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Office of Emergency and Remedial Response
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September 1989

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Superfund Record of Decision:

Northwest Transformer, WA

50272-101

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16. Abstract (Limit: 200 words)

The Northwest Transformer site (NWT), a 1.6-acre former salvage yard, is approximately 2 miles south of Everson in Whatcom County, Washington. The site is in a rural area and is bordered by low-density residential areas to the north and east, and farmland to the south. The NWT site was used for transformer storage and salvage. Storage and salvage operations were conducted in an onsite barn where PCB-contaminated dielectric fluid was drained from the transformers before dismantling. Transformer casings and associated parts were incinerated onsite, and some of the recovered oil was burned to heat the barn. Spillage and leakage of PCB-laden oil on the ground appeared to have occurred frequently, and some oil apparently was dumped directly into a seepage pit onsite, contaminating soil and possibly ground water. EPA performed several soil and ground water sampling studies between 1977 and 1985 and identified PCB concentrations as high as 38,000 mg/kg. In 1985 EPA performed an Immediate Removal Action to address the danger posed by PCB contamination, including removing 1,400 cubic yards of PCB-contaminated soil and debris, 6,660 gallons of PCB-contaminated liquids, several contaminated transformer casings, monitoring ground water, and imposing site access restrictions. In 1987 sampling during an RI/FS identified sufficient PCB contamination in the soil to warrant further site remediation. This operable unit includes investigations of ground water and the onsite barn to determine whether either is sufficiently contaminated to merit a subsequent operable unit. The primary contaminant of concern affecting (See Attached Sheet)

17. Document Analysis a. Descriptors

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First Remedial Action - Final
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16. Abstract (continued)

the soil is PCB.

The selected remedial action for this site includes excavation, consolidation, and treatment of approximately 1,200 cubic yards of soil with a PCB concentration greater than 10 mg/kg using in situ vitrification; placement of two feet of clean fill over the entire site; abandonment of an onsite well; and ground water monitoring and sampling of the wood in the onsite barn to determine if a second operable is necessary to address PCB-contamination in these media. The estimated present worth cost for this remedial action is $771,000 for soil treatment only with no O&M required.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 SIXTH AVENUE
SEATTLE, WASHINGTON

RECORD OF DECISION, DECISION SUMMARY, AND RESPONSIVENESS SUMMARY

FOR
FINAL REMEDIAL ACTION
NORTHWEST TRANSFORMER (MISSION/POLE)
SUPERFUND SITE
SEPTEMBER 1989

Declaration for the
Northwest Transformer (Mission/Pole)
Superfund Site

Record of Decision

Site

Northwest Transformer (Mission/Pole)
Whatcom County, Washington

Statement of Basis and Purpose

This decision document presents the selected Remedial Action for the Northwest Transformer site in Whatcom County, Washington, developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and, to the extent practicable, the National Contingency Plan. This decision is based on the Administrative Record for this site. The attached index identifies the items which comprise the Administrative Record upon which the selection of the Remedial Action is based.

The state of Washington has verbally concurred on the selected remedy.

Description of Selected Remedy

This Record of Decision addresses on-site soil contamination as a first operable unit. The selected remedy is in situ vitrification (ISV). The remedy addresses the principal confirmed threat at the site by significantly reducing the risk associated with exposure to the contaminated soil and by reducing the potential for the soil to act as a source for groundwater contamination. The aquifer will be monitored for contaminant migration and may have to be addressed as a second operable unit.

In addition, there is a wooden barn on site that will require some sampling of the deeper wood matrix to determine whether or not the structure will need to be treated as a separate operable unit.

The major components of the selected on-site treatment remedy include:

- Excavation, consolidation, and treatment, via ISV, of approximately 1200 cubic yards of contaminated soil (soils with a PCB concentration greater than 10 ppm (mg/kg)).
- Abandonment of the on-site well (in accordance with Washington state regulations).
- Placement of approximately two feet of clean fill over the entire site.

- Implementation of a comprehensive groundwater monitoring program to determine whether contamination is moving through the aquifer.

- Sampling of the on-site wood structure to determine deeper matrix contamination.

The remedy will destroy the PCB in the treated soils and therefore significantly reduce the mobility, toxicity, and volume of contamination on site.

Continued groundwater monitoring will be performed to ensure the integrity of the aquifer as a drinking water source. If groundwater analyses indicate contamination at a concentration in excess of the accepted U.S. Environmental Protection Agency (EPA) and state of Washington health-based levels, further action will be initiated as a separate operable unit.

Declaration

The selected remedy is protective of human health and the environment, attains federal and state requirements that are applicable or relevant and appropriate to the Remedial Action, and is cost effective. This remedy satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. Because this remedy will result in hazardous substances remaining on site (i.e., soils with a PCB concentration less than 10 ppm (mg/kg)), a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

9-15-89

Robie G. Russell — Date
Regional Administrator
U.S. Environmental Protection Agency, Region 10

NORTHWEST TRANSFORMER (MISSION/POLE)

SUPERFUND SITE

RECORD OF DECISION

Decision Summary

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I. Site Description

Location

The Northwest Transformer Salvage Yard (Mission/Pole) site (hereafter referred to as the Northwest Transformer or NWT site) is located approximately two miles south of Everson in Whatcom County, Washington (Figure 1). The site, located immediately southwest of the intersection of Mission and Pole Roads, occupies approximately 1.6 acres in the NE 1/4 of the NE 1/4 of Section 12, Township 39 N, Range 3 E, Willamette Meridian.

Topography

The NWT site is located in the Nooksack River basin. The basin lowlands lie west of the foothills of the Cascade Mountain Range and east of the Strait of Georgia and Bellingham Bay. The topography of the lowlands is the result of glaciation from the Fraser Glaciation, which left westward trending streams and surface glacial features. The region is dissected by the Nooksack River and its tributaries. The course of the Nooksack River is dominated by the topography, which has a low gradient, and to a lesser extent, by geologic structure. The river flows northward less than one mile east of the site; however, the site does not lie in the flood plain. The elevation at the site is approximately 120 feet above mean sea level.

Adjacent Land Uses

The site is bordered by low density residential areas to the north and east, and by agricultural fields to the south. A small gravel pit is located approximately 500 feet to the west. Land use in the area is comprised mainly of rural homesteads, dairies, and farms, with approximately 200 persons living within a one-mile radius of the site.

Surface and Subsurface Features

The soil in the area is glacial outwash consisting of silt, sand and gravel. Cobbles are commonly present at depths greater than three feet. Well logs for wells within 2,000 feet of the site indicate that the water table is encountered between 17 and 40 feet below ground surface. It was approximately 30 feet below ground surface during the summer months at the NWT site. At least 27 domestic wells surround the site within a one-half mile radius. Many of these wells use the water table aquifer at 40 to 50 feet for a drinking water source. Saline water generally occurs at a depth of 100 feet or more beneath the lowland area. There is a wooden structure (an old barn) on the northwest corner of the site (see Figure 2).

II. Site History and Enforcement Activities

The NWT site was primarily used for the storage and salvage of transformers prior to final disposition (disposal/sale as scrap) or transportation to another facility for recycling. As many as several hundred transformer casings were stored at the unsecured site. The casings were

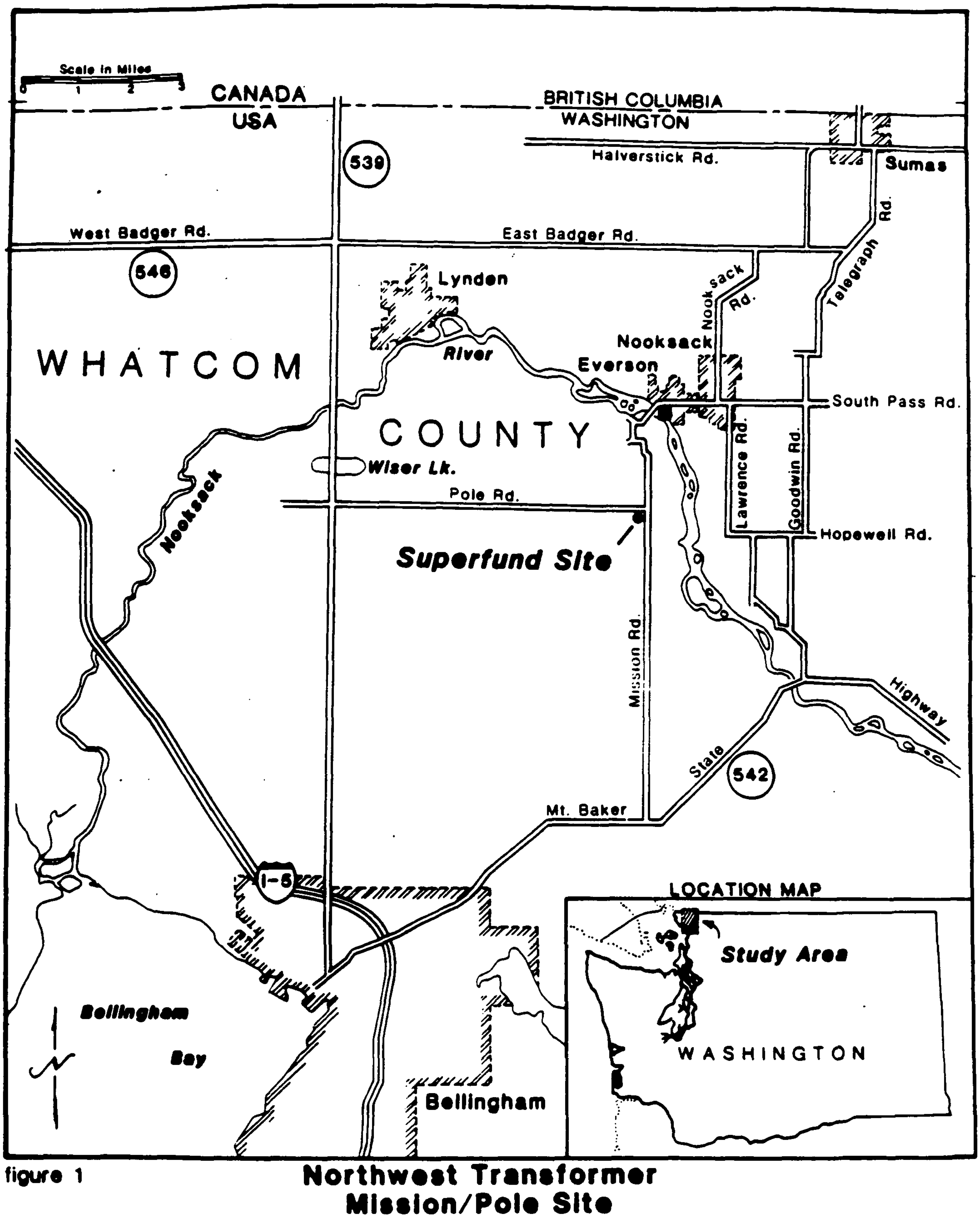

figure 1

Northwest Transformer
Mission/Pole Site

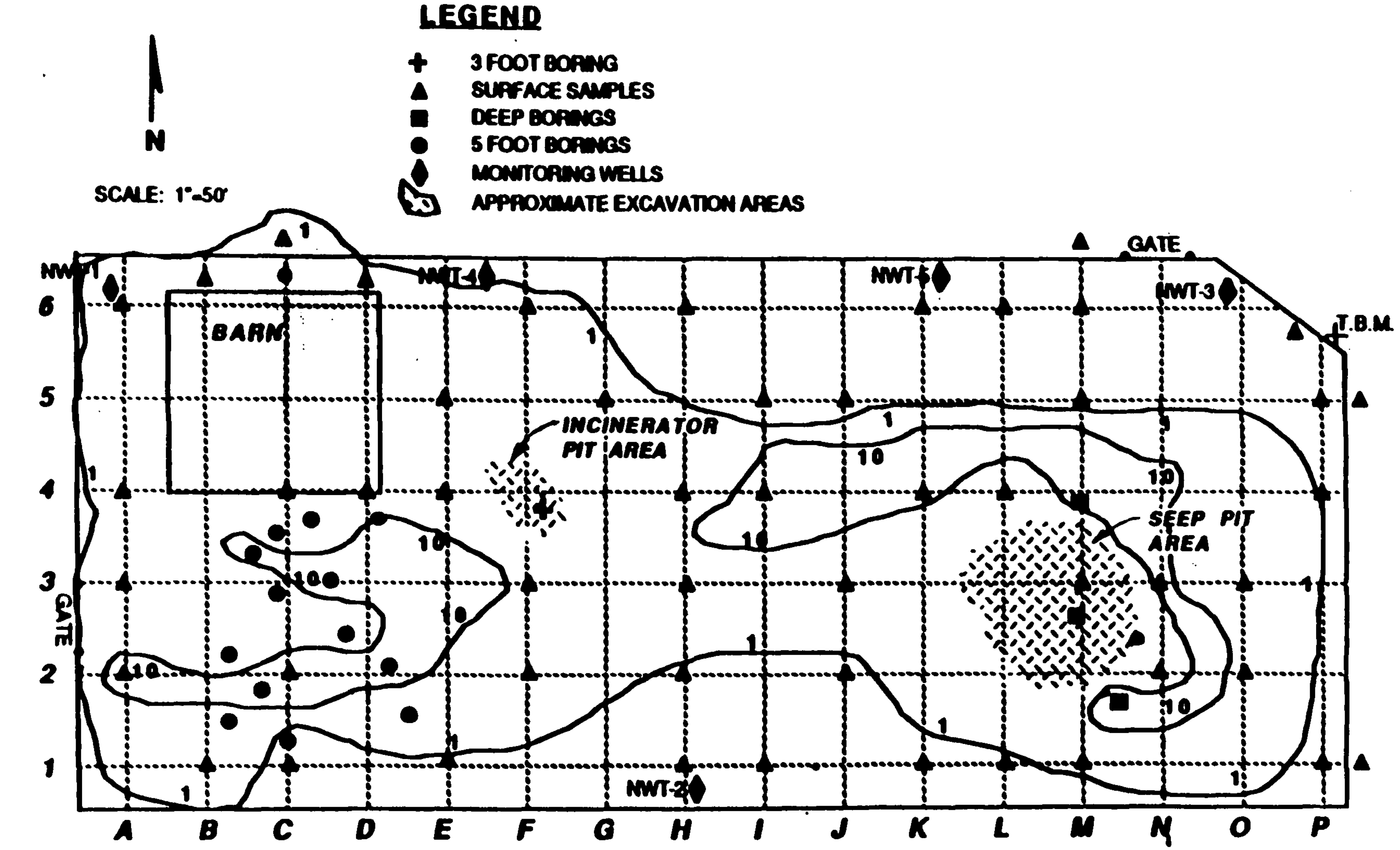

Figure 2

Surface Soil Concentrations of PCBs (ppm)

Northwest Transformer Site

Everson, Washington

placed directly on the ground, and there were no provisions for weather or spill protection. Activities at the NWT site included storage of transformers; removal of dielectric fluids from the transformers (the primary source of PCB and related compounds); burning of recovered oils in a space heater to provide heat for the barn; dismantling of transformers in the barn; burning of casings and associated parts in an air curtain open pit incinerator; and scrap metal reclamation. The open pit incinerator was a concrete structure sixteen feet long and eight feet wide with a manifold designed to blow 8,000 cfm of air into the combustion zone. The incinerator operated at temperatures of approximately 1,000 to 1,200° F. During operation of the site, spillage and leakage of the PCB-laden oil onto the ground surface appeared to have occurred frequently. In addition, it is suspected that PCB oil was dumped directly into a seepage pit (sometimes referred to as the septic tank), in the southeast portion of the site (see Figure 2), where it would seep out into the surrounding soil. This structure consisted of a pit with wooden walls and a wooden cover with an access hole. The top was located at the ground surface and the bottom was approximately six to eight feet below the surface.

The NWT facility has been inspected several times since 1977. Soil samples have been collected on a number of occasions. In 1977 EPA analyzed two samples which revealed a total polychlorinated biphenyl (PCB) concentration of 80 ppm (mg/kg) for Arochlors 1248 and 1254 in soil near the incinerator (see Figure 2) and 510 ppm (mg/kg) for Arochlor 1260 at a location within the transformer storage area. In 1979 EPA analyzed two samples from oil-stained areas of soil and found total PCB concentrations of 41 and 60 ppm (mg/kg). In February 1981, EPA collected and analyzed a sample from the incinerator area which indicated the presence of PCB at a concentration of 160 ppm (mg/kg). Samples were collected by the Washington Department of Ecology (Ecology) during an August 1984 site inspection in which two soil samples from an oil-stained area near the roadway indicated PCB levels at 6.3 and 0.72 ppm (mg/kg).

