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Final Work Plan
J.H. Baxter Arlington Plant
Remedial Investigation/
Feasibility Study
Arlington, Washington

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Delivering smarter solutions

Prepared for
J.H. Baxter

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DRAFT WORK PLAN
J.H. BAXTER ARLINGTON PLANT
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
ARLINGTON, WASHINGTON

INTRODUCTION

This Work Plan outlines the proposed Remedial Investigation and Feasibility Study to address contaminant issues identifies on the J.H. Baxter Arlington site. The Work Plan summarizes the existing information, presents our conceptual understanding of property contamination issues, and develops a plan for collecting and evaluating additional information to enable selection of a cleanup action. This work plan is conducted pursuant to an Agreed Order with the Washington State Department of Ecology.

The J.H. Baxter (Baxter) wood preserving facility is a 52-acre pole processing and preservation plant located in southwest Arlington, Washington (Township 31 N., Range 5 E., Section 22). The Baxter site lies southeast of the intersection of 67th Avenue and 188th Street as shown on Figure 1. The site consists of three land parcels as shown on Figure 2:

- Parcel A, where wood is treated and stored;
- Parcel B, where untreated wood poles are stored and peeled; and
- A former woodwaste landfill, where untreated woodwaste from pole peeling operations was placed in a former sand and gravel pit. The landfill was closed in 1989 in accordance with state standards for woodwaste landfills (Sweet-Edwards/EMCON, 1989-1998).

SUMMARY OF BACKGROUND INFORMATION

Background information was reviewed to understand the site environmental conditions. This section summarizes the historical site use and describes environmental studies that have been conducted on the property over the past decade. A summary of the current operations and the chemicals used is also presented. Figure 2 presents a summary map of the relevant historical and current site features.

Historical Development and Use of Parcel A

Parcel A is a 17-acre plot of land bordered by the Burlington Northern Railroad on the east and 188th Street NE on the north. The northern half of Parcel A was farmland as late as 1965. Aerial photos from 1961 and 1965 show several buildings and site activity on the southern half of Parcel A but no evidence of logs or poles. We reviewed aerial photographs from 1961, 1964, 1965, 1967, 1969, and 1970 to assess the previous land uses and the nature of any wood treating operations up to 1970 when Baxter purchased the property for the current site use.

Butcher Operations

According to letters in Ecology and EPA files, Ted Butcher, Inc. (Butcher) developed Parcel A as a woodtreating facility in the 1960s. Butcher peeled logs to be used as telephone poles and treated them with a solution of PCP and creosote. The first evidence we found of logs and pole treating operations was in a 1967 aerial photograph of the site. This photo also shows an excavated area in the middle of the parcel, which appears to be in the process of being backfilled (See Figures 2). 1969 and 1970 aerial photographs show increased use of the site, including possible treatment buildings near the current butt-treating plant.

The 1960 series photos indicate treated poles were stored on the southern half of Parcel A. Dark areas of ground that may indicate chemical staining extend from the treatment buildings to the northwest corner of what was the excavated area in 1967 (now filled in). According to Tom Orthmeyer, the current plant manager, this was a drainage ditch that extended west toward what was then a french drain, just east of the current location of MW-3. There also appears to be stained ground in the south and northwest portions of Parcel A in the 1967 photo. There are reports that during the period of the Butcher operations (EPA, 1984), PCP and creosote wastes were allegedly disposed of in a 20-foot by 20-foot pit (referred to as the Butcher Pit).

Baxter Purchased in 1970

Baxter bought the site in 1970 and continued wood treating operations. Baxter moved untreated wood operations to Parcel B which they purchased soon after Parcel A. Parcel A became the site of the wood treatment facilities and treated wood storage area. The 1970 wood treatment facility consisted of a butt tank, a tank farm adjacent to the butt tank, a thermal retort, and an open thermal tank. Wood was initially treated with creosote and a 6.5 percent pentachlorophenol

(PCP)/aromatic oil solution (specific gravity = 0.90). Baxter performed several upgrades on the existing system over the years, including:

- Constructing a containment area for the tank farm adjacent to the butt tank (1974);
- Removing the thermal retort (1975) and replacing it with a contained pressure retort (1981). A second, contained pressure retort was added in 1984;
- Cleaning and backfilling the thermal tank (1979);
- Constructing a contained tank farm adjacent to the pressure retorts (1981); and
- Constructing a new butt tank (1990).

In March 1991, french infiltration drains (numbers 13, 14, and 23) for storm water runoff were installed. In 1993 and 1994, two more french drains (numbers 24 and 25) were added.

During expansion of the treatment system in the 1970s, an area of heavy tar was excavated and disposed of at the Arlington, Oregon, RCRA landfill. This was excavated near the southern border of Parcel A, approximately within the stained area from the 1961 and 1965 aerial photos according to a former employee of Butcher, still employed at the site by Baxter. This area has been referred to as the Butcher pit in correspondence found in Ecology files.

Releases of the PCP solution from the butt tank were reported in March 1981 (1,400 gallons), February 1989 (200 gallons), and January 1990 (2,000 gallons). Workers recovered most of the solution in each case. According to reports, the 1981 and 1989 releases flowed approximately 50 feet south-southeast of the butt tank toward the treatment plant. During the January 1990 release, the PCP solution flowed northwest, where it collected in a small depression south of the treated pole storage area. A portion of the spill also flowed south onto Parcel B, where site personnel contained it in a former infiltration basin. Figure 2 identifies the locations where spilled product reportedly accumulated.

Historical Development and Use of Parcel B

Parcel B is a 28-acre plot of land that lies on the southern border of Parcel A and the former woodwaste landfill. Prior to the early 1970s, Parcel B was developed farmland. Baxter purchased Parcel B at the same time as Parcel A, and currently uses the western half for untreated wood storage and peeling. The pole peeler is located in the northwest corner of the parcel, near the closed woodwaste landfill. Nineteen french drains for storm water runoff were installed in March 1991 in this area. Wood treatment has not occurred on Parcel B.

Former Woodwaste Landfill

A woodwaste landfill was located beneath the 5-acre plot of land bordering Parcel A on the west and Parcel B on the north (Figure 2). As late as 1965, this plot was undeveloped woodland. Aerial photos show this parcel being cleared and the north section being mined for gravel in 1967 (See Figure 2). Baxter purchased this property in 1978 and reportedly disposed of untreated woodwaste from peeling operations in the mined out pit through 1988. The landfill is not lined. Approximately 23 feet of woodwaste had reportedly accumulated by 1989 (Sweet-Edwards/EMCON, 1989) the landfill when it was capped and closed in the early 1990s. A storm water retention pond to collect runoff from the landfill cap is on the southwestern corner of the plot. The woodwaste landfill is now covered with grass.

Previous Investigations and Significant Findings

Several previous environmental investigations have been performed at the Arlington site. A summary of the previous investigations that provide soil, groundwater, and/or storm water quality data is provided below. A map showing all sampling locations is provided on Figure 3.

Sweet-Edwards/EMCON (1989) Hydrogeologic Report

Sweet-Edwards/EMCON conducted a hydrogeologic investigation of the woodwaste landfill in July 1988. Their work included installation of four wells (BXS-1 through BSX-4) to monitor water quality impacts from the woodwaste landfill. Wells BXS-1, BXS-2, and BXS-3 were placed on the northern and western edges of the landfill. Well BXS-4 was placed in Parcel B, approximately 200 feet west of the railroad and 400 feet south of the Parcel A property line. The wells were initially monitored for:

- Groundwater elevation, specific conductivity, pH, temperature; and
- Chloride, COD, coliform, nitrate/nitrite, ammonia, sulfate, tannin-lignin, TOC, iron, manganese, and zinc.

In addition, instantaneous withdrawal tests (bailed slug tests) were performed on wells BXS-2 and BXS-4 to estimate hydraulic conductivity. A beneficial use survey and a water balance for site groundwater were also performed. The beneficial use survey included collection of well logs from Ecology, discussions with local purveyors, and a field inventory within one-mile of the site. The inventory indicated that fourteen private wells occur within 2,000 feet of the site. One of these wells, a trailer park well, was abandoned by J.H. Baxter in 1992. The other wells are hydraulically upgradient of the site. The results of the survey are included as Appendix B.

EMCON (1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997) Quarterly Groundwater Sampling Results Summary Reports

EMCON has sampled wells BXS-1, BXS-2, BXS-3, and BXS-4 on a quarterly basis since installing the wells in July 1988. The samples have been analyzed for the following parameters:

- Groundwater elevation, specific conductivity, pH, temperature;
- Chloride, COD, coliform, nitrate/nitrite, ammonia, sulfate, tannin-lignin, TOC, iron, manganese, zinc, nickel, arsenic, barium, cadmium, copper, and TDS; and
- Samples taken in 1992, 1993, and 1994 were also analyzed for chromium, lead, mercury, selenium, silver, and fluoride.

Woodward-Clyde (1990) Soil and Ground Water Investigation

Woodward-Clyde (WWC) installed three monitoring wells in Parcel A in August 1990 in response to concern over the January 1990 release of PCP treating solution. Well MW-1 was placed 100 feet northeast of the main treatment area, well MW-2 was placed near the northwestern corner of Parcel A, and well MW-3 was placed just outside the southwestern corner of the treated pole storage area. In addition, soil boring B-1 was drilled approximately 150 feet north of the retorts, at the site of PCP solution accumulation during the spill.

Soil samples from several depths were collected from boring B-1 and well MW-1 and analyzed for PCP and pyrene. Groundwater was sampled from the three new monitoring wells and from wells BXS-1, BXS-2, BXS-3, and BXS-4 and analyzed for:

- SVOCs, including PCP and PAHs.

Slug tests were performed on wells MW-1 and MW-3 to estimate hydraulic conductivity. An assessment of the potential for impact to groundwater quality from the spill was made. The results indicated no immediate risk but recommended that groundwater quality monitoring be continued.

Woodward-Clyde Groundwater Monitoring 1991

Groundwater quality data collected by Woodward-Clyde (WWC, 1991) in August and October 1991 are presented. The following groundwater parameters were measured at wells MW-1, MW-2, MW-3, BXS-1, BXS-2, BXS-3, and BXS-4 during these two sampling events:

- Groundwater elevation, specific conductivity, pH, and temperature; and

- PCP.

Ecology (1992) Site Hazard Assessment, Revised 1998

The Washington State Department of Ecology (Ecology) initially ranked the Baxter site a four based on a Site Hazard Assessment conducted in 1992. At that time, Ecology collected surface soil at four locations in Parcel A; at the south end of the old drip pad and retort (sample 40), at the north end of the new drip pad (sample 41), at the south end of the treated log storage area (sample 42), and at the north end of the treated wood area (sample 43). The soil samples were analyzed for PAHs and PCP.

The site was re-ranked in 1998 and assigned a higher priority as a result of growth in the area, and groundwater and storm water quality data collected as part of the NPDES permit (discussed below).

Waste Discharge Permit Studies and Monitoring

Several studies have been conducted to support the State Waste Discharge permit issued in 1994. The permit is currently being re-issued. Abundant storm water and groundwater quality data have been collected on the site as part of on-going monitoring associated with the original permit. Storm water discharge practices were also studied as part of an AKART (all known, available, and reasonable methods of prevention, control and treatment) analysis performed by AGI for Baxter. The following is a summary of the data collection and studies that have been conducted as part of this permit.

Permit Groundwater Monitoring

Baxter has been collecting groundwater quality data since 1994 as part of the monitoring requirements associated with the discharge permit. The following groundwater parameters have been measured at monitoring wells MW-1, MW-2, MW-3, MW-4 and BXS-1, BXS-2, BXS-3, and BXS-4 beginning in 1994:

- Groundwater elevation, specific conductivity, pH, temperature, Eh, dissolved oxygen; and

- Calcium, magnesium, sodium, potassium, iron, manganese, alkalinity, TOC, bicarbonate, sulfate, chloride, PAHs, PCP, and total phenols.

Monitoring well MW-4 was installed in 1994 to provide an additional background well, hydraulically upgradient of the site operations. Ecology requested this well be installed upgradient of Parcel B because of a minor detection of PCP in BXS-4, and BXS-4's location central to untreated wood storage operations.

Beginning in the Fall of 1999, monitoring in groundwater under the permit will include biannual (fall and spring) sampling for:

- Calcium, magnesium, sodium, potassium, and iron as general water quality stability indicators; and

- PCP, dioxin/furan, and total suspended solids (TSS).

Permit Storm Water Monitoring

Storm water samples have been collected at drains 13/14, 23, 24, and 25 in the treated product storage area, and from a composite of drains 10, 11, 16 through 22 in the untreated wood storage area since September 1994 as part of the permit. Storm water monitoring included making estimates of the flow rate to the drains and collection of water samples every two to three months during significant storm events between September and May for the following parameters:

- Oil and grease, suspended solids, PAHs, and PCP.

The storm water drain locations and a summary of the storm water quality results are presented on Figure 12. The complete data set is provided in Appendix A, Table A-3.

Under the new storm water permit, storm water will be sampled and analyzed for:

- Oil and grease, suspended solids, PCP, and dioxin/furans.

Monitoring in the treated product storage area will include sampling at drains 13, 14, 23, 24, and 25. Monitoring in the untreated wood storage area will include discrete samples from drains 16 and 22, and composites of drains 17 and 18, 19 through 21, 1 through 6, and 7 through 12.

AGI Storm Water AKART Study

In 1997, AGI conducted an AKART analysis to comply with an Order on Consent that required evaluation of treatment technologies and BMPs to meet groundwater quality standards that became effective in 1996. Groundwater monitoring data collected prior to this period indicated that this standard was exceeded in some of the groundwater monitoring wells.

The study identified potential sources of PCP at the site and evaluated source control methods. Findings of the study indicated that the majority of the PCP in site runoff was from Parcel A; including approximately half from the cooling tower located in the central treatment area, and the other half from the treated pole storage area. The AKART analysis recommended pretreatment of wastewater going to the cooling tower and bioswale and paving alternatives for the treated pole area. Treatment technology for the cooling tower water is currently being installed.

Dioxin/Furan Study

A dioxin/furan study of the storm water was conducted in 1997/1998 as a requirement of the discharge permit. The study included sampling in September 1997 and January 1998 from storm drains 13/14 (a composite), 23, 24, and 25. The samples were chemically analyzed for chlorophenols, PAHs, and dioxins/furans. In addition to the storm water, two samples of PCP treating solution were analyzed for these same compounds.

In June of 1998, AGI collected additional storm water samples for analysis of dioxins/furans. During this sampling both filtered and unfiltered samples were collected from storm drains 13/14, and 25. These samples were collected and analyzed for dioxins and furans in an attempt to assess the effect of sediment on the sample results.

Current Wood Treatment Operations

The Baxter plant imports raw logs and processes them into utility poles. This processing includes debarking, trimming, marking, kiln drying, and treatment.

The finished products are then shipped to utilities and other users by truck and rail line.

Treating includes placing the poles in either pressure retorts or in a butt tank. The pressure retorts conditions the pole first using a heated solution of preservative under a vacuum that further removes moisture from the wood (the Boulton process), then treats the wood by immersion in the heated preservative under pressure. Boulton water removed during the drying process is directed to an oil/water separator where the oil is recovered and recycled in the system. The water is sent to a cooling tower where it is recirculated to cool condensers. Evaporation occurs all through the process. In the butt tank, poles are treated by partial immersion in an open vat containing a heated solution of 5.5 percent PCP and a medium aromatic oil (characteristics of a winter No. 2 diesel).

After the treated poles are removed from a retort, they are kept on drip pads until they are certified that all drippage has ceased. The poles are then moved to the treated wood storage area, and ultimately shipped off site by rail or truck.

Treating Solution Chemistry

The wood is treated with a PCP solution of technical grade PCP that is dissolved in an aromatic oil solution. Typically the treating solution contains between 4 and 8 percent PCP. Baxter currently uses a 5.5 percent solution. The technical grade PCP from which the solution is made typically includes about 85 to 90 percent PCP, 2 to 6 percent higher molecular weight chlorophenols, 4 to 8 percent tetrachloropenol; and about 0.1 percent dioxin/furans (EPA, 1997).

The dioxin/furans that are present in PCP are formed as by-products during the production of chlorophenolic compounds. Of the dioxins present, the primary congeners are octachlorodibenzo-*p*-dioxins with traces of hexa- and heptadibenzon-*p*-dioxin (EPA, 1997 and 1992). The congener of most concern 2,3,7,8-TCDD and TCDF have not been detected in PCP produced in the United States. TCDD and other congeners not present in PCP can, however, be formed by the incomplete combustion of PCP (EPA, 1997).

Analysis of a wood treating solution sample in September 1997 indicated PCP at less than 18 percent, and a total TCDD equivalent concentration of 55.3 ppb. Another treating solution analysis in January 1998 indicated a total TCDD equivalent concentration of 192 ppb.

Creosote was used historically at the site, but Baxter discontinued its use in 1990. An analysis of the wood treating solution in September 1997 indicated no PAHs were present, except for approximately 1.4 mg/L of fluorene.

SUMMARY OF EXISTING ENVIRONMENTAL CONDITIONS

The following sections provide a summary of the physical and chemical conditions present on the Baxter site. This summary of existing conditions is based on our review of the studies and data described above and available documents listed in the references. Figure 3 presents the locations of the surface and subsurface explorations completed to date at the site.

Hydrogeologic Setting

The property is located in a regionally broad valley that was filled in with glacial outwash and river alluvium deposited during and following the retreat of the last glaciers from this area. These deposits are typically coarse-grained sands and gravels that readily infiltrate precipitation. The site lies on a relatively flat portion of this outwash/alluvial plain as shown on Figure 1. A glaciated hillside lies to the east of the site. The closest drainage feature is Portage Creek approximately 5,000 feet to the northwest. The coarse-grained material is believed to be 100 to 150 feet thick in this area (WWC, 1990; and Newcomb, 1952). Glacial till reportedly underlies the outwash confining potential deeper aquifers and separating the shallow aquifer from any deeper zones (WWC, 1990).

Site Aquifer Characteristics

Existing drilling data extend to depths of approximately 50 feet. The stratigraphy encountered indicates dominantly coarse-grained sandy gravel to a depth of 15 to 25 feet underlain by finer sand deposits. Discontinuous layers of silty clay and sandy gravel are interlayered within the predominantly fine sands. Figures 4 and 5 present north-south and east-west cross sections showing the materials encountered during drilling of the existing wells. Figure 3 shows the location of the developed cross sections.

Groundwater is encountered at depths of between 10 and 40 feet depending on the time of year and the location on the property. Groundwater levels are higher on the south and east side of the property and deeper on the north and west property areas creating a general southeast to northwest groundwater flow direction. Groundwater levels fluctuate about 5 to 10 feet between the wet and dry seasons and as much as 15 to 18 feet between wet and dry years (Table 1). The seasonal pattern of recharge is indicated by hydrographs of several of the existing wells (Figure 6).

The aquifer is generally a water table (unconfined) aquifer although it appears to be slightly confined in the southeast site area, perhaps beneath the clay layer in the BXS-4 area. Aquifer characteristics beneath the eastern and southern site area appear to be slightly different than in the western Parcel A and woodwaste landfill area. Groundwater elevations are significantly higher in wells MW-4 and BXS-4 and groundwater elevations in these wells peak several months before the elevations in the downgradient wells (See Figure 6). In addition, MW-4 and BXS-4 have water quality distinct from the downgradient wells. For example, wells BXS-4 and MW-4 have higher alkalinity and pH, lower redox potential, and higher iron levels than in downgradient wells. Review of bicarbonate/alkalinity and pH data shows three distinct water quality types beneath the site (See Figure 10).

The groundwater data suggest substantial recharge occurs from the eastern upland area and that an upward flow gradient may exist, at least on the east side of the site. An upward gradient may be responsible for the higher groundwater levels in BXS-4 and MW-4 where the screened zones are slightly shorter and deeper than the downgradient wells. These data together with the consistent groundwater flow patterns indicate that domestic water wells located east of the site are very unlikely to ever be impacted by groundwater from beneath the northwestern site area.

<u>Groundwater Flow System</u>

The groundwater system is recharged by direct infiltration of precipitation and by inflow from the upland area to the east. Groundwater generally flows to the northwest and is believed to discharge into Portage Creek and ultimately to the Stillaquamish River (Newcomb, 1952). Recharge from the uplands east of the site and discharge to the creek northwest of the site creates the general southeast to northwest flow pattern seen in the groundwater elevation data.

Although the groundwater generally flows southeast to northwest, there are several local flow features indicated by the site well data. Figures 7 and 8 show groundwater elevation contours for the highest water level period recorded to date (April 1997) and the lowest recorded to date (October 1995). These data together with the hydrographs on Figure 6 indicate the following local flow features:

- Groundwater beneath the wood treatment area appears to be directed to the MW-3 location with a more northerly component to the flow pattern in this area. This may be the result of the sandy gravel located at the bottom of the well. In general, the MW-3 data suggest this area may be acting as a sink or drain to the local groundwater flow system.

- Although hydraulic control on the northeast site area is limited, the data suggest a more east to west flow direction may occur in this area.

Groundwater flow rates will vary based on variations in hydraulic conductivity and the hydraulic gradient. Estimates of flow rate can be made based on the existing data. Table 1 below presents the hydraulic conductivity data collected by previous investigators.

Hydraulic Conductivity Data

Well Tested	Material in Screen Interval	Type of Test	Hydraulic Conductivity in Feet/Day (cm/sec)
MW-1	Fine Sand, trace of silt	Slug rod test	4 to 6 (2×10^{-3})
MW-3	Screened in both sandy Gravel and fine Sand	Slug rod test	100 to 150 (4×10^{-2})
BXS-2	Fine to medium Sand	Bailed slug test	2 to 6 (1.4×10^{-3})
BXS-4	Silty Sand; with gravel; decrease in silt with depth	Bailed slug test	0.2 to 1 (2×10^{-4})

The hydraulic conductivity data show consistency with typical values for the material properties identified in each of the wells; 2 to 6 feet per day in the fine sand layer, around 0.2 feet per day in the silty sand at BXS-4, and around 100 feet per day in the sand and gravel layer.

Hydraulic gradients range from roughly 0.01 ft/ft in the southeast site area (between wells MW-4 and BSX-4) to between 0.02 and 0.06 ft/ft beneath the main treatment (Parcel A) area. Using the gradients beneath the Parcel A area, and the hydraulic conductivity of the fine sands, groundwater flow rates of between 0.1 and 1 ft/day are calculated. This equates to an annual travel distance of 36 to 365 feet once a particle of water is in the groundwater system. Comparison of lag times between peak precipitation and peak groundwater levels for the wells completed beneath Parcel A, indicates it takes several months for precipitation to infiltrate the ground surface, migrate through the unsaturated zone, and reach the water table.

Soil Quality Results

The four surface soil samples collected by Ecology from Parcel A in 1992 detected both PAHs and PCP, however, only PCP (in one sample) exceeded the industrial soil cleanup level for direct contact used for screening the soil data. The PCP concentrations ranged from 6 to 1900 mg/kg with the highest concentrations detected in samples 42 and 43. Only sample 42 from the treated wood storage yard exceeded the PCP industrial screening level of 1,093 mg/kg.

The five subsurface soil samples collected from boring B-1 (located in the depression where the January 1990 PCP release collected) and three samples from monitoring well MW-1 indicated low concentrations of PCP (less than 10 mg/kg) near the surface and below the water table. PCP was not detected in the vadose zone in either B-1 or MW-1; although low level photo-ionization detector measurements were indicated during drilling near the water table.

Statistical summaries of the four surface soil and eight subsurface soil analyses conducted for PCP and PAHs are presented in Tables 2 and 3. A complete summary of the compounds detected in the soil samples is presented in Appendix B. Figure 9 presents a summary of the PCP in soil on a site map; and Figure 4 shows the subsurface soil sample data in profile.

Groundwater Quality Results

Groundwater at the site has been sampled extensively since wells were first installed in 1988. Wells BXS-1 through BXS-4 have each been sampled over 40 times including quarterly since 1992. Wells MW-1 through MW-3 have each been sampled over 20 times including quarterly since 1995. Well MW-4 installed in 1994 has been sampled quarterly since installation. Chemical analyses have focused on wood treating chemicals (PAHs and PCP), metals, and general inorganic parameters. A summary of the analyses performed at each location for each sampling event is provided in Appendix A, Table A-2. A statistical summary of these analyses and exceedences of constituents relative to drinking water criteria is provided in Table 4.

Wood Treating Chemicals

PCP has been regularly detected in three of the site wells; MW-3, MW-2, and BXS-1 since 1990. With the exception of a few low level detections (less than 2 μg/L), PCP has not been measured in wells MW-1, MW-4, BXS-2, or BXS-3. Figure 10 presents a summary of the PCP concentrations detected in plan view.

Figure 11 graphical presents PCP concentrations over time for the three wells within which PCP has been detected.

Concentrations of PCP have been highest in MW-3 and exhibit large seasonal fluctuations, generally peaking in late fall, at the start of the rainy season. In general, PCP concentrations are highest when the water table is lowest, and are lowest when the water table is highest. PCP concentrations at BXS-1 and MW-2 are lower (below 100 µg/L at BXS-1 and below 10 µg/L at MW-2) and more stable. PCP concentrations in all three wells appear to have gradually declined since 1993 (Figure 11).

Although creosote was reportedly used for wood treating in the past, PAHs (the chemicals of greatest concern in creosote) have not been significantly detected in groundwater. The only exceptions are low level detections in two samples from well MW-3 taken in 1997 in which concentrations of 2 and 2.5 µg/L of total PAHs were measured, and a detection of 1 µg/L total PAHs in well BXS-4. Given that quarterly sampling in groundwater for PAHs has been conducted since 1994 (over twenty samples in most of the wells) PAHs do not appear to be a chemical of concern.

Other Chemical Parameters

Arsenic, manganese, and cadmium were indicated in groundwater at concentrations slightly above the Method B groundwater screening level. The elevated concentrations occurred in wells (BXS-2 and BXS-3) directly downgradient of the woodwaste landfill. Thick deposits of organic material will result in heavy biological oxygen demand (BOD), creating anaerobic conditions in water that percolates through this layer. This results in higher values of COD, specific conductivity, dissolved solids, and TOC. Dissolved metal concentrations also increase when groundwater conditions are reducing. The occurrence of these metal exceedences appears to be related only to the woodwaste landfill.

Storm Water Quality Results

Storm water quality has been analyzed quarterly since 1994 for wood treating chemicals (PAHs, PCP), oil and grease, and suspended solids. Figure 12 presents the locations of the storm drains, associated drainage ditches, and the range in concentration of PCP detected in each storm water sub-basin. A statistical summary of the chemicals detected in storm water and their concentrations relative to drinking water standards is given in Table 5. A summary of the analyses completed is presented in Appendix A, Table A-3.

Parcel A Storm Drains

PCP concentrations have been detected in Parcel A storm drains. The PCP concentrations fluctuate between sampling events, averaging around 200 µg/L at drains 13/14 and 25 and roughly 450 µg/L at drains 23 and 24. PCP concentrations weakly correlate with suspended solid concentrations when each subdrain is considered separately.

Low concentrations of PAHs have been detected in storm water. Total concentrations in Parcel A drains are less than 100 µg/L. Oil and grease concentrations are usually below detection limits. Suspended solid concentrations vary widely between sampling events, but average between 400 and 700 mg/L.

Dioxins and furans were detected in Parcel A storm drain samples during three sampling events in September 1997, January 1998, and June 1998. Measured concentrations vary greatly (33 ppq to 11,146 ppq TCDD TEQ). Higher dioxin concentrations weakly correlate with higher suspended solids concentrations. In addition, concentrations of dioxins/furans in filtered storm water samples collected in June 1998 were over an order of magnitude less than unfiltered samples collected at the same time, indicating that most of the dioxins are likely associated with particulate matter in the storm water. This would be expected because of the hydrophobic nature of dioxins. However, filters will also tend to remove hydrophobic chemicals (such as dioxins), so these results may not be indicative of the true dissolved concentration.

Parcel B Storm Drains

PCP has been detected in the Parcel B storm drains, but at significantly lower concentrations (averaging around 30 µg/L) than in Parcel A. The concentration has generally been decreasing over time as Baxter has made site operation improvements that minimize any potential for PCP carry over to the Parcel B area.

Total PAH concentrations measured in samples from Parcel B drains have been less than 6 µg/L. Oil and grease concentrations are generally below detection limits; suspended solids concentrations fluctuate greatly but in general are higher (averaging about 4,000 mg/L) than those in Parcel A storm water. This is likely due to the woodwaste generated by the log storage and pole peeling operations.

Parcel B storm water samples have not been analyzed for dioxins or furans; however, it is unlikely they would occur in this area given the lack of a potential source. PCP and/or the combustion by-products of PCP are unlikely to occur in this area.

ENVIRONMENTAL RISK ISSUES

This section describes the chemicals of concern, the possible mechanisms for their transport, and human health or environmental exposure to these chemicals.

Chemicals of Concern

Potential chemicals of concern at the site, based on the historical and current operations include: PCP, dioxins, PAHs (from past use of creosote), and TPH (from the aromatic oil PCP carrier solution). Screening of the existing data with Method B soil and groundwater criteria indicate that PCP and dioxin/furans are the principal chemicals of concern. PAHs have been tested for in soil, groundwater, and storm water and are not considered a significant issue at the site. PCP and dioxin were detected above the groundwater criteria in storm water. PCP was detected above the groundwater criteria in groundwater. Only one soil sample was detected PCP above industrial soil direct contact levels. The soil concentration protective of groundwater will be evaluated as part of this investigation.

PCP present locally in groundwater at concentrations above the drinking water standard is the principal risk issue at the site. PCP is slightly soluble in water (8 mg/per 100 mL) but is very soluble in oil. PCP-oil solutions released to the ground may behave as a LNAPL upon encountering the water table in the subsurface. Investigation of the soil within the zone of water table fluctuation for oil as well as PCP will help assess the potential for past product releases. PCP is an ionizable organic compound, and at a pH greater than 5 is present mostly in its ionized, and therefore most water-soluble, form (groundwater beneath the site has a pH of 6 or greater).

Dioxin/furans have not been tested in groundwater. Dioxins have been detected in the dissolved phase in storm water. Although they are hydrophobic and unlikely to migrate in a dissolved state with the groundwater, the occurrence of dissolved dioxins in groundwater is a possibility. Dioxin may also occur in the groundwater if an LNAPL exists. Groundwater will be tested for dioxins as part of this Remedial Investigation.

Transport Pathways and Potential Exposure

Four potential transport pathways to human or environmental receptors are identified for the Baxter site. The potential exposures are outlined below.

Groundwater Migration

Transport of PCP via groundwater migration has the potential for:

- Off-site discharge to potential groundwater users; and

- Off-site groundwater discharge to surface water bodies.

The beneficial use survey (Appendix B), the location of the PCP plume, and the direction of groundwater flow indicate it is unlikely that any well in the area would intercept PCP-containing groundwater. However, the human health risk associated with groundwater consumption will be evaluated during the Remedial Investigation. Since the closest surface water body, Portage Creek, is approximately one mile downgradient of the site, it is unlikely that discharge to surface water will be a significant exposure pathway.

Dioxins are strongly sorbed to soil and thus are unlikely to be transported in groundwater. Sampling for dioxin analysis will occur to evaluate any occurrence in groundwater; however, it is very unlikely they would migrate beyond the site boundaries.

Storm Water Discharge

Storm water is contained on site and the PCP found in the storm water does not appear to present a direct exposure risk. However, it may indirectly affect groundwater exposure impacts through the following pathways:

- PCP-containing storm water that discharges to storm drains and migrates through the vadose zone to the water table; and

- Local infiltration through PCP-containing soils in the vadose zone to the water table.

Transport of dioxins in storm water to groundwater is likely minimal, since the majority of dioxins detected in storm water are most likely associated with suspended solids that will be filtered out in the vadose zone. However, because of the detection of dissolved dioxins in storm water, groundwater will be analyzed for dioxins as part of this Remedial Investigation.

The magnitude of storm water impact on groundwater quality will be evaluated in the Remedial Investigation.

Soil Contact

Exposure to chemicals of concern in surface soils may occur via:

- Ingestion of soils by site workers and trespassers.

Direct exposure to soils is not likely to be a significant ecological or human heath risk because surface soil samples have generally not exceeded MTCA direct contact cleanup levels. This will be verified during the Remedial Investigation with additional surface soil samples. The potential for off-site surface soil contamination from dust fallout will also be evaluated.

In addition to direct contact exposure, chemicals of concern in both surface and subsurface soils may be transported via the following pathways:

- Dissolution into groundwater; and
- Dissolution into storm water.

In the Remedial Investigation, we will evaluate the contribution of surface soil to PCP and dioxins in storm water, and investigate possible subsurface sources of PCP from which dissolution may be a significant transport pathway.

Volatilization

Volatilization of aromatic oil from site operations could be a potential exposure pathway via:

- Inhalation of vapors by on-site workers, trespassers, and nearby residential populations.

The low vapor pressure of PCP makes transport via volatilization unlikely, unless heated during site operations. In the storm water AKART Analysis (AGI, 1997), evaporation and condensation from the cooling tower were estimated to provide half of the annual PCP releases at the site. Evaporation from the butt tank was negligible. Although volatilization from the cooling tower may have been a historical pathway, it is not likely to be a significant transport pathway in the future because the cooling tower is currently being retrofitted with an in-line activated carbon treatment unit.

