Comments on
Eco & Associates, 'October 2012 Groundwater Sampling Report – Draft – Brown & Bryant (B&B) Superfund Site, Arvin, CA,' Prepared for US Army Corps of Engineers, Albuquerque District, by Eco & Associates, Orange, CA, February 13, 2013

Comments provided by
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Committee for a Better Arvin (CBA)

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On March 28, 2013 the California Department of Toxic Substance Control (DTSC) announced the availability of a draft report on the groundwater sampling conducted in October 2012 at the Brown and Bryant Superfund Site, Arvin, CA. The draft report:

> Eco & Associates, "October 2012 Groundwater Sampling Report – Draft – Brown & Bryant (B&B) Superfund Site, Arvin, CA," Prepared for US Army Corps of Engineers, Albuquerque District, by Eco & Associates, Orange, CA, February 13, 2013.

and all appendixes are available on the DTSC envirostor website at:
http://www.envirostor.dtsc.ca.gov/public/final_documents2.asp?global_id=15280011&doc_id=60317039.

Highlights of Draft Report

Page 1 of the draft report states:

> "*1.0 Introduction*
> *This report describes the October 2012 groundwater-sampling event conducted at the former Brown & Bryant, Inc. (B&B) Superfund Site (hereafter, referred to as the "Site") located in the City of Arvin, Kern County, California (Figure 1). Groundwater at this Site was impacted with chlorinated solvents, herbicides, and pesticides during B&B's occupancy. Eco & Associates, Inc. (Eco) was retained by the U.S. Army Corps of Engineers (USACE) to perform groundwater monitoring at the Site."*

Its background information on the B&B site includes the following:

> "*The B&B facility operated as a pesticide re-formulator and custom applicator facility from 1960 to 1989. The facility formulated agricultural chemicals including pesticides, herbicides, fumigants, and fertilizers for sale to the local farming community between 1960 and 1968. In 1981, the facility was licensed under the Resource and Conservation Recovery Act (RCRA) as a hazardous waste transporter. Contamination of soil and groundwater resulted from inadequate procedural controls, chemical spills during operations, and leaks from a surface wastewater pond and sumps. The largest releases on-site were from the wastewater pond, a*

sump area, and a dinoseb spill area (U.S. Environmental Protection Agency [USEPA 1993a]).

The background information provided on geologic and hydrogeologic characteristics of the site is as follows:

"2.3 Site Geology and Hydrogeology

The subject Site is underlain with an alluvial deposit of alternating layers and mixtures of unconsolidated sands, silts, and clay. Soil underlying the Site to a depth of 80 feet generally consists of silty fine sand to fine sandy silt. Clean, well-graded sand lenses and seams of silty clay occur locally within these soils. The soils are generally thinly interbedded with textural changes occurring every few vertical inches. These textural changes are also believed to occur laterally.

The Site geology has been divided into two zones: the A-zone and the B-zone. The A-zone includes unsaturated soil at 65 to 75 feet bgs and includes the first water bearing unit, the A-zone groundwater. The depth to the saturated zone (see groundwater depths on Table 1) varied between 65 and 85 feet bgs in recent groundwater depth measurements. The base of the A-zone is a thin sandy clay layer between 75 and 85 feet bgs. The clay layer and the A-zone groundwater occur beneath the entire Site but disappear within 640 feet south of the Site, 560 feet east of the Site, and 500 feet west of the Site.

The B-zone includes unsaturated soil beneath the A-zone and the second lowest water-bearing unit (B-zone groundwater) at 140 to 165 feet bgs. The B-zone extends to at least 250 feet bgs and ends at a clay layer that confines the drinking water aquifer beneath it. The top of the clay layer may be as deep as 300 feet and is reported to be 20 to 40 feet thick (Eco 2011).

