

Public Utilities Commission of South Dakota

Keystone Pipeline Application

Edward D Miller

Intervener

Dec 2007

Version: SD PUC
F1a Nov 2007

Background

Miner County, SD Landowner

Degree in Computer Science
University of Minnesota

Former Exxon Data Analyst
Data Base Administrator



Concerns

TransCanada is not being truthful with South Dakota regarding the risks associated with this facility.

TransCanada is not being truthful with landowners regarding potential spills.



Purpose

To demonstrate that TransCanada's spill estimates are significantly lower than historical averages, and that some of TransCanada's statements regarding historical pipeline oil spills are false.



Petroleum Pipelines in the United States

are transportation systems
used to deliver products.



The Dept of Transportation

is responsible for
regulating pipelines in
the US (Title 49 CFR)



The Dept of Transportation
classifies crude oil and other
liquid petroleum products as
“Hazardous Liquids.”



The Dept of Transportation

has several subdivisions
including PHMSA and OPS,
the Office of Pipeline Safety



The Office of Pipeline Safety

regulates, monitors and
collects information regarding
petroleum pipelines in the US



The Office of Pipeline Safety

maintains databases of
“significant incidents”
involving pipelines.

(Available to the public)



The Office of Pipeline Safety

“Significant Incidents” include

Oil Spills and Releases

Explosions and Fires

Injuries and Fatalities

Major Property Damage



The Office of Pipeline Safety

Classifies energy pipelines into three separate categories:

- Gas Distribution Pipelines
- Gas Transmission Pipelines
- Hazardous Liquids Pipelines



Hazardous Liquids Pipelines

TransCanada's proposed
Keystone Pipeline is a
Hazardous Liquids Pipeline.



Hazardous Liquids Pipelines

Have significantly higher accident rates relative to other types of energy pipelines.

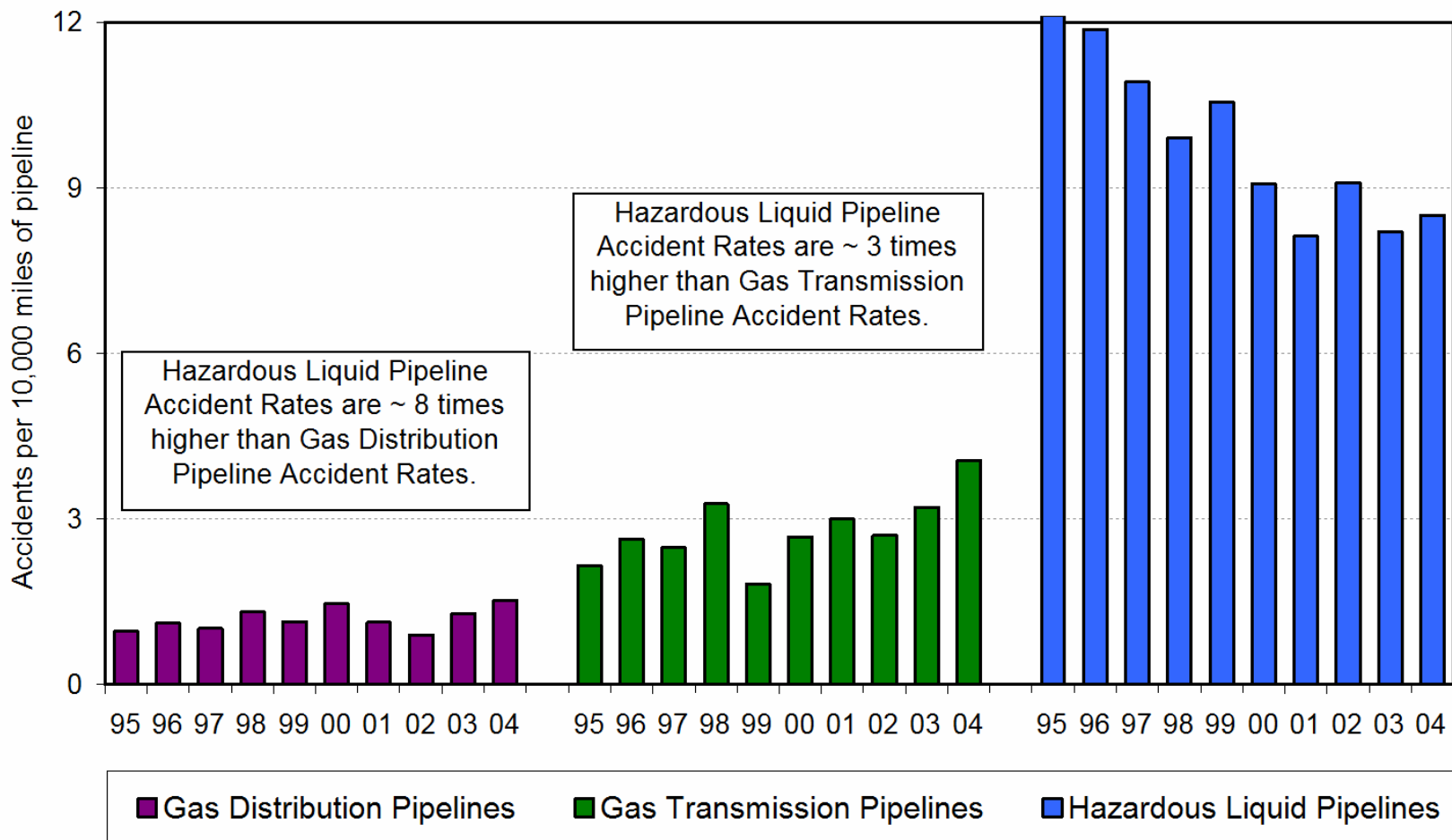


Energy Pipelines in the US

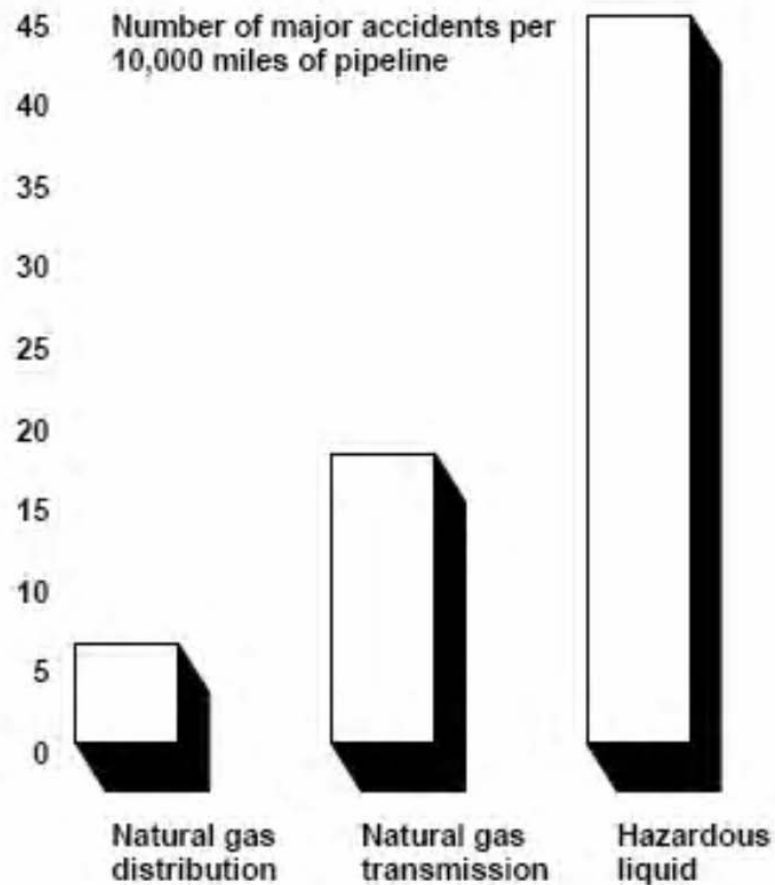
Accident Rate Comparison Chart

Accidents per 10,000 Miles of Pipeline

Source: Office of Pipeline Safety



United States General Accounting Office – Pipeline Safety Report – May 2000 (1989-1998 data)



Source: GAO's analysis of OPS' data.

GAO/RCED-00-128 Oversight of Pipeline Safety

EXHIBIT A

Hazardous Liquids Pipelines

Accident summary reports
are available online from the
Office of Pipeline Safety.

Source: US DOT - Office of Pipeline Safety



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OPS Pipeline Statistics

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Pipeline Statistics:

Average and Summary Statistics:

- [Distribution & Transmission Annual Mileage Totals \(1984-2006\)](#)
- [Liquid Accident Yearly Summaries \(1986-2007\)](#)
- [Natural Gas Incident Yearly Summaries for Distribution Operators\(1986-2007\)](#)
- [Natural Gas Incident Yearly Summaries for Transmission Operators\(1986-2007\)](#)
- [Liquid Pipeline Operator Total National Mileage \(1984-2005\)](#)

Click "Liquid Accident Yearly Summaries..."

[Liquid Pipeline Operator Total National Mileage \(1984-2005\)](#) provides Incident Details and Trends at both National and State level. [Liquid Pipeline Operator Total National Mileage \(1984-2005\)](#) provides Summaries by State.

- [Pipeline Significant Incident Data Display](#)

Additional Statistical data sets:

also available from the On-Line Library

- [Distribution, Transmission, and Liquid Annual Data](#)
- [Distribution, Transmission, and Liquid Accident and Incident Data](#)

**PHMSA OFFICE OF PIPELINE SAFETY
HAZARDOUS LIQUID PIPELINE OPERATORS
ACCIDENT SUMMARY STATISTICS BY YEAR
1/1/1986 - 09/30/2007**

Year	No. of Accidents	Fatalities	Injuries	Property Damage	Gross Loss (Bbls)	Net Loss (Bbls)
1986						220,317
1987						312,794
1988						114,251
1989						121,179
1990						54,663
1991						55,774
1992						68,810
1993	229	0	10	\$28,873,651	116,802	57,559
1994	245	1	7 ⁽¹⁾	\$62,166,058	164,387	114,002
1995	188	3	11	\$32,518,689	110,237	53,113
1996	194	5	13	\$85,136,315	160,316	100,949
1997	171	0	5	\$55,186,642	195,549	103,129
1998	153	2	6	\$63,308,923	149,500	60,791
1999	167	4	20	\$86,355,560	167,230	104,487
2000	146				108,652	56,953
2001	130				98,348	77,456
2002	147				95,642	77,269
2003	131				80,112	50,523
2004	144				88,237	68,558
2005	139	2	2	\$149,000,000	137,017	45,814
2006	110	0	2	\$53,710,000	136,263	53,806
2007	83	0	2	\$26,013,700	66,327	48,442
Totals ⁽²⁾	3788	44	276⁽¹⁾	\$1,225,675,095	3,415,329	2,020,638

Historical totals may change as PHMSA receives supplemental information on incidents.

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1987	237	3	20	\$13,140,434	395,854	312,794
1988	198	2	19	\$32,414,912	198,397	114,251
1989	160	3	38	\$8,813,604	201,758	121,179
1990	180	0	7	\$15,720,422	124,277	54,663
1991	210	0	0	\$14,844,844	200,567	55,774
1992	210	0	0	\$13,140,434	137,065	68,810
1993	210	0	0	\$11,680,200	116,802	57,559
1994	210	0	0	\$164,387,000	164,387	114,002
1995	180	0	0	\$110,237,000	110,237	53,113
1996	194	5	13	\$85,136,315	160,316	100,949
1997	171	0	5	\$55,196,642	195,549	103,129
1998	147	0	0	\$149,500,000	149,500	60,791
1999	167	0	0	\$167,230,000	167,230	104,487
2000	108	0	0	\$108,652,000	108,652	56,953
2001	98	0	0	\$98,348,000	98,348	77,456
2002	147	0	0	\$47,410,656	95,642	77,269
2003	131	0	5	\$49,981,280	80,112	50,523
2004	116	5	16	\$146,314,940	88,237	68,558
2005	139	2	2	\$149,690,733	137,017	45,814
2006	110	0	2	\$53,713,137	136,263	53,806
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Totals ⁽²⁾	3788	44	276⁽¹⁾	\$1,225,675,095	3,415,329	2,020,638

Yearly Summaries
starting with 1986

through Sep 2007
(updated monthly)

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1988	193	0	10	\$32,414,912	198,397	114,251
1989	163	0	10	8,813,604	201,758	121,179
1990	180	0	10	5,720,422	124,277	54,663
1991	216	0	10	7,788,944	200,567	55,774
1992	212	0	10	9,146,062	137,065	68,810
1993	229	0	10	\$28,873,651	116,802	57,559
1994	245	1	7 ⁽¹⁾	\$62,166,058	164,387	114,002
1995	188	3	11	\$32,518,689	110,237	53,113
1996	194	5	13	\$85,136,315	160,316	100,949
1997	171	0	5	\$55,186,642	195,549	103,129
1998	153	2	6	\$63,308,923	149,500	60,791
1999	167	0	10	6,355,560	167,230	104,487
2000	146	0	10	0,555,745	108,652	56,953
2001	130	0	10	5,346,751	98,348	77,456
2002	147	0	10	7,410,656	95,642	77,269
2003	131	0	10	49,981,280	80,112	50,523
2004	144	0	16	\$146,314,940	88,237	68,558
2005	139	2	2	\$149,690,733	137,017	45,814
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1989	163	3	38		101,758	121,179
1990	180	3	7		4,277	54,663
1991	216	0	9		0,567	55,774
1992	212	5	38		7,065	68,810
1993	229	0	10		16,802	57,559
1994	245	1	7 ⁽¹⁾	\$62,166,058	164,387	114,002
1995	188	3	11	\$32,518,689	110,237	53,113
1996	194	5	13	\$85,136,315	160,316	100,949
1997	171	0	5	\$55,186,642	195,549	103,129
1998	153	2	6	\$82,288,888	149,500	60,791
1999	167	4	20		2,230	104,487
2000	146	1	4		6,652	56,953
2001	130	0	10		3,348	77,456
2002	147	1	0		6,642	77,269
2003	131	0	5	\$1,280	80,112	50,523
2004	144	5	16	\$3,314,940	88,237	68,558
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**Fatalities &
Injuries**

44; 276

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1988	18			\$32,414,912	198,397	114,251
1989	1			\$8,813,604	201,758	121,179
1990	1			\$15,720,422	124,277	54,663
1991	2			\$37,788,944	200,567	55,774
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1993	229	0	10	\$28,873,651	116,802	57,559
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1999	167	4	20	\$86,355,560	167,230	104,487
2000	146	1	4	\$150,555,745	108,652	56,953
2001				\$25,346,751	98,348	77,456
2002				\$47,410,656	95,642	77,269
2003				\$49,981,280	80,112	50,523
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**Property
Damage**

**\$1.2+ Billion
Dollars**

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1990	180				124,277	54,663
1991	216				200,567	55,774
1992	212	5	38	\$39,146,062	137,065	68,810
1993	220	0	10	\$28,973,651	116,900	57,550
<div style="border: 1px solid black; padding: 10px; margin: 10px auto; width: 80%;"> <p>The reporting threshold for this report is 50+ bbl.</p> </div>						
1999	167	4	20	\$86,355,560	167,230	104,487
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1988	193	0	0	\$0	198,397	114,251
1989	163	0	0	\$0	201,758	121,179
1990	180	0	0	\$0	124,277	54,663
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Amount of Oil Spilled (Gross Loss)

Pipelines have spilled more than 13 times as much oil as the Exxon Valdez spilled in Alaska in 1989. (143 million gallons versus 10.6 million gallons)

2000	146	0	0	\$0	108,652	56,953
2001	130	0	0	\$0	98,348	77,456
2002	147	0	0	\$0	95,642	77,269
2003	131	0	0	\$0	80,112	50,523
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**3.4 million barrels;
143 million gallons**

Historical totals may change as PHMSA receives supplemental information on incidents.

Worst environmental disaster in US history.



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1987	237	3	20	\$13,140,434	312,794	312,794
1988	193	2	11	114,251		114,251
1989	163	3	12	121,179		121,179
1990	180	3	10	54,663		54,663
1991	216	0	10	55,774		55,774
1992	212	5	10	68,810		68,810
1993	220	0	10	57,550		57,550
<div data-bbox="850 335 1449 614" style="border: 1px solid black; border-radius: 50%; padding: 10px; display: inline-block;"> <p align="center">Amount of Oil "Lost" (never recovered)</p> </div>						
<div data-bbox="357 635 1574 821" style="border: 1px solid black; padding: 10px;"> <p align="center">The reporting threshold for this report is 50+ bbl.</p> </div>						
1999	167	4	20	104,487		104,487
2000	146	1	10	56,953		56,953
2001	130	0	10	77,456		77,456
2002	147	1	10	77,269		77,269
2003	131	0	10	50,523		50,523
2004	144	5	10	68,558		68,558
2005	139	2	10	45,814		45,814
2006	110	0	2	\$53,713,137	63	53,806
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Totals ⁽²⁾	3788	44	276⁽¹⁾	\$1,225,675,095	3,415,329	2,020,638

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1994	245	1	7 ⁽¹⁾	\$62,166,058	164,387	114,002

The reporting threshold for this report is 50+ bbl.

Total Number of Accidents: 3,788
Total Amount Spilled: 3,415,329 bbl
Average spill per accident: 900+ bbl

Totals ⁽²⁾	3788	44	276 ⁽¹⁾	\$1,225,675,095	3,415,329	2,020,638
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A Case Study


Trans Alaska Pipeline October 2001 Oil Spill

Source: US DOT – OPS; Alaska DEC

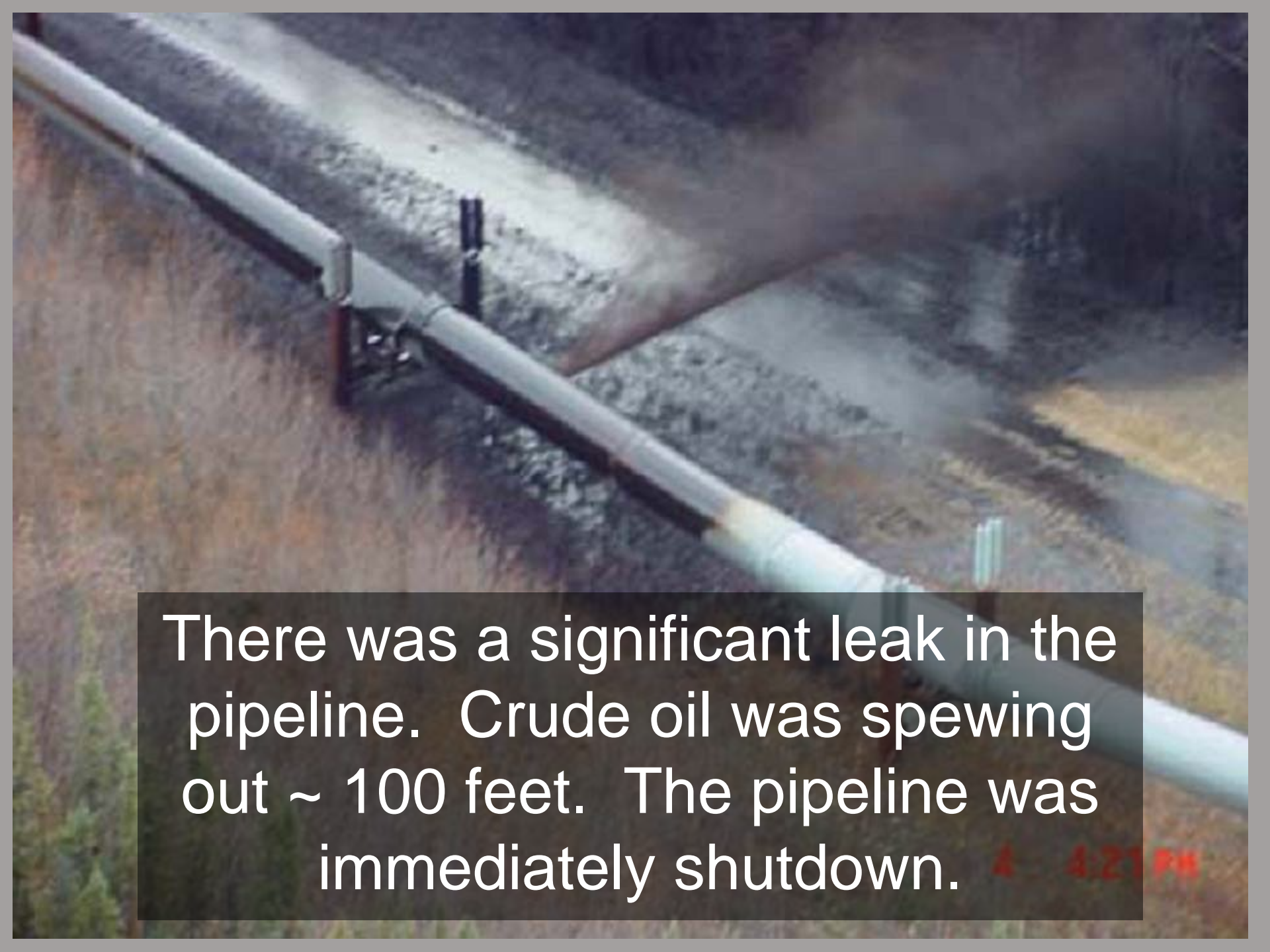




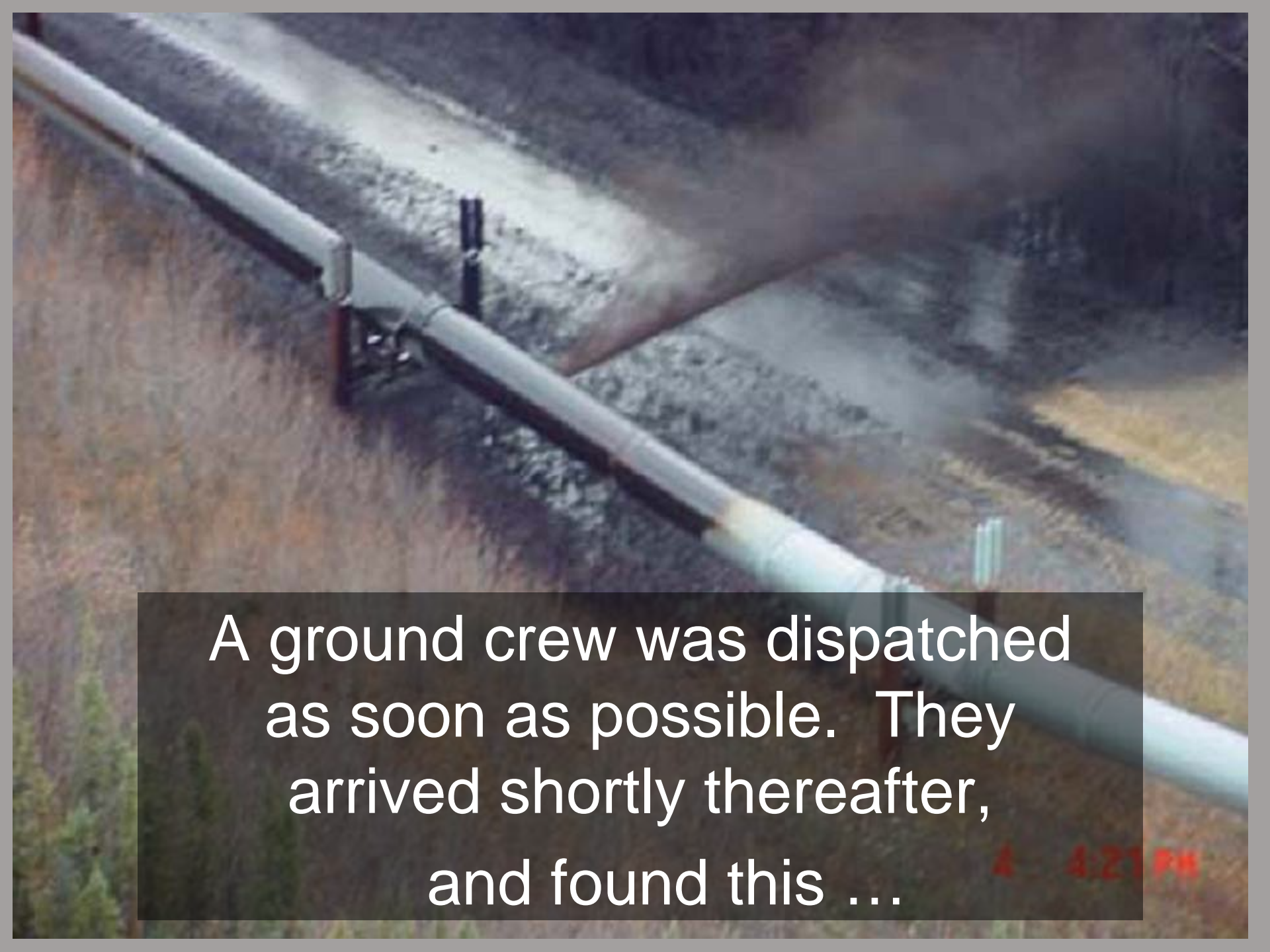
The Trans Alaska Pipeline
was built in the 1970s.
It is the one of the most closely
monitored pipelines in the world.

A landscape photograph showing a long pipeline stretching across a green valley. The pipeline is supported by wooden posts and runs from the foreground into the distance. In the background, there are large, rugged mountains under a blue sky with white clouds. A semi-transparent dark box is overlaid on the middle of the image, containing white text.

On October 4, 2001, a
surveillance aircraft on patrol
came across the following
scene ...

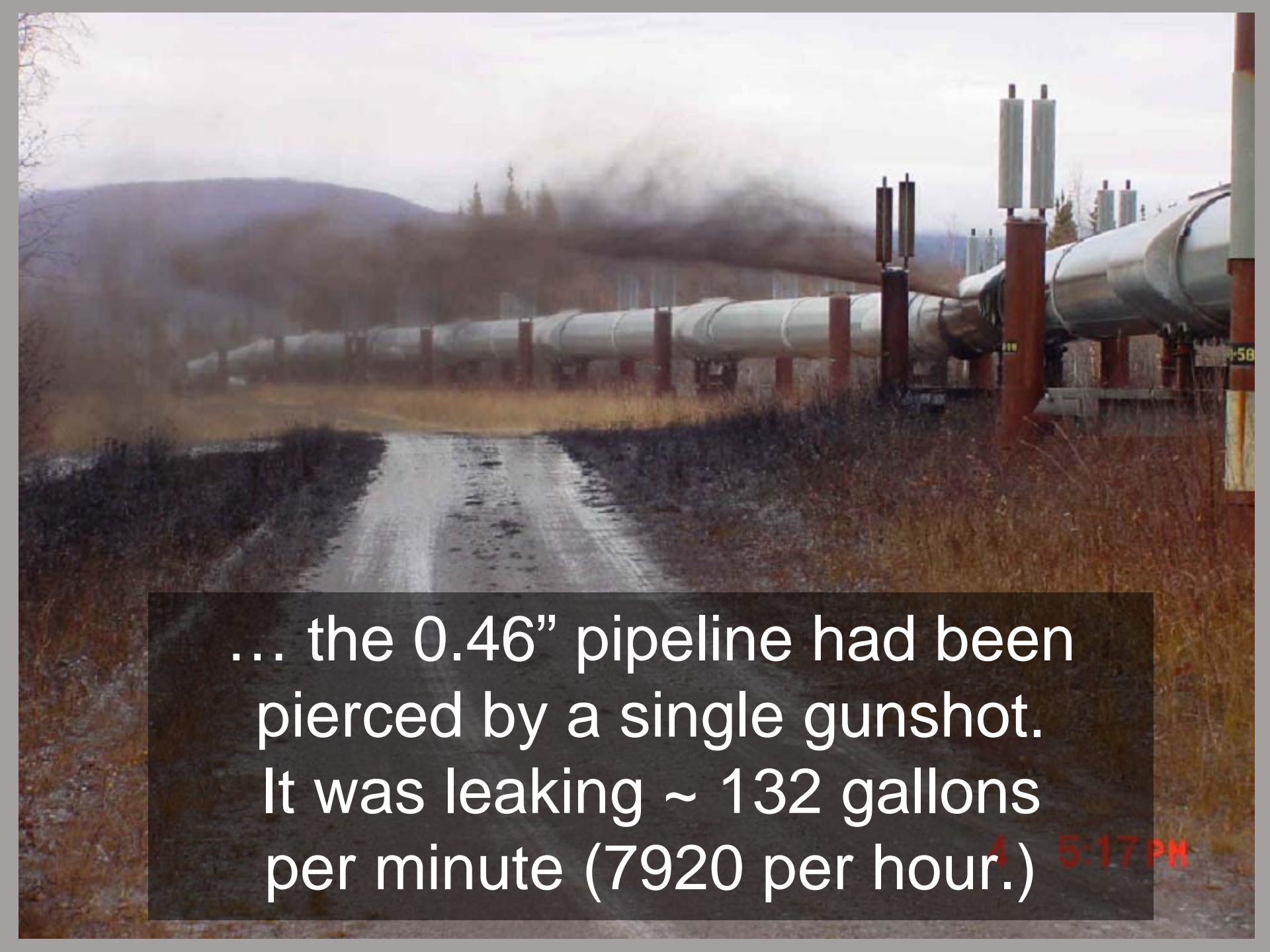
A photograph showing a pipeline with a significant leak. A large, dark, thick plume of crude oil is being emitted from a joint in the pipeline, spreading across the ground. The pipeline is supported by metal brackets. The surrounding area appears to be a mix of dirt and gravel. A timestamp in the bottom right corner reads "4:42 PM".

