2007-018986 Klamath County, Oregon



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After recording, return to:
Oregon DEQ
700 SE Emigrant, Suite 330
Pendleton, OR 97801
Att: Katie Robertson

# EASEMENT AND EQUITABLE SERVITUDES

This grant of Easement and acceptance of Equitable Servitudes is made and entered into as of October 10, 2007, between Klamath County, a political subdivision of the State of Oregon, herein after called *Grantor* and the State of Oregon, acting by and through the Oregon Department of Environmental Quality herein after called *DEQ* or *Grantee*.

#### RECITALS

- A. Grantor is the owner of certain real property, commonly known as the former Chiloquin Forest Products Mill, located at the west end of Blocklinger Street in Chiloquin, Klamath County, Oregon. The property is more particularly described in Attachment A to this Easement and Equitable Servitudes, and referenced under the name Chiloquin Forest Products, ECSI # 1213 in the files of DEQ's Eastern Region Environmental Cleanup Program in Pendleton, Oregon. Interested parties may contact the Pendleton office to review a detailed description of the residual risks present at the Property and found in the *Boiler House and Soil Removal Report* dated March 21, 2006, and the *Off-Site Risk Assessment Report* dated July 13, 2007.
- B. On January 6, 2005, the Director of the Oregon Department of Environmental Quality or delegate selected the remedial action for the Property set forth in the *Record of Decision* (ROD) dated January 5, 2005, for the Property. On November 7, 2006, the Director of the Oregon Department of Environmental Quality or delegate selected a revised remedial action for the Property as set forth in the *Record of Decision Amendment No. 1* dated November 7, 2006 for the Property. The revised remedial action selected requires, among other things, the implementation of an institutional control in the form of an Easement and Equitable Servitude (E&ES) that will notify owners or potential owners of the presence of the soil cap and identify associated restrictions to preserve and maintain the cap integrity.

Easement and Equitable Servitudes Klamath County

- C. On September 22, 2004, Grantor entered into a Voluntary Cleanup Agreement (*Agreement*) with DEQ, in which Grantor agreed to implement the selected remedial action, including the required institutional controls.
- D. The provisions of this Easement and Equitable Servitudes are intended to further the implementation of the selected remedial action and thereby protect human health and the environment.

#### 1. DEFINITIONS

- "Acceptable risk level" has the meaning set forth in Oregon Revised Statute (ORS) 465.315 and Oregon Administrative Rule (OAR) 340-122-0115.
- "Beneficial use" has the meaning set forth in OAR 340-122-0115.
- "DEQ" means the Oregon Department of Environmental Quality, and its employees, agents, and authorized representatives. "DEQ" also means any successor or assign of DEQ under the laws of Oregon, including but not limited to any entity or instrumentality of the State of Oregon authorized to perform any of the functions or to exercise any of the powers currently performed or exercised by DEQ.
- 1.4 "Ecological receptor" has the meaning set forth in OAR 340-122-0115.
- 1.5 "Engineering control" has the meaning set forth in OAR 340-122-0115.
- 1.6 "Hazardous substance" has the meaning set forth in ORS 465.200
- 1.7 "Owner" means any person or entity, including Grantor, who at any time owns, occupies, or acquires any right, title, or interest in or to any portion of the Property or a vendee's interest of record to any portion of the Property, including any successor, heir, assign or holder of title or a vendee's interest of record to any portion of the Property, excluding any entity or person who holds such interest solely for the security for the payment of an obligation and does not possess or control use of the Property.
- 1.8 "Property" means the real property described in Exhibit A to this Easement and Equitable Servitudes.

# 2. GENERAL DECLARATION

Grantor, in consideration of Grantee's issuance of a Conditional No Further Action letter, grants to DEQ an Easement for access and accepts the Equitable Servitudes described in this instrument and, in so doing, declares that the Property described in Attachment A to this Easement and Equitable Servitudes, is now subject to and shall in future be conveyed, transferred, leased, encumbered, occupied, built upon, or otherwise used or improved, in whole or in part, subject to this Easement and Equitable Servitudes. Each condition and restriction set forth in this Easement and Equitable Servitudes touches and concerns the Property and the equitable servitudes granted in paragraph 3 and easement granted in paragraph 4 below, shall run with the land for all purposes, shall be binding upon all current and future owners of the Property as set forth in this Easement

and Equitable Servitudes, and shall inure to the benefit of the State of Oregon. Grantor further conveys to DEQ the perpetual right to enforce the conditions and restrictions set forth in this Easement and Equitable Servitudes.

# 3. EQUITABLE SERVITUDES (RESTRICTIONS ON USE)

- 3.1 **Groundwater Use Restrictions:** Owner shall not extract through wells or by other means or use the groundwater from the shallow aquifer at the Property for consumption or other beneficial use, as long as the hazardous substance concentrations exceed the acceptable risk level for such use. This prohibition shall not apply to extraction of groundwater associated with groundwater treatment or monitoring activities approved by DEQ or to temporary dewatering activities related to construction, development, or the installation of sewer or utilities at the Property. Owner shall conduct a waste determination on any groundwater that is extracted during such monitoring, treatment, or dewatering activities and handle, store and manage waste water according to applicable laws.
- 3.2 Soil Cap Engineering Control Use Restrictions: Except in accordance with the Continuing Obligations Plan included as Attachment B, Owner shall not conduct operations on the Property or use the Property in any way that will or likely will penetrate the soil cap or jeopardize the soil cap's protective function as an engineering control that prevents exposure to contaminated soil, including without limitation any excavation, drilling, scraping, or erosion. Owner shall maintain the soil cap in accordance with the Continuing Obligations Plan included as Attachment B. Any proposed deviations from the Continuing Obligations Plan are required to be reviewed and approved by DEQ.
- 3.3 Use of the Property. Owner shall not occupy or allow other parties to occupy the Property unless the controls listed in this Paragraph 3 are maintained and reporting as outlined in the Continuing Obligations Plan included as Attachment B, is submitted to DEQ documenting that the restrictions and prohibitions of this Easement and Equitable Servitudes are intact and continue to protect public health and the environment.
- 3.4 **Notice of Transfer.** Owner shall notify DEQ at least ten (10) days before the effective date of any conveyance, grant, gift, or other transfer, in whole or in part, of Owner's interest in or occupancy of the Property, or the start of any development activities or change in use of the Property that might expose human or ecological receptors to hazardous substances at the Property. Notwithstanding the foregoing, Owner shall not commence any development inconsistent with the conditions or restrictions in this Paragraph 3 without prior written approval from DEQ as provided in Paragraph 3.2 or removal of the condition or restriction as provided in Paragraph 5.1 below.
- 3.4 **Zoning Changes.** Owner shall notify DEQ no less than thirty (30) days before Owner's petitioning for or filing of any document initiating a rezoning of the Property that would change the base zone of the Property under the Klamath County

zoning code or any successor code. As of the date of this Easement and Equitable Servitudes, the base zone of the Property is heavy industrial.

# 4. EASEMENT (RIGHT OF ENTRY)

During reasonable hours and subject to reasonable security requirements, DEQ shall have the right to enter upon and inspect any portion of the Property to determine whether the requirements of this Easement and Equitable Servitudes have been or are being complied with. DEQ shall have the right, privilege, and license to enter upon the Property at any time to abate, mitigate, or cure at the expense of the Owner the violation of any condition or restriction contained in this Easement and Equitable Servitudes, provided DEQ first gives written notice of the violation to Owner describing what is necessary to correct the violation and Owner fails to cure the violation within the time specified in such notice. Any such entry by DEQ shall not be deemed a trespass, and DEQ shall not be subject to liability to Owner for such entry and any action taken to abate, mitigate, or cure a violation.

# 5. GENERAL PROVISIONS

- 5.1 Each condition and restriction contained in this Easement and Equitable Servitudes shall be recited in any deed conveying the Property or any portion of the Property, and shall run with the land so burdened until such time as the condition or restriction is removed by written certification from DEQ, recorded in the Deed Records of the County in which the Property is located, certifying that the condition or restriction is no longer required in order to protect human health or the environment.
- 5.2 Upon the recording of this Easement and Equitable Servitudes, all future Owners, as defined in Paragraph 2.2 above, shall be conclusively deemed to have consented and agreed to every condition and restriction contained in this Easement and Equitable Servitudes, whether or not any reference to this Easement and Equitable Servitudes is contained in an instrument by which such person or entity occupies or acquires an interest in the Property.
- 5.3 Upon any violation of any condition or restriction contained in this Easement and Equitable Servitudes, DEQ, in addition to the remedies described in Paragraph 4 above, may enforce this Easement and Equitable Servitudes as provided in the letter agreement, or may seek any other available legal or equitable remedy to enforce this Easement and Equitable Servitudes.

IN WITNESS WHEREOF Grantor and Grantee have executed this Easement and Equitable Servitudes as of the date and year first set forth above.

GRANTOR: Klamath County, a political subdivision of the State of Oregon
Jah. This 10/3/0>
John W. Elliot, Chairman of the Board Date
William A. Switzer, County Commissioner Date
William A. Switzer, , County Commissioner Date
Wellin & hour 10/31/07
William R. Brown, , County Commissioner Date
STATE OF OREGON ) ss.
County of Klamath )
This instrument was acknowledged before me on Cotobar 31,2007
by John Elliott, chairman, Cl Switzer and Bick Brown
by John Elliott, chairman, Cl Switzer and Bick Brown as Townath County Commissioners a political subdivision
of the State of Orager
Sand E Name
Notary Public for Oregon
OFFICIAL SEAL PAMELA E. NEVES NOTARY PUBLIC-OREGON COMMISSION NO. A374850 NY COMMISSION EXPIRES DEG. 27, 2007

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My commission expires: MARCH 22, 2009

GRANTEE: State of Oregon, Department of Environmental Quality

NOTARY PUBLIC-OREGON COMMISSION NO. 389075 MY COMMISSION EXPIRES MAR. 22, 2009

#### ATTACHMENT A

## LEGAL DESCRIPTION OF THE PROPERTY

PARCEL 1: THAT PORTION OF LOT 2, SECTION 3, TOWNSHIP 35 SOUTH, RANGE 7 EAST OF THE WILLAMETTE MERIDIAN, KLAMATH COUNTY, OREGON, DESCRIBED AS FOLLOWS: COMMENCING AT THE NORTHWEST CORNER OF LOT 2 DESCRIBED ABOVE; THENCE SOUTH 356.9 FEET; THENCE EAST 270.0 FEET; THENCE NORTH 160.0 FEET; THENCE EAST 160.0 FEET; THENCE NORTH 196.9 FEET; THENCE WEST 430.0 FEET TO THE POINT OF BEGINNING. ALL POINTS MARKED WITH IRON ROD. EXCEPTING RAILROAD RIGHT-OF-WAY.

PARCEL 2: THAT PART OF LOT 2, SECTION 3, TOWNSHIP 35 SOUTH, RANGE 7 EAST OF THE WILLAMETTE MERIDIAN, KLAMATH COUNTY, OREGON, PARTICULARLY DESCRIBED AS FOLLOWS: BEGINNING AT THE SOUTHWEST CORNER OF SAID LOT 2; THENCE EAST 430.0 FEET TO A POINT; THENCE NORTH 303.1 FEET TO A POINT; THENCE WEST 430.0 FEET TO A POINT DUE NORTH OF THE POINT OF BEGINNING; THENCE SOUTH 303.1 FEET TO THE PLACE OF BEGINNING.

PARCEL 3: ALL OF LOT 12, AND THAT PORTION OF LOTS 3 AND 7 LYING EAST OF THE SOUTHERN PACIFIC COMPANY'S RIGHT-OF WAY, IN SECTION 3, TOWNSHIP 35 SOUTH, RANGE 7 EAST OF THE WILLAMETTE MERIDIAN, TOGETHER WITH THE EASEMENT OF SECOND AVENUE AND WHICH RUNS THROUGH LOTS 11 AND 16 IN A SOUTH AND WESTERLY DIRECTION TO THE EAST LINE OF SAID LOT 12, FOR INGRESS TO AND EGRESS FROM THE ABOVE PROPERTY.

Easement and Equitable Servitudes Klamath County

# ATTACHMENT B CONTINUING OBLIGATIONS PLAN

Easement and Equitable Servitudes Klamath County



Continuing Obligations Plan
Chiloquin Mill Site Restoration Project
Chiloquin, Oregon

Prepared for Oregon Department of Environmental Quality

October 4, 2007 15545-01/Task 8

Prepared by

Hart Crowser, Inc.

Richard Ernst, RG

Principal

D E C E I V E D

OCT -5 2007

State of Oregon Dept. of Environmental Quality Eastern Region - Pendleton

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# CONTINUING OBLIGATIONS PLAN CHILOQUIN MILL SITE RESTORATION PROJECT CHILOQUIN, OREGON

#### 1.0 INTRODUCTION

This Continuing Obligations Plan (COP) presents the obligations necessary by future landowners to continue to minimize and/mitigate potential health risks to people from primarily dioxin-contaminated soils at the former Chiloquin Forest Products site in Chiloquin, Oregon (Figure 1). In June 2007, a soil cap was constructed on approximately 16 acres of the 32-acre site as a protective barrier to contaminated soils (Figure 2). As such, this COP describes protocols for both the capped area and uncapped areas.

