

APPENDIX A

Spill Risk Information:

- # Calculations for Section 3.18 of EIS
- # Summary of Pipeline Spill Scenarios
- # Historical U.S. Oil Spill Incidents in the 1980 - 1998 Time Frame
- # Table A-1. Petroleum Release History for Olympic Pipeline, 1966 - 1997

CALCULATIONS FOR SECTION 3.18 OF EIS

Calculation of leak and rupture probability for the Proposed Project

1. Probability of leak and rupture:

Leak (less than 50 bbl volume): 0.7×10^{-3} /mile/year

Rupture (50 bbls or greater): 0.3×10^{-3} /mile/year

Source: Mastrandea, 1982. Not dependent on volume transported. Represents U.S. pipeline industry failure rates for 1980. Based on 10" pipe operating at 1000 psi.

Other data sources:

a) Pacific Pipeline, 1996. Leaks - 0.54×10^{-3} ; Ruptures - 0.27×10^{-3} . Based on new pipe, 20" diameter.

b) Existing Olympic Pipeline. Leaks - 1.8×10^{-3} ; Ruptures - 1.3×10^{-3} . Based on actual performance, pipeline construction in 1965, diameters from 12" to 20".

2. Correction for pipe diameter:

14" pipe - 0.5; 12" pipe - 0.6 (Source: ibid)

3. Correction for age of pipe:

0-5 yrs - 0.25; 5-15 yrs - 0.5; 15-25 yrs - 0.6; 25-30 yrs - 1.4

(These factors are based on spills >50 bbls, and have been used for all spill size age corrections.)

(Source: Ibid)

4. Calculation of spill rate projection:

Example: Leak, pipeline 0-5 yrs old, 12" dia. segment:

$$0.7 \times 10^{-3} \text{ leaks/mile/year} \times 0.6 \text{ correction for 12" pipe} \times 0.25 \text{ correction for age} \\ = 1.05 \times 10^{-4} \text{ leaks per mile per year.}$$

This value is entered in Table 3.18-4; other values in the table are calculated in a similar manner.

5. Calculation of projected number of spills:

Example: Leak rate for Kittitas to Pasco segment, length 107 miles, within first 5 years.

$$1.05 \times 10^{-4} \text{ leaks per mile per year} \times 107 \text{ mile length} \\ = 0.0112 \text{ leaks per year (projected during the first 5 years of the pipeline life).}$$

This value is entered in Table 3.18-5; other values in the table are calculated in a similar manner.

Calculation of Truck Spill Rate, No Action Alternative

1. Spills per truck-mile

$$\begin{aligned} & 3.51 \times 10^{-6} \text{ accidents/truck mile} \times 0.188 \text{ releases/accident} \\ & = 6.6 \times 10^{-7} \text{ spills/truck mile} \end{aligned}$$

Source: US DOT, Federal Highway Administration, 1990.
Present Practices of Highway Transportation of Hazardous Materials.
Hazardous materials include crude oil and petroleum products.

2. Calculation of truck transportation without proposed project:

In 2014, an increase to an average of 101 trucks/day is projected, and in 2026, an increase to an average of 128 trucks/day (No Action Alternative description).

$$\begin{aligned} \text{In 2014: } & 101 \text{ trucks/day} \times 365 \text{ days/year} \times 275 \text{ miles/trip} \\ & = 10.14 \times 10^6 \text{ miles/year} \quad (\text{note: only loaded direction counted}) \end{aligned}$$

$$\text{In 2026: } 128 \times 365 \times 275 = 12.85 \times 10^6 \text{ miles/year.}$$

3. Calculation of projected spills/year for No Action Alternative:

$$\begin{aligned} \text{2014: } & 10.14 \times 10^6 \text{ miles/year} \times 6.6 \times 10^{-7} \text{ spills/mile} \\ & = 6.7 \text{ spills/year} \\ \text{2026: } & 12.85 \times 10^6 \times 6.6 \times 10^{-7} = 8.5 \text{ spills/year} \end{aligned}$$

These values are entered into Table 3.18-7.