PRELIMINARY REMEDIAL ALTERNATIVES

Remedial alternatives will be evaluated following the Remedial Investigation to determine appropriate cleanup actions to address the groundwater contamination. This section describes preliminary goals of the remedial alternatives and potential technologies that may be considered to implement those goals.

Remedial Action Objectives

In addition to the chemicals of concern identified at the site (PCP and dioxins), three metals (arsenic, iron, and manganese) have been detected in groundwater above screening criteria. These metals, however, are associated with a known source (reducing conditions resulting from the woodwaste landfill) and are not considered a human or environmental health threat. Therefore, this remedial investigation focuses on PCP and dioxins, the chemicals of concern.

Although chemicals of concern may be present at the site in a variety of media, the primary exposure concern is through the off-site migration of groundwater. PCP and dioxins present in soil, storm water, and air do not appear to adversely affect environmental or human health, but additional investigation is needed to fully assess the health impacts. The intent of this Remedial Investigation is to determine the source(s) of PCP to groundwater, their relative contribution, and the resulting exposure risk. If dioxin is indicated as a specific risk based on future data collections remedial action objectives for dioxin will also be identified. The preliminary media-specific remedial action objectives based on existing data include:

- Prevent transport of PCP and potentially dioxins in soil and/or storm water to groundwater at concentrations above MTCA Method B groundwater cleanup standards; and

- Prevent off-site migration of PCP and potentially dioxins in groundwater above MTCA Method B groundwater cleanup standards.

Remedial Technologies

To attain these objectives, remedial measures may need to be implemented. Media in which PCP has been detected above screening criteria include soil, groundwater, and storm water. Remedial technologies may involve containment, *in situ* treatment, *ex situ* treatment, or off-site disposal of contaminated media.

Soil

The general response actions for PCP-contaminated soil are:

- *Ex Situ* Treatment/Disposal, by excavation of impacted shallow or subsurface soils with subsequent treatment;

- Containment, by capping to prevent dissolution of residual PCP and potentially dioxin in soil; and

- *In Situ* Actions, such as chemical oxidation or stabilization.

The demonstrated technologies for treating PCP-contaminated soils include soil washing, solidification/stabilization, thermal desorption, incineration, chemical oxidation, and bioremediation. Technologies for treating dioxin-contaminated soil will be evaluated if dioxin is identified as an issue in soil.

Groundwater

Possible remedial actions for PCP-contaminated groundwater are:

- No Action, through natural attenuation;
- *In Situ* Treatment, by enhancing natural attenuation;
- Containment, using a vertical hydrologic barrier; and
- *Ex Situ* Treatment, through extraction and treatment.

The demonstrated technologies for treating PCP-contaminated groundwater include activated carbon, bioremediation, and advanced oxidation processes, or a combination thereof such as ozone-amended biosparging. Technologies for treating dioxin-contaminated groundwater will be evaluated is dioxin is identified as an issue in groundwater.

Storm Water

The general remedial response actions targeting PCP-contaminated storm water are:

- No Action, using sorption to the soil column and natural attenuation to limit transport to groundwater; and

- Containment, by capping, collection and treatment, and infiltration into the subsurface;

The demonstrated technologies for treating PCP-contaminated storm water include activated carbon, enhanced filtration using organic media, and bioswales. Technologies for treating dioxin-contaminated storm water will be evaluated if dioxin is identified as an issue in storm water.

SUMMARY OF DATA NEEDS

The large amount of data that has already been collected at the site is sufficient to identify potential exposure issues, but significant gaps in the conceptual model of the site still exist. This section summarizes the additional data recommended to further define the nature and extent of contamination so that an appropriate remedial action may be chosen. The section following this one provides the specific Remedial Investigation Sampling and Analysis Plan.

Source of Groundwater Contamination

The primary sources of PCP in the groundwater are suspected to be from historical releases at the site and/or storm water infiltration. One of the principal goals of this investigation will be to assess the relative proportion of these potential sources. To further this goal we propose to:

- Review any historical information from archived Baxter files, possibly interview employees of the Butcher operation, and review aerial photos from the 1970s and 1980s to evaluate changes in the Baxter operations.

- Collect surface soil samples from discrete areas where PCP has been indicated in storm water to assess surface soil PCP concentrations and PCP leaching potential; these locations will include puddle areas under log storage racks, around the storm water drains, and in the treatment areas.

- Collect subsurface soil samples at the site of suspected former waste disposal areas (such as the previously excavated area) and spill accumulation areas to assess the contribution of past spills and disposal practices on subsurface PCP occurrence. This will include analyses of TPH in the area of previous spill collection/infiltration.

- Collect subsurface soil samples in french drain locations to assess the relative contribution of storm water to soil and assess the soil adsorption capacity.

- Evaluate the relative contribution of the various potential sources through PCP fate and transport analyses.

- Determine the relationship between the occurrence of PCP and TPH in soil.

Nature of Groundwater Contamination

Sufficient data exist to identify a PCP plume in groundwater. Additional analyses will clarify whether any free phase product (LNAPL) exists and hence if any dioxin may be present. In addition, minimizing turbidity during sampling will make a more accurate measure of the PCP concentration. The following data will be collected:

- Analyze groundwater samples for TPH (aromatic carrier oil) in wells near past spills and where PCP occurs, as an indicator of a possible subsurface PCP LNAPL source. In these same areas analyze groundwater samples for dioxin; and

- Minimize turbidity in all future groundwater samples, to provide a more controlled and accurate measure of constituent concentrations. Measure turbidity in groundwater samples to differentiate between dissolved PCP and dioxins and PCP and dioxins associated with particulate matter.

Extent of Contamination

While a PCP plume has been identified, the extent of the plume to the northwest and east of the treated wood storage area is uncertain. Understanding the extent of the plume in these locations will assist in source identification as well as potential off-site migration and attenuation analyses. In addition, the extent of soil as a source will also be explored in these areas. Specific data needs include:

- Evaluate groundwater quality beneath the treated pole storage area and the eastern extent of the plume;

- Evaluate off-site migration by collecting groundwater samples to the northwest;

- Collect groundwater and subsurface soil samples between storm drains 24 and 25/26, to characterize the upgradient boundary of the plume and the relative contribution of storm drains 25 and 26;

- Collect surface soil samples from both the treated pole storage area and untreated pole storage areas to estimate the extent of any PCP vapor deposition; and

- Collect subsurface soil samples in the former Butcher pit and spill locations to identify possible subsurface sources of PCP.

Chemical Fate and Transport

The migration pathways for PCP to enter the groundwater system and the off-site migration of the PCP in groundwater will be evaluated by estimating the following site-specific characteristics:

- Leachability of PCP from treated poles and the fate of the PCP in the soil and storm water;
- Leachability of PCP from site soils and its fate and transport through the vadose zone;
- Dissolution of subsurface soil sources from past spills or other releases; and
- Fate and transport of PCP through the saturated zone.

Risk Assessment

The potential for future exposures will be evaluated using groundwater migration and attenuation analyses to assess the following risks:

- Closest off-site water user to PCP-containing groundwater;
- Potential ecological risk of surface water discharge; and
- Potential off-site soil quality impacts due to deposition of vapor-carried particles.

Evaluation and Selection of Cleanup Action

The site-specific treatability of PCP will need to be assessed to support detailed evaluation of cleanup alternatives and selection of an appropriate cleanup action for the site. Although significant treatability data exist for PCP in the public domain, much of these data represent "best case" performance at "high-profile" test sites and the percent removal data can range over an order of magnitude in some cases.

The site-specific treatability parameters that will require determination are bioavailability and biodegradability of PCP. These parameters will initially be determined through the leachability studies and empirical site data. If needed, we will supplement these data with focused laboratory testing and/or additional field studies.

REMEDIAL INVESTIGATION SAMPLING AND ANALYSIS PLAN

This Sampling and Analysis Plan presents the scope of work for the Remedial Investigation phase of this project based on data needs described above. A summary of the proposed exploration locations and their objective is provided in Table 6. Figure 13 presents a map showing the location of the proposed soil and groundwater explorations.

Task 1—Collect Additional Background and Historical Data

In addition to the historical investigations performed to date, the following additional investigations will be conducted:

- Interview site workers and operators who were present at the site during the 1960s and 1970s and review operational changes through the 1970s and 1980s;

- Obtain disposal information for the tar-like substance excavated in the 1970s as possible; and

- Field verify the well inventory previously completed to within 2,000 feet downgradient of the site to more adequately characterize the risk associated with the site.

Task 2—Collect Six Composite Surface Soil Samples

We propose to collect composite surface soil samples from six locations: three from the treated pole storage area, two from the main treatment area, and one from the outside operational areas in the dominant wind direction. These samples are designed to:

- Evaluate the PCP concentration in storm water sediment and the relative contribution of dissolved PCP to the vadose zone using these data in conjunction with storm water data;

- Determine the relationship, if any, between occurrence of PCP and TPH;

- Evaluate the impact of treated wood storage on soil quality including dioxin; and

- Determine the impact of dust and vapor emissions on soils surrounding the site not directly exposed to treated materials;

The samples will be collected at locations shown on Figure 13. Samples of the fine-grained soil just below the crushed rock or that which accumulates in low areas, will be collected from within the top 3 inches. A second sample will be obtained between a depth of 6 inches and 1 foot to assess historical PCP accumulation at the ground surface. The samples will be a five-point composite (four corners and center) from within a roughly 40-foot-square area.

Samples will be analyzed for PCP (EPA Method 8151 Modified), and selected samples will be analyzed for total organic carbon (TOC) content and soil pH. Each sample from the main treatment areas (SS-1 and SS-2) will be tested for NWTPH-Dx. One of the soil samples from each location in the main treatment area and the treated pole storage area will also be tested for dioxin (EPA Method 8290) and PCP leachability using the Synthetic Precipitation Leaching Procedure (SPLP). Dioxin will be tested for in the shallower surface sample from each location. SPLP will be tested in the sample with the highest detected PCP concentration at each location. The leachability data will be compared to total PCP concentrations obtained from the same sample to establish soil/water partition coefficients.

Task 3—Drill Ten Soil Borings and Sample Subsurface Soils

We propose to drill seven soil borings (SB-2 through SB-8) for subsurface soil sampling, and three additional borings that will be completed as monitoring wells (HCMW-5 through HCMW-8). Groundwater grab samples from four of the seven soil borings not completed as monitoring wells will also be collected. These borings are designed to:

- Investigate soils in the area of potential historical releases and in storm water infiltration areas to assess sources of PCP to the groundwater system;

- Determine the depth to which surface contamination leaches into soil particularly in areas of past spillage and in storm water infiltration areas; and

- Collect groundwater grab samples to further define the PCP plume and to assist with developing a soil adsorption rate.

The proposed locations of the soil borings are shown on Figure 13. Table 6 presents the approximate depth, number of chemical samples proposed, and the data quality objectives.

The borings will be drilled with a hollow-stem auger and soil samples will be collected at 2.5-foot-depth intervals using split-spoon sampling procedures. The field geologist will log the geology and stratigraphy of the boreholes, and soils will be classified using standard ASTM methods. Grain size analyses will be completed on selected samples to verify material type and assist with understanding the hydraulic conductivity of the soils.

All soil samples will be screened in the field for volatile organic vapors using a portable photoionization detector and general characteristics. About 30 soil samples will be analyzed by Columbia Analytical for PCP (EPA Method 8151 Modified). In addition, about ten soil samples will be analyzed for soil pH and total organic carbon content (TOC) and five will be analyzed for NWTPH-Dx. Up to three samples will be analyzed for PAHs (Method 8270) if there are indications of a creosote-like product. Soil samples will be selected based on sample depth, lithology, amount of sample recovered, field screening, and the objective of the boring as follows:

- In borings HCMW-5, SB-2, SB-4, and SB-8 we anticipate that three to four samples will be selected for laboratory analysis; one from within the upper few feet, one or two within silty layers in the vadose zone, and one at the water table (in the 30- to 40-foot-depth interval). Samples will be analyzed for PCP (EPA Method 8151 Modified). One sample within the water table zone will be analyzed for NWTPH-Dx. A shake flask sheen test will be conducted on samples near the water table to look for evidence of LNAPL. If PCP is detected and TPH-D is detected above 200 mg/kg in these borings near the water table, a soil sample from the water table zone will also be analyzed for dioxin/furans (EPA Method 8290). The shallow soil sample at HCMW-5 will also be tested for NWTPH-Dx, to help assess the relationship between occurrences of TPH and PCP.

- In borings HCMW-7, HCMW-6, and SB-3, where sources are not expected; only one soil sample (HCMW-7) or two soil samples (SB-3, HCMW-6) from the water table zone will be sampled and analyzed for PCP. In addition, two shallow soil samples from HCMW-6 will be analyzed for PCP.

- In borings SB-5 and SB-6, two samples of the material used to fill the 1967 excavated area will be analyzed. If wastes other than woodwaste are encountered, we will analyze those materials for semivolatiles (Method 8270) and/or other analysis appropriate of the waste observed. Otherwise we will analyze one sample from within the upper foot of ground surface, and the bottom of the fill zone. Samples will be analyzed for PCP. SB-5 will be continued to the water table to evaluate the groundwater quality directly upgradient of MW-3.

- Boring SB-7 will be completed in the area covered by the previous butt tank spills. Two soil samples will be analyzed for PCP.

Groundwater grab samples will be collected within the upper water table zone from borings SB-2 through SB-5 and SB-8 using a Hydropunch sampler. The groundwater sample will be analyzed for PCP (EPA Method 8151 Modified) and total suspended solids (TSS). Groundwater from borings SB-2, SB-4, and SB-8 will be analyzed for NWTPH-G/BTEX and NWTPH-Dx. If LNAPL is found at other borings, the groundwater samples will also be analyzed for NWTPH-G/BTEX and NWTPH-Dx.

Task 4—Install Three Monitoring Wells and Sample Groundwater

Monitoring wells will be installed in the HCMW-5, HCMW-6, and HCMW-7 soil borings. These wells will be used as follows:

- To provide better upgradient (HCMW-5 and MCMW-6) and downgradient (HCMW-7) definition to the PCP plume; and

- Provide a more accurate assessment of the groundwater flow under the treated pole storage area, and to the northwest of the property.

Monitoring wells will be constructed of 2-inch-diameter PVC casing, completed to a depth of 40 to 50 feet with 15 feet of well screen placed across the water table. The wells will be surveyed relative to existing monitoring wells after completion.

The wells will be developed using surge and bail techniques. The groundwater will be sampled from the new wells at the same time that the existing wells are sampled under the NPDES permit. Groundwater sampling is planned to occur in October 1999. The wells will be sampled using low-flow rate sampling pumps to minimize turbidity. If existing monitoring wells are not sampled for dioxin or TSS, we will sample three wells (BXS-1, MW-2, MW-3) for dioxins and TSS.

Groundwater samples will be collected from each well and field analyzed for pH, temperature, specific conductivity, and dissolved oxygen. One sample from each new well will be analyzed by Columbia Analytical for PCP (EPA Method 8151 Modified) and total suspended solids. In addition, the HCMW-5 sample will be analyzed for dioxins, and samples from MW-2, MW-3, and BXS-1 will be analyzed for NWTPH-G/BTEX and NWTPH-Dx. One additional sampling of the three new wells will be conducted in the spring of 2000 concurrent with the groundwater sampling being conducted under the NPDES permit.

Task 5—Evaluate Data and Report Findings

The data collected during the Remedial Investigation will be analyzed in conjunction with the existing data to evaluate:

- Sources of the groundwater contamination;
- The extent of groundwater and surface soil contamination;
- Contaminant transport pathways and rates; and
- Whether existing contamination at the site poses a threat to human health or the environment.

We will evaluate the treated pole storage area surface soils as a source of PCP to the groundwater via storm water runoff and direct infiltration. The potential for historical source areas will be evaluated through exploration in suspected areas of spillage and waste disposal. The relative contribution of sources will be assessed and the migration of PCP migration through the vadose zone to the water table will be assessed.

The extent of the PCP plume will be better defined based on groundwater sample analyses and water level measurements in the new wells. Site-specific soil-water partition coefficients and biodegradation rates for PCP will be estimated in conjunction with the empirical data obtained in the off-site well HCMW-7. The potential for off-site impacts will be assessed using these data in conjunction with the groundwater use survey.

FOCUSED FEASIBILITY STUDY PLAN

Hart Crowser will conduct a focused feasibility study (FFS) to evaluate and select an appropriate remedial approach for the Arlington site. The FFS will focus on PCP (and dioxin if found to be a risk factor) as the chemicals of concern and will develop a comprehensive solution by considering the three impacted matrices of soil, groundwater, and storm water.

Task 1—Compile Available PCP Remediation Findings

A large amount of information exists concerning remediation of PCP at wood-treating sites. We will incorporate these data into our assessment of the current state of PCP remediation for soils, groundwater, and storm water to focus our efforts in remaining RI/FS tasks. Our review will include federal databases, peer-reviewed journal articles, and other published and unpublished reports.

Task 2—Identify and Describe Remedial Alternatives

Using available information and our site-specific data, we will select the most cost-effective technologies and assemble a set of comprehensive remedial alternatives for the site. We anticipate that four to five alternatives will be developed to provide a range of expected performance and associated costs.

Task 3—Evaluate Performance of Alternatives

The effectiveness of each alternative in containing, treating, or removing PCP in the environment will be evaluated. In general, performance data will be obtained from the literature or similar project where available. However, the effectiveness of bioremediation for reducing PCP in groundwater is highly variable and dependent on site-specific conditions. Preliminary data from the Remedial Investigation findings will be evaluated and the need for bench scale and/or field testing assessed.

Task 4—Evaluate Cost for Alternatives

The cost of each alternative will be estimated to allow an economic comparison of alternatives. The cost estimates will include both first-year construction and annual operation and maintenance (O&M) cost and will also contain a present-worth analysis. The level of accuracy of the cost estimates will be "order of magnitude" as defined by the American Association of Cost Engineers. The accuracy of an Order of Magnitude cost estimate plus 50 percent and minus 30 percent.

Task 5—Compare Alternatives and Select Preferred Alternative

A practicability assessment (cost-effectiveness based on level of risk reduction) and comparative analysis will be conducted to provide a basis for selection of a preferred alternative. The comparative analysis will be based on the criteria used by Ecology for selecting cleanup actions (WAC 173-340-360).

PROJECT TEAM AND SCHEDULE

This project is being conducted by J.H. Baxter & Co., under the supervision of Georgia Baxter, Executive Vice President. The RI/FS is being managed by Lori Herman, hydrogeologist with Hart Crowser. Also with Hart Crowser, Jeremy Porter is the field and project engineer, and technical oversight will be provided by Mike Ehlebracht (Environmental Chemist) and Barry Kellems, P.E. (Remediation Engineer).

We plan to conduct the field work in August and September, 1999. We will analyze the data in October and November and summarize preliminary findings in an interim report with any recommendations for additional field work, laboratory work, or other studies needed to complete an assessment of remedial alternatives. The interim report will be submitted to Ecology not later than December 10, 1999. If additional field or laboratory work is needed it will be completed during the winter of 2000. In any case, the RI/FS report will be completed by the end of July 2000.

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Table 1 - Summary of Water Elevation Data

Monitoring Well	BXS-1	BXS-2	BXS-3	BXS-4	MW-1	MW-2	MW-3	MW-4
				Depth to Water in Feet				
Sampling Date								
8/1/1990	35.80	34.80	31.60	15.60	26.50	38.50	36.20	(2)
8/1/1991	34.94	33.79	30.71	15.31	27.08	37.99	35.14	(2)
10/1/1991	NM	NM	32.97	NM	NM	NM	37.45	(2)
3/1/1992	35.16	34.72	31.06	10.06	21.50	40.56	(1)	(2)
8/1/1992	39.92	38.85	35.77	17.61	32.97	44.83	(1)	(2)
3/1/1993	40.70	40.22	37.31	16.17	28.58	45.54	(1)	(2)
6/1/1993	40.61	70.02	NM	NM	NM	45.52	(1)	(2)
9/1/1993	42.35	41.64	NM	NM	33.40	47.20	(1)	(2)
12/1/1993	43.57	42.93	NM	NM	NM	NM	(1)	(2)
8/15/1994	42.85	41.93	39.79	19.06	33.45	47.74	43.70	(2)
11/30/1994	44.91	43.65	41.86	NM	26.54	NM	43.16	14.74
2/16/1995	40.17	39.31	36.64	13.91	23.31	45.29	42.37	13.30
4/27/1995	38.40	37.59	34.23	12.84	23.28	43.59	40.79	11.36
8/1/1995	40.39	39.40	36.28	17.59	30.13	45.37	43.08	15.00
10/10/1995	41.46	40.66	38.18	15.61	28.46	46.56	44.17	12.27
1/11/1996	38.28	37.78	34.43	12.19	22.95	43.57	40.60	9.79
4/18/1996	31.20	35.20	31.53	31.78	26.79	41.35	38.88	11.70
7/18/1996	36.66	35.76	31.99	15.94	28.25	41.74	38.78	13.82
9/25/1996	38.81	37.85	34.35	14.85	29.57	43.76	41.95	12.10
1/14/1997	33.52	32.83	29.26	8.14	19.68	38.93	35.60	7.01
4/9/1997	28.23	27.82	23.22	10.14	22.28	33.35	30.88	10.67
8/6/1997	30.99	29.96	25.29	13.65	24.50	36.19	33.79	13.00
10/6/1997	33.27	32.13	28.29	13.73	27.02	38.53	36.15	11.87
1/15/1998	33.19	34.94	28.22	10.94	23.25	38.78	35.99	9.23
4/15/1998	30.92	29.88	25.78	11.45	23.61	36.35	33.95	10.67

Monitoring Well	BXS-1	BXS-2	BXS-3	BXS-4	MW-1	MW-2	MW-3	MW-4
				Water Table Elevation in Feet (4)				
Top of Casing Reference Elevations	99.6	99.8	99	100.37	102.3	100.8	100.5	100.5
Sampling Date								
8/1/1990	63.8	65	67.4	84.77	75.8	62.3	64.3	(2)
8/1/1991	64.66	66.01	68.29	85.06	75.22	62.81	65.36	(2)
10/1/1991	NM	NM	66.03	NM	NM	NM	63.05	(2)
3/1/1992	64.44	65.08	67.94	90.31	80.8	60.24	63.4	(2)
8/1/1992	59.68	60.95	63.23	82.76	69.33	55.97	58	(2)
3/1/1993	58.9	59.58	61.69	84.2	73.72	55.26	60.53	(2)
6/1/1993	58.99	(1)	NM	NM	NM	55.28	57.64	(2)
9/1/1993	57.25	58.16	NM	NM	68.9	53.6	55.56	(2)
12/1/1993	56.03	56.87	NM	NM	NM	NM	54.38	(2)
8/15/1994	56.75	57.87	59.21	81.31	68.85	53.06	56.8	(2)
11/30/1994	54.69	56.15	57.14	NM	75.76	NM	57.34	85.76
2/16/1995	59.43	60.49	62.36	86.46	78.99	55.51	58.13	87.2
4/27/1995	61.2	62.21	64.77	87.53	79.02	57.21	59.71	89.14
8/1/1995	59.21	60.4	62.72	82.78	72.17	55.43	57.42	85.5
10/10/1995	58.14	59.14	60.82	84.76	73.84	54.24	56.33	88.23
1/11/1996	61.32	62.02	64.57	88.18	79.35	57.23	59.9	90.71
4/18/1996	68.4	64.6	67.47	(3)	75.51	59.45	61.62	88.8
7/18/1996	62.94	64.04	67.01	84.43	74.05	59.06	61.72	86.68
9/25/1996	60.79	61.95	64.65	85.52	72.73	57.04	58.55	88.4
1/14/1997	66.08	66.97	69.74	92.23	82.62	61.87	64.9	93.49
4/9/1997	71.37	71.98	75.78	90.23	80.02	67.45	69.62	89.83
8/6/1997	68.61	69.84	73.71	86.72	77.8	64.61	66.71	87.5
10/6/1997	66.33	67.67	70.71	86.64	75.28	62.27	64.35	88.63
1/15/1998	66.41	64.86	70.78	89.43	79.05	62.02	64.51	91.27
4/15/1998	68.68	69.92	73.22	88.92	78.69	64.45	66.55	89.83

Notes: 702601\WateElevat.xls

(1) Data are not reported.
(2) MW-4 not installed until 1994.
(3) Reported elevation inconsistent with water elevation history.
(4) We have assumed reference elevations from data contained on the original well construction logs. We understand that MW-1 through MW-3 may have been reconfigured from a flush-mounted completion to a stick-up completion. We are resurveying the well casings to verify our assumptions on the reference elevation.

Table 2 - Statistical Summary of Analytical Results for Surface Soil Samples

Analyte	Detection Frequency	Range	Maximum Detection	Location of Maximum Detect.	Method C Industrial	Exceedence Frequency
Semivolatiles in mg/kg						
Acenaphthene	1/4	0.046 J to 0.9 U	0.046 J	40-3/25/92	210000	0/4
Anthracene	3/4	0.375 to 0.9 U	0.87	40-3/25/92	1050000	0/4
Benzo(a)anthracene	2/4	0.39 U to 2.6	2.6	40-3/25/92;	17.98	0/4
			2.6 J	42-3/25/92		
Benzo(a)pyrene	2/4	0.39 U to 2.3 J	2.3 J	40-3/25/92	17.98	0/4
Benzo(b)fluoranthene	4/4	0.18 J to 8.2 J	8.2 J	40-3/25/92	17.98	0/4
Chrysene	4/4	0.17 J to 2.6	2.6	40-3/25/92	17.98	0/4
Dibenz(a,h)anthracene	2/4	0.16 J to 1.2 J	1.2 J	40-3/25/92		
Fluoranthene	4/4	0.16 J to 9.2	9.2	40-3/25/92	140000	0/4
Fluorene	1/4	0.11 J to 0.9 U	0.11 J	40-3/25/92	140000	0/4
Pyrene	4/4	0.26 J to 13 J	13 J	42-3/25/92	105000	0/4
Total cPAHs	4/4	0.35 to 16.9	16.9	40-3/25/92	20	0/4
Carbazole	1/4	2 UJ to 4.6 UJ	2.4 J	40-3/25/92	6562.5	0/4
Pentachlorophenol	4/4	6 J to 1900 J	1900 J	42-3/25/92	1093.75	1/4

Notes:

U = Not detected at indicated detection limit.

J = Estimated value.

Total cPAHs was calculated using detected cPAH results only.

Table 3 - Statistical Summary of Analytical Results for Subsurface Soil Samples

Analyte	Detection Frequency	Range	Maximum Detection	Location of Maximum Detect.	Method C Industrial	Exceedence Frequency
Semivolatiles in mg/kg						
Acenaphthene	0/8	0.17 U to 0.17 U		N/A	210000	0/8
Acenaphthylene	0/8	0.17 U to 0.17 U		N/A		
Anthracene	0/8	0.17 U to 0.17 U		N/A	1050000	0/8
Benzo(a)anthracene	0/8	0.17 U to 0.17 U		N/A	17.98	0/8
Benzo(a)pyrene	0/8	0.17 U to 0.17 U		N/A	17.98	0/8
Benzo(b)fluoranthene	0/8	0.17 U to 0.17 U		N/A	17.98	0/8
Benzo(g,h,i)perylene	0/8	0.17 U to 0.17 U		N/A		
Benzo(k)fluoranthene	0/8	0.17 U to 0.17 U		N/A	17.98	0/8
Chrysene	0/8	0.17 U to 0.17 U		N/A	17.98	0/8
Dibenz(a,h)anthracene	0/8	0.17 U to 0.17 U		N/A		
Fluoranthene	0/8	0.17 U to 0.17 U		N/A	140000	0/8
Fluorene	0/8	0.17 U to 0.17 U		N/A	140000	0/8
Indeno(1,2,3-cd)pyrene	0/8	0.17 U to 0.17 U		N/A	17.98	0/8
Naphthalene	0/8	0.17 U to 0.17 U		N/A	140000	0/8
Phenanthrene	0/8	0.17 U to 0.17 U		N/A		
Pyrene	1/8	0.17 U to 0.24	0.24	B-1-COMP	105000	0/8
Total cPAHs	0/8	0.17 U to 0.17 U		N/A		
Pentachlorophenol	4/8	0.29 to 8.2	8.2	MW-1-3-4	1093.75	0/8

Notes:
U = Not detected at indicated detection limit.
Total cPAHs was calculated using detected cPAH results only.

Table 4 - Statistical Summary of Analytical Results for Groundwater Samples

Analyte	Detection Frequency	Range	Maximum Detection	Location of Maximum Detect.	Method B GW	Exceedence Frequency
Dissolved Metals in mg/L						
Arsenic	20/96	0.005 to 0.017	0.017	BXS-3-1/15/98	0.005	16/96
Barium	95/96	0.005 U to 0.078	0.078	BXS-3-7/18/96	1.12	0/96
Cadmium	3/96	0.003 U to 0.009	0.009	BXS-1-3/24/92	0.008	1/96
Chromium	1/48	0.005 U to 0.018	0.018	BXS-4-9/25/92	0.08	0/48
Copper	3/96	0.01 U to 0.015	0.015	BXS-3-9/07/93	0.592	0/96
Iron	141/204	0.02 to 23	23	BXS-3-4/16/98	-	-
Lead	1/48	0.002 U to 0.003	0.003	BXS-3-6/22/93	0.015	0/48
Manganese	172/200	0.005 U to 14	14	BXS-3-4/16/98	2.24	16/200
Mercury	0/48	0.0005 U to 0.0005 U		N/A	0.0048	0/48
Nickel	29/88	0.02 to 0.039	0.039	BXS-2-1/15/98	0.32	0/88
Selenium	1/48	0.005 U to 0.007	0.007	BXS-1-3/22/94	0.08	0/48
Silver	0/48	0.01 U to 0.01 U		N/A	0.08	0/48
Zinc	31/116	0.01 to 0.062	0.062	BXS-3-1/10/95	4.8	0/116
Semivolatiles in µg/L						
Pentachlorophenol	79/173	0.1 to 750	750	MW-3-12/1/93	0.729	67/173
Total PAHs	5/124	0.1 to 2.5	2.5	MW-3-4/17/96	0.012 (a)	5/124
Total Phenols	3/125	0.2 to 300	300	BXS-4-4/17/96	-	-
Conventionals in mg/L						
Alkalinity	126/126	27 to 519	519	BXS-3-8/06/97	-	-
Ammonia as Nitrogen	58/105	0.006 to 1.3	1.3	BXS-4-8/13/88	-	-
Calcium	124/124	7.8 to 102	102	BXS-3-9/26/96	-	-
Chemical Oxygen Demand	114/116	0.4 to 1,857	1,857	BXS-4-8/13/88	-	-
Chloride	200/200	1.8 to 78	78	BXS-2-3/28/89	-	-
Diss. Bicarbonate	126/126	27 to 519	519	BXS-3-8/06/97	-	-
Fluoride	1/47	0.2 to 0.2	0.2	BXS-4-1/10/95	-	-
Magnesium	126/126	1.8 to 60.5	60.5	BXS-3-9/25/92B; BXS-3-9/26/96	-	-

Table 4 - Statistical Summary of Analytical Results for Groundwater Samples

Analyte	Detection Frequency	Range	Maximum Detection	Location of Maximum Detect.	Method B GW	Exceedence Frequency
Nitrate+Nitrite as Nitrogen	21/80	0.2 U to 3.4	3.4	BXS-1-1/14/97	-	-
Nitrate-N	7/32	0.04 to 1.4	1.4	BXS-1-6/15/89	-	-
Nitrite-N	0/32	0.2 U to 0.2 U		N/A	-	-
Potassium	85/85	2 to 7.7	7.7	BXS-3-1/14/97	-	-
Sodium	126/126	3.55 to 14.6	14.6	BXS-2-11/30/94	-	-
Sulfate	178/200	0.2 to 23	23	MW-2-7/17/96	-	-
Tannin-Lignin	91/112	0.1 to 30.4	30.4	BXS-4-1/14/98	-	-
Total Coliforms	65/116	2 to >2,400	>2400	BXS-1-8/13/88; BXS-3-8/13/88	-	-
Total Dissolved Solids	92/92	123 to 624	624	BXS-3-9/25/96	-	-
Total Organic Carbon	191/195	0.5 U to 91	91	BXS-4-3/28/89	-	-
Field Data						
Conductivity	243/243	6.56 to 913	913	BXS-3-8/06/97	-	-
Dissolved Oxygen	119/119	0 to 8.6	8.6	MW-2-1/13/97	-	-
Temperature	232/232	8 to 21.3	21.3	BXS-4-8/13/88	-	-
pH	246/246	4.89 to 9.61	9.61	MW-3-4/17/96	-	-

Notes:
U = Not detected at indicated detection limit.
J = Estimated value.
(a) Based on carcinogenic PAHs as benzo(a)pyrene.