#### 1.1 Purpose

The purpose of this COP is to describe the obligations and protocols that future landowners must follow to ensure the continued management of risks to human health from surficial soils with dioxins and furans (collectively "dioxin") on the site. A small volume of subsurface soil with pentachlorophenol (PCP) is also present. Future landowners may own a portion of the site or the entire site, and the obligations stated herein are required as applicable to their land ownership. As appropriate and applicable, landowners will be responsible for notifying workers and occupants on their portions of the site of the requirements of this COP.

To mitigate risks from dioxin-contaminated soils on a majority of the site slated for future use by people, a protective soil cap, consisting of at least one foot of soil, was constructed over 16 acres of the site in July 2007 as a remedial cleanup action. Because dioxin and PCP are still present in soil beneath this cap and dioxin is present in surficial soils on uncapped portions of the property, certain obligations are required to manage risks to human health. These obligations include:

- Maintenance of the cap to ensure its continued presence as a protective barrier over underlying dioxin- and PCP-contaminated soils;
- Implementation of mitigation measures, as needed, to address potential risks from dioxin in surface soils in uncapped areas of the site prior to development; and
- The proper management of native soils excavated from the site during future construction activities (e.g., cap penetrations for footings and utilities).

To ensure that this COP is maintained, it will be referenced or attached to an Easement and Equitable Servitudes (EES), a legal document recorded on the property title in Klamath County that indicates the presence of contamination and the requirements for managing the contamination.

# 1.2 Plan Organization

Subsequent sections of this COP are organized as follows.

- Section 2 provides a description of the project site (including extent of the protective soil cap) and the extent and magnitude of site contaminants.
- Section 3 describes the inspection and maintenance activities for the cap.
- Section 4 presents required assessment activities and possible mitigation measures prior to development of uncapped areas of the site property.
- Section 5 describes management of contaminated soil.
- Section 6 presents a discussion of health and safety issues.

The table lists previous dioxin data on soil from the site, and figures show the site location, its previous features, the soil cap, and previous dioxin and PCP analyses results on soil.

#### 1.3 Limitations

This COP is intended to present the obligations necessary by future landowners to continue to minimize and/mitigate potential health risks to people from dioxinand PCP-contaminated soils at the former Chiloquin Forest Products site. Hart Crowser prepared this COP in accordance with generally accepted professional practices related to the nature of the work specified in the COP, in the same or similar localities, at the time this plan was prepared. No other warranty, express or implied, is made.

This COP is for the specific application to the referenced project and for the exclusive use of the Oregon Department of Environmental Quality (DEQ), Klamath County, and future landowners of the site. Individuals and parties who own, work on, and/or occupy any portions of the property should read this document and the documents referenced herein. It is recommended that landowners retain an environmental consultant to assist in interpreting and/or meeting the requirements of this COP. Changes or amendments to the protocols specified in this COP will require DEQ approval.

#### 2.0 BACKGROUND

This section presents a description of the former Chiloquin Forest Products site and previous environmental activities performed at the site. For more information, please refer to the *Boiler House and Contaminated Soil Removal Report* and *Dioxin Assessment Report* completed for the site (Hart Crowser, 2006a,b). References are provided in Section 7.

# 2.1 Site Location and Description

The project site, the former Chiloquin Forest Products mill, is located at the west end of Blocklinger Street just outside the city limits of the City of Chiloquin in Klamath County, Oregon (Figures 1 and 2). The mill site is situated at an elevation of approximately 4,180 feet above mean sea level and consists of approximately 31.74 acres. Railroad tracks run adjacent to the northwest side of the site. An elementary school and high school are located east and southeast of the site, respectively; and residences are present to the northwest and to the east beyond the schools. The Sprague River flows to the northwest adjacent to the site to its confluence with the Williamson River about 500 feet downstream.

The Chiloquin Lumber and Box Company was originally built at the site in 1918. The box factory was located in the northern portion of the site, and worker housing in the western portion. In 1947, the box factory burned down. Probably in the 1950s, a new mill was built on the eastern portion of the property, and a log pond was created in the northwestern portion of property. Between 1968 and 1983, the pond was filled to become a log deck for the mill. Chiloquin Forest Products, Inc., operated the mill until 1988, filing for bankruptcy in 1991. In early 1992, U.S. Bank liquidated site assets and in 1998, Klamath County foreclosed on the property, removing all but the boiler house (due to concerns about asbestos-containing materials [ACMs]).

Environmental activities performed at the site have encountered brown silt with some clay and gravel. Wood waste in the former log deck area (also former log pond) is 1 to 2 feet thick and covers 4 to 5 feet of large gravel and cobbles (the deck). Beneath this deck is 3 to 5 feet of silt with logs overlying gray clay. Wood waste along the bank of the Sprague River is 10 to 14 feet deep. Bedrock is present between 8 and 14 feet below the ground surface (bgs). Groundwater is present at about 2.5 to 8 feet bgs in native soils, and as shallow as 0.5 feet bgs in the wood waste. In some cases, groundwater was not encountered in explorations up to 13 feet deep.

# 2.2 Previous Environmental Activities

Since 1991, environmental activities have been performed at the site, which have included subsurface investigation, removal actions, and chemical analysis of various environmental media. These activities are summarized below.

Initial Assessments and Removals. In 1991, a Level I Environmental Assessment was performed at the site that identified numerous drums and containers of chemical products, soil staining, removed underground storage tanks, and potential ACMs in the boiler house. In 1992, the DEQ performed an emergency removal action to remove the drums and heavily petroleum-contaminated soil. In 1996, the DEQ conducted follow-up sampling to assess for residual petroleum contamination in soil and groundwater at the site. Three areas of petroleum-contaminated soil were identified, with one area at the former repair shop having a thin layer of petroleum product on groundwater. In 1998, Klamath County removed all structures except the boiler house.

Targeted Brownfields Assessments (TBAs). In 2002 and 2003, the DEQ conducted two TBAs at the site to further assess the site for chemical contamination. A total of 28 push probes were performed for soil and groundwater samples. Two surface water samples were collected from seeps along the Sprague River bank at the site. Besides areas with petroleum contamination, PCP-contaminated soil was discovered and delineated in an area near the former mill building. An apparently small area of dioxin-contaminated soil was also identified nearby. Low levels of PCP in groundwater (up to 1.8 micrograms per liter  $[\mu g/L]$ ) were also detected in four probes across the site. Elevated iron and manganese concentrations were detected in three probes and in the two seep samples.

Remedial Activities. In June 2004, the U.S. Environmental Protection Agency (EPA) awarded Klamath County a Brownfield Grant to perform cleanup activities at the site. To reduce or mitigate risks to human health and the environment posed by site hazards and contamination, three cleanup alternatives were selected: 1) hazardous material abatement and demolition of the boiler house; 2) excavation and off-site disposal of soil contaminated with petroleum, PCP, and dioxin; and 3) excavation and disposal/re-use of wood waste from the former log pond and adjacent areas. In April 2005, remedial activities were performed at the site to implement the first two cleanup alternatives. The third alternative will be conducted in the future, likely as part of site development (see Hart Crowser, 2005, for a work plan for implementing this alternative).

ACMs were abated from the boiler house, and the boiler house was demolished. About 360 tons of petroleum-contaminated soil and 530 tons of PCP-contaminated soil (including 15 tons of dioxin-contaminated soil) were transported to off-site

landfills. Excavations were graded or backfilled with soil from the site. Remedial action objectives (RAOs) were achieved for the boiler house and petroleum-contaminated soil. For the PCP removal action, the RAO was essentially met. Surface soil met the cleanup goal, but PCP exceeded its cleanup goal in deeper soils in the southwest portion of the PCP excavation. Further evaluation, including a follow-up groundwater investigation, indicated that this soil would not pose a likely threat to human health or the environment (Hart Crowser, 2006a).

Dioxin Assessment. Chemical results on confirmation soil samples from the dioxin excavation activities, however, did not meet the cleanup goal. Subsequent sampling events in 2005 indicated that dioxin-contaminated soil was present around the PCP excavation at up to 2,629 nanograms per kilogram (ng/kg), expressed as a 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) toxicity equivalent concentration (TEQ). Most of these detections are presumably associated with use of PCP at the former mill site (dioxin is generated as a contaminant during the manufacture of PCP). In addition, dioxin was also detected at up to 109 ng/kg at "background" locations on the site. The suspected sources of this dioxin are likely tracking of dioxin-contaminated soil around the site and/or atmospheric deposition of dioxin from burning treated wood in the mill wood waste burner. Figures 3 and 4 show the dioxin results for samples collected from the site.

**Soil Cap Construction.** In order to address dioxin-contaminated soil at the site, Hart Crowser evaluated several remedial alternatives. Capping the site with a protective soil cover (a.k.a. the soil cap) and recording a deed restriction (i.e., EES) was the recommended alternative for the site as it was the most favorable alternative meeting the protectiveness and feasibility criteria. The DEQ selected this alternative in Amendment No. 1 to the Record of Decision (DEQ, 2006).

Because insufficient funds remained in the Brownfields Grant, the Emergency Response Unit of EPA Region 10 implemented soil cap construction as a time-critical removal action in July 2007. Their work included removing vegetation, breaking up asphalt pavement and concrete foundations, spreading a minimum of one foot of soil over approximately 16.1 acres of the site, spreading wood waste along the northern and central portions of the cap, and installing a gate and rock barrier to limit site access. Soil was obtained from an on-site stockpile from an Oregon Department of Transportation road cut (after screening to remove boulders) and imported from a local source.

In August 2007, All Points Engineering & Surveying (All Points) surveyed the extent of the cap under subcontract to Hart Crowser. Figures 2 and 3 show the extent of the cap. Previously, All Points had completed a topographic survey of the property and surveyed the extent of the dioxin sampling grid around the PCP excavation. Copies of the surveys are attached in Appendix A.

#### 2.3 Extent of Site Contamination

Dioxin has been detected in surface soil over the majority of the site, as shown on Figures 3 and 4. This section briefly describes evaluation of these dioxin data and summarizes the extent and magnitude of dioxin at the site. In addition, PCP is present at depth in the southwest portion of the PCP remedial excavation.

**Regulatory Screening Levels.** In order to evaluate whether dioxin concentrations pose a concern to human health, dioxin data can be compared against screening levels developed by the DEQ. In Oregon, promulgated environmental regulations state that an acceptable concentration for an individual carcinogenic compound, such as a single dioxin or furan compound (i.e., a congener), would be a lifetime excess cancer risk of less than or equal to one in a million (expressed as  $1 \times 10^{-6}$ ). For numerous carcinogenic compounds, the cumulative lifetime excess cancer risk cannot exceed a one in a hundred thousand (i.e.,  $1 \times 10^{-5}$ ). These statutory definitions are defined in Oregon Administrative Rules (OAR) 340-122-0115(2)(a) and (3).

For the 1 x  $10^{-6}$  acceptable level, the DEQ has calculated a risk-based concentration (RBC) of 3.9 ng/kg for 2,3,7,8-TCDD in residential soil (direct contact exposure pathway). Because toxicity information for other sixteen 2,3,7,8-congeners is more limited, the World Health Organization (WHO) has developed toxicity equivalence factors (TEFs) for each congener relative to TCDD. TEFs shown in Table 1 are the recently published WHO 2005 TEFs (van den Berg, et al., 2006). Multiplying the congener concentration by its TEF converts it to a TCDD TEQ concentration that can be compared against the TCDD RBC (e.g., 3.9 ng/kg). By adding individual TEQs, a total TCDD TEQ concentration is derived which then can be compared to the acceptable level on a cumulative basis (1 x  $10^{-5}$  or 10 times the individual level). For residential soil, the total TCDD TEQ would be 39 ng/kg.

**Dioxin in Site Soils.** Table 1 lists and Figures 3 and 4 show the dioxin analyses results on soil samples from the site. Based on toxicological data and default exposure factors, the DEQ has developed dioxin screening levels (e.g., RBCs) for various land uses on an individual and cumulative basis. Current RBCs are as follows and are from DEQ (2007), except for the recreational user (this RBC was developed for this site assuming a weekly visit to a park).

Person/Land Use	<u>Individual</u>	<u>Cumulative</u>
Residential	3.9	39
Urban Residential (Apartment)	10	100
Commercial Worker	17	170
Recreational User	17	170
Construction Worker	130	1,300
Utility Worker	3,700	37,000

Individual and cumulative TEQs were screened against TCDD screening levels of 3.9 ng/kg and 39 ng/kg, respectively, for residential soil. This screening exercise indicates that most samples from the site, except wood waste, exceed regulatory acceptable levels. These samples are shown by shaded TEQs in Table 1 and by pink dots on Figures 3 and 4. With the exception of utility workers, screening levels for these other land uses are exceeded by one or more samples.

Because of these exceedances, a protective soil cap was constructed over the majority of the property slated for future use by people, as shown on Figure 2. This cap serves an effective barrier to direct contact with underlying dioxincontaminated soil; however, it must be maintained as required by this COP. Additionally, future development of uncapped portions must be conducted in a manner that mitigates possible exposure to soils with dioxin exceeding regulatory levels for the projected land use.

