remedy that includes removal and treatment, as well as in the scenario where materials begin to exit the site.

b) The long-term monitoring program proposed in the Draft CAP is inadequate and is not protective. Long-term monitoring should include performance and confirmational monitoring. Specifically:

- Groundwater elevation monitoring and groundwater quality sampling should be required for existing wells LMW-1, LMW-2, LMW-4, LMW-6, LMW-7, LMW-9, LMW-10, LMW-11, and P-2, and also a) beneath known contaminant release areas (e.g., Pond 1 and Pond 2), b) in the major fault zone east and west of the Rogers Seam should be required (unless the fault is demonstrated, rather than hypothesized, to be impermeable), and c) within the third (deepest) level of the Rogers Seam north of the major fault.
- "Frequent monitoring during construction" should include bi-weekly testing of field parameters (pH, specific conductance, temperature, and dissolved oxygen concentration), and Priority Pollutant metals, VOCs, and SVOCs for samples collected from wells screened beneath known contaminant source areas, and weekly testing of these analytes for wells located elsewhere.
- Confirmational monitoring should include quarterly water level monitoring and testing of field parameters (pH, specific conductance, temperature, and dissolved oxygen concentration), Priority Pollutant metals, VOCs, SVOCs, and major ions for samples collected from all wells. Samples should be tested for PCBs and chlorinated pesticides annually.
- Contingency procedures that will be implemented should any COC be detected at or above agreed actions levels should be clearly defined: a) Ecology and the City of Kent should be notified within 24 hours of initial receipt of analytical results (even if results cannot be validated within that time frame), b) the affected well(s) should be re-sampled within 5 working days of initial receipt of analytical results, and c) contingency cleanup actions should be implemented.

c) A Compliance Monitoring Plan is included in the Draft CAP as an unlisted appendix. The monitoring proposed in this document is similar to that proposed in the body of the Draft CAP, and is similarly unprotective as it does not address the limits of or uncertainty in the conceptual hydrogeologic model. Therefore, the proposed compliance monitoring is inadequate. The modifications to the long-term monitoring program proposed in the Draft CAP (Item 5b, above) also apply to the appended Compliance Monitoring Program.

Performance monitoring that would demonstrate the efficacy of the remedy or the contingent groundwater extraction system is not defined. Performance monitoring should include collection of daily groundwater levels in all site wells identified above (in Item 5b) for a

minimum of one year before construction of the cap, plus for at least two years after construction of the cap. Performance monitoring should also include two one-month periods of hourly groundwater level collection in all site wells during a season when intense precipitation events are anticipated; one of these periods would occur before cap construction and one would occur after cap construction. The performance monitoring program should be evaluated after three years to determine which wells should be retained as a performance monitoring wells and the frequency of such ongoing monitoring.

General Clarifications of Facts within the Draft CAP

There are numerous errors of fact, inaccuracies, and misleading data presentations in the Draft CAP. The following information is presented to improve the Draft CAP in a manner consistent with the facts. In addition, there are statements that minimize known data limitations, conceptual model uncertainty, and site hazards. Selected examples, listed by topic, include:

1) Representation of potential impacts to groundwater.
   a) Page 5: The statement "These investigations have detected hazardous substances in drum contents, adjacent soils, and ponded surface water within the trench. Hazardous substances were not detected, however, in adjacent private and public water supply wells, mine portal discharges, or soil gases." is accurate but misleading in that it minimizes the reader's understanding of the nature and extent of impacts by emphasizing what was *not* detected while omitting salient details about the numbers, types, and concentrations of constituents that *were* detected.

      For example, chromium, lead, mercury, zinc, plus 25 volatile organic compounds (VOCs) and 12 semi-volatile organic compounds (SVOCs) were detected in the surface water samples. The VOCs and SVOCs included chlorinated solvents, vinyl chloride and other chlorinated solvent breakdown products, gasoline constituents, phenols, *bis* [2-ethylhexyl] phthalate, and diethyl phthalate. Analytes detected in drum residue samples included cadmium, chromium, copper, lead, mercury, zinc, cyanide, chlorinated solvents, gasoline constituents, phthalates, phenol, and PCBs. The composite soil sample tested for VOCs contained chlorinated solvents, gasoline constituents, and PCBs. Concentrations of freon 11, freon 13, 1,1,1-TCA, and TCE in the single composite soil sample were consistent with those expected if those contaminants were present as DNAPL (UES, 2004). Analytes detected in both surface water samples and potable water supply samples include benzene, 1,3,5-trimethyl benzene, 1,1-dichloroethane, *bis* [2-ethylhexyl] phthalate and diethyl phthalate. Given the number, nature, and detected concentrations of these hazardous substances it is inappropriate to trivialize the data by focusing on what was *not* detected.

In addition, the discussion is structured such that "[t]hese investigations" refers only to potable water samples collected by the Washington Department of Health during 1990. Subsequent potable water well and mine portal discharge sampling during the RI detected benzene, 1,3,5-trimethyl benzene, 1,1-dichloroethane, 1,3-dichlorobenzene, and diethyl phthalate in nearby potable water supply wells or portal discharges. Groundwater samples from six of the eleven tested potable water wells that are located within about 1,000 feet of the Rogers Seam (PW-2, PW-5, PW-7, PW-9, PW-10, and PW-13) contained detectable concentrations of at least one VOC in at least one groundwater sample. At least one VOC was detected in at least one surface water sample collected from each portal. However, only the results from the previous investigations are presented in the "Site History"- results from the subsequent investigations are presented in an entirely different section, and are there reported imprecisely. Given the limited number of samples actually collected from potable water supply wells and portals, it is inappropriate to trivialize these detections.

2) Representation of Contaminant Source Characteristics and Selection of Contaminants of Concern
   a) Pages 11 – 13: The Section entitled "Nature and Extent of Contamination" provides a discussion that is based on an undefined "data screening" process that results in virtually none of the contaminants detected at the site being identified or reviewed in the Draft CAP. The only contaminants actually identified in this section are those subsequently selected as COCs. Contaminants not subsequently selected as COCs are either referred to using terms like "a few organic compounds" or simply not mentioned at all. For example, the identities and concentration of analytes detected in the drum residue samples, or in the composite soil sample at concentrations below the interpreted MTCA Method B standards, or in the ponded surface water samples are not identified anywhere in the document. The VOCs detected in the portal samples are likewise omitted. The presence of chlorinated solvents at concentrations consistent with the presence of DNAPL in source area soils is not mentioned (it is also unclear how freon 11, freon 13, 1,1,1-TCA, and TCE, which were detected at concentrations sufficient to suggest equilibrium with DNAPL, were interpreted to not exceed MTCA Method B standards).

      In addition, the data presentation does not permit understanding or evaluation of the process used to select "the chemical compounds potentially posing a human or environmental health risk and/or which exceed regulatory criteria...". Consequently, virtually all detected analytes were eliminated from consideration or discussion in a manner that precludes a reviewer unfamiliar with the site history from realizing that the analytes had ever been detected.

b) Page 13: The definitive statement "No chemical migration is occurring from the mine." is inappropriate and unscientific as it misrepresents the degree of certainty in site characterization. It is essential that scientists differentiate between conclusions that are *permitted* by existing data and those that are *required* by the data. Existing data *permit but do not require* a conclusion that contaminants are not migrating from the mine.

   In addition, groundwater quality beneath known contaminant source areas has never been evaluated. It is inappropriate for the Draft CAP to present assurances that groundwater impacts have not been detected at the site without concurrently noting that the most likely locations for detecting impacted groundwater have never been monitored.

c) Page 13: The discussion of the "potential for waste movement after dumping" is limited to the potential movement of drums or barrels after dumping- it does not address the potential movement of the liquid wastes after dumping. Given that significant volumes of waste (about 200,000 gallons) were discharged to the Rogers Seam as liquids, and that it is reasonable to expect that most of the drums contained liquid, it also seems reasonable that a discussion of "potential waste movement after dumping" would address the anticipated behavior of liquid waste as well as solid waste. This discussion should note the mine was fully dewatered during waste placement, that liquid wastes would have included light, non-aqueous phase liquids (LNAPLs) and dense, non-aqueous phase liquids (DNAPLs), that liquids would be expected drained downward into the underlying rubble zone, that LNAPLs would likely have been retained at or above the water table (i.e., the base of the mine workings), and that DNAPLs could have readily drained to or beyond the base of the mine workings.

d) Page 5: The conjecture, "It is expected that many of the drums were only partially full." is speculation and inappropriate.

e) Page 8: The discussion of "Source Characteristics" closes with the statement "The amount of waste remaining at the site is uncertain, but a significant portion may have been burnt during fires, which occurred during placement." Speculations regarding the potential fate of the source(s) are unnecessary and inappropriate to a discussion of "Source Characteristics." Furthermore, it has been agreed by the Department of Ecology and the PLP Group that this hypothesis would no longer be presented.

Time of Travel Memo

The City of Kent and its consultants have reviewed the *Monitoring Frequency Based on Travel Time of Potential Contaminants at the Landsburg Mine* (Draft Travel Time memo) prepared December 3, 2002, by Golder Associates, Inc. (Golder). This draft

memorandum was prepared to support the monitoring frequency proposed in the *Draft Cleanup Action Plan Landsburg Mine Site, Ravensdale, Washington* (Draft CAP) prepared March 13, 2002 (Golder, 2000a). Concerns regarding the use of this memo in making decisions for monitoring are of great concern for the City of Kent.

The Draft Travel Time memo presents a summary of modeling efforts performed to justify monitoring frequencies proposed in the Draft CAP. The modeling effort relied upon application of BIOSCREEN (Version 1.3 was presumably used, although the Draft Travel Time memo references Version 3.1). BIOSCREEN was developed by the United States Environmental Protection Agency (USEPA) to simulate "remediation through natural attenuation (RNA) of dissolved hydrocarbons at petroleum hydrocarbon release sites" (USEPA, 1996). The BIOSCREEN model was specifically developed to address biodegradation and attenuation of benzene, toluene, ethylbenzene, and xylenes (the primary constituents of petroleum hydrocarbon releases). The model "has the ability to simulate advection, dispersion, adsorption, and aerobic decay as well as anaerobic reactions that have been shown to be the dominant biodegradation processes at many petroleum release sites" (USEPA, 1996). The User's Manual notes, "An extensive investment in site characterization and mathematical modeling is often necessary to establish the contribution of natural attenuation at a particular site. BIOSCREEN is offered as a screening tool to determine whether it is appropriate to invest in a full-scale evaluation of natural attenuation at a particular site. Because BIOSCREEN incorporates a number of simplifying assumptions, it is not a substitute for the detailed mathematical models that are necessary for making final regulatory decisions at complex sites." (USEPA, 1996).

The Draft Travel Time memo simply states that BIOSCREEN was used for the evaluation; no rationale for considering BIOSRCEEN appropriate for predictive modeling of the complex contaminant suite and hydrogeologic conditions at the Landsburg Mine Site is presented.

As with all models, BIOSCREEN requires user input of numerous values that become the basis for subsequently calculations. These values may be derived from actual site data, or estimated by the user.

Significant issues related to the use of BIOSRCEEN to model contaminant migration at the Landsburg Mine site, and the specific application of BIOSCREEN described in the Draft Travel Time memo, are:

1) As noted above, the intended purpose of BIOSCREEN is "as a screening tool to determine whether it is appropriate to invest in a full-scale evaluation of natural attenuation at a particular site." (USEPA, 1996). The Draft Travel Time memo suggests that the intended application of BIOSCREEN at the Landsburg Mine site is to definitively predict contaminant travel times to selected sensitive receptors. This application is inconsistent with the intended purpose of the modeling tool.
2) Application of any numerical contaminant fate and transport model assumes that the hydrogeology of the site being modeled is sufficiently characterized to permit such modeling. The hydrogeology of the Landsburg Mine site is not understood, and the conceptual model used as the basis for modeling

contaminant fate and transport using BIOSCREEN was sufficiently flawed that it did not predict the following:

- Significant seasonal groundwater discharge at the south portal
- The absence of a hydraulic divide in the southern portion of the Rogers Seam

In addition, the model assumes a constant groundwater velocity of 20 feet per day, which is not supported by site data.

3) BIOSCREEN was developed to model the behavior of petroleum hydrocarbons and their constituents. It was not developed to model the behavior of complex mixtures of contaminants. For example, it cannot model the cosolvency of contaminants like chlorinated solvents.
4) It is unclear whether BIOSCREEN is an appropriate tool for evaluating the specific constituents of concern (COCs) for this site. The constituents selected for modeling were selenium, cadmium, arsenic, methylene chloride, and a collective grouping of benzene, trichloroethene (TCE), and tetrachloroethene (PCE). (Note that critical properties assigned to the group of benzene, TCE, and PCE are not representative of the individual constituents, as discussed below). Actual COCs at the site include cadmium, chromium, copper, lead, mercury, zinc, cyanide, chlorinated solvents, gasoline constituents, phthalates, phenol, PCBs (detected in drum residue samples), plus at least 25 volatile organic compounds (VOCs) and 12 semi-volatile organic compounds (SVOCs) that were detected in site surface water samples. The VOCs and SVOCs included chlorinated solvents, vinyl chloride and other chlorinated solvent breakdown products, gasoline constituents, phenols, *bis* [2-ethylhexyl] phthalate, and diethyl phthalate. In particular, concentrations of freon 11, freon 13, 1,1,1-TCA, and TCE in the single composite soil sample were consistent with those expected if those contaminants were present as DNAPL (UES, 2004a; UES, 2004b). While it is true that contaminants have not yet been detected in site groundwater samples, it is also true that groundwater directly beneath known contaminant source areas has never been sampled. Therefore, the absence of detected impacts could result from either an absence of impacts or, more probably, inadequacy of the detection monitoring network.
5) The model assumed that all contaminant flow discharges through a coal seam, and explicitly assigned a value of 70% carbon to modeled soils. The effect of this assignment cannot be overstated: because BIOSCREEN was developed to address petroleum hydrocarbons, it calculates a retardation factor that is directly proportional to the fraction of organic carbon assigned to the soils. The model documentation notes that "typical values" for the organic carbon fraction are "0.002 to 0.02" (USEPA, 1996). The default fraction of organic carbon cited in the CLARC tables is 0.001 (0.1%). It is unclear why the organic carbon fraction applied to calculate the travel times was 70%- roughly 35 times the highest "typical" value. This 70% value effectively prevents the model from predicting migration of any contaminant that would be adsorbed to organic carbon (e.g., most of the modeled contaminants) and therefore forces the model to predict extraordinarily low travel times. However, there is no basis for assuming that that the mineral

coal of the Rogers Seam would have the same properties that the model assumes for organic carbon in soil. There is also no basis for assuming that all groundwater discharge occurs through Rogers Seam coal.

6) Benzene, TCE, and PCE were collectively assigned the organic carbon partitioning coefficient (K_{oc}) of 62 milligrams per liter (mg/L). The presumptive K_{oc} for benzene is 38 mg/L (USEPA, 1996); however, values assumed for TCE and PCE are not defined, and the basis for assigning 62 mg/L to the group of compounds is not presented. Typical Log K_{oc} values for TCE and PCE are 2,100 mg/L and 2,420 mg/L, respectively (Cohen and Mercer, 1993), equal to K_{oc} values of 3.3 mg/L for TCE and 3.4 mg/L for PCE. The retardation factor is directly proportional to the product of the organic carbon fraction and the organic carbon partitioning coefficient. Using an usually high organic carbon partitioning coefficient would force the model to calculate increased retardation and decreased travel times for these constituents.

The model presented in the Draft Travel Time memo (Golder, 2002b) does not and cannot effectively estimate contaminant travel times at this site. Therefore, the monitoring frequency recommendations based on the model presented in the Draft Travel Time memo (Golder, 2002b) should be rejected.

Summary and Recommendations

The following items should be incorporated into a revised DRAFT CAP:

1) Results of all investigations performed after completion of Phase I of the RI, as well as data and interpretations provided in local or regional studies published after 1996, should be incorporated into the Revised Draft CAP.
2) The locations and identities of wells within a 1-mile radius of the site should be updated. The locations of these wells should be included on site maps presented in the Revised Draft CAP, and the boreholes included in relevant cross-sections.
3) Figure 7 of the Draft CAP, showing cross-section C-C', is illegible. The section should be legibly presented, should illustrate the base of intercepted or projected mine workings in all seams, and should be drawn using scales and vertical exaggeration consistent with those of Figure 8, cross-section A-A'. Cross-sections B-B' and D-D' should be included (drawn using scales and vertical exaggeration consistent with those of Figure 8, cross-section A-A').
4) The conceptual site model should be revised such that it is consistent with all site data. Where existing data are insufficient to permit selection of a unique conceptual model, the data gap should be identified and alternative conceptual models supported by data should be presented.
5) Contaminant source removal through groundwater extraction (dewatering the Rogers Seam to the base of the former mine workings) and treatment using wells extracting groundwater from the deepest portions of the Rogers Mine workings north and south of the major fault should be identified and evaluated as a remedial alternative.
6) Performance monitoring wells should be installed a) in the Rogers Seam beneath contaminant source areas Pond 1 and Pond 2, b) east and west of the Rogers Seam along the trace of the major fault, and c) within the third

(deepest) level of the Rogers Seam north of the major fault. These wells would also allow evaluation of groundwater elevations, and therefore groundwater flow directions and rates, in the Rogers Seam near the contaminant source areas. Wells installed along the fault trace east and west of the Rogers Seam should be designed such that they can be used as test points for evaluating the hydraulic nature of the large fault near LMW-1.

7) The hydraulic characteristics of the large fault near LMW-1 should be tested using a pumping test; testing should be completed before the cap is installed. Testing will require installing at least two additional wells along the fault trace (one east and one west of the Rogers Seam). These wells would also serve as performance and compliance monitoring wells. These are the same wells discussed under 6(b) above.
8) The quality of area public and private water supply wells should be monitored at least once. For critical wells (e.g., those within 1,000 feet of the Rogers Seam and those used to construct regional hydrogeologic cross-sections and potentiometric surface maps), water levels should be measured and the horizontal and vertical position of the water level measuring point should be surveyed to the closest 0.1-foot increment. Monitoring should be completed before the cap is installed.
9) The Revised Draft CAP should define COCs for groundwater using data from wells installed directly beneath contaminant source areas *or* identify all hazardous constituents detected in previous samples of ponded surface water, soils, or drum residue as COCs and, for constituents detected in the single composite soil sample, multiply detected concentrations by a factor of four to address potential dilution due to compositing. Calculations of MTCA Method B standards for all COCs should be appended to the Draft CAP.
10) Groundwater and surface water samples, and groundwater and surface water elevations, should be collected quarterly for compliance and performance monitoring.
11) Performance monitoring wells should include existing wells LMW-1, LMW-2, LMW-4, LMW-6, LMW-7, LMW-9, LMW-10, LMW-11, and P-2. Additional performance monitoring wells should include those installed in the Rogers Seam beneath contaminant source areas, east and west of the Rogers Seam along the major fault, and within the third (deepest) level of the Rogers Seam north of the major fault (see Item 6).
12) Performance monitoring should include collection of daily groundwater levels in all site wells for a minimum of one year before construction of the cap, plus for at least two years after construction of the cap. Performance monitoring should also include two one-month periods of hourly groundwater level collection in all site wells during a season when intense precipitation events are anticipated; one of these periods would occur before cap construction and one would occur after cap construction. The performance monitoring program should be evaluated after three years to determine which wells should be retained as a performance monitoring wells and the frequency of such ongoing monitoring.
13) If contingency groundwater extraction is implemented, groundwater levels in performance monitoring wells should be monitored hourly.
14) Confirmation monitoring should include collection of groundwater quality samples from beneath source areas for at least four quarters before

corrective actions are implemented, followed by semi-annual monitoring for at least five years after corrective action implementation. After the five years of semi-annual monitoring, data should be reviewed to determine the appropriate frequency for ongoing monitoring.

15) Methods for defining "area background concentrations" for the site should be defined.

16) The conditional points of compliance should include all existing site wells (except possibly LMW-8 and LMW-10), plus additional wells installed to monitor the third level (deepest portion) of the mine workings north of the major fault, and the fault itself east and west of the Rogers Seam (unless the fault is proven impermeable).

17) Groundwater sampling procedures should be rewritten to emphasize that samples should be discharged into sampling containers within minimal air contact in order to minimize changes to sample quality caused by degassing or chemical exchanges with the atmosphere.

18) The Revised Draft CAP and its attachments should also be updated to confirm that schedules and staff names are correct, and that proposed procedures are current. The Revised Draft Cap should be updated to describe the corrective actions that are currently proposed, which differ somewhat from those described in the current Draft CAP.

19) The Table of Contents should be expanded to identify all included appendices, redundancies between discussions of monitoring programs in the body of the Revised Draft CAP and the appendices should be eliminated, and redundancies in the Draft Compliance Monitoring Plan, Operation and Maintenance Plan, and Contingency Groundwater Extraction and Treatment Plan should be eliminated.

20) The Revised Draft CAP should bear the seal and signature of the professionals responsible for its preparation and approval.

21) The BIOSCREEN model was developed as a screening tool to allow relatively rapid and inexpensive evaluation of whether anticipated biodegradation and attenuation of benzene, toluene, ethylbenzene, and xylenes was sufficiently probable to warrant investing in a full-scale evaluation of a given site. The Draft Travel Time memo does not provide any rationale for considering this model to be either appropriate or the best model for evaluating travel times at the Landsburg Mine site: a hydrogeologically complex site with a complex contaminant suite that includes, but is not limited to, petroleum hydrocarbons.

22) The conceptual hydrogeologic model as the basis for modeled groundwater flow is inadequate and does not represent actual site conditions.

23) Calculated contaminant travel times presented in the Draft Travel Time memo (Golder, 2002b) appears to grossly underestimate contaminant transport times. In particular, critical assumptions used to derive retardation factors are unwarranted and force the model to predict excessive contaminant retardation.

24) A second deep well should be installed just south of Pond Area 2 in the deepest part of the mine. If contamination is discovered, it will help characterize the waste disposed of in the mine.

25) The entire subsidence trench should have a physical cap installed, rather than a limited cap on the northern portion of the mine. The cap should be impervious to prevent water from entering the mine, and precipitation which falls in the Rock Creek Basin should remain in the basin. A limited cap will still allow water to enter the mine, while a full cap will provide a level of assurance that contamination is less likely to migrate out of the mine.
26) The Potentially Liable Parties (PLP) Group should be required to pump out the mine, treat the water appropriately and discharge the water to the sewer. Assuming a cap is installed over the entire subsidence trench, the mine will eventually be dewatered, reducing the potential of the contamination from migrating.
27) Monitoring frequency as proposed in the Draft CAP is grossly inadequate given the close proximity of a major potable water source for a large municipal water purveyor and several residences in the area.
28) The time of travel from the southern portal is a significant issue. If contamination is discovered in a shallow well at the southern portion of the mine, the contamination could reach the City of Kent's Clark Springs facility prior to detection. The Responsiveness Summary for the Agreed Order Amendment regarding the Infrastructure for a Contingent Groundwater Treatment System stated that 2-3 months would be required to obtain and install a treatment system. With the monitoring frequencies proposed in the Draft CAP, contamination could easily reach Clark Springs prior to detection at the southern portal, even prior to the installation of treatment facilities or infrastructure to capture water seeping out of the southern portal into the outwash aquifer.

References

Cohen and Mercer, 1993. DNAPL Site Evaluation. EPA/600/R-93/022. February 1993.

Golder Associates, Inc. 1992a. *Conceptual Model of the Landsburg Mine Site.* Completed with assistance from SubTerra, Inc. November 13, 1992.

Golder Associates, Inc. 1992b. *Landsburg Phase I Remedial Investigation/Feasibility Study (RI/FS) Work Plan.* Completed with assistance from SubTerra, Inc. November 18, 1992.

Golder Associates, Inc. 1996. *Remedial Investigation and Feasibility Study for the Landsburg Mine Site, Ravensdale Washington.* Volumes I and II. February 1996.

Golder Associates, Inc. 2002. *Draft Cleanup Action Plan, Landsburg Mine Site, Ravensdale, Washington.*

Golder Associates, Inc. 2002a. *Draft Cleanup Action Plan, Landsburg Mine Site, Ravensdale, Washington.*

Golder Associates, Inc. 2002b. *Monitoring Frequency Based on Travel Time of Potential Contaminants at the Landsburg Mine.* Draft Memorandum to Washington Department of Ecology from Doug Morell (Golder Associates, Inc.), December 3, 2002 (Golder Ref. 923-1000-002.R154)

SubTerra, Inc. 2005. *Landsburg Mine Coal Mine Hazard Assessment.* Prepared for Landsburg Mine Site PLP Group, May 2005.

Udaloy Environmental Services. 2004a. *UES Comments Regarding the Remedial Investigation and Feasibility Study for the Landsburg Mine Site, Ravensdale, Washington.* Letter to Mr. Bill Wolinski, P. E., May 24, 2004.

Udaloy Environmental Services, 2004b. *Evaluation of Chlorinated Solvents and DNAPL at the Landsburg Mine Site.* Letter to Mr. Bill Wolinski, P. E., November 5, 2004.

Thank you again of the opportunity to provide these preliminary comments on the Draft Clean-up Action Plan for the Landsburg Mine. As previously mentioned by the City of Kent, it is imperative that all necessary protective measures are taken to avoid contamination to the import water supplies for municipalities and residences in the Rock Creek Basin, in addition to protecting aquatic habitat for salmonids in Rock Creek and the Cedar River.

If there is any additional information we might be able to provide, please feel free to contact Mr. Mike Mactutis, P.E., Environmental Engineering Manager, of my staff at (253) 856-5520.

Sincerely,

Larry Blanchard

Larry Blanchard
Public Works Director

c: Mr. Gary Gill, P.E., City Engineer
Mr. Mike Mactutis, P.E., Environmental Engineering Manager
Mr. Kelly Peterson, Environmental Engineer
Mr. Brad Lake, Water Superintendent
Mr. Dave Brock, P.E., Utility Engineer
Anne Udaloy, L.H.G., Udaloy Environmental Services
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January 29, 2009

Dr. Jerome Cruz
Washington Department of Ecology
Toxics Cleanup Program
Northwest Regional Office
3190 160th Avenue SE
Bellevue, Washington 98008-5452

RE: Landsburg Mine Site

Dear Dr. Cruz:

This letter addresses recent correspondence and meetings between Ecology and the City of Kent (the "City") regarding the Landsburg Mine Site (the "Site"), particularly your meeting with a member of my staff (Michael Mactutis) and the City's groundwater modeling consultant on January 6, 2009, and the communications that preceded that meeting. We hope through this letter to clarify the City's position on anticipated Site activities, and after further discussions reach a common understanding with Ecology on the path forward for those activities. To that end, we propose that Ecology and the City schedule another meeting as soon as possible.

The City had understood that the January 6 meeting was scheduled to discuss the planning of technical studies yet to be accomplished for the Site, particularly groundwater contaminant travel time modeling ("groundwater modeling") to evaluate issues associated with groundwater monitoring frequency to be included in the Draft Cleanup Action Plan ("DCAP"). However, the City was surprised to learn at the January 6 meeting that Ecology may be inclined to forego groundwater modeling entirely and instead may be inclined to establish Site monitoring frequency (e.g., annual monitoring) for the DCAP without further technical analyses. Ecology also has indicated that the City's input regarding Site contingency planning, with the exception of providing comments during the public comment period for the DCAP, will not be considered. The City is very troubled by these developments and is concerned that Ecology has decided to reverse course on at least two fronts (i.e., Ecology's decision that groundwater modeling and evaluations should be accomplished to inform Site decision-making, as well as Ecology's offer to allow the City opportunities to participate in certain Site activities, including modeling and evaluation of possible contingency plans).

Based upon many years of City comments and submittals, Ecology certainly is aware that the City has fundamental concerns about the Landsburg Mine Site and its potential for detrimental impacts to the City's water source at nearby Clark Springs. While Ecology has indicated it is prepared to go forward with a DCAP notwithstanding the City's fundamental concerns, in Robert W. Warren's letter to the undersigned dated October 7, 2008, Ecology informed the City of "three substantive actions" that Ecology had decided to pursue to "assist in addressing the City's concerns." First, Ecology had decided that groundwater modeling and evaluations would be appropriate to inform Ecology's decision-making and offered alternatives ways for the City to be involved in those activities: "Ecology can consider hiring an independent professional groundwater and contaminant transport modeler for this task, or Ecology and the City of Kent can actively participate in the modeling effort, or serve as independent reviewers." Second, Ecology had decided that the City could "assist Ecology in evaluating the appropriate response times for contingency plans or corrective action in the DCAP." And third, Ecology had decided to require in the DCAP the "pre-positioning of the components needed for timely emergency pumping and conveyance of groundwater to the north portal groundwater treatment system." Obviously, the contaminant travel time modeling would help to inform both the contingency planning and the requirements for preparing for "timely emergency pumping and conveyance of groundwater."

In subsequent correspondence exchanged by the City and Ecology in November and December 2008, it was understood by both the City and Ecology that the City wants be involved in the evaluation of anticipated groundwater modeling activities, but as of December 10, 2008, "Ecology ha[d] not determine the nature of such a study for this complex site...." At the same time, Ecology suggested that the City could do its own modeling, possibly with the assistance of Ecology, and Ecology indicated its willingness to consider "any other options [for modeling] that the City would like to propose for Ecology's consideration." Accordingly, the City understood that the January 6, 2009, meeting had been scheduled to pursue modeling (and to assist with that effort, the City was accompanied by an experienced groundwater modeling consultant). Instead, Ecology revealed its inclination to abandon plans for modeling to inform Site decision-making, and inquired whether the City would endorse an annual groundwater monitoring requirement for the Site.

At this point in time, the City is not prepared to endorse annual groundwater monitoring, or any other particular monitoring requirements, without additional information and analyses (including the anticipated groundwater modeling, and obtaining data necessary to accomplish such modeling). The imposition of an annual groundwater monitoring requirement would be unsupported by science. Indeed, preliminary evaluation by a previous consultant for the City, and confirmed by the City's existing consultant, of the estimated time required for groundwater discharging from the Site's south portal to reach the City's Clark Springs property is only 13 to 40 days indicating that monitoring should occur much more frequently than annually. A copy of the brief write-up dated January 28, 2009, summarizing that preliminary evaluation is enclosed for your reference. Further analyses and modeling is necessary before reaching any final judgments about monitoring frequency and related requirements. The City believes that Ecology should not reverse course on the modeling effort, or on Ecology's willingness to involve the City in evaluation of proposed modeling activities and the activities themselves. Likewise, Ecology should not reverse course on its suggestion that the City "can assist Ecology in evaluating the appropriate response times for contingency plans or corrective action in the DCAP."[1]

To address these matters effectively and expeditiously, and to chart a path forward for the anticipated Site activities, we request that Ecology and the City schedule a meeting soon. We anticipate that the meeting will include discussions about the alternatives for proceeding with groundwater modeling. We will contact you to discuss scheduling and development of an agenda in the near future.

Sincerely,

Larry Blanchard

Larry Blanchard
Public Works Director

cc: Mr. Tim Laporte, P.E., Deputy Public Works Director
Mr. Michael Mactutis, P.E., Environmental Engineering Manager
Mr. Kelly Peterson, AICP, Environmental Conservation Supervisor
Mr. Brad Lake, Water Superintendent

[1] The City's willingness to become involved in these activities should not be interpreted as a waiver or abandonment of the City's fundamental concerns about the Site, as described above and as have been the subject of numerous submittals by the City to Ecology in the past.

SLR **Memorandum**

To:	Mike Mactutis, City of Kent	**Date:**	January 28, 2009
CC:	Kelly Peterson, City of Kent		
Project:	Landsburg Mine Site RI/FS		
From:	Anne Udaloy, LHG		
Re:	Evaluation of Groundwater Travel Time from the Southern Portion of the Rogers Seam Mine to Clark Springs		

The City of Kent has requested that SLR evaluate the potential time required for contaminants released from the southern portal of the Rogers Seam to travel to Clark Springs by using data from the *City of Kent Wellhead Protection Program; Clark, Kent, and Armstrong Springs* (Hart-Crowser, April 2, 1996). This memorandum provides the requested calculation and also presents a discussion of the results.

Travel Time Calculation

Horizontal flow rates were calculated for valley fill (outwash and alluvium) extending from the point where discharge from the Rogers Seam would enter the valley fill alluvium (flow along the short distance from the portal to the valley fill is not evaluated).

Horizontal flow rates are calculated for the valley in this area using:

$$v = \frac{Ki}{ne}$$

where:

v = velocity (length per unit time)
K = hydraulic conductivity (length per unit time)
i = hydraulic gradient (length per unit length)
ne = effective porosity (volume per unit volume)

Values of hydraulic conductivity, porosity, and hydraulic gradient used for this analysis are derived from the data presented in Appendix B of the *City of Kent Wellhead Protection Program; Clark, Kent, and Armstrong Springs*. The estimated hydraulic conductivity of the valley fill ranges from 1,500 to 3,000 feet per day. The estimated values of effective porosity are assumed to equal the estimated porosity values of 0.2 to 0.3, with a mean of 0.25. The horizontal hydraulic gradient was calculated as being about 0.005 feet per foot using the observed groundwater elevation values presented in Figure B-7.

The groundwater velocity through the valley fill soils calculated using these values ranges from about 25 to 75 feet per day. The distance from the area where discharge from the south portal of the Rogers Seam would enter the valley fill to the Clark Springs watershed property

line is about 1,000 feet. Therefore, the estimated time required for groundwater discharging from the south portal of the Rogers Seam to reach the Clark Springs property is 13 to 40 days.

Discussion

The travel time calculated using these data is considered reasonable given the available data. Developing a more accurate travel time estimate would require:

- Performing additional tests to better constrain the physical properties of the valley fill soils between the south portal of the Rogers Seam and Clark Springs (e.g., performing field investigations, including aquifer tests, to determine the effective porosity and hydraulic conductivity of those soils)
- Installing and monitoring a piezometer network that would allow definition and measurement of the actual hydraulic gradient (and seasonal variations) in valley fill soils between the south portal (or the coal seam as it extends south towards Rock Creek) and the point where flow parallels surface water
- Installing and monitoring a piezometer network that would allow definition and measurement of the actual hydraulic gradient (and seasonal variations) along the flow path between the point where flow discharging from the south portal parallels surface water and Clark Springs
- Calculating the actual flow path length (and seasonal variations of that flow path) using the refined hydraulic gradients
- Re-calculating travel times using the refine data and addressing seasonal variations in flow

Although these data could be used to estimate potential contaminant travel times using the formula defined above, these data would also be needed to develop an effective numerical model of contaminant flow for the area under consideration. However, development of an effective numerical model capable of defining contaminant flow would require additional data (e.g., measurements of the organic carbon content of valley fill soils, etc.).

Please note that water balance calculations suggest that a significant volume of potentially-impacted groundwater discharges through the Rogers Seam coal. Therefore, it may also be necessary to determine whether Rogers Seam coal extends beneath Rock Creek (the coal may have been truncated by the fault interpreted as extending along and parallel to the northern valley sidewall). Therefore, a thorough characterization of this potential contaminant flow path may require characterization of flow through the coal in the area of the fault.

Please also note that the contaminant flow path considered by this evaluation is only one of many possible contaminant flow paths extending from contaminant source areas within the Rogers Seam to sensitive receptors. This specific flow path was reviewed as it has been repeatedly identified as a likely (and short) flow path that could transport contaminants from the Rogers Seam to the Clark Springs water supply intake area.

Robert F. Bakemeier

From: Peterson, Kelly [KPeterson@ci.kent.wa.us]
Sent: Monday, November 09, 2009 5:22 PM
To: Cruz, Jerome (ECY)
Cc: Mactutis, Mike; rfb@rfblaw.com; Steve J. Germiat; Peter S. Bannister
Subject: FW: Some quick questions regarding Aspect Consulting's letter to Ecology on the Landsburg Mine site BIOSCREEN modeling report
Attachments: Comments on BIOSCREEN Evaluation w 2 stamps.pdf

Jerome-

Please find attached BIOSCREEN evaluation with both stamps per your request. It is important to note the date has been changed on the report, but no other changes have been made per the explanation provided by Steve Germiat in the e-mail below.

The answer regarding the location of the sentinel wells will be coming soon.

Sincerely,

Kelly

Kelly Peterson, *Environmental Conservation Supervisor*
Environmental Engineering | Public Works Department
220 Fourth Avenue South, Kent, WA 98032
Phone **253-856-5547**
www.choosekent.com

From: Steve J. Germiat [mailto:sgermiat@aspectconsulting.com]
Sent: Monday, November 09, 2009 4:22 PM
To: Peterson, Kelly; Peter S. Bannister
Cc: rfb@rfblaw.com
Subject: RE: Some quick questions regarding Aspect Consulting's letter to Ecology on the Landsburg Mine site BIOSCREEN modeling report

Kelly-
Attached is a version of the memo with Peter's PE stamp added. Because of the licensing requirements to sign/date each stamp, we've revised the memo date to match our stamp dates. We want to make sure Jerome realizes this is done only to accommodate his request for dual stamps – the memo was in fact submitted on October 28 as he had originally requested, and there are no other changes to it. Let me know if there are any concerns with this.

We'll get back to you shortly re: Jerome's other request.

Steve Germiat | Aspect Consulting LLC | Direct: 206.838.5830

From: Peterson, Kelly [mailto:KPeterson@ci.kent.wa.us]
Sent: Monday, November 09, 2009 9:34 AM
To: Steve J. Germiat; Peter S. Bannister
Cc: rfb@rfblaw.com
Subject: FW: Some quick questions regarding Aspect Consulting's letter to Ecology on the Landsburg Mine site BIOSCREEN modeling report
Importance: High

Steve and Peter-

Please see the e-mail from Jerome Cruz. Please prepare a response to him and provide me a stamped copy of the request so that I can forward to him.

Thanks,

Kelly

Kelly Peterson, *Environmental Conservation Supervisor*
Environmental Engineering | Public Works Department
220 Fourth Avenue South, Kent, WA 98032
Phone **253-856-5547**
www.choosekent.com

From: Cruz, Jerome (ECY) [mailto:JCRU461@ECY.WA.GOV]
Sent: Friday, November 06, 2009 4:22 PM
To: Lake, Brad; Jensen, Susan; Peterson, Kelly; Laporte, Tim; Mactutis, Mike; pbannister@aspectconsulting.com; Robert F. Bakemeier; sgermiat@aspectconsulting.com
Cc: Wang, Ching-Pi (ECY); Timm, Ronald W. (ECY); Park, Hun Seak (ECY); Furst, Elliott (ATG)
Subject: Some quick questions regarding Aspect Consulting's letter to Ecology on the Landsburg Mine site BIOSCREEN modeling report
Importance: High

Hello,

Ecology will need additional time (estimated at two weeks or less) to evaluate the long term groundwater monitoring frequency based on the BIOSCREEN modeling and input from Golder Associates (representing the Landsburg Mine PLP Group) and Aspect Consulting (representing the city of Kent). Ecology appreciates Kent's participation in the modeling and monitoring frequency review.

Just a few quick questions:

1. Aspect's memo states:

   "Given the lack of understanding of how groundwater moves within the mine workings, it is uncertain whether sentinel wells are appropriately positioned for contaminant detection.",

   and

   "However, Golder's recommended monitoring frequencies derived from the modeling exercise rely entirely on the assumption of properly positioned sentinel wells. Golder's recommended monitoring frequencies would not be protective of groundwater at the identified compliance wells if sentinel wells "miss" an advancing contaminant plume."

   Given these contentions about the present locations of the proposed sentinel wells, where and how would Aspect suggest such sentinel wells be placed at this site?

2. It is noted that there is State of Washington Licensed Geologist stamp on the memorandum, yet no Licensed Engineer stamp for the coauthor. Could Ecology request a copy of this memorandum with both professional stamps and signatures?

Thank you.

Jerome B. Cruz, Ph.D.
Toxics Cleanup Program, Northwest Regional Office
3190 - 160th SE Bellevue, WA 98008
Tel: (425) 649-7094 Fax: (425) 649-7098
jcru461@ecy.wa.gov
http://www.ecy.wa.gov/programs/tcp/cleanup.html

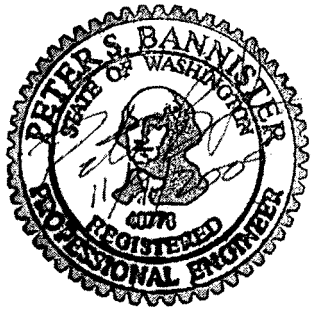
Aspect consulting
earth + water

MEMORANDUM

Project No.: 090015-001

November 9, 2009

To: Mike Mactutis and Kelly Peterson, City of Kent



Steve J. Germiat

From: **Peter S. Bannister, PE**
Senior Project Groundwater Resources Engineer

Steve J. Germiat, LHG
Senior Associate Hydrogeologist

Re: **Comments on PLP Group's BIOSCREEN Modeling Results and Proposed Monitoring Frequencies**
Landsburg Mine Site

This memo provides our comments on the groundwater monitoring frequency analysis based on BIOSCREEN model results for the Landsburg Mine Site (Site) by Golder Associates (consultant for the Site PLP Group) in a report dated October 13, 2009 (Golder, 2009). The intent of the BIOSCREEN evaluation was to assist in establishing the groundwater monitoring frequency for the long-term monitoring program as a component of the Site Cleanup Action Plan. Ecology provided input parameters, assumptions, and required output for the BIOSCREEN modeling in a memorandum dated August 7, 2009 (Ecology, 2009). We organize our comments by identifying Golder's independent assumptions in the modeling effort, summarizing Golder's BIOSCREEN results and analysis, providing a simple risk analysis of Golder's recommended monitoring frequencies, and providing our recommendations for alternative monitoring frequencies.

These comments should be considered in the context of our previous observations about the significant limitations of applying the BIOSCREEN model to this site, particularly given the lack of site investigation, the "black box" conceptual model, and the resulting speculative assumptions that are relied upon.

Executive Summary

Golder applied Ecology's input parameters and generated BIOSCREEN results and calculated breakthrough times consistent with those parameters. Using the BIOSCREEN results, Golder recommends monitoring frequencies based on detections at sentinel monitoring wells located between the source area and the identified compliance wells. The

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a limited liability company

two proposed sentinel wells along the Southern Pathway are LMW-9 and LMW-11. Two new sentinel wells along the Northern Pathway are proposed for installation at different depths in the North Portal area. However, there is uncertainty whether sentinel wells are correctly positioned. If sentinel wells are completed outside the pathway of a contaminant plume, groundwater concentrations at identified compliance wells would likely exceed the CUL within the proposed interval between monitoring events.

We believe the site conditions and analyses require monitoring intervals that are more frequent than those recommended by Golder. Accordingly, we recommend an alternative set of monitoring frequencies and analyte list to provide a more reasonable assurance of remedy protectiveness, whether or not sentinel wells are positioned correctly to detect contaminants before they arrive at identified compliance wells. We also believe the BIOSCREEN results support the conclusion that the contingency groundwater containment system infrastructure should be constructed and tested as part of the remedial construction phase.

Golder's Independent Assumptions

This section describes Golder's independent assumptions for conducting BIOSCREEN evaluations.

Modeling Scenarios

Ecology provided ranges of BIOSCREEN input values for source concentrations, dispersion coefficients, and distances between an assumed source and a monitoring point where contaminants migrate to. Golder grouped values to evaluate 3 cases, subjectively termed: "ultra conservative," "medium conservative," and "baseline conservative". Given the "black box" approach to site characterization, the label "conservative" is speculative. The differences in BIOSCREEN input and Golder's independent assumptions between the 3 cases are shown in Table 1 below:

Table 1: Differences between Golder BIOSCREEN Cases

	"Ultra Conservative" Case	"Medium Conservative" Case	"Baseline Conservative" Case
Source Concentration	Between 2.5 and 100 times the middle value*	Middle Value	Between 1% and 41% of middle value*
Dispersion Coefficient Values	20% greater than middle value	Middle Value	20% less than middle value
Southern Pathway Distance	1722 feet to sentinel wells (LMW-9) 2296 feet to compliance wells	1722 feet to sentinel wells (LMW-9) 2296 feet to compliance wells	1722 feet to sentinel wells (LMW-9) 2296 feet to compliance wells
Northern Pathway Distance	300 feet to sentinel wells 600 feet to compliance wells	500 feet to sentinel wells 800 feet to compliance wells	900 feet to sentinel wells 1200 feet to compliance wells

*Source concentrations differ depending on specific contaminant

Golder did not run Ecology's requested shorter distance for the Southern Pathway (1,400 feet from trench area 7 to LMW-11). The differences in results between the Golder BIOSCREEN cases are described in the following section.

Golder asserts that non-detections at existing monitoring wells illustrate the "conservative" nature of the BIOSCREEN evaluation, and prevent BIOSCREEN calibration: "Modeling results are not consistent with monitoring results." Golder relies on the assumption that existing monitoring wells are located within a contaminant flow path. However, it is equally probable that the well screens are outside a contaminant flow path, and do not (and will not) sample impacted groundwater. In addition, BIOSCREEN simplistically assumes a perfectly linear groundwater flow path. It is likely that actual groundwater flow paths within the mine workings (and within the site generally) are complex and three-dimensional, such that actual contaminant arrival times may be longer than predicted by a one-dimensional model.

Sentinel Wells

Golder asserts that sentinel wells will provide early detection of contaminants and, on that basis, recommends longer monitoring intervals than would be warranted without sentinel wells[1]. The two proposed sentinel wells along the Southern Pathway are existing wells LMW-9 and LMW-11. It is our opinion that the well completion intervals for LMW-9 and LMW-11 are potentially outside (below) a contaminant pathway, and do not (or will not) sample impacted groundwater.

The two new sentinel wells along the Northern Pathway are proposed to be installed near the Northern Portal (Portal 2) at different (unspecified) depths within the mine workings. Because existing wells LMW-2 and LMW-4 are installed "...at the northernmost point downgradient of the mine workings..."[2], and groundwater drains from the Northern Portal to a gravel-filled trench[3] (currently unmonitored), the proposed wells near the portal would better serve as compliance wells, instead of sentinel wells. To have value, the northern sentinel wells need to be located between the source area and the Northern Portal, despite the potential access difficulties siting a well in that area.

Longer Monitoring Frequencies using Method Detection Limit

There is less difference in concentration between a quantitative concentration at the reporting limit (RL) and the CUL, than between an estimated concentration at the method detection limit (MDL) and the CUL. Using RLs results in shorter monitoring frequency than using MDLs. Golder specified using MDLs in their monitoring frequency analysis. Some RLs used in the BIOSCREEN analysis are lower than those achieved to date in the Site monitoring program. Because the calculated monitoring frequencies are dependent on the MDLs presented, the draft CAP must require they be achieved throughout the long-term monitoring program, and require that the lab report estimated concentrations between the MDL and RL, which has not been done in the Site monitoring program to date.

---

[1] Note that identifying the point of compliance near the portals, and using sentinel wells that are not compliance wells, requires a demonstration under WAC 173-340-350 through -390 that it is not practicable to meet cleanup levels throughout the site, and that all practicable methods of treatment are used at a site (WAC 173-340-720(8)(c)). We are not aware that these MTCA requirements have been met at the site.
[2] Page 2-18 of the final RI Volume 1 (Golder, 1996).
[3] Page 3 of Response to City of Kent Letter dated March 17, 1997 Concerning Landsburg Mine Site Remediation Project (Golder, 1997).

Termination of Long-Term Monitoring

Golder asserts that "Long-term groundwater monitoring will be conducted in perpetuity *or until impacted media in the Roger's Coal Mine is below MTCA Cleanup Levels*" [emphasis added]. While this is accurate under MTCA, it is doubtful that the Site could be sampled sufficiently to determine with any confidence whether concentrations are below MTCA cleanup levels. Without substantial additional site characterization, groundwater monitoring will need to occur in perpetuity. That is a consequence of the "black box" approach to cleanup.

Golder's BIOSCREEN Results and Analysis

Golder properly applied Ecology's input parameters and the BIOSCREEN results, and the calculation of breakthrough times, appear to be appropriate for the Ecology-specified assumptions. Golder did not meet all of Ecology reporting requirements, as follows:

- BIOSCREEN analysis was not conducted for selenium and cadmium.
- Peak concentrations were not reported.
- Summary tables for each contaminant were not provided, although contaminant-specific results were tabulated by case.

Golder's report provides some information useful for conducting a monitoring frequency analysis, but it must be considered within the inherent limitations of attempting to mathematically model a "black box" conceptual model.

Difference in Results between Cases

In general, the "ultra conservative" BIOSCREEN case provided the shortest breakthrough times[4], and the "baseline conservative" BIOSCREEN case provided the longest breakthrough times. The rate of concentration increase after breakthrough, not contaminant arrival time, determines the appropriate monitoring frequency. Figure 1 presents Golder's calculated CUL breakthrough times at identified compliance wells, and the approximate time since waste disposal (reported as almost 40 years ago). Results for the Southern Pathway, excluding arsenic, are on the left side of the graph[5]. Results for the Northern Pathway are on the right side of the graph. Vertical bars show the range in breakthrough times for the "ultra conservative" and "baseline conservative" cases. Proportional uncertainty exists for MDL breakthrough times at sentinel wells and at identified compliance wells. The uncertainty for breakthrough times is much less for volatile organic compounds (VOCs) than for arsenic.

[4] The breakthrough times for vinyl chloride for the "medium conservative" case were shorter than the breakthrough times for the "ultra conservative" case.

[5] The "medium conservative" calculated arsenic breakthrough time for the Southern Pathway was 174 years, with a range of 142 to 227 years for the "baseline" and "ultra" conservative cases.

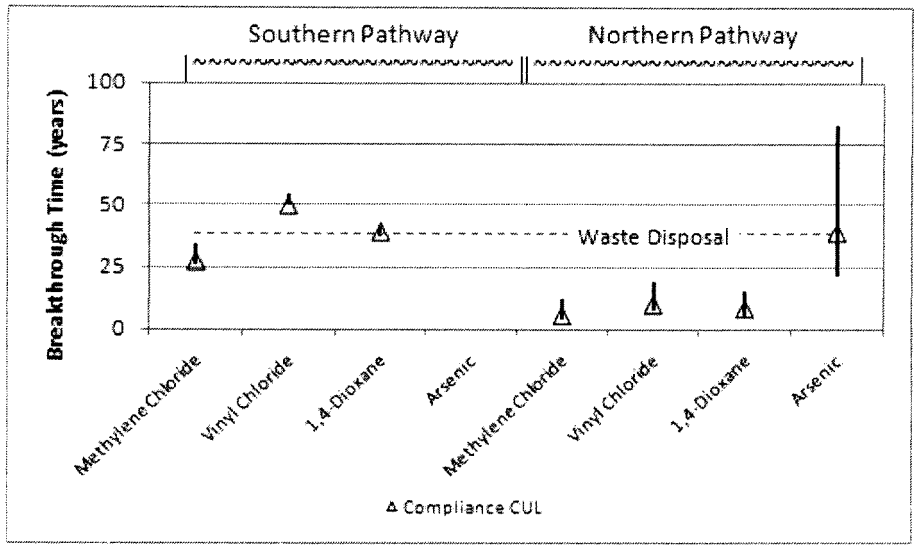


Figure 1: Calculated CUL Exceedance Breakthrough Times to Identified Compliance Wells

Figure 2 graphically compares Golder's calculated breakthrough times for MDLs at sentinel wells, MDLs at compliance wells, and exceedances of the CUL at compliance wells, based on the "medium-conservative" modeling scenario used to propose monitoring frequencies[6]. Detections at sentinel wells could provide advance warning of the migrating contaminant plume, assuming sentinel wells are completed within the plume pathway. Because CULs for the modeled VOCs are very low, detections at compliance wells are quickly followed by exceedances of CULs.

[6] The "medium conservative" arsenic results for the Southern Pathway are 109 years for MDL at sentinel wells, 154 years for MDL at compliance wells, and 174 years for CUL at compliance wells.

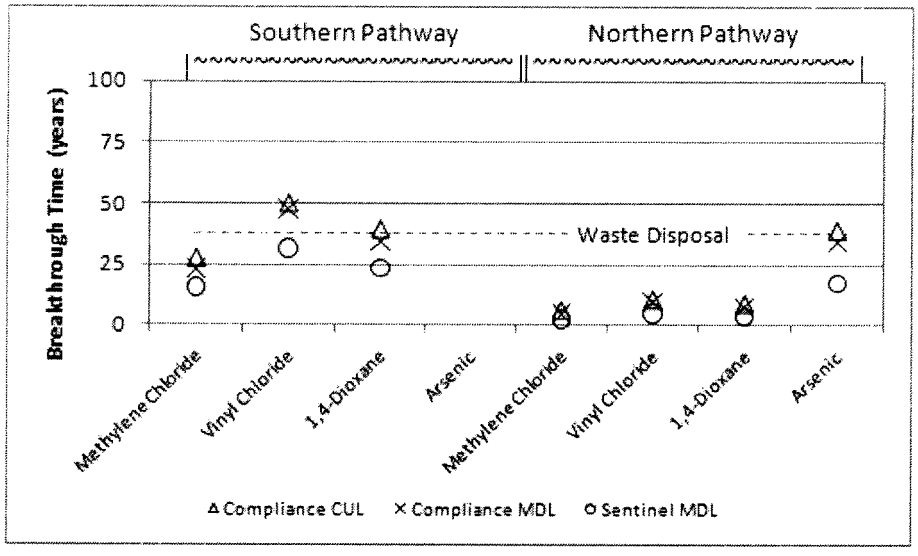


Figure 2: Calculated Breakthrough Times at Sentinel and Compliance Wells, "Medium-Conservative" Scenario

Golder's Recommended Monitoring Frequencies

Golder proposes monitoring frequencies based on the time interval between initial detection (MDL) at identified sentinel wells and the concentration reaching 50% of the CUL at the associated identified compliance wells, as determined from the "medium-conservative" modeling scenario. Golder's proposed monitoring intervals are shorter (more frequent) than the modeled time between those two levels of detection, except in the case of 1,4-dioxane breakthrough at the North Portal.

Golder recommends separate monitoring frequencies for the Southern Pathway and the Northern Pathway based on different modeled breakthrough times, and, for each pathway, separate monitoring frequencies for different contaminant groups. For each pathway, one set of monitoring frequencies is for VOCs, and another set is for metals, semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and pesticides. Although BIOSCREEN results for the SVOC 1,4-dioxane showed relatively high mobility, Golder associated the monitoring frequency for this contaminant with SVOCs.

Table 2: Golder's Recommended Monitoring Frequencies

Contaminant Groups	Southern Pathway	Northern Pathway
VOCs	5 years	2.5 years
Metals, SVOCs, PCBs, Pesticides	10 years	5 years

To help visualize the various modeling results, Figure 3 compares Golder's recommended monitoring frequencies (horizontal bars) with the modeled time differences between various levels of detection at sentinel and compliance wells versus CUL exceedances at compliance wells, for both pathways.

- The difference between detection (MDL) at a sentinel well and CUL exceedance at a compliance well is shown with a circle. Based on BIOSCREEN results, arsenic is detected at sentinel wells more than 20 years before it exceeds the CUL at compliance wells, so those circles are not shown on Figure 3.
- The difference between detection and CUL exceedances at a compliance well is shown with a cross.
- The difference between 50% CUL and the full CUL at a compliance well is shown with a diamond.

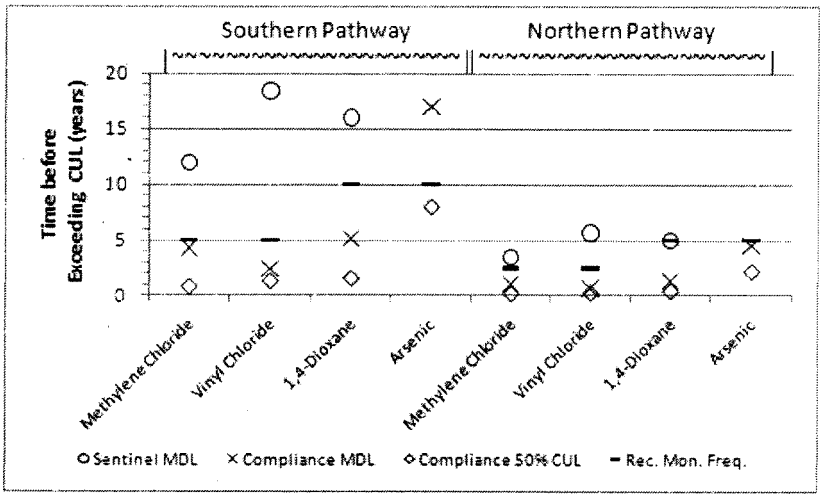


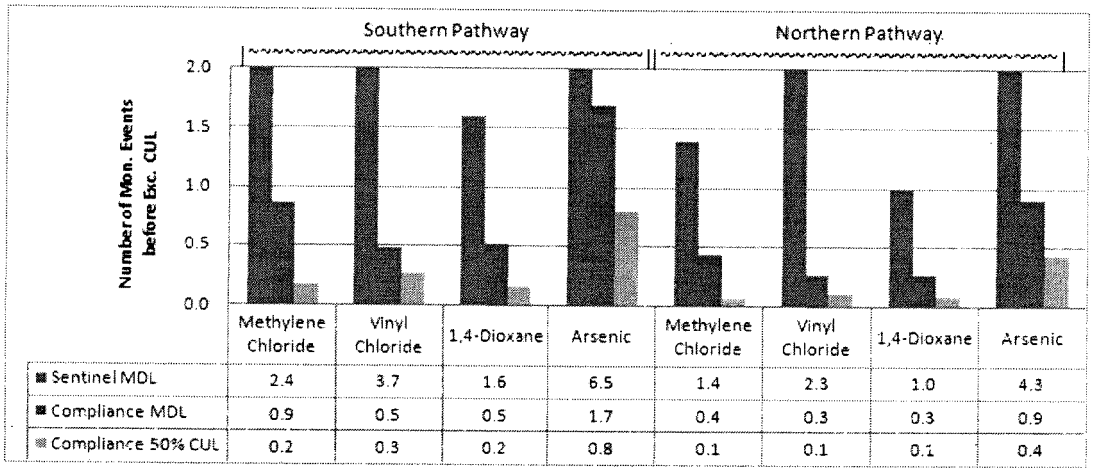
Figure 3: Differences in Breakthrough Times with Golder's Recommended Monitoring Frequencies

Simple Risk Analysis of Recommended Monitoring Frequencies

We conduct a simple risk analysis of Golder's recommended monitoring frequencies by dividing the monitoring frequency by the differences between various breakthrough times. This approach calculates the number of groundwater monitoring events before the CUL is exceeded at identified compliance wells, according to model breakthrough results. Figure 4 shows the results of the risk analysis.

If sentinel wells are positioned along a contaminant flow path, the recommended monitoring frequency would provide at least one monitoring event before the concentration exceeded a CUL at compliance wells also positioned along a contaminant flow path (blue bars in Figure 4). Given the lack of understanding of how groundwater moves within the mine workings, it is uncertain whether sentinel wells are appropriately positioned for contaminant detection. If sentinel wells miss the contaminant plume because they are not positioned along a

contaminant flow path, the chances of detecting a contaminant before the concentration exceeds the CUL at a compliance well are generally low (red bars on Figure 4). The chances are even lower of detecting a contaminant at or above 50% of the CUL before the concentration exceeds the CUL at a compliance well (green bars on Figure 4).



	Methylene Chloride	Vinyl Chloride	1,4-Dioxane	Arsenic	Methylene Chloride	Vinyl Chloride	1,4-Dioxane	Arsenic
Sentinel MDL	2.4	3.7	1.6	6.5	1.4	2.3	1.0	4.3
Compliance MDL	0.9	0.5	0.5	1.7	0.4	0.3	0.3	0.9
Compliance 50% CUL	0.2	0.3	0.2	0.8	0.1	0.1	0.1	0.4

Figure 4: Risk Analysis Results of Recommended Monitoring Frequencies

Our Recommended Alternative Monitoring Frequencies

Based on Golder's BIOSCREEN results for breakthrough times, and the risk analysis presented above, we recommend an alternative set of monitoring frequencies that provide a more reasonable assurance that the groundwater remedy would be appropriately protective. The alternative frequencies do not rely entirely on sentinel wells which may or may not be positioned along a potential contaminant flow path based on the current "black box" conceptual model.

Based on the limited understanding of the contaminant source area, analytes with shorter monitoring frequencies include VOCs, diesel- and gasoline-range total petroleum hydrocarbons (TPHs), and 1,4-dioxane[7]. Analytes with longer monitoring frequencies include metals, SVOCs other than 1,4-dioxane, and pesticides. Given the limited mobility of PCBs compared to other likely contaminants at the Site, we do not anticipate PCBs would arrive before other contaminants to trigger the groundwater contingency action. Thus, we recommend that PCBs be removed from the analyte list.

For the Northern Pathway, the "medium-conservative" model indicates a 5-month time for vinyl chloride to increase from detection to 50% of the CUL at a compliance well (3 and 7 months for the "ultra-conservative" and "baseline conservative" cases, respectively). Given these results, the inability to know whether sentinel wells will provide early warning of contaminant migration, coupled with the very large uncertainties in the modeling overall, it is appropriate in our opinion to monitor quarterly for the most mobile contaminants (VOCs, TPH, and 1,4-dioxane) in wells along the Northern Pathway.