In August of 1981, the company was cited and fined by EPA for violations of recordkeeping, marking, storage, dating, and disposal requirements of the Toxic Substances Control Act (TSCA) PCB Regulation 47 CFR Part 761.

Groundwater sampling results have been inconsistent. In February 1981, sampling of four wells showed low levels of PCB (0.05 to 0.11 ug/l) using a detection limit of .015 ug/l, while in December of 1981, sampling of eleven wells surrounding the site (including the four wells sampled in February 1981) showed no evidence of PCB contamination using a detection limit of .015 ug/l.

Between April 1983 and April 1984, groundwater samples were collected on a periodic basis from domestic wells near the site by the Whatcom County District Department of Public Health. PCB was detected in several samples at concentrations slightly above the minimum detection limit of 0.50 ug/l.

In 1984, the site was added to the National Priorities List (NPL) under CERCLA.

A comprehensive soil sampling effort was completed in March 1985 by the EPA Region 10 Field Investigation Team (FIT). Sample analyses indicated PCB soil contamination at the facility to be as high as 38,000 ppm (mg/kg), with significant concentrations detected at various depths and locations around the site.

Five samples were also collected during the March FIT sampling effort and analyzed for the presence of the full range of dioxin and furan isomers. Three composite surface samples were collected from the perimeter of the incinerator pit. Each composite consisted of soil from four discrete points which were equally spaced around the pit and close to the edge. In addition, an uncomposited sample was collected from the middle of the field south of the site. A background sample was obtained from an area near Pole Road, approximately one-half mile west of the site. Analytical results indicated that dioxin and furans were present at concentrations well below 1 ppb (ug/l).

In March of 1985, EPA issued a CERCLA 106 Order to the owners of the company requiring that they take immediate action to mitigate the threat to public health and the environment.

In April and May of 1985, the EPA Technical Assistance Team (TAT) Emergency Response Cleanup Services (ERCS) implemented an Immediate Removal Action (IRM). Activities included the following:

- Enclosure of the site with a chain-link fence.
- Excavation and disposal of approximately 1,400 cubic yards of contaminated soil and solid materials (barn soil/concrete, six-inch surface scrape, 12 to 18 inch excavations, incinerator pit excavation and seep pit area excavation, 12 to 18 feet below the ground surface.)
- Draining, rinsing, and cleaning of thirty-five transformers.
- Removal of approximately 6,000 gallons of PCB-contaminated liquids (less than 500 ppm (mg/l)).
- Removal of approximately 660 gallons of PCB-contaminated liquids (greater than 500 ppm (mg/l)).
- Removal of four transformer casings and one drum found to be contaminated by PCB (greater than 500 ppm (mg/l)).
- Decontamination of concrete and selected wood surfaces of the barn.
- Installation of five groundwater monitoring wells and sampling of the associated soil and groundwater.
- Two rounds of domestic well sampling: first round, twenty-one residences, and second round, sixteen residences.

The NWT site was significantly altered by the IRM in 1985. The purpose of the Remedial Investigation (RI) was to gather sufficient information and data to characterize the degree and extent of contamination (if any) remaining at the site.

In June of 1987, the Remedial Investigation/Feasibility Study (RI/FS) sampling effort took place. The scope of the RI included:

- Collecting and analyzing four ditch samples immediately outside of the security fence to determine if there was any off-site soil contamination.
- Collecting and analyzing forty-eight randomly-located surface soil samples to determine the degree and extent of contamination, primarily in areas that were not disturbed by the IRM.
- Collecting and analyzing surface and subsurface soil samples from shallow (five-foot) borings at fifteen locations which were determined to be "hot spots" prior to the IRM. The locations are primarily south of the barn and are in an area that had six inches to one foot of soil removed during the IRM.
- Collecting and analyzing surface and subsurface soil samples from deep (twenty- to forty-foot) borings at three locations near the former septic tank area. This area was excavated during the IRM.
- Collecting and analyzing surface and subsurface soil samples from one shallow (three-foot) boring in the area of the former incinerator pit to determine the degree and extent of contamination remaining. This area was overexcavated at least one foot during the IRM.
- Collecting and analyzing two surface soil samples and one wood sample from the barn to verify the effectiveness of the decontamination effort during the IRM.
- Collecting and analyzing background soil samples from locations that could not have been reasonably impacted from site operations.
- Collecting and analyzing groundwater samples from five on-site monitoring wells and four off-site residential wells to determine the degree and extent of groundwater contamination.

III. Community Relations History

Community relations activities conducted for the NWT site to date include the following:

- In 1984 the site was added to the NPL under CERCLA.
- In May 1985, EPA began an IRM at the site (see Section II). EPA addressed community information needs about the action at that time through press releases.
- In March 1986 community interviews were conducted in preparation for the community relations plan.
- The RI field investigation began in June 1987. This was announced in a May 1987 fact sheet sent to all citizens and local officials on the EPA mailing list.

- In July 1988, a fact sheet updating progress at the site was sent to all people on the EPA mailing list.

- The proposed plan was mailed out on August 17, 1988.

- On August 17, 1988, EPA placed a public notice in the local newspapers announcing the following:

    - Brief description of the investigation results.

    - Public comment period running from August 17 to September 21.

    - Location of the information repositories.

    - EPA contacts.

- Potentially Responsible Parties (PRPs) who attended an informational meeting at EPA Region 10 on August 22, 1988, or who requested the handouts from the meeting were provided with an RI/FS information package which included the following:

    - Proposed Plan

    - Remedial Investigation

    - Feasibility Study

    - PRP Status Summary Report

- The public comment period was extended for two weeks at the request of the PRP Steering Committee.

- A Responsiveness Summary was prepared by EPA in December 1988. This document addressed the comments received from the public and the PRPs during the comment period. The questions/comments and EPA's responses are listed by category in this document (see Section XII).

IV. Scope and Role of Response Action

The principal threat at the NWT site is the potential for exposure to PCB-contaminated soils. The site is located in a rural area designated by the Soil Conservation Service as having soils suitable for "prime farmland." With both agricultural and residential properties at its borders and a dairy located nearby, the potential for exposure is high. The first operable unit of soil remediation addresses the principal threat by significantly reducing the toxicity, mobility, and volume of the contamination on site and by significantly reducing the risk associated with exposure to the contaminated soil. In addition, the first operable unit remediation will reduce the potential for the contaminated soil to act as a source for groundwater contamination.

The potential threat posed by contaminated groundwater associated with the site is uncertain. Analyses of samples obtained from on-site wells indicate low levels of contamination; however, analyses of samples obtained off site are inconclusive. A groundwater monitoring program that is designed to 1) detect trace levels of PCB in the aquifer and 2) more clearly define aquifer characteristics will be implemented to allow for a better assessment of the risk, if any, due to the use of groundwater as a drinking water source. If groundwater analyses indicate groundwater contamination in excess of the EPA and state of Washington health-based levels, groundwater will be acted on as a separate operable unit.

In addition to soils and groundwater, there is a wooden structure (an old barn) on site that was used for transformer repair and storage. The barn was heated at times by burning PCB-contaminated oil. Surficial samples (i.e., wood shavings) were obtained during the RI and analyzed for PCB contamination. The analyses indicated PCB concentrations below 1 ppm (mg/kg); however, core samples will be required to determine the extent of at-depth contamination. If core samples indicate significant levels of PCB in the wooden structure, the barn will be acted on as a separate operable unit.

V. Site Characteristics

Contaminant Characteristics

The contaminant of concern at the NWT site is PCB, primarily Arochlor 1260. It is unlikely that free-flowing PCB-bearing fluids (i.e., transformer dielectrics) are still present at the site. PCB is readily adsorbed onto soil particles and does not easily leach from soil. Adsorption of PCB by soil is related to the organic content of a particular soil type, and PCB recovered from soil is found to concentrate in the organic fraction of the soil media. The low water solubility and low volatility of PCB also suggest that it is partitioned most heavily into the organic fraction of soil. The rate of PCB movement in saturated soil has been found to be between one-tenth and one-hundredth the rate of groundwater movement.

Affected Matrices Characteristics

For site management, stabilization, and cleanup purposes, the NWT site can be divided into specific affected matrices.

The following discussion summarizes the characteristics and volumes of each matrix that are relevant to the identification, screening, and selection of remedial technologies and strategies.

Soil

The contaminant of concern in the soil is PCB. The tri-tetrachlorobenzenes were not included in analyses because these more volatile compounds were not expected to be persistent in surface soils, especially considering the length of time between the EPA IRM and the RI sampling effort. The distribution of PCB contamination in the surface soil is shown in Figure 2 (p.7). PCB contamination has been shown to exist at levels exceeding the April 1985 IRM cleanup level of 10 ppm (mg/kg) in two areas: 1) the area south of the barn and 2) the former seepage pit area (Figure 2). PCB concentrations between 1 and 10 ppm (mg/kg) exist in surface soil throughout the site.

During the July 1987 RI, shallow subsurface samples were taken from 2.5 and 5.0 feet below ground surface at selected locations. The principal contaminant of concern in these samples was PCB. The tri-tetrachlorobenzenes were not detected in the samples. Results indicated that PCB contamination generally decreased with depth and that the PCB levels were at or below 1 ppm (mg/kg) below the depth of five feet. The PCB analytical data show concentrations at or above 10 ppm (mg/kg) in the area just south of the barn. Analytical data indicate that below 2.5 feet some PCB concentrations are between 1 ppm (mg/kg) and 5 ppm (mg/kg). PCB concentrations in the subsurface soil in the seepage/septic tank area range between 1 to 10 ppm (mg/kg) at a depth of 19 feet.

The volumes of soil within the ranges of PCB contamination reported in the FS are shown in Table 1.

The surface area of the site is approximately 70,000 square feet (7,778 square yards) or approximately 1.6 acres.

Groundwater

There are two current primary PCB sources relative to groundwater contamination beneath the NWT site and vicinity. First, historical dumping of potentially high but undocumented concentrations of PCB in the seepage pit may have resulted in significant PCB migration into groundwater in the past. This high level contamination could act as a future source of groundwater contamination by PCB. The current low level PCB soil contamination can be considered a second source. The soil PCB contamination could act as a constant low level source of groundwater contamination until the site is remediated.

Based on the results of this RI and previous investigations, PCB contamination in groundwater has not been adequately characterized to assess the lifetime incremental cancer risk through ingestion of contaminated water, nor have the groundwater flow patterns been fully determined.

On-Site Structure (Barn)

During the IRM, a significant amount of washing, rinsing, and sandblasting of the surface of wooden structural members inside the barn was conducted; however, there is uncertainty as to the effectiveness of the decontamination of the deeper wood matrix of the barn. Core samples of the wood must be analyzed for PCB before all remediation alternatives, including the no action alternative, can be evaluated for the barn.

TABLE 1 NORTHWEST TRANSFORMER: ESTIMATED VOLUMES ASSOCIATED WITH SURFACE SOIL CLEANUP LEVELS

RESIDUAL PCB CONCENTRATION (PPM)	EXCAVATION DEPTH IN 10 PPM AREA (ft.)(1)(2)	VOLUME OF SOIL FROM 10 PPM AREA (cu.yd.)(1)	VOLUME OF SOIL FROM AREA BETWEEN 10 AND 1 PPM (cu.yd.)(1)	TOTAL VOLUME OF SOIL (cu.yd.)
40	0.0	0	0	0
32	0.5	313	0	313
24	1.0	625	0	625
16	1.5	938	0	938
10	1.9	1,172	0	1,172
8	2.0	1,250	171	1,421
5	2.2	1,367	468	1,836
1	2.5	1,563	964	2,526

(1) See Figure 2 for isoconcentration contours.
(2) Assume that concentration decreases from surface (avg = 40 ppm) to 2.5 ft. depth (1 ppm) in a linear manner.

Migration Pathways

The transport of the chlorinated contaminants in the environment is controlled by their physical properties. Three potential pathways of migration exist: groundwater, air, and surface water.

The potential for airborne migration of PCB from the site is minimal. The contaminants, especially the more chlorinated isomers, are not highly volatile. Also, the high equilibrium binding constant for PCB in soil indicates that contaminants bind tightly to the soils. Heavy vegetation on the site virtually eliminates any migration of contaminants on particulates generated from wind erosion. If surface vegetation is removed, the resulting wind dispersion of existing contaminated surface soils is not expected to result in off-site PCB contamination greater than one mg/kg based on results of background soils and on-site surface soils obtained in July 1987.

Likewise, the potential for transport of PCB from the site via surface water is minimal. Due to the very high permeability of the soils at the site and relatively flat topography, surface water runoff from the site is minimal.

It is for these reasons that the major potential pathway of contaminant migration identified for this site is the regional groundwater system. PCB is readily absorbed from water by solid particles and only slowly leaches from soils. PCB has poor mobility through saturated soil. Downward movement of contaminants would be effected very slowly by water infiltration from precipitation coupled with sorption/desorption mechanisms based on contaminant solubility. Rapid downward movement and horizontal migration would only be suspected if large quantities of oil-soluble solvents were allowed to percolate through the soil.

The highest potential for the downward migration appears to be in the seepage pit area, where the excavated and caved area tends to funnel precipitation. Review of previous investigations indicates that unknown amounts of liquids were disposed of in this area of the site by dumping into the seepage pit. The construction of this pit was such that liquids would seep out to the surrounding formations. Sources of the liquids are not known but are suspected to include some portions of the liquids generated on site. Unless large quantities of solvents were dumped into the excavated area, migration of PCB would not be expected to be significant.

VI. Summary of Site Risks

Introduction

The surface, subsurface, and deep soils at the NWT site were analyzed for all or a subset of the following contaminants: PCB, volatile organics, semi-volatile organics, polychlorinated dibenzo-p-dioxins and dibenzofurans, and inorganics. Groundwater samples were analyzed for PCB, volatile organics, and semi-volatile organics.

The results showed PCB contamination in soils and in all five of the groundwater wells on site. Because of the questionable quality of the data from the off-site wells, it is not clear if they are contaminated with PCB. Low levels of penta through octachlorinated dibenzofurans and/or dioxins were found in the soil samples from the burn pit that were analyzed for these compounds. Of the other organics (volatile and semi-volatile) analyzed for, acetone and methylene chloride were identified at or just below the detection limit in some of the samples and blanks. Inorganics in soil samples were at or below background levels except for copper and lead, which were slightly elevated in two samples.

A risk assessment was performed for PCB in soil and groundwater and for chlorinated dioxins and furans in the burn pit samples. Both acetone and methylene chloride were present at very low levels in several of the off-site groundwater samples and were likely found because of their use as laboratory solvents. For the inorganics that were found at concentrations above background (lead and copper), only lead is of concern to human health. The maximum soil lead level (53 ppm (mg/kg)) was well below the level of concern for lead in soil.

Toxicity of PCB and Polychlorinated Dibenzofurans and Dibenzo-p-dioxins

The Arochlor oil used in transformers contains a mixture of PCB in various proportions. The majority of the Arochlors found in the soil samples at the NWT site was Arochlor 1260; the type of Arochlor present in the water samples was not identified.

Each PCB compound may exhibit its own toxicological characteristics. In general, however, PCB has been shown to produce a variety of non-cancer health effects in laboratory animals, including liver, thyroid, and reproductive toxicity. Several studies have also shown that PCB causes cancer in laboratory animals. The combination of the sufficient evidence from these animal studies and inadequate, but suggestive, evidence from human studies leads to a designation of PCB as a probable human carcinogen, Group B2, under EPA guidelines. EPA has estimated an oral cancer potency value of 7.7 per mg/kg/day for Arochlor 1260 based upon a study by Norback and Weltman (For this and following references, see the revised Risk Assessment, which is part of the Administrative Record for the site.) in which chronic dietary administration of Arochlor 1260 was shown to cause liver cancers in rats. A separate cancer potency value for inhalation of PCB has not been developed by EPA. For this risk assessment, the inhalation potency of PCB was assumed to be the same as the one calculated for the oral route.

Chlorinated dibenzo-p-dioxins and dibenzofurans are structurally similar compounds. They are not intentionally made for any commercial purpose, but rather are by-products created during the manufacture of other chemicals or as a result of incomplete combustion of materials containing chlorinated compounds, such as PCB. There are seventy-five different chlorinated dioxin isomers and over one hundred furan isomers. The toxic effects of these isomers can differ markedly depending upon the location and number of chlorine molecules. The most toxic isomer, 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD), has been shown to cause many different types of toxic effects in animals, including reproductive effects, thymic atrophy, and a "wasting syndrome" leading to death.

2,3,7,8-TCDD, as well as a mixture of two 2,3,7,8 hexachlorodibenzo-p-dioxins, have been shown to cause cancer in laboratory animals and are among the most potent animal carcinogens evaluated by EPA to date. Available experimental data suggest that some of the other chlorinated dioxins and furans may exhibit similar toxic effects. The toxicity of each chlorinated dioxin and furan is estimated relative to that of 2,3,7,8-TCDD by using a toxicity equivalence factor (TEF) approach derived by EPA from comparisons with the *in vitro* tests. With the TEF procedure 2,3,7,8 TCDD is always given a value of 1 and other chlorinated dioxins and furans a value that is a fraction of this.

