BHP

BHP Hawaii

Certified Mail No. P-101-726-959
Return Receipt Requested

February 27, 1995

Mr. Mitch Kaplan
US EPA Region IX (H-3-1)
75 Hawthorne Street
San Francisco, CA 94105-3901

Subject: **Revised Groundwater Monitoring Plan (HID 056786395)**

Dear Mr. Kaplan:

Enclosed please find the revised Groundwater Monitoring Plan (GMP) which reflects all the EPA approved modifications to the original Groundwater Monitoring Plan submitted to EPA by BHP Hawaii Refinery on October 19, 1993. BHP Hawaii was asked to incorporate those approved modifications into a revised GMP plan and to submit the revised plan to EPA in the EPA letter on January 27, 1995. The major modifications to the original GMP plan are summarized in the **Statement of Revison** in front of this revised workplan.

If you have any questions regarding this revised workplan or any other related issues, please contact our staff hydrogeologist - Tony Shan at 808-547-3804.

Sincerely,

Frank D. Clouse

Frank D. Clouse
BHP Refinery Manager

cc: Ms. Nicole Moutoux, EPA (H-3-2)
Mr. Steve Chang, HDOH

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BHP

BHP Hawaii

REVISED
GROUNDWATER MONITORING PLAN
HID 056 786 395

BHP HAWAII REFINING INC.
91-325 KOMOHANA STREET, KAPOLEI, HAWAII 96707

FEBRUARY 28, 1995

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February 28, 1995

STATEMENT OF REVISION

Several modifications to the original Groundwater Monitoring Plan (GMP) have been requested by BHP Hawaii Refinery and approved by U.S. EPA. BHP Hawaii was asked to incorporate these approved modifications into a revised GMP plan and to submit the revised plan to EPA in the EPA letter dated January 27, 1995. The major modifications to the original GMP are summarized below.

1. Page 9 (2nd paragraph): A change of drilling technique from 12-inch diameter core barrels to 4-inch diameter core barrels with 12-inch diameter hollow stem augers.

2. Page 15 (1st and 2nd paragraph): Move groundwater sampling at high and low tidal levels from the first GMP sampling to the regular BHP groundwater quarterly sampling in August 1994.

3. Page 16 (3rd paragraph): Modification to the statement regarding dissolved metals sampling and analyses.

4. Page 25 (3rd paragraph): Modification of general chemistry analyses based on EPA 40CFR part 265.92 b(2) and b(3).

5. Page 28 (3rd paragraph): Change of field sample filtration for dissolved iron and manganese to being filtered by the analytical laboratory.

6. Page 29 (1st paragraph): Change of hourly water level measurement from 1-month period to 48-hour period; and (3rd paragraph): atmospheric data will be collected from weather service stations rather than to set up a weather station in the Refinery.

7. Table 1: Updated GMP schedule reflecting actual EPA approval of GMP and the above EPA approved modifications.

8. Table 5: EPA approved new general chemistry analysis list.

9. Table 6: Change of analytical method from ASTM D2887 to EPA 8015B for free-product analysis as requested by EPA.

10. Appendix A: Replaced the special drilling technique (no longer needed) description with the chemical descriptions for major chemical compounds analyzed in this workplan.

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1.0 INTRODUCTION

This Groundwater Monitoring Plan (GMP) describes the scope of work and methods of implementation for groundwater monitoring at BHP Petroleum Americas Refining Inc. (BHPPAR, the "Refinery"), formerly Hawaiian Independent Refinery, Inc. or HIRI. The Refinery is located at 91-325 Komohana Street, Kapolei, Hawaii, in the Campbell Industrial Park (Figure 1).

The GMP is submitted by BHPPAR to the U.S. Environmental Protection Agency (EPA) as required by Paragraph 17(b)(i) of the Consent Agreement and Final Order (CA/FO), EPA Docket No. RCRA 09-91-0007. As required by the CA/FO, field activities and analytical results will be summarized in a final report which will be submitted to the EPA in accordance with the schedule of implementation included herein as Table 1.

1.1 Objective

The objective of this GMP is to provide the EPA and personnel conducting the GMP with a written document that describes the scope of work, procedures and techniques that will provide data necessary to meet the requirements specified in the CA/FO, 40 CFR 265.93(d) (3-4) and to conduct groundwater monitoring for groundwater monitoring wells MW-3, MW-4, MW-5 and MW-6 and cluster wells CW-1, CW-2, CW-3 and CW-4. According to 40 CFR 265.93(d)(3) the GMP for the Refinery must specify:

- The number, location, and depth of groundwater monitoring wells installed under the GMP to further characterize the groundwater flow system in the vicinity of Pond Nos. 1, 2A and 2.
- Sampling and analytical methods for Skinner List constituents identified at the Refinery.
- Evaluation procedures, including any use of previously gathered groundwater quality information.
- A schedule of implementation.

Under 40 CFR 265.93(d)(4) and the CA/FO the GMP must, at a minimum, determine:

- The rate and extent of migration of Skinner List constituents that may have been released from Pond Nos. 1, 2A or 2 into the groundwater at the Refinery.
- The concentration of Skinner List constituents in the groundwater at the Refinery.

The data collected will be evaluated and a determination will be made regarding the rate of migration and concentration of Skinner List constituents in the groundwater at the Refinery as soon as technically feasible. This evaluation and determination will be provided to EPA in a report which will be submitted in accordance with the schedule of implementation (Table 1). As stated in 40 CFR 265.93 (d)(6), if the results of the first determination indicate no significant concentrations of Skinner List constituents in the groundwater resulting from releases from Pond Nos. 1, 2A or 2, then BHPPAR will reinstate the quarterly indicator evaluation program for Pond Nos. 1, 2A and 2. The EPA will be notified as required in 40 CFR 265.93 (d)(5) prior to the reinstatement of an indicator evaluation program. Based on an evaluation of GMP data, if the GMP does not provide the information necessary to determine: 1) the rate and extent of migration of Skinner List constituents, which may have been released from Pond Nos. 1, 2A or 2; and 2) whether a release had occurred from Pond Nos. 1, 2A or 2, then additional work will be conducted conducted to provide this information.

This GMP supersedes the "Revised Sampling and Analysis Plan Ground-Water Quality Assessment Monitoring at Pond No. 1", dated August 28, 1991. The previous plan describes the procedures for conducting groundwater monitoring for groundwater monitoring wells MW-3, MW-4, MW-5 and MW-6. This GMP will be the reference document for collecting groundwater samples from groundwater monitoring wells MW-3 through MW-6, cluster wells CW-1 through CW-4 and proposed cluster wells CW-5 through CW-9 (Figures 2 and 3). Cluster wells CW-1 through CW-4 are each comprised of three (3) groundwater monitoring wells. Each groundwater monitoring well is screened at different zones (A, B and C) within the uppermost aquifer. For the purpose of this GMP, only zones A and B will be sampled during groundwater monitoring.

1.2 Overview of Scope of Work

The scope of work includes: the installation of additional groundwater monitoring wells at the Refinery that will be used to assist in determining the rate of migration and the vertical and horizontal extent of Skinner List constituents, which may be detected in groundwater of the uppermost aquifer, emanating from Pond Nos. 1, 2A or 2; groundwater sample collection and analysis; sample handling and shipment; assessment of certain aquifer characteristics necessary for groundwater modeling; water level measurement; immiscible liquid (free-product) evaluation; computer transport modeling; and data evaluation. In addition, this GMP describes quality control procedures that will be implemented during all phases of the scope of work. The purpose of these quality control procedures is to assess the accuracy and validity of the sample analytical

results and computer modeling results. This plan also includes a Health and Safety Plan (HSP) which addresses potential hazards associated with planned field activities outlined in this GMP. A scope of work task summary is included as Table 2.

2.0 BACKGROUND

This section describes the Refinery's history, processes employed and hydrogeologic setting, and briefly summarizes previous investigations conducted at the Refinery.

2.1 Refinery Description

The Refinery is located approximately 22 miles west of downtown Honolulu and approximately 2,000 feet north of the mean tide level of the Pacific Ocean. The Refinery occupies approximately 150 acres in an area of relatively little topographic relief at an elevation of approximately 11 feet above mean sea level. BHPPAR has operated the petroleum refinery since 1972. A refinery site plan is included as Figure 2.

2.1.1 Processing Units and Refined Products

Crude oil processing facilities at the Refinery consist of a crude oil distillation unit, a vacuum distillation unit, a catalytic reformer unit, a distillate hydrocracker, a hydrogen generation unit, a visbreaker, a cogeneration unit, sulfur recovery units, a light ends recovery unit and an asphalt plant. The Refinery produces a variety of petroleum products, including various grades of gasoline, naphtha-based jet aviation fuel, kerosene-based jet aviation fuel, diesel fuel, a variety of distillate and residual fuel oils, asphalt and a petroleum-based feed stock for use in synthetic natural gas production.

2.1.2 Surface Impoundments

Four (4) surface impoundments (Pond Nos. 1, 2A, 2 and 3) are located near the southwestern corner of the Refinery, as shown on Figure 2. Pond No. 1 was formerly used to manage wastewater and is currently in the closure process. Pond Nos. 2 and 3 are presently used to manage non-hazardous wastewater. Tanks 902 and 902A receive refinery process wastewater which is discharged into Pond No. 2. Pond No. 3 receives only discharge from Pond No. 2. Pond No. 2A formerly received effluent from Tank 902, but this pond is no longer in use.

Wastewater from Pond No. 3 is injected into two (2) underground injection control wells located south of the impoundments as shown in Figure 3. These wells have permits from the State of Hawaii Department of Health (HDOH), Environmental Management Division, Safe Drinking Water Branch.

2.2 Refinery History

The existing groundwater monitoring well network adjacent to the ponds consists of four (4) monitoring wells (MW-3, MW-4, MW-5 and MW-6) installed by Harding Lawson Associates (HLA) in 1987 to monitor groundwater in the vicinity of Pond No. 1, two (2) monitoring wells (MW-7 and MW-8) installed by Levine•Fricke in 1991 to monitor groundwater in the vicinity of Pond Nos. 2A and 2 and four (4) cluster wells (CW-1, CW-2, CW-3 and CW-4) installed by Levine•Fricke to monitor groundwater in the vicinity of Pond Nos. 1, 2A and 2. Locations of the six (6) monitoring wells and the four (4) cluster wells are shown in Figures 2 and 3, respectively. Each of the six (6) groundwater monitoring wells was installed to a depth approximately 20 feet below ground surface (BGS) and screened between 10 and 20 feet BGS. Each of the four (4) cluster wells is comprised of three groundwater monitoring wells. The cluster wells were installed to depths of 25, 43 and 60 feet BGS. The bottom ten (10) feet of each cluster well was screened. Water level measurements collected from these wells have ranged from approximately 11 to 12 feet BGS. Water levels in the wells fluctuate in response to tidal influences.

2.3 Hydrogeologic Setting

Field work and literature research completed by Dames & Moore in 1974 and 1986, and by HLA in 1987, indicate that the Refinery was underlain by a "wedge" (often referred to by the Department of Land and Natural Resources [DLNR] and the United States Geological Survey [USGS] as "Caprock") of sedimentary strata composed of reef and lagoonal sediments, including coralline limestone and calcareous mudstone, and terrestrial sediments (Dames & Moore, 1974; Dames & Moore, 1986; Harding Lawson, 1987; State of Hawaii, 1989).

The Caprock overlies a basaltic basement and the upper 300 feet consists of three (3) aquifers separated by at least two (2) terrestrial silt aquitards (Dames & Moore, 1974). The uppermost portion of the Caprock (i.e., limestone strata) is termed Aquifer 1 by the DLNR and is described as a relatively clean fossil reef. Aquifer 1 is underlain by a terrestrial silt unit (often referred to by the DLNR and the USGS as Aquiclude 1) which occurs approximately 110 to 140 feet BGS. The next lower limestone strata is termed Aquifer 2 by the DLNR and the following confining layer is termed Aquiclude 2. Further differentiation of the

remainder of the Caprock between Aquiclude 2 and the volcanic basement is not made (State of Hawaii, 1989). However, the lower aquifers are generally thinner, with silt contents generally increasing inland. The lower aquitards appear to consist of brown terrestrial and alluvial sediments (Dames & Moore, 1986). The lowest strata in the Caprock is composed of muddy sediments directly overlying the basaltic basement. The wedge is called Caprock because the basal formations of the wedge exhibit poor permeability characteristics and inhibit upward seepage from the lower confined volcanic aquifers (State of Hawaii, 1989).

The limestone formation forming the Caprock (Aquifer 1) is argillaceous to some degree (especially toward the inland boundary). This limestone was believed to be moderately permeable, and the silt layer forming the underlying confining layer (i.e., Aquitard 1) below Aquifer 1 is believed to exhibit a lower permeability than the limestone formation immediately above it (Dames & Moore, 1986). Aquifer 1 is predominantly a lagoonal deposit containing evidence of a thin ash strata and thin discontinuous lenses of mud. Neither strata was believed to behave as an aquiclude. The transition from Aquifer 1 to Aquitard 1 is believed to be abrupt (State of Hawaii, 1989).

Based on the Dames & Moore 1974 and 1986 reports, a brown silt layer (an additional aquitard) believed to be of alluvial origin is located approximately 65 feet below the ground surface and is approximately 5 to 10 feet thick. Dames and Moore believed that this silt layer acted as an additional aquitard, was laterally continuous beneath the Refinery and was probably the lower boundary for movement of potential refinery contaminants (Dames & Moore, 1974 and Dames & Moore, 1986). Please see Dames & Moore, 1974, Dames & Moore, 1986 and Harding Lawson, 1987 for additional hydrogeologic information.

2.3.1 Site Hydrogeology

The uppermost aquifer and the uppermost aquitard were defined in Levine•Fricke's *"Hydrogeologic Characterization"*, dated January 7, 1993. The uppermost aquifer was originally identified by Dames & Moore in 1986.

2.3.1.1 Uppermost Aquifer

The uppermost aquifer was defined (pursuant to 40 CFR, Section 146.3) as the fossil reef from a depth of 11 feet BGS to a depth of approximately 60 feet BGS. The water-bearing zone consists of coralline limestone with discontinuous lenses of siltstone, sandy silt and silty sands, as described in Section 4.2. The limestone is stated to be very porous, with voids measuring up to several inches. Based on the drilling

conditions and lithology encountered in the exploratory borings drilled during the Levine•Fricke hydrogeologic characterization, groundwater flow in the uppermost aquifer appears to be representative of porous media flow, as opposed to typical conduit (mature karst-type) flow.

2.3.1.2 Uppermost Aquitard

Less permeable terrestrial sediments (an aquitard) consisting of sandstone and silty sand underlie the uppermost aquifer. This strata was encountered at each cluster well location at depths ranging from 57 to 60 feet BGS and extending to the bottom of the boreholes. Dames & Moore also encountered a relatively low permeability silt layer (an aquitard) near CW-3 at a depth of approximately 65 feet BGS. Dames & Moore concluded that this lower permeability layer was probably the lower boundary for movement of potential refinery contaminants (Dames & Moore, 1986). Exploration by Levine•Fricke did not fully penetrate the sandstone/silty sand formation encountered at a depth of 57 to 60 feet BGS. The Hydrogeologic Characterization indicated that the sandstone/siltstone formation (aquitard) is the lower boundary for downward migration of potential Refinery contaminants near the surface impoundments.

2.3.2 Previous Subsurface Investigations

Previous subsurface investigations were performed at the Refinery by Dames & Moore in 1974 and 1986, by HLA in 1987 and by Levine•Fricke in 1991 and 1993. These investigations are summarized below.

2.3.2.1 Dames & Moore Hydrogeologic Characterization

In 1974, the Refinery retained Dames & Moore to evaluate alternatives for wastewater disposal. The work included conducting a hydrogeologic investigation to compare groundwater injection and ocean outfall discharge scenarios.

In 1986, the Refinery retained Dames & Moore to perform a more comprehensive hydrogeologic study to provide data useful in designing and implementing a groundwater monitoring well network. The results of this study were presented to the Refinery in Dames & Moore's June 1986 report.

2.3.2.2 Shallow Groundwater Monitoring Well Network

In 1987, HLA installed a network of four (4) monitoring wells (MW-3, MW-4, MW-5 and MW-6) to monitor shallow groundwater conditions adjacent to Pond No. 1. The locations of these four (4) monitoring wells are shown in Figures 2 and 3. The monitoring wells were installed to depths of approximately 20 feet BGS,

and were screened from approximately 10 to 20 feet BGS. Water level measurements indicate groundwater in the wells ranges from approximately 11 to 12 feet BGS.

2.3.2.3 Previous Groundwater Monitoring

Groundwater monitoring was performed by HLA for wells MW-3, MW-4, MW-5 and MW-6 during four (4) different periods prior to November 1987, and at semi-annual intervals from November 1987 through May 1989. Quarterly groundwater monitoring was performed for these wells by HLA between May 1989 and May 1991, and by Levine•Fricke between August 1991 and May 1993. Currently, the Refinery is conducting the quarterly groundwater monitoring. A summary of the 1991 and 1992 quarterly groundwater monitoring data for Pond No. 1 is presented in the Refinery's Annual Groundwater Monitoring Reports (HIRI, 1991 and 1992).

2.3.2.4 Levine•Fricke Hydrogeologic Characterization

In 1992, the Refinery retained Levine•Fricke to conduct a hydrogeologic characterization at the Refinery. The objectives of the hydrogeologic characterization were to assess: 1) the vertical flow direction and gradient; 2) the horizontal flow direction and gradient; 3) the hydraulic conductivity, storativity, and effective porosity of the uppermost aquifer; 4) the hydraulic conductivity and total porosity of the uppermost aquitard; 5) the potential for hydraulic interconnection between saturated zones; 6) the influence of the tides and the injection wells on groundwater flow directions; and 7) the vertical and lateral distribution of Skinner List constituents in groundwater near the surface impoundments.

The hydrogeologic characterization was completed in accordance with applicable EPA guidance documents and approved Work Plans. Results of the study were described in Levine•Fricke's report entitled "*Hydrogeologic Characterization*", dated January 7, 1993 and approved by the EPA in a letter dated August 6, 1993.

3.0 SCOPE OF WORK

This section describes the scope of work and procedures for conducting the GMP. Items described in this section include installation of groundwater monitoring wells, sampling of groundwater, analysis of groundwater samples, preservation and handling of groundwater samples, implementation of a free-product evaluation program, assessment of certain aquifer characteristics necessary for groundwater modeling,

establishment of a water level monitoring program, an equipment Quality Assurance/Quality Control (QA/QC) program, selection and development of a computer database containing all pertinent GMP data, development of a groundwater flow and transport model and the methods used to interpret groundwater data.

3.1 Limited Geophysical Survey

Prior to drilling the borings, the locations of underground utilities will be assessed through the use of electrical line locator and pipe locator instruments. Underground utilities that are identified will be marked with survey paint and/or flagging. Final boring placement will be dependent on the locations of underground utilities.

3.2 Groundwater Monitoring Well Installation

BHPPAR will install five (5) on site groundwater monitoring well clusters (CW-5 through CW-9) in the uppermost aquifer underlying the Refinery. The well clusters will be located as shown in Figure 3. The locations of the well clusters was determined by the five following objectives: 1) to provide data points to develop potentiometric surfaces for each of the two (2) arbitrary vertical zones (zones A and B) of the uppermost aquifer; 2) to allow adequate spatial distribution between the clusters to be representative of the area of interest (i.e., Pond Nos. 1, 2A and 2); 3) to provide water quality data for groundwater upgradient and downgradient of Pond Nos. 1, 2A and 2; 4) to divide the uppermost aquifer into arbitrary vertical intervals, with a separate monitoring well in each interval, that will allow the evaluation of vertical gradients; and 5) to aid in the estimation of the rate and extent of migration of possible Skinner List constituents in the groundwater which may have been released from Pond Nos. 1, 2A or 2.

Based on the analytical data reported in the "*Hydrogeologic Characterization*", the investigation of the uppermost aquifer will be confined to two (2) vertical groundwater zones, A and B. The third zone (zone C) assessed in the "*Hydrogeologic Characterization*" did not indicate the presence of Skinner List constituents and therefore is not considered in this GMP. Each well cluster will consist of two (2) groundwater monitoring wells as shown in Figure 4. The wells within each cluster will be screened at depths selected to assess the vertical gradient. Each cluster will have an alphanumeric identification (e.g., CW-5A and CW-5B) which describes the depth of the well in that particular cluster. For example, cluster well CW-5A will be installed to approximately 25 feet BGS and screened within interval A at a depth of approximately 15 to 25 feet BGS (Figure 5). The second well in each cluster (CW-5B) will be installed to approximately 43 feet

BGS and will be screened within interval B at a depth of approximately 33 to 43 feet BGS. Necessary monitoring well permits and utility clearances will be obtained by BHPPAR prior to drilling and installing each of the wells. All applicable health and safety standards as described in Appendix H will be implemented during the groundwater monitoring well installation.

Groundwater monitoring wells will be installed by drilling the boreholes with a Watson 2000 Bucket Auger drilling rig or an equivalent drilling equipment. The drilling rig will be equipped with 4-inch outer diameter core barrels and 12-inch outer diameter hollow stem augers. Both the core barrels and the augers are 5 feet long. The deeper well borehole will be cored in 5-foot intervals with the core barrels first, and then be reamed to 12-inch in diameter by the hollow stem augers; and the shallow well will be drilled directly with the hollow stem augers.

Drilling equipment will be steam cleaned prior to use at each groundwater monitoring well location. Sampling equipment will be cleaned with a laboratory-grade detergent and double-rinsed with distilled water between sampling events. All down hole drilling equipment and well casings will be steam cleaned prior to initiation of each well installation.

The groundwater monitoring wells will be constructed of 4-inch diameter flush-threaded-joint polyvinyl chloride (PVC) casing with factory-slotted well screen. Based on the consolidated limestone of the formation well casing, slot size will be 0.020-inch factory-slotted screen. The shallow wells will be designed to allow sampling of the upper shallow groundwater zone without allowing direct surface water runoff or vertical migration through the well annulus. An illustration of a typical monitoring well is presented as Figure 6. Additionally, monitoring well construction information will be included on well construction logs. A sample well construction log is included in Appendix B.

After the well has been installed in the boring, the well annulus opposite the slotted casing will be backfilled with No. 8-12 sized sand pack. The sand will extend to a height of approximately two (2) feet above the screened interval. A sodium bentonite seal approximately three (3) feet thick will then be placed above the sand pack. Well development (Section 3.2.3) will occur during and after the installation of the sand pack. The remaining borehole annulus will be filled with cement/bentonite grout, and the top of the well will be completed with a locking cap and monument well box to protect the integrity of the well. When dedicated pumps are added to the wells, the well head equipment will be secured to the well head and locked.

Waste soils and wastewater produced from drilling, well development and groundwater sampling activities will be placed within storage bins and/or 55-gallon Department of Transportation (DOT)-approved drums and stored at the Refinery pending proper disposal. Waste soil and wastewater management are further discussed in Section 3.10 of this document.

3.2.1 Lithologic Logging

The field geologist will describe the recovered coral cores visually in the field and these descriptions will be recorded on a well construction log. The description will be based on coral cores and drill cuttings circulated to the surface. All well construction log, sample intervals (depth intervals) and percent sample recovery will be recorded on the boring log. All rock designations, descriptions and strata changes will also be recorded.

Once the core barrel has collected its sample, the core barrel will be removed from the borehole and disassembled on the ground surface by the field geologist. The recovered core will be placed in the core box with the upper (surface) end of the core at the upper-left corner of the core box. The core will continue to be boxed with appropriate markings and spacer blocks. Spacer blocks will be used to properly mark noticeable gaps in the recovered core which may indicate voids in the coral formation. The field geologist will photograph each core with a scale and describe the recovered core in accordance with the procedure described below.

Coral cores generated during the installation of groundwater monitoring wells will be classified by geologic classification, weathering characteristics, discontinuity classification, color, grain size and hardness. Geologic classification identifies the sample by the geologic name and local name (if any). Geologic classification for sedimentary rocks (coral) would include: group, grain size, composition and name (e.g., fossiliferous limestone). Subordinate constituents in the sample such as seams or bands of a different type of material (e.g., calcareous sandstone, clay, sandy limestone and dolomitic limestone) will also be recorded on the well construction log. Weathering classification is described as fresh, slightly weathered, moderately weathered, highly weathered, completely weathered and residual coral. Discontinuity classification describes spacing of fractures, joints and voids as wide, medium, close and very close. The width of the fracture opening or the cavity and its filling (sand, clay, breccia, etc.) will be recorded. The Rock Color Chart by the Geological Society of America will be used to describe the sample's basic colors. Grain size for sedimentary rocks will include the following descriptions: coarse-grained, medium-grained, fine-grained, and very fine-grained.

Hardness will include the following descriptions: extremely hard, very hard, hard, soft and very soft. Subsurface structures, including fractures, cavities and visual observations of staining, will also be described on the boring log. This lithologic logging will assist in further characterizing the uppermost aquifer.

3.2.2 Coral Sample Collection

Coral samples will be collected for the assessment of aquifer characteristics as described in Section 3.8 and Table 9 of this document. Samples will be collected from the borings following ASTM designation: D 2113-83; Standard Practice for Diamond Core Drilling For Site Investigation. The samples will be placed in wide mouth plastic or glass containers, labeled and immediately placed in a chilled cooler for delivery to the analytical laboratory. Each sample container submitted to the laboratory for analysis will have a label affixed to identify the Refinery's project number, sample date, analyses requested, time of sample collection and sampler's initials. Strict chain-of-custody protocol will be followed throughout the sample handling process.

3.2.3 Well Development

Prior to well development, static water level measurements will be collected from each well. The groundwater monitoring wells will be developed by surging, swabbing, and pumping to remove fine sediment from the formation around the wells to enhance hydraulic communication of the well with the surrounding formation. Visual observations concerning the quantity and clarity of the groundwater drawn from the well will be recorded during this process. Turbidity measurements will be collected using a turbidity meter calibrated to the nephelometric turbidity unit (NTU) system, or equivalent turbidity unit system, and recorded on the appropriate groundwater sampling data sheets and in the field log book. The final turbidity measurement will be recorded in the field log book and on the well construction log. The rate at which groundwater is removed from the well during development will be recorded in the field log book and well development sheets.

3.2.4 Monitoring Well Security, Inspection and Maintenance

The monument well box for each groundwater monitoring well included in this GMP will be secured with a lock to prevent tampering. The groundwater monitoring wells (including well box, casing and dedicated pump) will be inspected on a monthly basis by field personnel for signs of tampering or damage. All well security, inspection and maintenance information will be recorded in a field log book on a monthly basis. If field personnel notice signs of tampering or damage, then descriptions of the tampering or damage will be made in the field log book and the damage will be repaired.

- **Natural Biodegradation**

  The basic concept behind natural biodegradation or passive bioremediation is to allow naturally occurring microbes to degrade organic contaminants that have been released into the subsurface and at the same time minimize risks to public health and the environment. To assess natural biodegradation in the groundwater at the Refinery, a site-specific assessment of the factors that influence the biodegradation capacity of the aquifer or soil and the potential human and environmental risks will be required. Ongoing research has shown that an aquifer's assimilative capacity depends on the metabolic capabilities of the native microbes, the aquifer hydrogeology and geochemistry, and the contaminants involved. The GMP will collect this type of data for the Refinery.

3.8.3.1 Proposed Biodegradation Sampling and Analysis

The data used to assess environmental conditions related to natural biodegradation is proposed to be collected by two (2) different methods, as follows:

- Initial site screening and database development will be accomplished by field data collection using portable field test kits and meters. Parameters collected by these means will include dissolved oxygen (DO), soluble (Fe^{2+}) and total (Fe^{3+}) iron, pH, conductivity, and temperature.

- A second phase of data collection will require well sampling techniques similar to organic compound sampling for analytical chemistry characterization. The second phase of biodegradation data collection will analyze for water quality parameters such as nitrogen species (ammonia (NH_3), nitrite (NO_2), nitrate (NO_3), sulfate (SO_4), phosphorus (o-PO_4) and various other indicators of geochemistry.

3.8.3.2 Phase I Site Screening

During the GMP, several rounds of groundwater samples will be collected from monitoring wells for analysis of organic chemical compounds to assist in mapping the extent of Skinner List constituents in the subsurface. During this task, supplemental data will be collected by using portable test kits and meters for certain groundwater parameters that have importance in assessing biodegradation related to the chemical compounds

of interest. Specifically, the additional data collection is for DO, (Fe^{2+}), (Fe^{3+}), temperature, conductivity, and pH. The importance of each parameter specific to biodegradation is listed in Table 7.

The data from the biological environment characterization will allow interpretation of factors that control the rate and extent of in-situ organic chemical biodegradation. Observations and notes for each specific well will accompany the data produced by the test kits measurements to ensure accurate data interpretation.

3.8.3.3 Phase II Groundwater Sampling

The second phase of groundwater sampling and analysis will attempt to characterize the in-situ groundwater environment as it relates to organic chemical biodegradation. Standard testing parameters analyzed in this phase are listed on Table 8. Samples for dissolved iron and manganese metals will be filtered by the analytical laboratory.

Data analysis and interpretation of the Phase II groundwater sampling results will be completed to assess the biodegradation capacity of natural biodegradation for site-specific contaminants. Data evaluation of these test results will lead to an understanding of the natural biodegradation processes at the Refinery, as well as the limiting factors for biodegradation in the subsurface environment.

3.8.4 Dispersion Characteristics

Aquifer dispersivities will be estimated based on published dispersivities determined in hydrogeologic systems that are similar to those found at the Refinery. The aquifer soil/water distribution or partitioning coefficient (K_d) will be estimated based on the product of the fraction of organic carbon (F_{oc}) and the organic carbon partitioning coefficient (K_{oc}). As in the vadose-zone, the product of K_{oc} and F_{oc} will be used to estimate K_d for the groundwater zone. Laboratory measurements of soil partitioning coefficients may also be used. Laboratory techniques to aid in determining the above characteristics are summarized in Table 9.

3.9 Water Level Measurements

This section describes the procedures, measuring equipment, data collection, calibration procedures and data evaluation procedures that will be used in the water level measurement program.

3.9.1 Water Level Measurement Program

Groundwater level measurements in the cluster wells installed during this GMP will be performed on a seasonal basis. A time series analysis of the groundwater flow system will be conducted by installing pressure transducers in the newly installed cluster wells and selected existing monitoring wells and measuring water level fluctuations, tidal conditions and atmospheric conditions for periods lasting approximately 48 hours in each of the summer and winter seasons (during two (2) months). One (1) pressure transducer, rated at five (5) pounds per square inch (psi), will be installed in each of the newly installed cluster wells and selected existing groundwater monitoring wells. A five (5) psi transducer will provide water level measurements accurate to the nearest one-hundredth (0.01) foot. A data logger will be housed in the center of each well cluster. In locations where it is feasible, the transducers from two (2) well clusters will be connected to one (1) data logger. Simultaneous groundwater level measurements will be collected from each well on an hourly basis for two (2) separate 48-hour periods.

The purpose of collecting continuous water level measurements is to further assess the influence of the tides on groundwater flow and gradients, to monitor changes in regional and localized groundwater flow during times of the year with different amounts of rainfall, and to collect information to accurately determine the mean groundwater levels. The uppermost aquifer has been divided into two (2) arbitrary layers in order to deduce this information. Based on groundwater surface elevation measurements at the different locations within each layer, an equipotentiometric surface map will be made at different times within seasonal and tidal cycles. Interpretations of these maps in each of the two (2) layers will provide a three-dimensional understanding of groundwater flow changes with time.

Data for the atmospheric conditions such as the amount of rainfall and the rate of evaporation during the period of water level measurement at Kapolei area will be collected from National Weather Services or nearby weather observation stations.

Hourly ocean. stage data collected from nearby tide measuring stations will be used to compare the results obtained from the water level measurement activities. Data obtained from the pressure transducer system will provide a base-line gradient against which groundwater flow and gradient variations can be compared.

3.9.2 Transducer Correction Procedure

During the seasonal time series analysis, the transducers will need to be adjusted for drift, which is typically encountered during extended periods of use. Drift that occurs in the field will be quantified by comparing the water level measurement obtained by the transducer with a simultaneous water level measurement obtained with a hand-held water level indicator. The manufacturer's instructions will be followed when correcting the transducer drift. This manual drift correction procedure will be conducted on a weekly basis. BHPPAR will consult with the manufacturer of the transducers on these drift correction procedures.

3.9.3 Data Evaluation

Data recorded by the data loggers will be downloaded into the EPA-approved database developed for this GMP. The water level data, along with each monitoring well's survey data, will be used to calculate groundwater elevations in each well. Groundwater elevation data will be used to evaluate the rate and direction of regional groundwater flow through the use of groundwater contour maps and rose diagrams.

3.10 Waste Management

Waste soils, formation materials and wastewater produced from drilling, well development and sampling activities will be placed in storage bins, tanks, drum or other suitable containers and stored on site pending proper disposal.

Based on information currently available to BHPPAR regarding the composition of generated wastewater, BHPPAR anticipates disposal of the wastewater through its existing and new wastewater treatment system. Additional soil/formation material sampling and chemical analysis may be required to characterize (profile) the waste soils prior to disposal.

3.11 Computer Database

A computer database will be developed, as part of these GMP activities, that will be able to archive, manage and manipulate information developed during execution of the GMP. Such information includes, but is not limited to the following: groundwater level observations; groundwater quality information; free-product data; waste management information; and hydrologic/hydrogeologic information. Once information has been assembled in the database, the data can be subjected to mathematical and statistical operations which can further enhance understanding of the groundwater flow system.

BHPPAR will select a database based on the abilities and features described below. Once BHPPAR has selected a database, the selection of database and the final data format will be submitted to the EPA for approval. After receiving approval from the EPA, BHPPAR will integrate the database into the Refinery's data management system.

3.11.1 Database Structure

A data management system will be developed to provide storage, analysis, reporting and display of data collected during the GMP. A data management plan will be developed and submitted to the EPA for review and approval. The data management plan will include the following:

- Guidelines for data acquisition
- Data security
- Data reporting and display
- Data transfer
- Recommended software

After review and approval of the data management plan, data collected during the GMP will be entered into the database.

3.11.1.1 Data Types

Data which will be collected during execution of the GMP will include, but not be limited to the following:

- Monitoring well construction details
- Water quality data
- Free product data
- Water level data
- Contaminant concentrations

3.11.1.2 Digital Data Entry

The results and observations obtained during execution of project tasks will be entered into the database management system. Data entry will be verified by utilizing double entry techniques, comparison with data

entry forms, posting of appropriate data on base maps and statistical evaluation of data for determination of "outlying" values.

3.11.1.3 Database Design

A relational database management system and associated technical application package will be used to store and manipulate data collected during the project. Information collected will be identified with a unique combination of site or sample designation and the date and time the information was obtained. Sequential sample numbers will be assigned to each sample. That sample number will be cross-referenced with the laboratory sample information that is carried in the database. Site designations will be tied to the Hawaii Zone 3 State Plane Coordinate System and local "Refinery" coordinates using a global positioning system (GPS), or other approved surveying techniques.

3.11.1.4 Digital Data

A primary or dedicated hardware platform will be maintained with the project database residing on it. The machine will be locked using the manufacturer's hard drive lock provided with the machine. Any data input, release or transfer will be made by request in writing to the database manager. Such requests will be filed appropriately. The data manager will perform incremental backups of project files. The data manager will also keep a log of all personnel having access to the database system.

3.11.2 Data Analysis and Display

Data reports and information generated during the project will include the project name, date, originator and number of total pages. Generated documents will bear a draft notation until final review indicates that the documents are approved as final. A standard sign-off will be included at the bottom corner of the document which will indicate the individuals who have reviewed and approved the documents.

3.11.2.1 Graphic Formats

The final graphic formats will be approved by BHPPAR. Each graphic will contain the following minimum information.

- Date
- Prepared by
- Revision No.

- Revision Date
- Project No.
- Title

Maps will contain a bar scale, north arrow and legend. Graphics will be labeled as draft until approved as final.

3.11.2.2 Digital Data Exchange Format

Transfer of groundwater quality data to the EPA will be accomplished using 3.5" - 1.4 Mb magnetic diskettes formatted using MS-DOS Version 4.0 or higher.

3.12 Groundwater Flow and Transport Modeling

To facilitate evaluation of the rate and extent of dissolved phase "Skinner List" constituents that may be migrating within the groundwater flow system beneath the Refinery, a groundwater transport model will be constructed as part of this GMP. Prior to actually building the computer model, a conceptual model will be developed and submitted for the EPA's review and approval. Such conceptual modeling will be accomplished by utilizing a standard modeling process and will be summarized in a brief letter submitted to the EPA prior to commencement of the groundwater flow and transport modeling. Once the EPA approves the conceptual model and recommended modeling software, BHPPAR will begin integrating the model into the GMP activities. Such a model will be calibrated until simulated conditions correlate favorably with select observed field conditions. At such time, the model will be considered calibrated. A detailed description of the modeling process is included in Appendix G.

3.13 Data Validation

In order to ensure that data integrity is maintained throughout the implementation of this GMP, data validation will be an integral part of QA/QC procedures.

3.13.1 Groundwater Analytical Data

Upon receipt of analytical data on standard laboratory report format and computer diskette, pertinent information will be transferred to the database system. Such information will include chemical information, well number, sample collection data, sample analysis data, method detection limits, analytical results and units of measurement. In order to minimize the probability for entering incorrect data into the database

system, a quality assurance program will be implemented, including double entry and statistical checks for outlying values. Data input into the Refinery's database system will be referenced with the laboratories' analytical reports. Final results on the laboratory analytical reports will be assumed correct.

3.13.1.1 Completeness Check

The Refinery will perform a check for data completeness during the review of the analytical data. Completeness of data is a measure of the number of analytical data points which meet all of the acceptance criteria required by the specific methods used relative to the total number of data points generated. Completeness for all organic analyses will be generally 90% or greater and completeness for all inorganic analyses will be 95% or greater. If the completeness of data, in any area, is found to be less than the above set completeness requirements, then the reasons for the incompleteness will be investigated. Based on the results of the investigation, measures will be implemented to avoid continued incomplete data reporting. The laboratory standards for completeness, accuracy and precision are included in the QA/QC manuals included as Appendix F.

3.13.1.2 Reporting of Not Detectable (ND) Values

In the event that the laboratory reports an analytical result for a given parameter as below the limit of detection, the data will be analyzed and a judgement will be made as to the validity of the not detectable (ND) value. Possible reasons for the ND value include the absence of contaminants, the presence of contaminants at concentrations below the limit of detection, or the interference of a chemical matrix of the groundwater with the analytical technique. When data sets consist of a mixture of values that are ND and actual concentration measurements, the ND values may be considered at half of their limit of detection. In other words, if a result is reported ND with a limit of detection of 5.0 μg/l, then the value of 2.5 μg/l will be used for statistical analysis. In this event, the analytical results will be analyzed to check for changes in the reported limits of detection. If inconsistencies are noted in the detection limits, such as increasing detection limits over time and ND results, the Refinery will investigate the reasons for the increasing limit and implement corrective procedures.

3.13.1.3 Outliers

In the event that an analytical result from the laboratory is significantly different from previous and subsequent analytical results, BHPPAR will investigate and document the possible reasons for the discrepancy, such as an unnatural occurrence or an error in transcription of data values or decimal points.

Documentation and validation of the cause of the outliers will accompany any request to the EPA to correct or delete outlier data values.

3.13.2 Groundwater Elevation Data

Periodically, water level measurements collected by pressure transducers will be compared with water level measurements collected using a hand-held water level indicator. If necessary, the pressure transducers will be manually adjusted to match the values measured with the water level indicator. The transducers will be adjusted as described in Section 3.9.2.

3.14 Data Evaluation

Statistical and graphic evaluation methods along with groundwater computer modeling will be employed to determine: 1) the rate and extent of migration of selected Skinner List constituents that may have been released from Pond Nos. 1, 2A or 2 into the groundwater at the Refinery; and 2) whether a release of Skinner List constituents has occurred from Pond Nos. 1, 2A or 2. Such a determination will require the evaluation of hydrogeologic, geochemical and climatic factors along with other environmental parameters. The evaluation of these factors during a statistical analysis and graphic evaluation will also be necessary to determine the boundaries of the Skinner List Constituents' dissolved phase plumes and whether a result is actually indicative of a statistically significant release from Pond Nos. 1, 2A or 2. The statistical and graphic methods are briefly described in this section; however, the groundwater flow and transport computer modeling has been previously described in Section 3.12 of this GMP.

3.14.1 Statistical Methods

Statistical methods, as outlined in Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Final Guidance, will be employed to evaluate the groundwater analytical data collected from the existing groundwater monitoring wells, MW-3, MW-4, MW-5 and MW-6, the existing cluster wells, CW-1 through CW-4 and the proposed cluster wells CW-5 through CW-9. Selection of the appropriate statistical methods will be based on the theoretical properties of the methods, available data, the Refinery's hydrogeology and the fate and transport characteristics of certain Skinner List constituents. However, based on a review of the current groundwater analytical data, the following types of statistical methods will be employed:

1. Confidence Intervals - A fixed standard comparison of well concentration data to an alternate concentration limit (ACL), the HDOH Water Quality Standards for Protection of Marine Life, using confidence intervals.

2. Control Charts - An intra-well comparison that plots each well's concentration data on a time scale. The time scale is evaluated for trends or sudden changes in the concentration levels - a time series analysis.

3.14.2 Graphic Methods

Graphic methods will be employed to evaluate the groundwater analytical data collected from the existing groundwater monitoring wells, MW-3, MW-4, MW-5 and MW-6, the existing cluster wells, CW-1 through CW-4 and the proposed cluster wells CW-5 through CW-9.

1. Spatial Distribution Maps/Histograms - The plotting of select Skinner List constituent concentration values for each well and other groundwater data as a series of comparative "footprint or fingerprint" histograms on a Refinery site plan. These data histograms will be used to evaluate variations in Skinner List constituent concentrations from well to well, to track certain Skinner List constituent's plumes and to compare the relative proportions of these constituents from well to well. The plotted histograms are also evaluated along with groundwater flow data for trends or sudden changes in the spatial distribution of the concentration levels and changes in the relative proportions of the constituents.

2. Isopleth Maps - The technique of mapping Skinner List constituent concentration values by drawing lines of equal concentration. The applicability of this technique is dependent on the following:

   - Homogeneity of groundwater composition with depth.

   - Gradient of the constituent concentration between wells.

3. Groundwater Contour Maps -The technique of mapping groundwater elevations and vertical flow potential by drawing lines of equal hydraulic elevation and vertical flow potential.

4. Trilinear Diagrams - The technique of plotting certain groups of ions or compounds within triangles (usually two triangles bracketing a diamond shaped plotting field) that represent the composition percentages of a particular group of ions or compounds. These trilinear diagrams provide a useful tool in groundwater analysis interpretation by allowing the evaluation of certain relationships which may exist among individual samples.

5. Tabular Summaries - Skinner List constituent concentrations and other groundwater analytical data collected from the groundwater monitoring wells will be tabulated and compared, in tabular form, to actual or predicted leachate data from possible sources of Skinner List constituents such as Pond Nos. 1, 2A and 2.

3.15 Report Preparation

Following receipt of the laboratory analytical results, the activities associated with the GMP will be summarized in a Groundwater Monitoring Report. This report will include detailed descriptions of the methodologies used to collect data, evaluations and interpretations of the data, and the technical rationale for the conclusions reached. A summary of the geologic and hydrogeologic conditions in the general site vicinity will be included in the report. The report will:

- Describe the location and construction of the groundwater monitoring well network installed by this GMP.
- Discuss analytical results of groundwater sampling.
- Present the results of groundwater transport modeling.
- State whether or not Skinner List constituents have been released from Pond Nos. 1, 2 or 2A and have entered the groundwater at the Refinery.

The report will be submitted by BHPPAR to the EPA in accordance with the schedule of implementation included as Table 1.

4.0 HEALTH AND SAFETY

A copy of the HSP, which describes the hazards associated with the field activities to install groundwater monitoring wells and collect groundwater samples at the Refinery is included in Appendix H. The field activities include the drilling of soil borings, the construction of groundwater monitoring wells and the collection of groundwater samples from various locations throughout the Refinery. All procedures to complete the aforementioned tasks are described in this GMP.

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5.0 REFERENCES

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TABLES

GMP_Schedule

Task Name	Start Date	Duration	End Date
EPA approval of GMP	8/23/94	0d	8/23/94
Site geophysical survey	9/19/94	6.00d	9/26/94
Drilling and well installation	9/27/94	32.00d	11/9/94
Installation of dedicated pumps	11/10/94	14.00d	12/1/94
Well elevation survey	12/2/94	5.00d	12/8/94
1st quarterly sampling	12/9/94	10.00d	12/22/94
Laboratory analysis	12/22/94	20.00d	1/20/95
Submit 1st quarter report	2/20/95	0d	2/20/95
2nd quarterly sampling	3/9/95	10.00d	3/22/95
Laboratory analysis	3/22/95	20.00d	4/18/95
Submit 2nd quarter report	5/18/95	0d	5/18/95
3rd quarterly sampling	6/9/95	10.00d	6/22/95
Laboratory analysis	6/22/95	20.00d	7/20/95
Submit 3rd quarter report	8/20/95	0d	8/20/95
4th quarterly sampling	9/9/95	10.00d	9/22/95
Laboratory analysis	9/22/95	20.00d	10/19/95
Submit 4th quarter report	11/19/95	0d	11/19/95
Submit 95 annual report	3/29/96	0d	3/29/96
First water level measurement	3/20/95	10.00d	3/31/95
Second water level measurement	9/18/95	10.00d	9/29/95
Submit database selection to EPA	10/17/94	0d	10/17/94
Setup and manage database	11/18/94	330.00d	3/8/96
Transport model evaluation	12/13/94	25.00d	1/18/95
Submit model selection to EPA	1/20/95	0d	1/20/95
EPA approves model	2/21/95	0d	2/21/95
Conduct groundwater modeling	8/1/95	35.00d	9/19/95
Prepare final report	8/1/95	160.00d	3/18/96
Submit final report to EPA	3/31/96	0d	3/31/96

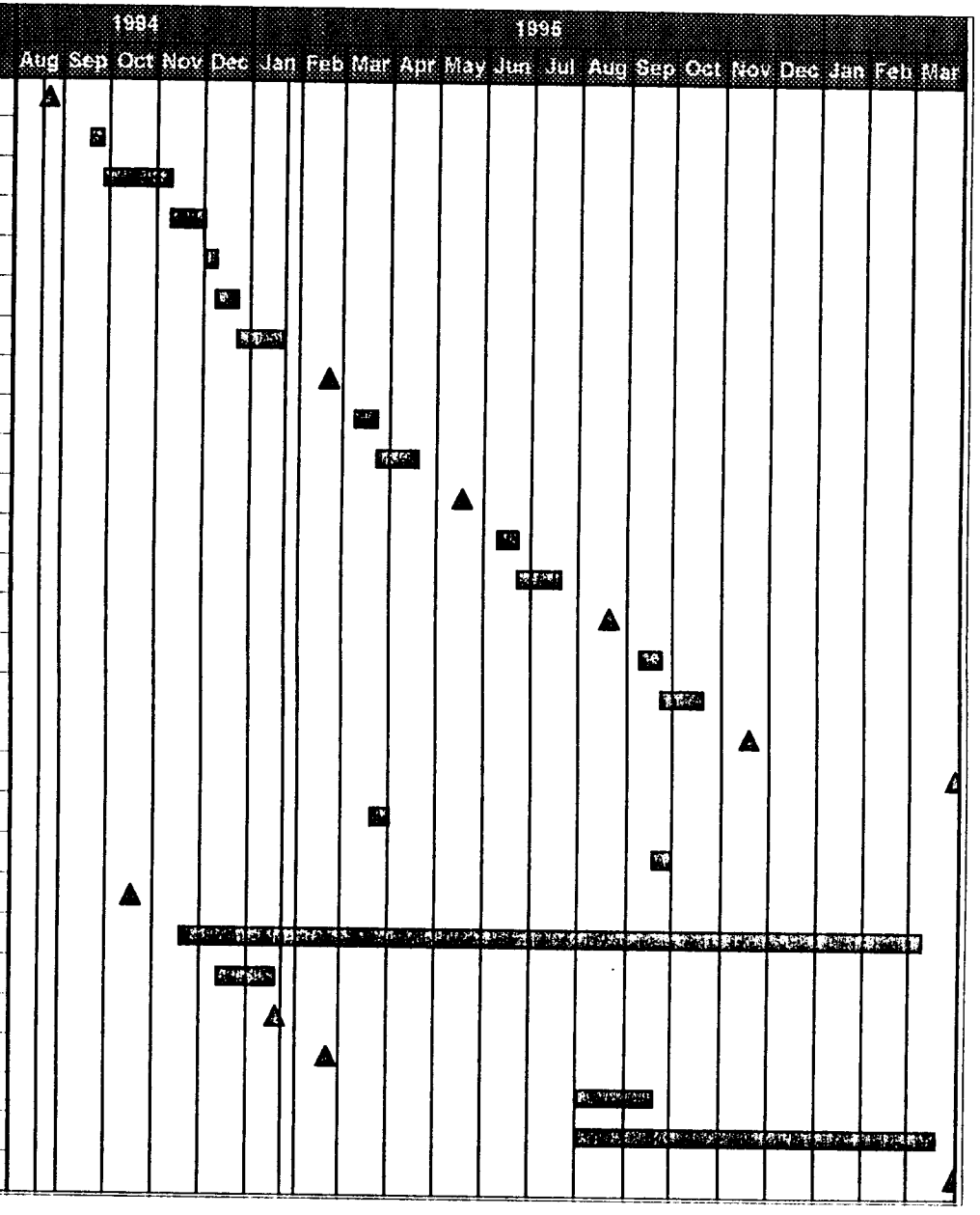

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TABLE 2

TASK SUMMARY
BHP PETROLEUM AMERICAS REFINING INC.
91-325 KOMOHANA STREET
KAPOLEI, HAWAII
DELTA NO. 45-93-033

TASK 1	Submit GMP to EPA
TASK 2	Develop Database for Submittal to the EPA
TASK 3	Setup Database
TASK 4	Conduct Geophysical Survey
TASK 5	Install and Develop Groundwater Monitoring Wells
TASK 6	Conduct Well Location Survey
TASK 7	Conduct Quarterly Groundwater Sampling
TASK 8	Conduct Free-Product Evaluation
TASK 9	Conduct Laboratory Analysis
TASK 10	Conduct Water Level Measurements
TASK 11	Assess Aquifer Characteristics
TASK 12	Initiate Transport Modeling
TASK 13	Conduct Transport Modeling
TASK 14	Prepare Final Report
TASK 15	Submit Final Report to EPA

TABLE 3

SAMPLE COLLECTION TABLE
QUARTERLY GROUNDWATER SAMPLES
BHP PETROLEUM AMERICAS REFINING INC.
91-325 KOMOHANA STREET
KAPOLEI, HAWAII
DELTA NO. 45-93-033

Parameters	Preservative	Maximum Holding Time	Container Type	Container Volume
Skinner Volatile Organic Compounds (VOCs)	4 Drops of conc. HCL Cool to 4°C	14 days	Glass Vial with Teflon Septum	2 X 40 ml
Skinner Semi-Volatile Organic Compounds (SVOCs)	Cool to 4°C	Extracted within 7 days Analyzed within 40 days	Amber Glass with Teflon Liner	1,000 ml
Skinner Metals (Total)	HNO_3 to pH < 2	6 months except for Mercury (28 days)	HDPE	1,000 ml
Skinner Metals (Dissolved)	Filter on Site: HNO_3 to pH < 2	6 months except for Mercury (28 days)	HDPE	1,000 ml
General Chemistry	Cool to 4°C†	14 days except for Surfactant (48 hours)	Plastic	1,000 ml
	H_2SO_4 to pH <2† Cool to 4°C		Plastic	4 ounce
GC Characterization (Free-Product)	Not Required	14 days	Laboratory Provided Glass Capillary Tubes	-
Flashpoint (Free-Product)	Cool to 4°C	14 days	Amber Glass with Septum	8 ounce
Specific Gravity	Cool to 4°C	14 days	Plastic	4 ounce
Total Organic Carbon and Fraction of Organic Carbon	H_2SO_4 to pH < 2 Cool to 4°C	28 days	Amber Glass with Septum	4 ounce

† See Table 5 for preservation techniques for specific analytical parameters

TABLE 4

(Page 1 of 2)
SAMPLE SUMMARY TABLE
QUARTERLY GROUNDWATER SAMPLES
BHP PETROLEUM AMERICAS REFINING INC.
91-325 KOMOHANA STREET
KAPOLEI, HAWAII
DELTA NO. 45-93-033

Analytical Parameters	Analytical Method Number	Preparation or Extraction Method
Volatile Organic Compounds (VOCs) †		
Benzene	8240	5030
Carbon Disulfide	8240	5030
Chlorobenzene	8240	5030
Chloroform	8240	5030
Cyclohexane	8240	5030
1,2 dichloroethane	8240	5030
1,4, dioxane	8240	5030
Ethylene dibromide	8240	5030
Styrene	8240	5030
Toluene	8240	5030
Xylene (m-, o&p)	8240	5030
Semi-Volatile Base/Neutral Extractable Organic Compounds (SVOCs)		
Anthracene	8270	3510 or 3520
Bis (2,-ethylhexyle)phthalate	8270	3510 or 3520
Butyl benzyl phthalate	8270	3510 or 3520
Chrysene	8270	3510 or 3520
Diben(a,h)acridine	8270	3510 or 3520
Dibenz(a,h)anthracene	8270	3510 or 3520
Dichlorobenzenes	8270	3510 or 3520
Diethylphthalate	8270	3510 or 3520
Dimethyl phthalate	8270	3510 or 3520
7,12-Dimethylbenz(a)-anthracene	8270	3510 or 3520
Di-n-octyl phthalate	8270	3510 or 3520
Di-n-butylphthalate	8270	3510 or 3520
Fluoranthene	8270	3510 or 3520
Indene	8270	3510 or 3520
1-methynapthalene	8270	3510 or 3520
2-methylneapthalene	8270	3510 or 3520
Napthalene	8270	3510 or 3520
Phananthrene	8270	3510 or 3520
Pyridine	8270	3510 or 3520
Pyrene	8270	3510 or 3520
Quinoline	8270	3510 or 3520

TABLE 4

(Page 2 of 2)
SAMPLE SUMMARY TABLE
QUARTERLY GROUNDWATER SAMPLES
BHP PETROLEUM AMERICAS REFINING INC.
91-325 KOMOHANA STREET
KAPOLEI, HAWAII
DELTA NO. 45-93-033

Analytical Parameters	Analytical Method Number	Preparation or Extraction Method
Semi-Volatile Acid-Extractable Compounds (SVOCs)		
Benzenethiol Cresols	8270	3510 or 3520
2,4,-dimethylphenol	8270	3510 or 3520
2,4-dinitrophenol	8270	3510 or 3520
4-nitrophenol	8270	3510 or 3520
Phenol	8270	3510 or 3520
Metals ‡		
Antimony	6010 (ICAP)	3005 or 3010
Arsenic	7060 (AA/GF)	3020
Barium	6010 (ICAP)	3005 or 3010
Beryllium	6010 (ICAP)	3005 or 3010
Cobalt	6010 (ICAP)	3005 of 3010
Cadmium	7131 (AA/GF)	3020
Chromium	6010 (ICAP)	3005 or 3010
Lead	7421 (AA/GF)	3020
Mercury	7470 (AA/CV)	3020
Nickel	6010 (ICAP)	3005 or 3010
Selenium	7740 (AA/GF)	3020
Vanadium	6010 (ICAP)	3005 or 3010

ICAP = Inductively Coupled Argon Plasma
AA/GF = Atomic Absorption/Graphite Furnace
AA/CV = Atomic Absorption/Cold Vapor

† West Coast Analytical Services performs EPA Method 8260 for analysis of VOCs.

‡ West Coast Analytical Services performs Inductively Couple Plasma Mass Spectrometry (ICPMS) for metals analysis. A sample preparation method of acid digestion is used. Commonly used acids are nitric acid and hydrochloric acid.

TABLE 5

GENERAL CHEMISTRY ANALYSIS
BHP PETROLEUM AMERICAS REFINING INC.
91-325 KOMOHANA STREET, KAPOLEI, HAWAII

PARAMETER	EPA METHOD	TECHNIQUE	PRESERVATION	DETECTION LIMIT
Total dissolved solids	160.1	Gravimetric	4°C	20.0 mg/L
Sulfate	9038	Turbidimetric	4°C	10.0 mg/L
pH	9040	Electrode	4°C	NA
Electrical conductivity	9050	Electrode	4°C	20 umhos/cm
Chloride	9253	Titrimetric	4°C	5.0 mg/L
Phenol	8270	GC/MS	4°C	50 ug/L
Iron	6010	ICP	4°C	0.1 mg/L
Manganese	6010	ICP	4°C	0.1 mg/L
Sodium	6010	ICP	4°C	0.1 mg/L

TABLE 6

FREE-PRODUCT ANALYSIS

BHP PETROLEUM AMERICAS REFINING INC.

91-325 KOMOHANA STREET, KAPOLEI, HAWAII

PARAMETER	ANALYTICAL METHOD	TECHNIQUE
GC Characterization	EPA Method 8015B	Simulated Distillation
Specific Gravity	SM 213E	Gravimetric
Flashpoint	EPA Method 1010	Flashpoint/Redox

TABLE 7

BIODEGRADATION-FIELD GROUNDWATER PARAMETERS
BHP PETROLEUM AMERICAS REFINING INC.
91-325 KOMOHANA STREET
KAPOLEI, HAWAII
DELTA NO. 45-93-033

Parameter	Data Value
Dissolved Oxygen (DO):	Dissolved oxygen levels in groundwater are indicators of natural inputs of oxygen into the saturated zone, activity of natural bacteria in response to organic chemicals in the groundwater, and a tool to help map chemical plumes in groundwater. Biodegradation generally requires >2 ppm DO in groundwater to be efficient at consuming dissolved-phase chemicals.
Soluble Iron (Fe):	Soluble or dissolved iron in groundwater provides a check on the DO that is measured since only low levels of DO (<1-2 ppm) can provide the correct conditions for the presence of high levels of soluble iron (>10 ppm). Alternately, high levels of DO (>2 ppm) will result in low levels of soluble iron (<10 ppm). High levels of soluble iron will likely cause maintenance problems in the operation of groundwater remediation systems.
Total Iron (Fe):	Total iron in groundwater provides an estimate of potential soluble iron if low oxygen levels are able to influence the groundwater environment.
Temperature:	Groundwater temperature is a controlling factor for the rate of in-situ biodegradation of dissolved chemicals. Better estimates of rates of natural, in-situ biodegradation are possible when the actual in-situ temperature is known. Higher groundwater temperatures result in higher biodegradation activity.
Conductivity:	Conductivity is the opposite of resistance in assessing groundwater for electrical current transport. Generally, the greater the concentration of chemicals, cations, and anions in groundwater, the greater the conductivity. Its measurement provides a relative indicator of the level of chemicals, cations, and anions in different groundwater wells.
pH:	The amount of hydrogen ions in groundwater dictates a corresponding pH value. A pH level of 6.5 up to 8.5 is generally considered acceptable for optimal biodegradation conditions.

TABLE 8

BIODEGRADATION-LABORATORY GROUNDWATER PARAMETERS
BHP PETROLEUM AMERICAS REFINING INC.
91-325 KOMOHANA STREET
KAPOLEI, HAWAII
DELTA NO. 45-93--33

Parameter/EPA Method	Detection Limit	Data Value
Total Organic Carbon (TOC): (EPA 415.2)	0.5 mg/l	This parameter measures the total carbon, or "food," that groundwater microbes can use for energy and growth. All organic chemicals in the groundwater are summed in the TOC measurement.
Chemical Oxygen Demand: (EPA 410.2)	5 mg/l	Chemical oxygen demand (COD) gives a measurement of the sum total oxygen demand in the groundwater from the dissolved chemicals.
Biochemical Oxygen Demand: (EPA 405.1)	5.0 mg/l	Biochemical oxygen demand is based on the oxygen demand in a 5-day test known as BOD_5. The oxygen demand of the biochemical processes present in the groundwater sample is given as a sum total for all the various microbes present in the sample.
Nitrogen: (Ammonia Nitrogen - EPA 350.1) (Nitrate - Nitrite Nitrogen - EPA 353.2)	0.05 mg/l	Ammonia (NH_3), nitrite (NO_2), and nitrate (NO_3) nitrogen provide an essential nutrient, nitrogen, to microbes for growth. Nitrate can also provide energy to microbes when oxygen levels are low.
Phosphorus: (Phosphorus, Ortho - EPA 365.2)	0.05 mg/l	Reactive phosphorus (o-PO_4), or ortho-phosphate, provides an essential nutrient, phosphorus, to microbes for growth.
Sulfate: (EPA 9038)	10.0 mg/L	Sulfate (SO_4) is utilized by microbes when the supply of oxygen or nitrate-nitrogen is low. Microbes can reduce the sulfate molecule to provide energy for biodegradation.
Carbonates, Alkalinity Hardness, Total & Soluble Iron and Manganese:		These parameters are important for maintenance concerns during the operation of groundwater treatment systems. Knowing these levels in advance of design activities can assist the project in anticipating maintenance schedules and problems.
(Hardness - SMA 314A)	0.5	
(Total Iron - EPA 6010)	0.01 mg/l	
(Soluble Iron - EPA 236.1)	0.01 mg/l	
(Total Manganese and Soluble Manganese - EPA 6010)	0.01 mg/l	

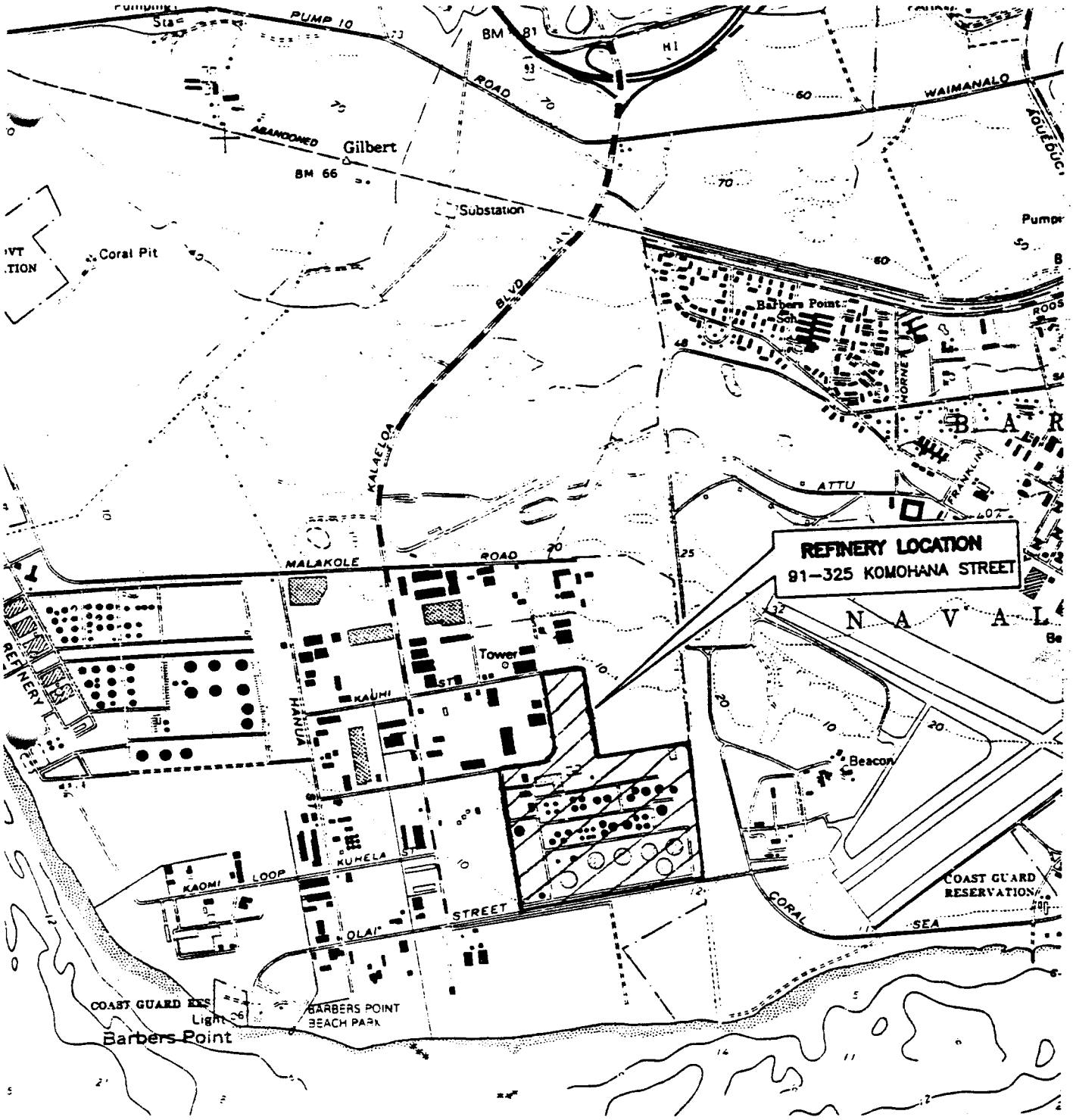
TABLE 9

SOIL CHARACTERISTIC ANALYTICAL METHODS
BHP PETROLEUM AMERICAS REFINING INC.
91-325 KOMOHANA STREET
KAPOLEI, HAWAII
DELTA NO. 45-93–33

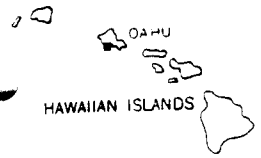
CHARACTERISTIC	ANALYTICAL METHOD	TECHNIQUE
Fraction of Organic Carbon (F_{oc})	EPA Method 9060	Carbonaceous Analyzer
Partitioning Coefficient (K_{oc})	8240	TCLP
Total Organic Carbon	Walkley-Black*	Agronomy Method

* Estimated Detection Limit = 0.010%

FIGURES



GENERAL NOTES:
BASE MAP FROM U.S.G.S.
EWA, HAWAII QUADRANGLE
7.5 MINUTE TOPOGRAPHIC MAP
PHOTOREVISED 1983



QUADRANGLE LOCATION

N

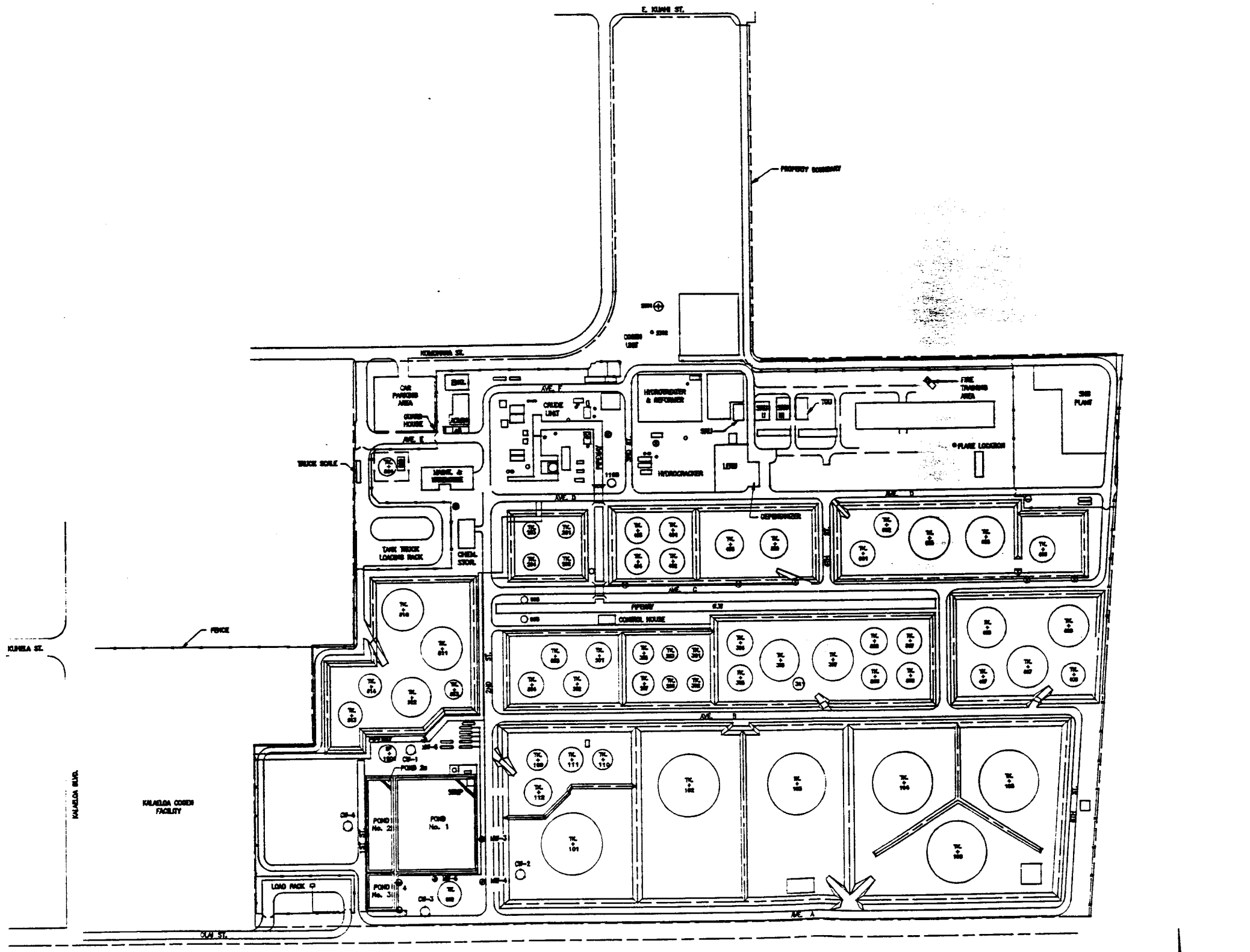
0 2000 FT

SCALE: 1 : 24,000

FIGURE 1

SITE LOCATION MAP
BHP PETROLEUM AMERICAS REFINING INC.
91-325 KOMOHANA STREET
KAPOLEI, HAWAII

PROJECT NO. 45-93-033	DRAWN BY G. ROSAS	Delta Environmental Consultants, Inc.
FILE NO. 3-033-02	PREPARED BY J. AMATO	
DATE 15 JUL 93 / REV. 0	REVIEWED BY	

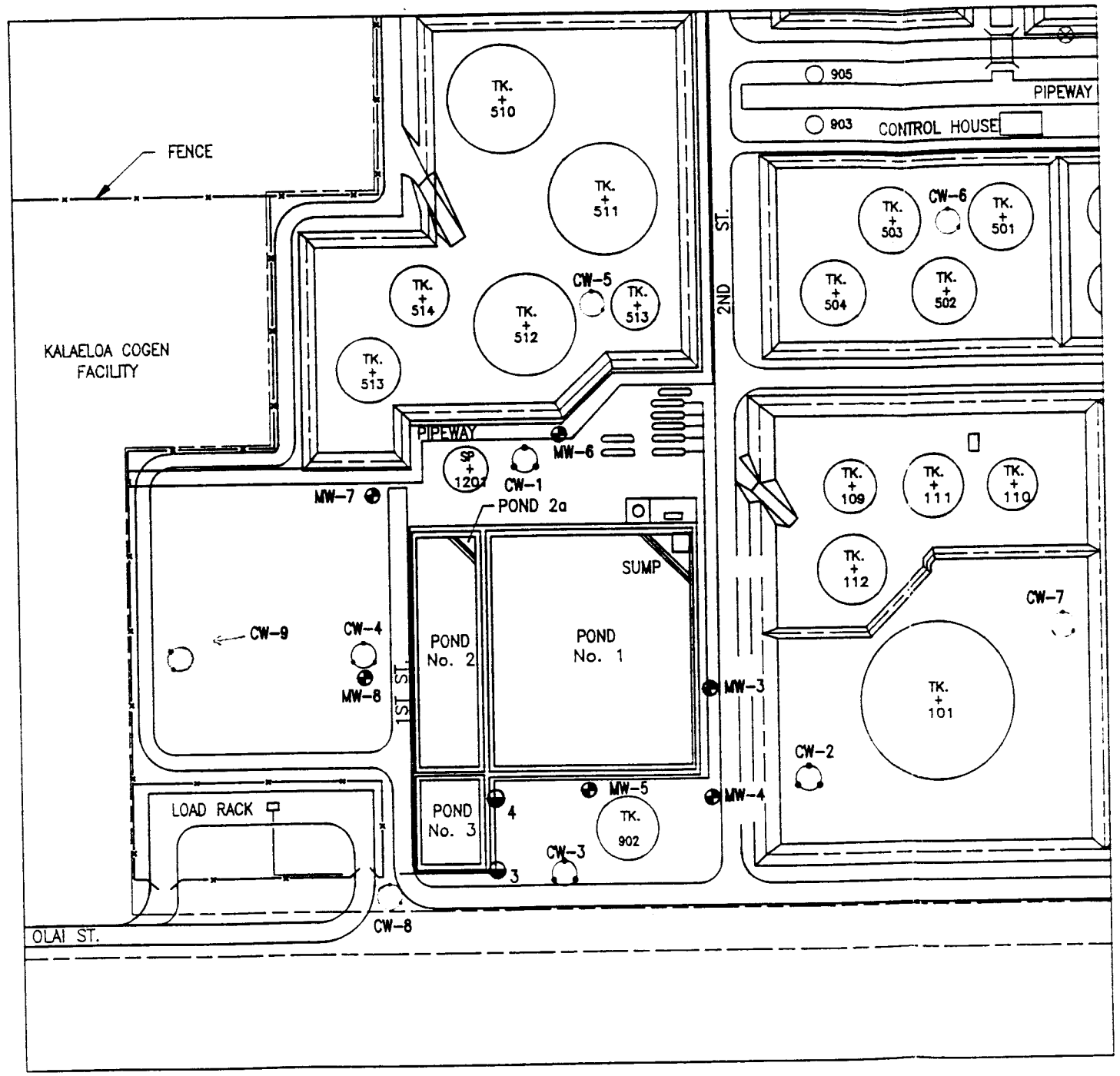


LEGEND

- MW-3 EXISTING GROUNDWATER MONITORING WELL LOCATION
- CW-4 EXISTING WELL CLUSTER LOCATION (SEE FIGURE 4 FOR DETAIL)
- 3 INJECTION WELL LOCATION

FIGURE 2
REFINERY SITE PLAN WITH EXISTING GROUNDWATER MONITORING WELL LOCATIONS
BHP PETROLEUM AMERICAS REFINING INC.
91-325 KOMOHANA STREET
KAPOLEI, HAWAII

PROJECT NO. 45-93-033	DRAWN BY GREG ROSAS	Delta Environmental Consultants, Inc.
FILE NO. 3-033-06	PREPARED BY JOHN AMATO	
DATE 3 AUG 93 / REV.	REVIEWED BY	



LEGEND

MW-5 EXISTING GROUNDWATER MONITORING WELL LOCATION

CW-4 EXISTING CLUSTER WELL LOCATION (SEE FIGURE 4 FOR DETAIL)

4 INJECTION WELL LOCATION

CW-9 PROPOSED CLUSTER WELL LOCATION

N

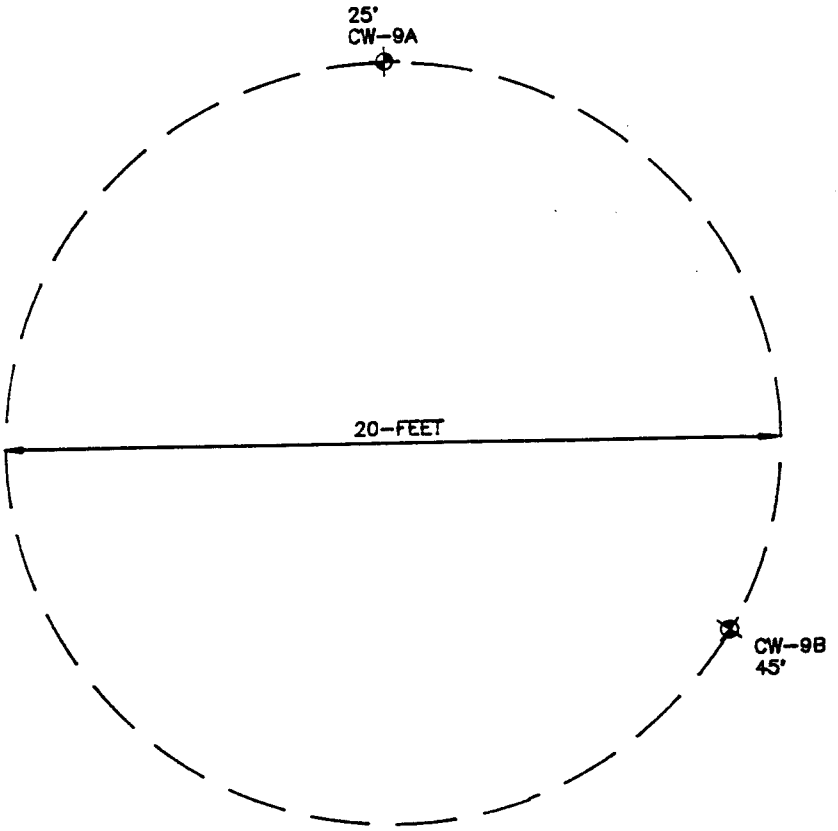
0 100 200

SCALE FEET

FIGURE 3

GROUNDWATER MONITORING WELL NETWORK WITH PROPOSED CLUSTER WELL LOCATIONS
BHP PETROLEUM AMERICAS REFINING INC.
91-325 KOMOHANA STREET
KAPOLEI, HAWAII

PROJECT NO. 45-93-033	DRAWN BY M. ENTERLINE	Delta Environmental Consultants, Inc.
FILE NO. 3-033-08	PREPARED BY J. AMATO	
DATE 18 OCT 93 / REV.	REVIEWED BY	



LEGEND

CW-9A 25' — CLUSTER WELL WITH TOTAL DEPTH OF WELL IN FEET

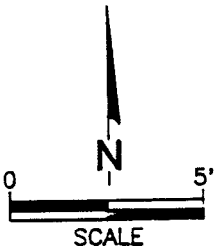
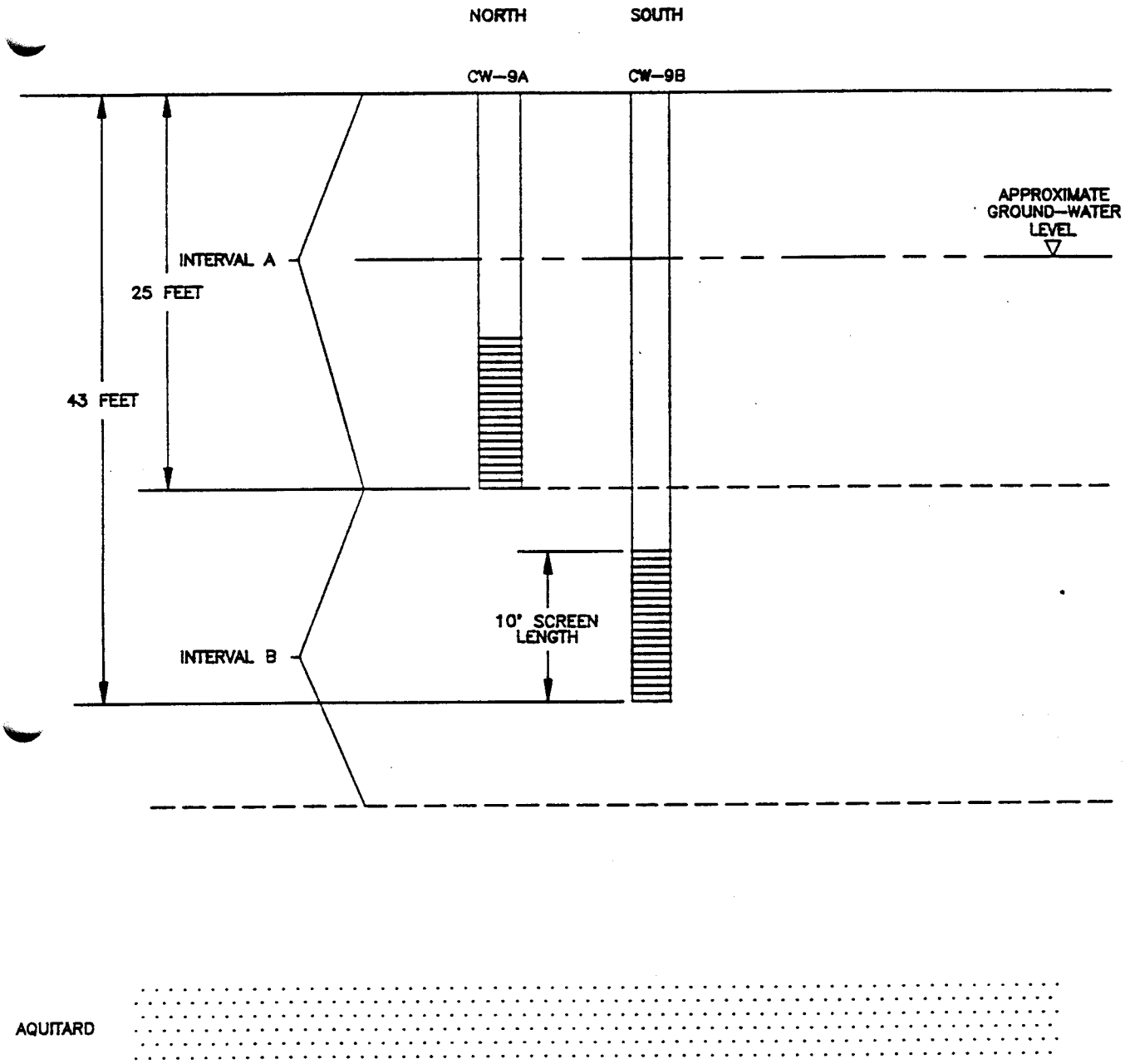


FIGURE 4
DETAIL OF CONFIGURATION OF PROPOSED CLUSTER WELLS (PLAN VIEW)
BHP PETROLEUM AMERICAS REFINING INC.
91-325 KOMOHANA STREET
KAPOLEI, HAWAII

PROJECT NO. 45-93-033	DRAWN BY G. ROSAS	Delta Environmental Consultants, Inc.
FILE NO. 3-033-04	PREPARED BY J. AMATO	
DATE 30 SEP 93 / REV. 0	REVIEWED BY	



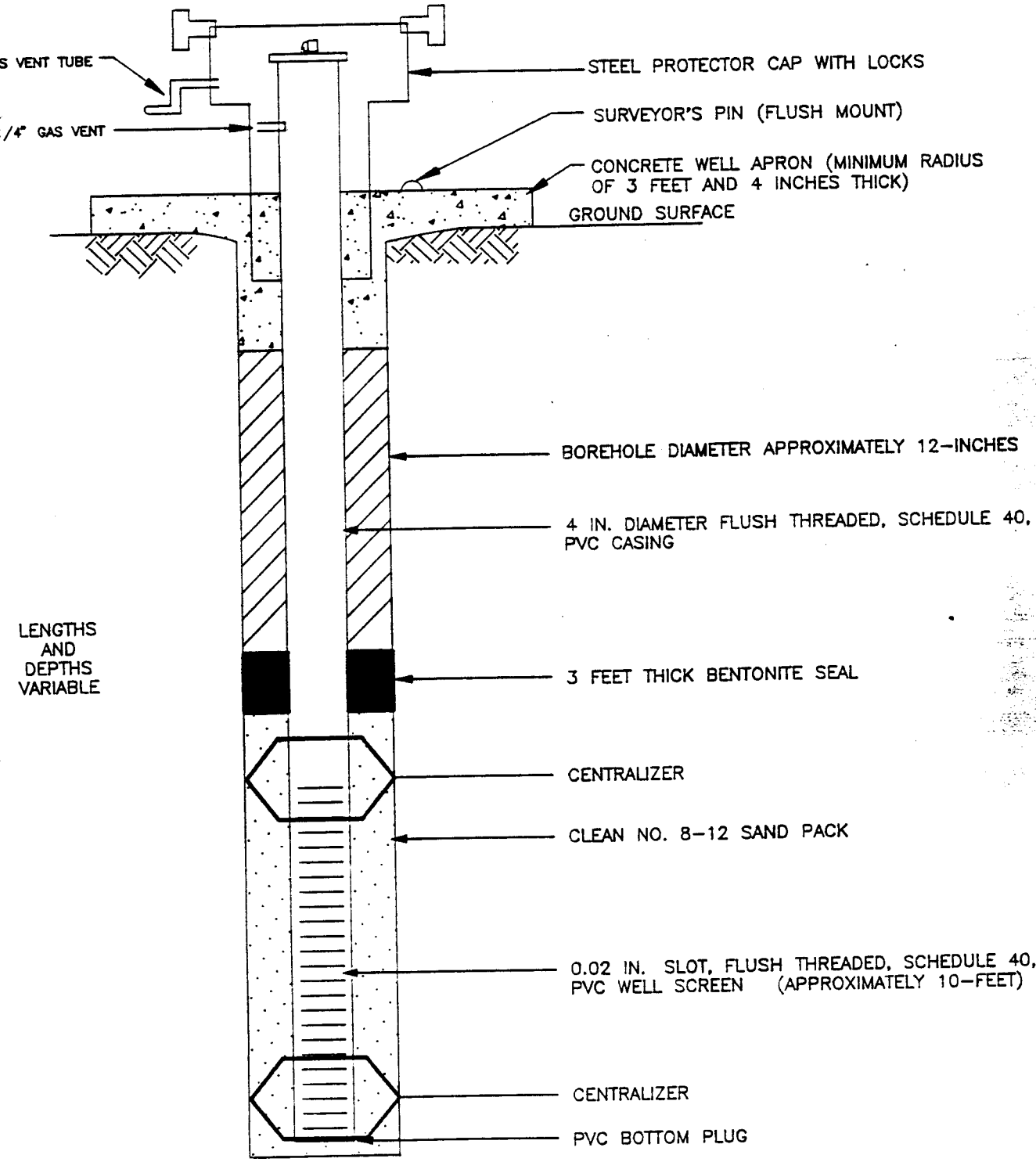
NOT TO SCALE

FIGURE 5

CLUSTER WELL SCHEMATIC
BHP PETROLEUM AMERICAS REFINING INC.
91-325 KOMOHANA STREET
KAPOLEI, HAWAII

PROJECT NO. 45-93-033	DRAWN BY A. KRUSE	
FILE NO. 3-033-10	PREPARED BY J. AMATO	
DATE 1 NOV 93 / REV. 0	REVIEWED BY	

Delta Environmental Consultants, Inc.



NOT TO SCALE

FIGURE 6
CONSTRUCTION DETAIL OF TYPICAL GROUNDWATER MONITORING WELL
BPH PETROLEUM AMERICAS REFINING INC.
91-325 KOMOHANA STREET
KAPOLEI, HAWAII

PROJECT NO. 45-93-033	DRAWN BY G. ROSAS	Delta Environmental Consultants, Inc.
FILE NO. 3-033-05	PREPARED BY J. AMATO	
DATE 6 OCT 93 / REV 0	REVIEWED BY	

APPENDIX A

APPENDIX A

Chemical Descriptions

CHEMICAL DESCRIPTIONS

Antimony

Antimony is a silvery, white solid.

Short-term exposure to antimony can cause gastrointestinal pain, cough, loss of appetite, itching, skin eruptions, and irritation of the eyes, nose, and throat.

The permissible exposure limit (PEL) time-weighted average (TWA) for antimony is 0.5 mg/m^3.

Arsenic (All Forms)

Metallic arsenic is most commonly a gray, brittle, crystalline solid. It can also occur in a black or yellow amorphous form. Arsenic is commonly found in its voiatile white trioxide form. It is used in several insecticides, herbicides, silvicides, defoliants, desiccants, and rodenticides and appears in a variety of forms.

Arsenic is classified by the U.S. Environmental Protection Agency as a known human carcinogen.

Short-term exposure to arsenic can cause marked irritation of the stomach and intestines with nausea, vomiting, and diarrhea. In severe cases, the vomiting and stools are bloody and the exposed individual goes into collapse and shock with weak, rapid pulse, cold sweats, coma, and death. Inorganic arsenicals are more toxic than organic arsenicals, and the trivalent form is more toxic than the pentavalent form. Acute arsenic poisoning usually results from ingestion exposures.

The PEL for arsenic is 0.01 mg/m^3 and for organic arsenic the PEL is 0.5 mg/m^3.

Benzene

Benzene is a clear colorless liquid.

Exposure to high concentrations (3,000 ppm) may result in acute poisoning, characterized by the narcotic action of benzene on the central nervous system. Chronic poisoning occurs most commonly through inhalation and dermal absorption. Benzene is also a recognized carcinogen.

The PEL for benzene is 1 ppm.

Beryllium

Beryllium is a silvery gray metal.

Short-term exposure to beryllium can cause pain below the sternum, weight loss, nonproductive cough, shortness of breath, and irritation of the eyes, respiratory system, and skin.

The PEL TWA for beryllium is 0.002 mg/m^3.

Cadmium

Cadmium dust is an odorless gray powder.

Short-term exposure to cadmium dust can cause irritation of the nose and throat. If enough has been inhaled, after a delay of several hours, a person mai also develop cough, chest pain, sweating, chills, shortness of breath, and weakness. Death may occur. Ingestion of cadmium dust may cause nausea, vomiting, diarrhea, and abdominal cramps.

The PEL TWA for cadmium dust is 0.2 mg/m^3.

Chromium

Chromium is a greenish-blue, odorless solid.

Exposure to chromium has been associated with lung changes in workers exposed to chromium alloys. Chromium dust exposure may cause minor lung changes.

The PEL for chromium is 1 mg/m^3.

Lead

Lead (inorganic) is a bluish-white, silver, or gray odorless solid.

Short-term exposure to lead can cause decreased appetite, insomnia, headache, muscle and joint pain, colic, and constipation.

The PEL for lead is 0.05 mg/m^3.

Mercury

Mercury is a silvery, mobile, odorless liquid.

Short-term exposure to inhaled mercury vapors may cause headache, cough, chest pains, chest tightness, and difficulty in breathing. In addition, it may cause soreness of the mouth, loss of teeth, nausea, and diarrhea. Liquid mercury may irritate the skin.

The PEL TWA for mercury is 0.1 mg/m^3.

Selenium

Selenium is a black, gray, or red odorless solid.

Prolonged exposure to selenium can cause paleness, coated tongue, stomach disorders, nervousness, metallic taste, and a garlic odor of the breath. Fluid in the abdominal cavity, damage to the liver and spleen, and anemia have been reported in animals.

The PEL for selenium is 0.2 mg/m^3.

Toluene

Toluene is a colorless liquid with a benzol-like odor.

Inhalation of high vapor concentrations may cause impairment of coordination and reaction time, headaches, nausea, eye irritation, loss of appetite, a bad taste, and lassitude.

The PEL for toluene is 100 ppm.

Xylenes

Xylenes are clear, colorless liquids.

Exposure to high concentrations of xylene vapor may result in eye and skin irritation. Eye irritation may occur at concentrations of about 200 ppm.

The PEL for total xylene is 100 ppm.

Cyclohexane

Cyclohexane is a colorless, mobile liquid with a pungent odor, and is moderately toxic by ingestion. It is a systemic irritant by inhalation and ingestion and a skin irritant.

The PEL for cyclohexane is 300 ppm.

Anthracene

Anthracene is a colorless crystal, violet fluorescence. It is an experimental tumorigen and neoplastigen. It is also a skin irritant and allergen.

The PEL for anthracene is 0.2 milligrams per cubic meter.

Barium

The soluble barium salts, such as the chloride and sulfide, are poisonous when ingested. Some salts are skin, eye, and mucous membrane irritants producing dermatitis.

The PEL for barium is 0.5 milligrams (Ba) per cubic meters.

Cobalt and Compounds

Cobalt and Compounds are gray, hard, magnetic, ductile, and somewhat malleable metals.

Cobalt is moderately toxic by ingestion. It is an experimental neoplastigen. Inhalation of dust may cause pulmonary damage. The powder may cause dermatitis.

The PEL for cobalt is 0.1 milligrams per cubic meter.

Chrysene

Chrysene occurs in tar. Orthorhombic bipyramidal plates from benzene. An experimental carcinogen by skin contact.

The PEL for chrysene is 0.2 milligrams per cubic meter.

Cresols (all isomers)

Cresols can be colorless, yellow, brown, or pinkish oily liquids or solids with a sweet, tarry odor. Contact with skin or eyes can cause burns and/or dermatitis.

The PEL for cresols is 22 mg/m^3 per cubic meter.

Pyrene

Pyrene is a colorless or white solid.

Pyrene is moderately by ingestion and poisonous by inhalation. Exposure to pyrene may cause skin irritation.

The PEL for pyrene is 0.2 mg/m^3 in air.

Naphthalene

Naphthalene is a white crystalline solid used as moth repellant. Initial symptoms resulting from exposures to high concentrations include eye irritation, headache, confusion, malaise, profuse sweating, nausea, and vomiting.

The PEL TWA for naphthalene is 10 ppm in air.

Phenanthrene

Phenanthrene is a white crystal.

Phenanthrene is moderately toxic by ingestion.

The PEL for phenanthrene is 0.2 mg/m^3.

APPENDIX B

APPENDIX B

Sample Well Construction Log

Delta
Environmental
Consultants, Inc.

WELL CONSTRUCTION LOG

BORING/WELL LOCATION SKETCH MAP

N

WELL NO.			
PROJECT NO./NAME	LOCATION		
DRILLING CONTRACTOR/DRILLER			
GEOLOGIST/OFFICE	APPROVED BY		
DRILLING EQUIPMENT/METHOD	SIZE/TYPE OF BIT	SAMPLING METHOD	START/FINISH DATE

WELL INSTALLED? YES ☐ NO ☐ | CASING MAT./DIA. | SCREEN: TYPE MAT. LENGTH DIA. SLOT SIZE

ELEVATION OF: (FT. ABOVE M.S.L.) GROUND SURFACE | TOP OF WELL CASING | TOP & BOTTOM SCREEN | GW SURFACE | DATE

WELL CONSTRUCTION	LITHOLOGY			SAMPLING DATA	
Depth, feet			Graphic Log	Visual Description	Sample No. and Interval	Values (ppm)
5					5	
10					10	
15					15	
20					20	
25					25	
30					30	
35					35	

Continued ...

Delta
Environmental
Consultants, Inc.

WELL CONSTRUCTION LOG

WELL NO.

PROJECT NO./NAME

LOCATION

WELL CONSTRUCTION		LITHOLOGY		SAMPLING DATA	
Depth, feet	Continued	Graphic Log	Visual Description	Sample No. and Interval	Values (ppm)
40				40	
45				45	
				50	
55				55	
60				60	
65				65	
70				70	

APPENDIX C

APPENDIX C

Sample Label

SAMPLE LABEL

Analytical Technologies, Inc.
5550 Morenouse Drive, San Diego, CA 92121

Client:

Date Sampled:

Source:

Analysis:

Unpreserved Preserved: _____

APPENDIX D

APPENDIX D

Sample Chain-of-Custody

Anal[illegible]l Technologies, Inc. SAN DIEGO, CA [illegible] (619) 458 9141

Chain of Custody

PROJECT MANAGER:

COMPANY:

ADDRESS:

BILL TO:

COMPANY:

ADDRESS:

SAMPLERS: (Signature) ( ) - PHONE NUMBER

SAMPLE ID	SAMPLE DATE	TIME	MATRIX	LAB ID

Recommended Quantity and Preservative (Provide triple volume on QC [illegible]ples)

Petroleum Hydrocarbons 418.1	Oil and Grease 413.2	Gasoline (MOD 8015/DOHS)	Diesel (MOD 8015/DOHS)	Gasoline/BTXE (MOD 8015/8020) Maximum Contamination Level of Gasoline: 2ppm (water), 50ppm (Soil)	MOD 8015 (Unknown)	BTXE (8020)	Chlorinated Hydrocarbons (8010)	Aromatic Hydrocarbons (8020)	Chlorinated/Aromatic Hydrocarbons (8010/8020)	Organic Pb		Pesticides/PCB (8080)	Base/NEU/Acid Cmpds GC/MS (8270)	Volatile Cmpds GC/MS (8240)	Polynuclear Aromatic (8310)	CCR Metals	Priority Pollutant Metals									Number of Containers
1L (H_2SO_4)/100g	1L (H_2SO_4)/100g	4 oz (HCl)/50g	4 oz (HCl)/50g	2X40ml (HCl)/50g	4 oz (HCl)/50g	2X40ml (HCl)/50g	2X40ml (HCl)/50g	2X40ml (HCl)/50g	2X40ml (HCl)/50g	500ml/50g		1L/50g	1L/100g	2X40ml (HCl)/100g	1L/100g	500ml/100g	500ml/100g									

PROJECT INFORMATION	SAMPLE RECEIPT	
PROJECT NUMBER:	TOTAL NUMBER OF CONTAINERS	
PROJECT NAME:	CHAIN OF CUSTODY SEALS Y/N/NA	
PURCHASE ORDER NUMBER:	SEALS INTACT? Y/N/NA	
VIA:	RECEIVED GOOD COND./COLD	
TAT: ☐24HR ☐48HRS ☐72HRS ☐1WK ☐2WK	LAB NUMBER	

SAMPLE DISPOSAL INSTRUCTIONS

☐ ATI Disposal @ $5.00 each ☐ Return ☐ Pickup

Comments:

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Time:	Signature: Time:	Signature: Time:
Printed Name: Date:	Printed Name: Date:	Printed Name: Date:
Company:	Company:	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: (LAB) 3.**
Signature: Time:	Signature: Time:	Signature: Time:
Printed Name: Date:	Printed Name: Date:	Printed Name: Date:
Company:	Company:	Analytical Technologies, Inc.

DISTRIBUTION: White, Canary - ANALYTICAL TECHNOLOGIES, INC. • Pink - ORIGINATOR

APPENDIX E

APPENDIX E

Summary of Analytical Laboratory Procedures

APPENDIX E

Summary of Analytical Laboratory Procedures

EPA Method 8240 - VOCs

Groundwater samples collected for VOC analysis will be analyzed according to EPA Method 8240. EPA Method 8240 is based upon a purge-and-trap, gas chromatographic/mass spectrographic (GC/MS) procedure. The practical quantitation limit (PQL) of Method 8240 for an individual compound (except 1,4,-dioxane) is approximately 5 μg/L. The PQL for 1,4-dioxane is approximately 50 μg/L. The target VOCs are listed in Table 4.

EPA Method 8270 - SVOCs

Groundwater samples collected for SVOC analysis will be analyzed according to EPA Method 8270. EPA Method 8270 is based upon the direct injection of a sample extract into a GC/MS. EPA Method 8270 can be used to quantify most neutral, acidic, and basic organic compounds that are soluble in methylene chloride and capable of being eluted without derivatization as sharp peaks from a gas chromatographic fused-silica capillary column coated with a slightly polar silicone. The lowest PQL of Method 8270 is approximately 10 μg/L for groundwater samples. Selected compounds such as 2,4-dinitrophenol and 4-nitrophenol have PQLs as high as 50 μg/L. The target SVOCs are listed in Table 4.

EPA Method 9252 - Chloride

Method 9252 is suitable for all concentration ranges of chloride content. An acidified sample is titrated with mercuric nitrate in the presence of mixed diphenylcardazone-bromophenol blue indicator. The end point of the titration is the formation of the blue-violet mercury diphenylcardazone complex.

EPA Method 6010 - Antimony, Barium, Beryllium, Cobalt, Chromium, Nickel and Vanadium

Inductively coupling plasma atomic emission spectroscopy (ICP), determines trace elements, including metals, in groundwater. Detection limits, sensitivity, and optimum ranges of the metals will vary with the model of the spectrometer. Prior to analysis, groundwater samples must be solubilized or digested using the appropriate sample preparation methods (e.g., Methods 3005-3050). The methods measure element-emitted light by optical spectrometry. The samples are nebulized and the resulting aerosol is transported to the torch. Photomultiplier tubes are used to monitor the intensity of the dispersed spectral lines. Estimated detection limits for target metals Antimony, Barium, Beryllium, Cobalt, Chromium, Nickel and Vanadium are 0.03 mg/L, 0.01 mg/L, 0.005 mg/L, 0.01 mg/L, 0.01 mg/L, 0.01 mg/L, 0.01 mg/L.

EPA Method 7060 - Arsenic

Method 7060 is an atomic absorption (AA) procedure approved for determining the concentration of arsenic in groundwater. Samples must be subject to a dissolution step prior to analysis. Samples must be prepared in order to convert organic forms of arsenic to inorganic forms to minimize organic interferences. The absorption of hollow cathode or EDL radiation during atomization in the graphite furnace will be proportional to the arsenic concentration. Detection limits are typically as low as 2 μg/l.

EPA Methods 7131 and 7421 - Cadmium and Lead

EPA Methods 7131 and 7421 are AA spectroscopy methods approved for determining the concentration of cadmium and lead, respectively, in groundwater. Detection limits will vary with the model of AA spectrometers but using the furnace procedure detection limits as low as 0.6 μg/l and 2.0 μg/l can be obtained in cadmium and lead, respectively.

EPA Method 7470 - Mercury

Method 7470 is a cold-vapor AA procedure approved for determining the concentration of mercury in groundwater. Samples must be subjected to an appropriate dissolution step prior to analysis. This method is based on the absorption of radiation at 253.7 manometers by mercury vapor. The absorbance is measured as a function of mercury concentration. Detection limits for this method as low as 0.5 μg/l are achievable.

EPA Method 7740 - Selenium

Method 7740 is an AA method procedure approved for determining the concentration of selenium in groundwater. Samples must be prepared in order to convert organic forms of selenium to inorganic forms to minimize interferences. Aqueous samples are subject to an acid-digestion procedure. The prepared samples is subjected to evaporation in a graphite furnace. The absorption of lamp radiation during atomization will be proportional to the selenium concentration. The typical detection limit for this method is 10 μg/l.

General Minerals

The parameters included in the general minerals analysis include carbonate as $CaCO_3$, bicarbonate as $CaCO_3$, hydroxide as $CaCO_3$, alkalinity as $CaCO_3$, chloride, electrical conductivity, fluoride, nitrogen, pH, sulfate and total dissolved solids (TDS). See Table 5 for a summary of general minerals analyses and their respective analytical methods and detection limits.

APPENDI

QUALITY ASSURANCE MANUAL

West Coast Analytical Services
9840 Alburtis Avenue
Santa Fe Springs, CA 90670
July, 1993

Approved by: 8-18-93
D.J. Northington, Ph.D.
President

Rex Morris, Ph.D.
Quality Assurance Coordinator

WCAS

Table of Contents

Summary of Revisions

Introduction

Description of the Company
- 2.1 Organizational Structure
- 2.2 Floor Plan
- 2.3 List of Services Offered According to General Classification
- 2.4 Procedures
- 2.5 Confidentiality

Operational Procedures: Sample Logging, Tracking, and Storage
- 3.1 Sample Receipt
- 3.2 Chain of Custody
- 3.3 Sample Log-In; The Master Log
- 3.4 The Job Envelope, Job Number, and Distribution
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- 5.4 Precision and Accuracy in Quality Control
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1 2.5 Confidentiality
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Five Place Balance calibration changed to
2.0000 ± 0.00009 g
Table 1. QC Frequency (new Table)
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1 7/93

re 2-1 Updated Organizational Chart
ndix E Job Descriptions added
ndix B Minor Updating

1. Introduction

Analytical Service, Inc. is an independent laboratory providing state-of-the-art instrumental chemistry to both industry and government. We specialize in trace analyses using GC, GCMS, FTIR, HPLC, and ICPMS techniques. Services include tal, priority pollutant, and pesticide analysis, hygiene analyses, contaminant identification, gas n and trace impurity determinations, polymer and coating tions, product compositions, and quality control.

, managers, and staff at WCAS consider quality of work erequisite in serving our clients' needs. We are to providing the highest quality analytical services an. For that reason we have a formal QA program, we are and accredited by outside agencies, and we participate equired and voluntary proficiency evaluation programs.

ty Assurance Manual (QAM) describes the procedures that owed to monitor the quality of our work.

2: Describes the organization, floor plan, services offered, and the source of analytical procedures used in our work.

3: Describes the procedures that are used to log, track, store samples, analytical data, and reports.

4: Lists laboratory equipment.

5: Describes the procedures used to monitor the precision and accuracy of data as well as the operational guidelines used in performing the analyses.

2. Description of the Company

Organizational Structure

Laboratory is currently divided into five groups: (1) GCMS, GC, (3) Inorganics, (4) Ion Chromatography and Wet Chemistry (5) Sample Preparation. Support groups include accounting, retarial, and janitorial services. An Organizational Chart ears in Figure 2.1.

up Leaders are responsible for technical and administrative agement of small groups of two to five people specializing in ype of instrumental analysis or chemistry. The Group Leaders sign work to individual members of the group, organize the work forts, review data packages, and help solve analytical prob- ns. In some cases, the Group Leader is assisted with these ties by senior technical members of the group.

Organics Manager aids in coordinating the work effort between , GCMS, and the extraction lab. This manager also performs many the same duties as a Group Leader in reviewing data packages, c.

e Group Leaders and Organics Manager report to the Technical rector and the Lab Director. The Technical Director is sponsible for the technical aspects of the lab including setting new methods, solving analytical problems, and specifying thods. The Lab Director is responsible for administration.

th directors report directly to the President, as does the QA ordinator. The President assists the Technical Director in the chnical aspects of the operation. The President also acts as e QA Officer. The QA Coordinator's responsibilities are scribed further in Section 5.1. The President is responsible r setting and monitoring all Quality standards and updating the M.

.2 Floor Plan

new floor plan is given in Figure 2.2. The building is pproximately 16,500 square feet (110' x 150'), including 1300 for CMS, 1600 for GC and LC, 750 for ICPMS, 250 for IC/LC, 600 for norganic Prep, 1000 for Organic Extraction, 500 for IR, and 1000 quare feet for Log-In/Sample Receipt. The remaining space is rimarily office and storage space.

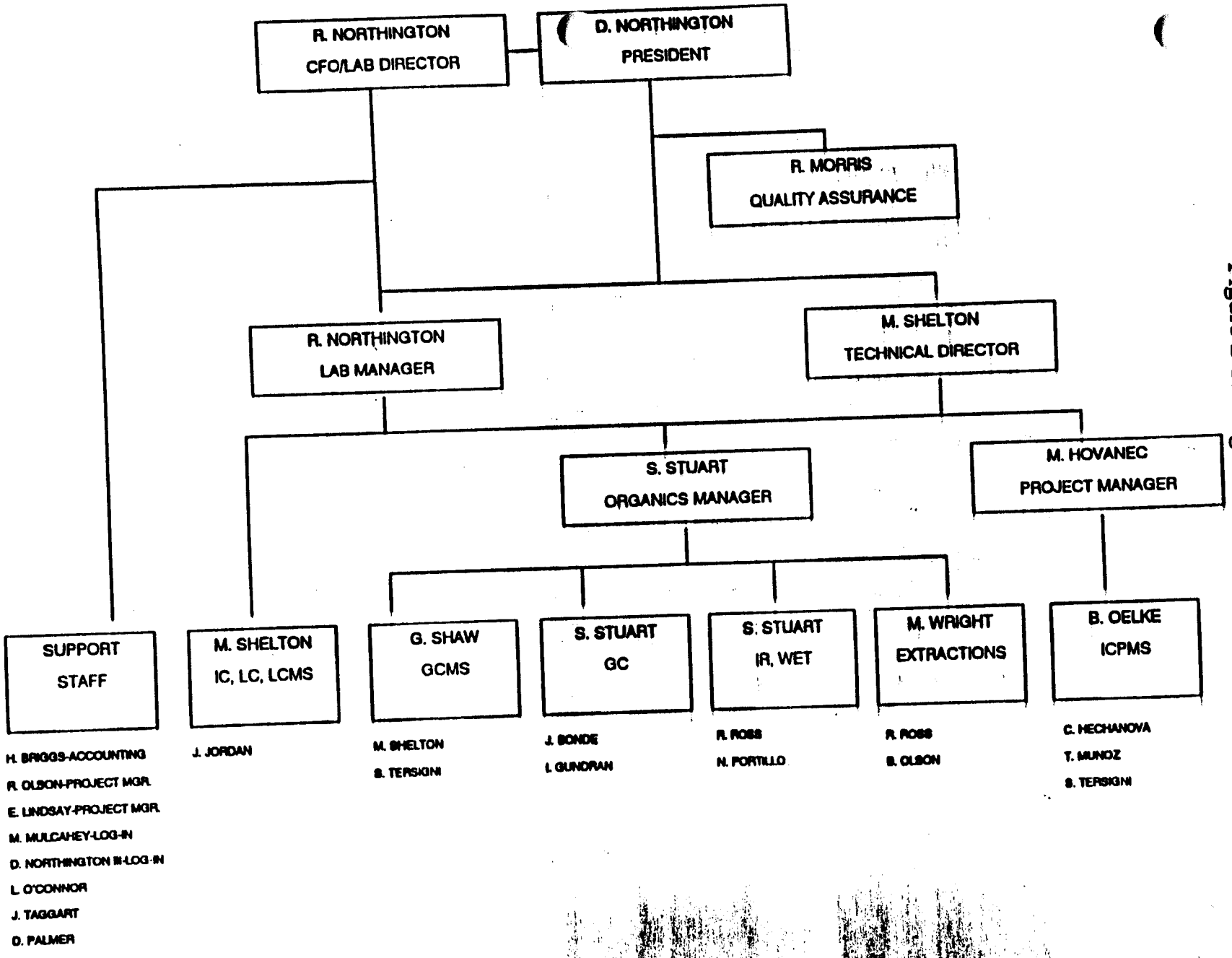
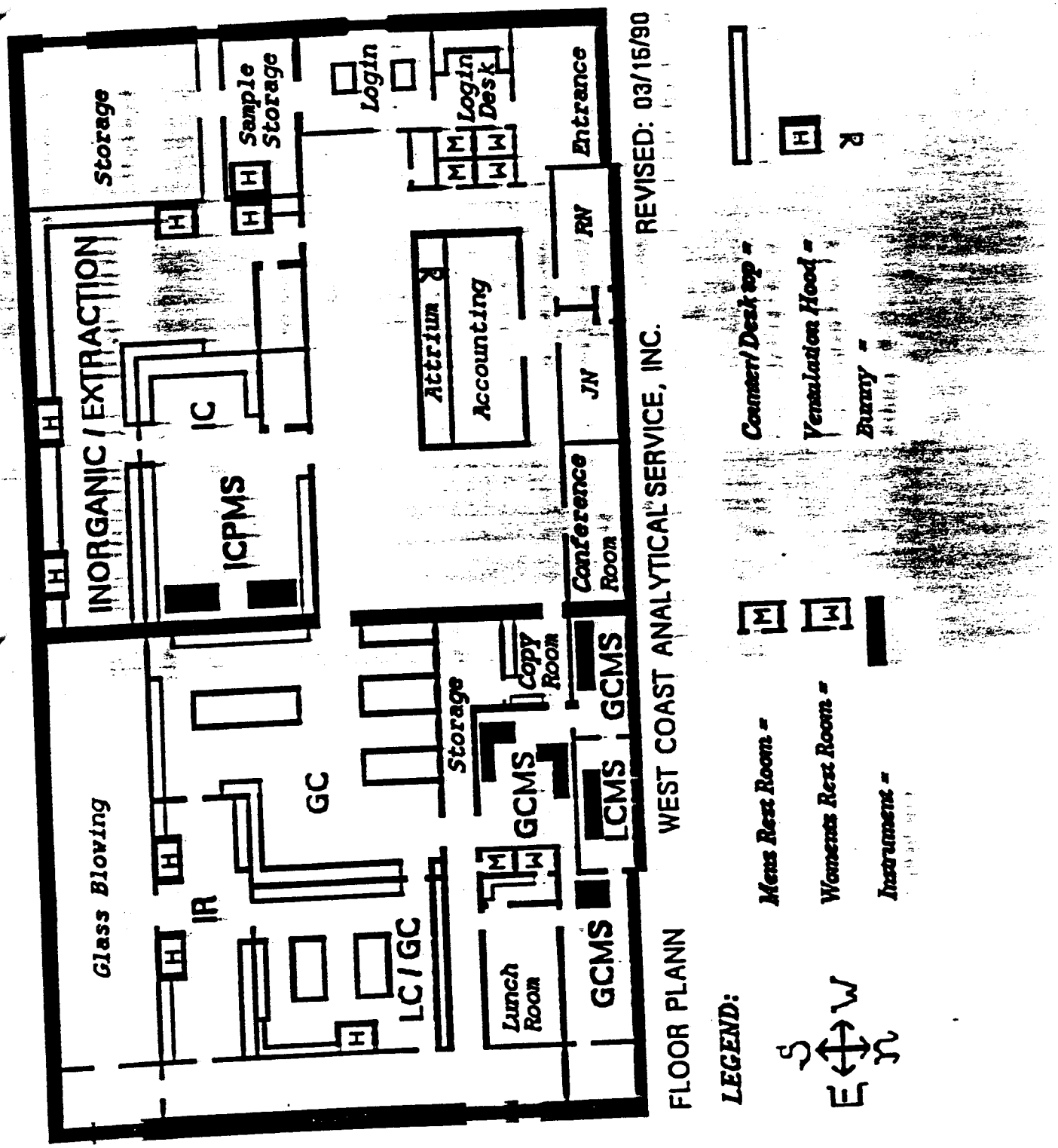


Figure 2-1. Organization Chart

Figure 2-2. Floor Plan



Services offered according to general classification.

C matography-Mass Spectrometry +EI, +CI, -CI, sector 2000 amu range, thermospray, and particle beam

romatography-Mass Spectrometry (GCMS) positive ion mpact and chemical ionization, quadrupole mass filter, GCMS.

- Environmental Analysis
- EPA Priority Pollutant Analysis
- Contaminant Analysis
- Composition of Organic Mixtures
- Pyrolysis GCMS
- Organic Molecular Structure Determination
- Solvent Composition
- Industrial Hygiene Analyses
- Air Pollution Analyses
- Forensic Chemistry
- Plastic and Coatings Analysis
- Food and Flavor Analysis
- Pharmaceuticals Analysis
- Molecular Weight Determination (800)
- Deformulation Analysis
- Reaction Products

C omatography (GC)-packed and capillary GC with FID, TC, 1, hermionic N/P, and photo ionization (PID) detection.

- Quantitative Analysis
- Natural Gas and LPG Analysis
- Environmental Analysis
- EPA Priority Pollutant Analysis
- Contaminant and Solvent Composition
- Pesticide Residues
- Deformulation
- Industrial Hygiene Analyses
- Pharmaceuticals Analyses
- Combustion Products Analyses
- Quality Control

iquid Chromatography (LC) with variable UV/VIS and escence detection.

- Carbamate and Urea Pesticides
- Pharmaceuticals
- Polymer Additives
- Environmental Analysis

pectroscopy-Fourier Transform (FTIR)

Identifications of Plastics, Polymers and Coatings
Organic Structure Determination
Deformulation
Surfactant Identification
Quality Control
Oil and Grease

c

Trace Metals (ICPMS)
Anions (Selective Electrode)
Anions, Cations, Speciation (Ion Chromatography)

WET Chemical Analysis
Consulting

Laboratory Services

Elemental Analyses (CHNSX)
Nuclear Magnetic Resonance (NMR)
Emission Spectroscopy (ES)
Surface Analyses (SEM, ESCA, etc.)
Microbiological Analyses
Asbestos

edures

methods are documented in WCAS Standard Operating es (SOP) Manual. SOP's are revised periodically as revision dates and summary of changes are documented in ace to each SOP. The date revised and authorization by nical Director is also documented in the preface.

pplicable the following documents are used to determine cal procedures for testing.

a. American Society for Testing and Materials: Annual Standards. (ASTM)

b. U.S. Environmental Protection Agency: Manuals: EPA 600, SW846, etc.

c. American Public Health Association, American Water Works Association, Water Pollution Control Federation: Standard Methods for the Examination of Water and Wastewater.

d. American Pharmaceutical Association: National Formulary XIII. (NF)

e. The United States pharmacopeial Convention, Inc.: The Pharmacopeia of the United States of America (USP).

f. FDA Pesticide Analytical Manual.

g. The Association of Official Analytical Chemists: Official Methods of Analysis of the Association of Official Analytical Chemists.

h. California Air Resources Board and Air Quality Management Districts manuals.

i. State of California: LUFT Manual.

j. Military Specifications: (MIL-SPEC)

k. NIOSH and OSHA Manuals of Analytical Methods.

l. Other government specifications.

5 Confidentiality

:ten during the course of business, we are privileged to data or
ıformation that is considered confidential or proprietary to our cli
ıch information includes results of their tests, origin of their sam
ıe fact that we are working with them, any procedures or processes t
hey conduct or investigate, any information about them or their busi
ur own laboratory procedures, and clients. All such information mus
ept strictly confidential. The information should only be discussed
ith people designated as technical contacts or purchasing agents for
he particular project or corporate officers for the clients company.
he information should not be discussed with anyone else, even people
vithin a client's company not designated as a contact, without writte
permission from the client.

often we are contacted by government agencies or consultants hired
by our clients. Without express permission, we may only discuss
the tests generally such as procedures or QC limits, and then only
if it is obvious from the conversation that they have a copy of
the report. Any discussion of the origin of the samples, test
results, or analytical problems requires written permission.
Permission by the designated contact may be granted by phone if it
is followed in writing.

3. Operational Procedures

.1 Sample Receipt

ımples are received in the log-in area, where lab personnel are esponsible for logging in the samples under the direction of the ımple Coordinator/Log-In Supervisor.

.2 Chain of Custody

or all samples potentially involved in litigation (most nvironmental samples), Chain of Custody procedures are to be ollowed. All environmental samples delivered to the lab should ave Chain of Custody records similar to Figure 3.2. This is ecessary to preserve the security of samples. Samples are onsidered secure for evidentiary purposes if they are in your ossession, within view, or in a secured area. The laboratory is onsidered secure because access during working hours is onitored and the laboratory is locked and armed with alarms audible and silent) during non-working hours. The Chain of ustody record, Figure 3.2, is therefore used to document the hange in possession from sampling, delivery, and receipt by the aboratory.

ac sample should be clearly identifiable. The condition of the ample/container and the presence/absence of custody seals should e noted. Signatures of parties changing custody as well as date nd time should be documented on the form. Clients may have forms f their own. Use our form (Figure 3.2) if the client does not ave such a form.

3.3 Sample Log-In: The Master Log

Master Job Log is maintained at the log-in desk. The following nformation is put in the log to initiate a job.

1. Initials of person receiving/logging in the job.
2. Date received.
3. How samples were delivered to the laboratory, i.e., Customer (designating the sample as having been delivered by an employee of the client) or specific agent (U.S. Mail, UPS, Fed Exp., etc.)
4. Assigned job number (number stamp is used).

QUOTED TAT _____

Job No. _____

Date Rec'd _____

Company _____

Address _____

Technical Contact _____

Phone _____ FAX _____

P.O. No. _____

Proj. Name _____

Date Sampled _____

Retainer $_____

Check No. _____

Credit Apprv'd _____

WEST COAST ANALYTICAL SERVICES, INC.

GROUP	NO.	ANALYSIS DESCRIPTION	PRICE/SAMPLE	EXTENSION
GCMS				
GC				
IC				
ICPMS				
IR				
LC				
LCMS				
MISC/ WET				
O/S Lab				

TOTAL INVOICE AMT $_____

Samples in Fridge No. _____ On dry shelf _____ Air bag area _____

SAMPLE DESCRIPTION/NOTES:

Report date _____

Chain of Custody copy with invoice ( )

A/P instructions enclosed ( )

Disposition _____

Invoice date _____

Invoice no. _____

Additional notes/phone conversations:

Figure 3.1 Job envelope

ure 3.2 Chain of Custody

COMPANY _____
ADDRESS _____
_____
PHONE NO. _____ FAX _____
MAIL REPORT TO: _____

PROJECT MANAGER _____
PROJECT NAME _____
PROJECT NO. _____
PURCHASE ORDER NO. _____

WEST COAST ANALYTICAL SERVICE, INC.
9840 Alburtis Avenue
Santa Fe Springs, CA 90670
(310) 948-2225 Fax (310) 948-5850

COMMENTS:

If sample is liquid & has sediment or particulate should we:
_____ test filtrate only?
_____ mix sample by shaking?
_____ test particulate only?

If sample is multi-phased, should we:
_____ test each phase separately?
_____ test only ONE phase? Which phase?
_____ mix all phases by shaking, if possible?

WCAS

Sample I.D. #	Date Sampled	Time Sampled	Preservative	MATRIX: soil	MATRIX: water	MATRIX: air	MATRIX: other	# of containers	8015 Modified Gas Diesel	Total Petroleum Hydrocarbons 418.1	Halo. Volatiles 601/8010	Aromatic Volatiles 602/8020	Volatile Organics 624/8240	Semi-Volatile Org 625/8270	Other Pest/PCB 608/8080	Herbicides 615/8150	CAM (17) Metals	TCLP Metals	STLC Metals	Hex Chrome EPA 218.6	CARB 425/Total & Hex Chrome	CARB 426 Multi-metals						RUSH	Remarks

Relinquished by:	Company	Date/Time	Received by:	Company	Date/Time
Relinquished by:	Company	Date/Time	Received by:	Company	Date/Time
Relinquished by:	Company	Date/Time	Received by:	Company	Date/Time

NOTE: Samples are discarded 30 days after date of final report.

White Copy - WCAS • Yellow - Report • Pink - Client

WCAS Job No. _____

5. Customer's company name.

6. Number of samples and description of work requested.

7. Name of individual to whom work is assigned.

8. Invoice date.

9. Invoice No.

10. Disposition of samples after the analyses are completed, i.e., consumed in test, stored, returned to customer via, etc.

11. "Remarks" column for any other special entries. The same information is put into a computerized data base for job tracking.

4 The Job Envelope, Job Number, and Distribution.

ncurrent with entering the above information into the Master g, a job envelope is prepared which will ultimately contain all nformation, data, and results connected with this job. The job nvelope, as shown in Figure 3.1, has space on the face of the nvelope for the following information:

1. Job number.

2. Customer name and address.

3. Date and time sample was received.

4. Technical Contact - to whom the report will be addressed.

5. Phone number of Technical Contact.

6. Purchase order number.

7. Report date.

8. Invoice number and date.

9. Disposition of the sample.

10. Entries for number and types of analyses & charges.

11. Space to indicate if quote and P.O. are enclosed.

ntial job number corresponding to the entry number in the L is placed on the job envelope and on each of the containers associated with this job. All subsequent nce to the sample is made first by this job number, and y the customer identification. After checking in the s, logging the job, preparing the job envelope and tagging mples, the samples are placed in the appropriate storage on and the job envelope is placed in the lab in the numeri- b file.

bs are assigned, at the time of the log-in, to the group or that will be responsible for performing the work. The idual to whom the job is assigned will then check the sam- and make sure that all the information necessary for job ction is present. He/she contacts the customer when neces- to complete this information.

the job information is placed in the Master Log, similar mation is entered into the WCAS Job Tracking computer rk.

gnated Group Leaders schedule work for their groups and assign ers of their groups to various jobs. Analysts frequently out a listing of outstanding jobs from the Job Tracking uter network.

analysts, performing the actual analysis, log the analytical a log book specific to the instrument or area of work. example, each chromatograph has a book used to log each uctive injection (standards, calibrations, blanks, samples,). These books are used to log the following information t the analytical run:

1. Instrument log run number.
2. Job number.
3. Customer.
4. Sample Identification.
5. Date.
6. Analysts name.
7. Other pertinent information.

nilar books are used for all instruments. Special lab notebooks e used to document sample preparation.

ter work is complete, the results and report are assembled by e alyst and checked by the Group Leader. The rough draft of

ce-rt, data, and job envelope are passed on to the typist.

any cases, analysts prepare the report drafts using programs omputers attached to the network. The analyst can enter a lete status and the file name of the draft report into the Job king network described in Section 3.6.

les are put into storage or returned to the customer via the le Coordinator. The final report and invoice are prepared by lab secretaries. The reports are reviewed and signed by the a ior Chemist (or higher), Technical Director, and/or President.

Job Tracking

m the WCAS Job Tracking computer network, periodic outstanding lists are prepared and reviewed with each group. An end-of-month reconciliation is done between the WCAS Job Tracking nputer network and the Master Log Book. Sample result files for final report are integrated into this data base. A hierarchy security measures is password protected. Only certain staff mbers are allowed access to make changes, corrections, or prove reports.

7 Storage of completed samples, reports, data and job envelopes.

mples are returned to the customer or stored for up to 30 days. it becomes necessary to dispose of the samples because the lient cannot take them back, samples containing hazardous materials or having hazardous characteristics are disposed according o the Hazardous Waste SOP. Reports are filed alphabetically ccording to customer name. Job envelopes are filed numerically. ata Packages are filed by analysis and instrument, chronologically. Hard copies of such information are kept on site for 2 ears, and may be kept for an unspecified time off site. Data or jobs known to be involved in litigation are kept in a separate file until we are notified otherwise by the attorney, or for seven years for an in-active file.

4. Laboratory Equipment Summary

1 Organic Analysis: GC, GCMS, LC, LCMS, FTIR

uipment	Number	Mfg/Model	Accessories
MS (Gas romatography- ss Spectrometer)	4	Finn 5100 (3/85) Finn 4500 (9/86) VG Trio 1 (6/89) VG Trio 1000 (5/91)	+/-EI & +/-CI Capillary HP Autosampler-7673 Gas Sampling
:/LC/MS :C-Liquid ıromatography-MS)	1	Extrel ELQ 400 (7/88)	Thermospray ThermaBeam Waters 600MS LC Programmable UV/Vis
*	13	Varian 3700 (6) 6000 (1) 6500 (1) 3400 (4) Hewlett Packard 5890	FID(7), TCD, ECD(9), N/P Thermionic Detector(2), Hall Detector(4), Photo-ionization Dtr.(5) Autosamplers (8) Gas Sampler
ırge and Trap	10	Tekmar LSC 3 (3) LSC 2 (2) LSC 2000 (5)	Fritted and Needle Sparge ALS 2050 ALS 2016 (4)
TIR (Fourier ransform Infrared pectrometer)	1	Nicolet 44	ATR, Gas and Liquid Cells
C	3	Dionex 2010 Spectra Physics Waters 600MS	Variable UV/VIS Fluorescence Scanning UV/VIS Post Column Reactor

GCid#8 (Varian 3400, 7/87) is the primary CLP-Pest GC and Cid#2 (Varian 3700, 4/84) is the back-up.
.ll GCMSs and the GC/LC/MS will be used for CLP work; installa-.ion dates are in parentheses.

4.2 Inorganics Analysis: ICPMS, IC, etc.

Equipment	Number	Mfg/Model	Accessories
ICPMS Inductively Coupled Plasma/ Mass Spectrometry	2	VG Instruments PQ2TurboPlus Fisons/VG PQ2 Turbo STE	Autosampler (3) HP Plotter Peristaltic Pump (4) Flow Injection Pump Hydride Generator Corrosion Resistant Nebulization Sys. (2)
Mercury Analyzer	1	Jerome Cold Vapor/Gold Film Analyzer Model 511	
Ion Chromatography	2	Dionex 2010i	Auto Sampler (2) Conductance Detector Variable UV/Vis Det.
Ph Meter	2	Altex 70 Orion 720A Orion 520A	Selective Ion Electrodes Cyanide Fluoride
UV/VIS Spectrophotometer		Sequoia Turner 340	
Grinder/Pulverizer		Spex 8000	
Tissue Grinder			
Microwave Digestion Sys.		CEM Corp. MDS-2000	Pressure/Temp. Probe Open Vessel Carousel
Specific Conductance		Markson	
BOD		Hach	DO Meter, VWR Incubator
Reacti-Term Evap.	2	Pierce	
Programmable Hot Plate/ Block Digester		PMC 730 (2)	
Turbidometer		Hach 2100A	
COD Reactor		Hach	
Micro-Distillation		Lachat	

3 Other Equipment

ıipment	Number	Mfg/Model	Accessories
nifier	2	Branson 350(1) Branson 250(1)	Ultrasonic Cell Disrupter
ffle Furnace	1	Thermolyne Type 48000	
ens	5	Scientific Products(2) Pacific Combustion VWR Convection(2)	
rolysis it	1	CDS Pyroprobe 100/382	Extended Pyroprobe
cilloscope	3	BK 1522(1) Tektronix 2235(1)	
ectronic ılance	11	Mettler AE100 Sartorious 1265MP Sartorious 1202MP Sartorious L310 5 Ohaus Metler AE240 (semi-micro) Metler PJ3000	
ew oint	1	Alnor 7000	
lash Point	1	GCA Closed Cup	
entrifuge	1	IEC/UV	
team Baths	2	Boekle	
otary Evaporator	2	Yamato	
otory Extractors or WET, EPTox, nd TCLP	3	Anal. Testing (2) Other (1)	ZHE (18)
ressure Filter	1	Millipore	
hillers, Recirc.	9	Neslab (6) VWR (3)	

1 Computers and Data Systems

uipment	Mfg/Model	Accessories
strument ta Systems:	Finnigan Incos (4)	70 MB disks Tape Streamers 30 MB Hard Disk
	Varian 654 (2) Spectra Physics (3) Dionex (4) Fisons Lab-Base (2)	210/340 MB H.D. w/ Jumbo 120 MB Tape Drive
omputer Network perating System	Novell Netware Version 3.11	
etwork Electronics	SMC Elite 3512TP 10Base-T Concentrators (2) SMC Elite16 10Base-T EtherCard Plus (30)	
Vorkstations	assorted 286 and 386 PCs (30)	
File Server	Dell 486/ME, 16MB RAM, 650MB H.D.	
Network Printers	HP LaserJet 2686D, HP LaserJet IIID	

5. Laboratory Quality Control

ality control program consists of both internal and external
; on precision and accuracy of analytical results. The
isibility for maintaining the program rests with the
ient and the QA Coordinator.

Quality Assurance Coordinator

88 the staff position of Quality Assurance Coordinator was
ed to aid in maintaining the Quality Control Program. The
on of the QA coordinator, who reports directly to the Presi-
, is to develop and maintain a QA database for recording data
iplicates, spikes, and laboratory control standards. Period-
ly he will revise QC limits based upon historical data,
te summaries of data on control charts for group leaders and
Technical Director, aid in revising the QA Manual and setting
olicies, and work with each group to facilitate the collec-
, and reporting of QA data. He is also responsible for per-
ing periodic data package audits.

Internal Quality Control

ard bound log book is maintained for each instrument (Section
). This log book is used to document the analysis of each
ple, standard, and blank. The log book is also used to record
ibration and maintenance information. These logs are reviewed
iodically by the Technical Director.

licate and spiked samples as well as standards and blanks are
ged separately into the log book. Generally, 5% of the
coming samples are split and analyzed in duplicate (including
mple preparation) to yield data on the precision of the
alysis. These same samples are also analyzed as matrix spikes
r determining accuracy. This is described in more detail in
ction 5.4. Method Blanks are prepared and analyzed with each
tch of samples. Standard Reference Materials are routinely used
Laboratory Control Standards (LCS).

the statistical analysis of data for precision and accuracy,
rning and control limits are set using 2 and 3 standard
viations (S.D., n-1) respectively. The use of data outside of
rning limits is at the discretion of the Group Leader. If the
ata shows that the error may cause an erroneous conclusion
ecause of its nearness to a critical or regulatory limit, the
ource of error should be corrected and the analysis repeated.
he se of data outside control limits shall be at the discretion

the Technical Director depending on the needs of the client. c: on and accuracy data from duplicates and spikes and data m laboratory control standards are archived in a QC database tten in D-Base III. Control Charts are plotted for up to 20 the latest data points. QC limits are taken from the last 100 a points after discarding points outside 2 SD.

n large numbers of samples are analyzed, a standard is repeated quently. In cases where sample preparation is required, prep a for each job is recorded in a special laboratory workbook or ksheet. This book has duplicate pages so that the original is t in the workbook while a carbon copy is placed in the job elope when the analyses are completed. Worksheets are placed the job envelope.

e specific information on the Quality Control Programs can be nd in Standard Operation Procedures (SOPs) and Methods.

