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Electronic Copy

September 19, 2017

Mr. Paul E. Kalina, P.E.
Senior Project Manager
AECOM
111 Third Avenue, STE 1600
Seattle, WA 98101

Re: Ecology Comments on the *Draft Interim Action Work Plan, In Situ Solidification, B36 Area, Area B, and Area D, Tacoma Metals Site,* dated May 19, 2017, prepared by AECOM, Former Tacoma Metals Site, Draft Agreed Order DE 13740, Facility/Site No. 1257, Cleanup Site ID No. 3910.

Ref: April 28, 2009, Letter from Steve Teel, Ecology, to Mr. Ty Schreiner, Kennedy/Jenks Consultants, *Transmittal of Ecology Comments on the Response to Ecology Comments, Forensic Evaluation of Hydrocarbons, dated February 17, 2009*.

Dear Mr. Kalina:

Thank you for submitting the above-referenced draft Interim Action Work Plan (IAWP) for our review. Please revise the IAWP to incorporate the following comments and then resubmit for our review within 45 days of the date of this letter. Please provide paper and electronic copies plus a separate redline/strikeout electronic copy so that revisions are shown.

1. Section 2.2: Regarding the statement that soil containing metals and/or polychlorinated biphenyls (PCBs) above cleanup levels will be stored in a temporary containment unit, and "will be addressed by others during future remedial activities targeting contamination from metals recycling":

    a. Please explain why these soils could not be included in the solidification treatment and/or demonstrate why it is disproportionate to do so as opposed to temporary storage (in staging piles) and then subsequent disposal off-site. According to the Interstate Technology & Regulatory Council (ITRC) *Development of Performance Specifications for Solidification/Stabilization* (2011) guidance document, solidification/stabilization has shown demonstrated effectiveness for PCBs and metals.

b. If Ecology agrees that it is appropriate to not include treatment of the shallow soils with metals and/or PCBs contamination as part of the interim action, these soils shall be managed as a "staging pile" as defined by WAC 173-303-040. Also:

   i. Staging piles must be designated by Ecology according to the requirements of WAC 173-303-64690.

   ii. Staging piles must be located within property under the control of International Paper (owner/operator).

   iii. Sufficient information must be provided to Ecology regarding design standards (for example design drawings and specifications) to show that will be protective of human health and the environment.

   iv. Design standards need to take into account the length of time the pile will be in operation, the volume of wastes, physical and chemical characteristics, potential for releases, relevant environmental conditions, and potential for human and environmental exposure.

   v. The staging pile must not operate for more than two years unless the owner/operator makes a request to Ecology for an operating term extension and Ecology accepts this extension. One extension may be granted for up to 180 days.

c. Delete the phrase "temporary containment unit, and will be addressed by others during future remedial activities targeting contamination from metals recycling" in this section and in the other sections that it appears (such as Sections 3.2.1, 5.1, and 6.4.12; Table 3-1; and Appendices F and L) and replace with "staging pile".

2. Section 3.2.1:
   a. 1st paragraph, last sentence: Delete "nor surface water is a current or potential future source of potable water." The site is located at approximately Puyallup River mile 1.5. According to WAC 173-201A-602, designated uses for the Puyallup River from mile 1.0 to confluence with the White River include domestic water supply. Please reword accordingly.

   b. 2nd paragraph: Please also clarify that the exposure assumptions for an excavation worker do not include direct contact at the surface. Please also add a clarification that soil that meets Remediation Levels (RELs) cannot be placed at the ground surface but must be below some type of cap so that contact is limited to excavation workers only.

The IAWP seems to assume that soil meeting RELs can be used anywhere at the site (including the land surface). This is not the case because RELs are based on a very limited exposure duration.

c. 3rd paragraph, last sentence: Delete this sentence. Soil cleanup levels need to protect potable water uses of Puyallup River water and there have been past exceedances of surface water cleanup standards at site groundwater wells (including shoreline wells). Also, Ecology does not agree that an empirical demonstration has been satisfied that demonstrates that existing soil concentrations are protective of the groundwater-to-surface water pathway. One of the primary goals of the interim action is to contain contaminated soils at the site and reduce the risk of soil contamination leaching to groundwater and then reaching surface water.

d. 5th paragraph, 3rd sentence: Add "and/or until site-wide groundwater monitoring is initiated" after "5 years".

