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DEPARTMENT OF ECOLOGY
NORTHWEST REGION

REPORT OF GEOTECHNICAL SERVICES
UNDERGROUND STORAGE TANK REMOVAL AND
SUBSURFACE CONTAMINATION STUDY
STORES BUILDING, RENTON SERVICE CENTER
RENTON, WASHINGTON
FOR PUGET SOUND POWER & LIGHT COMPANY

PUGET POWER

March 8, 1990

Mr. Joe Hickey
Washington State Department
of Ecology
Northwest Region Office
4350 - 150th Avenue NE
Redmond, WA 98052

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DEPARTMENT OF ECOLOGY
NORTHWEST REGION

Subject: Underground Storage Tank Report, Stores Building
at 620 South Grady Way, Renton, Washington

Dear Mr. Hickey:

Enclosed is our consultant's, GeoEngineers, report concerning removal of underground storage tanks and residual contamination at 620 South Grady Way, Renton, Washington.

During tank removal, residual contamination was found and investigated. Thirty monitoring wells have revealed the presence of contamination under the northern portion of the General Stores Building and the asphalt yard between the building and Grady Way. The contamination does not appear to be moving.

The monitoring wells are checked periodically and an observation log is kept.

Three site cleanup methods were evaluated in the GeoEngineers report, pages 14 to 17; soil excavation, in-situ bio-remediation, and in-situ steam stripping. Soil excavation was selected as the most effective way to clean up the site with the greatest degree of confidence.

We are planning to remove the contamination this summer, during the period of low ground water. The work inside of the building will start with the removal of the the concrete floor, stabilization of the building, removal the contamination, and restoration of the area. The contamination between the building and Grady Way will be excavated after the work inside the building is completed.

If you need additional information or would like to meet, please call Steve Perrigo, Project Manager-GeoEngineers, at 746-5200, Puget's Project Manager Gary Reid, 462-3077, or me, 462-3066.

Very truly yours,



T. Van Decar
Staff Environmental
Engineer

Enclosure

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REPORT OF GEOTECHNICAL SERVICES
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INTRODUCTION

This report summarizes the results of our observations during the removal of two underground waste oil tanks (Tank #224 and Tank #225) and our subsequent subsurface contamination study at the Stores Building of the Puget Sound Power & Light Company (PSP&L) Renton Service Center in Renton, Washington. The site is located at 620 South Grady Way and is shown relative to surrounding physical features on the Vicinity Map, Figure 1. The general layout of the site is shown on the Site Plan, Figure 2.

We obtained soil samples from the tank excavations for field screening and chemical analysis during the tank removal activities. Soil contamination detected in the vicinity of the former tanks was suspected to be related in part to leakage of hydraulic fluid from hydraulic lifts located near the former waste oil tanks and within the garage area of the Stores Building. Subsequently, PSP&L requested that GeoEngineers complete a subsurface contamination study in the vicinity of the hydraulic lifts to further explore the extent of subsurface contamination related to the leakage of hydraulic fluid.

SCOPE

The purpose of our tank removal observations was to evaluate residual contamination in the vicinity of each tank during removal. Where minor contamination was encountered, we provided technical guidance to PSP&L's contractors for the removal of contaminated soils and provided confirmatory soils testing of remaining soils. We also assisted PSP&L with regulatory support and coordination of disposal of contaminated soils. Where more extensive contamination was identified, we provided technical recommendations for mitigation or further characterization of residual contamination resulting from use of the tanks.

The purpose of our subsequent subsurface contamination study was to explore subsurface soil and ground water conditions at the site for the presence of residual hydrocarbons resulting from releases from the underground storage tanks or other nearby sources.

The scope of services completed for this project has included:

Tank Removal Consultation Services

1. Analyze a fluid sample from one waste oil tank (#225) for the presence of volatile organic compounds and polychlorinated biphenyls (PCBs).
2. Observe and document the excavation of underground waste oil tanks and related petroleum-contaminated soils.
3. Obtain soil samples from the former tank excavations for field screening and analytical testing.
4. Analyze selected soil samples from the vicinity of the waste oil tanks for the presence of total petroleum hydrocarbons (TPH by EPA Method 418.1) and volatile organic compounds (EPA Methods 8010/8020).
5. Obtain samples from the stockpiles of soils removed during tank excavation for chemical analysis to assess concentrations of contaminants, and coordinate off-site disposal of contaminated soil with the Seattle-King County Health Department.

Subsequent Subsurface Contamination Study

6. Obtain an oil sample from the hydraulic fluid tank and contaminated soil samples from the tank excavations for laboratory analysis of a "fuel fingerprint" (EPA Method 8015, modified) to allow comparison of oil types.
7. Drill twenty-seven exploratory borings in the area of the hydraulic lifts within the garage area of the Stores Building and in the vicinity of the former underground waste oil tanks.
8. Obtain soil samples from the borings at 2½-foot intervals and conduct field screening for potential contamination in each soil sample.

9. Analyze one or more soil samples from each boring for TPH (EPA Method 418.1) and analyze selected samples from the borings to characterize the contaminant type using a "fuel fingerprint" analysis (EPA Method 8015, modified).
10. Install 2-inch-diameter PVC monitor well casings with a flush-grade, lockable, surface monument in twenty-four of the borings. Develop each well screen and determine casing rim elevations relative to an assumed datum.
11. Measure water table elevations in the wells (including four nearby wells, MW-1 through MW-4, which were installed as part of a previous study) and sample each well for the presence of free (floating) hydrocarbons.
12. Obtain ground water samples from selected wells for laboratory analysis of TPH (EPA Method 418.1).
13. Obtain a hydraulic fluid sample and free product samples for determination of API gravity.
14. Observe evacuation of fluids from the hydraulic lift vaults in the Stores Building and note the condition of the concrete in each vault.
15. Measure product thickness in monitor wells with free product and periodically bail product from the wells to observe product recovery.
16. Evaluate the field and laboratory data with regard to existing regulatory concerns.
17. Develop recommendations for remedial actions.

GENERAL SITE CONDITIONS

The site is relatively level and is located at an elevation of approximately 40 feet above sea level. The Stores Building and its associated access/parking areas are bounded by South Grady Way to the north, Talbot Road to the west, and by other PSP&L facilities to the east and south. The area of study as shown in Figure 2 is located within and north of the garage area of the Stores Building. The former waste oil tanks were located immediately north of the truck bays of the garage beneath the asphalt covered access/parking area. The garage area of the Stores

Building, including the concrete floor slab, is supported on timber piles. Within the garage area are three hydraulic lifts, two above-ground hydraulic fluid tanks, and a truck wash sump. We understand that these hydraulic lifts have been out of service since May 1988.

We have completed studies at the Renton Service Center which form the basis of our general understanding of subsurface conditions across the facility. Prior subsurface explorations generally encountered a thin layer of fill overlying coal mine spoils, which consist of a mixture of fragmented coal and rock spoils, with variable amounts of sediment. The source of the coal mine spoils is likely to be the former coal mine workings east of the site. Ground water is typically encountered within the coal fill at a depth of less than 10 feet beneath the ground surface. Previous ground water gradients generally indicated a westerly flow direction.

WASTE OIL TANK EXCAVATIONS

GENERAL

Chempro Environmental Services removed the two underground waste oil tanks from the locations shown in Figure 2 and 3 on August 14 and 15, 1989. A representative of GeoEngineers was on site to observe the tank removal activities and to obtain soil samples from the former tank excavations. Field screening methods were used to characterize the potential presence of petroleum-related hydrocarbons in the soil samples. These screening methods are described in Appendix A. Sixteen soil samples from locations shown on Figure 3 were submitted to Analytical Technologies, Inc. (ATI) for chemical analysis. All sixteen soil samples were analyzed for the presence of TPH by EPA Method 418.1 and selected soil samples were also analyzed for a fuel fingerprint (EPA Method 8015, modified). The results of these hydrocarbon analyses are summarized in Table 1 with the field screening results. Seven of the sixteen samples were further analyzed for volatile organic compounds (EPA Methods 8010/8020). The results of these further analyses are summarized in Table 2. Analytical laboratory reports are presented in Appendix B.

Soil removed from the excavations was stockpiled temporarily on-site on plastic sheeting and securely covered with plastic. After completion of

all excavation activities, the soil stockpiles were sampled for chemical analysis as required for soil disposal. Soil from the waste oil tank excavations was disposed of in the Cedar Hills Landfill.

WASTE OIL TANK #224 EXCAVATION

Tank #224, a 1000-gallon waste oil tank of steel construction, was removed on August 15, 1989. Corrosion was evident on the base of the tank but no leaks or holes in the tank were apparent. Observation during tank removal identified hydrocarbon contaminated soil on the west wall and the base of the excavation.

Chemical analysis of soils from the excavation showed TPH concentrations ranging from nondetected to 52,000 ppm. TPH concentrations increased as the excavation was deepened to the south and west. Fuel fingerprint analysis showed that the hydrocarbons found were in the carbon range of C16-C26 at concentrations (quantified as diesel) ranging from 2,400 to 16,000 ppm in samples from the base, south wall and west wall of the excavation. Gasoline was not indicated in the fuel fingerprint analyses nor was BETX detected in the soil samples from the base of the excavation. A low concentration of xylenes (0.100 ppm) was detected in the soil sample from the south wall of the excavation. Low concentrations of chlorinated solvents (dibromochloromethane and tetrachloroethene) were detected in soil samples from the base and the south wall of the excavation. The results of chemical analyses are summarized in Tables 1 and 2.

The final excavation covered an area of approximately 18 by 12 feet in plan dimension and extended to a maximum depth of about 10.5 feet. Further excavation was hampered by the Stores Building, located immediately to the south and a sanitary sewer vault to the east. The contamination appeared to extend beneath the Stores Building and to the west. Some free product was present on the water table surface in the tank excavation. Based upon additional testing to be described later, it became apparent that the contamination observed in the tank excavation could not be attributed entirely to leakage from Tank #224 and that further study by other means was warranted. A decision was made to backfill the excavation. On August 31 to September 1, 1989 the excavation was lined with visqueen and backfilled

with clean crushed rock to the grade of the adjacent pavement. The backfill was placed in a manner so that the new, uncontaminated backfill may be removed when further remediation is performed.

WASTE OIL TANK #225 EXCAVATION

Prior to removing Tank #225, a fluid sample from the tank was provided by PSP&L and analyzed for volatile organic compounds and polychlorinated biphenyls (PCBs). The results of those analyses are summarized on Table 3. The testing showed the presence of aromatic compounds commonly associated with gasoline (BETX) and the presence of chlorinated solvents, primarily methylene chloride, tetrachloroethene, and 1,1,1-trichloroethane. PCBs were not detected in the oil from the tank.

Tank #225, a 550-gallon waste oil tank of steel construction was removed on August 14, 1989. A $\frac{1}{2}$ -inch-diameter hole was observed on the north side of the west end of the tank, about mid-level on the tank. Observation during tank removal identified hydrocarbon contamination in the base of the excavation.

TPH was detected in soil samples from this excavation at concentrations ranging to 11,000 ppm. Fuel fingerprint analysis detected hydrocarbons in the carbon range of C16-C26 at a concentration of 710 ppm (quantified as diesel) in the soil sample from the base of the excavation. BETX was not detected in the soil samples from the base and west wall of the excavation. Low concentrations of ethylbenzene, toluene, and xylenes were detected in soil samples from the north, east and south walls of the excavation. Chlorinated hydrocarbons were detected in the soil samples from the base and all walls of the excavation. Tetrachloroethene was found at concentrations up to 1.1 ppm, 1,1,1-tetrachloroethane at concentrations up to 0.51 ppm, and trichloroethene at a concentration of 0.043 in the base of the excavation. The results of chemical analyses are summarized in Tables 1 and 2.

The final excavation covered an area of approximately 11 by 12 feet in plan dimension and extended to a maximum depth of about 9 feet. Further excavation was hampered by the Stores Building located immediately to the south. The contamination appeared to extend beneath the base of the excavation and beneath the Stores Building. A heavy sheen with oil globules was floating on the ground water surface in the base of the excavation.

upon additional testing to be described later, it became apparent that the contamination observed in the excavation could not be attributed entirely to leakage from Tank #225 and that further study by other means was warranted. A decision was made to backfill the excavation. On August 30, the excavation was lined with visqueen and backfilled with clean crushed rock to the grade of the adjacent pavement. The backfill was placed so that the new, uncontaminated backfill may be removed when further remediation is performed.

WASTE SOIL TESTING AND DISPOSAL

The stockpiled soils from the tank excavations were sampled on August 30, 1989 in accordance with the requirements of the Seattle-King County Health Department. The samples were submitted to an analytical laboratory for analysis of volatile organic compounds, PCBs, TPH, and EP Toxicity metals. The purpose of the sampling and analysis was to provide a basis for determination of disposal options within the solid waste disposal facilities in King County. The results of the analyses are summarized on Table 4. Analytical laboratory reports are included in Appendix B. The waste soils were cleared for disposal at the Cedar Hills Landfill by the Seattle-King County Health Department (Appendix C) and were transported to the landfill on November 1, 1989.

SUBSEQUENT SUBSURFACE CONTAMINATION STUDY

INITIAL FINGERPRINT ANALYSIS

After extensive hydrocarbon contamination was found in the backfill surrounding the former waste oil tanks, we learned that there had been a history of loss of hydraulic fluid from the lift systems within the Stores Building. There are four existing below-grade concrete vaults in the truck bays of the Stores Building as shown on Figure 4. Vaults V-1, V-3 and V-4 are below-grade vaults for hydraulic lift equipment. These three vaults extend to about 8 feet below slab grade. The other vault, V-2, is a shallower vault associated with a truck wash system. The hydraulic systems in vaults V-1, V-3, and V-4 are connected to above-grade hydraulic fluid reservoirs via below-grade piping. We obtained a sample of the pure hydraulic fluid for chemical analysis and performed a fuel fingerprint analysis (EPA Method 8015, modified) for comparison to other analyses. The

chromatogram for the hydraulic fluid is presented in Figure 5. Figure 5 also shows sample chromatograms for other hydrocarbons which (despite differences in scale) demonstrate the distinctive fingerprint of the hydraulic fluid as compared to other distilled hydrocarbon products.

The chromatograms for the hydrocarbon in the soil samples analyzed from the excavation for Tank #224 and Tank #225 correlated very well with the profile of the hydraulic fluid (Figure 6).

EXPLORATORY BORINGS AND MONITOR WELLS

Three phases of exploratory drilling and monitor well installation were performed to evaluate the distribution of subsurface contamination. Details of the subsurface exploration program are presented in Appendix A. One or more soil samples from each boring, selected on the basis of field screening results and depth, were submitted to the analytical laboratory for analysis of TPH (EPA Method 418.1). Selected samples from the borings were also submitted for fuel fingerprint analysis (EPA Method 8015, modified).

The information gained from the exploratory borings and monitor wells was supplemented by the information gathered during the removal of the waste oil tanks and by four exploratory borings with monitor wells (MW-1 to MW-4) completed as part of a prior investigation.

Six exploratory borings were drilled on the site on September 5 and 6, 1989. Monitor wells were installed in each of the borings (MW-6 to MW-10). Fifteen additional exploratory borings with monitor wells (MW-11 to MW-22 and MW-24 to MW-26) were installed on October 9 through 12, 1989. Six additional exploratory borings were completed on November 27 and 28, 1989. Monitor wells were installed in three of these explorations (MW-23, MW-30, and MW-31). The soil borings without monitor wells (B-27 to B-29) were backfilled. The locations of all exploratory borings and monitor wells are shown on Figures 2 and 4.

SUBSURFACE SOIL CONDITIONS

Shallow fill soil was generally encountered beneath the asphaltic concrete outside of the building, in the vicinity of the waste oil tanks, and beneath the portland cement concrete in the Stores Building. This shallow fill consists of sand and gravel to average depths of 1 to 2 feet and a maximum observed depth of 5 feet. Beneath the shallow fill we

encountered a thick layer of coal mine spoils which can be characterized as being a mixture of fragmented coal and rock (generally shale), with variable amounts of sediment. Generally the coal mine spoils extended to depths of about 8 to 12 feet below grade. The coal mine spoils were underlain by interlayered sand, silty sand, and silt which extend to the base of the explorations.

GROUND WATER CONDITIONS

Ground water conditions were explored by constructing monitor wells in twenty-four of the exploratory borings. Construction details for the wells are presented in Appendix A. Monitor wells from a prior investigation (MW-1 through MW-4) also provided additional water level information.

Water levels were measured in all completed wells (including MW-1 through MW-4) on September 7, October 16, and November 15, 1989. Additional water level measurements were made in Wells MW-6, MW-7, and MW-25 on October 24, November 2, and November 27, 1989. Measured water level elevations are presented in Table 5. Between early September and mid-October, water levels dropped an average of about 0.3 feet across the site. Between mid-October and mid-November, water levels rose about 0.6 feet. Heavy rains in early November are likely responsible for the water level rise in November. The depth to ground water ranged from approximately 6 to 9 feet below existing grades in the wells on November 15, 1989. Water table elevations as measured on November 15 are shown in Figure 4 and on the monitor well logs in Appendix A.

SUBSURFACE CONTAMINATION

Ground Water Observations: Free product was encountered in MW-6, MW-7 and MW-25. Product thickness measurements during seven periods between October 16 and November 27, 1989 are shown on Table 6. Product was bailed from the wells on several occasions so that product recovery could be observed. Product recovery was slow in MW-6 and MW-7 and was relatively rapid in MW-25. A maximum product thickness of 1.32 feet was measured in MW-25 on November 27, 1989.

We obtained product samples from MW-7 and MW-25 for fuel fingerprint analysis (EPA Method 8015, modified). The results of those analyses demonstrate that the product is hydraulic fluid similar in character to that

obtained from the oil reservoir in the Stores Building. Chromatograms for those analyses are shown in Figure 6. Analytical results are included in Appendix B.

Ground Water Chemistry: Ground water samples were obtained from selected wells shortly after they were installed for analysis of TPH. Ground water samples were obtained from MW-5 through MW-10 on September 7, 1989. Water samples were obtained from MW-12, MW-19 and MW-20 on October 27, 1989. The results of the ground water analyses are summarized on Table 7. TPH concentrations in ground water ranged from 22 to 140 ppm for those wells where contaminated soils were identified and tested. The highest TPH concentration noted in ground water tested from wells outside the limits of soil contamination was 0.48 ppm. Current Washington Department of Ecology (Ecology) cleanup guidelines require mitigation of ground water contamination where TPH concentrations in ground water exceed 15 ppm.

Soil Chemistry: One or more soil samples from each soil boring were tested for TPH. Soil samples were selected on the basis of field screening test results and the depth of the samples relative to the water table. Petroleum hydrocarbon contamination which migrates laterally on the water table as free (floating) product tends to accumulate within the soil matrix in the zone of water table fluctuation. The results of TPH analysis are shown on Table 8.

Ecology guidelines presently require mitigation of soil contamination where TPH concentrations in soil exceed 200 ppm. The estimated limits of soil contamination (TPH in soil exceeding 200 ppm) are shown on Figure 4.

Five soil samples were also submitted to the analytical laboratory for fuel fingerprint analysis. The fuel fingerprint analytical results are also presented in Table 8. Samples from four of the soil borings (MW-16, MW-24 MW-25 and MW-31) showed distinctive chromatograms characteristic of the hydraulic fluid. The chromatogram for the soil sample from MW-18 did not indicate any significant petroleum hydrocarbon contamination. Chromatograms for these soil sample analyses (except for MW-31) are shown on Figure 7.

Soil Contamination Observations: Based upon the results of field screening and analytical testing, we estimate that the zone of soil contamination varies between 5 and 10 feet in thickness with an average thickness of 7 feet within the "contaminated zone" as shown on Figure 4. The vertical distribution of contamination extends both above and below the ground water level as measured on November 15, 1989. Contaminated soils were identified as much as 5 feet below the water table.

Additional Observations: A sample of the hydraulic fluid from the fuel reservoir and a composite sample of the free product bailed from the wells were obtained for analysis of API gravity. This analysis provides additional information about the hydrocarbon product that is useful in evaluation of migration potential (viscosity) and the potential for successful biodegradation. The API gravity for the hydraulic fluid was 29.41° and the API gravity for the product from the wells was 29.22°. Analytical results are presented in Appendix B. Based upon these values, the viscosity of the hydraulic fluid is roughly 20 to 30 times greater than that of water. This means that the hydraulic fluid will move at 1/20th to 1/30th the rate of ground water beneath the ground.

Buried sewer utility lines were identified in the vicinity of the known areas of contamination from drawings, asphalt patches, manholes, and catch basins. The approximate locations and alignments of the sanitary sewer and the storm sewer in this area are shown on Figure 4. Buried utilities that extend to depths that potentially intercept the water table zone can be significant because the backfill surrounding the utility can act as a preferential conduit for the migration of contaminants.

On October 4, 1989 we observed the pumping of fluids from hydraulic vaults V-1, V-3, and V-4 (Figure 4). The dimensions of each vault and the measurements of accumulated hydraulic fluid and water in each sump are listed on Table 9. The total volume of liquid accounted for in the vaults (697 gallons) correlates with the estimate of the volume removed by the vacuum truck (700 gallons). At the time the observations were made, the bases of the vaults were about $\frac{1}{2}$ to 1 foot above the water level in surrounding wells. We expect that in the winter months the ground water levels rise above the base of the vaults. Only one vault was noted to be

in poor condition, vault V-4, the westernmost vault. There were numerous fractures on the walls of vault V-4 and pieces of the concrete wall were missing. Approximately one hour after pumping fluid from vault V-4 we observed fluid movement into the vault, indicating continuity with the surrounding soils.

CONCLUSIONS AND RECOMMENDATIONS

GENERAL

Soil contamination remains in the vicinity of both of the former underground waste oil storage tanks. It is likely that the contamination in these areas is derived from both hydraulic fluid and the waste oils and other fluids placed in the waste oil tanks. Chlorinated solvent contamination in the vicinity of Tank #225 is present in soils at concentrations that warrant cleanup for tetrachloroethene and 1,1,1-trichloroethane. It is likely that the removal of soil contaminated by petroleum hydrocarbons will also result in cleanup of the solvent contaminated soils.

The easternmost source of the subsurface hydraulic fluid contamination appears to be in the vicinity of vault V-1. Our observations of the conditions of the vaults at the time they were evacuated of accumulated oil and water suggest that vault V-4 is also a contributor to the subsurface hydraulic oil contamination. Free product was noted in Wells MW-6 and MW-7, both of which are in close proximity to vault V-4. The condition of subsurface hydraulic fluid distribution lines was not checked and these subsurface structures are also possible sources of hydraulic fluid leakage.

The lateral distribution of hydraulic fluid contamination does not appear to be strongly influenced by hydraulic gradients on the water table. The general direction of ground water movement is toward the southwest and west. The hydraulic fluid contamination has migrated both to the south and northwest of the probable source areas, as shown on Figure 4. This may be due to seasonal changes in the local hydraulic gradient or to the movement of the hydraulic fluid through preferential flow pathways that do not follow the natural ground water gradient.

It appears that the subsurface migration of the hydraulic fluid may have been influenced in part by the location of subsurface utility lines. The data suggest a distribution of soil contamination following the pattern

shown in Figure 4. The reason for this distribution pattern is not clear, but it likely represents the presence of preferential flow paths within the utility backfill and the coal spoils.

The westerly front of the plume appears to terminate quite rapidly in the soil. This observation is supported by the ground water quality data. We believe that the coal mine spoils are effective in adsorbing the hydraulic fluid to both the coal fragments and the sediments. Carbon treatment technology is commonly used to remove organic compounds from ground water. The coal spoils may be acting like a large carbon filter beneath the site. While this has the beneficial effect of significantly retarding the migration of the hydraulic fluid away from the site, it also means that the hydrocarbons could be very difficult to remove from the soil matrix.

A lobe of the plume extends toward Grady Way. It is likely that the soil contamination extends off of PSP&L property in this direction. Based on our past experience, cleanup of hydrocarbon contamination beneath public right-of-ways has not always been required, especially when the risk posed by the contamination is relatively low.

Total petroleum hydrocarbon concentrations in the soils significantly exceed Ecology's current cleanup guideline of 200 ppm TPH. Mitigation is warranted under Ecology's current policy. Future standards and regulations could result in requirements for a more exhaustive and expensive cleanup than that mandated under Ecology's current policy. Ground water only appears to be adversely impacted in the immediate vicinity of soil contamination. We do not believe that ground water cleanup (other than mitigation of free product) is required based upon the testing performed to date.

We recommend that PSP&L begin evaluating site mitigation alternatives now so that this site can be addressed prior to changes in Ecology's current cleanup guidelines. Several remedial options are discussed in the following section.

REMEDIAL OPTIONS

Soil Excavation: The soil excavation option involves the removal of concrete or asphalt, the upper zone of uncontaminated fill material; identification and excavation of contaminated soils; possible dewatering activities during excavation; disposal and/or remediation of the contaminated soils; and restoration of the site, including replacement of compacted fill and the concrete or asphalt surfaces. This option will result in expeditious site cleanup and a high level of confidence in the completeness of cleanup activities. Soil excavation at this site would potentially involve the following tasks:

1. Demolition of concrete floor slab within the Stores Building and asphalt pavement over the area of known hydrocarbon contamination. Waste concrete could be disposed of as demolition fill or recycled by a concrete crushing company. Waste asphalt could be transported to the Coal Creek Landfill for disposal.
2. Removal and stockpiling of uncontaminated overburden. Field screening tests supported by confirmatory analysis at an off-site analytical laboratory or on-site analytical testing capabilities will be required to discriminate between contaminated and uncontaminated soils.
3. Removal of contaminated soils to the top of the water table zone. If preacceptance for disposal of the waste soils at the Cedar Hills Landfill is obtained, the material may be transported directly to the landfill, which avoids the necessity for double handling. Otherwise, the material will need to be stockpiled until clearance for disposal is obtained. As an alternative to soil disposal, it may be possible to use alternative technologies to remove the hydrocarbons from the soil, such as controlled bioremediation or thermal treatment.
4. Collection of free (floating) product from the water table zone. Construction of shallow collection trenches will allow for the accumulation of free product so that it can be collected with sorbent pads and vacuum trucks. Dewatering should not be attempted until most of the free product is removed so that deeper soil zones are not contaminated with free product.

5. Dewatering the area of excavations to a level corresponding with the base of the zone of contamination. The amount of dewatering can be minimized or eliminated by conducting the cleanup in late summer when water levels are at a seasonal low. Dewatering will require the placement of dewatering wells and coordinating the disposal of effluent water with METRO and possibly the City of Renton.
6. Excavation and disposal of contaminated soils from the dewatered zone in a manner similar to that described in item 3, above.
7. Restoration of site, including the placement of compacted fill and replacement of concrete flooring
8. Followup monitoring of ground water in existing or new wells to evaluate lateral migration and dissolution of hydraulic fluid into ground water that may have occurred as a result of the remedial action.

In-Situ Bioremediation: In-situ bioremediation involves the stimulation of naturally occurring bacteria which degrade petroleum hydrocarbons. This stimulation generally is done by adding oxygen and/or nutrients to the subsurface environment. We are not aware of successful application of in-situ bioremediation techniques for soil contaminated by hydraulic fluid. Generally, in-situ bioremediation is a relatively slow process, often taking several years to complete a cleanup. In-situ bioremediation at this site would involve the following tasks:

1. Perform a treatability study to evaluate the capability of naturally occurring bacteria to degrade the hydrocarbons and to determine the optimum conditions for biodegradation to occur.
2. Remove free (floating) product using conventional skimming techniques from wells or collection trenches.
3. Install a nutrient and/or oxygen injection system in the zone of contamination. As part of this, monitoring points will be established to provide feedback on needs of the system and its effectiveness.
4. Monitor the system on a regular basis to evaluate microbe populations, nutrient levels, and oxygen concentrations.

5. Monitor ground water quality on a regular basis as a precautionary measure.
6. When it is felt that the cleanup goals have been reached, the site would be redrilled and sampled for TPH to provide confirmation of the effectiveness of the bioremediation.
7. Upon successful completion of remediation, the nutrient and oxygen distribution system would be dismantled, wells abandoned, and the site restored to its prior condition.

In-Situ Steam Stripping: Another potential technology which to our knowledge is unproven for mitigation of hydraulic fluid contamination is in-situ steam stripping. This process involves the injection of steam into the ground to help mobilize product in the vapor phase and in the liquid phase (by lowering its viscosity) so that it can be recovered at a collection point. We envision that in-situ steam stripping at this site would involve the following tasks:

1. Perform laboratory bench studies with the contaminated coal spoils to evaluate the effectiveness of steam in stripping hydraulic fluid from the soil sufficiently to achieve the target cleanup goals.
2. Design and install a series of steam injection wells along the perimeter of the contaminated zone, a ground water collection gallery/well at the center of the contaminated zone, and a steam collection gallery in the center of the contaminated zone.
3. Design and install a steam generating and distribution system. This may use ground water as makeup water.
4. Design, permit, and install a steam condenser and effluent scrubbing system
5. Install a skimmer pump in the ground water collection gallery/well to remove accumulated free product.
6. When it is felt that the cleanup goals have been reached, the site would be redrilled and sampled for TPH to provide confirmation of the effectiveness of the steam stripping.

7. Upon successful completion of remediation, the steam stripping system would be dismantled, the wells abandoned, and the site restored to its prior condition.

RECOMMENDATIONS

It is our opinion that the soil excavation option will be the most effective way to quickly remediate the site with the greatest degree of confidence in the cleanup. The other options present uncertainty in effectiveness that will not be fully resolved until the method is attempted on a full-scale basis. The general feasibility of bioremediation and steam stripping could be evaluated by completion of the primary task listed for each of those options. We have not evaluated costs of implementation of these cleanup options. At your direction we can prepare estimated remediation costs for those options selected.

If soil excavation is selected for site remediation, we recommend that it be implemented in the late summer of 1990, when the water table is low, so that dewatering requirements can be reduced or eliminated. Dewatering for a cleanup of this size would likely be difficult and expensive.

Until such time that remediation is begun, we recommend monthly measurement of water levels and product thicknesses, and quarterly sampling and analysis of ground water from selected wells for TPH. We also recommend that PSP&L meet with the City of Renton to discuss possible contamination beneath Grady Way. We further recommend that treatability studies be undertaken to investigate the feasibility of steam stripping and biological treatment of the excavated soil.

LIMITATIONS

This report has been prepared for use by PSP&L in their evaluation of subsurface contamination in the vicinity of the Stores Building at the Renton Service Center located in Renton, Washington. This report may be provided to regulatory agencies and to other parties authorized by PSP&L for this project. The report is not intended for use by others and the information contained herein may not be applicable to other sites.



Our services have been executed in accordance with generally accepted practices in this area at the time the report was prepared. No other conditions, expressed or implied, should be understood.

- o o o -

If you have any questions concerning this report, please call.

Respectfully submitted,

GeoEngineers, Inc.

A handwritten signature in black ink that reads "Kathy S. Killman".

Kathy S. Killman
Project Geologist

A handwritten signature in black ink that reads "Stephen C. Perrigo".

Stephen C. Perrigo
Associate

A handwritten signature in black ink that reads "James A. Miller".

James A. Miller, P.E.
Principal

KSK:SCP:JAM:sd

**TABLE 1
SUMMARY OF SAMPLING, SCREENING, AND
HYDROCARBON ANALYSIS FOR SOIL SAMPLES
FROM WASTE OIL TANK EXCAVATIONS**

Sample Number	Sample Depth (feet)	Sampling Location	Date Sampled	Sheen Test	TPH (ppm)	Fuel Fingerprint Analysis (ppm)	
						as gasoline	as diesel
Tank 224							
224-WW	4.5	west wall	08/15/89	MS	<1.0	--	--
224-EW	4.0	east wall	08/15/89	SS	590	--	--
224-SW	4.0	south wall	08/15/89	SS	130	--	--
224-NW	4.0	north wall	08/15/89	SS	100	--	--
224-BASE	7.0	base	08/15/89	HS	3,900	<25	2,400
224-EW1	7.5	east wall	08/22/89	HS	190	--	--
224-B1	10.5	base	08/22/89	MS	29	--	--
224-SW1	7.5	south wall	08/24/89	HS	52,000	<100	16,000
224-WW1	7.0	west wall	08/24/89	MS	21,000	<50	5,700
Tank 225							
225-B	8.0	base	08/14/89	HS	1,900	<5	710
225-NW	7.0	north wall	08/14/89	HS	11,000	--	--
225-WW	7.0	west wall	08/14/89	MS	28	--	--
225-EW	7.0	east wall	08/14/89	MS	200	--	--
225-SW	5.0	south wall	08/14/89	SS	22	--	--
225-NW1	7.0	north wall	08/22/89	SS	19	--	--
225-B1	8.0	base	08/22/89	SS	1.8	--	--

Notes:
 Sheen Testing: SS = slight sheen, MS = moderate sheen, HS = heavy sheen.
 TPH (total petroleum hydrocarbons) analyzed by EPA Method 418.1
 Fuel fingerprint analyzed by EPA Method 8015 (modified) and quantified relative to gasoline and diesel standards
 Fuel fingerprint analysis detections quantified as diesel were in the carbon range of C-16 to C-26.

TABLE 2
SUMMARY OF VOLATILE ORGANIC COMPOUND ANALYSIS
FOR SOIL SAMPLES FROM WASTE OIL TANK EXCAVATIONS

COMPOUND	UNITS	TANK 224	
		224-BASE	224-SW-1
benzene	ppm	<0.025	<0.025
ethylbenzene	ppm	<0.025	<0.025
toluene	ppm	<0.025	<0.025
total xylenes	ppm	<0.050	0.100
dibromochloromethane	ppm	<0.010	0.032
tetrachloroethene	ppm	0.022	<0.010

COMPOUND	UNITS	TANK 225				
		225-B	225-NW	225-WW	225-EW	225-SW
benzene	ppm	<0.025	<0.025	<0.025	<0.025	<0.025
ethylbenzene	ppm	<0.025	0.11	<0.025	0.032	0.12
toluene	ppm	<0.025	0.055	<0.025	0.036	0.044
total xylenes	ppm	<0.050	0.56	<0.050	0.169	0.65
tetrachloroethene	ppm	0.47	1.1	0.23	0.42	0.095
1,1,1-trichloroethane	ppm	0.15	0.069	0.51	0.067	0.091
trichloroethene	ppm	0.043	<0.010	<0.010	<0.010	<0.010

Notes:
 "<" indicates "less than"
 "ppm" indicates "parts per million"
 Volatile organic compounds analyzed by EPA Methods 8010/8020.
 Only those volatile organic compounds detected are listed.
 Refer to Appendix B for a complete list of analytes.

**TABLE 3
SUMMARY OF ANALYTICAL CHEMISTRY DATA
FOR FLUIDS FROM TANK 225**

COMPOUND	UNITS	TANK FLUID	
		WATER PHASE	OIL PHASE
Volatile Organic Compounds			
benzene	ppb	140.	--
ethylbenzene	ppb	170.	--
toluene	ppb	580.	--
total xylenes	ppb	830.	--
1,1 dichloroethane	ppb	49.	--
1,2 dichloroethane	ppb	20.	--
methylene chloride	ppb	13,000.	--
tetrachloroethene	ppb	510.	--
1,1,1 trichloroethane	ppb	1,200.	--
Polychlorinated Biphenyls	ppm	--	<2.0

Notes:
 "ppm" indicates "parts per million"
 "ppb" indicates "parts per billion"
 "<" indicates "less than"
 Volatile organic compounds analyzed by EPA Methods 8010/8020.
 Only those compounds detected are listed, refer to Appendix B
 for a complete list of analytes.
 Polychlorinated biphenyls analyzed by EPA Method 8080.
 Individual PCB aroclors are below detection limit of 2.0 ppm.

TABLE 4
SUMMARY OF ANALYTICAL CHEMISTRY DATA FOR
STOCKPILED SOIL FROM WASTE OIL TANK EXCAVATIONS

Parameter	UNITS	Sample Stock-C
Volatile Organic Compounds		
benzene	ppm	<0.025
ethylbenzene	ppm	<0.025
toluene	ppm	<0.025
xylene	ppm	0.041
tetrachloroethene	ppm	0.045
Polychlorinated Biphenyls		
aroclor 1016	ppm	<0.025
aroclor 1221	ppm	<0.025
aroclor 1232	ppm	<0.025
aroclor 1242	ppm	<0.025
aroclor 1248	ppm	<0.025
aroclor 1254	ppm	<0.025
aroclor 1260	ppm	<0.025
EP Toxicity Test – Metals		
arsenic	ppm	<0.005
barium	ppm	0.11
cadmium	ppm	<0.01
chromium	ppm	<0.02
lead	ppm	<0.1
mercury	ppm	<0.0005
selenium	ppm	<0.005
silver	ppm	<0.02
TPH	ppm	3,500

Notes:

Sample # Stock-C is a composite soil sample obtained from stockpiled soils from waste oil tank excavations (tanks 224 and 225).

"ppm" indicates "parts per million"

"<" indicates "less than"

Volatile organic compounds analyzed by EPA Methods 8010/8020, refer to Appendix B for a complete list of analytes.

Polychlorinated biphenyls analyzed by EPA Method 8080.

TPH (total petroleum hydrocarbons) analyzed by EPA Method 418.1.

**TABLE 5
WATER LEVEL ELEVATIONS**

Well Number	Water Table Elevations (feet)					
	09/07/89	10/16/89	10/24/89	11/02/89	11/15/89	11/27/89
MW-1	92.05	91.76	--	--	92.49	--
MW-2	92.37	92.10	--	--	92.87	--
MW-3	92.59	92.19	--	--	93.16	--
MW-4	92.54	92.12	--	--	93.14	--
MW-5	91.66	91.47	--	--	92.06	--
MW-6	91.69	91.48*	91.58*	91.56*	92.04	92.12
MW-7	92.21	91.50*	91.56*	91.74*	92.08*	92.18*
MW-8	91.55	91.36	--	--	91.91	--
MW-9	91.58	91.39	--	--	91.91	--
MW-10	91.38	91.28	--	--	91.82	--
MW-11	--	91.50	--	--	92.09	--
MW-12	--	91.35	--	--	91.90	--
MW-13	--	91.52	--	--	92.10	--
MW-14	--	91.49	--	--	92.07	--
MW-15	--	91.48	--	--	92.05	--
MW-16	--	91.50	--	--	92.08	--
MW-17	--	91.49	--	--	91.20	--
MW-18	--	91.43	--	--	92.00	--
MW-19	--	91.35	--	--	91.90	--
MW-20	--	91.29	--	--	91.85	--
MW-21	--	91.50	--	--	92.08	--
MW-22	--	91.50	--	--	92.07	--
MW-24	--	91.50	--	--	92.07	--
MW-25	--	91.37*	91.48*	91.58	91.95*	91.96*
MW-26	--	91.50	--	--	92.05	--

Notes:

"--" indicates "not measured"

Water level elevations based on assumed datum of 100.0 feet at the location shown on Figure 2.

* Water level elevation has been corrected for floating product.

TABLE 6
PRODUCT THICKNESS IN MONITOR WELLS

Date	Well Number		
	MW-6	MW-7	MW-25
10/16/89	0.24	0.22	0.37
10/17/89	0.29	0.33	0.52
10/24/89	0.15*	0.53*	0.60*
10/27/89	0.04*	0.07*	0.58*
11/02/89	0.45*	0.30*	0.72*
11/15/89	trace	0.25*	0.46*
11/27/89	trace	0.23	1.32

Notes:
 Product thickness measured in feet using tape and
 paste and/or an acrylic baller.
 * Product removed from the well after measurement.

TABLE 7
SUMMARY OF ANALYTICAL CHEMISTRY DATA
FOR GROUND WATER SAMPLES

WELL NUMBER	SAMPLE DATE	TPH (ppm)
MW-5	09/07/89	0.21
MW-6	09/07/89	140
MW-7	09/07/89	49
MW-8	09/07/89	0.48
MW-9	09/07/89	22
MW-10	09/07/89	0.34
MW-12	10/27/89	0.06
MW-19	10/27/89	0.06
MW-20	10/27/89	0.06

Notes:

"ppm" indicates "parts per million"

TPH (total petroleum hydrocarbons) analyzed by EPA Method 418.1

TABLE 8
SUMMARY OF ANALYTICAL CHEMISTRY DATA
FOR SOIL SAMPLES FROM BORINGS

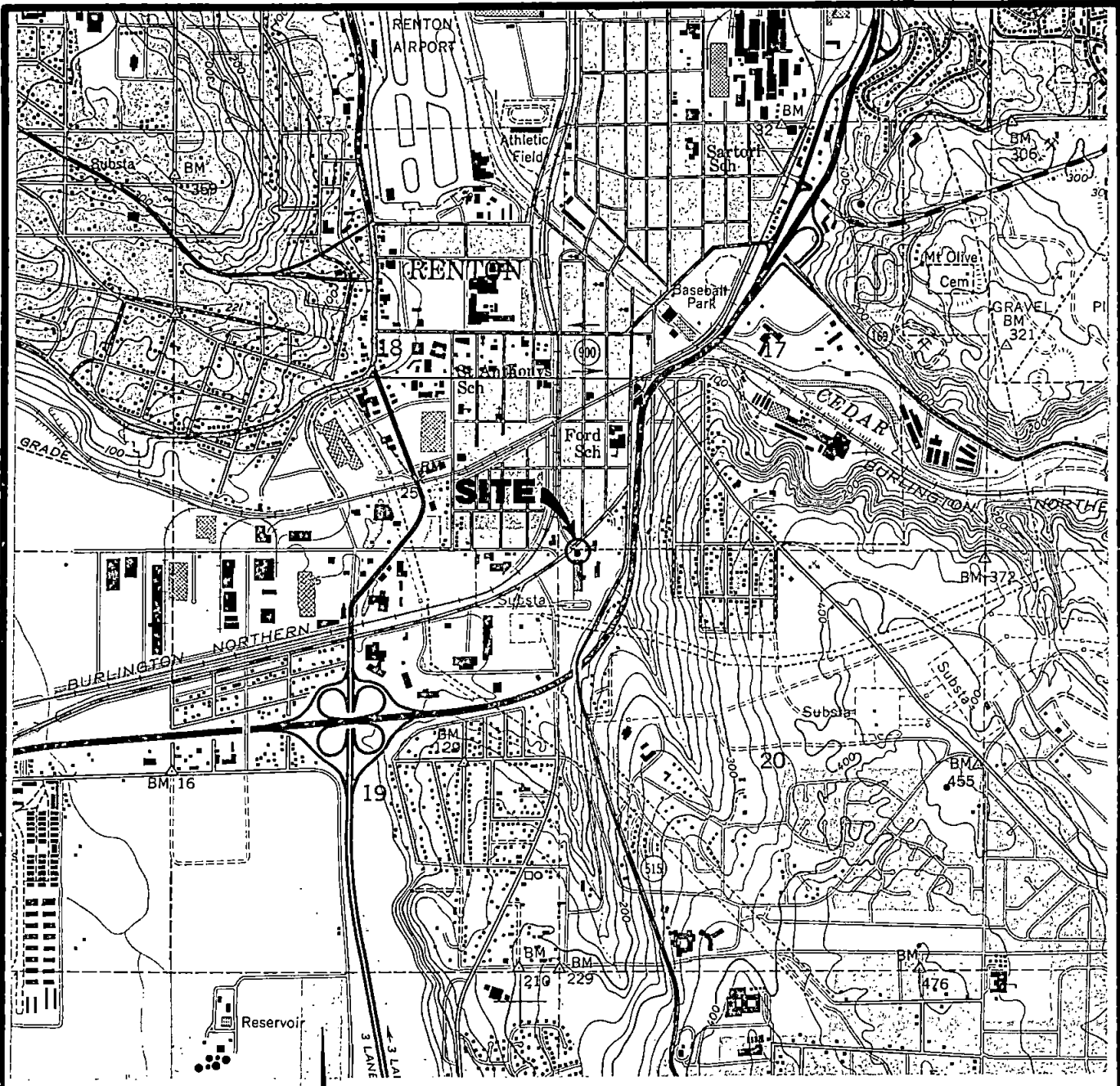
BORING NUMBER	SAMPLE DEPTH (feet)	TPH (ppm)	FUEL FINGERPRINT ANALYSIS (ppm)	
			as gasoline	as diesel
MW-5	8.0	<1	--	--
"	13.0	<1	--	--
MW-6	8.0	34,000	--	--
"	13.0	2.8	--	--
MW-7	8.0	13,000	--	--
"	13.0	12	--	--
MW-8	8.0	22	--	--
"	13.0	<1	--	--
MW-9	8.0	11,000	--	--
"	13.0	<1	--	--
MW-10	5.5	<1	--	--
"	13.0	<1	--	--
MW-11	8.0	<1	--	--
MW-12	8.0	13	--	--
MW-13	8.0	3	--	--
MW-14	8.0	7,100	--	--
"	10.5	100	--	--
"	13.0	<1	--	--
MW-15	8.0	13,000	--	--
"	10.5	320	--	--
"	13.0	<1	--	--
MW-16	8.0	9,300	<25	2,200(a)
"	13.0	<1	--	--
MW-17	8.0	<1	--	--
MW-18	8.0	7.7	<5	10(b)
"	13.0	<1	--	--
MW-19	8.0	<1	--	--
MW-20	8.0	<1	--	--
MW-21	8.0	.370	--	--
MW-22	8.0	73	--	--
MW-23	8.0	5,900	--	--
MW-24	8.0	6,000	<25	1,800(a)
"	13.0	7	--	--
MW-25	5.5	14,000	<50	4,500(c)
"	8.0	<1	--	--
MW-26	8.0	<1	--	--
B-27	5.5	19	--	--
B-28	8.0	25	--	--
B-29	8.0	6.9	--	--
MW-30	8.0	8.4	--	--
MW-31	5.5	2,000	<5	840(d)

Notes:
 "ppm" indicates "parts per million"
 "--" indicates "not tested"
 "<" indicates "less than"
 TPH (total petroleum hydrocarbons) analyzed by EPA Method 418.1.
 Fuel fingerprint analyzed by EPA Method 8015 (modified) and quantified relative to gasoline and diesel standards.
 (a) Carbon range C14-C26
 (b) Carbon range C18-C26
 (c) Carbon range C16-C26
 (d) Carbon range C08-C28

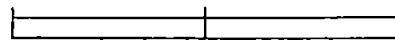
TABLE 9
OBSERVATION OF HYDRAULIC VAULT PUMPING
October 4, 1989

Vault	Plan Dimension (feet)	Vault Depth (feet)	Water		Oil		Sump Condition
			Thickness (Feet)	Volume (gallons)	Thickness (Feet)	Volume (gallons)	
V-1	1.5 x 12.2	7.83	0.25	34	0.42	57	Good
V-3	1.5 x 12.7	8.33	0.50	71	1.92	274	Good
V-4	1.5 x 12.7	8.33	0.0	0	1.83	261	Poor

0186-101-604 KSK:KKT 11-16-89



0 2000 4000



SCALE IN FEET

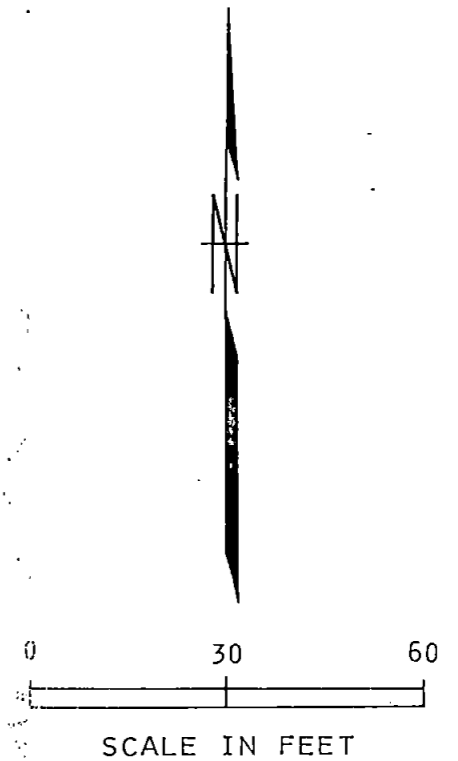
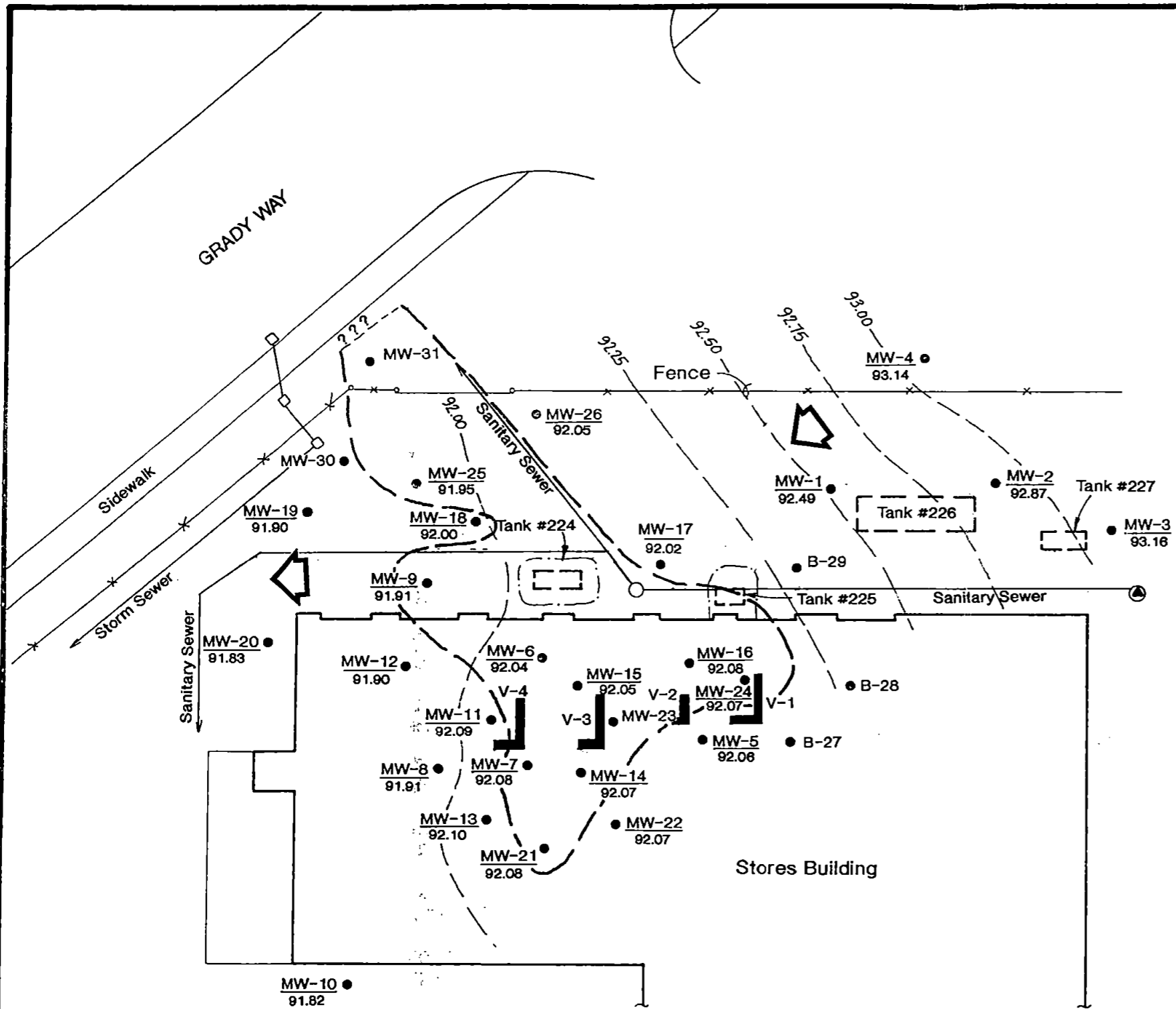
REFERENCE: USGS 7.5' TOPOGRAPHIC QUADRANGLE MAP "RENTON, WASH."



