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Ching-Pi Wang
Washington State Department of Ecology
Northwest Regional Office
3190 160th Ave. S.E.
Bellevue, Washington 98008-5452

Re: Response to EPA Comments on the Draft RI Report
J-7026-02

Dear Ching-Pi:

This letter summarizes our responses to the comments provided to the Washington State Department of Ecology (Ecology) by the United States Environmental Protection Agency (EPA) on August 3, 2000, regarding the Remedial Investigation report (RI) for the J. H. Baxter Arlington (Baxter) site. The EPA comments were reviewed and discussed by Hart Crowser and Ecology on August 16 and 25, 2000. The responses given below are based on these discussions and are a joint effort on the part of Hart Crowser and Ecology. We understand you intend to forward these responses to the EPA.

SUMMARY

We appreciate EPA's efforts to review the RI for the Baxter Site, as the RI data are integral to other regulatory actions currently involving the site. It was apparent, however, that not all of the background data were available to EPA, as EPA was not involved in the investigation planning effort. As an overview then, to the comment responses, it is important to understand the following:

- The purpose of this RI was a focused investigation to evaluate the potential sources to observed groundwater contamination and to identify contamination issues that need to be addressed. It was not intended to be a comprehensive, detailed study of general site conditions.

- Considerable amounts of site characterization data were collected between 1988 and 1999, prior to the RI. These data primarily included quarterly groundwater sampling at eight wells, stormwater sampling at five Parcel A French drains, and a composite sample of nine Parcel B French drains. Other limited surface soil and subsurface soil data were

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available as a result of Baxter's closure of a woodwaste landfill and Baxter's investigation of a 1990 butt tank overflow. These data were evaluated and the relevant data summarized in the Work Plan (Hart Crowser, 1999). We believe that many of the data gaps identified by the EPA have been addressed by earlier site investigations and monitoring programs which are summarized in the Work Plan. As indicated in the RI report introduction, not all of the data presented in the Work Plan were repeated in the RI report. A copy of the Work Plan was provided to the EPA during the meeting with Baxter on August 17, 2000; and

- The RI document was intended as an Interim RI report. Per the 1998 schedule of coordinated MTCA and NPDES activity a follow-on investigation to fill in data gaps identified in the RI was planned to follow this report. The Scope of Work for the follow-up investigation, to be finalized with Ecology, will address other issues identified by EPA as discussed in the Response to Comments below, including further characterization of site sources and off-site migration of contaminants.

RESPONSE TO COMMENTS BY RENE FUENTES

General Comments

1. Line 1 to 10

Site data collected prior to 1999 are summarized in the Work Plan. The RI focuses on presenting the data obtained during the RI field investigation, but analyzes all available historical data to develop a conceptual model and identify contaminant sources.

1. Line 10 to 24

The purpose of the RI was to investigate potential areas of concern and identify sources of PCP to groundwater. The following three sources were identified:

- A NAPL mixture of PCP and oil in the subsurface near the former butt treating tank;
- A NAPL mixture of PCP and oil in the subsurface in the Main Treatment Area around boring SB-6; and
- PCP-contaminated surface soils, from which stormwater leaches PCP before reaching groundwater.

The data analysis presented in the RI indicated that the primary contributing source of PCP to groundwater is the subsurface NAPL. Follow-up investigation will further characterize the nature and extent of each identified source.

2.
Large variations in PCP concentrations were observed near the source area; however, contaminant concentrations downgradient of sources are typically more spread out. Non-detect concentrations of PCP at wells BXS-2, MW-2, and HCMW-7 bound the downgradient area potentially affected by the groundwater plume. However, additional off-site and on-site characterization is planned for the follow-up investigation.

3.
Well screen lengths are 20 feet to account for the 15-foot seasonal variation in water levels. Wells are placed so the screened interval is across the water table to allow assessment of LNAPL since the treating solution is 95 percent aromatic oil. Subsurface occurrence of PCP is associated with the LNAPL carrier oil, which accumulates at the top of the water table. Infiltrating stormwater will also enter the water table at the top. Therefore, the highest contaminant concentrations are expected to be near the water table surface.

Although PCP does have a specific gravity much greater than water, PCP is a solid in pure form at atmospheric conditions. PCP in solid form will not migrate through the subsurface. High concentrations of PCP in subsurface soil have only been observed in connection with the petroleum carrier oil, in which PCP is dissolved for site use. The PCP/carrier oil solution is an LNAPL, as described in the memo included as Attachment A, and thus will accumulate at the top of the water table. This LNAPL is what was identified in the RI at boring SB-6 and underneath the butt treating tank. LNAPL has not been observed in any of the existing monitoring wells. Installing monitoring wells in the areas of LNAPL observation and measuring LNAPL thickness will be part of the follow-up investigation.

4.
Groundwater level data have been collected quarterly at site monitoring wells since 1990 and these data are presented in Table 2 of the RI. The direction of the groundwater gradient has been consistent in each season and over each year. Site groundwater contours are also consistent with the regional aquifer groundwater flow to the northwest, as exhibited in a relatively recent regional groundwater study conducted by the USGS for western Snohomish County (see Attachment B map excerpts). Furthermore, the consistency in flow direction measured at the site is typical for moderately permeable aquifers such as those at the Baxter site.

A localized deviation from a uniform northwest groundwater gradient is identified in the Main Treatment Area; however, the overall pattern is still northwest as would be expected based on both regional and local hydrogeologic conditions (i.e., recharge and discharge boundaries). The localized deviation in the treatment area is planned to be further

characterized by additional monitoring wells installed in the follow-up investigation. PCP has not been detected in wells along the southern boundary of Parcel A (see data for BXS-4, HCMW-5, and BXS-3), again in quarterly sampling for over 6 years. These data, plus any data on a viable source to groundwater in the south facility area, indicate that the groundwater PCP plume does not extend to the south of Parcel A.

5.

The rationale for selecting sampling locations and method of collection are described in the Work Plan for the RI, and are summarized in Table A-1 of the RI, which is included as Attachment C. There are always additional data that can be collected and, in hindsight, locations where a permanent monitoring well would have been useful for repeated groundwater quality sampling. There were, however, specific purposes for soil sampling from every boring and the data were used for developing the site conceptual model. For example, SB-4 was installed next to the Treated Pole Storage Yard drainage ditch to evaluate the impact of infiltrating stormwater on soil and groundwater. Low concentrations of PCP detected in soil throughout the soil column (0.024 mg/kg) and in groundwater (1.2 ppb) at SB-4 suggest that stormwater contributes to subsurface occurrence of PCP, but is not a major contributor to the PCP concentrations measured in groundwater at MW-3 and BXS-1.

Stormwater samples are analyzed as part of an ongoing NPDES monitoring program. French drain stormwater samples from Parcel B (the Untreated Pole Storage Area) are composited before analysis as outlined in the NDPES permit requirements. To evaluate the impact on groundwater of stormwater infiltrating through French drains, monitoring well HCMW-5 was placed downgradient of french drains 25 and 26. The other Parcel A french drains are in areas in which groundwater is potentially impacted by Main Treatment Area NAPL sources, and thus would not provide as clear a measure of french drain contribution.

Screen lengths are long because of the large seasonal variation in water levels at the site, as explained above in the response to comment 3.

A quarterly monitoring program of site monitoring wells using consistent sampling techniques has been in place for the last ten years. Beginning in December 1999, dedicated well pumps are being phased in so that low-flow sampling techniques may be used which provide more representative samples of true groundwater quality.

6.

The groundwater gradient at the site and in the general area has been well characterized as flowing to the northwest, as explained above in the response to comment 4. Data from Parcel B monitoring wells indicate that groundwater from Parcel B flows also to the

northwest (see Cross Section A-A', Figure 6 of the RI - Attachment D). PCP has not been detected in wells to the south, southeast, or southwest of the observed area of groundwater contamination. There is no evidence of southward migration of groundwater or groundwater contaminants from either Parcel A or the Woodwaste Landfill.

The quote referenced from the AKART Study was a generalized comment that did not include any analysis of the site groundwater data. Review of the completed Quilceda Basin study indicates that the site is included within the Quilceda Creek surface water basin because the drainage ditch east of the site eventually flows into the creek. The east site ditch is 2 to 3 feet deep, while the shallowest depth to water (MW-4 at south site boundary) is over 10 feet. Clearly, the surface water divide and the groundwater divide are not coincident at this site. Furthermore, the site groundwater flow direction data are consistent with the regional groundwater flow analyses completed by the USGS for both the Qvr and Qva aquifers (see Attachment B).

See also comment 4 response.

7.

All historical records were reviewed and interviews of staff made to evaluate past spills. Explorations were made in all known or potential areas for spillage. In addition, Parcel A French drains as a potential source of groundwater contamination were thoroughly investigated in the RI. Well HCMW-5 was installed downgradient of drains 25 and 26 and groundwater was sampled twice. Boring SB-3 was located downgradient of drain 24 (BXS-1 and BXS-2 are also downgradient of this drain) and boring SB-4 was located downgradient of drain 23 and within the infiltration zone of the principal stormwater drain ditch within Parcel A. Drains 13 and 14 are not actual drain fields, but are catch basins piped to this drainage ditch. All other french drains are located on Parcel B away from treatment operations and treated materials. The rationale behind placement of each boring, well, and surface soil sample are provided in the Work Plan and in Table A-1 of the RI (Attachment C).

In addition, there are monitoring wells that completely surround the detected groundwater contamination and all identified spill areas.

8.

Wells installed in the RI were placed with specific investigative purposes (see Table A-1 of the RI, Attachment C). A follow-up investigation is planned that includes installing an additional off-site well to more narrowly define the extent of off-site migration of the PCP plume.

The only two wells exhibiting PCP concentrations consistently above the MCL (MW-3 and BXS-1) are part of the same plume, and are located adjacent to each other. Although low PCP concentrations were seen in at MW-2, these may be an artifact of the prior sampling methodology as recent PCP sampling has been non-detect at MW-2. In any case, the site conceptual model presented in the RI indicates that surface infiltration through the drainage ditch can result in low but detectable PCP groundwater concentrations at the MW-2 location.

9.
All available site data prior to 1999 were collected and summarized in the Work Plan, which has now been provided to EPA (although had not at the time of their RI review). The conceptual model presented in the RI includes use of all available data, and we understand the conceptual model to be consistent with previous investigations including the Site Hazard Assessment report and the Woodward-Clyde study. PCP concentrations have consistently been low at MW-2, moderate at BXS-1, and high at MW-3 (See Figure 11 of the Work Plan, Attachment E). PCP is not detected in other site wells.

It can be argued that the extent of PCP contamination at the site is not completely characterized. Therefore the follow-up investigation is planned to more precisely delineate both on- and off-site contamination.

10.
PCP will breakdown as you've indicated, and breakdown products of PCP will depend on the pathway of degradation, as follows:

- Anaerobic biodegradation results in tetra-, tri-, di-, and monochlorophenols. These breakdown products are more easily degraded than PCP, and have generally not been detected in site groundwater. Tetrachlorophenol has been detected below MTCA Method B cleanup levels in samples from the LNAPL area that contain high PCP concentrations; however, tetrachlorophenol is also present in the PCP treating solution. The toxicity of these breakdown products is less than that of PCP.

- Aerobic biodegradation results in tetra-, tri-, and dichlorohydroquinones. The toxicity of these compounds is not known, and the rates of biodegradation are not well characterized; however, breakdown products of dichlorohydroquinones are too short lived to be detected in lab experiments. It is likely that hydroquinones are more easily biodegraded than PCP. Chlorohydroquinones are not analytes in any EPA analytical methods, which makes it difficult to evaluate.

Conventional parameters and ions have been monitored in site groundwater for the past ten years, and these data are presented in the work plan. Differences occur in water chemistry upgradient of the Main Treatment Area, downgradient of the Main Treatment Area, and downgradient of the Woodwaste Landfill. To date, our review of these data indicate that these conventional data fit into the conceptual model of the site as outlined in the RI.

11.
A discrete sample of LNAPL has not been collected for chemical analysis since existing monitoring wells do not contain LNAPL. LNAPL will be sampled in the follow-up investigation if observed. The report breaks out the occurrence of chemicals in each medium sampled (surface soil, subsurface soil, groundwater, and surface water). Tables 8 through 11 of the RI (Attachment F) summarize the occurrence of chemicals in each medium. Figures 11 through 24 attempt to graphically represent the chemicals found in each of the media as well as the overall conceptual model of the site conditions.

12.
Site features and locations of all soil borings and monitoring wells were surveyed to state-plane coordinates, and their location on the map are an accurate representation of their true location relative to the property boundary. The data as presented allow for accurate calculation of distances to off-site features. Elevations are relative to a site datum. The surveyor was Clark Leeman Land Surveying of Everett, WA. 425-259-6072.

13.
At this point we don't see a reason to revise the Draft RI. Additional explorations will be conducted and a final RI will follow the data collection effort.

Specific Comments

14.
The report discusses surface soil, subsurface soil, and groundwater separately. LNAPL was observed to be present in soil, but was not discretely sampled during the RI. The aqueous phase of groundwater samples that were collected beneath the butt treating tank (where LNAPL was observed) was analyzed. The high TPH concentrations in these samples are likely due to the high turbidity of these samples and perhaps lack of complete separation of the aqueous and LNAPL phases. Characterization of the LNAPL is planned as part of the follow-up investigation.

15.
The third parcel is referred to as the Woodwaste Landfill, not Parcel C. The woodwaste landfill is located to the west of the south half of Parcel A.

16.
The scope of work for the RI was designed to investigate the potential sources of contamination to groundwater at the site, not to fully characterize all site conditions. Further characterization of located sources will occur in the follow-up investigation.

17.
As described in the work plan, approximately 2,000 gallons of PCP treating solution were spilled in the 1990 event, with most of it recovered. Contaminated materials were disposed of off site. Waste disposal documentation will be included in the final report as available.

18.
The location of the butt treating thermal tank was determined through interviews with site workers and scaled using aerial photographs. Maps provided in the RI are scaled as accurately as aerial photography allows. Boring SB-8 was located adjacent to the tank on the downgradient side to evaluate this as a potential source. Baxter's plant personnel, who worked there when the thermal tank was used, assisted in the location.

19.
There is no runoff at the site because there is a storm drain system and because of the local hydrogeologic conditions. Precipitation not included in recharge is essentially lost to evaporation, although our text on pg. 5 used the word evapotranspiration to describe this loss. We did an annual water balance for the site, as we felt this sufficient to get a sense of the recharge rate. If we assumed a month-to-month balance and allowed for very little evaporation during the rainy season, we would get a dilution of the existing groundwater contamination, thus using the annual balance approach is somewhat conservative. However, as can be seen by the sensitivity analysis in Appendix C, Table C-3, doubling or halving the infiltration rate does not effect the concentrations calculated by the fate and transport modeling. Further, detailed studies of the Snohomish County groundwater by the USGS, indicate similar recharge rates.

20.
We have used the site flow rate data to estimate the extent of the PCP plume, in conjunction with empirical data, and fate and transport modeling. The MULTIMED model provides an estimate of plume extent at steady-state using site groundwater flowrate estimates. Using this steady-state model without biodegradation provides the most

conservative estimate of plume extent. The empirical data (non-detectable PCP concentration at BXS-2, MW-2, and HCMW-7) show a much lesser plume extent than that predicted purely by hydrogeologic data.

21.
The lag time estimates come from water elevation data presented in the Work Plan (which EPA now has). See also Attachment J. Direct surface infiltration and French drain infiltration both contribute to recharge. In the French drains, water enters the ground at a depth of 4 feet below ground, and must infiltrate through another 30 feet of soil before reaching the water table. Thus, the French drains do not provide a much faster pathway to the water table than direct infiltration. The time lag estimates are based a comparison of peak precipitation levels and peak water levels. It is quite common in recessional outwash deposits such as these to see some time lag, as it often takes several months to wet the sands and gravels in the unsaturated zone and produce a wetting front.

22.
MTCA Modified Method B cleanup levels for soil are based on residential cleanup levels for groundwater. The modification of Method B cleanup levels refers to using site-specific data to determine parameters such as K_{OC} and organic carbon content. They represent soil concentrations at the site that will result in residentially acceptable concentrations of contaminants in groundwater. The MCL of 1 ug/L is the screening level applied to groundwater.

23.
All monitoring wells have been monitored for LNAPL, and no LNAPL has been observed. Dissolved-phase oil has also not been detected in these wells, indicating that the extent of LNAPL occurrence is limited, and LNAPL is not migrating away from the source areas. The source areas in which NAPL have been observed will be further characterized in the follow-up investigation. The estimated subsurface extent of the Oil/PCP mixture is confined to the source areas shown on Figure 20 of the RI (Attachment G). Dioxin has been found in site, and may occur in areas of LNAPL occurrence. LNAPL will be sampled as possible in the follow-up investigation and will be analyzed for dioxin.

24.
The sheen observed in soil samples evidenced an LNAPL, which will occur in the smear zone of water table fluctuation. Therefore the extent of LNAPL contamination can be estimated by the water table history, as shown on Figure 13 of the RI (Attachment G). Also, as discussed in Attachment A, oil particles are expected to migrate upward once in the

water table. The follow-up investigation will further delineate the vertical extent of PCP contamination in these source areas as needed.

25.
The PCP concentration at MW-2 has been monitored quarterly for the past 10 years as summarized in the Work Plan and shown in Attachment E.

26.
We agree that PCP associated with suspended solids in groundwater samples indicates that the PCP has been transported by groundwater flow, as it does not occur naturally at detectable levels. Sampling and testing of the dissolved constituents in groundwater is the preferred means of identifying what is transported in groundwater. Sampling of the soil is the preferred means to measure contaminant absorption by the soil for contaminants transported to the groundwater. In some cases, collection of groundwater grab samples during drilling is a quick way to look at the soil/water matrix, although we believe it is not an accurate representation of the true groundwater quality.

27.
The existence of PCP in the soil is most likely from past site operations, as stated in previous response. However, since only dissolved-phase PCP will be transported off site in groundwater, PCP associated with solids in groundwater samples should not be included when comparing PCP concentrations to the groundwater cleanup level.

28.
Biodegradation rates were determined to explain why PCP concentrations decrease downgradient of the source area faster than the model predicts without biodegradation. The rates are not intended to be robust values but aid in the conceptual model of the site. The model supports the conclusions drawn based on empirical data; namely, that storm-water/surface water infiltration may result in low PCP concentrations in groundwater, but subsurface NAPL sources are likely the most significant contributors to the PCP concentrations measured in monitoring wells BXS-1 and MW-3. Future investigations will rely on collecting empirical data to characterize site conditions and determine necessary actions.

For a discussion on byproducts produced by biodegradation of PCP, see the response to comment 10, above.

29.
The well survey, field data, and modeling predictions all indicate that PCP migration in groundwater does not threaten any potential human or ecological receptors. We will install an additional off-site well in the follow-up investigation.

30.
All water supply wells, to the best of our knowledge, are included on Figure 3 of the RI. Table 1 has a list of well locations, information, and how and when each well was inventoried. These are included in Attachment I.

Regional hydrogeologic data summarized on Figures 3 and 4 of the RI and a Snohomish County groundwater study (Attachment B) support the likelihood of discharge to Portage Creek. Portage Creek acts as a hydrogeologic boundary to groundwater flow so impacts to wells on the other side of the Creek would not be an issue. The Snohomish County Quilceda/Allen Basin Watershed Study indicates that surface water near the site may flow into Quilceda Creek; however, regional and site groundwater data clearly indicate flow from the site to the northwest toward Portage Creek.

Discharge of the PCP plume does not appear to be a concern because Portage Creek is located over 3,000 feet from the site, and PCP is not detected in monitoring well HCMW-7, only 300 feet from the site. An additional well will be installed in the follow-up investigation to confirm the limits of the groundwater plume.

31.
PCP is stored as a solid in the Penta Storage shed in a contained area. The shed does not contain PCP in a form that is mobile in the subsurface. Well BXS-1 is located close to the shed and groundwater in this well is monitored quarterly. PCP detected in this well appears to be related to PCP detected in groundwater upgradient of the Penta Storage Shed. An additional well west of the retorts is planned for the follow-up investigation as part of characterizing the Main Treatment Area sources.

32.
Although BXS-4 and MW-4 are screened farther below the water table than other site wells, they are screened at similar elevations as the other wells. There are no potential sources of PCP in the areas of these two wells. BXS-4 could not be screened higher due to the presence of a confining silty clay layer. Although screened deeper below the water table, these wells are still within recessional outwash aquifer as evidenced by blow count data and density estimated made during drilling. Also, they are obviously hydraulically upgradient as evidenced by consistently higher groundwater elevations.

PCP concentrations detected at the site are not compared to background concentrations. The background concentration of PCP is assumed to be zero.

33.
Ten years of quarterly groundwater monitoring has provided a consistent measure of groundwater elevation and gradients. Seasonal variations are well characterized, and consistent year to year and in general relation to variations in precipitation seen during this period of time. Table 2 of the RI provides the available groundwater elevation data and Figure 6 of the Work Plan show seasonal variation of water levels relative to precipitation. These are included in Attachment J.

Source-area (i.e., NAPL) monitoring wells are planned to be installed during the follow-up investigation.