Baseline Risk Assessment for PCB - Maximum Cancer Risk for an Individual

Estimates of risk from exposure to PCB in soil and groundwater were made assuming the following exposure scenarios:

- Residential Scenario--The NWT site may sometime become a residential area. Humans could be directly exposed to PCB in soils as a result of ingestion and inhalation of contaminated soils, absorption of PCB from soils onto skin surfaces (dermal absorption), and indirectly through the ingestion of vegetables that are grown in contaminated soil. In addition, it was assumed that PCB-contaminated water from wells dug on the site would be used for drinking water.

- Grazing Scenario--Since the soils at and surrounding the site are designated as prime farmland by the Soil Conservation Service, the NWT site may sometime become farmland used for cattle grazing.

Residential Scenario

In this scenario, it was assumed that a person lives on the NWT site for an entire lifetime (70 years) and that:

1. Children (ages 0-5 years) ingest 0.05 to 0.5 grams of soil per day as a result of hand-to-mouth activity.

2. Older children and adults ingest from 0.05 to 0.25 grams of soil per day.

3. Inhalation rate is 20 m^3/day for all age groups.

4. The concentration of dust in the air at the site is 50 ug/m^3.

5. Skin contact with soil ranges from 0.1 g to 10 g per day for children, and is 0.1 g per day for adults.

6. Soil exposure occurs six months per year.

7. The absorption of PCB from soil in the gastrointestinal (GI) tract is 30%; through the lung, 50%; and through the skin, 1%.

8. Children and adults ingest two liters of water per day; absorption of PCB in the GI tract is 100%.

9. PCB uptake values [ug/g of PCBs in plant tissue (dry weight) per ug/g of PCBs in soil (dry weight)] for root crops, garden fruits, and leafy vegetables were estimated to be 0.150, 0.007, and 0.013, respectively. It was assumed that from 25% to 100% of the vegetables consumed by a person are grown on the NWT site.

10. PCB concentrations in soil and water will remain the same over the next seventy years (i.e., no degradation in soil occurs and no changes in groundwater concentrations occur).

These exposure parameters were selected from the literature because they appear to be the most reasonable and fairly conservative and because they give a range of exposure values with which to calculate risk. The final exposure parameters to be selected are the PCB soil and groundwater values.

Direct Soil Contact: Ingestion, Inhalation, and Dermal Absorption

For soils, the PCB concentrations in surface soil samples were used since human exposure to surface soil is of greatest concern in the residential scenario. Existing surface soil values at the site range from below the detection limit of 25 ppb (ug/kg) to 92 ppm (mg/kg). Risk estimates were performed using the weighted average surface soil concentration (6.6 ppm (mg/kg)) for the site as well as the weighted average soil concentration plus two standard deviations (36.9 ppm (mg/kg)) to account for the fact that some "hot spots" of contamination are present.

Using the average PCB soil concentration (6.6 ppm (mg/kg)) to calculate risk from ingestion, inhalation and dermal absorption results in an estimated upper-bound lifetime cancer risk of 2×10^{-5} to 7×10^{-5} (2 chances in 100,000 to 7 chances in 100,000). Using the average soil value plus two standard deviations (36.9 ppm (mg/kg)) results in an estimated upper-bound lifetime cancer risk that is about five to six times higher, or 1×10^{-4} to 4×10^{-4}.

Groundwater

Three analyses of the five on-site monitoring wells have been performed. Two of these (done in April 1985 and July 1987) used detection limits of 1.0 ug/l and showed no contamination. The third analysis, done by EPA in May 1985, used a detection limit of 0.02 ug/l. Contamination ranging from 0.03 ug/l to 0.12 ug/l was found in all five wells. The average value of 0.06 ug/l and the maximum value of 0.12 ug/l from the May 1985 analysis were used to estimate the upper-bound lifetime risk of developing cancer from drinking on-site groundwater. This resulted in risks of 1×10^{-5} and 3×10^{-5} for the average and maximum values, respectively.

Vegetables

To calculate exposure to PCB through ingestion of vegetables grown on the NWT site, it is necessary to have estimates of the PCB concentrations expected in vegetables grown on the site and estimates of the consumption rates of these vegetables.

Estimates of PCB Concentrations in Vegetables

To estimate the PCB concentrations in vegetables, both published and unpublished literature of PCB uptake into vegetables was reviewed. The literature available is very limited and uptake factors [ug/g of PCB in plant tissue (dry weight) per ug/g of PCB in soil (dry weight)] for a given vegetable varied greatly depending on several factors, including the type and amount of PCB isomer present in the soil and the type of soil. When possible, the uptake factors used in the Risk Assessment were those estimated from experiments where Arochlor 1260, Arochlor 1254, or highly chlorinated isomers were present in the soil at levels ranging from a few parts per million PCB up to about 100 ppm (mg/kg) PCB. These experiments were chosen since they most closely represent conditions at the site [i.e., presence of highly chlorinated PCB in soils at concentrations up to 92 ppm (mg/kg)].

The uptake factors used in this risk assessment and the information upon which they are based are summarized below. More details of these calculations are presented in Appendix 1 of the revised Risk Assessment, which is included in the Administrative Record for the site.

Root Crops

Data from Wallnofer, et al. and Iwata, et al. were used to estimate an uptake factor for carrots of 0.30. An uptake factor for radishes of 0.007 was also calculated from Wallnofer, et al. and uptake factors of 0.002 and 0.008 for beets and turnips, respectively, were calculated from Sawhney and Hankin.

It was assumed that 50% of the root crops consumed at the site would have an uptake factor equal to that of carrots (0.30) and 50% would have an uptake factor equal to that of the average of the other three root crops (0.006). This resulted in a weighted average uptake factor for all root crops of 0.15. It was assumed that all root crops are eaten unpeeled.

Garden Fruits

Garden fruits include such vegetables as beans, peas, eggplant, and tomatoes. Only one reference was found, that of Sawhney and Hankin, which contained information on any garden fruits (bean pods). Use of this data resulted in a calculated uptake factor for garden fruits of 0.007.

Leafy Vegetables

No data on PCB uptake into lettuce, spinach, and other commonly eaten leafy vegetables were found. However, data are available for beet greens and turnip greens; therefore, these data were used to calculate an uptake factor for the leafy vegetable group. Using the data of Sawhney and Hankin resulted in an uptake factor of 0.004 for beet leaves and uptake factors of 0.002 and 0.007 for turnip leaves. The data of Strek, et al. resulted in a calculated uptake factor of 0.45 for beet tops.

The uptake factor used for leafy vegetables (0.013) was estimated by calculating the geometric mean of the four values (0.004, 0.002, 0.007, 0.45) for beet greens and turnip greens.

Potatoes

Data provided by Lewis Naylor indicated no detectable uptake of Arochlor 1254 when potatoes were grown on soils containing from 0.08 to 1.3 ppm (mg/kg) Arochlor 1254. Therefore, an uptake factor of 0 was assumed for potatoes.

Vegetable Consumption Rates

Consumption rates for leafy vegetables, garden fruits, and root vegetables were calculated using data presented in "Methodology for the Assessment of Health Risks Associated with Multiple Pathway Exposure to Municipal Waste Combustor Emissions" (October 1986. EPA, external draft). In this document, consumption rates for various food groups (in grams per day, dry weight) are presented by sex and for certain age groupings. These consumption rates are based on a reanalysis of data compiled in the FDA Total Diet Study.

For this Risk Assessment, the consumption rates in the EPA document were adjusted to provide consumption rates for three age ranges covering 0-70 years of age:

1. A 0-11 month old child (based upon the consumption rate for a 6-11 month-old given in the EPA document).

2. An 11 month - 5 year-old child (based upon the consumption rate for a 2 year-old given in the document).

3. Older children and adults, from 5-70 years of age (based upon the average of all the consumption rates (male and female) for a 14-65 year-old given in the document).

Estimation of Increased Cancer Risk from Consumption of Vegetables

To estimate the risk from ingesting vegetables grown at the NWT site, two different scenarios were used. In the first, it was assumed that 100% of the vegetables consumed by a person were grown on the site; in the second, it was assumed that 25% of the person's vegetables were grown on the site.

Using the average PCB soil concentration (6.6 ppm (mg/kg)) to calculate risk from vegetables results in an estimated upper-bound lifetime cancer risk of 2 X 10^{-5} (assuming 25% of vegetables are grown on site) to 9 X 10^{-5} (assuming 100% of the vegetables are grown on site). Using the average soil value plus two standard deviations (36.9 ppm (mg/kg)) results in an estimated upper-bound lifetime cancer risk of 1 X 10^{-4} (if 25% of vegetables are grown on site) to 5 X 10^{-4} (if 100% of vegetables are grown on site).

Risk from all Exposure Routes for the Residential Scenario

The increased chance of developing cancer from the three routes of exposure to PCB in the residential exposure scenario can be obtained by adding the risks from direct contact to soils, from drinking water consumption, and from vegetable consumption (see Table 7). Using the average soil PCB concentration on site (6.6 ppm (mg/kg)) results in estimated risks ranging from 5 X 10^{-5} (using the less conservative ingestion and skin absorption factors, assuming 25% of vegetables consumed are grown on site, and using the average groundwater concentrations) to 2 X 10^{-4} (using the more conservative ingestion and skin absorption factors, assuming 100% of vegetables consumed are grown on site and using the highest groundwater concentration).

Using the higher soil PCB concentration (36.9 ppm (mg/kg), average plus two standard deviations) results in risks ranging from 2 X 10^{-4} (using the less conservative values) to 9 X 10^{-4} (using the more conservative values).

Grazing Scenario

In this scenario, it is assumed that the NWT site is converted to agricultural land that is used for beef and dairy cattle grazing. PCB can be ingested by cattle because they consume soil during foraging (about 0.72 kg of soil/day). Therefore, if soil is contaminated, beef and milk can also become contaminated.

To estimate the risk from ingesting beef and dairy products from cattle raised on the NWT site, two different scenarios were used. In the first, it was assumed that 100% of the beef and milk products consumed by a person are from cattle raised at the site; in the second, it was assumed that 25% of their beef and milk products come from cattle raised at the site. It was also assumed that the average soil value of 6.6 ppm (mg/kg) is the most appropriate to use for livestock grazing.

Uptake studies of PCB by cattle are not available; therefore, data on polybrominated biphenyls (PBBs) were used. Fries and Jacobs conducted studies in which cattle were kept in an area where soils were contaminated with PBBs. Under these conditions, the beef fat/soil ratio was 0.39 and the milk fat/soil ratio was 0.40. An assumption was made that the same fat/soil ratios exist for PCB.

In Schaum, the following table is given:

	Total Consumption Rate (g/person-day)	Percentage Fat	Fat Consumption Rate (g/person-day)
Beef	124	15	19
Dairy Products	550	7.8	43

Using these data, the cancer risk for a person who obtains all his beef and dairy products from cattle grazing on the site is estimated to be 1×10^{-2}.

The cancer risk for a person who obtains 25% of his beef and dairy products from cattle grazing at the site is estimated to be 2.5×10^{-3}.

Uncertainties in Risk Assessment Estimates

Many uncertainties exist and several conservative assumptions were used in generating the risk estimates just discussed. For example, the exposure scenarios presented are conservative ones and represent reasonable worst cases; yet they could potentially occur if the site is converted to residential or agricultural land. Several of the exposure parameters used (e.g., soil ingestion and dermal contact rates, vegetable uptake factors, uptake of PCB into cattle) are estimates and may be higher than actually would occur. Finally, the cancer potency value for PCB is based upon oral studies in animals at high concentrations and must be extrapolated to humans.

Therefore, these cancer risk numbers should not be considered precise numbers but rather conservative estimates that err on the side of safety. The actual risks due to potential future exposure at the site are unlikely to be higher than those presented here and could well be much lower; however, because PCB is a probable human carcinogen, it is prudent to use conservative estimates of risk in deciding what remedial action may be needed at the NWT site.

VII. Documentation of Significant Changes

The FS and the Proposed Plan recommended thermal destruction of PCB in PCB-contaminated soils with concentrations at or above 10 ppm (mg/kg).

Table 2

Baseline Risk Assessment for PCBs[1]

Residential Scenario

PCB Soil Levels	Estimated Upper-Bound Lifetime Cancer Risks			
	Direct Soil Contact	Consumption of Homegrown Vegetables	Drinking Water	Total Risk
6.6 ppm[2]	$2\text{-}7 \times 10^{-5}$	$2\text{-}9 \times 10^{-5}$	$1\text{-}3 \times 10^{-5}$	5×10^{-5} to 2×10^{-4}
36.9 ppm[3]	$1\text{-}4 \times 10^{-4}$	$1\text{-}5 \times 10^{-4}$	$1\text{-}3 \times 10^{-5}$	2×10^{-4} to 9×10^{-4}

Dairy and Beef Cattle Grazing

PCB Soil Levels	Estimated Upper-Bound Lifetime Cancer Risk
6.6 ppm	1×10^{-2}

1. Estimated upper-bound lifetime cancer risks.

2. Weighted average PCB soil value.

3. Weighted average PCB soil value plus 2 standard deviations.

Thermal destruction technologies include incineration and vitrification, as well as the thermal-based processes such as catalytic combustion and infrared destruction. Upon further review and cost analysis by EPA and further review of documentation of demonstrations of the vitrification technology, the best thermal destruction process for this site was determined to be vitrification. This determination was made based on 1) relative ease and foreseen schedule of mobilization, 2) advantageous costs over other thermal processes as reflected in the FS, 3) acceptability of the vitrified mass as an on-site residue over other conventional materials classified as ash, 4) the foreseen local acceptance of contained, "in-the-ground" thermal destruction of PCB contaminants over conventional incinerator operations, and 5) the criteria set forth for technology selection in the FS.

In addition, EPA has been provided with an updated cost for ISV for smaller scale applications ($250-$330/ton versus $180/ton). One unknown regarding ISV is the availability and cost of the appropriate high-voltage electrical service. EPA has been advised that in regions where electrical service is insufficient to accommodate the system, a mobile substation can be provided. This additional power source represents a ten to twelve percent increase in the project cost, yielding a minimum small-scale cost range of approximately $275-$350/ton. The cost of this technology is still within the range of costs cited in the Proposed Plan under thermal destruction.

VIII. Description of Alternatives

For this operable unit, remedial action technologies have been specifically evaluated and selected for application to the surface soil contamination and associated exposure/migration routes. During the initial stage of the FS process, a broad range of possible treatment/disposal technologies were identified and evaluated. Several alternatives were found to be acceptable in terms of the primary screening criteria used. These alternatives included the following:

- Off-site landfill
- Off-site incineration
- On-site thermal destruction
- On-site soil washing
- On-site immobilization
- On-site thermal stripping
- On-site dechlorination by potassium hydroxide and polyethylene glycols (KPEG)
- In situ vitrification
- In situ immobilization
- Capping
- Cover

Secondary screening of these technologies in terms of feasibility, environmental and public health concerns, and costs reduced the number of technologies to five. These five technologies were then assembled to develop the alternatives described below.

The estimated volume of soil contaminated with PCB at a concentration greater than or equal to 10 ppm (mg/kg) is approximately 1200 cubic yards. This volume estimate is based on a 25 X 25 foot soil sampling grid utilized for RI sampling and an assumption that the concentration of PCB decreases linearly in the soil with depth.

All alternatives (except the no action alternative) will include abandonment of the one on-site well in accordance with state law. In addition, a groundwater monitoring program and sampling of the deeper wood matrix of the barn timbers will be included as a part of the remedial action for the site.

Alternative 1: Off-Site Management

This alternative includes the excavation of PCB-contaminated soil with a concentration greater than or equal to 10 ppm, transport to a TSCA-approved chemical waste landfill for disposal, and backfilling of the excavated area, to grade. In addition, a two-foot soil cover would be applied and hydroseeded for stabilization.

The implementation of this alternative is relatively straightforward with the soils being transported in truckloads of approximately 10 cu yd per load.

This alternative would meet all Applicable, Relevant, and Appropriate Requirements (ARARs) including the "to be considered" requirements by removing the soils with a PCB concentration greater than or equal to 10 ppm from the site. The risk due to exposure to the residual contamination (soils with PCB concentrations less than 10 ppm (mg/kg)) would be significantly reduced with the placement of the two-foot clean soil cover.

Covers less than two feet in depth are not considered adequate for future use of the site (i.e., crop growth or cattle grazing) and would be used only with conditions/restrictions placed on future property use. The two-foot depth limit is derived from recommended tilling depths for common root crops.

