INTERIM ACTION REPORT
ENNIS CREEK-FINISHING ROOM
FUEL OIL TANK NO. 2
MACHINE SHOP

FORMER RAYONIER PULP MILL SITE
PORT ANGELES, WASHINGTON

Prepared for:

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Appendices provided on attached CD-Rom.

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ACRONYMS AND ABBREVIATIONS

ARAR	applicable, relevant, and appropriate requirement
B&B	Bruch and Bruch Construction, Inc.
BMP	best management practice
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
COC	contaminant of concern
CZMA	Coastal Zone Management Act
DRO	Diesel range organics
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESI	expanded site investigation
FOT2	Former Fuel Oil Tank No. 2
HDPE	high density polyethylene
IAWP	Interim Action Work Plan
MHHW	mean high high water
MTCA	Model Toxics Control Act
NPL	National Priorities List
PCB	polychlorinated biphenyl
PID	Photo-ionization detector
PPE	personal protective equipment
ppm	parts per million
Rayonier	Rayonier, Inc.
RCRA	Resource Conservation and Recovery Act
RCW	Revised Code of Washington
RI	remedial investigation
RRO	Residual range organics
T/E	threatened and endangered
TPH	total petroleum hydrocarbons
Tribe	The Lower Elwha Klallam Tribe
TSCA	Toxic Substances Control Act

ACRONYMS AND ABBREVIATIONS (CONT.)

USC	United States Code
VOC	volatile organic compound
WAC	Washington Administrative Code

EXECUTIVE SUMMARY

Interim actions were performed during the summer of 2002 at three locations on the former Rayonier pulp mill site, located in Port Angeles, Washington, and owned by Rayonier, Inc. as part of an agreement among the Washington State Department of Ecology (Ecology), the Lower Elwha Klallam Tribe (the Tribe), and Rayonier, Inc. An Interim Action Work Plan (IAWP) was developed describing the interim actions to be performed at the mill site. The IAWP was reviewed by regulatory agencies and the public. The interim actions were performed under Agreed Order No. DE 02SWFAPST-4571, which was issued to Rayonier by Ecology in July 2002.

The interim actions were carried out at three areas on the site; the Ennis Creek-Finishing Room Area, the Former Fuel Oil Tank No. 2, and the Former Machine Shop. The Ennis Creek-Finishing Room Area and Former Fuel Oil Tank No. 2 were selected for interim actions to address soil contamination that remained following earlier actions at these sites. The Machine Shop Area was selected for interim action because oil contamination was noted on the ground after the building was removed. This area was subsequently covered with plastic to prevent migration of contaminants until an interim action could be completed.

Soil and sediment on the banks and in the streambed of Ennis Creek adjacent to the former Finishing Room were characterized for the presence of total petroleum hydrocarbons (TPH) and polychlorinated biphenyls (PCBs). The soils were characterized prior to start of the cleanup project because it would be necessary to temporarily bypass the Ennis Creek around the work area during the remediation, and a suitable location for the bypass system beyond the limits of excavation needed to be identified. TPH and PCBs were detected in the western portion of the study area at concentrations requiring cleanup. The pre-excavation characterization determined the planned limits of the excavation. However, during the actual excavation several areas were identified which required remediation beyond what had been planned. Some of these required excavation as deep as 3 1/2 to 4 feet below the top of the streambed. Physical limitations of equipment and the existing structures prevented some areas from being excavated to meet the desired cleanup level. Approximately 81,000 gallons of oil and water from within the excavation were pumped to a treatment tank. A total of 1,248 tons of soil/sediment were excavated from the area, characterized for disposal, and sent to the City of Port Angeles Sanitary Landfill. In addition, a sheet pile wall, two concrete pipe supports, some of the protective bank riprap, and groundwater monitoring and extraction wells were removed from the area. The excavation was backfilled with clean graded fill material. The excavation and associated west bank of Ennis Creek were modified to improve the habitat. A shallow inundation area was created to allow the creek to flow more naturally. Anchored root wads and vegetation were established in the inundation area as habitat enhancements.

Soil in an area extending approximately 100 feet east and north of the Former Fuel Oil Tank No. 2 was found to be affected by TPH. Soil with TPH concentrations greater than the cleanup levels was excavated to or slightly below the groundwater depth. Excavation below the groundwater was accomplished by dewatering the excavation, and pumping the groundwater to an oil-water separator. About 72,000 gallons of oily water were recovered and treated. A total of 3,042 tons of TPH-affected soil was excavated. The excavated soil was characterized for disposal and sent to the City of Port Angeles sanitary landfill and the TPS Technologies soil recycling facility in Lakewood, WA. The excavation was backfilled with concrete rubble and graded fill material. Soil in an area approximately 50 feet by 75 feet in the Former Machine Shop was found to be affected by TPH. Approximately 970 tons of affected soil was excavated from the area to the groundwater depth. The excavated soil was characterized for disposal and sent to the City of Port Angeles sanitary Landfill. Concrete supports were either left in place and cleaned or removed to a staging area for further characterization and possible disposal. The excavation was backfilled to surrounding grade with clean concrete rubble.

The three interim actions were conducted in accordance with the IAWP and resulted in removing significant quantities of contaminated soil. In each of the three locations, the volume of soil removed was more extensive than had been anticipated in the IAWP. At the Ennis Creek and Fuel Oil Tank locations, physical limitations of equipment and existing structures prevented some areas from being excavated to the desired cleanup level. Based on monitoring wells nearest the excavation, the residual TPH near the Fuel Oil Tank does not appear to be migrating. The remaining zone of TPH-impacted soil is thin (generally less than one inch thick), discontinuous, and occurs 10 feet below the ground surface. Considering the site conceptual model, the remaining material does not present an exposure hazard and does not appear to present an adverse affect to the environment. Residual TPH-impacted soil remains at the Ennis Creek area. The analytical results from the conformational soil samples at Ennis Creek may be biased high due to the presence of oily water at many of the sample locations. The field activities conducted were successful in meeting the objectives of the IAWP by excavating soil to a depth of 3.5 feet where impacted soil was present. Further excavation was not possible due to the presence of groundwater and physical structures that limited excavation.

1 INTRODUCTION

This Interim Action Report has been prepared by Integral Consulting Corporation and Foster Wheeler Environmental Corporation for the former Rayonier pulp mill site, located in Port Angeles, Washington, and owned by Rayonier, Inc. as part of an agreement among the Washington State Department of Ecology (Ecology), the Lower Elwha Klallam Tribe (the Tribe), and Rayonier, Inc. The former Rayonier pulp mill site, located at 700 North Ennis Street occupies approximately 80 acres on the northern coast of Washington's Olympic Peninsula bordering on the Strait of Juan de Fuca (Figure 1-1). The three interim actions completed at the site between July and October 2002 were done so under Agreed Order No. DE 02SWFAPST-4571, which was issued to Rayonier by Ecology in July 2002 (Appendix A).

The three interim action sites (Figure 1-2) included are:

1. Ennis Creek - Finishing Room Area
2. Former Fuel Oil Tank No. 2
3. Former Machine Shop

The Ennis Creek-Finishing Room Area and the Former Fuel Oil Tank No. 2 (FOT2) sites were selected because partial cleanup actions had already been conducted at these locations and additional cleanup actions were planned. However, the previous actions did not completely remove all of the known or suspected contamination. The Former Machine Shop was selected because oil contamination was noted on the ground after the building was removed. This area was covered with plastic to prevent migration of contaminants until the interim action could be completed.

The Interim Action Report was prepared in accordance with Ecology's Guidance for Interim Actions (Washington Administrative Code [WAC] 173-340-430). The organization of the report is presented below:

- Section 1: Introduction – purpose and organization
- Section 2: Site Description – site history, IIAWP, and Agreed Order
- Section 3: Cleanup Objectives – regulatory framework, affected media and contaminants of concern, and cleanup levels for each interim action site
- Section 4: Remedial Actions – description of activities completed for each site
- Section 5: Sampling and Analysis – description of sampling locations and results of laboratory analysis for each site

- Section 6: Summary and Conclusions – summary of interim actions
- Section 7: References

Figure 1-1. Former Rayonier Pulp Mill Vicinity Map.

200 0 200 400 600

1"=400'

HORIZONTAL SCALE

N

FOSTER WHEELER ENVIRONMENTAL CORPORATION

Figure 1-2
Former Rayonier Pulp Mill
Interim Action Locations

2 BACKGROUND

For the three interim actions, previous investigation results were evaluated to determine the affected media and contaminants of concern. This evaluation was based upon the primary focus for each interim action:

- Ennis Creek – Finishing Room Area sampling of soils remaining between the sheet pile wall and Ennis Creek; sampling of sediments within Ennis Creek; removal of the steel sheet pile wall; replacement and relocation of protective riprap; removal of soils/sediments above the cleanup level established in the IAWP; removal of remaining concrete pipe supports; removal of groundwater monitoring wells and sumps in the Finishing Room area; replacement of riprap along the north bridge; introduction of surface water flow into a portion of the previous Finishing Room area
- Former Fuel Oil Tank No. 2 sampling soil in the vicinity of the former FOT2; removal of soil above the groundwater table exceeding the cleanup level established in the IAWP; backfilling the excavation
- Former Machine Shop sampling soil beneath the former machine shop; cleaning concrete supports; removal of soil above the groundwater table exceeding the cleanup level established in the IAWP; backfilling the excavated area

2.1 SITE HISTORY

2.1.1 ENNIS CREEK – FINISHING ROOM AREA

During a chemical safety audit in May 1989, personnel discovered an oil sheen on Ennis Creek. The sheen appeared to originate from riprap located on the west bank of Ennis Creek, next to the Finishing Room. Subsequent investigations conducted by Rayonier identified concentrations of petroleum and PCBs in underlying shallow soils. The petroleum and PCBs came from past releases of hydraulic fluid from several pulp baling presses in the Finishing Room. Rayonier installed absorbent pads and containment structures to collect the leaking oil.

Oil absorbent booms were also placed in Ennis Creek, and Rayonier installed a recovery system to intercept and collect oil migrating towards Ennis Creek (Foster Wheeler 1997). A site characterization study, begun in October 1989, identified a free-phase oil plume approximately 65 by 160 feet under the eastern side of the Finishing Room and extending to Ennis Creek. Based on this study, Rayonier proposed an interim remedial action plan to mitigate oil seepage into Ennis Creek. Rayonier completed the former Rayonier pulp mill site investigation in the

Finishing Room area in 1990 and began operating an oil recovery system in 1991, using three oil/water extraction wells.

In August 1990, Ecology notified Rayonier that the Finishing Room cleanup would take place under a MTCA consent decree. Rayonier and Ecology negotiated an agreed order to complete a feasibility study to determine what cleanup technologies would be most suitable for the type of contamination on the former Rayonier pulp mill site. In February 1992, Ecology issued a MTCA enforcement order to complete site cleanup. The enforcement order required the removal of contaminated soils, control of water runon and runoff to the Finishing Room area, and blocking of hydraulic oil migration towards Ennis Creek. In 1993, Rayonier excavated a 160-foot-long, 8-foot-wide, and 8-foot-deep trench along the western side of the sheet pile wall that bordered Ennis Creek and installed an oil recovery system (SECOR 1993).

During Rayonier's site investigation, soils beneath the Finishing Room were found to have hydraulic oil and PCBs (Ecology 1992). In 1998, following removal of the Finishing Room building, Ecology and Rayonier signed an agreed order for the cleanup of affected soils and groundwater at the Finishing Room site. The agreed order included a work plan, prepared by SECOR, which called for removal of contaminated soils in the Finishing Room hydraulic area to meet MTCA Method B cleanup level requirements of 1,000 mg/kg of TPH and 10 mg/kg of PCBs. Contaminated soils in the load center transformer room area were to be removed to meet Toxic Substances Control Act cleanup levels for PCBs (1 mg/kg).

Rayonier removed more than 8,300 tons of soil in the Finishing Room project area between September and December of 1998. An estimated 166,835 pounds of TPH and 27 pounds of PCBs were removed with the contaminated soils. Excavation soil samples were analyzed by an on-site mobile laboratory to confirm whether MTCA Method B and Toxic Substances Control Act (TSCA) cleanup levels were being met. Statistical analysis of the confirmation soil sample data demonstrated compliance with the agreed order (SECOR 1999). The area east of the sheet piling was not addressed during the 1998 phase. Investigation and remediation activities in the Finishing Room area have been conducted in accordance with the provisions described in Enforcement Order DE 92TCI029 and Agreed Order DE 98SW-S288, issued to Rayonier by Ecology in 1992 and 1998, respectively. Four groundwater monitoring wells (FR-1, FR-2, FR-3, FR-4) and two extraction wells were installed after the excavation and screened between 3 and 15 feet below ground surface. Pursuant to the requirements of the agreed order, quarterly sampling of groundwater from compliance wells FR-1, FR-2, FR-3, and FR-4, installed downgradient of the area, and surface water sampling from Ennis Creek have occurred. Results of groundwater and surface water sampling through the fourth quarter of 1999 indicated concentrations of TPH and PCBs above laboratory detection limits are no longer present (Landau 1999).

2.1.2 FORMER FUEL OIL TANK NO. 2

FOT2 was purchased in 1944 and was used to store No. 6 fuel oil (Bunker C) until 1990. The tank, which was located on the west side of the mill property, was an above-ground, riveted-plate carbon steel tank without a concrete tank pad. The tank had a capacity of 55,000 barrels (2.3 million gallons). The tank was demolished in 1993.

Subsurface investigations of the area underlying FOT2 were completed in 1989 and 1990 (Landau 1990 and 1991). The scope of these investigations included the following:

- Drilling of 28 soil borings in and around the tank
- Excavation of a test pit near the pump sump
- Installation of groundwater monitoring wells in 13 of the soil borings
- Installation of a monitoring well in the test pit location

Soil and groundwater samples were analyzed for TPH, PCBs, polynuclear aromatic hydrocarbons, and aromatic volatile organics (benzene, ethylbenzene, toluene, and xylene). Results from these previous investigations are presented in Section 3.

After the tank was dismantled in 1993, an interim action was conducted to remediate soil and groundwater beneath the former tank location. This action included the excavation, treatment, and replacement of approximately 1,500 cubic yards of soil under the tank and to the east of the tank near the pump sump. Because of limited accessibility, the area near the sump and associated pipe racks could not be excavated. A geomembrane barrier was placed on the west side of the pump sump before placing clean backfill in the tank area to prevent migration of TPH contamination into the remediated area.

Based on observations made during a site visit on 26 July 2001, petroleum may be seeping from the west sidewall of the hog fuel pile excavation at several locations. The location of the seeps and the stratigraphy indicate that this product may have traveled underneath the road from the tank toward the sludge building/hogfuel storage area.

2.1.3 FORMER MACHINE SHOP

The Former Machine Shop area was located near the west end of the mill property and occupied the west end of the engineering building. The concrete block building had a wooden floor that was set on concrete supports at ground level. This facility contained machine tools such as lathes and milling machines that required heavy oil

lubrication during operation. The building was constructed around 1941 and was demolished in mid-1999. At the time of demolition, oil staining was noted both on the wooden flooring and on the soils beneath the shop.

Soils and groundwater beneath the former machine shop had not been previously investigated for potential contamination; however, staining noted during the demolition of the building suggested that heavy oil from the shop operations leaked through the flooring to the soil below. Some of the concrete supports were also stained with oil. Following demolition of the building, the wooden flooring was tested for TPH as diesel and heavy oil and PCBs in preparation for disposal. The results of that testing indicated that the flooring material in the shop contained diesel-range TPH, heavy oil and PCBs (specifically Aroclors 1254 and 1260) (See Section 3.2).

2.2 INTERIM ACTION WORK PLAN

The IAWP was prepared and submitted for public review in February 2002. The IAWP presented the interim actions that were to be conducted at the former Rayonier Mill Site. The information presented included a summary of previous investigations conducted at each site, specified cleanup levels for each site, an evaluation of interim action alternatives and the selected alternative, sampling and analysis to be completed during each interim action, and the reporting and documentation required during the interim actions.

Comments from the public and regulatory agencies were received and incorporated into a revised IAWP and the Final IAWP was issued with an addendum in June 2002 (Foster Wheeler 2002). Based upon the Final IAWP Ecology prepared an Agreed Order permitting the interim actions completion during the summer of 2002.