The following is a description of the A- and B-zone groundwater conditions as described in the project Remedial Investigation/Feasibility Study report (RI/FS) (Panacea 2005):

<u>*A-zone*</u>*: Groundwater in the A-zone flows in a generally southwesterly direction. Periodic and localized changes in flow directions occur beneath the Site. Several groundwater depressions exist south of the Site toward which groundwater flow occurs. These groundwater depressions provide pathways for vertical flow of groundwater from the A-zone into the B- zone. The soils under the A-zone aquitard, and at the top of the B-zone, are unsaturated to a depth of approximately 140 feet (Elevation 286). The groundwater velocity in the A-zone has been estimated at 53 feet per year. Slug test results suggest that a yield of less than 100 gallons per day can be expected for wells in the A-zone. Aquifer testing of three of the on-Site extraction wells showed a groundwater yield of approximately ¼ gallon per minute (gpm).*

<u>*B-zone*</u>*: The B-zone groundwater comprises a series of water-bearing units. Wells in the B-zone were installed in the water-bearing units located at approximately 145 feet bgs and 170 feet bgs. The direction of flow in the water-bearing unit at 170 feet bgs is to the south, and the gradient is relatively flat (0.0004 ft/ft). The hydraulic conductivity in the B-zone is much higher than that for the A-zone. Past pump tests for the water-bearing unit at 170 feet bgs*

indicated that wells could be pumped at seven gpm for an extended period without appreciable drawdown.

Sections 2.4, 2.5, and 2.6 describe the wells, well construction, groundwater depths, and the BarCad.system for groundwater sampling, as follows:

"2.4 Well Description

The 44 groundwater monitoring wells at the Site and on the adjoining properties were constructed between 1984 and 2007 and installed at locations designed to assess the extent of the contaminant plume, contaminant concentrations, and aquifer characteristics. Another four wells were installed at the Site in 2010 (PWB-13A through PWB-16). Also, three background wells were installed upgradient of the site in August 2012 — BBW-1, BBW-2, and BBW-3. A list of the 51 groundwater monitoring wells is provided on Table 1. The coordinates (NAD83, Zone 5) for the wells are also presented on that table. The locations of these wells are shown on Figure 2.

Fifty-one wells, 14 on-Site and 37 offsite, are used to sample for A- & B-zone groundwater and to assess the COCs in groundwater. Twenty-five of these wells are screened within the A-zone aquifer, and 26 are screened within the B-zone aquifer. Ten of the 25 A-zone wells listed on Table 1 were not sampled because water was below the BarCad® elevation and at these wells the groundwater depth was reported to be "not measured". These wells are: AMW-1P, AMW-2P, AP-1, AP-2, AP-4, EPAS-1, PWA-5, PWA-6, WA-4, WA-7, and WA-8. At an additional five wells (EPAS-1, EPAS-4, PWA-1, PWA-4, and WA-6) samples were not collected because little water was measured and there was not sufficient recharge following purging at these wells. The city well was not sampled during this sampling event.

The wells sampled during this study (Figure 2) are spaced widely within the known contaminant plume and along portions of the plume's perimeter. These wells were intended to provide sufficient data to delineate the on-Site and offsite extent of the seven COCs listed in Section 2.3 of this report. A history of the COC concentrations reported for each of these wells is provided in the analytical summary attached as Tables 2 and 4 of this report."

Section 3.0 provides information on the scope of sampling and analytical methods, and Section 4.0 describes sampling procedures.

The findings and conclusions are discussed in Section 7 as follows:

"7.0 Findings and Conclusions

7.1 Groundwater Depths and Flow Direction

In October 2012, groundwater depths and elevations were measured as follows and are presented in Table 1:

<u>A-zone</u>

- *Deepest water is observed in well EPAS-1 (87.82 feet) and shallowest in WA-2 (65.83 feet). At 10 wells water elevations could not be measured as the water was below the BarCad® elevation. These are reported Not Measured or NM.*
- *Highest elevation of 362.41 feet (WA-2) and lowest elevation of 345.74 feet (EPAS-1).*

The groundwater flow for the A-zone is depicted in a contour plot for groundwater elevations (Figure 3). As typically observed in previous monitoring events, lower water elevations are observed in EPAS-1 (southwest of the site and just east of the railroad spur in that area) and PWA-2 (near the southeast tip of the site). A-zone water apparently flows towards these two areas. Further south in the area of WA-2 the flow appears to be in a generally southwest direction.