[7] Some labs can quantify 1,4-dioxane using a VOCs analysis (EPA 8260B), but achievable RLs may vary.

For the Southern Pathway, the "medium-conservative" model indicates a 1.1-year time for vinyl chloride to increase from detection to 50% of the CUL at a compliance well (1.0 and 1.5 years for the "ultra-conservative" and "baseline conservative" cases, respectively). The above-stated uncertainties regarding sentinel wells and the overall modeling apply equally to the Southern Pathway. In addition, the proximity of drinking water sources to the South Portal (the City's Clark Springs and even closer domestic wells), warrant that an additional factor of safety be applied when determining monitoring frequencies for the Southern Pathway, in our opinion. For reference, Figure 5 (attached) illustrates the location of the South Portal relative to Clark Springs with its 6-month time-of-travel wellhead protection zone, and the closer residential parcels. To provide reasonable assurance of protectiveness, we therefore recommend a quarterly monitoring frequency for VOCs, TPH, and 1,4-dioxane in wells along the Southern Pathway.

Table 3 shows our recommended contaminants and alternative monitoring frequencies for both the Southern and Northern Pathways.

Table 3: Aspect's Recommended Alternative Monitoring Frequencies

Contaminants	Southern Pathway	Northern Pathway
VOCs; TPH-Dx and -Gx; 1,4 Dioxane	0.25 year	0.25 year
Metals; SVOCs; Pesticides	5 years	2 years

Because of the uncertainties associated with this Site, we recommend that sentinel wells be retained in the monitoring program, which we understand Ecology is already requiring[8].

Summary

Golder's recommended monitoring frequencies were based on BIOSCREEN evaluations conducted in accordance with Ecology's specified assumptions. However, Golder's recommended monitoring frequencies derived from the modeling exercise rely entirely on the assumption of properly positioned sentinel wells. Golder's recommended monitoring frequencies would not be protective of groundwater at the identified compliance wells if sentinel wells "miss" an advancing contaminant plume. We recommend an alternative set of monitoring frequencies that provides for detections at an identified compliance well before the CUL is exceeded there, and accounts for large uncertainties in the modeling, thus achieving greater assurance of remedy protectiveness. We also recommend that, throughout the groundwater monitoring program, the laboratory report concentrations to the MDL to provide the earliest possible detection capability.

Golder's modeling effort indicates a short response time for implementing the contingency containment system in the event that contaminants reach the identified compliance wells: 2 months and 10 months at North Portal and South Portal, respectively, under the "medium-conservative" case; 2 months and 7 months at North Portal and South Portal, respectively, under the "ultra-conservative" case. This information supports the conclusion that the draft CAP include construction and testing of infrastructure for the contingency groundwater

[8] Ecology (2008).

containment system as part of a comprehensive remedial construction phase (source removal, cap construction, cap performance monitoring wells), and the subsequent monitoring program in perpetuity as we have outlined previously.

References

Golder Associates (Golder), 2009, BIOSCREEN Modeling Results and Long-term Groundwater Monitoring Frequency. October 13, 2009.

Golder Associates (Golder), 1997, Response to City of Kent Letter dated March 17, 1997 Concerning Landsburg Mine Site Remediation Project.

Golder Associates (Golder), 1996, Remedial Investigation and Feasibility Study for the Landsburg Mine Site. Prepared for the Landsburg PLP Steering Committee. Redmond, Washington.

Washington State Department of Ecology (Ecology), 2009, Letter re: BIOSCREEN modeling of hypothetical contaminant travel times and recommended long term monitoring frequencies at Landsburg Mine site in Ravensdale, Washington. August 7, 2009.

Washington State Department of Ecology (Ecology), 2008, Responses to Ecology Review Comments on the March 20, 2002 Landsburg Mine Consent Decree Document and Exhibits (including Draft Cleanup Action Plan). August 5, 2008.

Limitations

Work for this project was performed and this memo prepared in accordance with generally accepted professional practices for the nature and conditions of work completed in the same or similar localities, at the time the work was performed. This memo does not represent a legal opinion. No other warranty, expressed or implied, is made.

Attachments

Figure 5: Clark Springs Zone 1 Detail

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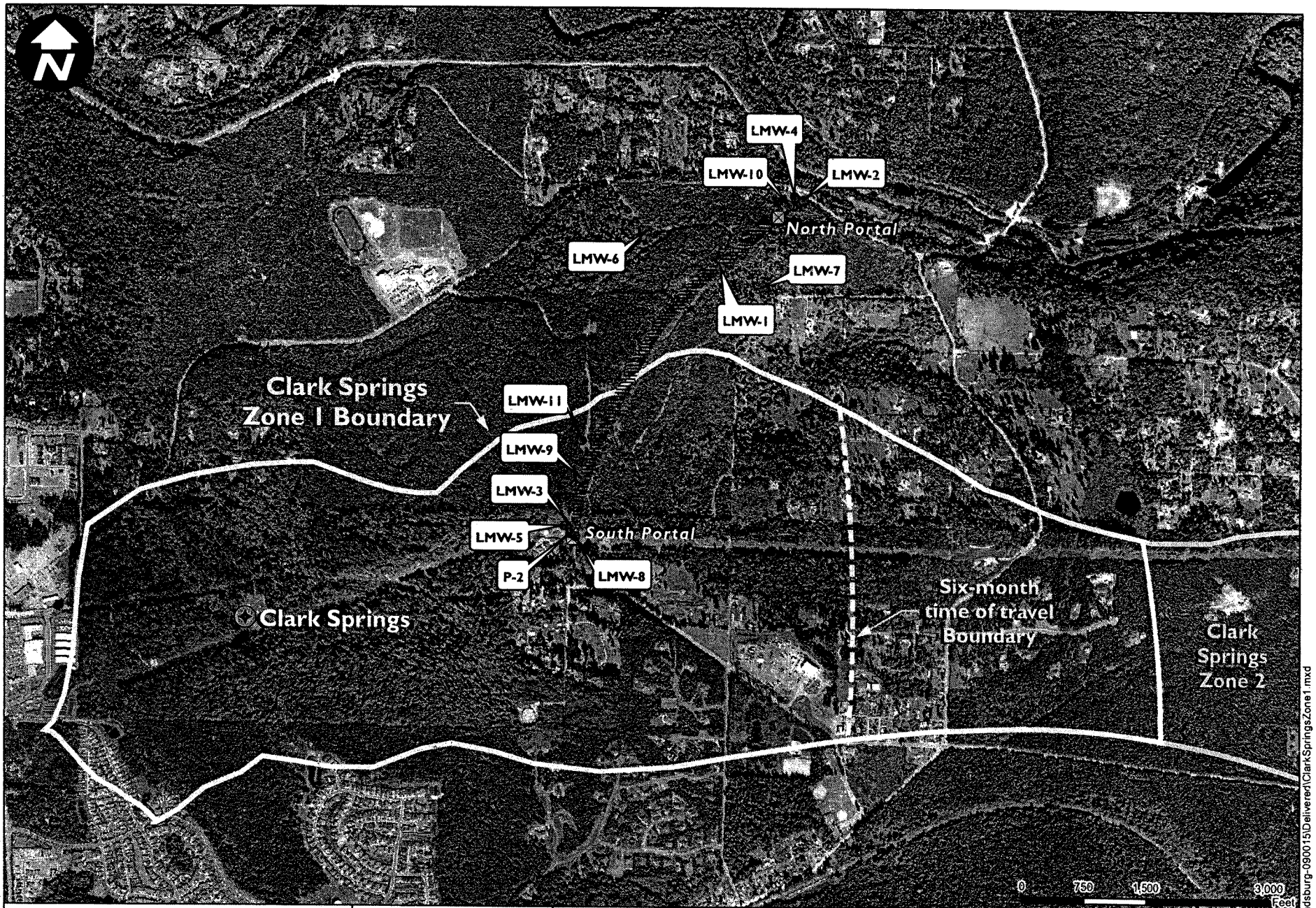


Legend

- Monitoring Wells
- Mine Portals
- Landsburg Mine
- Supply Source

Aspect consulting
earth • water
www.aspectconsulting.com
a limited liability company

Clark Springs Zone 1 Detail

City of Kent Wellhead Protection Plan

DATE: Oct 2009	PROJECT NO. 090015
DESIGNED BY: PPW	
DRAWN BY: PPW	FIGURE NO. 5
REVISED BY: -	

T:\projects_8\Kent\Landsburg-090015\Deliverer\ClarkSpringsZone1.mxd

Robert F. Bakemeier

From: Peterson, Kelly [KPeterson@ci.kent.wa.us]
Sent: Thursday, November 12, 2009 2:57 PM
To: Cruz, Jerome (ECY)
Cc: Mactutis, Mike; Laporte, Tim; Lake, Brad; Brubaker, Tom; Jensen, Susan; rfb@rfblaw.com; Steve J. Germiat; Peter S. Bannister; Wang, Ching-Pi (ECY); Park, Hun Seak (ECY); Furst, Elliott (ATG); Timm, Ronald W. (ECY)
Subject: FW: proposed wells to be installed, Landsburg Mine Site
Attachments: additional sentinel wells.pdf; ProposedWellLocationsAndDepths - Cross Section.pdf

Jerome-

Please find attached the proposed sentinel well locations for the Landsburg Mine per your request. Please confirm that you have received this e-mail.

Sincerely,

Kelly

Kelly Peterson, *Environmental Conservation Supervisor*
Environmental Engineering | Public Works Department
220 Fourth Avenue South, Kent, WA 98032
Phone **253-856-5547**
www.choosekent.com

From: Steve J. Germiat [mailto:sgermiat@aspectconsulting.com]
Sent: Thursday, November 12, 2009 2:45 PM
To: Peterson, Kelly; Mactutis, Mike
Cc: rfb@rfblaw.com; Peter S. Bannister
Subject: proposed wells to be installed, Landsburg Mine Site

Kelly and Mike –

As requested by Ecology, we are providing a map depicting proposed locations for sentinel wells intended to provide early warning of contaminant migration toward the mine portals. For illustration purposes, the proposed wells are also sketched onto a cross section, attached.

We remain concerned for potential contaminant migration shallow in the mine workings, so we recommend that sentinel wells be screened shallow – just below the water table. However, we agree with Golder's recommendation (in the October 13, 2009, BIOSCREEN memorandum) to install two new sentinel wells along the northern pathway – a deeper well with a shallow water table well.

Our proposed sentinel wells beneath the soil cap north and south of the rock wall provide for "double duty": (1) provide water quality monitoring for early warning of migration from the source area, and (2) provide water level monitoring to monitor cap performance as discussed in our June 23 meeting with Ecology. As we discussed in that meeting, we feel it necessary that wells providing water level data for cap performance monitoring be installed at least a year prior to cap construction to allow a year of baseline (pre-capping) water level monitoring, for later comparison with post-capping conditions.

A significant benefit that we see with the proposed sentinel wells along the southern pathway is having water level data which provide a substantially improved understanding of whether there is a gradient (thus groundwater flow potential) from the known waste disposal area toward the south portal.

We are also providing on the map a proposed location for a new monitoring well in the gravel trench at the north portal - as we recommended to Ecology in our June 23, 2009, meeting.

Steve Germiat | Direct: 206.838.5830 | Cell: 206.619.6743 sgermiat@aspectconsulting.com

Aspect Consulting LLC | 401 Second Ave South, Suite 201, Seattle, WA 98104 | Fax: 206.838.5853 | www.aspectconsulting.com

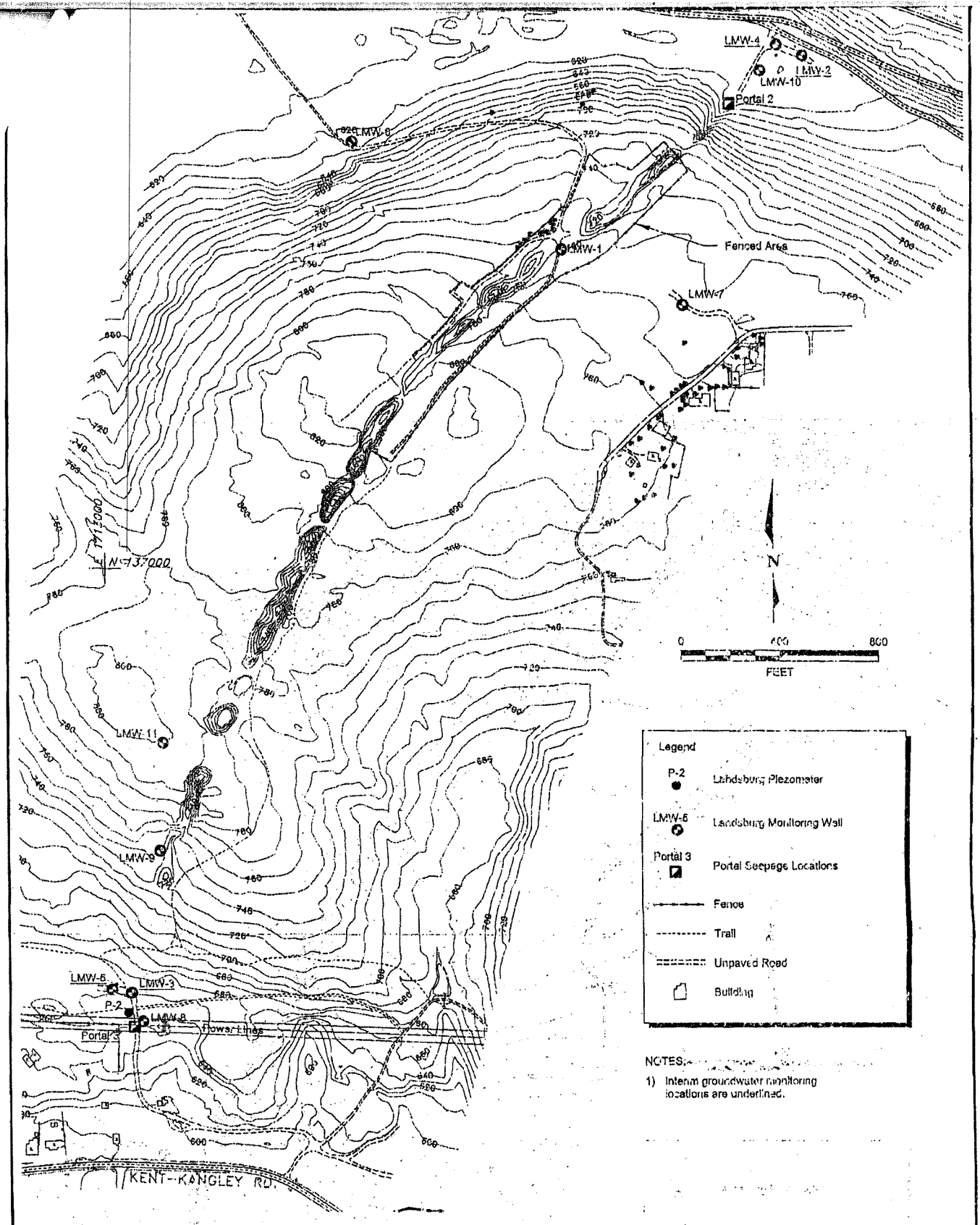
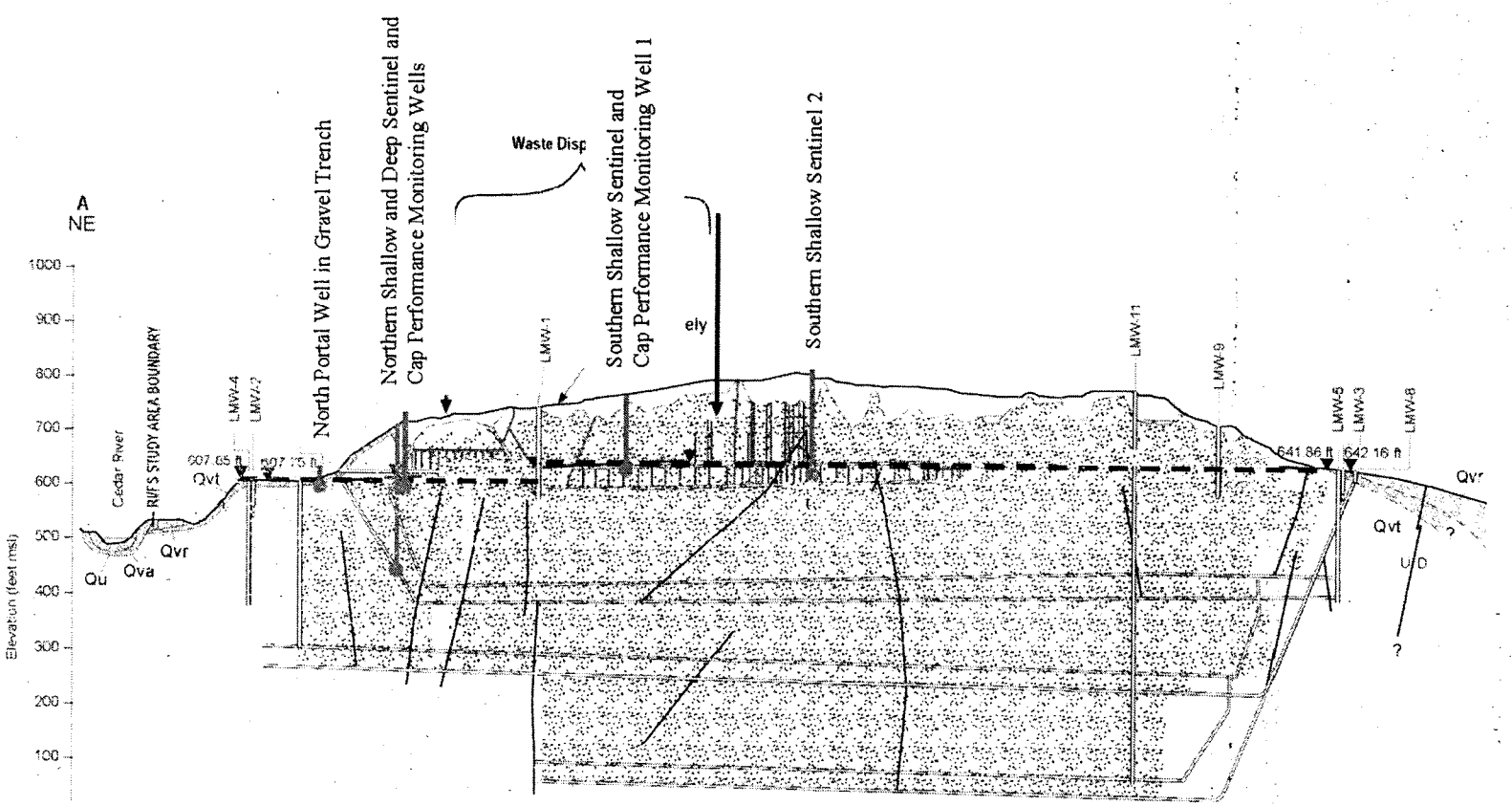


FIGURE 1
GROUNDWATER MONITORING LOCATIONS
PALMER/LANDSBURG MINE/WA

K:\CAD\Projects\1992\231000\002\R273\231000002R273P01.dwg 05/11/2006, 9E:04 Layout: Layout1

Golder Associates

Cross-Section Showing Proposed Well Locations
Landsburg Mine Site – Rogers Seam



Aspect Consulting, LLC
11/11/2009
S:\City of Kent\Landsburg Support 090015\Data\Maps\ProposedWellLocationsAndDepths_Final.doc

KENT
WASHINGTON

PUBLIC WORKS ADMINISTRATION
Timothy J. LaPorte, P.E.
Public Works Director
400 West Gowe
Kent, WA 98032
Fax: 253-856-6500

PHONE: 253-856-5500

March 5, 2010

Dr. Jerome B. Cruz
Site Manager
Toxics Cleanup Program
Northwest Regional Office
Washington Department of Ecology
3190 – 160th Avenue SE
Bellevue, Washington 98008

Re: Landsburg Mine Site—Ecology Letter Dated January 21, 2010 Ecology Decisions Regarding Proposed Groundwater Monitoring Program

Dear Dr. Cruz:

I write of behalf of the City of Kent (the "City"), to address the recent decisions made by the Washington Department of Ecology ("Ecology") regarding a proposed long term groundwater monitoring ("LTGWM") program at the Landsburg Mine Site (the "Site"), as described in Ecology's letter dated January 21, 2010 (and its enclosed Attachment A)(the "LTGWM Decisions"), addressed to the Landsburg Mine Site PLP Group's consultant (Douglas Morell of Golder Associates, Inc.).[1] This letter expresses some of the City's significant concerns about Ecology's LTGWM Decisions, and encloses a memorandum prepared by Aspect Consulting ("Aspect") pertinent to the City's concerns.[2] While the City feels compelled to state its positions (and reiterate some of its fundamental criticisms) regarding the Site to Ecology, the City anticipates (requests) that Ecology will continue to involve us in important aspects of the Site decision-making process and revision of the Site's Draft Cleanup Action Plan ("DCAP"). The City particularly would like to be involved in the framing of proposed plans for groundwater containment system infrastructure installation, testing, and related matters (as the City understands that Ecology has previously

[1]Although I have been directly involved in many of the previous efforts by the City regarding the Site, Larry Blanchard has previously met and corresponded with you regarding the Landsburg Mine Site. He has left the City and I have succeeded him as the Public Works Director.

[2]As previously emphasized by the City, the City's involvement in commenting upon Site matters, commenting upon modeling efforts and Ecology's LTGWM Decisions, discussions regarding potential modifications/clarifications of the previously prepared DCAP (as outlined by Aspect on June 23, 2009, as discussed in this and other correspondence, and/or otherwise), and related matters should not be interpreted as a waiver or abandonment of the City's fundamental concerns about the Site, as described in part in this letter and as have been the subject of numerous submittals by the City to Ecology in the past.

indicated the City will be consulted regarding such matters before they are incorporated into a revised DCAP). And, as previously requested, the City would like the opportunity to review the draft consent decree and revised DCAP before they are finalized for public comment.

Despite the City's ongoing concerns about the Site and Ecology's decisions, I would like to thank Ecology for meeting previously with the City's representatives and for allowing the City and its consultants to comment upon some of the recent technical activities (i.e., the BIOSCREEN modeling efforts). By expressing what we believe to be legitimate and serious concerns about the Site, its surrounding environment, and the safety of the City's water supply, the City has hoped to demonstrate to Ecology the need for some significant revisions to the previously prepared DCAP. We have hoped that technical analyses and recommendations proferred by two different independent consulting firms would provide strong justification for those DCAP revisions. We try to remain somewhat optimistic about yet-to-be-revealed DCAP revisions. But, while we acknowledge that Ecology's LTGWM Decisions do include some helpful modifications/clarifications for the DCAP (i.e., some new wells, use of method detection limits, 0.5 cleanup level detection triggering groundwater response activities), unfortunately we see their benefits to be undermined by Ecology's decisions to adopt the PLP Group's proposals regarding LTGWM frequencies and the number/locations of LTGWM wells. The City believes that those decisions are particularly inappropriate in the context of previous Site decisions made by Ecology regarding the adequacy of the Site investigations, the framework and adequacy of the remedial investigation and feasibility study ("RI/FS")(and subsequent Site activities), and the conceptual "black box" approach to the Site.

Ecology's LTGWM Decisions, and the justifications underlying those decisions, are fundamentally inconsistent with the "black box" conceptual model that Ecology and the PLP Group have concluded should guide Ecology's Site decision-making. While the City has not concurred with the conceptual model and its implementation, Ecology should not inconsistently and arbitrarily apply that model to reach critical Site decisions. According to past Ecology determinations, that conceptual model would be used to frame a remedy that assumes the worst in the unknown depths of the abandoned coal mine at the Site. That "black box" would be monitored regularly (and perpetually) in appropriate locations to ensure that the uncharacterized toxic wastes dumped into the mine would not escape without detection and appropriate remedial action. Having endorsed and relied upon the "black box" conceptual model to justify minimal (and in the views of the City and its consultants, inadequate) Site characterization, Ecology now abandons that conceptual model in the context of its LTGWM frequencies decision by pointing to the supposed "fact" that there are "no groundwater impacts" at the Site.[3] In the

[3] Ecology letter dated January 21, 2010, Attachment A, p. 3 (citing "no groundwater impacts" to justify rejection of more frequent LTGWM at the Site); Ecology email dated January 25, 2010, transmitting those materials to the PLP Group, the City, consultants, and Ecology personnel ("I would like to stress that based on the history of no detections of contaminants in groundwater issuing from the site, these elements [involving groundwater containment infrastructure] are basically additional safeguards in case contamination is detected in the future."). Likewise, Ecology should not abandon

circumstances of minimal Site characterization, and a very poor understanding regarding what/where contamination exists at the Site, it cannot be concluded that there are "no groundwater impacts" at the Site, or that more frequent LTGWM would be "unreasonable" (Ecology's word) under the circumstances.

Furthermore, as previously observed by the City and its consultants, the use of BIOSCREEN modeling does not improve the fundamental lack of understanding of the Site, and the model's results should not be construed to be an accurate predictor of Site conditions. Ecology should not point to BIOSCREEN modeling (i.e., a model relying upon speculative assumptions in the absence of Site data) in an attempt to justify the abandonment of the "black box" conceptual site model (or to mischaracterize the LTGWM Decisions supported by mere assumptions as "conservative" under the circumstances).

Ecology relies upon other inappropriate conclusions to reject more frequent Site monitoring recommended by Aspect. For example, Ecology dismisses more frequent LTGWM as inappropriate due to the "[s]trong possibility of being economically unsustainable."[4] Ecology evidently reaches this conclusion without information to substantiate it. The City has seen no cost estimates, net present value calculations, or PLP financial information presented to (or produced by) Ecology to inform such a conclusion rejecting Aspect's recommendations.[5] And, if there is some concern that more frequent LTGWM would be "economically unsustainable" for the PLPs, where does that leave the prospect of their proposed future installation and operation of groundwater containment/treatment infrastructure as a viable "contingency" plan? No matter what other requirements are proposed for the revised DCAP, if toxic wastes are to remain uncharacterized in the Site, groundwater containment system infrastructure must be installed and tested as part of remedy implementation, including a demonstration that extraction can actually achieve defined performance standards. If "contingency" measures are to be proposed to justify a minimalist Site remedy, there are many reasons for requiring that the revised DCAP impose obligations to actually construct and test those measures rather than leave them to a very uncertain future.[6]

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the conceptual model in the context of decisions about "contingency" infrastructure by pointing to "no groundwater impacts" to justify an inadequate or incomplete "contingency" plan.

[4] Ecology letter dated January 21, 2010, Attachment A, p. 3.

[5] Outdated cost estimates based upon a different scope of activities in the 1996 RI/FS for the Site do not support the conclusion that more frequent monitoring possibly would be "economically unsustainable." To the contrary, the FS alternatives involving capping and monitoring were ranked as the low cost alternatives.

[6] The City requests to be involved in the framing of proposed plans for the groundwater system, in part because the City believes it can add value and in part because we are concerned about preliminary concepts for the system. For example, Ecology's letter to the City dated October 7, 2008, indicated that fuel storage at the south portal of the Site might become part of the plan. That prospect is troubling to the City, and we would urge consideration of other options for powering the system.

As far as the new wells required by Ecology's LTGWM Decisions are concerned, Ecology indicated that those "wells will be drilled in accordance with the number, location and depths in [the PLP Group's consultant's] memo dated December 4, 2009." However, Ecology inaccurately characterizes its decisions about the new wells as reflecting the City's "basic concurrence on appropriate location of the sentinel wells." To the contrary, the City's consultant (Aspect) recommended two wells in critical locations within the proposed cap area serving dual purposes (the proposed cap performance monitoring wells that would also serve as "sentinel" wells). In fact, in Aspect's December 11, 2009, technical memorandum, among other disagreements with the well locations proposed by the PLP Group, Aspect indicated: "We disagree that the proposed south sentinel well located immediately south of the cap will provide effective monitoring of the hydraulic effects of the cap." Aspect also opined that the omitted "dual purpose" wells would provide "greater value" than other proposed wells, both as "sentinel" wells and to provide significant missing information about Site hydrogeology. Given the omission of those two wells from Ecology's LTGWM Decisions, it is clearly inaccurate to assert that the City is in "basic concurrence" with the new well locations.

Furthermore, it must be noted that Ecology's LTGWM Decisions attempt to justify less frequent monitoring based upon the assumptions that "[c]apping and runoff modification will cause hydraulic changes which put the south portal at less risk" (Ecology Letter dated January 21, 2010, Attachment A, p. 3). It is inappropriate to base such a critical decision upon those assumptions without verification and collection of substantiating data from appropriate locations. The two cap performance monitoring wells recommended by Aspect would provide critical information necessary to understand Site hydrogeology and to assess performance of the proposed capping remedy. They should be added to the proposed monitoring plan.

In another troubling section of Attachment A to Ecology's January 21, 2010 letter entitled "Summary of Recommended Monitoring Frequencies," in the table outlining Ecology's decisions regarding the "Southward Flow," Ecology asserts that its rationale for its decision is based, in part, upon "Concerns by City of Kent." However, the Ecology decision reflected in that table represents wholesale adoption of the PLP Group's recommendations and rejection of the recommendations provided by the City's consultant (Aspect) regarding monitoring frequencies and the inclusion of the two wells described above in the monitoring plan.

The City and Ecology have historically had, and based upon Ecology's LTGWM Decisions obviously continue to have, very different views about the adequacy of the Site investigations, the framework and adequacy of the RI/FS, the conceptual "black box" approach to the Site, the basis for and protectiveness of various DCAP components, the level of threat that the Site poses for the City's Clark Springs water source, and many technical issues related to these matters. From the City's perspective, Ecology has continually endorsed the minimalist approach to the Site advocated by the PLP Group. That perspective has been reinforced by Ecology's adoption via its LTGWM Decisions of the PLP Group's latest proposals in all critical

respects--new wells (number, locations, and depths), as well as LTGWM frequencies. That perspective also has been reinforced by the examples above where Ecology has asserted that the City is in "basic concurrence" with particular decisions, and Ecology has asserted that the City's concerns have influenced particular decisions. The reality in those circumstances is that Ecology has adopted the PLP Group's recommendations, apparently dismissed the City's concerns, and rejected the recommendations of the City's consultants.

The City requests that Ecology: (a) consider this letter and the enclosed Aspect memorandum; (b) reconsider its LTGWM Decisions; (c) require LTGWM frequencies as recommended by Aspect; (d) require the installation of two additional cap performance monitoring wells as recommended by Aspect; (e) involve the City in the framing of proposed plans for groundwater containment infrastructure installation and testing; and (f) provide the City the opportunity to review the draft consent decree and revised DCAP before they are finalized for public comment. The City believes that such actions, and likely some further discussions with Ecology and the PLP Group in due course, may ultimately help to resolve potential disputes about the Site. We will appreciate Ecology's consideration of these requests, and look forward to hearing further from Ecology regarding these matters.

Sincerely,

Tim Laporte, P.E.
Public Works Director

cc: Mike Mactutis, P.E., City Environmental Engineering Manager
Kelly Peterson, AICP, City Environmental Conservation Supervisor
Brad Lake, City Water Superintendent
Tom Brubaker, City Attorney
Susan Jensen, Assistant City Attorney
Steve Germiat, Aspect Consulting
Peter Bannister, Aspect Consulting
Robert Bakemeier, Bakemeier, P.C.

Aspect consulting
earth + water

DRAFT MEMORANDUM

Project No.: 090015-001

February 12, 2010

To: Mike Mactutis and Kelly Peterson, City of Kent

From: Steve Germiat, LHG
Senior Associate Hydrogeologist

Peter Bannister, PE
Senior Project Groundwater Resources Engineer

Re: **Draft Comments on Ecology's Long-Term Groundwater Monitoring Decisions (dated January 21, 2010)**
Landsburg Mine Site

This memorandum provides Aspect Consulting's comments on Ecology's decisions regarding long-term groundwater monitoring for the Landsburg Mine site in their January 21, 2010 letter. In short, Ecology agreed with the Landsburg Mine PLP Group's proposals regarding installation of new monitoring wells, and on long-term monitoring frequencies that were based on BIOSCREEN modeling results and the speculation that groundwater monitoring wells (to be installed) will be located appropriately to act as "sentinel" wells that provide early warning of contaminant plumes approaching the north and south mine portals. The City of Kent and its consultants have repeatedly expressed concerns about inadequate site characterization, and the resulting poor understanding regarding what/where contamination exists, and how/where it moves, within the site. Developing a non-calibrated mathematical contaminant transport model (BIOSCREEN) of the site does not improve that fundamental lack of understanding, and the model's results should not be construed to be an accurate predictor of future conditions. As such, we were expecting that Ecology would take into account the large uncertainties and require a more protective set of monitoring frequencies given the proximity of the south portal to the City of Kent's primary drinking water supply. As indicated in the specific comments below, we feel that Ecology's proposed long-term monitoring program would not provide reasonable assurance of remedy protectiveness. Our specific comments are as follows:

1. We appreciate that Ecology will require installation of four new sentinel wells, including two north of the waste disposal area, and two south of it. Even if these wells miss the path of a contaminant plume, they should provide better understanding of the direction(s) and velocity of groundwater flow, and the location of potential hydraulic divides within the mine workings. However, as indicated below in comment 7, we continue to recommend that two cap performance monitoring wells be added as well.

2. We appreciate that Ecology specified that the new sentinel wells be installed before remedial actions (cap construction) are implemented. We hope that these wells will be installed as soon as possible to provide a sufficient baseline monitoring period. We likewise appreciate that Ecology's letter specifies that the long-term monitoring will continue in perpetuity.

3. We appreciate that Ecology alludes to a contaminant concentration detection at 0.5 the cleanup level being the trigger for implementing the contingency action (groundwater containment system operation). We recommend that the DCAP provide details on specific actions (including expanded monitoring) triggered by detections during long-term monitoring. We continue to recommend that the DCAP require the system to be installed and tested to demonstrate that containment performance standards can be met.

4. We appreciate that Ecology specified the need for prepositioning the infrastructure at the south portal area for the contingent groundwater containment system. We look forward to additional details on construction and testing of the system in the DCAP.

5. We appreciate Ecology specifying that groundwater monitoring results will be reported to method detection limits (MDLs) to provide the earliest possible detection capability. We recommend that the compound-specific MDLs be specified in the DCAP.

6. Ecology apparently disagreed with our recommendation that 1,4-dioxane be included with the set of analytes sampled more frequently. Given the known presence of chlorinated solvents in the waste disposal area, and 1,4-dioxane's high mobility and persistence, we reiterate our previous recommendation that 1,4-dioxane (an SVOC) also be analyzed with VOCs and TPH.

7. We reiterate our concerns with the locations of some sentinel wells proposed by the PLP Group and accepted by Ecology. While not the topic of the modeling effort, cap performance monitoring wells screened in the mine workings beneath the cap are needed to directly monitor the hydraulic performance of the cap (reduced recharge). As stated in our December 11, 2009 memo, positioning wells beneath the cap, north and south of the rock wall, would accomplish that while also providing the earliest possible warning of contaminant migration (i.e., sentinel well) – thus meeting two important remedial action objectives and greatly increasing the benefits achieved for the cost expended, relative to Ecology's locations. We disagree with Ecology's statement that a well far upgradient of the portals that shows contamination would "fail to function as a sentinel well". Given their distance from potential receptors, they would be ideal sentinel wells and would provide tremendous decision-making value, not for choosing the final remedy but for implementing it to provide reasonable assurance of protectiveness. For example, if such a well south of the rock wall did not show contamination, our concern for protection of the City of Kent's Clark Springs water source would be reduced. However, even if not considered a reliable sentinel well by Ecology, the failure to install wells to directly monitor the cap's hydraulic effects on the groundwater system would be a fundamental flaw in the proposed monitoring program and overall site remedy. We note that Ecology attempts to justify less frequent long-term water quality monitoring based on the assumption that the cap will "cause hydraulic changes which put the south portal at less risk." (page 3 of Attachment A in the January 21, 2010 letter). It is inappropriate at this time to base such important decisions on assumptions without any substantiating data.

8. As we previously stated in our November 9 and December 11, 2009 comments, sentinel wells for the north portal need to be positioned upgradient (southwest) of the portal to be effective. The existing water level data from wells near the north portal (LMW-2, -4, -10) indicate upward gradients, suggesting upward groundwater flow toward the north portal, presumably preferentially following the inclined mine shaft as a permeable conduit. Groundwater at the north portal discharges subsurface via a gravel-filled trench[i]. As depicted on Figure 1 of Golder's December 4, 2009 memo, the two northern sentinel wells will not intercept the inclined shaft unless they would be drilled at a relatively steep angle to the southwest. If that is the plan, it should be clarified.

9. Ecology disagreed with our December 11, 2009 recommendation to install a new compliance monitoring well in the gravel-filled trench downgradient of the north portal. Based on the available information outlined in our comment 8, the trench may represent a significant groundwater discharge point for the mine workings. As such, we still feel that having monitoring data there, irrespective of attenuation that may be occurring, would be important for empirically demonstrating protection of off-site water resources to the north.

10. We reiterate our previous recommendations for more frequent monitoring frequencies than recommended by PLP Group and adopted by Ecology. We reiterate that BIOSCREEN is not a calibrated predictive tool, nor can it be in the circumstances of the site, where the distribution of contaminants has not been characterized. We acknowledge that the new sentinel wells will provide better understanding of the groundwater flow system within the mine workings; they may also show contaminant detections which would improve the understanding of site contaminant distribution and transport. However, at this time, faced with the BIOSCREEN modeling's large uncertainties resulting from the "black box" conceptual site model and the potential risk to drinking water supplies at stake, it is our opinion that Ecology's proposed long-term monitoring program would not provide reasonable assurance of remedy protectiveness.

11. There is confusing text in Section II of Attachment A to Ecology's January 21, 2010 letter that needs to be clarified with Ecology. In the table outlining Ecology's decisions regarding Southward Flow, the last footnote states "Monitoring only at compliance wells LMW-3, LMW-5, LMW-8" (emphasis in original). Ecology should confirm that monitoring will be conducted at the full set of monitoring wells listed in Table A of the letter itself, not just at wells LMW-3, -5, and -8.

12. The first part of Section III of Attachment A to Ecology letter ("Disadvantages of using compliance wells only (no sentinel wells)...") appears to suggest that the monitoring approach outlined in our November 9, 2009 memo would not include monitoring of sentinel wells. That is not correct. Our proposed monitoring frequencies were developed to provide reasonable assurance of protectiveness even if the intended sentinel wells were not positioned within contaminant flow paths (i.e., not reliable sentinel wells). We still intended that sentinel wells be monitored with the hope that they are positioned within potential contaminant flow paths.

13. We acknowledge Ecology's statement that the long-term monitoring program can be revisited in the first periodic review (at least every 5 years per WAC 173-340-420) of the site remedy, at which time we expect the cap will be in place and information from the newly installed wells will be available.

Please contact us if you would like to discuss these comments.

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[1] Page 3 of Response to City of Kent Letter dated March 23, 1997, Concerning Landsburg Mine Site Remediation Project (Golder, 1997).

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ATTACHMENT H

Past Letters to Ecology About Landsburg Mine Site From Interested Parties (Chronological Order)

1. City of Renton Letter to Ecology (October 7, 2004
2. Covington Water District Letter to Ecology (October 14, 2004)
3. King County Water Land Resources Division Letter to Ecology (December 10, 2004)
4. King County Executive Letter to Ecology (February 15, 2006)
5. Soos Creek Water & Sewer District Letter to King County (March 8, 2006)

Kathy Keolker-Wheeler, Mayor

CITY OF RENTON
Planning/Building/Public Works Department
Gregg Zimmerman P.E., Administrator

October 7, 2004

Jerome Cruz, Site Manager
WA Department of Ecology
Toxics Cleanup Program
3190 160 Ave SE
Bellevue, WA 98008

SUBJECT: LANDSBURG MINE

Dear Mr. Cruz:

We have followed with interest recent discussions between the City of Kent, the Department of Ecology, and the Potentially Liable Parties (PLP) for the Landsburg Mine. Kent raises questions in their position paper dated September 23, 2004, the answers to which concern the City of Renton as well. The questions relate to whether the site has been adequately characterized for purposes of adopting a cleanup plan.

Our interest in this site is twofold: First, it is located in the Cedar Valley Sole Source Aquifer, the source of Renton's drinking water. Second, it has the potential to impact water quality of the Cedar River and, as a result, wildlife habitat and opportunities for public recreation.

Ecology is considering adoption of a draft consent decree and preferred cleanup plan submitted by the Landsburg PLP Group in 1997. We request that Ecology carefully consider and answer the questions raised by Kent, and by Renton in this letter, prior to making a decision. Additional study, as needed, should be performed in order to answer the questions.

Upon review of the Remedial Investigation/Feasibility Study (RI/FS) for this site, we question whether adequate study has been completed to conclude that:

1. Hazardous waste remains where it was dumped;
2. Hazardous waste is not affecting groundwater;
3. Fractures and faults are not contaminant pathways; and
4. The only potential contaminant pathway is to the north.

All contaminant pathways from the site should be defined. The type and concentration of contaminants that could be transported by those pathways should be defined. Directions, volumes, and rates of groundwater flow should be established. A water balance for the mine workings should be completed to determine whether all significant water flow paths from the mine workings have been identified. The possible movement of dense non-aqueous phase liquids according to the contour of impermeable layers at depth rather than with the direction of regional groundwater flow should be evaluated.

The impact of cleanup strategies on the site should be explained. Only with this information can an effective cleanup and site management plan be established.

We appreciate your taking our concerns into consideration and we look forward to continued involvement in the resolution of the Landsburg Mine.

Sincerely,

Gregg Zimmerman

Gregg Zimmerman, Administrator
Planning, Building, Public Works Department

cc: Mayor Kathy Keolker-Wheeler, City of Renton
Renton City Council
Jay Covington, City Administrative Officer, City of Renton
Lys Hornsby, Utility Systems Director, City of Renton
Ronald Straka, Surface Water Utility Engineering Supervisor, City of Renton
Abdoul Gafour, Water Utility Engineering Supervisor, City of Renton
Carolyn Boatsman, Aquifer Coordinator, City of Renton
Larry Phillips and David Irons, Co-chairs, Cedar River Council
Bill Wolinski, Environmental Engineering Manager, City of Kent
Kelly Peterson, Wellhead Project Engineer, City of Kent

Covington Water District

Serving the Community Since 1960

Jefferson Davis
Water Res. & Eviron. Affairs Assit. Supervisor

October 14, 2004

Jerome B. Cruz, Hydgrogeologist / Site manager
Washington State Dept. of Ecology
Northwest Regional Office
3190 160th Ave SE
Bellevue, WA 98008-5452

RE: Landsburg Mine Hazardous Waste Cleanup

Dear Mr. Cruz:

Covington Water District (CWD) appreciates the opportunity to provide comments concerning the Landsburg Mine hazardous clean up process. The south portal of the Landsburg Mine is located within the capture zone of our 222nd Wellhead protection area. In addition, the south portal is also located within the zone of contribution to our Witte Wellhead protection area. CWD and the city of Kent have overlapping wellhead protection areas. Therefore, any possible contamination that impairs Kent's water quality will have the same negative impacts to our water supply as well as the regional aquifer.

We support and share the same concerns that the city of Kent Identified in their Landsburg Mine position paper dated September 23, 2004. We share the belief that the current site characterization is inadequate. Site characterization should be based on proven quantifiable scientific methods not hypothesis that cannot be proven or replicated. We also identify the need for a supplemental Remedial Investigation (RI) that will properly identify receptors, flow paths, type, and concentration of contaminants. Furthermore, recommendations from the City of Kent should be considered during the entire supplemental RI planning/implementation process.

A supplemental RI will assist the Department of Ecology (DOE) in making a decision that will be publicly defensible. The appropriate decision can help build stronger coordinated efforts and relationships with other agencies and concerned stakeholders.

18631 S.E. 300th Pl. Kent, WA 98042 (253) 631-0565 • Fax (253) 631-5823

Covington Water District

Serving the Community Since 1960

The preferred decision is one that will provide adequate protection for the continued health of our citizens and natural resources, as well as upholding your goal to prevent pollution, clean up pollution, and support sustainable communities and natural resources.

The number one priority for water purveyors is to provide safe potable water to our people while protecting our vital natural resources. I am confident that DOE shares the same concerns and is dedicated to make the right decision.

Thank you for considering us as a vital part of your consultation process. Please feel free to contact me at 253-631-0565 ext 167 with any further questions or comments you may have.

Sincerely,

Jefferson Davis

18631 S.E. 300th Pl. Kent, WA 98042 (253) 631-0565 • Fax (253) 631-5823

King County

Water and Land Resources Division
Department of Natural Resources and Parks
King Street Center
201 South Jackson Street, Suite 600
Seattle, WA 98104-3855
206-296-6519 206-296-0192 Fax

December 10, 2004

Jerome B. Cruz
Hydrogeologist, Site Manager
Washington Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452

Dear Mr. Cruz:

The King County Water and Land Resources Division appreciates the opportunity to provide comments concerning the Landsburg Mine hazardous clean up process. It is my understanding that this hazardous site is within both the City of Kent and the Covington Water District wellhead protection areas. Therefore, any possible contamination of the groundwater from this site could lead to negative impacts to the water supply of two significant purveyors in the South King County area, and possibly affect the regional aquifer and others' water supply as well.

We share many of the same concerns expressed by the City of Kent in their Landsburg Mine Position paper dated September 23, 2004. We share the belief that the current site characterization is inadequate. Site characterization should be based on proven quantifiable scientific methods, not hypothesis that cannot be proven or replicated. We support the request for a supplemental Remedial Investigation (RI) that will properly identify receptors, flow paths, type, and concentrations of contaminants. An important element of the RI should be further drilling and monitoring at lower elevations in order to accurately characterize conditions at the deepest points of the original pit and locations of possible contaminant migration. Additionally, we ask that the Washington Department of Ecology (Ecology) consider recommendations made by the City of Kent during the entire supplemental RI planning/implementation process.

King County believes that a supplemental RI will aid Ecology in making decisions that are publicly defensible. Well informed decision making will help build trust in the regulatory community and confidence about our region's water supplies. We encourage Ecology to pursue a path that will provide the very best protection for the continued health of our citizens and natural resources, and fulfill your agency's mission of preventing pollution, cleaning up existing pollution, and supporting sustainable communities and natural resources.

King County residents depend on clean groundwater to maintain their quality of life. Groundwater is the source of one third of all of King County's drinking water. These groundwater resources are finite and we must be vigilant to insure they are protected today and for future generations. If you have any questions about our comments, please contact Sarah Ogier, Groundwater Protection Program Manager in the Water and Land Resources Division, at 206-263-6159.

Thank you for considering these comments.

Sincerely,

Daryl Grigsby
Division Director

cc: Joanna Richey, Manager, Strategic Planning Section (SI), Water and Land Resources Division (WLRD), Department of Natural Resources and Parks (DNRP)
Sarah Ogier, Program Manager, Groundwater Protection Program, SI, WLRD, DNRP

King County
Ron Sims
King County Executive
701 Fifth Avenue, Suite 3210
Seattle, WA 98104
206-296-4040 Fax 206-296-0194
TTY Relay: 711
www metrokc.gov

February 15, 2006

Jerome Cruz, Site Manager
Washington State Department of Ecology
3190 160th Avenue SE
Bellevue, WA 98008

Dear Mr Cruz:

Thank you for the opportunity to comment on the Agreed Order Amendment for the Landsburg Mine Site.

King County appreciates the opportunities we have had to meet with you and your staff on the proposed changes to the Agreed Order and the State Environmental Policy Act documents. Several King County staff also attended the public meeting conducted by the Department of Ecology on February 7, 2006 to listen to questions and comments from the community I have reviewed the proposal with knowledgeable King County staff in our departments of Development and Environmental Services (DDES), Natural Resources and Parks (DNRP), and Public Health (DPH). Our comments are as follows:

1. King County agrees in concept to allow the dry sewer pipe from the mine site to be placed in the ground, and left unconnected and unused, until monitoring determines that contaminants threaten public health and safety.

2 The sewer pipe from the mine to the Tahoma School District's Jr High School will be a tightline dedicated solely for the disposal of waters from the mine and only upon determination of a threat to public health and safety, as required by the King County Code.

3. An amendment to the Soos Creek Sewer District Comprehensive Plan approved by the King County Council will be required prior to the connection from the mine site to the Tahoma School District tightline sewer line. This amendment will address the new tightline sewer to serve the mine site and also the proposed connection to the existing tightline sewer serving the school. Additionally, the Department of Ecology will presumably need to coordinate and obtain approval from Soos Creek and the School District to connect to their facilities

4 Based on comments raised at the February 7, 2006, public meeting, King County will further analyze placing the sewer pipe under the Summit-Landsburg Road rather than placing the pipe through the King County park land as currently proposed by the

Department of Ecology We will work with you to develop a schedule to allow for this analysis

5 Monitoring reports of test wells at the mine site must be routinely sent by either the Department of Ecology or the site trustee to the Environmental Health Division of Public Health-Seattle and King County, with appropriate staff as identified by the Division

6 The waste from the mine must be pre-treated to standards established by King County Wastewater Division's Industrial Pre-Treatment Program before it may be discharged into the wastewater system. The PLPs or the trustee are responsible for all fees associated with the permitting for such disposal and the ongoing service costs of sewer disposal.

We assume that the other institutional controls associated with the cleanup plan will conform to the requirements of the Model Toxics Control Act, including periodic review by the Department of Ecology and consultation with King County as the local and use authority. King County's technical review group, comprised of myself and the staff copied below, is ready to work with you and your staff in the coming months to address these issues as the project moves forward. If you have any further questions, please do not hesitate to call me at 206-296-3423.

Again, thank you for your attention to our comments and concerns.

Sincerely,

Karen Wolf

Karen Wolf
Sr Executive Policy Advisor

cc: Paul Reitenbach, Senior Policy Analyst, DDES
Laura Wharton, Supervisor, Wastewater Treatment Division, DNRP
Bob Hirsch, Government Relations Administrator, Wastewater Treatment Division, DNRP
Dave Monthie, Regional Water Policy Analyst, DNRP
Larry Fay, Section Manager, Community Environmental Health, Public Health-Seattle and King County
Bill Lasby, Health and Environmental Investigator, Community Environmental Health, Public Health-Seattle and King County
Joe Rochelle, Senior Deputy, Office of the Prosecuting Attorney (PAO)
Kevin Wright, Assistant Chief Civil Deputy, PAO
William Blakeney, Supervising Attorney, PAO

SOOS CREEK WATER & SEWER DISTRICT
14616 S.E. 192nd St. • P.O. Box 58039 • Renton, WA 98058-1039 • Phone (253) 630-9900 • Fax (253) 630-5289

March 8, 2006

NATURE SAVER™ FAX MEMO 01616	Date 3-16	# of pages ▶ 1
To JEROME CRUZ	From KAREN WOLF	
Co./Dept.	Co.	
Phone # 425-649-7098	Phone # 206-296-3923	
Fax #	Fax #	

Ms. Laura Wharton, Supervisor
King County
Waste Treatment Division
King Street Center, KSC-NR-0512
201 S Jackson ST
Seattle, WA 98104-3855

RECEIVED
MAR 16 2006
DEPT OF ECOLOGY

RE: Landsburg Mine Site

Dear Ms. Wharton:

Thank you very much for your letter dated March 3, concerning the Agreed Order Amendment for the Landsburg Mine Site.

The District does not have a Developer Extension Agreement (DE) with the mining company that would address sewer facilities, ownership, O&M rates, GFC charges, Comprehensive Plan Amendment, or capacity.

If the mining company approaches Soos Creek regarding the installation of facilities described in the letter from Karen Wolf of King County to Jerome Cruz of the WSDOE, we will advise you when a DE has been entered into.

Please continue to keep me in the loop.

Sincerely,

Ron Speer.
District Manager

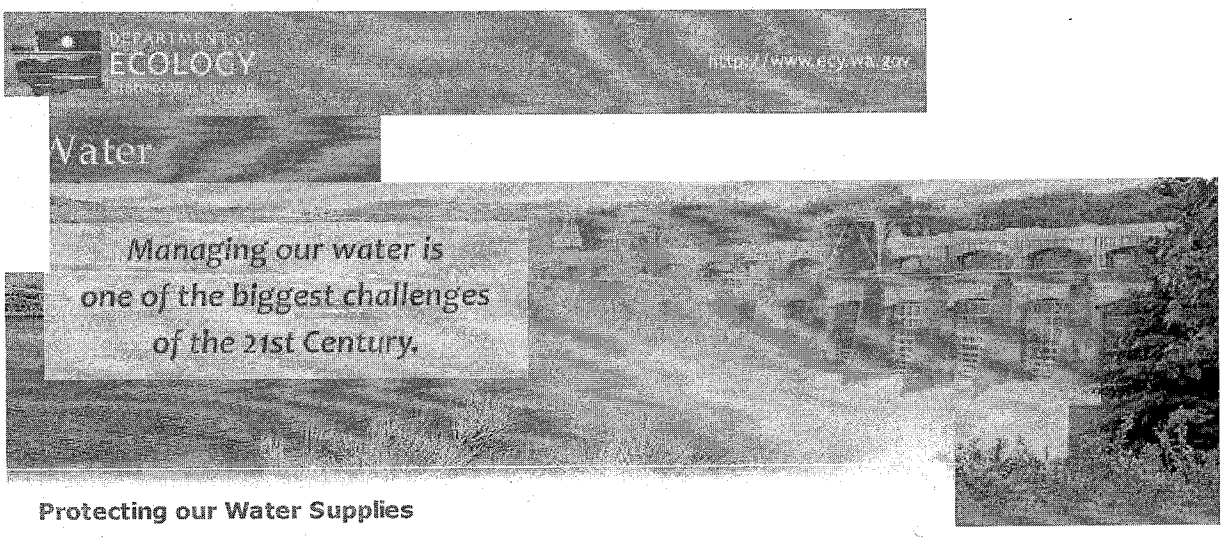
cc: Alan Eades, Operations Mgr.
Alice Marshall, DE Coordinator
Bob Hirsch
✓Karen Wolf

C:\Linda\LETTERS\KCWhartonLandsburgMine.doc

Received Time Mar 16 4:25PM

ATTACHMENT I

Materials from Ecology's Website Regarding Water Resources, Water Initiatives, and the State's Duties as Trustee of Water Resources



Protecting our Water Supplies

ECOLOGY PRIORITIES
Managing our Waters | Our Living Shorelines

MANAGING WATER SUPPLIES
Water Supply Information | Instream Flows | Metering Water Use | Water Rights | Water Market | Wells | Irrigation Guide | Reclaimed Water | Water Conservation | Wastewater & Water Treatment Plants

WATERSHEDS AND BASINS
River Basins: Columbia, Spokane, Puget Sound and more | Watershed Planning | Updates By Watershed (WRIA) | Watershed Characterization for Puget Sound

GROUNDWATER

FLOODS

FRESHWATER, LAKES, RIVERS, STREAMS AND WETLANDS
Freshwater Assessment | Aquatic Plants, Algae and Lakes | Aquatic Invasive Species | Lake Water Quality | Wetlands | Flooding & Floodplain Management

SHORELANDS MANAGEMENT
Coastal Zone Management (CZM) | Shoreline Management (SMA) | Coastal Atlas | Puget Sound Shorelines

MARINE AND COASTAL WATERS
Coastal Assessment | BEACH Program | Aquaculture | Ocean Resources | Ocean Acidification

DAMS
Dam Safety | 401 Certification for Hydropower | Condit Dam Removal

WATER POLLUTION
Surface Water Quality Standards | Quality Assessment (303[d]) & Improvement Projects (TMDLs) | Stormwater and Runoff | Nonpoint Pollution | Point Source Pollution | Spills Response | Controlling Toxic Chemicals in Puget Sound | Toxics Studies | Urban Waters Initiative | Clean Water on Agricultural Lands

MONITORING WATER
Instream Flows | Beach Water Quality | Marine Water Quality | River and Stream Flow Data | River and Stream Water Quality | Water Data Quality Assurance

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RULES, REGULATIONS & ENFORCEMENT
Water Quality | Water Resources | Shorelands | Spills | Water Quality Field Tickets

PERMITS
Environmental Permitting Assistance (ORA) | Water Quality Permits | Water Quality Permit Data | Joint Aquatic Resource Permits Application (JARPA)

FORMS
Water Claims | Water Rights | Well Construction | Dam Safety | Wastewater Discharge

GRANTS AND FUNDING
Water Quality Funding | Non-Point Pollution Projects | Flood Control Grants | Shoreline Master Program Grants

PUBLICATIONS
Estuaries | Groundwater | Instream Flows | Lakes | Puget Sound | Water Cleanup Plans (TMDLs) | Water Quality Success Stories | Watersheds | Wetlands

SURFACE WATER QUALITY STANDARDS RULEMAKING
Protecting and advancing Washington's values of human, environmental and economic health while sharing our valuable surface waters.

SPOTLIGHT

PUGET SOUND DISSOLVED OXYGEN STUDY

CERTIFIED WATER RIGHT EXAMINERS
CWRE examinations in November 2013

YAKIMA RIVER BASIN INTEGRATED PLAN

OCEAN ACIDIFICATION

TSUNAMI/MARINE DEBRIS

REDUCING TOXICS IN FISH, SEDIMENTS AND WATER

SUCCESS STORY

YAKIMA BASIN WATER RIGHTS
Moxee and Wide Hollow subbasins

DUNGENESS WATER MANAGEMENT

SHORELINE MASTER PROGRAMS
Local Shoreline Master Programs apply the Shoreline Management Act at the community level.

WELL LOG REPORT
Look up the location, ownership, construction details and lithology of a completed well.

REPORT A SPILL

WATER RESOURCES EXPLORER
Online mapping tool to access water right information

STORMWATER PERMITS
Information for Construction, Industrial and Municipal Permits

WATER QUALITY PERMIT DATABASE
Electronic discharge monitoring reports (PARIS)

FOCUS ON CLEAN WATER

WATER MARKETS

WATER SUPPLY INFORMATION

WATERS OF CONCERN

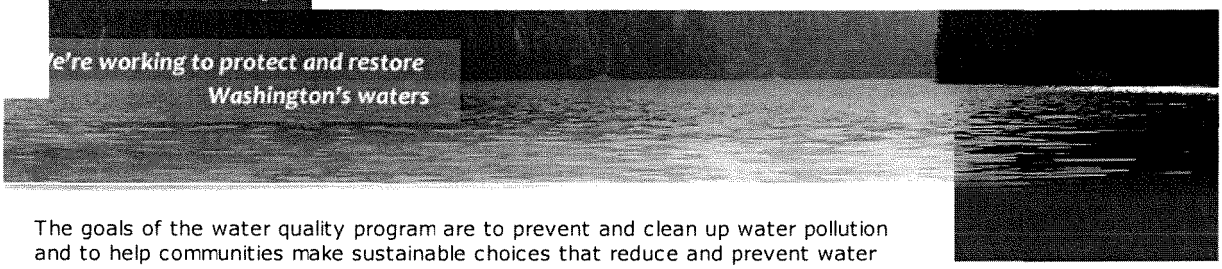
- Puget Sound
- Columbia River
- Spokane River
- Urban Waters Initiative

WASHINGTON WATERS - OURS TO PROTECT

DEPARTMENT OF ECOLOGY
State of Washington

http://www.ecy.wa.gov

Water Quality



The goals of the water quality program are to prevent and clean up water pollution and to help communities make sustainable choices that reduce and prevent water quality problems.

The program also aims to provide water quality partners with technical, financial, and education assistance. We produce useful water quality information for the public and our partners.

AQUATIC PLANTS and LAKES
Aquatic Plant Identification | Aquatic Plant Management | Lake Information | Pesticides to Control Aquatic Plants | More

GRANTS and LOANS
Water Quality Grant and Loan Funding | More

GROUND and SURFACE WATER QUALITY
Ground Water | Surface Water | UIC Program | Use Attainability Analysis | Water Quality Monitoring | More

NONPOINT POLLUTION - POLLUTED RUNOFF
Nonpoint Plan | Land Use | Agriculture | Forestry | Phosphorus Ban | More

PERMITS - POINT SOURCE POLLUTION
Combined Sewer Overflows (CSO) | Permitting and Reporting Information System (PARIS) | General Permits (non-stormwater) | Permit Guidance/Data/Forms | Orange Book | 401 for Dams (FERC) | Permit Fees | Cruise Ship Lines MOU | More

PUGET SOUND WATER QUALITY
SPS Dissolved Oxygen | Dissolved Oxygen Model | More

STORMWATER
Permits | Technical Assistance | Stormwater Mgmt. Manuals | More

WASTEWATER TREATMENT
Wastewater Operator Certification Program | Reclaimed Water | Wastewater Treatment Resources | More

WATER QUALITY ASSESSMENT and WATER QUALITY IMPROVEMENT
Water Quality Assessment [303(d)] | Water Quality Improvement

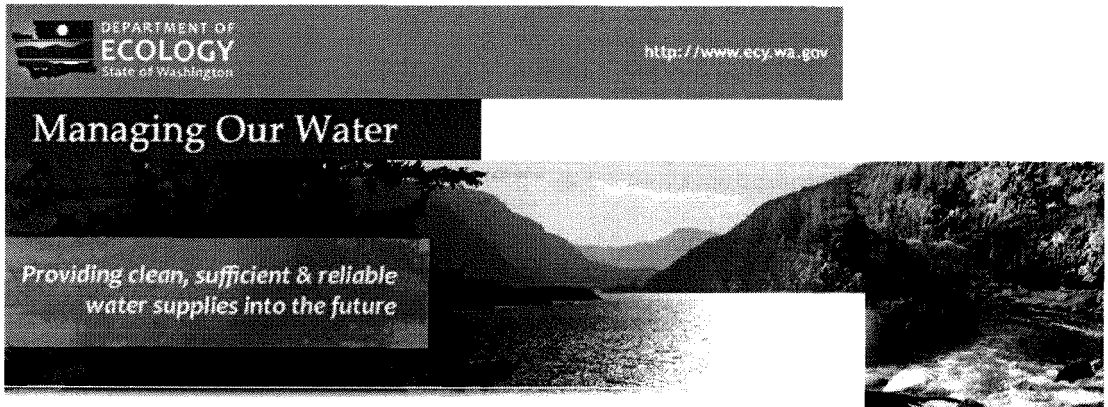
WASHINGTON waters
OURS TO PROTECT

SPOTLIGHT

Ecology hosts SWQS Water Quality rulemaking public meeting November 6, 2013.