Table 5 - Statistical Summary of Analytical Results for Storm Water Samples

Analyte	Detection Frequency	Range	Maximum Detection	Location of Maximum Detect.	Screening Level	Exceedence Frequency
Dioxins in pg/L						
1234678-HpCDD	13/15	25 JB to 429,315	429,316	Drains 13/14-1/08/98	-	-
1234678-HpCDF	12/15	9.7 U to 95,637	95,638	Drains 13/14-1/08/98	-	-
123478-HxCDD	10/15	5 U to 4,700	4,700	13/14-T-6/98	-	-
123478-HxCDF	7/15	5.1 U to 2,812	2,813	Drain 25-1/08/98	-	-
1234789-HpCDF	10/15	6.9 U to 7,240	7,241	Drain 30-1/08/98	-	-
123678-HxCDD	11/15	7.6 U to 14,728	14,729	Drain 24-1/08/98	-	-
123678-HxCDF	4/15	4.5 U to 17,000 U	2,095	Drains 13/14-1/08/98	-	-
12378-PeCDD	9/15	8.5 U to 1,800	1,800	13/14-T-6/98	-	-
12378-PeCDF	5/15	4.5 U to 1,289	1,289	Drain 24-1/08/98	-	-
123789-HxCDD	11/15	7 U to 13,322	13,322	Drain 24-1/08/98	-	-
123789-HxCDF	1/15	1.5 U to 52	52	13/14-T-6/98	-	-
234678-HxCDF	7/15	7.1 U to 3,300	3300	13/14-T-6/98	-	-
23478-PeCDF	3/15	4.3 U to 220	220	13/14-T-6/98	-	-
2378-TCDD	5/15	2.4 U to 110	110	13/14-T-6/98	-	-
2378-TCDF	4/15	3.4 U to 256	256	Drain 23-9/18/97	-	-
HpCDDs (Total)	13/15	25 B to 746,104	746,104	Drains 13/14-1/08/98	-	-
HpCDFs (Total)	12/15	9.7 U to 419,941	419,941	Drains 13/14-1/08/98	-	-
HxCDDs (Total)	11/15	7.6 U to 78,863	78,863	Drains 13/14-1/08/98	-	-
HxCDFs (Total)	11/15	7.7 U to 99,374	99,374	Drains 13/14-1/08/98	-	-
OCDD	13/15	12.7 U to 4,016,164	4,016,164	Drains 13/14-1/08/98	-	-
OCDF	12/15	17.2 U to 544,878	544,878	Drains 13/14-1/08/98	-	-
PeCDDs (Total)	9/15	8.5 U to 6,000	6,000	13/14-T-6/98	-	-
PeCDFs (Total)	11/15	6.5 U to 15,000	15,000	13/14-T-6/98	-	-
TCDDs (Total)	5/15	2.4 U to 550	550	13/14-T-6/98	-	-
TCDFs (Total)	9/15	3.5 U to 1,700	1,700	13/14-T-6/98	-	-
2,3,7,8-TCDD TEF Equivalent	14/15	0.36 to 13,568	13,568	Drains 13/14-1/08/98	0.6	13/14

Table 5 - Statistical Summary of Analytical Results for Storm Water Samples

Analyte	Detection Frequency	Range	Maximum Detection	Location of Maximum Detect.	Screening Level	Exceedence Frequency
Semivolatiles in µg/L						
Acenaphthene	0/6	1 U to 1 U		N/A	-	-
Acenaphthylene	0/6	1 U to 11 U		N/A	-	-
Anthracene	0/6	0.1 U to 0.1 U		N/A	-	-
Benzo(a)anthracene	0/6	0.1 U to 0.1 U		N/A	-	-
Benzo(a)pyrene	2/6	0.1 to 0.1	0.1	Drain 30-9/18/97; Drains 13/14-9/18/97	-	-
Benzo(b)fluoranthene	2/6	0.2 U to 0.3	0.3	Drain 30-9/18/97; Drains 13/14-9/18/97	-	-
Benzo(g,h,i)perylene	0/6	0.2 U to 0.2 U		N/A	-	-
Benzo(k)fluoranthene	2/6	0.1 to 0.1	0.1	Drain 30-9/18/97; Drains 13/14-9/18/97	-	-
Chrysene	2/6	0.1 U to 0.2	0.2	Drain 30-9/18/97; Drains 13/14-9/18/97	-	-
Dibenz(a,h)anthracene	0/6	0.1 U to 0.1 U		N/A	-	-
Fluoranthene	2/6	0.2 U to 0.3	0.3	Drain 30-9/18/97; Drains 13/14-9/18/97	-	-
Fluorene	0/6	0.2 U to 0.2 U		N/A	-	-
Indeno(1,2,3-cd)pyrene	2/6	0.1 U to 0.2	0.2	Drain 30-9/18/97; Drains 13/14-9/18/97	-	-
Naphthalene	0/6	1 U to 1 U		N/A	-	-
Phenanthrene	2/6	0.1 U to 0.5 U	0.2	Drain 30-9/18/97; Drains 13/14-9/18/97	-	-
Pyrene	3/6	0.2 to 0.5	0.5	Drains 13/14-9/18/97	-	-
Total PAHs	10/75	0.148 to 84.8 U	34.1	Drains 13/14-1/1-2/28/97	-	-
2,4,6-Trichlorophenol	0/6	0.5 U to 50 U		N/A	-	-
Pentachlorophenol	96/96	0.8 to 960	960	Drain 24-1/1-2/28/96	1.0	95/96
Total Tetrachlorophenols	3/6	2.3 to 50 U	2.7	Drains 10-22-9/18/97	-	-

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Table 5 - Statistical Summary of Analytical Results for Storm Water Samples

Analyte	Detection Frequency	Range	Maximum Detection	Location of Maximum Detect.	Screening Level	Exceedence Frequency
Conventionals in mg/L						
Total Suspended Solids	96/96	18 to 19,900	19,900	Untreat. Wood-3/1-5/31/9	-	-
pH	96/96	6.01 to 8.82	8.82	Drain 25-5/1-5/31/97	6.5-8.5	3/96
TPH in mg/L						
Oil & Grease	88/93	1 to 16	16	Drain 25-9/1-10/31/94	10	3/93

Notes:

U = Not detected at indicated detection limit.

2,3,7,8-TCDD TEF Equivalent was calculated using detected dioxin results multiplied by the corresponding Toxic Equivalency Factor.

Table 6 - Exploration Objectives and Proposed Sampling and Analysis Plan

Exploration Location	Estimated Depth in Feet	Number of Soil Samples for Chemistry	Soil Chemical Testing	Groundwater Chemical Testing	Objective
HCMW-5	55	3	PCP, (sheen test, dioxin(1), TOC, PAHs (2), GS, NWTPH-Dx(3))	PCP, TSS, NWTPH-G/BTEX, NWTPH-Dx, dioxin	Investigate area where tar-like material was excavated in 1981, evaluate upgradient extent of PCP plume, determine impact of storm drains 24, 25 and 26 on groundwater quality, look for evidence of residual from 1990 spill, evaluate area of stained soil
HCMW-6	55	4	PCP, (TOC)	PCP,TSS	Define groundwater flow direction, eastern extent of PCP plume, soil column quality, and water quality under treated pole storage area, sample surface soils
HCMW-7	55	1	PCP	PCP, TSS	Define northern extent of PCP plume, provide empirical data on PCP attenuation, evaluate off-site groundwater risks
SB-2	40	3	PCP, (sheen test, dioxin(1), TOC, PAHs (2), GS, NWTPH-Dx(3))	PCP, TSS, NWTPH-G/BTEX, NWTPH-Dx	Assess subsurface impact of 1990 PCP spill, look for LNAPL
SB-3	40	2	PCP, (TOC)	PCP, TSS	Evaluate the impact of storm drain 24 on groundwater quality, define southwest PCP plume boundary, evaluate source to BSX-1
SB-4	40	3	PCP, (sheen test, dioxin(1), TOC, GS, NWTPH-Dx(3))	PCP, TSS, NWTPH-G/BTEX, NWTPH-Dx	Evaluate soils with depth beneath drainage ditch to assess storm water impact on soil sorption
SB-5	40	3	PCP, (TOC, PAHs (2), GS)	PCP, TSS	Investigate backfill of excavated area for wastes, assess impact of treatment operations on subsurface soil, determine source of PCP appearing in MW-3.
SB-6	15	2	PCP	-	Investigate backfill of excavated area for wastes, assess impact of treatment operations on subsurface soil
SB-7	15	2	PCP	-	Investigate area of previous butt tank overflow spills
SB-8	40	3	PCP (sheen test, dioxin(1), NWTPH-Dx(3))	PCP, TSS, NWTPH-G/BTEX, NWTPH-Dx	Investigate area of previous butt treatment tank
SS-1	0.5	2	PCP, pH, NWTPH-Dx, (SPLP, dioxin, TOC)	-	Assess impact of treatment operations on nearby soils, assess leachability and surface contamination within catch basin for storm drain 24.
SS-2	0.5	2	PCP, pH, (SPLP, dioxin, NWTPH-Dx, TOC)	-	Assess impact of treatment operations on nearby soils, and assess leachability
SS-3	0.5	2	PCP, (SPLP, dioxin)	-	Assess surface soil contamination and leachability in the treated pole storage area away from treatment operations and surface runoff
SS-4	0.5	2	PCP, pH (SPLP, dioxin, TOC)	-	Assess surface soil contamination and leachability in the treated pole storage area away from treatment operations and surface runoff.
SS-5	0.5	2	PCP, pH (SPLP, dioxin)	-	Assess surface soil contamination in the treated pole storage area within catch basin for storm drain 23.
SS-6	0.5	2	PCP	-	Assess impact of airborne dusts and volatilization from treatment processes on surrounding soils.

Notes:
(parenthesis) around chemical analysis indicates only one of the soil samples in that exploration will be selected for that analysis
(1) Dioxin will be analyzed only if PCP is detected and NW-TPHDx is detected greater than 200 mg/kg in soil sampled within the water table zone
(2) Up to three samples may be analyzed for PAHs (Method 8270) if evidence of creosote-like product is observed
(3) NWTPH-Dx will be analyzed from a soil sample within the water table zone; in HCMW-5 a surface soil sample will also be analyzed.

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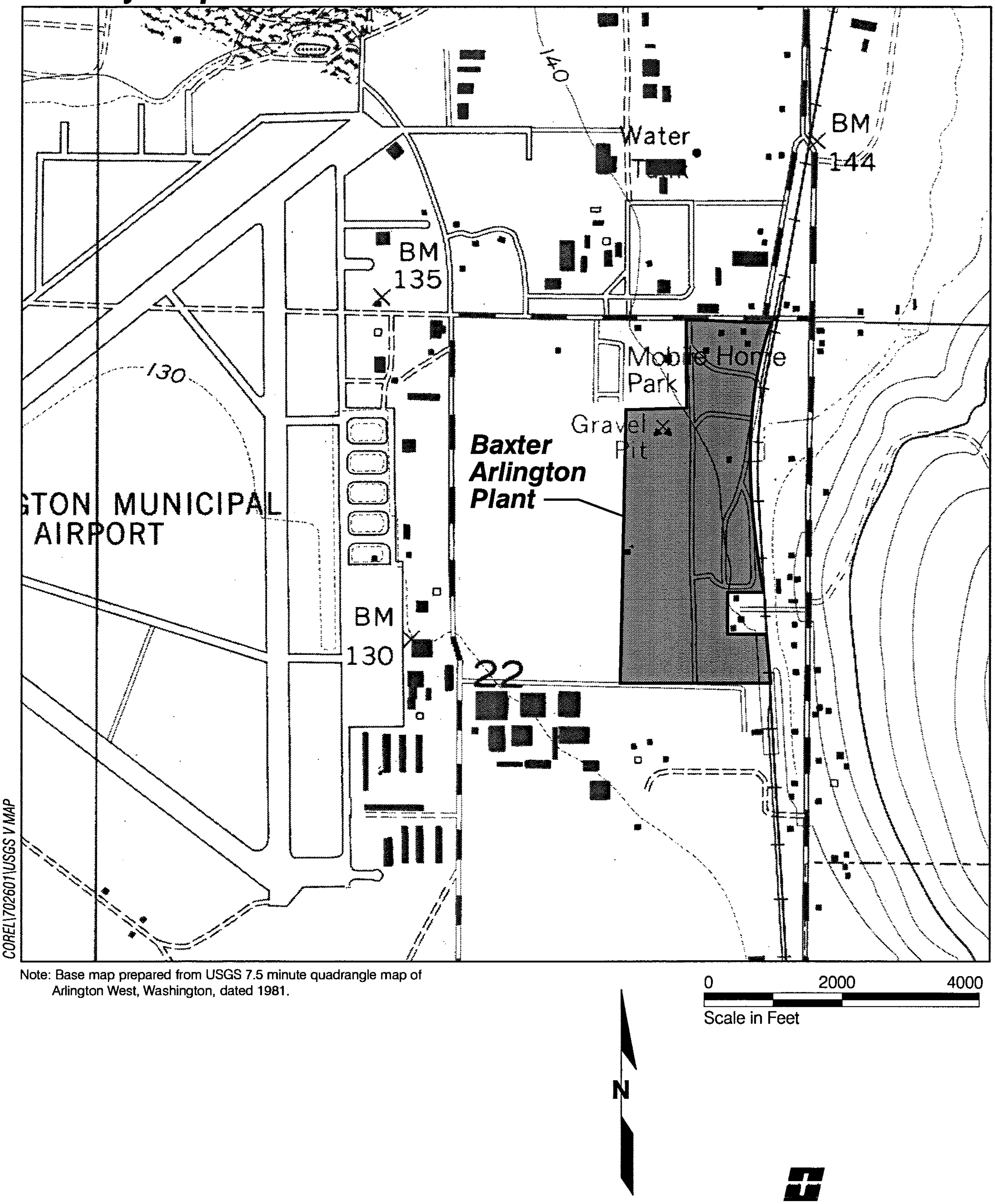
Vicinity Map



Note: Base map prepared from USGS 7.5 minute quadrangle map of Arlington West, Washington, dated 1981.

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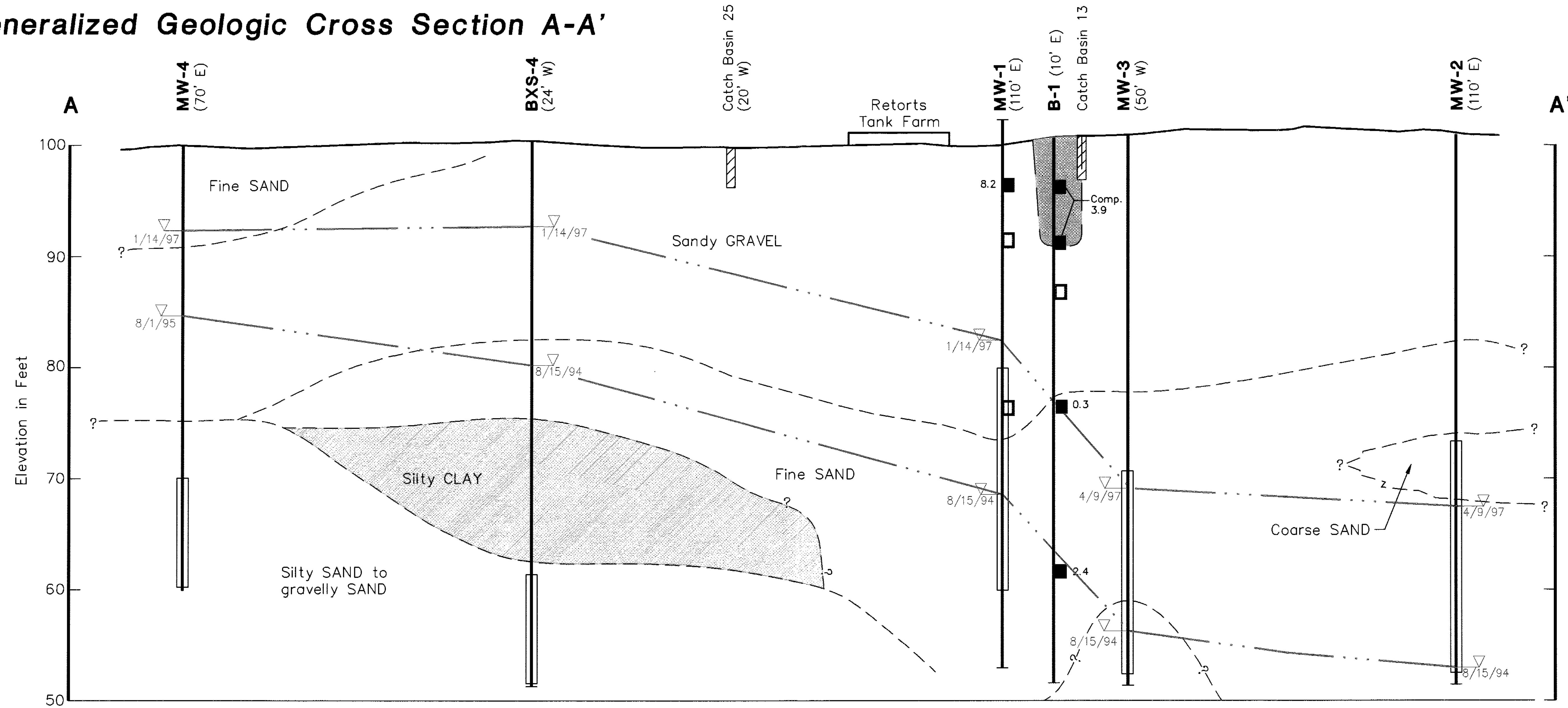
Figure 1

Generalized Geologic Cross Section A-A'



Note: Contacts between soil units are based upon interpolation between borings and represent our interpretation of subsurface conditions based on currently available data.

Horizontal Scale in Feet
0 200 400

0 10 20
Vertical Scale in Feet
Vertical Exaggeration x 20

MW-1 Exploration Number

(70' E) (Offset Distance and Direction)

Exploration Location

8.2 Soil Sample Location
Concentration of PCP in mg/kg where Detected; Otherwise Not Detected (WWC, 1990)

MAX Maximum Recorded Water Level (Observed at Date Specified)

MIN Minimum Recorded Water Level (Observed at Date Specified)

Screened Interval

Storm Water Drain
Catch Basin Location and Number

CVD 6/15/99 1=200 color.pc2
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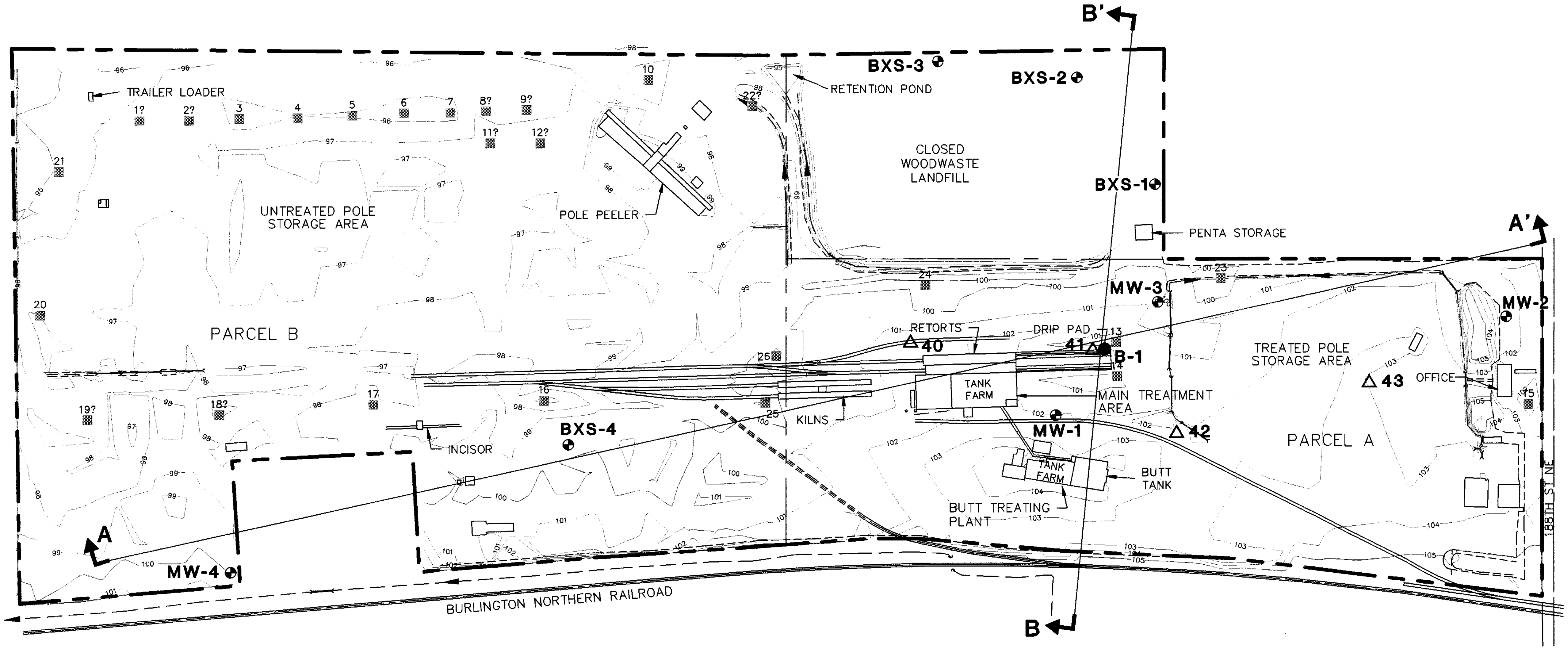
J-7026-01 6/99
Figure 4

Exploration Location Map



Drainage Ditch and Flow Direction (From ACI, 1998)

Culvert

Catch Basin – ? Indicates Approximate Location

Ground Surface Elevation Contour in Feet Based on Baxter Plant Datum

Approximate Property Parcel Boundary

Baxter Site Boundary

Railroad

Building or Structure

Note: Survey by Clark Leaman Surveying, January 1996).

Exploration Location and Number

MW-4 Monitoring Well

B-1 Soil Boring

42 Surface Soil Sample

AA' Cross Section Location and Designation

N

0 200 400

Scale in Feet

XR-BASE.DWG

CVD 5/3/99 1=200 color.pc2
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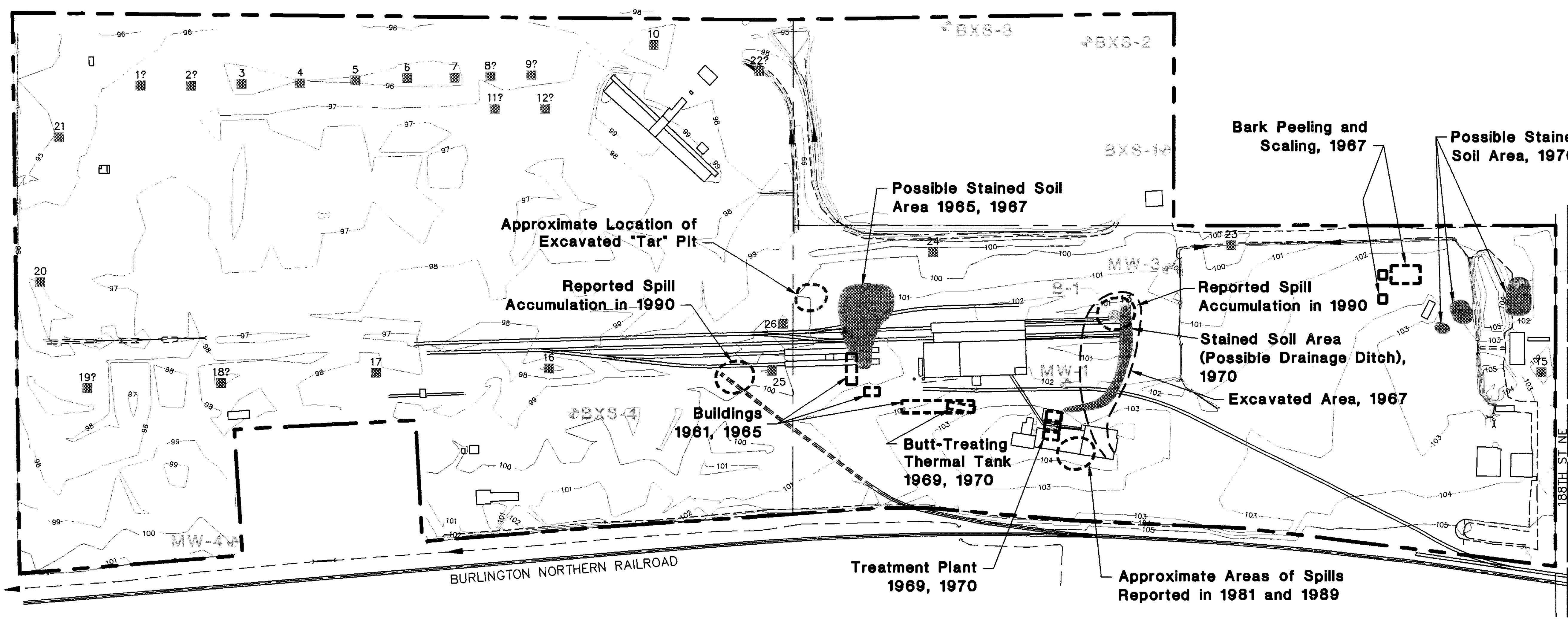
J-7026-01 6/99

Figure 3

Historical Features and Spill Locations



Drainage Ditch and Flow Direction (From ACI, 1998)

Culvert

Catch Basin – ? Indicates Approximate Location

Ground Surface Elevation Contour in Feet Based on Baxter Plant Datum

Approximate Property Parcel Boundary

Baxter Site Boundary

Railroad

Building or Structure

Exploration Location and Number

MW-4 Monitoring Well

B-1 Soil Boring

Previous Location of Building or Structure and Date of Aerial Photo in which Observed

Date and Approximate Location of PCP Spill

Date and Area that Ground is Discolored in Aerial Photos – Possible Staining

N

0 200 400

Scale in Feet

Note: Survey by Clark Leaman Surveying, January 1996.

XR-BASE.DWG

CVD 6/15/99 1=200 color.pc2
70260108

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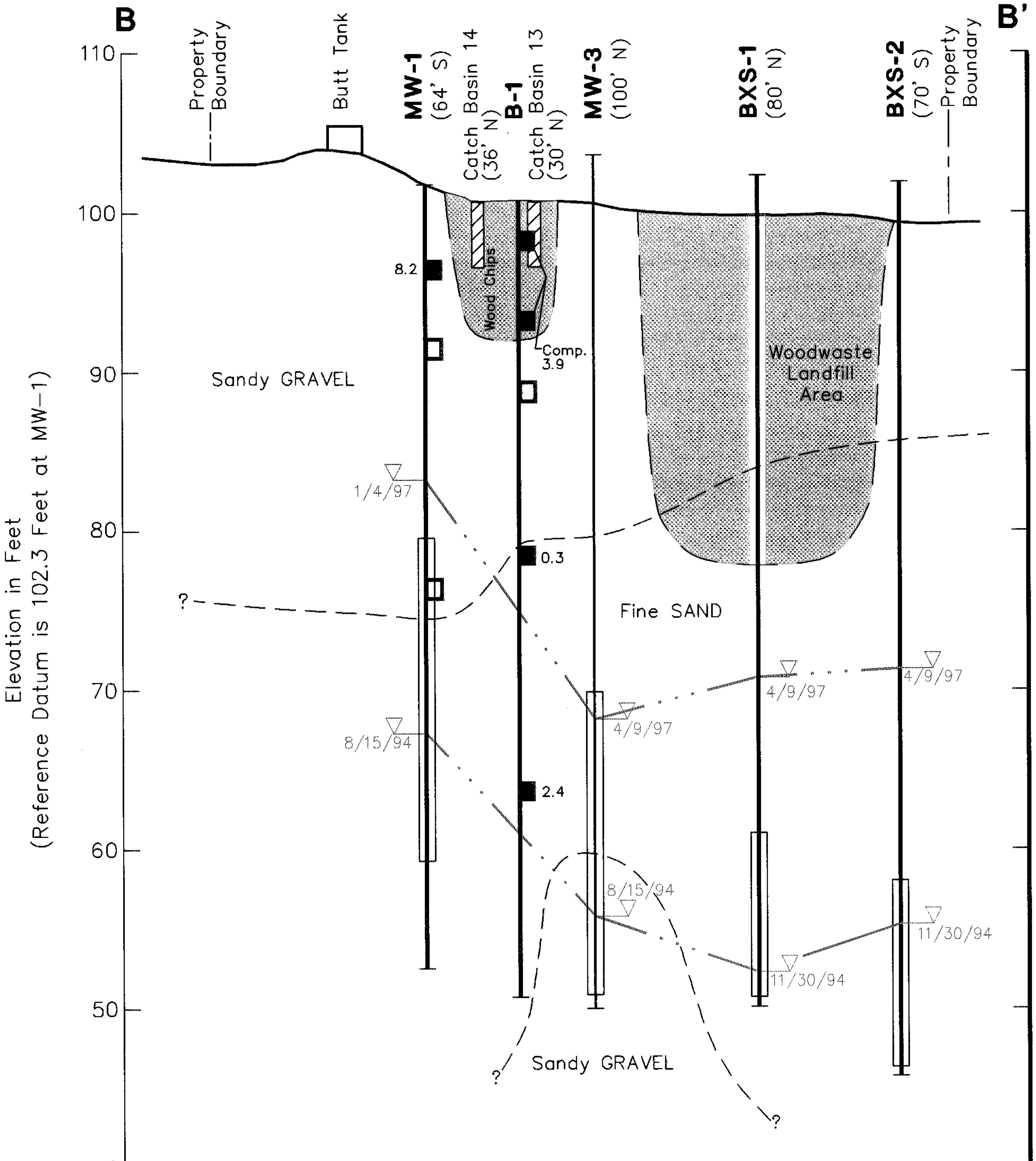
J-7026-01 6/99

Figure 2

Generalized Geologic Cross Section B-B'



Note: Contacts between soil units are based upon interpolation between borings and represent our interpretation of subsurface conditions based on currently available data.