34.
The K_{OC} correlation for PCP concentrations less than 10 mg/kg in soil was calculated using a standard least squares method of linear fitting, and agrees with the K_{OC} calculated from groundwater/soil concentrations (Table 4 of the RI). The correlation was used to predict a site-wide average leachate concentration for fate and transport modeling. A lower K_{OC} value would predict leachate concentrations that do not agree with the SPLP data.

RESPONSE TO COMMENTS BY JULIUS NWOSU

General Comments

1.
The PCP concentration of 150 ppb detected in May 1990 was at well BXS-1; all subsequently detected concentrations of PCP at this well have been significantly lower. The RI does not state that the PCP plume is only confined to within the site boundaries. It is unclear what data are lacking for the northeast (sic?) corner of the site. An additional off-site well, planned for the follow-up investigation, will further delineate the PCP plume to the northwest of the site.

2.
French drains are identified as a potential contributor to groundwater PCP concentrations in the RI, but our analysis indicates that the major contributor is due to the LNAPL. The analysis acknowledges stormwater contribution but focuses on the apparently greater

LNAPL contribution. Remedial alternatives being considered as part of the RI/FS process address both LNAPL and stormwater pathways.

The active wells in the site vicinity are not downgradient of the site. Figure 3 of the RI, which shows regional well locations, has been revised to include the area groundwater flow direction and is presented in Attachment K.

3.
The existence of attenuation is also supported by the decrease in PCP concentrations between on-site wells. Wells installed in the Main Treatment Area during the follow-up investigation will better characterize the change in PCP concentration downgradient of the source area. Another off-site well will also be installed in the downgradient direction from the site.

4.
Comment acknowledged. The detected groundwater dioxin concentrations will be the basis for groundwater risk management at the site. If measured dioxin concentrations are due to dioxin associated with suspended solids, this represents dioxin that is not mobile and will not be transported off site. Therefore, only freely dissolved dioxin concentrations should be compared to the groundwater screening level. We conducted this analysis to show that the detected concentration may be due to solids content, but without a solids-free groundwater sample we recognize that the detected concentration of dioxin at MW-2 does exceed the screening level and will have to be addressed.

Specific Comments

1.
We agree it is appropriate to use residential cleanup standards for groundwater. Groundwater cleanup standards are residential due to the use of the aquifer. It is also appropriate to use residential cleanup standards for soil in regards to protection of groundwater. However, since the Baxter property and all surrounding properties are zoned industrial, it is appropriate to use industrial cleanup levels for direct contact of soil at this site.

2.
The intent of the scope of work was agreed to by Ecology in an Agreed Order. The Agreed Order identifies the focus of this investigation to be on identification of PCP sources to the groundwater contamination observed beneath Parcel A. Long-term groundwater quality data were reviewed to identify the area(s) of groundwater concern and the investigation

thus focused. The scope of work addressed both previously identified and potential contaminant issues and sources and assumed paving as a presumptive remedy for surface soil and stormwater contributions (see Agreed Order). This DRI was intended to be an Interim report with a second phase of investigation. We intend to conduct a follow-up investigation to more thoroughly explore contamination issues identified in the interim RI.

3.
The 1990 butt treating tank spill consisted of PCP dissolved in the carrier oil, and occurred when the tank boiled over. The Snohomish County Health District report is provided in Attachment L.

4.
The areas initially identified as potential 'stained soil areas' in the Work Plan (recently provided to EPA) were reviewed with site employees and analyzed by an experienced aerial photography interpreter. Aerial photographs showed these areas to be darker than surrounding land but gave no indication of staining or any processes in the area that would result in staining. These areas were identified on aerial photographs during a period of operation (1967) in which poles were observed but no treating operations were apparent. Monitoring well HCMW-5, located downgradient of the southern area, did not indicate any contamination.

5.
The mobile home park well was sampled in 1990 prior to decommissioning and PCP was not detected (Attachment M). No chemical data prior to 1990 for this well are known.

6.
The wells on the eastern edge of the Baxter property are upgradient of the site. Several of the wells located in the 1988 survey no longer exist as their sites have been redeveloped. Figure 3 and Table 1 in the RI provide the most current well survey information.

The PCP concentration detected at MW-4 in April 1995 is below the MCL, and is the only PCP detection in 22 sampling events. Groundwater does not flow to the east from the site under any conditions. Monitoring wells MW-4 and BXS-4 are on the south and north sides of the Loughnan property, respectively, and indicate that any groundwater flowing onto this property from Baxter does not contain PCP. The Loughnan property well has been abandoned and this property is currently connected to city water.

7.

HCMW-7 was installed north of BXS-1 and MW-3 to bound the plume to the north. We will add an additional off-site well in the follow-up investigation.

8.
Wells BXS-1, -2, -3, MW-3, and MW-2 are located along the northwest site boundary. Well HCMW-7 is located off site to the northwest. We will add an additional off-site well in the follow-up investigation.

Southwesterly flow of contaminated water from the butt tank source area to the southern part of the site is unlikely given data collected HCMW-5 and the groundwater grab samples at SB-2 and SB-8. Groundwater potentially migrating to the south of the site would originate from the southern portion of Parcel B, which is not the site of treatment processes, chemical handling, treated materials, or any other known contaminant source. Regional groundwater flow around the Baxter site is to north and northwesterly directions. Groundwater recharge to Quilceda Creek occurs well to the south of the site (Attachment B). Groundwater anomalies in the Main Treatment Area will be further investigated in the follow-up investigation; however, all current evidence provides no reason to further characterize groundwater conditions in the southern portion of the site.

9.
See response to comment 22 of Rene Fuentes. Modified MTCA Method B levels are calculated to be protective of groundwater at a residential groundwater cleanup level. The MCL of 1 ppb is used as the groundwater screening level at the site.

10.
See comment 9, above.

11.
We can modify our comment in the final RI. The arithmetic and lognormal average PCP concentrations for surface soil are presented in the RI for comparison purposes. Screening levels presented in the RI are based on modified Method B cleanup levels (see comment 9, above) and use site-specific values of organic carbon content and K_{OC}. Using the lognormal average PCP concentration provides an estimate of average PCP concentrations in surface soil in Parcel A. The average surface soil PCP concentration is used to for modeling purposes to determine an average PCP concentration in surface water from leaching, using the SPLP data. These comparisons and summaries are used for screening the data. Cleanup levels will ultimately be determined in the Cleanup Action Plan.

12.
The EPA guidance screening levels for dioxins were provided for comparison only. Cleanup levels for this site will be determined in the Cleanup Action Plan.

13.
Evidence that leachate from the Treated Pole Storage Yard does not significantly impact groundwater is provided by data from boring SB-4, on-site well HCMW-6, and off-site wells MW-2 and HCMW-7. In hind sight, a well at the SB-4 location would have been valuable, however, an additional off-site well will be installed in the follow-up investigation to further evaluate this area as a potential source.

14.
Only total PCP concentrations are measured in stormwater samples. PCP concentrations detected in highly turbid samples do not indicate the true dissolved concentration of PCP, and therefore do not represent the dissolved concentration in infiltrating surface water once solids have been filtered out. The correlation between turbidity and PCP concentration provides an estimate of the dissolved concentration.

15.
We agree that the existence of turbidity in groundwater samples does not discount the measured PCP concentrations; however, groundwater samples containing low concentrations of suspended solids (as collected by low-flow sampling) are more representative of dissolved PCP concentrations.

16.
We agree that the PCP and dioxins detected at MW-2 are likely related to site operations.

17.
Our comments may be too strongly stated but our concept was that biodegradation is likely occurring. Our conceptual model indicates that stormwater may contribute to PCP concentrations in the groundwater, but the contribution relative to the LNAPL is likely small. PCP concentrations at MW-2 and BXS-1 have declined in the last 10 years (see Attachment E), indicating that the plume is not growing larger and may be shrinking.

Out of the 11 monitoring wells at the site, only wells MW-3 and BXS-1 have PCP concentrations consistently above screening levels. Well MW-2 typically contains low concentrations of PCP that fluctuate slightly above and below screening levels. PCP is consistently not detected or detected below screening levels at the other 8 wells at the site. Many of these wells have been monitored quarterly for the past 10 years. These data should not be discounted as limited or unrepresentative.

The model results do not prove that biodegradation is occurring at the site; thus, we will revise the fourth sentence on p. 26 of the DRI to read 'Therefore it is likely that biodegradation of PCP is an important attenuation factor.'

18.
The well inventory indicates that no drinking water supplies are downgradient of the site. Although we don't think that off-site groundwater supplies are being impacted, an additional off-site well will be installed in the follow-up investigation to further examine downgradient transport of contaminants.

19.
Table 9 was erroneously cited on page 18. This will be changed to Table 10 in the final report.

Sincerely,

HART CROWSER, INC.

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JEREMY PORTER
Senior Staff Engineer

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LORI HERMAN
Project Hydrogeologist

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Attachments:
Attachment A - Density of NAPL
Attachment B - Regional Groundwater Flow from USGS (1997
Attachment C - Summary of Explorations and Samples Analyzed
Attachment D - Groundwater Flow Along Cross-Section A-A'
Attachment E - PCP Concentrations at Site Monitoring Wells
Attachment F - Summary of Analytical Results - Surface Soil, Subsurface Soil, Stormwater and Groundwater
Attachment G - NAPL Extent in Subsurface and PCP Concentration in Groundwater
Attachment H - Estimated Seasonal Water Table Fluctuation at the Butt Tank
Attachment I - Summary of Active Water Wells near Site
Attachment J - Water Elevation Data
Attachment K - Groundwater Flow Direction and Area Well Locations
Attachment L - Snohomish County Health Department Field Notes - 1990 Butt Tank Spill
Attachment M - Mobile Home Park Well Chemical Results
Attachment N –Comments on J.H. Baxter Remedial Investigation Report Draft, dated March 10, 2000

cc: Georgia Baxter, J. H. Baxter

ATTACHMENT A
DENSITY OF NAPL

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Delivering smarter solutions

MEMORANDUM

Anchorage
Boston
Chicago
Denver
Fairbanks
Jersey City
Juneau
Long Beach
Portland
Seattle

DATE: September 14, 2000

TO: Lori Herman

FROM: Jeremy Porter

RE: Density of NAPL Present at the Arlington Baxter Site
J-7026-02

This memorandum discusses the properties of non-aqueous phase liquids (NAPLs) present at the Baxter site in Arlington, Washington. The evidence suggests that only light NAPLs (LNAPLs), which float on top of water, are in the subsurface, and that site groundwater is not contaminated by NAPLs at depths greater than that of the seasonal water table fluctuation. The rationale for this conclusion is outlined below.

NAPLs Used at the Site

The NAPL used in site operations consists of PCP dissolved in a diesel-range aromatic carrier oil. The carrier oil density is 0.91 g/mL, which is less than the density of water. The density of the PCP/oil solution will vary based on the concentration of PCP in the oil. The treating solution used at the site is between 5 and 6 percent PCP in oil, and the solution involved in the treating solution spill of 1990 was reported to be 6 percent PCP. Furthermore, discussion with Baxter and other representatives of the wood treating industry and review of EPA's report on the wood treating industry indicate this is the typical mixture used in all historical PCP treatment operations. As shown on Figure 1, the density of 6 percent PCP in oil is less than that of water, and hence is an LNAPL.

After the treating solution was released to the subsurface, the concentration of PCP may be altered due to preferential leaching or biodegradation of the solution components. If the PCP concentration in the carrier oil were to increase (e.g., if soil bacteria degraded components of the carrier oil faster than PCP), then the PCP solution could become a DNAPL. However, if PCP were preferentially leached from the oil, the PCP concentration in the oil would decrease and the solution would remain an LNAPL. Analysis of subsurface soil samples containing residual product indicate a PCP concentration in oil of subsurface NAPL to be 2.6%, as shown on Figure 2 (Figure 21 of the Draft Remedial Investigation Report).

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Tel 206.324.9530

This solution is lighter than the original treatment solution. The lower PCP concentration in subsurface NAPL versus the original treating solution suggests that PCP is leached out of the treatment solution by infiltrating surface water and groundwater. This is likely due to the ionic nature of PCP. These data indicate the treating solution detected in the subsurface is an LNAPL.

In addition to chemical data, field observations indicate that NAPL at the site is less dense than water. When subsurface soil samples containing NAPL were placed in a clean glass jar and shaken, the oil layer would float at the top. A sheen (characteristic of floating product) was observed in samples containing lower concentrations of the treating solution. Sinking drops or globules (characteristic of DNAPL) were not observed in any samples.

Prior to 1990, creosote was reportedly used in some operations at the site. Creosote is a DNAPL and will sink below the water table, and a mixture of PCP in creosote would potentially exist as a DNAPL. However, PAHs (which are the primary constituents of concern in creosote) have consistently not been detected in site groundwater (quarterly samples between 1994 and 1998 in all site wells). Also, since creosote and PCP were reportedly not used together, it is unlikely that PCP contamination is associated with a DNAPL occurrence in subsurface soils.

LNAPL Behavior in the Subsurface

An LNAPL will move down through the unsaturated zone until it reaches groundwater, leaving behind residual product. Since the density is less than that of water, when LNAPL reaches the water table it will form a pool that floats on the water table. Seasonal fluctuation of water levels will move this pool up and down. Because the viscosity of the oil is greater than that of water, as the water table rises some of the oil remains where it is, adhering to soil particles and moving more slowly upward through the porous soil than the less viscous water. This creates a smear zone, equal to the seasonal fluctuation of the water table, in which relatively high concentrations of oil are distributed year-round. The highest concentrations will remain at the top, where the LNAPL pool remains. The thickness of LNAPL will likely be highest when the water table is lowest.

Although some LNAPL is left below the water table as the groundwater elevation rises, this oil will not sink farther below. Instead, it will slowly float towards the top. The net force on a submerged LNAPL droplet or globule is up since the density is less than the droplet's surroundings. This positively buoyant force will transport the droplet to the top of the water table. Thus, LNAPL occurrence should be limited to above the historically low water elevation since the release occurred.

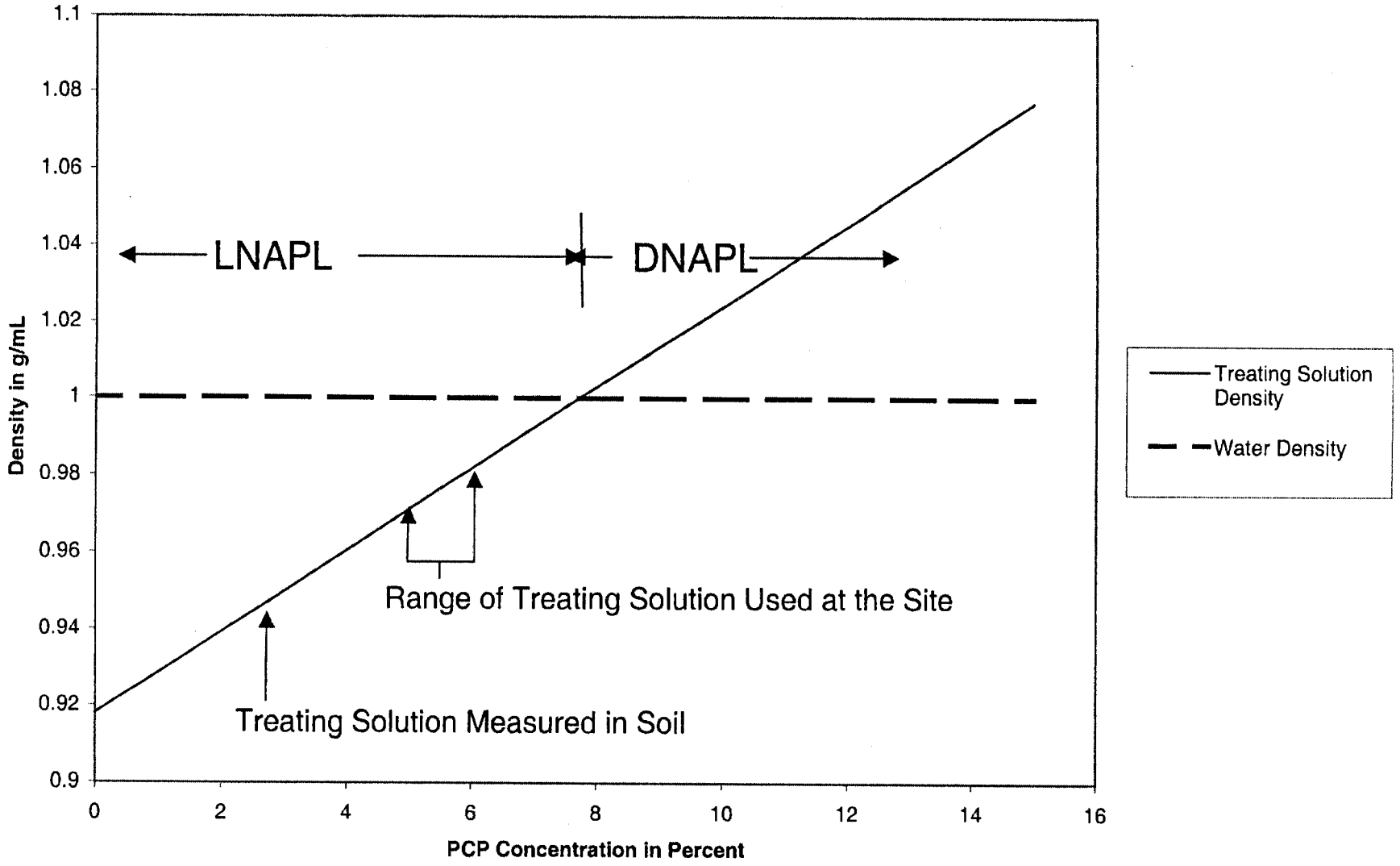
References

EPA, 1997. Treatment Technology Performance and Cost Data for Remediation of Wood Preserving Sites, US EPA/625/R-97/009. October. Personal communication.

F:\Docs\Jobs\702602\NAPLdensity.doc

Attachments:
Figures 1 and 2

Density of PCP/Oil Solu



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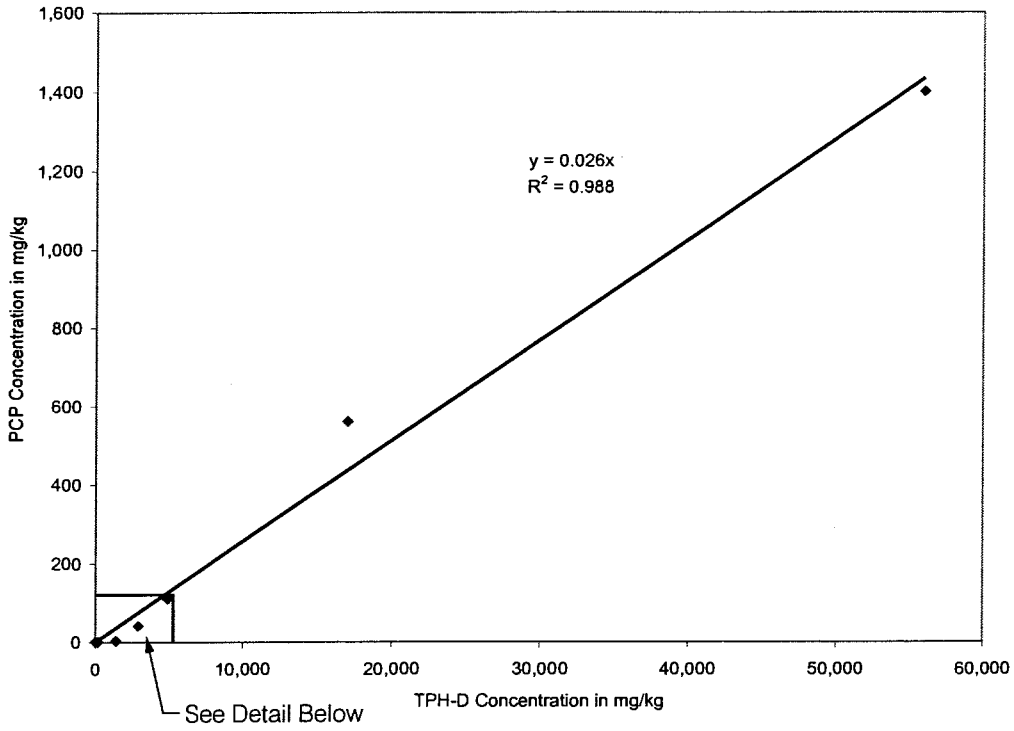
J-7026-02 2/00