Alternative 2: Vitrification

Vitrification is a thermal destruction/stabilization process that converts contaminated soil into a chemically inert, stable glass and crystalline product. Four electrodes are placed in a square arrangement and inserted into the ground to the desired treatment depth (see Figure 3). Because the soil is not electrically conductive, a mixture of flaked graphite and glass frit is placed among the electrodes to act as a starter path. An electrical potential is applied to the electrodes, which establishes an electrical current in the start path. The resultant power heats the starter path and surrounding soil to 3600° F, well above the initial melting temperature or fusion temperature of soil (2000° and

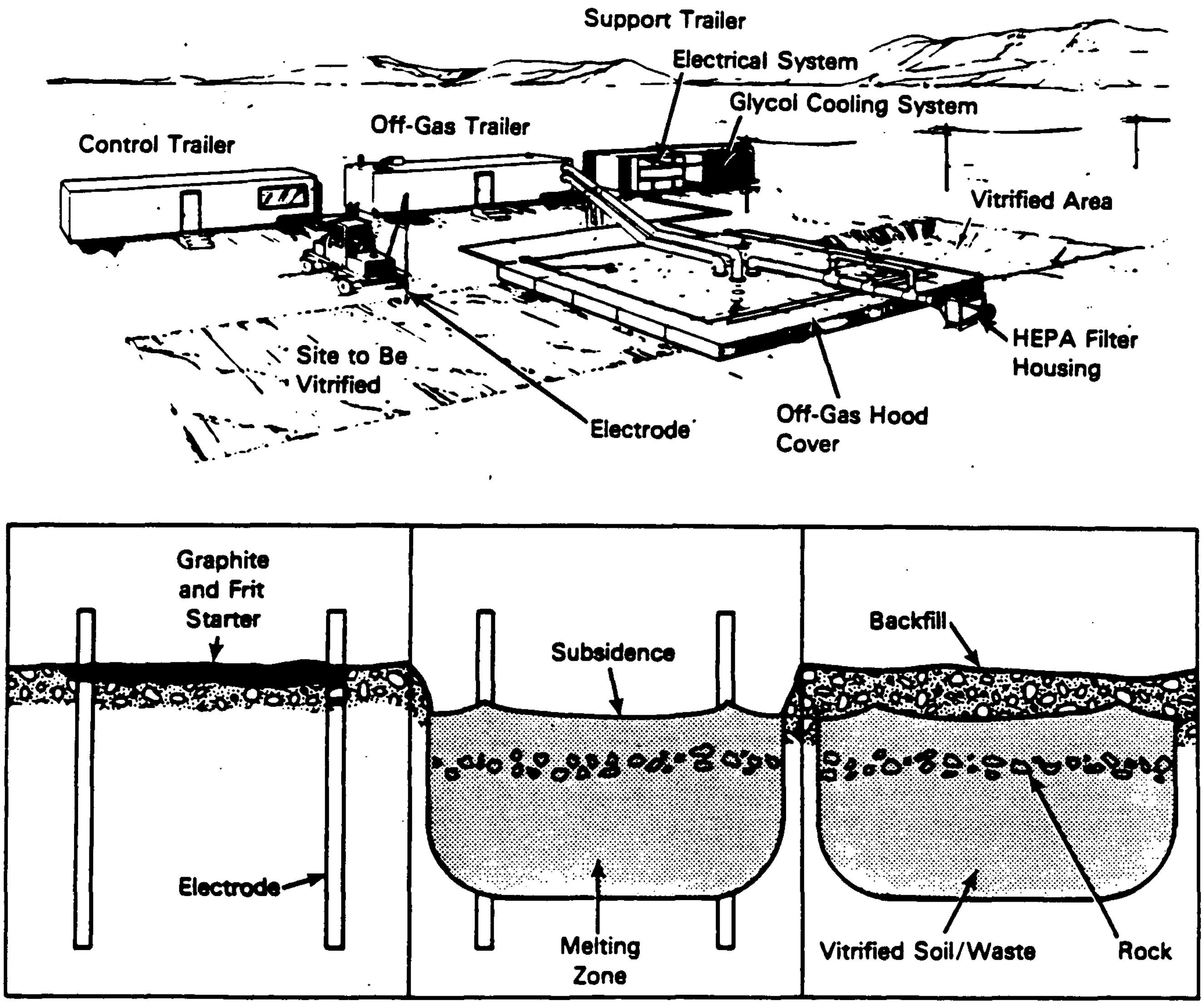

Figure 3

In Situ Vitrification

2500°). The graphite starter path is eventually consumed by oxidation, and the current is transferred to the molten soil, which is now electrically conductive. As the vitrified zone grows, it incorporates nonvolatile elements and destroys organic components (PCB) by pyrolysis. The pyrolyzed by-products migrate to the surface of the vitrified zone, where they combust in the presence of oxygen. A hood placed over the processing area provides collection of the combustion gases, which are drawn off to the off-gas treatment system.

Because the depth of contamination in the soil at NWT is relatively shallow, use of the vitrification process would require staging the contaminated soil to a trench or stockpiling it above ground in order to achieve a more appropriate process depth. A typical configuration for treatment is a 20 to 25 foot square, 10 to 15 feet deep. The soil at the site would have to be placed in such a configuration in order to make the use of vitrification cost effective.

The soil characteristics at the NWT site are compatible with use of this technology. The gravelly and sandy soil do not interfere with the process; however, moisture content of the soil could cause additional costs.

Prior to the implementation of this technology, a site-specific treatability test would be required to:

1. Obtain confirmation that ISV is technically applicable to the PCB-contaminated soils at the site.

2. Confirm that the treatment levels required (i.e. a residual product that contains less than 1 ppm PCB) can be obtained.

3. Determine any technical factors that may cause the cost of remedial operations to vary from the FS estimates.

This alternative would meet all ARARs (including the "to be considered" requirements) by destroying the PCB contamination in the treated soils, such that the concentration of PCB in the residual remaining after treatment is less than 1 ppm.

The risk due to exposure to the residual contamination (soils with PCB concentration less than 10 ppm (mg/kg)) would be significantly reduced with the placement of the two-foot clean soil cover.

The vitrified mass would be left on site once it was determined to contain less than 1 ppm of PCB. It is estimated that the remaining vitrified mass would occupy approximately one-sixth of an acre.

<u>Alternative 3: Soil Washing</u>

Soil washing involves the on-site excavation and extraction of organic contaminants (PCB) by contacting soil particles with a solvent. The solvent is then separated from the soil and the solute is concentrated by distillation or other processes. The solvent may then be recycled to the extraction process, and the washed soil is returned to the site. The only type of solvents that would be appropriate for use at the NWT site are chemicals that are proven not to pose a public health or environmental hazard due to the high level of the groundwater table. The concentrated solutes and/or unrecycled contaminated solvent must be handled as hazardous waste after treatment is completed. Typically, the PCB residues from pilot tests exceed 500 ppm (mg/l) and must, therefore, be incinerated or further treated to destroy the PCB residues. These final treatment technologies include hydrolysis, ultrafiltration, reverse osmosis, carbon adsorption, dechlorination, and the light-activated reduction (LARC) process.

The majority of the techniques for soil washing are in the pilot research phase, yet preliminary field work indicates that soil washing may be a feasible alternative for the NWT site. The EPA high pressure soil washing technique, using only water and surfactants as solvents, would significantly reduce the volume of leachate that would require further treatment. Another advantage is that this method does not introduce additional chemicals into the site soil.

Prior to implementation of this technology, a site-specific treatability test would be required to:

1. Determine whether soil washing is technically applicable to the PCB-contaminated soils at the site.

2. Confirm that the treatment levels required can be obtained.

3. Determine any technical factors that may cause the cost of remedial operations to vary from FS estimates.

4. Determine which leachate treatment technology would be most applicable.

This alternative would meet all ARARs (including the "to be considered" requirements) by removing the PCB contaminaton from the treated soils to a concentration of less than 2 ppm.

The risk due to exposure to the residual contamination (soils with PCB concentration less than 10 ppm (mg/kg)) would be significantly reduced with the placement of the two-foot clean soil cover.

<u>Alternative 4: Asphalt Cap</u>

The surface sealing technique of using asphalt as a capping material is an effective measure for reducing or limiting the exposure pathways of direct contact, windblown dust, and surface water transport. Although the contaminant remains in place, it is confined from wind and surface water.

However, to be effective as a long-term remedial action measure, the asphalt cap must be periodically maintained. The design must also take into account measures for controlling increased or redirected storm water runoff.

Use of an asphalt cap at the site is considered only as a stand-alone alternative. The other alternatives (i.e., soil removal and/or treatment/disposal) will be sufficient to eliminate requirements for a subsequent cap. Therefore capping was not considered as a supplementary technology in the development of the other remedial alternatives.

Control of future land use is viewed as a supplemental requirement where capping is implemented in order to assure future integrity of the cap structure.

Surface sealing with an asphalt cap will provide protection against direct contact with contaminated materials and the migration of subsurface contamination; however, this technology will not meet the ARARs (TSCA 761.60-761.79) without redesignating this site as a TSCA landfill, and, therefore, restricting land use in perpetuity.

This alternative would not meet the "to be considered" requirements because it would not meet the cleanup goal (TSCA spill cleanup policy) of removing soils contaminated with PCB at a concentration greater than or equal to 10 ppm.

Alternative 5: Soil Cover

This alternative includes the application of a soil cover without previous excavation or treatment of contaminated materials.

For this site, covers, in contrast to caps, are not designed to significantly decrease infiltration into the underlying strata. A cover at this site will decrease the potential for direct contact and/or physical dispersal of surface soil only. Its performance would be attributed to short-term (10-15 years) isolation of underlying contaminated soil. For this reason, a cover at this site has been viewed as a complementary technology, used as a final measure in addition to other cleanup processes.

A soil cover of two-foot thickness provides some level of protection for the environment in that direct contact and surface erosion/ transport are controlled. However, application of a soil cover alone (without prior cleanup) does not meet the cleanup goal of 10 ppm (mg/kg); nor does it meet the designated ARARs for the site without redesignating the site as a TSCA landfill.

Alternative 6: No Action

This alternative must be considered as a viable option when the existing and future risks attributable to the site are within acceptable ranges. The "no action" alternative infers that the status quo conditions at the site will be allowed to persist and that remedial actions to protect human health and the environment are unwarranted.

No action at the NWT site constitutes on-site (and uncontrolled) disposal of PCB-contaminated wastes and does not meet the designated ARARs for the site.

IX. Summary of the Comparative Analysis of Alternatives

For the five finalists, the following nine criteria, as outlined in section 121 of SARA and the RI/FS guidance, were explored during the final analysis of remedial alternatives:

Short- and Long-term Effectiveness

Each remedial alternative considered during the FS process represents some identifiable risk to community health and safety during the implementation stages. However, for most processes, these risks can be identified and mitigated through proper process control, monitoring, and execution.

During removal of soil to an off-site facility (Alternative 1), some potential exists for distribution of contaminated soil from trucks and other equipment passing through the adjacent community. This can be mitigated by covering the soil loads and, if necessary, applying moisture to dry, dusty loads. The short-term threat due to fugitive dusts generated during excavation could be mitigated, if necessary, by applying moisture.

On-site vitrification (Alternative 2) may create air emissions, but effective and reliable technologies have been developed for capturing and/or destroying contaminants in this process. As there would be some excavation required during the implementation of this remediation technique, mitigation of fugitive dusts generated would be required.

Soil washing (Alternative 3) does not present any measurable risk to the community. The only exception would be the release of extractants or PCB while mixing the soil during the extraction process. The process also generates a PCB concentrate that must be transported off site and disposed of. Again, there would be some excavation required during the implementation of this remediation technique, and mitigation of fugitive dusts generated would be required.

Capping or application of a soil cover at the NWT site (Alternatives 4 and 5) do not pose any unique short-term risk to the adjacent community beyond those inherent in any construction activity. The only exception would be accidental tracking of contaminated soils off site by heavy equipment. However, this risk is common to all the alternatives discussed above and can be reduced by proper project management and equipment decontamination protocols prior to exiting the site.

The long-term effectiveness and risk reduction for the six alternatives is estimated to be highest for those that actually treat and/or destroy PCB contaminants in the soil (i.e., vitrification and soil washing). While off-site disposal of soils in a landfill also reduces the on-site concentrations of PCB, it potentially transfers the contaminant problem to another land-based facility. Further, off-site transportation and disposal of hazardous substances without treatment should be the least favored alternative where practicable treatment technologies are available [CERCLA §121(b)]. Caps must rely on land-use restrictions, regular inspections, and scheduled maintenance to assure their long-term performance. Installation of a cap or soil cover is not a permanent solution and would require regular maintenance.

Reduction of Toxicity, Mobility, and Volume

Landfilling of soils off site does nothing to physically destroy or treat PCB-contaminated soils from the site. In contrast, vitrification effectively destroys the contaminants in the soil matrix and thereby permanently reduces toxicity, mobility, and volume. Soil washing removes the contaminants from the soil matrix; however, this technology may introduce new problems because residual washing agents may still be present in the treated soil to be redeposited on the site, and the concentrated PCB extracts require subsequent treatment or disposal. Installation of a cap or soil cover does nothing to address the volume or toxicity of the contaminant but has the potential of reducing contaminant mobility.

Implementability

All of the finalist alternatives are technically feasible methods for addressing the PCB contamination at the site. Alternative 1 (off-site landfilling) is probably the most commonly practiced method of disposal but does not result in actual detoxification or destruction of the PCB. Also, landfilling of PCB-contaminated soils is more commonly practiced for highly contaminated materials (above 50 ppm (mg/kg)) when on-site options are not as feasible.

Alternative 2 (in situ vitrification) has been successfully used in engineering-scale studies involving PCB-contaminated soil; however, it has not yet been demonstrated commercially. A site-specific treatability test would be required prior to implementation of this technology as a remedial action.

Alternative 3 (soil washing) would also require site-specific treatability testing of soil from the site to evaluate its effectiveness. In addition, the concentrated process waste (leachate contaminated with PCB) would still require off-site treatment/disposal.

During the course of the FS, a number of surface-sealing methods (capping and soil covers) were evaluated. The use of an asphalt cap was finally selected as the most cost-effective capping method for further consideration as Alternative 4. The installation of an asphalt cap is straightforward; however, the long-term effectiveness can only be assured through routine monitoring and maintenance of the paved surface. Because the subsurface soils would not be treated or altered, the site would require classification as a TSCA landfill.

Alternative 6, the "no action" alternative, is included in the FS to assess the current site status. It serves as a reference point for measuring the relative effectiveness of other alternatives and determining if cleanup is necessary. If accepted, the no-action alternative would leave the site as it is, with no constraints on continued exposure to hazardous materials for those who enter the site and with possible migration of contaminants into the shallow potable water aquifer. It was determined that this alternative is unacceptable because the environmental and public health risks would not be reduced.

Cost

The cost estimates for each process for cleaning up or capping PCB-contaminated soil to the 10 ppm (mg/kg) level are shown in Table 3. The cost elements considered and included as applicable for each of the assessed technologies include the following:

- Treatability testing (where applicable)
- Mobilization/demobilization
- Confirmatory testing
- Excavation/soil staging
- Processing (including utilities, chemicals, labor, etc.)
- Construction materials
- Backfill

The no-action alternative has only those implementation costs common to all alternatives, i.e., the cost of the five-year review required by CERCLA, but the cost of environmental degradation was not assessed.

Compliance with Other Laws and Regulations

As part of the FS process, each alternative was evaluated to determine whether or not it met ARARs. The chemical-specific requirement for this analysis is TSCA, specifically, TSCA 40 CFR 761.60-761.79, Subpart D: Storage and Disposal.

This regulation states that PCB at concentrations greater than or equal to 50 ppm must be disposed of in an incinerator which complies with § 761.70. However, the regulation goes on to state that non-liquid PCB-contaminated materials, such as soil, can be treated by an alternate methodology as described in § 761.60(e) or disposed of in a chemical waste landfill that complies with § 761.75. In order to meet the requirement that an alternate methodology be equivalent to thermal treatment, a destruction removal of 99.9999% should be achieved. However, other factors may have to be considered in the determination of equivalency. For example, the mathematically calculated PCB destruction efficiency of a process may be less than 99.9999% due to the analytical Limit of Quantification (LOQ) for PCB. The LOQ for PCB is 2 ppm and has been adopted as the required treatment level for PCB-contaminated material covered by TSCA (i.e., any treatment of PCB-contaminated material must reduce the level of contamination to less than 2 ppm before the material can be disposed of on site).

In addition, the TSCA PCB spill cleanup policy (TSCA 40 CFR Part 761, Subpart G 761.120-761.139) provides guidance on PCB levels that are considered protective to leave on site based on the location and consequent exposure scenarios of the site. The current policy requires that the material be treated to less than 2 ppm PCB before it can be replaced or left on site.