2.3 AGREED ORDER

The interim actions presented in this report were performed pursuant to Agreed Order No. DE02SWFAPST-4571, issued to Rayonier by Ecology in July 2002. The objectives of the interim actions were to remove contaminated soil and sediment along the west bank of Ennis Creek and to restore the area with an inundation area, while the other two sites (Former FOT2 and Former Machine Shop) required removal of contaminated soil within a suspected footprint to a depth of six to eight feet below the ground surface. The Agreed Order had outlined specific design criteria for the Ennis Creek interim action, which was incorporated in the IAWP (Foster Wheeler 2002).

3 CLEANUP OBJECTIVES

3.1 REGULATORY FRAMEWORK

Both the U.S. Environmental Protection Agency (EPA) and Ecology have conducted routine regulatory compliance inspections at the former Rayonier pulp mill site. In 1997, EPA initiated a site assessment and hazard ranking scoring process for the former Rayonier pulp mill site to determine if the site should be recommended for the National Priorities List (NPL) under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA). An expanded site investigation (ESI) was conducted in support of this effort (E&E 1998). Although the former Rayonier pulp mill site scored high enough to qualify for consideration to be listed on the NPL, EPA opted to defer the listing and allow a CERCLA protective cleanup to proceed under the direction of Ecology. EPA, Ecology and the Tribe formally agreed to the deferral in a Deferral Agreement signed in 2000.

As a result of the Deferral Agreement, site evaluation and remediation at the former Rayonier pulp mill site is being conducted under MTCA and implementing regulations (WAC 173-340). MTCA requires that all cleanup activities, including interim actions, comply with applicable state and federal laws and regulations, including requirements that Ecology determines to be applicable or relevant and appropriate requirements (Arras). Potential Arras for the interim actions are summarized below.

- MTCA (Chapter 70.105D, Revised Code of Washington [RCW]; Chapter 173-340 WAC). MTCA is Washington State's contaminated site cleanup law. Through MTCA, Ecology established cleanup standards and regulations to protect citizens and the environment. MTCA cleanup levels for the interim actions are addressed in Section 3.3.
- Toxic Substances Control Act (TSCA) (40 Code of Federal Regulations [CFR] Part 761). TSCA establishes regulatory requirements for the disposal of PCBs and materials containing PCBs, including contaminated soil. Under TSCA, PCB concentrations greater than 50 parts per million (ppm) must be disposed via specific means identified in TSCA.
- Federal Archaeological Resources Protection Act (16 United States Code [USC] 470aa-ll; 43 CFR Part 7). This federal statute and implementing regulations are applicable if any work along the shoreline (debris removal, excavation) should uncover evidence of archaeological resources (e.g., shell middens). The Tribe will be notified and closely involved if archaeological materials are

identified. An archeologist observed excavation activities in areas where native soils were present.

- Federal Endangered Species Act (ESA) (16 USC 1531 et seq.; 50 CFR Parts 17, 225, 402). ESA protects fish, wildlife, and plants that are threatened or endangered (T/E) with extinction. T/E species that occur or may occur in the project area include Puget Sound chinook salmon, bull trout, and bald eagles. The requirements of the ESA apply to the interim actions that may affect or impact an ESA-listed T/E species or designated critical habitat.
- Federal Coastal Zone Management Act (CZMA) (16 USC 1451, 1453). The federal CZMA requires that federal agencies conducting activities affecting the coastal zone must ensure that the activities are consistent with the approved state CZM program. Under this definition of shoreline provided in 16 USC 1453, the beach and most of the project site are within the coastal zone.
- Washington State Shoreline Management Act (Chapter RCW 90.58; Chapters 173-, 173-16, 173-22, and 173-27 WAC). Washington State manages its coastal zones through the Shoreline Management Act. The substantive requirements of this statute and implementing regulations are applicable to construction activities along the shoreline (extending 200 feet). WAC 173-27-060 (1) discusses the applicability of RCW Chapter 90.58 to federal lands and agencies within the coastal counties, including Clallam County.
- Washington State Solid Waste Management Act (Chapter 70.95 RCW; Chapter 173-351 WAC). Requirements for handling, siting, storage, and disposal of solid waste are applicable to materials generated from project activities that are disposed of as waste.
- State Sediment Management Standards (WAC 173-204). The purpose of these standards is to reduce and ultimately eliminate adverse effects on biological resources and significant health threats to humans from surface sediment contamination. These standards apply to marine, low salinity, and freshwater surface sediments in the vicinity of the site.
- State Water Quality Standards for Surface Waters (WAC 173-201A) and the Water Pollution Control Act (RCW 90.48). The purpose of these standards is to establish water quality standards for surface waters of the state of Washington consistent with public health and public enjoyment, and the propagation and protection of fish, shellfish, and wildlife. Surface waters of the state of Washington includes lakes, rivers, ponds, streams, inland waters, saltwaters, and all other surface waters and water courses within the jurisdiction of

the state of Washington. Port Angeles Harbor, the Strait of Juan de Fuca, and Ennis Creek are surface waters of the state of Washington.

- Construction Projects in State Waters (RCW 77.55) and its associated Hydraulic Code Rules (WAC 220-110). These regulations provide for the protection for all fish life during the construction of hydraulic project(s) or performance of other work that will use, divert, obstruct, or change the natural flow or bed of any of the salt or fresh waters of the state.

3.2 AFFECTED MEDIA AND CONTAMINANTS OF CONCERN

3.2.1 ENNIS CREEK – FINISHING ROOM AREA

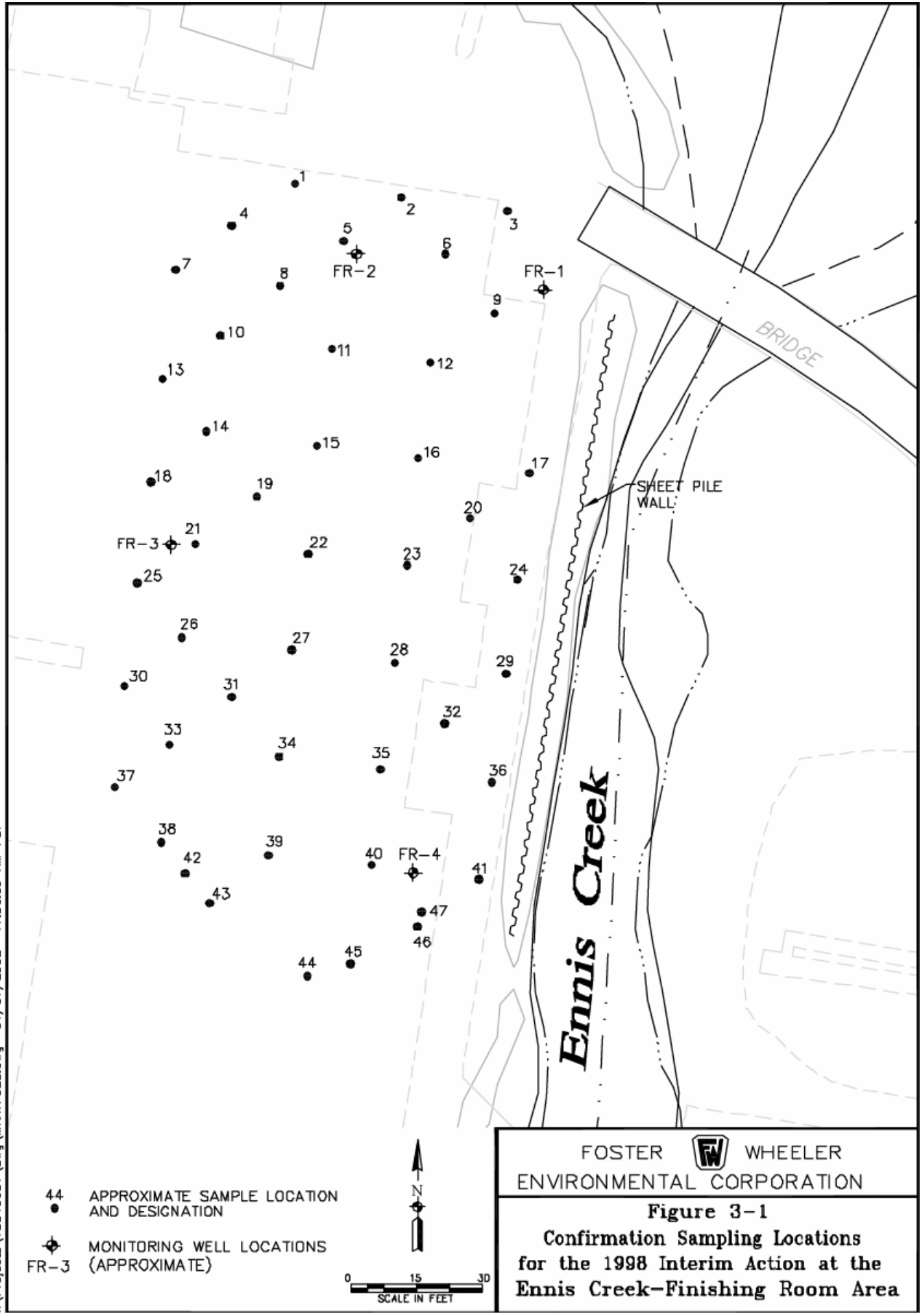
Based upon previous studies performed in the Ennis Creek – Finishing Room Area, potentially affected media included the following:

- Soil – On the western bank of Ennis Creek, between the creek and sheet pile wall, and on the eastern bank of Ennis Creek
- Sediments – Within Ennis Creek (Note: This interim action includes sediments downstream to the south side of the bridge at the mouth of Ennis Creek. Any sediment investigation north of the bridge occurred during the RI of the off-shore areas.)
- Groundwater – East of the sheet pile wall
- Surface water – Potential release to Ennis Creek

Based upon previous investigations performed at the site, the estimated range of concentrations for contaminants of concern (COCs) present in the Finishing Room area before the 1998 Interim Action included:

- TPH – Potentially present in soils east of sheet pile wall
  - TPH (diesel) 64 to 12,000 ppm
  - TPH (oil) 89 to 23,600 ppm
- PCBs – Potentially present in soils east of sheet pile wall
  - PCBs 0.145 to 2.32 ppm

The confirmation samples collected after the 1998 Interim Action are presented in Figure 3-1 and Table 3-1. As shown in Table 3-1, the 1998 Interim Action reduced the COCs in the Finishing Room area to the following: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FR-1
FR-2
FR-3
FR-4
BRIDGE
SHEET PILE WALL
Ennis Creek
44 APPROXIMATE SAMPLE LOCATION AND DESIGNATION
FR-3 MONITORING WELL LOCATIONS (APPROXIMATE)
N
0 15 30
SCALE IN FEET
FOSTER WHEELER ENVIRONMENTAL CORPORATION
Figure 3-1
Confirmation Sampling Locations for the 1998 Interim Action at the Ennis Creek-Finishing Room Area
I:\Projects\18340001\dwg\MRAYFG20.dwg 01/07/2002 11:56:09 AM PST

Table 3-1. Concentrations of Detected Chemicals in Soil West of Ennis Creek Finishing Room Area Following the 1998 Interim Action.

Sample Location	Sample ID	Date Collected	TPH as Heavy Oil (mg/kg)[1/]	PCBs (mg/kg)
1	North Wall-3	10/13/98	590	0.2
2	North Wall-2	10/13/98	ND	ND
3	North Wall-1	10/13/98	ND	ND
4	Comp 2-4	10/13/98	ND	ND
5	Comp 2-1-(2)	10/13/98	ND	ND
6	Comp 1-4-(2)	10/13/98	650	ND
7	West Wall-1	10/13/98	1050	NA
8	Comp 2-5	10/13/98	115	ND
9	Comp 1-5-(3)	10/13/98	800	ND
10	Comp 2-3-(2)	10/13/98	180	ND
11	Comp 2-2-(2)	10/13/98	65	ND
12	Comp 1-3-(2)	10/13/98	670	ND
13	West Wall-8	10/13/98	ND	ND
14	Comp 4-4-(1)	10/13/98	58	ND
15	Comp 4-1-(3)	10/13/98	ND	ND
16	Comp 3-4-(3)	10/13/98	220	ND
17	Comp 3-1-(3)	10/13/98	480	ND
18	West Wall-9	10/13/98	30	ND
19	Comp 4-5-(1)	10/13/98	150	ND
20	Comp 3-5-(3)	10/13/98	45	ND
21	Comp 4-3-(1)	10/13/98	ND	ND
22	Comp 4-2-(3)	10/13/98	300	ND
23	Comp 3-3-(2)	10/13/98	ND	ND
24	Comp 3-2-(2)	10/13/98	640	ND
25	West Wall-10	10/13/98	ND	ND
26	Comp 6-4-(1)	10/13/98	320	ND
27	Comp 6-1-(2)	10/13/98	230	ND
28	Comp 5-4-(1)	10/13/98	790	ND
29	Comp 5-1-(3)	10/13/98	670	0.27
30	West Wall-11	10/13/98	850	ND
31	Comp 6-5-(1)	10/13/98	ND	ND
32	Comp 5-5-(2)	10/13/98	1100	NA
33	Comp 6-3-(3)	10/13/98	ND	ND
34	Comp 6-2-(3)	10/13/98	ND	ND
35	Comp 5-3-(2)	10/13/98	410	0.06
36	Comp 5-2-(2)	10/13/98	420	ND
37	S-Wall-7	10/13/98	110	ND
38	Comp 8-4-(1)	10/13/98	71	ND
39	Comp 8-1-(1)	10/13/98	ND	ND
40	Comp 7-4-2	10/13/98	ND	ND
41	Comp 7-1-(2)	10/13/98	140	ND
42	S-Wall-11	10/13/98	120	ND
43	S-Wall-10	10/13/98	ND	ND
44	S-Wall-12	10/13/98	ND	ND
45	Comp 7-3-(a)	10/13/98	ND	ND
46	S-Wall-8	10/13/98	ND	ND
47	Comp 7-5-(2)	10/13/98	ND	ND
1998 Interim Action Cleanup Level			1,000	10
Proposed Interim Action Cleanup Level			2,000	1

Notes:

1/ Samples were also analyzed for TPH as diesel. No TPH as diesel was detected at or above the method detection limits in the analyzed samples.

ND – Not detected at or above the method detection limit which is 40 mg/kg for TPH and 0.05 mg/kg for PCBs

NA – Not analyzed

Source: Finishing Room Project Area Interim Action Report, SECOR, 1999

- TPH (diesel) ND
- TPH (oil) ND to 1,100 ppm
- PCBs ND to 0.27 ppm

3.2.2 FUEL OIL TANK NO. 2

During the 1989 and 1990 investigations, contamination was detected in both the soils and the groundwater beneath the former tank location. Some areas showed predominantly surface soil contamination, while others had contamination to depths approaching the groundwater interface. The soil contamination extended to the east of the tank towards the sludge dewatering building and hog fuel pile area; however, the horizontal extent of contamination could not be determined since the sludge building and the roadway between this building and FOT2 were still in use at the time of the investigations. Figure 3-2 presents the sampling locations from previous investigations and Table 3-2 presents the analytical data from the sampling.

Analytical results for soil samples collected were compared to MTCA Method A and B levels (see Table 3-2). Because of the complexity of the site, Method B is the primary regulatory guidance for determining appropriate cleanup levels for this interim action. Soil at several locations beneath and to the east of the former tank location contained TPH as heavy oil. Most of the contaminated soil in the footprint of the fuel oil tank was removed during a previous investigation. However, there were visual observations of the Bunker C fuel east of the former tank. One sample collected from previous investigations, which has not been excavated, contained 15,000 ppm total TPH, which is expected to be primarily Bunker C fuel (heavy oil). This concentration exceeds the MTCA Method A Unrestricted/Industrial soil cleanup level for TPH-heavy oils of 2,000 mg/kg.

3.2.3 MACHINE SHOP

Based on visual and olfactory observations, both the soils beneath the former machine shop and the concrete supports were potentially contaminated with petroleum. There were also particles of various metals on the surface of the soil. These particles would have come from the pipe threading and metal lathe operations.

Method B is the primary regulatory guidance for determining appropriate cleanup levels for this interim action. Petroleum is the suspected primary contaminant beneath the former machine shop. The metal particles from the machine shop operations would have stayed on the surface of the soil and not been carried down into the subsurface soils. No samples had been taken of the soil beneath the flooring, although flooring samples were analyzed prior to disposal. The flooring samples contained oil-range TPH and PCBs (Aroclor 1254) (Table 3-3 and Figure 3-

3). In addition to TPH, there was also the potential that other petroleum compounds, particularly solvents, may be present in the soils beneath the former Machine Shop. Therefore, the contaminants of potential concern in the soil beneath the Machine Shop could include TPH, PCBs, metals, and solvents.

