were in the affected cooler on the MCD. | YES | NO |
| 5 | Is the COC* complete per cooler ?<br>Relinquished: yes/no Requested analysis: yes/no | YES | NO |
| 6 | Is the COC* in agreement with the samples received?<br># Samples: yes/no Sample ID's: yes/no Date sampled: yes/no<br>Matrix: yes/no # containers: yes/no | YES | NO |
| 7 | Are the samples preserved correctly? | YES | NO |
| 8 | Is there enough sample for all the requested analyses? | YES | NO |
| 9 | Are all samples within holding times for the requested analyses? | YES | NO |
| 10 | Record cooler temperature. Contact PM if temperature is not 4°C ± 2°C. | 2.6 °C | |
| | Is ice present in cooler? | YES | NO |
| 11 | Were all sample containers received intact (ie. not broken, leaking, etc.)? | YES | NO |
| 12 | Are samples requiring no headspace, headspace free? N/A | YES | NO |
| 13 | Are VOA 1st stickers required? | YES | NO |
| 14 | Are there special comments on the Chain of Custody which require client contact? | YES | N/A |
| 15 | If yes, was ATI Project Manager notified? | YES | NO |

Describe "no" items: * Samples for 6015 analysis preserved with HCl in lab.

Was client contacted? yes / no

If yes, Date: _____ Name of Person contacted:

Describe actions taken or client instructions:

*Or other representative documents, letters, and/or shipping memos

Analytical**Technologies,** Inc. Corporate Offices 5550 Morehouse Drive San Diego, CA 92121 (619) 458-9141

ATI I.D.: 511291

ecember 01, 1995

DUSTRIAL COMPLIANCE
57 5TH STREET
OAKLAND, CA 94607

roject Name: 5TH AVE. & 7TH ST.
roject # : 05100269

ttention: JAMES ACKERMAN

nalytical Technologies, Inc. has received the following sample(s):

| Date Received | Quantity | Matrix |
|---|---|---|
| November 20, 1995 | 2 | WATER |

e sample(s) were analyzed with EPA methodology or equivalent methods as specified in the closed analytical schedule. The symbol for "less than" indicates a value below the reportable detection limit. If any flags appear next to the analytical data in this report, please see the attached list of flag definitions.

The results of these analyses and the quality control data are enclosed. Please note that the Sample Condition Upon Receipt Checklist is included at the end of this report.

N FREED
PROJECT MANAGER

ALAN J. KLEINSCHMIDT
LABORATORY MANAGER

SAMPLE CROSS REFERENCE



Client : INDUSTRIAL COMPLIANCE
Project # : 05100269
Project Name: 5TH AVE. & 7TH ST.

Report Date: December 01, 1995
ATI I.D. : 511291

| ATI # | Client Description | Matrix | Date Collected |
|---|---|---|---|
| | GWS-1 | WATER | 17-NOV-95 |
| | GWS-2 | WATER | 17-NOV-95 |

---TOTALS---

| Matrix | # Samples |
|---|---|
| WATER | 2 |

ATI STANDARD DISPOSAL PRACTICE

The sample(s) from this project will be disposed of in twenty-one (21) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

ANALYTICAL SCHEDULE



Client : INDUSTRIAL COMPLIANCE
Project # : 05100269 ATI I.D.: 511291
Project Name: 5TH AVE. & 7TH ST.

| Analysis | Technique/Description |
|---|---|
| EPA 8020 (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) | GC/PHOTO IONIZATION DETECTOR |
| MOD EPA 8015-CDOHS (FUEL HYDROCARBONS-EXT. RANGE) | GC/FLAME IONIZATION DETECTOR |
| MOD EPA 8015-CHOHS (SIMULATED DISTILLATION) | GC/FLAME IONIZATION DETECTOR |

GAS CHROMATOGRAPHY RESULTS



Test : EPA 8020 (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES)
Client : INDUSTRIAL COMPLIANCE ATI I.D. : 511291
Project # : 05100269
Project Name: 5TH AVE. & 7TH ST.

| Sample # | Client ID | Matrix | Date Sampled | Date Extracted | Date Analyzed | Dil. Factor |
|---|---|---|---|---|---|---|
| 1 | GWS-1 | WATER | 17-NOV-95 | N/A | 20-NOV-95 | 1.00 |
| 2 | GWS-2 | WATER | 17-NOV-95 | N/A | 20-NOV-95 | 1.00 |

| Parameter | Units | 1 | 2 |
|---|---|---|---|
| BENZENE | UG/L | <0.50 | <0.50 |
| TOLUENE | UG/L | <0.50 | <0.50 |
| ETHYLBENZENE | UG/L | <0.50 | <0.50 |
| XYLENES (TOTAL) | UG/L | 1.3@E | <1.0 |
| SURROGATES | | | |
| TRIFLUOROTOLUENE | % | 99 | 100 |

GAS CHROMATOGRAPHY - QUALITY CONTROL

REAGENT BLANK



Test : EPA 8020 (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) ATI I.D. : 511291
Blank I.D. : 37407 Date Extracted: N/A
Client : INDUSTRIAL COMPLIANCE Date Analyzed : 20-NOV-95
Project # : 05100269 Dil. Factor : 1.00
Project Name: 5TH AVE. & 7TH ST.

| Parameters | Units | Results |
|---|---|---|
| BENZENE | UG/L | <0.50 |
| TOLUENE | UG/L | <0.50 |
| ETHYLBENZENE | UG/L | <0.50 |
| XYLENES (TOTAL) | UG/L | <1.0 |
| SURROGATES | | |
| TRIFLUOROTOLUENE | % | 97 |

GAS CHROMATOGRAPHY - QUALITY CONTROL

MSMSD



Test : EPA 8020 (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) ATI I.D. : 511291
MSMSD # : 80085 Date Extracted: N/A
Client : INDUSTRIAL COMPLIANCE Date Analyzed : 14-NOV-95
Sample Matrix : WATER
Project # : 05100269 REF I.D. : 511182-01
Project Name: 5TH AVE. & 7TH ST.

| Parameters | Units | Sample Result | Conc Spike | Spiked Sample | % Rec | Dup Spike | Dup % Rec | RPD |
|---|---|---|---|---|---|---|---|---|
| BENZENE | UG/L | <0.50 | 5.0 | 5.0 | 100 | 5.2 | 104 | 4 |
| TOLUENE | UG/L | 3.6 | 5.0 | 7.9 | 86 | 8.1 | 90 | 3 |

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Spiked Sample Result - Duplicate Spike Result)*100/Average Result

GAS CHROMATOGRAPHY - QUALITY CONTROL

BLANK SPIKE



Test : EPA 8020 (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) ATI I.D. : 511291
Blank Spike #: 60156 Date Extracted: N/A
Client : INDUSTRIAL COMPLIANCE Date Analyzed : 20-NOV-95
Project # : 05100269 Sample Matrix : WATER
Project Name : 5TH AVE. & 7TH ST.

| Parameters | Units | Blank Result | Spiked Sample | Spike Conc. | % Rec |
|---|---|---|---|---|---|
| BENZENE | UG/L | <0.50 | 4.9 | 5.0 | 98 |
| TOLUENE | UG/L | <0.50 | 4.9 | 5.0 | 98 |

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Spiked Sample - Blank Result)*100/Average Result

GAS CHROMATOGRAPHY RESULTS



Test : MOD EPA 8015-CDOHS (FUEL HYDROCARBONS-EXT. RANGE)
Client : INDUSTRIAL COMPLIANCE ATI I.D. : 511291
Project # : 05100269
Project Name: 5TH AVE. & 7TH ST.,

| Sample # | Client ID | Matrix | Date Sampled | Date Extracted | Date Analyzed | Dil. Factor |
|---|---|---|---|---|---|---|
| 1 | GWS-1 | WATER | 17-NOV-95 | 21-NOV-95 | 21-NOV-95 | 1.00 |
| 2 | GWS-2 | WATER | 17-NOV-95 | 29-NOV-95 | 30-NOV-95 | 1.00 |

| Parameter | Units | 1 | 2 |
|---|---|---|---|
| FUEL HYDROCARBONS | MG/L | 2.5 | 3.1 |
| HYDROCARBON RANGE | | C25-C36 | C25-C36 |
| HYDROCARBONS QUANTITATED USING | | 30W | 30W |

GAS CHROMATOGRAPHY RESULTS



Test : MOD EPA 8015-CHOHS (SIMULATED DISTILLATION)
Client : INDUSTRIAL COMPLIANCE ATI I.D. : 511291
Project # : 05100269
Project Name: 5TH AVE. & 7TH ST.

| Sample # | Client ID | Matrix | Date Sampled | Date Extracted | Date Analyzed | Dil. Factor |
|---|---|---|---|---|---|---|
| 1 | GWS-1 | WATER | 17-NOV-95 | 21-NOV-95 | 21-NOV-95 | 1.00 |
| 2 | GWS-2 | WATER | 17-NOV-95 | 29-NOV-95 | 30-NOV-95 | 1.00 |

| Parameter | Units | 1 | 2 |
|---|---|---|---|
| FUEL HYDROCARBONS | MG/L | 9.0 | 8.4 |
| HYDROCARBON RANGE | | C9-C24+ | C11-C24+ |
| HYDROCARBONS QUANTITATED USING | | DIESEL | DIESEL |
| SURROGATES | | | |
| BIS(2-ETHYLHEXYL) PHTHALATE | % | 112 | 75 |

GAS CHROMATOGRAPHY - QUALITY CONTROL

REAGENT BLANK



Test : MOD EPA 8015-CDOHS (FUEL HYDROCARBONS)
Blank I.D. : 37427
Client : INDUSTRIAL COMPLIANCE
Project # : 05100269
Project Name: 5TH AVE. & 7TH ST.