<u>B-zone</u>

- *Deepest in well WB2-4 (150.86 feet) and shallowest in PWB-15 and PWB-16 (127.68 feet and 127.71, respectively).*
- *Highest elevation of 303.19 feet (BBW-2) and lowest elevation of 274.55 feet (WB2-4).*

The groundwater flow for the B-zone is depicted in a contour plot for groundwater elevations (Figure 4). The measured groundwater elevations in Wells AMR-3R [Should that be AMW-3R?] and WB2-4 are significantly [sic] [lower?] *relative to other B-zone wells and these two heavily influence the B-zone groundwater flow. Upgradient of the site the general B-zone groundwater flow is towards the south to southwest. In a separate assessment of water flow in the B-zone, the flow pattern was evaluated by filtering out the measurements of wells screened below 170 feet below adjacent ground surface. When assessed using the "filtered" data, the B-zone groundwater flow south of the site appears to bend to a more southeasterly direction.*

Groundwater elevations as a function of time for all wells (A-zone and B-zone) are plotted for the period that the wells have been monitored. These plots are presented in Appendix D. These plots show the water elevations since the installation of the wells. As a general observation it appears the A-zone groundwater was untypically high when many of the wells were installed in the 2002 to 2004 time frame. Water elevations are generally about five to eight feet lower now. As an example, WA-2 was reported at a high of about ~El. 367 in 2004 and a low of ~El. 358.5 in 2008 and is now about where it was report prior to 2000 at ~El. 362.5. Conversely, the B-zone wells show increased water since the mid-2000. As an example, PWB-2 was reported at ~El. 285 in 2002 and is at ~El. 298.5 now.

7.2 Contaminants of Concern in the A-zone

Table 2 presents the analytical results for the COCs reported in groundwater samples collected from the A-zone. A summary of the COCs in the A-zone for the October 2012 sampling event are presented in Table 3. Isoconcentration maps (contours) are plotted for COCs for which there are sufficient data: 1,2-DCP, chloroform, and 1,2,3,-TCP (Figures 5, 6, and 7). The following observations are made for A-zone sampling results for COCs where ten wells were sampled and the samples analyzed for COCs:

- *1,2,3-TCP was reported in all ten at concentrations above its California Department of Public Health (CDPH) Notification Level of 0.005 µg/L. The high concentration was in PWA-2 at 1,100 µg/L.*
- *Chloroform was reported in nine wells but none of the concentrations exceeded the B-zone Cleanup Levels for chloroform of 80 µg/L. The high concentration for chloroform was at WA-2 at 53 µg/L.*

- *1,2-DCP was reported for seven wells and at four wells the concentrations exceeded its B-zone Cleanup Levels of 5µg/L. The high concentration for 1,2- DCP was at PWA-2 at 6,600 µg/L.*
- *Dinoseb was reported at five wells and at four wells the concentrations exceeded its B-zone Cleanup Levels of 7µg/L. The high concentration for dinoseb was also at PWA-2 at 9,100 µg/L.*
- *Other COCs 1,3-DCP, DBCP, and EDB were reported less frequently and were typically present in the same wells along with the more frequently found COCs. They were all also reported above their respective B-zone Cleanup Levels when reported.*
- *EPAS-2, EPAS-3, and PWA-2 were the three wells where contaminants were reported in high concentrations and represent the heavier contaminated areas of the A-zone among the areas monitored by the installed wells. This is also generally represented in the contour plots for COCs in the A-zone – Figures 5, 6, and 7.*

The high concentrations for COCs are in wells south of the Site (EPAS-2, EPAS-3, WA-3, and PWA-2). The wells with the relatively high COC concentrations are located coincidentally with the low water areas of the A-zone. This may be an interpretation that is biased by the inability to obtain samples from the A-zone wells that are on-site or closer to the site and have previously shown high concentrations of COCs, such as, wells AP-4 and AMW-2P. The trend for the presence of contaminants in the A-zone appears relatively unchanged from the COC concentrations reported for the last three monitoring events (fall 2011, spring 2012, and fall 2012).