Figure 1

Co-Occurrence of PCP and TPH

Correlation of PCP and Diesel-Range Petroleum



Overprediction of PCP Concentration by TPH-D Correlation at Low Concentrations

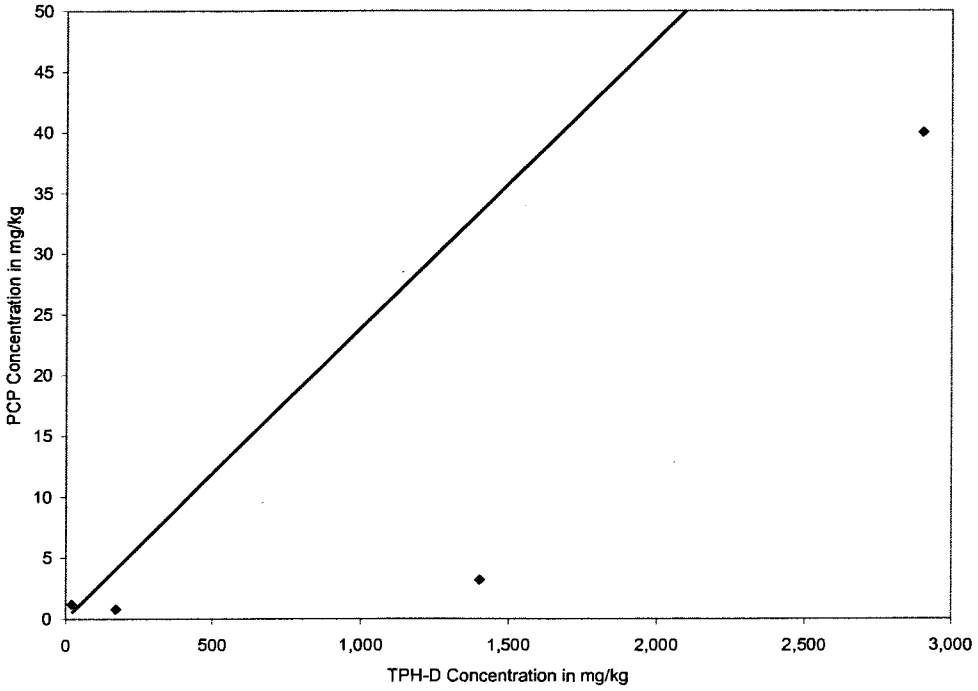


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Figure 2

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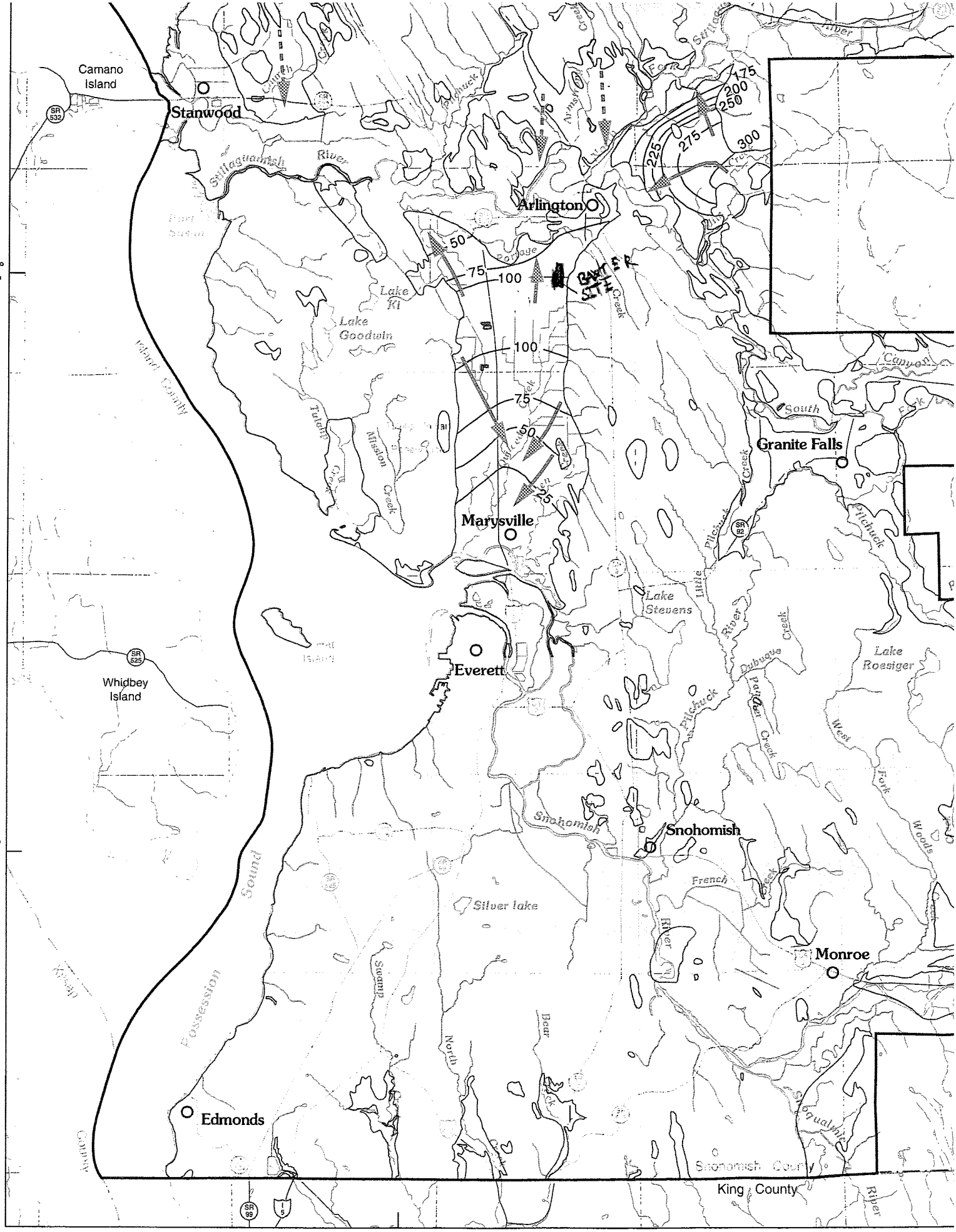
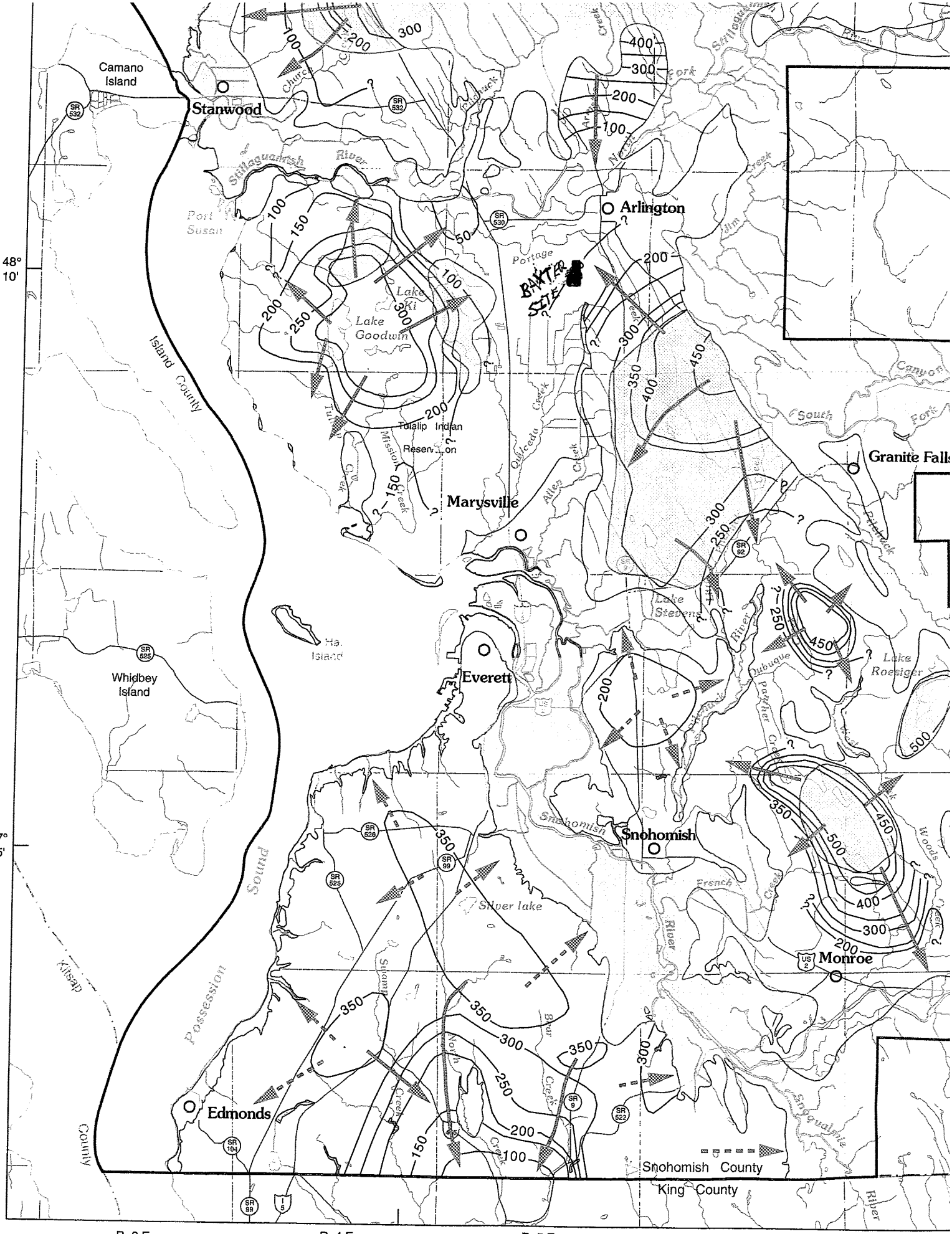
ATTACHMENT B
REGIONAL GROUNDWATER FLOW
FROM USGS (1997)



From: The Groundwater System and Groundwater Quality in Western Snohomish County, Washington.
USGS Water Resources Investigation Report 91-4217

c. Potentiometric surface and flow directions in Vashon Recession



d. Potentiometric surface and flow directions in Vashon Advanc

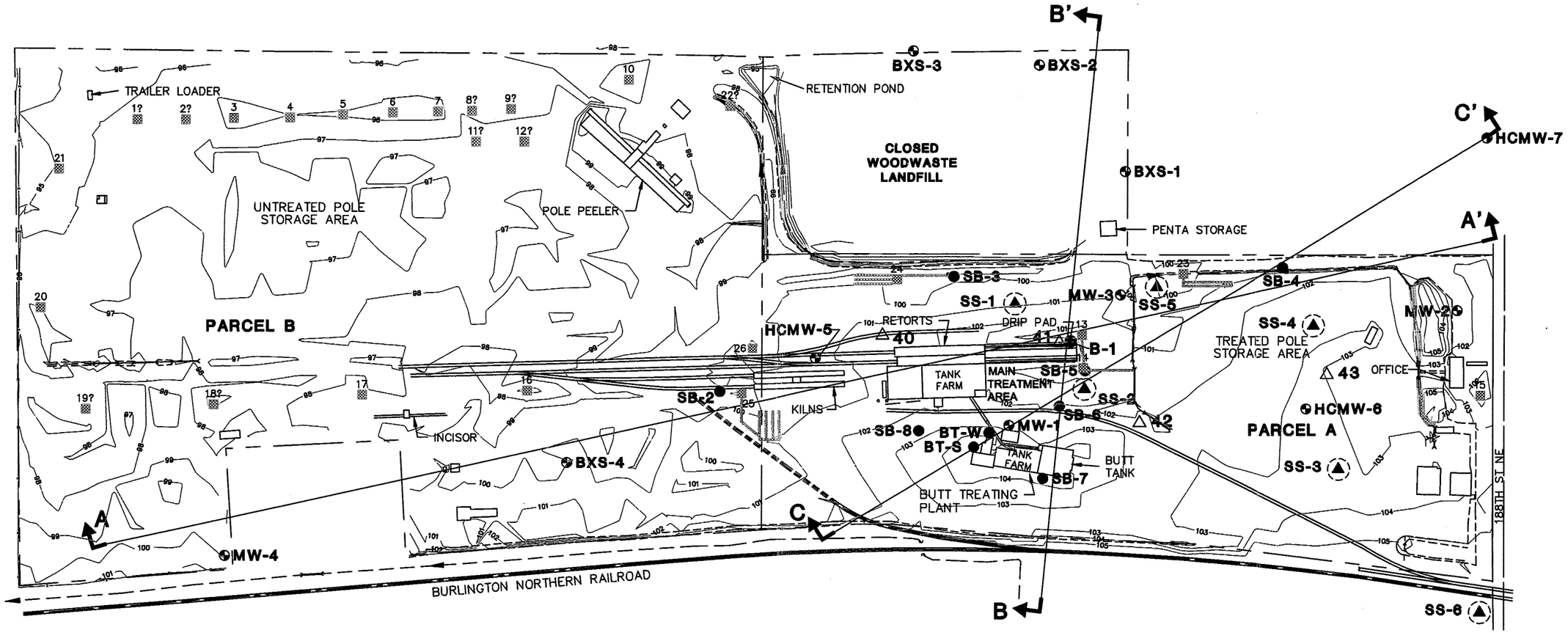
ATTACHMENT C
SUMMARY OF EXPLORATIONS AND SAMPLES ANALYZED

Table A-1 - Summary of Explorations and Samples Analyzed

Exploration Location	Depth of Exploration in Feet	Depth of Sample in Feet	Soil Testing	Groundwater Testing	Objective
BT-S	34	12.5 to 14.0 32.5 to 34.0	PCP, NWTPH-Dx PCP, NWTPH-Dx	PCP, TSS, NWTPH-G/BTEX, NWTPH-Dx	Investigate Area Beneath Former Butt-Treating Tank
BT-W	35	12.0 to 13.5 30.5 to 31.5	PCP, NWTPH-Dx PCP, NWTPH-Dx	PCP, TSS, NWTPH-G/BTEX, NWTPH-Dx	Investigate Area Beneath Former Butt-Treating Tank
HCMW-5	31.5	2.5 to 4.0 22.5 to 24.0 30.0 to 31.5	PCP, NWTPH-Dx PCP PCP, NWTPH-Dx	PCP, TSS	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	39	2.5 to 4.0 22.5 to 24.0 35.0 to 36.5 37.5 to 39.0	PCP PCP, TOC PCP PCP, TOC	PCP,TSS 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	42.5 to 44.0	PCP	PCP, TSS	Define northern extent of PCP plume, provide empirical data on PCP attenuation, evaluate off-site groundwater risks
SB-2	29	2.5 to 4.0 17.5 to 24.0 (Composite) 27.5 to 29.0	PCP PCP, TOC PCP	PCP, TSS, NWTPH-G/BTEX, NWTPH-Dx	Assess subsurface impact of 1990 PCP spill, look for LNAPL
SB-3	34	25.0 to 26.5 32.5 to 34.0	PCP 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	39	7.5 to 9.0 12.5 to 14.0 37.5 to 39.0	PCP PCP PCP, NWTPH-Dx	PCP, TSS, NWTPH-G/BTEX, NWTPH-Dx	Evaluate soils with depth beneath drainage ditch to assess storm water impact on soil sorption
SB-5	34	2.5 to 4.0 10.0 to 11.5 32.5 to 34.0	PCP PCP PCP, TOC	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	34	2.5 to 4.0 15.0 to 16.5 32.5 to 34.0	PCP PCP, NWTPH-Dx, PAHs, Dioxins PCP, NWTPH-Dx, PAHs, Dioxins		Investigate backfill of excavated area for wastes, assess impact of treatment operations on subsurface soil
SB-7	19	2.5 to 4.0 17.5 to 19.0	PCP PCP		Investigate area of previous butt tank overflow spills
SB-8	29	2.5 to 4.0 25.0 to 26.5 27.5 to 29.0	PCP PCP PCP, NWTPH-Dx	PCP, TSS, NWTPH-G/BTEX, NWTPH-Dx	Investigate area of previous butt treatment tank
SS-1	-	0.0 to 0.2 0.6 to 1.0	PCP, pH, NWTPH-Dx, SPLP, dioxin, TOC PCP, NWTPH-Dx	- -	Assess impact of treatment operations on nearby soils, assess leachability and surface contamination within catch basin for storm drain 24.
SS-2	-	0.0 to 0.2 0.6 to 1.0	PCP, pH, dioxin, NWTPH-Dx, TOC PCP, SPLP, NWTPH-Dx	- -	Assess impact of treatment operations on nearby soils, and assess leachability
SS-3	-	0.0 to 0.2 0.6 to 1.0	PCP, SPLP, Dioxin PCP	- -	Assess surface soil contamination and leachability in the treated pole storage area away from treatment operations and surface runoff
SS-4	-	0.0 to 0.2 0.6 to 1.0	PCP, Dioxin, TOC PCP	- -	Assess surface soil contamination and leachability in the treated pole storage area away from treatment operations and surface runoff.
SS-5	-	0.0 to 0.2 0.6 to 1.0	PCP, pH, SPLP, Dioxin PCP	- -	Assess surface soil contamination in the treated pole storage area within catch basin for storm drain 23.
SS-6	-	0.0 to 0.2 0.6 to 1.0	PCP PCP	- -	Assess impact of airborne dusts and volatilization from treatment processes on surrounding soils.

702602\TableA-1.xls - rationale

Exploration Location Map



Drainage Ditch and Flow Direction (From ACI, 1998)

Culvert

Catch Basin and Drainfield – ? 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

42 Surface Soil Sample (Ecology, 1992)

SS-1 Composite Surface Soil Sample (Hart Crowser, 1999)

BB' Cross Section Location and Designation

N

0 200 400

Scale in Feet

Note: Base map based on survey by Clark Leaman Surveying, January 1996.

CVD 2/17/00 1=200 color.pc2
70280206

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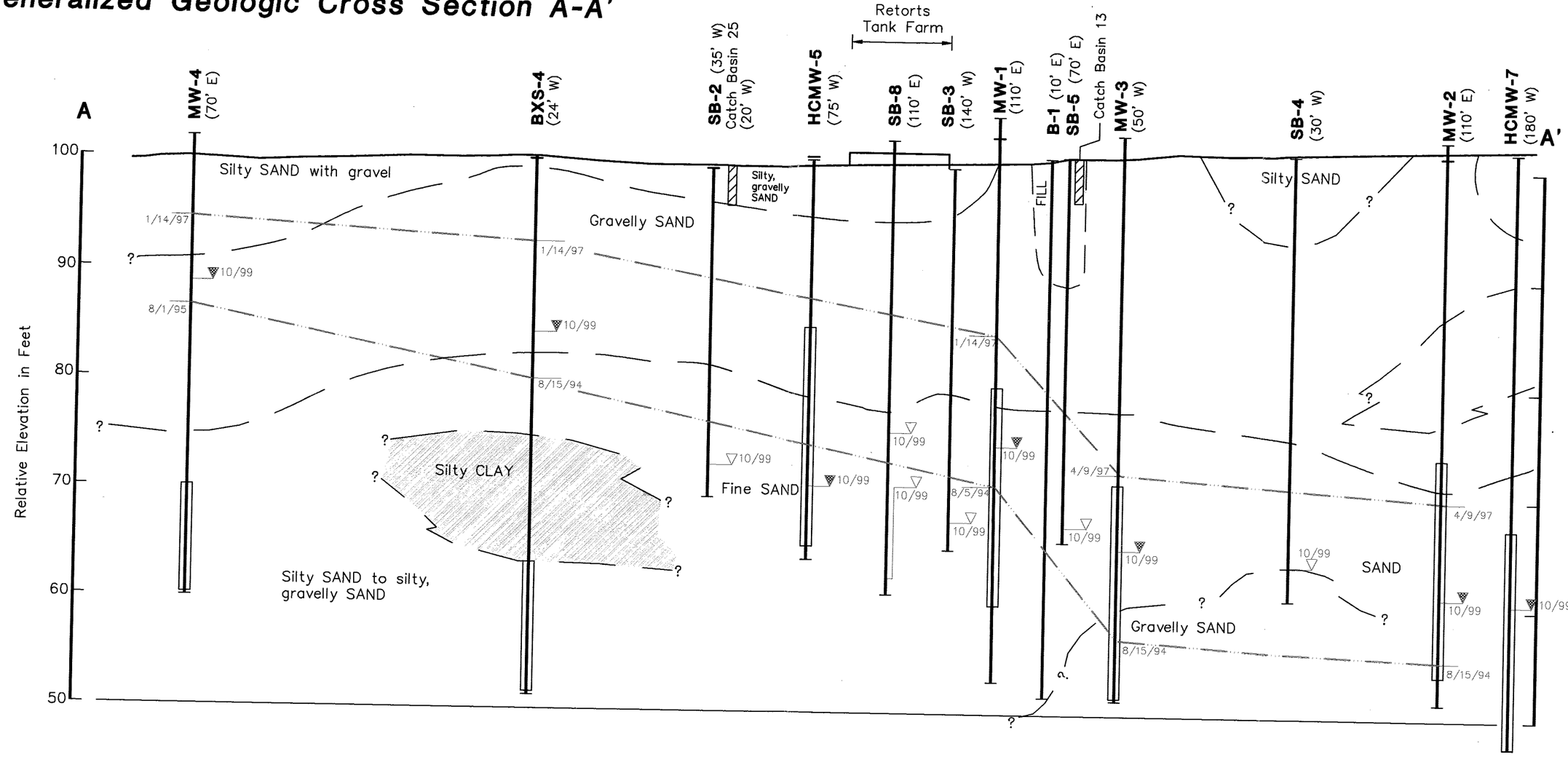
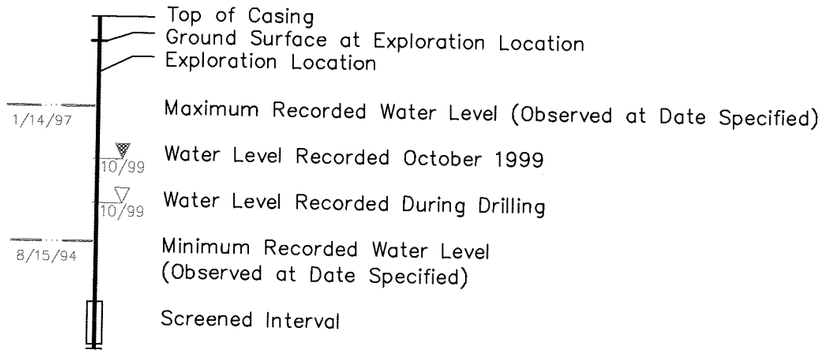
Figure 5

ATTACHMENT D
GROUNDWATER FLOW ALONG CROSS-SECTION A-A'

Generalized Geologic Cross Section A-A'



MW-1 Exploration Number
(70' E) (Offset Distance and Direction)



Top of Casing
Ground Surface at Exploration Location
Exploration Location

Maximum Recorded Water Level (Observed at Date Specified)

Water Level Recorded October 1999

Water Level Recorded During Drilling

Minimum Recorded Water Level (Observed at Date Specified)

Screened Interval

13 Storm Water Drain Field
Catch Basin Location and Number

Horizontal Scale in Feet
0 200 400
0 10 20
Vertical Scale in Feet
Vertical Exaggeration x 20

Notes:
1.Contacts between soil units are based upon interpolation between borings and represent our interpretation of subsurface conditions based on currently available data.
2.Reference Elevation Datum is 104.4 Feet at MW-1 Top of Casing.

