

WORKSHEET 1

SUMMARY SCORE SHEET

January 15, 2004

Site assessed for the February 24, 2004, update of the Site Register.

Site Name/Location (Street, City, County, Section /Township/Range, ID Number):

USN Camp Wesley Harris	Township:	24N
4607 Seabeck Highway	Range:	1W
Bremerton, WA 98312	Section:	1
	Longitude:	122° 41' 43.51"
	Latitude:	47° 34' 13.33"

Facility Site ID: 2603

Site Description (Include management areas, substances of concern, and quantities):

HISTORY AND SITE DESCRIPTION

The US Navy Camp Wesley Harris site is an operational military training range located in rural Kitsap County to the west-northwest of the City of Bremerton. This site was listed on the Washington State Department of Ecology's (Ecology) Confirmed and Suspected Contaminated Sites (CSCS) list on March 1, 1988. The site was listed on the CSCS list based on the suspected release of halogenated organic compounds (HOCs) to the soil. Site investigations have documented metals (lead and chromium) contamination of the soil and shallow ground water. The various site investigations and sampling events found no HOCs in any of the site media.

The 387 acre camp has been used by the military since 1940. The site has been used as a rifle and pistol range and except in the range areas, is largely covered with stands of fir, pine, and hemlock trees. Swampy wetland areas also exist on the camp property. Multiple areas at the site have been used for target ranges and a minimum of four (4) areas have been designated as historic waste disposal sites. Except for the indoor pistol range currently located at the site, all of the historic and current ranges have used earthen backstops to catch the spent ammunition. The four (4) identified waste disposal sites were reported to have been landfill sites for inert materials, including scrap wood and metal. In 1968, two (2) of the identified landfill sites were used for the disposal of spent gas cylinders from the gas shop at Puget Sound Naval Shipyard. These 465 reportedly empty cylinders included acetylene, oxygen, carbon dioxide, chlorine, caustic (ammonia), and freon. It is unknown if there has been any release from these compressed gas cylinders. It is believed that the CSCS listing for this site included HOCs as a suspected contaminant based on the freon cylinders reportedly buried at the site.

Seabeck Highway, a county road, bisects the site and separates the camp offices from the training ranges. The offices and barracks are located on the south side of Seabeck Highway and the much larger training area located on the north side of the road. A deep (350 ft.) drinking water well is located near the office area, which supplies the facilities at the site. The camp

property is surrounded by undeveloped Washington State Department of Natural Resources forest lands to the north and west and rural residential property parcels, which are located to the east and south. The camp is situated on the crest of Kitsap Peninsula between Hood Canal and Dyes Inlet, elevations vary from 400-540 feet above sea level.

PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIONS

In 1983, the Navy performed an assessment of the camp to determine if contamination existed at the site (*Navy Assessment and Control of Installation Pollutants*, June 1983). The assessment identified lead as a contaminant of concern in the rifle and pistol range areas. The Navy's March 26, 1998, *Action Memorandum*, describes that in 1995, during sampling at the site, exceedances of the Model Toxics Control Act (MTCA) Method A residential soil cleanup standard for lead were discovered. More focused sampling in 1996 revealed that not only was the level of total lead in the soil in exceedance of MTCA, but leachable levels of lead exceeded the Washington State Dangerous Waste Regulations. In 1997, monitoring wells were installed at the site to determine if groundwater had been impacted by these releases. Sampling of the groundwater showed lead and chromium contamination, but no volatile or semivolatile compound contaminants. An effort to immobilize the lead in the soil was selected as the remedial action for the range areas.