Calculation of Trucking Fatality Rate, No Action Alternative

1. Fatalities per ton-mile transported: 9.22×10^{-9}

Source: California State Fire Marshall, Hazardous Liquid Pipeline Risk Assessment,
April 1993

2. Correction to fatalities per barrel-mile transported:

$$\frac{9.22 \times 10^{-9} \text{ fatalities/ton-mile}}{6.8 \text{ barrels/ton}} = 1.4 \times 10^{-9} \text{ fatalities/barrel-mile}$$

3. Calculation of barrel-miles/year:

$$\begin{aligned} 2014: & 101 \text{ trucks/day} \times 275 \text{ miles/trip} \times 190 \text{ bbls/truck} \times 365 \text{ days/year} \\ & = 19.3 \times 10^8 \text{ bbl-miles/year.} \end{aligned}$$

$$2026: 128 \times 275 \times 190 \times 365 = 2.40 \times 10^9 \text{ bbl-miles/year}$$

4. Calculation of number of fatalities per year:

$$\begin{aligned} 2014: & 19.3 \times 10^8 \text{ bbl-miles/year} \times 1.4 \times 10^{-9} \text{ fatalities/bbl-mile} \\ & = 2.7 \text{ fatalities/year} \end{aligned}$$

$$2026: 2.4 \times 10^9 \times 1.4 \times 10^{-9} = 3.4 \text{ fatalities/year}$$

These values are entered into Table 3.18-7.

Calculation of Barge Spill Rate, No Action Alternative

1. Spills per billion barrels transported:

Spills not involving hull rupture (leaks), 6.81×10^{-9} / bbl transported

Spills involving hull rupture (ruptures), 1.3×10^{-9} / bbl transported

Sources:

1) Minerals Management Service, Oil Spill Risk Analysis: Northern California (proposed sale 91) Outer Continental Shelf, US Dept. of the Interior, August 1987.

2) Minerals Management Service, Final EIS, Proposed Southern California Lease Offering, April 1984.

3) Minerals Management Service, Final EIS, OCS Sale 73, proposed 1983 OCS Oil and Gas Lease Sale Offshore Central California, June 1983

2. Barges on Columbia River (from No Action Alternative project description):

2014, 346 barge trips/year,

2026, 600 barge trips/year,

3. Calculation of Leak Rate:

2014, 6.81×10^{-9} leaks/bbl transported $\times 2.25 \times 10^6$ bbl transported/year

= $155 \times 10^{-3} = 0.153$ leaks/year

2026, $6.81 \times 10^{-9} \times 25.8 \times 10^6 = 0.175$ leaks/year

6. Calculation of Rupture Rate:

2014, 1.30×10^{-9} ruptures/bbl transported $\times 22.8 \times 10^6$ bbl transported/year

= 0.029 ruptures/year

2026, $1.3 \times 10^{-9} \times 25.8 \times 10^6 = 0.034$ ruptures/year

These values are entered into Table 3.18-8.

Calculation of Projected Spill Rate of Existing Olympic Pipeline

1. Projected spill rate for pipeline built 1997, and aged to 25-30 years old, spill rate:

Whatcom County to Allen Station - 16" dia., 37 miles
Allen Station to Renton Station - two lines, 16" and 20" dias., 78 miles
Renton Station to SeaTac airport - 12" dia., 6 miles
Renton to Harbor Island - 12" dia., 12 miles
Renton to Vancouver/ Portland - 14" dia., 150 miles

Assume average diameter of 14 A

14" dia. - Leak probability = 4.9×10^{-4} per mile per year

Rupture = 2.1×10^{-4} per mile per year

(Source: Table 3.18-4 of this EIS)

2. Existing pipeline length = 375 miles. Constructed 1965.

3. Factor for 1960s year of construction, using Mastrandea (1982) spill rate for 1960 year of construction:

$$\text{Leaks: } 1960\text{s/new} = \frac{1.8 \times 10^{-3}}{4.9 \times 10^{-4}} = 3.7$$

$$\text{Ruptures: } 1960\text{s/new} = \frac{9 \times 10^{-4}}{2.1 \times 10^{-4}} = 4.3$$

4. Calculation of spill rate:

Leaks: 375 miles x 3.7 age factor x 4.9×10^{-4} leaks/mile/year = 0.68 leaks/yr

Ruptures: $375 \times 4.3 \times 2.1 \times 10^{-4}$ = 0.34 ruptures/yr

Total 1.02 spills/yr

SUMMARY OF PIPELINE SPILL SCENARIOS

Scenario No.	Milepost	Spill Size (gal)*	Between Block Valves	Vol. Between Block Valves (gal)	% of Volume Spilled
1	0.8	1. 54,600 2. 13,500	1-2	310,000	18 4
2	7.9	1. 96,000 2. 13,650	1-2	310,000	31 4
3	19.0	148,400	5-6	279,426	53
4	34.0	100,700	9-10	124,068	81
5	38.2	20,000	11-12	70,350	28
6	55.0	29,400	14-15	495,642	6
7	59.0	162,100	14-15	495,642	33
8	94.5	1. 67,900 2. 9,300	20-21	158,046	43 6
9	108.0	35,550	21-22	430,920	8
10	145.0	13,100	25-26	605,556	2
11	174.5	11,700	29-30	766,836	2
12	212.5	49,800	33-34	1,265,124	4
					avg. = 21.5%
<p>* 1. = short term 2. = long term</p> <p>Source: Product Spill Analysis prepared by Dames & Moore, Feb. 28, 1997.</p>					