External Quality Control Programs

laboratory participates in:

California Department of Health Services
Environmental Laboratory Accreditation Program (ELAP)
(formerly the Approved Water and Hazardous Waste Testing programs)

Environmental Protection Agency (EPA)PE programs
Water Supply (WS)
Water Pollution (WP)

National Institute of Occupational Safety and Health (NIOSH)
Proficiency in Analytical Testing (PAT) program
administered through the American Industrial Hygiene Association (AIHA)

U.S. Geological Society

Precision and Accuracy in Quality Control

a general QC procedure replicate analyses are performed for ermining precision and spiked samples are analyzed to determine iracy. Warning limits are set at 2 S.D. (95% Confidence its) while control limits are set at 3 S.D. (99% Confidence its). Standards are routinely repeated during analysis to ire instrument calibration.

cision is the measure of the repeatability of an analysis. It letermined by replicate analysis and can be expressed as the itive percent difference (RPD) of a set of duplicate results.

$$RPD = | X1 - X2 | * 100 / \bar{X}$$

re X1 and X2 are the results for the duplicates

$\bar{X}$ is the mean of the two results

racy is a measure of the nearness of a result or the mean of a of results to the true value. It can be expressed as recovery a spiked sample. After the sample has been analyzed in icate to determine a mean concentration, the sample is spiked pproximately double the mean concentration and reanalyzed. very is then calculated as;

$$\% \text{ Recovery} = (S - \bar{X}) * 100 / T$$

e S = analytical value determined after spiking

$\bar{X}$ = analytical value before spiking

T = theoretical value of spike

xample of how precision and accuracy data are used is as ows: A set of 15 water samples are submitted for routine ysis for organochlorine pesticides. One sample from this set elected for duplicate analysis. Two aliquots of this sample analyzed. The results of this set of duplicates are compared revious laboratory data which shows that the relative standard ation for past replicates of this approximate concentration is If the RPD of the duplicates is larger than 12% (within 2 , the set of results are suspect. The method and results are ically reviewed to determine if a problem encountered must be ected. The sample which has been analyzed in duplicate is spiked with the parameters of interest to double the entrations. Previous laboratory data has shown that mean very of organochlorine pesticides from this type of sample is with a standard deviation of 5%. The warning limits are efore 85 - 105%. The recovery of this particular sample is efore used to judge the validity of the set of results as

If precision or accuracy measurements are outside
ir s, the group leader must be notified and the
e orrected. This set of samples can then be
y QC parameter is outside of the Control Limits,
nical Director must be notified.

directly responsible for quality control during
data reduction schemes involve Lotus 123
ach of these incorporates forms for documenting QC
licates, spikes, and LCS samples. The forms
rimental results with warning and control limits,
ilts if they are outside these limits. These forms
ie QC data base. Group Leaders and other super-
ese forms in the data packages. The analysts
for alerting their supervisors of outliers,
ecting the problems, and reanalyzing samples if
iis way the QC program identifies and corrects
ems as they arise. This type of program is in
ams that only have review of QC results by
ved in the analysis. The latter types of pro-
a delay in alerting lab personnel to QC

harts are useful in indicating trends
may be developing. Periodically the QA Coordi-
control charts from the data base.

s

e useful in following trends in analytical
iracy and identifying problem occurrences. In
ter of known value is measured periodically
et, and its measured value is compared with its
From a number of such measurements, a standard
be calculated. Acceptance windows for this
ien be set, typically at 2 SD. Data can then be
with the measured value on the Y-axis and the
the X-axis. The acceptance or warning limits
raph as dotted lines extending from the Y-axis
± 2SD, when X is the mean of several measure-

following data set was taken from the analysis
bes for benzene. One sample out of every 10 was
enzene and the percent recovery calculated.

Benzene % Recovery

103
96
98
100
107
101
98
102
105
101

re calculated and found to be:

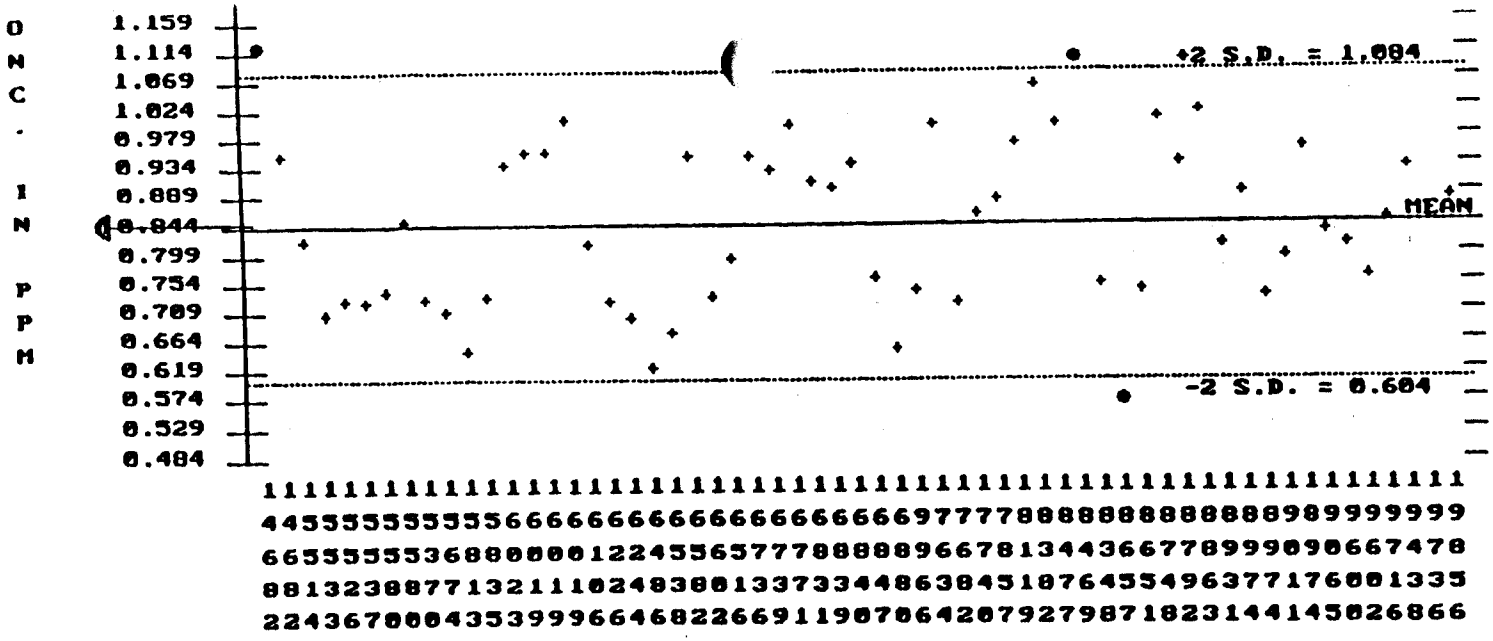
= 101.1
= 3.35

are a graph showing the
to the warning limits (± 2/SD).
e warning limits, this would
have abnormally large errors,
eed to be re-analyzed. The
set of 10 spikes can then be
ture spiked samples by adding
significantly more data is
d be recalculated based on all

enerates control charts and
mple is shown in Fig. 5.3.

fic corrective action steps and
trol situation has been detected,
ervisor and together try to find
d the situation. After fixing it,
the corrective action steps to
l. Usually this means re-preparing
When sample or time limitations
he situation, discuss it with the
client by phone, and flag the

Figure 5.3 Contr


ONC. IN PPM
1.159
1.114
1.069
1.024
0.979
0.934
0.889
0.844
0.799
0.754
0.709
0.664
0.619
0.574
0.529
0.484
+2 S.D. = 1.084
MEAN
-2 S.D. = 0.604

boratory Control Standards (Reference Materials)

es standard reference materials from NBS, EPA, and other to check the accuracy of analysis. Some of the reference ls used are listed in Table 5.2. These materials are used inely check analysis using control limits from previous

Table 5.2 Standard Reference Materials

NBS 1643b	Trace Metals in Water
NBS 1645	River Sediment (for Trace Metals)
NBS 1646	Estuarine Sediment (for Trace Metals)
NBS 1084	Wear-Metals in Lubricating Oil
NBS 1583	Chlorinated Pesticides
NBS 1633	Coal Fly Ash (for Trace Metals)
NBS 2713	Lead in Reference Fuel
NBS 4350	River Sediment (Trace Metals)
NBS 679	Brick Clay (Trace Metals)
NBS 4354	Lake Sediment (Trace Metals)
NBS 2704	Buffalo River Sediment (Trace Metals)
NBS 1572	Citrus Leaves
NBS 1577a	Bovine Liver
NBS 1549	Non-Fat Milk Powder
NBS 981-3	Lead Isotopes
EPA	WP and WS samples
EPA	Trace Metals in Fish
EPA	PCBs in Oil
USGS	Trace Metals and others
WCAS	Volatile Organics
WCAS	Volatile Organics in Gas
WCAS	Herbicides
WCAS	Semi-Volatiles
DORM-1	Dogfish Muscle from Canadian Ref. for trace metals and methylmercury

Data Packages, Data Review, and Audits

data is assembled with QC summaries into data packages by the ysts. A face page summarizing the contents of the data age and any problems is signed by the analyst and a super- r after the data has been reviewed. This package contains face page, a copy of the instrument run log, QC summaries as internal standard recovery, calibration, LCS, duplicate spike results, blanks, raw data, and QA Action Forms. The

ges are then filed by instrument, date, and analysis

% of all data packages undergo an independent audit by
rdinator. Periodic audits are also conducted by the
and the Technical Director. The QA Coordinator submits
y of his data package audits to the President for his
a monthly basis. The President then will initiate any
action required to comply with Quality Standards,
involving the Technical Director, Group Leader, and

the data package Signature Page, QA Action Form, and
ary are at the end of Appendix B. The Quality Assurance
QC procedures, preset QC limits, review of data
and approval of reports is designed to catch errors and
rior to data being reported to clients. However, when
action affects previously reported data, the client is
n writing describing the problem and resolution.

APPENDIX

Appendix A	Resumes: Jim Bonde Isabelle Gundran Craig Hechanova B. Michael Hovanec Jeff Jordan Rex Morris Todd Munoz Dewey Northington Ramona L. Northington Bettina Oelke Noemi Portillo Greg Shaw Michael Shelton Shelley Stuart
Appendix B	SOP for Quality Control
Appendix C	SOP for Legal and Forensic Jobs
Appendix D	Requirements for Special Programs
Appendix E	Job Descriptions

RESUME

ES BONDE
ior Chemist

CATION
, Biochemistry, 1973, California State University - Fuller-
Fullerton, CA.

OYMENT HISTORY

ior Chemist -Present	West Coast Analytical Service, Inc., Santa Fe Springs, CA. Responsible for GC analysis.
ytical Chemist -1984	It Analytical Service, Cerritos, CA. Responsible for GC analysis.
ist -1980	Humko Products, Buena Park, CA. Responsible for chemical testing of various food products using classical wet chemical methods and gas chromatography.
ector -1979	United States Department of Agriculture, Long Beach, CA. Responsible for inspection of meat products, sanitation and quality control of various food processing plants.
ger -1976	Bradbury-Robb, Los Angeles, CA. Responsible for sales, purchasing, and shipping/ receiving.

Bonde has expertise in the GC and GCMS analysis of a variety ifferent sample types, including environmental samples, s, and industrial hygiene samples using various specific ctors with packed and capillary columns. He has also devel- methods for analyzing a variety of samples by GC.

TIONAL TRAINING

an Liquid Chromatography, Varian Inc., 1989.

ature

2-24-93
Date

Initials

WCAS

RESUME

AN

/, 1973, National University, Manila, Philippines.

TORY

West Coast Analytical Service, Inc. Santa Fe Springs, CA. Responsible for performing 601/602 analysis, drinking water, and gas analysis.

Responsible for FTIR, wet chemistry, and inorganic analyses.

Oil Well Research, Inc. Responsible for AA, GC, IR analyses of wastewater, oil and gas samples.

INING

, WCAS, 1989.

2-24-93 Date

I.E.G. Initials

RESUME

:G ECHANOVA
.ytical Chemist

:ATION
., Chemistry, 1984, University of California, Santa Barbara,

:OYMENT HISTORY

lytical Chemist 1-Present	West Coast Analytical Service, Inc. Santa Fe Springs, CA. Responsible for ICPMS sample preparation and analysis.
9-1990	GC Group Leader responsible for supervising GC group.
3-1989	Responsible for GC analyses by EPA methods 601,602, and 608.
nist 5-1988	IT Corporation, Cerritos, CA., Responsible for preparation and analysis of solid and liquid samples for trace organics by GC using EPA methods 608 and 8080, primarily for analysis of pesticides by PCB's.

Hechanova is an Analytical Chemist with expertise in prepara-
n of solid and liquid environmental and industrial samples for
or and trace organic constituents as well as a variety of
sical and chemical properties. His analytical laboratory
er se includes GC, column chromatography, titrations and
ple preparations according to CLP and EPA methods.

ITIONAL TRAINING

omatography, WCAS, 1989.

-Mass Spectrometry SI-8,9,10, Plasma Spec Winter Conference, 1992.

Craig Hechanova
gnature

2/23/93
Date

CH
Initials

WCAS

RESUME

M IAEL HOVANEC
ıior Staff Chemist
ɔject Manager

JCATION
A., Chemistry, 1975, University of California - Riverside, verside, CA., Major emphasis in analytical instrumentation. rtificate in Hazardous Materials Management, 1990, University California - Irvine, Irvine, CA.

PLOYMENT HISTORY

ıior Staff emist	West Coast Analytical Service, Inc. Santa Fe Springs, CA.
92-Present	Project Manager ICPMS and Air Toxics
90-1993	Group Leader ICPMS
89-1990	LCMS Research responsible for Particle Beam and Thermospray Methods Development.
86-1989	Group Leader inorganic section: ICPMS, AA, IC and wet chemistry.
Analytical emist/Engineer 80-1986	Rockwell International (Semiconductor Products Division), Newport Beach, CA. Provided technical support to various internal divisions in the areas of semi-conductor problem solving, Space Shuttle tile adhesion system modification and characteri-zation, environmental methods development and implementation, as well as laboratory design and equipment purchase.
Chemist up Leader 8-1980	West Coast Technical Service, Inc. (Division of IT Corporation), Cerritos, CA. Responsible for the mass spec group. Analyzed microcircuit cavities, high purity gases, and polymer off-gassing.
mist 7-1978	Lever Bros., City of Commerce, CA. Responsible for monitoring the manufacture of detergents, edible oils and margarines.
Chemist 5-1977	Industrial Polymers, Inc., Cucamonga, CA. Responsible for formulation of various isocyanate polymers and hybrids.

B. Michael Hovanec
ɟnature

2/23/93
Date

Initials

:. Hovanec has seventeen years of analytical experience in the :e of trace metals, polymers, semiconductor materials, light ensitive organics, and ultra pure water systems. His analytical iemistry background includes GCMS, GC, LC, LCMS, MS, Thermal ialysis, AA, ICP, ICPMS, IR/FTIR, IC, UV/VIS and SEM/EDAX. He s an expert in GCMS, ICPMS, and LCMS analysis. He has extensive lectronics experience in maintaining and trouble shooting many /stems at the component level. Mr. Hovanec's current research iterests are in ICPMS and Hyphenated ICPMS techniques.

DDITIONAL TRAINING

CP-Mass Spectrometry I,II,III, Plasma Spec Winter Conference, 1987.

ab Application of 1-2-3 etc: Beyond the Basics, ACS Short Course, 1988.

3 Instruments ICPMS PlasmaQuad Electronics Maintenance Course, 1988.

innigan MAT Institute, INCOS 50 GC/MS Data Systems Course, 1989.

CP-Mass Spectrometry SI-8,9,10, Plasma Spec Winter Conference, 1992.

RESENTATIONS AND PUBLICATIONS

.J. Northington & B.M. Hovanec, "ICPMS Analysis of Reference Materials," Rocky Mountain Conference, 1987.

.J. Northington & B.M. Hovanec, "Analysis of Environmental Reference Materials using ICPMS," Winter Conference on Plasma Spectrochemistry, 1988.

.M. Hovanec, "Particle Beam LCMS in Environmental Analysis," Fifth Annual Hazardous Material Management Conference/West, HAZMAT/West, 1989.

.J. Northington, B.M. Hovanec, & M. Shelton, "Particle Beam LCMS in Environmental Analysis," 28th ACS Pacific Conference, Pasadena, CA., 1989.

Northington, B.M. Hovanec, & M. Shelton, "Finnigan INCOS Data System," WCAS, 1989.

Northington, B.M. Hovanec, & M. Shelton, "Particle Beam LCMS in Environmental Analysis," Am. Environmental Lab, 10/90, 34-41 (1990).

Hovanec, "Hazardous Substance Chemistry," California State University, Long Beach, University Extension Services, Instructor 1992-Present.

RESUME

J F JORDAN
Chemist

EDUCATION
B.S., Microbiology, 1984, California State University - Long Beach, Long Beach, CA.

EMPLOYMENT HISTORY

Chemist 1988-Present	West Coast Analytical Service, Inc. Santa Fe Springs, CA. Responsible for analyzing samples using IC and HPLC including Anions, Cations, and Hexavalent Chromium, Carbamate Pesticides, etc.
Analyst 1986-1988	Applied Microbiological Services, Inc., Signal Hill, CA. Performed various microbiological and chemical testes on ultra-pure and city water including Direct Epifluorescent Microscopy, Ion Chromatography and Total Organic Carbon.
Quality Control Microbiologist 1985-1986	Gregg Foods, Garden Grove, CA. Performed standard microbiological tests for all products produced.
Laboratory Technician 1984-1985	Allergan Pharmacuetical, Inc. Irvine, CA. Assisted in chronic and sub-actue research and development studies related to eye and skin care products.

Mr. Jordan is an expert in the analysis of organic and inorganic anions as well as hexavalent chromium using ion chromatography. His experience also includes numerous LC analyses, including carbamates, aldehydes, glyphosate, PAH's, TDI, MDI, Diquat and acrylamide; as well as an extensive number of wet chemistry techniques relating to the analysis of water and soil.

ADDITIONAL TRAINING

Chromatography, WCAS, 1989.

Jeff Jordan
Signature

2/24/93
Date

JJ
Initials

RESUME

)RI , Ph.D.
:y Assurance Coordinator

TION
. Analytical Chemistry, 1977, Iowa State University, Ames,

Organic Chemistry, 1971, Oklahoma State University, Still-
, OK.
Chemistry, 1969, Oklahoma State University, Stillwater, OK.

YMENT HISTORY

:y Assurance inator Present	West Coast Analytical Service, Inc. Santa Fe Springs, CA. Develops and maintains a QA database for recording data duplicates, spikes, and laboratory controls and standards. Works with the technical director in revising the QA Manual and setting QA policies. Works with analytical groups to insure the collection and reporting of QA data. Performs QA audits on data packages.
r Staff st 1993	Responsible for trace metals analysis using ICPMS.
rch Associate 19	UNOCAL Science and Technology Research Center., Brea, CA. Responsible for the Thermal Analysis Unit operations including DSC, TMA, TGA, DTA, HP-DSC, HP-TGA and TGA/MS, Network LAN administrator, instrument repair, computer interfacing, methods development in NMR, ESR, UV/VIS, FTIR, Raman and MS.

orris is an expert in thermal analysis, many spectrochemical s, as well as mini and PC computer systems and LAN's. He orked in such diverse fields as environmental analysis, ysts, polymers, agricultural chemicals, lubricants, fuels, ceramics, oil shale and oil field problems. He is experi- in instrument repair as well as instrument interfacing with ters and computer networking.

ature

4/5/93
Date

Initials

RESUME

TO[redacted] P. MUNOZ
Chemist

EDUCATION
B.A., Biology, 1991, California State University - Fullerton, Fullerton, CA.

EMPLOYMENT HISTORY

Chemist 1992-present	West Coast Analytical Service, Inc. Santa Fe Springs, CA. Resonsible for ICPMS sample preparation.
Chemical Analyst 1990-1992	Golden West Refining Company. Santa Fe Springs, CA. Organized and managed chemical analysis of wastewater, read and interpreted results, led certification process for mercaptans in wastewater.

Mr. Munoz is an analytical chemist with experience in preparation of solid and liquid environmental and industrial samples for minor and trace organic consitituents as well as a variety of physical and chemical properties. His analytical laboratory expertise includes mercury analysis by cold vapor/gold film absorption and sample prep for ICPMS using microwave digestion, traditional acid digestions and leaching methods. Additionally, M[redacted] Munoz is experienced in the analysis of wastewater using t[redacted]ditional wet chemistry and spectrophotometric methods.

Todd Munoz
Signature

3-9-93
Date

TM
Initials

RESUME

DEWEY J. NORTHINGTON, Ph.D.
President

EDUCATION
Ph.D. Organic Chemistry, 1970, University of Florida, Gainesville, FL.
B.S., Chemistry, 1967, Louisiana State University, Baton Rouge, LA.

EMPLOYMENT HISTORY

President/ Technical Dir. 1984-Present	West Coast Analytical Service, Inc. Santa Fe Springs, CA. Responsible for operation of the laboratory.
Technical Dir. 1974-1984	IT Analytical Services, (previously West Coast Technical Service, Inc.) Cerritos, CA. Responsible for directing the laboratory, quality control, safety, contracts and proposals.
Sr. Research Scientist 1972-1974	Carnation Company, Van Nuys, CA. Responsible for basic and applied research in food, flavor, and analytical chemistry, developing GC, LC, and GCMS techniques.
Postdoctoral Fellow 1971	Syva Research Institute, Palo Alto, CA. Conducts basic research in organic photochemistry, exploring the chemistry of photochemically sensitive protective groups.

Dr. Northington is an expert in trace organic analyses, especially GCMS, GC, LC, MS, MNR, ICPMS, and IR. His experience extends from AA, emission, X-Ray analyses, surface analysis techniques, and computers, to lab automation. For several years he has been directing work done under contract with EPA. These programs include GCMS, GC, LC, ICPMS, and AA analysis of soil, water, wastewater, chemical wastes, and other environmental samples, methods development and validation, and quality control. He also has experience in the fields of industrial hygiene, chemistry, landfill gas recovery, pesticides, hazardous wastes, and air and water pollution. He is responsible for the QA program and certification of the laboratory by AIHA, California DOHS, and others.

Dr. Northington's current research interests include ICPMS and LCMS.

Signature	2-23-93 Date	Initials

ADDITIONAL TRAINING

Finnigan INCOS GCMS Data System, Finnigan Corp., 1977.

Statistical Approach to Industrial Hygiene Sampling and Analysis, American Industrial Hygiene Association (AIHA), 1978.

VG PlasmaQuad Operators Course, VG Elemental, 1981.

Liquid Chromatography-Mass Spectromety, American Chemical Society (ACS), 1988.

PUBLICATIONS AND PRESENTATIONS (since 1987)

D.J. Northington & B. M. Hovanec, "ICPMS Analysis of Reference Materials," Rocky Mountain Conference, 1987.

D.J. Northington, "Inductively Coupled Plasma-Mass Spectrometry for the Analysis of Metals on Membrane Filters," Am. Ind. Hyg. Assoc. J., 48, 977-979 (1987).

D.J. Northington, "Chromatography," WCAS, 1989.

M. Shelton, & D.J. Northington, "Determining Total Organic Lead in Waters and Soils by ICPMS," ACS Pacific Conference, Pasadena, 1989.

D.J. Northington, B.M. Hovanec, & M. Shelton, "Finnigan INCOS Data System," WCAS, 1989.

D.J. Northington, "Particle Beam LCMS Analysis of Pesticides," California Dept. of Food and Agriculture Conference, 1989.

D.J. Northington, B.M. Hovanec, & M. Shelton, "Particle Beam LCMS in Environmental Analysis," Am. Environmental Lab, 10/90, 34-41 (1990).

D.J. Northington, "Introduction to ICPMS," Environmental Tutorial, ALEX Conference, November 1992.

D.J. Northington, "Hazardous Substance Chemistry," California State University , Long Beach, University Extension Services, Instructor 1992-Present.

D.J. Northington & Ken Reich, "Arsenic in Groundwater by ICPMS," submitted to Environmental Science and Technology, January 1993.

ADDITIONAL TRAINING-TECHNICAL

LCMS, ACS, 1988.

Chromatography, WCAS, 1989.

Organic Chemistry, Hazmacon, 1989.

Hazardous Substance Chemistry, WCAS, 1993.

RESUME

IONA LEE NORTHINGTON
CFO/Laboratory Director

EDUCATION
B.S., Accounting, 1979, California State University - Dominguez Hills, Dominguez Hills, CA.

EMPLOYMENT HISTORY

Laboratory Director 1986-Present	West Coast Analytical Service, Inc. Santa Fe Springs, CA. Responsible for financial controls, accounting policies and procedures, marketing, and administrative practises of the lab.
Controller 1984-1986	Responsible for financial and accounting administration.
Controller 1983-1986	Goodwin Company, Garden Grove, CA. Responsible for finaincial, accounting and office administration, including extensive cost accounting system.
Senior Accountant	Enyedi & Calloway, Certified Public Account ants (now known as McGinnes, Knechtel and McIntyre) Pasadena, CA. Responsible for 45 write-up clients through tax returns and two audit clients.
Office Manager	West Coast Technical Service, Inc. Cerritos, CA. Responbile for accounting and administration.

As an accountant and administrator, Ms. Northington has experience in the chemical manufacturing and testing laboratory industries. She is currently a Board Member of the American Council of Independent Laboratories (ACIL) and the Association of California Testing Laboratories (actLABS). She served as co-chairperson for the ACIL Environmental Section from 1987-1991.

Ryana Lee Northington	3-1-93	RN
Signature	Date	Initials

ADDITIONAL TRAINING-TECHNICAL

LCMS, ACS, 1988.

Chromatography, WCAS, 1989.

Organic Chemistry, Hazmacon, 1989.

Hazardous Substance Chemistry, WCAS, 1993.

RESUME

B[illegible]INA OELKE
Senior Chemist

EDUCATION
B.S., Chemistry, 1985, University of California, Irvine, CA.

EMPLOYMENT HISTORY

Senior Chemist 1992-Present	West Coast Analytical Service, Inc. Santa Fe Springs, CA. ICPMS Group Leader responsible for trace metals analysis.
1990-1992	Chemist in GCMS performing volatile and semi-volatile organics analyses.
1990	Chemist in GC group performing 601/602, herbicide, and pesticide analyses.
1988-1990	Responsible for ICPMS analysis.
Product Specialist 1985-1988	Applied Research Laboratories, Brea, CA. Responsible for providing technical support to customers, sales representatives and field service concerning AA, ICP-AES and DCP-AES.
Chemist Product Specialist 1985-1986	Beckman Instruments, Brea, CA. Performed applications studies for customers using DCP-AES. Generated technical literature.
C[illegible]emist 1[illegible]5	Beckman Instruments, Irvine, CA. Implemented applications for designing optical emission accessories for DCP-AES.

Ms. Oelke has over seven years experience in the area of inorganic analysis. She is also proficient in performing many other types of analyses including the EPA methods for pesticides, herbicides, VOA's and BNA's in water, air, hazardous wastes, and drinking water.

ADDITIONAL TRAINING

ICPMS Theory Short Course, Plasma Winter Conference, 1988.

Mass Spectral Interpretation, Finnigan MAT Institute, 1990.

Bettina Oelke
Signature

2-24-93
Date

B.O.
Initials

RESUME

NOEMI PORTILLO
Chemist

EDUCATION
B.S., Chemistry, 1992, University of California, Los Angeles, Los Angeles, CA.

EMPLOYMENT HISTORY

Chemist 1992-Present	West Coast Analytical Service, Inc. Santa Fe Springs, CA. Responsible for wet chemical and spectrophotometric methods of analysis.
Laboratory Assistant 1988-1992	Dept. of Physiology, UCLA, Los Angeles, CA. Prepared assays and buffers, performed experiments on animal tissue to determine muscle architecture and effects of space-flight, computed data.

Noemi M. Portillo — Signature

3/9/93 — Date

N.M.P. — Initials

RESUME

[illegible]G R. SHAW
[illegible]nior Chemist

EDUCATION
M.S., Chemistry, 1987, California State University - Long Beach, Long Beach, CA.
B.S., Chemistry, 1982, San Diego State University, San Diego, CA.

EMPLOYMENT HISTORY

Chemist	West Coast Analytical Service, Inc. Santa Fe Springs, CA.
1992-Present	GCMS Group Leader.
1987-1992	Responsible for GCMS analyses.
Graduate Assistant 1986-1987	California State University - Long Beach, Long, Beach, CA. Thesis research "Kinetics and Mechanism of Hg(II) Halide Promoted Hydrolysis of Benzaldehyde O-Ethyl S-Phenyl Acetal."
Research Associate 1984-1986	Molecular Ecology Institute, CSULB. Responsible for PAH analysis of marine sediments and fauna.

Mr. Shaw is proficient at preparing and analyzing environmental samples using a variety of techniques, including HPLC, GC, and [illegible]MS.

ADDITIONAL TRAINING

Finnigan INCOS Data System, WCAS, 1989.

Advanced Data System Techniques for the Triol, VG Instruments, 1990.

PUBLICATIONS AND PRESENTATIONS

J.L. Jensen and G.R. Shaw, "The Effects of Mercuric Halide Complexes on the Hydrolysis of Benzaldehyde O-Ethyl S-Phenyl Acetal," Abstracts, Pacific Conference of Chemistry and Spectroscopy, October 28-30, 1987, Irvine, CA. No. 185, p. 76.

[signature]	3.2.93	[signature]
Signature	Date	Initials

James L. Jensen, Richard C. Kanner, and Gregory R. Shaw, "A Simple Method for Extending the Range of Pseudo-Order Kinetic Measurements," Int. J. Chem. Kin., 22, 1211 (1990).

James L. Jensen, David F. Maynard, Gregory R. Shaw, Et. al., "Chemical Reactions Mediated by Heavy Metal Ions. 2. Mecury Ligation Effects on the Hg(II)-Promoted Hydrolyses of Benzaldehyde O-Ethyl S-Ethyl and S-Phenl Acetals," J. Org. Chem., 57, 1982 (1992).

RESUME

MICHAEL J. SHELTON
Senior Staff Chemist
Technical Director

EDUCATION
B.S., Chemistry, 1982, University of California, Irvine, CA.

EMPLOYMENT HISTORY

Senior Staff Chemist 1990-Present	West Coast Analytical Service, Inc., Santa Fe Springs, CA. Technical Director.
1989-1990	Group Leader ICPMS and Inorganic.
1987-1989	Group Leader GCMS.
1985-1987	Responsible for GCMS analyses.
Senior Chemist 1982-1985	IT Analytical Service, Cerritos, CA. Responsible for GCMS, primarily commercial and non-routine problems.
Lab Assistant 1980-1981	UC Irvine, Irvine, CA.

Mr. Shelton is an expert in GCMS and LCMS, mass spectral interpretation, and applications to non-routine sample types and problems. He has several years experience in EPA CLP protocols. Mr. Shelton is also knowledgeable in FTIR, GC, LC, IC, ICPMS, and organic chemical analysis. His research interests are new mass spectrometry techniques.

ADDITIONAL TRAINING

Mass Spectral Interpretation, Finnigan Institute, 1984.
Electronics for MS, ASMS Short Course, 1987.
LCMS, ACS Short Course, 1988.
Thermospray LCMS, Vestec Corp., 1989.
Supercritical Fluid Extraction, ACS Short Course, 1992.

Signature

2-23-93
Date

Initials

PUBLICATIONS AND PRESENTATIONS

M. Shelton & D.J. Northington, "Organic Lead by ICPMS," Pacific Conference, Oct. 1989.

D.J. Northington, M. Shelton, & B.M. Hovanec, "Finnigan INCOS Data Systems," WCAS, 1989.

D.J. Northington, B.M. Hovanec, & M. Shelton, "Particle Beam LCMS in Environmental Analysis," Am. Environmental Lab, 10/90, 34-41 (1990).

M. Shelton & D.J. Northington, "Aromatic Sulfonic Acids in Water by GCMS", FACSS, 1991.

D.J. Northington, M. Shelton, & M. Hovanec, "Hazardous Substance Chemistry," California State University, Long Beach, University Extension Services, Instructor 1992-Present.

RESUME

SHELLEY D. STUART
Senior Chemist
Organics Manager

EDUCATION
B.A., Chemistry, 1984, Indiana University of Pennsylvania.

EMPLOYMENT HISTORY

Senior Chemist 1990-Present	West Coast Analytical Service, Inc. Santa Fe Springs, CA. Organics Manager responsible for scheduling the workload, training, and quality control of data for GC, GCMS, IR and wet chemistry departments.
1989-1990	Group Leader GCMS.
1986-1989	Group Leader GC and FTIR
1984-1986	Responsible for routine GC, IC and FTIR analysis.
Intern 1983	Philadelphia Police Department, Philadelphia, PA. Responsible for IR and GC analysis of forensic samples such as fire debris, blood and stains, hair, etc.

Mrs. Stuart performs many GC, GCMS, FTIR, HPLC, and IC analyses. She is experienced with the EPA methods for pesticides, herbicides, anions, cations, carbamates, VOA's and BNA's in water, soil, and hazardous wastes. She is also familiar with industrial hygiene and air analysis using GC and GCMS.

ADDITIONAL TRAINING

Maintaining and Troubleshooting Chromatographic Systems, ACS Short Course, 1986.

Capillary Gas Chromatography: Techniques and Problem Solving, ACS Short Course, 1988.

Basic course in Ion Chromatography, Dionex, 1988.

Finnigan INCOS Data System, WCAS, 1989.

PC/IR Training Course, Nicolet Instrument Corporation, 1989.

Environmental Compliance for Laboratories, Association of Bay Area Governments, 1992.

Shelley Stuart	2/24/93	SS
Signature	Date	Initials

PUBLICATIONS AND PRESENTATIONS

S. Stuart, Safety Meetings for WCAS Employees, on a bimonthly basis, WCAS, 1993.

APPENDIX B

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Phenol 98
Sulfide 98
Total Organic Carbon 98
Alkalinity 98
Ammonia 99
Biochemical Oxygen Demand 99
Conductivity 99
Chemical Oxygen Demand 99
Hardness 99
Karl Fischer Water 99
Residual Chlorine 100
Surfactant 100
Total Dissolved Solids 100
Total Suspended Solids 100
Turbidity 100

EQUIPMENT QC PARAMETERS

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Introduction

Quality is a prerequisite in all of our work. This policy outlines the use of warning and control limits for Quality Control results. These warning and control limits are used for analyses when not superseded by contractual obligations such as the EPA/CLP contract. There are three types of limits described in the following pages. Where limited number of data points (<20) are available, the limits are expressed as Guidelines. When data exceed these Guidelines, notify your supervisor. Where sufficient data has been obtained (>20 points), notify your Group Leader whenever Warning Limits (2 S.D., 95% Confidence) have been exceeded. Notify the Technical Director whenever Control Limits have been exceeded (3 S.D., 99% Confidence).

The various QA parameters are described below. The frequency that each of these are performed is dictated by SOPs, but general guidelines on frequency are outlined in Table 1.

1. Precision and Accuracy

   a) At least one sample in each batch of 20 analyses will be spiked in duplicate with representative analytes to determine % recovery and relative percent difference. Alternatively, 1 duplicate and 1 spike may be performed in each batch of 20 analyses.

   b) In cases where surrogates or internal standards are used in routine analyses such as VOA, BNA, and Pesticides (608), duplicate spikes need only be performed on one sample out of every 20 even if only small batches are processed at a time.

   c) In some cases, spiked samples are not appropriate, (gas analysis, high level [%] analysis, etc.). Whenever possible, other types of quality control data should be generated to assure a quality result.

Table 1. QC Frequency

Unless precluded by agency, program, or contractual obligations, follow the guidelines below to determine the frequency of analysis for blanks, standards, spikes, and LCS.

I. Whenever sample batches are large (20+) or frequent (daily)

A. analyze a blank with each sample preparative batch,

B. see SOP for initial and continuing calibration frequency,

C. MS and MSD every 20 samples (or Dup/MS),

D. an LCS at least once with every initial calibration

II. Less than 20 samples, more than one per week

A. initial calibration and LCS at least one per month

B. continuing calibration at least daily within SOP guidelines of initial calibration

C. blank with each preparative batch

D. Dup/MS or MS/MSD once per week or 5 - 10 % of samples

III. Less than 20 samples, less than one per week

A. initial calibration and LCS at least once per month

B. continuing calibration at least daily within SOP guidelines of initial calibration

C. blank with each preparative batch

D. Dup/MS or MS/MSD once per month or 5 - 10 % of samples

IV. Less than 20 samples, less than one per month

Full QC with every batch. Price should reflect blank, calibration, LCS, MS and MSD.

2. Instrument Calibration

Instrument calibration must be performed frequently for quantitative analysis.

Calibration should be performed with a frequency which will assure that the response factors are at least as reproducible as the analytical error for the method or the client's needs. For example; for an external standard GC method, 2 sigma variations are usually ± 15%. Calibrations should be repeated as frequently as necessary to ensure that the response changes less than 15%. Some methods are more or less reproducible than this and the frequency of calibration may vary from every few minutes to a minimum of one per day.

Initial multipoint calibration must meet specifications set in the SOP. Usually this means that the linearity coefficient (R^2) is greater than 0.995 or the RSD of response factors is less than 10 - 20%. Continuing calibration must then agree with initial within 5 - 20% (see SOPs for individual guidelines).

Calibration standards should be initialed by preparer, dated, and serialized.

3. Method Blanks

Method blanks must be generated with every analysis. These must include a blank taken through any sample preparation, clean-up, and analysis stage. Use the same guidelines for the frequency of blanks as in #1 above. Whenever contamination is found in blanks, notify your supervisor. Blank contamination must be generally less than agency reporting limits or less than five times WCAS reporting limits.

4. QC Limits

QC limits apply to data which are greater than 20 x detection limits. At less than 20 x detection limits, errors may exceed QC limits.

Whenever QC data is outside warning limits; (1) notify your supervisor, (2) try to determine the cause of the error and correct the problem, and (3) repeat analysis of samples if necessary to ensure quality data. Note, the first thing you should do is to notify your supervisor. The use of data outside warning limits (2 S.D.) is at the discretion of the Group Leader. The use of data

outside of Control Limits (3 S.D.) is at the discretion of the Technical Director.

5. Log Book

A log book must be kept with each instrument to document chronologically which samples were analyzed and instrument maintenance performed. The Technical Director will periodically review these notebooks.

6. Source and Preparation of Standards

Calibration standards are prepared from reagents of documented purity or grades. Each stock solution and calibration standard shall be documented in a standards log-book including the manufacturer of the chemical, lot #, and purity. The weight and/or volume of each component in the standard should be documented. Each solution made in this way is given a unique serial number. Each person preparing a standard shall initial and date the entry in the log book.

7. Good Laboratory Practices

To prevent contamination of samples and extracts either use virgin containers that have been shown free from contamination or follow SOP procedures for cleaning (see SOP Manual-Glassware Cleaning).

8. Laboratory Control Standards (LCS)

LCS are samples from NTIS (formerly NBS), EPA, USGS, or other sources which mimic real sample matrixes with known concentrations of analytes. These are used with each sample set must meet additional QC limits. There may be two types of LCS: (1) Initial Calibration Verification (ICV or CCV) where the LCS is simply injected or (2) where the sample goes through the extraction process.

9. Corrective Action

Table 2 defines out of control situations for various analytical parameters (blank, standards, LCS, and MS/MSD). It also lists corrective action steps required to bring the analysis back under control.

10. Additional Policies

Other policies and information can be found in the Quality Assurance Manual or individual method SOP's.

Table 2. Out of Control Situations

In each case notify your supervisor and try to correct the problem before proceeding. Additional corrective action steps may be outlined in SOPs. If corrective action is precluded by sample or time limitations (rush work), (a) notify your supervisor, (b) notify the client, and (c) flag the results on the report. Choose from the corrective action options listed below the ones that best suit the situation.

Analytical Parameter	Out of Control	Corrective Action Options
Blank	a) > Agency Required Reporting Limits (DLR) b) > 5X WCAS Reporting Limits c) $MeCl_2$ in VOAs by GCMS Water > 10 ppb Soil > 50 ppb d) Phthalate in BNAs by GCMS Water > 8 ppb Soil > 100 ppb	Reprep and reanalyze samples, if possible
Initial Calibration	a) $R^2 < 0.995$ * b) Resp Factor > 20% RSD * (see SOP for limits.)	a) For rarely observed analytes, proceed if analyte not detected b) Repeat bad points until initial calibration meets specs.
Continuing Calibration	Calculated amount in standard > 10-20% error (see SOP)	a) Repeat continuing calibration, or b) Repeat initial calibration
Lab Control Standards	See QAM, Appendix B	1) repeat LCS 2) repeat initial calibration and LCS analysis
Surrogate	See QAM, Appendix B	1) if surrogate not obscured by matrix a) re-inject sample b) re-prep. sample c) dilute and

2) if surrogate is obscured by matrix or corrective action fails, flag data

<u>Out of Control Situations</u> (cont'd)

See QAM, Appendix B

a) If calibration and blanks are prepared as a sample (VOAs, MBAS, etc.), flag data as matrix problem. When a calibration standard is prepared as a sample, this may be reported as additional QC as a spiked blank.

b) If calibration stds are not prepared as a sample but sample prep is simple, run a spiked blank (or a prepared LCS).

c) Re-prepare samples, MS/MSD, and a spiked blank. If sample

MS/MSD continues out of control but the blanks and spiked blanks are in control, report as a matrix problem and flag the data.

QUALITY CONTROL LIMITS FOR GC

)LATILE ORGANICS IN DRINKING WATER, EPA METHOD 502.2

Analyte	N	MATRIX SPIKE PERCENT RECOVERY Quality Control Limits Warning	Control
1,1-Dichloroethylene	18	36 - 123	15 - 144*
Benzene	52	57 - 140	36 - 160
Chlorobenzene	22	82 - 123	72 - 133
Trichloroethylene	50	66 - 116	53 - 128
Toluene	20	67 - 121	54 - 134
1,1-Dichloroethane	30	62 - 123	47 - 138
1,2-Dichloroethane	30	58 - 122	42 - 138
1,4-Dichlorobenzene	30	63 - 119	50 - 134
,1,1-Trichloroethane	30	69 - 132	53 - 147
Carbon Tetrachloride	30	77 - 155	59 - 175
Dibromochloromethane	30	64 - 126	49 - 142
Bromoform	22	54 - 130	35 - 150
Bromodichloromethane	30	69 - 103	61 - 112
Chloroform	30	56 - 110	43 - 123
Vinyl Chloride	26	67 - 133	50 - 150

	MATRIX SPIKE RELATIVE PERCENT DIFFERENCE Quality Control Limits
All Analytes	< 25%

* Updated 4/93

aboratory Control Standard Results: 502 SRM

nalyte	N	Ideal Value	Lower Warning Limit	Upper Warning Limit	Lower Control Limit	Upper Control Limit
,1,1-TCA	26	0.50	0.33	0.57	0.27	0.63
,1-DCE	26	0.50	0.33	0.60	0.26	0.67
,2-DCA	26	0.50	0.34	0.46	0.31	0.50
,4-DCB	26	0.50	0.29	0.61	0.21	0.69
enzene	26	0.50	0.38	0.58	0.33	0.63
HBr3	24	0.50	0.33	0.67	0.25	0.75
Cl4	26	0.50	0.36	0.65	0.29	0.72
HBr2Cl	25	0.50	0.33	0.61	0.25	0.69
CHBrCl2	25	0.50	0.30	0.56	0.23	0.62
CHCl3	26	0.50	0.21	0.63	0.11	0.73
TCE	26	0.50	0.35	0.59	0.29	0.65
VC	24	0.50	0.33	0.67	0.25	0.75

QUALITY CONTROL LIMITS FOR GC

VOLATILE ORGANICS, EPA METHOD 601/602 (8021)

	Surrogate % Recovery			
	Water		Soil	
Bromofluorobenzene	Warning	Control	Warning	Control
Hall Detector	84-119	75-128	71-126	58-138
PID	90-106	86-110	82-110	75-117

Repeat the analysis if the surrogate is outside of control limits.

SOIL

		RPD MATRIX SPIKES Quality Control Limits	
Analyte	N	Warning	Control
1,1-DCE	83	< 24	< 36
BENZENE	100	< 21	< 31
CHLOROBENZENE	100	< 16	< 25
TCE	83	< 22	< 34
TOLUENE	100	< 16	< 25

WATER

		RPD MATRIX SPIKES Quality Control Limits	
Analyte	N	Warning	Control
1,1-DCE	78	< 37	< 55
BENZENE	100	< 26	< 39
CHLOROBENZENE	100	< 12	< 18
TCE	78	< 15	< 22
TOLUENE	68	< 12	< 18

VOLATILE ORGANICS, EPA METHOD 601/602 (8021), cont'd

SOIL

Analyte	N	MATRIX SPIKE PERCENT RECOVERY Quality Control Limits Warning	Control
1,1-DCE	100	41 - 141	16 - 166
BENZENE	100	60 - 152	36 - 175
CHLOROBENZENE	100	66 - 127	52 - 140
TCE	100	64 - 123	50 - 138
TOLUENE	100	58 - 136	39 - 152

WATER

Analyte	N	MATRIX SPIKE PERCENT RECOVERY Quality Control Limits Warning	Control
1,1-DCE	100	42 - 140	18 - 163
BENZENE	100	60 - 153	36 - 175
CHLOROBENZENE	100	80 - 125	69 - 136
TCE	100	70 - 126	55 - 140
TOLUENE	100	61 - 121	46 - 136*

* Updated 4/93

VOLATILE ORGANICS, EPA METHOD 601/602 (8021), cont'd

Laboratory Control Standard Results: 601/602 SRM

Analyte	N	Cert Value	Lower Control Limit	Lower Warning Limit	Upper Warning Limit	Upper Control Limit
1,1,2-TCA	100	81.2	51	63	111	123
1,2-DCA	100	59.5	30	38	70	77
1,2-DCB	100	28.1	14	17	32	35
Bromoform	100	21.4	6	11	28	32
CCl_4	100	48.0	24	30	55	62
$CHBrCl_2$	100	66.5	27	36	74	83
Ethylbenzene	100	100.8	61	73	122	134

TOTAL PETROLEUM HYDROCARBONS , EPA METHOD 8015

urrogate for Water Macro-extraction	% Recovery
Tetradecane	65-135%

RPD MATRIX SPIKES
Quality Control Limits

SOIL

Analyte	N	Warning Limits	Control Limits
DIESEL FUEL	100	< 11	< 17
GASOLINE	100	< 9	< 14

WATER

Analyte	N	Warning Limits	Control Limits
DIESEL FUEL	36	< 17	< 25
GASOLINE	27	< 17	< 25

MATRIX SPIKES
PERCENT RECOVERY
Quality Control Limits

SOIL

Analyte	N	Warning	Control
DIESEL FUEL	100	85 - 115	77 - 122*
GASOLINE	100	88 - 110	82 - 116*

WATER

Analyte	N	Warning	Control
DIESEL FUEL	100	61 - 111	49 - 123*
GASOLINE	100	52 - 133	32 - 153*

* Updated 4/93

VOLATILE ORGANICS IN AIR by GC (CALDERON ANALYSIS)

GAS

Analyte	N	SAMPLE RPD Quality Control Limits Warning	Control
1,1,1-TCA	35	< 38	< 57
BENZENE	24	< 52	< 78
CARBON TET	16	< 15	< 23
CHLOROFORM	8	< 41	< 61
PCE	22	< 37	< 55
TCE	24	< 43	< 64

MAJOR FIXED GASES by GC

GAS Analyte	N	RPD Quality Control Limits Warning	Control
CO_2	59	< 11	< 17*
CH_4	63	< 7	< 11*
N_2	66	< 5	< 8*
O_2	62	< 5	< 8*

SRM: NGPA GAS STANDARD

ANALYTE	N	MEAN VALUE	EXPECTED VALUE	Quality Control Limits Warning Limits	Control Limits
CO	37	0.47	0.50	0.34 - 0.59	0.28 - 0.65*
CH_4	37	1.98	2.00	1.70 - 2.30	1.60 - 2.40*
	37	78.3	77.0	75.5 - 80.6	74.3 - 81.8*
O_2	37	19.3	20.5	17.9 - 20.8	17.2 - 21.5*

* Updated 4/93

POLYCHLORINATED BIPHENYLS by GC

SC AND WATER

Analyte	N	3 S.D. (99 %) Limits Matrix Spike % RECOVERY
1254	45	54 - 158
1260	45	59 - 130

ORGANOCHLORINE PESTICIDES by GC, EPA 608 (8080)

Surrogate	% Recovery Control Limits Soil	Water
Tetrachloro-m-xylene	60 - 150	33 - 101
Decachlorobiphenyl	60 - 150	49 - 136

SOIL

Analyte	N	RPD Matrix Spikes Quality Control Limits Warning	Control
ALDRIN	81	< 14	< 21
DDT	79	< 23	< 34
DIELDRIN	80	< 21	< 32
ENDRIN	84	< 15	< 22
HEPTACHLOR	80	< 14	< 21
LINDANE	82	< 13	< 19

WATER

Analyte	N	RPD Matrix Spikes Quality Control Limits Warning	Control
ALDRIN	41	< 20	< 29
DDT	41	< 17	< 26
DIELDRIN	41	< 21	< 31
ENDRIN	37	< 16	< 25
HEPTACHLOR	40	< 21	< 32
LINDANE	41	< 15	< 22

RGANOCHLORINE PESTICIDES by GC, EPA 608 (8080), cont'd

)IL

MATRIX SPIKES
PERCENT RECOVERY
Quality Control Limits

alyte	N	Warning	Control
DRIN	100	76 - 118	67 - 129
4-DDT	100	59 - 149	42 - 160
ELDRIN	100	62 - 131	45 - 147
DRIN	100	78 - 132	65 - 145*
PTACHLOR	100	75 - 121	62 - 134
NDANE	100	77 - 124	65 - 135*

TER

MATRIX SPIKES
PERCENT RECOVERY
Quality Control Limits

lyte	N	Warning	Control
RIN	83	64 - 110	52 - 122*
-DDT	83	68 - 133	52 - 149*
LDRIN	81	73 - 122	60 - 135*
RIN	81	68 - 131	53 - 147*
TACHLOR	81	67 - 114	55 - 124*
DANE	83	71 - 124	58 - 137*

* Updated 4/93

SRM1583

Analyte	N	Cert Value	Lower Control Limit	Lower Warning Limit	Upper Warning Limit	Upper Control Limit
ALDRIN	100	0.59	0.31	0.35	0.66[1]	0.69[1]*
D-BHC	100	0.53	0.35	0.40	0.60	0.65 *
DDE	100	0.85	0.62	0.69	0.99	1.07 *
DDT	100	1.31	0.87	0.99	1.45	1.57 *
LINDANE	100	0.77	0.56	0.62	0.87	0.94 *

1. These limits were widened from the mean to allow for the certified value +10% and +15% warning and control limits.

* Updated 4/93

CHLORINATED HERBICIDE ANALYSIS by EPA 615/8150

SO AND WATER

Surrogate 2,4-DCAA

	Warning Limits	Control Limits
SOIL	48 - 122	29 - 141
WATER	42 - 104	26 - 119

SOIL AND WATER #

Analyte	N	MATRIX SPIKE RPD Q.C. Limits Warning	Control
2,4,5-T	67	< 40	< 61
DICAMBA	69	< 26	< 41
DINOSEB	62	< 40	< 60
SILVEX	68	< 27	< 42

OIL AND WATER

Analyte	N	MATRIX SPIKE PERCENT RECOVERY 3 S.D. (99 %) Limits Warning	Control
,4,5-T	94	27 - 133	0 - 160
ICAMBA	100	44 - 131	23 - 152
INOSEB	100	22 - 126	0 - 152
ILVEX	100	52 - 105	39 - 118

ERBICIDE SRM (Methyl esters in Organic Matrix)

Analyte	N	Cert. Value	Lower Control Limit	Lower Warning Limit	Upper Warning Limit	Upper Control Limit
4-D	96	1.00	0.32	0.50	1.22	1.41
ILVEX	94	0.100	0.037	0.053	0.120	0.137

ORGANOPHOSPHOROUS PESTICIDES (EPA 614, 622, 8140)

SURROGATE - Triphenylphosphate

Percent Recovery Guidelines 38 - 146

Analyte	N	Spike RPD Guidelines
Phorate	8	< 27
Disulfoton	8	< 27
Dimethoate	6	< 195
Methyl Parathion	8	< 51
Parathion	8	< 58

Analyte	N	Percent Recovery Guidelines
Phorate	11	23 - 139
Disulfoton	17	14 - 150
Dimethoate	17	0 - 103
Methyl Parathion	13	13 - 169
Parathion	16	55 - 127

QUALITY CONTROL FOR IR ANALYSIS

L ROCARBONS by EPA METHODS 418.1 and 413.2 (INFRARED ANALYSIS)

SOIL and WATER

Analyte	N	RPD Matrix Spikes QC Limits: Warning Limits	RPD Matrix Spikes QC Limits: Control Limits
DIESEL FUEL	100	< 10	< 15

SOIL

Analyte	N	Matrix Spikes Percent Recovery Quality Control Limits: Warning Limits	Matrix Spikes Percent Recovery Quality Control Limits: Control Limits
DIESEL FUEL	100	81 - 105	75 - 111

WATER

Analyte	N	Matrix Spikes Percent Recovery Quality Control Limits: Warning Limits	Matrix Spikes Percent Recovery Quality Control Limits: Control Limits
DIESEL FUEL	100	86 - 104	80 - 109

QUALITY CONTROL LIMITS FOR GCMS

N[illegible]n DRINKING WATER by EPA 525.1

ATER

Surrogate	% Recovery Control Limits
-Fluorobiphenyl	34 - 120
,4,6-Tribromophenol	42 - 119
erphenyl - d_{14}	27 - 111

ATER

nalyte	N	MATRIX SPIKES PERCENT RECOVERY Control Limits
cenaphthalene	12	35 - 125
ıtylbenzylphthalate	12	35 - 125
imethylphthalate	12	35 - 125
ı-N-butylphthalate	12	35 - 125
ntachlorophenol	12	0 - 215
ıenanthrene	12	35 - 125
rene	12	34 - 166

TER

alyte	N	RPD MATRIX SPIKES Control Limits
enaphthalene	6	< 25
tylbenzylphthalate	6	< 25
nethylphthalate	6	< 25
-N-butylphthalate	6	< 25
ıtachlorophenol	6	< 43
enanthrene	6	< 25
ene	6	< 20

(cont'd) QUALITY CONTROL LIMITS FOR GCMS

Bl SRM for Drinking Waters by EPA 525.1

WATER

Analyte	N	Cert Value	Warning Limits	Control Limits
2,4,6-Trichlorophenol	15	5	3.3 - 6.3	2.5 - 7.1 *
Benzo(GHI)Perylene	15	4	2.3 - 5.8	1.5 - 6.7 *
Butylbenzylphthalate	15	3	1.6 - 4.4	0.92 - 5.1 *
Fluorene	15	2	1.6 - 2.5	1.4 - 2.7 *
Dimethyl Phthalate	15	1	0.83 - 1.2	0.74 - 1.3 *
Phenanthrene	15	4	3.2 - 4.6	2.9 - 5.0 *

* Updated 4/93

(cont'd) QUALITY CONTROL LIMITS FOR GCMS

BNA EXTRACTABLES by EPA METHOD 625 (8270)

Surrogate	% Recovery Water Warning	Water Control	Soil Warning	Soil Control
Phenol-d_5	39-119	19-139	33-113	24-113
2-Fluorophenol	34-130	21-154	30-121	25-121
Nitrobenzene-d_5	45-114	35-114	39-119	23-120
2-Fluorobiphenyl	46-114	43-116	38-115	30-115
2,4,6-Tribromophenol	29-113	10-123	26-118	19-122
p-Terphenyl-d_{14}	61-129	44-141	37-137	18-137

Repeat the analysis if 2 or more are outside of the control limits.

SOIL

Analyte	N	RPD MATRIX SPIKES Quality Control Limits Warning	Control
1,2,4-Trichlorobenzene	100	< 17	< 25
1,4-Dichlorobenzene	100	< 15	< 23
2,4-Dinitrotoluene	99	< 19	< 29
2-Chlorophenol	100	< 16	< 24
4-Chloro-3-methylphenol	100	< 19	< 29
4-Nitrophenol	97	< 15	< 24
Acenaphthene	100	< 17	< 26
Pentachlorophenol	88	< 23	< 36
N-Nitroso Di-N-propylamine	99	< 20	< 30
Phenol	98	< 18	< 27
Pyrene	100	< 25	< 37

BNA EXTRACTABLES by EPA METHOD 625 (8270), cont'd

WATER

Analyte	N	RPD MATRIX SPIKES Quality Control Limits Warning	Control
1,2,4-Trichlorobenzene	100	< 21	< 31
1,4-Dichlorobenzene	100	< 23	< 34
2,4-Dinitrotoluene	100	< 11	< 18
2-Chlorophenol	100	< 10	< 17
4-Chloro-3-methylphenol	100	< 12	< 20
4-Nitrophenol	100	< 25	< 38
Acenaphthene	100	< 10	< 17
Pentachlorophenol	100	< 24	< 36
Nitroso Di-N-Propylamine	100	< 14	< 24
Phenol	100	< 13	< 21
Pyrene	100	< 19	< 29

BNA EXTRACTABLES by EPA METHOD 625 (8270), cont'd

SOIL

MATRIX SPIKES
PERCENT RECOVERY
Quality Control Limits

Analyte	N	Warning	Contro
1,2,4-Trichlorobenzene	100	58 - 113	44 - 12
1,4-Dichlorobenzene	100	55 - 100	44 - 11
2,4-Dinitrotoluene	100	51 - 115	35 - 13
2-Chlorophenol	100	64 - 110	52 - 12
4-Chloro-3-methylphenol	100	56 - 116	42 - 13
4-Nitrophenol	100	22 - 146	0 - 17
Acenaphthene	100	62 - 114	49 - 12
Pentachlorophenol	100	38 - 159	8 - 18
N-Nitroso Di-N-propylamine	100	40 - 120	21 - 13
enol	100	55 - 104	43 - 11
Pyrene	100	55 - 144	33 - 16

BNA EXTRACTABLES by EPA METHOD 625 (8270), cont'd

WATER

Analyte	N	MATRIX SPIKES PERCENT RECOVERY Quality Control Limits Warning	Control
1,2,4-Trichlorobenzene	100	43 - 87	32 - 98
1,4-Dichlorobenzene	100	41 - 75	32 - 84
2,4-Dinitrotoluene	100	51 - 109	36 - 124
2-Chlorophenol	100	60 - 114	46 - 128
4-Chloro-3-methylphenol	100	51 - 96	38 - 110
4-Nitrophenol	100	25 - 103	6 - 123
Acenaphthene	100	54 - 114	39 - 129
Pentachlorophenol	100	20 - 176	0 - 215
N-Nitroso Di-n-propylamine	100	47 - 96	35 - 108
Phenol	100	55 - 100	42 - 113
Pyrene	100	56 - 144	34 - 166

BNA SRM

Analyte	N	Actual Value	Warning Limits	Control Limits
1,2-Dichlorobenzene	100	20	16.4 - 25.0	14.2 - 27.1
2,4,6-Trichlorophenol	100	100	59.7 - 122.9	44.0 - 138.6
2,4-Dimethylphenol	100	100	81.9 - 123.7	71.5 - 134.1
Benzo(GHI)Perylene	100	80	55.1 - 96.1	44.9 - 106.3
Bis(2-Chloroethyl)ether	100	40	32.3 - 52.7	27.2 - 57.8
Butylbenzylphthalate	100	60	44.3 - 74.8	36.6 - 82.5
Fluorene	97	40	29.2 - 52.8	23.4 - 58.7
Hexacloroethane	100	80	64.0 - 108.1	53.0 - 119.1
Isophorone	100	20	14.4 - 31.2	10.2 - 35.4
2-Methylnaphthalene	100	20	14.9 - 23.5	12.8 - 25.6
Dimethyl Phthalate	83	40	30.4 - 49.1	25.7 - 53.8
Naphthalene	100	40	32.9 - 48.0	29.1 - 51.8
Nitrobenzene	97	80	66.7 - 95.1	59.6 - 102.2
p-Cresol	100	100	76.9 - 141.8	60.7 - 158.1
Phenanthrene	100	80	53.0 - 86.7	44.6 - 95.2

VOLATILE ORGANICS in DRINKING WATERS by EPA METHOD 524.2

Surrogate	% Recovery Control Limits Water	Soil
1,2-Dichloroethane-d_4	81 - 109	74 - 116
Toluene-d_8	72 - 124	59 - 137
Bromofluorobenzene	73 - 117	62 - 128

Repeat the analysis if 2 or more of the surrogates are out of control limits.

WATER

Analyte	N	RPD MATRIX SPIKES Quality Control Limits Warning	Control
Benzene	15	< 7.7	< 11.7
Bromodichloromethane	15	< 7.8	< 11.7
Bromoform	15	< 9.0	< 12.9
Carbon Tetrachloride	15	< 8.9	< 13.4
[illegible]oroform	15	< 6.9	< 10.5
Dibromochloromethane	15	< 9.9	< 14.5
1,4-Dichlorobenzene	15	< 7.3	< 12.0
1,2-Dichloroethane	15	< 5.9	< 9.3
1,1-Dichloroethylene	15	< 8.9	< 13.2
Trichloroethane	15	< 6.9	< 10.3
Trichloroethylene	15	< 8.6	< 12.8
Vinyl Chloride	15	< 10.4	< 16.2

VOLATILE ORGANICS in DRINKING WATERS by EPA METHOD 524.2, cont'd

WATER

Analyte	N	PERCENT RECOVERY MATRIX SPIKE Quality Control Limits	
		Warning	Control
Benzene	32	70 - 110	60 - 120
Bromodichloromethane	32	77 - 109	69 - 117
Bromoform	32	62 - 97	54 - 105
Carbon Tetrachloride	32	71 - 115	60 - 126
Chloroform	32	74 - 110	65 - 119
Dibromochloromethane	32	63 - 127	47 - 144
1,4-Dichlorobenzene	32	72 - 122	59 - 134
1,2-Dichloroethane	32	64 - 123	49 - 138
1,1-Dichloroethylene	32	65 - 113	53 - 125
Trichloroethane	32	79 - 107	72 - 114
Trichloroethylene	32	57 - 119	41 - 134
Vinyl Chloride	32	45 - 141	20 - 165

VOA SRM

Analyte	Actual Value	Percent Recovery Quality Control Limits
All Analytes	5.0	3.5 - 6.5

VOLATILE ORGANICS by EPA METHOD 624 (8240)

Surrogate	% Recovery Control Limits Water	Soil
1,2-Dichloroethane-d_4	76-114	77-125
Toluene-d_8	88-110	84-114
Bromofluorobenzene	86-115	74-121

Repeat the analysis if 2 or more of the surrogates are out of control limits.

OIL

nalyte	N	RPD MATRIX SPIKES Quality Control Limits Warning	Control
,1-Dichloroethylene	100	< 14	< 20
richloroethylene	100	< 11	< 17
hlorobenzene	100	< 8	< 12
oluene	100	< 12	< 18
en[illegible]ne	100	< 10	< 14

ATER

alyte	N	RPD MATRIX SPIKES Quality Control Limits Warning	Control
1-Dichloroethylene	90	< 24	< 36
ichloroethylene	100	< 13	< 19
lorobenzene	100	< 10	< 15
luene	100	< 13	< 19
nzene	100	< 14	< 19

VOLATILE ORGANICS by EPA METHOD 624 (8240), cont'd

WATER AND SOIL

Analyte	N	PERCENT RECOVERY MATRIX SPIKE Quality Control Limits Warning	Contro
1,1-Dichloroethylene	100	51 - 155	25 - 18:
Benzene	100	73 - 125	60 - 13:
Chlorobenzene	100	82 - 109	75 - 11:
Trichloroethylene	100	59 - 120	44 - 13:
Toluene	100	80 - 116	71 - 12:

VOLATILE ORGANICS by EPA METHOD 624 (8240) and 601/602, cont'd

V SRM

Analyte	N	Cert Value	Lower Control Limit	Lower Warning Limit	Upper Warning Limit	Upper Control Limit
1,1,2-TCA	100	81.3	74	78	94	98
1,2-DCA	100	55.0	46	49	65	68
1,2-DCB	100	25.1	16	19	29	32
BRCL2METH	100	51.3	42	46	58	62 *
BROMOFORM	100	20.1	14	16	21	23
CARBON TET	100	47.1	41	44	57	60
ETHYLBENZ	100	98.6	82	89	116	122
MIBK	100	80.8	38	52	109	123 *

* Updated 4/93

OLATILE ORGANICS in AIR

	SAMPLE RPD CONTROL LIMITS
11 Analytes	< 35
NTERNAL STANDARDS AREA	50 - 200 % per Day

QUALITY CONTROL FOR IC

LIMITS FOR ANIONS ANALYSIS

		RPD SAMPLES Quality Control Limits		
Analyte	N	WATER	N	OTHER
CHLORIDE	28	< 10	11	< 39
FLUORIDE	15	< 17	3	< 50
NITRATE	32	< 11	2[1]	< 18
NITRITE	10	< 15	0	< 50
SULFATE	32	< 9	11	< 49
O-PHOSPHATE	6[2]	< 35	2	< 50

1. Statistics are for SOIL matrix.

2. Limits were calculated for these data using (3 * S.D.) and not the t-value, because the sample numbers were small and the S.D. values were large.

WATER

MATRIX SPIKES
PERCENT RECOVERY
Quality Control Limits

Analyte	N	Warning	Control
CHLORIDE	100	73 - 111	63 - 121*
BROMIDE	100	83 - 108	77 - 114
FLUORIDE	100	74 - 122	63 - 133
NITRATE	99	77 - 116	67 - 126*
NITRITE	92	80 - 114	72 - 123
SULFATE	95	77 - 112	68 - 120*
O-PHOSPHATE	92	75 - 113	66 - 122

SOIL AND OTHER

MATRIX SPIKES
PERCENT RECOVERY
Quality Control Limits

Analyte	N	Control Limits
CHLORIDE	46	60 - 110
BROMIDE	45	60 - 127*
FLUORIDE	54	57 - 142*
NITRATE	41	63 - 117
NITRITE	29	75 - 112
SULFATE	40	54 - 114
O-PHOSPHATE	37	67 - 116*

* Updated 4/93

CATIONS by ION CHROMATOGRAPHY

WATER

RPD SAMPLES
Quality Control Limits

Analyte	N	Control
AMMONIUM	8	< 27
CALCIUM	10	< 27
MAGNESIUM	8	< 23
POTASSIUM	11	< 32
SODIUM	15	< 10
LITHIUM		N/A

MATRIX SPIKES
PERCENT RECOVERY
Quality Control Limits

WATER

Analyte	N	Control Limits
AMMONIUM	3	50 - 150
CALCIUM	10	50 - 150
MAGNESIUM	6	86 - 115
POTASSIUM	10	50 - 150
SODIUM	11	45 - 142
LITHIUM	2	50 - 150

HEXAVALENT CHROMIUM by ION CHROMATOGRAPHY

RPD MATRIX SPIKES
Quality Control Limits

Analyte	N	SOIL	N	WATER	N	OTHER[1]
HEXAVALENT CHROMIUM	9	< 12	19	< 13	95	< 13

MATRIX SPIKE
PERCENT RECOVERY
Quality Control Limits

Analyte	N	SOIL	N	WATER	N	OTHE
HEXAVALENT CHROMIUM	28	67 - 128*	43	74 - 117	100	70 -

1. OTHER matrix samples are predominantly 20 mM aqueous bicarbonat impinger samples.

* Updated 4/93

QUALITY CONTROL FOR ICPMS

Internal Standards	Response Relative to Calibration
Sc, In, Tb	50 - 150 %

SOIL AND AIR(CARB436)**

Analyte	N	RPD SAMPLES QC Limits Warning Limit	Control Limit
ANTIMONY	92	25	40
ARSENIC	90	25	40
BARIUM	100	25	40
BERYLLIUM	92	25	40
CADMIUM	90	25	40
CHROMIUM	100	25	40
COBALT	100	25	40
COPPER	100	25	40
LEAD	100	25	40
MERCURY	50	25	40
MOLYBDENUM	100	25	40
NICKEL	100	25	40
SELENIUM	43	25	40
SILVER	79	25	40
THALLIUM	74	25	40
VANADIUM	87	25	40
ZINC	100	25	40

** Page Updated 4/93

QUALITY CONTROL FOR ICPMS, cont'd

SOIL AND AIR(CARB436)**

Analyte	N	RPD Matrix Spikes Quality Control Limits	
		Warning Limits	Control Limits
ANTIMONY	90	25	40
ARSENIC	82	25	40
BARIUM	64	25	40
BERYLLIUM	94	25	40
CADMIUM	91	25	40
CHROMIUM	67	25	40
COBALT	88	25	40
COPPER	78	25	40
LEAD	67	25	40
MERCURY	82	25	40
MOLYBDENUM	94	25	40
NICKEL	63	25	40
SELENIUM	97	25	40
SILVER	88	25	40
THALLIUM	95	25	40
VANADIUM	61	25	40
ZINC	63	25	40

** Page Updated 4/93

QUALITY CONTROL FOR ICPMS, cont'd

SOIL AND AIR(CARB436)**

Analyte	N	PERCENT RECOVERY MATRIX SPIKES Quality Control Limits: Warning Limits	Control Limits
Antimony	100	40 - 140	20 - 160
Arsenic	100	60 - 140	40 - 155
Barium	17	60 - 140	40 - 155
Beryllium	100	75 - 125	60 - 140
Cadmium	100	75 - 125	60 - 140
Chromium	100	40 - 140	20 - 160
Cobalt	100	75 - 125	60 - 140
Copper	100	60 - 140	40 - 155
Lead	100	60 - 140	40 - 155
Mercury	100	60 - 140	40 - 155
Molybdenum	100	75 - 125	60 - 140
Nickel	100	40 - 140	20 - 160
Selenium	100	75 - 125	60 - 140
Silver	100	60 - 140	40 - 155
Thallium	100	75 - 125	60 - 140
Vanadium	52	60 - 140	40 - 155
Zinc	33	60 - 140	40 - 155

** Page Updated 4/93

QUALITY CONTROL FOR ICPMS, cont'd

WATER AND IH FILTER**

Analyte	N	RPD SAMPLES QC Limits Warning Limit	Control Limit
ANTIMONY	33	35	50
ARSENIC	65	35	50
BARIUM	92	20	30
BERYLLIUM	31	20	30
CADMIUM	50	35	50
CHROMIUM	59	20	30
COBALT	50	20	30
COPPER	65	20	30
LEAD	54	20	30
MERCURY	28	35	50
MOLYBDENUM	60	20	30
NICKEL	52	20	30
SELENIUM	32	35	50
SILVER	35	35	50
THALLIUM	30	20	30
VANADIUM	52	20	30
ZINC	72	20	30

** Page Updated 4/93

RPD Matrix Spikes
Quality Control Limits

WATER AND IH FILTER**

Analyte	N	Warning Limits	Control Limits
ANTIMONY	61	15	25
ARSENIC	61	15	25
BARIUM	58	10	15
BERYLLIUM	63	10	15
CADMIUM	61	10	15
CHROMIUM	56	10	15
COBALT	63	10	15
COPPER	59	10	15
LEAD	62	10	15
MERCURY	59	20	30
MOLYBDENUM	61	10	15
NICKEL	60	10	15
SELENIUM	61	20	30
SILVER	62	20	30
THALLIUM	62	10	15
VANADIUM	58	10	15
ZINC	57	10	15

** Page Updated 4/93

MATRIX SPIKES
PERCENT RECOVERY
Quality Control Limits

VATER AND IH FILTER**

Analyte	N	Warning Limits	Control Limits
Antimony	100	60 - 140	45 - 155
Arsenic	100	85 - 115	80 - 120
Barium	100	85 - 115	80 - 120
Beryllium	100	85 - 115	80 - 120
Cadmium	100	85 - 115	80 - 120
Chromium	100	85 - 115	80 - 120
Cobalt	100	85 - 115	80 - 120
Copper	100	85 - 115	80 - 120
Lead	100	85 - 115	80 - 120
Mercury	100	60 - 140	45 - 155
olybdenum	100	85 - 115	80 - 120
Nickel	100	85 - 115	80 - 120
Selenium	100	60 - 140	45 - 155
Silver	100	25 - 125	0 - 150
Thallium	100	85 - 115	80 - 120
Vanadium	100	85 - 115	80 - 120
Zinc	100	85 - 115	80 - 120

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QUALITY CONTROL FOR ICPMS, cont'd

SRM1646 Quality Control Limits

Analyte	N	Certified Value	Control Limits		Warning Limits	
Antimony	35		0.000 - 0.586		0.000 - 0.442	
Arsenic	35	11.600	0.000 - 18.80		0.000 - 14.53	
Barium	35		26.32 - 61.27		32.14 - 55.45	
Beryllium	35		0.204 - 1.410		0.405 - 1.209	
Cadmium	35	0.3600	0.000 - 0.917		0.000 - 0.719	
Chromium	35	76.000	27.04 - 62.96		33.02 - 56.97	
Cobalt	35	10.500	5.470	11.759	6.518	10.711
Copper	35	18.000	9.919	21.607	11.867	19.659
Lead	35	28.200	15.076	30.226	17.601	27.701
Mercury	35	0.0630	0.000	0.112	0.000	0.077
Molybdenum	35		0.961	2.665	1.245	2.3814
Nickel	35	32.000	15.067	34.151	18.248	30.97
Selenium	35	0.600	0.000	8.169	0.000	5.885
Silver	35		0.000	0.298	0.000	0.232
Thallium	35		0.061	0.317	0.104	0.274
Vanadium	35	94.000	26.198	80.429	35.237	71.391
Zinc	35	138.000	63.461	150.42	77.954	135.926

USGS T111 Quality Control Limits

Analyte	Cert. Value	N	Lower Warning Limit	Upper Warning Limit	Lower Control Limit	Upper Control Limit
Antimony	0.2450	100	0.2363	0.3415	0.2100	0.3678
Arsenic	0.0033	100	0.0026	0.0054	0.0019	0.0061
Barium	0.0270	100	0.0234	0.0290*	0.0224	0.0300*
Beryllium	0.0077	100	0.0071	0.0087	0.0067	0.0091
Cadmium	0.0230	100	0.0208	0.0260	0.0195	0.0273
Chromium	0.0250	100	0.0240	0.0280	0.0230	0.0290
Cobalt	0.0090	100	0.0082	0.0098	0.0078	0.0102
Copper	0.0109	100	0.0098	0.0118	0.0093	0.0123
Lead	0.0188	100	0.0181	0.0213	0.0173	0.0221
Mercury		100	0.0000	0.0018	0.0000	0.0023
Molybdenum	0.0140	100	0.0126*	0.0174	0.0119*	0.0181
Nickel	0.0155	100	0.0137	0.0161	0.0131	0.0167
Selenium	0.0033	100	0.0000	0.0098	0.0000	0.0126
Silver	0.0140	100	0.0121	0.0153	0.0113	0.0161
Thallium		100	0.0000	0.0005	0.0000	0.0007
Vanadium	0.0270	100	0.0251*	0.0302	0.0242*	0.0310
Zinc	0.320	100	0.2767	0.3468*	0.2638	0.3602*

* These limits were widened from the mean ± 2 or 3 SD to allow for the certified value ± 7 and ± 10%, warning and control limits.

MERCURY (CV - GFO)

	Percent Recovery	RPD
MERCURY	75 - 110	< 25

URANIUM IN GROUNDWATER

	WARNING LIMITS	CONTROL LIMITS
RPD	< 12	< 18
PERCENT RECOVERY	94 - 110	90 - 114

QUALITY CONTROL FOR WET CHEMISTRY

CYANIDE (WATER and/or SOIL) (EPA Method 9010)	N	Quality Control Guidelines
RPD	11	<30
PERCENT RECOVERY	26	50* - 135

* Specified by Method 9010

PHENOL (WATER and/or SOIL) (EPA Method 9065)	N	Quality Control Guidelines
RPD	5	<15
PERCENT RECOVERY	6	55 - 125

SULFIDE (EPA Method 376.2)	N	Quality Control Guidelines
RPD	8	<25
PERCENT RECOVERY	25	50 - 125

TOTAL ORGANIC CARBON (Walky-Black Method)	N	Quality Control Guidelines
RPD	2	< 23
PERCENT RECOVERY	9	50 - 150

ALKALINITY (EPA Method 310.1)	N	Warning Limits	Control Limits
RPD	16		<6
PERCENT RECOVERY	44	64 - 126	48 - 142

QUALITY CONTROL FOR WET CHEMISTRY, cont'd

AMMONIA (Standard Method 4500-NH3C)	N	Warning Limits	Control Limits
RPD	5		<25
PERCENT RECOVERY	44	64 - 126	48 - 142

BIOCHEMICAL OXYGEN DAMAND (EPA Method 405.1)	N	Quality Control Guidelines
RPD	11	<33
PERCENT RECOVERY	10	32 - 170

CONDUCTIVITY (EPA Method 120.1)	N	Warning Limits	Control Limits
RPD	24	<3	<5

CHEMICAL OXYGEN DEMAND (EPA Methods 410.1 to 3)	N	Warning Limits	Control Limits
RPD	24	<3	<5

HARDNESS (EPA Method 130.2)	N	Quality Control Guidelines
RPD	3	<5
PERCENT RECOVERY	14	88 - 110

Karl Fischer Water	N	Quality Control Guidelines
RPD	14	<39

QUALITY CONTROL FOR WET CHEMISTRY, cont'd

RESIDUAL CHLORINE (EPA Method 330.5)	N	Quality Control Guidelines
RPD	4	<11

SURFACTANT (Standard Method 5540 C)	N	Warning Limits	Control Limits
RPD	6		<23
PERCENT RECOVERY	43	36 - 139	10 - 165

TOTAL DISSOLVED SOLIDS (EPA Method 160.2)	N	Warning Limits	Control Limits
RPD	27	<9	<13
PERCENT RECOVERY	77	92 - 108	89 - 111

TOTAL SUSPENDED SOLIDS (EPA Method 160.1)	N	Warning Limits	Control Limits
RPD	20	<27	<41

TURBIDITY (EPA Method 180.1)	N	Warning Limits	Control Limits
RPD	10		<26
PERCENT RECOVERY	29	83 - 120	74 - 129

Analytical Balances

Balances shall be checked with class S weights weekly by the extraction lab supervisor. QC limits for balances are:

1 place balance	10g ± 0.1g
	100g ± 0.1g
2 place balances	1.00g ± 0.02
	50.00 ± 0.02
4 place balances	1.0000 ± 0.0003
	50.0000 ± 0.0005
5 place balances	2.0000 ± 0.00009
	50.0000 ± 0.0005

All balances shall be serviced and certified annually by an outside service.

Refrigerators

Refrigerators for storing environmental samples will be monitored periodically by log-in to insure performance between 2-6 ^{o}C.

Sample Containers, Preservatives, and Holding Times

Whenever sub-sampling, follow recommended procedures for storage and preservation (Standard Methods or SW846). Table 2-16 from SW-846 is attached which should be applied to water samples. Soils should be stored similarly but without the addition of chemical preservatives.

APPENDIX C

SOP FOR LEGAL AND FORENSIC JOBS

1. It is preferable for the laboratory to be hired by an attorney rather than a private or corporate party. Work done for a private party can be subject to discovery, whereas an attorney may protect this information. Note that when files are taken into the courtroom, they are available to all parties.

2. Samples must be clearly identified, labeled, and documented. The job envelope should distinguish it from non-legal samples.

3. There should be a chain-of-custody record with legal samples. For simplicity's sake, it is preferable to have the person who will be performing the analyses and testify, also be the one receiving the samples.

4. When possible, the samples should be photographed and the photographs put into the job envelope.

5. The lab work must be of the highest quality to withstand close scrutiny in a court of law. The conclusion must be objective, supported by valid data. Standard test methods, (ASTM, NIOSH, EPA, etc.) and QC experiments are necessary. Deviations from standard methods can prove embarrassing.

6. The test should be performed by the person who may also serve as a witness. If this is unreasonable, the tests should be at least closely observed.

7. A verbal report should be issued first. The attorney may prefer not to have a written report.

8. Legal samples should be returned to the client as soon as possible. The job envelope, data results, etc., should be permanently stored in the legal file.

9. Courtroom testimony should be clear, coherent, and articulate. The questioning can be intense, critical, and very stressful. Dress appropriately. Try to relate to the jury and the judge.

10. The building must be kept secure to protect legal evidence.

11. Whenever possible, the tests should be non-destructive.

APPENDIX D

REQUIREMENTS FOR SPECIAL PROGRAMS

Whenever analyzing samples under these special programs, additional QC steps are required as follows:

A. California Hazardous Waste Testing Laboratory

1. At least 1 sample in each batch of 20 or fewer samples must be analyzed as a duplicate spike.

B. Utah Environmental Accreditation

1. QC Frequency: standards, spikes, duplicates, and blanks must be performed once for each 10 samples; lab control standards must be used where applicable once for each 20 samples.

2. At least 3 point calibrations are required.

3. All refrigerators must be monitored and logged daily.

4. Column performance for EPA 608 using CLP protocol must be monitored daily.

5. A QC action report (attached) should be used to document the use of data obtained from outside warning limits and correction of problems.

6. CLP data qualifier should be used for VOA, Pesticide, and BNA's.

C. Navy Programs

1. The attached QC action report should be filled out for data outside warning limits to document resolution of problems.

D. California Drinking Water Programs

1. Because QC guidelines for RPD's and % Recovery in Appendix A includes wastewaters and other highly contaminated waters, better results should be anticipated for clean drinking water. The following guidelines should be applied to drinking water:

	RPD's	% Recovery
Organic Analyses	25%	75 - 125%
Inorganic Analyses	10%	85 - 115%

2. When the sample concentration exceeds 80% of the Maximum Contaminant Levels (MCL) (See CAC Title 22) the analysis must be repeated to confirm the high level.

3. Detection limits for purposes of reporting (DLR's) have been identified for drinking water pollutants and AB1803. The DLR's are generally set at 1/5 to 1/10 of the MCL. The analysis must demonstrate that the detection limits are below the DLR by analysis of a blank and one standard below the MCL. Do not report data below the DLR. All GC results above the DLR must be confirmed on a second column or by GCMS.

4. Hardness should be analyzed by EDTA titration (Std. Methods 314.B) and checked by calculation (Std. Methods 314.A).

5. Cation and Anion concentrations must balance within 5% (ion balance).

6. Fluoride must be analyzed by selective ion electrode (Std. Methods 413.B).

7. Blank values should not be subtracted from samples. Report blanks separately.

8. Nitrate concentrations >45 ppm must be confirmed by resampling. Alert the client by phone immediately.

E. IH Samples and NIOSH PAT

1. An aqueous LCS such as NBS 1643 or USGS T111 will be used with each batch of filters to verify calibration. The acceptance criteria will be within 5% of the certified value or historical mean, which ever we feel is most appropriate. This criteria reflects the more stringent requirements of the PAT program.

2. With each set of filters, a filter of known concentration must be processed through digestion and analysis. This filter will be either a spiked blank, NIST filter, or a past NIOSH PAT filter. Acceptance criteria for the results will be according to the PAT data or within 5% of the theoretical.

QC ACTION FORM

Job No. _____ Analyst _____

Analysis _____ Supervisor _____

Date _____

1. Describe the out-of-control situation:

QC Results	QC Guidelines

2. Describe possible causes and resolutions of the problem.

3. What data did this situation effect?

Job #	Client	Data

4. Actions Taken: (was the data used as is or reanalyzed/why, why not?)

APPENDIX E

Job Descriptions

Below are general descriptions of the duties, responsibilities, and training required for various employment positions. These positions correlate with the Towers Compensation Survey and WCAS management positions as shown in Table 1. Job responsibilities should be considered cumulative, e.g. a Sr. Chemist has the responsibilities of subordinate positions as well as those particular to a Sr. Chemist. As needed, personnel may also be assigned specific duties which have not been listed here but which are consistent with their training.

1. Attendant
No specific education or training required. Entry level position to assist others in the laboratory performing non-technical tasks under close supervision or to work in Log-in. Reports to Log-in Supervisor, Analyst, or Group Leader.

2. Technician
High School education required. Entry level position to assist others and to be trained to perform routine tasks of a non-technical nature. Reports to either an Analyst, Group Leader, or Log-in Supervisor.

3. Chemist
B.S. in a scientific discipline, preferably chemistry, with 0-2 years experience. In training to perform routine tasks, may perform routine maintenance, prepares data packages for review, notifies supervisor of Out-of-Warning/Control situations. Reports to and is closely supervised by an Analyst or Group Leader.

4. Analytical Chemist
B.S. plus two years direct experience. Trained to perform routine tests, helps evaluate new tests, helps write SOPs, performs routine maintenance, prepares and reviews data packages, requisitions routine supplies. May supervise a Technician or Chemist. Reports to a Group Leader.

5. Senior Chemist
B.S. and five years direct experience. Trained to perform and supervise a variety of routine and some non-routine tasks, evaluates and develops new tests, writes SOPs, performs non-routine instrument repair, prepares and reviews data packages, writes case/data package narratives, calls clients with results or resolution of problems, may be assigned to sign final reports, helps train others, requisitions routine and non-routine supplies and equipment. Reports to Group Leader, Manager, or Director.

6. Senior Staff Chemist
B.S. and 10 years experience. Performs routine and non-routine tasks, develops new tests and SOPs, performs difficult instrument repairs, prepares and reviews data packages and narratives, works with clients on problems, trains others, requisitions non-routine supplies and equipment. Reports to Group Leader, Manager, Lab Director, or President.

The following are management positions which carry some supervisory duties in addition to the responsibilities above.

6. Log-In Supervisor
Two years experience in Log-in. Supervises Attendants in shipping and receiving, logging-in jobs; assigns work to various groups; completion of CoCs and sample disposition; maintains sample storage conditions; maintains Log-in SOPs. Reports to Lab Manager, Technical Director or Lab director. May also assist in report preparation and invoicing.

7. Analyst
Training and responsibilities of Analytical Chemist or above who may be assigned to supervise one or more Chemists or Technicians in performing a routine task.

8. Group Leader
Sr. Chemist or above who is additionally responsible for all SOPs for their group; insures that the analysts have read, understood, and signed-off on the SOP, and that the analysts have the training, information, and resources to perform their assignments; assigns tasks and schedules to those in group; enforces safety policies in group; maintains equipment and calls outside for repair when needed; maintains outstanding job lists, dry boards, and attends staff meetings to insure turn-around-times; reviews and signs data packages; reviews instrument and maintenance logs; approves the use of Out-of-Warning data; approves overtime and time-off requests; works with managers and directors to meet project schedules and goals; administrates personnel policies within group, and conducts semiannual performance and salary reviews for group; approves requisitions of supplies up to $750. Reports to Manager or Director.

9. Chemical Hygiene Officer
Sr. Chemist or above who assists chemists in safely handling chemicals and other hazards and assists in maintaining the Safety Manual. Reports to the Lab Manager and Technical Director.

10. Organics or Inorganics Manager
Sr. Chemist or above who coordinates the work of more than one group, conducts training classes, conducts performance and salary reviews of Group Leaders, approves requisitions of up to $1000, working jointly with Project Manager organizes and directs work on projects. Reports to Lab Director, Technical Director, or President.

11. Safety Officer
Sr. Chemist or above who organizes and conducts safety meetings and training, and maintains the Safety Manual. Reports to the Lab Director or President.

12. Project Manager
Two years experience in environmental/laboratory industry who organizes and directs work on projects through other managers and Group Leaders, handles client inquiries and problems, prepares proposals and bids, develops and markets services through presentations and visits to clients, phones/FAX results to clients. Reports to Lab Director or President.

13. Study Director
Sr. Chemist or above who is assigned projects which must comply with Good Laboratory Practices (GLP). Responsible for overall study from a technical standpoint including conducting the study according to plans, interpreting the results, documenting and verifying results, obtaining approval of protocol changes, selecting corrective action, compliance of study with GLP, and archival of all raw data, documentation, protocol, specimens, and reports at the close of the study. Reports to President.

14. QA Coordinator
Sr. Chemist or above who maintains QA data bases, prepares and reviews QA statistics, performs periodic audits of data packages, may work with clients and Managers to develop project QA plans, helps to train analysts in QA, assists the Technical Director in maintaining SOPs, and helps maintain the QA Manual.
Reports to QA Officer or President.

15. Lab Manager
Sr. Chemist or above who is responsible for scheduling and administration of the entire laboratory, may be final approval of time off and overtime, conducts performance and salary reviews of Group Leaders, works with Lab Director on developing and implementing personnel policies, supports marketing and sales personnel, helps prepare proposals and bids, conducts training, approves vendors, recommends equipment purchases, approves requisitions up to $5000, helps Lab Director maintain Operations SOPs. Reports to the Lab Director.

16. QA Officer
Sr. Staff Chemist responsible for setting and monitoring QA policies for the entire lab, maintains the QA Manual, develops project QA plans, works with other managers and Group Leaders to train personnel, supports sales and marketing, assists the Technical Director in maintaining the SOPs, heads the Quality Assurance Unit for GLP projects. Reports to President.

17. Technical Director
Sr. Staff Chemist responsible for the quality of data, SOPs for laboratory operations, and technical training of personnel; conducts performance and salary reviews of Managers with Lab Director or Lab Manager, approves use of Out-of-Control data, reviews instrument and maintenance logs, keeps the lab current on technical issues, evaluates and develops new tests, prepares technical presentations and papers, maintains Safety Manual, responsible for sample and hazardous waste disposal, first signature on reports, knowledgeable in all methods required by regulations. Reports to President.

18. Lab Director
B.S. degree and 10 years experience in the industry. Chief Financial Officer responsible for administration of the business, maintains Operations SOPs, prepares financial reports, responsible for budgeting and profitability, final approval on capital expenditures, responsible for marketing and sales, personnel, conducts reviews of Managers with Technical Director or President, develops current and long term plans and policies, maintains knowledge of regulations.

19. President
B.S. and 20 years experience in the laboratory industry. Responsible for quality of the services; maintains QA Manual; maintains certifications and accreditations; works with Lab Director on profitability of the business, marketing, and current and long term planning; prepares large bids and proposals; conducts training classes; second signature on reports; prepares technical papers and presentations.

Table 1. Correlation of Training and Positions

Towers Survey	WCAS Training Level	WCAS Management Position
	Attendant	
Lab Attendant	Technician	
Chemist I	Chemist	
Chemist II	Analytical Chemist	Log-in Supervisor
		Analyst
		Section Leader
		Asst. Group Leader
Sr. Chemist	Sr. Chemist	Group Leader
		Chem. Hyg. Officer
		Organics Manager
		Inorganics Manager
		Safety Officer
		Project Manager
		Client Services Rep.
		Study Director
		QA Coordinator
		Lab Manager
		Other Managers
Consulting Chem.	Sr. Staff Chemist	QA Officer
		Technical Director
		Lab Director
		Vice President
		President

Below are job descriptions of support personnel.

1. Computer Specialist.
B.S. in a scientific discipline. Responsible for maintaining hardware and software used by the company to include the Novel Network, Foxbase Job Tracking, spreadsheet and word processing software, printers and workstations. Responsible for maintaining network backups and SOPs associated with the computers and network. May work on software development projects. Reports to the QA Coordinator, Lab Manager, Technical Director, or President.

Job Description and Check List for Laboratory Personnel

Name_____ Title_____

Date_____ File H:JOBDESC.JN

This form can be used to document a persons level of training and responsibilities.

Comments should be added where needed.

1. Laboratory Testing

_____a. Assists in routine tests (list):

_____b. In training to conduct routine tests (list):

_____c. Conducts routine tests (list):

_____d. Conducts non-routine tests (list):

_____e. Supervises tests (list):

_____f. Evaluates published methods from literature (list for past year):

_____g. Develops methods (list for past year):

2. Standard Operating Procedures

_____a. Read and understood specific SOPs for job (list):

_____b. Develops specific SOPs for job (list):

_____c. maintains SOPs for group

_____d. maintains and approves Laboratory or Operations SOPs for entire lab

3. Instrument Operation and Maintenance

_____a. in training to use an instrument (list):

_____b. uses instrument that has been set-up by others (list):

_____c. sets up instrument to use by self or others (list):

_____d. performs daily, routine maintenance on instruments (list):

_____e. runs more than one instrument in group (list):

_____f. runs more than one instrument in more than one group (lis

_____g. performs non-routine repairs on instruments (list):

_____h. authority to call outside instrument repair personnel

_____i. overall responsibility for lab

4. Data Review and Reporting

_____a. generates data package and notifies supervisor of Out-of-Warning/Control situations

_____b. reviews own work

_____c. places results in Job Tracking

_____d. reviews work/data packages of others

_____e. reviews work/data packages of group (list groups):

_____f. prepares case/data package narratives for client reports

_____g. approves use of Out of Warning data

_____h. calls clients with results

_____i. reviews instrument and maintenance log books monthly

_____j. approves use of Out of Control data

_____k. approves and signs final reports when assigned

_____l. approves and signs final reports routinely

_____m. overall responsibility for entire lab data quality

_____n. performs periodic data package audits

5. Work Schedules

_____a. follows schedule set by others

_____b. develops schedule of own work

_____c. develops schedule of several people

_____d. schedules work for entire group

_____e. approves overtime

_____f. approves time off

_____g. coordinates schedules between group

_____h. coordinates schedules for entire lab

_____i. final approval for overtime and time-off

_____j. keeps lab calendar

6. Management

_____a. check CoC and other job information

_____b. assigns jobs to analysts

_____c. provides direction to analysts

_____d. organizes and directs projects

_____e. calls clients to address problems, quotes, and questions

_____f. conducts performance and salary reviews

_____g. visits clients to address problems and market services

_____h. makes presentations to clients

_____i. implements company policies

_____j. develops company policies

_____k. directly responsible for lab profit/loss

7. Training

_____a. in training for (list):

_____b. helps train others in group (list tests):

_____c. responsible for training of entire group

_____d. responsible for training of entire lab

_____e. conducts training classes (list):

_____f. conducts health and safety meetings

8. Works with and supports

_____a. other analysts in conducting tests (list):

_____b. group leader in scheduling and conducting tests

_____c. Organics Manager, Project Managers, and Log-in Supervisor in scheduling and conducting tests for projects, answering client inquiries, and addressing problems

_____d. Safety Officer in conducting safety training or inspections

_____e. Technical Director to develop methods and SOPs

_____f. Lab Manager to schedule personnel and administrate company policies

_____g. Marketing and sales personnel to support and expand sales

_____h. President to develop new tests and improve quality

9. Ordering Equipment and Supplies

_____a. notifies supervisor of deficient supplies

_____b. places supply needed on purchase requisition list

_____c. fills out purchase requisitions

_____d. calls in order

_____e. approves requisitions of up to $750

_____f. approves requisitions of up to $1000

_____g. approves requisitions of up to $5000

_____h. selects and recommends equipment for purchase

_____i. selects vendors for supplies

_____j. final approval on capital expenditures

10. Marketing and Sales

_____a. helps develop sales literature and brochures

_____b. handles routine phone inquiries

_____c. calls clients by phone to develop sales

_____d. visits clients

_____e. makes formal presentations to clients

_____f. overall responsibility for sales and marketing

How does your job description differ from the descriptions above?

Do you have responsibilities not included above?

Are there areas that you feel you should supervise, that you don't currently supervise?

What is your biggest challenge over the next six months?

APPENDIX G

APPENDIX G

Modeling Process

APPENDIX G

Modeling Process

The conceptual model document will include the following items: a description of the model domain, a review and summary of available information, a comprehensive discussion of the conceptual model describing the system, establishment of performance criteria, model validation procedures, selection of governing equations and recommendation of computer codes (groundwater models) which may be selected to simulate the groundwater flow system. A brief listing of groundwater models, that will be reviewed during development of the conceptual model, are included below. Additional groundwater models may also be identified. These models will be reviewed and summarized during development of the conceptual model. A description of the modeling process follows below.

To develop a site specific groundwater transport model, a standard modeling process will be employed. The first step in this process is to define the model domain and conduct a comprehensive review and evaluation of available information. The second step is to develop a conceptual model of the system in order to abstract the available data so that the system can be represented geometrically, the physiochemical processes involved in the system can be identified, and the boundary and initial conditions can be determined. The next step is to establish reasonable performance criteria for the model. Performance criteria are the quantities or parameters of interest that the model is being asked to simulate or predict. The fourth step is to assign governing equations or mathematical relationships that simulate the processes taking place within the system. Such governing equations generally simplify the conceptual model, which is typically complex in nature. After governing equations have been selected a numerical or computer code is developed or chosen, followed by codification of the available data and commencement with computer runs. The next step is to evaluate the results of the computer runs by comparing simulated output with observed conditions. This output, including uncertainties, must also be evaluated against the previously established performance criteria. The outcome of this evaluation may indicate that the model results contain too many uncertainties. In that case additional information may be required to further enhance the model. The final outcome may indicate that the model results along with uncertainties, yield satisfactory output. If the latter is true the model is considered calibrated and can be run in predictive mode. The table at the end of this section describes the steps in the modeling process and characteristics requiring validation.

Since the goal of any model is to ensure that the modeling results present an accurate representation of the actual processes occurring within the real system, validation procedures will be applied to every step in the above modeling process. Each step will be peer reviewed and verified prior to proceeding. A thorough validation procedure will be outlined in the conceptual model documentation.

Groundwater Transport Model Requirements

Mass flux from the vadose zone to the saturated zone may be a source of Skinner List compounds to the uppermost aquifer underlying the Refinery. As part of the GMP modeling effort, this potential loading will be assessed through the use of an unsaturated zone model (analytical or numerical). This will help quantify concentrations of Skinner List compounds that may be arriving at the water table due to concentrations that may be found in overlying coral (caprock). Such information will be integrated with the groundwater flow model, which will be run for various scenarios to predict contaminant fate and transport. The groundwater transport modeling software selected for the GMP should be capable of handling variable-sized source areas, capable of representing biodegradation, absorption, advective-dispersive transport, transient flow, heterogeneities and potentially transient boundary conditions. It is anticipated that numerical, analytical and semi-analytical models may be utilized during modeling activities of the GMP. The following list summarizes models that have already been evaluated, a final listing will accompany the conceptual model documentation:

- *HELP - The Hydrogeologic Evaluation of Landfill Performance Model*
- *SESOIL - Seasonal Soil Compartment Model*
- *SUTRA - Saturated-Unsaturated TRAnsport (Voss, 1984)*

Available Groundwater Transport Models

Although numerous groundwater transport codes are available only a select few are likely to satisfy the modeling objectives for this GMP and be able to effectively simulate the conceptual model that will be developed and approved by the EPA. Computer codes that are capable of representing chemical retardation and degradation, advective/diffusive transport, hydrodynamic dispersion, mixing and dilution from recharge, chemical reactions, and biodegradation and are able to represent transient and temporally and spatially heterogenous conditions will be selected for review. Of those codes which meet some or all of these capabilities, only a few are publicly available, well documented, PC-compatible, and accepted by the scientific and regulatory communities. Several groundwater transport models that generally meet most of the above requirements have been evaluated for their use on this project. The following list summarizes several models that have already been evaluated, a final listing will accompany the conceptual model documentation:

- *TDAST - Two Dimensional Analytical solution for Transport (Javandel et al., 1984)*
- *AT123D - Analytical Transport in 1-, 2-, 3-dimensions (Yeh, 1981)*

- *SUTRA - Saturated-Unsaturated TRAnsport (Voss, 1984)*
- *HST3D - Heat and Solute Transport in 3-Dimensional groundwater flow systems (Kipp, 1987)*
- *USGS 2-D Solute Transport Model (MOC) (Konikow and Bredehoeft, 1978)*
- *BIOPLUME II (Bedient and Rifai, 1987)*
- *MODFLOW / MODPATH (McDonald and Harbaugh, 1984)*

Brief Description of Models

TDAST provides for chemical retardation and degradation, although it is limited to two-dimensional transport modeling. Thus, chemical loading from soil leachate at the water table must be represented by instantaneous and uniform vertical distribution of the chemical through the entire aquifer thickness. Also, TDAST is not as user-friendly as the other models described below.

AT123D was developed by G.T. Yeh of the Oak Ridge National Laboratory (Yeh, 1981). It is a semi-analytical model for transient simulation of 1-, 2-, or 3-dimensional transport of solutes in groundwater. It can represent advective-dispersive transport with adsorption and biodegradation in homogeneous aquifers of simple geometry. It allows proper representation of the soil leachate loading at the water table, and it is very flexible and user-friendly.

SUTRA is a numerical modeling code capable of simulating advective-dispersive transport of a single component undergoing retardation and degradation within a complex two-dimensional aquifer system. If the need arises to characterize complex hydrogeologic conditions on a site, SUTRA would be a useful to the extent that no significant three-dimensional effects need representation. Because significant three-dimensional effects are likely to be encountered, SUTRA may be of limited use.

HST3D was developed by Kenneth Kipp of the Water Resources Division, USGS. It is fully three-dimensional, and has all of the capabilities required for our anticipated uses as a rigorous benchmark model that the simpler AT123D can be compared to. In such a role, HST3D would be used to assess the errors associated with the use of AT123D and its implicit assumptions of simple aquifer geometry and homogeneous, isotropic media.

MOC is a two-dimensional model developed by the USGS for simulation of non-conservative solute transport n saturated groundwater flow systems. The model is flexible in its design and therefore can be applied to a wide range of scenarios. The model computes changes in the spatial concentration distribution over time caused by convective transport, advection, dispersion, mixing, dilution and chemical reactions. MOC couples the groundwater flow equation with the non-conservative solute-transport equation. The program uses the strongly implicit procedure or the alternating direction implicit method to solve the finite difference approximation to the groundwater flow equation.

BIOPLUME II simulates solute transport in a saturated porous media. The model is based upon the USGS 2-D Solute Transport Model (MOC). The model solves the transport equation twice, once for the contaminant and once for oxygen. The model assumes an instantaneous reaction between the two components at every time step. The model simulates aerobic biodegradation, first order decay to estimate anaerobic biodegradation, advective and dispersive transport and instantaneous reactions between the contaminant and oxygen.

MODFLOW/MODPATH (McDonald and Harbaugh, 1984) MODFLOW is a 3-dimensional modular groundwater flow model that uses a block centered, finite difference approximation in solving the groundwater flow equation. Distinct and/or arbitrary hydrogeologic units are represented in the model as layers which can be simulated as unconfined, confined or a combination of both. External stresses, such as evapotranspiration, flow into and out of the aquifer from surface water features and other stresses can also be simulated. The model utilizes the strongly implicit procedure (SIP) or slice successive over relaxation (SSOR) to solve the finite difference equations. MODPATH is the companion to MODFLOW and utilizes the head distribution estimated by MODFLOW to estimate migration of particles from a source area. The particle tracker estimates transport by advective mechanisms and is very convenient for evaluations of flow systems that are somewhat dynamic in nature.

HELP is a quasi-two-dimensional deterministic water budget model. Using daily climatologic data as input, the program performs a sequential daily analysis to determine runoff, evapotranspiration, percolation and lateral drainage. The program reports daily, monthly, annual and long-term average water budgets. Daily precipitation may be input manually, selected from a historical database, or generated stochastically. Other daily climatological data are generated stochastically. The WGEN model of the Agricultural Research Service is used to generate the daily weather variables. Hydrologic modeling procedures used in the HELP model were adapted from the HSSWDS model of the U.S. Environmental Protection Agency and the CREAMS and SWRRB models of the Agricultural Research Service. Runoff is computed using the runoff curve-number method of the U.S. soil Conservation Service. Evapotranspiration is computed by a modified

Penman method developed by Ritchie and adapted for limiting soil moisture by Shanholtz and Saxton. Growth and decay of surface vegetation is modeled using a routine adapted from the SWRRB model. Vertical drainage is computed using Darcy's law, modified for unsaturated conditions. The lateral drainage model is based on the assumption of quasi-steady flow.

SESOIL is a mathematical soil compartment model designed for long-term environmental hydrologic, sediment, and pollutant fate simulations. It can describe: water transport (quality and quantity); sediment transport (quality and quantity); pollutant transport and transformation; soil quality; pollutant migration to groundwater; and other processes. Simulations are performed for a ;user specified soil column extending between the ground surface and the lower part of the unsaturated soil zone of a region. The simulations are based upon a three-cycle rationale, each cycle being associated with a number of processes. the three cycles are the: (1) hydrologic cycle which takes account of rainfall, soil moisture, infiltration, exfiltration, surface runoff, evapotranspiration, groundwater runoff, (2) sediment cycle which takes account of sediment washload (from storms) and sediment resuspension (due to wind), and (3) pollutant fate cycle which takes account of advection, diffusion, volatilization, adsorption and desorption, chemical degradation or decay, biological transformation, hydrolysis, photolysis (not operational), oxifixation (not operational), complexation of metals by organic ligands, cation exchange, fixation (not operational) nutrient cycles (not operational) and other processes. Model development has been sponsored by the U.S. Environmental Protection Agency and validation studies have been performed for the hydrologic part of the model (in estimating basin water balances), and for the unsaturated soil zone part of the model (pollutant transport model at waste land treatment disposal sites). the model has been also applied to estimating volatilization of solvents from leaking buried barrels, and to conducting exposure assessment studies. The entire model development has not yet been fully accomplished; however, most model features are operational.

The preceding models have been presented and will be evaluated and summarized further in the conceptual model documentation. However, additional modeling software packages are likely to be identified and evaluated as well. Such additional models will also be include in the conceptual modeling documentation.

TYPICAL MODELING PROCESS
BHP PETROLEUM AMERICAS REFINING INC.
91-325 KOMOHANA STREET
KAPOLEI, HAWAII
DELTA NO. 45-93-033

STEP NUMBER	MODEL PROCESS	MODEL CHARACTERISTICS REQUIRING VALIDATION
1	Establish problem domain	Data review and evaluation
2	Conceptual model development	Conceptual model accuracy and probability of scenarios
3	Establish performance criteria	Is performance criteria reasonable?
4	Establish/select model governing equations; Select modeling computer code	Abstraction of Conceptual model
5	Model runs/sensitivity analyses	Uncertainty in input data and mathematical relationship choices
6	Evaluation of model results i. If uncertainty too high, then define new model data needs and go to step 1 - if feasible. ii. If observed and simulated conditions correlate favorably and uncertainties are acceptable, then model is considered calibrated and validated.	

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APPENDIX H

APPENDIX H

Health and Safety Plan

HEALTH AND SAFETY PLAN

GROUNDWATER MONITORING PLAN
BHP PETROLEUM AMERICAS REFINING INC.
91-325 KOMOHANA STREET
KAPOLEI, HAWAII

October 19, 1993

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HEALTH AND SAFETY PLAN

GROUNDWATER MONITORING PLAN
BHP PETROLEUM AMERICAS REFINING INC.
KAPOLEI, HAWAII

1.0 INTRODUCTION

This Health and Safety Plan (HSP) addresses the hazards associated with the field activities planned to collect samples at BHP Petroleum Americas Refining Inc. (BHPPAR) property in Kapolei, Hawaii. The field activities include the installation of groundwater monitoring wells at various locations around Pond Nos. 1, 2A and 2, and the collection of groundwater samples from those wells. The samples will be shipped from the site to an analytical laboratory. For the purposes of this HSP, the Site is defined as the Refinery property.

This HSP is to be used as a guidance document for contractor personnel. It presents baseline health and safety requirements for establishing and maintaining a safe working environment. In addition to the procedures and safeguards outlined in this HSP, contractor/subcontractor personnel shall follow applicable federal, state, county, and city regulations and the refinery safety procedures. In the event that requirements conflict, the procedures that provide the highest degree of personnel protection shall be implemented. Deviations from this HSP must have prior approval from the designated Health and Safety Representative.

If work plan specifications change during or after the preparation of this HSP, or if, during the course of the work, site conditions encountered are found to differ substantially from those anticipated, appropriate changes shall be made to this HSP.

At a minimum, every contractor and subcontractor working on site must do the following:

1. Ensure that its personnel have read and understood the requirements of this HSP and the Refinery safety procedures.

2. Ensure that its personnel have completed all training requirements in 29 Code of Federal Regulations (CFR) 1910.120 and all applicable state regulations.

3. Provide its own health and safety equipment as indicated in this HSP. If a contractor or subcontractor has prepared its own HSP, that HSP, at a minimum, must meet requirements contained herein and all applicable federal, state, and local health and safety requirements.

A copy of this HSP shall be kept on site, easily accessible to all employees and government inspectors, and in the prime contractor's files during the course of the project.

This HSP was prepared using the following documents:

- 29 CFR 1910, Occupational Safety and Health Standards.
- 29 CFR 1926, Safety and Health Regulations for Construction.
- American Conference of Governmental Industrial Hygienists (ACGIH), Cincinnati, Ohio. Threshold Limit Values and Biological Exposure Indices for 1991-1992.
- National Institute for Occupational Safety and Health (NIOSH); OSHA; U.S. Coast Guard (USCG); U.S. Environmental Protection Agency (EPA). 1985. Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities. Washington, D.C.: U.S. Government Printing Office. October.
- NIOSH/OSHA 1992. Occupational Health Guidelines for Chemical Hazards.
- Sax, N. Irving. 1984. Dangerous Properties of Materials, 6th edition. New York, New York: Van Nostrand Reinhold Company, Inc.
- U.S. EPA, Office of Emergency and Remedial Response, Hazardous Response Support Division. November 1984. Standard Operative Safety Guides.

2.0 SITE CHARACTERISTICS

2.1 Site Description/History/Background

BHPPAR operates a crude oil refinery at the Site which produces gasolines, propane, butane, fuel gas, kerosene-type jet fuels, and fuel oils. The refinery has been in operation since 1972. The refinery property occupies approximately 150 acres at Barbers Point in the southwest portion of the island of Oahu.

3.0 WORK DESCRIPTION

The activities planned at the Site will include the following:

- Installation of groundwater monitoring wells.
- Collection of groundwater samples.
- Management of Free-Product (sample collection and disposal).
- Disposal of wastes (coral, groundwater and free-product).

4.0 KEY PERSONNEL AND RESPONSIBILITIES

4.1 Project Manager

The Project Manager shall be responsible for the health and safety of personnel on site. As part of his or her duties, the Project Manager shall ensure that:

1. The Health and Safety Representative is informed of project developments;

2. Personnel on site receive the proper training and are informed of potential hazards anticipated at the Site and the procedures and precautions to be implemented on the job;

3. Contractors and Subcontractors are informed of expected hazards and appropriate protective measures at the Site; and,

4. Resources necessary for a safe and healthy work environment are available to personnel.

4.2 Health and Safety Representative

The Health and Safety Representative shall be responsible for:

1. Monitoring the health and safety impacts of this project on personnel working at the Site;

2. Assessing potential health and safety hazards at the Site;

3. Recommending appropriate safeguards and procedures;

4. Modifying the HSP when necessary; and,

5. Approving changes in safeguards or operating procedures used at the Site.

The Health and Safety Representative shall have the authority to:

1. Require that additional safety precautions or procedures be implemented;

2. Order evacuation of the Site or any portion(s) of the Site, or shut down any operation, if he or she believes a health or safety hazard exists;

3. Deny unauthorized personnel access to the Site;

4. Require that any worker, including subcontractor personnel, obtain immediate medical attention; and,

5. Approve or disallow any proposed modifications to safety precautions or working procedures.

4.3 Site Safety Officer

The Site Safety Officer (SSO) or a trained designated alternate will be present at the Site during work activities. The SSO shall be notified of and approve activities during which personnel may be reasonably expected to be exposed to contaminated soil and/or groundwater.

The SSO shall be responsible for:

1. Ensuring that personnel on site comply with the requirements of the HSP;

2. Limiting access to the Site;

3. Reporting unusual or potentially hazardous conditions to the Health and Safety Representative and the Project Manager;

4. Reporting injuries, exposures, and illnesses to the Health and Safety Representative and the Project Manager;

5. Communicating proposed changes in work scope or procedures to the Health and Safety Representative for approval; and,

6. Recommending to the Health and Safety Representative and the Project Manager additional safety procedures or precautions that might be implemented.

The SSO shall have the authority to:

1. Order an evacuation of the Site or any portion(s) of the Site, or shut down any operation, if he or she believes a health or safety hazard exists;

2. Deny site access to unauthorized personnel; and,

3. Require that any worker, including subcontractor personnel, obtain immediate medical attention.

5.0 HAZARD ANALYSIS

Potential chemical hazards are attributed primarily to residual chemicals that remain in the environment from operation of the ponds. Physical hazards arise from the planned sampling activities.

Procedures to protect personnel from chemical and physical hazards are discussed in Section 6.0. Potential chemical and physical hazards during the activities planned at the Site are as follows.

5.1 Chemical Hazards

- Respiratory (exposure to volatile organic compounds [VOCs]; and,
- Dermal (contact with petroleum products).

According to the records of previous investigations and activities at the Site, chemical hazards arise primarily from the following chemical constituents:

VOCs

Benzene

Cyclohexane

Toluene

Xylenes

Polycyclic Aromatic Hydrocarbons

Anthracene

Chrysene

Cresols (all isomers)

Naphthalene

Phenanthrene

Pyrene

1,Methylnaphthalene

2,Methylnaphthalene

Metals

Antimony

Arsenic

Barium

Beryllium

Cadmium

Chromium

Cobalt

Lead

Mercury

Nickel

Selenium

Vanadium

Descriptions of the suspected chemicals of concern are included in Appendix A. Each chemical description includes available physical characteristics, the short-term exposure effects, and the time-weighted average (TWA) permissible exposure limit (PEL) (OSHA Standard, 29 CFR 1910.1000).

5.2 Physical Hazards

The physical hazards at the Site during the planned activities include working around vehicles, and heavy equipment in the refinery. The planned field activities will be conducted as outlined in the GMP.

6.0 WORK REQUIREMENTS

6.1 Respiratory Protection

All field personnel in the work area initially will use modified Level D personal protective equipment (PPE). Air monitoring activities will be conducted as described below which may increase this level of PPE.

6.2 Air Monitoring

The primary route of exposure for chemicals is inhalation. Inhalation hazards due to volatilization will be monitored during soil boring and groundwater sampling activities using a photoionization detector or a flame-ionization detector. If ambient air concentrations of VOCs are above background over a 5-minute average, a temporary stop-work will be observed and a measurement of possible benzene concentration conducted. Detector tubes specifically designed to measure benzene concentrations will be used to assess benzene concentrations in the ambient air. If benzene concentrations exceed 0.5 parts per million (ppm), stoppage of work will continue and a PPE upgrade to supplied air will be considered, or the sampling activities modified to reduce benzene exposure to less than 0.5 ppm.

In the absence of benzene, should airborne organic concentrations in the breathing zone exceed 25 ppm, Level C protection using a NIOSH-approved air purifying respirator APR with organic cartridges will be required.

The temporary stop-work action level will be 10% lower explosive level (LEL) reading on the combustible gas meter. All operating equipment will be shut down and the Health and Safety Representative will be notified.

6.3 Dermal Protection

Chemicals in the coral or groundwater may come in contact with skin or clothing. To protect against such potential exposure, the following personal protective equipment shall be worn during sampling activities.

- Hard hats
- Chemically resistant steel-toed, steel-shank safety boots (minimum 14 inches in height);
- Safety glasses
- Latex undergloves and Edmont Solvex or equivalent overgloves
- Polyethylene-coated Tyvek coveralls taped at the boots and gloves
- Hearing protection around heavy equipment

6.4 Protection Against Physical Hazards

Noise

Field personnel working near heavy machinery or in locations throughout the Refinery will require hearing protection.

Heavy Equipment

Hazards related to heavy equipment will necessitate securing the work area. OSHA requirements for operating heavy equipment in 29 CFR 1910/1926 shall be observed.

Heat Stress

Field work will begin early in the day, and breaks will be taken at midday, when temperatures normally peak. Personnel shall be provided with liquids to drink throughout the work day. The duration and number of breaks shall be determined by the temperature, humidity, and workload. Personnel will be monitored for symptoms of heat stress, such as increased pulse rate, high body temperature, and hot, dry red skin. Additionally, personnel may be monitored for dehydration by measuring body weight before, during, and after work shifts.

General Safety

Personnel will wear approved head protection while working around heavy equipment at the Site. Fire hydrants will be identified before field activities begin. Two (2) 10-pound fire extinguisher will be kept on Site near the working area.

6.5 Entry Procedures

At a minimum, all visitors entering the sampling area must wear the same protective clothing and equipment as on-site personnel, or equivalent protective gear. Permission to enter the work area must be obtained from at least one (1) of the personnel named in Section 4.0. Visitors' names and the purpose of their visit will be recorded in the field notes.

6.6 Decontamination Procedures

Personal protective equipment such as disposable gloves, disposable coveralls, and other disposable clothing or equipment worn by on-site personnel will be placed in a suitable container on site at the end of each work day. Protective clothing and equipment will be replaced if its protective function is compromised by holes or tears.

6.6.1 Personnel

A formal decontamination area will not be required, but anyone entering the Site shall follow decontamination procedures before leaving the Site. All personnel will be required to wash their hands and faces before leaving the Site at the end of each work day. Personnel should shower after leaving work. In addition, no drinking, eating, or smoking will only be allowed in appropriate areas, and personnel shall wash their hands before conducting those activities on their breaks.

All disposable protective equipment shall be left on site and bagged for appropriate disposal. Boots shall be washed with an non phosphate detergent and rinsed before being removed from the Site.

The following decontamination equipment shall be present on site:

- Two tubs for washing and rinsing boots
- Alconox (non phosphate detergent)
- Two brushes with handles for washing and rinsing boots
- Small table to support hand/face wash/rinse basins

- Wash basins
- Rinse basins
- Plastic garbage bags for disposal of used protective clothing

6.7 Disposal Procedures

Sample analysis results will be used to assess the appropriate disposal method for material. Disposable gloves, coveralls, and other disposable clothing or equipment worn by on-site personnel will be placed in a suitable disposal container on site at the end of each work day.

7.0 EMERGENCY PROCEDURES

7.1 General Injury

Step 1: Use first aid kit on site, if appropriate.

Step 2: Use off-site help and/or assistance, if appropriate.

Step 3: Notify SSO, Project Manager, and Health and Safety Representative.

7.2 Specific Treatments

Eye exposure: Flush eye with eye wash, call ambulance.

Skin exposure: Wash immediately with soap and water; call ambulance if necessary.

Fire (localized): Use fire extinguisher.

Fire (uncontrolled): Call fire department.

Chemical spill: Call fire department and National Response Center for Toxic Chemical and Oil Spills.

Inhalation: Move person away from source of chemicals.

Swallowing: Call ambulance service.

7.3 Emergency Phone Numbers

Medical/General Services

Police Department	911
Fire Department	1-808-523-4411 or 911
Ambulance	911
Saint Francis West Hospital	1-808-687-7001

Hospital

Saint Francis West Hospital 1-808-687-7001

91-2141 Fort Weaver Road

Ewa Beach, Hawaii

Figure 1 shows the route from the Site to the hospital.

Hazardous Materials Response/Reporting

National Emergency Response Center: 1-800-424-8802

National Response Center for Toxic Chemical and Oil Spills: 1-800-424-8802

7.4 Accident Reporting Procedures

In the event of an emergency, call 808-547-3900.

If chemical exposure or injury occur, work shall be halted until the SSO in consultation with the Health and Safety Representative decide that it is safe to continue work.

8.0 DOCUMENTATION

The SSO will record field observations of health and safety procedures by workers conducting the planned activities, including necessary deviations from the recommended health and safety procedures.

9.0 MEDICAL MONITORING

Personnel who use or may come in contact with hazardous materials will undergo compulsory routine medical surveillance. The surveillance should include but is not limited to the following:

- A one-time baseline medical history and physical examination, chest x-ray, pulmonary function test, audiogram, electrocardiogram, complete blood count, chemistry panel, and urinalysis.
- Annual medical examination.
- Exit physical examination upon termination of employment.

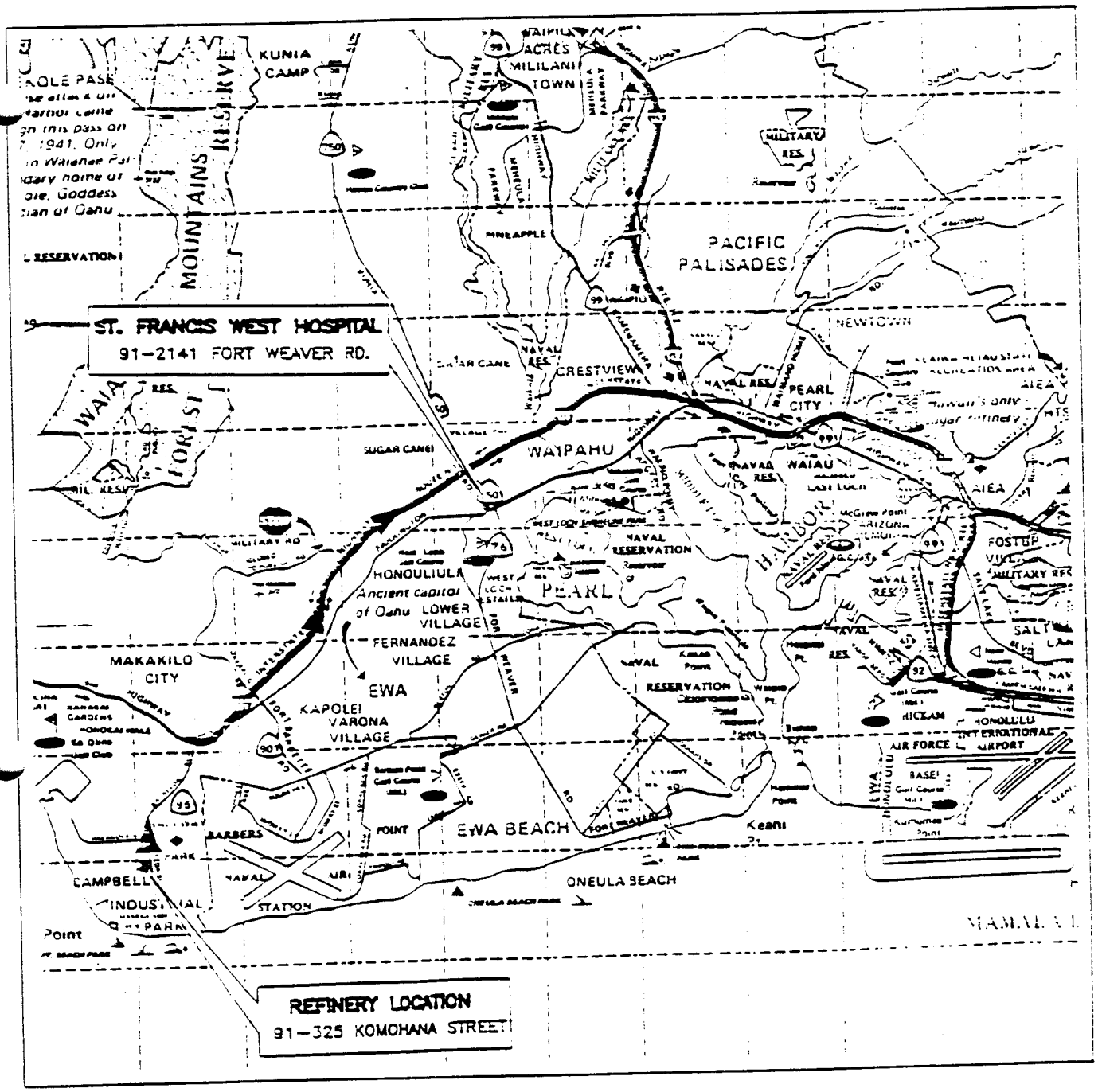
10.0 TRAINING PROGRAM

1. All Site personnel shall have completed 40-hour Health and Safety requirements and refresher courses as specified in 29 CFR 1910.120.

2. The SSO shall have fulfilled all appropriate training requirements specified in 29 CFR 1910.120 (e), including the 40-hour training requirements, 8-hour supervisory training requirements, and required annual refresher courses.

3. A tailgate session to discuss this HSP will be held before field activities begin. All personnel and contractor/subcontractor employees shall receive, at a minimum, the following information:

   - The names of personnel and alternates responsible for site safety and health
   - Safety, health, and other hazards at the Site
   - Instruction on use of personal protective equipment
   - Instruction on work practices that will minimize risks from on-site hazards
   - Action levels
   - Instruction on safe use of engineering controls and equipment on site
   - Site control measures
   - Emergency plans



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SCALE IN MILES

FIGURE 1

SITE/HOSPITAL LOCATION MAP
BHP PETROLEUM AMERICAS REFINING INC.
91-325 KOMOHANA STREET
KAPOLEI, HAWAII

PROJECT NO. 45-93-033	DRAWN BY M. ENTERLINE
FILE NO. 3-033-M1	PREPARED BY S. COLE
DATE 17 OCT 93 / REV. 0	REVIEWED BY

Delta Environmental Consultants, Inc.

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BHP

CERTIFIED MAIL NO. P-101-726-958
RETURN RECEIPT REQUESTED

BHP Hawaii

February 27, 1995

Mr. Mitch Kaplan
U. S. EPA, Region IX (H-3-1)
75 Hawthorne Street
San Francisco, CA 94105-3901

Subject: **GROUNDWATER QUALITY MONITORING ANNUAL REPORT**
HID 056 786 395

Dear Mr. Kaplan:

Enclosed please find the 1994 **Annual report** for groundwater quarterly quality assessment monitoring conducted at BHP Hawaii Refining Inc., located at Kapolei, Hawaii.

The old groundwater monitoring well network was installed in 1987 at BHP Hawaii Refinery in compliance with Federal Regulation 40 CFR Part 265, Subpart F, and consists of four groundwater monitoring wells: MW-3, MW-4, MW-5, and MW-6. The enclosed annual report for 1994 includes the analytical results for groundwater samples collected at four separate quarterly sampling events from the four groundwater monitoring wells. Under the new groundwater monitoring plan (GMP - October 19, 1993), 22 additional groundwater monitoring wells were included in the December 1994 sampling. For the purpose of comparison, the analytical data of the new wells were not included in the annual report for 1994; but the data were included in the quarterly report for December 1994 which was sent to you in a separated letter on February 17, 1995.

Please contact Tony Shan at (808) 547-3804 should you have any questions.

Sincerely,

Frank D. Clouse

Frank D. Clouse
BHP Refinery Manager

cc: Mr. Steven Y. K. Chang, HDOH
Ms. Paula Bisson, US EPA

BHP Hawaii Inc
733 Bishop Street Honolulu Hawaii 96813 USA
PO Box 3379 Honolulu Hawaii 96842 USA
Telephone 808 547 3111 Facsimile 808 547 3145

GROUNDWATER QUARTERLY MONITORING
BHP HAWAII REFINERY
ANNUAL REPORT
1994

BHP HAWAII REFINING INC.
91-325 KOMOHANA STREET, KAPOLEI, HI 96707

February 25, 1995

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GROUNDWATER QUARTERLY MONITORING
BHP HAWAII REFINERY
ANNUAL REPORT
1994

1.0 INTRODUCTION

This is the Annual 1994 Groundwater Monitoring Report for the groundwater monitoring program conducted at BHP Hawaii Refining Inc. (the "Refinery"), formerly the Hawaiian Independent Refinery Inc. or HIRI. The Refinery is located at 91-325 Komohana Street, Kapolei, Hawaii (Figure 1). Submittal of the Annual Groundwater Monitoring Report is required by the United States Environmental Protection Agency (EPA). This report presents the results of groundwater monitoring activities conducted at the Refinery during February, May, August, and December 1994. In addition, this report compares the analytical results for groundwater samples collected in 1994 with those collected in 1992 and 1993.

The groundwater monitoring wells included in Pond No. 1 groundwater monitoring activities at the Refinery are MW-3, MW-4, MW-5, and MW-6. These groundwater monitoring wells were installed by Harding Lawson & Associates (HLA) in 1987. The location of these wells are shown on Figures 2 and 3. Additional groundwater monitoring wells (CW-1 to CW-4) and new groundwater monitoring wells (CW- 5 to CW-9) installed in November 1994 and sampled in December 1994 under the new GMP (Groundwater Monitoring Plan - October 19, 1993) have not be included in this report and will be discussed in next annual report to be completed in 1996.

2.0 WATER-LEVEL AND PRODUCT THICKNESS MEASUREMENTS

Groundwater elevations, depths to groundwater and depths to product in groundwater monitoring wells MW-3, MW-4, MW-5, and MW-6 were measured on February 22, 1994, May 17, 1994, August 9, 1994, and December 19, 1994, during quarterly groundwater sampling activities, and the data are shown in Table 1.

3.0 QUARTERLY GROUNDWATER MONITORING

3.1 Sampling and Analytical Procedures

Groundwater samples were collected during quarterly groundwater sampling events conducted in February 1994, May 1994, August 1994, and December 1994. The December quarterly sampling

was combined with the first sampling of the new Groundwater Monitoring Plan (GMP) currently undergoing in the Refinery. Groundwater samples were analyzed for volatile organic compounds (VOC), semi-volatile organic compounds (SVOC), including but not limited to the Skinner List VOCs and SVOCs, and Skinner List total and dissolved metals (dissolved metals were not analyzed for the December sampling event after getting EPA's approval of eliminating that analysis). The 1994 quarterly groundwater sampling was conducted by Environmental Technologies International (ETI), Inc. located in Honolulu, Hawaii.

The sampling procedures used during the first three quarterly groundwater sampling follow the procedures outlined in the Refinery's Revised Sampling and Analysis Plan, Groundwater Quality Assessment Monitoring at Pond No. 1, dated August 28, 1991. The December quarterly sampling used the procedures outlined in the Refinery's new Groundwater Monitoring Plan (GMP) dated October 19, 1993.

3.2 Laboratory Analyses

Groundwater samples collected during 1994 quarterly monitoring events were analyzed for VOCs using EPA Method 8240, for SVOCs using EPA Method 8270, and for Skinner List total and dissolved metals using EPA Methods 6010, 7060, 7131, 7470, 7421, and 7740. The groundwater samples were submitted to Analytical Technologies, Inc. (ATI), located in San Diego, California, for laboratory analysis. A summary of the 1994 analytical results for groundwater samples collected from groundwater monitoring wells MW-3, MW-4, MW-5, and MW-6 is presented in Tables 2, 3, and 4. Additional groundwater samples collected from MW-3, MW-4, MW-5, and MW-6 during the February 1994 and August 1994 quarterly sampling events were analyzed for chloride, total phenols (February only), sulfate, and total dissolved solids (TDS) using EPA Methods 9253, 8040, 9038, and 160.1 respectively. A summary of these additional analytical results is presented in Table 5.

3.3 Analytical Results

The following is a discussion of the analytical results for groundwater samples collected during the 1994 quarterly groundwater sampling events. The discussion is separated into three sections: VOCs, SVOCs, and metals. Each section discusses compound concentration maximums, yearly trends, and comparisons with EPA established maximum contaminant levels (MCL). Graphical representation's of the analytical results of 1994 plus previous data (1992 and 1993) for each groundwater monitoring well are included in Figures 4 to 15. Tables 2 and 3 summarize the Skinner List VOCs, SVOCs, and metals analytical results of 1992, 1993, and 1994 for groundwater monitoring wells MW-3, MW-4, MW-5, and MW-6.