General Permit for Vessel Deconstruction

Water Quality Permit Databases



Managing our water is one of the biggest challenges of the 21st Century.

Clean, abundant water was once taken for granted in Washington state as a free, unlimited resource. Today, after more than a century of dramatic population growth and climate change we know our water resources are not unlimited and certainly not free.

Population growth and associated development increase the demand for clean, abundant water and increase pollution problems.

Ecology's water programs are working closely with Washington communities to clean up and protect water quality in Washington. They also work to ensure the state has clean, adequate water supplies that meet current and future drinking water needs, commercial and agricultural uses, and to sustain fish and the natural environment.

We remain committed to protecting and enhancing the quantity and quality of our water resources even in challenging economic times. Ecology embraces local partnerships and citizen involvement in our efforts to ensure a water smart future in the 21st Century.

WATER SUPPLY
Water Supply Info | Water Rights | Water Market | Instream Flows | Floodplain Management | Dam Safety | Water Conservation | ***More...***

POLLUTION ISSUES
Nonpoint Pollution | Point Source Pollution | Stormwater | Preventing Oil Spills | ***More...***

PROTECTING OUR WATER
Watershed Planning Information by Watershed | Assessments and Improvement Projects (303[d]s and TMDLs) | Ground and Surface Water Quality Standards | Success Stories | Point Source/Permits | ***More...***

MONITORING AND MEASURING
Metering Water Use | Groundwater Assessment | ***More...***

WASHINGTON *waters*
OURS TO PROTECT

COLUMBIA RIVER WATER MANAGEMENT
Managing instream and out-of-stream water uses in the Columbia River Basin

HOW WATER SUPPORTS WASHINGTON JOBS

WATER SUPPLY INFORMATION

WATER MARKETS

KITTITAS COUNTY GROUNDWATER

SPOKANE RIVER

URBAN WATERS INITIATIVE

CONTROL OF TOXIC CHEMICALS IN PUGET SOUND

MEASURING

PERFORMANCE (GMAP)
2010 Water Smart Washington presentation (pdf) (7/27/10)

By the Numbers – How Water Supports Washington Jobs

Perhaps nothing is as critical in shaping the quality of life in Washington state than securing the future of our water resources. In one way or another, everything we value depends on access to clean water.

Managing Washington's water supply is good business, too.

NEWS:
New water opportunities available soon in Kittitas County
(6/15/2011)

Enhancing Community Development

- A water right can allow for development of residential land, essentially doubling typical property values
  - East side of Washington: 72 percent increase in value.
  - West side of Washington: 117 percent increase in value.
  - Conservative estimate of future residential value of water from Lake Roosevelt storage release: 25,000 acre-feet of municipal water could facilitate future residential development in the area worth $3.7 billion, increasing the property tax base by providing water for up to 62,500 homes.
- Conservative estimate value of water in NE Washington from Sullivan Lake project:
  - 5,000 acre-feet of municipal water could facilitate future residential development in the area worth $754 million, increasing the property tax base by providing water for up to 12,500 homes.
  - 5,000 acre-feet of agricultural water used for crop irrigation could generate $2.1 million in additional direct value each year.

Enhancing Farms and Agriculture

- WSU estimates that a water right in agriculture can increase property values fivefold to tenfold.
- Agriculture is Washington's leading employer, and it depends on a reliable water supply. Washington's 1.7 million acres of irrigated crop land (39% of farms) generate $4.8 billion in crops sold in a year. Half or more of that crop value is attributable to the water available from irrigation.
- It's conservatively estimated that agricultural property value will increase $50 million to $100 million from development of 1,785 acres of new vineyards in the Red Mountain American Viticultural Area through Ecology's Office of Columbia River. (The project also will add 20,000 + acre-feet of instream flow to benefit fish and fisheries in the lower Yakima River.)

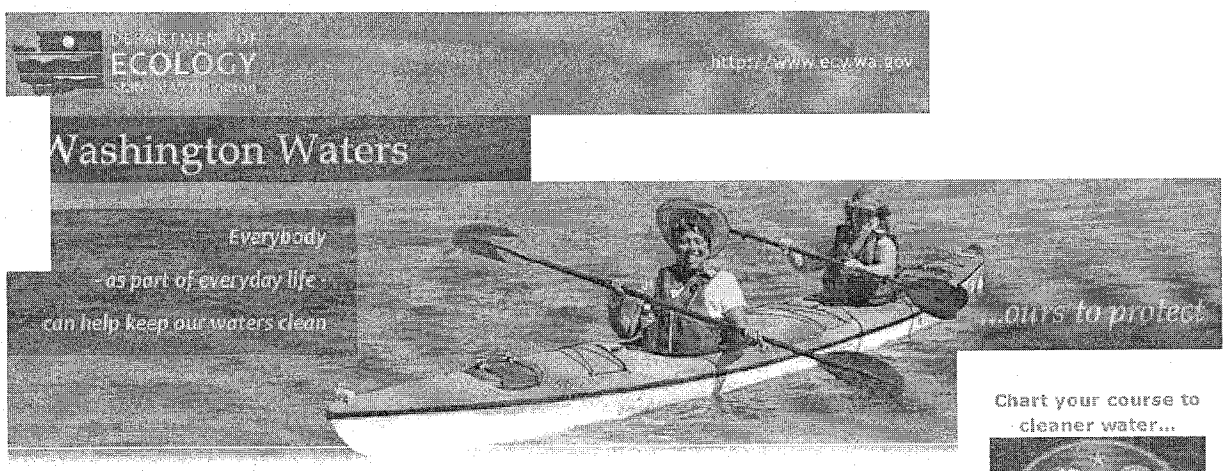
Fish-Bearing Waters are a Vital Part of our Economy
Water for fish also plays an important part in Washington's economy. For example, Washington's freshwater fish have an annual economic value of $1.3 billion.

- Washington's commercial fishery for salmon and other anadromous fish generates $31 million each year in direct revenue to harvesters and processors. It employs 612 direct employees harvesting and processing anadromous fish, generating $28 million in personal income each year.
- Angler expenditures in Washington directly and indirectly support more than 12,000 jobs, generating $424 million in personal income each year.

Analysis by Washington Department of Ecology natural resources economics section, June 2010

Sources:

- County property assessment data for counties in Washington State, multiple counties, residential and commercial, 2010
- USDA Census of Agriculture, 2007
- Agri-Facts, National Agricultural Statistics Service, USDA, 2010
- Washington Water Rights for Agricultural Producers, WSU Extension Factsheet FSWR001, 2009
- Economic Analysis of the Non-Treaty Commercial and Recreational Fisheries in Washington State, Washington Department of Fish and Wildlife, 2008
- National Survey of Fishing, Hunting, and Wildlife-Associated Recreation, US Census Bureau, 2006



Washington waters need our help.

Puget Sound. The Columbia River. The Pacific Ocean. These waters and many more rivers, lakes and streams are part of Washington's identity, character and daily life.

- About one-third of Washington's waters are too polluted to meet state water quality standards.
- More than 60 percent of water pollution comes from things like cars leaking oil, fertilizers and pesticides from farms and gardens, failing septic tanks, pet waste and fuel spills from recreational boaters.

All these small, dispersed sources add up to a big pollution problem. But each of us can do small things to help clean up our waters too—and that adds up to a pollution solution!

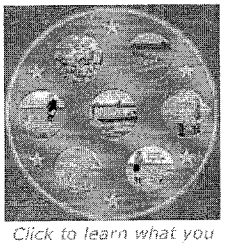
WASHINGTON waters
OURS TO PROTECT

Puget Sound Starts Here

NEW! **FREE CAR WORKSHOPS!**

Click here to report environmental problems

Chart your course to cleaner water...



Click to learn what you can do to protect our waters.

- CAMPAIGN LOGOS
- TOOL KIT
- MORE RESOURCES

SPREAD THE WORD
Simple actions by individuals multiply to make a big difference. Share what you're doing to inspire others into action.

FUN ACTIVITIES
Are you stormwater smart? Take the Stormwater Quiz

What's your Pollution Prevention Personality Profile?

Video: MARINE WATER QUALITY MONITORING
Highlighting scientists who monitor Washington's marine waters. Also read the ECOconnect blog.

CLEAN, GREEN BOATING
Boat owners play an important role in protecting water quality.

Getting to Clean Water

Clean water is vital for our quality of life – for both economic development and a healthy environment. Unfortunately, some waters are so polluted they need extra help. One of the primary tasks of the Washington Department of Ecology (Ecology) Water Quality Program is to identify and improve the quality of Washington's polluted streams, rivers, lakes, and marine waters.

Ecology uses a system of rules and policy, developed in compliance with federal and state law, to help guide improvements to water quality. Washington's citizens help with this by:

- Observing and measuring conditions in local streams.
- Participating on local groups that develop and implement water quality improvement plans, also known as total maximum daily loads, or TMDLs. TMDLs identify how much pollution needs to be reduced or eliminated to achieve clean water.
- Changing daily activities to produce less water pollution.

Water Quality Standards

The federal Clean Water Act proclaims a national goal that water should be "fishable and swimmable." To achieve this goal and meet legal requirements, Washington State has established water quality standards to protect the beneficial uses of our bays, inland seas, lakes, rivers, and streams. These beneficial uses include drinking water, recreation, and habitat for fish and other aquatic life.

The water quality standards address toxic chemicals, such as arsenic, and other pollutants, such as harmful bacteria. They also set limits on other conditions, such as the water temperature. Water that is too warm harms fish and other aquatic life.

Federal regulations require that states hold public meetings at least once every three years to review applicable surface water quality standards and, as appropriate, adopt new or modified standards. This process is called a "triennial review." In 2010, Ecology conducted this process. It held a series of public meetings and received written comments about how the water quality standards could be improved.

Ecology plans to post comments it received from its triennial review in early 2011. Ecology will then summarize and prioritize water quality standard activities (guidance development, education, rule changes, etc.) and announce

Publication Number: 10-10-079 01/11

upcoming actions by summer 2011. Of particular interest is the fish consumption rate numbers used to determine toxics criteria limits for protecting human health. Fish consumption rates set many years ago by the U.S. Environmental Protection Agency (EPA) are outdated and do not reflect how much fish people eat, especially for tribal members and others who subsist on locally caught fish and shellfish. Ecology will engage tribes, EPA, and the public to explore whether new fish consumption rate numbers are needed in Washington, and if so, what assumptions should be used to establish those new limits.

To learn more about the water quality standards, visit our website at www.ecy.wa.gov/programs/wq/swqs.

Water Quality Assessment

The Clean Water Act established a process to identify and clean up polluted waters. Every two years, states are required to prepare a list of water bodies that do not meet water quality standards. This list is called the 303(d) list because the process is described in Section 303(d) of the Clean Water Act. All water bodies identified on the list must attain water quality standards within a reasonable period, either through a water quality improvement plan (also known as a total maximum daily load or TMDL) or other pollution control mechanisms.

To develop Washington's list of polluted waters, Ecology compiles its own water quality data and invites others to submit water quality data they have collected. Data that is acceptable must be collected and assessed using appropriate scientific methods that Ecology describes in its listing policy. Based on this data, Ecology updates its list and allows the public to review and comment on the list.

Ecology submits the results of the assessment to the EPA as an "integrated report" to satisfy federal Clean Water Act requirements. The list helps us use state resources more efficiently by focusing our limited time on water bodies that need the most work. The list of water bodies in the assessment reflects water quality problems in Washington, as recognized by local government, community, and citizens, demonstrating citizen interest and commitment to clean water.

As local watersheds implement their water quality improvement plans (TMDLs), Ecology removes water bodies from the polluted waters (303d) list. EPA approved Washington's latest list of polluted waters in January 2009. All water bodies identified on the list must attain water quality standards within a reasonable period, through either a water quality improvement plan (TMDL) or other pollution control mechanisms.

Some changes are scheduled over the next year. One is the changeover to match the latest mapping tools and capabilities available in electronic media. A re-sorting of data from freshwater listings is underway. This re-sort will be made available in 2011 to help the public understand how freshwater data will be sorted in the next assessment due to EPA in 2012.

Ecology is changing the schedule for conducting the water quality assessment and 303(d) listing process. Rather than assessing all waters every two years, Ecology is moving to assessments of

marine waters and freshwaters in alternating two-year cycles. The first split list will be an assessment of marine water data received prior to October 2009. This assessment will be submitted as the next candidate 303(d) list for marine waters to the EPA in 2011. The next freshwater candidate list is scheduled for 2012. To learn more about the water quality assessment, visit our website at www.ecy.wa.gov/programs/wq/303d/index.html.

Water Quality Improvement Plans (TMDLs)

Total maximum daily loads (TMDLs or water quality improvement plans) describe the type, amount, and sources of water pollution in a particular water body. The plans also analyze how much the pollution needs to be reduced to achieve clean water, and provide strategies to control pollution.

Ecology regulates point sources (pollution that generally comes out of a pipe or an activity that has a wastewater or stormwater permit) by placing limits on water discharges. For pollution from nonpoint sources (pollution that comes from many smaller, diffuse sources), Ecology works with other agencies, local governments, landowners, and citizens to identify and implement specific pollution controls or "best management practices."

As a result of a 1998 legal settlement, Ecology has a deadline of 2013 to develop and implement plans to address about 1,566 polluted water bodies throughout the state that were listed on the 1996 303(d) list. The settlement agreement established a schedule for completing the required water quality improvement plans by 2013. The schedule includes interim targets at five-year intervals.

Ecology achieved the first five-year target of 249 plans required by June 30, 2003, but it did not meet the 2008 schedule, and will not be able to meet the 2013 schedule. As a result, Ecology talked with both EPA and litigants about the best method and schedule for completing the remaining TMDLs. Many factors prevented Ecology from meeting the original schedule and will complicate our ability to meet any new schedule. Some of the challenges are:

- TMDLs have become more complicated and controversial as we implement stricter pollution limits to protect human health and threatened and endangered species.
- Information is not yet available that shows existing forest practices regulations are successfully mitigating the effects of forestry on water quality. The state expected that this information would address listings and count for 400 TMDLs. This has not happened.
- We delayed many difficult TMDL issues, such as toxics, waiting for new and simpler pollution control strategies, which are not yet in play.

In addition, every time Ecology issues a new list of polluted waters, we find more water bodies that need TMDLs.

In any given year, Ecology typically is working on approximately 100 TMDLs at various stages of development. We have improved water quality because of TMDLs, and by implementing practices we know how to protect water quality without a TMDL. In Eastern Washington, we

were able to count 84 TMDL "equivalents" because of the livestock management activities that local farmers are implementing. In Kitsap County, we were able to count 34 TMDL "equivalents" because of Kitsap County's Pollution Identification and Correction Program.

Contacts

TMDLs
Helen Bresler, 360-407-6180
helen.bresler@ecy.wa.gov

Water Quality Assessment
Mike Herold, 360-407-6434
mike.herold@ecy.wa.gov

Water Quality Standards
Susan Braley, 360-407-6414
susan.braley@ecy.wa.gov

For more information about what you can do to protect clean water, visit Ecology's clean water education website
"Washington Waters – Ours to Protect" http://www.ecy.wa.gov/washington_waters/

Special accommodations:

To ask about the availability of this document in a version for the visually impaired, call the Water Quality Program at 360-407-6600. Persons with hearing loss, call 711 for Washington Relay Service. Persons with a speech disability, call 877-833-6341.

An Introduction To Washington Water Law

Office of Attorney General

January 2000

Christine O. Gregoire
Attorney General

James K. Pharris
Senior Assistant Attorney General

P. Thomas McDonald
Special Assistant Attorney General

SUMMARY

"But let justice run down like waters, and righteousness as a mighty stream."

Amos V: 24

Just as in Old Testament times, water and justice are closely associated. Water is elemental to life, to commerce, and to civilization. Limits on available water doom lands and landowners to limited development. Control of the allocation of water automatically carries with it great political and economic power. It is hardly surprising that modern citizens, like Amos, see water as a metaphor for justice itself. The history of the struggle to achieve justice is the story of *Washington Water Law*.

Chapter I: Who owns the water?

Washington, like other U. S. jurisdictions, adopts the European notion that water is a natural resource held in common for the public good. As such, water in its natural flowing or seeping state is not susceptible to "ownership". Private parties do have the right, however, to take this common resource and put it to use. In a sense, a party obtains "ownership" of water molecules that have actually been captured and put to use, but as soon as the water is no longer used and is released back into nature, any "ownership" of the water ceases and it reverts to its "common public resource status".

Deciding who may appropriate water, which uses are appropriate and serve the public good, and how to sort out disputes over water use are the fundamental tasks of water law.

Like most other states, Washington has declared, both in its Constitution and in statute, that water is a public resource held in trust for the people. This principle is the foundation of the state's authority to define both the substance and the process of obtaining the right to use water. The state regulates water as a public resource and as an outgrowth of the state's "police power" to protect the general health and welfare.

Chapter II: Who gets to take water and put it to use?

The early history of Washington water law is, above all, the story of the struggle between two doctrines of water rights: the *riparian* doctrine and the doctrine of *prior appropriation.* In its classic form, the riparian doctrine ties the right to use a particular body of water (lake, stream, or underground aquifer) to the ownership of the land over, under, and adjacent to the water in question. If a body of water is entirely confined to one person's land, that person has an exclusive right to use of the water. If a body of water is adjacent ("riparian") to more than one landowner, they all have an equal right to use of the water. If there is insufficient water to meet all needs, the equal shares are reduced proportionally. Date of first use of water is irrelevant, and "nonriparians" (that is, those whose land is not adjacent to the water in question) have no right to use the water in question.[1]

[1] Every jurisdiction following the riparian theory has, inevitably, created various exceptions and conditions on the general rules discussed above.

ATTACHMENT J

Ecology and PLP Group Materials and Letters Promising The Public That Monitoring "In Perpetuity" Will Be Required At The Site (Chronological Order)

1. Ecology Letter from Jerome B. Cruz, Site Manager, Toxics Cleanup Program, Northwest Regional Office to Douglas Morell, Golder Associates Inc. (February 2, 2004), p.

2. PLP Group's Presentation Materials for Ecology Technical Meeting (September 29, 2004), pp. 7, 29, and 47

3. Ecology's Questions and Answers Handout at Public Meeting Regarding Proposed Landsburg Mine Infrastructure Installation (February 7, 2006), p. 5

4. Ecology's Responsiveness Summary for Agreed Order Amendment, State Environmental Policy Act (SEPA) and Determination of Non-Significance (DNS) to Address Infrastructure for a Contingent Groundwater Treatment System for the Landsburg Mine Site (June 2006), p. 36

5. Ecology Presentation Materials for Landsburg Mine Background and Status Update (September 2008), p. 32

6. Ecology Letter from Robert W. Warren, Section Manager, Toxics Cleanup Program, Northwest Regional Office to Larry Blanchard, Public Works Director, City of Kent (October 7, 2008), p. 2

7. Ecology Presentation Materials for Cedar River Council Meeting (November 25, 2008), pp. 4 and 5

8. Ecology Letter from Jerome B. Cruz, Site Manager, Toxics Cleanup Program, Northwest Regional Office to Douglas Morell, Golder Associates Inc. (January 25, 2010), p. 2

9. Ecology Presentation Materials for Landsburg Mine Brief Overview of the Site and Status Update Since 2008 (May 2011), pp. 4 and 5

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Northwest Regional Office • 3190 160th Avenue SE • Bellevue, Washington 98008-5452 • (425) 649-7000

February 2, 2004

Dr. Douglas Morell
Golder Associates Inc
18300 NE Union Hill Road, Suite 200
Redmond WA 98052-3333

Dear Dr. Morell:

Re: Approval of revised Workplan for Landsburg Mine Site Hydrogeologic Investigation at the South Portal Number 3, Landsburg Mine, Ravensdale

Last December 1, 2003, I sent to you via email The Department of Ecology's (Ecology) response and approval to the proposed Work Plan for the hydrogeologic investigation at the south portal number 3 in Landsburg Mine, Ravensdale. I would like to reconfirm and formalize this response through this letter by reiterating the contents of my email communication.

Our meeting on November 21, 2003 was able to clarify points in the investigation which helped in the conceptualization of the proposed well network and eliminate features with the likelihood of yielding equivocal results. Here are the revisions we agreed upon which provide acceptable results and inferences on flow direction and water contributions at the site, along with relevant statements on issues of compliance that may be raised with this study:

- The investigation will continue with the installation of wells P-5, and P-1 and P-2 at the south portal location. Wells P-3 and P-4 may be eliminated due to the agreed possibility of equivocal results when inferring direction and source of shallow horizontal flow with these wells.

- Wells P-1 and P-2 should be installed within the collapsed portal area. Attention will be paid toward making sure that well P-1 will not be installed above the more impermeable till unit found locally in the area. This is in order to ensure that both wells are within the same hydrostratigraphic unit, in hydraulic communication and not in a perched zone in the outwash gravel aquifer. This will be illustrated in greater detail in cross sections in the Work Plan.

- The Work Plan will include detailed hydrogeologic cross sections or schematics showing the location of well P-5, and magnified views of wells P-1 and P-2 as completed in the collapsed portal. These illustrations will show the proposed wells completed in their

intended hydrostratigraphic units and intended position with respect to the collapsed portal location and local hydrologic features.

- The inferred flow directions from this study will not change compliance wells and monitoring in the area. As stated by the PLP, the wells will be monitored in perpetuity, and the monitoring network and schedule will not change based on the results of the investigation. However, the investigation will provide a better understanding of the risk for southward discharge from the mine workings and can be used for that purpose if measurements are of acceptable quality and of significant magnitude. Seasonal variations in direction will be taken into account in the investigation.

- Based on your arguments on the possibility of vertical gradients affecting head measurements in P-5 in a deeper screened well vs. one near or at the surface of the water table, the original shallower screen elevation beneath the water table is acceptable. However, screen length and depth should be such that it accommodates for seasonal fluctuations in water table that occur in the area (this may be up to 18 feet). Because the primary purpose of P-5 was to aid in the determination of horizontal hydraulic gradient at this portion of the abandoned mine and estimate the location of a groundwater divide, this rationale is justifiable for the well design.

- The PLP group will have the option to delay the installation of well P-5 along the southern slope of the abandoned mine if weather conditions are unfavorable and until drier weather conditions occur. Please provide to Ecology a scheduled date for drilling.

Given the above, please proceed with the hydrogeologic investigation based on this final, revised work plan.

Please don't hesitate to contact me if you have any questions or comments.

Sincerely,

Jerome B. Cruz, Ph.D., L.G., L.H.G.
Toxics Cleanup Program

JC:SA
cc: William S. Wolinski
William Kombol

AGENDA
Landsburg Mine Technical Meeting
September 29, 2004

9:00 – 9:10am	Introductions, scope and objective of meeting, agenda, ground rules (Rebekah Padgett, Ecology)
9:10 – 9:10am	Introduction of Topic 1: Deep level contaminant transport (Jerome Cruz, Ecology)
9:10 – 9:25am	City of Kent perspective on Topic 1 Clarifying Questions (All)
9:25 – 9:40am	Landsburg PLP Group perspective on Topic 1 Clarifying Questions (All)
9:40 – 10:25am	Discussion on Topic 1 (lead by Ching-Pi Wang, Ecology)
10:25 – 10:35am	Break
10:35 – 10:35am	Introduction of Topic 2: Transverse flow of contaminants (Cruz)
10:35 – 10:50am	City of Kent perspective on Topic 2 Clarifying Questions (All)
10:50 – 11:05am	Landsburg PLP Group perspective on Topic 2 Clarifying Questions (All)
11:05 – 11:50am	Discussion on Topic 2 (lead by Wang)
11:50am – 1:00pm	Break for Lunch (on your own)
1:00 – 1:00pm	Introduction of Topic 3: Contaminant adsorption by coal and requirements for measurement (Cruz)
1:00 – 1:15pm	City of Kent perspective on Topic 3 Clarifying Questions (All)
1:15 – 1:30pm	Landsburg PLP Group perspective on Topic 3 Clarifying Questions (All)
1:30 – 2:15pm	Discussion on Topic 3 (lead by Wang)
2:15 – 2:15pm	Introduction of Topic 4: Groundwater monitoring frequency (Cruz)
2:15 – 2:30pm	City of Kent perspective on Topic 4 Clarifying Questions (All)
2:30 – 2:45pm	Landsburg PLP Group perspective on Topic 4 Clarifying Questions (All)
2:45 – 3:30pm	Discussion on Topic 4 (lead by Wang)
3:30 – 3:40pm	Break
3:40 – 3:40pm	Introduction of Topic 5: Contingency plan (Cruz)
3:40 – 3:55pm	City of Kent perspective on Topic 5 Clarifying Questions (All)
3:55 – 4:10pm	Landsburg PLP Group perspective on Topic 5 Clarifying Questions (All)
4:10 – 4:55pm	Discussion on Topic 5 (lead by Wang)
4:55 – 5:00pm	Wrap-up and close of meeting (Padgett)

Landsburg Coal Mine Site Technical Meeting

Prepared by the Landsburg PLP Group

September 29, 2004

Proposed Remediation System

- Institutional Control for Groundwater Use
- Institutional Control on Mine Site Use
- Low Permeability Cap Over Waste
- Surface Water Diversion Around Mine Trenches
- In-Perpetuity Groundwater Monitoring
- Contingent Groundwater Treatment System

Issue #4 – Groundwater Monitoring Frequency

- Proposed bi-weekly monitoring during remediation
- Quarterly monitoring first year after remediation
- Semi-annual for next four years
- Annual for next five years
- Every 2.5, 5 and 10 years (depending on contaminant mobility) in perpetuity

Landsburg Mine Site Remediation Time-Table

- South Portal Investigation - April 2004
- Revised CAP to Ecology for re-evaluation early Summer of 2004
- Draft CAP to public (tentatively was targeted for Aug/Sept 2004, most likely by end of 2004)
- Public Comment on Draft CAP and Consent Decree (Schedule ??)
- Engineer Design Report (2 - 3 months estimated by PLP Group);
- Permit Requirements (2-3 months estimated by PLP Group)
- Contractor Bid and Selection (1.5 months estimated by PLP Group)
- Remedial Action (two years)
- Compliance Monitoring (in perpetuity)

Landsburg Mine Site

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Public Meeting: The Washington State Department of Ecology (Ecology) is holding this public meeting in order to hear your comments and respond to questions you may have about the proposed infrastructure for a contingent groundwater treatment system for the Landsburg mine site. During a public comment period held between October 20 and November 18, 2005, several community members requested a public meeting to discuss the proposed interim action.
Meeting Location: Tahoma Junior High School, 25600 Summit Landsburg Road, Ravensdale, WA
Date: February 7, 2006

Agenda:

Time	Topic	Who
6:30 – 7:10	**Open House** **Sign in, visit stations and talk with staff**	**All**
7:10 – 7:15	**Welcome and Introduction**	**Justine Asohmbom, Ecology**
7: 15 – 7:30	**Presentation I** • **Site overview** • **Cleanup process and status update** • **Purpose of proposed infrastructure** • **Brief overview of preferred alternative**	**Jerome Cruz, Ecology**
7:30 – 7:55	**Presentation II — Additional Details on:** • **Preferred Alternative - Infrastructure components and layout** • **Discharge alternatives evaluated** • **Criteria for selection**	**Doug Morell, Golder Associates (Consultant)**
7:55 – 8:00	**Next Steps** • **Responsiveness Summary** • **Consent Decree and Cleanup Action Plan**	**Jerome Cruz, Ecology**
8:00 – 8:55	Comments/Questions and Answers	All in attendance
8:55 – 9:00	Wrap up and Closing	Justine Asohmbom, Ecology

Comment Period extended through February 15, 2006

How Can I influence Ecology's Decision?

Put your comments in writing and submit them to the Site Manager identified on this public notice before the public comment period ends. This is an opportunity for you to have your voice heard. You know about your neighborhood, community and local conditions and how Ecology's regulatory proposal may affect them.

Complete a comment form and mail it to Ecology by February 15, 2006

Where can I review documents about this site?

- WA Department of Ecology, 3190 160th Avenue SE, Bellevue, (425) 649-7190 (call for an appointment)
- Maple Valley Library, 21844 SE 248th St; Maple Valley, (425) 649-4620
- Ecology's Web Site:
  http://www.ecy.wa.gov/programs/tcp/sites/landsburg_mine/landsburg_mine_hp.html

Who should I contact?

Jerome Cruz, Site Manager
WA Department of Ecology
3190 160th Avenue SE
Bellevue, WA 98008
Phone: (425) 649-7094
Email: jcru461@ecy.wa.gov

Justine Asohmbom
Public Involvement Coordinator
Phone: (425) 649-7135
Email: juas461@ecy.wa.gov

Barbara Smith
Potentially Liable Parties Group contact
Phone: 206-343-0250
Barbara@harrisandsmith.com

Thank you for coming!

WELCOME

Welcome to the Department of Ecology's open house on the Landsburg Mine site.

There are a few stations around the room with information about the proposed infrastructure for the contingent groundwater treatment system that will be the topic of our presentation tonight at 7:10pm.

Please visit each station and feel free to pick up information and ask questions about the site. The Department of Ecology's site manager and the consultants (overseeing the cleanup for the potentially liable parties) are available at the stations.

Remember, we need your input to make this cleanup work!

Continued on back

Station	Topic	Handouts, Graphics, *Documents* (Source)	Staffing
Station 1	**Welcome and Sign in**	Handouts - Welcome handout, Agenda and comment form Handout - fact sheet (Ecology- Oct, 2005)	Sarah Good , Ecology Justine Asohmbom, Ecology
Station 2	♦ **Site Overview** ♦ **Cleanup process and status update** ♦ **Purpose of proposed infrastructure** ♦ **Preferred alternative** ♦ **What happens next**	Vicinity Maps Figures showing location of monitoring wells Aerial map - showing the proposed pipeline route Handouts - presentation slide.	Jerome Cruz, Ecology
Station 3	♦ **Infrastructure components and layout** ♦ **Discharge alternatives evaluated** ♦ **Criteria for selection**	Drawings of discharge alternatives Handout – Q & A sheet - Potentially Liable Parties Group (PLPs)	Doug Morell, Golder Associates Barbara Smith – PLP Consultant

Landsburg Mine Public Meeting
Tuesday February 7, 2006
Tahoma Jr. High School 6:30-9:00pm

Questions/Comments/Answers:

- Q. What is the scope of comments you would like to receive by 2/15?
  A. Comments on the Amendment to the Agreed Order re: Contingent Groundwater System

- Q. The Pad set up that you described seems to be very small. Will it be able to accommodate an adequate treatment system?
  A. The treatment systems are surprisingly small and compact and would fit on the proposed pad.

- Q. How are you going to filter out PCBs? What kind of treatment system will you use?
  A. There will be a Carbon Unit in the system

- Q. If you find contamination, how long will it take to create/implement a treatment system?
  A. The treatment systems are off the shelf and we could order one quickly. It will likely take 2-3 months to have an operational treatment system. This may seem like a long time, but due to the slow rate of groundwater flow, once we anticipate a problem we will have about a year before treatment is needed.

- Q. How long will it take to install the system to capture contamination from the Southern Portal?
  A. It will take about 3 months to design, construct, and connect Southern Portal to the treatment system at the Northern Portal.

- Q. What is the frequency of monitoring at the Southern Portal?
  A. Detection Levels for the wells are lower than standards.

- Q. In the school district there is land set aside for future schools. Why will you connect the pipeline to the school property? How will you ensure safety?
  A. The pipeline will be safely connected to the sewer line. The water will be pre-treated to levels mandated by KC. It is not our intent to impact the schools capacity. There will be negotiations for compensation to the school district.

- Q. Is there any reason why you can't get treated water down to non-detectable levels?
  A. The short answer is yes; you can treat the water to any level, however the lower the level the more difficult and the less reliable the system is. But it is possible.

- Q. At this time does the sewer line go to the school and stop? Is it a CSO?
  A. No the dedicated line goes to the school for sanitary sewer only, it's not a CSO.

- Q. Are there any problems with the monitoring wells now?
  A. They are all fine. We have only found Iron and Manganese in the monitoring wells.

- Q. The mines currently have a lot of water in them. Could that be diluting contaminants? If you are pumping at 35 gpm would the contamination be a lot more concentrated?
  A. The contamination must first be made soluble before it becomes mobilized in liquid form. There can be dilution. What we are talking about though is containing the groundwater plume, not dewatering the mine. We will be focusing on contamination within the capture zone.

- Q. Is the drinking water in wells safe today?
  A. Nothing was found in the 1990's and nothing was found in the most recent round of tests.

- Q. You have not announced any results from the Deep Well to the public. How many samples were taken and what did you find?
  A. 4 samples were taken for representative VOC's only. The samples contained Benzene (at 5ppb), Toluene (below drinking standards) and Xylene (below drinking standards). We purged the well with water and the Benzene and Toluene dropped, but the Xylene increased. This is probably due to the rotary air drill that was used. The way air rotary works is it blows air at high pressure. The motor uses transmission fluid which contains Benzene, Toluene, and Xylene.

- Q. Before people send their comments in, they would like to know the sampling results from the Deep Well. You haven't provided any data yet.
  A. We want to do a complete analysis on a whole suite of chemicals and run Quality Assurance/Quality Control so we can share data that we know is right. We will be sampling next week and there will be a Fact Sheet sent out with sampling results.

- Q. Do you have any data on private wells? Will you be re-sampling private wells? Is my well safe?
  A. Private wells were most recently monitored in 1996 and no contamination was found. We don't have any justification to resample private wells at this time.

- Q. Because of extraction and preferential flow the seams are keeping water isolated, is that right?
  A. Yes

- Q. Sampling wells only pull water when you are actively sampling, is that correct?
  A. Yes

- Q. What is the rate of flow through the seams?
  A. It is high within seams

- Q. Are you monitoring in the seams and in the bedrock?
  A. No. This is where we are monitoring: At the Southern Portal there is a shallow well, a 250 ft well, and a 50 foot well at the mine. LNW11 is 700 ft deep well and LNW9 is between LNW11 and the portal. It is shallow. At the Northern Portal there is LNW4 at 400 ft, LNW2 which is a shallow well, and LNW10 at 300 ft. LNW1 is 150 ft deep located at the water table on the rock ridge between the mines.

- Q. Are the groundwater flows representative of contaminant flow?
  A. No. Contaminants don't move at the same rate as water. It is called retardation. That is why when we start detecting low levels we should see a slow in the flow as the trend in contaminants increase.

- Q. Do private wells get monitoring well reports?
  A. Yes, they were sent out to the owners in the 90's.

- No one has ever tested my well.

- Q. Does a lot of water move through fractures in the coal? Shouldn't there be a lot of water moving? How slow are organic particles moving?
  A. Contaminant mobility varies. Organics would rather stick to soil particles, than mobilize in the water.

- Q. There have been a lot of private wells put in since 1996. Some are closer to the well and deeper than the ones originally tested.
  A. There has been no evidence in the 1996 private well sampling that contamination left the mine. Since then we have been monitoring the most likely pathways of the water leaving the mine and we haven't found any contamination in the water leaving the well. Sampling took place before the 1996 round of sampling and nothing was found then either.

- I bought property in this area—one of the ones that had sampling done in '96. I sold that property and bought another property and had it tested myself. If you are concerned about your water, just have it tested. It's pretty simple and not that expensive.

- Q. The City of Kent disagrees with the geologic model that you displayed tonight, specifically the role that fractures play, how water is distributed, and movement of potential contaminants.
  A. Noted. We are working with the City of Kent. We will be splitting the water from the deep well for sampling with the City of Kent. They are concerned with their water source.

- Q. There are about 150 acres that could potentially become developed in the future. That will change the surface hydrology. Is your system going to be ready for build out conditions?
  A. MTCA does not have authority over the future use of property. However, surface flow is not directly relevant.

- Q. Would the water you pump out of the well impact flow of Rock Creek? How will you protect the Chinook?
  A. We will be pumping a relatively small amount and slow rate of water. This system is not hydrolically connected directly to Rock Creek. It is hard to answer the exact number for the flow rate out of the S. Portal.

- Q. Where did you get the numbers to determine the 30 gpm pumping rate?
  A. This is from surface overland flow, drainage precipitation, water movement through bedrock, and mining records. 30-35 gpm will be a long term average w/out a CAP. With a CAP that number will go down to about 5 gpm.

- Q. What are the potential effects on Cedar River with discharge out of the North Portal? What do you expect to see as contaminants?
  A. We are concerned with Fish Habitat. We are probably looking at VOC contaminants and others. We will take the groundwater monitoring results and compare them with the surface water standards to make sure they are lower than any level of concern. So far there has been nothing detected at any level.

- Q. How long does it take to install the infrastructure that you are proposing?
  A. Once the design is set it will take about 1 month to build.

- Q. Why do you need to put the pipeline in now? If it only takes a month to do, why not wait until you detect something?
  A. We are doing it now to prevent further delays. There is a whole process that we are in now, including public review, permits, etc.. We want to hit the ground running and be prepared if we detect contamination.

- Q. What is your long term plan for this infrastructure? Will this be in place until the problem is solved?
  A. Once the cleanup action is complete we will monitor in perpetuity. When we say cleanup, we mean containment. The contamination on this site will not be removed, but rather contained. There will be a 5 year review and 10 year review. We will need the infrastructure and treatment facility as an integral part of the permanent remedy.

- Q. Could we do the plan, design, and review for the infrastructure now, but not build it until it's necessary?
  A. No, we think it's better to do now than later.

- Q. Are there other ways to store and truck the water for 1 month as you build the infrastructure?
  A. Yes, that is possible in the short term.

- Q. Did you ever consider removing contaminants from the site and not just putting a CAP on it?
  A. In 1996 they conducted a Remedial Action Feasibility Study (RI/FS) which looked at the alternatives for cleanup, including waste removal. We determined that there was no way we could safely remove the contaminants, and be sure that it's all out. The CAP is all that will accomplish the cleanup safely and effectively.

- Q. When do you expect the CAP to be available for review?
  A. There have been several starts and stops since 2004. A draft CAP should be available soon. The public will be invited to comment on that when the CAP is up for review. The PLP wants to do the CAP as soon as possible.

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Ecology Welcomes You!

Public Meeting on a Proposed Infrastructure for the contingent groundwater Treatment System for Landsburg Mine Site

Tuesday February 7, 2006

Agenda:

Time	Topic	Who
6:30 – 7:10 PM	Open House: Visit stations	All
7:10 – 7:15 PM	Welcome and Introduction	Justine Asohmbom, Ecology
7:15 – 7:30 PM	Presentation I Site Overview Cleanup process and status update Purpose of proposed Infrastructure Brief overview of prefered alternative	Jerome Cruz, Ecology
7:30 – 7:55 PM	Presentation II : Additional Details on: Prefered infrastructure components and layout Discharge Alternatives evaluated Criteria for selection	Doug Morell, Golder Associates (Consultant)
7:55 – 8:00 PM	Next Steps Responsiveness Summary Consent Decree & Draft Cleanup Action plan	Jerome Cruz, Ecology
8:00 – 8:55 PM	Comments/Questions and Answers	All in attendance
8:55 – 9:00 PM	Wrap up and Closing	Justine Asohmbom, Ecology

Landsburg Mine site, Ravensdale

Proposed Infrastructure for

The Contingent Ground water Treatment System

February 7, 2005

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Is this the final cleanup remedy?

- No –it's an interim action to protect public health and the environment. Ecology will direct main cleanup at a later time.
- This is to get groundwork in place - infrastructure – a way to dispose of treated groundwater from mine ("Contingent Groundwater Treatment System") in the possible event of contaminated water detected from the site. Originally a Contingency Plan that was part of the Draft Cleanup Action Plan.
- It's being done only for this possibility – it won't be used otherwise.

Developing Infrastructure for a Contingent Ground water Treatment System

- Risk: No contamination in groundwater leaving the former mine after 30 years. This proposal is for a contingency and for prompt action should it happen.
- Main Risk exists in groundwater pathway coming from mine portal areas
- Purpose: To protect human health and the environment

What actions are proposed?

- Design and build Infrastructure components- (*concrete pad, an electrical connection, access gravel drive, parking area and an underground effluent discharge line for a contingent groundwater treatment system*)
- Obtain permits or substantive requirements for Model Toxic Control Act (MTCA)-exempted permits
- Right now, it is probable that **pipeline will be installed but not be physically connected** to the existing sewer connection at the Tahoma School District – agreement to connect *only* if the Contingent Treatment System will be implemented.

Landsburg Mine Potentially Liable Parties (PLPs)

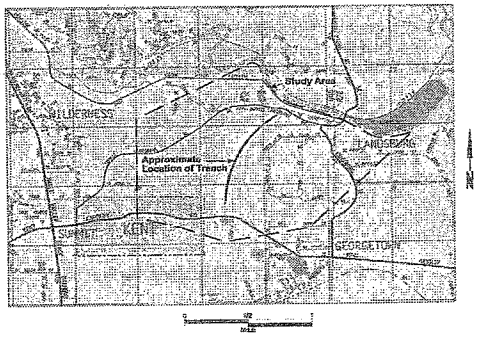
- Browning-Ferris Industries/Allied Waste
- Burlington Northern and Santa Fe Railroad Company
- PACCAR Inc.
- Plum Creek Timberland Company, L.P.
- Time Oil
- Palmer Coking Coal Company
- Burlington Environmental Inc.*

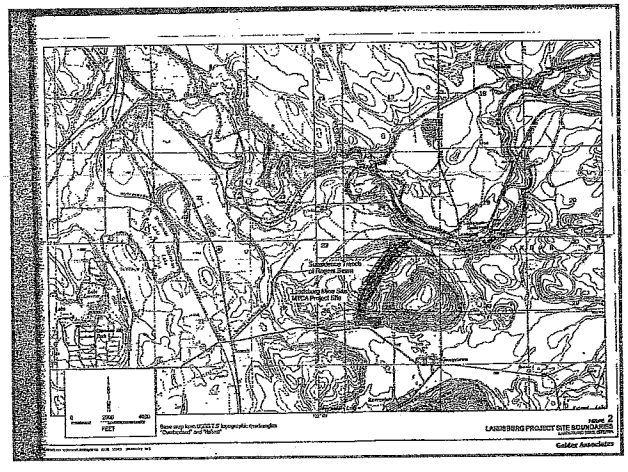
  * subsidiary of Philip Services Corporation or PSC; PSC bankruptcy settlement

What is Ecology currently seeking comments on?

- The Department of Ecology examined proposal and concurred on preferred method of disposal
- Mechanism: Amendment to the original Agreed Order
- Process: SEPA (State Environmental Policy Act) checklist was distributed. This is used to consider if there will be significant environmental impacts from the proposal.

Site Location and Background



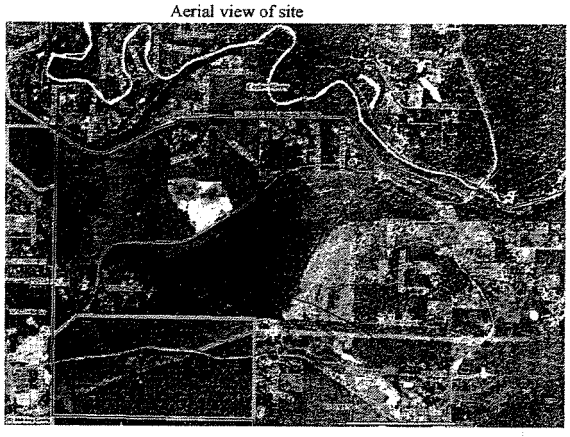


Some chemicals of concern from wastes sampled in subsidence trench:

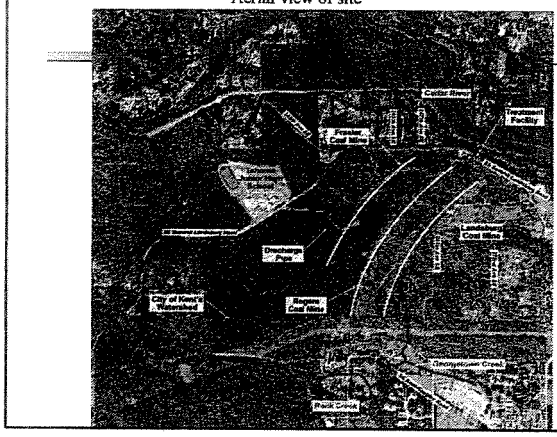
Soil:

- Chromium, lead
- PCBs (polychlorinated biphenyls)
- Bis(2-ethylhexyl)phthalate
- Methylene Chloride
- TCE (trichloroethene)
- TPH (total petroleum hydrocarbons)

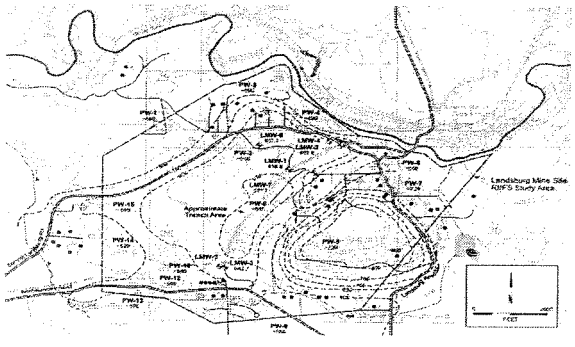
Aerial view of site



Aerial view of site



Private Wells Monitored

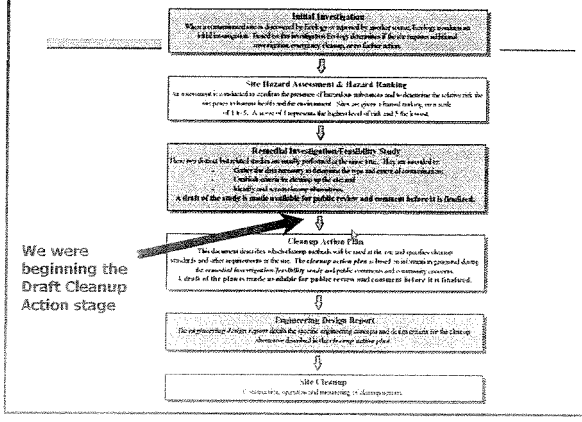


Status Update: What have we done?

- Initial Investigation (1989)
- Site Hazard Assessment (1991)
- Department of Health sampling; Expedited Response Action – drum removal (1991)
- Agreed Order (1993)
- Remedial Investigation/Feasibility Study completed (1996)
  - South Portal Hydrogeologic investigation (2004)
  - Deep Well (summer 2005)
  - Interim Ground water monitoring (2000, 2003 to present): No contamination found
- Draft Cleanup Action Plan: started 1999 and still under review
- Infrastructure for Contingent Ground water Treatment System

The Formal Cleanup Process

Under Washington's Model Toxics Control Act



We were beginning the Draft Cleanup Action stage

Why design & build the Infrastructure now?

- Whatever the final cleanup alternative is, the infrastructure for the Contingent Treatment System is needed.
- Delays in installing the infrastructure could take too long to control a release of contaminated water if detected

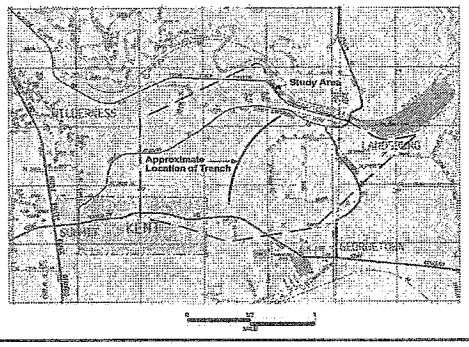
What is the preferred alternative for disposing pretreated ground water?

- Preferred method: on-site pretreatment and discharge to a sanitary sewer line with multiple, redundant treatment steps.
- Plan: If ground water above cleanup levels (contaminated water) is detected at the site, the plan is to pump the water to prevent contamination from migrating off site (into glacial gravels/sands that connect to Cedar River and Rock Creek) to contain it and to pretreat it.
- A safe and reliable means is needed to dispose of the pretreated water. Preferred alternative is through a 4 inch pipeline connecting to an existing sewer system or Publicly Owned Treatment Works or POTW

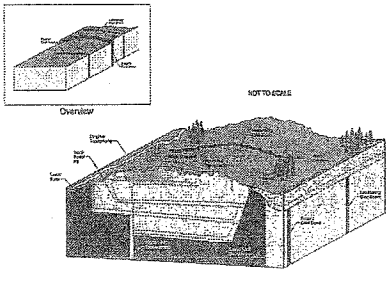
Criteria and Preferred alternative...

- Different alternatives were considered for reliability, technical implementability and cost
- Preferred method: on-site pretreatment and discharge to a sanitary sewer line with multiple, redundant treatment steps.
- Pretreatment at site, more treatment by Metro
- Actual physical connection will be made ONLY IF CONTINGENT TREATMENT SYSTEM MUST BE USED

Site Location



3-D View of Mine Site



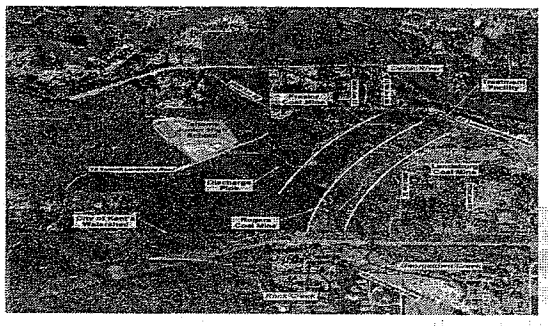
Groundwater Contingency Plan

- Draft CAP has a Groundwater Contingency Plan if contaminants will exceed cleanup levels leaving the Site
- Landsburg PLP Group has begun implementation of the Groundwater Contingency Plan
- Completed Phase 1 Infrastructure Alternatives
- Starting on Phase 2 – Design of Infrastructure

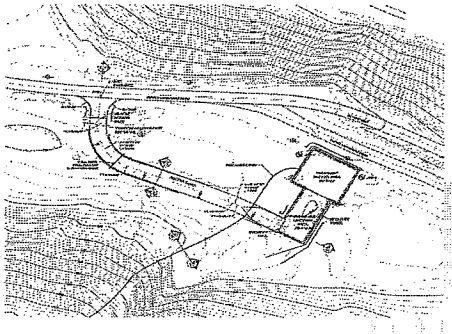
Preferred Alternative Infrastructure Components

- Access Road
- Parking Area
- Electrical Transformer
- Treatment System Foundation Pad
- Discharge Pipeline
- Pipeline Connected Only When Needed

Preferred Infrastructure Layout



Preferred Treatment Infrastructure



Infrastructure Alternatives Evaluated

- Alternative 1: Discharge to Cedar River
- Alternative 2: Discharge to Soos Creek Sewer Line (Preferred Alternative)
- Alternative 3: Discharge to On-Site Infiltration System
- Alternative 4: Trucking to Sewer Line

Alternative 1: Discharge to Cedar River

- Advantages
  - Returns water to basin
  - Low capital cost
  - Operation easy
- Disadvantages
  - Low reliability
  - Esthetics bad

Alternative 2: Discharge to Soos Creek Sewer Line

- Advantages
  - High reliability
  - Operation easy
  - Esthetics good
- Disadvantages
  - Does not return water to basin
  - High capital cost

Alternative 2: Surface Water Effects

- Cedar River Average flow ~ 230,000 gpm (not including alluvial aquifer water)
- Rock Creek and Aluvial Aquifer flow ~ 8,000 to 16,000 gpm
- Maximum Groundwater Extracted ~ 30 to 35 gpm (short –term)
- Long-Term Groundwater Extraction ~ 5 to 10 gpm

Alternative 3: Discharge to On-Site Infiltration System

- Advantages
  - Returns water to basin
  - Low capital cost
  - Esthetics good
- Disadvantages
  - Low reliability
  - Operation difficult

Alternative 4: Trucking to Sewer Line

- Advantages
  - High reliability
  - Low capital cost
- Disadvantages
  - Does not return water to basin
  - Operation difficult
  - Esthetics bad

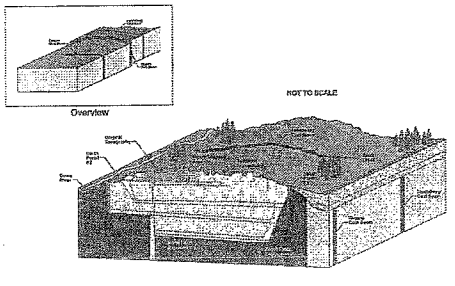
Conceptual Site Geologic Model

- Sedimentary bedrock originally horizontal layers
- Geologic/tectonic movement folded bedrock layers to near vertical
- Three primary coal seams in area (Frazier, Rogers and Landsburg)
- Glacial sediments cover the bedrock

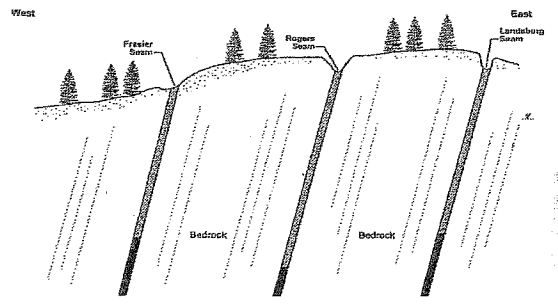
Conceptual Site Hydrogeologic Model

- Source of ground water is surface runoff into trench & direct precipitation
- Groundwater divide exists in the mine's south half
- Groundwater discharge is to the north and to the south
- Not much lateral groundwater flow
- Groundwater seeps from mine portals and up-wells to Cedar River and Rock Creek

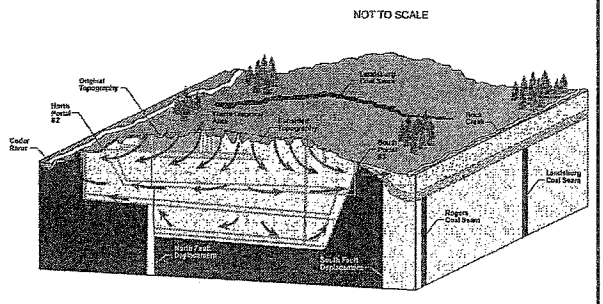
3-D View of Mine Site



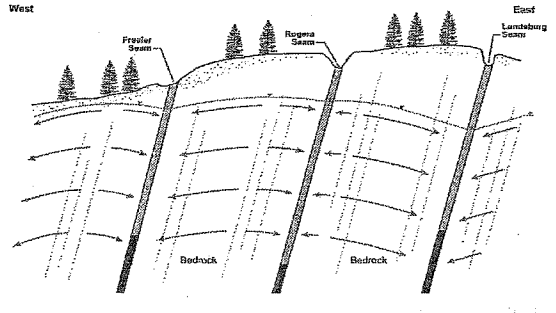
Cross Section of Mines



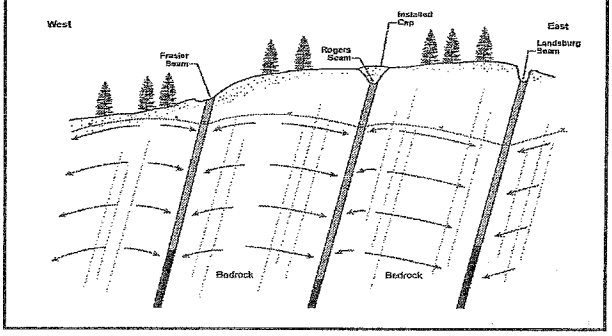
Groundwater Movement in Rogers Coal Mine



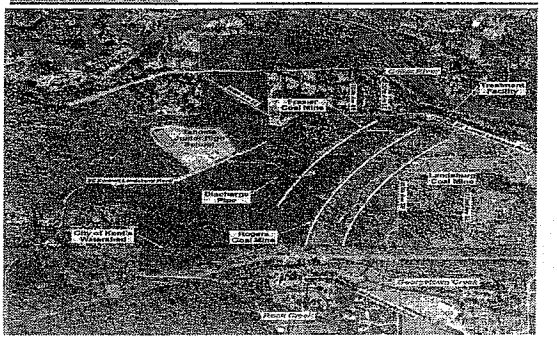
Groundwater Movement in Bedrock



Groundwater Movement During Pumping



Preferred Infrastructure Layout



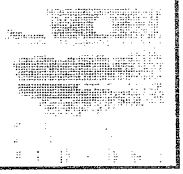
What Happens next ?

- Responsiveness Summary
- Public comment period was extended to hear concerns.
- This is an opportunity to comment or raise points relevant to this interim action.
- Work with local government (permitting) authorities on the proposal
- Permits and substantial requirements will be worked on, including engineering design
- Work on sampling and analyzing deep southern well (LMW-11) water chemistry
- Work on finalizing the Draft Cleanup Action Plan

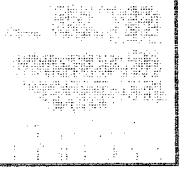
How can you comment to Ecology?

- Fill out a comment form and turn it in tonight or send it by February 15
- Email Jerome Cruz at jcru461@ecy.wa.gov

Thank You!!



Comments/Questions?



Responsiveness Summary

Agreed Order Amendment, State Environmental Policy Act (SEPA) and Determination of Non-Significance (DNS) to Address Infrastructure for a Contingent Groundwater Treatment System

Landsburg Mine Site – Ravensdale, Washington

June 2006

Prepared by the Washington State Department of Ecology
Northwest Regional Office, Bellevue, Washington

Answer: We are doing it now to prevent further delays. There is a whole process that we are in now, including public review, permits, etc. We want to hit the ground running and be prepared if we detect contamination.

8.34 Question: What is your long-term plan for this infrastructure? Will this be in place until the problem is solved?

Answer: Once the cleanup action is complete, we will monitor in perpetuity. When we say cleanup, we mean containment. The contamination on this site will not be removed, but rather contained. There will be a 5-year review and 10-year review. We will need the infrastructure and treatment facility as an integral part of the permanent remedy.

8.35 Question: Could we do the plan, design, and review for the infrastructure now, but not build it until it's necessary?

Answer: No, we think it's better to do now than later.

8.36 Comment: What if the PLPs go bankrupt? (made in response to question 8.35)

8.37 Question: Are there other ways to store and truck the water for 1 month as you build the infrastructure?

Answer: Yes, that is possible in the short term.

8.38 Question: Did you ever consider removing contaminants from the site and not just putting a cap on it?

Answer: In 1996, they conducted a Remedial Action/Feasibility Study (RI/FS) which looked at the alternatives for cleanup, including waste removal. We determined that there was no way we could safely remove the contaminants, and be sure that it's all out. The cap is all that will accomplish the cleanup safely and effectively.

8.39 Question: When do you expect the CAP (Cleanup Action Plan) to be available for review?

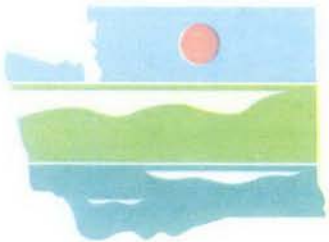
Answer: There have been several starts and stops since 2004. A draft CAP should be available soon. The public will be invited to comment on that when the CAP is up for review. The PLP wants to do the CAP as soon as possible.

Landsburg Mine site, Ravensdale

Model Toxics Control Act

Cleanup Site: Background and Status Update

September 2008



WASHINGTON STATE
DEPARTMENT OF
ECOLOGY

Approach

- The conservative assumption was made that wastes and hazardous substances above MTCA levels exist in the north end of the mine and the potential pathways of chemicals or potentially contaminated groundwater will be monitored
- The DCAP proposes: low permeability cap over the wastes in the north trench, surface water diversion, institutional controls on land use, groundwater monitoring in perpetuity, and contingent groundwater capture and treatment should contamination becomes detected at site wells

Proposed Remediation System

- Institutional Control for Groundwater Use
- Institutional Control on Mine Site Use
- Low Permeability Cap Over Waste
- Surface Water Diversion Around Mine Trenches
- In-Perpetuity Groundwater Monitoring
- Contingent Groundwater Treatment System

Proposed Remediation System

- Institutional Control for Groundwater Use
- Institutional Control on Mine Site Use
- Low Permeability Cap Over Waste
- Surface Water Diversion Around Mine Trenches
- In-Perpetuity Groundwater Monitoring
- Contingent Groundwater Treatment System

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Northwest Regional Office • 3190 160th Avenue SE • Bellevue, Washington 98008-5452 • (425) 649-7000

October 7, 2008

Mr. Larry Blanchard
Public Works Director
City of Kent
Public Works Engineering
400 West Gowe St.
Kent, WA 98032

Dear Mr. Blanchard:

Thank you for meeting with Department of Ecology Director Jay Manning, Site Manager Jerome Cruz, and myself at State Representative Upthegrove's office last September 22, 2008. The Department of Ecology (Ecology) shares your concern for the health of the City of Kent citizens and the environment which supports the City of Kent's water supply.

