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MEMORANDUM

Date: April 3, 2012

To: Brandon Perkins, Site Assessment Manager, EPA, Seattle, WA, Mail Stop ECL-112

From: Linda Ader, START-3 Project Leader, E & E, Seattle, WA *LEA*

Subject: Hazard Ranking System Score
Makah Reservation – Warmhouse Beach Dump

Ref: Contract Number: EP-S7-06-02
Technical Direction Document Number: 11-01-0013

A Hazard Ranking System (HRS) Score of 50 was derived for the Makah Reservation – Warmhouse Beach Dump (WBD) site, which is located in Neah Bay, Washington as part of a Site Inspection (SI). The site score is based on the SI, a Removal Assessment (RA) completed by TechLaw, Inc. for the Environmental Protection Agency (EPA), and a Preliminary Assessment (PA) also completed by TechLaw, Inc. for the EPA, and when necessary professional assumptions. The HRS scoresheets, which were generated using Quickscore version 3.0.4 software, are attached.

Site Description:

The Makah Reservation WBD is located 2 to 3 miles northwest of Neah Bay in Clallam County, Washington, and is situated on a ridgeline overlooking the Strait of Juan de Fuca. The dump is actively used by local residents as a landfill. Dumping at the site first began in the 1940s and has continued through the years to the present. Waste disposed in the WBD have included household waste, polychlorinated biphenyls (PCBs), asbestos, batteries, used motor oil, hypodermic needles, tires, appliances, roofing, spent fireworks, construction materials, car bodies, and glass.

Drainage from the site occurs to both the west and the east, reaching West Creek and East Creek in their respective directions. Both creeks discharge to the shoreline of the Strait of Juan de Fuca along East Beach and Warmhouse Beach. Warmhouse Beach is used for camping, shellfish harvesting, surfing, and other recreational activities, while East Beach also is used for shellfish harvesting.

Pathways/Threats Not Evaluated:

Because of the relatively few targets associated with ground water migration, soil exposure, and air migration pathways, this section focuses solely on the surface water migration pathway. The Drinking Water Threat of the Surface Water Migration Pathway was not scored also due to a lack of targets.





Site Characteristics Information:

Site Name:	Makah Reservation – Warmhouse Beach Dump
CERCLIS ID Number:	WAN001002857
Latitude:	48° 23' 20" North
Longitude:	-124° 29' 24" West
Legal Description:	Township 33 North, Range 15 West, Section 4
County:	Clallam
Congressional District:	6

Sources:

WBD (landfill): During the PA, which was based on data from the RA, it was determined that SVOCs (2-methylnaphthalene, acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, bis(2-ethylhexyl)phthalate, chrysene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, and pyrene), metals (antimony, barium, cadmium, copper, lead, manganese, silver, and zinc), dioxin/furans (2,3,7,8-TCDD; 2,3,7,8-TCDF; 1,2,3,7,8-PeCDF; 1,2,3,7,8-PeCDD; 2,3,4,7,8-PeCDF; 1,2,3,4,7,8-HxCDF; 1,2,3,6,7,8-HxCDF; 1,2,3,4,7,8-HxCDD; 1,2,3,6,7,8-HxCDD; 1,2,3,7,8,9-HxCDD; 2,3,4,6,7,8-HxCDF; 1,2,3,7,8,9-HxCDF; 1,2,3,4,6,7,8-HpCDF; 1,2,3,4,6,7,8-HpCDD; 1,2,3,4,7,8,9-HpCDF; OCDD; and OCDF), and PBDEs (BDE#47, BDE#99, BDE#100, BDE#153, BDE#154, BDE#183, and BDE#209) were present at significant concentrations in soil samples from the landfill. The presence of the PCB aroclor-1016 and perchlorate at significant concentrations in the landfill were confirmed during the SI. The landfill has been estimated to have a volume between 55,000 and 65,000 cubic yards. For scoring purposes, the more conservative value of 55,000 cubic yards is being used. The hazardous waste quantity of the source is 22 (i.e., 55,000 cubic yards/2,500 for Tier C).

SURFACE WATER: OVERLAND/FLOOD (O/F) MIGRATION COMPONENT:

The Strait of Juan de Fuca watershed is being evaluated.