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Table 3-2. Concentrations of Detected Chemicals in Soil at Fuel Oil Tank No. 2[1/]

Sample Location	Sample Depth (ft. below surface)	TPH (Method 418.1[2/])	PAH (Method 8100)	PCBs (Method 8080)	Aromatic Volatile Organics (Method 8020)			
					Benzene	Toluene	Ethyl Benzene	Xylene
Soil (mg/kg) ppm								
B-1[5/]	0-0.5	4700	–[3/]	–	–	–	–	–
B-1[5/]	5.2-5.4	20	–	–	–	–	–	–
B-2[5/]	4.1-4.2	68	–	–	–	–	–	–
B-3[5/]	4.4-4.6	110	ND[4/]	–	<0.05	<0.10	<0.10	<0.10
B-4[5/]	2.5-2.7	130	–	–	–	–	–	–
B-5[5/]	4.1-4.3	200	–	–	–	–	–	–
B-6[5/]	0-0.5	2600	–	–	–	–	–	–
B-6[5/]	4.0-4.5	99	–	–	–	–	–	–
B-7[5/]	4.5-4.7	27000	ND	<0.05	0.12	0.73	1.5	11
B-9	5.0	24	–	–	–	–	–	–
B-9	10.0	1400	–	–	–	–	–	–
B-10[5/]	7.5	12	–	–	–	–	–	–
B-11	2.5	85	–	–	–	–	–	–
B-11	7.5	240	–	–	–	–	–	–
B-12	7.5	26	–	–	–	–	–	–
B-13	7.5	<5.0	–	–	–	–	–	–
B-14	7.5	<5.0	–	–	–	–	–	–
B-15	7.5	<5.0	–	–	–	–	–	–
TP-16	3.0	<5.0	–	–	–	–	–	–
TP-16	7.5	15000	–	–	–	–	–	–
Cleanup Levels[6/]		TBD[7/]	0.137 ppm	1 ppm	1.82E+01	1.60E+04	8.00E+03	1.60E+05
Groundwater (ug/L) (ppb)								
MW-11	–	3800	ND	–	0.52	0.72	1.6	7.2
MW-13	–	570	ND	–	0.74	<0.30	<0.30	0.32

Notes

1/ This table summarizes applicable information from Landau (1999). Not included in this table are the laboratory analyses for the low, medium and high boiling point (BP) hydrocarbons obtained using EPA Method 8015.

2/ Total petroleum hydrocarbons (TPH) by the EPA Method 418.1 is reported as total recoverable petroleum hydrocarbons in the laboratory report. The standard analytical method was modified to include multiple silica gel cleanups until the percent difference in concentration in two successive analyses was less than 10 percent. This modification minimized the interference effect of non-petroleum organics in sample results.

3/ "- " = Not analyzed.

4/ ND = Not detected.

5/ These soils were excavated during a previous interim action.

6/ Proposed cleanup levels are based on MTCA Method B for TPH, PAHs and BTEX, and Method A Unrestricted Land Use for PCBs.

7/ Cleanup level was determined during the action as either Method A or a site-specific level as high as 1,000 ppm based on Ecology's Interim Guidance.

Table 3-3. Chemicals Detected in Flooring Materials during Previous Investigations at the Machine Shop.

				PCB Aroclor								
Sample Location	**Sample ID**	**DRH**	**HORH**	**1016**	**1221**	**1232**	**1242**	**1248**	**1254**	**1260**	**1262**	**1268**
Welding Shop Floor	B904104-03	●	●									
Machine Shop Floor	B904104-04	●	●									
Tin Shop Floor	B904104-05	●	●						●	●		
Instrument Shop Floor	B904104-06	●	●						●	●		
Blacksmith Shop Floor	B904104-07	●	●						●			
Pipe Shop Floor	B904104-08	●	●						●			

Notes:
● = Chemical detected.
All samples were taken on 4/1/99.
DRH = Diesel Range Hydrocarbons (C12-C24)
HORH = Heavy Oil Range Hydrocarbons (C24-C40)
The tin shop and instrument shop were located on the second floor of the building.

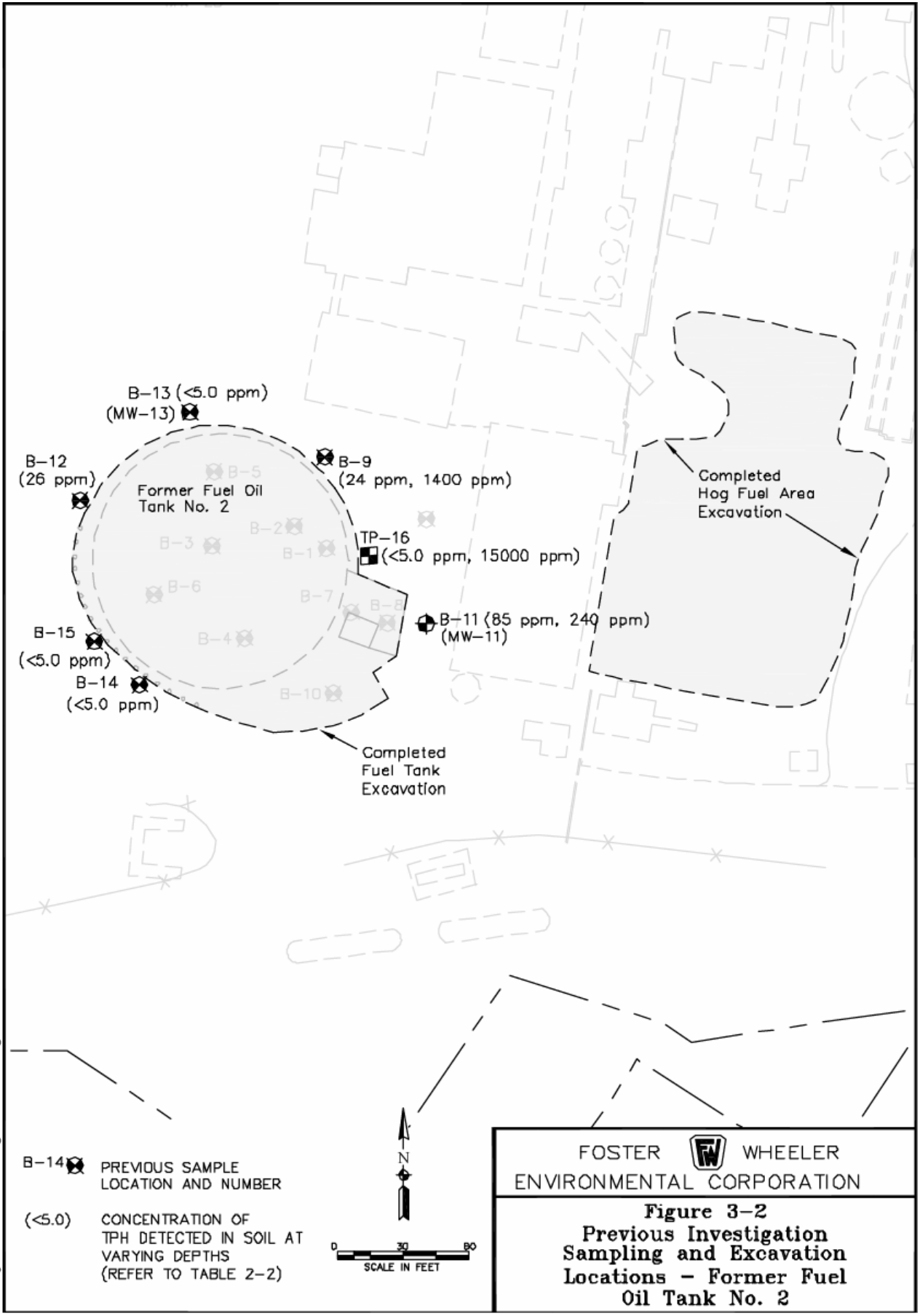

Figure 3-2
Previous Investigation Sampling and Excavation Locations - Former Fuel Oil Tank No. 2

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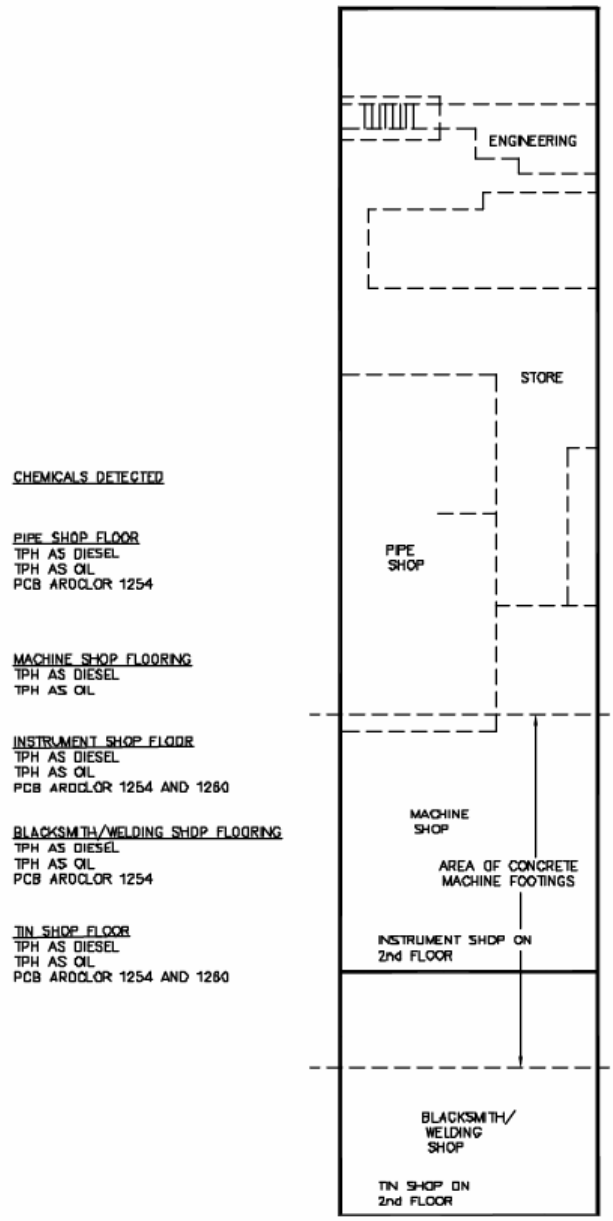

CHEMICALS DETECTED

PIPE SHOP FLOOR
TPH AS DIESEL
TPH AS OIL
PCB AROCLOR 1254

MACHINE SHOP FLOORING
TPH AS DIESEL
TPH AS OIL

INSTRUMENT SHOP FLOOR
TPH AS DIESEL
TPH AS OIL
PCB AROCLOR 1254 AND 1260

BLACKSMITH/WELDING SHOP FLOORING
TPH AS DIESEL
TPH AS OIL
PCB AROCLOR 1254

TIN SHOP FLOOR
TPH AS DIESEL
TPH AS OIL
PCB AROCLOR 1254 AND 1260

N

0 15 30
SCALE IN FEET

FOSTER WHEELER ENVIRONMENTAL CORPORATION

Figure 3-3
Previous Investigation
Chemicals Detected
Machine Shop

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3.3 CLEANUP LEVELS

The primary contaminants of concern for the interim actions are:

- Ennis Creek Finishing Room: TPH Diesel, TPH Heavy Oil, PCBs
- Fuel Oil Tan No. 2: TPH Heavy Oil
- Machine Shop: TPH Diesel, TPH Heavy Oil, PCBs, Metals, Solvents

As discussed previously, the primary goals of the interim actions were guided by Washington State MTCA (WAC 173-340). MTCA contains cleanup standards and regulations to protect human health and the environment from past releases of hazardous substances. Potential exposure of humans and aquatic organisms inhabiting Ennis Creek to TPH and PCBs found in soil/sediment is a concern at the Finishing Room and the cleanup levels (Table 3-4) are therefore protective of both humans and aquatic biota.

Table 3-4. Cleanup Levels for the Ennis Creek - Finishing Room Area Interim Action.

Chemical/Compound	Cleanup Level (mg/kg) [/a]
TPH – Diesel	**100**[1/]
TPH - Heavy Oil	**200**[2/]
PCBs	**0.021**[3/]

[1/] These cleanup levels are specific to this interim action.

[2/] Site-specific level derived to be protective of aquatic organisms and humans (Note: The MTCA Method A soil cleanup level and residual saturation screening level are 2000 mg/kg).

[3/] Site-specific levels that are protective of aquatic organisms as determined using bioassays (Ecology 1997) and are protective of humans (MTCA Method B soil cleanup level for PCBs is 0.5 mg/kg).

The primary concern at FOT2 and the Former Machine Shop was potential human exposure to contaminants found in soil and the cleanup levels (Table 3-5) are therefore set to be protective of human exposure.

Table 3-5. Soil Cleanup Levels for Fuel Oil Tank No. 2 and Machine Shop Interim Actions

Chemical/Compound	Soil Cleanup Levels (mg/kg) [1/]	Source
TPH-Diesel	2000	MTCA Residual Saturation Screening Level
TPH-Heavy Oil	2000	MTCA Residual Saturation Screening Level
PCBs	0.5	MTCA Method B
Arsenic	20	MTCA Method A
Barium	5600	MTCA Method B
Cadmium	80	MTCA Method B
Chromium	120000	MTCA Method B (as Cr III)
Lead	400[2/]	EPA Region 9 PRG

Table 3-5. Soil Cleanup Levels for Fuel Oil Tank No. 2 and Machine Shop Interim Actions[a] (continued)

Chemical/Compound	Soil Cleanup Levels (mg/kg) [1/]	Source
Mercury	24	MTCA Method B
Selenium	400	MTCA Method B
Silver	400	MTCA Method B
Acetone	8000	MTCA Method B
Benzene	18.2	MTCA Method B
Bromodichloromethane	16.1	MTCA Method B
Bromoform	127	MTCA Method B
2-Butanone	48000	MTCA Method B
Carbon Disulfide	800	MTCA Method B
Carbon Tetrachloride	7.69	MTCA Method B
Chlorobenzene	1600	MTCA Method B
Chlorodibromomethane	11.9	MTCA Method B
Chloroethane	NA	--
Chloroform	164	MTCA Method B
Chloromethane	76.9	MTCA Method B
Dibromochloromethane	11.9	MTCA Method B
1,1-Dichloroethane	800	MTCA Method B
1,2-Dichloroethane	11	MTCA Method B
1,1-Dichloroethene	800	MTCA Method B
Cis-1,2-Dichloroethene	800	MTCA Method B
Trans-1,2-Dichloroethene	1600	MTCA Method B
1,2-Dichloropropane	14.7	MTCA Method B
Cis-1,3-Dichloropropene	5.56	MTCA Method B
Trans-1,3-Dichloropropene	5.56	MTCA Method B
Ethylbenzene	8000	MTCA Method B
2-Hexanone	48000	MTCA Method B
Methylene Chloride (Dichloromethane)	133	MTCA Method B
4-Methyl-2-Pentanone	6400	MTCA Method B
Styrene	33.3	MTCA Method B
1,1,2,2-Tetrachloroethane	5	MTCA Method B
Tetrachloroethene	19.6	MTCA Method B
Toluene	16000	MTCA Method B
1,1,1-Trichloroethane	72000	MTCA Method B
1,1,2-Trichloroethane	17.5	MTCA Method B
Trichloroethene	90.9	MTCA Method B
Vinyl Acetate	80000	MTCA Method B
Vinyl Chloride	0.667	MTCA Method B
Xylenes (Total)	160000	MTCA Method B

[1/] Cleanup levels may be revised during the remedial investigation, which may necessitate further cleanup at these locations.

[2/] EPA Region 9 preliminary remediation goal (http//www.epa.gov/region9/waste/sfund/prg/index.htm) based upon EPA's blood lead model that is protective of humans under residential land use.

NA – Not Available

4 REMEDIAL ACTIONS

This section presents the activities that were described in the IAWP (Foster Wheeler 2002) and conducted at each of the interim action areas. Analytical results for the various sampling tasks are presented in Section 5. Sample collection sheets are provided in Appendix C and the sample chain of custodies are provided in Appendix E. Soil disposal manifests listing the shipments of excavated soil sent to the City of Port Angeles Sanitary landfill and the TPS Technologies soil recycling facility in Lakewood, WA, are provided in Appendix E. Photographs documenting many of the activities described in Section 4 are presented in Appendix F.