MW-1 Exploration Number

(70' E) (Offset Distance and Direction)

Exploration Location

8.3 Soil Sample Location
Concentration of PCP in mg/kg (WWC, 1990)

1/1/97 Maximum Recorded Water Level
(Observed at Date Specified)

11/94 Minimum Recorded Water Level
(Observed at Date Specified)

Screened Interval

Storm Water Drain Catch Basin Location and Number

Horizontal Scale in Feet
0 200 400

0 10 20
Vertical Scale in Feet
Vertical Exaggeration x 20

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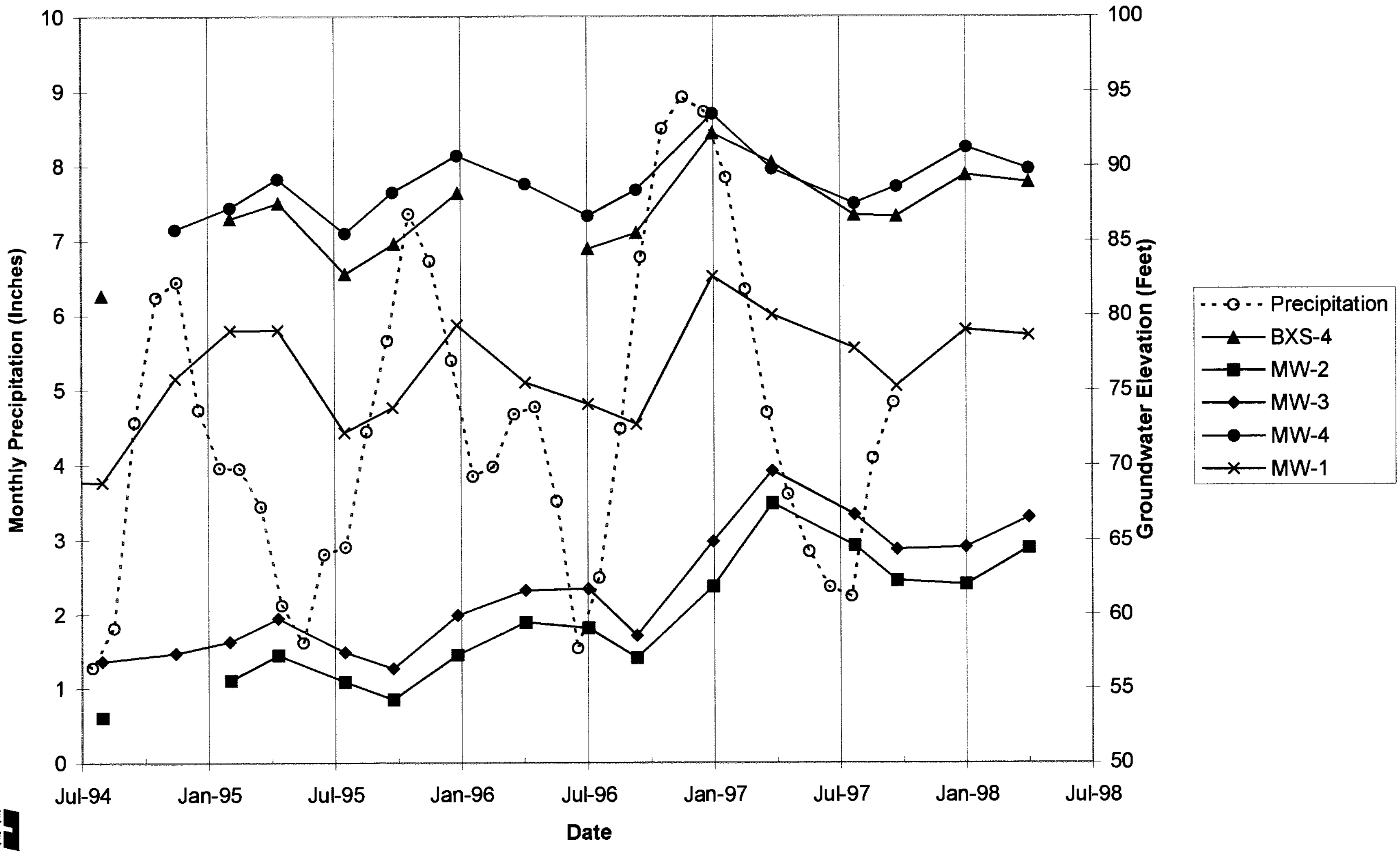
J-7026-01 6/99

Figure 5

CVD 6/15/99 1=200 color.pc2
7026109

Monthly Precipitation and Groundwater Elevations in Arlington, WA

3 Month Averages



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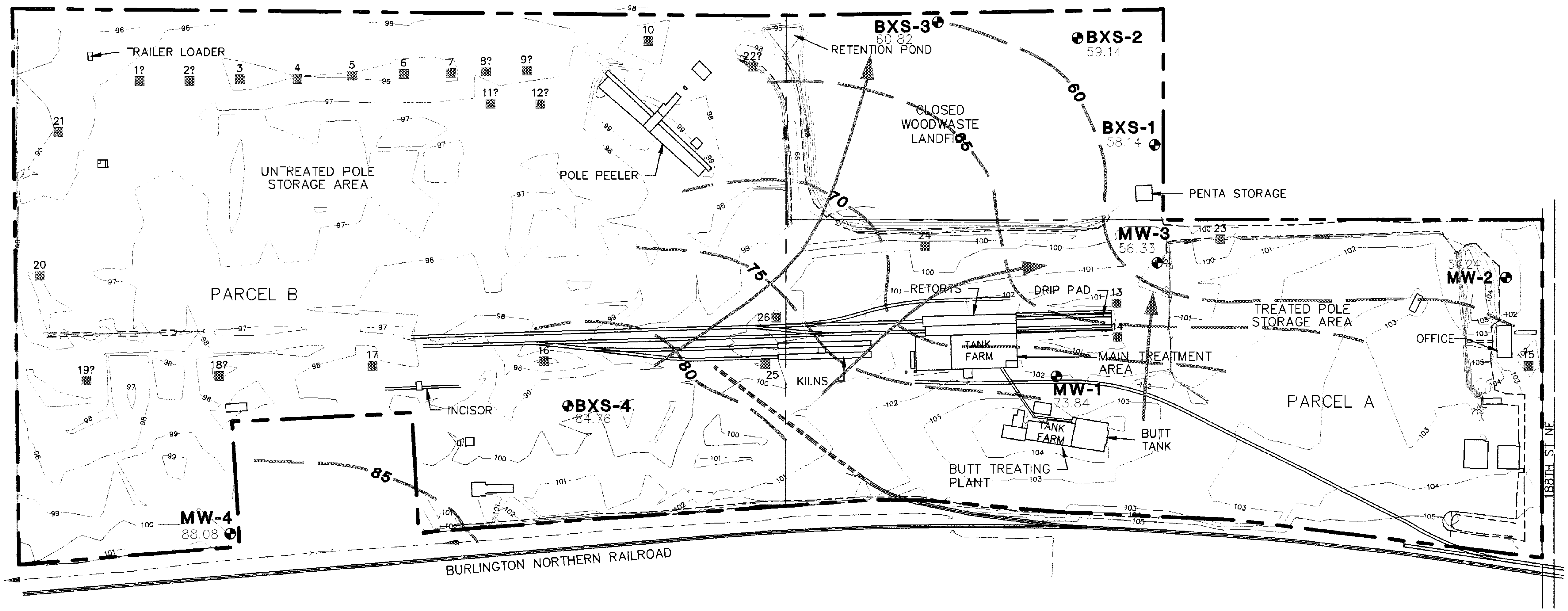
J-7026-01 6/99
Figure 6

corel\702601\PRECIP

Groundwater Elevation Contour Map
October 1995



Drainage Ditch and Flow Direction (From ACI, 1998)

Culvert

1? Catch Basin – ? Indicates Approximate Location

105 Ground Surface Elevation Contour in Feet Based on Baxter Plant Datum

Approximate Property Parcel Boundary

Baxter Site Boundary

Railroad

Building or Structure

MW-4 Monitoring Well Locaiton and Number

75 Groundwater Elevation Contour in Feet

71.37 Groundwater Elevation in Feet

Groundwater Flow Direction

N

0 200 400

Scale in Feet

Notes:
1. Site survey by Clark Leaman Surveying, January 1996 using an assumed site datum.
2. The well elevations used are from original construction logs and are being resurveyed to tie into the site datum.

HARTCROWSER

J-7026-01 6/99

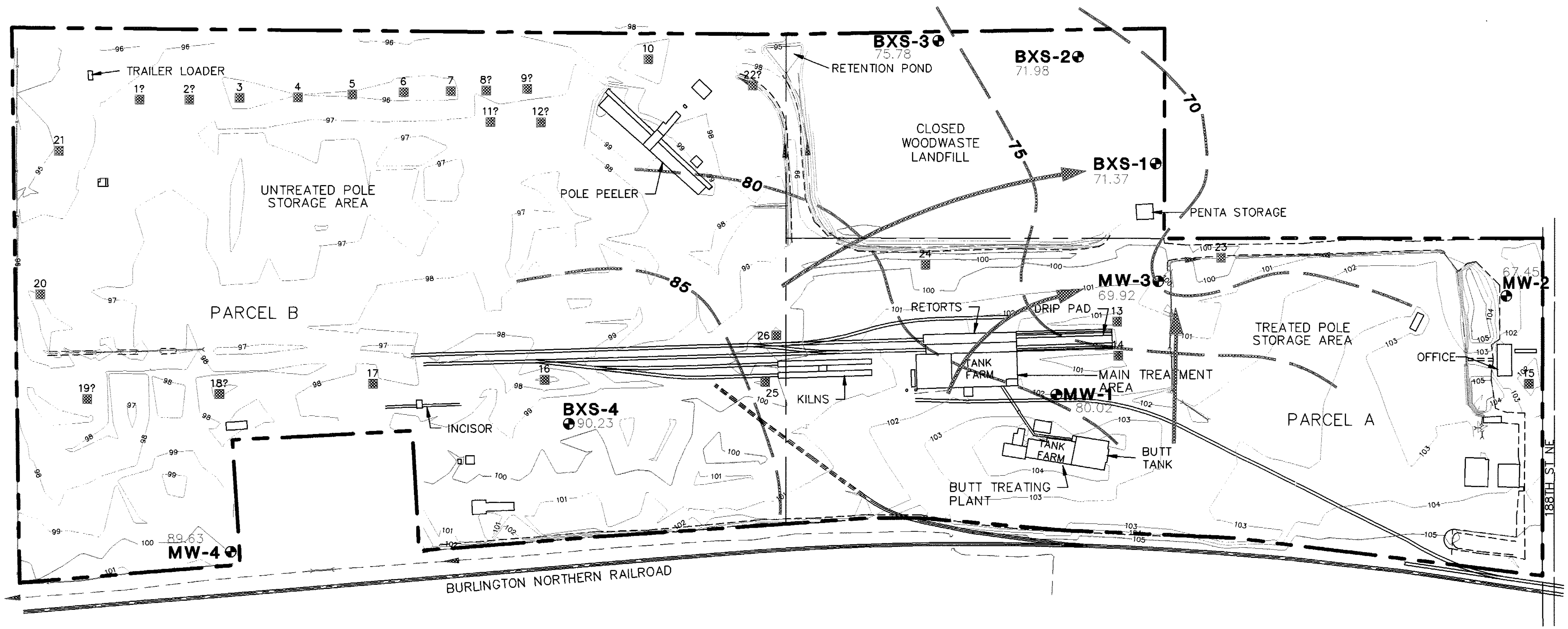
Figure 7

XR-BASE.DWG

CVD 6/15/99 1=200 color.pc2
70260102

Groundwater Elevation Contour Map

April 1997



- Drainage Ditch and Flow Direction (From ACI, 1998)
- Culvert
- 1? Catch Basin – ? Indicates Approximate Location
- 105 Ground Surface Elevation Contour in Feet Based on Baxter Plant Datum
- Approximate Property Parcel Boundary
- Baxter Site Boundary
- Railroad
- Building or Structure
- MW- Monitoring Well Locaiton and Number
- 75 Groundwater Elevation Contour in Feet
- 71.37 Groundwater Elevation in Feet
- Groundwater Flow Direction

N

0 200 400

Scale in Feet

Notes:
1. Site survey by Clark Leaman Surveying, January 1996 using an assumed site datum.
2. The well elevations used are from original construction logs and are being resurveyed to tie into the site datum.

XR-BASE.DWG

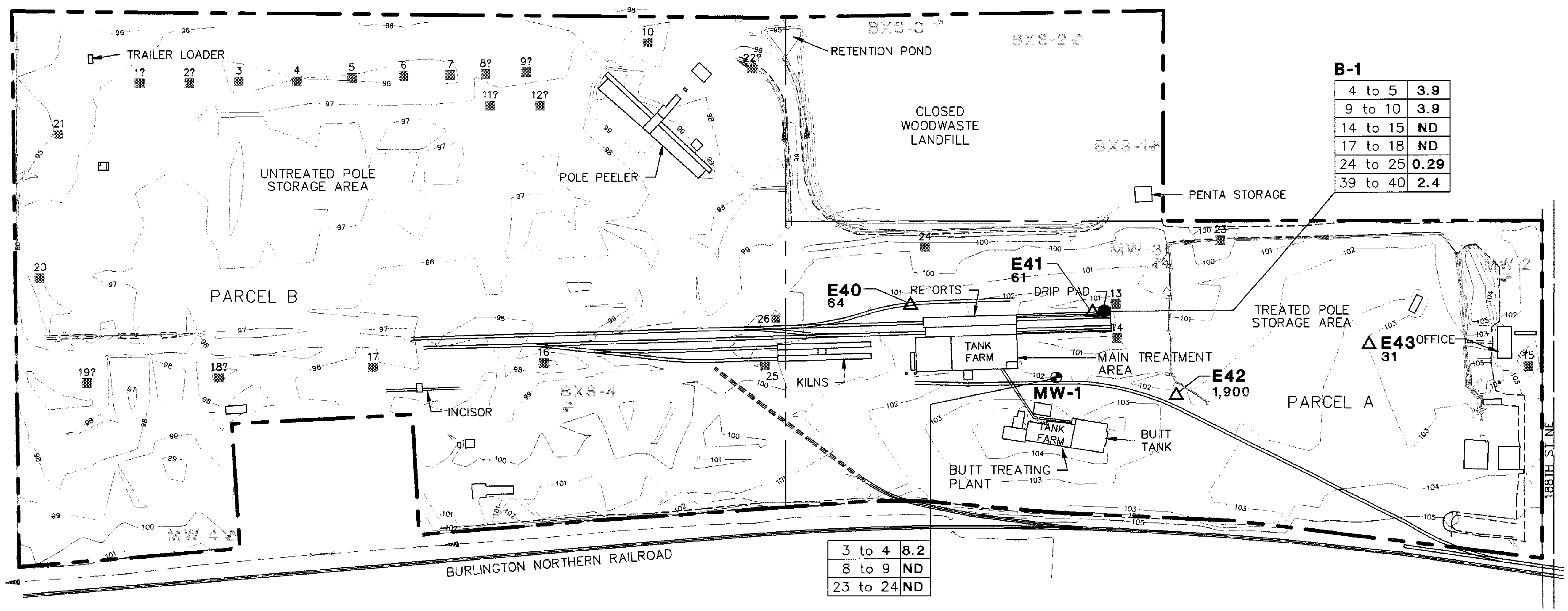
CVD 6/15/99 1=200 color.pc2
70260101

HARTCROWSER

J-7026-01 6/99

Figure 8

Soil PCP Concentrations



Drainage Ditch and Flow Direction (From ACI, 1998)

Culvert

1? Catch Basin – ? Indicates Approximate Location

105 Ground Surface Elevation Contour in Feet Based on Baxter Plant Datum

Approximate Property Parcel Boundary

Baxter Site Boundary

Railroad

Building or Structure

Exploration Location and Number

MW-4 Monitoring Well

B-1 Soil Boring

E42 Surface Soil Sample (Ecology, 1992)

31 Soil PCP Concentration in mg/kg

Depth of Sample in Feet

3 to 4	8.2

Concentration in mg/kg

N

0 200 400

Scale in Feet

Note: Survey by Clark Leaman Surveying, January 1996.

XR-BASE.DWG

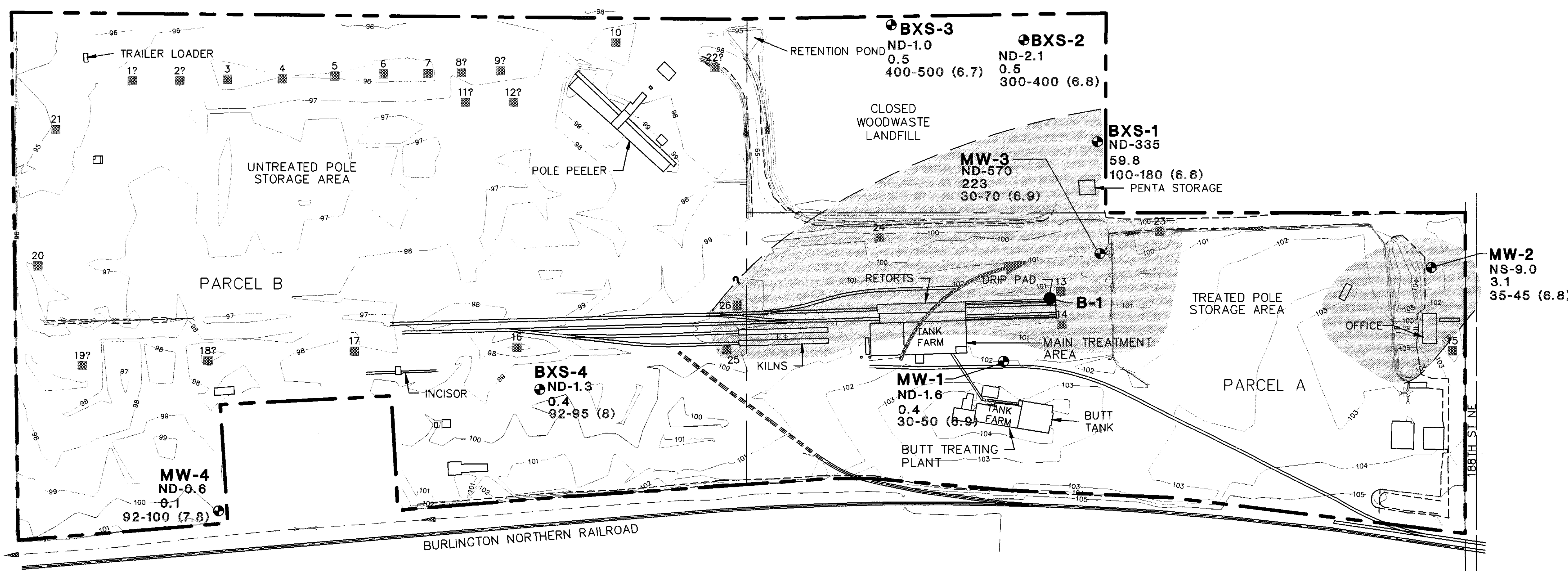
CVD 6/15/99 1=200 color.pc2
70260105

HARTCROWSER

J-7026-01 6/99

Figure 9

Groundwater PCP Concentrations



Drainage Ditch and Flow Direction (From ACI, 1998)	
Culvert	
1?	Catch Basin – ? Indicates Approximate Location
105	Ground Surface Elevation Contour in Feet Based on Baxter Plant Datum
	Approximate Property Parcel Boundary
	Baxter Site Boundary
	Railroad
	Building or Structure

Note: Survey by Clark Leaman Surveying, January 1996.

	Approximate Boundary of PCP Plume
ND-335	Range of Measured PCP Concentration in Groundwater
59.8	Mean PCP Concentration in µg/L
ND	Not Detected
200 (6)	Bicarbonate/Alkalinity Concentration Range in mg/kg; Average pH measured

Exploration Location and Number

MW-4	Monitoring Well
B-1	Soil Boring

N

0 200 400

Scale in Feet

Note: Half the detection limit (0.2 to 5 µg/L) was used for calculating mean values.

XR-BASE.DWG

CVD 6/15/99 1=200 color.pc2
70260106

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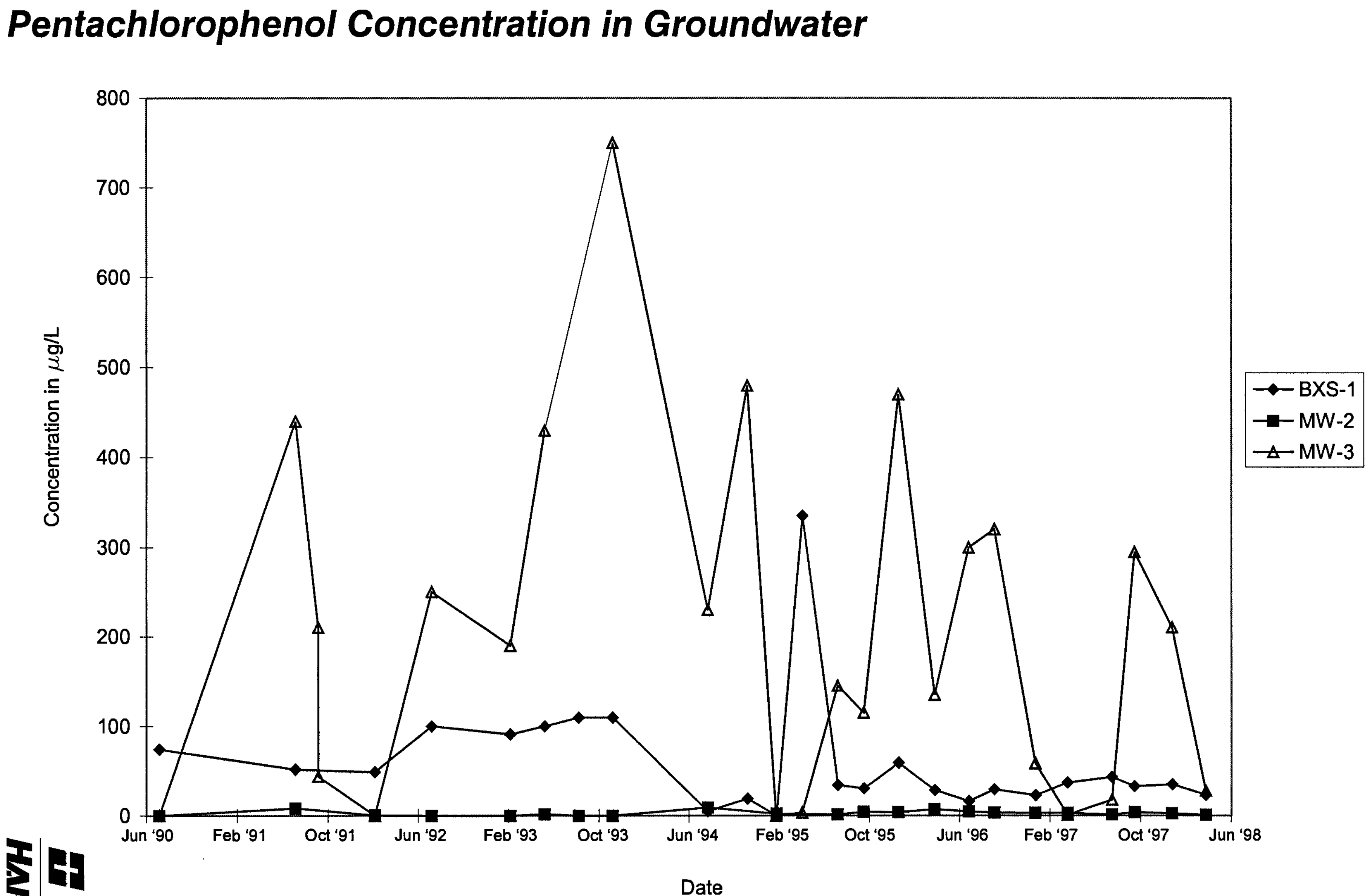
J-7026-01 6/99

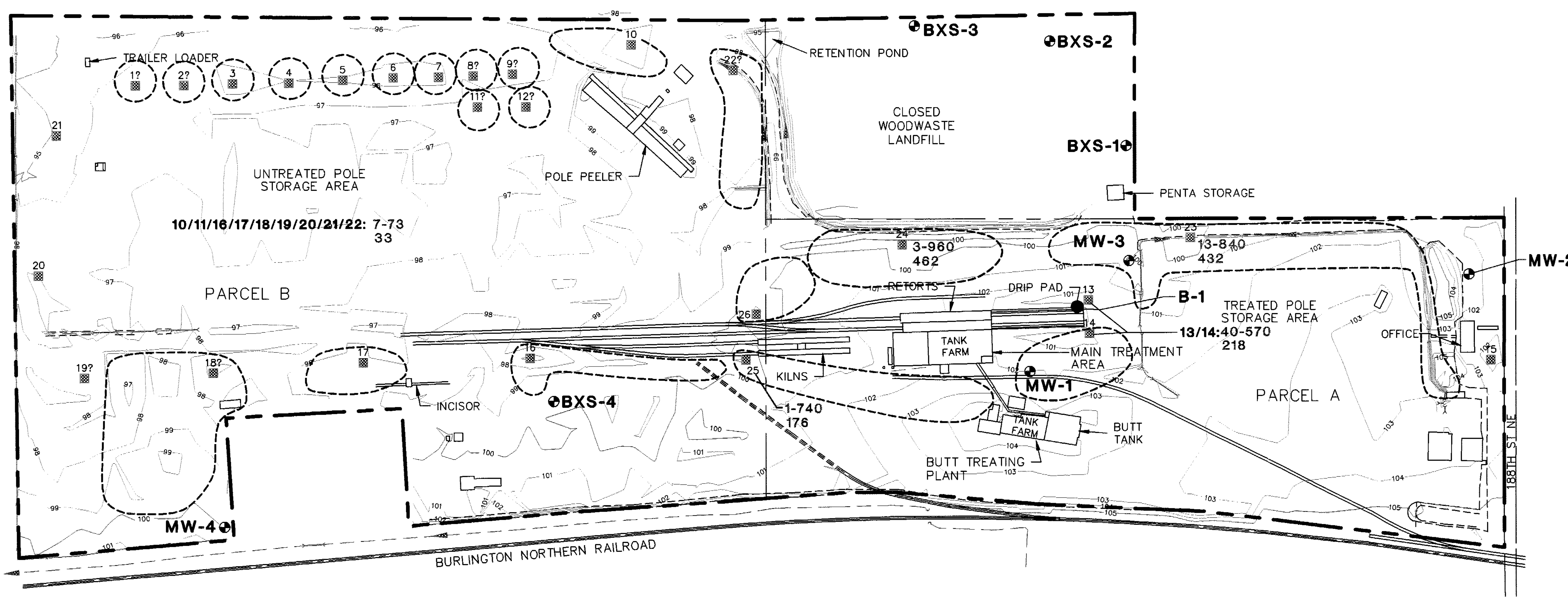
Figure 10



HARTCROWSER
J-7026-01 9/99
Figure 11

core\702601\PENT 2

Storm Water Collection Basins and PCP Concentrations



Drainage Ditch and Flow Direction (From ACI, 1998)

Culvert

1? Catch Basin – ? Indicates Approximate Location

105 Ground Surface Elevation Contour in Feet Based on Baxter Plant Datum

Approximate Property Parcel Boundary

Baxter Site Boundary

Railroad

Building or Structure

Note: Survey by Clark Leaman Surveying, January 1996.

Exploration Location and Number

MW-4	Monitoring Well
B-1	Soil Boring
	Approximate Boundary of Storm Water Collection for the Enclosed Catch Basin (from WWC, 1990)
13/14:	Storm Water Samples to be Analyzed were Consolidated from Drains 13 and 14
40-570	Range of Measured PCP Concentration in Storm Water in µg/L
218	Mean PCP Concentration in Storm Water in µg/L

N

0 200 400

Scale in Feet

XR-BASE.DWG

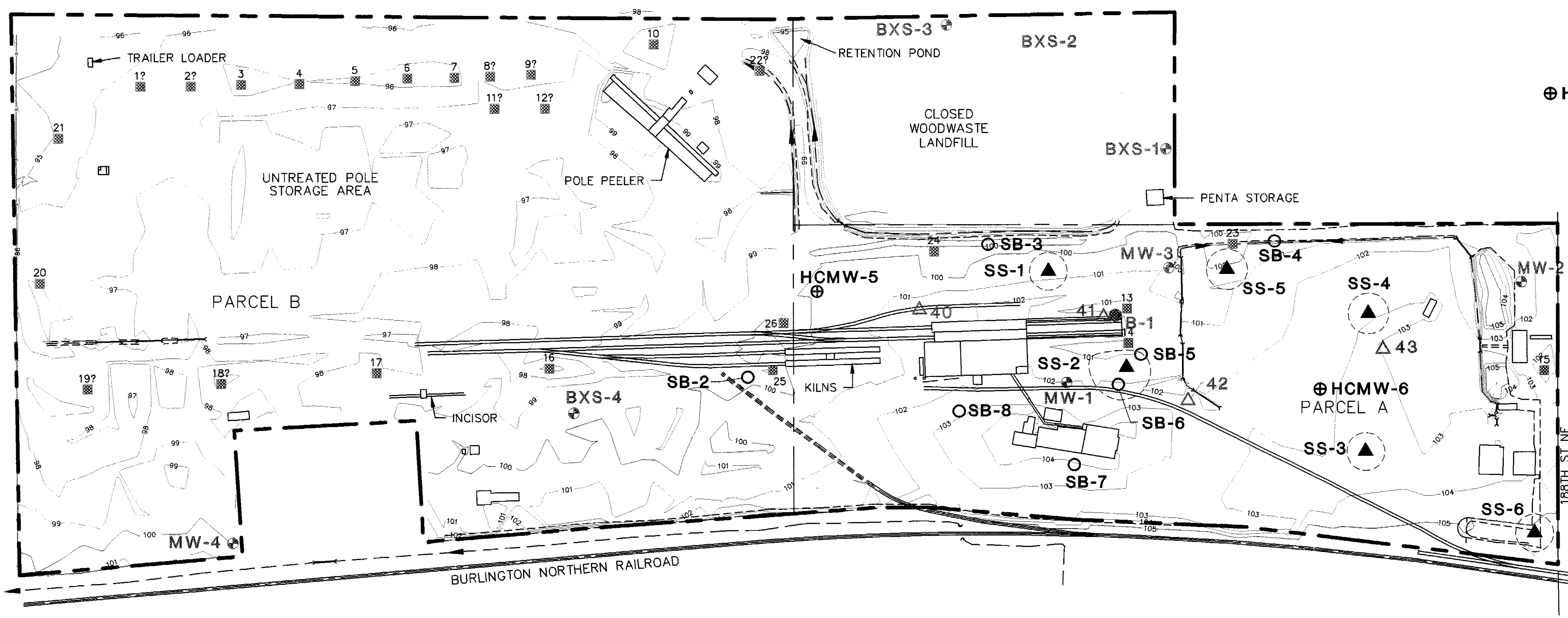
CVD 6/15/99 1=200 color.pc2
7026017

HARTCROWSER

J-7026-01 6/99

Figure 12

Proposed Sampling and Analysis Plan



— ◄— —	Drainage Ditch and Flow Direction (From ACI, 1998)
→←	Culvert
1? ▩	Catch Basin – ? Indicates Approximate Location
···105···	Ground Surface Elevation Contour in Feet Based on Baxter Plant Datum
—— – – ——	Approximate Property Parcel Boundary
━ ━ ━	Baxter Site Boundary
═══	Railroad
☐	Building or Structure

Note: Survey by Clark Leaman Surveying, January 1996.

Proposed Exploration Location and Number

⊕HCMW-5	Monitoring Well
○SB-2	Soil Boring
▲ SS-1	Composite Surface Sample (See Table 6 for details on sampling and analysis at these locations.)

Existing Exploration Location and Number

MW-4	Monitoring Well
●B-1	Soil Boring
△42	Surface Soil Sample

N

0 200 400

Scale in Feet

XR-BASE.DWG

CVD 6/18/99 1=200 70260110.pc2
70260110

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J-7026-01 5/99

Figure 13

APPENDIX A
CHEMICAL DATA BASE SUMMARY
SOIL, GROUNDWATER AND STORM WATER

Table A-1 - Soil Analytical Data

Sample ID	40	41	42	43	B-1-14-15	B-1-17-18
Sampling Date	3/25/92	3/25/92	3/25/92	3/25/92	8/24/90	8/24/90
Depth in feet	< 1	< 1	< 1	< 1	14 to 15	17 to 18
Semivolatiles in mg/kg						
Acenaphthene	0.046 J	0.39 U	0.9 U	0.45 U	0.17 U	0.17 U
Acenaphthylene					0.17 U	0.17 U
Anthracene	0.87	0.375	0.9 U	0.45 J	0.17 U	0.17 U
Benzo(a)anthracene	2.6	0.39 U	2.6 J	0.45 U	0.17 U	0.17 U
Benzo(a)pyrene	2.3 J	0.39 U	0.57 J	0.45 UJ	0.17 U	0.17 U
Benzo(b)fluoranthene	8.2 J	0.18 J	1.2 J	0.31 J	0.17 U	0.17 U
Benzo(g,h,i)perylene					0.17 U	0.17 U
Benzo(k)fluoranthene					0.17 U	0.17 U
Chrysene	2.6	0.17 J	2.4 J	0.39 J	0.17 U	0.17 U
Dibenz(a,h)anthracene	1.2 J	0.39 U	0.16 J	1.1 UJ	0.17 U	0.17 U
Fluoranthene	9.2	0.16 J	5.7 J	0.31 J	0.17 U	0.17 U
Fluorene	0.11 J	0.39 U	0.9 U	0.45 U	0.17 U	0.17 U
Indeno(1,2,3-cd)pyrene					0.17 U	0.17 U
Naphthalene					0.17 U	0.17 U
Phenanthrene					0.17 U	0.17 U
Pyrene	7.6 J	0.26 J	13 J	0.77 J	0.17 U	0.17 U
Total cPAHs	16.9	0.35	6.93	0.7	0.17 U	0.17 U
Pentachlorophenol	64 J	6 J	1900 J	31	0.85 U	0.85 U
Carbazole	2.4 J	2 UJ	4.6 UJ	2.3 UJ		

Table A-1 - Soil Analytical Data

Sample ID	B-1-24-25	B-1-39-40	B-1-COMP	MW-1-23-24	MW-1-3-4	MW-1-8-9
Sampling Date	8/24/90	8/24/90	8/24/90	8/24/90	8/24/90	8/24/90
Depth in feet	24 to 25	39 to 40	4 to 5 & 9 to 10	23 to 24	3 to 4	8 to 9
Semivolatiles in mg/kg						
Acenaphthene	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U
Acenaphthylene	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U
Anthracene	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U
Benzo(a)anthracene	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U
Benzo(a)pyrene	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U
Benzo(b)fluoranthene	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U
Benzo(g,h,i)perylene	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U
Benzo(k)fluoranthene	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U
Chrysene	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U
Dibenz(a,h)anthracene	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U
Fluoranthene	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U
Fluorene	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U
Indeno(1,2,3-cd)pyrene	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U
Naphthalene	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U
Phenanthrene	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U
Pyrene	0.17 U	0.17 U	0.24	0.17 U	0.17 U	0.17 U
Total cPAHs	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U
Pentachlorophenol	0.29	2.4	3.9	0.85 U	8.2	0.85 U
Carbazole						

Notes:
U = Not detected at indicated detection limit.
J = Estimated value.
Total cPAHs was calculated using detected cPAH results only.