PCP in Site Soils. Figure 5 shows analytical results on residual soil for the PCP excavation. Surface soil met the cleanup goal (3 milligrams per kilogram [mg/kg]), but PCP exceeded its cleanup goal in deeper soils in the southwest portion of the PCP excavation with a maximum detection of 72.8 mg/kg. This concentration exceeds current RBCs for urban residents (8.1 mg/kg) and commercial workers (13 mg/kg), but because this soil is at depth it does not pose a concern unless it is brought to the surface through site development activities. This soil does not pose a current concern to construction and excavation workers, who could encounter deeper soils, as detected PCP concentrations are below respective RBCs of 100 and 2,900 mg/kg.

#### 3.0 CAP MAINTENANCE

In order for the soil cap to continue as a protective barrier over underlying dioxin-contaminated soils, the cap must be maintained. Annual inspection of the cap will be performed to ensure that it is functioning as intended, and repairs to the cap performed as necessary. This section describes required inspection and maintenance activities associated with the soil cap, as well as allowable activities that may affect the cap.

Hart Crowser 15545-01/Task 8 October 4, 2007

# 3.1 Inspection Activities

The landowner(s), or their agent(s), will be required to conduct inspections in accordance with the schedule and criteria listed below. Inspections will be conducted by a representative capable of distinguishing the inspection criteria and recording their observations.

# 3.1.1 Frequency and Extent

The soil cap will be inspected annually in June (after winter and spring rains) for 5 years (June 2008 through June 2012). Following 5 years of annual monitoring, it will be assumed that the cap is fairly stable, and the monitoring frequency can be reduced as appropriate for site conditions (minimum of every 3 years). These inspections should cover the entire cap, except for those portions covered by hardscape (e.g., pavement and buildings).

During construction work, the cap should be inspected biweekly in areas where construction activities are being completed (including ingress and egress routes) to ensure that it has not been breached (unless temporarily allowed by Section 3.3). Upon completion of construction activities, the cap should be inspected. Areas that are not covered by hardscape or repaired portions of the cap should be inspected annually for a period of 5 years after construction or repair, respectively.

# 3.1.2 Inspection Criteria

During each inspection event, an inspection form will be filled out (included in Appendix B), and photographs will be taken. Three general criteria will be inspected: cap integrity, vegetation, and previous repairs. Each criterion is listed in the inspection form and is described below.

Cap Integrity. The soil cap is subject to erosion or damage from runoff from precipitation and traffic (both vehicular and foot), and subsidence. The cap will be inspected to determine if the soil cover has been disturbed or native soils have been exposed. Observations for these deteriorating effects should be made both on the cap and adjacent to the cap where they may have the potential to threaten the integrity of the cap. If there is a disturbance of the soil cap (which has reduced the cap thickness by more than 4 inches) or any disturbance adjacent to the cap that threatens the cap's integrity, the following information will be documented on the form and a photograph(s) taken:

The cause of the disturbance;

- The extent of the damage; and
- The recommended corrective action.

During construction, the inspection should also check for native soils that have been excavated and placed at the surface, and if so, that they are being addressed in accordance with the contaminated soil management procedures described in Section 6. If not, a corrective action will be recommended.

**Vegetation.** The southern and western portions of the cap will be hydroseeded with grass and clover as an erosion control measure. It is anticipated that other vegetation will also start growing on the cap where development does not occur. The presence of vegetation does not constitute a concern, as vegetation reduces the possibility of direct contact with soil and provides erosion control. Clearing of vegetation is allowed for construction activities and for property maintenance.

The inspection should document the amount of vegetative cover on the cap and whether clearing activities have affected the integrity of the cap (such as may occur through grubbing for construction). If the integrity of the cap has been compromised, a corrective action should be recommended. The presence of thick vegetation may hinder inspection of portions of the cap, which should be noted on the form.

**Previous Repairs.** Areas of previous repair will be inspected to look for signs of additional damage, which may be an indication that redesign or reconstruction of the area is needed. If additional damage is observed, the extent and possible cause of the damage should be documented on the inspection form and with photographs. A corrective action should be recommended.

#### 3.1.3 Documentation

An inspection form covering all aspects of the inspection activities is included in Appendix B. A form will be completed for each inspection. Any deficiencies and/or cap damage arising from the inspection will be noted on the form, its location marked on the diagram included with the form, and representative photographs taken. General photographs will also be taken during the inspection for comparison with photographs taken during previous inspections. The direct comparison of the current photographs to the previous photographs will allow for temporal tracking of any changes to the cap. All completed inspection forms will be maintained by the landowner(s) and will be submitted to the DEQ following the completion of inspection activities.

#### 3.2 Repairs

Following the inspection, any recommended corrective action will be scheduled and implemented as soon as practical. Repairs to the cap shall consist of importing, placing, and compacting fill material of similar consistency as the cap in the damaged area to bring the cap to its original surface grade. Repair is required when:

- Erosion (as rills) or settlement ("pot holes") of more than 4 inches of cap material will require repair; or
- Erosion of more than 2 inches of the cap occurs over an area of more than 1,000 square feet. In this case, additional erosion control measures (e.g., establishing vegetation, covering with gravel) will also be implemented.

Disturbances adjacent to the cap that threaten the cap's integrity will be appropriately addressed. This may include filling, stabilizing, or regrading the surrounding ground surface.

Post-repair photographs and documentation will be recorded following the repair. Repair documentation will be maintained by the landowner(s) and will be submitted to the DEQ following the completion of repair activities.

# 3.3 Allowable Cap Alterations

The property is slated for redevelopment, and during construction, the cap may need to be altered or penetrated for, but not limited to, subgrade preparation, utility trenching, or footing installation. Amendment of the EES is not required. The following activities are allowed with the following conditions.

- Adding additional, uncontaminated material to the top of the cap.
- For road and parking lot improvements, removal of up to 6 inches of the cap is allowed, as long as the removed amount is replaced by base course and then paved with asphalt or Portland-cement concrete.
- Penetrating the cap for footing and utility installations. Excavations can remain open for up to two weeks. Any excavated native soils from beneath the cap must be managed per Section 6. After installation, the cap must be repaired with a one-foot-thick barrier of uncontaminated soil (e.g., cap material excavated for the installation) and/or concrete (e.g., the concrete footing).
- Grubbing of vegetation. Because vegetation with large root structures, such as trees, can damage the cap integrity when pulled out, cap repairs will be

required. If native soils beneath the cap are pulled up to the ground surface, they will be managed per Section 6.

#### 4.0 DEVELOPMENT OF UNCAPPED AREAS

Other portions of the site property were not capped because contamination was not present, soil was not available, or future development was unlikely. Uncapped areas of the property can be divided into four areas based on their location on the site and the assumed future use. These areas are shown on Figure 2. This section discusses these areas and the likely steps for their development.

#### 4.1 Northeast Area

The northeast portion of the property consists of approximately 1.5 acres and is generally covered with grasses. Three samples have been obtained from this area, with dioxin concentrations ranging from 24 to 50 ng/kg TCDD TEQ. On an individual and cumulative basis, congeners exceed DEQ's current residential and urban residential (apartment dweller) RBCs. However, detected concentrations are acceptable for industrial or commercial development. If a residential land use is proposed, capping will likely be necessary as described below.

# 4.1.1 Capping

Capping is required if the planned use of the northeast area is for residential or urban residential development. Alternatively, additional data can be collected in accordance with Section 4.1.2 to attempt to demonstrate that surface soil concentrations are below residential soil or urban residential RBCs.

Capping can consist of a soil cap and/or infrastructure cap. Within the area of development, debris and aboveground vegetation would be removed. Subgrade preparation is allowed, as long as a cultural resource monitor is present to observe movement of native soils (the monitor should be an archaeologist registered with the Register of Professional Archaeologists [RPA]). For a soil cap, the cap shall be constructed in the same manner as the existing cap on the site property: at least one foot of compacted, uncontaminated soil or fill material imported to the site (an equivalent, semi-compacted depth of landscaping soil may be substituted). An infrastructure cap can consist of hardscape, such as buildings, sidewalks, and pavement. Excess soil generated through development must still be managed per Section 5.

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After capping, the EES will require amendment with a survey of the extent of the cap. The landowner(s) must abide by the cap maintenance and contaminated soil management protocols discussed in Sections 3 and 5, respectively.

#### 4.1.2 Further Assessment

Additional assessment can be performed, prior to development, to further evaluate whether dioxin concentrations in soil might be below residential or urban residential RBCs (whichever the proposed land use). Assessment activities do not need to be performed if the site is capped as discussed in Section 4.1.1 or if the area is redeveloped for commercial or industrial use. Additional sampling and analysis could be performed in the northeast area or a portion of this area using the procedures discussed in Sections 5.2.2 and 5.2.3, respectively. Analytical results can be directly compared against RBCs, or if sufficient data are collected, a risk assessment per OAR 340-122-084 can be performed to develop reasonable maximum exposure (RME) values for comparison to the appropriate RBC.

If the results are below RBCs (Section 2.3) for the proposed land use, then no capping is necessary. However, if a development other than residential use is planned, the EES will require amendment indicating that any future development must be consistent with this land use. For this area, the landowner must abide by the contaminated soil management protocols discussed in Section 5.

# 4.2 Proposed Wetland

The low-lying northwestern portion of the property is planned for use as a wetland for tertiary wastewater treatment. No human use of this area is planned. This area is approximately 6 acres. No dioxin data have been obtained for this area, but it appears to outside the general area of impact by dioxins (e.g., around the PCP excavation and east portion of the site). If any portion of this area other than the former log deck is planned for development for human use, a wetland determination and delineation will first be required. If no wetlands are present or if permission from regulatory agencies allows construction, the development area must be either capped (even if for residential use) or assessed following the protocols described for Northeast Area.

# 4.3 Former Log Deck

The former log deck in the western portion of the site has 1 to 2 feet of wood waste overlying large gravel and cobbles. Figure 2 shows this area northwest of the soil cap, within the extent of wood waste. Analysis of three wood waste samples detected dioxin ranging from 3.6 to 6.8 ng/kg TCDD TEQ. These dioxin concentrations are below current residential RBCs, and therefore the wood waste

is acceptable for use on and off the site (approximately 3,000 cubic yards was spread on the cap as an organic layer prior to hydroseeding). After removal of the wood waste, this area will be used for the wetlands and as developable land. For the latter, clean imported fill material may be required to meet grade requirements for development. As such, no capping or assessment will be required for this area.

#### 4.4 River Buffer Zone

The southern portion of the real property is bounded by the Sprague River. A zone approximately 50 feet from top of bank was not included in the cap design because of erosion concerns and to provide a natural transition zone between the developable soil cap and the river. This area may have a foot path and/or river access in the future (i.e., limited human use). One sample from along the boundary of this area had 9.9 mg/kg dioxin, below residential RBCs. For the planned use, no capping or assessment will be required for this area. Other uses may require further assessment per Section 4.1.2. Because of limited data for this area, excess soil generated through development must still be managed per Section 5.

#### 5.0 CONTAMINATED SOIL MANAGEMENT

Previous environmental activities have identified dioxin- and PCP-contaminated soil on the site (see Section 2.3). Earthwork activities may encounter and/or generate contaminated soil during construction activities, including when penetrating the soil cap constructed on the property. This section discusses methods to determine whether soil is contaminated and how to manage the soil.

# 5.1 Preparatory Activities

Prior to construction on the property, certain preparatory activities will be required when native, and likely contaminated, soils might be encountered. These activities are described below.

**Cultural Resources Monitor.** During previous remedial excavation activities performed at the site, The Klamath Tribe required that a cultural resource monitor be present on the site during all ground disturbing activities to monitor for archaeological or historic artifacts. For construction activities and unless otherwise approved by tribal authorities, a cultural resource monitor will likely be required when native soils would be encountered. Entities involved in development of the property should retain a RPA archaeologist as a monitor.

Hart Crowser 15545-01/Task 8 October 4, 2007 Health and Safety. Construction activities may encounter contaminated soil at uncapped areas and when the soil cap is penetrated. Existing site data does not indicate an unacceptable risk from known contamination to construction or excavation workers, with the exception of five sample locations within dioxin sampling grid (Figure 4). This area has been capped. If the soil cap above the sampling grid shown on Figure 3 is to be penetrated by construction activities (including drilling, grading, or trenching), a site-specific Health and Safety Plan (HSP) and appropriately trained personnel will be required in accordance with Hazardous Waste Operation & Emergency Response regulations per part 1910.120 of title 29 of the Code of Federal Regulations (CFR). For all other areas, it is the responsibility of each involved entity to conduct their own hazard assessment to determine appropriate health and safety measures.

# 5.2 Identification of Contaminated Soil

Contaminated soils may be encountered during development activities at the site. This section presents aids to site personnel to identify known and potential contaminated soil, including sampling and analytical procedures. If such soils are encountered and are excavated, they will be stockpiled separately for further evaluation and management.