3.3.1 Monitoring Well MW-3

VOCs

The VOC analytical results for groundwater samples collected from groundwater monitoring well MW-3 indicated maximum detectable concentrations of benzene at 11 ug/L and carbon disulfide and total xylenes at 5 and 2 ug/L respectively. The analytical results indicated that the concentration of benzene in groundwater samples collected from MW-3 increased from 2 ug/L in February 1994 quarterly sampling event to 11 ug/L in May 1994 quarterly sampling event, but then decreased to 8 ug/L in the August 1994 quarterly sampling event, and further decreased to 1 ug/L in December 1994 sampling event. Detectable concentrations of carbon disulfide and total xylenes were presented in groundwater samples collected in May 1994 sampling event only. Based on the analytical results, all of the applicable Skinner List VOCs except for benzene are below their respective MCLs.

SVOCs

The analytical results did not indicate the presence of detectable concentrations of SVOCs in groundwater samples collected from MW-3 except for 1-methylnaphthalene, 2-methylnaphthalene, and naphthalene with maximum detectable concentrations of 210 ug/L, 53 ug/L, and 190 ug/L respectively (all occurred in February 1994 quarterly sampling). The analytical results indicated that detectable concentrations of 1-methylnaphthalene ranged from 44 ug/L to 210 ug/L during 1994 groundwater sampling event. Detectable concentrations of 2-methylnaphthalene of 53 ug/L and 38 ug/L respectively in February 1994 and August 1994 sampling events. The analytical results indicate that detectable naphthalene was presented for all quarterly sampling events except May 1994 with concentrations of 190 ug/L, 110 ug/L, and 36 ug/L respectively.

Metals

The analytical results for groundwater samples collected from MW-3 did not indicate the presence of detectable concentrations of total and dissolved Skinner List metals except for arsenic, barium, and vanadium. Detectable concentrations of arsenic at 3 ug/L and 4 ug/L were found in February 1994 and May 1994 quarterly sampling events, but both are below the MCL of arsenic at 50 ug/L. Detectable barium concentration at 20 ug/L was found in August 1994 sampling, and it is far below the MCL of barium at 1000 ug/L. Detectable vanadium was found in all four quarterly sampling events at the level of 10 to 20 ug/L; however, there is no MCL for vanadium at present. Dissolved metal analytical results are basically identical with total metal analyses. No dissolved metal analysis was conducted for December 1994 sampling.

3.3.2 Monitoring Well MW-4

VOCs

The VOC analytical results for groundwater samples collected from groundwater monitoring well MW-4 show detectable concentrations of benzene at 2 ug/L level for the first three quarterly sampling events in 1994 and non-detectable for December 1994; carbon disulfide at 3 ug/L and 4 ug/L for February 1994 and May 1994 sampling events respectively and non-detectable for August 1994 and December 1994 sampling events; and total xylenes at 1 ug/L and 2 ug/L for February 1994 and May 1994 sampling events respectively and non-detectable for August 1994 and December 1994 sampling events. Based on the analytical results, all of the applicable Skinner List VOCs (including benzene) at MW-4 are below their respective MCLs in 1994.

SVOCs

The analytical results did not indicate the presence of detectable concentrations of SVOCs in groundwater samples collected from MW-4 except for 1-methylnaphthalene, and naphthalene with maximum detectable concentrations of 190 ug/L and 59 ug/L respectively (all occurred in February 1994 quarterly sampling). The analytical results indicated that detectable concentrations of 1-methylnaphthalene ranged from 62 ug/L to 190 ug/L during 1994 groundwater sampling events. The analytical results also indicate that detectable naphthalene was presented at all quarterly sampling events except May 1994 with concentrations of 59 ug/L, 31 ug/L, and 19 ug/L respectively.

Metals

The analytical results for groundwater samples collected form MW-4 did not indicate the presence of detectable concentrations of total and dissolved Skinner List metals except for arsenic, barium, lead, and vanadium. Detectable concentration of arsenic at 4 ug/L was found in May 1994 quarterly sampling event; and it is below the MCL of arsenic at 50 ug/L. Detectable barium concentration at 20 ug/L was found in August 1994 sampling, and it is far below the MCL of barium at 1000 ug/L. Detectable lead concentration of 3 ug/L was found in February 1994 sampling event; and it is below the MCL of lead at 50 ug/L. Detectable vanadium was found in all four quarterly sampling events at the level of 10 to 20 ug/L except December 1994 sampling event that it was below detection limit at 10 ug/L; however, there is no MCL for vanadium at present. Dissolved metal analytical results are basically identical with total metal analyses. No dissolved metal analysis was conducted for December 1994 sampling after getting EPA's approval.

3.3.3 Monitoring Well MW-5

VOCs

The VOC analytical results for groundwater samples collected from groundwater monitoring well MW-5 indicate that benzene has been non-detectable except for February 1994 sampling which was at 1 ug/L level; carbon disulfide was detected at 3 ug/L to 6 ug/L during 1994 except August 1994 sampling it was non-detectable; toluene was found for February 1994 and May 1994 sampling events at concentrations of 4 ug/L and 2 ug/L respectively; and total xylenes was detected at 3 ug/L, 3 ug/L and 6 ug/L for February 1994, May 1994, and December 1994 sampling events respectively. Based on the analytical results, all of the applicable Skinner List VOCs (including benzene) at MW-5 are below their respective MCLs in 1994.

SVOCs

The analytical results did not indicate the presence of detectable concentrations of SVOCs in groundwater samples collected from MW-5 except for 1-methylnaphthalene, 2-methylnaphthalene, and naphthalene with maximum detectable concentrations of 96 ug/L, 26 ug/L, and 15 ug/L respectively. The analytical results indicated that detectable concentrations of 1-methylnaphthalene ranged from 30 ug/L to 96 ug/L during 1994 groundwater sampling events. The analytical results also indicate that detectable 2-methylnaphthalene and naphthalene were presented at December 1994 quarterly sampling with the concentrations of 26 ug/L and 15 ug/L respectively.

Metals

The analytical results for groundwater samples collected form MW-5 did not indicate the presence of detectable concentrations of total and dissolved Skinner List metals except for arsenic, barium, lead, and vanadium. Detectable concentrations of arsenic at 15 ug/L and 14 ug/L were found in February 1994 and May 1994 quarterly sampling events; and they are below the MCL of arsenic at 50 ug/L. Detectable barium concentrations at 10 ug/L were found in May 1994, August 1994, and December 1994 sampling events, and they are far below the MCL of barium at 1000 ug/L. Detectable lead concentration of 3 ug/L was found in August 1994 sampling event; and it is below the MCL of lead at 50 ug/L. Detectable vanadium was found in all four quarterly sampling events at the level of 10 to 20 ug/L in 1994; however, there is no MCL for vanadium at present. Dissolved metal analytical results are basically identical with total metal analyses. No dissolved metal analysis was conducted for December 1994 sampling after getting EPA's approval.

3.3.4 Monitoring Well MW-6

VOCs

The VOC analytical results for groundwater samples collected from groundwater monitoring well MW-6 show detectable concentrations of benzene at 2 to 19 ug/L level for all four quarterly

sampling events, and carbon disulfide at 3 ug/L for February 1994 sampling event. Based on the analytical results, all of the applicable Skinner List VOCs except benzene at MW-6 are below their respective MCLs in 1994. Benzene concentrations from three of the four quarterly sampling events are above the MCL for benzene during 1994.

SVOCs

The analytical results did not indicate the presence of detectable concentrations of SVOCs in groundwater samples collected from MW-6 except for 1-methylnaphthalene, 2-methylnaphthalene, and naphthalene with maximum detectable concentrations of 140 ug/L, 25 ug/L, and 54 ug/L respectively (all occurred in February 1994 quarterly sampling). The analytical results indicated that detectable concentrations of 1-methylnaphthalene ranged from 24 ug/L to 140 ug/L during 1994 groundwater sampling events. The analytical results also indicate that detectable 2-methylnaphthalene of 25 ug/L and 10 ug/L at February 1994 and December 1994 samplings respectively; and that naphthalene was presented at concentrations of 54 ug/L and 25 ug/L at February 1994 and December 1994 samplings respectively.

Metals

The analytical results for groundwater samples collected form MW-6 indicate the presence of detectable concentrations of total and dissolved Skinner List metals for arsenic, barium, Nickel, selenium, and vanadium. Detectable concentration of arsenic at 3 ug/L was found in May 1994 quarterly sampling event; and it is below the MCL of arsenic at 50 ug/L. Detectable barium concentrations at 10 ug/L were found in May 1994 and August 1994 sampling events, and they are far below the MCL of barium at 1000 ug/L. Detectable Nickel concentrations of 30 ug/L and 10 ug/L were found in February 1994 and May 1994 sampling events respectively. Detectable selenium at 5 ug/L level was found February 1994 sampling and it is below the MCL of 50 ug/L. Detectable vanadium was found in all four quarterly sampling events at the level of 10 to 20 ug/L; however, there is no MCL for vanadium at present. Dissolved metal analytical results are basically identical with total metal analyses. No dissolved metal analysis was conducted for December 1994 sampling after getting EPA's approval.

4.0 COMPARISON OF HISTORICAL ANALYTICAL RESULTS

The analytical results for groundwater monitoring wells MW-3 to MW-6 recorded during the period from February 1992 through December 1994 are compared and discussed in this section. A summary of the analytical data is presented in Table 5; and graphical summaries of the analytical results are presented in Figures 4 to 15. For comparison purposes, the figures illustrating the results for EPA 8240 analysis use an identical concentration scale of 0 ug/L to 200 ug/L, for EPA 8270 analysis use an identical concentration scale of 0 ug/L to 500 ug/L, and for

metal analysis use an identical concentration scale of 0 ug/L to 250 ug/L.

4.1 Volatile Organic Compounds

Benzene

The analytical results for groundwater samples collected from MW-3 between February 1992 and December 1994 indicated a decreasing trend of benzene concentrations from a high of 140 ug/L (in August 1992) to the low of 1 ug/L (in December 1994) as shown in Figure 4. The analytical results also indicated decreasing concentrations of benzene in groundwater samples collected from MW-4 ranging from 20 ug/L in August 1992 to less than the detection limit at 1 ug/L in December 1994 (Figure 5). The analytical results for groundwater samples collected from MW-5 between February 1992 and December 1994 indicated a gradual decreasing of benzene concentrations from a high of 6 ug/L in February 1992 to the low of less than the detection limits at 1 or 2 ug/L levels in most of 1994 as shown in Figure 6. The analytical results of samples from MW-6 indicated an increasing in benzene concentration from 3 ug/L in November 1993 to 19 ug/L in May 1994, and then a decreasing to 2 ug/L in December 1994 (Figure 7).

Cyclohexane

Cyclohexane was detected in groundwater samples collected from MW-3 in earlier 1992 from February to August, but had not been detected until August 1994 sampling which indicated a concentration of 11 ug/L (that was just above the detection limit of 10 ug/L), and then decreased to less than the limit of detection (10 ug/L) again in December 1994 (Figure 4). The analytical results for samples collected from MW-4 did not indicate detectable concentrations of cyclohexane except in earlier 1992 with 10 ug/L and 10 ug/L in the February and May sampling events respectively (Figure 5). Cyclohexane was detected in groundwater samples collected from MW-5 in earlier 1992 from February to August 1992 and then again in February 1993, but have decreased to less than the limit of detection (10 ug/L) since then (Figure 6). The analytical results did not indicate the presence of detectable concentrations of cyclohexane above the limit of detection at 10 ug/L in MW-6 for the past three years (see Figure 7 and Table 5).

Toluene

The analytical results of groundwater samples collected from MW-3 indicated detectable concentrations of toluene ranging from 3 ug/L to 5 ug/L from February 1992 through August 1992, and toluene has not been detected (below detection limit) in MW-3 since that time (Figure 4 and Table 5). The analytical results of groundwater samples collected from MW-4 did not indicate the presence of detectable concentrations of toluene except for 8 ug/L at February and May 1992 sampling events and for 3 ug/L at May 1993 sampling event (Figure 5 and Table 5).

The analytical results of groundwater samples collected from MW-5 indicated a decreasing of detectable concentrations of toluene from 10 ug/L at in February 1992 to below the detection limit (2 ug/L) in August and December 1994 sampling events (Figure 6 and Table 5). The analytical results of groundwater samples collected from MW-6 did not indicate the presence of detectable concentrations of toluene (2 ug/L) as shown in Figure 7 and Table 5.

Xylenes

The analytical results indicated that the highest total xylenes concentrations for samples collected from MW-3, MW-4, and MW-5 occurred in May 1992 at 22 ug/L, 36 ug/L, and 64 ug/L respectively; and xylenes from all three wells decreased to below detection limit (1 ug/L) by August 1994, but MW-5 indicated a detectable concentration of 6 ug/L again in December 1994 while MW-3 and MW-4 were still undetected (Table 5). The analytical results of MW-6 indicated that xylenes have been always below detection limit (1 ug/L) at that well with the exception of 1 ug/L of detected xylenes in November 1992 (Figure 7 and Table 5).

4.2 Semivolatile Organic Compounds

The analytical results indicate that detectable concentrations of 1-methylnaphthalene, 2-methylnaphthalene, 2,4-dimethylphenol, and naphthalene were generally decreasing from 1992 to 1994 for all the monitoring wells except MW-6 which did not show clear decrease. The comparison of annual SVOCs analytical results were plotted in Figures 8 to 11; and the analytical data were summarized in Table 5.

1-Methylnaphthalene

The analytical results indicated that detectable concentrations of 1-methylnaphthalene were present in groundwater samples collected from all the monitoring wells for all the sampling events except for May 1993 sampling event that all four wells were below detection limit of 50 ug/L. The maximum concentration of 1-methylnaphthalene at MW-3 was detected to be 210 ug/L in August 1992, February 1993, and February 1994; the maximum concentration of 1-methylnaphthalene at MW-4 was detected to be 190 ug/L in February 1994; the maximum concentration of 1-methylnaphthalene at MW-5 was detected to be 180 ug/L in August 1992; and the maximum concentration of 1-methylnaphthalene at MW-6 was detected to be 140 ug/L in February 1994.

2-Methylnaphthalene

The analytical results indicated the presence of detectable concentrations of 2-methylnaphthalene in approximately half of the groundwater samples collected from MW-3, MW-4, MW-5, and

MW-6 during the time period from February 1992 through December 1994. In 1992, the maximum concentrations of 2-methylnaphthalene were 19 ug/L in MW-3, 53 ug/L in MW-4, 160 ug/L in MW-5, and 88 ug/L in MW-6. In 1993, 2-methylnaphthalene was detected in MW-3 at 69 ug/L in February 1993 and 24 ug/L in August 1993, in MW-4 at 59 ug/L in February 1993, in MW-5 at the range of 15 to 150 ug/L except August 1993 which was below detection limit (20 ug/L), and in MW-6 at 12 ug/L in February and 95 in November 1993. In 1994, 2-methylnaphthalene was detected twice in MW-3 at 53 ug/L in February 1994 and 30 ug/L in August 1994, was not presented above detection limit in MW-4, was detected only once in MW-5 at 26 ug/L in December 1994, and was detected twice in MW-6 at 25 ug/L in February 1994 and 10 ug/L in December 1994. The analytical results were plotted in Figures 8 to 11, and the data were summarized in Table 5.

2,4-Dimethylphenol

The analytical results for groundwater samples collected in 1992 indicated that detectable concentration of 2,4-dimethylphenol in MW-4 and MW-5 were present at maximum concentrations of 270 ug/L and 50 ug/L respectively. 2,4-Dimethylphenol was not detected in MW-3 and MW-6 during the 1992 or 1993 quarterly sampling events. Detectable concentrations of 2,4-dimethylphenol found in MW-4 during 1992 and in May 1993 decreased to below the limits of detection (20 ug/L) in August 1993. Analytical results for groundwater samples collected from MW-5 during 1993 indicated a maximum concentration of 1,300 ug/L (could it be a lab contamination?) in February 1993 decreasing to 12 ug/L by November 1993. 2,4-Dimethylphenol was detected only once in 1994 at MW-5 in August 1994 sampling event at 28 ug/L level, and was not present above detection limit in all the other wells for all the sampling events during 1994 (Table 5).

Naphthalene

The analytical results for groundwater samples collected from MW-3, MW-4, MW-5, and MW-6 during 1992 indicated maximum detectable concentrations of naphthalene of 120 ug/L, 40 ug/L, 110 ug/L, and 140 ug/L respectively. Analytical results for 1993 indicated detectable concentrations of naphthalene ranging from the lowest concentration of 10 ug/L in MW-6 to the highest concentrations of 95 ug/L in MW-6. In 1994, the highest naphthalene concentration was found in MW-3 at 190 ug/L in February 1994. Naphthalene was not detected for all four monitoring wells for May 1994 sampling event. It was detected in the range of 15 ug/L to 36 ug/L for all the four wells in December 1994 (Table 5).

4.3 Skinner List Metals

The graphical representations of the annual Skinner List metals analytical results were plotted in

Figures 12 to 15; and the analytical data were summarized in Table 3 and Table 5. Most of the Skinner List metals have very often been below detection limits, and the only metal that was almost always above the detection limit is vanadium. Even though both total metals and dissolved metals were analyzed for 1992, 1993, and most of 1994, the analytical results of these analyses indicated that there is no significant difference between the two analyses. After getting EPA's approval, the dissolved metals analysis was dropped from December 1994 sampling event for MW-3, MW-4, MW-5, and MW-6.

1992 Skinner List Metals Analytical Results

The analytical results did not indicate the presence of detectable concentrations of total and dissolved Skinner List metals in groundwater samples collected in 1992 except for arsenic, barium, chromium, nickel, and vanadium. The analytical results indicated detectable concentrations of total arsenic in groundwater samples collected during 1992 quarterly sampling events from MW-3, MW-4, MW-5, and MW-6 with maximum concentrations of 5 ug/L, 4 ug/L, 23 ug/L, and 3 ug/L respectively. Analytical results indicated low concentrations (10 ug/L) of total barium in groundwater samples collected from MW-4 during the May quarterly sampling event, 10 ug/L of barium from MW-5 during the November quarterly sampling event, and 10 ug/L of total and dissolved barium from MW-6 for all four quarterly sampling events in 1992. Total chromium was present in groundwater samples collected from MW-4 with a maximum concentration of 0.02 mg/L. The analytical results indicated nickel in groundwater samples collected from MW-3, MW-4, MW-5, and MW-6 with maximum concentrations of 10 ug/L, 20 ug/L, 10 ug/L, and 30 ug/L respectively. The analytical results indicated vanadium (total and dissolved) in groundwater samples from MW-3, MW-4, MW-5, and MW-6 with maximum concentrations of 30 ug/L, 30 ug/L, 50 ug/L, and 40 ug/L respectively.

1993 Skinner List Metals Analytical Results

The analytical results for groundwater samples collected during 1993 from monitoring wells MW-3, MW-4, MW-5, and MW-6 did not indicate the presence of detectable concentrations of total and dissolved Skinner List metals except for arsenic, chromium, lead, nickel, selenium, and vanadium. Analytical results indicated the presence of detectable concentrations of total chromium (10 ug/L) only in MW-4 during the May 1993 and November 1993 sampling events. Analytical results indicated detectable concentrations of total nickel ranging from 10 ug/L in MW-3, MW-4, and MW-5, and 20 ug/L in MW-6. Detectable concentrations of dissolved nickel ranged from 10 ug/L in MW-4 to 20 ug/L in MW-6 (reported as 60 ug/L, but must be an analytical mistake because the dissolved nickel should be equal to or less than the total nickel). The analytical results indicated detectable concentrations of total and dissolved vanadium in groundwater samples collected from each of four wells ranging from 20 ug/L in MW-3 and MW-4 to 30 ug/L in MW-5 and MW-6. Detectable concentrations of 2 ug/L to 12 ug/L of total and dissolved arsenic were also present in groundwater samples collected from MW-3, MW-4, MW-

5, and MW-6. Detectable concentrations of barium were present in wells MW-5 and MW-6 at 10 ug/L. The EPA MCLs for arsenic, barium, chromium, and lead were not exceeded in 1993.

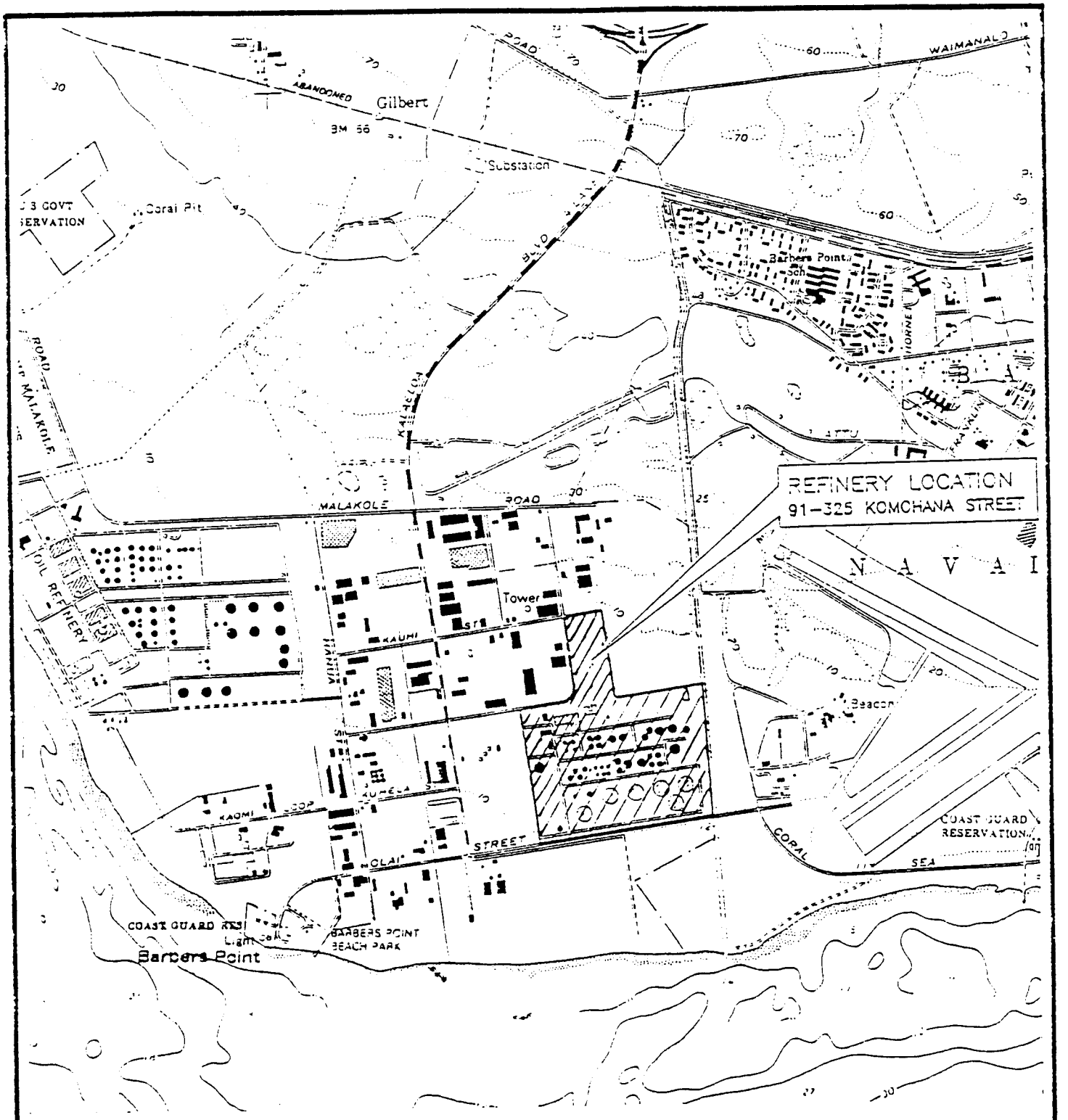
1994 Skinner List Metals Analytical Results

The analytical results indicated the presence of detectable concentrations of total and dissolved Skinner List metals of arsenic, barium, chromium, nickel, lead, selenium, and vanadium in groundwater samples collected in 1994. The analytical results indicated detectable concentrations of total arsenic in groundwater samples collected during February 1994 and May 1994 quarterly sampling events from MW-3, MW-4, MW-5, and MW-6 with maximum concentrations of 4 ug/L, 4 ug/L, 15 ug/L, and 3 ug/L respectively. Analytical results indicated low concentrations (10 ug/L) of total barium in groundwater samples collected from MW-5 and MW-6 during the May quarterly sampling event, 20 ug/L of barium from MW-3 and MW-4, and 10 ug/L from MW-5 and MW-6 during the August quarterly sampling event, and 10 ug/L of barium from MW-5 for December quarterly sampling event. Total chromium was present in groundwater samples collected from MW-6 with the concentrations of 20 ug/L, 10 ug/L, and 20 ug/L for February, May, and December quarterly sampling events. Detectable concentrations of lead were found in water samples collected from MW-4 in February and in MW-5 in August. The analytical results indicated nickel in groundwater samples collected from MW-4, MW-5, and MW-6 with maximum concentrations of 10 ug/L, 20 ug/L, and 30 ug/L respectively for February and May sampling events. Analytical results indicated the presence of detectable concentrations of selenium from MW-5 and MW-6 at the levels of 13 ug/L and 5 ug/L respectively in February and 6 ug/L for MW-5 in May. The analytical results indicated vanadium (total and dissolved) in groundwater samples from MW-3, MW-4, MW-5, and MW-6 with maximum concentrations of 20 ug/L respectively (Table 3).

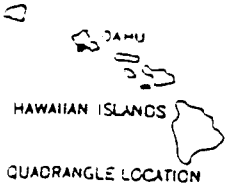
5.0 SUMMARY

Groundwater monitoring results from monitoring wells MW-3, MW-4, MW-5, and MW-6 at BHP Hawaii Refinery continue to indicate reductions in concentrations of most of the detectable volatiles and semi-volatiles over the past year in general. Concentrations of Skinner List metals including arsenic, barium, nickel, chromium, lead, selenium, and vanadium either decreased or remained relatively constant throughout the year when compared to the previous data.

FIGURES



GENERAL NOTES:
BASE MAP FROM U.S.G.S.
EWA, HAWAII QUADRANGLE
7.5 MINUTE TOPOGRAPHIC MAP
PHOTOREVISED 1983



QUADRANGLE LOCATION

N

0 2400 FT

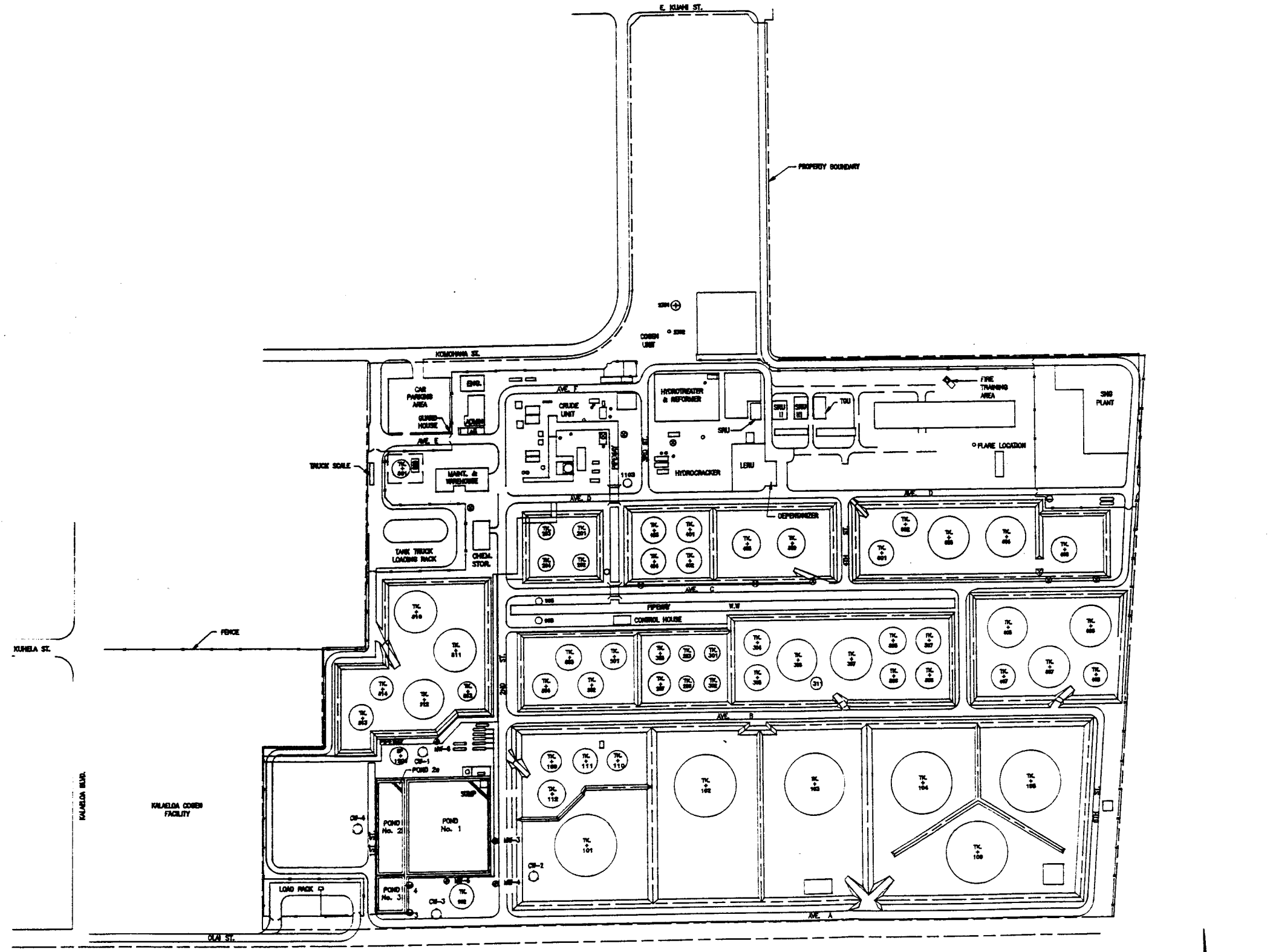
SCALE: 1 : 24,000

FIGURE 1

SITE LOCATION MAP
HAWAIIAN INDEPENDANT REFINERY, INC.
91-325 KOMAHANA STREET
EWA BEACH, HAWAII

PROJECT NO. 45-93-005	DRAWN BY GREG ROSAS	
FILE NO. 3-005-01	PREPARED BY JOHN AMATO	
DATE 16 FEB 93 / REV.	REVIEWED BY	

Delta Environmental Consultants, Inc.

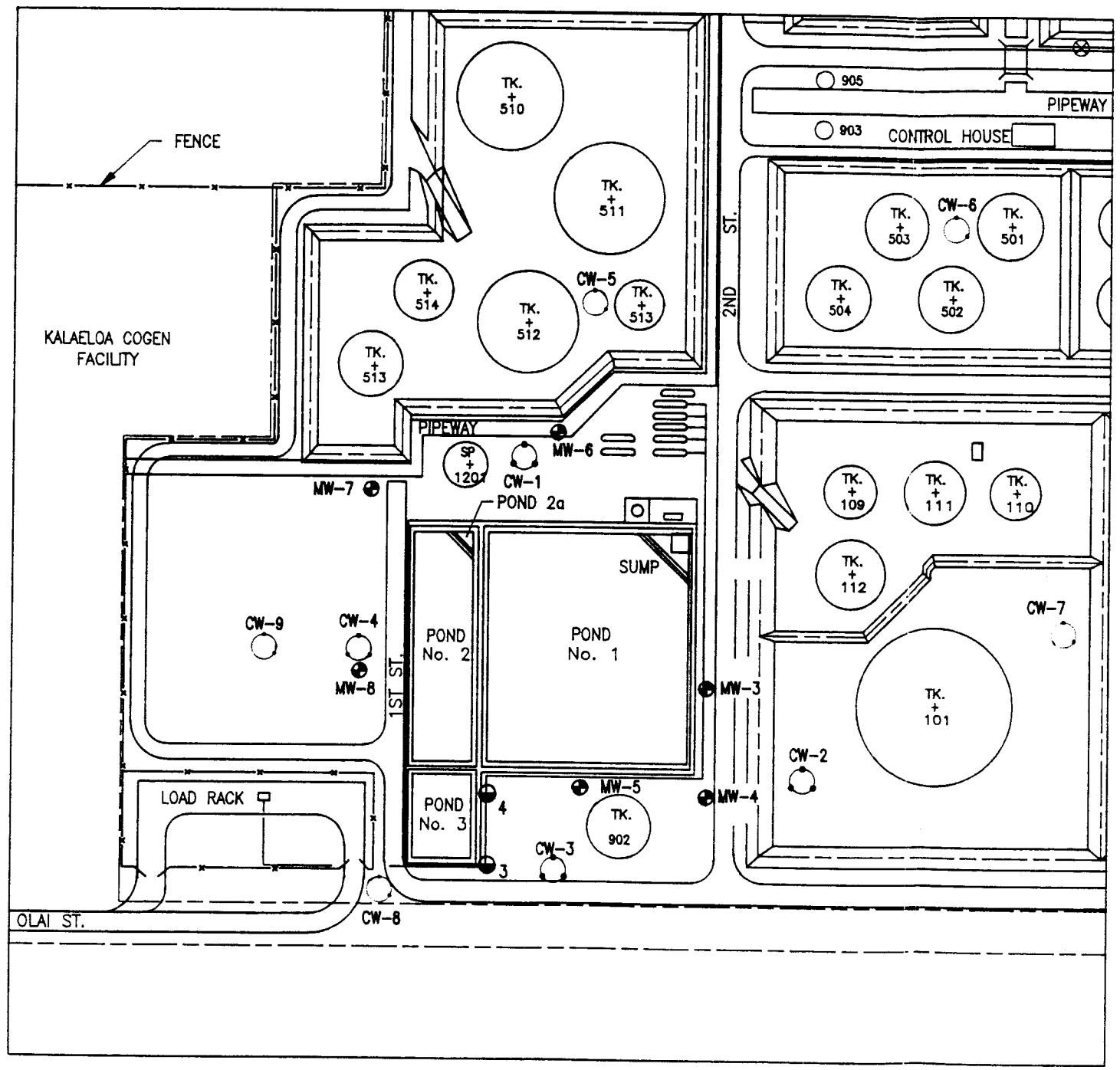


LEGEND

- MW-3 EXISTING GROUNDWATER MONITORING WELL LOCATION
- CW-4 EXISTING WELL CLUSTER LOCATION (SEE FIGURE 4 FOR DETAIL)
- 3 INJECTION WELL LOCATION

FIGURE 2
REFINERY SITE PLAN WITH EXISTING GROUNDWATER MONITORING WELL LOCATIONS
BHP PETROLEUM AMERICAS REFINING INC.
91-325 KOMOHANA STREET
KAPOLEI, HAWAII

PROJECT NO. 45-93-033	DRAWN BY GREG ROSAS	Delta Environmental Consultants, Inc.
FILE NO. 3-033-06	PREPARED BY JOHN AMATO	
DATE 3 AUG 93 / REV.	REVIEWED BY	



LEGEND

MW-5 EXISTING GROUNDWATER MONITORING WELL LOCATION

CW-4 EXISTING CLUSTER WELL LOCATION (SEE FIGURE 4 FOR DETAIL)

4 INJECTION WELL LOCATION

CW-9 PROPOSED CLUSTER WELL LOCATION

N

0 100 200

SCALE FEET

FIGURE 3

GROUNDWATER MONITORING WELL NETWORK WITH *NEW* CLUSTER WELL LOCATIONS
BHP PETROLEUM AMERICAS REFINING INC.
91-325 KOMOHANA STREET
KAPOLEI, HAWAII

PROJECT NO. 45-93-033	DRAWN BY M. ENTERLINE	Delta Environmental Consultants, Inc.
FILE NO. 3-033-08	PREPARED BY J. AMATO	
DATE 18 OCT 93 / REV.	REVIEWED BY	

Figure 4. BHP GROUNDWATER ANALYTICAL RESULTS

EPA METHOD 8240 - MW-3

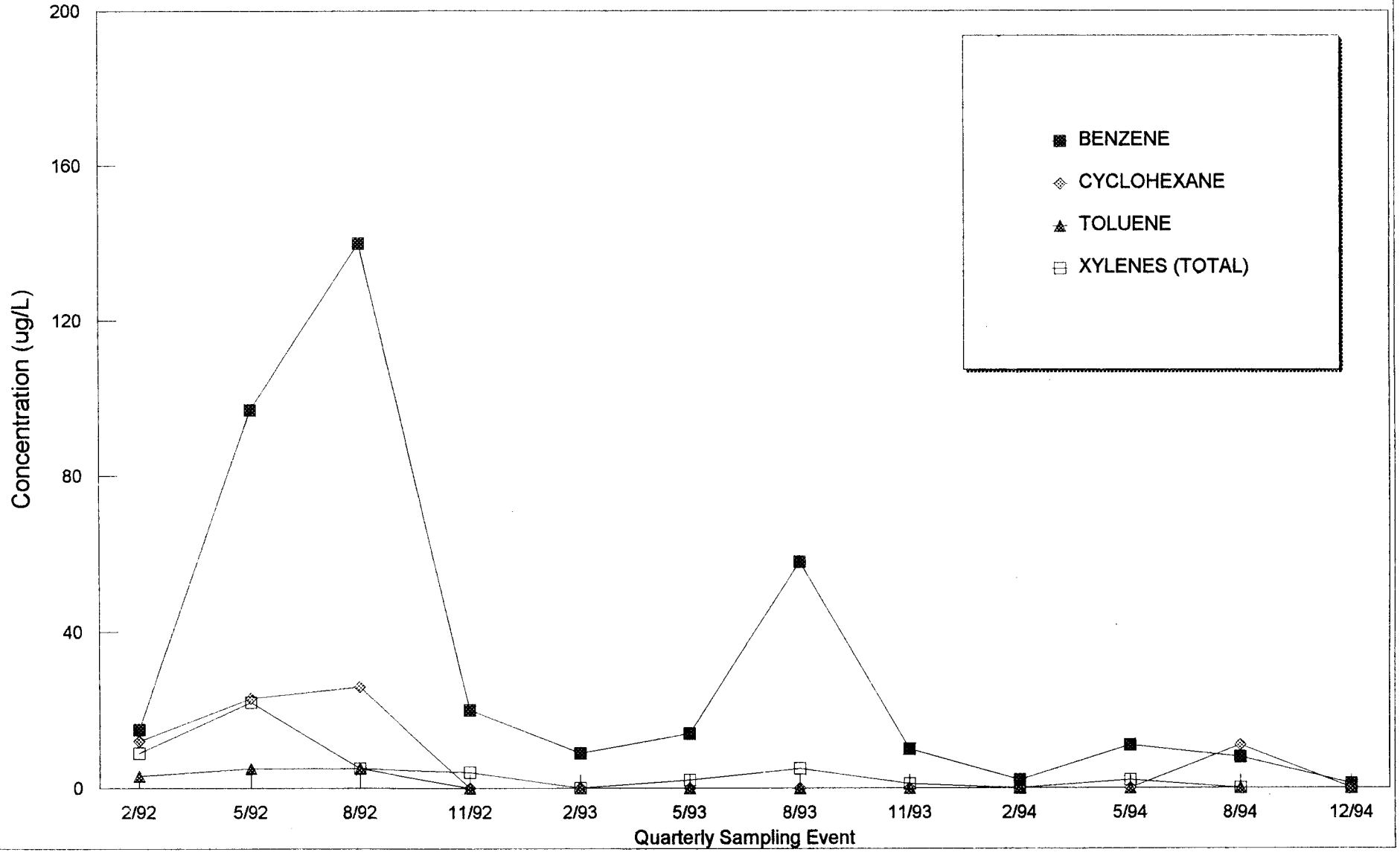


Figure 5. BHP GROUNDWATER ANALYTICAL RESULTS

EPA Method 8240 - MW-4

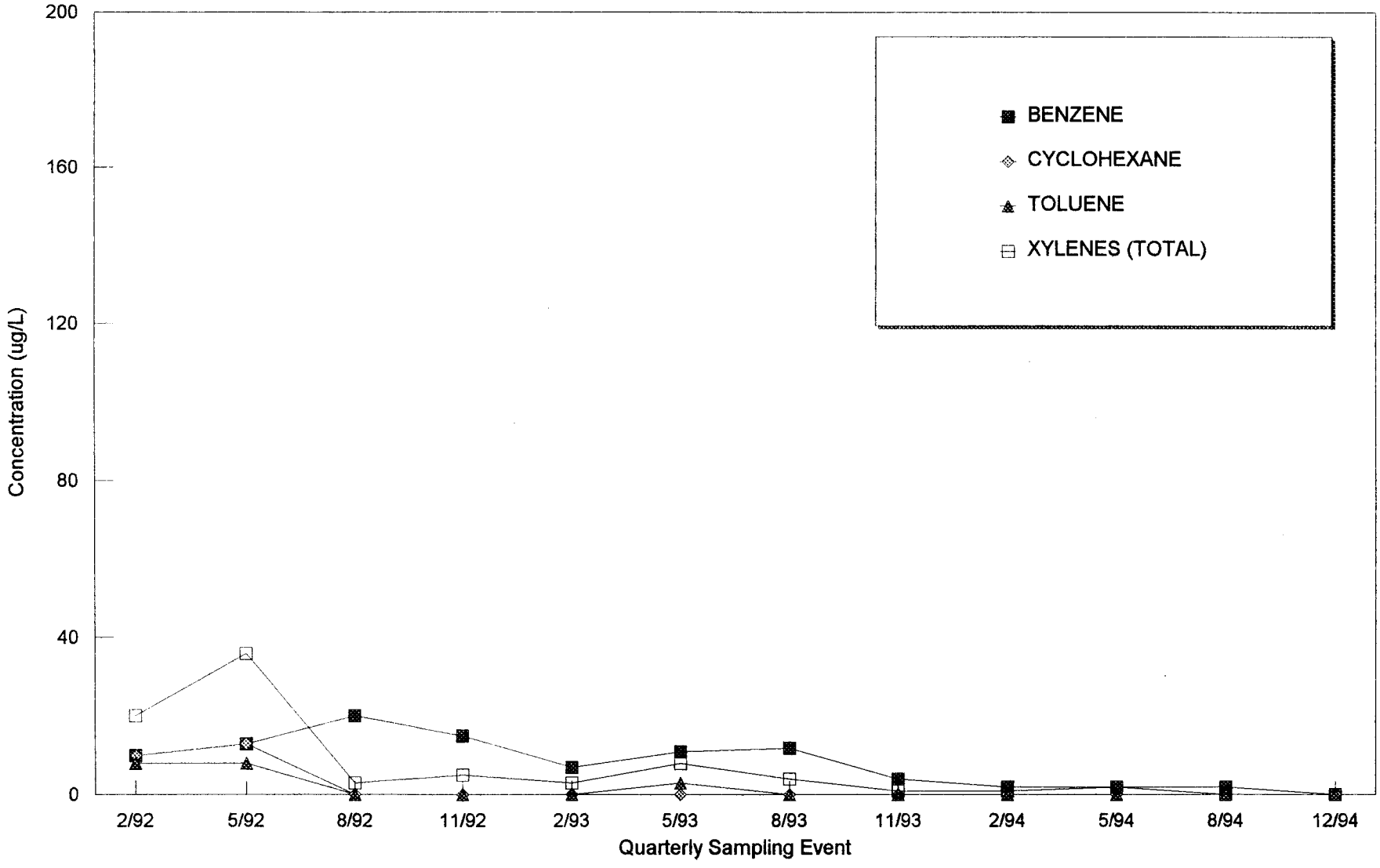


Figure 6. BHP GROUNDWATER ANALYTICAL RESULTS

EPA Method 8240 - MW-5

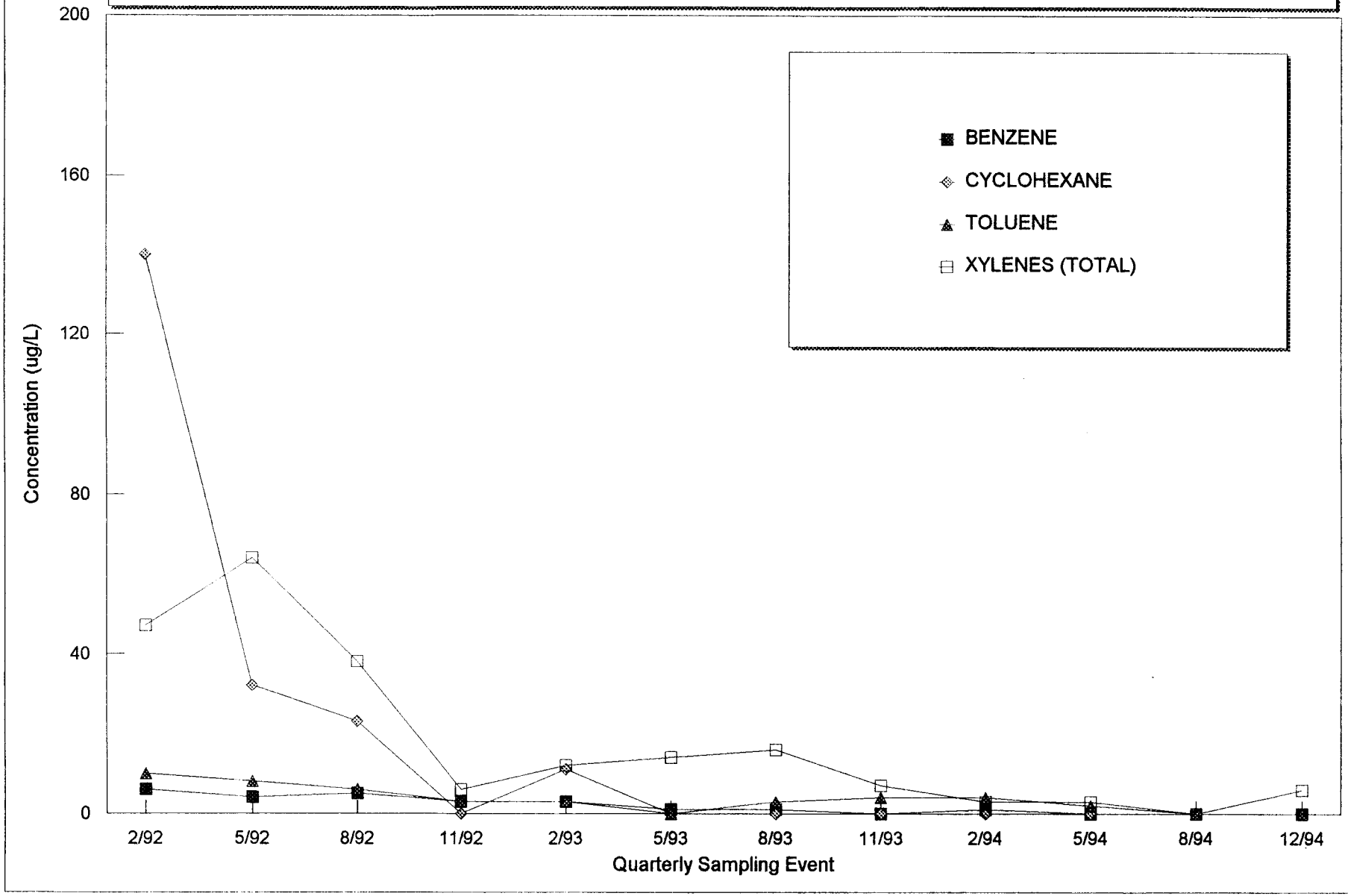


Figure 7. BHP GROUNDWATER ANALYTICAL RESULTS

EPA Method 8240 - MW-6

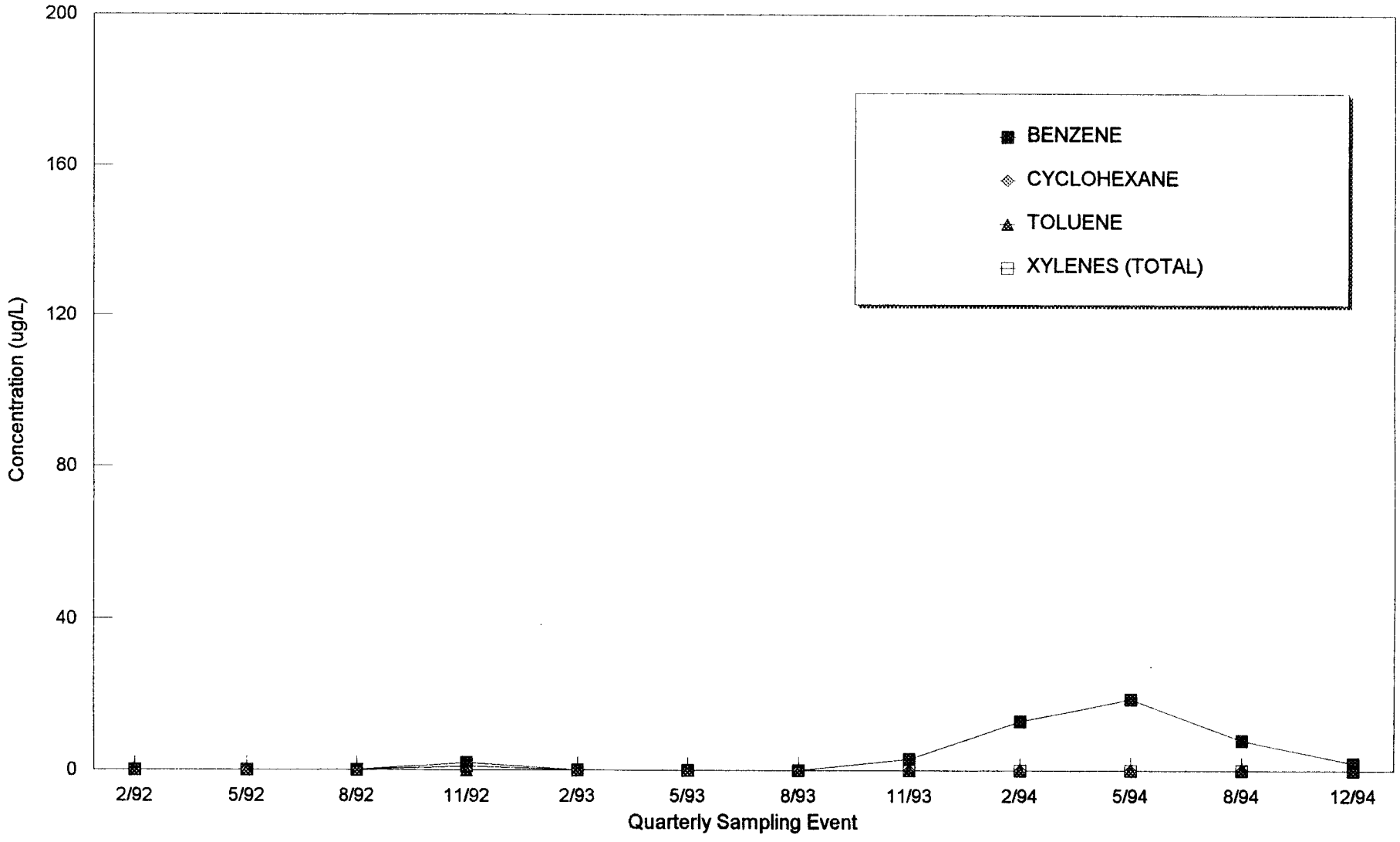


Figure 8. BHP GROUNDWATER ANALYTICAL RESULTS

EPA METHOD 8270 - MW-3

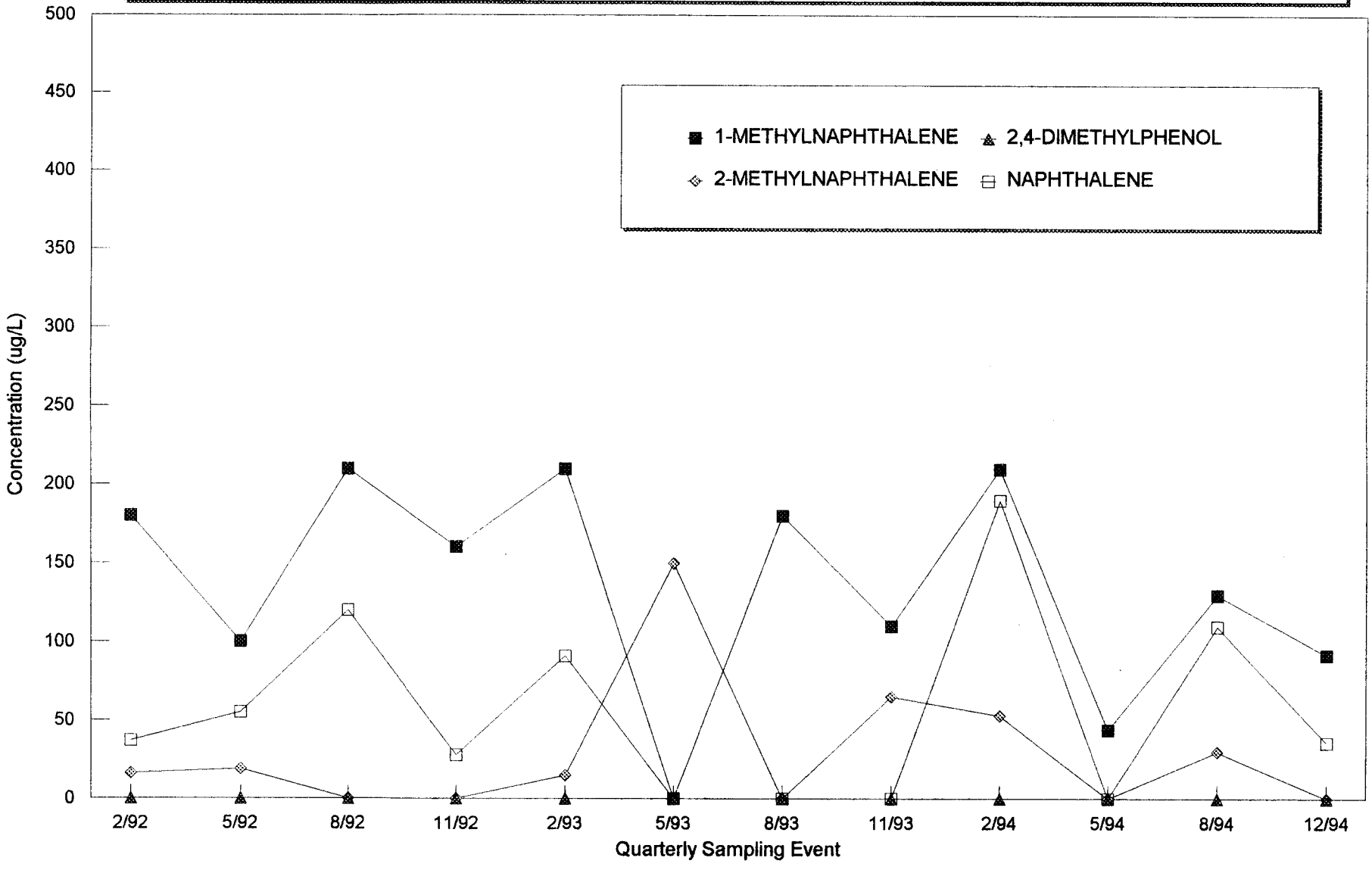


Figure 9. BHP GROUNDWATER ANALYTICAL RESULTS

EPA Method 8470 - MW-4

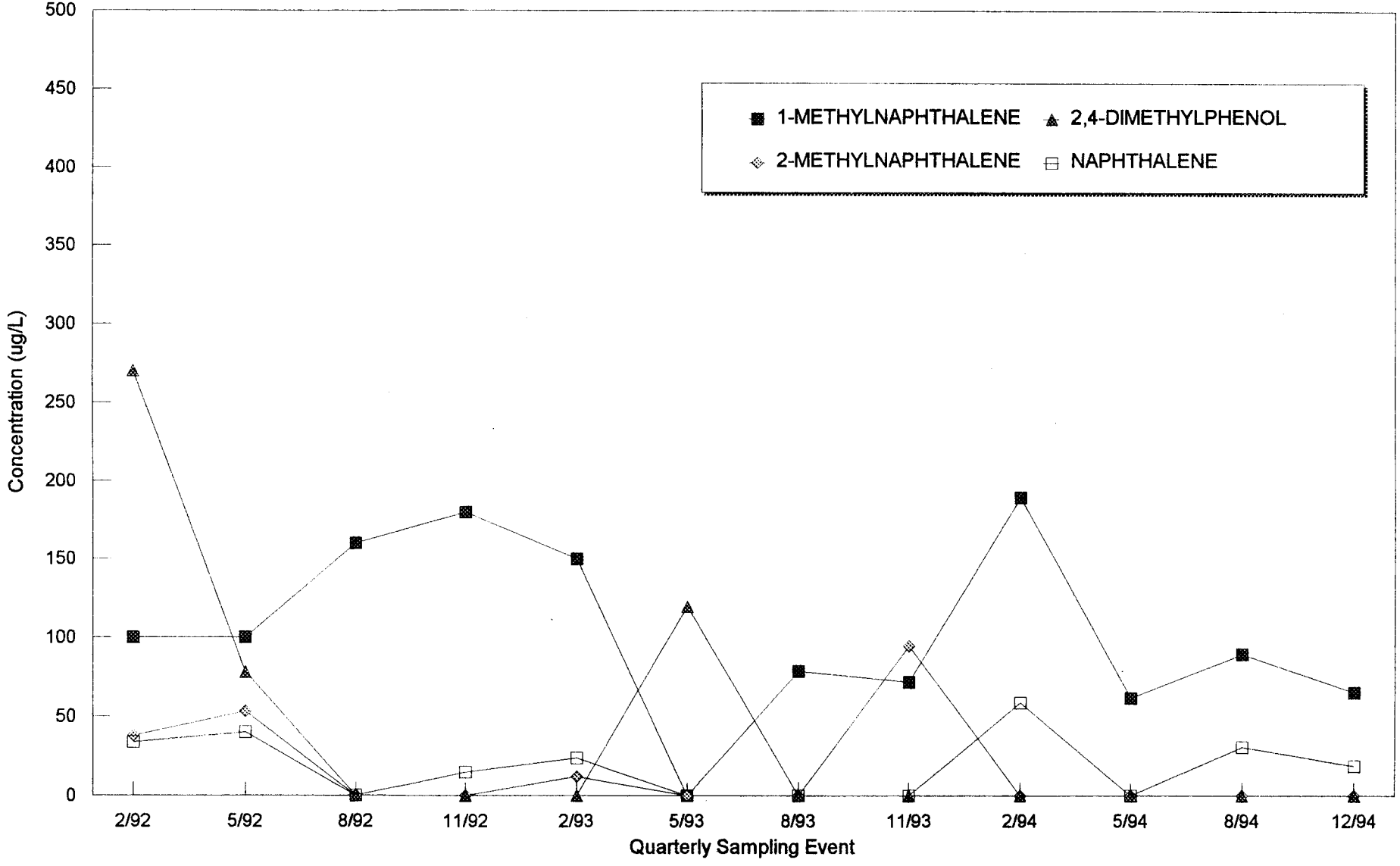


Figure 10. BHP GROUNDWATER ANALYTICAL RESULTS

EPA Method 8270 - MW-5

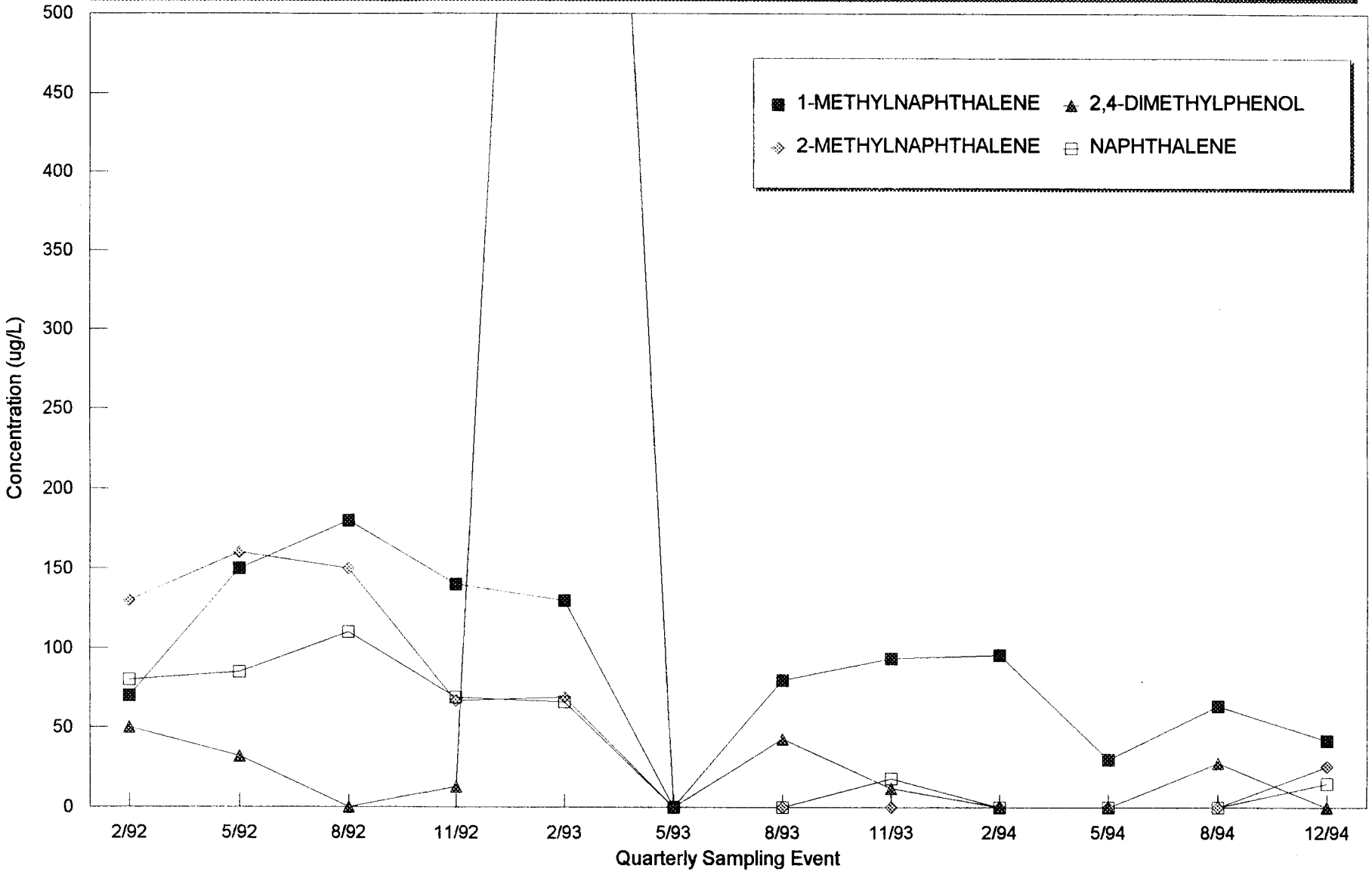


Figure 11. BHP GROUNDWATER ANALYTICAL RESULTS

EPA Method 8270 - MW-6

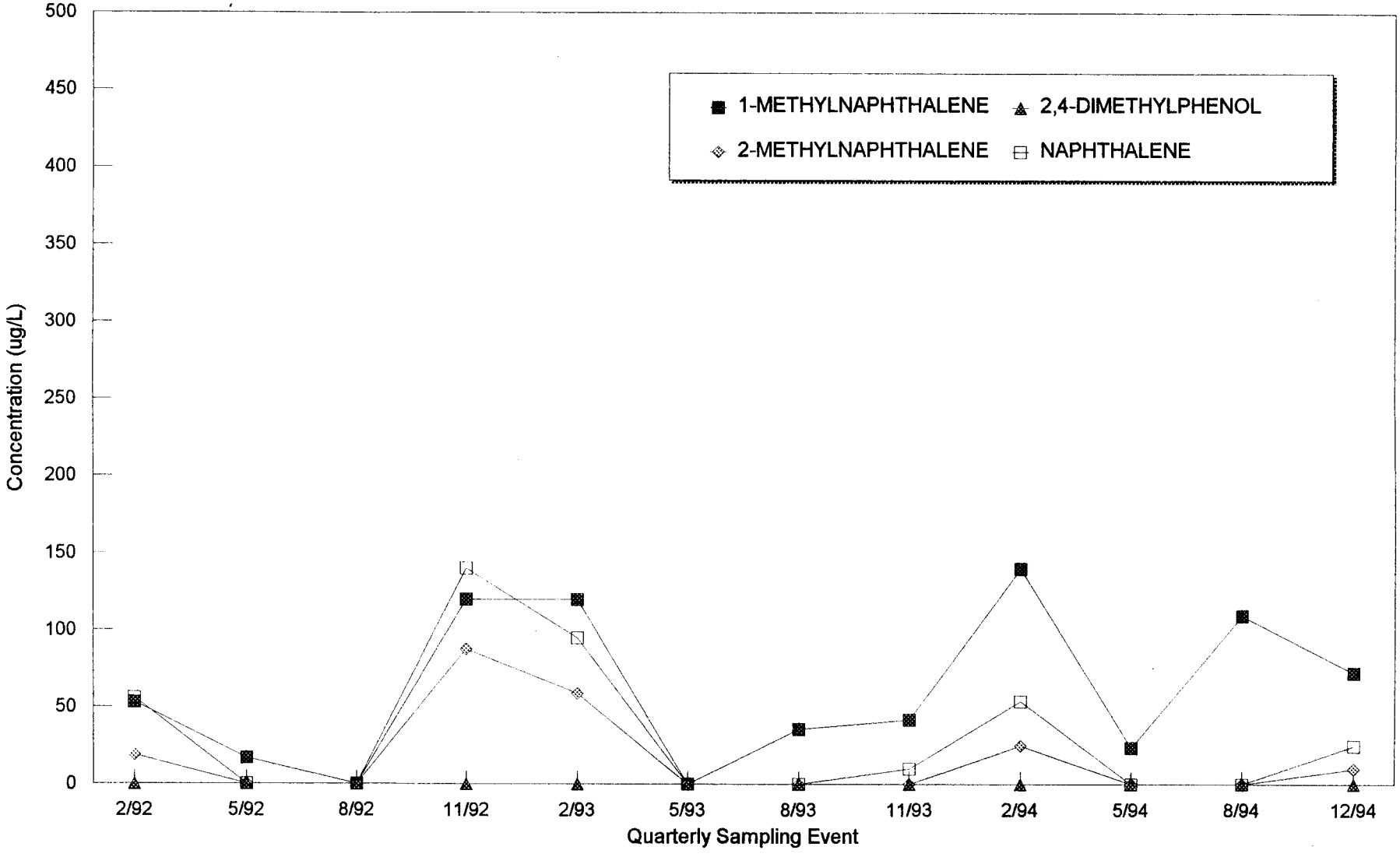


Figure 12. BHP GROUNDWATER ANALYTICAL RESULTS

Skinner List Metals (Total) - MW-3

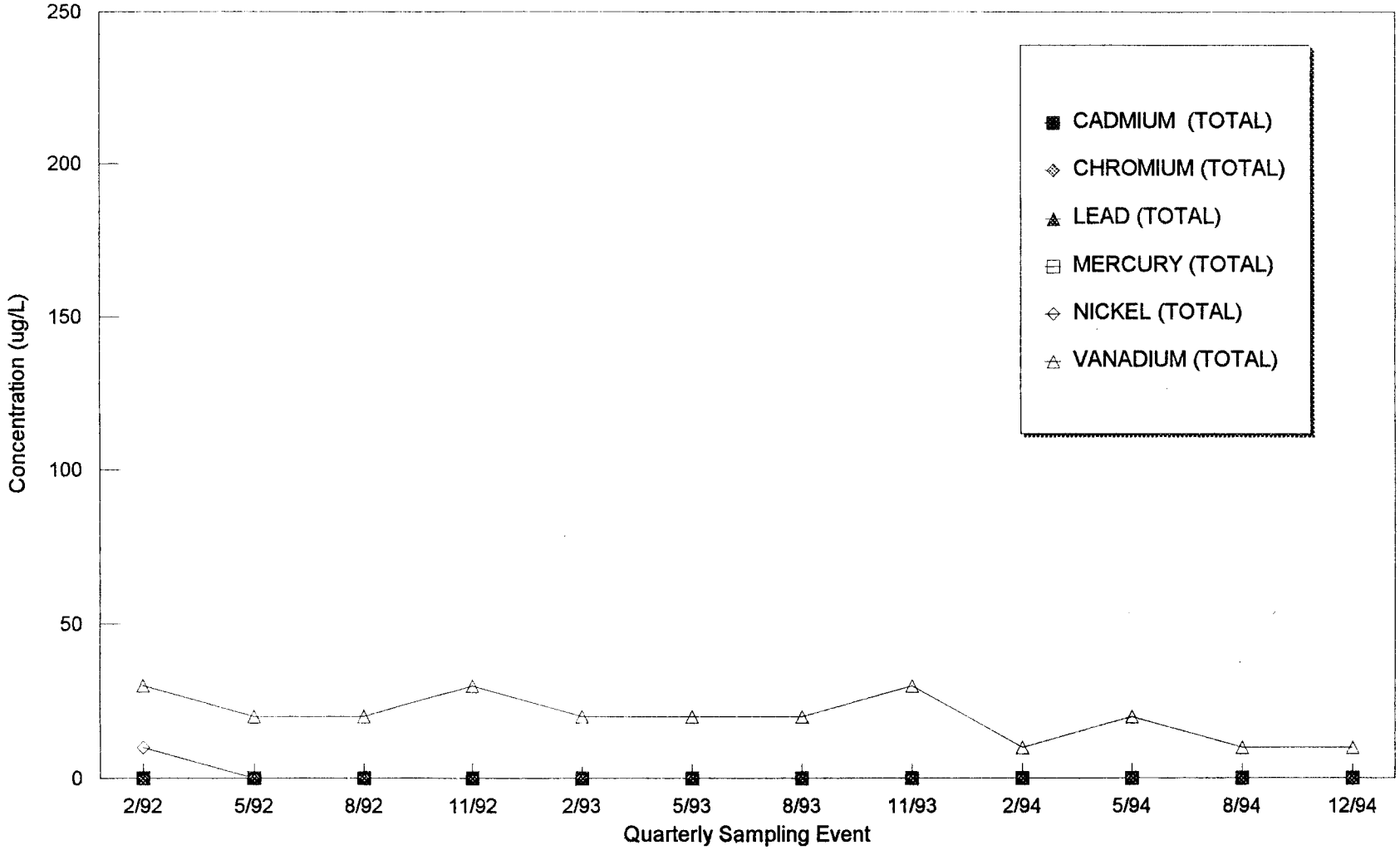


Figure 13. BHP GROUNDWATER ANALYTICAL RESULTS

Skinner List Metals (Total) - MW-4

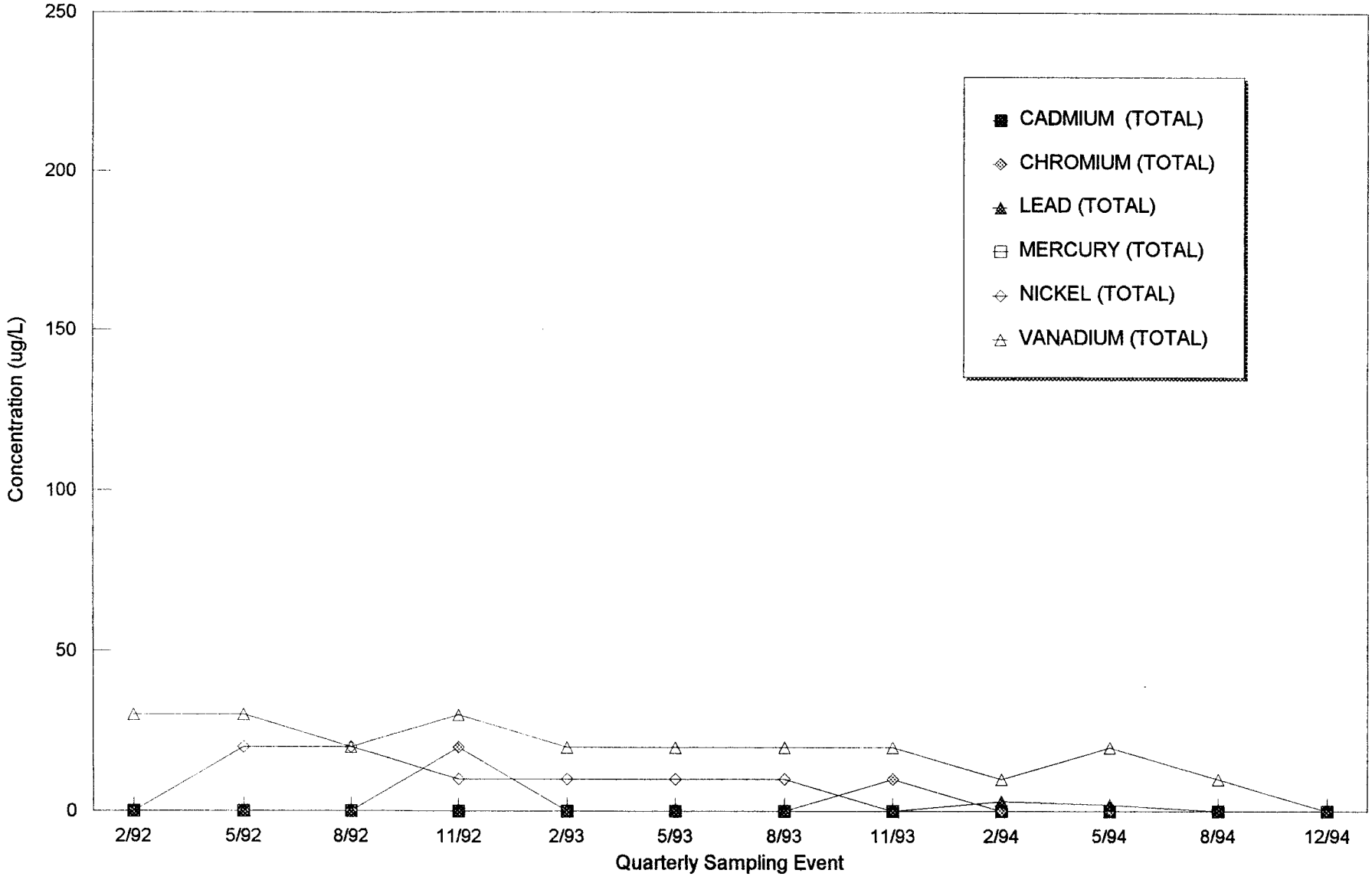


Figure 14. BHP GROUNDWATER ANALYTICAL RESULTS

Skinner List Metals (Total) - MW-5

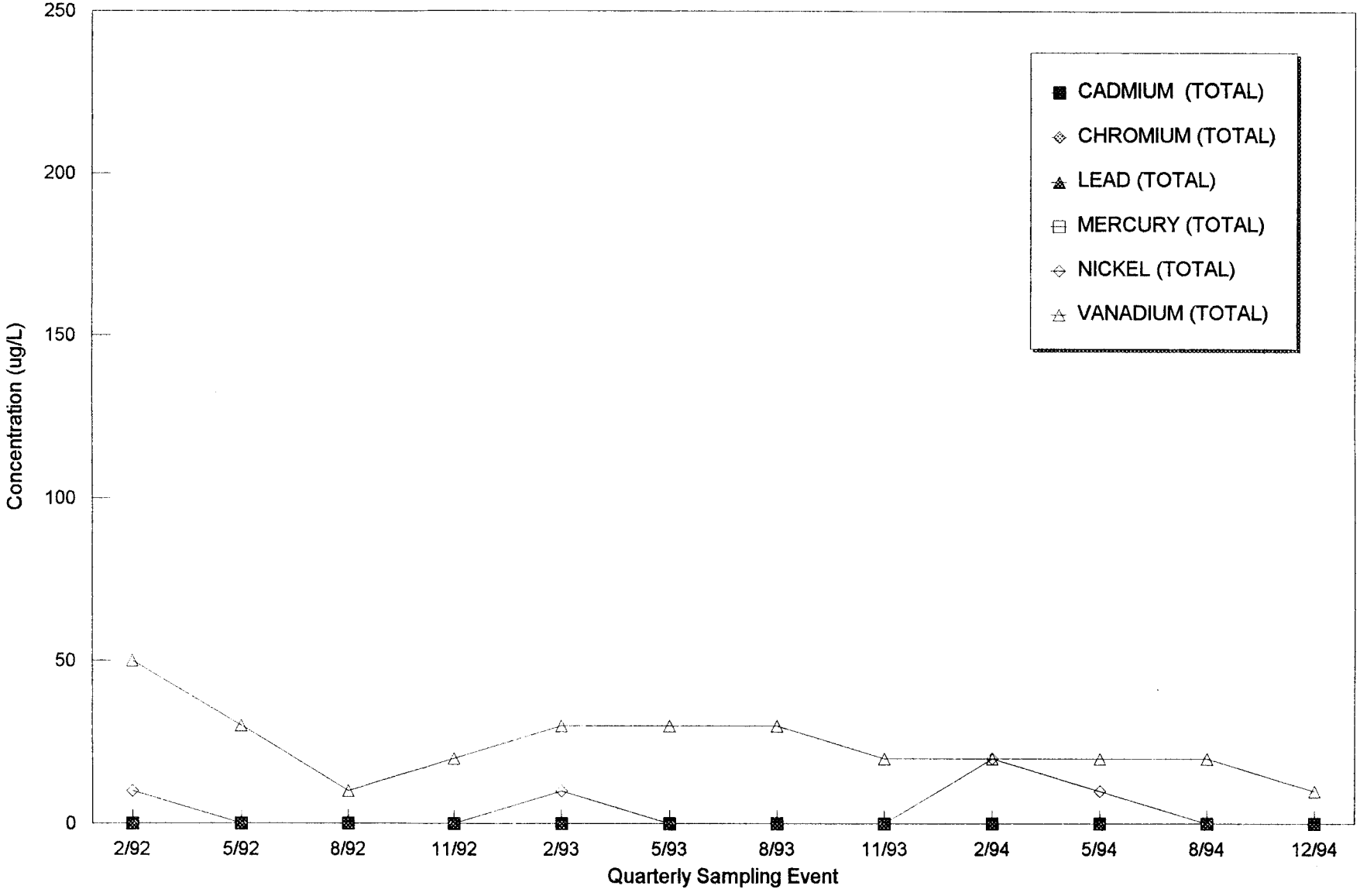
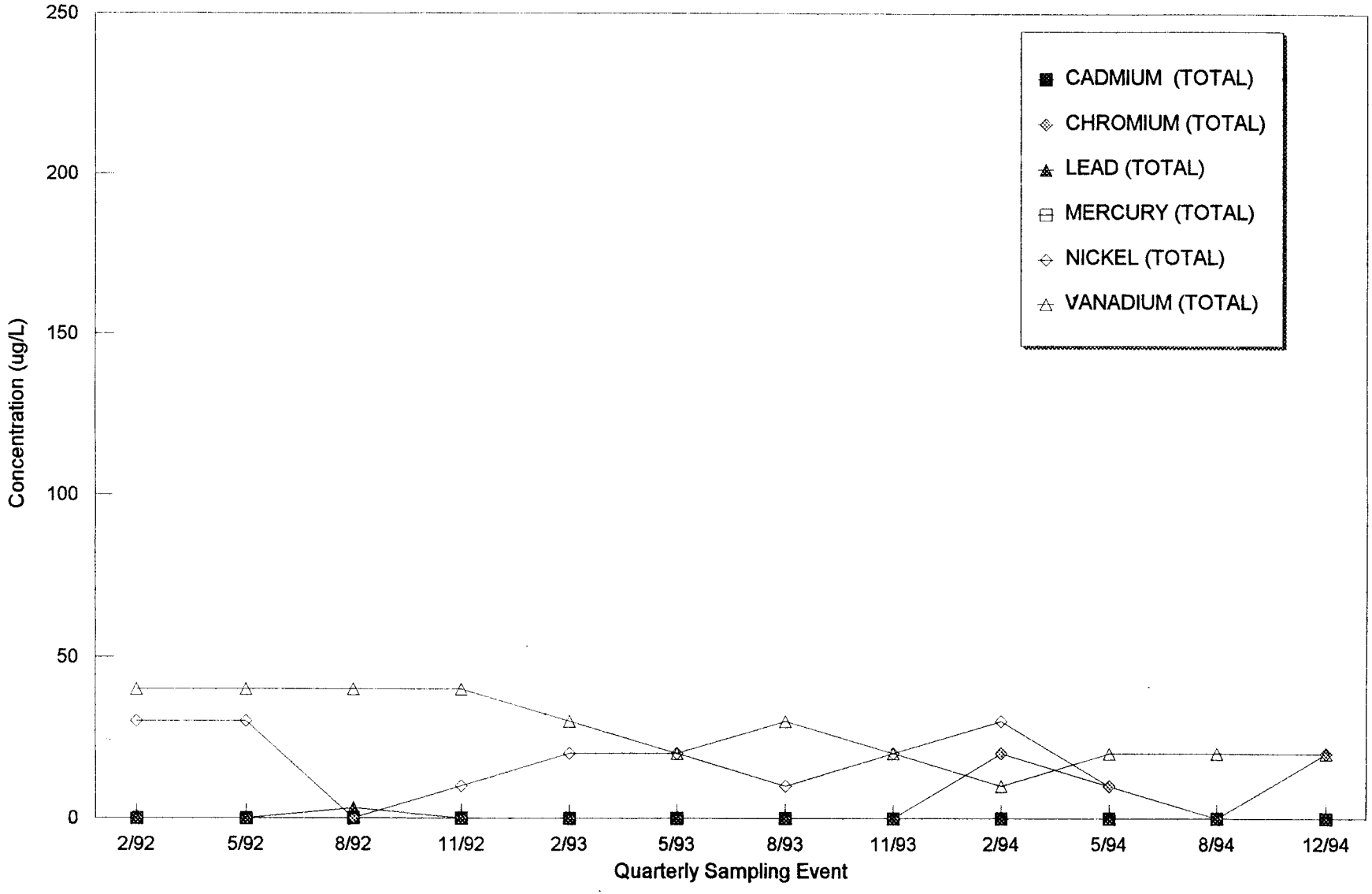


Figure 15. BHP GROUNDWATER ANALYTICAL RESULTS

Skinner List Metals (Total) - MW-6



TABLES

TABLE 1 BHP HAWAII REFINERY GROUNDWATER ELEVATION DATA (1994)

	February 1994				May 1994				August 1994***				December 1994***			
	MW-3	MW-4	MW-5	MW-6	MW-3	MW-4	MW-5	MW-6	MW-3	MW-4	MW-5	MW-6	MW-3	MW-4	MW-5	MW-6
Top of casing (ft. MSL)^	12.81	13.29	13.58	13.12	12.81	13.29	13.58	13.12	12.81	13.29	13.58	13.12	12.81	13.29	13.58	13.12
Top of apron (ft. MSL)^^	11.76	12.15	11.85	11.58	11.76	12.15	11.85	11.58	11.76	12.15	11.85	11.58	11.76	12.15	11.85	11.58
Ground surface (ft. MSL)^^	11.11	11.75	11.05	11.28	11.11	11.75	11.05	11.28	11.11	11.75	11.05	11.28	11.11	11.75	11.05	11.28
Depth to oil (ft)	11.86	12.26	12.69	12.09	11.87	12.32	12.64	12.26	12.00	12.45	12.66	12.30	12.08	12.57	12.72	12.37
Depth to water (ft)	12.16	12.67	12.89	12.15	12.21	12.71	12.94	12.29	12.08	12.93	12.66	12.39	12.18	12.81	12.75	12.32
Oil thickness (ft)	0.30	0.41	0.20	0.06	0.34	0.39	0.30	0.03	0.08	0.48	0.00	0.09	0.10	0.24	0.03	0.00
Corrected depth to water (ft)*	11.90	12.31	12.71	12.10	11.91	12.37	12.68	12.26	12.01	12.51	12.66	12.31	12.09	12.60	12.72	12.32
Corrected water table (ft. MSL)**	0.91	0.98	0.87	1.02	0.90	0.92	0.90	0.86	0.80	0.78	0.92	0.81	0.72	0.69	0.86	0.80

Notes:
^=Survey conducted 8/87
^^=Survey conducted 9/17/91
*=Corrected depth to water = depth to water - (oil thickness*specific gravity)
**=Corrected water table elevation = top of casing elevation - corrected depth to water
Note: specific gravities of oil were measured by the laboratory to be 0.88 for MW-3, MW-4, and MW-5; and 0.88 for MW-6 in 8/94.
MSL = Mean Sea Level
***= First round sampling data

TABLE 2 BHP HAWAII REFINERY GROUNDWATER ANALYTICAL RESULTS (1994)
Skinner List Compounds - EPA Methods 8240 and 8270 (ug/L)

	February 1994				May 1994				August 1994***				December 1994***			
COMPOUND	MW-3	MW-4	MW-5	MW-6	MW-3	MW-4	MW-5	MW-6	MW-3	MW-4	MW-5	MW-6	MW-3	MW-4	MW-5	MW-6
BENZENE (EPA 8240)	2	2	1	13	11	2	<1	19	8	2	<1	8	1	<1	<1	2
CARBON DISULFIDE (8240)	<2	3	3	3	5	4	6	<2	<2	<2	<2	<2	<2	<2	3	<2
CHLOROBENZENE (8240)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	13	<1	<1	<1	<1	<1
CHLOROFORM (8240)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CYCLOHEXANE (8240)	<10	<10	<10	<10	<10	<10	<10	<10	11	<10	<10	<10	<10	<10	<10	<10
1,2-DICHLOROETHANE (8240)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,4-DIOXANE (8240)	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200
ETHYLENE DIBROMIDE (8240)	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
STYRENE (EPA 8240)	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
TOLUENE (EPA 8240)	<2	<2	4	<2	<2	<2	2	<2	<2	<2	<2	<2	<2	<2	<2	<2
XYLENES (TOTAL) (8240)	<1	1	3	<1	2	2	3	<1	<1	<1	<1	<1	<1	<1	6	<1
Following are all with EPA 8270																
1,2-DICHLOROBENZENE	<10	<20	<20	<10	<20	<20	<20	<20	<25	<25	<25	<25	<10	<10	<10	<10
1,3-DICHLOROBENZENE	<10	<20	<20	<10	<20	<20	<20	<20	<25	<25	<25	<25	<10	<10	<10	<10
1,4-DICHLOROBENZENE	<10	<20	<20	<10	<20	<20	<20	<20	<25	<25	<25	<25	<10	<10	<10	<10
1-METHYLENAPHTHALENE	210	190	96	140	44	62	30	24	130	90	64	110	92	66	42	73
2-METHYLENAPHTHALENE	53	<20	<20	25	<20	<20	<20	<20	38	<25	<25	<25	<10	<10	26	10
2,4-DIMETHYLPHENOL	<10	<20	<20	<10	<20	<20	<20	<20	<25	<25	28	<25	<10	<10	<10	<10
2,4-DINITROPHENOL	<50	<100	<100	<50	<100	<100	<100	<100	<130	<130	<130	<130	<50	<50	<50	<50
4-NITROPHENOL	<50	<100	<100	<50	<100	<100	<100	<100	<130	<130	<130	<130	<50	<50	<50	<50
7,12-DIMETHYL B(a)A	<10	<20	<20	<10	<20	<20	<20	<20	<25	<25	<25	<25	<10	<10	<10	<10
ANTHRACENE	<10	<20	<20	<10	<20	<20	<20	<20	<25	<25	<25	<25	<10	<10	<10	<10
BENZENETHIOL	<10	<20	<20	<10	<20	<20	<20	<20	<25	<25	<25	<25	<10	<10	<10	<10
BIS(2-ETHYLHEXYL)PHEHALATE	<10	<20	<20	<10	<20	<20	<20	<20	<25	<25	<25	<25	<10	<10	<10	<10
BUTYLBENZLYPHTHALATE	<10	<20	<20	<10	<20	<20	<20	<20	<25	<25	<25	<25	<10	<10	<10	<10
CHRYSENE	<10	<20	<20	<10	<20	<20	<20	<20	<25	<25	<25	<25	<10	<10	<10	<10
DI-N-BUTYLPHTHALATE	<10	<20	<20	<10	<20	<20	<20	<20	<25	<25	<25	<25	<10	<10	<10	<10
DI-N-OCTYPHTHALATE	<10	<20	<20	<10	<20	<20	<20	<20	<25	<25	<25	<25	<10	<10	<10	<10
DIBENZ(a,h)ACRIDINE	<10	<20	<20	<10	<20	<20	<20	<20	<25	<25	<25	<25	<10	<10	<10	<10
DIBENZ(a,h)ANTHRACENE	<10	<20	<20	<10	<20	<20	<20	<20	<25	<25	<25	<25	<10	<10	<10	<10

DIETHYLPHTHALATE	<10	<20	<20	<10	<20	<20	<20	<20	<25	<25	<25	<25	<10	<10	<10	<10
DIMETHYLPHTHALATE	<10	<20	<20	<10	<20	<20	<20	<20	<25	<25	<25	<25	<10	<10	<10	<10
FLOURANTHENE	<10	<20	<20	<10	<20	<20	<20	<20	<25	<25	<25	<25	<10	<10	<10	<10
INDENE	<10	<20	<20	<10	<20	<20	<20	<20	<25	<25	<25	<25	<10	<10	<10	<10
NAPHTHALENE	190	59	<20	54	<20	<20	<20	<20	110	31	<25	<25	36	19	15	25
PHENANTHRENE	<10	<20	<20	<10	<20	<20	<20	<20	<25	<25	<25	<25	<10	<10	<10	<10
PHENOL	<10	<20	<20	<10	<20	<20	<20	<20	<25	<25	<25	<25	<10	<10	<10	<10
PYRENE	<10	<20	<20	<10	<20	<20	<20	<20	<25	<25	<25	<25	<10	<10	<10	<10
PYRIDINE	<50	<100	<100	<50	<100	<100	<100	<100	<130	<130	<130	<130	<50	<50	<50	<50
QUINOLINE	<50	<100	<100	<50	<100	<100	<100	<100	<130	<130	<130	<130	<50	<50	<50	<50
CRESOILS	<10	<20	<20	<10	<20	<20	<20	<20	<25	<25	<25	<25	<10	<10	<10	<10

Notes:

<10 = Not present above the stated limit of detection or detection limit.

ug = Micrograms per liter

***= First round sampling data; and NA = not analyzed.

TABLE 3 BHP HAWAII REFINERY GROUNDWATER ANALYTICAL RESULTS (1994)
Skinner List Metals - EPA Methods (ug/L)

		February 1994				May 1994				August 1994***				December 1994***			
METAL & METHOD	MCL	MW-3	MW-4	MW-5	MW-6	MW-3	MW-4	MW-5	MW-6	MW-3	MW-4	MW-5	MW-6	MW-3	MW-4	MW-5	MW-6
Total metals																	
ANTIMONY (6010)		<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
ARSENIC (7060)	50	3*S	<4*S	15*S	<3*S	4	4*S	14*S	3*S	<20@H	<20@H	<20@H	<10@H	<50	<50	<50	<50
BARIUM (6010)	1000	<10	<10	<10	<10	<10	<10	10	10	20	20	10	10	<10	<10	10	<10
BERYLLIUM (6010)		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
CADMIUM (6010)	5	<5	<5	<5	<5	<0.5	<0.5	<0.5	<0.7@H	<5	<5	<5	<5	<10	<10	<10	<10
CHROMIUM (6010)	100	<10	<10	<10	20	<10	<10	<10	10	<10	<10	<10	<10	<10	<10	<10	20
COBALT (6010)		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
LEAD (7421)	50	<2	3	<2*S	<2	<2	<2	<2	<2	<2	<2	3*S	<2	<30	<30	<30	<30
MERCURY (7470)	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
NICKEL (6010)		<10	<10	20	30	<10	10	10	10	<10	<10	<10	<10	<10	<10	<10	<10
SELENIUM (7740)	50	<3*S	<3*S	13*S	5*S	<5@H	<5@H	6*S	<5@H	<20@H	<20@H	<20@H	<20@H	<50	<50	<50	<20@H
VANADIUM (6010)		10	10	20	10	20	20	20	20	10	10	20	20	10	<10	10	20
Dissolved metal																	
ANTIMONY (6010)		<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	NA	NA	NA	NA
ARSENIC (7060)	50	4*S	6*S	11	<2	4*S	4*S	12*S	<2	<20@H	<20@H	<20@H	<10@H	NA	NA	NA	NA
BARIUM (6010)	1000	<10	<10	<10	<10	<10	<10	<10	10	20	20	10	10	NA	NA	NA	NA
BERYLLIUM (6010)		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	NA	NA	NA	NA
CADMIUM (6010)	5	<5	<5	<5	<5	<0.5	<0.5	<0.5	<0.5	<5	<5	<5	<5	NA	NA	NA	NA
CHROMIUM (6010)	100	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	NA	NA	NA	NA
COBALT (6010)		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	NA	NA	NA	NA
LEAD (7421)	50	<2	<2	<2*S	<2	<2	<2	<2	<2	<2*S	<3*S	<3*S	<2	NA	NA	NA	NA
MERCURY (7470)	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	NA	NA	NA	NA
NICKEL (6010)		<10	<10	<10	20	<10	<10	<10	20	<10	<10	<10	10	NA	NA	NA	NA
SELENIUM (7740)	50	<2*S	<3*S	13*S	<2*S	<5@H	<5@H	9*S	<5@H	<20@H	<20@H	<20@H	<20@H	NA	NA	NA	NA
VANADIUM (6010)		10	10	20	20	20	20	20	20	10	10	20	20	NA	NA	NA	NA

Notes:

<10 = Not present above the stated limit of detection or detection limit.

MCL = Maximum contaminant level (as published on July 1, 1992 in 40 CFR 141)

@H = Detection limit elevated due to matrix interference

*S = Reported value was determined by method of standard additions

***= First round sampling data; and NA = not analyzed.

TABLE 4 BHP HAWAII REFINERY GROUNDWATER ANALYTICAL RESULTS (1994)
Selected Skinner List Compounds (ug/L)

	MW-3											
COMPOUND	2/92	5/92	8/92	11/92	2/93	5/93	8/93	11/93	2/94	5/94	8/94	12/94
BENZENE	15	97	140	20	9	14	58	10	2	11	8	1
CYCLOHEXANE	12	23	26	<10	<10	<10	NA	NA	<10	<10	11	<10
TOLUENE	3	5	5	<2	<2	<2	<2	<2	<2	<2	<2	<2
XYLENES (TOTAL)	9	22	5	4	<2	2	5	1	<1	2	<1	<1
1-METHYLNAPHTHALENE	180	100	210	160	210	<50	180	110	210	44	130	92
2-METHYLNAPHTHALENE	16	19	<50TR	<10	15	150	<20	65	53	<20	30	<10
2,4-DIMETHYLPHENOL	<10TR	<10	<50	<10	<10	<50	<20	<20	<10	<20	<25	<10
NAPHTHALENE	37	55	120	28	91	<50	18*J	<20	190	<20	110	36
CADMIUM (TOTAL)	<0.6	<0.6	<0.6	<0.6	<0.5	<0.5	<0.5	<0.6@H	<5	<0.5	<5	<10
CHROMIUM (TOTAL)	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
LEAD (TOTAL)	<2	<2	<2	<2	<2	<10@H	<2	<2	<2	<2	<2	<30
MERCURY (TOTAL)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
NICKEL (TOTAL)	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
VANADIUM (TOTAL)	30	20	20	30	20	20	20	30	10	20	10	10
CADMIUM (DISSOLVED)	<0.6	<0.6	<0.6	<0.6	<0.5	<0.5	<0.5	<0.6@H	<5	<0.5	<5	NA
CHROMIUM (DISSOLVED)	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	NA
LEAD (DISSOLVED)	<2	<2	<2	<2	<10@H	<10@H	<2	<2	<2	<2	<2*S	NA
MERCURY (DISSOLV	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	NA
NICKEL (DISSOLVED)	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	NA
VANADIUM (DISSOVLED)	30	20	20	30	20	20	20	30	10	20	10	NA

	MW-4											
COMPOUND	2/92	5/92	8/92	11/92	2/93	5/93	8/93	11/93	2/94	5/94	8/94	12/94
BENZENE	10	13	20	15	7	11	12	4	2	2	2	<1
CYCLOHEXANE	10	13	<20TR	<10	<10	<10	NA	NA	<10	<10	<10	<10
TOLUENE	8	8	<4TR	<2	<2	3	<2	<2	<2	<2	<2	<2
XYLENES (TOTAL)	20	36	3	5	3	8	4	1	1	2	<1	<1
1-METHYLNAPHTHALENE	100	100	160	180	150	<50	79	72	190	62	90	66
2-METHYLNAPHTHALENE	38	53	<50	<10	12	<50	<20	95	<20	<20	<25	<10
2,4-DIMETHYLPHENOL	270	78	<50	<10	<10	120	<20	<50	<20	<20	<25	<10
NAPHTHALENE	34	40	<50TR	15	24	<50	<20	<50	59	<20	31	19
CADMIUM (TOTAL)	<0.6	<0.6	<0.6	<0.6	<0.5	<0.5	<0.5	<0.7@H	<5	<0.5	<5	<10
CHROMIUM (TOTAL)	<10	<10	<10	20	<10	<10	<10	10	<10	<10	<10	<10
LEAD (TOTAL)	<2	<2	<2	<2	<2	<10@H	<2	<2	3	2	<2	<30
MERCURY (TOTAL)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
NICKEL (TOTAL)	<10	20	20	10	10	10	10	<10	<10	<10	<10	<10
VANADIUM (TOTAL)	30	30	20	30	20	20	20	20	10	20	10	<10
CADMIUM (DISSOLVED)	<0.6	<0.6	<0.6	<0.6	<0.5	<0.5	<0.5	<0.6@H	<5	<0.5	<5	NA
CHROMIUM (DISSOLVED)	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	NA
LEAD (DISSOLVED)	<2	<2	<10@H	<2	<2	<10@H	<2	<2	<2	<2	<3*S	NA
MERCURY (DISSOLV	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	NA
NICKEL (DISSOLVED)	<10	<10	20	<10	10	10	<10	<10	<10	<10	<10	NA
VANADIUM (DISSOVLED)	30	30	20	30	30	30	20	30	10	20	10	NA

COMPOUND	MW-5											
	2/92	5/92	8/92	11/92	2/93	5/93	8/93	11/93	2/94	5/94	8/94	12/94
BENZENE	6	4	5	3	3	1	1	<1	1	<1	<2	<1
CYCLOHEXANE	140	32	23	<10	11	<10	NA	NA	<10	<10	<10	<10
TOLUENE	10	8	6	3	3	<2	3	4	4	2	<2	<2
XYLENES (TOTAL)	47	64	38	6	12	14	16	7	3	3	<1	6
1-METHYLNAPHTHALENE	70	150	180	140	130	<50	80	94	96	30	64	42
2-METHYLNAPHTHALENE	130	160	150	67	69	<50	24*J	<20	<20	<20	<25	26
2,4-DIMETHYLPHENOL	50	32	<50TR	13	1300	<50	43	12	<20	<20	28	<10
NAPHTHALENE	80	85	110	69	66	<50	24*J	18	<20	<20	<25	15
CADMIUM (TOTAL)	<0.6	<0.6	<0.6	<0.6	<0.5	<1@H	<0.5	<0.6@H	<5	<0.5	<5	<10
CHROMIUM (TOTAL)	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
LEAD (TOTAL)	<2	<2	<2	<2	<10@H	<10@H	<2	<3@H	<2*S	<2	3*S	<30
MERCURY (TOTAL)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
NICKEL (TOTAL)	10	<10	<10	<10	10	<10	<10	<10	20	10	<10	<10
VANADIUM (TOTAL)	50	30	10	20	30	30	30	20	20	20	20	10
CADMIUM (DISSOLVED)	<0.6	<0.6	<0.6	<0.6	<0.5	<1@H	<0.5	<0.7@H	<5	<0.5	<5	NA
CHROMIUM (DISSOLVED)	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	NA
LEAD (DISSOLVED)	<2	<2	<2	<2	<10@H	<10@H	<2	<3@H	<2*S	<2	<3*S	NA
MERCURY (DISSOLV	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	NA
NICKEL (DISSOLVED)	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	NA
VANADIUM (DISSOVLED)	50	30	<10	20	30	30	<30	20	20	20	20	NA

COMPOUND	MW-6											
	2/92	5/92	8/92	11/92	2/93	5/93	8/93	11/93	2/94	5/94	8/94	12/94
BENZENE	<1	<1	<1	2	<1	<1	<1	3	13	19	8	2
CYCLOHEXANE	<10	<10	<10	<10	<10	<10	NA	NA	<10	<10	<10	<10
TOLUENE	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
XYLENES (TOTAL)	<1	<1	<1	1	<2	<1	<1	<1	<1	<1	<1	<1
1-METHYLNAPHTHALENE	53	17	<25	120	120	<50	36	42	140	24	110	73
2-METHYLNAPHTHALENE	19	<10	<25	88	59	<50	<20	<20	25	<20	<25	10
2,4-DIMETHYLPHENOL	<10	<10	<25	<10	<10	<50	<20	<20	<10	<20	<25	<10
NAPHTHALENE	56	<10	<25	140	95	<50	<20	10	54	<20	<25	25
CADMIUM (TOTAL)	<0.6	<3@H	<0.6	<0.6	<0.5	<0.5	<0.5	<0.7@H	<5	<0.5	<5	<10
CHROMIUM (TOTAL)	<10	<10	<10	<10	<10	<10	<10	<10	20	10	<10	20
LEAD (TOTAL)	<2	<2	3	<2	<2	<2	<2	<2	<2	<2	<2	<30
MERCURY (TOTAL)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
NICKEL (TOTAL)	30	30	<20	10	20	20	10	20	30	10	<10	<10
VANADIUM (TOTAL)	40	40	40	40	30	20	30	20	10	20	20	20
CADMIUM (DISSOLVED)	<0.6	<0.6	<0.6	<0.6	<0.5	<0.5	<0.5	<0.7@H	<5	<0.5	<5	NA
CHROMIUM (DISSOLVED)	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	NA
LEAD (DISSOLVED)	<2	<2	<2	<2	<10@H	<10@H	<2	<2	<2	<2	<2	NA
MERCURY (DISSOLV	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	NA
NICKEL (DISSOLVED)	30	20	20	10	60	20	20	20	20	20	<10	NA
VANADIUM (DISSOVLED)	40	40	40	40	30	20	30	20	20	20	20	NA

NA=not analyzed; TR=trace detected at the concentration specified; *J=estimated value;

<10=not present above stated limit of detection; @H=detection limit elevated due to matrix interference.

TABLE 5 BHP HAWAII REFINERY GROUNDWATER ANALYTICAL RESULTS (1994)
EPA METHODS 9038, 9066, 9252, AND 160.1 (mg/L)

PARAMETER	MW-3		MW-4		MW-5		MW-6	
	2/94	8/94	2/94	8/94	2/94	8/94	2/94	8/94
CHLORIDE	645.00	3220	617.00	2110	975.00	1120	1080	1410
PHENOLS (TOTAL)	0.16	NA	<0.2@h	NA	<0.08@h	NA	<0.04@h	NA
SULFATE	190.00	1330	329.00	1330	1160	1610	87.20	212
TOTAL DISSOLVED SOLIDS	2040	7400	2400	5740	3500	4770	2840	3640

Notes:

mg/L = Milligrams per liter;
NA = Not analyzed;
@h = Detection limit elevated due to matrix interference.

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February 22, 1995

BHP Hawaii

Mr. Mitch Kaplan
U.S. Environmental Protection Agency, Region IX (H-3-1)
75 Hawthorne Street
San Francisco, California 94105

Dear Mr. Kaplan:

Summary of Groundwater Analytical Results (December 1994)
Groundwater Monitoring Plan, BHP Hawaii Refinery
HID 056786395

Enclosed is the tabled summary of the analytical results for groundwater samples collected in December 1994 at BHP Hawaii Refinery according to the Groundwater Monitoring Plan (GMP). The original laboratory analytical report was sent to EPA in a previous letter on February 17, 1995.

The locations of groundwater monitoring wells are shown in Figures 1 to 3. The comparison of groundwater analytical results of samples collected at high tidal level verse at low tidal level is shown in Table 1. The percentage difference between high tidal and low tidal samples was calculated as [high - low]/((high + low)/2). For parameter detected below the detection limit, the detection limit was taken as the value for that parameter during the calculation. The comparison of groundwater analytical results of total metals verse dissolved metals for the newly installed monitoring wells (CW-5 to CW-9) is shown in Table 2. Groundwater elevation data are listed in Table 3.

The purpose of collecting samples at both high tide and low tide is to find out whether there is significant difference between the two sets of samples. The analytical results in Table 1 indicate that there is no significant difference between groundwater samples collected at high tidal level verse that collected at low tidal level. For example, volatile organic samples were collected from 19 wells and analyzed for 43 parameters, only carbon disulfide and benzene were found twice with a difference over 20% between the high and low tidal level samples (CW8A, CW5A, and CW9A, CW1A respectively). That is approximately 5% of the analytical parameters or 10% of the monitoring wells. The same pattern also occurred to the analyses of semi-volatile organic compounds, metals, and general chemistry parameters. Therefore, BHP Hawaii Refinery will only collect one set of groundwater samples in the future quarterly sampling events according the GMP workplan.

BHP Hawaii Inc
733 Bishop Street Honolulu Hawaii 96813 USA
PO Box 3379 Honolulu Hawaii 96842 USA
Telephone 808 547 3111 Facsimile 808 547 3145

Both total metals and dissolved metals were analyzed for groundwater samples collected from the newly installed ten (10) monitoring wells (CW-5 to CW-9) to serve as a baseline according to EPA's instruction. The analytical results from Table 2 once again show that there is no significant difference between total metal content and dissolved metal content (as discussed before it is because the groundwater aquifer underneath the Refinery is composed of mostly carbonate coral rocks with very little fine sediments presented in the groundwater). Therefore, BHP Hawaii Refinery would like to ask your permission to discontinue the analysis of the dissolved metals for these wells in the future quarterly sampling and analysis (the total metal analysis should provide us the worst scenario data because it also includes the dissolved metal).

We need to start the preparation work for our next quarterly GMP groundwater sampling to be conducted in March 1995, therefore, we look forward to receiving your response as soon as possible. Please contact Tony Shan at (808) 547-3804 should you have any questions.

Sincerely,

Frank D. Clouse

Frank D. Clouse
Refinery Manager

cc:

Ms. Nicole Moutoux, EPA
Mr. Steven Y. K. Chang, HDOH

TABLE 1 Comparison of groundwater analytical results of high tide vs low tide - Volatile organics

Parameter	Units	High CW8A	Low CW8A	%Diff	High CW8B	Low CW8B	%Diff	High CW9A	Low CW9A	%D	High CW9B	Low CW9B	%D	High CW3A	Low CW3A	%D	%Wells D>20%**
Carbon Disulfide	UG/L	4	3	28.57	<2	<2	0.00	<2	<2	0.00	<2	<2	0.00	<2	<2	0.00	11%
Chloromethane	UG/L	<10	<10	0.00	<10	<10	0.00	<10	<10	0.00	<10	<10	0.00	<10	<10	0.00	0%
Chloroform	UG/L	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	0%
Vinyl Choride	UG/L	<5	<5	0.00	<5	<5	0.00	<5	<5	0.00	<5	<5	0.00	<5	<5	0.00	0%
2-Butanone	UG/L	<10	<10	0.00	<10	<10	0.00	<10	<10	0.00	<10	<10	0.00	<10	<10	0.00	0%
Bromomethane	UG/L	<10	<10	0.00	<10	<10	0.00	<10	<10	0.00	<10	<10	0.00	<10	<10	0.00	0%
1,2-Dichloroethane	UG/L	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	0%
Chloroethane	UG/L	<5	<5	0.00	<5	<5	0.00	<5	<5	0.00	<5	<5	0.00	<5	<5	0.00	0%
Acetone	UG/L	<10	<10	0.00	<10	<10	0.00	<10	<10	0.00	<10	<10	0.00	<10	<10	0.00	0%
Benzene	UG/L	<1	<1	0.00	<1	<1	0.00	1	2	66.67	<1	<1	0.00	<1	<1	0.00	11%
1,1-Dichloroethene	UG/L	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	0%
Toluene	UG/L	<2	<2	0.00	<2	<2	0.00	<2	<2	0.00	<2	<2	0.00	<2	<2	0.00	0%
Chlorobenzene	UG/L	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	0%
Methylene Chloride	UG/L	<5	<5	0.00	8*L	<5		<5	<5	0.00	<5	<5	0.00	16B	<5		0%
Ethylbenzene	UG/L	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	0%
Trans-1,2-Dichloroethene	UG/L	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	0%
Xylenes (Total)	UG/L	<1	1	0.00	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	0%
1,1-Dichloroethane	UG/L	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	0%
Styrene	UG/L	<2	<2	0.00	<2	<2	0.00	<2	<2	0.00	<2	<2	0.00	<2	<2	0.00	0%
1,4-Dioxane	UG/L	<200	<200	0.00	<200	<200	0.00	<200	<200	0.00	<200	<200	0.00	<200	<200	0.00	0%
Cis-1,2-Dichloroethene	UG/L	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	0%
Ethylene Dibromide	UG/L	<5	<5	0.00	<5	<5	0.00	<5	<5	0.00	<5	<5	0.00	<5	<5	0.00	0%
Cyclohexane	UG/L	<10	<10	0.00	<10	<10	0.00	<10	<10	0.00	<10	<10	0.00	<10	<10	0.00	0%
1,1,1-Trichloroethane	UG/L	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	0%
Carbon Tetrachloride	UG/L	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	0%
Trichloroethene	UG/L	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	0%
1,2-Dichloropropane	UG/L	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	0%
Bromodichloromethane	UG/L	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	0%
4-Methyl-2-Pentanone (MIBK)	UG/L	<10	<10	0.00	<10	<10	0.00	<10	<10	0.00	<10	<10	0.00	<10	<10	0.00	0%
Cis-1,3-Dichloropropene	UG/L	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	0%
Trans-1,3-Dichloropropene	UG/L	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	0%
2-Hexanone (MBK)	UG/L	<10	<10	0.00	<10	<10	0.00	<10	<10	0.00	<10	<10	0.00	<10	<10	0.00	0%
1,1,2-Trichloroethane	UG/L	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	0%
Tetrachloroethene	UG/L	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	0%
Dibromochloroethane	UG/L	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	<1	<1	0.00	0%
Bromoform	UG/L	<5	<5	0.00	<5	<5	0.00	<5	<5	0.00	<5	<5	0.00	<5	<5	0.00	0%
1,1,2,2-Tetrachloroethane	UG/L	<2	<2	0.00	<2	<2	0.00	<2	<2	0.00	<2	<2	0.00	<2	<2	0.00	0%
Dichlorodifluoromethane	UG/L	<10	<10	0.00	<10	<10	0.00	<10	<10	0.00	<10	<10	0.00	<10	<10	0.00	0%
Trichlorofluoromethane	UG/L	<5	<5	0.00	<5	<5	0.00	<5	<5	0.00	<5	<5	0.00	<5	<5	0.00	0%
1,1,2-Trichloro-1,2,2-Trifluoroethane	UG/L	<5	<5	0.00	<5	<5	0.00	<5	<5	0.00	<5	<5	0.00	<5	<5	0.00	0%
1,2-Dichlorobenzene	UG/L	<5	<5	0.00	<5	<5	0.00	<5	<5	0.00	<5	<5	0.00	<5	<5	0.00	0%
1,3-Dichlorobenzene	UG/L	<5	<5	0.00	<5	<5	0.00	<5	<5	0.00	<5	<5	0.00	<5	<5	0.00	0%
1,4-Dichlorobenzene	UG/L	<5	<5	0.00	<5	<5	0.00	<5	<5	0.00	<5	<5	0.00	<5	<5	0.00	0%

Note: *L=Analyte is a suspected lab contaminant; B=Analyte found in the associated reagent blank; H=Detection limit elevated due to matrix interference; **=For all wells sampled at high & low tidal levels.