TABLE 3: SUMMARY OF ESTIMATED COMPARATIVE COSTS FOR EACH ALTERNATIVE

ALTERNATIVE	TOTAL COST ($ X 1,000) AT: EXCAVATION DEPTH (FT) 0.5	1	1.5	2	2.5	3
1 OFF-SITE MGT/LANDFILL	$101	$177	$254	$330	$407	$483
2A THERMAL DESTRUCT.: ISV	$287	$448	$610	$771	$933	$1,094
2B THERMAL DESTRUC: INCIN.	$448	$641	$833	$1,026	$1,219	$1,412
3 SOIL WASHING	$302	$504	$707	$909	$1,111	$1,313
4 ASPHALT CAP	$36	$36	$37	$37	$37	$38
5 SOIL COVER	$19	$19	$19	$19	$19	$19
6 NO ACTION	$0	$0	$0	$0	$0	$0

(assumes contaminated area of 16,875 square feet)

However, the state of Washington Dangerous Waste Regulations (WAC 173-303) require various analytical results depending on the sampling/analytical procedures used. The most stringent requirement is 1 ppm PCB for treated material; therefore that is the standard that must be met for the treated soils at this site.

- The NWT site is classified as a non-restricted access area (i.e., residential area). Even though it is surrounded by a chain-link fence, it is considered to be a non-restricted access area due to its close proximity (less than .1 km) to a residential area. Based on this non-restricted access classification and the PCB concentrations in the soil, the TSCA spill cleanup policy (40 CFR 761.120, Subpart G) requires a 10 ppm (mg/kg) cleanup level (provided that soil is excavated to a minimum depth of 10 inches) in addition to at least ten inches of clean backfill (i.e., soil with less than 1 ppm PCB) for this site.

Alternatives 1, 2, and 3 (landfilling, vitrification, or washing of PCB-contaminated soils) are all estimated to meet the requirements and limitations of both the TSCA regulation and spill cleanup policy. Capping and covering of the site without initial cleanup to 10 ppm (mg/kg) does not meet the intent of the TSCA spill cleanup policy and would have to meet the design requirements for on-site disposal of wastes as specified under TSCA.

Overall Protection

All of the finalist cleanup alternatives (except the no action alternative) will afford an enhanced level of environmental protection in the vicinity of the site. As indicated in the discussion of public health below, each alternative would protect the environment by removing, destroying, or isolating PCB compounds in the soil. The candidate measures will reduce the potential for these compounds to migrate off site via windblown dust or storm water runoff.

Excavation of soils and hauling to an off-site landfill (Alternative 1) will protect the environment in the vicinity of the site, but will increase the risk to the environment along the haul routes to the distant landfill and at the landfill.

Vitrification (Alternative 2) will result in the destruction of PCB in the soils and therefore provides the most permanent solution to the PCB contamination problem. Destruction of PCB in the vitrified mass would permit future unrestricted land use at the site, and potentially the site could be used as farmland or for residential purposes. Although there is a small potential for airborne release from the ISV process, emissions can be effectively controlled and are not viewed as a significant environmental risk for this technology.

Soil washing (Alternative 3) requires direct mixing of the soil with an extracting liquid. The concentrated waste extract must be transported and disposed of off site. Similar to the landfill alternative, this alternative would reduce the risk in the vicinity of the site, but has the potential to increase the risk with respect to the ultimate placement/disposal of the contaminated extract.

The capping and cover processes represented by Alternatives 4 and 5 do not address contaminants that remain in the soil and would require designating the site as a TSCA landfill facility. Environmental and public health protection is contingent upon long-term maintenance of the capping system, and land use restrictions would need to be imposed in perpetuity.

The no-action alternative represents no enhanced level of public health or environmental protection over current site conditions.

Public health risks from the NWT site arise from the following:

1. Potential contact, ingestion, or inhalation of PCB-contaminated soil.

2. Potential agricultural activities (growth of vegetables or dairy and beef cattle grazing) associated with the soil that might result in ingestion of accumulated PCB.

3. Contamination of shallow groundwater resources.

In order to assess the effectiveness of each cleanup alternative, each is evaluated in terms of the "residual" risk at the site after the cleanup is finished. This is done by examining the mitigating effect each cleanup alternative would have on the pathways listed above and by examining the impact of the degree of cleanup achieved (i.e., the residual PCB concentrations).

The highest degree of risk mitigation (the lowest final risk levels) is achieved through surface sealing (i.e., a barrier technology such as a cap or cover), since all potential risks posed by contaminated surface soils are eliminated. However, the long-term effectiveness of these measures is highly dependent on regular inspection and maintenance, as well as strict limits on future land use. All other processes that treat or dispose of contaminated soils also achieve risk reduction, but since some residual is left in the soils, there is still a residual risk level. This was the key reason for selecting the best treatment/disposal technology <u>and</u> combining it with a final soil cover. The resulting preferred alternative achieves both the soil cleanup objectives (removing or treating soil contaminated with more than 10 ppm (mg/kg) PCB) <u>and</u> reduction of the potential for direct contact with residual PCB levels (below 10 ppm (mg/kg)) by covering with clean soil.

Summary of Evaluation of Final Alternatives

Criteria	Alt 1: Landfill	Alt 2: Vitrification	Alt 3: Soil Washing	Alt 4: Asphalt Cap	Alt 5: Soil Cover	Alt 6: No Action	
Short-term Effectiveness	Community and worker exposure to PCBs via airborne dust could occur during the excavation and hauling phase. Estimated potential for PCB exposure due to airborne dust is less than a month.	Potential exists for community and worker exposure during excavation. Excavation would take approx. 2 weeks. The potential for process off-gases to escape from the air emissions hood exists.	Potential exposure to PCB dust during excavation exists. In addition, the potential for extractants to be released into the environment during the mixing phase exists. Soil washing process takes 4-12 mo.	The cap could be installed in 4-6 weeks. However, a risk is posed by fugitive dust generated during the grading process.	A 2 ft. soil cover would reduce direct contact with the contaminated soil. The import and grading of the cover may generate fugitive dust. Takes approx. 4-6 weeks.	Involves continuation of the status quo conditions at the site.	
Long-term Effectiveness and Permanance	Reduces the mobility and volume of contaminants in the site soil. However, it does not offer a permanent solution to the contamination problem, only transfers it to another location.	Effectively destroys PCB contamination in the soil through pyrolysis.	Soil washing with water is reported to be a reliable method for removing PCB contaminants from the soil. Process may not completely remove PCBs from the soil. Thus, a potential threat to groundwater may still exist.	The surface cap is not a permanent alternative because its effectiveness is highly dependent on regular inspection and maintenance.	Long-term reliability is questionable due to the potential for erosion and uncontrolled infiltration of surface water.	Involves continuation of status quo.	2
Reduction of Toxicity, Mobility, and Volume	Does not destroy or treat PCB contaminants. The waste is simply transported to another location.	Vitrification is a thermal destruction process that converts contaminated soil into a chemically inert, stable glass and crystalline product.	Soil washing removes approximately 7[illegible]% of PCB residues from treated media. Removed residues would need further treatment disposal	This is not a permanent method and does not treat, destroy or reduce the contaminated soil.	See alternative 4	Involves the continuation of the status quo. See alternative 4	3

Summary of Evaluation of Final Alternatives

Criteria	Alt 1: Landfill	Alt 2: Vitrification	Alt 3: Soil Washing	Alt 4: Asphalt Cap	Alt 5: Soil Cover	Alt 6: No Action	
Implementable	This is a reliable and effective approach to cleaning up the site. Process utilizes common construction methods.	Process machinery requires mobilization. Treatability test is required.	Process is in pilot testing stage. Treatability test is required.	Technical feasibility of implementing this alternative is high. Process utilizes common construction methods.	See alternative 4	Technical feasibility is high, but it does not meet the cleanup goals or agency objectives of adequate site control.	4
Cost	$330,000 Total cost includes on-site excavation, hauling and disposal costs.	$771,000 Cost includes mobilization and demobilization, sampling and treatability test, soil excavation and soil treatment.	$909,000 Does not include the necessary O and M costs.	$37,000	$19,000	**No capital expenditure, but** cost of environmental degradation was not assessed.	5
Operation and Maintenance Requirements	None	None	No information currently available.	$1,600/per year	$2,000/per year	None	6
Compliance with ARAR'S	**Complies with TSCA** **requirement 40 CFR** 761.60-761.79, Subpart D: Storage and Disposal	**See** Alternative 1	See Alternative 1	Does not meet TSCA requirements unless the site is classified as a TSCA landfill.	See Alternative 4	See alternative 4	7

Summary of Evaluation of Final Alternatives

Criteria	Alt 1: Landfill	Alt 2: Vitrification	Alt 3: Soil Washing	Alt 4: Asphalt Cap	Alt 5: Soil Cover	Alt 6: No Action	
STATE ACCEPTANCE	The Washington State Dept. of Ecology has sustained an on-going involvement in the decision-making process for this site. The State agrees that the statutory requirements are being addressed and concurs with EPA's recommendations.	See Alternative 1.	See Alternative 1.	See Alternative 1.	See Alternative 1.	See alternative 1.	8
COMMUNITY ACCEPTANCE	The Proposed Plan for NWT had a seven week public comment period. Concern was expressed through a petition, signed by approx. 100 people, that any cleanup action at the site would result in an increase in their utility rates.	One letter was received questioning the ISV technology.	See Alternative 1.	See Alternative 1.	See Alternative 1.	See Alternative 1.	9

X. The Selected Remedy

Approximately 1,200 cubic yards of soil shall be excavated within the areas of PCB contamination of a concentration greater than or equal to 10 ppm (mg/kg) (Figure 2). The actual excavation boundaries will be more closely defined in the Remedial Design/Remedial Action phase. The excavated soils will be treated through in situ vitrification such that the concentration of PCB in the remaining residual is less than 1 ppm (mg/kg).

The excavated area will be backfilled; then the entire site will be covered with a two-foot thick layer of native fill. The site will be hydroseeded to stabilize the fill cover.

The on-site well will be abandoned in accordance with Washington state law.

Post-Cleanup and Continued Site Monitoring

Part of the site remediation will include plans for sampling the deeper wood matrix of the barn, post-cleanup confirmatory sampling, and ongoing groundwater monitoring to document the effectiveness of the implemented measures.

Barn

Because of the uncertainty relative to the effectiveness of decontamination of the deeper wood matrix of the barn, additional sampling and analysis of the wood is required. Core samples of the wood in the barn will be obtained and PCB analyses will be performed on subsamples taken from several different depths of the core. If core samples indicate significant levels of PCB in the wooden structure, the barn will be acted upon as a separate operable unit.

Groundwater

Groundwater monitoring is an important activity which will be included as part of the remedial action. As discussed in the RI report, PCB has a low potential to migrate from soil into groundwater. Investigations of the rates of PCB desorption from soils suggest that the relationship between soil PCB concentration and transfer to percolating water is highly dependent on the solubility of the particular PCB cogener, water flow rate, and the diffusion rate of PCB out of the soil matrix. The aqueous solubilities of PCB are extremely low and are most likely the primary factor limiting PCB concentrations in slow-moving groundwater in contact with highly contaminated soils.

In the past, certain areas of the site, such as the seepage pit, had very high PCB levels in the soil. At these "hot spot" areas there was assumed to be a higher potential for migration of PCB into groundwater than at other areas. Hot spots were excavated during the removal action in 1985 on the basis that this action would reduce the driving force for contamination to enter groundwater.

If the remainder of the areas of soil where PCB greater than 10 ppm (mg/kg) are remediated, the potential for future groundwater contamination will be greatly reduced. Lower levels of PCB which would remain in soil should not contribute significantly to groundwater contamination. Nevertheless, there is uncertainty regarding the degree and extent of low part per trillion contamination of groundwater which could have resulted in the past from migration of PCB from the hot spot areas. Therefore, a groundwater monitoring and aquifer characterization program/plan will be prepared that is designed to provide sufficient information upon which to base a decision regarding the need for groundwater remediation.

Several factors are important in obtaining the necessary groundwater information and should be considered in the design of the groundwater monitoring program:

- Characteristics of aquifer. The existing well log data for monitoring wells and residential wells do not appear to provide sufficient hydrogeologic information to characterize the aquifer. The need for additional monitoring wells that fully penetrate the aquifer and for the performance of pump tests to define the site-specific aquifer characteristics must be evaluated in the design of the groundwater monitoring program.

- Direction of groundwater flow. The groundwater table has a low gradient near the site. Very little information exists relative to the direction of groundwater flow. Based on the measurement of static water levels at two different times, the flow appears to deviate slightly to the east and west of due north. There is uncertainty whether seasonal effects would cause a change in flow direction which would in turn impact contaminant movement. Monitoring groundwater levels at scheduled intervals and taking samples from residences found to be downgradient of the site will be a requirement of the groundwater monitoring program.

- Sampling point for residential wells. Sampling residential wells at a point before the water enters the houses in order to avoid interferences from trace compounds that may be associated with PVC piping will be a requirement of the groundwater monitoring program.

- PCB detection limit. PCB detection limits should be established at or below five parts per trillion (5 ppt) to allow quantification of the risk of drinking groundwater at the 10^{-6} cancer risk level. To achieve reliable results at this low level, it is essential that careful adherence to sampling and analytical protocols and quality control practices be followed.

XI. Statutory Determinations

Protection of Human Health and the Environment

The selected remedial alternative best meets all statutory requirements, particularly those of CERCLA as amended by SARA. The use of the ISV technology and the subsequent placement of two feet of clean fill over the site best protects human health and the environment by eliminating PCB contamination above the 10 ppm level from the site and creating a barrier between any remaining low level contamination and the existing ground surface. The two-foot depth for clean fill was derived from the recommended tilling depths for common root crops and should therefore be protective for both residential and agricultural future uses.

Any short-term risks due to implementation of this remedy can be mitigated/controlled through proper process control, monitoring, and process execution. Continued protection at the site is assured through the barrier layer and the groundwater monitoring program. In addition, since the remedial technology chosen for the site will destroy the PCB contamination, there is the added dimension of overall environmental protection.

Attainment of ARARs

The selected remedy will meet all applicable requirements as listed below.

- TSCA PCB regulations in 40 CFR 761.60 - 761.79, which address the requirements for storage and disposal of PCB-contaminated media.
- OSHA regulations in 20 CFR Subpart 1910.120, which address worker protection standards for employees involved in operations at CERCLA sites.
- Department of Transportation: Hazardous Materials Regulations in 49 CFR, Subchapter C, which address shipment of any hazardous material off site.

New Waste Generation--Off-gas Treatment

- Washington State Dangerous Waste Regulations (WAC 173-303)

  The vitrification process generates off-gases from the soil that are collected under a hood and are cooled, scrubbed, filtered, and chemically treated before release into the atmosphere. There may be dangerous wastes generated from the off-gas treatment process that will require designation and treatment or disposal under the dangerous waste regulations.

  070 Designation of Dangerous Waste. This section describes how to determine whether a waste is a dangerous waste.

110 Sampling and Testing Methods. This section describes the testing methods which may be used in designating a dangerous waste.

140 Land Disposal Restrictions. The purpose of this section is to encourage the best management practices for dangerous wastes according to the priorities of RCW 70.105.150 which are, in order of priority: reduction; recycling; physical, chemical and biological treatment; incineration; stabilization and solidification; and landfill. This section identifies dangerous wastes that are restricted from land disposal, describes requirements for restricted wastes, and defines the circumstances under which a prohibited waste may continue to be land disposed.

141 Treatment, Storage, or Disposal of Dangerous Waste. This section describes the requirements for offering a dangerous waste to a TSD facility.

145 Spills and Discharges into the Environment. This section sets forth the requirements for any person responsible for a spill or discharge into the environment.

150 Division, Dilution, and Accumulation. This section prohibits dividing or diluting wastes to evade the intent of this regulation.

170 Requirements for Generators of Dangerous Waste.

180 Manifest. Before transporting dangerous waste or offering dangerous waste for transport off the site of generation, the generator shall prepare a manifest and shall follow all applicable procedures described in this section.

190 Preparing Dangerous Waste for Transport. This section details requirements for packaging, labeling, marking, and placarding before transporting off site or offering for off-site transport any dangerous waste.

200 Accumulating Dangerous Waste On Site. A generator may accumulate dangerous waste on site for ninety days or less after the date of generation without being subject to storage facility requirements.

201 Special Accumulation Standards. This section provides for an extended accumulation period based on the quantity of dangerous waste generated per month.

202 Special Requirements for Generators of Between Two Hundred Twenty and Two Thousand Two Hundred Pounds per Month that Accumulate Dangerous Waste in Tanks.