ATI I.D. : 511291
Date Extracted: 21-NOV-95
Date Analyzed : 21-NOV-95
Dil. Factor : 1.00

| Parameters | Units | Results |
|---|---|---|
| FUEL HYDROCARBONS | MG/L | <0.05 |
| HYDROCARBON RANGE | | - |
| HYDROCARBONS QUANTITATED USING | | - |
| SURROGATES | | |
| BIS(2-ETHYLHEXYL)PHTHALATE | % | 107 |

GAS CHROMATOGRAPHY - QUALITY CONTROL

REAGENT BLANK



Test : MOD EPA 8015-CDOHS (FUEL HYDROCARBONS)
Blank I.D. : 37485
Client : INDUSTRIAL COMPLIANCE
Project # : 05100269
Project Name: 5TH AVE. & 7TH ST.

ATI I.D. : 511291
Date Extracted: 29-NOV-95
Date Analyzed : 30-NOV-95
Dil. Factor : 1.00

| Parameters | Units | Results |
|---|---|---|
| FUEL HYDROCARBONS | MG/L | <0.05 |
| HYDROCARBON RANGE | | - |
| HYDROCARBONS QUANTITATED USING | | - |
| SURROGATES | | |
| BIS(2-ETHYLHEXYL) PHTHALATE | % | 94 |

GAS CHROMATOGRAPHY - QUALITY CONTROL

MSMSD



Test : MOD EPA 8015-CDOHS (FUEL HYDROCARBONS)
MSMSD # : 80203
Client : INDUSTRIAL COMPLIANCE

Project # : 05100269
Project Name: 5TH AVE. & 7TH ST.

ATI I.D. : 511291
Date Extracted: 21-NOV-95
Date Analyzed : 21-NOV-95
Sample Matrix : WATER
REF I.D. : REAGENT WATER

| Parameters | Units | Sample Result | Conc Spike | Spiked Sample | % Rec | Dup Spike | Dup % Rec | RPD |
|---|---|---|---|---|---|---|---|---|
| FUEL HYDROCARBONS | MG/L | <0.050 | 1.0 | 0.93 | 93 | 0.99 | 99 | 6 |

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Spiked Sample Result - Duplicate Spike Result)*100/Average Result

GAS CHROMATOGRAPHY - QUALITY CONTROL

MSMSD



Test : MOD EPA 8015-CDOHS (FUEL HYDROCARBONS)
MSMSD # : 80331
Client : INDUSTRIAL COMPLIANCE

Project # : 05100269
Project Name: 5TH AVE. & 7TH ST.

ATI I.D. : 511291
Date Extracted: 29-NOV-95
Date Analyzed : 30-NOV-95
Sample Matrix : WATER
REF I.D. : REAGENT WATER

| Parameters | Units | Sample Result | Conc Spike | Spiked Sample | % Rec | Dup Spike | Dup % Rec | RPD |
|---|---|---|---|---|---|---|---|---|
| FUEL HYDROCARBONS | MG/L | <0.050 | 1.0 | 1.0 | 100 | 0.96 | 96 | 4 |

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Spiked Sample Result - Duplicate Spike Result)*100/Average Result

ANALYTICAL TECHNOLOGIES, INC.
SAN DIEGO
FLAGS

ORGANICS

| FLAG | MESSAGE DESCRIPTION |
|---|---|
| A | A TIC IS A SUSPECTED ALDOL-CONDENSATION PRODUCT |
| B | ANALYTE FOUND IN THE ASSOCIATED REAGENT BLANK |
| C | PESTICIDE, WHERE THE IDENTIFICATION WAS CONFIRMED BY GC/MS |
| CO | THESE COMPOUNDS CO-ELUTE AND ARE QUANTITATED AS ONE PEAK |
| D | COMPOUND IDENTIFIED IN AN ANALYSIS AT SECONDARY DILUTION |
| E | ANALYTE AMOUNT EXCEEDS THE CALIBRATION RANGE |
| J | ESTIMATED VALUE |
| H | QUANTIFIED AS DIESEL BUT CHROMATOGRAPHIC PATTERN DOES NOT MATCH THAT OF DIESEL |
| K | QUANTIFIED AS KEROSENE BUT CHROMATOGRAPHIC PATTERN DOES NOT MATCH THAT OF KEROSENE |
| L | QUANTIFIED AS GASOLINE BUT CHROMATOGRAPHIC PATTERN DOES NOT MATCH THAT OF GASOLINE |
| N | PRESUMPTIVE EVIDENCE OF A COMPOUND |
| P | PESTICIDE/AROCLOR TARGET ANALYTE, WHERE THERE IS GREATER THAN 25% DIFFERENCE FOR DETECTED CONCENTRATION BETWEEN 2 GC COLUMNS |
| TR | COMPOUND DETECTED AT AN UNQUANTIFIABLE TRACE LEVEL |
| U | COMPOUND WAS ANALYZED FOR BUT NOT DETECTED |
| X | SEE CASE NARRATIVE |
| Y | SEE CASE NARRATIVE |
| Z | SEE CASE NARRATIVE |
| * | OUTSIDE OF QUALITY CONTROL LIMITS |
| *D | COMPOUND ANALYZED FROM A SECONDARY ANALYSIS |
| *F | RESULT OUTSIDE OF ATI'S QUALITY CONTROL LIMITS |
| *G | RESULT OUTSIDE QUALITY CONTROL LIMITS. INSUFFICIENT SAMPLE FOR RE-EXTRACTION/ANALYSIS |
| *H | RESULT OUTSIDE OF LIMITS DUE TO SAMPLE MATRIX INTERFERENCE |
| *I | BECAUSE OF NECESSARY SAMPLE DILUTION, VALUE WAS OUTSIDE QC LIMITS |
| *K | DUE TO THE NECESSARY DILUTION OF THE SAMPLE, RESULT WAS NOT ATTAINABLE |
| *L | ANALYTE IS A SUSPECTED LAB CONTAMINANT |
| *P | A STANDARD WAS USED TO QUANTITATE THIS VALUE |
| *R | DATA IS NOT USABLE |
| *T | SURROGATE RECOVERY IS OUTSIDE QC CONTROL LIMITS. NO CORRECTIVE ACTION INDICATED BY METHOD |
| *V | SAMPLE RESULT IS >4X SPIKED CONCENTRATION, THEREFORE SPIKE IS NOT DETECTABLE |
| *Y | RESULT NOT ATTAINABLE DUE TO SAMPLE MATRIX INTERFERENCE |
| @A | RESULTS OUT OF LIMITS DUE TO SAMPLE NON-HOMOGENEITY |
| @C | *VARIABLE MESSAGE* |
| @D | RESULT COULD NOT BE CONFIRMED DUE TO MATRIX INTERFERENCE ON THE CONFIRMATION COLUMN |
| @E | RESULT MAY BE FALSELY ELEVATED DUE TO SAMPLE MATRIX INTERFERENCE |
| @F | RESULT OUTSIDE OF CONTRACT SPECIFIED QUALITY CONTROL LIMITS |
| @G | RESULT OUTSIDE OF CONTRACT SPECIFIED ADVISORY LIMITS |
| @H | DETECTION LIMIT ELEVATED DUE TO MATRIX INTERFERENCE |
| @M | RESULT NOT CONFIRMED BY U.V. DUE TO SAMPLE MATRIX INTERFERENCE |
| @N | RESULT NOT CONFIRMED BY FLUORESCENCE DUE TO SAMPLE MATRIX INTERFERENCE |
| @P | RESULT QUANTITATED USING FLUORESCENCE ONLY DUE TO THE LOW CONCENTRATION |
| @Q | DETECTION LIMIT ELEVATED DUE TO LIMITED SAMPLE FOR ANALYSIS |
| @T | RESULT DUE TO TCLP EXTRACTION MATRIX INTERFERENCE. NO QC LIMITS HAVE BEEN ESTABLISHED |
| @U | SAMPLE CHROMATOGRAM DOES NOT RESEMBLE COMMON FUEL HYDROCARBON FINGERPRINTS |
| @Z | SAMPLE CHROMATOGRAM DOES NOT RESEMBLE A FUEL HYDROCARBON |