As we promised at the meeting, Ecology has reviewed the City of Kent's concerns on the Draft Cleanup Action Plan (DCAP) and would like to respond with what Ecology can do to meet Kent's concerns.

Ecology's technical staff and I have evaluated the City of Kent's concerns voiced to us as to their degree of protectiveness, added value to the preferred cleanup alternative, technical feasibility, and responsiveness to the concerns expressed by Kent. This letter will address these concerns as outlined in an email from City of Kent Environmental Conservation Supervisor Kelly B. Peterson that was forwarded to Site Manager Jerome Cruz.

<u>The Draft Cleanup Action Process and Next Steps</u>

Following the completion of the Remedial Investigation/Feasibility Study (RI/FS) in 1996, Ecology Determined that sufficient data were obtained to proceed to the next step in the cleanup process. A Draft Cleanup Action Plan (DCAP) was written and revised in 1999 and 2002, respectively. Subsurface investigations in 2004 to 2005 led to the installation of additional wells in the south and north mine portals, including the installation of a 700 foot deep well in the interior of the former mine, and expanded groundwater sampling. Results from these investigations as well as interim groundwater monitoring in 1996, 2000, and 2003 to the present showed no contamination that can be attributed to the wastes disposed in the subsidence trench above the former mine.

In addition, the Potentially Liable Persons (PLPs) installed infrastructure (a gravel pad, road, electrical hookup, and 2 inch pipeline) at the north portal area to eliminate potential delays in

the treatment of pumped water from the mine in the possible event that contaminated water is detected issuing from the mine.

In 2006, Ecology evaluated the DCAP for deficiencies in the cleanup remedy. The PLPs responded to Ecology's comments raised in the 2006 letter. The outcome was such that Ecology found enough reason to proceed with work on finalizing the DCAP after identifying several outstanding technical tasks.

The DCAP will have the following elements:

- Institutional Control for Groundwater Use
- Institutional Control on Mine Site Use
- Low Permeability Cap Over Waste at the northern half of the trench
- Surface Water Diversion Around Mine Trenches
- In-Perpetuity Groundwater Monitoring
- Contingent Groundwater Treatment System stationed at the former north portal
- Contingency Plans for the potential event that contaminants are detected at site wells or sampling locations

In order to complete the DCAP, Ecology believes that the most critical outstanding technical issue is the frequency of long term groundwater monitoring at this site. Presently, it is based on the modeling of contaminant velocities using the BIOSCREEN semi-analytical model distributed by the EPA's Center for Subsurface Modeling Support (CSMoS) (see 1996 EPA publication EPA/600/R-96/087).

Although no groundwater contamination has been detected from the site for 30 years, the results of such transport simulations will provide information needed to design an 'in perpetuity" monitoring program that will be protective in the possible event that contaminants are detected to be issuing from the site. It will also provide information needed to determine the appropriate response times should Contingency Plans be triggered at the site.

The process to finalize the DCAP has taken 9 years; likewise, with the trench open to the elements, the wastes disposed in the trench are subject to exposure to direct contact, rainfall percolation, and potential leaching. Without a Consent Decree to make legally binding the implementation of the preferred remedial alternative, continued long term monitoring, and implementation of Contingency plans, progress in the cleanup of this site is uncertain. Therefore, Ecology believes that upon accomplishing the travel time modeling and revisions to the DCAP, it is in the best interest of the public to aim at finalizing the DCAP by next year.

Response on substantive actions of the DCAP with regards to Kent's concerns

Ecology has evaluated the concerns presented by the City of Kent on the degree of characterization and the preferred remedial alternative in the DCAP. Ecology recognizes the stake the City has in its Clark Springs Water supply, and wishes to work collaboratively to provide the reassurance it needs that the water supply in Rock Creek is protected. The additional actions Ecology can take at this stage of the cleanup are based on the Model Toxics

Control Act (MTCA), degree of value to the preferred cleanup solution, protectiveness, technical feasibility, public concerns, and cost, among other things.

Of the various issues raised by the City in Representative Upthegrove's letter and the September 22 meeting, Ecology believes that three substantive actions will assist in addressing the City's concerns.

First, Ecology would like to invite the City of Kent to participate in the contaminant travel time modeling simulations and evaluation of appropriate monitoring frequencies needed to detect contaminants from the mine if this should occur. Ecology and the City of Kent can work as model reviewers on the original 2002 travel time memo and proposed reverse modeling and sensitivity analyses by Golder Associates using the BIOSCREEN semi-analytical model. Alternatively, the simulations may be carried out using a numerical contaminant transport and fate model such as MODFLOW-MT3D. Ecology can consider hiring an independent professional groundwater and contaminant transport modeler for this task, or Ecology and the City of Kent can actively participate in the modeling effort, or serve as independent reviewers.

Second, the City of Kent can assist Ecology in evaluating the appropriate response times for contingency plans or corrective action in the DCAP. Ecology will require the PLPs to the estimated response times to initiate groundwater pumping or containment, treatment, and safe disposal at the portal wells if Contingency Plans are triggered at the site. With this as the starting point, the City of Kent can provide comments on the appropriate response times for contingency plans or corrective action in the DCAP. Ecology would appreciate continued technical dialogue in the design and expected response times of the Contingency Plan which may provide better understanding of the feasibility, operational limits or tolerances of the plan. Ultimately, Ecology will evaluate and decide if the response times for mobilization, set-up, and operation are protective and reasonable based on science and engineering design considerations and any relevant MTCA criteria.

Third, although infrastructure for a groundwater treatment system at the south portal is not needed due to the presence of the infrastructure for the groundwater treatment system at the north portal, a reasonable reassurance to provide City of Kent is pre-positioning of the components needed for timely emergency pumping and conveyance of groundwater to the north portal groundwater treatment system. This will include ensuring that the appropriate pumps are available. Thus the south portal pumps can be replaced with ones with the capacity to pump an estimated 30 gallons per minute. Also, a pipeline conveyance connecting the south portal to the treatment system at the north portal may be installed to prevent delays in conveying water pumped from the south portal to the north portal area for treatment. Note that its actual use may depend on whether the north portal groundwater treatment system is operational at that time. Additionally, a holding tank with a minimum volume of 20,000 gallons may be pre-positioned at the south portal to allow for the storage of the pumped groundwater. A suitable pump and source of power can be used to convey water from the holding tank to the pipeline. Fuel brought and stored at the site for generation of electricity will have properly designed containment and spill protection structures and safe handling procedures in place. Ecology can suggest that such materials can be staged at the south portal to allow its use in a timely manner.

Next steps before issuance of the DCAP

Ecology proposes that we meet to discuss these proposed actions and plan for the three proposals outlined above.

Kent's concerns with regards to the infrastructure at the southern portal and monitoring

With regard to this concern, please see the third proposal above on pre-positioning components for timely emergency pumping and conveyance of groundwater to the north portal groundwater treatment system.

Ecology hopes that these proposals and the implementation of the final cleanup plan will provide the reassurance that City of Kent's Clark Springs Water supply will be protected.

Ecology appreciates the comments and input from the District, the City of Kent, and other area stakeholder and service organizations. Ecology will continue to update you and the public on our planning and implementation of a final cleanup at this site as applied under Ecology's authority under MTCA.

Please be assured that Ecology has always been aware of the stake the City of Kent has in its water supply, as well as other stakes for other resources such as the water quality of the Cedar River and Rock Creek. Although contamination has never been detected in groundwater from the monitoring network at the site, the cleanup plan will be designed to be timely in its implementation and conservatively protective for the possible event that contaminated groundwater are detected emanating from the former mine. If you have any questions please call me at (425) 649-7054.

Thank you,

Robert W. Warren
Section Manager
Dept. of Ecology Toxics Cleanup Program, Northwest Regional Office

rw/jc/kp

Cc: Director Jay Manning
State Representative Dave Upthegrove
Mayor Suzette Cooke
Mike Mactutis
Kelly Peterson
Doug Levy
Ching-Pi Wang
Elliot Furst

King County
Water and Land Resources Division
Department of Natural Resources and Parks
King Street Center
201 South Jackson Street, Suite 600
Seattle, WA 98104-3855
206-263-6181
206-296-0192 Fax

AGENDA

Cedar River Council
November 25, 2008
7:00 PM – 9:00 PM
Maplewood Greens Golf Course, Renton

7:00 PM - Approval of Meeting Minutes from October 28, 2008

7:05 PM - **Public Comment Period** (Time limit of 3 min per person.)

7:15 PM - **Landsburg Mine Clean-Up Action Plan Update:** Jerome Cruz with Department of Ecology and Doug Morell with Golder Associates will present information about the Mine clean up activities. They will present the project history and discuss the current status of the Clean-Up Action Plan for the Landsburg Mine site.

8:30 PM - **Updates & Announcements:**

- **Cedar River Basin Steward Update Report**: Tom Beavers will give an update on Cedar River grants.

8:45 PM - **Future Agenda Topics**: To be discussed at meeting

8:50 PM - **Public Comment Period** – (Time limit of 3 minutes per person.)

9:00 PM – **Adjourn**

Next Meeting: Tuesday, January 27, 7-9 PM at Maplewood Greens Golf Course, Renton

Landsburg Mine Site, Ravensdale

Model Toxics Control Act (MTCA)

Cleanup Site: Background and Status Update

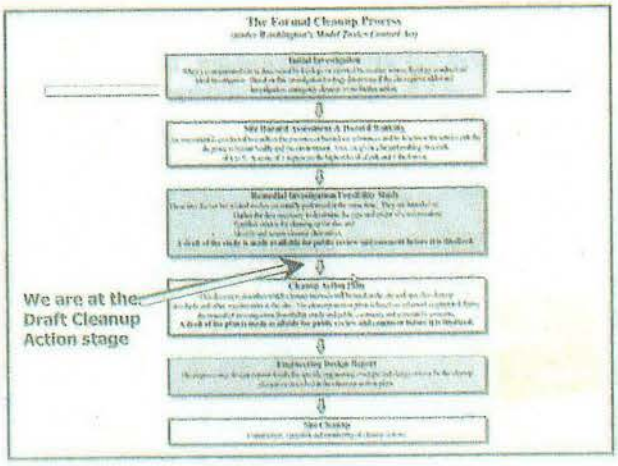
November 2008

WASHINGTON STATE DEPARTMENT OF ECOLOGY

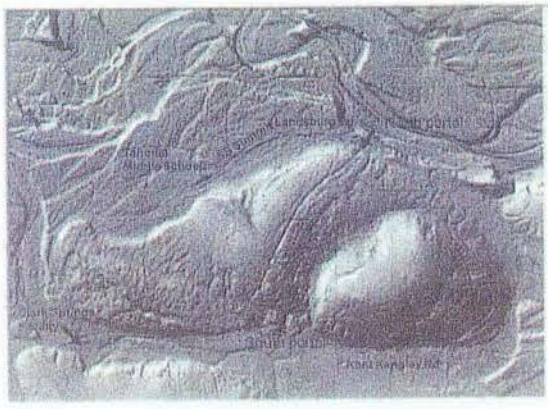
Landsburg Mine Site

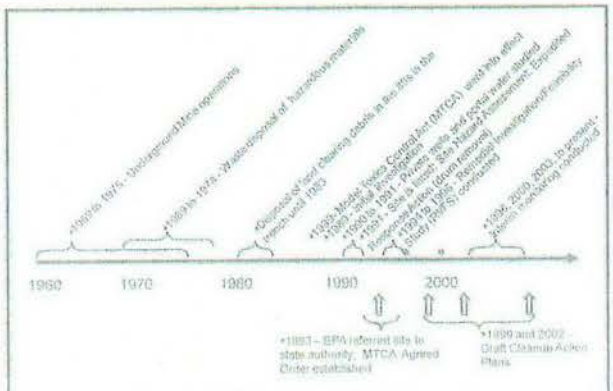
This Presentation:

- Background and History
- Review of Studies Done in the Past and Results
- Hydrogeology and Site Conceptual Model
- Next Steps for Cleanup



Site Location and Background





Early Timeline of Events

Recent Landsburg Mine History

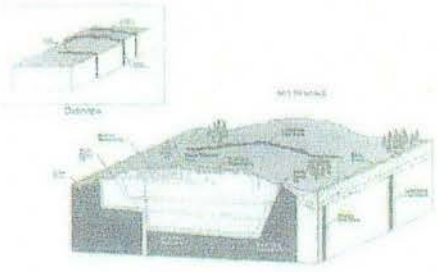
- October 2005 – Deep well installed southern mine working
- February 2006 – Public Meeting. Agreement to construct infrastructure for Contingent Groundwater Treatment System
- August 2006 – February 2008 –Ecology and Potentially Liable Parties review of Draft Cleanup Action Plan (DCAP)
- Summer 2008 – Construction of Infrastructure for Contingent Groundwater Treatment System

Landsburg Mine Original Potentially Liable Parties (PLPs)

- Browning-Ferris Industries/Allied Waste
- Burlington Northern and Santa Fe Railroad Company
- PACCAR Inc.
- Plum Creek Timberland Company, L.P.
- Time Oil
- Palmer Coking Coal Company
- Burlington Environmental Inc.*

*** subsidiary of Philip Services Corporation or PSC; PSC bankruptcy settlement**

3-D View of Mine Site



from May 1991 Site Hazard Assessment Report, Ecology and Environment, Inc.

Past Investigations of Water, Wastes and Waste area

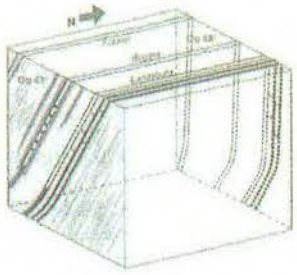
- Surface Water Sampling (Geraghty and Miller 1990)
- Soil Gas Survey (Applied Geotechnology 1990)
- Private Well and Surface Water Sampling (Department of Health, 1990)
- 1991 – Site Hazard Assessment
- 1991 – Emergency Drum Removal
- 1995 to 1996 – Report of Investigation and Feasibility Study
- 2000 to Present Interim Groundwater Monitoring
- 2004 – South Portal Hydrogeologic Study
- 2004 – Deep well LMW-10 (north end)
- 2005 – Deep well LMW-11 (south mine interior)

Some Chemicals of Concern from Wastes Sampled in Subsidence Trench

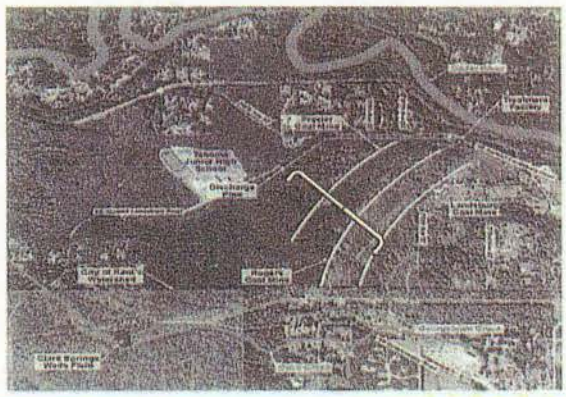
Soil:

- Chromium, lead
- PCBs (polychlorinated biphenyls)
- Bis (2-ethylhexyl)phthalate
- Methylene Chloride
- TCE (trichloroethene)
- TPH (total petroleum hydrocarbons)

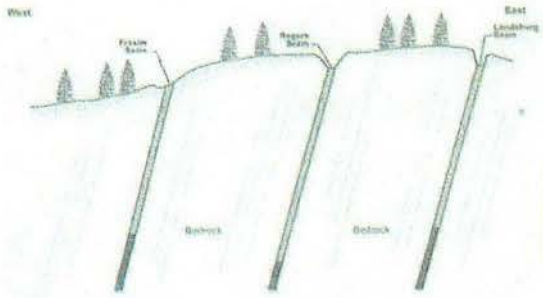
3-D Geologic Model



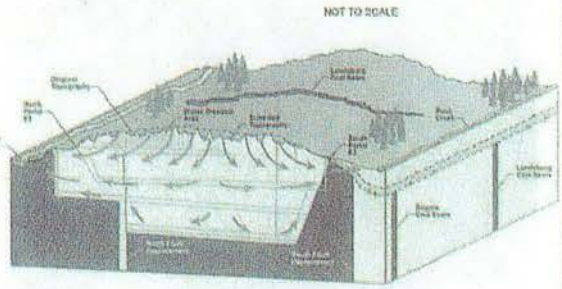
Aerial view of site

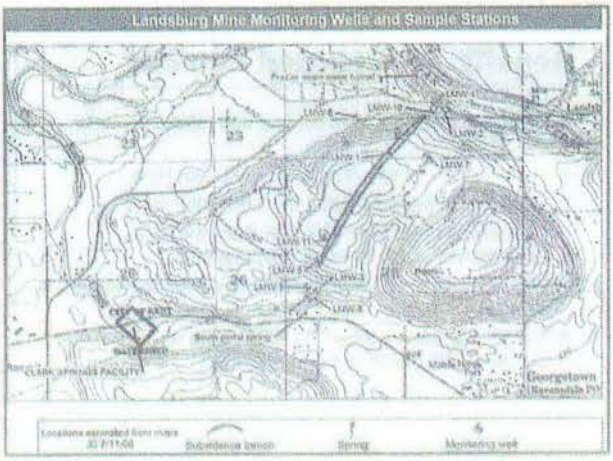


Cross Section of Mines

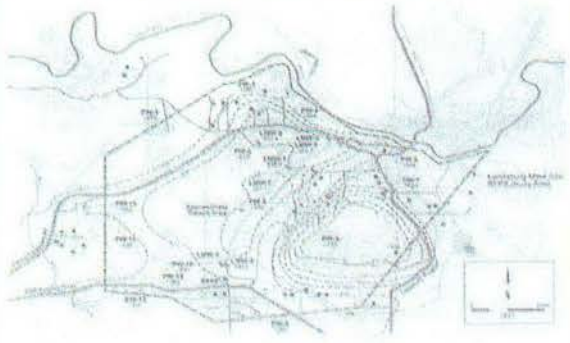


Groundwater Movement in Rogers Coal Mine





Private Wells Monitored



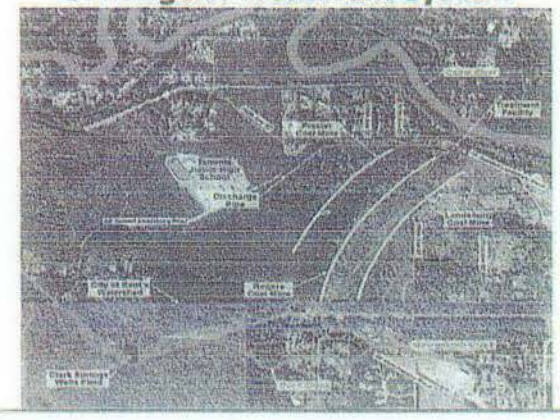
Voluntary Actions by the PLP Group

- Interim Groundwater Monitoring
- Hydrogeologic Investigation at South Portal
- Installation of the deeper wells LMW-10 and LMW-11
- Construction of the Contingent Groundwater Treatment System

Cleanup Approach

- Conservative stance that wastes are still there and remediation will proceed.
- Actions:
  - low permeability soil cap,
  - surface water diversion,
  - institutional controls on land & groundwater use,
  - groundwater monitoring in perpetuity,
  - contingent groundwater capture and treatment should contamination becomes detected at site wells

Contingent Treatment System



Treatment Infrastructure

Treatment Infrastructure

Benefits of Proposed Remedy

- Isolates the wastes from contact and rainfall (leaching)
- Much less water entering the Rogers Coal Mine
- Much less water emanating from the coal mine
- Contaminant migration is slower from the mine, because less water to move contaminants
- Groundwater from bedrock made to enter the mine at all times
- Maintain groundwater divide in the mine within the southern half (south of waste disposal)

What's Next?

- Finalize the Draft Cleanup Action Plan. Outstanding issues are:
  - Groundwater Monitoring Frequency – to be based on computer modeling of the time it takes a potential contaminant to travel a certain distance.
  - Contingency Plan and Response Times
- Follow Timetable (next slide)

Landsburg Mine Site Remediation Time-Table

- Revised Cleanup Action Plan (CAP) to Ecology for re-evaluation
- Draft CAP for public review
- Public Comment on Draft CAP and Consent Decree
- Engineer Design Report (2 - 3 months after Final CAP)
- Permit Requirements (2-3 months after Design Report)
- Contractor Bid and Selection (2 months after Permits)
- Remedial Action (2 construction seasons after Contractor Bid and Selection)
- Compliance Monitoring (in perpetuity)

Comments or Questions?

Robb Bakemeier

From:	Cruz, Jerome (ECY) <JCRU461@ECY.WA.GOV>
Sent:	Monday, January 25, 2010 9:45 AM
To:	Bill Kombol; Bodnar, Randy; bruce.sheppard@bnsf.com; fred.benz@paccar.com; jlipsky@cascadialaw.com; kmctigue@OMM.com; mark.allendorf@awin.com; Morell, Doug; rbrown@cascadialaw.com; wjoyce@sjzlaw.com; blake@ci.kent.wa.us; Jensen, Susan; kpeterson@ci.kent.wa.us; Laporte, Tim; Mactutis, Mike; pbannister@aspectconsulting.com; Robert F. Bakemeier; sgermiat@aspectconsulting.com; Warren, Bob (ECY); Wang, Ching-Pi (ECY); Furst, Elliott (ATG); Park, Hun Seak (ECY); Timm, Ronald W. (ECY); Lui, Nancy (ECY)
Subject:	Ecology's decision on long term groundwater monitoring frequency at Landsburg MIne site, Ravensdale
Importance:	High

Good morning,

The Department of Ecology has evaluated the BIOSCREEN modeling and input from the City of Kent and the Landsburg Mine PLP group on these simulations. A final decision on the long term groundwater monitoring frequency (ten years and beyond) was made based on internal peer review and evaluation in Ecology's Toxics Cleanup Program.

Hardcopies are in the mail. You may download the decision letter (in pdf format) at Ecology's FTP site at:
ftp://www.ecy.wa.gov/
under the folder "Landsburg Mine LT Monitoring"

Ecology thanks the PLP Group and the City of Kent for their cooperation in this task.

Work will now resume on the Draft Cleanup Action Plan (DCAP). It will incorporate the long term monitoring decision and the other two elements of Ecology's response to a letter from State Representative Dave Upthegrove to Director Jay Manning last September 9, 2008, and in the meeting at Rep. Upthegrove's office last September 22, 2008. The other two elements will incorporate in the DCAP:

- appropriate response times to initiate groundwater pumping or containment, treatment, and safe disposal at the portal wells if Contingency Plans are triggered at the site and;
- pre-positioning at the south portal area of the components needed for timely emergency pumping and conveyance of groundwater to the north portal groundwater treatment system.

I would like to stress that based on the history of no detections of contaminants in groundwater issuing from the site, these elements are basically additional safeguards in case contamination is detected in the future.

If you have any questions concerning the content of the decision letter and Ecology's cleanup process for this site, please contact me at 425-649-7094.

Thank you.

WASHINGTON STATE DEPARTMENT OF ECOLOGY
Jerome B. Cruz, Ph.D.
Toxics Cleanup Program, Northwest Regional Office
3190 - 160th SE Bellevue, WA 98008
Tel: (425) 649-7094 Fax: (425) 649-7098
jcru461@ecy.wa.gov
http://www.ecy.wa.gov/programs/tcp/cleanup.html

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Northwest Regional Office • 3190 160th Avenue SE • Bellevue, Washington 98008-5452 • (425) 649-7000

January 21, 2009

Dr. Douglas Morell
Golder Associates Inc
18300 NE Union Hill Road Suite 200
Redmond WA 98052-3333

Re: Long term groundwater monitoring frequency based on BIOSCREEN modeling of hypothetical contaminant travel times at the Landsburg Mine site in Ravensdale, Washington

Dear Dr. Morell:

The Department of Ecology (Ecology) thanks you and the Landsburg Mine PLP Group for the investment of time and resources into the BIOSCREEN modeling and recommended long term (greater than ten year and in perpetuity) groundwater monitoring period at the Landsburg Mine site.

Ecology has evaluated the BIOSCREEN report, along with the exchange of recommendations and comments received by the PLP Group and the city of Kent (Kent) through Aspect Consulting.

The long term monitoring scheme to be implemented at the subject site is provided in Table A below. It is based on evaluation of BIOSCREEN modeling simulations using the time between detection of contaminants at Method Detection Limits (MDL) at sentinel well locations and detection at one half of Cleanup Levels (0.5 CUL) at compliance well locations:

Table A. "In Perpetuity" Frequencies at all Site Wells

	Northwards	Southwards	Remarks
Wells	LMW-2, LMW-4, LMW-10, Deep North Sentinel Well (new), Shallow North Sentinel Well (new), LMW-6, LMW-7	LMW-3, LMW-5, LMW-8, LMW-9, LMW-11, South Shallow Sentinel Well (new), Dual South Sentinel/Cap Effectiveness Well (new)	Based on recommended frequencies in Golder Associates' BIOSCREEN modeling report and paired sentinel well – compliance well approach.
VOCs, TPH	**2.5 years**	**5 years**	
Metals, SVOCs, polychlorinated biphenyls, chlorinated pesticides	**5 years**	**10 years**	

The frequencies in this table will be incorporated in the compliance monitoring plan and related sections of the Draft Cleanup Action Plan (DCAP) for this site. Compliance wells LMW-6 and LMW-7 will be monitored according to the frequencies established for the northern trench area wells.

Sentinel wells will be drilled in accordance with the number, location and depths in Golder's memo dated December 4, 2009. They will be installed after the CAP is finalized but before the remedial action (trench filling, low permeability capping) is implemented.

Attachment A provides Explanatory Notes on Ecology's decision for long term monitoring frequency based on the modeling and the network of sentinel wells.

The implementation of this long term groundwater monitoring plan, along with the response/travel times for corrective actions based on the BIOSCREEN modeling results (to be detailed in the DCAP), and prepositioning of equipment or infrastructure at the south portal area for contingent groundwater treatment fulfills the proposed additional actions for the city of Kent offered by Ecology in its letter of October 7, 2008. Please note that according to the Model Toxics Control Act WAC 173-340-420, this monitoring plan is subject to the five year periodic review process. Upon each five year review of this site, the long term monitoring schedule can be modified or changed when evaluated under the review criteria of WAC 173-340-420(4).

The next steps for this site will be finalizing the Consent Decree and DCAP. Ecology will be in contact with you for this purpose.

Thank you,

Jerome B. Cruz, Ph.D., L.G., L.H.G.
Toxics Cleanup Program

jc/kp

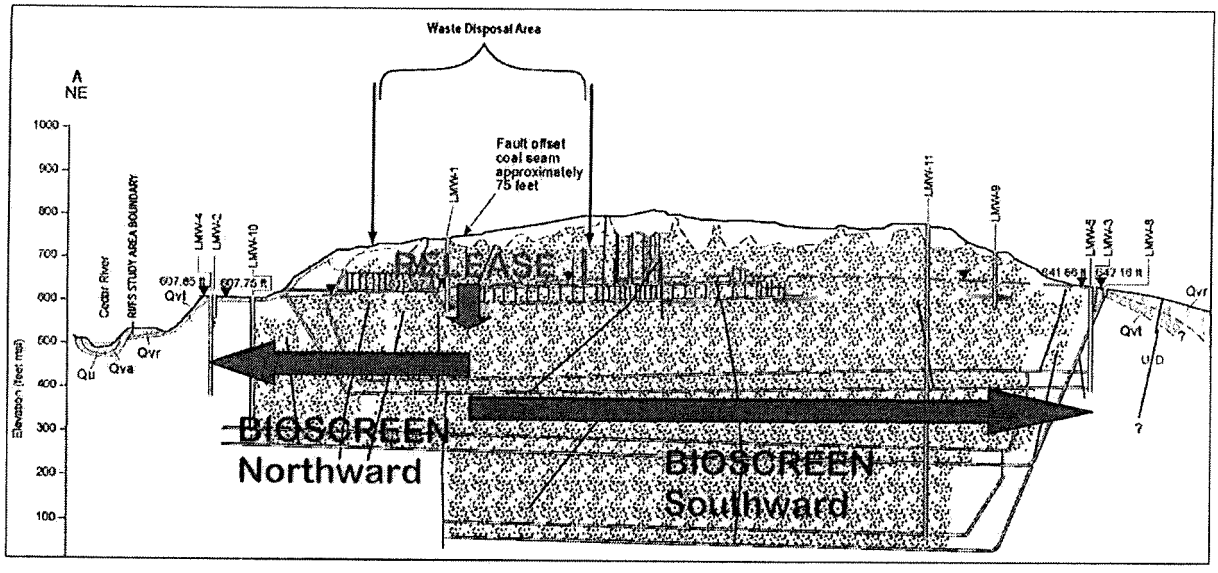
Attachments

cc: William Kombol, Palmer Coking Coal Co.
Mike Mactutis, City of Kent Public Works
Robert F. Bakemeier, Bakemeier Law Firm (Bakemeier, P.C.)
Elliot Furst, Assistant Attorney General, Ecology Division
Robert Warren, WA State Department of Ecology
Ching-Pi Wang, WA State Department of Ecology
Ronald W. Timm, WA State Department of Ecology
Hun Seak Park, WA State Department of Ecology

Attachment A. Explanatory Notes on Ecology's decision for long term monitoring frequency based on the BIOSCREEN modeling

Contents

I. Reference Schematic of Modeled Pathways



II. Summary of Recommended Monitoring Frequencies

Northward Flow

	PLP† recommended	PLP* calculated	Kent recommended	ECY †† decision	ECY Rationale
VOCs, TPH	2.5 years	0.4 year	0.25 year	**POC wells and Sentinel wells: 2.5 years**	**PLP recommended frequency; Will require additional sentinel wells at north portal location**
Metals, every-thing else	5 years	2.3 years	2 years **	**POC wells and Sentinel wells: 5 years**	**Safety factor of 2; Will require additional sentinel wells at north portal location**

† Refers to recommendations based on analysis of travel time from MDL at sentinel well to 0.5 CUL at compliance well.

* Refers to no sentinel well, "medium conservative" case using vinyl chloride (VOCs, TPH) and arsenic (metals, everything else) and their breakthrough times from MDL to 0.5 CUL (VOCs, TPH)

** Recommendation based on single well model (no sentinel wells) with most conservative results and increasing further the frequency.

†† Monitoring using sentinel well (300 feet south of compliance wells) and compliance wells LMW-2, LMW-4, LMW-10

Southward Flow

	PLP† recommended	PLP* calculated	Kent recommended	ECY†† decision	ECY Rationale
VOCs, TPH	5 years	1.1 year	0.25 year **	POC wells: and Sentinel wells: 5 years	Based on BIOSCREEN medium conservative At (MDL to 0.5CUL) at single compliance well without sentinel wells; Metals measurements within five year periodic review; Concerns by City of Kent
Metals, every-thing else	10 years	9 years	5 years **	POC wells: and Sentinel wells: 10 years	

† Refers to recommendations based on analysis of travel time from MDL at sentinel well to 0.5 CUL at compliance well.

* Refers to no sentinel well, "medium conservative" case using vinyl chloride (VOCs, TPH) and arsenic (metals, everything else) and their breakthrough times from MDL to 0.5 CUL (VOCs, TPH)

** Recommendation based on single well model (no sentinel wells) with most conservative results and further reduction of frequency

†† Monitoring only at compliance wells LMW-3, LMW-5, LMW-8.

III. Assessment of Compliance Well -Only vs. Paired Sentinel Well - Compliance Well Approaches Toward Deriving Long Term Monitoring Frequency Based on BIOSCREEN Modeling.

Disadvantages of using compliance wells only (no sentinel wells) for determining monitoring frequencies using BIOSCREEN, especially if compliance monitoring and triggers are strictly implemented:

- Provides sampling intervals with unreasonable frequencies (unheard of in sites with no groundwater impacts)
- Strong possibility of being economically unsustainable
- Not logical given that past and current monitoring frequencies are less frequent than proposed frequencies, no reason for drastically increased frequency based on site history. Capping and runoff modification will cause hydraulic changes which put the south portal at less risk.
- Provides fewer safeguards due to lack of monitoring of sentinel wells which are much closer to source.
- Less lead time to respond with a corrective action at point of compliance. Kent has said that if contamination is detected at compliance wells, "it's all over". Not having sentinel wells to monitor will foster this situation.

Disadvantages of using paired monitoring of compliance wells and sentinel wells:

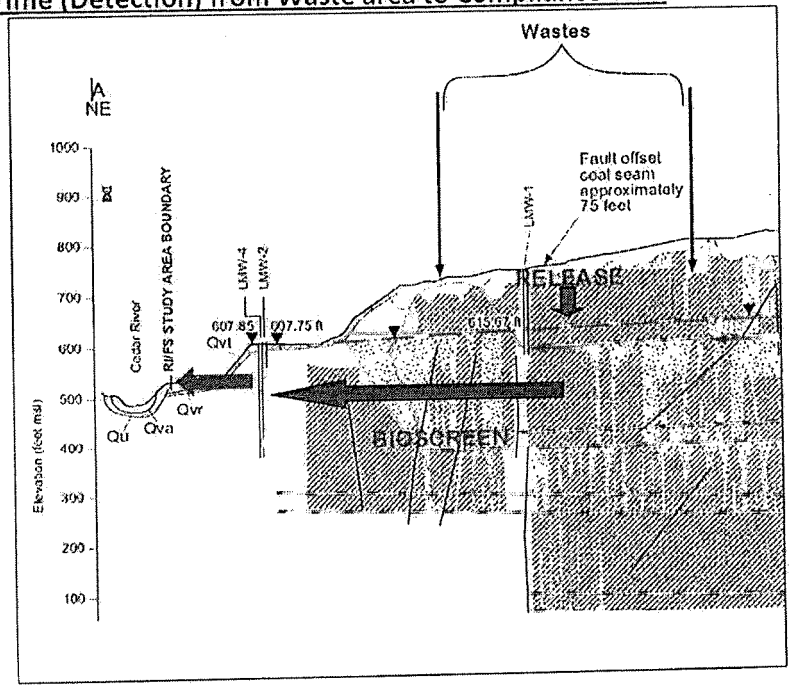
- Provides a longer monitoring frequency because of added time stemming from horizontal travel time between wells; nontechnical negative perception compared to more frequent monitoring
- Extra wells to install and monitor; added cost
- Critics of the cleanup discount the location of sentinel wells to intercept a plume. However, based on site data, the proposed sentinel wells are situated appropriately. Additionally, input from Kent on proposed sentinel wells was incorporated to ensure basic concurrence on appropriate location of the sentinel wells.

Salient Points on Two Approaches:

- Both are equally protective and should detect an outbreak of groundwater contamination if it occurs.
- The paired sentinel well-compliance well monitoring approach does not require overly frequent and uneconomic monitoring schedules.
- The paired sentinel well-compliance well monitoring approach affords more time to respond with contingency plans or corrective actions to protect receptors.

IV. Hypothetical Outcomes of Approaches Used To Derive Monitoring Frequencies Approaches

CASE 1. Travel Time (Detection) from Waste area to Compliance Well:

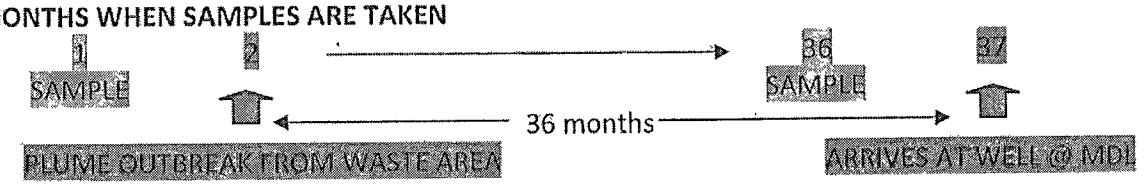


Using a hypothetical number for travel time of 36 months (therefore a monitoring frequency of 36 months) from waste area to Method Detection Limit at Well:

MONTHS WHEN SAMPLES ARE TAKEN

If contamination breaks out from waste area a month later (month 2) after the first sampling round on month 1:

MONTHS WHEN SAMPLES ARE TAKEN



RESULT: No detection during 2nd round (month 36) and the plume will have traveled past well an additional 35 months before detection (past MDL) only on the 3rd round. Not an acceptable approach for long term groundwater monitoring.

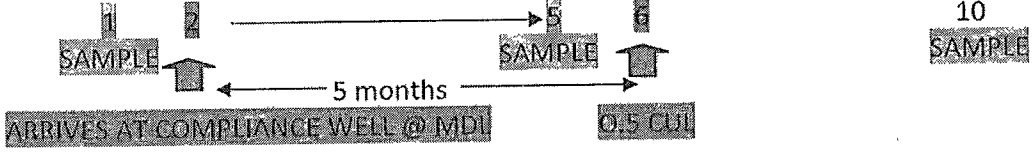
CASE 2. Using BIOSCREEN and Compliance Wells Only Approach (No Sentinel Wells)

Example: Using results for Methylene Chloride monitoring frequency of 5 months based on breakthrough from MDL to 0.5 CUL at compliance well only. Travel time from waste area to well of 3 years 3 months.

MONTHS WHEN SAMPLES ARE TAKEN

If contamination arrives a month later (month 2) after the first sampling round on month 1:

MONTHS WHEN SAMPLES ARE TAKEN

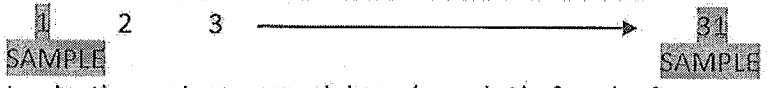


RESULT: At 2nd round of sampling, well will not reach action level (0.5 CUL) required to trigger action although contamination will have been detected. Concentration will be >MDL but <0.5 CUL. It will be a 4 year old plume when the 3rd round of samples is taken. There is time for warning; however, since it occurs at compliance well, the time for corrective action will likely be short. Engenders the perception that upon detection, contamination will have progressed too far.

CASE 3. Using BIOSCREEN and Sentinel Well – Compliance Well Approach. Utilizes the time difference from detection at MDL at a Sentinel Well and 0.5 Cleanup Level at the Compliance Well(s)

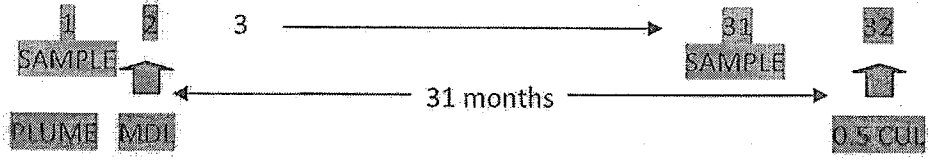
Example: Using a sentinel well with a 31 month (2 years, 7 months) monitoring frequency. Travel time from waste area to well of 3 years 3 months:

MONTHS WHEN SAMPLES ARE TAKEN AT SENTINEL WELL



If contamination arrives a month later (month 2) after the first sampling round on month 1:

MONTHS WHEN SAMPLES ARE TAKEN AT SENTINEL WELL



RESULT: At 2nd round of sampling, concentration at sentinel well will be >>0.5CUL (many orders of magnitude greater). The compliance well will be < MDL or nondetect. It will be a 5 year 9 month (5.72 years) old plume by the time the 2nd round of samples is taken. However, the plume will not have reached the compliance well locations. Substantial pre-warning will have occurred with sufficient time to mobilize a corrective action.

V. Sentinel Well Locations

Regarding Aspect Consulting's suggested six alternative sentinel well locations (forwarded in an email dated 11/12/2009 by Kelly Peterson, Kent Public Works Department), Ecology will implement a good portion of the suggested wells locations and screen depths. There appears to be agreement between Ecology, Kent and the PLP Group that having sentinel wells is an appropriate approach for this site and that the wells are situated in the appropriate map locations for the most part.

Ecology would like to address the letter from Aspect Consulting of December 11, 2009 with the following observations:

1. The "Southern Shallow Sentinel Well and Cap Performance Monitoring Well 1" is located within the trench waste area and is more of a characterization well and not a sentinel well. It is also close to LMW-1 and due to the hydraulic connection within the mine workings, LMW-1 could provide a similar performance function as this proposed well. The RI/FS adopted the approach that the wastes are still in the northern trench zone and the outputs of the system will be monitored should a potential outbreak of groundwater contamination occur from this zone. Therefore, wells drilled within the waste area, aside from providing little decision-making value to the final preferred

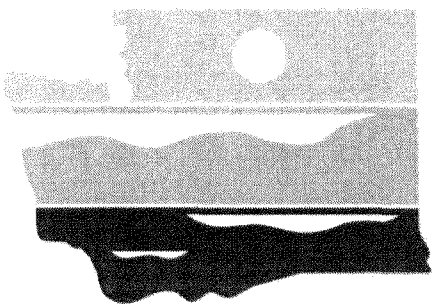
cleanup alternative, can conceivable fail to function as a sentinel well if it exhibits groundwater contamination that may be within or beneath the waste disposal area.

2. The location of Aspect's "Southern Shallow Sentinel Well 2" agrees with Golder's proposed well.
3. Southern Shallow Sentinel Well 3 is not likely to be in a better position to detect groundwater contamination from the waste area and measure water tables in the trench compared to Golder's "South Shallow Sentinel Well" located at or near LMW-11. Golder's proposed well is not too far from Aspect's location at LMW-9 and should provide similar results, with the advantage that it is located closer to the waste area (better warning) and addresses a data gap (shallow water table elevation in this part of the site).
4. Aspect recommended locating two northern sentinel wells (Northern Shallow and Deep Sentinel and Cap Performance Monitoring Wells" at the northern edge of the waste disposal area, while Golder has proposed to site the wells approximately 300 feet further north, at the north portal area. Golder justified this location rather than Aspect's location due to high relief and poor accessibility. While Ecology agrees with Aspect that the location closer to the waste area should still be accessible, Ecology finds Golder's location to be equally protective due to the high hydraulic connectivity in the mine workings (e.g. see Baker tank discharge study in 1996 RI/FS) and similar due to the close proximity of both recommended locations. Furthermore, despite the 300 feet spacing between recommended locations, Aspect's location (for similar reasons stated above), may be a waste area well and would not serve as well as a sentinel well to its location.
5. Ecology does not agree with installing a north portal well within the gravel trench downgradient of the north portal because it will not be representative of water that comes from the mine. Glacial till deposits could contribute meteoric and/or perched water that will mix with groundwater at this location. Golder's "Shallow North Sentinel Well" is located at the north portal and will serve the same purpose while at the same time be screened in the mine/portal area rather than in glacial drift.

Landsburg Mine Site, Ravensdale

Brief Overview of the Site and Status Update Since 2008

May 2011



DEPARTMENT OF
ECOLOGY
State of Washington

Cleanup Approach

- Conservative stance that wastes are still there and remediation will proceed.
- Preferred cleanup approach:
  - fill in trench and low permeability soil cap,
  - surface water diversion,
  - institutional controls on land & groundwater use,
  - contingent groundwater capture and treatment should contamination be detected at site wells
  - groundwater monitoring in perpetuity

Long term groundwater monitoring frequency based on modeling

Table A. "In Perpetuity" Frequencies at all Site Wells

	Northwards	Southwards	Remarks
Wells	LMW-2, LMW-4, LMW-10, Deep North Sentinel Well (new), Shallow North Sentinel Well (new), LMW-6, LMW-7	LMW-3, LMW-5, LMW-8, LMW-9, LMW-11, South Shallow Sentinel Well (new), Dual South Sentinel/Cap Effectiveness Well (new)	Based on recommended frequencies in Golder Associates' BIOSCREEN modeling report and paired sentinel well – compliance well approach.
VOCs, TPH	**2.5 years**	**5 years**	
Metals, SVOCs, polychlorinated biphenyls, chlorinated pesticides	**5 years**	**10 years**	

Landsburg Mine Site Remediation Timetable

- Revised Cleanup Action Plan (CAP) to Ecology for re-evaluation (**presently undergoing Ecology review**)
- Draft CAP for public review
- Public Comment on Draft CAP and Consent Decree
- Engineer Design Report (2-6 months estimated by PLP Group);
- Permit Requirements (2-9 months estimated by PLP Group)
- Contractor Bid and Selection (2 months estimated by PLP Group)
- Remedial Action Construction (two years)
- Compliance Monitoring (in perpetuity)

Landsburg Mine Site, Ravensdale

Brief Overview of the Site and Status Update Since 2008

May 2011

DEPARTMENT OF ECOLOGY
State of Washington

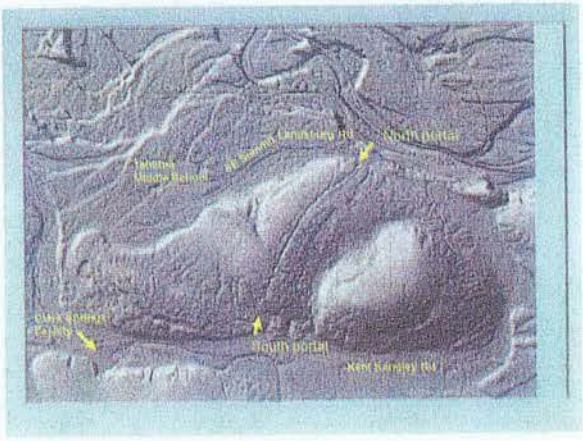
Landsburg Mine Site

This Presentation will include:

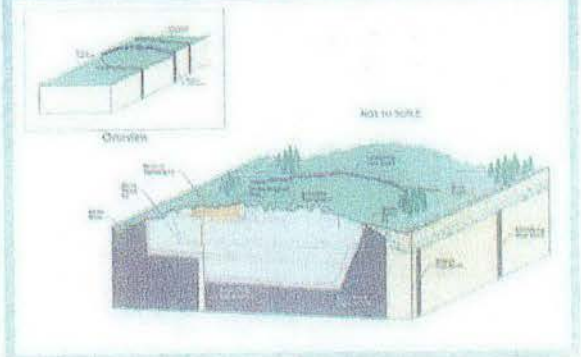
- Site Background and History
- Update from the Last Meeting in 2008
- Hydrogeology of the Site
- Proposed Cleanup Action
- What's Next?

Site Background and History

Site Location and Background



3-D View of Mine Site



From May 1991 Site Hazard Assessment Report, Ecology and Environment, Inc.

Landsburg Mine Original Potentially Liable Parties (PLPs)

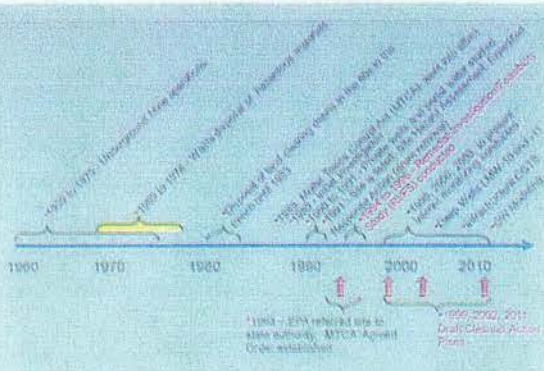
- Browning-Ferris Industries/Allied Waste
- Burlington Northern and Santa Fe Railroad Company
- PACCAR Inc.
- Plum Creek Timberland Company, L.P.
- Time Oil
- Palmer Coking Coal Company
- Burlington Environmental Inc.*

* subsidiary of Philip Services Corporation or PSC; PSC bankruptcy settlement

Some Chemicals of Concern from Wastes Sampled in Subsidence Trench

Soil:

- Chromium, lead
- PCBs (polychlorinated biphenyls)
- Bis (2-ethylhexyl)phthalate
- Methylene Chloride
- TCE (trichloroethene)
- TPH (total petroleum hydrocarbons)



Early Timeline of Events

Key Points about Landsburg Mine site

- Groundwater monitoring has never detected any contamination which could be associated with the wastes.
- Wastes were disposed in the northern trench area.
- No contaminants are migrating off of the waste area in surface water or groundwater. Similarly, nothing was detected in soils outside of the north trench area.
- We know the hydrogeology and contamination sufficiently to select a remedy (Draft Cleanup Action Plan or DCAP)

Update from the Last Meeting in 2008

Landsburg Mine Recent Events

- Continued groundwater monitoring twice a year.
- Summer 2008 – Construction of Infrastructure for Contingent Groundwater Treatment System
- October 2008 to January 2009 – Hypothetical Travel Time modeling using BIOSCREEN to derive long term monitoring frequency
- Draft Cleanup Action Plan submitted to Ecology March 2011.

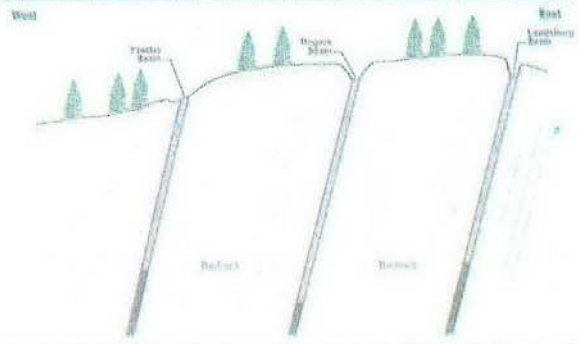
Contingent Treatment System Infrastructure

Treatment Infrastructure

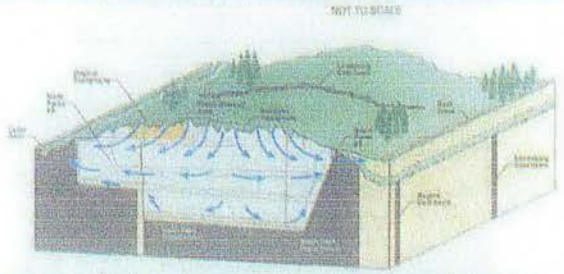
Hydrogeology of the Site

Aerial view of site

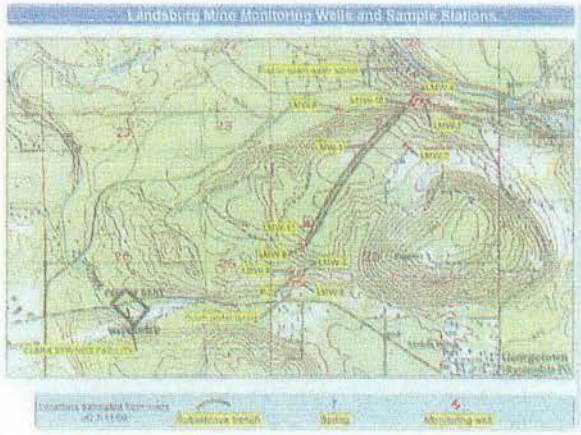
Cross Section of Mines



Groundwater Movement in Rogers Coal Mine



Landaburg Mine Monitoring Wells and Sample Stations

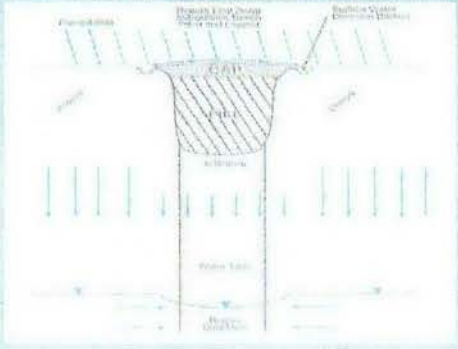


Proposed Cleanup Action

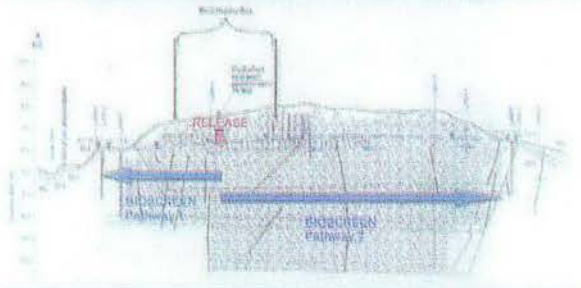
Cleanup Approach

- Conservative stance that wastes are still there and remediation will proceed.
- Preferred cleanup approach:
  - fill in trench and low permeability soil cap,
  - surface water diversion,
  - institutional controls on land & groundwater use,
  - contingent groundwater capture and treatment should contamination be detected at site wells
  - groundwater monitoring in perpetuity

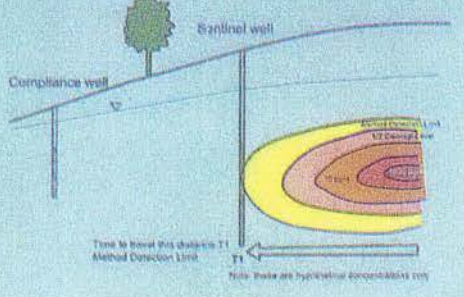
Proposed Cap Design



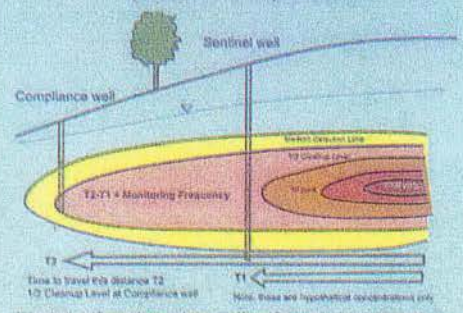
Hypothetical travel time modeling and Long term Monitoring Frequency



BIOSCREEN simulations were used to compute hypothetical travel times of contaminants in the possible event of a release within the mine



Combining simulated travel times with sentinel wells make the frequency of long-term monitoring protective and practical

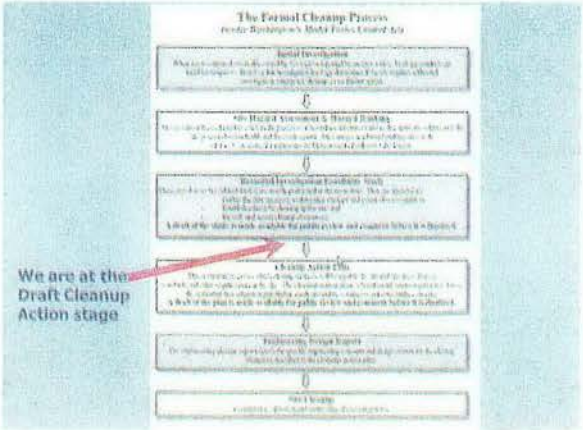


Long term groundwater monitoring frequency based on modeling

Table A "In Perpetuity" Frequencies at all Site Wells

	Northwards	Southwards	Remarks
Wells	LMW-2, LMW-9, LMW-10, Deep North Sentinel Well (new), Shallow North Sentinel Well (new), LMW-6, LMW-*	LMW-3, LMW-5, LMW-8, LMW-9, LMW-11, South Shallow Sentinal Well (new), Pond South Sentinel/Sump Effectiveness Well (new)	Based on recommended frequencies in Golder Associates BIOSCREEN modeling report and paired sentinel well – compliance well approach
VOCs, TPH	2.5 years	5 years	
Metals, SVOCs, polychlorinated biphenyls, chlorinated pesticides	5 years	10 years	

What's next?



What's Next?

Finalize the Draft Cleanup Action Plan. We have recently concluded:

- Long-term groundwater monitoring frequency – based on BIOSCREEN modeling of the time it takes a potential contaminant to travel a certain distance.
- Some infrastructure for contingent groundwater treatment at south portal based on City of Kent's request.
- Contingency Plan and Response Times – in revised DCAP

Follow Timetable (last slide)

Landsburg Mine Site Remediation Timetable

- Revised Cleanup Action Plan (CAP) to Ecology for re-evaluation (**presently undergoing Ecology review**)
- Draft CAP for public review
- Public Comment on Draft CAP and Consent Decree
- Engineer Design Report (2-6 months estimated by PLP Group);
- Permit Requirements (2-9 months estimated by PLP Group)
- Contractor Bid and Selection (2 months estimated by PLP Group)
- Remedial Action Construction (two years)
- Compliance Monitoring (in perpetuity)

Comments or Questions?

ATTACHMENT K

Additional Historical Materials from Ecology's Landsburg Mine Site File (Chronological Order)

5.1.2

SUITE 4400 · 1001 FOURTH AVENUE PLAZA · SEATTLE, WASHINGTON 98154 · (206) 624-3600

Riddell, Williams, Bullitt & Walkinshaw

LAW OFFICES

RODNEY L. BROWN, JR.

December 16, 1991

Mr. David South
Washington Department of Ecology
Northwest Regional Office
3190 - 160th Ave. S.E.
Bellevue, WA 98008

Re: Landsburg Mine Site

Dear Dave:

Enclosed please find a copy of Chempro's final report on the drum removal project. I do not know whether Chempro has sent you a copy of this report yet, but I thought that you would find it interesting. Please give me a call if you have any questions about it.

With best regards.

Sincerely,

Rod

Rodney L. Brown, Jr.

RLB/ces

Enclosure

C:\RLB\5979\001\SOUTH.LTR

TELEX RCA 296338 RWBW UR · FACSIMILE (206) 389-1708

BELLEVUE OFFICE
2100 SECURITY PACIFIC PLAZA · 777 108TH AVENUE N.E. · BELLEVUE, WASHINGTON 98004
(206) 462-4500 · FACSIMILE (206) 462-4501

BURLINGTON ENVIRONMENTAL

REPORT ON THE LANDSBURG MINE DRUM REMOVAL PROJECT

August 20 to October 30, 1991

Prepared for

The Landsburg Mine PRP Group

by

Burlington Environmental, Inc.
Seattle Field Service Division

December 10, 1991

Burlington Environmental Inc.
7440 West Marginal Way South • Seattle, WA 98108
(206) 682-4898 • FAX: (206) 233-0869

Table of Contents

Burlington Environmental Inc.
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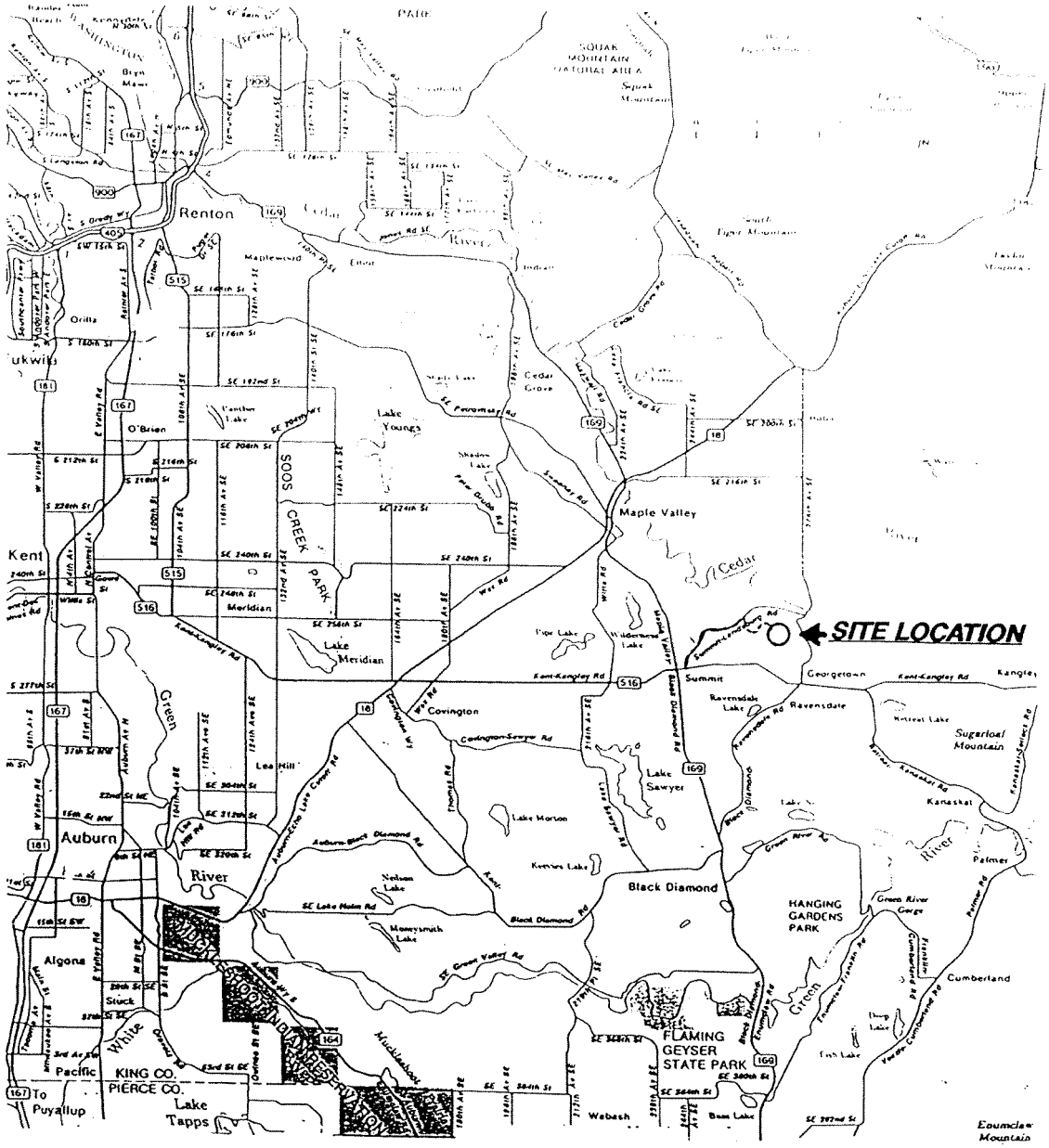


BURLINGTON ENVIRONMENTAL INC.