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Parameter	Units	High CW3B	Low CW3B	%Diff	High CW3C	Low CW3C	%Diff	High CW4A	Low CW4A	%D	High CW4B	Low CW4B	%D	High CW4C	Low CW4C	%D
Carbon Disulfide	UG/L	< 2	< 2	0.00	< 2	< 2	0.00	< 2			< 2			< 2		
Chloromethane	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10			< 10			< 10		
Chloroform	UG/L	< 1	< 1	0.00	< 1	< 1	0.00	< 1			< 1			< 1		
Vinyl Choride	UG/L	< 5	< 5	0.00	< 5	< 5	0.00	< 5			< 5			< 5		
2-Butanone	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10			< 10			< 10		
Bromomethane	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10			< 10			< 10		
1,2-Dichloroethane	UG/L	< 1	< 1	0.00	< 1	< 1	0.00	< 1			< 1			< 1		
Chloroethane	UG/L	< 5	< 5	0.00	< 5	< 5	0.00	< 5			< 5			< 5		
Acetone	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10			< 10			< 10		
Benzene	UG/L	< 1	< 1	0.00	< 1	< 1	0.00	1			< 1			< 1		
1,1-Dichloroethene	UG/L	< 1	< 1	0.00	< 1	< 1	0.00	< 1			< 1			< 1		
Toluene	UG/L	< 2	< 2	0.00	< 2	< 2	0.00	< 2			< 2			< 2		
Chlorobenzene	UG/L	< 1	< 1	0.00	< 1	< 1	0.00	< 1			< 1			< 1		
Methylene Chloride	UG/L	17B	< 5		< 5	< 5	0.00	< 5			< 5			< 5		
Ethylbenzene	UG/L	< 1	< 1	0.00	< 1	< 1	0.00	3			< 1			< 1		
Trans-1,2-Dichloroethene	UG/L	< 1	< 1	0.00	< 1	< 1	0.00	< 1			< 1			< 1		
Xylenes (Total)	UG/L	< 1	< 1	0.00	< 1	< 1	0.00	1			< 1			< 1		
1,1-Dichloroethane	UG/L	< 1	< 1	0.00	< 1	< 1	0.00	< 1			< 1			< 1		
Styrene	UG/L	< 2	< 2	0.00	< 2	< 2	0.00	< 2			< 2			< 2		
1,4-Dioxane	UG/L	< 200	< 200	0.00	< 200	< 200	0.00	< 200			< 200			< 200		
Cis-1,2-Dichloroethene	UG/L	< 1	< 1	0.00	< 1	< 1	0.00	< 1			< 1			< 1		
Ethylene Dibromide	UG/L	< 5	< 5	0.00	< 5	< 5	0.00	< 5			< 5			< 5		
Cyclohexane	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10			< 10			< 10		
1,1,1-Trichloroethane	UG/L	< 1	< 1	0.00	< 1	< 1	0.00	< 1			< 1			< 1		
Carbon Tetrachloride	UG/L	< 1	< 1	0.00	< 1	< 1	0.00	< 1			< 1			< 1		
Trichloroethene	UG/L	< 1	< 1	0.00	< 1	< 1	0.00	< 1			< 1			< 1		
1,2-Dichloropropane	UG/L	< 1	< 1	0.00	< 1	< 1	0.00	< 1			< 1			< 1		
Bromodichloromethane	UG/L	< 1	< 1	0.00	< 1	< 1	0.00	< 1			< 1			< 1		
4-Methyl-2-Pentanone (MIBK)	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10			< 10			< 10		
Cis-1,3-Dichloropropene	UG/L	< 1	< 1	0.00	< 1	< 1	0.00	< 1			< 1			< 1		
Trans-1,3-Dichloropropene	UG/L	< 1	< 1	0.00	< 1	< 1	0.00	< 1			< 1			< 1		
2-Hexanone (MBK)	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10			< 10			< 10		
1,1,2-Trichloroethane	UG/L	< 1	< 1	0.00	< 1	< 1	0.00	< 1			< 1			< 1		
Tetrachloroethene	UG/L	< 1	< 1	0.00	< 1	< 1	0.00	< 1			< 1			< 1		
Dibromochloroethane	UG/L	< 1	< 1	0.00	< 1	< 1	0.00	< 1			< 1			< 1		
Bromoform	UG/L	< 5	< 5	0.00	< 5	< 5	0.00	< 5			< 5			< 5		
1,1,2,2-Tetrachloroethane	UG/L	< 2	< 2	0.00	< 2	< 2	0.00	< 2			< 2			< 2		
Dichlorodifluoromethane	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10			< 10			< 10		
Trichlorofluoromethane	UG/L	< 5	< 5	0.00	< 5	< 5	0.00	< 5			< 5			< 5		
1,1,2-Trichloro-1,2,2-Trifluoroethane	UG/L	< 5	< 5	0.00	< 5	< 5	0.00	< 5			< 5			< 5		
1,2-Dichlorobenzene	UG/L	< 5	< 5	0.00	< 5	< 5	0.00	< 5			< 5			< 5		
1,3-Dichlorobenzene	UG/L	< 5	< 5	0.00	< 5	< 5	0.00	< 5			< 5			< 5		
1,4-Dichlorobenzene	UG/L	< 5	< 5	0.00	< 5	< 5	0.00	< 5			< 5			< 5		

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Parameter	Units	High MW3	Low MW3	%Diff	High MW4	Low MW4	%Diff	High MW5	Low MW5	%D	High MW6	Low MW6	%D	High CW2A	Low CW2A	%D
Carbon Disulfide	UG/L	< 2			< 2			3			< 2			< 2	< 2	0.00
Chloromethane	UG/L	< 10			< 10			< 10			< 10			< 10	< 10	0.00
Chloroform	UG/L	< 1			< 1			< 1			< 1			< 1	< 1	0.00
Vinyl Choride	UG/L	< 5			< 5			< 5			< 5			< 5	< 5	0.00
2-Butanone	UG/L	< 10			< 10			< 10			< 10			< 10	< 10	0.00
Bromomethane	UG/L	< 10			< 10			< 10			< 10			< 10	< 10	0.00
1,2-Dichloroethane	UG/L	< 1			< 1			< 1			< 1			< 1	< 1	0.00
Chloroethane	UG/L	< 5			< 5			< 5			< 5			< 5	< 5	0.00
Acetone	UG/L	< 10			< 10			< 10			< 10			< 10	< 10	0.00
Benzene	UG/L	1			< 1			< 1			2			< 1	< 1	0.00
1,1-Dichloroethene	UG/L	< 1			< 1			< 1			< 1			< 1	< 1	0.00
Toluene	UG/L	< 2			< 2			< 2			< 2			< 2	< 2	0.00
Chlorobenzene	UG/L	< 1			< 1			< 1			< 1			< 1	< 1	0.00
Methylene Chloride	UG/L	< 5			< 5			< 5			< 5			< 5	< 5	0.00
Ethylbenzene	UG/L	4			2			6			2			< 1	< 1	0.00
Trans-1,2-Dichloroethene	UG/L	< 1			< 1			< 1			< 1			< 1	< 1	0.00
Xylenes (Total)	UG/L	< 1			< 1			6			< 1			< 1	< 1	0.00
1,1-Dichloroethane	UG/L	< 1			< 1			< 1			< 1			< 1	< 1	0.00
Styrene	UG/L	< 2			< 2			< 2			< 2			< 2	< 2	0.00
1,4-Dioxane	UG/L	< 200			< 200			< 200			< 200			< 200	< 200	0.00
Cis-1,2-Dichloroethene	UG/L	< 1			< 1			< 1			< 1			< 1	< 1	0.00
Ethylene Dibromide	UG/L	< 5			< 5			< 5			< 5			< 5	< 5	0.00
Cyclohexane	UG/L	< 10			< 10			< 10			< 10			< 10	< 10	0.00
1,1,1-Trichloroethane	UG/L	< 1			< 1			< 1			< 1			< 1	< 1	0.00
Carbon Tetrachloride	UG/L	< 1			< 1			< 1			< 1			< 1	< 1	0.00
Trichloroethene	UG/L	< 1			< 1			< 1			< 1			< 1	< 1	0.00
1,2-Dichloropropane	UG/L	< 1			< 1			< 1			< 1			< 1	< 1	0.00
Bromodichloromethane	UG/L	< 1			< 1			< 1			< 1			< 1	< 1	0.00
4-Methyl-2-Pentanone (MIBK)	UG/L	< 10			< 10			< 10			< 10			< 10	< 10	0.00
Cis-1,3-Dichloropropene	UG/L	< 1			< 1			< 1			< 1			< 1	< 1	0.00
Trans-1,3-Dichloropropene	UG/L	< 1			< 1			< 1			< 1			< 1	< 1	0.00
2-Hexanone (MBK)	UG/L	< 10			< 10			< 10			< 10			< 10	< 10	0.00
1,1,2-Trichloroethane	UG/L	< 1			< 1			< 1			< 1			< 1	< 1	0.00
Tetrachloroethene	UG/L	< 1			< 1			< 1			< 1			< 1	< 1	0.00
Dibromochloroethane	UG/L	< 1			< 1			< 1			< 1			< 1	< 1	0.00
Bromoform	UG/L	< 5			< 5			< 5			< 5			< 5	< 5	0.00
1,1,2,2-Tetrachloroethane	UG/L	< 2			< 2			< 2			< 2			< 2	< 2	0.00
Dichlorodifluoromethane	UG/L	< 10			< 10			< 10			< 10			< 10	< 10	0.00
Trichlorofluoromethane	UG/L	< 5			< 5			< 5			< 5			< 5	< 5	0.00
1,1,2-Trichloro-1,2,2-Trifluoroethane	UG/L	< 5			< 5			< 5			< 5			< 5	< 5	0.00
1,2-Dichlorobenzene	UG/L	< 5			< 5			< 5			< 5			< 5	< 5	0.00
1,3-Dichlorobenzene	UG/L	< 5			< 5			< 5			< 5			< 5	< 5	0.00
1,4-Dichlorobenzene	UG/L	< 5			< 5			< 5			< 5			< 5	< 5	0.00

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Parameter	Units	High CW2B	Low CW2B	%Diff	High CW2C	Low CW2C	%Diff	High CW6A	Low CW6A	%D	High CW6B	Low CW6B	%D	High CW7A	Low CW7A	%D
Carbon Disulfide	UG/L	< 2	< 2	0.00	< 2	< 2	0.00	< 2	< 2	0.00	< 2	< 2	0.00	< 2	< 2	0.00
Chloromethane	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
Chloroform	UG/L	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00
Vinyl Choride	UG/L	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00
2-Butanone	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
Bromomethane	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
1,2-Dichloroethane	UG/L	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00
Chloroethane	UG/L	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00
Acetone	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
Benzene	UG/L	1	1	0.00	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00
1,1-Dichloroethene	UG/L	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00
Toluene	UG/L	< 2	< 2	0.00	< 2	< 2	0.00	< 2	< 2	0.00	< 2	< 2	0.00	< 2	< 2	0.00
Chlorobenzene	UG/L	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00
Methylene Chloride	UG/L	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00
Ethylbenzene	UG/L	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00
Trans-1,2-Dichloroethene	UG/L	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00
Xylenes (Total)	UG/L	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00
1,1-Dichloroethane	UG/L	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00
Styrene	UG/L	< 2	< 2	0.00	< 2	< 2	0.00	< 2	< 2	0.00	< 2	< 2	0.00	< 2	< 2	0.00
1,4-Dioxane	UG/L	< 200	< 200	0.00	< 200	< 200	0.00	< 200	< 200	0.00	< 200	< 200	0.00	< 200	< 200	0.00
Cis-1,2-Dichloroethene	UG/L	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00
Ethylene Dibromide	UG/L	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00
Cyclohexane	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
1,1,1-Trichloroethane	UG/L	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00
Carbon Tetrachloride	UG/L	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00
Trichloroethene	UG/L	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00
1,2-Dichloropropane	UG/L	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00
Bromodichloromethane	UG/L	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00
4-Methyl-2-Pentanone (MIBK)	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
Cis-1,3-Dichloropropene	UG/L	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00
Trans-1,3-Dichloropropene	UG/L	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00
2-Hexanone (MBK)	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
1,1,2-Trichloroethane	UG/L	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00
Tetrachloroethene	UG/L	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00
Dibromochloroethane	UG/L	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00	< 1	< 1	0.00
Bromoform	UG/L	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00
1,1,2,2-Tetrachloroethane	UG/L	< 2	< 2	0.00	< 2	< 2	0.00	< 2	< 2	0.00	< 2	< 2	0.00	< 2	< 2	0.00
Dichlorodifluoromethane	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
Trichlorofluoromethane	UG/L	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00
1,1,2-Trichloro-1,2,2-Trifluoroethane	UG/L	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00
1,2-Dichlorobenzene	UG/L	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00
1,3-Dichlorobenzene	UG/L	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00
1,4-Dichlorobenzene	UG/L	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00

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Parameter	Units		High CW7B		Low CW7B	%Diff		FB 1		FB 2	%D		FB 3		FB 4	%D		TB 1		TB 2	%D		TB 3		TB 4	%D
Carbon Disulfide	UG/L	<	2		2	0.00	<	2	<	2	0.00	<	2	<	2	0.00	<	2	<	2	0.00	<	2	<	2	0.00
Chloromethane	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00
Chloroform	UG/L	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00
Vinyl Choride	UG/L	<	5	<	5	0.00	<	5	<	5	0.00	<	5	<	5	0.00	<	5	<	5	0.00	<	5	<	5	0.00
2-Butanone	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00
Bromomethane	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00
1,2-Dichloroethane	UG/L	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00
Chloroethane	UG/L	<	5	<	5	0.00	<	5	<	5	0.00	<	5	<	5	0.00	<	5	<	5	0.00	<	5	<	5	0.00
Acetone	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00
Benzene	UG/L	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00
1,1-Dichloroethene	UG/L	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00
Toluene	UG/L	<	2	<	2	0.00	<	2	<	2	0.00	<	2	<	2	0.00	<	2	<	2	0.00	<	2	<	2	0.00
Chlorobenzene	UG/L	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00
Methylene Chloride	UG/L	<	5	<	5	0.00	<	5	<	5	0.00	<	5	<	5	0.00	<	5	<	5	0.00	<	5	<	5	0.00
Ethylbenzene	UG/L	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00
Trans-1,2-Dichloroethene	UG/L	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00
Xylenes (Total)	UG/L	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00
1,1-Dichloroethane	UG/L	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00
Styrene	UG/L	<	2	<	2	0.00	<	2	<	2	0.00	<	2	<	2	0.00	<	2	<	2	0.00	<	2	<	2	0.00
1,4-Dioxane	UG/L	<	200	<	200	0.00	<	200	<	200	0.00	<	200	<	200	0.00	<	200	<	200	0.00	<	200	<	200	0.00
Cis-1,2-Dichloroethene	UG/L	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00
Ethylene Dibromide	UG/L	<	5	<	5	0.00	<	5	<	5	0.00	<	5	<	5	0.00	<	5	<	5	0.00	<	5	<	5	0.00
Cyclohexane	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00
1,1,1-Trichloroethane	UG/L	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00
Carbon Tetrachloride	UG/L	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00
Trichloroethene	UG/L	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00
1,2-Dichloropropane	UG/L	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00
Bromodichloromethane	UG/L	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00
4-Methyl-2-Pentanone (MIBK)	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00
Cis-1,3-Dichloropropene	UG/L	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00
Trans-1,3-Dichloropropene	UG/L	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00
2-Hexanone (MBK)	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00
1,1,2-Trichloroethane	UG/L	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00
Tetrachloroethene	UG/L	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00
Dibromochloroethane	UG/L	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00	<	1	<	1	0.00
Bromoform	UG/L	<	5	<	5	0.00	<	5	<	5	0.00	<	5	<	5	0.00	<	5	<	5	0.00	<	5	<	5	0.00
1,1,2,2-Tetrachloroethane	UG/L	<	2	<	2	0.00	<	2	<	2	0.00	<	2	<	2	0.00	<	2	<	2	0.00	<	2	<	2	0.00
Dichlorodifluoromethane	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00
Trichlorofluoromethane	UG/L	<	5	<	5	0.00	<	5	<	5	0.00	<	5	<	5	0.00	<	5	<	5	0.00	<	5	<	5	0.00
1,1,2-Trichloro-1,2,2-Trifluoroethane	UG/L	<	5	<	5	0.00	<	5	<	5	0.00	<	5	<	5	0.00	<	5	<	5	0.00	<	5	<	5	0.00
1,2-Dichlorobenzene	UG/L	<	5	<	5	0.00	<	5	<	5	0.00	<	5	<	5	0.00	<	5	<	5	0.00	<	5	<	5	0.00
1,3-Dichlorobenzene	UG/L	<	5	<	5	0.00	<	5	<	5	0.00	<	5	<	5	0.00	<	5	<	5	0.00	<	5	<	5	0.00
1,4-Dichlorobenzene	UG/L	<	5	<	5	0.00	<	5	<	5	0.00	<	5	<	5	0.00	<	5	<	5	0.00	<	5	<	5	0.00

TABLE 1 Comparison of groundwater analytical results of high tide vs low tide - Semivolatile organics

Parameter	Units	High CW8A	Low CW8A	%Diff	High CW8B	Low CW8B	%Diff	High CW9A	Low CW9A	%D	High CW9B	Low CW9B	%D	High CW3A	Low CW3A	%D	%Wells D>20%**
Anthracene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%
N-Nitrosodimethylamine	UG/L	< 15	< 15	0.00	< 15	< 15	0.00	< 15	< 15	0.00	< 15	< 15	0.00	< 15	< 15	0.00	0%
Benzo(a)Anthracene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%
Benzo (b) Fluoranthene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%
Aniline	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%
Benzo(k)Fluoranthene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%
Benzo(a)Pyrene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%
Bis(2-Chloroethyl)ether	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%
2-Chlorophenol	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%
Bis(2-ethylhexyl)Phthalate	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%
Butylbenzylphthalate	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%
Chrysene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%
Benzyl alcohol	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%
Dibenz(a,h)acridine	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%
Dibenz(a,h)anthracene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%
1,2-Dichlorobenezene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%
1,3-Dichlorobenzene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%
Bis-(2-Chloroisopropyl)ether	UG/L	< 15	< 15	0.00	< 15	< 15	0.00	< 15	< 15	0.00	< 15	< 15	0.00	< 15	< 15	0.00	0%
1,4-Dichlorobenzene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%
4-Methylphenol	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%
Diethylphthalate	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%
N-Nitroso-Di-N-Propylamine	UG/L	< 15	< 15	0.00	< 15	< 15	0.00	< 15	< 15	0.00	< 15	< 15	0.00	< 15	< 15	0.00	0%
7,12-Dimethylbenzo(a)Anthracene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%
Hexachloroethane	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%
Dimethylphthalate	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%
Nitrobenzene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%
Di-N-Butylphthalate	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%
Isophorone	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%
2-Nitrophenol	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%
Di-N-Octylphthalate	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%
Benzoic Acid	UG/L	< 50	< 50	0.00	< 50	< 50	0.00	< 50	< 50	0.00	< 50	< 50	0.00	< 50	< 50	0.00	0%
Bis(2-Chloroethoxy)methane	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%
2,4-Dichlorophenol	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%
Fluoranthene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%
1,2,4-Trichlorobenzene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%
Naphthalene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	16%
Phenanthrene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%
4-Chloroaniline	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%
Pyrene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%
Hexachlorobutadiene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%
2-Methylnaphthalene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	11%
4-Chloro-3-Methylphenol	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%
Benzenethiol	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%

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4-Nitrophenol	UG/L	< 50	< 50	0.00	< 50	< 50	0.00	< 50	< 50	0.00	< 50	< 50	0.00	< 50	< 50	0.00	0%
2,4-Dimethylphenol	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%
2,4-Dinitrophenol	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%
Phenol	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%
2-Methylphenol	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	0%
3&4-Methylphenol	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	
Hexachlorocyclopentadiene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	
2,4,6-Trichlorophenol	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	
2,4,5-Trichlorophenol	UG/L	< 50	< 50	0.00	< 50	< 50	0.00	< 50	< 50	0.00	< 50	< 50	0.00	< 50	< 50	0.00	
2-Chloronaphthalene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	
2-Nitroaniline	UG/L	< 50	< 50	0.00	< 50	< 50	0.00	< 50	< 50	0.00	< 50	< 50	0.00	< 50	< 50	0.00	
Acenaphthylene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	
2,6-Dinitrotoluene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	
3-Nitroaniline	UG/L	< 50	< 50	0.00	< 50	< 50	0.00	< 50	< 50	0.00	< 50	< 50	0.00	< 50	< 50	0.00	
Acenaphthalene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	
Dibenzofuran	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	
2,4-Dinitrotoluene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	
4-Chlorophenol-Phenylether	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	
Fluorene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	
4-Nitroaniline	UG/L	< 50	< 50	0.00	< 50	< 50	0.00	< 50	< 50	0.00	< 50	< 50	0.00	< 50	< 50	0.00	
2-Methyl-4,6-Dinitrophenol	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	
N-Nitrosodiphenylamine	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	
4-Bromophenyl-phenylether	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	
Hexachlorobenzene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	
Pentachlorophenol	UG/L	< 50	< 50	0.00	< 50	< 50	0.00	< 50	< 50	0.00	< 50	< 50	0.00	< 50	< 50	0.00	
3,3'-Dichlorobenzidine	UG/L	< 20	< 20	0.00	< 20	< 20	0.00	< 20	< 20	0.00	< 20	< 20	0.00	< 20	< 20	0.00	
Indeno(1,2,3-cd)pyrene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	
Indene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	
1-Methylnaphthalene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	26%	
Pyridine	UG/L	< 50	< 50	0.00	< 50	< 50	0.00	< 50	< 50	0.00	< 50	< 50	0.00	< 50	< 50	0.00	
Quinoline	UG/L	< 50	< 50	0.00	< 50	< 50	0.00	< 50	< 50	0.00	< 50	< 50	0.00	< 50	< 50	0.00	
6-Methyl Chrysene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	
Benzo(g,h,i)perylene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	

Parameter	Units	High CW3B	Low CW3B	%Diff	High CW3C	Low CW3C	%Diff	High CW4A	Low CW4A	%D	High CW4B	Low CW4B	%D	High CW4C	Low CW4C	%D	
Anthracene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10			< 10			< 10			
N-Nitrosodimethylamine	UG/L	< 15	< 15	0.00	< 15	< 15	0.00	< 15			< 15			< 15			
Benzo(a)Anthracene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10			< 10			< 10			
Benzo (b) Fluoranthene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10			< 10			< 10			
Aniline	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10			< 10			< 10			
Benzo(k)Fluoranthene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10			< 10			< 10			
Benzo(a)Pyrene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10			< 10			< 10			
Bis(2-Chloroethyl)ether	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10			< 10			< 10			
2-Chlorophenol	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10			< 10			< 10			
Bis(2-ethylhexyl)Phthalate	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10			< 10			< 10			
Butylbenzylphthalate	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10			< 10			< 10			
Chrysene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10			< 10			< 10			
Benzyl alcohol	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10			< 10			< 10			

Semivolatile Organics

Dibenz(a,h)acridine	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											
Dibenz(a,h)anthracene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											
1,2-Dichlorobenezene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											
1,3-Dichlorobenzene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											
Bis-(2-Chloroisopropyl)ether	UG/L	<	15	<	15	0.00	<	15	<	15	0.00	<	15					<	15					<	15											
1,4-Dichlorobenzene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											
4-Methylphenol	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											
Diethylphthalate	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											
N-Nitroso-Di-N-Propylamine	UG/L	<	15	<	15	0.00	<	15	<	15	0.00	<	15					<	15					<	15											
7,12-Dimethylbenzo(a)Anthracene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											
Hexachloroethane	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											
Dimethylphthalate	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											
Nitrobenzene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											
Di-N-Butylphthalate	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											
Isophorone	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											
2-Nitrophenol	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											
Di-N-Octylphthalate	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											
Benzoic Acid	UG/L	<	50	<	50	0.00	<	50	<	50	0.00	<	50					<	50					<	50											
Bis(2-Chloroethoxy)methane	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											
2,4-Dichlorophenol	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											
Fluoranthene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											
1,2,4-Trichlorobenzene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											
Naphthalene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00		10					<	10					<	10											
Phenanthrene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											
4-Chloroaniline	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											
Pyrene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											
Hexachlorobutadiene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											
2-Methylnaphthalene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											
4-Chloro-3-Methylphenol	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											
Benzenethiol	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											
4-Nitrophenol	UG/L	<	50	<	50	0.00	<	50	<	50	0.00	<	50					<	50					<	50											
2,4-Dimethylphenol	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											
2,4-Dinitrophenol	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											
Phenol	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											
2-Methylphenol	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											
3&4-Methylphenol	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											
Hexachlorocyclopentadiene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											
2,4,6-Trichlorophenol	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											
2,4,5-Trichlorophenol	UG/L	<	50	<	50	0.00	<	50	<	50	0.00	<	50					<	50					<	50											
2-Chloronaphthalene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											
2-Nitroaniline	UG/L	<	50	<	50	0.00	<	50	<	50	0.00	<	50					<	50					<	50											
Acenaphthylene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											
2,6-Dinitrotoluene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											
3-Nitroaniline	UG/L	<	50	<	50	0.00	<	50	<	50	0.00	<	50					<	50					<	50											
Acenaphthalene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											
Dibenzofuran	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											
2,4-Dinitrotoluene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											
4-Chlorophenol-Phenylether	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											
Fluorene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10											

4-Nitroaniline	UG/L	<	50	<	50	0.00	<	50	<	50	0.00	<	50					<	50					<	50						
2-Methyl-4,6-Dinitrophenol	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10						
N-Nitrosodiphenylamine	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10						
4-Bromophenyl-phenylether	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10						
Hexachlorobenzene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10						
Pentachlorophenol	UG/L	<	50	<	50	0.00	<	50	<	50	0.00	<	50					<	50					<	50						
3,3'-Dichlorobenzidine	UG/L	<	20	<	20	0.00	<	20	<	20	0.00	<	20					<	20					<	20						
Indeno(1,2,3-cd)pyrene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10						
Indene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10						
1-Methylnaphthalene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00		28					<	10					<	10						
Pyridine	UG/L	<	50	<	50	0.00	<	50	<	50	0.00	<	50					<	50					<	50						
Quinoline	UG/L	<	50	<	50	0.00	<	50	<	50	0.00	<	50					<	50					<	50						
6-Methyl Chrysene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10						
Benzo(g,h,i)perylene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10					<	10					<	10						

Parameter	Units		High MW3		Low MW3	%Diff		High MW4		Low MW4	%Diff		High MW5		Low MW5	%D		High MW6		Low MW6	%D		High CW2A		Low CW2A	%D
Anthracene	UG/L	<	10				<	10				<	10				<	10				<	10	<	10	0.00
N-Nitrosodimethylamine	UG/L	<	15				<	15				<	15				<	15				<	15	<	15	0.00
Benzo(a)Anthracene	UG/L	<	10				<	10				<	10				<	10				<	10	<	10	0.00
Benzo (b) Fluoranthene	UG/L	<	10				<	10				<	10				<	10				<	10	<	10	0.00
Aniline	UG/L	<	10				<	10				<	10				<	10				<	10	<	10	0.00
Benzo(k)Fluoranthene	UG/L	<	10				<	10				<	10				<	10				<	10	<	10	0.00
Benzo(a)Pyrene	UG/L	<	10				<	10				<	10				<	10				<	10	<	10	0.00
Bis(2-Chloroethyl)ether	UG/L	<	10				<	10				<	10				<	10				<	10	<	10	0.00
2-Chlorophenol	UG/L	<	10				<	10				<	10				<	10				<	10	<	10	0.00
Bis(2-ethylhexyl)Phthalate	UG/L	<	10				<	10				<	10				<	10				<	10	<	10	0.00
Butylbenzylphthalate	UG/L	<	10				<	10				<	10				<	10				<	10	<	10	0.00
Chrysene	UG/L	<	10				<	10				<	10				<	10				<	10	<	10	0.00
Benzyl alcohol	UG/L	<	10				<	10				<	10				<	10				<	10	<	10	0.00
Dibenz(a,h)acridine	UG/L	<	10				<	10				<	10				<	10				<	10	<	10	0.00
Dibenz(a,h)anthracene	UG/L	<	10				<	10				<	10				<	10				<	10	<	10	0.00
1,2-Dichlorobenezene	UG/L	<	10				<	10				<	10				<	10				<	10	<	10	0.00
1,3-Dichlorobenzene	UG/L	<	10				<	10				<	10				<	10				<	10	<	10	0.00
Bis-(2-Chloroisopropyl)ether	UG/L	<	15				<	15				<	15				<	15				<	15	<	15	0.00
1,4-Dichlorobenzene	UG/L	<	10				<	10				<	10				<	10				<	10	<	10	0.00
4-Methylphenol	UG/L	<	10				<	10				<	10				<	10				<	10	<	10	0.00
Diethylphthalate	UG/L	<	10				<	10				<	10				<	10				<	10	<	10	0.00
N-Nitroso-Di-N-Propylamine	UG/L	<	15				<	15				<	15				<	15				<	15	<	15	0.00
7,12-Dimethylbenzo(a)Anthracene	UG/L	<	10				<	10				<	10				<	10				<	10	<	10	0.00
Hexachloroethane	UG/L	<	10				<	10				<	10				<	10				<	10	<	10	0.00
Dimethylphthalate	UG/L	<	10				<	10				<	10				<	10				<	10	<	10	0.00
Nitrobenzene	UG/L	<	10				<	10				<	10				<	10				<	10	<	10	0.00
Di-N-Butylphthalate	UG/L	<	10				<	10				<	10				<	10				<	10	<	10	0.00
Isophorone	UG/L	<	10				<	10				<	10				<	10				<	10	<	10	0.00
2-Nitrophenol	UG/L	<	10				<	10				<	10				<	10				<	10	<	10	0.00
Di-N-Octylphthalate	UG/L	<	10				<	10				<	10				<	10				<	10	<	10	0.00
Benzoic Acid	UG/L	<	50				<	50				<	50				<	50				<	50	<	50	0.00
Bis(2-Chloroethoxy)methane	UG/L	<	10				<	10				<	10				<	10				<	10	<	10	0.00
2,4-Dichlorophenol	UG/L	<	10				<	10				<	10				<	10				<	10	<	10	0.00

Fluoranthene	UG/L	<	10					<	10					<	10					<	10					<	10		<	10		0.00			
1,2,4-Trichlorobenzene	UG/L	<	10					<	10					<	10					<	10					<	10		<	10		0.00			
Naphthalene	UG/L		36						19						15						25					<	10		<	10		0.00			
Phenanthrene	UG/L	<	10					<	10					<	10					<	10					<	10		<	10		0.00			
4-Chloroaniline	UG/L	<	10					<	10					<	10					<	10					<	10		<	10		0.00			
Pyrene	UG/L	<	10					<	10					<	10					<	10					<	10		<	10		0.00			
Hexachlorobutadiene	UG/L	<	10					<	10					<	10					<	10					<	10		<	10		0.00			
2-Methylnaphthalene	UG/L	<	10					<	10					<	10					<	10					<	10		<	10		0.00			
4-Chloro-3-Methylphenol	UG/L	<	10					<	10					<	10					<	10					<	10		<	10		0.00			
Benzenethiol	UG/L	<	10					<	10					<	10					<	10					<	10		<	10		0.00			
4-Nitrophenol	UG/L	<	50					<	50					<	50					<	50					<	50		<	50		0.00			
2,4-Dimethylphenol	UG/L	<	10					<	10					<	10					<	10					<	10		<	10		0.00			
2,4-Dinitrophenol	UG/L	<	10					<	10					<	10					<	10					<	10		<	10		0.00			
Phenol	UG/L	<	10					<	10					<	10					<	10					<	10		<	10		0.00			
2-Methylphenol	UG/L	<	10					<	10					<	10					<	10					<	10		<	10		0.00			
3&4-Methylphenol	UG/L	<	10					<	10					<	10					<	10					<	10		<	10		0.00			
Hexachlorocyclopentadiene	UG/L	<	10					<	10					<	10					<	10					<	10		<	10		0.00			
2,4,6-Trichlorophenol	UG/L	<	10					<	10					<	10					<	10					<	10		<	10		0.00			
2,4,5-Trichlorophenol	UG/L	<	50					<	50					<	50					<	50					<	50		<	50		0.00			
2-Chloronaphthalene	UG/L	<	10					<	10					<	10					<	10					<	10		<	10		0.00			
2-Nitroaniline	UG/L	<	50					<	50					<	50					<	50					<	50		<	50		0.00			
Acenaphthylene	UG/L	<	10					<	10					<	10					<	10					<	10		<	10		0.00			
2,6-Dinitrotoluene	UG/L	<	10					<	10					<	10					<	10					<	10		<	10		0.00			
3-Nitroaniline	UG/L	<	50					<	50					<	50					<	50					<	50		<	50		0.00			
Acenaphthalene	UG/L	<	10					<	10					<	10					<	10					<	10		<	10		0.00			
Dibenzofuran	UG/L	<	10					<	10					<	10					<	10					<	10		<	10		0.00			
2,4-Dinitrotoluene	UG/L	<	10					<	10					<	10					<	10					<	10		<	10		0.00			
4-Chlorophenol-Phenylether	UG/L	<	10					<	10					<	10					<	10					<	10		<	10		0.00			
Fluorene	UG/L	<	10					<	10					<	10					<	10					<	10		<	10		0.00			
4-Nitroaniline	UG/L	<	50					<	50					<	50					<	50					<	50		<	50		0.00			
2-Methyl-4,6-Dinitrophenol	UG/L	<	10					<	10					<	10					<	10					<	10		<	10		0.00			
N-Nitrosodiphenylamine	UG/L	<	10					<	10					<	10					<	10					<	10		<	10		0.00			
4-Bromophenyl-phenylether	UG/L	<	10					<	10					<	10					<	10					<	10		<	10		0.00			
Hexachlorobenzene	UG/L	<	10					<	10					<	10					<	10					<	10		<	10		0.00			
Pentachlorophenol	UG/L	<	50					<	50					<	50					<	50					<	50		<	50		0.00			
3,3'-Dichlorobenzidine	UG/L	<	20					<	20					<	20					<	20					<	20		<	20		0.00			
Indeno(1,2,3-cd)pyrene	UG/L	<	10					<	10					<	10					<	10					<	10		<	10		0.00			
Indene	UG/L	<	10					<	10					<	10					<	10					<	10		<	10		0.00			
1-Methylnaphthalene	UG/L		92						66						42						73					<	10		<	10		0.00			
Pyridine	UG/L	<	50					<	50					<	50					<	50					<	50		<	50		0.00			
Quinoline	UG/L	<	50					<	50					<	50					<	50					<	50		<	50		0.00			
6-Methyl Chrysene	UG/L	<	10					<	10					<	10					<	10					<	10		<	10		0.00			
Benzo(g,h,i)perylene	UG/L	<	10					<	10					<	10					<	10					<	10		<	10		0.00			

Parameter	Units		High CW7B		Low CW7B	%Diff		FB 1		FB 2	%D		FB 3		FB 4	%D		High CW5A		Low CW5A	%D		High CW5B		Low CW5B	%D
Anthracene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00
N-Nitrosodimethylamine	UG/L	<	15	<	15	0.00	<	15	<	15	0.00	<	15	<	15	0.00	<	15	<	15	0.00	<	15	<	15	0.00
Benzo(a)Anthracene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00

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Benzo (b) Fluoranthene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
Aniline	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
Benzo(k)Fluoranthene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
Benzo(a)Pyrene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
Bis(2-Chloroethyl)ether	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
2-Chlorophenol	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
Bis(2-ethylhexyl)Phthalate	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
Butylbenzylphthalate	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
Chrysene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
Benzyl alcohol	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
Dibenz(a,h)acridine	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
Dibenz(a,h)anthracene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
1,2-Dichlorobenezene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
1,3-Dichlorobenzene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
Bis-(2-Chloroisopropyl)ether	UG/L	< 15	< 15	0.00	< 15	< 15	0.00	< 15	< 15	0.00	< 15	< 15	0.00	< 15	< 15	0.00
1,4-Dichlorobenzene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
4-Methylphenol	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
Diethylphthalate	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
N-Nitroso-Di-N-Propylamine	UG/L	< 15	< 15	0.00	< 15	< 15	0.00	< 15	< 15	0.00	< 15	< 15	0.00	< 15	< 15	0.00
7,12-Dimethylbenzo(a)Anthracene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
Hexachloroethane	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
Dimethylphthalate	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
Nitrobenzene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
Di-N-Butylphthalate	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
Isophorone	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
2-Nitrophenol	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
Di-N-Octylphthalate	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
Benzoic Acid	UG/L	< 50	< 50	0.00	< 50	< 50	0.00	< 50	< 50	0.00	< 50	< 50	0.00	< 50	< 50	0.00
Bis(2-Chloroethoxy)methane	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
2,4-Dichlorophenol	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
Fluoranthene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
1,2,4-Trichlorobenzene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
Naphthalene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	25	< 10	85.71	24	< 10	82.35
Phenanthrene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
4-Chloroaniline	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
Pyrene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
Hexachlorobutadiene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
2-Methylnaphthalene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	15	< 10	40.00	15	< 10	40.00
4-Chloro-3-Methylphenol	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
Benzenethiol	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
4-Nitrophenol	UG/L	< 50	< 50	0.00	< 50	< 50	0.00	< 50	< 50	0.00	< 50	< 50	0.00	< 50	< 50	0.00
2,4-Dimethylphenol	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
2,4-Dinitrophenol	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
Phenol	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
2-Methylphenol	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
3&4-Methylphenol	UG/L	< 10	< 10	0.00	< 10	< 10	0	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
Hexachlorocyclopentadiene	UG/L	< 10	< 10	0.00	< 10	< 10	0	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
2,4,6-Trichlorophenol	UG/L	< 10	< 10	0.00	< 10	< 10	0	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
2,4,5-Trichlorophenol	UG/L	< 50	< 50	0.00	< 50	< 50	0	< 50	< 50	0.00	< 50	< 50	0.00	< 50	< 50	0.00

2-Chloronaphthalene	UG/L	<	10	<	10	0.00	<	10	<	10	0	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00		
2-Nitroaniline	UG/L	<	50	<	50	0.00	<	50	<	50	0	<	50	<	50	0.00	<	50	<	50	0.00	<	50	<	50	0.00		
Acenaphthylene	UG/L	<	10	<	10	0.00	<	10	<	10	0	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00		
2,6-Dinitrotoluene	UG/L	<	10	<	10	0.00	<	10	<	10	0	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00		
3-Nitroaniline	UG/L	<	50	<	50	0.00	<	50	<	50	0	<	50	<	50	0.00	<	50	<	50	0.00	<	50	<	50	0.00		
Acenaphthalene	UG/L	<	10	<	10	0.00	<	10	<	10	0	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00		
Dibenzofuran	UG/L	<	10	<	10	0.00	<	10	<	10	0	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00		
2,4-Dinitrotoluene	UG/L	<	10	<	10	0.00	<	10	<	10	0	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00		
4-Chlorophenol-Phenylether	UG/L	<	10	<	10	0.00	<	10	<	10	0	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00		
Fluorene	UG/L	<	10	<	10	0.00	<	10	<	10	0	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00		
4-Nitroaniline	UG/L	<	50	<	50	0.00	<	50	<	50	0	<	50	<	50	0.00	<	50	<	50	0.00	<	50	<	50	0.00		
2-Methyl-4,6-Dinitrophenol	UG/L	<	10	<	10	0.00	<	10	<	10	0	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00		
N-Nitrosodiphenylamine	UG/L	<	10	<	10	0.00	<	10	<	10	0	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00		
4-Bromophenyl-phenylether	UG/L	<	10	<	10	0.00	<	10	<	10	0	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00		
Hexachlorobenzene	UG/L	<	10	<	10	0.00	<	10	<	10	0	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00		
Pentachlorophenol	UG/L	<	50	<	50	0.00	<	50	<	50	0	<	50	<	50	0.00	<	50	<	50	0.00	<	50	<	50	0.00		
3,3'-Dichlorobenzidine	UG/L	<	20	<	20	0.00	<	20	<	20	0	<	20	<	20	0.00	<	20	<	20	0.00	<	20	<	20	0.00		
Indeno(1,2,3-cd)pyrene	UG/L	<	10	<	10	0.00	<	10	<	10	0	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00		
Indene	UG/L	<	10	<	10	0.00	<	10	<	10	0	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00		
1-Methylnaphthalene	UG/L	<	10	<	10	0.00	<	10	<	10	0	<	10	<	10	0.00		29	<	10	97.44		26	<	10	88.87		
Pyridine	UG/L	<	50	<	50	0.00	<	50	<	50	0	<	50	<	50	0.00	<	50	<	50	0.00	<	50	<	50	0.00		
Quinoline	UG/L	<	50	<	50	0.00	<	50	<	50	0	<	50	<	50	0.00	<	50	<	50	0.00	<	50	<	50	0.00		
6-Methyl Chrysene	UG/L	<	10	<	10	0.00	<	10	<	10	0	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00		
Benzo(g,h,i)perylene	UG/L	<	10	<	10	0.00	<	10	<	10	0	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00		

Parameter	Units		High CW2B		Low CW2B	%Diff		High CW2C		Low CW2C	%D		High CW6A		Low CW6A	%D		High CW6B		Low CW6B	%D		High CW1A		Low CW1A	%D	
Anthracene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
N-Nitrosodimethylamine	UG/L	<	15	<	15	0.00	<	15	<	15	0.00	<	15	<	15	0.00	<	15	<	15	0.00	<	15	<	15	0.00	
Benzo(a)Anthracene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
Benzo (b) Fluoranthene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
Aniline	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
Benzo(k)Fluoranthene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
Benzo(a)Pyrene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
Bis(2-Chloroethyl)ether	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
2-Chlorophenol	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
Bis(2-ethylhexyl)Phthalate	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
Butylbenzylphthalate	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
Chrysene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
Benzyl alcohol	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
Dibenz(a,h)acridine	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
Dibenz(a,h)anthracene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
1,2-Dichlorobenezene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
1,3-Dichlorobenzene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
Bis-(2-Chloroisopropyl)ether	UG/L	<	15	<	15	0.00	<	15	<	15	0.00	<	15	<	15	0.00	<	15	<	15	0.00	<	15	<	15	0.00	
1,4-Dichlorobenzene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
4-Methylphenol	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
Diethylphthalate	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
N-Nitroso-Di-N-Propylamine	UG/L	<	15	<	15	0.00	<	15	<	15	0.00	<	15	<	15	0.00	<	15	<	15	0.00	<	15	<	15	0.00	
7,12-Dimethylbenzo(a)Anthracene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	

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Hexachloroethane	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
Dimethylphthalate	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
Nitrobenzene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
Di-N-Butylphthalate	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
Isophorone	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
2-Nitrophenol	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
Di-N-Octylphthalate	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
Benzoic Acid	UG/L	<	50	<	50	0.00	<	50	<	50	0.00	<	50	<	50	0.00	<	50	<	50	0.00	<	50	<	50	0.00	
Bis(2-Chloroethoxy)methane	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
2,4-Dichlorophenol	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
Fluoranthene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
1,2,4-Trichlorobenzene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
Naphthalene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00		20		29	36.73	
Phenanthrene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
4-Chloroaniline	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
Pyrene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
Hexachlorobutadiene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
2-Methylnaphthalene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
4-Chloro-3-Methylphenol	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
Benzenethiol	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
4-Nitrophenol	UG/L	<	50	<	50	0.00	<	50	<	50	0.00	<	50	<	50	0.00	<	50	<	50	0.00	<	50	<	50	0.00	
2,4-Dimethylphenol	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
2,4-Dinitrophenol	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
Phenol	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
2-Methylphenol	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
3&4-Methylphenol	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
Hexachlorocyclopentadiene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
2,4,6-Trichlorophenol	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
2,4,5-Trichlorophenol	UG/L	<	50	<	50	0.00	<	50	<	50	0.00	<	50	<	50	0.00	<	50	<	50	0.00	<	50	<	50	0.00	
2-Chloronaphthalene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
2-Nitroaniline	UG/L	<	50	<	50	0.00	<	50	<	50	0.00	<	50	<	50	0.00	<	50	<	50	0.00	<	50	<	50	0.00	
Acenaphthylene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
2,6-Dinitrotoluene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
3-Nitroaniline	UG/L	<	50	<	50	0.00	<	50	<	50	0.00	<	50	<	50	0.00	<	50	<	50	0.00	<	50	<	50	0.00	
Acenaphthalene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
Dibenzofuran	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
2,4-Dinitrotoluene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
4-Chlorophenol-Phenylether	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
Fluorene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
4-Nitroaniline	UG/L	<	50	<	50	0.00	<	50	<	50	0.00	<	50	<	50	0.00	<	50	<	50	0.00	<	50	<	50	0.00	
2-Methyl-4,6-Dinitrophenol	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
N-Nitrosodiphenylamine	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
4-Bromophenyl-phenylether	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
Hexachlorobenzene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
Pentachlorophenol	UG/L	<	50	<	50	0.00	<	50	<	50	0.00	<	50	<	50	0.00	<	50	<	50	0.00	<	50	<	50	0.00	
3,3'-Dichlorobenzidine	UG/L	<	20	<	20	0.00	<	20	<	20	0.00	<	20	<	20	0.00	<	20	<	20	0.00	<	20	<	20	0.00	
Indeno(1,2,3-cd)pyrene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
Indene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00	
1-Methylnaphthalene	UG/L		14		19	30.30	<	10	<	10	0.00	<	10	<	10	0.00	<	10	<	10	0.00		130		200	42.42	

Pyridine	UG/L	< 50	< 50	0.00	< 50	< 50	0.00	< 50	< 50	0.00	< 50	< 50	0.00	< 50	< 50	0.00
Quinoline	UG/L	< 50	< 50	0.00	< 50	< 50	0.00	< 50	< 50	0.00	< 50	< 50	0.00	< 50	< 50	0.00
6-Methyl Chrysene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00
Benzo(g,h,i)perylene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00	< 10	< 10	0.00

Parameter	Units	High CW1B	Low CW1B	%Diff	High CW1C	Low CW1C	%D
Anthracene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00
N-Nitrosodimethylamine	UG/L	< 15	< 15	0.00	< 15	< 15	0.00
Benzo(a)Anthracene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00
Benzo (b) Fluoranthene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00
Aniline	UG/L	< 10	< 10	0.00	< 10	< 10	0.00
Benzo(k)Fluoranthene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00
Benzo(a)Pyrene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00
Bis(2-Chloroethyl)ether	UG/L	< 10	< 10	0.00	< 10	< 10	0.00
2-Chlorophenol	UG/L	< 10	< 10	0.00	< 10	< 10	0.00
Bis(2-ethylhexyl)Phthalate	UG/L	< 10	< 10	0.00	< 10	< 10	0.00
Butylbenzylphthalate	UG/L	< 10	< 10	0.00	< 10	< 10	0.00
Chrysene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00
Benzyl alcohol	UG/L	< 10	< 10	0.00	< 10	< 10	0.00
Dibenz(a,h)acridine	UG/L	< 10	< 10	0.00	< 10	< 10	0.00
Dibenz(a,h)anthracene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00
1,2-Dichlorobenezene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00
1,3-Dichlorobenzene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00
Bis-(2-Chloroisopropyl)ether	UG/L	< 15	< 15	0.00	< 15	< 15	0.00
1,4-Dichlorobenzene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00
4-Methylphenol	UG/L	< 10	< 10	0.00	< 10	< 10	0.00
Diethylphthalate	UG/L	< 10	< 10	0.00	< 10	< 10	0.00
N-Nitroso-Di-N-Propylamine	UG/L	< 15	< 15	0.00	< 15	< 15	0.00
7,12-Dimethylbenzo(a)Anthracene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00
Hexachloroethane	UG/L	< 10	< 10	0.00	< 10	< 10	0.00
Dimethylphthalate	UG/L	< 10	< 10	0.00	< 10	< 10	0.00
Nitrobenzene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00
Di-N-Butylphthalate	UG/L	< 10	< 10	0.00	< 10	< 10	0.00
Isophorone	UG/L	< 10	< 10	0.00	< 10	< 10	0.00
2-Nitrophenol	UG/L	< 10	< 10	0.00	< 10	< 10	0.00
Di-N-Octylphthalate	UG/L	< 10	< 10	0.00	< 10	< 10	0.00
Benzoic Acid	UG/L	< 50	< 50	0.00	< 50	< 50	0.00
Bis(2-Chloroethoxy)methane	UG/L	< 10	< 10	0.00	< 10	< 10	0.00
2,4-Dichlorophenol	UG/L	< 10	< 10	0.00	< 10	< 10	0.00
Fluoranthene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00
1,2,4-Trichlorobenzene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00
Naphthalene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00
Phenanthrene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00
4-Chloroaniline	UG/L	< 10	< 10	0.00	< 10	< 10	0.00
Pyrene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00
Hexachlorobutadiene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00
2-Methylnaphthalene	UG/L	< 10	< 10	0.00	< 10	< 10	0.00
4-Chloro-3-Methylphenol	UG/L	< 10	< 10	0.00	< 10	< 10	0.00
Benzenethiol	UG/L	< 10	< 10	0.00	< 10	< 10	0.00

Semivolatile Organics

CW 1B(1) CW 1B(4) % D

4-Nitrophenol	UG/L	<	50	<	50	0.00	<	50	<	50	0.00																				
2,4-Dimethylphenol	UG/L	<	10	<	10	0.00	<	10	<	10	0.00																				
2,4-Dinitrophenol	UG/L	<	10	<	10	0.00	<	10	<	10	0.00																				
Phenol	UG/L	<	10	<	10	0.00	<	10	<	10	0.00																				
2-Methylphenol	UG/L	<	10	<	10	0.00	<	10	<	10	0.00																				
3&4-Methylphenol	UG/L	<	10	<	10	0.00	<	10	<	10	0.00																				
Hexachlorocyclopentadiene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00																				
2,4,6-Trichlorophenol	UG/L	<	10	<	10	0.00	<	10	<	10	0.00																				
2,4,5-Trichlorophenol	UG/L	<	50	<	50	0.00	<	50	<	50	0.00																				
2-Chloronaphthalene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00																				
2-Nitroaniline	UG/L	<	50	<	50	0.00	<	50	<	50	0.00																				
Acenaphthylene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00																				
2,6-Dinitrotoluene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00																				
3-Nitroaniline	UG/L	<	50	<	50	0.00	<	50	<	50	0.00																				
Acenaphthalene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00																				
Dibenzofuran	UG/L	<	10	<	10	0.00	<	10	<	10	0.00																				
2,4-Dinitrotoluene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00																				
4-Chlorophenol-Phenylether	UG/L	<	10	<	10	0.00	<	10	<	10	0.00																				
Fluorene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00																				
4-Nitroaniline	UG/L	<	50	<	50	0.00	<	50	<	50	0.00																				
2-Methyl-4,6-Dinitrophenol	UG/L	<	10	<	10	0.00	<	10	<	10	0.00																				
N-Nitrosodiphenylamine	UG/L	<	10	<	10	0.00	<	10	<	10	0.00																				
4-Bromophenyl-phenylether	UG/L	<	10	<	10	0.00	<	10	<	10	0.00																				
Hexachlorobenzene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00																				
Pentachlorophenol	UG/L	<	50	<	50	0.00	<	50	<	50	0.00																				
3,3'-Dichlorobenzidine	UG/L	<	20	<	20	0.00	<	20	<	20	0.00																				
Indeno(1,2,3-cd)pyrene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00																				
Indene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00																				
1-Methylnaphthalene	UG/L	<	10		19	62.07	<	10	<	10	0.00																				
Pyridine	UG/L	<	50	<	50	0.00	<	50	<	50	0.00																				
Quinoline	UG/L	<	50	<	50	0.00	<	50	<	50	0.00																				
6-Methyl Chrysene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00																				
Benzo(g,h,i)perylene	UG/L	<	10	<	10	0.00	<	10	<	10	0.00																				

Metals

Parameter	Units	High CW6B	Low CW6B	%Diff	High CW8A	Low CW8A	%Diff	High CW7A	Low CW7A	%D	High CW7B	Low CW7B	%D				%D
Total Arsenic	MG/L	< 0.05	< 0.05	0.00	< 0.05	< 0.05	0.00	< 0.05	< 0.05	0.00	< 0.05	< 0.05	0.00				
Total Barium	MG/L	0.03	0.02	40.00	0.02	0.02	0.00	0.1	0.09	10.53	0.08	0.08	0.00				
Total Beryllium	MG/L	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00				
Total Cadmium	MG/L	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00				
Total Cobalt	MG/L	0.01	0.01	0.00	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00	< 0.01	0.01	0.00				
Total Chromium	MG/L	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00				
Total Mercury	MG/L	< 0.0005	< 0.0005	0.00	< 0.0005	0.0012	82.35	< 0.0005	< 0.0005	0.00	< 0.0005	< 0.0005	0.00				
Total Nickel	MG/L	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00				
Total Lead	MG/L	< 0.03	< 0.03	0.00	< 0.03	< 0.03	0.00	< 0.03	< 0.03	0.00	< 0.03	< 0.03	0.00				
Total Antimony	MG/L	< 0.03	< 0.03	0.00	< 0.03	< 0.03	0.00	< 0.03	< 0.03	0.00	< 0.03	< 0.03	0.00				
Total Selenium	MG/L	< 0.05	< 0.05	0.00	< 0.05	< 0.05	0.00	< 0.05	< 0.05	0.00	< 0.05	< 0.05	0.00				
Total Vanadium	MG/L	< 0.01	< 0.01	0.00	0.01	0.01	0.00	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00				

Parameter	Units	High CW8B	Low CW8B	%Diff	High CW9A	Low CW9A	%Diff	High CW9B	Low CW9B	%D	High MW3	Low MW3	%D	High MW4	Low MW4	%D
Total Arsenic	MG/L	< 0.5H	< 0.05		< 0.05	< 0.05	0.00	< 0.5H	< 0.05		< 0.05			< 0.05		
Total Barium	MG/L	0.02	0.02	0.00	< 0.01	< 0.01	0.00	0.04	0.04	0.00	< 0.01			< 0.01		
Total Beryllium	MG/L	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005			< 0.005		
Total Cadmium	MG/L	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00	< 0.01			< 0.01		
Total Cobalt	MG/L	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00	< 0.01			< 0.01		
Total Chromium	MG/L	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00	< 0.01			< 0.01		
Total Mercury	MG/L	< 0.0005	< 0.0005	0.00	< 0.0005	< 0.0005	0.00	< 0.0005	< 0.0005	0.00	< 0.0005			< 0.0005		
Total Nickel	MG/L	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00	< 0.01			< 0.01		
Total Lead	MG/L	< 0.03	< 0.03	0.00	< 0.03	< 0.03	0.00	< 0.03	< 0.03	0.00	< 0.03			< 0.03		
Total Antimony	MG/L	< 0.03	< 0.03	0.00	< 0.03	< 0.03	0.00	< 0.03	< 0.03	0.00	< 0.03			< 0.03		
Total Selenium	MG/L	< 0.05	< 0.05	0.00	< 0.05	< 0.05	0.00	< 0.5H	< 0.05		< 0.05			< 0.05		
Total Vanadium	MG/L	0.01	< 0.01	0.00	0.01	< 0.01	0.00	< 0.01	< 0.01	0.00	0.01			< 0.01		

Parameter	Units	High MW5	Low MW5	%Diff	High MW6	Low MW6	%Diff	FB 1	FB 2	%D	FB 3	FB 4	%D				%D
Total Arsenic	MG/L	< 0.05			< 0.05			< 0.05	< 0.05	0.00	< 0.05	< 0.05	0.00				
Total Barium	MG/L	0.01			< 0.01			< 0.1	< 0.01	163.64	< 0.01	< 0.01	0.00				
Total Beryllium	MG/L	< 0.005			< 0.005			< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00				
Total Cadmium	MG/L	< 0.01			< 0.01			< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00				
Total Cobalt	MG/L	< 0.01			< 0.01			< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00				
Total Chromium	MG/L	< 0.01			0.02			< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00				
Total Mercury	MG/L	< 0.0005			< 0.0005			< 0.0005	< 0.0005	0.00	< 0.0005	< 0.0005	0.00				
Total Nickel	MG/L	< 0.01			< 0.01			< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00				
Total Lead	MG/L	< 0.03			< 0.03			< 0.03	< 0.03	0.00	< 0.03	< 0.03	0.00				
Total Antimony	MG/L	< 0.03			< 0.03			< 0.03	< 0.03	0.00	< 0.03	< 0.03	0.00				
Total Selenium	MG/L	< 0.05			< 0.2H			< 0.05	< 0.05	0.00	< 0.05	< 0.05	0.00				
Total Vanadium	MG/L	0.01			0.02			< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00				

Metals

Parameter	Units	High CW5A	Low CW5A	%Diff	High CW5B	Low CW5B	%Diff	High CW6A	Low CW6A	%D	High CW6B	Low CW6B	%D	High CW7A	Low CW7A	%D	%Wells D>20%
Dissolved Arsenic	MG/L	< 0.05	< 0.1H		< 0.5H	< 0.05		< 0.05	< 0.05	0.00	< 0.05	< 0.05	0.00	< 0.05	< 0.05	0.00	0%
Dissolved Barium	MG/L	0.04	0.03	28.57	0.03	0.03	0.00	0.04	0.04	0.00	0.02	0.02	0.00	0.1	0.09	10.53	20%
Dissolved Beryllium	MG/L	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	0%
Dissolved Cadmium	MG/L	< 0.01	< 0.01	0.00	< 0.1H	< 0.01		< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00	0%
Dissolved Cobalt	MG/L	< 0.01	< 0.01	0.00	0.01	0.01	0.00	< 0.01	< 0.01	0.00	< 0.01	0.01	0.00	< 0.01	< 0.01	0.00	0%
Dissolved Chromium	MG/L	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00	0%
Dissolved Mercury	MG/L	< 0.0005	< 0.0005	0.00	< 0.0005	< 0.0005	0.00	< 0.0005	< 0.0005	0.00	< 0.0005	< 0.0005	0.00	< 0.0005	< 0.0005	0.00	0%
Dissolved Nickel	MG/L	< 0.01	< 0.01	0.00	0.05	0.04	22.22	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00	10%
Dissolved Lead	MG/L	< 0.03	< 0.03	0.00	< 0.3H	< 0.03		< 0.03	< 0.03	0.00	< 0.03	< 0.03	0.00	< 0.03	< 0.03	0.00	0%
Dissolved Antimony	MG/L	< 0.03	< 0.03	0.00	< 0.03	< 0.03	0.00	< 0.03	< 0.03	0.00	< 0.03	< 0.03	0.00	< 0.03	< 0.03	0.00	0%
Dissolved Selenium	MG/L	< 0.05	< 0.05	0.00	< 0.5H	< 0.1H		< 0.05	< 0.05	0.00	< 0.05	< 0.05	0.00	< 0.05	< 0.05	0.00	0%
Dissolved Vanadium	MG/L	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00	0%

Parameter	Units	High CW7B	Low CW7B	%Diff	High CW8A	Low CW8A	%Diff	High CW8B	Low CW8B	%D	High CW9A	Low CW9A	%D	High CW9B	Low CW9B	%D
Dissolved Arsenic	MG/L	< 0.05	< 0.05	0.00	< 0.05	< 0.05	0.00	< 0.05	< 0.05	0.00	< 0.05	< 0.05	0.00	< 0.05	< 0.05	0.00
Dissolved Barium	MG/L	0.07	0.07	0.00	0.02	0.02	0.00	0.02	0.02	0.00	< 0.01	< 0.01	0.00	0.04	0.03	28.57
Dissolved Beryllium	MG/L	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00
Dissolved Cadmium	MG/L	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00
Dissolved Cobalt	MG/L	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00	< 0.01	0.01	0.00	0.01	< 0.01	0.00
Dissolved Chromium	MG/L	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00
Dissolved Mercury	MG/L	< 0.0005	< 0.0005	0.00	< 0.0005	< 0.0005	0.00	< 0.0005	< 0.0005	0.00	< 0.0005	< 0.0005	0.00	< 0.0005	< 0.0005	0.00
Dissolved Nickel	MG/L	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00
Dissolved Lead	MG/L	< 0.03	< 0.03	0.00	< 0.03	< 0.03	0.00	< 0.03	< 0.03	0.00	< 0.03	< 0.03	0.00	< 0.03	< 0.03	0.00
Dissolved Antimony	MG/L	< 0.03	< 0.03	0.00	< 0.03	< 0.03	0.00	< 0.03	< 0.03	0.00	< 0.03	< 0.03	0.00	< 0.03	< 0.03	0.00
Dissolved Selenium	MG/L	< 0.05	< 0.05	0.00	< 0.05	< 0.05	0.00	< 0.05	< 0.05	0.00	< 0.05	< 0.05	0.00	< 0.05	< 0.05	0.00
Dissolved Vanadium	MG/L	< 0.01	< 0.01	0.00	0.01	0.01	0.00	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00	< 0.01	< 0.01	0.00

TABLE 1 Comparison of groundwater analytical results of high tide vs low tide - General Chemistry

Parameter	Units	High CW1A	Low CW1A	%Diff	High CW1B	Low CW1B	%Diff	High CW1C	Low CW1C	%D	High CW2A	Low CW2A	%D	High CW2B	Low CW2B	%D	%Wells D>20%**
Carbonate as CACO3	MG/L	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	0%
Bicarbonate as CACO3	MG/L	1300	1280	1.55	282	282	0.00	141	132	6.59	370	393	6.03	431	459	6.29	0%
Hydroxide as CACO3	MG/L	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	0%
Total Alkalinity CACO3	MG/L	1300	1280	1.55	282	282	0.00	141	132	6.59	370	393	6.03	431	459	6.29	0%
Chloride	MG/L	1800	1830	1.65	11700	12100	3.36	14100	14300	1.41	8110	8120	0.12	1940	1960	1.03	4%
Electrical Conductivity	U/CM	8300	8500	2.38	33000	32800	0.61	38100	37800	0.79	24300	24000	1.24	8830	8730	1.14	0%
Fluoride	MG/L	0.64	0.61	4.80	0.52	0.52	0.00	0.61	0.59	3.33	0.66	0.61	7.87	< 0.5	< 0.5	0.00	0%
Surfactants (MBAS)	MG/L	0.89	0.54	48.95	0.18	0.14	25.00	0.1	< 0.1	0.00	< 0.1	0.18	57.14	0.41	0.4	2.47	26%
Nitrate-Nitrite as Nitrogen	MG/L	< 0.05	< 0.05	0.00	< 0.05	< 0.05	0.00	0.22	0.29	27.45	< 0.05	< 0.05	0.00	< 0.05	0.07	33.33	20%
pH	Units	7.52	7.7	2.37	7.3	7.31	0.14	7.38	7.41	0.41	6.91	7.00	1.29	7.47	7.47	0.00	0%
Sulfate	MG/L	448	509	12.75	2290	2120	7.71	2550	2580	1.17	2040	1380	38.60	1580	1530	3.22	26%
Total Dissolved Solids	MG/L	4800	4950	3.08	22200	22900	3.10	26600	26300	1.13	15700	15500	1.28	5530	5600	1.26	8%

Parameter	Units	High CW2C	Low CW2C	%Diff	High CW3A	Low CW3A	%Diff	High CW3B	Low CW3B	%D	High CW3C	Low CW3C	%D	High CW4A	Low CW4A	%D
Carbonate as CACO3	MG/L	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00
Bicarbonate as CACO3	MG/L	164	199	19.28	311	307	1.29	325	316	2.81	306	277	9.95	513	530	3.26
Hydroxide as CACO3	MG/L	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00
Total Alkalinity CACO3	MG/L	164	199	19.28	311	307	1.29	325	316	2.81	306	277	9.95	513	530	3.26
Chloride	MG/L	13900	13600	2.18	509	503	1.19	587	579	1.37	530	510	3.85	1970	1740	12.40
Electrical Conductivity	U/CM	37100	36500	1.63	5680	6010	5.65	6000	5810	3.22	5840	6210	6.14	9100	8500	6.82
Fluoride	MG/L	0.69	0.69	0.00	< 0.5	< 0.5	0.00	< 0.5	< 0.5	0.00	< 0.5	< 0.5	0.00	< 0.5	< 0.5	0.00
Surfactants (MBAS)	MG/L	< 0.01	0.11	166.67	0.8	0.85	6.06	0.67	0.58	14.40	0.62	0.87	33.56	0.48	0.46	4.26
Nitrate-Nitrite as Nitrogen	MG/L	< 0.05	< 0.05	0.00	4.8	4.6	4.26	5.4	5.6	3.64	7	10.1	36.26	< 0.05	< 0.05	0.00
pH	Units	6.74	6.91	2.49	8.19	8.14	0.61	8.26	8.26	0.00	8.21	8.11	1.23	7.91	7.89	0.25
Sulfate	MG/L	2320	2470	6.26	2180	2230	2.27	1970	2110	6.86	1640	2270	32.23	1510	1550	2.61
Total Dissolved Solids	MG/L	24900	24600	1.21	3980	4190	5.14	4000	4030	0.75	3990	4450	10.90	4940	5000	1.21

Parameter	Units	High CW4B	Low CW4B	%Diff	High CW4C	Low CW4C	%Diff	High CW5A	Low CW5A	%D	High CW5B	Low CW5B	%D	High CW6A	Low CW6A	%D
Carbonate as CACO3	MG/L	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00
Bicarbonate as CACO3	MG/L	204	216	5.71	160	143	11.22	529	526	0.57	260	276	5.97	470	503	6.78
Hydroxide as CACO3	MG/L	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00
Total Alkalinity CACO3	MG/L	204	216	5.71	160	143	11.22	529	526	0.57	260	276	5.97	470	503	6.78
Chloride	MG/L	12300	11900	3.31	14200	11000	25.40	1160	1170	0.86	11200	10700	4.57	994	992	0.20
Electrical Conductivity	U/CM	34500	33600	2.64	39000	37000	5.26	4610	4560	1.09	31800	29200	8.52	3920	3970	1.27
Fluoride	MG/L	0.55	0.55	0.00	0.79	0.76	3.87	< 0.5	< 0.5	0.00	< 0.5	< 0.5	0.00	< 0.5	< 0.5	0.00
Surfactants (MBAS)	MG/L	0.23	0.21	9.09	0.21	0.23	9.09	0.25	0.2	22.22	0.25	0.25	0.00	< 0.1	< 0.1	0.00
Nitrate-Nitrite as Nitrogen	MG/L	< 0.05	1.3	185.19	2.1	< 0.05	190.70	< 0.05	< 0.05	0.00	< 0.05	< 0.05	0.00	< 0.05	< 0.05	0.00
pH	Units	7.14	7.16	0.28	7.4	7.41	0.14	7.13	7.1	0.42	7.32	7.24	1.10	6.81	6.87	0.88
Sulfate	MG/L	2690	1560	53.18	2880	2880	0.00	100	87.7	13.11	2060	1960	4.98	93.4	84.6	9.89
Total Dissolved Solids	MG/L	23700	16100	38.19	26300	26300	0.00	2380	2440	2.49	20800	19200	8.00	2210	2220	0.45

General Chemistry

Parameter	Units	High CW6B	Low CW6B	%Diff	High CW7A	Low CW7A	%Diff	High CW7B	Low CW7B	%D	High CW8A	Low CW8A	%D	High CW8B	Low CW8B	%D
Carbonate as CACO3	MG/L	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00
Bicarbonate as CACO3	MG/L	290	252	14.02	600	521	14.09	450	427	5.25	345	362	4.81	210	215	2.35
Hydroxide as CACO3	MG/L	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00
Total Alkalinity CACO3	MG/L	290	252	14.02	600	521	14.09	450	427	5.25	345	362	4.81	210	215	2.35
Chloride	MG/L	6930	6940	0.14	2180	2160	0.92	6510	6570	0.92	1240	1180	4.96	9440	9270	1.82
Electrical Conductivity	U/CM	22100	21400	3.22	7320	7260	0.82	19300	19200	0.52	7410	7360	0.68	27100	26400	2.62
Fluoride	MG/L	1.2	1.3	8.00	< 0.5	< 0.5	0.00	< 0.5	< 0.5	0.00	< 0.5	< 0.5	0.00	0.73	0.73	0.00
Surfactants (MBAS)	MG/L	< 0.1	< 0.1	0.00	< 0.1	< 0.1	0.00	0.16	0.14	13.33	0.19	0.21	10.00	< 0.1	0.11	9.52
Nitrate-Nitrite as Nitrogen	MG/L	< 0.05	< 0.05	0.00	< 0.05	< 0.05	0.00	< 0.05	< 0.05	0.00	< 0.05	< 0.05	0.00	< 0.05	< 0.05	0.00
pH	Units	7.52	7.59	0.93	6.76	6.82	0.88	6.81	6.85	0.59	8.09	8.08	0.12	7.49	7.49	0.00
Sulfate	MG/L	2270	2150	5.43	209	209	0.00	934	1340	35.71	2020	2070	2.44	1970	2700	31.26
Total Dissolved Solids	MG/L	13900	13600	2.18	4320	4310	0.23	12500	12000	4.08	4930	4770	3.30	17900	16600	7.54

Parameter	Units	High CW9A	Low CW9A		High CW9B	Low CW9B	%Diff	High MW3	Low MW3	%D	High MW4	Low MW4	%D	High MW5	Low MW5	%D
Carbonate as CACO3	MG/L	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00
Bicarbonate as CACO3	MG/L	645	629	2.51	161	160	0.62	689	750	8.48	516	581	11.85	445	444	0.22
Hydroxide as CACO3	MG/L	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00
Total Alkalinity CACO3	MG/L	645	629	2.51	161	160	0.62	689	750	8.48	516	581	11.85	445	444	0.22
Chloride	MG/L	1970	1960	0.51	12400	12500	0.80	1080	1070	0.93	1010	1020	0.99	794	789	0.63
Electrical Conductivity	U/CM	8710	8760	0.57	34100	35100	2.89	6430	6330	1.57	6430	6410	0.31	6150	6140	0.16
Fluoride	MG/L	0.53	0.51	3.85	0.55	0.55	0.00	0.61	0.69	12.31	0.52	0.52	0.00	< 0.5	< 0.5	0.00
Surfactants (MBAS)	MG/L	< 0.1	0.12	18.18	< 0.1	< 0.1	0.00	0.46	0.41	11.49	0.47	0.43	8.89	0.32	0.34	6.06
Nitrate-Nitrite as Nitrogen	MG/L	< 0.05	< 0.05	0.00	0.3	0.31	3.28	< 0.05	< 0.05	0.00	< 0.05	< 0.05	0.00	< 0.05	< 0.05	0.00
pH	Units	8.04	8.04	0.00	7.48	7.49	0.13	7.75	7.65	1.30	7.75	7.66	1.17	8.03	7.89	1.76
Sulfate	MG/L	985	1210	20.50	2830	2970	4.83	1160	1330	13.65	1320	1360	2.99	1960	1910	2.58
Total Dissolved Solids	MG/L	5260	5430	3.18	22700	22600	0.44	4170	4080	2.18	4220	4260	0.94	4180	4220	0.95

Parameter	Units	High MW6	Low MW6	%Diff	FB 1	FB 2	%Diff	FB 3	FB 4	%D
Carbonate as CACO3	MG/L	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00
Bicarbonate as CACO3	MG/L	1150	1300	12.24	< 5	< 5	0.00	< 5	< 5	0.00
Hydroxide as CACO3	MG/L	< 5	< 5	0.00	< 5	< 5	0.00	< 5	< 5	0.00
Total Alkalinity CACO3	MG/L	1150	1300	12.24	< 5	< 5	0.00	< 5	< 5	0.00
Chloride	MG/L	1740	1670	4.11	< 5	< 5	0.00	< 5	< 5	0.00
Electrical Conductivity	U/CM	7520	7330	2.56	145	62	80.19	< 20	< 20	0.00
Fluoride	MG/L	0.61	0.61	0.00	< 0.5	< 0.5	0.00	< 0.5	< 0.5	0.00
Surfactants (MBAS)	MG/L	0.66	0.51	25.64	< 0.1	< 0.1	0.00	< 0.1	< 0.1	0.00
Nitrate-Nitrite as Nitrogen	MG/L	< 0.05	< 0.05	0.00	0.39	0.41	5.00	0.43	0.39	9.76
pH	Units	7.49	7.38	1.48	5.66	5.51	2.69	5.39	6.34	16.20
Sulfate	MG/L	318	172	59.59	< 10	< 10	0.00	< 10	< 10	0.00
Total Dissolved Solids	MG/L	4500	4230	6.19	28	< 20	33.33	< 20	24	18.18

Table 2. Comparison of groundwater analytical results of total metals vs. dissolved metals
BHP Hawaii Refinery (December 1994)

Well CW-5A

Parameter* List	Units	MCL	Total (high tide)	Dissolved (high tide)	Diff. (mg/l)		Total (low tide)	Dissolved (low tide)	Diff. (mg/l)
Arsenic	mg/l	0.05	<0.05	<0.05	0		<0.05	<0.01H	0
Barium	mg/l	1	0.04	0.04	0		0.04	0.03	0.01
Beryllium	mg/l	0	<0.005	<0.005	0		<0.005	<0.005	0
Cadmium	mg/l	0.01	<0.01	<0.01	0		<0.01	<0.01	0
Cobalt	mg/l	NE	<0.01	<0.01	0		<0.01	<0.01	0
Chromium	mg/l	0.1	<0.01	<0.01	0		<0.01	<0.01	0
Mercury	mg/l	0	<0.0005	<0.0005	0		<0.0005	<0.0005	0
Nickel	mg/l	0.1	<0.01	<0.01	0		<0.01	<0.01	0
Lead	mg/l	0.05	<0.03	<0.03	0		<0.03	<0.03	0
Antimony	mg/l	0.01	<0.03	<0.03	0		<0.03	<0.03	0
Selenium	mg/l	0.05	<0.05	<0.05	0		<0.01H	<0.05	0
Vanadium	mg/l	NE	<0.01	<0.01	0		<0.01	<0.01	0

* Parameters below detection limits are expressed as less than the detection limit value.
H - Detection limit elevated due to matrix interference

Well CW-5B

Parameter* List	Units	MCL	Total (high tide)	Dissolved (high tide)	Diff. (mg/l)		Total (low tide)	Dissolved (low tide)	Diff. (mg/l)
Arsenic	mg/l	0.05	<0.05	<0.5H	0		<0.05	<0.01H	0
Barium	mg/l	1	0.03	0.03	0		0.03	0.03	0
Beryllium	mg/l	0	<0.005	<0.005	0		<0.005	<0.005	0
Cadmium	mg/l	0.01	<0.01	<0.1H	0		<0.01	<0.01	0
Cobalt	mg/l	NE	0.01	<0.01	0		0.01	0.01	0
Chromium	mg/l	0.1	<0.01	<0.01	0		<0.01	<0.01	0
Mercury	mg/l	0	<0.0005	<0.0005	0		<0.0005	<0.0005	0
Nickel	mg/l	0.1	0.05	0.05	0		0.04	0.04	0
Lead	mg/l	0.05	<0.03	<0.3H	0		<0.03	<0.03	0
Antimony	mg/l	0.01	<0.03	<0.03	0		<0.03	<0.03	0
Selenium	mg/l	0.05	<0.05	<0.5H	0		<0.05	<0.1H	0
Vanadium	mg/l	NE	<0.01	<0.01	0		<0.01	<0.01	0

* Parameters below detection limits are expressed as less than the detection limit value.
H - Detection limit elevated due to matrix interference

Table 2. Comparison of groundwater analytical results of total metals vs. dissolved metals
BHP Hawaii Refinery (continue)

Well CW-6A

Parameter* List	Units	MCL	Total (high tide)	Dissolved (high tide)	Diff. (mg/l)		Total (low tide)	Dissolved (low tide)	Diff. (mg/l)
Arsenic	mg/l	0.05	<0.05	<0.05	0		<0.05	<0.05	0
Barium	mg/l	1	0.04	0.04	0		0.04	0.04	0
Beryllium	mg/l	0	<0.005	<0.005	0		<0.005	<0.005	0
Cadmium	mg/l	0.01	<0.01	<0.01	0		<0.01	<0.01	0
Cobalt	mg/l	NE	<0.01	<0.01	0		<0.01	<0.01	0
Chromium	mg/l	0.1	<0.01	<0.01	0		<0.01	<0.01	0
Mercury	mg/l	0	<0.0005	<0.0005	0		<0.0005	<0.0005	0
Nickel	mg/l	0.1	<0.01	<0.01	0		<0.01	<0.01	0
Lead	mg/l	0.05	<0.03	<0.03	0		<0.03	<0.03	0
Antimony	mg/l	0.01	<0.03	<0.03	0		<0.03	<0.03	0
Selenium	mg/l	0.05	<0.05	<0.05	0		<0.05	<0.05	0
Vanadium	mg/l	NE	<0.01	<0.01	0		<0.01	<0.01	0

* Parameters below detection limits are expressed as less than the detection limit value.
H - Detection limit elevated due to matrix interference

Well CW-6B

Parameter* List	Units	MCL	Total (high tide)	Dissolved (high tide)	Diff. (mg/l)		Total (low tide)	Dissolved (low tide)	Diff. (mg/l)
Arsenic	mg/l	0.05	<0.05	<0.05	0		<0.05	<0.05	0
Barium	mg/l	1	0.03	0.02	0.01		0.02	0.02	0
Beryllium	mg/l	0	<0.005	<0.005	0		<0.005	<0.005	0
Cadmium	mg/l	0.01	<0.01	<0.01	0		<0.01	<0.01	0
Cobalt	mg/l	NE	0.01	<0.01	0		0.01	0.01	0
Chromium	mg/l	0.1	<0.01	<0.01	0		<0.01	<0.01	0
Mercury	mg/l	0	<0.0005	<0.0005	0		<0.0005	<0.0005	0
Nickel	mg/l	0.1	<0.01	<0.01	0		<0.01	<0.01	0
Lead	mg/l	0.05	<0.03	<0.03	0		<0.03	<0.03	0
Antimony	mg/l	0.01	<0.03	<0.03	0		<0.03	<0.03	0
Selenium	mg/l	0.05	<0.05	<0.05	0		<0.05	<0.05	0
Vanadium	mg/l	NE	<0.01	<0.01	0		<0.01	<0.01	0

* Parameters below detection limits are expressed as less than the detection limit value.
H - Detection limit elevated due to matrix interference

Table 2. Comparison of groundwater analytical results of total metals vs. dissolved metals
BHP Hawaii Refinery (continue)

Well CW-7A

Parameter* List	Units	MCL	Total (high tide)	Dissolved (high tide)	Diff. (mg/l)		Total (low tide)	Dissolved (low tide)	Diff. (mg/l)
Arsenic	mg/l	0.05	<0.05	<0.05	0		<0.05	<0.05	0
Barium	mg/l	1	0.1	0.1	0		0.09	0.09	0
Beryllium	mg/l	0	<0.005	<0.005	0		<0.005	<0.005	0
Cadmium	mg/l	0.01	<0.01	<0.01	0		<0.01	<0.01	0
Cobalt	mg/l	NE	<0.01	<0.01	0		<0.01	<0.01	0
Chromium	mg/l	0.1	<0.01	<0.01	0		<0.01	<0.01	0
Mercury	mg/l	0	<0.0005	<0.0005	0		<0.0005	<0.0005	0
Nickel	mg/l	0.1	<0.01	<0.01	0		<0.01	<0.01	0
Lead	mg/l	0.05	<0.03	<0.03	0		<0.03	<0.03	0
Antimony	mg/l	0.01	<0.03	<0.03	0		<0.03	<0.03	0
Selenium	mg/l	0.05	<0.05	<0.05	0		<0.05	<0.05	0
Vanadium	mg/l	NE	<0.01	<0.01	0		<0.01	<0.01	0

* Parameters below detection limits are expressed as less than the detection limit value.
H - Detection limit elevated due to matrix interference

Well CW-7B

Parameter* List	Units	MCL	Total (high tide)	Dissolved (high tide)	Diff. (mg/l)		Total (low tide)	Dissolved (low tide)	Diff. (mg/l)
Arsenic	mg/l	0.05	<0.05	<0.05	0		<0.05	<0.05	0
Barium	mg/l	1	0.08	0.07	0.01		0.08	0.07	0.01
Beryllium	mg/l	0	<0.005	<0.005	0		<0.005	<0.005	0
Cadmium	mg/l	0.01	<0.01	<0.01	0		<0.01	<0.01	0
Cobalt	mg/l	NE	<0.01	<0.01	0		0.01	<0.01	0
Chromium	mg/l	0.1	<0.01	<0.01	0		<0.01	<0.01	0
Mercury	mg/l	0	<0.0005	<0.0005	0		<0.0005	<0.0005	0
Nickel	mg/l	0.1	<0.01	<0.01	0		<0.01	<0.01	0
Lead	mg/l	0.05	<0.03	<0.03	0		<0.03	<0.03	0
Antimony	mg/l	0.01	<0.03	<0.03	0		<0.03	<0.03	0
Selenium	mg/l	0.05	<0.05	<0.05	0		<0.05	<0.05	0
Vanadium	mg/l	NE	<0.01	<0.01	0		<0.01	<0.01	0

* Parameters below detection limits are expressed as less than the detection limit value.
H - Detection limit elevated due to matrix interference

Table 2. Comparison of groundwater analytical results of total metals vs. dissolved metals
BHP Hawaii Refinery (continue)

Well CW-8A

Parameter* List	Units	MCL	Total (high tide)	Dissolved (high tide)	Diff. (mg/l)		Total (low tide)	Dissolved (low tide)	Diff. (mg/l)
Arsenic	mg/l	0.05	<0.05	<0.05	0		<0.05	<0.05	0
Barium	mg/l	1	0.02	0.02	0		0.02	0.02	0
Beryllium	mg/l	0	<0.005	<0.005	0		<0.005	<0.005	0
Cadmium	mg/l	0.01	<0.01	<0.01	0		<0.01	<0.01	0
Cobalt	mg/l	NE	<0.01	<0.01	0		<0.01	<0.01	0
Chromium	mg/l	0.1	<0.01	<0.01	0		<0.01	<0.01	0
Mercury	mg/l	0	<0.0005	<0.0005	0		0.0012	<0.0005	0.0007
Nickel	mg/l	0.1	<0.01	<0.01	0		<0.01	<0.01	0
Lead	mg/l	0.05	<0.03	<0.03	0		<0.03	<0.03	0
Antimony	mg/l	0.01	<0.03	<0.03	0		<0.03	<0.03	0
Selenium	mg/l	0.05	<0.05	<0.05	0		<0.05	<0.05	0
Vanadium	mg/l	NE	0.01	0.01	0		0.01	0.01	0

* Parameters below detection limits are expressed as less than the detection limit value.
H - Detection limit elevated due to matrix interference

Well CW-8B

Parameter* List	Units	MCL	Total (high tide)	Dissolved (high tide)	Diff. (mg/l)		Total (low tide)	Dissolved (low tide)	Diff. (mg/l)
Arsenic	mg/l	0.05	<0.5H	<0.05	0		<0.05	<0.05	0
Barium	mg/l	1	0.02	0.02	0		0.02	0.02	0
Beryllium	mg/l	0	<0.005	<0.005	0		<0.005	<0.005	0
Cadmium	mg/l	0.01	<0.01	<0.01	0		<0.01	<0.01	0
Cobalt	mg/l	NE	<0.01	<0.01	0		<0.01	<0.01	0
Chromium	mg/l	0.1	<0.01	<0.01	0		<0.01	<0.01	0
Mercury	mg/l	0	<0.0005	<0.0005	0		<0.0005	<0.0005	0
Nickel	mg/l	0.1	<0.01	<0.01	0		<0.01	<0.01	0
Lead	mg/l	0.05	<0.03	<0.03	0		<0.03	<0.03	0
Antimony	mg/l	0.01	<0.03	<0.03	0		<0.03	<0.03	0
Selenium	mg/l	0.05	<0.05	<0.05	0		<0.05	<0.05	0
Vanadium	mg/l	NE	0.01	<0.01	0		<0.01	<0.01	0

* Parameters below detection limits are expressed as less than the detection limit value.
H - Detection limit elevated due to matrix interference

Table 2. Comparison of groundwater analytical results of total metals vs. dissolved metals
BHP Hawaii Refinery (continue)

Well CW-9A

Parameter* List	Units	MCL	Total (high tide)	Dissolved (high tide)	Diff. (mg/l)		Total (low tide)	Dissolved (low tide)	Diff. (mg/l)
Arsenic	mg/l	0.05	<0.05	<0.05	0		<0.05	<0.05	0
Barium	mg/l	1	<0.01	<0.01	0		<0.01	<0.01	0
Beryllium	mg/l	0	<0.005	<0.005	0		<0.005	<0.005	0
Cadmium	mg/l	0.01	<0.01	<0.01	0		<0.01	<0.01	0
Cobalt	mg/l	NE	<0.01	<0.01	0		<0.01	0.01	0
Chromium	mg/l	0.1	<0.01	<0.01	0		<0.01	<0.01	0
Mercury	mg/l	0	<0.0005	<0.0005	0		<0.0005	<0.0005	0
Nickel	mg/l	0.1	<0.01	<0.01	0		<0.01	<0.01	0
Lead	mg/l	0.05	<0.03	<0.03	0		<0.03	<0.03	0
Antimony	mg/l	0.01	<0.03	<0.03	0		<0.03	<0.03	0
Selenium	mg/l	0.05	<0.05	<0.05	0		<0.05	<0.05	0
Vanadium	mg/l	NE	0.01	<0.01	0		<0.01	<0.01	0

* Parameters below detection limits are expressed as less than the detection limit value.
H - Detection limit elevated due to matrix interference

Well CW-9B

Parameter* List	Units	MCL	Total (high tide)	Dissolved (high tide)	Diff. (mg/l)		Total (low tide)	Dissolved (low tide)	Diff. (mg/l)
Arsenic	mg/l	0.05	<0.5H	<0.05	0		<0.05	<0.05	0
Barium	mg/l	1	0.04	0.04	0		0.04	0.03	0.01
Beryllium	mg/l	0	<0.005	<0.005	0		<0.005	<0.005	0
Cadmium	mg/l	0.01	<0.01	<0.01	0		<0.01	<0.01	0
Cobalt	mg/l	NE	<0.01	0.01	0		<0.01	<0.01	0
Chromium	mg/l	0.1	<0.01	<0.01	0		<0.01	<0.01	0
Mercury	mg/l	0	<0.0005	<0.0005	0		<0.0005	<0.0005	0
Nickel	mg/l	0.1	<0.01	<0.01	0		<0.01	<0.01	0
Lead	mg/l	0.05	<0.03	<0.03	0		<0.03	<0.03	0
Antimony	mg/l	0.01	<0.03	<0.03	0		<0.03	<0.03	0
Selenium	mg/l	0.05	<0.5H	<0.05	0		<0.05	<0.05	0
Vanadium	mg/l	NE	<0.01	<0.01	0		<0.01	<0.01	0

* Parameters below detection limits are expressed as less than the detection limit value.
H - Detection limit elevated due to matrix interferenc

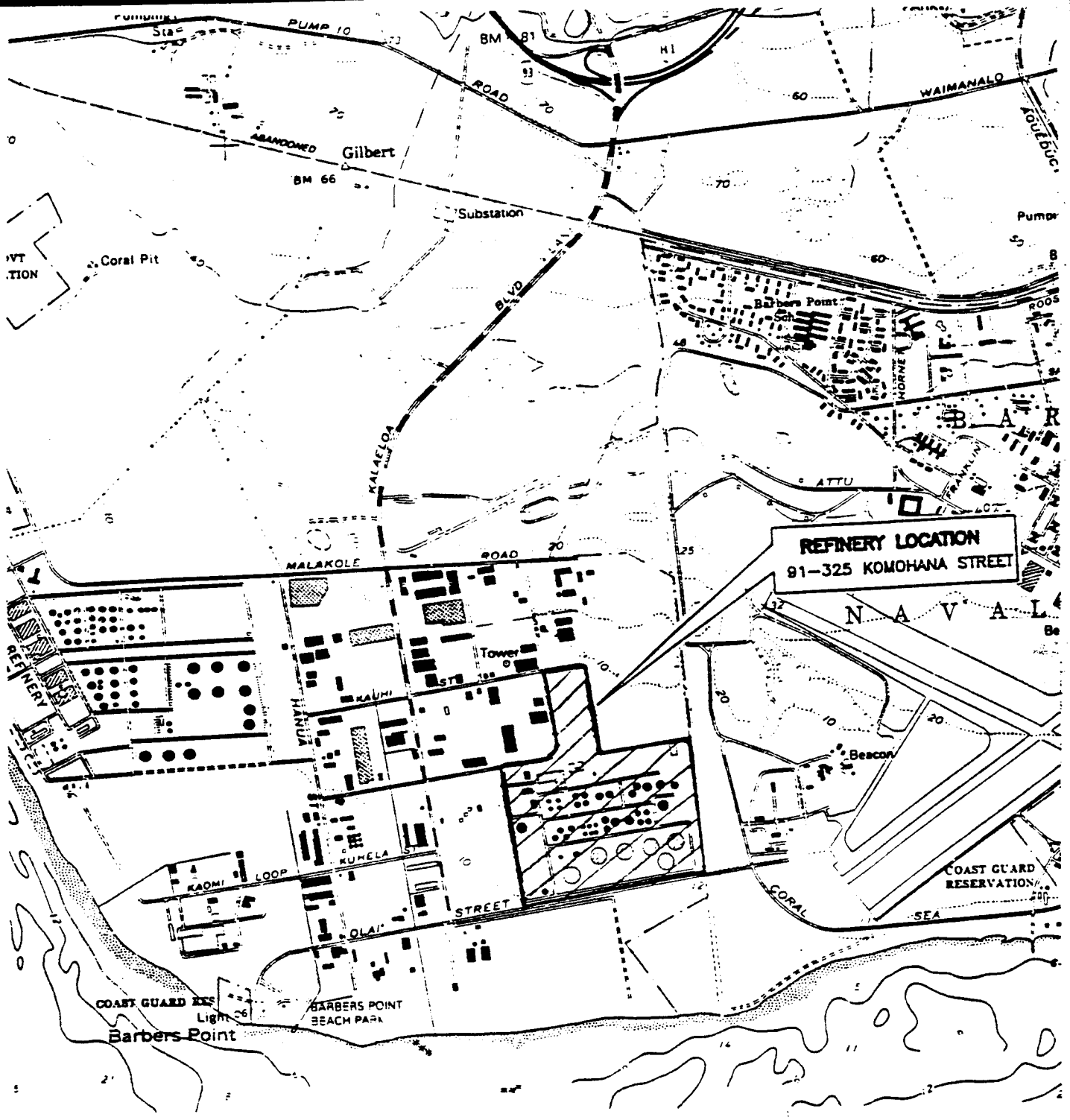
Table 3. BHP HAWAII REFINERY GROUNDWATER ELEVATION DATA

Well I.D. No.	Date [a]	Time [a]	Top of Stainless Steel or PVC Case Elevation (ft,MSL)[b]	Top of Concrete Apron Elevation (ft,MSL) [c]	Ground Surface Elevation (ft,MSL) [c]	Depth to Oil (ft)	Depth to Water (ft)	Oil Thickness (ft)	Corrected Depth to Water (ft)[d]	Corrected Water Table Elevation (ft,MSL)[e]
MW-3	12/19/94	10:39am	12.81	11.76	11.11	12.08	12.18	0.10	12.09	0.72
		14:15pm				12.33	12.43	0.10	12.34	0.47
MW-4	12/19/94	11:37am	13.29	12.15	11.75	12.57	12.81	0.24	12.60	0.69
		14:34pm				12.75	13.03	0.28	12.79	0.50
MW-5	12/19/94	9:46am	13.58	11.85	11.05	12.72	12.75	0.03	12.72	0.86
		13:36pm				13.04	13.12	0.08	13.04	0.54
MW-6	12/19/94	7:32am	13.12	11.58	11.28	12.32	12.32	0.0	12.32	0.80
		13:12pm				12.60	12.63	0.03	12.60	0.52
CW1A	12/19/94	11:00am	13.34	N/A	11.34	N/A	12.56	0.0	12.56	1.26
		15:40pm					12.81	0.0	12.81	1.01
CW1B	12/19/94	7:40am	13.55	N/A	11.19	N/A	12.21	0.0	12.21	1.34
		13:20pm					12.57	0.0	12.57	0.98
CW1C	12/19/94	10:00am	13.66	N/A	11.21	N/A	12.72	0.0	12.72	0.94
		14:55pm					13.00	0.0	13.00	0.66
CW6A	12/20/94	8:05am	15.80	N/A	13.60	N/A	14.36	0.0	14.36	1.44
		13:39pm					16.39	0.0	16.39	-0.59
CW6B	12/20/94	9:00am	15.74	N/A	13.50	N/A	14.30	0.0	14.30	1.44
		14:12pm					16.37	0.0	16.37	-0.63
CW7A	12/20/94	10:06am	14.03	N/A	11.90	N/A	12.61	0.0	12.61	1.42
		15:20pm					14.74	0.0	14.74	-0.71
CW7B	12/20/94	10:49am	14.41	N/A	11.90	N/A	13.06	0.0	13.06	1.35
		15:55pm					15.12	0.0	15.12	-0.71
CW2A	12/20/94	8:00am	13.74	N/A	11.46	N/A	12.11	0.0	12.11	1.63
		13:30pm					12.50	0.0	12.50	1.24
CW2B	12/20/94	9:15am	13.62	N/A	11.37	N/A	12.27	0.0	12.27	1.35
		14:15pm					12.65	0.0	12.65	0.97
CW2C	12/20/94	10:25am	13.66	N/A	11.17	N/A	12.61	0.0	12.61	1.05
		15:52pm					12.93	0.0	12.93	0.73

CW8A	12/21/94	8:16am	11.48	N/A	12.00	N/A	9.82	0.0	9.82	1.66
		13:27pm					10.25	0.0	10.25	1.23
CW8B	12/21/94	9:00am	11.52	N/A	11.90	N/A	9.94	0.0	9.94	1.58
		13:54pm					10.37	0.0	10.37	1.15
CW9A	12/21/94	10:09am	12.41	N/A	10.00	N/A	11.07	0.0	11.07	1.34
		14:43pm					11.42	0.0	11.42	0.99
CW9B	12/21/94	10:48am	12.40	N/A	10.10	N/A	11.29	0.0	11.29	1.11
		15:38pm					11.63	0.0	11.63	0.77
CW3A	12/21/94	7:55am	13.65	N/A	11.16	N/A	11.06	0.0	11.06	2.59
		13:30pm					11.89	0.0	11.89	1.76
CW3B	12/21/94	8:34am	13.82	N/A	11.22	N/A	12.12	0.0	12.12	1.70
		14:25pm					12.58	0.0	12.58	1.24
CW3C	12/21/94	9:30am	13.85	N/A	11.27	N/A	10.21	0.0	10.21	3.64
		15:27pm					11.00	0.0	11.00	2.85

CW5A	12/22/94	8:45am	15.71	N/A	13.20	N/A	14.39	0.0	14.39	1.32
		14:36pm					14.65	0.0	14.65	1.06
CW5B	12/22/94	9:20am	15.51	N/A	13.10	N/A	14.21	0.0	14.21	1.30
		15:11pm					14.54	0.0	14.54	0.97
CW4A	12/22/94	8:25am	12.24	N/A	10.07	N/A	11.01	0.0	11.01	1.23
		14:25pm					11.43	0.0	11.43	0.81
CW4B	12/22/94	9:23am	12.01	N/A	9.68	N/A	10.93	0.0	10.93	1.08
		15:05pm					11.36	0.0	11.36	0.65
CW4C	12/22/94	10:05am	12.13	N/A	9.74	N/A	11.23	0.0	11.23	0.90
		15:40pm					11.72	0.0	11.72	0.41

(a) Date and time of water level measurements
(b) Survey conducted in 8/87 for MW-3, MW-4, MW-5, MW-6; in 6/92 for CW1-4ABC; and in 11/94 for CW5-9AB
(c) Survey conducted 9/17/91
(d) Corrected depth to water = depth to water-(oil thickness x specific gravity)
Note: Specific gravities of oils were measured by the laboratory to be 0.88 for MW-3, MW-4, and MW-5; and 0.87 for MW-6 in August 1994.
(e) Corrected water table elevation = top of casing elevation - corrected depth to water



GENERAL NOTES:
BASE MAP FROM U.S.G.S.
EWA, HAWAII QUADRANGLE
7.5 MINUTE TOPOGRAPHIC MAP
PHOTOREVISED 1983

QUADRANGLE LOCATION

N

0 2000 FT

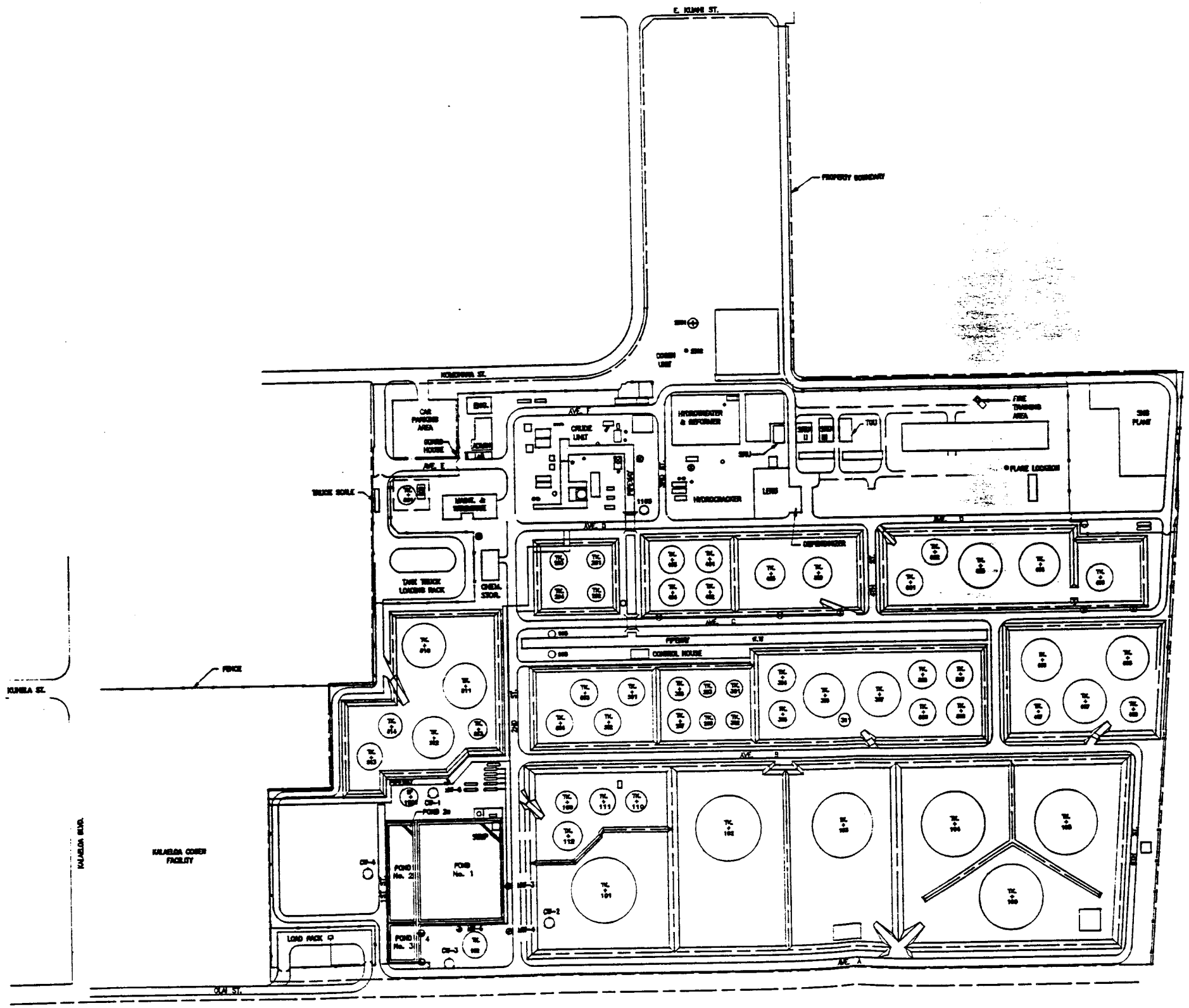
SCALE: 1 : 24,000

FIGURE 1

SITE LOCATION MAP
BHP PETROLEUM AMERICAS REFINING INC.
91-325 KOMOHANA STREET
KAPOLEI, HAWAII

PROJECT NO. 45-93-033	DRAWN BY G. ROSAS	
FILE NO. 3-033-02	PREPARED BY J. AMATO	
DATE 15 JUL 93 / REV. 0	REVIEWED BY	

Delta Environmental Consultants, Inc.



LEGEND

- MW-3 EXISTING GROUNDWATER MONITORING WELL LOCATION
- CW-4 EXISTING WELL CLUSTER LOCATION (SEE FIGURE 4 FOR DETAIL)
- 3 INJECTION WELL LOCATION

N

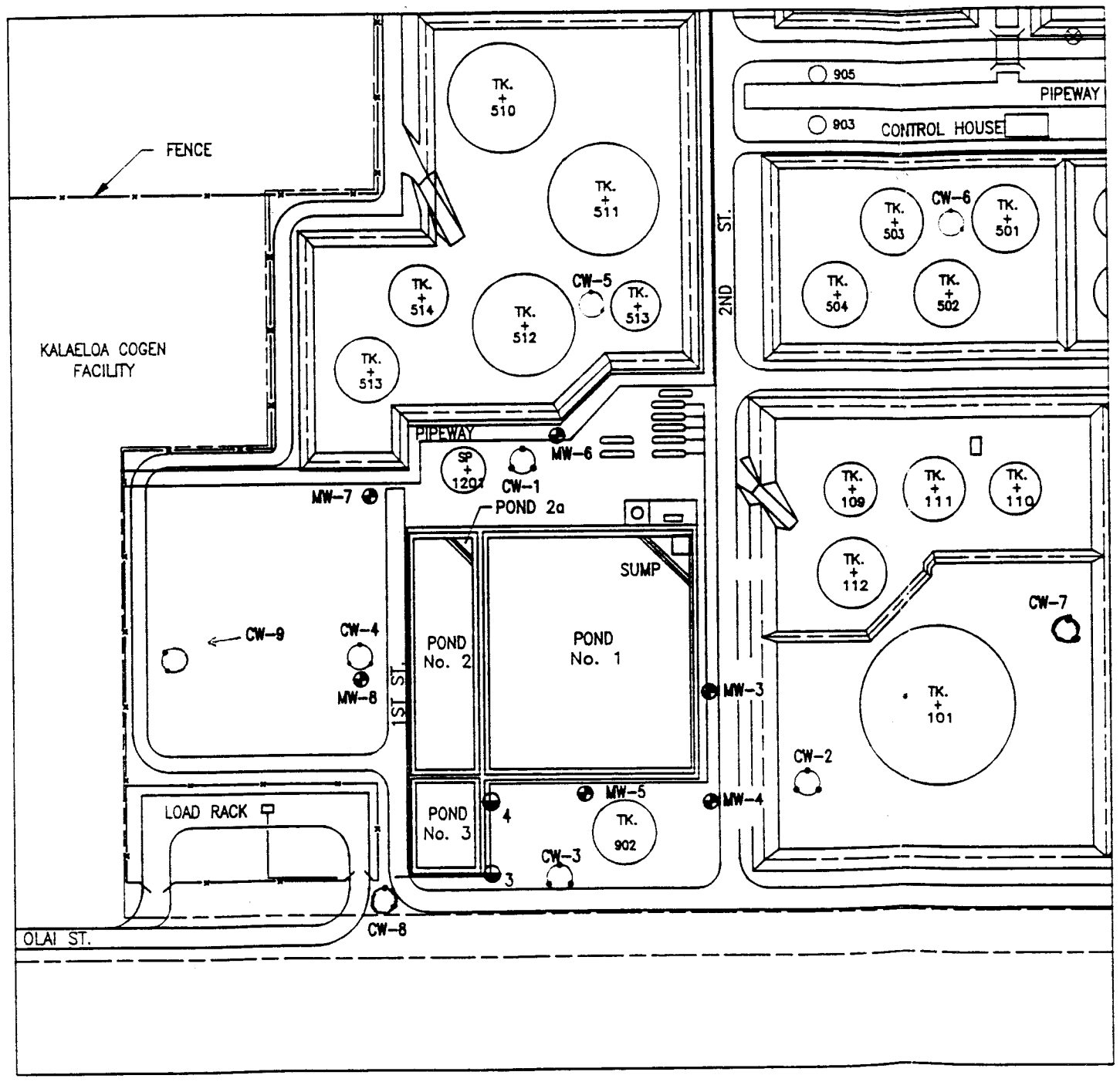
0 200 400

SCALE FEET

FIGURE 2

REFINERY SITE PLAN WITH EXISTING GROUNDWATER MONITORING WELL LOCATIONS
BHP PETROLEUM AMERICAS REFINING INC.
91-325 KOMOHANA STREET
KAPOLEI, HAWAII

PROJECT NO. 45-93-033	DRAWN BY GREG ROSAS	Delta Environmental Consultants, Inc.
FILE NO. 3-033-06	PREPARED BY JOHN AMATO	
DATE 3 AUG 93 / REV.	REVIEWED BY	



LEGEND

MW-5 EXISTING GROUNDWATER MONITORING WELL LOCATION

CW-4 EXISTING CLUSTER WELL LOCATION (SEE FIGURE 4 FOR DETAIL)

4 INJECTION WELL LOCATION

CW-9 PROPOSED CLUSTER WELL LOCATION

N

0 100 200

SCALE FEET

FIGURE 3

GROUNDWATER MONITORING WELL NETWORK WITH PROPOSED CLUSTER WELL LOCATIONS
BHP PETROLEUM AMERICAS REFINING INC.
91-325 KOMOHANA STREET
KAPOLEI, HAWAII

PROJECT NO. 45-93-033	DRAWN BY M. ENTERLINE	Delta Environmental Consultants, Inc.
FILE NO. 3-033-08	PREPARED BY J. AMATO	
DATE 18 OCT 93 / REV.	REVIEWED BY	

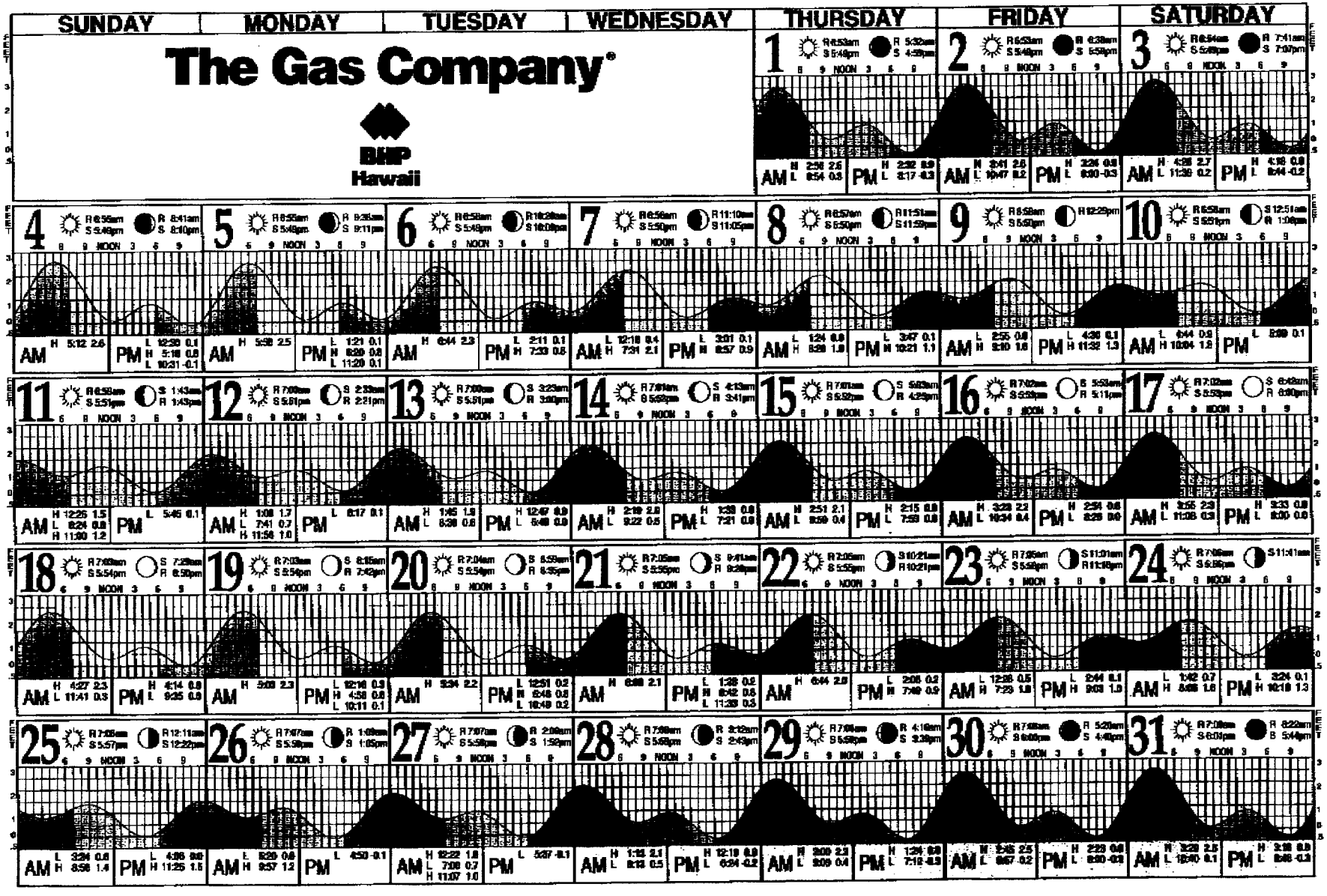
South Point ulua. *Photo by G. Brad Lewis.*

Attn: Mr. Mitch Kaplan. Samples collected from Dec. 19 to Dec. 22, 94.

DECEMBER 1994

The Gas Company®

BHP Hawaii



BHP

PO Box 3379 Honolulu Hawaii 96842-0001

GROUNDWATER ANALYTICAL RESULTS

DECEMBER 1994

BHP HAWAII REFINERY

BHP

February 17, 1995

BHP Hawaii

CERTIFIED MAIL NO. P-101-726-956
RETURN RECEIPT REQUESTED

Mr. Mitch Kaplan
Hazadous Waste Division (H-3-1)
U.S. Environmental Protection Agency, Region IX
75 Hawthorne Street
San Francisco, California 94105

Dear Mr. Kaplan:

Groundwater Analytical Results
HID 056786395

BHP Petroleum Americas Refining Inc., submits, for your review, the enclosed groundwater analytical results for groundwater samples collected in December 1994.

A tabled summary and discussion of the analytical results will be sent to you soon in a separate letter along with our plan for next quarterly groundwater sampling to be conducted in March 1995. Please contact Tony Shan at (808) 547-3804 should you have any questions.

Sincerely,

Frank D. Clouse

Frank D. Clouse
Refinery Manager

cc: Ms. Paula Bisson, EPA (w/o Enclosure)
Mr. Steven Y. K. Chang, HDOH (w/ Enclosure)

BHP Hawaii Inc
733 Bishop Street Honolulu Hawaii 96813 USA
PO Box 3379 Honolulu Hawaii 96842 USA
Telephone 808 547 3111 Facsimile 808 547 3145

GROUNDWATER ANALYTICAL RESULTS

FOR THE QUARTER OF DECEMBER 1994

BHP HAWAII REFINERY
91-325 KOMOHANA STREET, KAPOLEI, HAWAII 96707

February 17, 1995

CONTENTS

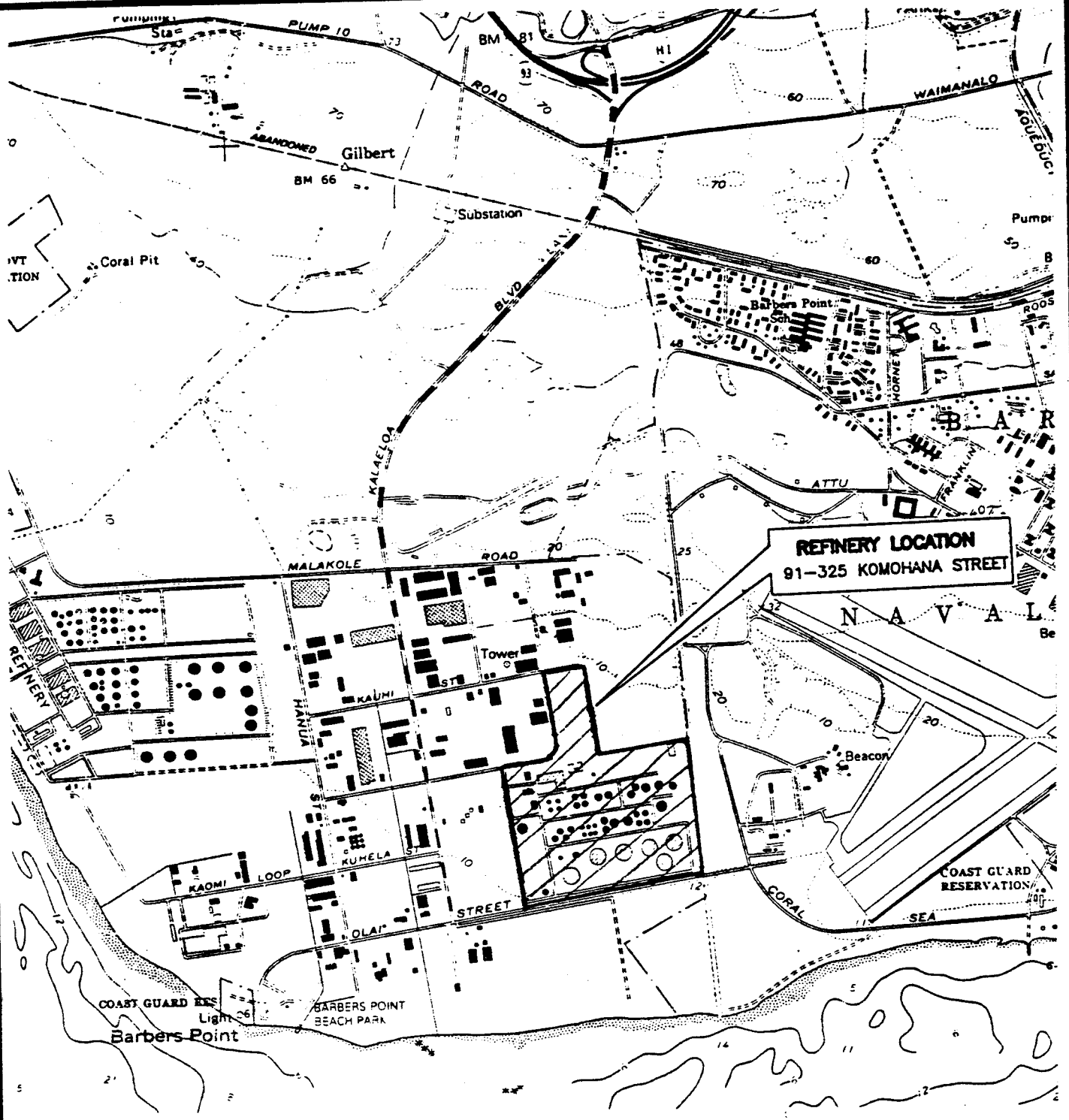
1. Groundwater monitoring well locations.

2. Analytical results of groundwater.

3. Analytical results of duplicate groundwater samples.

4. Groundwater elevation data.

1. GROUNDWATER MONITORING WELL LOCATIONS



GENERAL NOTES:
BASE MAP FROM U.S.G.S.
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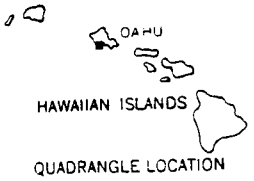
7.5 MINUTE TOPOGRAPHIC MAP
PHOTOREVISED 1983



QUADRANGLE LOCATION

N

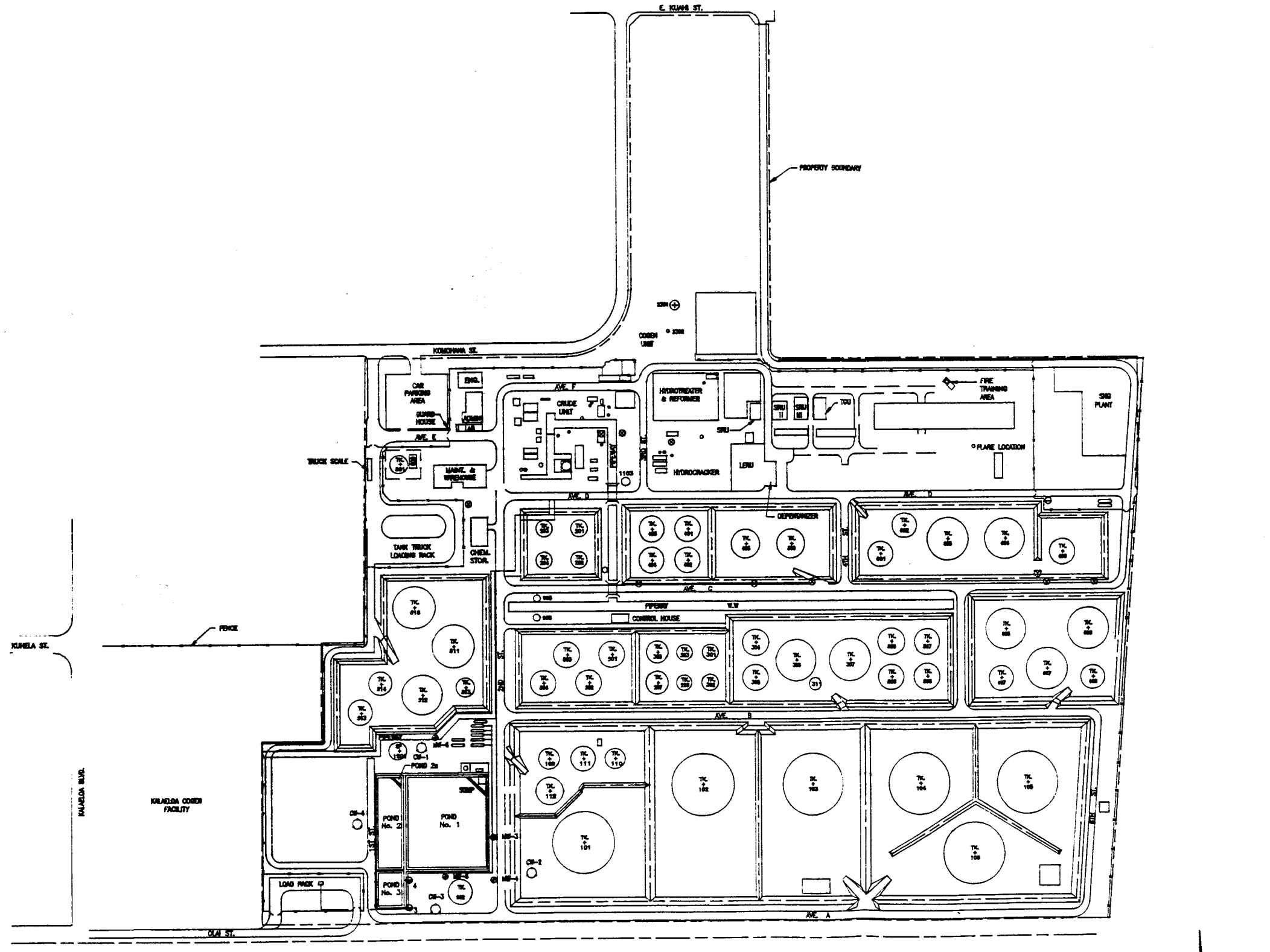
0 2000 FT

SCALE: 1 : 24,000

FIGURE 1

SITE LOCATION MAP
BHP PETROLEUM AMERICAS REFINING INC.
91-325 KOMOHANA STREET
KAPOLEI, HAWAII

PROJECT NO. 45-93-033	DRAWN BY G. ROSAS	Delta Environmental Consultants, Inc.
FILE NO. 3-033-02	PREPARED BY J. AMATO	
DATE 15 JUL 93 / REV. 0	REVIEWED BY	

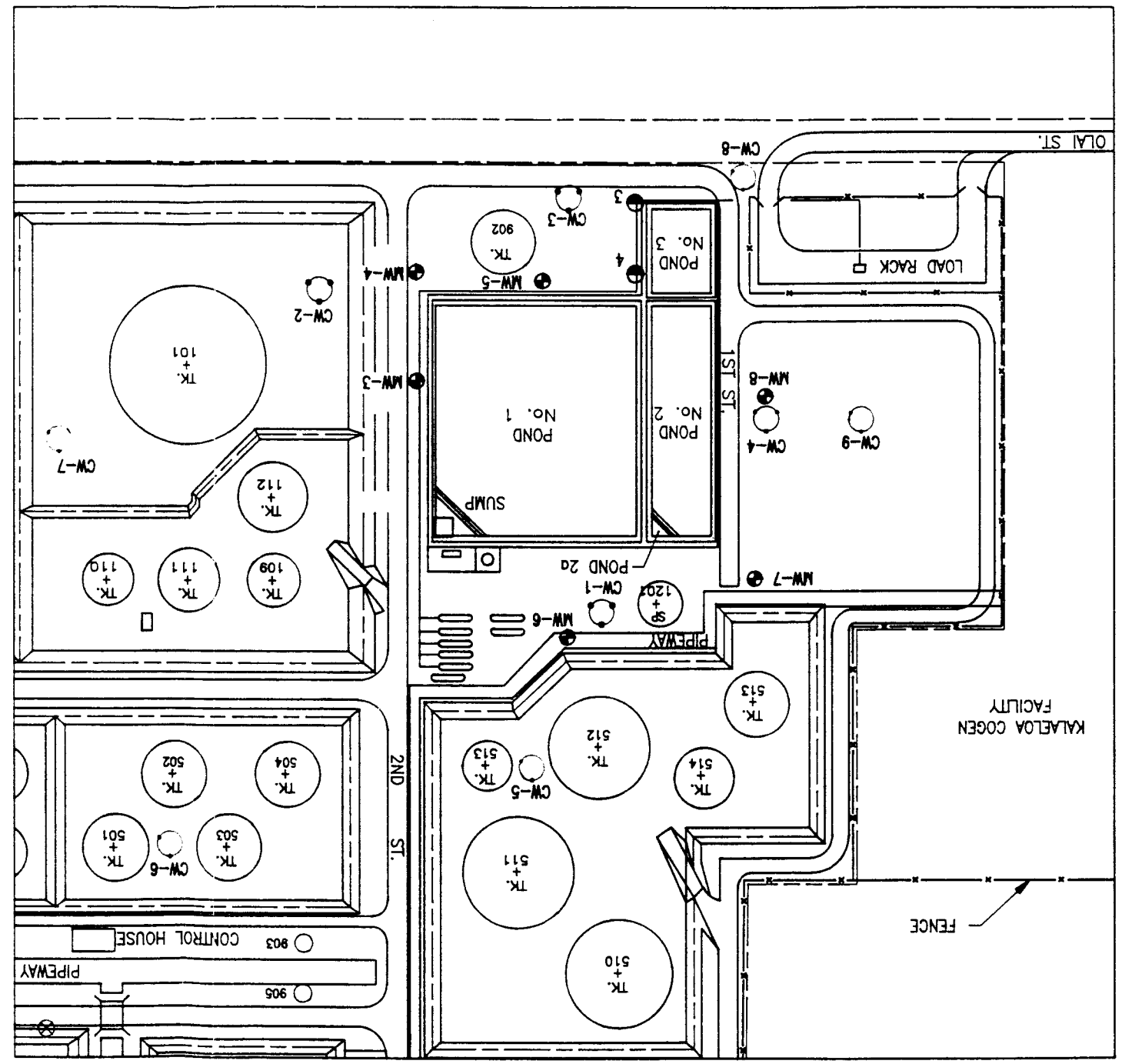


LEGEND

- MW-3 EXISTING GROUNDWATER MONITORING WELL LOCATION
- CW-4 EXISTING WELL CLUSTER LOCATION (SEE FIGURE 4 FOR DETAIL)
- 3 INJECTION WELL LOCATION

FIGURE 2
REFINERY SITE PLAN WITH EXISTING GROUNDWATER MONITORING WELL LOCATIONS
BHP PETROLEUM AMERICAS REFINING INC.
91-325 KOMOHANA STREET
KAPOLEI, HAWAII

PROJECT NO. 45-93-033	DRAWN BY GREG ROSAS	Delta Environmental Consultants, Inc.
FILE NO. 3-033-06	PREPARED BY JOHN AMATO	
DATE 3 AUG 93 / REV.	REVIEWED BY	



LEGEND

MW-5 EXISTING GROUNDWATER MONITORING WELL LOCATION

CW-4 EXISTING CLUSTER WELL LOCATION (SEE FIGURE 4 FOR DETAIL)

4 INJECTION WELL LOCATION

CW-9 PROPOSED CLUSTER WELL LOCATION

FIGURE 3
GROUNDWATER MONITORING WELL NETWORK WITH *NEW* CLUSTER WELL LOCATIONS
BHP PETROLEUM AMERICAS REFINING INC.
91-325 KOMOHANA STREET
KAPOLEI, HAWAII

PROJECT NO. 45-93-033	DRAWN BY M. ENTERLINE
FILE NO. 3-033-08	PREPARED BY J. AMATO
DATE 18 OCT 93	REV. REVIEWED BY

Delta Environmental Consultants, Inc.

2. ANALYTICAL RESULTS OF GROUNDWATER

AnalyticalTechnologies, Inc. Corporate Offices: 5550 Morehouse Drive San Diego, CA 92121 (619) 458-9141

ATI I.D.: 412262

January 25, 1995

ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
c/o BHP REFINING 91325 KOMOHANA STREET
KAPOLEI, HI 96707

Project Name: GMP
Project # : 34-37-74-441000

Attention: STEPHANIE SAKURAI

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

Date Received	Quantity	Matrix
December 20, 1994	16	WATER

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

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

SUSAN M. SNYDER
PROJECT MANAGER

FOR
M. E. SHIGLEY
LABORATORY MANAGER

AnalyticalTechnologies,Inc.

SAMPLE CROSS REFERENCE

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 34-37-74-441000
Project Name: GMP

Report Date: January 25, 1995
ATI I.D. : 412262

ATI #	Client Description	Matrix	Date Collected
1	HCW1A	WATER	19-DEC-94
2	HCW1B	WATER	19-DEC-94
3	HCW1C	WATER	19-DEC-94
4	LCW1A	WATER	19-DEC-94
5	LCW1B	WATER	19-DEC-94
6	LCW1C	WATER	19-DEC-94
7	FB-1	WATER	19-DEC-94
8	HMW3	WATER	19-DEC-94
9	HMW4	WATER	19-DEC-94
10	HMW5	WATER	19-DEC-94
11	HMW6	WATER	19-DEC-94
12	LMW3	WATER	19-DEC-94
13	LMW4	WATER	19-DEC-94
14	LMW5	WATER	19-DEC-94
15	LMW6	WATER	19-DEC-94
16	TB-1 (GCMS 1117,1119)	WATER	19-DEC-94
17	HCW1A/DISSOLVED 01	WATER	19-DEC-94
18	HCW1B/DISSOLVED 02	WATER	19-DEC-94
19	HCW1C/DISSOLVED 03	WATER	19-DEC-94
20	LCW1A/DISSOLVED 04	WATER	19-DEC-94
21	LCW1B/DISSOLVED 05	WATER	19-DEC-94
22	LCW1C/DISSOLVED 06	WATER	19-DEC-94
23	FB-1/DISSOLVED 07	WATER	19-DEC-94
24	HMW3/DISSOLVED 08	WATER	19-DEC-94
25	HMW4/DISSOLVED 09	WATER	19-DEC-94
26	HMW5/DISSOLVED 10	WATER	19-DEC-94
27	HMW6/DISSOLVED 11	WATER	19-DEC-94

---TOTALS---

Matrix	# Samples
WATER	27

ATI STANDARD DISPOSAL PRACTICE

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

AnalyticalTechnologies,Inc.

ANALYTICAL SCHEDULE

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 34-37-74-441000
Project Name: GMP

ATI I.D.: 412262

Analysis	Technique/Description
EPA 160.1 (TOTAL DISSOLVED SOLIDS)	GRAVIMETRIC
EPA 310.1 (ALKALINITY)	TITRIMETRIC
EPA 340.2 (FLUORIDE)	ELECTRODE
EPA 353.2 (NITRATE-NITRITE AS NITROGEN)	COLORIMETRIC
EPA 425.1 (SURFACTANTS (MBAS))	COLORIMETRIC
EPA 6010 (ANTIMONY)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (ARSENIC)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (BARIUM)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (BERYLLIUM)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (CADMIUM)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (CHROMIUM)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (COBALT)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (IRON)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (LEAD)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (MANGANESE)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (NICKEL)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 7740 (SELENIUM)	ATOMIC ABSORPTION/GRAPHITE FURNACE
EPA 6010 (SELENIUM)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (SODIUM)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (VANADIUM)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 7470 (AQUEOUS MERCURY)	ATOMIC ABSORPTION/COLD VAPOR
EPA 8240 (GC/MS FOR VOLATILE ORGANICS)	GC/MASS SPECTROMETER
EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)	GC/MASS SPECTROMETER
EPA 9038 (SULFATE)	TURBIDIMETRIC
EPA 9040 (pH)	ELECTRODE
EPA 9050 (ELECTRICAL CONDUCTIVITY)	ELECTRODE
EPA 9253 (CHLORIDE)	TITRIMETRIC, SILVER NITRATE

AnalyticalTechnologies,Inc.

GENERAL CHEMISTRY RESULTS

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 34-37-74-441000
Project Name: GMP

ATI I.D.: 412262

Sample #	Client ID	Matrix	Date Sampled	Date Received
1	HCW1A	WATER	19-DEC-94	20-DEC-94
2	HCW1B	WATER	19-DEC-94	20-DEC-94
3	HCW1C	WATER	19-DEC-94	20-DEC-94
4	LCW1A	WATER	19-DEC-94	20-DEC-94
5	LCW1B	WATER	19-DEC-94	20-DEC-94

Parameter	Units	1	2	3	4	5
CARBONATE AS CACO3	MG/L	<5	<5	<5	<5	<5
BICARBONATE AS CACO3	MG/L	1300	282	141	1280	282
HYDROXIDE AS CACO3	MG/L	<5	<5	<5	<5	<5
TOTAL ALKALINITY AS CACO3	MG/L	1300	282	141	1280	282
CHLORIDE	MG/L	1800	11700	14100	1830	12100
ELECTRICAL CONDUCTIVITY	UMHOS/CM	8300	33000	38100	8500	32800
FLUORIDE	MG/L	0.64	0.52	0.61	0.61	0.52
SURFACTANTS (MBAS)	MG/L	0.89	0.18	0.10	0.54	0.14
NITRATE-NITRITE AS NITROGEN	MG/L	<0.05	<0.05	0.22	<0.05	<0.05
pH	UNITS	7.52	7.30	7.38	7.70	7.31
SULFATE	MG/L	448	2290	2550	509	2120
TOTAL DISSOLVED SOLIDS	MG/L	4800	22200	26600	4950	22900

AnalyticalTechnologies,Inc.

GENERAL CHEMISTRY RESULTS

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 34-37-74-441000
Project Name: GMP

ATI I.D.: 412262

Sample #	Client ID	Matrix	Date Sampled	Date Received
6	LCW1C	WATER	19-DEC-94	20-DEC-94
7	FB-1	WATER	19-DEC-94	20-DEC-94
8	HMW3	WATER	19-DEC-94	20-DEC-94
9	HMW4	WATER	19-DEC-94	20-DEC-94
10	HMW5	WATER	19-DEC-94	20-DEC-94

Parameter	Units	6	7	8	9	10
CARBONATE AS CACO3	MG/L	<5	<5	<5	<5	<5
BICARBONATE AS CACO3	MG/L	132	<5	689	516	445
HYDROXIDE AS CACO3	MG/L	<5	<5	<5	<5	<5
TOTAL ALKALINITY AS CACO3	MG/L	132	<5	689	516	445
CHLORIDE	MG/L	14300	<5.0	1080	1010	794
ELECTRICAL CONDUCTIVITY	UMHOS/CM	37800	145	6430	6430	6150
FLUORIDE	MG/L	0.59	<0.5	0.61	0.52	<0.5
SURFACTANTS (MBAS)	MG/L	<0.10	<0.10	0.46	0.47	0.32
NITRATE-NITRITE AS NITROGEN	MG/L	0.29	0.39	<0.05	<0.05	<0.05
pH	UNITS	7.41	5.66	7.75	7.75	8.03
SULFATE	MG/L	2580	<10.0	1160	1320	1960
TOTAL DISSOLVED SOLIDS	MG/L	26300	28	4170	4220	4180

AnalyticalTechnologies,Inc.

GENERAL CHEMISTRY RESULTS

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 34-37-74-441000 ATI I.D.: 412262
Project Name: GMP

Sample #	Client ID	Matrix	Date Sampled	Date Received
11	HMW6	WATER	19-DEC-94	20-DEC-94
12	LMW3	WATER	19-DEC-94	20-DEC-94
13	LMW4	WATER	19-DEC-94	20-DEC-94
14	LMW5	WATER	19-DEC-94	20-DEC-94
15	LMW6	WATER	19-DEC-94	20-DEC-94

Parameter	Units	11	12	13	14	15
CARBONATE AS CACO3	MG/L	<5	<5	<5	<5	<5
BICARBONATE AS CACO3	MG/L	1150	750	581	444	1300
HYDROXIDE AS CACO3	MG/L	<5	<5	<5	<5	<5
TOTAL ALKALINITY AS CACO3	MG/L	1150	750	581	444	1300
CHLORIDE	MG/L	1740	1070	1020	789	1670
ELECTRICAL CONDUCTIVITY	UMHOS/CM	7520	6330	6410	6140	7330
FLUORIDE	MG/L	0.61	0.69	0.52	<0.5	0.61
SURFACTANTS (MBAS)	MG/L	0.66	0.41	0.43	0.34	0.51
NITRATE-NITRITE AS NITROGEN	MG/L	<0.05	<0.05	<0.05	<0.05	<0.05
pH	UNITS	7.49	7.65	7.66	7.89	7.38
SULFATE	MG/L	318	1330	1360	1910	172
TOTAL DISSOLVED SOLIDS	MG/L	4500	4080	4260	4220	4230

AnalyticalTechnologies,Inc.

GENERAL CHEMISTRY - QUALITY CONTROL

DUP/MS

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 34-37-74-441000
Project Name: GMP

ATI I.D. : 412262

Parameters	REF I.D.	Units	Sample Result	Dup Result	RPD	Spiked Sample	Spike Conc	% Rec
BICARBONATE AS CACO3	412262-07	MG/L	<5	<5	0	N/A	N/A	N/A
BICARBONATE AS CACO3	412262-10	MG/L	445	450	1	N/A	N/A	N/A
CARBONATE AS CACO3	412262-07	MG/L	<5	<5	0	N/A	N/A	N/A
CARBONATE AS CACO3	412262-10	MG/L	<5	<5	0	N/A	N/A	N/A
CHLORIDE	820152-04	MG/L	<5.0	<5.0	0	39.0	40.0	98
CHLORIDE	412262-07	MG/L	<5.0	<5.0	0	39.0	40.0	98
CHLORIDE	412210-03	MG/L	<5.0	<5.0	0	39.0	40.0	98
ELECTRICAL CONDUCTIVITY	412262-06	UMHOS/CM	37800	37800	0	N/A	N/A	N/A
ELECTRICAL CONDUCTIVITY	412262-15	UMHOS/CM	7330	7240	1	N/A	N/A	N/A
FLUORIDE	412279-01	MG/L	<0.5	<0.5	0	4.8	5.0	96
FLUORIDE	412262-04	MG/L	0.61	0.61	0	5.6	5.0	100
FLUORIDE	412281-05	MG/L	<0.5	<0.5	0	5.0	5.0	100
HYDROXIDE AS CACO3	412262-07	MG/L	<5	<5	0	N/A	N/A	N/A
HYDROXIDE AS CACO3	412262-10	MG/L	<5	<5	0	N/A	N/A	N/A
NITRATE-NITRITE AS NITROGEN	412262-07	MG/L	0.39	0.39	0	2.3	2.0	96
NITRATE-NITRITE AS NITROGEN	412283-02	MG/L	<0.05	<0.05	0	2.0	2.0	100
SULFATE	412280-01	MG/L	459	448	2	1490	1000	103
SULFATE	412107-02	MG/L	<10.0	<10.0	0	19.8	20.0	99
SULFATE	412210-01	MG/L	<10.0	<10.0	0	20.4	20.0	102
SURFACTANTS (MBAS)	412262-07	MG/L	<0.10	<0.10	0	1.0	1.0	100
TOTAL ALKALINITY AS CACO3	412262-07	MG/L	<5	<5	0	N/A	N/A	N/A
TOTAL ALKALINITY AS CACO3	412262-10	MG/L	445	450	1	N/A	N/A	N/A
TOTAL DISSOLVED SOLIDS	412262-06	MG/L	26300	26600	1	N/A	N/A	N/A
TOTAL DISSOLVED SOLIDS	412280-01	MG/L	1210	1210	0	N/A	N/A	N/A
pH	412262-07	UNITS	5.66	5.47	3	N/A	N/A	N/A
pH	412262-15	UNITS	7.38	7.39	0	N/A	N/A	N/A

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

AnalyticalTechnologies,Inc.

GENERAL CHEMISTRY - QUALITY CONTROL

BLANK SPIKE

lient : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
roject # : 34-37-74-441000
roject Name: GMP

ATI I.D. : 412262

rameters	Blank Spike ID#	Units	Blank Result	Spiked Sample	Spike Conc.	% Rec
LORIDE	52932	MG/L	<5.0	41.0	40.0	103
LORIDE	52975	MG/L	<5.0	40.0	40.0	100
JORIDE	52983	MG/L	<0.5	5.2	5.0	104
TRATE-NITRITE AS NITROGEN	52948	MG/L	<0.05	2.0	2.0	100
LFATE	52946	MG/L	<10.0	21.2	20.0	106
LFATE	53055	MG/L	<10.0	21.5	20.0	108
RFACTANTS (MBAS)	52816	MG/L	<0.10	0.95	1.0	95

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

AnalyticalTechnologies, Inc.

METALS RESULTS

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 34-37-74-441000
Project Name: GMP

ATI I.D.: 412262

Sample #	Client ID	Matrix	Date Sampled	Date Received
1	HCW1A	WATER	19-DEC-94	20-DEC-94
2	HCW1B	WATER	19-DEC-94	20-DEC-94
3	HCW1C	WATER	19-DEC-94	20-DEC-94
4	LCW1A	WATER	19-DEC-94	20-DEC-94
5	LCW1B	WATER	19-DEC-94	20-DEC-94

Parameter	Units	1	2	3	4	5
ARSENIC	MG/L	<0.05	<0.05	<0.05	<0.05	<0.05
BARIUM	MG/L	<0.01	0.03	0.03	<0.01	0.03
BERYLLIUM	MG/L	<0.005	<0.005	<0.005	<0.005	<0.005
CADMIUM	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01
COBALT	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01
CHROMIUM	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01
IRON	MG/L	<0.01	0.02	0.25	<0.01	0.06
MERCURY	MG/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
MANGANESE	MG/L	0.07	0.12	0.18	0.07	0.13
SODIUM	MG/L	1640	6450	7690	1580	6590
NICKEL	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01
LEAD	MG/L	0.03	<0.03	<0.03	<0.03	<0.03
ANTIMONY	MG/L	<0.03	<0.03	<0.03	<0.03	<0.03
SELENIUM	MG/L	<0.05	<0.05	<0.05	<0.05	<0.05
VANADIUM	MG/L	0.02	0.01	<0.01	0.02	<0.01

AnalyticalTechnologies,Inc.

METALS RESULTS

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 34-37-74-441000
Project Name: GMP

ATI I.D.: 41226

Sample #	Client ID	Matrix	Date Sampled	Date Received
6	LCW1C	WATER	19-DEC-94	20-DEC-9
7	FB-1	WATER	19-DEC-94	20-DEC-9
8	HMW3	WATER	19-DEC-94	20-DEC-9
9	HMW4	WATER	19-DEC-94	20-DEC-9
10	HMW5	WATER	19-DEC-94	20-DEC-9

Parameter	Units	6	7	8	9	10
ARSENIC	MG/L	<0.05	<0.05	<0.05	<0.05	<0.05
BARIUM	MG/L	0.03	<0.01	<0.01	<0.01	0.01
BERYLLIUM	MG/L	<0.005	<0.005	<0.005	<0.005	<0.005
CADMIUM	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01
COBALT	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01
CHROMIUM	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01
IRON	MG/L	0.15	<0.01	<0.01	0.01	<0.01
MERCURY	MG/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
MANGANESE	MG/L	0.17	<0.01	0.04	0.02	0.02
SODIUM	MG/L	7820	1.5	1350	1330	1320
NICKEL	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01
LEAD	MG/L	<0.03	<0.03	<0.03	<0.03	<0.03
ANTIMONY	MG/L	<0.03	<0.03	<0.03	<0.03	<0.03
SELENIUM	MG/L	<0.05	<0.05	<0.05	<0.05	<0.05
VANADIUM	MG/L	<0.01	<0.01	0.01	<0.01	0.01

AnalyticalTechnologies,Inc.

METALS RESULTS

ient : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
roject # : 34-37-74-441000
Project Name: GMP

ATI I.D.: 412262

Sample #	Client ID	Matrix	Date Sampled	Date Received
11	HMW6	WATER	19-DEC-94	20-DEC-94
17	HCW1A/DISSOLVED 01	WATER	19-DEC-94	20-DEC-94
18	HCW1B/DISSOLVED 02	WATER	19-DEC-94	20-DEC-94
19	HCW1C/DISSOLVED 03	WATER	19-DEC-94	20-DEC-94
20	LCW1A/DISSOLVED 04	WATER	19-DEC-94	20-DEC-94

Parameter	Units	11	17	18	19	20
ARSENIC	MG/L	<0.05	-	-	-	-
BARIUM	MG/L	<0.01	-	-	-	-
BERYLLIUM	MG/L	<0.005	-	-	-	-
CADMIUM	MG/L	<0.01	-	-	-	-
COBALT	MG/L	<0.01	-	-	-	-
CHROMIUM	MG/L	0.02	-	-	-	-
IRON	MG/L	0.10	<0.01	<0.01	<0.01	<0.01
MERCURY	MG/L	<0.0005	-	-	-	-
MANGANESE	MG/L	0.11	-	-	-	-
SODIUM	MG/L	1450	-	-	-	-
NICKEL	MG/L	<0.01	-	-	-	-
LEAD	MG/L	<0.03	-	-	-	-
ANTIMONY	MG/L	<0.03	-	-	-	-
SELENIUM	MG/L	<0.02@H	-	-	-	-
VANADIUM	MG/L	0.02	-	-	-	-

AnalyticalTechnologies, Inc.

METALS RESULTS

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 34-37-74-441000
Project Name: GMP

ATI I.D.: 412262

Sample #	Client ID	Matrix	Date Sampled	Date Received
21	LCW1B/DISSOLVED 05	WATER	19-DEC-94	20-DEC-94
22	LCW1C/DISSOLVED 06	WATER	19-DEC-94	20-DEC-94
23	FB-1/DISSOLVED 07	WATER	19-DEC-94	20-DEC-94
24	HMW3/DISSOLVED 08	WATER	19-DEC-94	20-DEC-94
25	HMW4/DISSOLVED 09	WATER	19-DEC-94	20-DEC-94

Parameter	Units	21	22	23	24	25
IRON	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01

AnalyticalTechnologies,Inc.

METALS RESULTS

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 34-37-74-441000
Project Name: GMP

ATI I.D.: 412262

Sample #	Client ID	Matrix	Date Sampled	Date Received
26	HMW5/DISSOLVED 10	WATER	19-DEC-94	20-DEC-94
27	HMW6/DISSOLVED 11	WATER	19-DEC-94	20-DEC-94

Parameter	Units	26	27
IRON	MG/L	<0.01	0.01

AnalyticalTechnologies,Inc.

METALS - QUALITY CONTROL

DUP/MS

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 34-37-74-441000
Project Name: GMP

ATI I.D. : 412262

Parameters	REF I.D.	Units	Sample Result	Dup Result	RPD	Spiked Sample	Spike Conc	% Rec
ANTIMONY	412262-11	MG/L	<0.03	<0.03	0	1.95	2.00	98
ARSENIC	412262-11	MG/L	<0.05	<0.05	0	2.05	2.00	102
BARIUM	412262-11	MG/L	<0.01	<0.01	0	3.92	4.00	98
BERYLLIUM	412262-11	MG/L	<0.005	<0.005	0	2.02	2.00	101
CADMIUM	412262-11	MG/L	<0.01	<0.01	0	1.82	2.00	91
CHROMIUM	412262-11	MG/L	0.02	0.02	0	1.94	2.00	96
COBALT	412262-11	MG/L	<0.01	<0.01	0	3.80	4.00	95
IRON	412315-04	MG/L	0.95	1.01	6	10.4	10.0	95
IRON	412262-11	MG/L	0.10	0.10	0	3.94	4.00	96
LEAD	412262-11	MG/L	<0.03	<0.03	0	1.86	2.00	93
MANGANESE	412262-11	MG/L	0.11	0.11	0	3.99	4.00	97
MERCURY	412041-02	MG/L	<0.0005	<0.0005	0	0.0021	0.0020	105
NICKEL	412262-11	MG/L	<0.01	<0.01	0	1.93	2.00	97
SELENIUM	412262-11	MG/L	<0.02@H	<0.02@H	0	1.27	1.20	106
SELENIUM	412262-11	MG/L	<0.05	<0.05	0	1.26	1.20	105
SODIUM	412262-11	MG/L	1450	1510	4	1440	25.0	N/A*V
VANADIUM	412262-11	MG/L	0.02	0.02	0	6.07	6.00	101

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

AnalyticalTechnologies, Inc.