3. Section 4.1.2, page 4-3, 1st paragraph, last sentence: The sentence states that the types of mixing methods to be used may include auger mixing, Lang Tool (injection/rotary drum mixer), or bucket mixing. Each of these types has its own advantages, disadvantages, and depth and effectiveness limitations. For example, bucket mixing is generally limited to depths less than 8 feet. How will the mixing method be chosen? According to Section 8.3.2 of *Stabilization and Solidification of Contaminated Soil and Waste: A Manual of Practice* by Edward Bates and Colin Hills (2015), available at:https://clu-in.org/techfocus/default.focus/sec/Solidification/cat/Application/, the objectives of the bench-scale treatability test is to replicate as closely as possible to the full-scale treatment, mixing, and type of contaminated materials. Therefore, the development of the conceptual field implementation plan (including the specific type of equipment that will be used) should precede the bench-scale treatability process.

4. Section 4.1.2, page 4-3, 4th paragraph, last sentence: The "clean fill" that is placed above the geotextile fabric needs to meet industrial property and terrestrial ecological evaluation (TEE) cleanup levels. Soil that only meets RELs cannot be considered "clean fill" for surface use.

5. Page 4-4, item #16: Add "and/or until site-wide groundwater monitoring is initiated" after "5 years".

6. Section 4.2.2, 2nd paragraph: Add "and/or until site-wide groundwater monitoring is initiated" after "5 years".

7. Section 4.3.1, Protectiveness; Qualitative Protectiveness Evaluation Component, 2nd paragraph: Please re-check the estimated timeframe for Alternative 2 to be implemented (3 years). An estimate of 2 years seems to align more with the schedule shown in Appendix F and Exhibit C.

8. Section 5.1, page 5-2, sentence beginning with "Although naphthalene and BTEX": Delete this sentence. Naphthalene and benzene, toluene, ethylbenzene, and total xylenes (BTEX) are contaminants of concern (COCs) for the Site and the reasons for this include:

    a. As stated in Ecology's above-referenced April 2009 letter, For the portions of the Site that appear to be impacted with creosote only (no other total petroleum hydrocarbons source), applicable cleanup levels include BTEX, naphthalenes, polycyclic aromatic hydrocarbons (PAHs), carcinogenic PAHs (cPAHs), PCBs, and metals.

    b. Ecology's previously calculated groundwater cleanup levels for the Site for BTEX and total naphthalenes are 1.2 micrograms per liter (µg/L), 14 µg/L, 14 µg/L, 5 µg/L, and 13 µg/L, respectively. Groundwater concentrations of these constituents have exceeded cleanup levels in one or more wells. Therefore, these constituents are contaminants of concern for soil because soil concentrations are impacting groundwater.

9. Section 5.2.1, 1st paragraph: Replace "approximately 1 mile upstream" with "approximately river mile 1.5" to more accurately describe the location of the Site.

10. Sections 5.2.2 and 5.2.3: Delete "if deemed necessary by this assessment". An inadvertent discovery plan shall be prepared.

11. Section 5.2.3, Critical Areas Ordinance, page 5-4: Add that as per RCW 90.58.355, the requirements to obtain a substantial development permit, conditional use permit, variance, letter of exemption or other such review to implement the Shoreline Management Act (SMA), do not apply to remedial actions conducted under an Agreed Order provided that the action meets the substantive requirements of the SMA.

12. Section 5.3.1, Institutional Controls: Please add additional details regarding how the institutional controls for the separate parcels that are involved in the interim action will be implemented.

For example, the Agreed Order for the interim action will require that International Paper, the owner of Pierce County assessor's parcel number (APN) 8950000402 (former Simpson property), record an Environmental Covenant on this parcel and also work with the owners of APNs 0320032013 (J.J. Port property) and the City of Tacoma 18th Street Right-of-Way to make a good faith effort to obtain an Environmental Covenant before using any other legal or administrative mechanisms [see WAC 173-340-440(8)(c)]. Also, please note that as per WAC 173-340-440(8)(b), for properties owned by a local government (such as the City of Tacoma), an Environmental Covenant may not be required if they demonstrate to Ecology that they do not routinely file records relating to this type of interest in real property and it will implement an effective alternative system to meet the requirements of the Environmental Covenant. Ecology will be requiring that the Environmental Covenants for the remaining Site parcels (former Tacoma Metals property) be filed following the completion of the Site cleanup.