Landsburg Mine

Drum Removal Project

LOCATION MAP

Landsburg Mine Drum Removal Project
Project Number 91S341

PROJECT REPORT

December 10, 1991

Introduction

The Landsburg site consists of a semi-continuous trench 20 to 60 feet deep, 60 to 100 feet wide, and nearly 3/4 of a mile long. The trench was formed by underground coal mining activities on the Rodgers Seam that caused surface subsidence and/or collapse. The mine operated from the 1940's until 1975.

In the late 1960's and early 70's, portions of the trench were used to dispose of hazardous materials, a practice that was condoned at the time. These materials consisted of miscellaneous industrial wastes contained in drums or dumped directly from tanker trucks. Also deposited in the trench were logging and demolition debris, tires, and miscellaneous household garbage. Dumping at the site continued intermittently until the mid 1980's.

Due to concerns that contamination from the site might pose long-term ground water and other environmental problems, the Washington State Department of Ecology sampled domestic water wells in the Landsburg area in 1990, and commissioned a site hazard assessment (SHA) study in February, 1991. The SHA confirmed that certain portions of the trench contained drums with heavy metals, cyanides, volatile and semivolitile organic compounds, and PCBs.

The DOE then requested potentially liable parties (PRPs) to perform an expedited response action to remove surficial drums and secure the site from unauthorized access. The PRP group (Chemical Processors, Inc., PACCAR Inc., Palmer Coking Coal Company, and Plum Creek Timber Company) awarded a contract to the Chempro Division of Burlington Environmental, Inc. to recover up to 65 drums and dispose of them and their contents at an approved RCRA facility. Prior to site activity, Chempro would prepare a site Health, Safety and Work Plan for approval by the PRP group and review by the DOE.

Site Health, Safety, and Work Plan

The Site Health and Safety Plan (HASP) which included a Comprehensive Work Plan was prepared and submitted for review and approval in mid-August, 1991. The plan called for overpacking and removal of drums from the trench using a 28 ton crane. Overpacked drums would be taken to a drum storage area and their contents sampled. Based upon sample

results, profiles would be prepared and the material taken off site for disposal. All drums were to be assessed prior to removal from the trench, and a log kept of each container that described its condition, contents, and location.

Initial Site Work

Chempro mobilized a crew to the site on August 20th to begin site preparation and setup activities. The crew consisted of a Project Manager, Supervisor, Equipment Operator, and two Technicians. A storage container, portable toilet, and decon stations, were set up on the site. Land was cleared for crane operations and access trails built to the drum locations. A bermed and lined drum storage area was constructed. The site was surveyed by compass and tape and a site map prepared (Figure 1).

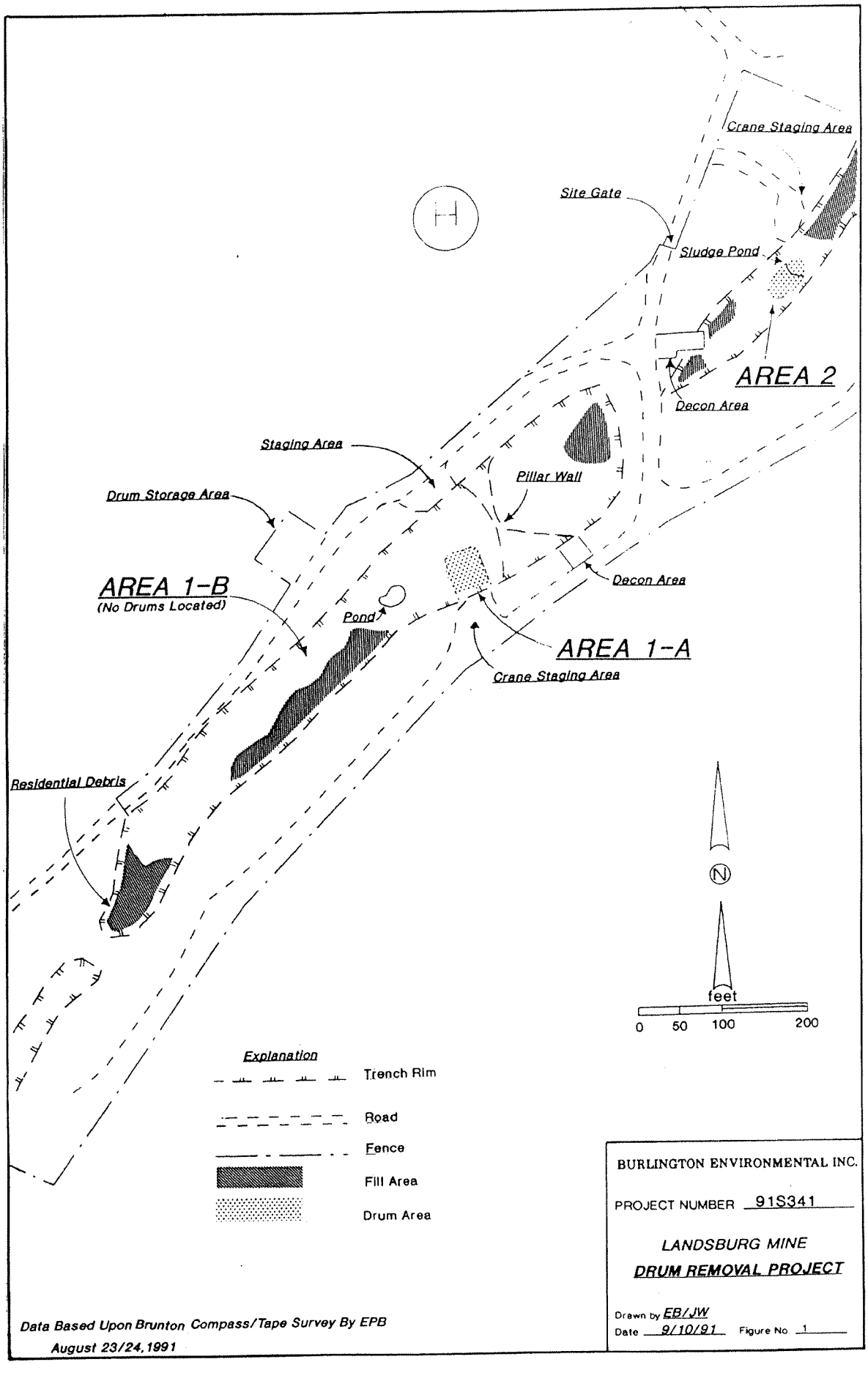
While Chempro was setting up, a fencing contractor began enclosing the site with 8 foot cyclone fence under an agreement with Palmer Coking Coal Company.

Area 2

Initial site assessment and drum recovery operations began on August 22nd in Area 2 (see Figure 1). Thirteen drums were found in two localities, informally named the "pond" and the "stump pile" (see Figure 2-A). The "pond" is an area of soft oily sludge about 24 feet in diameter in the bottom of the trench where water accumulates during wet months. The "pond" contained eleven drums in varying stages of deterioration. Ten were open top drums without lids lying on their sides with some of their contents spilled onto the ground. One drum containing sludge was a bung type with a ruptured top. Drum assessment was done in Level B PPE. It was observed that when the sludgey soil was disturbed, a 1 to 2 second spike of 500 to 700 ppm was recorded on the organic vapor analysis (OVA) meter. It was also observed that the sludge in the pond area was composed of various different colored layers probably representing episodic dumping of sludge from tanker trucks.

The stump pile consists primarily of logging and construction debris and soil located on the northwest bank of the trench just north of the "pond". The total length of the pile is about 350 feet and it varies in width from 15 to 60 feet. Depth of the pile is unknown. Two bung type drums with closed tops were found beneath southern end of stump pile. One was basically empty and the other contained green solids.

All the drums found in Area 2 had multiple bullet holes or punctures.


Crane Staging Area
Site Gate
Sludge Pond
AREA 2
Decon Area
Staging Area
Pillar Wall
Drum Storage Area
AREA 1-B
(No Drums Located)
Pond
Decon Area
AREA 1-A
Crane Staging Area
Residential Debris
N
feet
0 50 100 200
Explanation
Trench Rim
Road
Fence
Fill Area
Drum Area
BURLINGTON ENVIRONMENTAL INC.
PROJECT NUMBER 91S341
LANDSBURG MINE
DRUM REMOVAL PROJECT
Drawn by EB/JW
Date 9/10/91 Figure No 1
Data Based Upon Brunton Compass/Tape Survey By EPB
August 23/24, 1991

Following initial assessment, the 11 drums around the pond were overpacked by hand into 85 gallon salvage drums. Contents of drums that had spilled onto the ground were shoveled back into their original containers. The overpacked drums were numbered and left on site until they could be removed.

On August 28th, a 30 ton crane was positioned above the stump pile to remove drums and stumps. The 11 overpacked "pond" drums were hoisted out of the trench, placed on a flatbed truck and taken to the drum storage facility.

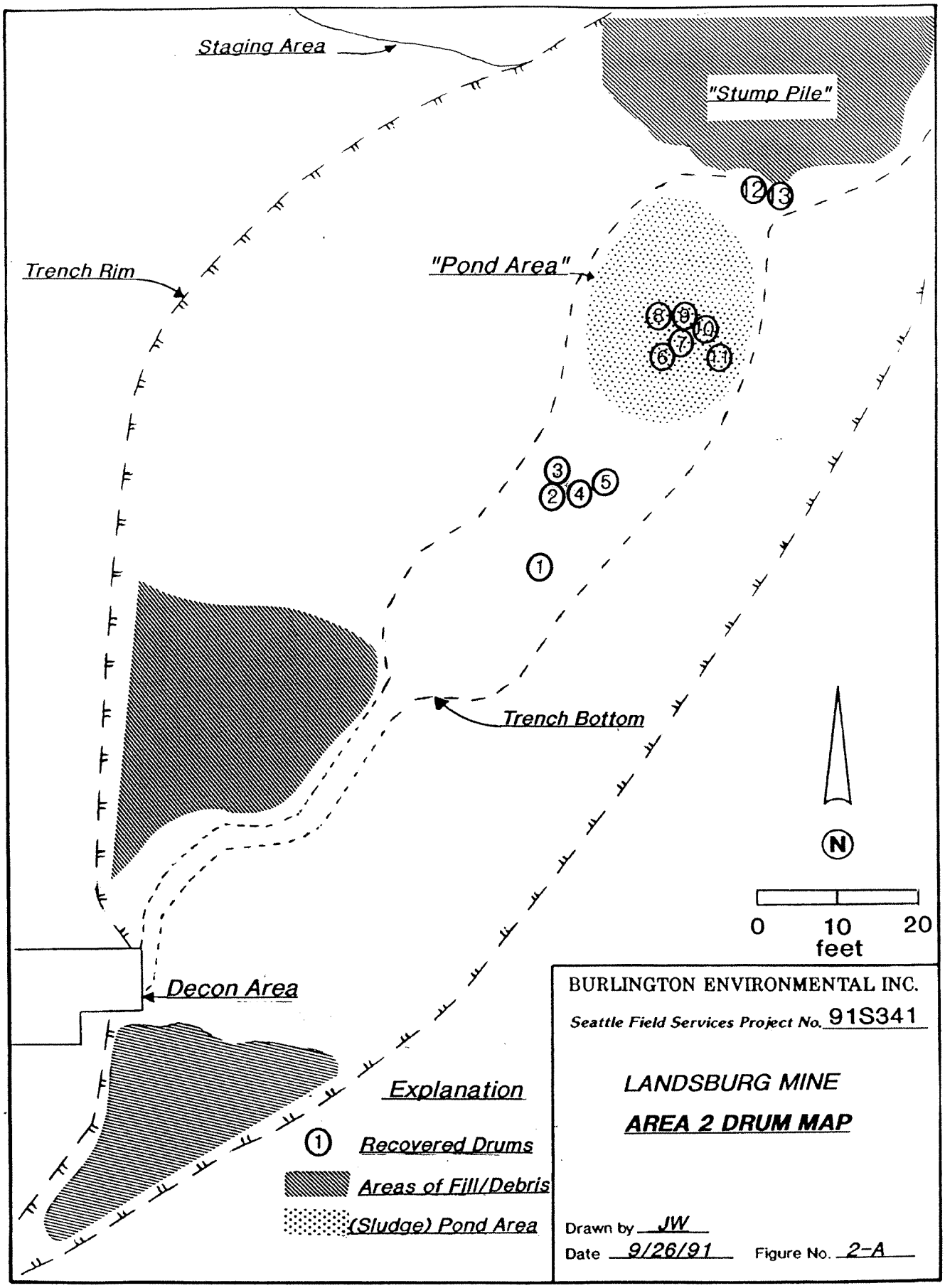
The crane then removed several stumps to expose the two drums beneath the stump pile. These drums were also overpacked, labled and removed to the storage facility. During stump removal, ten additional drums were observed mixed in with the stump pile debris. Recovery of these additional drums would require support by mechanical equipment outside the project scope of work. Consequently, they were left in place.

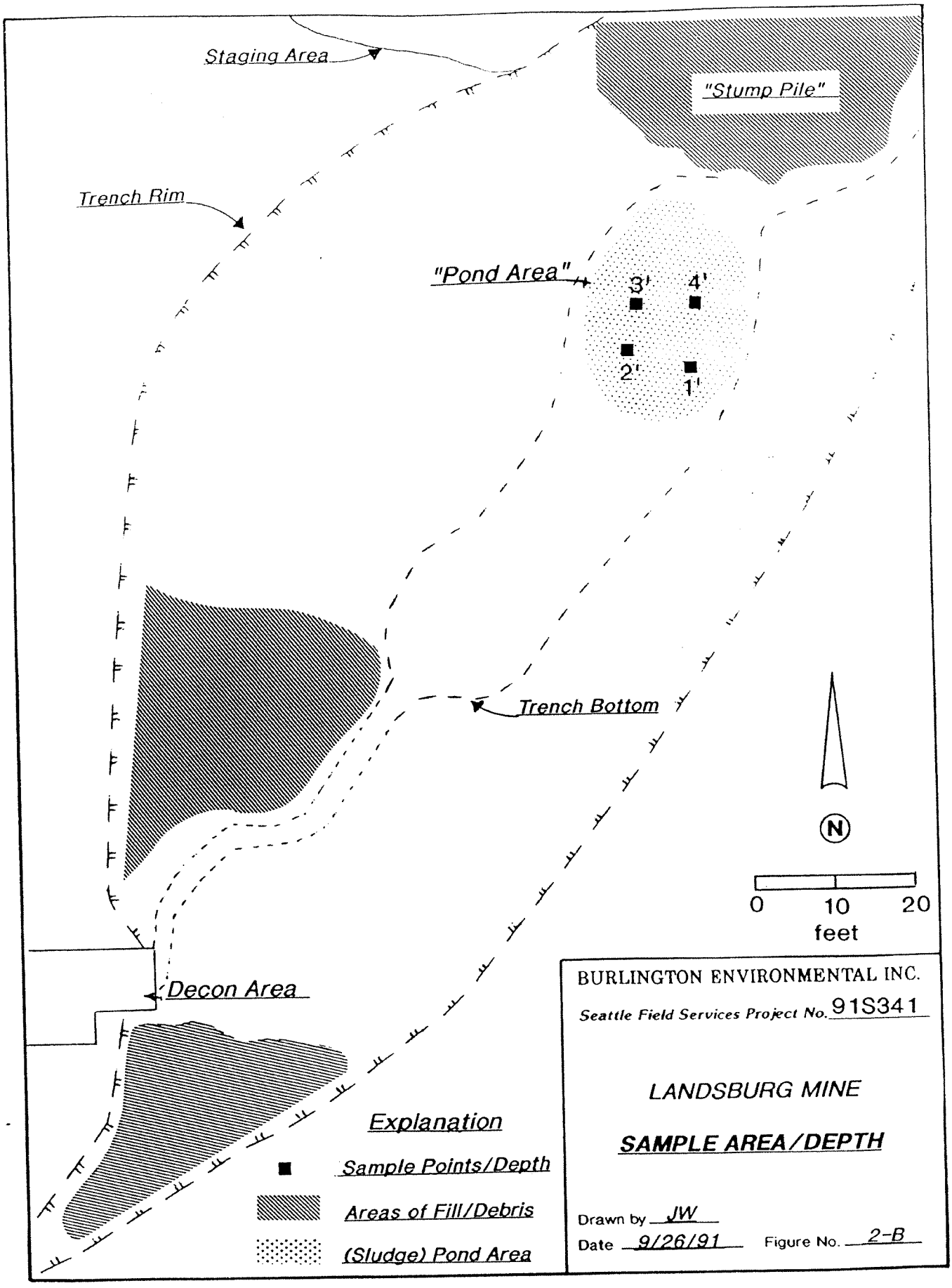
Area 1A

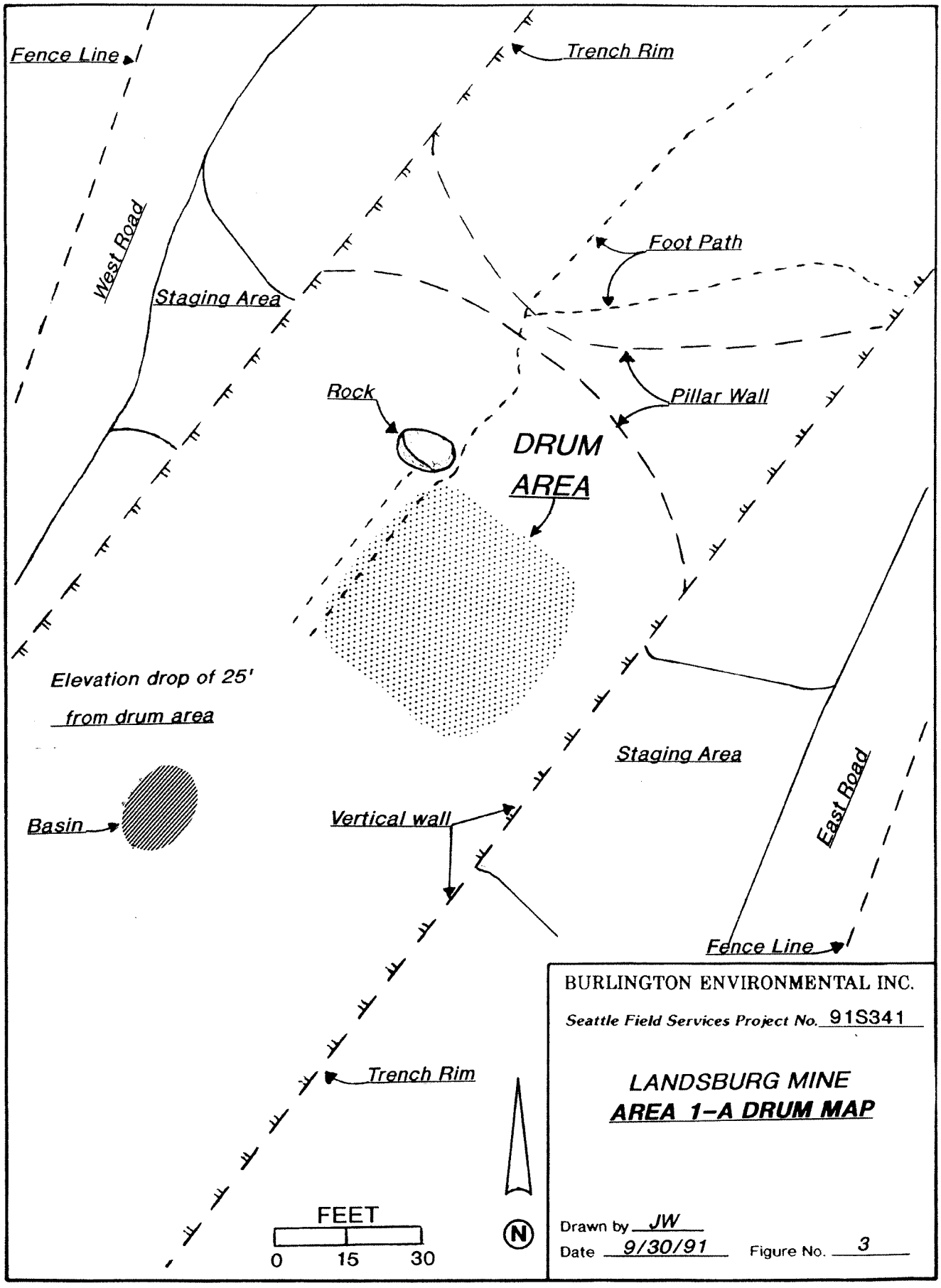
Most of the visible drums in the Landsburg Trench are located in Area 1A, approximately 500 feet southwest of Area 2 (see Figure 1). The top of the drum pile was about 25 to 30 feet below the east rim of the trench and extended down slope for 40 to 45 feet to the trench floor. The width of the pile along the trench wall was 40 feet (Figure 3). At the upper end of the pile, drums were piled or layered 2 to 3 high, and at the bottom, 4 to 5 high. All of the top layer of drums and part of the second had bullet holes or angular punctures made with a chisel or other sharp object. Inital assessment of the pile revealed that many of the drums were crushed or deformed, especially those near the bottom of the pile. About 10% of the drums contained liquids, the rest were sludgey solids.

The 30 ton crane was positioned above the pile on the east side of the trench for recovery operations. The crane operator was in radio communication with workers in the trench and an observer was stationed on the west side of the trench with a clear view of both the recovery workers and crane operator. Recovery operations began on August 29th.

The drum removal process was initiated by a visual assessment of each drum prior to overpacking. After assessment, each drum was lifted with the crane and placed into 85 gallon overpack drums. If copious liquids were present, they were transferred to new drums and removed. The overpacked drums were hoisted out of the trench and put on a flatbed truck then taken to the drum storage area. About 10% of the drums recovered from area 1A were placed in


Staging Area
"Stump Pile"
Trench Rim
"Pond Area"
Trench Bottom
Decon Area
N
0
10
20
feet
Explanation
Recovered Drums
Areas of Fill/Debris
(Sludge) Pond Area
BURLINGTON ENVIRONMENTAL INC.
Seattle Field Services Project No. 91S341
LANDSBURG MINE
AREA 2 DRUM MAP
Drawn by JW
Date 9/26/91
Figure No. 2-A


Staging Area
"Stump Pile"
Trench Rim
"Pond Area"
3'
4'
2'
1'
Trench Bottom
N
0
10
20
feet
Decon Area
Explanation
Sample Points/Depth
Areas of Fill/Debris
(Sludge) Pond Area
BURLINGTON ENVIRONMENTAL INC.
Seattle Field Services Project No. 91S341
LANDSBURG MINE
SAMPLE AREA/DEPTH
Drawn by JW
Date 9/26/91
Figure No. 2-B


Fence Line
Trench Rim
West Road
Staging Area
Foot Path
Rock
Pillar Wall
DRUM AREA
Elevation drop of 25'
from drum area
Staging Area
Basin
Vertical wall
East Road
Fence Line
Trench Rim
FEET
0 15 30
N
BURLINGTON ENVIRONMENTAL INC.
Seattle Field Services Project No. 91S341
LANDSBURG MINE
AREA 1-A DRUM MAP
Drawn by JW
Date 9/30/91
Figure No. 3

1 cubic yard bulk bags and removed because they were too flat or crushed to fit into overpack salvage drums.

A total of 103 drums were removed from Area 1A. This included an additional 50 drums authorized for removal by the PRP Group under a change order in early September. Ten of these were basically empty but contained some residues or coatings. Drum removal operations were completed on September 12th.

Drum Sampling

Sampling of drum contents was done at the drum storage area. After removing the lid from the overpack, a 1 inch hole was made in the top of the drum with a brass non-sparking brass punch. A glass tube was inserted to collect liquid samples. If the drum contained solids or sludges, the hole was enlarged to collect samples with an aluminum sampling scoop. Samples were placed in 16 ounce jars with teflon seals in the lid. Sample labels were affixed and the jars placed in coolers for transport to the lab.

Information regarding physical characteristics of the drum contents and volume was recorded on the drum recovery log at the time of sampling. The drum recovery log also included a description of the drum condition, its location, and an identifying number. Copies of the drum recovery logs are included in the Appendix.

Sludge sampling in Area 2

The "pond" site in Area 2 was sampled on September 12th (see Figure 2-B). Four 16 ounce samples were collected at varying depths to provide adequate material for overall characterization. Sample #1 was taken 1 foot deep, #2 at 2 feet, #3 at 3 feet, and #4 at 4 feet. These four samples were then composited into one sample that was submitted to the laboratory for analysis.

Sludge material in the "pond" appears to be paint waste, petroleum products, and resins. There are different layers in the material which suggests multiple episodes of dumping of various products. Core samples were collected with a hand auger to visually inspect the various layers of sludge. They range from light to dark brown with occasional black streaks and greenish tints. The depth of material is about 4 feet and the total volume is estimated to be between 65 and 70 cubic yards.

Site Reconnaissance

The trench area southwest of Area 1A was examined for other drum piles. The SHA report had indicated drums were present in this area (Area 1B) but none could be located. A

number of areas of fill material were present and are shown on Figure 1. These fill areas could potentially contain drums beneath the present surface. A "burn barrel" was found mixed with residential debris in one such fill area at the southerly end of Area 1B.

Demobilization

Site demobilization and sampling activities were completed by September 18th. Decon facilities, the storage container and portable toilet were removed from the site. Overpacked drums in the drum storage area were covered with a tarp. The site was secured from unauthorized entry by locking the gate in the cylone fence.

Analytical

The drum samples were submitted to Burlington Environmental's corporate laboratory for Classification and Characterization (C & C) analysis. This is a relatively inexpensive analysis to determine the physical parameters of a waste and whether or not it contains certain regulated substances that affect disposal options. The analysis is primarily used to prepare profiles for disposal at Burlington Environmental's TSD facilities. Copies of the C & C analysis reports are in the Appendix.

Of the 13 drums recovered in Area 2, one was empty (#12) and the remainder contained mostly green, brown, black, or red solids, half of which were burnable. Six drums contained some free liquids (1 to 50%). Four samples tested positive for hexavalent chrome, three for phenolics, three for chlorinated compounds, and four contained oxidizers. All of the samples were negative for cyanides and sulfides.

A total of 103 containers were recovered from Area 1A including one 50 gallon hot water tank that was cleaned and scrapped. An additional 4 drums of liquids were generated by transfering product from old to new drums. Of these 107 drums, 7 were empty, 42 contained solidified material, 34 contained both solids and liquids, 12 contained semi-solids or sludges, and 12 contained liquids. Product colors varied between black, brown, tan, red, yellow, amber, green, gray, and white.

Twenty one samples from Area 1A tested positive for oxidizers and 16 were positive for phenolic materials. Twenty six samples contained chlorinated solvents and 39 hexavalent chromium. No cyanides or sulfides were detected. Eighty two samples were burnable with flash points from less than 70^{o} to over 200^{o} F.

Drum Removal

On October 28th and 30th, 131 drums were loaded from the drum storage area and shipped on flatbed trucks to Burlington Environmental's Georgetown TSD facility for disposal. Besides the 115 drums actually recovered from the trench, there were 9 drums of PPE and related material, 3 drums of decon water, and 4 drums of liquids transferred into new containers during recovery operations in Area 1A. The shipments were made under Hazardous Waste Manifests Numbers 17375, 25418, 25420, and 25421, copies of which are in the Appendix.

Site Closure

During removal of the drums from the site in late October, it was noticed that about 4 feet of soil had slid down the side of the trench in area 1A above the drums exposing partially buried drums and covering others. Consequently, after removal of the drums, the permalon liner from the drum storage area was removed and placed over the partially exposed damaged drums still remaining. The liner was tied to tree stumps and anchored with sandbags to provide a secure cover protecting the remaining drums from rain over the winter months.

Drum Disposal

Upon arrival at Georgetown, the drums were logged in, inspected, and the contents volumetrically measured. A Fingerprint Analysis for final disposal was generated for each drum based upon the C & C analysis and other lab data. This information is shown on Table 3.

The disposal option used for each drum was the least expensive allowable by law and regulation. The materials were all disposed of by incineration or otherwise burned as fuels at RCRA facilities. Disposal costs are based upon the volume of material and Georgetown's current pricing. The materials designated for disposal were:

Solid Blend Fuels >5000 BTU/lb. - Cadence Cons
Straight incineration <5000 BTU/lb.- Rollins Cons
Mixed Wastes, < 1% solvents - Main Still (liquids)
- Rollins Cons (solids)
Mixed Solvents >5000 BTU/lb - Alternative Fuels
Oils >5000 BTU/lb. - Alternative Fuels
Emulsification >5000 BTU/lb.- Alternative Fuels

Empty drums were crushed and landfilled at Arlington, Oregon along with other non-burnable debris.

Following the C & C analyses, all the drum samples were split into two groups, burnable and non-burnable. Composited samples were made from each group, 9 of burnable material and 3 of non-burnable (see Table 1). These samples were analysed for total cadmium, chromium, and lead. These analyses found lead concentrations ranging from 1,000 ppm to 11,000 ppm, chromium from 660 to 4900 ppm, and cadmium from 1.5 to 22 ppm. The lead and chromium levels were above regulatory limits for land disposal. The metals laboratory reports can be found in the Appendix.

From the above analyses, four disposal profiles were prepared:

Profile # CP 49422 - RQ Waste Paint Related Material Combustible Liquid NA 1263 (D006, D007, D008, F002, F003, F005)

Profile # CP 49437 - RQ Waste Paint Related Material Flammable Liquid NA 1263 (D001, D006, D007, D008, F002, F003, F005)

Profile # CP 51718 - RQ Hazardous Waste Liquid N.O.S. ORM-E NA 9189 (F002, F003, F005)

Profile # CP 51719 - RQ Hazardous Waste Liquid N.O.S. ORM-E NA 9189 (D006, D007, D008)

A list of the drums included in each profile is given in Table 2.

The composited sludge sample taken from the "pond" area in Area 2 was analyzed and found to contain a variety of F-listed solvents, namely methylene chloride (1690 ppm), trichlorofluoromethane (299 ppm), 1,1,2-trichloro-trifluoroethane (216 ppm), 1,1,1-trichloroethane (317 ppm), trichloroethene (1530 ppm), toluene (141 ppm), ethylbenzene (270 ppm), and total xylenes (1320 ppm). In addition, the sample contained 67,000 ppm TPH and 4.9 ppm PCBs (Aroclor 1254). TCLP metals (D004-11) were all negative except for lead which was 0.84 ppm. A copy of the pond area sludge sample results is in the Appendix.

The sludge in the "pond" in Area 2 exceeds Method A Soil Cleanup Levels under the Washington State Model Toxics Control Act (WAC 173-340) for ethylbenzene (20 ppm), methylene chloride (0.5 ppm), PCBs (1 ppm), toluene (40 ppm), 1,1,1-trichloroethane (20 ppm), and total xylenes (20 ppm).

Burnable

Composite # B 1

Samples 2-A, 3-A, 4-A, 6-A, 7-A, 9-A, 10-A, 12-A, 14-A, 15-A, and 13-2.

Composite # B 2

Samples 17-A, 18-A, 19-A, 21-A, 22-A, 23-A, 1-2, 6-2, 8-2, 10-2, and 11-2.

Composite # B 3

Samples 24-A, 25-A, 27-A, 28-A, 29-A, 30-A, 33-A, 34-A, 35-A, and 37-A.

Composite # B 4

Samples 38-A, 39-A, 40-A, 41-A, 42-A, 43-A, 44-A, 45-A, 45-A, 47-A, and 50-A.

Composite # B 5

Samples 51-A, 56-A, 57-A, 58-A, 59-A, 60-A, 62-A, 64-A, 65-A, and 66-A.

Composite # B 6

Samples 67-A, 68-A, 69-A, 70-A, 71-A, 72-A, 73-A, 74-A, 75-A, and 76-A.

Composite # B 7

Samples 77-A, 78-A, 79-A, 80-A, 81-A, 82-A, 83-A, 84-A, 85-A, and 86-A.

Composite # B 8

Samples 87-A, 88-A, 90-A, 91-A, 92-A, 93-A, 94-A, and 95-A.

Composite # B 9

Samples 96-A, 97-A, 99-A, 102-A, 103-A, 55/56-B, 55/57/58-B and 69/72-B.

Note: Sample numbers with a hyphen and the number 2 (-2) are from Area 2. Those with a hyphen and the letter A (-A) are from Area 1A. Samples with slash marks (/) are liquids from old drums that were transferred into new drums.

Non-Burnable

Composite #N.B. 1

Samples 1-A, 8-A, 11-A, 13-A, 20-A, 2-2, 3-2, 4-2, 5-2, 7-2, and 9-2.

Composite #N.B. 2

Samples 26-A, 36-A, 48-A, 49-A, 53-A, 54-A, 61-A, & 89-A.

Composite #N.B. 3

Samples 91/95/96-B, 98-A, 100-A, 101-A, & XXX (Decon Water)

BURLINGTON ENVIRONMENTAL INC.

Seattle Field Services Project No. 91S341

Landsburg Mine Drum Removal Project

TABLE 1

Drum Samples Composited for Metals Analysis

Date *12/10/91*

Profile CP 49422

Area 1A Drums

2-A
3-A
6-A
7-A
15-A
17-A
18-A
19-A
21-A
23-A
25-A
27-A
29-A
30-A
33-A
34-A
35-A
36-A
37-A
38-A
39-A
40-A
41-A
43-A
44-A
45-A
47-A
51-A
56-A
55/56-B
55/57/58-B
57-A
58-A
60-A
62-2
65-A
66-A
68-A
70-A
71-A
74-A
75-A
76-A
77-A
82-A
83-A
84-A
85-A
86-A
90-A
91-A
93-A
94-A
95-A
96-A
97-A
100-A
102-A

Area 2 Drums

1-2
4-2
6-2
8-2
9-2
11-2

Total 64 Drums

Profile CP 49437

Area 1A Drums

9-A
10-A
12-A
14-A
22-A
24-A
24-A
28-A
42-A
50-A
59-A
64-A
67-A
69-A
69/72-B
72-A
73-A
78-A
79-A
80-A
81-A
87-A
88-A
92-A
99-A
101-A
103-A

Area 2 Drum

13-2

PPE 9 Drums

Total 36 Drums

Profile CP 51719

Area 1A Drums

1-A
5-A
8-A
11-A
13-A
20-A
26-A
31-A
32-A
46-A
48-A
49-A
52-A
53-A
54-A
55-A
61-A
63-A
89-A
91/95/96-B
98-A

Area 2 Drums

2-2
3-2
5-2
7-2

Total 25 Drums

Profile CP 51718

Area 1A Drum

4-A

Area 2 Drums

10-2
12-2

Decon Water 3 Drums

Total 6 Drums

BURLINGTON ENVIRONMENTAL INC.

Seattle Field Services Project No. 91S341

Landsburg Mine Drum Removal Project

TABLE 2

Disposal Profile Drum List

Date 12/10/91

GEORGETOWN LABORATORY REPORT

DATE: OCTOBER, 31, 1991
SUBJECT: FINGERPRINT ANALYSIS FOR FINAL DISPOSAL METHOD - LANDSBURG MINE
ANALYST: LOUIS LA ROSA, HECTOR SANCHEZ
MANIFEST # : 25421
WASTE RECEIPT # : 10492

PLANT#	DRUM #	HEAT OF COMBUSTION	FINAL DISPOSAL	COMPOSITION	VOLUME (GAL)
10492-01	1A-102	>5000 BTU/lb	MIXED SOLVENTS	10% SOLIDS	55
10492-02	1A-60	>5000 BTU/lb	MIXED SOLVENTS	50% SOLIDS	40
10492-03	1A-41	<1% SOLVENTS	MAIN STILL/ROLLINS CONS	30% SOLIDS	55
10492-04	1A-2	>5000 BTU/lb	CADENCE CONS	99% SOLIDS	15
10492-05	1A-37	>5000 BTU/lb	CADENCE CONS	50% SOLIDS	2
10492-06	1A-43	>5000 BTU/lb	CADENCE CONS	99% SOLIDS	5
10492-07	1A-19	>5000 BTU/lb	CADENCE CONS	100% SOLIDS	30
10492-08	1A-4	>5000 BTU/lb	CADENCE CONS	100% SOLIDS	10
10492-09	1A-44	>5000 BTU/lb	CADENCE CONS	99% SOLIDS	5
10492-10	1A-38	>5000 BTU/lb	CADENCE CONS	100% SOLIDS	45
10492-11	1A-35	>5000 BTU/lb	CADENCE CONS	99% SOLIDS	20
10492-12	1A-40	>5000 BTU/lb	CADENCE CONS	99% SOLIDS	10
10492-13	1A-45	>5000 BTU/lb	CADENCE CONS	99% SOLIDS	20
10492-14	1A-6	>5000 BTU/lb	CADENCE CONS	99% SOLIDS	5
10492-15	1A-21	>5000 BTU/lb	CADENCE CONS	99% SOLIDS	20
10492-16	2A-10	>5000 BTU/lb	CADENCE CONS	99% SOLIDS	30
10492-17	1A-36	<1% SOLVENTS	MAIN STILL/ROLLINS CONS	50% SOLIDS	20
10492-18	1A-29	>5000 BTU/lb	CADENCE CONS	100% SOLIDS	15
10492-19	1A-51	>5000 BTU/lb	CADENCE CONS	90% SOLIDS	55
10492-20	2A-9	<5000 BTU/lb	ROLLINS CONS	95% SOLIDS	40
10492-21	A2-8	>5000 BTU/lb	CADENCE CONS	100% SOLIDS	35
10492-22	1A-57	>5000 BTU/lb	CADENCE CONS	100% SOLIDS	40
10492-23	1A-84	>5000 BTU/lb	CADENCE CONS	100% SOLIDS	25
10492-24	1A-100	>5000 BTU/lb	CADENCE CONS	100% SOLIDS	40
10492-25	1A-56	>5000 BTU/lb	CADENCE CONS	100% SOLIDS	10
10492-26	2A-11	>5000 BTU/lb	CADENCE CONS	99% SOLIDS	25
10492-27	1A-93	>5000 BTU/lb	CADENCE CONS	99% SOLIDS	20
10492-28	1A-91	<5000 BTU/lb	ROLLINS CONS	90% SOLIDS	10
10492-29	1A-90	<5000 BTU/lb	ROLLINS CONS	100% SOLIDS	20
10492-30	1A-58	<5000 BTU/lb	ROLLINS CONS	99% SOLIDS	35
10492-31	1A-86	<5000 BTU/lb	ROLLINS CONS	100% SOLIDS	55
10492-32	1A-83	>5000 BTU/lb	CADENCE CONS	100% SOLIDS	20
10492-33	1A-96	<5000 BTU/lb	ROLLINS CONS	95% SOLIDS	25
10492-34	1A-85	>5000 BTU/lb	CADENCE CONS	100% SOLIDS	25
10492-35	1A-15	<5000 BTU/lb	ROLLINS CONS	100% SOLIDS	25
10492-36	1A-30	<5000 BTU/lb	ROLLINS CONS	100% SOLIDS	55
10492-37	2A-4	<5000 BTU/lb	ROLLINS CONS	99% SOLIDS	20
10492-38	1A-18	<5000 BTU/lb	ROLLINS CONS	100% SOLIDS	50
10492-39	1A-97	>5000 BTU/lb	CADENCE CONS	100% SOLIDS	45
10492-40	2A-6	<5000 BTU/lb	ROLLINS CONS	100% SOLIDS	30
10492-41	1A-94	<5000 BTU/lb	ROLLINS CONS	100% SOLIDS	45
10492-42	1A-47	<5000 BTU/lb	ROLLINS CONS	100% SOLIDS	50
10492-43	2A-1	<5000 BTU/lb	ROLLINS CONS	100% SOLIDS	30
10492-44	1A-17	<5000 BTU/lb	ROLLINS CONS	100% SOLIDS	45
10492-45	1A-25	>5000 BTU/lb	CADENCE CONS	100% SOLIDS	30
10492-46	1A-34	<5000 BTU/lb	ROLLINS CONS	95% SOLIDS	50
10492-47	1A-39	>5000 BTU/lb	CADENCE CONS	100% SOLIDS	55
10492-48	1A-33	<5000 BTU/lb	ROLLINS CONS	100% SOLIDS	30
10492-49	1A-27	<5000 BTU/lb	ROLLINS CONS	99% SOLIDS	30
10492-50	1A-23	<5000 BTU/lb	ROLLINS CONS	99% SOLIDS	15
10492-51	1A-3	<5000 BTU/lb	ROLLINS CONS	100% SOLIDS	5

NOTE: ALL THE ABOVE MATERIAL MEETS THE APPROPIATE PROFILE , WITH THE FOLLOWING EXCEPTIONS: DRUMS# 10492-01,02,03,17

GEORGETOWN LABORATORY REPORT

DATE: NOVEMBER 7, 1991
SUBJECT: FINGERPRINT ANALYSIS FOR FINAL DISPOSAL METHOD
MANIFEST#: 25418
WASTE RECEIPT#: 10493

PLANT#	DRUM #	HEAT OF COMBUSTION	FINAL DISPOSAL	COMPOSITION	VOLUME (GAL)
10493-01	1A-77	>5000 BTU/lb	CADENCE CONS	90% SOLIDS	30
10493-02	1A-75	<5000 BTU/lb	ROLLINS CONS	99% SOLIDS	55
10493-03	1A-66	<5000 BTU/lb	ROLLINS CONS	95% SOLIDS	55
10493-04	1A-68	>5000 BTU/lb	CADENCE CONS	80% SOLIDS	30
10493-05	1A-65	<5000 BTU/lb	ROLLINS CONS	100% SOLIDS	35
10493-06	1A-74	<5000 BTU/lb	ROLLINS CONS	100% SOLIDS	55
10493-07	1A-95	<5000 BTU/lb	ROLLINS CONS	95% SOLIDS	25
10493-08	1A-76	<5000 BTU/lb	ROLLINS CONS	100% SOLIDS	35
10493-09	1A-70	<1% SOLVENTS	MAIN STILL	100% LIQUID	55

NOTE: ALL THE ABOVE NOTED MATERIAL MEETS THE APPROPIATE PROFILES, WITH THE FOLLOWING EXCEPTIONS:

DRUM# 10493-09 CONTAINS 55 GALLONS OF LIQUID WITH <1% SOLVENTS.

BURLINGTON ENVIRONMENTAL INC.

Seattle Field Services Project No. 91S341

Landsburg Mine Drum Removal Project

TABLE 3

Georgetown Fingerprint Analyses

Waste Receipts 10492 and 10493

Date 12/10/91

GEORGETOWN LABORATORY REPORT

DATE: NOVEMBER 7, 1991
SUBJECT: FINGERPRINT ANALYSIS FOR FINAL DISPOSAL METHOD
MANIFEST#: 25420
WASTE RECEIPT#: 10516

PLANT#	DRUM #	HEAT OF COMBUSTION	FINAL DISPOSAL	COMPOSITION	VOLUME (GAL)
10516-01	1A-61	<5000 BTU/lb	ROLLINS CONS	100% SOLIDS	55
10516-02	1A-13	<5000 BTU/lb	ROLLINS CONS	99% SOLIDS	55
10516-03	1A-48	<5000 BTU/lb	ROLLINS CONS	99% SOLIDS	40
10516-04	1A-49	<5000 BTU/lb	ROLLINS CONS	100% SOLIDS	55
10516-05	1A-84	<5000 BTU/lb	ROLLINS CONS	99% SOLIDS	30
10516-06	1A-20	<5000 BTU/lb	ROLLINS CONS	85% SOLIDS	35
10516-07	1A-53	<5000 BTU/lb	ROLLINS CONS	90% SOLIDS	55
10516-08	1A-54	<5000 BTU/lb	ROLLINS CONS	80% SOLIDS	45
10516-09	2A-2	>5000 BTU/lb	CADENCE CONS	99% SOLIDS	2
10516-10	1A-98	<5000 BTU/lb	ROLLINS CONS	99% SOLIDS	50
10516-11	1A-89	>5000 BTU/lb	MIXED SOLVENTS	100% LIQUID	10
10516-12	2A-2	<5000 BTU/lb	ROLLINS CONS	99% SOLIDS	25
10516-13	2A-7	<5000 BTU/lb	ROLLINS CONS	99% SOLIDS	55
10516-14	1A-26	>5000 BTU/lb	CADENCE CONS	99% SOLIDS	30
10516-15	2A-3	<5000 BTU/lb	ROLLINS CONS	100% SOLIDS	30
10516-16	1A-1	<5000 BTU/lb	ROLLINS CONS	100% SOLIDS	25
10516-17	1A-11	<1% SOLVENTS	MAIN STILL	100% LIQUID	20
10516-18	XXX	<1% SOLVENTS	MAIN STILL	100% LIQUID	30
10516-19	XXX	<1% SOLVENTS	MAIN STILL	100% LIQUID	40
10516-20	XXX	<1% SOLVENTS	MAIN STILL	100% LIQUID	5
10516-21	18-91,95,96	<1% SOLVENTS	MAIN STILL	100% LIQUID	50
10516-22	18-55,57,58	>5000 BTU/lb	OILS	100% LIQUID	50
10516-23	18-55,56	>5000 BTU/lb	OILS	25% SOLIDS	50
10516-24	1A-7	>5000 BTU/lb	CADENCE CONS	95% SOLIDS	10
10516-26	1A-71	>5000 BTU/lb	MIXED SOLVENTS	50% SOLIDS	20
10516-27	1A-64	>5000 BTU/lb	CADENCE CONS	95% SOLIDS	25
10516-28	1A-10	>5000 BTU/lb	CADENCE CONS	95% SOLIDS	50
10516-29	1A-28	>5000 BTU/lb	CADENCE CONS	90% SOLIDS	40
10516-30	1A-12	>5000 BTU/lb	CADENCE CONS	90% SOLIDS	50
10516-31	1A-42	>5000 BTU/lb	CADENCE CONS	99% SOLIDS	45
10516-32	1A-81	>5000 BTU/lb	CADENCE CONS	99% SOLIDS	50
10516-33	1A-50	>5000 BTU/lb	CADENCE CONS	75% SOLIDS	55
10516-34	2A-13	>5000 BTU/lb	CADENCE CONS	100% SOLIDS	55
10516-35	1A-69	>5000 BTU/lb	MIXED SOLVENTS	50% SOLIDS	10
10516-36	1A-67	>5000 BTU/lb	CADENCE CONS	99% SOLIDS	20
10516-37	1A-101	>5000 BTU/lb	CADENCE CONS	99% SOLIDS	30
10516-38	1A-73	>5000 BTU/lb	CADENCE CONS	99% SOLIDS	55
10516-39	1A-99	>5000 BTU/lb	CADENCE CONS	80% SOLIDS	55
10516-40	1A-78	>5000 BTU/lb	CADENCE CONS	100% SOLIDS	30
10516-41	1A-103	>5000 BTU/lb	CADENCE CONS	99 % SOLIDS	55
10516-42	1A-14	>5000 BTU/lb	MIXED SOLVENTS	50% SOLIDS	50
10516-43	1A-80	>5000 BTU/lb	MIXED SOLVENTS	20% SOLIDS	40
10516-44	1A-79	>5000 BTU/lb	MIXED SOLVENTS	100% LIQUID	55
10516-45	1A-24	>5000 BTU/lb	MIXED SOLVENTS	50% SOLIDS	55
10516-46	1A-87	>5000 BTU/lb	MIXED SOLVENTS	50% SOLIDS	50
10516-47	1A-88	>5000 BTU/lb	MIXED SOLVENTS	50% SOLIDS	40
10516-48	1A-22	>5000 BTU/lb	EMULSIFICATION	90% SOLIDS	40
10516-49	1A-9	>5000 BTU/lb	EMULSIFICATION	50% SOLIDS	25
10516-50	1A-59	>5000 BTU/lb	CADENCE CONS	99% SOLIDS	40
10516-51	2A-69,72	>5000 BTU/lb	OILS	100% LIQUID	30
10516-52	1A-92	<5000 BTU/lb	ROLLINS INCINERATION	100% SOLIDS	50

GEORGETOWN LABORATORY REPORT

DATE: NOVEMBER 7, 1991
SUBJECT: FINGERPRINT ANALYSIS FOR FINAL DISPOSAL METHOD
MANIFEST#: 17375
WASTE RECEIPT#: 10515

PLANT#	DRUM #	HEAT OF COMBUSTION	FINAL DISPOSAL	COMPOSITION	VOLUME (GAL)
10515-10	1A-71	<5000 BTU/lb	ROLLINS CONS	100% SOLIDS	30
10515-11	1A-62	>5000 BTU/lb	CADENCE CONS	100% SOLIDS	5
10515-12	1A-82	>5000 BTU/lb	CADENCE CONS	100% SOLIDS	20
10515-13	1A-98	<5000 BTU/lb	ROLLINS CONS	99% SOLIDS	10
10515-14	1A-5	<5000 BTU/lb	ROLLINS CONS	100% SOLIDS	1
10515-15	1A-46	<5000 BTU/lb	ROLLINS CONS	100% SOLIDS	20
10515-16	1A-63	>5000 BTU/lb	CADENCE CONS	100% SOLIDS	5
10515-18	1A-52	<5000 BTU/lb	ROLLINS CONS	100% SOLIDS	5
10515-19	2A-12	<5000 BTU/lb	ROLLINS CONS	100% SOLIDS	1

NOTE: DRUMS# 10515-01 THRU 10515-09 CONTAIN PPE
DRUM# 10515-17 IS AN EMPTY CONTAINER

BURLINGTON ENVIRONMENTAL INC.

Seattle Field Services Project No. 91S341

Landsburg Mine Drum Removal Project

TABLE 3 (continued)

Georgetown Fingerprint Analyses

Waste Receipts 10515 and 10516

Date *12/10/91*

LANDSBURG/SIT 3.1.2
(See Agreed Order, SIT 8.5.1)

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Golder Associates

LANDSBURG PHASE I
REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS)
WORK PLAN

prepared by:

Golder Associates Inc. (GAI)

with assistance from:

SubTerra, Inc.

for the:

Landsburg Potentially Liable Party
Steering Committee (PLPSC)

November 18, 1992

923-1000.015

adjustments or choices as to the appropriate course for further investigations and analyses are required. These choices, like the remedy selection itself, involve the balancing of a wide variety of factors and the exercise of best professional judgement."

This RI/FS represents the first major investigation at the Landsburg Mine Site. As such, much uncertainty currently exists with regard to site conditions and the nature and extent of waste materials; and thus additional information and data are required to support an informed decision for the most appropriate remedy for this site.

1.4 RI/FS Approach

A phased approach to the RI/FS is proposed for the Landsburg Mine Site. A phased approach is appropriate to focus on obtaining data that is necessary to understand the risks posed by the site and to evaluate remedial measures. For a contaminated site to pose a risk there has to be a current or potential exposure pathway from the hazardous substance source to the receptor. Risk from the site can be eliminated or reduced by a remedial measure that modifies or eliminates links of the exposure pathway. These remedial alternatives can be categorized as source control remedial measures and/or off-site migration control remedial measures. The RI/FS will collect information and data for identifying and quantifying operative exposure pathways and for detailed evaluation of source control and off-site migration control remedial measures.

Potential Exposure Pathways: The conceptual model (GAI 1992) presented a preliminary risk assessment and identified potential operative exposure pathways. The major potential exposure pathways involve subsurface migration of waste to the groundwater and subsequent migration of potentially contaminated groundwater to either the accessible environment (surface water) or to local drinking water supply wells. Secondary potential exposure pathways were also identified and included potential volatilization of organic compounds to the atmosphere from near surface wastes within the trench and direct contact with surface soils and waste materials within the trench. Secondary importance is given to airborne and direct contact exposure pathways because the site is secured by a locked fence and because air monitoring conducted during a previous assessment and drum removal action did not reveal levels of concern (Ecology and Environment 1991; and Landsburg PLP Steering Committee 1991).

Each of these potential exposure pathways needs to be better understood and quantified during the RI/FS. During Phase I of the RI/FS each of these major and secondary potential exposure pathways will be initially investigated. Additional data will be obtained during Phase II RI/FS for adequate quantification of risk from these exposure pathways if necessary after implementation of Phase I.

Source Control Remedial Measures: Sources of contamination exist at the site, either as disposed drums of waste or as liquids that either escaped from the drums or were directly disposed as bulk liquids. These sources contain hazardous substances which are above

MTCA standards in adjacent soil and in nearby surface water in the trench. Exposed drums (116 drums removed out of an estimated 4500 drums) and exhumed materials obtained during the independent removal actions by the Landsburg PLP Steering Committee (1991) contained mainly solids and sludges, most liquids from these drums appear to have been released or possibly burnt during trench fires. Since disposal of much of the industrial waste drums appears to have occurred during 1969 to 1971 when the mine was active and dewatered, mobile liquid wastes may have infiltrated into all levels of the mine.

Currently, the extent of disposed waste both along the Rogers trench and vertically into the mine working is not known. The relative depth of burial may be important in evaluating the implementability of exhumation. The long term stability of the existing trench will need to be determined for safety concerns during remediation such as drum removal actions and for long-term integrity of remedial measures. Phase I RI/FS for the Landsburg Mine will attempt to locate drums within the trench by using remote geophysical sensing techniques.

Exhumation of drums and remaining waste materials from the Rogers Trench will be evaluated based on safety concerns due to subsidence or rim collapse, risks to the public health and the environment, and technical feasibility. Exhumation of drums and waste materials potentially could remove the majority of remaining sources within the trench from the site. The exhumed materials could be treated either by stabilizing or destructing the compounds of concern. If exhumation appears unsafe, technically infeasible or poses undue additional risks, remedial measures that contain the sources in-place, thus isolating them from the environment, could be appropriate. Since wastes were disposed within the trench, the site offers a potentially effective system for encapsulation at a sufficient depth for isolation. This approach would effectively eliminate exposures caused by direct contact and through the food chain. The isolation could be designed to minimize water infiltration to eliminate the potential for mobilizing waste material to the groundwater system.

Source characterization through a sampling and analysis program is not recommended for Phase I RI/FS. Sources, particularly residual wastes within drums, are expected to be highly heterogeneous in chemical constituents and a comprehensive sampling and analysis program would probably not adequately characterize the materials. A subsurface sampling program has risks of drum ruptures and escape of potentially flammable liquids and of subsidence from exploratory equipment. Environmental degradation and health and safety concerns increase significantly. If exhumation of wastes with or without subsequent treatment is selected as a source remedial measure, chemical characterization of sources during exhumation, instead of during the RI, is expected to provide more cost effective and more relevant information. Soils adjacent to exhumed drum burial areas could be sampled also during remediation for determining limits of waste materials and verification of residuals soils after remediation.

Off-Site Migration Control Remedial Measures: The major decision for determining off-site migration is whether the mined Rogers Seam can be considered a "Black Box" (the term "Black Box" is used to describe a undefined system where internal characterization is difficult) or would require characterization. As-built drawings of the mine workings exist

and have been summarized in the conceptual model (GAI 1992). Characterization of the nature and extent of contamination present within the mine workings may be technically difficult. Waste liquids may have infiltrated into the mine working following disposal, when the mine was active and dewatered. Solvents could have accumulated in cavities within the mine. When the mining operations were halted and the mine working became inundated, any lighter-than-water solvents, which were present, would float and be trapped within any remaining roof cavities. An attempt to characterize contamination within the mine may result in little benefit to refining the conceptual model and reducing uncertainty. An important consideration, if the decision is made to attempt mine characterization, is the difficulty in drilling and sealing boreholes through open workings and voids. An exploratory borehole program could open new avenues for contaminants to migrate within the mine.

The important issue is whether contaminants are migrating out of the "black box" at concentrations that are unacceptable or pose a risk to the public and environment. It is estimated that mine workings have several million cubic feet of coal, mixed shale and bedrock remaining as pillars and debris. Coal may have a high absorption affinity for organic compounds and would thus tend to bind and immobilize organic contaminants. Associated shales are similar to clays and have high absorptive properties for metals. It is possible that the contaminants within the mine are sufficiently immobilized and are not migrating from the "black box." In addition, the coal seams are expected to be the main pathway for groundwater flow (the sandstones and shales are tight with minor jointing and fracturing). The coal seam may limit the migration potential of organic contaminants within groundwater by adsorption. Samples of the Rogers Seam coal will be obtained and tested in a laboratory during Phase I RI/FS to confirm its absorptive capacity with respect to the contaminants of concern.

The Phase I RI/FS should initially focus on understanding the hydrogeologic system in the immediate vicinity of the Rogers seam mine workings. The current conceptual model envisions most groundwater flow occurring through the coal seams and not through the tight sandstones and shales. Faults are not believed to be major conduits for groundwater movement at the site. To confirm this model groundwater monitoring shall be established to evaluate three dimensioned hydraulic gradients within the site area. Monitoring of water quality will be emphasized within the Rogers Coal Seam at the north and south end of the mine workings. The monitoring system shall be capable of measuring vertical hydraulic heads within the coal seam at each end.

The Phase I monitoring system will also be capable of monitoring groundwater quality and horizontal head within the site area, possibly within the Landsburg seam and Frazier seam mines. This monitoring system would be capable of determining horizontal flow field through the bedrock. If contamination is observed or the conceptual hydrogeology is significantly different, additional monitoring wells may need to be installed during Phase II RI/FS to expand the monitoring capabilities of the hydrogeologic system.

If waste constituents are emanating from the mine at unacceptable concentrations and remedial action is warranted, several remedial options exist. One option involves groundwater pump and treat systems for hydraulic control and containment of

contaminant plumes. The amount of water that recharges the mine is important for evaluating hydraulic control and containment systems. Preliminary hydraulic testing of the aquifer is proposed for Phase I. If more detailed analysis of the aquifer hydraulic parameters are necessary, additional hydraulic tests could be conducted during Phase II RI/FS. Additional data on the available quantity of groundwater within the glacial outwash aquifer along the southern portion of the mine site may be required to estimate potential mine inflow for such systems. This information is best obtained during Phase II since off-site migration control measures may not be necessary. Another option could eliminate surface water inflow and meteoric water infiltration to the trench by surface water diversion and construction of impermeable caps. This option would minimize future mobilization of waste materials from percolating water to the water table. Surface water diversion and capping of waste materials could be operated in conjunction with groundwater hydraulic controls if warranted.

mentioned areas of the site, Areas 1 and 2 of Figure 2-2. Although drum removal activities were carefully conducted in overpacked drums, sampling of soils in these areas will provide additional information on residual contamination which may be present from handling waste materials either during disposal or removal activities

Therefore, areas at the site which require investigation to evaluate the significance of soil as a contaminant source at the site include the Rogers Trench rim (Access Areas 1 and 2 of Figure 2-2), and the surficial soils located downstream of the portals #2 and #3. In order to address these potential contaminant source issues at the site the following activities are planned for this task:

- Activity 7a - Sampling of Rogers Trench Rim Perimeter Soils
- Activity 7b - Sampling of Soils adjacent to and downstream of Portals #2 and #3.

Surface soil sample analyses under both activities will include the complete Total Analyte List (TAL) and Target Compound List (TCL) constituents using standard methods as defined in SW 846. The specific chemical analytes and analytical methods are presented in the QAPP. The results of the sample analysis will be statistically evaluated in a manner consistent with Ecology document "Statistical Guidance for Ecology Site Managers" (1992) to evaluate whether MTCA cleanup levels are exceeded.

2.7.1 Activity 7a - Sampling of Rogers Trench Rim Perimeter Soils

Sampling of the Rogers trench rim surface soils (Areas 1 and 2) is to be performed in the following manner:

- A total of 12 composite samples will be collected for analysis, of which four will be taken from Area 1, four from Area 2, and four will be taken from a control area. The control area is located in a portion of the site away from previous waste disposal/waste handling activities and is expected to be representative of background levels. The location of the background area is shown in Figure 2-2.
- In order to provide for adequate representation of the soil contaminant distributions in the trench rim area, each of the twelve samples will be comprised of a composite of four discrete sub-samples. The four sub-samples shall be taken from within well-defined zones which shall be chosen on the basis of specific criteria described below, and in consultation with Ecology.
- There shall be four zones defined in Area 1, four in Area 2 , and four zones defined in the background area. In Areas 1 and 2, three of the four zones shall consist of suspect areas defined on the basis of the following indicator criteria:

    (1) presence of vegetative stress

(2) presence of soil discoloration
(3) history of past storage and dumping

The three zones will be chosen to maximize the expression of these criteria. The fourth zone in each of the two areas shall consist of the entirety of Area 1 and 2 exclusive of the three zones meeting the criteria.
The four background zones shall be defined by dividing the background area into four equally sized quadrants.

- From within each of the twelve sampling zones, four subsamples shall be collected from the upper 3-6 inches of soil at discrete, random locations. The four subsamples will be composited (equal volumes of each subsample) into a single sample for chemical analysis.

