CSID 2781 NFA

WORKSHEET 1
SUMMARY SCORE SHEET

Note: This document currently has no provision for sediment route scoring.

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

Great Northern BNRR Tank Farm, 1621 Mukilteo Blvd., Everett , Snohomish County, 35/29N/4E

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

The site is located in the city of Everett adjacent to a city park and Puget Sound. The surrounding area is residential. The area is served by public water not supplied by the underlying aquifer. The tank farm was constructed at the location in the 1930's. The tanks were decommissioned in the 1950's and by the mid 1960's the tanks were removed. A complaint was filed in November of 1995 with the Department of Ecology (Ecology) concerning large areas of solidified oil and tar in area of historic oil storage tanks for Great Northern Railroad. The Snohomish Health District conducted an initial investigation and observed the presence of a dark oily tar material on the property where the tank farm was originally located. A followup visit led to the observation of an oily substance just below the surface of the sand in the tidelands near where the pier for the tank farm was originally located. A soil sample was collected and TPH Heavy Oil was found at levels that exceeded Model Toxics Control Act (MTCA) cleanup levels. In a subsequent visit by Ecology, two soil samples were collected in the rockery near the tidelands. Visual evidence of a petroleum product was noted. One sample was found to contain polycyclic aromatic hydrocarbons (PAHs) in excess of MTCA cleanup levels. In May of 1997, the site was added to Ecology's database of suspected and confirmed contaminated sites. The site was listed as confirmed for petroleum in groundwater and surface water, and for base/neutral organics and PAHs in soils. The site was also listed as suspected for base/neutral organics and PAHs in surface water and groundwater.

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):

In scoring the ground water route and surface water routes, toxicity values for the diesel component of TPH were used. There are no toxicity values presently quantified, for WARM scoring purposes, for TPH expressed as heavy hydrocarbons (heavy oils) and diesel is the next weight hydrocarbon weight grouping, with expressed toxicity data. The presence of TPH as heavy oils were found in the soil samples collected on the property exceeded MTCA cleanup levels.

ROUTE SCORES:

Surface Water/Human Health:	30.1	Surface Water/Environ.:	39.5
Air/Human Health:	20.1	Air/Environmental:	NS
Ground Water/Human Health:	23.5		

OVERALL RANK: 2

WORKSHEET 2
ROUTE DOCUMENTATION

1. SURFACE WATER ROUTE

List those substances to be considered for scoring: Source: 1,2,3

TPH Diesel, Benzo(a)pyrene, and Chrysene

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

TPH Diesel, Benzo(a)pyrene, and Chrysene will be used in scoring the surface water route, as their measured concentrations exceed MTCA cleanup levels in soils near the tideland areas and are available due to less than perfect containment.

List those management units to be considered for scoring: Source: 1,2,3

Subsurface Groundwater and Contaminated surface soils

Explain basis for choice of unit to be used in scoring. Source: 1,2,3

Contaminated surface soils will be used in scoring as the measured concentrations TPH Diesel, Benzo(a)pyrene, and Chrysene was from this management unit. No containment was observed of this unit allowing contaminants to be available to the surface water pathway.

2. AIR ROUTE

List those substances to be considered for scoring: Source: 1,2,3

TPH Diesel, Benzo(a)pyrene, and Chrysene

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

TPH Diesel, Benzo(a)pyrene, and Chrysene will be used in scoring the air route, as their measured concentrations exceed MTCA cleanup levels in surface soils near the tideland areas and are available due to less than perfect containment. TPH Diesel will be used in the scoring toxicity only as it is felt that mobility of the contamination is better represented by TPH Heavy Oils.

List those management units to be considered for scoring: Source: 1,2,3

Subsurface Groundwater and Contaminated surface soils

Explain basis for choice of unit to be used in scoring. Source: 1,2,3

Contaminated surface soils will be used in scoring as the measured concentrations TPH Diesel, Benzo(a)pyrene, and Chrysene was from this management unit. No containment was observed of this unit allowing contaminants to be available to the air pathway.

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3. GROUND WATER ROUTE

List substances to be considered for scoring: Source: 1,2,3

TPH Diesel, Benzo(a)pyrene, and Chrysene

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

TPH Diesel, Benzo(a)pyrene, and Chrysene will be used in scoring the ground water route, as their measured concentrations exceed MTCA cleanup levels and are available due to less than perfect containment.

List management units to be considered in scoring: Source: 1,2,3

Contaminated subsurface soil

Explain basis for choice of unit used in scoring. Source: 1,2,3

Contaminated subsurface soil will be used in scoring as the measured concentration of TPH Diesel, Benzo(a)pyrene, and Chrysene was from this management unit. No containment was observed of this unit allowing contaminants to be available to the ground water pathway.