4.1 ENNIS CREEK FINISHING ROOM AREA

The objective of this interim action was to remove soil/sediments containing TPH and PCBs above the cleanup levels protective of human health and the environment at the northern end of Ennis Creek near the former Finishing Room. In addition, the steel sheet pile wall, two existing concrete pipe supports, and groundwater wells were removed. Ennis Creek was allowed to expand into the area formerly blocked by the riprap and sheet pile wall.

4.1.1 DELINEATION SAMPLING

Remediation of the Ennis Creek area required the creek be bypassed during the cleanup efforts. Therefore, it was necessary to pre-determine the horizontal and vertical area limits of the planned excavation. Soil and sediment samples were collected on June 25, 2002 in the area to the east of the steel sheet pile wall to determine the horizontal and vertical extent of contamination by TPH and PCBs. Samples were shipped to a laboratory for determination of diesel range organics (DRO) and residual range organics (RRO) using the NWTPH-Dx analytical protocol, and PCBs using the 8082 analytical protocol. The area sampled was bordered on the north by the bridge at the mouth of Ennis Creek and extended upstream approximately 70 feet south of the sheet pile wall.

Preliminary evaluation of the creek bed characteristics showed the use of a hand auger or vibracore system for collecting sediment samples was infeasible. The creek bed is composed of very dense cobble that made material recovery difficult. Instead, samples were collected using a small rubber-tracked backhoe with a six inch bucket. The backhoe was cleaned and thoroughly inspected to ensure there were no hydraulic leaks prior to entering the creek and the samples were collected in a manner that minimized impacts to the creek.

Samples were collected from five transects extending from the west bank to the east bank of Ennis Creek. One transect was located upstream of the Finishing Room

and the other four transects were located across from the Finishing Room. Samples were collected from four locations along each transect; the west bank of Ennis Creek east of the sheet pile wall, the mid-point of the western half of Ennis Creek, the center line of Ennis Creek, and the east bank of Ennis Creek. The west bank sample locations were sampled at depth intervals of 0.0 to 0.5 foot, 0.5 to 1.0 foot, and 1 foot intervals thereafter to a final depth of 3 feet below the groundwater table (which was assumed to be the surface of Ennis Creek) or until refusal was encountered. Three samples were sent for analysis (0.0 to 0.5 ft, from the interval which contained soil collected at the water table, and 2.0 to 3.0 ft below groundwater). The remaining samples were archived for analysis in the event that they were needed for further delineation of the excavation area.

The sample locations along the west half of Ennis Creek were also sampled to a depth of 3 feet below groundwater (or to refusal) at the same intervals. Two samples were sent for analyses (from the interval which contained soil collected at the groundwater table and 2.0 – 3.0 feet below groundwater). The remaining samples were archived for analysis and were not needed for further delineation of the excavation area.

The centerline creek sample locations were sampled to a depth of 1 foot below the mud-line and had one sample per location. The sample locations along the east bank of Ennis Creek were sampled to the top of groundwater (assumed to be the surface of Ennis Creek) or one foot below the mud-line (if collected within Ennis Creek) and also had one sample per location.

The field sampler confirmed that all samples collected at the groundwater table were within the smear zone. The analytical results of the delineation sampling activity were used to characterize material to be excavated for disposal purposes. Results of delineation sampling are presented in Section 5.1.1.

4.1.2 ENNIS CREEK MONITORING SAMPLES

Sediment samples were collected in the alluvial fan of Ennis Creek prior to excavation of soil/sediment at the Ennis Creek-Finishing Room Area and after completion of the interim action to assess the potential downstream impact of the interim action. Pre-excavation samples were collected on 6/25/02 and 8/9/02 and post-interim action samples were colleted on 9/04/02. The surface sediment samples (0-10 cm) were collected using a stainless steel spoon and bowl. Samples were shipped to a laboratory for determination of DRO and RRO using the NWTPH-Dx analytical protocol, and PCBs using the EPA 8082 analytical protocol. Results of the monitoring sampling are presented in Section 5.1.4.

4.1.3 MOBILIZATION AND SETUP

Bruch & Bruch Construction, Inc. (B&B) of Port Angeles, Washington, provided the necessary equipment, supplies, and personnel needed for the interim action. Initial site work consisted of setting up an exclusion zone, a decontamination zone and a clean zone for the project in accordance with the Site Health and Safety Plan. The exclusion zone was large enough to enclose any anticipated or potential work zones. The existing on site soil containment area located in the southeast portion of the former mill site was prepared for use as a temporary storage and dewatering area for all soils being excavated during the interim actions. A portion of this temporary storage and dewatering area was intentionally left open and clean for the planned excavated material from the Ennis Creek – Finishing Room Area. Prior to invasive activities, utilities were located and marked with color-coded paint to clearly indicate the location and type of utility.

4.1.4 TEMPORARY CREEK BYPASS

A 36 inch diameter high density polyethylene (HDPE) bypass culvert was designed and installed by B&B to run the length of the work area, a distance of approximately 280 feet, and was used to temporarily bypass Ennis Creek as described in the IAWP (Foster Wheeler 2002). The headwall was installed near Station 2+00. Concrete ecology blocks were used to create the main portion of the headwall and plastic sheeting and sandbags were used to seal the headwall and bypass culvert. The bypass culvert ran north along the east side of the stream bank and discharged near Station 0+25, at the existing bridge over Ennis Creek.

At the north bridge location an endwall was constructed to prevent water from flowing back up the stream during high tides. The endwall was built with ecology blocks in the same manner as the headwall. The stream bypass remained in place until the clean soil was backfilled and graded in accordance with the design. The culvert, headwall and endwall were removed and the minimal disturbance to the creek was regraded.

To help keep the extraneous stream bed water from entering the excavation area, a temporary sump was built just north of the headwall and two 3-inch pumps were installed, which pumped water back into the stream above the headwall.

4.1.5 EXCAVATION

The horizontal and vertical extent of TPH and PCB contamination was determined based on the analytical results from the preliminary delineation sampling conducted in June 2002. An excavation plan was incorporated into the design (Foster Wheeler 2002) delineating approximate areas and depths requiring excavation. B&B used two large excavators working in tandem to remove contaminated material and immediately backfill with cobble material. Prior to

excavating in the creek area, two large concrete pipe rack supports were removed and used as working pads for the excavators, along with some large, clean concrete slabs that were also located on site. This allowed the excavators to work efficiently and distribute their weight in an effort to minimize disturbance and potential contamination of the clean backfill located in the Finishing Room Area which was deemed acceptable to be incorporated in the final grading design. In areas where analytical results were below required cleanup levels, no soil or sediment excavation was required beyond that associated with the removal of the sheet pile wall and inundation of the Finishing Room Area. In areas exceeding cleanup levels, which spanned most of the west side of Ennis Creek east of the sheet pile wall, soil or sediment excavation was performed (Figure 4-1). Haul trucks for excavated material were staged outside of the exclusion zone, when possible, to prevent contamination, and were loaded from within the exclusion zone using a large excavator. In cases where the excavated material was saturated, the trucks were lined in the rear with dry material to prevent the loss of contaminated runoff during hauling to the temporary storage area.

The site was excavated to a greater areal extent and depth than was anticipated in the IAWP in an attempt to remove as much contaminated soil as possible. Excavation near the north bridge ceased at a point approximately six feet from the western abutment footing, where any further efforts to remove visible contaminants could have compromised the integrity of the bridge and footing. The eastern edge of the excavation was limited by the presence of the bypass pipe, where further excavation would have resulted in failure of the bypass system.

It was necessary to collect the oily water that accumulated in the excavation while the contaminated soils were being excavated. A 3-inch diaphragm pump moved the water into a 28,000-gallon tank/oil-water separator. The floating oil was removed and the cleaner water was pumped with a 4-inch high head pump into Rayonier's onsite tank for storage and testing. Only one tank was needed, although Rayonier had three 140,000-gallon tanks available for storage. Absorbent pads were also used in the sump and in the weir tank to collect the oil in the water before being sent to the storage tank.

Equipment decontamination primarily consisted of steam cleaning the equipment when necessary.

4.1.6 CONFIRMATION SAMPLING

In parallel with the excavation of affected soil/sediment between the sheet pile wall and the approximate centerline of Ennis Creek, confirmation samples were collected when it was determined through visual observations that clean material was apparent along the smear zone near centerline of the creek. The smear zone was

characterized as the region at approximately 1.0-1.5 feet below the elevation of the creek bed at the limit of the excavation

4.1.7 SHEET PILE REMOVAL

The 162 foot-long sheet pile containment wall, which was installed in June, 1993 along the west bank of Ennis Creek between the creek and Finishing Room, was removed following the excavation of affected soil/sediment east of the sheet pile. The sheet piles were removed using a large excavator, which removed the piles vertically using a cable and bell housing. The individual piles were cut in lengths ranging from approximately 12 to 17 feet, and only few obstructions were encountered during removal. The cable and bell housing had to be replaced once during the activity due to wear from the resistance of the piles in the ground. The piles were transported by truck to the containment area to be washed prior to disposal.

4.1.8 BACKFILL

In order to reduce the potential for sloughing of soils and movement of contaminated water, it was necessary to backfill the excavated area each day. Approximately 40 to 50 feet of affected soil/sediment were excavated and then backfilled daily. Prior to backfilling the area, confirmation samples were collected from the bottom and sidewalls of the excavation as discussed in the IAWP (Foster Wheeler 2002). The analytical results of the confirmation sampling were not available until after the site had been completely backfilled. Thus, it was necessary to predetermine the limits of the excavation.

Backfilling operations used an outside source of clean suitable material. The riprap that was on site was reused after washing and steam cleaning at the temporary storage area to remove dirt and other potential contaminants; however, no contaminants were observed on the existing riprap. Additional riprap was hauled to the site and incorporated with the existing riprap in the design. Backfilling was accomplished using an excavator, and material was bucket-tamped into position.

4.1.9 SHORELINE DESIGN

A general design for the Ennis Creek – Finishing Room Area was presented in the IAWP (Foster Wheeler 2002). This design showed an inundation of the creek into the area of the former Finishing Room. As defined in the Ennis Creek Phase I Agreed Order, the final design for the creek shows the west bank at a 6:1 slope beginning at the centerline of the creek until it reached a peak elevation of 12 feet. At the peak of the berm a buried riprap layer was placed to protect the arc of the

inundation area, and filter fabric was placed under the base of the riprap armor. The material used to backfill the previous interim action in this area was determined to be of an acceptable gradation. Additionally, imported material met gradation specifications of beach sand for the top one to two feet of surface material. Six root-wads were anchored with ecology blocks along the inundation area at an elevation of approximately 3 feet. Cedar trees were used for the root-wads and aged beach wood was also placed above the water line in the vegetated area. Hooker's Willow (Salix hookeriana) was planted along the toe of the slope to provide important root stability and overhanging vegetation. In addition, the remainder of the slope is in the process of being seeded with Dune Wildrye (Elymus mollis), large-headed sedge (Carex macrocephala), Sand dune sedge (C. pansa) or Lyngby's sedge (C. lyngbeyi), and the sea-shore lupine (Lupinus littoralis). Figure 4-2 shows the Ennis Creek-Finishing Room Area as it appeared after the 1998 interim action and after the 2002 interim action.

4.1.10 WASTE HANDLING

Potentially contaminated water generated during the interim action was pumped to a 28,000 gallon oil-water separator tank and then to a pre-selected storage tank. The current on-site treatment system incorporated oil-water separation. This water included decontamination water from equipment washing and groundwater or surface water runoff removed from the excavation. Water that was treated on site used the criteria for determining suitability for discharge of treated water to the harbor under the State of Washington Water Quality Standards for Surface Waters that are protective of aquatic organisms (WAC 173-201A) and the MTCA surface water cleanup standards protective of humans that consume aquatic organisms (WAC 173-340). The criteria selected were the lowest of the marine acute and marine chronic criteria protective of aquatic life and human health criteria.

Soils removed were stockpiled in the containment area located in the southeastern portion of the mill site. Following characterization sampling of the stockpile, the soils were found suitable for disposal at the City of Port Angeles Sanitary Landfill and a total of 1,286 tons of soil were transported to the landfill.

Stormwater control and best management practices (BMPs) were implemented to minimize stormwater runoff, sedimentation, and erosion of stockpiled soil. This sealed blacktop area was designed specifically for the temporary storage of contaminated soils that were excavated during a previous project. During the few periods of periodic rainfall in the area, the stockpiles were covered with thick plastic sheeting to reduce the separation and movement of contaminants from the soil. Personal protective equipment (PPE) that contacted contaminated soils was containerized for appropriate disposal. Equipment decontamination also occurred

Figure 4-1. Excavation Boundary for the 2002 Interim Action at the Ennis Creek Finishing Room Area.

in the soil containment area. Ordinary trash that was not contaminated was disposed of along with regular waste generated on the site.

4.1.11 FIELD CHANGES

Four groundwater monitoring wells (FR-1, FR-2, FR-3, and FR-4) and two extraction sumps (N-EX and S-EX) were present within the area of the former Finishing Room. The wells and sumps were to be decommissioned and removed before removal of the riprap and sheet piling in accordance with Washington State regulations (WAC 173-160). Due to the wells being located in the immediate area of the new berm and inundation area for Ennis Creek, the wells were completely removed instead of being grouted or overdrilled in place. Based on the design and construction of the berm and creek inundation area, the void space previously occupied by the wells was filled and compacted with new material during the riprap armoring and final grading activities.

4.2 FORMER FUEL OIL TANK NO. 2

The objective of the interim action for FOT2 was to remove TPH-containing soils above the groundwater table in the area between former FOT2 footprint and the hog fuel pile. This excavation was guided on observation of visibly contaminated soil, the use of TPH screening field test kits, and formal laboratory analysis.

4.2.1 PRELIMINARY SITE CHARACTERIZATION

Tests pits were excavated with a backhoe to the groundwater level at several locations around the proposed excavation boundary for FOT2. The purposes of the test pits were to visually verify the extent of TPH-affected soil and to identify areas where overlying concrete slabs required removal. TPH-affected soil was visible in a few test pits just above the groundwater table. Because the oil had moved through the subsurface by moving with the groundwater, the upper 4 to 6 feet of soil that was above the groundwater would not be affected by TPH. Based upon observations from the test pits, two separate stockpiles were created for the TPH-affected excavated material: (1) a "light" stockpile containing soil with visibly lower amounts of TPH and (2) a "heavy" stockpile containing soil with visibly higher amounts of TPH. This segregation allowed for the possibility of using different disposal options for the two stockpiles following characterization of their chemical concentrations.

Figure 4-2. Schematic View of the Ennis Creek – Finishing Room Area Interim Actions

The visually determined TPH-free overburden soil from the upper four to six feet of the excavation was stockpiled near the excavation boundary so it could be used for backfill if laboratory analysis indicated TPH concentrations were below the cleanup levels.

4.2.2 MOBILIZATION AND SETUP

B&B provided the necessary equipment, supplies, and personnel needed for the interim action work conducted at the site. Initial site work consisted of setting up an exclusion zone, a decontamination zone and a clean support zone for the project in accordance with the Site Health and Safety Plan. The exclusion zone was large enough to enclose any anticipated or potential work zones. The existing on site soil containment area located in the southeast portion of the mill site was prepared for use as a temporary storage and dewatering area for all soils being excavated during the interim actions. An area within this temporary storage and dewatering area was intentionally left open and clean for the planned excavated material from FOT2. Prior to invasive activities, utilities were located and marked with color-coded paint to clearly indicate the location and type of utility.

4.2.3 EXCAVATION

Excavation for FOT2 required two large excavators, between two and four haul trucks, and a large concrete breaker. During the preliminary site characterization, thick reinforced concrete slabs were identified between the former FOT2 area and the hog fuel pile excavation area. Also, TPH-affected soil was identified west of the hog fuel pile excavation area. Holes were punched through the former sludge building foundation to determine if the oil had traveled underneath the concrete slab, and portions of the clean concrete slab were broken up and stockpiled on site for recycling.