In 1998, an on-site soil stabilization project was performed to immobilize the lead and prevent continued lead leaching to the soil and groundwater. This project addressed two (2) range areas on the site, identified as Sites 101 (long rifle range) and 102 (former pistol range) in the *Independent Cleanup Action Report for Camp Wesley Harris*, September 25, 1998, US Navy. In the report, a summary of the lead stabilization procedure was presented, as well as documentation about the effectiveness of binding the lead to prevent further release. The stabilization efforts included excavating soil, adding a lead stabilizing material to the soil in a processing mill, and then returning the stabilized soil to its original location. Lead stabilizing material was also tilled into some of the site soils which were not excavated and run through the processing mill. The report documents that the stabilization technique was effective in lowering the leachable lead values to lower than dangerous waste TCLP levels (<5ppm).

In January, 1999, a secondary groundwater sampling effort was performed, documented in the *Summary of Final Groundwater Sample Results...*, February 25, 1999, Foster Wheeler Corporation. This groundwater sampling event documented lead and chromium contamination in groundwater.

In May, 1999, a stormwater ditch sampling event occurred to further verify the effectiveness of the soil lead stabilization effort. The sediment sampling effort occurred in stormwater ditch locations which would be impacted by the shooting range runoff. In the *Summary of Sediment Sample Results...*, June 29, 1999, Foster Wheeler Corporation, ditch sediment sample results show that the total lead level had elevated, possibly from reuse of the shooting range, but the leachable lead level had not increased at that time. Leachable lead may increase over time if the area is not managed to prevent further lead release.

SITE HAZARD ASSESSMENT INVESTIGATION

In preparation for conducting the site hazard assessment (SHA) for the US Navy Camp Wesley Harris site, an initial site visit was performed to review the remedial action sites and determine current site status. On October 27, 2003, KCHD staff met with representatives from Engineering Field Activity (EFA) Northwest, who manage the environmental activities which occur at the site. The site visit gave KCHD staff a familiarity with the site history, possible contamination migration pathways, targets, and provided information about the site's current usage.

During the site visit, it was noted that Site 102, the remediated former pistol range, had been utilized after the remedial action, likely recontaminating the area with lead. A new pistol range has been placed on the east side of the long rifle range. This range also has an earthen backstop and no remedial action has been performed in this area. KCHD staff were not aware of the former waste disposal areas at the time of the site visit, and were not shown these areas by EFA Northwest representatives.

Surface water pathway

At the time of the site visit, many areas of standing water were noted and wetland areas are known to exist on the camp property. Wetlands are also located on the property to the west of the camp. Surface water generally flows to the west towards Hood Canal, and salmon bearing streams are located in the area. The surface geology in the camp area is typed as the Vashon Drift formation. The Vashon Drift formation includes both glacial outwash and glacial till areas. The soil has been mapped as Alderwood very gravelly sandy loam. Low permeability hardpan (glacial till) is located between 20-40 inches below the ground surface (bgs). Precipitation in this part of Kitsap County is approximately 51 inches per year.

Air pathway

Particulate emission is the possible migratory pathway for the metals in the soils. Erodibility of the soils at the camp is low due to the Kitsap County climate. However, the contaminated soil is at the ground surface which maximizes the exposure. Although the adjacent land is primarily undeveloped, there are two large housing developments in a half mile radius of the camp. The estimated number of persons in the half mile radius is 3353, based on an average of 2.6 people per household

Groundwater pathway

Groundwater samples from the site show contamination by lead and chromium. The monitoring wells which have been installed at the camp monitor shallow groundwater in the area. These wells show that shallow groundwater flows in a westerly direction, toward Hood Canal. Monitoring well MW-3 draws from a perched water table at a depth of 25 feet bgs. However, local well logs show that the deeper, more productive drinking water aquifer is found at between 200-350 feet bgs. The geology of the area is typical of Kitsap County. Primarily alternating layers of sand, mixed gravel and clay, and clay are the stratum below the site. In the surrounding area, there are several Group A and B public water systems and multiple private wells. It is estimated that 863 persons are supplied from local groundwater

within 10,000 feet of the site. The nearest drinking water well is approximately 600 feet away from the camp property boundary. The deep drinking water well located at the camp is away from the contaminated areas and has no permanent, resident users.