13. Section 5.3.5, Waste Disposal:

    a. Delete the third paragraph (beginning with "Based on discussions with Ecology…) and the associated bullets. A request for contained-in determination will need to be submitted and then reviewed by Ecology in order for the disposal requirements to be determined.

    b. This section contains the sentence: "As previously described, off-site disposal of soil is not currently planned as part of the interim action." This sentence is not accurate because staging pile soil will need to be disposed-of. Also, according to Sections 5.1.6 and 5.2.5 of Bates and Hills (2015), for in-situ solidification by auger mixing, injection tillers, or rotary drum mixers, in general, 15% to 30% of the volume of the treated soil will become spoil (sometimes referred to as 'swell', 'slop', or 'float'). Bucket mixing will also generate about 15% or more. This spoil will need to be managed on-site before removal and off-site disposal. Therefore, management of spoil during pilot- and full-scale implementation and off-site disposal of spoil needs to be included in the IAWP.

    c. Delete the sentence that states that Land Disposal Restrictions (LDRs) would not apply to the interim action. LDRs will likely be applicable to the interim action.

    d. Add a reference and description of staging piles to this section.

14. Section 6.1, Summary of Work and Work Flow:

    a. Add in the construction steps that a site-specific and detailed treatment plan shall be prepared by the contractor, prior to starting pilot-scale testing and/or full-scale implementation.

Ecology shall have the opportunity to review and comment on the plan this plan shall also be a deliverable for the Agreed Order. The treatment plan shall include the specific equipment to be used, staffing, work schedule, reagent mixing and dosage rates, plan for sample collection/curing/testing, and reporting. According to Bates and Hills (2015), for in-situ mixing, a critical component of the plan is the precise layout and planned depth of each column, so as to achieve the desired area of treatment with overlapping columns and thus have complete treatment with no void spaces.

b. Add that a performance sampling plan (to include both pilot- and full-scale work) shall be prepared as recommended by Bates and Hills (2015). Ecology shall have the opportunity to review and comment on the plan this plan shall also be a deliverable for the Agreed Order. The performance sampling plan shall include the procedure for collecting samples, the test methods that will be employed, sample and analysis frequency (for example minimum daily and every 500 cubic yards, and at 7, 14, and 28 days of curing), the number of sample coupons to be prepared per sampling event, sample preparation (including curing and storage), and the agreed procedure for handling sample failures.

15. Section 6.2.1, 3rd bullet: Add BTEX to the list of constituents. Metals and PCBs should also be added unless Ecology agrees that it is appropriate to not include treatment of the shallow soils with metals and/or PCBs contamination as part of the interim action (see above comment 1).

16. Section 6.2.3, 1st paragraph, last sentence: Add that samples will be analyzed for BTEX also. Metals and PCBs should also be added unless Ecology agrees that it is appropriate to not include treatment of the shallow soils with metals and/or PCBs contamination as part of the interim action (see above comment 1).

17. Section 6.2.1, bullet list of potential reagents: Why are carbon-based reagents not included in the list? As shown in Bates and Hills (2015) Appendix A, these were used as in the reagent formula at several sites for treatment of BTEX, polycyclic aromatic hydrocarbons (PAHs), and creosote. Please also note that phosphates and sulfates should also be included as potential reagents if metals are to be treated.

18. Sections 6.2.5, 6.2.7, and 6.3.4, stormwater discharges: These sections mention measuring turbidity in stormwater discharged from the Site. Please note that Ecology typically does not allow any stormwater to be discharged to surface water from a contaminated site under a Construction Stormwater General Permit (CSWGP). Stormwater from contaminated sites generally is either infiltrated on-site, contained and disposed of off-site, or discharged to sewer (by separate permit from the sewage treatment plant).

19. Section 6.2.6, Compliance Monitoring Plan: Change "annual" to "quarterly and/or until groundwater monitoring is taken over by the site-wide groundwater monitoring program". However, Ecology may be requested to review groundwater data after the first year to see if it is appropriate to reduce the monitoring frequency.