7.3 Contaminants of Concern in the B-zone

Table 4 presents the analytical results for the COCs reported in groundwater samples collected from the B-zone. A summary of the COCs in the B-zone for the October 2012 sampling event are presented in Table 5. Isoconcentration maps (contours) are plotted for five COCs for which there are sufficient data: 1,2-DCP, chloroform, dinoseb, 1,2,3-TCP, and DBCP. The isoconcentration maps are presented on Figures 8 through 12. The following observations are made for B-zone sampling results for COCs where twenty six (26) wells were sampled and the samples analyzed for COCs:

- *1,2,3-TCP was reported in all twenty six wells and at twenty five wells was reported at concentrations above its California Department of Public Health (CDPH) Notification Level of 0.005 µg/L. The high concentration was in PWB-7A at 55.0 µg/L.*
- *1,2-DCP was reported for twenty three wells and at six wells the concentrations exceeded its B-zone Cleanup Levels of 5µg/L. The high concentration for 1,2-DCP was at PWB-14 at 17 µg/L.*
- *Chloroform was reported in thirteen wells but none of the concentrations exceeded the B-zone Cleanup Levels for chloroform of 80µg/L. The high concentration for chloroform was at PWB-13A at 14 µg/L.*
- *Dinoseb was reported at eleven wells and at two wells the concentrations exceeded its B-zone Cleanup Levels of 7µg/L. The high concentration for dinoseb was at PWB-12 at 27 µg/L.*

- *DBCP was reported less frequently at nine wells but at seven of these wells the concentrations exceeded its B-zone Cleanup Levels of 0.2 µg/L. As with dinoseb, the high concentration for DBCP was at PWB-12 at 2.6 µg/L.*
- *1,3-DCP and EDB were not reported above laboratory detection limits in any of the wells sampled.*
- *Both of the commonly reported contaminants, 1,2-DCP and 1,2,3-TCP were also reported in the background monitoring wells.*
- *Except for dinoseb and DBCP that were both reported in high concentrations at PWA-12, the other COCs were reported in high concentrations in different wells indicating low commonality in the presence of contaminants in the B- zone.*

The high concentrations for COCs in the B-zone are in two areas offsite: one closer to the Site but to the southwest. The other area is located further to the south and southeast of the Site (see isoconcentration maps Figures8 through 12). The trend for the presence of contaminants in the B-zone appears relatively unchanged from the concentrations reported for the last three monitoring events (Fall 2011, Spring 2012, and Fall 2012).

7.4 Other Laboratory Results
Results for other laboratory analyses are presented on Table 6. The table includes the results for the following analyses:

- *Nitrate as nitrogen (nitrate-N) and nitrite as nitrogen (nitrite-N)*
- *Sulfate and sulfide*
- *Total Organic Carbon (TOC)*
- *Ferrous Iron, and*
- *Dissolved methane and dissolved hydrogen.*

A summary of these analysis results for the October 2012 sampling event are presented in Table 7. The following observations are made regarding these sampling results:

- *Nitrate as nitrogen was reported for all twenty six wells sampled. At twenty four of the twenty six it was reported above its Maximum Contaminant Level (MCL) of 10 mg/L. The high concentration for nitrate-N was reported for PWB-12 at 61.2 mg/L.*
- *Sulfate was reported for all twenty six wells sampled but was not above its MCL of 250 mg/L at any of the wells. The high concentration of sulfate was for AR-1 at 232 mg/L.*
- *Total organic carbon was reported for all wells except for WB2-4. The high concentration for TOC was at PWB-7A at 0.959 mg/L.*
- *Other analyses yielded either no detection or detection at a single well. Nitrite-N at WB2-3 (12 mg/L), sulfide at PWB-9 (0.038 mg/L), ferrous iron at PWB-11 (0.551 mg/L) and dissolved methane at WB2-3 (0.0088 mg/L) were single well detections. Dissolved hydrogen was not reported for any of the wells sampled."*

The key finding and conclusion in this data set and report was, as reported on page 13-14 and quoted above:

> *The high concentrations for COCs in the B-zone are in two areas offsite: one closer to the Site but to the southwest. The other area is located further to the south and southeast of the Site (see isoconcentration maps Figures8 through 12). The trend for the presence of*

contaminants in the B-zone appears relatively unchanged from the concentrations reported for the last three monitoring events (Fall 2011, Spring 2012, and Fall 2012).

That finding/conclusion for measured parameters is in accord with the data presented in the tables and figures in the draft report. The problem with the "clean-up" level for chloroform, discussed in previous comments, has remained unaddressed.