There was a significant leak in the pipeline. Crude oil was spewing out ~ 100 feet. The pipeline was immediately shutdown.



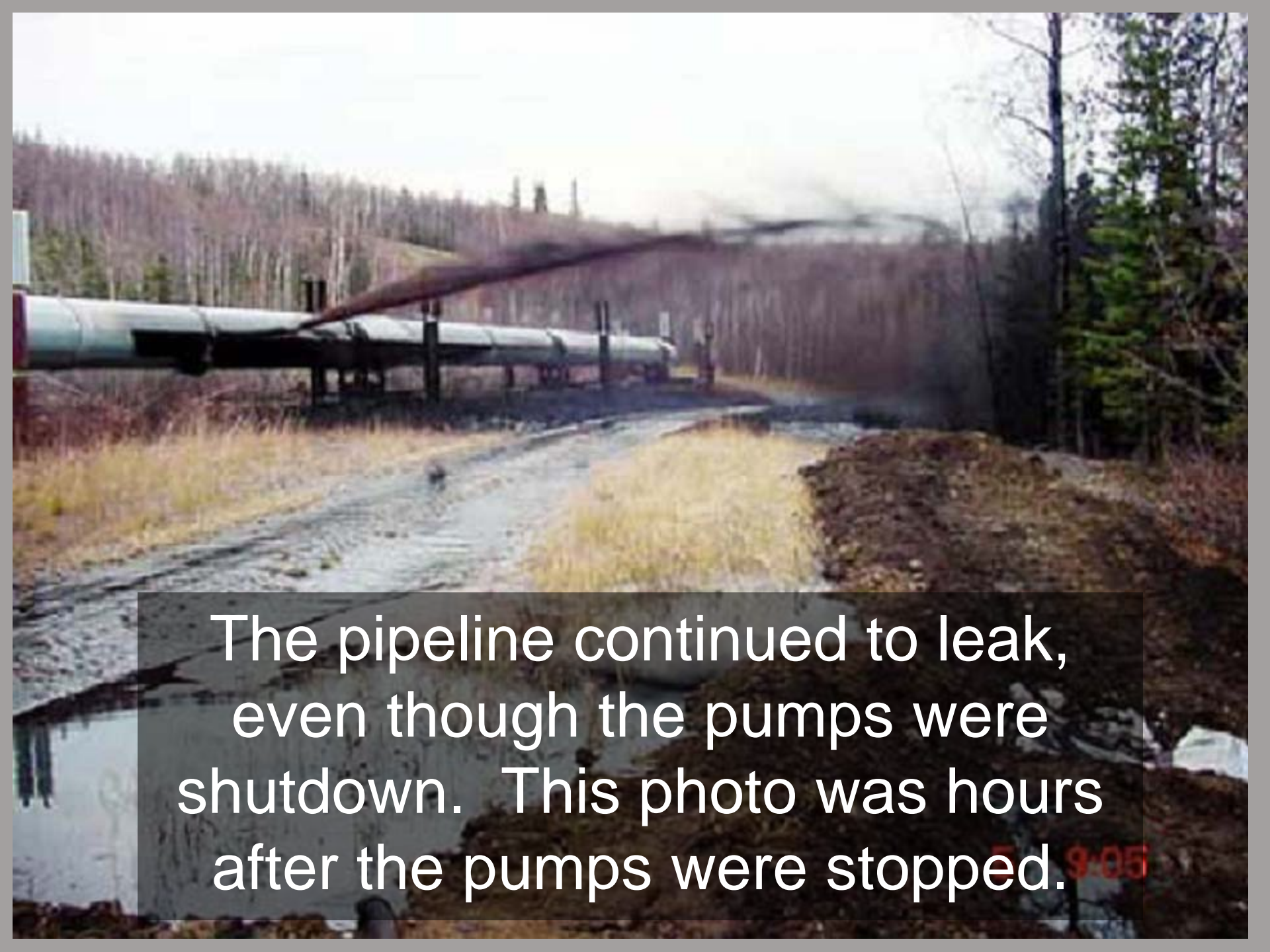
A ground crew was dispatched as soon as possible. They arrived shortly thereafter, and found this ...

4:21 PM



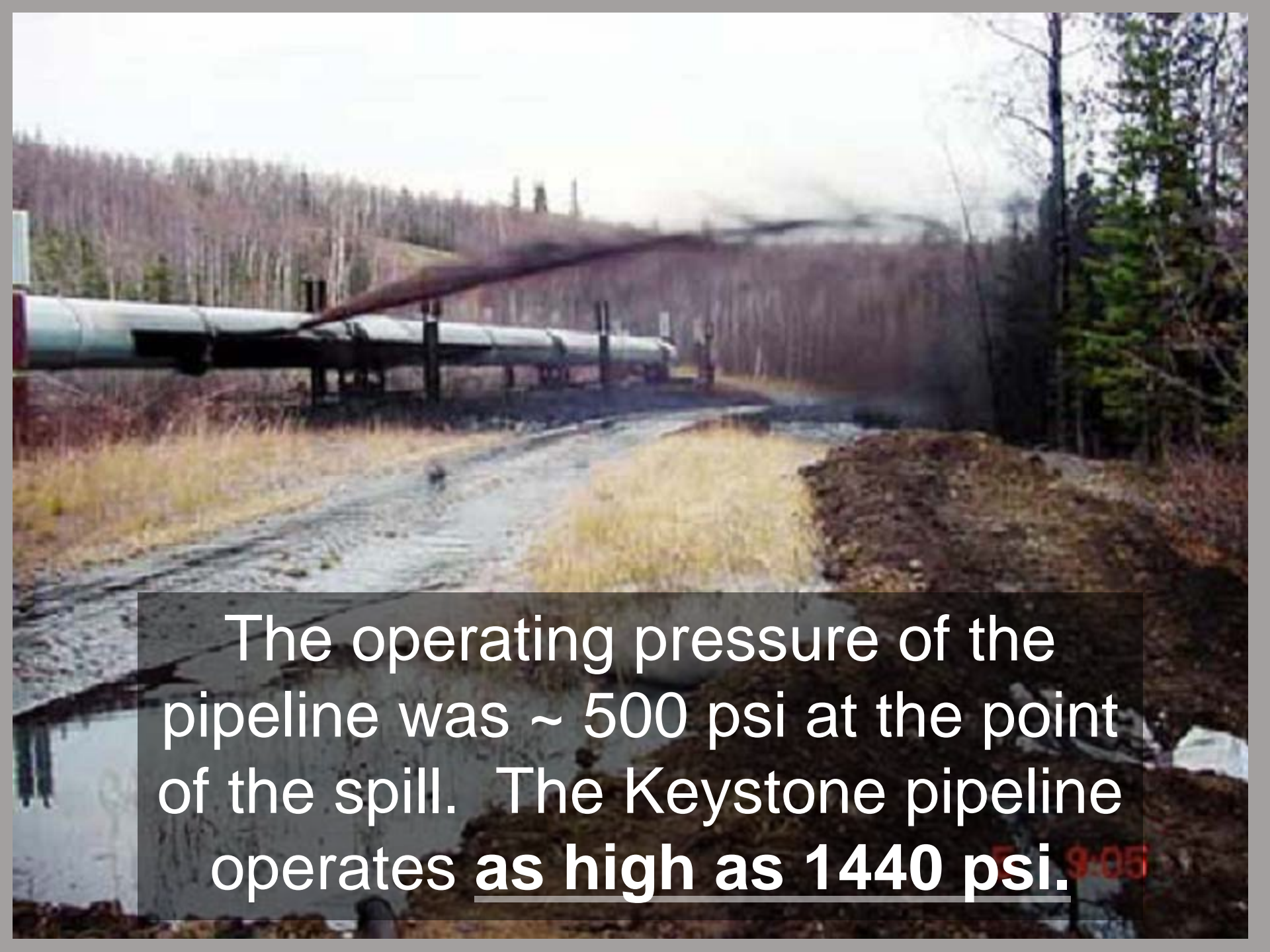
... the 0.46" pipeline had been pierced by a single gunshot. It was leaking ~ 132 gallons per minute (7920 per hour.)

5:17 PM



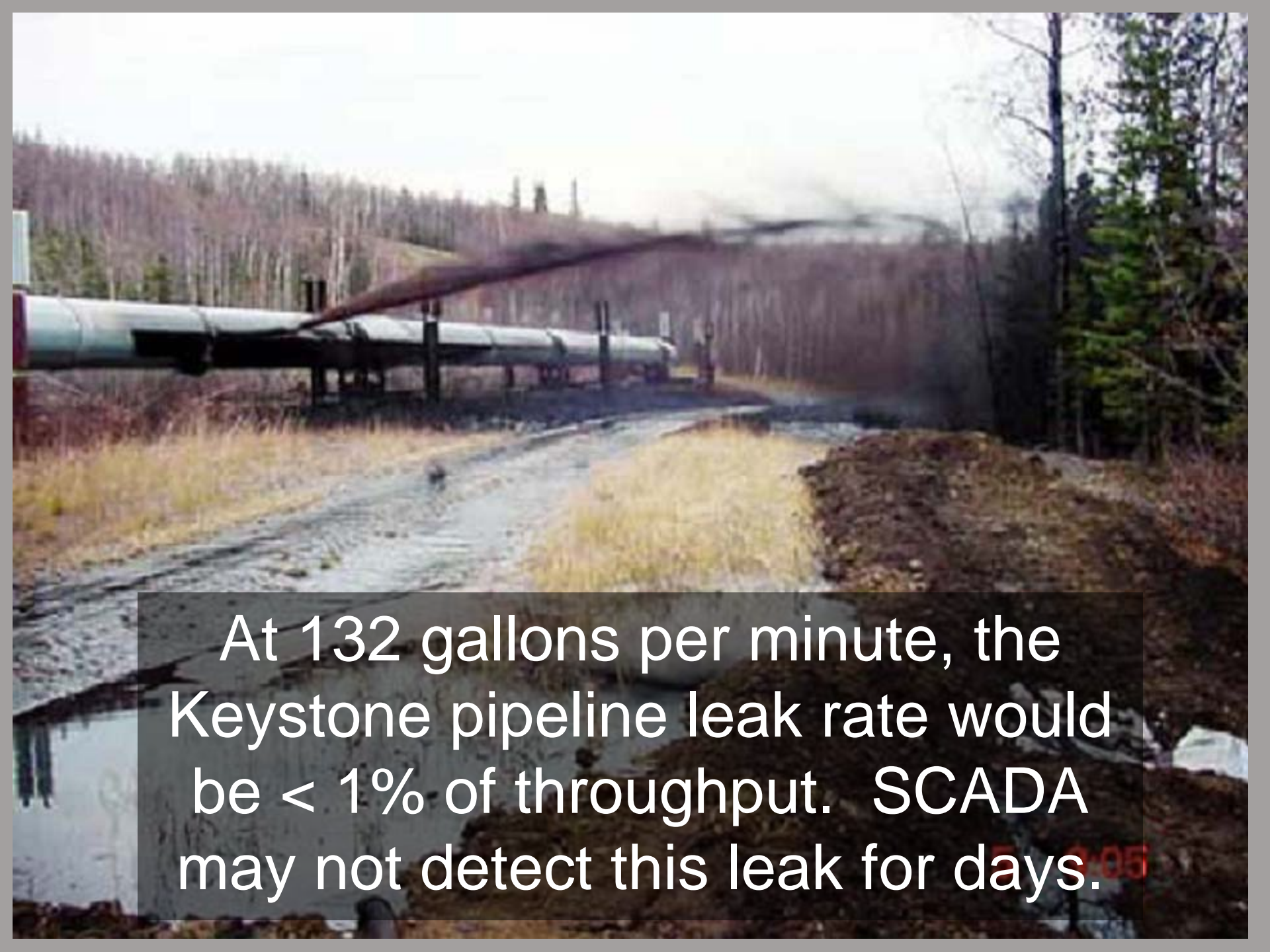
The pipeline continued to leak, even though the pumps were shutdown. This photo was hours after the pumps were stopped.

5 9:05




The operating pressure of the pipeline was ~ 500 psi at the point of the spill. The Keystone pipeline operates as high as 1440 psi.

9:05




At 132 gallons per minute, the Keystone pipeline leak rate would be $< 1\%$ of throughput. SCADA may not detect this leak for days.


An aerial photograph showing a recovery site in a forest. A large black tarp covers a structure, and various pieces of equipment, including a white van and a red vehicle, are visible on a dirt path. The surrounding area is dense green forest.

The spray zone is significant.
Recovery crews have favorable
access, weather, etc. (no snow,
mud, inclement weather.)

5 11:02




After ~ 36 hours, crews were finally able to clamp the pipeline and stop the leak. Over 285,000 gallons of oil had spilled.

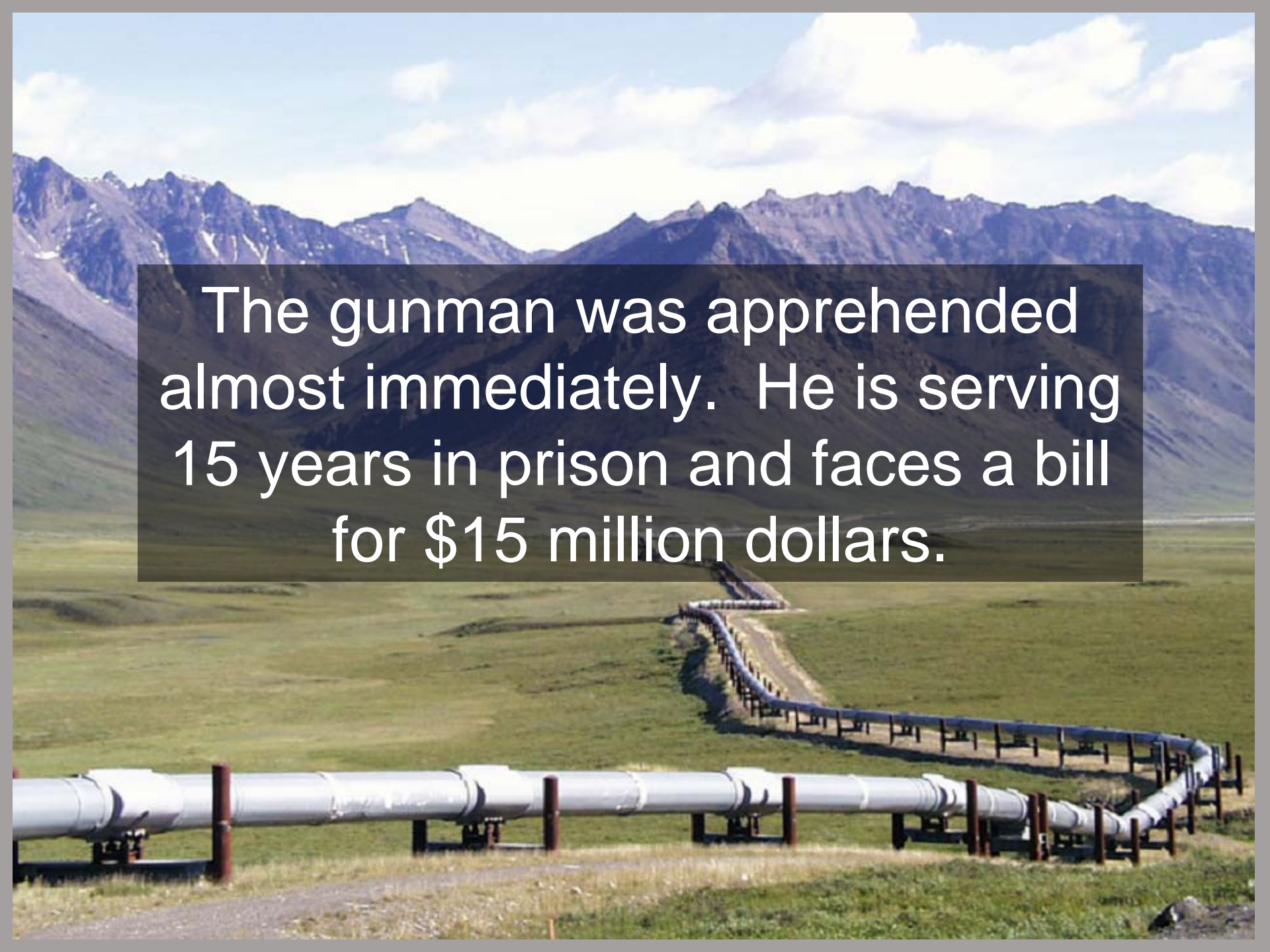


Keystone assumes they will be able to locate, excavate and clamp all small leaks within 4 hours - anywhere on the entire pipeline.

2081



Eventually, ~ 164,000 gallons of spilled crude oil were recovered; approximately 121,000 gallons were lost into the environment.



The gunman was apprehended almost immediately. He is serving 15 years in prison and faces a bill for \$15 million dollars.

Pipeline Safety Improvement Act

- 1) Implemented by Congress in 2002
- 2) Safety & Inspection Requirements
- 3) Integrity Management Programs
- 4) Tighter Spill Reporting Thresholds
(from 50 bbl to 5 bbl or 5 gal)
- 5) More Detailed Reports (RSPA 7001)



**PHMSA OFFICE OF PIPELINE SAFETY
HAZARDOUS LIQUID PIPELINE OPERATORS
ACCIDENT SUMMARY STATISTICS BY YEAR
1/1/1986 - 09/30/2007**

Year	No. of Accidents	Fatalities	Injuries	Property Damage	Gross Loss (Bbls)	Net Loss (Bbls)
1986	210	4	32	\$16,077,846	282,791	220,317
1987	237	3	20	\$13,140,434	395,854	312,794
1988						14,251
1989						21,179
1990						54,663
1991						55,774
1992						68,810
1993						57,559
1994						14,002
1995						53,113
1996	194	5	13	\$85,136,315	160,316	100,949
1997	171	0	5	\$55,186,642	195,549	103,129
1998	153	2	6	\$63,308,923	149,500	60,791
1999	167	4	20	\$86,355,560	167,230	104,487
2000	146	1	4	\$150,555,745	108,652	56,953
2001	130	0	10	\$25,346,751	98,348	77,456
2002	147	1	0	\$47,410,656	95,642	77,269
2003	131	0	5	\$49,981,280	80,112	50,523
2004	144	5	16	\$146,314,940	88,237	68,558
2005	139	2	2	\$149,690,733	137,017	45,814
2006	110	0	2	\$53,713,137	136,263	53,806
2007	83	0	2	\$26,013,791	66,327	48,442
Totals ⁽²⁾	3788	44	276⁽¹⁾	\$1,225,675,095	3,415,329	2,020,638

The Pipeline Safety Improvement Act
was implemented in 2002.

Historical totals may change as PHMSA receives supplemental information on incidents.

**PHMSA OFFICE OF PIPELINE SAFETY
HAZARDOUS LIQUID PIPELINE OPERATORS
ACCIDENT SUMMARY STATISTICS BY YEAR
1/1/1986 - 09/30/2007**

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1987	237	3	20	\$13,140,434	395,854	312,794
1988	193	2	19	\$32,414,912	198,397	114,251
1989	163	3	38	\$8,813,604	201,758	121,179
1990	180	3	7	\$15,720,422	124,277	54,663
1991	216	0	9	\$37,788,944	200,567	55,774
1992	212	5	38	\$39,146,062	137,065	68,810

The reporting threshold for this report is 50+ bbl.

1998	153	2	6	\$63,308,923	149,500	60,791
1999	167	4	20	\$86,355,560	167,230	104,487
2000	146	1	4	\$150,555,745	108,652	56,953
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2006	110	0	2	\$53,713,137	136,263	53,806
2007	83	0	2	\$26,013,791	66,327	48,442

Totals: 754 accidents **603,598 bbl**
The average spill for years 2002-2007 = 800 bbl.

Hazardous Liquids Pipelines

A closer look at pipeline
oil spills in the US since the
Pipeline Safety Improvement Act

Source: US DOT - Office of Pipeline Safety



Hazardous Liquids Pipelines

The following reports are based on the new (2002+) reporting standards. Specifically, only spills reported as 5 barrels or more are included. All other records are excluded (gallons)



**PHMSA Office of Pipeline Safety
Hazardous Liquid Pipeline Operators
Accident Summary Statistics by Year
Hazardous Liquid Spills - 5 barrels or more**

Year	Number of Accidents	Water involved	HCAs involved	Property Damage	Gross Loss barrels	Net Loss barrels	Ave Spill barrels	Ave Spill gallons
2002	182	35	48	\$ 42,913,873	92,461	73,654	508	21,337
2003	184	35	54	\$ 48,857,018	81,011	50,793	440	18,492
2004	166	35	48	\$ 99,886,974	88,498	68,818	533	22,391
2005	159	26	55	\$ 130,550,384	137,785	46,106	867	36,396
2006	131	18	46	\$ 35,927,161	137,204	54,119	1,047	43,989
2007	93	19	36	\$ 24,378,875	66,659	48,414	717	30,104
Totals	915	168 18%	287 31%	\$382,514,285 \$418,048	603,618	341,904	660	27,707

"Historical totals may change as PHMSA receives supplemental information on incidents."

**PHMSA Office of Pipeline Safety
Hazardous Liquid Pipeline Operators
Accident Summary Statistics by Year
Crude Oil Spills - 5 barrels or more**

Year	Number of Accidents	Water involved	HCAs involved	Property Damage	Gross Loss barrels	Net Loss barrels	Ave Spill barrels	Ave Spill gallons
2002	78	13	10	\$ 26,738,641	20,238	8,844	259	10,897
2003	86	11	10	\$ 18,529,314	28,850	14,106	335	14,090
2004	82	19	11	\$ 61,660,836	31,279	19,755	381	16,021
2005	85	11	18	\$ 86,013,150	102,901	19,253	1,211	50,845
2006	73	8	17	\$ 14,775,328	84,294	5,929	1,155	48,498
2007	42	9	13	\$ 9,299,370	12,201	1,455	291	12,201
Totals	446	71 16%	79 18%	\$217,016,639 \$486,584	279,763	69,342	627	26,345

Database Generated on 10/19/2007

"Historical totals may change as PHMSA receives supplemental information on incidents."

Regional Summary

Actual Crude Oil Pipeline Spills

- 1) Surface Water Contamination
- 2) Ground Water Contamination
- 3) High Consequence Areas Affected
- 4) Multi-Million Gallon Spills
- 5) Multi-Million Dollar Cleanups



US DOT - Office of Pipeline Safety - Regional Oil Spills

Note: This is a partial list of significant regional pipeline oil spills; it is not a complete list.

Date	OPS Report ID	Operator	Location	State	Spill (gal)	Damages (\$) or Comment
1/1/2007	20070029	Enbridge	Atwood	WI	63,000	\$702,500
9/27/2005	20050310	Enbridge	not listed	ND	14,700	\$350,000
10/21/2005	20050336	Enbridge	El Dorado	KS	98,700	\$24,976
4/14/2003	20030187	Enbridge	Trail	MN	5,250	\$1,000,000

Regional Crude Oil Pipeline Spills (surface water contamination)

6/27/2006	20060218	Koch	Little Falls	MN	134,400	\$4,158,716
6/8/2004	20040241	Tesoro	Center	ND	16,800	\$805,000
5/13/2004	20040139	Enbridge	Superior	WI	1,680	\$81,764
1/24/2003	20030083	Enbridge	Superior	WI	189,000	\$2,853,000
7/4/2002	20020238	Enbridge	Cohasset	MN	252,000	\$5,597,300

Regional Crude Oil Pipeline Spills (ground water contamination)

2/5/2007	20070050	Enbridge	Clearbrook	MN	294	\$49,341
2/2/2007	20070048	Enbridge	Exeland	WI	126,000	\$1,633,660
10/20/2006	20060320	Enbridge	Pinewood	MN	210	\$50,000
2/9/2004	20040063	Enbridge	Grand Rapids	MN	42,126	\$1,089,790
July 2002	no OPS report	Enbridge	Cass Lake	MN	48,000+	?

US DOT - Office of Pipeline Safety - Regional Oil Spills

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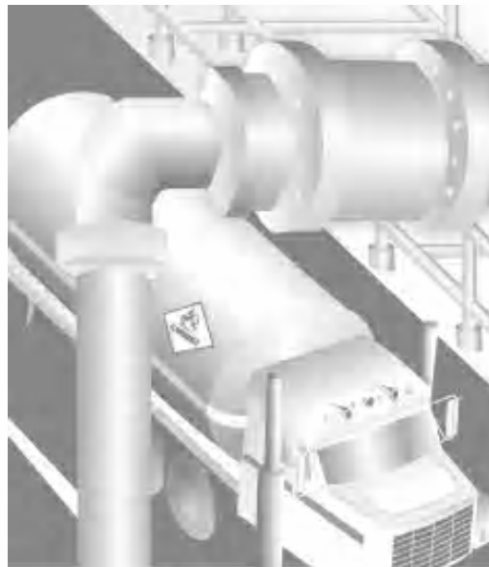
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July 2002	no OPS report	Enbridge	Cass Lake	MN	48,000+	?