210 Generator Recordkeeping.

220 Generator Reporting.

230 Special Conditions.

Air Emissions

The vitrification process generates off-gases from the soil that are collected under a hood and are cooled, scrubbed, filtered, and chemically treated before release into the atmosphere. The air emissions generated are addressed by the following directly applicable requirements.

- Washington State General Regulations for Air Pollution Sources (WAC 173-400)

  Section 040 General Standards for Maximum Emissions. This section addresses control of fugitive dust and emissions during excavation and other field activities.

- Implementation of Regulations for Air Contaminant Sources (WAC 173-403)

  Section 050 New Source Review. Subsection (7) - Portable Sources. This subsection describes air emission requirements for new sources.

Well Construction and Abandonment

- Minimum Standards for Construction and Maintenance of Wells (WAC 173.160)

  This regulation addresses how wells will be installed and abandoned by licensed well contractors. Though reporting and recording requirements are not considered substantive, well contractors are required to submit well construction and abandonment information.

  Part One - General Requirements.

  020 General (introduction) and Subsection (1). This section provides minimum well construction standards and details conditions that require well construction standards in excess of the minimum.

  065 Design and Construction.

  075 Design and Construction - Sealing of Casing - General.

  085 Capping.

  Part Two - Water Supply Wells.

  415 Abandonment of Wells. This section applies to the abandonment of the water supply wells at the site.

Part Three - Resource Protection Wells.

500 Design and Construction - General.

510 Design and Construction - Surface Protective Measures. Subsections (1), (2), (3), and (5).

520 Design and Construction - Casing.

530 Design and Construction - Cleaning.

540 Design and Construction - Well Screen, Filter Pack, and Development.

550 Design and Construction - Well Seals. Subsection (1), (2), and (3) without the variance requirement.

560 Abandonment of Resource Protection Wells.

The selected remedy will meet all <u>relevant and appropriate</u> requirements as specified below.

Soil Contamination

- <u>Washington State Dangerous Waste Regulations (WAC 173-303)</u>

  145 Spills and Discharge into the Environment. This section sets forth the requirements for any person responsible for a spill or discharge into the environment. The vitrification process and associated support activities create the potential for a spill or a discharge as a result of materials handling or equipment malfunction.

  610 Closure and Postclosure. Subsection (2a) - Closure Performance Standard. The owner or operator must close the facility in a manner that minimizes the need for further maintenance; controls, minimizes or eliminates to the extent necessary to protect human health and the environment, postclosure escape of dangerous waste, dangerous constituents, leachate, contaminated run-off, or dangerous waste decomposition products to the ground, surface water, groundwater, or the atmosphere; and returns the land to the appearance and use of surrounding land areas to the degree possible given the nature of the previous dangerous waste activity.

  (Closure, for the purpose of interpreting these relevant and appropriate requirements is considered equivalent to completion of the remedial action.)

Subsection (7d) - Postclosure Care and Use of Property. Postclosure use of property on or in which dangerous wastes remain after partial or final closure must never be allowed to disturb the integrity of the final cover or any other components of any containment system, or the function of the facility's monitoring systems, unless the department finds that the disturbance is necessary to the proposed use of the property and will not increase the potential hazard to human health or the environment, or is necessary to reduce a threat to human health or the environment.

Subsection [10b (1)(A)(B)] - Notice in Deed to Property. Within sixty days of closure the owner or operator must record, in accordance with state law, a notation on the deed to the facility property, or on some other instrument which is normally examined during title search, that will in perpetuity notify any potential purchaser of the property that the land has been used to manage dangerous waste and that its use is restricted as specified in subsection (7d).

645 Groundwater Protection. Subsection (8, a through g) - General Groundwater Monitoring Requirements. The owner or operator must comply with the requirements of this subsection for development of a groundwater monitoring program that is specified in the ROD as part of the remedial action.

655 Land Treatment. Unsaturated Zone Monitoring. Subsection (6).

(The purpose of the monitoring specified in this section is to determine what effect the vitrification process has on the soil that surrounds the vitrified mass. It is intended as a one time event, provided it is performed in such a manner that reliable conclusions can be clearly made. "Background" in this instance is defined as the soil on site that is just beyond the boundaries of the soil to be vitrified. Sampling the soil in these areas must be done prior to and following vitrification.)

(a) An owner or operator must establish an unsaturated zone monitoring program. The owner or operator must monitor the soil and soil-pore liquid to determine whether dangerous constituents migrate out of the treatment zone during vitrification and cooling.

(b) The owner or operator must install an unsaturated zone monitoring system that includes soil monitoring using soil cores and soil-pore liquid monitoring, using devices such as lysimeters. The unsaturated zone monitoring system must consist of a sufficient number of sampling points at appropriate locations and depths to yield samples that represent the quality of background soil-pore liquid and the chemical make-up of the soil that has not been affected by potential leakage from the treatment zone; and indicate the quality of soil-pore liquid and the chemical make-up of the soil below the treatment zone.

(c) The owner or operator must establish a background value for each dangerous constituent to be monitored.

(d) The owner or operator must conduct soil monitoring and soil-pore liquid monitoring immediately below the treatment zone.

(e) The owner or operator must use consistent sampling and analysis procedures that are designed to ensure sampling results that provide a reliable indication of soil-pore liquid quality and the chemical make-up of the soil below the treatment zone.

- <u>State Water Pollution Control Act (RCW 90.48)</u>

  Section 080 - Discharge of Polluting Matter in Waters Prohibited. Groundwater impacts as a result of soil vitrification are not anticipated. This section is included to address any unidentified threats to the groundwater.

The selected remedy will meet all "<u>to be considered</u>" criteria as specified below.

- <u>TSCA PCB Regulations</u> in 40 CFR 761.120, Subpart G, which address the requirements for cleaning up a PCB spill.

- <u>Washington State Final Cleanup Policy - Technical (July 1984)</u>

  This policy provides a framework to determine cleanup levels for releases of materials that threaten public health and/or the environment. Ecology currently has a general requirement that PCB-contaminated soils are to be cleaned up to a concentration of 1 ppm. The FS considered cleanup of PCB in the soil down to 1 ppm. Based on site-specific factors, the FS recommended a cleanup level of 10 ppm and a requirement for 2 feet of clean soil cover. The proposed soil cleanup is consistent with the final cleanup policy for the specific characteristics of the NWT site.

  (Regulations that are being developed under the Washington State Model Toxics Control Act [Initiative 97] may impact implementation of the cleanup policy for future site cleanups.)

- Draft Toxic Air Contaminant New Source Review Guidelines (Ecology - August 1988).

  These guidelines are designed to assist regulatory agencies and the regulated community in reviewing proposed new air pollution sources for toxic air contaminant emissions.

- U.S. EPA, Statement of Policy to Protect Environmentally Significant Agricultural Lands (EPA - September 8, 1978)

  The statement calls upon the agency to evaluate and mitigate direct and indirect impacts on agricultural lands during the preparation and review of environmental impact statements (or functionally equivalent documents).

Cost Effectiveness

The selected remedy appears to be cost effective in light of the degree of protectiveness provided by the destructive element of the chosen technology when compared to the overall protectiveness of the non-destructive technologies. The projected cost of the selected remedy is higher than the projected costs of most of the non-destructive technologies; however, the added benefit in the degree of overall protectiveness appears to be cost effective.

Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

During the comparative evaluation of the various cleanup alternatives, it became apparent that all of the final alternatives would meet the applicable requirements as defined for this site. However, there were two issues that significantly influenced the analysis and the consequent choice of remedy when the "to be considered" requirements and the following evaluation criterion were factored into the analysis:

- Overall protection of human health and the environment.
- Long-term effectiveness and permanence.
- Reduction of toxicity, mobility, or volume.

The two issues relate to current and future land use and the potential for destruction of the contamination.

As stated earlier in this Record of Decision, the NWT site is located in the middle of a rural area where the soils are designated as prime farmland by the Soil Conservation Service. The land supports both residential and agricultural uses for several miles in all directions. This issue tended to make the alternatives that left the contamination on site much less desirable because these alternatives would require that the site be classified as a TSCA landfill. The agencies believe that this classification would be highly incompatible with current and possible future land use. Classification as a TSCA landfill would very likely preclude the site from being used as farmland or for residential purposes.

When evaluating the alternatives for 1) their degree of protection of human health and the environment, 2) their long-term effectiveness and permanence, and 3) their ability to reduce the toxicity, mobility, or volume of the contamination, the alternatives that were capable of destroying the contamination were viewed as much more desirable than the nondestructive alternatives.

The final remedy was selected because it was considered to provide the best combination of attributes in terms of all the evaluation criteria. It is highly protective, attains all ARARs including the "to be considered" requirements, and is believed to be cost effective with respect to the degree of overall protection provided.

Preference for Treatment as a Principal Element

The statutory preference for treatment that permanently and significantly reduces the toxicity, mobility, or volume of hazardous substances as a principal element is met by the use of a thermal destruction technology. Contaminant destruction will be implemented to the maximum extent practicable. The use of this technology provides for a permanent reduction in the mobility, toxicity, and volume of the contaminant at the site.

XII. Responsiveness Summary

After identifying a preferred alternative and informing the public of the proposed plan, EPA opened a thirty-five day public comment period on August 7, 1988. A copy of the Proposed Plan and an accompanying fact sheet were mailed to all people on the mailing list for the site. The fact sheet stated that a public meeting would be held if requested; however, no meeting was requested.

The PRPs requested an extension of the public comment period, so a fourteen-day extension was granted to allow them to submit comments. The public comment period closed on October 5, 1988.

Background on Community Involvement

Several residents of the community had been concerned about the site during the 1970s and had complained to the state and other officials about possible contamination at the site. They noted that children in the neighborhood had played at the site over the years. They also commented that there had been frequent burning at the site. They were assured that there was no significant problem on the basis of local, state and federal testing which did not show significant levels of contamination.

Community interest was not high when the site was listed on the NPL in 1984 because of the earlier assurances that the site did not pose a threat and a lack of awareness that more recent sampling had revealed much higher levels of PCB contamination.

The community was therefore taken by surprise when EPA chose to undertake an immediate removal of PCB-contaminated material from the site. The appearance of workers in protective gear and heavy press coverage of the "emergency" caused confusion and worry for residents. In subsequent community interviews done by EPA in March 1986 (in preparation for the RI/FS), local residents complained that EPA had failed to keep the community informed and involved, and that either EPA had overreacted or that earlier problems had been concealed.

During those 1986 interviews, a number of residents and officials expressed confusion and/or concern about EPA coming back to do the RI/FS. Some were confused because they said they had been told after the removal that "the site had been cleaned up." These and others did not understand the Superfund process and/or requirements. Some felt that EPA was overreacting to the severity of the problem by returning to do the RI/FS. Some also expressed concerns about other NWT sites in the area and the stigma and economic costs associated with Superfund sites.

In response, EPA explained the goals and results of the 1985 removal and the goals of the RI/FS as part of an ongoing effort to provide timely information to the community. During the RI/FS, EPA and its contractors maintained contact with local officials and sent four fact sheets to the public and the press.

A thirty-five day comment period (extended to forty-nine days) followed publication of the Proposed Plan and availability of the RI, FS, and Administrative Record at information repositories for the site.

Summary of Comments and Agency Responses

The following is a summary of the comments that were received during the public comment period for the FS and the corresponding agency responses. All submitted comments have been included in the Administrative Record for the site.

The comments submitted by the Geosafe Corporation (the owners of the ISV technology) focused on updating the information contained in the FS regarding the ISV technology. The current information includes the following:

- ISV technology has been continuously developed since 1980.
- The number of ISV tests performed to date is about sixty.
- The first ISV machine is presently committed to three projects.
- It is not necessary to dry soil prior to ISV treatment; however, it requires energy for the ISV process to remove water by vaporization.
- Leaching of PCB from the residual monolith is impossible since organics do not remain in the glass residual.
- ISV is a pyrolysis process.
- The unit cost estimate for ISV ranges from to $250 to $350 per ton.
- Mobilization and setup time is expected to be less than one week.

The current information regarding the ISV technology was factored into the evaluation of the remedial alternatives.

Comments were received from the PRP "steering committee" that "was formed as a result of a consensus among a larger group of parties identified by EPA." Their detailed review comment document and detailed agency responses have been included in the Administrative Record. Their summarized comments and EPA's summarized responses follow:

- Comment
  1. The Risk Assessment prepared by EPA and included as Appendix A to the FS employs excessively conservative assumptions. A risk assessment that employs more reasonable but still very conservative assumptions indicates that the removal action already conducted by EPA has brought risks associated with residual soil contamination to acceptable levels and that additional action is not necessary.

  EPA Response
  1. EPA agrees that a few of the assumptions used in the Risk Assessment were overly conservative and these have been modified (see below). However, for the majority of the assumptions, EPA used either an average value or a range of values. These resulted in conservative yet reasonable worst case estimates of risk.

The following assumptions/values were changed and the risk assessment was revised accordingly:

- New vegetable uptake factors and consumption rates were calculated. In addition, risks were calculated assuming that 25% of the vegetables consumed by a person are grown on the site, as well as the original assumption of 100%.

- For the grazing scenario, only average PCB soil concentration were used instead of the average and the average plus 2 standard deviation. Risk estimates were also made assuming that a person obtains 25% of his beef and dairy products from cattle grown on the site as well as 100%.

- Risks associated with consumption of groundwater from off-site wells were deleted due to the lack of reliable data.

- For modeling purposes, the concentration of dust in the air was assumed to be 50 ug/m^3.

- Risk estimates were performed using the weighted average surface soil value and the weighted average plus two standard deviation values calculated by Landau and Associates.

The Risk Assessment, as revised, is summarized in section VI of this Record of Decision and is included in its entirety as part of the Administrative Record for the site. See Table 2 on page 23 for a summary of the risk levels associated with the site. The risk calculation for the grazing scenario (which assumes the site is used for beef and dairy cattle grazing) resulted in an estimated upper-bound lifetime cancer risk ranging from 2.5×10^{-3} to 1×10^{-2}. Based on these results, EPA and Ecology believe that further remedial action on the site is necessary.

- <u>Comment</u>

2. Were further action nonetheless required, soil cover or cement-soil stabilization/immobilization are the most appropriate alternatives, and they meet the statutory criteria of 42 U.S.C. § 9621. "Thermal destruction" by on-site vitrification is too costly and technically uncertain to constitute a desirable alternative.

<u>EPA Response</u>

2. Following current EPA guidance and § 121 of SARA, the FS evaluated remedial alternatives using the following criteria:

a. Compliance with applicable or relevant and appropriate requirements (as defined by federal, state and local regulations and/or policy)

b. Permanent and significant reduction of toxicity, mobility or volume

c. Short-term effectiveness

d. Long-term effectiveness

e. Implementability

f. Cost

g. Community acceptance

h. State acceptance

i. Overall protection of human health and the environment

EPA recognizes that the recommended alternative for this site is more expensive than some of those proposed by the reviewers. However, the FS (as summarized by the following) demonstrates that this cost is offset by the benefits under the other criteria required to satisfy the CERCLA process.

- Short-term effectiveness: stabilization would require additional testing that may delay implementation.

- Long-term effectiveness: ISV represents the lowest long-term risk from residuals remaining after implementation.

- Permanent and significant reduction of toxicity, mobility, or volume: ISV results in destruction of PCB in the soil matrix, rather than increase in the volume of contaminated solids, less certain reductions in toxicity or mobility through fixation, or relocation of contaminants to a landfill.

- Implementability: ISV has undergone testing for PCB-contaminated soils specifically. Fixation technologies must be demonstrated to assure long-term stability.

- Compliance with ARARs/TBCs: Residual PCB concentrations above the allowable limits under TSCA are not left on site.

- Overall protection of human health and the environment: Risk of direct contact or exposure to contaminated soils and dust is eliminated by the direct treatment and destruction of PCB to an acceptable risk level. The potential for PCB leaching from the treated material to other matrices (groundwater) is also eliminated.

Efforts to identify the least costly, most effective, and innovative measures for remediating PCB-contaminated sites are appreciated and supported. However, these measures must 1) meet the intent of the ARARs as presented in the FS, and 2) be applicable to the specific contaminants and site conditions. Remedial actions that leave residual PCB soil contamination above 50 ppm (mg/kg) do not meet the ARAR-defined objective of contaminant destruction set forth under TSCA 761.60: "Any non-liquid PCBs at concentrations of 50 ppm or greater in the form of contaminated soil, rags, or other debris shall be disposed of:

(i) In an incinerator which complies with Section 761.7; or,
(ii) In a chemical waste landfill which complies with Section 761.75."

nor under the technical requirements for construction of chemical waste landfills defined by TSCA 761.75. Unfortunately, little scientific or CERCLA-based support is provided by the reviewers for their proposed approach of mixing PCB-contaminated soil with Portland Cement.