In general, the top 4 to 6 feet of soil appeared to be clean and was excavated and stored near the excavation in case it could be used for backfill material. This overburden stockpile was sampled and screened prior to use as backfill material. Initially, the excavation proceeded westward from the sludge building foundation towards the former FOT2 excavation area. The depth to groundwater was approximately 10 feet below ground surface. It was determined that the previous interim action at FOT2 only removed soil to a depth of approximately 4 to 6 feet below ground surface based upon the presence of a geomembrane liner. TPH-affected soil was visible near groundwater beneath this former excavation area and a portion of this area was re-excavated to remove TPH-affected material. The clean backfill above the geomembrane liner was stockpiled and used as backfill following excavation. Periodic field testing with PetroFLAGTM Field Test Kits was conducted to screen for the presence of TPH. Results of the field test kit screening helped guide excavation activities. If screening results were significantly below the

cleanup criteria (<500 ppm), a confirmation sample was collected from the excavation boundary. Confirmation samples were collected from the excavation sidewalls approximately every 25 linear feet. If the excavation could be dewatered significantly, samples were also collected from the bottom. As analytical results from the confirmation samples were received from the laboratory, a determination of whether the excavation had attained the cleanup levels was made. If confirmation sample results showed the cleanup levels had not been attained, these areas were reworked when feasible and new confirmation samples were collected along a newly excavated boundary.

There were two areas excavated in the FOT2 area (Figure 4-3). One excavation was located immediately to the east and northeast of the former location of FOT2 and was approximately 11,500 square feet in area (approximately 150 x 75 feet). Soil was excavated to a depth of approximately 10 feet below grade or just below the water table as described in the IAWP. The northern extent of this excavation was limited by the presence of an approximately 2 foot thick concrete slab at ground surface. At the northern boundary, conformational sample 87 was taken at the water table and verified concentrations below the cleanup level. Sample 86 collected near sample 87, but approximately three feet higher on the excavation sidewall, showed concentrations above the cleanup level. This sample was taken from a seam of soil approximately 12 to 18 inches, directly below the utility corridor. Based on visual observations, the soils below this seam and down to the depth where sample 87 was collected didn't appear to have been impacted by petroleum. Because the layer of petroleum-contaminated soils is several feet above the groundwater table, and is overlain by a concrete slab, it's unlikely the contaminated layer will impact groundwater.

The second excavation area was located immediately to the west of the previous Hog Fuel Pile excavation area, approximately 45 feet east of the eastern edge of the first excavation, and comprised approximately 5,300 square feet (approximately 105 x 50 feet). Initially, the oil visible at the east end of the planned excavation area was believed to have come from the oil tank. However, confirmation samples 71, 73, 74, and 78 collected on the eastern sidewall of the west excavation, and confirmation samples 81, 82, and 83 collected from the western sidewall of the eastern excavation) did not show concentrations above the cleanup levels. This second area required removal of a thick concrete slab and was excavated to groundwater that was encountered at a depth of approximately six feet below grade. A total of 5,137 tons of soil were excavated from these two areas and stockpiled in the soil containment area located in the southeast corner of the site.

Equipment decontamination primarily consisted of steam cleaning the equipment when necessary. Haul trucks for excavated material were staged outside of the exclusion zone, when possible, to prevent contamination, and were loaded from

within the exclusion zone using a large excavator. In cases where the excavated material was saturated, the trucks were lined in the rear with dry material to prevent the loss of contaminated runoff during hauling to the temporary storage area. At the conclusion of each day's operations, all trucks used to haul TPH-affected materials were steam cleaned and the water was discharged into the open-pit excavation. The water collected in the excavation was being pumped to an oil-water separator and then to one of the large on-site storage tanks for storage and additional treatment as necessary.

4.2.4 CONFIRMATION SAMPLING

When visual observations indicated the soil was not impacted, a confirmation sample was collected. The sidewall samples were collected approximately every 25 linear feet. When possible, samples were collected from the bottom of the excavation; however, this was sometimes difficult to achieve with the constant presence of groundwater. All samples were analyzed by method NWTPH-Dx for TPH Diesel and TPH heavy oils. Results of the confirmation sampling are presented in Section 5.2.1.

4.2.5 BACKFILL

On site materials were used to backfill the excavation. When a portion of the excavation had been completed and confirmation samples collected, the area would be dewatered as much as possible and clean concrete rubble was placed in the bottom of the excavation. This helped to provide a firm foundation for the soil. After the concrete rubble was placed, overburden material that had been sampled and determined below the cleanup criteria was placed and bucket tamped for compaction. The excavation area was backfilled to the pre-excavation grade.

4.2.6 WASTE HANDLING

Soils removed from the excavation area were segregated into three stockpiles. The stockpiles included: 1) clean overburden material stockpiled near the excavation boundary (top 4 to 6 feet of soil and clean fill from the previous FOT2 interim action), 2) the light oil stockpile at the soil containment area, and 3) the heavy oil stockpile at the soil containment area. BMPs were implemented for stockpiled soils to minimize stormwater runoff, sedimentation, and erosion primarily through the continuous use of the soil containment area. Due to space limitations at the containment area and a delay in receiving approval from the City of Port Angeles Landfill, the initial shipments of excavated soil totaling 1,793 tons were sent to the TPS Technology facility in Lakewood, WA. Subsequent shipments of excavated soil totaling 3,344 tons were shipped from the containment area to the City of Port Angeles Sanitary Landfill.

A 3-inch diaphragm pump moved the water accumulating in the excavations into a 28,000-gallon tank oil-water separator. The floating oil was removed and taken by Emerald Services, Inc., Seattle, WA and the cleaner water was pumped into an onsite tank for storage and testing. The storage tank was designed to separate the heavy oil from the groundwater.

PPE that contacted contaminated soils was containerized in 55 gallon drums for appropriate disposal. Ordinary trash that was not contaminated was disposed of along with regular waste generated on the site.

4.2.7 FIELD CHANGES

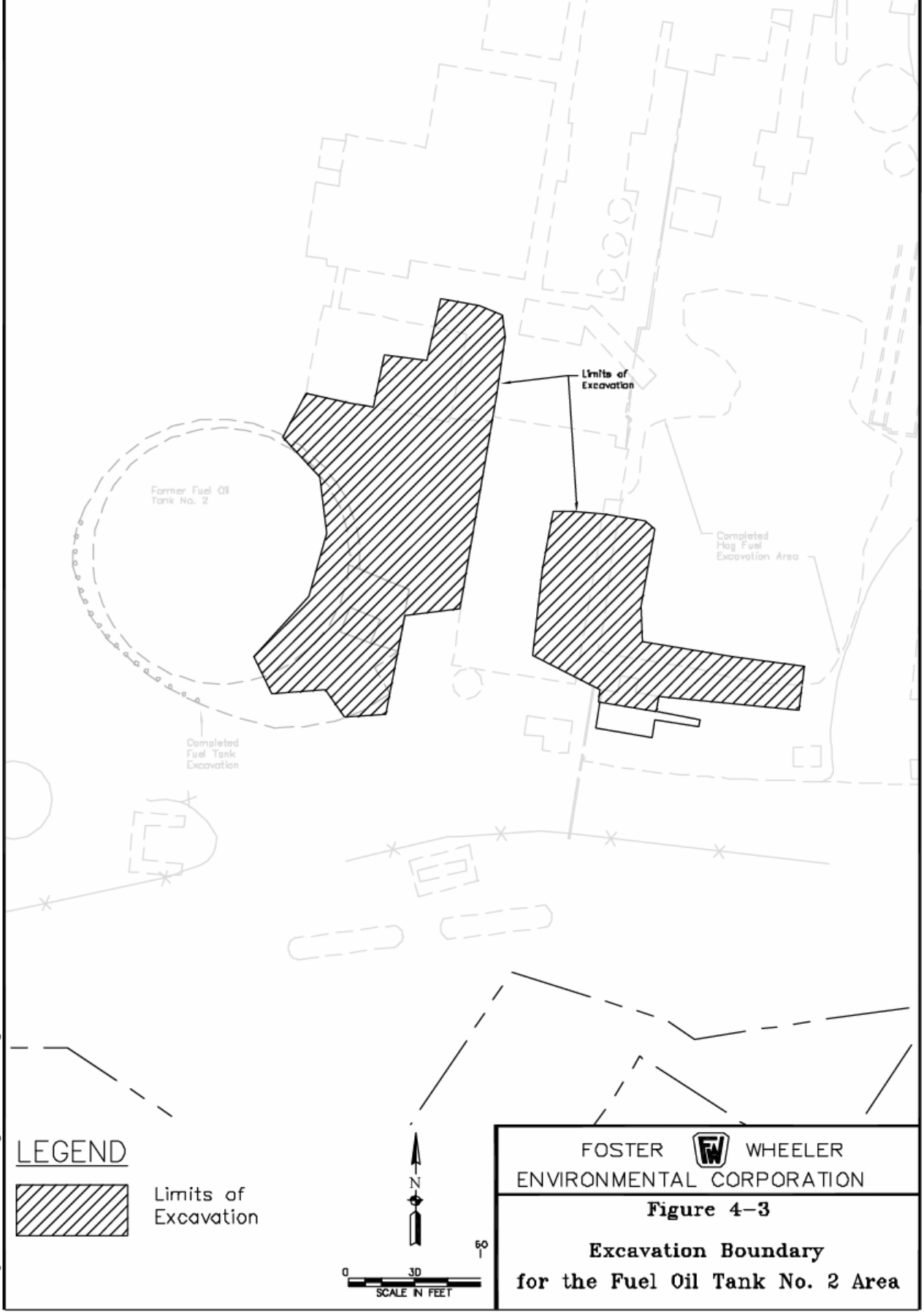
The IAWP (Foster Wheeler 2002) included the collection of characterization samples prior to mobilization to support waste profiling for disposal purposes. Since the excavated soil was not directly sent to a disposal facility, but rather held at temporary on-site stockpiles in the soil containment area, it was deemed preferable to collect waste characterization samples directly from the stockpiles. This sampling method ensured a higher level of accuracy for the waste profiling and more readily complied with the waste acceptance policy for the City of Port Angeles Sanitary Landfill (Parametrix 1998).

4.3 MACHINE SHOP

The objective of this interim action was to remove TPH contaminated soils above the groundwater table in the area between the support piers under the former Machine Shop, and to clean residual petroleum from the surface of the support members. Based on historical analytical data and historical activities in the Machine Shop area, samples were analyzed for TPH, PCBs, RCRA metals, and volatile organic compounds (VOCs).

4.3.1 MOBILIZATION AND SETUP

Mobilization and setup for this interim action included assembly and transport to the site of all equipment, supplies, and personnel needed for excavation, chemical screening, loading, and hauling of the soil and cleaning the concrete supports. B&B provided all of the equipment and labor necessary to excavate the soil. B&B developed an approach for removing the soil, hauling the soil to the soil staging area, and for cleaning the concrete supports. All utilities were located and marked prior to any intrusive activities in the Machine Shop area.



FOSTER WHEELER ENVIRONMENTAL CORPORATION

Figure 4–3

Excavation Boundary for the Fuel Oil Tank No. 2 Area

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4.3.2 CHARACTERIZATION SAMPLING

Characterization sampling was not conducted prior to excavating the soil because all soil was stockpiled at the soil staging area located in the southeast portion of the mill site. The IAWP (Foster Wheeler 2002) had specified characterization sampling so the soil could be hauled directly to the appropriate disposal facility; however, it was determined to be more cost effective and efficient to stockpile the soil from all of the interim action separately in the staging area and then characterize the material to support waste profiling for the selected disposal facility.

4.3.3 EXCAVATION

Excavation was guided by observation of TPH-affected soil and the use of field test kits for TPH. Air monitoring was also conducted with a photo-ionization detector (PID) (MiniRae 2000) to determine if there were any VOCs released off of the soil during excavation, and laboratory analysis for TPH, PCBs, metals, and VOCs was performed on confirmation samples. The excavation of this area began on September 2, 2002 and the area to be excavated was approximately 50 feet by 75 feet (Figure 4-4). The excavation depth went to groundwater that was approximately 8 to 10 feet below the ground surface.

The two outer concrete supports that were small enough to permit easy removal and therefore more efficient excavation of soil were removed. The center support running east-west was significantly larger and was allowed to remain in place. Light staining on this concrete support was scraped and debris removed to the stockpile. All of the concrete removed was staged in the stockpile area located in the southeast portion of the former mill site until laboratory analyses were received to determine appropriate disposal.

Approximately one half of the Machine Shop excavation was completed to groundwater on the first day. Field screening for TPH and air monitoring with the MiniRae 2000 PID, and confirmation samples were collected as described in the IAWP. The south side of the excavation was backfilled after the confirmation samples were collected. The remaining excavation was completed the following day. The area was excavated and sampled in the same manner as the first day. A total of 984 tons of soil and concrete were removed from the Machine Shop excavation area.

4.3.4 DEWATERING

The selected interim action did not excavate below the groundwater table; therefore, dewatering the excavation area was not required. The excavation was completed in two days and there was no stormwater generated during this time.

4.3.5 CONFIRMATION SAMPLING

The initial delineation and extent of soil excavation was based on visual observations of TPH-contaminated soil. After excavation of visibly contaminated soil was completed, field test kits (PetroFLAG™) were used to determine whether additional soil required excavation. Based on field-testing, the eastern boundary of excavation extended an additional 10 feet from the extents shown in the IAWP (Foster Wheeler 2002). Confirmation soil samples were collected from the excavation bottom and sidewalls and sent for laboratory analysis to ensure that remaining soils did not exceed the selected cleanup levels. Sidewall samples were collected at 25 linear feet intervals and bottom samples were collected on a 25-foot grid. All laboratory analyses and additional details of the confirmation sampling are presented in Section 5.3.

4.3.6 CONCRETE SUPPORT CLEANING

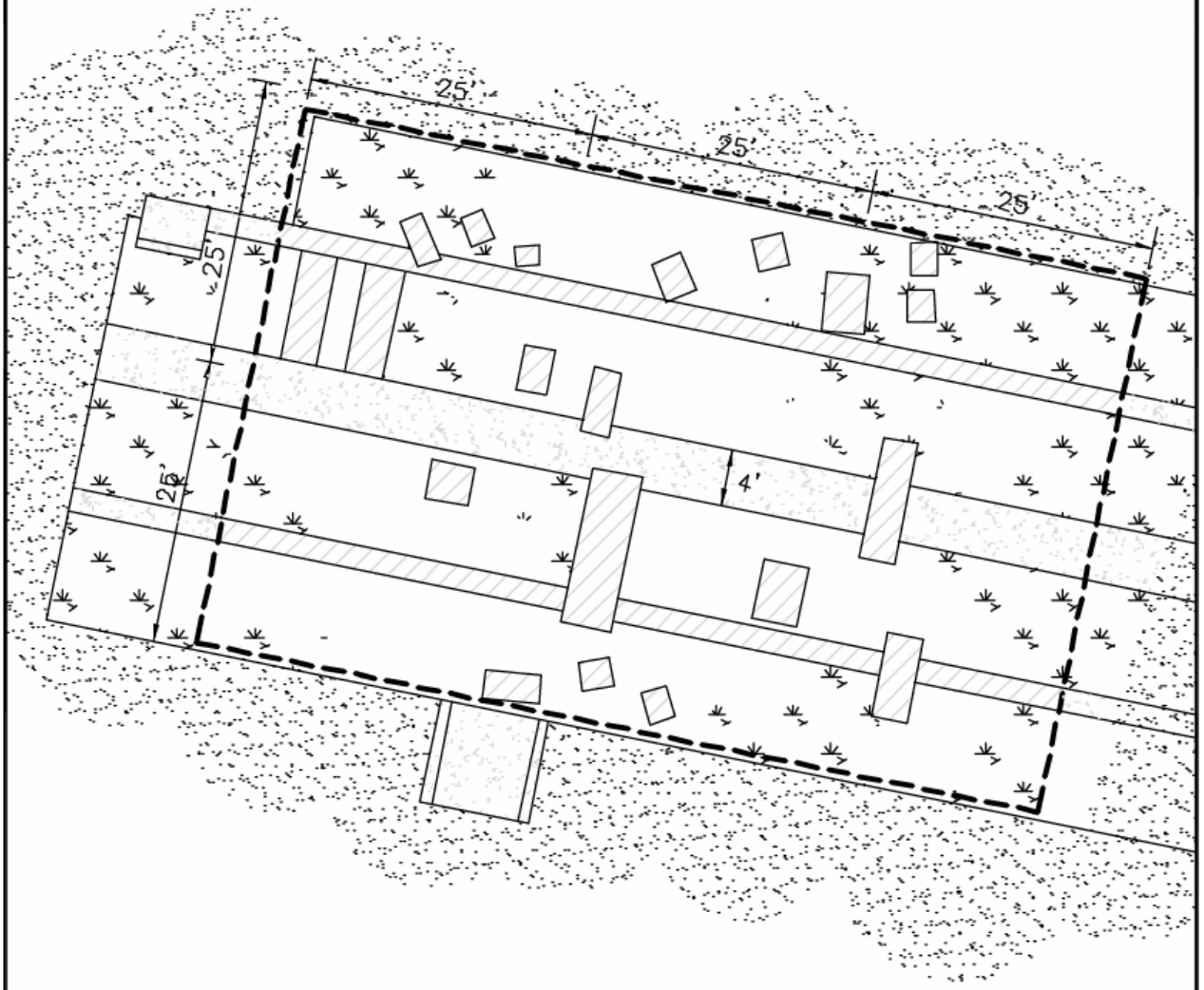
The center concrete support span was left in place and scraped to remove caked-on petroleum material and the debris generated was added to the soil stockpile. Because the other concrete supports with visual staining were removed from the excavation, further cleaning of the concrete was not conducted. The sections of the concrete supports with visual staining were also stockpiled at the soil staging area. Visibly clean sections of the concrete supports removed from the Former Machine Shop were stockpiled at another location on site to be broken down to rubble size and used for future backfilling.

