PROPOSED AMENDMENT TO CLEANUP ACTION PLAN

4.1.2 Northwest Developed Zone (NWDZ)

Free product is to be excavated in the NWDZ, and petroleum-contaminated soil in the NWDZ is to be excavated to the remediation level of 3,400 mg/kg NWTPH-Dx throughout the zone, with the exception of properties where property owners will not allow access, and under the Skykomish School only if thermal technologies are employed. If excavation of petroleum-contaminated soil is selected for the school, the soil beneath the school is to be excavated to the remediation level of 3,400 mg/kg NWTPH-Dx, as specified below in Section 4.1.2.3. Soil contaminated with lead exceeding the cleanup level of 250 mg/kg and/or arsenic exceeding the cleanup level of 20 mg/kg is to be excavated throughout the zone. No structures will be relocated to facilitate surface metal contamination removal unless the metals contamination is coincident with TPH contamination that requires a structure to be relocated.

4.1.2.2 3 School Property

Because of the unique nature of the school's role in the Skykomish community, BNSF and Ecology will conduct early and open communication with the school board regarding development of cleanup plans for the school to minimize impacts on the learning environment and the community as a whole.

BNSF will either use excavateion or will aggressively treatment to address petroleum contamination beneath the school. If BNSF chooses to treat the contamination, tThe objectives of treatment are to reduce the amount of petroleum beneath the school to the extent technically possible, with the treatment goal of removing separate phase mobile or volatile liquid petroleum components or nonaqueous phase liquid (NAPL). If BNSF chooses to excavate the contamination, BNSF shall The objectives of excavation are to remove free product and petroleum-contaminated soil beneath the Skykomish School to the remediation level of 3,400 mg/kg NWTPH-Dx, to the extent technically possible while protecting the structural integrity of the School building. After- excavation or treatmentcleanup, protection against vapor intrusion may be required if petroleum contamination exceeding 3,400 mg/kg NWTPH-Dx remains under the building. After excavation or treatment, compliance monitoring of indoor and ambient air will use the air cleanup level of 1,346 µg/m^3 APH as the standard when evaluating monitoring data to assess whether vapor protection measures are required.

Compliance monitoring is to be conducted to ensure that excavations remove the soil to

the concentrations specified. Removal of soil exceeding 3,400 mg/kg NWTPH-Dx and control, remediation, and/or isolation of contaminated soil under the school, ~~if necessary (see Section 4.1.2.3)~~ is expected to result in significant decline of groundwater contamination resulting from removal of the soil source contamination, as described further below.~~.~~

BNSF must include a work plan for excavation or treatment beneath the school in the EDR for the work year(s) in which activities associated with the remediation work are to be performed. The work plan must discuss how detailed design of the remediation activities will be performed and provide for Ecology review and approval of the design calculations, plans, and specifications. The work plan will discuss restoration time frame and impacts on school operations and learning environment.

One treatment technology being considered for the school is thermal treatment. This treatment option is discussed below to illustrate the consideration which needs to be given to treatment beneath the school if excavation is not implemented. Other treatment options which may be considered include surfactant flushing and water flushing. If other treatment options are used, they must remove and immobilize oil to at least as great a degree as would be achieved by thermal technology, although possibly taking longer. If excavation is not implemented, the decision of the treatment technology to be used will be developed in discussions among BNSF, Ecology, and the school board and documented in a School Cleanup Alternatives Evaluation Report. Preparation of this report is a requirement for developing cleanup plans for the school. See further discussion of this report under §6.2.

If it is the selected technology, thermal treatment would be done by drilling boreholes in the basement of the school to access the petroleum. The soil would be heated and mobilized petroleum extracted through the boreholes. A recovery trench would be installed on the north and west sites of the school to capture any petroleum that is not extracted through the boreholes. Figure 7 shows a conceptual diagram of the recovery trench design associated with thermal treatment.[15,16]

It is anticipated the entire thermal treatment process would take about a year. During that time, the school's basement, at a minimum, would not be available for classes. If, in the school's estimation, temporary classrooms are needed, BNSF would make accommodations to ensure the school's needs are met in order to minimize any disruption.

[15] Monitoring/recovery wells will be located on centers no greater than 10 feet apart unless otherwise approved by Ecology. Such approval will only be given if sufficient information is presented to Ecology for Ecology to determine that a proposed wider spacing will ensure that any free product entering the trench will flow to the monitoring wells prior to penetrating to the downgradient side of the trench.
[16] Surfactant or water flushing will require a trench design incorporating an impermeable barrier and groundwater extraction and treatment similar to that shown on Figure 9.