Rupture of Enbridge Pipeline and Release of Crude Oil
near Cohasset, Minnesota
July 4, 2002



Pipeline Accident Report
NTSB/PAR-04/01

PB2004-916501
Notation 7514A



**National
Transportation
Safety Board**
Washington, D.C.



US DOT - Office of Pipeline Safety - Regional Oil Spills

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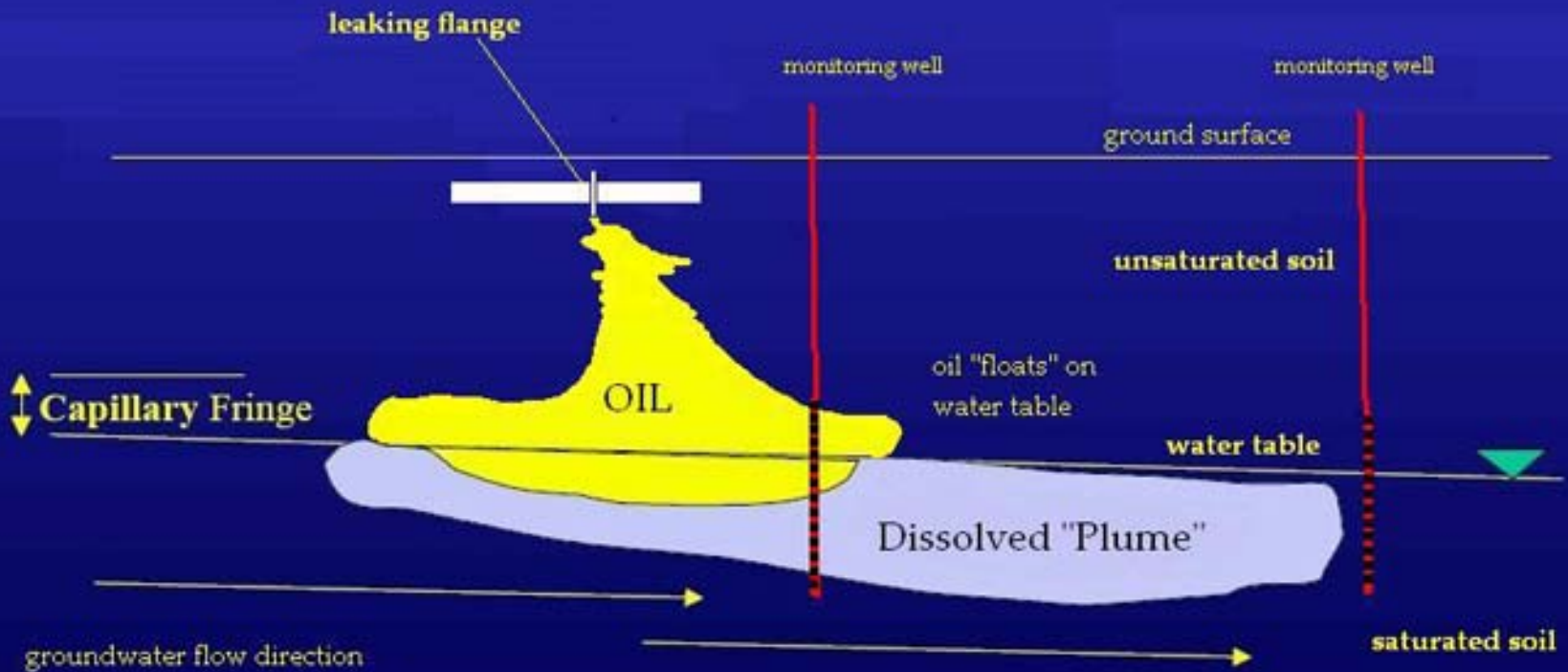
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2/9/2004	20040063	Enbridge	Grand Rapids	MN	42,126	\$1,089,790
July 2002	no OPS report	Enbridge	Cass Lake	MN	48,000+	?

Anatomy of South Cass Lake Leak Site



Regional Crude Oil Pipeline Spills (HCAs affected)

1/25/2007	20070043	Enbridge	Stanley	ND	9,030	HCA
5/3/2006	20060154	Koch	Cottage Grove	MN	1,260	HCA
12/14/2005	20050374	Enbridge	Stanley	ND	504	HCA
11/2/2005	20050320	Enbridge	Stanley	ND	252	HCA
5/13/2004	20040139	Enbridge	Superior	WI	1,680	HCA
12/2/2003	20030464	Enbridge	Clearbrook	MN	1,974	HCA
1/24/2003	20030083	Enbridge	Superior	WI	189,000	HCA

Regional Crude Oil Pipeline Spills - 50,000+ gal - (pre-2002 OPS format)

7/27/2000	20000095	Lakehead *	Douglas Co	WI	50,400	\$200,000
9/16/1998	19980147	Lakehead *	not listed	MN	239,400	\$100,000
7/2/1997	19970102	Marathon	Garden Co	NE	295,092	\$420,000
12/26/1996	19970010	Marathon	Nucholls Co	NE	205,800	\$1,300,000
8/24/1996	19960142	Lakehead *	Donaldson Co	MN	210,000	\$500,000
5/1/1993	19930093	Amoco	Patoka	IL	210,672	\$300,000
3/3/1991	19910057	Lakehead *	Itasca Co	MN	1,701,000	\$14,400,000
7/13/1989	19890091	Lakehead *	Pembina Co	ND	1,314,600	\$1,500,000
6/16/1988	19880120	Lakehead *	Macomb Co	MI	369,600	\$3,200,000
4/9/1988	19880115	Amoco	Peoria Co	IL	210,000	\$1,500,000
5/27/1987	19870136	Lakehead *	Columbia Co	WI	132,300	\$345,000
4/24/1986	19860087	Lakehead *	Elgin	IL	525,000	\$815,000
11/7/1985	19850155	Minn Pipeline	Anoka Co	MN	251,160	?

* Note: Lakehead = Enbridge

South Dakota Hazardous Liquid Pipeline Spills

What should we expect?

What should we believe?

1) Frequency of Spills?

2) Volume of Spills?



Spill Frequency Rate (SFR)

Defined

= the number of oil spills per year for a given length of pipe.



Spill Frequency Rate (SFR)

Keystone Pipeline

= the number of oil spills per year per 1845 miles of pipe/ROW.



Pipeline Oil Spill Information

Hazardous Liquid Pipelines (Only)

North America (Only)

- 1) An Independent Study
- 2) An Industry Leader
- 3) The Industry Average.



California State Fire Marshal

**Hazardous Liquid Pipeline
Risk Assessment**



Pete Wilson
Governor

Sandra R. Smoley
Secretary, State and Consumer
Service Agency

Ronny J. Coleman
State Fire Marshal



8.0 Conclusions

Based on the results presented for the period from January 1, 1981 through December 31, 1990, the following conclusions have been drawn regarding California's regulated hazardous liquid pipelines. These conclusions have been organized into two subsections. The first includes items which we consider to be major findings, as well as the issues specifically required to be addressed in the study by state statute. The second subsection includes what we consider to be less significant findings.

8.1 Significant Findings

a. Overall Incident Rates

The various criteria used to report hazardous liquid pipeline incidents had a direct effect on the resulting incident rates. The data collected regarding California's incidents was the only completely audited sample available. It resulted in incident rates somewhat higher than those presented in other studies. Using all of the available data, we have estimated the overall incident rates for various pipeline events as follows:

Event	Incident Rate
any size leak	7.1 incidents per 1,000 mile years
damage greater than \$5,000	1.3 to 6.2 incidents per 1,000 mile years

Spill Frequency Rate (SFR)

California State Fire Marshall

The SFR is equivalent to 13 leaks
per year per 1845 miles of pipe.



Industry Leader - Enbridge

Actual Ten Year Results (1996 – 2005)

Spills Reported to Regulatory Jurisdictions

Total Reported Oil Spills: 499

Gallons Spilled: 5,931,828

Average Oil Spill: 11,887 gallons

Source: Enbridge, Inc - See EXHIBIT F



US Industry Average

Actual Four Year Results (2002 – 2005)

After the Pipeline Safety Improvement Act

Reporting Threshold Used = 5 gallons

Total Reported Oil Spills: 1550

Gallons Spilled: 17,045,746

Average Oil Spill: 10,997 gallons

Source: USDOT-OPS - See EXHIBIT G



TransCanada Keystone Spill Frequency Rate

Projection = 1 spill every 7 years
for the entire 1845 mile pipeline
(50 barrels or more).

Source: Frequency Volume Analysis



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28 March 2007

Keystone Pipeline Frequency and Volume Analysis Report 70020509 (rev 3)
TransCanada Keystone Pipeline L.P.

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6.0 Summary and Conclusions

6.1 Calculated Likelihood of Leaks

The risk analysis of the Keystone Pipeline focused on the likelihood of leaks over the entire pipeline during its lifetime. The base frequencies discussed in Section 4.0 were adapted to each segment via application of modification factors. The resulting leak frequencies were summed to provide an average annual leak frequency for the pipeline lifetime.

For the four cases studied, only one case incorporated both the Keystone Mainline and the Cushing Extension, the 591,000 bpd Diluted Bitumen Case. For this case, the likelihood of a leak greater than 50 barrels anywhere along the pipeline is predicted to be about 0.15 per year, or once every 7 years. In the three other cases, where only the Keystone Mainline is included, the likelihood of a leak greater than 50 bbl anywhere along the pipeline is predicted to be about 0.09 per year, or once every 11 years.

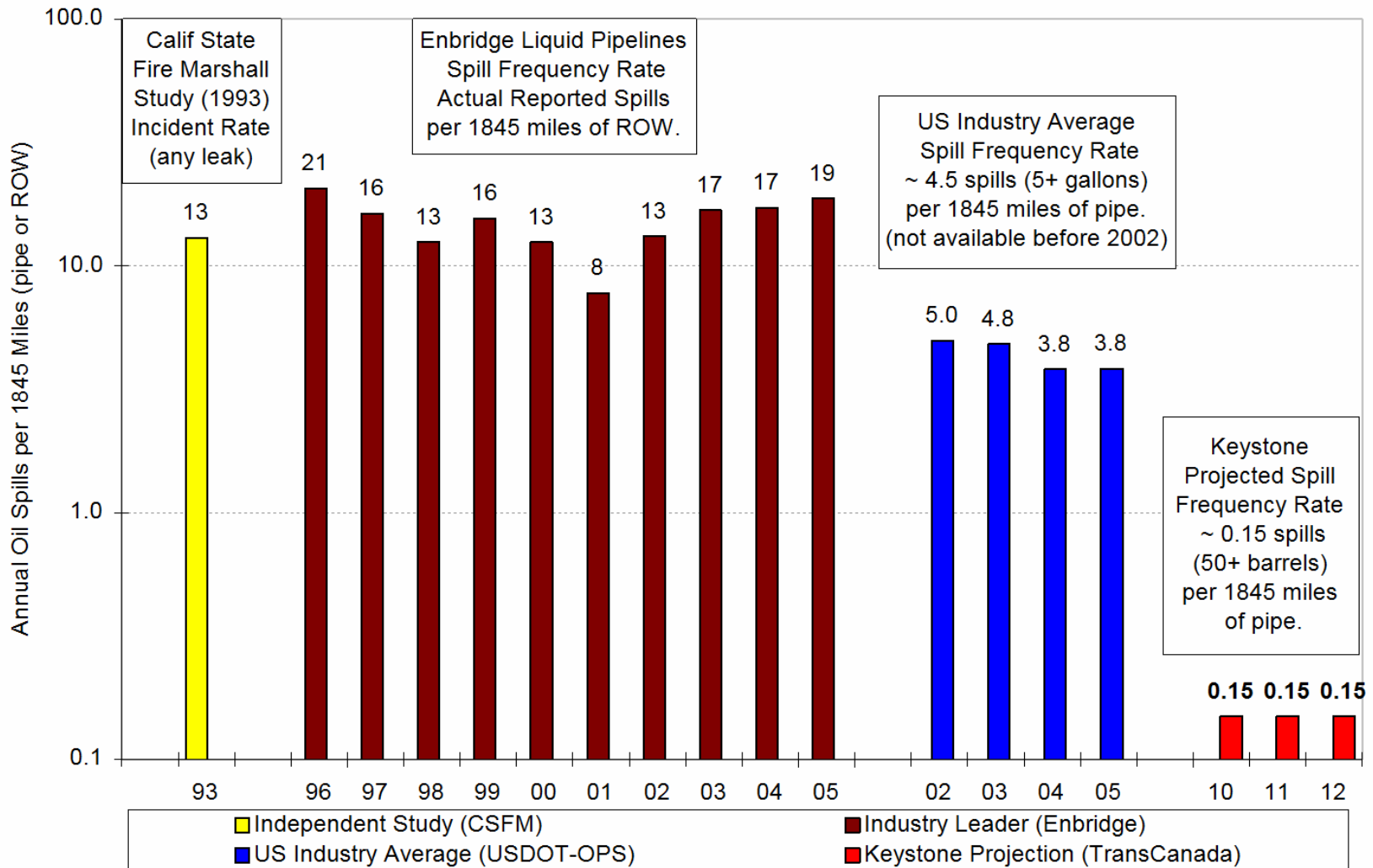
The calculated likelihood of spills less than 50 bbl is considerably less than practical experience would dictate. This is primarily the result of historical reporting requirements, as spills of less than 50 bbl were not required to be reported to the DOT within the historical data set. The current requirement of reporting all spills above 5 bbl is therefore not represented in the dataset used in this analysis.

Hazardous Liquid Pipelines in North America

Spill Frequency Rate (SFR) Comparisons

Annual Number of Spills per 1845 Miles

Source: CSFM, Enbridge, USDOT-OPS, TransCanada



Pipeline Oil Spills

Volume of Spills

How much do they leak?



Spill Volume Rate (SVR)

Defined

= amount of oil spilled per million barrel-miles of product transport.



Spill Volume Rate (SVR)

One barrel-mile equals
one barrel of oil transported
a distance of one mile.

Source: Association of Oil Pipelines



Spill Volume Rate (SVR)

The US industry average SVR is
~1 gallon of oil spilled per million
barrel-miles of product transport.

Source: Association of Oil Pipelines



Spill Volume Rate (SVR)

An Industry Leader

The Enbridge actual spill volume rates (1996-2005) are listed first.

Source: Enbridge, Inc - See EXHIBIT F



Spill Volume Rate (SVR)

The US Industry Average

The actual US Industry Average spill results (1996-2005) are next.

Source: US-DOT OPS - See EXHIBIT G



Spill Volume Rate (SVR)

Keystone Projection

TransCanada's projected spill
volume rate (for year 2010+)

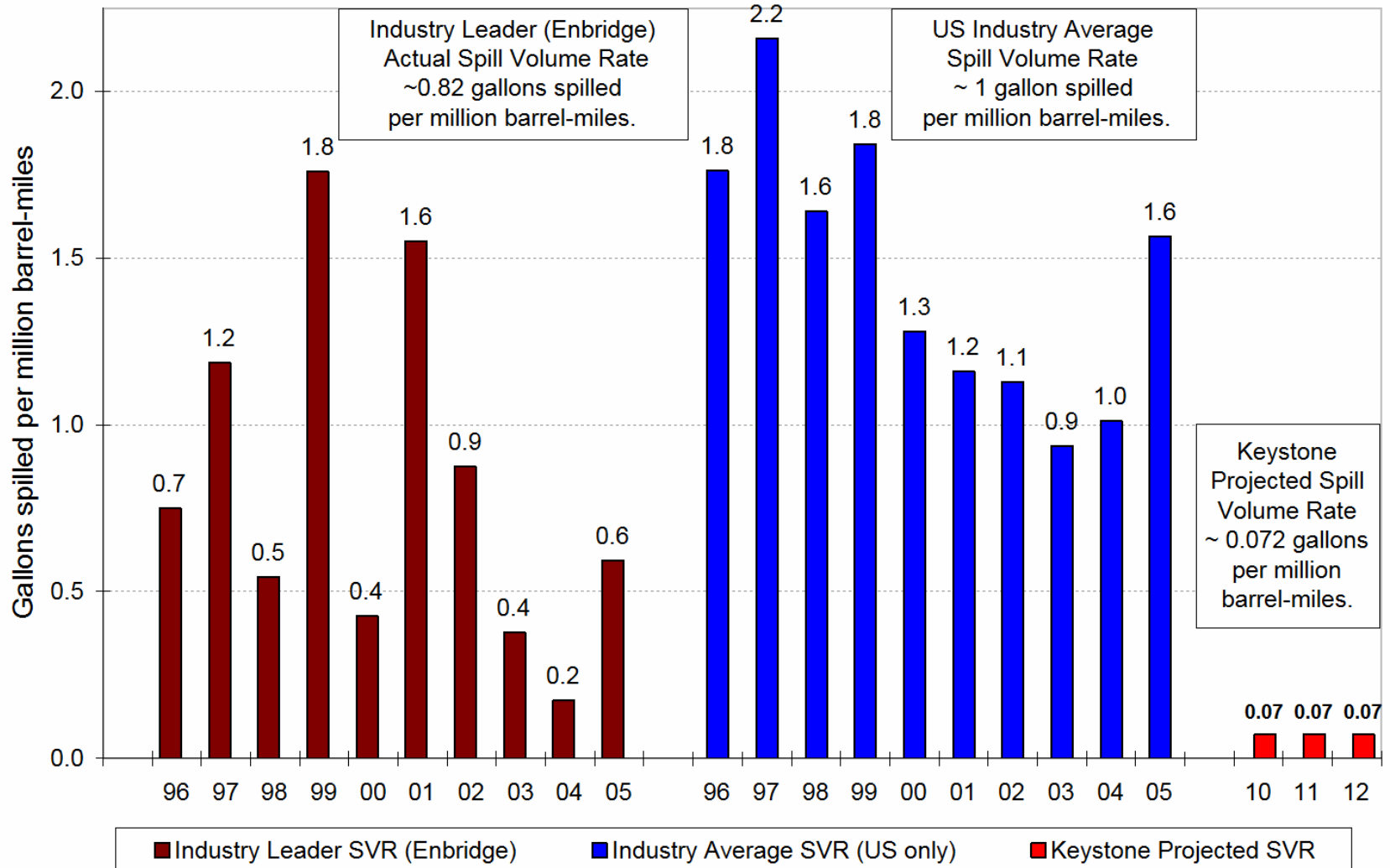


Hazardous Liquid Pipelines in North America

Spill Volume Rate (SVR) Comparisons

Gallons of Oil Spilled per Million Barrel-Miles

Source: Enbridge, USDOT-OPS, TransCanada

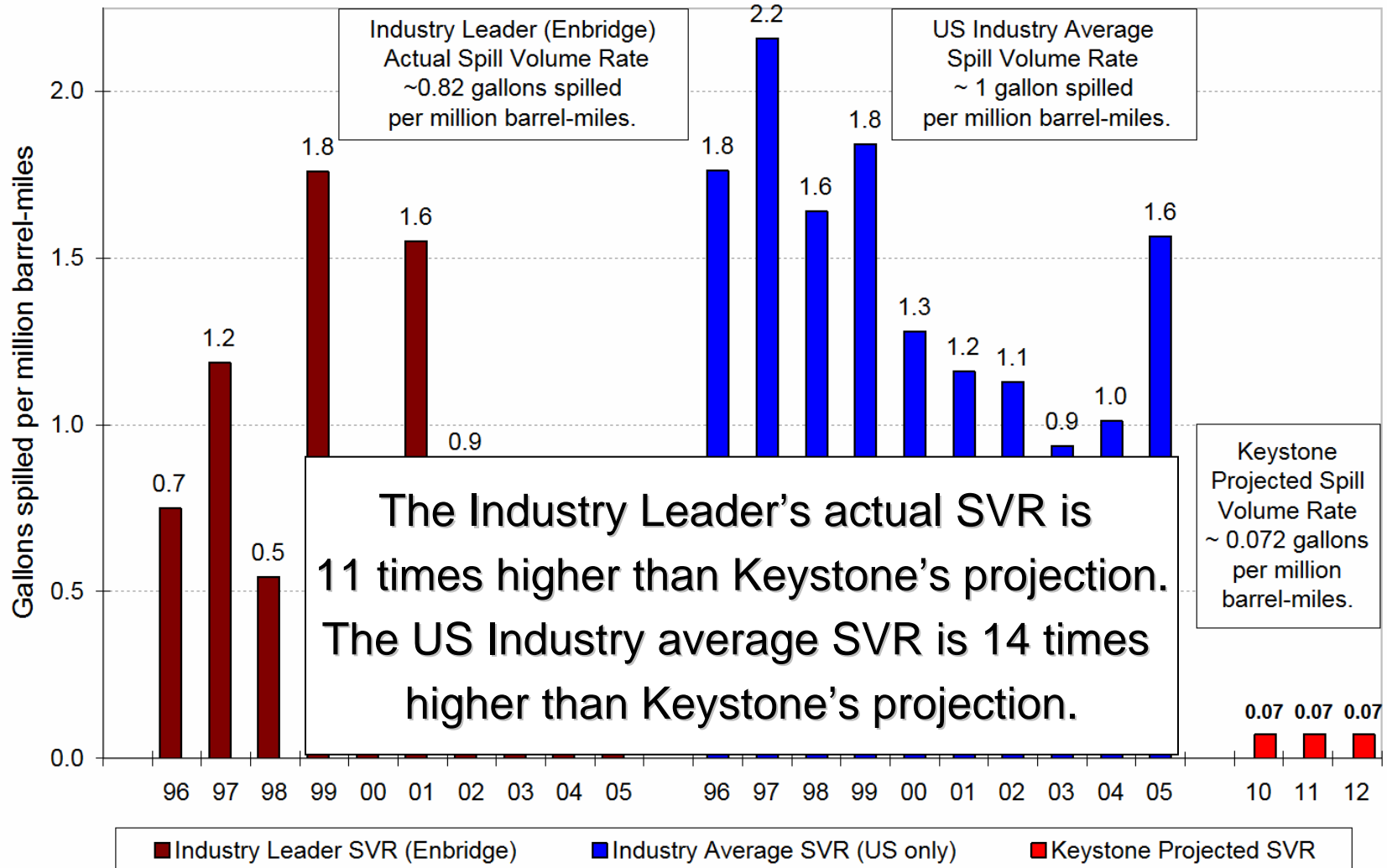


Hazardous Liquid Pipelines in North America

Spill Volume Rate (SVR) Comparisons

Gallons of Oil Spilled per Million Barrel-Miles

Source: Enbridge, USDOT-OPS, TransCanada



Keystone Spill Projections

Are significantly lower than the actual historical track record of hazardous liquid pipelines in North America.

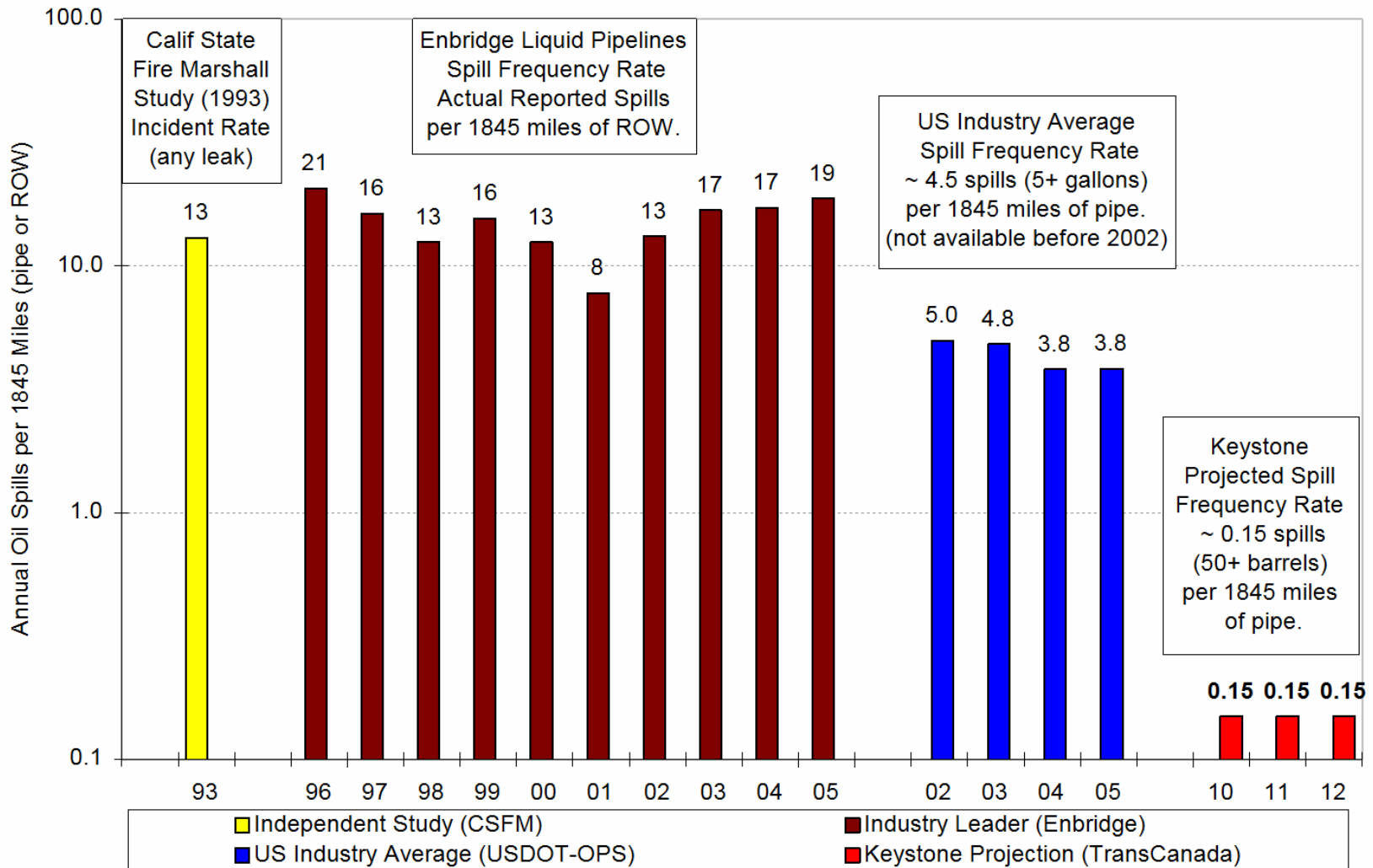


Hazardous Liquid Pipelines in North America

Spill Frequency Rate (SFR) Comparisons

Annual Number of Spills per 1845 Miles

Source: CSFM, Enbridge, USDOT-OPS, TransCanada

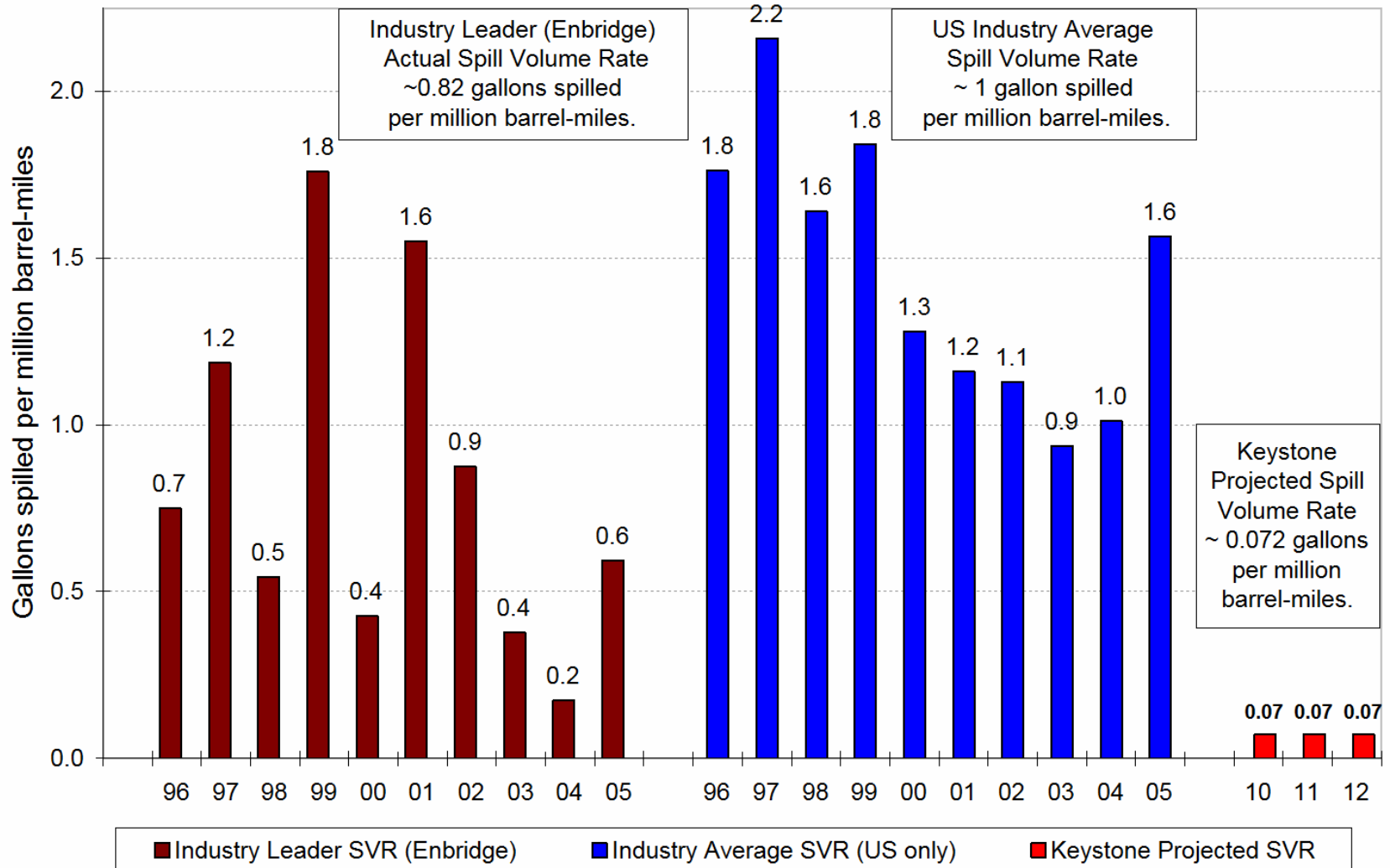


Hazardous Liquid Pipelines in North America

Spill Volume Rate (SVR) Comparisons

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DNV ENERGY

Keystone Pipeline Frequency and Volume Analysis

Report for TransCanada Keystone Pipeline L.P.
Report no.: 70020509 Revision 3,
28 March 2007

Frequency Volume Analysis

Flaws Affecting Spill Frequency

(lower the number of spills)

Data Selection Flaws

- 1) Wrong Location - Out of North America
- 2) Wrong Subject – Natural Gas Pipelines



Frequency Volume Analysis
 References & Literature

I.3 References and Literature Review

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Wrong Locations (blue);
 Outside North America

Wrong Subject (yellow);
 Natural Gas Pipelines, etc.