20. Section 6.3.3, Soil Excavation: See above comments 2b and 4.

21. Section 6.3.3, In-Situ Solidification and Section 6.3.4, Pilot-Scale Treatability Testing: Change the minimum performance criteria from "10" pounds per square inch (psi) to "40".

22. Section 6.3.4, Overburden and Import Material Testing: As stated above, soil that meets Remediation Levels (RELs) cannot be placed at the ground surface but must be below some type of cap so that contact is limited to excavation workers only. Please clarify this in the sentence that refers to Table 3-1.

23. Section 6.3.4, Import Fill Requirements: Please revise to incorporate the following soil import criteria:

    a. Potential import fill sources shall be reviewed consistent with a Phase I Environmental Site Assessment review regarding presence of contamination and property use history. Please describe specifically how potential fill sources will be reviewed. Site visits shall also be performed if necessary to verify that the import fill source is not contaminated above unrestricted use cleanup standards.

    b. It is preferred that soil that originated from the following sources not be used. However, if their use is necessary, laboratory testing shall be performed and soils from the below sources shall not imported until approval by Ecology:

        i. Soils from within the footprint of the Tacoma Smelter Plume. See the website https://fortress.wa.gov/ecy/smeltersearch/ for the footprint of the plume.

        ii. Sites undergoing an environmental cleanup.

        iii. Agricultural sites where soils contain pesticides, herbicides, or metals.

        iv. Industrial and/or commercial sites where hazardous materials were used, handled or stored.

        v. Sites where petroleum hydrocarbons could have spilled or leaked into the soil.

        vi. Street sweepings.

vii. Commercial sites including: former gasoline service stations.

viii. Retail areas that contained dry cleaning facilities or photographic processing facilities, paint stores, auto repair and/or painting facilities.

ix. Agricultural supply stores.

x. Industrial facilities including metal processing shops, manufacturing facilities, aerospace facilities, oil refineries, waste treatment plants, or other similar facilities.

xi. Soil from a thermal desorption remediation or treatment process.

xii. Soil from a biological remediation or treatment process.

c. The minimum number of samples from the above sources or from sites with recognized environmental conditions (as defined by ASTM E 1527-13) shall be consistent with Table 6.9 in Ecology's *Guidance for Remediation of Contaminated Sites* (revised June 2016).

d. Gravel material (rock or mineral pieces greater than 2-millimeters in diameter with minimal organic material and fines) does not require laboratory analysis.

e. Ecology shall be consulted to determine analytes for laboratory testing.

24. Section 6.4.5, well surveying: In 2013 Ecology adopted NAVD88 as the agency's official vertical datum. Since then, Ecology's Environmental Information Management database (EIM) has been modified to accept only NAVD88 referenced elevations which in turn are used to calculate groundwater level elevations and depths below land surface from user input groundwater levels. Therefore, please survey any new or readjusted wells plus all existing groundwater monitoring wells to the NAVD88 vertical datum.

25. Section 6.4.8, Soil Excavation: See above comments 2b, 4, and 22. Also, Ecology does not agree with the use of composite soil sampling. Discrete samples shall be collected using the sampling frequency from Table 6.9 in Ecology's *Guidance for Remediation of Contaminated Sites* (revised June 2016). However, Ecology encourages the use of the multi-incremental sampling (MIS) approach rather than discrete samples. Please contact Ecology for more information if you choose to use MIS.

26. Section 6.4.10, Site Restoration: Add that a geotextile layer will be placed between the solidified mass and the clean fill.

27. Section 6.4.12, Waste Management: Revise to clarify that the applicable cleanup levels for "clean fill" and/or the reused stockpile soil need to meet industrial property and TEE cleanup levels. Soil that only meets RELs cannot be considered for surface use.

28. Table 3-1:
    a. Add a column for cleanup levels for surface soil (industrial property and TEE cleanup levels).

    b. Label the current "Interim Action Cleanup Levels" column as "Interim Action Remediation Levels (below cap)".

    c. Delete the footnote stating that naphthalene and BTEX are not COCs (see above comment 8).

29. Figures 4-1b, 4-2b, D-1b, D-2b, G-1; Area B:

    a. Revise the areas shown on these figures so that B23 is included in the treatment/remediation area.

    b. Revise the areas shown on these figures so that the area exceeding interim action levels between B20 and MW-18 is included in the treatment/remediation area.

    c. Please explain what the features are that are shown in the photographs in the vicinity of TP-65, southwest of MW-2, and east of MW-6. Please also note the approximate date of the photo.