WORKSHEET 4
SURFACE 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/da)	Val.	Carcinogenicity WOE	PF	Val.
TPH-Diesel	20	6	490	5	0.004	3	X	X	X
Benzo(a)pyrene	0.2	10	50	10	X	X	B2	12	7
Chrysene	0.2	10	X	X	X	X	B2	11.5	7

Source: 1,2,3,4
Highest Value: 10
2 Bonus Points? 2
Final Toxicity Value 12

1.2 Environmental Toxicity

( ) Freshwater
(X) Marine

Substance	Acute Criteria (ug/l)	Val.	Non-human Mammalian Acute Toxicity (mg/kg)	Val.
TPH-Diesel	2350	2	490	5
Benzo(a)pyrene	300	4	50	10
Chrysene	300	4		

Source: 1,2,3,4 Value: 4

1.3 Substance quantity

Source: 1,2,3 Value: 1

Explain basis: Unknown - Default value

WORKSHEET 4 CONTINUED
SURFACE WATER ROUTE

2.0 MIGRATION POTENTIAL

2.1 Containment — Source: 1,2,3 Value: 10
Explain basis: No run-on/runoff control system

2.2 Surface Soil Permeability: Gravelly sand loam — Source: 1,3,9 Value: 1

2.3 Total Annual Precipitation 34.7 inches — Source: 3,5 Value: 3

2.4 Max. 2-Yr/24-hour Precipitation 1.5 inches — Source: 3 Value: 2

2.5 Flood Plain: not in floodplain — Source: 1,3 Value: 0

2.6 Terrain Slope: 10% — Source: 1,3 Value: 5

3.0 TARGETS

3.1 Distance to Surface Water: Tidelands — Source: 1,3 Value: 10

3.2 Population Served within 2 miles: 0 — Source: 3,7,8,10 Value: 0

3.3 Area Irrigated within 2 miles: 0 — Source: 3,7 Value: 0

3.4 Distance to Nearest Fishery Resource: Tidelands — Source: 1,3 Value: 12

3.5 Distance to, and Name (s) of, nearest Sensitive Environment (s) Tidelands — Source: 1,3 Value: 12

4.0 RELEASE

Explain basis for scoring a release to surface water: — Source: 1,3 Value: 5
Sample collected on beach at low tide indicated TPH levels above cleanup levels.

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 (ug/m3)	Val.	Acute Toxicity (mg/kg)	Val.	Chronic Toxicity (mg/kg/da)	Val.	Carcinogenicity WOE	PF	Val.
TPH-Diesel	166.5	4	X	ND	X	ND	X	X	ND
Benzo(a)pyrene	0.0006	10	X	ND	X	ND	X	X	ND
Chrysene	X	ND	X	ND	X	ND	X	X	ND

Source: 1,2,3,4
Highest Value: 10
2 Bonus Points? _____
Final Toxicity Value 10

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

1.3.1 Gaseous Mobility — Source: 1,2,3,4 Value: 1

Vapor Pressure (s): Due to the nature of the contamination it is felt that TPH Heavy Oils better represents the mobility. A value of 1 is used.

1.3.2 Particulate Mobility — Source: _____ Value: _____

Soil type:
Erodibility:
Climactic Factor:

1.4 Highest Human Health Toxicity/Mobility Matrix Value (from Table A-7) equals **Final Matrix Value:** 5

1.5 Environmental Toxicity/Mobility — Source: _____

Non-human Mammalian

Substance	Inhal. Toxicity (ug/m3)	Value	Mobility	Value	Matrix Value

1.4 Highest Environmental Toxicity/Mobility Matrix Value (from Table A-7) equals **Final Matrix Value** 0

WORKSHEET 5 CONTINUED
AIR ROUTE

1.6 Substance Quantity: Source: 1,3 Value: 1
Explain basis Unknown quantity - default value =1

2.0 MIGRATION POTENTIAL

2.1 Containment: Spils and soil contamination, no cover, no vapor collection Source: 1,3 Value: 10

3.0 TARGETS

3.1 Nearest Population: Within a 1000 feet Source: 1,3 Value: 10

3.2 Distance to, and Name (s) of, Nearest Sensitive Environment (s) City Park within 200 feet Source: 1,3 Value: 10

3.3 Population within 0.5 miles: Source: 3,12 Value: 48
sq root of 2001 = 44.7

4.0 RELEASE

Explain basis for scoring a release to air: Source: 1,2,3 Value: 0
No confirmed documented release.