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70260209

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J-7026-02 2/00
Figure 6

ATTACHMENT E
PCP CONCENTRATIONS AT SITE MONITORING WELLS

Pentachlorophenol Concentration in Groundwater

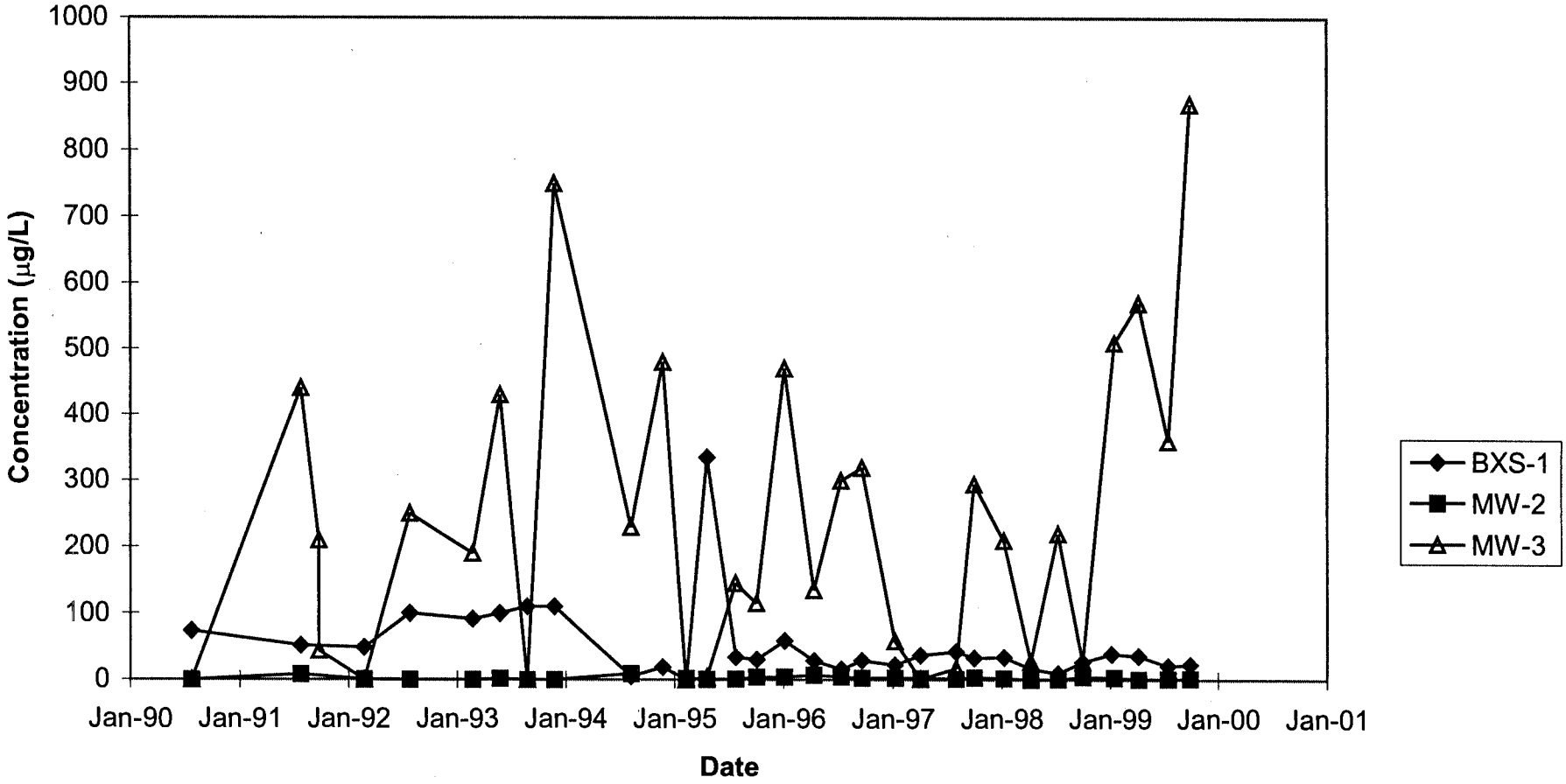

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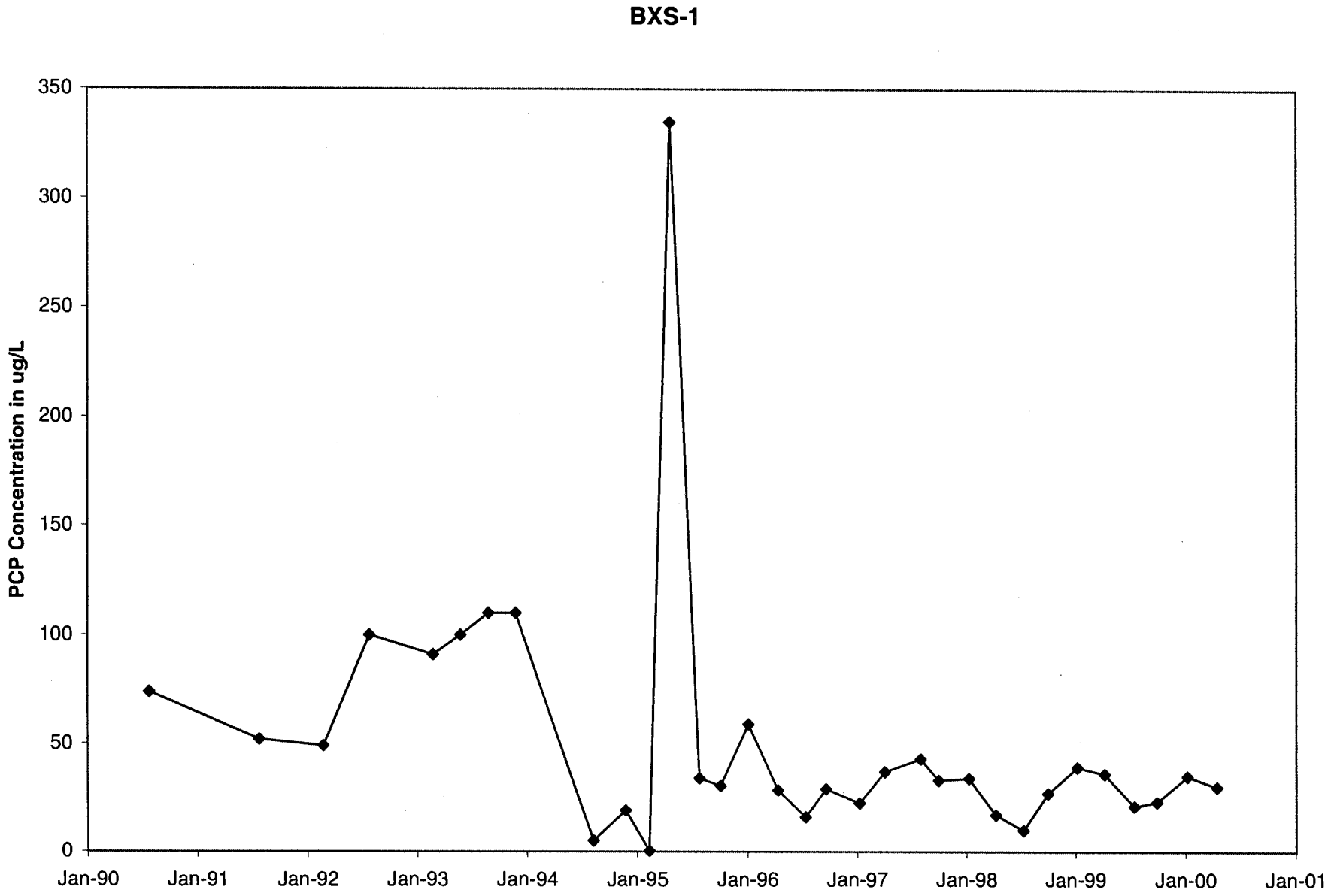
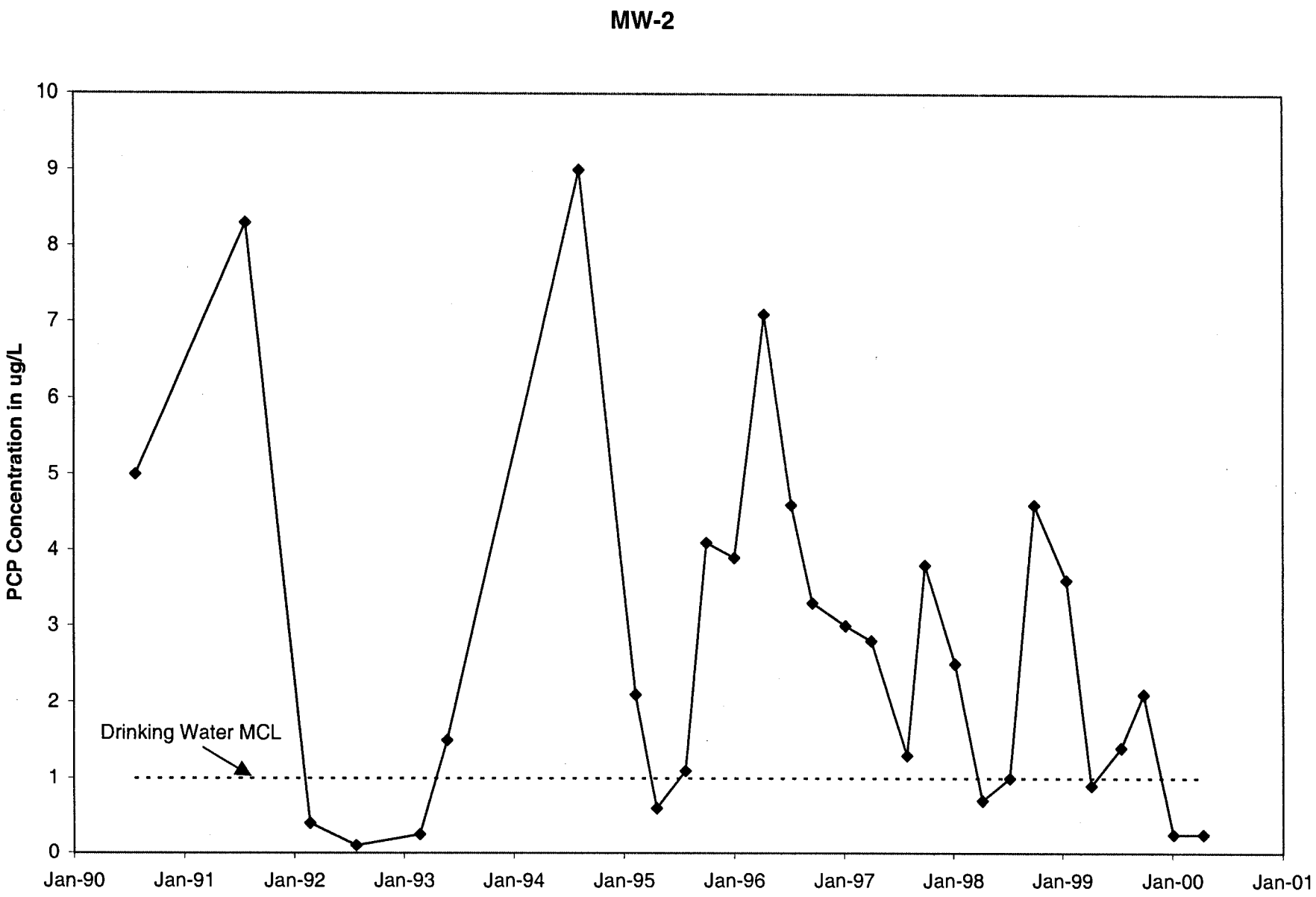
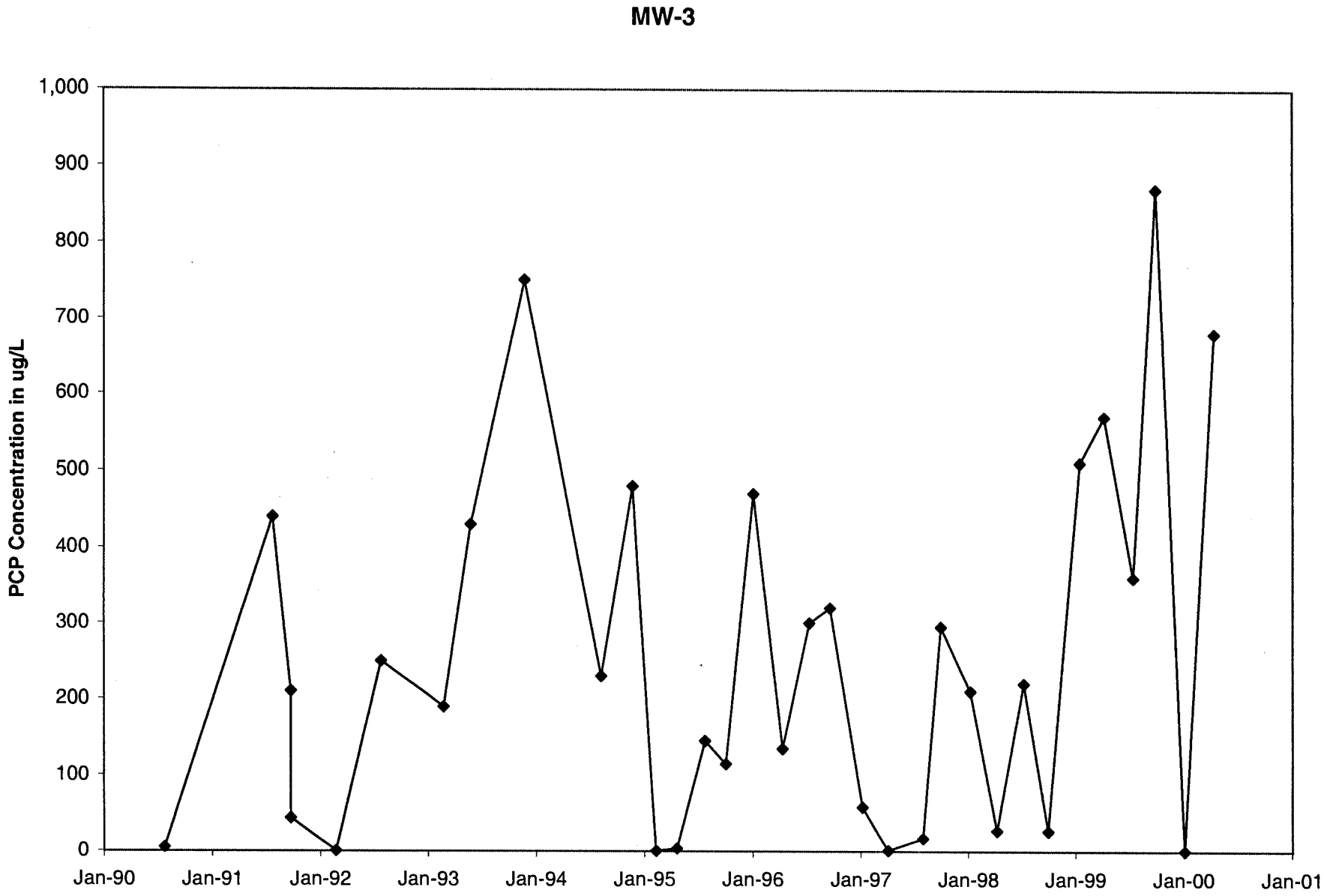
Figure 11


BXS-1
PCP Concentration in ug/L
350
300
250
200
150
100
50
0
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01


MW-2
PCP Concentration in ug/L
10
9
8
7
6
5
4
3
2
1
0
Drinking Water MCL
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01


MW-3
PCP Concentration in ug/L
1,000
900
800
700
600
500
400
300
200
100
0
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01

ATTACHMENT F
SUMMARY OF ANALYTICAL RESULTS - SURFACE SOIL, SUBSURFACE SOIL, STORMWATER, AND GROUNDWATER

Table 8 - Statistical Summary of Analytical Results for Surface Soil Samples

Analyte	Detection Frequency	Range	Maximum Detection	Location of Maximum Detect.	Direct Contact (a)	Exceedence Frequency	Protection of GW	Exceedence Frequency
Nonchlorinated Semivolatiles in mg/kg								
Acenaphthene	1/4	.046 J to .9 U	0.046 J	40-3/25/92	210000	0/4		
Anthracene	3/4	.375 to .9 U	0.87	40-3/25/92	1050000	0/4		
Benzo(a)anthracene	2/4	.39 U to 2.6	2.6	40-3/25/92	17.98	0/4		
Benzo(a)anthracene	2/4	.39 U to 2.6	2.6 J	42-3/25/92	17.98	0/4		
Benzo(a)pyrene	2/4	.39 U to 2.3 J	2.3 J	40-3/25/92	17.98	0/4		
Benzo(b)fluoranthene	4/4	.18 J to 8.2 J	8.2 J	40-3/25/92	17.98	0/4		
Chrysene	4/4	.17 J to 2.6	2.6	40-3/25/92	17.98	0/4		
Dibenz(a,h)anthracene	2/4	.16 J to 1.2 J	1.2 J	40-3/25/92				
Fluoranthene	4/4	.16 J to 9.2	9.2	40-3/25/92	140000	0/4		
Fluorene	1/4	.11 J to .9 U	0.11 J	40-3/25/92	140000	0/4		
Pyrene	4/4	.26 J to 13 J	13 J	42-3/25/92	105000	0/4		
Total cPAHs	4/4	.35 to 16.9	16.9	40-3/25/92			22 (c)	0/4
Chlorinated Phenols in mg/kg								
2,4,6-Trichlorophenol	0/19	.005 U to 5 U	N/A					
Pentachlorophenol	23/23	.015 to 1900 J	1900 J	42-3/25/92	1094	1/23	3.1 (c)	17/23
Total Tetrachlorophenols	5/19	.005 U to 10	10	SB-5 S-1	105000	0/19	530 (c)	0/19
Dioxins in ng/kg								
TEF Equivalent	5/5	1161 to 8248	8248	SS-3-S	875 (a)	5/5	8900 (c)	0/5
TPH in mg/kg								
Diesel	0/5	25 U to 25 U	N/A				2000 (b)	0/5
Heavy Fuel Oil	0/5	100 U to 100 U	N/A				2000 (b)	0/5
Jet Fuel as Jet A	0/5	25 U to 25 U	N/A				2000 (b)	0/5
Kerosene	0/5	25 U to 25 U	N/A				2000 (b)	0/5
Lube Oil	3/5	60 J to 630	630	SS-1-S			2000 (b)	0/5
Mineral Spirits	0/5	25 U to 25 U	N/A				2000 (b)	0/5
Non-PHC as Diesel	0/5	100 U to 100 U	N/A				2000 (b)	0/5
PHC as Diesel	1/5	100 U to 1400	1400	SS-2-D			2000 (b)	0/5

U = Not detected at indicated detection limit.

J = Estimated value.

(a) Using MTCA Method C Cleanup Level for Industrial Soils.

(b) Proposed MTCA Method A Cleanup Level.

(c) Modified MTCA Method B Cleanup Level.