CONCLUSIONS / RECOMMENDATIONS

Based on the findings of this SHA, the Health District recommends the US Navy Camp Wesley Harris site be ranked using the Washington Ranking Method and added to Ecology's Hazardous Sites List pending remedial action.

Special Considerations (Include limitations in site file data or data which cannot be accommodated in the model, but which are important in evaluating the risk associated with the site, or any other factor(s) over-riding a decision of no further action for the site):

Although gas cylinders were buried at the site and possible releases may have occurred, the substances were not used in the scoring of the site as no sampling data exists for the disposal areas. The addition of freon (dichlorodifluoromethane, R-12) would not change the toxicity score for any of the pathways.

In the air pathway, the Washington Ranking Method guidance assumes 3 people per household. The scoring was done using the Kitsap County average of 2.6 people per household. In the groundwater pathway, the 2.6 average was also used for the number of residents using drinking private well water.

PATHWAY SCORES:

Surface Water/Human Health:	<u>20.0</u>	Surface Water/Environ:	<u>45.7</u>
Air/Human Health:	<u>24.3</u>	Air/Environmental:	<u>NS</u>
Groundwater/Human Health:	<u>42.2</u>		

OVERALL RANK: 2

**WORKSHEET 2
ROUTE DOCUMENTATION**

1. SURFACE WATER ROUTE -

List those substances to be considered for scoring:

Source: 1

Lead.

Explain basis for choice of substance(s) to be used in scoring.

The substance was identified in analytical soil samples from the site at concentrations above the applicable MTCA cleanup standard.

List those management units to be considered in scoring:

Source: 1

Contaminated soils in shooting range areas.

Explain basis for choice of unit to be considered in scoring.

Confirmed contaminated soils at the site exposed to surface water run-on / run-off with no stormwater controls.

2. AIR ROUTE

List those substances to be considered for scoring:

Source: 1

Lead.

Explain basis for choice of substance (s) to be used in scoring:

The substance was identified in analytical soil samples from the site at concentrations above the applicable MTCA cleanup standard.

List those management units to be considered in scoring:

Source: 1

Contaminated soils.

Explain basis for choice of unit to be considered in scoring:

Contaminant particulates generated from exposed contaminated soils. No erosion control measures in place.

3. GROUND WATER ROUTE

List those substances to be considered for scoring:

Source: 1

Lead and chromium.

Explain basis for choice of substance (s) to be used in scoring:

The substance was identified in analytical soil samples from the site at concentrations above the applicable MTCA cleanup standard.

List those management units to be considered in scoring:

Source: 1

Contaminated soil and shallow groundwater.

Explain basis for choice of unit to be considered in scoring:

Confirmed contamination from soil and shallow groundwater sampling.

**WORKSHEET 4
 SURFACE WATER ROUTE**

1.0 SUBSTANCE CHARACTERISTICS

1.1 Human Toxicity

Substance	Drinking Water Standard	Val.	Acute Toxicity	Val.	Chronic Toxicity	Val.	Carcinogenicity		
	(ug/l)		(mg/kg-bw)		(mg/kg/day)		WOE B2	PF ND	Val.
lead	5	8	ND	-	ND	-			
							Source:	1, 4	
							Highest Value:	8	
							2 Bonus Points?	0	
							Final Toxicity Value		8

1.2 Environmental Toxicity

Substance	(X) Freshwater () Marine Acute Criteria	Val.	Non-human Mammalian Acute Toxicity	Val.	Source:	Value:
	(ug/l)		(mg/kg)			
lead	82	6			1,4	6
1.3 Substance quantity					1	1
Explain basis:	unknown quantity of contaminated soils					

2.0 MIGRATION POTENTIAL

2.1 Containment	spills and discharges to ground surface	Source:	1,3	Value:	10
Explain basis:	with no run-on/run-off controls				
2.2 Surface Soil Permeability:	sands, silt, loam, and clayey soils	Source:	1,3,7	Value:	3
2.3 Total Annual Precipitation:	51 inches/year	Source:	6	Value:	4
2.4 Max. 2-Yr/24-hour Precipitation:	3.3 inches	Source:	3	Value:	3
2.5 Flood Plain:	In a 100 year flood plain	Source:	1,6	Value:	2
2.6 Terrain Slope:	>2-5%	Source:	1,6	Value:	2