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/da)	Val.	Carcinogenicity WOE	PF	Val.
TPH-Diesel	20	6	490	5	0.004	3	X	X	X
Benzo(a)pyrene	0.2	10	50	10	X	X	B2	12	7
Chrysene	0.2	10	X	X	X	X	B2	11.5	7

Source: 1,2,3,4
Highest Value: 10
2 Bonus Points? 2
Final Toxicity Value: 12

1.2 Mobility (Use numbers to refer to above listed substances) Source: 1,2,3,4 Value: 1
Cations/Anions

OR
Solubility (mg/l)

TPH-D = 30 mg/l

1.3 Substance Quantity Source: 1,2,3 Value: 1
Explain basis: Unknown quantity - default value

2.0 MIGRATION POTENTIAL

2.1 Containment Source: 1,2,3 Value: 10
Explain basis: Discharge and contaminated soil

2.2 Net Precipitation: 16.9 inches Source: 3,5 Value: 2

2.3 Subsurface Hydraulic Conductivity: Admiralty clay Source: 3,11 Value: 1

2.4 Vertical Depth to Ground Water: 20 feet Source: 3,11 Value: 8

WORKSHEET 6
GROUND WATER ROUTE

3.0 TARGETS

3.1 Ground Water Usage: Ground water not used but usable. Source: 3,7,8,10 Value: 2

3.2 Distance to Nearest Drinking Water Well: Source: 3,8,10 Value: 0
>10,000 feet

3.3 Population Served within 2 Miles: Source: 3,7,8,10 Value: 0
None

3.4 Area Irrigated by (Groundwater) Wells Source: 3,7 Value: 0
within 2 miles: None

4.0 RELEASE

Explain basis for scoring a release to ground water: Source: 2,3 Value: 0
No evidence of a release to groundwater

Sources Used in Scoring

1. Snohomish Health District, Initial Investigation, Great Northern BNRR Tank Farm, Mukilteo, WA, June 5, 1996.
2. Washington Department of Ecology, Site Sample Results, July 1996.
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.
5. National Weather Service, Washington Climate Data, Snohomish County.
6. U.S.G.S. Topo. Map, Everett Quad., 7.5 Min. Series, Photorev. 1981.
7. Washington Department of Ecology, Water Rights Information System (WRIS), November 4, 1992.
8. Washington Department of Health, Public Water System List, April 26, 1993.
9. United States Dept. of Agriculture, Soil Survey of Snohomish County Area Washington, July 1983.
10. Washington Department of Ecology, Well Logs, 1995.
11. U.S. Geological Service, Geologic Map of Everett, 1985.
12. Transamerica Title Company, Metroscan, 1997.

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 = **20.14**

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 = 58

Air Route - Environmental Pathway

AIR = (SUB X 60/329) X {REL + (TAR X 35/85} / 24 = **~~21.28~~**

where
- AIR = Pathway score for Air-Environmental =
- SUB = (Env. Toxicity Value + 5) X (Containment +1) + Substance Quantity = 56
- REL = Release to Air = 0
- TAR = Nearest Sensitive Environment = 10

Surface Water Route - Human Health Pathway

SW = (SUB X 40/175) X {(MIG X 25/24)) + REL + (TAR X 30/115)} / 24 = **30.14**

where
- SW = Pathway Score for Surface Water-Human Health =
- SUB = (Human Toxicity + 3) X (Containment + 1) + Substance Quantity = 166
- MIG = Soil Permability + Annual Precip. + Rainfall Frequency + Floodplain + Slope = 11
- REL = Release to the Surface Water = 5
- TAR = Distance to Surface Water + Population Served by Surface Water + Area Irrigated = 10

Table 2 (Continued)

Surface Water Route - Environmental Pathway

SW = (SUB X 40/175) X {(MIG X 25/24)) + REL + (TAR X 30/115)} / 24 = **39.47**

where
- SW = Pathway Score for Surface Water-Environmental =

SUB = (Env. Toxicity + 3) X (Containment + 1) + Substance Quantity = 78

MIG = Soil Permability + Annual Precip. + Rainfall Frequency + Floodplain + Slope = 11

REL = Release to the Surface Water = 5

TAR = Distance to Nearest Surface Water + Distance to Fisheries Resource + Distance to Sensitive Environment = 34

Ground Water Route - Human Health Pathway

GW = (SUB X 40/208) X {(MIG X 25/17) + REL + (TAR X 30/165)} / 24 = **23.46**

GW = Pathway Score For Ground Water-Human Health =

SUB = (Human Toxicity + Mobility + 3) X (Containment + 1) + Substance Quantity = 177

MIG = Depth to Aquifer + Net Precipitation + Hydraulic Conductivity = 11

REL = Release to the Ground Water = 0

TAR = Aquifer Use + Well Distance + Population Served + Area Irrigated = 2