Analytical Technologies, Inc. 5550 Morehouse Dr. San Diego, CA 92121 (619) 458-9141

Client: INDUSTRIAL COMPLIANCE

Client Descript.: GWS-1

Matrix WATER

ATI Sample Number 511291-01A 11/21

| | |
|---|---|
| Amount Ext'd | 910.0 ml |
| Extract Vol | 10.0 ml |
| Dilution | 1 |
| Date of Analysis | 21-Nov-95 |
| ATI Data Filename | 2112113 |
| Pract Quant Limit | 0.05 mg/L |

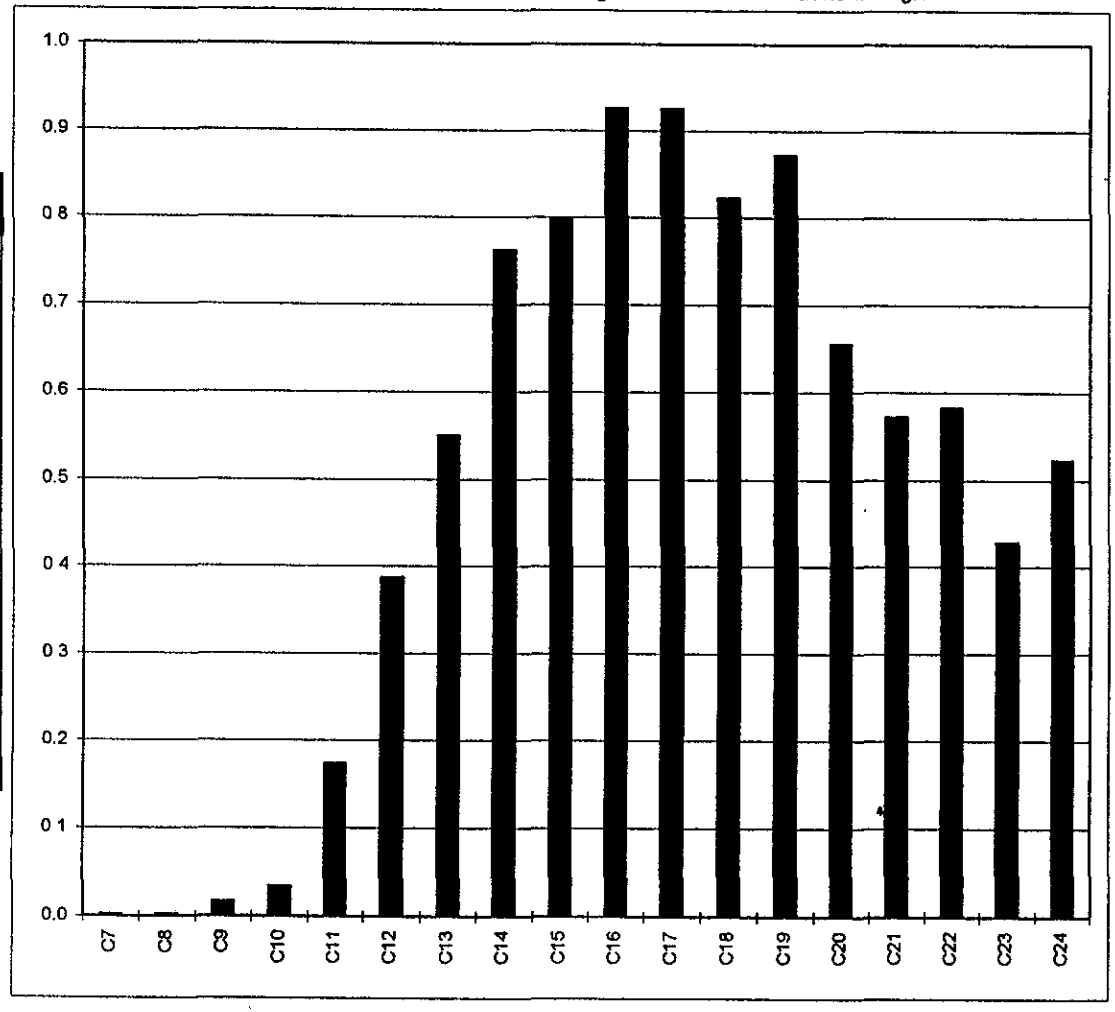
FINAL RESULTS:

**9.03 mg/L Diesel quantitated between C7 and C24**

**Comment:**

Table of concentrations within standard fuel carbon ranges. All concentrations in mg/L.

| Paraffin Range | Fuel Conc. | Percent of Total | Cum. Percent |
|---|---|---|---|
| C7 | 0.0 | 0.0% | 0.0% |
| C8 | 0.0 | 0.0% | 0.0% |
| C9 | 0.0 | 0.2% | 0.2% |
| C10 | 0.0 | 0.4% | 0.6% |
| C11 | 0.2 | 1.9% | 2.5% |
| C12 | 0.4 | 4.3% | 6.8% |
| C13 | 0.6 | 6.1% | 12.9% |
| C14 | 0.8 | 8.4% | 21.3% |
| C15 | 0.8 | 8.8% | 30.2% |
| C16 | 0.9 | 10.3% | 40.4% |
| C17 | 0.9 | 10.2% | 50.7% |
| C18 | 0.8 | 9.1% | 59.8% |
| C19 | 0.9 | 9.7% | 69.4% |
| C20 | 0.7 | 7.3% | 76.7% |
| C21 | 0.6 | 6.3% | 83.0% |
| C22 | 0.6 | 6.5% | 89.5% |
| C23 | 0.4 | 4.7% | 94.2% |
| C24 | 0.5 | 5.8% | 100.0% |
| Totals: | 9.0 | 100.0% | |



Analytical Technologies, Inc. 5550 Morehouse Dr. San Diego, CA 92121 (619) 458-9141

Client: INDUSTRIAL COMPLIANCE

Client Descript.: GWS-2

Matrix WATER

ATI Sample Number 511291-02A 11/29

Amount Ext'd: 905.0 ml
Extract Vol: 10.0 ml
Dilution: 1
Date of Analysis 29-Nov-95
ATI Data Filename: 3112945
Pract. Quant. Limit 0.05 mg/L

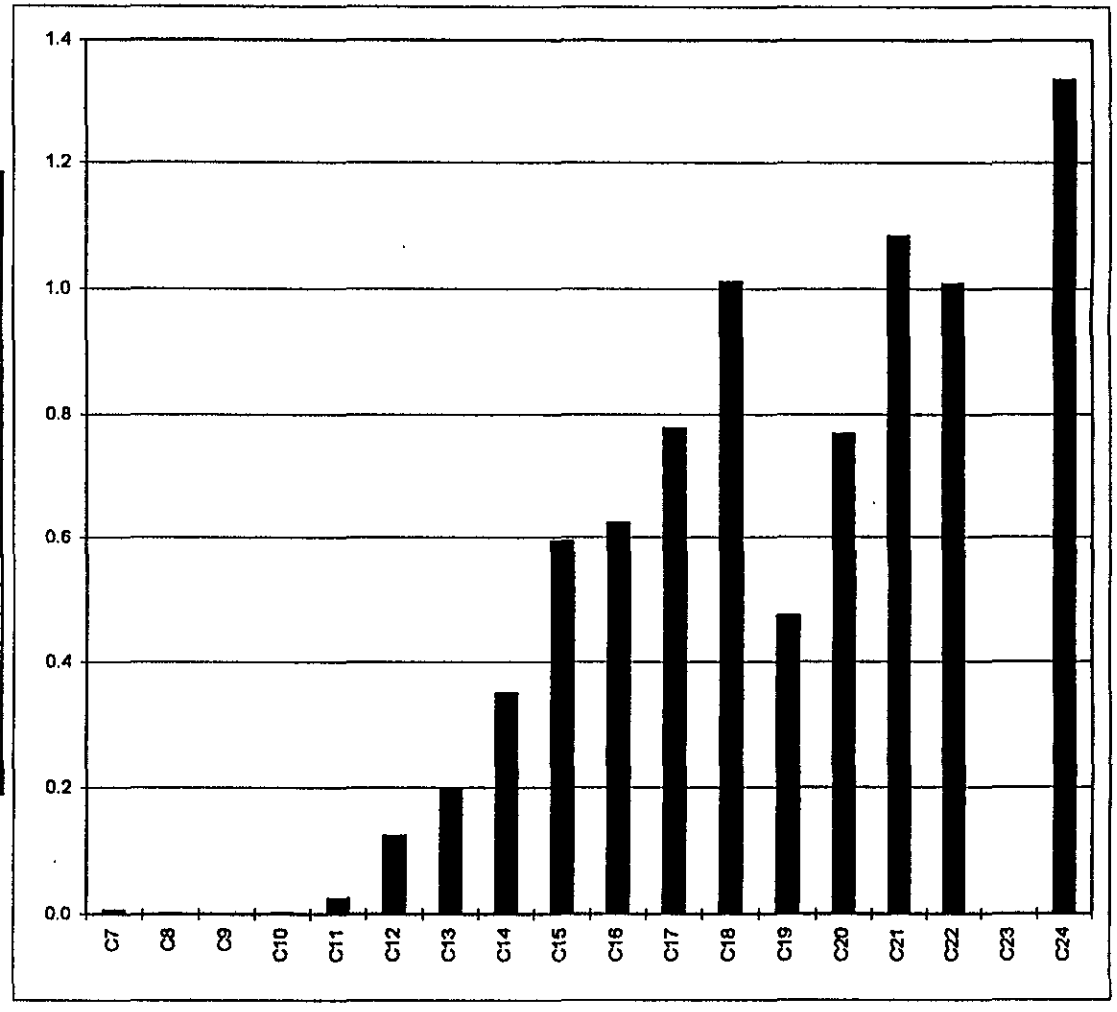
FINAL RESULTS:

**8.38 mg/L Diesel quantitated between C7 and C24**

**Comment:**

Table of concentrations within standard fuel carbon ranges. All concentrations in mg/L.

| Paraffin Range | Fuel Conc. | Percent of Total | Cum. Percent |
|---|---|---|---|
| C7 | 0.0 | 0.1% | 0.1% |
| C8 | 0.0 | 0.0% | 0.1% |
| C9 | 0.0 | 0.0% | 0.1% |
| C10 | 0.0 | 0.0% | 0.1% |
| C11 | 0.0 | 0.3% | 0.4% |
| C12 | 0.1 | 1.5% | 1.9% |
| C13 | 0.2 | 2.4% | 4.3% |
| C14 | 0.4 | 4.2% | 8.4% |
| C15 | 0.6 | 7.1% | 15.5% |
| C16 | 0.6 | 7.4% | 23.0% |
| C17 | 0.8 | 9.3% | 32.2% |
| C18 | 1.0 | 12.1% | 44.3% |
| C19 | 0.5 | 5.7% | 50.0% |
| C20 | 0.8 | 9.2% | 59.1% |
| C21 | 1.1 | 12.9% | 72.1% |
| C22 | 1.0 | 12.0% | 84.1% |
| C23 | 0.0 | 0.0% | 84.1% |
| C24 | 1.3 | 15.9% | 100.0% |
| Totals: | 8.4 | 100.0% | |



Analytical Technologies, Inc. 5550 Morehouse Dr. San Diego, CA 92121 (619) 458-9141

Client: INDUSTRIAL COMPLIANCE

Results: **9.03 mg/L Diesel quantitated between C7 and C24**

Client Descript.: GWS-1

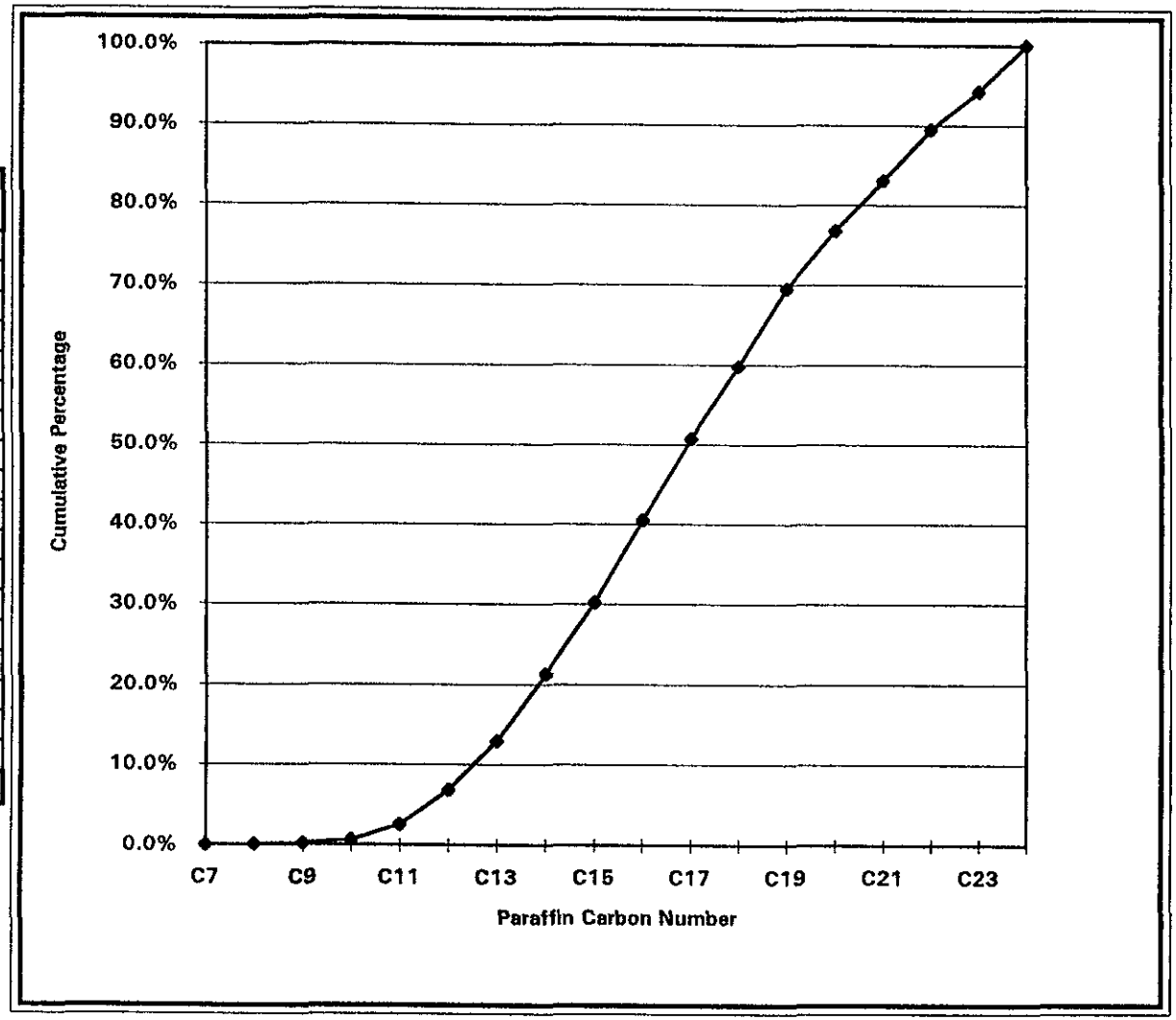
Matrix WATER

ATI Sample Number 511291-01A 11/21

Comment:

Amount Ext'd: 910.0 ml
Extract Vol: 10.0 ml
Dilution: 1
Date of Analysis 21-Nov-95
ATI Data Filename: 2112113
Pract. Quant Limit 0.05 mg/L

| Paraffin Range | Fuel mg/L | Percent of Total | Cum. Percent |
|---|---|---|---|
| C7 | 0.0 | 0.0% | 0.0% |
| C8 | 0.0 | 0.0% | 0.0% |
| C9 | 0.0 | 0.2% | 0.2% |
| C10 | 0.0 | 0.4% | 0.6% |
| C11 | 0.2 | 1.9% | 2.5% |
| C12 | 0.4 | 4.3% | 6.8% |
| C13 | 0.6 | 6.1% | 12.9% |
| C14 | 0.8 | 8.4% | 21.3% |
| C15 | 0.8 | 8.8% | 30.2% |
| C16 | 0.9 | 10.3% | 40.4% |
| C17 | 0.9 | 10.2% | 50.7% |
| C18 | 0.8 | 9.1% | 59.8% |
| C19 | 0.9 | 9.7% | 69.4% |
| C20 | 0.7 | 7.3% | 76.7% |
| C21 | 0.6 | 6.3% | 83.0% |
| C22 | 0.6 | 6.5% | 89.5% |
| C23 | 0.4 | 4.7% | 94.2% |
| C24 | 0.5 | 5.8% | 100.0% |
| Totals: | 9.03 | 100.0% | |



Analytical Technologies, Inc. 5550 Morehouse Dr. San Diego, CA 92121 (619) 458-9141