# 5.2.1 Field Indicators

Dioxin has been detected at variable concentrations in surficial soil across the site property, as shown on Figures 3 and 4. Native soils on the site are therefore considered to have dioxin and will require management per Section 6.3, unless analytical testing shows concentrations are less than residential RBCs (such as was determined for wood waste on the site). Because dioxin occurs at such minute concentrations, there are no readily available field indications to determine its presence or relative magnitude of its presence.

Native soils are present at the ground surface in uncapped areas and beneath the protective soil cap. For the latter, the former native soil horizon can likely be distinguished by the presence of buried root zone, matted vegetation or organic matter, a gravelly layer, broken concrete foundations, or ripped asphalt pavement. Native soils generally consisted of silt and should also differ in consistency from more granular capping materials. The soil cap was spread at a minimum thickness of one foot, but may be up to several feet thick. Cobbles and boulders were also used as fill material where deeper filling for the cap was needed. If native soils cannot be distinguished, it should be assumed that all soils below a depth of one foot within the capped area are native soils.

For PCP, the area of potential contamination is shown on Figures 4 and 5 (i.e., the southwest side of the former PCP excavation). PCP is present at a depth greater than 3 feet below the former native soil horizon. The southwest limit of the PCP excavation was denoted by draping orange plastic fencing over the excavation sidewall prior to backfilling. During previous excavation work, the only field indication of PCP contamination was a slight chemical odor. As such, the best indicator of contamination will be the presence of orange fencing.

It is also possible that unknown areas of contamination may exist and could be encountered. For native soil, generally observable indicators of contamination include sheens (silvery or iridescent colors when soil is placed in water), staining (discolored soils, typically silvery, dark gray, or black), odors (sweet smelling to pungent; petroleum-like), or non-soil material (e.g., ash, sludge, slag). Field screening with a photoionization detector (PID) can be used to assess whether volatile chemical compounds are present. Contaminated soil may exhibit one or more of these indicators. If encountered, the soil should be segregated into a separate stockpile and undergo further assessment, including chemical analysis.

# 5.2.2 Sampling Protocols

Data are available that indicates the extent and magnitude of contamination at the site. These data can be used to evaluate excavated native soils. However, additional samples may be obtained for analysis for the reasons described below. If so, sample locations will be noted. Samples are to be collected in clean, laboratory-supplied containers using clean metal spoons.

**Evaluating Surficial Soils in Uncapped Areas.** Additional assessment of surficial soils may be performed in uncapped areas to evaluate whether measures are necessary to mitigate potential exposure to dioxin-contaminated soils. Samples would be collected using these procedures.

- Identify sample locations. When all existing and new sample locations are considered, they should be spread out over the area of development to provide representative coverage of the area.
- If required by tribal authorities, retain a cultural resource monitor to observe sampling activities (the monitor should be an RFA archaeologist).
- At each sample location, dig a 6-inch deep hole using a shovel, hand auger, post-hole digger, or similar equipment. If present, surficial gravel, vegetation, or wood debris will be first scrapped away from the ground surface.
- Using the metal spoon, obtain sample of soil from a depth interval of 1 to
   6 inches from the side of the hole and place into the sample container.

Backfill the hole using soil removed when digging the hole.

After analysis (per Section 5.2.3), dioxin data would be compared to RBCs for the proposed land use. If below, mitigation measures would not be necessary and development can proceed without capping.

Assessing Excavated Native Soils. Unless dioxin data indicate otherwise, native soils at the site are presumed to contain dioxin compounds. PCP is present in a limited area of the site. If excess excavated soils are generated (i.e., cannot be placed back into the excavation from which they were removed), the landowner/developer can: (1) manage the soils as being contaminated per Section 5.3; or (2) analyze the soil to determine whether contaminant concentrations are below regulatory screening levels and, if so, be available for less restrictive uses.

To assess excavated native soils, excess soil from the development area can be stockpiled at a central location. Soil from the sampling grid (Figures 3 and 4) are considered contaminated and cannot be combined with this soil. Likewise, "clean" soil from the soil cap cannot be mixed with potentially contaminated native soils. One composite sample for each 500 cubic yards of stockpiled soil (or portion thereof) will be collected for chemical analysis. Each composite sample will be composed of at least three subsamples obtained at discrete locations from the stockpile.

**Profiling for Off-Site Disposal.** Sampling may also be required by the landfill to obtain their approval for disposal. Existing data might be allowed, although landfill operators may require more recent data for profiling. As such, a representative sample of the contaminated soil will be obtained for chemical analysis. Existing data may be used to guide where this sample should be collected. Alternatively, the contaminated soil could be excavated and stockpiled, and a composite sample then collected for analysis as described above.

**Unknown Contamination.** If field indications indicate the presence of chemical contamination, a sample of this suspect soil will be collected for chemical analysis for characterization and profiling purposes. If contamination is confirmed, further investigative activities should be performed in accordance with DEQ regulations to determine the extent and magnitude of contamination, whether it poses a concern to human health or the environment, and if mitigation is necessary. The scope of these tasks is beyond this COP and an environmental consultant should be retained to assist in evaluating this contaminated soil.

#### 5.2.3 Analytical Protocols

Samples should be stored in a cooler below 4°C until submitted to analytical laboratory certified by the Oregon and/or National Environmental Laboratory Accreditation Program (ORELAP and NELAP, respectively). Any facility receiving soil from the site (e.g., landfill) should be contacted as to their requirements for acceptance. Analysis for dioxin should be by EPA Method 1613 or a comparable method. PCP analysis should be by EPA Method 8270 or 8270-SIM, or a comparable method.

For soil samples with unknown contamination, samples should be analyzed for suspected contaminants, beginning with total petroleum hydrocarbons (TPH) by Northwest Methods NWTPH-Gx and NWTPH-Dx. If volatile compounds are indicated by field screening, samples will be analyzed for volatile organic compounds by EPA Method 8021, 8260, or a comparable method. If TPH contamination is detected, additional follow-up analyses (e.g., metals, polynuclear aromatic hydrocarbons) may be necessary.

Quality control and quality assurance protocols should be followed. Chain-of-custody documentation needs to be maintained. After dioxin data are received from the laboratory, the data should undergo a quality assurance review. Analytical method reporting limits need to be below regulatory screening criteria.

# 5.3 Management of Contaminated Soil

This section describes the management of contaminated soil excavated during redevelopment of the property. Temporary storage, loading, and transportation protocols and permits/approvals are discussed. Soil from the soil cap does not require special management, beyond that described below.

# 5.3.1 Excavation and Temporary Storage

If soil from the protective soil cap is removed, it should be stored separately from native soils, preferably elsewhere on the soil cap. As indicated in Section 5.3.4, these soils can be returned to excavations, used as capping material, or transported off the site for reuse. For excavation of native soils, the following procedures will be used as applicable (one or more may apply).

Native Soil to be Returned to Excavation. Native soil removed for excavations (e.g., for footings or utility installations) and planned for return to the excavation can be stockpiled adjacent to the excavation or at another nearby location. With the exception of native soils from the dioxin grid (see below), placement of native soils on the soil cap is allowed; however, all

native soil must be removed upon completion (this may require scraping the top of the cap slightly and replacing material to bring the cap to a minimum 12 inch thickness). Alternatively, native soils can be placed on plastic.

- **Excess Native Soil.** Excess native soil consists of soil that will not be returned to the excavation from which it was removed. Excess soil can be directly loaded into trucks for disposal or stockpiled on 30-mil plastic at a designated location for later handling and disposal.
- Excavated Native Soil from Grid. Native soil excavated from the dioxin grid (Figure 3) cannot be placed on the soil cap due to the relatively higher dioxin concentrations in this area. After removal of capping soil, native soils can be directly loaded into trucks for disposal or stockpiled on plastic next to the excavation or other designated location for later handling and disposal.
- Stockpiling Native and/or Contaminated Soils. Native and/or contaminated soil might be temporarily stored on the property while it is characterized, awaiting return to the excavation, or awaiting disposal or reuse. When indicated above and for unknown contaminated soils, soil will be stockpiled on 30-mil plastic at all times. The stockpiles will be covered with 30-mil plastic during rainy, snowy, and windy weather (except during soil placement or removal). Storage locations will be on the site property and in an area where the piles will not affect stormwater discharge and will be inaccessible to the general public.

### 5.3.2 Permits and Approvals

The landowner/developer will be responsible for obtaining permits for earthwork activities at the project site. For contaminated soil, approvals and permits will be required from off-site disposal facilities for disposal of contaminated soil. Existing data might be allowed by the landfill, although sometimes more recent data are required for profiling. Sampling for profiling is discussed in Section 5.2. Off-site disposal facilities should be contacted regarding their requirements.

#### 5.3.3 Loading and Transportation

Transportation of contaminated soil off the property requires specific manifesting, licensing, and insurance requirements. Under no circumstances will contaminated soil leave the site without acceptance by the off-site disposal facility. Contaminated soil will be loaded and transported using procedures to prevent its release or spread to other areas of the property or off-site locations. Loading of soil will be performed in a manner that maintains a condition of no visible dust in the work area. This may be achieved by a light application of water. Prior to departure from the loading location, all loose soil will be brushed from the truck and returned to the stockpile. Loads leaving the property will be tarped.

## 5.3.4 Disposal and Reuse Options

This section present the disposal and reuse options for contaminated and "clean" soils excavated during construction activities on the property. Because of the presence of dioxin in surficial native soils across the site, these soils should be considered and handled as contaminated unless analytical data show otherwise. Disposal or reuse methods not listed below must be approved by the DEQ.

**Contaminated Soils.** Contaminated soils are defined as soils with chemical concentrations exceeding residential soil RBCs (e.g., Section 2.3). Disposal and reuse options for these soils are as follows.

- Return to Excavation. Native soil removed from an excavation (e.g., for footings or utility installations) can be returned to its excavation only if geotechnically suitable. If the excavation occurred in the capped area, native soils cannot be used as backfill above the original native soil/cap soil contact.
- Landfill. Soil can be disposed of at a permitted Subtitle D solid waste disposal facility. The nearest facility is the Klamath County Landfill in Klamath Falls; however, other landfills are available in the region.
- Fill When Below RBCs for Proposed Land Use. If excavated native soils have chemical concentrations below their respective RBCs for the proposed land use, these soils can be used wherever needed. For example, soil with dioxin concentrations above residential RBCs but below commercial/industrial RBCs can be reused on the property in an area being developed for a commercial or industrial use. Placement of these soils must be in a location where they cannot be spread, eroded, or tracked outside the development area.
- On-Site Fill with Cap. Excess soils may be used as fill elsewhere on the site, but a soil or infrastructure cap must be placed on top of these soils. Soil caps must be at least one foot thick, and can include landscaping soils. Hardscape (e.g., pavement or buildings) is required for an infrastructure cap. The EES will require amendment as to the location of these soils and type of cap, and inspection will be required per Section 3 of this COP.

"Clean" Excavated Soils. "Clean" excavated soils are soil from the soil cap or those soils that have been tested and have chemical concentrations at or below residential soil RBCs. Disposal and reuse options for these soils are as follows.

On-Site Fill. Excavated soil can be considered for use as backfill in on-site excavations, placed back from where it was removed, or used elsewhere on the site as fill.

Off-Site Fill. Uncontaminated or "clean" soil can be disposed of at off-site facilities requesting fill. These soils cannot be used in ecologically sensitive areas, wetlands, near waterways, or drainages.

# 5.4 Imported Material

All materials (e.g., soil, rock, crushed concrete) imported to the site for use as fill and/or a cap must be uncontaminated. These materials can be purchased from a commercial source or obtained from an off-site location(s) where releases of hazardous substances or petroleum products are not known or suspected to have occurred. Otherwise, fill material must be supported by chemical analysis to document that the material is uncontaminated. Samples of such material must be collected and analyzed prior to the material being hauled to the site.

#### 6.0 HEALTH AND SAFETY

Because contamination is present at the site, site personnel should be made aware of the potential for encountering contaminated soil. Existing site data does not indicate an unacceptable risk from known contamination to construction or excavation workers except in the grid area (Figure 3). It is, however, the responsibility of each involved entity to conduct their own hazard assessment to determine appropriate health and safety measures.

## 6.1 Worker Safety

Each involved entity is responsible for the safety of their respective workers. This includes implementation of any training requirements, safety plans, monitoring, certifications, and any other action or requirement that may be required or prudent prior to beginning site activities. This COP or other notification must be provided to employees who will be working on site. Prior to any ground-disturbing activities, a utility locate should be performed to identify potential utilities in proposed work areas.

Each involved party will make preliminary assessments of potentially contaminated media as it relates to worker safety. Occupational health guidelines for chemical hazards (i.e., OSHA and NIOSH) can be used to evaluate site conditions. The evaluation should consider exposure limits (i.e., TWA, STEL, PEL), exposure symptoms, and personal protection equipment. Specific recommendations should be provided to protect worker safety.

All entities are responsible for notifying and updating others and their employees of potential site hazards that may be encountered during the project. Testing, management, handling, excavation, transportation, etc., of contaminated media

may require persons with appropriate training for Hazardous Waste Operation & Emergency Response (29 CFR 1910.120), especially within the grid shown on Figure 3. Each party involved should assess the need for this training on the basis of current information for the site.