METALS - QUALITY CONTROL

BLANK SPIKE

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 34-37-74-441000
Project Name: GMP

ATI I.D. : 412262

Parameters	Blank Spike ID#	Units	Blank Result	Spiked Sample	Spike Conc.	% Rec
ANTIMONY	53110	MG/L	<0.03	2.04	2.00	102
ARSENIC	53507	MG/L	<0.05	2.09	2.00	105
BARIUM	53110	MG/L	<0.01	4.19	4.00	105
BERYLLIUM	53110	MG/L	<0.005	2.10	2.00	105
CADMIUM	53507	MG/L	<0.01	1.97	2.00	99
CHROMIUM	53110	MG/L	<0.01	2.08	2.00	104
COBALT	53110	MG/L	<0.01	4.11	4.00	103
IRON	52966	MG/L	<0.01	9.82	10.0	98
IRON	53111	MG/L	<0.01	4.11	4.00	103
LEAD	53507	MG/L	<0.03	2.03	2.00	102
MANGANESE	53111	MG/L	<0.01	4.20	4.00	105
MERCURY	53031	MG/L	<0.0005	0.0019	0.0020	95
NICKEL	53110	MG/L	<0.01	2.10	2.00	105
SELENIUM	53228	MG/L	<0.002	1.34	1.20	112
SELENIUM	53507	MG/L	<0.05	1.30	1.20	108
SODIUM	53111	MG/L	<0.1	25.1	25.0	100
VANADIUM	53110	MG/L	<0.01	6.41	6.00	107

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

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412262
Project # : 34-37-74-441000
Project Name: GMP

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
1	HCW1A	WATER	19-DEC-94	N/A	30-DEC-94	1.00
2	HCW1B	WATER	19-DEC-94	N/A	30-DEC-94	1.00
3	HCW1C	WATER	19-DEC-94	N/A	30-DEC-94	1.00

Parameter	Units	1	2	3
CARBON DISULFIDE	UG/L	<2	<2	<2
CHLOROMETHANE	UG/L	<10	<10	<10
CHLOROFORM	UG/L	<1	<1	<1
VINYL CHLORIDE	UG/L	<5	<5	<5
2-BUTANONE (MEK)	UG/L	<10	<10	<10
BROMOMETHANE	UG/L	<10	<10	<10
1,2-DICHLOROETHANE	UG/L	<1	<1	<1
CHLOROETHANE	UG/L	<5	<5	<5
ACETONE	UG/L	<10	<10	<10
BENZENE	UG/L	15	<1	<1
1,1-DICHLOROETHENE	UG/L	<1	<1	<1
TOLUENE	UG/L	<2	<2	<2
CHLOROBENZENE	UG/L	<1	<1	<1
METHYLENE CHLORIDE	UG/L	<5	<5	<5
ETHYLBENZENE	UG/L	4	<1	<1
TRANS-1,2-DICHLOROETHENE	UG/L	<1	<1	<1
XYLENES (TOTAL)	UG/L	2	<1	<1
1,1-DICHLOROETHANE	UG/L	<1	<1	<1
STYRENE	UG/L	<2	<2	<2
1,4-DIOXANE	UG/L	<200	<200	<200
CIS-1,2-DICHLOROETHENE	UG/L	<1	<1	<1
ETHYLENE DIBROMIDE	UG/L	<5	<5	<5
CYCLOHEXANE	UG/L	<10	<10	<10
1,1,1-TRICHLOROETHANE	UG/L	<1	<1	<1
CARBON TETRACHLORIDE	UG/L	<1	<1	<1
TRICHLOROETHENE	UG/L	<1	<1	<1
1,2-DICHLOROPROPANE	UG/L	<1	<1	<1
BROMODICHLOROMETHANE	UG/L	<1	<1	<1
4-METHYL-2-PENTANONE (MIBK)	UG/L	<10	<10	<10
CIS-1,3-DICHLOROPROPENE	UG/L	<1	<1	<1
TRANS-1,3-DICHLOROPROPENE	UG/L	<1	<1	<1
2-HEXANONE (MBK)	UG/L	<10	<10	<10
1,1,2-TRICHLOROETHANE	UG/L	<1	<1	<1
TETRACHLOROETHENE	UG/L	<1	<1	<1
DIBROMOCHLOROMETHANE	UG/L	<1	<1	<1
BROMOFORM	UG/L	<5	<5	<5
1,1,2,2-TETRACHLOROETHANE	UG/L	<2	<2	<2
DICHLORODIFLUOROMETHANE	UG/L	<10	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

st : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412262
Project # : 34-37-74-441000
Project Name: GMP

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
1	HCW1A	WATER	19-DEC-94	N/A	30-DEC-94	1.00
2	HCW1B	WATER	19-DEC-94	N/A	30-DEC-94	1.00
3	HCW1C	WATER	19-DEC-94	N/A	30-DEC-94	1.00

Parameter	Units	1	2	3
TRICHLOROFLUOROMETHANE	UG/L	<5	<5	<5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	UG/L	<5	<5	<5
1,2-DICHLOROBENZENE	UG/L	<5	<5	<5
1,3-DICHLOROBENZENE	UG/L	<5	<5	<5
1,4-DICHLOROBENZENE	UG/L	<5	<5	<5
SURROGATES				
1,2-DICHLOROETHANE-D4	%	102	101	99
TOLUENE-D8	%	101	99	98
BFB	%	104	99	96

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Te : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Cl t : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 34-37-74-441000
Project Name: GMP

ATI I.D. : 412262

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
4	LCW1A	WATER	19-DEC-94	N/A	30-DEC-94	1.00
5	LCW1B	WATER	19-DEC-94	N/A	30-DEC-94	1.00
6	LCW1C	WATER	19-DEC-94	N/A	30-DEC-94	1.00

Parameter	Units	4	5	6
ARBON DISULFIDE	UG/L	<2	<2	<2
HLOROMETHANE	UG/L	<10	<10	<10
HLOROFORM	UG/L	<1	<1	<1
INYL CHLORIDE	UG/L	<5	<5	<5
-BUTANONE (MEK)	UG/L	<10	<10	<10
ROMOMETHANE	UG/L	<10	<10	<10
,2-DICHLOROETHANE	UG/L	<1	<1	<1
HLOROETHANE	UG/L	<5	<5	<5
ETONE	UG/L	<10	<10	<10
NZENE	UG/L	51	<1	<1
1-DICHLOROETHENE	UG/L	<1	<1	<1
LUENE	UG/L	<2	2	<2
LOROBENZENE	UG/L	<1	<1	<1
THYLENE CHLORIDE	UG/L	<5	<5	<5
HYLBENZENE	UG/L	4	<1	<1
ANS-1,2-DICHLOROETHENE	UG/L	<1	<1	<1
LENES (TOTAL)	UG/L	2	<1	<1
1-DICHLOROETHANE	UG/L	<1	<1	<1
RENE	UG/L	<2	<2	<2
-DIOXANE	UG/L	<200	<200	<200
-1,2-DICHLOROETHENE	UG/L	<1	<1	<1
YLENE DIBROMIDE	UG/L	<5	<5	<5
LOHEXANE	UG/L	<10	<10	<10
,1-TRICHLOROETHANE	UG/L	<1	<1	<1
BON TETRACHLORIDE	UG/L	<1	<1	<1
CHLOROETHENE	UG/L	<1	<1	<1
-DICHLOROPROPANE	UG/L	<1	<1	<1
MODICHLOROMETHANE	UG/L	<1	<1	<1
ETHYL-2-PENTANONE (MIBK)	UG/L	<10	<10	<10
-1,3-DICHLOROPROPENE	UG/L	<1	<1	<1
IS-1,3-DICHLOROPROPENE	UG/L	<1	<1	<1
XANONE (MBK)	UG/L	<10	<10	<10
2-TRICHLOROETHANE	UG/L	<1	<1	<1
ACHLOROETHENE	UG/L	<1	<1	<1
OMOCHLOROMETHANE	UG/L	<1	<1	<1
OFORM	UG/L	<5	<5	<5
2,2-TETRACHLOROETHANE	UG/L	<2	<2	<2
LORODIFLUOROMETHANE	UG/L	<10	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412262
Project # : 34-37-74-441000
Project Name: GMP

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
4	LCW1A	WATER	19-DEC-94	N/A	30-DEC-94	1.00
5	LCW1B	WATER	19-DEC-94	N/A	30-DEC-94	1.00
6	LCW1C	WATER	19-DEC-94	N/A	30-DEC-94	1.00

Parameter	Units	4	5	6
TRICHLOROFLUOROMETHANE	UG/L	<5	<5	<5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	UG/L	<5	<5	<5
1,2-DICHLOROBENZENE	UG/L	<5	<5	<5
1,3-DICHLOROBENZENE	UG/L	<5	<5	<5
1,4-DICHLOROBENZENE	UG/L	<5	<5	<5
SURROGATES				
1,2-DICHLOROETHANE-D4	%	101	104	98
TOLUENE-D8	%	100	99	100
BFB	%	96	96	94

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

t : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
ient : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 34-37-74-441000
Project Name: GMP

ATI I.D. : 412262

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
7	FB-1	WATER	19-DEC-94	N/A	30-DEC-94	1.00
8	HMW3	WATER	19-DEC-94	N/A	30-DEC-94	1.00
9	HMW4	WATER	19-DEC-94	N/A	30-DEC-94	1.00

Parameter	Units	7	8	9
CARBON DISULFIDE	UG/L	<2	<2	<2
CHLOROMETHANE	UG/L	<10	<10	<10
CHLOROFORM	UG/L	<1	<1	<1
VINYL CHLORIDE	UG/L	<5	<5	<5
2-BUTANONE (MEK)	UG/L	<10	<10	<10
BROMOMETHANE	UG/L	<10	<10	<10
1,2-DICHLOROETHANE	UG/L	<1	<1	<1
CHLOROETHANE	UG/L	<5	<5	<5
ACETONE	UG/L	<10	<10	<10
BENZENE	UG/L	<1	1	<1
1,1-DICHLOROETHENE	UG/L	<1	<1	<1
TOLUENE	UG/L	<2	<2	<2
CHLOROBENZENE	UG/L	<1	<1	<1
METHYLENE CHLORIDE	UG/L	<5	<5	<5
ETHYLBENZENE	UG/L	<1	4	2
TRANS-1,2-DICHLOROETHENE	UG/L	<1	<1	<1
XYLENES (TOTAL)	UG/L	<1	<1	<1
1,1-DICHLOROETHANE	UG/L	<1	<1	<1
STYRENE	UG/L	<2	<2	<2
1,4-DIOXANE	UG/L	<200	<200	<200
CIS-1,2-DICHLOROETHENE	UG/L	<1	<1	<1
ETHYLENE DIBROMIDE	UG/L	<5	<5	<5
CYCLOHEXANE	UG/L	<10	<10	<10
1,1,1-TRICHLOROETHANE	UG/L	<1	<1	<1
CARBON TETRACHLORIDE	UG/L	<1	<1	<1
TRICHLOROETHENE	UG/L	<1	<1	<1
1,2-DICHLOROPROPANE	UG/L	<1	<1	<1
BROMODICHLOROMETHANE	UG/L	<1	<1	<1
4-METHYL-2-PENTANONE (MIBK)	UG/L	<10	<10	<10
CIS-1,3-DICHLOROPROPENE	UG/L	<1	<1	<1
TRANS-1,3-DICHLOROPROPENE	UG/L	<1	<1	<1
2-HEXANONE (MBK)	UG/L	<10	<10	<10
1,1,2-TRICHLOROETHANE	UG/L	<1	<1	<1
TETRACHLOROETHENE	UG/L	<1	<1	<1
DIBROMOCHLOROMETHANE	UG/L	<1	<1	<1
BROMOFORM	UG/L	<5	<5	<5
1,1,2,2-TETRACHLOROETHANE	UG/L	<2	<2	<2
DICHLORODIFLUOROMETHANE	UG/L	<10	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412262
Project # : 34-37-74-441000
Project Name: GMP

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
7	FB-1	WATER	19-DEC-94	N/A	30-DEC-94	1.00
8	HMW3	WATER	19-DEC-94	N/A	30-DEC-94	1.00
9	HMW4	WATER	19-DEC-94	N/A	30-DEC-94	1.00

Parameter	Units	7	8	9
TRICHLOROFLUOROMETHANE	UG/L	<5	<5	<5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	UG/L	<5	<5	<5
1,2-DICHLOROBENZENE	UG/L	<5	<5	<5
1,3-DICHLOROBENZENE	UG/L	<5	<5	<5
1,4-DICHLOROBENZENE	UG/L	<5	<5	<5
SURROGATES				
1,2-DICHLOROETHANE-D4	%	101	96	98
TOLUENE-D8	%	100	101	101
BFB	%	95	105	104

AnalyticalTechnologies, Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412262
Project # : 34-37-74-441000
Project Name: GMP

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
10	HMW5	WATER	19-DEC-94	N/A	31-DEC-94	1.00
11	HMW6	WATER	19-DEC-94	N/A	30-DEC-94	1.00
16	TB-1 (GCMS 1117,1119)	WATER	19-DEC-94	N/A	30-DEC-94	1.00

Parameter	Units	10	11	16
CARBON DISULFIDE	UG/L	3	<2	<2
CHLOROMETHANE	UG/L	<10	<10	<10
CHLOROFORM	UG/L	<1	<1	<1
VINYL CHLORIDE	UG/L	<5	<5	<5
2-BUTANONE (MEK)	UG/L	<10	<10	<10
BROMOMETHANE	UG/L	<10	<10	<10
1,2-DICHLOROETHANE	UG/L	<1	<1	<1
CHLOROETHANE	UG/L	<5	<5	<5
ACETONE	UG/L	<10	<10	<10
BENZENE	UG/L	<1	2	<1
1,1-DICHLOROETHENE	UG/L	<1	<1	<1
TOLUENE	UG/L	<2	<2	<2
CHLOROBENZENE	UG/L	<1	<1	<1
METHYLENE CHLORIDE	UG/L	<5	<5	<5
ETHYLBENZENE	UG/L	6	2	<1
TRANS-1,2-DICHLOROETHENE	UG/L	<1	<1	<1
XYLENES (TOTAL)	UG/L	6	<1	<1
1,1-DICHLOROETHANE	UG/L	<1	<1	<1
STYRENE	UG/L	<2	<2	<2
1,4-DIOXANE	UG/L	<200	<200	<200
CIS-1,2-DICHLOROETHENE	UG/L	<1	<1	<1
ETHYLENE DIBROMIDE	UG/L	<5	<5	<5
CYCLOHEXANE	UG/L	<10	<10	<10
1,1,1-TRICHLOROETHANE	UG/L	<1	<1	<1
CARBON TETRACHLORIDE	UG/L	<1	<1	<1
TRICHLOROETHENE	UG/L	<1	<1	<1
1,2-DICHLOROPROPANE	UG/L	<1	<1	<1
BROMODICHLOROMETHANE	UG/L	<1	<1	<1
4-METHYL-2-PENTANONE (MIBK)	UG/L	<10	<10	<10
CIS-1,3-DICHLOROPROPENE	UG/L	<1	<1	<1
TRANS-1,3-DICHLOROPROPENE	UG/L	<1	<1	<1
2-HEXANONE (MBK)	UG/L	<10	<10	<10
1,1,2-TRICHLOROETHANE	UG/L	<1	<1	<1
TETRACHLOROETHENE	UG/L	<1	<1	<1
DIBROMOCHLOROMETHANE	UG/L	<1	<1	<1
BROMOFORM	UG/L	<5	<5	<5
1,1,2,2-TETRACHLOROETHANE	UG/L	<2	<2	<2
DICHLORODIFLUOROMETHANE	UG/L	<10	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412262
Project # : 34-37-74-441000
Project Name: GMP

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
10	HMW5	WATER	19-DEC-94	N/A	31-DEC-94	1.00
11	HMW6	WATER	19-DEC-94	N/A	30-DEC-94	1.00
16	TB-1 (GCMS 1117,1119)	WATER	19-DEC-94	N/A	30-DEC-94	1.00

Parameter	Units	10	11	16
TRICHLOROFLUOROMETHANE	UG/L	<5	<5	<5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	UG/L	<5	<5	<5
1,2-DICHLOROBENZENE	UG/L	<5	<5	<5
1,3-DICHLOROBENZENE	UG/L	<5	<5	<5
1,4-DICHLOROBENZENE	UG/L	<5	<5	<5
SURROGATES				
1,2-DICHLOROETHANE-D4	%	101	98	97
TOLUENE-D8	%	99	99	103
BFB	%	104	93	88

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Blank I.D. : 33755
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 34-37-74-441000
Project Name: GMP

ATI I.D. : 412262
Date Extracted: N/A
Date Analyzed : 30-DEC-94
Dil. Factor : 1.00

Parameters	Units	Results
CHLOROMETHANE	UG/L	<10
CARBON DISULFIDE	UG/L	<2
CHLOROFORM	UG/L	<1
VINYL CHLORIDE	UG/L	<5
BROMOMETHANE	UG/L	<10
2-BUTANONE (MEK)	UG/L	<10
1,2-DICHLOROETHANE	UG/L	<1
CHLOROETHANE	UG/L	<5
ACETONE	UG/L	<10
BENZENE	UG/L	<1
TOLUENE	UG/L	<2
1,1-DICHLOROETHENE	UG/L	<1
CHLOROBENZENE	UG/L	<1
METHYLENE CHLORIDE	UG/L	<5
ETHYLBENZENE	UG/L	<1
XYLENES (TOTAL)	UG/L	<1
TRANS-1,2-DICHLOROETHENE	UG/L	<1
STYRENE	UG/L	<2
1,1-DICHLOROETHANE	UG/L	<1
1,4-DIOXANE	UG/L	<200
CIS-1,2-DICHLOROETHENE	UG/L	<1
ETHYLENE DIBROMIDE	UG/L	<5
CYCLOHEXANE	UG/L	<10
1,1,1-TRICHLOROETHANE	UG/L	<1
CARBON TETRACHLORIDE	UG/L	<1
TRICHLOROETHENE	UG/L	<1
1,2-DICHLOROPROPANE	UG/L	<1
BROMODICHLOROMETHANE	UG/L	<1
4-METHYL-2-PENTANONE (MIBK)	UG/L	<10
CIS-1,3-DICHLOROPROPENE	UG/L	<1
TRANS-1,3-DICHLOROPROPENE	UG/L	<1
2-HEXANONE (MBK)	UG/L	<10
1,1,2-TRICHLOROETHANE	UG/L	<1
TETRACHLOROETHENE	UG/L	<1
DIBROMOCHLOROMETHANE	UG/L	<1
BROMOFORM	UG/L	<5
1,1,2,2-TETRACHLOROETHANE	UG/L	<2
DICHLORODIFLUOROMETHANE	UG/L	<10
TRICHLOROFLUOROMETHANE	UG/L	<5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	UG/L	<5
1,2-DICHLOROBENZENE	UG/L	<5
1,3-DICHLOROBENZENE	UG/L	<5
1,4-DICHLOROBENZENE	UG/L	<5

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GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Blank I.D. : 33755
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 34-37-74-441000
Project Name: GMP

ATI I.D. : 412262
Date Extracted: N/A
Date Analyzed : 30-DEC-94
Dil. Factor : 1.00

Parameters	Units	Results
SURROGATES		
1,2-DICHLOROETHANE-D4	%	98
TOLUENE-D8	%	100
BFB	%	93

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Blank I.D. : 33758
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 34-37-74-441000
Project Name: GMP

ATI I.D. : 412262
Date Extracted: N/A
Date Analyzed : 31-DEC-94
Dil. Factor : 1.00

Parameters	Units	Results
CHLOROMETHANE	UG/L	<10
CARBON DISULFIDE	UG/L	<2
CHLOROFORM	UG/L	<1
VINYL CHLORIDE	UG/L	<5
BROMOMETHANE	UG/L	<10
2-BUTANONE (MEK)	UG/L	<10
1,2-DICHLOROETHANE	UG/L	<1
CHLOROETHANE	UG/L	<5
ACETONE	UG/L	<10
BENZENE	UG/L	<1
TOLUENE	UG/L	<2
1,1-DICHLOROETHENE	UG/L	<1
CHLOROBENZENE	UG/L	<1
METHYLENE CHLORIDE	UG/L	<5
ETHYLBENZENE	UG/L	<1
XYLENES (TOTAL)	UG/L	<1
TRANS-1,2-DICHLOROETHENE	UG/L	<1
STYRENE	UG/L	<2
1,1-DICHLOROETHANE	UG/L	<1
1,4-DIOXANE	UG/L	<200
CIS-1,2-DICHLOROETHENE	UG/L	<1
ETHYLENE DIBROMIDE	UG/L	<5
CYCLOHEXANE	UG/L	<10
1,1,1-TRICHLOROETHANE	UG/L	<1
CARBON TETRACHLORIDE	UG/L	<1
TRICHLOROETHENE	UG/L	<1
1,2-DICHLOROPROPANE	UG/L	<1
BROMODICHLOROMETHANE	UG/L	<1
4-METHYL-2-PENTANONE (MIBK)	UG/L	<10
CIS-1,3-DICHLOROPROPENE	UG/L	<1
TRANS-1,3-DICHLOROPROPENE	UG/L	<1
2-HEXANONE (MBK)	UG/L	<10
1,1,2-TRICHLOROETHANE	UG/L	<1
TETRACHLOROETHENE	UG/L	<1
DIBROMOCHLOROMETHANE	UG/L	<1
BROMOFORM	UG/L	<5
1,1,2,2-TETRACHLOROETHANE	UG/L	<2
DICHLORODIFLUOROMETHANE	UG/L	<10
TRICHLOROFLUOROMETHANE	UG/L	<5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	UG/L	<5
1,2-DICHLOROBENZENE	UG/L	<5
1,3-DICHLOROBENZENE	UG/L	<5
1,4-DICHLOROBENZENE	UG/L	<5

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Blank I.D. : 33758
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 34-37-74-441000
Project Name: GMP

ATI I.D. : 412262
Date Extracted: N/A
Date Analyzed : 31-DEC-94
Dil. Factor : 1.00

Parameters	Units	Results
SURROGATES		
1,2-DICHLOROETHANE-D4	%	98
TOLUENE-D8	%	101
BFB	%	94

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

MSMSD

'est : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
:SMSD # : 71398
·lient : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.

roject # : 34-37-74-441000
roject Name: GMP

ATI I.D. : 412262
Date Extracted: N/A
Date Analyzed : 31-DEC-95
Sample Matrix : WATER
REF I.D. : 412262-06

arameters	Units	Sample Result	Conc Spike	Spiked Sample	% Rec	Dup Spike	Dup % Rec	RPD
ENZENE	UG/L	<1	50	53	106	56	112	6
.1-DICHLOROETHENE	UG/L	<1	50	53	106	57	114	7
)LUENE	UG/L	<2	50	53	106	55	110	4
HLOROBENZENE	UG/L	<1	50	56	112	61	122	9
RICHLOROETHENE	UG/L	<1	50	56	112	59	118	5

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

AnalyticalTechnologies, Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

BLANK SPIKE

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Blank Spike #: 53103
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 34-37-74-441000
Project Name : GMP

ATI I.D. : 412262
Date Extracted: N/A
Date Analyzed : 30-DEC-94
Sample Matrix : WATER

Parameters	Units	Blank Result	Spiked Sample	Spike Conc.	% Rec
BENZENE	UG/L	<1	56	50	112
1,1-DICHLOROETHENE	UG/L	<1	57	50	114
TOLUENE	UG/L	<2	57	50	114
CHLOROBENZENE	UG/L	<1	59	50	118
TRICHLOROETHENE	UG/L	<1	60	50	120

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

AnalyticalTechnologies, Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412262
Project # : 34-37-74-441000
Project Name: GMP

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
1	HCW1A	WATER	19-DEC-94	21-DEC-94	11-JAN-95	1.00
2	HCW1B	WATER	19-DEC-94	21-DEC-94	10-JAN-95	1.00
3	HCW1C	WATER	19-DEC-94	21-DEC-94	10-JAN-95	1.00

Parameter	Units	1	2	3
ANTHRACENE	UG/L	<10	<10	<10
N-NITROSODIMETHYLAMINE	UG/L	<15	<15	<15
BENZO(a)ANTHRACENE	UG/L	<10	<10	<10
BENZO(b)FLUORANTHENE	UG/L	<10	<10	<10
ANILINE	UG/L	<10	<10	<10
BENZO(k)FLUORANTHENE	UG/L	<10	<10	<10
BENZO(a)PYRENE	UG/L	<10	<10	<10
BIS(2-CHLOROETHYL)ETHER	UG/L	<10	<10	<10
2-CHLOROPHENOL	UG/L	<10	<10	<10
BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	<10	<10	<10
BUTYLBENZYLPHTHALATE	UG/L	<10	<10	<10
CHRYSENE	UG/L	<10	<10	<10
BENZYL ALCOHOL	UG/L	<10	<10	<10
DIBENZ(a,h)ACRIDINE	UG/L	<10	<10	<10
DIBENZ(a,h)ANTHRACENE	UG/L	<10	<10	<10
1,2-DICHLOROBENZENE	UG/L	<10	<10	<10
1,3-DICHLOROBENZENE	UG/L	<10	<10	<10
BIS(2-CHLOROISOPROPYL)ETHER	UG/L	<15	<15	<15
1,4-DICHLOROBENZENE	UG/L	<10	<10	<10
4-METHYLPHENOL	UG/L	<10	<10	<10
DIETHYLPHTHALATE	UG/L	<10	<10	<10
N-NITROSO-DI-N-PROPYLAMINE	UG/L	<15	<15	<15
7,12-DIMETHYLBENZO(a)ANTHRACENE	UG/L	<10	<10	<10
HEXACHLOROETHANE	UG/L	<10	<10	<10
DIMETHYLPHTHALATE	UG/L	<10	<10	<10
NITROBENZENE	UG/L	<10	<10	<10
DI-N-BUTYLPHTHALATE	UG/L	<10	<10	<10
ISOPHORONE	UG/L	<10	<10	<10
2-NITROPHENOL	UG/L	<10	<10	<10
DI-N-OCTYLPHTHALATE	UG/L	<10	<10	<10
BENZOIC ACID	UG/L	<50	<50	<50
BIS(2-CHLOROETHOXY)METHANE	UG/L	<10	<10	<10
2,4-DICHLOROPHENOL	UG/L	<10	<10	<10
FLUORANTHENE	UG/L	<10	<10	<10
1,2,4-TRICHLOROBENZENE	UG/L	<10	<10	<10
NAPHTHALENE	UG/L	20	<10	<10
PHENANTHRENE	UG/L	<10	<10	<10
4-CHLOROANILINE	UG/L	<10	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412262
Project # : 34-37-74-441000
Project Name: GMP

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
1	HCW1A	WATER	19-DEC-94	21-DEC-94	11-JAN-95	1.00
2	HCW1B	WATER	19-DEC-94	21-DEC-94	10-JAN-95	1.00
3	HCW1C	WATER	19-DEC-94	21-DEC-94	10-JAN-95	1.00

Parameter	Units	1	2	3
PYRENE	UG/L	<10	<10	<10
HEXACHLOROBUTADIENE	UG/L	<10	<10	<10
2-METHYLNAPHTHALENE	UG/L	<10	<10	<10
4-CHLORO-3-METHYLPHENOL	UG/L	<10	<10	<10
BENZENETHIOL	UG/L	<10	<10	<10
4-NITROPHENOL	UG/L	<50	<50	<50
2,4-DIMETHYLPHENOL	UG/L	<10	<10	<10
2,4-DINITROPHENOL	UG/L	<50	<50	<50
PHENOL	UG/L	<10	<10	<10
2-METHYLPHENOL	UG/L	<10	<10	<10
3- & 4-METHYLPHENOL	UG/L	<10	<10	<10
HEXACHLOROCYCLOPENTADIENE	UG/L	<10	<10	<10
2,4,6-TRICHLOROPHENOL	UG/L	<10	<10	<10
2,4,5-TRICHLOROPHENOL	UG/L	<50	<50	<50
2-CHLORONAPHTHALENE	UG/L	<10	<10	<10
2-NITROANILINE	UG/L	<50	<50	<50
ACENAPHTHYLENE	UG/L	<10	<10	<10
2,6-DINITROTOLUENE	UG/L	<10	<10	<10
3-NITROANILINE	UG/L	<50	<50	<50
ACENAPHTHENE	UG/L	<10	<10	<10
DIBENZOFURAN	UG/L	<10	<10	<10
2,4-DINITROTOLUENE	UG/L	<10	<10	<10
4-CHLOROPHENYL-PHENYLETHER	UG/L	<10	<10	<10
FLUORENE	UG/L	<10	<10	<10
4-NITROANILINE	UG/L	<50	<50	<50
2-METHYL-4,6-DINITROPHENOL	UG/L	<50	<50	<50
N-NITROSODIPHENYLAMINE	UG/L	<10	<10	<10
4-BROMOPHENYL-PHENYLETHER	UG/L	<10	<10	<10
HEXACHLOROBENZENE	UG/L	<10	<10	<10
PENTACHLOROPHENOL	UG/L	<50	<50	<50
3,3'-DICHLOROBENZIDINE	UG/L	<20	<20	<20
INDENO(1,2,3-cd)PYRENE	UG/L	<10	<10	<10
INDENE	UG/L	<10	<10	<10
1-METHYLNAPHTHALENE	UG/L	130	<10	<10
PYRIDINE	UG/L	<50	<50	<50
QUINOLINE	UG/L	<50	<50	<50
6-METHYL CHRYSENE	UG/L	<10	<10	<10
BENZO(g,h,i)PERYLENE	UG/L	<10	<10	<10

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GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412262
Project # : 34-37-74-441000
Project Name: GMP

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
1	HCW1A	WATER	19-DEC-94	21-DEC-94	11-JAN-95	1.00
2	HCW1B	WATER	19-DEC-94	21-DEC-94	10-JAN-95	1.00
3	HCW1C	WATER	19-DEC-94	21-DEC-94	10-JAN-95	1.00

Parameter	Units	1	2	3
SURROGATES				
NITROBENZENE-D5	%	65	88	74
2-FLUOROBIPHENYL	%	88	84	79
TERPHENYL-D14	%	58	65	62
PHENOL-D6	%	96	85	70
2-FLUOROPHENOL	%	72	63	58
2,4,6-TRIBROMOPHENOL	%	38	78	47

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 34-37-74-441000
Project Name: GMP
ATI I.D. : 412262

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
4	LCW1A	WATER	19-DEC-94	21-DEC-94	13-JAN-95	2.50
5	LCW1B	WATER	19-DEC-94	21-DEC-94	10-JAN-95	1.00
6	LCW1C	WATER	19-DEC-94	21-DEC-94	10-JAN-95	1.00

Parameter	Units	4	5	6
ANTHRACENE	UG/L	<25	<10	<10
N-NITROSODIMETHYLAMINE	UG/L	<38	<15	<15
BENZO(a)ANTHRACENE	UG/L	<25	<10	<10
BENZO(b)FLUORANTHENE	UG/L	<25	<10	<10
ANILINE	UG/L	<25	<10	<10
BENZO(k)FLUORANTHENE	UG/L	<25	<10	<10
BENZO(a)PYRENE	UG/L	<25	<10	<10
BIS(2-CHLOROETHYL)ETHER	UG/L	<25	<10	<10
2-CHLOROPHENOL	UG/L	<25	<10	<10
BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	<25	<10	<10
BUTYLBENZYLPHTHALATE	UG/L	<25	<10	<10
CHRYSENE	UG/L	<25	<10	<10
BENZYL ALCOHOL	UG/L	<25	<10	<10
DIBENZ(a,h)ACRIDINE	UG/L	<25	<10	<10
DIBENZ(a,h)ANTHRACENE	UG/L	<25	<10	<10
1,2-DICHLOROBENZENE	UG/L	<25	<10	<10
1,3-DICHLOROBENZENE	UG/L	<25	<10	<10
BIS(2-CHLOROISOPROPYL)ETHER	UG/L	<25	<10	<10
1,4-DICHLOROBENZENE	UG/L	<38	<15	<15
4-METHYLPHENOL	UG/L	<25	<10	<10
DIETHYLPHTHALATE	UG/L	<25	<10	<10
N-NITROSO-DI-N-PROPYLAMINE	UG/L	<25	<10	<10
7,12-DIMETHYLBENZO(a)ANTHRACENE	UG/L	<38	<15	<15
HEXACHLOROETHANE	UG/L	<25	<10	<10
DIMETHYLPHTHALATE	UG/L	<25	<10	<10
NITROBENZENE	UG/L	<25	<10	<10
DI-N-BUTYLPHTHALATE	UG/L	<25	<10	<10
ISOPHORONE	UG/L	<25	<10	<10
2-NITROPHENOL	UG/L	<25	<10	<10
DI-N-OCTYLPHTHALATE	UG/L	<25	<10	<10
BENZOIC ACID	UG/L	<25	<10	<10
BIS(2-CHLOROETHOXY)METHANE	UG/L	<130	<50	<50
2,4-DICHLOROPHENOL	UG/L	<25	<10	<10
FLUORANTHENE	UG/L	<25	<10	<10
1,2,4-TRICHLOROBENZENE	UG/L	<25	<10	<10
NAPHTHALENE	UG/L	<25	<10	<10
PHENANTHRENE	UG/L	29	<10	<10
4-CHLOROANILINE	UG/L	<25	<10	<10
	UG/L	<25	<10	<10

AnalyticalTechnologies, Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412262
Project # : 34-37-74-441000
Project Name: GMP

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
4	LCW1A	WATER	19-DEC-94	21-DEC-94	13-JAN-95	2.50
5	LCW1B	WATER	19-DEC-94	21-DEC-94	10-JAN-95	1.00
6	LCW1C	WATER	19-DEC-94	21-DEC-94	10-JAN-95	1.00

Parameter	Units	4	5	6
PYRENE	UG/L	<25	<10	<10
HEXACHLOROBUTADIENE	UG/L	<25	<10	<10
2-METHYLNAPHTHALENE	UG/L	<25	<10	<10
4-CHLORO-3-METHYLPHENOL	UG/L	<25	<10	<10
BENZENETHIOL	UG/L	<25	<10	<10
4-NITROPHENOL	UG/L	<130	<50	<50
2,4-DIMETHYLPHENOL	UG/L	<25	<10	<10
2,4-DINITROPHENOL	UG/L	<130	<50	<50
PHENOL	UG/L	<25	<10	<10
2-METHYLPHENOL	UG/L	<25	<10	<10
3- & 4-METHYLPHENOL	UG/L	<25	<10	<10
HEXACHLOROCYCLOPENTADIENE	UG/L	<25	<10	<10
2,4,6-TRICHLOROPHENOL	UG/L	<25	<10	<10
2,4,5-TRICHLOROPHENOL	UG/L	<130	<50	<50
2-CHLORONAPHTHALENE	UG/L	<25	<10	<10
2-NITROANILINE	UG/L	<130	<50	<50
ACENAPHTHYLENE	UG/L	<25	<10	<10
2,6-DINITROTOLUENE	UG/L	<25	<10	<10
3-NITROANILINE	UG/L	<130	<50	<50
ACENAPHTHENE	UG/L	<25	<10	<10
DIBENZOFURAN	UG/L	<25	<10	<10
2,4-DINITROTOLUENE	UG/L	<25	<10	<10
4-CHLOROPHENYL-PHENYLETHER	UG/L	<25	<10	<10
FLUORENE	UG/L	<25	<10	<10
4-NITROANILINE	UG/L	<130	<50	<50
2-METHYL-4,6-DINITROPHENOL	UG/L	<130	<50	<50
N-NITROSODIPHENYLAMINE	UG/L	<25	<10	<10
4-BROMOPHENYL-PHENYLETHER	UG/L	<25	<10	<10
HEXACHLOROBENZENE	UG/L	<25	<10	<10
PENTACHLOROPHENOL	UG/L	<130	<50	<50
3,3'-DICHLOROBENZIDINE	UG/L	<50	<20	<20
INDENO(1,2,3-cd)PYRENE	UG/L	<25	<10	<10
INDENE	UG/L	<25	<10	<10
1-METHYLNAPHTHALENE	UG/L	200	<10	<10
PYRIDINE	UG/L	<130	<50	<50
QUINOLINE	UG/L	<130	<50	<50
6-METHYL CHRYSENE	UG/L	<25	<10	<10
BENZO(g,h,i)PERYLENE	UG/L	<25	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412262
Project # : 34-37-74-441000
Project Name: GMP

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
4	LCW1A	WATER	19-DEC-94	21-DEC-94	13-JAN-95	2.50
5	LCW1B	WATER	19-DEC-94	21-DEC-94	10-JAN-95	1.00
6	LCW1C	WATER	19-DEC-94	21-DEC-94	10-JAN-95	1.00

Parameter	Units	4	5	6
SURROGATES				
NITROBENZENE-D5	%	93	84	80
2-FLUOROBIPHENYL	%	20*I	86	88
TERPHENYL-D14	%	112	70	71
PHENOL-D6	%	163*I	78	85
2-FLUOROPHENOL	%	136*I	66	72
2,4,6-TRIBROMOPHENOL	%	14*I	78	69

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412262
Project # : 34-37-74-441000
Project Name: GMP

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
7	FB-1	WATER	19-DEC-94	21-DEC-94	11-JAN-95	1.00
8	HMW3	WATER	19-DEC-94	21-DEC-94	12-JAN-95	1.00
9	HMW4	WATER	19-DEC-94	21-DEC-94	11-JAN-95	1.00

Parameter	Units	7	8	9
ANTHRACENE	UG/L	<10	<10	<10
N-NITROSODIMETHYLAMINE	UG/L	<15	<15	<15
BENZO(a)ANTHRACENE	UG/L	<10	<10	<10
BENZO(b)FLUORANTHENE	UG/L	<10	<10	<10
ANILINE	UG/L	<10	<10	<10
BENZO(k)FLUORANTHENE	UG/L	<10	<10	<10
BENZO(a)PYRENE	UG/L	<10	<10	<10
BIS(2-CHLOROETHYL)ETHER	UG/L	<10	<10	<10
2-CHLOROPHENOL	UG/L	<10	<10	<10
BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	<10	<10	<10
BUTYLBENZYLPHTHALATE	UG/L	<10	<10	<10
CHRYSENE	UG/L	<10	<10	<10
BENZYL ALCOHOL	UG/L	<10	<10	<10
DIBENZ(a,h)ACRIDINE	UG/L	<10	<10	<10
DIBENZ(a,h)ANTHRACENE	UG/L	<10	<10	<10
1,2-DICHLOROBENZENE	UG/L	<10	<10	<10
1,3-DICHLOROBENZENE	UG/L	<10	<10	<10
BIS(2-CHLOROISOPROPYL)ETHER	UG/L	<15	<15	<15
1,4-DICHLOROBENZENE	UG/L	<10	<10	<10
4-METHYLPHENOL	UG/L	<10	<10	<10
DIETHYLPHTHALATE	UG/L	<10	<10	<10
N-NITROSO-DI-N-PROPYLAMINE	UG/L	<15	<15	<15
7,12-DIMETHYLBENZO(a)ANTHRACENE	UG/L	<10	<10	<10
HEXACHLOROETHANE	UG/L	<10	<10	<10
DIMETHYLPHTHALATE	UG/L	<10	<10	<10
NITROBENZENE	UG/L	<10	<10	<10
DI-N-BUTYLPHTHALATE	UG/L	<10	<10	<10
ISOPHORONE	UG/L	<10	<10	<10
2-NITROPHENOL	UG/L	<10	<10	<10
DI-N-OCTYLPHTHALATE	UG/L	<10	<10	<10
BENZOIC ACID	UG/L	<50	<50	<50
BIS(2-CHLOROETHOXY)METHANE	UG/L	<10	<10	<10
2,4-DICHLOROPHENOL	UG/L	<10	<10	<10
FLUORANTHENE	UG/L	<10	<10	<10
1,2,4-TRICHLOROBENZENE	UG/L	<10	<10	<10
NAPHTHALENE	UG/L	<10	36	19
PHENANTHRENE	UG/L	<10	<10	<10
4-CHLOROANILINE	UG/L	<10	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412262
Project # : 34-37-74-441000
Project Name: GMP

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
7	FB-1	WATER	19-DEC-94	21-DEC-94	11-JAN-95	1.00
8	HMW3	WATER	19-DEC-94	21-DEC-94	12-JAN-95	1.00
9	HMW4	WATER	19-DEC-94	21-DEC-94	11-JAN-95	1.00

Parameter	Units	7	8	9
PYRENE	UG/L	<10	<10	<10
HEXACHLOROBUTADIENE	UG/L	<10	<10	<10
2-METHYLNAPHTHALENE	UG/L	<10	<10	<10
4-CHLORO-3-METHYLPHENOL	UG/L	<10	<10	<10
BENZENETHIOL	UG/L	<10	<10	<10
4-NITROPHENOL	UG/L	<50	<50	<50
2,4-DIMETHYLPHENOL	UG/L	<10	<10	<10
2,4-DINITROPHENOL	UG/L	<50	<50	<50
PHENOL	UG/L	<10	<10	<10
2-METHYLPHENOL	UG/L	<10	<10	<10
3- & 4-METHYLPHENOL	UG/L	<10	<10	<10
HEXACHLOROCYCLOPENTADIENE	UG/L	<10	<10	<10
2,4,6-TRICHLOROPHENOL	UG/L	<10	<10	<10
2,4,5-TRICHLOROPHENOL	UG/L	<50	<50	<50
2-CHLORONAPHTHALENE	UG/L	<10	<10	<10
2-NITROANILINE	UG/L	<50	<50	<50
ACENAPHTHYLENE	UG/L	<10	<10	<10
2,6-DINITROTOLUENE	UG/L	<10	<10	<10
3-NITROANILINE	UG/L	<50	<50	<50
ACENAPHTHENE	UG/L	<10	<10	<10
DIBENZOFURAN	UG/L	<10	<10	<10
2,4-DINITROTOLUENE	UG/L	<10	<10	<10
4-CHLOROPHENYL-PHENYLETHER	UG/L	<10	<10	<10
FLUORENE	UG/L	<10	<10	<10
4-NITROANILINE	UG/L	<50	<50	<50
2-METHYL-4,6-DINITROPHENOL	UG/L	<50	<50	<50
N-NITROSODIPHENYLAMINE	UG/L	<10	<10	<10
4-BROMOPHENYL-PHENYLETHER	UG/L	<10	<10	<10
HEXACHLOROBENZENE	UG/L	<10	<10	<10
PENTACHLOROPHENOL	UG/L	<50	<50	<50
3,3'-DICHLOROBENZIDINE	UG/L	<20	<20	<20
INDENO(1,2,3-cd)PYRENE	UG/L	<10	<10	<10
INDENE	UG/L	<10	<10	<10
1-METHYLNAPHTHALENE	UG/L	<10	92	66
PYRIDINE	UG/L	<50	<50	<50
QUINOLINE	UG/L	<50	<50	<50
6-METHYL CHRYSENE	UG/L	<10	<10	<10
BENZO(g,h,i)PERYLENE	UG/L	<10	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412262
Project # : 34-37-74-441000
Project Name: GMP

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
7	FB-1	WATER	19-DEC-94	21-DEC-94	11-JAN-95	1.00
8	HMW3	WATER	19-DEC-94	21-DEC-94	12-JAN-95	1.00
9	HMW4	WATER	19-DEC-94	21-DEC-94	11-JAN-95	1.00

Parameter	Units	7	8	9
SURROGATES				
NITROBENZENE-D5	%	80	75	79
2-FLUOROBIPHENYL	%	83	97	89
TERPHENYL-D14	%	63	62	62
PHENOL-D6	%	103	100	110
2-FLUOROPHENOL	%	73	76	78
2,4,6-TRIBROMOPHENOL	%	17*	86	78

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412262
Project # : 34-37-74-441000
Project Name: GMP

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
10	HMW5	WATER	19-DEC-94	21-DEC-94	12-JAN-95	1.00
11	HMW6	WATER	19-DEC-94	21-DEC-94	11-JAN-95	1.00

Parameter	Units	10	11
ANTHRACENE	UG/L	<10	<10
N-NITROSODIMETHYLAMINE	UG/L	<15	<15
BENZO(a)ANTHRACENE	UG/L	<10	<10
BENZO(b)FLUORANTHENE	UG/L	<10	<10
ANILINE	UG/L	<10	<10
BENZO(k)FLUORANTHENE	UG/L	<10	<10
BENZO(a)PYRENE	UG/L	<10	<10
BIS(2-CHLOROETHYL)ETHER	UG/L	<10	<10
2-CHLOROPHENOL	UG/L	<10	<10
BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	<10	<10
BUTYLBENZYLPHTHALATE	UG/L	<10	<10
CHRYSENE	UG/L	<10	<10
BENZYL ALCOHOL	UG/L	<10	<10
DIBENZ(a,h)ACRIDINE	UG/L	<10	<10
DIBENZ(a,h)ANTHRACENE	UG/L	<10	<10
1,2-DICHLOROBENZENE	UG/L	<10	<10
1,3-DICHLOROBENZENE	UG/L	<10	<10
BIS(2-CHLOROISOPROPYL)ETHER	UG/L	<15	<15
1,4-DICHLOROBENZENE	UG/L	<10	<10
4-METHYLPHENOL	UG/L	<10	<10
DIETHYLPHTHALATE	UG/L	<10	<10
N-NITROSO-DI-N-PROPYLAMINE	UG/L	<15	<15
7,12-DIMETHYLBENZO(a)ANTHRACENE	UG/L	<10	<10
HEXACHLOROETHANE	UG/L	<10	<10
DIMETHYLPHTHALATE	UG/L	<10	<10
NITROBENZENE	UG/L	<10	<10
DI-N-BUTYLPHTHALATE	UG/L	<10	<10
ISOPHORONE	UG/L	<10	<10
2-NITROPHENOL	UG/L	<10	<10
DI-N-OCTYLPHTHALATE	UG/L	<10	<10
BENZOIC ACID	UG/L	<50	<50
BIS(2-CHLOROETHOXY)METHANE	UG/L	<10	<10
2,4-DICHLOROPHENOL	UG/L	<10	<10
FLUORANTHENE	UG/L	<10	<10
1,2,4-TRICHLOROBENZENE	UG/L	<10	<10
NAPHTHALENE	UG/L	15	25
PHENANTHRENE	UG/L	<10	<10
4-CHLOROANILINE	UG/L	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412262
Project # : 34-37-74-441000
Project Name: GMP

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
10	HMW5	WATER	19-DEC-94	21-DEC-94	12-JAN-95	1.00
11	HMW6	WATER	19-DEC-94	21-DEC-94	11-JAN-95	1.00

Parameter	Units	10	11
PYRENE	UG/L	<10	<10
HEXACHLOROBUTADIENE	UG/L	<10	<10
2-METHYLNAPHTHALENE	UG/L	26	10
4-CHLORO-3-METHYLPHENOL	UG/L	<10	<10
BENZENETHIOL	UG/L	<10	<10
4-NITROPHENOL	UG/L	<50	<50
2,4-DIMETHYLPHENOL	UG/L	<10	<10
2,4-DINITROPHENOL	UG/L	<50	<50
PHENOL	UG/L	<10	<10
2-METHYLPHENOL	UG/L	<10	<10
3- & 4-METHYLPHENOL	UG/L	<10	<10
HEXACHLOROCYCLOPENTADIENE	UG/L	<10	<10
2,4,6-TRICHLOROPHENOL	UG/L	<10	<10
2,4,5-TRICHLOROPHENOL	UG/L	<50	<50
2-CHLORONAPHTHALENE	UG/L	<10	<10
2-NITROANILINE	UG/L	<50	<50
ACENAPHTHYLENE	UG/L	<10	<10
2,6-DINITROTOLUENE	UG/L	<10	<10
3-NITROANILINE	UG/L	<50	<50
ACENAPHTHENE	UG/L	<10	<10
DIBENZOFURAN	UG/L	<10	<10
2,4-DINITROTOLUENE	UG/L	<10	<10
4-CHLOROPHENYL-PHENYLETHER	UG/L	<10	<10
FLUORENE	UG/L	<10	<10
4-NITROANILINE	UG/L	<50	<50
2-METHYL-4,6-DINITROPHENOL	UG/L	<50	<50
N-NITROSODIPHENYLAMINE	UG/L	<10	<10
4-BROMOPHENYL-PHENYLETHER	UG/L	<10	<10
HEXACHLOROBENZENE	UG/L	<10	<10
PENTACHLOROPHENOL	UG/L	<50	<50
3,3'-DICHLOROBENZIDINE	UG/L	<20	<20
INDENO(1,2,3-cd)PYRENE	UG/L	<10	<10
INDENE	UG/L	<10	<10
1-METHYLNAPHTHALENE	UG/L	42	73
PYRIDINE	UG/L	<50	<50
QUINOLINE	UG/L	<50	<50
6-METHYL CHRYSENE	UG/L	<10	<10
BENZO(g,h,i)PERYLENE	UG/L	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412262
Project # : 34-37-74-441000
Project Name: GMP

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
10	HMW5	WATER	19-DEC-94	21-DEC-94	12-JAN-95	1.00
11	HMW6	WATER	19-DEC-94	21-DEC-94	11-JAN-95	1.00

Parameter	Units	10	11
SURROGATES			
NITROBENZENE-D5	%	77	70
2-FLUOROBIPHENYL	%	91	14*
TERPHENYL-D14	%	61	80
PHENOL-D6	%	96	128
2-FLUOROPHENOL	%	72	100
2,4,6-TRIBROMOPHENOL	%	81	7.6*

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Blank I.D. : 33871
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 34-37-74-441000
Project Name: GMP

ATI I.D. : 412262
Date Extracted: 21-DEC-94
Date Analyzed : 10-JAN-95
Dil. Factor : 1.00

Parameters	Units	Results
ANTHRACENE	UG/L	<10
N-NITROSODIMETHYLAMINE	UG/L	<15
BENZO(a)ANTHRACENE	UG/L	<10
BENZO(b)FLUORANTHENE	UG/L	<10
BENZO(k)FLUORANTHENE	UG/L	<10
ANILINE	UG/L	<10
BIS(2-CHLOROETHYL)ETHER	UG/L	<10
BENZO(a)PYRENE	UG/L	<10
BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	<10
2-CHLOROPHENOL	UG/L	<10
BUTYLBENZYLPHTHALATE	UG/L	<10
CHRYSENE	UG/L	<10
BENZYL ALCOHOL	UG/L	<10
DIBENZ(a,h)ACRIDINE	UG/L	<10
DIBENZ(a,h)ANTHRACENE	UG/L	<10
1,2-DICHLOROBENZENE	UG/L	<10
BIS(2-CHLOROISOPROPYL)ETHER	UG/L	<15
1,3-DICHLOROBENZENE	UG/L	<10
4-METHYLPHENOL	UG/L	<10
1,4-DICHLOROBENZENE	UG/L	<10
N-NITROSO-DI-N-PROPYLAMINE	UG/L	<15
DIETHYLPHTHALATE	UG/L	<10
7,12-DIMETHYLBENZO(a)ANTHRACENE	UG/L	<10
HEXACHLOROETHANE	UG/L	<10
DIMETHYLPHTHALATE	UG/L	<10
NITROBENZENE	UG/L	<10
ISOPHORONE	UG/L	<10
DI-N-BUTYLPHTHALATE	UG/L	<10
DI-N-OCTYLPHTHALATE	UG/L	<10
2-NITROPHENOL	UG/L	<10
BENZOIC ACID	UG/L	<50
BIS(2-CHLOROETHOXY)METHANE	UG/L	<10
2,4-DICHLOROPHENOL	UG/L	<10
FLUORANTHENE	UG/L	<10
1,2,4-TRICHLOROBENZENE	UG/L	<10
NAPHTHALENE	UG/L	<10
PHENANTHRENE	UG/L	<10
4-CHLOROANILINE	UG/L	<10
PYRENE	UG/L	<10
HEXACHLOROBUTADIENE	UG/L	<10
4-CHLORO-3-METHYLPHENOL	UG/L	<10
2-METHYLNAPHTHALENE	UG/L	<10
BENZENETHIOL	UG/L	<10
4-NITROPHENOL	UG/L	<50
2,4-DIMETHYLPHENOL	UG/L	<10
2,4-DINITROPHENOL	UG/L	<50

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Blank I.D. : 33871
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 34-37-74-441000
Project Name: GMP

ATI I.D. : 412262
Date Extracted: 21-DEC-94
Date Analyzed : 10-JAN-95
Dil. Factor : 1.00

Parameters	Units	Results
PHENOL	UG/L	<10
2-METHYLPHENOL	UG/L	<10
3- & 4-METHYLPHENOL	UG/L	<10
HEXACHLOROCYCLOPENTADIENE	UG/L	<10
2,4,6-TRICHLOROPHENOL	UG/L	<10
2,4,5-TRICHLOROPHENOL	UG/L	<50
2-CHLORONAPHTHALENE	UG/L	<10
2-NITROANILINE	UG/L	<50
ACENAPHTHYLENE	UG/L	<10
2,6-DINITROTOLUENE	UG/L	<10
3-NITROANILINE	UG/L	<50
ACENAPHTHENE	UG/L	<10
DIBENZOFURAN	UG/L	<10
2,4-DINITROTOLUENE	UG/L	<10
4-CHLOROPHENYL-PHENYLETHER	UG/L	<10
FLUORENE	UG/L	<10
4-NITROANILINE	UG/L	<50
2-METHYL-4,6-DINITROPHENOL	UG/L	<50
N-NITROSODIPHENYLAMINE	UG/L	<10
4-BROMOPHENYL-PHENYLETHER	UG/L	<10
HEXACHLOROBENZENE	UG/L	<10
PENTACHLOROPHENOL	UG/L	<50
3,3'-DICHLOROBENZIDINE	UG/L	<20
INDENO(1,2,3-cd)PYRENE	UG/L	<10
INDENE	UG/L	<10
1-METHYLNAPHTHALENE	UG/L	<10
PYRIDINE	UG/L	<50
QUINOLINE	UG/L	<50
6-METHYL CHRYSENE	UG/L	<10
BENZO(g,h,i)PERYLENE	UG/L	<10
SURROGATES		
NITROBENZENE-D5	%	67
2-FLUOROBIPHENYL	%	78
TERPHENYL-D14	%	65
PHENOL-D6	%	88
2-FLUOROPHENOL	%	79
2,4,6-TRIBROMOPHENOL	%	85

AnalyticalTechnologies, Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

MSMSD

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
MSMSD # : 71681
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.

Project # : 34-37-74-441000
Project Name: GMP

ATI I.D. : 412262
Date Extracted: 12-DEC-94
Date Analyzed : 10-JAN-95
Sample Matrix : WATER
REF I.D. : REAGENT WATER

Parameters	Units	Sample Result	Conc Spike	Spiked Sample	% Rec	Dup Spike	Dup % Rec	RPD
2-CHLOROPHENOL	UG/L	<10	150	120	80	130	87	8
1,4-DICHLOROBENZENE	UG/L	<10	100	96	96	86	86	11
N-NITROSO-DI-N-PROPYLAMINE	UG/L	<10	100	96	96	81	81	17
1,2,4-TRICHLOROBENZENE	UG/L	<10	100	99	99	90	90	10
PYRENE	UG/L	<10	100	83	83	75	75	10
4-CHLORO-3-METHYLPHENOL	UG/L	<10	150	130	87	13	9	160
4-NITROPHENOL	UG/L	<50	100	14	14*	140	140	160*
PHENOL	UG/L	<10	100	110	110	120	120	9
ACENAPHTHENE	UG/L	<10	100	94	94	86	86	9
2,4-DINITROTOLUENE	UG/L	<10	100	90	90	76	76	17
PENTACHLOROPHENOL	UG/L	<50	150	N/A	0*	140	93	0*

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

ANALYTICAL TECHNOLOGIES, INC.
SAN DIEGO
FLAGS

INORGANICS

FLAG	MESSAGE DESCRIPTION
B	ABSOLUTE VALUE OF ANALYTE CONCENTRATION IS < CRDL BUT ≥ THE IDL
BB	RESULT BETWEEN IDL AND LOQ
D	POST DIGESTION SPIKE FOR GFAA OUTSIDE LIMITS AFTER 1:25 DILUTION. SAMPLE REPORTED AT ORIGINAL CONCENTRATION.
E	ESTIMATED VALUE DUE TO INTERFERENCE
M	DUPLICATE INJECTION PRECISION NOT MET
N	SPIKED SAMPLE RECOVERY NOT WITHIN CONTROL LIMITS
S	REPORTED VALUE WAS DETERMINED BY METHOD OF STANDARD ADDITIONS
U	COMPOUND WAS ANALYZED FOR BUT NOT DETECTED
W	POST DIGESTION SPIKE OUT OF CONTROL LIMITS; SAMPLE ABSORBANCE < 50% OF SPIKE ABSORBANCE FOR GF/AA
X	ABSOLUTE VALUE OF ANALYTE CONCENTRATION IS LESS THAN 3 TIMES THE MDL
*	DUPLICATE ANALYSIS NOT WITHIN CONTROL LIMITS
+	CORRELATION COEFFICIENT FOR MSA IS LESS THAN 0.995
*H	RESULTS OUTSIDE OF LIMITS DUE TO SAMPLE MATRIX INTERFERENCE
*Q	INSUFFICIENT SAMPLE FOR ANALYSIS
*R	DATA IS NOT USABLE
*V	SAMPLE RESULT IS >4X SPIKED CONCENTRATION, THEREFORE SPIKE IS NOT DETECTABLE
*Y	RESULT NOT ATTAINABLE DUE TO SAMPLE MATRIX INTERFERENCE
@C	*VARIABLE MESSAGE*
@H	DETECTION LIMIT ELEVATED DUE TO MATRIX INTERFERENCE
@Q	DETECTION LIMIT ELEVATED DUE TO LIMITED SAMPLE FOR ANALYSIS
@R	RPD LIMIT IS 67% FOR INORGANIC RESULTS LESS THAN TEN TIMES THE REPORTING DETECTION LIMIT
@S	RPD: ONE RESULT ABOVE AND ONE RESULT BELOW REPORTING LIMIT (RL). RESULT ABOVE SHOULD BE < 5 TIMES RL TO BE IN CONTROL.
@V	PRE-DIGEST SPIKE OUT OF LIMITS. POST DIGESTION SPIKE YIELDED ACCEPTABLE RESULTS
@W	DETECTION LIMIT ELEVATED DUE TO REDUCED SAMPLE WEIGHT
@Y	ION BALANCE OUTSIDE OF ATI'S ACCEPTANCE LIMITS; REANALYSIS CONFIRMED ORIGINAL RESULT
@X	RESULTS VERIFIED BY REDIGESTION AND REANALYSIS

ANALYTICAL TECHNOLOGIES, INC.
SAN DIEGO
FLAGS

ORGANICS

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

ACCESSION #: 412262 INITIALS: LM

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

1	Does this project require special handling according to NEESA Levels C, D, AFOEHL or CLP protocols? If yes, complete a) thru c) a) Cooler temperature _____ b) pH sample aliquoted: yes / no / n/a c) LOT #'s: _____	YES	NO
2	Are custody seals present on cooler?	YES	NO
	If yes, are seals intact?	YES	NO
3	Are custody seals present on sample containers?	YES	NO
	If yes, are seals intact?	YES	NO
4	Is there a Chain-Of-Custody (COC)*?	YES	NO
5	Is the COC* complete? Relinquished: yes/no Requested analysis: yes/no	YES	NO
6	Is the COC* in agreement with the samples received? # Samples: yes/no Sample ID's: yes/no Date sampled: yes/no Matrix: yes/no # containers: yes/no	YES	NO
7	Are the samples preserved correctly?	YES	NO
8	Is there enough sample for all the requested analyses?	YES	NO
9	Are all samples within holding times for the requested analyses?	YES	NO
10	Cooler temperature: 3.0°, 2.0° (cooler #112), 2.5°C, 2.5°C, 4.5°C		
11	Were all sample containers received intact (ie. not broken, leaking, etc.)?	YES	NO
12	Are samples requiring no headspace, headspace free? N/A	YES	NO
13	Are VOA 1st stickers required?	YES	NO
14	Are there special comments on the Chain of Custody which require client contact?	YES	N/A
15	If yes, was ATI Project Manager notified?	YES	NO

Describe "no" items: #11) Sample HMW5 had cap broken on one of the two 1 Liter Amber glass bottles. Replaced in lab immediately. #12) 8240 analysis VOA VIALS have bubbles the equivalent of a pea size bubble. Trip blank not one-oc added on 12/15/94 LM.

Was client contacted? yes / no

If yes, Date: _____ Name of Person contacted: _____

Describe actions taken or client instructions: Persue Snyder OK to run 1L Amber glass bottle for 8270. Also bubbles in VOA vials are OK, client is aware it is shipping that causes bubbles.

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

ATIFRM902 (11/92)

Analytical Technologies, Inc.
5550 MOREHOUSE DRIVE
SAN DIEGO, CA 92121-1709
(619) 458-9141

Chain of Custody

DATE 12/19/94 PAGE 1 OF 2

PROJECT MANAGER: TONY SHAN
COMPANY: BHP Petroleum
ADDRESS: [illegible] Lombardo St. Lompoc, CA 93436-707

BILL TO: TONY SHAN
COMPANY: BHP Petroleum
ADDRESS:

SAMPLERS: (Signature) [signature] PHONE NUMBER (805) 547-3864

Recommended Quantity and Preservative (Provide triple volume on QC Samples)

SAMPLE ID	SAMPLE DATE	TIME	MATRIX	LAB ID	Petroleum Hydrocarbons 418.1 (1L (H_2SO_4)/100g)	Oil and Grease 413.2 (1L (H_2SO_4)/100g)	Gasoline (MOD 8015/DOHS) (4 oz (HCl)/50g)	Diesel (MOD 8015/DOHS) (4 oz (HCl)/50g)	Gasoline/BTXE (MOD 8015/8020) Maximum Contamination Level of Gasoline: 2ppm(water), 50ppm(Soil) (2X40ml (HCl)/50g)	MOD 8015 (Unknown) (4 oz (HCl)/50g)	BTXE (8020) (2X40ml (HCl)/50g)	Chlorinated Hydrocarbons (8010) (2X40ml (HCl)/50g)	Aromatic Hydrocarbons (8020) (2X40ml (HCl)/50g)	Chlorinated/Aromatic Hydrocarbons (8010/8020) (2X40ml (HCl)/50g)	Organic Pb (500ml/50g)	Pesticides/PCB (8080) (1L/50g)	Base/NEU/Acid Cmpds GC/MS (8270) (1L/100g)	Volatile Cmpds GC/MS (8240) (2X40ml (HCl)/100g)	Polynuclear Aromatic (8310) (1L/100g)	CCR Metals (500ml/100g)	Priority Pollutant Metals (500ml/100g)	[illegible]	[illegible]	[illegible]					Number of Containers
HMW 3	12/19/94	10:57	G.W.	08													X	X		X		X	X	X					8
HMW 4	12/19/94	11:52	G.W.	09													X	X		X		X	X	X					8
HMW 5	12/19/94	9:58 am	"	10													X	X		X		X	X	X					8
HMW 6	12/19/94	8:41 am	"	11													X	X		X		X	X	X					8
LMW 3	12/19/94	2:22 pm	"	12																		X	X						2
LMW 4	12/19/94	2:44 pm	"	13																		X	X						2
LMW 5	12/19/94	1:44 pm	"	14																		X	X						2
LMW 6	12/19/94	1:22 pm	"	15																		X	X						2
TB-1 Lab 12/19/94				16															X										

PROJECT INFORMATION	SAMPLE RECEIPT	
PROJECT NUMBER: ~~[illegible]~~	TOTAL NUMBER OF CONTAINERS	40
PROJECT NAME:	CHAIN OF CUSTODY SEALS Y/N/NA	N
PURCHASE ORDER NUMBER:	SEALS INTACT? Y/N/NA	NA
VIA:	RECEIVED GOOD COND./COLD	Y
TAT: ☐24HR ☐48HRS ☐72HRS ☐1WK ☒2WK	LAB NUMBER	41226 2

SAMPLE DISPOSAL INSTRUCTIONS

☐ ATI Disposal @ $5.00 each ☐ Return ☐ Pickup

Comments: General Chemistry - TDS, Alkalinity, Fluoride, Nitrate, Sulfate, pH, EC, Soluble [illegible] Cl. All VOAS in cooler 1112

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: [signature] Time: 1700	Signature: [signature] Time: 5:30 pm	Signature: Time:
Printed Name: Jay Silkoff Date: 12/19/94	Printed Name: Tony Shan Date: 12/19/94	Printed Name: Date:
Company: ~~[illegible]~~ ETI	Company: BHP	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: (LAB) 3.**
Signature: [signature] Time: 5:30 pm	Signature: Time: 10:50	Signature: Time:
Printed Name: Tony Shan Date: 12/19/94	Printed Name: Date:	Printed Name: Date:
Company: BHP	Company:	Analytical Technologies, Inc.

DISTRIBUTION: White, Canary - ANALYTICAL TECHNOLOGIES, INC. • Pink - ORIGINATOR

Analytical Technologies, Inc.
5550 MOREHOUSE DRIVE
SAN DIEGO, CA 92121-1709
(619) 458-9141

Chain of Custody

DATE 12/19/99 PAGE 2 OF 2

PROJECT MANAGER: TONY SHAN
COMPANY: BHP petroleum
ADDRESS: 77-325 Kamohana St. Kapolei, HI 96707

BILL TO: Tony Shan
COMPANY: BHP petroleum
ADDRESS:

SAMPLERS: (Signature) [signature] PHONE NUMBER (808) 547-3804

Recommended Quantity and Preservative (Provide triple volume on QC Samples)

SAMPLE ID	SAMPLE DATE	TIME	MATRIX	LAB ID	Petroleum Hydrocarbons 418.1 (1L (H_2SO_4)/100g)	Oil and Grease 413.2 (1L (H_2SO_4)/100g)	Gasoline (MOD 8015/DOHS) (4 oz (HCl)/50g)	Diesel (MOD 8015/DOHS) (4 oz (HCl)/50g)	Gasoline/BTXE (MOD 8015/8020) Maximum Contamination Level of Gasoline: 2ppm (water), 50ppm (Soil) (2X40ml (HCl)/50g)	MOD 8015 (Unknown) (4 oz (HCl)/50g)	BTXE (8020) (2X40ml (HCl)/50g)	Chlorinated Hydrocarbons (8010) (2X40ml (HCl)/50g)	Aromatic Hydrocarbons (8020) (2X40ml (HCl)/50g)	Chlorinated/Aromatic Hydrocarbons (8010/8020) (2X40ml (HCl)/50g)	Organic Pb (500ml/50g)	Pesticides/PCB (8080) (1L/50g)	Base/NEU/Acid Cmpds GC/MS (8270) (1L/100g)	Volatile Cmpds GC/MS (8240) (2X40ml (HCl)/100g)	Polynuclear Aromatic (8310) (1L/100g)	CCR Metals (500ml/100g)	Priority Pollutant Metals (500ml/100g)	NO3-NO2	General Chemistry	Total						Number of Containers
HCW1A	12/19/99	12:00 AM	G.W.	01													X	X		X		X	X	X						8
HCW1B	"	9:45 AM	"	02													X	X		X		X	X	X						8
HCW1C	"	10:45 PM	"	03													X	X		X		X	X	X						8
LCW1A	"	16:30 PM	"	04													X	X		X		X	X	X						8
LCW1B	"	14:40 PM	"	05													X	X		X		X	X	X						8
LCW1C	"	15:15 PM	"	06													X	X		X		X	X	X						8
FB1	"	16:10 PM	"	07													X	X		X		X	X	X						8

PROJECT INFORMATION
PROJECT NUMBER: 39-37-74-441000
PROJECT NAME: GMP
PURCHASE ORDER NUMBER:
VIA:
TAT: ☐24HR ☐48HRS ☐72HRS ☐1WK ☐2WK

SAMPLE RECEIPT
TOTAL NUMBER OF CONTAINERS: 56
CHAIN OF CUSTODY SEALS Y/N/NA: N
SEALS INTACT? Y/N/NA: Nil
RECEIVED GOOD COND/COLD: Y
LAB NUMBER: 4122621

SAMPLE DISPOSAL INSTRUCTIONS
☐ ATI Disposal @ $5.00 each ☐ Return ☐ Pickup

Comments: General Chemistry = TDS, Alkalinity, Fluoride, NH3, Sulfate, pH, EC, Soluble Iron, Chloride, [illegible] in cooler No 1112

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: [signature] Time: 1717	Signature: [signature] Time: [illegible]	Signature: Time:
Printed Name: RYAN I SHEVOSH Date: 12/19/99	Printed Name: Tony Shan Date: 12/19	Printed Name: Date:
Company: Dumont and Moore	Company: BHP	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: (LAB) 3.**
Signature: [signature] Time: 0:30 p	Signature: [signature] Time:	Signature: Time:
Printed Name: Tony Shan Date: 12/19	Printed Name: [illegible] Date: [illegible]	Printed Name: Date:
Company: BHP	Company: ATI [illegible]	Analytical Technologies, Inc.

DISTRIBUTION: White, Canary - ANALYTICAL TECHNOLOGIES, INC. • Pink - ORIGINATOR

AnalyticalTechnologies, Inc. Corporate Offices: 5550 Morehouse Drive San Diego, CA 92121 (619) 458-9141

ATI I.D.: 412281

January 20, 1995

ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
c/o BHP REFINING 91325 KOMOHANA STREET
KAPOLEI, HI 96707

Project Name: GMP (GROUNDWATER MONITORING)
Project # : 441000

Attention: STEPHANIE SAKURAI/TONY SHAN

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

Date Received	Quantity	Matrix
December 21, 1994	16	WATER

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

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

SUSAN M. SNYDER
PROJECT MANAGER

For
M. E. SHIGLEY
LABORATORY MANAGER

AnalyticalTechnologies,Inc.

SAMPLE CROSS REFERENCE

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Report Date: January 20, 1995
ATI I.D. : 412281

ATI #	Client Description	Matrix	Date Collected
1	HCW2A	WATER	20-DEC-94
2	HCW2B	WATER	20-DEC-94
3	HCW2C	WATER	20-DEC-94
4	LCW2A	WATER	20-DEC-94
5	LCW2B	WATER	20-DEC-94
6	LCW2C	WATER	20-DEC-94
7	FB-2	WATER	20-DEC-94
8	HCW6A	WATER	20-DEC-94
9	HCW6B	WATER	20-DEC-94
10	HCW7A	WATER	20-DEC-94
11	HCW7B	WATER	20-DEC-94
12	LCW6A	WATER	20-DEC-94
13	LCW6B	WATER	20-DEC-94
14	LCW7A	WATER	20-DEC-94
15	LCW7B	WATER	20-DEC-94
16	HCW2A/DISSOLVED 01	WATER	20-DEC-94
17	HCW2B/DISSOLVED 02	WATER	20-DEC-94
18	HCW2C/DISSOLVED 03	WATER	20-DEC-94
19	LCW2A/DISSOLVED 04	WATER	20-DEC-94
20	LCW2B/DISSOLVED 05	WATER	20-DEC-94
21	LCW2C/DISSOLVED 06	WATER	20-DEC-94
22	FB-2/DISSOLVED 07	WATER	20-DEC-94
23	HCW6A/DISSOLVED 08	WATER	20-DEC-94
24	HCW6B/DISSOLVED 09	WATER	20-DEC-94
25	HCW7A/DISSOLVED 10	WATER	20-DEC-94
26	HCW7B/DISSOLVED 11	WATER	20-DEC-94
27	LCW6A/DISSOLVED 12	WATER	20-DEC-94
28	LCW6B/DISSOLVED 13	WATER	20-DEC-94
29	LCW7A/DISSOLVED 14	WATER	20-DEC-94
30	LCW7B/DISSOLVED 15	WATER	20-DEC-94
31	TB-2 (SDGCMS 1115)	WATER	20-DEC-94

---TOTALS---

Matrix	# Samples
WATER	31

ATI STANDARD DISPOSAL PRACTICE

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

AnalyticalTechnologies,Inc.

ANALYTICAL SCHEDULE

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D.: 412281

Analysis	Technique/Description
EPA 160.1 (TOTAL DISSOLVED SOLIDS)	GRAVIMETRIC
EPA 310.1 (ALKALINITY)	TITRIMETRIC
EPA 340.2 (FLUORIDE)	ELECTRODE
EPA 353.2 (NITRATE-NITRITE AS NITROGEN)	COLORIMETRIC
EPA 425.1 (SURFACTANTS (MBAS))	COLORIMETRIC
EPA 6010 (ANTIMONY)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (ARSENIC)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (BARIUM)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (BERYLLIUM)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (CADMIUM)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (CHROMIUM)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (COBALT)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (IRON)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (LEAD)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (MANGANESE)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (NICKEL)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (SELENIUM)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (SODIUM)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (VANADIUM)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 7470 (AQUEOUS MERCURY)	ATOMIC ABSORPTION/COLD VAPOR
EPA 8240 (GC/MS FOR VOLATILE ORGANICS)	GC/MASS SPECTROMETER
EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)	GC/MASS SPECTROMETER
EPA 9038 (SULFATE)	TURBIDIMETRIC
EPA 9040 (pH)	ELECTRODE
EPA 9050 (ELECTRICAL CONDUCTIVITY)	ELECTRODE
EPA 9253 (CHLORIDE)	TITRIMETRIC, SILVER NITRATE

Analytical Technologies, Inc.

GENERAL CHEMISTRY RESULTS

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D.: 412281

Sample #	Client ID	Matrix	Date Sampled	Date Received
1	HCW2A	WATER	20-DEC-94	21-DEC-94
2	HCW2B	WATER	20-DEC-94	21-DEC-94
3	HCW2C	WATER	20-DEC-94	21-DEC-94
4	LCW2A	WATER	20-DEC-94	21-DEC-94
5	LCW2B	WATER	20-DEC-94	21-DEC-94

Parameter	Units	1	2	3	4	5
CARBONATE AS CACO3	MG/L	<5	<5	<5	<5	<5
BICARBONATE AS CACO3	MG/L	370	431	164	393	459
HYDROXIDE AS CACO3	MG/L	<5	<5	<5	<5	<5
TOTAL ALKALINITY AS CACO3	MG/L	370	431	164	393	459
CHLORIDE	MG/L	8110	1940	13900	8120	1960
ELECTRICAL CONDUCTIVITY	UMHOS/CM	24300	8830	37100	24000	8730
FLUORIDE	MG/L	0.66	<0.5	0.69	0.61	<0.5
SURFACTANTS (MBAS)	MG/L	<0.10	0.41	<0.10	0.18	0.40
NITRATE-NITRITE AS NITROGEN	MG/L	<0.05	<0.05	<0.05	<0.05	0.07
pH	UNITS	6.91	7.47	6.74	7.00	7.47
SULFATE	MG/L	2040	1580	2320	1380	1530
TOTAL DISSOLVED SOLIDS	MG/L	15700	5530	24900	15500	5600

AnalyticalTechnologies,Inc.

GENERAL CHEMISTRY RESULTS

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D.: 412281

Sample #	Client ID	Matrix	Date Sampled	Date Received
6	LCW2C	WATER	20-DEC-94	21-DEC-94
7	FB-2	WATER	20-DEC-94	21-DEC-94
8	HCW6A	WATER	20-DEC-94	21-DEC-94
9	HCW6B	WATER	20-DEC-94	21-DEC-94
10	HCW7A	WATER	20-DEC-94	21-DEC-94

Parameter	Units	6	7	8	9	10
CARBONATE AS CACO3	MG/L	<5	<5	<5	<5	<5
BICARBONATE AS CACO3	MG/L	199	<5	470	290	600
HYDROXIDE AS CACO3	MG/L	<5	<5	<5	<5	<5
TOTAL ALKALINITY AS CACO3	MG/L	199	<5	470	290	600
CHLORIDE	MG/L	13600	<5.0	994	6930	2180
ELECTRICAL CONDUCTIVITY	UMHOS/CM	36500	62.0	3920	22100	7320
FLUORIDE	MG/L	0.69	<0.5	<0.5	1.2	<0.5
SURFACTANTS (MBAS)	MG/L	0.11	<0.10	<0.10	<0.10	<0.10
NITRATE-NITRITE AS NITROGEN	MG/L	<0.05	0.41	<0.05	<0.05	<0.05
pH	UNITS	6.91	5.51	6.81	7.52	6.76
SULFATE	MG/L	2470	<10.0	93.4	2270	209
TOTAL DISSOLVED SOLIDS	MG/L	24600	<20	2210	13900	4320

AnalyticalTechnologies,Inc.

GENERAL CHEMISTRY RESULTS

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D.: 412281

Sample #	Client ID	Matrix	Date Sampled	Date Received
11	HCW7B	WATER	20-DEC-94	21-DEC-94
12	LCW6A	WATER	20-DEC-94	21-DEC-94
13	LCW6B	WATER	20-DEC-94	21-DEC-94
14	LCW7A	WATER	20-DEC-94	21-DEC-94
15	LCW7B	WATER	20-DEC-94	21-DEC-94

Parameter	Units	11	12	13	14	15
CARBONATE AS CACO3	MG/L	<5	<5	<5	<5	<5
BICARBONATE AS CACO3	MG/L	450	503	252	521	427
HYDROXIDE AS CACO3	MG/L	<5	<5	<5	<5	<5
TOTAL ALKALINITY AS CACO3	MG/L	450	503	252	521	427
CHLORIDE	MG/L	6510	992	6940	2160	6570
ELECTRICAL CONDUCTIVITY	UMHOS/CM	19300	3970	21400	7260	19200
FLUORIDE	MG/L	<0.5	<0.5	1.3	<0.5	<0.5
SURFACTANTS (MBAS)	MG/L	0.16	<0.10	<0.10	<0.10	0.14
NITRATE-NITRITE AS NITROGEN	MG/L	<0.05	<0.05	<0.05	<0.05	<0.05
pH	UNITS	6.81	6.87	7.59	6.82	6.85
SULFATE	MG/L	934	84.6	2150	209	1340
TOTAL DISSOLVED SOLIDS	MG/L	12500	2220	13600	4310	12000

AnalyticalTechnologies,Inc.

GENERAL CHEMISTRY - QUALITY CONTROL

DUP/MS

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D. : 412281

Parameters	REF I.D.	Units	Sample Result	Dup Result	RPD	Spiked Sample	Spike Conc	% Rec
BICARBONATE AS CACO3	412262-10	MG/L	445	450	1	N/A	N/A	N/A
BICARBONATE AS CACO3	412281-07	MG/L	<5	<5	0	N/A	N/A	N/A
BICARBONATE AS CACO3	820155-06	MG/L	250	253	1	N/A	N/A	N/A
CARBONATE AS CACO3	412262-10	MG/L	<5	<5	0	N/A	N/A	N/A
CARBONATE AS CACO3	412281-07	MG/L	<5	<5	0	N/A	N/A	N/A
CARBONATE AS CACO3	820155-06	MG/L	<5	<5	0	N/A	N/A	N/A
CHLORIDE	412231-02	MG/L	<5.0	<5.0	0	39.0	40.0	98
CHLORIDE	412281-07	MG/L	<5.0	<5.0	0	40.0	40.0	100
ELECTRICAL CONDUCTIVITY	412281-08	UMHOS/CM	3920	3910	0	N/A	N/A	N/A
ELECTRICAL CONDUCTIVITY	412281-15	UMHOS/CM	19200	19200	0	N/A	N/A	N/A
FLUORIDE	412281-05	MG/L	<0.5	<0.5	0	5.0	5.0	100
FLUORIDE	412281-12	MG/L	<0.5	<0.5	0	4.8	5.0	96
HYDROXIDE AS CACO3	412262-10	MG/L	<5	<5	0	N/A	N/A	N/A
HYDROXIDE AS CACO3	412281-07	MG/L	<5	<5	0	N/A	N/A	N/A
HYDROXIDE AS CACO3	820155-06	MG/L	<5	<5	0	N/A	N/A	N/A
NITRATE-NITRITE AS NITROGEN	412281-10	MG/L	<0.05	<0.05	0	2.0	2.0	100
NITRATE-NITRITE AS NITROGEN	412281-15	MG/L	<0.05	<0.05	0	1.7	2.0	85
SULFATE	412210-01	MG/L	<10.0	<10.0	0	20.4	20.0	102
SULFATE	412096-05	MG/L	<10.0	<10.0	0	20.9	20.0	105
SULFATE	412281-07	MG/L	<10.0	<10.0	0	18.1	20.0	91
SULFATE	412319-09	MG/L	28.2	27.5	3	63.0	40.0	87
SURFACTANTS (MBAS)	412281-04	MG/L	0.18	0.16	12	1.9	2.0	86
SURFACTANTS (MBAS)	412281-15	MG/L	0.14	0.16	13	2.1	2.0	98
TOTAL ALKALINITY AS CACO3	412262-10	MG/L	445	450	1	N/A	N/A	N/A
TOTAL ALKALINITY AS CACO3	412281-07	MG/L	<5	<5	0	N/A	N/A	N/A
TOTAL ALKALINITY AS CACO3	820155-06	MG/L	250	253	1	N/A	N/A	N/A
TOTAL DISSOLVED SOLIDS	412278-01	MG/L	3270	3270	0	N/A	N/A	N/A
TOTAL DISSOLVED SOLIDS	412281-08	MG/L	2210	2210	0	N/A	N/A	N/A
pH	412262-15	UNITS	7.38	7.39	0	N/A	N/A	N/A
pH	412244-06	UNITS	4.91	5.02	2	N/A	N/A	N/A
pH	412281-15	UNITS	6.85	6.90	1	N/A	N/A	N/A

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

AnalyticalTechnologies,Inc.

GENERAL CHEMISTRY - QUALITY CONTROL

BLANK SPIKE

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D. : 412281

Parameters	Blank Spike ID#	Units	Blank Result	Spiked Sample	Spike Conc.	% Rec
CHLORIDE	52975	MG/L	<5.0	40.0	40.0	100
FLUORIDE	52983	MG/L	<0.5	5.2	5.0	104
NITRATE-NITRITE AS NITROGEN	52949	MG/L	<0.05	2.0	2.0	100
NITRATE-NITRITE AS NITROGEN	52950	MG/L	<0.05	2.0	2.0	100
SULFATE	53055	MG/L	<10.0	21.5	20.0	108
SULFATE	53115	MG/L	<10.0	21.5	20.0	108
SURFACTANTS (MBAS)	52869	MG/L	<0.10	0.93	1.0	93

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

AnalyticalTechnologies,Inc.

METALS RESULTS

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D.: 412281

Sample #	Client ID	Matrix	Date Sampled	Date Received
1	HCW2A	WATER	20-DEC-94	21-DEC-94
2	HCW2B	WATER	20-DEC-94	21-DEC-94
3	HCW2C	WATER	20-DEC-94	21-DEC-94
4	LCW2A	WATER	20-DEC-94	21-DEC-94
5	LCW2B	WATER	20-DEC-94	21-DEC-94

Parameter	Units	1	2	3	4	5
ARSENIC	MG/L	<0.05	<0.05	<0.05	<0.05	<0.05
BARIUM	MG/L	0.03	<0.01	0.02	0.03	0.01
BERYLLIUM	MG/L	<0.005	<0.005	<0.005	<0.005	<0.005
CADMIUM	MG/L	<0.01	<0.01	<0.1@H	<0.01	<0.01
COBALT	MG/L	<0.01	<0.01	<0.01	0.01	<0.01
CHROMIUM	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01
IRON	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01
MERCURY	MG/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
MANGANESE	MG/L	0.03	0.03	0.19	0.04	0.03
SODIUM	MG/L	4800	1750	7480	4720	1750
NICKEL	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01
LEAD	MG/L	<0.03	<0.03	<0.3@H	<0.03	<0.03
ANTIMONY	MG/L	<0.03	<0.03	<0.03	<0.03	<0.03
SELENIUM	MG/L	<0.05	<0.05	<0.5@H	<0.05	<0.05
VANADIUM	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01

AnalyticalTechnologies, Inc.

METALS RESULTS

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D.: 412281

Sample #	Client ID	Matrix	Date Sampled	Date Received
6	LCW2C	WATER	20-DEC-94	21-DEC-94
7	FB-2	WATER	20-DEC-94	21-DEC-94
8	HCW6A	WATER	20-DEC-94	21-DEC-94
9	HCW6B	WATER	20-DEC-94	21-DEC-94
10	HCW7A	WATER	20-DEC-94	21-DEC-94

Parameter	Units	6	7	8	9	10
ARSENIC	MG/L	<0.05	<0.05	<0.05	<0.05	<0.05
BARIUM	MG/L	0.02	<0.01	0.04	0.03	0.10
BERYLLIUM	MG/L	<0.005	<0.005	<0.005	<0.005	<0.005
CADMIUM	MG/L	<0.1@H	<0.01	<0.01	<0.01	<0.01
COBALT	MG/L	<0.01	<0.01	<0.01	0.01	<0.01
CHROMIUM	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01
IRON	MG/L	<0.01	0.01	0.35	0.17	1.53
MERCURY	MG/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
MANGANESE	MG/L	0.18	<0.01	0.19	0.07	0.21
SODIUM	MG/L	7600	1.4	544	5020	1160
NICKEL	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01
LEAD	MG/L	<0.3@H	<0.03	<0.03	<0.03	<0.03
ANTIMONY	MG/L	<0.03	<0.03	<0.03	<0.03	<0.03
SELENIUM	MG/L	<0.5@H	<0.05	<0.05	<0.05	<0.05
VANADIUM	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01

AnalyticalTechnologies,Inc.

METALS RESULTS

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D.: 412281

Sample #	Client ID	Matrix	Date Sampled	Date Received
11	HCW7B	WATER	20-DEC-94	21-DEC-94
12	LCW6A	WATER	20-DEC-94	21-DEC-94
13	LCW6B	WATER	20-DEC-94	21-DEC-94
14	LCW7A	WATER	20-DEC-94	21-DEC-94
15	LCW7B	WATER	20-DEC-94	21-DEC-94

Parameter	Units	11	12	13	14	15
ARSENIC	MG/L	<0.05	<0.05	<0.05	<0.05	<0.05
BARIUM	MG/L	0.08	0.04	0.02	0.09	0.08
BERYLLIUM	MG/L	<0.005	<0.005	<0.005	<0.005	<0.005
CADMIUM	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01
COBALT	MG/L	0.01	<0.01	0.01	<0.01	<0.01
CHROMIUM	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01
IRON	MG/L	0.59	0.26	0.14	1.40	0.61
MERCURY	MG/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
MANGANESE	MG/L	0.19	0.17	0.06	0.19	0.19
SODIUM	MG/L	3610	529	4560	1170	3510
NICKEL	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01
LEAD	MG/L	<0.03	<0.03	<0.03	<0.03	<0.03
ANTIMONY	MG/L	<0.03	<0.03	<0.03	<0.03	<0.03
SELENIUM	MG/L	<0.05	<0.05	<0.05	<0.05	<0.05
VANADIUM	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01

AnalyticalTechnologies,Inc.

METALS RESULTS

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D.: 412281

Sample #	Client ID	Matrix	Date Sampled	Date Received
16	HCW2A/DISSOLVED 01	WATER	20-DEC-94	21-DEC-94
17	HCW2B/DISSOLVED 02	WATER	20-DEC-94	21-DEC-94
18	HCW2C/DISSOLVED 03	WATER	20-DEC-94	21-DEC-94
19	LCW2A/DISSOLVED 04	WATER	20-DEC-94	21-DEC-94
20	LCW2B/DISSOLVED 05	WATER	20-DEC-94	21-DEC-94

Parameter	Units	16	17	18	19	20
IRON	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01

AnalyticalTechnologies,Inc.

METALS RESULTS

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000 ATI I.D.: 412281
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Received
21	LCW2C/DISSOLVED 06	WATER	20-DEC-94	21-DEC-94
22	FB-2/DISSOLVED 07	WATER	20-DEC-94	21-DEC-94
23	HCW6A/DISSOLVED 08	WATER	20-DEC-94	21-DEC-94
24	HCW6B/DISSOLVED 09	WATER	20-DEC-94	21-DEC-94
25	HCW7A/DISSOLVED 10	WATER	20-DEC-94	21-DEC-94

Parameter	Units	21	22	23	24	25
ARSENIC	MG/L	-	<0.05	<0.05	<0.05	<0.05
BARIUM	MG/L	-	<0.01	0.04	0.02	0.10
BERYLLIUM	MG/L	-	<0.005	<0.005	<0.005	<0.005
CADMIUM	MG/L	-	<0.01	<0.01	<0.01	<0.01
COBALT	MG/L	-	<0.01	<0.01	<0.01	<0.01
CHROMIUM	MG/L	-	<0.01	<0.01	<0.01	<0.01
IRON	MG/L	<0.01	<0.01	0.11	<0.01	0.06
MERCURY	MG/L	-	<0.0005	<0.0005	<0.0005	<0.0005
MANGANESE	MG/L	-	<0.01	0.18	0.06	0.22
SODIUM	MG/L	-	2.6	517	4540	1140
NICKEL	MG/L	-	<0.01	<0.01	<0.01	<0.01
LEAD	MG/L	-	<0.03	<0.03	<0.03	<0.03
ANTIMONY	MG/L	-	<0.03	<0.03	<0.03	<0.03
SELENIUM	MG/L	-	<0.05	<0.05	<0.05	<0.05
VANADIUM	MG/L	-	<0.01	<0.01	<0.01	<0.01

AnalyticalTechnologies,Inc.

METALS RESULTS

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D.: 412281

Sample #	Client ID	Matrix	Date Sampled	Date Received
26	HCW7B/DISSOLVED 11	WATER	20-DEC-94	21-DEC-94
27	LCW6A/DISSOLVED 12	WATER	20-DEC-94	21-DEC-94
28	LCW6B/DISSOLVED 13	WATER	20-DEC-94	21-DEC-94
29	LCW7A/DISSOLVED 14	WATER	20-DEC-94	21-DEC-94
30	LCW7B/DISSOLVED 15	WATER	20-DEC-94	21-DEC-94

Parameter	Units	26	27	28	29	30
ARSENIC	MG/L	<0.05	<0.05	<0.05	<0.05	<0.05
BARIUM	MG/L	0.07	0.04	0.02	0.09	0.07
BERYLLIUM	MG/L	<0.005	<0.005	<0.005	<0.005	<0.005
CADMIUM	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01
COBALT	MG/L	<0.01	<0.01	0.01	<0.01	<0.01
CHROMIUM	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01
IRON	MG/L	0.06	0.15	<0.01	0.05	0.03
MERCURY	MG/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
MANGANESE	MG/L	0.18	0.18	0.06	0.19	0.19
SODIUM	MG/L	3440	555	4800	1100	3600
NICKEL	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01
LEAD	MG/L	<0.03	<0.03	<0.03	<0.03	<0.03
ANTIMONY	MG/L	<0.03	<0.03	<0.03	<0.03	<0.03
SELENIUM	MG/L	<0.05	<0.05	<0.05	<0.05	<0.05
VANADIUM	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01

AnalyticalTechnologies,Inc.

METALS - QUALITY CONTROL

DUP/MS

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D. : 412281

Parameters	REF I.D.	Units	Sample Result	Dup Result	RPD	Spiked Sample	Spike Conc	% Rec
ANTIMONY	412281-26	MG/L	<0.03	<0.03	0	1.80	2.00	90
ANTIMONY	412281-30	MG/L	<0.03	<0.03	0	1.82	2.00	91
ARSENIC	412281-26	MG/L	<0.05	<0.05	0	1.89	2.00	95
ARSENIC	412281-30	MG/L	<0.05	<0.05	0	1.88	2.00	94
BARIUM	412281-26	MG/L	0.07	0.07	0	3.56	4.00	87
BARIUM	412281-30	MG/L	0.07	0.07	0	3.58	4.00	88
BERYLLIUM	412281-26	MG/L	<0.005	<0.005	0	1.82	2.00	91
BERYLLIUM	412281-30	MG/L	<0.005	<0.005	0	1.84	2.00	92
CADMIUM	412281-26	MG/L	<0.01	<0.01	0	1.71	2.00	86
CADMIUM	412281-30	MG/L	<0.01	<0.01	0	1.67	2.00	84
CHROMIUM	412281-26	MG/L	<0.01	<0.01	0	1.74	2.00	87
CHROMIUM	412281-30	MG/L	<0.01	<0.01	0	1.75	2.00	88
COBALT	412281-26	MG/L	<0.01	0.01	N/A@S	3.30	4.00	83
COBALT	412281-30	MG/L	<0.01	<0.01	0	3.36	4.00	84
IRON	412281-26	MG/L	0.06	0.05	18	3.57	4.00	88
IRON	412281-30	MG/L	0.03	0.03	0	3.57	4.00	89
IRON	412281-16	MG/L	<0.01	<0.01	0	9.56	10.0	96
LEAD	412281-26	MG/L	<0.03	<0.03	0	1.73	2.00	86
LEAD	412281-30	MG/L	0.03	<0.03	0	1.77	2.00	88
MANGANESE	412281-26	MG/L	0.18	0.18	0	3.68	4.00	88
MANGANESE	412281-30	MG/L	0.19	0.18	5	3.71	4.00	88
MERCURY	412300-24	MG/L	<0.0005	<0.0005	0	0.0016	0.0020	80
MERCURY	412281-15	MG/L	<0.0005	<0.0005	0	0.0018	0.0020	90
NICKEL	412281-26	MG/L	<0.01	<0.01	0	1.69	2.00	85
NICKEL	412281-30	MG/L	<0.01	<0.01	0	1.71	2.00	86
SELENIUM	412281-26	MG/L	<0.05	<0.05	0	1.14	1.20	95
SELENIUM	412281-30	MG/L	<0.05	<0.05	0	1.13	1.20	94
SODIUM	412281-26	MG/L	3440	3460	1	3620	25.0	N/A*V
SODIUM	412281-30	MG/L	3600	3550	1	3440	25.0	N/A*V
VANADIUM	412281-26	MG/L	<0.01	<0.01	0	5.47	6.00	91
VANADIUM	412281-30	MG/L	<0.01	<0.01	0	5.52	6.00	92

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

AnalyticalTechnologies,Inc.

METALS - QUALITY CONTROL

BLANK SPIKE

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000 ATI I.D. : 412281
Project Name: GMP (GROUNDWATER MONITORING)

Parameters	Blank Spike ID#	Units	Blank Result	Spiked Sample	Spike Conc.	% Rec
ANTIMONY	53217	MG/L	<0.03	1.97	2.00	99
ANTIMONY	53219	MG/L	<0.03	1.98	2.00	99
ARSENIC	53402	MG/L	<0.05	2.01	2.00	101
ARSENIC	53403	MG/L	<0.05	2.00	2.00	100
BARIUM	53217	MG/L	<0.01	3.93	4.00	98
BARIUM	53219	MG/L	<0.01	3.99	4.00	100
BERYLLIUM	53217	MG/L	<0.005	2.04	2.00	102
BERYLLIUM	53219	MG/L	<0.005	2.02	2.00	101
CADMIUM	53577	MG/L	<0.01	2.04	2.00	102
CADMIUM	53578	MG/L	<0.01	2.01	2.00	100
CHROMIUM	53217	MG/L	<0.01	2.06	2.00	103
CHROMIUM	53219	MG/L	<0.01	2.01	2.00	101
COBALT	53217	MG/L	<0.01	3.95	4.00	99
COBALT	53219	MG/L	<0.01	3.92	4.00	98
IRON	53218	MG/L	<0.01	4.08	4.00	102
IRON	53220	MG/L	<0.01	4.02	4.00	101
IRON	53330	MG/L	<0.01	10.1	10.0	101
LEAD	53577	MG/L	<0.03	2.03	2.00	102
LEAD	53578	MG/L	<0.03	2.02	2.00	101
MANGANESE	53218	MG/L	<0.01	4.08	4.00	102
MANGANESE	53220	MG/L	<0.01	4.04	4.00	101
MERCURY	53313	MG/L	<0.0005	0.0021	0.0020	105
MERCURY	53314	MG/L	<0.0005	0.0020	0.0020	100
NICKEL	53217	MG/L	<0.01	2.03	2.00	102
NICKEL	53219	MG/L	<0.01	2.00	2.00	100
SELENIUM	53577	MG/L	<0.05	1.20	1.20	100
SELENIUM	53578	MG/L	<0.05	1.19	1.20	99
SODIUM	53218	MG/L	<0.1	23.7	25.0	95
SODIUM	53220	MG/L	<0.1	24.4	25.0	98
VANADIUM	53217	MG/L	<0.01	6.23	6.00	104
VANADIUM	53219	MG/L	<0.01	6.11	6.00	102

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

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412281
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
1	HCW2A	WATER	20-DEC-94	N/A	31-DEC-94	1.00
2	HCW2B	WATER	20-DEC-94	N/A	31-DEC-94	1.00
3	HCW2C	WATER	20-DEC-94	N/A	31-DEC-94	1.00

Parameter	Units	1	2	3
CARBON DISULFIDE	UG/L	<2	<2	<2
CHLOROMETHANE	UG/L	<10	<10	<10
CHLOROFORM	UG/L	<1	<1	<1
VINYL CHLORIDE	UG/L	<5	<5	<5
2-BUTANONE (MEK)	UG/L	<10	<10	<10
BROMOMETHANE	UG/L	<10	<10	<10
1,2-DICHLOROETHANE	UG/L	<1	<1	<1
CHLOROETHANE	UG/L	<5	<5	<5
ACETONE	UG/L	<10	<10	<10
BENZENE	UG/L	<1	1	<1
1,1-DICHLOROETHENE	UG/L	<1	<1	<1
TOLUENE	UG/L	<2	<2	<2
CHLOROBENZENE	UG/L	<1	<1	<1
METHYLENE CHLORIDE	UG/L	<5	<5	<5
ETHYLBENZENE	UG/L	<1	<1	<1
TRANS-1,2-DICHLOROETHENE	UG/L	<1	<1	<1
XYLENES (TOTAL)	UG/L	<1	<1	<1
1,1-DICHLOROETHANE	UG/L	<1	<1	<1
STYRENE	UG/L	<2	<2	<2
1,4-DIOXANE	UG/L	<200	<200	<200
CIS-1,2-DICHLOROETHENE	UG/L	<1	<1	<1
ETHYLENE DIBROMIDE	UG/L	<5	<5	<5
CYCLOHEXANE	UG/L	<10	<10	<10
1,1,1-TRICHLOROETHANE	UG/L	<1	<1	<1
CARBON TETRACHLORIDE	UG/L	<1	<1	<1
TRICHLOROETHENE	UG/L	<1	<1	<1
1,2-DICHLOROPROPANE	UG/L	<1	<1	<1
BROMODICHLOROMETHANE	UG/L	<1	<1	<1
4-METHYL-2-PENTANONE (MIBK)	UG/L	<10	<10	<10
CIS-1,3-DICHLOROPROPENE	UG/L	<1	<1	<1
TRANS-1,3-DICHLOROPROPENE	UG/L	<1	<1	<1
2-HEXANONE (MBK)	UG/L	<10	<10	<10
1,1,2-TRICHLOROETHANE	UG/L	<1	<1	<1
TETRACHLOROETHENE	UG/L	<1	<1	<1
DIBROMOCHLOROMETHANE	UG/L	<1	<1	<1
BROMOFORM	UG/L	<5	<5	<5
1,1,2,2-TETRACHLOROETHANE	UG/L	<2	<2	<2
DICHLORODIFLUOROMETHANE	UG/L	<10	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412281
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
1	HCW2A	WATER	20-DEC-94	N/A	31-DEC-94	1.00
2	HCW2B	WATER	20-DEC-94	N/A	31-DEC-94	1.00
3	HCW2C	WATER	20-DEC-94	N/A	31-DEC-94	1.00

Parameter	Units	1	2	3
TRICHLOROFLUOROMETHANE	UG/L	<5	<5	<5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	UG/L	<5	<5	<5
1,2-DICHLOROBENZENE	UG/L	<5	<5	<5
1,3-DICHLOROBENZENE	UG/L	<5	<5	<5
1,4-DICHLOROBENZENE	UG/L	<5	<5	<5
SURROGATES				
1,2-DICHLOROETHANE-D4	%	105	103	103
TOLUENE-D8	%	99	98	98
BFB	%	109	99	99

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412281
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
4	LCW2A	WATER	20-DEC-94	N/A	31-DEC-94	1.00
5	LCW2B	WATER	20-DEC-94	N/A	31-DEC-94	1.00
6	LCW2C	WATER	20-DEC-94	N/A	31-DEC-94	1.00

Parameter	Units	4	5	6
CARBON DISULFIDE	UG/L	<2	<2	<2
CHLOROMETHANE	UG/L	<10	<10	<10
CHLOROFORM	UG/L	<1	<1	<1
VINYL CHLORIDE	UG/L	<5	<5	<5
2-BUTANONE (MEK)	UG/L	<10	<10	<10
BROMOMETHANE	UG/L	<10	<10	<10
1,2-DICHLOROETHANE	UG/L	<1	<1	<1
CHLOROETHANE	UG/L	<5	<5	<5
ACETONE	UG/L	<10	<10	<10
BENZENE	UG/L	<1	1	<1
1,1-DICHLOROETHENE	UG/L	<1	<1	<1
TOLUENE	UG/L	<2	<2	<2
CHLOROBENZENE	UG/L	<1	<1	<1
METHYLENE CHLORIDE	UG/L	<5	<5	<5
ETHYLBENZENE	UG/L	<1	<1	<1
TRANS-1,2-DICHLOROETHENE	UG/L	<1	<1	<1
XYLENES (TOTAL)	UG/L	<1	<1	<1
1,1-DICHLOROETHANE	UG/L	<1	<1	<1
STYRENE	UG/L	<2	<2	<2
1,4-DIOXANE	UG/L	<200	<200	<200
CIS-1,2-DICHLOROETHENE	UG/L	<1	<1	<1
ETHYLENE DIBROMIDE	UG/L	<5	<5	<5
CYCLOHEXANE	UG/L	<10	<10	<10
1,1,1-TRICHLOROETHANE	UG/L	<1	<1	<1
CARBON TETRACHLORIDE	UG/L	<1	<1	<1
TRICHLOROETHENE	UG/L	<1	<1	<1
1,2-DICHLOROPROPANE	UG/L	<1	<1	<1
BROMODICHLOROMETHANE	UG/L	<1	<1	<1
4-METHYL-2-PENTANONE (MIBK)	UG/L	<10	<10	<10
CIS-1,3-DICHLOROPROPENE	UG/L	<1	<1	<1
TRANS-1,3-DICHLOROPROPENE	UG/L	<1	<1	<1
2-HEXANONE (MBK)	UG/L	<10	<10	<10
1,1,2-TRICHLOROETHANE	UG/L	<1	<1	<1
TETRACHLOROETHENE	UG/L	<1	<1	<1
DIBROMOCHLOROMETHANE	UG/L	<1	<1	<1
BROMOFORM	UG/L	<5	<5	<5
1,1,2,2-TETRACHLOROETHANE	UG/L	<2	<2	<2
DICHLORODIFLUOROMETHANE	UG/L	<10	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412281
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
4	LCW2A	WATER	20-DEC-94	N/A	31-DEC-94	1.00
5	LCW2B	WATER	20-DEC-94	N/A	31-DEC-94	1.00
6	LCW2C	WATER	20-DEC-94	N/A	31-DEC-94	1.00

Parameter	Units	4	5	6
TRICHLOROFLUOROMETHANE	UG/L	<5	<5	<5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	UG/L	<5	<5	<5
1,2-DICHLOROBENZENE	UG/L	<5	<5	<5
1,3-DICHLOROBENZENE	UG/L	<5	<5	<5
1,4-DICHLOROBENZENE	UG/L	<5	<5	<5
SURROGATES				
1,2-DICHLOROETHANE-D4	%	104	104	106
TOLUENE-D8	%	98	102	99
BFB	%	103	104	97

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412281
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
7	FB-2	WATER	20-DEC-94	N/A	31-DEC-94	1.00
8	HCW6A	WATER	20-DEC-94	N/A	31-DEC-94	1.00
9	HCW6B	WATER	20-DEC-94	N/A	31-DEC-94	1.00

Parameter	Units	7	8	9
CARBON DISULFIDE	UG/L	<2	<2	<2
CHLOROMETHANE	UG/L	<10	<10	<10
CHLOROFORM	UG/L	<1	<1	<1
VINYL CHLORIDE	UG/L	<5	<5	<5
2-BUTANONE (MEK)	UG/L	<10	<10	<10
BROMOMETHANE	UG/L	<10	<10	<10
1,2-DICHLOROETHANE	UG/L	<1	<1	<1
CHLOROETHANE	UG/L	<5	<5	<5
ACETONE	UG/L	<10	<10	<10
BENZENE	UG/L	<1	<1	<1
1,1-DICHLOROETHENE	UG/L	<1	<1	<1
TOLUENE	UG/L	<2	<2	<2
CHLOROBENZENE	UG/L	<1	<1	<1
METHYLENE CHLORIDE	UG/L	<5	<5	<5
ETHYLBENZENE	UG/L	<1	<1	<1
TRANS-1,2-DICHLOROETHENE	UG/L	<1	<1	<1
XYLENES (TOTAL)	UG/L	<1	<1	<1
1,1-DICHLOROETHANE	UG/L	<1	<1	<1
STYRENE	UG/L	<2	<2	<2
1,4-DIOXANE	UG/L	<200	<200	<200
CIS-1,2-DICHLOROETHENE	UG/L	<1	<1	<1
ETHYLENE DIBROMIDE	UG/L	<5	<5	<5
CYCLOHEXANE	UG/L	<10	<10	<10
1,1,1-TRICHLOROETHANE	UG/L	<1	<1	<1
CARBON TETRACHLORIDE	UG/L	<1	<1	<1
TRICHLOROETHENE	UG/L	<1	<1	<1
1,2-DICHLOROPROPANE	UG/L	<1	<1	<1
BROMODICHLOROMETHANE	UG/L	<1	<1	<1
4-METHYL-2-PENTANONE (MIBK)	UG/L	<10	<10	<10
CIS-1,3-DICHLOROPROPENE	UG/L	<1	<1	<1
TRANS-1,3-DICHLOROPROPENE	UG/L	<1	<1	<1
2-HEXANONE (MBK)	UG/L	<10	<10	<10
1,1,2-TRICHLOROETHANE	UG/L	<1	<1	<1
TETRACHLOROETHENE	UG/L	<1	<1	<1
DIBROMOCHLOROMETHANE	UG/L	<1	<1	<1
BROMOFORM	UG/L	<5	<5	<5
1,1,2,2-TETRACHLOROETHANE	UG/L	<2	<2	<2
DICHLORODIFLUOROMETHANE	UG/L	<10	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412281
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
7	FB-2	WATER	20-DEC-94	N/A	31-DEC-94	1.00
8	HCW6A	WATER	20-DEC-94	N/A	31-DEC-94	1.00
9	HCW6B	WATER	20-DEC-94	N/A	31-DEC-94	1.00

Parameter	Units	7	8	9
TRICHLOROFLUOROMETHANE	UG/L	<5	<5	<5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	UG/L	<5	<5	<5
1,2-DICHLOROBENZENE	UG/L	<5	<5	<5
1,3-DICHLOROBENZENE	UG/L	<5	<5	<5
1,4-DICHLOROBENZENE	UG/L	<5	<5	<5
SURROGATES				
1,2-DICHLOROETHANE-D4	%	105	103	99
TOLUENE-D8	%	99	101	99
BFB	%	97	100	97

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412281
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
10	HCW7A	WATER	20-DEC-94	N/A	31-DEC-94	1.00
11	HCW7B	WATER	20-DEC-94	N/A	31-DEC-94	1.00
12	LCW6A	WATER	20-DEC-94	N/A	31-DEC-94	1.00

Parameter	Units	10	11	12
CARBON DISULFIDE	UG/L	<2	<2	<2
CHLOROMETHANE	UG/L	<10	<10	<10
CHLOROFORM	UG/L	<1	<1	<1
VINYL CHLORIDE	UG/L	<5	<5	<5
2-BUTANONE (MEK)	UG/L	<10	<10	<10
BROMOMETHANE	UG/L	<10	<10	<10
1,2-DICHLOROETHANE	UG/L	<1	<1	<1
CHLOROETHANE	UG/L	<5	<5	<5
ACETONE	UG/L	<10	<10	<10
BENZENE	UG/L	<1	<1	<1
1,1-DICHLOROETHENE	UG/L	<1	<1	<1
TOLUENE	UG/L	<2	<2	<2
CHLOROBENZENE	UG/L	<1	<1	<1
METHYLENE CHLORIDE	UG/L	<5	<5	<5
ETHYLBENZENE	UG/L	<1	<1	<1
TRANS-1,2-DICHLOROETHENE	UG/L	<1	<1	<1
XYLENES (TOTAL)	UG/L	<1	<1	<1
1,1-DICHLOROETHANE	UG/L	<1	<1	<1
STYRENE	UG/L	<2	<2	<2
1,4-DIOXANE	UG/L	<200	<200	<200
CIS-1,2-DICHLOROETHENE	UG/L	<1	<1	<1
ETHYLENE DIBROMIDE	UG/L	<5	<5	<5
CYCLOHEXANE	UG/L	<10	<10	<10
1,1,1-TRICHLOROETHANE	UG/L	<1	<1	<1
CARBON TETRACHLORIDE	UG/L	<1	<1	<1
TRICHLOROETHENE	UG/L	<1	<1	<1
1,2-DICHLOROPROPANE	UG/L	<1	<1	<1
BROMODICHLOROMETHANE	UG/L	<1	<1	<1
4-METHYL-2-PENTANONE (MIBK)	UG/L	<10	<10	<10
CIS-1,3-DICHLOROPROPENE	UG/L	<1	<1	<1
TRANS-1,3-DICHLOROPROPENE	UG/L	<1	<1	<1
2-HEXANONE (MBK)	UG/L	<10	<10	<10
1,1,2-TRICHLOROETHANE	UG/L	<1	<1	<1
TETRACHLOROETHENE	UG/L	<1	<1	<1
DIBROMOCHLOROMETHANE	UG/L	<1	<1	<1
BROMOFORM	UG/L	<5	<5	<5
1,1,2,2-TETRACHLOROETHANE	UG/L	<2	<2	<2
DICHLORODIFLUOROMETHANE	UG/L	<10	<10	<10

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412281
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
10	HCW7A	WATER	20-DEC-94	N/A	31-DEC-94	1.00
11	HCW7B	WATER	20-DEC-94	N/A	31-DEC-94	1.00
12	LCW6A	WATER	20-DEC-94	N/A	31-DEC-94	1.00

Parameter	Units	10	11	12
TRICHLOROFLUOROMETHANE	UG/L	<5	<5	<5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	UG/L	<5	<5	<5
1,2-DICHLOROBENZENE	UG/L	<5	<5	<5
1,3-DICHLOROBENZENE	UG/L	<5	<5	<5
1,4-DICHLOROBENZENE	UG/L	<5	<5	<5
SURROGATES				
1,2-DICHLOROETHANE-D4	%	106	106	101
TOLUENE-D8	%	100	96	98
BFB	%	105	102	98

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412281
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
13	LCW6B	WATER	20-DEC-94	N/A	31-DEC-94	1.00
14	LCW7A	WATER	20-DEC-94	N/A	31-DEC-94	1.00
15	LCW7B	WATER	20-DEC-94	N/A	01-JAN-95	1.00

Parameter	Units	13	14	15
CARBON DISULFIDE	UG/L	<2	<2	2
CHLOROMETHANE	UG/L	<10	<10	<10
CHLOROFORM	UG/L	<1	<1	<1
VINYL CHLORIDE	UG/L	<5	<5	<5
2-BUTANONE (MEK)	UG/L	<10	<10	<10
BROMOMETHANE	UG/L	<10	<10	<10
1,2-DICHLOROETHANE	UG/L	<1	<1	<1
CHLOROETHANE	UG/L	<5	<5	<5
ACETONE	UG/L	<10	<10	<10
BENZENE	UG/L	<1	<1	<1
1,1-DICHLOROETHENE	UG/L	<1	<1	<1
TOLUENE	UG/L	<2	<2	<2
CHLOROBENZENE	UG/L	<1	<1	<1
METHYLENE CHLORIDE	UG/L	<5	<5	<5
ETHYLBENZENE	UG/L	<1	<1	<1
TRANS-1,2-DICHLOROETHENE	UG/L	<1	<1	<1
XYLENES (TOTAL)	UG/L	<1	<1	<1
1,1-DICHLOROETHANE	UG/L	<1	<1	<1
STYRENE	UG/L	<2	<2	<2
1,4-DIOXANE	UG/L	<200	<200	<200
CIS-1,2-DICHLOROETHENE	UG/L	<1	<1	<1
ETHYLENE DIBROMIDE	UG/L	<5	<5	<5
CYCLOHEXANE	UG/L	<10	<10	<10
1,1,1-TRICHLOROETHANE	UG/L	<1	<1	<1
CARBON TETRACHLORIDE	UG/L	<1	<1	<1
TRICHLOROETHENE	UG/L	<1	<1	<1
1,2-DICHLOROPROPANE	UG/L	<1	<1	<1
BROMODICHLOROMETHANE	UG/L	<1	<1	<1
4-METHYL-2-PENTANONE (MIBK)	UG/L	<10	<10	<10
CIS-1,3-DICHLOROPROPENE	UG/L	<1	<1	<1
TRANS-1,3-DICHLOROPROPENE	UG/L	<1	<1	<1
2-HEXANONE (MBK)	UG/L	<10	<10	<10
1,1,2-TRICHLOROETHANE	UG/L	<1	<1	<1
TETRACHLOROETHENE	UG/L	<1	<1	<1
DIBROMOCHLOROMETHANE	UG/L	<1	<1	<1
BROMOFORM	UG/L	<5	<5	<5
1,1,2,2-TETRACHLOROETHANE	UG/L	<2	<2	<2
DICHLORODIFLUOROMETHANE	UG/L	<10	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412281
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
13	LCW6B	WATER	20-DEC-94	N/A	31-DEC-94	1.00
14	LCW7A	WATER	20-DEC-94	N/A	31-DEC-94	1.00
15	LCW7B	WATER	20-DEC-94	N/A	01-JAN-95	1.00

Parameter	Units	13	14	15
TRICHLOROFLUOROMETHANE	UG/L	<5	<5	<5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	UG/L	<5	<5	<5
1,2-DICHLOROBENZENE	UG/L	<5	<5	<5
1,3-DICHLOROBENZENE	UG/L	<5	<5	<5
1,4-DICHLOROBENZENE	UG/L	<5	<5	<5
SURROGATES				
1,2-DICHLOROETHANE-D4	%	102	106	96
TOLUENE-D8	%	100	98	102
BFB	%	95	103	99

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412281
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
31	TB-2 (SDGCMS 1115)	WATER	20-DEC-94	N/A	31-DEC-94	1.00

Parameter	Units	31
CARBON DISULFIDE	UG/L	<2
CHLOROMETHANE	UG/L	<10
CHLOROFORM	UG/L	<1
VINYL CHLORIDE	UG/L	<5
2-BUTANONE (MEK)	UG/L	<10
BROMOMETHANE	UG/L	<10
1,2-DICHLOROETHANE	UG/L	<1
CHLOROETHANE	UG/L	<5
ACETONE	UG/L	<10
BENZENE	UG/L	<1
1,1-DICHLOROETHENE	UG/L	<1
TOLUENE	UG/L	<2
CHLOROBENZENE	UG/L	<1
METHYLENE CHLORIDE	UG/L	<5
ETHYLBENZENE	UG/L	<1
TRANS-1,2-DICHLOROETHENE	UG/L	<1
XYLENES (TOTAL)	UG/L	<1
1,1-DICHLOROETHANE	UG/L	<1
STYRENE	UG/L	<2
1,4-DIOXANE	UG/L	<200
CIS-1,2-DICHLOROETHENE	UG/L	<1
ETHYLENE DIBROMIDE	UG/L	<5
CYCLOHEXANE	UG/L	<10
1,1,1-TRICHLOROETHANE	UG/L	<1
CARBON TETRACHLORIDE	UG/L	<1
TRICHLOROETHENE	UG/L	<1
1,2-DICHLOROPROPANE	UG/L	<1
BROMODICHLOROMETHANE	UG/L	<1
4-METHYL-2-PENTANONE (MIBK)	UG/L	<10
CIS-1,3-DICHLOROPROPENE	UG/L	<1
TRANS-1,3-DICHLOROPROPENE	UG/L	<1
2-HEXANONE (MBK)	UG/L	<10
1,1,2-TRICHLOROETHANE	UG/L	<1
TETRACHLOROETHENE	UG/L	<1
DIBROMOCHLOROMETHANE	UG/L	<1
BROMOFORM	UG/L	<5
1,1,2,2-TETRACHLOROETHANE	UG/L	<2
DICHLORODIFLUOROMETHANE	UG/L	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412281
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
31	TB-2 (SDGCMS 1115)	WATER	20-DEC-94	N/A	31-DEC-94	1.00

Parameter	Units	31
TRICHLOROFLUOROMETHANE	UG/L	<5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	UG/L	<5
1,2-DICHLOROBENZENE	UG/L	<5
1,3-DICHLOROBENZENE	UG/L	<5
1,4-DICHLOROBENZENE	UG/L	<5
SURROGATES		
1,2-DICHLOROETHANE-D4	%	105
TOLUENE-D8	%	96
BFB	%	96

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Blank I.D. : 33757
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D. : 412281
Date Extracted: N/A
Date Analyzed : 01-JAN-95
Dil. Factor : 1.00

Parameters	Units	Results
CHLOROMETHANE	UG/L	<10
CARBON DISULFIDE	UG/L	<2
CHLOROFORM	UG/L	<1
VINYL CHLORIDE	UG/L	<5
BROMOMETHANE	UG/L	<10
2-BUTANONE (MEK)	UG/L	<10
1,2-DICHLOROETHANE	UG/L	<1
CHLOROETHANE	UG/L	<5
ACETONE	UG/L	<10
BENZENE	UG/L	<1
TOLUENE	UG/L	<2
1,1-DICHLOROETHENE	UG/L	<1
CHLOROBENZENE	UG/L	<1
METHYLENE CHLORIDE	UG/L	<5
ETHYLBENZENE	UG/L	<1
XYLENES (TOTAL)	UG/L	<1
TRANS-1,2-DICHLOROETHENE	UG/L	<1
STYRENE	UG/L	<2
1,1-DICHLOROETHANE	UG/L	<1
1,4-DIOXANE	UG/L	<200
CIS-1,2-DICHLOROETHENE	UG/L	<1
ETHYLENE DIBROMIDE	UG/L	<5
CYCLOHEXANE	UG/L	<10
1,1,1-TRICHLOROETHANE	UG/L	<1
CARBON TETRACHLORIDE	UG/L	<1
TRICHLOROETHENE	UG/L	<1
1,2-DICHLOROPROPANE	UG/L	<1
BROMODICHLOROMETHANE	UG/L	<1
4-METHYL-2-PENTANONE (MIBK)	UG/L	<10
CIS-1,3-DICHLOROPROPENE	UG/L	<1
TRANS-1,3-DICHLOROPROPENE	UG/L	<1
2-HEXANONE (MBK)	UG/L	<10
1,1,2-TRICHLOROETHANE	UG/L	<1
TETRACHLOROETHENE	UG/L	<1
DIBROMOCHLOROMETHANE	UG/L	<1
BROMOFORM	UG/L	<5
1,1,2,2-TETRACHLOROETHANE	UG/L	<2
DICHLORODIFLUOROMETHANE	UG/L	<10
TRICHLOROFLUOROMETHANE	UG/L	<5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	UG/L	<5
1,2-DICHLOROBENZENE	UG/L	<5
1,3-DICHLOROBENZENE	UG/L	<5
1,4-DICHLOROBENZENE	UG/L	<5

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Blank I.D. : 33757
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D. : 412281
Date Extracted: N/A
Date Analyzed : 01-JAN-95
Dil. Factor : 1.00

Parameters	Units	Results
SURROGATES		
1,2-DICHLOROETHANE-D4	%	95
TOLUENE-D8	%	100
BFB	%	94

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Blank I.D. : 33760
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D. : 412281
Date Extracted: N/A
Date Analyzed : 30-DEC-94
Dil. Factor : 1.00

Parameters	Units	Results
CHLOROMETHANE	UG/L	<10
CARBON DISULFIDE	UG/L	<2
CHLOROFORM	UG/L	<1
VINYL CHLORIDE	UG/L	<5
BROMOMETHANE	UG/L	<10
2-BUTANONE (MEK)	UG/L	<10
1,2-DICHLOROETHANE	UG/L	<1
CHLOROETHANE	UG/L	<5
ACETONE	UG/L	<10
BENZENE	UG/L	<1
TOLUENE	UG/L	<2
1,1-DICHLOROETHENE	UG/L	<1
CHLOROBENZENE	UG/L	<1
METHYLENE CHLORIDE	UG/L	<5
ETHYLBENZENE	UG/L	<1
XYLENES (TOTAL)	UG/L	<1
TRANS-1,2-DICHLOROETHENE	UG/L	<1
STYRENE	UG/L	<2
1,1-DICHLOROETHANE	UG/L	<1
1,4-DIOXANE	UG/L	<200
CIS-1,2-DICHLOROETHENE	UG/L	<1
ETHYLENE DIBROMIDE	UG/L	<5
CYCLOHEXANE	UG/L	<10
1,1,1-TRICHLOROETHANE	UG/L	<1
CARBON TETRACHLORIDE	UG/L	<1
TRICHLOROETHENE	UG/L	<1
1,2-DICHLOROPROPANE	UG/L	<1
BROMODICHLOROMETHANE	UG/L	<1
4-METHYL-2-PENTANONE (MIBK)	UG/L	<10
CIS-1,3-DICHLOROPROPENE	UG/L	<1
TRANS-1,3-DICHLOROPROPENE	UG/L	<1
2-HEXANONE (MBK)	UG/L	<10
1,1,2-TRICHLOROETHANE	UG/L	<1
TETRACHLOROETHENE	UG/L	<1
DIBROMOCHLOROMETHANE	UG/L	<1
BROMOFORM	UG/L	<5
1,1,2,2-TETRACHLOROETHANE	UG/L	<2
DICHLORODIFLUOROMETHANE	UG/L	<10
TRICHLOROFLUOROMETHANE	UG/L	<5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	UG/L	<5
1,2-DICHLOROBENZENE	UG/L	<5
1,3-DICHLOROBENZENE	UG/L	<5
1,4-DICHLOROBENZENE	UG/L	<5

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GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Blank I.D. : 33760
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D. : 412281
Date Extracted: N/A
Date Analyzed : 30-DEC-94
Dil. Factor : 1.00

Parameters	Units	Results
SURROGATES		
1,2-DICHLOROETHANE-D4	%	96
TOLUENE-D8	%	100
BFB	%	94

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Blank I.D. : 33761
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D. : 412281
Date Extracted: N/A
Date Analyzed : 31-DEC-94
Dil. Factor : 1.00

Parameters	Units	Results
CHLOROMETHANE	UG/L	<10
CARBON DISULFIDE	UG/L	<2
CHLOROFORM	UG/L	<1
VINYL CHLORIDE	UG/L	<5
BROMOMETHANE	UG/L	<10
2-BUTANONE (MEK)	UG/L	<10
1,2-DICHLOROETHANE	UG/L	<1
CHLOROETHANE	UG/L	<5
ACETONE	UG/L	<10
BENZENE	UG/L	<1
TOLUENE	UG/L	<2
1,1-DICHLOROETHENE	UG/L	<1
CHLOROBENZENE	UG/L	<1
METHYLENE CHLORIDE	UG/L	<5
ETHYLBENZENE	UG/L	<1
XYLENES (TOTAL)	UG/L	<1
TRANS-1,2-DICHLOROETHENE	UG/L	<1
STYRENE	UG/L	<2
1,1-DICHLOROETHANE	UG/L	<1
1,4-DIOXANE	UG/L	<200
CIS-1,2-DICHLOROETHENE	UG/L	<1
ETHYLENE DIBROMIDE	UG/L	<5
CYCLOHEXANE	UG/L	<10
1,1,1-TRICHLOROETHANE	UG/L	<1
CARBON TETRACHLORIDE	UG/L	<1
TRICHLOROETHENE	UG/L	<1
1,2-DICHLOROPROPANE	UG/L	<1
BROMODICHLOROMETHANE	UG/L	<1
4-METHYL-2-PENTANONE (MIBK)	UG/L	<10
CIS-1,3-DICHLOROPROPENE	UG/L	<1
TRANS-1,3-DICHLOROPROPENE	UG/L	<1
2-HEXANONE (MBK)	UG/L	<10
1,1,2-TRICHLOROETHANE	UG/L	<1
TETRACHLOROETHENE	UG/L	<1
DIBROMOCHLOROMETHANE	UG/L	<1
BROMOFORM	UG/L	<5
1,1,2,2-TETRACHLOROETHANE	UG/L	<2
DICHLORODIFLUOROMETHANE	UG/L	<10
TRICHLOROFLUOROMETHANE	UG/L	<5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	UG/L	<5
1,2-DICHLOROBENZENE	UG/L	<5
1,3-DICHLOROBENZENE	UG/L	<5
1,4-DICHLOROBENZENE	UG/L	<5

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GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Blank I.D. : 33761
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D. : 412281
Date Extracted: N/A
Date Analyzed : 31-DEC-94
Dil. Factor : 1.00

Parameters	Units	Results
SURROGATES		
1,2-DICHLOROETHANE-D4	%	98
TOLUENE-D8	%	100
BFB	%	96

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

MSMSD

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
MSMSD # : 71427
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.

Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D. : 412281
Date Extracted: N/A
Date Analyzed : 31-DEC-94
Sample Matrix : WATER
REF I.D. : 412281-11

Parameters	Units	Sample Result	Conc Spike	Spiked Sample	% Rec	Dup Spike	Dup % Rec	RPD
BENZENE	UG/L	<1	50	51	102	51	102	0
1,1-DICHLOROETHENE	UG/L	<1	50	56	112	51	102	9
TOLUENE	UG/L	<2	50	54	108	53	106	2
CHLOROBENZENE	UG/L	<1	50	57	114	56	112	2
TRICHLOROETHENE	UG/L	<1	50	56	112	54	108	4

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

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GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

MSMSD

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
MSMSD # : 71428
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.

Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D. : 412281
Date Extracted: N/A
Date Analyzed : 03-JAN-95
Sample Matrix : WATER
REF I.D. : 412316-10

Parameters	Units	Sample Result	Conc Spike	Spiked Sample	% Rec	Dup Spike	Dup % Rec	RPD
BENZENE	UG/L	<1	50	50	100	47	94	6
1,1-DICHLOROETHENE	UG/L	<1	50	49	98	45	90	9
TOLUENE	UG/L	<2	50	51	102	47	94	8
CHLOROBENZENE	UG/L	<1	50	55	110	51	102	8
TRICHLOROETHENE	UG/L	<1	50	54	108	51	102	6

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

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GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

BLANK SPIKE

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Blank Spike #: 53105
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name : GMP (GROUNDWATER MONITORING)

ATI I.D. : 412281
Date Extracted: N/A
Date Analyzed : 01-JAN-95
Sample Matrix : WATER

Parameters	Units	Blank Result	Spiked Sample	Spike Conc.	% Rec
BENZENE	UG/L	<1	53	50	106
1,1-DICHLOROETHENE	UG/L	<1	62	50	124
TOLUENE	UG/L	<2	55	50	110
CHLOROBENZENE	UG/L	<1	57	50	114
TRICHLOROETHENE	UG/L	<1	57	50	114

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

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

BLANK SPIKE

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Blank Spike #: 53122
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name : GMP (GROUNDWATER MONITORING)

ATI I.D. : 412281
Date Extracted: N/A
Date Analyzed : 31-DEC-94
Sample Matrix : WATER

Parameters	Units	Blank Result	Spiked Sample	Spike Conc.	% Rec
BENZENE	UG/L	<1	50	50	100
1,1-DICHLOROETHENE	UG/L	<1	50	50	100
TOLUENE	UG/L	<2	51	50	102
CHLOROBENZENE	UG/L	<1	53	50	106
TRICHLOROETHENE	UG/L	<1	54	50	108

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

AnalyticalTechnologies, Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412281
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
1	HCW2A	WATER	20-DEC-94	27-DEC-94	13-JAN-95	1.00
2	HCW2B	WATER	20-DEC-94	27-DEC-94	13-JAN-95	1.00
3	HCW2C	WATER	20-DEC-94	27-DEC-94	13-JAN-95	1.00

Parameter	Units	1	2	3
ANTHRACENE	UG/L	<10	<10	<10
N-NITROSODIMETHYLAMINE	UG/L	<15	<15	<15
BENZO(a)ANTHRACENE	UG/L	<10	<10	<10
BENZO(b)FLUORANTHENE	UG/L	<10	<10	<10
ANILINE	UG/L	<10	<10	<10
BENZO(k)FLUORANTHENE	UG/L	<10	<10	<10
BENZO(a)PYRENE	UG/L	<10	<10	<10
BIS(2-CHLOROETHYL)ETHER	UG/L	<10	<10	<10
2-CHLOROPHENOL	UG/L	<10	<10	<10
BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	<10	<10	<10
BUTYLBENZYLPHTHALATE	UG/L	<10	<10	<10
CHRYSENE	UG/L	<10	<10	<10
BENZYL ALCOHOL	UG/L	<10	<10	<10
DIBENZ(a,h)ACRIDINE	UG/L	<10	<10	<10
DIBENZ(a,h)ANTHRACENE	UG/L	<10	<10	<10
1,2-DICHLOROBENZENE	UG/L	<10	<10	<10
1,3-DICHLOROBENZENE	UG/L	<10	<10	<10
BIS(2-CHLOROISOPROPYL)ETHER	UG/L	<15	<15	<15
1,4-DICHLOROBENZENE	UG/L	<10	<10	<10
4-METHYLPHENOL	UG/L	<10	<10	<10
DIETHYLPHTHALATE	UG/L	<10	<10	<10
N-NITROSO-DI-N-PROPYLAMINE	UG/L	<15	<15	<15
7,12-DIMETHYLBENZO(a)ANTHRACENE	UG/L	<10	<10	<10
HEXACHLOROETHANE	UG/L	<10	<10	<10
DIMETHYLPHTHALATE	UG/L	<10	<10	<10
NITROBENZENE	UG/L	<10	<10	<10
DI-N-BUTYLPHTHALATE	UG/L	<10	<10	<10
ISOPHORONE	UG/L	<10	<10	<10
2-NITROPHENOL	UG/L	<10	<10	<10
DI-N-OCTYLPHTHALATE	UG/L	<10	<10	<10
BENZOIC ACID	UG/L	<50	<50	<50
BIS(2-CHLOROETHOXY)METHANE	UG/L	<10	<10	<10
2,4-DICHLOROPHENOL	UG/L	<10	<10	<10
FLUORANTHENE	UG/L	<10	<10	<10
1,2,4-TRICHLOROBENZENE	UG/L	<10	<10	<10
NAPHTHALENE	UG/L	<10	<10	<10
PHENANTHRENE	UG/L	<10	<10	<10
4-CHLOROANILINE	UG/L	<10	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412281
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
1	HCW2A	WATER	20-DEC-94	27-DEC-94	13-JAN-95	1.00
2	HCW2B	WATER	20-DEC-94	27-DEC-94	13-JAN-95	1.00
3	HCW2C	WATER	20-DEC-94	27-DEC-94	13-JAN-95	1.00

Parameter	Units	1	2	3
PYRENE	UG/L	<10	<10	<10
HEXACHLOROBUTADIENE	UG/L	<10	<10	<10
2-METHYLNAPHTHALENE	UG/L	<10	<10	<10
4-CHLORO-3-METHYLPHENOL	UG/L	<10	<10	<10
BENZENETHIOL	UG/L	<10	<10	<10
4-NITROPHENOL	UG/L	<50	<50	<50
2,4-DIMETHYLPHENOL	UG/L	<10	<10	<10
2,4-DINITROPHENOL	UG/L	<50	<50	<50
PHENOL	UG/L	<10	<10	<10
2-METHYLPHENOL	UG/L	<10	<10	<10
3- & 4-METHYLPHENOL	UG/L	<10	<10	<10
HEXACHLOROCYCLOPENTADIENE	UG/L	<10	<10	<10
2,4,6-TRICHLOROPHENOL	UG/L	<10	<10	<10
2,4,5-TRICHLOROPHENOL	UG/L	<50	<50	<50
2-CHLORONAPHTHALENE	UG/L	<10	<10	<10
2-NITROANILINE	UG/L	<50	<50	<50
ACENAPHTHYLENE	UG/L	<10	<10	<10
2,6-DINITROTOLUENE	UG/L	<10	<10	<10
3-NITROANILINE	UG/L	<50	<50	<50
ACENAPHTHENE	UG/L	<10	<10	<10
DIBENZOFURAN	UG/L	<10	<10	<10
2,4-DINITROTOLUENE	UG/L	<10	<10	<10
4-CHLOROPHENYL-PHENYLETHER	UG/L	<10	<10	<10
FLUORENE	UG/L	<10	<10	<10
4-NITROANILINE	UG/L	<50	<50	<50
2-METHYL-4,6-DINITROPHENOL	UG/L	<50	<50	<50
N-NITROSODIPHENYLAMINE	UG/L	<10	<10	<10
4-BROMOPHENYL-PHENYLETHER	UG/L	<10	<10	<10
HEXACHLOROBENZENE	UG/L	<10	<10	<10
PENTACHLOROPHENOL	UG/L	<50	<50	<50
3,3'-DICHLOROBENZIDINE	UG/L	<20	<20	<20
INDENO(1,2,3-cd)PYRENE	UG/L	<10	<10	<10
INDENE	UG/L	<10	<10	<10
1-METHYLNAPHTHALENE	UG/L	<10	14	<10
PYRIDINE	UG/L	<50	<50	<50
QUINOLINE	UG/L	<50	<50	<50
6-METHYL CHRYSENE	UG/L	<10	<10	<10
BENZO(g,h,i)PERYLENE	UG/L	<10	<10	<10

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GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412281
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
1	HCW2A	WATER	20-DEC-94	27-DEC-94	13-JAN-95	1.00
2	HCW2B	WATER	20-DEC-94	27-DEC-94	13-JAN-95	1.00
3	HCW2C	WATER	20-DEC-94	27-DEC-94	13-JAN-95	1.00

Parameter	Units	1	2	3
SURROGATES				
NITROBENZENE-D5	%	62	91	68
2-FLUOROBIPHENYL	%	83	107	79
TERPHENYL-D14	%	83	79	80
PHENOL-D6	%	101	109	81
2-FLUOROPHENOL	%	91	90	74
2,4,6-TRIBROMOPHENOL	%	120	107	88

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412281
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
4	LCW2A	WATER	20-DEC-94	27-DEC-94	13-JAN-95	1.00
5	LCW2B	WATER	20-DEC-94	27-DEC-94	13-JAN-95	1.00
6	LCW2C	WATER	20-DEC-94	27-DEC-94	17-JAN-95	1.00

Parameter	Units	4	5	6
ANTHRACENE	UG/L	<10	<10	<10
N-NITROSODIMETHYLAMINE	UG/L	<15	<15	<15
BENZO(a)ANTHRACENE	UG/L	<10	<10	<10
BENZO(b)FLUORANTHENE	UG/L	<10	<10	<10
ANILINE	UG/L	<10	<10	<10
BENZO(k)FLUORANTHENE	UG/L	<10	<10	<10
BENZO(a)PYRENE	UG/L	<10	<10	<10
BIS(2-CHLOROETHYL)ETHER	UG/L	<10	<10	<10
2-CHLOROPHENOL	UG/L	<10	<10	<10
BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	<10	<10	<10
BUTYLBENZYLPHTHALATE	UG/L	<10	<10	<10
CHRYSENE	UG/L	<10	<10	<10
BENZYL ALCOHOL	UG/L	<10	<10	<10
DIBENZ(a,h)ACRIDINE	UG/L	<10	<10	<10
DIBENZ(a,h)ANTHRACENE	UG/L	<10	<10	<10
1,2-DICHLOROBENZENE	UG/L	<10	<10	<10
1,3-DICHLOROBENZENE	UG/L	<10	<10	<10
BIS(2-CHLOROISOPROPYL)ETHER	UG/L	<15	<15	<15
1,4-DICHLOROBENZENE	UG/L	<10	<10	<10
4-METHYLPHENOL	UG/L	<10	<10	<10
DIETHYLPHTHALATE	UG/L	<10	<10	<10
N-NITROSO-DI-N-PROPYLAMINE	UG/L	<15	<15	<15
7,12-DIMETHYLBENZO(a)ANTHRACENE	UG/L	<10	<10	<10
HEXACHLOROETHANE	UG/L	<10	<10	<10
DIMETHYLPHTHALATE	UG/L	<10	<10	<10
NITROBENZENE	UG/L	<10	<10	<10
DI-N-BUTYLPHTHALATE	UG/L	<10	<10	<10
ISOPHORONE	UG/L	<10	<10	<10
2-NITROPHENOL	UG/L	<10	<10	<10
DI-N-OCTYLPHTHALATE	UG/L	<10	<10	<10
BENZOIC ACID	UG/L	<50	<50	<50
BIS(2-CHLOROETHOXY)METHANE	UG/L	<10	<10	<10
2,4-DICHLOROPHENOL	UG/L	<10	<10	<10
FLUORANTHENE	UG/L	<10	<10	<10
1,2,4-TRICHLOROBENZENE	UG/L	<10	<10	<10
NAPHTHALENE	UG/L	<10	<10	<10
PHENANTHRENE	UG/L	<10	<10	<10
4-CHLOROANILINE	UG/L	<10	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412281
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
4	LCW2A	WATER	20-DEC-94	27-DEC-94	13-JAN-95	1.00
5	LCW2B	WATER	20-DEC-94	27-DEC-94	13-JAN-95	1.00
6	LCW2C	WATER	20-DEC-94	27-DEC-94	17-JAN-95	1.00

Parameter	Units	4	5	6
PYRENE	UG/L	<10	<10	<10
HEXACHLOROBUTADIENE	UG/L	<10	<10	<10
2-METHYLNAPHTHALENE	UG/L	<10	<10	<10
4-CHLORO-3-METHYLPHENOL	UG/L	<10	<10	<10
BENZENETHIOL	UG/L	<10	<10	<10
4-NITROPHENOL	UG/L	<50	<50	<50
2,4-DIMETHYLPHENOL	UG/L	<10	<10	<10
2,4-DINITROPHENOL	UG/L	<50	<50	<50
PHENOL	UG/L	<10	<10	<10
2-METHYLPHENOL	UG/L	<10	<10	<10
3- & 4-METHYLPHENOL	UG/L	<10	<10	<10
HEXACHLOROCYCLOPENTADIENE	UG/L	<10	<10	<10
2,4,6-TRICHLOROPHENOL	UG/L	<10	<10	<10
2,4,5-TRICHLOROPHENOL	UG/L	<50	<50	<50
2-CHLORONAPHTHALENE	UG/L	<10	<10	<10
2-NITROANILINE	UG/L	<50	<50	<50
ACENAPHTHYLENE	UG/L	<10	<10	<10
2,6-DINITROTOLUENE	UG/L	<10	<10	<10
3-NITROANILINE	UG/L	<50	<50	<50
ACENAPHTHENE	UG/L	<10	<10	<10
DIBENZOFURAN	UG/L	<10	<10	<10
2,4-DINITROTOLUENE	UG/L	<10	<10	<10
4-CHLOROPHENYL-PHENYLETHER	UG/L	<10	<10	<10
FLUORENE	UG/L	<10	<10	<10
4-NITROANILINE	UG/L	<50	<50	<50
2-METHYL-4,6-DINITROPHENOL	UG/L	<50	<50	<50
N-NITROSODIPHENYLAMINE	UG/L	<10	<10	<10
4-BROMOPHENYL-PHENYLETHER	UG/L	<10	<10	<10
HEXACHLOROBENZENE	UG/L	<10	<10	<10
PENTACHLOROPHENOL	UG/L	<50	<50	<50
3,3'-DICHLOROBENZIDINE	UG/L	<20	<20	<20
INDENO(1,2,3-cd)PYRENE	UG/L	<10	<10	<10
INDENE	UG/L	<10	<10	<10
1-METHYLNAPHTHALENE	UG/L	<10	19	<10
PYRIDINE	UG/L	<50	<50	<50
QUINOLINE	UG/L	<50	<50	<50
6-METHYL CHRYSENE	UG/L	<10	<10	<10
BENZO(g,h,i)PERYLENE	UG/L	<10	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412281
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
4	LCW2A	WATER	20-DEC-94	27-DEC-94	13-JAN-95	1.00
5	LCW2B	WATER	20-DEC-94	27-DEC-94	13-JAN-95	1.00
6	LCW2C	WATER	20-DEC-94	27-DEC-94	17-JAN-95	1.00

Parameter	Units	4	5	6
SURROGATES				
NITROBENZENE-D5	%	60	91	89
2-FLUOROBIPHENYL	%	76	111	128
TERPHENYL-D14	%	86	67	94
PHENOL-D6	%	115	110	102
2-FLUOROPHENOL	%	105	85	86
2,4,6-TRIBROMOPHENOL	%	127	100	147*T

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GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412281
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
7	FB-2	WATER	20-DEC-94	27-DEC-94	17-JAN-95	1.00
8	HCW6A	WATER	20-DEC-94	27-DEC-94	17-JAN-95	1.00
9	HCW6B	WATER	20-DEC-94	27-DEC-94	17-JAN-95	1.00

Parameter	Units	7	8	9
ANTHRACENE	UG/L	<10	<10	<10
N-NITROSODIMETHYLAMINE	UG/L	<15	<15	<15
BENZO(a)ANTHRACENE	UG/L	<10	<10	<10
BENZO(b)FLUORANTHENE	UG/L	<10	<10	<10
ANILINE	UG/L	<10	<10	<10
BENZO(k)FLUORANTHENE	UG/L	<10	<10	<10
BENZO(a)PYRENE	UG/L	<10	<10	<10
BIS(2-CHLOROETHYL)ETHER	UG/L	<10	<10	<10
2-CHLOROPHENOL	UG/L	<10	<10	<10
BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	<10	<10	<10
BUTYLBENZYLPHTHALATE	UG/L	<10	<10	<10
CHRYSENE	UG/L	<10	<10	<10
BENZYL ALCOHOL	UG/L	<10	<10	<10
DIBENZ(a,h)ACRIDINE	UG/L	<10	<10	<10
DIBENZ(a,h)ANTHRACENE	UG/L	<10	<10	<10
1,2-DICHLOROBENZENE	UG/L	<10	<10	<10
1,3-DICHLOROBENZENE	UG/L	<10	<10	<10
BIS(2-CHLOROISOPROPYL)ETHER	UG/L	<15	<15	<15
1,4-DICHLOROBENZENE	UG/L	<10	<10	<10
4-METHYLPHENOL	UG/L	<10	<10	<10
DIETHYLPHTHALATE	UG/L	<10	<10	<10
N-NITROSO-DI-N-PROPYLAMINE	UG/L	<15	<15	<15
7,12-DIMETHYLBENZO(a)ANTHRACENE	UG/L	<10	<10	<10
HEXACHLOROETHANE	UG/L	<10	<10	<10
DIMETHYLPHTHALATE	UG/L	<10	<10	<10
NITROBENZENE	UG/L	<10	<10	<10
DI-N-BUTYLPHTHALATE	UG/L	<10	<10	<10
ISOPHORONE	UG/L	<10	<10	<10
2-NITROPHENOL	UG/L	<10	<10	<10
DI-N-OCTYLPHTHALATE	UG/L	<10	<10	<10
BENZOIC ACID	UG/L	<50	<50	<50
BIS(2-CHLOROETHOXY)METHANE	UG/L	<10	<10	<10
2,4-DICHLOROPHENOL	UG/L	<10	<10	<10
FLUORANTHENE	UG/L	<10	<10	<10
1,2,4-TRICHLOROBENZENE	UG/L	<10	<10	<10
NAPHTHALENE	UG/L	<10	<10	<10
PHENANTHRENE	UG/L	<10	<10	<10
4-CHLOROANILINE	UG/L	<10	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412281
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
7	FB-2	WATER	20-DEC-94	27-DEC-94	17-JAN-95	1.00
8	HCW6A	WATER	20-DEC-94	27-DEC-94	17-JAN-95	1.00
9	HCW6B	WATER	20-DEC-94	27-DEC-94	17-JAN-95	1.00

Parameter	Units	7	8	9
PYRENE	UG/L	<10	<10	<10
HEXACHLOROBUTADIENE	UG/L	<10	<10	<10
2-METHYLNAPHTHALENE	UG/L	<10	<10	<10
4-CHLORO-3-METHYLPHENOL	UG/L	<10	<10	<10
BENZENETHIOL	UG/L	<10	<10	<10
4-NITROPHENOL	UG/L	<50	<50	<50
2,4-DIMETHYLPHENOL	UG/L	<10	<10	<10
2,4-DINITROPHENOL	UG/L	<50	<50	<50
PHENOL	UG/L	<10	<10	<10
2-METHYLPHENOL	UG/L	<10	<10	<10
3- & 4-METHYLPHENOL	UG/L	<10	<10	<10
HEXACHLOROCYCLOPENTADIENE	UG/L	<10	<10	<10
2,4,6-TRICHLOROPHENOL	UG/L	<10	<10	<10
2,4,5-TRICHLOROPHENOL	UG/L	<50	<50	<50
2-CHLORONAPHTHALENE	UG/L	<10	<10	<10
2-NITROANILINE	UG/L	<50	<50	<50
ACENAPHTHYLENE	UG/L	<10	<10	<10
2,6-DINITROTOLUENE	UG/L	<10	<10	<10
3-NITROANILINE	UG/L	<50	<50	<50
ACENAPHTHENE	UG/L	<10	<10	<10
DIBENZOFURAN	UG/L	<10	<10	<10
2,4-DINITROTOLUENE	UG/L	<10	<10	<10
4-CHLOROPHENYL-PHENYLETHER	UG/L	<10	<10	<10
FLUORENE	UG/L	<10	<10	<10
4-NITROANILINE	UG/L	<50	<50	<50
2-METHYL-4,6-DINITROPHENOL	UG/L	<50	<50	<50
N-NITROSODIPHENYLAMINE	UG/L	<10	<10	<10
4-BROMOPHENYL-PHENYLETHER	UG/L	<10	<10	<10
HEXACHLOROBENZENE	UG/L	<10	<10	<10
PENTACHLOROPHENOL	UG/L	<50	<50	<50
3,3'-DICHLOROBENZIDINE	UG/L	<20	<20	<20
INDENO(1,2,3-cd)PYRENE	UG/L	<10	<10	<10
INDENE	UG/L	<10	<10	<10
1-METHYLNAPHTHALENE	UG/L	<10	<10	<10
PYRIDINE	UG/L	<50	<50	<50
QUINOLINE	UG/L	<50	<50	<50
6-METHYL CHRYSENE	UG/L	<10	<10	<10
BENZO(g,h,i)PERYLENE	UG/L	<10	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412281
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
7	FB-2	WATER	20-DEC-94	27-DEC-94	17-JAN-95	1.00
8	HCW6A	WATER	20-DEC-94	27-DEC-94	17-JAN-95	1.00
9	HCW6B	WATER	20-DEC-94	27-DEC-94	17-JAN-95	1.00

Parameter	Units	7	8	9
SURROGATES				
NITROBENZENE-D5	%	73	55	72
2-FLUOROBIPHENYL	%	110	89	111
TERPHENYL-D14	%	91	93	98
PHENOL-D6	%	83	84	99
2-FLUOROPHENOL	%	73	73	88
2,4,6-TRIBROMOPHENOL	%	111	93	144*T

*T -

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412281
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
10	HCW7A	WATER	20-DEC-94	27-DEC-94	17-JAN-95	1.00
11	HCW7B	WATER	20-DEC-94	27-DEC-94	18-JAN-95	1.00
12	LCW6A	WATER	20-DEC-94	27-DEC-94	18-JAN-95	1.00

Parameter	Units	10	11	12
ANTHRACENE	UG/L	<10	<10	<10
N-NITROSODIMETHYLAMINE	UG/L	<15	<15	<15
BENZO(a)ANTHRACENE	UG/L	<10	<10	<10
BENZO(b)FLUORANTHENE	UG/L	<10	<10	<10
ANILINE	UG/L	<10	<10	<10
BENZO(k)FLUORANTHENE	UG/L	<10	<10	<10
BENZO(a)PYRENE	UG/L	<10	<10	<10
BIS(2-CHLOROETHYL)ETHER	UG/L	<10	<10	<10
2-CHLOROPHENOL	UG/L	<10	<10	<10
BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	<10	<10	<10
BUTYLBENZYLPHTHALATE	UG/L	<10	<10	<10
CHRYSENE	UG/L	<10	<10	<10
BENZYL ALCOHOL	UG/L	<10	<10	<10
DIBENZ(a,h)ACRIDINE	UG/L	<10	<10	<10
DIBENZ(a,h)ANTHRACENE	UG/L	<10	<10	<10
1,2-DICHLOROBENZENE	UG/L	<10	<10	<10
1,3-DICHLOROBENZENE	UG/L	<10	<10	<10
BIS(2-CHLOROISOPROPYL)ETHER	UG/L	<15	<15	<15
1,4-DICHLOROBENZENE	UG/L	<10	<10	<10
4-METHYLPHENOL	UG/L	<10	<10	<10
DIETHYLPHTHALATE	UG/L	<10	<10	<10
N-NITROSO-DI-N-PROPYLAMINE	UG/L	<15	<15	<15
7,12-DIMETHYLBENZO(a)ANTHRACENE	UG/L	<10	<10	<10
HEXACHLOROETHANE	UG/L	<10	<10	<10
DIMETHYLPHTHALATE	UG/L	<10	<10	<10
NITROBENZENE	UG/L	<10	<10	<10
DI-N-BUTYLPHTHALATE	UG/L	<10	<10	<10
ISOPHORONE	UG/L	<10	<10	<10
2-NITROPHENOL	UG/L	<10	<10	<10
DI-N-OCTYLPHTHALATE	UG/L	<10	<10	<10
BENZOIC ACID	UG/L	<50	<50	<50
BIS(2-CHLOROETHOXY)METHANE	UG/L	<10	<10	<10
2,4-DICHLOROPHENOL	UG/L	<10	<10	<10
FLUORANTHENE	UG/L	<10	<10	<10
1,2,4-TRICHLOROBENZENE	UG/L	<10	<10	<10
NAPHTHALENE	UG/L	<10	<10	<10
PHENANTHRENE	UG/L	<10	<10	<10
4-CHLOROANILINE	UG/L	<10	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412281
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
10	HCW7A	WATER	20-DEC-94	27-DEC-94	17-JAN-95	1.00
11	HCW7B	WATER	20-DEC-94	27-DEC-94	18-JAN-95	1.00
12	LCW6A	WATER	20-DEC-94	27-DEC-94	18-JAN-95	1.00

Parameter	Units	10	11	12
PYRENE	UG/L	<10	<10	<10
HEXACHLOROBUTADIENE	UG/L	<10	<10	<10
2-METHYLNAPHTHALENE	UG/L	<10	<10	<10
4-CHLORO-3-METHYLPHENOL	UG/L	<10	<10	<10
BENZENETHIOL	UG/L	<10	<10	<10
4-NITROPHENOL	UG/L	<50	<50	<50
2,4-DIMETHYLPHENOL	UG/L	<10	<10	<10
2,4-DINITROPHENOL	UG/L	<50	<50	<50
PHENOL	UG/L	<10	<10	<10
2-METHYLPHENOL	UG/L	<10	<10	<10
3- & 4-METHYLPHENOL	UG/L	<10	<10	<10
HEXACHLOROCYCLOPENTADIENE	UG/L	<10	<10	<10
2,4,6-TRICHLOROPHENOL	UG/L	<10	<10	<10
2,4,5-TRICHLOROPHENOL	UG/L	<50	<50	<50
2-CHLORONAPHTHALENE	UG/L	<10	<10	<10
2-NITROANILINE	UG/L	<50	<50	<50
ACENAPHTHYLENE	UG/L	<10	<10	<10
2,6-DINITROTOLUENE	UG/L	<10	<10	<10
3-NITROANILINE	UG/L	<50	<50	<50
ACENAPHTHENE	UG/L	<10	<10	<10
DIBENZOFURAN	UG/L	<10	<10	<10
2,4-DINITROTOLUENE	UG/L	<10	<10	<10
4-CHLOROPHENYL-PHENYLETHER	UG/L	<10	<10	<10
FLUORENE	UG/L	<10	<10	<10
4-NITROANILINE	UG/L	<50	<50	<50
2-METHYL-4,6-DINITROPHENOL	UG/L	<50	<50	<50
N-NITROSODIPHENYLAMINE	UG/L	<10	<10	<10
4-BROMOPHENYL-PHENYLETHER	UG/L	<10	<10	<10
HEXACHLOROBENZENE	UG/L	<10	<10	<10
PENTACHLOROPHENOL	UG/L	<50	<50	<50
3,3'-DICHLOROBENZIDINE	UG/L	<20	<20	<20
INDENO(1,2,3-cd)PYRENE	UG/L	<10	<10	<10
INDENE	UG/L	<10	<10	<10
1-METHYLNAPHTHALENE	UG/L	<10	<10	<10
PYRIDINE	UG/L	<50	<50	<50
QUINOLINE	UG/L	<50	<50	<50
6-METHYL CHRYSENE	UG/L	<10	<10	<10
BENZO(g,h,i)PERYLENE	UG/L	<10	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412281
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
10	HCW7A	WATER	20-DEC-94	27-DEC-94	17-JAN-95	1.00
11	HCW7B	WATER	20-DEC-94	27-DEC-94	18-JAN-95	1.00
12	LCW6A	WATER	20-DEC-94	27-DEC-94	18-JAN-95	1.00

Parameter	Units	10	11	12
SURROGATES				
NITROBENZENE-D5	%	84	62	78
2-FLUOROBIPHENYL	%	98	77	93
TERPHENYL-D14	%	91	77	81
PHENOL-D6	%	97	77	85
2-FLUOROPHENOL	%	79	65	69
2,4,6-TRIBROMOPHENOL	%	123	104	111

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412281
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
13	LCW6B	WATER	20-DEC-94	27-DEC-94	18-JAN-95	1.00
14	LCW7A	WATER	20-DEC-94	27-DEC-94	18-JAN-95	1.00
15	LCW7B	WATER	20-DEC-94	27-DEC-94	18-JAN-95	1.00

Parameter	Units	13	14	15
ANTHRACENE	UG/L	<10	<10	<10
N-NITROSODIMETHYLAMINE	UG/L	<15	<15	<15
BENZO(a)ANTHRACENE	UG/L	<10	<10	<10
BENZO(b)FLUORANTHENE	UG/L	<10	<10	<10
ANILINE	UG/L	<10	<10	<10
BENZO(k)FLUORANTHENE	UG/L	<10	<10	<10
BENZO(a)PYRENE	UG/L	<10	<10	<10
BIS(2-CHLOROETHYL)ETHER	UG/L	<10	<10	<10
2-CHLOROPHENOL	UG/L	<10	<10	<10
BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	<10	<10	<10
BUTYLBENZYLPHTHALATE	UG/L	<10	<10	<10
CHRYSENE	UG/L	<10	<10	<10
BENZYL ALCOHOL	UG/L	<10	<10	<10
DIBENZ(a,h)ACRIDINE	UG/L	<10	<10	<10
DIBENZ(a,h)ANTHRACENE	UG/L	<10	<10	<10
1,2-DICHLOROBENZENE	UG/L	<10	<10	<10
1,3-DICHLOROBENZENE	UG/L	<10	<10	<10
BIS(2-CHLOROISOPROPYL)ETHER	UG/L	<15	<15	<15
1,4-DICHLOROBENZENE	UG/L	<10	<10	<10
4-METHYLPHENOL	UG/L	<10	<10	<10
DIETHYLPHTHALATE	UG/L	<10	<10	<10
N-NITROSO-DI-N-PROPYLAMINE	UG/L	<15	<15	<15
7,12-DIMETHYLBENZO(a)ANTHRACENE	UG/L	<10	<10	<10
HEXACHLOROETHANE	UG/L	<10	<10	<10
DIMETHYLPHTHALATE	UG/L	<10	<10	<10
NITROBENZENE	UG/L	<10	<10	<10
DI-N-BUTYLPHTHALATE	UG/L	<10	<10	<10
ISOPHORONE	UG/L	<10	<10	<10
2-NITROPHENOL	UG/L	<10	<10	<10
DI-N-OCTYLPHTHALATE	UG/L	<10	<10	<10
BENZOIC ACID	UG/L	<50	<50	<50
BIS(2-CHLOROETHOXY)METHANE	UG/L	<10	<10	<10
2,4-DICHLOROPHENOL	UG/L	<10	<10	<10
FLUORANTHENE	UG/L	<10	<10	<10
1,2,4-TRICHLOROBENZENE	UG/L	<10	<10	<10
NAPHTHALENE	UG/L	<10	<10	<10
PHENANTHRENE	UG/L	<10	<10	<10
4-CHLOROANILINE	UG/L	<10	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412281
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
13	LCW6B	WATER	20-DEC-94	27-DEC-94	18-JAN-95	1.00
14	LCW7A	WATER	20-DEC-94	27-DEC-94	18-JAN-95	1.00
15	LCW7B	WATER	20-DEC-94	27-DEC-94	18-JAN-95	1.00

Parameter	Units	13	14	15
PYRENE	UG/L	<10	<10	<10
HEXACHLOROBUTADIENE	UG/L	<10	<10	<10
2-METHYLNAPHTHALENE	UG/L	<10	<10	<10
4-CHLORO-3-METHYLPHENOL	UG/L	<10	<10	<10
BENZENETHIOL	UG/L	<10	<10	<10
4-NITROPHENOL	UG/L	<50	<50	<50
2,4-DIMETHYLPHENOL	UG/L	<10	<10	<10
2,4-DINITROPHENOL	UG/L	<50	<50	<50
PHENOL	UG/L	<10	<10	<10
2-METHYLPHENOL	UG/L	<10	<10	<10
3- & 4-METHYLPHENOL	UG/L	<10	<10	<10
HEXACHLOROCYCLOPENTADIENE	UG/L	<10	<10	<10
2,4,6-TRICHLOROPHENOL	UG/L	<10	<10	<10
2,4,5-TRICHLOROPHENOL	UG/L	<50	<50	<50
2-CHLORONAPHTHALENE	UG/L	<10	<10	<10
2-NITROANILINE	UG/L	<50	<50	<50
ACENAPHTHYLENE	UG/L	<10	<10	<10
2,6-DINITROTOLUENE	UG/L	<10	<10	<10
3-NITROANILINE	UG/L	<50	<50	<50
ACENAPHTHENE	UG/L	<10	<10	<10
DIBENZOFURAN	UG/L	<10	<10	<10
2,4-DINITROTOLUENE	UG/L	<10	<10	<10
4-CHLOROPHENYL-PHENYLETHER	UG/L	<10	<10	<10
FLUORENE	UG/L	<10	<10	<10
4-NITROANILINE	UG/L	<50	<50	<50
2-METHYL-4,6-DINITROPHENOL	UG/L	<50	<50	<50
N-NITROSODIPHENYLAMINE	UG/L	<10	<10	<10
4-BROMOPHENYL-PHENYLETHER	UG/L	<10	<10	<10
HEXACHLOROBENZENE	UG/L	<10	<10	<10
PENTACHLOROPHENOL	UG/L	<50	<50	<50
3,3'-DICHLOROBENZIDINE	UG/L	<20	<20	<20
INDENO(1,2,3-cd)PYRENE	UG/L	<10	<10	<10
INDENE	UG/L	<10	<10	<10
1-METHYLNAPHTHALENE	UG/L	<10	<10	<10
PYRIDINE	UG/L	<50	<50	<50
QUINOLINE	UG/L	<50	<50	<50
6-METHYL CHRYSENE	UG/L	<10	<10	<10
BENZO(g,h,i)PERYLENE	UG/L	<10	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412281
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
13	LCW6B	WATER	20-DEC-94	27-DEC-94	18-JAN-95	1.00
14	LCW7A	WATER	20-DEC-94	27-DEC-94	18-JAN-95	1.00
15	LCW7B	WATER	20-DEC-94	27-DEC-94	18-JAN-95	1.00

Parameter	Units	13	14	15
SURROGATES				
NITROBENZENE-D5	%	69	75	82
2-FLUOROBIPHENYL	%	85	91	97
TERPHENYL-D14	%	58	81	70
PHENOL-D6	%	45	82	72
2-FLUOROPHENOL	%	37	67	54
2,4,6-TRIBROMOPHENOL	%	51	119	103

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GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Blank I.D. : 33888
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D. : 412281
Date Extracted: 27-DEC-94
Date Analyzed : 11-JAN-95
Dil. Factor : 1.00

Parameters	Units	Results
ANTHRACENE	UG/L	<10
N-NITROSODIMETHYLAMINE	UG/L	<15
BENZO(a)ANTHRACENE	UG/L	<10
BENZO(b)FLUORANTHENE	UG/L	<10
BENZO(k)FLUORANTHENE	UG/L	<10
ANILINE	UG/L	<10
BIS(2-CHLOROETHYL)ETHER	UG/L	<10
BENZO(a)PYRENE	UG/L	<10
BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	<10
2-CHLOROPHENOL	UG/L	<10
BUTYLBENZYLPHTHALATE	UG/L	<10
CHRYSENE	UG/L	<10
BENZYL ALCOHOL	UG/L	<10
DIBENZ(a,h)ACRIDINE	UG/L	<10
DIBENZ(a,h)ANTHRACENE	UG/L	<10
1,2-DICHLOROBENZENE	UG/L	<10
BIS(2-CHLOROISOPROPYL)ETHER	UG/L	<15
1,3-DICHLOROBENZENE	UG/L	<10
4-METHYLPHENOL	UG/L	<10
1,4-DICHLOROBENZENE	UG/L	<10
N-NITROSO-DI-N-PROPYLAMINE	UG/L	<15
DIETHYLPHTHALATE	UG/L	<10
7,12-DIMETHYLBENZO(a)ANTHRACENE	UG/L	<10
HEXACHLOROETHANE	UG/L	<10
DIMETHYLPHTHALATE	UG/L	<10
NITROBENZENE	UG/L	<10
ISOPHORONE	UG/L	<10
DI-N-BUTYLPHTHALATE	UG/L	<10
DI-N-OCTYLPHTHALATE	UG/L	<10
2-NITROPHENOL	UG/L	<10
BENZOIC ACID	UG/L	<50
BIS(2-CHLOROETHOXY)METHANE	UG/L	<10
2,4-DICHLOROPHENOL	UG/L	<10
FLUORANTHENE	UG/L	<10
1,2,4-TRICHLOROBENZENE	UG/L	<10
NAPHTHALENE	UG/L	<10
PHENANTHRENE	UG/L	<10
4-CHLOROANILINE	UG/L	<10
PYRENE	UG/L	<10
HEXACHLOROBUTADIENE	UG/L	<10
4-CHLORO-3-METHYLPHENOL	UG/L	<10
2-METHYLNAPHTHALENE	UG/L	<10
BENZENETHIOL	UG/L	<10
4-NITROPHENOL	UG/L	<50
2,4-DIMETHYLPHENOL	UG/L	<10
2,4-DINITROPHENOL	UG/L	<50

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GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Blank I.D. : 33888
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D. : 412281
Date Extracted: 27-DEC-94
Date Analyzed : 11-JAN-95
Dil. Factor : 1.00

Parameters	Units	Results
PHENOL	UG/L	<10
2-METHYLPHENOL	UG/L	<10
3- & 4-METHYLPHENOL	UG/L	<10
HEXACHLOROCYCLOPENTADIENE	UG/L	<10
2,4,6-TRICHLOROPHENOL	UG/L	<10
2,4,5-TRICHLOROPHENOL	UG/L	<50
2-CHLORONAPHTHALENE	UG/L	<10
2-NITROANILINE	UG/L	<50
ACENAPHTHYLENE	UG/L	<10
2,6-DINITROTOLUENE	UG/L	<10
3-NITROANILINE	UG/L	<50
ACENAPHTHENE	UG/L	<10
DIBENZOFURAN	UG/L	<10
2,4-DINITROTOLUENE	UG/L	<10
4-CHLOROPHENYL-PHENYLETHER	UG/L	<10
FLUORENE	UG/L	<10
4-NITROANILINE	UG/L	<50
2-METHYL-4,6-DINITROPHENOL	UG/L	<50
N-NITROSODIPHENYLAMINE	UG/L	<10
4-BROMOPHENYL-PHENYLETHER	UG/L	<10
HEXACHLOROBENZENE	UG/L	<10
PENTACHLOROPHENOL	UG/L	<50
3,3'-DICHLOROBENZIDINE	UG/L	<20
INDENO(1,2,3-cd)PYRENE	UG/L	<10
INDENE	UG/L	<10
1-METHYLNAPHTHALENE	UG/L	<10
PYRIDINE	UG/L	<50
QUINOLINE	UG/L	<50
6-METHYL CHRYSENE	UG/L	<10
BENZO(g,h,i)PERYLENE	UG/L	<10
SURROGATES		
NITROBENZENE-D5	%	81
2-FLUOROBIPHENYL	%	89
TERPHENYL-D14	%	82
PHENOL-D6	%	113
2-FLUOROPHENOL	%	93
2,4,6-TRIBROMOPHENOL	%	90

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GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

MSMSD

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
MSMSD # : 71735
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.

Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D. : 412281
Date Extracted: 29-DEC-94
Date Analyzed : 11-JAN-95
Sample Matrix : WATER
REF I.D. : REAGENT WATER

Parameters	Units	Sample Result	Conc Spike	Spiked Sample	% Rec	Dup Spike	Dup % Rec	RPD
2-CHLOROPHENOL	UG/L	<10	150	150	100	140	93	7
1,4-DICHLOROBENZENE	UG/L	<10	100	96	96	97	97	1
N-NITROSO-DI-N-PROPYLAMINE	UG/L	<10	100	88	88	90	90	2
1,2,4-TRICHLOROBENZENE	UG/L	<10	100	100	100	100	100	0
PYRENE	UG/L	<10	100	89	89	85	85	5
4-CHLORO-3-METHYLPHENOL	UG/L	<10	150	150	100	140	93	7
4-NITROPHENOL	UG/L	<50	100	190	190	150	150	24
PHENOL	UG/L	<10	100	150	150	130	130	14
ACENAPHTHENE	UG/L	<10	100	97	97	94	94	3
2,4-DINITROTOLUENE	UG/L	<10	100	84	84	82	82	2
PENTACHLOROPHENOL	UG/L	<50	150	180	120	120	80	40

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

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GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

MSMSD

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
MSMSD # : 71736
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.

Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D. : 412281
Date Extracted: 28-DEC-94
Date Analyzed : 11-JAN-95
Sample Matrix : WATER
REF I.D. : REAGENT WATER

Parameters	Units	Sample Result	Conc Spike	Spiked Sample	% Rec	Dup Spike	Dup % Rec	RPD
2-CHLOROPHENOL	UG/L	<10	150	81	54	130	87	46*
1,4-DICHLOROBENZENE	UG/L	<10	100	80	80	77	77	4
N-NITROSO-DI-N-PROPYLAMINE	UG/L	<10	100	84	84	76	76	10
1,2,4-TRICHLOROBENZENE	UG/L	<10	100	88	88	84	84	5
PYRENE	UG/L	<10	100	83	83	84	84	1
4-CHLORO-3-METHYLPHENOL	UG/L	<10	150	110	73	130	87	17
4-NITROPHENOL	UG/L	<50	150	100	67	160	107	46*
PHENOL	UG/L	<10	150	83	55	130	87	44*
ACENAPHTHENE	UG/L	<10	100	90	90	87	87	3
2,4-DINITROTOLUENE	UG/L	<10	100	79	79	81	81	3
PENTACHLOROPHENOL	UG/L	<50	150	90	60	110	73	20

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

* -

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GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

BLANK SPIKE

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Blank Spike #: 53374
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name : GMP (GROUNDWATER MONITORING)

ATI I.D. : 412281
Date Extracted: 27-JAN-94
Date Analyzed : 11-JAN-95
Sample Matrix : WATER

Parameters	Units	Blank Result	Spiked Sample	Spike Conc.	% Rec
2-CHLOROPHENOL	UG/L	<10	120	150	80
1,4-DICHLOROBENZENE	UG/L	<10	110	100	110
N-NITROSO-DI-N-PROPYLAMINE	UG/L	<15	81	100	81
1,2,4-TRICHLOROBENZENE	UG/L	<10	98	100	98
PYRENE	UG/L	<10	88	100	88
4-CHLORO-3-METHYLPHENOL	UG/L	<10	130	150	87
4-NITROPHENOL	UG/L	<50	95	150	63
PHENOL	UG/L	<10	100	150	67
ACENAPHTHENE	UG/L	<10	88	100	88
2,4-DINITROTOLUENE	UG/L	<10	100	100	100
PENTACHLOROPHENOL	UG/L	<50	94	150	63

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

ANALYTICAL TECHNOLOGIES, INC.
SAN DIEGO
FLAGS

INORGANICS

FLAG	MESSAGE DESCRIPTION
B	ABSOLUTE VALUE OF ANALYTE CONCENTRATION IS < CRDL BUT ≥ THE IDL
BB	RESULT BETWEEN IDL AND LOQ
D	POST DIGESTION SPIKE FOR GFAA OUTSIDE LIMITS AFTER 1:25 DILUTION. SAMPLE REPORTED AT ORIGINAL CONCENTRATION.
E	ESTIMATED VALUE DUE TO INTERFERENCE
M	DUPLICATE INJECTION PRECISION NOT MET
N	SPIKED SAMPLE RECOVERY NOT WITHIN CONTROL LIMITS
S	REPORTED VALUE WAS DETERMINED BY METHOD OF STANDARD ADDITIONS
U	COMPOUND WAS ANALYZED FOR BUT NOT DETECTED
W	POST DIGESTION SPIKE OUT OF CONTROL LIMITS; SAMPLE ABSORBANCE < 50% OF SPIKE ABSORBANCE FOR GF/AA
X	ABSOLUTE VALUE OF ANALYTE CONCENTRATION IS LESS THAN 3 TIMES THE MDL
*	DUPLICATE ANALYSIS NOT WITHIN CONTROL LIMITS
+	CORRELATION COEFFICIENT FOR MSA IS LESS THAN 0.995
*H	RESULTS OUTSIDE OF LIMITS DUE TO SAMPLE MATRIX INTERFERENCE
*Q	INSUFFICIENT SAMPLE FOR ANALYSIS
*R	DATA IS NOT USABLE
*V	SAMPLE RESULT IS >4X SPIKED CONCENTRATION, THEREFORE SPIKE IS NOT DETECTABLE
*Y	RESULT NOT ATTAINABLE DUE TO SAMPLE MATRIX INTERFERENCE
@C	*VARIABLE MESSAGE*
@H	DETECTION LIMIT ELEVATED DUE TO MATRIX INTERFERENCE
@Q	DETECTION LIMIT ELEVATED DUE TO LIMITED SAMPLE FOR ANALYSIS
@R	RPD LIMIT IS 67% FOR INORGANIC RESULTS LESS THAN TEN TIMES THE REPORTING DETECTION LIMIT
@S	RPD: ONE RESULT ABOVE AND ONE RESULT BELOW REPORTING LIMIT (RL). RESULT ABOVE SHOULD BE < 5 TIMES RL TO BE IN CONTROL.
@V	PRE-DIGEST SPIKE OUT OF LIMITS. POST DIGESTION SPIKE YIELDED ACCEPTABLE RESULTS
@W	DETECTION LIMIT ELEVATED DUE TO REDUCED SAMPLE WEIGHT
@Y	ION BALANCE OUTSIDE OF ATI'S ACCEPTANCE LIMITS; REANALYSIS CONFIRMED ORIGINAL RESULT
@X	RESULTS VERIFIED BY REDIGESTION AND REANALYSIS

ANALYTICAL TECHNOLOGIES, INC.
SAN DIEGO
FLAGS

ORGANICS

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

Analytical Technologies, Inc.

5550 MOREHOUSE DRIVE
SAN DIEGO, CA 92121-1709
(619) 458-9141

Chain of Custody

DATE 12/20/94 PAGE 1 OF 2

PROJECT MANAGER: TONY SHAN
COMPANY: BHP Petroleum
ADDRESS: 91-325 Komohana St.
Kapolei HI 96707

BILL TO: TONY SHAN
COMPANY: BHP Hawaii
ADDRESS:

SAMPLERS: (Signature) [signature] PHONE NUMBER (808) 547-3804

Recommended Quantity and Preservative (Provide triple volume on QC Samples)

SAMPLE ID	SAMPLE DATE	TIME	MATRIX	LAB ID	Petroleum Hydrocarbons 418.1 (1L (H_2SO_4)/100g)	Oil and Grease 413.2 (1L (H_2SO_4)/100g)	Gasoline (MOD 8015/DOHS) (4 oz (HCl)/50g)	Diesel (MOD 8015/DOHS) (4 oz (HCl)/50g)	Gasoline/BTXE (MOD 8015/8020) Maximum Contamination Level of Gasoline:2ppm(water),50ppm(Soil) (2X40ml (HCl)/50g)	MOD 8015 (Unknown) (4 oz (HCl)/50g)	BTXE (8020) (2X40ml (HCl)/50g)	Chlorinated Hydrocarbons (8010) (2X40ml (HCl)/50g)	Aromatic Hydrocarbons (8020) (2X40ml (HCl)/50g)	Chlorinated/Aromatic Hydrocarbons (8010/8020) (2X40ml (HCl)/50g)	Organic Pb (500ml/50g)	Pesticides/PCB (8080) (1L/50g)	Base/NEU/Acid Cmpds GC/MS (8270) (1L/100g 2X1L)	Volatile Cmpds GC/MS (8240) (2X40ml (HCl)/100g)	Polynuclear Aromatic (8310) (1L/100g)	GCR Metals (Total) (500ml/100g)	Priority Pollutant Metals (500ml/100g)	NO_3-NO_2	General Chemistry	Total Hg	Dissolved Metals (1L)					Number of Containers
HCW2A	12/20/94	8:57 am	G.W.	01													X	X		X		X	X	X						8
HCW2B	"	10:05 am	"	02													X	X		X		X	X	X						8
HCW2C	"	11:10 am	"	03													X	X		X		X	X	X						8
LCW2A	"	14:00 pm	"	04													X	X		X		X	X	X						8
LCW2B	"	14:35 pm	"	05													X	X		X		X	X	X						8
LCW2C	"	15:45 pm	"	06													X	X		X		X	X	X						8
FE 2 12/20/94				07													X	X		X		X	X	X						

PROJECT INFORMATION	
PROJECT NUMBER:	441000
PROJECT NAME:	BHP
PURCHASE ORDER NUMBER:	
VIA:	DAL
TAT: ☐24HR ☐48HRS ☐72HRS ☐1WK ☒2WK	

SAMPLE RECEIPT	
TOTAL NUMBER OF CONTAINERS	48
CHAIN OF CUSTODY SEALS Y/N/NA	N
SEALS INTACT? Y/N/NA	N/A
RECEIVED GOOD COND/COLD	Y/Z
LAB NUMBER	417281

SAMPLE DISPOSAL INSTRUCTIONS

☐ ATI Disposal @ $5.00 each ☐ Return ☐ Pickup

Comments: General Chemistry = TDS, Alkalinity, Fluoride, MBAS, Sulfate, MEC, Soluble Fe, Chloride
All Vers are in Cooler "ATI-1209"

RELINQUISHED BY: 1	RELINQUISHED BY: 2	RELINQUISHED BY: 3
Signature: [signature] Time: 1815	Signature: [signature] Time: 19:00 pm	Signature: Time:
Printed Name: Zuyi Shen Date: 12/20/94	Printed Name: Tony Shan Date: 12/20/94	Printed Name: Date:
Company: Dames & Moore	Company: BHP	Company:
RECEIVED BY: 1	**RECEIVED BY: 2**	**RECEIVED BY: (LAB) 3**
Signature: [signature] Time: 19:00	Signature: Time:	Signature: [signature] Time: 10:15
Printed Name: Tony Shan Date: 12/20/94	Printed Name: Date:	Printed Name: Date: 12/20/94
Company: BHP	Company:	Analytical Technologies, Inc.

DISTRIBUTION: White, Canary - ANALYTICAL TECHNOLOGIES, INC. • Pink - ORIGINATOR

Analytical Technologies, Inc.
5550 MOREHOUSE DRIVE
SAN DIEGO, CA 92121-1709
(619) 458-9141

Chain of Custody

DATE 12/20/94 PAGE 2 OF 2

PROJECT MANAGER: Tony SHAN
COMPANY: BHP Hawaii
ADDRESS: 91-325 Komohana St.
Kapolei HI 96707

BILL TO: Tony Shan
COMPANY: BHP Hawaii
ADDRESS:

SAMPLERS: (Signature) Jay Shiloff PHONE NUMBER (808) 597-3804

Recommended Quantity and Preservative (Provide triple volume on QC Samples)

SAMPLE ID	SAMPLE DATE	TIME	MATRIX	LAB ID	Petroleum Hydrocarbons 418.1 (1L (H₂SO₄)/100g)	Oil and Grease 413.2 (1L (H₂SO₄)/100g)	Gasoline (MOD 8015/DOHS) (4 oz (HCl)/50g)	Diesel (MOD 8015/DOHS) (4 oz (HCl)/50g)	Gasoline/BTXE (MOD 8015/8020) Maximum Contamination Level of Gasoline:2ppm(water),50ppm(Soil) (2X40ml (HCl)/50g)	MOD 8015 (Unknown) (4 oz (HCl)/50g)	BTXE (8020) (2X40ml (HCl)/50g)	Chlorinated Hydrocarbons (8010) (2X40ml (HCl)/50g)	Aromatic Hydrocarbons (8020) (2X40ml (HCl)/50g)	Chlorinated/Aromatic Hydrocarbons (8010/8020) (2X40ml (HCl)/50g)	Organic Pb (500ml/50g)	Pesticides/PCB (8080) (1L/50g)	Base/NEU/Acid Cmpds GC/MS (8270) (1L/100g 2X1L)	Volatile Cmpds GC/MS (8240) (2X40ml (HCl)/100g)	Polynuclear Aromatic (8310) (1L/100g)	CCR Metals Total (500ml/100g)	Priority Pollutant Metals (500ml/100g)	NO₃-NO₂	General Chemistry	Total Hg	Dissolved metals	Number of Containers
HCW6A	12/20/94	8:45 am	[illegible]	08													X	X		X		X	X	X	X	9
HCW6B	"	9:30 am	"	09													X	X		X		X	X	X	X	9
HCW7A	"	10:30 am	"	10													X	X		X		X	X	X	X	9
HCW7B	"	11:30 am	"	11													X	X		X		X	X	X	X	9
LCW6A	"	14:05 pm	"	12													X	X		X		X	X	X	X	9
LCW6B	"	14:50 pm	"	13													X	X		X		X	X	X	X	9
LCW7A	"	15:45 pm	"	14													X	X		X		X	X	X	X	9
LCW7B	"	16:25 pm	"	15													X	X		X		X	X	X	X	9
TB-2	"	N/A	[illegible]	31/6 12/21/94														X								2

PROJECT INFORMATION		SAMPLE RECEIPT	
PROJECT NUMBER:	441000	TOTAL NUMBER OF CONTAINERS	+2
PROJECT NAME:	GMP	CHAIN OF CUSTODY SEALS Y/N/NA	N
PURCHASE ORDER NUMBER:		SEALS INTACT? Y/N/NA	N/A
VIA:	UPS	RECEIVED GOOD COND./COLD	Y/20
TAT: ☐24HR ☐48HRS ☐72HRS ☐1WK ☒2WK		LAB NUMBER	412281

SAMPLE DISPOSAL INSTRUCTIONS

☐ ATI Disposal @ $5.00 each ☐ Return ☐ Pickup

Comments: General Chemistry = TDS, Alkalinity, Fluoride, MBAS, Sulfate, pH, EC, Soluble Fe, Chloride.
All VOCs are in cooler "ATI" 1209

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: [signature] Time: 1845	Signature: [signature] Time: 19:00	Signature: Time:
Printed Name: Jay Shiloff Date: 12/20/94	Printed Name: Tony Shan Date: 12/20/94	Printed Name: Date:
Company: ETI	Company: BHP	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: (LAB) 3.**
Signature: [signature] Time: 19:00	Signature: Time:	Signature: [signature] Time: [illegible]
Printed Name: Tony Shan Date: 12/20/94	Printed Name: Date:	Printed Name: [illegible] Date: [illegible]
Company: BHP	Company:	Analytical Technologies, Inc.

DISTRIBUTION: White, Canary - ANALYTICAL TECHNOLOGIES, INC. • Pink - ORIGINATOR

ACCESSION #: 412281 INITIALS: LM

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

1	Does this project require special handling according to NEESA Levels C, D, AFOEHL or CLP protocols? If yes, complete a) thru c) a) Cooler temperature _____ b) pH sample aliquoted: yes / no / n/a c) LOT #'s: _____	YES	NO
2	Are custody seals present on cooler?	YES	NO
	If yes, are seals intact?	YES	NO
3	Are custody seals present on sample containers?	YES	NO
	If yes, are seals intact? N/A	YES	NO
4	Is there a Chain-Of-Custody (COC)*?	YES	NO
5	Is the COC* complete? Relinquished: yes/no Requested analysis: yes/no	YES	NO
6	Is the COC* in agreement with the samples received? # Samples: yes/no Sample ID's: yes/no Date sampled: yes/no Matrix: yes/no # containers: yes/no	YES	NO
7	Are the samples preserved correctly?	YES	NO
8	Is there enough sample for all the requested analyses?	YES	NO
9	Are all samples within holding times for the requested analyses?	YES	NO
10	Cooler temperature: 2.0°C		
11	Were all sample containers received intact (ie. not broken, leaking, etc.)?	YES	NO
12	Are samples requiring no headspace, headspace free? N/A	YES	NO
13	Are VOA 1st stickers required?	YES	NO
14	Are there special comments on the Chain of Custody which require client contact?	YES	N/A
15	If yes, was ATI Project Manager notified?	YES	NO

Describe "no" items: #6) Received Sample FB-2 which does not appear on C.O.C. Also date sampled for samples HCW2A-2C, LCW2A-2C are 12/19/94 on C.O.C however sample containers state sample date as 12/20/94.

Was client contacted? yes / no

If yes, Date: 12/21 Name of Person contacted: Stephanie S.

Describe actions taken or client instructions: Per Stephanie the sampling date was 12/20/94. Sample FB-2 should be added to COC + logged-in for parameters same as samples. SMS

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

AnalyticalTechnologies, Inc. Corporate Offices: 5550 Morehouse Drive San Diego, CA 92121 (619) 458-9141

ATI I.D.: 412300

February 01, 1995

ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
c/o BHP REFINING 91325 KOMOHANA STREET
KAPOLEI, HI 96707

Project Name: GMP (GROUNDWATER MONITORING)
Project # : 441000

Attention: STEPHANIE SAKURAI/TONY SHAN

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

Date Received	Quantity	Matrix
December 22, 1994	16	WATER

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

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

SUSAN M. SNYDER
PROJECT MANAGER

M. E. SHIGLEY
LABORATORY MANAGER

AnalyticalTechnologies,Inc.

SAMPLE CROSS REFERENCE

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Report Date: February 01, 1995
ATI I.D. : 412300

ATI #	Client Description	Matrix	Date Collected
1	HCW8A	WATER	21-DEC-94
2	HCW8B	WATER	21-DEC-94
3	HCW9A	WATER	21-DEC-94
4	HCW9B	WATER	21-DEC-94
5	LCW8A	WATER	21-DEC-94
6	LCW8B	WATER	21-DEC-94
7	LCW9A	WATER	21-DEC-94
8	LCW9B	WATER	21-DEC-94
9	HCW3A	WATER	21-DEC-94
10	HCW3B	WATER	21-DEC-94
11	HCW3C	WATER	21-DEC-94
12	LCW3A	WATER	21-DEC-94
13	LCW3B	WATER	21-DEC-94
14	LCW3C	WATER	21-DEC-94
15	FB-3	WATER	21-DEC-94
16	TB (SDGCMS 1116/1120)	WATER	21-DEC-94
17	HCW8A/DISSOLVED 01	WATER	21-DEC-94
18	HCW8B/DISSOLVED 02	WATER	21-DEC-94
19	HCW9A/DISSOLVED 03	WATER	21-DEC-94
20	HCW9B/DISSOLVED 04	WATER	21-DEC-94
21	LCW8A/DISSOLVED 05	WATER	21-DEC-94
22	LCW8B/DISSOLVED 06	WATER	21-DEC-94
23	LCW9A/DISSOLVED 07	WATER	21-DEC-94
24	LCW9B/DISSOLVED 08	WATER	21-DEC-94
25	HCW3A/DISSOLVED 09	WATER	21-DEC-94
26	HCW3B/DISSOLVED 10	WATER	21-DEC-94
27	HCW3C/DISSOLVED 11	WATER	21-DEC-94
28	LCW3A/DISSOLVED 12	WATER	21-DEC-94
29	LCW3B/DISSOLVED 13	WATER	21-DEC-94
30	LCW3C/DISSOLVED 14	WATER	21-DEC-94
31	FB-3/DISSOLVED 15	WATER	21-DEC-94

---TOTALS---

Matrix	# Samples
WATER	31

ATI STANDARD DISPOSAL PRACTICE

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

AnalyticalTechnologies,Inc.

ANALYTICAL SCHEDULE

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D.: 412300

Analysis	Technique/Description
EPA 160.1 (TOTAL DISSOLVED SOLIDS)	GRAVIMETRIC
EPA 310.1 (ALKALINITY)	TITRIMETRIC
EPA 340.2 (FLUORIDE)	ELECTRODE
EPA 353.2 (NITRATE-NITRITE AS NITROGEN)	COLORIMETRIC
EPA 425.1 (SURFACTANTS (MBAS))	COLORIMETRIC
EPA 6010 (ANTIMONY)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (ARSENIC)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (BARIUM)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (BERYLLIUM)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (CADMIUM)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (CHROMIUM)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (COBALT)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (IRON)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (LEAD)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (MANGANESE)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (NICKEL)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (SELENIUM)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (SODIUM)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (VANADIUM)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 7470 (AQUEOUS MERCURY)	ATOMIC ABSORPTION/COLD VAPOR
EPA 8240 (GC/MS FOR VOLATILE ORGANICS)	GC/MASS SPECTROMETER
EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)	GC/MASS SPECTROMETER
EPA 9038 (SULFATE)	TURBIDIMETRIC
EPA 9040 (pH)	ELECTRODE
EPA 9050 (ELECTRICAL CONDUCTIVITY)	ELECTRODE
EPA 9253 (CHLORIDE)	TITRIMETRIC, SILVER NITRATE

Analytical Technologies, Inc.

GENERAL CHEMISTRY RESULTS

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D.: 412300

Sample #	Client ID	Matrix	Date Sampled	Date Received
1	HCW8A	WATER	21-DEC-94	22-DEC-94
2	HCW8B	WATER	21-DEC-94	22-DEC-94
3	HCW9A	WATER	21-DEC-94	22-DEC-94
4	HCW9B	WATER	21-DEC-94	22-DEC-94
5	LCW8A	WATER	21-DEC-94	22-DEC-94

Parameter	Units	1	2	3	4	5
CARBONATE AS CACO3	MG/L	<5	<5	<5	<5	<5
BICARBONATE AS CACO3	MG/L	345	210	645	161	362
HYDROXIDE AS CACO3	MG/L	<5	<5	<5	<5	<5
TOTAL ALKALINITY AS CACO3	MG/L	345	210	645	161	362
CHLORIDE	MG/L	1240	9440	1970	12400	1180
ELECTRICAL CONDUCTIVITY	UMHOS/CM	7410	27100	8710	34100	7360
FLUORIDE	MG/L	<0.5	0.73	0.53	0.55	<0.5
SURFACTANTS (MBAS)	MG/L	0.19	<0.10	<0.10	<0.10	0.21
NITRATE-NITRITE AS NITROGEN	MG/L	<0.05	<0.05	<0.05	0.30	<0.05
pH	UNITS	8.09	7.49	8.04	7.48	8.08
SULFATE	MG/L	2020	1970	985	2830	2070
TOTAL DISSOLVED SOLIDS	MG/L	4930	17900	5260	22700	4770

AnalyticalTechnologies,Inc.

GENERAL CHEMISTRY RESULTS

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000 ATI I.D.: 412300
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Received
6	LCW8B	WATER	21-DEC-94	22-DEC-94
7	LCW9A	WATER	21-DEC-94	22-DEC-94
8	LCW9B	WATER	21-DEC-94	22-DEC-94
9	HCW3A	WATER	21-DEC-94	22-DEC-94
10	HCW3B	WATER	21-DEC-94	22-DEC-94

Parameter	Units	6	7	8	9	10
CARBONATE AS CACO3	MG/L	<5	<5	<5	<5	<5
BICARBONATE AS CACO3	MG/L	215	629	160	311	325
HYDROXIDE AS CACO3	MG/L	<5	<5	<5	<5	<5
TOTAL ALKALINITY AS CACO3	MG/L	215	629	160	311	325
CHLORIDE	MG/L	9270	1960	12500	509	587
ELECTRICAL CONDUCTIVITY	UMHOS/CM	26400	8760	35100	5680	6000
FLUORIDE	MG/L	0.73	0.51	0.55	<0.5	<0.5
SURFACTANTS (MBAS)	MG/L	0.11	0.12	<0.10	0.80	0.67
NITRATE-NITRITE AS NITROGEN	MG/L	<0.05	<0.05	0.31	4.8	5.4
pH	UNITS	7.49	8.04	7.49	8.19	8.26
SULFATE	MG/L	2700	1210	2970	2180	1970
TOTAL DISSOLVED SOLIDS	MG/L	16600	5430	22600	3980	4000

AnalyticalTechnologies, Inc.

GENERAL CHEMISTRY RESULTS

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000 ATI I.D.: 41230C
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Received
11	HCW3C	WATER	21-DEC-94	22-DEC-94
12	LCW3A	WATER	21-DEC-94	22-DEC-94
13	LCW3B	WATER	21-DEC-94	22-DEC-94
14	LCW3C	WATER	21-DEC-94	22-DEC-94
15	FB-3	WATER	21-DEC-94	22-DEC-94

Parameter	Units	11	12	13	14	15
CARBONATE AS CACO3	MG/L	<5	<5	<5	<5	<5
BICARBONATE AS CACO3	MG/L	306	307	316	277	<5
HYDROXIDE AS CACO3	MG/L	<5	<5	<5	<5	<5
TOTAL ALKALINITY AS CACO3	MG/L	306	307	316	277	<5
CHLORIDE	MG/L	530	503	579	510	<5.0
ELECTRICAL CONDUCTIVITY	UMHOS/CM	5840	6010	5810	6210	<20
FLUORIDE	MG/L	<0.5	<0.5	<0.5	<0.5	<0.5
SURFACTANTS (MBAS)	MG/L	0.62	0.85	0.58	0.87	<0.10
NITRATE-NITRITE AS NITROGEN	MG/L	7.0	4.6	5.6	10.1	0.43
pH	UNITS	8.21	8.14	8.26	8.11	5.39
SULFATE	MG/L	1640	2230	2110	2270	<10.0
TOTAL DISSOLVED SOLIDS	MG/L	3990	4190	4030	4450	<20

AnalyticalTechnologies,Inc.

GENERAL CHEMISTRY - QUALITY CONTROL

DUP/MS

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000 ATI I.D. : 41230C
Project Name: GMP (GROUNDWATER MONITORING)

Parameters	REF I.D.	Units	Sample Result	Dup Result	RPD	Spiked Sample	Spike Conc	% Rec
BICARBONATE AS CACO3	412300-02	MG/L	210	208	1	N/A	N/A	N/A
BICARBONATE AS CACO3	412300-08	MG/L	160	164	2	N/A	N/A	N/A
CARBONATE AS CACO3	412300-02	MG/L	<5	<5	0	N/A	N/A	N/A
CARBONATE AS CACO3	412300-08	MG/L	<5	<5	0	N/A	N/A	N/A
CHLORIDE	820154-03	MG/L	<5.0	<5.0	0	42.0	40.0	105
CHLORIDE	412300-12	MG/L	503	506	1	542	40.0	98
CHLORIDE	412307-01	MG/L	66.0	68.0	3	105	40.0	98
ELECTRICAL CONDUCTIVITY	412300-08	UMHOS/CM	35100	35300	1	N/A	N/A	N/A
ELECTRICAL CONDUCTIVITY	412300-14	UMHOS/CM	6210	6200	0	N/A	N/A	N/A
FLUORIDE	412300-05	MG/L	<0.5	<0.5	0	5.5	5.0	110
FLUORIDE	412300-14	MG/L	<0.5	<0.5	0	5.5	5.0	110
HYDROXIDE AS CACO3	412300-02	MG/L	<5	<5	0	N/A	N/A	N/A
HYDROXIDE AS CACO3	412300-08	MG/L	<5	<5	0	N/A	N/A	N/A
NITRATE-NITRITE AS NITROGEN	412300-08	MG/L	0.31	0.31	0	2.2	2.0	95
NITRATE-NITRITE AS NITROGEN	412315-03	MG/L	<0.05	<0.05	0	1.9	2.0	95
SULFATE	820154-01	MG/L	12.8	12.1	6	47.9	40.0	88
SULFATE	412300-12	MG/L	2230	2340	5	6240	4000	100
SULFATE	412300-15	MG/L	<10.0	<10.0	0	18.2	20.0	91
SURFACTANTS (MBAS)	412300-01	MG/L	0.19	0.20	5	1.9	2.0	86
SURFACTANTS (MBAS)	412300-15	MG/L	<0.10	<0.10	0	0.94	1.0	94
TOTAL ALKALINITY AS CACO3	412300-02	MG/L	210	208	1	N/A	N/A	N/A
TOTAL ALKALINITY AS CACO3	412300-08	MG/L	160	164	2	N/A	N/A	N/A
TOTAL DISSOLVED SOLIDS	412300-01	MG/L	4930	4890	1	N/A	N/A	N/A
pH	412300-10	UNITS	8.26	8.26	0	N/A	N/A	N/A
pH	412315-03	UNITS	6.88	6.89	0	N/A	N/A	N/A

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

AnalyticalTechnologies,Inc.

GENERAL CHEMISTRY - QUALITY CONTROL

BLANK SPIKE

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D. : 412300

Parameters	Blank Spike ID#	Units	Blank Result	Spiked Sample	Spike Conc.	% Rec
CHLORIDE	53073	MG/L	<5.0	41.0	40.0	103
FLUORIDE	53140	MG/L	<0.5	4.9	5.0	98
NITRATE-NITRITE AS NITROGEN	53034	MG/L	<0.05	2.0	2.0	100
SULFATE	53138	MG/L	<10.0	22.3	20.0	112
SULFATE	53187	MG/L	<10.0	21.2	20.0	106
SURFACTANTS (MBAS)	52891	MG/L	<0.10	0.93	1.0	93

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

Analytical Technologies, Inc.

METALS RESULTS

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000 ATI I.D.: 412300
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Received
1	HCW8A	WATER	21-DEC-94	22-DEC-94
2	HCW8B	WATER	21-DEC-94	22-DEC-94
3	HCW9A	WATER	21-DEC-94	22-DEC-94
4	HCW9B	WATER	21-DEC-94	22-DEC-94
5	LCW8A	WATER	21-DEC-94	22-DEC-94

Parameter	Units	1	2	3	4	5
ARSENIC	MG/L	<0.05	<0.5@H	<0.05	<0.5@H	<0.05
BARIUM	MG/L	0.02	0.02	<0.01	0.04	0.02
BERYLLIUM	MG/L	<0.005	<0.005	<0.005	<0.005	<0.005
CADMIUM	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01
COBALT	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01
CHROMIUM	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01
IRON	MG/L	0.05	0.01	<0.01	0.66	<0.01
MERCURY	MG/L	<0.0005	<0.0005	<0.0005	<0.0005	0.0012
MANGANESE	MG/L	0.02	0.03	0.03	0.15	0.02
SODIUM	MG/L	1600	5600	1720	7190	1570
NICKEL	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01
LEAD	MG/L	<0.03	<0.03	<0.03	<0.03	<0.03
ANTIMONY	MG/L	<0.03	<0.03	<0.03	<0.03	<0.03
SELENIUM	MG/L	<0.05	<0.05	<0.05	<0.5@H	<0.05
VANADIUM	MG/L	0.01	0.01	0.01	<0.01	0.01

Analytical Technologies, Inc.

METALS RESULTS

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000 ATI I.D.: 412300
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Received
6	LCW8B	WATER	21-DEC-94	22-DEC-94
7	LCW9A	WATER	21-DEC-94	22-DEC-94
8	LCW9B	WATER	21-DEC-94	22-DEC-94
9	HCW3A	WATER	21-DEC-94	22-DEC-94
10	HCW3B	WATER	21-DEC-94	22-DEC-94

Parameter	Units	6	7	8	9	10
ARSENIC	MG/L	<0.05	<0.05	<0.05	<0.05	<0.05
BARIUM	MG/L	0.02	<0.01	0.04	0.06	0.04
BERYLLIUM	MG/L	<0.005	<0.005	<0.005	<0.005	<0.005
CADMIUM	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01
COBALT	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01
CHROMIUM	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01
IRON	MG/L	0.06	<0.01	0.63	0.07	0.02
MERCURY	MG/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
MANGANESE	MG/L	0.02	0.02	0.15	<0.01	<0.01
SODIUM	MG/L	5500	1720	7030	1200	1320
NICKEL	MG/L	<0.01	<0.01	<0.01	0.02	0.02
LEAD	MG/L	<0.03	<0.03	<0.03	<0.03	<0.03
ANTIMONY	MG/L	<0.03	<0.03	<0.03	<0.03	<0.03
SELENIUM	MG/L	<0.05	<0.05	<0.05	<0.05	<0.05
VANADIUM	MG/L	<0.01	<0.01	<0.01	0.04	0.08

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METALS RESULTS

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D.: 41230C

Sample #	Client ID	Matrix	Date Sampled	Date Received
11	HCW3C	WATER	21-DEC-94	22-DEC-9
12	LCW3A	WATER	21-DEC-94	22-DEC-9
13	LCW3B	WATER	21-DEC-94	22-DEC-9
14	LCW3C	WATER	21-DEC-94	22-DEC-9
15	FB-3	WATER	21-DEC-94	22-DEC-9

Parameter	Units	11	12	13	14	15
ARSENIC	MG/L	<0.05	<0.05	<0.05	<0.05	<0.05
BARIUM	MG/L	0.05	0.07	0.04	0.06	<0.01
BERYLLIUM	MG/L	<0.005	<0.005	<0.005	<0.005	<0.005
CADMIUM	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01
COBALT	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01
CHROMIUM	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01
IRON	MG/L	0.07	0.06	0.02	0.07	<0.01
MERCURY	MG/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
MANGANESE	MG/L	<0.01	0.01	<0.01	<0.01	<0.01
SODIUM	MG/L	1300	1310	1300	1430	1.6
NICKEL	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01
LEAD	MG/L	<0.03	<0.03	<0.03	<0.03	<0.03
ANTIMONY	MG/L	<0.03	<0.03	<0.03	<0.03	<0.03
SELENIUM	MG/L	<0.05	<0.05	<0.05	<0.05	<0.05
VANADIUM	MG/L	0.10	0.04	0.08	0.09	<0.01

AnalyticalTechnologies,Inc.

METALS RESULTS

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D.: 41230

Sample #	Client ID	Matrix	Date Sampled	Date Received
17	HCW8A/DISSOLVED 01	WATER	21-DEC-94	22-DEC-9
18	HCW8B/DISSOLVED 02	WATER	21-DEC-94	22-DEC-9
19	HCW9A/DISSOLVED 03	WATER	21-DEC-94	22-DEC-9
20	HCW9B/DISSOLVED 04	WATER	21-DEC-94	22-DEC-9
21	LCW8A/DISSOLVED 05	WATER	21-DEC-94	22-DEC-9

Parameter	Units	17	18	19	20	21
ARSENIC	MG/L	<0.05	<0.05	<0.05	<0.05	<0.05
BARIUM	MG/L	0.02	0.02	<0.01	0.04	0.02
BERYLLIUM	MG/L	<0.005	<0.005	<0.005	<0.005	<0.005
CADMIUM	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01
COBALT	MG/L	<0.01	<0.01	<0.01	0.01	<0.01
CHROMIUM	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01
IRON	MG/L	<0.01	<0.01	0.03	0.05	0.01
MERCURY	MG/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
MANGANESE	MG/L	0.02	0.02	0.03	0.14	0.02
SODIUM	MG/L	1600	5230	1650	7140	1520
NICKEL	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01
LEAD	MG/L	<0.03	<0.03	<0.03	<0.03	<0.03
ANTIMONY	MG/L	<0.03	<0.03	<0.03	<0.03	<0.03
SELENIUM	MG/L	<0.05	<0.05	<0.05	<0.05	<0.05
VANADIUM	MG/L	0.01	<0.01	<0.01	<0.01	0.01

Analytical Technologies, Inc.

METALS RESULTS

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D.: 412300

Sample #	Client ID	Matrix	Date Sampled	Date Received
22	LCW8B/DISSOLVED 06	WATER	21-DEC-94	22-DEC-94
23	LCW9A/DISSOLVED 07	WATER	21-DEC-94	22-DEC-94
24	LCW9B/DISSOLVED 08	WATER	21-DEC-94	22-DEC-94
25	HCW3A/DISSOLVED 09	WATER	21-DEC-94	22-DEC-94
26	HCW3B/DISSOLVED 10	WATER	21-DEC-94	22-DEC-94

Parameter	Units	22	23	24	25	26
ARSENIC	MG/L	<0.05	<0.05	0.05	-	-
BARIUM	MG/L	0.02	<0.01	0.03	-	-
BERYLLIUM	MG/L	<0.005	<0.005	<0.005	-	-
CADMIUM	MG/L	<0.01	<0.01	<0.01	-	-
COBALT	MG/L	<0.01	0.01	<0.01	-	-
CHROMIUM	MG/L	<0.01	<0.01	<0.01	-	-
IRON	MG/L	0.01	0.05	0.05	<0.01	<0.01
MERCURY	MG/L	<0.0005	<0.0005	<0.0005	-	-
MANGANESE	MG/L	0.02	0.05	0.14	-	-
SODIUM	MG/L	5300	1760	6810	-	-
NICKEL	MG/L	<0.01	<0.01	<0.01	-	-
LEAD	MG/L	<0.03	<0.03	<0.03	-	-
ANTIMONY	MG/L	<0.03	<0.03	<0.03	-	-
SELENIUM	MG/L	<0.05	<0.05	<0.05	-	-
VANADIUM	MG/L	<0.01	<0.01	<0.01	-	-

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METALS RESULTS

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D.: 412300

Sample #	Client ID	Matrix	Date Sampled	Date Received
27	HCW3C/DISSOLVED 11	WATER	21-DEC-94	22-DEC-94
28	LCW3A/DISSOLVED 12	WATER	21-DEC-94	22-DEC-94
29	LCW3B/DISSOLVED 13	WATER	21-DEC-94	22-DEC-94
30	LCW3C/DISSOLVED 14	WATER	21-DEC-94	22-DEC-94
31	FB-3/DISSOLVED 15	WATER	21-DEC-94	22-DEC-94

Parameter	Units	27	28	29	30	31
IRON	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01

AnalyticalTechnologies,Inc.

METALS - QUALITY CONTROL

DUP/MS

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D. : 41230

Parameters	REF I.D.	Units	Sample Result	Dup Result	RPD	Spiked Sample	Spike Conc	% Rec
ANTIMONY	412300-24	MG/L	<0.03	<0.03	0	1.78	2.00	89
ANTIMONY	412281-30	MG/L	<0.03	<0.03	0	1.82	2.00	91
ARSENIC	412281-30	MG/L	<0.05	<0.05	0	1.88	2.00	94
ARSENIC	412300-24	MG/L	<0.05	<0.05	0	1.79	2.00	90
BARIUM	412300-24	MG/L	0.03	0.03	0	0.94	1.00	91@V
BARIUM	412281-30	MG/L	0.07	0.07	0	3.58	4.00	88
BERYLLIUM	412300-24	MG/L	<0.005	<0.005	0	1.74	2.00	87
BERYLLIUM	412281-30	MG/L	<0.005	<0.005	0	1.84	2.00	92
CADMIUM	412281-30	MG/L	<0.01	<0.01	0	1.67	2.00	84
CADMIUM	412300-24	MG/L	<0.01	<0.01	0	1.65	2.00	83
CHROMIUM	412300-24	MG/L	<0.01	<0.01	0	1.65	2.00	83
CHROMIUM	412281-30	MG/L	<0.01	<0.01	0	1.75	2.00	88
COBALT	412300-24	MG/L	<0.01	<0.01	0	0.88	1.00	88@V
COBALT	412281-30	MG/L	<0.01	<0.01	0	3.36	4.00	84
IRON	412300-24	MG/L	0.05	0.04	22@R	3.32	4.00	82
IRON	412281-30	MG/L	0.03	0.03	0	3.57	4.00	89
IRON	412281-16	MG/L	<0.01	<0.01	0	9.56	10.0	96
LEAD	412281-30	MG/L	0.03	<0.03	0	1.77	2.00	88
LEAD	412300-24	MG/L	<0.03	<0.03	0	1.67	2.00	84
MANGANESE	412300-24	MG/L	0.14	0.15	7	3.51	4.00	84
MANGANESE	412281-30	MG/L	0.19	0.18	5	3.71	4.00	88
MERCURY	412300-24	MG/L	<0.0005	<0.0005	0	0.0016	0.0020	80
MERCURY	412300-15	MG/L	<0.0005	<0.0005	0	0.0019	0.0020	95
NICKEL	412300-24	MG/L	<0.01	<0.01	0	1.63	2.00	82
NICKEL	412281-30	MG/L	<0.01	<0.01	0	1.71	2.00	86
SELENIUM	412281-30	MG/L	<0.05	<0.05	0	1.13	1.20	94
SELENIUM	412300-24	MG/L	<0.05@H	<0.05	0	1.10	1.20	92
SODIUM	412300-24	MG/L	6810	6840	0	6870	25.0	N/A*
SODIUM	412281-30	MG/L	3600	3550	1	3440	25.0	N/A*
VANADIUM	412300-24	MG/L	<0.01	<0.01	0	5.39	6.00	90
VANADIUM	412281-30	MG/L	<0.01	<0.01	0	5.52	6.00	92

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

AnalyticalTechnologies,Inc.

METALS - QUALITY CONTROL

BLANK SPIKE

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D. : 41230C

Parameters	Blank Spike ID#	Units	Blank Result	Spiked Sample	Spike Conc.	% Rec
ANTIMONY	53144	MG/L	<0.03	1.96	2.00	98
ANTIMONY	53219	MG/L	<0.03	1.98	2.00	99
ARSENIC	53403	MG/L	<0.05	2.00	2.00	100
ARSENIC	53673	MG/L	<0.05	1.92	2.00	96
BARIUM	53144	MG/L	<0.01	3.86	4.00	97
BARIUM	53219	MG/L	<0.01	3.99	4.00	100
BERYLLIUM	53144	MG/L	<0.005	1.95	2.00	98
BERYLLIUM	53219	MG/L	<0.005	2.02	2.00	101
CADMIUM	53578	MG/L	<0.01	2.01	2.00	100
CADMIUM	53673	MG/L	<0.01	2.01	2.00	100
CHROMIUM	53144	MG/L	<0.01	1.97	2.00	99
CHROMIUM	53219	MG/L	<0.01	2.01	2.00	101
COBALT	53144	MG/L	<0.01	3.78	4.00	95
COBALT	53219	MG/L	<0.01	3.92	4.00	98
IRON	53145	MG/L	<0.01	3.89	4.00	97
IRON	53220	MG/L	<0.01	4.02	4.00	101
IRON	53330	MG/L	<0.01	10.1	10.0	101
LEAD	53578	MG/L	<0.03	2.02	2.00	101
LEAD	53673	MG/L	<0.03	2.02	2.00	101
MANGANESE	53145	MG/L	<0.01	3.99	4.00	100
MANGANESE	53220	MG/L	<0.01	4.04	4.00	101
MERCURY	53314	MG/L	<0.0005	0.0020	0.0020	100
MERCURY	53315	MG/L	<0.0005	0.0018	0.0020	90
NICKEL	53144	MG/L	<0.01	1.99	2.00	100
NICKEL	53219	MG/L	<0.01	2.00	2.00	100
SELENIUM	53578	MG/L	<0.05	1.19	1.20	99
SELENIUM	53673	MG/L	<0.05	1.16	1.12	104
SODIUM	53145	MG/L	<0.1	23.5	25.0	94
SODIUM	53220	MG/L	<0.1	24.4	25.0	98
VANADIUM	53144	MG/L	<0.01	6.15	6.00	103
VANADIUM	53219	MG/L	<0.01	6.11	6.00	102

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

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412300
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
1	HCW8A	WATER	21-DEC-94	N/A	31-DEC-94	1.00
2	HCW8B	WATER	21-DEC-94	N/A	31-DEC-94	1.00
3	HCW9A	WATER	21-DEC-94	N/A	04-JAN-95	1.00

Parameter	Units	1	2	3
CARBON DISULFIDE	UG/L	4	<2	<2
CHLOROMETHANE	UG/L	<10	<10	<10
CHLOROFORM	UG/L	<1	<1	<1
VINYL CHLORIDE	UG/L	<5	<5	<5
2-BUTANONE (MEK)	UG/L	<10	<10	<10
BROMOMETHANE	UG/L	<10	<10	<10
1,2-DICHLOROETHANE	UG/L	<1	<1	<1
CHLOROETHANE	UG/L	<5	<5	<5
ACETONE	UG/L	<10	<10	<10
BENZENE	UG/L	<1	<1	1
1,1-DICHLOROETHENE	UG/L	<1	<1	<1
TOLUENE	UG/L	<2	<2	<2
CHLOROBENZENE	UG/L	<1	<1	<1
METHYLENE CHLORIDE	UG/L	<5	8*L	<5
ETHYLBENZENE	UG/L	<1	<1	<1
TRANS-1,2-DICHLOROETHENE	UG/L	<1	<1	<1
XYLENES (TOTAL)	UG/L	<1	<1	<1
1,1-DICHLOROETHANE	UG/L	<1	<1	<1
STYRENE	UG/L	<2	<2	<2
1,4-DIOXANE	UG/L	<200	<200	<200
CIS-1,2-DICHLOROETHENE	UG/L	<1	<1	<1
ETHYLENE DIBROMIDE	UG/L	<5	<5	<5
CYCLOHEXANE	UG/L	<10	<10	<10
1,1,1-TRICHLOROETHANE	UG/L	<1	<1	<1
CARBON TETRACHLORIDE	UG/L	<1	<1	<1
TRICHLOROETHENE	UG/L	<1	<1	<1
1,2-DICHLOROPROPANE	UG/L	<1	<1	<1
BROMODICHLOROMETHANE	UG/L	<1	<1	<1
4-METHYL-2-PENTANONE (MIBK)	UG/L	<10	<10	<10
CIS-1,3-DICHLOROPROPENE	UG/L	<1	<1	<1
TRANS-1,3-DICHLOROPROPENE	UG/L	<1	<1	<1
2-HEXANONE (MBK)	UG/L	<10	<10	<10
1,1,2-TRICHLOROETHANE	UG/L	<1	<1	<1
TETRACHLOROETHENE	UG/L	<1	<1	<1
DIBROMOCHLOROMETHANE	UG/L	<1	<1	<1
BROMOFORM	UG/L	<5	<5	<5
1,1,2,2-TETRACHLOROETHANE	UG/L	<2	<2	<2
DICHLORODIFLUOROMETHANE	UG/L	<10	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412300
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
1	HCW8A	WATER	21-DEC-94	N/A	31-DEC-94	1.00
2	HCW8B	WATER	21-DEC-94	N/A	31-DEC-94	1.00
3	HCW9A	WATER	21-DEC-94	N/A	04-JAN-95	1.00

Parameter	Units	1	2	3
TRICHLOROFLUOROMETHANE	UG/L	<5	<5	<5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	UG/L	<5	<5	<5
1,2-DICHLOROBENZENE	UG/L	<5	<5	<5
1,3-DICHLOROBENZENE	UG/L	<5	<5	<5
1,4-DICHLOROBENZENE	UG/L	<5	<5	<5
SURROGATES				
1,2-DICHLOROETHANE-D4	%	98	99	102
TOLUENE-D8	%	101	98	101
BFB	%	87	91	106

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412300
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
4	HCW9B	WATER	21-DEC-94	N/A	31-DEC-94	1.00
5	LCW8A	WATER	21-DEC-94	N/A	31-DEC-94	1.00
6	LCW8B	WATER	21-DEC-94	N/A	31-DEC-94	1.00

Parameter	Units	4	5	6
CARBON DISULFIDE	UG/L	<2	3	<2
CHLOROMETHANE	UG/L	<10	<10	<10
CHLOROFORM	UG/L	<1	<1	<1
VINYL CHLORIDE	UG/L	<5	<5	<5
2-BUTANONE (MEK)	UG/L	<10	<10	<10
BROMOMETHANE	UG/L	<10	<10	<10
1,2-DICHLOROETHANE	UG/L	<1	<1	<1
CHLOROETHANE	UG/L	<5	<5	<5
ACETONE	UG/L	<10	<10	<10
BENZENE	UG/L	<1	<1	<1
1,1-DICHLOROETHENE	UG/L	<1	<1	<1
TOLUENE	UG/L	<2	<2	<2
CHLOROBENZENE	UG/L	<1	<1	<1
METHYLENE CHLORIDE	UG/L	<5	<5	<5
ETHYLBENZENE	UG/L	<1	<1	<1
TRANS-1,2-DICHLOROETHENE	UG/L	<1	<1	<1
XYLENES (TOTAL)	UG/L	<1	1	<1
1,1-DICHLOROETHANE	UG/L	<1	<1	<1
STYRENE	UG/L	<2	<2	<2
1,4-DIOXANE	UG/L	<200	<200	<200
CIS-1,2-DICHLOROETHENE	UG/L	<1	<1	<1
ETHYLENE DIBROMIDE	UG/L	<5	<5	<5
CYCLOHEXANE	UG/L	<10	<10	<10
1,1,1-TRICHLOROETHANE	UG/L	<1	<1	<1
CARBON TETRACHLORIDE	UG/L	<1	<1	<1
TRICHLOROETHENE	UG/L	<1	<1	<1
1,2-DICHLOROPROPANE	UG/L	<1	<1	<1
BROMODICHLOROMETHANE	UG/L	<1	<1	<1
4-METHYL-2-PENTANONE (MIBK)	UG/L	<10	<10	<10
CIS-1,3-DICHLOROPROPENE	UG/L	<1	<1	<1
TRANS-1,3-DICHLOROPROPENE	UG/L	<1	<1	<1
2-HEXANONE (MBK)	UG/L	<10	<10	<10
1,1,2-TRICHLOROETHANE	UG/L	<1	<1	<1
TETRACHLOROETHENE	UG/L	<1	<1	<1
DIBROMOCHLOROMETHANE	UG/L	<1	<1	<1
BROMOFORM	UG/L	<5	<5	<5
1,1,2,2-TETRACHLOROETHANE	UG/L	<2	<2	<2
DICHLORODIFLUOROMETHANE	UG/L	<10	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412300
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
4	HCW9B	WATER	21-DEC-94	N/A	31-DEC-94	1.00
5	LCW8A	WATER	21-DEC-94	N/A	31-DEC-94	1.00
6	LCW8B	WATER	21-DEC-94	N/A	31-DEC-94	1.00

Parameter	Units	4	5	6
TRICHLOROFLUOROMETHANE	UG/L	<5	<5	<5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	UG/L	<5	<5	<5
1,2-DICHLOROBENZENE	UG/L	<5	<5	<5
1,3-DICHLOROBENZENE	UG/L	<5	<5	<5
1,4-DICHLOROBENZENE	UG/L	<5	<5	<5
SURROGATES				
1,2-DICHLOROETHANE-D4	%	100	103	100
TOLUENE-D8	%	100	102	101
BFB	%	96	99	92

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412300
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
7	LCW9A	WATER	21-DEC-94	N/A	01-JAN-95	1.00
8	LCW9B	WATER	21-DEC-94	N/A	31-DEC-94	1.00
9	HCW3A	WATER	21-DEC-94	N/A	31-DEC-94	1.00

Parameter	Units	7	8	9
CARBON DISULFIDE	UG/L	<2	<2	<2
CHLOROMETHANE	UG/L	<10	<10	<10
CHLOROFORM	UG/L	<1	<1	<1
VINYL CHLORIDE	UG/L	<5	<5	<5
2-BUTANONE (MEK)	UG/L	<10	<10	<10
BROMOMETHANE	UG/L	<10	<10	<10
1,2-DICHLOROETHANE	UG/L	<1	<1	<1
CHLOROETHANE	UG/L	<5	<5	<5
ACETONE	UG/L	<10	<10	<10
BENZENE	UG/L	2	<1	<1
1,1-DICHLOROETHENE	UG/L	<1	<1	<1
TOLUENE	UG/L	<2	<2	<2
CHLOROBENZENE	UG/L	<1	<1	<1
METHYLENE CHLORIDE	UG/L	<5	<5	16B
ETHYLBENZENE	UG/L	<1	<1	<1
TRANS-1,2-DICHLOROETHENE	UG/L	<1	<1	<1
XYLENES (TOTAL)	UG/L	<1	<1	<1
1,1-DICHLOROETHANE	UG/L	<1	<1	<1
STYRENE	UG/L	<2	<2	<2
1,4-DIOXANE	UG/L	<200	<200	<200
CIS-1,2-DICHLOROETHENE	UG/L	<1	<1	<1
ETHYLENE DIBROMIDE	UG/L	<5	<5	<5
CYCLOHEXANE	UG/L	<10	<10	<10
1,1,1-TRICHLOROETHANE	UG/L	<1	<1	<1
CARBON TETRACHLORIDE	UG/L	<1	<1	<1
TRICHLOROETHENE	UG/L	<1	<1	<1
1,2-DICHLOROPROPANE	UG/L	<1	<1	<1
BROMODICHLOROMETHANE	UG/L	<1	<1	<1
4-METHYL-2-PENTANONE (MIBK)	UG/L	<10	<10	<10
CIS-1,3-DICHLOROPROPENE	UG/L	<1	<1	<1
TRANS-1,3-DICHLOROPROPENE	UG/L	<1	<1	<1
2-HEXANONE (MBK)	UG/L	<10	<10	<10
1,1,2-TRICHLOROETHANE	UG/L	<1	<1	<1
TETRACHLOROETHENE	UG/L	<1	<1	<1
DIBROMOCHLOROMETHANE	UG/L	<1	<1	<1
BROMOFORM	UG/L	<5	<5	<5
1,1,2,2-TETRACHLOROETHANE	UG/L	<2	<2	<2
DICHLORODIFLUOROMETHANE	UG/L	<10	<10	<10

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GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412300
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
7	LCW9A	WATER	21-DEC-94	N/A	01-JAN-95	1.00
8	LCW9B	WATER	21-DEC-94	N/A	31-DEC-94	1.00
9	HCW3A	WATER	21-DEC-94	N/A	31-DEC-94	1.00

Parameter	Units	7	8	9
TRICHLOROFLUOROMETHANE	UG/L	<5	<5	<5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	UG/L	<5	<5	<5
1,2-DICHLOROBENZENE	UG/L	<5	<5	<5
1,3-DICHLOROBENZENE	UG/L	<5	<5	<5
1,4-DICHLOROBENZENE	UG/L	<5	<5	<5
SURROGATES				
1,2-DICHLOROETHANE-D4	%	101	99	104
TOLUENE-D8	%	103	101	99
BFB	%	96	91	102

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412300
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
10	HCW3B	WATER	21-DEC-94	N/A	31-DEC-94	1.00
11	HCW3C	WATER	21-DEC-94	N/A	01-JAN-95	1.00
12	LCW3A	WATER	21-DEC-94	N/A	31-DEC-94	1.00

Parameter	Units	10	11	12
CARBON DISULFIDE	UG/L	<2	<2	<2
CHLOROMETHANE	UG/L	<10	<10	<10
CHLOROFORM	UG/L	<1	<1	<1
VINYL CHLORIDE	UG/L	<5	<5	<5
2-BUTANONE (MEK)	UG/L	<10	<10	<10
BROMOMETHANE	UG/L	<10	<10	<10
1,2-DICHLOROETHANE	UG/L	<1	<1	<1
CHLOROETHANE	UG/L	<5	<5	<5
ACETONE	UG/L	<10	<10	<10
BENZENE	UG/L	<1	<1	<1
1,1-DICHLOROETHENE	UG/L	<1	<1	<1
TOLUENE	UG/L	<2	<2	<2
CHLOROBENZENE	UG/L	<1	<1	<1
METHYLENE CHLORIDE	UG/L	17B	<5	<5
ETHYLBENZENE	UG/L	<1	<1	<1
TRANS-1,2-DICHLOROETHENE	UG/L	<1	<1	<1
XYLENES (TOTAL)	UG/L	<1	<1	<1
1,1-DICHLOROETHANE	UG/L	<1	<1	<1
STYRENE	UG/L	<2	<2	<2
1,4-DIOXANE	UG/L	<200	<200	<200
CIS-1,2-DICHLOROETHENE	UG/L	<1	<1	<1
ETHYLENE DIBROMIDE	UG/L	<5	<5	<5
CYCLOHEXANE	UG/L	<10	<10	<10
1,1,1-TRICHLOROETHANE	UG/L	<1	<1	<1
CARBON TETRACHLORIDE	UG/L	<1	<1	<1
TRICHLOROETHENE	UG/L	<1	<1	<1
1,2-DICHLOROPROPANE	UG/L	<1	<1	<1
BROMODICHLOROMETHANE	UG/L	<1	<1	<1
4-METHYL-2-PENTANONE (MIBK)	UG/L	<10	<10	<10
CIS-1,3-DICHLOROPROPENE	UG/L	<1	<1	<1
TRANS-1,3-DICHLOROPROPENE	UG/L	<1	<1	<1
2-HEXANONE (MBK)	UG/L	<10	<10	<10
1,1,2-TRICHLOROETHANE	UG/L	<1	<1	<1
TETRACHLOROETHENE	UG/L	<1	<1	<1
DIBROMOCHLOROMETHANE	UG/L	<1	<1	<1
BROMOFORM	UG/L	<5	<5	<5
1,1,2,2-TETRACHLOROETHANE	UG/L	<2	<2	<2
DICHLORODIFLUOROMETHANE	UG/L	<10	<10	<10

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GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412300
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
10	HCW3B	WATER	21-DEC-94	N/A	31-DEC-94	1.00
11	HCW3C	WATER	21-DEC-94	N/A	01-JAN-95	1.00
12	LCW3A	WATER	21-DEC-94	N/A	31-DEC-94	1.00

Parameter	Units	10	11	12
TRICHLOROFLUOROMETHANE	UG/L	<5	<5	<5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	UG/L	<5	<5	<5
1,2-DICHLOROBENZENE	UG/L	<5	<5	<5
1,3-DICHLOROBENZENE	UG/L	<5	<5	<5
1,4-DICHLOROBENZENE	UG/L	<5	<5	<5
SURROGATES				
1,2-DICHLOROETHANE-D4	%	98	100	94
TOLUENE-D8	%	102	101	105
BFB	%	91	92	89

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412300
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
13	LCW3B	WATER	21-DEC-94	N/A	31-DEC-94	1.00
14	LCW3C	WATER	21-DEC-94	N/A	31-DEC-94	1.00
15	FB-3	WATER	21-DEC-94	N/A	31-DEC-94	1.00

Parameter	Units	13	14	15
CARBON DISULFIDE	UG/L	<2	<2	<2
CHLOROMETHANE	UG/L	<10	<10	<10
CHLOROFORM	UG/L	<1	<1	<1
VINYL CHLORIDE	UG/L	<5	<5	<5
2-BUTANONE (MEK)	UG/L	<10	<10	<10
BROMOMETHANE	UG/L	<10	<10	<10
1,2-DICHLOROETHANE	UG/L	<1	<1	<1
CHLOROETHANE	UG/L	<5	<5	<5
ACETONE	UG/L	<10	<10	<10
BENZENE	UG/L	<1	<1	<1
1,1-DICHLOROETHENE	UG/L	<1	<1	<1
TOLUENE	UG/L	<2	<2	<2
CHLOROBENZENE	UG/L	<1	<1	<1
METHYLENE CHLORIDE	UG/L	<5	<5	<5
ETHYLBENZENE	UG/L	<1	<1	<1
TRANS-1,2-DICHLOROETHENE	UG/L	<1	<1	<1
XYLENES (TOTAL)	UG/L	<1	<1	<1
1,1-DICHLOROETHANE	UG/L	<1	<1	<1
STYRENE	UG/L	<2	<2	<2
1,4-DIOXANE	UG/L	<200	<200	<200
CIS-1,2-DICHLOROETHENE	UG/L	<1	<1	<1
ETHYLENE DIBROMIDE	UG/L	<5	<5	<5
CYCLOHEXANE	UG/L	<10	<10	<10
1,1,1-TRICHLOROETHANE	UG/L	<1	<1	<1
CARBON TETRACHLORIDE	UG/L	<1	<1	<1
TRICHLOROETHENE	UG/L	<1	<1	<1
1,2-DICHLOROPROPANE	UG/L	<1	<1	<1
BROMODICHLOROMETHANE	UG/L	<1	<1	<1
4-METHYL-2-PENTANONE (MIBK)	UG/L	<10	<10	<10
CIS-1,3-DICHLOROPROPENE	UG/L	<1	<1	<1
TRANS-1,3-DICHLOROPROPENE	UG/L	<1	<1	<1
2-HEXANONE (MBK)	UG/L	<10	<10	<10
1,1,2-TRICHLOROETHANE	UG/L	<1	<1	<1
TETRACHLOROETHENE	UG/L	<1	<1	<1
DIBROMOCHLOROMETHANE	UG/L	<1	<1	<1
BROMOFORM	UG/L	<5	<5	<5
1,1,2,2-TETRACHLOROETHANE	UG/L	<2	<2	<2
DICHLORODIFLUOROMETHANE	UG/L	<10	<10	<10

AnalyticalTechnologies, Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412300
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
13	LCW3B	WATER	21-DEC-94	N/A	31-DEC-94	1.00
14	LCW3C	WATER	21-DEC-94	N/A	31-DEC-94	1.00
15	FB-3	WATER	21-DEC-94	N/A	31-DEC-94	1.00

Parameter	Units	13	14	15
TRICHLOROFLUOROMETHANE	UG/L	<5	<5	<5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	UG/L	<5	<5	<5
1,2-DICHLOROBENZENE	UG/L	<5	<5	<5
1,3-DICHLOROBENZENE	UG/L	<5	<5	<5
1,4-DICHLOROBENZENE	UG/L	<5	<5	<5
SURROGATES				
1,2-DICHLOROETHANE-D4	%	103	103	101
TOLUENE-D8	%	102	102	102
BFB	%	95	90	94

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412300
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
16	TB (SDGCMS 1116/1120)	WATER	21-DEC-94	N/A	01-JAN-95	1.00

Parameter	Units	16
CARBON DISULFIDE	UG/L	<2
CHLOROMETHANE	UG/L	<10
CHLOROFORM	UG/L	<1
VINYL CHLORIDE	UG/L	<5
2-BUTANONE (MEK)	UG/L	<10
BROMOMETHANE	UG/L	<10
1,2-DICHLOROETHANE	UG/L	<1
CHLOROETHANE	UG/L	<5
ACETONE	UG/L	<10
BENZENE	UG/L	<1
1,1-DICHLOROETHENE	UG/L	<1
TOLUENE	UG/L	<2
CHLOROBENZENE	UG/L	<1
METHYLENE CHLORIDE	UG/L	<5
ETHYLBENZENE	UG/L	<1
TRANS-1,2-DICHLOROETHENE	UG/L	<1
XYLENES (TOTAL)	UG/L	<1
1,1-DICHLOROETHANE	UG/L	<1
STYRENE	UG/L	<2
1,4-DIOXANE	UG/L	<200
CIS-1,2-DICHLOROETHENE	UG/L	<1
ETHYLENE DIBROMIDE	UG/L	<5
CYCLOHEXANE	UG/L	<10
1,1,1-TRICHLOROETHANE	UG/L	<1
CARBON TETRACHLORIDE	UG/L	<1
TRICHLOROETHENE	UG/L	<1
1,2-DICHLOROPROPANE	UG/L	<1
BROMODICHLOROMETHANE	UG/L	<1
4-METHYL-2-PENTANONE (MIBK)	UG/L	<10
CIS-1,3-DICHLOROPROPENE	UG/L	<1
TRANS-1,3-DICHLOROPROPENE	UG/L	<1
2-HEXANONE (MBK)	UG/L	<10
1,1,2-TRICHLOROETHANE	UG/L	<1
TETRACHLOROETHENE	UG/L	<1
DIBROMOCHLOROMETHANE	UG/L	<1
BROMOFORM	UG/L	<5
1,1,2,2-TETRACHLOROETHANE	UG/L	<2
DICHLORODIFLUOROMETHANE	UG/L	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412300
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
16	TB (SDGCMS 1116/1120)	WATER	21-DEC-94	N/A	01-JAN-95	1.00

Parameter	Units	16
TRICHLOROFLUOROMETHANE	UG/L	<5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	UG/L	<5
1,2-DICHLOROBENZENE	UG/L	<5
1,3-DICHLOROBENZENE	UG/L	<5
1,4-DICHLOROBENZENE	UG/L	<5
SURROGATES		
1,2-DICHLOROETHANE-D4	%	100
TOLUENE-D8	%	99
BFB	%	92

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Blank I.D. : 33756
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D. : 412300
Date Extracted: N/A
Date Analyzed : 31-DEC-94
Dil. Factor : 1.00

Parameters	Units	Results
CHLOROMETHANE	UG/L	<10
CARBON DISULFIDE	UG/L	<2
CHLOROFORM	UG/L	<1
VINYL CHLORIDE	UG/L	<5
BROMOMETHANE	UG/L	<10
2-BUTANONE (MEK)	UG/L	<10
1,2-DICHLOROETHANE	UG/L	<1
CHLOROETHANE	UG/L	<5
ACETONE	UG/L	<10
BENZENE	UG/L	<1
TOLUENE	UG/L	<2
1,1-DICHLOROETHENE	UG/L	<1
CHLOROBENZENE	UG/L	<1
METHYLENE CHLORIDE	UG/L	7*L
ETHYLBENZENE	UG/L	<1
XYLENES (TOTAL)	UG/L	<1
TRANS-1,2-DICHLOROETHENE	UG/L	<1
STYRENE	UG/L	<2
1,1-DICHLOROETHANE	UG/L	<1
1,4-DIOXANE	UG/L	<200
CIS-1,2-DICHLOROETHENE	UG/L	<1
ETHYLENE DIBROMIDE	UG/L	<5
CYCLOHEXANE	UG/L	<10
1,1,1-TRICHLOROETHANE	UG/L	<1
CARBON TETRACHLORIDE	UG/L	<1
TRICHLOROETHENE	UG/L	<1
1,2-DICHLOROPROPANE	UG/L	<1
BROMODICHLOROMETHANE	UG/L	<1
4-METHYL-2-PENTANONE (MIBK)	UG/L	<10
CIS-1,3-DICHLOROPROPENE	UG/L	<1
TRANS-1,3-DICHLOROPROPENE	UG/L	<1
2-HEXANONE (MBK)	UG/L	<10
1,1,2-TRICHLOROETHANE	UG/L	<1
TETRACHLOROETHENE	UG/L	<1
DIBROMOCHLOROMETHANE	UG/L	<1
BROMOFORM	UG/L	<5
1,1,2,2-TETRACHLOROETHANE	UG/L	<2
DICHLORODIFLUOROMETHANE	UG/L	<10
TRICHLOROFLUOROMETHANE	UG/L	<5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	UG/L	<5
1,2-DICHLOROBENZENE	UG/L	<5
1,3-DICHLOROBENZENE	UG/L	<5
1,4-DICHLOROBENZENE	UG/L	<5

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Blank I.D. : 33756
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D. : 412300
Date Extracted: N/A
Date Analyzed : 31-DEC-94
Dil. Factor : 1.00

Parameters	Units	Results
SURROGATES		
1,2-DICHLOROETHANE-D4	%	97
TOLUENE-D8	%	102
BFB	%	87

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Blank I.D. : 33757
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D. : 412300
Date Extracted: N/A
Date Analyzed : 01-JAN-95
Dil. Factor : 1.00

Parameters	Units	Results
CHLOROMETHANE	UG/L	<10
CARBON DISULFIDE	UG/L	<2
CHLOROFORM	UG/L	<1
VINYL CHLORIDE	UG/L	<5
BROMOMETHANE	UG/L	<10
2-BUTANONE (MEK)	UG/L	<10
1,2-DICHLOROETHANE	UG/L	<1
CHLOROETHANE	UG/L	<5
ACETONE	UG/L	<10
BENZENE	UG/L	<1
TOLUENE	UG/L	<2
1,1-DICHLOROETHENE	UG/L	<1
CHLOROBENZENE	UG/L	<1
METHYLENE CHLORIDE	UG/L	<5
ETHYLBENZENE	UG/L	<1
XYLENES (TOTAL)	UG/L	<1
TRANS-1,2-DICHLOROETHENE	UG/L	<1
STYRENE	UG/L	<2
1,1-DICHLOROETHANE	UG/L	<1
1,4-DIOXANE	UG/L	<200
CIS-1,2-DICHLOROETHENE	UG/L	<1
ETHYLENE DIBROMIDE	UG/L	<5
CYCLOHEXANE	UG/L	<10
1,1,1-TRICHLOROETHANE	UG/L	<1
CARBON TETRACHLORIDE	UG/L	<1
TRICHLOROETHENE	UG/L	<1
1,2-DICHLOROPROPANE	UG/L	<1
BROMODICHLOROMETHANE	UG/L	<1
4-METHYL-2-PENTANONE (MIBK)	UG/L	<10
CIS-1,3-DICHLOROPROPENE	UG/L	<1
TRANS-1,3-DICHLOROPROPENE	UG/L	<1
2-HEXANONE (MBK)	UG/L	<10
1,1,2-TRICHLOROETHANE	UG/L	<1
TETRACHLOROETHENE	UG/L	<1
DIBROMOCHLOROMETHANE	UG/L	<1
BROMOFORM	UG/L	<5
1,1,2,2-TETRACHLOROETHANE	UG/L	<2
DICHLORODIFLUOROMETHANE	UG/L	<10
TRICHLOROFLUOROMETHANE	UG/L	<5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	UG/L	<5
1,2-DICHLOROBENZENE	UG/L	<5
1,3-DICHLOROBENZENE	UG/L	<5
1,4-DICHLOROBENZENE	UG/L	<5

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Blank I.D. : 33757
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D. : 412300
Date Extracted: N/A
Date Analyzed : 01-JAN-95
Dil. Factor : 1.00

Parameters	Units	Results
SURROGATES		
1,2-DICHLOROETHANE-D4	%	95
TOLUENE-D8	%	100
BFB	%	94

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Blank I.D. : 33758
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D. : 412300
Date Extracted: N/A
Date Analyzed : 31-DEC-94
Dil. Factor : 1.00

Parameters	Units	Results
CHLOROMETHANE	UG/L	<10
CARBON DISULFIDE	UG/L	<2
CHLOROFORM	UG/L	<1
VINYL CHLORIDE	UG/L	<5
BROMOMETHANE	UG/L	<10
2-BUTANONE (MEK)	UG/L	<10
1,2-DICHLOROETHANE	UG/L	<1
CHLOROETHANE	UG/L	<5
ACETONE	UG/L	<10
BENZENE	UG/L	<1
TOLUENE	UG/L	<2
1,1-DICHLOROETHENE	UG/L	<1
CHLOROBENZENE	UG/L	<1
METHYLENE CHLORIDE	UG/L	<5
ETHYLBENZENE	UG/L	<1
XYLENES (TOTAL)	UG/L	<1
TRANS-1,2-DICHLOROETHENE	UG/L	<1
STYRENE	UG/L	<2
1,1-DICHLOROETHANE	UG/L	<1
1,4-DIOXANE	UG/L	<200
CIS-1,2-DICHLOROETHENE	UG/L	<1
ETHYLENE DIBROMIDE	UG/L	<5
CYCLOHEXANE	UG/L	<10
1,1,1-TRICHLOROETHANE	UG/L	<1
CARBON TETRACHLORIDE	UG/L	<1
TRICHLOROETHENE	UG/L	<1
1,2-DICHLOROPROPANE	UG/L	<1
BROMODICHLOROMETHANE	UG/L	<1
4-METHYL-2-PENTANONE (MIBK)	UG/L	<10
CIS-1,3-DICHLOROPROPENE	UG/L	<1
TRANS-1,3-DICHLOROPROPENE	UG/L	<1
2-HEXANONE (MBK)	UG/L	<10
1,1,2-TRICHLOROETHANE	UG/L	<1
TETRACHLOROETHENE	UG/L	<1
DIBROMOCHLOROMETHANE	UG/L	<1
BROMOFORM	UG/L	<5
1,1,2,2-TETRACHLOROETHANE	UG/L	<2
DICHLORODIFLUOROMETHANE	UG/L	<10
TRICHLOROFLUOROMETHANE	UG/L	<5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	UG/L	<5
1,2-DICHLOROBENZENE	UG/L	<5
1,3-DICHLOROBENZENE	UG/L	<5
1,4-DICHLOROBENZENE	UG/L	<5

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Blank I.D. : 33758
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D. : 412300
Date Extracted: N/A
Date Analyzed : 31-DEC-94
Dil. Factor : 1.00

Parameters	Units	Results
SURROGATES		
1,2-DICHLOROETHANE-D4	%	98
TOLUENE-D8	%	101
BFB	%	94

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Blank I.D. : 33771
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D. : 412300
Date Extracted: N/A
Date Analyzed : 04-JAN-95
Dil. Factor : 1.00

Parameters	Units	Results
CHLOROMETHANE	UG/L	<10
CARBON DISULFIDE	UG/L	<2
CHLOROFORM	UG/L	<1
VINYL CHLORIDE	UG/L	<5
BROMOMETHANE	UG/L	<10
2-BUTANONE (MEK)	UG/L	<10
1,2-DICHLOROETHANE	UG/L	<1
CHLOROETHANE	UG/L	<5
ACETONE	UG/L	<10
BENZENE	UG/L	<1
TOLUENE	UG/L	<2
1,1-DICHLOROETHENE	UG/L	<1
CHLOROBENZENE	UG/L	<1
METHYLENE CHLORIDE	UG/L	<5
ETHYLBENZENE	UG/L	<1
XYLENES (TOTAL)	UG/L	<1
TRANS-1,2-DICHLOROETHENE	UG/L	<1
STYRENE	UG/L	<2
1,1-DICHLOROETHANE	UG/L	<1
1,4-DIOXANE	UG/L	<200
CIS-1,2-DICHLOROETHENE	UG/L	<1
ETHYLENE DIBROMIDE	UG/L	<5
CYCLOHEXANE	UG/L	<10
1,1,1-TRICHLOROETHANE	UG/L	<1
CARBON TETRACHLORIDE	UG/L	<1
TRICHLOROETHENE	UG/L	<1
1,2-DICHLOROPROPANE	UG/L	<1
BROMODICHLOROMETHANE	UG/L	<1
4-METHYL-2-PENTANONE (MIBK)	UG/L	<10
CIS-1,3-DICHLOROPROPENE	UG/L	<1
TRANS-1,3-DICHLOROPROPENE	UG/L	<1
2-HEXANONE (MBK)	UG/L	<10
1,1,2-TRICHLOROETHANE	UG/L	<1
TETRACHLOROETHENE	UG/L	<1
DIBROMOCHLOROMETHANE	UG/L	<1
BROMOFORM	UG/L	<5
1,1,2,2-TETRACHLOROETHANE	UG/L	<2
DICHLORODIFLUOROMETHANE	UG/L	<10
TRICHLOROFLUOROMETHANE	UG/L	<5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	UG/L	<5
1,2-DICHLOROBENZENE	UG/L	<5
1,3-DICHLOROBENZENE	UG/L	<5
1,4-DICHLOROBENZENE	UG/L	<5

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GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Blank I.D. : 33771
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D. : 412300
Date Extracted: N/A
Date Analyzed : 04-JAN-95
Dil. Factor : 1.00

Parameters	Units	Results
SURROGATES		
1,2-DICHLOROETHANE-D4	%	98
TOLUENE-D8	%	102
BFB	%	100

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

MSMSD

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
MSMSD # : 71398
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.

Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D. : 412300
Date Extracted: N/A
Date Analyzed : 31-DEC-95
Sample Matrix : WATER
REF I.D. : 412262-06

Parameters	Units	Sample Result	Conc Spike	Spiked Sample	% Rec	Dup Spike	Dup % Rec	RPD
BENZENE	UG/L	<1	50	53	106	56	112	6
1,1-DICHLOROETHENE	UG/L	<1	50	53	106	57	114	7
TOLUENE	UG/L	<2	50	53	106	55	110	4
CHLOROBENZENE	UG/L	<1	50	56	112	61	122	9
TRICHLOROETHENE	UG/L	<1	50	56	112	59	118	5

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

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GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

MSMSD

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
MSMSD # : 71427
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.

Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D. : 412300
Date Extracted: N/A
Date Analyzed : 31-DEC-94
Sample Matrix : WATER
REF I.D. : 412281-11

Parameters	Units	Sample Result	Conc Spike	Spiked Sample	% Rec	Dup Spike	Dup % Rec	RPD
BENZENE	UG/L	<1	50	51	102	51	102	0
1,1-DICHLOROETHENE	UG/L	<1	50	56	112	51	102	9
TOLUENE	UG/L	<2	50	54	108	53	106	2
CHLOROBENZENE	UG/L	<1	50	57	114	56	112	2
TRICHLOROETHENE	UG/L	<1	50	56	112	54	108	4

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

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

MSMSD

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
MSMSD # : 71428
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.

Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D. : 412300
Date Extracted: N/A
Date Analyzed : 03-JAN-95
Sample Matrix : WATER
REF I.D. : 412316-10

Parameters	Units	Sample Result	Conc Spike	Spiked Sample	% Rec	Dup Spike	Dup % Rec	RPD
BENZENE	UG/L	<1	50	50	100	47	94	6
1,1-DICHLOROETHENE	UG/L	<1	50	49	98	45	90	9
TOLUENE	UG/L	<2	50	51	102	47	94	8
CHLOROBENZENE	UG/L	<1	50	55	110	51	102	8
TRICHLOROETHENE	UG/L	<1	50	54	108	51	102	6

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

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

BLANK SPIKE

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Blank Spike #: 53103
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name : GMP (GROUNDWATER MONITORING)

ATI I.D. : 412300
Date Extracted: N/A
Date Analyzed : 30-DEC-94
Sample Matrix : WATER

Parameters	Units	Blank Result	Spiked Sample	Spike Conc.	% Rec
BENZENE	UG/L	<1	56	50	112
1,1-DICHLOROETHENE	UG/L	<1	57	50	114
TOLUENE	UG/L	<2	57	50	114
CHLOROBENZENE	UG/L	<1	59	50	118
TRICHLOROETHENE	UG/L	<1	60	50	120

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

AnalyticalTechnologies, Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

BLANK SPIKE

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Blank Spike #: 53104
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name : GMP (GROUNDWATER MONITORING)

ATI I.D. : 412300
Date Extracted: N/A
Date Analyzed : 31-DEC-94
Sample Matrix : WATER

Parameters	Units	Blank Result	Spiked Sample	Spike Conc.	% Rec
BENZENE	UG/L	<1	53	50	106
1,1-DICHLOROETHENE	UG/L	<1	61	50	122
TOLUENE	UG/L	<2	55	50	110
CHLOROBENZENE	UG/L	<1	58	50	116
TRICHLOROETHENE	UG/L	<1	57	50	114

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

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

BLANK SPIKE

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Blank Spike #: 53105
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name : GMP (GROUNDWATER MONITORING)

ATI I.D. : 412300
Date Extracted: N/A
Date Analyzed : 01-JAN-95
Sample Matrix : WATER

Parameters	Units	Blank Result	Spiked Sample	Spike Conc.	% Rec
BENZENE	UG/L	<1	53	50	106
1,1-DICHLOROETHENE	UG/L	<1	62	50	124
TOLUENE	UG/L	<2	55	50	110
CHLOROBENZENE	UG/L	<1	57	50	114
TRICHLOROETHENE	UG/L	<1	57	50	114

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

AnalyticalTechnologies, Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

BLANK SPIKE

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Blank Spike #: 53134
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name : GMP (GROUNDWATER MONITORING)

ATI I.D. : 412300
Date Extracted: N/A
Date Analyzed : 04-JAN-95
Sample Matrix : WATER

Parameters	Units	Blank Result	Spiked Sample	Spike Conc.	% Rec
BENZENE	UG/L	<1	45	50	90
1,1-DICHLOROETHENE	UG/L	<1	49	50	98
TOLUENE	UG/L	<2	46	50	92
CHLOROBENZENE	UG/L	<1	49	50	98
TRICHLOROETHENE	UG/L	<1	49	50	98

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

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412300
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
1	HCW8A	WATER	21-DEC-94	28-DEC-94	18-JAN-95	1.00
2	HCW8B	WATER	21-DEC-94	28-DEC-94	18-JAN-95	1.00
3	HCW9A	WATER	21-DEC-94	28-DEC-94	18-JAN-95	1.00

Parameter	Units	1	2	3
ANTHRACENE	UG/L	<10	<10	<10
N-NITROSODIMETHYLAMINE	UG/L	<15	<15	<15
BENZO(a)ANTHRACENE	UG/L	<10	<10	<10
BENZO(b)FLUORANTHENE	UG/L	<10	<10	<10
ANILINE	UG/L	<10	<10	<10
BENZO(k)FLUORANTHENE	UG/L	<10	<10	<10
BENZO(a)PYRENE	UG/L	<10	<10	<10
BIS(2-CHLOROETHYL)ETHER	UG/L	<10	<10	<10
2-CHLOROPHENOL	UG/L	<10	<10	<10
BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	<10	<10	<10
BUTYLBENZYLPHTHALATE	UG/L	<10	<10	<10
CHRYSENE	UG/L	<10	<10	<10
BENZYL ALCOHOL	UG/L	<10	<10	<10
DIBENZ(a,h)ACRIDINE	UG/L	<10	<10	<10
DIBENZ(a,h)ANTHRACENE	UG/L	<10	<10	<10
1,2-DICHLOROBENZENE	UG/L	<10	<10	<10
1,3-DICHLOROBENZENE	UG/L	<10	<10	<10
BIS(2-CHLOROISOPROPYL)ETHER	UG/L	<15	<15	<15
1,4-DICHLOROBENZENE	UG/L	<10	<10	<10
4-METHYLPHENOL	UG/L	<10	<10	<10
DIETHYLPHTHALATE	UG/L	<10	<10	<10
N-NITROSO-DI-N-PROPYLAMINE	UG/L	<15	<15	<15
7,12-DIMETHYLBENZO(a)ANTHRACENE	UG/L	<10	<10	<10
HEXACHLOROETHANE	UG/L	<10	<10	<10
DIMETHYLPHTHALATE	UG/L	<10	<10	<10
NITROBENZENE	UG/L	<10	<10	<10
DI-N-BUTYLPHTHALATE	UG/L	<10	<10	<10
ISOPHORONE	UG/L	<10	<10	<10
2-NITROPHENOL	UG/L	<10	<10	<10
DI-N-OCTYLPHTHALATE	UG/L	<10	<10	<10
BENZOIC ACID	UG/L	<50	<50	<50
BIS(2-CHLOROETHOXY)METHANE	UG/L	<10	<10	<10
2,4-DICHLOROPHENOL	UG/L	<10	<10	<10
FLUORANTHENE	UG/L	<10	<10	<10
1,2,4-TRICHLOROBENZENE	UG/L	<10	<10	<10
NAPHTHALENE	UG/L	<10	<10	<10
PHENANTHRENE	UG/L	<10	<10	<10
4-CHLOROANILINE	UG/L	<10	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

est : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412300
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	il. Factor
1	HCW8A	WATER	21-DEC-94	28-DEC-94	18-JAN-95	1.00
2	HCW8B	WATER	21-DEC-94	28-DEC-94	18-JAN-95	1.00
3	HCW9A	WATER	21-DEC-94	28-DEC-94	18-JAN-95	1.00

Parameter	Units	1	2	3
PYRENE	UG/L	<10	<10	<10
HEXACHLOROBUTADIENE	UG/L	<10	<10	<10
2-METHYLNAPHTHALENE	UG/L	<10	<10	<10
4-CHLORO-3-METHYLPHENOL	UG/L	<10	<10	<10
BENZENETHIOL	UG/L	<10	<10	<10
4-NITROPHENOL	UG/L	<50	<50	<50
2,4-DIMETHYLPHENOL	UG/L	<10	<10	<10
2,4-DINITROPHENOL	UG/L	<50	<50	<50
PHENOL	UG/L	<10	<10	<10
2-METHYLPHENOL	UG/L	<10	<10	<10
3- & 4-METHYLPHENOL	UG/L	<10	<10	<10
HEXACHLOROCYCLOPENTADIENE	UG/L	<10	<10	<10
2,4,6-TRICHLOROPHENOL	UG/L	<10	<10	<10
2,4,5-TRICHLOROPHENOL	UG/L	<50	<50	<50
2-CHLORONAPHTHALENE	UG/L	<10	<10	<10
2-NITROANILINE	UG/L	<50	<50	<50
ACENAPHTHYLENE	UG/L	<10	<10	<10
2,6-DINITROTOLUENE	UG/L	<10	<10	<10
3-NITROANILINE	UG/L	<50	<50	<50
ACENAPHTHENE	UG/L	<10	<10	<10
DIBENZOFURAN	UG/L	<10	<10	<10
2,4-DINITROTOLUENE	UG/L	<10	<10	<10
4-CHLOROPHENYL-PHENYLETHER	UG/L	<10	<10	<10
FLUORENE	UG/L	<10	<10	<10
4-NITROANILINE	UG/L	<50	<50	<50
2-METHYL-4,6-DINITROPHENOL	UG/L	<50	<50	<50
N-NITROSODIPHENYLAMINE	UG/L	<10	<10	<10
4-BROMOPHENYL-PHENYLETHER	UG/L	<10	<10	<10
HEXACHLOROBENZENE	UG/L	<10	<10	<10
PENTACHLOROPHENOL	UG/L	<50	<50	<50
3,3'-DICHLOROBENZIDINE	UG/L	<20	<20	<20
INDENO(1,2,3-cd)PYRENE	UG/L	<10	<10	<10
INDENE	UG/L	<10	<10	<10
1-METHYLNAPHTHALENE	UG/L	<10	<10	10
PYRIDINE	UG/L	<50	<50	<50
QUINOLINE	UG/L	<50	<50	<50
6-METHYL CHRYSENE	UG/L	<10	<10	<10
BENZO(g,h,i)PERYLENE	UG/L	<10	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412300
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
1	HCW8A	WATER	21-DEC-94	28-DEC-94	18-JAN-95	1.00
2	HCW8B	WATER	21-DEC-94	28-DEC-94	18-JAN-95	1.00
3	HCW9A	WATER	21-DEC-94	28-DEC-94	18-JAN-95	1.00

Parameter	Units	1	2	3
SURROGATES				
NITROBENZENE-D5	%	79	83	85
2-FLUOROBIPHENYL	%	91	107	105
TERPHENYL-D14	%	64	83	61
PHENOL-D6	%	71	93	74
2-FLUOROPHENOL	%	57	78	60
2,4,6-TRIBROMOPHENOL	%	92	128	85

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412300
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
4	HCW9B	WATER	21-DEC-94	28-DEC-94	18-JAN-95	1.00
5	LCW8A	WATER	21-DEC-94	28-DEC-94	18-JAN-95	1.00
6	LCW8B	WATER	21-DEC-94	28-DEC-94	18-JAN-95	1.00

Parameter	Units	4	5	6
ANTHRACENE	UG/L	<10	<10	<10
N-NITROSODIMETHYLAMINE	UG/L	<15	<15	<15
BENZO(a)ANTHRACENE	UG/L	<10	<10	<10
BENZO(b)FLUORANTHENE	UG/L	<10	<10	<10
ANILINE	UG/L	<10	<10	<10
BENZO(k)FLUORANTHENE	UG/L	<10	<10	<10
BENZO(a)PYRENE	UG/L	<10	<10	<10
BIS(2-CHLOROETHYL)ETHER	UG/L	<10	<10	<10
2-CHLOROPHENOL	UG/L	<10	<10	<10
BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	<10	<10	<10
BUTYLBENZYLPHTHALATE	UG/L	<10	<10	<10
CHRYSENE	UG/L	<10	<10	<10
BENZYL ALCOHOL	UG/L	<10	<10	<10
DIBENZ(a,h)ACRIDINE	UG/L	<10	<10	<10
DIBENZ(a,h)ANTHRACENE	UG/L	<10	<10	<10
1,2-DICHLOROBENZENE	UG/L	<10	<10	<10
1,3-DICHLOROBENZENE	UG/L	<10	<10	<10
BIS(2-CHLOROISOPROPYL)ETHER	UG/L	<15	<15	<15
1,4-DICHLOROBENZENE	UG/L	<10	<10	<10
4-METHYLPHENOL	UG/L	<10	<10	<10
DIETHYLPHTHALATE	UG/L	<10	<10	<10
N-NITROSO-DI-N-PROPYLAMINE	UG/L	<15	<15	<15
7,12-DIMETHYLBENZO(a)ANTHRACENE	UG/L	<10	<10	<10
HEXACHLOROETHANE	UG/L	<10	<10	<10
DIMETHYLPHTHALATE	UG/L	<10	<10	<10
NITROBENZENE	UG/L	<10	<10	<10
DI-N-BUTYLPHTHALATE	UG/L	<10	<10	<10
ISOPHORONE	UG/L	<10	<10	<10
2-NITROPHENOL	UG/L	<10	<10	<10
DI-N-OCTYLPHTHALATE	UG/L	<10	<10	<10
BENZOIC ACID	UG/L	<50	<50	<50
BIS(2-CHLOROETHOXY)METHANE	UG/L	<10	<10	<10
2,4-DICHLOROPHENOL	UG/L	<10	<10	<10
FLUORANTHENE	UG/L	<10	<10	<10
1,2,4-TRICHLOROBENZENE	UG/L	<10	<10	<10
NAPHTHALENE	UG/L	<10	<10	<10
PHENANTHRENE	UG/L	<10	<10	<10
4-CHLOROANILINE	UG/L	<10	<10	<10

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GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

st : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412300
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
4	HCW9B	WATER	21-DEC-94	28-DEC-94	18-JAN-95	1.00
5	LCW8A	WATER	21-DEC-94	28-DEC-94	18-JAN-95	1.00
6	LCW8B	WATER	21-DEC-94	28-DEC-94	18-JAN-95	1.00

Parameter	Units	4	5	6
PYRENE	UG/L	<10	<10	<10
HEXACHLOROBUTADIENE	UG/L	<10	<10	<10
2-METHYLNAPHTHALENE	UG/L	<10	<10	<10
4-CHLORO-3-METHYLPHENOL	UG/L	<10	<10	<10
BENZENETHIOL	UG/L	<10	<10	<10
4-NITROPHENOL	UG/L	<50	<50	<50
2,4-DIMETHYLPHENOL	UG/L	<10	<10	<10
2,4-DINITROPHENOL	UG/L	<50	<50	<50
PHENOL	UG/L	<10	<10	<10
2-METHYLPHENOL	UG/L	<10	<10	<10
3- & 4-METHYLPHENOL	UG/L	<10	<10	<10
HEXACHLOROCYCLOPENTADIENE	UG/L	<10	<10	<10
2,4,6-TRICHLOROPHENOL	UG/L	<10	<10	<10
2,4,5-TRICHLOROPHENOL	UG/L	<50	<50	<50
2-CHLORONAPHTHALENE	UG/L	<10	<10	<10
2-NITROANILINE	UG/L	<50	<50	<50
ACENAPHTHYLENE	UG/L	<10	<10	<10
2,6-DINITROTOLUENE	UG/L	<10	<10	<10
3-NITROANILINE	UG/L	<50	<50	<50
ACENAPHTHENE	UG/L	<10	<10	<10
DIBENZOFURAN	UG/L	<10	<10	<10
2,4-DINITROTOLUENE	UG/L	<10	<10	<10
4-CHLOROPHENYL-PHENYLETHER	UG/L	<10	<10	<10
FLUORENE	UG/L	<10	<10	<10
4-NITROANILINE	UG/L	<50	<50	<50
2-METHYL-4,6-DINITROPHENOL	UG/L	<50	<50	<50
N-NITROSODIPHENYLAMINE	UG/L	<10	<10	<10
4-BROMOPHENYL-PHENYLETHER	UG/L	<10	<10	<10
HEXACHLOROBENZENE	UG/L	<10	<10	<10
PENTACHLOROPHENOL	UG/L	<50	<50	<50
3,3'-DICHLOROBENZIDINE	UG/L	<20	<20	<20
INDENO(1,2,3-cd)PYRENE	UG/L	<10	<10	<10
INDENE	UG/L	<10	<10	<10
1-METHYLNAPHTHALENE	UG/L	<10	<10	<10
PYRIDINE	UG/L	<50	<50	<50
QUINOLINE	UG/L	<50	<50	<50
6-METHYL CHRYSENE	UG/L	<10	<10	<10
BENZO(g,h,i)PERYLENE	UG/L	<10	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412300
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
4	HCW9B	WATER	21-DEC-94	28-DEC-94	18-JAN-95	1.00
5	LCW8A	WATER	21-DEC-94	28-DEC-94	18-JAN-95	1.00
6	LCW8B	WATER	21-DEC-94	28-DEC-94	18-JAN-95	1.00

Parameter	Units	4	5	6
SURROGATES				
NITROBENZENE-D5	%	122	25	75
2-FLUOROBIPHENYL	%	114	47	95
TERPHENYL-D14	%	84	47	72
PHENOL-D6	%	71	60	70
2-FLUOROPHENOL	%	50	53	60
2,4,6-TRIBROMOPHENOL	%	57	86	97

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412300
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
7	LCW9A	WATER	21-DEC-94	28-DEC-94	18-JAN-95	1.00
8	LCW9B	WATER	21-DEC-94	28-DEC-94	18-JAN-95	1.00
9	HCW3A	WATER	21-DEC-94	28-DEC-94	18-JAN-95	1.00

Parameter	Units	7	8	9
ANTHRACENE	UG/L	<10	<10	<10
N-NITROSODIMETHYLAMINE	UG/L	<15	<15	<15
BENZO(a)ANTHRACENE	UG/L	<10	<10	<10
BENZO(b)FLUORANTHENE	UG/L	<10	<10	<10
ANILINE	UG/L	<10	<10	<10
BENZO(k)FLUORANTHENE	UG/L	<10	<10	<10
BENZO(a)PYRENE	UG/L	<10	<10	<10
BIS(2-CHLOROETHYL)ETHER	UG/L	<10	<10	<10
2-CHLOROPHENOL	UG/L	<10	<10	<10
BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	<10	<10	<10
BUTYLBENZYLPHTHALATE	UG/L	<10	<10	<10
CHRYSENE	UG/L	<10	<10	<10
BENZYL ALCOHOL	UG/L	<10	<10	<10
DIBENZ(a,h)ACRIDINE	UG/L	<10	<10	<10
DIBENZ(a,h)ANTHRACENE	UG/L	<10	<10	<10
1,2-DICHLOROBENZENE	UG/L	<10	<10	<10
1,3-DICHLOROBENZENE	UG/L	<10	<10	<10
BIS(2-CHLOROISOPROPYL)ETHER	UG/L	<15	<15	<15
1,4-DICHLOROBENZENE	UG/L	<10	<10	<10
4-METHYLPHENOL	UG/L	<10	<10	<10
DIETHYLPHTHALATE	UG/L	<10	<10	<10
N-NITROSO-DI-N-PROPYLAMINE	UG/L	<15	<15	<15
7,12-DIMETHYLBENZO(a)ANTHRACENE	UG/L	<10	<10	<10
HEXACHLOROETHANE	UG/L	<10	<10	<10
DIMETHYLPHTHALATE	UG/L	<10	<10	<10
NITROBENZENE	UG/L	<10	<10	<10
DI-N-BUTYLPHTHALATE	UG/L	<10	<10	<10
ISOPHORONE	UG/L	<10	<10	<10
2-NITROPHENOL	UG/L	<10	<10	<10
DI-N-OCTYLPHTHALATE	UG/L	<10	<10	<10
BENZOIC ACID	UG/L	<50	<50	<50
BIS(2-CHLOROETHOXY)METHANE	UG/L	<10	<10	<10
2,4-DICHLOROPHENOL	UG/L	<10	<10	<10
FLUORANTHENE	UG/L	<10	<10	<10
1,2,4-TRICHLOROBENZENE	UG/L	<10	<10	<10
NAPHTHALENE	UG/L	<10	<10	<10
PHENANTHRENE	UG/L	<10	<10	<10
4-CHLOROANILINE	UG/L	<10	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412300
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
7	LCW9A	WATER	21-DEC-94	28-DEC-94	18-JAN-95	1.00
8	LCW9B	WATER	21-DEC-94	28-DEC-94	18-JAN-95	1.00
9	HCW3A	WATER	21-DEC-94	28-DEC-94	18-JAN-95	1.00

Parameter	Units	7	8	9
PYRENE	UG/L	<10	<10	<10
HEXACHLOROBUTADIENE	UG/L	<10	<10	<10
2-METHYLNAPHTHALENE	UG/L	<10	<10	<10
4-CHLORO-3-METHYLPHENOL	UG/L	<10	<10	<10
BENZENETHIOL	UG/L	<10	<10	<10
4-NITROPHENOL	UG/L	<50	<50	<50
2,4-DIMETHYLPHENOL	UG/L	<10	<10	<10
2,4-DINITROPHENOL	UG/L	<50	<50	<50
PHENOL	UG/L	<10	<10	<10
2-METHYLPHENOL	UG/L	<10	<10	<10
3- & 4-METHYLPHENOL	UG/L	<10	<10	<10
HEXACHLOROCYCLOPENTADIENE	UG/L	<10	<10	<10
2,4,6-TRICHLOROPHENOL	UG/L	<10	<10	<10
2,4,5-TRICHLOROPHENOL	UG/L	<50	<50	<50
2-CHLORONAPHTHALENE	UG/L	<10	<10	<10
2-NITROANILINE	UG/L	<50	<50	<50
ACENAPHTHYLENE	UG/L	<10	<10	<10
2,6-DINITROTOLUENE	UG/L	<10	<10	<10
3-NITROANILINE	UG/L	<50	<50	<50
ACENAPHTHENE	UG/L	<10	<10	<10
DIBENZOFURAN	UG/L	<10	<10	<10
2,4-DINITROTOLUENE	UG/L	<10	<10	<10
4-CHLOROPHENYL-PHENYLETHER	UG/L	<10	<10	<10
FLUORENE	UG/L	<10	<10	<10
4-NITROANILINE	UG/L	<50	<50	<50
2-METHYL-4,6-DINITROPHENOL	UG/L	<50	<50	<50
N-NITROSODIPHENYLAMINE	UG/L	<10	<10	<10
4-BROMOPHENYL-PHENYLETHER	UG/L	<10	<10	<10
HEXACHLOROBENZENE	UG/L	<10	<10	<10
PENTACHLOROPHENOL	UG/L	<50	<50	<50
3,3'-DICHLOROBENZIDINE	UG/L	<20	<20	<20
INDENO(1,2,3-cd)PYRENE	UG/L	<10	<10	<10
INDENE	UG/L	<10	<10	<10
1-METHYLNAPHTHALENE	UG/L	<10	<10	<10
PYRIDINE	UG/L	<50	<50	<50
QUINOLINE	UG/L	<50	<50	<50
6-METHYL CHRYSENE	UG/L	<10	<10	<10
BENZO(g,h,i)PERYLENE	UG/L	<10	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412300
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
7	LCW9A	WATER	21-DEC-94	28-DEC-94	18-JAN-95	1.00
8	LCW9B	WATER	21-DEC-94	28-DEC-94	18-JAN-95	1.00
9	HCW3A	WATER	21-DEC-94	28-DEC-94	18-JAN-95	1.00

Parameter	Units	7	8	9
SURROGATES				
NITROBENZENE-D5	%	65	53	74
2-FLUOROBIPHENYL	%	17*T	78	98
TERPHENYL-D14	%	72	68	38
PHENOL-D6	%	57	60	66
2-FLUOROPHENOL	%	53	54	57
2,4,6-TRIBROMOPHENOL	%	15*T	73	94

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412300
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
10	HCW3B	WATER	21-DEC-94	28-DEC-94	18-JAN-95	1.00
11	HCW3C	WATER	21-DEC-94	28-DEC-94	18-JAN-95	1.00
12	LCW3A	WATER	21-DEC-94	28-DEC-94	18-JAN-95	1.00

Parameter	Units	10	11	12
ANTHRACENE	UG/L	<10	<10	<10
N-NITROSODIMETHYLAMINE	UG/L	<15	<15	<15
BENZO(a)ANTHRACENE	UG/L	<10	<10	<10
BENZO(b)FLUORANTHENE	UG/L	<10	<10	<10
ANILINE	UG/L	<10	<10	<10
BENZO(k)FLUORANTHENE	UG/L	<10	<10	<10
BENZO(a)PYRENE	UG/L	<10	<10	<10
BIS(2-CHLOROETHYL)ETHER	UG/L	<10	<10	<10
2-CHLOROPHENOL	UG/L	<10	<10	<10
BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	<10	<10	<10
BUTYLBENZYLPHTHALATE	UG/L	<10	<10	<10
CHRYSENE	UG/L	<10	<10	<10
BENZYL ALCOHOL	UG/L	<10	<10	<10
DIBENZ(a,h)ACRIDINE	UG/L	<10	<10	<10
DIBENZ(a,h)ANTHRACENE	UG/L	<10	<10	<10
1,2-DICHLOROBENZENE	UG/L	<10	<10	<10
1,3-DICHLOROBENZENE	UG/L	<10	<10	<10
BIS(2-CHLOROISOPROPYL)ETHER	UG/L	<15	<15	<15
1,4-DICHLOROBENZENE	UG/L	<10	<10	<10
4-METHYLPHENOL	UG/L	<10	<10	<10
DIETHYLPHTHALATE	UG/L	<10	<10	<10
N-NITROSO-DI-N-PROPYLAMINE	UG/L	<15	<15	<15
7,12-DIMETHYLBENZO(a)ANTHRACENE	UG/L	<10	<10	<10
HEXACHLOROETHANE	UG/L	<10	<10	<10
DIMETHYLPHTHALATE	UG/L	<10	<10	<10
NITROBENZENE	UG/L	<10	<10	<10
DI-N-BUTYLPHTHALATE	UG/L	<10	<10	<10
ISOPHORONE	UG/L	<10	<10	<10
2-NITROPHENOL	UG/L	<10	<10	<10
DI-N-OCTYLPHTHALATE	UG/L	<10	<10	<10
BENZOIC ACID	UG/L	<50	<50	<50
BIS(2-CHLOROETHOXY)METHANE	UG/L	<10	<10	<10
2,4-DICHLOROPHENOL	UG/L	<10	<10	<10
FLUORANTHENE	UG/L	<10	<10	<10
1,2,4-TRICHLOROBENZENE	UG/L	<10	<10	<10
NAPHTHALENE	UG/L	<10	<10	<10
PHENANTHRENE	UG/L	<10	<10	<10
4-CHLOROANILINE	UG/L	<10	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412300
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
10	HCW3B	WATER	21-DEC-94	28-DEC-94	18-JAN-95	1.00
11	HCW3C	WATER	21-DEC-94	28-DEC-94	18-JAN-95	1.00
12	LCW3A	WATER	21-DEC-94	28-DEC-94	18-JAN-95	1.00

Parameter	Units	10	11	12
PYRENE	UG/L	<10	<10	<10
HEXACHLOROBUTADIENE	UG/L	<10	<10	<10
2-METHYLNAPHTHALENE	UG/L	<10	<10	<10
4-CHLORO-3-METHYLPHENOL	UG/L	<10	<10	<10
BENZENETHIOL	UG/L	<10	<10	<10
4-NITROPHENOL	UG/L	<50	<50	<50
2,4-DIMETHYLPHENOL	UG/L	<10	<10	<10
2,4-DINITROPHENOL	UG/L	<50	<50	<50
PHENOL	UG/L	<10	<10	<10
2-METHYLPHENOL	UG/L	<10	<10	<10
3- & 4-METHYLPHENOL	UG/L	<10	<10	<10
HEXACHLOROCYCLOPENTADIENE	UG/L	<10	<10	<10
2,4,6-TRICHLOROPHENOL	UG/L	<10	<10	<10
2,4,5-TRICHLOROPHENOL	UG/L	<50	<50	<50
2-CHLORONAPHTHALENE	UG/L	<10	<10	<10
2-NITROANILINE	UG/L	<50	<50	<50
ACENAPHTHYLENE	UG/L	<10	<10	<10
2,6-DINITROTOLUENE	UG/L	<10	<10	<10
3-NITROANILINE	UG/L	<50	<50	<50
ACENAPHTHENE	UG/L	<10	<10	<10
DIBENZOFURAN	UG/L	<10	<10	<10
2,4-DINITROTOLUENE	UG/L	<10	<10	<10
4-CHLOROPHENYL-PHENYLETHER	UG/L	<10	<10	<10
FLUORENE	UG/L	<10	<10	<10
4-NITROANILINE	UG/L	<50	<50	<50
2-METHYL-4,6-DINITROPHENOL	UG/L	<50	<50	<50
N-NITROSODIPHENYLAMINE	UG/L	<10	<10	<10
4-BROMOPHENYL-PHENYLETHER	UG/L	<10	<10	<10
HEXACHLOROBENZENE	UG/L	<10	<10	<10
PENTACHLOROPHENOL	UG/L	<50	<50	<50
3,3'-DICHLOROBENZIDINE	UG/L	<20	<20	<20
INDENO(1,2,3-cd)PYRENE	UG/L	<10	<10	<10
INDENE	UG/L	<10	<10	<10
1-METHYLNAPHTHALENE	UG/L	<10	<10	<10
PYRIDINE	UG/L	<50	<50	<50
QUINOLINE	UG/L	<50	<50	<50
6-METHYL CHRYSENE	UG/L	<10	<10	<10
BENZO(g,h,i)PERYLENE	UG/L	<10	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412300
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
10	HCW3B	WATER	21-DEC-94	28-DEC-94	18-JAN-95	1.00
11	HCW3C	WATER	21-DEC-94	28-DEC-94	18-JAN-95	1.00
12	LCW3A	WATER	21-DEC-94	28-DEC-94	18-JAN-95	1.00

Parameter	Units	10	11	12
SURROGATES				
NITROBENZENE-D5	%	69	82	88
2-FLUOROBIPHENYL	%	92	111	115
TERPHENYL-D14	%	64	61	48
PHENOL-D6	%	92	67	84
2-FLUOROPHENOL	%	83	58	74
2,4,6-TRIBROMOPHENOL	%	138*T	115	118

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412300
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
13	LCW3B	WATER	21-DEC-94	28-DEC-94	20-JAN-95	1.00
14	LCW3C	WATER	21-DEC-94	28-DEC-94	20-JAN-95	1.00
15	FB-3	WATER	21-DEC-94	28-DEC-94	21-JAN-95	1.00

Parameter	Units	13	14	15
ANTHRACENE	UG/L	<10	<10	<10
N-NITROSODIMETHYLAMINE	UG/L	<15	<15	<15
BENZO(a)ANTHRACENE	UG/L	<10	<10	<10
BENZO(b)FLUORANTHENE	UG/L	<10	<10	<10
ANILINE	UG/L	<10	<10	<10
BENZO(k)FLUORANTHENE	UG/L	<10	<10	<10
BENZO(a)PYRENE	UG/L	<10	<10	<10
BIS(2-CHLOROETHYL)ETHER	UG/L	<10	<10	<10
2-CHLOROPHENOL	UG/L	<10	<10	<10
BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	<10	<10	<10
BUTYLBENZYLPHTHALATE	UG/L	<10	<10	<10
CHRYSENE	UG/L	<10	<10	<10
BENZYL ALCOHOL	UG/L	<10	<10	<10
DIBENZ(a,h)ACRIDINE	UG/L	<10	<10	<10
DIBENZ(a,h)ANTHRACENE	UG/L	<10	<10	<10
1,2-DICHLOROBENZENE	UG/L	<10	<10	<10
1,3-DICHLOROBENZENE	UG/L	<10	<10	<10
BIS(2-CHLOROISOPROPYL)ETHER	UG/L	<15	<15	<15
1,4-DICHLOROBENZENE	UG/L	<10	<10	<10
4-METHYLPHENOL	UG/L	<10	<10	<10
DIETHYLPHTHALATE	UG/L	<10	<10	<10
N-NITROSO-DI-N-PROPYLAMINE	UG/L	<15	<15	<15
7,12-DIMETHYLBENZO(a)ANTHRACENE	UG/L	<10	<10	<10
HEXACHLOROETHANE	UG/L	<10	<10	<10
DIMETHYLPHTHALATE	UG/L	<10	<10	<10
NITROBENZENE	UG/L	<10	<10	<10
DI-N-BUTYLPHTHALATE	UG/L	<10	<10	<10
ISOPHORONE	UG/L	<10	<10	<10
2-NITROPHENOL	UG/L	<10	<10	<10
DI-N-OCTYLPHTHALATE	UG/L	<10	<10	<10
BENZOIC ACID	UG/L	<50	<50	<50
BIS(2-CHLOROETHOXY)METHANE	UG/L	<10	<10	<10
2,4-DICHLOROPHENOL	UG/L	<10	<10	<10
FLUORANTHENE	UG/L	<10	<10	<10
1,2,4-TRICHLOROBENZENE	UG/L	<10	<10	<10
NAPHTHALENE	UG/L	<10	<10	<10
PHENANTHRENE	UG/L	<10	<10	<10
4-CHLOROANILINE	UG/L	<10	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412300
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
13	LCW3B	WATER	21-DEC-94	28-DEC-94	20-JAN-95	1.00
14	LCW3C	WATER	21-DEC-94	28-DEC-94	20-JAN-95	1.00
15	FB-3	WATER	21-DEC-94	28-DEC-94	21-JAN-95	1.00

Parameter	Units	13	14	15
PYRENE	UG/L	<10	<10	<10
HEXACHLOROBUTADIENE	UG/L	<10	<10	<10
2-METHYLNAPHTHALENE	UG/L	<10	<10	<10
4-CHLORO-3-METHYLPHENOL	UG/L	<10	<10	<10
BENZENETHIOL	UG/L	<10	<10	<10
4-NITROPHENOL	UG/L	<50	<50	<50
2,4-DIMETHYLPHENOL	UG/L	<10	<10	<10
2,4-DINITROPHENOL	UG/L	<50	<50	<50
PHENOL	UG/L	<10	<10	<10
2-METHYLPHENOL	UG/L	<10	<10	<10
3- & 4-METHYLPHENOL	UG/L	<10	<10	<10
HEXACHLOROCYCLOPENTADIENE	UG/L	<10	<10	<10
2,4,6-TRICHLOROPHENOL	UG/L	<10	<10	<10
2,4,5-TRICHLOROPHENOL	UG/L	<50	<50	<50
2-CHLORONAPHTHALENE	UG/L	<10	<10	<10
2-NITROANILINE	UG/L	<50	<50	<50
ACENAPHTHYLENE	UG/L	<10	<10	<10
2,6-DINITROTOLUENE	UG/L	<10	<10	<10
3-NITROANILINE	UG/L	<50	<50	<50
ACENAPHTHENE	UG/L	<10	<10	<10
DIBENZOFURAN	UG/L	<10	<10	<10
2,4-DINITROTOLUENE	UG/L	<10	<10	<10
4-CHLOROPHENYL-PHENYLETHER	UG/L	<10	<10	<10
FLUORENE	UG/L	<10	<10	<10
4-NITROANILINE	UG/L	<50	<50	<50
2-METHYL-4,6-DINITROPHENOL	UG/L	<50	<50	<50
N-NITROSODIPHENYLAMINE	UG/L	<10	<10	<10
4-BROMOPHENYL-PHENYLETHER	UG/L	<10	<10	<10
HEXACHLOROBENZENE	UG/L	<10	<10	<10
PENTACHLOROPHENOL	UG/L	<50	<50	<50
3,3'-DICHLOROBENZIDINE	UG/L	<20	<20	<20
INDENO(1,2,3-cd)PYRENE	UG/L	<10	<10	<10
INDENE	UG/L	<10	<10	<10
1-METHYLNAPHTHALENE	UG/L	<10	<10	<10
PYRIDINE	UG/L	<50	<50	<50
QUINOLINE	UG/L	<50	<50	<50
6-METHYL CHRYSENE	UG/L	<10	<10	<10
BENZO(g,h,i)PERYLENE	UG/L	<10	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412300
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
13	LCW3B	WATER	21-DEC-94	28-DEC-94	20-JAN-95	1.00
14	LCW3C	WATER	21-DEC-94	28-DEC-94	20-JAN-95	1.00
15	FB-3	WATER	21-DEC-94	28-DEC-94	21-JAN-95	1.00

Parameter	Units	13	14	15
SURROGATES				
NITROBENZENE-D5	%	81	76	90
2-FLUOROBIPHENYL	%	88	77	91
TERPHENYL-D14	%	57	49	82
PHENOL-D6	%	90	65	92
2-FLUOROPHENOL	%	73	50	77
2,4,6-TRIBROMOPHENOL	%	106	81	102

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Blank I.D. : 33887
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D. : 412300
Date Extracted: 28-DEC-94
Date Analyzed : 11-JAN-95
Dil. Factor : 1.00

Parameters	Units	Results
ANTHRACENE	UG/L	<10
N-NITROSODIMETHYLAMINE	UG/L	<15
BENZO(a)ANTHRACENE	UG/L	<10
BENZO(b)FLUORANTHENE	UG/L	<10
BENZO(k)FLUORANTHENE	UG/L	<10
ANILINE	UG/L	<10
BIS(2-CHLOROETHYL)ETHER	UG/L	<10
BENZO(a)PYRENE	UG/L	<10
BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	<10
2-CHLOROPHENOL	UG/L	<10
BUTYLBENZYLPHTHALATE	UG/L	<10
CHRYSENE	UG/L	<10
BENZYL ALCOHOL	UG/L	<10
DIBENZ(a,h)ACRIDINE	UG/L	<10
DIBENZ(a,h)ANTHRACENE	UG/L	<10
1,2-DICHLOROBENZENE	UG/L	<10
BIS(2-CHLOROISOPROPYL)ETHER	UG/L	<15
1,3-DICHLOROBENZENE	UG/L	<10
4-METHYLPHENOL	UG/L	<10
1,4-DICHLOROBENZENE	UG/L	<10
N-NITROSO-DI-N-PROPYLAMINE	UG/L	<15
DIETHYLPHTHALATE	UG/L	<10
7,12-DIMETHYLBENZO(a)ANTHRACENE	UG/L	<10
HEXACHLOROETHANE	UG/L	<10
DIMETHYLPHTHALATE	UG/L	<10
NITROBENZENE	UG/L	<10
ISOPHORONE	UG/L	<10
DI-N-BUTYLPHTHALATE	UG/L	<10
DI-N-OCTYLPHTHALATE	UG/L	<10
2-NITROPHENOL	UG/L	<10
BENZOIC ACID	UG/L	<50
BIS(2-CHLOROETHOXY)METHANE	UG/L	<10
2,4-DICHLOROPHENOL	UG/L	<10
FLUORANTHENE	UG/L	<10
1,2,4-TRICHLOROBENZENE	UG/L	<10
NAPHTHALENE	UG/L	<10
PHENANTHRENE	UG/L	<10
4-CHLOROANILINE	UG/L	<10
PYRENE	UG/L	<10
HEXACHLOROBUTADIENE	UG/L	<10
4-CHLORO-3-METHYLPHENOL	UG/L	<10
2-METHYLNAPHTHALENE	UG/L	<10
BENZENETHIOL	UG/L	<10
4-NITROPHENOL	UG/L	<50
2,4-DIMETHYLPHENOL	UG/L	<10
2,4-DINITROPHENOL	UG/L	<50

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Blank I.D. : 33887
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D. : 412300
Date Extracted: 28-DEC-94
Date Analyzed : 11-JAN-95
Dil. Factor : 1.00

Parameters	Units	Results
PHENOL	UG/L	<10
2-METHYLPHENOL	UG/L	<10
3- & 4-METHYLPHENOL	UG/L	<10
HEXACHLOROCYCLOPENTADIENE	UG/L	<10
2,4,6-TRICHLOROPHENOL	UG/L	<10
2,4,5-TRICHLOROPHENOL	UG/L	<50
2-CHLORONAPHTHALENE	UG/L	<10
2-NITROANILINE	UG/L	<50
ACENAPHTHYLENE	UG/L	<10
2,6-DINITROTOLUENE	UG/L	<10
3-NITROANILINE	UG/L	<50
ACENAPHTHENE	UG/L	<10
DIBENZOFURAN	UG/L	<10
2,4-DINITROTOLUENE	UG/L	<10
4-CHLOROPHENYL-PHENYLETHER	UG/L	<10
FLUORENE	UG/L	<10
4-NITROANILINE	UG/L	<50
2-METHYL-4,6-DINITROPHENOL	UG/L	<50
N-NITROSODIPHENYLAMINE	UG/L	<10
4-BROMOPHENYL-PHENYLETHER	UG/L	<10
HEXACHLOROBENZENE	UG/L	<10
PENTACHLOROPHENOL	UG/L	<50
3,3'-DICHLOROBENZIDINE	UG/L	<20
INDENO(1,2,3-cd)PYRENE	UG/L	<10
INDENE	UG/L	<10
1-METHYLNAPHTHALENE	UG/L	<10
PYRIDINE	UG/L	<50
QUINOLINE	UG/L	<50
6-METHYL CHRYSENE	UG/L	<10
BENZO(g,h,i)PERYLENE	UG/L	<10
SURROGATES		
NITROBENZENE-D5	%	74
2-FLUOROBIPHENYL	%	89
TERPHENYL-D14	%	81
PHENOL-D6	%	98
2-FLUOROPHENOL	%	85
2,4,6-TRIBROMOPHENOL	%	105

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

MSMSD

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
MSMSD # : 71736
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.