Client: INDUSTRIAL COMPLIANCE

Client Descript.: GWS-2

Matrix WATER

ATI Sample Number 511291-02A 11/29

Amount Ext'd: 905.0 ml

Extract Vol: 10.0 ml

Dilution: 1

Date of Analysis 29-Nov-95

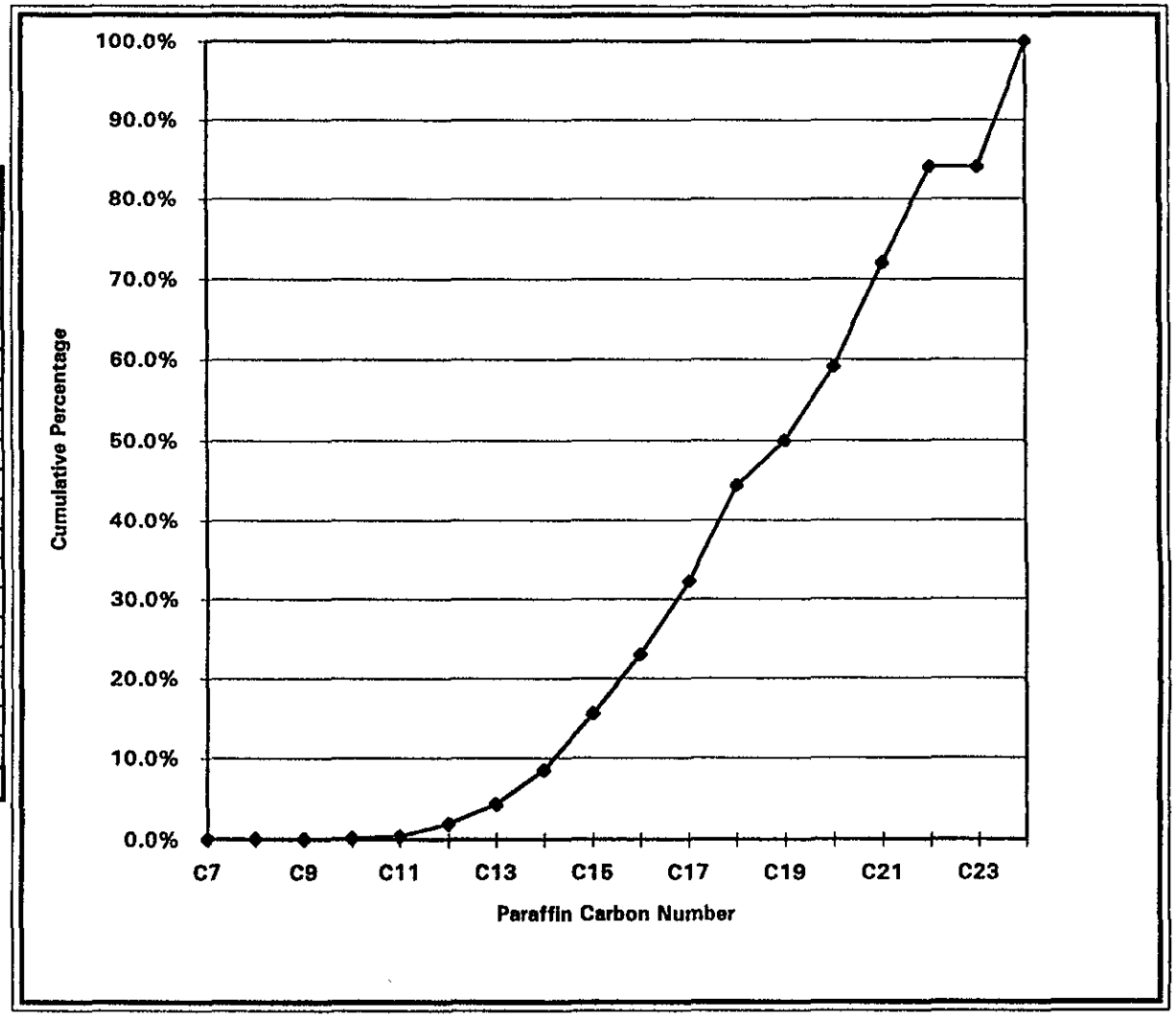
ATI Data Filename: 3112945

Pract. Quant. Limit 0.05 mg/L

**Results: 8.38 mg/L Diesel quantitated between C7 and C24**

Comment:

| Paraffin Range | Fuel mg/L | Percent of Total | Cum. Percent |
|---|---|---|---|
| C7 | 0.0 | 0.1% | 0.1% |
| C8 | 0.0 | 0.0% | 0.1% |
| C9 | 0.0 | 0.0% | 0.1% |
| C10 | 0.0 | 0.0% | 0.1% |
| C11 | 0.0 | 0.3% | 0.4% |
| C12 | 0.1 | 1.5% | 1.9% |
| C13 | 0.2 | 2.4% | 4.3% |
| C14 | 0.4 | 4.2% | 8.4% |
| C15 | 0.6 | 7.1% | 15.5% |
| C16 | 0.6 | 7.4% | 23.0% |
| C17 | 0.8 | 9.3% | 32.2% |
| C18 | 1.0 | 12.1% | 44.3% |
| C19 | 0.5 | 5.7% | 50.0% |
| C20 | 0.8 | 9.2% | 59.1% |
| C21 | 1.1 | 12.9% | 72.1% |
| C22 | 1.0 | 12.0% | 84.1% |
| C23 | 0.0 | 0.0% | 84.1% |
| C24 | 1.3 | 15.9% | 100.0% |
| Totals: | 8.38 | 100.0% | |



ACCESSION #: 511344 INITIALS: LM

## ATI-SanDiego
## SAMPLE CONDITION UPON RECEIPT CHECKLIST
## (FOR RE-ACCESSIONS, COMPLETE #7 THRU #9)

| | | | |
|---|---|---|---|
| 1 | Does this project require special handling according to NFESC Levels C, D, AFCEE or CLP protocols?<br>If yes, complete a) and b)<br>a) pH sample aliquoted: yes /no /na<br>b) Either 1) Record Bottle Lot #'s:<br>Or 2) Attach Sample Kit Request Form(s) | YES | (NO) |
| 2 | Number of Coolers Received<br>If more than one cooler received attach Multiple Cooler Documentation Form (MCD)<br>Indicate "see MCD" on Item 11 below | 1 | |
| 3 | Are custody seals required for this project ? | YES | (N/A) |
| | a) are Custody Seals present on Cooler(s) ? | YES | (NO) |
| | If yes, are seals intact ? (NA) | YES | NO |
| | b) are Custody Seals present on the sample ? | YES | (NO) |
| | If yes, are seals intact ? (NA) | YES | NO |
| 4 | Is there a Chain-Of-Custody (COC)* per cooler ?<br>if not, if a problem is found indicate which samples/test were in the affected cooler on the MCD. | (YES) | NO |
| 5 | Is the COC* complete per cooler ?<br>Relinquished: yes/no Requested analysis: yes/no | (YES) | NO |
| 6 | Is the COC* in agreement with the samples received?<br># Samples: yes/no Sample ID's: yes/no Date sampled: yes/no<br>Matrix: yes/no # containers: yes/no | YES | (NO) |
| 7 | Are the samples preserved correctly? * | (YES) | NO |
| 8 | Is there enough sample for all the requested analyses? ** | (YES) | NO |
| 9 | Are all samples within holding times for the requested analyses? | (YES) | NO |
| 10 | Record cooler temperature. Contact PM if temperature is not 4°C ± 2°C. | 2.0 °C | |
| | Is ice present in cooler? | (YES) | NO |
| 11 | Were all sample containers received intact (ie. not broken, leaking, etc.)? | (YES) | NO |
| 12 | Are samples requiring no headspace, headspace free? N/A | (YES) | NO |
| 13 | Are VOA 1st stickers required? | YES | (NO) |
| 14 | Are there special comments on the Chain of Custody which require client contact? | YES | (N/A) |
| 15 | If yes, was ATI Project Manager notified? | YES | NO |

Describe "no" items: #6) Sample GWS-3 listed on COC has two 40ml VOA vial however Containers lists two as: GSW-3 on 1X40ml VOA and GWS-3 on the other 1X40 ml VOA.** Both Samples GWS-3 @1000 and GWS-3 @1200 have approx. 60% Soil and 40% WATER. Sample volume is limited for 8015M analysis.