2.7.2 Activity 7b - Sampling of Soils Adjacent to and Downstream of Portals #2 and #3

Sampling of surface soils from each of the two portal areas shall be performed as follows:

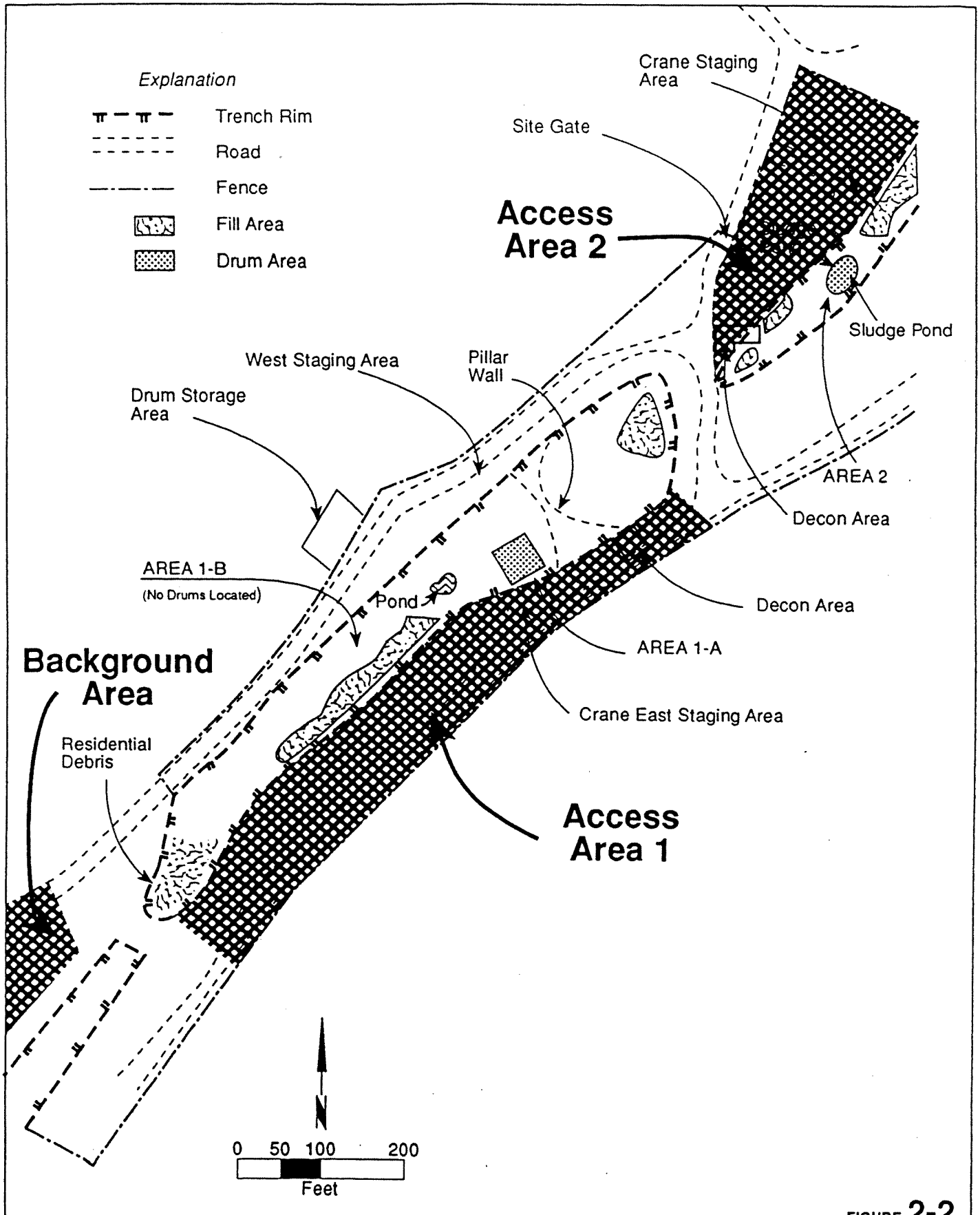
- A total of four samples will be collected from along the drainage at each portal area. The four samples will be collected at location spacings of approximately 50 feet. Each will consist of a discrete sample collected from the upper 3-6 inches of soil.

- In addition, two background samples will be collected from similar geologic medium at the site, if available. Likely background locations include possible mine drainages at the nearby Landsburg and/or Frazier seams. The locations for background sampling will be observed and evaluated during the site Geologic Reconnaissance to be performed under Task 13. Selection of appropriate sampling locations will be made in consultation with Ecology.

Sample collection and handling will involve strict Quality Assurance protocols and procedures. All sampling of surface soils under this task shall be performed in accordance with procedure TP-1.2-18, "Technical Procedure for Sampling Surface Soil for Chemical Analysis" as referenced in the QAPP.

Samples will be collected in properly cleaned bottles of appropriate volume and type as specified in the QAPP. All equipment utilized will be properly decontaminated. After filling, the bottles shall be immediately sealed, labelled and placed in a cooler maintained at 4° C. Samples shall be transported to the analytical facility under formal chain of custody documentation in sufficient time to conduct the requested analyses within the specified holding times in the QAPP.

Documentation for sampling shall include bottle labels, completion of Sample Integrity Data Sheets, Field Report Forms and Chain of Custody Records (Copies of these forms are included in the QAPP). Sample coolers shall be secured with chain of custody seals. Chain of custody shall be maintained in accordance with procedure TP-1.2-23, "Sample Handling



Source: Landsburg PLP Steering Committee 1991
Data Based Upon Brunton Compass/Tape Survey By EPB August 23/24, 1991

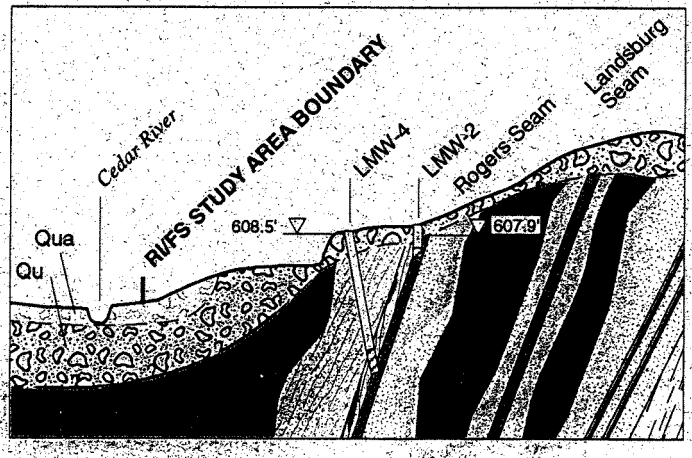
FIGURE **2-2**
SURFACE SOIL SAMPLING ALONG TOP OF TRENCH AREA
PHASE 1 RI/FS WP/WA

PROJECT NO. 923 1000.013 DRAWING NO. 28027 DATE 4/16/92 DRAWN BY TB

Golder Associates

Final Report to:
Washington State Department of Ecology

Remedial Investigation and Feasibility Study for the Landsburg Mine Site
Ravensdale, Washington
Volume I



February 1996

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Based on a combination of the geophysical and geodetic surveys, a surficial projection of the coal seams was established at each drill site. Utilizing the surface projections and recorded information on the dip of the coal seam and tunnel depth, drilling locations and estimated depths were then established for the seven monitoring wells.

Boreholes LMW-2 and LMW-4 were initially to be located just south of the Seattle Water Department's Lake Youngs Aqueduct (a 96-inch diameter water pipe with a 10-inch thick steel reinforced concrete wall). This location was originally chosen so that core samples of coal which had not been altered by mining activities could be obtained. The Seattle Water Department expressed concerns over the possibility of damage to the aqueduct from the weight of the drill rig and from ground vibrations produced during drilling. Upon further consultation with Seattle Water Department and with the approval of Ecology, LMW-2 and LMW-4 borehole locations were relocated to intercept the Rogers Seam at the northern most point downgradient of the mine workings but still on land owned by Landsburg PLP members (Figure 2-3).

2.7.2 Drilling and Well Installation

Burlington Environmental, Inc. of Groveport, Ohio was contracted by the PLP Group to perform all borehole drilling and well installation activities for the RI. All monitoring wells were drilled using the air rotary method with driven steel casing. Burlington utilized a Schramm T-660 rotary drilling rig and eight-inch diameter steel casing. The air compressor on the drill rig was equipped with an operable air filter to remove entrained hydrocarbons so the pressured air was of "D" breathable quality.

Prior to conducting any drilling operations, the rotary rig, drill rods, bits, and steel drive casing were decontaminated with a pressure washer and steam cleaner. The rig and tools were thoroughly decontaminated between each borehole drilling operation, and prior to demobilization from the site. Decontamination activities were conducted within the confines of a bermed plastic-lined decontamination area (Figure 2-13). Decontamination water was collected and stored in labeled 55-gallon Department of Transportation approved drums.

After decontamination, the air rotary rig was set up at each site using levels to ensure a stable, plumb borehole. Boreholes LMW-4 and LMW-7 were drilled at an angle (20 degrees off vertical) to aid in the intersection of the coal seam at depth. All other boreholes were drilled vertically. Drilling consisted of driving an eight-inch steel casing behind a 7 7/8-inch tricone bit until consolidated material was reached. The purpose of the steel casing was to maintain the open borehole in the unconsolidated soils and to channel all return circulation and cuttings through the casing to a cyclone, via a diverter and flexible hose. After setting the casing, drilling continued in the open borehole to depth by 7 7/8-inch tricone bit or 7 7/8-inch downhole hammer with button bit (dependent on drilling conditions). During drilling, grab samples of the encountered formation(s) were collected at five foot intervals for geologic logging and interpretation.

Landsburg Mine Site Cleanup Update

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Site Study and Evaluation of Cleanup Alternatives Complete

Public Comment Period and Public Meeting Scheduled

The Washington State Department of Ecology (Ecology) has prepared this fact sheet to update you on the environmental investigation taking place at the Landsburg Mine in Ravensdale, Washington. We also want to make sure you're aware of opportunities to give us your input during the cleanup process.

Report Available for Public Review

The final report on the environmental investigations conducted at the Landsburg Mine Site is now available for public review and comment. The report, called the Remedial Investigation/Feasibility Study Report, describes the nature and extent of contamination at the Site and evaluates alternatives for cleanup. The report is now available for review at the locations listed in the box on the right.

Ecology is currently seeking comments from the public on the findings of the investigations and the alternatives being considered for cleanup. The Comment Period will run from *March 13 - April 12.* Comments may be submitted in writing by mailing them to the address listed on the right, or may be given at a public meeting which will be held on March 27, 1996.

At the public meeting the information in the report will be summarized and the public will be invited to comment.

Public Meeting

March 27, 1996
7 - 9 pm
Tahoma Jr. High Auditorium
24425 SE 216th Way
Maple Valley, WA

At this time, Ecology is also seeking comments on a proposed amendment to the legal agreement between Ecology and the Landsburg Mine Site Potentially Liable Persons (PLPs) Group regarding the site investigations. The amendment is available at the locations listed on the right and its contents are summarized near the end of this fact sheet.

Site Investigation Findings

Soil and Remaining Drums

The results of the Remedial Investigation indicate that chemicals associated with the prior waste disposal activities at the site do not appear to be exiting the mine. Chemicals associated with the waste were found, but only in the soils in the area where waste disposal occurred. The levels of chemicals detected outside of the mine trench are consistent with typical background levels in the area.

Historical information indicates much of the waste disposed of in the trench may have

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March 1996

Review Documents at:

Maple Valley Library
23730 Maple Valley Hwy
Maple Valley, WA 98038

Department of Ecology
Northwest Regional Office
3190 160th Avenue S.E.
Bellevue, WA 98008-5452
(206) 649-7190

Send Comments to:

David L. South
Site Manager
Department of Ecology
3190 160th Avenue S.E.
Bellevue, WA 98008-5452
(206) 649-7200

Questions?

Call: Marianne Deppman
Department of Ecology
Public Involvement Specialist
(206) 649-7254

For special accommodation or language translation needs, call Marianne at the number above or at (206) 649-4259 (TDD)

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Publication No. 96-603

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either been consumed by fires which occurred during disposal, or may have already leaked from drums due to drum rupture or bullet holes. Drums remaining in the trench are buried by land-clearing and construction debris and earthen fill.

Wastes remaining in the trench could include some intact and partially intact drums buried beneath the trench bottom surface at some depth. However, based on observations during the removal of the accessible drums, the majority of the drums have probably already ruptured or deteriorated in some manner.

Ground water

Extensive sampling of private wells in the vicinity of the mine and of wells installed specifically for the investigation indicate that the wastes disposed of in the mine are not impacting the ground water at this time.

Ground water represents the most probable potential pathway by which waste may leave the mine. Waste present in the trench is believed to be confined to the northern half of the site. Ground water flow beneath this portion of the site is to the north through the mined out and highly permeable Rogers Seam.

Future ground water monitoring activities will focus on detecting potential releases from the north end of the mine. The chance of a discharge occurring at the southern end is unlikely given the direction of ground water flow and the absence of waste in this portion of the mine.

Once exiting the site, contaminants leaving the northern end of the mine would flow primarily to the north and northeast towards the Cedar River, consistent with the local ground surface topography. No drinking water wells are currently located along this primary path of ground water flow. Two monitoring wells were installed along this probable pathway during the site investigation. Neither showed evidence of contamination. These two wells will likely serve as ground water monitoring points during future site activities.

It is also possible that some ground water flow could occur to the northwest within the glacial outwash deposits located to the north of the mine. If ground water were to flow in this direction, potential receptors would include the wells located to the northwest of the mine portal located along the Summit-Landsburg Road. The closest well is approximately 1,500 feet away from the trench. It is not likely that ground water would flow to these wells given the strong topographic gradient towards the Cedar River.

Preferred Cleanup Alternative

Based on the information in the Remedial Investigation Report, nine potential cleanup options were evaluated for this site. The options ranged from no action, or leaving the site in its current state with no future monitoring, to excavating and removing all remaining waste and contaminated soil at the site.

After several screenings based on criteria specified in the Model Toxics Control Act, the Remedial Investigation/Feasibility Study indicates the preferred cleanup alternative for the site is to leave the remaining waste in place and backfill and grade the area of the trench where waste disposal occurred. The backfilled area would then be covered with a low-permeability cap made of compacted soil. This cap design will minimize the amount of water infiltrating the waste and thus minimize the potential for future impacts to ground water. This alternative also includes continued ground water monitoring, institutional controls to limit access to the site and periodic maintenance.

Amendment of Agreed Order

The original Agreed Order between Ecology and the Potentially Liable Persons (PLPs, listed at the end of this fact sheet) provided for conducting further investigations at the site if necessary in order to select a cleanup alternative for the site. However, the information gathered during the first phase of the investigation was sufficient to identify and evaluate cleanup

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alternatives. The amendment to the Agreed Order simply indicates that additional investigations are not necessary and that adequate information was obtained during the first phase of the study.

What Happens Next?

After receiving and considering public comment on the Remedial Investigation/Feasibility Study Report and the Amendment to the Agreed Order, Ecology will select a cleanup alternative for the site. Ecology will then prepare a Cleanup Action Plan (CAP) describing in detail the cleanup alternative selected. Ecology and the PLPs will negotiate a legal document (Agreed Order or Consent Decree) to govern the CAP implementation. The public will have an opportunity to comment on the CAP and on the legal document before cleanup work begins.

Development of a CAP, negotiating a legal document, and obtaining public comment usually takes between six and 12 months. If all goes well, field activities for the cleanup at the site may begin as early as Spring 1997.

Questions

If you have questions, feel free to call either Marianne Deppman, Ecology's Public Involvement Specialist, at (206) 649-7254, or David L. South, Ecology's Site Manager for the Landsburg Mine Site, at (206) 649-7200. Of course, please feel free to bring any questions to the public meeting.

Site Background

The Landsburg Mine Site is a former underground coal mine located approximately 1.5 miles northwest of Ravensdale in southeast King County. The Cedar River passes within approximately 500 feet of the site to the north. The mine site occupies property owned by Palmer Coking Coal Company and the Plum Creek Timber Company, L.P.. Coal mining began along the Landsburg coal seam in the 1940's. In 1959, when the Landsburg seam was exhausted, mining shifted to the Rogers seam and continued there until 1975.

Underground caving methods were used to extract the coal from the Rogers Seam. These methods resulted in a subsidence trench at the ground surface. This trench is roughly three-quarters of a mile long, 20 to 60 feet deep and 60 to 100 feet wide.

During the late 1960s and early 1970s, the northern part of the trench was used as a disposal site for a variety of industrial wastes. The wastes were either contained in barrels or were drained from tanker trucks. Records indicate that about 4,500 drums and 200,000 gallons of oily waste water and sludges were disposed of in this portion of the trench. Samples taken from recovered drums indicate that this material consisted of a wide range of organic and inorganic industrial waste, including paint-waste, PCBs, cyanide, metals and oily sludge. Disposal of land-clearing debris and construction debris in the trench continued until the early 1980s.

In 1991 Ecology designated the mine site a high priority for cleanup. In late 1991, at Ecology's request, four of the PLPs removed the most accessible drums from the trench and constructed a fence to restrict access to the site. Following removal of the drums, Ecology and the PLPs began negotiations for a Remedial Investigation/Feasibility Study. The results of this study are now available for public review and comment.

The Landsburg Mine Site PLP Group is the group of companies responsible for addressing the environmental issues at the Landsburg Mine Site. Collectively these companies are known as the "Potentially Liable Persons" or PLPs. The PLPs are: Browning-Ferris Industries, Philip Environmental (formerly known as Burlington Environmental), Burlington Northern Railroad, PACCAR, Palmer Coking Coal Company, Plum Creek Timber and Time Oil.

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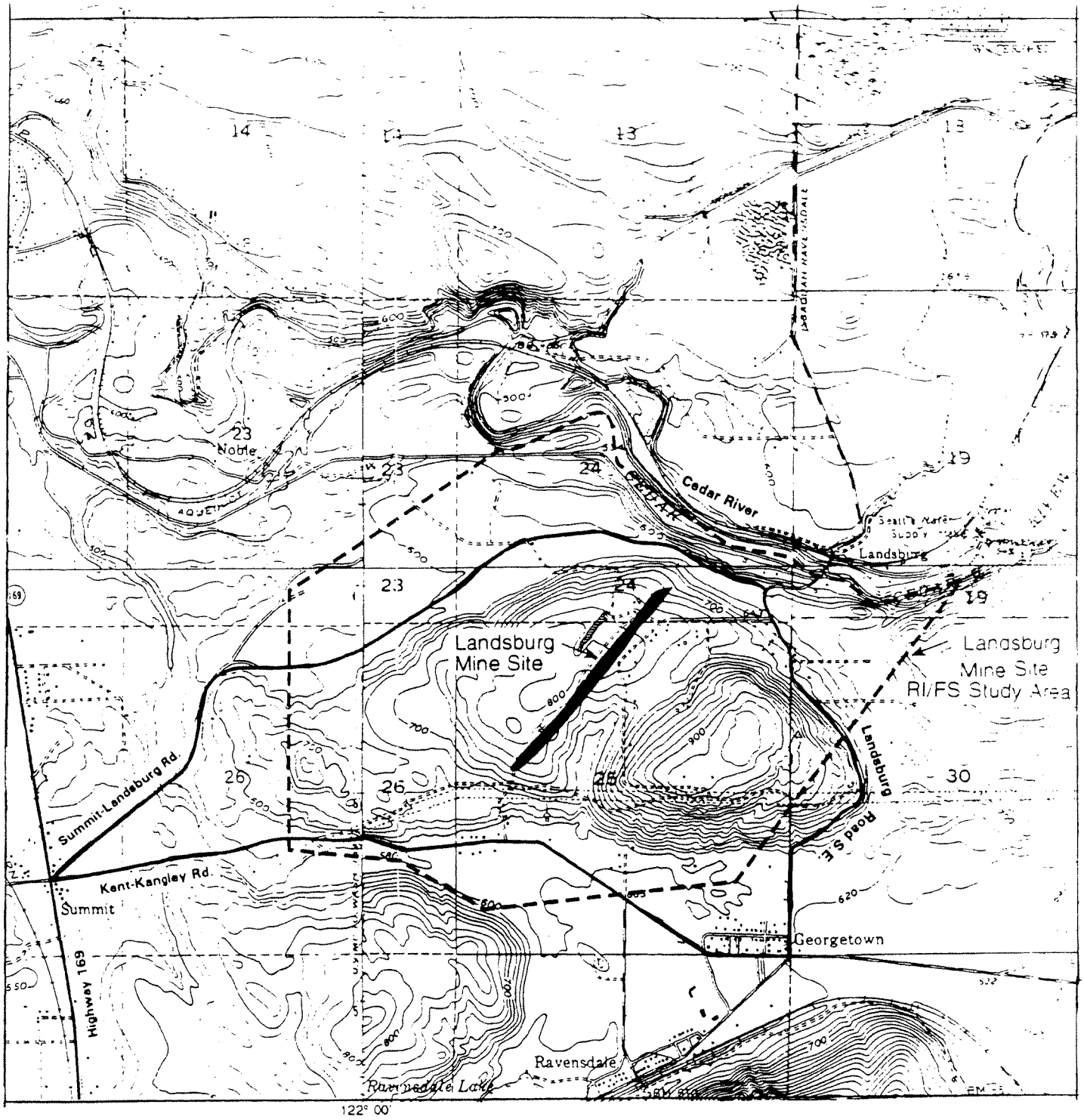

Approximate scale 2 1/4 inches = 1 mile

Landsburg /SIT 7.14

Responsiveness Summary for Public Comments on the Remedial Investigation and Feasibility Study for the Landsburg Mine Site

November 1996

As noted in the RI/FS, the vast majority of drums and liquid waste disposal occurred from 1969 - 1971. It should be noted that mining activities continued during this period and for approximately four to five years after the dumping had stopped (underground coal mining on the Rogers Seam continued until 1975), and throughout that time miners even at the lowest levels of the mine did not see evidence of waste materials migrating to the south.

2 c. The waste within the Landsburg trench is confined to the northern half of the trench. It is correct that waste may have escaped the northern half of the Landsburg trench in the past via groundwater discharge to the north, but no migration of waste is occurring now. With respect to the waste disposal area on the south end of the Landsburg seam, there are no records indicating that any hazardous materials were ever disposed there. Please see response to comment #2a.

2 d. The two accessible Rogers coal seam mine portals (portal #2 and portal # 3) were closed by blasting and grading. These closed portals were located by geodetic and geophysical surveying conducted during the RI. Sediment/soil, surface water discharge and groundwater in the vicinity of these portals was sampled as part of the RI and the results are presented in the Final RI/FS document.

2 e. No additional openings are available for sampling. Portal #1 does not exist because it was collapsed within the mine surface subsidence trench.

2 f / g. The Department of Ecology recognizes that it is often difficult to know the exact history of waste disposal at any site. However, both the Department of Ecology and the Landsburg PLP Group have gathered a significant amount of information about disposal activities at the Landsburg Mine site. The historic records of the Palmer Coking Coal Company and various government agencies provide a great amount of detail. (For example, review of the Pollution Control Hearings Board file revealed that the disposal incident in 1978 did not impact groundwater and the case was dismissed). Interviews of former employees of the site provided even more information. The Department of Ecology believes that enough information is available to allow a decision to be made about remedying the site.

Regardless of the information available, the remedy at the site will be protective because it conservatively assumes that waste remains in the mine workings. The remedy therefore will provide for a low-permeability cap to prevent precipitation from reaching any waste, and will include both a long-term monitoring plan and a contingency plan for actions to be taken should long-term monitoring indicate waste begins exiting the mine. These measures will protect against the release of hazardous substances off of the site, no matter what kinds of waste might remain in the mine.

ITEM #3.
Letter from Ms. Kathleen J. Toensjost and Mr. Ralph F. Toensjost
Ravensdale, Washington
dated: April 6, 1996

3 a. Ecology will select a cleanup remedy according to criteria specified in regulation. While complete removal of any remaining waste would be the most permanent solution in the long-term, the difficulty of removal presents short-term hazards both with respect to a potentially rapid release of relatively large quantities of hazardous substances due to disturbance during recovery and with respect to hazards to cleanup workers. Complete removal is complicated by not knowing, and having no way of knowing, the nature and quantity of hazardous substances left to be removed. In light of not finding any contamination in groundwater leaving the site during the RI/FS, a major excavation and recovery operation is unlikely to be warranted. Ecology plans on approaching the site by monitoring all exposure pathways to ensure that, should any waste be detected, measures can be taken to prevent it from leaving the mine property. If waste is detected in the future, we will be in a much better position to design specific remedial actions.

3 b. Palmer Coking Coal Company's records are believed to be fairly reliable in terms of the quantities of material disposed in the trench.In any case, knowledge of the precise number of drums placed or gallons of waste deposited in the trench is not necessary because the pathways for potential chemical migration out of the mine have been adequately characterized and will be monitored during long-term monitoring of the site through a system of wells that will provide early detection of a release. In effect, Ecology does not plan on selecting a remedy which depends upon knowlege of past events.

With regard to the 162,600 gallons of liquid, there is no reference to solvents. It is believed that this liquid was primarily water with some mixed contaminants.

With regard to the 50,000 barrel figure cited in the Valley Daily News article of September 5, 1991, this was a very early estimate of the potential maximum amount of barrels made prior to reviewing records of operation. Record review indicates 4,563 barrels were disposed of in the trench. Again, while we can never be sure that review of old records account for every barrel, Ecology will select a remedy that does not depend upon past knowledge of the amount of waste disposed.

3 c. The geophysical work confirmed that zone 2 (the accessible northern portion of the trench used for waste disposal) contains a large concentration of magnetic anomalies. Based on the high density and magnitude of these anomalies, there is probably a significant concentration of ferrous debris located below the surface. This debris, based on the history of the site, probably consists principally of rusted and damaged steel 55-gallon drums.

ITEM #6.
Letter from Mr. Don E. Wickstrom
Director of Public Works
City of Kent
dated: April 25, 1996

6 a. The Department of Ecology is sensitive to the City of Kent's concern for their water supply, as is the Landsburg Mine site PLP Group. This concern has expressed itself in the RI/FS through a conservative approach to the proposed remediation and monitoring programs at the Landsburg Mine site. Information collected to date indicates that waste was not placed in the southern portion of the trench and that the water flow in the trench (and certainly that portion of the trench overlain by waste) is primarily to the north. Despite this the monitoring program (the final version will be presented in the Cleanup Action Plan) will monitor both ends of the trench using existing wells and will provide for a contingency remediation plan in the event that contaminants are detected.

6 b-f. It is acknowledged there is waste in the source area. The methodology for conducting the RI, however, focused on characterizing potential pathways and the nature of chemicals exiting the mine rather than the specific contents of the mine itself. This approach was fundamental to the RI because, as discussed in the Work Plan, the waste materials present in the trench would be very difficlut to completely characterize due to dangers and hazards associated with drilling and sampling in the subsidence trench, the highly heterogeneous nature of "landfilled" material, and the complexity of the collapsed Landsburg Mine. As long as the relevant pathways of chemicals potentially exiting the mine are adequately characterized and monitored for early warning of a release, evaluation of remedial approach is not compromised by incomplete characterization of the waste.

6 g. Please see response to Comment #2 a (from Mr. Greg Wingard).

6 h, j-m. It is acknowledged that there are a number of possible scenarios and that other scenarios beyond those presented in the RI may also be applicable. The four which were postulated in the RI were presented as potential scenarios which may have contributed to the attenuation of wastes and to help explain the observed lack of chemicals in groundwater. The remedial measures evaluated in the FS, however, account for the possibility that waste may remain. In fact, the FS conservatively assumes that a significant volume of waste is present.

6 i. It is agreed that there are other possible scenarios, such as the contaminants not yet having migrated to the mine portal discharge points. However, based on the site hydrogeologic model developed from field investigations and discussions with former miners regarding water flow in the mine, the site's monitoring wells are located in the most direct pathways for early detection monitoring. It is possible at any site using a containment remedy

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May 23, 1997

Our ref: 923-1000.R310

City of Kent
220 4th Avenue South
Kent, Washington 98032-5895

ATTENTION: Mr. Don E. Wickstrom, P.E., Director of Public Works

RE: RESPONSE TO CITY OF KENT LETTER DATED MARCH 17, 1997
CONCERNING LANDSBURG MINE SITE REMEDIATION PROJECT

Dear Mr. Wickstrom:

This letter has been prepared for the Landsburg Mine Site PLP Group (Group). The Group appreciates this opportunity for further discussion pertaining to the City of Kent's (City) letter of March 17, 1997. Several of these issues were also discussed in our meeting with you and your consultants on March 20, 1997.

Based on our discussions, the Group is prepared to consider providing the Washington Department of Ecology (Ecology) and the City additional assurances in the remedial actions and compliance monitoring for the Landsburg Mine Site. These additional assurances include:

- Incorporate into the design of the cap in the north portions of the mine site, increased run-off for rainfall (domed cap) whereby maximum practical reduction of infiltration is achieved.
- Design surface diversions of overland flow in the south portion of the mine site to prevent surface water from adjacent land from entering the southern trenches. Diversion of surface waters will significantly reduce the amount of infiltration and recharge of water to the mine from the southern subsidence trenches while maintaining the existing hydrologic regime which is protective of the City's watershed.
- Monitor groundwater for a 30 year time period instead of the proposed 20 year period.
- Monitor the south end at LMW-3, LMW-5 and the Portal #3 discharges in addition to the monitoring effort in the north end.
- Implement an Interim Groundwater Monitoring Program immediately until start-up of remedial actions.

- Include a detailed contingent Groundwater Containment/Treatment Plan which is adaptable to both the north and south ends of the mine and is capable of treating a wide variety of potential contaminants.
- Development of a Remedial Action Consent Decree with Ecology which demonstrates the Group's commitment to implement actions required under the Cleanup Action Plan.

However, after careful reevaluation and discussion, the Group disagrees with the technical merits of the City's request to cap the entire mine site with a lower permeability (10^{-7}) cap. The following information is provided to facilitate a better mutual understanding of the key technical issues related specifically to the lower permeability cap and the request to cap the entire site, as well as details of specific additional assurances.

1.0 CAPPING

Since water movement within the mine is germane to capping issues, the Group would like to initially address water balances at the site before discussing capping issues.

1.1 Water Balance

The City raised the possibility that most of the mine water discharges to the south and that water discharges toward the north appear minimal. An initial review of water flows measured at Portal #3 at the south end of the mine has led some to believe that a significant portion of the mine water may be discharging to the south. The City has also postulated that the mine water divide may be positioned under the waste disposal area within the northern half of the site. The following discussion evaluates the City's concerns in more detail.

1.1.1 Water Flow into the Mine

Water enters the mine (mine water recharge) from direct infiltration of water entering the mine subsidence trenches. Water entering the subsidence trenches are from two origins: (1) direct rainfall into the trenches; and (2) surface overland flow into the trenches. The current amount of water infiltrating and recharging the mine is difficult to accurately determine.

The HELP modeling performed and reported in the Landsburg Remedial Investigation/ Feasibility Study (RI/FS) Report estimates that these two sources of mine water recharge contribute about equal amounts of water. Although, only the northern half of the mine (132,000 ft^2 of north trench area) was modeled, the average rate of mine water recharge is currently 13 gpm from the north trenches. A reasonable assumption is that the south half of the mine will have roughly the same amount of recharge as the north half (south trench area is roughly equal to the north half). The entire total mine water recharge would be estimated to be about 26 gpm which is consistent with the historical 30 to 40 gpm of water pumped from the mine for dewatering during active mining operations.

Some water could enter the mine horizontally through the bedrock when it was dewatered but miners did not report observing any sizable seeps entering the mine through fractures. Therefore, the Group believes that mine recharge is currently about 26 gpm.

1.1.2 Portal #2/North Mine Groundwater Discharges

The City emphasized that water movement and flow was not observed at Portal #2 (north portal) compared to Portal #3 (south portal). The water level in Portal #2 at the north end of the Landsburg Mine has been observed to fluctuate depending on the season and frequency of recent heavy rain events. However, there does not appear to be any evidence of past surface drainage from Portal #2 and Portal #2 was not observed to overflow and drain overland during the multi-season remedial investigation.

Water movement at Portal #2 is subterrain and the pond (at Portal #2) represents a depression from subsidence where the local topography intersects the mine water table. This depression is above the valley gravels and does not receive water from the gravel aquifer as observed at Portal #3. The mechanism for drainage from Portal #2 is through a surface excavated trench that was subsequently backfilled with gravel. The location of this trench is shown on Figure 1 and also as Photo 1A on Photograph Plate 1. A very limited surface mining operation was conducted on the subcrop of the Rogers coal seam between Portal #2 and the Summit-Landsburg Road. A trench following the vertical coal seam to a depth of approximately 25 feet was excavated and then backfilled with surface gravels and excavated materials. This trench and the surrounding gravels act as a permeable drain discharging to numerous seeps, springs and pools along the gravel covered slopes of the Cedar River valley. Significant outflows have been observed in the wet season. The groundwater flow from the north end of the Rogers coal seam (Landsburg Mine) appears to fan out through the constructed road backfill and glaciofluvial gravels and emerges as numerous small seeps and pools on the side of the Cedar River valley as shown on Figure 1. The City of Seattle had to install anti-erosion concrete pads and ditches to divert the significant quantity of water through culverts under the pipeline road in specific areas as shown in Photo 2b on Photographic Plate 2.

1.1.3 Portal #3 Discharges

The City postulates that most of the mine water drains to the south as observed by flow rates associated with Portal #3. Surface water emanating in the vicinity of the Roger's Portal #3 actually results from two primary sources and one potential source:

1. Surface water flowing overland directly into the Portal #3 area (actually witnessed by the City during the site visit on February 10, 1997)
2. Groundwater flow from the permeable and shallow gravel outwash aquifer surrounding Portal #3.
3. Groundwater possibly from the Rogers coal seam through the inclined shaft to Portal #3.

Golder believes the average flow of surface water (about 18 gpm measured at the Portal seep area) could be mostly or entirely from the first two sources mentioned above. Figure 2 shows the approximate area in which surface overland flow and local shallow gravel aquifer could supply water to the Portal #3 area. The collection basin totals approximately 1 million square feet (23 acres). With an average annual rainfall of 50 inches, the amount of water precipitating on this area totals over 4 million cubic feet per year (60 gpm). The amount of the evapotranspiration is unknown and would reduce this number, but the potential for this drainage area to supply the majority or all of the observed surface water flow around Portal #3 is probable.

It is possible to conclude that no mine water actually discharges to Portal #3. Figure 3 illustrates potential mine water table configurations based on the observed water level measurements at monitor wells LMW - 1, 2, 3, 4 and 5. The most straight forward and obvious depiction is Figure 3a where the hydraulic gradient between all measured water levels is linear and all groundwater within the mine migrates from the south to the north (no mine water discharging at Portal #3). In this scenario, Portal #3 seep area is not only discharging groundwater from the surrounding gravel aquifer but is actually recharging water to the mine from the above gravel aquifer. Given the lower elevation and more substantial discharge zone of the Cedar River, the mine and coal seam could act as a conduit for transporting waters from the Portal #3 seep area north towards Portal #2. It is important to note the fact that the gradients north and south of LMW-1 are equal is further evidence of a consistent hydraulic gradient to the north.

Because iron precipitate staining is observed on the surface at Portal #3, Golder also believes that it is possible that some mine water may be discharging at Portal #3 (illustrated in
Figure 3b). However, the chemistry of Portal #3 water actually has higher iron content than the coal seam waters from monitoring wells. The entire collapse zone around Portal #3 probably consists of much coal mine waste refuse (the slope and portal were blasted shut and filled with loose coal/shale material) and iron debris (rails, spikes, pipe and sheet metal were all present in the slope area) from mining operations which could affect groundwater quality in the shallow gravel aquifer to behave characteristically like coal mine/seam water.

The City's consultants have postulated that the indicated mine water divide may be positioned under the waste disposal trenches within the northern half of the site. Figure 3c illustrates the configuration of the water table necessary to accommodate this hypothesis that the mine water divide may be positioned under the waste disposal areas within the north half of the site. As can be seen in Figure 3c a very steep hydraulic gradient would have to exist between LMW-1 and the south end of the waste disposal zone (Trench 8 as identified in the RI/FS report). Hydrogeological conditions which could effect such a steep gradient would have to include extreme amounts of infiltration within Trench #8 and/or extremely low hydraulic conductivity of the mine aquifer just south of the rock bridge (below the Trench 8 zone). The contrast in either the infiltration or hydraulic conductivity in the Trench 8 zone are not indicated by site observations or mining records (see Figure 3-9 in RI/FS report). The mine had major horizontal drifts and collapsing/fragmentation of the coal seam throughout the north half of the mine. A

small surface pond does seasonably exist within Trench 8 and Trench 9 on the north half of the site but three ponds exist within the southern half of the mine subsidence trenches (two of these ponds are significantly larger than the ponds in Trench 8 and 9). Ponding may suggest more infiltration potentially occurring under trenches in the south half of the site where wastes were not disposed.

Surface drainage areas (see Figure 8-3 in RI/FS report) are not significantly different along the northern portions of the mine site to suggest extreme infiltration differences. In conclusion, a mine water table configuration as illustrated in Figure 3c is not supported by, nor expected based on available information.

In summary, Golder believes all available information and principles of hydrogeology provide clear indications that the majority if not all of the mine water migrates to the north and ultimately discharges to the Cedar River. Extreme hydrogeologic conditions with irregular hydraulic gradients would have to exist to have the majority of the mine drain to the south and ultimately into Rock Creek. If the gradient is in fact highly irregular, the probability of installing LMW-1 exactly at a location which would be indicative of a constant linear gradient is so low, as to be considered infeasible.

1.2 Lower Permeability Cap

The City is concerned about potential releases of contaminated water from the mine, and specifically the impact of potential releases from the south end of the mine on the quality of the City's water supply. The City's water supply is vulnerable to contamination from various sources including increased residential developments in the watershed of the Rock Creek basin. The south end of the Landsburg Mine Site is one of the many potential sources of contamination. Even though contamination has not yet been detected from increased residential development or from the water leaving the mine trench, the City is obligated to take all reasonable measures to pro-actively protect Kent's drinking water.

On this basis, the City has requested that remedial action at the Landsburg Mine Site provide maximum practical reduction in water infiltration into the mine trench. The original design of the Landsburg Mine Site cap included a design permeability of 10^{-6} cm/sec rather than the lower permeable cap of 10^{-7} cm/sec or impermeable synthetic cap for several reasons which are detailed in the RI/FS. The City is requesting reconsideration of the lower permeability cap of 10^{-7} cm/sec to further reduce infiltration. In reevaluating this request, the Group has analyzed closely the relative effectiveness of the lower permeability cap, other alternatives, and the associated costs.

The origin of water infiltrating through the trenches in the northern half of the mine site comes from both direct rainfall onto these trenches and overland surface water flow entering the trenches. The north mine subsidence trenches have a total surface area of 132,000 ft^2. The estimate of water currently recharging the mine from infiltration along the northern half is 13 gpm without any cap. Using the EPA HELP code, modeling infiltration using a 10^{-6} cm/sec and 10^{-7} cm/sec cap results in 9.9 inches per year (1.5 gpm) and 1.25 inches per year (0.2 gpm), respectively. This 8.6 inches per year difference

amounts to a reduction in mine water of 1.3 gpm using the 10^{-7} cm/sec cap instead of the 10^{-6} cm/sec cap. In other words, the 10^{-7} cm/sec permeability cap would only reduce water infiltration by 1.3 gpm over the entire north half of the mine. As can be seen from these estimates, the cap (whether 10^{-6} or 10^{-7} cm/sec) does not account for most of the infiltration and recharge of mine water. Instead, surface water diversion around the subsidence trenches results in a substantial reduction in mine water recharge. With the proposed surface water diversion and a 10^{-6} cm/sec cap, the mine recharge in the northern portions is reduced to 1.5 gpm (an 88 percent reduction). Using a 10^{-7} cm/sec cap would reduce the total mine water recharge along the northern half to 0.2 gpm (98.5 percent reduction).

The capital cost of installing a 10^{-7} cm/sec cap instead of 10^{-6} cm/sec cap is approximately 50 percent higher for the northern portion ($1.5 million vs. $1.0 million). Testing of local materials revealed that 10^{-7} cm/sec is not achievable without admixing with imported bentonite. A cap with 10^{-7} cm/sec permeability not only would be costly to install, it would be more difficult to maintain especially if subsidence occurred in the future. For a ten percent greater reduction in mine water recharge, the cost is increased 50 percent. Since there is no observed contamination emanating within the aquifer from the mine with current infiltration rates, the benefit of further reducing infiltration is marginal. The Group believes that a 10^{-7} cm/sec cap has disproportionate costs to negligible benefits gained (a reduction of only 1.3 gpm).

The Landsburg RI/FS Report evaluated functionally equivalent cap alternatives (Alternatives 6 and 7 using an impermeable FML liner) to a 10^{-7} cm/sec clay-type cap. The evaluation in the FS demonstrates these cap designs to be less desirable than a 10^{-6} cm/sec permeable cap (Alternative 5) using MTCA evaluation criteria. The FS evaluated the FML cap alternatives to have disproportionate cost to the benefits gained compared tot he 10^{-6} cm/sec cap. A 10^{-7} cm/sec clay-type cap is also less desirable for the same reasons and is even more costly than a FML cap for this site. The 10^{-6} cm/sec permeability cap provides the best incremental cost to benefit comparisons and is "permanent to the maximum extent practicable."

As an alternative to installing a cap with a 10^{-7} cm/sec permeability, the Group will consider incorporating into the design an increased slope to the 10^{-6} cm/sec cap to promote run-off of rain water (domed cap) to the surface water diversion system and thus further reduce infiltration through the cap without lowering its design permeability. Increasing the slope of the cap is an alternative that offers maximum practical reduction of infiltration.

1.4 Extent of Cap

The Group understands the City's stewardship responsibilities with regard to the quality of your drinking water supply. The City has requested the Group consider capping the entire length of the trench rather than just the northern half which was proposed in the RI/FS Report. Although it is clearly documented that waste disposal was limited to the northern half of the trench, the City has posed the question that if groundwater does flow primarily to the south, including from the north waste disposal area, limiting water

flow into the entire length of the trench may reduce flow of any material out of the trench. The City has further posed the question that if waste did at some point after disposal flow from the north to the south, waste now potentially caught in the south half could be mobilized over the long term by continued infiltration of water in the south half.

The Group's investigation has determined that wastes were disposed in the northern half of the trench, and did not migrate to the south. Geophysical surveys, air monitoring and historic lack of access roads (supported by detailed examination of aerial photography) are all strong evidence that waste was not disposed in the southern half of the mine trench.

Therefore, water infiltration through the southern portion of the subsidence trench would not be in contact with waste materials in the vadose zone. Further, miners were present on a daily basis on the lowest levels of the south end of the trench for up to 4 or 5 years after waste disposal activities in the northern half had ceased. With the mine dewatered and the large quantities of oily water disposed in the north half, it is believed that southward flow of wastes from the north disposal area would have been evident to the miners.

In addition, the Group remains convinced that primary flow of mine water occurs from south to north. Evidence includes the relative water levels in the south and north portals and the uncannily consistent groundwater level found in LMW-1. Although, seeps to the south may seem like obvious signs of significant southern flow, especially given the estimated mine groundwater recharge rate and measured flows from the south portal, these are instead physical manifestations of surface water and local groundwater flows in the southern portal area as previously detailed in the Water Balance discussion.

Given these scientifically reasonable assumptions, the original RI/FS remediation option proposed capping the north half of the trench, and monitoring only the north portal. Even after additional evaluation, the Group does not believe that if contamination is someday detected in the mine water, that it will flow to the south. However, given the magnitude of the potential impact on the City's water supply, and the expressed concerns of the City, the Group is willing to consider monitoring to the south as well as to the north, even though monitoring costs would be effectively doubled.

However, capping the south end of the trench poses other concerns beyond the obvious substantial and disproportionate cost arguments, given that no contamination has yet been detected from the north or south portals. Capping the south end of the trench could shift groundwater flow in the trench to the south (see Figure 3d) potentially to a degree that if there was a release from the remaining waste in the north trench, it could flow to the south. Conversely, limiting capping to just the north half of the trench will provide an added measure of protection by maintaining groundwater flow to the north, away from the City's watershed.

The cap design for the northern half of the mine subsidence was designed to:

- Create a substantial barrier to waste and eliminate the potential for direct contact by humans and ecological species.
- Significantly reduce the amount of water infiltration through the wastes in the vadose zone.
- Ensure, if a groundwater divide does exist within the mine (groundwater within the mine flows diverge toward the north and south ends), this divide does not move toward the north after remedial action (see Figure 3d compared with Figure 3b). Thus, the low permeability cap only in the northern portion of the trench is conservative in its approach that it works with the existing hydrogeologic system to provide an increased level of protection to the City's Clark Springs facility.

Capping the entire subsidence zone would reduce the total amount of water entering the mine, but could have adverse effects. The potential groundwater divide could move towards the north depending on the relative infiltration rates between the north and south halves. It is important to the protection of the City's watershed that the permanent remedial action permits a greater amount of water infiltration and recharge to the mine from the southern half. This design will ensure that water in the northern half of the mine cannot migrate toward the south end.

As an alternative, the Group will consider surface water diversion along the southern half of the mine subsidence trenches instead of capping. Overland surface water flows into the subsidence trenches are estimated to account for at least half of the total water infiltrating into the mine. Surface water diversion along the southern half would be a cost effective means of substantially reducing the total amount of water entering the mine from the south half, but would still allow direct rainfall to infiltrate and recharge the mine with more water than from the northern half which is capped with a 10^{-6} cm/sec permeability. Thus, mine water in the north half will not migrate toward the south but will continue to flow toward the north.

2.0 MONITORING

The City asked for a longer and more comprehensive Compliance Monitoring Program than was outlined in the Feasibility Study. The proposed Compliance Groundwater Monitoring Program for the Landsburg Mine Site will be provided to Ecology and the City as part of the Cleanup Action Plan documents. The long-term Groundwater Compliance Monitoring Plan proposed by the Group could include the following:

- The long-term monitoring period could be extended to 30 years, instead of 20 years proposed in the Landsburg Feasibility Study.
- Monitoring could be conducted at the south end of the trench with equal emphasis as the north end, instead of focusing only on the north end.
- Portal #3 (south end) could be included in the sampling effort for the south end of the mine, as recommended by the City.

- Measurement of monitoring well groundwater levels and of surface flows associated with Portal #3 could be measured and recorded for each compliance monitoring event, as recommended by the City.

The City and Ecology expressed a desire to conduct groundwater monitoring at the site until remedial measures are implemented. The Landsburg PLP Group is willing to initiate immediately an Interim Groundwater Monitoring Program until startup of the remedial activities. The PLP Group is preparing a proposed Interim Groundwater Monitoring Plan for submission to Ecology.

The Interim Groundwater Monitoring Plan includes:

- Monitoring locations at LMW-2 and LMW-4 at the north end of the mine and LMW-3, LMW-5, and Portal #3 at the South end of the mine.
- Groundwater Monitoring will be conducted quarterly.
- The first sampling round will consist of the full GC/MS analysis (volatiles by EPA Method 8260 semi-volatiles by EPA Method 8270 and pesticides/PCBs by EPA Method 8081) and priority metals. Selected wet chemistry parameters will be included.
- Subsequent quarters of sample will involve focused monitoring for more mobile parameters and will include pH, specific conductance, priority metals and volatile organic compounds by EPA Method 8260.

3.0 CONTINGENCY PLANNING

The City asked for assurances for the protection of their water supply resources. The Group feels a Contingent Groundwater Containment/Treatment System provides assurances in the event that the City's water supply system becomes in jeopardy from mine waste releases. A Contingent Groundwater Containment/Treatment System has been developed and could be submitted to Ecology as part of the Cleanup Action Plan documents. The Group would also send a copy directly to the City. The Contingent Groundwater Containment/Treatment System is designed to contain and treat unacceptably impacted groundwater that could otherwise potentially emanate from the north or south end of the mine.

The Contingent Groundwater Containment/Treatment System could include the following:

- The Contingent Groundwater Containment/Treatment System includes several types of systems for various types of potential contaminants.
- The system can be readily mobilized and put into place.
- The system is designed for containment of groundwater emanating from the Rogers Coal Seam, immediately downgradient from the mine.
- The system incorporates provisions for regular vendor updates to evaluate treatment availability.

The Contingent Groundwater Containment/Treatment System is not a typical provision in a Cleanup Action Plan, but assures the City as well as users of the Cedar River to the north that any potential future contamination from the Landsburg Mine Site can and will be mitigated and impacts will not be realized in adjoining aquifers or surface water systems. The Group anticipates entering into a Remedial Action Consent Decree with Ecology which demonstrates our commitment to implement actions required under the Cleanup Action Plan.

Following your review of this response letter, we would be pleased to schedule another technical meeting to facilitate face to face discussion of these issues, if questions still remain. In the interim, please feel to call me with any questions you may have.

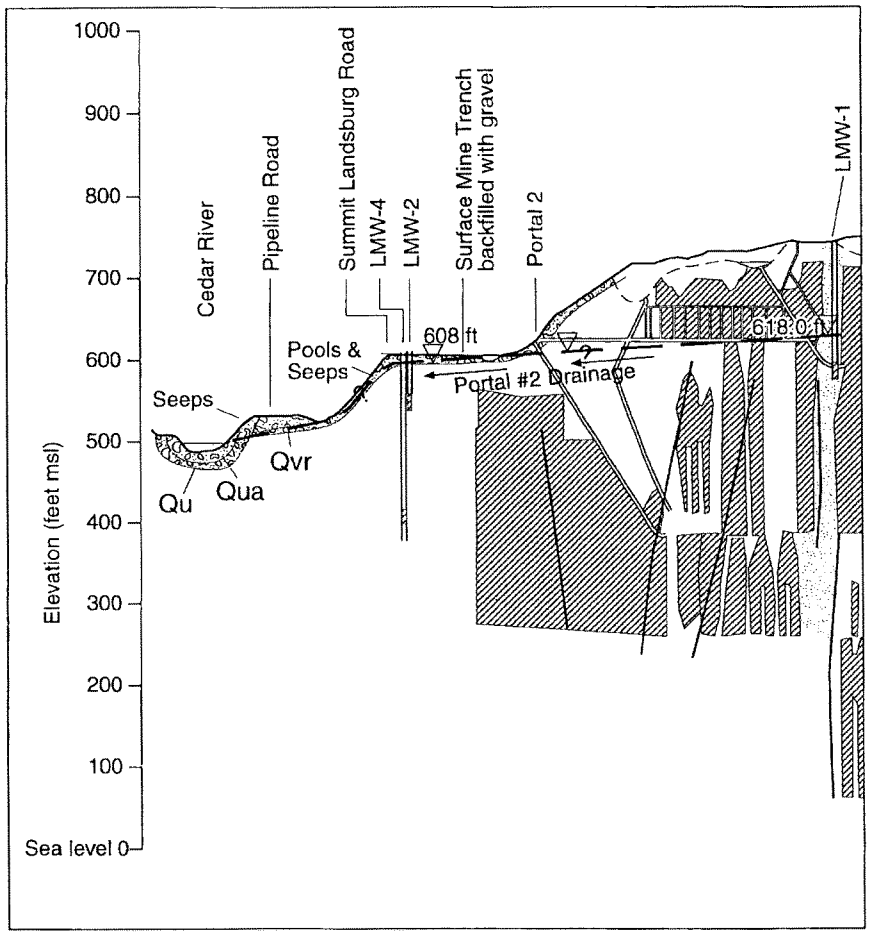
Sincerely,

GOLDER ASSOCIATES INC.

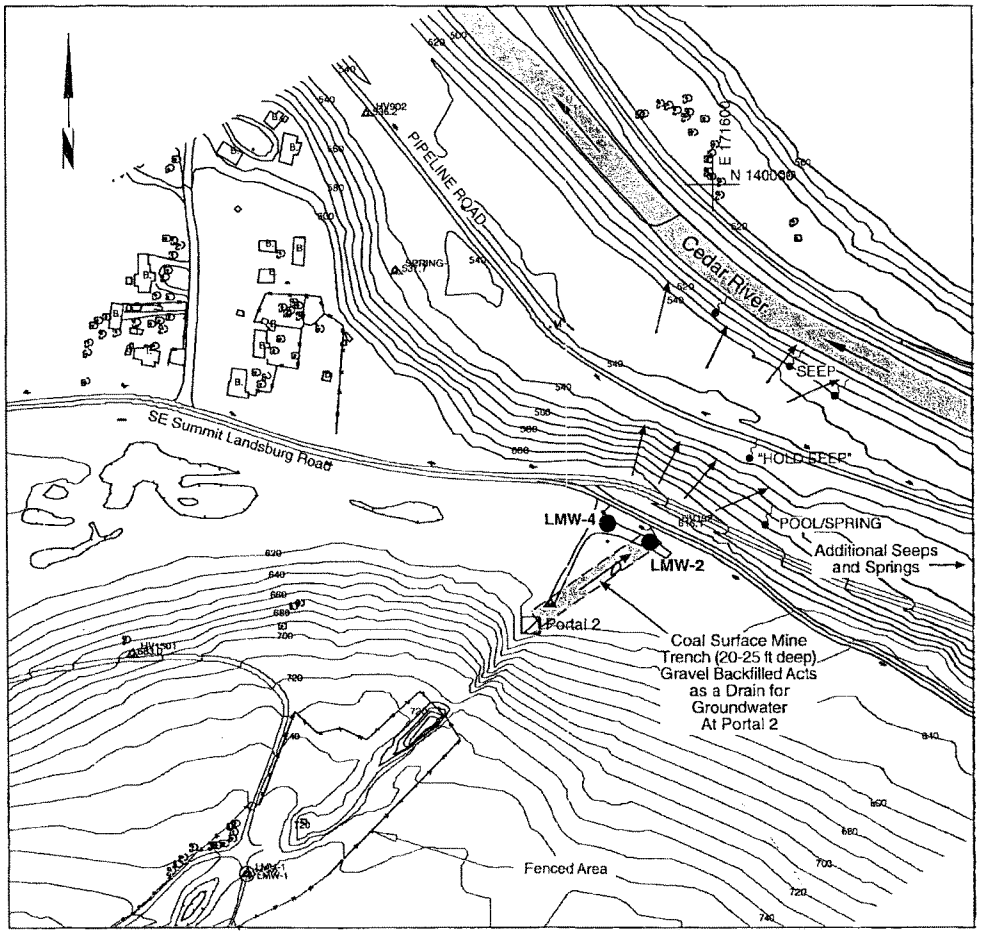
Douglas Morell, Ph.D.
Associate

cc:	Lisa Robbins	Bruce Sheppard	David Brenner	Rod Brown
	William Kombol	Pam Nehring	Pete Haller	Dave Provance
	Bob Laurence	Peter Mintzer	Pat Steerman	Robert Pancoast
	William Joyce	Marlys Palumbo	Susanna Duke	David South

0414r11.doc



Cross Section Along Stroke of Coal Seam
at North End of Landsburg Mine



North End Site Features and Groundwater Flow
Landsburg Mine

FIGURE 1
NORTH END SITE FEATURES AND GROUNDWATER FLOW
LANDSBURG MINE SITE/WA

PROJECT NO. 923 1000.R310 DRAWING NO. 72912 DATE 4/15/97 DRAWN BY TK

Golder Associates

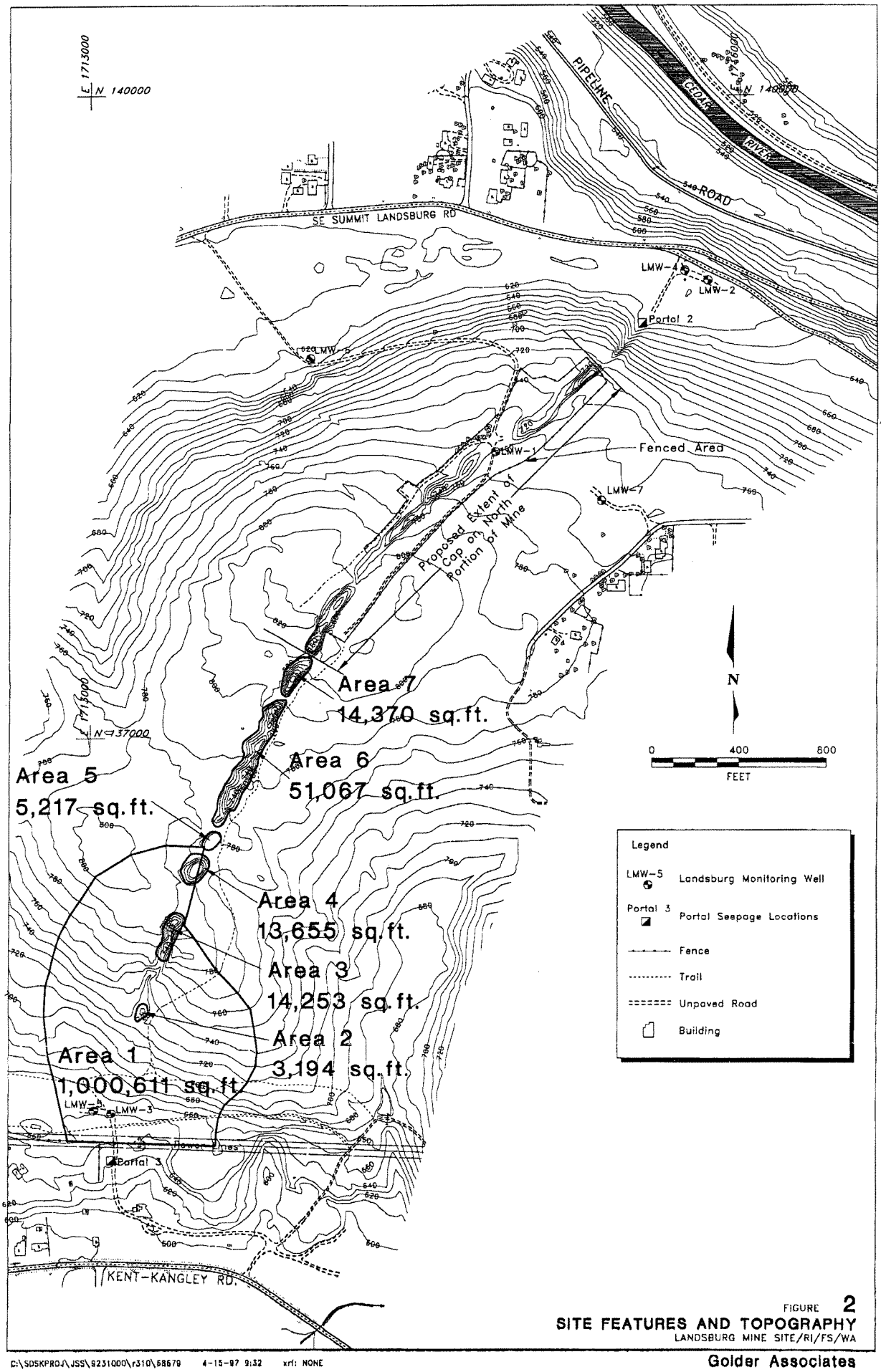


FIGURE 2
SITE FEATURES AND TOPOGRAPHY
LANDSBURG MINE SITE/RI/FS/WA

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Golder Associates

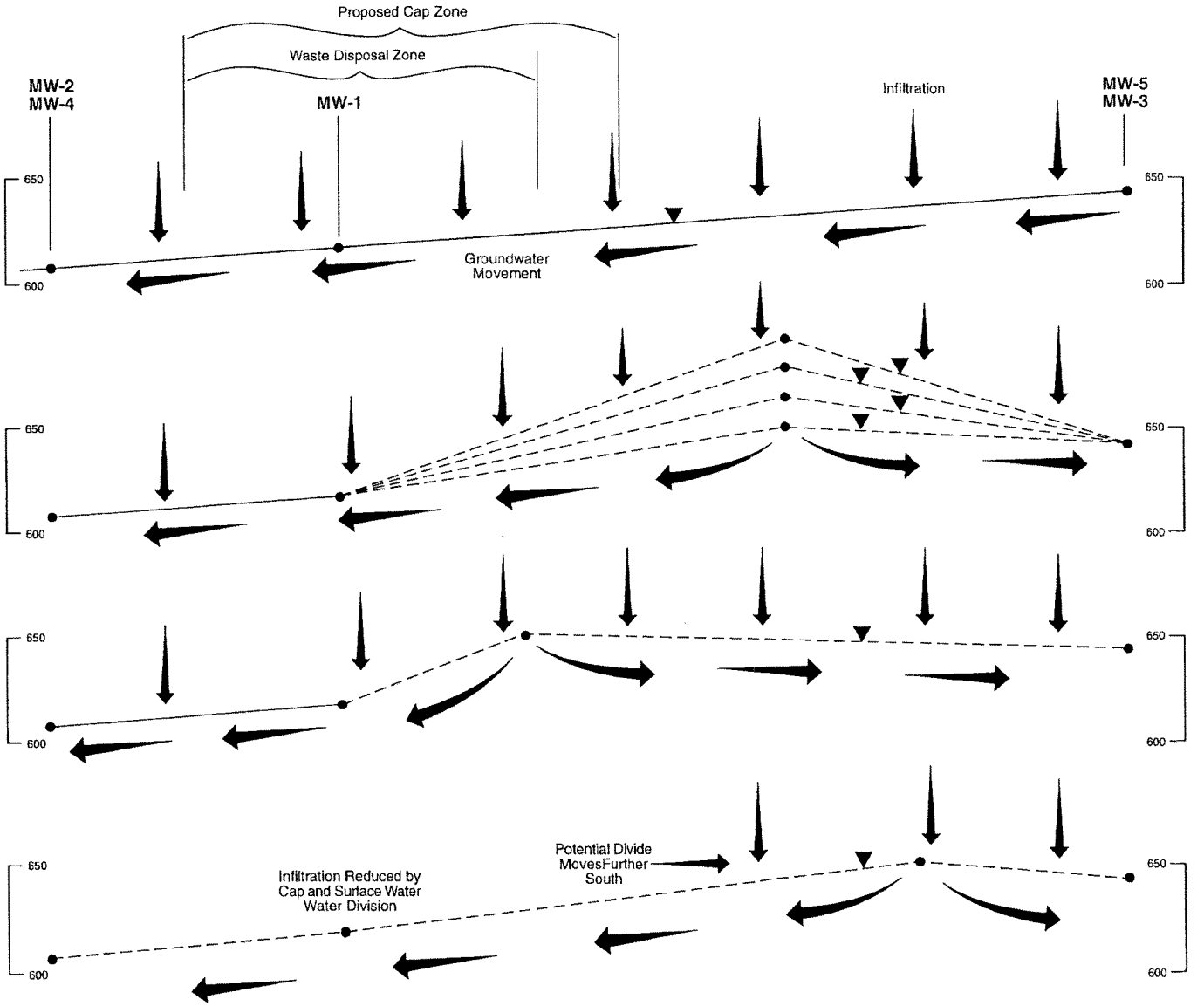

Figure 3a. Assuming No Mine Water Divide Current Mine Water Table

Figure 3b. Position of Potential Mine Water Divide Assuming Uniform Hydraulic Conductivity in Mine

Figure 3c. Configuration of Water Table with Mine Water Potential Divide Beneath Waste Disposal Zone

Figure 3d. Shift in Potential Mine Water Divide with Cap and Surface Water Diversion in the North Half

FIGURE **3**
POTENTIAL MINE WATER TABLE CONFIGURATIONS
LANDSBURG MINE SITE/WA

PROJECT NO. 923 1000.R310 DRAWING NO. 72913 DATE 4/15/97 DRAWN BY TK

Golder Associates

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Northwest Regional Office • 3190 160th Avenue SE • Bellevue, Washington 98008-5452 • (425) 649-7000

December 30, 2004

Dear Community Member,

RE: The Department of Ecology's Decision on Further Investigations at the Landsburg Mine site, Ravensdale, Washington

The Washington State Department of Ecology (Ecology) appreciates your continued interest in the Landsburg Mine site cleanup process and wants to keep you updated on recent developments about this site. This letter provides information on Ecology's decision in response to a request from the City of Kent for additional investigation of the site's possible effect on nearby groundwater.