4.3.7 BACKFILLING

The Machine Shop excavation area was backfilled with existing clean concrete rubble generated from other locations on the site. The excavation was backfilled to the grade of the surrounding area. There was no standing water in the excavation prior to backfilling.

4.3.8 WASTE HANDLING

Soils excavated from the Machine Shop Area were stockpiled at the soil staging area in the southeast corner of the mill site. After laboratory analytical results were received, it was determined that all of the soil and concrete was suitable for disposal at the City of Port Angeles Sanitary Landfill. PPE that had been in contact with contaminated soils were containerized for appropriate disposal. Ordinary trash that was not contaminated was disposed of along with regular solid waste generated on the site.



LEGEND

EXCAVATION BOUNDARY

CONCRETE REMAINING

CONCRETE REMOVED

N

0 7.5 15
SCALE IN FEET

FOSTER WHEELER
ENVIRONMENTAL CORPORATION

Figure 4–4

Excavation Boundary of Machine Shop

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5 SAMPLING AND ANALYSIS

This section summarizes the analytical results of delineation sampling, confirmation sampling, and stockpile sampling for the Ennis Creek-Finishing Room, FOT2, and Former Machine Shop interim action areas. Full analytical data reports are provided in Appendix B.

5.1 ENNIS CREEK – FINISHING ROOM AREA

5.1.1 DELINEATION SAMPLING

On June 25, 2002, soil and sediment samples were collected from 20 locations east of the sheet pile wall (Figure 5-1) to delineate the extent of contamination from TPH and PCBs. The Plan required the creek be bypassed and therefore it was necessary to pre-determine the limits of the contamination and the planned excavation area, and to identify a suitable location for the bypass system outside of the limits of excavation. Samples were collected from five transects running from the west bank of Ennis Creek to the east bank of Ennis Creek. Samples were collected from four locations along each transect; the west bank of Ennis Creek, the midpoint of the western half of Ennis Creek, the center line of Ennis Creek, and the east bank of Ennis Creek (see Section 4.1.1 for further details of the sampling design).

Results of the delineation sampling are summarized in Table 5-1. All samples collected from transects A, B and E, as well as sediment samples collected from Ennis Creek and soil samples collected from the east bank show that DRO, RRO, and PCBs were either not detected or detected at concentrations below the applicable cleanup levels. Soil samples collected from locations EC-10 and EC-14 on the west bank of Ennis Creek had detected concentrations of DRO, RRO, and PCBs that were greater than the cleanup levels. Chemical concentrations were elevated above the cleanup levels throughout the entire sampling depth at locations EC-10 and EC-14. Based upon the delineation sample results, the excavation was to occur from the sheetpile wall eastward to the "line" made by connecting the delineation sample points EC 6, 9, 13 and southward to a location between sample points EC 14 and EC 18.

5.1.2 CONFIRMATION SAMPLING

Confirmation samples were collected from the 15 locations on the bottom and sidewalls of the excavation (Figure 5-2) from August 9 to 12, 2002 to evaluate the attainment of cleanup levels. Confirmation samples were collected when it appeared through visual observations that clean material was encountered. Confirmation samples from the sidewall were collected near the centerline of the

creek at an elevation approximately 1.5 to 1.0 foot below the centerline elevation of the creek bed. Excavation depths between the sheet pile wall and the center of the creek exceeded the planned excavation depth and averaged approximately 3.5 feet below groundwater. In some locations it was difficult to obtain the exact depths due to rapid infiltration of groundwater. Due to the infiltrating groundwater, it was necessary that the excavated area was backfilled each day to control sloughing of soils and movement of water accumulating in the excavation. Therefore, laboratory analytical results of the confirmation sampling were not available until the excavation and backfilling were completed. The excavation also went as far east as could occur without endangering the integrity of the creek bypass line.

Results of the confirmation sampling are shown in Table 5-2. Five of eight sediment samples collected from the sidewall of the excavation show that DRO and RRO, and PCBs were either not detected or detected at concentrations below the cleanup levels. Three sediment samples collected from the excavation sidewall had concentrations of DRO and/or RRO greater than the cleanup level and these samples are situated along the northern half of the excavation. Five of the six sediment sample locations at the bottom of the excavation (near the former center line of the creek) had concentrations of DRO and RRO that were greater than the cleanup level. The soil sample collected from the northwest corner adjacent to the bridge support excavation (FW0070) had concentrations of DRO, RRO, and PCBs that were greater than the cleanup level.

Confirmation sample collection was complicated by the fact that water accumulated in the excavation despite a concerted efforts to remove it. An oily sheen was present on the excavation area water. Confirmation samples collected with the aid of the excavator bucket were compromised by contact with the excavation water and the oily sheen. This would have influenced the DRO and RRO concentrations reported for some of the bottom and sidewall sediment samples collected from Ennis Creek.

The remaining TPH-impacted soil is just above the cleanup levels with the exception of sample FW0067, which showed concentrations one order of magnitude higher than the cleanup level. As described in Section 4.1.6, further excavation near the northwest side of the bridge was limited by concerns about bridge integrity and only a localized area of soil with visible TPH was left in place. Sample FW0070 was collected from an area of localized visible contamination, but was the only sample collected where oil was visible in the soil.

Table 5-1. Delineation Sampling Results for the Ennis Creek-Finishing Room Areas.

Sample Location	Sample ID	Date Collected	Sample Depth	Diesel Range Organics (mg/Kg)	Residual Range Organics (mg/Kg)	PCBs (mg/Kg)
EC-3	FW0003	06/25/02	0-1 ft	ND	10	ND
EC-5	FW0007	06/25/02	0-1 ft	ND	21	ND
EC-5	FW0008	06/25/02	0-1 ft	ND	12	ND
EC-6	FW0009	06/25/02	0-0.5 ft	ND	10	ND
EC-6	FW0010	06/25/02	0.5-1 ft	ND	15	ND
EC-6	FW0011	06/25/02	1-2 ft	ND	9.8	ND
EC-7	FW0012	06/25/02	0-1 ft	ND	18	ND
EC-9	FW0016	06/25/02	0-1 ft	13	53	ND
EC-10	FW0017	06/25/02	0-0.5 ft	590	1700	0.033
EC-10	FW0018	06/25/02	0.5-1 ft	4500	13000	0.063
EC-10	FW0019	06/25/02	1-2 ft	1500	4500	0.035
EC-11	FW0020	06/25/02	0-1 ft	ND	19	ND
EC-13	FW0024	06/25/02	0-1 ft	7.9	19	ND
EC-14	FW0025	06/25/02	0-0.5 ft	930	8100	0.086
EC-14	FW0026	06/25/02	0.5-1 ft	430	2700	0.03
EC-14	FW0027	06/25/02	0.5-1 ft	410	2700	0.029
EC-14	FW0029	06/25/02	2-3 ft	170	1000	ND
EC-15	FW0030	06/25/02	0-1 ft	38	260	ND
EC-15	FW0031	06/25/02	1-2 ft	26	200	ND
EC-17	FW0035	06/25/02	0-1 ft	6.2	34	ND
EC-18	FW0036	06/25/02	1-2 ft	6.2	29	ND
EC-18	FW0039	06/25/02	2-3 ft	38	120	ND
EC-19	FW0040	06/25/02	0-1 ft	16	77	ND
EC-21	FW0045	06/25/02	0-1 ft	ND	16	ND
EC-22	FW0046	06/25/02	0-0.5 ft	27	160	ND
EC-22	FW0051	06/25/02	2-3 ft	ND	18	ND

ND - not detected

Chemical analysis of sediment samples EC-4/8/12/16/20 was not conducted because sediment samples closer to the source area (EC-5/9/13/17/21) did not show concentrations of TPH and PCBs greater than the cleanup levels.

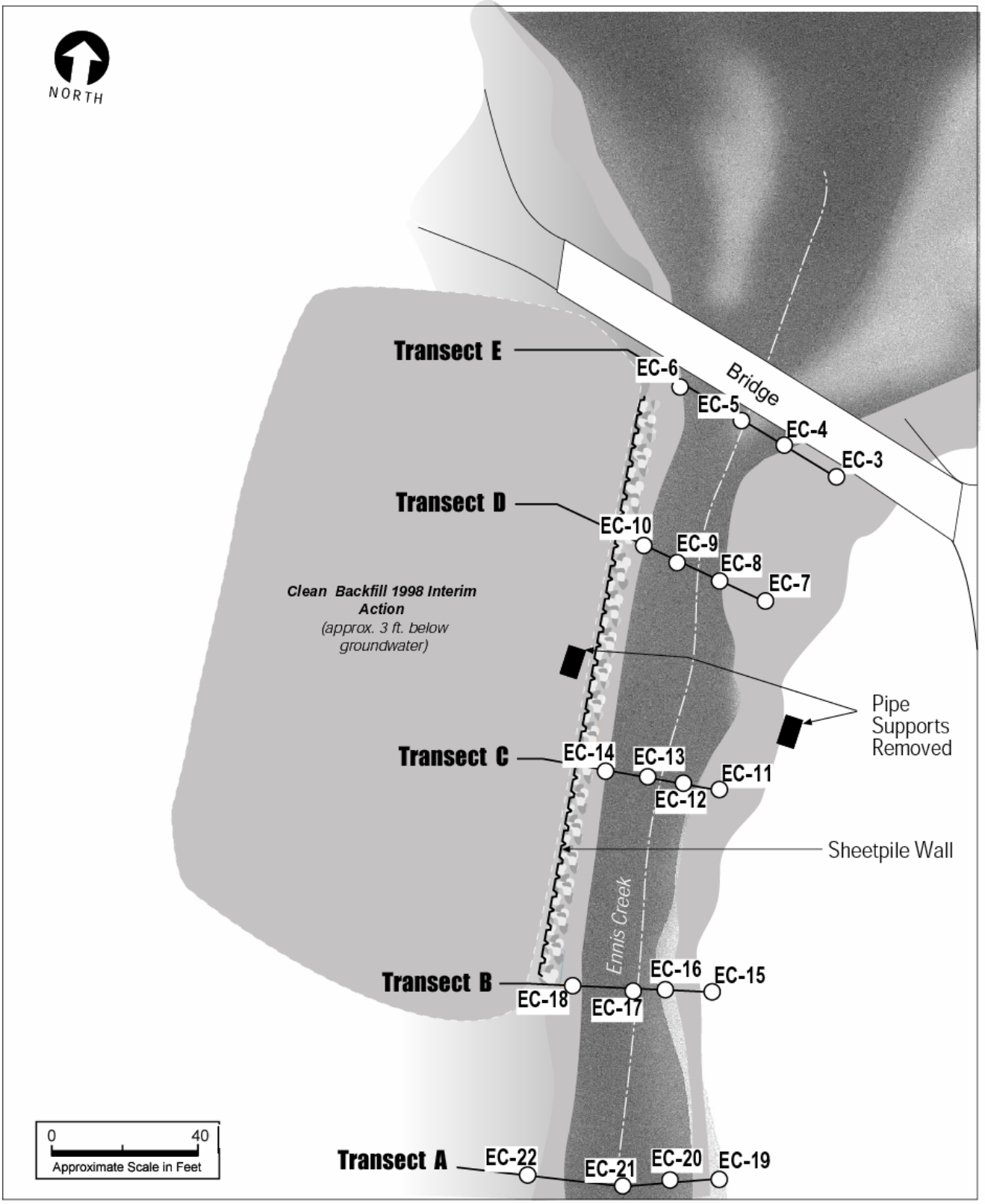


Figure 5-1.
Delineation Sample Locations for the Ennis Creek - Finishing Room Area

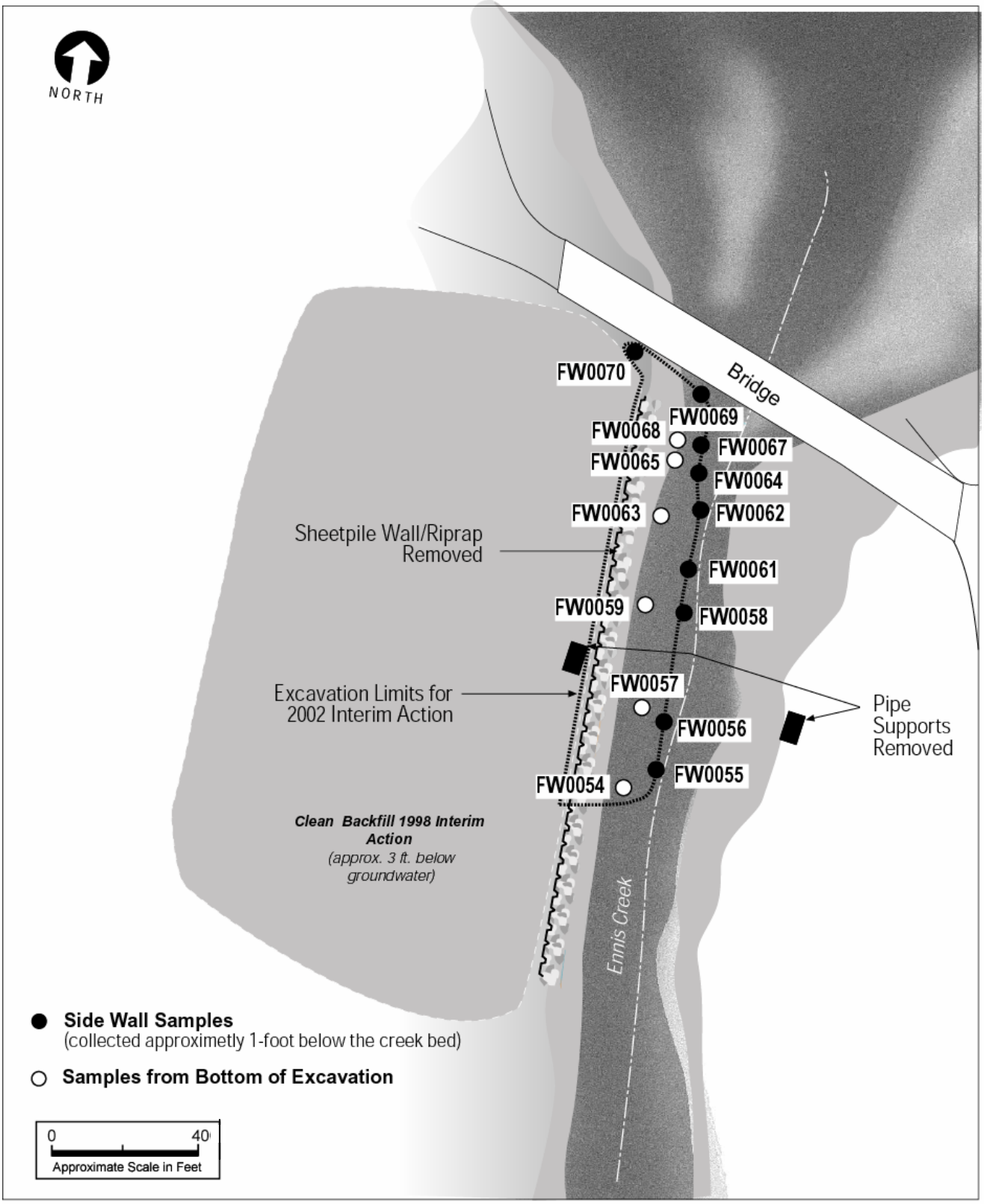


Figure 5-2.
Confirmation Sample Locations for the Ennis Creek - Finishing Room Area

5.1.3 STOCKPILE SAMPLING

The excavated soil and sediment from the Ennis Creek-Finishing Room Area was stockpiled separately in the soil containment area located at the southeast end of the former mill site for waste characterization prior to disposal. Ten composite samples were collected from the stockpile, which was estimated to be less than 1,000 cubic yards on August 16, 2002, and submitted to a laboratory for DRO, RRO, and PCB analysis to determine the suitability of the material for disposal at the City of Port Angeles Sanitary Landfill. The samples were collected along transects spaced approximately 10 feet apart. Each sample was a composite of three to five subsamples in accordance with the Waste Acceptance Policy criteria established by the City of Port Angeles Sanitary Landfill (Parametrix 1998).