Table 9 - Statistical Summary of Analytical Results for Subsurface Soil Samples

Analyte	Detection Frequency	Range	Maximum Detection	Location of Maximum Detec	Direct Contact (a)	Exceedence Frequency	Protection of GW	Exceedence Frequency
Nonchlorinated Semivolatiles in mg/kg								
Acenaphthene	2/10	.084 to 58	58	SB-6 S-6	210000	0/10		
Acenaphthylene	2/10	.003 J to 1.2	1.2	SB-6 S-6				
Anthracene	2/10	.087 to 31	31	SB-6 S-6	1050000	0/10		
Benzo(a)anthracene	2/10	.041 to 8.9	8.9	SB-6 S-6	17.98	0/10		
Benzo(a)pyrene	2/10	.017 to 3.7	3.7	SB-6 S-6	17.98	0/10		
Benzo(b)fluoranthene	2/10	.014 to 2.9	2.9	SB-6 S-6	17.98	0/10		
Benzo(g,h,i)perylene	2/10	.006 to 1.1	1.1	SB-6 S-6				
Benzo(k)fluoranthene	2/10	.017 to 4.1	4.1	SB-6 S-6	17.98	0/10		
Chrysene	2/10	.043 to 9.1	9.1	SB-6 S-6	17.98	0/10		
Dibenz(a,h)anthracene	1/10	.005 U to .6	0.6	SB-6 S-6				
Fluoranthene	2/10	.17 U to 51	51	SB-6 S-6	140000	0/10		
Fluorene	2/10	.14 to 68	68	SB-6 S-6	140000	0/10		
Indeno(1,2,3-cd)pyrene	2/10	.009 to 1.6	1.6	SB-6 S-6	17.98	0/10		
Naphthalene	2/10	.009 to 68	68	SB-6 S-6	140000	0/10		
Phenanthrene	2/10	.17 U to 150	150	SB-6 S-6				
Pyrene	3/10	.15 to 39	39	SB-6 S-6	105000	0/10		
Total cPAHs	2/10	.17 U to 30.9	30.9	SB-6 S-6			2 (e)	1/8
Chlorinated Phenols in mg/kg								
2,4,6-Trichlorophenol	0/25	.005 U to 50 U	N/A					
Pentachlorophenol	27/33	.001 J to 1400	1400	BT-W S-7	1094	1/33	.28/0.012(b)(d)	14/33
Total Tetrachlorophenols	5/25	.005 U to 40 J	40 J	BT-W S-7	105000	0/25	48 (e)	0/25
Dioxins in ng/kg								
TEF Equivalent	2/2	79 to 7092	7092	SB-6-S-6	875	1/2	809/32(b)(d)	2/2
TPH in mg/kg								
Diesel	3/10	20 J to 17000	17000	SB-6 S-6			2000 (c)	1/10
Heavy Fuel Oil	0/10	100 U to 100 U	N/A				2000 (c)	0/10
Jet Fuel as Jet A	0/10	25 U to 25 U	N/A				2000 (c)	0/10
Kerosene	0/10	25 U to 25 U	N/A				2000 (c)	0/10
Lube Oil	0/10	100 U to 100 U	N/A				2000 (c)	0/10
Mineral Spirits	0/10	25 U to 25 U	N/A				2000 (c)	0/10
Non-PHC as Diesel	0/10	100 U to 100 U	N/A				2000 (c)	0/10
PHC as Diesel	3/10	100 U to 56000	56000	BT-W S-7			2000 (c)	3/10

U = Not detected at indicated detection limit; J = Estimated value.

(a) MTCA Method C Cleanup Level for Industrial Soils.

(b) Modified MTCA Method B Cleanup Level.

(c) Proposed MTCA Method A Cleanup Level.

(d) Unsaturated/saturated zone.

(e) Standard MTCA Method B Cleanup Level.

Table 10 - Statistical Summary of Analytical Results for Storm Water Samples

Analyte	Detection Frequency	Range	Maximum Detection	Location of Maximum Detect.	Screening Level (a)	Exceedence Frequency
Dioxins in pg/L						
TEF Equivalent	13/13	.36 to 13568	13568	Drains 13/14	1.0	12/13
Nonchlorinated Semivolatiles in µg/L						
Acenaphthene	0/40	1 U to 10 U	N/A			
Acenaphthylene	0/40	1 U to 35 U	N/A			
Anthracene	0/40	.1 U to 1 U	N/A			
Benzo(a)anthracene	4/40	.1 U to 1 U	0.9	Drains 13/14		
Benzo(a)pyrene	10/40	.1 to 1.8	1.8	Drain 13		
Benzo(b)fluoranthene	9/40	.2 U to 2.5	2.5	Drain 13		
Benzo(g,h,i)perylene	5/40	.2 U to 2 U	0.8	Drains 13/14		
Benzo(k)fluoranthene	11/40	.1 to 1.2	1.2	Drain 13		
Chrysene	19/40	.1 to 2.6	2.6	Drain 13		
Dibenz(a,h)anthracene	1/40	.1 to 1 U	0.1	Drains 13/14		
Fluoranthene	3/40	.2 U to 11 U	5.1	Drains 13/14		
Fluorene	0/40	.2 U to 2 U	N/A			
Indeno(1,2,3-cd)pyrene	6/40	.1 U to 2 U	0.7	Drains 13/14		
Naphthalene	0/40	1 U to 10 U	N/A			
Phenanthrene	10/40	.1 to 5 U	2	Drains 13/14		
Pyrene	3/40	.2 to 30 U	6.8	Drains 13/14		
Total PAHs	10/75	.148 to 84.8 U	34.1	Drains 13/14		
Total cPAHs	1/5	.2 U to .9	0.9	Drains 13/14		
Chlorinated Phenols in µg/L						
2,4,6-Trichlorophenol	0/40	.5 U to 50 U	N/A			
Pentachlorophenol	130/130	.8 to 960	960	Drain 24	1.0	129/130
Total Tetrachlorophenols	28/40	.5 U to 50 U	15	Drain 24; Drains 13/14		
Conventionals in mg/L						
Total Suspended Solids	130/130	5 to 19900	19900	Untreat. Wood-3/1-5/31/95		
pH	130/130	6.01 to 8.82	8.82	Drain 25	6.5-8.5	3/130
TPH in mg/L						
Oil & Grease	100/127	1 to 16	16	Drain 25	10	4/127

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.

(a) Based on NPDES permit requirements.

Table 11 - Statistical Summary of Analytical Results for Groundwater Samples

Analyte	Detection Frequency	Range	Maximum Detection	Location of Maximum Detect.	GW Scr. Level	Exceedence Frequency
Dioxins in pg/L						
TEF Equivalent	6/6	.0745 to 1056	1056	MW-2	0.6 (d)	3/6
Nonchlorinated Semivolatiles in µg/L						
Acenaphthene	0/71	1 U to 10 U	N/A			
Acenaphthylene	1/71	1 to 10 U	1	BXS-3		
Anthracene	0/71	.1 U to 1 U	N/A			
Benzo(a)anthracene	0/71	.1 U to 1 U	N/A			
Benzo(a)pyrene	0/71	.1 U to 1 U	N/A			
Benzo(b)fluoranthene	3/71	.2 U to 2 U	0.8	BXS-4		
Benzo(g,h,i)perylene	0/71	.2 U to 2 U	N/A			
Benzo(k)fluoranthene	0/71	.1 U to 1 U	N/A			
Chrysene	0/71	.1 U to 1 U	N/A			
Dibenz(a,h)anthracene	0/71	.1 U to 1 U	N/A			
Fluoranthene	0/71	.2 U to 2 U	N/A			
Fluorene	1/71	.2 to 2 U	0.2	MW-3		
Indeno(1,2,3-cd)pyrene	0/71	.1 U to 1 U	N/A			
Naphthalene	1/71	1 U to 10 U	1.7	MW-3		
Phenanthrene	1/71	.1 to 1 U	0.1	BXS-4		
Pyrene	0/71	.2 U to 2 U	N/A			
Total cPAHs	3/71	.2 U to 2 U	0.8	BXS-4	0.1 (a)	3/71
Chlorinated Phenols in µg/L						
2,4,6-Trichlorophenol	0/82	.2 U to 500 U	N/A		7.95 (d)	0/80
2,4-Dichlorophenol	0/72	.2 U to .2 U	N/A		48 (d)	0/72
2,4-Dimethylphenol	0/72	.2 U to .2 U	N/A		320 (d)	0/72
2,4-Dinitrophenol	0/72	.5 U to .5 U	N/A		32 (d)	0/72
2-Chlorophenol	0/72	.2 U to .2 U	N/A		80 (d)	0/72
2-Nitrophenol	0/72	.2 U to .2 U	N/A			
4,6-Dinitro-2-methylphenol	0/72	.5 U to .5 U	N/A			
4-Chloro-3-methylphenol	0/72	.2 U to .2 U	N/A			

Table 11 - Statistical Summary of Analytical Results for Groundwater Samples

Analyte	Detection Frequency	Range	Maximum Detection	Location of Maximum Detect.	GW Scr. Level	Exceedence Frequency
4-Nitrophenol	0/72	.5 U to .5 U	N/A			
Pentachlorophenol	106/169	.1 to 58000	58000	BT-S-GW	1 (d)	88/163
Phenol	0/72	.2 U to .2 U	N/A		9600 (d)	0/72
Total Phenols (b)	3/4	.2 to 300	300	BXS-4		
Total Tetrachlorophenols	4/10	.1 J to 2600	2600	BT-S-GW	480 (c)	2/10
Volatiles in µg/L						
Benzene	0/6	.5 U to 5 U	N/A		5 (e)	0/6
Ethylbenzene	0/6	1 U to 10 U	N/A		700 (e)	0/6
Toluene	0/6	1 U to 10 U	N/A		1000 (e)	0/6
Total Xylenes	0/6	1 U to 10 U	N/A		1000 (e)	0/6
TPH in µg/L						
Diesel	2/9	250 U to 1500000 J	1500000 J	BT-W-GW	500 (e)	2/9
Gasoline	0/6	250 U to 500 U	N/A		500 (e)	0/6
Heavy Fuel Oil	0/9	500 U to 500 U	N/A		500 (e)	0/9
Jet Fuel as Jet A	0/9	250 U to 250 U	N/A		500 (e)	0/9
Kerosene	0/9	250 U to 250 U	N/A		500 (e)	0/9
Lube Oil	0/9	500 U to 500 U	N/A		500 (e)	0/9
Mineral Spirits	0/9	250 U to 250 U	N/A		500 (e)	0/9
Non-PHC as Diesel	3/9	70 J to 500 U	89 J	SB-4 GW	500 (e)	0/9
Non-PHC as Gasoline	0/6	250 U to 500 U	N/A		500 (e)	0/6
PHC as Diesel	0/9	500 U to 500 U	N/A		500 (e)	0/9
PHC as Gasoline	2/6	250 U to 1000 J	1000 J	BT-W-GW	500 (e)	2/6

U = Not detected at indicated detection limit.

J = Estimated value.

(a) Based on Standard MTCA Method B carcinogenic PAHs as benzo(a)pyrene.

(b) Not including pentachlorophenol.

(c) MTCA Method B Cleanup level for 2,3,4,6-Tetrachlorophenol.

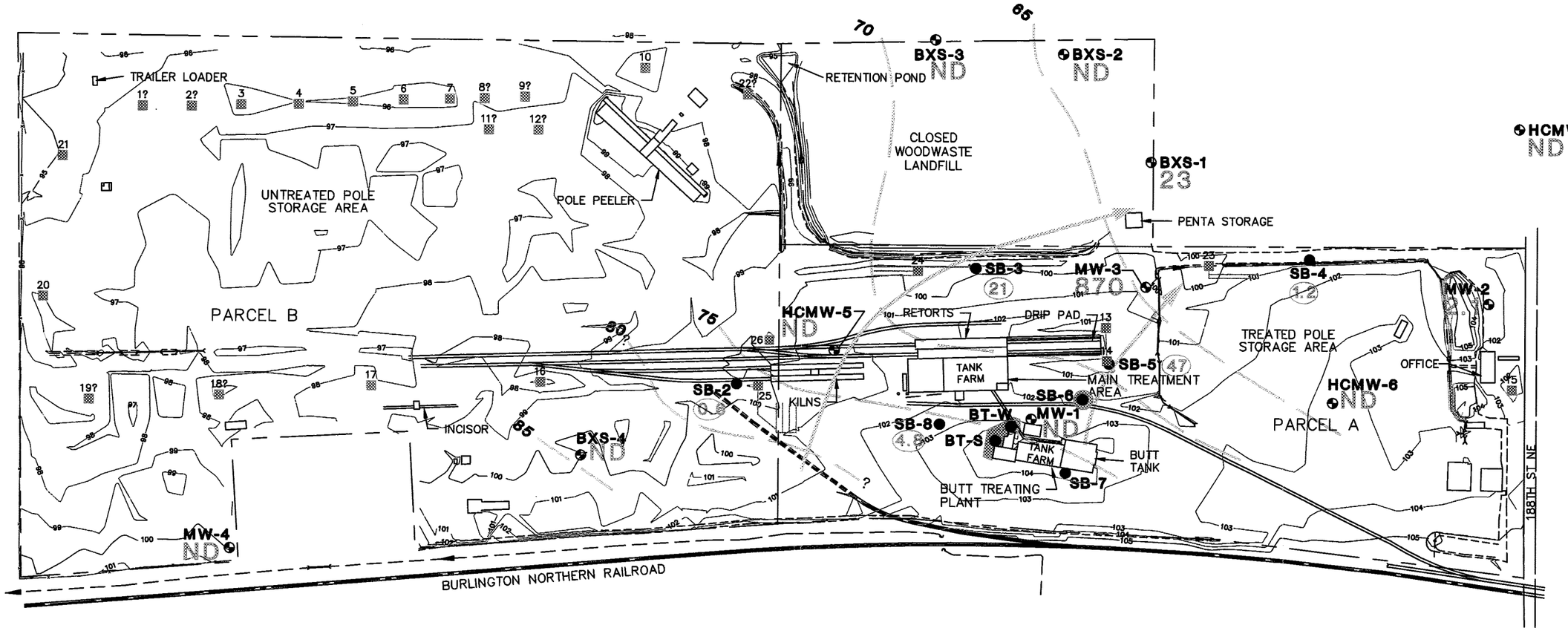
(d) MTCA Method B Drinking Water Cleanup Level.

(e) Proposed MTCA Method A Cleanup Level.

ATTACHMENT G
NAPL EXTENT IN SUBSURFACE AND PCP CONCENTRATION IN GROUNDWATER

PCP Concentration in Groundwater

October 1999



- 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-1 Monitoring Well
- SB-1 Soil Boring
- 65 Groundwater Elevation Contour in Feet (October 1999)
- Groundwater Flow Direction (October 1999)

PCP Concetration in µg/L

- 0.6 Groundwater Sample from Monitoring Well (October 1999)
- ND Not Detected at Detection Limit of 0.5 µg/L
- (4.8) Groundwater Grab Sample taken during drilling. Analysis run on highly turbid sample. (See Appendix A)
- Area of LNAPL Occurrence

N

0 200 400

Scale in Feet

Note: Base map based on survey by Clark Leaman Surveying, January 1996.

XR-BASE.DWG

CVD 2/17/00 1=200 color.pc2
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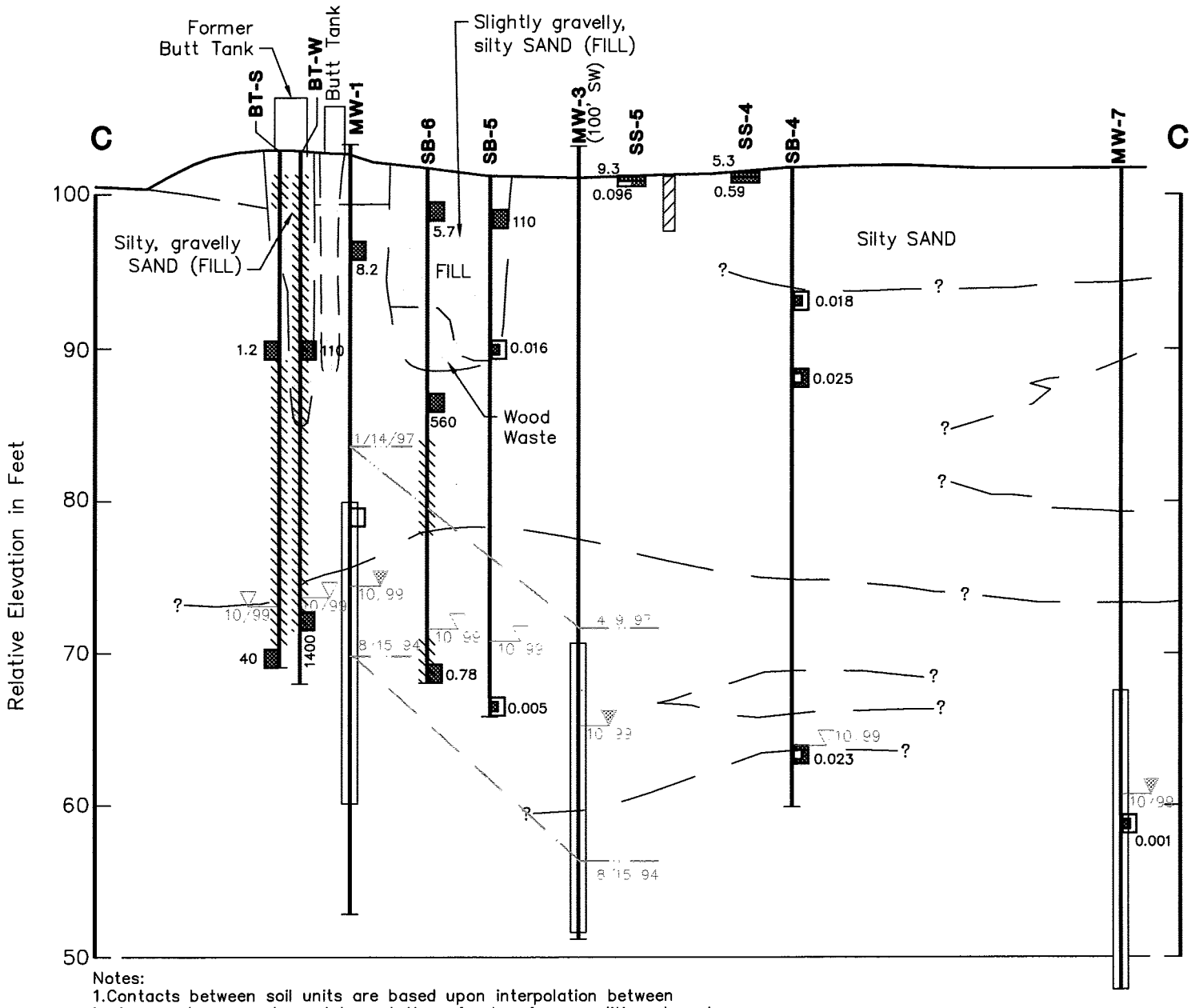
Figure 20

ATTACHMENT H
ESTIMATED SEASONAL WATER TABLE FLUCTUATION AT THE BUTT TANK

PCP Occurrence in Cross Section C-C'



Notes:
1.Contacts between soil units are based upon interpolation between borings and represent our interpretation of subsurface conditions based on currently available data.
2.Reference Elevation Datum is 104.4 Feet at MW-1 Top of Casing.

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)

Top of Casing
Ground Surface at Exploration Location
Exploration Location

Not Detected

Detected at <0.02 mg/kg

Detected at 0.02 to 0.2 mg/kg

Detected at >0.2 mg/kg

Area of Positive Sheen Tests

Storm Water Drain Catch Basin Location and Number

1/14/97 Maximum Recorded Water Level (Observed at Date Specified)

10/99 Water Level Recorded October 1999

10/99 Water Level Recorded During Drilling

8/15/94 Minimum Recorded Water Level (Observed at Date Specified)

Screened Interval

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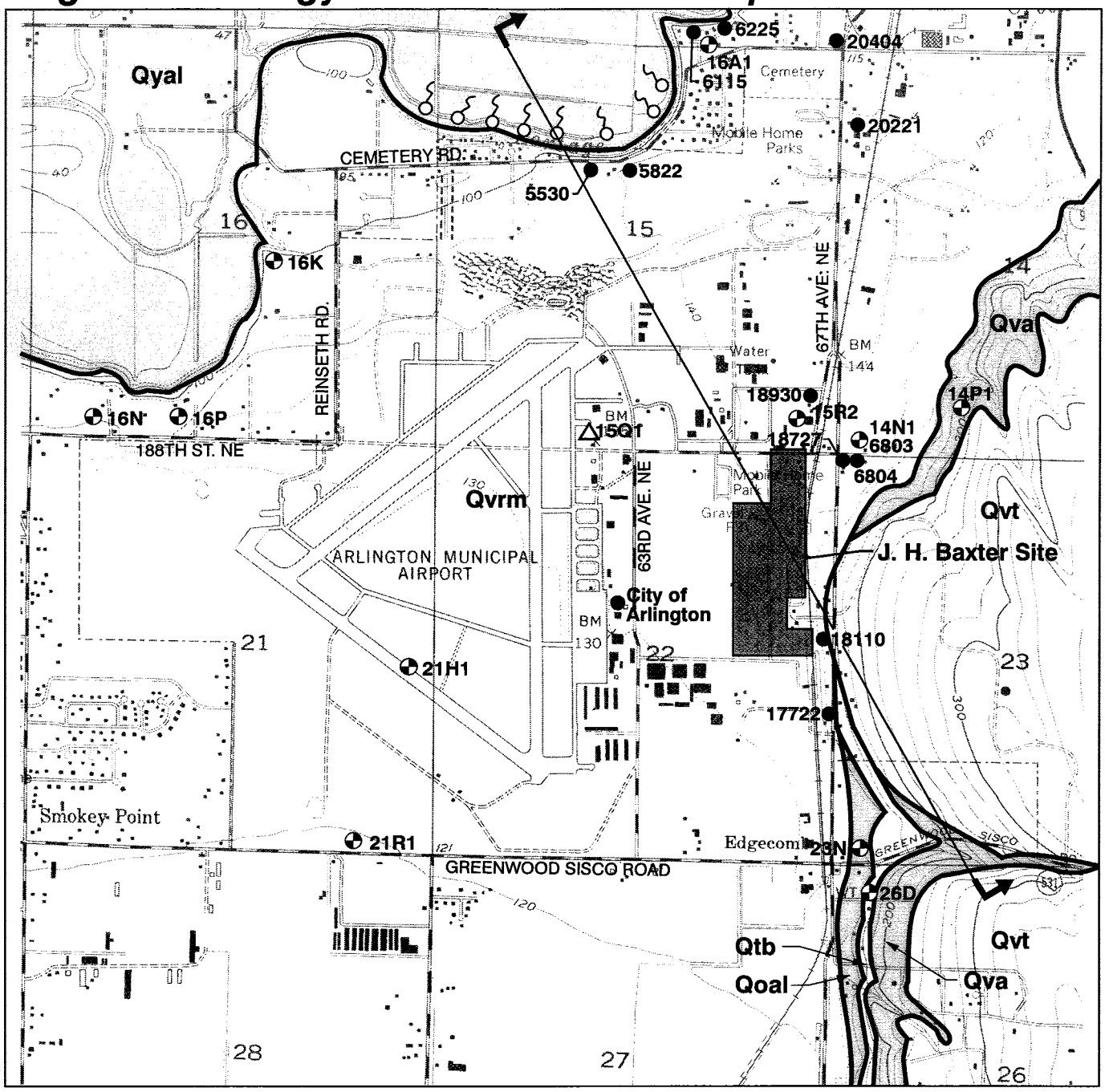
J-7026-02 2/00
Figure 13

CVD 2/23/00 1=200 color.pc2
70260214

ATTACHMENT I
SUMMARY OF ACTIVE WATER WELLS NEAR SITE

Regional Geology and Well Location Map



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Notes:
1. Base map prepared from USGS 7.5 minute quadrangle map of Arlington West, Washington, dated 1981. Township 31N, Range 5E.
2. See Figure 5 for definitions of geologic units.