# 6.2 Health and Safety Plan

Parties involved should prepare a site-specific HSP for their employees to cover safety issues related to specific environmental hazards that may be encountered. All parties will be responsible for compliance with their HSP, including use of appropriate personal protection equipment.

#### 7.0 REFERENCES

DEQ, 2003c. Risk-Based Decision Making for the Remediation of Petroleum-Contaminated Sites. September 22, 2003.

DEQ, 2007. Record of Decision Amendment No. 1, Chiloquin Forest Products (former), Chiloquin, Oregon, ECSI #1213. November 7, 2006.

DEQ, 2007. Risk-Based Concentrations for Individual Chemicals. March 20, 2007.

Hart Crowser, 2005. Wood Waste Removal Work Plan, The Chiloquin Mill Site Restoration Project, Chiloquin, Oregon. June 10, 2005.

Hart Crowser, 2006a. Boiler House and Contaminated Soil Removal Report, Chiloquin Mill Site Restoration Project, Chiloquin, Oregon. March 21, 2006.

Hart Crowser, 2006b. *Dioxin Assessment Letter Report, Former Chiloquin Forest Products Site, Chiloquin, Oregon.* September 12, 2006.

van den Berg, M., Birnbaum, L.S., Denison, M., De Vito, M., Farland, W., Feeley, M., Fiedler, H., Hakansson, H., Hanberg, A., Haws, L., Rose, M., Safe, S., Schrenk, D., Tohyama, C., Tritscher, A., Tuomisto, J., Tysklind, M., Walker, N., and Peterson, R.E., 2006. *The 2005 World Health Organization Re-evaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds*. Toxicological Sciences, July 7, 2006. Available at <a href="http://www.who.int/ipcs/assessment/tef\_update/en/index.html">http://www.who.int/ipcs/assessment/tef\_update/en/index.html</a>.

Table 1 - Soil Chemical Analyses Results: Dioxin Chiloquin Mill Site Restoration Project Chiloquin, Oregon

Analytical Results

	Location:				Excavat	Excavation Area				
	Sample:	Dioxin 1	Dioxin 2	HA-1A	HA-1B	HA-2A	HA-3A	HA-4B	HA-5B	
	Date:	15-Apr-05	15-Apr-05	27-Jun-05	27-Jun-05	27-Jun-05	27-Jun-05	27-Jun-05	27-Jun-05	
Dioxins/Furans	Depth (ft.):	2	2	2	3.5	2	2	3.5	4	
Concentrations				(	Concentration	in ng/kg (ppt	)			
2,3,7,8-TCDD		<0.97	4.3	<0.98	<0.99	1.2	<1.00	9.8	1.3	
1,2,3,7,8-PeCDD	•	<4.90	. 15	7	5.1	16	<5.00	38	7.8	
1,2,3,4,7,8-HxCDD		<4.90	24	8.2	11	37	11	150	20	
1,2,3,6,7,8-HxCDD		. 15	140	53	54	140	38	310	110	
1,2,3,7,8,9-HxCDD		5.1	53	22	21	56	13	60	34	
1,2,3,4,6,7,8-HpCDD		75	2,300	920	1,300	3,100	. 370	5,200	1,800	
OCDD		820	29,000 D	12,000 D	19,000	45,000	4,300	73,000 D	29,000 D	
2,3,7,8-TCDF		<0.97	1.6	<0.98	<0.99	<0.98	1.2	<0.99	3.2	
1,2,3,7,8-PeCDF		<4.90	, 5.5	<4.90	<4.90	<4.90	<5.00	<4.90	<5.00	
2,3,4,7,8-PeCDF		<4.90	14	<4.90	<4.90	<4.90	<5.00	<4.90	6.9	
1,2,3,4,7,8-HxCDF		<4.90	62 K	18 K	9.6	23	6.4 K	130 K	26 K	
1,2,3,6,7,8-HxCDF		<4.90	21	8.1	5.3	20	<5.00	14	11	
1,2,3,7,8,9-HxCDF		<4.90	14	<4.90	<4.90	6	<5.00	9.9	5.4	
2,3,4,6,7,8-HxCDF		<4.90	31	12	12	25	6.9	12	21	
1,2,3,4,6,7,8-HpCDF		190	2,200	540	590	1,200	340	1,600	780	
1,2,3,4,7,8,9-HpCDF		<4.90	37	16	22	38	5	140	20	
OCDF		93	1,300	730	1,500	1,100	160	5,200	560	

Toxicity Equivalence

	Location:				Excavat	ion Area		······································	
	Sample:	Dioxin 1	Dioxin 2	HA-1A	HA-1B	HA-2A	HA-3A	HA-4B	HA-5B
	Date:	15-Apr-05	15-Apr-05	27-Jun-05	27-Jun-05	27-Jun-05	27-Jun-05	27-Jun-05	27-Jun-05
Dioxins/Furans	Depth (ft.):	2	2	2	3.5	2	2	3.5	4
Congeners	TEF			Toxicity Equiv	alent (TEQ)	Concentration	in ng/kg (ppt	)	/
2,3,7,8-TCDD	1.0	0.49	4.30	0.49	0.50	1.20	0.50	9.80	1.30
1,2,3,7,8-PeCDD	1.0	2.45	15.00	7.00	5.10	16.00	2.50	38.00	7.80
1,2,3,4,7,8-HxCDD	0.1	0.25	2.40	0.82	1.10	3.70	1.10	15.00	2.00
1,2,3,6,7,8-HxCDD	0.1	1.50	14.00	5.30	5.40	14.00	3.80	31.00	11.00
1,2,3,7,8,9-HxCDD	0.1	0.51	5.30	2.20	2.10	5.60	1.30	6.00	3.40
1,2,3,4,6,7,8-HpCDD	0.01	0.75	23.00	9.20	13.00	31.00	3.70	52.00	18.00
OCDD	0.0003	0.25	8.70	3.60	5.70	13.50	1.29	21.90	8.70
2,3,7,8-TCDF	0.1	0.05	0.16	0.05	0.05	0.05	0.12	0.05	0.32
1,2,3,7,8-PeCDF	0.03	0.07	0.17	0.07	0.07	0.07	0.08	0.07	0.08
2,3,4,7,8-PeCDF	0.3	0.74	4.20	0.74	0.74	0.74	0.75	0.74	2.07
1,2,3,4,7,8-HxCDF	0.1	0.25	6.20	1.80	0.96	2.30	0.64	13.00	2.60
1,2,3,6,7,8-HxCDF	0.1	0.25	2.10 ·	0.81	0.53	2.00	0.25	1.40	1.10
1,2,3,7,8,9-HxCDF	0.1	0.25	1.40	0.25	0.25	0.60	0.25	0.99	0.54
2,3,4,6,7,8-HxCDF	0.1	0.25	3.10	1.20	1.20	2.50	0.69	1.20	2.10
1,2,3,4,6,7,8-HpCDF	0.01	1.90	22.00	5.40	5.90	12.00	3.40	16.00	7.80
1,2,3,4,7,8,9-HpCDF	0.01	0.02	0.37	0.16	0.22	0.38	0.05	1.40	0.20
OCDF	0.0003	0.03	0.39	0.22	0.45	0.33	0.05	1.56	0.17
Toxic Equivalency									
2,3,7,8-TCDD TEQ		10.0	113	39.3	43.3	106	20.5	210	69.2

Please refer to notes on the last page of this table.

Table 1 - Soil Chemical Analyses Results: Dioxin Chiloquin Mill Site Restoration Project Chiloquin, Oregon

Analytical Results

	Location:				Gric	i Area		······································	
	Sample:	A-4	A-5	A-6	B-3	B-6	B-8	C-2	C-2 Dup (D-8*)
	Date:	12-Oct-05	12-Oct-05	12-Oct-05	12-Oct-05	12-Oct-05	12-Oct-05	12-Oct-05	12-Oct-05
Dioxins/Furans	Depth (ft.):	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1
Concentrations					Concentratio	n in ng/kg (pp	ot)		
2,3,7,8-TCDD		0.483 J	18.357	<0.130	1.251 K	0.317 JK	5.706	0.423 J	0.187 JK
1,2,3,7,8-PeCDD		3.332 J	208.186	< 0.149	8.15	1.907 J	32.852	1.048 J	1.132 J
1,2,3,4,7,8-HxCDD		1.644 J	<0.028	<0.197	9.085	1.819 J	34.572	1.045 J	1.22 J
1,2,3,6,7,8-HxCDD		59.681	12,085.79 D	2.154 D	52.042	25.413	565.305	13.306	14.424
1,2,3,7,8,9-HxCDD		14.004	1,503.67 D	0.851 JK	į.		157.009	4.763	5.557
1,2,3,4,6,7,8-HpCDD		213.83		28.844		1	1 '		256.124
OCDD		•	131,347.506 D				86,429.105 D	2,825.34	3,461.94 E
2,3,7,8-TCDF		1.667 C	403.64 CD	< 0.184	T .	1			l I
1,2,3,7,8-PeCDF		1.204 J	171.75	<0.118	1	i .	11.947	0.491 J	
2,3,4,7,8-PeCDF		1.759 J	411.668	<0.124	2.098 J		14.338	0.559 J	0.793 J
1,2,3,4,7,8-HxCDF		6.494	179.289	0.475 J	5.727	3.205 J	114.796	3.743 J	4.189 J
1,2,3,6,7,8-HxCDF		6.695	137.286	0.445 J	5.271	3.036 J	98.913	3.173 J	3.623 J
1,2,3,7,8,9-HxCDF	•	0.38 J	9.555	< 0.542	<0.380	0.162 J	<1.029	0.152 JK	< 0.174
2,3,4,6,7,8-HxCDF		6.889	485.918	< 0.335	5.532	2.886 J	129.807	3.047 J	5.788
1,2,3,4,6,7,8-HpCDF		651.19	6,915.557 D	41.055	435.376	237.434	13,445.858 D	367.454	445.817
1,2,3,4,7,8,9-HpCDF		2.816 J	45.508	< 0.407	4.635	3.789 J	72.773	2.003 J	3.775 J
OCDF		216.52	1953.566	18.581	279.271	153.541	11,160.943 D	144.613	175.891

Toxicity Equivalence

Toxicity Equivale	nce								
	Location:				Grid	Area			
	Sample:	A-4	A-5	A-6	B-3	B-6	B-8	C-2	C-2 Dup (D-8*)
	Date:	12-Oct-05	12-Oct-05	12-Oct-05	12-Oct-05	12-Oct-05	12-Oct-05	12-Oct-05	12-Oct-05
Dioxins/Furans	Depth (ft.):	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1
Congeners	TEF			Toxicity Equi	valent (TEQ)	Concentratio	n in ng/kg (ppt)		
2,3,7,8-TCDD	1.0	0.48	18.36	0.07	1.25	0.32	5.71	0.42	0.19
1,2,3,7,8-PeCDD	1.0	3.33	208.19	0.07	8.15	1.91	32.85	1.05	1.13
1,2,3,4,7,8-HxCDD	0.1	0.16	0.00	0.01	0.91	0.18	3.46	0.10	0.12
1,2,3,6,7,8-HxCDD	0.1	5.97	1208.58	0.22	5.20	2.54	56.53	1.33	1.44
1,2,3,7,8,9-HxCDD	0.1	1.40	150.37	0.09	3.00	0.75	15.70	0.48	0.56
1,2,3,4,6,7,8-HpCDD	0.01	2.14	683.35	0.29	6.47	4.21	47.01	2.07	2.56
OCDD	0.0003	0.35	39.40	0.09	0.99	1.86	25.93	0.85	1.04
2,3,7,8-TCDF	0.1	0.17	40.36	0.01	0.20	0.09	0.31	0.03	0.09
1,2,3,7,8-PeCDF	0.03	0.04	5,15	0.00	0.03	0.02	0.36	0.01	0.02
2,3,4,7,8-PeCDF	0.3	0.53	123.50	0.02	0.63	0.01	4.30	0.17	0.24
1,2,3,4,7,8-HxCDF	0.1	0.65	17.93	0.05	0.57	0.32	11.48	0.37	0.42
1,2,3,6,7,8-HxCDF	0.1	0.67	13,73	0.04	0.53	0.30	9.89	0.32	0.36
1,2,3,7,8,9-HxCDF	0.1	0.04	0.96	0.03	0.02	0.02	0.05	0.02	0.01
2,3,4,6,7,8-HxCDF	0.1	0.69	48.59	0.02	0.55	0.29	12.98	0.30	0.58
1,2,3,4,6,7,8-HpCDF	0.01	6.51	69.16	0.41	4.35	2.37	134.46	3.67	4.46
1,2,3,4,7,8,9-HpCDF	0.01	0.03	0.46	0.00	0.05	0.04	0.73	0.02	0.04
OCDF	0.0003	0.06	0.59	0.01	0.08	0.05	3.35	0.04	0.05
Toxic Equivalency			voltes, as as years	,					
2,3,7,8-TCDD TEQ		23.2	2,629	1.41	33.0	15.3	365	11.3	13.3

Please refer to notes on the last page of this table.