VICINITY MAP

FIGURE 1

0186-101-804 SCP:KKT 11-29-89



EXPLANATION:

- B-28 ● BORING LOCATION AND NUMBER
- MW-1 ● MONITOR WELL LOCATION AND NUMBER
92.49 GROUND WATER ELEVATION OF 11/15/89
- ▲ BENCHMARK AT CENTER OF MANHOLE
ASSUMED ELEVATION OF 100.00 FEET
- 92.00 --- GROUND WATER CONTOUR BASED ON
11/15/89 MEASUREMENTS
- ▾ GENERAL DIRECTION OF GROUND
WATER FLOW
- APPROXIMATE LOCATION OF SANITARY SEWER
LINES AND MANHOLES
- V-1 █ APPROXIMATE LOCATION AND
ORIENTATION OF VAULTS
- APPROXIMATE LIMITS OF SOIL CONTAMINATION
EXCEEDING 200 PPM TPH
- APPROXIMATE LOCATION OF STORM SEWER
LINES AND CATCH BASINS

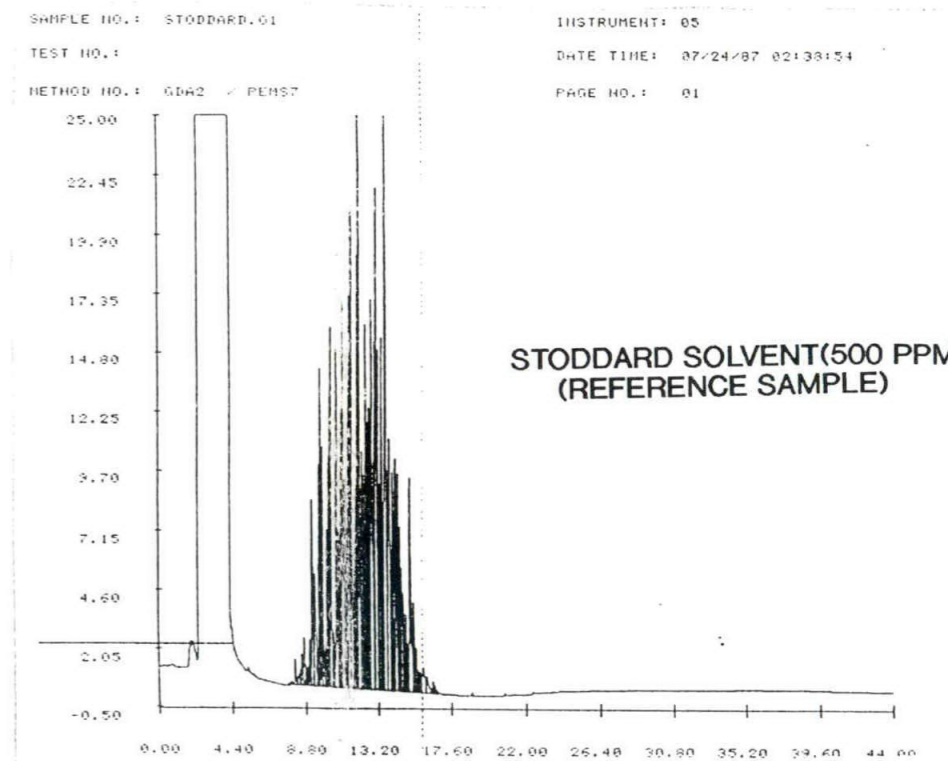
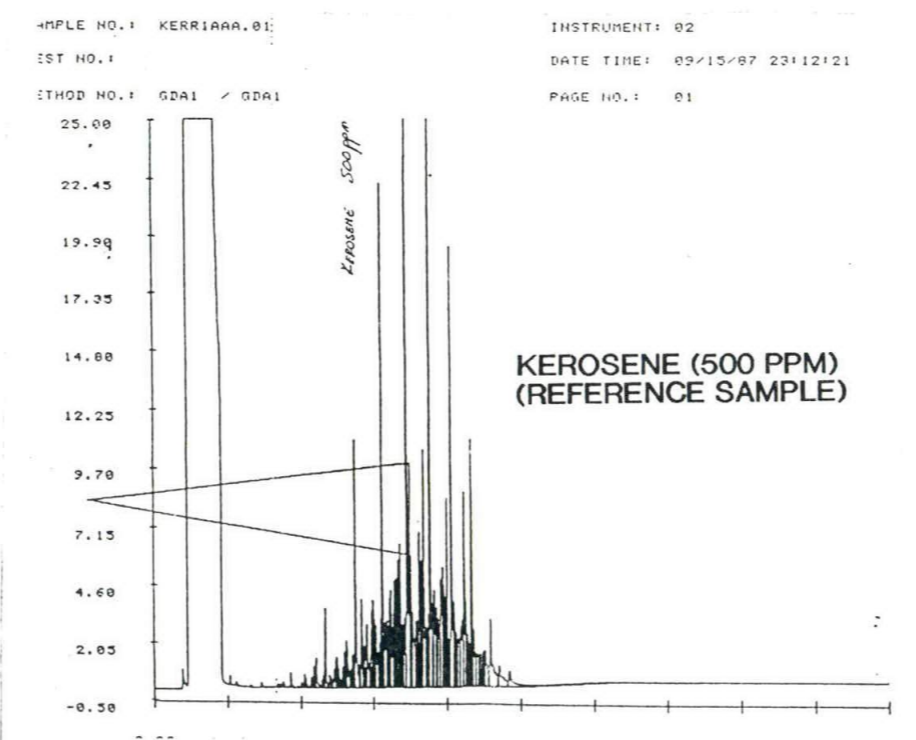
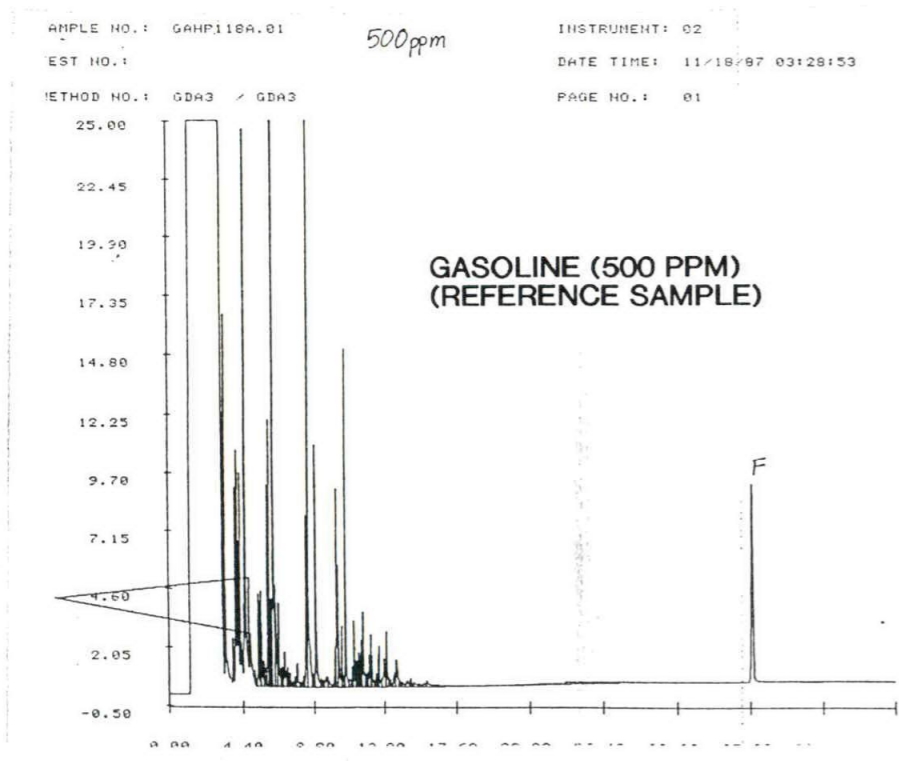
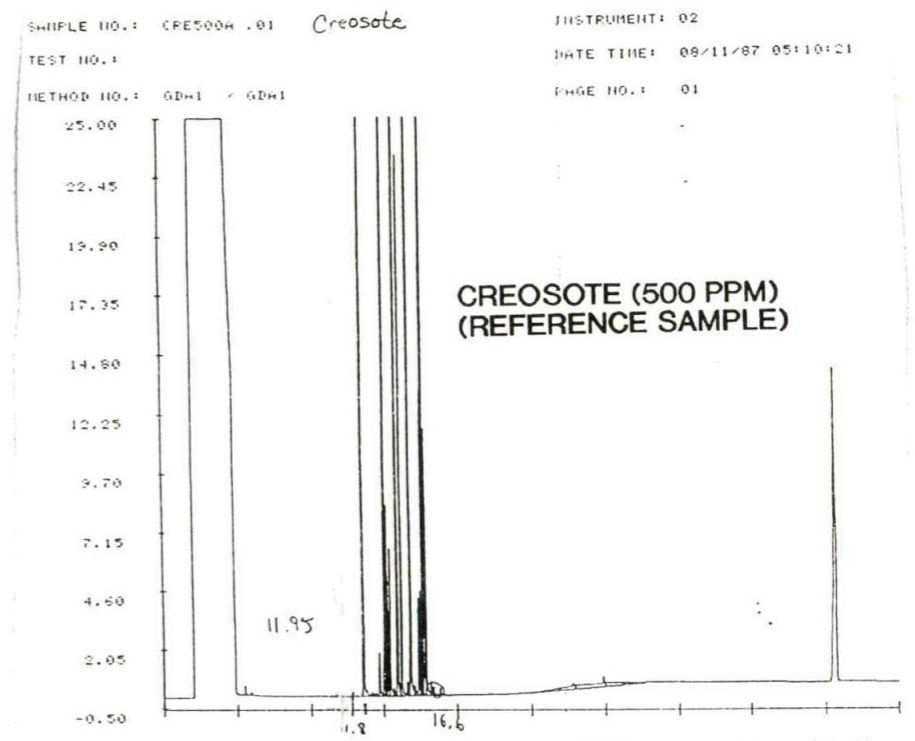
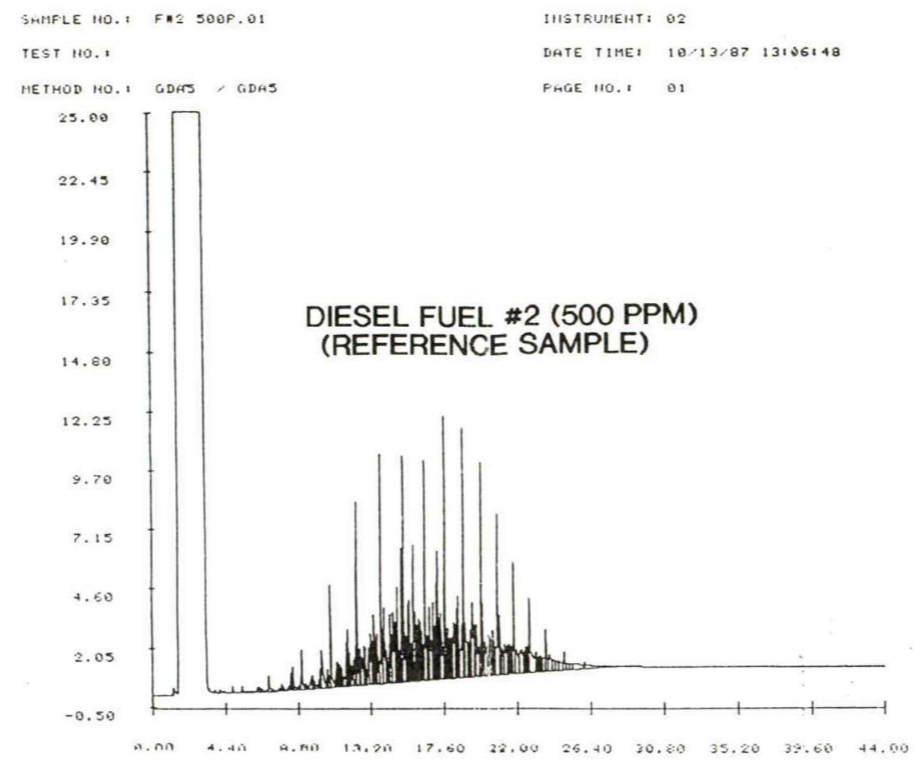
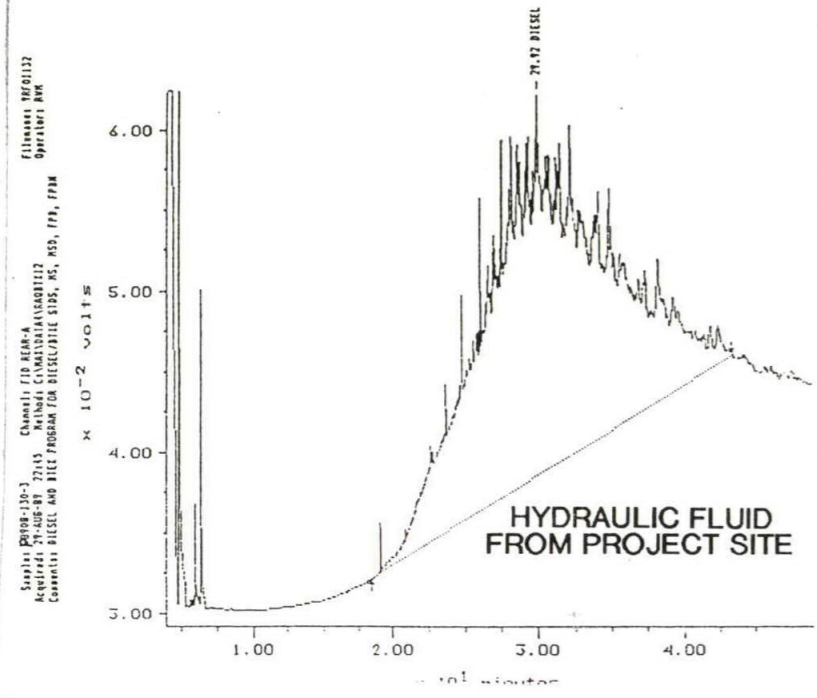
REFERENCE: DRAWING ENTITLED "RENTON TRANSPORTATION CENTER REMODEL", DATED 3/4/74,
BY PUGET POWER AND SITE MEASUREMENTS MADE BY GEOENGINEERS, INC.



**LIMIT OF CONTAMINATION AND
GROUND WATER LEVELS**

FIGURE 4

0186-101-Bo4 SCP:BDH 12-12-89



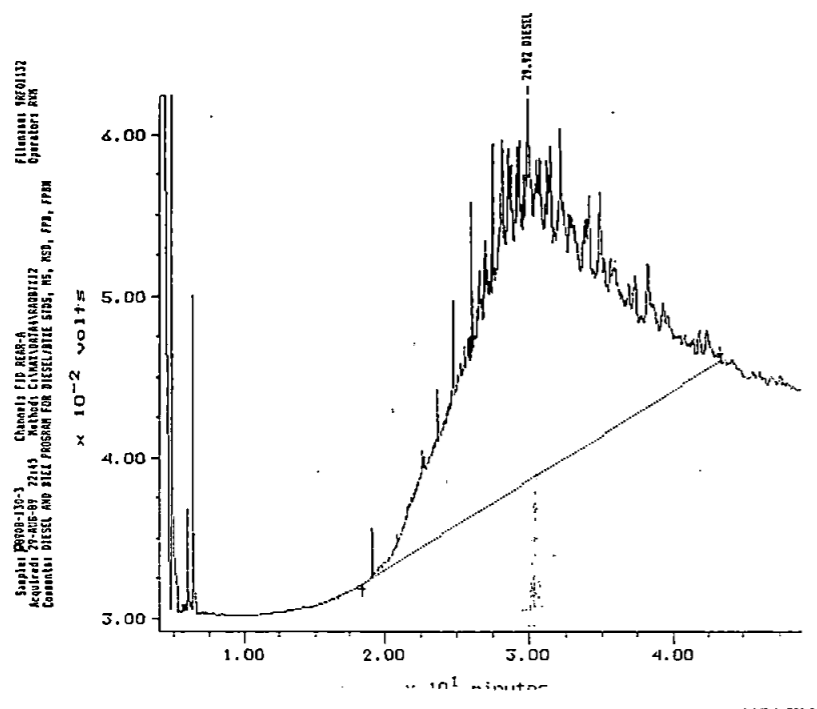
CHROMATOGRAMS FROM FUEL FINGERPRINT ANALYSIS - EPA METHOD 8015(MODIFIED)
 NOTE: BOTH VERTICAL AND HORIZONTAL SCALES MAY VARY BETWEEN CHROMATOGRAMS.
 THESE CHROMATOGRAMS ARE INCLUDED FOR ILLUSTRATIVE PURPOSES ONLY.



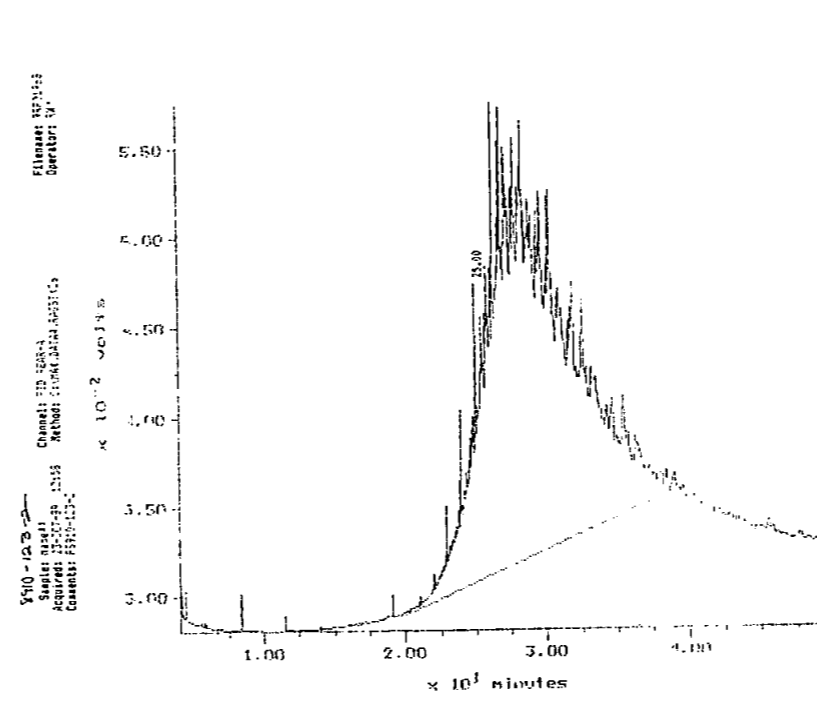
CHROMATOGRAMS OF HYDRAULIC FLUID AND OTHER PETROLEUM HYDROCARBON DISTILLATES
 FIGURE 5

0186-101-504 JCP: wH 12-12-89

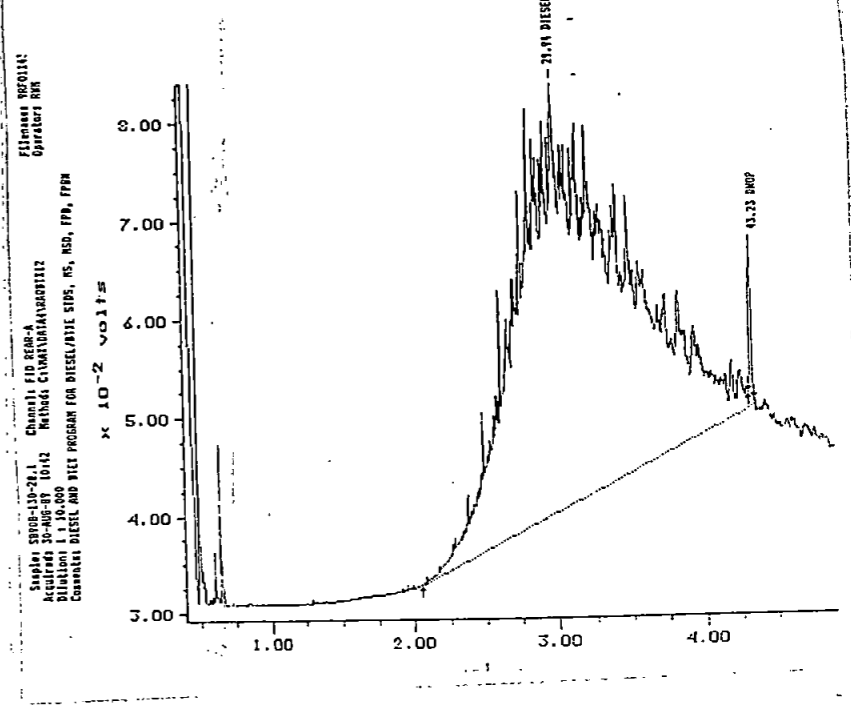
HYDRAULIC FLUID FROM PROJECT SITE



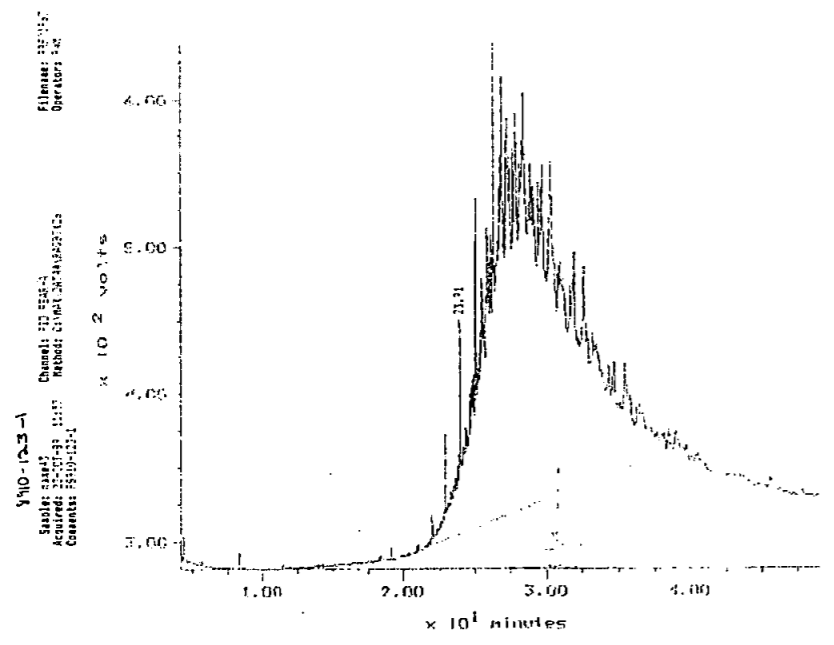
MW-7 PRODUCT



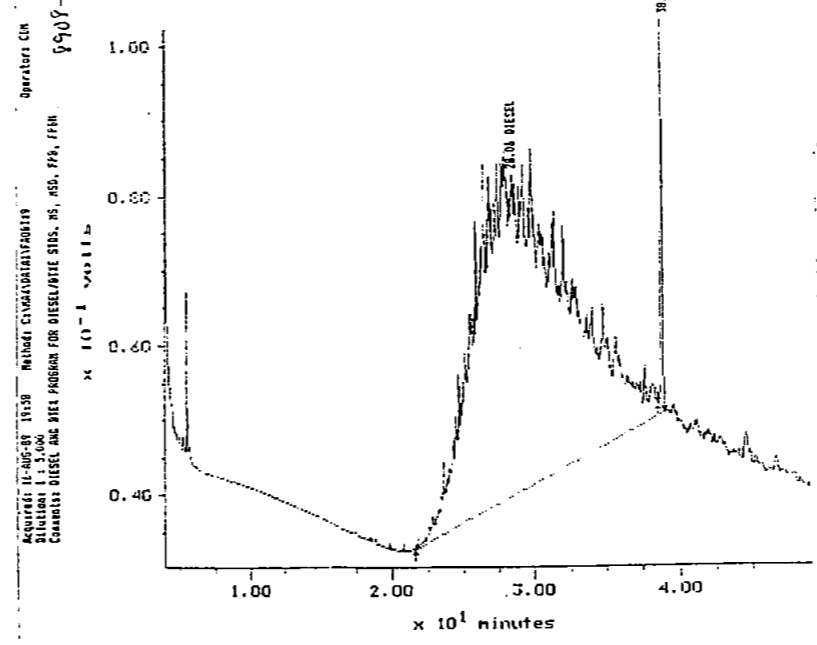
TANK #224 - WEST WALL (SOIL)



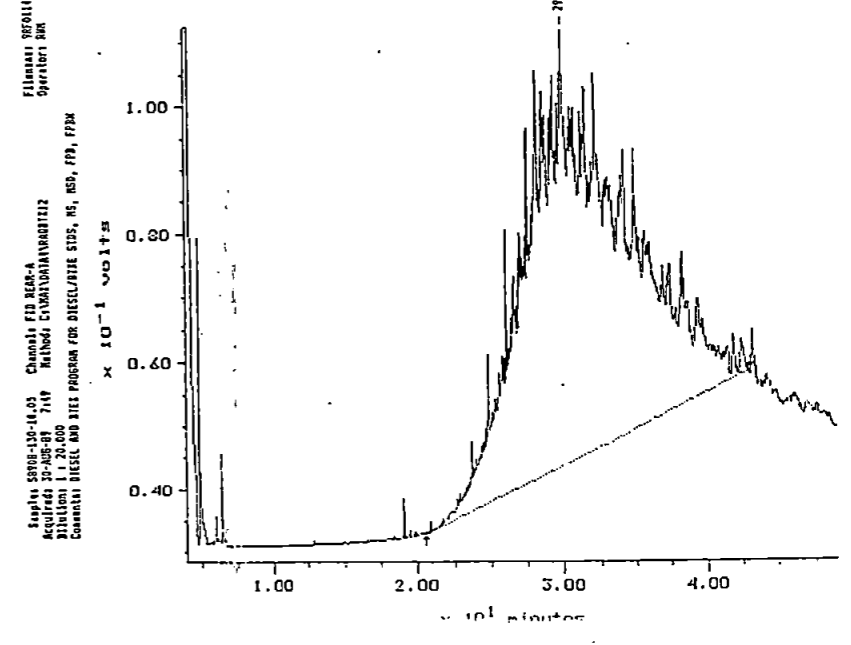
MW-25 PRODUCT



TANK #224 - BASE (SOIL)



TANK #224 - SOUTH WALL (SOIL)



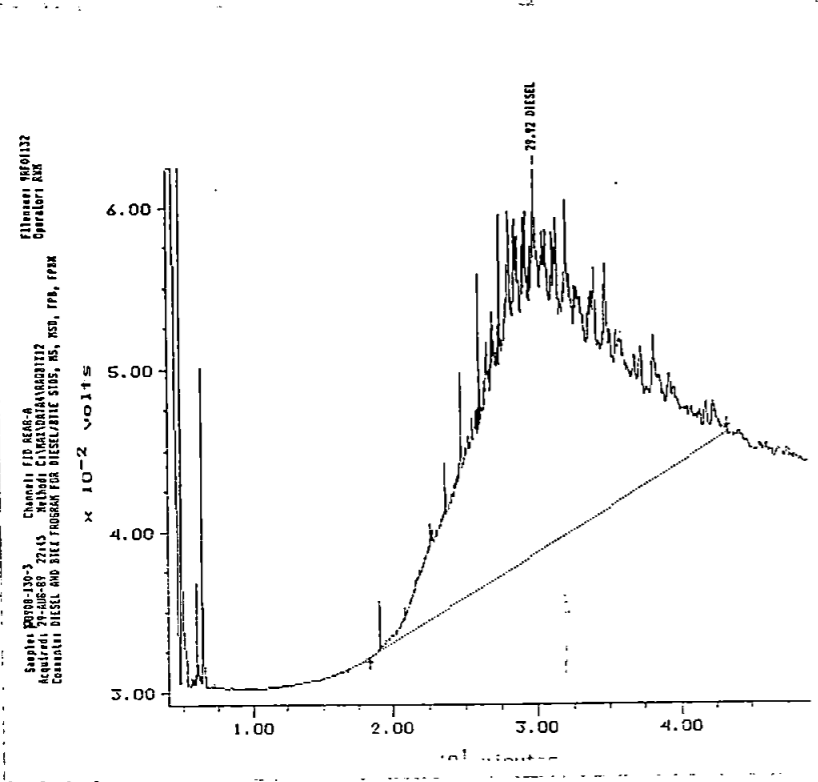
CHROMATOGRAMS FROM FUEL FINGERPRINT ANALYSIS - EPA METHOD 8015(MODIFIED)
NOTE: VERTICAL SCALES MAY VARY BETWEEN CHROMATOGRAMS



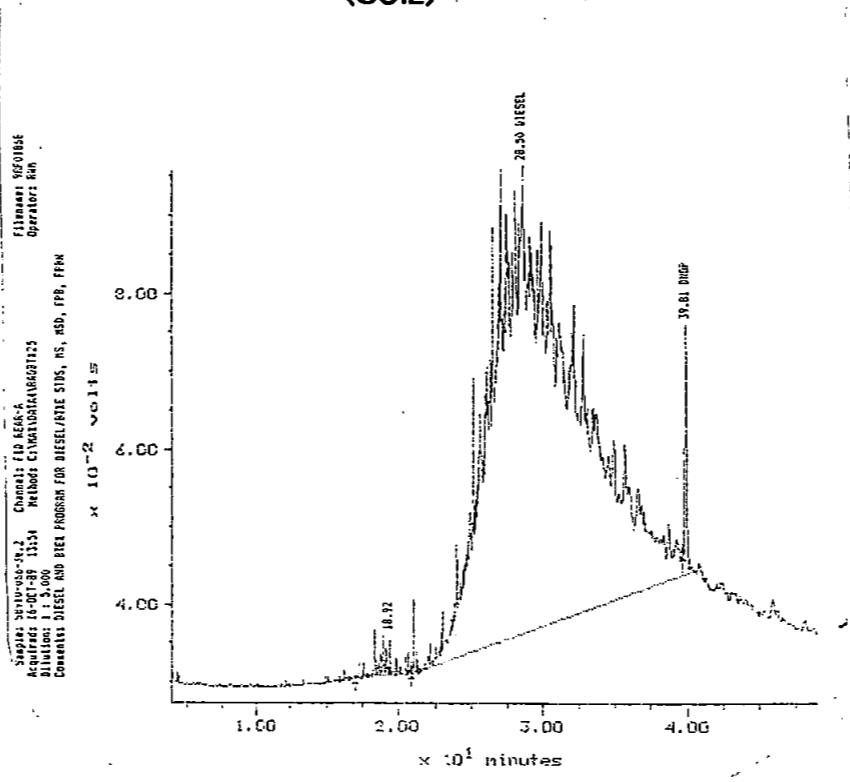
CHROMATOGRAMS OF HYDRAULIC FLUID, PRODUCT FROM WELLS, AND SOILS FROM TANK #224

FIGURE 6

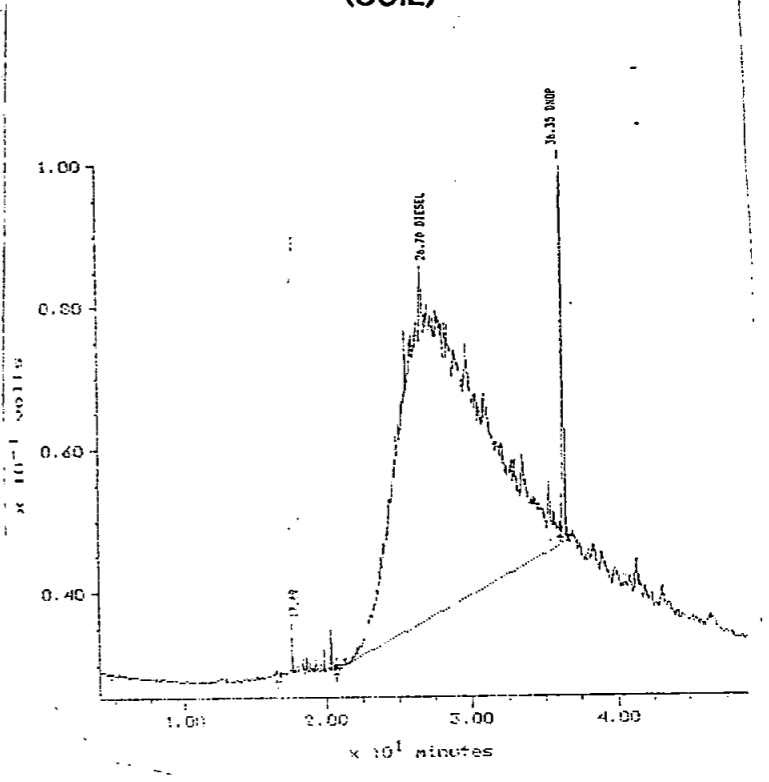
HYDRAULIC FLUID FROM PROJECT SITE



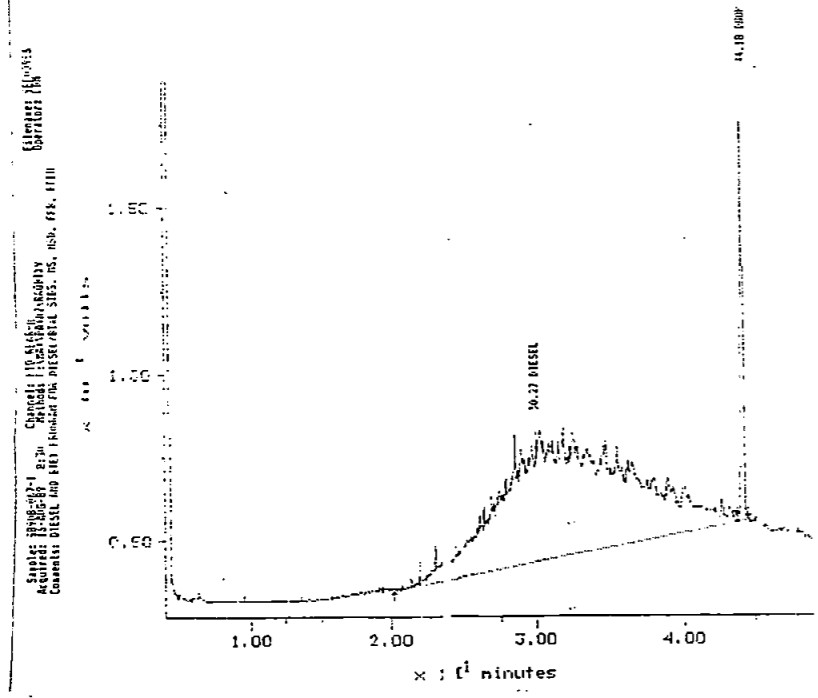
MW-16 #3 (SOIL)



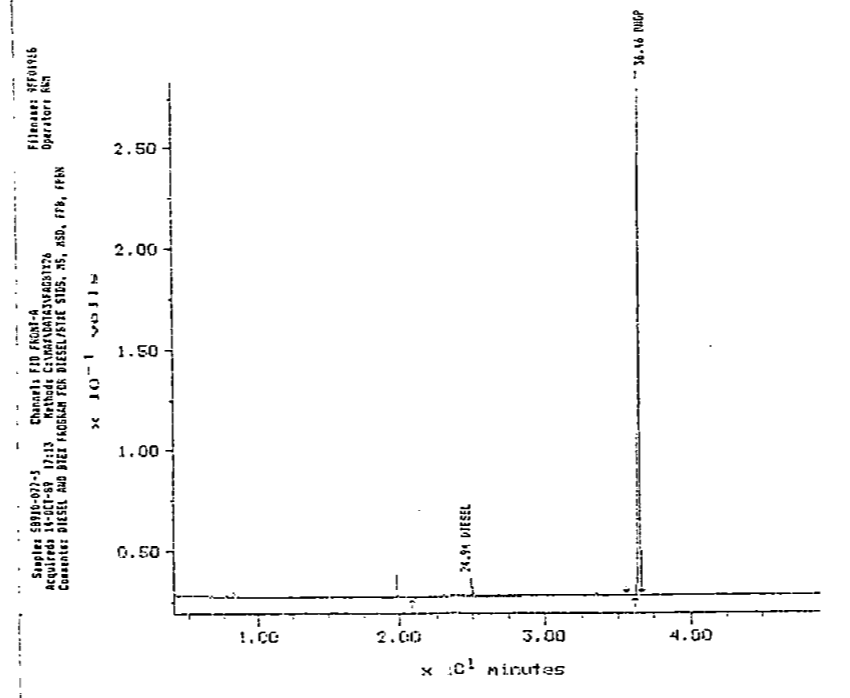
MW-24 #3 (SOIL)



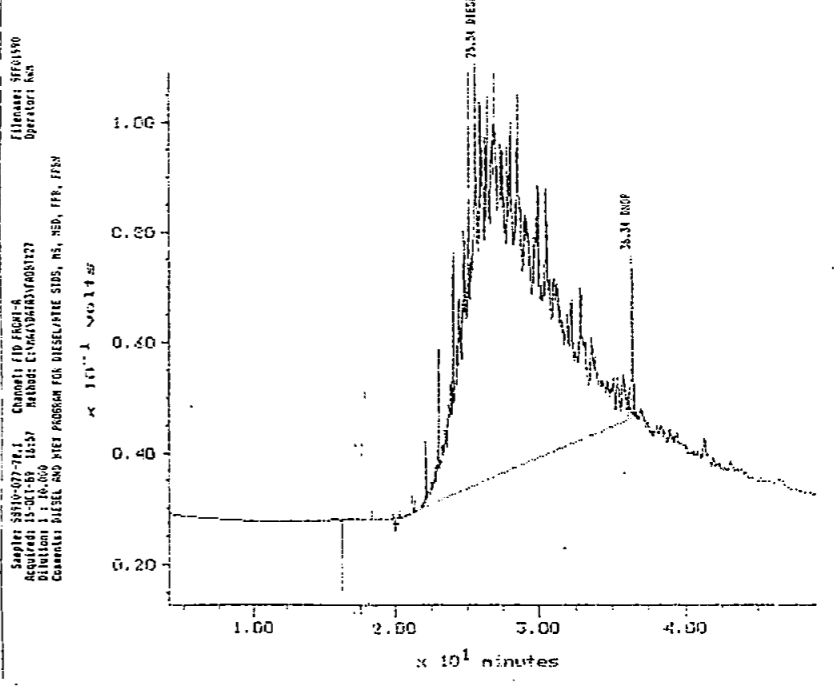
TANK #225 (BASE) (SOIL)



MW-13 #3 (SOIL)



MW-25 #2 (SOIL)



CHROMATOGRAMS FROM FUEL FINGERPRINT ANALYSIS - EPA METHOD 8015(MODIFIED)
 NOTE: VERTICAL SCALES MAY VARY BETWEEN CHROMATOGRAMS



CHROMATOGRAMS OF HYDRAULIC FLUID,
 SOILS FROM TANK #225, AND SOIL BORINGS

FIGURE 7

O186-101-Bo4 SCP:BOH 12-12-89

APPENDIX B

A P P E N D I X B

Index

<u>Laboratory and I.D.#</u>	<u>Contents</u>	<u>Pages</u>
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ATI #8908-067	Analytical results (EPA 8010/8020 and 418.1) on soil samples from Tank #225 excavation	B-11 thru B-27
ATI #8908-075	Analytical results (EPA 8010/8020, 418.1 and 8015, modified) on soil samples from Tank #224 excavation	B-28 thru B-40
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APPENDIX B - CONTINUED

<u>Laboratory and I.D.#</u>	<u>Contents</u>	<u>Pages</u>
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ATI #8911-108	Analytical results (EPA 418.1) on soil samples from Borings MW-23, B-27 and B-28	B-161 thru B-166
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Analytical **Technologies, Inc.**

560 Naches Avenue, S.W., Suite 101, Renton, WA 98055, (206) 228-8335

ATI I.D. # 8908-032

GeoEngineers

August 15, 1989

AUG 16 1989

Routing SCP SP KSK
 File 0186-101-4

GeoEngineers, Inc.
 2405 140th Avenue N.E.
 Suite 105
 Bellevue, WA 98005

Attention : Steve Perrigo

Project Number : 0186-101-BO4

Project Name : PSP+L-Renton

On August 4, 1989 Analytical Technologies, Inc. received one oil/water sample for analyses. The sample was analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and the quality control data are enclosed.

Mary C. Silva
 Mary C. Silva
 GC Chemist

FWG/nah

Frederick W. Grothkopp
 Frederick W. Grothkopp
 Technical Manager



SAMPLE CROSS REFERENCE SHEET

CLIENT : GEOENGINEERS, INC.
PROJECT # : 0186-101-BO4
PROJECT NAME : PSP+L RENTON

Table with 4 columns: ATI #, CLIENT DESCRIPTION, MATRIX, DATE SAMPLED. Row 1: 8908-032-1, EAST TANK, OIL/WATER, 08/04/89

----- TOTALS -----

Summary table with 2 columns: MATRIX, # SAMPLES. Row 1: OIL/WATER, 1

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) 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 : GEOENGINEERS, INC.
PROJECT # : 0186-101-BO4
PROJECT NAME : PSP+L RENTON

ANALYSIS	TECHNIQUE	REFERENCE/METHOD
PURGEABLE HALOCARBONS	GC/HALL	EPA 601
PURGEABLE AROMATICS	GC/PID	EPA 602
POLYCHLORINATED BIPHENYLS (PCBs)	GC/ECD	EPA 8080

VOLATILE ORGANIC ANALYSIS
 DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: N/A
PROJECT #	: 0186-101-BO4	DATE RECEIVED	: N/A
PROJECT NAME	: PSP+L RENTON	DATE EXTRACTED	: N/A
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 08/08/89
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 601/602	DILUTION FACTOR	: 1

COMPOUND	RESULT
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<0.5
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<0.5
CHLOROFORM	<0.2
CHLOROMETHANE	<2.0
DIBROMOCHLOROMETHANE	<0.2
1,2-DICHLOROBENZENE	<0.5
1,3-DICHLOROBENZENE	<0.5
1,4-DICHLOROBENZENE	<0.5
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE	<0.2
1,1-DICHLOROETHENE	<0.2
CIS-1,2-DICHLOROETHENE	<0.2
TRANS-1,2-DICHLOROETHENE	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<1.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<0.5
META & PARA XYLENE	<0.5
ORTHO XYLENE	<0.5

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE	92
BROMOFLUOROBENZENE	91



VOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 08/04/89
PROJECT #	: 0186-101-BO4	DATE RECEIVED	: 08/04/89
PROJECT NAME	: PSP+L RENTON	DATE EXTRACTED	: N/A
CLIENT I.D.	: EAST TANK	DATE ANALYZED	: 08/08/89
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 601/602	DILUTION FACTOR	: 50/2500

COMPOUND	RESULT
BENZENE	140
BROMODICHLOROMETHANE	<10
BROMOFORM	<10
BROMOMETHANE	<25
CARBON TETRACHLORIDE	<10
CHLOROBENZENE	<25
CHLOROETHANE	<25
CHLOROFORM	<10
CHLOROMETHANE	<100
DIBROMOCHLOROMETHANE	<10
1,2-DICHLOROBENZENE	<25
1,3-DICHLOROBENZENE	<25
1,4-DICHLOROBENZENE	<25
1,1-DICHLOROETHANE	49
1,2-DICHLOROETHANE	20
1,1-DICHLOROETHENE	<10
CIS-1,2-DICHLOROETHENE	<10
TRANS-1,2-DICHLOROETHENE	<10
1,2-DICHLOROPROPANE	<10
CIS-1,3-DICHLOROPROPENE	<10
TRANS-1,3-DICHLOROPROPENE	<10
ETHYLBENZENE	170
METHYLENE CHLORIDE	13,000 *
1,2,2-TETRACHLOROETHANE	<10
TETRACHLOROETHENE	510
TOLUENE	580
1,1,1-TRICHLOROETHANE	1,200
1,1,2-TRICHLOROETHANE	<10
TRICHLOROETHENE	<10
TRICHLOROFLUOROMETHANE	<25
VINYL CHLORIDE	<25
META & PARA XYLENE	540
ORTHO XYLENE	290

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE	101
BROMOFLUOROBENZENE	102

* Dilution factor = 2500



VOLATILE ORGANIC
QUALITY CONTROL DATA

CLIENT	: GEOENGINEERS, INC.	SAMPLE I.D.	: BLANK 7/31B
PROJECT #	: 0186-101-BO4	DATE ANALYZED	: 07/31/89
PROJECT NAME	: PSP+L RENTON	SAMPLE MATRIX	: WATER
EPA METHOD	: 601/602	UNITS	: ug/L

COMPOUND	SAMPLE RESULT	SPIKE ADDED	SPIKED SAMPLE	% REC	DUP SPIKED SAMPLE	DUP % REC	RPD
BENZENE	<0.5	12.0	11.9	99	11.8	98	1
CHLOROBENZENE	<0.5	12.0	12.0	100	12.0	100	0
1,1-DICHLOROETHENE	<0.2	4.00	3.96	99	3.99	100	1
TETRACHLOROETHENE	<0.2	4.00	4.47	112	4.59	115	3
TOLUENE	<0.5	12.0	12.6	105	12.2	102	3
TRICHLOROETHENE	<0.2	4.00	4.37	109	4.29	107	2
META & PARA XYLENE	<0.5	21.9	21.8	100	21.7	99	0

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

POLYCHLORINATED BIPHENYLS (PCB) ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: N/A
PROJECT #	: 0186-101-BO4	DATE RECEIVED	: N/A
PROJECT NAME	: PSP+L RENTON	DATE EXTRACTED	: 08/04/89
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 08/07/89
SAMPLE MATRIX	: OIL	UNITS	: mg/Kg
EPA METHOD	: 8080 (PCB) MID LEVEL	DILUTION FACTOR	: 1

COMPOUND	RESULT
PCB 1016	<2.0
PCB 1221	<2.0
PCB 1232	<2.0
PCB 1242	<2.0
PCB 1248	<2.0
PCB 1254	<2.0
PCB 1260	<2.0

SURROGATE PERCENT RECOVERY

DECACHLOROBIPHENYL	79
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ATI I.D. # 8908-032-1

POLYCHLORINATED BIPHENYLS (PCB) ANALYSIS
DATA SUMMARY

CLIENT : GEOENGINEERS, INC. DATE SAMPLED : 08/04/89
PROJECT # : 0186-101-BO4 DATE RECEIVED : 08/04/89
PROJECT NAME : PSP+L RENTON DATE EXTRACTED : 08/04/89
CLIENT I.D. : EAST TANK DATE ANALYZED : 08/08/89
SAMPLE MATRIX : OIL UNITS : mg/Kg
EPA METHOD : 8080 (PCB) MID LEVEL DILUTION FACTOR : 1

COMPOUND	RESULT
PCB 1016	<2.0
PCB 1221	<2.0
PCB 1232	<2.0
PCB 1242	<2.0
PCB 1248	<2.0
PCB 1254	<2.0
PCB 1260	<2.0

SURROGATE PERCENT RECOVERY

DECACHLOROBIPHENYL 136



POLYCHLORINATED BIPHENYLS (PCB)
QUALITY CONTROL

CLIENT : GEOENGINEERS, INC. SAMPLE ID : 8908-032-1
PROJECT # : 0186-101-BO4 DATE ANALYZED : 08/08/89
PROJECT NAME : PSP+L RENTON SAMPLE MATRIX : OIL
EPA METHOD : 8080 MID LEVEL UNITS : mg/Kg

Table with 8 columns: COMPOUND, SAMPLE RESULT, CONC SPIKED, SPIKED SAMPLE, % REC, DUP SPIKED SAMPLE, DUP % RECOVERY, RPD. Row 1: PCB 1260, <2.0, 10.0, 12.2, 122, 14.3, 143, 16

% Recovery = (Spike Sample result - Sample Result) / Spike Concentration X 100

RPD (Relative % Difference) = (Spiked Sample - Duplicate Spike) / Average of Spiked Sample X 100

Chain of Custody

DATE 8/4/89 PAGE 1 OF 1

PROJECT MANAGER: Steve Perrigo
 COMPANY: GeoEngineers, Inc.
 ADDRESS: _____
 PHONE: _____ SAMPLED BY: _____

LABORATORY NUMBER: 8908-032

ANALYSIS REQUEST

SAMPLE DISPOSAL INSTRUCTIONS
 ATI Disposal @ \$5.00 each
 Return Hold 30 days
 Pickup (will call)

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	8010	8020	BETX ONLY	8240	8270	8310	8080	PCB's ONLY	8140	8150	WDOE	418.1	413.2	8015	TOC	TOX	%	TCLP	Priority	EPTOX	EP TOX	NUMBER OF CONTAINERS
					Halogenated Volatiles	Aromatic Volatiles	GCMS Volatiles	GCMS BNA	HPLC PNA	Pesticides & PCB's	Phosphate Pesticides	Herbicides	PAH/HH (WAC 173)	(TPH)	Grease & Oil	(Modified)	9060	9020	Moisture	Metals (13)	Metals (8) Total	Metals (8) EP EXT				
East Tank	8/4/89		Oil	-1																						
"	8/4/89		Water	-1	X	X						X														

PROJECT INFORMATION		SAMPLE RECEIPT		RELINQUISHED BY: 1		RELINQUISHED BY: 2		RELINQUISHED BY: 3	
PROJECT NUMBER: <u>0186-84-B04</u>	TOTAL NUMBER OF CONTAINERS: <u>1</u>	CHAIN OF CUSTODY SEALS Y/NNA: <u>N</u>		Signature: <u>Steve Perrigo</u>	Time: <u>9:00</u>	Signature: _____	Time: _____	Signature: _____	Time: _____
PROJECT NAME: <u>PSPIL - Renton</u>	INTACT? Y/NNA: <u>Y</u>	RECEIVED GOOD COND./COLD: <u>Y</u>		Printed Name: <u>Steve Perrigo</u>	Date: <u>8/4/89</u>	Printed Name: _____	Date: _____	Printed Name: _____	Date: _____
PURCHASE ORDER NUMBER: _____	VIA: _____		TAT: <input checked="" type="checkbox"/> 24HR <input type="checkbox"/> 48 HRS <input type="checkbox"/> 72 HRS <input type="checkbox"/> 1 WK <input type="checkbox"/> 2 WKS (Normal)	Company: <u>GEI</u>	Company: _____	Company: _____	Company: _____	Company: _____	Company: _____
PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA		SPECIAL INSTRUCTIONS:		RECEIVED BY: 1		RECEIVED BY: 2		RECEIVED BY: (LAB) 3	
Signature: _____		Time: _____		Signature: _____	Time: _____	Signature: _____	Time: _____	Signature: <u>Deanna Barkley</u>	Time: <u>9:30</u>
Printed Name: _____		Date: _____		Printed Name: _____	Date: _____	Printed Name: _____	Date: _____	Printed Name: <u>Deanna Barkley</u>	Date: <u>8/4/89</u>
Company: _____		Company: _____		Company: _____		Company: _____		Company: <u>Analytical Technologies, Inc.</u>	

B - 10



August 23, 1989

Geoengineers, Inc.
2405 140th Avenue N.E.
Suite 105
Bellevue, WA 98005

Attention : Steve Perrigo

Project Number : 186-101-B4

Project Name : Puget Power

On August 14, 1989 Analytical Technologies, Inc. received five soil samples for analyses. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and the quality control data are enclosed.