30. Please revise Appendix E to incorporate the comments in this letter.

31. Appendix F, SEPA Checklist:

    a. A.6: Remove "issued" and indicate that a draft Agreed Order has been prepared.

    b. B.1.e: Revise to clarify that the applicable cleanup levels for "clean fill" and/or the reused stockpile soil need to meet industrial property and TEE cleanup levels. Soil that only meets RELs cannot be considered for surface use.

    c. Page 9, item 2: Include a discussion of management of spoil during pilot- and full-scale implementation and off-site disposal of spoil (see above comment 13b).

32. Appendix G, Bench Test Work Plan:

a. Section 2, Summary: Revise treatment volumes as they are affected by the above comments.

b. Section 3.2.2 and 4.3: The proposed compositing of the three cores from each area will in effect "average" the contaminant levels. According to Bates and Hills (2015; Section 8.5), this approach has a risk of failure and retreatment of 10% to 25% and in practice, the most contaminated area(s) of the site will require retreatment and additional costs may be significant. They suggest that sampling areas with approximately 75% of the maximum contamination levels for bench scale testing may be a less risky and more economical option.

c. Intervals within the treatment zone contain significant quantities of wood debris. Will the wood debris intervals be more difficult to treat? If so, is there a higher potential for failure to reach performance criteria within the wood debris and has the bench scale testing strategy taken this into account?

d. Section 4.2: Sulfate content should also be measured. Sulfate attack of Portland cement blends may lead to aggressive degradation through delayed ettringite formation (see ITRC 2011; Table 4-1).

e. Section 4.2.2, Strength: Please state what the pocket penetrometer strength criteria are.

f. Section 4.2.4, Leachability: Ecology does not agree that the use of "one or more" of the three referenced leaching tests (toxicity characteristic leaching procedure, TCLP; synthetic precipitation leaching procedure, SPLP; and American Nuclear Society, ANS Method 16.1) is the best approach. Recently, four new methods (Methods 1313, 1314, 1315, and 1316) have been developed under the Leaching Environmental Assessment Framework (LEAF; http://www.vanderbilt.edu/leaching/downloads/test-methods/). These LEAF methods are also now included in SW-846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. Ecology recommends the use of the LEAF methods rather than SPLP/TCLP/ANS 16.1. See also ITRC (2011) for a discussion of the limitations of SPLP/TCLP/ANS 16.1 as opposed to the LEAF methods. Also please revise this section to indicate specifically which leaching test methods shall be used and rationale for why they were chosen.

g. Section 4.2.4, Leachability, last paragraph: Add BTEX to the list of constituents. Metals and PCBs should also be added unless Ecology agrees that it is appropriate to not include treatment of the shallow soils with metals and/or PCBs contamination as part of the interim action (see above comment 1).

h. Section 4.3, Approach: Please describe in more detail the approach that will be used for bench-scale testing. For example, Bates and Hills (2015; Section 8.3.4) discussed options such as a tiered approach (often the best to use), a shotgun approach, or a focused problem approach.

i. Section 4.3.1, 1st sentence: This sentence states that soil samples will be homogenized by blending in an open pan using a stainless steel spoon. A more effective method may be to use a rotary drum mixer or commercial paint stirrer. However, if the materials contain volatile contaminants, to avoid loss, a zero headspace mixer may be required (Bates and Hills, 2015). Following homogenization, three random sub-samples/aliquots should be obtained and analyzed for key parameters (such as total contaminant levels or leaching). Then, if the three untreated aliquots all have similar results, then the bulk sample can be considered homogenized (Bates and Hills, 2015).

j. Section 4.3.2, 1st paragraph: Please note if viscosity will be measured and/or considered in the reagent/soil mixing. Bates and Hills (2015) note that if the treatment approach involves in-situ injection of a binder-slurry followed by mixing, there will be limits set for the allowable viscosity of the slurry and therefore, the bench-scale test should also follow these limits.

k. Section 4.3.3, 2nd paragraph, 1st sentence: We recommend that additional testing be performed so that strength and permeability can be evaluated as a function of time up to 28 days rather than just testing at 7 and 28 days. This will help indicate if shorter curing times may be possible for pilot/full scale to meet the performance criteria or if a longer curing time is needed (Bates and Hills, 2015).

l. Attachment 1, Figures 3-3 through 3-6: Please revise these figures to show the correct dates and company names. Also, revise to incorporate the above comments.