If treatment is implemented, BNSF would conduct vapor monitoring in the school's basement during the heating phase of the cleanup and for two years afterward. Monitoring during the heating phase (including collection of baseline data prior to heating) would measure whether the basement meets the air cleanup level of 1,346 µg/m3 APH as a result of the heating. Vapor monitoring for the following two years would ensure that vapors from petroleum remaining after the heating phase are not impacting the school. The monitoring frequency would be monthly for the first three months of the thermal treatment; thereafter, the monitoring frequency would be reduced to quarterly, if the vapor concentrations are below the air cleanup level of 1,346 µg/m3 APH. If impacts are found, BNSF would install vapor control measures to reduce the vapor concentrations to safe levels.

If treatment is implemented, BNSF would monitor the wells installed in the downgradient trench as part of confirmational monitoring; this monitoring would be included in the compliance monitoring plan that BNSF would submit to Ecology for review and approval. Observations would be made quarterly for the first two years following thermal treatment. The observation frequency may be reduced after that, depending upon what is observed, with Ecology's approval. The observations would consist of visual observation of water removed from each well with a bailer for petroleum visible as nonaqueous phase liquid. Chemical analyses for these wells may be necessary, and would be included in the confirmational monitoring plan if Ecology determines it is necessary. If petroleum as nonaqueous phase liquid is observed in any well, BNSF would install equipment in the well to recover the nonaqueous phase liquid. Additional monitoring wells would be installed downgradient and observed for the presence of petroleum as nonaqueous phase liquid, and tested for dissolved chemical components. If petroleum as nonaqueous phase liquid is observed in these wells, BNSF would take actions to remove it and stop the migration of petroleum through the trench. BNSF would propose a plan for this contingency in the EDR.

If excavation is implemented, ~~then~~ BNSF would install monitoring wells ~~and a recovery trench~~ and ~~would~~ conduct monitoring in accordance with the compliance monitoring plan. An interception and recovery trench as noted above for treatment technologies will be constucted, only if ~~after excavation free product~~ - free product -remained under the School building and were present in downgradient monitoring wells.

Excavation, or treatment, ~~Thermal remediation~~ and monitoring for and removal as necessary of free product in a downgradient interception and recovery trench and beyond the recovery trench if necessary, is likely to result in the groundwater remediation level of 477 µg/L NWTPH-Dx being met downgradient of the school, and the groundwater cleanup level of 208 µg/L NWTPH-Dx being met at the conditional point of compliance. However, in the event dissolved petroleum concentrations in groundwater still exceed 477 µg/L NWTPH-Dx downgradient from the school after the excavation or treatment~~thermal remediation~~ and associated interception and recovery trench installation has been performed, no additional measures on or at the school property will be required to meet the 477 µg/L NWTPH-Dx dissolved petroleum remediation level on property or downgradient. Instead, as a contingency, treatment methods will be employed at the

levee if necessary to ensure that the cleanup level of 208 µg/L NWTPH-Dx and absence of sheen or free product would still be met at and downgradient of compliance wells in the levee. BNSF may elect to perform measures between the school and the levee if BNSF believes they would be more effective.

Even after excavation or~~excavation or thermal~~ treatment, contamination ~~will~~ may remain beneath the school at concentrations exceeding 3,400 mg/kg NWTPH-Dx in soil and 477 ug/l NWTPH-Dx in groundwater. Restrictive covenants as previously described in Section 4.1.2.1would be required as an institutional control for the school property to ensure that future generations are aware of the remaining contamination and the need to manage it appropriately if it is exposed by future activities on the property.

Chapter 6 - Implementation of the Cleanup Action

6.2 Schedule

Cleanup of the BNSF Skykomish Site will proceed in phases over a number of years. A schedule of due dates for the documents which control the work is presented in Exhibit C of the Consent Decree. The phased cleanup schedule is shown on Figure 13. This figure shows the areas to be cleaned up and the Work Year in which the most active construction in each area will begin. Planning will start the year before, and some construction activities (i.e., landscaping, final surface improvements) may occur in a subsequent ~~the following~~ year. Pre-excavation explorations, discussions with stakeholders, results of confirmation sampling during construction, and time necessary to obtain access agreements may result in modification of some of the excavation boundaries shown on Figure 13. A summary of the activities by Work Year is as follows:

- 2008 – Construction of project-duration soil handling facility on the railyard. Begin excavation of NWDZ east of fifth street and along Railroad Avenue. Begin installation of hydraulic control and containment system along northern railyard boundary. Excavation of portion of NEDZ along Railroad Avenue. Excavation of metals in the NEDZ. Installation of air-sparging system to treat contaminated soil and groundwater in NEDZ.
- 2009 – Continue excavation of NWDZ. Extension of hydraulic control and containment system along northern railyard boundary if not completed in 2008 ~~and installation of hydraulic control and containment system at FMC, if necessary~~. ~~Excavation of SDZ and part of FMC.~~ Excavation of petroleum and metals contaminated soil within 2 feet of the surface on the railyard (may be rescheduled, but will be completed by 2012). Cleanup around the south abutment of Fifth Street Bridge (this work may be extend to 2010 and is subject to coordination with the Washington State Department of Transportation) and obtaining the permits to perform in-water work around the bridge.
- 2010 – ~~Continue~~ Complete excavation of NWDZ and begin excavation or treatment beneath the school. Excavation of SDZ and FMC and installation of

hydraulic control and containment system at FMC, if necessary.~~Complete FMC excavation. Cleanup around south abutment of Fifth Street Bridge (this work may be moved to 2011 and is subject to coordination with the Washington State Department of Transportation).~~ Cleanup of the south abutment of the Fifth Street Skykomish Bridge if not performed in 2009.

- 2011 – ~~Complete excavation of NWDZ.~~ Complete school cleanup if not completed in 2010. ~~Cleanup of the south abutment of the Fifth Street Skykomish Bridge if not performed in 2010.~~ Any work not completed in prior years and dismantling of active cleanup operations. It is anticipated that the final surface improvements such as final sidewalks and final street driving surfaces will be completed this year.

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- 2012 and following – Operation and maintenance of installed systems. Compliance monitoring. Excavation of additional smear and vadose zone soil within BNSF's railyard facility property boundary as necessary to reach a total of 7,500 cubic yards.

A number of follow-on documents are necessary for each phase of work and required by regulation. These include engineering design reports, construction plans and specifications, operation and maintenance plans, permits and substantive permit requirements, compliance monitoring plans; and as-built reports. Figure 14 summarizes the main follow-on documents. The *Groundwater Monitoring Plan* dated May 12, 2005, will be incorporated into the site-wide compliance monitoring plans. Plans may be combined as appropriate. Each plan is to be submitted to Ecology for review and approval. A detailed list of deliverables and schedule must be developed and approved by Ecology for each phase of the work.

Mitigating measures described in the Final Environmental Impact Statement (Ecology 2007) are to be incorporated in the engineering design report or other appropriate deliverables specified in Exhibit C of the Consent Decree.

Investigations to define the distribution of contamination in further detail have been ongoing at the Site during 2007. The results of this work will be summarized in the 2008 Engineering Design Report. This includes the following investigations:

- Former Maloney Creek Zone – This investigation will provide additional data to define the extent of TPH contamination in the former Maloney Creek Zone soil and sediment. In addition, the investigation will include preparation of a detailed topographic survey of the Former Maloney Creek zone including definition of the wetland boundaries and ordinary high water mark.

- South Developed Zone - This investigation will provide additional data to define the extent of soil contamination in the south developed zone.

- Northwest Developed Zone – This investigation will provide additional data to define the north, west and east boundaries of the free product plume and soil with TPH concentrations exceeding the remediation level (3,400 mg/kg NWTPH-Dx).

These data will allow the extent of excavation to be more fully defined so that the impacts to properties in that zone can be predicted with more certainty.

- Northeast Developed Zone – This investigation will provide additional data to define the extent of free product and soil exceeding 30,000 mg/kg NWTPH-DX in the Northeast Developed Zone to the north of the railyard; this will better define the area that will require excavation during cleanup. This investigation will also provide additional data to define the extent of soil to the north of the railyard with TPH concentrations above the remediation level (3,400 mg/kg NWTPH-Dx); this will better define the area that will require air sparging.

- Fifth Street Skykomish Bridge South Abutment – This investigation will provide additional data to define the extent of petroleum hydrocarbons in the vicinity of the south bridge abutment. The extent of TPH exceeding the remediation level (3,400 mg/kg NWTPH-Dx) and the cleanup level (22 mg/kg NWTPH-Dx), as appropriate, will be better defined to allow cleanup of the area in the immediate vicinity of the south bridge abutment to be designed. This investigation will be conducted when the river flow is at the seasonal low to allow drilling beneath the bridge.