Mary C. Silva
Senior Project Manager

FWG/tpj

Frederick W. Grothkopp
Technical Manager

SAMPLE CROSS REFERENCE SHEET

CLIENT : GEOENGINEERS, INC.
PROJECT # : 186-101-B4
PROJECT NAME : PUGET POWER

Table with 4 columns: ATI #, CLIENT DESCRIPTION, MATRIX, DATE SAMPLED. Contains 5 rows of sample data.

----- TOTALS -----

Summary table with 2 columns: MATRIX, # SAMPLES. Shows SOIL with 5 samples.

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) 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 : GEOENGINEERS, INC.
PROJECT # : 186-101-B4
PROJECT NAME : PUGET POWER

ANALYSIS	TECHNIQUE	REFERENCE/METHOD
PURGEABLE HALOCARBONS	GC/HALL	EPA 8010
PURGEABLE AROMATICS	GC/PID	EPA 8020
FUEL HYDROCARBONS	GC/FID	EPA 8015 MODIFIED
PETROLEUM HYDROCARBONS	IR	EPA 418.1
MOISTURE	GRAVIMETRIC	METHOD 7-2.2

VOLATILE ORGANIC ANALYSIS
 DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: N/A
PROJECT #	: 186-101-B4	DATE RECEIVED	: N/A
PROJECT NAME	: PUGET POWER	DATE EXTRACTED	: 08/15/89
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 08/16/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8010/8020	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
BENZENE	<0.025
BROMODICHLOROMETHANE	<0.010
BROMOFORM	<0.010
BROMOMETHANE	<0.025
CARBON TETRACHLORIDE	<0.010
CHLOROBENZENE	<0.025
CHLOROETHANE	<0.025
CHLOROFORM	<0.010
CHLOROMETHANE	<0.100
DIBROMOCHLOROMETHANE	<0.010
1,2-DICHLOROBENZENE	<0.025
1,3-DICHLOROBENZENE	<0.025
1,4-DICHLOROBENZENE	<0.025
1,1-DICHLOROETHANE	<0.010
1,2-DICHLOROETHANE	<0.010
1,1-DICHLOROETHENE	<0.010
CIS-1,2,-DICHLOROETHENE	<0.010
TRANS-1,2-DICHLOROETHENE	<0.010
1,2-DICHLOROPROPANE	<0.010
CIS-1,3-DICHLOROPROPENE	<0.010
TRANS-1,3-DICHLOROPROPENE	<0.010
ETHYLBENZENE	<0.025
METHYLENE CHLORIDE	<0.10
1,1,2,2-TETRACHLOROETHANE	<0.010
TETRACHLOROETHENE	<0.010
TOLUENE	<0.025
1,1,1-TRICHLOROETHANE	<0.010
1,1,2-TRICHLOROETHANE	<0.010
TRICHLOROETHENE	<0.010
TRICHLOROFLUOROMETHANE	<0.025
VINYL CHLORIDE	<0.025
META & PARA XYLENE	<0.025
ORTHO XYLENE	<0.025

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE	96
BROMOFLUOROBENZENE	102

VOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 08/14/89
PROJECT #	: 186-101-B4	DATE RECEIVED	: 08/14/89
PROJECT NAME	: PUGET POWER	DATE EXTRACTED	: 08/15/89
CLIENT I.D.	: 225-B	DATE ANALYZED	: 08/17/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8010/8020	DILUTION FACTOR	: 1
RESULTS BASED ON DRY WEIGHT			

COMPOUND	RESULT
BENZENE	<0.025
BROMODICHLOROMETHANE	<0.010
BROMOFORM	<0.010
BROMOMETHANE	<0.025
CARBON TETRACHLORIDE	<0.010
CHLOROBENZENE	<0.025
CHLOROETHANE	<0.025
CHLOROFORM	<0.010
CHLOROMETHANE	<0.100
DIBROMOCHLOROMETHANE	<0.010
1,2-DICHLOROBENZENE	<0.025
1,3-DICHLOROBENZENE	<0.025
1,4-DICHLOROBENZENE	<0.025
1,1-DICHLOROETHANE	<0.010
1,2-DICHLOROETHANE	<0.010
1,1-DICHLOROETHENE	<0.010
CIS-1,2,-DICHLOROETHENE	<0.010
TRANS-1,2-DICHLOROETHENE	<0.010
1,2-DICHLOROPROPANE	<0.010
CIS-1,3-DICHLOROPROPENE	<0.010
TRANS-1,3-DICHLOROPROPENE	<0.010
ETHYLBENZENE	<0.025
METHYLENE CHLORIDE	<0.10
1,1,2,2-TETRACHLOROETHANE	<0.010
TETRACHLOROETHENE	0.47
TOLUENE	<0.025
1,1,1-TRICHLOROETHANE	0.15
1,1,2-TRICHLOROETHANE	<0.010
TRICHLOROETHENE	0.043
TRICHLOROFLUOROMETHANE	<0.025
VINYL CHLORIDE	<0.025
META & PARA XYLENE	<0.025
ORTHO XYLENE	<0.025

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE	79
BROMOFLUOROBENZENE	73

VOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 08/14/89
PROJECT #	: 186-101-B4	DATE RECEIVED	: 08/14/89
PROJECT NAME	: PUGET POWER	DATE EXTRACTED	: 08/15/89
CLIENT I.D.	: 225-NW	DATE ANALYZED	: 08/17/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8010/8020	DILUTION FACTOR	: 1

COMPOUND	RESULT
BENZENE	<0.025
BROMODICHLOROMETHANE	<0.010
BROMOFORM	<0.010
BROMOMETHANE	<0.025
CARBON TETRACHLORIDE	<0.010
CHLOROBENZENE	<0.025
CHLOROETHANE	<0.025
CHLOROFORM	<0.010
CHLOROMETHANE	<0.100
DIBROMOCHLOROMETHANE	<0.010
1,2-DICHLOROBENZENE	<0.025
1,3-DICHLOROBENZENE	<0.025
1,4-DICHLOROBENZENE	<0.025
1,1-DICHLOROETHANE	<0.010
1,2-DICHLOROETHANE	<0.010
1,1-DICHLOROETHENE	<0.010
CIS-1,2,-DICHLOROETHENE	<0.010
TRANS-1,2-DICHLOROETHENE	<0.010
1,2-DICHLOROPROPANE	<0.010
CIS-1,3-DICHLOROPROPENE	<0.010
TRANS-1,3-DICHLOROPROPENE	<0.010
ETHYLBENZENE	0.11
METHYLENE CHLORIDE	<0.10
1,1,2,2-TETRACHLOROETHANE	<0.010
TETRACHLOROETHENE	1.1
TOLUENE	0.055
1,1,1-TRICHLOROETHANE	0.069
1,1,2-TRICHLOROETHANE	<0.010
TRICHLOROETHENE	<0.010
TRICHLOROFLUOROMETHANE	<0.025
VINYL CHLORIDE	<0.025
META & PARA XYLENE	0.38
ORTHO XYLENE	0.18

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE	84
BROMOFLUOROBENZENE	78

VOLATILE ORGANIC ANALYSIS
 DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 08/14/89
PROJECT #	: 186-101-B4	DATE RECEIVED	: 08/14/89
PROJECT NAME	: PUGET POWER	DATE EXTRACTED	: 08/15/89
CLIENT I.D.	: 225-WW	DATE ANALYZED	: 08/17/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8010/8020	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
BENZENE	<0.025
BROMODICHLOROMETHANE	<0.010
BROMOFORM	<0.010
BROMOMETHANE	<0.025
CARBON TETRACHLORIDE	<0.010
CHLOROBENZENE	<0.025
CHLOROETHANE	<0.025
CHLOROFORM	<0.010
CHLOROMETHANE	<0.100
DIBROMOCHLOROMETHANE	<0.010
1,2-DICHLOROBENZENE	<0.025
1,3-DICHLOROBENZENE	<0.025
1,4-DICHLOROBENZENE	<0.025
1,1-DICHLOROETHANE	<0.010
1,2-DICHLOROETHANE	<0.010
1,1-DICHLOROETHENE	<0.010
CIS-1,2,-DICHLOROETHENE	<0.010
TRANS-1,2-DICHLOROETHENE	<0.010
1,2-DICHLOROPROPANE	<0.010
CIS-1,3-DICHLOROPROPENE	<0.010
TRANS-1,3-DICHLOROPROPENE	<0.010
ETHYLBENZENE	<0.025
METHYLENE CHLORIDE	<0.10
1,1,2,2-TETRACHLOROETHANE	<0.010
TETRACHLOROETHENE	0.23
TOLUENE	<0.025
1,1,1-TRICHLOROETHANE	0.51
1,1,2-TRICHLOROETHANE	<0.010
TRICHLOROETHENE	<0.010
TRICHLOROFLUOROMETHANE	<0.025
VINYL CHLORIDE	<0.025
META & PARA XYLENE	<0.025
ORTHO XYLENE	<0.025

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE	71
BROMOFLUOROBENZENE	65

VOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 08/14/89
PROJECT #	: 186-101-B4	DATE RECEIVED	: 08/14/89
PROJECT NAME	: PUGET POWER	DATE EXTRACTED	: 08/15/89
CLIENT I.D.	: 225-EW	DATE ANALYZED	: 08/17/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8010/8020	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
BENZENE	<0.025
BROMODICHLOROMETHANE	<0.010
BROMOFORM	<0.010
BROMOMETHANE	<0.025
CARBON TETRACHLORIDE	<0.010
CHLOROBENZENE	<0.025
CHLOROETHANE	<0.025
CHLOROFORM	<0.010
CHLOROMETHANE	<0.100
DIBROMOCHLOROMETHANE	<0.010
1,2-DICHLOROBENZENE	<0.025
1,3-DICHLOROBENZENE	<0.025
1,4-DICHLOROBENZENE	<0.025
1,1-DICHLOROETHANE	<0.010
1,2-DICHLOROETHANE	<0.010
1,1-DICHLOROETHENE	<0.010
CIS-1,2,-DICHLOROETHENE	<0.010
TRANS-1,2-DICHLOROETHENE	<0.010
1,2-DICHLOROPROPANE	<0.010
CIS-1,3-DICHLOROPROPENE	<0.010
TRANS-1,3-DICHLOROPROPENE	<0.010
ETHYLBENZENE	0.032
METHYLENE CHLORIDE	<0.10
1,1,2,2-TETRACHLOROETHANE	<0.010
TETRACHLOROETHENE	0.42
TOLUENE	0.036
1,1,1-TRICHLOROETHANE	0.067
1,1,2-TRICHLOROETHANE	<0.010
TRICHLOROETHENE	<0.010
TRICHLOROFLUOROMETHANE	<0.025
VINYL CHLORIDE	<0.025
META & PARA XYLENE	0.12
ORTHO XYLENE	0.049

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE	79
BROMOFLUOROBENZENE	74

VOLATILE ORGANIC ANALYSIS
 DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 08/14/89
PROJECT #	: 186-101-B4	DATE RECEIVED	: 08/14/89
PROJECT NAME	: PUGET POWER	DATE EXTRACTED	: 08/15/89
CLIENT I.D.	: 225-SW	DATE ANALYZED	: 08/17/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8010/8020	DILUTION FACTOR	: 1

COMPOUND	RESULT
BENZENE	<0.025
BROMODICHLOROMETHANE	<0.010
BROMOFORM	<0.010
BROMOMETHANE	<0.025
CARBON TETRACHLORIDE	<0.010
CHLOROBENZENE	<0.025
CHLOROETHANE	<0.025
CHLOROFORM	<0.010
CHLOROMETHANE	<0.100
DIBROMOCHLOROMETHANE	<0.010
1,2-DICHLOROBENZENE	<0.025
1,3-DICHLOROBENZENE	<0.025
1,4-DICHLOROBENZENE	<0.025
1,1-DICHLOROETHANE	<0.010
1,2-DICHLOROETHANE	<0.010
1,1-DICHLOROETHENE	<0.010
CIS-1,2,-DICHLOROETHENE	<0.010
TRANS-1,2-DICHLOROETHENE	<0.010
1,2-DICHLOROPROPANE	<0.010
CIS-1,3-DICHLOROPROPENE	<0.010
TRANS-1,3-DICHLOROPROPENE	<0.010
ETHYLBENZENE	0.12
METHYLENE CHLORIDE	<0.10
1,1,2,2-TETRACHLOROETHANE	<0.010
TETRACHLOROETHENE	0.095
TOLUENE	0.044
1,1,1-TRICHLOROETHANE	0.091
1,1,2-TRICHLOROETHANE	<0.010
TRICHLOROETHENE	<0.010
TRICHLOROFLUOROMETHANE	<0.025
VINYL CHLORIDE	<0.025
META & PARA XYLENE	0.46
ORTHO XYLENE	0.19

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE	73
BROMOFLUOROBENZENE	72

VOLATILE ORGANIC
QUALITY CONTROL DATA

CLIENT : GEOENGINEERS, INC. SAMPLE I.D. : 8908-067-4
 PROJECT # : 186-101-B4 DATE ANALYZED : 08/17/89
 PROJECT NAME : PUGET POWER SAMPLE MATRIX : SOIL
 EPA METHOD : 8010/8020 UNITS : mg/Kg

COMPOUND	SAMPLE RESULT	SPIKE ADDED	SPIKED SAMPLE	% REC	DUP SPIKED SAMPLE	DUP % REC	RPD
BENZENE	<0.025	0.600	0.523	87	0.524	87	0
CHLOROBENZENE	<0.025	0.600	0.501	84	0.508	85	1
1,1-DICHLOROETHENE	<0.010	0.200	0.173	87	0.179	90	3
TETRACHLOROETHENE	0.339	0.200	0.496	79	0.505	83	2
TOLUENE	0.029	0.600	0.534	84	0.531	84	1
TRICHLOROETHENE	<0.010	0.200	0.199	100	0.209	105	5
META & PARA XYLENE	0.100	1.10	1.01	83	0.958	78	5

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: N/A
PROJECT #	: 186-101-B4	DATE RECEIVED	: N/A
PROJECT NAME	: PUGET POWER	DATE EXTRACTED	: 08/15/89
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 08/16/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUND

RESULT

FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	GASOLINE
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	DIESEL

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 08/14/89
PROJECT #	: 186-101-B4	DATE RECEIVED	: 08/14/89
PROJECT NAME	: PUGET POWER	DATE EXTRACTED	: 08/15/89
CLIENT I.D.	: 225-B	DATE ANALYZED	: 08/16/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUND	RESULT
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	GASOLINE
FUEL HYDROCARBONS	710
HYDROCARBON RANGE	C16 - C26
HYDROCARBONS QUANTITATED USING	DIESEL

FUEL HYDROCARBONS
 QUALITY CONTROL DATA

CLIENT	: GEOENGINEERS, INC.	CLIENT I.D.	: 8908-048-2
PROJECT #	: 186-101-B4	DATE ANALYZED	: 08/15/89
PROJECT NAME	: PUGET POWER	SAMPLE MATRIX	: SOIL
EPA METHOD	: 8015 MODIFIED	UNITS	: mg/Kg

COMPOUND	SAMPLE RESULT	CONC SPIKED	SPIKED SAMPLE	% REC	DUP SPIKED SAMPLE	DUP % RECOVERY	RPD
FUEL HYDROCARBONS	16	500	519	101	515	100	1

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

GENERAL CHEMISTRY RESULTS

CLIENT : GEOENGINEERS, INC.
PROJECT # : 186-101-B4
PROJECT NAME : PUGET POWER

SAMPLE MATRIX : SOIL

PARAMETER	UNITS	-1	-2	-3	-4	-5
PETROLEUM HYDROCARBONS	mg/Kg	1,900	11,000	28	200	22
MOISTURE	%	27	26	26	19	26



GENERAL CHEMISTRY QUALITY CONTROL

CLIENT : GEOENGINEERS, INC.
PROJECT # : 186-101-B4
PROJECT NAME : PUGET POWER

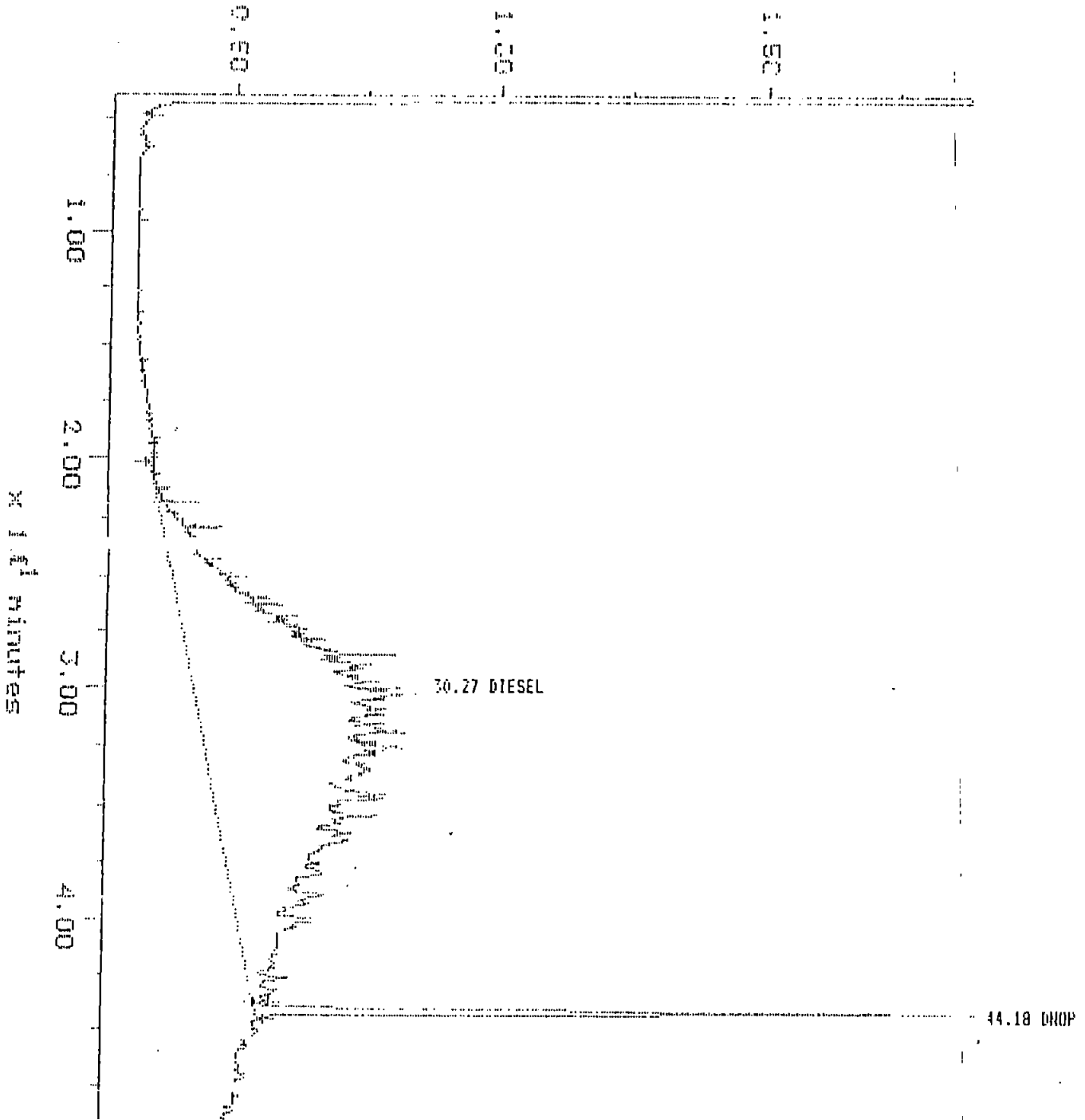
SAMPLE MATRIX : SOIL

Table with 9 columns: PARAMETER, UNITS, ATI I.D., SAMPLE RESULT, DUP RESULT, RPD, SPIKED CONC, SPIKE ADDED, % REC. Rows include PETROLEUM HYDROCARBONS, MOISTURE, and another PETROLEUM HYDROCARBONS entry.

% Recovery = (Spike Sample Result - Sample Result) / Spike Concentration X 100

RPD (Relative % Difference) = (Sample Result - Duplicate Result) / Average Result X 100

0.50 1.00 1.50





ATI I.D. # 8908-075

August 21, 1989

Geoengineers, Inc.
2405 140th Avenue N.E.
Suite 105
Bellevue, WA 98005

Attention : Steve Perrigo

Project Number : 186-101-B4

Project Name : Puget Power Renton

On August 15, 1989 Analytical Technologies, Inc. received five soil samples for analyses. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and the quality control data are enclosed.

Mary C. Silva
Senior Project Manager

FWG/tpj

Frederick W. Grothkopp
Technical Manager

SAMPLE CROSS REFERENCE SHEET

CLIENT : GEOENGINEERS, INC.
 PROJECT # : 186-101-B4
 PROJECT NAME : PUGET POWER RENTON

ATI #	CLIENT DESCRIPTION	MATRIX	DATE SAMPLED
8908-075-1	#224 WW	SOIL	08/15/89
8908-075-2	#224 EW	SOIL	08/15/89
8908-075-3	#224 SW	SOIL	08/15/89
8908-075-4	#224 NW	SOIL	08/15/89
8908-075-5	#224 BASE	SOIL	08/15/89

----- TOTALS -----

MATRIX	# SAMPLES
-----	-----
SOIL	5

ATI STANDARD DISPOSAL PRACTICE -----

The samples from this project will be disposed of in thirty (30) 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 : GEOENGINEERS, INC.
PROJECT # : 186-101-B4
PROJECT NAME : PUGET POWER RENTON

ANALYSIS	TECHNIQUE	REFERENCE/METHOD
PURGEABLE HALOCARBONS	GC/HALL	EPA 8010
PURGEABLE AROMATICS	GC/PID	EPA 8020
FUEL HYDROCARBONS	GC/FID	EPA 8015 MODIFIED
PETROLEUM HYDROCARBONS	IR	EPA 418.1
MOISTURE	GRAVIMETRIC	METHOD 7-2.2

VOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: N/A
PROJECT #	: 186-101-B4	DATE RECEIVED	: N/A
PROJECT NAME	: PUGET POWER RENTON	DATE EXTRACTED	: 08/16/89
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 08/16/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8010/8020	DILUTION FACTOR	: 1
RESULTS BASED ON DRY WEIGHT			

COMPOUND	RESULT
BENZENE	<0.025
BROMODICHLOROMETHANE	<0.010
BROMOFORM	<0.010
BROMOMETHANE	<0.025
CARBON TETRACHLORIDE	<0.010
CHLOROBENZENE	<0.025
CHLOROETHANE	<0.025
CHLOROFORM	<0.010
CHLOROMETHANE	<0.100
DIBROMOCHLOROMETHANE	<0.010
1,2-DICHLOROBENZENE	<0.025
1,3-DICHLOROBENZENE	<0.025
1,4-DICHLOROBENZENE	<0.025
1,1-DICHLOROETHANE	<0.010
1,2-DICHLOROETHANE	<0.010
1,1-DICHLOROETHENE	<0.010
CIS-1,2,-DICHLOROETHENE	<0.010
TRANS-1,2-DICHLOROETHENE	<0.010
1,2-DICHLOROPROPANE	<0.010
CIS-1,3-DICHLOROPROPENE	<0.010
TRANS-1,3-DICHLOROPROPENE	<0.010
ETHYLBENZENE	<0.025
METHYLENE CHLORIDE	<0.050
1,1,2,2-TETRACHLOROETHANE	<0.010
TETRACHLOROETHENE	<0.010
TOLUENE	<0.025
1,1,1-TRICHLOROETHANE	<0.010
1,1,2-TRICHLOROETHANE	<0.010
TRICHLOROETHENE	<0.010
TRICHLOROFLUOROMETHANE	<0.025
VINYL CHLORIDE	<0.025
META & PARA XYLENE	<0.025
ORTHO XYLENE	<0.025

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE	97
BROMOFLUOROBENZENE	101

VOLATILE ORGANIC ANALYSIS
 DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 08/15/89
PROJECT #	: 186-101-B4	DATE RECEIVED	: 08/15/89
PROJECT NAME	: PUGET POWER RENTON	DATE EXTRACTED	: 08/16/89
CLIENT I.D.	: #224 BASE	DATE ANALYZED	: 08/16/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8010/8020	DILUTION FACTOR	: 1
RESULTS BASED ON DRY WEIGHT			

COMPOUND	RESULT
BENZENE	<0.025
BROMODICHLOROMETHANE	<0.010
BROMOFORM	<0.010
BROMOMETHANE	<0.025
CARBON TETRACHLORIDE	<0.010
CHLOROBENZENE	<0.025
CHLOROETHANE	<0.025
CHLOROFORM	<0.010
CHLOROMETHANE	<0.100
DIBROMOCHLOROMETHANE	<0.010
1,2-DICHLOROBENZENE	<0.025
1,3-DICHLOROBENZENE	<0.025
1,4-DICHLOROBENZENE	<0.025
1,1-DICHLOROETHANE	<0.010
1,2-DICHLOROETHANE	<0.010
1,1-DICHLOROETHENE	<0.010
CIS-1,2,-DICHLOROETHENE	<0.010
TRANS-1,2-DICHLOROETHENE	<0.010
1,2-DICHLOROPROPANE	<0.010
CIS-1,3-DICHLOROPROPENE	<0.010
TRANS-1,3-DICHLOROPROPENE	<0.010
ETHYLBENZENE	<0.025
METHYLENE CHLORIDE	<0.050
1,1,2,2-TETRACHLOROETHANE	<0.010
TETRACHLOROETHENE	0.022
TOLUENE	<0.025
1,1,1-TRICHLOROETHANE	<0.010
1,1,2-TRICHLOROETHANE	<0.010
TRICHLOROETHENE	<0.010
TRICHLOROFLUOROMETHANE	<0.025
VINYL CHLORIDE	<0.025
META & PARA XYLENE	<0.025
ORTHO XYLENE	<0.025

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE	88
BROMOFLUOROBENZENE	89

VOLATILE ORGANIC
 QUALITY CONTROL DATA

CLIENT	: GEOENGINEERS, INC.	SAMPLE I.D.	: BLANK 8/2
PROJECT #	: 186-101-B4	DATE ANALYZED	: 08/15/89
PROJECT NAME	: PUGET POWER RENTON	SAMPLE MATRIX	: SOIL
EPA METHOD	: 8010/8020	UNITS	: mg/Kg

COMPOUND	SAMPLE RESULT	SPIKE ADDED	SPIKED SAMPLE	% REC	DUP SPIKED SAMPLE	DUP % REC	RPD
BENZENE	<0.025	0.600	0.620	103	N/A	N/A	N/A
CHLOROBENZENE	<0.025	0.600	0.638	106	N/A	N/A	N/A
1,1-DICHLOROETHENE	<0.010	0.200	0.183	92	N/A	N/A	N/A
TETRACHLOROETHENE	<0.010	0.200	0.223	112	N/A	N/A	N/A
TOLUENE	<0.025	0.600	0.638	106	N/A	N/A	N/A
TRICHLOROETHENE	<0.010	0.200	0.212	106	N/A	N/A	N/A
META & PARA XYLENE	<0.025	1.10	1.15	105	N/A	N/A	N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$



FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: N/A
PROJECT #	: 186-101-B4	DATE RECEIVED	: N/A
PROJECT NAME	: PUGET POWER RENTON	DATE EXTRACTED	: 08/16/89
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 08/16/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUND	RESULT
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	GASOLINE
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	DIESEL

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 08/15/89
PROJECT #	: 186-101-B4	DATE RECEIVED	: 08/15/89
PROJECT NAME	: PUGET POWER RENTON	DATE EXTRACTED	: 08/16/89
CLIENT I.D.	: #224 BASE	DATE ANALYZED	: 08/16/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 5

COMPOUND	RESULT
FUEL HYDROCARBONS HYDROCARBON RANGE HYDROCARBONS QUANTITATED USING	<25 - GASOLINE
FUEL HYDROCARBONS HYDROCARBON RANGE HYDROCARBONS QUANTITATED USING	2,400 C16 - C26 DIESEL



FUEL HYDROCARBONS
QUALITY CONTROL DATA

CLIENT	: GEOENGINEERS, INC.	CLIENT I.D.	: 8908-065-2
PROJECT #	: 186-101-B4	DATE ANALYZED	: 08/18/89
PROJECT NAME	: PUGET POWER RENTON	SAMPLE MATRIX	: SOIL
EPA METHOD	: 8015 MODIFIED	UNITS	: mg/Kg

COMPOUND	SAMPLE RESULT	CONC SPIKED	SPIKED SAMPLE	% REC	DUP SPIKED SAMPLE	DUP % RECOVERY	RPD
FUEL HYDROCARBONS	5	500	395	78	391	77	1

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$



GENERAL CHEMISTRY RESULTS

CLIENT : GEOENGINEERS, INC.
PROJECT # : 186-101-B4
PROJECT NAME : PUGET POWER RENTON

SAMPLE MATRIX : SOIL

PARAMETER	UNITS	-1	-2	-3	-4	-5
PETROLEUM HYDROCARBONS	mg/Kg	<1.0	590	130	100	3,900
MOISTURE	%	-	-	-	-	22

GENERAL CHEMISTRY QUALITY CONTROL

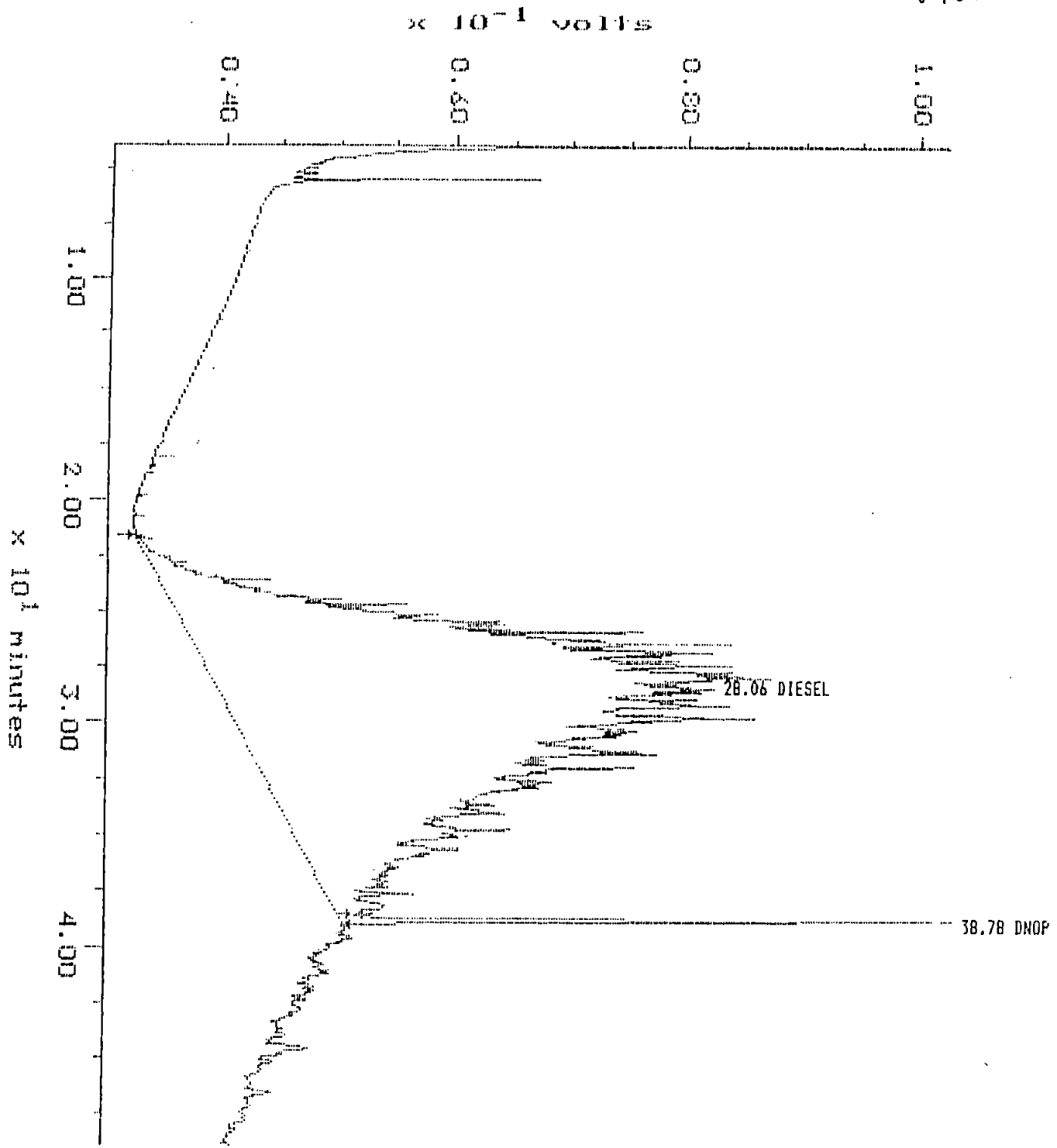
CLIENT : GEOENGINEERS, INC. SAMPLE MATRIX : SOIL
 PROJECT # : 186-101-B4
 PROJECT NAME : PUGET POWER RENTON

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED CONC	SPIKE ADDED	% REC
PETROLEUM HYDROCARBONS	mg/Kg	8908-073-1	260	230	12	N/A	N/A	N/A
PETROLEUM HYDROCARBONS	mg/Kg	BLANK SPK	N/A	N/A	N/A	64.3	63.4	101
MOISTURE	%	8908-069-5	6.9	6.4	8	N/A	N/A	N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

8908-075-5



Chain of Custody

PROJECT MANAGER: Steve Perrigo
 COMPANY: Geo Engineers
 ADDRESS: _____
 PHONE: 746-5200 SAMPLED BY: JGR

LABORATORY NUMBER: 8908-075

SAMPLE DISPOSAL INSTRUCTIONS
 ATI Disposal @ \$5.00 each Return Pickup (will call)

					ANALYSIS REQUEST																	NUMBER OF CONTAINERS					
SAMPLE ID	DATE	TIME	MATRIX	LAB ID	8010 Halogenated Volatiles	8020 Aromatic Volatiles	BETX ONLY	8240 GCMS Volatiles	8270 GCMS BNA	8310 HPLC PMA	8080 Pesticides & PCB's	PCB's ONLY	8140 Phosphate Pesticides	8150 Herbicides	WDOE PAH/HH (WAC 173)	418.1 (TPH)	413.2 Grease & Oil	8015 (Modified)	TOC 9060	TOX 9020	% Moisture		TCLP	Priority Pollutant Metals (13)	EP TOX Metals (8) Total	EP TOX Metals (8) EP EXT	
# 224 WW	8/15		Soil	-1													X										
# 224 EW				-2													X										
# 224 SW				-3													X										
# 224 NW _{ms}				-4													X										
# 224 Bulk				-5	X	X											X		X								

PROJECT INFORMATION	SAMPLE RECEIPT
PROJECT NUMBER: <u>186-101-84</u>	TOTAL NUMBER OF CONTAINERS: <u>5</u>
PROJECT NAME: <u>Argut Power Renton</u>	CHAIN OF CUSTODY SEALS Y/N/A: <u>N</u>
PURCHASE ORDER NUMBER:	INTACT? Y/N/A: <u>Y</u>
VIA:	RECEIVED GOOD COND./COLD: <u>Y</u>
TAT: <input checked="" type="checkbox"/> 24HR <input type="checkbox"/> 48 HRS <input type="checkbox"/> 72 HRS <input type="checkbox"/> 1 WK <input type="checkbox"/> 2 WKS (Normal)	
PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA	

SPECIAL INSTRUCTIONS: Coal tailings present in samples (silica gel technique)
- Only 418.1 and 8015(mod) are 24 TAT

RELINQUISHED BY: 1	RELINQUISHED BY: 2	RELINQUISHED BY: 3
Signature: <u>Jamae Roth</u> Time: <u>17:19</u>	Signature: _____ Time: _____	Signature: _____ Time: _____
Printed Name: <u>Jamae Roth</u> Date: <u>8/15</u>	Printed Name: _____ Date: _____	Printed Name: _____ Date: _____
Company: <u>Geo Engineers</u>	Company: _____	Company: _____
RECEIVED BY: 1	RECEIVED BY: 2	RECEIVED BY: (LAB) 3
Signature: _____ Time: _____	Signature: _____ Time: _____	Signature: <u>Jarvis Ware</u> Time: <u>5:22</u>
Printed Name: _____ Date: _____	Printed Name: _____ Date: _____	Printed Name: <u>JARVIS WARE</u> Date: <u>8/15/89</u>
Company: _____	Company: _____	Company: <u>Analytical Technologies, Inc.</u>

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Analytical **Technologies, Inc.**

560 Naches Avenue, S.W., Suite 101, Renton, WA 98055, (206) 228-8335

ATI I.D. # 8908-111

GeoEngineers

August 25, 1989

AUG 29 1989

Routing

.....

File

GeoEngineers, Inc.
 2405 140th Avenue N.E.
 Suite 105
 Bellevue, WA 98005

Attention : Steve Perrigo

Project Number : 186-101-B4

Project Name : Puget Power Renton

On August 22, 1989 Analytical Technologies, Inc. received four soil samples for analyses. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and the quality control data are enclosed.

Mary C. Silva
 Senior Project Manager

FWG/hbb

Frederick W. Grothkopp
 Technical Manager



SAMPLE CROSS REFERENCE SHEET

CLIENT : GEOENGINEERS, INC.
PROJECT # : 186-101-B4
PROJECT NAME : PUGET POWER RENTON

Table with 4 columns: ATI #, CLIENT DESCRIPTION, MATRIX, DATE SAMPLED. Rows include sample IDs like 8908-111-1 and descriptions like #224 EW1.

----- TOTALS -----

Summary table with 2 columns: MATRIX, # SAMPLES. Row for SOIL shows 4 samples.

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) 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 : GEOENGINEERS, INC.
PROJECT # : 186-101-B4
PROJECT NAME : PUGET POWER RENTON

ANALYSIS	TECHNIQUE	REFERENCE/METHOD
PETROLEUM HYDROCARBONS	IR	EPA 418.1



GENERAL CHEMISTRY RESULTS

CLIENT : GEOENGINEERS, INC.
PROJECT # : 186-101-B4
PROJECT NAME : PUGET POWER RENTON

SAMPLE MATRIX : SOIL

PARAMETER	UNITS	-1	-2	-3	-4
PETROLEUM HYDROCARBONS	mg/Kg	190	29	19	1.8

GENERAL CHEMISTRY QUALITY CONTROL

CLIENT : GEOENGINEERS, INC. SAMPLE MATRIX : SOIL
 PROJECT # : 186-101-B4
 PROJECT NAME : PUGET POWER RENTON

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED CONC	SPIKE ADDED	% REC
PETROLEUM HYDROCARBONS	mg/Kg	8908-101-1	120	130	8	N/A	N/A	N/A
PETROLEUM HYDROCARBONS	mg/Kg	BLANK SPIKE	N/A	N/A	N/A	70.6	63.7	110

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$



Chain of Custody

PROJECT MANAGER: Steve Perrigo
 COMPANY: Geo Engineers Inc.
 ADDRESS: _____
 PHONE: 746-5200 SAMPLED BY: JGR

LABORATORY NUMBER: 8908-111

SAMPLE DISPOSAL INSTRUCTIONS

- ATI Disposal @ \$5.00 each Return Pickup (will call)

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	8010	8020	BETX ONLY	8240	8270	8310	8080	PCB's ONLY	8140	8150	WDOE PAH/HH (WAC 173)	418.1 (TPH)	413.2	8015	TOC	TOX	%	TCLP	Priority Pollutant Metals (13)	EPTOX Metals (6) Total	EP TOX Metals (6) EP EXT	NUMBER OF CONTAINERS
					Halogenated Volatiles	Aromatic Volatiles	GCMS Volatiles	GCMS BNA	HPLC PNA	Pesticides & PCB's	Phosphate Pesticides	Herbicides	Grease & Oil	(Modified)	9060	9020	Moisture									
#224EW1	8/22		Soil	-1												X										
#224B1	↓		↓	-2												X										
#225NW1	↓		↓	-3												X										
#225B1	↓		↓	-4												X										

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PROJECT INFORMATION		SAMPLE RECEIPT		RELINQUISHED BY: 1		RELINQUISHED BY: 2		RELINQUISHED BY: 3	
PROJECT NUMBER: <u>186-101-B4</u>		TOTAL NUMBER OF CONTAINERS: <u>4</u>		Signature: <u>Dayna L. Barkley</u> Time: <u>14:52</u>		Signature: _____ Time: _____		Signature: _____ Time: _____	
PROJECT NAME: <u>Puget Power Renton</u>		CHAIN OF CUSTODY SEALS Y/N/NA: <u>N</u>		Printed Name: <u>Jim Roth</u> Date: <u>8/22/89</u>		Printed Name: _____ Date: _____		Printed Name: _____ Date: _____	
PURCHASE ORDER NUMBER: _____		INTACT? Y/N/NA: <u>Y</u>		Company: <u>GEI</u>		Company: _____		Company: _____	
VIA: _____		RECEIVED GOOD COND./COLD: <u>Y</u>		RECEIVED BY: 1		RECEIVED BY: 2		RECEIVED BY: (LAB) 3	
TAT: <input checked="" type="checkbox"/> 24HR <input type="checkbox"/> 48 HRS <input type="checkbox"/> 72 HRS <input type="checkbox"/> 1 WK <input type="checkbox"/> 2 WKS (Normal)		PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA: _____		Signature: _____ Time: _____		Signature: _____ Time: _____		Signature: <u>Dayna L. Barkley</u> Time: <u>8:22</u>	
SPECIAL INSTRUCTIONS: <u>Please hold soil for 30 days after testing.</u>				Printed Name: _____ Date: _____		Printed Name: _____ Date: _____		Printed Name: <u>Dayna L. Barkley</u> Date: <u>8/22</u>	
				Company: _____		Company: _____		Company: <u>Analytical Technologies, Inc.</u>	



SAMPLE CROSS REFERENCE SHEET

CLIENT : GEOENGINEERS, INC.
PROJECT # : 186-101-B4
PROJECT NAME : PUGET POWER RENTON

Table with 4 columns: ATI #, CLIENT DESCRIPTION, MATRIX, DATE SAMPLED. Rows include sample IDs 8908-130-1, 8908-130-2, and 8908-130-3 with their respective descriptions and sampling dates.

----- TOTALS -----

Summary table with 2 columns: MATRIX, # SAMPLES. Rows show SOIL with 2 samples and PRODUCT with 1 sample.