As you may know, Ecology has not proceeded with the completion of the cleanup action plan. Ecology is committed to selecting a remedy that protects public safety, health and the environment, and is responsive to community concerns. The City of Kent, whose Clark Spring water source is half a mile from the south end of the former mine, requested further investigation of the hydrogeology and contaminant characterization of the site, and a re-evaluation of the PLP Group's cleanup alternative.

After serious consideration and thoughtful analysis of the complex scientific issues by a team of technical experts, Ecology recommends:

- The drilling of one or more deep wells to sample groundwater at the lowest level of the former mine
- Coordination among the PLP Group, the City and Ecology to decide on the details of this action.

Ecology believes the drilling and sampling of water deep within the former mine will provide additional data needed to assess the level of risk posed at the site. The collection and analysis of water samples from the deep wells will also provide information needed to address concerns about any potential threat to groundwater resources from contaminated materials disposed of at the site. To date, samples from numerous test wells and nearby private wells have shown no violations of drinking water standards or cleanup standards for ground water.
Ecology will use the deep well data to clarify or rule out lingering technical concerns of deep contamination at this site and its pathways in the subsurface.

What's next? Ecology will meet with the PLP Group and City of Kent representatives to determine details of the well design and how it will be implemented. The next steps after the deep well installation will depend on the results of the sampling. The time needed to complete this will depend on whether the findings prompt additional investigations. We will update you on the findings.

When this additional investigation is complete, Ecology will proceed with work on the draft cleanup action plan. Ecology will make this draft plan available for public review and comment and will continue to update you on the status of the overall cleanup as the process moves along.

Thank you once again for your participation and continued interest in this cleanup effort.

More Information: For more information about the details of this decision, please visit Ecology website at:
http://www.ecy.wa.gov/programs/tcp/sites/landsburg_mine/landsburg_mine_hp.html

If you have any questions about this update or the overall cleanup process, please contact the Site Manager at (425) 649-7094, or by email at jcru461@ ecy.wa.gov. For information about public involvement for this site or to be added to the mailing list, contact Justine Asohmbom, Public Involvement Coordinator, at (425) 649-7135 or by email at juas461@ecy.wa.gov.

Sincerely,

Jerome B. Cruz
Site Manager
Toxic Cleanup Program

JBC:JA:ll

Golder Associates Inc.

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Golder Associates

July 6, 2004

Our Ref.: 923-1000-002.R200

Washington Department of Ecology
3190 – 160th Avenue SE
Bellevue, Washington 98006

Attention: Dr Jerome Cruz

RE: RESPONSES TO COMMENTS FROM THE CITY OF KENT

Dear Dr. Cruz:

The Landsburg PLP Group values the comments offered by the City of Kent (City) and all other interested parties on the progress of this important environmental cleanup. In the City of Kent's letter dated May 19, 2004, Appendix A was a review document by Udaloy Environmental Services (UES). Many of the comments forwarded to us by UES focuses on the completed Remedial Investigation/Feasibility Study (RI/FS) that was approved by Ecology in 1996. At that time, a public comment period on the Draft RI/FS was held and a Responsiveness Summary was prepared by Ecology. The comments prepared by UES appear to have the same content as the comments received from the City of Kent back in 1996 on the draft RI/FS, which were addressed in the Responsiveness Summary. Since that time, additional wells have been drilled, additional rounds of sampling have been conducted, a Hydrogeologic Investigation has been deployed and infrastructure for a Contingent Groundwater Treatment System is being developed. All of these additional efforts will be reflected in the Final Cleanup Action Plan (FCAP), which will also be subject to public review and comment prior to Ecology acceptance.

While the PLP Group believes that UES has made several important comments, we feel that these have been historically addressed by the PLP Group and Ecology and we are now focusing on the Draft Cleanup Action Plan (DCAP) that is anticipated to be available for formal public review in the fall. We are concerned that revisiting the approved RI/FS will delay the development of the DCAP. We are committed to working with Ecology to ensure the Final Cleanup Action Plan is protective of human health and environment.

In the meantime and in the spirit of cooperation, we have prepared the attached responses (Attachment A) to the ten summary points made by UES on pages 39-42 of Appendix A to provide information and data to reinforce the conceptual site hydrogeologic model presented in the RI/FS.

Sincerely,

GOLDER ASSOCIATES INC.

Douglas J. Morell, Ph.D., R.Hy.
Principal

Attachment
cc: Landsburg PLP Group

ATTACHMENT A

Attachment A

LANDSBURG PLP GROUP RESPONSE TO UES COMMENTS

Summary Comment 1st Bullet: The RI/FS Report proposes that Rogers Seam wastes are not present because they were destroyed by fire. No site-specific data (or even literature references) supportive of this hypothesis were provided; data that directly contradict this hypothesis were presented in the report. Rejection of this hypothesis is recommended.

Response: The statement that Rogers Seam wastes are not present is taken out of context. The statement was one possible explanation (along with other possible explanations) why contamination has not been detected in groundwater from site monitoring wells. The RI/FS does not conclude that wastes materials do not exist in the coal mine. The Draft Cleanup Actions Plan (DCAP) assumes that wastes are present and requires groundwater monitoring until residual hazardous substance concentrations no longer exceed MTCA levels. The DCAP assumes wastes are present and exceed MTCA levels. This is the premise of the RI/FS "black box" approach. Therefore, we are in agreement that wastes remain within the mine.

Summary Comment 2nd Bullet: The RI/FS Report proposes that Rogers Seam wastes are not present because they were discharged through the mine ends and are gone. No data demonstrating this hypothesis were provided; instead the data presented in this report directly contradict this hypothesis. Rejection of this conclusion is recommended.

Response: The same statement is taken out of context. The statement was one possible explanation (along with other possible explanations) why contamination has not been detected in groundwater from site monitoring wells. Please see response to the first bullet above.

Summary Comment 3rd Bullet: The RI/FS Report proposes that Rogers Seam wastes are not present because they are immobilized by coal. No data supportive of this hypothesis, or the concept that Rogers Seam bituminous coal is physically or geochemically comparable to activated carbon, were provided. Rejection of this hypothesis is recommended.

Response: The fact that absorption of liquid wastes to soils does occur and can be enhanced by the presence of coal and shale/clay is undisputable. Although there is no quantification of the amount absorbed, the RI/FS presents absorption of wastes to soils with enhancement by coal as another possible explanation why contamination has not been detected in groundwater from site monitoring wells. Most activated carbon is made from coal, subjecting coal (or other carbon sources) to heat and steam in the absence of oxygen then crushing to the desired particle size (http://ianrpubs.unl.edu/water/g1489.htm). The process physically increases the surface area of the coal thus making it "activated". Coal does have enhanced absorption capacity over soils for organic compounds. Tests conducted by Clean Environmental Concepts, Inc. (a supplier of activated carbon) found coal to have about one tenth the absorptive capacity index as their activated carbon product (unpublished test results by Mr. Dan Robinson of Clean Environmental Concepts, Inc.). Although not as efficient as activated carbon, this absorption index for organic compounds is much more than soils containing trace levels of organic carbon. Rejection of this hypothesis should not be done and would be technically inappropriate.

The capacity for absorption is chemical dependent and since the waste constituents are not defined, coal absorption studies would have limited use. Absorption of organic compounds by organic content of soils and the adsorption of metals by clayey soils do occur and would be eventually released, although the release may be insufficient to impact groundwater emanating from the mine above MTCA concentrations. The absorption capacity of the coal or shale does not affect the remedial action decisions for the site, since groundwater monitoring and the contingent groundwater capture and treatment system would be in effect in perpetuity.

Although not specifically stated in the RI/FS, the wastes were disposed in the Rogers coal mine subsidence trenches along with large quantities of landscaping/clearing debris grass cuttings, tree sumps, tree branches and leaves). This landscaping/clearing debris is composed of mostly organic carbon material and would absorb and promote microbial degradation of the organic compounds released during disposal or subsequent leakage of drums. The site model, that wastes remain in the trench, vadose zone and beneath the water table but is very immobile, is very understandable considering the co-disposal material and the residual coal of the coal mine.

Summary Comment 4th Bullet: The RI/FS Report proposes that the on-site monitoring wells are installed in primary contaminant flow paths and that the absence of detectable contaminants in on-site monitoring wells therefore demonstrates that the wastes originally discharged into the Rogers Seam are either destroyed by fire, completely removed via discharge through the mine ends, or immobilized by coal. Rejected of this hypothesis, definition of primary contaminant flow paths, and the installation of monitoring wells in primary contaminant flow paths, is recommended.

Response: The commenter apparently believes that the monitoring wells are not placed in the primary flow paths of groundwater emanating from the Rogers coal mine. The premise for this belief is taken from the results of the groundwater monitoring (absence of impacts) at the site wells/portals, and an unsupported evaluation that the primary flow path is laterally through the bedrock (perpendicular to the bedding planes) rather than through the ends of the coal mine and parallel to the coal seam. The commenter's conclusion that the primary groundwater flow path is through the cross-bedding of the Puget Group bedrock (interbedded sandstones, siltstones and shales) and not parallel through the coal seam and portals is based on a single piece of data and ignores all other information, other RI data collected, mining records and hydrogeologic principals. The one data point, in which the commenter relied, is the estimated hydraulic conductivity (~ 1.0 E- 05 ft/sec) for the well LMW-3 from a slug test. LMW-3 is the shallow well placed primarily in the coal seam, but with about two feet of siltstone. Slug test data for the other wells placed in the coal seam (LMW-2, LMW-4 and LMW-5) indicate much higher hydraulic conductivities between 7.0 E-03 to 3.6 E-02 ft/sec. The slug test conducted in LMW-1, which is installed in sandstone and siltstone indicates a hydraulic conductivity of 4 E-06 ft/sec for this well (which was in the fault zone and should represent a more conductive feature in the bedrock). The commenter uses the difference between the estimated hydraulic conductivity between LMW-3 and LMW-1 only being about one-order-of-magnitude difference as the reason that the site monitoring wells are not monitoring the primary groundwater flow path from the Rogers coal mine, because the commenter states that more flow is probably occurring perpendicular through the mine bedrock layers than parallel to the bedrock layers and out the mine ends. The slug test and estimated hydraulic conductivity at LMW-3 that was calculated is not believed to be representative of the permeability of the Rogers coal seam. The estimated hydraulic conductivity from the other three wells (LMW-2, LMW-4 and LMW-5) are relatively consistent with each other and have a much higher permeability estimate for the coal seam (3 to 4 orders-of magnitude) than LMW-1. We believe, the result of the slug test at LMW-3 is not representative. The same evaluation by the commenter using the hydraulic conductivity from the

LMW-2, LMW-4 and LMW-5 indicates that lateral groundwater migration through the bedrock is negligible.

Pump testing was conducted on the coal seams at each end of the mine. LMW-4 was pumped at 6 gpm while LMW-2 was used as an observation well. LMW-5 was the pumped well (again at 6 gpm) at the south end, while LMW-3 was the observation well. These results are provided in Appendix F of the RI/FS. These pump tests are more representative than slug tests because the response is measured over 160 to 180 feet of the coal seam between the pumped well and the observation well. Any well construction problems and well inefficiencies are eliminated or reduced by the use of an observation well response. The calculated transmissivity of the coal seam between LMW-2 and LMW-4 is about 0.03 ft^2/sec and between LMW-3 and LMW-5 is about 0.013 ft^2/sec. The hydraulic conductivity would be about 0.003 ft/sec and 0.0013 ft/sec, respectively. These pump tests results agree with the slug tests results conducted at LMW-2, LMW-4 and LMW-5, but are two orders-of-magnitude higher than the slug test results from LMW-3. This data show that the slug tests conducted in LMW-3 is not representative and that the coal has much higher hydraulic conductivity than the sandstone/siltstone (even within the fault zone at LMW-1). The commenter is relying on one piece of data that is not representative. The primary pathways are and should remain at the end of the Rogers coal mine and along the coal seam.

The RI/FS Report does identify that groundwater may migrate laterally through the sandstones, albeit if occurring would be negligible (RI/FS Report, Page 6-9). In addition the DCAP specifies a contingent point of compliance laterally in the Frasier and Landsburg coal mine/seam. The DCAP assumes there is no groundwater divide between the Rogers coal mine and that of the Frasier and Landsburg coal mines and assumes groundwater may migrate laterally towards and discharge to either adjacent coal mine. Monitoring wells LMW-6 and LMW-7, respectively, monitor groundwater in the adjacent coal mines to detect whether waste constituents are detectable. The DCAP proposes to institutionally control the use of groundwater between these mines.

The preponderance of information and data all indicate that the primary groundwater flow path from the mine is out the ends of the mine and through the coal seam. The multiple reasons are summarized below:

- Mining records reveal that water from the side walls and mapped fractures in the side wall bedrock was not an issue. Several fractures in the sidewall bedrock were described as not yielding much water. Site geologic reconnaissance indicated that very little fracturing and jointing exists in the hanging and falling walls to the Rogers coal mine where exposed. Mr. Chris Breeds, a mining engineer with SubTerra, Inc., who has much local and international expertise in coal mining, has reviewed the mine records for indications of mine seepage from the hanging wall and foot walls. The only problems with water appear to be from overland flow entering the mine from falling into the surface subsidence trench during large rain events. The records indicate that surface diversion ditching was conducted to reduce this problem.

- Interviews with mining personnel revealed that mine water was not significant and easy to control.

- As the LMW-2 / LMW/4 and the LMW-3 / LMW-5 pump tests show, the hydraulic conductivity is much greater in the coal seam than in the bedrock. The primary groundwater flow from the Rogers coal seam is out the ends of the mine and through the

coal seams to their discharge at the Cedar River and to the recessional gravels in route to Rock Creek.

- Springs exist at the portals of the mines and at locations where the coal seams outcrop at ground surface. This is observed north of the Landsburg –Summit road along the Cedar River. Spring discharges occur at the approximate at the portals to the Frasier and Landsburg mines. These discharges are strong indicators that the preferential groundwater pathway and discharge is from the coal mines and parallel along the coal seams, rather than through the bedrock. Any lateral movement of groundwater perpendicular to the bedding planes would continually be favoring migration parallel to the bedding planes within each lithologic stratum and between strata. This is consistent with known geologic principles governing initial depositional sequencing and post-depositional processes, which develop indurated sediments of contrasting lithologies and hydraulic transmissivities. It is not logical that the primary flow path is perpendicular through the bedding planes throughout the bedrock sequences. The Puget group throughout King County has multiple layers of alternating sandstones, siltstones and shales. These sedimentary layers were discovered during drilling and trenching at the site during the RI and were recorded in well driller logs in the area.

- Upward hydraulic gradients in the coal seam at the ends of the Rogers mine show the coal seam is a discharge zone and would be receiving groundwater from greater depths from the mine.

- Private wells logged to be in bedrock in the immediate area appear to have much lower hydraulic conductivities than the Rogers coal seam. Although construction of private wells can affect water productivity and yield, PW-6, PW-8 and the Bythral/Habenicht wells indicate a transmissivity on the order of 3.8 E-05 ft^2/sec, 1.9 E-05 ft^2/sec and 1.7 E-05 ft^2/sec, respectively; while the hydraulic conductivity would calculate to about 3.2 E-07 ft/sec, 1.6 E-07 ft/sec and 1.3 E-07 ft/sec. The hydraulic properties were estimated using the simple estimating equation: Transmissivity (gpd/ft) = 2000 * Pump Rate (gpm) / Drawdown (feet). (Note: It should be mentioned that this simple estimate would over-estimate the transmissivity if a significant portion of the pumped groundwater was from well bore storage. The water from these wells is almost all well bore storage water. For example, a 6-inch diameter well has 150 gallons in 100 feet of well bore storage. The three pump tests referred to above had drawdowns of 120 to 135 feet, but pumped only 270 gallons, 180 gallons and 90 gallons, respectively. The actual transmissivity must be much lower than calculated above, because most of the observed drawdown was from well bore storage with very little groundwater supplied from the aquifer. Considering the induced hydraulic gradient (>100 feet in very short distances through the bedrock) the transmissivity has to be much smaller than calculated above. These wells were the only bedrock wells for which we have any record in the study area that did not indicate encountering a coal seam. From the information we have, the best producer in the area bedrock is the Heckenlively well, but this well did encounter a coal seam. This well produces about 35 gpm with a drawdown of about 102 feet in one hour. The calculated transmissivity of this well using the same simple estimating equation yields a transmissivity of 1E-03 ft^2/sec and a hydraulic conductivity of 1E-05 ft/sec, which is still much lower than the estimated transmissivity and hydraulic conductivity for the Rogers coal seam.

- As presented in Freeze and Cherry (Groundwater, 1979, pages 32-34), the overall hydraulic conductivity tensor perpendicular through multiple beds approximates the

hydraulic conductivity of the lowest permeability stratum (shale) in that direction. The overall hydraulic conductivity tensor parallel along multiple beds approximate the hydraulic conductivity of the highest permeable stratum (coal) in that direction. The slug test in LMW-1 was not in shale, but shale beds exists in the Puget Group (see Appendix E trench logs). Shale beds typically have hydraulic conductivities two to three orders-of-magnitude less than sandstones (Freeze and Cherry, Groundwater, 1979, page 29) are extremely good aquitards and are even considered by many hydrogeologists to be an aquiclude, especially in the cross-bedded direction.

- Drilling boreholes through the sandstones and siltstones at the site hardly produced groundwater and most of the time the cuttings obtained below the water table appeared dry and were dusty. Upon drilling into the coal seam, drill water was typically so great that control and capture became problematic requiring the use of large baker tanks for water storage. A strong indication of the relative transmissivity of the coal seam to adjacent bedrock was observed during the drilling of LMW-4. This well was angled to the coal seam. The air-rotary rig had no problem with air circulation and cuttings removal until the coal seam was encountered. Cuttings removal was difficult because air was lost to the coal seam (the path of least resistance) preferentially rather than coming up the borehole. During the drilling in the coal seam at LMW-4 it was raining hard, and it was observed that the ground surface was saturated. Evolving bubbles were observed at the surface along the linear strike of the coal seam around LMW-2, when the drillers blew compressor air into the coal seam of LMW-4 borehole that was 200 feet below ground surface. Field data may lack associated quantitative numerical values but it does provide empirical information that tells much about the hydrogeologic conditions at the site. If the path of least resistance is within the coal seam versus the surrounding bedrock, then the coal seam must have the higher transmissivity then the bedrock. The lost of circulation is analogous to an injection pump test, which shows the transmissivity is much higher in the coal seam than in the bedrock

- The evaluation presented by the commenter only discussed quantity of groundwater migrating from the mine through the side walls and through the ends of the mine. No evaluation of relative velocity of groundwater emanating out the ends of the mine were compared with the velocity of groundwater through the bedrock walls. Because of the less surface area along the ends of the mine compared to the side walls, the same reasoning provides that the groundwater velocity through the ends of the coal would be many times greater than through the side walls. Wells located at the end of the mine will receive groundwater emanating from the mine more quickly and would detect contamination at an earlier time. The commenter made statements that the contaminants may not be present in the upper portions of the mine groundwater. The trench studies and interim actions conducted prior to the RI/FS determined that wastes were still within barrels and in the surface trench soils. The RI/FS in Section 6.3.2 Source Characteristics on page 6-5 state that "it is reasonable to expect that wastes remaining include a significant number of drums buried beneath the trench bottom surface at some depth." It is logical that wastes would also still be present in vadose zone soils, remaining barrels above the water table and in the soils of the upper portions of the water table. These wastes would be dissolved to some degree with infiltrating meteoric water and migrate within the upper portions of the water table toward the ends of the mine portals. The commenter identifies that shallow flow to the portal is relatively rapid and agrees that any contamination would migrate to these ends more quickly. The existing monitoring wells are at locations that would detect contamination at an early stage because the groundwater velocity is much greater parallel to the coal mine and seam.

In summary, the request for rejection of the site model is based on one piece of data to the exclusion of all other data, information and technical principles. If groundwater is migrating laterally through the bedrock, it would discharge to either the Frasier or Landsburg mine, which is being monitored. The DCAP assumes that there is the possibility for lateral migration of waste constituents through the bedrock and proposed to institutionally control groundwater use between the Frasier and Landsburg coal seams. This approach is protective of human health and the environment.

Summary Comment 5th Bullet: The RI/FS Report interprets site data as indicating that Rogers Seam groundwater is hydraulically separate from the regional aquifer monitored elsewhere (including at wells located within 1,000 feet of the Rogers Seam). Flaws in the RI/FS Report data analysis are identified. An alternative interpretation consistent with site data and fundamental hydrogeologic principles is proposed. Rejection of the RI/FS Report interpretation and adoption of the alternative that the regional aquifer beneath the Study Area is hydraulically continuous is recommended.

Response: First, the RI made the statement that the private wells in the Puget Group bedrock are hydraulically isolated from groundwater in the Rogers coal mine (RI/FS, page 6-9, 2nd paragraph). We do not agree with the request to remove the statement regarding hydraulic isolation of the bedrock private wells from groundwater emanating form the coal mine in the Rogers seam. The coal mine and coal seams are distinct aquifers and the bedrock is an aquitard or even an aquiclude between the aquifers. The hydraulics of the saturated bedrock of the hill containing the coal mines are controlled by the mines and their portal elevations. Groundwater flow to the coal mines can occur through the bedrock, but this flow is negligible in comparison to the flow parallel along the coal mines and the coal seams. There are no private wells between the Rogers coal mine and the Landsburg and Frasier coal mines. The Landsburg and Frasier coal mines act as hydraulic barriers/sinks in the bedrock, as evidenced by their portal discharges **above** the Cedar River, and isolates saturated bedrock beyond these mines from the Rogers coal mine. Private wells (PW-5, PW-7, PW-8, Bythral/Habenicht well and Heckenlively well) east of the Landsburg coal seam, except PW-6, have water levels above the water level in the Landsburg coal mine (LMW-7) which indicate the Landsburg coal mine is a hydrologic sink in the area. For the PW-6 exception, we were unable to measure water levels in the well because of an obstruction at about 140 foot bgs in this well and the only water level available was the driller log, which estimated the water level 6 feet below the level of LMW-7. The water level recorded on the well log may not represent static water level conditions in this well, since it is not consistent with the other wells in the bedrock east of the Landsburg coal mine. Therefore the conclusion that private wells extracting groundwater from bedrock in the study area are hydraulically isolated from the waste and groundwater emanating from the Rogers coal mine is valid. Any compounds detected in these wells are not associated with wastes from the Rogers coal mine.

Summary Comment 6th Bullet: The RI/FS Report proposes that the contamination of nearby offsite wells is unrelated to the Rogers Seam. No data supportive of this hypothesis were provided; data that directly contradict this hypothesis were presented in this report. Rejection of this hypothesis is recommended.

Response: Please see response to the previous bulleted issue above. A summary of all detected hazardous organic compounds, arsenic and lead in private wells are provided below:

- **PW-1:** No organic hazardous compounds were detected. Lead and arsenic were below MTCA levels.

- **PW-2:** Bis(2-ethylhexyl)phthalate and lead were detected once each out of 4 sampling events. These compounds were never detected from site monitoring wells or portals. Bis(2-ethylhexyl)phthalate has a Koc of 111,000 ml/g and lead has a Kd of 10,000 L/kg (WAC-173-340 Table 747-1 and Table 747-3). Both compounds would not be able to migrate 0.5 miles to this private well in 35 years.

- **PW-3:** No organic hazardous compounds were detected. Lead and arsenic were below MTCA levels.

- **PW-4:** No organic hazardous compounds were detected. Lead and arsenic were below MTCA levels.

- **PW-5:** Lead and arsenic were below MTCA levels. Bis(2-ethylhexyl)phthalate and diethyl phthalate detected once. This well obtains groundwater from bedrock and coal seams east of the Landsburg coal seam and has a groundwater level higher than both the Rogers mine and the Landsburg mine, therefore it is impossible for this well to be receiving groundwater from the Rogers coal mine. Water cannot flow from a lower hydraulic head to a higher hydraulic head.

- **PW-6:** No organic hazardous compounds were detected. Lead and arsenic were below MTCA levels.

- **PW-7:** Endrin and 1,3-dichlorobenzene were detected once out of three sampling periods and arsenic was detected over MTCA levels once out of three sampling periods. The split sample that was analyzed also did not detect 1,3 dichlorobenzene from the same sampling period in which this compound was detected, therefore, there is uncertainty whether this compound was actually present. These detected hazardous compounds were never detected from site monitoring wells. This well obtains groundwater from bedrock and glacial surface deposits east of the Landsburg coal seam and has a groundwater level higher than both the Rogers coal mine and the Landsburg coal mine, therefore it is impossible for this well to be receiving groundwater from the Rogers coal mine.

- **PW-8:** Arsenic was detected in all monitoring periods above MTCA cleanup standards, but no organic hazardous compounds were ever detected. Arsenic was not detected at site monitoring wells or portals above groundwater background levels established for the State of Washington. Groundwater levels in PW-8 are at a higher elevation than groundwater levels in the Landsburg coal mine. Therefore, groundwater from the Rogers coal mine can not migrate through the Landsburg coal mine to PW-8.

- **PW-9:** Diethyl phthalate and 1,3-dichlorobenzene. These compounds were detected once. The split sample that was analyzed did not detect 1,3-dichlorobenzene. 1,3-dichlorobenzene was never detected from site monitoring wells. This well obtains groundwater from glacial deposits up-stream of the Rogers coal seam and on the far side of Rock Creek. Therefore it appears impossible for this well to be receiving groundwater from the Rogers coal mine.

- **PW-10:** Benzene was detected once in this well out of four sampling periods. Benzene was never detected in any site monitoring wells or portal waters at the south end of the Rogers coal mine.

- **PW-12:** No organic hazardous compounds were detected. Lead and arsenic were below MTCA levels.

- **PW-13:** Diethyl phthalate was detected once out of four sampling periods. Lead and arsenic were below MTCA levels.

- **PW-14:** No organic hazardous compounds were detected. Lead and arsenic were below MTCA levels.

- **PW-15:** No organic hazardous compounds were detected. Lead and arsenic were detected once above MTCA levels out of three sampling periods. This well is about 0.8 miles from the Rogers coal mine. Lead and arsenic have a Kd of 1000 L/kg and 29 L/kg, respectively, would not be able to travel this distance in 35 years. The travel distance for lead and arsenic would be less than 10 feet through the bedrock in 35 years using the hydraulic conductivity measured in LMW-1 (which was in the fault zone and should represent a more conductive feature in the bedrock). Therefore, the single detect of lead and arsenic above MTCA levels is not from the Rogers coal mine.

Diethyl phthalate is the only organic priority pollutant compound detected at site monitoring locations and in private wells. The MTCA groundwater cleanup level for diethyl phthalate is 12,800 ug/L and the maximum detected concentration detected at the Rogers coal mine was 26 ug/L. Phthalates are ubiquitous in our man-made environment and are common analytical laboratory contaminants. As stated in the "USEPA Contract Laboratory Program, National Functional Guidelines for Organic Data Review" (EPA 540/R-99/008 October 1999, page 77), "The reviewer should be aware of common laboratory artifacts/contaminants and their sources (e.g., aldol condensation products, solvent preservatives, and reagent contaminants). Common laboratory contaminants include: COs (m/z 44), siloxanes (m/z 73), diethyl ether, hexane, certain freons, and phthalates at levels less than 100 ug/L or 4000 ug/Kg." Phthalates should be questioned whenever detected at trace concentrations. To provide information on the degree that phthalates are present in our man-made environment, the Kansas Department of Health and the Environment tested 80 samples of bottled water from retail stores and manufacturers. Forty six of the samples (58%) contained traces of some form of phthalate while 12 exceeded Federal safety levels (http://www.enn.com/news/2003-12-09/s_9212.asp).

ASTDR Toxicological Profiles provides additional information specific to the common use of diethyl phthalate (http://www.atsdr.cdc.gov/toxprofiles/tp73.html). Diethyl phthalate is contained in a variety of consumer products. These include plasticizers for plastic films and sheets, molded or extruded plastic articles (toothbrushes, tool handles, toys, etc.), reported in 67 cosmetics (bath preparations, soaps, detergents, perfumes hair sprays, lotions, etc.) at concentrations ranging from <0.1% to 25-50 %. Diethyl phthalate is used as a component in insecticide sprays and aspirin coatings, besides many more products.

Since diethyl phthalate is so common, it is understandable that it could be found at trace levels in environmental media and in the laboratory. Since diethyl phthalate has not been consistently detected or confirmed from site monitoring stations and private wells, the most logical scientific conclusion is that diethyl phthalate is not a contaminant emanating for the Rogers coal mine. If a consistent, repeated detection of this compound in site monitoring stations occurs in the future, this conclusion should be reviewed. The MTCA Method B cleanup level for diethyl phthalate is 12,800 ug/L in groundwater and 28,400 ug/L in surface water. Therefore trace levels are not considered to be a health risk.

Summary Comment 7th Bullet: The RI/FS Report interprets site data as indicating that groundwater is not impacted by Rogers Seam waste. Flaws in the RI/FS Report data analysis are identified. An alternative interpretation consistent with site data and fundamental hydrogeologic principles is proposed. Rejection of the RI/FS Report interpretation and adoption of the interpretation that Rogers Seam waste is the presumptive source of impacts to at least some nearby potable water supply wells is appropriate and recommended.

Response: There appear to be several issues identified in this bulleted issue. The first issue described is that the RI/FS Report indicates that groundwater is not impacted by Rogers seam. The approach taken during the RI/FS was to treat the coal mine as a "black box" that assumes soils and groundwater in the Rogers coal mine are impacted. RI/FS Report references to groundwater not being impacted are referring to groundwater emanating from the Roger coal mine, not groundwater within the mine. The DCAP clearly assumes that media in the Rogers coal mine contain hazardous substances at concentrations above MTCA levels until proven otherwise.

The second issue described that the Rogers seam should be considered (without substantive evidence) the presumptive source of impacts to nearby potable water supply wells. The response to the previous bulleted issues addresses private wells detections. No confirmed impacts from the wastes disposed in the Rogers coal mine have been noted in onsite monitoring wells or offsite potable water supply wells. The assertion that such has occurred serves only to further an agenda and is not scientifically warranted.

Summary Comment 8th Bullet: The RI/FS Report concludes that characterization of the nature and extent of Rogers Seam contamination is sufficient to permit the development and selection of a site remedy. The limits of the existing data (such as the absence of geochemical test results beyond those developed for an expedited response action and the complete absence of source area groundwater quality data) were reviewed; data indicating that existing source characterization is insufficient were presented in the report. Rejection of this conclusion, and instead requiring effective characterization of the source (particularly given that the RI/FS Report concludes that source characterization in fact poses littler or no risk), is recommended.

Response: The RI/FS and the DCAP assumes that soils and groundwater in the north end of the Rogers coal mine are impacted with hazardous substances above MTCA levels and is considered an existing source. Since contaminants of concern in the waste have not been defined, the DCAP requires long-term monitoring for a comprehensive list of hazardous constituents that potentially may emanate from the waste through the groundwater system in the future. Effective characterization of the source, if possible, would only serve to limit or decrease the number of constituents requiring monitoring in groundwater, as obviously all constituents analyzed probably would not be detected. The decision to monitor a comprehensive list of potential hazardous constituents in perpetuity eliminates the need to characterize the waste or source constituents and is a conservative approach to groundwater monitoring at the site. The DCAP provides the ability for contingent groundwater capture and treatment should groundwater emanating from the mine become impacted with hazardous constituents above MTCA levels. This approach is protective of possible receptors.

Summary Comment 9th Bullet: The RI/FS Report concludes that appropriate COPCs can be and have been selected. The limits of existing geochemical data (such as the complete absence of source area groundwater quality data) were reviewed; data indicating that existing source characterization are insufficient to permit effective selection of COPCs were presented in the

report. Rejection of this conclusion, and the performance of additional source characterization to define appropriate COPCs, are recommended.

Response: The groundwater and soil analytical data have been and are continuing to be evaluated whether detected analytes could be potential contaminants of concern from the waste and whether they represent a potential risk to groundwater users and receptors. The RI/FS Report did not conclude that there are no wastes or hazardous constituents remaining within the Rogers Seam coal mine. Please see response to the first summary comment above. The DCAP assumes that wastes and hazardous substances above MTCA levels exist in the north end of the mine and proposes a remedy to contain, monitor and keep these substances from migrating off-site to potential receptors. As mentioned in the previous response, characterization of the source would result in identifying the actual hazardous substances that are present and limit the conservative long-term groundwater monitoring list of analytes from that proposed in the DCAP. Source characterization as requested is believed to be impossible to achieve to the degree that would be sufficient to limit the number of analytes required during long-term groundwater monitoring. Therefore, source characterization was not proposed in the RI/FS Work Plan or done in the RI. If a future request is made to reduce the list of groundwater monitoring analytes, adequate source characterization would be required if feasible.

Summary Comment 10th Bullet: The RI/FS Report concludes that an appropriate remedy protective of human health and the environmental can be selected based on the existing conceptual model and the conclusions presented in the RI/FS Report. Inadequacies of the assumptions fundamental to remedy selection, and the consequent implications regarding the expected performance of the selected remedy, have been reviewed. Rejection of this conclusion and performance of the recommendations listed throughout this letter report are recommended.

Response: Direct exposure to trench soils/wastes and exposure to groundwater are the operative potential exposure pathways to receptors. The operative pathways are eliminated by the proposed remedial alternative that includes low permeability soil capping, surface water diversion, institutional controls on land use over the Rogers coal mine, institutional controls on groundwater use between the Frasier and Landsburg coal seams, groundwater monitoring at the points-of-compliance, and contingent groundwater capture and treatment should unacceptable concentrations of wastes constituents become detected at the points-of-compliance.

The direct exposure to trench soils/wastes would be eliminated by capping as proposed in the DCAP. The direct exposure to impacted groundwater in the future will be eliminated by the proposed remedy in the DCAP. The proposed point-of-compliance, institutional groundwater controls that are bounded by the Frasier and Landsburg coal seams, account for the possibility of groundwater migrating from the Rogers coal seam laterally through the bedrock. As discussed in the responses above, the groundwater pathways from the mine are being adequately monitored in perpetuity. The provision in the DCAP for a contingent groundwater capture and treatment system if hazardous substances are detected at unacceptable concentrations at the points-of-compliance from the Rogers coal mine will provide future protection to potential receptors from the groundwater pathway.

The RI/FS and the DCAP adapted an approach to minimize migration of waste from the Rogers mine by capping and surface water diversion to minimize the amount of water infiltrating through the waste remaining in the trench and vadose zone and the minimize the amount of water entering and emanating from the coal mine. Reducing the amount of water entering the mine would reduce the amount of waste constituents being mobilized and entering the underlying mine site

water table, slow the migration of contamination that is currently in or below the water table from migrating out of the mine and make groundwater capture and treatment more effective (reduced pump rate for containment), if needed in the future. The DCAP proposed alternative also requires monitoring hazardous substances emanating from the Rogers mine in perpetuity at the points of compliance and would require containment, capture and treatment of contaminated groundwater prior to reaching receptors should hazardous substances migrate at unacceptable concentrations to the points-of-compliance from the mine. The approach proposed in the DCAP is protective of humans and the environment.

Responsiveness Summary

Agreed Order Amendment, State Environmental Policy Act (SEPA) and Determination of Non-Significance (DNS) to Address Infrastructure for a Contingent Groundwater Treatment System

Landsburg Mine Site – Ravensdale, Washington

June 2006

Prepared by the Washington State Department of Ecology
Northwest Regional Office, Bellevue, Washington

Comment 2: Tahoma School District No. 409

Key Concerns: Safety, Capacity, and Compensation

2.1 This letter is in response to the proposed groundwater cleanup at the Landsburg Mine Site in Ravensdale, WA. It is our understanding that one of the proposed cleanup options would be to dispose of contaminated groundwater via connection to a sewer "tight line" that serves Tahoma Junior High School, 25600 Summit-Landsburg Road SE, Ravensdale. The Tahoma School Board has discussed this proposed cleanup option and we have questions and concerns about its possible impact.

The sewer line is designed to serve Tahoma Junior High School and a future school on an adjacent, 38-acre site. The line was not designed for usage beyond the schools' needs.

Ecology's Response:

Ecology will meet with school officials and King County Department of Development and Environmental Services (DDES) to get more information with regard to capacity. The PLP, with review by Ecology, will investigate further the feasibility of the connection with this concern in mind.

2.2 While the school board is pleased that discussion is taking place regarding cleanup of the mine site, the board is opposed to any use of the sewer line that would potentially limit or otherwise affect construction of a school on the 38-acre site.

Ecology's Response:

Ecology and the PLP Group understand the School Board's concern about the possible effect of this line for future growth. It is not the intention of Ecology or the PLPs for the proposed hookup to have negative effects to planned future capacity of the School District's sewer line. The PLPs will seek more information from King County Department of Development and Environmental Services (DDES) and the Soos Creek Sewer District to determine whether the proposed connection of the 4-inch line will affect future capacity for the school.

The PLPs will seek more information to fully understand details of possible plans for the line, background information, owner or user rights, fees, and related issues in order to seek adequate and acceptable resolution to this concern. The proposed 4-inch pipeline is not a sewer connection due to its small diameter pipe. This makes it unsuitable for developmental purposes and is against its original design parameters and purpose. The original design parameters and purpose is to convey pretreated groundwater from Landsburg Mine site if groundwater is detected above state cleanup levels.

2.3 A companion issue is whether the school district would receive compensation for use of the line, which was paid for by the district.

Ecology's Response:

The PLPs, under Ecology's review, are investigating the issue of compensation for the proposal.

2.4 Finally, the school board is concerned about the risks of sending toxic effluent through the line that serves more than 1,000 students and staff

Ecology's Response:

The pretreatment process will significantly remove or reduce the concentrations of contaminants before disposing to the discharge line. The pre-treated water will be conveyed through a pipeline into the sewer or publicly owned treatment works (POTW), for secondary and tertiary treatment. It will be pretreated to discharge levels that will follow the substantial requirements of the POTW for conveyance into their sewer treatment system.

Since we do not know what contaminants might be detected due to the fact that no contamination has been found at this site, it is sufficient at this point to say that pretreatment will be to or below acceptable discharge limitations for safe discharge to a POTW. The water quality or concentrations of various contaminants of concern must be reduced to low enough levels for the POTW to effectively apply their own secondary and tertiary treatment; otherwise, it would be expected to provide a strain to such facilities.

Ecology will require the PLPs to ensure that back flow prevention of their discharge water to the school is included in the design for connection to the existing Soos Creek Water and Sewer District's sanitary sewer line.

At present, there is a greater risk at this site due to lack of such infrastructure (treatment pad, access road, and discharge pipeline connection) needed under a contingency plan to address the possibility that contaminated water is detected at the site above cleanup levels at its points of compliance.

Springs gallery in 1990 (over 15 years after the coal mine had closed and the disposal of wastes occurred). Ecology finds that there are no technical grounds for such a statement, given lack of any detected contamination of a magnitude or type expected to derive from such wastes as seen from groundwater chemistry studies at this site.

3.5 Due to the largely unknown composition of many of the 4,500 barrels, and unknown quantities of other industrial contaminants dumped down the Landsburg Mine and Rogers Seam, all cleanup, capping, isolation, removal or other disposal of waste products on or likely emanating from this site should be held to the standards of hazardous waste treatment and disposal. The Model Toxics Control Act should not be waived on activities pursuant to resolution of these issues unless it can be adequately demonstrated to be in the public interest, particularly in regards to safety.

Ecology's Response:

Under the Model Toxics Control Act (MTCA) Cleanup Regulation, the standards for cleanup levels of hazardous substances are mandated under state law based on toxicological and/or risk-based calculations or other considerations such as applicable state and federal laws (ARARS). Standards for dangerous waste transport, treatment and disposal are applicable for generators of dangerous waste, not for cleanup of contaminated media (soil, water) at a property. However, dangerous waste standards are automatically adhered to when activities at the site are relevant to this process. The same standards for disposal of dangerous waste are adhered to as a matter of procedure and in collaboration with or under the direction of the appropriate regulating agency, be it state or local government.

For more details on MTCA cleanup standards see WAC 173-340-700 to 760. This provides the background material needed to understand the cleanup standards adhered to under MTCA cleanup in order to protect human health and the environment. These standards for cleanup have always been the benchmark for monitoring and remediation activities for all formal cleanup sites, including Landsburg Mine, under the Toxics Cleanup Program.

3.6 No action should be taken that increases the distribution of contaminants from this site to other waters of the State of Washington, including, ultimately, Puget Sound, by way of effluent discharge to a County sewer line.

Ecology's Response:

At present, Ecology believes there is greater risk to human health and the environment if no action is taken at this site. To eliminate or minimize this risk it is important to install infrastructure for the contingent groundwater treatment system.

If contaminated groundwater is detected at the site, the groundwater will be pumped out to prevent its release to the environment. This groundwater will then be pre-treated. It is important to have the infrastructure available to safely and reliably dispose of the pre-treated groundwater.

The length of time needed to get the appropriate permits or approvals to install the infrastructure could present problems with storing and disposal of the pumped water on-site. The most significant delay will be the procedures to obtain the various permits or approvals to construct infrastructure to house the treatment system, a reliable, robust, and cost-effective way to dispose of the pre-treated groundwater without discharging into the environment.

The purpose of the proposed interim action is to prevent any contaminants that may be present at the site in the future from migrating from the site. If the infrastructure is in place and any contaminated groundwater is detected emanating from the site, the PLPs can respond quickly by installing a treatment system that will pre-treat the identified contaminants to such a level that the groundwater may be safely piped to a POTW for final treatment prior to discharge to waters of the State. If the infrastructure is not installed now, the length of time required to obtain permits and approvals necessary to install the infrastructure could result in contaminants leaving the site.

For more information, see 2.4 above.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Northwest Regional Office • 3190 160th Avenue SE • Bellevue, Washington 98008-5452 • (425) 649-7000

August 5, 2008

Dr. Douglas Morell
Golder Associates Inc
18300 NE Union Hill Road Suite 200
Redmond WA 98052-3333

Dear Dr. Morell:

Re: Responses to Ecology Review Comments on the March 20, 2002 Landsburg Mine Consent Decree Document and Exhibits (including Draft Cleanup Action Plan)

Thank you for the effort that you and the Landsburg Mine PLP Group (Group) put into responding to Ecology comments on the Draft Cleanup Consent Decree and Exhibits dated March 20, 2002.

Please find attached Ecology's position on the Group's responses. Ecology believes that much of the material provides sufficient rationale for the preferred remedial alternative and compliance to MTCA minimum thresholds for cleanup, with improved clarification and response to the concerns of the community, its stakeholders and local government.

Ecology and the Group should be able to proceed with finalizing the Consent Decree and Cleanup Action Plan once the Group has carried out the following general outline of tasks:

1. Work with AAG Elliot Furst to produce an updated draft Landsburg Mine Consent Decree.
2. Revise the Technical Memorandum on Monitoring Frequency Based on Travel Times. This will include sensitivity analyses and modified model simulations so that Ecology can decide on an appropriate long-term groundwater monitoring frequency for the site. The memo will include reverse fate and transport modeling to determine contaminant velocities at the site, as well as the other activities provided in the Group's response.
3. Revise the relevant portions of the document with the agreed upon edits.

Please work with Ecology on a specific timetable whereby these tasks may be finished. Ecology will work with you with final editing of the Consent Decree and Exhibits, and public involvement as per MTCA regulations and terms of the negotiated Consent Decree. Regarding a path forward to cleanup, my proposal is to: 1) have the Consent Decree and Cleanup Action Plan (CAP) ready for public comment before the end of the last quarter of this year, 2) carry out all public outreach activities and write the final Engineering Design within the first quarter of 2009, and 3) implement the CAP starting in the second quarter of 2009.

Please don't hesitate to contact me if you have any questions or comments.

Sincerely,

Jerome B. Cruz, Ph.D., L.G., L.H.G.
Toxics Cleanup Program

jc/kp

Attachments:1

cc: William Kombol, Palmer Coking Coal Co.
Barbara Smith, Harris & Smith
Mike Mactutis, City of Kent Environmental Engineering Manager
Kelly B. Peterson, City of Kent Environmental Conservation Supervisor
Larry Blanchard, Director of Public Works, City of Kent
Elliot Furst, Assistant Attorney General, Ecology Division
Ching-Pi Wang, WA State Department of Ecology
Richard Bonewits, Greater Maple Valley Council
Nathan Brown, Cedar River Council

Technical and Administrative Comments on the March 20, 2002 draft of the Landsburg Mine Consent Decree and Exhibits:
(Ecology's response to PLP comments are in italics)

MAJOR COMMENTS

EXHIBIT B: DRAFT CLEANUP ACTION PLAN

6) Page 4, 2.1 Site Description, 3rd paragraph: Ecology site manager Jerome Cruz observed hikers walking along trails, and evidence of horse riding trails at the site. It is being used for recreational purposes. Are these authorized activities on the site?

PLP RESPONSE:
These are not authorized activities on the Site unless a person(s) has written permission from Palmer Coking Coal Company. A locked fence surrounds areas of the site that contain waste materials and prevents people from contacting waste materials during allowed recreational uses. Palmer Coking Coal Company does allow walkers, hikers, bicyclists, and horseback riders to access its property after signing a "Limited Access Permit" (i.e. written permission). Under the terms and conditions of the "Limited Access Permit" the permittee agrees to abide by all federal, state, county, and local laws and to access the property during daylight hours only. All "Limited Access Permits" are revocable at any time. It has been determined that the presence of responsible, law abiding, walkers, hikers, bicyclists, and horseback riders helps discourage use of the site by vandals, and other destructive individuals. The presence of "many sets of eyes" helps prevent the site from being used by those whose goal is trespass, vandalism, and destruction.

Ecology response:
Ecology would like to request a copy of the release form and will seek AAG Elliot Furst's counsel on this. Clearly marked signs should be placed on the fenced area to warn people that this area of the site contains waste materials that would put them at risk.

8) Page 12, 5th paragraph under "Groundwater": A study or an evaluation is needed of natural background concentrations of chemical constituents such as metals (manganese, arsenic, maybe iron) to explain their observed high values above secondary MCLs and Method B levels at the site. This background study must be incorporated as a section in the cleanup action plan.

RESPONSE:
The Landsburg Mine Site, specifically the Rogers Coal Mine, represents a unique hydrogeologic setting. The mine traverses a steep hillside that has prominent streams/rivers (Rock Creek and Cedar River) on each side of the hill. The Rogers Coal Mine is situated between these prominent surface water bodies and crosses their drainage divide. The data collected at the site indicates that the groundwater divide between these

remain uncertain, no matter how much investigation was or could be conducted. Please see our response to Ecology Major Comment # 36 for additional discussion on travel time details and our proposed manner to establish protective groundwater monitoring frequencies for the site.

Tables

18) Table 1: Ranking used for alternatives does not seem clear.
Option 9: Why is short term effectiveness ranked "0"? Why "4" for reliability? Why not higher rankings such as "5" or "6"?

Option 5: Why rank it as 8.3? Where do the .3, .5 fractions come from? What is the basis for using fractions (6.8, 6.6, 6.4,0) for short term effectiveness compared to assigning whole numbers?

Why is alternative 9 scored "0" under Implementability?

Why are there differences in short term effectiveness and implementability between alternatives 5, 6, and 7?

RESPONSE:
These rankings were from the Ecology-approved and final RI/FS that underwent public review and comment. The rankings were presented and discussed in the RI/FS. This section of the DCAP is a summary of the FS process and the results of the FS evaluation. If Ecology feels that a more detailed explanation of the rankings are necessary for the CAP, we will add further explanations rather than summarize the results from the FS.
Ecology response:
Accepted – language and ranking system should be maintained as specified in the approved FS. Please retain original content.

Exhibit E Draft
Compliance Monitoring Plan
Operation and Maintenance Plan
Contingency Groundwater Extraction and Treatment Plan

19) There is no response plan that details corrective measures that utilize the contingent groundwater extraction and treatment at the site. Provide a more detailed response plan in the case where the contingent groundwater treatment system would have to be used. The plan should include the specific actions and equipment for groundwater extraction to prevent offsite migration of groundwater contamination if detected at the site. It should include further steps to ensure short term protection, and all alternatives to long term protection, such as considering eventual dewatering of the mine if detected contamination is unabated and the contingency extraction is determined to result in medium to long term adverse effects to water resources.

RESPONSE:
We will provide more details on the groundwater quality results that would trigger consideration and the decision process to activate the groundwater extraction and treatment system. Additional details on a potential groundwater extraction system will be provided in PART C. Since the hazardous substances that may require treatment are not known, the treatment technology cannot be defined. Treatment technologies are constantly changing and are not appropriate to provide details of a treatment system that likely will be outdated and may not be the best technology when needed. We propose to remove details of a potential treatment system in Part C since this is speculative until or unless a treatment system will be needed. PART C will be modified to describe the process for installing a treatment system and the associated Treat System Design Report, Compliance Monitoring Addendum and O&M Plans that is specific to the selected treatment system, but will defer technology selection in PART C until the time in which treatment is necessary. Treatment technologies are well established for potential contaminants that may emanate from the mine and could be designed, installed and become operational in a short time. The contingent groundwater treatment system will include and detail an emergency groundwater extraction and pump-back system to the mine workings to prevent contaminants from escaping the compliance boundary at concentrations above MTCA while the treatment system is being installed. The emergency groundwater capture and pump-back system could be installed and operational in less than a month.

Ecology response:
Ecology will require the submission of the draft corrective action plan within a timely manner, such as 2 weeks and Ecology approval before the treatment system is implemented. (see comments further down).

Due to outside concerns over short travel times of potential contaminants to the City of Kent Rock Creek water supply, the installation of the emergency groundwater capture and pump-back system (if the contingency is triggered) must be capable to installation within a shorter timespan than a month. Ecology suggests a response time within a week to get the needed groundwater capture system in place and operating.

20) Operation of the contingent groundwater treatment system should include performance monitoring of effectiveness of the contingency plan. This should include plans for surface water and groundwater monitoring before reaching the surface water receptors from the portal areas. Specifically, if groundwater extraction is needed using the portal well(s), groundwater monitoring should be performed at wells located in glacial outwash or alluvial deposits near the Cedar river and/or Rock Creek, along with surface water monitoring. This will confirm that contamination has not migrated offsite and impacted nearby surface waters.

RESPONSE:
The Compliance Monitoring Plan – Part C will include details on performance monitoring of effectiveness of the groundwater capture and Contingent Groundwater Treatment System. The performance monitoring will include:

monitoring, will it be too late to compensate for potential off site migration? Note that these analytes will be measured starting first year of long term monitoring only.

RESPONSE:
Releases of hazardous substances could occur during construction for CAP implementation by the two main mechanisms:

1. **Exacerbation of disposed waste materials in the mine by compression from cap installation; and**

2. **Spills and releases from construction use and storage of fuels and construction materials containing hazardous substances.**

Short-term monitoring is intended to monitor releases that may occur as a result of exacerbation of mine waste materials (release mechanism #1 above) during construction. We do not agree that the additional suggested field parameters (turbidity and DO) are necessary for compliance monitoring since there are no associated regulatory levels and will not provide definitive indication of a release. We do agree that metals and VOCs should be included for analysis during short-term monitoring in groundwater wells, because some metal and VOC constituents could be in the disposed mine waste and be relatively mobile. We do not believe that short-term analysis for SVOCs, OCPs, and PCBs are necessary because they are not mobile (based on their K_{oc}) and will be monitored during the long-term monitoring program. We propose to conduct short-term monitoring once per month during trench back-filling activities.

Ecology response:
Turbidity can be a physical manifestation of mechanical forces "stirring up the groundwater". Changes in DO may do the same. Compressive forces or pressure wave propagation during cap emplacement may cause changes in turbidity or DO that may be strong secondary evidence of exacerbation of waste materials at a shorter turnaround time. Furthermore, Turbidity and DO are standard well measurement QA parameters that are employed in well water sampling, so their measurement for these purposes still apply without hardship. These should be measured and variations monitored as a matter of course during the short term monitoring. Turbidity and DO may thus provide strong supporting evidence for exacerbation or perturbation of the disposed waste materials in the mine during cap installation, especially when compared to measurements before cap installation.

Releases from construction fuel and hazardous substance materials storage and use will be abated immediately and monitored as needed. An Ecology-approved Spill Prevention, Control and Countermeasures (SPCC) Plan will be established by the contractor for hazardous substances used and brought to the construction site. The SPCC Plan will be an identified requirement in the PART A for short-term monitoring in the Compliance Monitoring Plan.

Part B Operation and Maintenance Plan

26) Page B-1, 2nd paragraph: Is an O & M plan not needed for the possible operation of the Contingent Groundwater Treatment System?

RESPONSE:
An O&M Plan for the Contingent Groundwater Treatment System should not be completed until the treatment system is needed. The hazardous substances that will require treatment are not known and the treatment technologies that will be most appropriate when required are constantly changing. Please see our response to Ecology Major Comment # 19 above. Part C - Contingent Groundwater Treatment System will identify the requirement for a Compliance Monitoring Plan Addendum and O&M Plan that is specific to the selected treatment system.

Ecology response:
Ecology understands the PLP Group's point about not having a treatment technology until the contaminant is known or detected. What is being referred to is a plan for pumping operations, disposal of treated water, rate and what duration it will be maintained, and how will performance of containment be measured. If this plan can be submitted to Ecology within one week after identification of a groundwater threat, then this can be made as a requirement in the consent decree without commitment into details on appropriate treatment technologies.

27) Page B-2, Erosion: Is there a possibility of appreciable erosion at the ends of the trench fill (north and south)? Does the fill terminate in pillars at these ends?

RESPONSE:
The design for the cap will incorporate provisions to control and minimize erosion. This is a common feature of all earthen cap designs. For the north end of the cap, long-term erosion will be controlled by the final engineered grade that is sufficient for the cap materials and by establishing a stable vegetative cover. For the south end of the cap, the cap will terminate at a mine pillar (between Trench 7 and 6), which will prevent erosion to the south.
The low permeability cap will be sloped for drainage toward the east and west to stormwater diversion ditches. These cap side slopes will be engineered and stabilized by the final grade that is acceptable for the cap materials and by a vegetative cover.

28) Page B-2, Cap Settlement: If cap monuments will not penetrate cap, they will not be stable benchmarks to base geodetic measurements (or site surveys) on. Ecology recommends that a "reference" monument or benchmark is set into bedrock along the trench edges to shoot surveys from. Alternative measurements using GPS may be proposed.

RESPONSE:
We will identify and define in the O&M Plan (Part B) that geodetic benchmark(s) on exposed bedrock adjacent to the capped areas will be established by a State-certified surveyor for comparison and calibration of the surveyed cap data.

29) Page B-3, 1.4 Maintenance, last paragraph: What qualifies as severe erosion and/or settling? Breaching of the low permeability soil cap? One suggestion is to have a way to

Robb Bakemeier

From: Cruz, Jerome (ECY)
Sent: Monday, July 02, 2012 7:46 AM
To: DMorell@golder.com; 'Palmercokingcoal@aol.com'
Cc: Jaffe, Dori (ATG); Warren, Bob (ECY); Wang, Ching-Pi (ECY)
Subject: FW: Final Comments on exhibits to Landsburg Mine consetn decree
Attachments: Exhibit E-Part B OM Plan_6-5-12.docx; Exhibit B - DCAP_06-05-12.docx; Exhibit E - contingency_Part C_6-5-12.docx; Exhibit E - Part A ComplianceMonPlan_06-05-12.docx; Exhibit E -Intro_06-05-12.docx; Ex D_PPP_06-5-12.docx; Exhibit B-Appendix B_SEPA_ 06-05-12.docx

Forgot to add a message title.

WASHINGTON STATE DEPARTMENT OF ECOLOGY
Jerome B. Cruz, Ph.D.
Toxics Cleanup Program, Northwest Regional Office
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From: Cruz, Jerome (ECY)
Sent: Monday, July 02, 2012 7:44 AM
To: DMorell@golder.com; 'Palmercokingcoal@aol.com'
Cc: Jaffe, Dori (ATG); Warren, Bob (ECY); Wang, Ching-Pi (ECY)
Subject:

Doug and Bill,
Please find combined comments from Dori Jaffe from the AGO and me on the exhibits to the consent decree. Exhibit C containing the schedule is locked, so Dori wasn't able to redline the document. Her comments on the schedule are below.
Please forward the files to other members of the PLP Group as necessary.
Thanks,
Jerome

COMMENTS ON EXHIBIT C SCHEDULE (Dori Jaffe, AGO):
Since I can't comment in tracked changes on Exhibit C, the schedule, I included them below in bulleted format:

- I don't understand why this is only a construction schedule. Why isn't it a scope of work and schedule for the entire project from start to finish?
- The schedule in Section 1.3 of the O&M Plan should be included in this Exhibit C so everything is in one place and is easy to access
- Everything in this "schedule" are deadlines for submission. They didn't include any of the substantive requirements or citations to the WAC. This is atypical for the scope of work and schedules I have seen for other Consent Decrees.
- There is nothing in the schedule about submission of the construction plans and specifications, yet every other plan (CMP, O&M, contingency plan) states that they will be submitted.
- When are the as-builts submitted?

- There is no timeline for the monitoring schedule (which I presume is because they only want this to be a construction schedule, but I really think the monitoring schedule should be laid out in this document as well, so there is no confusion regarding when the monitoring is required to occur and so you don't have to parse through multiple documents to find the schedules)
- Nothing about institutional controls, progress reports, compliance monitoring reports in the schedule.
- No mention of the contingency plan – the cap maintenance schedule, infrastructure maintenance, fence removal. These are all key items that should be included in an overall schedule. The O&M plan states that a treatment technology O&M will be submitted if contingency is triggered, this should be included in the schedule. Right now, there is no schedule for the contingency plan. The schedule should include deadlines to submit the engineering reports, construction plans, O&M plan for the contingency. I realize they won't be "exact dates" they will be more like "60 days after the conformation samples indicate that we've reached 0.5 of the cleanup level"
- I'm confused about the HASP plan , short term monitoring and QAPP – according to the schedule these are already done. Are they submitting those now for review? Is it being attached to the suite of documents? If it's does before this schedule takes effect, then why include it?
- I wouldn't include in the schedule the finalization of the consent decree, CAP and SEPA – since all those will occur before this schedule is submitted to the court. It will all be in the past and therefore is useless information
- The submission of the engineering report – there is no mention in this schedule for Ecology's review . it just gives "durations" "start" and "finish" – I presume that Ecology's review period is supposed to be built into those timeframes, but it's a poor system that lacks specificity.
- For the first season CAP – it says its starting in May 2012 – how can you start working on the implementation of the CAP when the CD hasn't been entered into yet and the CAP has not been approved?
- I disagree that they can predict what month and year they will be submitting the cleanup action report. Are they presuming that they will never have to implement the groundwater contingency plan? Are they planning on submitting this report prior to that determination? The cleanup action report is done when the entire remediation is completed. Perhaps they can do a partial report when the engineered cap is done, but groundwater monitoring appears to be going on indefinitely, so how are they planning on addressing that?