Table 1 - Soil Chemical Analyses Results: Dioxin Chiloquin Mill Site Restoration Project Chiloquin, Oregon

Analytical Results

	Location: Grid Area								
	Sample:	C-7	D-2	D-7	E-2	E-3	E-7	F-2	F-4
	Date:	12-Oct-05	12-Oct-05	12-Oct-05	12-Oct-05	12-Oct-05	12-Oct-05	13-Oct-05	13-Oct-05
Dioxins/Furans	Depth (ft.):	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1
Congeners				:	Concentratio	n in ng/kg (pp	ot)		
2,3,7,8-TCDD		1.42	0.254 J	0.965	1.012	1.485 K	6.159	< 0.107	0.685 JK
1,2,3,7,8-PeCDD		8.668	1.703 J	6.301	8.606	20.813	34.513	0.652 JK	13.321
1,2,3,4,7,8-HxCDD		9.991	2.687 J	5.071	13.801	37.481	28.534	1.084 J	33.868
1,2,3,6,7,8-HxCDD		105.238	18.213	84.856	134.504	302.26	434.983	11.781	492.542
1,2,3,7,8,9-HxCDD		45.654	8.167	29.063	48.184	89.662	133.507	4,138	94.944
1,2,3,4,6,7,8-HpCDD		2,888.588 D	432.027	968.823	2,515.528 D	6,302.717 D	4,110.667 D	136.241	4,988.706 D
OCDD		54,198.08 D	5,102.068 E	11,194.512 E	48,501.996 D	66,132.63 D	37,909.7 D	1,053.76	46,071.666 D
2,3,7,8-TCDF		2.197 C	0.537 CJ	1.019 C	3.612 C	10.456 C	3.454 C	0.608 C	
1,2,3,7,8-PeCDF		2.129 J	0.777 J	1.824 J	5.786	l .		0.435 J	;
2,3,4,7,8-PeCDF		3.247 J	1.045 J	2.487 J	6.781	31.832	18.068	0.489 J	71.992
1,2,3,4,7,8-HxCDF		17.531	4.705	14.421	28.275	102.077	139.163	1.645 J	222.819
1,2,3,6,7,8-HxCDF		14.687	4.648	13.218	17.684	66.81	118.222	1.597 J	99.305
1,2,3,7,8,9-HxCDF		0.765 J	<0.162	0.613 J	<1.896	< 0.561	6.055	< 0.147	<1.472
2,3,4,6,7,8-HxCDF		14.416	4.973	13.814	26.532	42.153	110.16	2.485 J	71.943
1,2,3,4,6,7,8-HpCDF		1493.575	306.802	1192.592	510.43		23,714.868 DK	32.001	!
1,2,3,4,7,8,9-HpCDF		17.986	5.084	8.09	19.555	37.305	51.921	1.357 J	55.314
OCDF		793.372	182.958	497.685	605.748	812.531	12,649 D	41.817	1,023.23

	Location:				Grid	i Area	•		
	Sample:	C-7	D-2	D-7	E-2	E-3	E-7	F-2	F-4
	Date:	12-Oct-05	12-Oct-05	12-Oct-05	12-Oct-05	12-Oct-05	12-Oct-05	13-Oct-05	13-Oct-05
Dioxins/Furans	Depth (ft.):	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1
Congeners	TEF			Toxicity Eq	uivalent (TEQ)	Concentration	n in ng/kg (ppt)		,
2,3,7,8-TCDD	1.0	1.42	0.25	0.97	1.01	1.49	6.16	0.05	0.69
1,2,3,7,8-PeCDD	1.0	8.67	1.70	6.30	8.61	20.81	34.51	0.65	13.32
1,2,3,4,7,8-HxCDD	0.1	1.00	0.27	0.51	1.38	3.75	2.85	0.11	3.39
1,2,3,6,7,8-HxCDD	0.1	10.52	1.82	8.49	13.45	30.23	43.50	1.18	49.25
1,2,3,7,8,9-HxCDD	0.1	4.57	0.82	2.91	4.82	8.97	13.35	0.41	9.49
1,2,3,4,6,7,8-HpCDD	0.01	28.89	4.32	9.69	25.16	63.03	41.11	1.36	49.89
OCDD	0.0003	16.26	1.53	3.36	14.55	19:84	11.37	0.32	13.82
2,3,7,8-TCDF	0.1	0.22	0.05	0.10	0.36	1.05	0.35	0.06	2.13
1,2,3,7,8-PeCDF	0.03	0.06	0.02	0.05	0.17	0.83	0.43	0.01	2.15
2,3,4,7,8-PeCDF	0.3	0.97	0.31	0.75	2.03	9.55	5.42	0.15	21.60
1,2,3,4,7,8-HxCDF	0.1	1.75	0.47	1.44	2.83	10.21	13.92	0.16	22.28
1,2,3,6,7,8-HxCDF	0.1	1.47	0.46	1.32	1.77	6.68	11.82	0.16	9.93
1,2,3,7,8,9-HxCDF	0.1	0.08	0.01	0.06	0.09	0.03	0.61	0.01	0.07
2,3,4,6,7,8-HxCDF	0.1	1.44	0.50	1.38	2.65	4.22	11.02	0.25	7.19
1,2,3,4,6,7,8-HpCDF	0.01	14.94	3.07	11.93	5:10	9.73	237.15	0.32	17.22
1,2,3,4,7,8,9-HpCDF	0.01	0.18	0.05	0.08	0.20	0.37	0.52	0.01	0.55
OCDF	0.0003	0.24	0.05	0.15	0.18	0.24	3.79	0.01	0.31
Toxic Equivalency					**************************************	e-mouranes conservations	MATTERN AND ADMINISTRATION TO A PRODUCT OF THE PROPERTY OF THE		
2,3,7,8-TCDD TEQ		92.7	15.7	49.5	84.4	191	438	5.23	223

Please refer to notes on the last page of this table.

Table 1 - Soil Chemical Analyses Results: Dioxin Chiloquin Mill Site Restoration Project Chiloquin, Oregon

Analytical Results

	Location:		Grid Area								
	Sample:	F-5	F-6	F-8	G-3	G-7	H-4	H-5			
	Date:	13-Oct-05	13-Oct-05	13-Oct-05	13-Oct-05	13-Oct-05	13-Oct-05	13-Oct-05			
Dioxins/Furans	Depth (ft.):	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1			
Congeners			Concentration in ng/kg (ppt)								
2,3,7,8-TCDD		0.58 JK	< 0.050	2.261	< 0.147	3.99	2.71	1.37			
1,2,3,7,8-PeCDD		11.943	3.38 J	11.122	1.382 J	29.175	66.485	11.8			
1,2,3,4,7,8-HxCDD		25.512	132.252	10.181	1.546 JK	13.639	<0.038	14.951			
1,2,3,6,7,8-HxCDD		217.838	217.569	237.567	16.861	377.908	7,413.589 D	358.066			
1,2,3,7,8,9-HxCDD		59.06	397.395	70.331	5.416	134.238		87.175			
1,2,3,4,6,7,8-HpCDD		12,029.368 D	26,696.634 D		218.458	, .					
OCDD		171,989.405 DE	331,341.997 D	6,554.032 D	1,385.07		20,762.608 D	45,689.597 D			
2,3,7,8-TCDF		7.821 C	6.871 C		0.508 C		1				
1,2,3,7,8-PeCDF		21.783 K	0.805 JK	3.888 J	0.841 J	6.746	31.729	6.501			
2,3,4,7,8-PeCDF		34.826	1.306 J	4.831 J	0.944 J	13.03	72.127	7.666			
1,2,3,4,7,8-HxCDF		115.453	7.584	47.495	3.741 J	95.264	42.433	20.888			
1,2,3,6,7,8-HxCDF		45.465	4.294	30.195	2.618 J	57.377	115.717	19.361			
1,2,3,7,8,9-HxCDF		<0.116	<0.174	1.651 J	< 0.441	2.115 J	0.94 JK	0.871 J			
2,3,4,6,7,8-HxCDF		27.215	3.97	44.983	3.237 J	59.913	120.553	16.728			
1,2,3,4,6,7,8-HpCDF		1197.032	672.541	3,896.016 D	43.301	3,527.589 E	1,133.37	945.366			
1,2,3,4,7,8,9-HpCDF		46.08	27.773	24.843	<0.804	40.42	42.967	16.631			
OCDF		1,339.38	2,757.37	1,953.92	42.742	2,479.52	543.616	919.113			

Toxicity Equivalence

	Location:	Grid Area									
	Sample:	F-5	F-6	F-8	G-3	G-7	H-4	H-5			
	Date:	13-Oct-05	13-Oct-05	13-Oct-05	13-Oct-05	13-Oct-05	13-Oct-05	13-Oct-05			
Dioxins/Furans	Depth (ft.):	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1	0.1 - 1			
Congeners	TEF		Toxicity Equivalent (TEQ) Concentration in ng/kg (ppt)								
2,3,7,8-TCDD	1.0	0.58	0.03	2.26	0.07	3.99	2.71	1.37			
1,2,3,7,8-PeCDD	1.0	11.94	3.38	11.12	1.38	29.18	66.49	11.80			
1,2,3,4,7,8-HxCDD	0.1	2.55	13.23	1.02	0.15	1.36	0.00	1.50			
1,2,3,6,7,8-HxCDD	0.1	21.78	21.76	23.76	1.69	37.79	741.36	35.81			
1,2,3,7,8,9-HxCDD	0.1	5.91	39:74	7.03	0.54	13.42	81.63	8.72			
1,2,3,4,6,7,8-HpCDD	0.01	120.29	266.97	8.92	2.18	19.34	238,30	46.19			
OCDD	0.0003	51.60	99.40	1.97	0.42	4.10	6.23	13.71			
2,3,7,8-TCDF	0.1	0.78	0.69	0.14	0.05	0.25	8.19	0.72			
1,2,3,7,8-PeCDF	0.03	0.65	0.02	0.12	0.03	0.20	0.95	0.20			
2,3,4,7,8-PeCDF	0.3	10.45	0.39	1.45	0.28	3.91	21.64	2.30			
1,2,3,4,7,8-HxCDF	0.1	11.55	0.76	4.75	0.37	9.53	4.24	2.09			
1,2,3,6,7,8-HxCDF	0.1	4.55	0.43	3.02	0.26	5.74	11.57	1.94			
1,2,3,7,8,9-HxCDF	0.1	0.01	0.01	0.17	0.02	0.21	0.09	0.09			
2,3,4,6,7,8-HxCDF	0.1	2.72	0.40	4.50	0.32	5.99	12,06	1.67			
1,2,3,4,6,7,8-HpCDF	0.01	11.97	6.73	38.96	0.43	35.28	11.33	9.45			
1,2,3,4,7,8,9-HpCDF	0.01	0.46	0.28	0.25	0.00	0.40	0.43	0.17			
OCDF	0.0003	0.40	0.83	0.59	0.01	0.74	0.16	0.28			
Toxic Equivalency 2,3,7,8-TCDD TEQ		258	455	110	8.23	171	1.207	138			

Please refer to notes on the last page of this table.

Table 1 - Soil Chemical Analyses Results: Dioxin Chiloquin Mill Site Restoration Project Chiloquin, Oregon

Analytical Results

	Location:		Grid Area			Wood Waste				
}	Sample:	H-6	1-4	Z-5	WW-1	WW-2	WW-3			
	Date:	13-Oct-05	15-May-06	15-May-06	15-May-06	15-May-06	15-May-06			
Dioxins/Furans	Depth (ft.):	0.1 - 1	0.1 - 0.5	0.1 - 0.5	0.1 - 0.5	0.1 - 0.5	0.1 - 0.5			
Congeners		Concentration in ng/kg (ppt)								
2,3,7,8-TCDD		0.711 J	2.52	0.694 JK	0.261 JK	0.445 JK	0.301 JK			
1,2,3,7,8-PeCDD		6.167	16.404	4.147 BJ	1.275 BJ	1.43 BJK	0.835 BJ			
1,2,3,4,7,8-HxCDD		7.392	9.143	2.21 J	1.337 J	1.391 J	0.487 JK			
1,2,3,6,7,8-HxCDD		125.942	486.745	46.796	8.899	10.182	5.646 J			
1,2,3,7,8,9-HxCDD		43.334	117.023	14.404	4.048 J	4.304 J	2.148 J			
1,2,3,4,6,7,8-HpCDD		1,398.61	2634.74	233.448	146.626	119.159	65.221			
OCDD		12,863.341 E	14,544.77	1,631.63	1,028.98	788.584	609.328			
2,3,7,8-TCDF		1.648 C	11.102 C	4.506 C	<0.941 CJ	<0.679 CJ	<0.550 CJ			
1,2,3,7,8-PeCDF		1.221 J	5.885 J	1.788 J	0.265 J	0.374 J	0.236 JK			
2,3,4,7,8-PeCDF		2.211 J	10.251	2.62 J	0.328 J	0.425 J	0.370 JK			
1,2,3,4,7,8-HxCDF		11.319	22.911	9.123	1.447 BJ	1.939 BJK	0.925BJ			
1,2,3,6,7,8-HxCDF		13.468	19.91	7.794	1.086 J	- 1.308 JK	0.758 J			
1,2,3,7,8,9-HxCDF		0.248 JK	4.701 J	1.256 J	<0.268	<0.458	0.337 J			
2,3,4,6,7,8-HxCDF		10.914	20.707	12.839	1.626 J	2.387 J	1.148 J			
1,2,3,4,6,7,8-HpCDF		537.795	855.586	821.139	33.865	109.797	32.1			
1,2,3,4,7,8,9-HpCDF		9.572	15.112	2.591 J	1.76 J	1.462 J	0.707 J			
OCDF		391.737	681.154	363.362	95.691	95.614	26.508			