Was client contacted? yes / no

If yes, Date: _____ Name of Person contacted:

Describe actions taken or client instructions: *Sample GWS-3 @1200 is unpreserved, 7-day hold time applies

AF 11-5-04

*Or other representative documents, letters, and/or shipping memos

511344

# CHAIN-OF-CUSTODY RECORD

P.O. Box 24374 Oakland CA 94623-1374

No. 20815

INDUSTRIAL COMPLIANCE • ~~9888 OLD PLACERVILLE ROAD, SUITE 100 • SACRAMENTO, CA 95827-3559~~ • Phone ~~916-369-8971~~ 510 238 9540 510-238-9193 • FAX ~~916-369-8370~~

| PROJECT NAME | PROJECT LOCATION |
|---|---|
| 5TH Ave & 7TH St. | East Oakland Yard |

| PROJ NO | PROJECT CONTACT | PROJECT TELEPHONE NO. |
|---|---|---|
| 05.100269 | James Ackerman | (510) 238-9540 |

| CLIENT'S REPRESENTATIVE | PROJECT MANAGER/SUPERVISOR |
|---|---|
| Mike Grant | Carl Taylor |

| ITEM NO. | SAMPLE NUMBER | DATE | TIME | COMP | GRAB | SAMPLE LOCATION (INCLUDE MATRIX AND POINT OF SAMPLE) | NUMBER OF CONTAINERS | 8015 Simulated Distillate (Soil) | 8020 BTEX | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | GWS-3 | 11-20 | 1000 | | X | Grab Groundwater Sample From Zone of East Oakland Yard | 2 | X | | |
| 2 | " | 11-22 | 1200 | | X | ↓ | 1 | | X | |
| 3 | | | | | | | | | | |
| 4 | | | | | | | | | | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |
| 8 | | | | | | | | | | |
| 9 | | | | | | | | | | |
| 10 | | | | | | | | | | |

| TRANSFER NUMBER | ITEM NUMBER | TRANSFERS RELINQUISHED BY | TRANSFERS ACCEPTED BY | DATE | TIME |
|---|---|---|---|---|---|
| 1 | 3 | James Ackerman | Sally Smallwood | 11/28/95 | 9:15 |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |

REMARKS

Standard T.A.T.

2°C 9:15 11/28/95

SAMPLER'S NAME: James Ackerman

SAMPLER'S SIGNATURE: James Ackerman

LAB COPY

Analytical**Technologies,** Inc. Corporate Offices 5550 Morehouse Drive San Diego, CA 92121 (619) 458-9141

ATI I.D.: 511344

December 05, 1995

INDUSTRIAL COMPLIANCE
1357 5TH STREET
OAKLAND, CA 94607

Project Name: 5TH AVE. & 7TH ST.
Project # : 05100269

Attention: JAMES ACKERMAN

Analytical Technologies, Inc. has received the following sample(s):

| Date Received | Quantity | Matrix |
|---|---|---|
| November 28, 1995 | 2 | WATER |

The sample(s) were analyzed with EPA methodology or equivalent methods as specified in the enclosed analytical schedule. The symbol for "less than" indicates a value below the reportable detection limit. If any flags appear next to the analytical data in this report, please see the attached list of flag definitions.

The results of these analyses and the quality control data are enclosed. Please note that the Sample Condition Upon Receipt Checklist is included at the end of this report.

Due to the extremely high sediment content of sample GWS-3, the method 8015M extraction was not effective. Results for the 8015M analysis may be artificially low due to matrix interference.

ANN FREED
PROJECT MANAGER

ALAN J. KLEINSCHMIDT
FOR LABORATORY MANAGER

SAMPLE CROSS REFERENCE



Client : INDUSTRIAL COMPLIANCE
Project # : 05100269
Project Name: 5TH AVE. & 7TH ST.

Report Date: December 05, 1995
ATI I.D. : 511344

| ATI # | Client Description | Matrix | Date Collected |
|---|---|---|---|
| | GWS-3 | WATER | 20-NOV-95 |
| 2 | GWS-3@1200 | WATER | 22-NOV-95 |

---TOTALS---

| Matrix | # Samples |
|---|---|
| WATER | 2 |

ATI STANDARD DISPOSAL PRACTICE

The sample(s) from this project will be disposed of in twenty-one (21) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

ANALYTICAL SCHEDULE



Client : INDUSTRIAL COMPLIANCE
Project # : 05100269 ATI I.D.: 511344
Project Name: 5TH AVE. & 7TH ST.

| Analysis | Technique/Description |
|---|---|
| EPA 8020 (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) | GC/PHOTO IONIZATION DETECTOR |
| MOD EPA 8015-CHOHS (SIMULATED DISTILLATION) | GC/FLAME IONIZATION DETECTOR |

GAS CHROMATOGRAPHY RESULTS



Test : EPA 8020 (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES)
Client : INDUSTRIAL COMPLIANCE ATI I.D. : 511344
Project # : 05100269
Project Name: 5TH AVE. & 7TH ST.

| Sample # | Client ID | Matrix | Date Sampled | Date Extracted | Date Analyzed | Dil. Factor |
|---|---|---|---|---|---|---|
| 1 | GWS-3 | WATER | 20-NOV-95 | N/A | 04-DEC-95 | 1.00 |

| Parameter | Units | 1 |
|---|---|---|
| BENZENE | UG/L | <0.50 |
| TOLUENE | UG/L | 0.84 |
| ETHYLBENZENE | UG/L | <0.50 |
| XYLENES (TOTAL) | UG/L | <1.0 |
| SURROGATES | | |
| TRIFLUOROTOLUENE | % | 99 |

GAS CHROMATOGRAPHY - QUALITY CONTROL

REAGENT BLANK



Test : EPA 8020 (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES)
Blank I.D. : 37517
Client : INDUSTRIAL COMPLIANCE
Project # : 05100269
Project Name: 5TH AVE. & 7TH ST.

ATI I.D. : 511344
Date Extracted: N/A
Date Analyzed : 04-DEC-95
Dil. Factor : 1.00

| Parameters | Units | Results |
|---|---|---|
| BENZENE | UG/L | <0.50 |
| TOLUENE | UG/L | <0.50 |
| ETHYLBENZENE | UG/L | <0.50 |
| XYLENES (TOTAL) | UG/L | <1.0 |
| SURROGATES | | |
| TRIFLUOROTOLUENE | % | 96 |

GAS CHROMATOGRAPHY - QUALITY CONTROL

MSMSD



Test : EPA 8020 (BENZENE,'TOLUENE, ETHYLBENZENE, XYLENES) ATI I.D. : 511344
MSMSD # : 80362 Date Extracted: N/A
Client : INDUSTRIAL COMPLIANCE Date Analyzed : 30-NOV-95
Sample Matrix : WATER
Project # : 05100269 REF I.D. : 511282-22
Project Name: 5TH AVE. & 7TH ST.

| Parameters | Units | Sample Result | Conc Spike | Spiked Sample | % Rec | Dup Spike | Dup % Rec | RPD |
|---|---|---|---|---|---|---|---|---|
| BENZENE | UG/L | <0.50 | 5.0 | 5.2 | 104 | 5.3 | 106 | 2 |
| TOLUENE | UG/L | <0.50 | 5.0 | 5.3 | 106 | 5.4 | 108 | 2 |

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Spiked Sample Result - Duplicate Spike Result)*100/Average Result

GAS CHROMATOGRAPHY - QUALITY CONTROL

BLANK SPIKE



Test : EPA 8020 (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) ATI I.D. : 511344
Blank Spike #: 60343 Date Extracted: N/A
Client : INDUSTRIAL COMPLIANCE Date Analyzed : 04-DEC-95
Project # : 05100269 Sample Matrix : WATER
Project Name : 5TH AVE. & 7TH ST.

| Parameters | Units | Blank Result | Spiked Sample | Spike Conc. | % Rec |
|---|---|---|---|---|---|
| BENZENE | UG/L | <0.50 | 4.8 | 5.0 | 96 |
| TOLUENE | UG/L | <0.50 | 4.9 | 5.0 | 98 |

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Spiked Sample - Blank Result)*100/Average Result

GAS CHROMATOGRAPHY RESULTS



Test : MOD EPA 8015-CHOHS (SIMULATED DISTILLATION)
Client : INDUSTRIAL COMPLIANCE ATI I.D. : 511344
Project # : 05100269
Project Name: 5TH AVE. & 7TH ST.

| Sample # | Client ID | Matrix | Date Sampled | Date Extracted | Date Analyzed | Dil. Factor |
|---|---|---|---|---|---|---|
| 2 | GWS-3@1200 | WATER | 22-NOV-95 | 29-NOV-95 | 30-NOV-95 | 1.00 |

| Parameter | Units | 2 |
|---|---|---|
| FUEL HYDROCARBONS | MG/L | <0.05 |
| HYDROCARBON RANGE | | - |
| HYDROCARBONS QUANTITATED USING | | - |
| SURROGATES | | |
| BIS(2-ETHYLHEXYL)PHTHALATE | % | N/A*H |

GAS CHROMATOGRAPHY - QUALITY CONTROL

REAGENT BLANK



Test : MOD EPA 8015-CDOHS (FUEL HYDROCARBONS)
Blank I.D. : 37485
Client : INDUSTRIAL COMPLIANCE
Project # : 05100269
Project Name: 5TH AVE. & 7TH ST.