HISTORICAL U.S. OIL SPILL INCIDENTS IN THE 1980-1998 TIME FRAME

One of the most sensitive concerns about the proposed project is the potential for oil spill from the operating pipeline somewhere between Snohomish County and Pasco, and the effects of such a spill on the environment, including water quality, water supply, groundwater, fisheries and public health and safety. Some discussion of spill scenarios is included and/or referenced in the text of the EIS. These are hypothetical incidents, as all scenarios are, wherein each element of each scenario is made up, based on some reasonable information.

The EIS examines potential impacts of oil spills and leaks. It presents leak and accident probabilities of the proposal comparing the potential spill probabilities of truck accident, barge accident and pipeline accident. It refers to various oil spill scenarios and their potential impacts with various response scenarios. All of these analyses use professional judgement and scientific analysis to predict the future; the future of spill frequency, spill size, spill location, response activities, and other forecasts. There are infinite scenarios and it is as easy to generate a worst case scenario for the proposal (50,000 barrel pipeline spill into Lake Keechelus) as it is for No Action (50,000 barrel spill into Puget Sound or the Columbia River from barges). Decision makers must evaluate these forecasts and consider their likelihood vs. their impact.

One aspect of this project is that refined petroleum product will be transported in Washington with or without the project, and decision makers, with consideration for public comment and scientific analysis, must decide whether this project will have more or less potential impact than No Action or would create unacceptable impacts regardless. There will be oil spills in the future, and traffic accidents in the future, with or without the project. This EIS attempts, in as many ways as possible, to inform the reader about the potential for and significance of impacts.

To provide further context for the reviewer, this section lists various actual spill incidents involving barges, pipelines, trucks, and terminals. The following information does not depend on probability analysis, assumptions on size of effect, response time, location, or likelihood. All of the following incidents actually occurred. The reviewers can arrive at their own conclusions as to this information's applicability to the decision and to the Cross Cascade Pipeline Project. It includes examples of the types of spills that will occur with and without the project. The reader can then consider the risk analysis, the scenarios, the impact assessment, the No Action conditions, and these actual spill events, in balancing the risks and benefits of approval vs. denial.

The following information is not intended to be complete but is a sample of petroleum transport product spills that have occurred in the U.S. since 1980. Petroleum spills from non-petroleum transport means (e.g., cargo ships) are not included unless associated with transfer activity.

Tables at the end of the section also provide spills in context with the volumes carried by various carriers. Pipelines, which are sometimes accused of spilling the most oil of all oil transport systems, carry the most oil of all transport systems: 53-57% of the crude and refined oil transported. Tanker ships and barges carry about 40% of the volumes transported. Trucks carry 2-3% and rail carries about 1.5%. In 1994 there were 200,000 miles of oil pipelines operating in the U.S. and 244 incidents causing 1,858 injuries. Of all spills worldwide from 1987 through 1996, barges spilled

an average of 2-5 million gallons each year with a high of 6 million gallons twice in that period. Pipelines, which carry much more product, averaged spills of 3-6 million gallons per year and had three years with approximately 11 million gallons spilled and two years of 40 million gallons, worldwide.

According to the Oil Spill Intelligence Report (OSIR 1996), for the five year period ending in 1996, barge spills averaged 40,000 bbls per incident for three years and 440 bbls per incident for two years. Pipelines during the same period averaged 1,333 bbls per incident.

The following incidents occurred in U.S. waters.

Tidewater Barge Lines Inc. Spills

October 14, 1993 - Approximately 3,000 gallons of diesel fuel was spilled into the Columbia River from a barge ruptured by a rock on the Snake River. Other Tidewater Barge spills between 1986 and 1995 are shown below.