Surface Water Pathway O/F Description:

- The average annual precipitation as measured at Neah Bay, Washington is 100 inches.
- A total of two probable points of entry (PPEs) are present at the site where the site drains to East Creek and West Creek. West Creek discharges approximately 1,000 feet from the landfill to Warmhouse Beach on the Strait of Juan de Fuca. East Creek flows into Kydikabbit Creek, which outfalls west of Kydikabbit Point on East Beach approximately 500 feet northeast of the landfill on the Strait of Juan de Fuca. From these beaches, the remainder of the 15-mile TDL is a radial arc into the Strait of Juan de Fuca.
- Flow rates for the TDL are as follows:

Surface Water Body Name	Flow Rate	Water Body Description	Dilution Weight
East Creek	5 cfs	Minimal stream	1
West Creek	3 cfs	Minimal stream	1
Strait of Juan de Fuca	Flow not applicable	Coastal tidal waters	0.0001

Surface Water O/F Likelihood of Release:

- An observed release is documented. The landfill extends into the headwaters of both East Creek and West Creek. Analytical data indicate the presence of perchlorate, anthracene, benzo(a)pyrene, barium, cadmium, copper, lead, manganese, silver, zinc, BDE#28, BDE#47, BDE#99, BDE#100, BDE#153, BDE#154, BDE#183, and BDE#209 at significant concentrations in the creeks. An observed release value of 550 is assigned.

A surface water O/F likelihood of release value of 550 is derived.

O/F Human Food Chain (HFC) Threat:

O/F HFC Waste Characteristics:

- The highest toxicity/persistence/bioaccumulation factor value that can be assigned is 5×10^8 based on PCBs, dioxins/furans, manganese, or benzo(a)pyrene as the contaminant of concern.
- A hazardous waste quantity value of 100 is assigned.

A waste characteristics value of 320 is derived.

O/F HFC Targets:

- A food chain individual value of 20 is assigned because a fishery is present within the TDL and a hazardous substance having a bioaccumulation value greater than 500 is present at observed release concentrations.
- HFC Population:
 - No fish catch is subject to Level I concentrations. A value of 0 is assigned.
 - No fish catch is subject to Level II concentrations. A value of 0 is assigned.
 - Sport catch figures were not reported by weight. Approximately 3,631,820 pounds of commercial and treaty fish catch are subject to potential contamination. The dilution weighted population by surface water body is as follows:

Surface Water Body Type	Pounds of Harvest	Human Food Chain Value	Dilution Weight	Dilution Weighted Target Value
Coastal Tidal Waters	3,631,820	3,100	0.0001	0.31
Total dilution weighted target value			0.31/10 = 0.031	

A population value of 0.03 is derived.

An O/F HFC targets value of 20.03 is derived.

An O/F HFC threat score of 42.73 is derived.

Surface Water O/F Environmental Threat:

O/F Environmental Waste Characteristics:

- The highest ecosystem toxicity/persistence/bioaccumulation factor value that can be assigned is 5×10^8 based on benzo(a)anthracene, benzo(a)pyrene, pyrene, cadmium, PCBs, or chlordane as the contaminant of concern.
- A hazardous waste quantity value of 100 is assigned.

A waste characteristics value of 320 is derived.

O/F Environmental Targets:

- Sensitive environments:
 - No environmental targets are subject to Level I concentrations. A value of 0 is assigned.

Makah Reservation – Warmhouse Beach Dump

- Environmental targets are subject to Level II concentrations. Copper was detected at elevated concentrations on Warmhouse Beach. This analyte was likewise present at elevated concentrations in West Creek and in samples from the WBD. The shoreline of Warmhouse Beach is within the Olympic Coast National Marine Sanctuary. A Level II concentrations value of 100 is assigned.
- Environmental targets subject to potential contamination by water body type are as follows:

Surface Water Body Type	Sensitive Environment	Assigned Value	Dilution Weight	Dilution Weighted Target Value
Coastal tidal waters	Flattery Rocks National Wildlife Refuge	75	0.0001	0.0075
	Federal-listed threatened marbled murrelet	75		0.0075
	Federal-listed threatened steller sea lion	75		0.0075
	State-listed endangered Sea otter	50		0.005
	Critical habitat for the Federal-listed threatened southern resident killer whales Evolutionarily Significant Unit	100		0.01
	Critical habitat for the Federal-listed threatened Ozette Lake sockeye salmon Evolutionarily Significant Unit	100		0.01
Total dilution weighted target value		0.0475/10 = 0.00475		

An O/F environmental targets value of 100 is derived

An O/F environmental threat score of 60 is derived.