Table A-2 - Groundwater Analytical Data

Sample ID	BXS-1	BXS-1	BXS-1	BXS-1	BXS-1	BXS-1
Sampling Date	8/13/88	12/27/88	3/28/89	6/15/89	9/13/89	12/11/89
Field Parameters						
Conductivity	415	452	225	236	430	435
Dissolved Oxygen						
pH	6.86	5.89	6.05	6	6.59	5.45
Temperature	13.1	11		12		
Conventionals						
Alkalinity						
Ammonia as Nitrogen	0.06	0.05 U	0.71	0.13	0.05	0.05 U
Chemical Oxygen Demand	126	17	24	60	30	27
Calcium						
Chloride	65	40	24	49	32	60
Conductivity	454	402	240	316	342	350
Dissolved Bicarbonate						
Fluoride						
Nitrate+Nitrite as Nitrogen						
Nitrate-N	0.04	0.6	0.2 U	1.4	0.2 U	0.2 U
Nitrite-N	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
pH	5.8	6	5.8	6.1	6.25	5.88
Sulfate	0.2 U	7.5	8.1	7	5.3	6.9
Total Dissolved Solids						
Total Organic Carbon						
Tannin-Lignin	1.5	0.16	0.2 U	0.2	0.2	0.5
Total Coliforms	2400 >	21	22	2 U	2 U	2 U
Dissolved Metals in mg/L						
Arsenic						
Barium						
Cadmium						
Chromium						
Copper						
Iron	0.02	0.02 U	0.02 U	0.02 U	0.02 U	0.02
Lead						
Magnesium						
Manganese	0.31	0.31	0.083	0.14	0.133	0.283
Mercury						
Nickel						
Potassium						
Selenium						
Silver						
Sodium						
Zinc	0.03	0.012	0.01 U	0.01 U	0.01 U	0.01 U
Semivolatiles in µg/L						
Pentachlorophenol						
Total PAHs						
Total Phenols						

Table A-2 - Groundwater Analytical Data

Sample ID	BXS-1	BXS-1	BXS-1	BXS-1	BXS-1	BXS-1
Sampling Date	8/01/90	8/01/91	3/01/92	3/24/92	6/23/92	8/01/92
Field Parameters						
Conductivity		290	310	296	450	240
Dissolved Oxygen						
pH		6.03	5.76	6.2	6.78	6.32
Temperature		12.8	12.2	11.5	12	12.9
Conventionals						
Alkalinity						
Ammonia as Nitrogen				0.05 U	0.05 U	
Chemical Oxygen Demand				29	23	
Calcium						
Chloride				20		
Conductivity				338	356	
Dissolved Bicarbonate						
Fluoride				0.2 U	0.2 U	
Nitrate+Nitrite as Nitrogen				1.2		
Nitrate-N						
Nitrite-N						
pH				6.15	6.29	
Sulfate				7.9		
Total Dissolved Solids				209	239	
Total Organic Carbon				1.7	4.7	
Tannin-Lignin				0.2 U		
Total Coliforms				140	2 U	
Dissolved Metals in mg/L						
Arsenic				0.005 U	0.005 U	
Barium				0.014	0.02	
Cadmium				0.009	0.003 U	
Chromium				0.005 U	0.005 U	
Copper				0.01 U	0.01 U	
Iron				0.021	0.02 U	
Lead				0.002 U	0.002 U	
Magnesium						
Manganese				0.156	0.214	
Mercury				0.0005 U	0.0005 U	
Nickel				0.02 U		
Potassium						
Selenium				0.005 U	0.005 U	
Silver				0.01 U	0.01 U	
Sodium						
Zinc				0.01 U	0.014	
Semivolatiles in µg/L						
Pentachlorophenol	74	52	49			100
Total PAHs						
Total Phenols						

Table A-2 - Groundwater Analytical Data

Sample ID	BXS-1	BXS-1	BXS-1	BXS-1	BXS-1	BXS-1
Sampling Date	9/25/92	12/09/92	3/01/93	3/16/93	6/01/93	6/22/93
Field Parameters						
Conductivity	250	50	171	240	171	199
Dissolved Oxygen						
pH	5.97	5.95	6.21	5.96	6.21	6.27
Temperature	12.5	10.7	10.9	13	10.9	11.3
Conventionals						
Alkalinity						
Ammonia as Nitrogen	0.05 U	0.05 U		0.05 U		0.05 U
Chemical Oxygen Demand	21	35		19		14
Calcium						
Chloride	14	15		11		12
Conductivity	245	254		216		181
Dissolved Bicarbonate						
Fluoride	0.2 U	0.2 U		0.2 U		0.2 U
Nitrate+Nitrite as Nitrogen	0.4	0.5		0.6		0.8
Nitrate-N						
Nitrite-N						
pH	6.04	6.03		6.28		6.57
Sulfate	9.7	9.4		12		9.3
Total Dissolved Solids	176	149		127		130
Total Organic Carbon	3.8	4.8		3.9		1.8
Tannin-Lignin	0.1	0.4		0.2 U		0.2 U
Total Coliforms	240	2 U		11		8
Dissolved Metals in mg/L						
Arsenic	0.005 U	0.005 U		0.005 U		0.005 U
Barium	0.013	0.012		0.01		0.009
Cadmium	0.003 U	0.003 U		0.003 U		0.003 U
Chromium	0.005 U	0.005 U		0.005 U		0.005 U
Copper	0.01 U	0.01 U		0.01 U		0.01 U
Iron	0.02 U	0.02 U		0.02 U		0.02 U
Lead	0.002 U	0.002 U		0.002 U		0.002 U
Magnesium						
Manganese		0.177		0.119		0.108
Mercury	0.0005 U	0.0005 U		0.0005 U		0.0005 U
Nickel		0.02 U		0.02 U		0.02 U
Potassium						
Selenium	0.005 U	0.005 U		0.005 U		0.005 U
Silver	0.01 U	0.01 U		0.01 U		0.01 U
Sodium						
Zinc		0.01 U		0.01 U		0.01 U
Semivolatiles in µg/L						
Pentachlorophenol			91		100	
Total PAHs						
Total Phenols						

Table A-2 - Groundwater Analytical Data

Sample ID	BXS-1	BXS-1	BXS-1	BXS-1	BXS-1	BXS-1
Sampling Date	9/01/93	9/07/93	12/01/93	12/02/93	3/22/94	6/21/94
Field Parameters						
Conductivity	205	245	237	270	235	580
Dissolved Oxygen						
pH	6.17	5.92	6.05	5.59	5.56	5.63
Temperature	11.5	14	10.1	10.8		13
Conventionals						
Alkalinity						
Ammonia as Nitrogen		0.05 U		0.05	0.05 U	0.05 U
Chemical Oxygen Demand		15		15	21	21
Calcium						
Chloride		13		13	15	13
Conductivity		224		194	209	214
Dissolved Bicarbonate						
Fluoride		0.2 U		0.2 U	0.2 U	0.2 U
Nitrate+Nitrite as Nitrogen		1.1		0.6		
Nitrate-N					0.8	0.5
Nitrite-N					0.2 U	0.2 U
pH		6.03		5.96	6.03	6.15
Sulfate		9.6		9.2	11	12
Total Dissolved Solids		153		161	146	156
Total Organic Carbon		3.7		3.9	3.5	5.3
Tannin-Lignin		0.2 U		0.2 U	0.2 U	0.2 U
Total Coliforms		2		2 U	2	2 U
Dissolved Metals in mg/L						
Arsenic		0.005 U		0.005 U	0.005 U	0.005 U
Barium		0.008		0.01	0.011	0.016
Cadmium		0.003 U		0.003 U	0.003 U	0.003 U
Chromium		0.005 U		0.005 U	0.005 U	0.005 U
Copper		0.01 U		0.01 U	0.01 U	0.01 U
Iron		0.02 U		0.02 U	0.02 U	0.028
Lead		0.002 U		0.002 U	0.002 U	0.002 U
Magnesium						
Manganese		0.19		0.153	0.011	0.076
Mercury		0.0005 U		0.0005 U	0.0005 U	0.0005 U
Nickel		0.02 U		0.02 U	0.02 U	0.02 U
Potassium						
Selenium		0.005 U		0.005 U	0.007	0.005 U
Silver		0.01 U		0.01 U	0.01 U	0.01 U
Sodium						
Zinc		0.01 U		0.01 U	0.01 U	0.013
Semivolatiles in µg/L						
Pentachlorophenol	110		110			
Total PAHs						
Total Phenols						

Table A-2 - Groundwater Analytical Data

Sample ID	BXS-1	BXS-1	BXS-1	BXS-1	BXS-1	BXS-1
Sampling Date	8/15/94	10/12/94	11/30/94	1/10/95	2/16/95	4/27/95
Field Parameters						
Conductivity	284	310	294	253	243	257
Dissolved Oxygen	6.1		2.8		0.6	5.25
pH	5.9	5.96	6.25	6.35	7.43	6.98
Temperature	14.778	12	14.88	10.8	10.7	14.2
Conventionals						
Alkalinity	107		130		94	111.5
Ammonia as Nitrogen		0.05 U		0.05 U		0.05 U
Chemical Oxygen Demand		26		17		19
Calcium	23.5		29		22.05	26.8
Chloride	11	12	10	12	14	12
Conductivity		198		239		267
Dissolved Bicarbonate	107		130		94	111.5
Fluoride		0.2 U		0.2 U		
Nitrate+Nitrite as Nitrogen		0.3		0.4		0.9
Nitrate-N						
Nitrite-N						
pH		6.07		6.12		6.13
Sulfate	14	14	11	10	11	11
Total Dissolved Solids		181		165		177
Total Organic Carbon	5.3	4	7.3	3.6	4.1	3.5
Tannin-Lignin		0.2 U		0.2		0.2 U
Total Coliforms		70		30		140
Dissolved Metals in mg/L						
Arsenic		0.005 U		0.005 U		0.005 U
Barium		0.012		0.012		0.02
Cadmium		0.003 U		0.003 U		0.003 U
Chromium		0.005 U		0.005 U		
Copper		0.01 U		0.01 U		0.01 U
Iron	0.02 U	0.022	0.02 U	0.02 U	0.02 U	0.02 U
Lead		0.002 U		0.002 U		
Magnesium	14.6		1.8		13.8	16.55
Manganese	0.114	0.18	0.201	0.081	0.053	0.052
Mercury		0.0005 U		0.0005 U		
Nickel		0.02 U		0.02 U		0.02 U
Potassium	ND		2.1		2.47	2.5
Selenium		0.005 U		0.005 U		
Silver		0.01 U		0.01 U		
Sodium	6.85		9.08		6.69	7.6
Zinc		0.01 U		0.01 U		0.01 U
Semivolatiles in µg/L						
Pentachlorophenol	5		19		ND	335
Total PAHs	ND		ND		ND	ND
Total Phenols	ND		ND		ND	ND

Table A-2 - Groundwater Analytical Data

Sample ID	BXS-1	BXS-1	BXS-1	BXS-1	BXS-1	BXS-1
Sampling Date	8/01/95	10/10/95	1/11/96	4/18/96	7/18/96	9/25/96
Field Parameters						
Conductivity	291	286	260	299	323	318
Dissolved Oxygen	2.3	4.5		1.7	0.9	0
pH	5.92	6.57	7.7	7.83	7.03	6.62
Temperature	15.1	11.8	12.7	11.8	12.1	13.4
Conventionals						
Alkalinity	119	141.5	98	113.5	131	141.5
Ammonia as Nitrogen	0.05 U	0.12	0.05 U	0.07	0.05 U	
Chemical Oxygen Demand	16	20	15	17	18	21
Calcium	26.4	28.2	24.6	26.5	31.45	30.1
Chloride	14.5	12	19	16	12	15
Conductivity	365	286	275	234	290	286
Dissolved Bicarbonate	119	141.5	98	113.5	131	141.5
Fluoride						
Nitrate+Nitrite as Nitrogen	0.5	0.3	2.7	1.3	1.1	0.7
Nitrate-N						
Nitrite-N						
pH	5.99	6.07	6.04	6.05	5.99	4.6
Sulfate	12	12	13	12	13	13
Total Dissolved Solids	199	167	206	203	222	210
Total Organic Carbon	5.1	5.3	4.1	4	4.2	5.7
Tannin-Lignin	0.2 U	0.3	0.2 U	0.2 U	0.2 U	0.2 U
Total Coliforms	2 U	23	80	30	140	8
Dissolved Metals in mg/L						
Arsenic	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Barium	0.017	0.018	0.015	0.018	0.022	0.019
Cadmium	0.003 U	0.003 U	0.004 U	0.004 U	0.004 U	0.004 U
Chromium						
Copper	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Iron	0.02 U	0.02 U	0.02 U	0.02 U	0.027	0.028
Lead						
Magnesium	16.5	17.65	15	16.25	19.25	18.55
Manganese	0.077	0.09	0.081	0.06	0.061	0.083
Mercury						
Nickel	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Potassium	2.38	2.45	ND	ND	6.84	ND
Selenium						
Silver						
Sodium	7.14	8.765	7.6	7.96	8.735	9.225
Zinc	0.01 U	0.01 U	0.011	0.025	0.012	0.01 U
Semivolatiles in µg/L						
Pentachlorophenol	34	30.5	59	28.5	16	29
Total PAHs	ND	ND	ND	ND	ND	ND
Total Phenols	ND	ND	ND	ND	ND	ND

Table A-2 - Groundwater Analytical Data

Sample ID	BXS-1	BXS-1	BXS-1	BXS-1	BXS-1	BXS-1
Sampling Date	1/14/97	4/09/97	8/06/97	10/06/97	1/15/98	4/15/98
Field Parameters						
Conductivity	369	289	354	354	378	385
Dissolved Oxygen	4.3	2.2	1.4	1.4	1.6	1.2
pH	7.12	6.29	7.41	7.18	7.08	7.14
Temperature	11.1	12.9	13.8	12.5	10.1	15.8
Conventionals						
Alkalinity	134.5	127.5	158	171	183	181.5
Ammonia as Nitrogen	0.12	0.06	0.05 U			
Chemical Oxygen Demand	16	11	19	18		
Calcium	30.9	29.85	33.7	35.05	39.05	40.2
Chloride	17	13	13	12.3	11.4	11.85
Conductivity	335	276	335	388	319	
Dissolved Bicarbonate	134.5	127.5	158	171	183	181.5
Fluoride						
Nitrate+Nitrite as Nitrogen	3.4	1.4	0.7	0.5		
Nitrate-N						
Nitrite-N						
pH	6.02	6.07	5.87	5.85	5.96	
Sulfate	11	16	11	10.1	10.8	10.2
Total Dissolved Solids	242	216	256	243		
Total Organic Carbon	5.3	4.8	6.3	6.7	6.6	6.4
Tannin-Lignin	0.2 U	0.2 U	0.2 U	0.2 U		
Total Coliforms	2	2 U	2 U	8		
Dissolved Metals in mg/L						
Arsenic	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	
Barium	0.022	0.021	0.025	0.025	0.026	
Cadmium	0.004 U	0.004 U	0.004 U	0.004 U	0.004 U	
Chromium						
Copper	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	
Iron	0.021	0.02 U	0.021	0.02 U	0.051	0.02 U
Lead						
Magnesium	19.35	18.6	20.9	22.25	24	24.55
Manganese	0.07	0.076	0.101	0.111	0.141	0.1415
Mercury						
Nickel	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	
Potassium	2.9	3.55	2.95	2.5	2.175	2.25
Selenium						
Silver						
Sodium	8.805	8.51	9.725	9.115	9.225	9.2
Zinc	0.013	0.012	0.015	0.012	0.014	
Semivolatiles in µg/L						
Pentachlorophenol	22.5	37	43	33	35	23
Total PAHs	ND	ND	ND	ND	ND	ND
Total Phenols	ND	ND	ND	ND	ND	ND

Table A-2 - Groundwater Analytical Data

Sample ID	BXS-2	BXS-2	BXS-2	BXS-2	BXS-2	BXS-2
Sampling Date	8/13/88	12/27/88	3/28/89	6/15/89	9/13/89	12/11/89
Field Parameters						
Conductivity	716	642	594	450	605	606
Dissolved Oxygen						
pH	4.89	6.3	6.37	6.39	6.6	5.8
Temperature	21.3	12		12		
Conventionals						
Alkalinity						
Ammonia as Nitrogen	0.05 U	0.05 U	0.05 U	0.22	0.17	0.07
Chemical Oxygen Demand	0.4	22	15	5 U	16	29
Calcium						
Chloride	68	67	78	75	43	35
Conductivity	740	630	675	596	500	500
Dissolved Bicarbonate						
Fluoride						
Nitrate+Nitrite as Nitrogen						
Nitrate-N	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Nitrite-N	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
pH	6.2	6.3	6.2	6.4	6.52	6.39
Sulfate	0.2 U	0.2 U	0.2 U	0.2 U	0.3	0.2 U
Total Dissolved Solids						
Total Organic Carbon	0.5 U		10	6	6.3	7.4
Tannin-Lignin	0.6	0.47	0.65	0.8	0.7	0.7
Total Coliforms	23	12	2	4	2 U	4
Dissolved Metals in mg/L						
Arsenic						
Barium						
Cadmium						
Chromium						
Copper						
Iron	0.02 U	0.15	0.052	0.02 U	0.02 U	0.03
Lead						
Magnesium						
Manganese	0.61	0.56	0.594	0.56	0.519	0.619
Mercury						
Nickel						
Potassium						
Selenium						
Silver						
Sodium						
Zinc	0.01 U	0.012	0.01 U	0.01 U	0.01 U	0.01 U
Semivolatiles in µg/L						
Total PAHs						
Pentachlorophenol						
Total Phenols						

Sample ID	BXS-2	BXS-2	BXS-2	BXS-2	BXS-2	BXS-2
Sampling Date	8/01/90	8/01/91	3/01/92	3/24/92	6/23/92	8/01/92
Field Parameters						
Conductivity		550	540	655	709	450
Dissolved Oxygen						
pH		6.23	6.06	6.31	6.69	6.34
Temperature		15.6	14.3	14	17	15.4
Conventionals						
Alkalinity						
Ammonia as Nitrogen				0.05 U	0.05	
Chemical Oxygen Demand				49	34	
Calcium						
Chloride				8.1		
Conductivity				592	592	
Dissolved Bicarbonate						
Fluoride				0.2 U	0.2 U	
Nitrate+Nitrite as Nitrogen				0.2 U		
Nitrate-N						
Nitrite-N						
pH				6.25	6.34	
Sulfate				0.2 U		
Total Dissolved Solids				387	365	
Total Organic Carbon				3.1	3.6	
Tannin-Lignin				0.4		
Total Coliforms				17	2 U	
Dissolved Metals in mg/L						
Arsenic				0.005 U	0.005 U	
Barium				0.042	0.04	
Cadmium				0.003 U	0.003 U	
Chromium				0.005 U	0.005 U	
Copper				0.01 U	0.01 U	
Iron				0.289	0.247	
Lead				0.002 U	0.002 U	
Magnesium						
Manganese				0.616	0.656	
Mercury				0.0005 U	0.0005 U	
Nickel				0.021		
Potassium						
Selenium				0.005 U	0.005 U	
Silver				0.01 U	0.01 U	
Sodium						
Zinc				0.01 U	0.01 U	
Semivolatiles in µg/L						
Total PAHs						
Pentachlorophenol	10 U	0.6	0.7			2.1
Total Phenols						

Table A-2 - Groundwater Analytical Data

Sample ID	BXS-2	BXS-2	BXS-2	BXS-2	BXS-2	BXS-2
Sampling Date	9/25/92	12/09/92	3/01/93	3/16/93	6/01/93	6/22/93
Field Parameters						
Conductivity	656	120	508	620	508	571
Dissolved Oxygen	0					
pH	6.58	6.21	6.24	6.02	6.24	6.18
Temperature	15.2	12.9	14.4	14	14.4	15.5
Conventionals						
Alkalinity	355					
Ammonia as Nitrogen		0.05 U		0.05 U		0.05 U
Chemical Oxygen Demand		40		40		30
Calcium						
Chloride	19	6.2		6.1		6.5
Conductivity		580		562		486
Dissolved Bicarbonate	355					
Fluoride		0.2 U		0.2 U		0.2 U
Nitrate+Nitrite as Nitrogen		0.2 U		0.2 U		0.2 U
Nitrate-N						
Nitrite-N						
pH		6.26		6.28		6.29
Sulfate	0.2	0.3		0.2 U		0.2
Total Dissolved Solids		345		315		339
Total Organic Carbon	12.8	6.8		7.4		6
Tannin-Lignin		0.5		0.5		0.4
Total Coliforms		50		1600		20
Dissolved Metals in mg/L						
Arsenic	0.005 U	0.005 U		0.005 U		0.005 U
Barium	0.04	0.042		0.035		0.039
Cadmium	0.003 U	0.003 U		0.003 U		0.003 U
Chromium	0.005 U	0.005 U		0.005 U		0.005 U
Copper	0.01 U	0.01 U		0.01 U		0.01 U
Iron	0.02 U	0.228		0.36		0.423
Lead	0.002 U	0.002 U		0.002 U		0.002 U
Magnesium						
Manganese		0.669		0.568		0.604
Mercury	0.0005 U	0.0005 U		0.0005 U		0.0005 U
Nickel		0.022		0.028		0.021
Potassium						
Selenium	0.005 U	0.005 U		0.005 U		0.005 U
Silver	0.01 U	0.01 U		0.01 U		0.01 U
Sodium						
Zinc		0.01 U		0.01 U		0.01 U
Semivolatiles in µg/L						
Total PAHs						
Pentachlorophenol			0.2 U		ND	
Total Phenols						

Table A-2 - Groundwater Analytical Data

Sample ID	BXS-2	BXS-2	BXS-2	BXS-2	BXS-2	BXS-2
Sampling Date	9/01/93	9/07/93	12/01/93	12/02/93	3/22/94	6/21/94
Field Parameters						
Conductivity	529	530	555	480	542	650
Dissolved Oxygen						
pH	6.36	6.14	6.43	6.05	5.79	6.2
Temperature	15.2	17.6	13	13.5	14.5	12
Conventionals						
Alkalinity						
Ammonia as Nitrogen		0.05 U		0.05 U	0.05 U	0.05 U
Chemical Oxygen Demand		31		40	30	30
Calcium						
Chloride		6.8		7.1	7	8
Conductivity		542		361	588	455
Dissolved Bicarbonate						
Fluoride		0.2 U		0.2 U	0.2 U	0.2 U
Nitrate+Nitrite as Nitrogen		0.2 U		0.2 U		
Nitrate-N					0.2 U	0.2 U
Nitrite-N					0.2 U	0.2 U
pH		6.23		6.2	6.39	6.31
Sulfate		0.3		0.2 U	0.3	0.3
Total Dissolved Solids		324		345	337	327
Total Organic Carbon		7.8		8	7.7	9.6
Tannin-Lignin		0.5		0.4	0.5	0.4
Total Coliforms		8		900	2 U	300
Dissolved Metals in mg/L						
Arsenic		0.005 U		0.005 U	0.005 U	0.005 U
Barium		0.031		0.038	0.036	0.041
Cadmium		0.003 U		0.004	0.003 U	0.003 U
Chromium		0.005 U		0.005 U	0.005 U	0.005 U
Copper		0.01 U		0.01 U	0.01 U	0.01 U
Iron		0.389		0.808	0.586	0.627
Lead		0.002 U		0.002 U	0.002 U	0.002 U
Magnesium						
Manganese		0.504		0.61	0.641	0.681
Mercury		0.0005 U		0.0005 U	0.0005 U	0.0005 U
Nickel		0.022		0.02 U	0.02 U	0.02
Potassium						
Selenium		0.005 U		0.005 U	0.005 U	0.005 U
Silver		0.01 U		0.01 U	0.01 U	0.01 U
Sodium						
Zinc		0.01 U		0.015	0.01 U	0.01 U
Semivolatiles in µg/L						
Total PAHs						
Pentachlorophenol	ND		ND			
Total Phenols						

Table A-2 - Groundwater Analytical Data

Sample ID	BXS-2	BXS-2	BXS-2	BXS-2	BXS-2	BXS-2
Sampling Date	8/16/94	10/12/94	11/30/94	1/10/95	2/17/95	4/27/95
Field Parameters						
Conductivity	464	610	477	512	540	571
Dissolved Oxygen	6.8		2.5		0.2	
pH	6.2	6.15	6.3	7.66	6.55	6.73
Temperature	16.28	14	17.25	13.4	13.11	14.7
Conventionals						
Alkalinity	283		288		314	
Ammonia as Nitrogen		0.05 U		0.12		0.05 U
Chemical Oxygen Demand		33		26		36
Calcium	45		46.6		53.7	
Chloride	6.8	7.3	7.3	7.1	4.9	6.2
Conductivity		412		458		633
Dissolved Bicarbonate	283		288		314	
Fluoride		0.2 U		0.2 U		
Nitrate+Nitrite as Nitrogen		0.2 U		0.2 U		0.2 U
Nitrate-N						
Nitrite-N						
pH		6.23		6.15		6.42
Sulfate	0.3	0.4	0.4	0.4	0.4	0.3
Total Dissolved Solids		335		328		347
Total Organic Carbon	16.1	8.8	24.1	8	8	9.9
Tannin-Lignin		0.5		0.5		0.4
Total Coliforms		80		70		2 U
Dissolved Metals in mg/L						
Arsenic		0.005 U		0.005 U		0.005 U
Barium		0.036		0.039		0.049
Cadmium		0.003 U		0.003 U		0.003 U
Chromium		0.005 U		0.005 U		
Copper		0.01 U		0.01 U		0.01 U
Iron	0.744	0.855	1.21	0.924	0.936	0.895
Lead		0.002 U		0.002 U		
Magnesium	33.6		35.8		41.6	
Manganese	0.63	0.647	0.644	0.734	0.803	0.857
Mercury		0.0005 U		0.0005 U		
Nickel		0.022		0.02		0.026
Potassium	2.6		3.9		3.9	
Selenium		0.005 U		0.005 U		
Silver		0.01 U		0.01 U		
Sodium	14		14.6		14.4	
Zinc		0.01 U		0.01 U		0.01 U
Semivolatiles in µg/L						
Total PAHs	ND		ND			
Pentachlorophenol	ND		ND		ND	
Total Phenols	ND		ND		ND	

Table A-2 - Groundwater Analytical Data

Sample ID	BXS-2	BXS-2	BXS-2	BXS-2	BXS-2	BXS-2
Sampling Date	4/28/95	8/01/95	10/11/95	1/11/96	4/18/96	7/18/96
Field Parameters						
Conductivity	571	566	567	598	633	661
Dissolved Oxygen	1.6	0.8	2.7		1.3	1.1
pH	6.73	6.22	6.74	8.14	6.78	6.95
Temperature	14.7	18.7	14.1	14.1	13.7	15.4
Conventionals						
Alkalinity	342	335	326	325	336	350
Ammonia as Nitrogen		0.05 U	0.05 U	0.07	0.14	0.05 U
Chemical Oxygen Demand		44	30	37	40	46
Calcium		53.7	55.5	55.3	59.6	66.6
Chloride	6.2	9.6	11	15	17	16
Conductivity		721	565	571	510	603
Dissolved Bicarbonate	342	335	326	325	336	350
Fluoride						
Nitrate+Nitrite as Nitrogen		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Nitrate-N						
Nitrite-N						
pH		6.29	6.24	6.24	6.28	6.23
Sulfate	0.3	0.3	0.3	0.3	0.3	0.3
Total Dissolved Solids		359	346	390	407	420
Total Organic Carbon	9.9	10.9	10.4	11.4	12.1	12.1
Tannin-Lignin		0.8	1.2	0.6	0.5	0.6
Total Coliforms		2 U	23	170	4	80
Dissolved Metals in mg/L						
Arsenic		0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Barium		0.043	0.044	0.044	0.048	0.052
Cadmium		0.003 U	0.003 U	0.004 U	0.004 U	0.004 U
Chromium						
Copper		0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Iron	0.895	0.895	1.3	1.38	1.57	1.55
Lead						
Magnesium	45.9	41.5	42.6	42.2	45.8	50.1
Manganese	0.857	0.78	0.843	0.857	0.993	1.14
Mercury						
Nickel		0.02 U	0.023	0.024	0.026	0.02 U
Potassium	4.5	3.6	4	3.3	3.1	5.36
Selenium						
Silver						
Sodium	13.9	12.4	13.2	12.8	13.1	13.1
Zinc		0.012	0.01 U	0.012	0.019	0.011
Semivolatiles in µg/L						
Total PAHs	ND	ND	ND	ND	ND	ND
Pentachlorophenol	ND	0.7	ND	0.6	ND	ND
Total Phenols	ND	ND	ND	ND	ND	ND

Table A-2 - Groundwater Analytical Data

Sample ID	BXS-2	BXS-2	BXS-2	BXS-2	BXS-2	BXS-2
Sampling Date	9/25/96	9/26/96	1/14/97	4/09/97	8/06/97	10/06/97
Field Parameters						
Conductivity	6.56	656	701	715	675	684
Dissolved Oxygen		0	4	1.4	0.6	0.8
pH	6.58	6.58	7.15	6.66	7.39	7.2
Temperature	15.2	15.2	11.4	17.2	17.2	14.6
Conventionals						
Alkalinity		355	364	383	384	397
Ammonia as Nitrogen			0.21	0.05 U		
Chemical Oxygen Demand	37		41	40	53	46
Calcium		63.3	61.1	64.9	66.2	70.1
Chloride	19	19	17	17	16	14.4
Conductivity	660		633	7103	692	671
Dissolved Bicarbonate		355	364	383	384	397
Fluoride						
Nitrate+Nitrite as Nitrogen	0.2 U		0.2 U	0.2 U	0.2 U	0.2 U
Nitrate-N						
Nitrite-N						
pH	6.22		6.22	6.21	6.11	5.99
Sulfate	0.2	0.2	0.3	0.4	0.6	0.5
Total Dissolved Solids	422		442	470	404	481
Total Organic Carbon	12.8	12.8	13.8	13.5	15.1	15.6
Tannin-Lignin	0.6		1	0.8	1	0.8
Total Coliforms	8		2	2 U	4	2 U
Dissolved Metals in mg/L						
Arsenic	0.005 U		0.005 U	0.005 U	0.005 U	0.005 U
Barium	0.046		0.047	0.049	0.052	0.05
Cadmium	0.004 U		0.004 U	0.004 U	0.004 U	0.004 U
Chromium						
Copper	0.01 U		0.01 U	0.01 U	0.01 U	0.01 U
Iron	1.35	1.35	1.59	1.31	1.55	1.5
Lead						
Magnesium		47.6	48.7	50.8	51.9	54.4
Manganese	1.14	1.14	1.22	1.32	1.46	1.56
Mercury						
Nickel	0.027		0.031	0.031	0.031	0.033
Potassium		2.55	4.4	4.89	4.6	3.9
Selenium						
Silver						
Sodium		12.7	12.4	12.3	12	12.2
Zinc	0.01 U		0.01 U	0.015	0.01 U	0.012
Semivolatiles in µg/L						
Total PAHs		ND	ND	ND	ND	ND
Pentachlorophenol		ND	ND	ND	ND	ND
Total Phenols		ND	ND	ND	ND	ND

Table A-2 - Groundwater Analytical Data

Sample ID	BXS-2	BXS-2
Sampling Date	1/15/98	4/16/98
Field Parameters		
Conductivity	733	716
Dissolved Oxygen	1.5	1.2
pH	6.97	7
Temperature	13.1	14.5
Conventionals		
Alkalinity	402	406
Ammonia as Nitrogen		
Chemical Oxygen Demand		
Calcium	68.3	70.5
Chloride	11.8	13.4
Conductivity	554	
Dissolved Bicarbonate	402	406
Fluoride		
Nitrate+Nitrite as Nitrogen		
Nitrate-N		
Nitrite-N		
pH	6.21	
Sulfate	0.5	0.4
Total Dissolved Solids		
Total Organic Carbon	15.3	15.4
Tannin-Lignin		
Total Coliforms		
Dissolved Metals in mg/L		
Arsenic	0.005 U	
Barium	0.05	
Cadmium	0.004 U	
Chromium		
Copper	0.01 U	
Iron	1.52	0.841
Lead		
Magnesium	52.2	53.7
Manganese	1.7	1.64
Mercury		
Nickel	0.039	
Potassium	3.46	3.15
Selenium		
Silver		
Sodium	11.6	12.1
Zinc	0.01 U	
Semivolatiles in µg/L		
Total PAHs	ND	ND
Pentachlorophenol	ND	ND
Total Phenols	ND	ND

Table A-2 - Groundwater Analytical Data

Sample ID	BXS-3	BXS-3	BXS-3	BXS-3	BXS-3	BXS-3
Sampling Date	8/13/88	12/27/88	3/28/89	6/15/89	9/13/89	12/11/89
Field Parameters						
Conductivity	564	550	469	403	550	527
Dissolved Oxygen						
pH	7.74	6.1	6.03	6.21	6.02	5.7
Temperature	19.2	15		13		
Conventionals						
Alkalinity						
Ammonia as Nitrogen	0.05 U	0.05 U	0.05 U	0.24	0.05 U	0.05 U
Chemical Oxygen Demand	76	56	114	94	75	106
Calcium						
Chloride	28	20	18	18	9	10
Conductivity	570	526	552	526	468	440
Dissolved Bicarbonate						
Fluoride						
Nitrate+Nitrite as Nitrogen						
Nitrate-N	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Nitrite-N	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
pH	6.1	6.2	6	6.3	6.27	6.2
Sulfate	0.2 U	0.2 U	0.2 U	0.2 U	0.3	0.2
Total Dissolved Solids						
Total Organic Carbon	23		38	20	6.3	26.5
Tannin-Lignin	1.8	1.4	2.4	2.5	0.2	2.8
Total Coliforms	2400 >	8	9	2 U	2 U	2
Dissolved Metals in mg/L						
Arsenic						
Barium						
Cadmium						
Chromium						
Copper						
Iron	0.02 U	0.037	0.045	0.07	0.02 U	0.25
Lead						
Magnesium						
Manganese	0.95	1.3	1.48	0.98	0.804	1.18
Mercury						
Nickel						
Potassium						
Selenium						
Silver						
Sodium						
Zinc	0.02	0.011	0.01 U	0.01 U	0.01	0.01 U
Semivolatiles in µg/L						
Total PAHs						
Pentachlorophenol						
Total Phenols						