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28 March 2007
Generic Failure Rate Data - Project 70020509 Rev 2
TransCanada Keystone Pipeline L.P.

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Wrong Locations (blue);
Outside North America

Wrong Subjects (yellow);
Natural Gas Pipelines, etc.

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TransCanada Keystone Pipeline L.P.

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Wrong Locations (blue);
Outside North America

Wrong Subjects (yellow);
Natural Gas Pipelines, etc.

Frequency Volume Analysis

28 Total References

15 were the wrong location
(Outside of North America)

11 were the wrong subject
(Natural Gas Pipelines, etc.)

➔ 19 out of 28 were either the wrong location or the wrong subject or both.



Frequency Volume Analysis

Flaws Affecting Spill Volumes

(lower the amount of oil spilled)

- 1) Data Omission Example
- 2) Data Interpretation Example
- 3) General Assumptions



Data Omission Example from the Frequency Volume Study

28 March 2007
Keystone Pipeline Frequency
TransCanada Keystone Pipe

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Data Omission Flaw: The time to shutdown the pumps is omitted, which reduces the spill sizes.

5.1 Detection, Verification, Response and Isolation

Table 5-1 Time from Leak Start to Closure of RGVs for Reported Causes

Hole size	Response Time	Valve Closure
Small	30 minutes	3 minutes
Medium	15 minutes	3 minutes
Large	9 minutes	3 minutes

Table 5.1 Time from Leak Start to Closure of RGVs for Reported Causes

Hole Size	Response Time	Pump Shutdown	Valve Closure	Total Time	Time/Spill Increase
Small	30	omitted	3	33	
Actual	30	9	3	42	27%
Medium	15	omitted	3	18	
Actual	15	9	3	27	50%
Large	9	omitted	3	12	
Actual	9	9	3	21	75%

Impact: The pipeline isolation times and potential spill sizes increase up to 75%.

Flaws Affecting Spill Volumes

Data Interpretation Example

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28 March 2007

Keystone Pipeline Frequency and Volume Analysis Report 70020509 (rev 3)
TransCanada Keystone Pipeline L.P.

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6.5 Comparison with Generic Pipeline Leak Frequency

Table 6-5 Leak Volume Summary

Case	Leak Volume (per mile per year)
M435S	0.24
M591S	0.29
M435DB	0.30
K591DB	0.45

In summary, the average leak volume per mile for the Keystone Pipeline is estimated in the range of 0.24 bbl to 0.45 bbl per mile per year (**Table 6-5**). For purposes of comparison, pipelines in the U.S. had an average leak frequency of 0.49 bbl per pipeline mile per year during the period 1992 to 2003 (OPS 2006). Thus, the Keystone Pipeline is estimated as better than average regarding oil spill frequency.

Frequency Volume Study - Data Interpretation Flaw

Hazardous Liquids Pipelines Incident Database (Source: OPS)

Year	Total Pipeline Mileage (miles)	Gross Loss Total Oil Spilled (barrels)	Net Loss Oil Never Recovered (barrels)
1992	155,113	137,065	68,810
1993	153,444	116,802	57,559
1994	154,731	164,387	114,002
1995	154,933	110,237	53,113
1996	163,422	160,316	100,949
1997	156,638	195,549	103,129
1998	154,528	149,500	60,791
1999	158,248	167,230	104,487
2000	160,900	108,652	56,953
2001	159,889	98,348	77,456
2002	161,670	95,642	77,269
2003	159,512	80,112	50,523
Totals	1,893,028 (Total Miles)	1,583,840 (Total Spill)	925,041 (Net Loss)

Real World Calculation

Average leak volume per mile ==== > **0.84** barrels
(TOTAL SPILL divided by TOTAL MILES)

Frequency Volume Study

Average leak volume per mile ===== > **0.49** barrels
(NET LOSS divided by TOTAL MILES)

The Real World
Average leak volume per mile is **71%** higher than their interpretation.

The Frequency Volume study doesn't use the TOTAL Spill in the calculation.
They subtract the amount of oil recovered from the original spill total.
The net result is that the average spill size is reduced because of data interpretation.

Frequency Volume Analysis

General Assumptions

- 1) Response Times to stop leaks
- 2) SCADA systems always work



Frequency Volume Analysis

References and Literature Review

Countries/Locations Mentioned

Australia, Brunei, Brussels, Europe,
Hong Kong, Norway, United
Kingdom, United States, United
Soviet Socialist Republic



Frequency Volume Analysis

References and Literature Review

Countries/Locations Not Mentioned

What about Canada?

Why isn't Canada mentioned in the
Frequency Volume Analysis?



What about Canada?

Never Mentioned:

- 1) NEB – National Energy Board
- 2) EUB – Alberta Energy & Utilities Board
- 3) CAPP – Assoc of Petroleum Producers
- 4) TSB – Transportation Safety Board
- 5) CEPA – Canada Energy Pipeline Assn





Pipeline Performance in Alberta, 1990-2005

April 2007

Alberta Energy and Utilities Board

EXHIBIT L

Figure 19. Pipeline releases by substance released per year

All pipeline releases from January 1, 1990, to December 31, 2005 (test failures are excluded)

EXHIBIT L

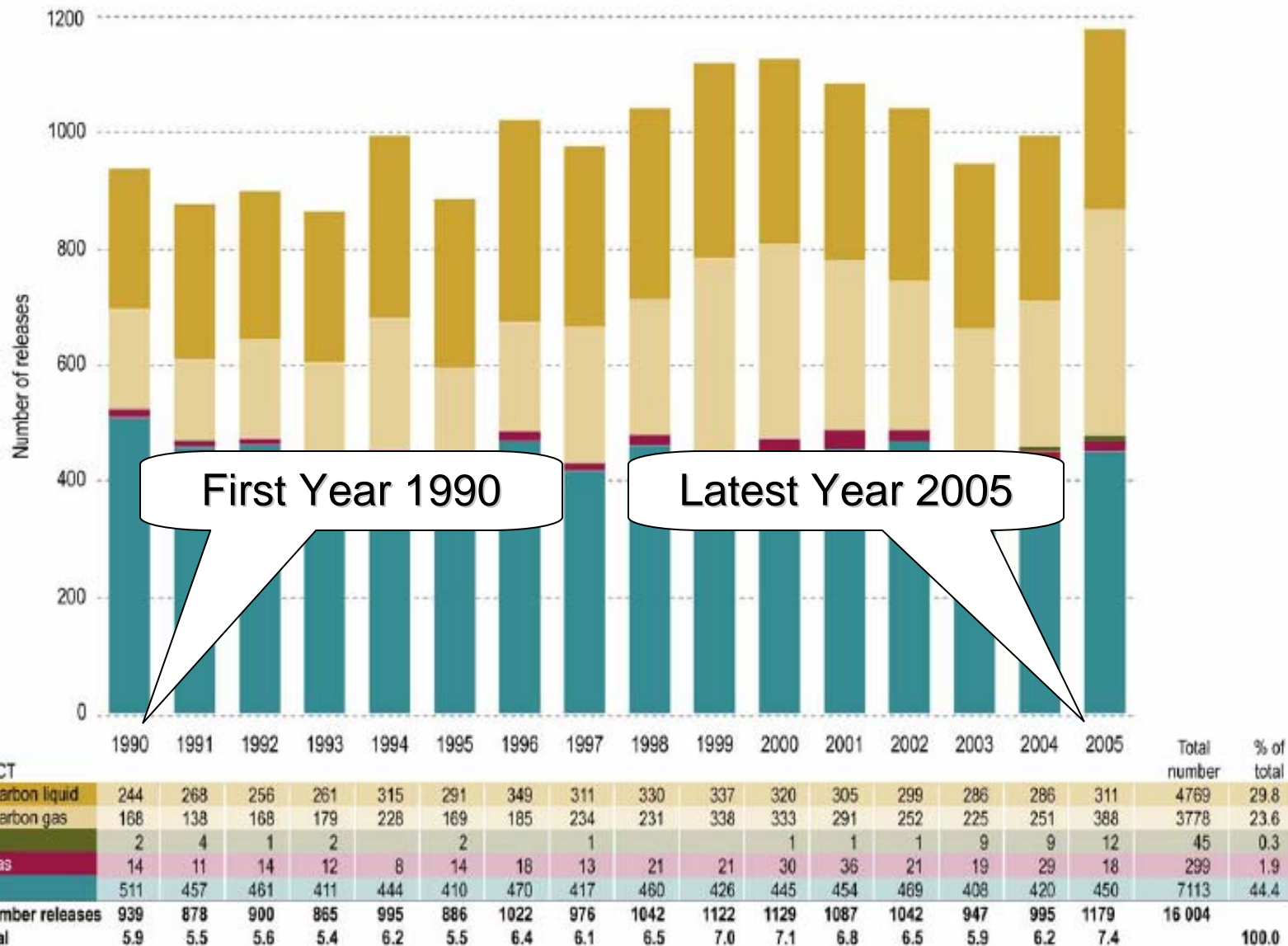


Figure 19. Pipeline releases by substance released per year

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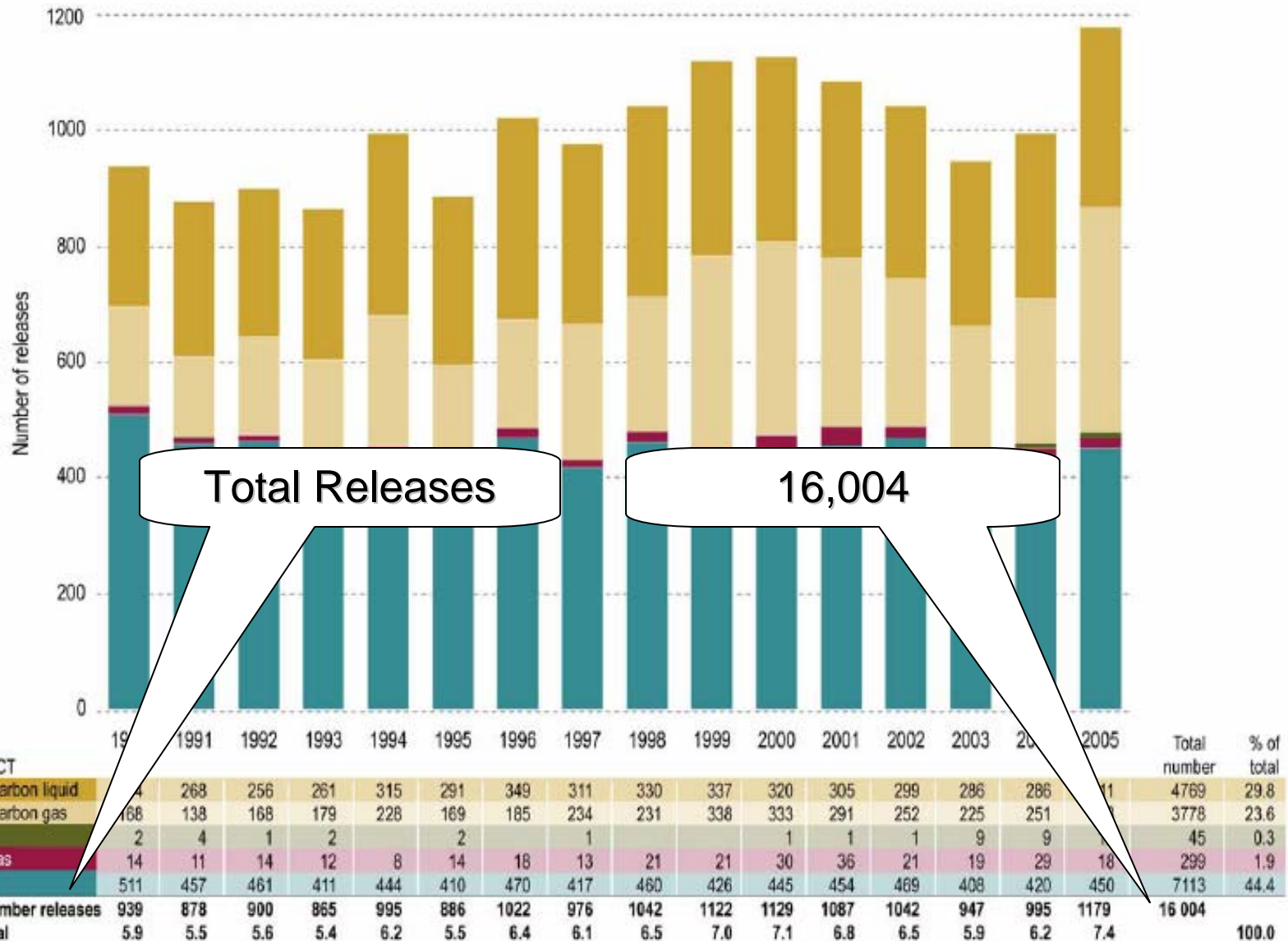


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EXHIBIT L

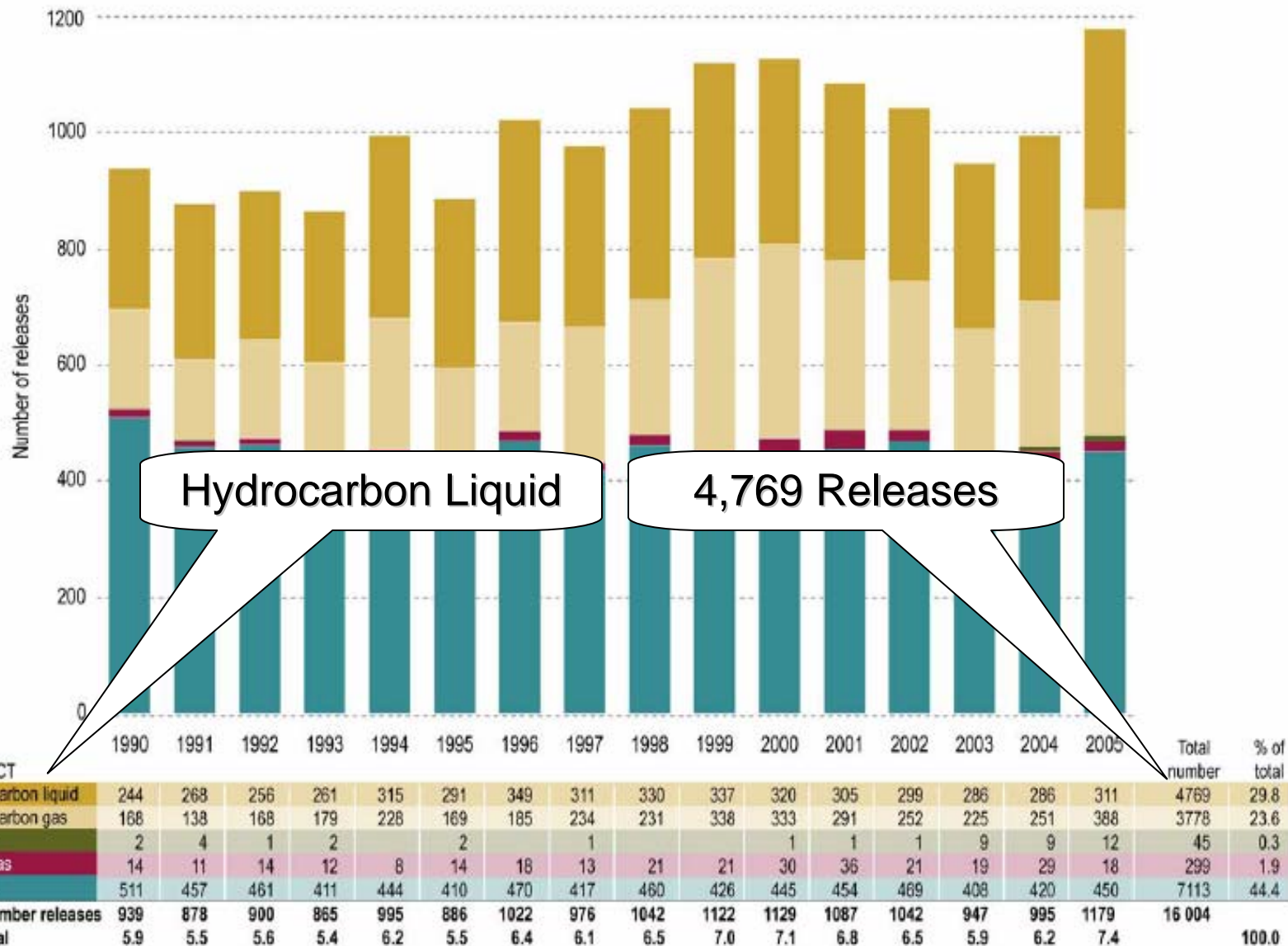
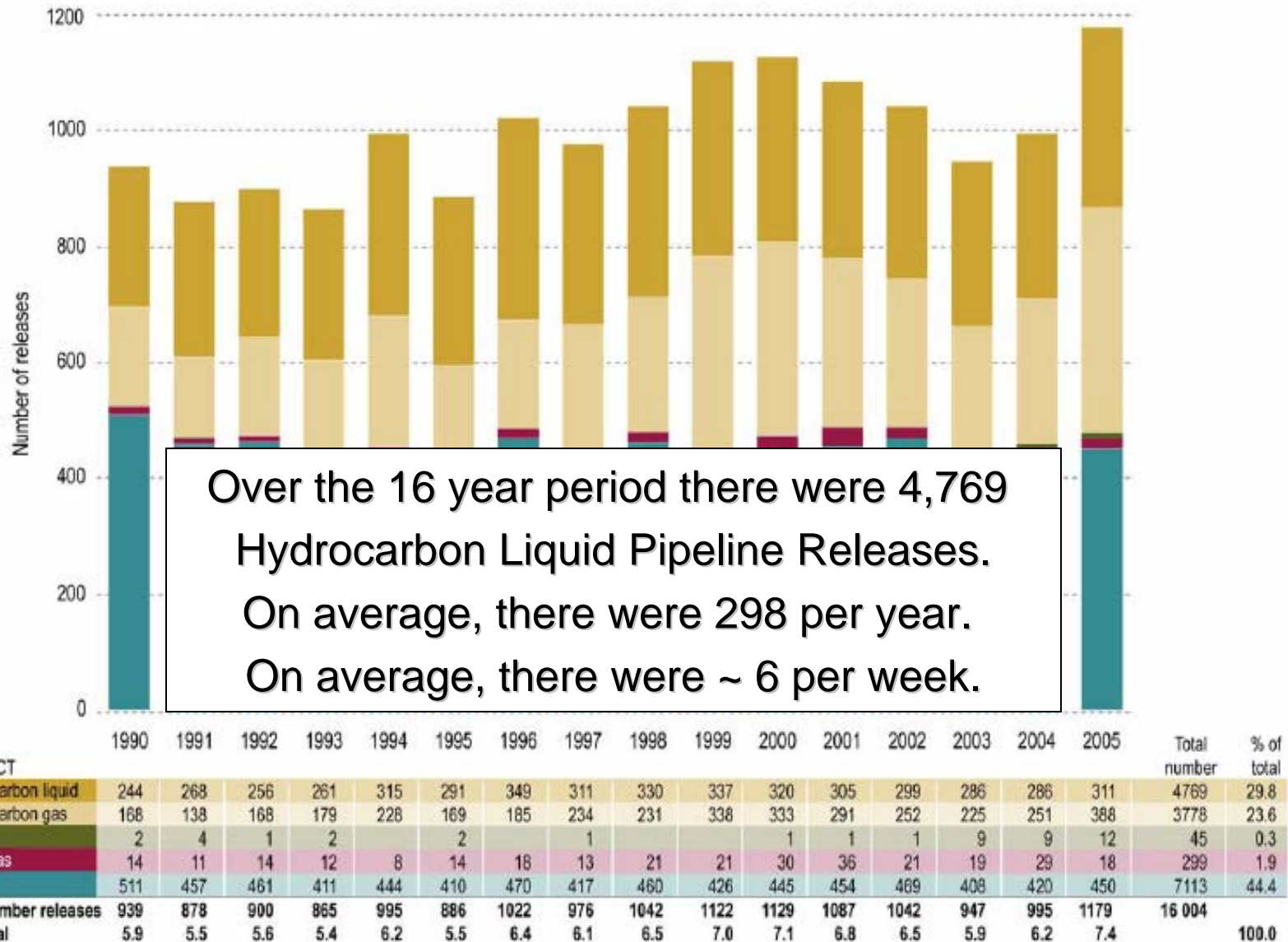


Figure 19. Pipeline releases by substance released per year

All pipeline releases from January 1, 1990, to December 31, 2005 (test failures are excluded)

EXHIBIT L



Alberta EUB Pipeline Performance Report (1990 - 2005)

Most of the 4,769 spills are “small”,
that is, less than 26,400 gallons

<100 m³ or cubic meters (26,400 gallons)

100 – 1000 m³ (up to 264,000 gallons)

1000 - 10,000 m³ (up to 2,640,000 gallons)

> 10,000 m³ (more than 2,640,000 gallons)



A Canadian Case Study

Burnaby, British Columbia

July 2007 Oil Spill

Source: Canadian News Reports



The city hired a local contractor to upgrade the city sewer system.

Source: Canadian News Reports



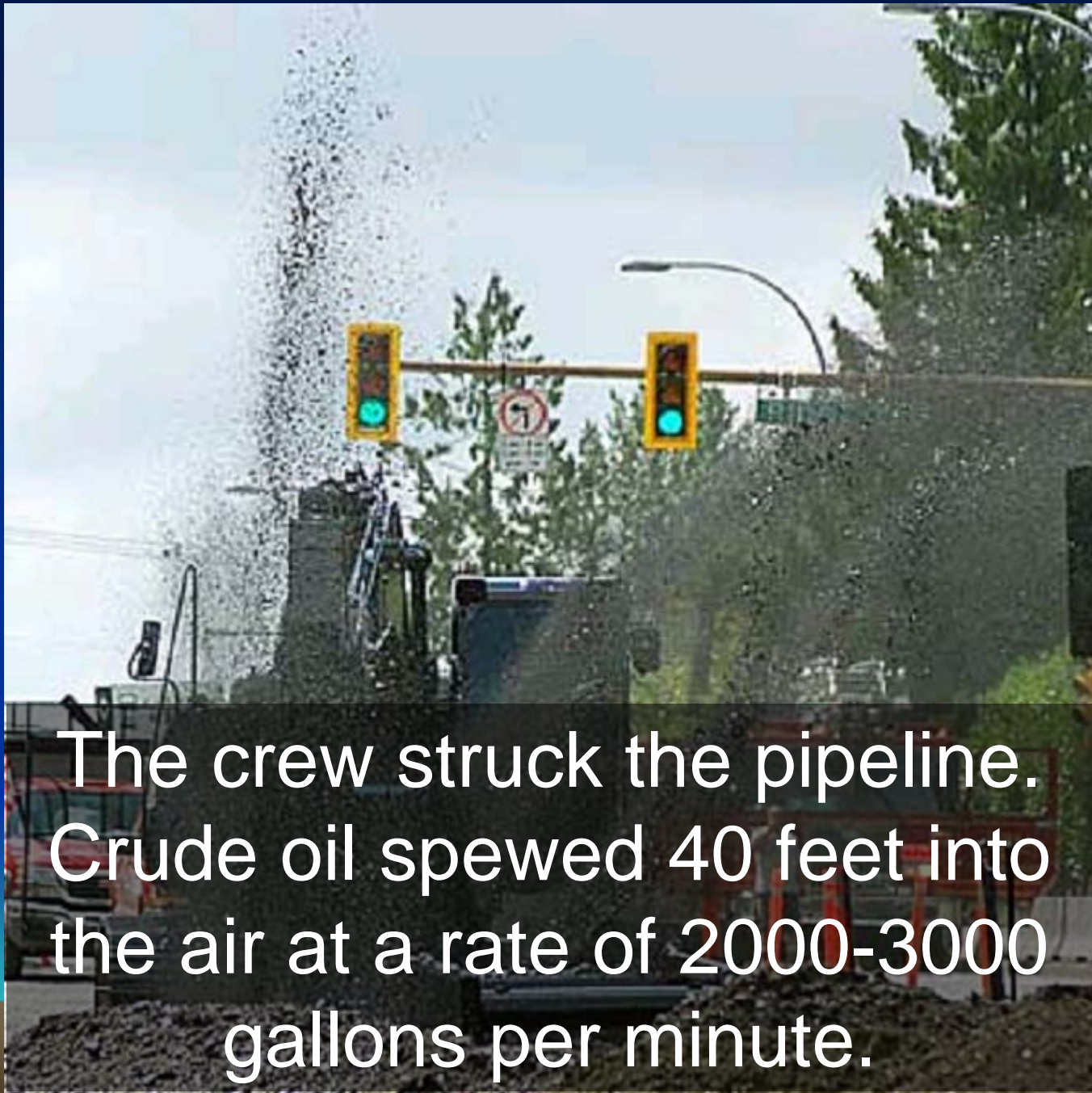
After reviewing the project plans with the local pipeline company, digging started.

Something went wrong ...

Source: Canadian News Reports







The crew struck the pipeline.
Crude oil spewed 40 feet into
the air at a rate of 2000-3000
gallons per minute.

The pipeline was shutdown immediately. An estimated 60,000 gallons leaked within 20 to 30 minutes.

Source: Canadian News Reports





Crude oil coated the street
and everything nearby.

The local residential area
sustained significant
damage ...