Toxicity Equivalence

	Location:		Grid Area		<del> </del>	Wood Waste		
	Sample:	H-6	1-4	Z-5	WW-1	WW-2	WW-3	
	Date:	13-Oct-05	15-May-06	15-May-06	15-May-06	15-May-06	15-May-06	
Dioxins/Furans	Depth (ft.):	0.1 - 1	0.1 - 0.5	0.1 - 0.5	0.1 - 0.5	0.1 - 0.5	0.1 - 0.5	
Congeners	TEF		Toxicity Equ	Concentration in	ation in ng/kg (ppt)			
2,3,7,8-TCDD	1.0	0.71	2.52	0.69	0.26	0.45	0.30	
1,2,3,7,8-PeCDD	1.0	6.17	16.40	4:15	1.28	1.43	0.84	
1,2,3,4,7,8-HxCDD	0.1	0.74	0.91	0.22	0.13	0.14	0.05	
1,2,3,6,7,8-HxCDD	0.1	12,59	48.67	4.68	0.89	1.02	0.56	
1,2,3,7,8,9-HxCDD	0.1	4.33	11.70	1.44	0.40	0.43	0.21	
1,2,3,4,6,7,8-HpCDD	0.01	13.99	26,35	2.33	1.47	1.19	0.65	
OCDD	0.0003	3.86	4.36	0.49	0.31	0.24	0.18	
2,3,7,8-TCDF	0.1	0.16	1.11	0.45	0.05	0.03	0.03	
1,2,3,7,8-PeCDF	0.03	0.04	0.18	0.05	0.01	0.01	0.01	
2,3,4,7,8-PeCDF	0.3	0.66	3.08	0.79	0.10	0.13	0.11	
1,2,3,4,7,8-HxCDF	0.1	1.13	2.29	0.91	0.14	0.19	0.09	
1,2,3,6,7,8-HxCDF	0.1	1.35	1.99	0.78	0.11	0.13	0.08	
1,2,3,7,8,9-HxCDF	0.1	0.02	0.47	0.13	0.01	0.02	0.03	
2,3,4,6,7,8-HxCDF	0.1	1.09	2.07	1.28	0.16	0.24	0.11	
1,2,3,4,6,7,8-HpCDF	0.01	5.38	8.56	8.21	0.34	1.10	0.32	
1,2,3,4,7,8,9-HpCDF	0.01	0.10	0.15	0.03	0.02	0.01	0.01	
OCDF	0.0003	0.12	0.20	0.11	0.03	0.03	0.01	
Toxic Equivalency				·				
2,3,7,8-TCDD TEQ		52.4	131	26.7	5.71	6.79	3.60	

Please refer to notes on the last page of this table.

Table 1 - Soil Chemical Analyses Results: Dioxin Chiloquin Mill Site Restoration Project Chiloquin, Oregon

Analytical Results

	Location:		Background Locations						
	Sample:	BGND1	BGND2	BGND3	BGND4	BGND5	353AB-1	353AB-2	
	Date:	13-Oct-05	13-Oct-05	13-Oct-05	13-Oct-05	15-May-06	15-May-06	15-May-06	
Dioxins/Furans	Depth (ft.):	<0.5	<0.5	<0.5	<0.5	0.1 - 0.5	0.1 - 0.5	0.1 - 0.5	
Congeners			Concentration in ng/kg (ppt)						
2,3,7,8-TCDD		1.5	0.7	1.8	0.7	0.392 JK	0.765 J	<0.261 JK	
1,2,3,7,8-PeCDD		20.4	4.6	13.1	3.7	1.968 BJ	5.634 BJ	3.493 BJ	
1,2,3,4,7,8-HxCDD	ļ	6.3	8.7	2.0	3.9	0.827 J	1.953 J	7.621	
1,2,3,6,7,8-HxCDD		245.9	70.3	151.0	88.0	19.193	54.052	48.018	
1,2,3,7,8,9-HxCDD		93.4	31.7	56.3	24.7	7.386	23.14	18.049	
1,2,3,4,6,7,8-HpCDD		775.7	1,565.0	368.9	848.0	94.516	191.058	808.029	
OCDD		7,590.1	16,117.6	2,389.2	7,437.1	537.472	895.225	4,781.921 E	
2,3,7,8-TCDF		0.9	1.5	<0.056	1.9	<0.590 CJ	<1.073 C	<0.402 C	
1,2,3,7,8-PeCDF		1.5	4.9	2.2	1.9	0.450 J	1.558 J	1.361 J	
2,3,4,7,8-PeCDF		4.2	4.4	3.1	2.4	0.582 J	2.485 J	1.351 J	
1,2,3,4,7,8-HxCDF		31.8	26.1	21.1	11.2	2.626	10.95	5.375	
1,2,3,6,7,8-HxCDF		35.5	14.0	20.2	6.7	2.395 J	11.607	4.144 J	
1,2,3,7,8,9-HxCDF		<0.152	< 0.136	8.0	0.5	0.866 J	1.170 J	2.181 J	
2,3,4,6,7,8-HxCDF		39.5	9.8	22.8	5.1	4.114	18.288	5.197 J	
1,2,3,4,6,7,8-HpCDF		2,970.8	578.0	1,722.3	293.9	242.088	734.88	62.105	
1,2,3,4,7,8,9-HpCDF		10.7	20.2	5.4	6.7	0.902 J	4.97 J	2.474 J	
OCDF		845.9	970.0	741.6	377.8	108.211	280.552	52.825	

Toxicity Equivalence

loxicity Equivale		·									
	Location:		Background Locations								
	Sample:	BGND1	BGND2	BGND3	BGND4	BGND5	353AB-1	353AB-2			
	Date:	13-Oct-05	13-Oct-05	13-Oct-05	13-Oct-05	15-May-06	15-May-06	15-May-06			
Dioxins/Furans	Depth (ft.):	<0.5	<0.5	<0.5	<0.5	0.1 - 0.5	0.1 - 0.5	0.1 - 0.5			
Congeners	TEF		Toxicity Equivalent (TEQ) Concentration in ng/kg (ppt)								
2,3,7,8-TCDD	1.0	1.52	0.68	1.78	0.70	0.39	0.77	0.26			
1,2,3,7,8-PeCDD	1.0	20.40	4.61	13,15	3.72	1.97	5.63	3.49			
1,2,3,4,7,8-HxCDD	0.1	0.63	0.87	0.20	0.39	0.08	0.20	0.76			
1,2,3,6,7,8-HxCDD	0.1	24.59	7.03	15.10	8.80	1.92	5.41	4.80			
1,2,3,7,8,9-HxCDD	0.1	9.34	3.17	5:63	2.47	0.74	2.31	1.80			
1,2,3,4,6,7,8-HpCDD	0.01	7.76	15,65	3.69	8.48	0.95	1.91	8.08			
OCDD	0.0003	2.28	4.84	0.72	2.23	0.16	0.27	1.43			
2,3,7,8-TCDF	0.1	0.09	0.15	0.00	0.19	0.03	0.05	0.02			
1,2,3,7,8-PeCDF	0.03	0.04	0.15	0.06	0.06	0.01	0.05	0.04			
2,3,4,7,8-PeCDF	0.3	1.27	1.33	0.94	0.72	0.17	0.75	0.41			
1,2,3,4,7,8-HxCDF	0.1	3.18	2.61	2.11	1.12	0.26	1.10	0.54			
1,2,3,6,7,8-HxCDF	0.1	3.55	1.40	2.02	0.67	0.24	1.16	0.41			
1,2,3,7,8,9-HxCDF	0.1	0.01	0.01	0.08	0.05	0.09	0.12	0.22			
2,3,4,6,7,8-HxCDF	0.1	3.95	0.98	2.28	0.51	0.41	1.83	0.52			
1,2,3,4,6,7,8-HpCDF	0.01	29.71	5.78	17.22	2.94	2.42	7.35	0.62			
1,2,3,4,7,8,9-HpCDF	0.01	0.11	0.20	0.05	0.07	0.01	0.05	0.02			
OCDF	0.0003	0.25	0.29	0.22	0.11	0.03	0.08	0.02			
Toxic Equivalency 2,3,7,8-TCDD TEQ		109	49.7	65.3	33.2	9.89	29.0	23.5			

Please refer to notes on the last page of this table.

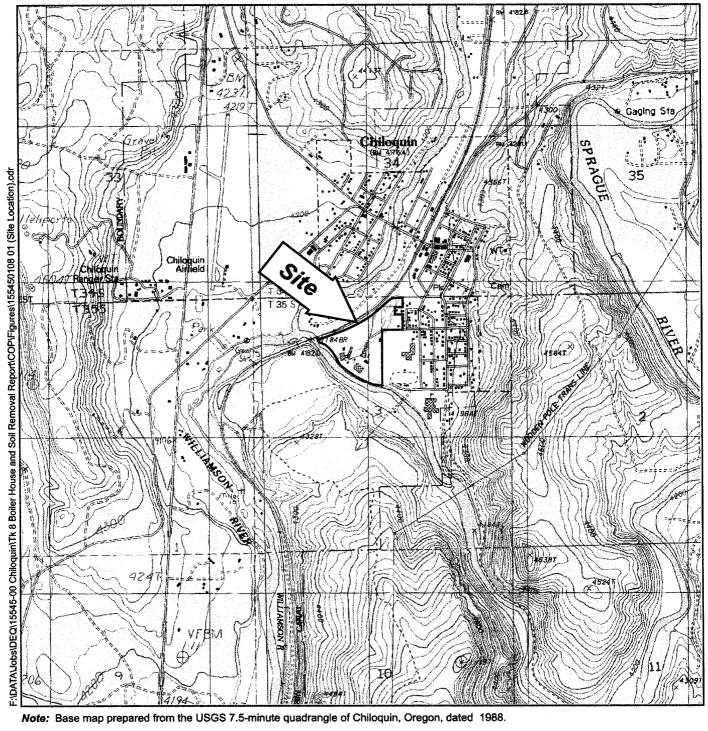
#### Table 1 - Soil Chemical Analyses Results: Dioxin Chiloquin Mill Site Restoration Project Chiloquin, Oregon

#### Notes:

- 1. Polychlorinated dibenzo-p-dioxins (PCDDs) and dibenzofurans (PCDFs), collectively dioxins, by EPA Method 1613B.
- 2. Results reported on a dry weight basis.
- ng/kg = nanograms per kilogram; or parts per trillion (ppt).
   Shading indicates a toxicity equivalent (TEQ) concentration exceeding a residential screening level of 3.9 ng/kg for an individual congener or 39 ng/kg on a cumulative basis.

- congenie of 39 fig/kg off a cumulative basis.
  5. <= Not detected above the method reporting limit.</li>
  6. \*D-8 is a duplicate sample of C-2.
  7. Screening level based on DEQ risk-based concentration (RBC) for direct contact with soil under a residential scenario (DEQ, 2007).
  8. Toxic Equivalency Factors (TEFs) for PCDDs and PCDFs from World Health Organization (WHO) for 2005 as adopted from van den Berg, et al (2006). Non-detected congener concentrations = 0.5 for toxicity equivalence (TEQ) calculation.
  8. Programme detected in blank at acceptanting arrest of the policy of the
- 9. B = Congener detected in blank at concentration greater than 0.1 times the sample congener concentration.
  10. C = Result is from confirmation analysis.
- 11. D = Result is from reanalysis of a diluted sample.
- 12. E = Concentration exceeds the upper calibration range.
- 13. J = Concentration is below the method reporting limit and is estimated.
  14. K = Estimated maximum possible concentration.