Table A-2 - Groundwater Analytical Data

Sample ID	BXS-3	BXS-3	BXS-3	BXS-3	BXS-3	BXS-3
Sampling Date	8/01/90	8/01/91	10/01/91	10/01/91	3/01/92	3/24/92
Field Parameters						
Conductivity		460	640		430	550
Dissolved Oxygen						
pH		6.37			6.31	6.52
Temperature		17.9			16.3	16.5
Conventionals						
Alkalinity						
Ammonia as Nitrogen						0.16
Chemical Oxygen Demand						93
Calcium						
Chloride						7.7
Conductivity						480
Dissolved Bicarbonate						
Fluoride						0.2 U
Nitrate+Nitrite as Nitrogen						0.2 U
Nitrate-N						
Nitrite-N						
pH						6.28
Sulfate						0.2 U
Total Dissolved Solids						346
Total Organic Carbon						20
Tannin-Lignin						3.5
Total Coliforms						280
Dissolved Metals in mg/L						
Arsenic						0.005 U
Barium						0.038
Cadmium						0.005
Chromium						0.005 U
Copper						0.01 U
Iron						6.04
Lead						0.002 U
Magnesium						
Manganese						2.56
Mercury						0.0005 U
Nickel						0.02 U
Potassium						
Selenium						0.005 U
Silver						0.01 U
Sodium						
Zinc						0.01 U
Semivolatiles in µg/L						
Total PAHs						
Pentachlorophenol	10 U	0.2 U		0.5	0.8	
Total Phenols						

Table A-2 - Groundwater Analytical Data

Sample ID	BXS-3	BXS-3	BXS-3	BXS-3	BXS-3	BXS-3
Sampling Date	6/23/92	8/01/92	9/25/92	12/09/92	3/01/93	3/16/93
Field Parameters						
Conductivity	582	490	871	124		610
Dissolved Oxygen			1.4			
pH	6.6	6.52	6.59	6.26		6.12
Temperature	19	18	16	15.2		16
Conventionals						
Alkalinity						
Ammonia as Nitrogen	0.07		0.09	0.05 U		0.05 U
Chemical Oxygen Demand	87		144	101		96
Calcium						
Chloride			7.2	8.2		24
Conductivity	504		560	586		567
Dissolved Bicarbonate						
Fluoride	0.2 U		0.2 U	0.2 U		0.2 U
Nitrate+Nitrite as Nitrogen			0.2 U	0.2 U		0.2 U
Nitrate-N						
Nitrite-N						
pH	6.4		6.36	6.6		6.45
Sulfate			0.2 U	0.2 U		0.2 U
Total Dissolved Solids	373		324	360		344
Total Organic Carbon	16		21.9	16.8		23.8
Tannin-Lignin			1.5	1.1		1.3
Total Coliforms	7		130	2 U		2 U
Dissolved Metals in mg/L						
Arsenic	0.005 U		0.005 U	0.005 U		0.005 U
Barium	0.035		0.031	0.038		0.033
Cadmium	0.003 U		0.003 U	0.003 U		0.003 U
Chromium	0.005 U		0.005 U	0.005 U		0.005 U
Copper	0.01 U		0.012	0.01 U		0.01 U
Iron	0.877		0.02	0.039		0.145
Lead	0.002 U		0.002 U	0.002 U		0.002 U
Magnesium			60.5			
Manganese	1.76			0.661		1.06
Mercury	0.0005 U		0.0005 U	0.0005 U		0.0005 U
Nickel				0.02 U		0.02 U
Potassium			3.07			
Selenium	0.005 U		0.005 U	0.005 U		0.005 U
Silver	0.01 U		0.01 U	0.01 U		0.01 U
Sodium			4.74			
Zinc	0.01 U			0.01 U		0.01 U
Semivolatiles in µg/L						
Total PAHs						
Pentachlorophenol		ND			NM	
Total Phenols						

Table A-2 - Groundwater Analytical Data

Sample ID	BXS-3	BXS-3	BXS-3	BXS-3	BXS-3	BXS-3
Sampling Date	6/01/93	6/22/93	9/01/93	9/07/93	12/01/93	12/02/93
Field Parameters						
Conductivity		557		615		590
Dissolved Oxygen						
pH		6.37		6.1		6.3
Temperature		17.7		18.3		15.5
Conventionals						
Alkalinity						
Ammonia as Nitrogen		0.05 U		0.006		0.06
Chemical Oxygen Demand		65		160		101
Calcium						
Chloride		9.5		9.1		8.8
Conductivity		482		621		434
Dissolved Bicarbonate						
Fluoride		0.2 U		0.2 U		0.2 U
Nitrate+Nitrite as Nitrogen		0.2 U		0.2 U		0.2 U
Nitrate-N						
Nitrite-N						
pH		6.36		6.44		6.46
Sulfate		0.2 U		0.3		0.2 U
Total Dissolved Solids		369		396		436
Total Organic Carbon		20.5		21.6		15.6
Tannin-Lignin		1.6		1.2		0.9
Total Coliforms		17		29		2 U
Dissolved Metals in mg/L						
Arsenic		0.005 U		0.005 U		0.005 U
Barium		0.036		0.041		0.043
Cadmium		0.003 U		0.003 U		0.003 U
Chromium		0.005 U		0.005 U		0.005 U
Copper		0.01 U		0.015		0.01 U
Iron		0.193		0.652		0.751
Lead		0.003		0.002 U		0.002 U
Magnesium						
Manganese		1.08		0.671		1.06
Mercury		0.0005 U		0.0005 U		0.0005 U
Nickel		0.02 U		0.02 U		0.02 U
Potassium						
Selenium		0.005 U		0.005 U		0.005 U
Silver		0.01 U		0.01 U		0.01 U
Sodium						
Zinc		0.01 U		0.01 U		0.01 U
Semivolatiles in µg/L						
Total PAHs						
Pentachlorophenol		NM		NM		NM
Total Phenols						

Table A-2 - Groundwater Analytical Data

Sample ID	BXS-3	BXS-3	BXS-3	BXS-3	BXS-3	BXS-3
Sampling Date	3/22/94	6/21/94	8/16/94	10/12/94	11/30/94	1/10/95
Field Parameters						
Conductivity	647	700	613	710	663	731
Dissolved Oxygen			6.1		3.9	
pH	5.83	6.43	6.4	6.33	6.3	7.31
Temperature	16.5	19	15.39	15	18.75	13.5
Conventionals						
Alkalinity			368		414	
Ammonia as Nitrogen	0.05 U	0.05 U		0.05 U		0.05 U
Chemical Oxygen Demand	79	93		64		96
Calcium			70		80.8	
Chloride	8.1	8.1	5.5	7.2	7.9	6.1
Conductivity	678	531		547		652
Dissolved Bicarbonate			368		414	
Fluoride	0.2 U	0.2 U		0.2 U		0.2 U
Nitrate+Nitrite as Nitrogen				0.2 U		0.2 U
Nitrate-N	0.2 U	0.2 U				
Nitrite-N	0.2 U	0.2 U				
pH	6.41	6.21		6.41		6.31
Sulfate	0.2 U	0.3	0.5	0.7	0.4	0.4
Total Dissolved Solids	399	382		440		449
Total Organic Carbon	18.9	28	24.6	18.7	27.7	22
Tannin-Lignin	1.1	0.9		0.9		1
Total Coliforms	2 U	50		900		50
Dissolved Metals in mg/L						
Arsenic	0.005 U	0.005 U		0.005 U		0.005 U
Barium	0.047	0.052		0.046		0.057
Cadmium	0.003 U	0.003 U		0.003 U		0.003 U
Chromium	0.005 U	0.005 U		0.005 U		0.005 U
Copper	0.01 U	0.01 U		0.01 U		0.01 U
Iron	2.26	0.626	0.412	1.36	1.93	3.54
Lead	0.002 U	0.002 U		0.002 U		0.002 U
Magnesium			41.2		50.3	
Manganese	0.894	0.981	0.671	1.11	1.28	1.46
Mercury	0.0005 U	0.0005 U		0.0005 U		0.0005 U
Nickel	0.02 U	0.03		0.02 U		0.02 U
Potassium			2.7		4.2	
Selenium	0.005 U	0.005 U		0.005 U		0.005 U
Silver	0.01 U	0.01 U		0.01 U		0.01 U
Sodium			5.98		8.16	
Zinc	0.01 U	0.01 U		0.01 U		0.062
Semivolatiles in µg/L						
Total PAHs			ND		ND	
Pentachlorophenol			ND		ND	
Total Phenols			ND		ND	

Table A-2 - Groundwater Analytical Data

Sample ID	BXS-3	BXS-3	BXS-3	BXS-3	BXS-3	BXS-3
Sampling Date	2/16/95	4/27/95	4/28/95	8/01/95	10/11/95	1/11/96
Field Parameters						
Conductivity	572	684	684	708	723	771
Dissolved Oxygen	0		1.8	1.8	2.9	
pH	6.38	6.68	6.68	6.17	6.82	7.45
Temperature	15	16.7	16.7	17.2	15.4	14.9
Conventionals						
Alkalinity	340		390	408	430	468
Ammonia as Nitrogen		0.11		0.13	0.24	0.08
Chemical Oxygen Demand		91		83	88	97
Calcium	70.2		61	81.1	84.2	95.8
Chloride	6.4	8.4	8.4	8.8	9.2	12
Conductivity		3070		882	719	179
Dissolved Bicarbonate	340		390	408	430	468
Fluoride						
Nitrate+Nitrite as Nitrogen		0.2 U		0.2 U	0.2 U	0.2 U
Nitrate-N						
Nitrite-N						
pH		6.78		6.32	6.31	6.31
Sulfate	1.6	1.4	1.4	1.8	3.2	0.9
Total Dissolved Solids		458		489	450	572
Total Organic Carbon	21.3	28.8	28.8	28.2	31.1	34.1
Tannin-Lignin		3.2		3	2.5	3.5
Total Coliforms		2 U		2 U	8	2 U
Dissolved Metals in mg/L						
Arsenic		0.006		0.006	0.005 U	0.005 U
Barium		0.064		0.057	0.055	0.051
Cadmium		0.003 U		0.003 U	0.003 U	0.004 U
Chromium						
Copper		0.01 U		0.01 U	0.01 U	0.01 U
Iron	3.56	6.94	6.94	3.13	0.293	3.28
Lead						
Magnesium	43.2		49.1	50.1	51.2	58.2
Manganese	2.45	4.17	4.17	3.39	1.55	5.99
Mercury						
Nickel		0.026		0.033	0.026	0.035
Potassium	3.4		5.3	3.5	3.8	3.77
Selenium						
Silver						
Sodium	5.27		5.08	5.28	5.66	4.88
Zinc		0.01 U		0.01 U	0.013	0.01 U
Semivolatiles in µg/L						
Total PAHs	ND		2 U	2 U	ND	ND
Pentachlorophenol	ND		ND	ND	1	ND
Total Phenols	0.2		ND	ND	ND	2000 U

Table A-2 - Groundwater Analytical Data

Sample ID	BXS-3	BXS-3	BXS-3	BXS-3	BXS-3	BXS-3
Sampling Date	4/18/96	7/18/96	9/25/96	9/26/96	1/14/97	4/09/97
Field Parameters						
Conductivity	868	848	871	871	855	881
Dissolved Oxygen	2.2	1.6		1.4	3.9	1.7
pH	7.04	7.1	6.59	6.59	6.89	6.75
Temperature	15.4	16.3	16	16	13.8	16.8
Conventionals						
Alkalinity	460	490		511	467	508
Ammonia as Nitrogen	0.58	0.34			0.5	0.63
Chemical Oxygen Demand	102	97	91		102	87
Calcium	93.3	101		102	88.6	97
Chloride	9.9	8.5	9.7	9.7	8.2	19
Conductivity	688	811	907		740	853
Dissolved Bicarbonate	460	490		511	467	508
Fluoride						
Nitrate+Nitrite as Nitrogen	0.2 U	0.2 U	0.2 U		0.2 U	0.2 U
Nitrate-N						
Nitrite-N						
pH	6.46	6.32	6.47		6.31	6.38
Sulfate	0.7	1	1.2	1.2	1.2	1.2
Total Dissolved Solids	586	595	624		610	611
Total Organic Carbon	37.2	34.8	44	44	38	34
Tannin-Lignin	4.7	5.6	4.2		7.9	5.6
Total Coliforms	2 U	140	2 U		2	2 U
Dissolved Metals in mg/L						
Arsenic	0.008	0.009	0.008		0.009	0.014
Barium	0.073	0.078	0.074		0.069	0.061
Cadmium	0.004 U	0.004 U	0.004 U		0.004 U	0.004 U
Chromium						
Copper	0.01 U	0.01 U	0.01 U		0.01 U	0.01 U
Iron	13	7.08	4.87	4.87	13	18
Lead						
Magnesium	55.7	58.9		60.5	53.6	56.8
Manganese	9.68	10.4	10.8	10.8	12.2	13
Mercury						
Nickel	0.03	0.022	0.038		0.02 U	0.021
Potassium	5.9	6.49		3.07	7.7	7.56
Selenium						
Silver						
Sodium	4.73	4.56		4.74	4.62	4.65
Zinc	0.016	0.012	0.01 U		0.011	0.01 U
Semivolatiles in µg/L						
Total PAHs	2 U	ND		2 U	0.1	2 U
Pentachlorophenol	ND	ND		ND	ND	ND
Total Phenols	ND	ND		ND	ND	ND

Table A-2 - Groundwater Analytical Data

Sample ID	BXS-3	BXS-3	BXS-3	BXS-3
Sampling Date	8/06/97	10/06/97	1/15/98	4/16/98
Field Parameters				
Conductivity	913	894	910	869
Dissolved Oxygen	2.1	0.9	1.7	1.2
pH	7.48	7.21	7.1	6.87
Temperature	18.1	15.2	12.7	14.6
Conventionals				
Alkalinity	519	513	490	474
Ammonia as Nitrogen				
Chemical Oxygen Demand	89	89		
Calcium	95.6	100	95.6	96.4
Chloride	6.1	6.2	5.4	6.5
Conductivity	814	753	638	
Dissolved Bicarbonate	519	513	490	474
Fluoride				
Nitrate+Nitrite as Nitrogen	0.2 U	0.2 U		
Nitrate-N				
Nitrite-N				
pH	6.29	6.13	6.37	
Sulfate	1	1.2	0.8	0.4
Total Dissolved Solids	623	597		
Total Organic Carbon	34	35.7	34.3	33.3
Tannin-Lignin	5.7	6.1		
Total Coliforms	4	900		
Dissolved Metals in mg/L				
Arsenic	0.013	0.015	0.017	
Barium	0.057	0.06	0.054	
Cadmium	0.004 U	0.004 U	0.004 U	
Chromium				
Copper	0.01 U	0.01 U	0.01 U	
Iron	17.4	17	18.8	23
Lead				
Magnesium	55.9	57.7	53.7	52.2
Manganese	13	13.3	12.7	14
Mercury				
Nickel	0.021	0.029	0.02 U	
Potassium	6.1	5.2	4.71	4.78
Selenium				
Silver				
Sodium	4.69	4.82	4.66	5
Zinc	0.01 U	0.023	0.01 U	
Semivolatiles in µg/L				
Total PAHs	2 U	ND	2 U	ND
Pentachlorophenol	ND	ND	ND	ND
Total Phenols	ND	ND	ND	ND

Table A-2 - Groundwater Analytical Data

Sample ID	BXS-4	BXS-4	BXS-4	BXS-4	BXS-4	BXS-4
Sampling Date	8/13/88	12/27/88	3/28/89	6/15/89	9/13/89	12/11/89
Field Parameters						
Conductivity	186	200	196	129	184	173
Dissolved Oxygen						
pH	8.72	7.81	7.25	7.71	6.8	7.78
Temperature					13	
Conventionals						
Alkalinity						
Ammonia as Nitrogen	1.3	0.66	0.76	0.75	0.63	1
Chemical Oxygen Demand	1857	11	416	365	158	1080
Calcium						
Chloride	28	2.1	2.8	2.6	2	2.1
Conductivity	200	190	194	177	163	156
Dissolved Bicarbonate						
Fluoride						
Nitrate+Nitrite as Nitrogen						
Nitrate-N	0.04	0.2 U	0.2 U	0.2 U	0.3	0.2 U
Nitrite-N	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
pH	7.5	7.9	7.5	7.4	7.49	6.58
Sulfate	0.2 U	0.2 U	2.9	4	3.2	2.6
Total Dissolved Solids						
Total Organic Carbon	0.5 U		91	1.7	1.4	3.7
Tannin-Lignin	10	2.9	0.96	11	0.3	1.4
Total Coliforms	1600	90	110	2 U	4	2 U
Dissolved Metals in mg/L						
Arsenic						
Barium						
Cadmium						
Chromium						
Copper						
Iron	0.02	0.09	0.058	0.11	0.02 U	0.11
Lead						
Magnesium						
Manganese	0.13	0.13	0.158	0.12	0.073	0.114
Mercury						
Nickel						
Potassium						
Selenium						
Silver						
Sodium						
Zinc	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Semivolatiles in µg/L						
Total PAHs						
Pentachlorophenol						
Total Phenols						

Table A-2 - Groundwater Analytical Data

Sample ID	BXS-4	BXS-4	BXS-4	BXS-4	BXS-4	BXS-4
Sampling Date	8/01/90	8/01/91	3/01/92	3/24/92	6/23/92	8/01/92
Field Parameters						
Conductivity		140	200	201	340	90
Dissolved Oxygen						
pH		7.79	8.08	8.5	7.4	7.67
Temperature		12.9	10.5	10	14	11.6
Conventionals						
Alkalinity						
Ammonia as Nitrogen				0.7	0.62	
Chemical Oxygen Demand				171	273	
Calcium						
Chloride				2.1		
Conductivity				189	184	
Dissolved Bicarbonate						
Fluoride				0.2 U	0.2 U	
Nitrate+Nitrite as Nitrogen				0.2 U		
Nitrate-N						
Nitrite-N						
pH				8	7.86	
Sulfate				2.3		
Total Dissolved Solids				151	147	
Total Organic Carbon				1.1	2	
Tannin-Lignin				0.3		
Total Coliforms				2 U	2 U	
Dissolved Metals in mg/L						
Arsenic				0.006	0.005	
Barium				0.022	0.018	
Cadmium				0.003 U	0.003 U	
Chromium				0.005 U	0.005 U	
Copper				0.01 U	0.01 U	
Iron				0.049	0.06	
Lead				0.002 U	0.002 U	
Magnesium						
Manganese				0.109	0.118	
Mercury				0.0005 U	0.0005 U	
Nickel				0.02 U		
Potassium						
Selenium				0.005 U	0.005 U	
Silver				0.01 U	0.01 U	
Sodium						
Zinc				0.01 U	0.01 U	
Semivolatiles in µg/L						
Total PAHs						
Pentachlorophenol	10 U	1.3	0.5			ND
Total Phenols						

Table A-2 - Groundwater Analytical Data

Sample ID	BXS-4	BXS-4	BXS-4	BXS-4	BXS-4	BXS-4
Sampling Date	9/25/92	12/09/92	3/01/93	3/16/93	6/01/93	6/22/93
Field Parameters						
Conductivity	206	33		230		182
Dissolved Oxygen						
pH	7.11	7.88		6.38		7.94
Temperature	10	8.6		9		10.8
Conventionals						
Alkalinity						
Ammonia as Nitrogen	0.54	0.83		0.51		0.52
Chemical Oxygen Demand	58	420		40		20
Calcium						
Chloride	2.1	2.3		2.5		2.2
Conductivity	189	192		192		162
Dissolved Bicarbonate						
Fluoride	0.2 U	0.2 U		0.2 U		0.2 U
Nitrate+Nitrite as Nitrogen	0.2 U	0.2 U		0.7		0.2 U
Nitrate-N						
Nitrite-N						
pH	7.71	7.88		7.95		7.54
Sulfate	1.9	1.7		12		1.9
Total Dissolved Solids	152	136		136		137
Total Organic Carbon	0.8	2.2		0.5 U		1.6
Tannin-Lignin	0.2	0.5		0.2 U		0.3
Total Coliforms	2 U	4		2 U		2 U
Dissolved Metals in mg/L						
Arsenic	0.006	0.006		0.005 U		0.005 U
Barium	0.061	0.026		0.025		0.026
Cadmium	0.003 U	0.003 U		0.003 U		0.003 U
Chromium	0.018	0.005 U		0.005 U		0.005 U
Copper	0.012	0.01 U		0.01 U		0.01 U
Iron	4.87	0.039		0.051		0.061
Lead	0.002 U	0.002 U		0.002 U		0.002 U
Magnesium						
Manganese		0.112		0.126		0.111
Mercury	0.0005 U	0.0005 U		0.0005 U		0.0005 U
Nickel		0.02 U		0.02 U		0.02 U
Potassium						
Selenium	0.005 U	0.005 U		0.005 U		0.005 U
Silver	0.01 U	0.01 U		0.01 U		0.01 U
Sodium						
Zinc		0.01 U		0.01 U		0.01 U
Semivolatiles in µg/L						
Total PAHs						
Pentachlorophenol			NM		NM	
Total Phenols						

Table A-2 - Groundwater Analytical Data

Sample ID	BXS-4	BXS-4	BXS-4	BXS-4	BXS-4	BXS-4
Sampling Date	9/01/93	9/07/93	12/01/93	12/02/93	3/22/94	6/21/94
Field Parameters						
Conductivity		197		194	192	180
Dissolved Oxygen						
pH		7.3		6.87	7.23	7.53
Temperature		12		8.6	9.5	12
Conventionals						
Alkalinity						
Ammonia as Nitrogen		0.48		0.36	0.5	0.35
Chemical Oxygen Demand		35		27	17	27
Calcium						
Chloride		2.2		2.2	2.4	2.1
Conductivity		190		145	204	159
Dissolved Bicarbonate						
Fluoride		0.2 U		0.2 U	0.2 U	0.2 U
Nitrate+Nitrite as Nitrogen		0.2 U		0.2 U		
Nitrate-N					0.2 U	0.2 U
Nitrite-N					0.2 U	0.2 U
pH		7.89		7.94	7.99	7.98
Sulfate		2		1.8	2.4	1.7
Total Dissolved Solids		144		148	140	140
Total Organic Carbon		1.8		0.9	0.7	3.9
Tannin-Lignin		0.3		0.3	0.4	0.2 U
Total Coliforms		2 U		2 U	4	2 U
Dissolved Metals in mg/L						
Arsenic		0.005 U		0.005 U	0.005 U	0.005 U
Barium		0.023		0.025	0.024	0.028
Cadmium		0.003 U		0.003 U	0.003 U	0.003 U
Chromium		0.005 U		0.005 U	0.005 U	0.005 U
Copper		0.01 U		0.01 U	0.01 U	0.01 U
Iron		0.039		0.038	0.043	0.052
Lead		0.002 U		0.002 U	0.002 U	0.002 U
Magnesium						
Manganese		0.102		0.112	0.12	0.118
Mercury		0.0005 U		0.0005 U	0.0005 U	0.0005 U
Nickel		0.02 U		0.02 U	0.02 U	0.02 U
Potassium						
Selenium		0.005 U		0.005 U	0.005 U	0.005 U
Silver		0.01 U		0.01 U	0.01 U	0.01 U
Sodium						
Zinc		0.01 U		0.01 U	0.01 U	0.01 U
Semivolatiles in µg/L						
Total PAHs						
Pentachlorophenol	NM		NM			
Total Phenols						

Table A-2 - Groundwater Analytical Data

Sample ID	BXS-4	BXS-4	BXS-4	BXS-4	BXS-4	BXS-4
Sampling Date	8/15/94	10/12/94	11/29/94	1/10/95	2/16/95	4/27/95
Field Parameters						
Conductivity	244	210		180	175.6	173
Dissolved Oxygen	6.5				0.08	3.53
pH	7.4	6.52		7.4	7.84	8.09
Temperature	12.5	9		11.7	8.67	11.9
Conventionals						
Alkalinity	94				95	96
Ammonia as Nitrogen		0.29		0.4		0.53
Chemical Oxygen Demand		21		23		48
Calcium	18.6				17.7	19
Chloride	2	1.8		2	2.2	1.8
Conductivity		148		166		174
Dissolved Bicarbonate	94				95	96
Fluoride		0.2 U		0.2		
Nitrate+Nitrite as Nitrogen		0.2 U		0.2 U		0.2 U
Nitrate-N						
Nitrite-N						
pH		7.77		7.86		7.92
Sulfate	1.6	1.7		1.9	1.3	1.9
Total Dissolved Solids		132		123		125
Total Organic Carbon	7.5	3.2		1.4	6.3	1.6
Tannin-Lignin		0.3		0.2		0.2
Total Coliforms		2 U		2 U		2 U
Dissolved Metals in mg/L						
Arsenic		0.005 U		0.005 U		0.006
Barium		0.023		0.026		0.029
Cadmium		0.003 U		0.003 U		0.003 U
Chromium		0.005 U		0.005 U		
Copper		0.01 U		0.01 U		0.01 U
Iron	0.054	0.051		0.032	0.032	0.057
Lead		0.002 U		0.002 U		
Magnesium	7.77				13.6	7.98
Manganese	0.112	0.112		0.133	0.114	0.121
Mercury		0.0005 U		0.0005 U		
Nickel		0.02 U		0.02 U		0.02 U
Potassium	3.2				3.4	3.9
Selenium		0.005 U		0.005 U		
Silver		0.01 U		0.01 U		
Sodium	6.38				6.55	6.81
Zinc		0.01 U		0.01 U		0.01 U
Semivolatiles in µg/L						
Total PAHs	ND				0.1	ND
Pentachlorophenol	ND				ND	ND
Total Phenols	ND				ND	ND

Table A-2 - Groundwater Analytical Data

Sample ID	BXS-4	BXS-4	BXS-4	BXS-4	BXS-4	BXS-4
Sampling Date	8/01/95	10/11/95	1/11/96	4/17/96	4/18/96	7/17/96
Field Parameters						
Conductivity	181	175	173	192.2	192	186.2
Dissolved Oxygen	1.8	2.8		3.5		1.2
pH	8.41	7.8	8.4	8.5	8.5	8.36
Temperature	13.7	9.2	10	9.4	9.4	10.9
Conventionals						
Alkalinity	408	96	94	93		94
Ammonia as Nitrogen	0.47	0.44	0.49		0.63	
Chemical Oxygen Demand	35	28	15		25	
Calcium	17.9	18.7	18.7	18.5		18.8
Chloride	1.9	1.9	2	1.9	1.9	2.1
Conductivity	227	177	17		154	
Dissolved Bicarbonate	408	96	94	93		94
Fluoride						
Nitrate+Nitrite as Nitrogen	0.2 U	0.2 U	0.2 U		0.2 U	
Nitrate-N						
Nitrite-N						
pH	7.7	7.68	7.49		7.83	
Sulfate	1.7	1.6	1.8	1.8	1.8	1.6
Total Dissolved Solids	133	149	155		152	
Total Organic Carbon	5.9	3.9	2.3	1.9	1.9	1
Tannin-Lignin	0.7	0.9	0.4		0.2	
Total Coliforms	2 U	2	2		2 U	
Dissolved Metals in mg/L						
Arsenic	0.005 U	0.005 U	0.005 U		0.005 U	
Barium	0.024	0.028	0.025		0.026	
Cadmium	0.003 U	0.003 U	0.004 U		0.004 U	
Chromium						
Copper	0.01 U	0.01 U	0.01 U		0.01 U	
Iron	0.047	0.038	0.058	0.04	0.04	0.042
Lead						
Magnesium	16	7.91	7.8	7.72		7.91
Manganese	0.119	0.122	0.126	0.121	0.121	0.12
Mercury						
Nickel	0.02 U	0.02 U	0.02 U		0.02 U	
Potassium	3	3.4	2.71	2.1		3.95
Selenium						
Silver						
Sodium	6.42	6.97	6.89	7.22		7.01
Zinc	0.01 U	0.01 U	0.01 U		0.025	
Semivolatiles in μg/L						
Total PAHs	ND	ND	ND	ND		ND
Pentachlorophenol	ND	ND	ND	ND		ND
Total Phenols	ND	ND	ND	0.3		ND

Table A-2 - Groundwater Analytical Data

Sample ID	BXS-4	BXS-4	BXS-4	BXS-4	BXS-4	BXS-4
Sampling Date	7/18/96	9/25/96	1/13/97	1/14/97	4/09/97	8/06/97
Field Parameters						
Conductivity	186	181	182.2	182	176.5	187.2
Dissolved Oxygen		0	3		1.9	1
pH	8.36	7.73	7.92	7.92	7.5	8.52
Temperature	10.9	13.3	9.9	9.9	12	11.9
Conventionals						
Alkalinity		94	96		96	96
Ammonia as Nitrogen	0.52			0.51	0.57	0.57
Chemical Oxygen Demand	14	5 U		27	13	14
Calcium		18.4	18.2		19.4	18.6
Chloride	2.1	2	2.1	2.1	2.1	2.1
Conductivity	165	157		168	166	174
Dissolved Bicarbonate		94	96		96	96
Fluoride						
Nitrate+Nitrite as Nitrogen	0.2 U	0.2 U		0.2 U	0.2 U	0.2 U
Nitrate-N						
Nitrite-N						
pH	7.52	7.55		7.87	7.89	7.81
Sulfate	1.6	1.7	1.6	1.6	1.7	1.6
Total Dissolved Solids	162	137		161	141	131
Total Organic Carbon	1	2.8	3.6	3.6	1.8	4
Tannin-Lignin	0.2	0.4		0.3	0.5	0.3
Total Coliforms	2 U	2 U		2 U	2 U	2 U
Dissolved Metals in mg/L						
Arsenic	0.005	0.005		0.005 U	0.005 U	0.006
Barium	0.027	0.025		0.026	0.005 U	0.028
Cadmium	0.004 U	0.004 U		0.004 U	0.004 U	0.004 U
Chromium						
Copper	0.01 U	0.01 U		0.01 U	0.01 U	0.01 U
Iron	0.042	0.054	0.046	0.046	0.02 U	0.065
Lead						
Magnesium		7.71	7.74		8.23	7.83
Manganese	0.12	0.12	0.122	0.122	0.005 U	0.119
Mercury						
Nickel	0.02 U	0.02 U		0.02 U	0.02 U	0.02 U
Potassium		ND	4.1		4.4	3.6
Selenium						
Silver						
Sodium		6.91	6.94		6.9	6.91
Zinc	0.01 U	0.01 U		0.01 U	0.01 U	0.01 U
Semivolatiles in µg/L						
Total PAHs		0.1	ND		ND	ND
Pentachlorophenol		ND	ND		ND	ND
Total Phenols		ND	ND		ND	ND

Table A-2 - Groundwater Analytical Data

Sample ID	BXS-4	BXS-4	BXS-4
Sampling Date	10/06/97	1/14/98	4/15/98
Field Parameters			
Conductivity	183		188.9
Dissolved Oxygen	1.2	1.6	1.1
pH	7.98	7.69	7.21
Temperature	10.7	9.3	11.9
Conventionals			
Alkalinity	93	95	92
Ammonia as Nitrogen			
Chemical Oxygen Demand	17	32	
Calcium	18.5	19.3	18.8
Chloride	1.8	2.1	2.2
Conductivity	189	148	
Dissolved Bicarbonate	93	95	92
Fluoride			
Nitrate+Nitrite as Nitrogen	0.2 U	0.2 U	
Nitrate-N			
Nitrite-N			
pH	7.8	8.04	
Sulfate	1.7	1.5	1.3
Total Dissolved Solids	142	186	
Total Organic Carbon	1.4	7.8	1.8
Tannin-Lignin	0.4	30.4	
Total Coliforms	2 U	2 U	
Dissolved Metals in mg/L			
Arsenic	0.006	0.005	
Barium	0.028	0.026	
Cadmium	0.004 U	0.004 U	
Chromium			
Copper	0.01 U	0.01 U	
Iron	0.082	0.041	0.063
Lead			
Magnesium	7.95	8.04	7.78
Manganese	0.119	0.127	0.124
Mercury			
Nickel	0.02 U	0.02 U	
Potassium	3.1	3.1	2.8
Selenium			
Silver			
Sodium	6.83	7.34	7.17
Zinc	0.01 U	0.024	
Semivolatiles in µg/L			
Total PAHs	ND	ND	ND
Pentachlorophenol	ND	ND	ND
Total Phenols	ND	ND	ND

Table A-2 - Groundwater Analytical Data

Sample ID	MW-1	MW-1	MW-1	MW-1	MW-1	MW-1	MW-1
Sampling Date	8/01/90	8/01/91	3/01/92	8/01/92	3/01/93	6/01/93	9/01/93
Field Parameters							
Conductivity		61	100	90	208		105
Dissolved Oxygen							
pH		6.32	6.38	6.06	6.33		6.56
Temperature		11	10.6	11.4	11.2		10
Conventionals							
Alkalinity							
Calcium							
Chloride							
Dissolved Bicarbonate							
Sulfate							
Total Organic Carbon							
Dissolved Metals in mg/L							
Iron							
Magnesium							
Manganese							
Potassium							
Sodium							
Semivolatiles in µg/L							
Total PAHs							
Pentachlorophenol	10 U	0.2 U	0.1	0.2 U	ND	NM	ND
Total Phenols							