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) 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 : GEOENGINEERS, INC.
PROJECT # : 186-101-B4
PROJECT NAME : PUGET POWER RENTON

ANALYSIS	TECHNIQUE	REFERENCE/METHOD
PURGEABLE HALOCARBONS	GC/HALL	EPA 8010
PURGEABLE AROMATICS	GC/PID	EPA 8020
FUEL HYDROCARBONS	GC/FID	EPA 8015 MODIFIED
PETROLEUM HYDROCARBONS	IR	EPA 418.1
MOISTURE	GRAVIMETRIC	METHOD 7-2.2

VOLATILE ORGANIC ANALYSIS
 DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: N/A
PROJECT #	: 186-101-B4	DATE RECEIVED	: N/A
PROJECT NAME	: PUGET POWER RENTON	DATE EXTRACTED	: 08/28/89
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 08/31/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8010/8020	DILUTION FACTOR	: 1
RESULTS BASED ON DRY WEIGHT			

COMPOUND	RESULT
BENZENE	<0.025
BROMODICHLOROMETHANE	<0.010
BROMOFORM	<0.010
BROMOMETHANE	<0.025
CARBON TETRACHLORIDE	<0.010
CHLOROBENZENE	<0.025
CHLOROETHANE	<0.025
CHLOROFORM	<0.010
CHLOROMETHANE	<0.10
DIBROMOCHLOROMETHANE	<0.010
1,2-DICHLOROBENZENE	<0.025
1,3-DICHLOROBENZENE	<0.025
1,4-DICHLOROBENZENE	<0.025
1,1-DICHLOROETHANE	<0.010
1,2-DICHLOROETHANE	<0.010
1,1-DICHLOROETHENE	<0.010
CIS-1,2,-DICHLOROETHENE	<0.010
TRANS-1,2-DICHLOROETHENE	<0.010
1,2-DICHLOROPROPANE	<0.010
CIS-1,3-DICHLOROPROPENE	<0.010
TRANS-1,3-DICHLOROPROPENE	<0.010
ETHYLBENZENE	<0.025
METHYLENE CHLORIDE	<0.10
1,1,2,2-TETRACHLOROETHANE	<0.010
TETRACHLOROETHENE	<0.010
TOLUENE	<0.025
1,1,1-TRICHLOROETHANE	<0.010
1,1,2-TRICHLOROETHANE	<0.010
TRICHLOROETHENE	<0.010
TRICHLOROFLUOROMETHANE	<0.025
VINYL CHLORIDE	<0.025
META & PARA XYLENE	<0.025
ORTHO XYLENE	<0.025

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE	92
BROMOFLUOROBENZENE	76

VOLATILE ORGANIC ANALYSIS
 DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 08/24/89
PROJECT #	: 186-101-B4	DATE RECEIVED	: 08/24/89
PROJECT NAME	: PUGET POWER RENTON	DATE EXTRACTED	: 08/28/89
CLIENT I.D.	: #224 SW 1	DATE ANALYZED	: 08/31/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8010/8020	DILUTION FACTOR	: 1
RESULTS BASED ON DRY WEIGHT			

COMPOUND	RESULT
BENZENE	<0.025
BROMODICHLOROMETHANE	<0.010
BROMOFORM	<0.010
BROMOMETHANE	<0.025
CARBON TETRACHLORIDE	<0.010
CHLOROBENZENE	<0.025
CHLOROETHANE	<0.025
CHLOROFORM	<0.010
CHLOROMETHANE	<0.10
DIBROMOCHLOROMETHANE	0.032
1,2-DICHLOROBENZENE	<0.025
1,3-DICHLOROBENZENE	<0.025
1,4-DICHLOROBENZENE	<0.025
1,1-DICHLOROETHANE	<0.010
1,2-DICHLOROETHANE	<0.010
1,1-DICHLOROETHENE	<0.010
CIS-1,2,-DICHLOROETHENE	<0.010
TRANS-1,2-DICHLOROETHENE	<0.010
1,2-DICHLOROPROPANE	<0.010
CIS-1,3-DICHLOROPROPENE	<0.010
TRANS-1,3-DICHLOROPROPENE	<0.010
ETHYLBENZENE	<0.025
METHYLENE CHLORIDE	<0.10
1,1,2,2-TETRACHLOROETHANE	<0.010
TETRACHLOROETHENE	<0.010
TOLUENE	<0.025
1,1,1-TRICHLOROETHANE	<0.010
1,1,2-TRICHLOROETHANE	<0.010
TRICHLOROETHENE	<0.010
TRICHLOROFLUOROMETHANE	<0.025
VINYL CHLORIDE	<0.025
META & PARA XYLENE	0.029
ORTHO XYLENE	0.071

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE	88
BROMOFLUOROBENZENE	66

VOLATILE ORGANIC
 QUALITY CONTROL DATA

CLIENT	: GEOENGINEERS, INC.	SAMPLE I.D.	: BLANK 8/28
PROJECT #	: 186-101-B4	DATE ANALYZED	: 09/01/89
PROJECT NAME	: PUGET POWER RENTON	SAMPLE MATRIX	: SOIL
EPA METHOD	: 8010/8020	UNITS	: mg/Kg

COMPOUND	SAMPLE RESULT	SPIKE ADDED	SPIKED SAMPLE	% REC	DUP SPIKED SAMPLE	DUP % REC	RPD
BENZENE	<0.025	0.600	0.519	87	N/A	N/A	N/A
CHLOROBENZENE	<0.025	0.600	0.509	85	N/A	N/A	N/A
1,1-DICHLOROETHENE	<0.010	0.200	0.183	92	N/A	N/A	N/A
TETRACHLOROETHENE	<0.010	0.200	0.202	101	N/A	N/A	N/A
TOLUENE	<0.025	0.600	0.525	88	N/A	N/A	N/A
TRICHLOROETHENE	<0.010	0.200	0.201	101	N/A	N/A	N/A
META & PARA XYLENE	<0.025	1.10	0.896	82	N/A	N/A	N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: N/A
PROJECT #	: 186-101-B4	DATE RECEIVED	: N/A
PROJECT NAME	: PUGET POWER RENTON	DATE EXTRACTED	: 08/28/89
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 08/29/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUND	RESULT
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	GASOLINE
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	DIESEL

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 08/24/89
PROJECT #	: 186-101-B4	DATE RECEIVED	: 08/24/89
PROJECT NAME	: PUGET POWER RENTON	DATE EXTRACTED	: 08/28/89
CLIENT I.D.	: #224 SW 1	DATE ANALYZED	: 08/30/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 20

COMPOUND	RESULT
FUEL HYDROCARBONS	<100
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	GASOLINE
FUEL HYDROCARBONS	16,000
HYDROCARBON RANGE	C16 - C26
HYDROCARBONS QUANTITATED USING	DIESEL



FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 08/24/89
PROJECT #	: 186-101-B4	DATE RECEIVED	: 08/24/89
PROJECT NAME	: PUGET POWER RENTON	DATE EXTRACTED	: 08/28/89
CLIENT I.D.	: #224 WW 1	DATE ANALYZED	: 08/30/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 10

COMPOUND	RESULT
FUEL HYDROCARBONS	<50
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	GASOLINE
FUEL HYDROCARBONS	5,700
HYDROCARBON RANGE	C16 - C26
HYDROCARBONS QUANTITATED USING	DIESEL

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 08/28/89
PROJECT #	: 186-101-B4	DATE RECEIVED	: 08/24/89
PROJECT NAME	: PUGET POWER RENTON	DATE EXTRACTED	: N/A
CLIENT I.D.	: HYDRAULIC FLUID TANK	DATE ANALYZED	: 08/29/89
SAMPLE MATRIX	: PRODUCT	UNITS	: ppm
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1900

COMPOUND	RESULT
FUEL HYDROCARBONS	<9,600
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	GASOLINE
FUEL HYDROCARBONS	650,000
HYDROCARBON RANGE	C16 - C26
HYDROCARBONS QUANTITATED USING	DIESEL

FUEL HYDROCARBONS
 QUALITY CONTROL DATA

CLIENT	: GEOENGINEERS, INC.	SAMPLE I.D.	: 8908-134-3
PROJECT #	: 186-101-B4	DATE ANALYZED	: 09/07/89
PROJECT NAME	: PUGET POWER RENTON	SAMPLE MATRIX	: SOIL
EPA METHOD	: 8015 MODIFIED	UNITS	: mg/Kg

COMPOUND	SAMPLE RESULT	CONC SPIKED	SPIKED SAMPLE	% REC	DUP SPIKED SAMPLE	DUP % RECOVERY	RPD
FUEL HYDROCARBONS	<5	500	417	83	426	85	2

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

GENERAL CHEMISTRY RESULTS

CLIENT : GEOENGINEERS, INC.
PROJECT # : 186-101-B4
PROJECT NAME : PUGET POWER RENTON

SAMPLE MATRIX : SOIL

PARAMETER	UNITS	-1	-2
PETROLEUM HYDROCARBONS	mg/Kg	52,000	21,000
MOISTURE	%	9.2	-

GENERAL CHEMISTRY QUALITY CONTROL

 CLIENT : GEOENGINEERS, INC.
 PROJECT # : 186-101-B4
 PROJECT NAME : PUGET POWER RENTON

SAMPLE MATRIX : SOIL

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED CONC	SPIKE ADDED	% REC
PETROLEUM HYDROCARBONS	mg/Kg	8908-127-1	62,000	64,000	3	N/A	N/A	N/A
PETROLEUM HYDROCARBONS	mg/Kg	BLANK SPIKE	N/A	N/A	N/A	65.0	63.1	103
MOISTURE	%	8908-149-1	26	27	4	N/A	N/A	N/A
MOISTURE	%	8908-134-4	17	17	0	N/A	N/A	N/A

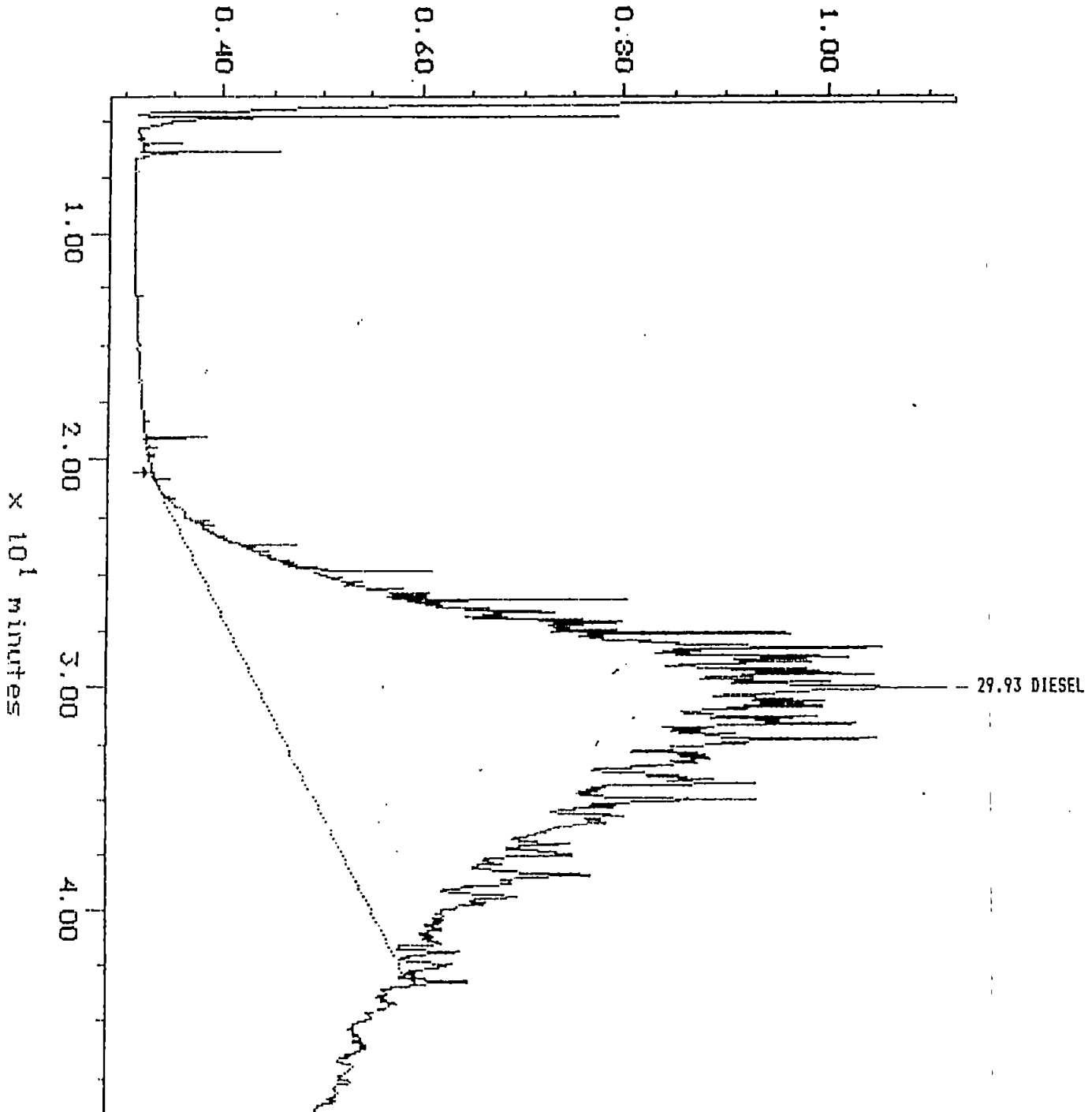
$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

Sample: S8908-130-10.05 Channel: FID REAR-A
Acquired: 30-AUG-89 7:49 Method: C:\MAX\DATA1\RA08TX12
Dilution: 1 : 20.000
Comments: DIESEL AND BTEX PROGRAM FOR DIESEL/BTEX STDs, MS, MSD, FPB, FPBN

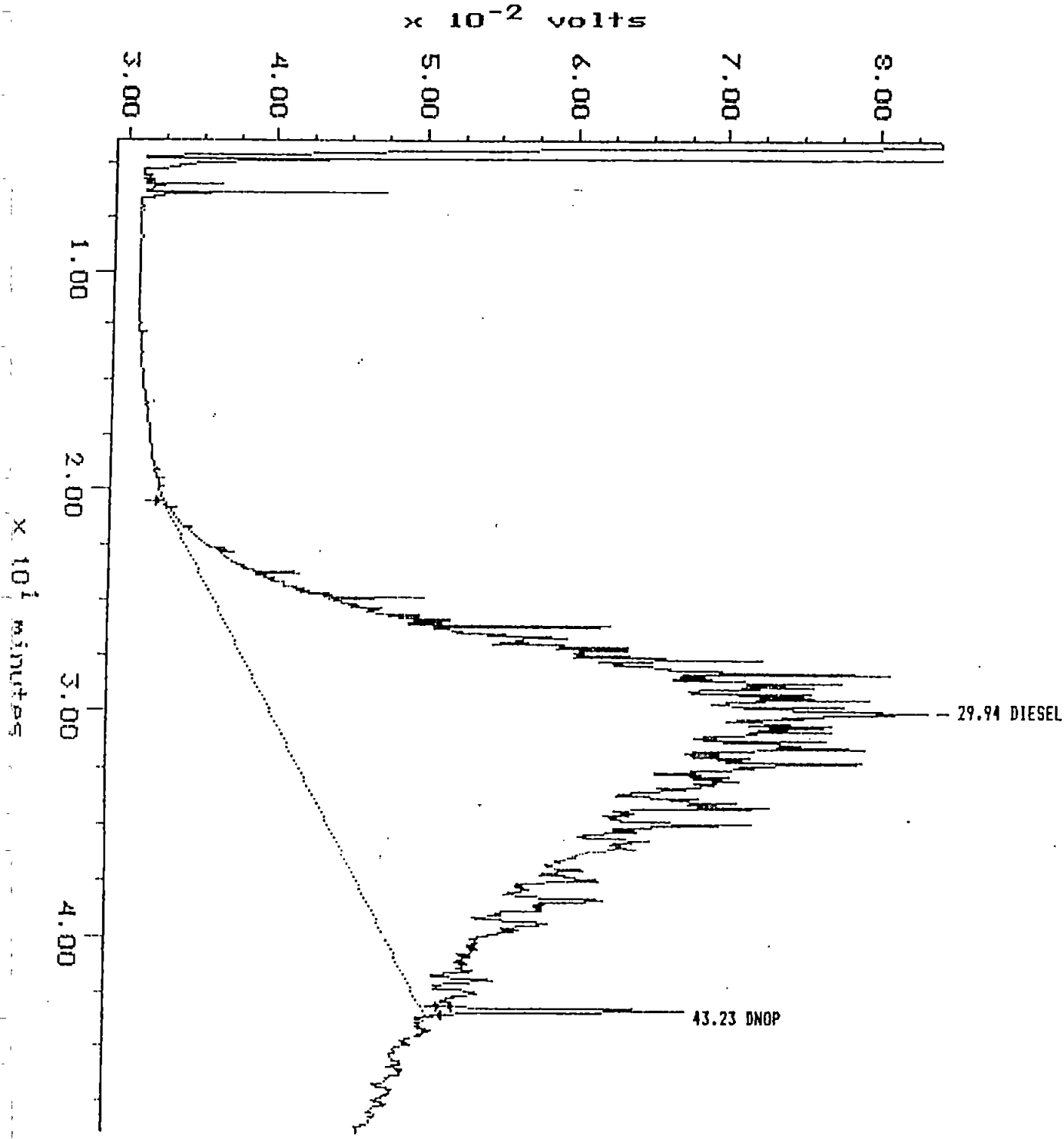
Filename: 9RF0114:
Operator: RWH

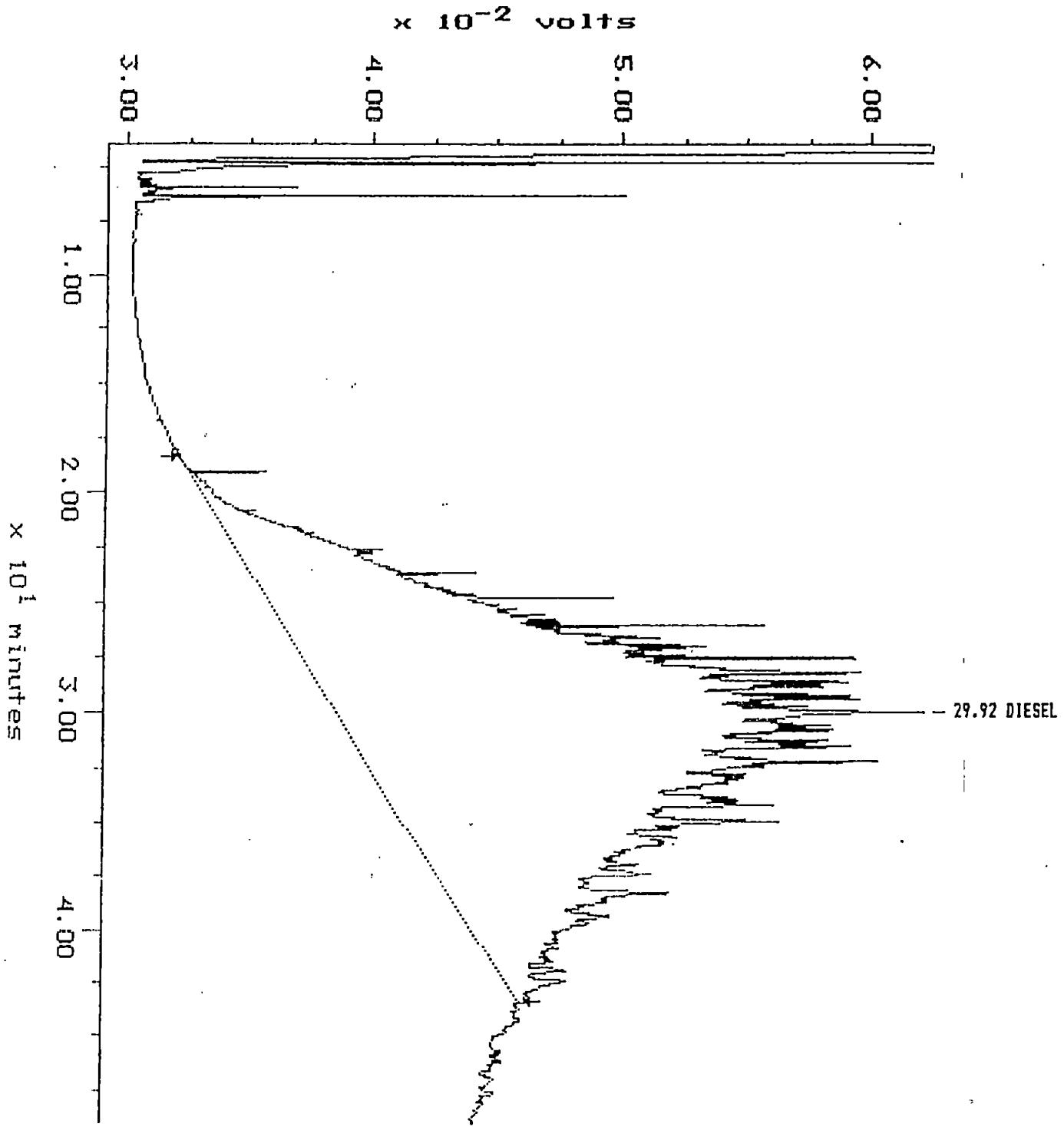
$\times 10^{-1}$ volts



Sample: S8908-130-20.1 Channel: FID REAR-A
Acquired: 30-AUG-89 10:42 Method: C:\MAX\DATA4\RA08TX12
Dilution: 1 : 10.000
Comments: DIESEL AND BTEX PROGRAM FOR DIESEL/BTXE STDS, MS, MSD, FPB, FPBN

Filename: 9RF01143
Operator: RWM





Chain of Custody

PROJECT MANAGER: Kathy Killman
 COMPANY: GEI
 ADDRESS: _____
 PHONE: 746-5200 SAMPLED BY: JGR

LABORATORY NUMBER: 8908-130

SAMPLE DISPOSAL INSTRUCTIONS
 ATI Disposal @ \$5.00 each Return Pickup (will call)

					ANALYSIS REQUEST																NUMBER OF CONTAINERS							
SAMPLE ID	DATE	TIME	MATRIX	LAB ID	8010 Halogenated Volatiles	8020 Aromatic Volatiles	BETX ONLY	8240 GCMS Volatiles	8270 GCMS BNA	8310 HPLC PNA	8080 Pesticides & PCB's	PCB's ONLY	8140 Phosphate Pesticides	8150 Herbicides	WDOE PAH/HH (WAC 173)	418.1 (TPH)	413.2 Grease & Oil	8015 (Modified)	TOC 9060	TOX 9020		% Moisture	TCLP	Priority Pollutant Metals (13)	EP TOX Metals (8) Total	EP TOX Metals (8) EP EXT		
#2245W4	8/24/89		soil	-1	X	X										X	X											
#224 W4	↓		↓	-2												X	X											
Hydraulic Fluid Tank	8/18/89	3:15	product	-3														X										

PROJECT INFORMATION		SAMPLE RECEIPT		RELINQUISHED BY: 1		RELINQUISHED BY: 2		RELINQUISHED BY: 3	
PROJECT NUMBER: <u>186-101-R4</u>	TOTAL NUMBER OF CONTAINERS: <u>12</u>	Signature: <u>James Roth</u>	Time: _____	Signature: _____	Time: _____	Signature: _____	Time: _____	Signature: _____	Time: _____
PROJECT NAME: <u>Pages Power Plant</u>	CHAIN OF CUSTODY SEALS Y/N/NA: <u>N</u>	Printed Name: <u>James Roth</u>	Date: _____	Printed Name: _____	Date: _____	Printed Name: _____	Date: _____	Printed Name: _____	Date: _____
PURCHASE ORDER NUMBER: _____	INTACT? Y/N/NA: <u>Y</u>	Company: <u>GEI</u>	RECEIVED GOOD COND./COLD: <u>Y</u>	Company: _____	Company: _____	Company: _____	Company: _____	Company: _____	Company: _____
TAT: <input checked="" type="checkbox"/> 24HR <input type="checkbox"/> 48 HRS <input type="checkbox"/> 72 HRS <input type="checkbox"/> 1 WK <input type="checkbox"/> 2 WKS (Normal)		PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA		RECEIVED BY: 1		RECEIVED BY: 2		RECEIVED BY: (LAB) 3	
SPECIAL INSTRUCTIONS: <u>Retain soil for 30 days. RUSH</u> <u>NORMAL FOR 8010/8020 Please fax chroms.</u>				Signature: _____	Time: _____	Signature: _____	Time: _____	Signature: <u>Dayna Barkley</u>	Time: <u>8/24</u>
				Printed Name: _____	Date: _____	Printed Name: _____	Date: _____	Printed Name: <u>Dayna Barkley</u>	Date: <u>8/24</u>
				Company: _____	Company: _____	Company: _____	Company: _____	Analytical Technologies, Inc.	

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ATI I.D. # 8908-158

GeoEngineers

SEP 19 1989

September 15, 1989

Routing	<i>KSK</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
File		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

GeoEngineers, Inc.
2405 140th Ave. N.E.
Suite 105
Bellevue, WA 98005

Attention : Kathy Killman

Project Number : 186-101-B4

Project Name : Puget Power

On August 30, 1989 Analytical Technologies, Inc. received one soil sample for analyses. The sample was analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and the quality control data are enclosed.

Donna M. McKinney
 Donna M. McKinney
 Project Manager

Frederick W. Grothkopp
 Frederick W. Grothkopp
 Technical Manager

FWG/nah



SAMPLE CROSS REFERENCE SHEET

CLIENT : GEOENGINEERS, INC.
PROJECT # : 186-101-B4
PROJECT NAME : PUGET POWER

Table with 4 columns: ATI #, CLIENT DESCRIPTION, MATRIX, DATE SAMPLED. Row 1: 8908-158-1, STOCK-C, SOIL, 08/30/89

----- TOTALS -----

Summary table with 2 columns: MATRIX, # SAMPLES. Row 1: SOIL, 1

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) 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 : GEOENGINEERS, INC.
PROJECT # : 186-101-B4
PROJECT NAME : PUGET POWER

ANALYSIS	TECHNIQUE	REFERENCE/METHOD
PURGEABLE HALOCARBONS	GC/HALL	EPA 8010
PURGEABLE AROMATICS	GC/PID	EPA 8020
POLYCHLORINATED BIPHENYLS (PCBs)	GC/ECD	EPA 8080
ARSENIC	AA/GF	EPA 7060
BARIUM	AA/F	EPA 7080
CADMIUM	AA/F	EPA 7130
CHROMIUM	AA/F	EPA 7190
LEAD	AA/F	EPA 7420
MERCURY	AA/COLD VAPOR	EPA 7471
SELENIUM	AA/GF	EPA 7740
SILVER	AA/F	EPA 7760
PETROLEUM HYDROCARBONS	IR	EPA 418.1
MOISTURE	GRAVIMETRIC	METHOD 7-2.2

VOLATILE ORGANIC ANALYSIS
 DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: N/A
PROJECT #	: 186-101-B4	DATE RECEIVED	: N/A
PROJECT NAME	: PUGET POWER	DATE EXTRACTED	: 09/08/89
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 09/08/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8010/8020	DILUTION FACTOR	: 1
RESULTS BASED ON DRY WEIGHT			

COMPOUND	RESULT
BENZENE	<0.025
BROMODICHLOROMETHANE	<0.010
BROMOFORM	<0.010
BROMOMETHANE	<0.025
CARBON TETRACHLORIDE	<0.010
CHLOROBENZENE	<0.025
CHLOROETHANE	<0.025
CHLOROFORM	<0.010
CHLOROMETHANE	<0.100
DIBROMOCHLOROMETHANE	<0.010
1,2-DICHLOROBENZENE	<0.025
1,3-DICHLOROBENZENE	<0.025
1,4-DICHLOROBENZENE	<0.025
1,1-DICHLOROETHANE	<0.010
1,2-DICHLOROETHANE	<0.010
1,1-DICHLOROETHENE	<0.010
CIS-1,2,-DICHLOROETHENE	<0.010
TRANS-1,2-DICHLOROETHENE	<0.010
1,2-DICHLOROPROPANE	<0.010
CIS-1,3-DICHLOROPROPENE	<0.010
TRANS-1,3-DICHLOROPROPENE	<0.010
ETHYLBENZENE	<0.025
METHYLENE CHLORIDE	<0.050
1,1,2,2-TETRACHLOROETHANE	<0.010
TETRACHLOROETHENE	<0.010
TOLUENE	<0.025
1,1,1-TRICHLOROETHANE	<0.010
1,1,2-TRICHLOROETHANE	<0.010
TRICHLOROETHENE	<0.010
TRICHLOROFLUOROMETHANE	<0.025
VINYL CHLORIDE	<0.025
META & PARA XYLENE	<0.025
ORTHO XYLENE	<0.025

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE	88
BROMOFLUOROBENZENE	105

VOLATILE ORGANIC ANALYSIS
 DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 08/30/89
PROJECT #	: 186-101-B4	DATE RECEIVED	: 08/30/89
PROJECT NAME	: PUGET POWER	DATE EXTRACTED	: 09/08/89
CLIENT I.D.	: STOCK-C	DATE ANALYZED	: 09/08/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8010/8020	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
BENZENE	<0.025
BROMODICHLOROMETHANE	<0.010
BROMOFORM	<0.010
BROMOMETHANE	<0.025
CARBON TETRACHLORIDE	<0.010
CHLOROBENZENE	<0.025
CHLOROETHANE	<0.025
CHLOROFORM	<0.010
CHLOROMETHANE	<0.100
DIBROMOCHLOROMETHANE	<0.010
1,2-DICHLOROBENZENE	<0.025
1,3-DICHLOROBENZENE	<0.025
1,4-DICHLOROBENZENE	<0.025
1,1-DICHLOROETHANE	<0.010
1,2-DICHLOROETHANE	<0.010
1,1-DICHLOROETHENE	<0.010
CIS-1,2,-DICHLOROETHENE	<0.010
TRANS-1,2-DICHLOROETHENE	<0.010
1,2-DICHLOROPROPANE	<0.010
CIS-1,3-DICHLOROPROPENE	<0.010
TRANS-1,3-DICHLOROPROPENE	<0.010
ETHYLBENZENE	<0.025
METHYLENE CHLORIDE	<0.050
1,1,2,2-TETRACHLOROETHANE	<0.010
TETRACHLOROETHENE	0.045
TOLUENE	<0.025
1,1,1-TRICHLOROETHANE	<0.010
1,1,2-TRICHLOROETHANE	<0.010
TRICHLOROETHENE	<0.010
TRICHLOROFLUOROMETHANE	<0.025
VINYL CHLORIDE	<0.025
META & PARA XYLENE	0.041
ORTHO XYLENE	<0.025

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE	75
BROMOFLUOROBENZENE	101

VOLATILE ORGANIC
QUALITY CONTROL DATA

CLIENT	: GEOENGINEERS, INC.	SAMPLE I.D.	: BLANK 8/28
PROJECT #	: 186-101-B4	DATE ANALYZED	: 09/01/89
PROJECT NAME	: PUGET POWER	SAMPLE MATRIX	: SOIL
EPA METHOD	: 8010/8020	UNITS	: mg/Kg

COMPOUND	SAMPLE RESULT	SPIKE ADDED	SPIKED SAMPLE	% REC	DUP SPIKED SAMPLE	DUP % REC	RPD
BENZENE	<0.025	0.600	0.519	87	N/A	N/A	N/A
CHLOROBENZENE	<0.025	0.600	0.509	85	N/A	N/A	N/A
1,1-DICHLOROETHENE	<0.010	0.200	0.183	92	N/A	N/A	N/A
TETRACHLOROETHENE	<0.010	0.200	0.202	101	N/A	N/A	N/A
TOLUENE	<0.025	0.600	0.525	88	N/A	N/A	N/A
TRICHLOROETHENE	<0.010	0.200	0.201	101	N/A	N/A	N/A
META & PARA XYLENE	<0.025	1.10	0.896	82	N/A	N/A	N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

POLYCHLORINATED BIPHENYLS (PCB) ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: N/A
PROJECT #	: 186-101-B4	DATE RECEIVED	: N/A
PROJECT NAME	: PUGET POWER	DATE EXTRACTED	: 09/05/89
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 09/07/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8080 (PCB)	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
PCB 1016	<0.025
PCB 1221	<0.025
PCB 1232	<0.025
PCB 1242	<0.025
PCB 1248	<0.025
PCB 1254	<0.025
PCB 1260	<0.025



POLYCHLORINATED BIPHENYLS (PCB) ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 08/30/89
PROJECT #	: 186-101-B4	DATE RECEIVED	: 08/30/89
PROJECT NAME	: PUGET POWER	DATE EXTRACTED	: 09/05/89
CLIENT I.D.	: STOCK-C	DATE ANALYZED	: 09/07/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8080 (PCB)	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
PCB 1016	<0.025
PCB 1221	<0.025
PCB 1232	<0.025
PCB 1242	<0.025
PCB 1248	<0.025
PCB 1254	<0.025
PCB 1260	<0.025

POLYCHLORINATED BIPHENYLS (PCB)
 QUALITY CONTROL

CLIENT	: GEOENGINEERS, INC.	SAMPLE ID	: 8908-158-1
PROJECT #	: 186-101-B4	DATE ANALYZED	: 09/07/89
PROJECT NAME	: PUGET POWER	SAMPLE MATRIX	: SOIL
EPA METHOD	: 8080	UNITS	: mg/Kg

COMPOUND	SAMPLE RESULT	CONC SPIKED	SPIKED SAMPLE	% REC	DUP SPIKED SAMPLE	DUP % RECOVERY	RPD
PCB 1260	<0.025	0.33	0.39	118	0.39	118	0

$$\% \text{ Recovery} = \frac{(\text{Spike Sample result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$

EP TOX
 METALS QUALITY CONTROL

CLIENT : GEOENGINEERS, INC. SAMPLE MATRIX : EP EXTRACT
 PROJECT # : 186-101-B4
 PROJECT NAME : PUGET POWER UNITS : mg/L

COMPOUND	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED SAMPLE	SPIKE CONC	% REC
ARSENIC	8909-003-1	<0.005	<0.005	0	0.049	0.050	98
BARIUM	8909-003-1	0.34	0.31	9	21.4	20.0	105
CADMIUM	8909-003-1	<0.01	<0.01	0	0.46	0.50	92
CHROMIUM	8909-003-1	0.06	0.06	0	1.83	2.00	88
LEAD	8909-003-1	0.19	0.20	5	9.46	10.0	93
MERCURY	8909-003-1	<0.0005	<0.0005	0	0.0020	0.0020	100
SELENIUM	8909-003-1	<0.005	<0.005	0	0.040	0.050	80
SILVER	8909-003-1	<0.02	<0.02	0	1.05	1.00	105

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$



EP TOX
METALS RESULTS

CLIENT : GEOENGINEERS, INC. SAMPLE MATRIX : EP EXTRACT
PROJECT # : 186-101-B4
PROJECT NAME : PUGET POWER UNITS : mg/L

PARAMETER -1

ARSENIC	<0.005
BARIUM	0.11
CADMIUM	<0.01
CHROMIUM	<0.02
LEAD	<0.1
MERCURY	<0.0005
SELENIUM	<0.005
SILVER	<0.02

GENERAL CHEMISTRY RESULTS

CLIENT : GEOENGINEERS, INC.
PROJECT # : 186-101-B4
PROJECT NAME : PUGET POWER

SAMPLE MATRIX : SOIL

PARAMETER	UNITS	-1
PETROLEUM HYDROCARBONS	mg/Kg	3,500
MOISTURE	%	16

GENERAL CHEMISTRY QUALITY CONTROL

CLIENT : GEOENGINEERS, INC. SAMPLE MATRIX : SOIL
 PROJECT # : 186-101-B4
 PROJECT NAME : PUGET POWER

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED CONC	SPIKE ADDED	% REC
PETROLEUM HYDROCARBONS	mg/Kg	8908-158-1	3,500	2,800	22	N/A	N/A	N/A
PETROLEUM HYDROCARBONS	mg/Kg	BLANK SPIKE	N/A	N/A	N/A	68.6	63.5	108
MOISTURE	%	8908-152-1	15	14	7	N/A	N/A	N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$



Chain of Custody

PROJECT MANAGER: K. Killman
 COMPANY: GET
 ADDRESS: _____
 PHONE: 746-5200 SAMPLED BY: JGR

LABORATORY NUMBER: 8408-158

SAMPLE DISPOSAL INSTRUCTIONS
 ATI Disposal @ \$5.00 each Return Pickup (will call)

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	8010	8020	BETX ONLY	8240	8270	8310	8080	PCB's ONLY	8140	8150	WDOE	418.1	413.2	8015	TOC	TOX	%	TCLP	Priority	EPTOX	EP TOX	NUMBER OF CONTAINERS	
					Halogenated Volatiles	Aromatic Volatiles	GCMS Volatiles	GCMS BNA	HPLC PNA	Pesticides & PCB's	Phosphate Pesticides	Herbicides	PAH/HH (WAC 173)	(TPH)	Grease & Oil	(Modified)	9060	9020	Moisture	Metals (13)	Metals (8) Total	Metals (8) EP EXT					
Stock-C (5 bottles)	8/30/89	1620	Soil		X	X					X				X												

PROJECT INFORMATION		SAMPLE RECEIPT		RELINQUISHED BY: 1	RELINQUISHED BY: 2	RELINQUISHED BY: 3
PROJECT NUMBER: <u>186-101-B4</u>	TOTAL NUMBER OF CONTAINERS: <u>5</u>	CHAIN OF CUSTODY SEALS Y/NNA: <u>N</u>	INTACT? Y/NNA: <u>Y</u>	Signature: <u>Jama. RdL</u> Time: _____	Signature: _____ Time: _____	Signature: _____ Time: _____
PROJECT NAME: <u>Puget Power</u>	RECEIVED GOOD COND./COLD: <u>Y</u>	INTACT? Y/NNA: <u>Y</u>	RECEIVED GOOD COND./COLD: <u>Y</u>	Printed Name: <u>Jama RdL</u> Date: <u>8/30/89</u>	Printed Name: _____ Date: _____	Printed Name: _____ Date: _____
PURCHASE ORDER NUMBER: _____	VIA: _____	RECEIVED GOOD COND./COLD: <u>Y</u>	TAT: <input type="checkbox"/> 24HR <input type="checkbox"/> 48 HRS <input type="checkbox"/> 72 HRS <input type="checkbox"/> 1 WK <input checked="" type="checkbox"/> 2 WKS (Normal)	Company: <u>GET</u>	Company: _____	Company: _____
PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA				RECEIVED BY: 1	RECEIVED BY: 2	RECEIVED BY: (LAB) 3
SPECIAL INSTRUCTIONS:				Signature: _____ Time: _____	Signature: _____ Time: _____	Signature: <u>Jackie Ware</u> Time: <u>4:30</u>
				Printed Name: _____ Date: _____	Printed Name: _____ Date: _____	Printed Name: <u>JACKIE WARE</u> Date: <u>8/30/89</u>
				Company: _____	Company: _____	Company: <u>Analytical Technologies, Inc.</u>

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GeoEngineers

September 7, 1989

SEP 11 1989

Routing KSK
File


GeoEngineers, Inc.
2405 140th Ave. N.E.
Suite 105
Bellevue, WA 98005

Attention : Kathy Killman


Project Number : 186-101-B04

Project Name : -

On September 5, 1989 Analytical Technologies, Inc. received six soil samples for analyses. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and the quality control data are enclosed.


Donna M. McKinney
Project Manager

FWG/hbb


Frederick W. Grothkopp
Technical Manager



SAMPLE CROSS REFERENCE SHEET

CLIENT : GEOENGINEERS, INC.
PROJECT # : 186-101-B04
PROJECT NAME : -

Table with 4 columns: ATI #, CLIENT DESCRIPTION, MATRIX, DATE SAMPLED. Contains 6 rows of sample data.

----- TOTALS -----

Summary table with 2 columns: MATRIX, # SAMPLES. Shows SOIL with 6 samples.

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) 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 : GEOENGINEERS, INC.
PROJECT # : 186-101-B04
PROJECT NAME : -

ANALYSIS	TECHNIQUE	REFERENCE/METHOD
PETROLEUM HYDROCARBONS	IR	EPA 418.1



GENERAL CHEMISTRY RESULTS

CLIENT : GEOENGINEERS, INC.
PROJECT # : 186-101-B04
PROJECT NAME : -

SAMPLE MATRIX : SOIL

PARAMETER	UNITS	-1	-2	-3	-4	-5	-6
PETROLEUM HYDROCARBONS	mg/Kg	34,000	2.8	22	<1.0	13,000	12

GENERAL CHEMISTRY QUALITY CONTROL

CLIENT : GEOENGINEERS, INC.
 PROJECT # : 186-101-B04
 PROJECT NAME : -

SAMPLE MATRIX : SOIL

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED CONC	SPIKE ADDED	% REC
PETROLEUM HYDROCARBONS	mg/Kg	8909-015-2	<1.0	<1.0	0	63.9	63.3	101

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

Chain of Custody

PROJECT MANAGER: Kathy Killman
 COMPANY: Geo Engineers
 ADDRESS: 2405 N.E. 140th Ave Suite 105
Bellevue, WA
 PHONE: 746-5200 SAMPLED BY: CSC

LABORATORY NUMBER: 8909-013

SAMPLE DISPOSAL INSTRUCTIONS

ATI Disposal @ \$5.00 each Return Pickup (will call)

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	8010	8020	BETX ONLY	8240	8270	8310	8080	PCB's ONLY	8140	8150	WDOE PAH/HH (WAC 173)	418.1 (TPH)	413.2 Grease & Oil	8015 (Modified)	TOC	TOX	%	Moisture	TCLP	Priority Pollutant Metals (13)	EPTOX Metals (8) Total	EP TOX Metals (8) EP EXT	NUMBER OF CONTAINERS
					Halogenated Volatiles	Aromatic Volatiles	GCMS Volatiles	GCMS BNA	HPLC PNA	Pesticides & PCB's	Phosphate Pesticides	Herbicides	TOC	TOX	%	Moisture	TCLP	Priority Pollutant Metals (13)	EPTOX Metals (8) Total	EP TOX Metals (8) EP EXT							
MW-6-3	9/5/87	1055	Soil	-1												X											
MW-6-5	"	1110	"	-2												X											
MW-8-3	"	1245	"	-3												X											
MW-8-5	"	1300	"	-4												X											
MW-7-3	"	1435	"	-5												X											
MW-7-5	"	1450	"	-6												X											

PROJECT INFORMATION		SAMPLE RECEIPT		RELINQUISHED BY: 1	RELINQUISHED BY: 2	RELINQUISHED BY: 3
PROJECT NUMBER: <u>186-101-304</u>	TOTAL NUMBER OF CONTAINERS: <u>6</u>	CHAIN OF CUSTODY SEALS Y/N/A: <u>N</u>	INTACT? Y/N/A: <u>Y</u>	Signature: <u>Charles S. Lindsey</u> Time: _____	Signature: _____ Time: _____	Signature: _____ Time: _____
PROJECT NAME: _____	RECEIVED GOOD COND./COLD: <u>Y</u>	RECEIVED BY: 1	RECEIVED BY: 2	Printed Name: <u>Charles S. Lindsey</u> Date: <u>9/5/87</u>	Printed Name: _____ Date: _____	Printed Name: _____ Date: _____
PURCHASE ORDER NUMBER: _____	TAT: <input type="checkbox"/> 24HR <input type="checkbox"/> 48 HRS <input type="checkbox"/> 72 HRS <input type="checkbox"/> 1 WK <input checked="" type="checkbox"/> 2 WKS (Normal)	Company: <u>Geo Engineers</u>	Company: _____	Company: _____	Company: _____	Company: _____
VIA: _____	PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA: _____	RECEIVED BY: 1	RECEIVED BY: 2	Signature: _____ Time: _____	Signature: _____ Time: _____	Signature: <u>Danna L. Barkley</u> Time: _____
SPECIAL INSTRUCTIONS: _____		Printed Name: _____ Date: _____	Printed Name: _____ Date: _____	Printed Name: _____ Date: _____	Printed Name: _____ Date: _____	Printed Name: <u>DANNA L. BARKLEY</u> Date: <u>9/5</u>
		Company: _____	Company: _____	Company: _____	Company: _____	Company: <u>Analytical Technologies, Inc.</u>

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ATI I.D. # 8909-025

September 20, 1989

GeoEngineers

SEP 21 1989

Routing RSK
File

GeoEngineers, Inc.
2405 140th Ave. N.E.
Suite 105
Bellevue, WA 98005

Attention : Kathy Killman

Project Number : 186-101-B4

Project Name : PSP&L, Renton

On September 6, 1989 Analytical Technologies, Inc. received six soil samples for analyses. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and the quality control data are enclosed.

Donna M. McKinney
Donna M. McKinney
Project Manager

Frederick W. Grothkopp
Frederick W. Grothkopp
Technical Manager

FWG/hbb

SAMPLE CROSS REFERENCE SHEET

CLIENT : GEOENGINEERS, INC.
 PROJECT # : 186-101-B4
 PROJECT NAME : PSP&L, RENTON

ATI #	CLIENT DESCRIPTION	MATRIX	DATE SAMPLED
8909-025-1	MW5 (8')	SOIL	09/06/89
8909-025-2	MW5 (13')	SOIL	09/06/89
8909-025-3	MW9 (8')	SOIL	09/06/89
8909-025-4	MW9 (13')	SOIL	09/06/89
8909-025-5	MW10 (5.5')	SOIL	09/06/89
8909-025-6	MW10 (13')	SOIL	09/06/89

----- TOTALS -----

MATRIX	# SAMPLES
SOIL	6

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) 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 : GEOENGINEERS, INC.
PROJECT # : 186-101-B4
PROJECT NAME : PSP&L, RENTON

ANALYSIS	TECHNIQUE	REFERENCE/METHOD
PETROLEUM HYDROCARBONS	IR	EPA 418.1

GENERAL CHEMISTRY RESULTS

CLIENT : GEOENGINEERS, INC. SAMPLE MATRIX : SOIL
PROJECT # : 186-101-B4
PROJECT NAME : PSP&L, RENTON UNITS : mg/Kg

ATI I.D.	CLIENT I.D.	PETROLEUM HYDROCARBONS
8909-025-1	MW5 (8')	<1.0
8909-025-2	MW5 (13')	<1.0
8909-025-3	MW9 (8')	11,000
8909-025-4	MW9 (13')	<1.0
8909-025-5	MW10 (5.5')	<1.0
8909-025-6	MW10 (13')	<1.0

GENERAL CHEMISTRY QUALITY CONTROL

CLIENT : GEOENGINEERS, INC. SAMPLE MATRIX : SOIL
 PROJECT # : 186-101-B4
 PROJECT NAME : PSP&L, RENTON UNITS : mg/Kg

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED CONC	SPIKE ADDED	% REC
PETROLEUM HYDROCARBONS	mg/Kg	8909-042-1	<1.00	<1.00	0	143	125	114

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$



Chain of Custody

PROJECT MANAGER: K. Killman
 COMPANY: GEI
 ADDRESS: _____
 PHONE: 746-5200 SAMPLED BY: JGR

LABORATORY NUMBER: 8909-025

ANALYSIS REQUEST

SAMPLE DISPOSAL INSTRUCTIONS

ATI Disposal @ \$5.00 each Return Pickup (will call)

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	8010 Halogenated Volatiles	8020 Aromatic Volatiles	BETX ONLY	8240 GCMS Volatiles	8270 GCMS BNA	8310 HPLC PNA	8080 Pesticides & PCB's	PCB's ONLY	8140 Phosphate Pesticides	8150 Herbicides	WDOE PAH/HH (WAC 173)	418.1 (TPH)	413.2 Grease & Oil	8015 (Modified) TOC	TOX 9060	TOX 9020	% Moisture	TCLP	Priority Pollutant Metals (13)	EP TOX Metals (8) Total	EP TOX Metals (8) EP EXT	NUMBER OF CONTAINERS
MW5 (8')	9/6/89		Soil	-1												X										
MW5 (13')				-2																						
MW9 (8')				-3																						
MW9 (13')				-4																						
MW10 (5.5')				-5																						
MW10 (13')				-6																						

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PROJECT INFORMATION		SAMPLE RECEIPT		RELINQUISHED BY: 1	RELINQUISHED BY: 2	RELINQUISHED BY: 3
PROJECT NUMBER: <u>186-101-B4</u>	TOTAL NUMBER OF CONTAINERS: <u>6</u>	CHAIN OF CUSTODY SEALS Y/N/NA: <u>N</u>	INTACT? Y/N/NA: <u>Y</u>	Signature: <u>James Hill</u> Time: _____	Signature: _____ Time: _____	Signature: _____ Time: _____
PROJECT NAME: <u>PSPIL, Rotator</u>	RECEIVED GOOD COND./COLD: <u>Y</u>			Printed Name: <u>Jamal Hill</u> Date: <u>9/16</u>	Printed Name: _____ Date: _____	Printed Name: _____ Date: _____
PURCHASE ORDER NUMBER: _____				Company: <u>GEI</u>	Company: _____	Company: _____
VIA: _____						
TAT: <input type="checkbox"/> 24HR <input type="checkbox"/> 48 HRS <input type="checkbox"/> 72 HRS <input type="checkbox"/> 1 WK <input checked="" type="checkbox"/> 2 WKS (Normal)						
PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA				RECEIVED BY: 1	RECEIVED BY: 2	RECEIVED BY: (LAB) 3
SPECIAL INSTRUCTIONS:				Signature: _____ Time: _____	Signature: _____ Time: _____	Signature: <u>Dayna L. Barkley</u> Time: <u>5:08</u>
				Printed Name: _____ Date: _____	Printed Name: _____ Date: _____	Printed Name: <u>DAYNA L. BARKLEY</u> Date: <u>9/16</u>
				Company: _____	Company: _____	Company: <u>Analytical Technologies, Inc.</u>



ATI I.D. # 8909-036

GeoEngineers

SEP 25 1989

Routing KSK
File

September 21, 1989

GeoEngineers, Inc.
2405 140th Ave. N.E.
Suite 105
Bellevue, WA 98005

Attention : Kathy Killman

Project Number : 0186-101-B04

Project Name : PSP&L

On September 7, 1989 Analytical Technologies, Inc. received six water and five soil samples for analyses. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and the quality control data are enclosed.

Donna M. McKinney
Donna M. McKinney
Project Manager

FWG/hbb

Frederick W. Grothkopp
Frederick W. Grothkopp
Technical Manager



SAMPLE CROSS REFERENCE SHEET

CLIENT : GEOENGINEERS, INC.
PROJECT # : 0186-101-B04
PROJECT NAME : PSP&L

Table with 4 columns: ATI #, CLIENT DESCRIPTION, MATRIX, DATE SAMPLED. Contains 11 rows of sample data.

----- TOTALS -----

Summary table with 2 columns: MATRIX, # SAMPLES. Shows 6 WATER and 5 SOIL samples.

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) 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 : GEOENGINEERS, INC.
PROJECT # : 0186-101-B04
PROJECT NAME : PSP&L

ANALYSIS	TECHNIQUE	REFERENCE/METHOD
BETX	GC/PID	EPA 8020
PETROLEUM HYDROCARBONS	IR	EPA 418.1
MOISTURE	GRAVIMETRIC	METHOD 7-2.2



PURGEABLE AROMATICS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: N/A
PROJECT #	: 0186-101-B04	DATE RECEIVED	: N/A
PROJECT NAME	: PSP&L	DATE EXTRACTED	: 09/08/89
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 09/08/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8020 (BETX)	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
BENZENE	<0.025
ETHYLBENZENE	<0.025
TOLUENE	<0.025
META & PARA XYLENE	<0.025
ORTHO XYLENE	<0.025

SURROGATE PERCENT RECOVERY

BROMOFLUOROBENZENE	97
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PURGEABLE AROMATICS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 09/07/89
PROJECT #	: 0186-101-B04	DATE RECEIVED	: 09/07/89
PROJECT NAME	: PSP&L	DATE EXTRACTED	: 09/08/89
CLIENT I.D.	: B-1	DATE ANALYZED	: 09/08/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8020 (BETX)	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
BENZENE	<0.025
ETHYLBENZENE	<0.025
TOLUENE	<0.025
META & PARA XYLENE	<0.025
ORTHO XYLENE	<0.025

SURROGATE PERCENT RECOVERY

BROMOFLUOROBENZENE	71
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PURGEABLE AROMATICS
QUALITY CONTROL DATA

CLIENT	: GEOENGINEERS, INC.	SAMPLE I.D.	: 8909-022-1
PROJECT #	: 0186-101-B04	DATE ANALYZED	: 09/07/89
PROJECT NAME	: PSP&L	UNITS	: mg/Kg
EPA METHOD	: 8020 (BETX)	MATRIX	: SOIL

COMPOUND	SAMPLE RESULT	SPIKE ADDED	SPIKED SAMPLE	% REC	DUP SPIKED SAMPLE	DUP % REC	RPD
BENZENE	<0.025	0.400	0.363	91	0.357	89	2
TOLUENE	<0.025	0.400	0.375	94	0.357	89	5
META & PARA XYLENE	<0.025	1.10	0.999	91	0.969	88	3

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$



GENERAL CHEMISTRY RESULTS

CLIENT : GEOENGINEERS, INC. SAMPLE MATRIX : WATER
PROJECT # : 0186-101-B04
PROJECT NAME : PSP&L

PARAMETER	UNITS	-1	-2	-3	-4	-5	-6
PETROLEUM HYDROCARBONS	mg/L	0.21	140	49	0.48	22	0.34



GENERAL CHEMISTRY QUALITY CONTROL

CLIENT : GEOENGINEERS, INC.
PROJECT # : 0186-101-B04
PROJECT NAME : PSP&L

SAMPLE MATRIX : WATER

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED CONC	SPIKE ADDED	% REC
PETROLEUM HYDROCARBONS	mg/L	8909-036-6	0.34	0.27	23	N/A	N/A	N/A
PETROLEUM HYDROCARBONS	mg/L	BLANK SPIKE	N/A	N/A	N/A	6.68	10.2	65

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$



GENERAL CHEMISTRY RESULTS

CLIENT : GEOENGINEERS, INC.
PROJECT # : 0186-101-B04
PROJECT NAME : PSP&L

SAMPLE MATRIX : SOIL

PARAMETER	UNITS	-7	-8	-9	-10	-11
PETROLEUM HYDROCARBONS	mg/Kg	61	81	49	220	27
MOISTURE	%	-	-	-	-	20

GENERAL CHEMISTRY QUALITY CONTROL

 CLIENT : GEOENGINEERS, INC.
 PROJECT # : 0186-101-B04
 PROJECT NAME : PSP&L

SAMPLE MATRIX : SOIL

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED CONC	SPIKE ADDED	% REC
PETROLEUM HYDROCARBONS	mg/Kg	8909-042-1	<1.0	<1.0	0	143	125	114
MOISTURE	%	8909-039-1	24	24	0	N/A	N/A	N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$



PROJ. MGR. <u>St Kathy Killman</u>					ANALYSIS REQUEST														NUMBER OF CONTAINERS		
COMPANY <u>Geo Eng. Inc PT</u>					BASE/NEU/ACID CMPDS. GC/MS/ 625/8270	VOLATILE CMPDS. GC/MS/ 624/8240	PESTICIDES/PCB 608/8080	POLYNUCLEAR AROMATIC 610/8310	PHENOLS, SUB PHENOLS 604/8040	HALOGENATED VOLATILES 601/8010	AROMATIC VOLATILES 602/8020	TOTAL ORGANIC CARBON 415/9060	TOTAL ORGANIC HALIDES 9020	PETROLEUM HYDROCARBONS 418	PRIORITY POLLUTANT METALS (13)	CAM METALS (18) TTLIC/STLC	EP TOX METALS (8)	SWDA-INORGANICS PRIMARY/SECONDARY		HAZARDOUS WASTE PROFILE	
ADDRESS <u>2405-140th Ave NE, Suite 105 Bellevue WA 98005</u>																					
SAMPLERS (SIGNATURE) <u>Dorothy Kruty</u> (PHONE NO.) <u>9/07/89</u>																					
SAMPLE ID.	DATE	TIME	MATRIX	LAB ID.																	
mw-5	7/07		H ₂ O	-1										X							1
mw-6				-2										X							1
mw-7				-3										X							1
mw-8				-4										X							1
mw-9				-5										X							1
mw-10				-6										X							1
A-1			Soil	-7										X							1
C-South 1			Soil	-8										X							1
C-North 1			Soil	-9										X							1

PROJECT INFORMATION		SAMPLE RECEIPT		INVOICE TO:		RELINQUISHED BY		RELINQUISHED BY	
PROJECT: <u>PSP+L</u>	TOTAL NO. OF CONTAINERS <u>11</u>	CHAIN OF CUSTODY SEALS <u>✓</u>				<u>Dorothy Kruty 14:48</u>			
PO NO. <u>0156-101-B04</u>	REC'D GOOD CONDITION/COLD <u>✓</u>	CONFORMS TO RECORD <u>✓</u>				<u>Dorothy Kruty 9/07</u>			
SHIPPING ID. NO.	LAB NO. <u>8907-036</u>		<u>Geo Eng. Inc.</u>						
VIA: <u>Hand delivered</u>	SPECIAL INSTRUCTIONS/COMMENTS: <u>Sols on a dry weighed basis</u>				RECEIVED BY		RECEIVED BY (LABORATORY)		
						<u>Jackie White 248</u>		<u>Jackie White 9/7/89</u>	
								<u>STEVIE WHITE 9/7/89</u>	
								ANALYTICAL TECHNOLOGIES, INC.	