Date of Spill	Product	Qty. Spilled (gals)
5/24/95	gas	1
10/14/94	diesel	3,925
8/12/94	diesel	1
11/21/93	gas	1
7/16/93	diesel	2
11/26/92	gas	1
9/19/92	diesel	370
4/8/91	gas	15
2/12/91	diesel	50
3/21/90	diesel	3
7/24/89	diesel	1
6/12/89	gas	6
5/10/89	diesel	20
4/11/89	diesel	40
9/10/88	diesel	125
2/9/88	diesel	150
7/24/86	gas	60
2/3/86	jet diesel	150
1/30/86	#6 fuel	1

Barge Spill/Accident Incidents (Other than Tidewater)

April 1971 - A United Transportation barge spilled 230,000 gallons of refined product in Puget Sound, Skagit County.

May 1984 - The Barge "Offshore 2403" spilled 117,000 gallons of JP5 jet fuel off the Pacific Coast.

February 1986 - The barge "Apex Houston" spilled 26,000 gallons of oil.

January 1988 - 70,000 gallons of Bunker C oil was spilled offshore of Skagit County by a barge (MCN#5) owned by Olympic Tug and Barge.

December 1988 - The barge "Nestucca" ruptured and sank in a collision and spilled 231,000 gallons of Bunker C oil off the Washington coast. Nearly 10,000 waterfowl were killed and 95 miles of shoreline affected.

June 3, 1993 - Approximately 3,000 gallons of fuel was spilled into the Columbia River during fueling operations at the Port of Longview.

December 1994 - The Crowley barge 101 spilled 29,400 gallons of diesel fuel into Rosario Strait.

January 1996 - The barge North Cape, carrying 4 million gallons of heating oil, foundered after its tow tug caught fire. It washed up on a Rhode Island beach spilling 800,000 gallons, killing 14,000 lobster, and forcing closure of 254 square miles of fishing grounds for months.

January 1, 1998 - Several thousand gallons of fuel oil spilled from the decks of a Russian cargo vessel into Commencement Bay, Puget Sound near Tacoma when taking on fuel from a barge owned by Olympic Tug and Barge company.

February 17, 1998 - A tug towing two barges out the Strait had a mechanical problem and had to be rescued. One barge was picked up by another tug after several attempts under storm conditions. The other barge was not intercepted until it drifted across the Strait and was picked up near Vancouver Island by the Canadian Coast Guard.

Pipeline Spill/Accident Incidents

January 1973 - The Trans Mountain Pipeline ruptured and spilled 460,000 gallons of crude oil bound for the northwest refineries.

March 6, 1980 - There were pipeline failures on the Colonial Pipeline Company line in Manassas and Locust Grove, Virginia.

April 16, 1980 - Williams Pipeline Company gasoline line exploded and burned at Roseville, Minnesota.

January 30, 1980 - There was a petroleum products rupture and fire of the Puerto Rico Pipeline Company in Bayamon, Puerto Rico.

July 23, 1985 - The Continental Pipe Line Company line ruptured and burned in Kaycee, Wyoming.

July 8, 1986 - The Williams Pipe Line Company pipeline ruptured in Mounds Views, Minnesota.

November 1992 - The Chevron pipeline in Lincoln County, Washington released 20,000 gallons of jet fuel.

Tanker Truck Spill/Accident Incidents

February 13, 1991 - A gasoline semi-trailer with cargo tank overturned on I-5 south of downtown Seattle, spilled gasoline and caught fire, closing the freeway for three hours.

January 9, 1996 - A loaded gasoline tanker truck was hit by a train and knocked over in Bergen County, New Jersey near the George Washington Bridge. There was no spill and no fire.

May 11, 1996 - A gasoline tanker crashed in Eau Clair, Wisconsin spilling 3,700 gallons of gasoline into Otter Creek, about 1 mile upstream of the Eau Clair River. Dead fish were observed.

June 30, 1997 - A gasoline tanker truck spilled 5,000 gallons of gasoline in an accident in Chamblee, Georgia. Businesses and homes were evacuated and gasoline entered a creek.

September 16, 1997 - A gasoline tanker truck spilled 6,000 gallons of gasoline after overturning on Highway 68 near Taos, New Mexico; another motorist was seriously injured after hitting the overturned truck.

October 9, 1997 - A gasoline tanker collided with a front end loader in Lexington, Kentucky, East of I-75, spilling 2,000 gallons of gasoline, some of which entered Boone Creek.

November 21, 1997 - A gasoline tanker involved in an accident leaked gasoline onto the Schuylkill Expressway, causing a traffic jam that lasted for hours.

April 15, 1998 - A gasoline double-tanker truck crashed into an asphalt refinery in Portland, spilling 9,100 gallons of gasoline, killing the driver and causing a fire.