Table A-2 - Groundwater Analytical Data

Sample ID	MW-1	MW-1	MW-1	MW-1	MW-1	MW-1	MW-1
Sampling Date	12/01/93	8/16/94	11/29/94	2/16/95	4/26/95	7/31/95	10/09/95
Field Parameters							
Conductivity		117	152.5	114.3	161.8	105.8	
Dissolved Oxygen		5.8	3.6	0	8.12	3.1	5.8
pH		6	6.6	7.66	8.2	6.03	7.1
Temperature		12	14.25	9.4	12.8	13.9	11
Conventionals							
Alkalinity		43	42	30	30	35	44
Calcium		9.7	12.3	9	8.81	7.89	10.5
Chloride		5.2	8.1	6.3	4.4	3.9	4.1
Dissolved Bicarbonate		43	42	30	30	35	44
Sulfate		9.2	11	11	9.6	9.3	7.3
Total Organic Carbon		2	1.5	2.9	1.8	1.5	1.8
Dissolved Metals in mg/L							
Iron		0.02 U	0.026	0.02 U	0.02 U	0.02 U	0.02 U
Magnesium		6.22	7.47	5.33	5.22	5.14	6.71
Manganese		0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Potassium		ND	ND	ND	ND	ND	ND
Sodium		4.23	4.43	4.03	4.06	3.55	4.57
Semivolatiles in µg/L							
Total PAHs		ND	ND	ND	ND	ND	ND
Pentachlorophenol	NM	ND	ND	ND	ND	1.6	ND
Total Phenols		ND	ND	ND	ND	ND	ND

Table A-2 - Groundwater Analytical Data

Sample ID	MW-1	MW-1	MW-1	MW-1	MW-1	MW-1	MW-1
Sampling Date	1/10/96	4/17/96	7/17/96	9/25/96	1/13/97	4/09/97	8/06/97
Field Parameters							
Conductivity	120.8	126	121	140.8	141.1		140.6
Dissolved Oxygen		6.3	3.5	2.9	3.7	5.6	5
pH	8.38	7.53	6.62	6.02	5.66	5.23	7.02
Temperature	12.3	11.2	11.4	11.3	9.2	10.1	12.7
Conventionals							
Alkalinity	38	37	38	50	39	44	53
Calcium	9.73	9.96	9.43	11.8	10.8	12.3	12.1
Chloride	6	4.6	4.2	4.1	4.2	4.2	2.9
Dissolved Bicarbonate	38	37	38	50	39	44	53
Sulfate	9	8.9	9.3	9.5	12	13	8.2
Total Organic Carbon	3.3	1.3	2.6	1.9	1.8	2.5	2.9
Dissolved Metals in mg/L							
Iron	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.728	0.02 U
Magnesium	5.7	6.15	5.95	7.58	6.21	7.51	7.28
Manganese	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.02	0.005 U
Potassium	ND	ND	2.3	ND	2.5	2.2	ND
Sodium	4.67	4.87	4.67	5.35	4.46	4.42	4.54
Semivolatiles in µg/L							
Total PAHs	ND	ND	ND	ND	ND	ND	ND
Pentachlorophenol	0.5	ND	ND	ND	ND	ND	ND
Total Phenols	ND	ND	ND	ND	ND	ND	ND

Table A-2 - Groundwater Analytical Data

Sample ID	MW-1	MW-1	MW-1	MW-2	MW-2	MW-2	MW-2
Sampling Date	10/06/97	1/14/98	4/15/98	8/01/90	8/01/91	10/01/91	3/01/92
Field Parameters							
Conductivity	151.3	138.9	130.8		170	170	70
Dissolved Oxygen	1.6	3	1.4				
pH	8.47	7.27	7.04		6.22	6.22	5.92
Temperature	10.2	11.7	12.9		10.7	10.7	11.1
Conventionals							
Alkalinity	58	44	43				
Calcium	13.2	11.6	11.4				
Chloride	3.2	4.7	3.7				
Dissolved Bicarbonate	58	44	43				
Sulfate	9.5	11.5	11.5				
Total Organic Carbon	2.8	3.8	2.2				
Dissolved Metals in mg/L							
Iron	0.02 U	0.735	0.02 U				
Magnesium	8.25	6.93	6.73				
Manganese	0.005 U	0.02	0.005 U				
Potassium	ND	ND	ND				
Sodium	5.09	5.1	4.32				
Semivolatiles in µg/L							
Total PAHs	ND	ND	ND				
Pentachlorophenol	ND	ND	ND	10 U	8.3	8.3	0.4
Total Phenols	ND	ND	ND				

Table A-2 - Groundwater Analytical Data

Sample ID	MW-2	MW-2	MW-2	MW-2	MW-2	MW-2	MW-2
Sampling Date	8/01/92	3/01/93	6/01/93	9/01/93	12/01/93	8/15/94	11/29/94
Field Parameters							
Conductivity	115	142	142	184		264	
Dissolved Oxygen						6.8	
pH	6.1	5.87	5.87	6.22		5.8	
Temperature	13.7	10.7	10.7	11.2		14.7	
Conventionals							
Alkalinity						40	
Calcium						18.9	
Chloride						30	
Dissolved Bicarbonate						40	
Sulfate						12	
Total Organic Carbon						9	
Dissolved Metals in mg/L							
Iron						0.033	
Magnesium						10.2	
Manganese						0.066	
Potassium						2	
Sodium						5.87	
Semivolatiles in µg/L							
Total PAHs						ND	
Pentachlorophenol	0.2 U	ND	1.5	NM	NM	9	
Total Phenols						ND	

Table A-2 - Groundwater Analytical Data

Sample ID	MW-2	MW-2	MW-2	MW-2	MW-2	MW-2	MW-2
Sampling Date	2/16/95	4/26/95	7/31/95	10/09/95	1/10/96	4/17/96	7/17/96
Field Parameters							
Conductivity	177.2	198	227	197	185.4	197	207
Dissolved Oxygen	0	5.76	4.3	6.2		7.9	4.6
pH	7.41	7.42	6.76	7.47	7.72	8.12	6.64
Temperature	9.2	14.3	15.4	10.9	9.8	11.8	11.2
Conventionals							
Alkalinity	35	38	38	40	37	40	39
Calcium	13.2	15.5	16.5	16.6	14.3	15.1	17.3
Chloride	18	18	27	25	19	13	17
Dissolved Bicarbonate	35	38	38	40	37	40	39
Sulfate	8.9	18	12	9.7	11	19	23
Total Organic Carbon	1.2	1.5	1.4	4.8	4.1	5.2	5.3
Dissolved Metals in mg/L							
Iron	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Magnesium	8.13	9.6	10.3	9.64	8.76	9.05	10.3
Manganese	0.005 U	0.005 U	0.005 U	0.018	0.005 U	0.005 U	0.005 U
Potassium	ND	ND	ND	2.1	ND	ND	2.6
Sodium	5.1	5.48	5.72	5.85	5.35	5.54	6.1
Semivolatiles in µg/L							
Total PAHs	ND	ND	ND	ND	ND	2 U	ND
Pentachlorophenol	2.1	0.6	1.1	4.1	3.9	7.1	4.6
Total Phenols	ND	ND	ND	ND	ND	ND	ND

Table A-2 - Groundwater Analytical Data

Sample ID	MW-2	MW-2	MW-2	MW-2	MW-2	MW-2	MW-2
Sampling Date	9/25/96	1/13/97	4/09/97	8/06/97	10/06/97	1/14/98	4/15/98
Field Parameters							
Conductivity	216	133.8	179.4	229	162.3	160.3	147.5
Dissolved Oxygen	2.6	8.6	5.2	2.9	1.5	1.6	1.5
pH	6.6	7.39	7.3	8.18	7.14	7.23	6.87
Temperature	12.2	8	11.4	13.3	11.6	9.6	11.5
Conventionals							
Alkalinity	40	30	44	43	44	31	35
Calcium	18.1	9.6	14.7	17.6	12.9	11.9	11.2
Chloride	21	7.2	4.2	19.2	7	9.7	5.4
Dissolved Bicarbonate	40	30	44	43	44	31	35
Sulfate	18	14	13	22.2	17	15.5	17.7
Total Organic Carbon	8.7	8.8	2.5	9.2	7.8	5.6	3
Dissolved Metals in mg/L							
Iron	0.02 U	0.082	0.076	0.02 U	0.02 U	0.187	0.02 U
Magnesium	10.9	6.09	7.6	10.6	7.98	7.4	6.87
Manganese	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Potassium	ND	2.8	2.7	ND	ND	ND	ND
Sodium	6.55	4.62	6.43	5.96	5.26	5.39	4.83
Semivolatiles in µg/L							
Total PAHs	ND	ND	ND	ND	ND	ND	ND
Pentachlorophenol	3.3	3	2.8	1.3	3.8	2.5	0.7
Total Phenols	ND	ND	ND	ND	ND	ND	ND

Table A-2 - Groundwater Analytical Data

Sample ID	MW-3	MW-3	MW-3	MW-3	MW-3	MW-3	MW-3
Sampling Date	8/01/90	8/01/91	8/01/91	10/01/91	3/01/92	8/01/92	3/01/93
Field Parameters							
Conductivity		75		130	110	100	209
Dissolved Oxygen							
pH		6.14		5.95	5.76	6.6	6.38
Temperature		11.9		10	10.7	12.1	12.5
Conventionals							
Alkalinity							
Calcium							
Chloride							
Dissolved Bicarbonate							
Sulfate							
Total Organic Carbon							
Dissolved Metals in mg/L							
Iron							
Magnesium							
Manganese							
Potassium							
Sodium							
Semivolatiles in µg/L							
Total PAHs							
Pentachlorophenol	10 U		440	210	ND	250	190
Total Phenols							

Table A-2 - Groundwater Analytical Data

Sample ID	MW-3	MW-3	MW-3	MW-3	MW-3	MW-3	MW-3	MW-3
Sampling Date	6/01/93	9/01/93	12/01/93	8/15/94	11/29/94	2/15/95	4/26/95	7/31/95
Field Parameters								
Conductivity	209	122	165	217	126.8	142	141.3	135.2
Dissolved Oxygen				7.4	2.8	2.8	5.76	1.4
pH	6.38	6.23	6.33	5.7	6.2	7.77	7.25	7.27
Temperature	12.5	10.7	9.6	12.7	11.75	9.1	13.1	16.1
Conventionals								
Alkalinity				42	35	31	41.5	38.5
Calcium				11.2	9.56	9.4	9.93	9.79
Chloride				7.7	6.4	7.9	6.9	7.05
Dissolved Bicarbonate				42	35	31	41.5	38.5
Sulfate				9.7	10	9	9.05	11
Total Organic Carbon				4.3	3.8	1.25	0.8	2.65
Dissolved Metals in mg/L								
Iron				0.312	0.989	0.029	0.02 U	0.082
Magnesium				6.82	6.62	6.3	6.74	6.48
Manganese				1.18	0.27	0.362	0.277	0.475
Potassium				ND	ND	2.68	ND	ND
Sodium				4.5	4.71	4.39	4.77	4.58
Semivolatiles in µg/L								
Total PAHs				ND	ND	ND	ND	ND
Pentachlorophenol	430	NM	750	230	480	ND	3.4	145
Total Phenols				ND	ND	ND	ND	ND

Table A-2 - Groundwater Analytical Data

Sample ID	MW-3	MW-3	MW-3	MW-3	MW-3	MW-3	MW-3	MW-3
Sampling Date	10/09/95	1/10/96	4/17/96	7/17/96	9/25/96	1/13/97	4/09/97	8/06/97
Field Parameters								
Conductivity	120	105.2	125.8	139.4	136.7	168.6	220	161.7
Dissolved Oxygen	3.9		3.4	1.9	0.4	0.1	4	1.7
pH	7.04	8.34	9.61	7.56	6.78	6.53	6.33	7.64
Temperature	10.8	9	11.3	12.3	14.7	9.7	11.6	14.8
Conventionals								
Alkalinity	27	30.5	41	42.5	44.5	40.5	73	56.5
Calcium	9.07	7.8	9.39	10.15	11	11.05	18.1	14.1
Chloride	7.05	5.15	5.75	5.25	5.45	6.65	9.85	6.85
Dissolved Bicarbonate	27	30.5	41	43	44.5	40.5	73	56.5
Sulfate	10.7	10.5	10.65	9.1	10.35	10.45	9.9	9.7
Total Organic Carbon	3.7	1.5	2	1.75	2.7	1.95	3.2	3.6
Dissolved Metals in mg/L								
Iron	0.198	0.078	0.02 U	0.02 U	0.02 U	0.026	0.108	0.02 U
Magnesium	5.9	5.27	6.31	6.98	7.47	7.27	11.4	8.68
Manganese	0.583	0.177	0.193	0.203	0.258	0.136	0.013	0.009
Potassium	ND	ND	ND	2.5	ND	2.7	2.65	ND
Sodium	4.515	4.01	4.465	4.7	4.72	4.825	6.43	5.485
Semivolatiles in µg/L								
Total PAHs	ND	ND	2.5	ND	ND	2	ND	ND
Pentachlorophenol	115	470	135	300	320	58.5	0.9	17.5
Total Phenols	1	ND	ND	ND	ND	ND	ND	ND

Table A-2 - Groundwater Analytical Data

Sample ID	MW-3	MW-3	MW-3	MW-3-A	MW-3-B	MW-4	MW-4	MW-4
Sampling Date	10/06/97	1/14/98	4/15/98	10/01/91	10/01/91	6/01/94	11/29/94	2/16/95
Field Parameters								
Conductivity	112		157.3	120	135		178.9	183
Dissolved Oxygen	0.9	2	1.2				2.4	0
pH	7.67	7.21	7.06	6.27	5.95		6.8	8.8
Temperature	13	9.8	13	9.8	10		11.9	8.8
Conventionals								
Alkalinity	40	37	62.5				92	98
Calcium	10.7	9.8	12.9				16.8	16.4
Chloride	5.2	5	5.55				2.5	2
Dissolved Bicarbonate	40	37	62.5				92	98
Sulfate	12.75	12.4	12.85				0.9	0.5
Total Organic Carbon	2.85	1.95	2.95				2.6	7.5
Dissolved Metals in mg/L								
Iron	0.02 U	0.02 U	0.066				0.568	0.336
Magnesium	6.8	6.23	8.02				8.62	8.45
Manganese	0.027	0.034	0.014				0.148	0.149
Potassium	ND	ND	ND				3.3	3.52
Sodium	4.92	4.8	5.36				6.54	5.1
Semivolatiles in µg/L								
Total PAHs	ND	ND	ND				ND	ND
Pentachlorophenol	295	210	27.5	210	440		ND	ND
Total Phenols	ND	ND	ND				ND	ND

Table A-2 - Groundwater Analytical Data

Sample ID	MW-4	MW-4	MW-4	MW-4	MW-4	MW-4	MW-4	MW-4
Sampling Date	4/26/95	8/01/95	10/09/95	1/10/96	4/17/96	7/17/96	9/25/96	1/13/97
Field Parameters								
Conductivity	183.8	182.8	173.5	176.9	191.4	185.1	180.6	191
Dissolved Oxygen	4.75	2	3.1		2.9	0.5	0.4	4.1
pH	7.82	7.67	7.48	8.22	9.14	8.03	7.51	7.62
Temperature	11.5	12.2	10.7	9.5	11.8	11.1	12.4	8
Conventionals								
Alkalinity	100	96	93	93	96	92	93	96
Calcium	16.8	16.2	17.3	17	16.5	17.4	17.2	16.2
Chloride	2.3	2.2	2.1	2.4	2.2	5.2	2.2	2.3
Dissolved Bicarbonate	100	96	93	93	96	92	93	97
Sulfate	0.5	0.5	0.5	0.7	0.7	9.2	0.7	0.7
Total Organic Carbon	0.8	1.6	1.1	1.1	1.1	1.1	2	1
Dissolved Metals in mg/L								
Iron	0.459	0.336	0.378	0.371	0.334	0.366	0.339	0.287
Magnesium	8.65	8.39	8.89	8.57	8.44	8.89	8.74	8.35
Manganese	0.148	0.136	0.143	0.136	0.133	0.138	0.136	0.128
Potassium	2.7	2.5	3.5	3.34	ND	4	2.3	4.2
Sodium	6.53	6.06	6.73	6.21	6.21	6.56	6.45	6.56
Semivolatiles in µg/L								
Total PAHs	ND	ND	ND	ND	ND	ND	ND	ND
Pentachlorophenol	0.6	ND	ND	ND	ND	ND	ND	ND
Total Phenols	ND	ND	ND	ND	ND	ND	ND	ND

Table A-2 - Groundwater Analytical Data

Sample ID	MW-4	MW-4	MW-4	MW-4	MW-4
Sampling Date	4/09/97	8/06/97	10/06/97	1/15/98	4/15/98
Field Parameters					
Conductivity	121.2	184.2	151.3	189.1	188.1
Dissolved Oxygen	1.9	1.9	1.6	1.4	0.8
pH	7.49	8.13	8.47	7.78	6.73
Temperature	13.8	13.7	10.2	9.2	9.1
Conventionals					
Alkalinity	98	96	96	92	92
Calcium	17.7	16.9	17.2	17.1	17.2
Chloride	2.2	2.3	2.1	2.4	2.3
Dissolved Bicarbonate	98	96	96	92	92
Sulfate	1	0.9	0.9	0.9	1
Total Organic Carbon	1.7	0.6	0.5 U	2.6	3.5
Dissolved Metals in mg/L					
Iron	0.392	0.323	0.262	0.297	0.214
Magnesium	9.11	8.63	8.84	8.63	8.75
Manganese	0.142	0.134	0.027	0.134	0.136
Potassium	4	3.2	3.2	3.2	2.8
Sodium	6.52	6.24	6.5	6.41	6.56
Semivolatiles in µg/L					
Total PAHs	ND	ND	ND	ND	ND
Pentachlorophenol	ND	ND	ND	ND	ND
Total Phenols	ND	ND	ND	ND	ND

Table A-3 - Storm Water Analytical Data

Sample ID	Drains 10-22	Drains 13/14	Drain 23	Drain 24	Drain 25	Drain 30
Sampling Date	9/18/97	9/18/97	9/18/97	9/18/97	9/18/97	9/18/97
						Duplicate 13/14
Semivolatiles in µg/L						
Acenaphthene	1 U	1 U	1 U	1 U	1 U	1 U
Acenaphthylene	1 U	3 U	1 U	11 U	1 U	1 U
Anthracene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Benzo(a)anthracene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Benzo(a)pyrene	0.1 U	0.1	0.1 U	0.1 U	0.1 U	0.1
Benzo(b)fluoranthene	0.2 U	0.3	0.2 U	0.2 U	0.2 U	0.3
Benzo(g,h,i)perylene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Benzo(k)fluoranthene	0.1 U	0.1	0.1 U	0.1 U	0.1 U	0.1
Carbazole						
Chrysene	0.1 U	0.2	0.1 U	0.1 U	0.1 U	0.2
Dibenz(a,h)anthracene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Fluoranthene	0.2 U	0.3	0.2 U	0.2 U	0.2 U	0.3
Fluorene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Indeno(1,2,3-cd)pyrene	0.1 U	0.2	0.1 U	0.1 U	0.1 U	0.2
Naphthalene	1 U	1 U	1 U	1 U	1 U	1 U
Phenanthrene	0.1 U	0.2	0.4 U	0.5 U	0.1 U	0.2
Pyrene	0.2 U	0.5	0.2	0.2 U	0.2 U	0.4
Total PAHs						
2,4,6-Trichlorophenol	0.5 U	0.5 U	50 U	50 U	50 U	0.5 U
Pentachlorophenol	18	74	720	780	340	88
Total Phenols						
Total Tetrachlorophenols	2.7	2.3	50 U	50 U	50 U	2.5

Table A-3 - Storm Water Analytical Data

Sample ID Sampling Date	Drains 13/14 9/18/97	Drains 13/14 1/08/98	13/14-Diss. 6/24/98	13/14-Diss. 6/24/98 Duplicate	13/14-Total 6/24/98	Drain 23 9/18/97	Drain 23 1/08/98
Dioxins in pg/L							
2378-TCDD	2.4 U	2.4 U	7.1 J	3.7 U	110	2.4 U	2.4 U
12378-PeCDD	17.8 U	1011.3	70	18 U	1800	17.8 U	273
123478-HxCDD	21.3 U	3822.1	200	18 U	4700	21.3 U	2773.7
123678-HxCDD	18 U	11648.5	450	41 J	11000	18 U	4581.3
123789-HxCDD	20 U	11663.8	450	35 J	12000	20 U	5147.4
1234678-HpCDD	29.2 U	429316	16000	1500	310000	29.2 U	85674.4
OCDD	12.7 U	4016164	150000	15000	2700000	12.7 U	394351
2378-TCDF	7.4 U	7.4 U	3.4 U	3.5 U	36	256.2	7.4 U
12378-PeCDF	21.7 U	21.7 U	8.8 U	8.4 U	150	21.7 U	750.8
23478-PeCDF	13.5 U	13.5 U	9.8 U	4.3 U	220	13.5 U	13.5 U
123478-HxCDF	25.1 U	1011.5	110	11 U	2700 U	25.1 U	25.1 U
123678-HxCDF	15.5 U	2094.8	390 U	55 U	17000 U	15.5 U	15.5 U
234678-HxCDF	13.4 U	1863.1	94	11 U	3300	13.4 U	13.4 U
123789-HxCDF	29.4 U	29.4 U	1.5 U	4 U	52	29.4 U	29.4 U
1234678-HpCDF	13.3 U	95637.7	3700	360	70000	13.3 U	16196.8
1234789-HpCDF	21.2 U	4181.8	280	33 J	5000	21.2 U	21.2 U
OCDF	17.2 U	544878	25000	3800	360000	17.2 U	67842.8
TCDDs (Total)	2.4 U	2.4 U	7.1	3.7 U	550	2.4 U	2.4 U
PeCDDs (Total)	17.8 U	1794	140	18 U	6000	17.8 U	762.8
HxCDDs (Total)	21.3 U	78863.3	2600	190	61000	21.3 U	26006.1
HpCDDs (Total)	29.2 U	746104	26000	2500	490000	29.2 U	190915
TCDFs (Total)	7.4 U	329.7	53	8.1	1700	7.4 U	7.4 U
PeCDFs (Total)	21.7 U	12177.4	460	32	15000	21.7 U	13301.3
HxCDFs (Total)	29.4 U	99373.5	3300	300	84000	29.4 U	20654.6
HpCDFs (Total)	21.2 U	419941	13000	1400	250000	21.2 U	89248.5
TEF Equivalent		13568.4	547.3	45.33	11146.3	25.62	2905.19

Table A-3 - Storm Water Analytical Data

Sample ID	Drain 24	Drain 24	Drain 25	Drain 25	25-Diss.	25-Total	Drain 30
Sampling Date	9/18/97	1/08/98	9/18/97	1/08/98	6/24/98	6/24/98	9/18/97 Duplicate 13/14
Dioxins in pg/L							
2378-TCDD	2.4 U	29.6	46.1	2.4 U	3.5 U	5.4 U	64.3
12378-PeCDD	17.8 U	681.7	870.4	360.2	8.5 U	40 U	1417.1
123478-HxCDD	21.3 U	3133.6	2414.1	1190.9	5 U	75	3583.4
123678-HxCDD	18 U	14728.8	5712	7132.2	7.6 U	180	8317.3
123789-HxCDD	20 U	13322.4	5185.8	7262.1	7 U	150	9938.8
1234678-HpCDD	1683.7	194781	115711	106342	25 JB	5300	154404
OCDD	13814	749445	634659	478617	110 B	46000	985885
2378-TCDF	7.4 U	7.4 U	50.4	7.4 U	3.5 U	4.1 U	50.7
12378-PeCDF	21.7 U	1289	74.8	21.7 U	5.3 U	4.5 U	72.7
23478-PeCDF	13.5 U	13.5 U	161	13.5 U	6.5 U	4.5 U	171.4
123478-HxCDF	25.1 U	25.1 U	867.5	2812.7	5.1 U	40 J	1316.2
123678-HxCDF	15.5 U	15.5 U	650.9	15.5 U	4.5 U	290 U	1851.7
234678-HxCDF	13.4 U	13.4 U	1588.4	13.4 U	7.1 U	41 J	2787.3
123789-HxCDF	29.4 U	29.4 U	29.4 U	29.4 U	7.7 U	1.8 U	29.4 U
1234678-HpCDF	202	43499.2	16466.1	21380.1	9.7 U	930	35497.9
1234789-HpCDF	13.6 J	21.2 U	1631.6	4650.6	6.9 U	67	2902.1
OCDF	742	113184	66649.5	64550.4	19 U	4800	120244
TCDDs (Total)	2.4 U	229.7	196.3	2.4 U	3.5 U	5.4 U	320.3
PeCDDs (Total)	17.8 U	3111.2	2714.9	1226.6	8.5 U	40 U	3984.7
HxCDDs (Total)	21.3 U	60909.7	36206.8	39898	7.6 U	1100	54914.2
HpCDDs (Total)	2526.3	311187	214953	186942	25 B	9300	287283
TCDFs (Total)	7.4 U	7.4 U	457.5	313.7	3.5 U	14	775.7
PeCDFs (Total)	21.7 U	12580.4	8676	4294.6	6.5 U	210	12565.3
HxCDFs (Total)	29.4 U	64416.8	37607.8	25303.6	7.7 U	1000	62807.4
HpCDFs (Total)	851.2	181922	86145.4	82518.4	9.7 U	2600	151553
TEF Equivalent	33.549	6798.81	4251.85	3886.78	0.36	162.37	6680.9

Table A-3 - Storm Water Analytical Data

Sample ID	Drain 30	
Sampling Date	1/08/98	
	Duplicate 13/14	
Dioxins in pg/L		
2378-TCDD	2.4	U
12378-PeCDD	763.3	
123478-HxCDD	2718.4	
123678-HxCDD	8651.9	
123789-HxCDD	8764	
1234678-HpCDD	357390	
OCDD	1292467	
2378-TCDF	7.4	U
12378-PeCDF	21.7	U
23478-PeCDF	13.5	U
123478-HxCDF	1707.4	
123678-HxCDF	1797.1	
234678-HxCDF	1613.3	
123789-HxCDF	29.4	U
1234678-HpCDF	74647.1	
1234789-HpCDF	7240.5	
OCDF	184840	
TCDDs (Total)	2.4	U
PeCDDs (Total)	1953.5	
HxCDDs (Total)	54700	
HpCDDs (Total)	615501	
TCDFs (Total)	383.1	
PeCDFs (Total)	7585.8	
HxCDFs (Total)	86241.4	
HpCDFs (Total)	373357	
TEF Equivalent	8776.94	

Table A-3 - Storm Water Analytical Data

Sample ID	Date	pH	Oil & Grease in mg/L		Total Suspended Solids in mg/L
Drain 13	3/1-4/30/98	7.19	2.5		560
Drain 13	5/1/-5/31/98	7.06	5		788
Drain 14	3/1-4/30/98	7.56	2.5		228
Drain 14	5/1-5/31/98	7.45	6		1400
Drain 23	9/1-10/31/94	6.64	9		486
Drain 23	11/1-12/31/94	7.82	4		280
Drain 23	1/1-2/28/95	7.41	4		830
Drain 23	3/1-4/30/95	7.19	3		392
Drain 23	9/1-10/31/95	6.68	4		636
Drain 23	11/1-12/31/95	7.69	3		196
Drain 23	1/1-2/28/96	7.8	2.5		380
Drain 23	3/1-4/30/96	6.77	6		788
Drain 23	5/1-5/31/96	6.86	2.5		3000
Drain 23	9/1-10/31/96	6.84	2.5		266
Drain 23	11/1-12/31/96	6.88	12		420
Drain 23	1/1-2/28/97	7.08	5		250
Drain 23	3/1-4/30/97	7.02	2.5		122
Drain 23	5/1-5/31/97	6.85	2.5		253
Drain 23	9/1-10/31/97	6.94	2.5		113
Drain 23	9/18/97	6.94	5	U	113
Drain 23	11/1-12/31/97	7.12	2.5		216
Drain 23	1/1-2/28/98	7.2	5		98
Drain 23	3/1-4/30/98	7.08	5		564
Drain 23	5/1-5/31/98	6.43		ND	21
Drain 24	9/1-10/31/94	6.63	4		322
Drain 24	11/1-12/31/94	7.53	2		242
Drain 24	1/1-2/28/95	7.75	3		1460
Drain 24	3/1-4/30/95	7.15	2		246
Drain 24	9/1-10/31/95	7.47	2		1520
Drain 24	11/1-12/31/95	8.54	2		290
Drain 24	1/1-2/28/96	7.64	2.5		380
Drain 24	3/1-4/30/96	6.74	2.5		1100
Drain 24	5/1-5/31/96	6.84	2.5		119
Drain 24	9/1-10/31/96	7.43	2.5		125
Drain 24	11/1-12/31/96	7.17	2.5		984
Drain 24	1/1-2/28/97	6.95	2.5		200
Drain 24	3/1-4/30/97	6.85	2.5		172
Drain 24	5/1-5/31/97	7.59	2.5		22
Drain 24	9/1-10/31/97	6.8	2.5		260
Drain 24	9/18/97	6.8	5	U	260
Drain 24	11/1-12/31/97	7.09	2.5		280
Drain 24	1/1-2/28/98	7.3	5		282
Drain 24	3/1-4/30/98	7.05	2.5		620
Drain 24	5/1-5/31/98	6.84		ND	71
Drain 25	11/1-12/31/94	7.75	2		3140
Drain 25	9/1-10/31/94	6.61	16		40
Drain 25	1/1-2/28/95	8.07	3		2430
Drain 25	3/1-4/30/95	8.5	1		1030

Table A-3 - Storm Water Analytical Data

Sample ID	Date	pH	Oil & Grease in mg/L	Total Suspended Solids in mg/L
Drain 25	9/1-10/31/95	8.15	2.5	2830
Drain 25	11/1-12/31/95	8.54	2.5	630
Drain 25	1/1-2/28/96	7.7	2.5	280
Drain 25	3/1-4/30/96	6.75	2.5	830
Drain 25	5/1-5/31/96	7.22	2.5	413
Drain 25	9/1-10/31/96	7.83	2.5	280
Drain 25	11/1-12/31/96	8.15	2.5	2620
Drain 25	1/1-2/28/97	7.58	2.5	1060
Drain 25	3/1-4/30/97	7.04	2.5	516
Drain 25	5/1-5/31/97	8.82	2.5	18
Drain 25	9/1-10/31/97	7.06	2.5	260
Drain 25	9/18/97	7.06	5 U	260
Drain 25	11/1-12/31/97	6.77	2.5	152
Drain 25	1/1-2/28/98	7.43	5	62
Drain 25	3/1-4/30/98	7.43	2.5	676
Drain 25	5/1-5/31/98	7.3	ND	268
Drain 30 (Dup)	9/18/97	7.71	5 U	890
Drains 13/14	9/1-10/31/94	7.65	3	538
Drains 13/14	11/1-12/31/94	7.67	1	410
Drains 13/14	1/1-2/28/95	8.25	3	2430
Drains 13/14	3/1-4/30/95	7.25	1	119
Drains 13/14	9/1-10/31/95	7.53	3	292
Drains 13/14	11/1-12/31/95	8.1	3	147.5
Drains 13/14	1/1-2/28/96	8.12	2.5	224
Drains 13/14	3/1-4/30/96	6.97	2.5	392
Drains 13/14	5/1-5/31/96	7.33	2.5	853.5
Drains 13/14	9/1-10/31/96	7.85	2.5	740
Drains 13/14	11/1-12/31/96	8.04	5	774
Drains 13/14	1/1-2/28/97	8.08	2.5	2285
Drains 13/14	3/1-4/30/97	7.23	2.5	150.5
Drains 13/14	5/1-5/31/97	6.01	5	653.5
Drains 13/14	9/1-10/31/97	7.97	2.5	955
Drains 13/14	9/18/97	7.97	5 U	1020
Drains 13/14	11/1-12/31/97	7.46	2.5	284
Drains 13/14	1/1-2/28/98	7.66	2.5	544
Untreat. Wood	9/1-11/30/94	7.22	2.5	456
Untreat. Wood	3/1-5/31/95	7.86	2.5	19900
Untreat. Wood	9/1-11/30/95	7.46	1	1480
Untreat. Wood	12/1-2/28/95	7.31	2	1080
Untreat. Wood	3/1-5/31/96	7.26	2.5	1800
Untreat. Wood	9/1-11/30/96	7.63	2.5	1200
Untreat. Wood	12/1-2/28/96	7.16	1.5	1300
Untreat. Wood	3/1-5/31/97	7.66	2.5	7020
Untreat. Wood	9/1-11/30/97	7.09	2.5	640
Untreat. Wood	12/1-2/28/97	7.21	2.5	2160
Untreat. Wood	3/1-5/31/98	7.29	5	1370
Untreat. Wood	12/1-2/28/98	7.61	13	6700