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ATI I.D. # 8910-059

GeoEngineers

November 8, 1989

NOV 8 1989

Routing
File

GeoEngineers, Inc.
2405 140th Avenue N.E.
Suite 105
Bellevue, WA 98005

Attention : Kathy Killman

Project Number : 186-101

Project Name : -

On October 9, 1989 Analytical Technologies, Inc. received six soil samples for analyses. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and the quality control data are enclosed.

Donna M. McKinney

Donna M. McKinney
Project Manager

FWG/nah

Frederick W. Grothkopp

Frederick W. Grothkopp
Technical Manager

SAMPLE CROSS REFERENCE SHEET

CLIENT : GEOENGINEERS, INC.
 PROJECT # : 186-101
 PROJECT NAME : -

ATI #	CLIENT DESCRIPTION	MATRIX	DATE SAMPLED
8910-059-1	MW-11, SAMPLE #3	SOIL	10/09/89
8910-059-2	MW-11, SAMPLE #5	SOIL	10/09/89
8910-059-3	MW-12, SAMPLE #3	SOIL	10/09/89
8910-059-4	MW-12, SAMPLE #5	SOIL	10/09/89
8910-059-5	MW-14, SAMPLE #3	SOIL	10/09/89
8910-059-6	MW-14, SAMPLE #5	SOIL	10/09/89

----- TOTALS -----

MATRIX	# SAMPLES
SOIL	6

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) 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 : GEOENGINEERS, INC.
PROJECT # : 186-101
PROJECT NAME : -

ANALYSIS	TECHNIQUE	REFERENCE/METHOD
PETROLEUM HYDROCARBONS	IR	EPA 418.1

GENERAL CHEMISTRY RESULTS

CLIENT : GEOENGINEERS, INC.
PROJECT # : 186-101
PROJECT NAME : -

SAMPLE MATRIX : SOIL

PARAMETER	UNITS	-1	-3	-5	-6
PETROLEUM HYDROCARBONS	mg/Kg	<1.0	13	7,100	<1.0



GENERAL CHEMISTRY QUALITY CONTROL

CLIENT : GEOENGINEERS, INC.
PROJECT # : 186-101
PROJECT NAME : -

SAMPLE MATRIX : SOIL

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED CONC	SPIKE ADDED	% REC
PETROLEUM HYDROCARBONS	mg/Kg	8910-031-6	22	22	0	N/A	N/A	N/A
PETROLEUM HYDROCARBONS	mg/Kg	BLANK SPIKE	N/A	N/A	N/A	130	124	105

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

Chain of Custody

8910-059

DATE: 10/9/89 PAGE: 1 OF 1

PROJECT MANAGER: Kathie Killman
 COMPANY: GeoEngineers
 ADDRESS: 2405 140th Ave NE, Suite 105
Bellevue WA 98005
 PHONE: 246-5200 SAMPLED BY: GWM

LABORATORY NUMBER: 8910.059

SAMPLE DISPOSAL INSTRUCTIONS

ATI Disposal @ \$5.00 each Return Pickup (will call)

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	8010	8020	BETX ONLY	8240	8270	8310	8080	PCB's ONLY	8140	8150	WDOE PAH/HH (WAC 173)	418.1 (TPH)	413.2 Grease & Oil	8015 (Modified)	TOC 9060	TOX 9020	% Moisture	TCLP	Priority Pollutant Metals (13)	EP TOX Metals (8) Total	EP TOX Metals (8) EP EXT	NUMBER OF CONTAINERS
					Halogenated Volatiles	Aromatic Volatiles	GCMS Volatiles	GCMS BNA	HPLC PNA	Pesticides & PCB's	Phosphate Pesticides	Herbicides	418.1 (TPH)	8015 (Modified)	TOC 9060	TOX 9020	% Moisture	TCLP	Priority Pollutant Metals (13)	EP TOX Metals (8) Total	EP TOX Metals (8) EP EXT					
MW-11, Sample # 3	10/9/89	1030	soil	-1												X										
MW-11, Sample # 5		1100		-2												X										
MW-12, Sample # 3		1225		-3												X										
MW-12, Sample # 5		1250		-4												X										
MW-14, Sample # 3		1430		-5												X										
MW-14, Sample # 5		1500		-6												X										

PROJECT INFORMATION		SAMPLE RECEIPT		RELINQUISHED BY: 1	RELINQUISHED BY: 2	RELINQUISHED BY: 3
PROJECT NUMBER: <u>186-101</u>	TOTAL NUMBER OF CONTAINERS: <u>6</u>	PROJECT NAME:	CHAIN OF CUSTODY SEALS Y/N/A: <u>N</u>	Signature: <u>Mala M...</u> Time: <u>10/13/89</u>	Signature:	Time:
PURCHASE ORDER NUMBER:	INTACT? Y/N/A: <u>Y</u>	VIA:	RECEIVED GOOD COND./COLD: <u>Y</u>	Printed Name: <u>Galan M...</u> Date: <u>10/9/89</u>	Printed Name:	Date:
TAT: <input type="checkbox"/> 24HR <input type="checkbox"/> 48 HRS <input type="checkbox"/> 72 HRS <input type="checkbox"/> 1 WK <input checked="" type="checkbox"/> 2 WKS (Normal)				Company: <u>GeoEngineers</u>	Company:	Company:
PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA				RECEIVED BY: 1	RECEIVED BY: 2	RECEIVED BY: (LAB) 3
SPECIAL INSTRUCTIONS:				Signature:	Signature:	Signature: <u>Dawn D. Barkley</u> Time: <u>10/13/89</u>
				Printed Name:	Printed Name:	Printed Name: <u>Dawn D. Barkley</u> Date: <u>10/13/89</u>
				Company:	Company:	Company: <u>Analytical Technologies, Inc.</u>

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ATI I.D. # 8910-066

November 8, 1989

GeoEngineers

NOV 8 1989

GeoEngineers, Inc.
2405 140th Avenue N.E.
Suite 105
Bellevue, WA 98005

Routing:
File

Attention : Kathy Killman

Project Number : 186-101-BO4

Project Name : -

On October 10, 1989 Analytical Technologies, Inc. received six soil samples for analyses. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and the quality control data are enclosed.

Donna M. McKinney

Donna M. McKinney
Project Manager

FWG/nah

Frederick W. Grothkopp

Frederick W. Grothkopp
Technical Manager

SAMPLE CROSS REFERENCE SHEET

CLIENT : GEOENGINEERS, INC.
 PROJECT # : 186-101-BO4
 PROJECT NAME : -

ATI #	CLIENT DESCRIPTION	MATRIX	DATE SAMPLED
8910-066-1	MW-15, SAMPLE #3	SOIL	10/10/89
8910-066-2	MW-15, SAMPLE #5	SOIL	10/10/89
8910-066-3	MW-16, SAMPLE #3	SOIL	10/10/89
8910-066-4	MW-16, SAMPLE #5	SOIL	10/10/89
8910-066-5	MW-20, SAMPLE #3	SOIL	10/10/89
8910-066-6	MW-20, SAMPLE #5	SOIL	10/10/89

----- TOTALS -----

MATRIX	# SAMPLES
SOIL	6

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) 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 : GEOENGINEERS, INC.
PROJECT # : 186-101-B04
PROJECT NAME : -

ANALYSIS	TECHNIQUE	REFERENCE/METHOD
FUEL HYDROCARBONS	GC/FID	EPA 8015 MODIFIED
PETROLEUM HYDROCARBONS	IR	EPA 418.1

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: N/A
PROJECT #	: 186-101-BO4	DATE RECEIVED	: N/A
PROJECT NAME	: -	DATE EXTRACTED	: 10/13/89
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 10/13/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUND	RESULT
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	GASOLINE
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	DIESEL



FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 10/10/89
PROJECT #	: 186-101-BO4	DATE RECEIVED	: 10/10/89
PROJECT NAME	: -	DATE EXTRACTED	: 10/13/89
CLIENT I.D.	: MW-16, SAMPLE #3	DATE ANALYZED	: 10/16/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 5

COMPOUND	RESULT
FUEL HYDROCARBONS HYDROCARBON RANGE HYDROCARBONS QUANTITATED USING	<25 - GASOLINE
FUEL HYDROCARBONS HYDROCARBON RANGE HYDROCARBONS QUANTITATED USING	2,200 C14 - C26 DIESEL

FUEL HYDROCARBONS
 QUALITY CONTROL DATA

CLIENT	: GEOENGINEERS, INC.	SAMPLE I.D.	: 8910-086-1
PROJECT #	: 186-101-BO4	DATE ANALYZED	: 10/14/89
PROJECT NAME	: -	SAMPLE MATRIX	: SOIL
EPA METHOD	: 8015 MODIFIED	UNITS	: mg/Kg

COMPOUND	SAMPLE RESULT	CONC SPIKED	SPIKED SAMPLE	% REC	DUP SPIKED SAMPLE	DUP % RECOVERY	RPD
FUEL HYDROCARBONS	<5	500	492	98	494	99	0

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$



GENERAL CHEMISTRY RESULTS

CLIENT : GEOENGINEERS, INC.
PROJECT # : 186-101-BO4
PROJECT NAME : -

SAMPLE MATRIX : SOIL

PARAMETER	UNITS	-1	-2	-3	-4	-5
PETROLEUM HYDROCARBONS	mg/Kg	13,000	<1.0	9,300	<1.0	<1.0

GENERAL CHEMISTRY QUALITY CONTROL

 CLIENT : GEOENGINEERS, INC.
 PROJECT # : 186-101-BO4
 PROJECT NAME : -

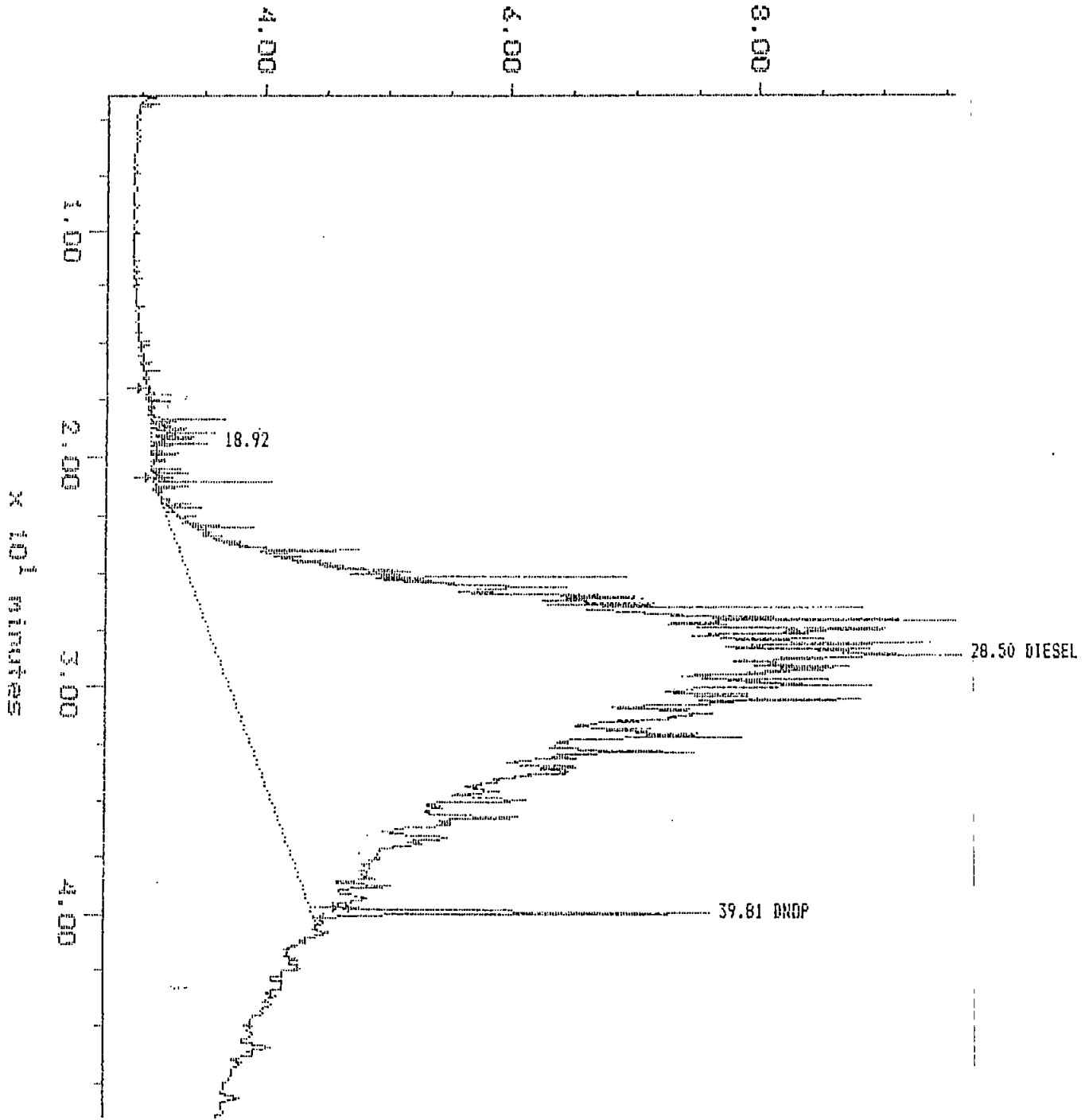
SAMPLE MATRIX : SOIL

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED CONC	SPIKE ADDED	% REC
PETROLEUM HYDROCARBONS	mg/Kg	8910-066-5	<1.0	<1.0	0	139	125	111

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

$\times 10^{-2}$ volts





ATI I.D. # 8910-077

GeoEngineers

November 8, 1989

NOV 8 1989

Routing *KSK*

File

GeoEngineers, Inc.
 2405 140th Ave. N.E.
 Suite 105
 Bellevue, WA 98005

Attention : Kathy Killman

Project Number : 186-101

Project Name : -

On October 11, 1989 Analytical Technologies, Inc. received 10 soil samples for analyses. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and the quality control data are enclosed.

Karen L. Mixon

Karen L. Mixon
 Project Manager

FWG/hbb

Frederick W. Grothkopp

Frederick W. Grothkopp
 Technical Manager

SAMPLE CROSS REFERENCE SHEET

CLIENT : GEOENGINEERS, INC.
 PROJECT # : 186-101
 PROJECT NAME : -

ATI #	CLIENT DESCRIPTION	MATRIX	DATE SAMPLED
8910-077-1	MW-17, SAMPLE #3	SOIL	10/11/89
8910-077-2	MW-17, SAMPLE #5	SOIL	10/11/89
8910-077-3	MW-18, SAMPLE #3	SOIL	10/11/89
8910-077-4	MW-18, SAMPLE #5	SOIL	10/11/89
8910-077-5	MW-19, SAMPLE #3	SOIL	10/11/89
8910-077-6	MW-19, SAMPLE #5	SOIL	10/11/89
8910-077-7	MW-25, SAMPLE #2	SOIL	10/11/89
8910-077-8	MW-25, SAMPLE #3	SOIL	10/11/89
8910-077-9	MW-26, SAMPLE #3	SOIL	10/11/89
8910-077-10	MW-26, SAMPLE #5	SOIL	10/11/89

----- TOTALS -----

MATRIX	# SAMPLES
SOIL	10

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) 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 : GEOENGINEERS, INC.
PROJECT # : 186-101
PROJECT NAME : -

ANALYSIS	TECHNIQUE	REFERENCE/METHOD
FUEL HYDROCARBONS	GC/FID	EPA 8015 MODIFIED
PETROLEUM HYDROCARBONS	IR	EPA 418.1

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: N/A
PROJECT #	: 186-101	DATE RECEIVED	: N/A
PROJECT NAME	: -	DATE EXTRACTED	: 10/13/89
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 10/13/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUND

RESULT

FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	GASOLINE
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	DIESEL

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 10/11/89
PROJECT #	: 186-101	DATE RECEIVED	: 10/11/89
PROJECT NAME	: -	DATE EXTRACTED	: 10/13/89
CLIENT I.D.	: MW-18, SAMPLE #3	DATE ANALYZED	: 10/14/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUND	RESULT
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	GASOLINE
FUEL HYDROCARBONS	10
HYDROCARBON RANGE	C18 - C26
HYDROCARBONS QUANTITATED USING	DIESEL



FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 10/11/89
PROJECT #	: 186-101	DATE RECEIVED	: 10/11/89
PROJECT NAME	: -	DATE EXTRACTED	: 10/13/89
CLIENT I.D.	: MW-25, SAMPLE #2	DATE ANALYZED	: 10/16/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 10

COMPOUND	RESULT
FUEL HYDROCARBONS	<50
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	GASOLINE
FUEL HYDROCARBONS	4,500
HYDROCARBON RANGE	C16 - C26
HYDROCARBONS QUANTITATED USING	DIESEL

FUEL HYDROCARBONS
 QUALITY CONTROL DATA

CLIENT	: GEOENGINEERS, INC.	SAMPLE I.D.	: BLANK 10/13
PROJECT #	: 186-101	DATE ANALYZED	: 10/14/89
PROJECT NAME	: -	SAMPLE MATRIX	: SOIL
EPA METHOD	: 8015 MODIFIED	UNITS	: mg/Kg

COMPOUND	SAMPLE RESULT	CONC SPIKED	SPIKED SAMPLE	% REC	DUP SPIKED SAMPLE	DUP % RECOVERY	RPD
FUEL HYDROCARBONS	<5	500	441	88	N/A	N/A	N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

GENERAL CHEMISTRY RESULTS

CLIENT : GEOENGINEERS, INC. SAMPLE MATRIX : SOIL
PROJECT # : 186-101
PROJECT NAME : - UNITS : mg/Kg

ATI I.D. #	CLIENT I.D.	PETROLEUM HYDROCARBONS
8910-077-1	MW-17, SAMPLE #3	<1.0
8910-077-3	MW-18, SAMPLE #3	7.7
8910-077-4	MW-18, SAMPLE #5	<1.0
8910-077-5	MW-19, SAMPLE #3	<1.0
8910-077-7	MW-25, SAMPLE #2	14,000
8910-077-8	MW-25, SAMPLE #3	<1.0
8910-077-9	MW-26, SAMPLE #3	<1.0

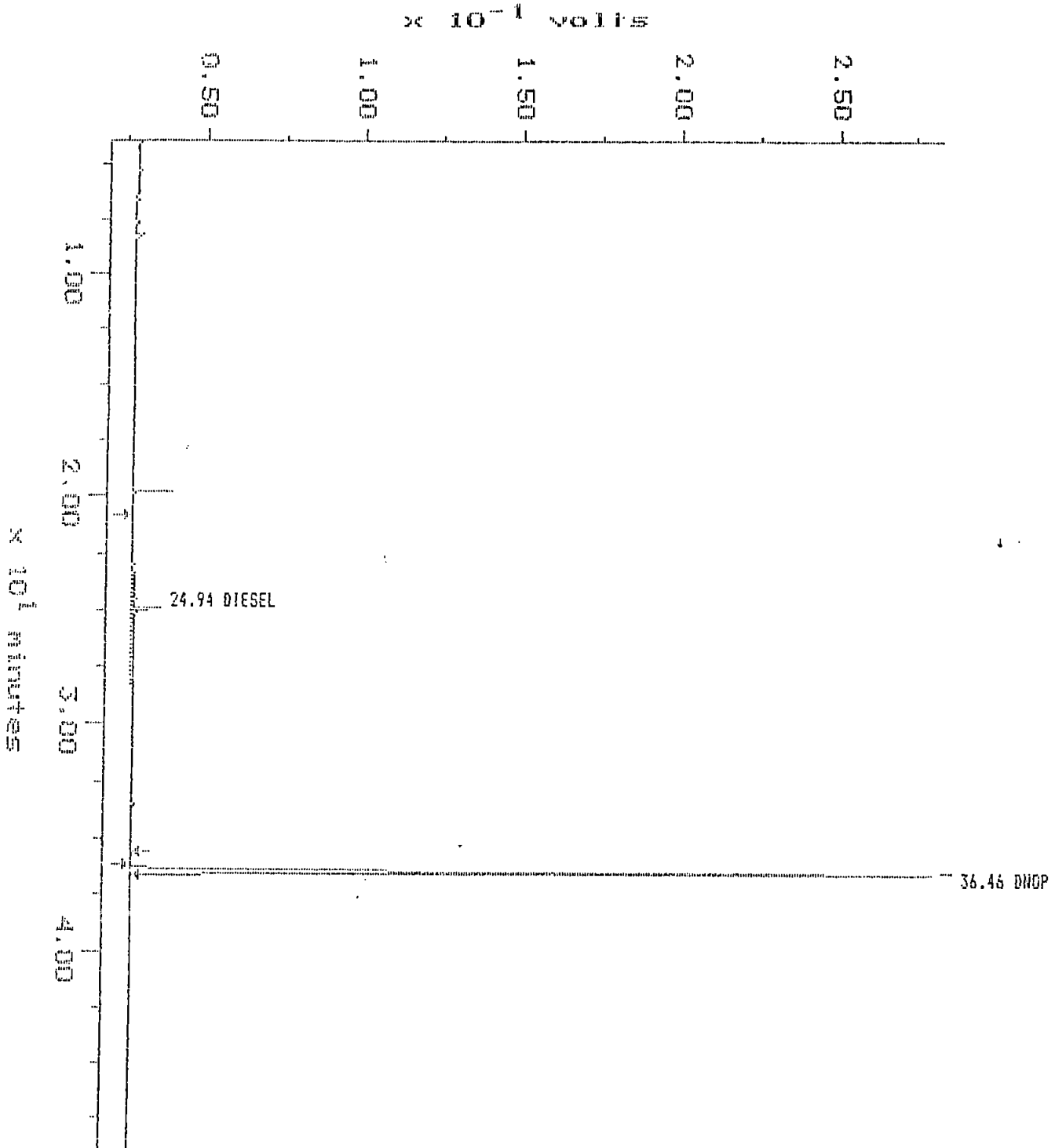
GENERAL CHEMISTRY QUALITY CONTROL

CLIENT : GEOENGINEERS, INC. SAMPLE MATRIX : SOIL
 PROJECT # : 186-101
 PROJECT NAME : - UNITS : mg/Kg

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED CONC	SPIKE ADDED	% REC
PETROLEUM HYDROCARBONS	mg/Kg	8910-066-5	<1.0	<1.0	0	139	125	111

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

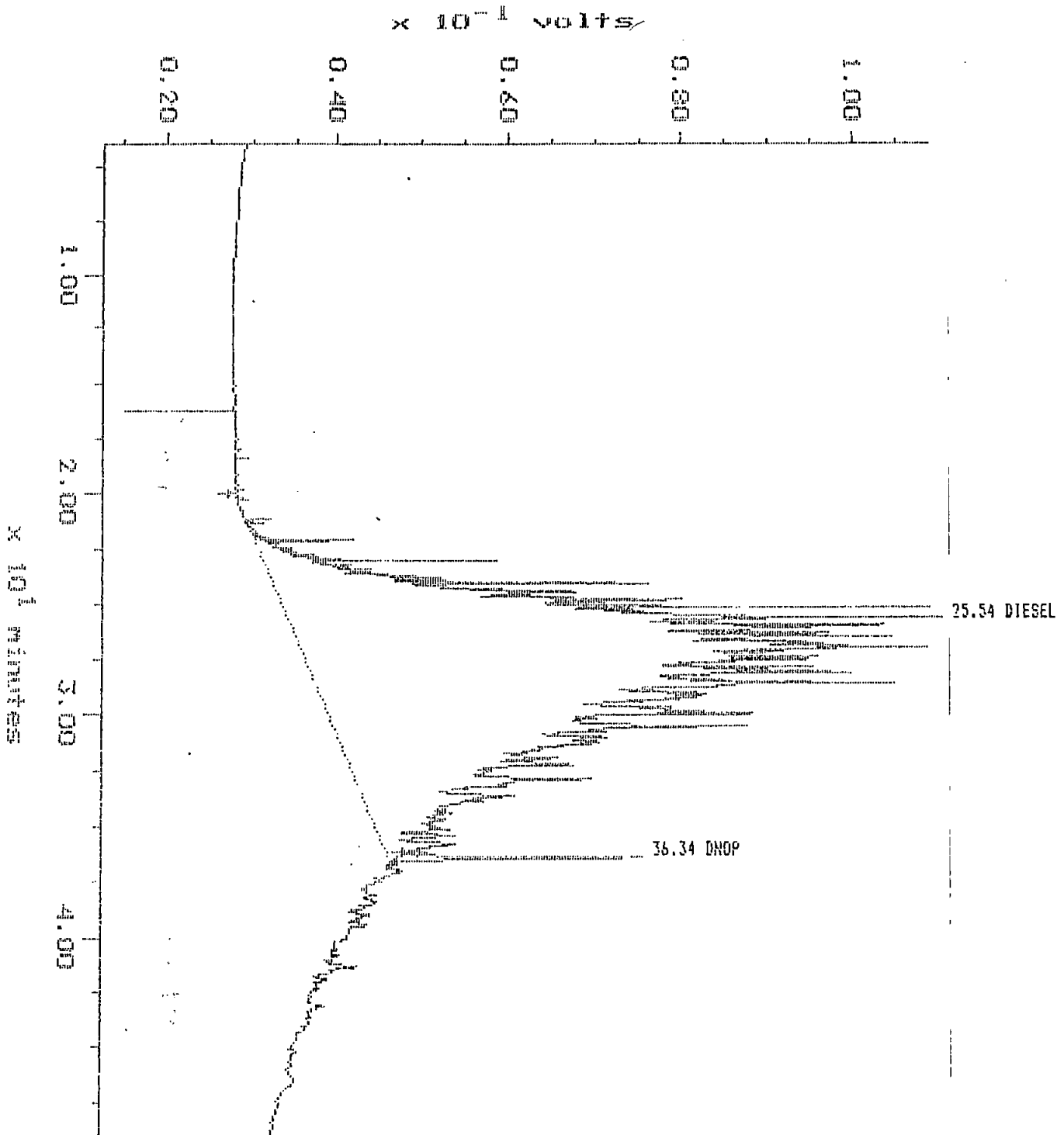
$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$



Sample: S8910-077-78.1
Acquired: 15-OCT-89 16:57
Dilution: 1 : 10.000
Comments: DIESEL AND BTEX PROGRAM FOR DIESEL/BTEX STDS, MS, MSD, FPB, FPBN

Channel: FID FRONT-A
Method: C:\MAX\DATA3\FABBTX27

Filename: 9FF01990
Operator: RWD



8910077

Chain of Custody

DATE 10/11/89 PAGE 1 OF 1

PROJECT MANAGER: Kathy Killman
 COMPANY: Geo Engineers
 ADDRESS: 2405 140th Ave. N.E., Suite 105
Belleveue, Wa.
 PHONE: 246-5200 SAMPLED BY: GWM

LABORATORY NUMBER: 8910077

SAMPLE DISPOSAL INSTRUCTIONS
 ATI Disposal @ \$5.00 each
 Return
 Pickup (will call)

					ANALYSIS REQUEST																	NUMBER OF CONTAINERS					
SAMPLE ID	DATE	TIME	MATRIX	LAB ID	8010 Halogenated Volatiles	8020 Aromatic Volatiles	BETX ONLY	8240 GCMS Volatiles	8270 GCMS BNA	8310 HPLC PNA	8080 Pesticides & PCB's	PCB's ONLY	8140 Phosphate Pesticides	8150 Herbicides	WDOE PAH/AH (WAC 173)	418.1 (TPH)	413.2 Grease & Oil	8015 (Modified)	TOC 9060	TOX 9020	% Moisture		TCLP	Priority Pollutant Metals (13)	EPTOX Metals (8) Total	EP TOX Metals (8) EP EXT	
MW-17, sample # 3	10/11/89	1045	Soil	-1												X											1
MW-17, sample # 5		1100		-2												X											1
MW-18, sample # 3		0920		-3												X											1
MW-18, sample # 5		0940		-4												X											1
MW-19, sample # 3		0820		-5												X											1
MW-19, sample # 5		0840		-6												X											1
MW-25, sample # 2		1240		-7												X											1
MW-25, sample # 3		1245		-8												X											1
MW-26, sample # 3		1420		-9												X											1
MW-26, sample # 5		1430		-10												X											1

PROJECT INFORMATION		SAMPLE RECEIPT		RELINQUISHED BY: 1		RELINQUISHED BY: 2		RELINQUISHED BY: 3	
PROJECT NUMBER: <u>186-101</u>	TOTAL NUMBER OF CONTAINERS: <u>10</u>	PROJECT NAME:	CHAIN OF CUSTODY SEALS Y/N/NA: <u>N</u>	Signature: <u>Gelan McInelly</u>	Time: <u>1646</u>	Signature:	Time:	Signature:	Time:
PURCHASE ORDER NUMBER:	INTACT? Y/N/NA: <u>N</u>	Printed Name: <u>Gelan McInelly</u>	Date: <u>10/11/89</u>	Printed Name:	Date:	Printed Name:	Date:	Printed Name:	Date:
VIA:	RECEIVED GOOD COND./COLD: <u>Y</u>	Company: <u>G E I</u>		Company:		Company:		Company:	
TAT: <input type="checkbox"/> 24HR <input type="checkbox"/> 48 HRS <input type="checkbox"/> 72 HRS <input type="checkbox"/> 1 WK	<input checked="" type="checkbox"/> 2 WKS (Normal)			RECEIVED BY: 1		RECEIVED BY: 2		RECEIVED BY: (LAB) 3	
PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA				Signature:	Time:	Signature:	Time:	Signature: <u>Maria Silva</u>	Time: <u>1646</u>
SPECIAL INSTRUCTIONS:				Printed Name:	Date:	Printed Name:	Date:	Printed Name: <u>Maria Silva</u>	Date: <u>10/11/89</u>
				Company:		Company:		Company: <u>Analytical Technologies, Inc.</u>	

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November 14, 1989

GeoEngineers, Inc.
2405 140th Ave. N.E.
Suite 105
Bellevue, WA 98005

Attention : Kathy Killman

Project Number : 186-101

Project Name : -

On October 12, 1989 Analytical Technologies, Inc. received eight soil samples for analyses. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and the quality control data are enclosed.

Donna M. McKinney
Project Manager

FWG/hbb

Frederick W. Grothkopp
Technical Manager

SAMPLE CROSS REFERENCE SHEET

CLIENT : GEOENGINEERS, INC.
 PROJECT # : 186-101
 PROJECT NAME : -

ATI #	CLIENT DESCRIPTION	MATRIX	DATE SAMPLED
8910-088-1	MW-13, SAMPLE #3	SOIL	10/12/89
8910-088-2	MW-13, SAMPLE #5	SOIL	10/12/89
8910-088-3	MW-21, SAMPLE #3	SOIL	10/12/89
8910-088-4	MW-21, SAMPLE #5	SOIL	10/12/89
8910-088-5	MW-22, SAMPLE #3	SOIL	10/12/89
8910-088-6	MW-22, SAMPLE #5	SOIL	10/12/89
8910-088-7	MW-24, SAMPLE #3	SOIL	10/12/89
8910-088-8	MW-24, SAMPLE #5	SOIL	10/12/89

----- TOTALS -----

MATRIX	# SAMPLES
SOIL	8

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) 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 : GEOENGINEERS, INC.
PROJECT # : 186-101
PROJECT NAME : -

ANALYSIS	TECHNIQUE	REFERENCE/METHOD
FUEL HYDROCARBONS	GC/FID	EPA 8015 MODIFIED
PETROLEUM HYDROCARBONS	IR	EPA 418.1

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: N/A
PROJECT #	: 186-101	DATE RECEIVED	: N/A
PROJECT NAME	: -	DATE EXTRACTED	: 10/13/89
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 10/13/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUND

RESULT

FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	GASOLINE

FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	DIESEL



FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 10/12/89
PROJECT #	: 186-101	DATE RECEIVED	: 10/12/89
PROJECT NAME	: -	DATE EXTRACTED	: 10/13/89
CLIENT I.D.	: MW-24, SAMPLE #3	DATE ANALYZED	: 10/16/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 5

COMPOUND	RESULT
FUEL HYDROCARBONS	<25
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	GASOLINE
FUEL HYDROCARBONS	1,800
HYDROCARBON RANGE	C14 - C26
HYDROCARBONS QUANTITATED USING	DIESEL

FUEL HYDROCARBONS
 QUALITY CONTROL DATA

CLIENT	: GEOENGINEERS, INC.	SAMPLE I.D.	: BLANK SPIKE
PROJECT #	: 186-101	DATE ANALYZED	: 10/14/89
PROJECT NAME	: -	SAMPLE MATRIX	: SOIL
EPA METHOD	: 8015 MODIFIED	UNITS	: mg/Kg

COMPOUND	SAMPLE RESULT	CONC SPIKED	SPIKED SAMPLE	% REC	DUP SPIKED SAMPLE	DUP % RECOVERY	RPD
FUEL HYDROCARBONS	<5	500	441	88	N/A	N/A	N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Sample Result}} \times 100$$



GENERAL CHEMISTRY RESULTS

CLIENT : GEOENGINEERS, INC.
PROJECT # : 186-101
PROJECT NAME : -

SAMPLE MATRIX : SOIL

PARAMETER	UNITS	-1	-3	-5	-7	-8
PETROLEUM HYDROCARBONS	mg/Kg	3	370	73	6,000	7

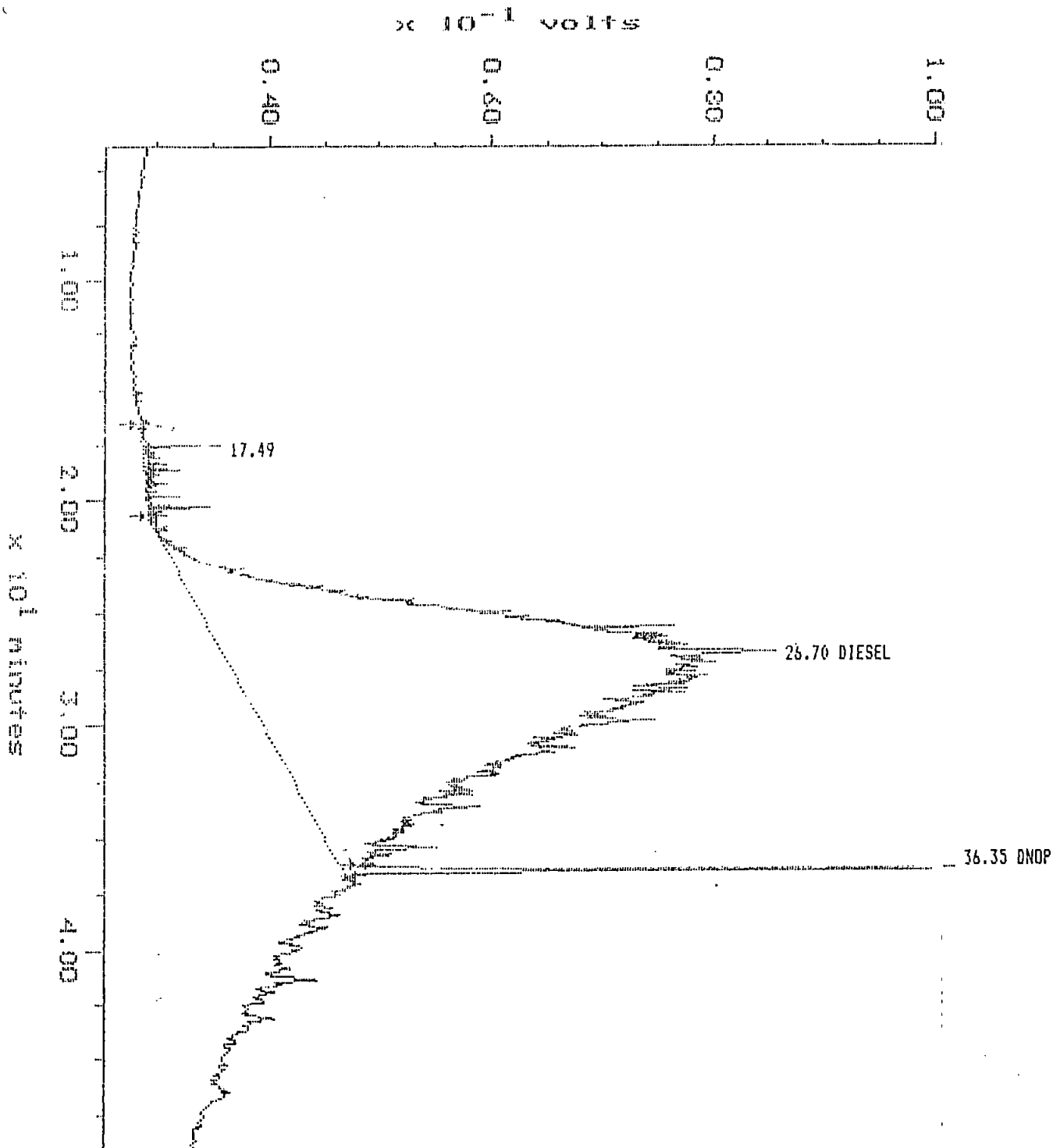
GENERAL CHEMISTRY QUALITY CONTROL

CLIENT : GEOENGINEERS, INC. SAMPLE MATRIX : SOIL
 PROJECT # : 186-101
 PROJECT NAME : -

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED CONC	SPIKE ADDED	% REC
PETROLEUM HYDROCARBONS	mg/Kg	8910-088-7	6,000	5,800	3	6,400	530	94

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$





Chain of Custody

PROJECT MANAGER: Kathy Killman
 COMPANY: GEI
 ADDRESS: 2405 140th Ave. N.E. Suite 105
Bellevue, Wa 98005
 PHONE: 246-5200 SAMPLED BY: GWM

LABORATORY NUMBER: 8910-088

SAMPLE DISPOSAL INSTRUCTIONS

ATI Disposal @ \$5.00 each Return Pickup (will call)

					ANALYSIS REQUEST																	NUMBER OF CONTAINERS					
SAMPLE ID	DATE	TIME	MATRIX	LAB ID	8010 Halogenated Volatiles	8020 Aromatic Volatiles	BETX ONLY	8240 GCMS Volatiles	8270 GCMS BNA	8310 HPLC PNA	8080 Pesticides & PCB's	PCB's ONLY	8140 Phosphate Pesticides	8150 Herbicides	WDOE PAH/HH (WAC 173)	418.1 (TPH)	413.2 Grease & Oil	8015 (Modified)	TOC 9060	TOX 9020	% Moisture		TCLP	Priority Pollutant Metals (13)	EPTOX Metals (8) Total	EP TOX Metals (8) EP EXT	
MW-13, Sample #3	10/12/89	0840	Soil	-1												X											
MW-13, Sample #5		0910		-2												X											
MW-21, Sample #3		1015		-3												X											
MW-21, Sample #5		1030		-4												X											
MW-22, Sample #3		1210		-5												X											
MW-22, Sample #5		1230		-6												X											
MW-24, Sample #3		1345		-7												X											
MW-24, Sample #5		1400		-8												X											

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PROJECT INFORMATION		SAMPLE RECEIPT		RELINQUISHED BY: 1		RELINQUISHED BY: 2		RELINQUISHED BY: 3	
PROJECT NUMBER: <u>186-101</u>	TOTAL NUMBER OF CONTAINERS: <u>8</u>	CHAIN OF CUSTODY SEALS Y/N/NA: <u>N</u>	INTACT? Y/N/NA: <u></u>	RECEIVED GOOD COND./COLD: <u></u>	Signature: <u>Galan M-Inchly</u> Time: <u>15:30</u>	Signature: <u></u> Time: <u></u>	Signature: <u></u> Time: <u></u>	Signature: <u></u> Time: <u></u>	Signature: <u></u> Time: <u></u>
PROJECT NAME: <u></u>	RECEIVED BY: <u></u>	RECEIVED BY: <u></u>	RECEIVED BY: (LAB) <u></u>	Signature: <u></u> Time: <u></u>	Signature: <u></u> Time: <u></u>	Signature: <u></u> Time: <u></u>	Signature: <u></u> Time: <u></u>	Signature: <u></u> Time: <u></u>	Signature: <u></u> Time: <u></u>
PURCHASE ORDER NUMBER: <u></u>	RECEIVED BY: <u></u>	RECEIVED BY: <u></u>	RECEIVED BY: (LAB) <u></u>	Signature: <u></u> Time: <u></u>	Signature: <u></u> Time: <u></u>	Signature: <u></u> Time: <u></u>	Signature: <u></u> Time: <u></u>	Signature: <u></u> Time: <u></u>	Signature: <u></u> Time: <u></u>
VIA: <u></u>	RECEIVED BY: <u></u>	RECEIVED BY: <u></u>	RECEIVED BY: (LAB) <u></u>	Signature: <u></u> Time: <u></u>	Signature: <u></u> Time: <u></u>	Signature: <u></u> Time: <u></u>	Signature: <u></u> Time: <u></u>	Signature: <u></u> Time: <u></u>	Signature: <u></u> Time: <u></u>
TAT: <input type="checkbox"/> 24HR <input type="checkbox"/> 48 HRS <input type="checkbox"/> 72 HRS <input checked="" type="checkbox"/> 1 WK <input checked="" type="checkbox"/> 2 WKS (Normal)	RECEIVED BY: <u></u>	RECEIVED BY: <u></u>	RECEIVED BY: (LAB) <u></u>	Signature: <u></u> Time: <u></u>	Signature: <u></u> Time: <u></u>	Signature: <u></u> Time: <u></u>	Signature: <u></u> Time: <u></u>	Signature: <u></u> Time: <u></u>	Signature: <u></u> Time: <u></u>
PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA: <u></u>	RECEIVED BY: <u></u>	RECEIVED BY: <u></u>	RECEIVED BY: (LAB) <u></u>	Signature: <u></u> Time: <u></u>	Signature: <u></u> Time: <u></u>	Signature: <u></u> Time: <u></u>	Signature: <u></u> Time: <u></u>	Signature: <u></u> Time: <u></u>	Signature: <u></u> Time: <u></u>
SPECIAL INSTRUCTIONS: <u></u>	RECEIVED BY: <u></u>	RECEIVED BY: <u></u>	RECEIVED BY: (LAB) <u></u>	Signature: <u></u> Time: <u></u>	Signature: <u></u> Time: <u></u>	Signature: <u></u> Time: <u></u>	Signature: <u></u> Time: <u></u>	Signature: <u></u> Time: <u></u>	Signature: <u></u> Time: <u></u>



ATI I.D. # 8910-096

November 13, 1989

GeoEngineers, Inc.
2405 140th Avenue N.E.
Suite 105
Bellevue, WA 98005

Attention : Kathy Killman


Project Number : 186-101-B04

Project Name : -

On October 13, 1989 Analytical Technologies, Inc. received two soil samples for analyses. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and the quality control data are enclosed:


Donna M. McKinney
Project Manager

FWG/nah


Frederick W. Grothkopp
Technical Manager

SAMPLE CROSS REFERENCE SHEET

CLIENT : GEOENGINEERS, INC.
 PROJECT # : 186-101-BO4
 PROJECT NAME : -

ATI #	CLIENT DESCRIPTION	DATE SAMPLED	MATRIX
8910-096-1	MW-14, SAMPLE #4	10/13/89	SOIL
8910-096-2	MW-15, SAMPLE #5	10/13/89	SOIL

----- TOTALS -----

MATRIX	# SAMPLES
SOIL	2

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) 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 : GEOENGINEERS, INC.
PROJECT # : 186-101-BO4
PROJECT NAME : -

ANALYSIS	TECHNIQUE	REFERENCE/METHOD
PETROLEUM HYDROCARBONS	IR	EPA 418.1

GENERAL CHEMISTRY RESULTS

CLIENT : GEOENGINEERS, INC. SAMPLE MATRIX : SOIL
PROJECT # : 186-101-BO4
PROJECT NAME : -

PARAMETER	UNITS	-1	-2
PETROLEUM HYDROCARBONS	mg/Kg	100	320

GENERAL CHEMISTRY QUALITY CONTROL

 CLIENT : GEOENGINEERS, INC.
 PROJECT # : 186-101-B04
 PROJECT NAME : -

SAMPLE MATRIX : SOIL

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED CONC	SPIKE ADDED	% REC
PETROLEUM HYDROCARBONS	mg/Kg	91026504	6,000	5,800	3	6,400	530	94

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$



ATI I.D. # 8910-123

GeoEngineers

NOV - 6 1989

Routing ESK
File

November 2, 1989

GeoEngineers, Inc.
2405 140th Avenue N.E.
Suite 105
Bellevue, WA 98005

Attention : Kathy Killman

Project Number : 186-101-B4

Project Name : Puget Power

On October 19, 1989 Analytical Technologies, Inc. received two product samples for analyses. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and the quality control data are enclosed.

Mary C. Silva
Senior Project Manager

FWG/nah

Frederick W. Grothkopp
Technical Manager



SAMPLE CROSS REFERENCE SHEET

CLIENT : GEOENGINEERS, INC.
PROJECT # : 186-101-B4
PROJECT NAME : PUGET POWER

Table with 4 columns: ATI #, CLIENT DESCRIPTION, MATRIX, DATE SAMPLED. Rows include 8910-123-1 (MW-25, PRODUCT, 10/17/89) and 8910-123-2 (MW-7, PRODUCT, 10/19/89).

----- TOTALS -----

Summary table with 2 columns: MATRIX, # SAMPLES. Row: PRODUCT, 2.

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) 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 : GEOENGINEERS, INC.
PROJECT # : 186-101-B4
PROJECT NAME : PUGET POWER

ANALYSIS	TECHNIQUE	REFERENCE/METHOD
FUEL HYDROCARBONS	GC/FID	EPA 8015 MODIFIED

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 10/17/89
PROJECT #	: 186-101-B4	DATE RECEIVED	: 10/19/89
PROJECT NAME	: PUGET POWER	DATE EXTRACTED	: N/A
CLIENT I.D.	: MW-25	DATE ANALYZED	: 10/23/89
SAMPLE MATRIX	: PRODUCT	UNITS	: ppm
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1600

COMPOUND

RESULT

FUEL HYDROCARBONS
HYDROCARBON RANGE
HYDROCARBONS QUANTITATED USING

300,000
C16 - C26
DIESEL



ATI I.D. # 8910-123-2

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 10/19/89
PROJECT #	: 186-101-B4	DATE RECEIVED	: 10/19/89
PROJECT NAME	: PUGET POWER	DATE EXTRACTED	: N/A
CLIENT I.D.	: MW-7	DATE ANALYZED	: 10/23/89
SAMPLE MATRIX	: PRODUCT	UNITS	: ppm
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 2000

COMPOUND

RESULT

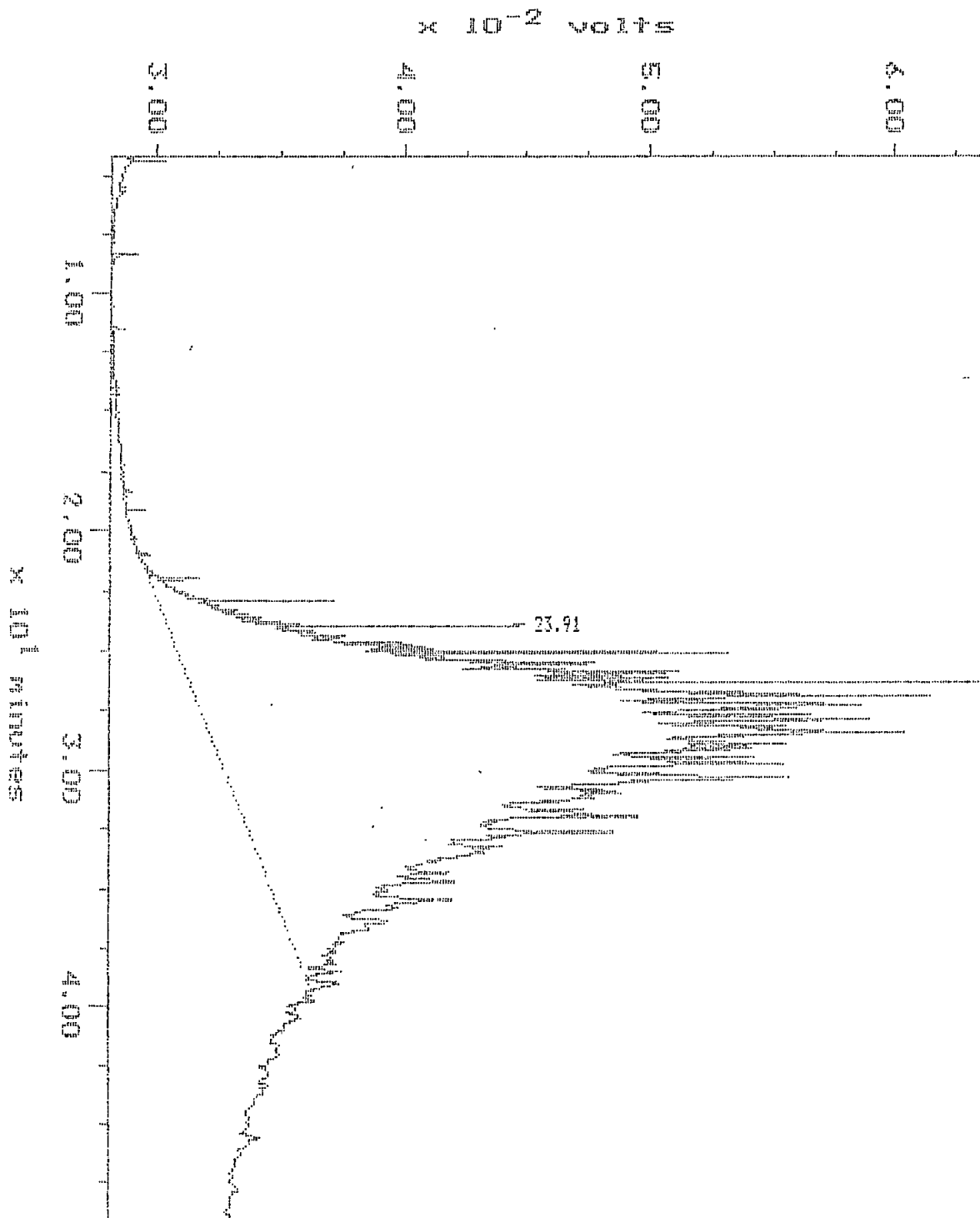
FUEL HYDROCARBONS 340,000
HYDROCARBON RANGE C16 - C26
HYDROCARBONS QUANTITATED USING DIESEL

8910-123-1

Sample: name43
Acquired: 23-OCT-89 11:57
Comments: P8910-123-1

Channel: FID REAR-A
Method: C:\MAX\DATA4\RAQ8TX26

Filename: 9RF01967
Operator: RWM



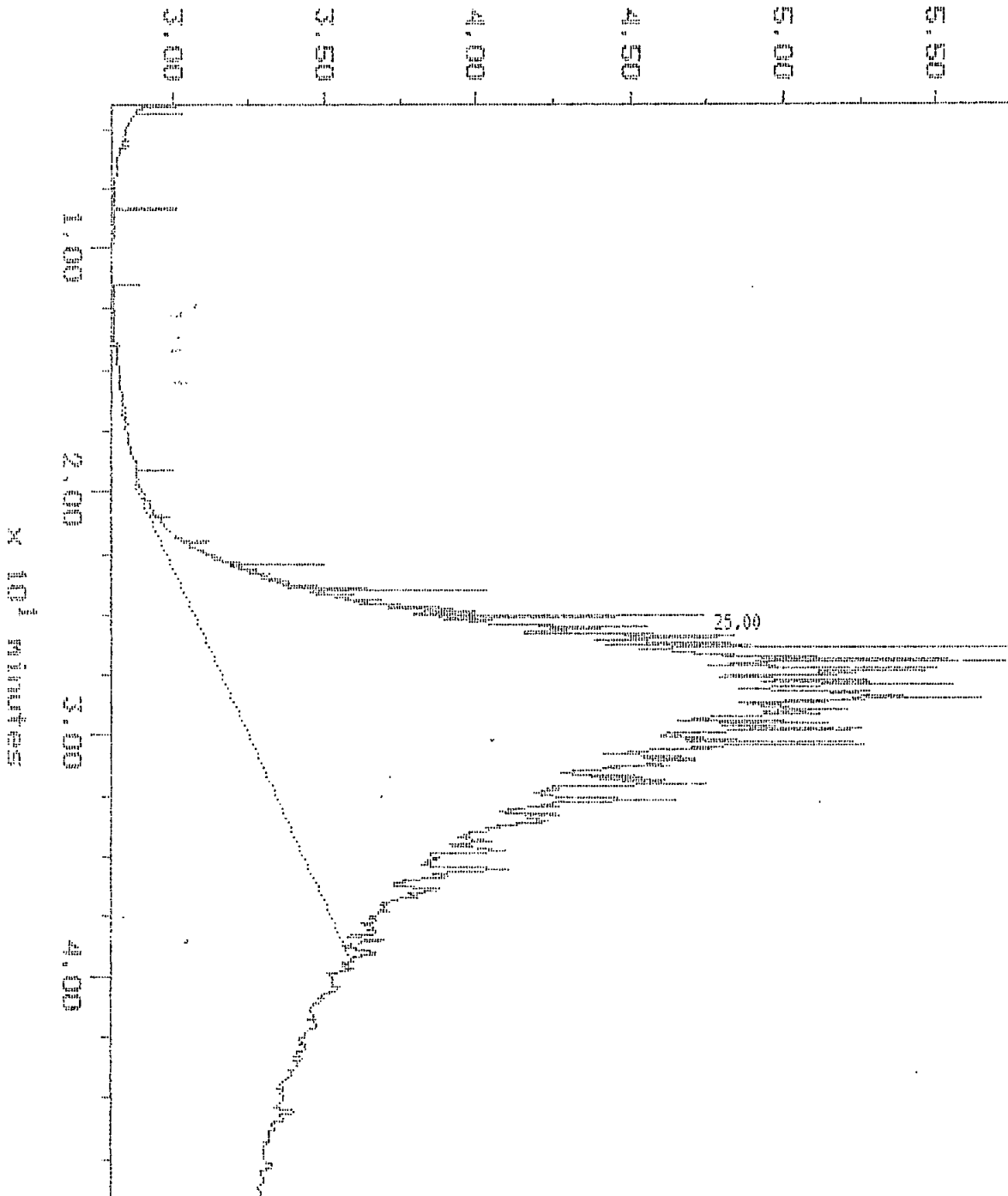
8910-123-2

Sample: name44
Acquired: 23-OCT-89 12:58
Comments: P8910-123-2

Channel: FID REAR-A
Method: C:\MAX\DATA4\RABBITX26

Filename: 9RF01968
Operator: RWM

$\times 10^{-2}$ volts





ATI I.D. # 8910-166

November 22, 1989

GeoEngineers, Inc.
2405 140th Ave. N.E., Suite 105
Bellevue, WA 98005

Attention : Brad Biggerstaff

Project Number : 186-101-B04

Project Name : Puget Power

On October 27, 1989 Analytical Technologies, Inc. received three water samples for analyses. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and the quality control data are enclosed.