Analytical results of the stockpile sampling are presented in Table 5-3. Results indicated that the material was suitable for disposal at the City of Port Angeles Sanitary Landfill. A total of 1,285 tons of soil and debris were shipped to the landfill from the Ennis Creek-Finishing Room Area stockpile.

5.1.4 ENNIS CREEK MONITORING SAMPLES

At the request of the Washington Department of Natural Resources, two surface sediment (0 to 10 cm) samples were collected on 6/25/02 and 8/9/02 from the alluvial fan of Ennis Creek (Figure 5-3) prior to excavation of soil/sediment from the Ennis Creek-Finishing Room Area, and on 9/04/02, several weeks after removal of the creek bypass, to assess the potential effect of the interim action downstream.

Results of the monitoring sampling are provided in Table 5-4. Results indicate that DRO and PCBs were not detected in any samples and RRO was detected at a relatively low concentration in both locations during both the pre- and post-interim action sampling periods. Concentrations of RRO remained relatively unchanged during the two sampling periods. These results indicate that DRO, RRO, and PCBs associated with the excavation activities in the Ennis Creek-Finishing Room Area did not affect sediments downgradient in the alluvial fan of Ennis Creek.

5.2 FORMER FUEL OIL TANK NO. 2

5.2.1 CONFIRMATION SAMPLING

Samples were collected from the sidewalls and bottom of the FOT2 excavation to evaluate whether the cleanup levels were attained. Figure 5-4 shows the location of 44 samples that were used to assess the acceptability of the excavation limits. Section 4.2.5 describes the confirmation sampling design for FOT2.

Analytical results for the confirmation samples (Table 5-5) indicate the concentrations of DRO and RRO were below the cleanup levels in 40 of 44 samples. Concentrations were greater than the cleanup levels at sidewall locations 10, 86, and 88 and at bottom sample location 30. Excavations did not proceed horizontally past sidewall locations 10, 86, and 88 because the mass of soil with residual TPH concentrations above the cleanup levels appeared to be limited and further excavation around the utility corridor was not practicable. Bottom samples, such as sample location 30, were collected at groundwater elevation or, where possible, at depths below the groundwater elevation. Despite concerted dewatering efforts, water accumulated in the excavations and often contained an oily sheen. It was difficult to collect confirmation soil samples from the bottom of the excavation that were not affected by the overlying sheen on the water. Sample location 86 was collected directly under a north-south oriented concrete utility corridor. There was very thin localized contamination under this corridor and it was determined that further excavation under the corridor would be suspended after squaring off the excavation with clean boundaries on either side (refer to Figure 5-4). Sample location 87 was collected three feet below sample 86, just above the groundwater table. Analytical results indicate very low concentrations of DRO and RRO at sample location 87. Sample locations 10 and 88 characterize small localized pockets of TPH contamination and further excavation in these areas was deemed unjustified.

5.2.2 STOCKPILE SAMPLING

The excavated soil from FOT2 was segregated during excavation into light and heavy TPH-affected soil based on visual observations of potential contamination. The segregated soil was placed in separate stockpiles in the soil containment area located at the southeast end of the mill site for waste characterization prior to disposal. The heavy stockpile consisted of approximately 2500 cubic yards of material. The light pile contained approximately 2000 cubic yards. Ten composite samples were collected from the heavy stockpile and eleven composite samples were collected from the light stockpile on August 8, 2002 and submitted to a laboratory for RRO & DRO analysis using the NWTPH-Dx analytical method to determine the suitability of the material for disposal at the City of Port Angeles Sanitary Landfill. The samples were collected along transects and each sample consisted of three to five composites in accordance with the Waste Acceptance Policy criteria established by the City of Port Angeles (Parametrix 1998).

Results of the stockpile sampling are presented in Table 5-6. Results indicate that all the soil was suitable for disposal at the Port Angeles Sanitary Landfill. However, a portion of the stockpiled soil was initially sent to the TPS Technologies disposal facility in Lakewood, WA because disposal at the City of Port Angeles Sanitary Landfill was unavailable. Approximately 1,793 tons of soil was shipped

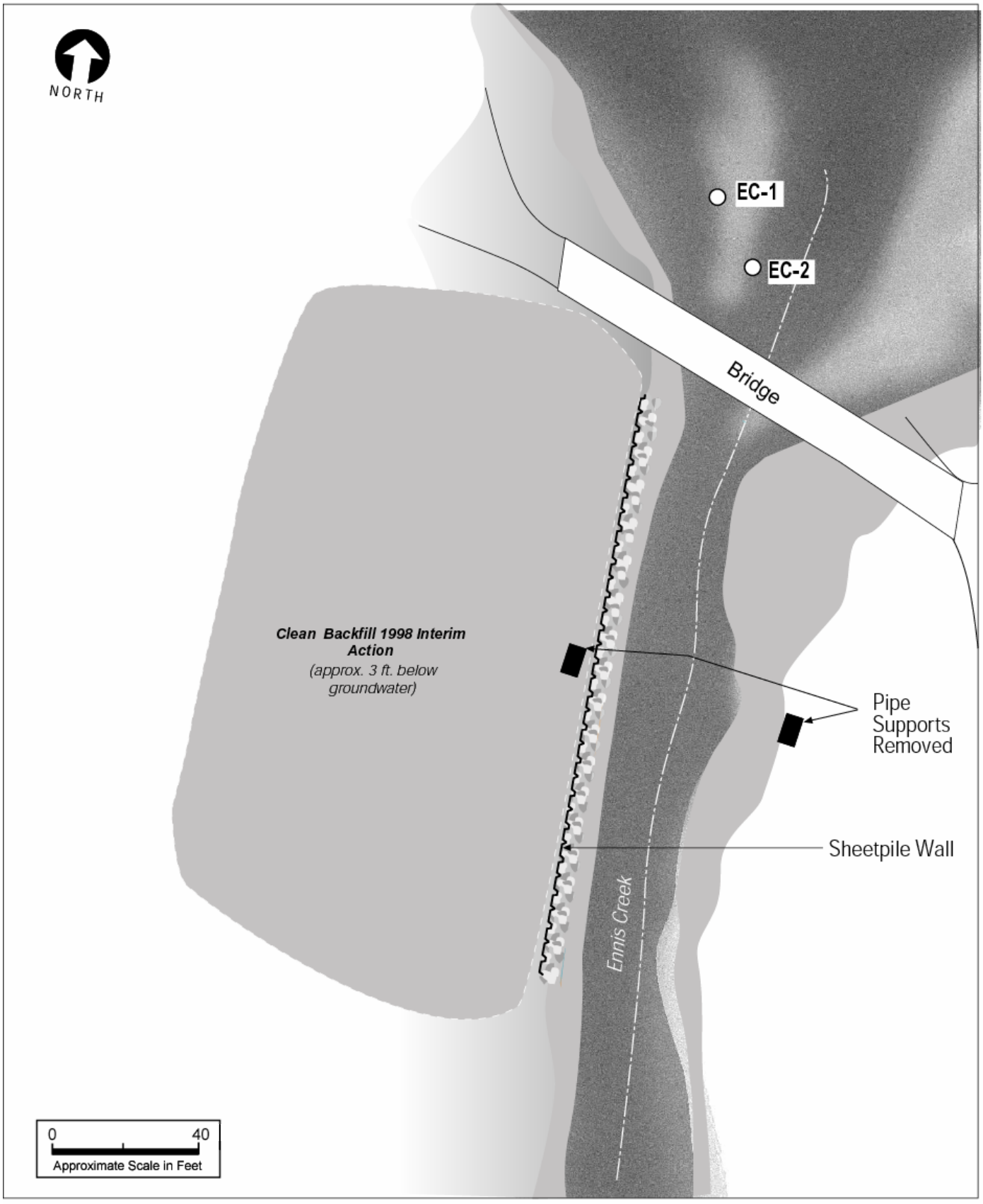


Figure 5-3.
Ennis Creek Monitoring Sample Locations

Figure 5-4. Confirmation Sample Locations for the Fuel Oil Tank No. 2 Area.

Table 5-2. Confirmation Sampling Results for the Ennis Creek-Finishing Room Area.

Sample ID	Date Collected	Diesel Range Organics (mg/Kg)	Residual Range Organics (mg/Kg)	PCB (mg/Kg)
FW0054	08/09/02	240	440	ND
FW0055	08/09/02	8.6	31	ND
FW0056	08/10/02	4.9	19	ND
FW0057	08/10/02	100	250	ND
FW0058	08/10/02	5.1	23	ND
FW0059	08/10/02	340	1700	ND
FW0061	08/10/02	48	350	ND
FW0062	08/12/02	130	600	ND
FW0063	08/12/02	140	170	ND
FW0064	08/12/02	8.8	57	ND
FW0065	08/12/02	300	470	ND
FW0067	08/12/02	1100	3000	ND
FW0068	08/12/02	380	1000	ND
FW0069	08/12/02	26	68	ND
FW0070	08/12/02	1300	6600	0.39

ND - not detected

Table 5-3. Stockpile Sample Results Ennis Creek-Finishing Room Area

Sample ID	Date Collected	Diesel Range Organics (mg/Kg)	Residual Range Organics (mg/Kg)	PCBs (mg/Kg)
SP3-1	08/16/02	2300	13000	0.51
SP3-2	08/16/02	1800	9500	0.16
SP3-3	08/16/02	3600	8600	0.24
SP3-4	08/16/02	3100	8500	0.054
SP3-5	08/16/02	3300	6800	0.039
SP3-6	08/16/02	2000	8300	0.029
SP3-7	08/16/02	1800	7400	0.069
SP3-8	08/16/02	1700	6900	0.047
SP3-9	08/16/02	3700	6200	0.054
SP3-10	08/16/02	2800	6300	0.059

from the FOT2 stockpiles to the TPS disposal facility. The remaining 3,344 tons of soil was shipped from the FOT2 stockpiles to the City of Port Angeles Sanitary Landfill.

In addition to characterizing the FOT2 stockpile located in the containment area, samples were also collected from the overburden stockpile located adjacent to the FOT2 excavation to characterize the suitability of this material for use as excavation backfill material. The overburden stockpile was estimated to contain approximately 200 cubic yards of soil obtained from the upper 4 to 6 feet of overburden soil from the FOT2 excavation area and the clean material encountered above the geomembrane liner of the earlier FOT2 interim action. Two grab samples (FOT-0018 and FOT-0019) were collected from the overburden stockpile.

Table 5-4. Monitoring Sampling Results Ennis Creek-Finishing Room Area.

Sample Location	Sample ID	Date Collected	Sample Depth	Diesel Range Organics (mg/Kg)	Residual Range Organics (mg/Kg)	PCBs (mg/Kg)
EC-1	FW0001	06/25/02	0-10 cm	ND	30	ND
EC-1	FW0053	08/09/02	0-10 cm	4.9	15	ND
EC-1	FW0071	09/04/02	0-10 cm	ND	11	ND
EC-2	FW0002	06/25/02	0-10 cm	ND	17	ND
EC-2	FW0052	08/09/02	0-10 cm	4.9	23	ND
EC-2	FW0072	09/04/02	0-10 cm	ND	14	ND

ND - not detected

Analytical results for these samples show that RRO was not detected in either sample, while DRO was detected in both samples at concentrations well below the cleanup level of 2,000 mg/kg (FOT-0018 = 210 mg DRO/kg and FOT-0019 = 17 mg DRO/kg). Therefore, soil in the overburden stockpile was deemed suitable for use as backfill in the FOT2 excavation.

5.3 FORMER MACHINE SHOP

5.3.1 CONFIRMATION SAMPLING

Following excavation of the Machine Shop Area, confirmation soil samples were collected from 16 locations to evaluate whether cleanup levels had been attained. Ten samples were collected from the sidewalls of the excavation at approximately 25-foot intervals just above the groundwater and 6 samples were collected from the bottom of the excavation in a 25-foot grid (Figure 5-5).

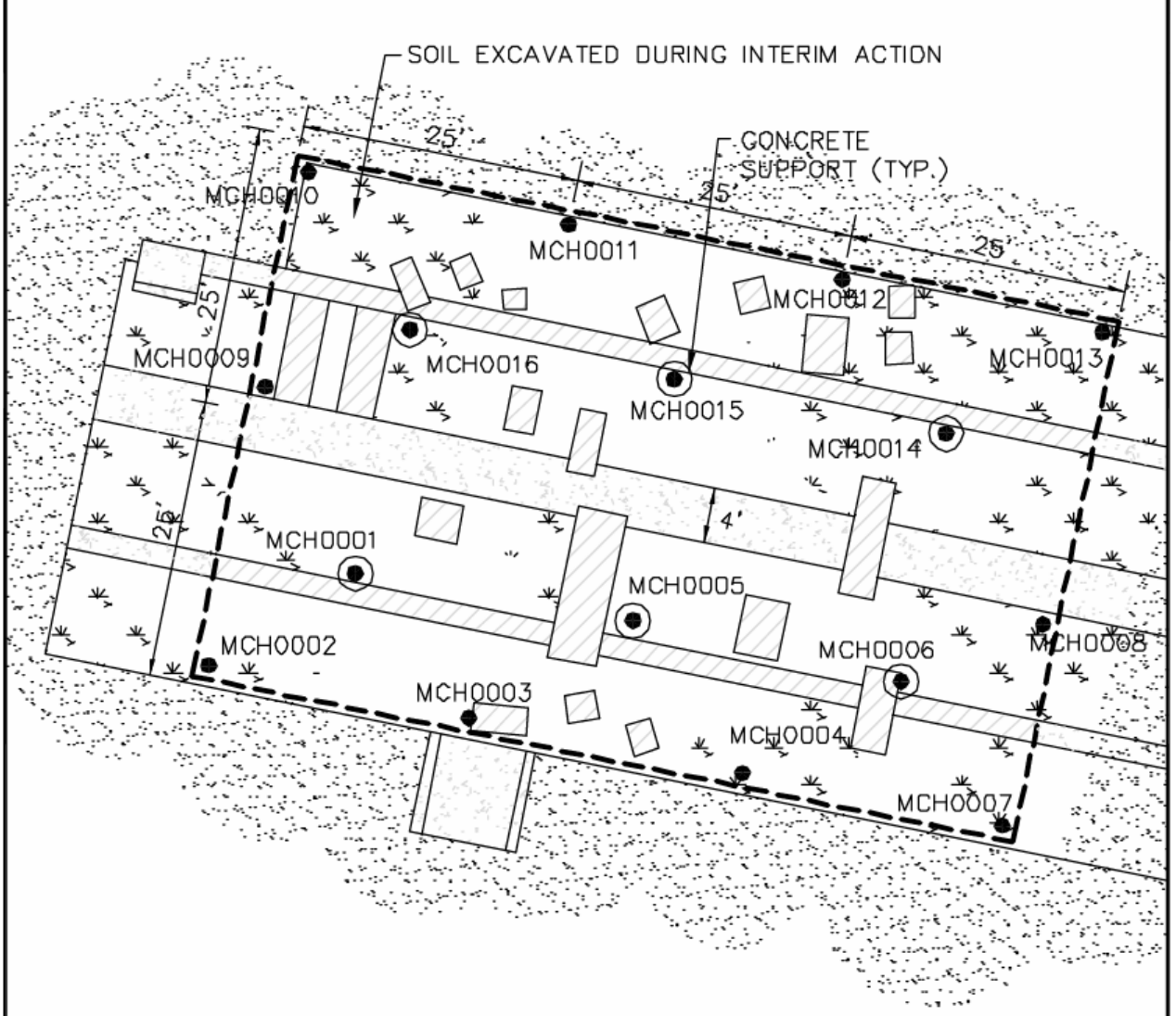
Analytical results of the confirmation sampling are presented in Table 5-7 for chemicals that were detected in at least one sample. Only 12 of 49 chemicals

included in the analyses were detected in at least one sample. Table 5-7 shows the concentrations of all chemicals were below the cleanup levels with the exception of lead at sidewall sample MCH0004. Sample MCH0004 did not show any visible signs of contamination and results for all other chemicals were either not detected or detected at concentrations below cleanup levels. Analytical results for inorganic chemicals from soil collected from industrial sites often demonstrate a highly variable and heterogeneous concentration pattern caused by the occasional presence of small pieces of metal included in the soil sample. This was believed to be the cause of the lead detected in sample MCH0004 and further excavation of this area was deemed unjustified.