ATI I.D. : 511344
Date Extracted: 29-NOV-95
Date Analyzed : 30-NOV-95
Dil. Factor : 1.00

| Parameters | Units | Results |
|---|---|---|
| FUEL HYDROCARBONS | MG/L | <0.05 |
| HYDROCARBON RANGE | | - |
| HYDROCARBONS QUANTITATED USING | | - |
| SURROGATES | | |
| BIS(2-ETHYLHEXYL)PHTHALATE | % | 94 |

GAS CHROMATOGRAPHY - QUALITY CONTROL

MSMSD



Test : MOD EPA 8015-CDOHS (FUEL HYDROCARBONS)
MSMSD # : 80331
Client : INDUSTRIAL COMPLIANCE

Project # : 05100269
Project Name: 5TH AVE. & 7TH ST.

ATI I.D. : 511344
Date Extracted: 29-NOV-95
Date Analyzed : 30-NOV-95
Sample Matrix : WATER
REF I.D. : REAGENT WATER

| Parameters | Units | Sample Result | Conc Spike | Spiked Sample | % Rec | Dup Spike | Dup % Rec | RPD |
|---|---|---|---|---|---|---|---|---|
| FUEL HYDROCARBONS | MG/L | <0.050 | 1.0 | 1.0 | 100 | 0.96 | 96 | 4 |

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Spiked Sample Result - Duplicate Spike Result)*100/Average Result

ANALYTICAL TECHNOLOGIES, INC.
SAN DIEGO
FLAGS

ORGANICS

| FLAG | MESSAGE DESCRIPTION |
|---|---|
| A | A TIC IS A SUSPECTED ALDOL-CONDENSATION PRODUCT |
| B | ANALYTE FOUND IN THE ASSOCIATED REAGENT BLANK |
| C | PESTICIDE, WHERE THE IDENTIFICATION WAS CONFIRMED BY GC/MS |
| CO | THESE COMPOUNDS CO-ELUTE AND ARE QUANTITATED AS ONE PEAK |
| D | COMPOUND IDENTIFIED IN AN ANALYSIS AT SECONDARY DILUTION |
| E | ANALYTE AMOUNT EXCEEDS THE CALIBRATION RANGE |
| J | ESTIMATED VALUE |
| H | QUANTIFIED AS DIESEL BUT CHROMATOGRAPHIC PATTERN DOES NOT MATCH THAT OF DIESEL |
| K | QUANTIFIED AS KEROSENE BUT CHROMATOGRAPHIC PATTERN DOES NOT MATCH THAT OF KEROSENE |
| L | QUANTIFIED AS GASOLINE BUT CHROMATOGRAPHIC PATTERN DOES NOT MATCH THAT OF GASOLINE |
| N | PRESUMPTIVE EVIDENCE OF A COMPOUND |
| P | PESTICIDE/AROCLOR TARGET ANALYTE, WHERE THERE IS GREATER THAN 25% DIFFERENCE FOR DETECTED CONCENTRATION BETWEEN 2 GC COLUMNS |
| TR | COMPOUND DETECTED AT AN UNQUANTIFIABLE TRACE LEVEL |
| U | COMPOUND WAS ANALYZED FOR BUT NOT DETECTED |
| X | SEE CASE NARRATIVE |
| Y | SEE CASE NARRATIVE |
| Z | SEE CASE NARRATIVE |
| * | OUTSIDE OF QUALITY CONTROL LIMITS |
| *D | COMPOUND ANALYZED FROM A SECONDARY ANALYSIS |
| *F | RESULT OUTSIDE OF ATI'S QUALITY CONTROL LIMITS |
| *G | RESULT OUTSIDE QUALITY CONTROL LIMITS. INSUFFICIENT SAMPLE FOR RE-EXTRACTION/ANALYSIS |
| *H | RESULT OUTSIDE OF LIMITS DUE TO SAMPLE MATRIX INTERFERENCE |
| *I | BECAUSE OF NECESSARY SAMPLE DILUTION, VALUE WAS OUTSIDE QC LIMITS |
| *K | DUE TO THE NECESSARY DILUTION OF THE SAMPLE, RESULT WAS NOT ATTAINABLE |
| *L | ANALYTE IS A SUSPECTED LAB CONTAMINANT |
| *P | A STANDARD WAS USED TO QUANTITATE THIS VALUE |
| *R | DATA IS NOT USABLE |
| *T | SURROGATE RECOVERY IS OUTSIDE QC CONTROL LIMITS. NO CORRECTIVE ACTION INDICATED BY METHOD |
| *V | SAMPLE RESULT IS >4X SPIKED CONCENTRATION, THEREFORE SPIKE IS NOT DETECTABLE |
| *Y | RESULT NOT ATTAINABLE DUE TO SAMPLE MATRIX INTERFERENCE |
| @A | RESULTS OUT OF LIMITS DUE TO SAMPLE NON-HOMOGENEITY |
| @C | *VARIABLE MESSAGE* |
| @D | RESULT COULD NOT BE CONFIRMED DUE TO MATRIX INTERFERENCE ON THE CONFIRMATION COLUMN |
| @E | RESULT MAY BE FALSELY ELEVATED DUE TO SAMPLE MATRIX INTERFERENCE |
| @F | RESULT OUTSIDE OF CONTRACT SPECIFIED QUALITY CONTROL LIMITS |
| @G | RESULT OUTSIDE OF CONTRACT SPECIFIED ADVISORY LIMITS |
| @H | DETECTION LIMIT ELEVATED DUE TO MATRIX INTERFERENCE |
| @M | RESULT NOT CONFIRMED BY U.V. DUE TO SAMPLE MATRIX INTERFERENCE |
| @N | RESULT NOT CONFIRMED BY FLUORESCENCE DUE TO SAMPLE MATRIX INTERFERENCE |
| @P | RESULT QUANTITATED USING FLUORESCENCE ONLY DUE TO THE LOW CONCENTRATION |
| @Q | DETECTION LIMIT ELEVATED DUE TO LIMITED SAMPLE FOR ANALYSIS |
| @T | RESULT DUE TO TCLP EXTRACTION MATRIX INTERFERENCE NO QC LIMITS HAVE BEEN ESTABLISHED |
| @U | SAMPLE CHROMATOGRAM DOES NOT RESEMBLE COMMON FUEL HYDROCARBON FINGERPRINTS |
| @Z | SAMPLE CHROMATOGRAM DOES NOT RESEMBLE A FUEL HYDROCARBON |

PLEASE PRESS HARD ALL 4 PARTS MUST BE READABLE

# CHAIN-OF-CUSTODY RECORD

No. 20

PO Box 24324 Oakland CA 94623 1324

[illegible] COMPLIANCE · [illegible] · [illegible]

PROJECT LOCATION: SW Cor. East Oakland Rail Yard

PROJECT NO: [illegible]

PROJECT CONTACT: James Ackerman

PROJECT TELEPHONE NO: (510) 233 4540

CLIENT'S REPRESENTATIVE

PROJECT MANAGER/SUPERVISOR: Carl Taylor

| ITEM NO | SAMPLE NUMBER | DATE | TIME | COMP | GRAB | SAMPLE LOCATION (INCLUDE MATRIX AND POINT OF SAMPLE) | NUMBER OF CONTAINERS | ANALYSIS DESIRED (INDICATE SEPARATE CONTAINERS) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 1 | [illegible] | 3/15 | 1610 | | X | 67209-10 | 2 | X X | |
| 2 | [illegible] | | 1630 | | X | 67211-12 | 2 | X X | |
| 3 | [illegible] | | 1645 | | X | 67213-14 | 2 | X X | |
| 4 | [illegible] | | 1545 | | X | 67215-16 | 2 | X X | |
| 5 | | | | | | | | | |
| 6 | | | | | | | | | |
| 7 | | | | | | | | | |
| 8 | | | | | | | | | |
| 9 | | | | | | | | | |
| 10 | | | | | | | | | |

* Analyze (Chromium VI) (Analyze before filtration) Nickel

| TRANSFER NUMBER | ITEM NUMBER | TRANSFERS RELINQUISHED BY | TRANSFERS ACCEPTED BY | DATE | TIME |
|---|---|---|---|---|---|
| 1 | | James Ackerman | Cathy Lowery FHDH | 3/15/96 | 9:45 |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |

REMARKS: P.O. # OC905

RUN EACH SAMPLE (CHROMIUM + NICKEL) WITH QUICK T.A.T., NOTIFY ME OF RESULTS, BEFORE PROCEEDING TO THE NEXT SAMPLE

SAMPLER'S NAME: James Ackerman

SAMPLER'S SIGNATURE: James Ackerman

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Andrew John Friedman
James E. Bruya, Ph.D.
(206) 285-8282