Donna M. McKinney
Donna M. McKinney
Project Manager

FWG/pes

Frederick W. Grothkopp
Frederick W. Grothkopp
Technical Manager

SAMPLE CROSS REFERENCE SHEET

CLIENT : GEOENGINEERS, INC.
 PROJECT # : 186-101-B04
 PROJECT NAME : PUGET POWER

ATI #	CLIENT DESCRIPTION	DATE SAMPLED	MATRIX
8910-166-1	MW-12	10/27/89	WATER
8910-166-2	MW-19	10/27/89	WATER
8910-166-3	MW-20	10/27/89	WATER

----- TOTALS -----

MATRIX	# SAMPLES
WATER	3

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) 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 : GEOENGINEERS, INC.
PROJECT # : 186-101-B04
PROJECT NAME : PUGET POWER

ANALYSIS	TECHNIQUE	REFERENCE/METHOD
PETROLEUM HYDROCARBONS	IR	EPA 418.1 ?

GENERAL CHEMISTRY RESULTS

CLIENT : GEOENGINEERS, INC. SAMPLE MATRIX : WATER
PROJECT # : 186-101-B04
PROJECT NAME : PUGET POWER

PARAMETER	UNITS	-1	-2	-3
PETROLEUM HYDROCARBONS	mg/L	0.06	0.06	0.06

GENERAL CHEMISTRY QUALITY CONTROL

 CLIENT : GEOENGINEERS, INC.
 PROJECT # : 186-101-B04
 PROJECT NAME : PUGET POWER

SAMPLE MATRIX : WATER

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED CONC	SPIKE ADDED	% REC
PETROLEUM HYDROCARBONS	mg/L	8910-126-13	<0.05	<0.05	0	N/A	N/A	N/A
PETROLEUM HYDROCARBONS	mg/L	BLANK SPIKE	N/A	N/A	N/A	7.0	10.0	70

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

Brad Biggerstaff

8910-666

GEOENGINEERS INC.
2405 - 140th AVE. N.E., SUITE 105
BELLEVUE, WASHINGTON 98005
206-746-5200

PROJECT LOC. Reactor
PROJECT NAME Project Power
GEI FILE NO. 186-101-1304

CHAIN OF CUSTODY RECORD

SAMPLED BY BBB

DATE 10/27/89

SAMPLE No.	DATE SAMPLED	TIME SAMPLED	DEPTH OF SAMPLE	TYPE OF SAMPLE	FIELD FILTERED	PRESERVATIVE ADDED TO SAMPLE	ANALYSES TO BE CONDUCTED	NO. OF SAMPLE CONTAINERS	COMMENTS
-1 MW 12	10/27	13:10		H ₂ O	NO	HCL	TPH	1	
-2 MW 19	10/27	13:25		↓	↓	↓	↓	1	
-3 MW 20	10/27	13:50		↓	↓	↓	↓	1	

B-159

RELINQUISHED BY (SIGNATURE) NAME <u>Brad Biggerstaff</u> FIRM <u>GEI</u>	DATE <u>10/27</u>	TIME <u>14:55</u>	RECEIVED BY (SIGNATURE) NAME <u>Fredrick Gustafson</u> FIRM <u>AT&T</u>	DATE <u>10/27/89</u>	TIME <u>1500</u>
RELINQUISHED BY (SIGNATURE) NAME _____ FIRM _____	DATE _____	TIME _____	RECEIVED BY (SIGNATURE) NAME _____ FIRM _____	DATE _____	TIME _____

ADDITIONAL COMMENTS:

GEI 101-94

GeoEngineers

AMTEST

AmTest Inc.

Professional
Analytical
Services

14603 N.E. 87th St.
Redmond, WA
98052

Fax: 206 883 3495

Tel: 206 885 1664

NOV 14 1989

Routing KSIC
File

ANALYSIS REPORT

CLIENT: Geo Engineers

DATE RECEIVED: 11/6/89

REPORT TO: Kathy Killman
2405 - 140th Avenue NE, Suite 105
Bellevue, WA 98005

DATE REPORTED: 11/9/89

Laboratory Sample Nos.	Client Identification	Specific Gravity (60/60°F)	API Gravity (°API)
11 - 28	#1 Hydraulic Fluid	0.8794	29.41
11 - 29	#21 Hydraulic Fluid	0.8804	29.22

NOTE: Sample 11 - 29 contained visible moisture and sediment.

MG/pb

REPORTED BY Michael Goodyear
Michael Goodyear



ATI I.D. # 8911-108

December 12, 1989

GeoEngineers

DEC 14 1989

Routing ecp

File

GeoEngineers, Inc.
 2405 140th Avenue N.E.
 Suite 105
 Bellevue, WA 98005

Attention : Steve Perrigo

Project Number : 186-106-B04

Project Name : Puget Power

On November 28, 1989 Analytical Technologies, Inc. received three soil samples for analyses. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and the quality control data are enclosed.

Donna M. McKinney
 Donna M. McKinney
 Project Manager

Frederick W. Grothkopp
 Frederick W. Grothkopp
 Technical Manager

FWG/elf



SAMPLE CROSS REFERENCE SHEET

CLIENT : GEOENGINEERS, INC.
PROJECT # : 186-106-BO4
PROJECT NAME : PUGET POWER

Table with 4 columns: ATI #, CLIENT DESCRIPTION, DATE SAMPLED, MATRIX. Rows include 8911-108-1 (MW-23), 8911-108-2 (B-27), and 8911-108-3 (B-28), all dated 11/27/89 and identified as SOIL.

----- TOTALS -----

Summary table with 2 columns: MATRIX, # SAMPLES. Row: SOIL, 3.

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) 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 : GEOENGINEERS, INC.
PROJECT # : 186-106-BO4
PROJECT NAME : PUGET POWER

ANALYSIS	TECHNIQUE	REFERENCE/METHOD
PETROLEUM HYDROCARBONS	IR	EPA 418.1



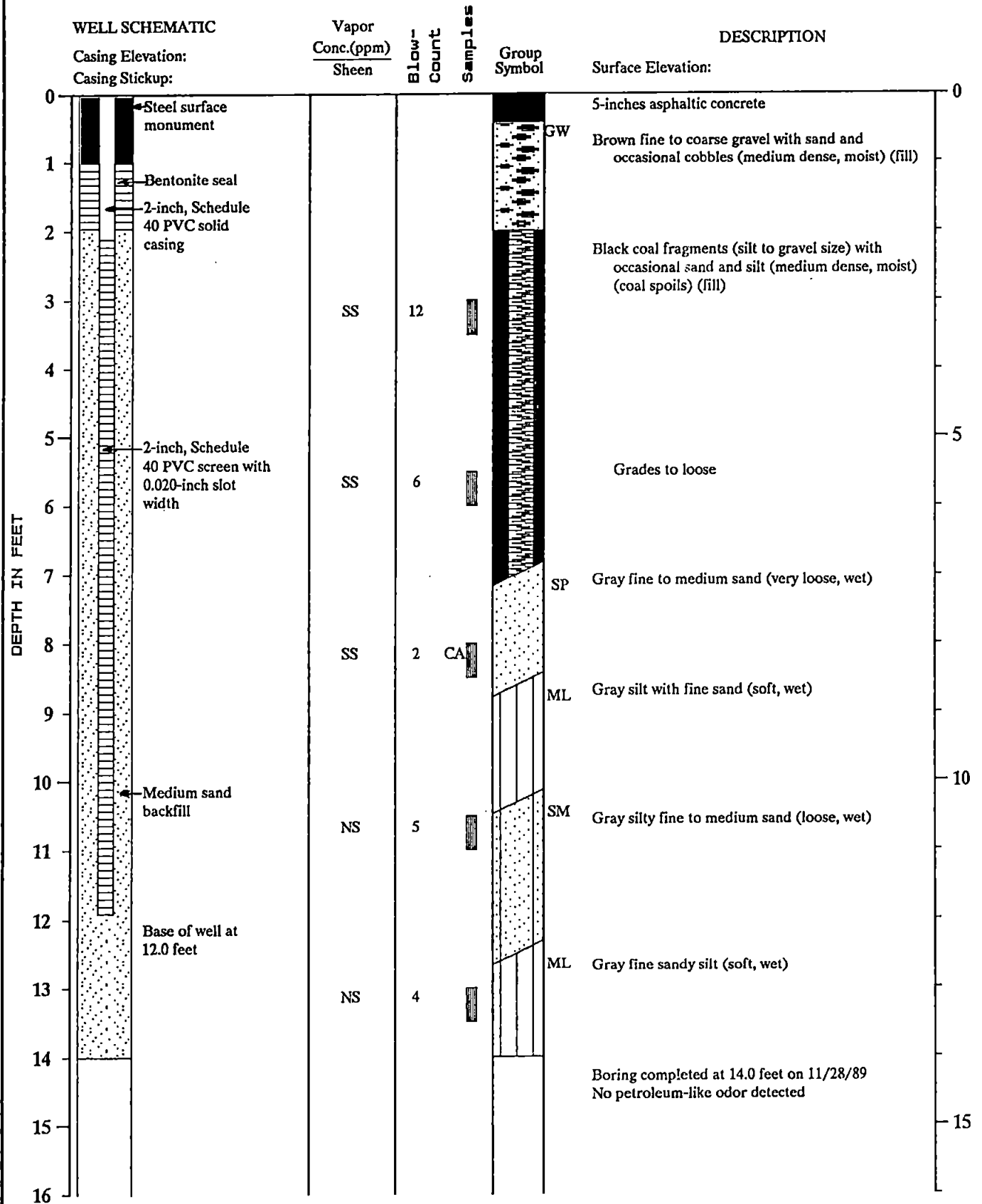
GENERAL CHEMISTRY RESULTS

CLIENT : GEOENGINEERS, INC.
PROJECT # : 186-106-BO4
PROJECT NAME : PUGET POWER

SAMPLE MATRIX : SOIL

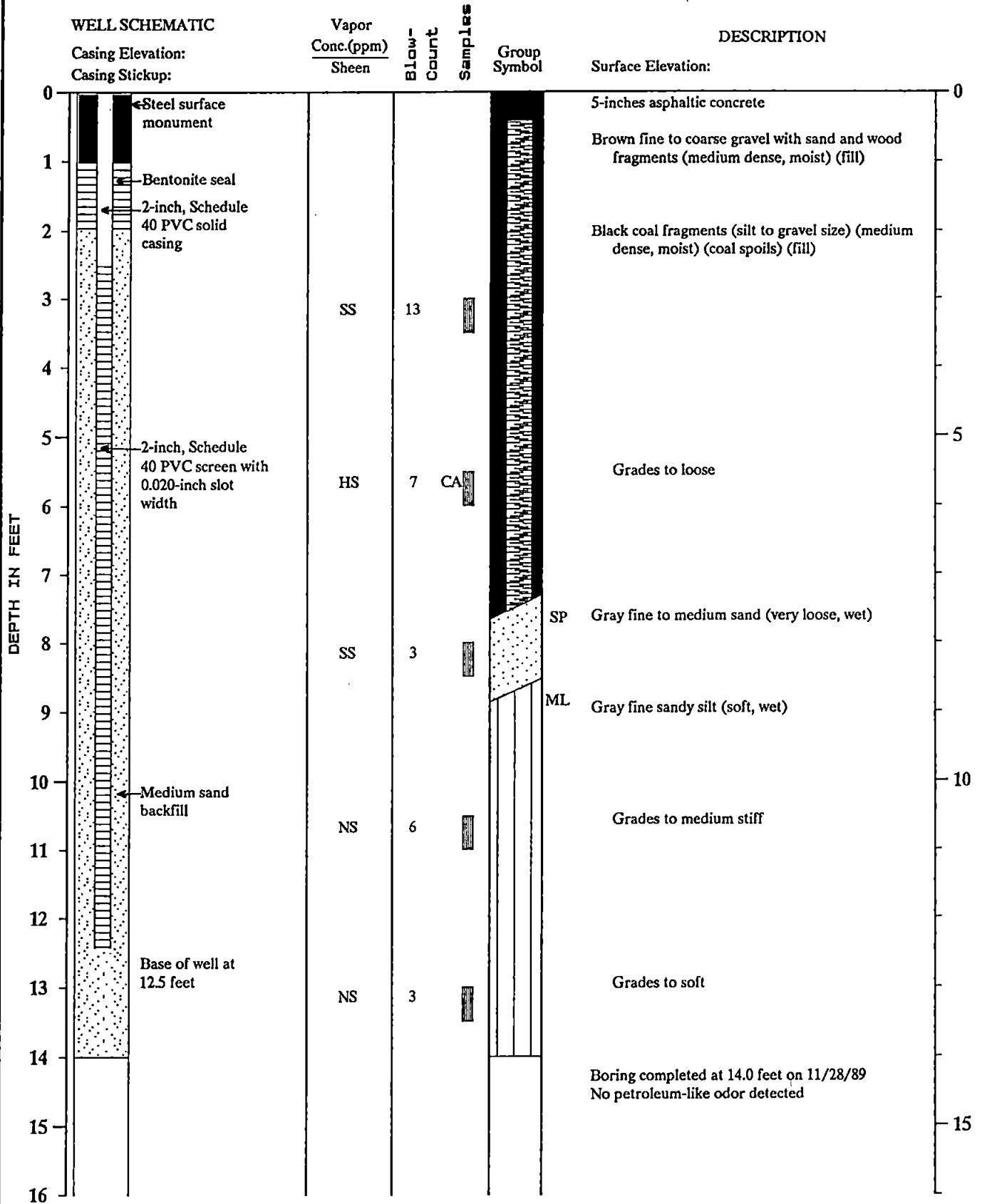
PARAMETER	UNITS	-1	-2	-3
PETROLEUM HYDROCARBONS	mg/Kg	5,900	19	25

MONITOR WELL NO. MW-30



Note: See Figure A-2 for explanation of symbols

MONITOR WELL NO. MW-31



Note: See Figure A-2 for explanation of symbols

KSK:CDO 12/7/89

0186-101-B04



Log of Monitor Well

Figure A-29

57 Waste Screening Memo
October 11, 1989
2 of 3

Please note that it is only the described materials that are acceptable for disposal. Any other type of questionable waste from this company will require separate review and analysis.

If you have any questions or need additional information, please call me at 296-4633 (FAX 296-0188).

SJB:jl/pspl2

cc: Chuck Shank, Hazardous Waste, Region X, EPA
John Conroy, Hazardous Waste, Northwest Office DOE
Larry Kirchner, EHS Supervisor, Southeast EHS Office
Greg Bishop, EHS Supervisor, Smith Tower, SKCDPH
Deborah Lambert, KCSW
Generator and Transporter listed above.
GeoEngineers, Inc. ATTN: K. Killman
2405 - 140th Ave. N.E.; Suite 105; Bellevue, WA 98005

Attachment

WASTE SCREENING CHECKLIST

Generator: Puget Sound Power
Materials: Soil

Date: 10/11/89

3 of 3

WAC 173-303	TITLE OR TEST	DONE	RESULT	COMMENTS
-090	D.W. Characteristics a) Ignitability b) Corrosivity c) Reactivity d) E.P. Tox	d) Y	d) not D.W.	
-101	Toxic D.W. a) Equivalent Conc. b) Bioassay			
C - 35 -102	Persistent D.W. a) Halogenates b) PAH's	a) Y	a) not D.W.	a) method 8010/8020
-103	Carcinogenic D.W.			
Other	a) TPH b) B-E-T-X c) PCB's	a) Y b) Y c) Y	a) l.t. 0.5% b) not D.W. c) not D.W.	b) method 8010/8020 c) ND; l.t. 250ppb

Abbreviations

Y = Yes; N = No; NA = Not Applicable;
WAC = Washington Administrative Code; E.P. Tox = Extraction Procedure Toxicity;
D.W. = Dangerous Waste; PAH = Polycyclic Aromatic Hydrocarbons;
D.O.E. = Department of Ecology;
l.t. = less than
B = Benzene; E = Ethylbenzene; T = Toluene; X = Xylenes - total unless otherwise specified
TPH = total petroleum hydrocarbons; EDB = Ethylene dibromide
ND = Not Detected



GENERAL CHEMISTRY QUALITY CONTROL

CLIENT : GEOENGINEERS, INC.
PROJECT # : 186-106-BO4
PROJECT NAME : PUGET POWER

SAMPLE MATRIX : SOIL

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED CONC	SPIKE ADDED	% REC
PETROLEUM HYDROCARBONS	mg/Kg	8911-115-2	8.4	8.3	1	150	125	113

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$



ATI I.D. # 8911-115

December 12, 1989

GeoEngineers

DEC 14 1989

GeoEngineers, Inc.
2405 140th Avenue N.E.
Suite 105
Bellevue, WA 98005

Routing *Scp*
File

Attention : Steve Perrigo

Project Number : 186-106-B04

Project Name : Puget Power

On November 28, 1989 Analytical Technologies, Inc. received three soil samples for analyses. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and the quality control data are enclosed.

Donna M. McKinney
Donna M. McKinney
Project Manager

FWG/elf

Frederick W. Grothkopp
Frederick W. Grothkopp
Technical Manager

SAMPLE CROSS REFERENCE SHEET

CLIENT : GEOENGINEERS, INC.
 PROJECT # : 186-106-B04
 PROJECT NAME : PUGET POWER

ATI #	CLIENT DESCRIPTION	DATE SAMPLED	MATRIX
8911-115-1	B-29	11/28/89	SOIL
8911-115-2	MW-30	11/28/89	SOIL
8911-115-3	MW-31	11/28/89	SOIL

----- TOTALS -----

MATRIX	# SAMPLES
SOIL	3

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) 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 : GEOENGINEERS, INC.
PROJECT # : 186-106-BO4
PROJECT NAME : PUGET POWER

ANALYSIS	TECHNIQUE	REFERENCE/METHOD
FUEL HYDROCARBONS	GC/FID	EPA 8015 MODIFIED
PETROLEUM HYDROCARBONS	IR	EPA 418.1



FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: N/A
PROJECT #	: 186-106-BO4	DATE RECEIVED	: N/A
PROJECT NAME	: PUGET POWER	DATE EXTRACTED	: 11/30/89
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 12/02/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUND	RESULT
FUEL HYDROCARBONS HYDROCARBON RANGE HYDROCARBONS QUANTITATED USING	<5 - GASOLINE
FUEL HYDROCARBONS HYDROCARBON RANGE HYDROCARBONS QUANTITATED USING	<5 - DIESEL

FUEL HYDROCARBONS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 11/28/89
PROJECT #	: 186-106-B04	DATE RECEIVED	: 11/28/89
PROJECT NAME	: PUGET POWER	DATE EXTRACTED	: 11/30/89
CLIENT I.D.	: MW-31	DATE ANALYZED	: 12/02/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED	DILUTION FACTOR	: 1

COMPOUND	RESULT
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	GASOLINE
FUEL HYDROCARBONS	840
HYDROCARBON RANGE	C8 - C28
HYDROCARBONS QUANTITATED USING	DIESEL



FUEL HYDROCARBONS
QUALITY CONTROL DATA

CLIENT	: GEOENGINEERS, INC.	SAMPLE I.D.	: 8911-117-1
PROJECT #	: 186-106-BO4	DATE EXTRACTED:	: 11/30/89
PROJECT NAME	: PUGET POWER	DATE ANALYZED	: 12/02/89
EPA METHOD	: 8015 MODIFIED	SAMPLE MATRIX	: SOIL
		UNITS	: mg/Kg

COMPOUND	SAMPLE RESULT	CONC SPIKED	SPIKED SAMPLE	% REC	DUP SPIKED SAMPLE	DUP % RECOVERY	RPD
FUEL HYDROCARBONS	<5	500	470	94	473	95	1

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$



GENERAL CHEMISTRY RESULTS

CLIENT : GEOENGINEERS, INC.
PROJECT # : 186-106-BO4
PROJECT NAME : PUGET POWER

SAMPLE MATRIX : SOIL

PARAMETER	UNITS	-1	-2	-3
PETROLEUM HYDROCARBONS	mg/Kg	6.9	8.4	2,000



GENERAL CHEMISTRY QUALITY CONTROL

CLIENT : GEOENGINEERS, INC.
PROJECT # : 186-106-BO4
PROJECT NAME : PUGET POWER

SAMPLE MATRIX : SOIL

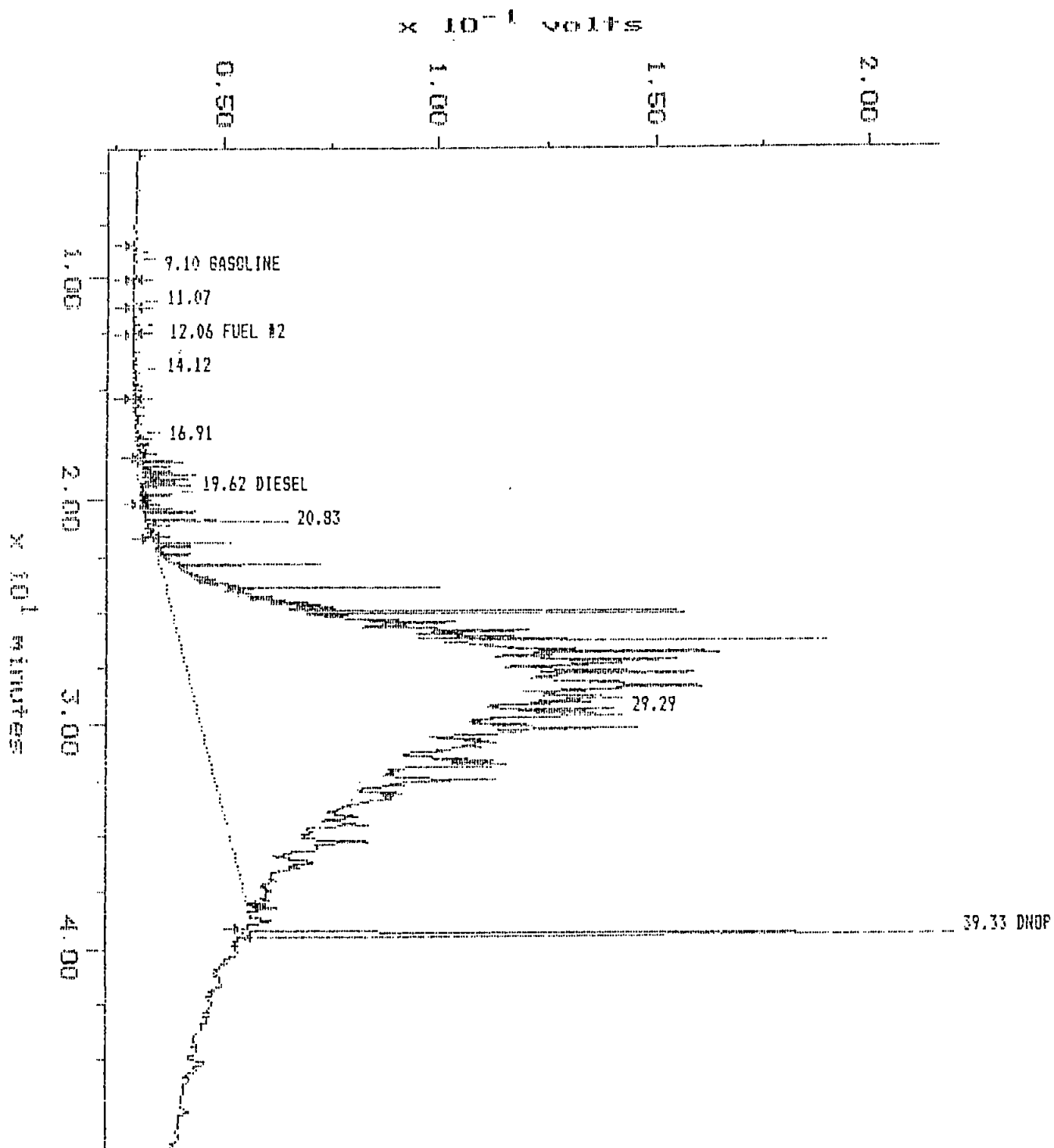
PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED CONC	SPIKE ADDED	% REC
PETROLEUM HYDROCARBONS	mg/Kg	8911-115-2	8.4	8.3	1	150	125	113

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

Sample: 8911-115-3 Channel: FID REAR-B
Acquired: 02-DEC-89 2:26 Method: C:\MAX\DATA4\FUEL1129
Comments: 8015 FUEL FINGERPRINT/ IUL INJECT ON PACKIE

Filename: 9RF02366
Operator: RWH



APPENDIX C



October 5, 1989

**Consulting Geotechnical
Engineers and Geologists**

Seattle-King County Department of Public Health
172 - 20th Avenue
Seattle, Washington 98122

Attention: Mr. Steve Burke

GeoEngineers, Inc. is providing consulting services to Puget Sound Power & Light Company (PSPL) regarding the excavation and removal of petroleum-contaminated soil surrounding five underground storage tanks. The tanks: two waste oil tanks, two diesel fuel tanks, and one gasoline tank; were located at the PSPL Renton Service Center, 620 South Grady Way in Renton, Washington. In addition, an underground water line was excavated adjacent to one of the former underground diesel fuel tanks. The soils from these excavations were stockpiled on-site and sampled by GeoEngineers. On behalf of PSPL, we are requesting written permission for disposal of the stockpiled soils at Cedar Hills Landfill and Newcastle Landfill.

A composite sample (sample Stock-C) of the stockpiled soil from the waste oil tank excavations was obtained on August 30, 1989 and analyzed for EP Toxicity-Metals, purgeable halocarbons and aromatics (EPA Methods 8010/8020), PCBs (EPA Method 8080), and total petroleum hydrocarbons (TPH) (EPA Method 418.1). Barium was detected at a concentration of 0.11 ppm. Based upon the EP Toxicity testing the soil is not a dangerous waste. Tetrachloroethene was detected at a concentration of 0.045 ppm. Meta and para xylene were detected at a concentration of 0.041 ppm. PCBs were not detected above the detection limit of 0.025 ppm. TPH was detected at a concentration of 3,500 ppm. The laboratory reports are attached. We propose that these soils be disposed of at the Cedar Hills Landfill. This stockpile contains approximately 110 cubic yards of contaminated soil. No free liquid is present in this stockpiled soil.

GeoEngineers, Inc.
2405 140th Ave. NE, Suite 105
Bellevue, WA 98005
Telephone (206) 746-5200
Fax. (206) 746-5068

A composite sample (sample F-1) of the stockpiled soil from a water line excavation adjacent to a former underground diesel fuel tank was obtained on September 7, 1989 and analyzed for TPH. TPH was detected at a concentration of 220 ppm. The laboratory reports are attached. Please disregard ground water analytical results included in the attached laboratory report since these results do not relate to the stockpiled soil. We propose that these soils be disposed of at the Cedar Hills Landfill. This stockpile contains approximately 60 cubic yards of contaminated soil. No free liquid is present in this stockpiled soil.

Composite samples of the stockpiled soil from the diesel fuel tank excavation (samples A-1, C-South-1 and C-North-1) and gasoline tank excavation (sample B-1) were obtained on September 7, 1989. The diesel fuel contaminated soils were analyzed for TPH. TPH was detected at concentrations less than 200 ppm. The gasoline contaminated soils were analyzed for TPH and BETX (EPA Method 8020). TPH was detected at a concentration less than 200 ppm. BETX was not detected with detection limits for each constituent at less than 0.025 ppm. The laboratory reports are attached. We propose that these soils be disposed of at the Newcastle Landfill. This stockpile contains approximately 270 cubic yards of contaminated soil. No free liquid is present in this stockpiled soil.

The following contacts are included for your convenience:

Generator: Puget Sound Power & Light Company
P.O. Box 97034
Bellevue, Washington 98009-9734
Contact: Mr. Gary Reid 462-3077

Environmental Consultation Services:
GeoEngineers
2405 140th Avenue Northeast, Suite 105
Bellevue, Washington 98005
Contact: Ms. Kathy Killman 746-5200

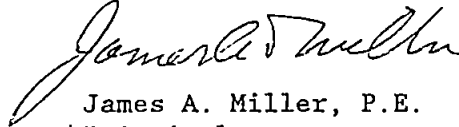
Cleanup Contractor and Waste Hauler:
Chempro Environmental Services
3400 East Marginal Way South
Seattle, Washington 98134
Contact: Mr. Robert Huston 682-4898

Seattle-King County Dept. of Public Health
October 5, 1989
Page 3

Thank you for your assistance in this matter. Please call if you require any more information regarding this project.

Yours very truly

GeoEngineers, Inc.



James A. Miller, P.E.
Principal

KSK:JAM:cs

GEI File No. 0186-101-B04

cc: Puget Sound Power & Light Company
Attn. Mr. Gary Reid



SAMPLE CROSS REFERENCE SHEET

CLIENT : GEOENGINEERS, INC.
PROJECT # : 0186-101-B04
PROJECT NAME : PSP&L

Table with 4 columns: ATI #, CLIENT DESCRIPTION, MATRIX, DATE SAMPLED. Rows include samples 8909-036-1 through 8909-036-11 with descriptions like MW-5, A-1, C-SOUTH 1, etc.

----- TOTALS -----

Summary table with 2 columns: MATRIX, # SAMPLES. Rows for WATER (6) and SOIL (5).

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) 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 : GEOENGINEERS, INC.
PROJECT # : 0186-101-B04
PROJECT NAME : PSP&L

ANALYSIS	TECHNIQUE	REFERENCE/METHOD
BETX	GC/PID	EPA 8020
PETROLEUM HYDROCARBONS	IR	EPA 418.1
MOISTURE	GRAVIMETRIC	METHOD 7-2.2

PURGEABLE AROMATICS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: N/A
PROJECT #	: 0186-101-B04	DATE RECEIVED	: N/A
PROJECT NAME	: PSP&L	DATE EXTRACTED	: 09/08/89
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 09/08/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8020 (BETX)	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
BENZENE	<0.025
ETHYLBENZENE	<0.025
TOLUENE	<0.025
META & PARA XYLENE	<0.025
ORTHO XYLENE	<0.025

SURROGATE PERCENT RECOVERY

BROMOFLUOROBENZENE	97
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PURGEABLE AROMATICS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 09/07/89
PROJECT #	: 0186-101-B04	DATE RECEIVED	: 09/07/89
PROJECT NAME	: PSP&L	DATE EXTRACTED	: 09/08/89
CLIENT I.D.	: B-1	DATE ANALYZED	: 09/08/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8020 (BETX)	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
BENZENE	<0.025
ETHYLBENZENE	<0.025
TOLUENE	<0.025
META & PARA XYLENE	<0.025
ORTHO XYLENE	<0.025

SURROGATE PERCENT RECOVERY

BROMOFLUOROBENZENE	71
--------------------	----



PURGEABLE AROMATICS
QUALITY CONTROL DATA

CLIENT	: GEOENGINEERS, INC.	SAMPLE I.D.	: 8909-022-1
PROJECT #	: 0186-101-B04	DATE ANALYZED	: 09/07/89
PROJECT NAME	: PSP&L	UNITS	: mg/Kg
EPA METHOD	: 8020 (BETX)	MATRIX	: SOIL

COMPOUND	SAMPLE RESULT	SPIKE ADDED	SPIKED SAMPLE	% REC	DUP SPIKED SAMPLE	DUP % REC	RPD
BENZENE	<0.025	0.400	0.363	91	0.357	89	2
TOLUENE	<0.025	0.400	0.375	94	0.357	89	5
META & PARA XYLENE	<0.025	1.10	0.999	91	0.969	88	3

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$



GENERAL CHEMISTRY RESULTS

CLIENT : GEOENGINEERS, INC.
PROJECT # : 0186-101-B04
PROJECT NAME : PSP&L

SAMPLE MATRIX : WATER

PARAMETER	UNITS	-1	-2	-3	-4	-5	-6
PETROLEUM HYDROCARBONS	mg/L	0.21	140	49	0.48	22	0.34



GENERAL CHEMISTRY QUALITY CONTROL

CLIENT : GEOENGINEERS, INC.
PROJECT # : 0186-101-B04
PROJECT NAME : PSP&L

SAMPLE MATRIX : WATER

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED CONC	SPIKE ADDED	% REC
PETROLEUM HYDROCARBONS	mg/L	8909-036-6	0.34	0.27	23	N/A	N/A	N/A
PETROLEUM HYDROCARBONS	mg/L	BLANK SPIKE	N/A	N/A	N/A	6.68	10.2	65

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$



GENERAL CHEMISTRY RESULTS

CLIENT : GEOENGINEERS, INC.
PROJECT # : 0186-101-B04
PROJECT NAME : PSP&L

SAMPLE MATRIX : SOIL

PARAMETER	UNITS	-7	-8	-9	-10	-11
PETROLEUM HYDROCARBONS	mg/Kg	61	81	49	220	27
MOISTURE	%	-	-	-	-	20

GENERAL CHEMISTRY QUALITY CONTROL

CLIENT : GEOENGINEERS, INC. SAMPLE MATRIX : SOIL
 PROJECT # : 0186-101-B04
 PROJECT NAME : PSP&L

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED CONC	SPIKE ADDED	% REC
PETROLEUM HYDROCARBONS	mg/Kg	8909-042-1	<1.0	<1.0	0	143	125	114
MOISTURE	%	8909-039-1	24	24	0	N/A	N/A	N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$



PROJ. MGR. <u>St Kathy Killman</u> COMPANY <u>Goodman Inc</u> ADDRESS <u>2405 - 140th Ave NE, Suite 105 Rolleme WA 98005</u>					ANALYSIS REQUEST														NUMBER OF CONTAINERS
SAMPLERS (SIGNATURE) <u>Deborah Kruty</u> (PHONE NO.) <u>9/07/89</u>				BASE/NEU/ACID CMPDS. GC/MS/ 625/8270	VOLATILE CMPDS. GC/MS/ 624/8240	PESTICIDES/PCB 608/8080	POLYNUCLEAR AROMATIC 610/8310	PHENOLS, SUB PHENOLS 604/8040	HALOGENATED VOLATILES 601/8010	AROMATIC VOLATILES 602/8020	TOTAL ORGANIC CARBON 415/9060	TOTAL ORGANIC HALIDES 9020	PETROLEUM HYDROCARBONS 418	PRIORITY POLLUTANT METALS (13)	CAM METALS (18) TTL/STLC	EP TOX METALS (8)	SWDA-INORGANICS PRIMARY/SECONDARY	HAZARDOUS WASTE PROFILE	
SAMPLE ID.	DATE	TIME	MATRIX	LAB ID.															
mw-5	9/07		H ₂ O	-1									X						
mw-6				-2									X						
mw-7				-3									X						
mw-8				-4									X						
mw-9				-5									X						
mw-10				-6									X						
A-1			Soil	-7									X						
C-South 1			Soil	-8									X						
C-North 1			Soil	-9									X						

PROJECT INFORMATION		SAMPLE RECEIPT		INVOICE TO:	RELINQUISHED BY		RECEIVED BY	
PROJECT: <u>PSP+L</u>	TOTAL NO. OF CONTAINERS <u>11</u>	CHAIN OF CUSTODY SEALS <u>12</u>	REC'D GOOD CONDITION/COLD <u>✓</u>		(Signature) <u>Deborah Kruty</u>	(Time) <u>14:48</u>	(Signature)	(Time)
PQ NO. <u>0156-101-B04</u>	CONFORMS TO RECORD <u>✓</u>	LAB NO. <u>8907-036</u>	(Printed Name) <u>Deborah Kruty</u>		(Date) <u>9/07/89</u>	(Printed Name)	(Date)	
SHIPPING ID. NO.			(Company) <u>Goodman Inc</u>		(Company)			
VIA: <u>Hand del. recd.</u>			RECEIVED BY		(Signature) <u>Yvonne White</u>	(Time) <u>248</u>	(Signature) <u>JACKIE WHITE</u>	(Time) <u>9/7/89</u>
SPECIAL INSTRUCTIONS/COMMENTS: <u>Sols on a dry weighed basis</u>						(Printed Name)	(Date)	
						(Company)	ANALYTICAL TECHNOLOGIES, INC	

CI-14



ATI I.D. # 8908-158

GeoEngineers

SEP 19 1989

September 15, 1989

Routing KSK
File _____

GeoEngineers, Inc.
2405 140th Ave. N.E.
Suite 105
Bellevue, WA 98005


Attention : Kathy Killman

Project Number : 186-101-B4

Project Name : Puget Power

On August 30, 1989 Analytical Technologies, Inc. received one soil sample for analyses. The sample was analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and the quality control data are enclosed.


Donna M. McKinney
Project Manager


Frederick W. Grothkopp
Technical Manager

FWG/nah

SAMPLE CROSS REFERENCE SHEET

CLIENT : GEOENGINEERS, INC.
PROJECT # : 186-101-B4
PROJECT NAME : PUGET POWER

ATI #	CLIENT DESCRIPTION	MATRIX	DATE SAMPLED
8908-158-1	STOCK-C	SOIL	08/30/89

----- TOTALS -----

MATRIX	# SAMPLES
SOIL	1

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) 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 : GEOENGINEERS, INC.
PROJECT # : 186-101-B4
PROJECT NAME : PUGET POWER

ANALYSIS	TECHNIQUE	REFERENCE/METHOD
PURGEABLE HALOCARBONS	GC/HALL	EPA 8010
PURGEABLE AROMATICS	GC/PID	EPA 8020
POLYCHLORINATED BIPHENYLS (PCBs)	GC/ECD	EPA 8080
ARSENIC	AA/GF	EPA 7060
BARIUM	AA/F	EPA 7080
CADMIUM	AA/F	EPA 7130
CHROMIUM	AA/F	EPA 7190
LEAD	AA/F	EPA 7420
MERCURY	AA/COLD VAPOR	EPA 7471
SELENIUM	AA/GF	EPA 7740
SILVER	AA/F	EPA 7760
PETROLEUM HYDROCARBONS	IR	EPA 418.1
MOISTURE	GRAVIMETRIC	METHOD 7-2.2

VOLATILE ORGANIC ANALYSIS
 DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: N/A
PROJECT #	: 186-101-B4	DATE RECEIVED	: N/A
PROJECT NAME	: PUGET POWER	DATE EXTRACTED	: 09/08/89
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 09/08/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8010/8020	DILUTION FACTOR	: 1
RESULTS BASED ON DRY WEIGHT			

COMPOUND	RESULT
BENZENE	<0.025
BROMODICHLOROMETHANE	<0.010
BROMOFORM	<0.010
BROMOMETHANE	<0.025
CARBON TETRACHLORIDE	<0.010
CHLOROBENZENE	<0.025
CHLOROETHANE	<0.025
CHLOROFORM	<0.010
CHLOROMETHANE	<0.100
DIBROMOCHLOROMETHANE	<0.010
1,2-DICHLOROBENZENE	<0.025
1,3-DICHLOROBENZENE	<0.025
1,4-DICHLOROBENZENE	<0.025
1,1-DICHLOROETHANE	<0.010
1,2-DICHLOROETHANE	<0.010
1,1-DICHLOROETHENE	<0.010
CIS-1,2,-DICHLOROETHENE	<0.010
TRANS-1,2-DICHLOROETHENE	<0.010
1,2-DICHLOROPROPANE	<0.010
CIS-1,3-DICHLOROPROPENE	<0.010
TRANS-1,3-DICHLOROPROPENE	<0.010
ETHYLBENZENE	<0.025
METHYLENE CHLORIDE	<0.050
1,1,2,2-TETRACHLOROETHANE	<0.010
TETRACHLOROETHENE	<0.010
TOLUENE	<0.025
1,1,1-TRICHLOROETHANE	<0.010
1,1,2-TRICHLOROETHANE	<0.010
TRICHLOROETHENE	<0.010
TRICHLOROFLUOROMETHANE	<0.025
VINYL CHLORIDE	<0.025
META & PARA XYLENE	<0.025
ORTHO XYLENE	<0.025

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE	88
BROMOFLUOROBENZENE	105

VOLATILE ORGANIC ANALYSIS
 DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 08/30/89
PROJECT #	: 186-101-B4	DATE RECEIVED	: 08/30/89
PROJECT NAME	: PUGET POWER	DATE EXTRACTED	: 09/08/89
CLIENT I.D.	: STOCK-C	DATE ANALYZED	: 09/08/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8010/8020	DILUTION FACTOR	: 1
RESULTS BASED ON DRY WEIGHT			

COMPOUND	RESULT
BENZENE	<0.025
BROMODICHLOROMETHANE	<0.010
BROMOFORM	<0.010
BROMOMETHANE	<0.025
CARBON TETRACHLORIDE	<0.010
CHLOROBENZENE	<0.025
CHLOROETHANE	<0.025
CHLOROFORM	<0.010
CHLOROMETHANE	<0.100
DIBROMOCHLOROMETHANE	<0.010
1,2-DICHLOROBENZENE	<0.025
1,3-DICHLOROBENZENE	<0.025
1,4-DICHLOROBENZENE	<0.025
1,1-DICHLOROETHANE	<0.010
1,2-DICHLOROETHANE	<0.010
1,1-DICHLOROETHENE	<0.010
CIS-1,2,-DICHLOROETHENE	<0.010
TRANS-1,2-DICHLOROETHENE	<0.010
1,2-DICHLOROPROPANE	<0.010
CIS-1,3-DICHLOROPROPENE	<0.010
TRANS-1,3-DICHLOROPROPENE	<0.010
ETHYLBENZENE	<0.025
METHYLENE CHLORIDE	<0.050
1,1,2,2-TETRACHLOROETHANE	<0.010
TETRACHLOROETHENE	0.045
TOLUENE	<0.025
1,1,1-TRICHLOROETHANE	<0.010
1,1,2-TRICHLOROETHANE	<0.010
TRICHLOROETHENE	<0.010
TRICHLOROFLUOROMETHANE	<0.025
VINYL CHLORIDE	<0.025
META & PARA XYLENE	0.041
ORTHO XYLENE	<0.025

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE	75
BROMOFLUOROBENZENE	101

VOLATILE ORGANIC
 QUALITY CONTROL DATA

CLIENT	: GEOENGINEERS, INC.	SAMPLE I.D.	: BLANK 8/28
PROJECT #	: 186-101-B4	DATE ANALYZED	: 09/01/89
PROJECT NAME	: PUGET POWER	SAMPLE MATRIX	: SOIL
EPA METHOD	: 8010/8020	UNITS	: mg/Kg

COMPOUND	SAMPLE RESULT	SPIKE ADDED	SPIKED SAMPLE	% REC	DUP SPIKED SAMPLE	DUP % REC	RPD
BENZENE	<0.025	0.600	0.519	87	N/A	N/A	N/A
CHLOROBENZENE	<0.025	0.600	0.509	85	N/A	N/A	N/A
1,1-DICHLOROETHENE	<0.010	0.200	0.183	92	N/A	N/A	N/A
TETRACHLOROETHENE	<0.010	0.200	0.202	101	N/A	N/A	N/A
TOLUENE	<0.025	0.600	0.525	88	N/A	N/A	N/A
TRICHLOROETHENE	<0.010	0.200	0.201	101	N/A	N/A	N/A
META & PARA XYLENE	<0.025	1.10	0.896	82	N/A	N/A	N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

POLYCHLORINATED BIPHENYLS (PCB) ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: N/A
PROJECT #	: 186-101-B4	DATE RECEIVED	: N/A
PROJECT NAME	: PUGET POWER	DATE EXTRACTED	: 09/05/89
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 09/07/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8080 (PCB)	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
PCB 1016	<0.025
PCB 1221	<0.025
PCB 1232	<0.025
PCB 1242	<0.025
PCB 1248	<0.025
PCB 1254	<0.025
PCB 1260	<0.025



POLYCHLORINATED BIPHENYLS (PCB) ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 08/30/89
PROJECT #	: 186-101-B4	DATE RECEIVED	: 08/30/89
PROJECT NAME	: PUGET POWER	DATE EXTRACTED	: 09/05/89
CLIENT I.D.	: STOCK-C	DATE ANALYZED	: 09/07/89
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8080 (PCB)	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
PCB 1016	<0.025
PCB 1221	<0.025
PCB 1232	<0.025
PCB 1242	<0.025
PCB 1248	<0.025
PCB 1254	<0.025
PCB 1260	<0.025



POLYCHLORINATED BIPHENYLS (PCB)
QUALITY CONTROL

CLIENT	: GEOENGINEERS, INC.	SAMPLE ID	: 8908-158-1
PROJECT #	: 186-101-B4	DATE ANALYZED	: 09/07/89
PROJECT NAME	: PUGET POWER	SAMPLE MATRIX	: SOIL
EPA METHOD	: 8080	UNITS	: mg/Kg

COMPOUND	SAMPLE RESULT	CONC SPIKED	SPIKED SAMPLE	% REC	DUP SPIKED SAMPLE	DUP % RECOVERY	RPD
PCB 1260	<0.025	0.33	0.39	118	0.39	118	0

$$\% \text{ Recovery} = \frac{(\text{Spike Sample result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$



EP TOX
METALS RESULTS

CLIENT : GEOENGINEERS, INC. SAMPLE MATRIX : EP EXTRACT
PROJECT # : 186-101-B4
PROJECT NAME : PUGET POWER UNITS : mg/L

PARAMETER -1

ARSENIC <0.005
BARIUM 0.11
CADMIUM <0.01
CHROMIUM <0.02
LEAD <0.1
MERCURY <0.0005
SELENIUM <0.005
SILVER <0.02



EP TOX
METALS QUALITY CONTROL

CLIENT : GEOENGINEERS, INC. SAMPLE MATRIX : EP EXTRACT
PROJECT # : 186-101-B4
PROJECT NAME : PUGET POWER UNITS : mg/L

COMPOUND	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED SAMPLE	SPIKE CONC	% REC
ARSENIC	8909-003-1	<0.005	<0.005	0	0.049	0.050	98
BARIUM	8909-003-1	0.34	0.31	9	21.4	20.0	105
CADMIUM	8909-003-1	<0.01	<0.01	0	0.46	0.50	92
CHROMIUM	8909-003-1	0.06	0.06	0	1.83	2.00	88
LEAD	8909-003-1	0.19	0.20	5	9.46	10.0	93
MERCURY	8909-003-1	<0.0005	<0.0005	0	0.0020	0.0020	100
SELENIUM	8909-003-1	<0.005	<0.005	0	0.040	0.050	80
SILVER	8909-003-1	<0.02	<0.02	0	1.05	1.00	105

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$



GENERAL CHEMISTRY RESULTS

CLIENT : GEOENGINEERS, INC.
PROJECT # : 186-101-B4
PROJECT NAME : PUGET POWER

SAMPLE MATRIX : SOIL

PARAMETER	UNITS	-1
PETROLEUM HYDROCARBONS	mg/Kg	3,500
MOISTURE	%	16



GENERAL CHEMISTRY QUALITY CONTROL

CLIENT : GEOENGINEERS, INC.
 PROJECT # : 186-101-B4
 PROJECT NAME : PUGET POWER

SAMPLE MATRIX : SOIL

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED CONC	SPIKE ADDED	% REC
PETROLEUM HYDROCARBONS	mg/Kg	8908-158-1	3,500	2,800	22	N/A	N/A	N/A
PETROLEUM HYDROCARBONS	mg/Kg	BLANK SPIKE	N/A	N/A	N/A	68.6	63.5	108
MOISTURE	%	8908-152-1	15	14	7	N/A	N/A	N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$



GeoEngineers

OCT 12 1989

City of Seattle Charles Royer, Mayor King County Tim Hill, Executive

Routing KSKK

Seattle-King County Department of Public Health File Bud Nicola, M.D., M.H.S.A., Director

TO: Roy Westmoreland, Coal Creek Landfill Joe Underwood, Site Foreman, Coal Creek Landfill FROM: Steve Burke, Senior Environmental Health Specialist Chemical/Physical Hazards Program DATE: October 10, 1989 SUBJECT: WASTE MATERIAL CLEARED FOR DISPOSAL AT COAL CREEK LANDFILL

This is to advise you that we find that the waste material listed from the following company currently acceptable for the landfill at Coal Creek.