Source: Canadian News Reports





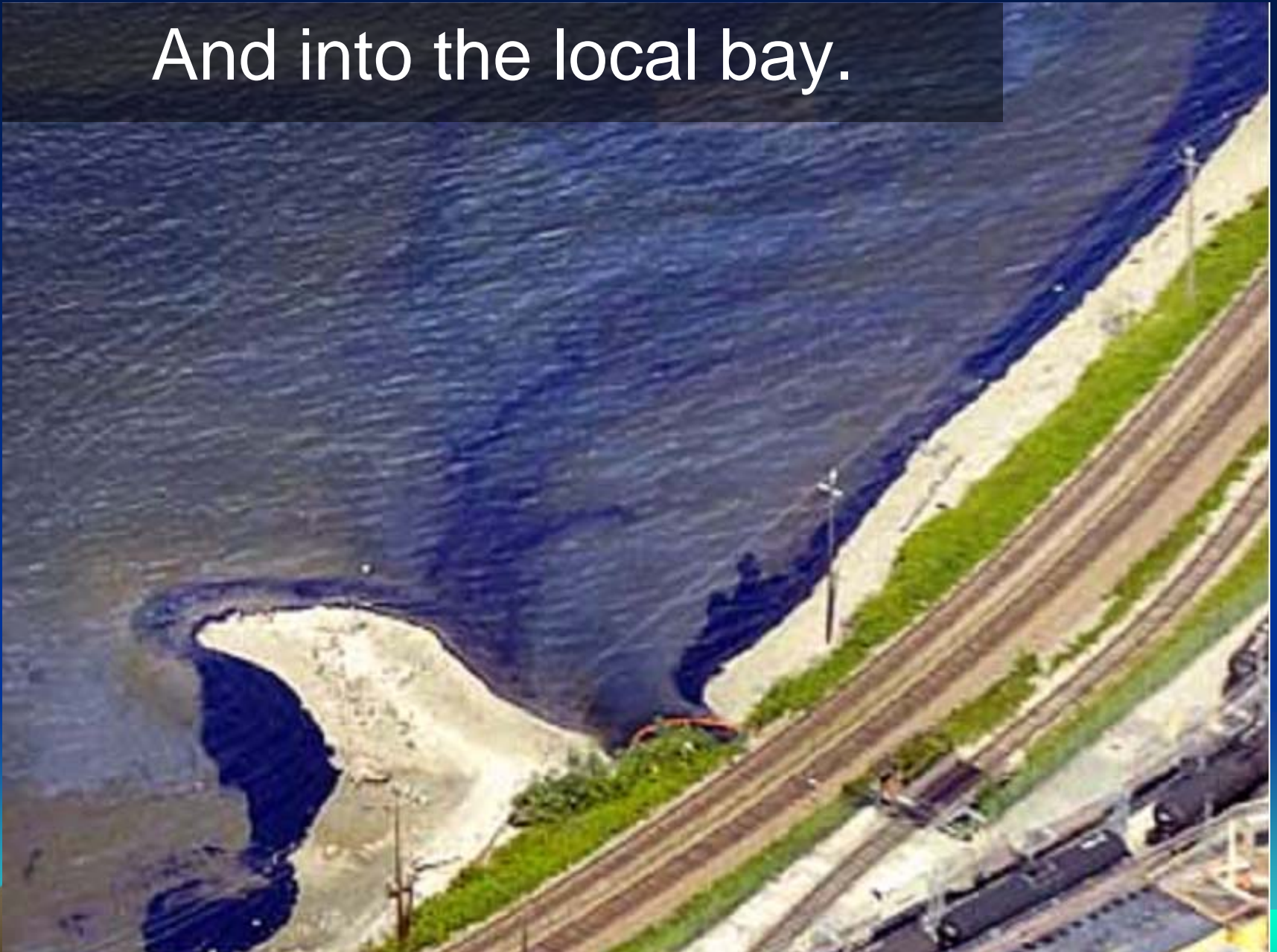
Crude oil flowed down the
streets into the city storm
sewers ...

Source: Canadian News Reports





And into the local bay.





The cleanup could take
several years and cost
“tens of millions” of dollars.

Source: Canadian News Reports



The pipeline company claims that they are not at fault. The city may have to pay for the spill.

Source: Canadian News Reports



How long before this
happens in South Dakota?

It is only a matter of when,
where, and how much.



Major Pipeline Spills in Canada



National Energy Board of Canada List of Pipeline Ruptures

Transportation Safety Board Investigations

Enbridge, TransCanada, Others
1992 - 2007



National Energy Board of Canada
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P96H0008	Enbridge	02/27/96	28	Glenavon, SK	Crude	211,000 gal spill.
P95H0047	Enbridge	11/13/95	30	Langbank, SK	Crude	203,000 gal spill.
P95H0023	Enbridge	06/16/95	27	Windthorst, SK	Condensate	
P94H0048	Enbridge	10/03/94	31	St. Leon, MB	SynCrude	1.1 million gal spill
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PIPELINE INVESTIGATION REPORT

P01H0004



CRUDE OIL PIPELINE RUPTURE

ENBRIDGE PIPELINES INC.
864-MILLIMETRE LINE 3/4, MILE POST 109.42
NEAR HARDISTY, ALBERTA
17 JANUARY 2001



PIPELINE INVESTIGATION REPORT P01H0004

Summary

At 0045 mountain standard time on 17 January 2001, a rupture occurred on the Enbridge Pipelines Inc. 864-millimetre outside diameter Line 3/4 at Mile Post 109.42, 0.8 kilometres downstream of the Hardisty pump station near Hardisty, Alberta. The rupture occurred in a permanent slough that was fed by an underground spring. Although the line was shut down at the control centre in Edmonton, Alberta, within minutes of the rupture, the exact location of the rupture was not found until 1415 mountain standard time. Approximately 3800 cubic metres of crude oil was released and contained within a 2.7-hectare section. As of 01 May 2001, 3760 cubic metres of crude oil had been recovered.

Other Factual Information

At 0045 mountain standard time (MST),¹ the control centre operator in Edmonton, Alberta, controlling Line 3/4 noticed a pressure drop at the Hardisty pump station and immediately began to shut down the mainline units at that pump station. As the line was being shut down, the emergency notification procedure was begun.

During the morning of 17 January 2001, the pipeline route downstream of the Hardisty pump station was both walked and flown along numerous times in an effort to identify the possible leak location. At approximately 1415, company personnel walking the line noticed that crude oil had surfaced through a crack in the ice near the edge of a slough about 300 metres (m) downstream of the Hardisty pump station. At that time, company personnel secured the site and began to implement oil containment, oil recovery and pipeline repair operations.

Enbridge Pipeline Rupture

Jan 2001 - Summary

- 1) Pipe Failure - Rupture
- 2) SCADA System worked well
- 3) Spill more than 1 million gallons
- 4) SCADA cannot prevent all large spills
- 5) Spill site not found for ~14 hours
- 6) Disproves Freq Volume Assumption
that leaks can be clamped within 4 hours



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P97H0024	Westcoast	04/30/97	19	Ft. St. John, BC	Sour gas	Resulted in ignition.
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	Westcoast	04/25/94	32	Rigel, BC	Sour gas	
P94H0003	Foothills	02/15/94	12	Maple Creek, SK	Gas	Resulted in ignition.
P93H0007	Westcoast	05/13/93	24	Fort St. John, BC	Sour gas	Delayed rupture.

Total – There were 26 pipeline ruptures over a 15 year period investigated by the TSB.

Enbridge Pipeline Rupture

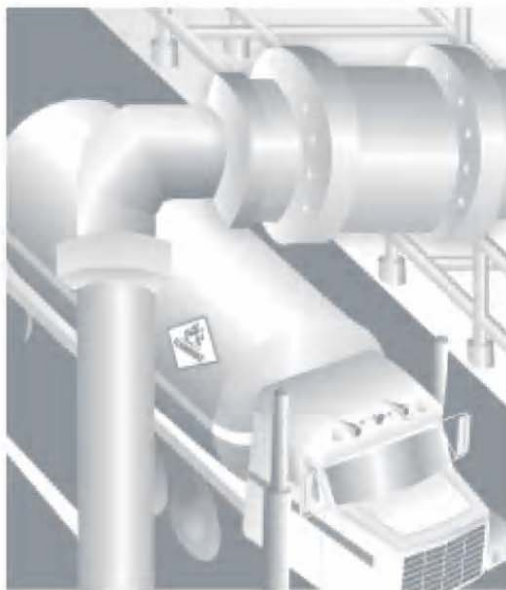
Oct 1994 - Summary

- 1) Pipeline shutdown for maintenance
- 2) Restarted with a valve still closed
- 3) SCADA did not detect closed valve
- 4) Large spill; 1+ million gallons

Disproves Freq Volume Assumption
that SCADA Systems always work



Supervisory Control and Data Acquisition (SCADA) in Liquid Pipelines



Safety Study

NTSB/SS-05/02

PB2005-917005

Notation 7505A



**National
Transportation
Safety Board**

Washington, D.C.

NTSB Safety Study (US) SCADA in Liquid Pipelines

Report NTSB/SS-05/02

PB2005-917005

Adopted November 29, 2005



NTSB Safety Study (US) SCADA in Liquid Pipelines

SCADA systems contributed to the severity of hazardous liquid pipeline spills in 10 out of 13 cases studied.

Report Adopted November 29, 2005



**National Energy Board of Canada
List of Pipeline Ruptures (1992 – 2007)
Transportation Safety Board Investigations**

(Grouped by Enbridge, TransCanada, Others; Sorted by date)

TSB #	Company	Date	Age	City	Product	Comment
P07H0014	Enbridge	04/15/07	39	Glenavon, SK	Crude	261,000 gal spill.
P01H0049	Enbridge	09/29/01	29	Binbrook, ON	Crude	13,200 gal spill
P01H0004	Enbridge	01/17/01	33	Hardisty, AB	Crude	1+ million gal spill
P99H0021	Enbridge	05/20/99	31	Regina, SK	Crude	825,000 gal spill
P96H0008	Enbridge	02/27/96	28			
P95H0047	Enbridge	11/13/95	30			
P95H0023	Enbridge	06/16/95	27			
P94H0048	Enbridge	10/03/94	31			
P02H0017	TransCanada	04/14/02	33			
P97H0063	TransCanada	12/02/97	28	Caon, SK		
P96H0049	TransCanada	12/11/96	39	Stewart, AB	Gas	Delayed ignition.
P96H0012	TransCanada	04/15/96	34	St. John's, MB	Gas	Delayed ignition.
P95H0036	TransCanada	07/29/95	22	Rapid City, SK	Gas	Immediate ignition.
P95H0003	TransCanada	02/04/95	22	Vermillion Bay, ON	Gas	Immediate ignition.
P94H0049	TransCanada	10/06/94	37	Williamstown, ON	Gas	
P94H0036	TransCanada	07/23/94	22	Lethbridge, AB		
P92T0005	TransCanada	07/15/92	19			
P02H0052	TNPL	12/07/02	50			
P02H0024	Westcoast	05/15/02	45			
P00H0037	Westcoast	08/07/00	43			
P98H0044	Westcoast	12/08/98	40			
P97H0024	Westcoast	04/30/97	19			
P94H0018	BP Canada	05/10/94	17	Regina, SK		
	Westcoast	04/25/94	32	Rigel, AB	Sour gas	
P94H0003	Foothills	02/15/94	12	Maple Creek, SK	Gas	Resulted in ignition.
P93H0007	Westcoast	05/13/93	24	Fort St. John, BC	Sour gas	Delayed rupture.

TransCanada had several failures in the mid 1990s. The pipe was about age 20

TransCanada owns and operates Foothills. This pipe was age 12; it was installed in 1982.

Total – There were 26 pipeline ruptures over a 15 year period investigated by the TSB.

**National Energy Board of Canada
List of Pipeline Ruptures (1992 – 2007)
Transportation Safety Board Investigations**

Total – There were 26 pipeline ruptures over a 15 year period investigated by the TSB.

Ruptures – Age of Pipe Distribution

Number of years from installation to failure (above listed ruptures)						<u>Totals</u>
Age of Pipe	0-10 yrs	11-20 yrs	21-30 yrs	31-40 yrs	41-50 yrs	12-50 yrs
Ruptures	0	4	9	10	3	26

Average ages of the pipe at time of rupture ~ 30 years; the range is 12 – 50 years.

EXHIBIT M

TransCanada Corporate Social Responsibility

Ms Kothari testified regarding 576 spills
on TransCanada's Corporate Social
Responsibility Reports (2000-2005)



BEFORE THE PUBLIC UTILITIES COMMISSION
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DAKOTA ENERGY CONVERSION AND)
TRANSMISSION FACILITIES ACT TO)
CONSTRUCT THE KEYSTONE PIPELINE)
PROJECT)

HP 07-001

**DIRECT TESTIMONY OF
MEERA KOTHARI**

19. Tell me specifically about the 576 spills posted on TransCanada's website?

Answer: Most importantly, none of these spills represent pipeline operational leaks.

5

Under TransCanada's spill classification system, between 2000-2005, there were 576 spills. Of the 576 spills, 20 were near misses, 523 spills were classified as Minor, 28 were classified as Serious, four spills were classified as Major and one as Critical. In the case of all four "major" spills, less than 20 gallons in total were spilled. The "critical" spill involved the release of approximately 100 gallons of various liquids such as lube oils.

6

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TSB #	Company	Date	Age	City	Product	Comment
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P99H0021	Enbridge	05/20/99	31	Regina, SK	Crude	825,000 gal spill
P96H0008	Enbridge	02/27/96	28	Glenavon, SK	Crude	211,000 gal spill.
P95H0047	Enbridge	11/13/95	30	Langbank, SK	Crude	203,000 gal spill.
P95H0023	Enbridge	06/16/95	27	Windthorst, SK	Condensate	
P94H0048	Enbridge	10/03/94	31	St. Leon, MB	SynCrude	1.1 million gal spill
P02H0017	TransCanada	04/14/02	33	Brookdale, MB	Gas	Immediate ignition
P97H0063	TransCanada	12/02/97	28	Cabri, SK	Gas	Resulted in ignition.
P96H0049	TransCanada	12/11/96	39	Stewart Lake, ON	Gas	Delayed ignition.
P96H0012	TransCanada	04/15/96	34	St. Norbert, MB	Gas	Delayed ignition.
P95H0036	TransCanada	07/29/95	22	Rapid City, SK	Gas	Immediate ignition.
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P94H0036	TransCanada	07/23/94	22	Latchford, ON	Gas	Resulted in ignition.
P92T0005	TransCanada	07/15/92	19	Potter, ON	Gas	Resulted in ignition.
P02H0052	TNPL	12/07/02	50	St-Clet, QU	Diesel	
P02H0024	Westcoast	05/15/02	45	Fort St. John, BC	Sour gas	
P00H0037	Westcoast	08/07/00	43	Hope, BC	Gas	
P98H0044	Westcoast	12/08/98	40	Kobes Creek, BC	Sour gas	Resulted in ignition.
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Total – There were 26 pipeline ruptures over a 15 year period investigated by the TSB.

TransCanada Pipeline Rupture

Brookdale, MB

April 14, 2002

Transportation Safety Board
Investigation Report P02H0017



Transportation Safety Board
of Canada



Bureau de la sécurité des transports
du Canada

PIPELINE INVESTIGATION REPORT

P02H0017



NATURAL GAS PIPELINE RUPTURE

TRANSCANADA PIPELINES

LINE 100-3, 914-MILLIMETRE-DIAMETER LINE

MAIN-LINE VALVE 31-3 + 5.539 KILOMETRES

NEAR THE VILLAGE OF BROOKDALE, MANITOBA

14 APRIL 2002

Canada

EXHIBIT O



PIPELINE INVESTIGATION REPORT P02H0017

TSB Investigation Report Excerpt 1

“At approximately 2310, the first verbal report from a member of the public indicated that there was an explosion and fire on TransCanada’s system near Brookdale, approximately 1.2 km from Rural Road 464. At the same time, TransCanada’s SCADA system gave very strong visual and graphical evidence to the CGCC of a possible line break between Stations 30 and 34. From this time on, several calls from the public and emergency services organizations were received by the CGCC related to the explosion and fire.”

TSB Investigation Report Excerpt 2

“At approximately 2318, TransCanada advised the Royal Canadian Mounted Police (RCMP) of a possible line break near Brookdale and that TransCanada personnel had been dispatched to the rupture site. The RCMP advised TransCanada that it would be implementing a 4 km radius evacuation area around the rupture site and would be evacuating local residents within this perimeter.”

TSB Investigation Report Excerpt 3

“At approximately 0230, the major fire self-extinguished at the break site due to actions undertaken at 0130. The isolation of the break site was accomplished with the automatic closure of four MLVs and various tie-over valves with adjacent lines, by low-pressure shut-off devices and the remote closure of 22 valves by the CGCC through the SCADA system. As a precaution, the operating pressures for Lines 100-2 and 100-4 were temporarily reduced to 1000 kPa, until the integrity of these two adjacent main lines could be confirmed. At the time of the break, the estimated pressure at the rupture site was 6010 kPa. The total volume of natural gas consumed by the fire and lost to atmosphere was estimated at 6 812 600 cubic metres.”
(conversion: 240,583,000 cubic feet)

Pipeline Incident Update

CALGARY, Alberta – April 15, 2002 – (TSE: TRP) (NYSE: TRP) – All but two residents in or near the community of Brookdale, Manitoba who were evacuated due to a line break have been cleared to return to their homes.

About 100 residents were evacuated as a result of a line break that occurred on Sunday, April 14, at approximately 11:00 p.m. (CDT). Two people occupying the house nearest the incident were advised not to return home tonight, but are expected to be able to return on Tuesday. Their home is not at risk.

TransCanada, which owns and operates the line, implemented its emergency response plan as a result of the line break. Company representatives are working with authorities, including the Transportation Safety Board and the National Energy Board, to investigate the incident.

TransCanada has isolated sections of two pipelines running adjacent to the affected pipeline to determine if they are damaged. Inspections of the adjacent pipelines are made difficult by water accumulation in the area. These sections of pipeline will remain isolated until a full inspection can be made and they can be safely returned to operation.

Some customers shipping natural gas on the TransCanada system have been impacted. TransCanada notified customers with interruptible transportation service (IT), of the need to reduce transportation by approximately 450 million cubic feet of natural gas effective 5:00 p.m. (MDT) today. No firm service transportation (FT) was affected. The situation will be re-assessed when more information is known about the condition of the adjacent pipelines. TransCanada's Mainline System typically carries about five to seven billion cubic feet of natural gas each day.

TransCanada Pipeline Rupture

April 14, 2002 Summary

- 1) Explosion and Major Fire
- 2) Evacuation (100 people) by RCMP ~12PM
- 3) Major Product Loss (240+ MCF gas)
- 4) Adverse Environmental Impact
- 5) Emergency Response Plan Activated
- 6) Customers were Impacted
- 7) Investigation by the TSB (P02H0017)

Q: Is this the critical spill?



TransCanada Pipeline Rupture

April 14, 2002 Summary

- 1) This incident doesn't match the description of the "critical" spill. There were 100 lives involved here, not 100 gal of various liquids.
- 2) This incident doesn't match the description of the "major" spills, where less than 20 gallons in total were spilled for all four spills.

How can this NOT be a critical or major spill?



TransCanada Corporate Social Responsibility Report

“Most importantly, none of these spills represent operational pipeline leaks.”

523 Minor Spills

28 Serious Spills

4 Major Spills -in all 4 spills, less than 20 gallons in total were spilled

1 Critical Spill -release of ~100 gallons of various liquids (lube oil)



TransCanada Pipeline
Nova Gas Transmission
Multiple Pipeline Ruptures

Outside Grande Prairie, AB

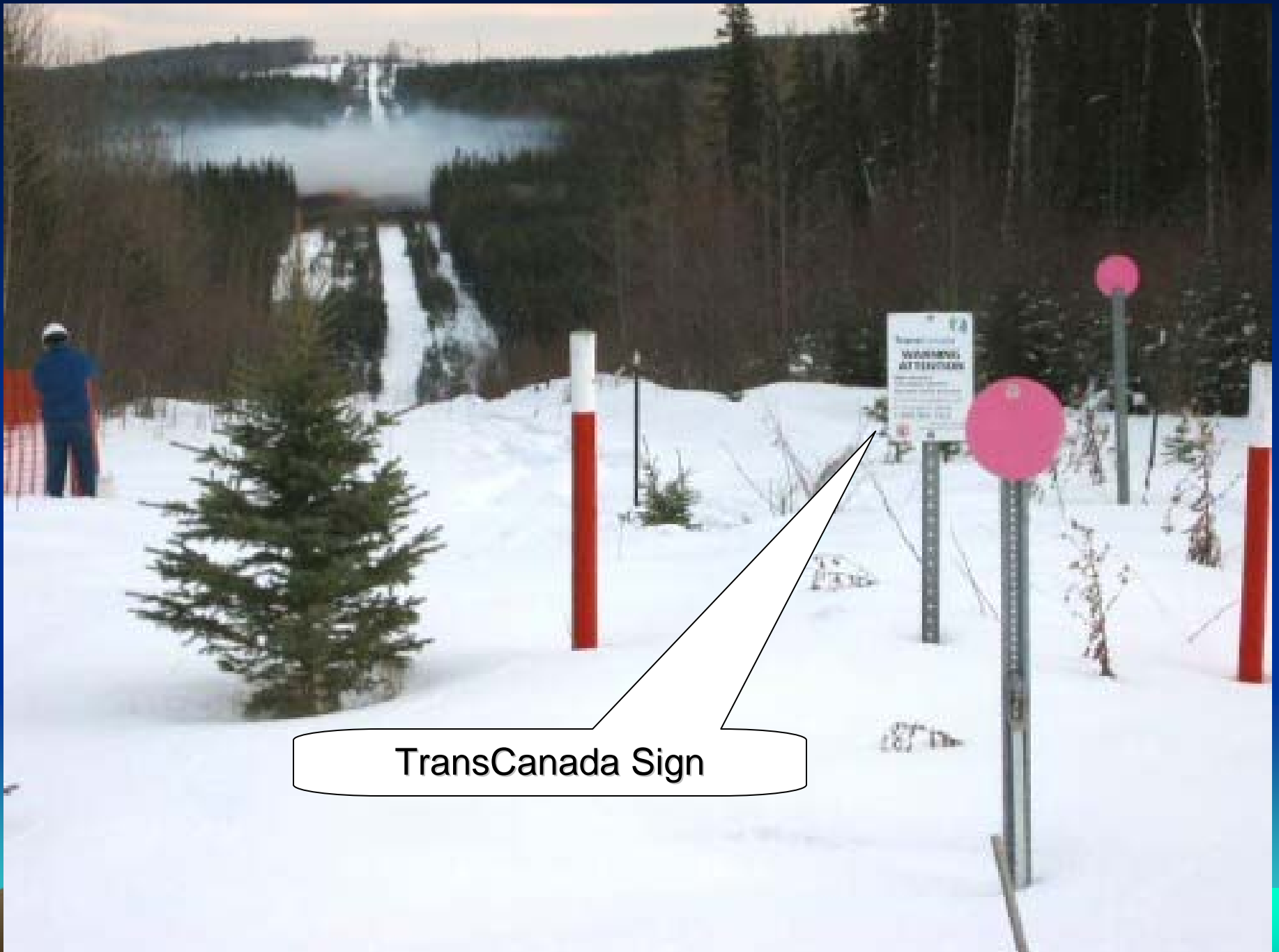
Dec 1-2, 2003



TransCanada Pipeline Nova Gas Transmission Multiple Pipeline Ruptures

The following photographs of one of the ruptures were provided by Don Gronlund of Fort St John, BC.



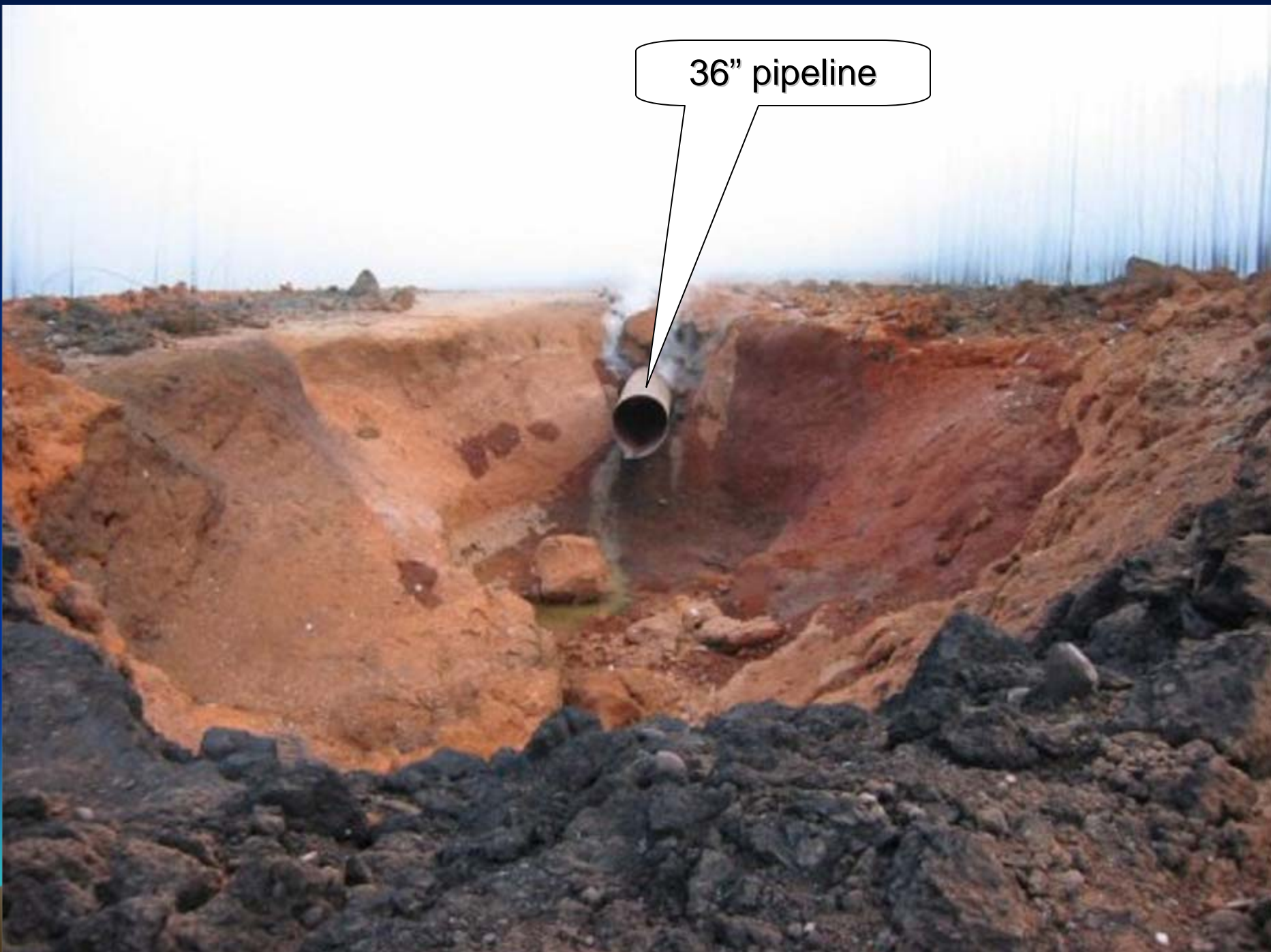


TransCanada Sign





36" pipeline







Western Alberta System Pipeline Incidents

CALGARY, Alberta - Dec. 2, 2003 - 1:00 p.m. MST - (TSX: TRP) (NYSE: TRP) - At approximately 7 a.m. MST , a natural gas pipeline break and resulting fire occurred on TransCanada's Alberta System, approximately 20 kilometres southwest of the communities of Valleyview and the Sturgeon Lake First Nation.

This is the second line break in the area in less than 24 hours. The first line break occurred approximately 15 km downstream of this incident at approximately 5:45 p.m. MST, Dec. 1, about 30 km southwest of the community of Little Smokey. The incident sites are about 90 and 110 km southeast of Grande Prairie.

TransCanada immediately activated its emergency response plan to isolate damaged sections of pipelines and allow the natural gas fires to burn themselves out. No injuries have been reported as a result of either incident. The extent of the damage to our system has not yet been determined.

Some shippers were impacted as a result of yesterday's break; however, there are no further impacts as a result of this second incident. Deliveries of gas to local communities have not been impacted as a result of either incident.

TransCanada Multiple Ruptures Dec 1–2, 2003 Summary

- 1) Multiple Explosions and Major Fires
 - 2) Emergency Response Plan Activated
 - 3) Major Product Loss (~200 MCF gas)
 - 4) Adverse Environmental Impact
 - 5) Shippers were Impacted
 - 6) Regulatory Investigation
- Q: Are these major or critical spills?



TransCanada Multiple Ruptures

Dec 1 – Dec 2, 2003

- 1) These multiple ruptures don't match the description of the "critical" spill, (release of ~100 gallons of various liquids)
- 2) These multiple ruptures don't match the description of the "major" spills, ("less than 20 gallons in total were spilled.")

What spills are these?



TransCanada Corporate Social Responsibility Report

“Most importantly, none of these spills represent operational pipeline leaks.”

523 Minor Spills

28 Serious Spills

4 Major Spills -in all 4 spills, less than 20 gallons in total were spilled

1 Critical Spill -release of ~100 gallons of various liquids (lube oil)



TransCanada Pipeline Nova Gas Transmission Additional Ruptures

Oct 8, 2005 12.4 MCF Natural Gas

Aug 17, 2005 9.9 MCF Natural Gas



TransCanada Corporate Social Responsibility

These events and photos have
nothing to do with a crude oil pipeline.

