Agencies' Comments on Intalco's Alternative 9 Description

This document provides the Agencies' comments on Intalco's memorandum titled: *Alternative 9 Description and Focused CERCLA-MTCA Feasibility Evaluation, Holden Mine Site, Chelan, WA* (Alternative 9 Description, URS 2005). As explained in a cover letter (Covington and Burling 2005), Intalco's memorandum presented a new remedial alternative proposed by Intalco that includes remedial components from Alternative 3b that were presented in the Draft Final Feasibility Study (DFFS, URS 2004), as well as additional collection and treatment of some of the groundwater impacted by Tailings Pile 1.

Intalco's memorandum includes discussion of the Agencies' Proposed Remedy, which the Agencies now refer to as Alternative 10. The Agencies take exception to Intalco's representation of Alternative 10. Information regarding the feasibility and protectiveness of Alternative 10 is in the Supplemental Feasibility Study and associated appendices (SFS, Forest Service 2007b).

The Agencies' comments provided below are focused on Alternative 9 only. These comments modify Intalco's Alternative 9 Description. Since Alternative 9 is an expansion of DFFS Alternative 3b, any comments that the Agencies have with regard to Alternative 3b, as provided by the Forest Service (2007a), are also incorporated herein by reference. Comment 3 provides a summary of the Agencies' opinion of Alternative 3b.

Alternative 9 is further evaluated by the Agencies in the SFS.

1. **Global Comment, Restoration Timeframe:** The Agencies disagree with Intalco's position that Alternative 9 would achieve potential applicable or relevant and appropriate requirements (ARARs) within a reasonable restoration timeframe. Alternative 9 does not provide for a reasonable restoration time frame for groundwater and surface water. This is because Alternative 9 relies on source depletion, upgradient source control measures, and natural attenuation processes over time, rather than active measures to contain and treat impacted groundwater, for large portions of the Site. Additional discussion of restoration timeframe is in the SFS.

2. **Global Comment, Remedy Compliance with ARARs:** The Agencies disagree with Intalco's position that Alternative 9 would achieve potential ARARs within 50 years. Intalco relies on a mass-loading model (referred to by the Agencies as the DFFS Model) to predict post-remediation surface water concentrations. The DFFS Model does not determine the concentration of hazardous substances at the anticipated points of compliance (POCs) for groundwater or surface waters at the Site. Rather the model estimates average concentrations in the stream based on the mass load calculated for a fully mixed condition at a point located at the downstream end of the Site. Due to the effects of dilution within the stream, metals concentrations at the POC would be much higher than the fully mixed condition predicted by Intalco. Appendix A of the SFS provides a full discussion of the limitations of the DFFS Model.

3. **Page 2, last paragraph, Protectiveness of Alternative 3b:** The Agencies do not agree with Intalco's characterization that Alternative 3b (and by extension, Alternative 9) would be protective of human health and the environment and would satisfy potential ARARs. Alternative 3b would not be protective of human health since it would not address tailings that exceed allowable concentrations for dermal contact and ingestion. Alternative 3b would not be protective of the environment, since it would not eliminate risks to potential terrestrial receptors, or releases to surface water that cause exceedances of aquatic life protection criteria. Alternative 3b relies on source depletion and natural attenuation to address hazardous substance concentrations above proposed cleanup levels in groundwater and

surface water impacted by Tailings Piles 1, 2, and 3, and relies on natural attenuation to address hazardous substance concentrations above proposed cleanup levels in groundwater in the Lower West Area (LWA). Reliance on source depletion and natural attenuation to clean up groundwater means surface water would continue to exceed aquatic life protection criteria for hundreds of years. Alternative 3b would not address ecological risk to other areas of the Site impacted by releases from the mine, including Holden Village and the wind-blown tailings area. Alternative 3b does not satisfy the threshold requirements for selection of a final cleanup action under CERCLA or MTCA.