Generator: Puget Sound Power & Light Co. (PSPL) P.O. Box 97034 Bellevue, WA 98009-9734 Contact: Gary Reid at 463-3077

Transporter: Chempro Environmental Services 3400 E. Marginal Way S. Seattle, WA 98134 Contact: R. Huston at 682-4898

Material: Soil excavated with the removal of two underground diesel fuel storage tanks and the removal of an underground gasoline storage tank at the PSPL Renton Service Center at 620 S. Grady Way; Renton, WA.

Amount: 270 cubic yards. Approximate total weight 400 tons.

Frequency: This one time.

Expiration Date: December 12, 1989

The above substances were found not to meet the State DOE definitions for either extremely hazardous waste or dangerous waste or Federal EPA criteria for hazardous waste or toxic substances. A summary of the available chemical analysis is attached, if applicable.

Downtown Public Health Center 14th Floor, Public Safety Building 610 Third Avenue (at James Street) Seattle, Washington 98104 (206) 296-4755

Central Environmental Health Center

Waste Screening Memo

October 10, 1989

Page 2

Please note that it is only the described materials that are acceptable for disposal. Any other type of questionable waste from this company will require separate review and analysis.

If you have any questions or need additional information, please call me at 296-4633 (FAX 296-0188).

SJB:jl\pspl

cc: Chuck Shank, Hazardous Waste, Region X, EPA
John Conroy, Hazardous Waste, Northwest Office DOE
Larry Kirchner, EHS Supervisor, Southeast EHS Office
Greg Bishop, EHS Supervisor, Smith Tower, SKCDPH
Generator and Transporter listed above.
Geoengineers ATTN: K. Killman
2405 - 140th Ave. N.E.; Suite 105; Bellevue, WA 98005

Attachment

WASTE SCREENING CHECKLIST

Generator: Puget Sound Power
 Materials: Soil

Date: 10/10/89

3 of 3

WAC 173-303	TITLE OR TEST	DONE	RESULT	COMMENTS
-090	D.W. Characteristics a) Ignitability b) Corrosivity c) Reactivity d) E.P. Tox			
-101	Toxic D.W. a) Equivalent Conc. b) Bioassay			
C - 32 -102	Persistent D.W. a) Halogenates b) PAH's			
-103	Carcinogenic D.W.			
Other	a) TPH b) B-E-T-X	a) Y b) Y	a) l.t. 200 ppm b) all l.t. 250 ppb	a) four samples

Abbreviations

Y = Yes; N = No; NA = Not Applicable;
 WAC = Washington Administrative Code; E.P. Tox = Extraction Procedure Toxicity;
 D.W. = Dangerous Waste; PAH = Polycyclic Aromatic Hydrocarbons;
 D.O.E. = Department of Ecology;
 l.t. = less than
 B = Benzene; E = Ethylbenzene; T = Toluene; X = Xylenes - total unless otherwise specified
 TPH = total petroleum hydrocarbons; EDB = Ethylene dibromide
 ND = Not Detected

GeoEngineers

OCT 13 1989

Routing

File



City of Seattle Charles Royer, Mayor King County Tim Hill, Executive

Seattle-King County Department of Public Health

Bud Nicola, M.D., M.H.S.A., Director

TO: Rod Hansen, Manager, King County Solid Waste Division
ATTN: Mel Andriesen, Cedar Hills
FROM: Steve Burke, Senior Environmental Health Specialist
DATE: October 11, 1989
SUBJECT: WASTE MATERIAL CLEARED FOR DISPOSAL AT CEDAR HILLS LANDFILL

This is to advise you that we find that the waste material listed from the following company is a solid waste, and if disposed of in King County, must be disposed at Cedar Hills.

Generator: Puget Sound Power & Light Co. (PSPL) Contact: Gary Reid
Transporter: Chempro Environmental Services Contact: Robert Huston

Delivery must be scheduled with Dennis Trammell at 296-4490.

Material: Soil excavated from A) the removal of two underground waste oil storage tanks and B) the removal of an underground water line at the PSPL Renton Service Center at 620 South Grady Way; Renton, Washington.

Amount: A) 110 cubic yards, and B) 60 cubic yards

Approximate total weight 255 tons.

Frequency: This one time.
Expiration Date: December 13, 1989
Consulted with: Dennis Trammell (10/11/89)

The above substances were found not to meet the State DOE definitions for either extremely hazardous waste or dangerous waste or Federal EPA criteria for hazardous waste or toxic substances. A summary of the available chemical analysis is attached, if applicable.

Downtown Public Health Center
14th Floor, Public Safety Building 610 Third Avenue (at James Street) Seattle, Washington 98104 (206) 296-4755

Central Environmental Health Center

APPENDIX A

A P P E N D I X A

FIELD EXPLORATIONS

DRILLING AND SOIL SAMPLING PROGRAM

Subsurface conditions at the site were explored in three phases by drilling 6 borings between September 5 and September 6, 1989, 15 borings between October 9 and October 12, 1989, and 6 borings between November 27 and November 28, 1989. The borings were drilled at the locations indicated in Figure 2 to a depth of 14.0 feet using truck-mounted, hollow-stem auger equipment owned and operated by GeoBoring and Development, Inc. The drilling and soil sampling equipment was cleaned with a hot-water pressure washer between each boring. The soil sampling equipment was cleaned in an trisodium phosphate detergent wash and distilled water rinse between each sampling attempt.

A hydrogeologist from our staff determined the boring and sampling locations, examined and classified the soils encountered, and prepared a detailed log of each boring. Soils encountered were classified visually in general accordance with ASTM D-2488-83, which is described in Figure A-1. An explanation of the boring log symbols is presented in Figure A-2. The boring logs are given in Figures A-3 through A-29.

Soil samples were obtained from each boring using a split-barrel sampler (1.375-inch-ID). The sampler was driven 18 inches by a 140-pound weight falling a vertical distance of approximately 30 inches. The number of blows needed to advance the sampler the final 12 inches is indicated to the left of the corresponding sample notations on the boring logs.

One or more soil samples from each boring were selected for chemical analysis. Samples from the borings that were tested are denoted in our boring logs with a "CA". The soil samples were transferred to jars in the field and kept cool during transport to the testing laboratory. Chain-of-custody procedures were observed during transport of the soil samples.

FIELD SCREENING METHODS

A GeoEngineers representative conducted field screening on soil samples obtained from the exploratory borings. Field screening results are used as a general guideline to delineate areas of potential petroleum-related contamination in soils. In addition, screening results are often used as

a basis for selecting soil samples for chemical analysis. The field screening methods employed included: (1) visual examination and (2) sheen testing.

Visual screening consists of inspecting the soil for the presence of stains indicative of residual fuel hydrocarbons. Visual screening is generally more effective in detecting the presence of heavier petroleum hydrocarbons such as motor oil, or when hydrocarbon concentrations are high. Sheen screening is a more sensitive method which has been effective in detecting residual fuel hydrocarbons at levels less than regulatory cleanup guidelines.

Sheen testing involves placing soil in water and observing the water surface for signs of sheen. Because of its sensitivity, the sheen method was first tested on soils obtained from a portion of the site believed to be clean and unaffected by residual fuel hydrocarbons. The results of the sheen tests on these soils were established as the background level of sheen for the site.

Sheens are classified as follows:

NS - No Sheen -	No visible sheen. Note: background samples at the site were classified NS.
SS - Slight Sheen -	Light colorless film, spotty to globular; spread is irregular, not rapid; areas of no sheen remain; film dissipates rapidly.
MS - Moderate Sheen -	Light to heavy film, may have some color or iridescence, globular to stringy; spread is irregular to flowing.
HS - Heavy Sheen -	Heavy colorful film with iridescence; stringy, spread is rapid; sheen flows off the sample; most of water surface is covered.

The results of the sheen testing on soil samples from the borings are presented on the boring logs in Figures A-3 through A-29.

Field screening results are site specific and vary with soil type, soil moisture content, temperature and type of contaminant.

MONITOR WELL CONSTRUCTION

Two-inch-diameter, Schedule 40 PVC pipe was installed in each boring at the completion of drilling, with the exception of Borings 27, 28 and 29. The lower portion of the PVC pipe is machine slotted (0.02-inch slot width) to allow entry of water, floating hydrocarbons and hydrocarbon vapors into the well casings. Medium sand was placed in the borehole annulus surrounding the slotted portion of the wells. The well casings are protected within locking flush-grade surface monuments. Monitor well construction is indicated in Figures A-3 through A-24 and A-28 through A-29.

The well screens for the twenty-four monitor wells were developed by removing approximately five well volumes of water from the well with a stainless steel bailer.

We determined the elevation of the well casings to the nearest 0.01 foot with an engineers level on September 7 and October 13, 1989. An elevation datum of 100.00 feet was assumed at the center of the manhole cover located approximately 15 feet southeast of MW-3 (Figure 2). Elevations referenced to this datum are included on the monitor well logs.

GROUND WATER SAMPLING PROGRAM

Ground water samples were collected from MW-5 through MW-10 on September 7, 1989, and from MW-12, MW-19 and MW-20 on October 27, 1989. The water samples were collected with a teflon bailer after at least three well volumes of water were removed from each well casing. The water samples were transferred to liter jars in the field and kept cool during transport to the testing laboratory. Chain-of-custody procedures were observed during transport of the water samples.

The bailer was cleaned prior to each sampling attempt with a fresh water rinse, a trisodium phosphate detergent wash, and a second fresh water rinse which was followed by a distilled water rinse.

GROUND WATER ELEVATIONS

The depth to the ground water table relative to the monitor well casing rims was measured in MW-1 through MW-10 (MW-1 through MW-4 were installed in a previous study on nearby underground gasoline storage tanks) on September 7, 1989. Water levels were measured in MW-1 through MW-26 on October 16, 1989 and again on November 15, 1989. The site measurements were

made using a weighted fiberglass tape and water-finding paste. Water table elevations were calculated by subtracting the water depth from the casing rim elevations. The water table elevations are presented in Table 5. Water table positions as measured on November 15, 1989 are shown on the monitor well logs.

PRODUCT SAMPLING AND MONITORING PROGRAM

Product samples were obtained from MW-7 and MW-25 on October 19 and October 17, 1989, respectively. The product samples were collected from the well casings using a clear acrylic bailer. The product samples were transferred to glass jars in the field and transported to the testing laboratory. Chain-of-custody procedures were observed during transport of the product samples.

Product levels have been measured in the well casings for MW-6, MW-7 and MW-25 on October 16, October 17, October 24, October 27, November 2 November 15, and November 27, 1989. Product has been bailed from each well casing on October 24, October 27, November 2 and November 15, 1989. Product was removed from the wells using an acrylic bailer until no measurable product remained, then stored on site in a secure container. Product thickness data is presented in Table 6.

CHEMICAL ANALYTICAL PROGRAM

Forty-one soil samples from the borings, nine ground water samples from the monitor wells, and two product samples from the monitor wells were analyzed by Analytical Technologies, Inc. The soil samples and water samples were analyzed for total petroleum hydrocarbons (TPH) by freon extraction/infrared spectroscopy in accordance with EPA Method 418.1. Selected soil samples and the product samples were also analyzed for fuel hydrocarbons (fuel fingerprint) using gas chromatography/flame ionization detection techniques in accordance with EPA Method 8015, modified. The analytical chemistry data for the soil samples from the borings are summarized in Table 8. The analytical chemistry data for the water samples are summarized in Table 7. The laboratory data sheets are included in Appendix B.

SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOL	GROUP NAME
COARSE GRAINED SOILS MORE THAN 50% RETAINED ON NO. 200 SIEVE	GRAVEL MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVEL	GW	WELL-GRADED GRAVEL, FINE TO COARSE GRAVEL
			GP	POORLY-GRADED GRAVEL
		GRAVEL WITH FINES	GM	SILTY GRAVEL
			GC	CLAYEY GRAVEL
	SAND MORE THAN 50% OF COARSE FRACTION PASSES NO. 4 SIEVE	CLEAN SAND	SW	WELL-GRADED SAND, FINE TO COARSE SAND
			SP	POORLY-GRADED SAND
		SAND WITH FINES	SM	SILTY SAND
			SC	CLAYEY SAND
FINE GRAINED SOILS MORE THAN 50% PASSES NO. 200 SIEVE	SILT AND CLAY LIQUID LIMIT LESS THAN 50	INORGANIC	ML	SILT
			CL	CLAY
	SILT AND CLAY LIQUID LIMIT 50 OR MORE	ORGANIC	OL	ORGANIC SILT, ORGANIC CLAY
		INORGANIC	MH	SILT OF HIGH PLASTICITY, ELASTIC SILT
			CH	CLAY OF HIGH PLASTICITY, FAT CLAY
		ORGANIC	OH	ORGANIC CLAY, ORGANIC SILT
HIGHLY ORGANIC SOILS			PT	PEAT

NOTES:

- Field classification is based on visual examination of soil in general accordance with ASTM D2488-83.
- Soil classification using laboratory tests is based on ASTM D2487-83.
- Descriptions of soil density or consistency are based on interpretation of blowcount data, visual appearance of soils, and/or test data.

SOIL MOISTURE MODIFIERS:

Dry - Absence of moisture, dusty, dry to the touch

Moist - Damp, but no visible water

Wet - Visible free water or saturated, usually soil is obtained from below water table

LABORATORY TESTS:

CA Chemical Analysis

VAPOR CONCENTRATION DATA:

Vapor concentration given in parts per million

SHEEN CLASSIFICATION SYSTEM:

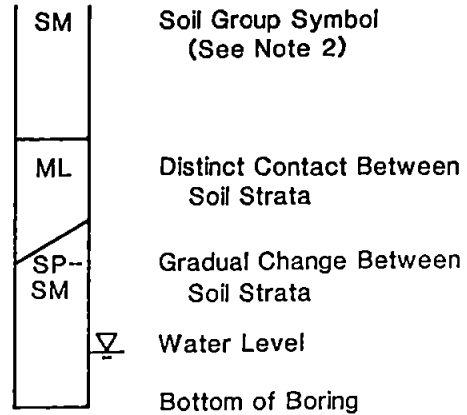
NS No visible sheen

SS Slight sheen

MS Moderate sheen

HS Heavy sheen

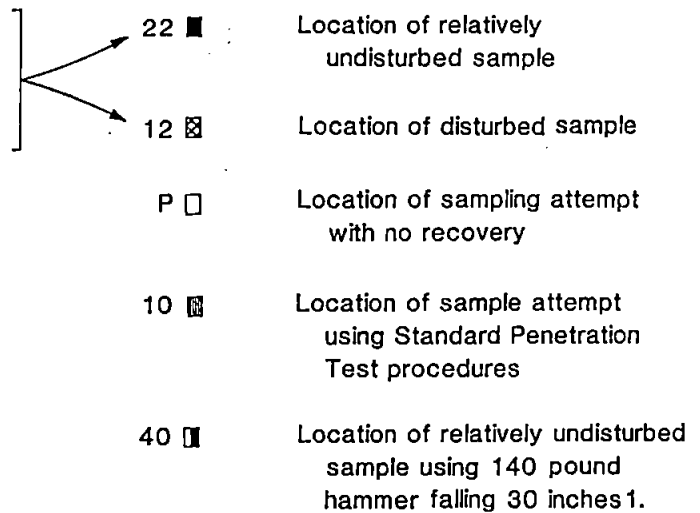
SOIL GRAPH:



BLOW-COUNT/SAMPLE DATA:

Blows required to drive Dames & Moore sampler 12 inches or other indicated distances using 140 pound hammer falling 30 inches.

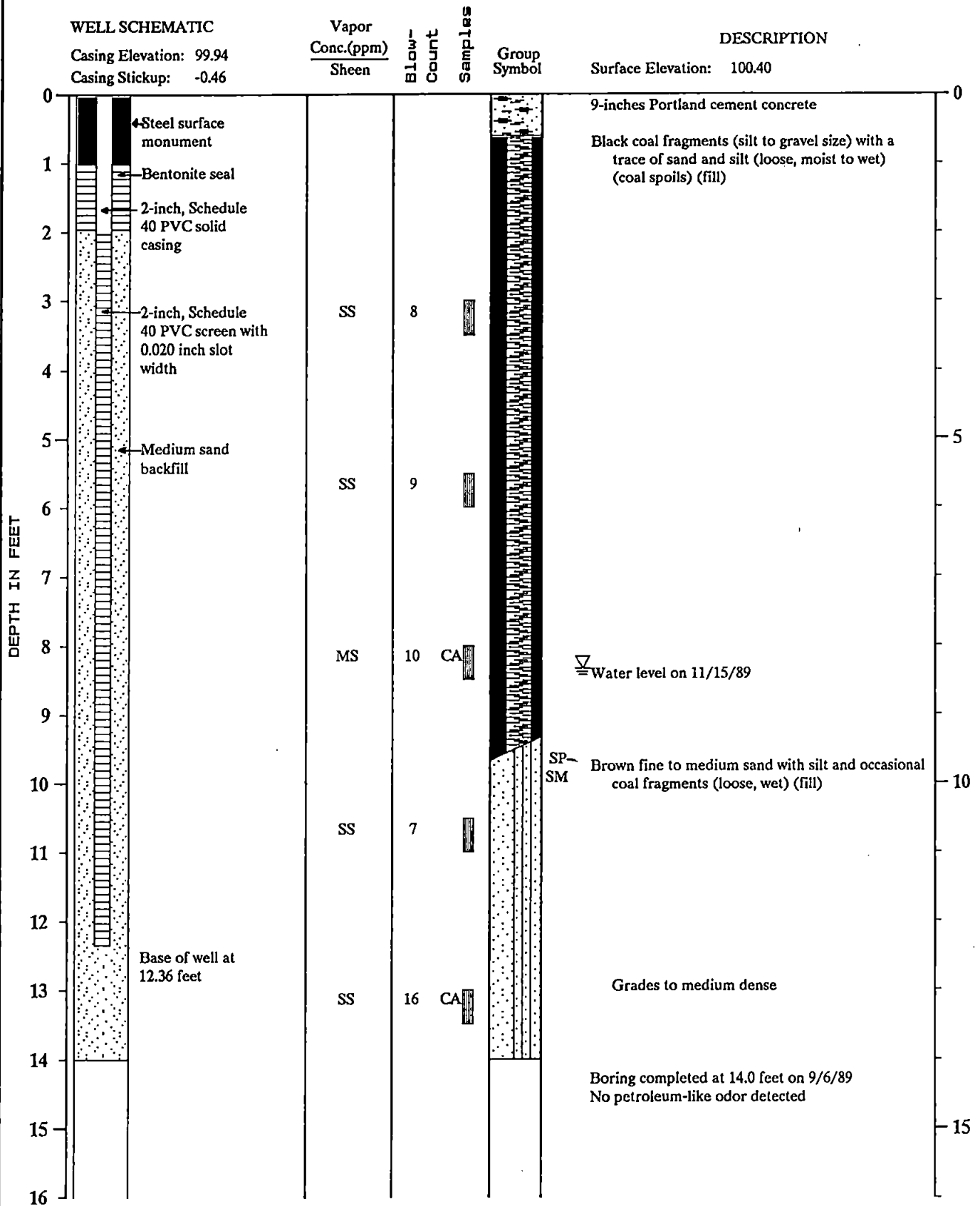
"P" indicated sampler pushed with weight of hammer or hydraulics of drill rig.



NOTES:

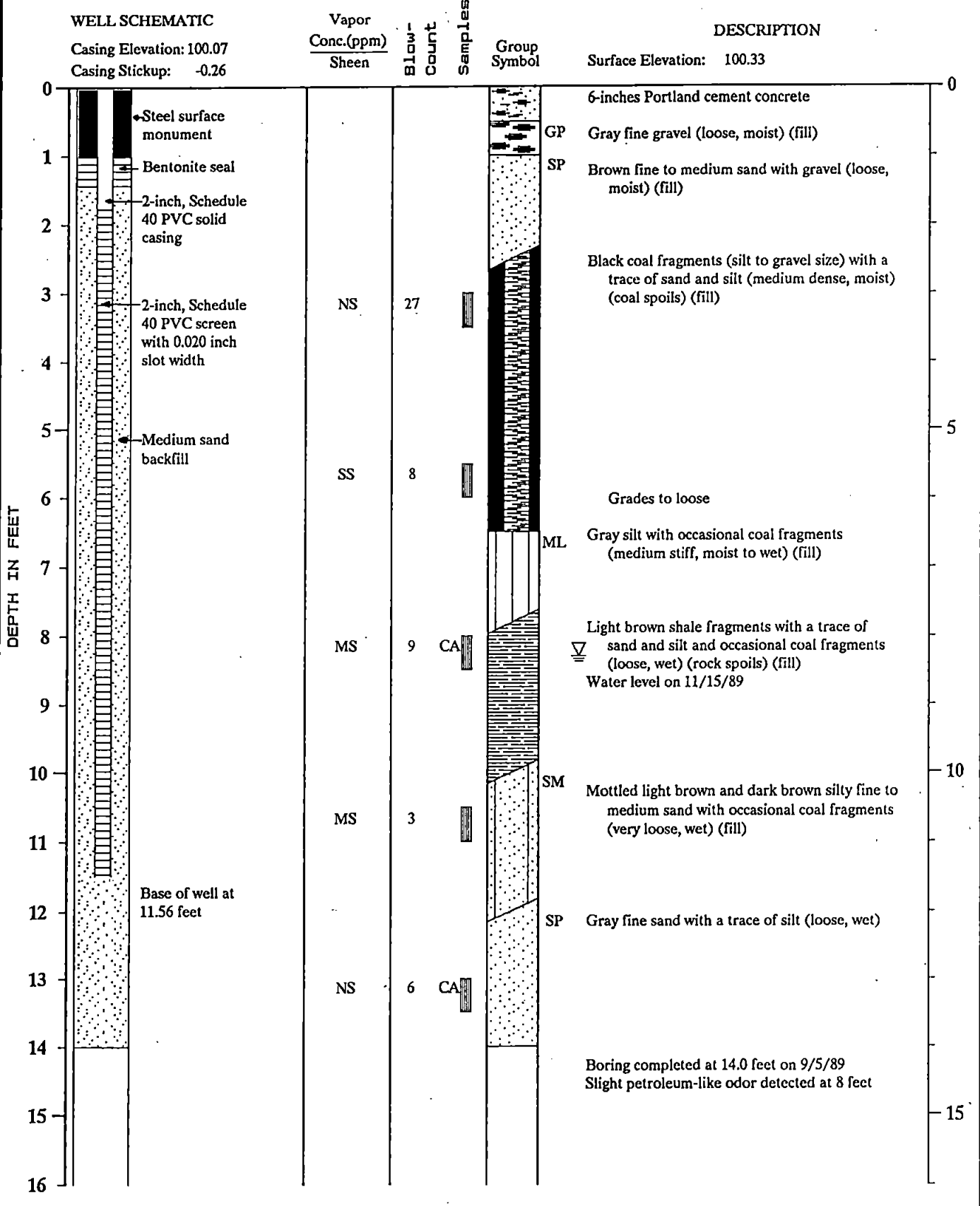
- Information presented in the attached text and the Key To Boring Log Symbols is required to adequately explain the data on the boring logs.
- Soil classification system is summarized in Figure A-1.
- The reader must refer to the discussion in the report test as well as the exploration logs for a proper understanding of subsurface conditions.

MONITOR WELL NO. MW-5



Note: See Figure A-2 for explanation of symbols

MONITOR WELL NO. MW-6



Note: See Figure A-2 for explanation of symbols



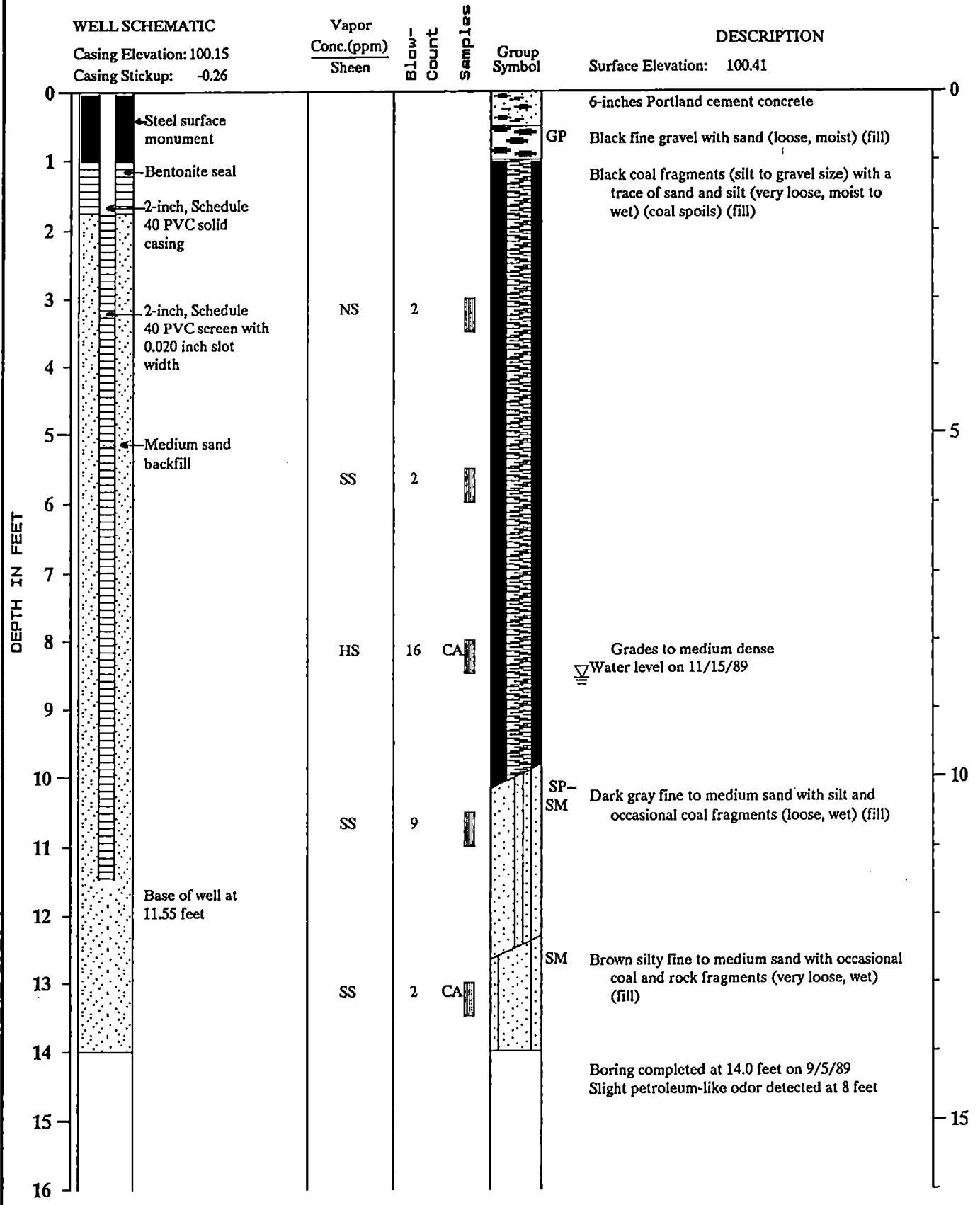
Log of Monitor Well

Figure A-4

KSK:CDO 12/20/89

0186-101-B04

MONITOR WELL NO. MW-7



Note: See Figure A-2 for explanation of symbols



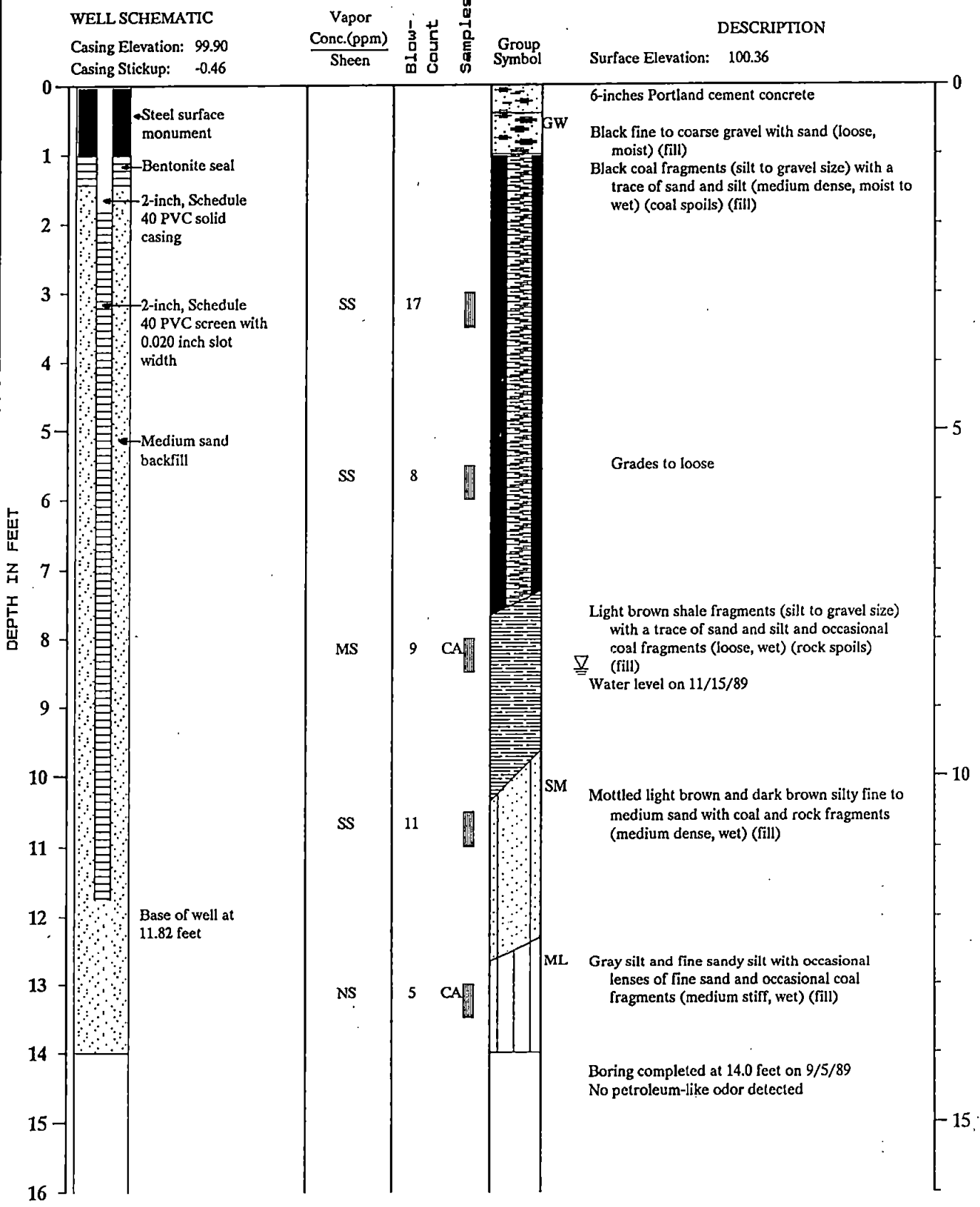
Log of Monitor Well

Figure A-5

KSK: CDO 12/7/89

0186-101-B04

MONITOR WELL NO. MW-8



Note: See Figure A-2 for explanation of symbols



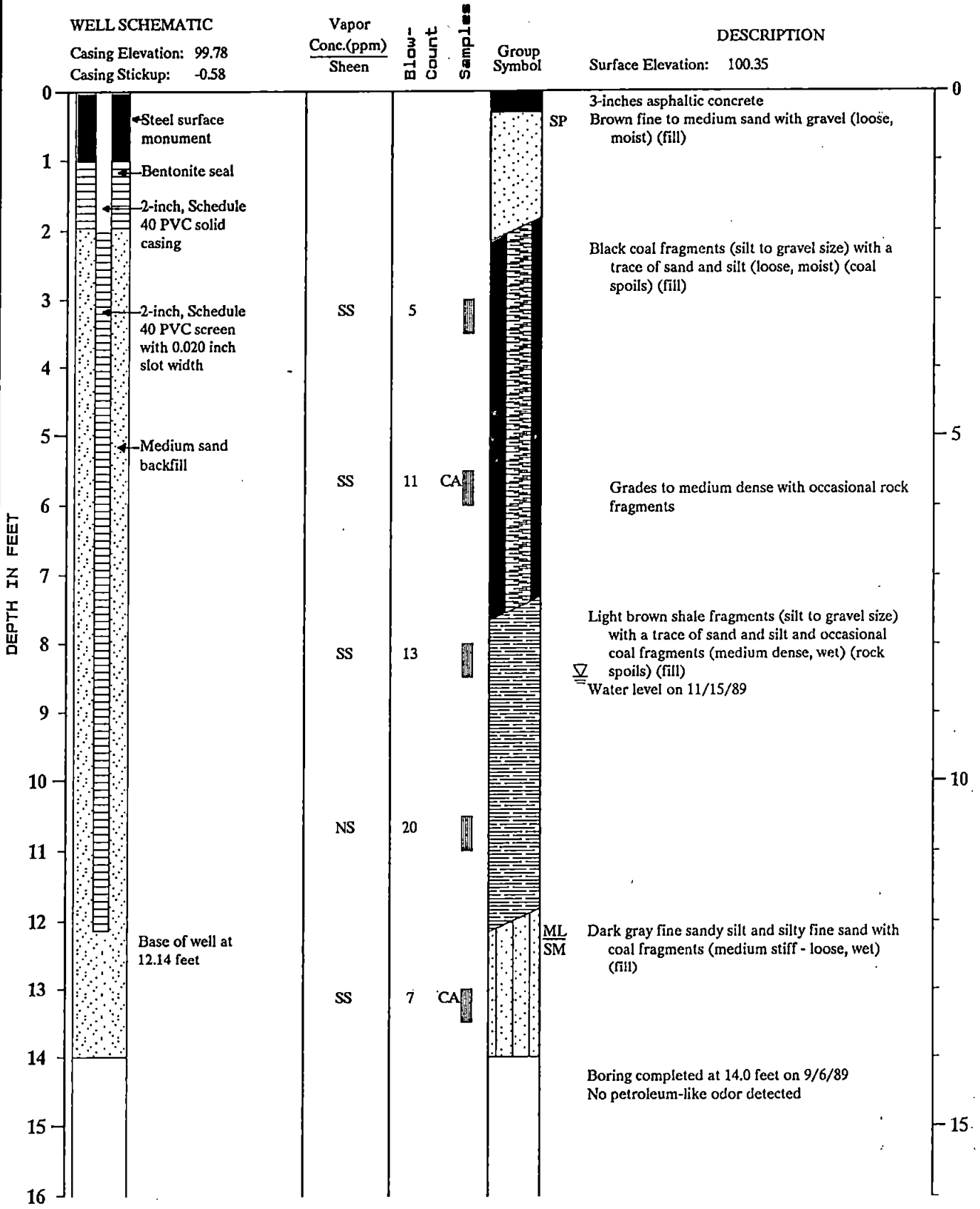
Log of Monitor Well

Figure A-6

KSK:CDO 12/20/89

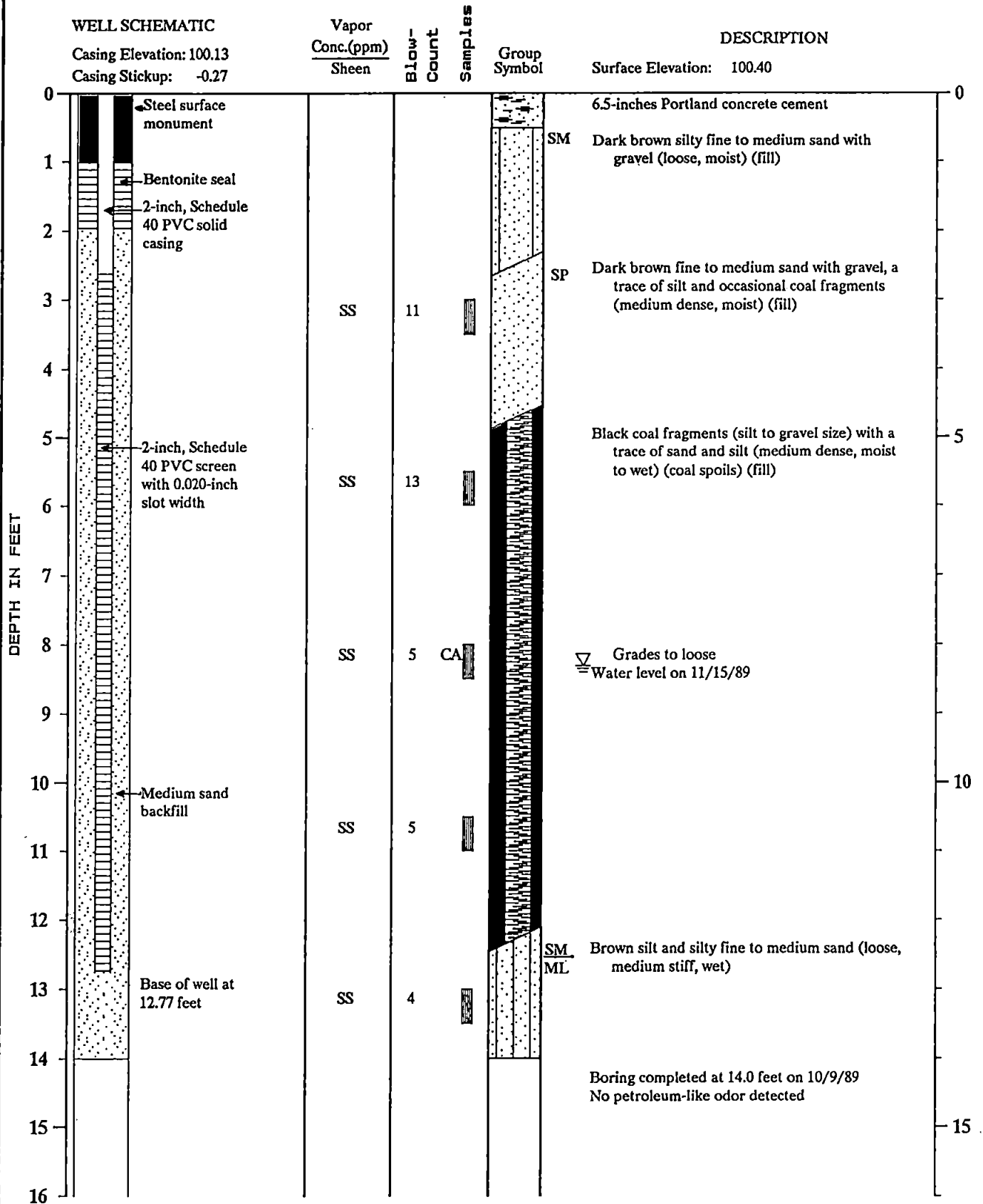
0186-101-B04

MONITOR WELL NO. MW-10



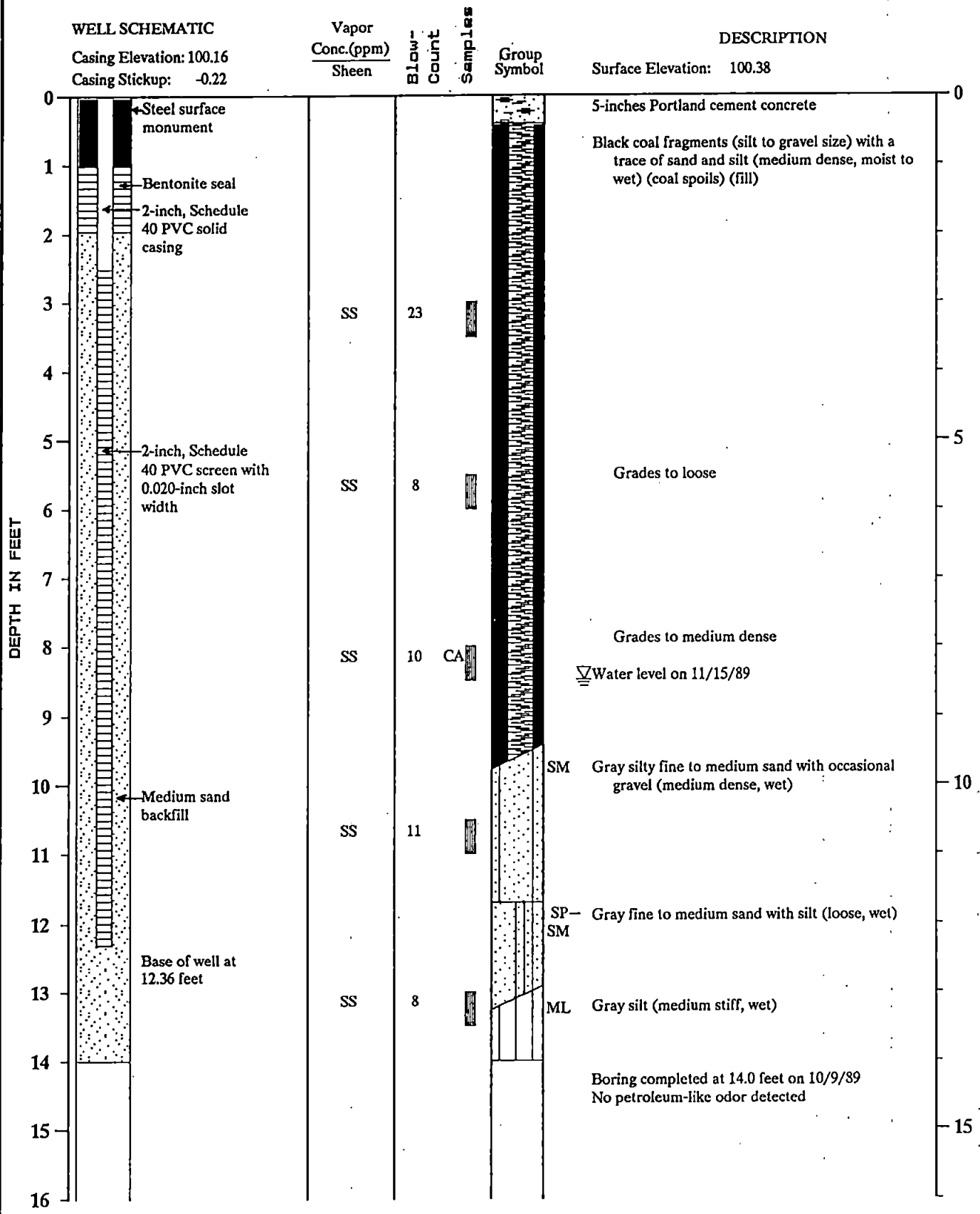
Note: See Figure A-2 for explanation of symbols

MONITOR WELL NO. MW-11



Note: See Figure A-2 for explanation of symbols

MONITOR WELL NO. MW-12



Note: See Figure A-2 for explanation of symbols



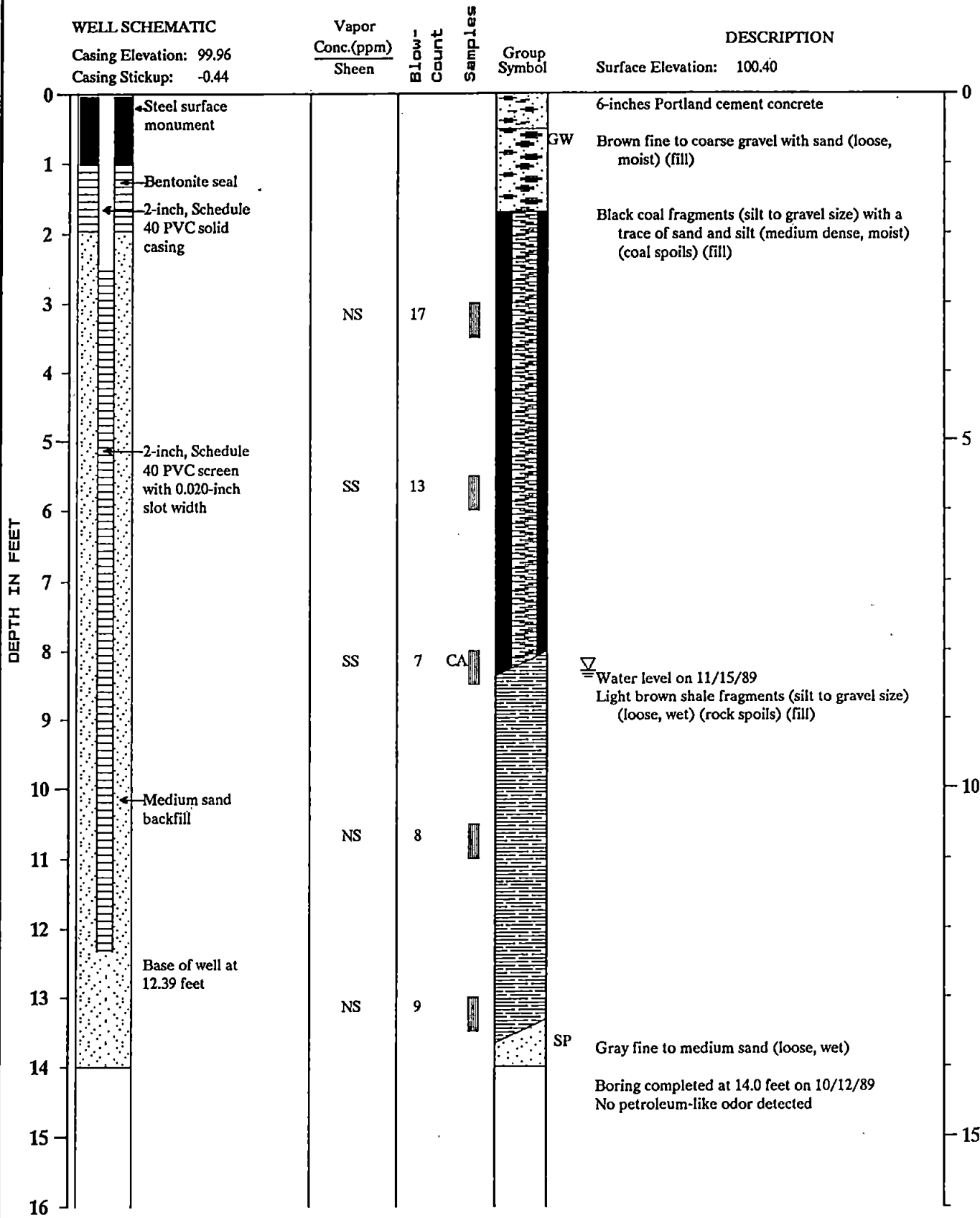
Log of Monitor Well

Figure A-10

KSK: CDO 12/7/89

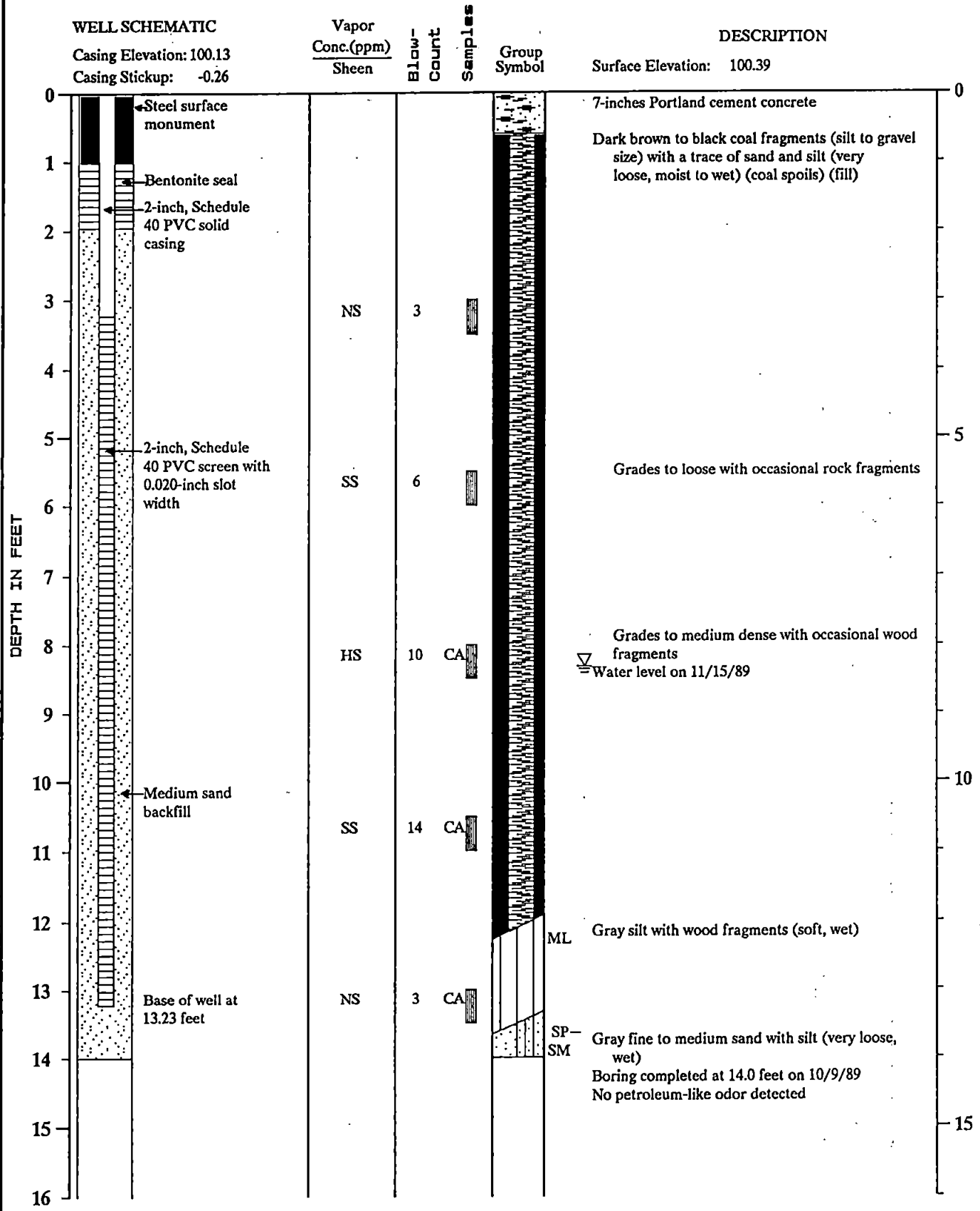
0186-101-B04

MONITOR WELL NO. MW-13



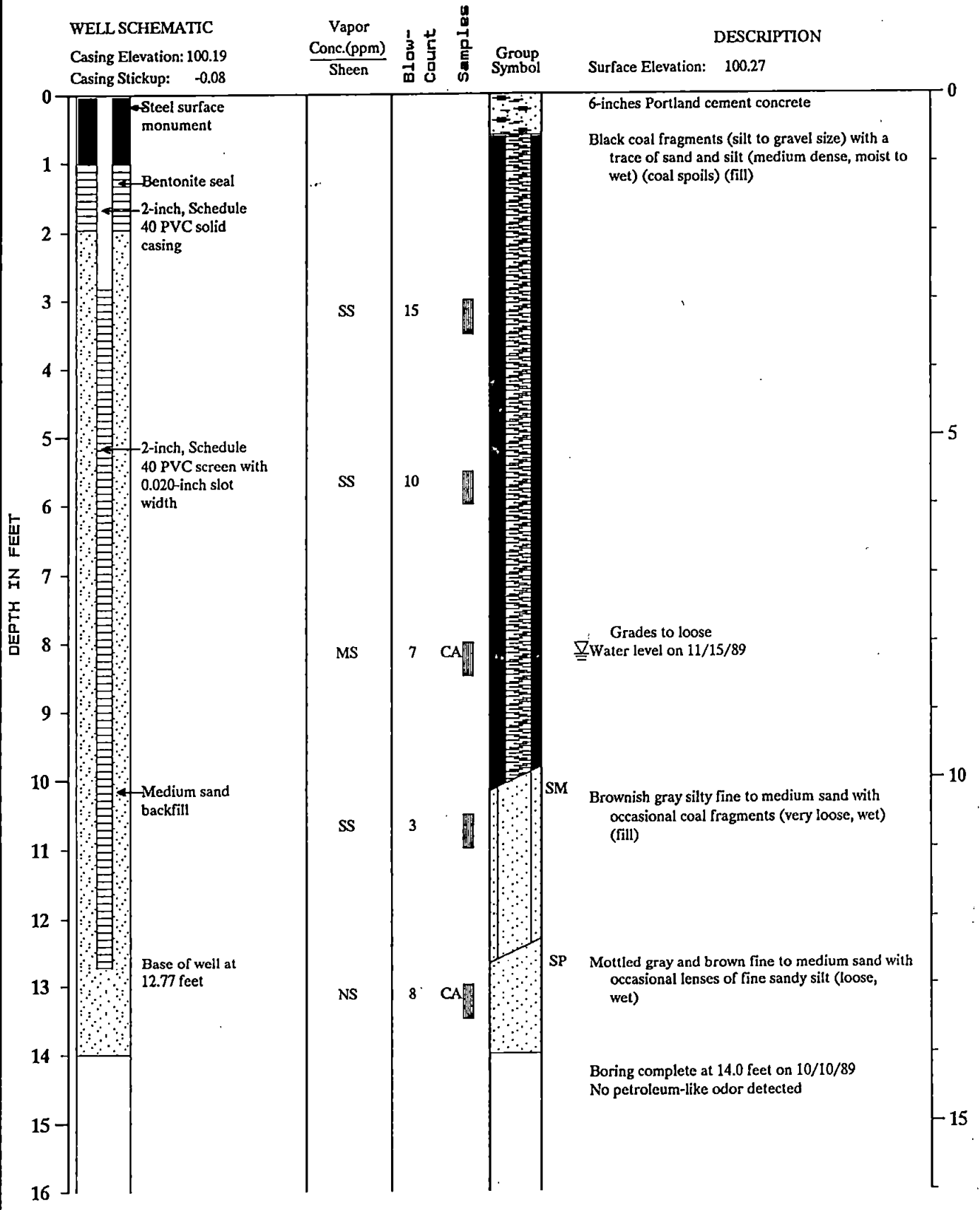
Note: See Figure A-2 for explanation of symbols