May 18, 1998 - A tanker truck carrying kerosene turned over on Highway 174 in Nevada, spilling 500 gallons of product.

May 1998 - A gasoline tanker truck left the roadway on I-95 in Philadelphia, hitting a tour bus, entering the oncoming lanes with a crash and fire that killed the driver and another passenger car driver, and burned an overpass so severely that it had to be replaced, closing I-95 for more than two months.

June 4, 1998 - a pickup truck collided with a full gasoline tanker in Delaware, causing the truck to turn over, burn and close the state highway for 2 days.

June 16, 1998 - A tanker truck carrying diesel fuel overturned, spilling its contents into the San Luis Rey River off Highway 76 near San Diego.

June 17, 1998 - A tanker truck collided with another truck in Forsyth, Illinois, resulting in a fuel spill into Stevens Creek.

June 18, 1998 - A train collided with a loaded gasoline tanker truck near Dallas, Texas, knocking over the cab and pushing the tank off the road. There was no spill.

July 1998 - two were killed when a tanker truck hit a bridge support over I-40 in North Carolina, collapsing the bridge onto the truck from the heat of the fire.

August 7, 1998 - A tanker truck overturned and burned on SR 836 in Florida, critically injuring the driver and burned through the road.

Product Terminal/Refinery Spill/Accident Incidents

February 1990 - The Navy Supply Depot in Kitsap County spilled 70,000 gallons of diesel fuel.

December 6, 1996 - 49,000 gallons of gasoline spilled from a failed coupling during a product transfer from the Olympic Pipeline. The spill occurred at the GATX terminal at Harbor Island in Seattle.

March 1990 - Texaco refinery at Marche Point spilled 130,000 gallons of diesel fuel.

January 1991 - 60,000 gallons of crude oil was spilled from a pipeline near Commencement Bay by U.S. Oil in Tacoma.

February 1991 - 210,000 gallons of crude oil was spilled from the Texaco refinery at Marche Point.

October 1993 - The U.S. Oil Company refinery in Tacoma spilled 264,000 gallons of crude oil.

December 1996 - 49,000 gallons of gasoline was spilled onto the ground at the GATX terminal on Harbor Island, Seattle.

August 5, 1997 - 1,300 gallons of marine fuel oil and jet fuel were spilled into the Strait at the Tosco Ferndale refinery from a sump when a valve was left open.

Tanker Ship Spill/Accident Incidents

The U.S. Coast Guard concluded in 1992 (Department of Transportation December 1992) that double hull tankers will prevent spills in all but the most severe incidents.

March 1989 - The crude oil tanker Exxon Valdez went aground and spilled 11,000,000 gallons of crude oil.

December 1980 - The tanker ship John A. McCone spilled 84,000 gallons of heavy crude oil off the Pacific Coast.

March 19, 1984 - The oil tanker SS Mobil Oil spilled 200,000 gallons of fuel oil into the Columbia River after grounding near St. Helens, Oregon.

October 1984 - The tanker APuerto Rican@ spilled between 1-1.4 million gallons of refined lube oil product off the Pacific Coast.

December 1985 - The tanker Arco Anchorage spilled 239,000 gallons of crude oil at Port Angeles.

February 1990 - The tanker American Trader spilled 394,000 gallons of light crude oil off the Pacific Coast.

October 1990 - The tanker Contessa spilled 81,000 gallons of diesel off the Pacific Coast.

May 12, 1996 - The crude oil tanker ANITRA spilled 40,000 gallons of crude while offloading cargo in Delaware Bay, Pennsylvania.

October 22, 1996 - The oil tanker Arcadia lost steering near Rosario Strait while carrying 10.5 million gallons of crude. It crossed in front of another oil tanker before turning around.

Olympic Pipe Line Company Spills Since 1983

The following information as reported in the literature and Table A-1 list OPL spills. Conflicts with the data have not been reconciled.

September 1983 - 168,000 gallons of diesel fuel was spilled at the Allen Pump station.

November 1985 - 31,000 gallons of jet fuel spilled into Des Moines Creek near Sea-Tac Airport south of Seattle.