## Site Location Map Chiloquin Mill Site Restoration Project Chiloquin, Oregon



Portland

OREGON

• Chiloquin

0 2,000 4,000
Scale in Feet
Contour Interval 20 Feet

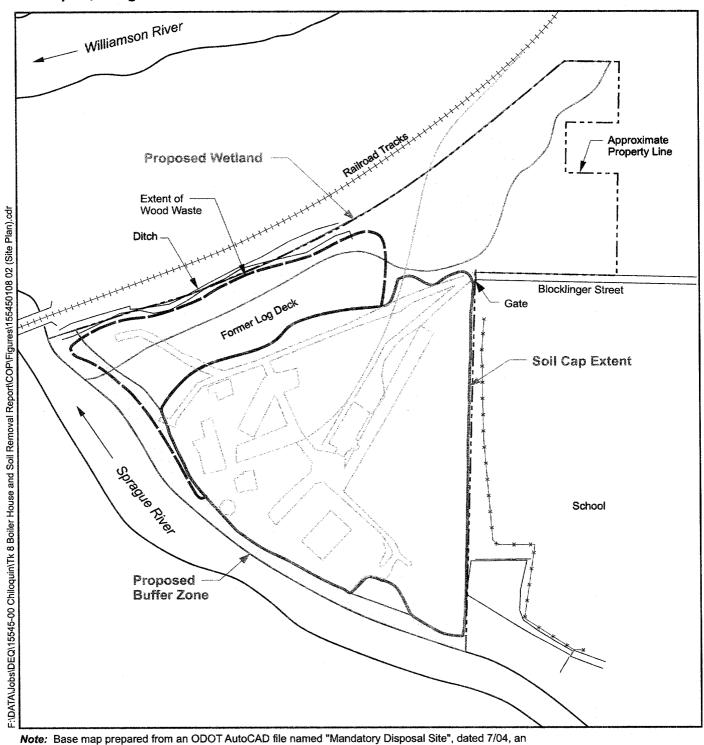
HARTCROWSER

15545-01/Task 8

Figure 1

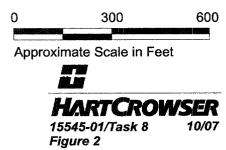
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#### Site Plan and Soil Cap Chiloquin Mill Site Restoration Project Chiloquin, Oregon

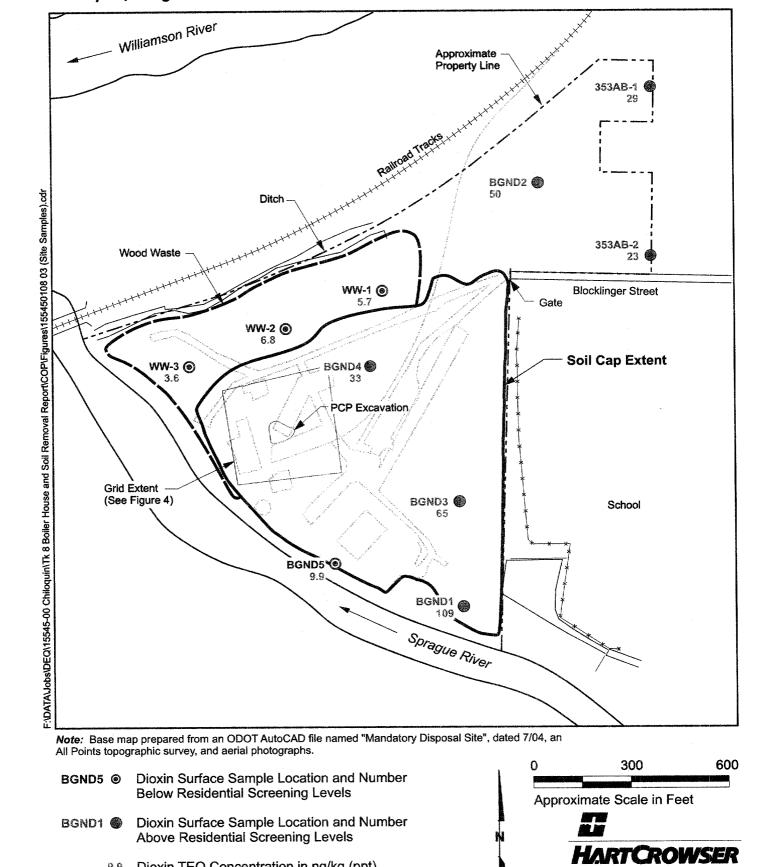


**Note:** Base map prepared from an ODOT AutoCAD file named "Mandatory Disposal Site", dated 7/04, an All Points topographic survey, and aerial photographs.

Approximate Location of Former Site Features



#### Dioxin Sample Locations and Results Chiloquin Mill Site Restoration Project Chiloquin, Oregon



15545-01/Task 8

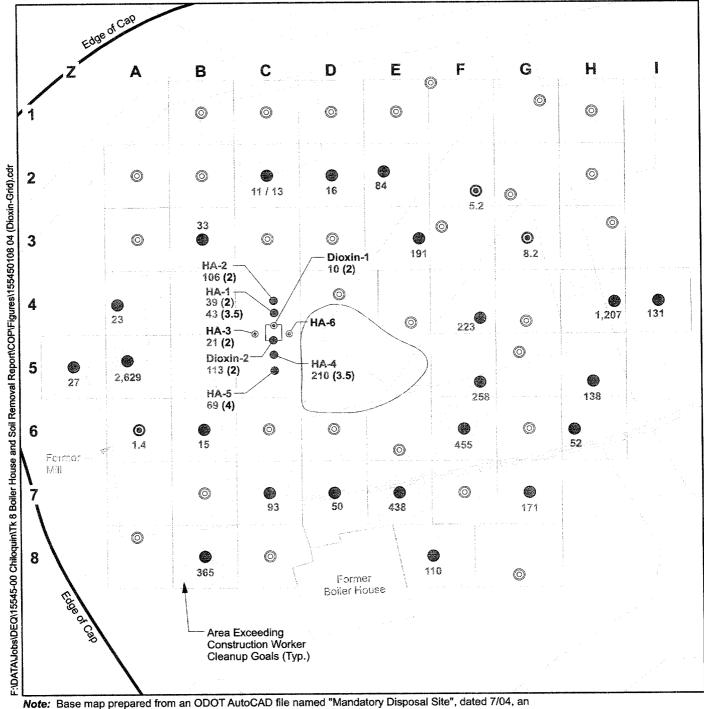
Figure 3

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Dioxin TEQ Concentration in ng/kg (ppt)

Approximate Location of Former Site Features

### Dioxin Grid and Excavation Results Chiloquin Mill Site Restoration Project Chiloquin, Oregon



Note: Base map prepared from an ODOT AutoCAD file named "Mandatory Disposal Site", dated 7/04, an All Points topographic survey, and aerial photographs.

Dioxin Surface Sample Location (Not Analyzed) 0

Dioxin Surface Sample Location (9) Below Residential Screening Levels

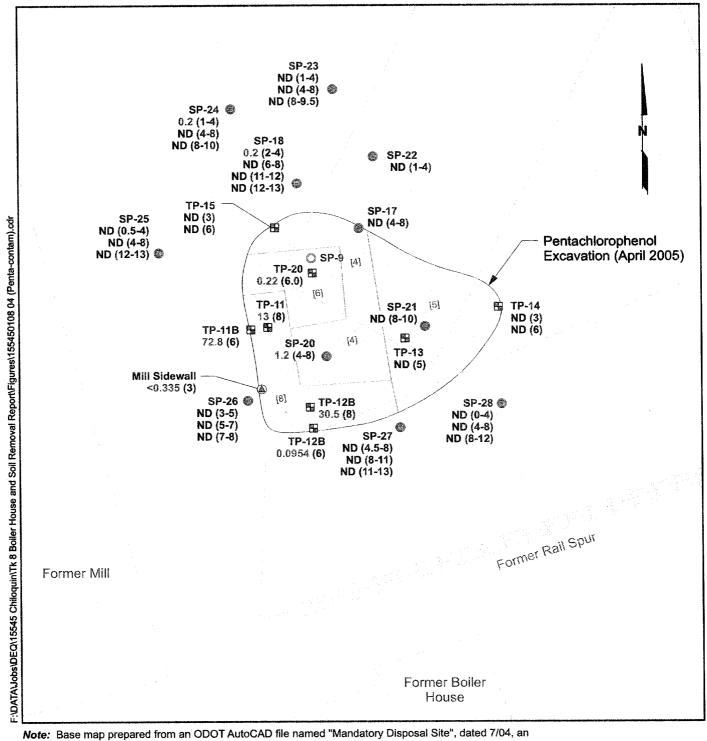
Dioxin Surface Sample/Hand Auger Boring Location Above Residential Screening Levels

Dioxin TEQ Concentration in ng/kg (ppt) 349

Hand Auger Soil Boring Location and Number Dioxin TEQ Concentration in ng/kg (ppt) and Depth in Feet

60 120 Approximate Scale in Feet *HART CROWSER* 10/07 15545-01/Task 8 Figure 4

#### Pentachlorophenol Excavation Sample Results Chiloquin Mill Site Restoration Project Chiloquin, Oregon

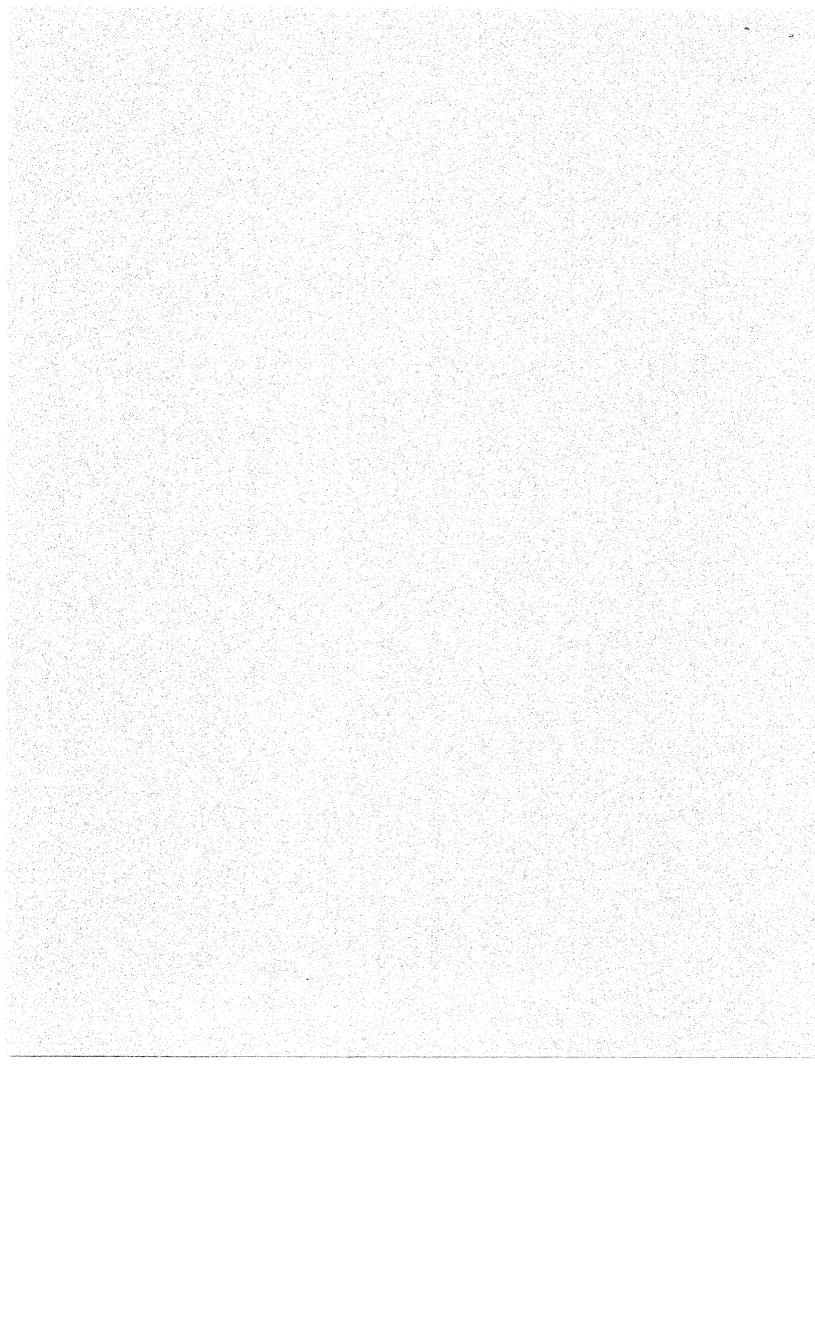


**Note:** Base map prepared from an ODOT AutoCAD file named "Mandatory Disposal Site", dated 7/04, an All Points topographic survey, and aerial photographs.

30 60 SP-18 Push Probe Location and Number Pentachlorophenol Concentration in mg/kg and (Depth in Feet) Approximate Scale in Feet 0.2 (2-4) ND Not Detected SP-9 O Push Probe Location and Number (Removed) *HART CROWSER* TP-14 🖫 Test Pit Location and Number 15545-01/Task 8 10/07 Confirmation Soil Sample Location and Designation Mill Sidewall @ Figure 5 Depth of Excavation in Feet

#### APPENDIX A SURVEYS

Hart Crowser 15545-01/Task 8 October 4 2007



# APPENDIX A SURVEYS

This appendix includes surveys completed at the site by All Points Engineering & Surveying of Terrebonne, Oregon. Specifically, this appendix includes the following (in order).

- **Topographic Map.** This map was prepared prior to construction of the soil cap. The soil stockpile shown on this map in the eastern portion of the property was used by the EPA for constructing the soil cap.
- Grid Survey. This survey shows the surface of the dioxin sampling grid corners and the approximate locations of the five samples in the dioxin grid that exceeded DEQ's risk-based concentrations for construction workers (point 21 for grid A5 was not accurately indicated by our field personnel).
- **Cap Survey.** This survey shows the extent of the soil cap. The surveyor indicated two types of construction materials (soil and granular fill) used to construct the cap.