A SURFACE WATER O/F MIGRATION Score of 100 is derived.

If you have any questions regarding this memorandum or its assumptions, please contact me at 206-624-9537.

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******PRE-DECISIONAL DOCUMENT ******
****** SUMMARY SCORESHEET ******
****** FOR COMPUTING PROJECTED HRS SCORE ******

****** Do Not Cite or Quote ******

Site Name: Makah Reservation - Warmhouse Beach Dump Region: Region 10

Scenario Name: Surface Water

City, County, State: Neah Bay/Clallam, Washington Evaluator: L.Ader

EPA ID#: WAN001002857 Date: 03/15/2012

Lat/Long: 48:23:20,-124:29:24

Congressional District: 6

This Scoresheet is for: SI

Scenario Name: Surface Water

Description: The site is an active landfill on the Makah Reservation. Two creeks are adjacent to the site. Both discharge to the Straight of Juan de Fuca.

	S pathway	S ² pathway
Ground Water Migration Pathway Score (S _{gw})	0.0	0.0
Surface Water Migration Pathway Score (S _{sw})	100.0	10000.0
Soil Exposure Pathway Score (S _s)	0.0	0.0
Air Migration Score (S _a)	0.0	0.0
$S_{gw}^2 + S_{sw}^2 + S_s^2 + S_a^2$		10000.0
$(S_{gw}^2 + S_{sw}^2 + S_s^2 + S_a^2)/4$		2500.0
$/(S_{gw}^2 + S_{sw}^2 + S_s^2 + S_a^2)/4$		50.0

Pathways not assigned a score (explain):

TABLE 4-1 --SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET

Factor categories and factors	Maximum Value	Value Assigned
Watershed Evaluated: Strait of Juan de Fuca		
Drinking Water Threat		
Likelihood of Release:		
1. Observed Release	550	550.0
2. Potential to Release by Overland Flow:		
2a. Containment	10	0.0
2b. Runoff	10	0.0
2c. Distance to Surface Water	5	3.0
2d. Potential to Release by Overland Flow [(lines 2a)(2b + 2c)]	35	0.0
3. Potential to Release by Flood:		
3a. Containment (Flood)	10	0.0
3b. Flood Frequency	50	0.0
3c. Potential to Release by Flood (lines 3a x 3b)	500	0.0
4. Potential to Release (lines 2d + 3c, subject to a maximum of 500)	500	0.0
5. Likelihood of Release (higher of lines 1 and 4)	550	550.0
Waste Characteristics:		
6. Toxicity/Persistence	(a)	0.0
7. Hazardous Waste Quantity	(a)	100.0
8. Waste Characteristics	100	0.0
Targets:		
9. Nearest Intake	50	0.0
10. Population:		
10a. Level I Concentrations	(b)	0.0
10b. Level II Concentrations	(b)	0.0
10c. Potential Contamination	(b)	0.0
10d. Population (lines 10a + 10b + 10c)	(b)	0.0
11. Resources	5	0.0
12. Targets (lines 9 + 10d + 11)	(b)	0.0
Drinking Water Threat Score:		
13. Drinking Water Threat Score [(lines 5x8x12)/82,500, subject to a max of 100]	100	0.0
Human Food Chain Threat		
Likelihood of Release:		
14. Likelihood of Release (same value as line 5)	550	550.0
Waste Characteristics:		
15. Toxicity/Persistence/Bioaccumulation	(a)	5.0E8
16. Hazardous Waste Quantity	(a)	100.0
17. Waste Characteristics	1000	320.0
Targets:		
18. Food Chain Individual	50	20.0
19. Population:		
19a. Level I Concentration	(b)	0.0
19b. Level II Concentration	(b)	0.0
19c. Potential Human Food Chain Contamination	(b)	0.03
19d. Population (lines 19a + 19b + 19c)	(b)	0.03
20. Targets (lines 18 + 19d)	(b)	20.03
Human Food Chain Threat Score:		
21. Human Food Chain Threat Score [(lines 14x17x20)/82500, subject to max of 100]	100	42.73
Environmental Threat		
Likelihood of Release:		
22. Likelihood of Release (same value as line 5)	550	550.0
Waste Characteristics:		
23. Ecosystem Toxicity/Persistence/Bioaccumulation	(a)	5.0E8
24. Hazardous Waste Quantity	(a)	100.0
25. Waste Characteristics	1000	320.0