These are not pipeline issues,
they are credibility issues.



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PROJECT)

HP 07-001

**DIRECT TESTIMONY OF
MEERA KOTHARI**

19. Tell me specifically about the 576 spills posted on TransCanada's website?

Answer: Most importantly, none of these spills represent pipeline operational leaks.

5

Not Credible.

Under TransCanada's spill classification system, between 2004-2005, there were 576 spills. Of the 576 spills, 20 were near misses, 523 spills were classified as Minor, 28 were

classified as Serious, four spills were classified as Major and one as Critical. In the case of all four "major" spills, less than 20 gallons in total were spilled. The "critical" spill involved the release of approximately 100 gallons of various liquids such as lube oils.

6

TransCanada Statements Regarding Historical Spills



TransCanada Statements Regarding Historical Spills

Ms Tillquist has stated that Keystone's spill assessment is highly conservative and that the average size of pipeline spills from 2002–2007 is 12 barrels.



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DAKOTA ENERGY CONVERSION AND) **DIRECT TESTIMONY OF**
TRANSMISSION FACILITIES ACT TO) **HEIDI TILLQUIST**
CONSTRUCT THE KEYSTONE PIPELINE)
PROJECT)

20. Discuss the probable size of a spill from the Keystone pipeline.

Answer: For the Risk Assessment analysis, DNV utilized data based on a reporting criteria of 50 barrels or more. So the assessment, by design, overemphasizes the probable spill size. This is done to ensure conservatism in emergency response planning and other objectives.

Data from actual spills reveals that Keystone's assessment is highly conservative. Since the PHMSA reporting criteria changed in 2002 to require reporting of spills of five barrels or more, the average size of a reported pipeline spill has been 12 barrels, equivalent to approximately 500 gallons. If a spill were to occur on the Keystone Pipeline, these recent data affirm that the spill is very likely to be small.

PHMSA Office of Pipeline Safety

Hazardous Liquid Accident Summary

(Jan 2002 – Sep 2007)

Data from actual spills show that
Keystone's spill statement is
clearly false. The average spill is
nowhere near 12 barrels.



PHMSA Office of Pipeline Safety

Hazardous Liquid Accident Summary

(Jan 2002 – Sep 2007)

The Accident Summary Statistics report directly from PHMSA (available online) can be used to disprove Keystone's statement that the average spill since 2002 is 12 bbl.



**PHMSA OFFICE OF PIPELINE SAFETY
HAZARDOUS LIQUID PIPELINE OPERATORS
ACCIDENT SUMMARY STATISTICS BY YEAR
1/1/1986 - 09/30/2007**

Year	No. of Accidents	Fatalities	Injuries	Property Damage	Gross Loss (Bbls)	Net Loss (Bbls)
1986						220,317
1987						312,794
1988						114,251
1989						121,179
1990						54,663
1991						55,774
1992	212	0	38	\$59,140,002	157,065	68,810
1993	229	0	10	\$28,873,651	116,802	57,559
1994	245	1	7 ⁽¹⁾	\$62,166,058	164,387	114,002
1995	188	3	11	\$32,518,689	110,237	53,113
1996	194	5	13	\$85,136,315	160,316	100,949
1997	171	0	5	\$55,186,642	195,549	103,129
1998	153	2	6	\$63,308,923	149,500	60,791
1999	167	4	20	\$86,355,560	167,230	104,487
2000	146	1	4	\$150,555,745	108,652	56,953
2001	130	0	10	\$25,346,751	98,348	77,456
2002	147	1	0	\$47,410,656	95,642	77,269
2003	131	0	5	\$49,981,280	80,112	50,523
2004	144	5				68,558
2005	139	2				45,814
2006	110	0	2	\$53,713,137	6,263	53,806
2007	83	0	2	\$26,013,791	6,327	48,442
Totals ⁽²⁾	3788	44	276⁽¹⁾	\$1,225,675,095	3,929	2,020,638

Historical totals may change as PHMSA receives supplemental information on incidents.

**PHMSA OFFICE OF PIPELINE SAFETY
HAZARDOUS LIQUID PIPELINE OPERATORS
ACCIDENT SUMMARY STATISTICS BY YEAR
1/1/1986 - 09/30/2007**

Year	No. of Accidents	Fatalities	Injuries	Property Damage	Gross Loss (Bbls)	Net Loss (Bbls)
1986	210	4	32	\$16,077,846	282,791	220,317
1987	237	3	20	\$13,140,434	395,854	312,794
1988	193	2	19	\$32,414,912	198,397	114,251
1989	163	3	38	\$8,813,604	201,758	121,179
1990	180	3	7	\$15,720,422	124,277	54,663
1991	216	0	9	\$37,788,944	200,567	55,774
1992	212	5	28	\$20,146,062	127,065	68,810

A total of **603,598** bbl of oil were spilled at the reporting threshold of 50 barrels or more.

The important number is the total amount spilled.

2000	146	1	4	\$150,555,745	108,652	56,953
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2002	147	1	0	\$47,410,656	95,642	77,269
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2005	139	2	2	\$149,690,733	137,017	45,814
2006	110	0	2	\$53,713,137	136,263	53,806
2007	83	0	2	\$26,013,791	66,327	48,442

Totals: 754 accidents

603,598 bbl

The average spill for years 2002-2007 = **800** bbl.

Office of Pipeline Safety

Hazardous Liquid Accident Data File

(Jan 2002 – Sep 2007)

In order for the average spill to be 12 barrels, there would have to have been 50,300 spills since 2002, or 20 spills every day.



Office of Pipeline Safety

Hazardous Liquid Accident Data File

(Jan 2002 – Sep 2007)

The OPS accident data file contains only 2,218 accident records, well short of the 50,300 needed for a 12 barrel average.

Keystone's spill statement is clearly false.



The Truth About Spills

Hazardous Liquid Pipelines

The actual average hazardous liquid pipeline spill since 2002 ranges from ~282 barrels (1+ gal) to ~660 barrels (5+ bbl)
... depending on the exact reporting criteria and the version of the database used.



**PHMSA Office of Pipeline Safety
Hazardous Liquid Pipeline Operators
Accident Summary Statistics by Year
Hazardous Liquid Spills - 1 gallon or more**

Year	Number of Accidents	Water Involved	HCAs Involved	Property Damage	Gross Loss Barrels	Net Loss Barrels	Ave Spill Barrels	Ave Spill Gallons
2002	443	43	56	\$49,106,732	92,929	73,926	210	8,810
2003	422	44	64	\$52,526,342	81,310	50,951	193	8,092
2004	362	53	66	\$145,515,991	89,228	68,941	246	10,352
2005	359	47	67	\$150,498,599	138,062	46,239	385	16,152
2006	333	29	60	\$49,798,528	137,486	54,253	413	17,341
2007	230	23	43	\$27,520,068	66,974	48,617	291	12,230
Totals	2149	239 11%	356 17%	\$474,966,260 \$221,017	605,989	342,927	282	11,843

Database Generated on 10/19/2007

There are 2,218 accident records in this database.

There are 69 records that have 0 in the LOSS field/column. They are not included on this report.

EXHIBIT Q

The Truth About Spills Hazardous Liquid Pipelines

Ms. Tillquist has rebutted my direct testimony including EXHIBIT C, stating that she was not able to reproduce many of the values reported (i.e. 660.)

I fully support my testimony as is.



The Truth About Spills Hazardous Liquid Pipelines

In her rebuttal, Ms. Tillquist displayed a “Table 1” showing oil spill statistics. Her own chart clearly shows an average spill of 287 barrels, not 12. The minimum spill listed is 0 barrels (all records included.)



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**REBUTTAL TESTIMONY
OF HEIDI TILLQUIST**

4. Mr. Edward Miller at p. 8 and 9 of his testimony, discusses pipeline spill records from the Office of Pipeline Safety Database. Can you comment?

A. Many of the values reported by Mr. Miller are not reproducible. For example, spill volumes for hazardous liquid pipelines do not average 660 barrels as identified in Exhibit C (Table 1).

Table 1 Spill Volumes Based on the PHMSA Database

	All Hazardous Liquid Pipelines	Crude Oil Pipelines ¹
Mean (barrels)	287	164
Median (barrels)	3.0	3.0
Minimum (barrels)	0.0	0.0
Maximum (barrels)	49,000	33,000

Mean =
Average = 287
barrels

¹PHMSA Database is modified to remove non-petroleum hydrocarbons (e.g., ammonia, CO₂), highly volatile liquids (e.g., ethane, propane), offshore pipelines, and aboveground facilities not associated with Keystone (e.g., aboveground storage tanks).

The Truth About Spills Hazardous Liquid Pipelines

Ms. Tillquist's rebuttal contradicts her own direct testimony (average spill = 12 barrels) by a factor of 24 times (287 bbl versus 12 bbl)

Data from actual spills reveals that Keystone's assessment is highly aggressive.



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Data from actual spills reveals that Keystone's assessment is highly conservative. Since the PHMSA reporting criteria changed in 2002 to require reporting of spills of five barrels or more, the average size of a reported pipeline spill has been 12 barrels, equivalent to approximately 500 gallons. If a spill were to occur on the Keystone Pipeline, these recent data affirm that the spill is very likely to be small.

The Truth About Spills

Hazardous Liquid Pipelines

Mr. Chairman, land owners deserve the truth regarding pipeline oil spills. We are clearly not getting the truth from TransCanada. Neither are you.



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HP 07-001

**DIRECT TESTIMONY OF
HEIDI TILLQUIST**

20. Discuss the probable size of a spill from the Keystone pipeline.

Answer: For the Risk Assessment analysis, DNV utilized data based on a reporting criteria of 50 barrels or more. So the assessment, by design, overemphasizes the probable spill size. This is done to ensure conservatism in emergency response planning and other objectives. Data from actual spills reveals that Keystone's assessment is highly conservative. Since the PHMSA reporting criteria changed in 2002 to require reporting of spills of five barrels or more, the average size of a reported pipeline spill has been 12 barrels, equivalent to approximately 500 gallons. If a spill were to occur on the Keystone Pipeline, these recent data affirm that the spill is very likely to be small.

FALSE

The Truth About Spills Hazardous Liquid Pipelines

Thank you, Mr. Chairman.

Thank you very much for giving me
the opportunity to tell you the truth.



Public Utilities Commission of South Dakota

Keystone Pipeline Application

Edward D Miller

Intervener

Dec 2007

Version: SD PUC
F1a Nov 2007

Background

Miner County, SD Landowner

Degree in Computer Science
University of Minnesota

Former Exxon Data Analyst
Data Base Administrator



Concerns

TransCanada is not being truthful with South Dakota regarding the risks associated with this facility.

TransCanada is not being truthful with landowners regarding potential spills.



Purpose

To demonstrate that TransCanada's spill estimates are significantly lower than historical averages, and that some of TransCanada's statements regarding historical pipeline oil spills are false.



Petroleum Pipelines in the United States

are transportation systems
used to deliver products.



The Dept of Transportation

is responsible for
regulating pipelines in
the US (Title 49 CFR)



The Dept of Transportation
classifies crude oil and other
liquid petroleum products as
“Hazardous Liquids.”



The Dept of Transportation

has several subdivisions
including PHMSA and OPS,
the Office of Pipeline Safety



The Office of Pipeline Safety

regulates, monitors and
collects information regarding
petroleum pipelines in the US



The Office of Pipeline Safety

maintains databases of
“significant incidents”
involving pipelines.

(Available to the public)



The Office of Pipeline Safety

“Significant Incidents” include

Oil Spills and Releases

Explosions and Fires

Injuries and Fatalities

Major Property Damage



The Office of Pipeline Safety

Classifies energy pipelines into three separate categories:

- Gas Distribution Pipelines
- Gas Transmission Pipelines
- Hazardous Liquids Pipelines



Hazardous Liquids Pipelines

TransCanada's proposed
Keystone Pipeline is a
Hazardous Liquids Pipeline.



Hazardous Liquids Pipelines

Have significantly higher accident rates relative to other types of energy pipelines.

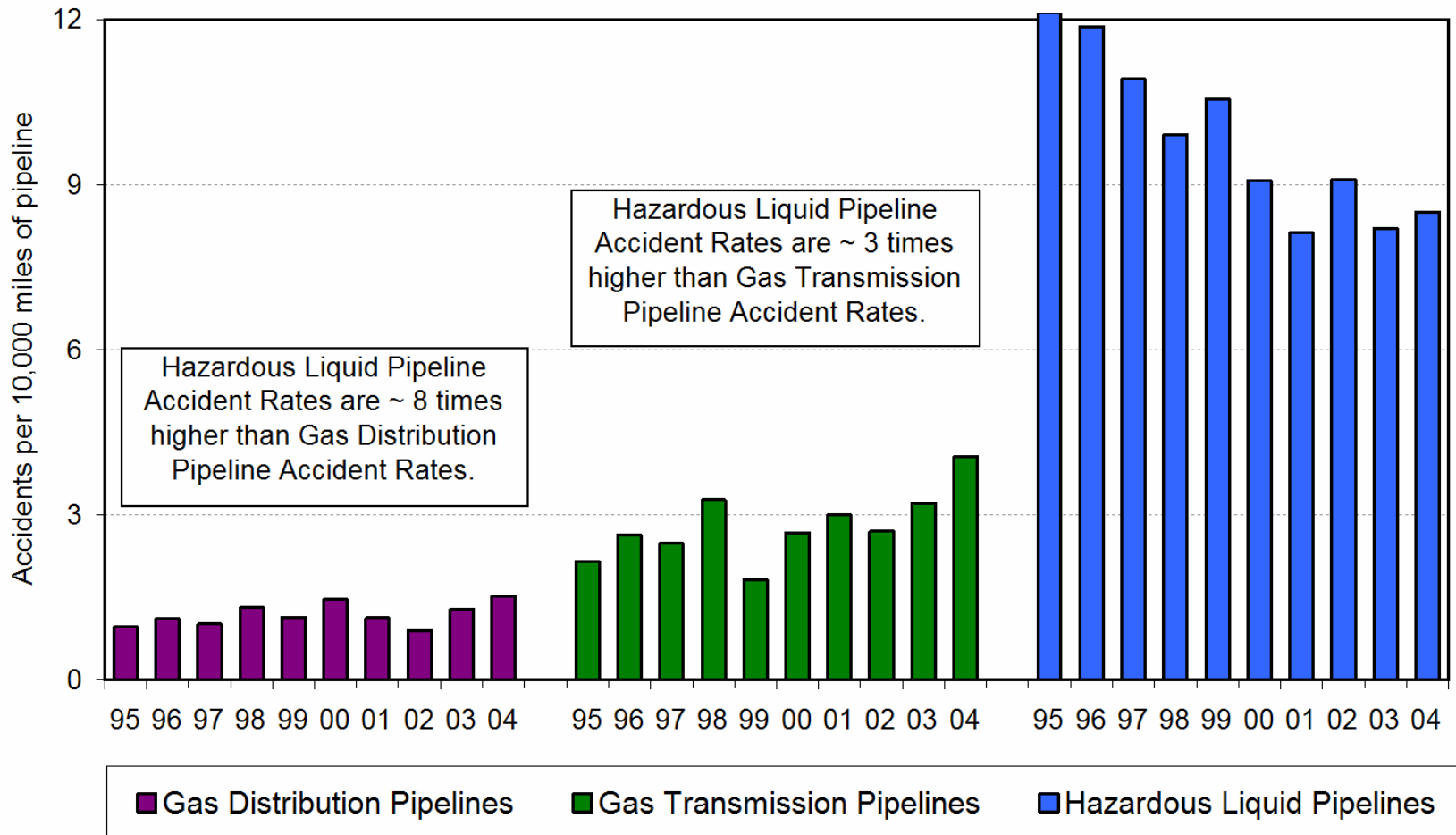


Energy Pipelines in the US

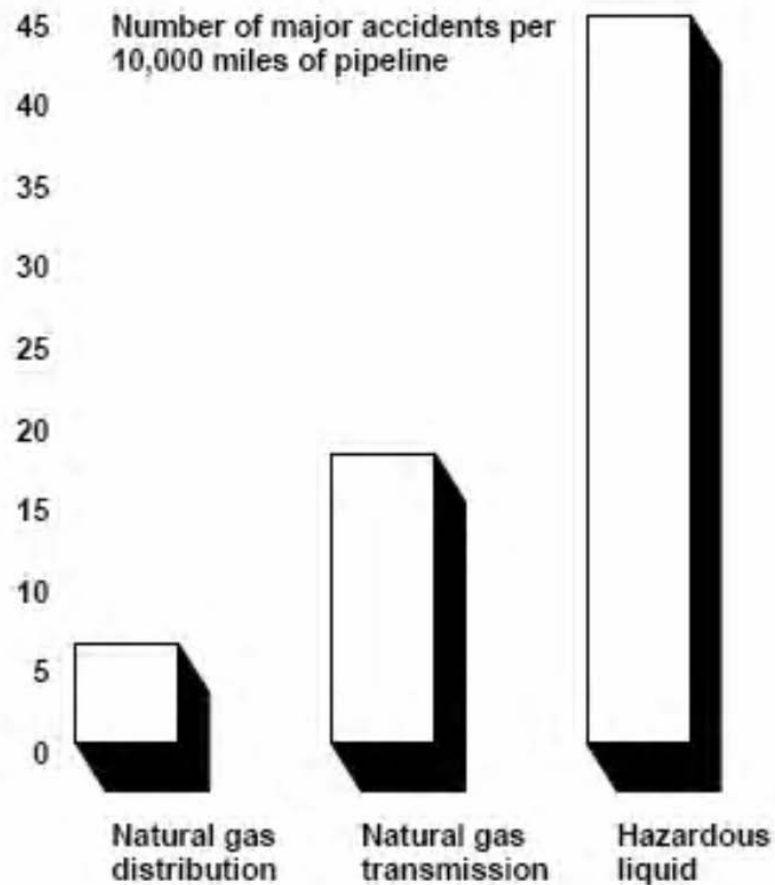
Accident Rate Comparison Chart

Accidents per 10,000 Miles of Pipeline

Source: Office of Pipeline Safety



United States General Accounting Office – Pipeline Safety Report – May 2000 (1989-1998 data)



Source: GAO's analysis of OPS' data.

GAO/RCED-00-128 Oversight of Pipeline Safety

EXHIBIT A

Hazardous Liquids Pipelines

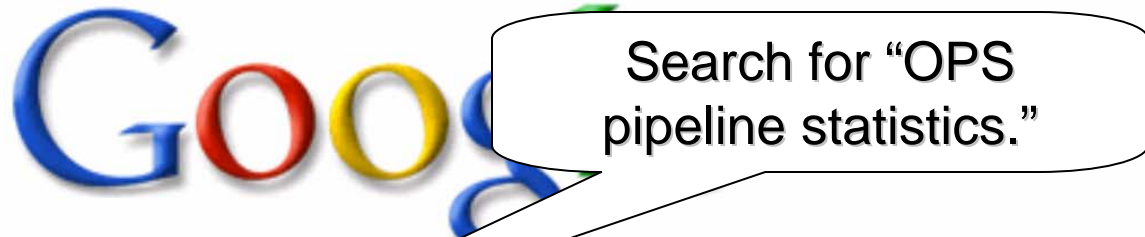
Accident summary reports
are available online from the
Office of Pipeline Safety.

Source: US DOT - Office of Pipeline Safety



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OPS Pipeline Statistics

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Pipeline Statistics:

Average and Summary Statistics:

- [Distribution & Transmission Annual Mileage Totals \(1984-2006\)](#)
- [Liquid Accident Yearly Summaries \(1986-2007\)](#)
- [Natural Gas Incident Yearly Summaries for Distribution Operators\(1986-2007\)](#)
- [Natural Gas Incident Yearly Summaries for Transmission Operators\(1986-2007\)](#)
- [Liquid Pipeline Operator Total National Mileage \(1984-2005\)](#)

Click "Liquid Accident Yearly Summaries..."

[Liquid Pipeline Operator Total National Mileage \(1984-2005\)](#) provides Incident Details and Trends at both National and State level. [Liquid Pipeline Operator Total National Mileage \(1984-2005\)](#) provides Summaries by State.

- [Pipeline Significant Incident Data Display](#)

Additional Statistical data sets:

also available from the On-Line Library

- [Distribution, Transmission, and Liquid Annual Data](#)
- [Distribution, Transmission, and Liquid Accident and Incident Data](#)

**PHMSA OFFICE OF PIPELINE SAFETY
HAZARDOUS LIQUID PIPELINE OPERATORS
ACCIDENT SUMMARY STATISTICS BY YEAR
1/1/1986 - 09/30/2007**

Year	No. of Accidents	Fatalities	Injuries	Property Damage	Gross Loss (Bbls)	Net Loss (Bbls)
1986						220,317
1987						312,794
1988						114,251
1989						121,179
1990						54,663
1991						55,774
1992						68,810
1993	229	0	10	\$28,873,651	116,802	57,559
1994	245	1	7 ⁽¹⁾	\$62,166,058	164,387	114,002
1995	188	3	11	\$32,518,689	110,237	53,113
1996	194	5	13	\$85,136,315	160,316	100,949
1997	171	0	5	\$55,186,642	195,549	103,129
1998	153	2	6	\$63,308,923	149,500	60,791
1999	167	4	20	\$86,355,560	167,230	104,487
2000	146				108,652	56,953
2001	130				98,348	77,456
2002	147				95,642	77,269
2003	131				80,112	50,523
2004	144				88,237	68,558
2005	139	2	2	\$149,713,713	137,017	45,814
2006	110	0	2	\$53,713,713	136,263	53,806
2007	83	0	2	\$26,013,713	66,327	48,442
Totals ⁽²⁾	3788	44	276⁽¹⁾	\$1,225,675,095	3,415,329	2,020,638

Historical totals may change as PHMSA receives supplemental information on incidents.

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HAZARDOUS LIQUID PIPELINE OPERATORS
ACCIDENT SUMMARY STATISTICS BY YEAR
1/1/1986 - 09/30/2007**

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1987	237	3	20	\$13,140,434	395,854	312,794
1988	198	2	19	\$32,414,912	198,397	114,251
1989	160	3	38	\$8,813,604	201,758	121,179
1990	180	0	7	\$15,720,422	124,277	54,663
1991	210	0	0	\$14,844,844	200,567	55,774
1992	210	0	0	\$13,140,434	137,065	68,810
1993	210	0	0	\$11,680,200	116,802	57,559
1994	210	0	0	\$164,387,000	164,387	114,002
1995	180	0	0	\$110,237,000	110,237	53,113
1996	194	5	13	\$85,136,315	160,316	100,949
1997	171	0	5	\$55,196,642	195,549	103,129
1998	147	0	0	\$149,500,000	149,500	60,791
1999	167	0	0	\$167,230,000	167,230	104,487
2000	108	0	0	\$108,652,000	108,652	56,953
2001	98	0	0	\$98,348,000	98,348	77,456
2002	147	0	0	\$47,410,656	95,642	77,269
2003	131	0	5	\$49,981,280	80,112	50,523
2004	116	5	16	\$146,314,940	88,237	68,558
2005	139	2	2	\$149,690,733	137,017	45,814
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Totals ⁽²⁾	3788	44	276⁽¹⁾	\$1,225,675,095	3,415,329	2,020,638

Yearly Summaries
starting with 1986

through Sep 2007
(updated monthly)

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1988	193	0	10	\$32,414,912	198,397	114,251
1989	163	0	10	8,813,604	201,758	121,179
1990	180	0	10	5,720,422	124,277	54,663
1991	216	0	10	7,788,944	200,567	55,774
1992	212	0	10	9,146,062	137,065	68,810
1993	229	0	10	\$28,873,651	116,802	57,559
1994	245	1	7 ⁽¹⁾	\$62,166,058	164,387	114,002
1995	188	3	11	\$32,518,689	110,237	53,113
1996	194	5	13	\$85,136,315	160,316	100,949
1997	171	0	5	\$55,186,642	195,549	103,129
1998	153	2	6	\$63,308,923	149,500	60,791
1999	167	0	10	6,355,560	167,230	104,487
2000	146	0	10	0,555,745	108,652	56,953
2001	130	0	10	5,346,751	98,348	77,456
2002	147	0	10	7,410,656	95,642	77,269
2003	131	0	10	49,981,280	80,112	50,523
2004	144	0	16	\$146,314,940	88,237	68,558
2005	139	2	2	\$149,690,733	137,017	45,814
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1989	163	3	38	\$11,758	101,758	121,179
1990	180	3	7	\$4,277	4,277	54,663
1991	216	0	9	\$0,567	0,567	55,774
1992	212	5	38	\$7,065	7,065	68,810
1993	229	0	10	\$16,802	16,802	57,559
1994	245	1	7 ⁽¹⁾	\$62,166,058	164,387	114,002
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1998	153	2	6	\$49,500	49,500	60,791
1999	167	4	20	\$230	230	104,487
2000	146	1	4	\$652	652	56,953
2001	130	0	10	\$348	348	77,456
2002	147	1	0	\$642	642	77,269
2003	131	0	5	\$1,280	80,112	50,523
2004	144	5	16	\$314,940	88,237	68,558
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Totals ⁽²⁾	3788	44	276⁽¹⁾	\$1,225,675,095	3,415,329	2,020,638

**Fatalities &
Injuries**

44; 276

Historical totals may change as PHMSA receives supplemental information on incidents.

**PHMSA OFFICE OF PIPELINE SAFETY
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1998	153	2	6	\$63,308,923	149,500	60,791
1999	167	4	20	\$86,355,560	167,230	104,487
2000	146	1	4	\$150,555,745	108,652	56,953
2001				\$25,346,751	98,348	77,456
2002				\$47,410,656	95,642	77,269
2003				\$49,981,280	80,112	50,523
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Totals ⁽²⁾	3788	44	276⁽¹⁾	\$1,225,675,095	3,415,329	2,020,638

**Property
Damage**

**\$1.2+ Billion
Dollars**

Historical totals may change as PHMSA receives supplemental information on incidents.

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1990	180				124,277	54,663
1991	216				200,567	55,774
1992	212	5	38	\$39,146,062	137,065	68,810
1993	220	0	10	\$28,973,651	116,900	57,550
<div style="border: 1px solid black; padding: 10px; margin: 10px auto; width: 80%;"> <p>The reporting threshold for this report is 50+ bbl.</p> </div>						
1999	167	4	20	\$86,355,560	167,230	104,487
2000	146				108,652	56,953
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2002	147				95,642	77,269
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Amount of Oil Spilled (Gross Loss)

Pipelines have spilled more than 13 times as much oil as the Exxon Valdez spilled in Alaska in 1989. (143 million gallons versus 10.6 million gallons)

2000	146				108,652	56,953
2001	130				98,348	77,456
2002	147				95,642	77,269
2003	131				80,112	50,523
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**3.4 million barrels;
143 million gallons**

Historical totals may change as PHMSA receives supplemental information on incidents.

Worst environmental disaster in US history.



**PHMSA OFFICE OF PIPELINE SAFETY
HAZARDOUS LIQUID PIPELINE OPERATORS
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1987	237	3	20	\$13,140,434	312,794	312,794
1988	193	2	11	114,251		114,251
1989	163	3	12	121,179		121,179
1990	180	3	10	54,663		54,663
1991	216	0	10	55,774		55,774
1992	212	5	10	68,810		68,810
1993	220	0	10	57,550		57,550
<div data-bbox="850 335 1449 621" style="border: 1px solid black; border-radius: 50%; padding: 10px; display: inline-block;"> <p align="center">Amount of Oil "Lost" (never recovered)</p> </div>						
<div data-bbox="357 635 1574 821" style="border: 1px solid black; padding: 10px;"> <p align="center">The reporting threshold for this report is 50+ bbl.</p> </div>						
1999	167	4	20	104,487		104,487
2000	146	1	10	56,953		56,953
2001	130	0	10	77,456		77,456
2002	147	1	10	77,269		77,269
2003	131	0	10	50,523		50,523
2004	144	5	10	68,558		68,558
2005	139	2	10	45,814		45,814
2006	110	0	2	\$53,713,137	63	53,806
2007	83	0	2	\$26,013,791	66,800	48,442
Totals ⁽²⁾	3788	44	276⁽¹⁾	\$1,225,675,095	3,415,329	2,020,638

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1994	245	1	7 ⁽¹⁾	\$62,166,058	164,387	114,002

The reporting threshold for this report is 50+ bbl.