3.0 TARGETS

3.1 Distance to Surface Water:	surface water at site - 0 feet	Source:	6	Value:	10
3.2 Population Served within 2 miles:	None.	Source:	1,6	Value:	0

WORKSHEET 4 (CONTINUED)
SURFACE WATER ROUTE

3.3	Area Irrigated within 2 miles: None, due to heavy rainfall in the area	Source: 6	Value: 0
3.4	Distance to Nearest Fishery Resource: approx. 2000 feet	Source: 6	Value: 9
3.5	Distance to, and Name (s) of, nearest Sensitive Environment (s) : 100 feet to wetlands	Source: 1	Value: 12
4.0	RELEASE		
	Explain basis for scoring a release to surface water: No confirmed release	Source: 1	Value: 0

**WORKSHEET 5
 AIR ROUTE**

1.0 SUBSTANCE CHARACTERISTICS

1.1 Introduction (WARM Scoring Manual) - Please review before scoring.

1.2 Human Toxicity

Substance	Air Standard	Val.	Acute Toxicity	Val.	Chronic Toxicity	Val.	Carcinogenicity		
	(ug/m3)		(mg/m3)		(mg/kg/day)		WOE	PF	Val.
lead	0.5	10	ND	-	ND	-	B2	ND	-
							Source:	1,4	
							Highest Value:	10	
							2 Bonus Points?	0	
							Final Toxicity Value		10

1.3 Mobility (Use numbers to refer to above listed substances)

1.3.1 Gaseous Mobility

Vapor Pressure:

mm Hg @ 20C

NOT USED

Source: 3 Value: 0
 Value

1.3.2 Particulate Mobility

erodibility climatic Value
 lead 86 1-10 1

Source: 3 Value: 1

1.4 Highest Human Health Toxicity/Mobility Matrix Value (from Table A-7)

equals

Final Matrix Value:

5

1.5 Environmental Toxicity/Mobility

Source: 4

Substance	Non-human Mammalian Toxicity (mg/m3)	Value	Particulate Mobility
lead	ND	-	1

1.5 Highest Environmental Toxicity/Mobility Matrix Value (from Table A-7) equals

Final Matrix Value: NS

1.6 Substance Quantity:

Explain basis unknown volume of contaminated soils

Source: 1,6 Value: 1

2.0 MIGRATION POTENTIAL

2.1 Containment: no cover - release at ground surface

Source: 1,3 Value: 10

3.0 TARGETS

3.1 Nearest Population: approx. 800 feet

Source: 3,6 Value: 10

3.2 Distance to, and Name (s) of, Nearest Sensitive Environment (s) wetlands habitat - 100 ft.

Source: 1,3,6 Value: 7

3.3 Population within 0.5 miles:

1341 homes at 2.6 people per home = 3487 persons square root of 3487 = 60

Source: 6 Value: 60

WORKSHEET 5 (CONTINUED)
AIR ROUTE

4.0 RELEASE

Explain basis for scoring a release to air: None confirmed Source: 1,3 Value: 0

**WORKSHEET 6
 GROUND WATER ROUTE**

1.0 SUBSTANCE CHARACTERISTICS

1.1 Human Toxicity

Substance	Drinking Water Standard (ug/l)	Val.	Acute Toxicity (mg/kg-bw)	Val.	Chronic Toxicity (mg/kg/day)	Val.	Carcinogenicity		
							WOE	PF	Val.
chromium (scored as CrIII)	100	6	-	ND	1	1	-	-	ND
lead	5	8	ND	-	ND	-	B2	ND	-
							Source:	1,3,4	
							Highest Value:	8	
							2 Bonus Points?	2	
							Final Toxicity Value:		10