3012 16th Avenue West
Seattle, WA 98119-2029
FAX: (206) 283-5044

MAR 2 5 1996

March 18, 1996

James Ackerman, Project Manager
Terranext
6200 Rothway, Suite 190
Houston, TX 77040

Dear Mr. Ackerman:

Enclosed are the results from the testing of material submitted on March 15, 1996 from your 05100209, 5th Ave. & 7th St., PO #00905 project.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Kelley Wilt

Kelley Wilt
Chemist

keh
Enclosures
FAX: (713) 460-4227
NAA0318R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: March 18, 1996
Date Received: March 15, 1996
Project: 05100209, 5th Ave. & 7th St., PO #00905
Date Samples Extracted: March 15, 1996
Date Extracts Analyzed: March 15, 1996

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL BY GC/FID (Modified 8015)**
**Extended to Include Motor Oil Range Compounds**
**Samples Processed Using Method 3510**
**Sample Extracts Passed Through a Silica Gel Column Prior to Analysis**
Results Reported as µg/L (ppb)

| Sample ID | Diesel ($n$-$C_{12}$-n-$C_{24}$) | Diesel Extended ($n$-$C_{12}$-$n$-$C_{36}$) | Surrogate (% Recovery) |
|---|---|---|---|
| GWS-4 (after silica/after filtration) | 690 | 880 | 99 |
| GWS-4 (before silica/before filtration) | 120,000 | 180,000 | d |
| Method Blank | <50 | <250 | 107 |

d - Due to sample dilution, surrogate recoveries are not meaningful.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: March 18, 1996
Date Received: March 15, 1996
Project: 05100209, 5th Ave. & 7th St., PO #00905

## QUALITY ASSURANCE RESULTS FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL BY GC/FID (Modified 8015)

Laboratory Code: Spike Blank

| Analyte: | Reporting Units | Spike Level | % Recovery MS | % Recovery MSD | Acceptance Criteria | Relative Percent Difference |
|---|---|---|---|---|---|---|
| Diesel | ug/L (ppb) | 2,500 | 91 | 92 | 63-150 | 1 |
| Diesel (Sil) | ug/L (ppb) | 2,500 | 94 | 89 | 63-150 | 5 |

# ATTACHMENT F

# PARAMETERS USED TO CALCULATE RBSLs

## Tier 1 Risk-Based Screening Levels (RBSLs) for Noncarcinogenic Compounds

**Equations:**

**Potable ground water ingestion:**

$$RBSL_w = \frac{(THQ \times RfD_o \times BW \times AT_n \times 365\ days/yr \times 10^3)}{(IR_{air} \times EF \times ED)}$$

**Surficial soil ingestion, inhalation of vapors and particulates, and dermal contact:**

$$RBSL_s = \frac{(THQ \times BW \times AT_n \times 365\ days/year)}{EF \times ED\ [((1x10^{-6}\ kg/mg) \times (IR_{soil} \times RAF_o + SA \times M \times RAF_d) / RfD_o) + ((SF_i \times IR_{air} \times (VF_{ss} + VF_p) / RfD_i)]}$$

**Subsurface soil leaching to ground water:**

$$RBSL_s = \frac{RBSL_w}{LF_{sw}}$$

## Tier 1 Risk-Based Screening Levels (RBSLs) for Carcinogenic Compounds

**Equations:**

**Potable ground water ingestion:**

$$RBSL_w = \frac{(TR \times BW \times AT_c \times 365\ days/yr)}{(SF_o \times IR_w \times EF \times ED)}$$

**Surficial soil ingestion, inhalation of vapors and particulates, and dermal contact:**

$$RBSL_s = \frac{(TR \times BW \times AT_c \times 365\ days/year)}{EF \times ED\ [((SF_o \times 10^{-6}\ kg/mg) \times (IR_{soil} \times RAF_o + SA \times M \times RAF_d)) + (SF_i \times IR_{air} \times (VF_{ss} + VF_p))]}$$

**Note:** Equations from Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites, American Society for Testing and Materials (E 1739-95). Exposure parameters listed in table Tier 1 Risk-Based Screening Levels (RBSLs) - Exposure Parameters

## Tier 1 Risk-Based Screening Levels (RBSLs) Equations for Voltalization and Leaching Factors

**Equation:**

**Volatilization Factor - surficial soils ambient air (vapors):**

$$VF_{ss} = \frac{W_{p,d} \times 1x10^{-3}}{U_{air}\delta_{air}}$$

**Volatilization Factor - surficial soils ambient air (particulates):**

$$VF_p = \frac{P_e W}{}$$

Leaching Factor - subsurface soils ground water

[illegible]

Note [illegible]

## Tier 1 Risk-Based Screening Levels (RBSLs) - Exposure Parameters

| Exposure Parameter | Definition (Units) | Residential Adult | Commercial/Industrial Construction |
|---|---|---|---|
| $AT_c$ | Averaging time for carcinogens (yr) | 70 | 70 |
| $AT_n$ | Averaging time for non-carcinogens (yr) | 30 | 25 |
| BW | Body Weight (kg) | 70 | 70 |
| ED | Exposure Duration (yr) | 30 | 25 |
| EF | Exposure Frequency (days/yr) | 350 | 250 |
| $IR_{soil}$ | Ingestion Rate of Soil (mg/day) | 100 | 50 |
| $IR_{a}$-indoor | Inhalation rate indoors ($m^3$/day) | 15 | 20 |
| $IR_{a}$-outdoor | Inhalation rate outdoors ($m^3$/day) | 20 | 20 |
| $IR_w$ | Ingestion Rate of Water (l/day) | 2 | 1 |
| $LF_{sw}$ | Leaching Factor (mg/kg, mg/l) | Chemical Specific | |
| M | Soil to skin adherence factor ($mg/cm^2$) | 0 5 | 0 5 |
| $RAF_d$ | Dermal relative absorption factor (volatiles or PAHs/10) | 0 5 | 0 5 |
| $RAF_o$ | Oral relative absorption factor | 1 | 1 |
| RBSL | Risk-based screening level for media i (mg/kg, mg/l, ug/$m^3$) | Chemical, Media Exposure, Route Specific | |
| $RfD_i$ | Inhalation chronic reference dose (mg/kg-day) | Chemical Specific | |
| $RfD_o$ | Oral chronic refrence dose (mg/kg-day) | Chemical Specific | |
| SA | Skin surface area ($cm^2$/day) | 3160 | 3160 |
| $SF_i$ | Ingestion cancer slope factor (mg/kg-day)$^{-1}$ | Chemical Specific | |
| $SF_o$ | Oral cancer slope factop (mg/kg-day)$^{-1}$ | Chemical Specific | |
| THQ | Target Hazard Quotient | 1 | |
| TR | Target risk, individual lifetime cancer risk | For example $1x10^{-6}$ or $1x10^{-4}$ | |

## Tier 1 Risk-Based Screening Levels (RBSLs) - Soil, Building, Surface, and Subsurface Parameters

| Exposure Parameter | Definition (Units) | Residential Adult | Commercial/Industrial Construction |
|---|---|---|---|
| d | Lower depth of surficial zone (cm) | 100 | 100 |
| $f_{oc}$ | fraction of organic carbon | 0 01 | 0 01 |
| H | Henry's Law coefficient ($cm^3$-$H_2O$/$cm^3$-air) | Chemical Specific | |
| I | Infiltration Rate of water through soil (cm/yr) | 30 | 30 |
| $k_{oc}$ | Carbon-water sorption coefficient ($cm^3$-$H_2O$/g-C) | Chemical Specific | |
| $k_s$ | Soil-water sorption coefficient ($cm^3$-$H_2O$/g-soil) | $f_{oc}$ x $k_{oc}$ | |
| $P_e$ | Particulate Emmission Rate ($g/cm^2$-s) | 6 90E-14 | 6 90E-14 |
| W | Width of source area parallel to wind, ground water flow (cm) | 1500 | 1500 |
| $U_{air}$ | Wind speed above ground surface in ambient mixing zone (cm/s) | 225 | 225 |
| $U_{gw}$ | Ground water Darcy velocity (cm/year) | 2500 | 2500 |
| $\delta_{air}$ | Ambient air mixing zone height (cm) | 200 | 200 |
| $\delta_{gw}$ | Ground water zone mixing zone thickness (cm) | 200 | 200 |
| $\theta_{as}$ | Volumetric air content in vados zone soils ($cm^3$/$cm^3$) | 0 26 | 0 26 |
| $\theta_{ws}$ | Volumetric water content in vados zone soils ($cm^3$/$cm^3$) | 0 12 | 0 12 |
| $\rho_s$ | Soil bulk density ($g/cm^3$) | 1 7 | 1 7 |