Total Number of Accidents: 3,788
Total Amount Spilled: 3,415,329 bbl
Average spill per accident: 900+ bbl

Totals ⁽²⁾	3788	44	276 ⁽¹⁾	\$1,225,675,095	3,415,329	2,020,638
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Historical totals may change as PHMSA receives supplemental information on incidents.

A Case Study


Trans Alaska Pipeline October 2001 Oil Spill

Source: US DOT – OPS; Alaska DEC

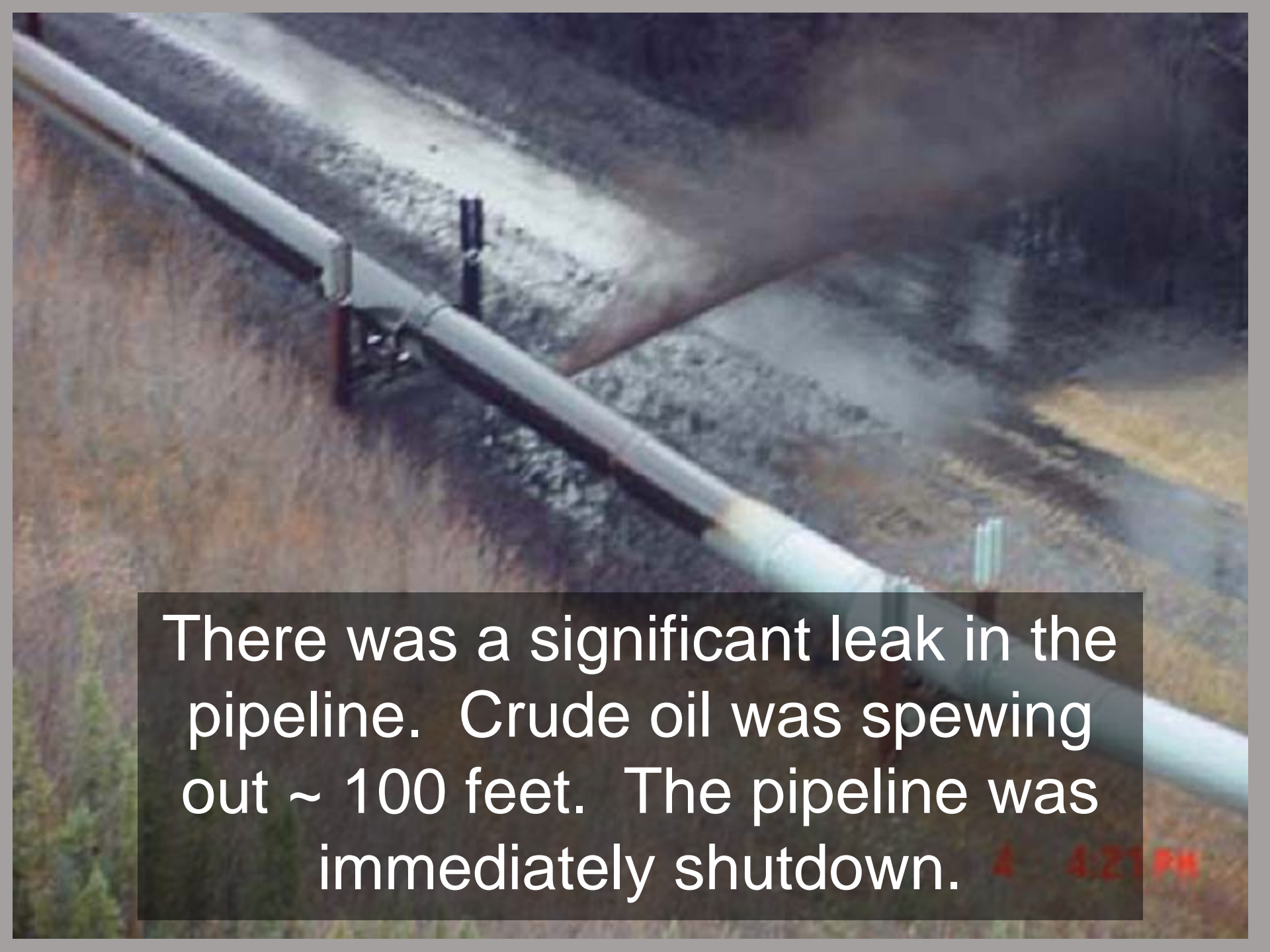




The Trans Alaska Pipeline
was built in the 1970s.
It is the one of the most closely
monitored pipelines in the world.

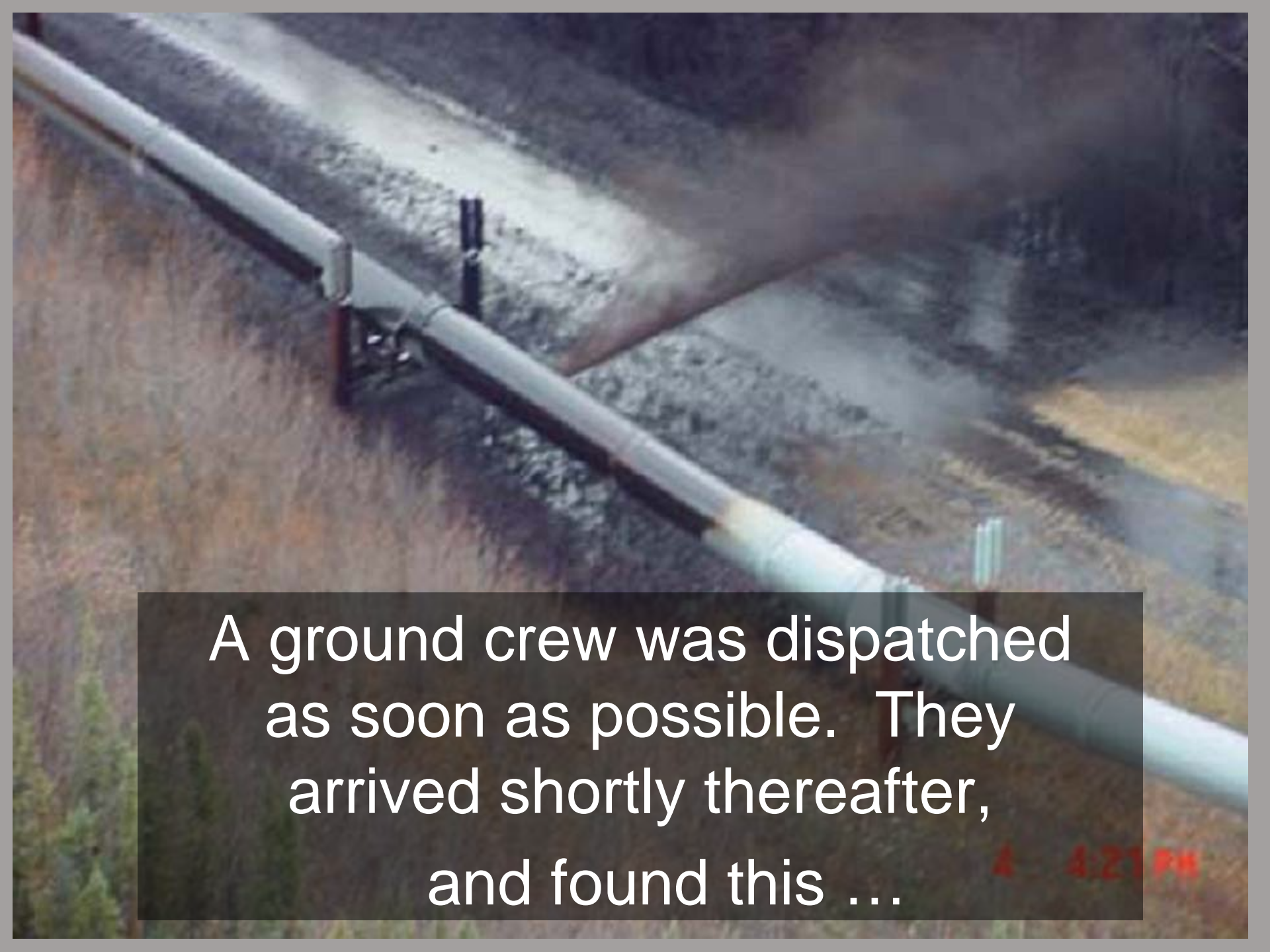
A landscape photograph showing a long pipeline stretching across a green valley. The pipeline is supported by wooden posts and runs from the foreground into the distance. In the background, there are rugged, rocky mountains under a blue sky with scattered white clouds. A semi-transparent dark rectangle is overlaid on the middle of the image, containing white text.

On October 4, 2001, a
surveillance aircraft on patrol
came across the following
scene ...

A photograph showing a pipeline leak. A large, dark, viscous plume of crude oil is being emitted from a joint in the pipeline, spreading across a gravel-covered area. The pipeline is supported by metal brackets. The background shows a dirt road and some vegetation.

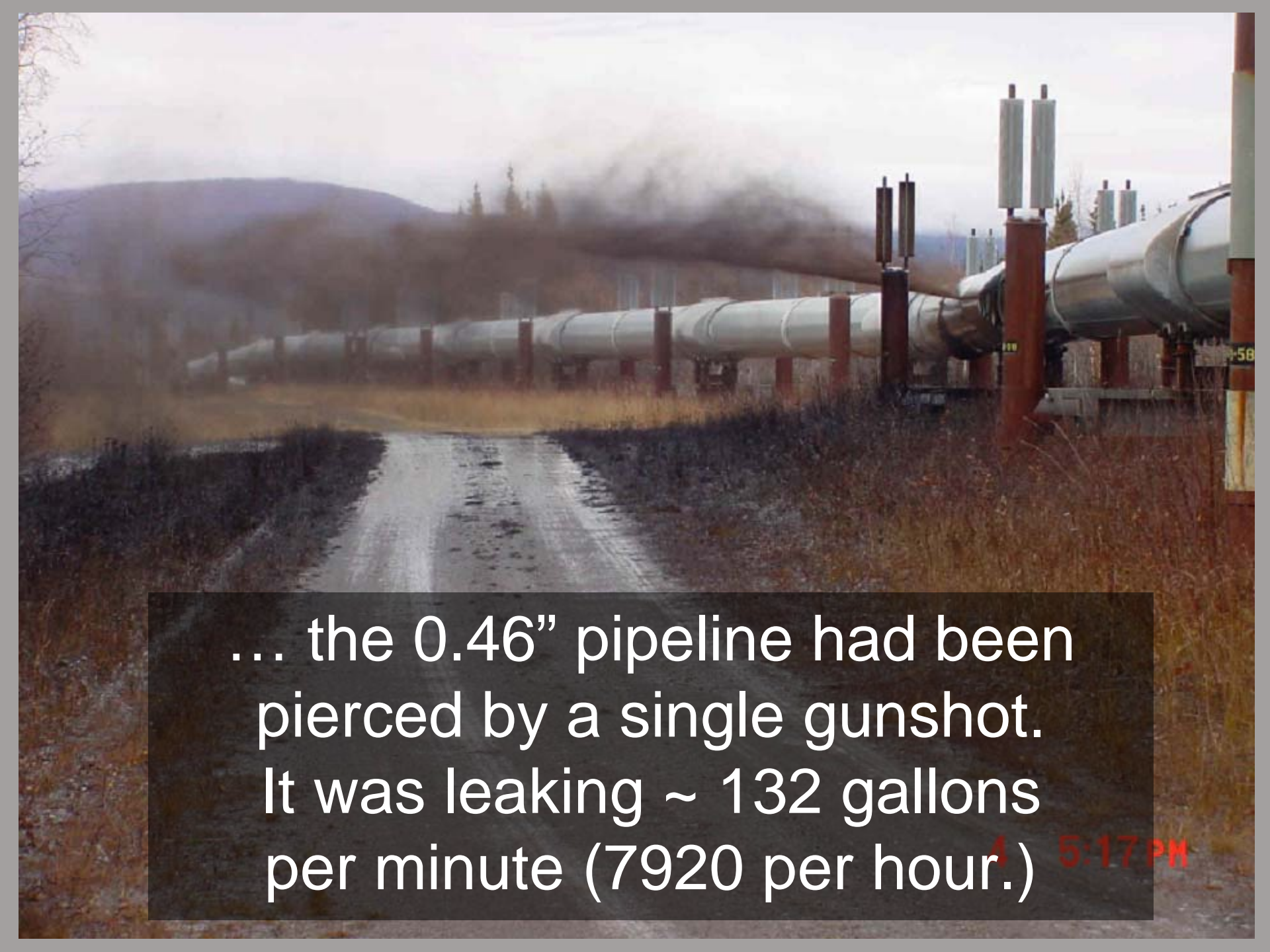
There was a significant leak in the pipeline. Crude oil was spewing out ~ 100 feet. The pipeline was immediately shutdown.

4:42 PM



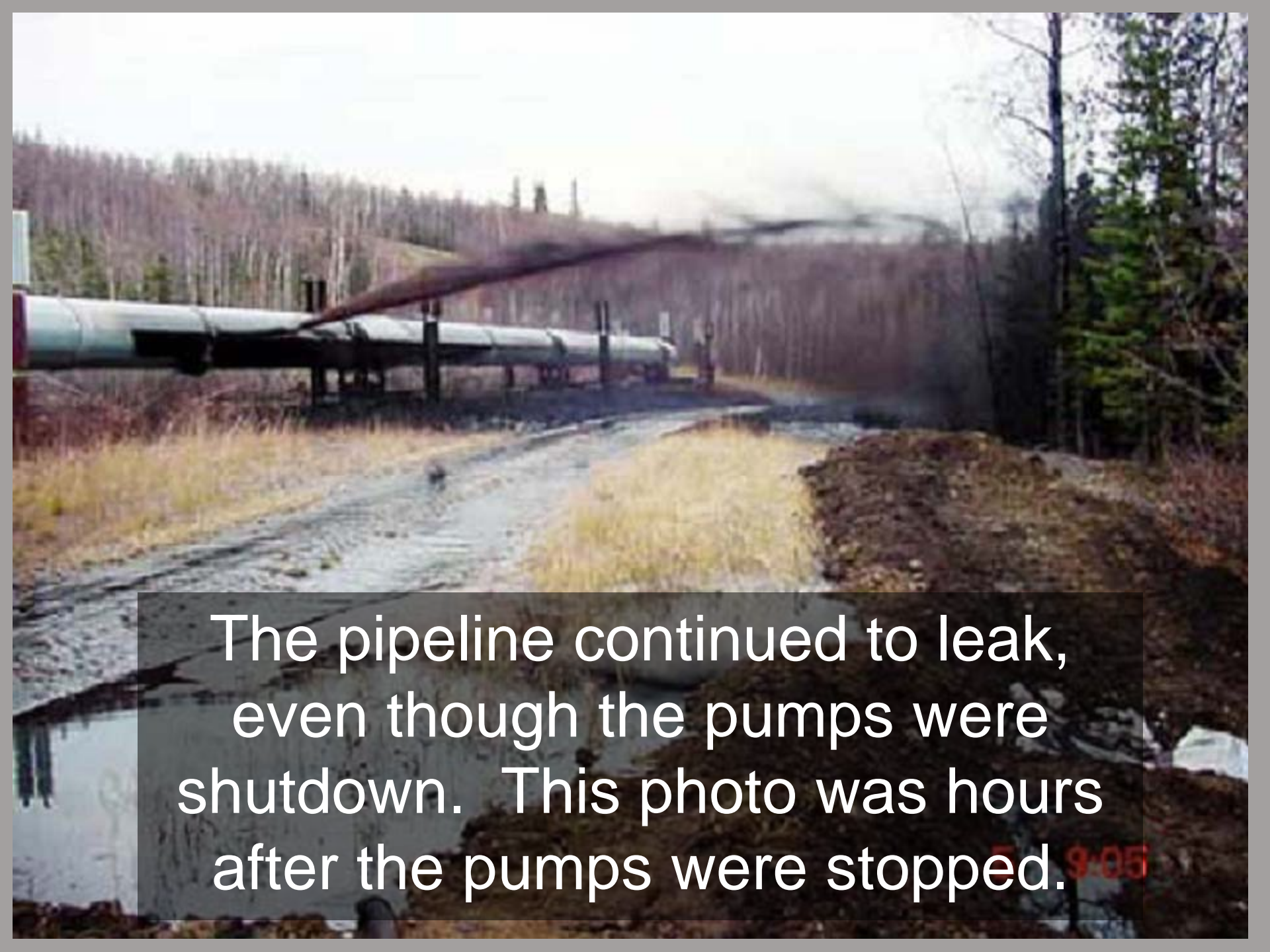
A ground crew was dispatched as soon as possible. They arrived shortly thereafter, and found this ...

4:21 PM



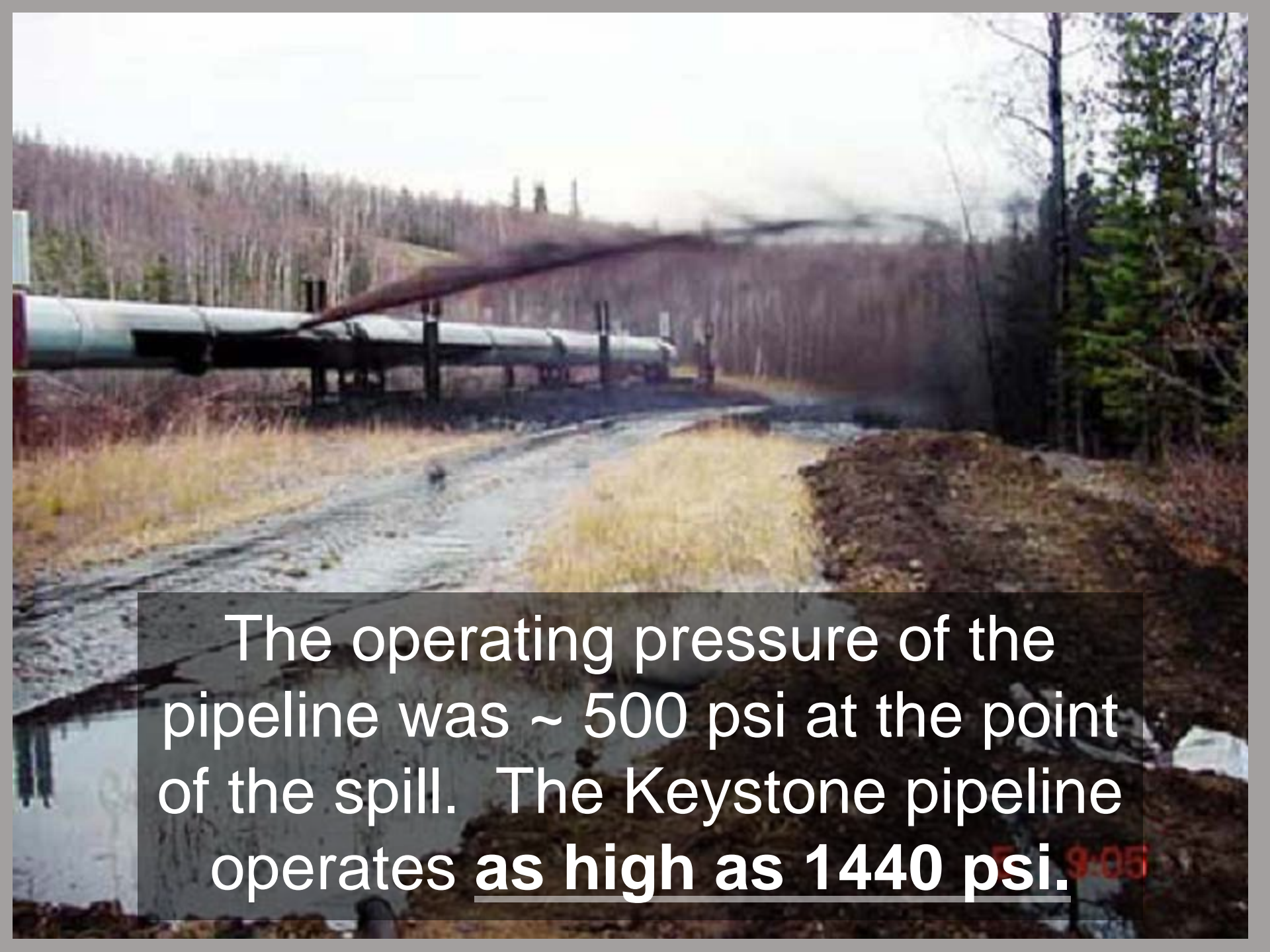
... the 0.46" pipeline had been pierced by a single gunshot. It was leaking ~ 132 gallons per minute (7920 per hour.)

5:17 PM



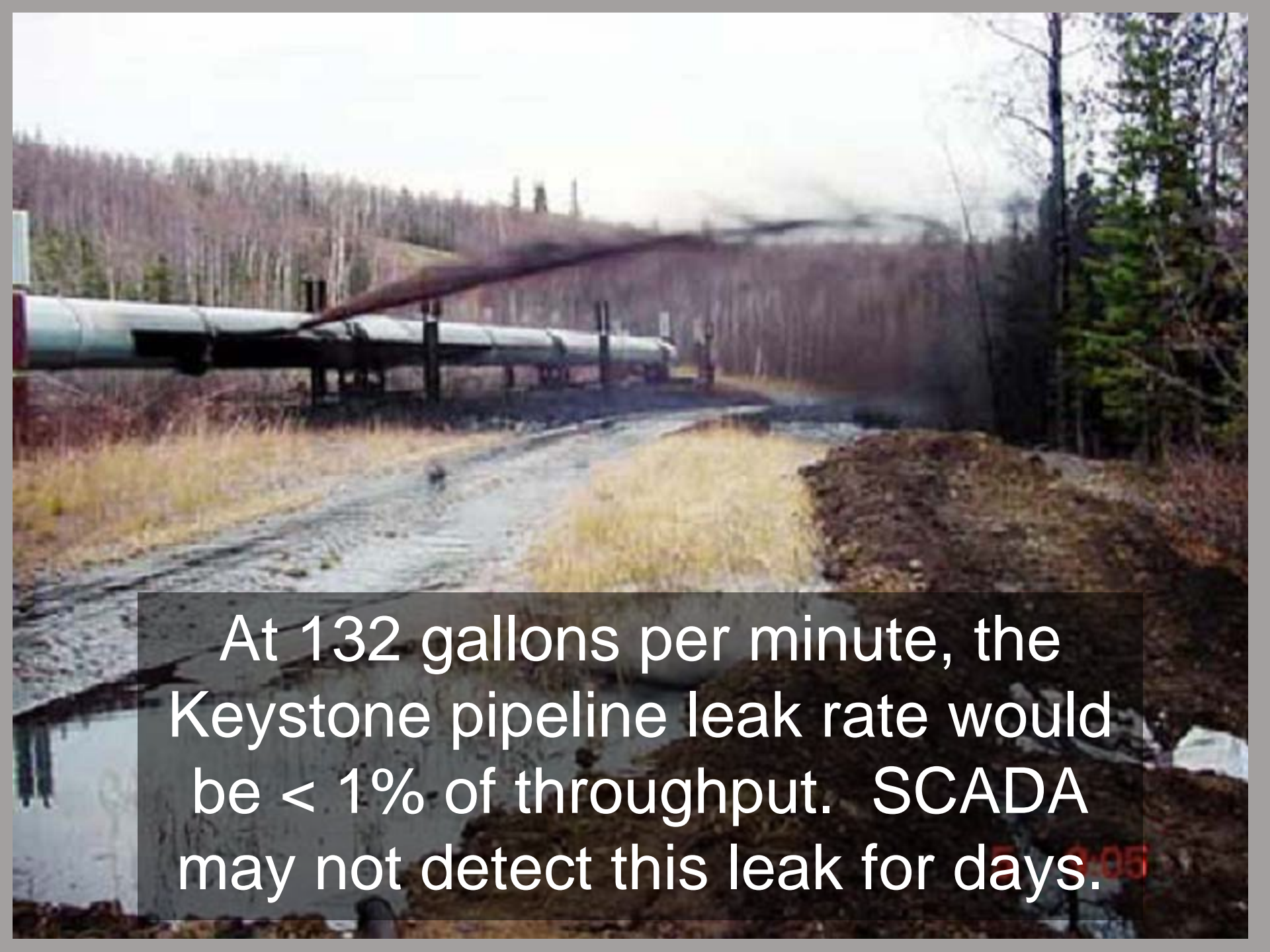
The pipeline continued to leak, even though the pumps were shutdown. This photo was hours after the pumps were stopped.

5 9:05




The operating pressure of the pipeline was ~ 500 psi at the point of the spill. The Keystone pipeline operates as high as 1440 psi.

9:05




At 132 gallons per minute, the Keystone pipeline leak rate would be $< 1\%$ of throughput. SCADA may not detect this leak for days.

5:05


An aerial photograph showing a recovery site in a forest. A large black tarp covers a structure, and various pieces of equipment, including a white van and a red vehicle, are visible on a dirt path. The surrounding area is dense green forest.

The spray zone is significant.
Recovery crews have favorable
access, weather, etc. (no snow,
mud, inclement weather.)

5 11:02




After ~ 36 hours, crews were finally able to clamp the pipeline and stop the leak. Over 285,000 gallons of oil had spilled.

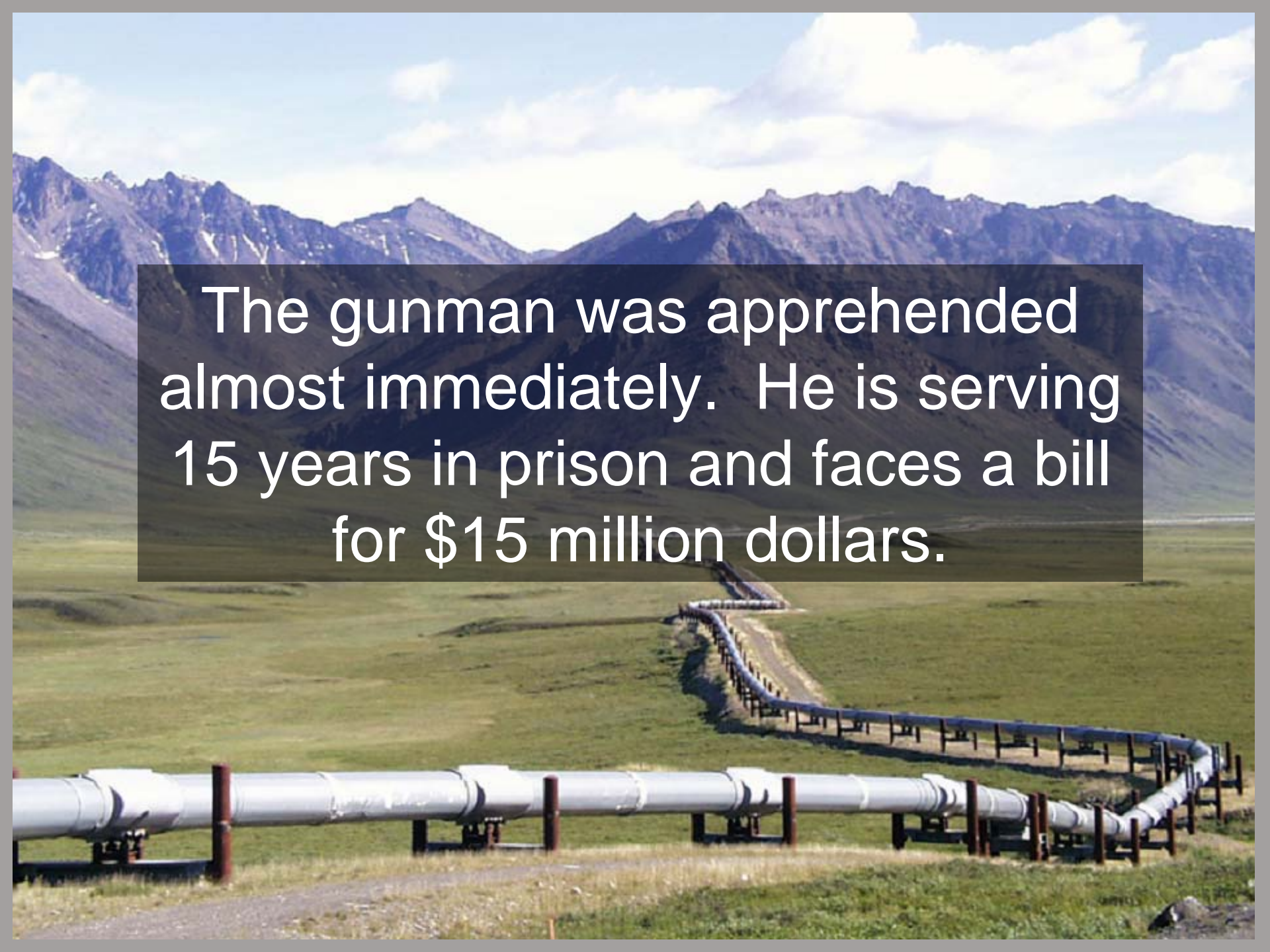


Keystone assumes they will be able to locate, excavate and clamp all small leaks within 4 hours - anywhere on the entire pipeline.