Table A-1. Petroleum Release History, Olympic Pipeline, 1966 - 1997

Date	Location	Cause	Product	Loss (BBLs)	Recovered (BBLs)
8-24-66	12" Seattle	3rd Party	Gasoline	160	140
1-23-68	So Po DF	3rd Party	Gasoline	10	10
2-2-68	Seattle DF	2" Gasket	Turbine	5	0
2-19-70	Olympia Junction	12" Gasket	Diesel	19	10
3-15-71	Sea-Tac	12" Gasket	Turbine	30	20
3-8-72	Renton Station	16" Gasket	Diesel	5	4.5
3-17-82	Renton Station	Pressure Gauge	Turbine	6	5.5
7-23-72	Fern Station	16" Gasket	Diesel	5	4
9-6-72	Woodinville Station	Sample Line	Diesel	10	10
9-15-72	Olympic Junction	12" Gasket	Diesel	2	0
3-22-73	Sea-Tac	Prover Gasket	Turbine	4	1
3-26-73	MP 84.5 of 20" Line	3rd Party	Gasoline	215	180
12-21-73	Allen Station	16" Gasket	Diesel	8	8
8-8-75	Allen Station	20" Gasket	Diesel/Gasoline	570	502
12-1-75	65.5 MP of 20" Line	Sensing Line	Turbine	12	7
7-21-78	Renton Station	O-Ring Gasket	Gasoline	1.5	0
3-13-79	So Po DF	Corrosion	Diesel	1,700	1,590
6-19-80	Renton Station	Small Piping	Diesel	1	0
8-18-80	Allen Station	Pressure Cell	Diesel	4	0
2-24-81	Woodinville Station	Fitting	Gasoline	5	4
9-26-81	Vance Junction	3rd Party	Gasoline	5	2
8-14-83	Allen Station	Flange Gasket	Diesel/Turbine	1,019	870
6-10-84	Olympia Lateral	3rd Party	Diesel	224	145
8-23-85	MP 46 of 20" Line	Sensing Line	Diesel	740	524
11-24-85	Sea-Tac	Filter Valve	Turbine	500	440
12-24-85	Seattle DF	Flange Gasket	Diesel	60+	60+
7-17-86	MP 114 of 14" Line	3rd Party	Diesel	820	740
9-30-86	MP 110 of 16" Line	Sensing Line	Mixture	2,000	unknown
5-15-87	Vance DF	Operator Error	Diesel	5	5
8-23-88	Allen Station	Mainline Rupture	Diesel	4,000	2,300
8-12-89	MP 119.0 of 14" Line	Block Valve Plug	Unknown	unknown	1

2-7-90	Woodinville Station	16" Gasket	Diesel	300	100
2-26-91	Sea-Tac Terminal	Differential Gauge	Turbine	10	8
1-24-92	Olympic Sta/Jct	Circulation Line	Diesel	75	60
2-17-92	Tacoma Station	Circulation Line	Diesel	2	2
3-1-92	Olympic Sta/Jct	Circulation Line	Diesel	10	unknown
10-30-92	Renton Station	T/I Gasket	Turbine	50	45
7-18-93	Renton Station	Gasket	Diesel	5	5
6-20-94	Tacoma Station	Thermo Well Failure	Diesel	55	50+
3-23-96	14" MP 227	Natural Forces	Diesel	10	5
6-17-96	20" MP 74.2	Buckle in Pipe	Diesel/Gasoline	20	11
5-27-97	Castle Rock Station	Seal Failure	Diesel/Gasoline	263	250

May 1986 - 70-80,000 gallons of product leaked from the line in the Renton area of South King County (a possible source of groundwater contamination which showed up in April, 1998). The 1986 spill of gasoline, jet fuel and diesel fuel caused nine families to be evacuated.

February 23, 1988 - 168,000 gallons of diesel fuel spilled from a pipeline rupture at the Allen Station. The product was contained in an adjacent field and none reached surface waters.

February 7, 1990 - 12,000 gallons of diesel fuel spilled from a failed gasket at the Woodinville pump station. No product reached surface waters.

January 24, 1992 - About 3,000 gallons of diesel fuel spilled from a ruptured fitting at the Rainier pump station. No product reached surface waters.

October 30, 1992 - Approximately 2,000 gallons of turbine lubricating oil spilled from a gasket at the Renton Station. Product was contained on site. No product reached surface waters.

June 20, 1994 - More than 4,000 gallons of diesel fuel spilled from an equipment monitor probe connection at the Spanaway pump station. No product reached surface waters.

March 23, 1996 - Olympic Pipeline leaked near Kalama as a result of ground movement after extensive rains. The slide moved and cracked the line. The leak was discovered when a resident detected oil in Spencer Creek in Cowlitz County.

June 17, 1996 - Olympic Pipeline leaked at least 1,000 gallons of gasoline and diesel due to a small crack in their line near Everett, next to Ebey Slough.