DTSC Comments

An important item in the suite of materials DTSC included with the draft report of the October 2012 groundwater monitoring in its envirostor listing, is the March 26, 2013cover letter from S. Ross of B&B DTSCC Project Manager. That cover letter states:

> "*Attached you will find DTSC comments based on review of the October 2012Groundwater Sampling Report for the Brown and Bryant Superfund site in Arvin, California. As the State is to assume oversight responsibility in the future, these comments were prepared and focused towards that end.*
>
> *Please forward to the individuals requiring the information. Let me know if you have any questions. Thanks."*
> http://www.envirostor.dtsc.ca.gov/regulators/deliverable_documents/9649052262/Oct%202012%20GSR%20comments%20cover.pdf

In a separate letter dated March 26, 2013, DTSC, through S. Ross, provided detailed comments on deficiencies in the Eco & Associates February 2013 draft report on the October 2012 Groundwater Sampling. Those comments are available at:
http://www.envirostor.dtsc.ca.gov/public/view_document.asp?docurl=/regulators/deliverable_documents/9649052262/BRB_032613_October%20GW%20Report_20016450.pdf

DTSC found that the draft Eco & Associates report on the October 2012 sampling is deficient in its presenting and discussing the results of that sampling. We had similarly noted in our comments cited below that the Eco & Associates October 2012 final report on the April 2012 groundwater sampling had failed to provide a detailed discussion of the data relative to site remediation.

> Lee, G. F., and Jones-Lee, A., "Comments on Eco & Associates, 'April 2012 Groundwater Sampling Report – Final – Brown & Bryant (B&B) Superfund Site, Arvin, CA,' Prepared for US Army Corps of Engineers, Albuquerque District, by Eco & Associates, Orange, CA, October 16, 2012," Comments submitted to CBA by G. Fred Lee & Associates, El Macero, CA, February 27 (2013).
> http://www.gfredlee.com/CBA_BBSite/2013/GWMonitoring_4-2012_Com.pdf

DTSC's comments on the February 13, 2013 Eco & Associates draft report on the October 2012 Groundwater Sampling Report include following:

> *"Comments*
> *Future monitoring reports should include the following information and corrections. These changes are needed for the following reasons:*
>
> - *To raise the quality of the report to an acceptable a level;*

- *To accurately describe the subsurface conditions and minimize uncertainties at the site to all stakeholders; and*
- *To ensure a sufficient monitoring well network is in-place at the site to accurately assess remedy efficacy before DTSC assumes operation and maintenance (O&M) of the remedy.*

1. <u>Undelineated Plumes.</u> Plumes are undelineated in both A and B zone groundwater located offsite and within the site boundary. The report text does not acknowledge this deficiency, does not include any discussion related to plume extent, or describe any plans the EPA has to address uncertainties related to plume extent or any other field activities. Moreover, the figures prepared to depict extent were contoured incorrectly (see comment 3). DTSC is aware that the USEPA is preparing a scope of work to address monitoring network deficiencies, yet the report does not mention this activity or describe its likely scope.

Future reports must 1) interpret the site data and make conclusions regarding plume extent and 2) reflect the plans by the EPA and the USACE to fill data gaps identified in the report. These discussions should occur in a conclusions and recommendations section, which currently does not exist.

2. <u>New Wells and Existing BarCad® Sampling Systems.</u> Most A-zone wells on-site cannot be sampled and do not provide reliable water level data because groundwater has declined below the well screens and/or below the BarCad® sampling systems mounted in the wells.

The lack of A-zone chemical and water level data and dry (or drying) wells is a serious issue exacerbated by the presence of the BarCad® systems. It impedes the ability of the EPA to determine how much mass is migrating to A-zone groundwater and where this mass may be migrating once it arrives. Of equal concern is the State of California who will inherit this well network which, if left unchanged, is incapable of monitoring performance of the remedy.

To ensure this issue is not deferred or diminished in importance, future reports must 1) discuss and acknowledge the problems related to water level declines and the BarCad® systems as it relates to plume extent/migration, and 2) reflect the plans the EPA and the USACE have to resolve the problem (e.g. well installations and BarCad® system removal and investigation).

3. <u>Incorrect Contouring Procedures – Contaminant Plumes.</u> Contaminant plume maps cannot be drawn as closed "bulls-eyes" because both A and B zone groundwater plumes are undelineated. In future reports, isoconcentration lines need to be truncated toward areas where data do not exist, dashed where interpolated, and solid where known. The A-zone plume is undelineated to the north, northeast, east and southeast of the corrective action cap and underlying source mass. The B-zone plume is undelineated east of well PWB-12.