33. Appendix H, Health and Safety Plan: Due to time constraints, this appendix was not reviewed. It will be reviewed as the comments in this letter are being incorporated and any comments will be transmitted separately.

34. Please clarify which Quality Assurance Project Plan the pilot-scale treatability testing falls under (Appendix J or Appendix K or both).

35. Please clarify if the pilot-scale treatability test will be a separate project phase between the bench-scale study and full-scale implementation or if pilot-scale testing will be performed as an initial phase of full-scale implementation (after the contractor has been awarded the construction contract).

36. Appendix J, Quality Assurance Project Plan, In-Situ Soil Solidification:

a. Section 3, page 5, last paragraph: Add that electronic data will be submitted to Ecology's Environmental Information Management (EIM) database.

b. Table J-1:

i. Add cleanup levels for BTEX and total naphthalenes.

ii. Add a column for cleanup levels for surface soil (industrial property and TEE cleanup levels).

iii. Label the current "Interim Action Cleanup Levels" column as "Interim Action Remediation Levels (below cap)".

c. Table J-2: Add water Quality Control Criteria for TPH-Dx.

d. Table J-4: Add soil Quality Control Criteria for BTEX.

e. Add quality control criteria tables for PCBs and metals, soil and water, if the IAWP is revised to include treatment of shallow soil.

37. Appendix K, Construction Quality Assurance Plan:

a. Above comment 13a states that a site-specific and detailed treatment plan shall be prepared by the contractor, prior to starting pilot-scale testing and/or full-scale implementation. Ecology shall have the opportunity to review and comment on the plan and this plan shall also be a deliverable for the Agreed Order. The treatment plan shall include the specific equipment to be used, staffing, work schedule, reagent mixing and dosage rates, plan for sample collection/curing/testing, and reporting. Include a reference to the treatment plan in Appendix K and state if the construction quality control plan (CQCP) that is prepared by the contractor (mentioned in Section 1, Introduction, last paragraph) will be an attachment to the treatment plan or if it will be a separate plan. If it is a separate plan, please state that Ecology shall have the opportunity to review and comment on the plan and this plan shall also be a deliverable for the Agreed Order.

b. Attachment B, Daily Soil Mixing Quality Control Log Form: Add to the form what was used to layout/locate the cells/columns (such as global positioning system, total station survey, or triangulation). For auger mixing add the number of mixing strokes/vertical passes per column and the grout wet volume via flow meter and pressure. Also add measurements of grout consistency (such as density, viscosity, temperature, pH) if applicable.

Bates and Hills (2015) note that important reagent properties such as accurate reagent densities, are critical for defining the appropriate water/reagent ratios, binder delivery rate, and required mixing effort. A map should also accompany the form that shows the grids/cells/columns and the daily treatment area.

c. Section 4.1.1, Imported Fill Materials: See comment 23, above.

d. Section 4.1.4, On-Site Overburden Materials: Revise this section to incorporate the comments in this letter (particularly comments 2a, 4, 22, and 28).

e. Section 4.2, Sampling, Analysis, and Testing: Leachability needs to be also measured during pilot- and full-scale implementation as a construction quality control (CQC) and construction quality assurance (CQA) measure. This particularly important in assessing the transition between bench-scale and pilot-scale.

f. Section 4.2.1, Sampling and Analysis:
   i. 1st paragraph, 2nd sentence: Delete this sentence ("In general…"). Revise to incorporate the comments in this letter (particularly comment 23).

   ii. 1st paragraph, sentence beginning with "Analytical testing…" Reword to add the specific constituents that will be analyzed. Overburden soils shall be analyzed for:

      1. B36 Area: BTEX, cPAHs, total naphthalenes.

      2. Area B and Area D: BTEX, cPAHs, total naphthalenes, PCBs, and metals.

   iii. Import Soil Materials Sampling: Revise to incorporate above comment 23.

   iv. Page 8, 1st paragraph, 3rd sentence: Remove the reference to composite samples and revise to incorporate the above comments (particularly comment 25).