Project # : 441000
Project Name: GMP (GROUNDWATER MONITORING)

ATI I.D. : 412300
Date Extracted: 28-DEC-94
Date Analyzed : 11-JAN-95
Sample Matrix : WATER
REF I.D. : REAGENT WATER

Parameters	Units	Sample Result	Conc Spike	Spiked Sample	% Rec	Dup Spike	Dup % Rec	RPD
2-CHLOROPHENOL	UG/L	<10	150	81	54	130	87	46*
1,4-DICHLOROBENZENE	UG/L	<10	100	80	80	77	77	4
N-NITROSO-DI-N-PROPYLAMINE	UG/L	<10	100	84	84	76	76	10
1,2,4-TRICHLOROBENZENE	UG/L	<10	100	88	88	84	84	5
PYRENE	UG/L	<10	100	83	83	84	84	1
4-CHLORO-3-METHYLPHENOL	UG/L	<10	150	110	73	130	87	17
4-NITROPHENOL	UG/L	<50	150	100	67	160	107	46*
PHENOL	UG/L	<10	150	83	55	130	87	44*
ACENAPHTHENE	UG/L	<10	100	90	90	87	87	3
2,4-DINITROTOLUENE	UG/L	<10	100	79	79	81	81	3
PENTACHLOROPHENOL	UG/L	<50	150	90	60	110	73	20

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

ANALYTICAL TECHNOLOGIES, INC.
SAN DIEGO
FLAGS

INORGANICS

FLAG	MESSAGE DESCRIPTION
B	ABSOLUTE VALUE OF ANALYTE CONCENTRATION IS < CRDL BUT ≥ THE IDL
BB	RESULT BETWEEN IDL AND LOQ
D	POST DIGESTION SPIKE FOR GFAA OUTSIDE LIMITS AFTER 1:25 DILUTION. SAMPLE REPORTED AT ORIGINAL CONCENTRATION.
E	ESTIMATED VALUE DUE TO INTERFERENCE
M	DUPLICATE INJECTION PRECISION NOT MET
N	SPIKED SAMPLE RECOVERY NOT WITHIN CONTROL LIMITS
S	REPORTED VALUE WAS DETERMINED BY METHOD OF STANDARD ADDITIONS
U	COMPOUND WAS ANALYZED FOR BUT NOT DETECTED
W	POST DIGESTION SPIKE OUT OF CONTROL LIMITS; SAMPLE ABSORBANCE < 50% OF SPIKE ABSORBANCE FOR GF/AA
X	ABSOLUTE VALUE OF ANALYTE CONCENTRATION IS LESS THAN 3 TIMES THE MDL
*	DUPLICATE ANALYSIS NOT WITHIN CONTROL LIMITS
+	CORRELATION COEFFICIENT FOR MSA IS LESS THAN 0.995
*H	RESULTS OUTSIDE OF LIMITS DUE TO SAMPLE MATRIX INTERFERENCE
*Q	INSUFFICIENT SAMPLE FOR ANALYSIS
*R	DATA IS NOT USABLE
*V	SAMPLE RESULT IS >4X SPIKED CONCENTRATION, THEREFORE SPIKE IS NOT DETECTABLE
*Y	RESULT NOT ATTAINABLE DUE TO SAMPLE MATRIX INTERFERENCE
@C	*VARIABLE MESSAGE*
@H	DETECTION LIMIT ELEVATED DUE TO MATRIX INTERFERENCE
@Q	DETECTION LIMIT ELEVATED DUE TO LIMITED SAMPLE FOR ANALYSIS
@R	RPD LIMIT IS 67% FOR INORGANIC RESULTS LESS THAN TEN TIMES THE REPORTING DETECTION LIMIT
@S	RPD: ONE RESULT ABOVE AND ONE RESULT BELOW REPORTING LIMIT (RL). RESULT ABOVE SHOULD BE < 5 TIMES RL TO BE IN CONTROL.
@V	PRE-DIGEST SPIKE OUT OF LIMITS. POST DIGESTION SPIKE YIELDED ACCEPTABLE RESULTS
@W	DETECTION LIMIT ELEVATED DUE TO REDUCED SAMPLE WEIGHT
@Y	ION BALANCE OUTSIDE OF ATI'S ACCEPTANCE LIMITS; REANALYSIS CONFIRMED ORIGINAL RESULT
@X	RESULTS VERIFIED BY REDIGESTION AND REANALYSIS

ANALYTICAL TECHNOLOGIES, INC.
SAN DIEGO
FLAGS

ORGANICS

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

ACCESSION #: 412300 INITIALS: MK

SAMPLE CONDITION UPON RECEIPT CHECKLIST (FOR RE-ACCESSIONS, COMPLETE #7 THRU #9)			
1	Does this project require special handling according to NEESA Levels C, D, AFOEHL or CLP protocols? If yes, complete a) thru c) a) Cooler temperature 2°C, all coolers b) pH sample aliquoted: yes / no / n/a c) LOT #'s:	YES	NO
2	Are custody seals present on cooler?	YES	NO
	If yes, are seals intact?	YES	NO
3	Are custody seals present on sample containers?	YES	NO
	If yes, are seals intact? n/a	YES	NO
4	Is there a Chain-Of-Custody (COC)*?	YES	NO
5	Is the COC* complete? Relinquished: yes/no Requested analysis: yes/no	YES	NO
6	Is the COC* in agreement with the samples received? # Samples: yes/no Sample ID's: yes/no Date sampled: yes/no Matrix: yes/no # containers: yes/no	YES	NO
7	Are the samples preserved correctly?	YES	NO
8	Is there enough sample for all the requested analyses?	YES	NO
9	Are all samples within holding times for the requested analyses?	YES	NO
10	Cooler temperature: see above		
11	Were all sample containers received intact (ie. not broken, leaking, etc.)?	YES	NO
12	Are samples requiring no headspace, headspace free? N/A	YES	NO
13	Are VOA 1st stickers required?	YES	NO
14	Are there special comments on the Chain of Custody which require client contact?	YES	N/A
15	If yes, was ATI Project Manager notified?	YES	NO

Describe "no" items:

HCW8A: 1 of 2 VOAs has 2X pea-size headspace. OK per Sup. & PM 12-22-96

Was client contacted? yes / no

If yes, Date: _____ Name of Person contacted: _____

Describe actions taken or client instructions:

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

ATIFRM902 (11/92)

Analytical Technologies, Inc.

5550 MOREHOUSE DRIVE
SAN DIEGO, CA 92121-1709
(619) 458-9141

Chain of Custody

DATE 12/21/94 PAGE 2 OF 2

PROJECT MANAGER: [illegible]
COMPANY: [illegible]
ADDRESS: [illegible]

BILL TO: [illegible]
COMPANY: [illegible]
ADDRESS:

[illegible] J. Slivkoff (SDS) 647-3864
SAMPLERS: (Signature) PHONE NUMBER

Recommended Quantity and Preservative (Provide triple volume on QC Samples)

SAMPLE ID	SAMPLE DATE	TIME	MATRIX	LAB ID	Petroleum Hydrocarbons 418.1 (1L (H_2SO_4)/100g)	Oil and Grease 413.2 (1L (H_2SO_4)/100g)	Gasoline (MOD 8015/DOHS) (4 oz (HCl)/50g)	Diesel (MOD 8015/DOHS) (4 oz (HCl)/50g)	Gasoline/BTXE (MOD 8015/8020) Maximum Contamination Level of Gasoline: 2ppm (water), 50ppm (Soil) (2X40ml (HCl)/50g)	MOD 8015 (Unknown) (4 oz (HCl)/50g)	BTXE (8020) (2X40ml (HCl)/50g)	Chlorinated Hydrocarbons (8010) (2X40ml (HCl)/50g)	Aromatic Hydrocarbons (8020) (2X40ml (HCl)/50g)	Chlorinated/Aromatic Hydrocarbons (8010/8020) (2X40ml (HCl)/50g)	Organic Pb (500ml/50g)	Pesticides/PCB (8080) (1L/50g)	Base/NEU/Acid Cmpds GC/MS (8270) (1L/100g 2x1L)	Volatile Cmpds GC/MS (8240) (2X40ml (HCl)/100g)	Polynuclear Aromatic (8310) (1L/100g)	CCR Metals (Total) (500ml/100g)	Priority Pollutant Metals (500ml/100g)	NO_3 - NO_2	General Chemistry	Total Hg	Dissolved metals					Number of Containers
HCW8A	12/1/94	8:35	H_2O	01													X	X		X		X	X	X	X					9
HCW8B	"	9:30	"	02													X	X		X		X	X	X	X					9
HCW9A	"	10:25	"	03													X	X		X		X	X	X	X					9
HCW9B	"	11:16	"	04													X	X		X		X	X	X	X					9
LCW8A	"	13:45	"	05													X	X		X		X	X	X	X					9
LCW8B	"	14:21	"	06													X	X		X		X	X	X	X					9
LCW9A	"	15:00	"	07													X	X		X		X	X	X	X					9
LCW9B	"	16:03	"	08													X	X		X		X	X	X	X					9

PROJECT INFORMATION	
PROJECT NUMBER:	421000
PROJECT NAME:	GMP
PURCHASE ORDER NUMBER:	
VIA:	DHL
TAT: ☐24HR ☐48HRS ☐72HRS ☐1WK ☒2WK	

SAMPLE RECEIPT	
TOTAL NUMBER OF CONTAINERS	72
CHAIN OF CUSTODY SEALS Y/N/NA	Y
SEALS INTACT? Y/N/NA	Y
RECEIVED GOOD COND./COLD	Y/Y
LAB NUMBER	412300

SAMPLE DISPOSAL INSTRUCTIONS

☐ ATI Disposal @ $5.00 each ☐ Return ☐ Pickup

Comments: General Chemistry = TDS, Alk, F, MBAS, SO_4, pH, Cl, Cu

ATI VOCs are in Cooler "ATI-L"

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: [illegible] Time: 1730	Signature: [illegible] Time: 18:00	Signature: Time:
Printed Name: Jay Slivkoff Date: 12/21/94	Printed Name: Tony Shan Date: 12/21/94	Printed Name: Date:
Company: ETI	Company: BHP	Company:

RECEIVED BY: 1.	RECEIVED BY: 2.	RECEIVED BY: (LAB) 3.
Signature: [illegible] Time: 17:30	Signature: Time:	Signature: [illegible] Time: 1030
Printed Name: Tony Shan Date:	Printed Name: Date:	Printed Name: Michael Hallorah Date: 12/22/94
Company: BHP	Company:	Analytical Technologies, Inc.

DISTRIBUTION: White, Canary - ANALYTICAL TECHNOLOGIES, INC. • Pink - ORIGINATOR

Analytical Technologies, Inc.
5550 MOREHOUSE DRIVE
SAN DIEGO, CA 92121-1709
(619) 458-9141

Chain of Custody

DATE 12/21/94 PAGE 1 OF 2

PROJECT MANAGER: Tony Shan
COMPANY: BHP Hawaii
ADDRESS: 91-325 Komohana St.
Kapolei, HI 96707

BILL TO: Tony Shan
COMPANY: BHP Hawaii
ADDRESS:

SAMPLERS: (Signature) [signature]
PHONE NUMBER (808) 547-3804

Recommended Quantity and Preservative (Provide triple volume on QC Samples)

Petroleum Hydrocarbons 418.1	Oil and Grease 413.2	Gasoline (MOD 8015/DOHS)	Diesel (MOD 8015/DOHS)	Gasoline/BTXE (MOD 8015/8020) Maximum Contamination Level of Gasoline: 2ppm(water), 50ppm(Soil)	MOD 8015 (Unknown)	BTXE (8020)	Chlorinated Hydrocarbons (8010)	Aromatic Hydrocarbons (8020)	Chlorinated/Aromatic Hydrocarbons (8010/8020)	Organic Pb	Pesticides/PCB (8080)	Base/Neu/Acid Cmpds GC/MS (8270)	Volatile Cmpds GC/MS (8240)	Polynuclear Aromatic (8310)	CCR Metals Total	Priority Pollutant Metals	NO_3 - NO_2	General Chemistry	Total HH					Number of Containers
												1L/100g	1L/100g 2x	2x40ml (HCl)/100g	1L/100g	500ml/100g	500ml/100g							
												X	X		X		X	X	X					8
												X	X		X		X	X	X					8
												X	X		X		X	X	X					8
												X	X		X		X	X	X					8
												X	X		X		X	X	X					8
												X	X		X		X	X	X					8
												X	X		X		X	X	X					8
													X											2

SAMPLE ID	SAMPLE DATE	TIME	MATRIX	LAB ID
HCW3A	12/21/94	8:30 am	H_2O	09
HCW3B	"	9:15 am	"	10
HCW3C	"	11:45 am	"	11
LCW3A	"	14:15 pm	"	12
LCW3B	"	15:21 pm	"	13
LCW3C	"	16:00 pm	"	14
FB-3	"	15:25 pm	"	15
TB			"	16

PROJECT INFORMATION	
PROJECT NUMBER:	99/300
PROJECT NAME:	TMP
PURCHASE ORDER NUMBER:	
VIA:	DHL
TAT: ☐24HR ☐48HRS ☐72HRS ☐1WK ☒2WK	

SAMPLE RECEIPT	
TOTAL NUMBER OF CONTAINERS	58
CHAIN OF CUSTODY SEALS Y/N/NA	Y
SEALS INTACT? Y/N/NA	Y
RECEIVED GOOD COND/COLD	Y/Y
LAB NUMBER	412300

SAMPLE DISPOSAL INSTRUCTIONS

☐ ATI Disposal @ $5.00 each ☐ Return ☐ Pickup

Comments: General Chemistry = TDS, Alk, F, MBAS, SO_4, pH, EC, Cl^-
All VOCs are in Cooler "ATI-L"

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: [signature] Time: 1730	Signature: [signature] Time: 18:05	Signature: Time:
Printed Name: Tony Shan Date: 12/21/94	Printed Name: Tony Shan Date: 12/21/94	Printed Name: Date:
Company: Dames & Moore	Company: BHP	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: (LAB) 3.**
Signature: [signature] Time: 17:10	Signature: Time:	Signature: [signature] Time: 1030
Printed Name: Tony Shan Date: 12/21/94	Printed Name: Date:	Printed Name: Michael Hallock Date: 12/22/94
Company: BHP	Company:	Analytical Technologies, Inc.

DISTRIBUTION: White, Canary - ANALYTICAL TECHNOLOGIES, INC. • Pink - ORIGINATOR

AnalyticalTechnologies, Inc. Corporate Offices: 5550 Morehouse Drive San Diego, CA 92121 (619) 458-9141

ATI I.D.: 412316

January 27, 1995

ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
c/o BHP REFINING 91325 KOMOHANA STREET
KAPOLEI, HI 96707

Project Name: GMP
Project # : 441000

Attention: STEPHANIE SAKURAI/TONY SHAN

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

Date Received	Quantity	Matrix
December 23, 1994	12	WATER

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

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

SUSAN M. SNYDER
PROJECT MANAGER

M. E. SHIGLEY
LABORATORY MANAGER

AnalyticalTechnologies,Inc.

SAMPLE CROSS REFERENCE

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP

Report Date: January 27, 1995
ATI I.D. : 412316

ATI #	Client Description	Matrix	Date Collected
1	HCW4A	WATER	22-DEC-94
2	HCW4B	WATER	22-DEC-94
3	HCW4C	WATER	22-DEC-94
4	LCW4A	WATER	22-DEC-94
5	LCW4B	WATER	22-DEC-94
6	LCW4C	WATER	22-DEC-94
7	HCW5A	WATER	22-DEC-94
8	HCW5B	WATER	22-DEC-94
9	LCW5A	WATER	22-DEC-94
10	LCW5B	WATER	22-DEC-94
11	FB4	WATER	22-DEC-94
12	HCW4A/DISSOLVED 01	WATER	22-DEC-94
13	HCW4B/DISSOLVED 02	WATER	22-DEC-94
14	HCW4C/DISSOLVED 03	WATER	22-DEC-94
15	LCW4A/DISSOLVED 04	WATER	22-DEC-94
16	LCW4B/DISSOLVED 05	WATER	22-DEC-94
17	LCW4C/DISSOLVED 06	WATER	22-DEC-94
18	HCW5A/DISSOLVED 07	WATER	22-DEC-94
19	HCW5B/DISSOLVED 08	WATER	22-DEC-94
20	LCW5A/DISSOLVED 09	WATER	22-DEC-94
21	LCW5B/DISSOLVED 10	WATER	22-DEC-94
22	TB (SDGCMS 10009)	WATER	22-DEC-94
23	FB4/DISSOLVED 11	WATER	22-DEC-94

---TOTALS---

Matrix	# Samples
WATER	23

ATI STANDARD DISPOSAL PRACTICE

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

AnalyticalTechnologies,Inc.

ANALYTICAL SCHEDULE

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP

ATI I.D.: 412316

Analysis	Technique/Description
EPA 160.1 (TOTAL DISSOLVED SOLIDS)	GRAVIMETRIC
EPA 310.1 (ALKALINITY)	TITRIMETRIC
EPA 340.2 (FLUORIDE)	ELECTRODE
EPA 353.2 (NITRATE-NITRITE AS NITROGEN)	COLORIMETRIC
EPA 425.1 (SURFACTANTS (MBAS))	COLORIMETRIC
EPA 6010 (ANTIMONY)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (ARSENIC)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (BARIUM)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (BERYLLIUM)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (CADMIUM)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (CHROMIUM)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (COBALT)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (IRON)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (LEAD)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (MANGANESE)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (NICKEL)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (SELENIUM)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (SODIUM)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (VANADIUM)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 7470 (AQUEOUS MERCURY)	ATOMIC ABSORPTION/COLD VAPOR
EPA 8240 (GC/MS FOR VOLATILE ORGANICS)	GC/MASS SPECTROMETER
EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)	GC/MASS SPECTROMETER
EPA 9038 (SULFATE)	TURBIDIMETRIC
EPA 9040 (pH)	ELECTRODE
EPA 9050 (ELECTRICAL CONDUCTIVITY)	ELECTRODE
EPA 9253 (CHLORIDE)	TITRIMETRIC, SILVER NITRATE

AnalyticalTechnologies,Inc.

GENERAL CHEMISTRY RESULTS

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000 ATI I.D.: 412316
Project Name: GMP

Sample #	Client ID	Matrix	Date Sampled	Date Received
1	HCW4A	WATER	22-DEC-94	23-DEC-94
2	HCW4B	WATER	22-DEC-94	23-DEC-94
3	HCW4C	WATER	22-DEC-94	23-DEC-94
4	LCW4A	WATER	22-DEC-94	23-DEC-94
5	LCW4B	WATER	22-DEC-94	23-DEC-94

Parameter	Units	1	2	3	4	5
CARBONATE AS CACO3	MG/L	<5.0	<5.0	<5.0	<5.0	<5.0
BICARBONATE AS CACO3	MG/L	513	204	160	530	216
HYDROXIDE AS CACO3	MG/L	<5.0	<5.0	<5.0	<5.0	<5.0
TOTAL ALKALINITY AS CACO3	MG/L	513	204	160	530	216
CHLORIDE	MG/L	1970	12300	14200	1740	11900
ELECTRICAL CONDUCTIVITY	UMHOS/CM	9100	34500	39000	8500	33600
FLUORIDE	MG/L	<0.5	0.55	0.79	<0.5	0.55
SURFACTANTS (MBAS)	MG/L	0.48	0.23	0.21	0.46	0.21
NITRATE-NITRITE AS NITROGEN	MG/L	<0.05	<0.05	2.1	<0.05	1.3
pH	UNITS	7.91	7.14	7.40	7.89	7.16
SULFATE	MG/L	1510	2690	2880	1550	1560
TOTAL DISSOLVED SOLIDS	MG/L	4940	23700	26300	5000	16100

AnalyticalTechnologies,Inc.

GENERAL CHEMISTRY RESULTS

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP

ATI I.D.: 412316

Sample #	Client ID	Matrix	Date Sampled	Date Received
6	LCW4C	WATER	22-DEC-94	23-DEC-94
7	HCW5A	WATER	22-DEC-94	23-DEC-94
8	HCW5B	WATER	22-DEC-94	23-DEC-94
9	LCW5A	WATER	22-DEC-94	23-DEC-94
10	LCW5B	WATER	22-DEC-94	23-DEC-94

Parameter	Units	6	7	8	9	10
CARBONATE AS CACO3	MG/L	<5.0	<5.0	<5.0	<5.0	<5.0
BICARBONATE AS CACO3	MG/L	143	529	260	526	276
HYDROXIDE AS CACO3	MG/L	<5.0	<5.0	<5.0	<5.0	<5.0
TOTAL ALKALINITY AS CACO3	MG/L	143	529	260	526	276
CHLORIDE	MG/L	11000	1160	11200	1170	10700
ELECTRICAL CONDUCTIVITY	UMHOS/CM	37000	4610	31800	4560	29200
FLUORIDE	MG/L	0.76	<0.5	<0.5	<0.5	<0.5
SURFACTANTS (MBAS)	MG/L	0.23	0.25	0.25	0.20	0.25
NITRATE-NITRITE AS NITROGEN	MG/L	<0.05	<0.05	<0.05	<0.05	<0.05
pH	UNITS	7.41	7.13	7.32	7.10	7.24
SULFATE	MG/L	2880	100	2060	87.7	1960
TOTAL DISSOLVED SOLIDS	MG/L	26300	2380	20800	2440	19200

AnalyticalTechnologies,Inc.

GENERAL CHEMISTRY RESULTS

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP

ATI I.D.: 412316

Sample #	Client ID	Matrix	Date Sampled	Date Received
11	FB4	WATER	22-DEC-94	23-DEC-94

Parameter	Units	11
CARBONATE AS CACO3	MG/L	<5.0
BICARBONATE AS CACO3	MG/L	<5.0
HYDROXIDE AS CACO3	MG/L	<5.0
TOTAL ALKALINITY AS CACO3	MG/L	<5.0
CHLORIDE	MG/L	<5.0
ELECTRICAL CONDUCTIVITY	UMHOS/CM	<20
FLUORIDE	MG/L	<0.5
SURFACTANTS (MBAS)	MG/L	<0.10
NITRATE-NITRITE AS NITROGEN	MG/L	0.39
pH	UNITS	6.34
SULFATE	MG/L	<10.0
TOTAL DISSOLVED SOLIDS	MG/L	24

AnalyticalTechnologies,Inc.

GENERAL CHEMISTRY - QUALITY CONTROL

DUP/MS

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP

ATI I.D. : 412316

Parameters	REF I.D.	Units	Sample Result	Dup Result	RPD	Spiked Sample	Spike Conc	% Rec
BICARBONATE AS CACO3	412316-03	MG/L	160	161	1	N/A	N/A	N/A
BICARBONATE AS CACO3	412316-11	MG/L	<5.0	<5.0	0	N/A	N/A	N/A
CARBONATE AS CACO3	412316-03	MG/L	<5.0	<5.0	0	N/A	N/A	N/A
CARBONATE AS CACO3	412316-11	MG/L	<5.0	<5.0	0	N/A	N/A	N/A
CHLORIDE	412096-03	MG/L	<5.0	<5.0	0	41.0	40.0	103
CHLORIDE	412244-01	MG/L	<5.0	<5.0	0	40.0	40.0	100
CHLORIDE	412316-11	MG/L	<5.0	<5.0	0	46.0	40.0	115
ELECTRICAL CONDUCTIVITY	412316-08	UMHOS/CM	31800	31700	0	N/A	N/A	N/A
ELECTRICAL CONDUCTIVITY	412316-11	UMHOS/CM	<20	<20	0	N/A	N/A	N/A
FLUORIDE	412316-07	MG/L	<0.5	<0.5	0	5.5	5.0	110
FLUORIDE	412324-01	MG/L	<0.5	<0.5	0	5.1	5.0	102
HYDROXIDE AS CACO3	412316-03	MG/L	<5.0	<5.0	0	N/A	N/A	N/A
HYDROXIDE AS CACO3	412316-11	MG/L	<5.0	<5.0	0	N/A	N/A	N/A
NITRATE-NITRITE AS NITROGEN	412316-05	MG/L	1.3	1.3	0	3.2	2.0	95
NITRATE-NITRITE AS NITROGEN	412231-01	MG/L	<0.05	<0.05	0	1.9	2.0	95
SULFATE	412316-04	MG/L	1550	1590	3	3260	2000	86
SULFATE	412316-11	MG/L	<10.0	<10.0	0	17.6	20.0	88
SURFACTANTS (MBAS)	412316-08	MG/L	0.25	0.24	4	1.8	2.0	78
SURFACTANTS (MBAS)	412316-11	MG/L	<0.10	<0.10	0	1.9	2.0	95
TOTAL ALKALINITY AS CACO3	412316-03	MG/L	160	161	1	N/A	N/A	N/A
TOTAL ALKALINITY AS CACO3	412316-11	MG/L	<5.0	<5.0	0	N/A	N/A	N/A
TOTAL DISSOLVED SOLIDS	412316-02	MG/L	23700	23900	1	N/A	N/A	N/A
TOTAL DISSOLVED SOLIDS	412316-10	MG/L	19200	19100	1	N/A	N/A	N/A
pH	412316-10	UNITS	7.24	7.25	0	N/A	N/A	N/A
pH	412319-26	UNITS	7.32	7.33	0	N/A	N/A	N/A

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

AnalyticalTechnologies,Inc.

GENERAL CHEMISTRY - QUALITY CONTROL

BLANK SPIKE

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP

ATI I.D. : 41231

Parameters	Blank Spike ID#	Units	Blank Result	Spiked Sample	Spike Conc.	% Rec
CHLORIDE	53074	MG/L	<5.0	40.0	40.0	100
CHLORIDE	53137	MG/L	<5.0	41.0	40.0	103
FLUORIDE	53140	MG/L	<0.5	4.9	5.0	98
NITRATE-NITRITE AS NITROGEN	53035	MG/L	<0.05	1.9	2.0	95
SULFATE	53187	MG/L	<10.0	21.2	20.0	106
SURFACTANTS (MBAS)	52933	MG/L	<0.10	0.94	1.0	94

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

AnalyticalTechnologies,Inc.

METALS RESULTS

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP

ATI I.D.: 412316

Sample #	Client ID	Matrix	Date Sampled	Date Received
1	HCW4A	WATER	22-DEC-94	23-DEC-94
2	HCW4B	WATER	22-DEC-94	23-DEC-94
3	HCW4C	WATER	22-DEC-94	23-DEC-94
7	HCW5A	WATER	22-DEC-94	23-DEC-94
8	HCW5B	WATER	22-DEC-94	23-DEC-94

Parameter	Units	1	2	3	7	8
ARSENIC	MG/L	<0.05	<0.05	<0.05	<0.05	<0.05
BARIUM	MG/L	<0.01	0.03	0.02	0.04	0.03
BERYLLIUM	MG/L	<0.005	<0.005	<0.005	<0.005	<0.005
CADMIUM	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01
COBALT	MG/L	0.01	<0.01	0.01	<0.01	0.01
CHROMIUM	MG/L	<0.01	<0.01	0.01	<0.01	<0.01
IRON	MG/L	0.54	0.04	0.25	0.26	0.11
MERCURY	MG/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
MANGANESE	MG/L	0.02	0.18	0.12	0.13	0.26
SODIUM	MG/L	1730	8320	9790	728	7480
NICKEL	MG/L	<0.01	<0.01	<0.01	<0.01	0.05
LEAD	MG/L	<0.03	<0.03	<0.03	<0.03	<0.03
ANTIMONY	MG/L	<0.03	<0.03	<0.03	<0.03	<0.03
SELENIUM	MG/L	<0.05	<0.05	<0.05	<0.05	<0.05
VANADIUM	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01

Analytical Technologies, Inc.

METALS RESULTS

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP

ATI I.D.: 412316

Sample #	Client ID	Matrix	Date Sampled	Date Received
9	LCW5A	WATER	22-DEC-94	23-DEC-94
10	LCW5B	WATER	22-DEC-94	23-DEC-94
11	FB4	WATER	22-DEC-94	23-DEC-94
12	HCW4A/DISSOLVED 01	WATER	22-DEC-94	23-DEC-94
13	HCW4B/DISSOLVED 02	WATER	22-DEC-94	23-DEC-94

Parameter	Units	9	10	11	12	13
ARSENIC	MG/L	<0.05	<0.05	<0.05	-	-
BARIUM	MG/L	0.04	0.03	<0.01	-	-
BERYLLIUM	MG/L	<0.005	<0.005	<0.005	-	-
CADMIUM	MG/L	<0.01	<0.01	<0.01	-	-
COBALT	MG/L	<0.01	0.01	<0.01	-	-
CHROMIUM	MG/L	<0.01	<0.01	<0.01	-	-
IRON	MG/L	<0.01	0.10	<0.01	<0.01	<0.01
MERCURY	MG/L	<0.0005	<0.0005	<0.0005	-	-
MANGANESE	MG/L	0.13	0.23	<0.01	-	-
SODIUM	MG/L	744	6620	1.1	-	-
NICKEL	MG/L	<0.01	0.04	<0.01	-	-
LEAD	MG/L	<0.03	<0.03	<0.03	-	-
ANTIMONY	MG/L	<0.03	<0.03	<0.03	-	-
SELENIUM	MG/L	<0.10@H	<0.05	<0.05	-	-
VANADIUM	MG/L	<0.01	<0.01	<0.01	-	-

AnalyticalTechnologies, Inc.

METALS RESULTS

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP

ATI I.D.: 412316

Sample #	Client ID	Matrix	Date Sampled	Date Received
14	HCW4C/DISSOLVED 03	WATER	22-DEC-94	23-DEC-94
15	LCW4A/DISSOLVED 04	WATER	22-DEC-94	23-DEC-94
16	LCW4B/DISSOLVED 05	WATER	22-DEC-94	23-DEC-94
17	LCW4C/DISSOLVED 06	WATER	22-DEC-94	23-DEC-94
18	HCW5A/DISSOLVED 07	WATER	22-DEC-94	23-DEC-94

Parameter	Units	14	15	16	17	18
ARSENIC	MG/L	-	-	-	-	<0.05
BARIUM	MG/L	-	-	-	-	0.04
BERYLLIUM	MG/L	-	-	-	-	<0.005
CADMIUM	MG/L	-	-	-	-	<0.01
COBALT	MG/L	-	-	-	-	<0.01
CHROMIUM	MG/L	-	-	-	-	<0.01
IRON	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01
MERCURY	MG/L	-	-	-	-	<0.0005
MANGANESE	MG/L	-	-	-	-	0.12
SODIUM	MG/L	-	-	-	-	689
NICKEL	MG/L	-	-	-	-	<0.01
LEAD	MG/L	-	-	-	-	<0.03
ANTIMONY	MG/L	-	-	-	-	<0.03
SELENIUM	MG/L	-	-	-	-	<0.05
VANADIUM	MG/L	-	-	-	-	<0.01

Analytical Technologies, Inc.

METALS RESULTS

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP

ATI I.D.: 412316

Sample #	Client ID	Matrix	Date Sampled	Date Received
19	HCW5B/DISSOLVED 08	WATER	22-DEC-94	23-DEC-94
20	LCW5A/DISSOLVED 09	WATER	22-DEC-94	23-DEC-94
21	LCW5B/DISSOLVED 10	WATER	22-DEC-94	23-DEC-94
23	FB4/DISSOLVED 11	WATER	22-DEC-94	23-DEC-94

Parameter	Units	19	20	21	23
ARSENIC	MG/L	<0.5@H	<0.10@H	<0.05	-
BARIUM	MG/L	0.03	0.03	0.03	-
BERYLLIUM	MG/L	<0.005	<0.005	<0.005	-
CADMIUM	MG/L	<0.1@H	<0.01	<0.01	-
COBALT	MG/L	0.01	<0.01	0.01	-
CHROMIUM	MG/L	<0.01	<0.01	<0.01	-
IRON	MG/L	<0.01	<0.01	<0.01	<0.01
MERCURY	MG/L	<0.0005	<0.0005	<0.0005	-
MANGANESE	MG/L	0.25	0.11	0.20	-
SODIUM	MG/L	6710	637	6440	-
NICKEL	MG/L	0.05	<0.01	0.04	-
LEAD	MG/L	<0.3@H	<0.03	<0.03	-
ANTIMONY	MG/L	<0.03	<0.03	<0.03	-
SELENIUM	MG/L	<0.5@H	<0.05	<0.10@H	-
VANADIUM	MG/L	<0.01	<0.01	<0.01	-

AnalyticalTechnologies,Inc.

METALS - QUALITY CONTROL

DUP/MS

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP

ATI I.D. : 412316

Parameters	REF I.D.	Units	Sample Result	Dup Result	RPD	Spiked Sample	Spike Conc	% Rec
ANTIMONY	412316-19	MG/L	<0.03	<0.03	0	1.71	2.00	86
ARSENIC	412316-19	MG/L	<0.5@H	<0.5	0	1.7	2.0	85
BARIUM	412316-19	MG/L	0.03	0.03	0	3.76	4.00	93
BERYLLIUM	412316-19	MG/L	<0.005	<0.005	0	1.69	2.00	85
CADMIUM	412323-01	MG/L	0.0006	0.0005	18	1.81	2.00	90
CADMIUM	412316-19	MG/L	<0.1@H	<0.1@H	0	1.9	2.0	95
CHROMIUM	412316-19	MG/L	<0.01	<0.01	0	1.59	2.00	80
COBALT	412316-19	MG/L	0.01	0.01	0	3.74	4.00	93
IRON	412316-19	MG/L	<0.01	<0.01	0	3.20	4.00	80
IRON	412316-12	MG/L	<0.01	<0.01	0	9.65	10.0	97
LEAD	412323-01	MG/L	0.055	0.053	4	1.87	2.00	91
LEAD	412316-19	MG/L	<0.3@H	<0.3@H	0	2.2	2.0	110
MANGANESE	412316-19	MG/L	0.25	0.24	4	4.19	4.00	99
MERCURY	412361-01	MG/L	<0.0005	<0.0005	0	0.0021	0.0020	105
MERCURY	412316-18	MG/L	<0.0005	<0.0005	0	0.0017	0.0020	85
NICKEL	412316-19	MG/L	0.05	0.05	0	2.09	2.00	102
SELENIUM	412323-01	MG/L	<0.002	0.002	N/A@S	1.17	1.20	98
SELENIUM	412316-19	MG/L	<0.05	<0.05	0	1.25	1.20	104
SODIUM	412316-19	MG/L	6710	6510	3	6480	25.0	N/A*V
VANADIUM	412316-19	MG/L	<0.01	<0.01	0	5.13	6.00	86

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

AnalyticalTechnologies,Inc.

METALS - QUALITY CONTROL

BLANK SPIKE

Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000 ATI I.D. : 412316
Project Name: GMP

Parameters	Blank Spike ID#	Units	Blank Result	Spiked Sample	Spike Conc.	% Rec
ANTIMONY	53297	MG/L	<0.03	1.94	2.00	97
ARSENIC	53401	MG/L	<0.05	1.94	2.00	97
BARIUM	53297	MG/L	<0.01	4.03	4.00	101
BERYLLIUM	53297	MG/L	<0.005	2.01	2.00	101
CADMIUM	53576	MG/L	<0.01	2.00	2.00	100
CHROMIUM	53297	MG/L	<0.01	1.99	2.00	100
COBALT	53297	MG/L	<0.01	3.94	4.00	99
IRON	53298	MG/L	<0.01	3.99	4.00	100
IRON	53363	MG/L	<0.01	9.91	10.0	99
LEAD	53576	MG/L	<0.03	2.01	2.00	100
MANGANESE	53298	MG/L	<0.01	4.04	4.00	101
MERCURY	53221	MG/L	<0.0005	0.0021	0.0020	105
MERCURY	53357	MG/L	<0.0005	0.0020	0.0020	100
NICKEL	53297	MG/L	<0.01	1.98	2.00	99
SELENIUM	53576	MG/L	<0.05	1.15	1.20	96
SODIUM	53298	MG/L	<0.1	25.2	25.0	101
VANADIUM	53297	MG/L	<0.01	6.14	6.00	102

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

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412316
Project # : 441000
Project Name: GMP

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
1	HCW4A	WATER	22-DEC-94	N/A	01-JAN-95	1.00
2	HCW4B	WATER	22-DEC-94	N/A	01-JAN-95	1.00
3	HCW4C	WATER	22-DEC-94	N/A	01-JAN-95	1.00

Parameter	Units	1	2	3
CARBON DISULFIDE	UG/L	<2	<2	<2
CHLOROMETHANE	UG/L	<10	<10	<10
CHLOROFORM	UG/L	<1	<1	<1
VINYL CHLORIDE	UG/L	<5	<5	<5
2-BUTANONE (MEK)	UG/L	<10	<10	<10
BROMOMETHANE	UG/L	<10	<10	<10
1,2-DICHLOROETHANE	UG/L	<1	<1	<1
CHLOROETHANE	UG/L	<5	<5	<5
ACETONE	UG/L	<10	<10	<10
BENZENE	UG/L	1	<1	<1
1,1-DICHLOROETHENE	UG/L	<1	<1	<1
TOLUENE	UG/L	<2	<2	<2
CHLOROBENZENE	UG/L	<1	<1	<1
METHYLENE CHLORIDE	UG/L	<5	<5	<5
ETHYLBENZENE	UG/L	3	<1	<1
TRANS-1,2-DICHLOROETHENE	UG/L	<1	<1	<1
XYLENES (TOTAL)	UG/L	1	<1	<1
1,1-DICHLOROETHANE	UG/L	<1	<1	<1
STYRENE	UG/L	<2	<2	<2
1,4-DIOXANE	UG/L	<200	<200	<200
CIS-1,2-DICHLOROETHENE	UG/L	<1	<1	<1
ETHYLENE DIBROMIDE	UG/L	<5	<5	<5
CYCLOHEXANE	UG/L	<10	<10	<10
1,1,1-TRICHLOROETHANE	UG/L	<1	<1	<1
CARBON TETRACHLORIDE	UG/L	<1	<1	<1
TRICHLOROETHENE	UG/L	<1	<1	<1
1,2-DICHLOROPROPANE	UG/L	<1	<1	<1
BROMODICHLOROMETHANE	UG/L	<1	<1	<1
4-METHYL-2-PENTANONE (MIBK)	UG/L	<10	<10	<10
CIS-1,3-DICHLOROPROPENE	UG/L	<1	<1	<1
TRANS-1,3-DICHLOROPROPENE	UG/L	<1	<1	<1
2-HEXANONE (MBK)	UG/L	<10	<10	<10
1,1,2-TRICHLOROETHANE	UG/L	<1	<1	<1
TETRACHLOROETHENE	UG/L	<1	<1	<1
DIBROMOCHLOROMETHANE	UG/L	<1	<1	<1
BROMOFORM	UG/L	<5	<5	<5
1,1,2,2-TETRACHLOROETHANE	UG/L	<2	<2	<2
DICHLORODIFLUOROMETHANE	UG/L	<10	<10	<10

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412316
Project # : 441000
Project Name: GMP

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
1	HCW4A	WATER	22-DEC-94	N/A	01-JAN-95	1.00
2	HCW4B	WATER	22-DEC-94	N/A	01-JAN-95	1.00
3	HCW4C	WATER	22-DEC-94	N/A	01-JAN-95	1.00

Parameter	Units	1	2	3
TRICHLOROFLUOROMETHANE	UG/L	<5	<5	<5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	UG/L	<5	<5	<5
1,2-DICHLOROBENZENE	UG/L	<5	<5	<5
1,3-DICHLOROBENZENE	UG/L	<5	<5	<5
1,4-DICHLOROBENZENE	UG/L	<5	<5	<5
SURROGATES				
1,2-DICHLOROETHANE-D4	%	102	99	98
TOLUENE-D8	%	103	101	99
BFB	%	94	105	99

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412316
Project # : 441000
Project Name: GMP

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
7	HCW5A	WATER	22-DEC-94	N/A	01-JAN-95	1.00
8	HCW5B	WATER	22-DEC-94	N/A	01-JAN-95	1.00
9	LCW5A	WATER	22-DEC-94	N/A	01-JAN-95	1.00

Parameter	Units	7	8	9
CARBON DISULFIDE	UG/L	10	<2	<2
CHLOROMETHANE	UG/L	<10	<10	<10
CHLOROFORM	UG/L	<1	<1	<1
VINYL CHLORIDE	UG/L	<5	<5	<5
2-BUTANONE (MEK)	UG/L	<10	<10	<10
BROMOMETHANE	UG/L	<10	<10	<10
1,2-DICHLOROETHANE	UG/L	<1	<1	<1
CHLOROETHANE	UG/L	<5	<5	<5
ACETONE	UG/L	<10	<10	<10
BENZENE	UG/L	<1	<1	<1
1,1-DICHLOROETHENE	UG/L	<1	<1	<1
TOLUENE	UG/L	<2	<2	<2
CHLOROBENZENE	UG/L	<1	<1	<1
METHYLENE CHLORIDE	UG/L	<5	<5	<5
ETHYLBENZENE	UG/L	<1	<1	<1
TRANS-1,2-DICHLOROETHENE	UG/L	<1	<1	<1
XYLENES (TOTAL)	UG/L	<1	<1	<1
1,1-DICHLOROETHANE	UG/L	<1	<1	<1
STYRENE	UG/L	<2	<2	<2
1,4-DIOXANE	UG/L	<200	<200	<200
CIS-1,2-DICHLOROETHENE	UG/L	<1	<1	<1
ETHYLENE DIBROMIDE	UG/L	<5	<5	<5
CYCLOHEXANE	UG/L	<10	<10	<10
1,1,1-TRICHLOROETHANE	UG/L	<1	<1	<1
CARBON TETRACHLORIDE	UG/L	<1	<1	<1
TRICHLOROETHENE	UG/L	<1	<1	<1
1,2-DICHLOROPROPANE	UG/L	<1	<1	<1
BROMODICHLOROMETHANE	UG/L	<1	<1	<1
4-METHYL-2-PENTANONE (MIBK)	UG/L	<10	<10	<10
CIS-1,3-DICHLOROPROPENE	UG/L	<1	<1	<1
TRANS-1,3-DICHLOROPROPENE	UG/L	<1	<1	<1
2-HEXANONE (MBK)	UG/L	<10	<10	<10
1,1,2-TRICHLOROETHANE	UG/L	<1	<1	<1
TETRACHLOROETHENE	UG/L	<1	<1	<1
DIBROMOCHLOROMETHANE	UG/L	<1	<1	<1
BROMOFORM	UG/L	<5	<5	<5
1,1,2,2-TETRACHLOROETHANE	UG/L	<2	<2	<2
DICHLORODIFLUOROMETHANE	UG/L	<10	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412316
Project # : 441000
Project Name: GMP

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
7	HCW5A	WATER	22-DEC-94	N/A	01-JAN-95	1.00
8	HCW5B	WATER	22-DEC-94	N/A	01-JAN-95	1.00
9	LCW5A	WATER	22-DEC-94	N/A	01-JAN-95	1.00

Parameter	Units	7	8	9
TRICHLOROFLUOROMETHANE	UG/L	<5	<5	<5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	UG/L	<5	<5	<5
1,2-DICHLOROBENZENE	UG/L	<5	<5	<5
1,3-DICHLOROBENZENE	UG/L	<5	<5	<5
1,4-DICHLOROBENZENE	UG/L	<5	<5	<5
SURROGATES				
1,2-DICHLOROETHANE-D4	%	101	99	99
TOLUENE-D8	%	101	96	99
BFB	%	93	89	94

AnalyticalTechnologies, Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412316
Project # : 441000
Project Name: GMP

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
10	LCW5B	WATER	22-DEC-94	N/A	01-JAN-95	1.00
11	FB4	WATER	22-DEC-94	N/A	01-JAN-95	1.00
22	TB (SDGCMS 10009)	WATER	22-DEC-94	N/A	01-JAN-95	1.00

Parameter	Units	10	11	22
CARBON DISULFIDE	UG/L	<2	<2	<2
CHLOROMETHANE	UG/L	<10	<10	<10
CHLOROFORM	UG/L	<1	<1	<1
VINYL CHLORIDE	UG/L	<5	<5	<5
2-BUTANONE (MEK)	UG/L	<10	<10	<10
BROMOMETHANE	UG/L	<10	<10	<10
1,2-DICHLOROETHANE	UG/L	<1	<1	<1
CHLOROETHANE	UG/L	<5	<5	<5
ACETONE	UG/L	<10	<10	<10
BENZENE	UG/L	<1	<1	<1
1,1-DICHLOROETHENE	UG/L	<1	<1	<1
TOLUENE	UG/L	<2	<2	<2
CHLOROBENZENE	UG/L	<1	<1	<1
METHYLENE CHLORIDE	UG/L	<5	<5	<5
ETHYLBENZENE	UG/L	<1	<1	<1
TRANS-1,2-DICHLOROETHENE	UG/L	<1	<1	<1
XYLENES (TOTAL)	UG/L	<1	<1	<1
1,1-DICHLOROETHANE	UG/L	<1	<1	<1
STYRENE	UG/L	<2	<2	<2
1,4-DIOXANE	UG/L	<200	<200	<200
CIS-1,2-DICHLOROETHENE	UG/L	<1	<1	<1
ETHYLENE DIBROMIDE	UG/L	<5	<5	<5
CYCLOHEXANE	UG/L	<10	<10	<10
1,1,1-TRICHLOROETHANE	UG/L	<1	<1	<1
CARBON TETRACHLORIDE	UG/L	<1	<1	<1
TRICHLOROETHENE	UG/L	<1	<1	<1
1,2-DICHLOROPROPANE	UG/L	<1	<1	<1
BROMODICHLOROMETHANE	UG/L	<1	<1	<1
4-METHYL-2-PENTANONE (MIBK)	UG/L	<10	<10	<10
CIS-1,3-DICHLOROPROPENE	UG/L	<1	<1	<1
TRANS-1,3-DICHLOROPROPENE	UG/L	<1	<1	<1
2-HEXANONE (MBK)	UG/L	<10	<10	<10
1,1,2-TRICHLOROETHANE	UG/L	<1	<1	<1
TETRACHLOROETHENE	UG/L	<1	<1	<1
DIBROMOCHLOROMETHANE	UG/L	<1	<1	<1
BROMOFORM	UG/L	<5	<5	<5
1,1,2,2-TETRACHLOROETHANE	UG/L	<2	<2	<2
DICHLORODIFLUOROMETHANE	UG/L	<10	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412316
Project # : 441000
Project Name: GMP

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
10	LCW5B	WATER	22-DEC-94	N/A	01-JAN-95	1.00
11	FB4	WATER	22-DEC-94	N/A	01-JAN-95	1.00
22	TB (SDGCMS 10009)	WATER	22-DEC-94	N/A	01-JAN-95	1.00

Parameter	Units	10	11	22
TRICHLOROFLUOROMETHANE	UG/L	<5	<5	<5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	UG/L	<5	<5	<5
1,2-DICHLOROBENZENE	UG/L	<5	<5	<5
1,3-DICHLOROBENZENE	UG/L	<5	<5	<5
1,4-DICHLOROBENZENE	UG/L	<5	<5	<5
SURROGATES				
1,2-DICHLOROETHANE-D4	%	99	99	99
TOLUENE-D8	%	96	102	100
BFB	%	90	95	94

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Blank I.D. : 33757
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP

ATI I.D. : 412316
Date Extracted: N/A
Date Analyzed : 01-JAN-95
Dil. Factor : 1.00

Parameters	Units	Results
CHLOROMETHANE	UG/L	<10
CARBON DISULFIDE	UG/L	<2
CHLOROFORM	UG/L	<1
VINYL CHLORIDE	UG/L	<5
BROMOMETHANE	UG/L	<10
2-BUTANONE (MEK)	UG/L	<10
1,2-DICHLOROETHANE	UG/L	<1
CHLOROETHANE	UG/L	<5
ACETONE	UG/L	<10
BENZENE	UG/L	<1
TOLUENE	UG/L	<2
1,1-DICHLOROETHENE	UG/L	<1
CHLOROBENZENE	UG/L	<1
METHYLENE CHLORIDE	UG/L	<5
ETHYLBENZENE	UG/L	<1
XYLENES (TOTAL)	UG/L	<1
TRANS-1,2-DICHLOROETHENE	UG/L	<1
STYRENE	UG/L	<2
1,1-DICHLOROETHANE	UG/L	<1
1,4-DIOXANE	UG/L	<200
CIS-1,2-DICHLOROETHENE	UG/L	<1
ETHYLENE DIBROMIDE	UG/L	<5
CYCLOHEXANE	UG/L	<10
1,1,1-TRICHLOROETHANE	UG/L	<1
CARBON TETRACHLORIDE	UG/L	<1
TRICHLOROETHENE	UG/L	<1
1,2-DICHLOROPROPANE	UG/L	<1
BROMODICHLOROMETHANE	UG/L	<1
4-METHYL-2-PENTANONE (MIBK)	UG/L	<10
CIS-1,3-DICHLOROPROPENE	UG/L	<1
TRANS-1,3-DICHLOROPROPENE	UG/L	<1
2-HEXANONE (MBK)	UG/L	<10
1,1,2-TRICHLOROETHANE	UG/L	<1
TETRACHLOROETHENE	UG/L	<1
DIBROMOCHLOROMETHANE	UG/L	<1
BROMOFORM	UG/L	<5
1,1,2,2-TETRACHLOROETHANE	UG/L	<2
DICHLORODIFLUOROMETHANE	UG/L	<10
TRICHLOROFLUOROMETHANE	UG/L	<5
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	UG/L	<5
1,2-DICHLOROBENZENE	UG/L	<5
1,3-DICHLOROBENZENE	UG/L	<5
1,4-DICHLOROBENZENE	UG/L	<5

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Blank I.D. : 33757
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP

ATI I.D. : 412316
Date Extracted: N/A
Date Analyzed : 01-JAN-95
Dil. Factor : 1.00

Parameters	Units	Results
SURROGATES		
1,2-DICHLOROETHANE-D4	%	95
TOLUENE-D8	%	100
BFB	%	94

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

MSMSD

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
MSMSD # : 71428
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.

Project # : 441000
Project Name: GMP

ATI I.D. : 412316
Date Extracted: N/A
Date Analyzed : 03-JAN-95
Sample Matrix : WATER
REF I.D. : 412316-10

Parameters	Units	Sample Result	Conc Spike	Spiked Sample	% Rec	Dup Spike	Dup % Rec	RPD
BENZENE	UG/L	<1	50	50	100	47	94	6
1,1-DICHLOROETHENE	UG/L	<1	50	49	98	45	90	9
TOLUENE	UG/L	<2	50	51	102	47	94	8
CHLOROBENZENE	UG/L	<1	50	55	110	51	102	8
TRICHLOROETHENE	UG/L	<1	50	54	108	51	102	6

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

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

BLANK SPIKE

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Blank Spike #: 53105
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name : GMP

ATI I.D. : 412316
Date Extracted: N/A
Date Analyzed : 01-JAN-95
Sample Matrix : WATER

Parameters	Units	Blank Result	Spiked Sample	Spike Conc.	% Rec
BENZENE	UG/L	<1	53	50	106
1,1-DICHLOROETHENE	UG/L	<1	62	50	124
TOLUENE	UG/L	<2	55	50	110
CHLOROBENZENE	UG/L	<1	57	50	114
TRICHLOROETHENE	UG/L	<1	57	50	114

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

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412316
Project # : 441000
Project Name: GMP

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
1	HCW4A	WATER	22-DEC-94	29-DEC-94	21-JAN-95	1.00
2	HCW4B	WATER	22-DEC-94	29-DEC-94	21-JAN-95	1.00
3	HCW4C	WATER	22-DEC-94	29-DEC-94	25-JAN-95	1.00

Parameter	Units	1	2	3
ANTHRACENE	UG/L	<10	<10	<10
N-NITROSODIMETHYLAMINE	UG/L	<15	<15	<15
BENZO(a)ANTHRACENE	UG/L	<10	<10	<10
BENZO(b)FLUORANTHENE	UG/L	<10	<10	<10
ANILINE	UG/L	<10	<10	<10
BENZO(k)FLUORANTHENE	UG/L	<10	<10	<10
BENZO(a)PYRENE	UG/L	<10	<10	<10
BIS(2-CHLOROETHYL)ETHER	UG/L	<10	<10	<10
2-CHLOROPHENOL	UG/L	<10	<10	<10
BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	<10	<10	<10
BUTYLBENZYLPHTHALATE	UG/L	<10	<10	<10
CHRYSENE	UG/L	<10	<10	<10
BENZYL ALCOHOL	UG/L	<10	<10	<10
DIBENZ(a,h)ACRIDINE	UG/L	<10	<10	<10
DIBENZ(a,h)ANTHRACENE	UG/L	<10	<10	<10
1,2-DICHLOROBENZENE	UG/L	<10	<10	<10
1,3-DICHLOROBENZENE	UG/L	<10	<10	<10
BIS(2-CHLOROISOPROPYL)ETHER	UG/L	<15	<15	<15
1,4-DICHLOROBENZENE	UG/L	<10	<10	<10
4-METHYLPHENOL	UG/L	<10	<10	<10
DIETHYLPHTHALATE	UG/L	<10	<10	<10
N-NITROSO-DI-N-PROPYLAMINE	UG/L	<15	<15	<15
7,12-DIMETHYLBENZO(a)ANTHRACENE	UG/L	<10	<10	<10
HEXACHLOROETHANE	UG/L	<10	<10	<10
DIMETHYLPHTHALATE	UG/L	<10	<10	<10
NITROBENZENE	UG/L	<10	<10	<10
DI-N-BUTYLPHTHALATE	UG/L	<10	<10	<10
ISOPHORONE	UG/L	<10	<10	<10
2-NITROPHENOL	UG/L	<10	<10	<10
DI-N-OCTYLPHTHALATE	UG/L	<10	<10	<10
BENZOIC ACID	UG/L	<50	<50	<50
BIS(2-CHLOROETHOXY)METHANE	UG/L	<10	<10	<10
2,4-DICHLOROPHENOL	UG/L	<10	<10	<10
FLUORANTHENE	UG/L	<10	<10	<10
1,2,4-TRICHLOROBENZENE	UG/L	<10	<10	<10
NAPHTHALENE	UG/L	10	<10	<10
PHENANTHRENE	UG/L	<10	<10	<10
4-CHLOROANILINE	UG/L	<10	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412316
Project # : 441000
Project Name: GMP

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
1	HCW4A	WATER	22-DEC-94	29-DEC-94	21-JAN-95	1.00
2	HCW4B	WATER	22-DEC-94	29-DEC-94	21-JAN-95	1.00
3	HCW4C	WATER	22-DEC-94	29-DEC-94	25-JAN-95	1.00

Parameter	Units	1	2	3
PYRENE	UG/L	<10	<10	<10
HEXACHLOROBUTADIENE	UG/L	<10	<10	<10
2-METHYLNAPHTHALENE	UG/L	<10	<10	<10
4-CHLORO-3-METHYLPHENOL	UG/L	<10	<10	<10
BENZENETHIOL	UG/L	<10	<10	<10
4-NITROPHENOL	UG/L	<50	<50	<50
2,4-DIMETHYLPHENOL	UG/L	<10	<10	<10
2,4-DINITROPHENOL	UG/L	<50	<50	<50
PHENOL	UG/L	<10	<10	<10
2-METHYLPHENOL	UG/L	<10	<10	<10
3- & 4-METHYLPHENOL	UG/L	<10	<10	<10
HEXACHLOROCYCLOPENTADIENE	UG/L	<10	<10	<10
2,4,6-TRICHLOROPHENOL	UG/L	<10	<10	<10
2,4,5-TRICHLOROPHENOL	UG/L	<50	<50	<50
2-CHLORONAPHTHALENE	UG/L	<10	<10	<10
2-NITROANILINE	UG/L	<50	<50	<50
ACENAPHTHYLENE	UG/L	<10	<10	<10
2,6-DINITROTOLUENE	UG/L	<10	<10	<10
3-NITROANILINE	UG/L	<50	<50	<50
ACENAPHTHENE	UG/L	<10	<10	<10
DIBENZOFURAN	UG/L	<10	<10	<10
2,4-DINITROTOLUENE	UG/L	<10	<10	<10
4-CHLOROPHENYL-PHENYLETHER	UG/L	<10	<10	<10
FLUORENE	UG/L	<10	<10	<10
4-NITROANILINE	UG/L	<50	<50	<50
2-METHYL-4,6-DINITROPHENOL	UG/L	<50	<50	<50
N-NITROSODIPHENYLAMINE	UG/L	<10	<10	<10
4-BROMOPHENYL-PHENYLETHER	UG/L	<10	<10	<10
HEXACHLOROBENZENE	UG/L	<10	<10	<10
PENTACHLOROPHENOL	UG/L	<50	<50	<50
3,3'-DICHLOROBENZIDINE	UG/L	<20	<20	<20
INDENO(1,2,3-cd)PYRENE	UG/L	<10	<10	<10
INDENE	UG/L	<10	<10	<10
1-METHYLNAPHTHALENE	UG/L	28	<10	<10
PYRIDINE	UG/L	<50	<50	<50
QUINOLINE	UG/L	<50	<50	<50
6-METHYL CHRYSENE	UG/L	<10	<10	<10
BENZO(g,h,i)PERYLENE	UG/L	<10	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412316
Project # : 441000
Project Name: GMP

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
1	HCW4A	WATER	22-DEC-94	29-DEC-94	21-JAN-95	1.00
2	HCW4B	WATER	22-DEC-94	29-DEC-94	21-JAN-95	1.00
3	HCW4C	WATER	22-DEC-94	29-DEC-94	25-JAN-95	1.00

Parameter	Units	1	2	3
SURROGATES				
NITROBENZENE-D5	%	82	97	102
2-FLUOROBIPHENYL	%	108	99	96
TERPHENYL-D14	%	76	77	81
PHENOL-D6	%	91	88	78
2-FLUOROPHENOL	%	80	78	71
2,4,6-TRIBROMOPHENOL	%	81	83	81

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412316
Project # : 441000
Project Name: GMP

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
7	HCW5A	WATER	22-DEC-94	29-DEC-94	25-JAN-95	1.00
8	HCW5B	WATER	22-DEC-94	29-DEC-94	21-JAN-95	1.00
9	LCW5A	WATER	22-DEC-94	29-DEC-94	21-JAN-95	1.00

Parameter	Units	7	8	9
ANTHRACENE	UG/L	<10	<10	<10
N-NITROSODIMETHYLAMINE	UG/L	<15	<15	<15
BENZO(a)ANTHRACENE	UG/L	<10	<10	<10
BENZO(b)FLUORANTHENE	UG/L	<10	<10	<10
ANILINE	UG/L	<10	<10	<10
BENZO(k)FLUORANTHENE	UG/L	<10	<10	<10
BENZO(a)PYRENE	UG/L	<10	<10	<10
BIS(2-CHLOROETHYL)ETHER	UG/L	<10	<10	<10
2-CHLOROPHENOL	UG/L	<10	<10	<10
BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	<10	<10	<10
BUTYLBENZYLPHTHALATE	UG/L	<10	<10	<10
CHRYSENE	UG/L	<10	<10	<10
BENZYL ALCOHOL	UG/L	<10	<10	<10
DIBENZ(a,h)ACRIDINE	UG/L	<10	<10	<10
DIBENZ(a,h)ANTHRACENE	UG/L	<10	<10	<10
1,2-DICHLOROBENZENE	UG/L	<10	<10	<10
1,3-DICHLOROBENZENE	UG/L	<10	<10	<10
BIS(2-CHLOROISOPROPYL)ETHER	UG/L	<15	<15	<15
1,4-DICHLOROBENZENE	UG/L	<10	<10	<10
4-METHYLPHENOL	UG/L	<10	<10	<10
DIETHYLPHTHALATE	UG/L	<10	<10	<10
N-NITROSO-DI-N-PROPYLAMINE	UG/L	<15	<15	<15
7,12-DIMETHYLBENZO(a)ANTHRACENE	UG/L	<10	<10	<10
HEXACHLOROETHANE	UG/L	<10	<10	<10
DIMETHYLPHTHALATE	UG/L	<10	<10	<10
NITROBENZENE	UG/L	<10	<10	<10
DI-N-BUTYLPHTHALATE	UG/L	<10	<10	<10
ISOPHORONE	UG/L	<10	<10	<10
2-NITROPHENOL	UG/L	<10	<10	<10
DI-N-OCTYLPHTHALATE	UG/L	<10	<10	<10
BENZOIC ACID	UG/L	<50	<50	<50
BIS(2-CHLOROETHOXY)METHANE	UG/L	<10	<10	<10
2,4-DICHLOROPHENOL	UG/L	<10	<10	<10
FLUORANTHENE	UG/L	<10	<10	<10
1,2,4-TRICHLOROBENZENE	UG/L	<10	<10	<10
NAPHTHALENE	UG/L	25	24	<10
PHENANTHRENE	UG/L	<10	<10	<10
4-CHLOROANILINE	UG/L	<10	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412316
Project # : 441000
Project Name: GMP

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
7	HCW5A	WATER	22-DEC-94	29-DEC-94	25-JAN-95	1.00
8	HCW5B	WATER	22-DEC-94	29-DEC-94	21-JAN-95	1.00
9	LCW5A	WATER	22-DEC-94	29-DEC-94	21-JAN-95	1.00

Parameter	Units	7	8	9
PYRENE	UG/L	<10	<10	<10
HEXACHLOROBUTADIENE	UG/L	<10	<10	<10
2-METHYLNAPHTHALENE	UG/L	15	15	<10
4-CHLORO-3-METHYLPHENOL	UG/L	<10	<10	<10
BENZENETHIOL	UG/L	<10	<10	<10
4-NITROPHENOL	UG/L	<50	<50	<50
2,4-DIMETHYLPHENOL	UG/L	<10	<10	<10
2,4-DINITROPHENOL	UG/L	<50	<50	<50
PHENOL	UG/L	<10	<10	<10
2-METHYLPHENOL	UG/L	<10	<10	<10
3- & 4-METHYLPHENOL	UG/L	<10	<10	<10
HEXACHLOROCYCLOPENTADIENE	UG/L	<10	<10	<10
2,4,6-TRICHLOROPHENOL	UG/L	<10	<10	<10
2,4,5-TRICHLOROPHENOL	UG/L	<50	<50	<50
2-CHLORONAPHTHALENE	UG/L	<10	<10	<10
2-NITROANILINE	UG/L	<50	<50	<50
ACENAPHTHYLENE	UG/L	<10	<10	<10
2,6-DINITROTOLUENE	UG/L	<10	<10	<10
3-NITROANILINE	UG/L	<50	<50	<50
ACENAPHTHENE	UG/L	<10	<10	<10
DIBENZOFURAN	UG/L	<10	<10	<10
2,4-DINITROTOLUENE	UG/L	<10	<10	<10
4-CHLOROPHENYL-PHENYLETHER	UG/L	<10	<10	<10
FLUORENE	UG/L	<10	<10	<10
4-NITROANILINE	UG/L	<50	<50	<50
2-METHYL-4,6-DINITROPHENOL	UG/L	<50	<50	<50
N-NITROSODIPHENYLAMINE	UG/L	<10	<10	<10
4-BROMOPHENYL-PHENYLETHER	UG/L	<10	<10	<10
HEXACHLOROBENZENE	UG/L	<10	<10	<10
PENTACHLOROPHENOL	UG/L	<50	<50	<50
3,3'-DICHLOROBENZIDINE	UG/L	<20	<20	<20
INDENO(1,2,3-cd)PYRENE	UG/L	<10	<10	<10
INDENE	UG/L	<10	<10	<10
1-METHYLNAPHTHALENE	UG/L	29	26	<10
PYRIDINE	UG/L	<50	<50	<50
QUINOLINE	UG/L	<50	<50	<50
6-METHYL CHRYSENE	UG/L	<10	<10	<10
BENZO(g,h,i)PERYLENE	UG/L	<10	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412316
Project # : 441000
Project Name: GMP

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
7	HCW5A	WATER	22-DEC-94	29-DEC-94	25-JAN-95	1.00
8	HCW5B	WATER	22-DEC-94	29-DEC-94	21-JAN-95	1.00
9	LCW5A	WATER	22-DEC-94	29-DEC-94	21-JAN-95	1.00

Parameter	Units	7	8	9
SURROGATES				
NITROBENZENE-D5	%	101	87	99
2-FLUOROBIPHENYL	%	101	88	99
TERPHENYL-D14	%	75	75	78
PHENOL-D6	%	86	87	78
2-FLUOROPHENOL	%	76	78	70
2,4,6-TRIBROMOPHENOL	%	89	89	72

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412316
Project # : 441000
Project Name: GMP

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
10	LCW5B	WATER	22-DEC-94	29-DEC-94	24-JAN-95	1.00
11	FB4	WATER	22-DEC-94	29-DEC-94	24-JAN-95	1.00

Parameter	Units	10	11
ANTHRACENE	UG/L	<10	<10
N-NITROSODIMETHYLAMINE	UG/L	<15	<15
BENZO(a)ANTHRACENE	UG/L	<10	<10
BENZO(b)FLUORANTHENE	UG/L	<10	<10
ANILINE	UG/L	<10	<10
BENZO(k)FLUORANTHENE	UG/L	<10	<10
BENZO(a)PYRENE	UG/L	<10	<10
BIS(2-CHLOROETHYL)ETHER	UG/L	<10	<10
2-CHLOROPHENOL	UG/L	<10	<10
BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	<10	<10
BUTYLBENZYLPHTHALATE	UG/L	<10	<10
CHRYSENE	UG/L	<10	<10
BENZYL ALCOHOL	UG/L	<10	<10
DIBENZ(a,h)ACRIDINE	UG/L	<10	<10
DIBENZ(a,h)ANTHRACENE	UG/L	<10	<10
1,2-DICHLOROBENZENE	UG/L	<10	<10
1,3-DICHLOROBENZENE	UG/L	<10	<10
BIS(2-CHLOROISOPROPYL)ETHER	UG/L	<15	<15
1,4-DICHLOROBENZENE	UG/L	<10	<10
4-METHYLPHENOL	UG/L	<10	<10
DIETHYLPHTHALATE	UG/L	<10	<10
N-NITROSO-DI-N-PROPYLAMINE	UG/L	<15	<15
7,12-DIMETHYLBENZO(a)ANTHRACENE	UG/L	<10	<10
HEXACHLOROETHANE	UG/L	<10	<10
DIMETHYLPHTHALATE	UG/L	<10	<10
NITROBENZENE	UG/L	<10	<10
DI-N-BUTYLPHTHALATE	UG/L	<10	<10
ISOPHORONE	UG/L	<10	<10
2-NITROPHENOL	UG/L	<10	<10
DI-N-OCTYLPHTHALATE	UG/L	<10	<10
BENZOIC ACID	UG/L	<50	<50
BIS(2-CHLOROETHOXY)METHANE	UG/L	<10	<10
2,4-DICHLOROPHENOL	UG/L	<10	<10
FLUORANTHENE	UG/L	<10	<10
1,2,4-TRICHLOROBENZENE	UG/L	<10	<10
NAPHTHALENE	UG/L	<10	<10
PHENANTHRENE	UG/L	<10	<10
4-CHLOROANILINE	UG/L	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412316
Project # : 441000
Project Name: GMP

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
10	LCW5B	WATER	22-DEC-94	29-DEC-94	24-JAN-95	1.00
11	FB4	WATER	22-DEC-94	29-DEC-94	24-JAN-95	1.00

Parameter	Units	10	11
PYRENE	UG/L	<10	<10
HEXACHLOROBUTADIENE	UG/L	<10	<10
2-METHYLNAPHTHALENE	UG/L	<10	<10
4-CHLORO-3-METHYLPHENOL	UG/L	<10	<10
BENZENETHIOL	UG/L	<10	<10
4-NITROPHENOL	UG/L	<50	<50
2,4-DIMETHYLPHENOL	UG/L	<10	<10
2,4-DINITROPHENOL	UG/L	<50	<50
PHENOL	UG/L	<10	<10
2-METHYLPHENOL	UG/L	<10	<10
3- & 4-METHYLPHENOL	UG/L	<10	<10
HEXACHLOROCYCLOPENTADIENE	UG/L	<10	<10
2,4,6-TRICHLOROPHENOL	UG/L	<10	<10
2,4,5-TRICHLOROPHENOL	UG/L	<50	<50
2-CHLORONAPHTHALENE	UG/L	<10	<10
2-NITROANILINE	UG/L	<50	<50
ACENAPHTHYLENE	UG/L	<10	<10
2,6-DINITROTOLUENE	UG/L	<10	<10
3-NITROANILINE	UG/L	<50	<50
ACENAPHTHENE	UG/L	<10	<10
DIBENZOFURAN	UG/L	<10	<10
2,4-DINITROTOLUENE	UG/L	<10	<10
4-CHLOROPHENYL-PHENYLETHER	UG/L	<10	<10
FLUORENE	UG/L	<10	<10
4-NITROANILINE	UG/L	<50	<50
2-METHYL-4,6-DINITROPHENOL	UG/L	<50	<50
N-NITROSODIPHENYLAMINE	UG/L	<10	<10
4-BROMOPHENYL-PHENYLETHER	UG/L	<10	<10
HEXACHLOROBENZENE	UG/L	<10	<10
PENTACHLOROPHENOL	UG/L	<50	<50
3,3'-DICHLOROBENZIDINE	UG/L	<20	<20
INDENO(1,2,3-cd)PYRENE	UG/L	<10	<10
INDENE	UG/L	<10	<10
1-METHYLNAPHTHALENE	UG/L	<10	<10
PYRIDINE	UG/L	<50	<50
QUINOLINE	UG/L	<50	<50
6-METHYL CHRYSENE	UG/L	<10	<10
BENZO(g,h,i)PERYLENE	UG/L	<10	<10

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC. ATI I.D. : 412316
Project # : 441000
Project Name: GMP

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
10	LCW5B	WATER	22-DEC-94	29-DEC-94	24-JAN-95	1.00
11	FB4	WATER	22-DEC-94	29-DEC-94	24-JAN-95	1.00

Parameter	Units	10	11
SURROGATES			
NITROBENZENE-D5	%	88	75
2-FLUOROBIPHENYL	%	91	77
TERPHENYL-D14	%	83	65
PHENOL-D6	%	96	105
2-FLUOROPHENOL	%	87	99
2,4,6-TRIBROMOPHENOL	%	89	113

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Blank I.D. : 33886
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP

ATI I.D. : 412316
Date Extracted: 29-DEC-94
Date Analyzed : 11-JAN-95
Dil. Factor : 1.00

Parameters	Units	Results
ANTHRACENE	UG/L	<10
N-NITROSODIMETHYLAMINE	UG/L	<15
BENZO(a)ANTHRACENE	UG/L	<10
BENZO(b)FLUORANTHENE	UG/L	<10
BENZO(k)FLUORANTHENE	UG/L	<10
ANILINE	UG/L	<10
BIS(2-CHLOROETHYL)ETHER	UG/L	<10
BENZO(a)PYRENE	UG/L	<10
BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	<10
2-CHLOROPHENOL	UG/L	<10
BUTYLBENZYLPHTHALATE	UG/L	<10
CHRYSENE	UG/L	<10
BENZYL ALCOHOL	UG/L	<10
DIBENZ(a,h)ACRIDINE	UG/L	<10
DIBENZ(a,h)ANTHRACENE	UG/L	<10
1,2-DICHLOROBENZENE	UG/L	<10
BIS(2-CHLOROISOPROPYL)ETHER	UG/L	<15
1,3-DICHLOROBENZENE	UG/L	<10
4-METHYLPHENOL	UG/L	<10
1,4-DICHLOROBENZENE	UG/L	<10
N-NITROSO-DI-N-PROPYLAMINE	UG/L	<15
DIETHYLPHTHALATE	UG/L	<10
7,12-DIMETHYLBENZO(a)ANTHRACENE	UG/L	<10
HEXACHLOROETHANE	UG/L	<10
DIMETHYLPHTHALATE	UG/L	<10
NITROBENZENE	UG/L	<10
ISOPHORONE	UG/L	<10
DI-N-BUTYLPHTHALATE	UG/L	<10
DI-N-OCTYLPHTHALATE	UG/L	<10
2-NITROPHENOL	UG/L	<10
BENZOIC ACID	UG/L	<50
BIS(2-CHLOROETHOXY)METHANE	UG/L	<10
2,4-DICHLOROPHENOL	UG/L	<10
FLUORANTHENE	UG/L	<10
1,2,4-TRICHLOROBENZENE	UG/L	<10
NAPHTHALENE	UG/L	<10
PHENANTHRENE	UG/L	<10
4-CHLOROANILINE	UG/L	<10
PYRENE	UG/L	<10
HEXACHLOROBUTADIENE	UG/L	<10
4-CHLORO-3-METHYLPHENOL	UG/L	<10
2-METHYLNAPHTHALENE	UG/L	<10
BENZENETHIOL	UG/L	<10
4-NITROPHENOL	UG/L	<50
2,4-DIMETHYLPHENOL	UG/L	<10
2,4-DINITROPHENOL	UG/L	<50

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Blank I.D. : 33886
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.
Project # : 441000
Project Name: GMP

ATI I.D. : 412316
Date Extracted: 29-DEC-94
Date Analyzed : 11-JAN-95
Dil. Factor : 1.00

Parameters	Units	Results
PHENOL	UG/L	<10
2-METHYLPHENOL	UG/L	<10
3- & 4-METHYLPHENOL	UG/L	<10
HEXACHLOROCYCLOPENTADIENE	UG/L	<10
2,4,6-TRICHLOROPHENOL	UG/L	<10
2,4,5-TRICHLOROPHENOL	UG/L	<50
2-CHLORONAPHTHALENE	UG/L	<10
2-NITROANILINE	UG/L	<50
ACENAPHTHYLENE	UG/L	<10
2,6-DINITROTOLUENE	UG/L	<10
3-NITROANILINE	UG/L	<50
ACENAPHTHENE	UG/L	<10
DIBENZOFURAN	UG/L	<10
2,4-DINITROTOLUENE	UG/L	<10
4-CHLOROPHENYL-PHENYLETHER	UG/L	<10
FLUORENE	UG/L	<10
4-NITROANILINE	UG/L	<50
2-METHYL-4,6-DINITROPHENOL	UG/L	<50
N-NITROSODIPHENYLAMINE	UG/L	<10
4-BROMOPHENYL-PHENYLETHER	UG/L	<10
HEXACHLOROBENZENE	UG/L	<10
PENTACHLOROPHENOL	UG/L	<50
3,3'-DICHLOROBENZIDINE	UG/L	<20
INDENO(1,2,3-cd)PYRENE	UG/L	<10
INDENE	UG/L	<10
1-METHYLNAPHTHALENE	UG/L	<10
PYRIDINE	UG/L	<50
QUINOLINE	UG/L	<50
6-METHYL CHRYSENE	UG/L	<10
BENZO(g,h,i)PERYLENE	UG/L	<10
SURROGATES		
NITROBENZENE-D5	%	79
2-FLUOROBIPHENYL	%	86
TERPHENYL-D14	%	69
PHENOL-D6	%	106
2-FLUOROPHENOL	%	101
2,4,6-TRIBROMOPHENOL	%	87

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

MSMSD

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
MSMSD # : 71735
Client : ENVIRONMENTAL TECHNOLOGIES INT'L, INC.

Project # : 441000
Project Name: GMP

ATI I.D. : 412316
Date Extracted: 29-DEC-94
Date Analyzed : 11-JAN-95
Sample Matrix : WATER
REF I.D. : REAGENT WATER

Parameters	Units	Sample Result	Conc Spike	Spiked Sample	% Rec	Dup Spike	Dup % Rec	RPD
2-CHLOROPHENOL	UG/L	<10	150	150	100	140	93	7
1,4-DICHLOROBENZENE	UG/L	<10	100	96	96	97	97	1
N-NITROSO-DI-N-PROPYLAMINE	UG/L	<10	100	88	88	90	90	2
1,2,4-TRICHLOROBENZENE	UG/L	<10	100	100	100	100	100	0
PYRENE	UG/L	<10	100	89	89	85	85	5
4-CHLORO-3-METHYLPHENOL	UG/L	<10	150	150	100	140	93	7
4-NITROPHENOL	UG/L	<50	100	190	190	150	150	24
PHENOL	UG/L	<10	100	150	150	130	130	14
ACENAPHTHENE	UG/L	<10	100	97	97	94	94	3
2,4-DINITROTOLUENE	UG/L	<10	100	84	84	82	82	2
PENTACHLOROPHENOL	UG/L	<50	150	180	120	120	80	40

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

AnalyticalTechnologies, Inc.

5550 MOREHOUSE DRIVE
SAN DIEGO, CA 92121-1709
(619) 458-9141

Chain of Custody

DATE 12/22/94 PAGE 1 OF 2

PROJECT MANAGER: Tony SHAN
COMPANY: BHP Hawaii
ADDRESS: 91-325 Komohana St.
Kapolei HI 96707

BILL TO: Tony Shan
COMPANY: BHP Hawaii
ADDRESS:

SAMPLERS: (Signature)
PHONE NUMBER: (808) 547-3804

Recommended Quantity and Preservative (Provide triple volume on QC Samples)

SAMPLE ID	SAMPLE DATE	TIME	MATRIX	LAB ID	Petroleum Hydrocarbons 418.1 (1L (H_2SO_4)/100g)	Oil and Grease 413.2 (1L (H_2SO_4)/100g)	Gasoline (MOD 8015/DOHS) (4 oz (HCl)/50g)	Diesel (MOD 8015/DOHS) (4 oz (HCl)/50g)	Gasoline/BTXE (MOD 8015/8020) Maximum Contamination Level of Gasoline:2ppm(water),50ppm(Soil) (2X40ml (HCl)/50g)	MOD 8015 (Unknown) (4 oz (HCl)/50g)	BTXE (8020) (2X40ml (HCl)/50g)	Chlorinated Hydrocarbons (8010) (2X40ml (HCl)/50g)	Aromatic Hydrocarbons (8020) (2X40ml (HCl)/50g)	Chlorinated/Aromatic Hydrocarbons (8010/8020) (2X40ml (HCl)/50g)	Organic Pb (500ml/50g)	Pesticides/PCB (8080) (1L/50g)	Base/Neu/Acid Cmpds GC/MS (8270) (1L/100g 2 x 1L)	Volatile Cmpds GC/MS (8240) (2X40ml (HCl)/100g)	Polynuclear Aromatic (8310) (1L/100g)	~~GCR~~ Metals (Total) (500ml/100g)	Priority Pollutant Metals (500ml/100g)	NO_3 - NO_2	General Chemistry	Total Hg	Number of Containers
HCW4A	12/22/94	9:15 am	H_2O	01													X	X		X		X	X	X		8
HCW4B	"	10:00	"	02													X	X		X		X	X	X		8
HCW4C	"	10:45	"	03													X	X		X		X	X	X		8
LCW4A	"	14:55	"	04													X	X		X		X	X	X		8
LCW4B	"	15:35	"	05													X	X		X		X	X	X		8
LCW4C	"	16:00	"	06													X	X		X		X	X	X		8

PROJECT INFORMATION		SAMPLE RECEIPT	
PROJECT NUMBER:	441000	TOTAL NUMBER OF CONTAINERS	30
PROJECT NAME:	GMP	CHAIN OF CUSTODY SEALS Y/N/NA	N
PURCHASE ORDER NUMBER:		SEALS INTACT? Y/N/NA	N/A
VIA:	DHL	RECEIVED GOOD COND./COLD	Y
TAT: ☐24HR ☐48HRS ☐72HRS ☐1WK ☒2WK		LAB NUMBER	412316

SAMPLE DISPOSAL INSTRUCTIONS

☐ ATI Disposal @ $5.00 each ☐ Return ☐ Pickup

Comments: General Chemistry = TDS, Alk, F, MBAS, SO_4, pH, EC, & Soluble F.

All VOCs are in Coolers "ATI 2031" 3°C, 2.0°C

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Zuyi Shen Time: 1705	Signature: Time: 18:00	Signature: Time:
Printed Name: Zuyi Shen Date: 12/22/94	Printed Name: Tony Shan Date: 12/22/94	Printed Name: Date:
Company: Dames & Moore	Company: BHP	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: (LAB) 3.**
Signature: Time: 17:10	Signature: Time:	Signature: Time:
Printed Name: Tony Shan Date: 12/22/94	Printed Name: Date:	Printed Name: Date:
Company: BHP	Company:	Analytical Technologies, Inc.

DISTRIBUTION: White, Canary - ANALYTICAL TECHNOLOGIES, INC. • Pink - ORIGINATOR

Analytical Technologies, Inc.

5550 MOREHOUSE DRIVE
SAN DIEGO, CA 92121-1709
(619) 458-9141

Chain of Custody

DATE 12/22/94 PAGE 2 OF 2

PROJECT MANAGER: Tony Shan
COMPANY: BHP Hawaii
ADDRESS: 91-325 Komohara St.
Kapolei, HI 96707

BILL TO: Tony Shan
COMPANY: BHP Hawaii
ADDRESS:

SAMPLERS: (Signature) _____ PHONE NUMBER (808) 547-3804

Recommended Quantity and Preservative (Provide triple volume on QC Samples)

SAMPLE ID	SAMPLE DATE	TIME	MATRIX	LAB ID	Petroleum Hydrocarbons 418.1 (1L (H_2SO_4)/100g)	Oil and Grease 413.2 (1L (H_2SO_4)/100g)	Gasoline (MOD 8015/DOHS) (4 oz (HCl)/50g)	Diesel (MOD 8015/DOHS) (4 oz (HCl)/50g)	Gasoline/BTXE (MOD 8015/8020) Maximum Contamination Level of Gasoline: 2ppm (water), 50ppm (Soil) (2X40ml (HCl)/50g)	MOD 8015 (Unknown) (4 oz (HCl)/50g)	BTXE (8020) (2X40ml (HCl)/50g)	Chlorinated Hydrocarbons (8010) (2X40ml (HCl)/50g)	Aromatic Hydrocarbons (8020) (2X40ml (HCl)/50g)	Chlorinated/Aromatic Hydrocarbons (8010/8020) (2X40ml (HCl)/50g)	Organic Pb (500ml/50g)	Pesticides/PCB (8080) (1L/50g)	Base/NEU/Acid Cmpds GC/MS (8270) (1L/100g 2X1L)	Volatile Cmpds GC/MS (8240) (2X40ml (HCl)/100g)	Polynuclear Aromatic (8310) (1L/100g)	CCR Metals (total) (500ml/100g)	Priority Pollutant Metals (500ml/100g)	NO_2-NO_3	General Chemistry	Total Hg	Dissolved metals	Number of Containers
HCW5A	12/22/94	9:05 am	H_2O	07													X	X		X		X	X	X	X	9
HCW5B	"	9:47 am	"	08													X	X		X		X	X	X	X	9
LCW5A	"	15:00	"	09													X	X		X		X	X	X	X	9
LCW5B	"	15:40	"	10													X	X		X		X	X	X	X	9
FB4	"	14:30	"	11													X	X		X		X	X	X		8
TB	"	N/A	"	2 ~~42~~														X								~~2~~ 6

PROJECT INFORMATION

PROJECT NUMBER: 441000
PROJECT NAME: GMP
PURCHASE ORDER NUMBER:
VIA: DHL
TAT: ☐24HR ☐48HRS ☐72HRS ☐1WK ☒2WK

SAMPLE RECEIPT

TOTAL NUMBER OF CONTAINERS	50
CHAIN OF CUSTODY SEALS Y/N/NA	N
SEALS INTACT? Y/N/NA	N/A
RECEIVED GOOD COND./COLD	Y
LAB NUMBER	412316

SAMPLE DISPOSAL INSTRUCTIONS

☐ ATI Disposal @ $5.00 each ☐ Return ☐ Pickup

Comments: General Chemistry = TDS, Alk, F, MBAS, SO_4, pH, EC, Cl, Soluble Fe.
All VOCs are in Cooler "ATI 2031" 3.0°C, 2.0°C

RELINQUISHED BY: 1.
Signature: Zuyi Shan Time: 1720
Printed Name: Zuyi Shan Date: 12/22/94
Company: Dames & Moore

RELINQUISHED BY: 2.
Signature: [signature] Time: 17:50
Printed Name: Tony Shan Date: 12/22/94
Company: BHP

RELINQUISHED BY: 3.
Signature: Time:
Printed Name: Date:
Company:

RECEIVED BY: 1.
Signature: [signature] Time: 17:35
Printed Name: Tony Shan Date: 12/22/94
Company: BHP

RECEIVED BY: 2.
Signature: Time:
Printed Name: Date:
Company:

RECEIVED BY: (LAB) 3.
Signature: [signature] Time: [illegible]
Printed Name: [illegible] Date: [illegible]
Analytical Technologies, Inc.

DISTRIBUTION: White, Canary - ANALYTICAL TECHNOLOGIES, INC. • Pink - ORIGINATOR

3. ANALYTICAL RESULTS OF DUPLICATE GROUNDWATER SAMPLES

WCAS
WEST COAST ANALYTICAL SERVICE, INC.
ANALYTICAL CHEMISTS

December 30, 1994

ENVIRONMENTAL TECHNOLOGIES INTERNATIONAL
91-325 Komohana Street
Kapolei, HI 96707

Attn: Tony Shan

JOB NO. 28321 S

LABORATORY REPORT

Samples Received: Eighteen (18) Water Samples
Date Received: 12-21-94
Project: #441000

The samples were analyzed as follows:

Samples Analyzed	Analysis	Page
Two (2) samples	Anions by EPA 300.0	3
Two (2) samples	Selected Metals by ICPMS	4 & 6
Two (2) samples	Soluble Iron by ICPMS	5 & 6
Two (2) samples	Alkalinity by SM 2320B	7 & 8
Two (2) samples	Conductivity by EPA 120.1	7
Two (2) samples	Total Dissolved Solids by EPA 160.0	7 & 9
Two (2) samples	pH by EPA 150.1	7
Two (2) samples	Surfactants by SM 5540C	7 & 8

D. J. Northington, Ph.D.
President

B. Michael Hovanec
Senior Staff Chemist

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9840 Alburtis Avenue ▪ Santa Fe Springs, California 90670 ▪ 310/948-2225 ▪ FAX 310/948-5850

WEST COAST ANALYTICAL SERVICE, INC.

ENVIRONMENTAL TECHNOLOGIES INTNL
Mr. Tony Shan

Job # 28321
December 30, 1994

LABORATORY REPORT

The samples were analyzed as follows:

Samples Analyzed	Analysis	Page
Three (3) samples	Volatile Organics by EPA 624	10 - 14
Two (2) samples	Semi-Volatile Organics by EPA 625	15 - 21

WEST COAST ANALYTICAL SERVICE, INC.

ENVIRONMENTAL TECHNOLOGIES INTERNATIONAL
Mr. Tony Shan

Job # 28321
December 30, 1994

LABORATORY REPORT

Anions by EPA 300.0

Parts Per Million (mg/l)

Analyte	HMW3D	LCW2C-D	Detection Limit
Chloride	1000	14000	2
Fluoride	ND	ND	2
Nitrite	ND	ND	2
Nitrate	ND	ND	2
Sulfate	1200	2400	2

Date Analyzed: 12-22-94

Matrix Spike/Matrix Spike Duplicate Recovery Summary

Sample: Batch QC
Units: ppm (mg/l)

Analyte	Sample Result	Amount Spiked	MS Result	% Rec MS	MSD Result	% Rec MSD	RPD
Chloride	900	10000	11700	108	11700	108	0
Fluoride	ND	10000	10200	102	10200	102	0
Nitrite	ND	10000	9980	100	10000	100	0
Nitrate	ND	10000	10000	100	10000	100	0
Sulfate	ND	10000	9990	100	10000	100	0

QC Limits

Analyte	RPD Control	% Recovery Warning		Control	
Chloride	10	73	111	63	121
Fluoride	17	74	122	63	133
Nitrite	15	80	114	72	123
Nitrate	11	77	116	67	126
Sulfate	9	77	112	68	120

WEST COAST ANALYTICAL SERVICE, INC.

ENVIRONMENTAL TECHNOLOGIES INTERNATIONAL
Mr. Tony Shan

Job # 28321
December 30, 1994

LABORATORY REPORT

Selected Total Metals
Quantitative Analysis Report
Inductively Coupled Plasma-Mass Spectrometry

Parts Per Billion (ug/l)

	LCW2C-D	HMW3D	Blank Detect. Limit
Antimony	ND<2	ND<2	2
Arsenic	ND<80	14	5
Barium	21	16.9	0.3
Beryllium	ND<7	ND<0.7	0.7
Cadmium	1.5	ND<0.1	0.1
Chromium	17	2	1
Cobalt	0.9	0.4	0.2
Iron	500	78	70
Lead	ND<0.4	ND<0.1	0.1
Mercury	ND<2	0.3	0.3
Nickel	ND<9	2.4	1
Selenium	80	ND<7	7
Vanadium	ND<100	ND<20	20

Date Analyzed: 12-27-94

WEST COAST ANALYTICAL SERVICE, INC.

ENVIRONMENTAL TECHNOLOGIES INTERNATIONAL
Mr. Tony Shan

Job # 28321
December 30, 1994

LABORATORY REPORT

Soluble Iron
Quantitative Analysis Report
Inductively Coupled Plasma-Mass Spectrometry

Parts Per Billion (ug/l)

	LCW2C-D	HMW3D	Blank DL
Iron	400	ND<60	60

Date Analyzed: 12-27-94

WCAS

WEST COAST ANALYTICAL SERVICE, INC.

ENVIRONMENTAL TECHNOLOGIES INTERNATIONAL
Mr. Tony Shan

Job # 28321
December 30, 1994

LABORATORY REPORT

Sample: HMW3D
Matrix: Water

Parts Per Billion (ug/l)

	Sample	Duplicate	RPD %	Spike Conc ppb	Spk Rslt	% Recovery	Blank Detect. Limit
Antimony	ND<2	ND<2		100	115	115	2
Arsenic	14	9		100	108	96.5	3
Barium	16.9	17.9	5.7	100	113	95.6	0.3
Beryllium	ND<0.7	ND<0.7		100	112	112	0.7
Cadmium	ND<0.1	0.12		100	80.4	80.3*	0.1
Chromium	2	2		100	97	95	1
Cobalt	0.4	0.4		100	95	94.6	0.2
Iron	78	ND<70		10000	9460	94.2	70
Lead	ND<0.1	ND<0.1		100	90.6	90.6	0.1
Mercury	0.3	0.3		10	17.1	168****	0.3
Nickel	2.4	2.2		100	98	95.7	1
Selenium	ND<7	10		1000	601	59.6*	7
Vanadium	ND<20	ND<20		100	113	113	20

Date Analyzed: 12-27-94
* - Exceeds Warning Limits
**** - Exceeds Control Limits

WCAS

WEST COAST ANALYTICAL SERVICE, INC.

ENVIRONMENTAL TECHNOLOGIES INTERNATIONAL
Mr. Tony Shan

Job # 28321
December 30, 1994

LABORATORY REPORT

Sample: HMW3D

Analyte	Result	Units	DL	Method	Date Analyzed
Alkalinity	730	mg CaCO3/l	2	SM 2320B	12/27/94
Conductivity	6300	umho/cm	1	EPA 120.1	12/27/94
Dissolved Solids	4200	mg/l	60	EPA 160.1	12/29/94
pH	8.1	units	--	EPA 150.1	12/27/94
Surfactants	1.7	mg/l	0.1	SM 5540C	12/29/94

Sample: LCW2C-D

Analyte	Result	Units	DL	Method	Date Analyzed
Alkalinity	200	mg CaCO3/l	2	SM 2320B	12/27/94
Conductivity	37000	umho/cm	1	EPA 120.1	12/27/94
Dissolved Solids	25000	mg/l	60	EPA 160.1	12/29/94
pH	7.8	units	--	EPA 150.1	12/27/94
Surfactants	0.7	mg/l	0.1	SM 5540C	12/29/94

WEST COAST ANALYTICAL SERVICE, INC.

ENVIRONMENTAL TECHNOLOGIES INTERNATIONAL
Mr. Tony Shan

Job # 28321
December 30, 1994

LABORATORY REPORT

Matrix Spike/Matrix Spike Duplicate Quality Control Summary

Sample: LCW2C-D

Analyte	Sample Result	Amount Spiked	MS Result	% Rec MS	MSD Result	% Rec MSD	RPD
SURFACTANTS	0.67	10	11	103	11	103	0

QC Limits

Analyte	RPD Warning	RPD Control	% Recovery Control
SURFACTANTS	15	25	50 - 150

Matrix Spike/Matrix Spike Duplicate Quality Control Summary

QC Batch: 122794W
Units: ppm

Analyte	Sample Result	Amount Spiked	MS Result	% Rec MS	MSD Result	% Rec MSD	RPD
ALKALINITY	330	530	820	92	820	92	0

QC Limits

Analyte	RPD Warning	RPD Control	% Recovery Control
ALKALINITY	4	6	48 - 142

WEST COAST ANALYTICAL SERVICE, INC.

ENVIRONMENTAL TECHNOLOGIES INTERNATIONAL
Mr. Tony Shan

Job # 28321
December 30, 1994

LABORATORY REPORT

Matrix Spike/Matrix Spike Duplicate Quality Control Summary

Sample: HMW3D

Analyte	Sample Result	Amount Spiked	MS Result	% Rec MS	MSD Result	% Rec MSD	RPD
TDS	4200	2000	6300	105	6400	110	2

QC Limits

Analyte	RPD Warning	RPD Control	% Recovery Control
TDS	9	13	89 - 111

WCAS

CLIENT: ENVIRONMENTAL TECHNOLOGIES SAMPLE: HMW3D
WCAS JOB #: 28321

VOLATILE ORGANICS BY EPA 624/8260

DATE RECEIVED: 12/21/94 MATRIX: WATER
DATE EXTRACTED: 12/22/94 SAMPLE AMOUNT: 5ML
DATE ANALYZED: 12/22/94 RUN NUMBER: 28321B2
INSTRUMENT ID: 4500 UNITS: UG/L (PPB)

CAS NO.	COMPOUND	CONCENTRATION	DET LIMIT
67-64-1	ACETONE	ND	5.
71-43-2	BENZENE	ND	1.
75-27-4	BROMODICHLOROMETHANE	ND	1.
75-25-2	BROMOFORM	ND	1.
74-83-9	BROMOMETHANE	ND	5.
78-93-3	2-BUTANONE (MEK)	ND	5.
75-15-0	CARBON DISULFIDE	ND	5.
56-23-5	CARBON TETRACHLORIDE	ND	1.
108-90-7	CHLOROBENZENE	ND	1.
75-00-3	CHLOROETHANE	ND	5.
67-66-3	CHLOROFORM	ND	1.
74-87-3	CHLOROMETHANE	ND	5.
108-41-8	CHLOROTOLUENE	ND	1.
124-48-1	DIBROMOCHLOROMETHANE	ND	1.
95-50-1	1,2-DICHLOROBENZENE	ND	1.
541-73-1	1,3-DICHLOROBENZENE	ND	1.
106-46-7	1,4-DICHLOROBENZENE	ND	1.
75-34-3	1,1-DICHLOROETHANE	ND	1.
107-06-2	1,2-DICHLOROETHANE	ND	1.
75-35-4	1,1-DICHLOROETHYLENE	ND	1.
156-59-4	CIS-1,2-DICHLOROETHYLENE	ND	1.
156-60-5	TRANS-1,2-DICHLOROETHYLENE	ND	1.
78-87-5	1,2-DICHLOROPROPANE	ND	1.
10061-01-5	CIS-1,3-DICHLOROPROPENE	ND	1.
10061-02-6	TRANS-1,3-DICHLOROPROPENE	ND	1.
100-41-4	ETHYLBENZENE	2.	1.
106-93-4	ETHYLENE DIBROMIDE	ND	1.
76-13-1	FREON-TF	ND	1.
119-78-6	2-HEXANONE	ND	5.
75-09-2	METHYLENE CHLORIDE	ND	5.
108-10-1	4-METHYL-2-PENTANONE (MIBK)	ND	5.
100-42-5	STYRENE	ND	1.
79-34-5	1,1,2,2-TETRACHLOROETHANE	ND	1.
127-18-4	TETRACHLOROETHYLENE	ND	1.
109-99-9	TETRAHYDROFURAN	ND	5.
108-88-3	TOLUENE	ND	1.
71-55-6	1,1,1-TRICHLOROETHANE	ND	1.
79-00-5	1,1,2-TRICHLOROETHANE	ND	1.
79-01-6	TRICHLOROETHYLENE	ND	1.
75-69-4	TRICHLOROFLUOROMETHANE	ND	1.
108-05-4	VINYL ACETATE	ND	5.
75-01-4	VINYL CHLORIDE	ND	5.
1330-20-7	TOTAL XYLENES	ND	1.

SURROGATE	1,2-DCA-d4	TOL-d8	BFB
PERCENT RECOVERY	95	99	97
CONTROL LIMITS	86-121	84-115	83-112

CLIENT: ENVIRONMENTAL TECHNOLOGIES SAMPLE: LCW2C-D
WCAS JOB #: 28321

VOLATILE ORGANICS BY EPA 624/8260

DATE RECEIVED: 12/21/94
DATE EXTRACTED: 12/22/94
DATE ANALYZED: 12/22/94
INSTRUMENT ID: 4500

MATRIX: WATER
SAMPLE AMOUNT: 5ML
RUN NUMBER: 28321B3
UNITS: UG/L (PPB)

CAS NO.	COMPOUND	CONCENTRATION		DET LIMIT
67-64-1	ACETONE	8.	B	5.
71-43-2	BENZENE	ND		1.
75-27-4	BROMODICHLOROMETHANE	ND		1.
75-25-2	BROMOFORM	ND		1.
74-83-9	BROMOMETHANE	ND		5.
78-93-3	2-BUTANONE (MEK)	ND		5.
75-15-0	CARBON DISULFIDE	ND		5.
56-23-5	CARBON TETRACHLORIDE	ND		1.
108-90-7	CHLOROBENZENE	ND		1.
75-00-3	CHLOROETHANE	ND		5.
67-66-3	CHLOROFORM	ND		1.
74-87-3	CHLOROMETHANE	ND		5.
108-41-8	CHLOROTOLUENE	ND		1.
124-48-1	DIBROMOCHLOROMETHANE	ND		1.
95-50-1	1,2-DICHLOROBENZENE	ND		1.
541-73-1	1,3-DICHLOROBENZENE	ND		1.
106-46-7	1,4-DICHLOROBENZENE	ND		1.
75-34-3	1,1-DICHLOROETHANE	ND		1.
107-06-2	1,2-DICHLOROETHANE	ND		1.
75-35-4	1,1-DICHLOROETHYLENE	ND		1.
156-59-4	CIS-1,2-DICHLOROETHYLENE	ND		1.
156-60-5	TRANS-1,2-DICHLOROETHYLENE	ND		1.
78-87-5	1,2-DICHLOROPROPANE	ND		1.
10061-01-5	CIS-1,3-DICHLOROPROPENE	ND		1.
10061-02-6	TRANS-1,3-DICHLOROPROPENE	ND		1.
100-41-4	ETHYLBENZENE	ND		1.
106-93-4	ETHYLENE DIBROMIDE	ND		1.
76-13-1	FREON-TF	ND		1.
119-78-6	2-HEXANONE	ND		5.
75-09-2	METHYLENE CHLORIDE	ND		5.
108-10-1	4-METHYL-2-PENTANONE (MIBK)	ND		5.
100-42-5	STYRENE	ND		1.
79-34-5	1,1,2,2-TETRACHLOROETHANE	ND		1.
127-18-4	TETRACHLOROETHYLENE	ND		1.
109-99-9	TETRAHYDROFURAN	ND		5.
108-88-3	TOLUENE	ND		1.
71-55-6	1,1,1-TRICHLOROETHANE	ND		1.
79-00-5	1,1,2-TRICHLOROETHANE	ND		1.
79-01-6	TRICHLOROETHYLENE	ND		1.
75-69-4	TRICHLOROFLUOROMETHANE	ND		1.
108-05-4	VINYL ACETATE	ND		5.
75-01-4	VINYL CHLORIDE	ND		5.
1330-20-7	TOTAL XYLENES	ND		1.

SURROGATE	1,2-DCA-d4	TOL-d8	BFB
PERCENT RECOVERY	103	98	93
CONTROL LIMITS	86-121	84-115	83-112

CLIENT: ENVIRONMENTAL TECHNOLOGIES SAMPLE: TB-W1
WCAS JOB #: 28321

VOLATILE ORGANICS BY EPA 624/8260

DATE RECEIVED:	12/21/94	MATRIX:	WATER
DATE EXTRACTED:	12/22/94	SAMPLE AMOUNT:	5ML
DATE ANALYZED:	12/22/94	RUN NUMBER:	28321B1
INSTRUMENT ID:	4500	UNITS:	UG/L (PPB)

CAS NO.	COMPOUND	CONCENTRATION		DET LIMIT
67-64-1	ACETONE	6.	B	5.
71-43-2	BENZENE	ND		1.
75-27-4	BROMODICHLOROMETHANE	ND		1.
75-25-2	BROMOFORM	ND		1.
74-83-9	BROMOMETHANE	ND		5.
78-93-3	2-BUTANONE (MEK)	ND		5.
75-15-0	CARBON DISULFIDE	ND		5.
56-23-5	CARBON TETRACHLORIDE	ND		1.
108-90-7	CHLOROBENZENE	ND		1.
75-00-3	CHLOROETHANE	ND		5.
67-66-3	CHLOROFORM	ND		1.
74-87-3	CHLOROMETHANE	ND		5.
108-41-8	CHLOROTOLUENE	ND		1.
124-48-1	DIBROMOCHLOROMETHANE	ND		1.
95-50-1	1,2-DICHLOROBENZENE	ND		1.
541-73-1	1,3-DICHLOROBENZENE	ND		1.
106-46-7	1,4-DICHLOROBENZENE	ND		1.
75-34-3	1,1-DICHLOROETHANE	ND		1.
107-06-2	1,2-DICHLOROETHANE	ND		1.
75-35-4	1,1-DICHLOROETHYLENE	ND		1.
156-59-4	CIS-1,2-DICHLOROETHYLENE	ND		1.
156-60-5	TRANS-1,2-DICHLOROETHYLENE	ND		1.
78-87-5	1,2-DICHLOROPROPANE	ND		1.
10061-01-5	CIS-1,3-DICHLOROPROPENE	ND		1.
10061-02-6	TRANS-1,3-DICHLOROPROPENE	ND		1.
100-41-4	ETHYLBENZENE	ND		1.
106-93-4	ETHYLENE DIBROMIDE	ND		1.
76-13-1	FREON-TF	ND		1.
119-78-6	2-HEXANONE	ND		5.
75-09-2	METHYLENE CHLORIDE	ND		5.
108-10-1	4-METHYL-2-PENTANONE (MIBK)	ND		5.
100-42-5	STYRENE	ND		1.
79-34-5	1,1,2,2-TETRACHLOROETHANE	ND		1.
127-18-4	TETRACHLOROETHYLENE	ND		1.
109-99-9	TETRAHYDROFURAN	ND		5.
108-88-3	TOLUENE	ND		1.
71-55-6	1,1,1-TRICHLOROETHANE	ND		1.
79-00-5	1,1,2-TRICHLOROETHANE	ND		1.
79-01-6	TRICHLOROETHYLENE	ND		1.
75-69-4	TRICHLOROFLUOROMETHANE	ND		1.
108-05-4	VINYL ACETATE	ND		5.
75-01-4	VINYL CHLORIDE	ND		5.
1330-20-7	TOTAL XYLENES	ND		1.

SURROGATE	1,2-DCA-d4	TOL-d8	BFB
PERCENT RECOVERY	95	100	92
CONTROL LIMITS	86-121	84-115	83-112

WCAS

CLIENT: ENVIRONMENTAL TECHNOLOGIES SAMPLE: LAB BLANK
WCAS JOB #: 28321

VOLATILE ORGANICS BY EPA 624/8260

DATE RECEIVED:	12/22/94	MATRIX:	WATER
DATE EXTRACTED:	12/22/94	SAMPLE AMOUNT:	5ML
DATE ANALYZED:	12/22/94	RUN NUMBER:	VBLK980
INSTRUMENT ID:	4500	UNITS:	UG/L (PPB)

CAS NO.	COMPOUND	CONCENTRATION	DET LIMIT
67-64-1	ACETONE	7.	5.
71-43-2	BENZENE	ND	1.
75-27-4	BROMODICHLOROMETHANE	ND	1.
75-25-2	BROMOFORM	ND	1.
74-83-9	BROMOMETHANE	ND	5.
78-93-3	2-BUTANONE (MEK)	ND	5.
75-15-0	CARBON DISULFIDE	ND	5.
56-23-5	CARBON TETRACHLORIDE	ND	1.
108-90-7	CHLOROBENZENE	ND	1.
75-00-3	CHLOROETHANE	ND	5.
67-66-3	CHLOROFORM	ND	1.
74-87-3	CHLOROMETHANE	ND	5.
108-41-8	CHLOROTOLUENE	ND	1.
124-48-1	DIBROMOCHLOROMETHANE	ND	1.
95-50-1	1,2-DICHLOROBENZENE	ND	1.
541-73-1	1,3-DICHLOROBENZENE	ND	1.
106-46-7	1,4-DICHLOROBENZENE	ND	1.
75-34-3	1,1-DICHLOROETHANE	ND	1.
107-06-2	1,2-DICHLOROETHANE	ND	1.
75-35-4	1,1-DICHLOROETHYLENE	ND	1.
156-59-4	CIS-1,2-DICHLOROETHYLENE	ND	1.
156-60-5	TRANS-1,2-DICHLOROETHYLENE	ND	1.
78-87-5	1,2-DICHLOROPROPANE	ND	1.
10061-01-5	CIS-1,3-DICHLOROPROPENE	ND	1.
10061-02-6	TRANS-1,3-DICHLOROPROPENE	ND	1.
100-41-4	ETHYLBENZENE	ND	1.
106-93-4	ETHYLENE DIBROMIDE	ND	1.
76-13-1	FREON-TF	ND	1.
119-78-6	2-HEXANONE	ND	5.
75-09-2	METHYLENE CHLORIDE	ND	5.
108-10-1	4-METHYL-2-PENTANONE (MIBK)	ND	5.
100-42-5	STYRENE	ND	1.
79-34-5	1,1,2,2-TETRACHLOROETHANE	ND	1.
127-18-4	TETRACHLOROETHYLENE	ND	1.
109-99-9	TETRAHYDROFURAN	ND	5.
108-88-3	TOLUENE	ND	1.
71-55-6	1,1,1-TRICHLOROETHANE	ND	1.
79-00-5	1,1,2-TRICHLOROETHANE	ND	1.
79-01-6	TRICHLOROETHYLENE	ND	1.
75-69-4	TRICHLOROFLUOROMETHANE	ND	1.
108-05-4	VINYL ACETATE	ND	5.
75-01-4	VINYL CHLORIDE	ND	5.
1330-20-7	TOTAL XYLENES	ND	1.

SURROGATE	1,2-DCA-d4	TOL-d8	BFB
PERCENT RECOVERY	95	98	93
CONTROL LIMITS	86-121	84-115	83-112

MATRIX SPIKE/MATRIX SPIKE DUPLICATE
PERCENT RECOVERY AND RPD SUMMARY

CLIENT:	ENVIRONMENTAL TECH	QC BATCH:	122294W
DATE ANALYZED:	12/22/94	MATRIX:	WATER
WCAS JOB #:	28321	UNITS:	UG/L (PPB)

VOLATILE COMPOUNDS

COMPOUND	CONC SPIKED	CONC SAMPLE	CONC MS	% REC MS	CONC MSD	% REC MSD	RPD
1,1-DICHLOROETHYLENE	49.9	ND	50.7	102	51.5	103	-2
TRICHLOROETHYLENE	50.3	ND	56.1	112	56.8	113	-1
CHLOROBENZENE	50.4	ND	53.6	106	54.4	108	-1
TOLUENE	49.9	ND	50.8	102	52.0	104	-2
BENZENE	49.8	ND	53.3	107	54.4	109	-2

WATER QUALITY CONTROL LIMITS

ANALYTE	% RECOVERY WARNING	% RECOVERY CONTROL	RPD WARNING	RPD CONTROL
1,1-DICHLOROETHYLENE	52-155	25-182	24	36
TRICHLOROETHYLENE	59-120	44-135	13	18
CHLOROBENZENE	82-109	75-115	10	14
TOLUENE	80-116	71-125	13	19
BENZENE	73-125	60-138	14	19

CLIENT: ENVIRONMENTAL TECHNOLOGIES SAMPLE: HMW3D
WCAS JOB #: 28321

SEMI-VOLATILE ORGANICS (EPA 625/8270)

DATE RECEIVED:	12/21/94	MATRIX:	WATER
DATE EXTRACTED:	12/22/94	SAMPLE AMOUNT:	1L:1ML
DATE ANALYZED:	12/23/94	RUN NUMBER:	28321A4
INSTRUMENT ID:	TRIO1000	UNITS:	UG/L (PPB)

CAS #	COMPOUND	CONCENTRATION	DET LIMIT
83-32-9	ACENAPHTHENE	ND	1.
208-96-8	ACENAPHTHYLENE	ND	1.
120-12-7	ANTHRACENE	ND	1.
56-55-3	BENZO(A)ANTHRACENE	ND	1.
205-99-2	BENZO(B & K)FLUORANTHENES	ND	1.
191-24-2	BENZO(G,H,I)PERYLENE	ND	1.
50-32-8	BENZO(A)PYRENE	ND	1.
65-85-0	BENZOIC ACID	ND	5.
100-51-6	BENZYL ALCOHOL	ND	5.
111-91-1	BIS(2-CHLOROETHOXY)METHANE	ND	1.
11-44-1	BIS(2-CHLOROETHYL)ETHER	ND	1.
39638-32-9	BIS(2-CHLOROISOPROPYL)ETHER	ND	1.
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	1.	1.
101-55-3	4-BROMOPHENYL PHENYL ETHER	ND	1.
85-68-7	BUTYL BENZYL PHTHALATE	ND	1.
106-47-8	4-CHLOROANILINE	ND	1.
59-50-7	4-CHLORO-3-METHYLPHENOL	ND	1.
91-58-71	2-CHLORONAPHTHALENE	ND	1.
95-57-8	2-CHLOROPHENOL	ND	1.
7005-72-3	4-CHLOROPHENYL PHENYL ETHER	ND	1.
218-01-9	CHRYSENE	ND	1.
53-70-3	DIBENZO(A,H)ANTHRACENE	ND	1.
132-64-9	DIBENZOFURAN	ND	1.
84-74-2	DI-N-BUTYL PHTHALATE	ND	1.
95-50-1	1,2-DICHLOROBENZENE	ND	1.
541-73-1	1,3-DICHLOROBENZENE	ND	1.
106-46-7	1,4-DICHLOROBENZENE	ND	1.
91-94-1	3,3'-DICHLOROBENZIDINE	ND	1.
120-33-2	2,4-DICHLOROPHENOL	ND	1.
84-66-2	DIETHYL PHTHALATE	ND	1.
105-67-9	2,4-DIMETHYLPHENOL	ND	1.
131-11-3	DIMETHYL PHTHALATE	ND	1.
534-52-1	4,6-DINITRO-2-METHYLPHENOL	ND	5.
51-28-5	2,4-DINITROPHENOL	ND	5.
121-14-2	2,4-DINITROTOLUENE	ND	1.
606-20-2	2,6-DINITROTOLUENE	ND	1.
117-84-0	DI-N-OCTYL PHTHALATE	ND	1.
204-44-0	FLUORANTHENE	ND	1.
86-73-7	FLUORENE	3.	1.
118-74-1	HEXACHLOROBENZENE	ND	1.
87-68-3	HEXACHLOROBUTADIENE	ND	1.

CLIENT: ENVIRONMENTAL TECHNOLOGIES SAMPLE: HMW3D
WCAS JOB #: 28321

SEMI-VOLATILE ORGANICS (EPA 625/8270)

DATE RECEIVED:	12/21/94	MATRIX:	WATER
DATE EXTRACTED:	12/22/94	SAMPLE AMOUNT:	1L:1ML
DATE ANALYZED:	12/23/94	RUN NUMBER:	28321A4
INSTRUMENT ID:	TRIO1000	UNITS:	UG/L (PPB)

CAS #	COMPOUND	CONCENTRATION	DET LIMIT
77-47-4	HEXACHLOROCYCLOPENTADIENE	ND	1.
67-72-1	HEXACHLOROETHANE	ND	1.
193-39-5	INDENO(1,2,3-CD)PYRENE	ND	1.
78-59-1	ISOPHORONE	ND	1.
91-57-6	2-METHYLNAPHTHALENE	3.	1.
95-48-7	2-METHYLPHENOL	ND	1.
106-44-5	4-METHYLPHENOL	ND	1.
91-20-3	NAPHTHALENE	26.	1.
88-74-4	2-NITROANILINE	ND	5.
99-09-2	3-NITROANILINE	ND	5.
100-01-6	4-NITROANILINE	ND	5.
98-95-3	NITROBENZENE	ND	1.
88-75-5	2-NITROPHENOL	ND	1.
100-02-7	4-NITROPHENOL	ND	5.
86-30-6	N-NITROSODIPHENYLAMINE **	ND	1.
621-64-7	N-NITROSODIPROPYLAMINE	ND	1.
87-86-5	PENTACHLOROPHENOL	ND	5.
85-01-8	PHENANTHRENE	ND	1.
108-95-2	PHENOL	ND	1.
129-00-0	PYRENE	ND	1.
120-82-1	1,2,4-TRICHLOROBENZENE	ND	1.
95-95-4	2,4,5-TRICHLOROPHENOL	ND	5.
88-06-2	2,4,6-TRICHLOROPHENOL	ND	1.

** - Cannot be separated from diphenylamine

SURROGATE	PERCENT RECOVERY	CONTROL LIMIT
PHENOL-d5	72	19-139
2-FLUOROPHENOL	74	21-154
NITROBENZENE-d5	71	35-114
2-FLUOROBIPHENYL	78	43-116
2,4,6-TRIBROMOPHENOL	97	10-123
TERPHENYL-d14	124	44-141

CLIENT: ENVIRONMENTAL TECHNOLOGIES SAMPLE: LCW2C-D
WCAS JOB #: 28321

SEMI-VOLATILE ORGANICS (EPA 625/8270)

DATE RECEIVED: 12/21/94
DATE EXTRACTED: 12/22/94
DATE ANALYZED: 12/23/94
INSTRUMENT ID: TRIO1000

MATRIX: WATER
SAMPLE AMOUNT: 980ML:1ML
RUN NUMBER: 28321A3
UNITS: UG/L (PPB)

CAS #	COMPOUND	CONCENTRATION	DET LIMIT
83-32-9	ACENAPHTHENE	ND	1.
208-96-8	ACENAPHTHYLENE	ND	1.
120-12-7	ANTHRACENE	ND	1.
56-55-3	BENZO(A)ANTHRACENE	ND	1.
205-99-2	BENZO(B & K)FLUORANTHENES	ND	1.
191-24-2	BENZO(G,H,I)PERYLENE	ND	1.
50-32-8	BENZO(A)PYRENE	ND	1.
65-85-0	BENZOIC ACID	ND	5.
100-51-6	BENZYL ALCOHOL	ND	5.
111-91-1	BIS(2-CHLOROETHOXY)METHANE	ND	1.
11-44-1	BIS(2-CHLOROETHYL)ETHER	ND	1.
39638-32-9	BIS(2-CHLOROISOPROPYL)ETHER	ND	1.
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	3.	1.
101-55-3	4-BROMOPHENYL PHENYL ETHER	ND	1.
85-68-7	BUTYL BENZYL PHTHALATE	ND	1.
106-47-8	4-CHLOROANILINE	ND	1.
59-50-7	4-CHLORO-3-METHYLPHENOL	ND	1.
91-58-71	2-CHLORONAPHTHALENE	ND	1.
95-57-8	2-CHLOROPHENOL	ND	1.
7005-72-3	4-CHLOROPHENYL PHENYL ETHER	ND	1.
218-01-9	CHRYSENE	ND	1.
53-70-3	DIBENZO(A,H)ANTHRACENE	ND	1.
132-64-9	DIBENZOFURAN	ND	1.
84-74-2	DI-N-BUTYL PHTHALATE	ND	1.
95-50-1	1,2-DICHLOROBENZENE	ND	1.
541-73-1	1,3-DICHLOROBENZENE	ND	1.
106-46-7	1,4-DICHLOROBENZENE	ND	1.
91-94-1	3,3'-DICHLOROBENZIDINE	ND	1.
120-33-2	2,4-DICHLOROPHENOL	ND	1.
84-66-2	DIETHYL PHTHALATE	ND	1.
105-67-9	2,4-DIMETHYLPHENOL	ND	1.
131-11-3	DIMETHYL PHTHALATE	ND	1.
534-52-1	4,6-DINITRO-2-METHYLPHENOL	ND	5.
51-28-5	2,4-DINITROPHENOL	ND	5.
121-14-2	2,4-DINITROTOLUENE	ND	1.
606-20-2	2,6-DINITROTOLUENE	ND	1.
117-84-0	DI-N-OCTYL PHTHALATE	ND	1.
204-44-0	FLUORANTHENE	ND	1.
86-73-7	FLUORENE	ND	1.
118-74-1	HEXACHLOROBENZENE	ND	1.
87-68-3	HEXACHLOROBUTADIENE	ND	1.