0 2000 3000
Scale in Feet

16A1 Well Log Available from Dept. of Ecology or Newcomb (1952); Well may be abandoned.

6803 Field Located Well (Number Identifies Well Address) No log available, see Table 1.

△15Q1 Ecology Log for Anode Well

Regional Cross Section Location

Seep

N

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Figure 3

ATTACHMENT J
WATER ELEVATION DATA

Table 1 - Water Supply Use

Well Location	Owner	Use	Approx. Surface Elev. in Feet (1)	Well Depth in Feet	Depth to Water in Feet (2)	Water Level Elev. in Feet	Screened Interval in Feet	Notes	Info. Source
T31N R5E									
Section 10	The Petal Patch Flower Shop, 20404 67th Ave. NE	Unknown	-	-	-	-	-		2
Section 14	Nikleson, 6803 188th St NE (14N1)	Domestic	-	-	-	-	-		3
Section 14	Mr. Willett, 'Cozy Heating', 20221 67th Ave. NE	Unknown	116	-	15	91	-	not in use	2
Section 15	Thomco, 18930 67th Avenue NE	Domestic	-	-	-	-	-		2,3
Section 15	Arlington Cemetary Association	Irrigation	119	77	43	76	73-77	irrigation	2
Section 15	Mr. E. Experdal, 5822 Cemetary Rd.	Domestic	120	65	69	51	-		2,3
Section 15	Mr. B. Hoggarth, 6225 204th Place NE	Domestic	110	69	52	58	-		2,3
Section 15	D.H. Thompson, 6210 204th Place NE	Domestic	120	85	50	70	80-85	16A1 on Figure 3	1,3
Section 15	Mr. Gray, 6115 204th Place NE	Domestic	110	69	52	58	60-69		2,3
Section 15	Kim Hudnall, 5530 Cemetary Rd	Domestic	117	-	52	65	-		2
Section 16	Mr. Hans Bohn	Domestic	-	-	-	-	-	not mapped	2
Section 21	City of Arlington, Arlington Airport	Municipal	-	-	-	-	-		4
Section 22	Mr. James, 18110 67th Ave. NE	Domestic	158	23	10	148	-	property to be redeveloped	2,3
Section 22	Mr. Jones, 17722 1/2 67th Ave. NE	Domestic	140	-	11	129	-		2
Section 23	Unknown, 6804 188th St NE	Domestic	-	-	-	-	-		3
Section 23	Unknown, 18727 67th Ave NE	Domestic	-	-	-	-	-	may soon switch to city water	3

Information Sources

1) Washington State Water Well Reports
2) 1988 Sweet-Edwards/EMCON Beneficial Use Survey (EMCON, 1989)
3) Hart Crowser Field Well Inventory (October 1999 and January 2000)
4) City of Arlington

Notes

- Indicates no data available or unknown
(1) Elevations are relative to Mean Sea Level. Most of the well elevations are determined from topographic maps and are only approximate.
(2) Water levels reported on the original well log or obtained during a well inventory (EMCON, 1989).

Table 2 - Summary of Water Elevation Data

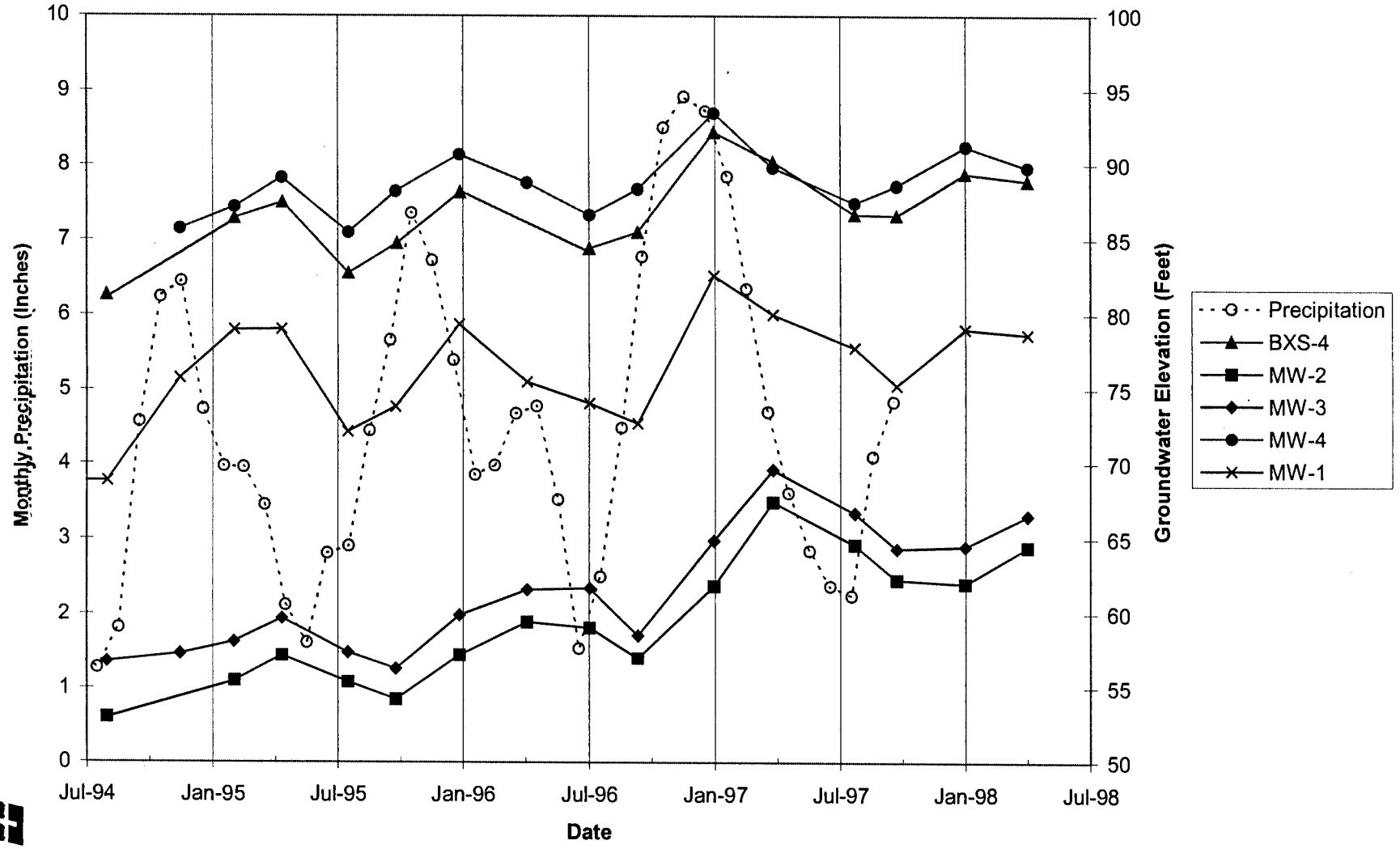
Monitoring Well	Depth to Water in Feet Below Top of Casing										
	BXS-1	BXS-2	BXS-3	BXS-4	MW-1	MW-2	MW-3	MW-4	HCMW-5	HCMW-6	HC-MW-7
Sampling Date											
8/1/90	35.80	34.80	31.60	15.60	26.50	38.50	36.20	(2)			
8/1/91	34.94	33.79	30.71	15.31	27.08	37.99	35.14	(2)			
10/1/91	NM	NM	32.97	NM	NM	NM	37.45	(2)			
3/1/92	35.16	34.72	31.06	10.06	21.50	40.56	(1)	(2)			
8/1/92	39.92	38.85	35.77	17.61	32.97	44.83	(1)	(2)			
3/1/93	40.70	40.22	37.31	16.17	28.58	45.54	(1)	(2)			
6/1/93	40.61	70.02	NM	NM	NM	45.52	(1)	(2)			
9/1/93	42.35	41.64	NM	NM	33.40	47.20	(1)	(2)			
12/1/93	43.57	42.93	NM	NM	NM	NM	(1)	(2)			
8/15/94	42.85	41.93	39.79	19.06	33.45	47.74	43.70	(2)			
11/30/94	44.91	43.65	41.86	NM	26.54	NM	43.16	14.74			
2/16/95	40.17	39.31	36.64	13.91	23.31	45.29	42.37	13.30			
4/27/95	38.40	37.59	34.23	12.84	23.28	43.59	40.79	11.36			
8/1/95	40.39	39.40	36.28	17.59	30.13	45.37	43.08	15.00			
10/10/95	41.46	40.66	38.18	15.61	28.46	46.56	44.17	12.27			
1/11/96	38.28	37.78	34.43	12.19	22.95	43.57	40.60	9.79			
4/18/96	31.20	35.20	31.53	31.78	26.79	41.35	38.88	11.70			
7/18/96	36.66	35.76	31.99	15.94	28.25	41.74	38.78	13.82			
9/25/96	38.81	37.85	34.35	14.85	29.57	43.76	41.95	12.10			
1/14/97	33.52	32.83	29.26	8.14	19.68	38.93	35.60	7.01			
4/9/97	28.23	27.82	23.22	10.14	22.28	33.35	30.88	10.67			
8/6/97	30.99	29.96	25.29	13.65	24.50	36.19	33.79	13.00			
10/6/97	33.27	32.13	28.29	13.73	27.02	38.53	36.15	11.87			
1/15/98	33.19	34.94	28.22	10.94	23.25	38.78	35.99	9.23			
4/15/98	30.92	29.88	25.78	11.45	23.61	36.35	33.95	10.67			
7/15/98	33.21	32.04	28.04	14.47	27.25	38.55	36.01	12.85			
10/6/98	36.63	35.47	31.59	16.43	31.51	41.89	39.57	13.95			
1/12/99	36.05	35.14	31.57	12.18	23.75	41.88	38.18	10.15			
4/13/99	31.79	30.81	26.61	11.40	23.06	47.32	34.45	10.82			
7/21/99	32.26	31.06	26.96	12.78	24.54	37.80	35.02	12.05			
10/4/99	34.87	33.73	29.55	15.65	29.14	40.24	37.82	13.81			
10/25/99	35.76	35.54	30.57	15.47	30.00	41.01	38.80	13.19	29.31	39.17	40.68

Monitoring Well	Water Table Elevation in Feet										
	BXS-1	BXS-2	BXS-3	BXS-4	MW-1	MW-2	MW-3	MW-4	HCMW-5	HCMW-6	HC-MW-7
Top of Casing Reference Elevations	**99.59**	**99.77**	**98.99**	**100.34**	**104.4**	**102.86**	**103.04**	**101.97**	**100.63**	**103.25**	**101.68**
Sampling Date											
8/1/1990	63.79	64.97	67.39	84.74	77.90	64.36	66.84	(2)			
8/1/1991	64.65	65.98	68.28	85.03	77.32	64.87	67.90	(2)			
10/1/1991	NM	NM	66.02	NM	NM	NM	65.59	(2)			
3/1/1992	64.43	65.05	67.93	90.28	82.90	62.30	(1)	(2)			
8/1/1992	59.67	60.92	63.22	82.73	71.43	58.03	(1)	(2)			
3/1/1993	58.89	59.55	61.68	84.17	75.82	57.32	(1)	(2)			
6/1/1993	58.98	(1)	NM	NM	NM	57.34	(1)	(2)			
9/1/1993	57.24	58.13	NM	NM	71.00	55.66	(1)	(2)			
12/1/1993	56.02	56.84	NM	NM	NM	NM	(1)	(2)			
8/15/1994	56.74	57.84	59.20	81.28	70.95	55.12	56.80	(2)			
11/30/1994	54.68	56.12	57.13	NM	77.86	NM	59.88	87.23			
2/16/1995	59.42	60.46	62.35	86.43	81.09	57.57	60.67	88.67			
4/27/1995	61.19	62.18	64.76	87.50	81.12	59.27	62.25	90.61			
8/1/1995	59.20	60.37	62.71	82.75	74.27	57.49	59.96	86.97			
10/10/1995	58.13	59.11	60.81	84.73	75.94	56.30	58.87	89.70			
1/11/1996	61.31	61.99	64.56	88.15	81.45	59.29	62.44	92.18			
4/18/1996	68.39	64.57	67.46	(3)	77.61	61.51	64.16	90.27			
7/18/1996	62.93	64.01	67.00	84.40	76.15	61.12	64.26	88.15			
9/25/1996	60.78	61.92	64.64	85.49	74.83	59.10	61.09	89.87			
1/14/1997	66.07	66.94	69.73	92.20	84.72	63.93	67.44	94.96			
4/9/1997	71.36	71.95	75.77	90.20	82.12	69.51	72.16	91.30			
8/6/1997	68.60	69.81	73.70	86.69	79.90	66.67	69.25	88.97			
10/6/1997	66.32	67.64	70.70	86.61	77.38	64.33	66.89	90.10			
1/15/1998	66.40	64.83	70.77	89.40	81.15	64.08	67.05	92.74			
4/15/1998	68.67	69.89	73.21	88.89	80.79	66.51	69.09	91.30			
7/15/98	66.38	67.73	70.95	85.87	77.15	64.31	67.03	89.12			
10/6/98	62.96	64.30	67.40	83.91	72.89	60.97	63.47	88.02			
1/12/99	63.54	64.63	67.42	88.16	80.65	60.98	64.86	91.82			
4/13/99	67.80	68.96	72.38	88.94	81.34	(3)	68.59	91.15			
7/21/99	67.33	68.71	72.03	87.56	79.86	65.06	68.02	89.92			
10/4/99	64.72	66.04	69.44	84.69	75.26	62.62	65.22	88.16			
10/25/1999	63.83	64.23	68.42	84.87	74.40	61.85	64.24	88.78	71.32	64.08	61.00

Notes:
(1) Data are not reported.
(2) MW-4 not installed until 1994.
(3) Reported elevation inconsistent with water elevation history.

Monthly Precipitation and Groundwater Elevations in Arlington, WA

3-Month Precipitation Averages



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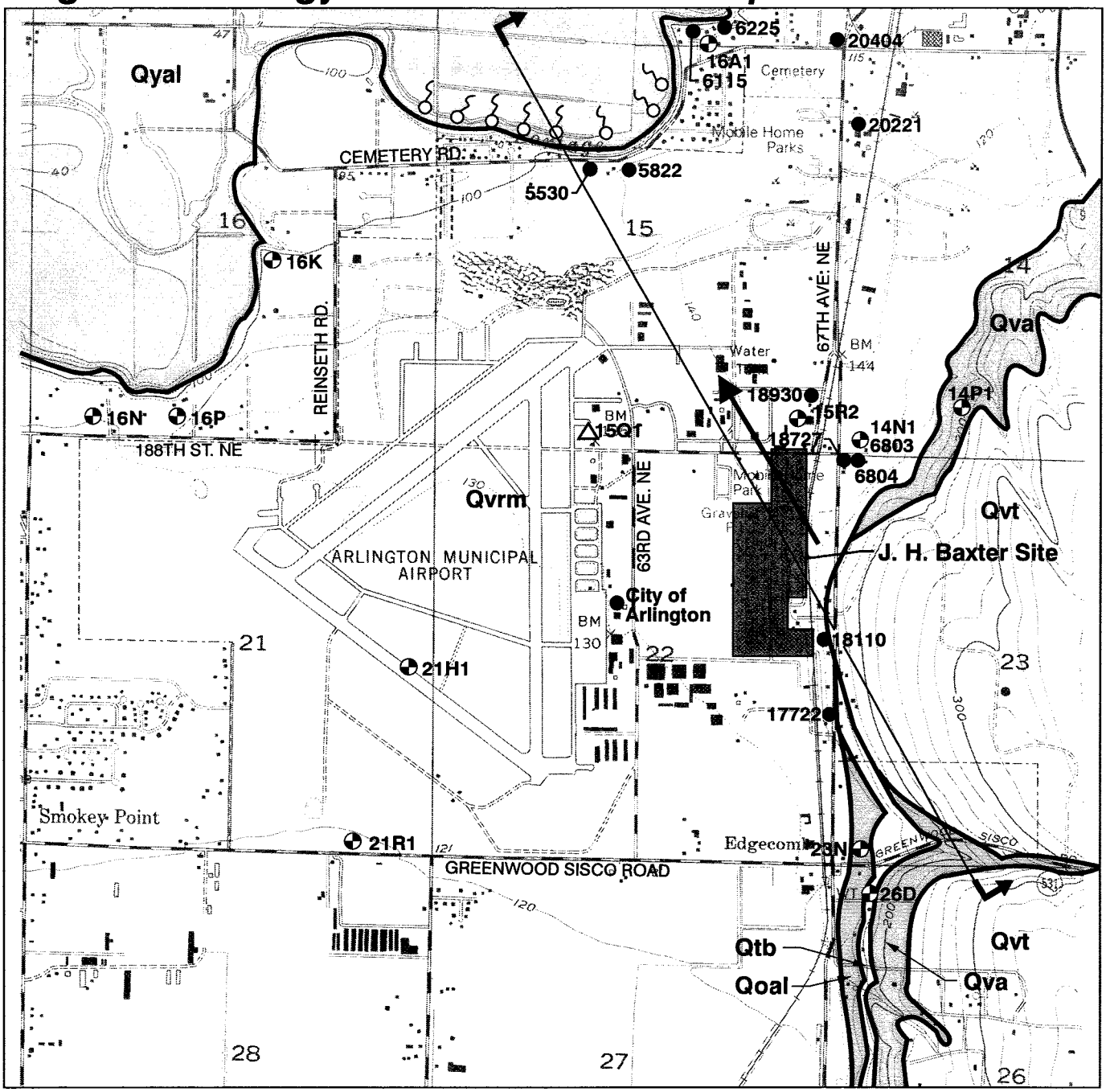
J-7026-01 9/00

Figure 6

core\\702601\\PRECIP2

ATTACHMENT K
GROUNDWATER FLOW DIRECTION AND AREA WELL LOCATIONS

Regional Geology and Well Location Map



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Notes:
1. Base map prepared from USGS 7.5 minute quadrangle map of Arlington West, Washington, dated 1981. Township 31N, Range 5E.
2. See Figure 5 for definitions of geologic units.

0 2000 3000
Scale in Feet

16A1 Well Log Available from Dept. of Ecology or Newcomb (1952); Well may be abandoned.

6803 Field Located Well (Number Identifies Well Address)
No log available, see Table 1.

△15Q1 Ecology Log for Anode Well

Regional Cross Section Location

Seep

Estimated Groundwater Flow Direction from Site Data and Regional Data

N

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J-7026-02 9/00

Figure 3

ATTACHMENT L
SNOHOMISH COUNTY HEALTH DEPARTMENT
FIELD NOTES - 1990 BUTT TANK SPILL

SNOHOMISH HEALTH DISTRICT
Courthouse
Everett, Washington 98201
(206) 339-5250
FIELD INVESTIGATION REPORT

Date R .: 1/29/90 Checkback_Due
Rec'd By: JRD/sei 2-17 ✓
Complaint Number: 900109 2-16
Area: 1 3-14

Address_of_Complaint | ZIP
6520 188th St NE, Arlington | 98223

Person_Causing_Complaint: J. H. Baxter Co.
Cause_Phone:
In_City:

Nature_of_Complaint

[ ] Solid Waste [ ] RV_Mobile_Pa [1] ChemPhys_Hazard [ ] Vector [ ] Misc
[ ] Prom_Dump [ ] Camps_Parks [ ] Watersport [ ] School [ ] Pending

Complaint received 1/28/90. Spill of pentachlorophenol (~6% solution in oil) at wood treatment plant.