MONITOR WELL NO. MW-14



Note: See Figure A-2 for explanation of symbols

MONITOR WELL NO. MW-16



Note: See Figure A-2 for explanation of symbols



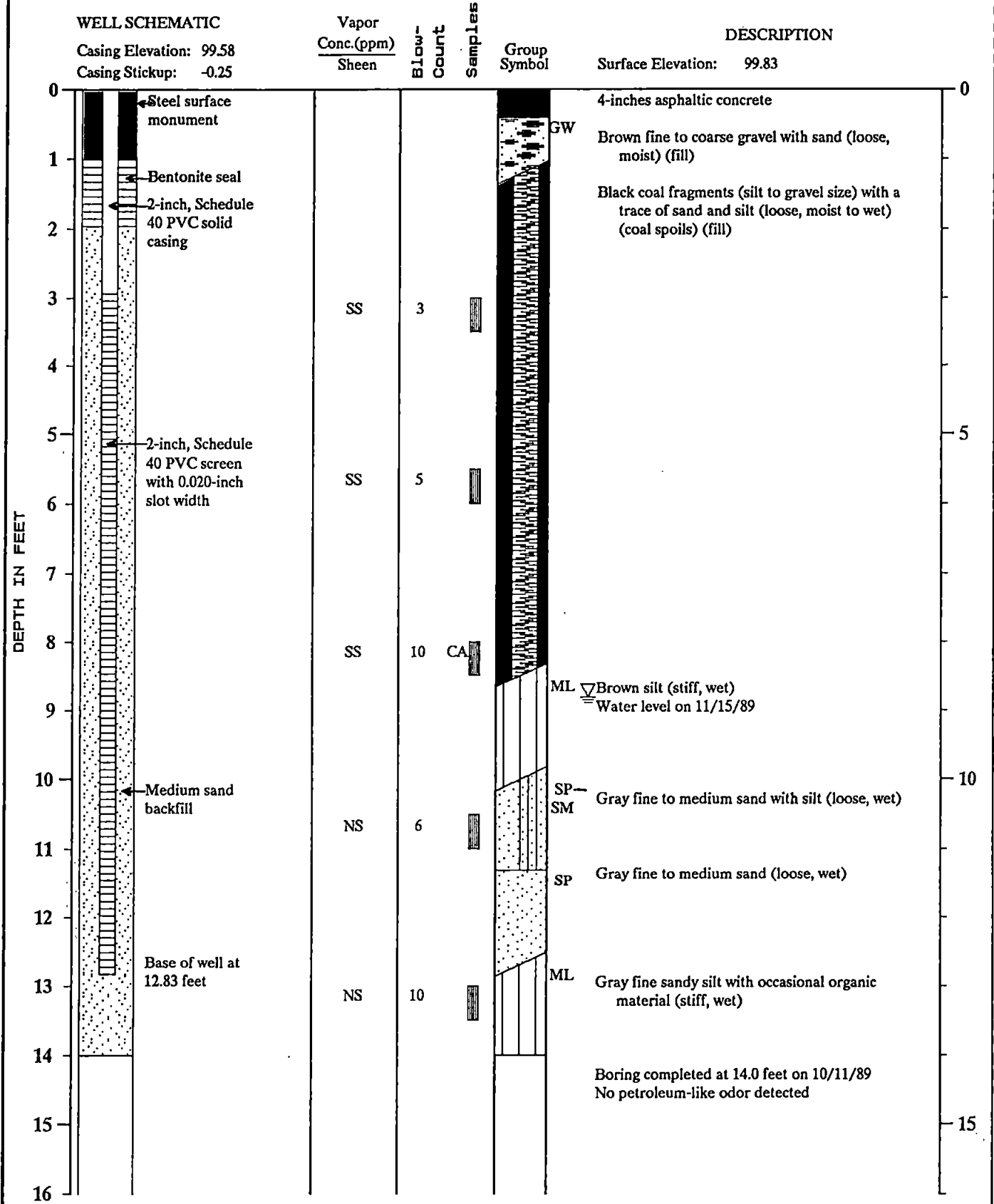
Log of Monitor Well

Figure A-14

KSK:CDO 12/7/89

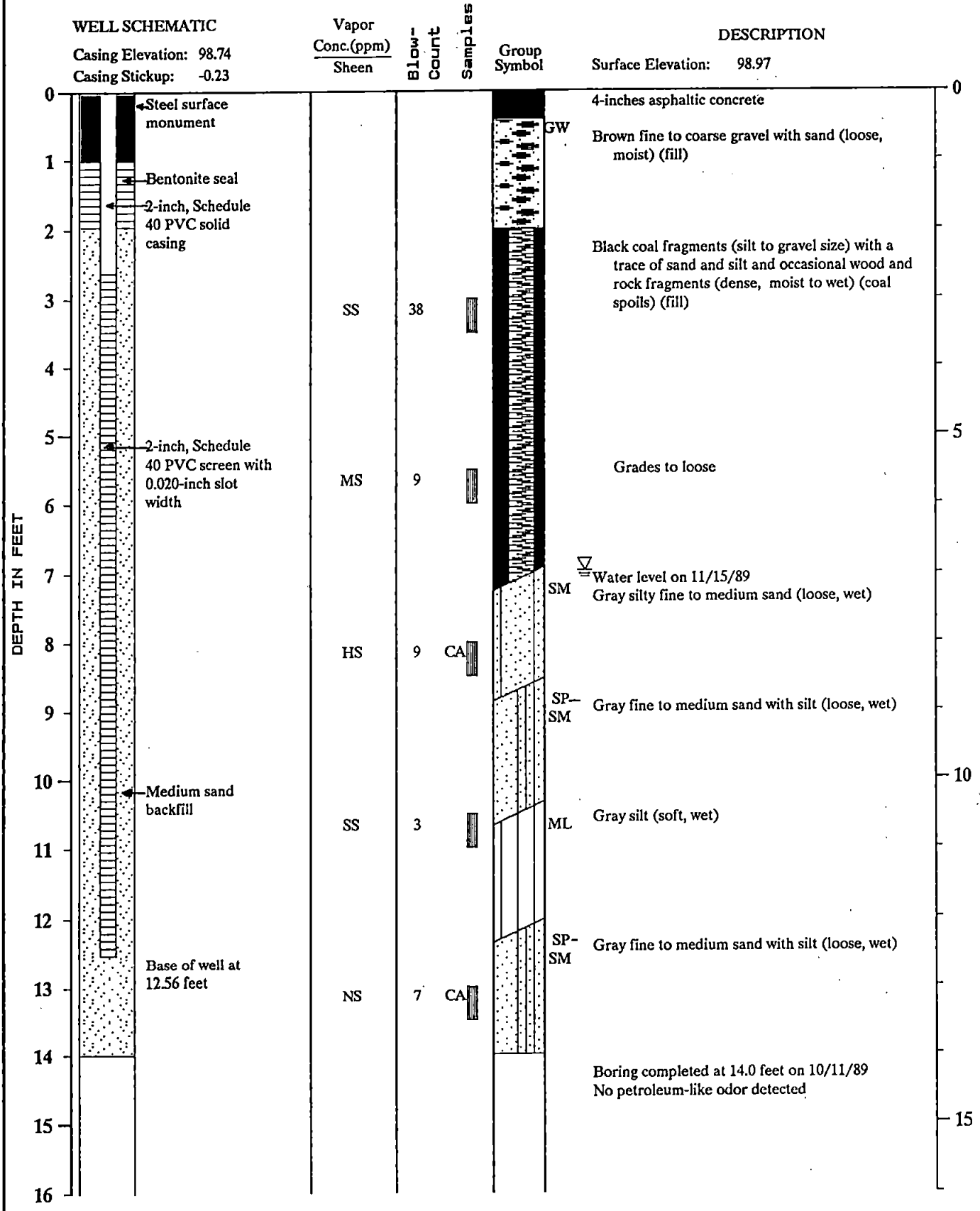
0186-101-B04

MONITOR WELL NO. MW-17



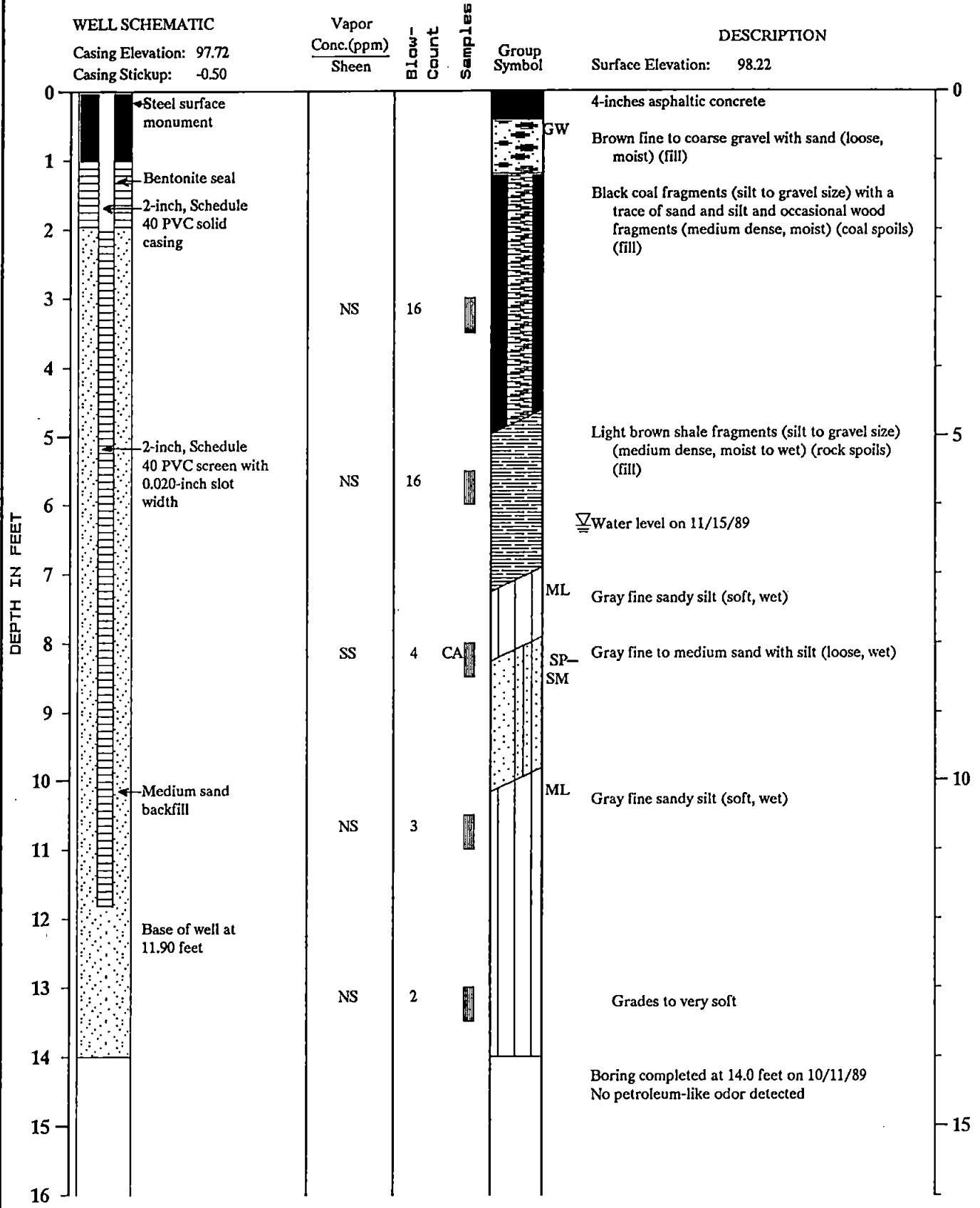
Note: See Figure A-2 for explanation of symbols

MONITOR WELL NO. MW-18



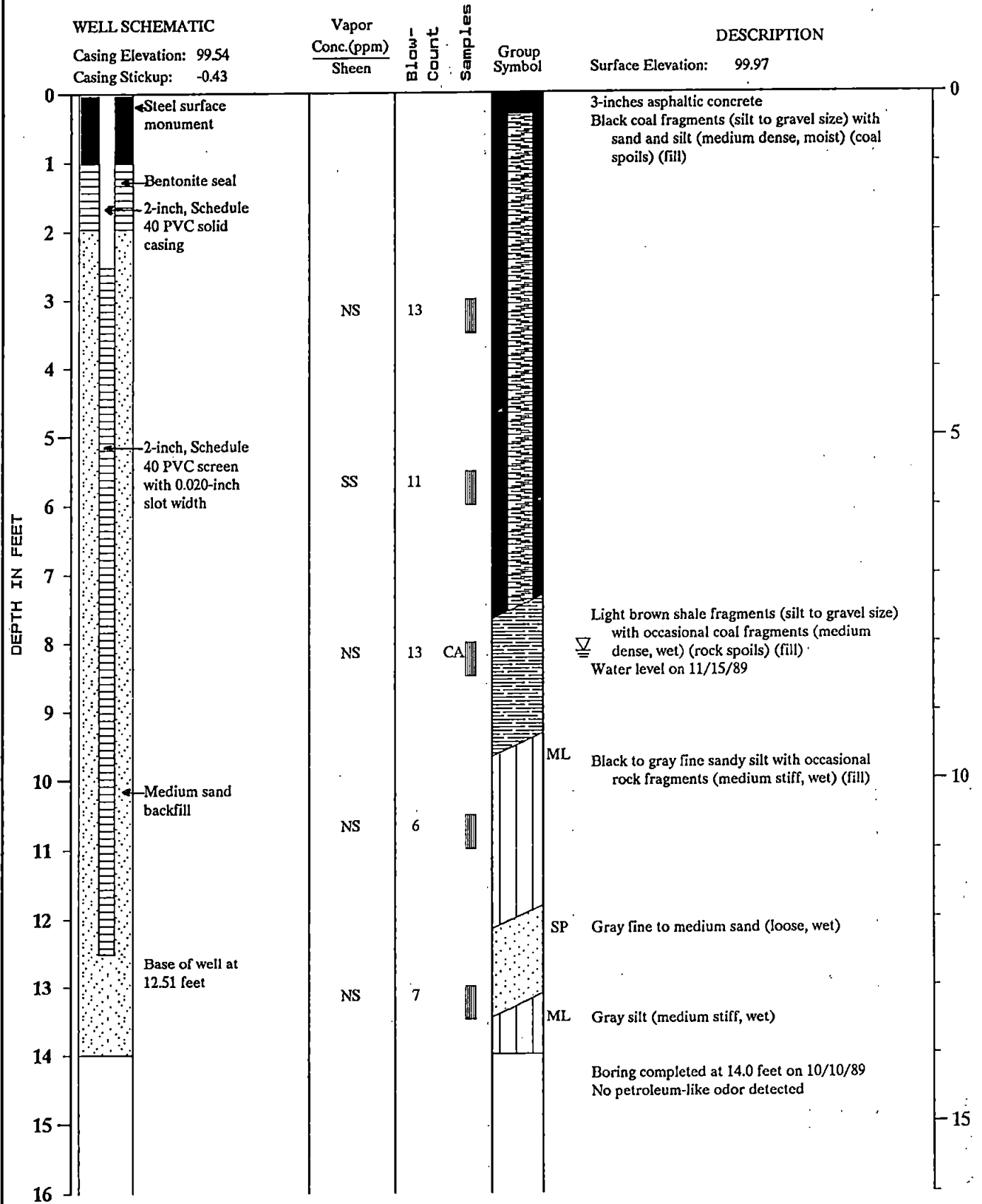
Note: See Figure A-2 for explanation of symbols

MONITOR WELL NO. MW-19



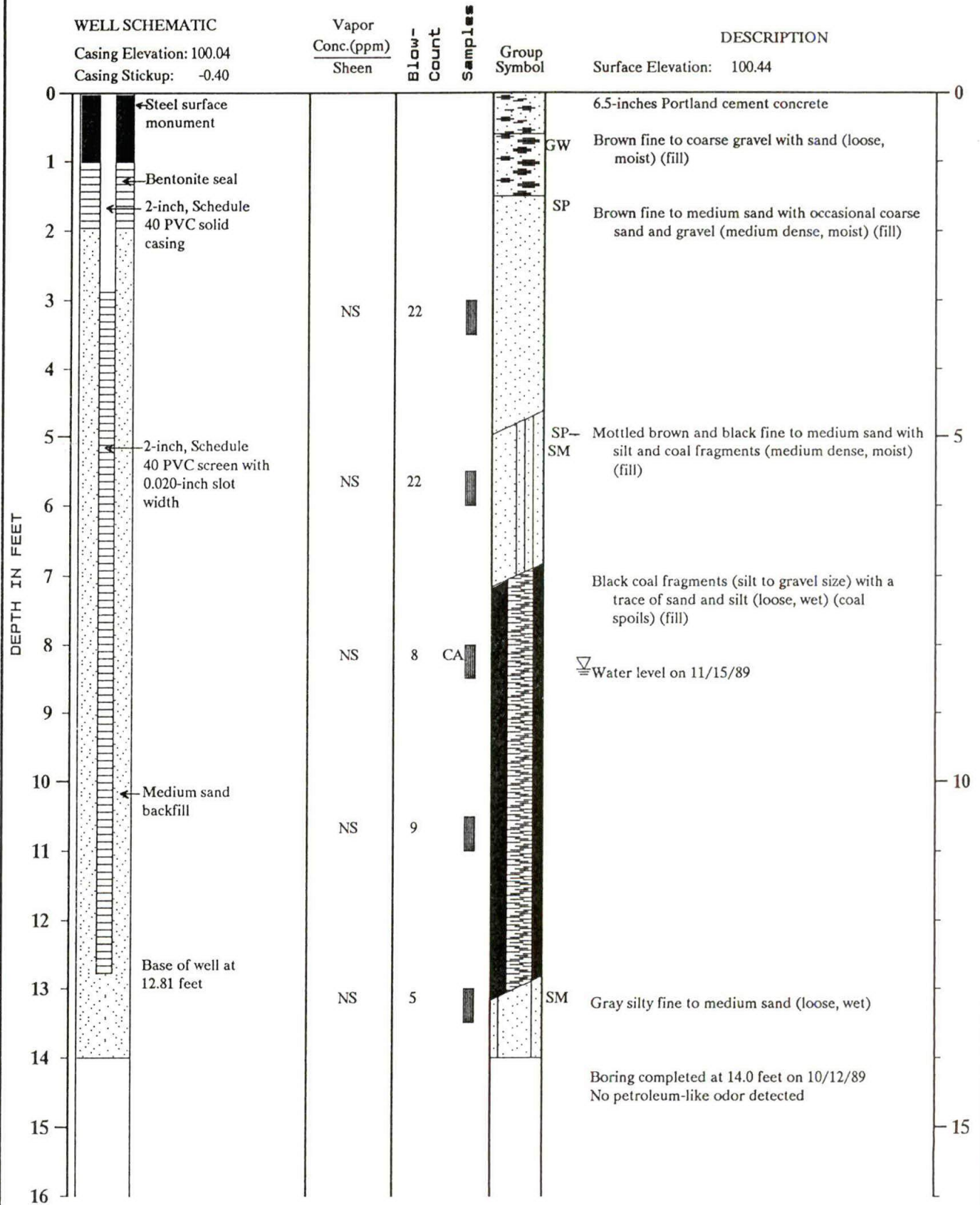
Note: See Figure A-2 for explanation of symbols

MONITOR WELL NO. MW-20



Note: See Figure A-2 for explanation of symbols

MONITOR WELL NO. MW-21



Note: See Figure A-2 for explanation of symbols



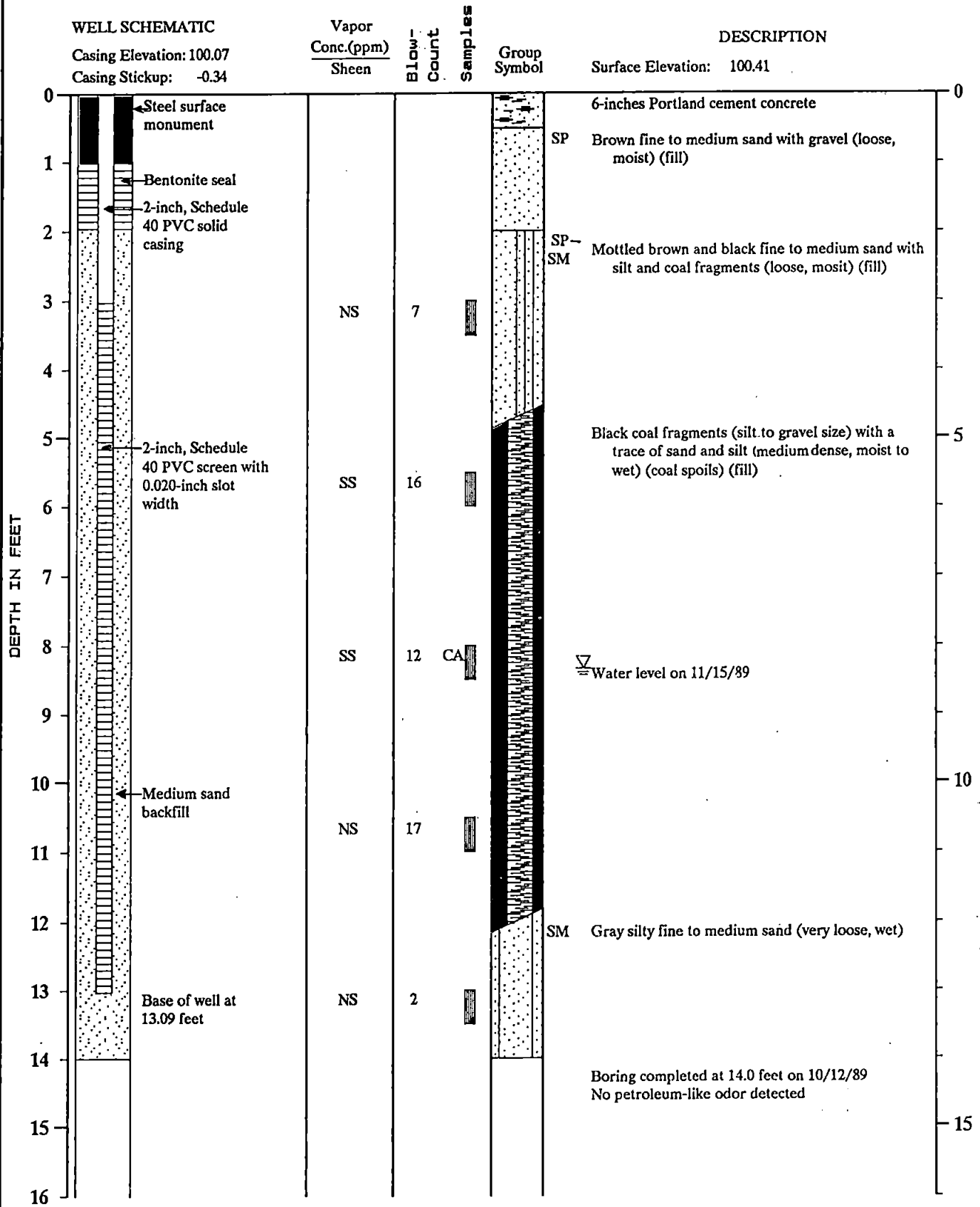
Log of Monitor Well

Figure A-19

KSK:CDO 12/7/89

0186-101-B04

MONITOR WELL NO. MW-22



Note: See Figure A-2 for explanation of symbols

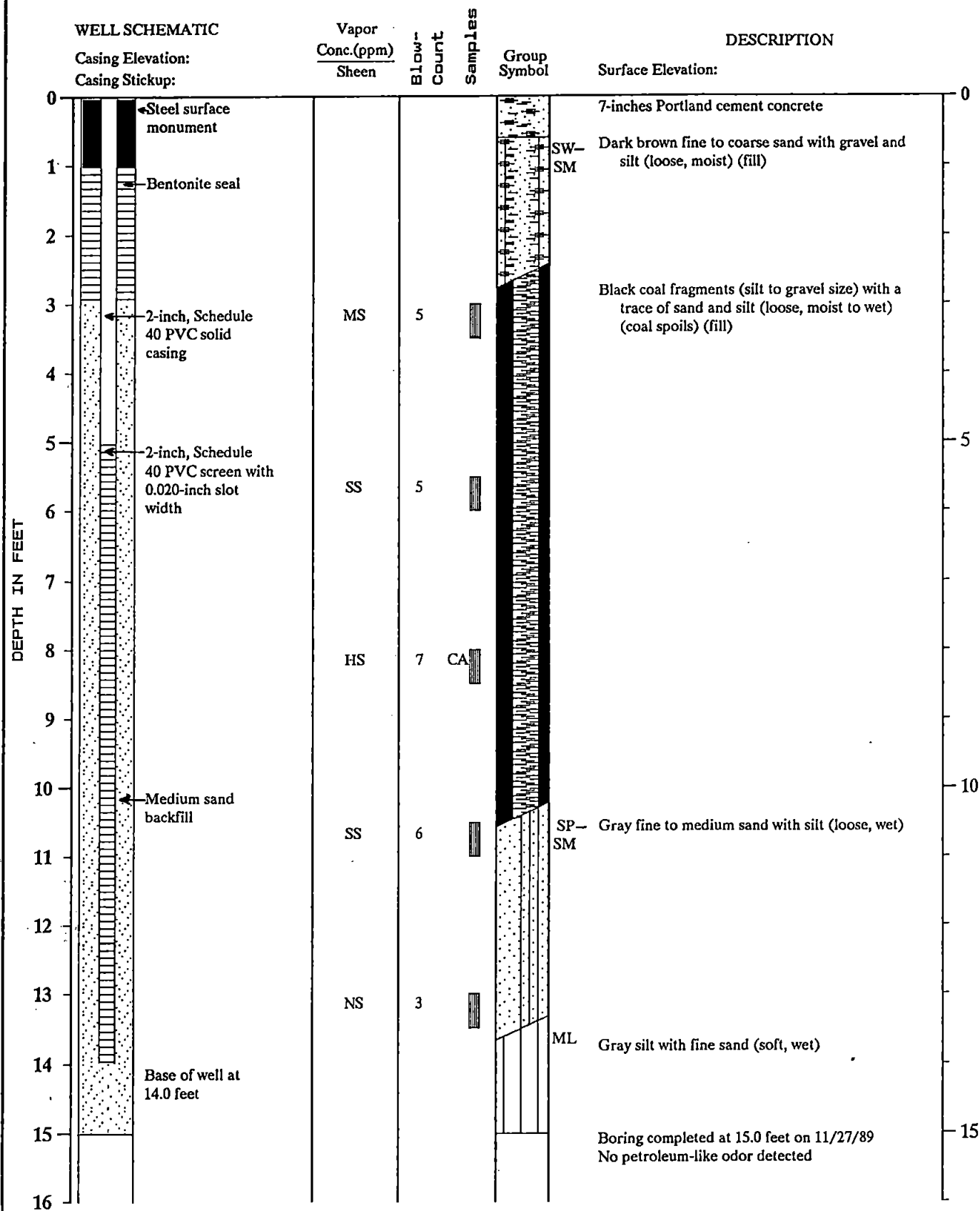


Log of Monitor Well

Figure A-20

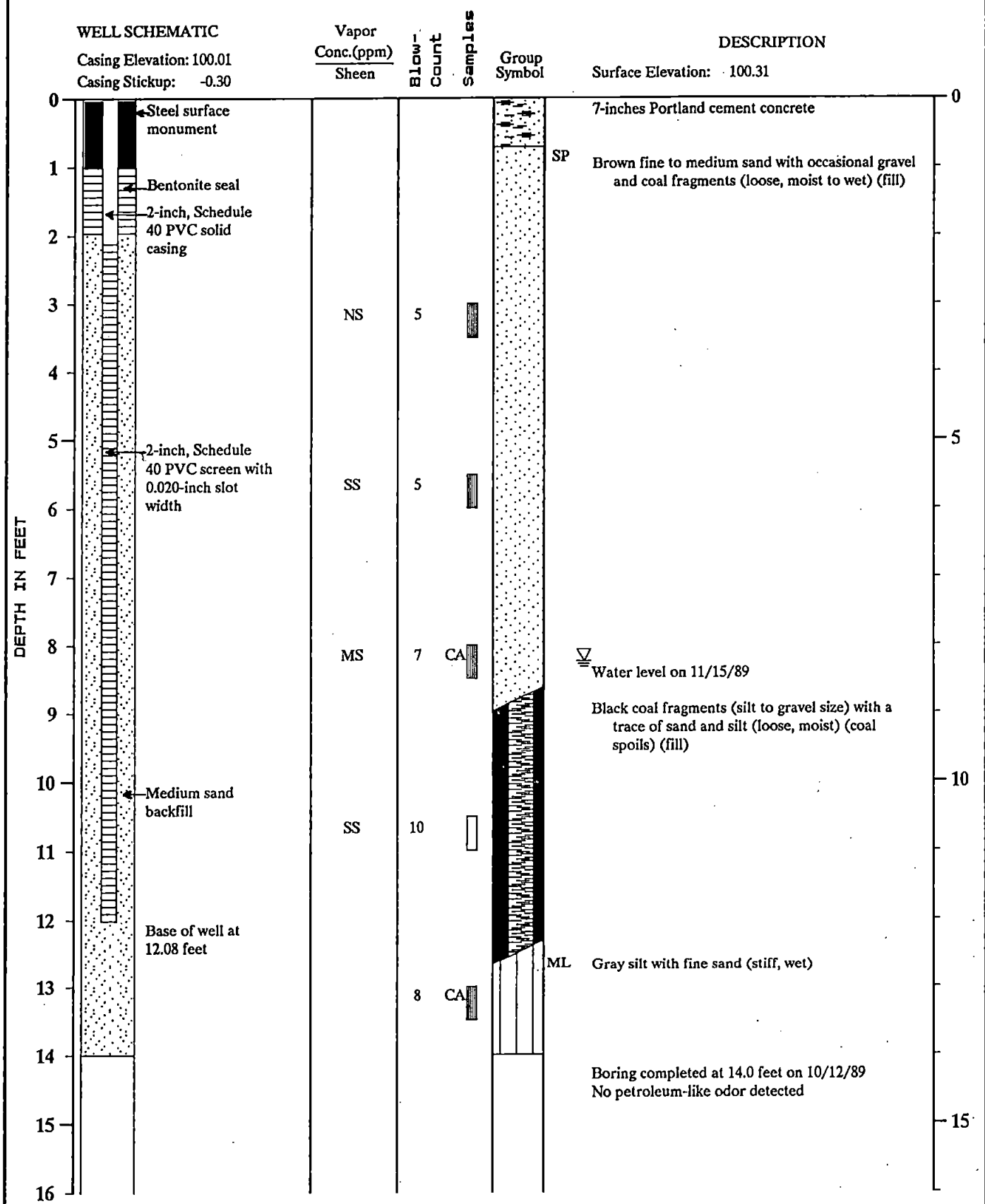
0186-101-B04 KSK: CDO 12/7/89

MONITOR WELL NO. MW-23



Note: See Figure A-2 for explanation of symbols

MONITOR WELL NO. MW-24



Note: See Figure A-2 for explanation of symbols

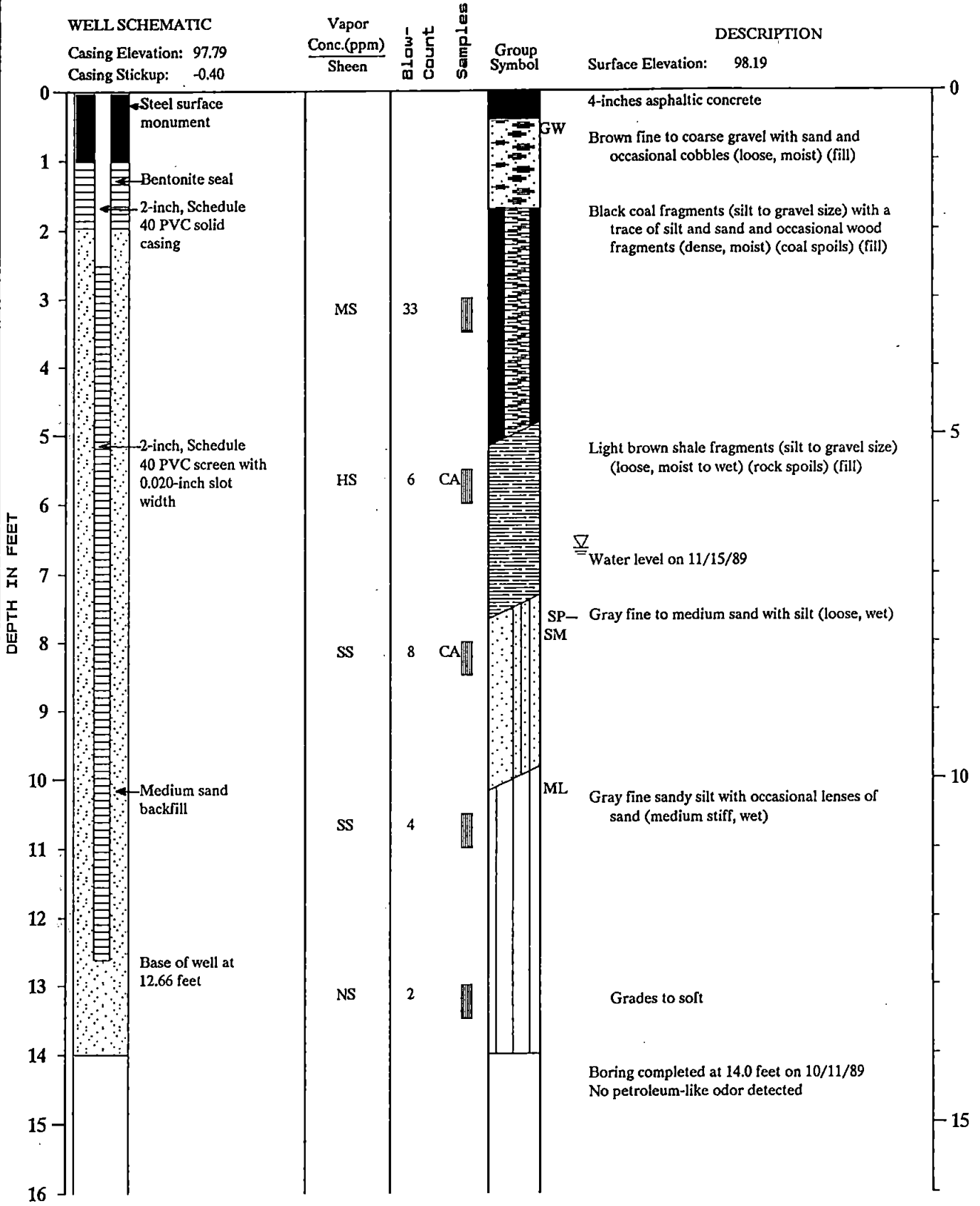


Log of Monitor Well

Figure A-22

0196-101-B04
 KSK: CDO 12/7/89

MONITOR WELL NO. MW-25



Note: See Figure A-2 for explanation of symbols

KSK: CDO 12/20/89

0186-101-B04

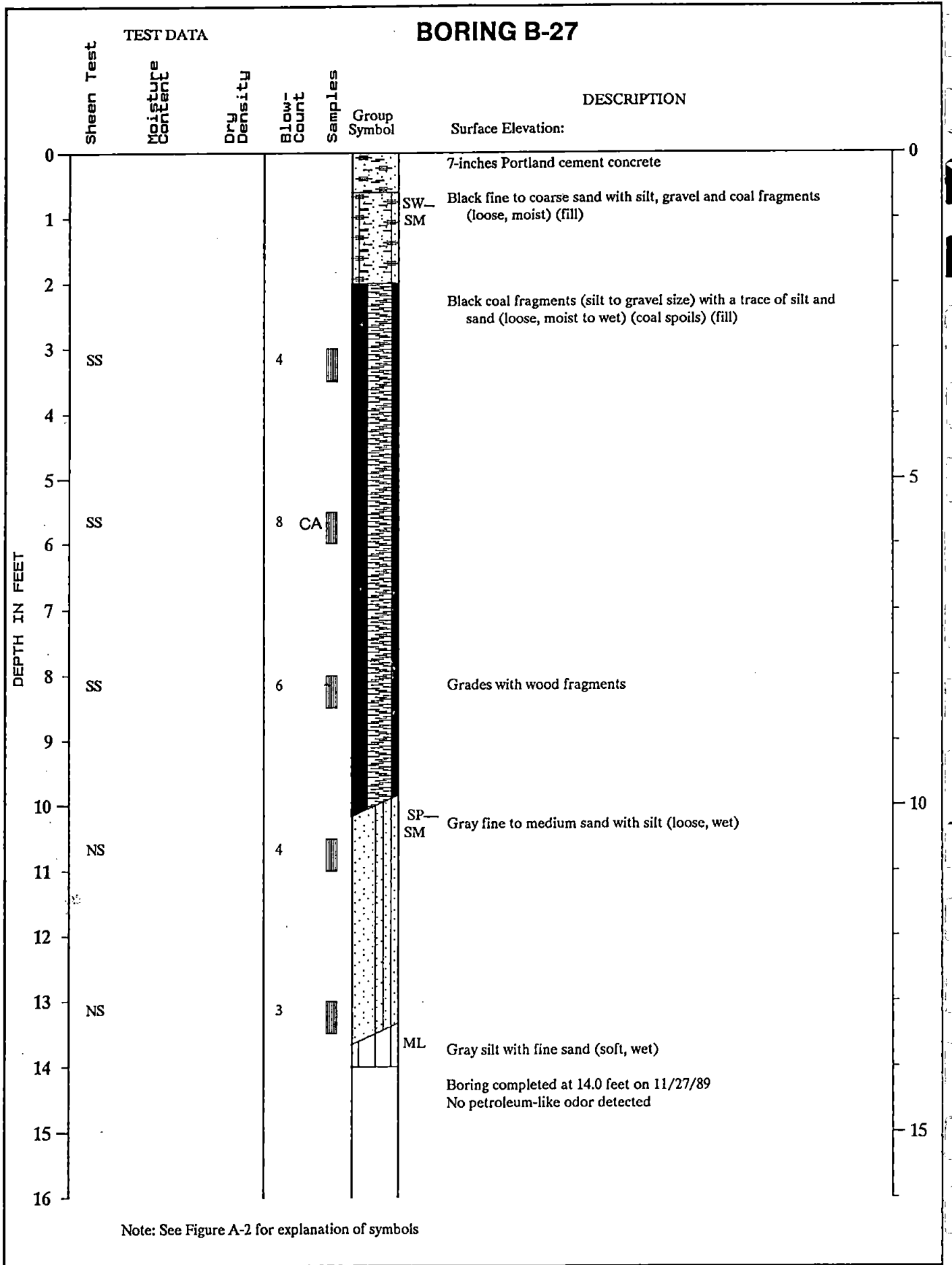


Log of Monitor Well

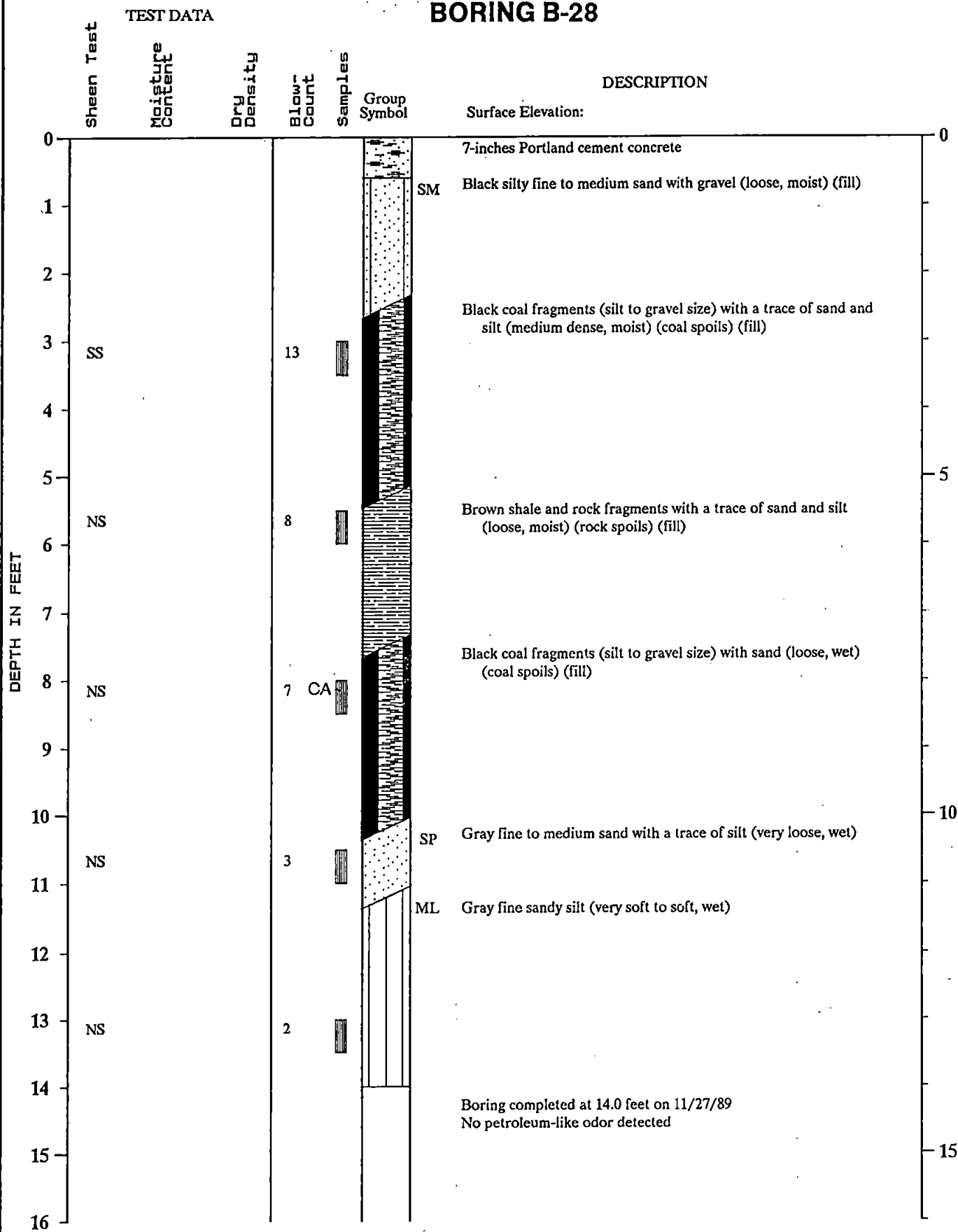
Figure A-23

KSK: CDO 12/20/89

0186-101-B04



BORING B-28



Note: See Figure A-2 for explanation of symbols



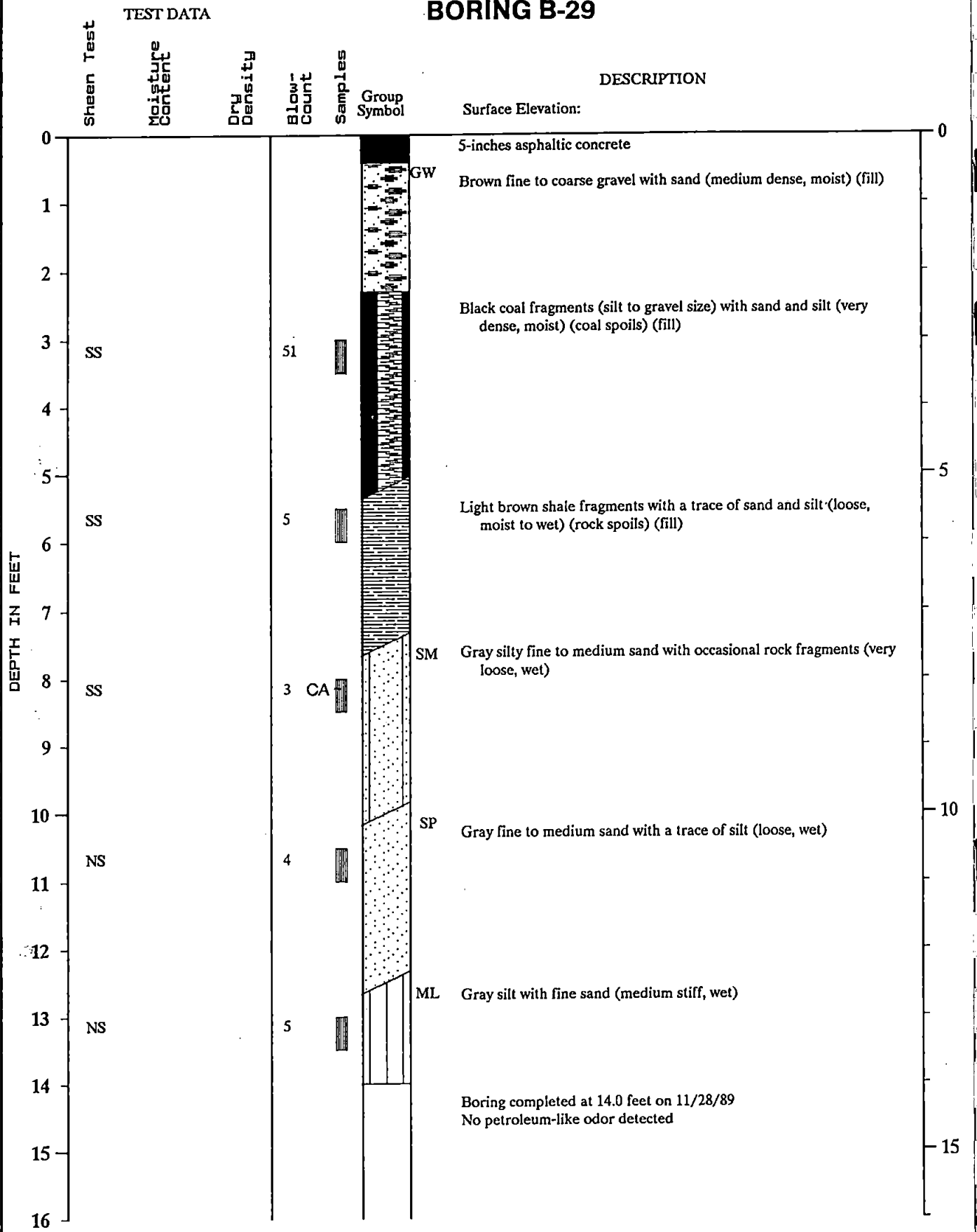
Log of Boring

Figure A-26

KSK: CDO 12/20/89

0186-101-B04

BORING B-29



Note: See Figure A-2 for explanation of symbols



Log of Boring

Figure A-27

KSK:CDO 12/20/89

0186-101-B04