Testing costs for the cement/soil stabilization process (approximately $120-150 thousand) would have to include additional long-term leachability tests to demonstrate long-term viability of this option. The suggested process is not proven for PCB specifically. In comparison, the vitrification testing would only require a one-time demonstration of applicability to site-specific soils as the process has been proven to destroy PCB, and this test could be conducted in a relatively short period of time (i.e., 2 to 3 months).

A recent, in-depth review of stabilization technologies (Pollution Engineering Magazine, August 1988) states that Portland Cement stabilization technology is more appropriately applied to waste materials containing inorganic (i.e., heavy metals) contamination. It is widely known in the concrete industry that even very low concentrations of organic compounds can hinder the molecular binding and curing processes of aging concrete. While it is possible that binding of PCB-contaminated soil in cement blocks reduces the mobility or accessibility of the soil matrix, research indicates the primary contaminant (PCB) may migrate through concrete to leachable and weathering areas near the surface. When compared to an alternative such as ISV, which destroys the contaminant, the long-term uncertainty makes fixation less desirable.

Section 121 of SARA states a preference for selecting remedial actions that employ treatment technologies that permanently and significantly reduce toxicity, mobility, or volume of the hazardous substances as their principal element. This preference is satisfied when treatment is used to reduce the principal threats at a site through destruction of toxic contaminants, reduction of the total mass of toxic contaminants, irreversible reduction in contaminant mobility, or reduction of total volume of contaminated media. None of the alternative remedial methods suggested in the review document (no action, soil cover, off-site land disposal), with the exception of the cement/soil stabilization process, meet any of the tests under this criterion.

The FS recommended thermal destruction of PCB in PCB-contaminated soils with concentrations at or above 10 ppm (mg/kg). Thermal destruction technologies include incineration and vitrification, as well as the thermal-based processes such as catalytic combustion and infrared destruction. Upon further review and cost analysis by EPA and further review of documentation on demonstrations of the vitrification technology, the best thermal destruction process for this site was determined to be vitrification. This determination was made based on 1) relative ease and foreseen schedule of mobilization, 2) advantageous costs over other thermal processes as reflected in the FS, 3) acceptability of the vitrified mass as an on-site residue over other conventional materials classified as ash,

4) the foreseen local acceptance of contained, "in-the-ground" thermal destruction of PCB contaminants over conventional incinerator operations, and 5) the criteria set forth for technology selection in the FS.

The statement that a soil cover is equivalent in protectiveness to the technologies recommended in the FS is based solely on the reduction of the numerical value for short-term risk. It ignores the significance of all other criteria and requirements under the ARARs as they were appropriately considered in the FS. The technique is not a permanent solution and would require restrictions on land use in perpetuity.

During the FS process, the appropriateness of deed and access restrictions were considered. For this specific site, these measures are considered ineffective and inappropriate when viewed in the context of the assumed long-term land uses and are therefore less protective. In conducting the FS, it was assumed the completed (cleaned up) site would support uses similar to those at surrounding properties and would be acceptable for eventual development into relatively unrestricted agricultural (grazing/farming) or residential uses.

- Comment
  3. A groundwater monitoring program is desirable to verify that on-site and off-site groundwater have not been contaminated.

  EPA Response
  3. We are in agreement that a groundwater monitoring program is desirable and this was expressly stated in the FS and Proposed Plan.

Clallam County Public Utility District submitted a comment letter. It is paraphrased by the following comments, which are followed by the respective EPA responses.

- Comment
  1. Based on a review of the RI, a six-inch soil scrape is all that is necessary to remove soil with PCB contamination above the 10 ppm (mg/kg) action level.

  EPA Response
  1. As stated in the FS, assumptions were made regarding the distribution of PCB contamination with depth within the cleanup area. Because of the porous nature of soil at the site and handling practices of concentrated liquids (being applied directly to the site), a linear decrease is a conservative assumption for the relationship of PCB concentration with depth.

  The theory has been advanced that high clay content in shallow soils at the site retained free-flowing PCB materials in the upper six inches.

The variability of the silty clay layers is highlighted in Figure 1.5 of the RI document (HDR 1988) and casts serious doubt on this layer's overall uniformity and ability to contain PCB. The discontinuous nature of these layers is well known and documented for outwash materials (alluvial sediments) of the northwest region. Some surface soils with the higher organic and clay content were removed during the IRM. To assume that the estimated PCB retention capabilities of these removed materials (a proposed decrease rate of 16 to 1) is equally applicable to the more porous underlying sand and gravel layers is not consistent with the fact that PCB concentrations at or above 1 ppm (mg/kg) were detected in the areas in question at a depth up to 2.5 feet.

Comment
2. They questioned the use of in situ vitrification because of the experimental nature of the technology and had particular concerns regarding the a) formation of PCDD and PCDF at the outer edges of the vitrification zone; b) uncontrolled gas venting during the vitrification process; and c) contamination of surface water by PCDD and PCDF on the edge of the vitrified zone.

EPA Response
2. The development of the ISV technology was initiated in 1980. There have been approximately sixty tests performed to date using this technology. ISV has been successfully used in engineering-scale studies involving PCB-contaminated soil.

a. PCDD and PCDF are PCB oxidation products and will be sampled for during the site-specific treatability testing. According to the tests done to date, it is believed that the PCDD/PCDF content observed was generated above the melt, under the hood, rather than in the ground.

b. The ISV off-gas treatment system is designed to maintain a slight negative pressure in the off-gas hood. It is not necessary that the hood itself be airtight; in fact, significant amounts of excess air are allowed into the hood to oxidize any combustible pyrolysis products. In the event of a loss of power to the system, an emergency backup power supply is employed to maintain flow through the off-gas system.

c. See response to a.

Comment
3. They felt that the short-term effectiveness of Alternatives 1, 2, and 3 is the same due to excavation and the potential for fugitive dust generation.

EPA Response
3. The short-term effectiveness with respect to excavation and fugitive dust generation is the same for Alternatives 1, 2, and 3 as defined in the FS and Proposed Plan. This information was factored into the remedial alternatives analysis.

- Comment
  4. The operation and maintenance cost was underestimated for both incineration and vitrification technologies.

  EPA Response
  4. Operation and maintenance costs are considered to be the costs of operating and maintaining the remedial action fix. As incineration and vitrification are destructive technologies, they are one-time actions and therefore do not require ongoing operation and maintenance inputs. In contrast, the reliability of non-destructive alternatives such as capping, soil cover, and cement fixation is dependent upon the continued integrity of that particular remedial action fix. Those kinds of fixes must be monitored and maintained/repaired in perpetuity, resulting in ongoing operation and maintenance costs.

  Responses to concerns regarding the viability of vitrification as a full-scale technology are included in comments on the FS provided by Geosafe Corporation to EPA. The basic ISV technology has been developed for large-scale operations. Tests of large-scale equipment, available since late 1983, have removed scale-up concerns and verified economic projections. For reference, the large-scale equipment will process up to 5 tons/hr and will produce up to 800 tons of melt in a single setting. Large-scale ISV experience has produced data sufficient for estimating labor, materials, and other input critical to costs. Geosafe Corporation has provided an updated cost for ISV for smaller scale applications ($250-330/ton), and this cost is competitive with other thermal destruction technologies.

A local geologist had several concerns, which are listed below with the respective EPA responses.

- Comment
  1. He was concerned that dust generated by excavation of soils on site and the potential for that dust to expose residents of Everson or to enter the food chain through local dairy cattle consumption of "dusted" vegetation would be a problem during remediation.

  EPA Response
  1. The potential for fugitive dust generation during remediation does exist. Part of the remedial action design will include measures to mitigate the generation of those dusts.

- Comment
  2. The commenter thought EPA should have specified a preference for either incineration or vitrification and asked whether EPA sacrificed effectiveness for lower cost by selecting vitrification rather than incineration.

  EPA Response
  2. EPA and Ecology have specified that vitrification is the thermal destruction technology to be used at the NWT site. ISV is less expensive than incineration, but both technologies provide for the destruction of PCB in soil.

A petition signed by approximately one hundred people and submitted to EPA suggested that institutional controls were more appropriate than the preferred plan due to the possibility that their electrical rates would increase if the PRPs (mostly public utility districts) were made to pay for the remediation on site.

A letter was sent to all petition signees (with approximately one-third being returned to EPA stamped "addressee unknown") explaining what criteria the agency must use in evaluating the various cleanup alternatives and how, after completion of this evaluation, the agency believes that the preferred alternative best meets the requirements as represented in the evaluation criteria.

The Snohomish County Public Utility District wrote and recommended deed restriction and follow-up groundwater monitoring rather than the recommended alternative of thermal destruction, because in their view it is more cost effective and appropriate for the circumstances of the site.

Deed restrictions, such as limiting access to the site or limiting use of the site, were considered in evaluating what the appropriate cleanup alternative for the site should be. EPA and Ecology believe that deed restrictions alone are inappropriate for this site due to the surrounding land uses and close proximity of residences. Follow-up groundwater monitoring will take place. (See response to comment 2 from PRP steering committee.)

Other Comments Received

Two local residents wrote and recommended Alternative 4 rather than Alternative 2 because of a belief that Alternative 4 will be adequately protective and that a better and safer method of dealing with PCB will eventually be developed.

SARA requires EPA to look for a permanent solution that reduces the toxicity, mobility and volume of waste, and not to choose interim solutions that will have to be redone later.

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

ADMINISTRATIVE RECORD INDEX

for

NORTHWEST TRANSFORMER - REMEDIAL

Everson, Washington

September 8, 1989

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1. Background						
00000001.	Background	Memo re referral for enforcement evaluation, Northwest Transformer Service, Everson, Washington	3/23/81	3	Alexandra B. Smith/EPA	Lloyd E. Reed/EPA
00000002.	Background	Field investigations of uncontrolled hazardous waste sites, FIT Project, task reports to the EPA, Contract No. 68-01-6056, Northwest Transformer Salvage Yard, BEllingham, Washington, final report, TDD 10-8108-05	4/82	50	Ecology & Environment, Inc	--
00000003.	Background	Background letter re Notice of Noncompliance with PCB regulations under Toxic Substances Control Act	1/21/83	3	Alexandra B. Smith/EPA	Ron Wallace/Northwest Transformer Service
00000004.	Background	Cover letter with attached copy of Findings re Release and Threat of Release of Hazardous Substances and Order for Immediate Removal re Northwest Transformer Company	3/29/85	15	Charles E. Findley/EPA	Ronald and Noah Wallace/Northwest Transformer Company
00000005.	Background	Federal On Scene Coordinator's Report, Hazardous Waste Site Cleanup, Northwest Transformer Salvage Yard, Everson, Washington, for 4 April-17 May 1985	7/85	53	Region 10 Technical Assistance Team	Region 10/EPA
00000006.	Background	Northwest Transformer Salvage Yard, Field Investigation, Final Report, TDD R10-8503-04	8/85	70	Jeff Whidden/Ecology & Environment, Inc	J. E. Osborn/EPA
00000007.	Background	Cover letters, Notice and Complaint re Administrative Action against Northwest Transformer Service for Alleged Violation of PCB Regulations	9/30/86	19	Anita J. Frankel/EPA	Noah Wallace and Merle Sidell/Northwest Transformer Service

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2. Preliminary Assessment Report						
00000008.	Preliminary assessment report	Potential hazardous waste site--preliminary assessment	8/15/84	5	--	--
3. Site Investigation Reports						
00000009.	Site investigation reports	Potential hazardous waste site--site inspection report	3/5/81	1	C. W. Rice/EPA	--
00000010.	Site investigation reports	Potential hazardous waste site--tentative disposition	3/19/81	19	C. W. Rice/EPA	--
00000011.	Site investigation reports	Potential hazardous waste log	3/19/81	1	C. Rice/EPA	--
00000012.	Site investigation reports	Potential hazardous waste site--site inspection report, Part 7, owner information	8/31/84	1	--	--
00000013.	Site investigation reports	Potential hazardous waste site--site inspection report, Part 1, site location and inspection information	9/25/84	1	Jeff Whidden/Ecology & Environment, Inc	--
00000014.	Site investigation reports	Preliminary site inspection, report of Northwest Transformer Salvage Yard, Everson, Washington, TDD R10-8408-12	10/26/84	39	Jeff Whidden/Ecology & Environment, Inc	J. E. Osborn/EPA
00000015.	Site investigation reports	Inspection Report re Northwest Transformer Salvage Yard	10/29/86	1	Sue Simms/Washington DOE	--
4. NPL Proposals and Comments						
00000016.	NPL proposals and comments	Excerpt from Fed. Register, V. 49, #200, pp. 40320-40352, EPA, 40CFR Part 300, Amend. to National Oil & Hazardous Substances Contingency Plan; National Priorities List--Proposed Rule	10/15/84	34	--	--

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00000017.	NPL proposals and comments	Excerpt from Fed. Register, V. 51, #111, pp. 21054-21098, EPA, 40CFR Part 300, Amend. to National Oil & Hazardous Substances Contingency Plan; National Priorities List--Final Rule	6/10/86	45	--	--
00000116.	NPL proposals and comments	Letter: Comments re comments on "Solidification/Immobilization as a viable Remedial Action" by Landau Associates, 1/4/89. (15-Page report of comments included)	1/9/89	18	Frederic A Morris/Perkins Coie	Sally Martyn/EPA

5. RI/FS Work Plans

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00000018.	RI/FS Work Plans	Work plan for RI/FS re Northwest Transformer Salvage Yard, Everson, Washington	1/87	349	Henningson, Durham & Richardson, Inc	Department of the Army, Kansas City District, Corps of Engineers and EPA, Region 10
00000023.	RI/FS Work Plans	Letter with attached Statement of Work for Feasibility Studies re RI/FS for Northwest Transformer	10/18/85	15	Norma Lewis/EPA	Edward Ray/Army Corps of Engineers--Kansas City District
00000052.	RI/FS Work Plans	Feasibility Study Work Plan for Northwest Transformer Service Salvage Yard	10/23/87	39	HDR Engineering, Omaha, NE	Corps of Engineers, Kansas City District
00000073.	RI/FS Work Plans	Comments on RI/FS work plan	11/19/86	5	Glynis A. Stumpf/WA Dept. of Ecology	Norma Lewis, EPA

6. Correspondence and Memos

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00000019.	Correspondence and memos	Memo re Northwest Transformer Compliance with SARA	3/11/87	2	Ron Vernesoni/EPA	File
00000020.	Correspondence and memos	Letter re description of possible future actions by EPA at Northwest Transformer facility	8/19/87	2	Philip G. Millam/EPA	Joe Doffing, Attorney at Law

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00000021.	Correspondence and memos	Letter re comments on draft Scope of Work for Feasibility Study at Northwest Transformer Salvage Yard	9/9/87	2	Sally Martyn/EPA	Clark Gunion/Army Corps of Engineers--Kansas City District
00000041.	Correspondence and memos	Letter of notification re proposed Superfund project to State	6/17/85	3	Kathryn M. Davidson/EPA	Ken Back/Washington Planning and Community Affairs Agency
00000042.	Correspondence and memos	Letter of notification re potential liability of responsible parties	10/2/86	2	Charles Findley/EPA	Noah Wallace/Northwest Transformer
00000043.	Correspondence and memos	Letter of notification re potential liability of responsible parties	10/2/86	2	Charles Findley/EPA	Merle Sidell/Block Steel
00000044.	Correspondence and memos	Letter of notification re potential liability of responsible parties	10/2/86	2	Charles Findley/EPA	Claude Potts
00000045.	Correspondence and memos	List of names of potential responsible parties	--	4	--	--
00000055.	Correspondence and memos	Letter regarding release of hazardous substances at Northwest Transformer Superfund site with list of PRPs	10/2/86	8	Charles Findley/EPA	Trans-Mountain Pipeline Corp, Vancouver, B.C.
00000056.	Correspondence and memos	Letter regarding release of hazardous substances at Northwest Transformer Superfund site without PRP list	10/2/86	3	Charles Findley/EPA	John S. Williams/Whatcom Builders, Bellingham, WA
00000057.	Correspondence and memos	Letter regarding release of hazardous substances at Northwest Transformer Superfund site with mailing list	6/8/88	5	Charles Findley/EPA	Mailing list
00000074.	Correspondence and memos	Request to be removed from PRP list for the Northwest Transformer Superfund site	9/14/88	19	H. Roy Donehower/Public Utility Dist. No. 2 of Grant City	Robie Russell/EPA
00000117.	Correspondence and memos	Memo: Re completion of review of samples from Northwest Transformer	2/15/89	3	Alice Yau/EPA	Joyce Crosson/EPA