   v. Page 8, Overburden Sampling: Revise to incorporate the comments in this letter.

g. Section 4.2.2, Performance Testing Procedures:

i. Please clarify whether the contractor will be collecting and analyzing samples for their QC program.

ii. Analytical laboratories: The 3rd paragraph of this section states that samples of the solidified soil will be collected for subsequent laboratory analysis. Then, the 4th paragraph states that samples will be transported "to an independent laboratory." Please clarify how many laboratories will be involved (for example contractor's laboratory vs. independent laboratory) and whether replicate samples will be analyzed by a second independent laboratory.

iii. Number of samples collected, 3rd paragraph: The number of samples collected needs to be increased by 50% to 100% so that there is sufficient samples for leachability analysis and so that there is at least 50% reserve in case samples need to be re-tested.

iv. Note that in above comment 13b, Ecology is requesting that a performance sampling plan (to include both pilot- and full-scale work) shall be prepared as recommended by Bates and Hills (2015). The performance sampling plan shall include the procedure for collecting samples, the test methods that will be employed, sample and analysis frequency (for example minimum daily and every 500 cubic yards, and at 7, 14, and 28 days of curing), the number of sample coupons to be prepared per sampling event, sample preparation (including curing and storage), and the agreed procedure for handling sample failures. Some of this information is in Appendix K but some critical details are missing, particularly the procedure and decision making framework for handling failures. For an example of a decision making framework, see Table 6.1 in Bates and Hills (2015). See also their Figures 6.1, 6.2, and 6.3 for examples of flowcharts for sampling and analysis-, design-, and operational issues-related decision making.

v. 4th paragraph: Change the minimum compressive strength performance criteria from "10" pounds per square inch (psi) to "40" psi.

vi. 4th paragraph: Delete the last sentence ("A humidity-controlled environment will not be required…"). This is incorrect. Sample curing needs to mimic the conditions experienced by the treatment area in the field as curing progresses. If samples are allowed to sit out in the open under atmospheric conditions, they will not be representative of field-cured material.

To avoid this, samples should be placed and cured in an environment with very high or saturated moisture, but at ambient temperatures (Bates and Hills, 2015).

vii. Analysis frequency: Samples shall be analyzed at the following frequency:

1. Strength testing at 7, 14, and 28 days.

2. Permeability testing at 7, 14, and 28 days during pilot-scale testing and 14 and 28 days minimum for full-scale.

3. Leachability testing at 7, 14, and 28 days during pilot-scale testing. Pilot-scale test results shall be used to determine the leachability testing frequency for full-scale. At a minimum leachability testing shall be done at 28 days. It is also recommended that some leachability testing be also done at 14 days for CQA. Leachability test results are used to determine if the leaching of contaminants falls within the range established for this same test during bench-scale testing, not as a performance criteria (ITRC, 2011).

h. Section 5.1, Water Quality Monitoring: Please also note in this section that stormwater from the site shall not be allowed to enter any catch basin that connects to surface water. As stated in comment 18, Ecology typically does not allow any stormwater to be discharged to surface water from a contaminated site under a CSWGP. Stormwater from contaminated sites generally is either infiltrated on-site, contained and disposed of off-site, or discharged to sewer (by separate permit from the sewage treatment plant).

38. Appendix L, Compliance Monitoring Plan:

a. As stated in WAC 173-340-410(3), where the cleanup action includes institutional controls, the monitoring needs to include documentation of observations on the performance of these controls. Please include a description of how the long-term inspections of the solidification areas will be performed (including inspection forms).

b. Section 3.3: Change “annual” to “quarterly and/or until groundwater monitoring is taken over by the site-wide groundwater monitoring program”. However, Ecology may be requested to review groundwater data after the first year to see if it is appropriate to reduce the monitoring frequency.

If you have questions about this letter, please contact me at (360) 407-6247 or at steve.teel@ecy.wa.gov.

Sincerely,

SS Teel

Steve Teel, LHG
Cleanup Project Manager/Hydrogeologist
Toxics Cleanup Program
Southwest Regional Office

By Certified Mail: [91 7199 9991 7037 0277 7583]

Cc: Mr. Philip J Slowiak, Senior Project Manager, EHS
Mr. John Cermak, Jr., Baker Hostetler
John Level, Attorney General's Office
Rebecca Lawson, Ecology
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