Targets:

26. Sensitive Environments		
26a. Level I Concentrations	(b)	0.0
26b. Level II Concentrations	(b)	100.0
26c. Potential Contamination	(b)	0.0
26d. Sensitive Environments (lines 26a + 26b + 26c)	(b)	100.0
27. Targets (value from line 26d)	(b)	100.0
Environmental Threat Score:		
28. Environmental Threat Score [(lines 22x25x27)/82,500 subject to a max of 60]	60	60.0
Surface Water Overland/Flood Migration Component Score for a Watershed		
29. Watershed Score ^c (lines 13+21+28, subject to a max of 100)	100	100.00
Surface Water Overland/Flood Migration Component Score		
30. Component Score (S _{sw}) ^c (highest score from line 29 for all watersheds evaluated)	100	100.00

^a Maximum value applies to waste characteristics category

^b Maximum value not applicable

^c Do not round to nearest integer

TABLE 4-25 --GROUND WATER TO SURFACE WATER MIGRATION COMPONENT SCORESHEET

Factor categories and factors	Maximum Value	Value Assigned
Watershed Evaluated: Strait of Juan de Fuca		
Drinking Water Threat		
Likelihood of Release to an Aquifer:		
1. Observed Release	550	0.0
2. Potential to Release:		
2a. Containment	10	0.0
2b. Net Precipitation	10	0.0
2c. Depth to Aquifer	5	0.0
2d. Travel Time	35	0.0
2e. Potential to Release [(lines 2a)(2b + 2c + 2d)]	500	0.0
3. Likelihood of Release (higher of lines 1 and 2e)	550	0.0
Waste Characteristics:		
4. Toxicity/Mobility	(a)	0.0
5. Hazardous Waste Quantity	(a)	0.0
6. Waste Characteristics	100	0.0
Targets:		
7. Nearest Well	(b)	0.0
8. Population:		
8a. Level I Concentrations	(b)	0.0
8b. Level II Concentrations	(b)	0.0
8c. Potential Contamination	(b)	0.0
8d. Population (lines 8a + 8b + 8c)	(b)	0.0
9. Resources	5	0.0
10. Targets (lines 7 + 8d + 9)	(b)	0.0
Drinking Water Threat Score:		
11. Drinking Water Threat Score [(lines 3 x 6 x 10)/82,500, subject to max of 100]	100	0.0
Human Food Chain Threat		
Likelihood of Release:		
12. Likelihood of Release (same value as line 3)	550	0.0
Waste Characteristics:		
13. Toxicity/Mobility/Persistence/Bioaccumulation	(a)	0.0
14. Hazardous Waste Quantity	(a)	0.0
15. Waste Characteristics	1000	0.0
Targets:		
16. Food Chain Individual	50	0.0
17. Population		
17a. Level I Concentration	(b)	0.0
17b. Level II Concentration	(b)	0.0
17c. Potential Human Food Chain Contamination	(b)	0.0
17d. Population (lines 17a + 17b + 17c)	(b)	0.0
18. Targets (lines 16 + 17d)	(b)	0.0
Human Food Chain Threat Score:		
19. Human Food Chain Threat Score [(lines 12x15x18)/82,500,subject to max of 100]	100	0.0
Environmental Threat		
Likelihood of Release:		
20. Likelihood of Release (same value as line 3)	550	0.0
Waste Characteristics:		
21. Ecosystem Toxicity/Persistence/Bioaccumulation	(a)	0.0
22. Hazardous Waste Quantity	(a)	0.0
23. Waste Characteristics	1000	0.0
Targets:		
24. Sensitive Environments		
24a. Level I Concentrations	(b)	0.0
24b. Level II Concentrations	(b)	0.0