CLIENT: ENVIRONMENTAL TECHNOLOGIES SAMPLE: LCW2C-D
WCAS JOB #: 28321

SEMI-VOLATILE ORGANICS (EPA 625/8270)

DATE RECEIVED:	12/21/94	MATRIX:	WATER
DATE EXTRACTED:	12/22/94	SAMPLE AMOUNT:	980ML:1ML
DATE ANALYZED:	12/23/94	RUN NUMBER:	28321A3
INSTRUMENT ID:	TRIO1000	UNITS:	UG/L (PPB)

CAS #	COMPOUND	CONCENTRATION	DET LIMIT
77-47-4	HEXACHLOROCYCLOPENTADIENE	ND	1.
67-72-1	HEXACHLOROETHANE	ND	1.
193-39-5	INDENO(1,2,3-CD)PYRENE	ND	1.
78-59-1	ISOPHORONE	ND	1.
91-57-6	2-METHYLNAPHTHALENE	ND	1.
95-48-7	2-METHYLPHENOL	ND	1.
106-44-5	4-METHYLPHENOL	ND	1.
91-20-3	NAPHTHALENE	ND	1.
88-74-4	2-NITROANILINE	ND	5.
99-09-2	3-NITROANILINE	ND	5.
100-01-6	4-NITROANILINE	ND	5.
98-95-3	NITROBENZENE	ND	1.
88-75-5	2-NITROPHENOL	ND	1.
100-02-7	4-NITROPHENOL	ND	5.
86-30-6	N-NITROSODIPHENYLAMINE **	ND	1.
621-64-7	N-NITROSODIPROPYLAMINE	ND	1.
87-86-5	PENTACHLOROPHENOL	ND	5.
85-01-8	PHENANTHRENE	ND	1.
108-95-2	PHENOL	ND	1.
129-00-0	PYRENE	ND	1.
120-82-1	1,2,4-TRICHLOROBENZENE	ND	1.
95-95-4	2,4,5-TRICHLOROPHENOL	ND	5.
88-06-2	2,4,6-TRICHLOROPHENOL	ND	1.

** - Cannot be separated from diphenylamine

SURROGATE	PERCENT RECOVERY	CONTROL LIMIT
PHENOL-d5	66	19-139
2-FLUOROPHENOL	70	21-154
NITROBENZENE-d5	73	35-114
2-FLUOROBIPHENYL	74	43-116
2,4,6-TRIBROMOPHENOL	102	10-123
TERPHENYL-d14	97	44-141

CLIENT: ENVIRONMENTAL TECHNOLOGIES SAMPLE: METHOD BLANK
WCAS JOB #: 28321

SEMI-VOLATILE ORGANICS (EPA 625/8270)

DATE RECEIVED:	12/22/94	MATRIX:	WATER
DATE EXTRACTED:	12/22/94	SAMPLE AMOUNT:	1L:1ML
DATE ANALYZED:	12/23/94	RUN NUMBER:	28321AA1
INSTRUMENT ID:	TRIO1000	UNITS:	UG/L (PPB)

CAS #	COMPOUND	CONCENTRATION	DET LIMIT
83-32-9	ACENAPHTHENE	ND	1.
208-96-8	ACENAPHTHYLENE	ND	1.
120-12-7	ANTHRACENE	ND	1.
56-55-3	BENZO(A)ANTHRACENE	ND	1.
205-99-2	BENZO(B & K)FLUORANTHENES	ND	1.
191-24-2	BENZO(G,H,I)PERYLENE	ND	1.
50-32-8	BENZO(A)PYRENE	ND	1.
65-85-0	BENZOIC ACID	ND	5.
100-51-6	BENZYL ALCOHOL	ND	5.
111-91-1	BIS(2-CHLOROETHOXY)METHANE	ND	1.
11-44-1	BIS(2-CHLOROETHYL)ETHER	ND	1.
39638-32-9	BIS(2-CHLOROISOPROPYL)ETHER	ND	1.
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	ND	1.
101-55-3	4-BROMOPHENYL PHENYL ETHER	ND	1.
85-68-7	BUTYL BENZYL PHTHALATE	ND	1.
106-47-8	4-CHLOROANILINE	ND	1.
59-50-7	4-CHLORO-3-METHYLPHENOL	ND	1.
91-58-71	2-CHLORONAPHTHALENE	ND	1.
95-57-8	2-CHLOROPHENOL	ND	1.
7005-72-3	4-CHLOROPHENYL PHENYL ETHER	ND	1.
218-01-9	CHRYSENE	ND	1.
53-70-3	DIBENZO(A,H)ANTHRACENE	ND	1.
132-64-9	DIBENZOFURAN	ND	1.
84-74-2	DI-N-BUTYL PHTHALATE	ND	1.
95-50-1	1,2-DICHLOROBENZENE	ND	1.
541-73-1	1,3-DICHLOROBENZENE	ND	1.
106-46-7	1,4-DICHLOROBENZENE	ND	1.
91-94-1	3,3'-DICHLOROBENZIDINE	ND	1.
120-33-2	2,4-DICHLOROPHENOL	ND	1.
84-66-2	DIETHYL PHTHALATE	ND	1.
105-67-9	2,4-DIMETHYLPHENOL	ND	1.
131-11-3	DIMETHYL PHTHALATE	ND	1.
534-52-1	4,6-DINITRO-2-METHYLPHENOL	ND	5.
51-28-5	2,4-DINITROPHENOL	ND	5.
121-14-2	2,4-DINITROTOLUENE	ND	1.
606-20-2	2,6-DINITROTOLUENE	ND	1.
117-84-0	DI-N-OCTYL PHTHALATE	ND	1.
204-44-0	FLUORANTHENE	ND	1.
86-73-7	FLUORENE	ND	1.
118-74-1	HEXACHLOROBENZENE	ND	1.
87-68-3	HEXACHLOROBUTADIENE	ND	1.

CLIENT: ENVIRONMENTAL TECHNOLOGIES SAMPLE: METHOD BLANK
WCAS JOB #: 28321

SEMI-VOLATILE ORGANICS (EPA 625/8270)

DATE RECEIVED:	12/22/94	MATRIX:	WATER
DATE EXTRACTED:	12/22/94	SAMPLE AMOUNT:	1L:1ML
DATE ANALYZED:	12/23/94	RUN NUMBER:	28321AA1
INSTRUMENT ID:	TRIO1000	UNITS:	UG/L (PPB)

CAS #	COMPOUND	CONCENTRATION	DET LIMIT
77-47-4	HEXACHLOROCYCLOPENTADIENE	ND	1.
67-72-1	HEXACHLOROETHANE	ND	1.
193-39-5	INDENO(1,2,3-CD)PYRENE	ND	1.
78-59-1	ISOPHORONE	ND	1.
91-57-6	2-METHYLNAPHTHALENE	ND	1.
95-48-7	2-METHYLPHENOL	ND	1.
106-44-5	4-METHYLPHENOL	ND	1.
91-20-3	NAPHTHALENE	ND	1.
88-74-4	2-NITROANILINE	ND	5.
99-09-2	3-NITROANILINE	ND	5.
100-01-6	4-NITROANILINE	ND	5.
98-95-3	NITROBENZENE	ND	1.
88-75-5	2-NITROPHENOL	ND	1.
100-02-7	4-NITROPHENOL	ND	5.
86-30-6	N-NITROSODIPHENYLAMINE **	ND	1.
621-64-7	N-NITROSODIPROPYLAMINE	ND	1.
87-86-5	PENTACHLOROPHENOL	ND	5.
85-01-8	PHENANTHRENE	ND	1.
108-95-2	PHENOL	ND	1.
129-00-0	PYRENE	ND	1.
120-82-1	1,2,4-TRICHLOROBENZENE	ND	1.
95-95-4	2,4,5-TRICHLOROPHENOL	ND	5.
88-06-2	2,4,6-TRICHLOROPHENOL	ND	1.

** - Cannot be separated from diphenylamine

SURROGATE	PERCENT RECOVERY	CONTROL LIMIT
PHENOL-d5	61	19-139
2-FLUOROPHENOL	62	21-154
NITROBENZENE-d5	69	35-114
2-FLUOROBIPHENYL	70	43-116
2,4,6-TRIBROMOPHENOL	85	10-123
TERPHENYL-d14	92	44-141

WEST COAST ANALYTICAL SERVICE

MATRIX SPIKE (MS AND MSD)
% RECOVERY AND RPD SUMMARY

CLIENT : ENVIRONMENTAL TECH
DATE ANALYZED: 12/23/94
WCAS JOB # : 28321

QC BATCH #: 122094L
MATRIX : LIQUID
UNITS : UG/L (PPB)

SEMI-VOLATILE COMPOUNDS

COMPOUND	CONC SPIKED	CONC SAMPLE	CONC MS	%REC MS	CONC MSD	%REC MSD	RPD
1,2,4-TRICHLOROBENZE	500.	ND	342.	68	353.	71	-3
ACENAPHTHENE	500.	ND	401.	80	388.	78	3
2,4-DINITROTOLUENE	500.	ND	329.	66	318.	64	3
PYRENE	500.	ND	488.	98	492.	98	-1
NITROSOPROPYLAMINE	500.	ND	411.	82	400.	80	3
1,4-DICHLOROBENZENE	500.	ND	280.	56	295.	59	-5
PENTACHLOROPHENOL	750.	ND	722.	96	667.	89	8
PHENOL	750.	ND	549.	73	506.	67	8
2-CHLOROPHENOL	750.	ND	692.	92	647.	86	7
P-CHLORO-M-CRESOL	750.	ND	684.	91	644.	86	6
4-NITROPHENOL	750.	ND	915.	122*	858.	114*	6

* - Asterisked Values Are Outside Warning Limits

WATER QUALITY CONTROL LIMITS

	% RECOVERY		RPD	
	WARNING	CONTROL	WARNING	CONTROL
1,2,4-TRICHLOROBENZENE	43- 87	32- 98	21	31
ACENAPHTHENE	54-114	39-129	10	17
2,4-DINITROTOLUENE	51-109	36-124	11	18
PYRENE	56-144	34-166	19	29
NITROSOPROPYLAMINE	47- 96	35-108	14	24
1,4-DICHLOROBENZENE	41- 75	32- 84	23	34
PENTACHLOROPHENOL	20-176	0-215	24	36
PHENOL	55-100	42-113	13	21
2-CHLOROPHENOL	60-114	46-128	10	17
P-CHLORO-M-CRESOL	51- 96	38-110	12	20
4-NITROPHENOL	25-103	6-123	25	38

BHP

CHAIN OF CUSTODY

Environmental Technologies International, Inc.
~~Mauka Tower 737 Bishop Street, 22nd Floor~~
P.O. Box 3379 Honolulu, HI 96842
(808) 547-~~3600~~ 3504 Facsimile: (808) 547-3033

PROJECT NO: 941000
ET CLIENT:

SEND RESULTS TO		SEND INVOICE TO	
Name	TONY SHAN	Name	TONY SHAN
Company	BHP Petroleum	Company	BHP PETROLEUM
Address	91-325 Komohana St	Address	
City, State, Zip	Kapolei, HI 96707	City, State, Zip	

Sample No.	Lab No.	No. Containers	Date	Time	Sample Type/Description	Analysis Required	Sampled By
HMW 3D		8	12/19/94	10:57 am	Groundwater	8240 (volatiles)	
LCW2C-D		8	12/20/94	15:45 pm	Groundwater	8270 (semi volatiles)	
						Total Metals (Sb, As, Ba, Be, Cd, Cr, Pb, Hg, Ni, Se, Va, Fe)	
						TDS, Alkalinity,	
						Fluoride, MBAS,	
						Sulfate, pH, EC,	
						Chloride, Nitrate-Nitrite,	
						Soluble Iron	
[illegible]		2x	[illegible]	[illegible]	[illegible]	8240 (volatiles)	

CUSTODY TRANSFERS

	RELINQUISHED BY: (NAME, SIGNATURE)	DATE	TIME	RECEIVED BY: (NAME, SIGNATURE)	DATE	TIME	COMMENTS
1	Jay Slivkoff	12/19/94	1700	Tony Shan	12/19	5:30 pm	
2	Tony Shan	[illegible]					
3	Tony Shan	12/20/94	18:00	Tony Shan	12/20	18:00 pm	
4	Tony Shan	12/20/94	19:30				

SHIPPING DETAILS

DELIVERED TO SHIPPER BY: Tony Sh
METHOD OF SHIPMENT:
RECEIVED FOR LAB: SIGNED
SAMPLE CONDITION UPON RECEIPT:

DATE 12/20/94 TIME 19:30
AIRBILL #
DATE TIME

WHITE - CUSTODY SHEET YELLOW - LAB PINK - ET

WCAS
WEST COAST ANALYTICAL SERVICE, INC.
ANALYTICAL CHEMISTS

December 30, 1994

ENVIRONMENTAL TECHNOLOGIES INTERNATIONAL
91-325 Komohana Street
Kapolei, HI 96707

Attn: Tony Shan

JOB NO. 28338 S

LABORATORY REPORT

Samples Received: Three (3) Samples in Thirty-four (34) Bottles
Date Received: 12-23-94
Project: #441000

The samples were analyzed as follows:

Samples Analyzed	Analysis	Page
Three (3) samples	Anions by EPA 300.0	3
Two (2) samples	Selected Metals by ICPMS	4 & 6
Three (3) samples	Soluble Iron by ICPMS	5 - 6
Three (3) samples	Alkalinity by SM 2320B	7 - 8
Three (3) samples	Conductivity by EPA 120.1	7
Three (3) samples	Total Dissolved Solids by EPA 160.1	7 - 8
Three (3) samples	pH by EPA 150.1	7
Three (3) samples	Surfactants by SM 5540C	7 - 8

Michael Shelton
Technical Director

D. J. Northington, Ph.D.
President

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9840 Alburtis Avenue • Santa Fe Springs, California 90670 • 310/948-2225 • FAX 310/948-5850

LABORATORY REPORT

Samples Analyzed	Analysis	Page
Two (2) samples	Volatile Organics by EPA 624	9 - 12
Two (2) samples	Semi-Volatile Organics by EPA 625	13 - 19

WEST COAST ANALYTICAL SERVICE, INC.

ENVIRONMENTAL TECHNOLOGIES INTERNATIONAL
Mr. Tony Shan

Job # 28338
December 30, 1994

LABORATORY REPORT

Anions by EPA 300.0

Parts Per Million (mg/l)

Analyte	HCW3CD	HCW5AD	LCW4AD	Detection Limit
Chloride	1500	1900	2800	2
Fluoride	ND	ND	ND	2
Nitrite	ND	ND	ND	2
Nitrate	26	9	7	2
Sulfate	2000	85	650	2

Date Analyzed: 12-22-94

Matrix Spike/Matrix Spike Duplicate Recovery Summary

Sample: Batch QC
Units: ppm (mg/l)

Analyte	Sample Result	Amount Spiked	MS Result	% Rec MS	MSD Result	% Rec MSD	RPD
Chloride	13	100	118	105	125	112 **	6
Fluoride	27	100	137	110	142	115	4
Nitrite	ND	100	95	95	96	96	1
Nitrate	ND	100	98	98	102	102	4
Sulfate	3.6	100	107	103	103	99	4

** - Result is outside warning limits.

QC Limits

Analyte	RPD Control	% Recovery Warning		Control	
Chloride	10	73	111	63	121
Fluoride	17	74	122	63	133
Nitrite	15	80	114	72	123
Nitrate	11	77	116	67	126
Sulfate	9	77	112	68	120

WEST COAST ANALYTICAL SERVICE, INC.

ENVIRONMENTAL TECHNOLOGIES INTERNATIONAL
Mr. Tony Shan

Job # 28338
December 30, 1994

LABORATORY REPORT

Selected Total Metals
Quantitative Analysis Report
Inductively Coupled Plasma-Mass Spectrometry

Parts Per Billion (ug/l)

	HCW3CD	HCW5AD	Blank DL
Antimony	4.6	ND<0.5	0.5
Arsenic	12.7	7.88	0.1
Barium	46	54	6
Beryllium	ND<5	ND<5	5
Cadmium	ND<0.2	0.3	0.2
Chromium	ND<0.8	0.9	0.8
Cobalt	1.3	0.9	0.2
Iron	126	109	20
Lead	0.32	ND<0.1	0.1
Mercury	0.2	0.2	0.1
Nickel	22.6	4	1
Selenium	15	18	8
Vanadium	104	ND<10	10

Date Analyzed: 12-27-94

WEST COAST ANALYTICAL SERVICE, INC.

ENVIRONMENTAL TECHNOLOGIES INTERNATIONAL
Mr. Tony Shan

Job # 28338
December 30, 1994

LABORATORY REPORT

Soluble Iron
Quantitative Analysis Report
Inductively Coupled Plasma-Mass Spectrometry

Parts Per Billion (ug/l)

	HCW3CD	HCW5AD	LCW4AD	Blank DL
Iron	100	50	70	40

Date Analyzed: 12-27-94

WEST COAST ANALYTICAL SERVICE, INC.

ENVIRONMENTAL TECHNOLOGIES INTERNATIONAL
Mr. Tony Shan

Job # 28338
December 30, 1994

LABORATORY REPORT

Sample: Batch QC
Matrix: Water

Parts Per Billion (ug/l)

	Sample	Duplicate	RPD %	Spike Conc ppb	Spk Rslt	% Recovery	Blank Detect. Limit
Antimony	ND<2	ND<2		100	115	115	2
Arsenic	14	9		100	108	96.5	3
Barium	16.9	17.9	5.7	100	113	95.6	0.3
Beryllium	ND<0.7	ND<0.7		100	112	112	0.7
Cadmium	ND<0.1	0.12		100	80.4	80.3*	0.1
Chromium	2	2		100	97	95	1
Cobalt	0.4	0.4		100	95	94.6	0.2
Iron	78	ND<70		10000	9460	94.2	70
Lead	ND<0.1	ND<0.1		100	90.6	90.6	0.1
Mercury	0.3	0.3		10	17.1	168****	0.3
Nickel	2.4	2.2		100	98	95.7	1
Selenium	ND<7	10		1000	601	59.6*	7
Vanadium	ND<20	ND<20		100	113	113	20

Date Analyzed: 12-27-94

* - Exceeds Warning Limits

**** - Exceeds Control Limits

WEST COAST ANALYTICAL SERVICE, INC.

ENVIRONMENTAL TECHNOLOGIES INTERNATIONAL
Mr. Tony Shan

Job # 28338
December 30, 1994

LABORATORY REPORT

Sample: HCW3CD

Analyte	Result	Units	DL	Method	Date Analyzed
Alkalinity	330	mg CaCO3/	2	SM 2320B	12/27/94
Conductivity	5500	umho/cm	1	EPA 120.1	12/27/94
Dissolved Solids	4100	mg/l	60	EPA 160.1	12/29/94
pH	8.4	units	--	EPA 150.1	12/27/94
Surfactants	1.8	mg/l	0.1	SM 5540C	12/29/94

Sample: HCW5AD

Analyte	Result	Units	DL	Method	Date Analyzed
Alkalinity	550	mg CaCO3/	2	SM 2320B	12/27/94
Conductivity	4400	umho/cm	1	EPA 120.1	12/27/94
Dissolved Solids	2500	mg/l	60	EPA 160.1	12/29/94
pH	7.3	units	--	EPA 150.1	12/27/94
Surfactants	0.7	mg/l	0.1	SM 5540C	12/29/94

Sample: LCW4AD

Analyte	Result	Units	DL	Method	Date Analyzed
Alkalinity	660	mg CaCO3/	2	SM 2320B	12/27/94
Conductivity	8100	umho/cm	1	EPA 120.1	12/27/94
Dissolved Solids	5200	mg/l	60	EPA 160.1	12/29/94
pH	8.0	units	--	EPA 150.1	12/27/94
Surfactants	4.3	mg/l	0.1	SM 5540C	12/29/94

WEST COAST ANALYTICAL SERVICE, INC.

ENVIRONMENTAL TECHNOLOGIES INTERNATIONAL
Mr. Tony Shan

Job # 28338
December 30, 1994

LABORATORY REPORT

Matrix Spike/Matrix Spike Duplicate Quality Control Summary

QC Batch: 122994W

Analyte	Sample Result	Amount Spiked	MS Result	% Rec MS	MSD Result	% Rec MSD	RPD
SURFACTANTS	0.67	10	11	103	11	103	0
TDS	4200	2000	6300	105	6400	110	2

QC Limits

Analyte	RPD Warning	RPD Control	% Recovery Control
SURFACTANTS	15	25	50 - 150
TDS	9	13	89 - 111

Matrix Spike/Matrix Spike Duplicate Quality Control Summary

Sample: HCW3CD
Units: ppm

Analyte	Sample Result	Amount Spiked	MS Result	% Rec MS	MSD Result	% Rec MSD	RPD
ALKALINITY	330	530	820	92	820	92	0

QC Limits

Analyte	RPD Warning	RPD Control	% Recovery Control
ALKALINITY	4	6	48 - 142

WCAS

CLIENT: ENVIRONMENTAL TECHNOLOGIES SAMPLE: HCW3CD
WCAS JOB #: 28338

VOLATILE ORGANICS BY EPA 624/8260

DATE RECEIVED:	12/23/94	MATRIX:	WATER
DATE EXTRACTED:	12/27/94	SAMPLE AMOUNT:	5ML
DATE ANALYZED:	12/27/94	RUN NUMBER:	28338B1
INSTRUMENT ID:	4500	UNITS:	UG/L (PPB)

CAS NO.	COMPOUND	CONCENTRATION	DET LIMIT
67-64-1	ACETONE	7.	5.
71-43-2	BENZENE	ND	1.
75-27-4	BROMODICHLOROMETHANE	ND	1.
75-25-2	BROMOFORM	ND	1.
74-83-9	BROMOMETHANE	ND	5.
78-93-3	2-BUTANONE (MEK)	ND	5.
75-15-0	CARBON DISULFIDE	ND	5.
56-23-5	CARBON TETRACHLORIDE	ND	1.
108-90-7	CHLOROBENZENE	ND	1.
75-00-3	CHLOROETHANE	ND	5.
67-66-3	CHLOROFORM	3.	1.
74-87-3	CHLOROMETHANE	ND	5.
108-41-8	CHLOROTOLUENE	ND	1.
124-48-1	DIBROMOCHLOROMETHANE	ND	1.
95-50-1	1,2-DICHLOROBENZENE	ND	1.
541-73-1	1,3-DICHLOROBENZENE	ND	1.
106-46-7	1,4-DICHLOROBENZENE	ND	1.
75-34-3	1,1-DICHLOROETHANE	ND	1.
107-06-2	1,2-DICHLOROETHANE	ND	1.
75-35-4	1,1-DICHLOROETHYLENE	ND	1.
156-59-4	CIS-1,2-DICHLOROETHYLENE	ND	1.
156-60-5	TRANS-1,2-DICHLOROETHYLENE	ND	1.
78-87-5	1,2-DICHLOROPROPANE	ND	1.
10061-01-5	CIS-1,3-DICHLOROPROPENE	ND	1.
10061-02-6	TRANS-1,3-DICHLOROPROPENE	ND	1.
100-41-4	ETHYLBENZENE	ND	1.
106-93-4	ETHYLENE DIBROMIDE	ND	1.
76-13-1	FREON-TF	ND	1.
119-78-6	2-HEXANONE	ND	5.
75-09-2	METHYLENE CHLORIDE	ND	5.
108-10-1	4-METHYL-2-PENTANONE (MIBK)	ND	5.
100-42-5	STYRENE	ND	1.
79-34-5	1,1,2,2-TETRACHLOROETHANE	ND	1.
127-18-4	TETRACHLOROETHYLENE	ND	1.
109-99-9	TETRAHYDROFURAN	ND	5.
108-88-3	TOLUENE	ND	1.
71-55-6	1,1,1-TRICHLOROETHANE	ND	1.
79-00-5	1,1,2-TRICHLOROETHANE	ND	1.
79-01-6	TRICHLOROETHYLENE	ND	1.
75-69-4	TRICHLOROFLUOROMETHANE	ND	1.
108-05-4	VINYL ACETATE	ND	5.
75-01-4	VINYL CHLORIDE	ND	5.
1330-20-7	TOTAL XYLENES	ND	1.

SURROGATE	1,2-DCA-d4	TOL-d8	BFB
PERCENT RECOVERY	102	103	102
CONTROL LIMITS	86-121	84-115	83-112

CLIENT: ENVIRONMENTAL TECHNOLOGIES SAMPLE: HCW5AD
WCAS JOB #: 28338

VOLATILE ORGANICS BY EPA 624/8260

DATE RECEIVED:	12/23/94	MATRIX:	WATER
DATE EXTRACTED:	12/27/94	SAMPLE AMOUNT:	5ML
DATE ANALYZED:	12/27/94	RUN NUMBER:	28338B2
INSTRUMENT ID:	4500	UNITS:	UG/L (PPB)

CAS NO.	COMPOUND	CONCENTRATION	DET LIMIT
67-64-1	ACETONE	ND	5.
71-43-2	BENZENE	ND	1.
75-27-4	BROMODICHLOROMETHANE	ND	1.
75-25-2	BROMOFORM	ND	1.
74-83-9	BROMOMETHANE	ND	5.
78-93-3	2-BUTANONE (MEK)	ND	5.
75-15-0	CARBON DISULFIDE	ND	5.
56-23-5	CARBON TETRACHLORIDE	ND	1.
108-90-7	CHLOROBENZENE	ND	1.
75-00-3	CHLOROETHANE	ND	5.
67-66-3	CHLOROFORM	ND	1.
74-87-3	CHLOROMETHANE	ND	5.
108-41-8	CHLOROTOLUENE	ND	1.
124-48-1	DIBROMOCHLOROMETHANE	ND	1.
95-50-1	1,2-DICHLOROBENZENE	ND	1.
541-73-1	1,3-DICHLOROBENZENE	ND	1.
106-46-7	1,4-DICHLOROBENZENE	ND	1.
75-34-3	1,1-DICHLOROETHANE	ND	1.
107-06-2	1,2-DICHLOROETHANE	ND	1.
75-35-4	1,1-DICHLOROETHYLENE	ND	1.
156-59-4	CIS-1,2-DICHLOROETHYLENE	ND	1.
156-60-5	TRANS-1,2-DICHLOROETHYLENE	ND	1.
78-87-5	1,2-DICHLOROPROPANE	ND	1.
10061-01-5	CIS-1,3-DICHLOROPROPENE	ND	1.
10061-02-6	TRANS-1,3-DICHLOROPROPENE	ND	1.
100-41-4	ETHYLBENZENE	ND	1.
106-93-4	ETHYLENE DIBROMIDE	ND	1.
76-13-1	FREON-TF	ND	1.
119-78-6	2-HEXANONE	ND	5.
75-09-2	METHYLENE CHLORIDE	ND	5.
108-10-1	4-METHYL-2-PENTANONE (MIBK)	ND	5.
100-42-5	STYRENE	ND	1.
79-34-5	1,1,2,2-TETRACHLOROETHANE	ND	1.
127-18-4	TETRACHLOROETHYLENE	ND	1.
109-99-9	TETRAHYDROFURAN	ND	5.
108-88-3	TOLUENE	ND	1.
71-55-6	1,1,1-TRICHLOROETHANE	ND	1.
79-00-5	1,1,2-TRICHLOROETHANE	ND	1.
79-01-6	TRICHLOROETHYLENE	ND	1.
75-69-4	TRICHLOROFLUOROMETHANE	ND	1.
108-05-4	VINYL ACETATE	ND	5.
75-01-4	VINYL CHLORIDE	ND	5.
1330-20-7	TOTAL XYLENES	ND	1.

SURROGATE	1,2-DCA-d4	TOL-d8	BFB
PERCENT RECOVERY	103	100	110
CONTROL LIMITS	86-121	84-115	83-112

CLIENT: ENVIRONMENTAL TECHNOLOGIES SAMPLE: LAB BLANK
WCAS JOB #: 28338

VOLATILE ORGANICS BY EPA 624/8260

DATE RECEIVED:	12/27/94	MATRIX:	WATER
DATE EXTRACTED:	12/27/94	SAMPLE AMOUNT:	5ML
DATE ANALYZED:	12/27/94	RUN NUMBER:	VBLK981
INSTRUMENT ID:	4500	UNITS:	UG/L (PPB)

CAS NO.	COMPOUND	CONCENTRATION	DET LIMIT
67-64-1	ACETONE	ND	5.
71-43-2	BENZENE	ND	1.
75-27-4	BROMODICHLOROMETHANE	ND	1.
75-25-2	BROMOFORM	ND	1.
74-83-9	BROMOMETHANE	ND	5.
78-93-3	2-BUTANONE (MEK)	ND	5.
75-15-0	CARBON DISULFIDE	ND	5.
56-23-5	CARBON TETRACHLORIDE	ND	1.
108-90-7	CHLOROBENZENE	ND	1.
75-00-3	CHLOROETHANE	ND	5.
67-66-3	CHLOROFORM	ND	1.
74-87-3	CHLOROMETHANE	ND	5.
108-41-8	CHLOROTOLUENE	ND	1.
124-48-1	DIBROMOCHLOROMETHANE	ND	1.
95-50-1	1,2-DICHLOROBENZENE	ND	1.
541-73-1	1,3-DICHLOROBENZENE	ND	1.
106-46-7	1,4-DICHLOROBENZENE	ND	1.
75-34-3	1,1-DICHLOROETHANE	ND	1.
107-06-2	1,2-DICHLOROETHANE	ND	1.
75-35-4	1,1-DICHLOROETHYLENE	ND	1.
156-59-4	CIS-1,2-DICHLOROETHYLENE	ND	1.
156-60-5	TRANS-1,2-DICHLOROETHYLENE	ND	1.
78-87-5	1,2-DICHLOROPROPANE	ND	1.
10061-01-5	CIS-1,3-DICHLOROPROPENE	ND	1.
10061-02-6	TRANS-1,3-DICHLOROPROPENE	ND	1.
100-41-4	ETHYLBENZENE	ND	1.
106-93-4	ETHYLENE DIBROMIDE	ND	1.
76-13-1	FREON-TF	ND	1.
119-78-6	2-HEXANONE	ND	5.
75-09-2	METHYLENE CHLORIDE	ND	5.
108-10-1	4-METHYL-2-PENTANONE (MIBK)	ND	5.
100-42-5	STYRENE	ND	1.
79-34-5	1,1,2,2-TETRACHLOROETHANE	ND	1.
127-18-4	TETRACHLOROETHYLENE	ND	1.
109-99-9	TETRAHYDROFURAN	ND	5.
108-88-3	TOLUENE	ND	1.
71-55-6	1,1,1-TRICHLOROETHANE	ND	1.
79-00-5	1,1,2-TRICHLOROETHANE	ND	1.
79-01-6	TRICHLOROETHYLENE	ND	1.
75-69-4	TRICHLOROFLUOROMETHANE	ND	1.
108-05-4	VINYL ACETATE	ND	5.
75-01-4	VINYL CHLORIDE	ND	5.
1330-20-7	TOTAL XYLENES	ND	1.

SURROGATE	1,2-DCA-d4	TOL-d8	BFB
PERCENT RECOVERY	98	102	101
CONTROL LIMITS	86-121	84-115	83-112

MATRIX SPIKE/MATRIX SPIKE DUPLICATE
PERCENT RECOVERY AND RPD SUMMARY

CLIENT:	ENVIRONMENTAL TECH	QC BATCH:	122294W
DATE ANALYZED:	12/22/94	MATRIX:	WATER
WCAS JOB #:	28338	UNITS:	UG/L (PPB)

VOLATILE COMPOUNDS

COMPOUND	CONC SPIKED	CONC SAMPLE	CONC MS	% REC MS	CONC MSD	% REC MSD	RPD
1,1-DICHLOROETHYLENE	49.9	ND	50.7	102	51.5	103	-2
TRICHLOROETHYLENE	50.3	ND	56.1	112	56.8	113	-1
CHLOROBENZENE	50.4	ND	53.6	106	54.4	108	-1
TOLUENE	49.9	ND	50.8	102	52.0	104	-2
BENZENE	49.8	ND	53.3	107	54.4	109	-2

WATER QUALITY CONTROL LIMITS

ANALYTE	% RECOVERY WARNING	% RECOVERY CONTROL	RPD WARNING	RPD CONTROL
1,1-DICHLOROETHYLENE	52-155	25-182	24	36
TRICHLOROETHYLENE	59-120	44-135	13	18
CHLOROBENZENE	82-109	75-115	10	14
TOLUENE	80-116	71-125	13	19
BENZENE	73-125	60-138	14	19

CLIENT: ENVIRONMENTAL TECHNOLOGIES SAMPLE: HCW3CD
WCAS JOB #: 28338

SEMI-VOLATILE ORGANICS (EPA 625/8270)

DATE RECEIVED:	12/23/94	MATRIX:	WATER
DATE EXTRACTED:	12/29/94	SAMPLE AMOUNT:	970ML:1ML
DATE ANALYZED:	12/30/94	RUN NUMBER:	28338A1
INSTRUMENT ID:	TRIO1000	UNITS:	UG/L (PPB)

CAS #	COMPOUND	CONCENTRATION	DET LIMIT
83-32-9	ACENAPHTHENE	ND	1.
208-96-8	ACENAPHTHYLENE	ND	1.
120-12-7	ANTHRACENE	ND	1.
56-55-3	BENZO(A)ANTHRACENE	ND	1.
205-99-2	BENZO(B & K)FLUORANTHENES	ND	1.
191-24-2	BENZO(G,H,I)PERYLENE	ND	1.
50-32-8	BENZO(A)PYRENE	ND	1.
65-85-0	BENZOIC ACID	ND	5.
100-51-6	BENZYL ALCOHOL	ND	5.
111-91-1	BIS(2-CHLOROETHOXY)METHANE	ND	1.
11-44-1	BIS(2-CHLOROETHYL)ETHER	ND	1.
39638-32-9	BIS(2-CHLOROISOPROPYL)ETHER	ND	1.
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	2.	1.
101-55-3	4-BROMOPHENYL PHENYL ETHER	ND	1.
85-68-7	BUTYL BENZYL PHTHALATE	ND	1.
106-47-8	4-CHLOROANILINE	ND	1.
59-50-7	4-CHLORO-3-METHYLPHENOL	ND	1.
91-58-71	2-CHLORONAPHTHALENE	ND	1.
95-57-8	2-CHLOROPHENOL	ND	1.
7005-72-3	4-CHLOROPHENYL PHENYL ETHER	ND	1.
218-01-9	CHRYSENE	ND	1.
53-70-3	DIBENZO(A,H)ANTHRACENE	ND	1.
132-64-9	DIBENZOFURAN	ND	1.
84-74-2	DI-N-BUTYL PHTHALATE	ND	1.
95-50-1	1,2-DICHLOROBENZENE	ND	1.
541-73-1	1,3-DICHLOROBENZENE	ND	1.
106-46-7	1,4-DICHLOROBENZENE	ND	1.
91-94-1	3,3'-DICHLOROBENZIDINE	ND	1.
120-33-2	2,4-DICHLOROPHENOL	ND	1.
84-66-2	DIETHYL PHTHALATE	ND	1.
105-67-9	2,4-DIMETHYLPHENOL	ND	1.
131-11-3	DIMETHYL PHTHALATE	ND	1.
534-52-1	4,6-DINITRO-2-METHYLPHENOL	ND	5.
51-28-5	2,4-DINITROPHENOL	ND	5.
121-14-2	2,4-DINITROTOLUENE	ND	1.
606-20-2	2,6-DINITROTOLUENE	ND	1.
117-84-0	DI-N-OCTYL PHTHALATE	ND	1.
204-44-0	FLUORANTHENE	ND	1.
86-73-7	FLUORENE	ND	1.
118-74-1	HEXACHLOROBENZENE	ND	1.
87-68-3	HEXACHLOROBUTADIENE	ND	1.

CLIENT: ENVIRONMENTAL TECHNOLOGIES SAMPLE: HCW3CD
WCAS JOB #: 28338

SEMI-VOLATILE ORGANICS (EPA 625/8270)

DATE RECEIVED:	12/23/94	MATRIX:	WATER
DATE EXTRACTED:	12/29/94	SAMPLE AMOUNT:	970ML:1ML
DATE ANALYZED:	12/30/94	RUN NUMBER:	28338A1
INSTRUMENT ID:	TRIO1000	UNITS:	UG/L (PPB)

CAS #	COMPOUND	CONCENTRATION	DET LIMIT
77-47-4	HEXACHLOROCYCLOPENTADIENE	ND	1.
67-72-1	HEXACHLOROETHANE	ND	1.
193-39-5	INDENO(1,2,3-CD)PYRENE	ND	1.
78-59-1	ISOPHORONE	ND	1.
91-57-6	2-METHYLNAPHTHALENE	ND	1.
95-48-7	2-METHYLPHENOL	ND	1.
106-44-5	4-METHYLPHENOL	ND	1.
91-20-3	NAPHTHALENE	ND	1.
88-74-4	2-NITROANILINE	ND	5.
99-09-2	3-NITROANILINE	ND	5.
100-01-6	4-NITROANILINE	ND	5.
98-95-3	NITROBENZENE	ND	1.
88-75-5	2-NITROPHENOL	ND	1.
100-02-7	4-NITROPHENOL	ND	5.
86-30-6	N-NITROSODIPHENYLAMINE **	ND	1.
621-64-7	N-NITROSODIPROPYLAMINE	ND	1.
87-86-5	PENTACHLOROPHENOL	ND	5.
85-01-8	PHENANTHRENE	ND	1.
108-95-2	PHENOL	ND	1.
129-00-0	PYRENE	ND	1.
120-82-1	1,2,4-TRICHLOROBENZENE	ND	1.
95-95-4	2,4,5-TRICHLOROPHENOL	ND	5.
88-06-2	2,4,6-TRICHLOROPHENOL	ND	1.

** - Cannot be separated from diphenylamine

SURROGATE	PERCENT RECOVERY	CONTROL LIMIT
PHENOL-d5	81	19-139
2-FLUOROPHENOL	84	21-154
NITROBENZENE-d5	90	35-114
2-FLUOROBIPHENYL	85	43-116
2,4,6-TRIBROMOPHENOL	132**	10-123
TERPHENYL-d14	101	44-141

CLIENT: ENVIRONMENTAL TECHNOLOGIES SAMPLE: HCW5AD
WCAS JOB #: 28338

SEMI-VOLATILE ORGANICS (EPA 625/8270)

DATE RECEIVED:	12/23/94	MATRIX:	WATER
DATE EXTRACTED:	12/29/94	SAMPLE AMOUNT:	990ML:1ML
DATE ANALYZED:	12/30/94	RUN NUMBER:	28338A3
INSTRUMENT ID:	TRIO1000	UNITS:	UG/L (PPB)

CAS #	COMPOUND	CONCENTRATION	DET LIMIT
83-32-9	ACENAPHTHENE	4.	1.
208-96-8	ACENAPHTHYLENE	ND	1.
120-12-7	ANTHRACENE	ND	1.
56-55-3	BENZO(A)ANTHRACENE	ND	1.
205-99-2	BENZO(B & K)FLUORANTHENES	ND	1.
191-24-2	BENZO(G,H,I)PERYLENE	ND	1.
50-32-8	BENZO(A)PYRENE	ND	1.
65-85-0	BENZOIC ACID	ND	5.
100-51-6	BENZYL ALCOHOL	ND	5.
111-91-1	BIS(2-CHLOROETHOXY)METHANE	ND	1.
11-44-1	BIS(2-CHLOROETHYL)ETHER	ND	1.
39638-32-9	BIS(2-CHLOROISOPROPYL)ETHER	ND	1.
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	2.	1.
101-55-3	4-BROMOPHENYL PHENYL ETHER	ND	1.
85-68-7	BUTYL BENZYL PHTHALATE	ND	1.
106-47-8	4-CHLOROANILINE	ND	1.
59-50-7	4-CHLORO-3-METHYLPHENOL	ND	1.
91-58-71	2-CHLORONAPHTHALENE	ND	1.
95-57-8	2-CHLOROPHENOL	ND	1.
7005-72-3	4-CHLOROPHENYL PHENYL ETHER	ND	1.
218-01-9	CHRYSENE	ND	1.
53-70-3	DIBENZO(A,H)ANTHRACENE	ND	1.
132-64-9	DIBENZOFURAN	ND	1.
84-74-2	DI-N-BUTYL PHTHALATE	1.	1.
95-50-1	1,2-DICHLOROBENZENE	ND	1.
541-73-1	1,3-DICHLOROBENZENE	ND	1.
106-46-7	1,4-DICHLOROBENZENE	ND	1.
91-94-1	3,3'-DICHLOROBENZIDINE	ND	1.
120-33-2	2,4-DICHLOROPHENOL	ND	1.
84-66-2	DIETHYL PHTHALATE	ND	1.
105-67-9	2,4-DIMETHYLPHENOL	ND	1.
131-11-3	DIMETHYL PHTHALATE	ND	1.
534-52-1	4,6-DINITRO-2-METHYLPHENOL	ND	5.
51-28-5	2,4-DINITROPHENOL	ND	5.
121-14-2	2,4-DINITROTOLUENE	ND	1.
606-20-2	2,6-DINITROTOLUENE	ND	1.
117-84-0	DI-N-OCTYL PHTHALATE	ND	1.
204-44-0	FLUORANTHENE	ND	1.
86-73-7	FLUORENE	3.	1.
118-74-1	HEXACHLOROBENZENE	ND	1.
87-68-3	HEXACHLOROBUTADIENE	ND	1.

CLIENT: ENVIRONMENTAL TECHNOLOGIES SAMPLE: HCW5AD
WCAS JOB #: 28338

SEMI-VOLATILE ORGANICS (EPA 625/8270)

DATE RECEIVED:	12/23/94	MATRIX:	WATER
DATE EXTRACTED:	12/29/94	SAMPLE AMOUNT:	990ML:1ML
DATE ANALYZED:	12/30/94	RUN NUMBER:	28338A3
INSTRUMENT ID:	TRIO1000	UNITS:	UG/L (PPB)

CAS #	COMPOUND	CONCENTRATION	DET LIMIT
77-47-4	HEXACHLOROCYCLOPENTADIENE	ND	1.
67-72-1	HEXACHLOROETHANE	ND	1.
193-39-5	INDENO(1,2,3-CD)PYRENE	ND	1.
78-59-1	ISOPHORONE	ND	1.
91-57-6	2-METHYLNAPHTHALENE	12.	1.
95-48-7	2-METHYLPHENOL	ND	1.
106-44-5	4-METHYLPHENOL	ND	1.
91-20-3	NAPHTHALENE	19.	1.
88-74-4	2-NITROANILINE	ND	5.
99-09-2	3-NITROANILINE	ND	5.
100-01-6	4-NITROANILINE	ND	5.
98-95-3	NITROBENZENE	ND	1.
88-75-5	2-NITROPHENOL	ND	1.
100-02-7	4-NITROPHENOL	ND	5.
86-30-6	N-NITROSODIPHENYLAMINE **	ND	1.
621-64-7	N-NITROSODIPROPYLAMINE	ND	1.
87-86-5	PENTACHLOROPHENOL	ND	5.
85-01-8	PHENANTHRENE	3.	1.
108-95-2	PHENOL	ND	1.
129-00-0	PYRENE	ND	1.
120-82-1	1,2,4-TRICHLOROBENZENE	ND	1.
95-95-4	2,4,5-TRICHLOROPHENOL	ND	5.
88-06-2	2,4,6-TRICHLOROPHENOL	ND	1.

** - Cannot be separated from diphenylamine

SURROGATE	PERCENT RECOVERY	CONTROL LIMIT
PHENOL-d5	90	19-139
2-FLUOROPHENOL	87	21-154
NITROBENZENE-d5	96	35-114
2-FLUOROBIPHENYL	90	43-116
2,4,6-TRIBROMOPHENOL	134**	10-123
TERPHENYL-d14	127	44-141

CLIENT: ENVIRONMENTAL TECHNOLOGIES SAMPLE: METHOD BLANK
WCAS JOB #: 28338

SEMI-VOLATILE ORGANICS (EPA 625/8270)

DATE RECEIVED:	12/29/94	MATRIX:	WATER
DATE EXTRACTED:	12/29/94	SAMPLE AMOUNT:	1L:1ML
DATE ANALYZED:	12/30/94	RUN NUMBER:	28338AA1
INSTRUMENT ID:	TRIO1000	UNITS:	UG/L (PPB)

CAS #	COMPOUND	CONCENTRATION	DET LIMIT
83-32-9	ACENAPHTHENE	ND	1.
208-96-8	ACENAPHTHYLENE	ND	1.
120-12-7	ANTHRACENE	ND	1.
56-55-3	BENZO(A)ANTHRACENE	ND	1.
205-99-2	BENZO(B & K)FLUORANTHENES	ND	1.
191-24-2	BENZO(G,H,I)PERYLENE	ND	1.
50-32-8	BENZO(A)PYRENE	ND	1.
65-85-0	BENZOIC ACID	ND	5.
100-51-6	BENZYL ALCOHOL	ND	5.
111-91-1	BIS(2-CHLOROETHOXY)METHANE	ND	1.
11-44-1	BIS(2-CHLOROETHYL)ETHER	ND	1.
39638-32-9	BIS(2-CHLOROISOPROPYL)ETHER	ND	1.
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	ND	1.
101-55-3	4-BROMOPHENYL PHENYL ETHER	ND	1.
85-68-7	BUTYL BENZYL PHTHALATE	ND	1.
106-47-8	4-CHLOROANILINE	ND	1.
59-50-7	4-CHLORO-3-METHYLPHENOL	ND	1.
91-58-71	2-CHLORONAPHTHALENE	ND	1.
95-57-8	2-CHLOROPHENOL	ND	1.
7005-72-3	4-CHLOROPHENYL PHENYL ETHER	ND	1.
218-01-9	CHRYSENE	ND	1.
53-70-3	DIBENZO(A,H)ANTHRACENE	ND	1.
132-64-9	DIBENZOFURAN	ND	1.
84-74-2	DI-N-BUTYL PHTHALATE	ND	1.
95-50-1	1,2-DICHLOROBENZENE	ND	1.
541-73-1	1,3-DICHLOROBENZENE	ND	1.
106-46-7	1,4-DICHLOROBENZENE	ND	1.
91-94-1	3,3'-DICHLOROBENZIDINE	ND	1.
120-33-2	2,4-DICHLOROPHENOL	ND	1.
84-66-2	DIETHYL PHTHALATE	ND	1.
105-67-9	2,4-DIMETHYLPHENOL	ND	1.
131-11-3	DIMETHYL PHTHALATE	ND	1.
534-52-1	4,6-DINITRO-2-METHYLPHENOL	ND	5.
51-28-5	2,4-DINITROPHENOL	ND	5.
121-14-2	2,4-DINITROTOLUENE	ND	1.
606-20-2	2,6-DINITROTOLUENE	ND	1.
117-84-0	DI-N-OCTYL PHTHALATE	ND	1.
204-44-0	FLUORANTHENE	ND	1.
86-73-7	FLUORENE	ND	1.
118-74-1	HEXACHLOROBENZENE	ND	1.
87-68-3	HEXACHLOROBUTADIENE	ND	1.

CLIENT: ENVIRONMENTAL TECHNOLOGIES SAMPLE: METHOD BLANK
WCAS JOB #: 28338

SEMI-VOLATILE ORGANICS (EPA 625/8270)

DATE RECEIVED:	12/29/94	MATRIX:	WATER
DATE EXTRACTED:	12/29/94	SAMPLE AMOUNT:	1L:1ML
DATE ANALYZED:	12/30/94	RUN NUMBER:	28338AA1
INSTRUMENT ID:	TRIO1000	UNITS:	UG/L (PPB)

CAS #	COMPOUND	CONCENTRATION	DET LIMIT
77-47-4	HEXACHLOROCYCLOPENTADIENE	ND	1.
67-72-1	HEXACHLOROETHANE	ND	1.
193-39-5	INDENO(1,2,3-CD)PYRENE	ND	1.
78-59-1	ISOPHORONE	ND	1.
91-57-6	2-METHYLNAPHTHALENE	ND	1.
95-48-7	2-METHYLPHENOL	ND	1.
106-44-5	4-METHYLPHENOL	ND	1.
91-20-3	NAPHTHALENE	ND	1.
88-74-4	2-NITROANILINE	ND	5.
99-09-2	3-NITROANILINE	ND	5.
100-01-6	4-NITROANILINE	ND	5.
98-95-3	NITROBENZENE	ND	1.
88-75-5	2-NITROPHENOL	ND	1.
100-02-7	4-NITROPHENOL	ND	5.
86-30-6	N-NITROSODIPHENYLAMINE **	ND	1.
621-64-7	N-NITROSODIPROPYLAMINE	ND	1.
87-86-5	PENTACHLOROPHENOL	ND	5.
85-01-8	PHENANTHRENE	ND	1.
108-95-2	PHENOL	2.	1.
129-00-0	PYRENE	ND	1.
120-82-1	1,2,4-TRICHLOROBENZENE	ND	1.
95-95-4	2,4,5-TRICHLOROPHENOL	ND	5.
88-06-2	2,4,6-TRICHLOROPHENOL	ND	1.

** - Cannot be separated from diphenylamine

SURROGATE	PERCENT RECOVERY	CONTROL LIMIT
PHENOL-d5	92	19-139
2-FLUOROPHENOL	92	21-154
NITROBENZENE-d5	89	35-114
2-FLUOROBIPHENYL	91	43-116
2,4,6-TRIBROMOPHENOL	113	10-123
TERPHENYL-d14	130	44-141

WEST COAST ANALYTICAL SERVICE

MATRIX SPIKE (MS AND MSD)
% RECOVERY AND RPD SUMMARY

CLIENT : ENVIRONMENTAL TECH.
DATE ANALYZED: 12/29/94
WCAS JOB # : 28338

SAMPLE: BATCH QC
MATRIX: WATER
UNITS : UG/L (PPB)

SEMI-VOLATILE COMPOUNDS

COMPOUND	CONC SPIKED	CONC SAMPLE	CONC MS	%REC MS	CONC MSD	%REC MSD	RPD
1,2,4-TRICHLOROBENZE	2500.	ND	1350.	54	1250.	50	8
ACENAPHTHENE	2500.	ND	1960.	78	1930.	77	2
2,4-DINITROTOLUENE	2500.	ND	2570.	103	2610.	104	-2
PYRENE	2500.	ND	3380.	135	3590.	144	-6
NITROSOPROPYLAMINE	2500.	ND	2620.	105*	2570.	103*	2
1,4-DICHLOROBENZENE	2500.	ND	1090.	44	1020.	41*	7
PENTACHLOROPHENOL	3750.	ND	2830.	75	2970.	79	-5
PHENOL	3750.	ND	3310.	88	3150.	84	5
2-CHLOROPHENOL	3750.	ND	3710.	99	3570.	95	4
P-CHLORO-M-CRESOL	3750.	ND	4030.	107*	4070.	109*	-1
4-NITROPHENOL	3750.	ND	3200.	85	3860.	103	-19

* - Asterisked Values Are Outside Warning Limits

WATER QUALITY CONTROL LIMITS

	% RECOVERY		RPD	
	WARNING	CONTROL	WARNING	CONTROL
1,2,4-TRICHLOROBENZENE	43- 87	32- 98	21	31
ACENAPHTHENE	54-114	39-129	10	17
2,4-DINITROTOLUENE	51-109	36-124	11	18
PYRENE	56-144	34-166	19	29
NITROSOPROPYLAMINE	47- 96	35-108	14	24
1,4-DICHLOROBENZENE	41- 75	32- 84	23	34
PENTACHLOROPHENOL	20-176	0-215	24	36
PHENOL	55-100	42-113	13	21
2-CHLOROPHENOL	60-114	46-128	10	17
P-CHLORO-M-CRESOL	51- 96	38-110	12	20
4-NITROPHENOL	25-103	6-123	25	38

Abbreviations Summary

General Reporting Abbreviations:

B — Blank - Indicates that the compound was found in both the sample and the blank. The sample value is reported without blank subtraction. If the sample value is less than 10X the blank value times the sample dilution factor, the compound may be present as a laboratory contaminant.

D — Indicates that the sample was diluted, and consequently the surrogates were too dilute to accurately measure.

DL — Detection Limit - Is the minimum value which we believe can be detected in the sample with a high degree of confidence, taking into account dilution factors and interferences. The reported detection limits are equal to or greater than Method Detection Limits (MDL) to allow for day to day and instrument to instrument variations in sensitivity.

J — Indicates that the value is an estimate.

ND — Not Detected - Indicates that the compound was not found in the sample at or above the detection limit.

ppm, ppb — parts per million (billion) in liquids is usually equivalent to mg/l (ug/l), or in solids to mg/kg (ug/kg). In the gas phase it is equivalent to ul/l (ul/m^3).

TR — Trace - Indicates that the compound was observed at a value less than our normal reported Detection Limit (DL), but we feel its presence may be important to you. These values are subject to large errors and low degrees of confidence.

kg kilogram	mg milligram	l liter	m meter
g gram	ug microgram	ul microliter	

QC Abbreviations:

Control — Control Limits are determined from historical data for a QC parameter. The test value must be within this acceptable range for the test to be considered in control. Usually this range corresponds to the 99% confidence interval for the historical data.

% Error — Percent Error - This is a measure of accuracy based on the analysis of a Laboratory Control Standard (LCS). An LCS is a reference sample of known value such as an NIST Standard Reference Material (SRM). The % Error is expressed in percent as the difference between the known value and the experimental value, divided by the known value. The LCS may simply be a solution based standard which confirms calibration (ICV or CCV - initial or continuing calibration verification), or it may be a reference sample taken through preparation and analysis.

QC Abbreviations (continued):

MS(D)	Matrix Spike (Duplicate) - This refers to a quality control sample. It may be a real sample or blank sample spiked with representative target analytes.
% Rec	Percent Recovery - This is a measure of the accuracy of the analysis. It is expressed in percent as the difference between the result of an MS sample and the unspiked sample, divided by the amount spiked.
RPD	Relative Percent Difference - This is a measure of the precision of the analysis. It is the difference between duplicate results divided by the mean of the duplicates.
Warning	Warning limits are determined from historical data, usually representing a 95% confidence interval. This serves to alert the analyst to problems before reaching the control limits. Data "Out of Warning" is still considered in control.

Environmental Abbreviations:

BNA	Base-Neutral/Acid Fraction - Also called the Extractable Semivolatile fraction, represents the pollutants which can be extracted from a sample, but which boil higher than 120 C and still pass through a gas chromatography column.
CAM	California Assessment Manual - The original draft containing the CA hazardous waste rules, one of which was a list of 17 toxic metals. "CAM Metals" is used to refer to this list.
STLC	Soluble Threshold Limit Concentration - According to California's hazardous waste regulations, a waste is considered hazardous if the concentration in the leachate from the Waste Extraction Test (WET) exceeds this limit.
TCLP	Toxicity Characteristic Leaching Procedure - According to EPA regulations, a waste is considered hazardous if the leachate from the TCLP extraction exceeds certain limits.
TTLC	Total Threshold Limit Concentration - According to California's hazardous waste regulations, a waste exceeding this concentration is considered a hazardous waste.
VOA	Volatile Organics Analysis - Represents a group of volatile organic solvents with a boiling range from below room temperature to approximately 150 C.
WET	Waste Extraction Test - See STLC.

CHAIN OF CUSTODY

BHP

Environmental Technologies International, Inc.
Mauka Tower 737 Bishop Street, 22nd Floor
P.O. Box 3379 Honolulu, HI 96842
(808) 547-3600 Facsimile: (808) 547-3033

PROJECT NO: 441000
ET CLIENT:

SEND RESULTS TO
Name: Tong Shan
Company: BHP Hawaii
Address: 91-325 Komohana St.
City, State, Zip: Kapolei, HI 96707

SEND INVOICE TO
Name: TONY SHAN
Company: BHP Hawaii
Address:
City, State, Zip:

Sample No.	Lab No.	No. Containers	Date	Time	Sample Type/Description	Analysis Required	Sampled By
HCW3CD		8	12/21/94	11:50	Ground water	8240 volatiles	
HCW5AD		8	12/22/94	9:05	"	8270 Semi volatiles	
						Total Metals (Sb, As, Ba, Be, Co, Cd, Cr, Pb, Hg, Ni, Se, Va, Zn)	
						TDS, Alk, F, MBAS, SO4, pH, EC, Cl, Soluble Fe	
						NO3 - NO2	
LCW4AD		2	12/22/94	14:58	Ground H2O	TDS, Alk, F, MBAS, SO4, pH, EC, Cl, Soluble Fe, NO3-NO2	

CUSTODY TRANSFERS

	RELINQUISHED BY: (NAME, SIGNATURE)	DATE	TIME	RECEIVED BY: (NAME, SIGNATURE)	DATE	TIME	COMMENTS
1	Tony Shan	12/22/94	1720	Tony Shan	12/22/94	17	
2	Tony Shan TOHL	12/22/94	07:30	TOHL			
3				Jennifer Holmes	12/23/94	11:55	
4							

SHIPPING DETAILS #28338

DELIVERED TO SHIPPER BY: DHL DATE ____ TIME ____
METHOD OF SHIPMENT: AIRBILL # ____
RECEIVED FOR LAB: SIGNED ____ DATE ____ TIME ____
SAMPLE CONDITION UPON RECEIPT:

WHITE - CUSTODY SHEET YELLOW - LAB PINK - ET

4. GROUNDWATER ELEVATION DATA

BHP HAWAII REFINERY GROUNDWATER ELEVATION DATA

Well I.D. No.	Date [a]	Time [a]	Top of Stainless Steel or PVC Case Elevation (ft,MSL)[b]	Top of Concrete Apron Elevation (ft,MSL) [c]	Ground Surface Elevation (ft,MSL) [c]	Depth to Oil (ft)	Depth to Water (ft)	Oil Thickness (ft)	Corrected Depth to Water (ft)[d]	Corrected Water Table Elevation (ft,MSL)[e]
MW-3	12/19/94	10:39am	12.81	11.76	11.11	12.08	12.18	0.10	12.09	0.72
		14:15pm				12.33	12.43	0.10	12.34	0.47
MW-4	12/19/94	11:37am	13.29	12.15	11.75	12.57	12.81	0.24	12.60	0.69
		14:34pm				12.75	13.03	0.28	12.79	0.50
MW-5	12/19/94	9:46am	13.58	11.85	11.05	12.72	12.75	0.03	12.72	0.86
		13:36pm				13.04	13.12	0.08	13.04	0.54
MW-6	12/19/94	7:32am	13.12	11.58	11.28	12.32	12.32	0.0	12.32	0.80
		13:12pm				12.60	12.63	0.03	12.60	0.52
CW1A	12/19/94	11:00am	13.34	N/A	11.34	N/A	12.56	0.0	12.56	1.26
		15:40pm					12.81	0.0	12.81	1.01
CW1B	12/19/94	7:40am	13.55	N/A	11.19	N/A	12.21	0.0	12.21	1.34
		13:20pm					12.57	0.0	12.57	0.98
CW1C	12/19/94	10:00am	13.66	N/A	11.21	N/A	12.72	0.0	12.72	0.94
		14:55pm					13.00	0.0	13.00	0.66
CW6A	12/20/94	8:05am	15.80	N/A	13.60	N/A	14.36	0.0	14.36	1.44
		13:39pm					16.39	0.0	16.39	-0.59
CW6B	12/20/94	9:00am	15.74	N/A	13.50	N/A	14.30	0.0	14.30	1.44
		14:12pm					16.37	0.0	16.37	-0.63
CW7A	12/20/94	10:06am	14.03	N/A	11.90	N/A	12.61	0.0	12.61	1.42
		15:20pm					14.74	0.0	14.74	-0.71
CW7B	12/20/94	10:49am	14.41	N/A	11.90	N/A	13.06	0.0	13.06	1.35
		15:55pm					15.12	0.0	15.12	-0.71
CW2A	12/20/94	8:00am	13.74	N/A	11.46	N/A	12.11	0.0	12.11	1.63
		13:30pm					12.50	0.0	12.50	1.24
CW2B	12/20/94	9:15am	13.62	N/A	11.37	N/A	12.27	0.0	12.27	1.35
		14:15pm					12.65	0.0	12.65	0.97
CW2C	12/20/94	10:25am	13.66	N/A	11.17	N/A	12.61	0.0	12.61	1.05
		15:52pm					12.93	0.0	12.93	0.73

CW8A	12/21/94	8:16am	11.48	N/A	12.00	N/A	9.82	0.0	9.82	1.66
		13:27pm					10.25	0.0	10.25	1.23
CW8B	12/21/94	9:00am	11.52	N/A	11.90	N/A	9.94	0.0	9.94	1.58
		13:54pm					10.37	0.0	10.37	1.15
CW9A	12/21/94	10:09am	12.41	N/A	10.00	N/A	11.07	0.0	11.07	1.34
		14:43pm					11.42	0.0	11.42	0.99
CW9B	12/21/94	10:48am	12.40	N/A	10.10	N/A	11.29	0.0	11.29	1.11
		15:38pm					11.63	0.0	11.63	0.77
CW3A	12/21/94	7:55am	13.65	N/A	11.16	N/A	11.06	0.0	11.06	2.59
		13:30pm					11.89	0.0	11.89	1.76
CW3B	12/21/94	8:34am	13.82	N/A	11.22	N/A	12.12	0.0	12.12	1.70
		14:25pm					12.58	0.0	12.58	1.24
CW3C	12/21/94	9:30am	13.85	N/A	11.27	N/A	10.21	0.0	10.21	3.64
		15:27pm					11.00	0.0	11.00	2.85

CW5A	12/22/94	8:45am	15.71	N/A	13.20	N/A	14.39	0.0	14.39	1.32
		14:36pm					14.65	0.0	14.65	1.06
CW5B	12/22/94	9:20am	15.51	N/A	13.10	N/A	14.21	0.0	14.21	1.30
		15:11pm					14.54	0.0	14.54	0.97
CW4A	12/22/94	8:25am	12.24	N/A	10.07	N/A	11.01	0.0	11.01	1.23
		14:25pm					11.43	0.0	11.43	0.81
CW4B	12/22/94	9:23am	12.01	N/A	9.68	N/A	10.93	0.0	10.93	1.08
		15:05pm					11.36	0.0	11.36	0.65
CW4C	12/22/94	10:05am	12.13	N/A	9.74	N/A	11.23	0.0	11.23	0.90
		15:40pm					11.72	0.0	11.72	0.41

(a) Date and time of water level measurements
(b) Survey conducted in 8/87 for MW-3, MW-4, MW-5, MW-6; in 6/92 for CW1-4ABC; and in 11/94 for CW5-9AB
(c) Survey conducted 9/17/91
(d) Corrected depth to water = depth to water-(oil thickness x specific gravity)
Note: Specific gravities of oils were measured by the laboratory to be 0.88 for MW-3, MW-4, and MW-5; and 0.87 for MW-6 in August 1994.
(e) Corrected water table elevation = top of casing elevation - corrected depth to water

RECORDS SEPARATOR PAGE

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DAMES & MOORE

BHP

CERTIFIED MAIL NO. P-101-726-938
RETURN RECEIPT REQUESTED

January 13, 1995

BHP Hawaii

Mr. Mitch Kaplan
Hazardous Waste Management Division (H-3-1)
U.S. Environmental Protection Agency
75 Hawthorne Street
San Francisco, California 94105

Dear Mr. Kaplan:

Conceptual Model Development and Computer Codes Selection for GMP -
"Groundwater Monitoring Plan", October 19, 1993
HID 056-786-395

Enclosed please find the report of conceptual model and model selection for GMP groundwater modeling submitted to BHP Hawaii Refinery by Dames & Moore. It presents a conceptual geological model for BHP Hawaii Refinery and the selection of the actual computer codes for the GMP modeling if EPA approves the selection.

The selected computer codes include a Modular Three-Dimensional Finite-Difference Groundwater Flow Model (MODFLOW) and a contaminant transport model - MT3D. MODFLOW uses the finite-difference method to solve the groundwater flow equations that describe groundwater flow and aquifer physical conditions. MT3D simulates contaminant transport in the aquifer involving the processes of advection, dispersion, sorption, and biodegradation.

We believe the selected models can be useful tools for simulating our site and predicting the migration and degradation of the contaminants in the uppermost aquifer beneath the Refinery. We look forward to your approval of our selection of the above models.

If you have any questions or comments regarding this subject or other groundwater issues, please contact Tony Shan at 808-547-3804.

Sincerely,

Frank D. Clouse

Frank D. Clouse
Refinery Manager

cc: Ms. Nicole Moutoux, EPA
Mr. Steve Chang, HDOH

BHP Hawaii Inc
733 Bishop Street Honolulu Hawaii 96813 USA
PO Box 3379 Honolulu Hawaii 96842 USA
Telephone 808 547 3111 Facsimile 808 547 3145

DRAFT CONCEPTUAL MODEL
FOR GROUNDWATER MODELING OF BHP REFINERY
91-325 KOMOHANA STREET
KAPOLEI, OAHU, HAWAII
FOR BHP PETROLEUM AMERICAS REFINING, INC.

DAMES & MOORE

Dames & Moore Job No. 29604-001-037
January 12, 1995

(HON-046:29604-001-037)

DAMES & MOORE
050 QUEEN STREET, SUITE 204, HONOLULU, HAWAII 96814
(808) 593-1116 FAX: (808) 593-1198

January 12, 1995

Mr. Tony Shan
Hydrogeologist
BHP Petroleum Americas Refining, Inc.
91-325 Komohana Street
Kapolei, Oahu, HI 96707

Draft Conceptual Model
for Groundwater Modeling of BHP Refinery
91-325 Komohana Street
Kapolei, Oahu, Hawaii
Job No. 29604-001-037

Dear Mr. Shan:

This draft report presents a conceptual geologic model for the site located at BHP Petroleum Americas Refining, Inc. Kapolei, Oahu, Hawaii (Refinery).

Dames & Moore is pleased to present BHP Petroleum Americas Refining, Inc. with a draft of our Conceptual Model for Groundwater Modeling of BHP Refinery, at 91-325 Komohaha Street, in Kapolei, Oahu, Hawaii. We trust this draft provides BHP Petroleum Americas Refining, Inc. with the information you require at this time. Should you have any questions or comments regarding the information presented in this draft, please contact us.

We trust this draft report contains the information you require at this time. If you have any questions or need additional information, please feel free to contact either Don Walker or Casey Schmidt, in Sacramento, California, at (916) 387-8800 or Zuyi Shen at (808) 593-1116 in Honolulu, Hawaii.

Sincerely,

DAMES & MOORE

Donald P. Walker	Casey S. Schmidt	Zuyi Shen
Engineer	Project Hydrogeologist	Hydrogeologist

(HON-046:29604-001-037)

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TABLE 2 SUMMARY OF GROUNDWATER CHEMICAL ANALYTICAL RESULTS DETECTIONS ONLY — HIGH AND LOW TIDE, AUGUST 1994

FIGURES

FIGURE 1 SITE VICINITY MAP SHOWING CROSS-SECTION A-A'

FIGURE 2 GENERALIZED HYDROGEOLOGIC CROSS-SECTION OF THE EWA PLAIN

DRAFT CONCEPTUAL MODEL
FOR GROUNDWATER MODELING OF BHP REFINERY
91-325 KOMOHANA STREET
KAPOLEI, OAHU, HAWAII
FOR BHP PETROLEUM AMERICAS REFINING, INC.

INTRODUCTION

This report presents a conceptual geologic model for the site located at BHP Petroleum Americas Refining, Inc. Kapolei, Oahu, Hawaii (Refinery Figure 1). The conceptual geologic model's physical domain was used to outline the data needs, and to select computer codes that may be appropriate to simulate groundwater flow and contaminant transport in groundwater beneath the Refinery.

Elements of the conceptual model were established in the Groundwater Monitoring Plan (GMP) prepared by Delta Environmental Consultants. The GMP documents procedures used to provide data necessary to meet the requirements specified in the Consent Agreement and Final Order, EPA Docket No. RCRA 09-91-0007. The GMP addresses groundwater flow and transport modeling procedures used to "facilitate evaluation of the rate and extent of dissolved phase 'Skinner List' constituents that may be migrating within the groundwater flow system beneath the Refinery". The modeling process described in the GMP includes 1) establishing the problem domain, 2) developing a conceptual model, 3) establishing performance criteria, 4) establishing governing equations and selecting appropriate computer codes 5), conducting model runs, and 6) evaluating model results. Items 1) through 4) of the modeling process are discussed below. The domain and geologic conceptual model are defined in the Geology and Hydrogeology section. The performance criteria and the rationale for their selection is presented under the Groundwater Quality section. This discussion is followed by a section that discusses the selection of computer codes.

GEOLOGY AND HYDROGEOLOGY

The Refinery is located in the Ewa Plain of southwestern Oahu, Hawaii, approximately 2,000 feet north and 4,000 feet east of the Pacific Ocean, at an elevation of about 10 to 15 feet above mean sea level. The Ewa Plain is generally flat with gentle seaward sloping surfaces, and is underlain by terrestrial sediments derived from basaltic rocks from the Koolau and Wainanae volcanic formations. These sediments were covered by and interbedded with a succession of marine sediments (fossil reef marine limestone) that are exposed at the surface over approximately two-thirds of the Ewa Plain. The terrestrial and marine sediments were deposited as a wedge that thickens to a maximum of about

1,000 feet at the southern coastline. These interbedded sediments are termed "caprock" by the State of Hawaii Department of Land and Natural Resources (DLNR) (State of Hawaii, Department of Land and Natural Resources, 1989). The caprock is about 650 feet thick beneath the Refinery and is divided into three aquifers. The aquifers are separated by silty terrestrial aquitards.

The shallow (water table) aquifer is termed "uppermost aquifer," and extends from the water table, which occurs about 10 feet below ground surface (bgs) to a depth of about 60 feet bgs (see attached Figure 2). The uppermost aquifer is composed of porous coralline limestone with discontinuous lenses of siltstone, sandy silt and silty sands. The limestone is composed of a very porous, fossil rich matrix which contains worm tubes and voids measuring up to several inches (possible solution cavities) (Levine-Fricke, 1993).

Aquifer pumping test results indicate increasing hydraulic conductivity with depth in the uppermost aquifer. Downward vertical hydraulic gradients were measured in all of the well clusters, except CW-3, which had an upward vertical gradient. Regional flow direction is to the south; however, the local flow direction is influenced by tides, surface water bodies, and/or wells, and is to the north-northwest (Levine-Fricke, 1993).

A relatively impermeable silty sandstone layer (5 to 10 feet thick), termed the "uppermost aquitard," is present beneath the Refinery at a depth of about 60 to 65 feet bgs (Figure 2). This layer is also present to the north and about 5 miles east of the refinery, and it is suggested to be the lower boundary for movement of refinery contaminants (Dames & Moore, 1986). Below the uppermost aquitard is a saturated zone that extends to a depth of about 110 feet bgs (to the top of the Aquitard 1; Figure 2). Known hydraulic parameters of the above units are listed in Table 1. Parameter values not available (see Table 1) will be estimated using empirical relations between aquifer type and parameters found in the literature.

Water levels measured in the uppermost aquifer are influenced by tidal fluctuations. A change in tide of approximately 1.5 feet causes a change in groundwater levels at the site of approximately 0.5 feet. In addition, the amplitude of the tidal fluctuations to the groundwater are small when compared to the saturated thickness of the aquifer (60 feet) (Levine-Fricke, 1993). Tidal data from the upcoming GMP Water Level Study, from the Hydrogeologic Characterization Report (Levine-Fricke, 1993), and from the Hydrogeologic Study Report (Dames & Moore, 1986) will be used, along with other groundwater flow data to simulate the tidal influences to groundwater beneath the Refinery. However, it will also be evaluated that, since tidal fluctuations are small compared to the saturated thickness of the aquifer, equations presented in Todd (1980) can be used to show that the mean, or regional hydraulic gradient can be used to represent the groundwater flow regime.

Other factors to be considered as input into the groundwater model include:

- The model boundary conditions,
- Rates of extraction and injection from local wells,
- Rates of recharge from infiltration of irrigation water,
- Rate of evapotranspiration, and
- Rates of recharge from surface water bodies.

The proposed boundary conditions of the model are discussed below. The amount of irrigation water infiltrating into the aquifer will be factored in as recharge to the northern boundary of the model. Recharge to the top of the model from precipitation is considered to be negligible due to the high rate of evapotranspiration (Dames & Moore, 1986). Recharge to the aquifer from surface water bodies, such as the drainage ditch on the eastern side of the site, will be investigated further.

Model boundary locations will be established after active wells and surface water features are identified. The boundary conditions will be placed at sufficient distance from site features as to not interfere with their effects to the aquifer. This will hold for the northern, western, and southern boundaries of the model. The drainage ditch on the eastern side will be used as the eastern boundary. The top of the water table in the uppermost aquifer will be considered the top of the model. The bottom of the model may be the top of the uppermost aquitard, at about 60 feet bgs or the top of Aquitard 1, at about 110 feet bgs depending on water level and tidal data collected for the upcoming GMP water level study.

Model assumptions based on the groundwater flow model code (MODFLOW) and the known data about the site hydrogeology, are as follows:

- The uppermost aquifer is unconfined, homogeneous, and vertically anisotropic.

- The groundwater is a constant density, although the salinity of the uppermost aquifer increases toward the coast and average of TDS is greater than 10,000 mg/L beneath the Refinery. Salinity differences will not be simulated in the model.

- The groundwater flow in aquifers and aquitards behaves as porous media flow.

- Infiltration from precipitation is negligible due to the low amounts of rainfall and high evaporation potential within the Ewa Plain.

- Discharge of groundwater to the ocean is estimated to be 170 to 180 gallons per day per foot (Williams, 1976; Dames & Moore, 1986).

- Groundwater gradients are very flat near the coast at the Refinery, and are estimated to be about 9.8×10^{-5} (Levine-Fricke, 1993).

GROUNDWATER QUALITY

Groundwater quality at the site is typified by the occurrence of brackish to saline water with total dissolved solid (TDS) concentrations ranging from approximately 3,500 mg/L to over 25,000 mg/L depending on location and depth. This brackish to saline groundwater has been partially impacted with petroleum hydrocarbons. Potential sources are dissolved constituents from floating product. Floating product is observed in wells MW-3, 4, 5, and 6. It should be noted, since the sources of groundwater impacts are not clearly defined, there is a potential for the presence of a source beyond the area of investigation. Though the TDS concentrations are quite high, density differences of water will not be considered since the introduction and mixing of fresh and saline waters does not appear to be significant within the model domain.

Groundwater impacts at the Refinery include: volatile organic compounds, semi-volatile organic compounds, and metals. Table 2 lists the most recent groundwater sampling analytical testing results available to Dames & Moore. These data show low concentrations of metals (all below 0.05 μg/L) for both total and dissolved constituents, the presence of volatile aromatic hydrocarbons (benzene, ethylbenzene, and xylenes) at concentrations below 10 μg/L, and the presence of semi-volatile constituents (primarily naphthalene and 1- and 2-methylnaphthalene) at concentrations ranging from 25 to 280 μg/L.

Based on the data listed in Table 2, one or two of the constituents will be used in the numerical model transport simulations. Predictions of the behavior of these constituents will be used as the performance criteria for the transport model. The most mobile constituent and/or the constituent that poses the greatest threat to human health and the environment, will be used in the transport model simulations.

It should be noted that Table 2 lists chemical analytical results for wells that are adjacent to the ponds. Five additional well clusters have recently been installed (CW-5 through CW-9) at the Refinery. Chemical analytical results from these wells are not currently available, but will be reviewed when available to determine a contaminant distribution for input into the numerical transport model.

NUMERICAL MODEL SELECTION

Appendix G of the GMP discusses several models available to simulate the transport of constituents in groundwater. Based on the input parameters available for the site and the contaminants of interest, Dames & Moore proposes to use a Modular Three-Dimensional Finite-Difference Groundwater Flow Model (MODFLOW) (McDonald and Harbough, 1988) to simulate groundwater flow conditions, and MT3D (Zheng, 1990) to simulate contaminant transport. The governing equations that describe groundwater flow and the three dimensional transport of contaminants in the groundwater system described above is not presented here, instead the reader is directed to Bear, 1979; MacDonald and Harbough, 1988; and Zheng, 1990.

MODFLOW is a computer code that uses the finite-difference method to solve the groundwater flow equation and can simulate confined and/or unconfined aquifers, wells (injection or pumping), recharge, rivers, drains, and evapotranspiration. MT3D is a transport model that uses output from MODFLOW to simulate contaminant transport. The form of the equation that is solved numerically using MT3D considers advection, dispersion (mechanical and molecular), sorption (retardation) and biodegradation. Based on the analytical results presented in Table 2, these processes should be adequate to approximate transport of contaminants in groundwater beneath the Refinery.

Both the groundwater flow and transport numerical model have been selected to simulate transport of constituents in groundwater at the Refinery. The numerical models selected appear to be flexible enough to provide for some of the complexities of the physical system as interpreted in this report. If these models are approved for use, the site will be discretized, and all data currently being collected will be available for review. After the grid is designed and parameters are input, model simulations will begin. Calibration of the model will compare simulated and actual head measurements. These calibration targets will be defined and documented before simulations begin. Model validation of pumping test data will be simulated independent of the calibration procedures. The calibrated model will then be used to simulate the fate and transport of constituents in groundwater.

-oOo-

REFERENCES

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McDonald, M.G., and A.W. Harbough, 1988. Techniques of Water-Resources Investigations of the United States Geological Survey, A Modular, Three-Dimensional Finite-Difference Groundwater Flow Model, USGS, Chapter A1, Book 6.

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Williams, J.A., 1976. Groundwater Leakage in the Vicinity of the Barbers Point Barge Harbor, Oahu, Hawaii. U.S. Army Corps of Engineers, October.

Zheng, C., 1990. MT3D — A Modular Three-Dimensional Transport Model for Simulation of Advection, Dispersion, and Chemical Reactors of Contaminants in Groundwater Systems, S.S. Papadopulous & Associates, Inc.

TABLE 1
GROUNDWATER FLOW MODEL PARAMETERS
BHP PETROLEUM AMERICAS REFINING, INC.
KAPOLEI, OAHU, HAWAII

Parameter	Value	Source
Uppermost Aquifer		
Hydraulic Conductivity (K)	530 to 1,100 feet/day 4,000 to 5,000 feet/day	Levine-Fricke, 1993 Dames & Moore, 1986
Vertical Hydraulic Conductivity (K_z)	88 to 440 feet/day	Levine-Fricke, 1993
Horizontal Gradient	variable, about 9.8×10^{-5}	Levine-Fricke, 1993
Vertical Gradient	variable, average -0.02	Levine-Fricke, 1993
Storage Coefficient (S)	0.032 to 0.045	Levine-Fricke, 1993
Effective Porosity (ne)	0.1	Williams, 1976
Thickness (b)	about 60 feet	Levine-Fricke, 1993
Uppermost Aquitard		
Hydraulic Conductivity (K)	?	
Vertical Hydraulic Conductivity (K_z)	0.062 to 7.28 feet/day	Levine-Fricke, 1993
Thickness (b)	5 to 10 feet	Dames & Moore, 1986
Other		
Annual Precipitation	< 20 inches/year	Dames & Moore, 1986
Evapotranspiration	?	Dames & Moore, 1986
Pumping Well Data	?	
Injection Well Data	150 GPM	BHP, 1995
Other Sources or Sinks	?	

? Data not available or uncertain.

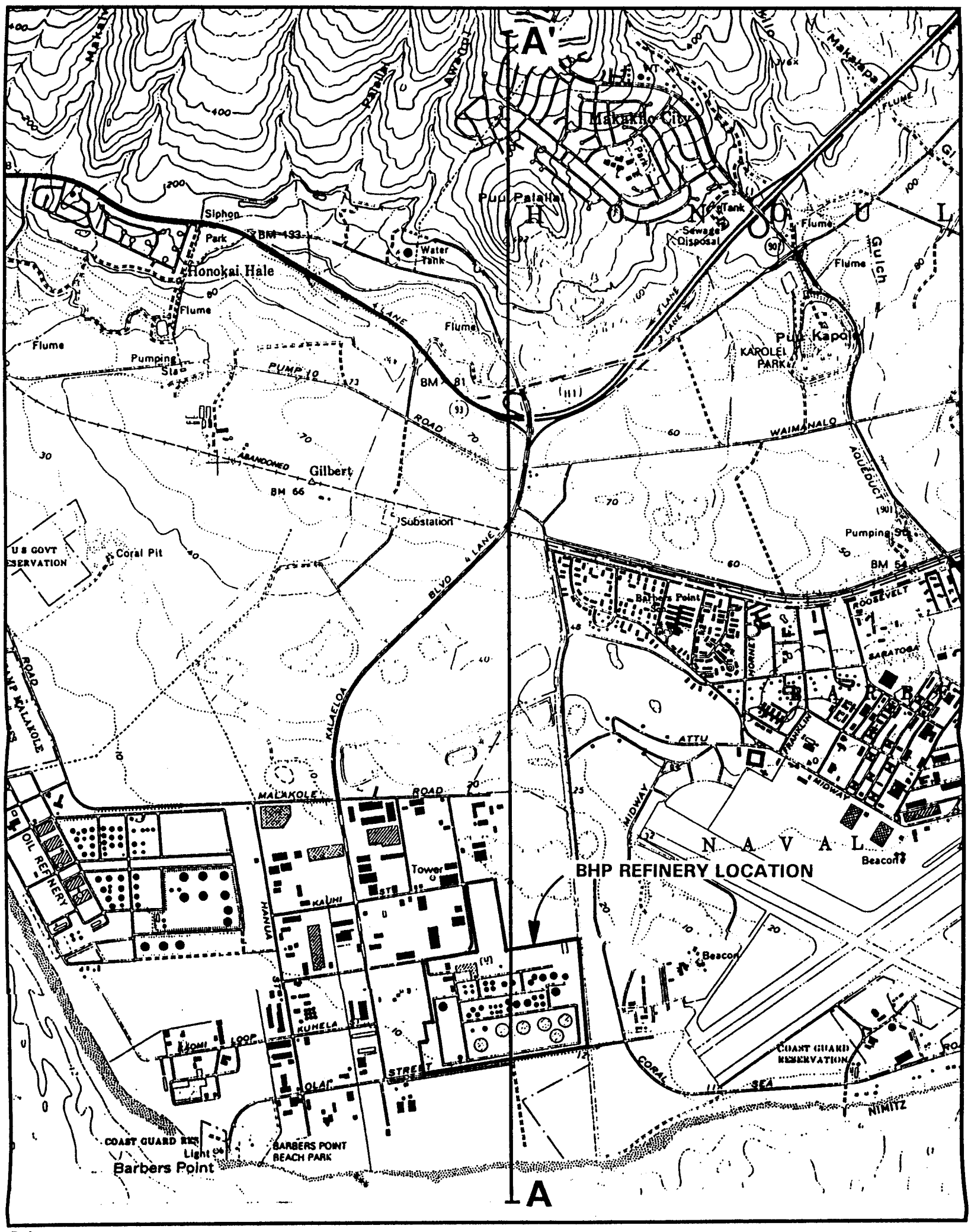
GPM gallons per minute.

TABLE 2
SUMMARY OF GROUNDWATER CHEMICAL ANALYTICAL RESULTS
DETECTIONS ONLY — HIGH AND LOW TIDE
AUGUST 1994

Parameter	Units	MW-3		MW-4		MW-5		MW-6		CW-4A		CW-4B		CW-4C	
		Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Total Barium	mg/L	0.02	0.03	0.02	0.03	0.01	0.01	0.01	0.01	<0.01	<0.01	0.03	0.03	0.02	0.02
Total Mercury	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.0005	<0.0005	0.0008	<0.0005	<0.0005
Total Nickel	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Lead	mg/L	<0.002	<0.002	<0.002	<0.002	0.003	<0.002	<0.002	<0.002	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02
Total Selenium	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.02	0.052	<0.04	0.065	0.059	0.043
Total Vanadium	mg/L	0.01	0.02	0.01	0.02	0.02	0.01	0.02	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dissolved Barium	mg/L	0.02	0.03	0.02	0.03	0.01	0..01	0.01	0.01	<0.01	<0.01	0.03	0.03	0.02	0.02
Dissolved Nickel	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dissolved Vanadium	mg/L	0.01	<0.01	0.01	0-.01	0.02	0.01	0.02	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzene	µg/L	8	7	2	2	<1	<1	8	<20	1	1	<1	<1	<1	<1
Chlorobenzene	µg/L	1	<1	<1	<1	13	<1	<1	NR	<1	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	3	4	2	<1	5	<1	<20	<1	2	<1	<1	<1	<1
Xylenes (total)	µg/L	<1	<1	<1	<1	<1	2	<1	<20	2	2	<1	<1	<1	<1
Naphthalene	µg/L	110	110	31	49	<25	<25	<25	42	<10	<20	<10	<10	<10	<10
1-Methylnaphthalene	µg/L	38	26	<25	25	<25	<25	<25	<25	<10	<20	<10	<10	<10	<10
1-Methylnaphthalene	µg/L	130	150	90	280	64	73	110	93	<10	23	<10	<10	<10	<10
2,4-Dimethylphenol	µg/L	<25	<25	<25	<25	28	<25	<25	<25	<10	<20	<10	<10	<10	<10

NR = Not recorded.

Source: Environmental Technologies Int., BHPPAR Table 1



Reference:
1983 United States Geological Survey: Ewa Quadrangle
Site Vicinity Map
Produced by Park Environmental and
Provided by BHP Petroleum Americas
Refining, Inc. on January 12, 1995;
Modified by Dames & Moore January 13, 1995.

0 2000 4000
Feet

North

SITE VICINITY MAP
SHOWING CROSS-SECTION A-A'

EWA PLAIN
EWA, OAHU, HAWAII

Dames & Moore
Figure 1

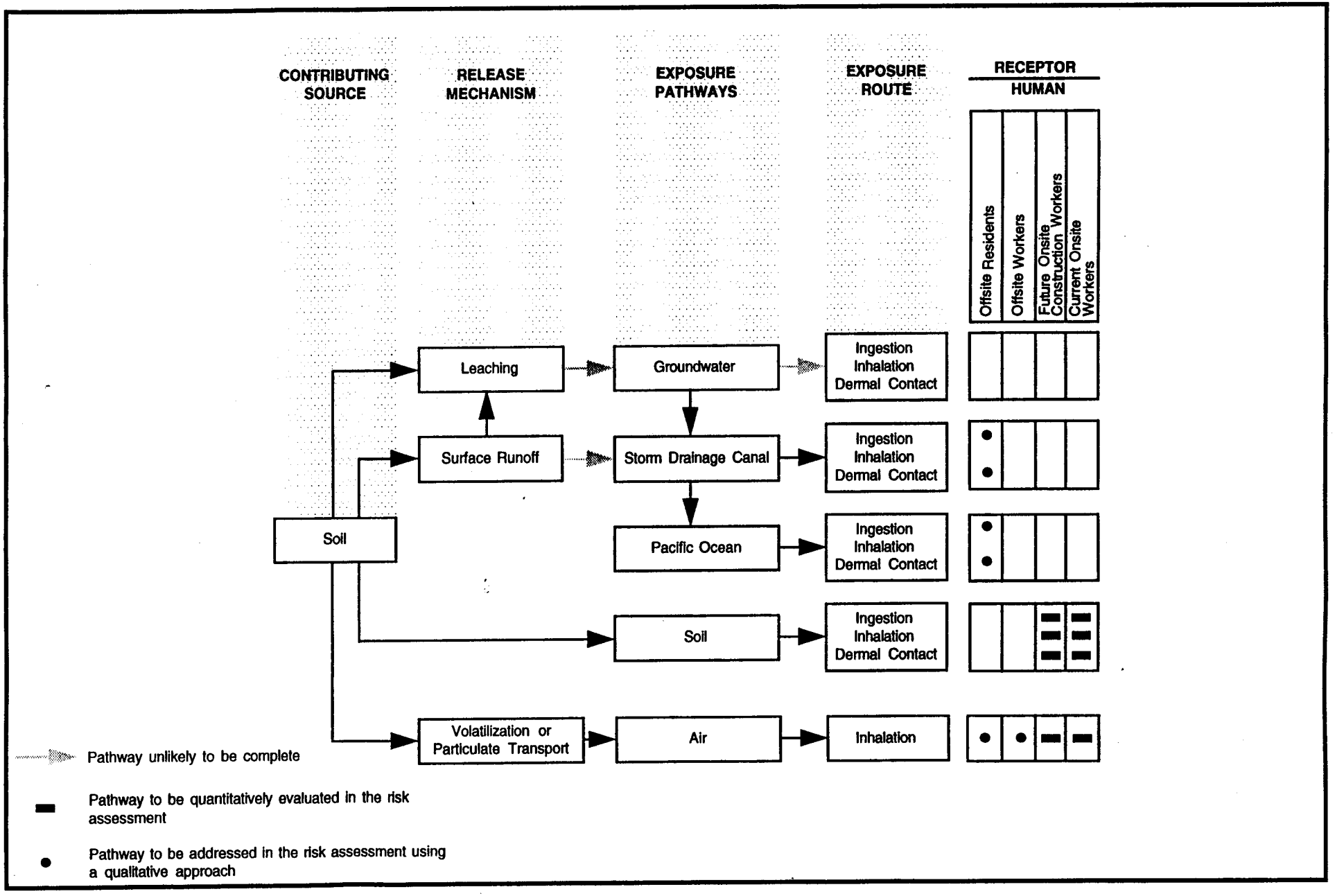
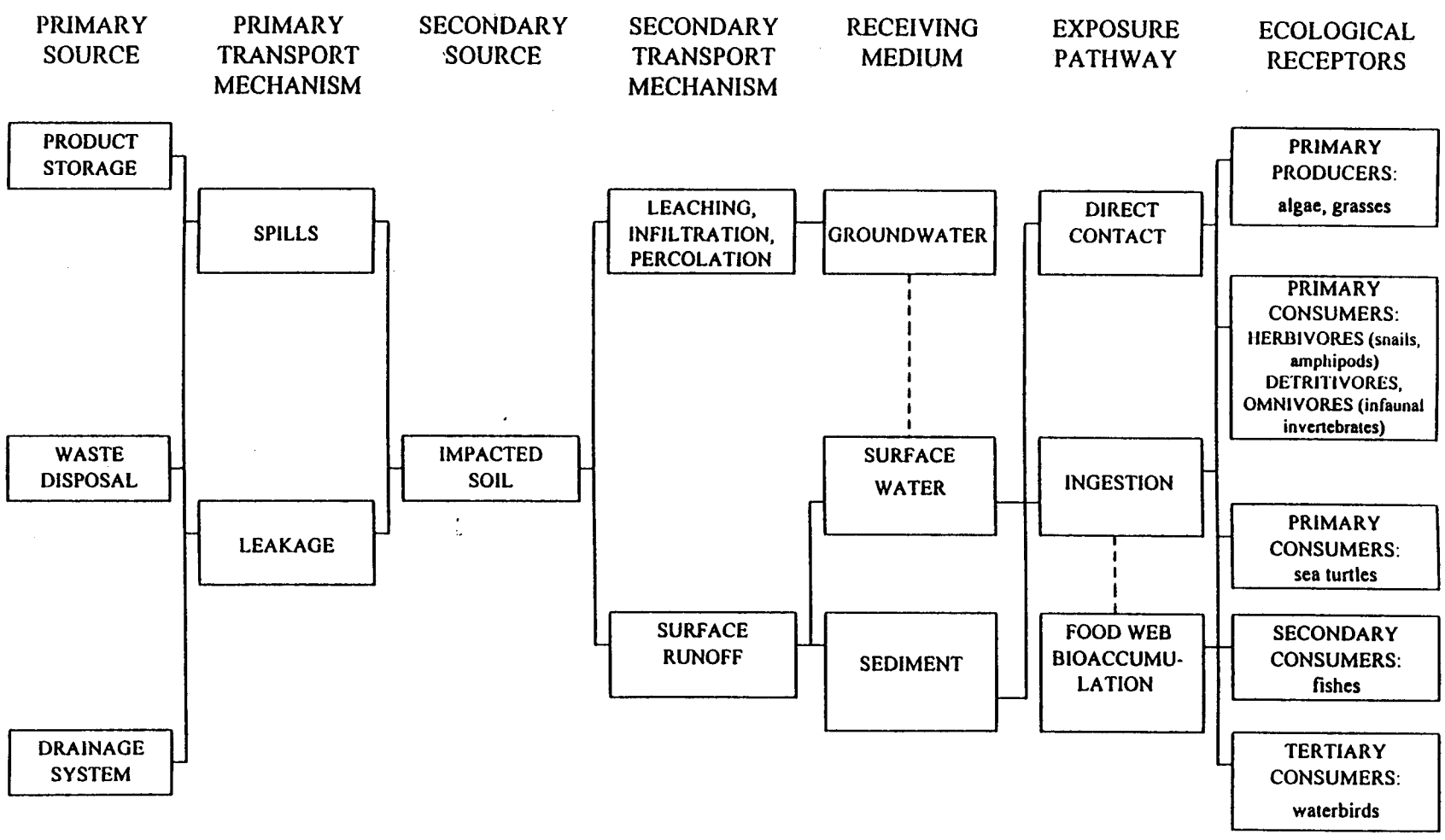
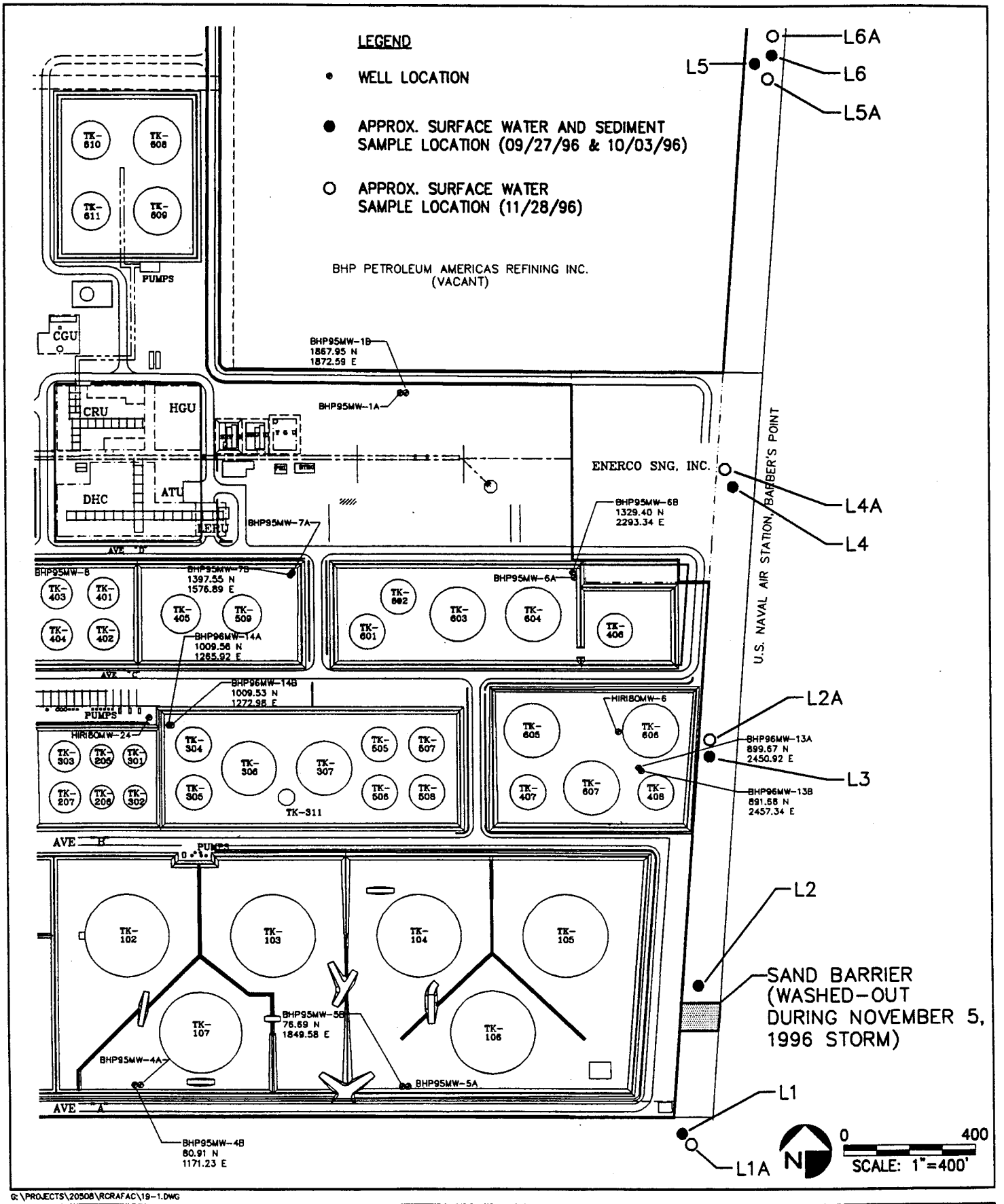


Figure 22.2 Conceptual Site Model for BHP Refinery, Kapolei, Hawaii

Figure 21-5. Ecological Model for the BHP Refinery Site and Vicinity.





G:\PROJECTS\20508\RCRAFAC\19-1.DWG

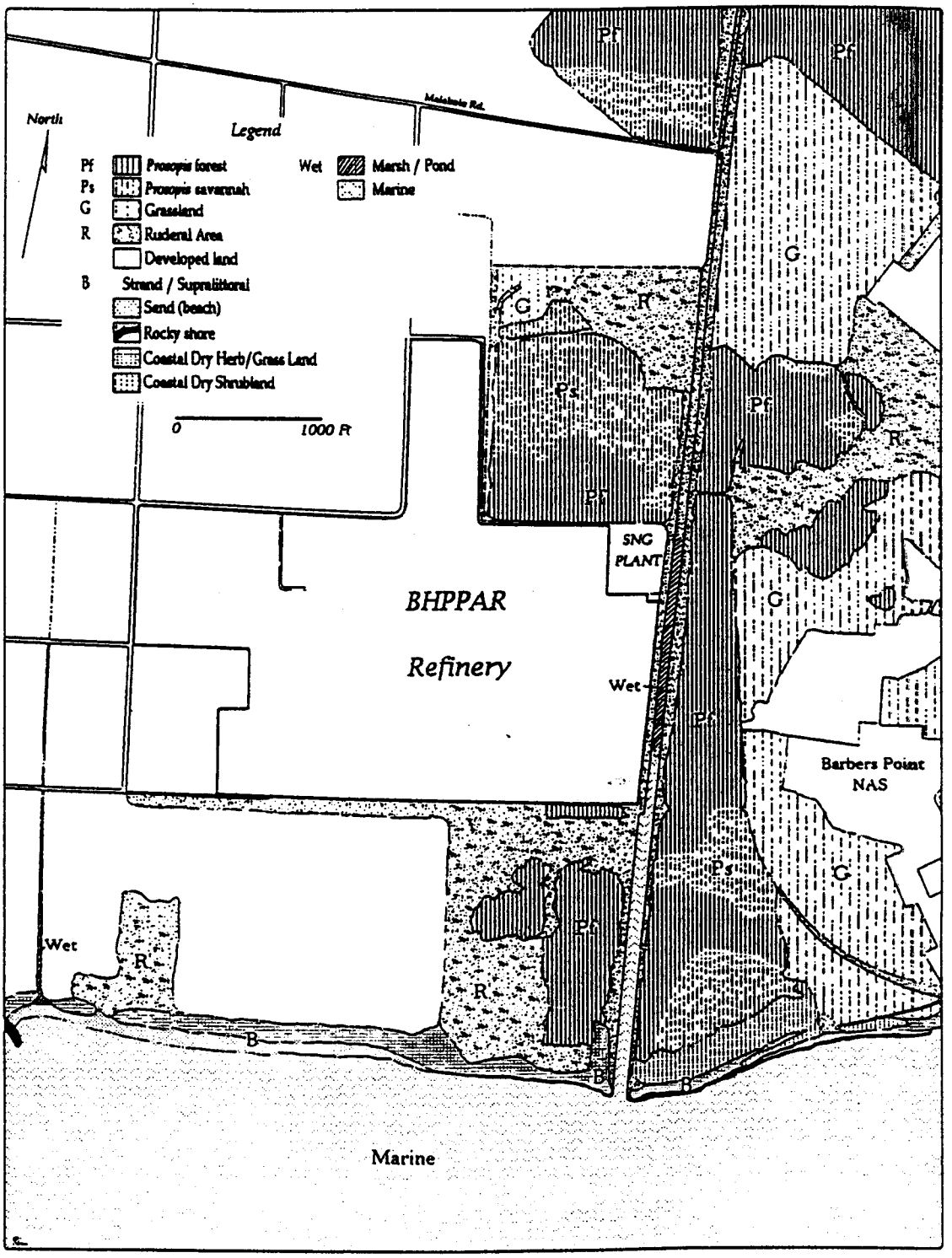
EARTH TECH

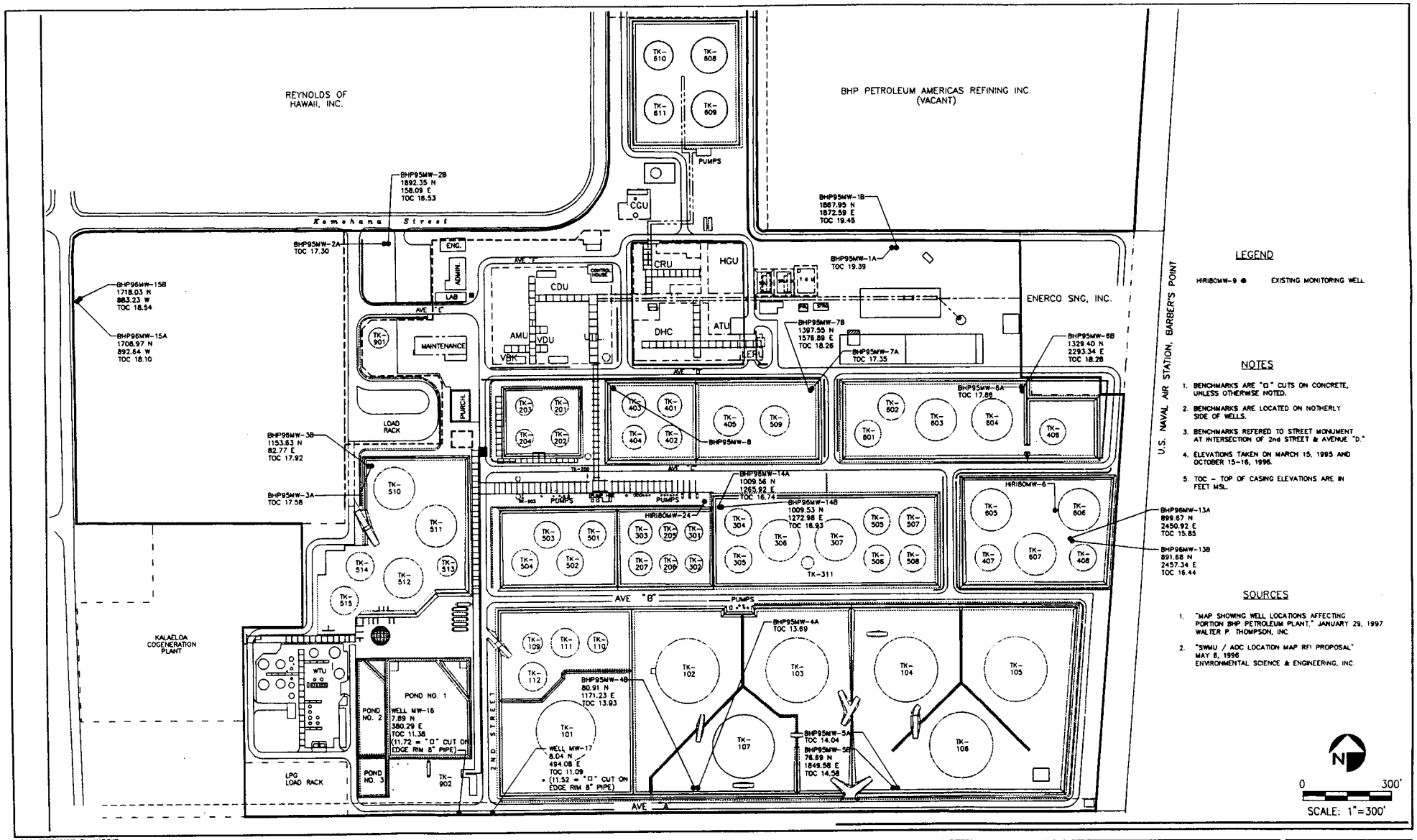
SAMPLING LOCATIONS
CANAL SURFACE WATER AND SEDIMENT
BHP, PETROLEUM AMERICAS REFINING INC.

FIGURE 19-1

FIGURE 21-1

MAPPING OF ECOSYSTEMS IN THE VICINITY OF THE BHP REFINERY AT BARBERS POINT, OAHU, HAWAII



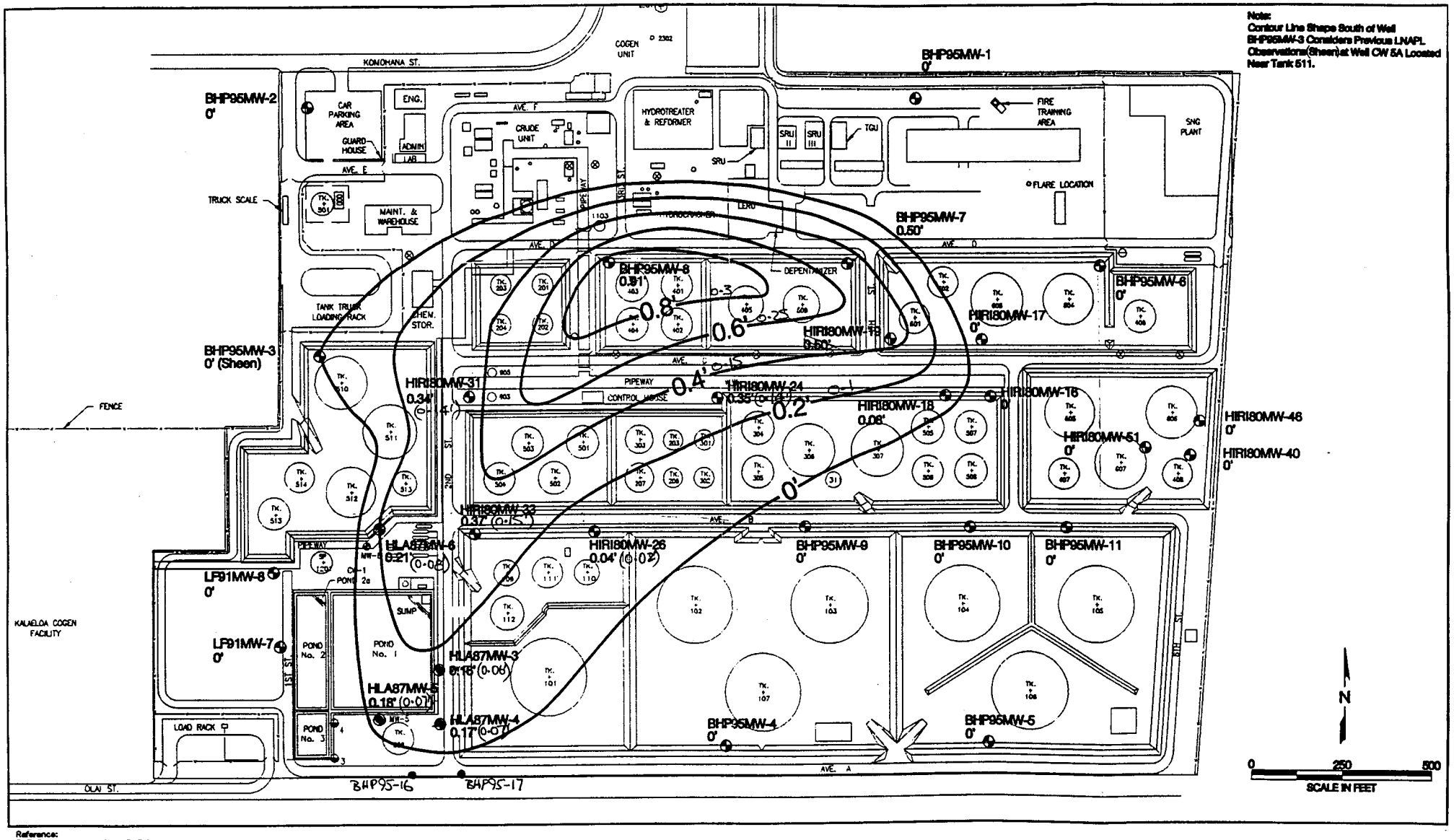


G:\PROJECTS\20008\WELL-MAP.DWG

EARTH TECH

WELL LOCATION MAP
BHP, PETROLEUM AMERICAS REFINING INC.

FIGURE
20-1



Reference:
BHP Petroleum Americas Refining Inc.
Refinery Site Plan with Proposed Groundwater Monitoring Well Cluster Locations, Figure 3
Proj. No. 45-93-033
Dated: 29 Jul 93

TRUE/APPARENT THICKNESS = 0.3 to 0.45
Adopt → 0.4

DAMES & MOORE

INTERPRETED LNAPL APPARENT ACCUMULATION CONTOUR MAP

FREE PRODUCT MNAGEMENT PROGRAM, PHASE 2
BHP PETROLEUM AMERICAS REFINING INC.
KAPOLEI, OAHU, HAWAII

FIGURE 2

DRAFT CONCEPTUAL MODEL
FOR GROUNDWATER MODELING OF BHP REFINERY
91-325 KOMOHANA STREET
KAPOLEI, OAHU, HAWAII
FOR BHP PETROLEUM AMERICAS REFINING, INC.

DAMES & MOORE

Dames & Moore Job No. 29604-001-037
January 12, 1995

(HON-046:29604-001-037)

DAMES & MOORE
1050 QUEEN STREET, SUITE 204, HONOLULU, HAWAII 96814
(808) 593-1116 FAX: (808) 593-1198

January 12, 1995

Mr. Tony Shan
Hydrogeologist
BHP Petroleum Americas Refining, Inc.
91-325 Komohana Street
Kapolei, Oahu, HI 96707

Draft Conceptual Model
for Groundwater Modeling of BHP Refinery
91-325 Komohana Street
Kapolei, Oahu, Hawaii
Job No. 29604-001-037

Dear Mr. Shan:

This draft report presents a conceptual geologic model for the site located at BHP Petroleum Americas Refining, Inc. Kapolei, Oahu, Hawaii (Refinery).

Dames & Moore is pleased to present BHP Petroleum Americas Refining, Inc. with a draft of our Conceptual Model for Groundwater Modeling of BHP Refinery, at 91-325 Komohaha Street, in Kapolei, Oahu, Hawaii. We trust this draft provides BHP Petroleum Americas Refining, Inc. with the information you require at this time. Should you have any questions or comments regarding the information presented in this draft, please contact us.

We trust this draft report contains the information you require at this time. If you have any questions or need additional information, please feel free to contact either Don Walker or Casey Schmidt, in Sacramento, California, at (916) 387-8800 or Zuyi Shen at (808) 593-1116 in Honolulu, Hawaii.

Sincerely,

DAMES & MOORE

Donald P. Walker	Casey S. Schmidt	Zuyi Shen
Engineer	Project Hydrogeologist	Hydrogeologist

(HON-046:29604-001-037)

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TABLE 2 SUMMARY OF GROUNDWATER CHEMICAL ANALYTICAL RESULTS DETECTIONS ONLY — HIGH AND LOW TIDE, AUGUST 1994

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FIGURE 1 SITE VICINITY MAP SHOWING CROSS-SECTION A-A'

FIGURE 2 GENERALIZED HYDROGEOLOGIC CROSS-SECTION OF THE EWA PLAIN

DRAFT CONCEPTUAL MODEL
FOR GROUNDWATER MODELING OF BHP REFINERY
91-325 KOMOHANA STREET
KAPOLEI, OAHU, HAWAII
FOR BHP PETROLEUM AMERICAS REFINING, INC.

INTRODUCTION

This report presents a conceptual geologic model for the site located at BHP Petroleum Americas Refining, Inc. Kapolei, Oahu, Hawaii (Refinery Figure 1). The conceptual geologic model's physical domain was used to outline the data needs, and to select computer codes that may be appropriate to simulate groundwater flow and contaminant transport in groundwater beneath the Refinery.

Elements of the conceptual model were established in the Groundwater Monitoring Plan (GMP) prepared by Delta Environmental Consultants. The GMP documents procedures used to provide data necessary to meet the requirements specified in the Consent Agreement and Final Order, EPA Docket No. RCRA 09-91-0007. The GMP addresses groundwater flow and transport modeling procedures used to "facilitate evaluation of the rate and extent of dissolved phase 'Skinner List' constituents that may be migrating within the groundwater flow system beneath the Refinery". The modeling process described in the GMP includes 1) establishing the problem domain, 2) developing a conceptual model, 3) establishing performance criteria, 4) establishing governing equations and selecting appropriate computer codes 5), conducting model runs, and 6) evaluating model results. Items 1) through 4) of the modeling process are discussed below. The domain and geologic conceptual model are defined in the Geology and Hydrogeology section. The performance criteria and the rationale for their selection is presented under the Groundwater Quality section. This discussion is followed by a section that discusses the selection of computer codes.

GEOLOGY AND HYDROGEOLOGY

The Refinery is located in the Ewa Plain of southwestern Oahu, Hawaii, approximately 2,000 feet north and 4,000 feet east of the Pacific Ocean, at an elevation of about 10 to 15 feet above mean sea level. The Ewa Plain is generally flat with gentle seaward sloping surfaces, and is underlain by terrestrial sediments derived from basaltic rocks from the Koolau and Wainanae volcanic formations. These sediments were covered by and interbedded with a succession of marine sediments (fossil reef marine limestone) that are exposed at the surface over approximately two-thirds of the Ewa Plain. The terrestrial and marine sediments were deposited as a wedge that thickens to a maximum of about

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The shallow (water table) aquifer is termed "uppermost aquifer," and extends from the water table, which occurs about 10 feet below ground surface (bgs) to a depth of about 60 feet bgs (see attached Figure 2). The uppermost aquifer is composed of porous coralline limestone with discontinuous lenses of siltstone, sandy silt and silty sands. The limestone is composed of a very porous, fossil rich matrix which contains worm tubes and voids measuring up to several inches (possible solution cavities) (Levine-Fricke, 1993).

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Other factors to be considered as input into the groundwater model include:

- The model boundary conditions,
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- Rates of recharge from surface water bodies.

The proposed boundary conditions of the model are discussed below. The amount of irrigation water infiltrating into the aquifer will be factored in as recharge to the northern boundary of the model. Recharge to the top of the model from precipitation is considered to be negligible due to the high rate of evapotranspiration (Dames & Moore, 1986). Recharge to the aquifer from surface water bodies, such as the drainage ditch on the eastern side of the site, will be investigated further.

Model boundary locations will be established after active wells and surface water features are identified. The boundary conditions will be placed at sufficient distance from site features as to not interfere with their effects to the aquifer. This will hold for the northern, western, and southern boundaries of the model. The drainage ditch on the eastern side will be used as the eastern boundary. The top of the water table in the uppermost aquifer will be considered the top of the model. The bottom of the model may be the top of the uppermost aquitard, at about 60 feet bgs or the top of Aquitard 1, at about 110 feet bgs depending on water level and tidal data collected for the upcoming GMP water level study.

Model assumptions based on the groundwater flow model code (MODFLOW) and the known data about the site hydrogeology, are as follows:

- The uppermost aquifer is unconfined, homogeneous, and vertically anisotropic.

- The groundwater is a constant density, although the salinity of the uppermost aquifer increases toward the coast and average of TDS is greater than 10,000 mg/L beneath the Refinery. Salinity differences will not be simulated in the model.

- The groundwater flow in aquifers and aquitards behaves as porous media flow.

- Infiltration from precipitation is negligible due to the low amounts of rainfall and high evaporation potential within the Ewa Plain.

- Discharge of groundwater to the ocean is estimated to be 170 to 180 gallons per day per foot (Williams, 1976; Dames & Moore, 1986).

- Groundwater gradients are very flat near the coast at the Refinery, and are estimated to be about 9.8×10^{-5} (Levine-Fricke, 1993).

GROUNDWATER QUALITY

Groundwater quality at the site is typified by the occurrence of brackish to saline water with total dissolved solid (TDS) concentrations ranging from approximately 3,500 mg/L to over 25,000 mg/L depending on location and depth. This brackish to saline groundwater has been partially impacted with petroleum hydrocarbons. Potential sources are dissolved constituents from floating product. Floating product is observed in wells MW-3, 4, 5, and 6. It should be noted, since the sources of groundwater impacts are not clearly defined, there is a potential for the presence of a source beyond the area of investigation. Though the TDS concentrations are quite high, density differences of water will not be considered since the introduction and mixing of fresh and saline waters does not appear to be significant within the model domain.

Groundwater impacts at the Refinery include: volatile organic compounds, semi-volatile organic compounds, and metals. Table 2 lists the most recent groundwater sampling analytical testing results available to Dames & Moore. These data show low concentrations of metals (all below 0.05 μg/L) for both total and dissolved constituents, the presence of volatile aromatic hydrocarbons (benzene, ethylbenzene, and xylenes) at concentrations below 10 μg/L, and the presence of semi-volatile constituents (primarily naphthalene and 1- and 2-methylnaphthalene) at concentrations ranging from 25 to 280 μg/L.

Based on the data listed in Table 2, one or two of the constituents will be used in the numerical model transport simulations. Predictions of the behavior of these constituents will be used as the performance criteria for the transport model. The most mobile constituent and/or the constituent that poses the greatest threat to human health and the environment, will be used in the transport model simulations.

It should be noted that Table 2 lists chemical analytical results for wells that are adjacent to the ponds. Five additional well clusters have recently been installed (CW-5 through CW-9) at the Refinery. Chemical analytical results from these wells are not currently available, but will be reviewed when available to determine a contaminant distribution for input into the numerical transport model.

NUMERICAL MODEL SELECTION

Appendix G of the GMP discusses several models available to simulate the transport of constituents in groundwater. Based on the input parameters available for the site and the contaminants of interest, Dames & Moore proposes to use a Modular Three-Dimensional Finite-Difference Groundwater Flow Model (MODFLOW) (McDonald and Harbough, 1988) to simulate groundwater flow conditions, and MT3D (Zheng, 1990) to simulate contaminant transport. The governing equations that describe groundwater flow and the three dimensional transport of contaminants in the groundwater system described above is not presented here, instead the reader is directed to Bear, 1979; MacDonald and Harbough, 1988; and Zheng, 1990.

MODFLOW is a computer code that uses the finite-difference method to solve the groundwater flow equation and can simulate confined and/or unconfined aquifers, wells (injection or pumping), recharge, rivers, drains, and evapotranspiration. MT3D is a transport model that uses output from MODFLOW to simulate contaminant transport. The form of the equation that is solved numerically using MT3D considers advection, dispersion (mechanical and molecular), sorption (retardation) and biodegradation. Based on the analytical results presented in Table 2, these processes should be adequate to approximate transport of contaminants in groundwater beneath the Refinery.

Both the groundwater flow and transport numerical model have been selected to simulate transport of constituents in groundwater at the Refinery. The numerical models selected appear to be flexible enough to provide for some of the complexities of the physical system as interpreted in this report. If these models are approved for use, the site will be discretized, and all data currently being collected will be available for review. After the grid is designed and parameters are input, model simulations will begin. Calibration of the model will compare simulated and actual head measurements. These calibration targets will be defined and documented before simulations begin. Model validation of pumping test data will be simulated independent of the calibration procedures. The calibrated model will then be used to simulate the fate and transport of constituents in groundwater.

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TABLES

TABLE 1
GROUNDWATER FLOW MODEL PARAMETERS
BHP PETROLEUM AMERICAS REFINING, INC.
KAPOLEI, OAHU, HAWAII

Parameter	Value	Source
Uppermost Aquifer		
Hydraulic Conductivity (K)	530 to 1,100 feet/day 4,000 to 5,000 feet/day	Levine-Fricke, 1993 Dames & Moore, 1986
Vertical Hydraulic Conductivity (K_z)	88 to 440 feet/day	Levine-Fricke, 1993
Horizontal Gradient	variable, about 9.8×10^{-5}	Levine-Fricke, 1993
Vertical Gradient	variable, average -0.02	Levine-Fricke, 1993
Storage Coefficient (S)	0.032 to 0.045	Levine-Fricke, 1993
Effective Porosity (ne)	0.1	Williams, 1976
Thickness (b)	about 60 feet	Levine-Fricke, 1993
Uppermost Aquitard		
Hydraulic Conductivity (K)	?	
Vertical Hydraulic Conductivity (K_z)	0.062 to 7.28 feet/day	Levine-Fricke, 1993
Thickness (b)	5 to 10 feet	Dames & Moore, 1986
Other		
Annual Precipitation	< 20 inches/year	Dames & Moore, 1986
Evapotranspiration	?	Dames & Moore, 1986
Pumping Well Data	?	
Injection Well Data	150 GPM	BHP, 1995
Other Sources or Sinks	?	

? Data not available or uncertain.

GPM gallons per minute.

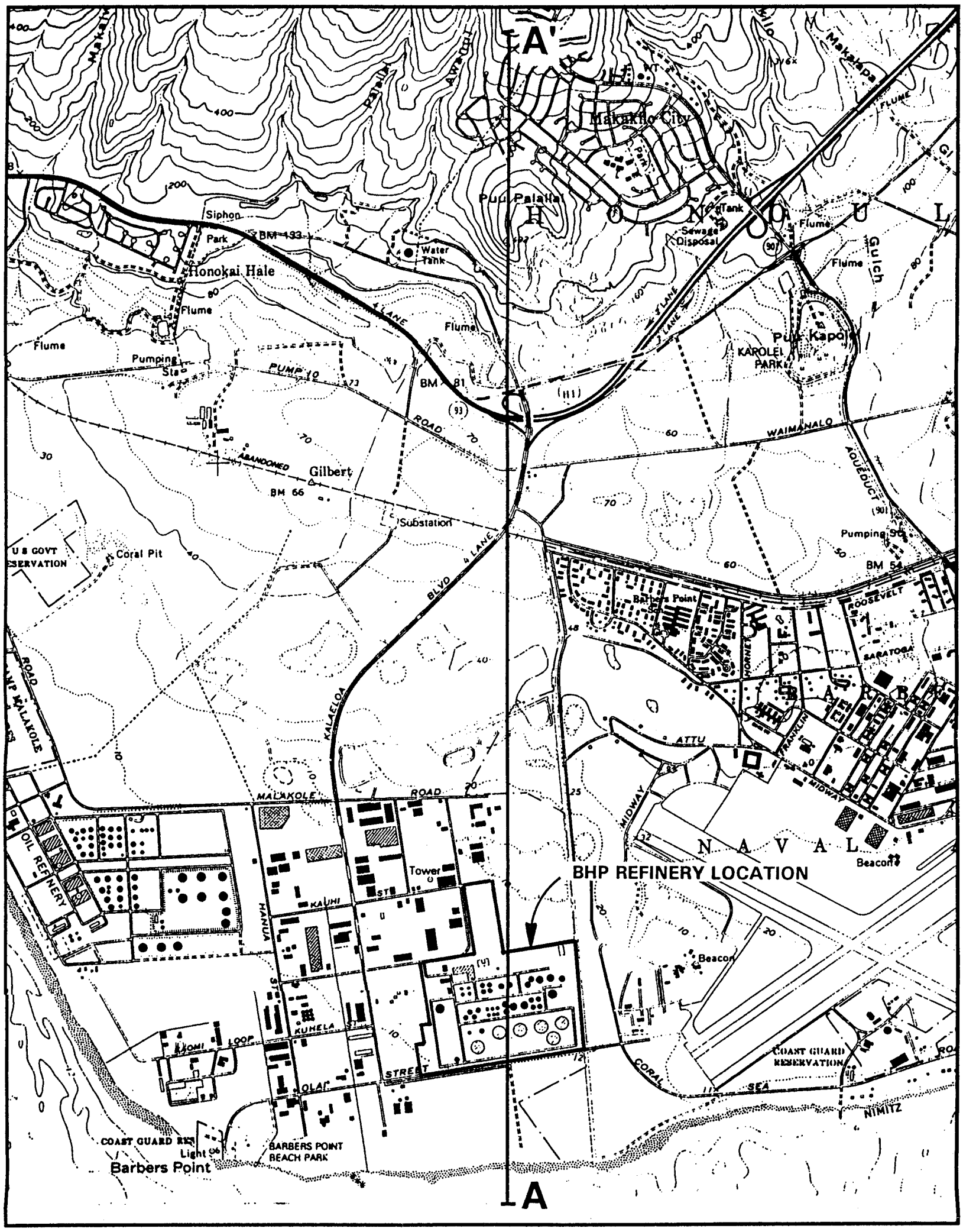
TABLE 2
SUMMARY OF GROUNDWATER CHEMICAL ANALYTICAL RESULTS
DETECTIONS ONLY — HIGH AND LOW TIDE
AUGUST 1994

Parameter	Units	MW-3		MW-4		MW-5		MW-6		CW-4A		CW-4B		CW-4C	
		Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Total Barium	mg/L	0.02	0.03	0.02	0.03	0.01	0.01	0.01	0.01	<0.01	<0.01	0.03	0.03	0.02	0.02
Total Mercury	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.0005	<0.0005	<0.0005	0.0008	<0.0005	<0.0005
Total Nickel	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Lead	mg/L	<0.002	<0.002	<0.002	<0.002	0.003	<0.002	<0.002	<0.002	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02
Total Selenium	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.02	0.052	<0.04	0.065	0.059	0.043
Total Vanadium	mg/L	0.01	0.02	0.01	0.02	0.02	0.01	0.02	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dissolved Barium	mg/L	0.02	0.03	0.02	0.03	0.01	0..01	0.01	0.01	<0.01	<0.01	0.03	0.03	0.02	0.02
Dissolved Nickel	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dissolved Vanadium	mg/L	0.01	<0.01	0.01	0-.01	0.02	0.01	0.02	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzene	µg/L	8	7	2	2	<1	<1	8	<20	1	1	<1	<1	<1	<1
Chlorobenzene	µg/L	1	<1	<1	<1	13	<1	<1	NR	<1	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	<1	3	4	2	<1	5	<1	<20	<1	2	<1	<1	<1	<1
Xylenes (total)	µg/L	<1	<1	<1	<1	<1	2	<1	<20	2	2	<1	<1	<1	<1
Naphthalene	µg/L	110	110	31	49	<25	<25	<25	42	<10	<20	<10	<10	<10	<10
1-Methylnaphthalene	µg/L	38	26	<25	25	<25	<25	<25	<25	<10	<20	<10	<10	<10	<10
1-Methylnaphthalene	µg/L	130	150	90	280	64	73	110	93	<10	23	<10	<10	<10	<10
2,4-Dimethylphenol	µg/L	<25	<25	<25	<25	28	<25	<25	<25	<10	<20	<10	<10	<10	<10

NR = Not recorded.

Source: Environmental Technologies Int., BHPPAR Table 1

FIGURES



Reference:
1983 United States Geological Survey: Ewa Quadrangle
Site Vicinity Map
Produced by Park Environmental and
Provided by BHP Petroleum Americas
Refining, Inc. on January 12, 1995;
Modified by Dames & Moore January 13, 1995.

0 2000 4000
Feet

North

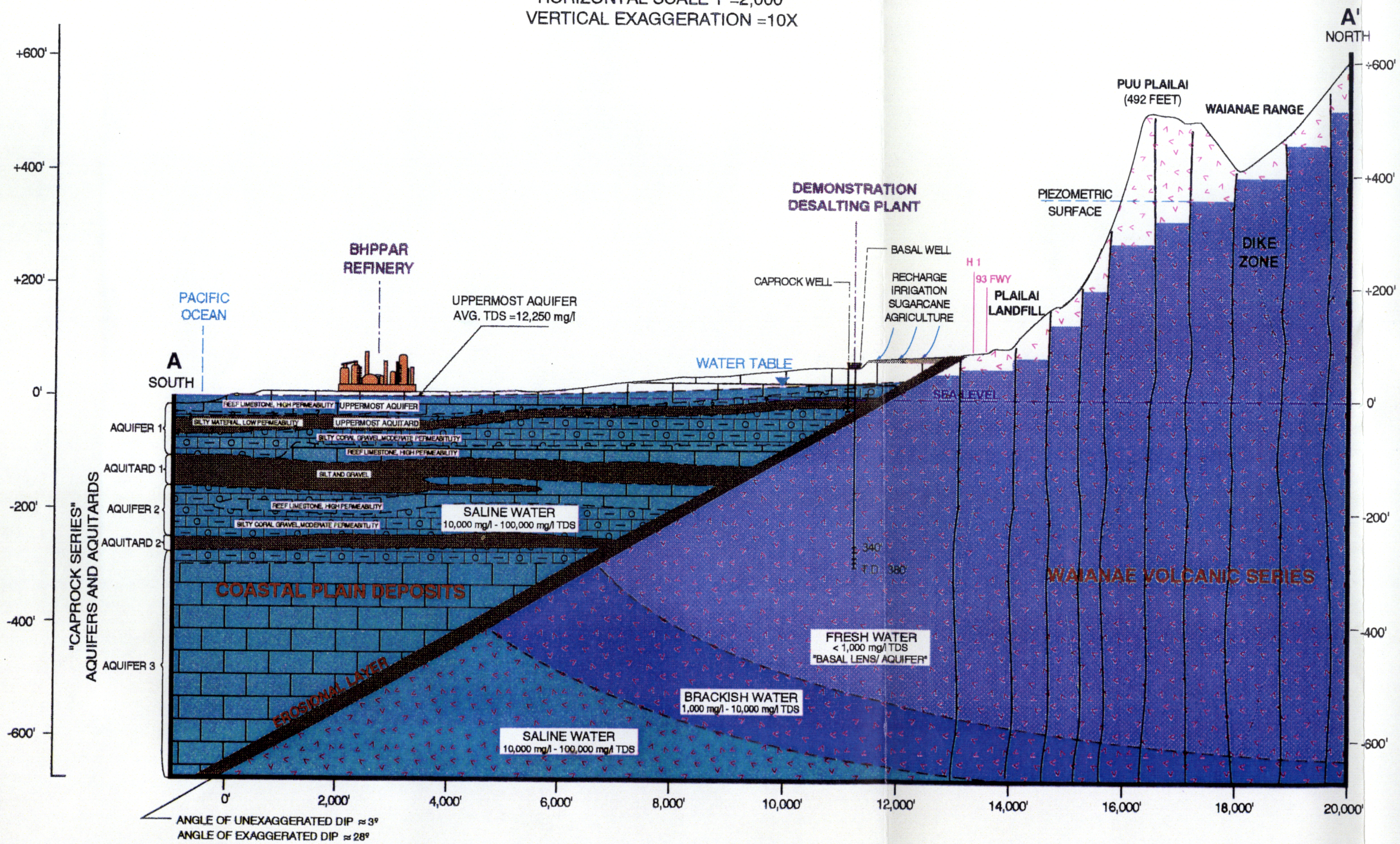
SITE VICINITY MAP
SHOWING CROSS-SECTION A-A'

EWA PLAIN
EWA, OAHU, HAWAII

Dames & Moore
Figure 1

GENERALIZED HYDROGEOLOGIC CROSS-SECTION OF THE EWA PLAIN OAHU, HAWAII

HORIZONTAL SCALE 1"=2,000'
VERTICAL EXAGGERATION =10X



Reference:
Generalized Hydrogeologic
Cross Section of the Ewa Plain
Produced by Park Environmental and
Provided by BHP Petroleum Americas
Refining, Inc. on January 12, 1995;
Modified by Dames & Moore January 13, 1995.

LEGEND

BHPPAR - BHP PETROLEUM AMERICAS REFINING INC.

mg/l - MILLIGRAM PER LITER

TDS - TOTAL DISSOLVED SOLIDS

T.D. - TOTAL DEPTH

LITHOLOGY

- REEF LIMESTONE
- SILTY CORAL GRAVEL
- SILTY MATERIAL
- ALLUVIUM
- VOLCANIC

GROUNDWATER

- SALINE WATER 10,000 mg/l - 100,000 mg/l TDS
- BRACKISH WATER 1,000 mg/l - 10,000 mg/l TDS
- FRESH WATER < 1,000 mg/l TDS

CONTACT — — — ? ? DASHED WHERE APPROXIMATELY LOCATED ; QUERIED WHERE UNCERTAIN

Dames & Moore

Figure 2