4. **Page 3, first paragraph and Footnote 3, Cleanup Levels Based on Concentration:** The discussion provided in these two citations is based on the percentage of load rather than concentration. Proposed surface water cleanup levels are based on concentration. Groundwater (including seeps) with concentrations that exceed proposed cleanup levels for aluminum, cadmium, copper, and iron discharge from Tailings Piles 2 and 3 into Railroad Creek. For example, under spring conditions described in the DRI, seeps SP-3 and SP-4 (at the base of Tailings Piles 2 and 3), have zinc concentrations 240 and 50 times the proposed cleanup levels, respectively. Under Alternative 9, impacted groundwater flows from Tailings Pile 2, Tailings Pile 3, and part of Tailings Pile 1 would continue to discharge into Railroad Creek.

5. **Page 3, Section 2.1, Groundwater Extraction Wells:** The Agencies question the effectiveness of the groundwater extraction wells proposed for Alternative 9. In the DFFS, this technology was not retained by Intalco in the initial technology screening process "due to the moderate anticipated effectiveness in reliably capturing groundwater flow in the heterogeneous subsurface conditions" (DFFS Page 5-38). The DFFS goes on to say "The high iron content and acidic nature of the East Area groundwater would significantly increase operation and maintenance requirements and reduce system performance."

   Intalco did not provide many details about the proposed Alternative 9 well system despite the Agencies' requests (Forest Service 2006a and 2006b). In particular, it is not clear whether pumping groundwater from the proposed wells would induce flow to the wells from Railroad Creek. Inflow of oxygen-rich water from the creek would cause iron fouling in the wells proposed for Alternative 9. While maintenance may be able to address some of the iron fouling issues, the Agencies are not convinced that the wells would operate consistently and reliably in intercepting the contaminated groundwater discharging from Tailings Pile 1. Intalco indicated pumping would be controlled to prevent inflow of oxygen-rich surface water, but did not discuss how this would affect feasibility and the effectiveness of Alternative 9 (Covington & Burling 2006b). The Agencies do not accept Intalco's preconditions on limiting application of the technology presented in Alternative 9, without addressing clean up of the overall Site (Covington & Burling 2006a and 2006b). A remedy is not effective unless it protects human health and the environment, and complies with ARARs.

6. **Page 4, Section 3.1, Page 6, Section 3.2, and Section 6, Reliance on Natural Attenuation:** The Agencies do not accept Intalco's assertion that Alternatives 9 and 10 would both achieve potential ARARs in surface water within a comparable restoration timeframe as a result of natural attenuation. Intalco notes that both CERCLA and MTCA recognize natural attenuation as part of a remedy, but Intalco has confused source depletion with natural attenuation.[1]

[1] Natural attenuation processes "include a variety of physical, chemical, or biological processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in soil or groundwater" (EPA 1999). For

Neither CERCLA nor MTCA allow a remedy to rely on source depletion.

CERCLA and MTCA do allow an alternative to include natural attenuation, provided certain conditions are met [EPA 1999, WAC 173-340-200, WAC 173-340-370(7)]. Intalco has not shown that Alternative 9 would satisfy the requirements for monitored natural attenuation (MNA) to be part of the remedy:

- Alternative 9 does not use source control to the maximum extent practicable, as required under WAC 173-340-370(7)(a).

- Intalco has not shown that leaving contaminants on the Site during the restoration time frame does not pose an unacceptable threat to human health and the environment, as required under WAC 173-340-370(7)(b).

- Intalco has not quantified natural attenuation processes (biodegradation or chemical degradation) occurring at the Site, which is required under WAC 173-340-370(7)(c), and as part of the CERCLA guidance for using natural attenuation as part of a remedy (EPA 1999).

Therefore, reliance on MNA is not appropriate as part of Alternative 9.

Alternative 9 relies on natural attenuation to address hazardous substance concentrations above proposed cleanup levels in groundwater in the LWA, and relies on source depletion and natural attenuation to address groundwater impacted by Tailings Piles 2 and 3, and a portion of Tailings Pile 1. Reliance on source depletion and natural attenuation to clean up groundwater means surface water would continue to exceed aquatic life protection criteria for hundreds of years.