1.2 Mobility (Use numbers to refer to above listed substances)

Source: 1,3,4 Value: 2

Solubility	Substance	Value (mg/L)	Score
	chromium	<0.1	1
	lead	0.1-1.0 K	2

1.3 Substance Quantity

Explain basis: Unknown volume of contaminated soils

Source: 1,3 Value: 1

2.0 MIGRATION POTENTIAL

2.1 Containment uncontained contaminated soils

Explain basis:

Source: 1,3 Value: 10

2.2 Net Precipitation (N-A): Total (38) - Evap (6) = 32 inches

Source: 3,5c Value: 4

2.3 Subsurface Hydraulic Conductivity:

silty, gravelly & clayey sands, permeable till

Source: 1,3,8 Value: 3

2.4 Vertical Depth to Ground Water: 25-95 feet

Source: 1,3, 8 Value: 6

3.0 TARGETS

3.1 Ground Water Usage: Public and private supplies with no simple alternates available

Source: 3, 6, 8 Value: 9

3.2 Distance to Nearest Drinking Water Well: approx. 720 feet

Source: 3, 6, 8 Value: 4

3.3 Population Served within 2 Miles: square root of 868 = 29

3 Group A systems - 221 connections (2.5) = 553 persons

14 Group B systems - 70 connections (2.5) = 175 persons

54 private wells (2.6) = 140 persons

Source: 3, 6, 8 Value: 29

3.4 Area Irrigated by (Groundwater) Wells within 2 miles:

NO AREA IRRIGATED

Source: 6, 8 Value: 0

WORKSHEET 6
GROUND WATER ROUTE (CONTINUED)

4.0 RELEASE

Explain basis for scoring a release to ground water: Confirmed release

Source: 1,3 Value: 5

Sources Used in Scoring

- 1 *Independent Cleanup Report*, September 25, 1988 - US Navy
Summary of Sediment Sample Results, June 29, 1999 - Foster Wheeler
Summary of Final Groundwater Sample Results, February 29, 1999 - Foster Wheeler
2. Kitsap County Stormwater Management Ordinance and Design manual, April 1997.
3. Washington Department of Ecology, WARM Scoring Manual, April, 1992.
4. Washington Department of Ecology, Toxicology Database for Use in Washington Ranking Method Scoring, January, 1992.
- 5A. Kitsap County Groundwater Management Plan, Volume I, July 1989.
- 5B. Kitsap County Groundwater Management Plan, Volume II, April 1991.
- 5C. Kitsap County Groundwater Management Plan, Volume III, April 1996
6. KCHD GIS system for Kitsap County environmental information
7. Soil Survey of Kitsap County Area, WA, United States Department of Agriculture, Soil Conservation Service, September 1980
8. Kitsap County Health District Public Well Database & Ecology's well log viewer

**PATHWAY SCORING FORMULAE WITH WEIGHTING AND
 NORMALIZATION FACTORS**

Air Route - Human Health Pathway

AIR = (SUB X 60/329) X {REL + (TAR X 35/85)} / 24 = **24.31**

where AIR = Pathway score for Air-Human Health =
 SUB = (Human Toxicity Value + 5) X (Containment +1) + Substance Quantity = 111
 REL = Release to Air = 0
 TAR = Nearest population + Population within 1/2 mile = 70

Air Route - Environmental Pathway

AIR = (SUB X 60/329) X {REL + (TAR X 35/85)} / 24 = **#VALUE!**

where AIR = Pathway score for Air-Environmental =
 SUB = (Env. Toxicity Value + 5) X (Containment +1) + Substance Quantity = #VALUE!
 REL = Release to Air = 0
 TAR = Nearest Sensitive Environment = 7