4. Incorrect Contouring Procedures – Water Level Maps. The depression shown around well PWA-2 in Figure 3 is not supported by site data; data show a low point at PWA-2, but nothing further. Flow and contaminants may be migrating offsite, to the east, in unmonitored areas. Like, the isoconcentration lines, groundwater elevation contours in this area must be truncated east of PWA-2. In addition, the 356- and 360-foot groundwater elevation lines should not bend northward toward well AP-2 because water level measurements were not collected from this well or this area of the site in October or for at least two years.

5. Incorrect Titles and Lack of Units – Groundwater Elevation and Plume Maps.

- *Figures 3 and 4 are titled as groundwater contour maps. The maps should be retitled as potentiometric surface maps or groundwater elevation maps.*
- *Figures 6 and 8 through 12 are titled as isopach maps. This is incorrect because concentration data are shown, not thicknesses. Use of the term isopach is a concern because it suggests 1) the preparer does not understand the difference between an isopach and isoconcentration map and/or 2) the report is not being properly reviewed before submittal to regulators. The maps should be retitled appropriately.*
- *Units are not defined in any of groundwater elevation contour or plume extent figures. This requires correction.*

6. Flow Arrows and Contour Intervals – Groundwater Elevation Maps.

- *Flow direction arrows need to be added in future groundwater elevation maps.*
- *The contour intervals selected for A and B zone groundwater are too large. A smaller interval is needed to clarify direction of flow because low gradients exist beneath and south of the site.*

7. Incorrect and Non-representative Stabilization Parameters. Impossibly high concentrations of dissolved oxygen [e.g. 92 milligrams per liter (mg/L in AMW-3R)] were recorded in purge water from several wells just prior to sampling. In addition, some of these same wells contained elevated groundwater temperatures (up to 78 degrees Fahrenheit); this temperature is not representative of formation groundwater, but instead, similar to stagnant well water that has been heated by exposure to the atmosphere.

These data suggest the groundwater samples collected during the monitoring event may not be representative of the formation and suggest the BarCad® systems should not be used to collect samples. If stabilization data continues to return questionable data, the BarCad® systems from those wells should be permanently removed and sampling returned to more traditional low-flow methods.

8. Natural Attenuation - Other Sampling Results. Section 7.4 describes the results from nitrate, sulfate, sulfide, total organic carbon, ferrous iron, dissolved methane and dissolved hydrogen analyses. However, this section does not interpret any of this data.

If the EPA is collecting these parameters to evaluate the natural attenuation portion of the remedy at the site than, at a minimum, an explanation should be provided as to what the data mean with respect to the remedy. GSU remains concerned that the collection many of *these parameters are unnecessary, are collected using incorrect methods (e.g. dissolved hydrogen), are collected from too many wells, and may ultimately be unusable because it is not clear if groundwater collection practices are providing formation water or stagnant well water. DTSC understanding from USEPA is the MNA portion of the implemented remedy is on hold pending the current planned field work with the source area extraction well development.*

The decision to sample for dissolved hydrogen helps illustrate this concern. Use of EPA Method RSK-175 for analyses of dissolved hydrogen is no longer recommended by many practitioners and has been replaced by the "bubble-strip" field method. RSK-175 is not preferred in these situations because research suggests bacteria in the water will consume hydrogen during transit to the laboratory which will lead to non-detectable or biased low results.

Until it is made clear how the data described in Section 7.4 will be used to monitor performance of the remedy and make decisions, resources should be redirected to more important and basic technical issues at the site (e.g. delineation and replacement of dry wells). It is GSU's perspective that natural attenuation of the contaminants at this site does not require the collection of many of the parameters listed and certainly not at the frequency or number of wells currently performed.

9. Licensed Professional. This report contains interpretations and depictions of subsurface conditions which are hydrogeologic in nature. Therefore, pursuant to State of California Business and Professions Code Section 7835, future reports should be signed and stamped by the California licensed professional geologist in responsible charge of the work performed.

Some of the DTSC issues raised on the deficiencies in the Eco & Associates are the same as we find in reviewing this report and are the same as those we raised on previous Eco & Associates reports. Of particular concern is the failure to discuss the implications of the data set in the ultimate remediation of the polluted groundwater. The issued raised by DTSC should be addressed in the revision of this draft report, as well as in all future groundwater monitoring reports.