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REPORT

DRAFT

CLEANUP ACTION PLAN

Landsburg Mine Site
MTCA Remediation Project
Ravensdale, Washington

Submitted To: Washington Department of Ecology
3190 – 160th Avenue SE
Bellevue, WA 98008

Submitted By: Golder Associates Inc.
18300 NE Union Hill Road, Suite 200
Redmond, WA 98052 USA

Submitted On Behalf Of: The Landsburg Mine Site PLP Group

Comment [DJ1]: This entire cover sheet will need to be replaced with an Ecology cover sheet. Under WAC 173-340-380, the dCAP is an Ecology issued document, so while we ask PLPs to do them, Ecology has to own the document and it has to be written as if Ecology did it, not the PLP. Please remove the Golder footer as well.

February 29, 2012

Project No. 923-1000-002.R154

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Alternative 9 (Excavation and Disposal) is a permanent remedy and had the overall lowest score for cost effectiveness and net-benefit. This ranking reflects the many problems associated with excavation and the uncertain benefit (i.e., lack of reliability). The lack of reliability on Alternative 9 as a cleanup solution stems from the inability to actually remove all of the waste materials and the commingled impacted mine/bedrock materials. The removal of waste and mine collapse debris is not considered technically possible and is impracticable. The mine collapse debris was found to flow during the drilling of deeper wells (i.e., LMW-11). Because the mine debris would flow toward an excavation, mine debris removal/excavation would create a constant flow of mine debris to the excavation, rendering it either impossible or impracticable to extend the excavation deeper into the mine workings. In addition, the mine is not completely vertical, which makes excavation more difficult at depths. Furthermore, specific locations of the waste within the Rogers Seam are not well known and cannot feasibly be determined because detailed sampling cannot provide definitive locations of all impacted areas to allow reliable and complete removal. Total removal of all wastes could not be verified by observation or detailed confirmation sampling. As a result of the inability to confirm total waste removal, it is likely that another alternative would have to be implemented for protection. Alternative 9 (Excavation and Disposal) would be much more likely to cause actual harm to humans in the form of construction accidents for Site workers (difficult and dangerous excavations with potential mine subsidence) and traffic accidents in the community (truck traffic). Remediation workers would also be much more likely to be exposed to waste constituents during implementation of Alternative 9, than from the other alternatives. These known risks were balanced against the potential risks of the other alternatives and resulted in Alternative 9 not being recommended.

After the non-cost evaluation, a comparison of the cost and benefit of the alternatives was made. Under WAC 173-340-360(3)(e)(ii)(c), "a cleanup action shall not be considered practicable if the incremental cost of the cleanup action is substantial and disproportionate to the incremental degree of protection it would achieve over a lower preference cleanup action." Thus, the alternative with the highest ratio of incremental benefit to incremental cost is the preferred alternative. As shown in Table 1, Alternative 5 (Low-Permeability Soil Cap) provides the best incremental cost-to incremental benefit ratio of the alternatives.

Comment [DJ12]: I cannot find this quote in section 173-340-360(3)(e)(ii)(c). This needs to be corrected

5.3 Proposed Cleanup Action Plan

Comment [DJ13]: Unless I missed it somewhere in this DCAP, where do you discuss the restoration timeframe? In my opinion, the restoration timeframe is indefinite. The CAP needs to address and make it clear that the monitoring will go on indefinitely (in perpetuity) and the soil cap will be maintained indefinitely. Right now, that is not clearly stated. You'll see a series of comments relating to this point.

The remedy proposed for the Site is Alternative 5 (low permeability soil cap). A conceptual design of this alternative is shown in Figure 14. This alternative provides a low-permeability soil cap over the backfill of the trenches. The permeability of this soil would be no higher than 10^{-6} cm/sec, and the cap would thus meet MFS specifications in WAC 173-304. The major steps in this alternative are:

1. Backfill the trenches as required for capping (as described below).
2. Allow the backfill to consolidate.

3. Place a low-permeability soil cap over the backfill of the trenches, including grading and surface water management (as described below).

4. Maintain the cap until residual hazardous substance concentrations no longer exceed cleanup or remediation levels under MTCA.

5. Implement and maintain institutional controls, ~~and~~ groundwater monitoring and any instituted contingency plan (as described below).

Comment [DJ14]: I have a problem with this statement (and will highlight it in every document that contains the same sentence). The contaminated soil under the CAP will never meet cleanup standards since you are containing it. So this statement is wholly inaccurate. This is where you need to say that you will maintain the cap indefinitely (or in perpetuity or until you are told by ecology that you don't need to anymore)

The areas that would be capped (areas 7, 8, and 9) are shown on Figure 15. This delineation is based on the areas of waste disposal identified in the RI/FS. The cap would extend slightly beyond the trenches on both sides to provide anchor zones and "overhang". Fill material may extend into area 6 if necessary and as appropriate to provide a buttress to the narrow pillar wall separating areas 6 and 7. Furthermore, it has been determined through the RI/FS and accompanying RI/FS Responsiveness Summary that capping and in-filling of the trenches (i.e. including the southern portion of the trenches in the proposed cleanup action) does not provide additional protection. Capping or in-filling the southern trenches do not provide beneficial protection from waste materials because:

- there is no indication that wastes were deposited in the southern trenches, therefore waste cannot be mobilized by infiltrating water in the southern trenches;
- groundwater quality in the mine, including the southern portion of the mine, is not currently impacted from waste disposal, therefore reducing the amount of groundwater infiltrating to the south half of the Rogers Seam has no benefit;
- the groundwater divide in the southern portion of the Rogers Seam keeps groundwater in the northern portion that is beneath the deposited waste materials from migrating toward the south and toward the City of Kent water supply watershed; and
- infiltration of rainwater into the open subsidence trenches in the south half of the mine ensures the permanency of the mine groundwater divide and the hydraulic isolation of the south half of the mine form the north half where waste were disposed.

These reasons provide the justification for only capping trenches in areas 7, 8, and 9.

Surface water runoff from the cap ~~would~~ will be collected in drainage ditches and directed as appropriate. The cap will be sloped to optimize stability and encourage rainwater runoff to minimize rainwater infiltration to the maximum extent possible. The cap slope will include doming the centerline of the cap (option not shown on Figure 14) or sloping from one side of the trenches to the other where elevations differ (option shown on Figure 14).

The major benefit of capping ~~would~~ will be to reduce rainfall from entering and infiltrating through any waste remaining on-site and reduce the amount of groundwater flowing through the Rogers Seam workings, and maintaining the groundwater divide located in the southern portion of the mine from shifting toward the north. Another common benefit of capping, prevention of direct contact and off-site migration in stormwater or dust, is provided by the backfill of the trenches.

specifications (cap thickness and permeability requirements), and to confirm the attainment of cleanup standards and/or relevant performance criteria. Health and safety monitoring will also be performed to ensure that Site workers are not exposed to undue or unexpected risks. Protection monitoring includes short-term groundwater monitoring, as discussed in the Compliance Monitoring Plan (Exhibit E, Part A of the Consent Decree).

Comment [DJ17]: This is for performance monitoring. They are two separate things: protection monitoring and performance monitoring. There should be a section on both in here.

Comment [DJ18]: There should be a reference in here to the HASP

Since the selected remedy involves containment, attainment of cleanup standards is not applicable to the selected remedy.

5.3.5.2 Confirmational Monitoring

Confirmational monitoring will be conducted for the following purposes: 1) to verify that the remedy performs as expected over time, and 2) to allow timely maintenance of a cap and other physical components of the alternative. Periodic Site inspections and surveys will be sufficient for determining maintenance needs and monitoring cap performance. Cap performance is also monitored by groundwater monitoring. Confirmational monitoring will continue until residual hazardous substance concentrations in all Site media no longer exceed cleanup ~~or remediation~~ levels under MTCA.

Comment [DJ19]: Alternative what?

Comment [DJ20]: You will never attain cleanup standards since you are containing the contamination under the cap. This is an inaccurate statement. You will be performing this monitoring indefinitely

Doesn't this sentence also conflict with the sentence in section 5.3.5.1 "since the selected remedy involves containment, attainment of cleanup standards is not applicable to the selected remedy."

It is my understanding that confirmational monitoring will be indefinite. This needs to be clearly stated.

Cap Monitoring: Cap monitoring will consist primarily of visual inspections for damage and subsidence. The cap will be periodically examined for the presence of offsets, scarps, low-points, ponded water, odd changes in grade, excessive erosion, and the condition of the vegetative layer. For the first year, such inspections may be performed on a quarterly basis and would eventually be reduced to once a year for the post-closure period. It is expected that the vegetated cover will be maintained including as needed mowing to prevent the establishment of deep rooted trees or bushes.

In the event of an earthquake of Intensity IV or greater (Modified Mercalli Intensity Scale) in the area, the cap will be inspected for damage and repaired accordingly. Water from the north and south portal areas will be inspected for signs of anomalous water quality (color, turbidity, odor, etc.). Ecology will be notified of site conditions within seven (7) days and a decision will be made between the property owner and Ecology on taking groundwater samples from site wells in accordance with the sampling network, protocols, and analytical methods of the Compliance Monitoring Plan in the Consent Decree (Exhibit E). Contingency actions will be implemented in accordance with this plan.

Comment [DJ21]: This was inadvertently left out of the dCAP. We have also added this to the O&M Plan

Groundwater Monitoring: Groundwater monitoring would include periodic groundwater sampling and analysis as described in the CMP at selected key locations throughout the Site to confirm that concentrations of constituents of concern from prior waste disposal activities do not exceed acceptable limits at the conditional points of compliance. Site groundwater currently meets remediation goals, so the monitoring program will be designed for early detection of a release to Site groundwater of potential contaminants attributable to the disposal of waste in the trenches, should it occur. Because groundwater from the trenches is channeled by the sidewalls with near vertically sloping rock strata, which provide a

wide range of potential VOCs that are mobile. Any detections or anomalies in the screening analyses would be subject to more laboratory analysis for confirmation of the detection. If the detection is confirmed, then samples from the effected well(s) would also be analyzed for priority pollutant metals and organic compounds using United States Environmental Protection Agency (EPA) methods 8270 and 8081. At the completion of the remedial action construction, sampling will extend for an additional month following the same sampling program.

- Confirmational monitoring would initially (after remedial construction is completed) consist of annual and screening-level monitoring. Annual monitoring would provide comprehensive monitoring for specific contaminants of potential concern, and would include VOCs, SVOCs, total petroleum hydrocarbons, PCBs, pesticides, and trace metals. Selected general water quality parameters (pH, specific conductance, dissolved oxygen, turbidity, and total dissolved solids) would also be included. Screening-level monitoring would be conducted when the monitoring is more frequent than annual (i.e., quarterly or semi-annually), and would include analysis for VOCs (EPA Method 8260), trace metals, pH, specific conductivity, dissolved oxygen, and turbidity. More in-depth analysis would then be performed if screening analysis indicated that constituents may be present in the groundwater at levels of concern (at least 50 percent of the respective MTCA Cleanup Level.

  Sentinel wells will also be included in the confirmational monitoring program. Sentinel wells will be used as an early warning for impacted groundwater migration. Four new sentinel wells will be installed prior to the completion of the remedial action. LMW-9 and LMW-11 are also considered sentinel wells.

  Confirmational monitoring would start at the completion of the remedial action in sentinel and compliance wells. The confirmational monitoring frequency would be quarterly for the first year, semi-annual for the next four years, and annual for the next five years. After 10 years (or until hazardous substances are below MTCA Cleanup Levels in media throughout the Site), the confirmational monitoring will decrease in frequency again, but the frequency will be analyte- and well location dependent, as follows:

  - LMW-2, LMW-4, LMW-10, Deep North Sentinel Well (yet to be installed), Shallow North Sentinel Well (yet to be installed), LMW-6, and LMW-7 will have a monitoring frequency of 2.5 years for VOCs and TPH; and every 5 years for metals, SVOCs, PCBs, and chlorinated pesticides.
  - LMW-3, LMW-5, LMW-8, LMW-9, MWL-11, South Shallow Sentinel Well (yet to be installed), Dual South Sentinel/Cap Effectiveness Well (yet to be installed) will have a monitoring frequency of 5 years for VOCs and TPH; and every 10 years for metals, SVOCs, PCBs, and chlorinated pesticides.

  These frequencies were based on the evaluation of BIOSCREEN modeling, the results of which were summarized by Golder in a report (2009a) and approved by Ecology in their letter dated January 21, 2010.

Comment [DJ22]: Same comment - How will this ever be attained? The contaminated soil is being contained, you will never reach MTCA cleanup levels. Conformational monitoring will go on indefinitely. Please restate this

5.3.5.4 Response If ~~Cleanup~~ Remediation Levels Are Exceeded

A response action will depend on information obtained from groundwater monitoring and cap inspections. In the event that a contaminant (that could be directly attributable to the disposal of waste in the trenches) is detected and confirmed within groundwater from a sentinel well or a compliance well at specific concentrations, remedial actions are triggered. Remedial actions are summarized below, but additional details are provided in Exhibit E - Part A Compliance Monitoring Plan:

Comment [DJ23]: How will you know? What does "directly attributable" mean?

Sentinal Well Detections:

- If following validation of a laboratory detection greater than 0.5 times the MTCA Cleanup Level at a sentinel well, the Group will inform Ecology and confirm the detection by re-sampling the compliance well and will analyze for the analyte that was detected over 0.5 times the MTCA Cleanup Level. If the detection in a sentinel well is confirmed by re-sampling, the Group will notify Ecology and will conduct an "alternative source evaluation" to understand if the detection is caused by another source other than the waste disposed in the Roger's mine trenches. The detection at a sentinel well does not trigger a remedial response action other than to evaluate whether the detection could be from a source other than the waste disposed in the Roger's subsidence trenches. The sequence of steps for detections at sentinel wells is shown on Figure A-8 in Exhibit E – Part A.

Compliance Well Detections Over 0.25 MTCA Cleanup Levels:

- If following validation of the laboratory data (QA/QC) the detection at a compliance well is over 0.25 of the MTCA Cleanup Level, the Group will inform Ecology within seven (7) days and then confirm the detection by re-sampling the compliance well. The sample will be analyzed for the analyte that was detected over 0.25 MTCA Cleanup Level.
- If the analytical validation and confirmation re-sampling results confirms that the analyte is present within groundwater from the compliance well at a concentration that is 0.25 of the MTCA Cleanup Level, the Group will notify Ecology within seven (7) days and then conduct an "alternative source evaluation" to evaluate if the detection is caused by another source other than the waste disposed in the Roger's mine trenches.
- If an alternative source of the detected analyte is not identified, the Group will then commit to increasing the monitoring frequency as per Table A-3. The increased monitoring will only be for groundwater at the particular compliance well and for the particular analyte having a validated and confirmed detection above 0.25 of the MTCA Cleanup Level. This sequence of steps for detections at compliance wells is shown on Figure A-9 in Exhibit E – Part A.

Compliance Well Detections above 0.5 MTCA Cleanup Level:

- If following validation of the laboratory data (QA/QC), the detection is determined valid and the detected concentration is over 0.5 of the MTCA Cleanup Level at a compliance well, the Group will inform Ecology of the detection within seven (7) days and then confirm the detection by re-sampling the compliance well and analyzing for the analyte that was detected over 0.5 MTCA Cleanup Level.
- If confirmation re-sampling does not confirm the contaminant at a concentration above 0.5 of the MTCA Cleanup Level, then the confirmational monitoring cycle will continue without the implementation of corrective remedial action to install the Contingent Groundwater Treatment System (see Figure A-9 in Exhibit E – Part A).
- If the confirmation re-sampling confirms the concentration of the contaminant above 0.5 of the MTCA Cleanup Level in a compliance well, Ecology will be informed within seven (7) days and then the Contingent Groundwater Treatment System presented in Exhibit E – Part C will be implemented and installed as the corrective remedial action for containment and treatment of impacted groundwater. Groundwater containment (pumping and treatment) will not be initiated unless groundwater concentrations of contaminants reach MTCA Cleanup Levels at a compliance boundary well(s). Treated groundwater will be discharged to the local POTW sewer (see Exhibit E - Part C for more details).

Because a detection at a compliance well may never increase to the MTCA Cleanup Level, tThe increased frequency of groundwater monitoring at specific compliance well(s) (as specified in Table A-3 in Exhibit E – Part A) can end and return to the regular long-term monitoring schedule in accordance with Table A-2 in Exhibit E – Part A under any of the following conditions:

Comment [DJ24]: Narrative seems to be missing the trigger for operating the contingent groundwater treatment system, although it talks about GW monitoring during operation. It appears to me at least, that it also needs to tell the reader that if the contaminant is detected at the cleanup level in a compliance well (like in Figure A-8 Exhibit E Part A), the Contingent GW Treatment System will be operated.

Comment [DJ25]: How quickly will this occur? Can you put in a cross reference to the contingency plan where this is discussed.

- If the validated and confirmed detection becomes non-detect at the same laboratory Method Detection Level (MDL) for three consecutive monitoring periods.
- If the trend analysis (using a minimum of eight monitoring events for statistical representativeness) shows a steady or decreasing trend; or
- If the trend analysis indicates a rate of increase would not result in concentrations reaching the MTCA Cleanup Level in a time period that is less than the routine long-term monitoring specified in the CMP (Table A-2 in Exhibit E – Part A).

Groundwater Monitoring During Operation of the Contingent Groundwater Treatment System:

- During the contingent groundwater treatment system operation, compliance wells at the compliance boundary where the exceedance of MTCA Cleanup Levels occurred will be monitored quarterly only for the analytes that were in exceedance. All other wells will be monitored as per the long-term monitoring program.
- Contingency groundwater extraction and treatment will continue until groundwater at the points of compliance and the pumped effluent are below MTCA Cleanup Levels for four consecutive monitoring periods or a minimum of one (year). When the contingency groundwater extraction and treatment system is implemented, the compliance monitoring frequency of treatment system inflow and outflow will be determined by the Metro discharge permit.

5.3.6 Institutional Controls

Under the selected remedy, any contaminated material (i.e., subsurface waste, including drums) will remain on-site and, as such, institutional controls are required [WAC 173-340-440(1)(a)] for the disposal areas. Institutional controls are a key component of the alternatives for maintaining long-term effectiveness.

Deed restrictions will be instituted to ensure that Site use restrictions remain in force regardless of the property owner, and to notify any prospective purchasers of the Site that there is the presence of subsurface waste. Site use restrictions will prohibit using the Site for purposes incompatible with a waste Site. For the selected remedy, these restrictions will prohibit penetrating the cap and any Site use that could damage the cap or significantly reduce its effectiveness. Any structures or buildings (such as maintenance equipment sheds) ~~would~~ will not be allowable. Warning signs ~~would~~ will be posted to provide notice of the presence of a waste site to trespassers and recreational visitors. Site deed restrictions will include the waste filled subsidence trenches and a 50-foot buffer zone around the installed remedial system cap and components. Site use restrictions ~~would~~ will remain in force indefinitely.

Comment [DJ26]: Where will they be posted? How many signs? Every 10 feet, every 50' – will this be discussed in detail in the EDR?

A locked fence surrounds ~~areas~~ the northern portion of the Site (see Figure 4), that ~~may~~ contains waste materials, to prevent people from coming in contact with waste materials during allowed recreational uses around the Site. This locked fence will remain in place for a period of five years following the remedial action to ensure that the cap is secured and ground cover is well established. Fencing may not be needed for capping alternatives (after five years) because the trench backfill will provide an effective barrier from the waste material, such that incidental trespass (which fencing is designed to prevent) or limited utilization of the Site would not present a health risk. After five years, the fencing could be removed. During the remedial action, a fence will be constructed around Portal #2 to prevent exposure to

Comment [DJ27]: Who decides when to remove the fence? Shouldn't there be an evaluation of the cap before this decision is made? What are the terms for removing the fence?

the water discharging from Portal #2. This fence will remain in place for a period of five years following the remedial action, at which time the necessity of the fence will be reevaluated.

Comment [DJ28]: By whom? Same comment as above

Periodic Site inspections and maintenance of the cap, fencing, warning signs, and any other physical components of the institutional controls will be included in the deed restrictions. Financial assurances will be established, as appropriate, in the Agreed Order or Consent Decree for potential future remedial actions at the Site.

Groundwater use restrictions will be employed to prevent exposure to groundwater near the Site and within the compliance boundary shown in Figure 11. After groundwater use restrictions are employed at the Site, exposure of humans to potentially contaminated groundwater from the Site could happen only if off-site migration occurred. Routine, periodic monitoring of groundwater will be used to detect contaminants on-site specifically attributable to the disposal of waste in the trenches before off-site migration can occur.

Groundwater at the Site's points of compliance currently meets remediation goals. Therefore, no groundwater containment or treatment is currently necessary. In the event that groundwater were to become impacted by contaminants specifically attributable to the disposal of waste in the trenches, groundwater containment treatment (if necessary) and discharge to the Metro POTW sewer would be readily implemented.

Comment [DJ29]: But you don't seem to know exactly what is in the trenches, so how can you limit it to that?

5.4 Evaluation of Cleanup Action With Respect to MTCA Criteria

Comment [DJ30]: Is this section meant to address the criteria in WAC 173-340-380(1)(a)(ix)? If so, this section needs to be elaborated upon. If not, where in the CAP are these items addressed? I would specifically reference this WAC and how you have met the criteria.

Alternative 5 meets all threshold criteria specified in WAC 173-340-360(2) (protection of human health and the environment, compliance with cleanup standards, compliance with ARARs, and provision for compliance monitoring). It provides the best combination of long-term effectiveness and reliability, short-term effectiveness, implementability, and reduction of toxicity, mobility, and volume. In addition, this alternative provides good cost-effectiveness [WAC 173-340-360(3)(e)].

Alternative 5 relies on containment of hazardous substances, which has a low preference under MTCA. Site conditions at the Landsburg Mine make higher preference remedial actions less desirable. Remedial actions involving in-situ treatment are less reliable and would be unverifiable. Remedial actions involving ex-situ treatment or off-site disposal would require excavation of the waste materials, which represents a significant potential safety concern with the Site conditions. In addition, waste materials could be below the water table within the mine workings and waste removal effectiveness is uncertain.

Although the amount of waste remaining at the Site within the Roger Seam trenches is uncertain, Alternative 5 provides a substantial surficial physical barrier (backfilling the trenches where waste was disposed) and reduces surface water infiltration, which will reduce the potential for mobilization of waste to the water table. Institutional controls will limit land uses at the Site and, therefore, reduce the risk associated with both mine subsidence and contaminant exposure.

6.0 IMPLEMENTATION SCHEDULE

The preliminary CAP implementation schedule is in Exhibit C to the Consent Decree. The final implementation schedule will be defined in the Final Consent Decree between Ecology and the Site PLP Group.

Comment [DJ35]: As of now its only the construction schedule, its not the entire CAP implementation schedule. This is an inaccurate statement. Exhibit C should be the entire scope of work and schedule for the implementation of the CAP. See my separate comments on Exhibit C.

DRAFT REPORT

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DRAFT

PART C

CONTINGENT GROUNDWATER EXTRACTION AND TREATMENT SYSTEM PLAN

Landsburg Mine Site
MTCA Remediation Project
Ravensdale, Washington

Submitted To: Washington Department of Ecology
3190 – 160th Avenue SE
Bellevue, WA 98008

Submitted By: Golder Associates Inc.
18300 NE Union Hill Road, Suite 200
Redmond, WA 98052 USA

Submitted On Behalf Of: The Landsburg Mine Site PLP Group

February 29, 2012 **Project No. 923-1000-002.R154**

Golder Associates

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2.0 GROUNDWATER MONITORING & EXISTING INFRASTRUCTURE

2.1 Compliance Monitoring

Long-term, or confirmational, monitoring is conducted to ensure that the site remedy performs as expected over time. For the Landsburg Mine, this entails monitoring groundwater quality at the Site compliance boundaries for changes in groundwater quality, which may indicate a contaminant release. Monitoring will be performed using existing monitoring wells LMW-2, LMW-3, LMW-4, LMW-5, LMW-6, LMW-7, LMW-8, LMW-9, LMW-10, and LMW-11, and four additional sentinel wells (yet to be installed). These monitoring points are strategically located to intercept groundwater flowing along preferential flow paths from the north and south ends of the mine and laterally from the Frasier and Landsburg mines. Long-term monitoring would begin at the completion of the short-term monitoring, and will continue until residual hazardous substance concentrations no longer exceed cleanup or remediation levels in any onsite media.

Comment [DJ3]: Same comment about how you already meet the treatment standards for groundwater since its currently not contaminated. The monitoring is going to be indefinitely since you don't know if/when the groundwater will exceed MTCA standards

2.1.1 Compliance Boundary

The approved standards for groundwater at the Landsburg Mine will be the MTCA Method B cleanup levels. Conditional points of compliance will be established for groundwater and surface water at the locations of groundwater and surface water discharge from the site as defined by the property boundary (owned by Palmer Coking Coal Company, LLP [PCC]). Figure C-1 depicts the compliance boundary and conditional points of compliance for the Site. Specifically for the north end of the mine site, the point of compliance will be the northern PCC property boundary. For the south side of the mine site, the point of compliance will be the southern PCC property boundary. Monitoring wells LMW-2, LMW-4, and LMW-10 will serve as the northern point of compliance monitoring points; monitoring wells LMW-3, LMW-5, and LMW-8 will serve as the southern point of compliance monitoring points. For the east and west conditional compliance boundary for groundwater, monitoring wells LMW-7 and LMW-6, respectively, will be used for compliance monitoring.

2.2 Sentinel Wells

Four additional sentinel wells will be installed prior to the completion of the remedial action. The sentinel wells will aid in early detection of migrating mine waste contaminants in the groundwater. Two sentinel wells will be in the north and two wells in the south. Figure C-1 illustrates the locations of the proposed additional sentinel wells. Figure C-2 depicts the depth profile of the compliance and sentinel well systems along the Rogers Seam.

2.2.1 South Sentinel Well System

Two additional sentinel wells will be added to the existing monitoring wells in the south (LMW-9 and LMW-11) for a total of four sentinel wells that will be used for the early detection of waste constituents. Both of these new sentinel wells will be installed to monitor the surface of the water table within the mine

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be encountered are uncertain, the treatment processes in the contingent systems cannot be identified at this time.

Comment [DJ4]: When/if the contingency plan is implemented, what documents will need to be submitted to Ecology for review and approval? Where do you identify those documents, in this plan or in a future plan? What will be the schedule for submitting such documents?

Contingency groundwater extraction and treatment would continue until groundwater at the points of compliance meets MTCA Method B cleanup levels. The compliance monitoring frequency of treatment system inflow and outflow, if and when the contingency groundwater extraction and treatment system is implemented, will be determined by the Metro POTW discharge permit. Both inflow and outflow are measured in order to evaluate the concentrations of mine waste contaminants entering the treatment system and the percentage that are being removed by the treatment system. The results of the inflow analysis will help determine whether the extracted groundwater requires treatment to meet Metro POTW discharge limitations as outlined in the permit. If inflow results meet discharge limitations (i.e. are below limitations) then the extracted groundwater can be directly discharged to the POTW without prior treatment.

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5.0 SYSTEM INSTALLATION PROCESS

Comment [DJ5]: What about after installation? What happens after you have installed the system? What about O&M? Where do you discuss that topic?

The following is the general guide to the installation process for the contingent groundwater treatment system, once it has been determined that the treatment system must be installed.

- Design Treatment System
- Order and install necessary equipment
- Hook-up equipment to power source
- Install Extraction Well And Pump
- Initiate Completion of North Discharge Pipeline
- Install South Discharge Pipeline (if groundwater is impacted at the south portal)

Comment [DJ6]: These items should be listed in the order they will be done to avoid any confusion

5.1 Install Extraction Well And Pump

The first step in the treatment system initiation is installation of the extraction well(s) and dedicated extraction pump. The pump that will be installed will have a flow rate of approximately 10 to 40 gallons per minute capacity. Installation of the well head will also occur at this time. The extraction system consists of up to two wells: one new 6-inch well to be located (if needed) at the north and south ends of the site. The extraction well(s) will only be installed at optimum location and depth (for the screened interval within the site where contaminated groundwater is encountered and emanating from the Rogers Seam. The new 6-inch well would be installed while the treatment system is being designed, purchased and delivered. The extraction wells are anticipated to take about one month to design, contract and construct. If needed, the existing monitoring wells can be used temporarily to extract groundwater and contain the plume until the permanent extraction well is installed and operational. Submersible pumps and associated controls would be placed in each of the extraction wells. The groundwater extraction system would be the same regardless of which treatment system (organics or inorganics) is needed. A general schematic of an extraction well is illustrated in Figure C-6. Well pumps would primarily operate on water level control within the wells. High water level in treatment system tankage (Figure C-5) would also automatically shut off the well pumps.

5.2 Design Treatment System

The next step in initiating the contingent system is to design a treatment system that will be able to adequately remediate the specific mine waste contaminants that has been detected in compliance wells. A treatment system will only be designed for and installed at the north portal area, but will service either or both contaminated groundwater from the north and south compliance boundaries. The design phase cannot occur until it has been identified that a contingent treatment system is necessary because treatment technology is continually evolving and is very contaminant specific. The treatment system design will be proposed to Ecology in a Draft Corrective Action Plan for approval. The Draft Corrective Action Plan will be used for meeting the substantive requirements of a King County building permit, if required. After Ecology approves the treatment system design and required substantive requirements are

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Robb Bakemeier

From:	Cruz, Jerome (ECY)
Sent:	Friday, January 25, 2013 11:10 AM
To:	Morell, Doug
Cc:	Jaffe, Dori (ATG); Wang, Ching-Pi (ECY); Warren, Bob (ECY)
Subject:	Comments on latest version of Landsburg Mine Consent Decree Exhibits
Attachments:	Exhibit E -Part C_Contingency Plan_ECY01242013.doc; Exhibit E-Intro_ECY01252013.doc; Exhibit E-Part A_CMP_ECY01252013.doc; Exhibit E-Part B_OM Plan_ECY01252013.doc; Exhibit B-DCAP_ECY01-24-13.doc; Exhibit C-Consent Decree Schedule_ECY01-24-13.doc
Importance:	High

Hi Doug,
Attached files contain our latest comments to the exhibits sent to us last January 16, 2013. They are redlined, but only for this most recent round of comments. The January 16 revisions were accepted otherwise.

Please don't hesitate to contact me if you have questions. Let's check in with each other when you are ready so that we can assess, based on this latest round of review, if we can finalize the exhibits in time for a comment period in March.

Thanks,

Jerome

WASHINGTON STATE DEPARTMENT OF ECOLOGY
Jerome B. Cruz, Ph.D.
Toxics Cleanup Program, Northwest Regional Office
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http://www.ecy.wa.gov/programs/tcp/cleanup.html

DRAFT CLEANUP ACTION PLAN

Landsburg Mine Site
MTCA Remediation Project
Ravensdale, Washington

Washington State Department of Ecology
Toxics Cleanup Program,
Northwest Regional Office
3190 – 160th Avenue SE
Bellevue, Washington 98008

January 16, 2013

contaminants on-site specifically attributable to the disposal of waste in the trenches before off-site migration can occur.

Groundwater at the Site's points of compliance currently meets remediation goals. Therefore, no groundwater containment or treatment is currently necessary. In the event that groundwater were to become impacted by contaminants specifically attributable to the disposal of waste in the trenches, groundwater containment treatment (if necessary) and discharge to the Metro POTW sewer would be readily implemented.

5.6 Evaluation of Cleanup Action With Respect to MTCA Criteria

Alternative 5 meets all threshold criteria specified in WAC 173-340-360(2) (protection of human health and the environment, compliance with cleanup standards, compliance with ARARs, and provision for compliance monitoring). It provides the best combination of long-term effectiveness and reliability, short-term effectiveness, implementability, and reduction of toxicity, mobility, and volume. In addition, this alternative provides good cost-effectiveness [WAC 173-340-360(3)(e)].

Alternative 5 relies on containment of hazardous substances, which has a low preference under MTCA. Site conditions at the Landsburg Mine make higher preference remedial actions less desirable. Remedial actions involving in-situ treatment are less reliable and would be unverifiable. Remedial actions involving ex-situ treatment or off-site disposal would require excavation of the waste materials, which represents a significant potential safety concern with the Site conditions and is considered impracticable. In addition, waste materials could be below the water table within the mine workings and waste removal effectiveness is uncertain.

WAC 173-340-380(1)(a)(ix) requires specification of the types, levels, and amounts of hazardous substances remaining on Site for containment alternatives. Based on available information, the northern trenches (areas 7, 8, and 9 on Figure 15) were used in the late 1960s to the late 1970s for disposal of various industrial waste materials, construction materials, and land-clearing debris. Materials were disposed of in those trenches from the access road shown in Figure 4 of the CAP, attached as Exhibit B. Industrial wastes were contained in drums or dumped directly from tanker trucks. Based on invoice and dumping records from Palmer Coking Coal Company, an estimated 4,500 drums of waste and about 200,000 gallons of oily wastewater and sludge were disposed into the trenches. Available documented interviews with waste haulers and truck drivers indicate that wastes included paint wastes, solvents, metal sludges, and oily water and sludge (Ecology 1990). It is expected that many of the drums were only partially full. The amount of waste remaining at the Site is unknown, but a significant portion may have been burnt during historical fires, which occurred during placement.

Comment [j7]: The fires that occurred were documented, but to say anything more is just speculation as far as I'm concerned. I found no investigations or data to support the contention that a significant portion of the wastes burned off.

Although the amount of waste remaining at the Site within the Roger Seam trenches is uncertain, Alternative 5 provides a substantial surficial physical barrier (backfilling the trenches where waste was disposed in the northern trenches (areas 7, 8, and 9 on Figure 15) and reduces surface water infiltration,

Robb Bakemeier

From: Cruz, Jerome (ECY)
Sent: Monday, March 11, 2013 2:31 PM
To: Wang, Ching-Pi (ECY)
Subject: Assigning a buffer zone prohibiting redevelopment on south portal
Attachments: portal-LMW-8.jpg

Hi Ching-Pi,
Before I submit my recommended revisions to the environmental covenant, I wanted to show you the map of the south portal, property ownership, and my recommended buffer zone prohibiting redevelopment (and presumably eliminating direct contact/ingestion risks from the water emanating from the south portal (Portal No. 3) of Landsburg Mine.

I have attached a map to illustrate this.

From GIS parcel coverages, I labeled property owned by Mr. Gribble and Palmer Coking Coal property. Unless the coverage is outdated, it appears that the Gribble properties bound the west side of the portal. The portal and portal wells (except for LMW-5) are within PCC property. Please ignore the red and white well label near LMW-8 (an artifact of zoom distortion) and magenta well labels.

In order to keep the buffer zone in PCC property, I drew a circle whose radius is around 60 feet. I don't see how I can propose to increase the buffer distance without a lot of resistance from the PLPs. Despite this restriction, I think this is a reasonable distance for this institutional control. Note that since it is within a powerline easement, there may be existing restrictions on development. So, I will propose to have a minimum 60 foot buffer prohibiting redevelopment. Alternative shapes might be explored with the PLPs, or maybe this whole parcel subtended by the CPOC can be assigned this restriction.

Any thoughts?

Thanks,
Jerome
P.S. I am leaving early (2:30 pm) to drive my son to an interview. I will be back Tuesday at my regular hours.

WASHINGTON STATE DEPARTMENT OF ECOLOGY
Jerome B. Cruz, Ph.D.
Toxics Cleanup Program, Northwest Regional Office
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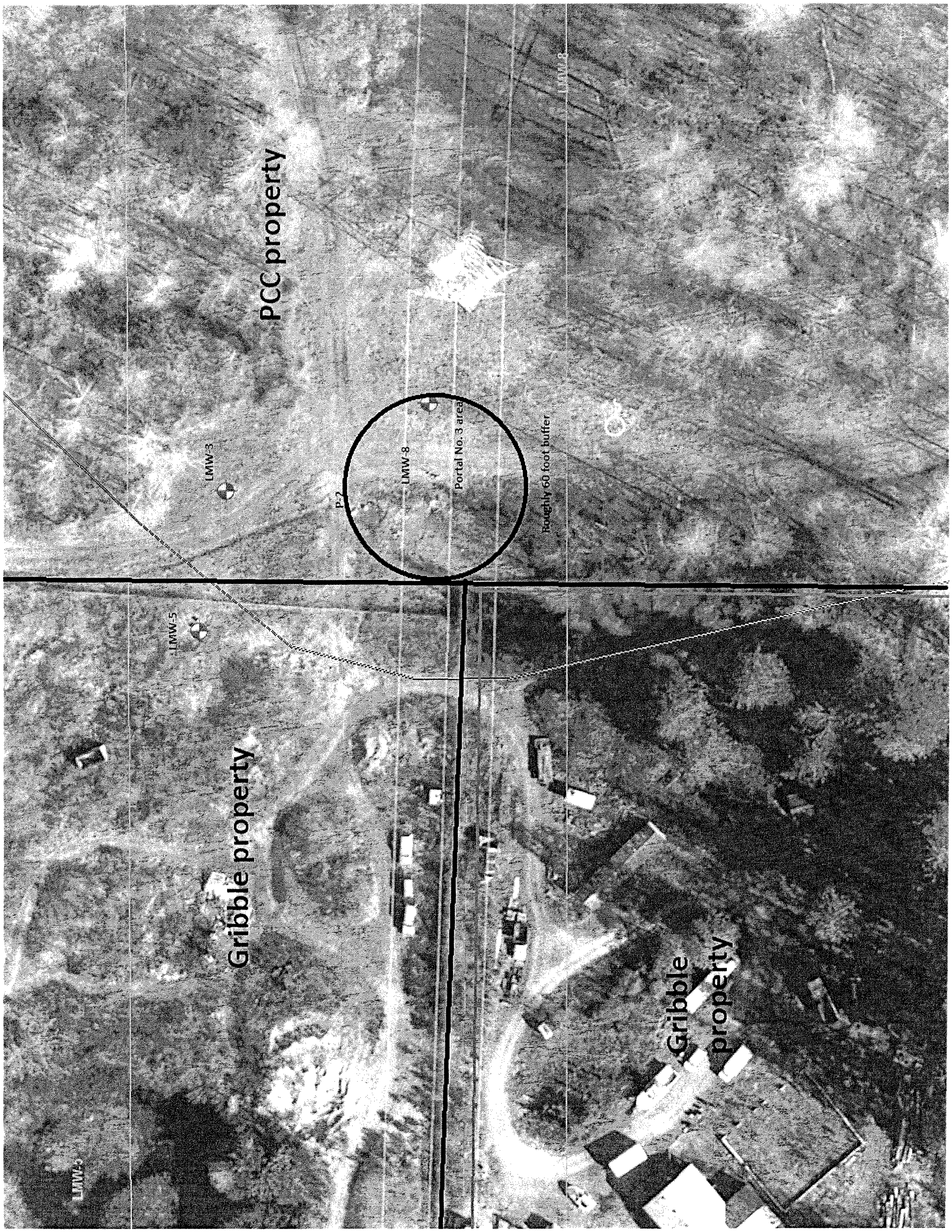
PCC property
LMW-3
P-2
LMW-8
Portal No. 3 area
Roughly 60 foot buffer
LMW-5
Gribble property
Gribble property

Robb Bakemeier

From:	Fitz, Andy (ATG)
Sent:	Monday, June 03, 2013 11:22 AM
To:	Joshua Lipsky; Wang, Ching-Pi (ECY); Cruz, Jerome (ECY)
Cc:	Matt Wells; Kelly McTigue; Ian Sutton; Pete Haller; rgordon@tocholdings.com; Bob Nicksin; Morell, Doug
Subject:	Landsburg CD, CAP, Environmental Covenants, & FA Trust
Attachments:	Landsburg CD_05-28-13 Ecology Revisions.docx; Exhibit F-1 Environmental Covenant (PC&C Property).docx; Figure 4 EC_SouthPortalBuffer Cruz annotated.jpg; Exhibit F-2 Environmental Covenant (Gribble).docx; MTCA FA Trust Agreement.Ecology Comments.doc

Landsburg Mine Group:

Thanks for your patience while we've reviewed your latest draft revisions. Thanks also for working to incorporate the changes we earlier discussed.

Except as otherwise noted in the attached documents, we accept the proposed edits sent by Matt on May 10 and Josh on May 22. For the most part, we've made only a few additions to the documents. The most significant of these relates to how the Gribble property is addressed, which we've previously discussed in relation to the "Groundwater and Portal Protection Area." I'll discuss that issue first, followed by a summary of the edits to each document.

Groundwater Point of Compliance Issue/ "Groundwater and Portal Protection Area"/ Gribble Property EC:

Josh noted in his May 22 email that you were still waiting to hear back from Ecology with respect to the "groundwater point of compliance issue" and the final boundaries of the Environmental Covenant's "Groundwater and Portal Protection Area," aka Area B.

With respect to how a (prospective) groundwater conditional point of compliance is described in Figure 11 of the CAP, we agree with a CPOC boundary that would follow the outer boundary of the Palmer Coke & Coal parcels.

At our meeting in April, you requested deleting the Gribble Property from the designated "Groundwater Protection Area" (now "Groundwater and Portal Protection Area") that is subject to environmental covenant requirements. You connected this request to the CPOC boundary as proposed above.

We think the issue of a prospective CPOC boundary, as a regulatory standard, is separate from the issue of whether an environmental covenant is warranted. Even in a case where a standard groundwater point of compliance has been established, an environmental covenant may be warranted to help prevent exposure to contaminated groundwater until cleanup levels are achieved.

At this unique site with its unique uncertainties, the idea of recording environmental covenants is to provide a preventative institutional control in the event groundwater contamination is detected in the future. The covenant serves two key functions, among others: 1) restricting groundwater use as a preventative measure; and 2) preserving the opportunity to establish a contingent groundwater treatment system in case future contamination is detected.

We believe the Gribble property should be covered by such a covenant both because of its proximity to the Site proper and its potential role in a contingent groundwater treatment system. We also recognize, however, that with respect to properties not owned by a potentially liable person, MTCA only requires a "good faith effort to obtain" and does not unconditionally mandate that environmental covenants be recorded on such properties. WAC 173-340-440(8)(c).

In light of this, we've proposed adding an additional paragraph to Section XX (Land Use Restrictions) of the CD (attached) requiring Defendants to make "good faith efforts" to cause an EC to be recorded for the Gribble property. We've also provided that if Defendants are unable to secure such a covenant, they should notify Ecology and describe their good faith efforts at the same time the PC&C EC is recorded.

We've drafted a proposed EC for the Gribble property that we've designated as Exhibit F-2 (attached). The draft follows the form and format of the PC&C EC as proposed by Josh on May 22, which we've re-designated as Exhibit F-1. The property-specific elements of the PC&C EC have been deleted, however, and there are really only two key restrictions for the Gribble property: 1) a restriction on groundwater use that mirrors the PC&C EC; and 2) an affirmative restriction requiring Gribble to allow access in the event the contingent groundwater treatment system needs to be installed and operated. I don't think the latter requirement is any different than the restriction already in place in the Gribble's warranty deed.

I recognize there's some tension between this approach and how you've approached defining (and visually depicting) the "Groundwater and Portal Area Protection Area," which doesn't include the Gribble property. To relieve this tension, I've suggested a few additions to the CD's description of institutional controls (see Section VI, bullet four, paragraph 5 [page 13]). Jerome and I reviewed the CAP and didn't think anything needed to be changed there. To be clear, we are not proposing that the "Groundwater and Portal Area Protection Area" definition be changed to include the Gribble property, although we are proposing the Defendants attempt to secure an EC for that property. I'm happy to discuss whether any further adjustments to the CD are needed.

CD: In addition to the additions discussed above, there is one other substantive addition:

In Section XIX (Contribution Protection), I've carried over the limitation language in the CNTS providing that the covenant applies "with respect to those hazardous substances...that Ecology knows or suspect are located at the Site..." I'm otherwise concerned that as literally defined, "matters addressed" covers *all* remedial actions/costs within the physical boundaries of the "Site," without limitation and regardless of their relation to the release(s)/potential releases that are the actual subject of this decree. This concern is amplified by the broad way in which we've defined "Site" for purposes of the CNTS and Contribution Protection provisions.

In addition, we've made one other edit to Section XX, adding in references to the new Figures 3 and 4 that will accompany the PC&C EC.

PC&C EC:

We have one edit the EC as proposed in Josh's May 22 email (see attached). We would like to add a new sentence to the end of Section 1.d as follows:

> d. No groundwater may be withdrawn from the Property for any non-remedial purpose. Water issuing directly from the former mine portal areas (Portals 2 and 3 on Figure 2) shall not be used for any non-remedial purpose. Water issuing from Portal 3 shall be contained within the Property at all times.

Our thinking here is that such containment could be provided through a berm or other similar means.

PC&C EC Figures:

Our only edit is to suggest that the South Portal Buffer Area in Figure 4 to the PC&C EC be expanded slightly to the south. From past reports, water from the south portal is documented to manifest as a saturated (wet) seepage area or as surface water run-off depending on the time of the year. Measurements from these reports show that the southern edge of this saturated area is approximately 225 feet from LMW-3. The southern boundary of the buffer area in Figure 4 falls short of this known extent and should be further extended to adequately secure this area from redevelopment. Jerome has provided a revised figure showing our proposed revision to the buffer zone area (see attached).

MTCA Financial Assurance Trust Instrument:

With one exception and with some additions, we have accepted all the edits proposed in Matt's May 10 email. All of our edits are in yellow highlight. To make the document cleaner, I've deleted all of your strikethroughs of text we agree can be deleted.

The one exception is in Section 11 (Annual Valuation and Quarterly Report—which we propose to be re-titled "Annual Report and Valuation"). As proposed by you under paragraph a, the Trustee is to provide an annual report no later than 30 days after the FA anniversary date as established under the CD. However, under paragraph b, any securities in the Fund are to be valued at market value at the close of the calendar year.

We would like these reporting markers to be aligned to match; i.e., either both triggered upon the FA anniversary date, or both triggered upon the end of the calendar year. Ecology's preference is to return to an end-of-the-calendar year trigger for both paragraphs.

The additions are as follows:

- "Operation and Maintenance Work" definition: We've added a further description of what this "work" includes.
- Section 5: Not technically an addition, but we corrected a cross-reference within the document.
- Section 7: We clarified that the Trustee's duty to act in the best interests of the Grantor Entities means, in the context of this trust, "utilizing the Fund to maximum advantage to provide for Operation and Maintenance Work required by the Consent Decree."
- Section 11: We added additional detail to the description of annual report content.

Thanks again for your cooperation and work in putting together these documents. We are very close to being done.

Andy

Andrew A. Fitz
Senior Counsel
Ecology Division
(360) 586-6752
andyf@atg.wa.gov

Robb Bakemeier

From: Fitz, Andy (ATG)
Sent: Monday, June 10, 2013 9:21 AM
To: Joshua Lipsky
Cc: Cruz, Jerome (ECY)
Subject: South Portal engineering measures

Josh—

It sounds like Jerome had a productive on-site meeting on Friday with Doug Morell and Bill Kombell. Among other things, I understand they discussed a plan to place a gravel pipe and trench system beneath the ground at the portal area and vicinity to prevent any portal water from daylighting and prevent it from migrating, or being conveyed or rechanneled, off property. Jerome also suggested amending the fill material for the south portal pipe and trench with materials that are known to remediate contamination, such as charcoal, or alternatively, utilizing a small "permeable reactive barrier mini-wall" as part of the construction. I understand Doug and Bill said they'd think about this.

Based on these actions, I think Jerome is inclined to scale back on his proposed southward expansion of the South Portal Buffer Area, as depicted on Figure 4 of the PC&C EC. Ecology could agree that the Buffer Area line would extend to the easement boundary for the power line, placing the southern margin a little more than half the distance between the PC&C proposed boundary and the Ecology proposed extended boundary.

The actions would fit well with the revised PC&C EC language I proposed by phone last Thursday ("No daylighted surface water issuing from Portal 3 shall be channeled, conveyed, or allowed to migrate off the Property."). Once defined, however, I think the actions (and a similar filling of the north portal pond with gravel) are also significant enough that they should be reflected in the CAP text. I'm writing to give you a heads up on this.

Andy

Andrew A. Fitz
Senior Counsel
Ecology Division
(360) 586-6752
andyf@atg.wa.gov

ATTACHMENT L

Financial Assurance Cost Estimate Provided by Ecology

Robb Bakemeier

From: Gritsch, Cherie (ECY) <CGRI461@ECY.WA.GOV>
Sent: Tuesday, November 26, 2013 11:28 AM
To: Robb Bakemeier
Subject: RE: Landsburg Records Request--Remaining Documents
Attachments: Landsburg Master Summary RA Cost Estmate_09-17-2012.xlsx

Importance: High

Robb,

I have obtained and attached a copy of the Landsburg Master Summary RA Cost Estimate to this email.

Chérie Gritsch | Public Disclosure
Department of Ecology
3190 160th Ave SE
Bellevue, WA 98008
425-649-7235 | 425-649-4450 (fax)
cgri461@ecy.wa.gov
NWRO_Public_Request@ecy.wa.gov

From: Robb Bakemeier [mailto:rfb@rfblaw.com]
Sent: Monday, November 25, 2013 7:38 PM
To: Gritsch, Cherie (ECY)
Subject: Landsburg Records Request--Remaining Documents

Cheri—
I am following up on my efforts to obtain the last of the records I requested from the Landsburg Mine Site file. Based upon my previous discussions with you, I understand that Ecology was in the process of producing some additional correspondence and materials gathered by Jerome Cruz. When I was at your office on Friday, November 15, you indicated you expected those materials would be posted to the Ecology FTP site by last week. I tried to call you on Friday (November 22) and left you a message. I need to have access to those materials as soon as possible. Please contact me to let me know the status.

I am particularly interested in obtaining a cost estimate or memorandum dated September 17, 2012—that document was cited in the Proposed Consent Decree for the Landsburg Mine Site as the basis for the financial assurance requirement. I would appreciate it very much if you could email that document to me because I will be traveling for the next few days and the end of the public comment period is fast approaching.

Thank you very much for your assistance.

Robb Bakemeier...

Robert F. Bakemeier
Bakemeier Law Firm (Bakemeier, P.C.)
7683 S.E. 27th Street, Suite 464
Mercer Island, Washington 98040

	TOTAL ALL	1	2	3
DATE (Year)	TOTAL PROJECT COSTS (COLUMNS 1-10)	SOIL CAP REMEDY CONSTRUCTION	FIELD DESIGN, CONST. OVERSIGHT AND AS-BULTS FOR SOIL CAP REMEDY	CAP REMEDY GW COMPLIANCE MONITORING & MAINTENANCE
2013	$1,680,000	$1,165,000	$150,000	
2014	$1,475,000	$1,050,000	$150,000	
2015 (in perpetuity)	$775,000			$775,000
TOTALS	$3,930,000	$2,215,000	$300,000	$775,000

INDIVIDUAL TASK BASIS BREAKOUT

4	5	6	7	8
SENTINEL WELL INSTALLATION	SOUTH CONTINGENT TREATMENT SYSTEM INFRA.	ENGINEERING RA DESIGN, EDR REPORT	PROJECT MANAGEMENT	GW & REMEDIATION MONITORING
	$150,000	$150,000	$25,000	$40,000
$150,000			$25,000	$100,000
$150,000	$150,000	$150,000	$50,000	$140,000

ATTACHMENT M

Correspondence Regarding Ecology's Production of Site File Materials and Correspondence

Robb Bakemeier

From: Gritsch, Cherie (ECY) <CGRI461@ECY.WA.GOV>
Sent: Wednesday, December 04, 2013 3:18 PM
To: Robb Bakemeier
Subject: Link to Ecology ftp site for electronic documents/emails for Landsburg Mint - PDTS # 22611

Importance: High

Robb,

I have uploaded the majority of the electronic documents to our ftp site, the link to your folder is below. There is one folder which transferred with an .xnk titled Legal that I could not open so I reloaded it in a regular folder titled Legal which can be opened. You will have 10 days to download the documents, please let me know if you have any problems. Let me know if you have any questions regarding this installment of electronic documents. I have one more file to go through which I am planning on doing first thing in the morning, there may be exempt items in that one and when Sally Perkins returns from vacation on Monday I will have her start working on the exempt log.

ftp://ecy.wa.gov/Robb%20Bakemeier_1/

Chérie Gritsch | Public Disclosure
Department of Ecology
3190 160th Ave SE
Bellevue, WA 98008
425-649-7235 | 425-649-4450 (fax)
cgri461@ecy.wa.gov
NWRO_Public_Request@ecy.wa.gov

ATTACHMENT N

Anne Udaloy, L.H.G.'s Resume

ANNE UDALOY, L. H. G.
Principal Hydrogeologist

Qualifications

BA	1985	Geology - Smith College, Northampton, MA, USA
MSc	1988	Geology - University of Montana, Missoula, MT, USA
RG	Since 1995	Registered Geologist (AK, CA, ID, OR, and WA, USA)
CPG	Since 1996	Certified Professional Geologist (USA)
LHG	Since 2002	Licensed Hydrogeologist (USA)

Key Areas of Expertise

Hydrogeological and geochemical site characterization	Characterizes regional and site hydrogeology and geochemistry including assessment of LNAPL and DNAPL mobility for industrial facilities and landfills
Remedial action strategy development and implementation	Identifies physical, chemical, and practical constraints on remedial actions; identifies cost- and time-effective solutions to addressing contaminant releases to soils, soil vapour, and groundwater; implements effective remedial strategies
Performance evaluations: Environmental controls	Evaluates existing and proposed control system performance including interactions between engineered controls and site soils, soil vapour, stormwater, and groundwater
Performance evaluations: Remedial actions	Evaluates predicted and actual performance of remedial actions, including groundwater extraction (with or without accompanying treatment systems), groundwater injection, soil vapour extraction and injection, barriers and cut-off walls, and in-situ treatments
Hydraulic Control System Design Support	Develops numerical models to predict head distributions and flow rates for proposed and operating groundwater and soil vapor controls, including injection systems, extraction systems, barriers, and vents
Groundwater and Soil Vapor Monitoring System Design, Installation, and Implementation	Designs monitoring wells, probes, and networks; places wells and probes to define background conditions and intercept contaminant flow paths, selects indicator analytes, and defines appropriate monitoring timing and frequency
Regulatory Assistance, Litigation Support, and Expert Witness	Evaluates applicable regulations, assists clients and their counsel with identifying critical technical and regulatory issues and regulatory negotiations, represents clients in public meetings, provides expert witness testimony in Court

Summary of Experience and Capability

Anne is a principal hydrogeologist with more than 24 years of experience serving clients throughout the Pacific Northwest. She has evaluated contaminant hydrogeology at more than 100 sites including industrial facilities and landfills located in Alaska, Arizona, California, Oregon, Utah, and Washington; British Columbia, Manitoba, and Saskatchewan; and Great Britain.

3015 NE 203rd Street, Lake Forest Park, WA 98155-1530
(206) 512-7517 ♦ E-mail: anne@udaloy.com

Relevant Project Experience

Selected relevant project experience is summarized below.

Project	Date	Anne's Role
LNAPL Mobility Assessment and Remediation	2010-2013	Characterised LNAPL distribution and calculated the mobility of perched, unconfined, and confined LNAPL in support of remedial action design and implementation at two operating petroleum refineries, a closed retail facility, and three operating retail facilities.
Chlorinated Solvent Remediation	2007-2012	Reviewed data, developed a conceptual model of site hydrogeology and contaminant distribution, supervised injection well design and construction, and supervised system start-up for a successful whey-based remedy.
Chlorinated Solvent Evaluation	2002-2013	Reviewed data, identified data gaps, and provided management recommendations to a municipality regarding two commercial properties impacted by chlorinated solvent releases; dissolved concentrations indicated that product remained present beneath one property. Correctly predicted that the owner's assurance of completing clean-up within five years was unrealistically optimistic.
Best Management Practices for MSW Landfills in Canada	2010	Lead author for draft Environment Canada Guidance for groundwater evaluations, performance monitoring, and landfill gas management at MSW landfills; provided peer review for entire document.
Landfill Expansion	1999-2008	Performed hydrogeological and geochemical characterisation of the Cedar Hills Regional Landfill in Maple Valley, WA. Supervised field investigations, prepared reports and assisted client with regulatory negotiations in support of permitting landfill expansion.
Landfill Gas Mitigation	2006-2013	Developed landfill gas mitigation measures for commercial and residential developments overlying or adjacent to closed landfills in Washington, Great Britain, and British Columbia.
Evaluation and Improvement of Leachate and LFG Controls	2006	Prepared a comprehensive review of ongoing and historical interactions between engineered facilities and site soils, soil vapour, and groundwater; recommended limited additional testing and performance monitoring in addition to modification of selected facilities for a MSW landfill that overlies a federally-designated sole-source aquifer on an island.

Publications

Development of an Intrinsic Bioremediation Program for Chlorinated Solvents at an Electronics Facility, September 1996. In: Symposium on Natural Attenuation of Chlorinated Organics in Ground Water, EPA/540/R-96/509.

Vacuum Enhanced Recovery of Semi-volatile LNAPLs, 1994. In: Proceedings of EMCON Industrial Conference.

Dual Purpose Leachate and Landfill Gas Extraction Wells, April 1993. SWANA Northwest Regional Solid Waste Symposium Proceedings.

Retrofitting a Combined Leachate and Landfill Gas Collection System in Solid Waste, January 1993. NSWMA WasteTech '93 Conference Proceedings.

Arsenic Mobilization in Response to the Draining and Filling of the Reservoir at Milltown, Montana, 1988. M.S. Thesis, University of Montana, Missoula, Montana.

ATTACHMENT O

City of Kent's Letter Regarding the Site to Washington State's Department of Health (December 12, 2013)

KENT
WASHINGTON

PUBLIC WORKS ADMINISTRATION
Timothy J. LaPorte, P.E.
Public Works Director
400 West Gowe
Kent, WA 98032
Fax: 253-856-6500

PHONE: 253-856-5500

December 12, 2013

VIA CERTIFIED MAIL; RETURN RECEIPT REQUESTED

Washington State Department of Health
Office of Environmental Health, Safety,
and Toxicology
P.O. Box 47825
Olympia, Washington 98504-7825

RE: Landsburg Mine Site
Request for Department of Health Activities

Dear Sir or Madam:

I write on behalf of the City of Kent ("City") to request that the Washington State Department of Health's Office of Environmental Health, Safety and Toxicology undertake appropriate site investigation, consultation, and reporting actions regarding the Landsburg Mine Site (the "Site") located in Ravensdale, Washington as described in detail below.

The Site is currently the subject of activities under the oversight of the Washington State Department of Ecology ("Ecology") pursuant to Washington's Model Toxics Control Act ("MTCA") because enormous volumes of hazardous wastes historically were dumped into the former coal mine at the Site. Ecology recently sought public comments on a Proposed Draft Consent Decree for the Site, including a Draft Cleanup Action Plan, Draft Compliance Monitoring Plan, and Related Exhibits (the "Proposed Plan").

The City is very concerned about the Site and the Site's threat to nearby water resources. The Site is located immediately north and upgradient of the Rock Creek drainage, a tributary of the Cedar River, and less than one-half mile from the City's primary source of municipal water at Clark Springs. The Site also is just 500 feet south of the Cedar River, and many private wells or small community water supply systems are located in the immediate vicinity of the Site. We understand that the Department of Health has had some involvement with the Site in the past.

Enclosed please find the City of Kent's Comments in Opposition to the Proposed Draft Consent Decree, Draft Cleanup Action Plan, Draft Compliance Monitoring Plan, and Related Exhibits for the Landsburg Mine Site ("Kent's Comments")—both in paper format (two duplicate copies) and in electronic format on disk (two duplicate disks). These materials also have been submitted to Ecology, for Ecology's consideration as part of the MTCA process for the Site. Additional information about the Site and the Proposed Draft Consent Decree can be obtained from Ecology's website (at https://fortress.wa.gov/ecy/gsp/Sitepage.aspx?csid=60) and from Ecology's Site Manager (Jerome Cruz, 425-649-7094).

Pursuant to the role and responsibilities of the Office of Environmental Health, Safety and Toxicology, the City requests that the Department of Health consider the Proposed Plan, consider Kent's Comments, and engage in the following activities: (1) engage in a health consultation with the Agency for Toxic Substance and Disease Registry ("ATSDR") to review the Proposed Plan to determine if the Proposed Plan is sufficient to prevent or sufficiently mitigate the exposure to, or threat of exposure to, hazardous substances (including a leak or discharge of chemical or hazardous materials) that may pose a risk to public health and safety, and the compromise of vital water resources (including but not limited to the City's municipal water supply source and water system); (2) conduct a Site investigation of a threat of exposure to hazardous substances (including a leak or discharge of chemical or hazardous materials) that may pose a risk to public health and safety, and the compromise of vital water resources (including but not limited to the City's municipal water supply source and water system); (3) formally communicate in writing to Ecology the results of the Department of Health activities described above in items #1 and #2, for Ecology's consideration in the MTCA process for the Site; and (4) provide the results of these Department of Health activities to the City.

We will appreciate your efforts regarding this matter and look forward to your timely response.

Sincerely,

Timothy Laporte
Public Works Director

Enclosure—Kent's Comments (two paper copies; two disks)
cc: Jerome Cruz, Washington State Department of Ecology