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00000118.	Correspondence and memos	Transmittal of Final ATSDR Health Assessment	4/14/89	1	Stephen D. Von Allmen/Agency for Toxic Substances and Disease Registry, Atlanta, GA	Phil Millam/EPA
00000119.	Correspondence and memos	Transmittal of map (attached) and explanation of terms for land classification in Whatcom County	5/17/89	2	John K. Gillies/U. S. Dept. of Agriculture	Christine Psyk/EPA
00000120.	Correspondence and memos	Memo: Re question of whether Northwest Transformer site lies in an area containing significant agriculture lands and if any related regulations are ARARs	6/16/89	1	Christine Psyk/EPA	Sally Martyn/EPA
00000121	Correspondence and memos	Letter: Comments re selection of alternative for stabilization of Northwest Transformer site	8/25/89	6	W. J. Finnegan/Puget Power	Charles Findley/ EPA

7. Sampling Plans

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00000022.	Sampling Plans	Engineering and design, chemical	12/30/85	43	Army Corps of Engineers	--

8. Lab Reports/Raw Data

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00000036.	Lab reports/raw data	Data Package Case #3980, located at EPA Region 10 Headquarters	Shipping date: 3/29/85	--	EAL	EPA Region 10 files
00000037.	Lab reports/raw/data	Letter re analytical results with attached: qualitatiave review of sample numbers 1556J-01 through 1556J-07, mid mass chromatograms, chain of custody forms, quality control summary for polychlorinated dioxin/furan analysis. Located at Northwest Transformer NW 924 files at EPA Regional Office	4/18/85	--	Paul Taylor, Michael J. Mille, Teri J. Vergara/California Analytical Labs, Inc.	John Osborn/EPA

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00000038.	Lab reports/raw data	Summation forms re parameter hazards, sample numbers 85121850 through 85121854	1985	5	EPA Manchester Laboratory	--
00000039.	Lab reports/raw data	Summation forms re parameter hazards, sample numbers 85181025 through 85181052	1985	32	EPA Manchester Laboratory	--
00000040.	Lab reports/raw data	Summation forms re parameter hazards, sample numbers 85201047 through 85201049	1985	3	EPA Manchester Laboratory	--
00000046.	Lab reports/raw data	Burning site, sample analysis results for sample numbers 8435571 and 81435572	8/31/84	2	EPA Lab, Region 10	--
00000047.	Lab reports/raw data	Everson, WA, sample analysis results for sample numbers 85121775 through 5121785	3/19/85	11	EPA Lab, Region 10	--
00000048.	Lab reports/raw data	Sample analysis results for sample numbers 85121850 through 85181854	3/19/85	5	EPA Lab, Region 10	--
00000049.	Lab reports/raw data	Sample analysis results for sample numbers 85181025 through 85181052	5/1/85	30	EPA Lab, Region 10	--
00000050.	Lab reports/raw data	Sample analysis results for sample numbers 85201047 through 85201049	5/14/85	3	EPA Lab, Region 10	--
)0000051.	Lab reports/raw data	Sample analysis results for sample numbers 86224615 through 86224617	6/2/86	3	EPA Lab, Region 10	--
)0000061.	Lab reports/raw data	PCB analytical data summary package for 81 soil samples	8/11/87	9	Victor Yeatrop/Versar, Inc, Springfield, VA	Corps of Engineers, Kansas City District
)0000062.	Lab reports/raw data	Soil sample analysis data for Northwest Transformer site for PCBs, 81 samples	9/8/87	7	Paul D. Barber/COE, Kansas City District	Sally Martyn/EPA
)0000063.	Lab reports/raw data	Review of analytical data on PCBs in groundwater, Northwest Transformer site	4/21/88	12	Michael J. Conzett/HDR Engineering, Omaha, NE	Clark Gunion, COE, Kansas City District

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00000075.	Lab reports/raw data	Memo: Draft approval of work accomplished during removal action	11/3/87	1	Rene Fuentes/Environmental Services Division	Joyce Crosson/QA
00000076.	Lab reports/raw data	Cover letter transmitting results of laboratory analysis of well water samples taken 7/16/87	11/16/87	7	Richard T. Sprague/HDR Infrastructure, Inc	Mr. & Mrs. D. Turner, Everson, WA 98247
00000077.	Lab reports/raw data	Cover letter transmitting results of laboratory analysis of well water samples taken 7/16/87	11/16/87	7	Richard T. Sprague/HDR Infrastructure, Inc	Mr. & Mrs. R. Harrimen, Everson, WA 98247
00000078.	Lab reports/raw data	Cover letter transmitting results of laboratory analysis of well water samples taken 7/16/87	11/16/87	7	Richard T. Sprague/HDR Infrastructure, Inc	Mr. & Mrs. E. Bergermon, Everson, WA 98247
00000079.	Lab reports/raw data	Cover letter transmitting results of laboratory analysis of well water samples taken 7/16/87	11/16/87	7	Richard T. Sprague/HDR Infrastructure, Inc	Mr. & Mrs. R. Reynolds, Everson, WA 98247
00000080.	Lab reports/raw data	Disposition Form: Transmittal of Corps of Engineers' review comments of the Remedial Investigation of Northwest Transformer Salvage Yard	5/3/88	5	John E. Moylan/Corps of Engineers, Kansas City District	EPA
00000081.	Lab reports/raw data	Memo: Comments on the need for additional groundwater sampling for PCB's	5/5/88	1	Dana Davoli/ESD, EPA	Sally Martyn/EPA
00000082.	Lab reports/raw data	Memo: Answer to concerns about inconsistent analytical results	6/7/88	2	Raleigh Farlow/QA Management Office, EPA	Sally Martyn/EPA
00000083.	Lab reports/raw data	Memo: Answers to questions rising from Remedial Investigation	4/25/88	2	Sally Martyn/EPA	Pat Storm/H & E Assessment, EPA
00000084.	Lab reports/raw data	Letter: Transmittal of data reference HDR's determination of PCB levels in groundwater	6/30/88	2	Michael J. Conzett/HDR Engineering, Inc	Clark Gunion/U.S. Army Corps of Engineers

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9. Interagency Agreements						
00000024.	Interagency agreements	Interagency agreement/amendment between EPA and Army Corps of Engineers re RI/FS at Northwest Transformer	9/24/85	6	Ernesta B. Barnes/EPA	Martha M. Lowe/Army Corps of Engineers
00000025.	Interagency agreements	Interagency agreement/amendment between EPA and Army Corps of Engineers re RI/FS at Northwest Transformer	3/12/86	7	Charles Findley/EPA	Martha M. Lowe/Army Corps of Engineers
00000026.	Interagency agreements	Letter with attached contract, fee proposal, and scope of services re agreement between EPA and Army Corps of Engineers for RI/FS at Northwest Transformer	3/23/87	49	Paul D. Barber/Army Corps of Engineers--Kansas City District	Ronald Vernesoni/EPA
00000027.	Interagency agreements	Interagency agreement/amendment between EPA and Army Corps of Engineers re RI/FS at Northwest Transformer	5/26/87	7	Charles E. Findley/EPA and Martha M. Lowe/Army Corps of Engineers	--
00000113.	Interagency agreements	Interagency agreement/amendment between EPA and Army Corps of Engineers re RI/FS at Northwest Transformer	2/13/89	15	Oddvar K. Aurdal/EPA and William Mulligan/Army Corps of Engineers	--
00000114.	Interagency agreements	Letter: Re Washington State Applicable and Relevant and Appropriate Requirements (ARARs)	8/2/89	9	Brad J. Ewy/Washington Dept. of Ecology	Christine Psyk/EPA
00000115.	Interagency agreements	Letter: Re Washington State Applicable and Relevant and Appropriate Reauirements (ARARs)	9/5/89	2	Charles E. Findley/EPA	Tekrry Hussman/Washington Dept. of Ecology
10. Community Relations						
00000028.	Community relations	Article entitled, "PCB's: Everson struggles with toxic uncertainty"	1/85	5	Diane Dietz/Klipsun	--
00000029.	Community relations	Mailing list for those in attendance at Everson town meeting 4/8/85	--	4	--	--

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Doc. #	File	Type/Description	Date	# Pgs	Author/Organization	Addressee/Organization
00000030.	Community relations	Letter re state intergovernmental review process for Northwest Transformer	6/17/85	3	Kathryn M. Davidson/EPA	Len Back/Washington Planning & Community Affairs Agency
00000031.	Community relations	Handwritten notes re meetings with members of community re cleanup work at Northwest Transformer	4/1-2/86	9	N. L.	--
00000032.	Community relations	Community Relations Plan for Northwest Transformer, Mission Pole Road site	6/86	19	EPA	--
00000033.	Community relations	Fact sheet re Northwest Transformer Superfund site	6/29/87	1	EPA	--
00000053.	Community relations	Fact sheet re Northwest Transformer Superfund site	7/28/88	1	EPA, Region 10	--
00000054.	Community relations	Fact sheet re Northwest Transformer Superfund site	8/15/88	1	EPA, Region 10	--
00000085.	Community relations	Notice of investigations results and public comment period for Northwest Transformer Superfund site	8/17/88	1	Bellingham Herald, Bellingham, WA	General Public
00000086.	Community relations	Notice of investigations results and public comment period for Northwest Transformer Superfund site	8/17/88	1	Westside Record-Journal, Ferndale, WA	General Public
00000087.	Community Relations	Transmittal letter for information repository	8/17/88	1	Sally Martyn/EPA	Barbara Skinner/Everson Library, Everson, WA
00000088.	Community Relations	Correction to Fact Sheet of 8/15/88	8/22/88	1	Sally Martyn/EPA	--

11. References/Guidance

Doc. #	File	Type/Description	Date	# Pgs	Author/Organization	Addressee/Organization
00000034.	References/guidance	List of guidances for Administrative Record	--	2	EPA	--

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12. Maps and Photos						
00000035.	Maps and photos	Aerial photographic analysis of Northwest Transformer	8/85	17	F. Mynar, II/Lockheed Engineering and Management Services Company, Inc, prepared for EPA	--
13. Draft Remedial Investigation Reports						
00000064.	Draft remedial investigation reports	Draft Remedial Investigation report, Northwest Transformer	10/87	230	HDR Engineering, Omaha	Corps of Engineers--Kansas City District, EPA Region 10
14. Remedial Investigation/Feasibility Study Comments						
00000065.	RI/FS study comments	Comments on draft RI/FS	11/30/87	14	Brad Ewy/Washington Dept. of Ecology	Sally Martyn/EPA
00000066.	RI/FS study comments	Comments on draft RI/FS	2/25/88	22	Paul D. Barber/Corps of Engineers--Kansas City District	Mike Conzett/HDR Engineering, Omaha, NE
00000067.	RI/FS study comments	Comments on draft RI/FS	7/1/88	3	Martin Werner/WA Dept. of Ecology	Brad Ewy/WA Dept. of Ecology
00000068.	RI/FS study comments	Response to comments on draft RI/FS	5/6/88	46	EPA Region 10, WA Dept. of Ecology	--
00000089.	RI/FS study comments	Letter: Comments on RI/FS for Northwest Transformer	9/20/88	4	Philip K. Jackson/Clallan County PUD #1	Sally Martyn/EPA
00000090.	RI/FS study comments	Letter requesting period of comment on RI/FS be extended 30 days	9/9/88	4	Frederick A. Morris/Perkins Coie	Robert Goodstein/EPA
00000091.	RI/FS study comments	Handwritten letter stating preference for alternative #1	9/17/88	1	Elaine & Jordan Silves, Everson, WA	Sally Martyn/EPA

Doc. #	File	Type/Description	Date	# Pgs	Author/Organization	Addressee/Organization
00000092.	RI/FS study comments	Petition/Commentary on proposed plan and cleanup alternatives	9/20/88	11	Whatcom County area residents	Sally Martyn/EPA
00000093.	RI/FS study comments	Letter extending public comment period for Northwest Transformer site another 2 weeks	9/22/88	1	Wayne Grotheer/EPA	Northwest Transformer Superfund site steering committee
00000094.	RI/FS study comments	Letter: Response to petition requesting no cleanup action to be taken	9/29/88	2	Sally Martyn/EPA	Concerned citizens/Whatcom County
00000095.	RI/FS study comments	Letter requesting destruction of former letter, dated 9/21/88, and its replacement with attached letter	10/3/88	3	Gary R. Gates, Deming, WA 98244	Sally Martyn/EPA
00000096.	RI/FS study comments	Leter: Comments on Northwest Transformer draft Feasibility KStudy	10/4/88	7	James E. Hansen/Geosafe Corp	Sally Martyn/EPA
00000097.	RI/FS study comments	Letter: Response to EPA's RI/FS at Northwest Transformer	10/5/88	2	J. D. Maner/Snohomish County PUD #1	Sally Martyn/EPA
00000098.	RI/FS study comments	Cover letter and review comments on RI/FS, Northwest Transformer site	10/5/88	55	Pugest South Power & Light Company & Landau Associates	Sally Martyn/EPA
00000099.	RI/FS study comments	Memo: Response to FS comments pertaining to risks	11/3/88	5	Dana Davoli/Environomental Health Assessment, EPA	File/EPA
00000100.	RI/FS study comments	Letter: Comments on response to comments (separate from FS comment period)	11/14/88	15	Frederic A. Morris/Perkins Coie and Landau Associates, Inc	Sally Martyn/EPA
00000101.	RI/FS study comments	Letter: Comments on response to comments (separate from FS comment period)	10/26/88	4	James E. Hansen/Geosafe Corp	Sally Martyn/EPA
00000102.	RI/FS study comments	Memo: Response to review comments of the Northwest Transformer Steering Committee	12/88	47	HDR Engineering, Omaha, NE	Corps of Engineers--Kansas City District and EPA

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15. Final Remedial Investigation Report						
00000070.	Final remedial investigation report	Final Remedial Investigation Report, Northwest Transformer Superfund site	7/88	246	HDR Engineering, Omaha, NE	Corps of Engineers--Kansas City District & EPA Region 10
16. Final Feasibility Study Report						
00000069.	Final feasibility study report	Final Feasibility Study Report: Northwest Transformer (Mission/Pole) Superfund site	8/88	160	HDR Engineering, Omaha, NE	Corps of Engineers--Kansas City District & EPA Region 10
00000103.	Final feasibility study report	Transmittal letter and mailing list for feasibility study	8/26/88	3	Sally Martyn/EPA	Mailing list
00000104.	Final feasibilility study report	Response to request for Feasibility Study information	9/26/88	1	Sally Martyn/EPA	Ken Morgan/Clallum County PUD
17. Risk Assessment						
00000071.	Risk assessment	Risk Assessment, Northwest Transformer	--	13	EPA Region 10	--
00000105.	Risk assessment	Revised Risk Assessment, Northwest Transformer	12/29/88	27	EPA Region 10	--
00000109.	Risk assessment	Revised Risk Assessment, Northwest Transformer	--	35	--	--
00000110.	Risk assessment	Memo: Record of conference call re comments on Risk Assessment	11/03/88	5	Dana Davoli/Environmental Health and Assessment, EPA	File/EPA
18. Proposed Cleanup Plan						
00000072.	Proposed cleanup plan	Proposed Cleanup Plan: Northwest Transformer (Mission/Pole) Superfund site	8/17/88	10	EPA Region 10	--

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19. Meetings						
00000058.	Meetings	Summary of EPA/COE/Ecology/HDR meeting 5/26/88 (w/notes and roster	6/13/88	4	EPA Region 10	Meeting participants
00000059.	Meetings	Summary of EPA/COE/Ecology/HDR meeting 7/6-7/88 (w/roster)	7/88	5	EPA Region 10	Meeting participants
00000060.	Meetings	Summary of EPA/COE/Ecology/HDR Meeting 5/6/88 (w/agenda and roster)	5/16/88	6	EPA Region 10	Meeting participants
00000106.	Meetings	Notice of information meeting on 8/22/88 for PRPs and mailing list	--	7	Charles Findley/EPA	Mailing list
00000111.	Meetings	Handwritten notes (w/roster) for Northwest Transformer meeting held 12/22/88	12/22/88	4	--	--
00000112.	Meetings	Handwritten notes (notes include names of attendees) for Northwest Transformer meeting held 8/22/89	8/22/89	3	--	--
20. Health Assessments						
00000107.	Health assessments	Draft ATSDR Health Assessment for Northwest Transformer Salvage Yard NPL site	12/6/88	11	Agency for Toxic Substances and Disease Registry, Atlanta, GA	Phil Millam/EPA
00000108.	Health assessments	Final ATSDR Health Assessment for Northwest Transformer Salvage Yard NPL site	4/14/89	11	Agency for Toxic Substances and Disease Registry, Atlanta, GA	Phil Millam/EPA
21. Record of Decision						
00000123	Record of Decision	Record of Decision for Northwest Transformer site	9/89	71	Robie G. Russell	--

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:. Remedial Design Documents						
)000122	Remedial Design Documents	Report: Application and Evaluation Considerations for In Situ Vitrification Technology	4/89	75	Geosafe Corp	--