Complainant: Emergency Management
Complainant_Phone:

Complainant_Address:

[ ][ ]

EHS _____ Date _____

Property Owner _____ Phone _____

Address _____ Tax Acc. # _____

Status

1/28/90 (2:30) Rcvd t.c. from Bob Pelech, who had been contacted by Mike Rozier of Sno. Co. Emer. Mgt. J. H. Baxter Co. had reported a spill of 6% pentachlorophenol mixed w/ oil. Apparently the incident occurred at 12:30 and involved ~ 2000 gallons of the material. I visited site (~3:00), viewed situation w/ Baxter personnel and DOE Spill Response Team (Craig Baker, Kevin Fitzpatrick). In the central area of the work yard is a pond and treatment tank which "burped" & "foamed" over, reportedly because water got

Abated/Completed: _____
Name Date

SERVICE RECORD

FAMILY NAME.....

Date	NOTES	Recorded by	Title
	into the system. The oil/parts spilled onto an unpaved, but hard packed area around the tank. Berms were constructed in an attempt to contain spill, a vacuum truck was brought in to suck up as much oil as possible. Oil soaked rock/soil was scraped back from tank, loaded by and oil recovered. Oil either placed back into system, and/or contaminated soil to be held for characterization/disposal. At does not appear that material has penetrated the top 1-2" of soil at this time. We asked Mike Spiro to pursue clean-up, obtain env. consultant to review site and determine need for further env. remediation — J. Osborne		
1/31/90	(in 50 mi) Again viewed site. Some of the material has migrated, on top of water, several hundred feet N and S of original spill area. Clean up still underway, several berms in place, does not appear that material can spread further. Went to NMED and spoke to Porter who		

SERVICE RECORD

AMILY NAME.....

Date	NOTES	Recorded by	Title
	has a ~70' deep well. Advised Mgr (Anthony Molle) my call strongly encouraged him to hook up pool to public water (available on the street). Also attempted to call park owners, but they are out-of-State for 4-5 weeks. Mr. Molle appeared interested in pursuing my suggestion. Attempted to trouble down the one additional well noted on the BAY SAN LF permit app. Interior was empty. Advised by two residents that all homes/businesses in area supplied by city water. Reportedly an old well near Summit was abandoned years ago.		
1/30/90	Letter to owners of MHP advising to connect to City of Arl. water.		
2/8/90	Revisited site. Clean up essentially complete - it does appear that most waste has been collected. Advised operations mgr. (Bob) to set out additional pads in some remaining "hot spots" (6 or 7 noted), and reported that I was concerned of potentially saturated dirt/soil in area directly east of the butt end tank. Left		

HD-5

SERVICE RECORD

FAMILY NAME.....

Date	NOTES	Recorded by	Title
	card, message for Mike Spies to contact me		
2/9/90	Rcd. t.c. from Mike Spies. He will continues to mop up hot spots, and will clean up (i.c. wash + recover pinta) from area east of butt end trnk CB-7		
2/14/90	Rock / soil scraped from area east of release and put in pile surrounded by berms. Mgr. will reportedly pressure wash + recover pinta. All other areas appear to be fairly clean, in some areas discussed the need to remove top 1-2" of soil for disposal (would result in a relatively small volume of waste dirt). I discussed this matter w/ Craig Baker earlier this week. He will check back to make sure clean ups completed. I will view area of pinta spill when Bldg 5 Landfill is inspected next month to verify as well. CB-30		
3/15/90	Clean up appears to be substantially completed. DOE to follow through if remedial site action, if needed. No further action taken at this time. Signed Off		

HD-5

ATTACHMENT M
MOBILE HOME PARK WELL CHEMICAL RESULTS

SNOHOMISH HEALTH DISTRICT

Serving the Public Health of Snohomish County and its Incorporated Cities and Towns

M. WARD HINDS, M.D., M.P.H.
Health Officer

Vital Statistics	(206) 339-5280	Administration Office	(206) 339-5210
Clinic Service	(206) 339-5220	Community Health Division	(206) 339-5230
Sanitation Program	(206) 339-5270	Environmental Health Division	(206) 339-5250

FAX (206) 339-5216

March 23, 1992

Robert and Virginia Bertilson
14301 8th Avenue N.E.
Marysville, WA 98270

Subject: Pentachlorophenol Testing, Airway Mobile Home Park Well

Dear Mr. and Mrs. Bertilson:

At the request of the J. H. Baxter Company and with your permission, Jeff Colon of our department drew a water sample from the Airway Mobile Home Park well on January 15, 1992, and hand delivered it to Laucks Laboratories for analysis of pentachlorophenol. The sample was drawn from the spigot adjacent to the south side of the pump house after allowing the water to flow for a period of ten minutes. This sample was analyzed for pentachlorophenol using a highly sensitive analytical method capable of detecting 0.10 parts per billion. Testing was paid for by the J. H. Baxter Company. No penta was detected (analysis results enclosed).

Although this result is promising, the groundwater beneath the Baxter site has been determined to flow northwest, creating potential for the migration of contaminants from the Baxter site toward your well. The J. H. Baxter Company is aware of this impending problem and, we are told, has offered to pay the cost of connecting the Airway Mobile Home Park to Arlington city water.

In the interest of public health, I again encourage you to connect the mobile home park to city water. This appears to be the best available alternative for ensuring a safe supply of drinking water for the residents of your mobile home park.

If you should have any questions regarding this matter or the analysis, please feel free to contact either Jeff Colon or me at (206) 339-5250.

Sincerely,

Jeffrey R. Defenbach, Supervisor
Environmental Health Division

JRD/JC:dmb

Enclosure

cc: Steve Hulsman, Washington Department of Health
Mike Gallagher, Washington Department of Ecology
Mike Spies, J. H. Baxter Company

Laucks 84 years
Testing Laboratories, Inc.
940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063

Chemistry, Microbiology, and Technical Services

CLIENT: J.H. Baxter Co.
3020 Rucker Ave. Ste 102
Everett, WA 98201-3971

ATTN : Jeff Colon

Work ID : J.H. Baxter Company
Taken By : Snohomish Health Dist.
Transported by: Hand Delivered
Type : Water

Certificate of Analysis
Work Order# : 92-01-693
DATE RECEIVED : 01/15/92
DATE OF REPORT: 01/28/92

SAMPLE IDENTIFICATION:

	Sample Description	Collection Date
01	AMHP-1	01/15/92 02:30

CC: J.H. Baxter Co.
P.O. Box 305
Arlington, WA 98223
ATTN: Georgia Baxter

COMMENTS ON PCP ANALYSIS:

The surrogate Tribromophenol was added to both the sample and the method blank for the purpose of monitoring sample handling and extraction efficiency. Control limits for recovery of this surrogate are 21-160%. Recoveries were:

Sample 9201693-01	96%
Method Blank	96%

FLAGGING:

The flag "U" indicates the analyte of interest was not detected, to the limit of detection indicated.

Laucks 84 years
Testing Laboratories, Inc.
940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063

Chemistry, Microbiology, and Technical Services

CLIENT : J.H. Baxter Co.

Certificate of Analysis

Work Order# : 92-01-693

Unless otherwise instructed all samples will be discarded on 03/21/92

Respectfully submitted,
Laucks Testing Laboratories, Inc.

J. M. Owens

Laucks 84 years
Testing Laboratories, Inc.
940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063
Chemistry, Microbiology, and Technical Services

CLIENT : J.H. Baxter Co.

Certificate of Analysis

Work Order # 92-01-693

TESTS PERFORMED AND RESULTS:

Analyte	Units	01
Pentachlorophenol	ug/L	0.1 U

Laucks 84 years
Testing Laboratories, Inc.
940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063
Chemistry, Microbiology, and Technical Services

APPENDIX A

Method Blank Report

Laucks 84 years
Testing Laboratories, Inc.
940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063
Chemistry, Microbiology, and Technical Services

Quality Control Report
Method Blanks for Work Order 9201693

Blank Name	Samples Verified	Test Description	Result		Units	Control Limit
B011692_GSV_W01	1	PCP_W	0.10	U	ug/l	0.20

Method blank results for multi-analyte tests appear directly after this report.

A method blank can validate more than one analyte on more than one work order. The method blanks in this report may validate analytes not determined on this work order, but nonetheless determined in the associated blank.

Because they validate more than one work order, method blank results are not always reported in the same concentration units used for sample results.

* = blank exceeds control limit

CHAIN OF CUSTODY RECORD

DATE 1/15/92 PAGE 1 OF 1

Laucks
Testing Laboratories, Inc.
940 South Harney St. Seattle, Washington 98108 (206)767-5060

THIS INFORMATION WILL BE USED FOR REPORTING.

NAME: Snohomish Health District
ADDRESS: 3020 Rucker Ave., Ste 102
Everett, WA 98201-3971
ATTENTION: Jeff Colon
PROJECT NAME: J. H. Baxter Company
JOB/P.O. NO.:
SAMPLER (SIGNATURE) (PRINTED NAME)

LAB NO.	LAB SA #	SAMPLE NO.	DATE	TIME	LOCATION	Pentachlorophenol	NO. OF CONTAINERS	OBSERVATIONS, COMMENTS, SPECIAL INSTRUCTIONS
		AMHA-1	1-15-91	2:30	HB -- A. MHP		2	

TESTING PARAMETERS

RELINQUISHED BY: Jeffrey S. Colon — DATE 1/15/92 — TIME 4:30 pm
SIGNATURE
PRINTED NAME: JEFFREY S. COLON
COMPANY: Snohomish Health District

RECEIVED BY
SIGNATURE
PRINTED NAME
COMPANY
DATE
TIME

RELINQUISHED BY
SIGNATURE
PRINTED NAME
COMPANY
DATE
TIME

RECEIVED BY: K. Laucks
SIGNATURE
PRINTED NAME: LAUCKS TESTING LABS
COMPANY
DATE 1/16/92
TIME 4:30

TOTAL NUMBER OF CONTAINERS:

INSTRUCTIONS:
1. Shaded areas for lab use only.
2. Complete in ballpoint pen. Draw one line through errors and initial.
3. Be specific in test requests.
4. Check off tests to be performed for each sample.
5. Retain final copy after signing.
6. Provide name and telephone of your contact person.

NAME
TELEPHONE

SHIPMENT METHOD:

SPECIAL SHIPMENT, HANDLING OR STORAGE REQUIREMENTS:

BILLING INFORMATION, IF DIFFERENT
NAME J. H. Baxter Co.
ADDRESS % Mike Spies
P. O. Box 305
ATTN: Arlington, WA 98223

ATTACHMENT N
COMMENTS ON J.H. BAXTER REMEDIAL INVESTIGATION REPORT DRAFT, DATED MARCH 10, 2000

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 10
1200 Sixth Avenue
Seattle, Washington 98101

19 May 2000

MEMORANDUM

SUBJECT: Comments on J H Baxter Remedial Investigation Report Draft, dated March 10, 2000

FROM: Rene Fuentes, Hydrogeologist
Office of Environmental Assessment

TO: Cheryl Williams, Project Manager
RCRA Compliance

I have reviewed the Draft Remedial Investigation Report (DRI) and some other background documents and letters related to this site, as you requested. Based on that information I have a number of comments on the DRI.

General Comments

1. A Remedial Investigation report should summarize all the information and data that is known and documented for a contaminated site, but this report ignores most of the data obtained prior to 1999. The investigation should also attempt to meet the objective of fully characterizing the site over the entire space and time of concern, which should include the entire facility history, and the likely distance which the contaminants may have traveled during that period. Since this DRI seems to have many major data gaps due to the limited sampling carried out, and also due to the limited period of time covered by the other data presented, both of these factors need to be addressed before this DRI can be considered a credible statement of the extent of contamination and a full characterization of the contamination from this facility. This report presents a conflicting picture -- there appear to be several major sources of contamination at this facility which would require a more detailed characterization to fully understand and remediate, but there is very limited contaminant sources and ground-water contamination characterization presented in the report. The DRI also appears to discount much of the currently existing and past contamination, both presently underneath the facility, and also probably uncontrolled releases that have gone beyond the facility boundary. This combination of factors produce a somewhat limited conceptual model of the extent of contamination caused by the sources at the facility. As presently written there is insufficient data used in this report to support the conclusion that there are not major contamination problems, given the

many years of pentachlorophenol (PCP) treatment and the history of discharges and product spills at the site. Therefore, the concept that major contamination exists at the facility, and beyond the facility's boundary, must be maintained as the hypothesis from which we need to proceed with future work. That hypothesis has not been ruled out by the data presented thus far.

2. The site data presented in the DRI documents that concentrations of PCP presently vary widely within relatively short distances, as indicated most clearly by the monitoring points available near the "butt treating plant", where the concentrations range from 58,000 µg/L in BT-S-GW to 0.5 U µg/L in MW-1, during October 1999. This large variability within a short lateral distance (about 100 feet in figure 5) near one source area, indicates that it is unlikely that, given all the many known and potential sources at the site (spills, butt tank area source, and many french drains which drain the site directly into the ground water aquifer), a single off-site well (HCMW-7) is sufficient to characterize the potential plumes going off site. Similarly, there are too few data points to understand the on-site contamination.

3. There needs to be more vertical and horizontal definition in the contaminant sampling, not just, for example, one sample from a well which has a twenty foot screen length, in order to adequately characterize the vertical contaminant distribution so that supportable conclusions can be drawn from the data. PCP has a specific gravity much greater than water, and there should be some discussion of that characteristic in the text and the conceptual model, supported by sufficient vertical sampling to document that the PCP is not sinking, going below the monitoring well screens, and therefore, not being sampled. Similarly if the PCP and the oil are mixed in the treatment process, the DRI should consider a combined PCP/oil product which would then float as an LNAPL, and there should be discussion and sampling for LNAPLs in addition to the dissolved PCP sampling.

4. There is a lack of sufficient monitoring wells both on-site and off-site, especially given that there may be a ground water divide on the south side of the site, and the gradients do not seem to have been fully characterized for different seasons. The fact that the gradients turn from westward to northward near the butt tank area, and the fact that these gradients may still be shifting near the northern boundary of the site is one major cause for concern that the gradients have not been characterized sufficiently to understand the direction of flow of the contaminants. Similarly, there is no data to characterize the gradients from the south side of the facility.

5. The DRI contains a mixture of data sets which are not clearly comparable to each other, and it is not clear what the rationale for the selection of the sampling locations and method of collection was. For example, there are many borings in areas which are documented to be highly contaminated, but the only samples were taken of the boring water and no permanent monitoring wells were ever installed. In addition, it is hard to understand why samples taken of the water from the french drains were composited. Also, arguments were made that turbidity affects the concentration of the water which

infiltrates past the french drains, but no monitoring wells have been installed to provide data from those areas that would be comparable to data from other monitoring wells, so that this issue of contamination to the ground water can be verified or disproved based on data collected directly from wells. In addition, many wells have very long well screens, or are screened too deep, which probably decreases the reliability of the data obtained from those water samples. A more complete routine sampling schedule, with more consistent sampling points and sampling techniques, needs to be adopted by the facility to develop a reliable ground water data set, including collecting samples during different seasons and at different water levels.

6. It is not clearly documented in the DRI that other directions of surface or ground water flow (south or southwest) have been studied, but it is possible that there may be other flow directions from the site given an apparent surface water drainage basin to the south and a nearby City of Arlington pumping well west of the site. In addition to the DRI, the Stormwater AKART Analysis done for J.H. Baxter by AGI Technologies, dated July 30, 1997, states that "it is believed that the shallow groundwater table in the site vicinity serves as a steady recharge to Quilceda Creek and that discontinuing infiltration may have an adverse effect on the hydrologic cycle and ultimately on fish and wildlife." Therefore, this data gap needs to be filled to assure that there are no other directions of flow for the water and potential contaminants to leave the site.

7. There appear to have been numerous spills and/or disposal activities occurring at the site over its history. The number of french drains into the upper aquifer are numerous, are spread over a large area, and it seems that not all of these french drain discharge areas have been monitored in the ground water. This is a major data gap which will need to be filled in for the characterization to be considered acceptable.

8. It is implausible, given the many documented and potential source areas, that a couple of wells more or less randomly located can be expected to locate and adequately characterize the potential plumes. A more complete characterization, perhaps using some type of push technology sampling technique, should provide a better characterization of the areas of concern, vertically and horizontally, to determine whether there are major plumes above the clean-up criteria, where permanent monitoring wells should be located. Note that the MCL for PCP is 1 µg/L. Since, even with the limited data presented in the DRI, there are several locations near the edge of the facility where PCP has been documented at levels many orders of magnitude above that value, it should be expected that there are plumes exceeding the MCL in many locations.

9. It is clear that all the data available for the J.H. Baxter site is not included in the DRI, and this is misleading and unacceptable. Using other data report, such as the Stormwater AKART Analysis, which was generated for J.H. Baxter, or the Site Assessment Report from WDOE, it is easy to develop a totally different conceptual model of the site, including that contamination of the soil and ground water has occurred in multiple locations, and that the extent of that contamination should be beyond the facility

boundary. While the DRI seems to develop a very benign picture which shows MW-2 at the north end of the site with 2 µg/L of PCP in 1999 (Figure 20), the Site Hazard Assessment report, with Woodward-Clyde Consultants data tables, indicates a value of 150 µg/L in one well in 1990, and concentrations in another well of 440 µg/L at the property boundary in 1991. These two totally different data sets create two totally different conceptual models to use to study the site, and raises questions about the validity of the conclusions in the DRI regarding the potential extent of contamination. The present data set which has value of "ND" in HCMW-7, located as far north as MW-2, but located about 300 feet to the west may just indicate that the plume has not been sampled by this well. The ground water concentration for PCP of 2 µg/L at well MW-2 could mean any number of things, including that the data represents sampling just the end of the plume that moved away from that source area, or that the PCP plume is now above, below or to the side of the present water sampling depth or well location. The point of this comparison (1990 data to 1999 data) is that, at a minimum, all the data available for the site needs to be used to develop an acceptable RI. These data should be included in this report, and used with all the other data available, to create a more complete and realistic conceptual model of the potential extent of contamination. It is clear that there is also a need to do much more additional sampling to define the vertical and horizontal extent of the contamination.

10. Additional sampling should include PCP and potential break-down products and other potential contaminants of PCP. In addition, other contaminants, including potential by-products of PCP (such as chlorohydroquinones) should also be included since there is no evidence that indicates that if PCP has been degraded it is into more benign compounds. Future reports must also include more complete interpretation of the conventional parameters and major ions data, both as tracers and as supporting evidence of dilution or other mechanisms of attenuation. While some samples were taken for a few conventional parameters, and analyses were carried out by the laboratory, not much use is made of that data in this report.

11. It is not clear what samples have been taken for LNAPL and whether these samples have been analyzed for all the key parameters listed above (and including dioxins and furans). The report should separate and identify the different media (ground water, soil, NAPL, etc), areas sampled and parameters of concern in the text, the tables, and the figures. Once the data is presented in a form that it is easily found in the report, then composite concepts and figures can be created with all the relevant data sets to support them.

12. The maps used in the report indicate that they were created from a survey, but there needs to be a supporting table(s) of the field surveyed locations (state plane coordinates) for all the other key points shown on the maps (wells, borings, french drains, source areas, survey bench marks, etc.). Since there is no supporting evidence of any of these data, it is hard to determine the reliability of their mapped locations or any related feature features outside the facility map (distances, nearby houses and wells, etc.). This lack of

confidence on the uncertainty of locations adds a further complication to any calculations made to calculate travel times, size of plumes, and other such calculations.

13. I include in the specific comments listed below major issues which I have found with the DRI, but these comments are not supposed to take the place of the complete, formal MTCA review which I expect WDOE will do on the report submitted to them. However since there are so many problems and deficiencies I strongly suggest that a new draft be prepared and re-submitted for review before a final is submitted for agency acceptance. This revised document will probably still indicate further proposals for characterization, but it will present an entire picture of what has occurred at the site and the data to support the characterization to date. It would be helpful to have a list of where these comments are revised in the report.

Specific Comments

14. The report should have separate sections which discuss soil, ground water, and NAPL. It appears that some of the values presented should be LNAPL but they are not discussed as such in the DRI. The concentrations presented for BT-S-GW and BT-W-GW which are listed as ground water samples in Table B-3 (Chemical Results for Groundwater Samples), have very high concentrations of TPH and are likely to be LNAPL. I am providing this comment first and out of sequence with the other specific comments because I found the report hard to follow due to the mixing of media and how the data is presented in the text, tables, and figures. The report should be structured so that the reader does not have to hunt for the major data pieces which support the conceptual model of the site. In addition the report should include an electronic file with the data presented in it to allow different interpretations of the data presented.

15. Page 1. It is not clear what the three parcels are. Is parcel C the facility to the north which I have seen in a map?