7. **Page 4, Section 3.1, Cadmium, Copper, and Zinc:** The Agencies take exception to the statement "*that the SWQC and NRWQC are based on species that do not inhabit Railroad or Copper Creeks, and are therefore not relevant or appropriate to the Holden Mine Site.*" As previously commented by the Agencies (Forest Service 2003), daphnia, ceriodaphnia, hyallella, and other sensitive organisms are considered surrogate species for those untested species found in natural waters. These sensitive invertebrates, although not found in Railroad Creek, represent the range of possible biological responses to contaminants. Additional evidence that the NRWQC are relevant and appropriate is presented in USFWS (2004 and 2005).

8. **Page 5, Section 3.1, Iron and Aluminum ARARs:** The Agencies do not accept Intalco's position "*that iron and aluminum are not hazardous substances for the purposes of liability under CERCLA and MTCA and should not be the basis for remedy selection...*" The Agencies

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metals at the Site, these natural attenuation processes may include dispersion, dilution, and sorption. Source depletion refers to the irreversible processes that produce low pH conditions that release metals resulting from chemical oxidation of sulfides in the mine, tailings, and waste rock. Over hundreds of years the available sulfide minerals will be "used up" and reduce the rate of ongoing release of acidic drainage and metals to groundwater from the tailings, waste rock, and underground mine. However, this change in the rate of release does nothing to mitigate the adverse effects of metals already or continuing to be released to the environment. In essence, relying on source depletion is a "no action" approach that is similar to letting an oil drum leak on the premise that the release will stop when all the oil has left the drum.

determination that iron and aluminum are hazardous substances was presented by USDA (2006).

9. **Page 5, Section 3.2, AKART:** The Agencies disagree with Intalco's position that remedial actions proposed under Alternative 9 constitute All Known, Available, and Reasonable Methods of Treatment (AKART) for the Site. Under Alternative 9, groundwater with metals above proposed cleanup levels would continue to be released untreated into Railroad Creek from the LWA, Tailings Piles 2 and 3, and a portion of Tailings Pile 1. Refer to the SFS for a more detailed discussion of AKART.

10. **Page 6, Last paragraph of Section 3.2:** The Agencies disagree with Intalco's position that Alternative 9 will provide significant improvements in water quality at the south bank of Railroad Creek in the short term. Following implementation of Alternative 9, seeps and groundwater that exceed proposed surface water cleanup levels would continue to discharge into Railroad Creek for significant portions of the Site. This uncontrolled discharge would include groundwater (including seeps) from the LWA, Tailings Piles 2 and 3, and a portion of Tailings Pile 1. Without immediate, permanent elimination of the release of metals into Railroad Creek above proposed cleanup levels, Alternative 9 would not be protective of aquatic receptors.

11. **Page 6, Section 3.3 and Page 8, Section 4.1, Ecological Risk Assessment and Protection of Ecological Receptors:** As outlined in Appendix E of the SFS, the Agencies have a number of concerns regarding use of the ERA prepared by Intalco to set soil cleanup levels. The ERA that was completed is not sufficient for determining the need for, or extent of soil cleanup for portions of the Site e.g., the LWA, the baseball field, areas within Holden Village, and the area of observed wind-blown tailings deposition east of the Village. The ERA did not adequately address the potential pathway of plant uptake of metals, and effects on animals that browse on the plant cover. Furthermore, the ERA relies on limited survey data and excludes amphibians and other receptors of concern. Additional Site observations and studies will be needed during remedial design (RD) if final soil cleanup levels are different from the MTCA values proposed by the Agencies (see Appendix E of the SFS).

    In commenting on the DRI, the Agencies took exception to the findings of the ERA, and later with the proposed soil and surface water cleanup levels presented in the DFFS (Forest Service 2001 and 2003; Hart Crowser 2005; USFWS 2004 and 2005, also see Appendix E to the SFS).