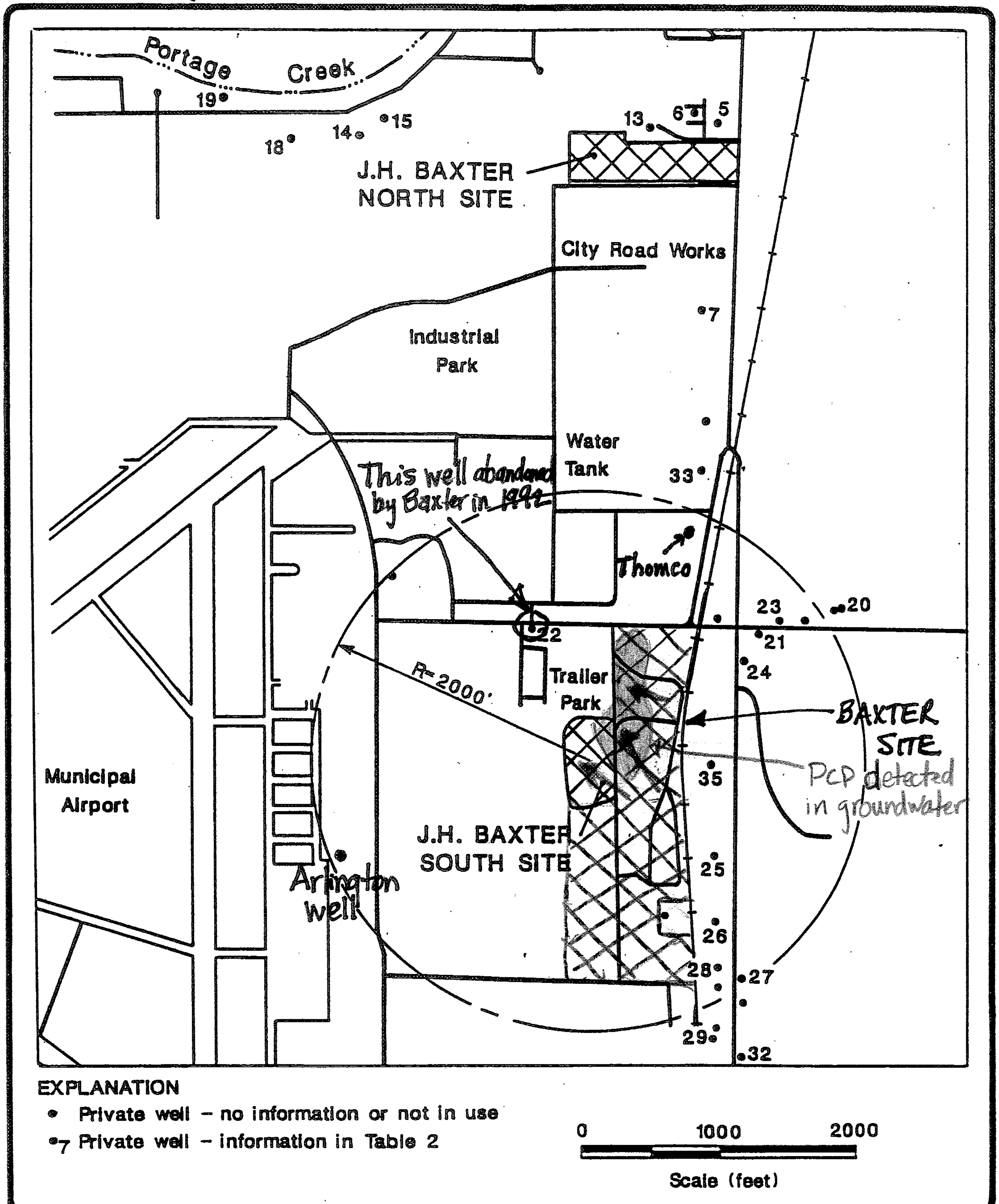
Table A-3 - Storm Water Analytical Data

Sample ID	Date	Pentachlorophenol in µg/L	PAHs in µg/L
Drain 13	3/1-4/30/98	435	84.8 U
Drain 13	5/1/-5/31/98	120	11.6 U
Drain 14	3/1-4/30/98	410	48.4 U
Drain 14	5/1-5/31/98	220	11.5 U
Drain 23	9/1-10/31/94	670	
Drain 23	11/1-12/31/94	400	
Drain 23	1/1-2/28/95	840	11.4 U
Drain 23	3/1-4/30/95	660	66.7 U
Drain 23	9/1-10/31/95	770	24.6 U
Drain 23	11/1-12/31/95	650	23.7 U
Drain 23	1/1-2/28/96	690	27.2 U
Drain 23	3/1-4/30/96	650	30.8 U
Drain 23	5/1-5/31/96	260	11.6 U
Drain 23	9/1-10/31/96	130	20.7 U
Drain 23	11/1-12/31/96	750	7.5 U
Drain 23	1/1-2/28/97	380	2.16
Drain 23	3/1-4/30/97	300	2 U
Drain 23	5/1-5/31/97	170	8 U
Drain 23	9/1-10/31/97	720	0.6 U
Drain 23	9/18/97	720	
Drain 23	11/1-12/31/97	350	48 U
Drain 23	1/1-2/28/98	250	
Drain 23	3/1-4/30/98	400	41.3 U
Drain 23	5/1-5/31/98	13	3.1 U
Drain 24	9/1-10/31/94	190	
Drain 24	11/1-12/31/94	150	
Drain 24	1/1-2/28/95	400	15.6 U
Drain 24	3/1-4/30/95	260	38.9 U
Drain 24	9/1-10/31/95	870	20.7 U
Drain 24	11/1-12/31/95	850	23.7 U
Drain 24	1/1-2/28/96	960	27.2 U
Drain 24	3/1-4/30/96	360	45.8 U
Drain 24	5/1-5/31/96	410	10.5 U
Drain 24	9/1-10/31/96	42	16.1 U
Drain 24	11/1-12/31/96	330	3.5 U
Drain 24	1/1-2/28/97	400	1.3
Drain 24	3/1-4/30/97	510	3.9 U
Drain 24	5/1-5/31/97	3.2	2 U
Drain 24	9/1-10/31/97	780	11.5 U
Drain 24	9/18/97	780	
Drain 24	11/1-12/31/97	490	49 U
Drain 24	1/1-2/28/98	550	1.1
Drain 24	3/1-4/30/98	370	18.2 U
Drain 24	5/1-5/31/98	15	0.2 U
Drain 25	9/1-10/31/94	34	
Drain 25	11/1-12/31/94	300	
Drain 25	1/1-2/28/95	740	17.9 U
Drain 25	3/1-4/30/95	52	10.6 U

Table A-3 - Storm Water Analytical Data

Sample ID	Date	Pentachlorophenol in μg/L	PAHs in μg/L
Drain 25	9/1-10/31/95	95	11 U
Drain 25	11/1-12/31/95	150	2.6 U
Drain 25	1/1-2/28/96	270	17.4 U
Drain 25	3/1-4/30/96	270	49.6 U
Drain 25	5/1-5/31/96	22	4.7 U
Drain 25	9/1-10/31/96	42	0.3 U
Drain 25	11/1-12/31/96	150	ND
Drain 25	1/1-2/28/97	300	2
Drain 25	3/1-4/30/97	270	1
Drain 25	5/1-5/31/97	0.8	
Drain 25	9/1-10/31/97	340	
Drain 25	9/18/97	340	
Drain 25	11/1-12/31/97	280	48 U
Drain 25	1/1-2/28/98	180	
Drain 25	3/1-4/30/98	150	4.1 U
Drain 25	5/1-5/31/98	120	1.6 U
Drain 30 (Dup)	9/18/97	88	
Drains 13/14	9/1-10/31/94	49	
Drains 13/14	11/1-12/31/94	160	
Drains 13/14	1/1-2/28/95	570	16.5 U
Drains 13/14	3/1-4/30/95	65	17.1 U
Drains 13/14	9/1-10/31/95	560	10.3 U
Drains 13/14	11/1-12/31/95	39.5	16.4 U
Drains 13/14	1/1-2/28/96	310	25.6 U
Drains 13/14	3/1-4/30/96	110	30.5 U
Drains 13/14	5/1-5/31/96	210	4.9 U
Drains 13/14	9/1-10/31/96	50.5	22.25 U
Drains 13/14	11/1-12/31/96	260	15.7 U
Drains 13/14	1/1-2/28/97	225	34.1
Drains 13/14	3/1-4/30/97	165	12.5 U
Drains 13/14	5/1-5/31/97	120	9.2 U
Drains 13/14	9/1-10/31/97	81	3.6 U
Drains 13/14	9/18/97	74	
Drains 13/14	11/1-12/31/97	260	62 U
Drains 13/14	1/1-2/28/98	135	15.8
Untreat. Wood	9/1-11/30/94	7	
Untreat. Wood	3/1-5/31/95	34	6.2 U
Untreat. Wood	9/1-11/30/95	18	4.2 U
Untreat. Wood	12/1-2/28/95	73	0.148
Untreat. Wood	3/1-5/31/96	30	3.5 U
Untreat. Wood	9/1-11/30/96	40	0.5 U
Untreat. Wood	12/1-2/28/96	64.5	4.3 U
Untreat. Wood	3/1-5/31/97	28	0.4
Untreat. Wood	9/1-11/30/97	18	
Untreat. Wood	12/1-2/28/97	42	3.5 U
Untreat. Wood	3/1-5/31/98	19	0.6 U
Untreat. Wood	12/1-2/28/98	27.7	0.3

APPENDIX B
BENEFICIAL USE SURVEY
BY SWEET-EDWARDS/EMCON
(1989)



Sweet-Edwards
EMCON
Edits by Hart Crowser

Figure 2
J.H. BAXTER LANDFILL
BENEFICIAL USE SURVEY
→ Groundwater Flow Direction

DATE
9–88
DWN/ APPR
TB/
PROJECT #

KUKER-RANKEN INC./106667

Table 1

DOMESTIC WELL DETAILS

Well #	Reported Owner	Approximate Ground Elevation (amsl)	Total Depth (ft)	Approximate Elevation of Piezo Surface (amsl)	Perf/ Screen Interval (ft)	Use	Remarks
1	G.P. Jenson 7811 204th Arlington	115	40	103	---	Not in Use	
2	G.P. Jenson Dairy Site	130	50	112	---	Not in Use	
5	M. Radler 19908 67th Ave NE	---	---	---	---	Domestic	No access to well
6	Mobile States (mobile home park) Mr. Shultz	127	---	87	---	Domestic	
7	G. Zachary 19604 67th Ave NE	145	70	92	60-70	Domestic	
8	Arlington Cemetary Association	119	77	76	73-77	Irrigation	Log* pH: 6.66 cond: 298 mmhos
9	The Petal Patch (flower shop)	---	---	---	---	Domestic	No access to well

Table 1 (cont.)

DOMESTIC WELL DETAILS

Well #	Reported Owner	Approximate Ground Elevation (amsl)	Total Depth (ft)	Approximate Elevation of Piezo Surface (amsl)	Perf/ Screen Interval (ft)	Use	Remarks
10	E.E. Donning Box 182 Arlington	94	---	74	---	Domestic	pH: 6.34 cond: 298 mmhos
11	Mrs. Sharp 6804 204th St N.E.	114	46	91	---	Domestic	
12	Mr. Willett "Cozy Heating" 20221 67th Ave N.E.	116	---	91	---	Not in use	
13	Mr. C. Osbourne 6511 199th St. N.E.	127	---	85	---	Domestic	
14	Mr. E. Experdal 5822 Cemetary Rd.	120	65	51	---	Domestic	
15	Mr. E. Maynard (next to #14)	---	---	---	---	Domestic	No access to well

Table 1 (cont.)

DOMESTIC WELL DETAILS

Well #	Reported Owner	Approximate Ground Elevation (amsl)	Total Depth (ft)	Approximate Elevation of Piezo Surface (amsl)	Perf/ Screen Interval (ft)	Use	Remarks
16	Mr. B. Hoggrath 6225 204th Pl N.E.	110	69	58	---	Domestic	
17	Mr. Gray 6115 204th Pl N.E.	110	69	58	60-69	Domestic	
18	Kim Hudnall 5530 Cemetary Rd.	117	---	65	---	Domestic	
19	Mr. Hans Bohn Cemetary Rd.	---	---	---	---	------	No access to well
20	Perry Erickson 6819 188th (Jehova Witness Church Site)	150	30	146	---	Domestic	
21	Mrs. McDonald 6722 188th	147	---	126	---	Domestic	
22	Bob Bertilson Airway Mobile Park	---	---	---	---	Domestic	No access to well

Table 1 (cont.)

DOMESTIC WELL DETAILS

Well #	Reported Owner	Approximate Ground Elevation (amsl)	Total Depth (ft)	Approximate Elevation of Piezo Surface (amsl)	Perf/ Screen Interval (ft)	Use	Remarks
23	Mrs. Livingstone 6803 188th	---	---	---	---	Domestic	No access
24	Shirley Kennedy 18705 67th Ave N.E.	148	---	132	---		
25	Loess Gildersleeve 18204 67th Ave N.E.	158	20	137	---	Domestic	Log*
26	Mr.Albert Kluin 18110 67th Ave N.E.	158	23	148	---	Domestic	
27	Mr. C. Engerseth 18007 67th Ave N.E.	---	---	---	---		Well filled in
28	Unknown	---	---	---	---	Domestic	Community Well - 3 houses
29	Sharon Christman 17722 1/2 67th Ave	140	---	129	---	Domestic	

Table 1 (cont.)

DOMESTIC WELL DETAILS

Well #	Reported Owner	Approximate Ground Elevation (amsl)	Total Depth (ft)	Approximate Elevation of Piezo Surface (amsl)	Perf/ Screen Interval (ft)	Use	Remarks
30	Unknown	---	---	---	---	Domestic	No access to well
31	George Seacome 1689 80th	---	---	---	---	Domestic	No access to well
32	Mr. S. Swanson 1689 67th Ave. N.E.	---	---	---	---	Domestic	
33	Mr. Kantzer 19120 66th Ave. N.E.	145	---	105	---	Domestic	
34	Mrs. Bogart 6121 172nd St. N.E.	125	---	119	---	Domestic	
35	HCI Steel Products Joe Holden	148	36	133	---	Domestic	

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* Notes: 1) Logs are available where noted
2) Wells not shown on Figure 3 are outside of the boundaries of the map

APPENDIX C
FIELD SAMPLING PROCEDURES AND LABORATORY QUALITY ASSURANCE PLAN

APPENDIX C
FIELD SAMPLING PROCEDURES AND LABORATORY QUALITY ASSURANCE PLAN

FIELD SAMPLING METHODS AND SAMPLE HANDLING

Sampling Procedures

Groundwater Samples. Aqueous samples will be collected in such a way to minimize turbidity. At least one casing volume of water will be purged from each well before sampling. When possible, low-flow sampling pumps will be used. During sampling, the following field parameters will be measured: pH, temperature, conductivity, and dissolved oxygen.

Soil Samples. At each sample location, soil from the appropriate depth interval will be collected with clean, stainless steel spoons and placed in clean, stainless steel bowls where the material will be homogenized. The material will be visually classified and recorded. The spoon will then be used to place soil into appropriate pre-cleaned sample jars.

Sample Labeling and Handling

Sample containers will be labeled at the time of sampling clearly identifying the project name, sampler's initials, sample location and depth, analysis to be performed, date, and time. Samples will be transferred with a completed chain of custody record to Columbia Analytical Services for analysis. The custody form will contain, at a minimum, sample identification, sampler's signature, date and time of sample collection, sample matrix, signatures of others in the chain of possession, and inclusive dates of possession.

Equipment Decontamination

Non-disposable sampling equipment will be cleaned between samples using the following steps:

- Scrubbing with brushes using an Alconox cleaning solution;
- Rinsing with potable water; and
- Rinsing with distilled/deionized water.

QUALITY ASSURANCE PLAN

This Quality Assurance Plan gives, in specific terms, the quality assurance and quality control objectives, organization, and functional activities associated with the sampling and analysis of groundwater and soil samples obtained during Remedial Investigation activities. Data collection is intended to produce data of sufficient technical quality to allow design and implementation of a effective and efficient remedial action.

Quality Assurance Organization and Responsibility

Project Role	Personnel Assignment	Responsibility
Project Manager	Lori Herman (206) 324-9530	Overall project review.
Project Quality Assurance Manager	Michael Ehlebracht (206) 324-9530	Ensure that all laboratory QA is performed in accordance with project plan.
Laboratory and Field Coordinator	Jeremy Porter (206) 324-9530	Coordinate all chemistry and chemical analyses for the project; Ensure that samples are collected and transferred to the laboratories under appropriate chain of custody procedures; Coordinate with Project QA Manager on issues concerning quality control and evaluate quality of the data.
Columbia Analytical Services	Mingta Lin (360)577-7222	Receive samples from Hart Crowser field personnel; Oversee performance of laboratory QA/QC on analysis and reporting.

Data Quality Objectives

Data quality objectives, including precision, accuracy (bias), representativeness, completeness, comparability, and data reporting limits are dictated by the project requirements and intended uses of the data. The data must be of sufficient quality. Ecology (1991) and EPA (1994b) were used to select the appropriate analytical levels, analytical methods, and QA/QC procedures for characterizing groundwater and soil quality to meet the intended data uses.

An assessment of data quality is based upon quantitative (precision, accuracy, and completeness) and qualitative (representativeness and comparability) quality assurance objectives. Definitions of these parameters and the applicable quality control procedures are given below.

Sensitivity (Reporting Limits). Reporting limits will be adequate to identify target analytes to compare results with site-specific cleanup criteria. Reporting limit goals for soil analyses are listed in Table C-1, and reporting limit goals for groundwater analyses are listed in Table C-2.

Precision. Precision measures the scatter in the data due to random error. Specifically, it is a quantitative measure of the variability of a group of measurements compared to their average values. Analytical precision is measured through matrix spike/matrix spike duplicate (MS/MSD) samples for organic analysis. Analytical precision is quantitatively expressed as the relative percent difference (RPD) between the MS/MSD or duplicates.

Accuracy (Bias). Accuracy measures the closeness of the measured value to the true value. Analytical accuracy is assessed by "spiking" samples with known standards (surrogates or matrix spikes) and establishing the percent recovery. Surrogate recoveries will be determined for every sample analyzed for organics.

Representativeness. Representativeness measures how closely the measured results reflect the actual concentration or distribution of the chemical compounds in the matrix sampled. The sampling plan design, sampling techniques, and sample handling protocols have been developed to assure representative samples.

Completeness. Completeness is defined as the ratio of acceptable (non-rejected) measurements obtained to the total number of measurements for an activity. The target completeness goal for this project is 95 percent.

Comparability. Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. The use of standard techniques for both sample collection and laboratory analysis should make data collected comparable to both internal and other data generated. Sample collection methods and other field methods are described above in the section titled 'Field Sampling Methods and Sample Handling'.

Laboratory internal quality control checks, performance evaluation standards, preventative maintenance, and corrective action will be implemented to help meet the quality assurance objectives established for these analyses.

Sample Handling Procedures

To control the quality of samples submitted for laboratory analysis, established preservation and storage measures will be followed. Table C-3 provides information on holding times, sample containers, and sample preservation requirements for soil and groundwater samples. Samples will be transported to the laboratory in a cooler cooled to 4°C using "blue ice."

Sampling activities will be documented in a field logbook. Field observations including field monitoring and visual and olfactory observation will be noted. The original field notes will be kept in Hart Crowser's project files and will be available for review upon written request.

Sample labels will clearly indicate the sample number, sampler's initials, date, and any pertinent comments. Labels will be filled out at the time of sampling. Sample identification numbers will be identified clearly in our field logbooks during sample collection.

A completed chain of custody form will be sealed in a ziplock bag. Custody records will be maintained for all samples recovered. This record will be signed by the sampler and others who subsequently hold custody of the sample. Specifications for analyses may also be made on the custody record.

Laboratory Custody Procedures. The samples will be shipped to laboratory as soon as possible to ensure that holding times are not exceeded. A designated sample custodian will accept custody of the shipped samples and verify that the chain of custody form matches the samples received. The sample delivery group of samples will be given a laboratory number and each sample will be assigned a unique sequential identification number that includes the laboratory case identification number.

The laboratory sample custodian is responsible for seeing that all samples are transferred to the proper analyst or stored in the appropriate secure area. The custodian distributes samples to the appropriate analysts. Laboratory personnel are responsible for the care and custody of samples from the time they are received until the sample is exhausted, disposed of, or returned to Hart Crowser. The laboratory will maintain an internal tracking system for samples that includes identification of sample custodians within the laboratory.

Laboratory Method Procedures

The laboratory methods used for this project, and the method detection limits or reporting limit goals for analyses of soil and groundwater samples are provided in Tables C-1 and C-2.

Chemical analyses of groundwater and soil samples will be performed by Columbia Analytical Services of Kelso, Washington. The address and contact of the project laboratory is listed below:

Columbia Analytical Services
1317 South 13th Ave.
P.O. Box 479
Kelso, WA 98626
(Contact Mingta Lin: [360] 577-7222).

Testing and analysis methods for this project (listed below) were selected on the basis of quantitation limits and the level of analytical quality control necessary to meet data quality objectives and intended data uses. The reporting limits are typically achieved by the laboratory methods listed below; however, matrix interference and dilutions may result in higher sample quantitation limits (SQLs) based on sample specific conditions.

Data Reduction, Review, and Reporting

All data will undergo two levels of QA/QC evaluation: one at the laboratory; and one by Hart Crowser.

Initial data reduction, evaluation, and reporting at the laboratory will be carried out as described in the appropriate analytical protocols and the laboratory's QA Manual. Quality control data resulting from methods and procedures described in this document will also be reported.

Minimum Data Reporting Requirements

The following describes the minimum data reporting requirements necessary to ensure sufficient reporting of analytical data to allow proper QA/QC reporting.

Sample IDs. Records will be produced that match samples with laboratory sample IDs.

Sample Receipt. Chain of custody forms will be filled out for all sample shipments to document problems in sample packaging, custody, and sample preservation.

Reporting. For each analytical method run, all analytes for each sample will be reported as a detected concentration or as less than the specific reporting limit. The laboratories will also report dilution factors for each sample as well as date of extraction (if applicable) and date of analysis. Standard data packages will consist of a case narrative, sample results, QA sample results, and chain of custody forms. Soil results (including non-detects) will be reported on a dry weight basis.

Internal Quality Control Reporting

Internal quality control samples will be analyzed at the rates specified in the applicable analytical method.

Laboratory Blanks. All analytes will be reported for each laboratory blank. All non-blank sample results shall be designated as corresponding to a particular laboratory blank in terms of analytical batch processing.

Surrogate Spike Samples. Surrogate spike recoveries will be reported with all organic reports where appropriate. The report shall also specify the control limits for surrogate spike results. Any out of control recoveries (as defined in the specified method) will result in the sample being rerun or the data will be qualified.

Matrix Spike Samples. Matrix spike recoveries will be reported for organic analyses. All general sample results will be designated as corresponding to a particular matrix spike sample. The report will indicate what sample was spiked. The report will also specify the control limits for matrix spike results for each method and matrix.

Laboratory Duplicates and/or Matrix Spike Duplicate Pairs. Relative percent differences will be reported for all duplicate pairs as well as analyte/matrix-specific control limits.

Laboratory Control Samples (LCS). When run for internal quality control, LCS results will be reported with the corresponding sample data. Control limits for LCS will be reported as specified.

Quality Control Procedures

Quality control procedures provide the means of controlling the precision and bias of the results. Adherence to established procedures for sample collection, preservation, and storage will minimize errors due to sampling and sample instability. Analytical and measurement systems must be in statistical control, which means that errors have been reduced to acceptable levels and then documented.

Laboratory Quality Control Procedures

The laboratories' quality control officer is responsible for assuring that all routine internal quality assurance and quality control procedures are implemented by the laboratory. The laboratory quality control procedures used for this project will consist of the following, at a minimum:

- Instrument calibration and standards as defined in EPA SW-846 Methods (EPA, 1994b);

- Laboratory blank measurements at a minimum frequency of 5 percent or 1-per-20 samples; and

- Accuracy and precision measurements as defined above, at a minimum frequency of 5 percent or 1-per-20 samples.

Preventative Maintenance Procedures

Field Preventative Maintenance

Preventative maintenance on field instruments and equipment will follow the operations manuals. Field meters, including pH, conductivity, and temperature probes, will be calibrated and maintained by Hart Crowser's equipment manager, as well as by appropriate field staff when in use. All routine maintenance will be recorded in instrument log books or directly on the instrument as appropriate.

Laboratory Preventative Maintenance

Preventative maintenance in the laboratory will be the responsibility of the laboratory personnel and analysts. This maintenance includes routine care and cleaning of instruments, and inspection and monitoring of carrier gases, solvents, and glassware used in analyses. Details of the maintenance procedures are addressed in the laboratory's Standard Operating Procedures and Methods manuals.

Precision and accuracy data are examined for trends and excursions beyond control limits to determine evidence of instrument malfunction. Maintenance will be performed when an instrument begins to change as indicated by the degradation of peak resolution, shift in calibration curves, decrease in sensitivity, or failure to meet one or another of the method-specific quality control criteria.

Data Assessment Procedures

The analytical data will be reviewed with regard to the following, as appropriate to the particular analysis.

- Sample custody;
- Holding times;
- Blank contamination;
- Reporting limits;
- Laboratory duplicate precision;
- Matrix spike and surrogate accuracy; and
- Completeness.

EPA Laboratory Functional Guidelines for Evaluating Organics and Inorganics Analyses (EPA, 1994a) will be used for evaluating data quality and assigning data qualifiers, as appropriate.

Reported analytical results will be qualified by the laboratory to identify quality control concerns in accordance with the specifications of SW-846 methods. Additional laboratory data qualifiers may be defined and reported in order for the laboratory to more completely explain quality control concerns regarding a particular sample result. Additional data qualifiers will be defined in the laboratory's narrative reports associated with each case.

Quality Assurance Reports

The final report for this project will include a summary of the data quality information gathered as part of this project. The report will include assessment of data accuracy and completeness, significant quality assurance problems, and recommended solutions.

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Table C-1 - Soil Analysis Method Reporting Limits

Analyte	Method	Method Reporting Limit in mg/kg	Method Detection Limit in mg/kg	MTCA Method B Soil Criteria (Groundwater Protection) in mg/kg
Polychlorinated Dibenzo-p-Dioxins/Furans	EPA 8290 (1)			
2,3,7,8-TCDD		0.000001	NA	0.0000000583
1,2,3,7,8-PeCDD		0.000005	NA	NA
1,2,3,4,7,8-HeCDD		0.000005	NA	0.00000141 (2)
1,2,3,6,7,8-HeCDD		0.000005	NA	0.00000141 (2)
1,2,3,7,8,9-HeCDD		0.000005	NA	0.00000141 (2)
1,2,3,4,6,7,8-HpCDD		0.000005	NA	NA
OCDD		0.00001	NA	NA
2,3,7,8-TCDF		0.000001	NA	NA
1,2,3,7,8-PeCDF		0.000005	NA	NA
2,3,4,7,8-PeCDF		0.000005	NA	NA
1,2,3,4,7,8-HeCDF		0.000005	NA	NA
1,2,3,6,7,8-HeCDF		0.000005	NA	NA
2,3,4,6,7,8-HeCDF		0.000005	NA	NA
1,2,3,7,8,9-HeCDF		0.000005	NA	NA
1,2,3,4,6,7,8-HpCDF		0.000005	NA	NA
1,2,3,4,7,8,9-HpCDF		0.000005	NA	NA
OCDF		0.00001	NA	NA
Polychlorinated Phenols	EPA 8151M			
2,4,6-Trichlorophenol		0.005	0.0007	0.795
Total Tetrachlorophenols		0.005	0.002	48 (3)
Pentachlorophenol		0.005	0.0007	0.0729
Polycyclic Aromatic Hydrocarbons	EPA 8270 SIM			
Naphthalene		0.005	0.0004	32
Acenaphthene		0.005	0.0002	96
Acenapthylene		0.005	0.0005	NA
Fluorene		0.005	0.0005	64
Phenanthrene		0.005	0.0008	NA
Anthracene		0.005	0.0006	480
Fluoranthene		0.005	0.0006	64
Pyrene		0.005	0.0008	48
Benz(a)anthracene		0.005	0.0007	0.0012
Chrysene		0.005	0.0006	0.0012
Benzo(b)fluoranthene		0.005	0.0008	0.0012
Benzo(k)fluoranthene		0.005	0.0006	0.0012
Benzo(a)pyrene		0.005	0.0005	0.0012
Dibenz(a,h)anthracene		0.005	0.0007	0.0012
Benzo(g,h,i)perylene		0.005	0.0005	NA
Indeno(1,2,3-cd)pyrene		0.005	0.0004	0.0012
TPH-D	NWTPH-Dx			
Mineral Spirits		25	4	NA
Jet Fuel as Jet A		25	4	NA
Kerosene		25	4	NA
Diesel		25	4	NA
Heavy Fuel Oil		100	10	NA
Lube Oil		100	10	NA
PHC as Diesel		100	4	NA
Non-PHC as Diesel		100	4	NA
Other Parameters				
SPLP Extraction	EPA 1312	NA	NA	NA
Grain Size	ASTM D422M	NA	NA	NA
pH	SM 9045C	NA	NA	NA
TOC	ASTM D4129-82M	0.01%	NA	NA

Notes:
NA Not Applicable
(1) Dioxin analyses will be subcontracted to Triangle Laboratories, Inc.
(2) MTCA Method B criterion for a hexachloro-p-dioxin mixture.
(3) MTCA Method B criterion for 2,3,4,6-tetrachlorophenol.

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Table C-2 - Groundwater Analysis Method Reporting Limits

Analyte	Method	Method Reporting Limit in µg/L	Method Detection Limit in µg/L	MTCA Method B Groundwater Criteria in µg/L
Polychlorinated dibenzo-p-dioxins/furans	EPA 1613 (1)			
2,3,7,8-TCDD		0.00001	NA	0.000000583
1,2,3,7,8-PeCDD		0.00005	NA	NA
1,2,3,4,7,8-HeCDD		0.00005	NA	0.0000141 (2)
1,2,3,6,7,8-HeCDD		0.00005	NA	0.0000141 (2)
1,2,3,7,8,9-HeCDD		0.00005	NA	0.0000141 (2)
1,2,3,4,6,7,8-HpCDD		0.00005	NA	NA
OCDD		0.0001	NA	NA
2,3,7,8-TCDF		0.00001	NA	NA
1,2,3,7,8-PeCDF		0.00005	NA	NA
2,3,4,7,8-PeCDF		0.00005	NA	NA
1,2,3,4,7,8-HeCDF		0.00005	NA	NA
1,2,3,6,7,8-HeCDF		0.00005	NA	NA
2,3,4,6,7,8-HeCDF		0.00005	NA	NA
1,2,3,7,8,9-HeCDF		0.00005	NA	NA
1,2,3,4,6,7,8-HpCDF		0.00005	NA	NA
1,2,3,4,7,8,9-HpCDF		0.00005	NA	NA
OCDF		0.0001	NA	NA
Polychlorinated Phenols	EPA 8151M			
2,4,6-Trichlorophenol		0.5	0.04	7.95
Total Tetrachlorophenols		0.5	0.09	480 (3)
Pentachlorophenol		0.5	0.07	0.729
TPH-Dx	NWTPH-Dx			
Mineral Spirits		250	20	NA
Jet Fuel as Jet A		250	20	NA
Kerosene		250	20	NA
Diesel		250	20	NA
Heavy Fuel Oil		500	30	NA
Lube Oil		500	30	NA
PHC as Diesel		500	20	NA
Non-PHC as Diesel		500	20	NA
TPH-G	NWTPH-G/BTEX			
Gasoline		250	NA	NA
Naphtha Distillate		250	NA	NA
Jet Fuel as JP-4		250	NA	NA
PHC as Gasoline		250	NA	NA
Non-PHC as Gasoline		250	NA	NA
BTEX	NWTPH-G/BTEX			
Benzene		0.5	0.2	1.51
Toluene		1	0.2	1600
Ethyl-benzene		1	0.2	80
Xylenes		1	0.5	16000
Other Parameters				
TSS	EPA 160.2	5	NA	NA

Notes:
NA Not Applicable
(1) Dioxin analyses will be subcontracted to Triangle Laboratories, Inc.
(2) MTCA Method B criterion for a hexachloro-p-dioxin mixture.
(3) MTCA Method B criterion for 2,3,4,6-tetrachlorophenol.

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Anchorage
2550 Denali Street, Suite 705
Anchorage, Alaska 99503-2737
Fax 907.276.2104
Tel 907.276.7475

Boston
100 Cummings Center, Suite 331G
Beverly, Massachusetts 01915-6123
Fax 978.921.8164
Tel 978.921.8163

Chicago
333 West Wacker Drive, Suite 700
Chicago, Illinois 60606-1225
Fax 312.750.4507
Tel 312.444.2991

Denver
274 Union Boulevard, Suite 200
Lakewood, Colorado 80228-1835
Fax 303.987.8907
Tel 303.986.6950

Fairbanks
1896 Marika Street, Unit 1
Fairbanks, Alaska 99709-5545
Fax 907.451.6056
Tel 907.451.4496

Jersey City
75 Montgomery Street, Fifth Floor
Jersey City, New Jersey 07302-3726
Fax 201.985.8182
Tel 201.985.8100

Juneau
319 Seward Street, Suite 1
Juneau, Alaska 99801-1173
Fax 907.586.1071
Tel 907.586.6534

Long Beach
One World Trade Center, Suite 2460
Long Beach, California 90831-2460
Fax 562.495.6361
Tel 562.495.6360

Portland
Five Centerpointe Drive, Suite 240
Lake Oswego, Oregon 97035-8652
Fax 503.620.6918
Tel 503.620.7284

Seattle
1910 Fairview Avenue East
Seattle, Washington 98102-3699
Fax 206.328.5581
Tel 206.324.9530

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