16. Page 2. The scope of the investigation as presented in the scope of work seems very limited given the likely extent of contamination as explained above in the general comments, and unlikely to be sufficient to characterize the contamination.

17. Page 3. It is not clear how much PCP was spilled in the 1990 Butt Tank spill, or where that was disposed of after clean-up. That should be documented in the revised report. Similarly all other known past spills and disposal areas should be documented, and referenced to original documents. Similarly all known ongoing contributions to contamination on site should be documented.

18. Page 4. It is not clear that the "former butt treating thermal tank" area has been carefully located or fully investigated. Since this seems to be one of the major sources known to exist at the site it must be fully investigated.

19. Page 5. It is not clear why the infiltration was calculated assuming no runoff, and whether this is or is not expected to be more conservative for the contaminant migration. Also, if the precipitation occurs mostly in the winter in this area, and is routed to french drains, it is not clear why the majority of the precipitation is not considered as recharge, without a large proportion (about half of the precipitation in this case) being allocated to evapotranspiration. Since this is a facility with little vegetative cover, there is no reason to assume that most of the precipitation is not directly recharged to the aquifer.

20. Page 9. Text gives a flow rate range of 0.4 to 5 ft/day, which translates into 150 to 1500 feet per year. Such information should be used to determine what the likely extent of the PCP or degradation products of the plume could be since a documented plume was at the facility boundary prior to 1990.

21. Page 9. It is not clear where the lag time estimates come from or what it is based on. How is this related to the paragraph previous to it which has ground water flow rates of 150 to 1500 ft/yr? Does this estimate include the infiltration from the french drains which the facility has been using? Until this issue is resolved to the satisfaction of the agencies this paragraph should be removed because it is potentially misleading.

22. Page 11. The concept of using MTCA Modified Method B for the cleanup levels is simply an unacceptable concept. While the facility itself may be an industrial setting, the land adjacent to it is residential and the water supply wells need protection unrelated to the facility zoning. Therefore, this statement and related concepts must be removed from the DRI and the concept of using the ground water MCL of 1 µg/L needs to be incorporated into the report for any areas beyond the facility boundary now, and for the entire aquifer after remediation of the contamination caused by the facility.

23. Page 15. Dioxin may be hydrophobic, but since PCP is normally applied as a mixture with oil there needs to be some more work to determine whether dioxin has migrated to the ground water with the oil mixture, and whether the oil/PCP mixture is remaining in site or migrating. It is not clear from the data collected if any LNAPL was sampled, and if it was, it is not clear if any LNAPL collected at the site has dioxin contamination. Similar issue for furans.

24. Page 16. It is interesting to note that in BT-W a product sheen was noted from the "shallowest sample to the deepest sample collected beneath the water table sample at 32 feet", but it is not clear why there were no more samples beyond 32 feet until there was no detection of contaminants in a vertical direction so that the complete vertical extent of the contamination could be determined and documented. It is unclear that this source area has been fully characterized. This appears to be another major data gap that needs to be resolved.

25. Page 20. The report states that PCP in MW-2 is "less than 10 µg/L", but as stated above, this seems to be based on a limited data set, and it is unclear whether the changes between these data and the 1990 data are due to true decreases or due to changes in sources or gradients from source areas to that well or to some other factor.

26. Page 20. While the concern about turbid samples may be true, such that more turbid samples give higher PCP concentrations, it should be noted that PCP is not expected to be present in normal soil background. Given that PCP may be correlated to turbidity, which is not necessarily accepted as valid given the correlation data presented in this DRI, it may be necessary to obtain more such "turbid" samples from wells and future sampling points to more carefully delineate the path of the contaminant plume in the past. At a minimum this should be carefully considered and discussed with the WDOE as a potential approach in the future studies at this facility.

27. Page 22. Again, the case is made that high PCP concentration may be associated with turbidity in MW-2. Since PCP is not expected to be found in background soils, unlike some metals, the presence of PCP should be taken as a source of contamination, and not as a sampling outlier which should be removed by changing to different sampling techniques.

28. Page 26. It is not very useful to debate the merits of PCP degradation based on modeling results since neither the site characterization, nor the modeling based on that characterization data can be considered very reliable at this point. There is no apparent reason to extrapolate that based on not finding high concentrations of PCP in a few wells there is sufficient data to determine biodegradation rates of PCP. In addition, as stated above, the degradation of PCP may only indicate that we have different toxic compounds which have been overlooked and which need to be included in future analyses.

29. Page 27. The issue of risk associated with PCP in ground water is not acceptable as presented. The characterization of the plumes needs to be continued and improved until we fully understand the extent and rate of migration of any PCP plume, and its break-down products, and then determine whether there are any drinking water supplies or ecosystems endangered by it.

30. There should be a more detailed map similar to Figure 3 which includes all the supply wells in the area, and which documents in detail how the wells were or were not found. If Portage Creek is considered a discharge boundary for the plume it needs to be documented with actual ground water data. If the plume is likely to go beyond the Creek, then nearby wells found on the north side of it should also be included in the mapping and sampling. Similarly, if Quilceda Creek is determined to be a discharge boundary for the south side of the site similar concerns have to be investigated there.

31. Figure 5. It is unclear how the Penta Storage location can be placed at the northern end of the facility boundary and not to have any monitoring points around it. This area should

be considered a source area until proven otherwise. Some soil and ground water monitoring of that area should be considered, and if it has been done it should be included in the DRI. Similarly, there should be some monitoring wells near and to the west of the retorts and tank farm area.

32. Figure 6 and 7. The wells used for background BXS-4 and MW-4 seem to be much deeper relative to the water table surface than the other wells nearer to the treatment area. That may present a problem with the detection of any contamination from the Parcel B area and may make any comparison to background questionable.

33. Figure 6, 7 and 8. The water elevation in the wells has varied by many feet over the years presented (about 15 feet between 1994 and 1997 in some wells). This variability makes any comparison of water quality and gradients very difficult. To verify the actual gradients it may be necessary to install transducers or go to a more routine (weekly) water level monitoring schedule. Water quality may have to be compared to periods where the well has had similar water elevations rather than just to the previous water samples in order to provide reasonable comparisons of the data to show trends. It is not clear why BT-S and BT-W were not completed as monitoring wells since these borings appear to be located near the source areas. Wells in the source areas should be installed soon to attempt to characterize the sources and begin to have a data set of those areas.

34. Figure 10. It seems that this figure is somewhat optimistic at considering such limited data as a valid determination of the K_{oc}.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 10
1200 Sixth Avenue
Seattle, Washington 98101

July 26, 2000

MEMORANDUM

SUBJECT: Review Comments on the March 10, 2000, J H Baxter Draft Remedial Investigation Report

FROM: Julius U. Nwosu, Toxicologist
Office of Environmental Assessment

TO: Cheryl Williams, Project Manager
RCRA Compliance

Please find below my review comments on the 2000 Draft Remedial Investigation Report (DRI). My comments are based on the DRI and other site related documents made available to me.

Purpose of the Review

The purpose of my reviewing this document is to ascertain if current and past practices at the Baxter Facility resulted in the contamination of groundwater in the areas near the site and vicinity, and also to determine if the contamination poses any threat to human health and the environment.

General Comments

1. It was not clear why conclusions were drawn concerning the non detection of pentachlorophenol (PCP) at HCMW-7. In May 1990, PCP at a concentration of 150 ppb was detected in a well on the northwest corner of the property, but no well identification information was mentioned in the document (Ecology Site Assessment Report). Also, in August 1991, PCP at a concentration of 440 ppb was detected at MW-3, during the same period (Ecology Site Assessment Report). Based on the information provided, it appears that only one well exists between BXS-1 and HCMW-7, and also the concentrations of PCP detected in some of the nearby wells (MW-2 and MW-3), exceeds State and Federal groundwater regulatory limits for PCP (Groundwater Regulatory limit- MCL for PCP is 1 ppb) [Ecology, 1999; EPA, 2000]. Therefore, it appears that groundwater

characterization in the northeast corner of the Baxter Facility is inadequate. In addition, the data provided in the report does not support the assumption stated in the DRI that the PCP plume is only confined to the areas within the site boundaries.

2. The fate and transport model (pages 25-26 of the DRI), seemed to show that the source most strongly contributing to the detected PCP in groundwater at MW-3 seems to be the LNAPL beneath the Butt Tank and in the SB-6 area. The French drains also appear to represent a surface pathway for PCP to reach groundwater at the site, but were not mentioned in the DRI as a contributing source to groundwater contamination. Based on limited site data, the DRI concludes that groundwater at the site flows toward the northwest; if this is true, areas around MW-3 and vicinity are the likely recipients of any PCP contained in the plume along that flow path. The DRI (Page 4) also indicated that there are several active wells in the site vicinity, however, it was not clear whether these wells were directly located downgradient of the site, and why no PCP monitoring data exists for these wells.

3. It was stated in the DRI that PCP migrating offsite posed a potential source of groundwater contamination in the area. It was also stated in the DRI that no PCP was detected at HCMW-7(the one well offsite which has been sampled), which is located approximately 300 feet downgradient from the site. Using this limited data, it was concluded that there is the possibility of PCP "attenuation" taking place prior to the contaminated groundwater reaching any existing wells, therefore mitigating the potential for offsite contamination of groundwater by PCP. Based on this limited data, it was suggested that the PCP in groundwater at the site does not pose any current threat to human health (Page 27 of the DRI). Without additional monitoring well data, this statement lacks support.

4. Page 22 of the DRI contains the following statements: "*Although dioxin concentrations detected at MW-2 were above screening levels, given the strong association of dioxin compounds with suspended solids, the January 2000 dioxin concentration detected at MW-2 may still be associated with suspended solids.*" This statement conveys that the dioxin that is present in groundwater at the site may not be free, that is, the dioxin is tied up by suspended solids. Though high total suspended solids (TSS) may be associated with high turbidity, it is not generally true that most hydrophobic compounds in highly turbid environments are all tied up; it appears that the undissolved fraction will have a higher affinity for suspended solids than the dissolved fraction. Notwithstanding, in January 2000, **2.5 pg/L** dioxin was detected in MW-2; this is approximately **four times** higher than the current screening level of **0.6 pg/L** (Ecology, 1999). Thus, regardless of what the groundwater TSS values are, the detected dioxin concentrations should be the basis for any groundwater risk management at the site.

Specific Comments

1. Page 1. It was stated that the Baxter Facility is located in an area zoned industrial. However, the information provided in the DRI shows that there is a residential neighborhood close to the facility boundary. The Facility appears to be located in a mixed-zoned area which is not strictly industrial, therefore, it is appropriate to apply a residential cleanup standard when making any cleanup decisions.

2. Page 2. The current scope of the investigation as presented seems to be very narrow. Given the likely nature and extent of the contamination at the site, the scope should be broadened to deal with all the contaminant issues around the site including potential offsite contamination. In addition, the process should clearly demonstrate what the remedial investigation (RI) intends to accomplish, and the underlying limitations, such as, groundwater data collection and plume characterization. Nevertheless, a broad investigation of the nature and extent of contamination at the site should be the main focus.

3. Page 3. It was not clear how the 1990 Butt Tank spill was handled. No record is presented in the DRI of how the spill happened or what contaminants were contained in the spilled material, even though it appears that the spills are the main focus of the investigation. A review of the information presented in the DRI from Baxter and the Snohomish County Health District about the PCP/oily solution spill seems to be incomplete. This is because there was no adequate chemical profile of the substance(s) or other supporting evidence made available concerning the spill.

4. Page 4. There is no evidence presented in the DRI or any other document that supports the claim that the "stained soil areas" detected by aerial photographs in the northeast and southeast areas of Parcel A are primarily vegetation. It seems some of the "dark ground" appearing in the photos may have been caused by spills from site activities.

5. Page 4. The area well water inventory as presented in the DRI did not state what the PCP levels were in 1990 before the mobile home park was connected to the City of Arlington water supply. It seems like some information gaps exist regarding the mobile home park wells; it would be valuable to see all the well inventory data and also the results of the chemical analysis performed on these wells during the 1990 inventory and prior to 1990.

6. Page 4. The Sweet-Edwards field survey of 1988 identified several wells that may still be used by the residents as drinking water sources or for irrigation. Residential wells 25, 26, 27, 28, 29, 35 and 32 are situated along the eastern fringes of the Baxter facility, and no monitoring data is provided for these wells (EMCON, 1989). Of particular interest is the well on the Loughnan property, which is near Catch basins 18, 19, 20 and MW-4.

PCP was detected in MW-4 at a concentration of 0.60 ppb in April of 1995 (Table A-2, page 43 of the DRI). Since the groundwater on the Southern portion of the site has not been adequately characterized, the potential exists for PCP and dioxin from contaminated groundwater on-site to migrate to the well in the Loughnan property and other residential wells along the eastern boundary of the Baxter Facility. It is not clear why this potential is not explored comprehensively in the DRI.

7. Page 5. In August 1990, PCP at a concentration of 440 ppb was detected in MW-3 (Woodward-Clyde, December 1990). Also, during the same period, 52 ppb PCP was detected at BXS-1. With the 1990 data in mind, it becomes clear that an adequate groundwater characterization is needed (i.e., installation of new monitoring wells) in the areas north of BXS-1 and vicinity in order to fully characterize the nature and extent of groundwater contamination at the facility and beyond the facility boundaries.

8. Page 7. It was mentioned in the last paragraph of the Hydrologic setting section of the DRI (page 5), that the closest surface drainage feature near the Baxter Facility is Portage Creek, a tributary to the Stillaguamish River. According to this document, it appears that this Creek is the likely discharge point for groundwater from the outwash aquifer. The DRI documents a flow rate range of 0.4 to 5 ft/day (which is 150 to 1,500 feet per year), therefore, it seems likely that the plume is moving closer to Portage Creek (which is 5,000 feet, north of the site). This scenario is corroborated by the preliminary groundwater flow pattern presented in the DRI. It was documented that groundwater at the site appears to flow to the northwest (this is based on limited site groundwater flow data). However, it appears that there is a more westerly flow on the eastern part of the site that curves around to the northwest beneath the main pole treatment area. From the limited data available, the DRI assumed that groundwater in this area ultimately discharges into Portage Creek. In light of this presumption, it becomes imperative that at a minimum, more monitoring wells should be installed on the northwestern portion of the site to help determine the extent of the PCP plume that may be traveling toward Portage Creek. The DRI did not discuss whether other flow patterns for surface water and groundwater have been investigated at the site. Several local groundwater flow anomalies were reported in the DRI (pages 7 & 8), and the report pointed out that the water levels measured in MW-1 and HCMW-5 suggested a local preferential southwest flow pattern may exist around the butt tank area. The existence of this preferential flow pattern may imply that groundwater and surface water in the southern portions and any wells along this path may be impacted. In addition, other documents prepared by the Facility's contractor indicate that a shallow groundwater table in the site vicinity serves as a steady recharge to Quilceda Basin (AKART (AGI) Analysis, July 30, 1997, page 27). The groundwater in the southern portion of the Facility has not been characterized, therefore, it is critical that additional monitoring wells are put in place in the southern portions of the site to help characterize the extent of groundwater contamination in the area.

9. Page 11. The use of a Modified MTCA Method B approach to calculate soil cleanup levels for groundwater protection for PCP is unacceptable. The Baxter Facility may be an industrial site, but the land adjacent to it is residential and the water supply wells need to be protected regardless of the zoning. Therefore, the modified MTCA Method B approach and related statements should be expunged from the DRI . The MTCA Method B soil cleanup level is **0.22 mg/kg** (Ecology, 1999), for surface soil which would result to a groundwater cleanup level of 1 ppb (i.e., MCL); this should be used as the soil cleanup standard for all areas within and beyond the facility boundaries. Also, the MCL of 1 ppb (Ecology, 1999; EPA, 2000), should be used as the cleanup standard for the entire groundwater systems (i.e., the aquifer) at the site.

10. Page 12. The application of the Modified MTCA Method B concept to compute soil cleanup levels for groundwater protection for dioxins and cPAHs is unacceptable. The soil screening level for dioxins for soil to groundwater is 5.6E-06 mg/kg (EPA, 1999a), and the corresponding groundwater concentration is 6.0E-07 mg/L (this is based on the MCL). The published MCL for dioxin is 3.0E-05 ppb (EPA, 2000). Also, the standard Method B groundwater protection level of 2 mg/kg should be used for cPAHs cleanup in soil (Ecology, 1999).

11. Pages 13 /14. The statistical inference made in the DRI concerning surface soil concentrations of PCP, dioxins, TPH and PAHs is incomprehensible. In particular, the introduction of lognormality to characterize the surface soil data in relation to groundwater protection, is not supported by the limited soil data available. In many instances, it was indicated in the DRI that the levels of these constituents detected in surface soil in affected areas at the site are all well above the soil screening levels. For example, it was stated in the DRI that the highest surface soil concentrations of PCP were detected in the shallow samples from SS-3 (90 mg/kg) located near the railroad loading area in the treated wood storage area, and the 2.5-foot deep samples from boring SB-5 (110 mg/kg) located just east of the drip pads. The MTCA Method B and EPA PCP soil screening level for an unsaturated zone (using the default at a dilution Factor of 20) for groundwater protection are **0.022 mg/kg** and **0.03 mg/kg**, respectively (Ecology, 1999; EPA, 1999b). Thus, with these exceedances above the soil screening level, it appears that the use of lognormality in characterizing the surface soil data is inappropriate.

12. Page 15. It is stated in the DRI that the dioxin levels detected in surface soil at the site are above MTCA Method C for industrial facilities. Since the State has an established cleanup guideline for dioxins, these guidelines should be **strictly** followed.

13. Page 16. The DRI states that there appears to be some consistency in the lower concentrations of PCP detected in SB-4 and also at HCMW-6. The DRI suggests that the lack of PCP in deeper soils and the consistently low concentration of PCP detected at SB-4 indicate that PCP leaching from treated poles in the pole storage yard is not a significant source of groundwater contamination at the Facility. The data that gave rise to

this conclusion comes from a single sampling point (HCMW-6). Since there are no other monitoring wells within this area, the conclusion that the treated pole storage yard is **not** a significant source for groundwater contamination at the site is not supported by the data. Groundwater data from more monitoring wells is needed in this area in order to fully evaluate this potential source.

14. Page 18. The DRI states that storm water samples from the site were generally turbid, and that because of the high turbidity and the hydrophobicity (compound that is immiscible with water) of PCP, the detected PCP concentrations were unlikely to represent the true dissolved concentrations. Although there have been some reports on the influence of turbidity on dissolved forms of organic constituents in both surface and groundwater, it would be more acceptable to use the total measured concentrations of PCP in the storm water without any modifications, than to use data from manipulated samples.

15. Pages 19 thru 21. The influence of turbidity may exist, but it may not necessarily mean that the levels of PCP measured in these wells should be considered as not significant. Regardless of turbidity, it appears that PCP levels measured in groundwater from the monitoring wells exceeded the regulatory standard or MCL of 1 ppb (page 20 of the DRI).

16. Page 22. Once again, the DRI states that high dioxin levels are associated with turbidity in MW-2. It should be noted that not all of the contaminants of concern are expected to be found in background soils (particularly, PCP and dioxins). Then, unlike TPH, PAHs, and some metals, the presence of PCP and dioxins in the monitoring wells must be considered as site-related, regardless of the level of turbidity. So, the level of dioxins detected in MW-2 is site-related, and may be attributed to the occurrence of PCP and it is relevant in the determination of the nature and extent of groundwater contamination at the site. Equally, the levels of dioxins detected in MW-2 are relevant in the evaluation of risk to humans and the environment. Overall, it appears that there is some established correlation between the occurrence of dioxins and PCP site-wide. Again, regardless of turbidity, it seems like the detections of dioxins in MW-2 are related to the occurrence of PCP in groundwater at the site, and is tied to the operations at the Baxter Facility.

17. Page 26. A fate and transport model was used in the RI to show that biodegradation of PCP is occurring at the site. According to the fate and transport model, the source most strongly contributing to the detected PCP in groundwater at MW-3 seems to be the LNAPL beneath the Butt Tank and in the SB-6 area. However, it appears that the old Butt Tank area and MW-3 are not the only sources of PCP at the site. The French drains also appear to represent a surface pathway for PCP to reach groundwater at the site, but were not mentioned in the DRI as a contributing source to groundwater contamination. It was also stated that the model results for PCP were higher than field values due to the fact that the model did not incorporate any biodegradation factors. The conclusions

found in the DRI do not appear to be supported because neither the site characterization, nor the modeling is based on adequate groundwater data. Therefore, there is no apparent reason to generalize (based on not finding high concentrations of PCP in a few wells) that there is sufficient evidence to suggest that biodegradation of PCP may be occurring. Given the limited data available, an equally likely conclusion is that unless the source is eliminated and the contaminated groundwater mitigated, the PCP plume will continue to become larger and will move offsite toward MW-3 and possibly to HCMW-7 and beyond.

18. Page 27. The conclusion that PCP and dioxins in groundwater at the site do not pose any current threats to human health is unsupported. Additional site groundwater characterization is needed to fully understand the extent and rate of migration of these contaminants, and then a determination must be made whether there are any potential drinking water supplies endangered by these contaminants.

19. Table 10. It seems that this Table was erroneously cited in the document on page 18 as Table 9. The text should read Table 10, instead of Table 9.

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