12. **Page 6, Second Paragraph of Section 3.3, Closure of Tailings Piles as Limited Purpose Landfills:** The Agencies do not agree with Intalco that the DRI demonstrates there is no risk to "most ecological receptors and low potential risk to select plants, soil biota, and wildlife due to soils in limited areas of the Site." Intalco has not demonstrated that soils above proposed cleanup levels based on MTCA Table 749-3 are protective under WAC 173-340-7493. The Agencies also note that closure of the tailings piles must be protective of human health and the environment, and that any alternative to the presumptive cover requirements [WAC 173-350-400(3)(e)(ii)] would need to satisfy MTCA requirements for protection of terrestrial ecological receptors [WAC 173-340-7491(2)(a)], (as well as be protective of human health). Specifically, the terrestrial protection requirement would include protection of burrowing animals and invertebrates, plants with roots in the tailings, and animals that graze on such plants.

13. **Page 7, Section 3.4, Solid Waste Handling Regulations:** Intalco contends that tailings and waste rock will be addressed under the state limited purpose landfill regulations (Chapter 173-350 WAC), which are an action-specific ARAR. The Agencies note that closure of the tailings and waste rock piles must be protective of human health and the environment, and

that any alternative to the presumptive cover requirements [WAC 173-350-400(3)(e)(ii)] would need to satisfy the final cover performance standards presented in WAC 173-350-400(3)(e)(i), as well as MTCA requirements for protection of human health and the environment as noted above.

14. **Page 7, Last Paragraph of Section 3.4, Applicability of Limited Purpose Landfill Regulations:** The Agencies note Intalco's position that the location and design standards on the state limited purpose landfill regulations (Chapter 173-350 WAC) are not applicable to the Site because the waste rock and tailings piles were abandoned prior to the applicable date of the regulations (2003). Although the state landfill regulations may not be applicable, these landfill regulations as well as portions of the Forest Service Land and Resource Management Plan as amended (Forest Service 1990) are relevant and appropriate to closure of the tailings and waste rock piles, as discussed in the SFS.

15. **Page 8, Section 4.2 and Section 7.0 Protection of Aquatic Life:** The Agencies disagree with Intalco's position that short term aluminum, cadmium, copper, iron, and zinc concentrations in Railroad Creek will not adversely impact the aquatic community. As stated in Comments 7 and 8 above, SWQC and NWQC are relevant and appropriate and are the basis for proposed cleanup levels for the Site. Furthermore, impacted groundwater flows from the LWA, Tailings Piles 2 and 3, and a portion of Tailings Pile 1 would continue to discharge into Railroad Creek under Alternative 9.

16. **Section 5.0, Long-Term Effectiveness of Alternative 9:** Alternative 9 relies on buried perforated pipe drains for groundwater collection along the proposed groundwater barrier wall and for discrete seep collection along Tailings Pile 1. The tailings pile seep drains would be susceptible to iron fouling and clogging in the likely event that these systems are exposed to atmospheric oxygen. Alternative 9 would also require maintenance of the dewatering well screens and pumps to maintain the effectiveness of groundwater remediation below a portion of Tailings Pile 1, over the life of the remedy. Intalco has not shown that this maintenance is feasible, or that it is more feasible than maintenance required for other proposed cleanup alternatives.

    Alternative 9 does not include any active controls to prevent the discharge of groundwater above proposed cleanup levels into Railroad Creek for large portions of the Site.

17. **Page 9, Section 6, Reduction of Toxicity, Mobility, and Volume through Treatment:** Alternative 9 does not include any containment, collection, or treatment of groundwater entering the creek from the high concentration seeps and groundwater baseflow in the LWA and along Tailings Piles 2 and 3.

REFERENCES

Covington and Burling 2005. Letter from Theodore Garrett to Jay Manning, et. al, re. Holden Mine Remedial Alternative 9. November 18, 2005.

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Covington and Burling 2006b. Letter from Theodore Garrett to Norman F. Day, re. Holden Mine; Pilot Test of Pump and Treat Remedy. May 30, 2006.Dames & Moore 1999. Draft Final Remedial Investigation Report, Holden Mine Site. Prepared for Alumet Inc. by Dames and Moore. Seattle, WA. July 28, 1999.

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USFWS 2004. Tables of Published Toxicity Values at Water Hardness Concentrations Similar to Railroad Creek. June 16, 2004.

USFWS 2005. Aluminum and Iron Toxicity Related to Water Quality Parameters Similar to Railroad Creek. January 3, 2005.

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