- Railyard – This investigation will provide additional data to define the extent of lead and arsenic exceeding cleanup levels in soil within two feet of the ground surface on the east side of the railyard (in the 'Y"). Data from this investigation will supplement soil data from the RI and Supplemental RI and be used to assess whether shallow soil will require excavation in the investigation area.

Work plans for the following special design investigations will be included in the Engineering Design Report for 2008 work:

- Hotel Structural Survey – A survey will be conducted to evaluate whether the structural condition of the hotel will permit moving it or supporting it so that work can occur beneath it. A draft report of the survey results is due on October 30, 2009, subject to gaining access to the hotel. The report will include subsequent work to be done in either the case the hotel can be moved can be moved or supported or the case that it cannot. The final report will be due no later than December 31, 2009.

- Hydraulic Control and Containment System – Investigations and studies will be conducted to design the hydraulic control and containment system. The investigations and studies will include, but are not limited to, design, installation, operation, and maintenance of: the groundwater interception trench; the redundant barrier system capable of detecting leaks of free product that may occur anywhere along the length of the barrier system.; groundwater pumping rates and volumes necessary to maintain hydraulic control and containment of both free product and dissolved contamination; water treatment requirements; water re-injection rates, volumes, and locations; surface water discharge rates, volumes, and locations; groundwater elevation and quality monitoring (including free

product monitoring); means of optimizing system performance; and any other parameters necessary to fully design, operate, maintain, and assess the performance of the hydraulic control and containment system. The draft report is due December 5, 2007. The final report is due no later than January 15, 2008.

- School Alternatives Evaluation Work Plan – An investigation will be required to assess how to clean up contamination beneath the school to the degree technically possible. The results of this investigation will be documented in a School Alternatives Evaluation Report. The report will evaluate means of thermally treating the contamination beneath the school in terms of the requirements for implementing thermal treatment and the impact of such implementation on school operations. The report may consider other technologies in addition to thermal treatment. Other technologies will be compared to thermal treatment in terms of amount of contamination mobilized and removed, the degree of immobilization of contamination remaining after treatment, the time to perform the treatment, the impact of the treatment on school operations, mitigation of impacts on school operations, and any other criteria which arise from discussion among Ecology, the School Board, and BNSF during the development of the work plan for the investigation. Comparative physical testing will be required unless otherwise approved by Ecology. Comparative physical testing must include testing of thermal treatment unless otherwise approved by Ecology. Comparative physical testing also must be performed on other treatment technologies still under consideration after literature research to provide data to permit comparison of other treatment technologies with thermal treatment.

  A draft work plan for the School Alternatives Evaluation is due September 30, 2007. The final School Alternatives Evaluation work plan is due November 30, 2007. A draft technology review report and work plan for comparative physical testing is due by January 31, 2008; the final technology review report and comparative physical testing work plan is due March 31, 2008. Comparative physical testing is anticipated to take about one year. A draft school comparative physical testing study report is due on April 1, 2009. The final comparative physical testing report is due May 1, 2009. A draft school alternatives evaluation report is due on June 1, 2009. The final school alternatives evaluation report is due on July 1, 2009. See Exhibit C.

In addition, the following two reports are required:

- FMC Wetlands Special Design Report – This report will specify the design of the wetlands to be constructed after cleanup of FMC. The final report will be due no later than June 30, 2008. There may be separate Special Design Reports for the "east" and "west" FMC wetland areas.

- Bridge Coordination Report – This report will provide sufficient design basis to begin coordination of cleanup around the south abutment of the Fifth Street Bridge with the Washington State Department of Transportation. The final report will be due no later than June 30, 2009.

As noted in Section 4.1, restrictive covenants and groundwater withdrawal restrictions will be required in certain areas and circumstances for the various cleanup zones. The covenants and groundwater withdrawal restrictions are to be developed as part of the Engineering Design Report for each phase of the work.

Each deliverable must be submitted in hard copy and electronic format. Ecology will specify the number of hard copies for each deliverable. In general, electronic submittals will be in Adobe Acrobat, Excel, Access, or AutoCAD format, as appropriate, or as otherwise specified by Ecology. Electronic formats appropriate for use in geographic information systems databases may also be required.

All submittals must follow the requirements of WAC 173-340-840, General Submittal Requirements.