24c. Potential Contamination	(b)	0.0	
24d. Sensitive Environments (lines 24a + 24b + 24c)	(b)	0.0	
25. Targets (value from line 24d)	(b)		0.0
Environmental Threat Score:			
26. Environmental Threat Score [(lines 20x23x25)/82,500 subject to a max of 60]	60		0.0
Ground Water to Surface Water Migration Component Score for a Watershed			
27. Watershed Score ^c (lines 11 + 19 + 28, subject to a max of 100)	100		0.0
28. Component Score (S _{gs}) ^c (highest score from line 27 for all watersheds evaluated, subject to a max of 100)	100		0.0

^a Maximum value applies to waste characteristics category

^b Maximum value not applicable

^c Do not round to nearest integer

TABLE 5-1 --SOIL EXPOSURE PATHWAY SCORESHEET

Factor categories and factors	Maximum Value	Value Assigned
Likelihood of Exposure:		
1. Likelihood of Exposure	550	
Waste Characteristics:		
2. Toxicity	(a)	0.0
3. Hazardous Waste Quantity	(a)	
4. Waste Characteristics	100	0.0
Targets:		
5. Resident Individual	50	
6. Resident Population:		
6a. Level I Concentrations	(b)	0
6b. Level II Concentrations	(b)	
6c. Population (lines 6a + 6b)	(b)	
7. Workers	15	0.0
8. Resources	5	
9. Terrestrial Sensitive Environments	(c)	
10. Targets (lines 5 + 6c + 7 + 8 + 9)	(b)	0.0
Resident Population Threat Score		
11. Resident Population Threat Score (lines 1 x 4 x 10)	(b)	0.0
Nearby Population Threat		
Likelihood of Exposure:		
12. Attractiveness/Accessibility	100	0.0
13. Area of Contamination	100	5.0
14. Likelihood of Exposure	500	0.0
Waste Characteristics:		
15. Toxicity	(a)	0.0
16. Hazardous Waste Quantity	(a)	0.0
17. Waste Characteristics	100	0.0
Targets:		
18. Nearby Individual	1	0.0
19. Population Within 1 Mile	(b)	
20. Targets (lines 18 + 19)	(b)	
Nearby Population Threat Score		
21. Nearby Population Threat (lines 14 x 17 x 20)	(b)	0.0
Soil Exposure Pathway Score:		
22. Pathway Score ^d (S _p), [(lines (11+21)/82,500, subject to max of 100]	100	0.0

^a Maximum value applies to waste characteristics category

^b Maximum value not applicable

^c No specific maximum value applies to factor. However, pathway score based solely on terrestrial sensitive environments is limited to a maximum of 60

^d Do not round to nearest integer

TABLE 6-1 --AIR MIGRATION PATHWAY SCORESHEET

Factor categories and factors	Maximum Value	Value Assigned
Likelihood of Release:		
1. Observed Release	550	
2. Potential to Release:		
2a. Gas Potential to Release	500	
2b. Particulate Potential to Release	500	
2c. Potential to Release (higher of lines 2a and 2b)	500	
3. Likelihood of Release (higher of lines 1 and 2c)	550	
Waste Characteristics:		
4. Toxicity/Mobility	(a)	
5. Hazardous Waste Quantity	(a)	
6. Waste Characteristics	100	
Targets:		
7. Nearest Individual	50	
8. Population:		
8a. Level I Concentrations	(b)	
8b. Level II Concentrations	(b)	
8c. Potential Contamination	(c)	
8d. Population (lines 8a + 8b + 8c)	(b)	
9. Resources	5	
10. Sensitive Environments:		
10a. Actual Contamination	(c)	
10b. Potential Contamination	(c)	
10c. Sensitive Environments (lines 10a + 10b)	(c)	
11. Targets (lines 7 + 8d + 9 + 10c)	(b)	
Air Migration Pathway Score:		
12. Pathway Score (S_a) $[(\text{lines } 3 \times 6 \times 11)/82,500]^d$	100	

^a Maximum value applies to waste characteristics category

^b Maximum value not applicable

^c No specific maximum value applies to factor. However, pathway score based solely on sensitive environments is limited to a maximum of 60.

^d Do not round to nearest integer