Surface Water Route - Human Health Pathway

SW = (SUB X 40/175) X {(MIG X 25/24)} + REL + (TAR X 30/115)} / 24 = **19.98**

where SW = Pathway Score for Surface Water-Human Health =
 SUB = (Human Toxicity + 3) X (Containment + 1) + Substance Quantity = 122
 MIG = Soil Permability + Annual Precip. + Rainfall Frequency +
 Floodplain + Slope = 14
 REL = Release to the Surface Water = 0
 TAR = Distance to Surface Water + Population Served by Surface Water +
 Area Irrigated = 10

Table 2 (Continued)

Surface Water Route - Environmental Pathway

$$SW = (SUB \times 40/175) \times \{(MIG \times 25/24)\} + REL + (TAR \times 30/115) / 24 = \quad \mathbf{45.68}$$

where SW = Pathway Score for Surface Water-Environmental =

$$SUB = (Env. Toxicity + 3) \times (Containment + 1) + Substance Quantity = \quad \mathbf{100}$$

$$MIG = Soil Permeability + Annual Precip. + Rainfall Frequency + Floodplain + Slope = \quad \mathbf{14}$$

$$REL = Release to the Surface Water = \quad \mathbf{0}$$

$$TAR = Distance to Nearest Surface Water + Distance to Fisheries Resource + Distance to Sensitive Environment = \quad \mathbf{31}$$

Ground Water Route - Human Health Pathway

$$GW = (SUB \times 40/208) \times \{(MIG \times 25/17) + REL + (TAR \times 30/165)\} / 24 = \quad \mathbf{42.24}$$

GW = Pathway Score For Ground Water-Human Health =

$$SUB = (Human Toxicity + Mobility + 3) \times (Containment + 1) + Substance Quantity = \quad \mathbf{166}$$

$$MIG = Depth to Aquifer + Net Precipitation + Hydraulic Conductivity = \quad \mathbf{13}$$

$$REL = Release to the Ground Water = \quad \mathbf{5}$$

$$TAR = Aquifer Use + Well Distance + Population Served + Area Irrigated = \quad \mathbf{42}$$

Name: USN Camp Wesley Harris SHA

Photo #: 1

Date: 10/27/03

Time: 1:30

Taken by: John Kiess, KCHD

Film: Digital

Camera: Sony Mavica FD-92



Description: View of the former pistol range area, site 102 in the cleanup reports, area where lead stabilization procedure was performed.

Name: USN Camp Wesley Harris SHA

Photo #: 2

Date: 10/27/03

Time: 1:30

Taken by: John Kiess, KCHD

Film: Digital

Camera: Sony Mavica FD-92



Description: Former shotgun range, adjacent to pistol range in photo #1. Identified as site 102 in the cleanup reports, area where lead stabilization procedure was also performed. Pistol range to right of photo over berm.

Name: USN Camp Wesley Harris SHA

Photo #: 3

Date: 10/27/03

Time: 1:30

Taken by: John Kiess, KCHD

Film: Digital

Camera: Sony Mavica FD-92



Description: View of the active pistol range firing line.

Name: USN Camp Wesley Harris SHA

Photo #: 4

Date: 10/27/03

Time: 1:30

Taken by: John Kiess, KCHD

Film: Digital

Camera: Sony Mavica FD-92



Description: The active pistol range backstop berm. This area has never had any remedial action performed.

Name: USN Camp Wesley Harris SHA

Photo #: 5

Date: 10/27/03

Time: 1:30

Taken by: John Kiess, KCHD

Film: Digital

Camera: Sony Mavica FD-92



Description: View down the long rifle range. The backstop at the end of the range is identified as Site 101 in the cleanup reports. The lead stabilization process was performed in the backstop area. Note the standing water in the foreground.

Name: USN Camp Wesley Harris SHA

Photo #: 6

Date: 10/27/03

Time: 1:30

Taken by: John Kiess, KCHD

Film: Digital

Camera: Sony Mavica FD-92



Description: View from the active grenade firing line on the long range. The backstop in the background is site 101. Note the stormwater ditch in the foreground. A picnic bench on end in the middle of the backstop area is the grenade target.