5.3.2 STOCKPILE SAMPLING

The excavated material from the Machine Shop Area was stockpiled separately in the soil containment area located at the southeast end of the former mill site for waste characterization prior to disposal. Ten composite samples were collected from the stockpile, which had a volume of less than 1,000 cubic yards of soil on September 5, 2002, and submitted to a laboratory for DRO, RRO, PCBs, and RCRA metals analysis to determine the suitability of the material for disposal at the City of Port Angeles Sanitary Landfill. An additional 10 samples were collected on September 6, 2002 and submitted to a laboratory for analysis of VOC's. During both sampling events, samples were collected along transects spaced approximately 10 feet apart. Each sample consisted of a three part composite sample in accordance with the Waste Acceptance Policy criteria established by the City of Port Angeles Sanitary Landfill (Parametrix 1998).

Analytical results of the stockpile sampling are presented in Table 5-8. Thirteen chemicals were detected in at least one stockpile sample. Concentrations of all detected chemicals were below the waste acceptance criteria (Parametrix 1998) and the material was deemed suitable for disposal at the City of Port Angeles Sanitary Landfill. A total of 970 tons of soil were transported from the Machine Shop stockpile to the City of Port Angeles Sanitary Landfill.



LEGEND

EXTENT OF EXCAVATION

SIDEWALL CONFIRMATION SAMPLE LOCATION ABOVE GROUNDWATER

BOTTOM CONFIRMATION SAMPLE LOCATION ABOVE GROUNDWATER

CONCRETE REMAINING AFTER EXCAVATION

CONCRETE REMOVED FROM EXCAVATION

N

0 7.5 15

SCALE IN FEET

FOSTER WHEELER ENVIRONMENTAL CORPORATION

Figure 5–5

Confirmation Sample Locations at the Machine Shop Area

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Table 5-5. Confirmation Sample Results for the Fuel Oil Tank No. 2 Area

Sample Location	Sample ID	Date Collected	Diesel Range Organics (mg/Kg)	Residual Range Organics (mg/Kg)
1	FOT-0001	07/29/02	5000	3500
2	FOT-0002	07/30/02	7.9	44
3	FOT-0003	07/30/02	5	9.4
4	FOT-0004	07/30/02	87	210
5	FOT-0005	07/30/02	9.1	13
6	FOT-0006	07/30/02	36	150
8	FOT-0008	07/31/02	6.9	13
9	FOT-0009	07/31/02	480	340
10	FOT-0010	07/31/02	2300	1000
11	FOT-0011	07/31/02	9.1	34
12	FOT-0012	08/01/02	5.4	11
13	FOT-0013	08/01/02	6.9	16
14	FOT-0014	08/01/02	4.9	10
15	FOT-0015	08/01/02	7.5	13
16	FOT-0016	08/01/02	110	280
17	FOT-0017	08/01/02	150	170
23	FOT-0023	08/02/02	9.6	29
24	FOT-0024	08/02/02	110	88
26	FOT-0026	08/02/02	38	29
27	FOT-0027	08/06/02	9.7	29
28	FOT-0028	08/06/02	7.8	14
29	FOT-0029	08/06/02	140	250
30	FOT-0030	08/06/02	15000	7300
31	FOT-0031	08/08/02	19	60
32	FOT-0032	08/08/02	12	17
33	FOT-0033	08/08/02	150	140
34	FOT-0034	08/08/02	6.2	11
35	FOT-0035	08/08/02	59	20
71	FOT-0071	08/29/02	4.6	7.9
72	FOT-0072	08/29/02	31	53
73	FOT-0073	08/29/02	4.4	4.9
74	FOT-0074	08/29/02	7.2	11
75	FOT-0075	08/29/02	36	32
76	FOT-0076	08/29/02	32	56
81	FOT-0081	08/30/02	7.8	43
82	FOT-0082	08/30/02	5.2	7.5
83	FOT-0083	08/30/02	1500	1100
85	FOT-0085	09/06/02	26	48
86	FOT-0086	09/06/02	39000	25000
87	FOT-0087	09/06/02	61	260
88	FOT-0088	09/06/02	5600	400
89	FOT-0089	09/06/02	7.4	8
90	FOT-0090	09/06/02	8.5	6.8
91	FOT-0091	09/06/02	34	27

Table 5-6. Stockpile Sample Results for the Fuel Oil Tank No. 2 Area.

Stockpile Designation	Sample ID	Date Collected	Diesel Range Organics (mg/Kg)	Residual Range Organics (mg/Kg)
SP1 (heavy)	SP1-1	08/08/02	5600	3300
SP1 (heavy)	SP1-2	08/08/02	6400	4000
SP1 (heavy)	SP1-3	08/08/02	5200	3400
SP1 (heavy)	SP1-4	08/08/02	3000	2100
SP1 (heavy)	SP1-5	08/08/02	10000	7200
SP1 (heavy)	SP1-6	08/08/02	7800	5300
SP1 (heavy)	SP1-7	08/08/02	6600	4400
SP1 (heavy)	SP1-A	08/08/02	3900	2600
SP1 (heavy)	SP1-B	08/08/02	6400	5500
SP1 (heavy)	SP1-C	08/08/02	7600	5500
SP2 (light)	SP2-1	08/08/02	3400	1800
SP2 (light)	SP2-2	08/08/02	2200	1700
SP2 (light)	SP2-3	08/08/02	2700	1500
SP2 (light)	SP2-4	08/08/02	3500	3100
SP2 (light)	SP2-5	08/08/02	2300	2300
SP2 (light)	SP2-6	08/08/02	1900	1400
SP2 (light)	SP2-7	08/08/02	2400	1700
SP2 (light)	SP2-8	08/08/02	1600	1700
SP2 (light)	SP2-9	08/08/02	730	1300
SP2 (light)	SP2-10	08/08/02	2200	2100
SP2 (light)	SP2-11	08/08/02	2200	1800

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Table 5-7. Confirmation Sampling Results Chemicals Detected in the Machine Shop Area.

Sample ID	Date Collected	Acetone (mg/Kg)	PCBs (mg/Kg)	Diesel Range Organics (mg/Kg)	Residual Range Organics (mg/Kg)	Arsenic (mg/Kg)	Barium (mg/Kg)	Cadmium (mg/Kg)	Chromium (mg/Kg)	Lead (mg/Kg)	Mercury (mg/Kg)	Selenium (mg/Kg)	Silver (mg/Kg)
MCH0001	09/03/02	12	0.075	120	140	5	45.3	ND	26.3	28.4	0.14	ND	ND
MCH0002	09/03/02	14	0.193	100	180	3.7	57.9	ND	28.8	181	0.24	ND	ND
MCH0003	09/03/02	20	0.011	190	350	4.2	81.8	ND	44	22.2	0.08	ND	ND
MCH0004	09/03/02	23	0.36	560	1700	4.8	256	ND	58	1110	0.3	0.6	ND
MCH0005	09/03/02	12	ND	63	26	3	36.7	ND	39.9	8.9	0.04	ND	ND
MCH0006	09/03/02	18	ND	ND	14	3.1	51.1	ND	44.2	ND	0.04	ND	ND
MCH0007	09/03/02	19	0.5	60	79	4.1	66.1	ND	40.1	38.7	0.14	ND	ND
MCH0008	09/03/02	21	0.0064	ND	13	2.6B	68.9	ND	41.9	ND	0.05	ND	ND
MCH0009	09/04/02	39	0.014	ND	20	4.6	70.9	0.3	50.9	8.3	0.04	0.9	1.2
MCH0010	09/04/02	22	ND	ND	15	4.1	60	0.18	44.5	3.8	0.03	0.8	1.1
MCH0011	09/04/02	20	ND	ND	14	4.6	42.5	0.18	28.2	4.8	0.01	ND	ND
MCH0012	09/04/02	30	ND	8.3	22	4.1	64.1	0.18	52.3	3.5	0.04	ND	ND
MCH0013	09/04/02	24	ND	ND	20	6.6	82.4	0.2	52.4	7.4	0.05	0.6	1.8
MCH0014	09/04/02	ND	ND	ND	29	3.5	42.9	0.24	32.7	ND	0.04	ND	1.6
MCH0015	09/04/02	21	0.0017	ND	14	2.1	24.5	0.15	18.7	ND	0.02	ND	0.9
MCH0016	09/04/02	69	ND	ND	13	1.4	22.6	ND	13.7	ND	0.01	ND	1.6

ND - not detected

Table 5-8. Stockpile Sample Results for Detected Chemicals for the Machine Shop Area.

Sample ID	Date Collected	Acetone (mg/Kg)	Ethylbenzene (mg/kg)	Styrene (mg/kg)	PCBs (mg/Kg)	Diesel Range Organics (mg/Kg)	Residual Range Organics (mg/Kg)	Arsenic (mg/Kg)	Barium (mg/Kg)	Chromium (mg/Kg)	Lead (mg/Kg)	Mercury (mg/Kg)	Selenium (mg/Kg)
SP4-1	09/05-06/2002	0.14	ND	ND	0.81	280	860	4.6	127	42.4	104	0.17	ND
SP4-2	09/05-06/2002	ND	ND	ND	1.2	360	1000	3.8	118	30.9	210	0.2	0.6
SP4-3	09/05-06/2002	0.14	ND	ND	1.2	100	380	3.6	196	43	124	0.4	ND
SP4-4	09/05-06/2002	ND	0.024	ND	0.293	200	760	3.7	66.5	33.7	29.5	0.23	ND
SP4-5	09/05-06/2002	0.84	ND	ND	1.59	300	910	4.2	76.2	35.1	47.2	0.18	0.6
SP4-6	09/05-06/2002	0.19	ND	ND	0.12	370	560	5	75.2	41.5	22.7	0.11	0.7
SP4-7	09/05-06/2002	ND	0.024	ND	0.385	120	510	4	65.8	36	28.3	0.13	ND
SP4-8	09/05-06/2002	ND	ND	0.013	1.34	110	190	3	54.7	33.3	26.2	0.12	0.7
SP4-9	09/05-06/2002	ND	0.021	ND	1.54	59	180	3.2	56.1	35.6	28	0.17	0.7
SP4-10	09/05-06/2002	ND	0.016	ND	1.2	20	74	4.3	72.9	53.2	33	0.13	1.1

ND - not detected

6 SUMMARY AND CONCLUSIONS

Interim actions were performed during the summer of 2002 at three locations on the former Rayonier pulp mill site, located in Port Angeles, Washington, and owned by Rayonier, Inc. as part of an agreement among Ecology, the Tribe, and Rayonier. An IAWP was developed describing the interim actions to be performed at the mill site. The IAWP was reviewed by regulatory agencies and the public and their comments were taken into consideration as the IAWP was finalized. The interim actions were performed under Agreed Order No. DE 02SWFAPST-4571, which was issued to Rayonier by Ecology in July 2002.

The interim actions were carried out at three sites; the Ennis Creek-Finishing Room Area, the Former FOT2, and the Former Machine Shop. The Ennis Creek-Finishing Room Area and FOT2 were selected for interim action to address soil contamination that remained following earlier interim actions at these sites. The Machine Shop Area was selected for interim action because oil contamination was noted on the ground after the building was removed. This area was subsequently covered with plastic to prevent migration of contaminants until an interim action could be completed.

Soil and sediment on the banks and in the streambed of Ennis Creek adjacent to the former Finishing Room were characterized for the presence of TPH and PCBs. It was necessary to determine the limits of the excavation prior to installing the creek bypass. Samples were collected from 20 locations to delineate the extent of contamination. Sampling was conducted along five transects that extended from the west bank to the east bank of the Ennis Creek-Finishing Room Area. Four samples were collected along each transect; the west bank, the mid-point of the west half of Ennis Creek, the midline of Ennis Creek, and the east bank of Ennis Creek. TPH and PCBs were detected in the western portion of the study area at concentrations requiring cleanup.

Prior to commencement of excavation activities at the Ennis Creek-Finishing Room Area, a stream diversion was constructed that routed the stream through a 36-inch HDPE bypass culvert around the excavation area. The bypass system allowed the area to be dewatered prior to excavation. The area was excavated and backfilled each day to control sloughing of soils and movement of water accumulating in the excavation. Confirmation samples were collected when the Plan's excavation area limits had been reached or exceeded and it was determined through visual observations that clean material was apparent along the smear zone near centerline of the creek. However, analytical results of the confirmation sampling were not available until the excavation and backfilling were completed. Analytical results of the confirmation sampling indicated that TPH was detected above the cleanup levels in several confirmation samples from the bottom and sidewalls of the

excavation. However, these confirmation samples were possibly cross-contaminated by water accumulating in the excavation that contained an oily sheen. Confirmation sampling also indicated that an area with TPH and PCB concentrations above the cleanup levels remained at the foot of the bridge located north of the site. This area was characterized as a localized area with observed TPH-affected soil that could not be excavated further because of concern about the integrity of the bridge. A total of 1,248 tons of soil and sediment were excavated from the area, characterized for disposal at the on-site containment area, and sent to the City of Port Angeles Sanitary Landfill.

Additional actions taken at the Ennis Creek-Finishing Room Area include the removal of a sheet pile wall, two concrete pipe supports and groundwater monitoring and extraction wells. The excavation was backfilled with clean graded fill material. The excavation and associated west bank of Ennis Creek were also modified to improve the habitat. A shallow inundation area was created to allow the creek to flow more naturally. Anchored trees with root wads and vegetation were established in the inundation area as habitat enhancements. Monitoring sediment samples were collected from the alluvial fan of Ennis Creek prior to and after completion of the interim action to evaluate the potential downstream affect of the interim action. Analytical results of the monitoring showed that the interim action did not result in a loss of contaminates to the downstream area. Low concentrations of TPH were present in the sediment samples and the concentrations were similar before and after the interim action.

Soil in an area extending approximately 100 feet east of the FOT2 was found to be affected by TPH. Soil with TPH concentrations greater than the cleanup levels was excavated to the groundwater depth or lower. Confirmation samples were collected from the bottom and sidewalls of the excavation. Analytical results for two confirmation samples from the bottom of the excavation showed TPH concentrations above the cleanup levels. However, these confirmation samples were possibly cross-contaminated by water accumulating in the excavation that contained an oily sheen. A confirmation sample collected directly under a utility corridor located along the north wall of the excavation had concentrations of TPH greater than the cleanup levels. Localized contamination under this corridor was determined not to be associated with FOT2, and further excavation of the small amount of soil under the corridor was impracticable and suspended after being squared off with clean boundaries on either side. Two other confirmation samples collected from the sidewall of the excavation were characterized as small localized pockets of TPH contamination and further excavation in these areas was deemed unjustified. Forty of 44 confirmation samples had results showing levels below the Plan's cleanup levels.

A total of 3,042 tons of TPH-affected soil was excavated from the FOT2. The excavated soil was characterized for disposal and sent either to the City of Port

Angeles Sanitary Landfill or the TPS Technologies, Inc. soil recycling facility in Lakewood, WA. The excavation removed and treated 72,000 gallons of oily water were removed from the excavation area and treated. The excavation was backfilled with a layer of clean concrete rubble and a surface layer of clean soil.

Soil in an area approximately 50 feet by 75 feet in the Former Machine Shop was found to be affected by TPH and possibly other chemicals as well. The area was excavated to the groundwater depth and confirmation samples were collected from the bottom and sidewalls of the excavation. Analytical results for the confirmation samples showed that the only chemical that exceeded a cleanup level was lead at a single sidewall sample location. Analytical results for inorganic chemicals for soil collected from industrial sites often demonstrate a highly variable and heterogeneous concentration pattern caused by the occasional presence of small pieces of metal included in the soil sample. This was believed to be the cause of the lead detected in a confirmation sample and further excavation of this area was deemed unjustified.

Approximately 970 tons of affected soil were excavated from the Machine Shop. The excavated soil was characterized for disposal and sent to the City of Port Angeles Landfill. Concrete supports were either left in place and cleaned or removed prior to excavation to a staging area for disposal. The excavation was backfilled with concrete rubble.

The interim actions conducted at the Ennis Creek-Finishing Room Area, FOT2, and Former Machine Shop in 2002 resulted in the excavation and disposal of approximately 7,393 tons of soil, and the removal of 81,000 gallons of water.

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APPENDICES PROVIDED ON ATTACHED CD-ROM