2081



Eventually, ~ 164,000 gallons of spilled crude oil were recovered; approximately 121,000 gallons were lost into the environment.



The gunman was apprehended almost immediately. He is serving 15 years in prison and faces a bill for \$15 million dollars.

Pipeline Safety Improvement Act

- 1) Implemented by Congress in 2002
- 2) Safety & Inspection Requirements
- 3) Integrity Management Programs
- 4) Tighter Spill Reporting Thresholds
(from 50 bbl to 5 bbl or 5 gal)
- 5) More Detailed Reports (RSPA 7001)



**PHMSA OFFICE OF PIPELINE SAFETY
HAZARDOUS LIQUID PIPELINE OPERATORS
ACCIDENT SUMMARY STATISTICS BY YEAR
1/1/1986 - 09/30/2007**

Year	No. of Accidents	Fatalities	Injuries	Property Damage	Gross Loss (Bbls)	Net Loss (Bbls)
1986	210	4	32	\$16,077,846	282,791	220,317
1987	237	3	20	\$13,140,434	395,854	312,794
1988						14,251
1989						21,179
1990						54,663
1991						55,774
1992						68,810
1993						57,559
1994						14,002
1995						53,113
1996	194	5	13	\$85,136,315	160,316	100,949
1997	171	0	5	\$55,186,642	195,549	103,129
1998	153	2	6	\$63,308,923	149,500	60,791
1999	167	4	20	\$86,355,560	167,230	104,487
2000	146	1	4	\$150,555,745	108,652	56,953
2001	130	0	10	\$25,346,751	98,348	77,456
2002	147	1	0	\$47,410,656	95,642	77,269
2003	131	0	5	\$49,981,280	80,112	50,523
2004	144	5	16	\$146,314,940	88,237	68,558
2005	139	2	2	\$149,690,733	137,017	45,814
2006	110	0	2	\$53,713,137	136,263	53,806
2007	83	0	2	\$26,013,791	66,327	48,442
Totals ⁽²⁾	3788	44	276⁽¹⁾	\$1,225,675,095	3,415,329	2,020,638

The Pipeline Safety Improvement Act
was implemented in 2002.

Historical totals may change as PHMSA receives supplemental information on incidents.

**PHMSA OFFICE OF PIPELINE SAFETY
HAZARDOUS LIQUID PIPELINE OPERATORS
ACCIDENT SUMMARY STATISTICS BY YEAR
1/1/1986 - 09/30/2007**

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1987	237	3	20	\$13,140,434	395,854	312,794
1988	193	2	19	\$32,414,912	198,397	114,251
1989	163	3	38	\$8,813,604	201,758	121,179
1990	180	3	7	\$15,720,422	124,277	54,663
1991	216	0	9	\$37,788,944	200,567	55,774
1992	212	5	38	\$39,146,062	137,065	68,810

The reporting threshold for this report is 50+ bbl.

1998	153	2	6	\$63,308,923	149,500	60,791
1999	167	4	20	\$86,355,560	167,230	104,487
2000	146	1	4	\$150,555,745	108,652	56,953
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2006	110	0	2	\$53,713,137	136,263	53,806
2007	83	0	2	\$26,013,791	66,327	48,442

Totals: 754 accidents **603,598 bbl**
The average spill for years 2002-2007 = 800 bbl.

Hazardous Liquids Pipelines

A closer look at pipeline
oil spills in the US since the
Pipeline Safety Improvement Act

Source: US DOT - Office of Pipeline Safety



Hazardous Liquids Pipelines

The following reports are based on the new (2002+) reporting standards. Specifically, only spills reported as 5 barrels or more are included. All other records are excluded (gallons)



**PHMSA Office of Pipeline Safety
Hazardous Liquid Pipeline Operators
Accident Summary Statistics by Year
Hazardous Liquid Spills - 5 barrels or more**

Year	Number of Accidents	Water involved	HCAs involved	Property Damage	Gross Loss barrels	Net Loss barrels	Ave Spill barrels	Ave Spill gallons
2002	182	35	48	\$ 42,913,873	92,461	73,654	508	21,337
2003	184	35	54	\$ 48,857,018	81,011	50,793	440	18,492
2004	166	35	48	\$ 99,886,974	88,498	68,818	533	22,391
2005	159	26	55	\$ 130,550,384	137,785	46,106	867	36,396
2006	131	18	46	\$ 35,927,161	137,204	54,119	1,047	43,989
2007	93	19	36	\$ 24,378,875	66,659	48,414	717	30,104
Totals	915	168 18%	287 31%	\$382,514,285 \$418,048	603,618	341,904	660	27,707

"Historical totals may change as PHMSA receives supplemental information on incidents."

**PHMSA Office of Pipeline Safety
Hazardous Liquid Pipeline Operators
Accident Summary Statistics by Year
Crude Oil Spills - 5 barrels or more**

Year	Number of Accidents	Water involved	HCAs involved	Property Damage	Gross Loss barrels	Net Loss barrels	Ave Spill barrels	Ave Spill gallons
2002	78	13	10	\$ 26,738,641	20,238	8,844	259	10,897
2003	86	11	10	\$ 18,529,314	28,850	14,106	335	14,090
2004	82	19	11	\$ 61,660,836	31,279	19,755	381	16,021
2005	85	11	18	\$ 86,013,150	102,901	19,253	1,211	50,845
2006	73	8	17	\$ 14,775,328	84,294	5,929	1,155	48,498
2007	42	9	13	\$ 9,299,370	12,201	1,455	291	12,201
Totals	446	71 16%	79 18%	\$217,016,639 \$486,584	279,763	69,342	627	26,345

Database Generated on 10/19/2007

"Historical totals may change as PHMSA receives supplemental information on incidents."

Regional Summary

Actual Crude Oil Pipeline Spills

- 1) Surface Water Contamination
- 2) Ground Water Contamination
- 3) High Consequence Areas Affected
- 4) Multi-Million Gallon Spills
- 5) Multi-Million Dollar Cleanups



US DOT - Office of Pipeline Safety - Regional Oil Spills

Note: This is a partial list of significant regional pipeline oil spills; it is not a complete list.

Date	OPS Report ID	Operator	Location	State	Spill (gal)	Damages (\$) or Comment
1/1/2007	20070029	Enbridge	Atwood	WI	63,000	\$702,500
9/27/2005	20050310	Enbridge	not listed	ND	14,700	\$350,000
10/21/2005	20050336	Enbridge	El Dorado	KS	98,700	\$24,976
4/14/2003	20030187	Enbridge	Trail	MN	5,250	\$1,000,000

Regional Crude Oil Pipeline Spills (surface water contamination)

6/27/2006	20060218	Koch	Little Falls	MN	134,400	\$4,158,716
6/8/2004	20040241	Tesoro	Center	ND	16,800	\$805,000
5/13/2004	20040139	Enbridge	Superior	WI	1,680	\$81,764
1/24/2003	20030083	Enbridge	Superior	WI	189,000	\$2,853,000
7/4/2002	20020238	Enbridge	Cohasset	MN	252,000	\$5,597,300

Regional Crude Oil Pipeline Spills (ground water contamination)

2/5/2007	20070050	Enbridge	Clearbrook	MN	294	\$49,341
2/2/2007	20070048	Enbridge	Exeland	WI	126,000	\$1,633,660
10/20/2006	20060320	Enbridge	Pinewood	MN	210	\$50,000
2/9/2004	20040063	Enbridge	Grand Rapids	MN	42,126	\$1,089,790
July 2002	no OPS report	Enbridge	Cass Lake	MN	48,000+	?

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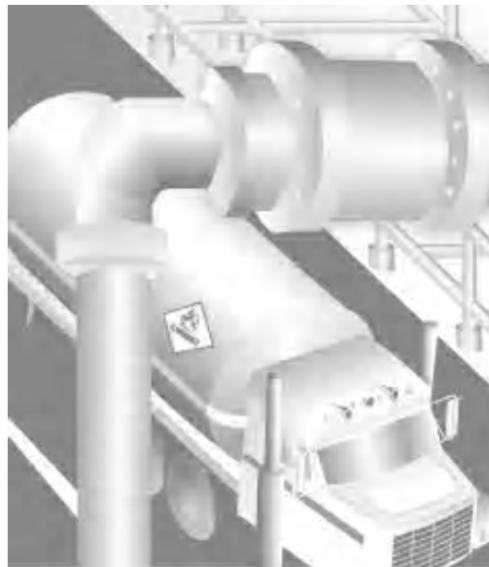
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July 2002	no OPS report	Enbridge	Cass Lake	MN	48,000+	?

Rupture of Enbridge Pipeline and Release of Crude Oil
near Cohasset, Minnesota
July 4, 2002



Pipeline Accident Report
NTSB/PAR-04/01

PB2004-916501
Notation 7514A



**National
Transportation
Safety Board**
Washington, D.C.



US DOT - Office of Pipeline Safety - Regional Oil Spills

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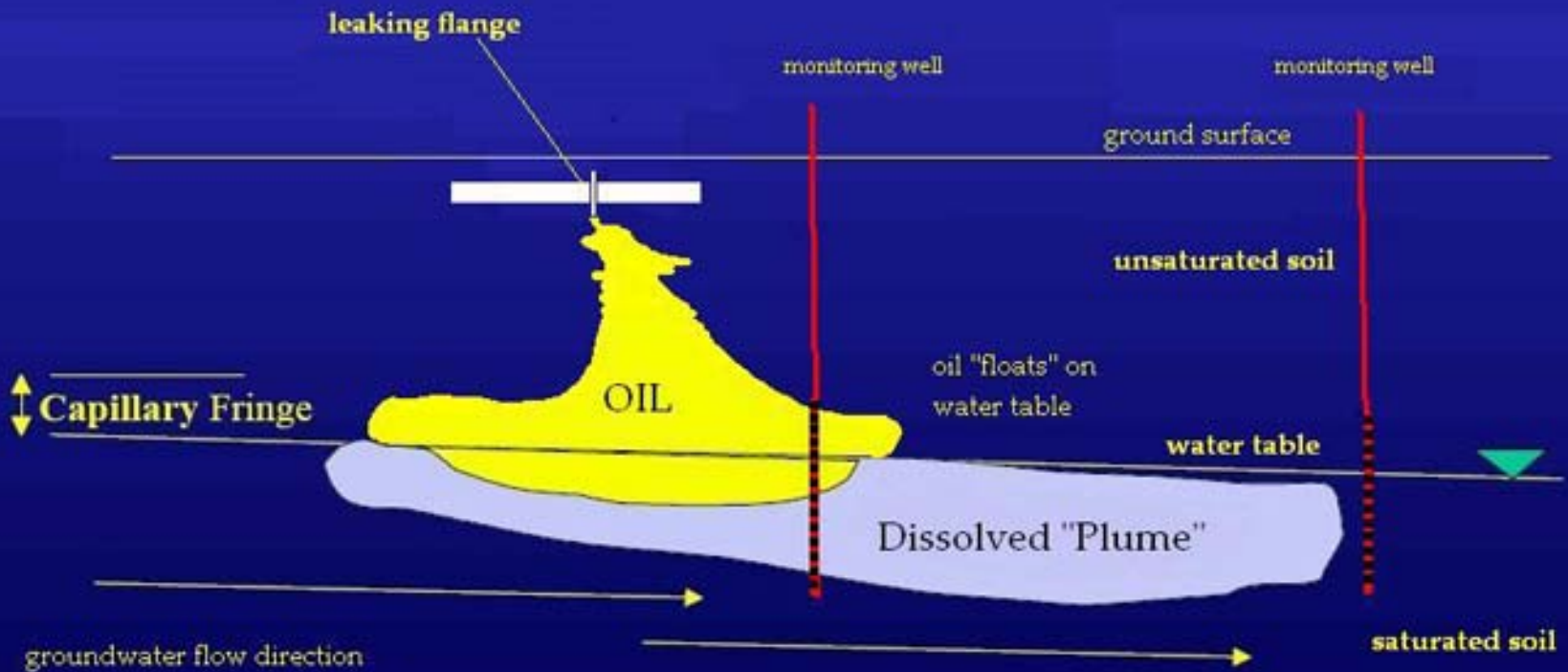
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July 2002	no OPS report	Enbridge	Cass Lake	MN	48,000+	?

Anatomy of South Cass Lake Leak Site



Regional Crude Oil Pipeline Spills (HCAs affected)

1/25/2007	20070043	Enbridge	Stanley	ND	9,030	HCA
5/3/2006	20060154	Koch	Cottage Grove	MN	1,260	HCA
12/14/2005	20050374	Enbridge	Stanley	ND	504	HCA
11/2/2005	20050320	Enbridge	Stanley	ND	252	HCA
5/13/2004	20040139	Enbridge	Superior	WI	1,680	HCA
12/2/2003	20030464	Enbridge	Clearbrook	MN	1,974	HCA
1/24/2003	20030083	Enbridge	Superior	WI	189,000	HCA

Regional Crude Oil Pipeline Spills - 50,000+ gal - (pre-2002 OPS format)

7/27/2000	20000095	Lakehead *	Douglas Co	WI	50,400	\$200,000
9/16/1998	19980147	Lakehead *	not listed	MN	239,400	\$100,000
7/2/1997	19970102	Marathon	Garden Co	NE	295,092	\$420,000
12/26/1996	19970010	Marathon	Nucholls Co	NE	205,800	\$1,300,000
8/24/1996	19960142	Lakehead *	Donaldson Co	MN	210,000	\$500,000
5/1/1993	19930093	Amoco	Patoka	IL	210,672	\$300,000
3/3/1991	19910057	Lakehead *	Itasca Co	MN	1,701,000	\$14,400,000
7/13/1989	19890091	Lakehead *	Pembina Co	ND	1,314,600	\$1,500,000
6/16/1988	19880120	Lakehead *	Macomb Co	MI	369,600	\$3,200,000
4/9/1988	19880115	Amoco	Peoria Co	IL	210,000	\$1,500,000
5/27/1987	19870136	Lakehead *	Columbia Co	WI	132,300	\$345,000
4/24/1986	19860087	Lakehead *	Elgin	IL	525,000	\$815,000
11/7/1985	19850155	Minn Pipeline	Anoka Co	MN	251,160	?

* Note: Lakehead = Enbridge

South Dakota Hazardous Liquid Pipeline Spills

What should we expect?

What should we believe?

1) Frequency of Spills?

2) Volume of Spills?



Spill Frequency Rate (SFR)

Defined

= the number of oil spills per year for a given length of pipe.



Spill Frequency Rate (SFR)

Keystone Pipeline

= the number of oil spills per year per 1845 miles of pipe/ROW.



Pipeline Oil Spill Information

Hazardous Liquid Pipelines (Only)

North America (Only)

- 1) An Independent Study
- 2) An Industry Leader
- 3) The Industry Average.



California State Fire Marshal

**Hazardous Liquid Pipeline
Risk Assessment**



Pete Wilson
Governor

Sandra R. Smoley
Secretary, State and Consumer
Service Agency

Ronny J. Coleman
State Fire Marshal



8.0 Conclusions

Based on the results presented for the period from January 1, 1981 through December 31, 1990, the following conclusions have been drawn regarding California's regulated hazardous liquid pipelines. These conclusions have been organized into two subsections. The first includes items which we consider to be major findings, as well as the issues specifically required to be addressed in the study by state statute. The second subsection includes what we consider to be less significant findings.

8.1 Significant Findings

a. Overall Incident Rates

The various criteria used to report hazardous liquid pipeline incidents had a direct effect on the resulting incident rates. The data collected regarding California's incidents was the only completely audited sample available. It resulted in incident rates somewhat higher than those presented in other studies. Using all of the available data, we have estimated the overall incident rates for various pipeline events as follows:

Event	Incident Rate
any size leak	7.1 incidents per 1,000 mile years
damage greater than \$5,000	1.3 to 6.2 incidents per 1,000 mile years

Spill Frequency Rate (SFR)

California State Fire Marshall

The SFR is equivalent to 13 leaks
per year per 1845 miles of pipe.



Industry Leader - Enbridge

Actual Ten Year Results (1996 – 2005)

Spills Reported to Regulatory Jurisdictions

Total Reported Oil Spills: 499

Gallons Spilled: 5,931,828

Average Oil Spill: 11,887 gallons

Source: Enbridge, Inc - See EXHIBIT F



US Industry Average

Actual Four Year Results (2002 – 2005)

After the Pipeline Safety Improvement Act

Reporting Threshold Used = 5 gallons

Total Reported Oil Spills: 1550

Gallons Spilled: 17,045,746

Average Oil Spill: 10,997 gallons

Source: USDOT-OPS - See EXHIBIT G



TransCanada Keystone Spill Frequency Rate

Projection = 1 spill every 7 years
for the entire 1845 mile pipeline
(50 barrels or more).

Source: Frequency Volume Analysis



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28 March 2007

Keystone Pipeline Frequency and Volume Analysis Report 70020509 (rev 3)
TransCanada Keystone Pipeline L.P.

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6.0 Summary and Conclusions

6.1 Calculated Likelihood of Leaks

The risk analysis of the Keystone Pipeline focused on the likelihood of leaks over the entire pipeline during its lifetime. The base frequencies discussed in Section 4.0 were adapted to each segment via application of modification factors. The resulting leak frequencies were summed to provide an average annual leak frequency for the pipeline lifetime.

For the four cases studied, only one case incorporated both the Keystone Mainline and the Cushing Extension, the 591,000 bpd Diluted Bitumen Case. For this case, the likelihood of a leak greater than 50 barrels anywhere along the pipeline is predicted to be about 0.15 per year, or once every 7 years. In the three other cases, where only the Keystone Mainline is included, the likelihood of a leak greater than 50 bbl anywhere along the pipeline is predicted to be about 0.09 per year, or once every 11 years.

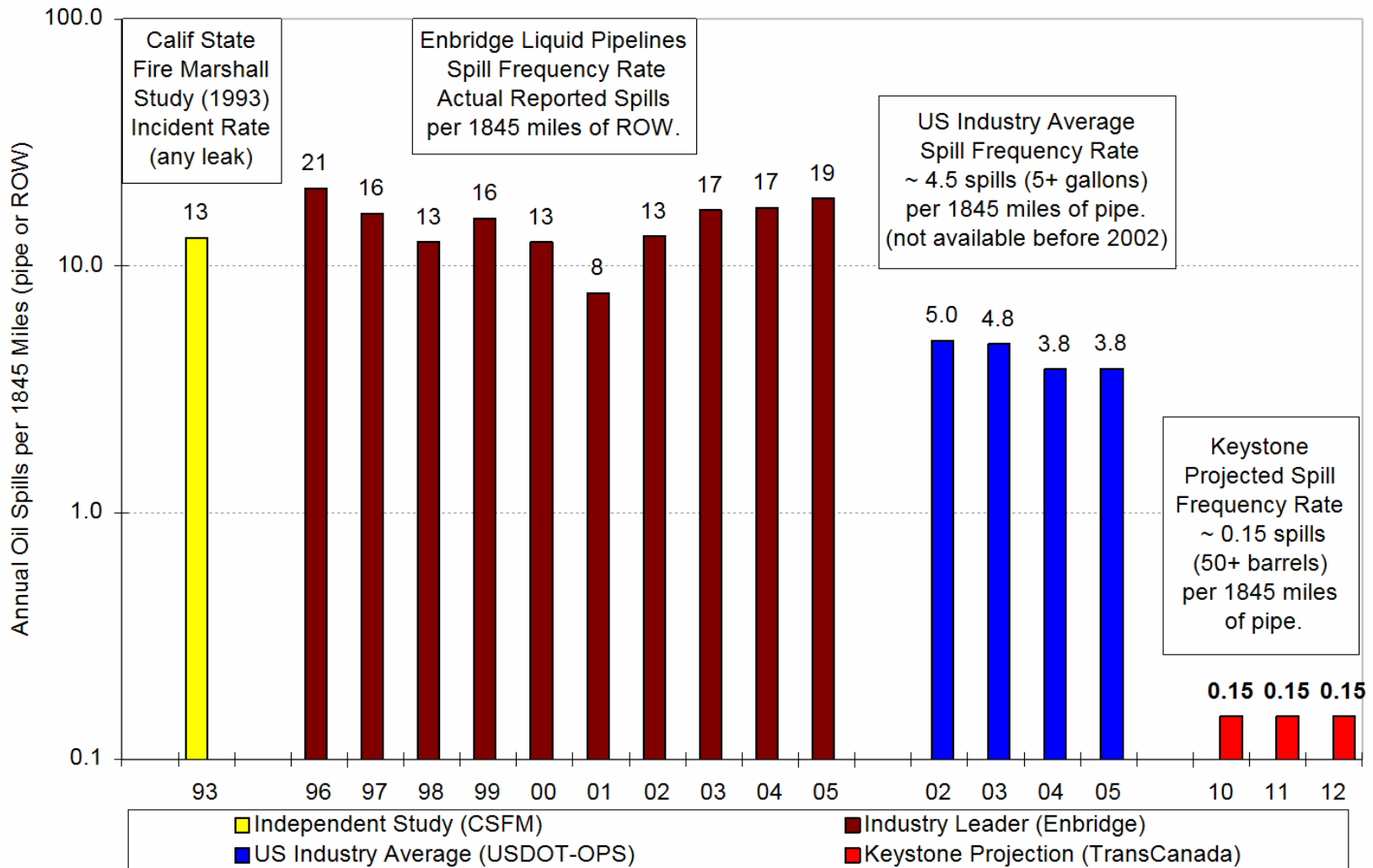
The calculated likelihood of spills less than 50 bbl is considerably less than practical experience would dictate. This is primarily the result of historical reporting requirements, as spills of less than 50 bbl were not required to be reported to the DOT within the historical data set. The current requirement of reporting all spills above 5 bbl is therefore not represented in the dataset used in this analysis.

Hazardous Liquid Pipelines in North America

Spill Frequency Rate (SFR) Comparisons

Annual Number of Spills per 1845 Miles

Source: CSFM, Enbridge, USDOT-OPS, TransCanada



Pipeline Oil Spills

Volume of Spills

How much do they leak?



Spill Volume Rate (SVR)

Defined

= amount of oil spilled per million barrel-miles of product transport.



Spill Volume Rate (SVR)

One barrel-mile equals
one barrel of oil transported
a distance of one mile.

Source: Association of Oil Pipelines



Spill Volume Rate (SVR)

The US industry average SVR is
~1 gallon of oil spilled per million
barrel-miles of product transport.

Source: Association of Oil Pipelines



Spill Volume Rate (SVR)

An Industry Leader

The Enbridge actual spill volume rates (1996-2005) are listed first.

Source: Enbridge, Inc - See EXHIBIT F



Spill Volume Rate (SVR)

The US Industry Average

The actual US Industry Average spill results (1996-2005) are next.

Source: US-DOT OPS - See EXHIBIT G



Spill Volume Rate (SVR)

Keystone Projection

TransCanada's projected spill
volume rate (for year 2010+)

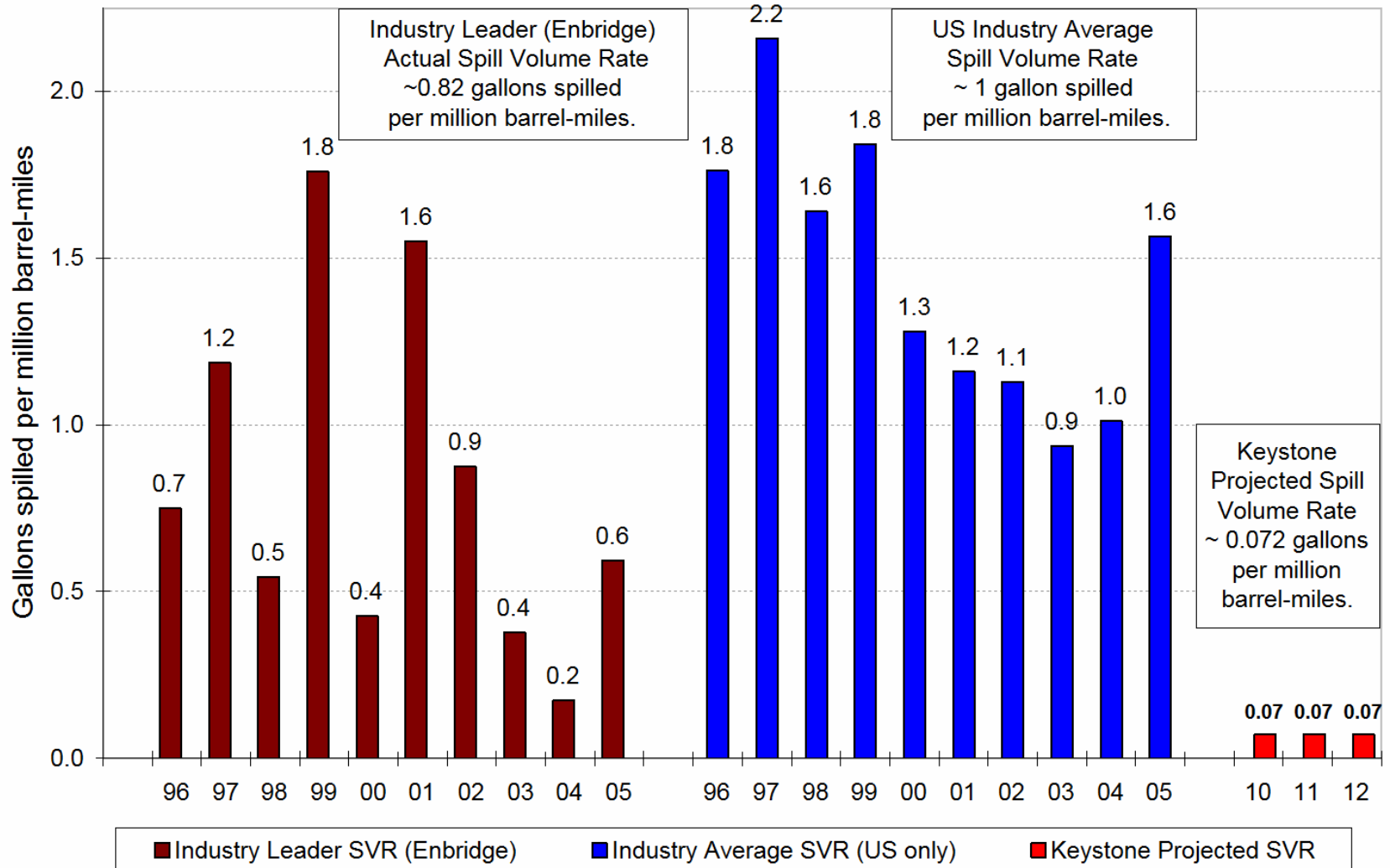


Hazardous Liquid Pipelines in North America

Spill Volume Rate (SVR) Comparisons

Gallons of Oil Spilled per Million Barrel-Miles

Source: Enbridge, USDOT-OPS, TransCanada

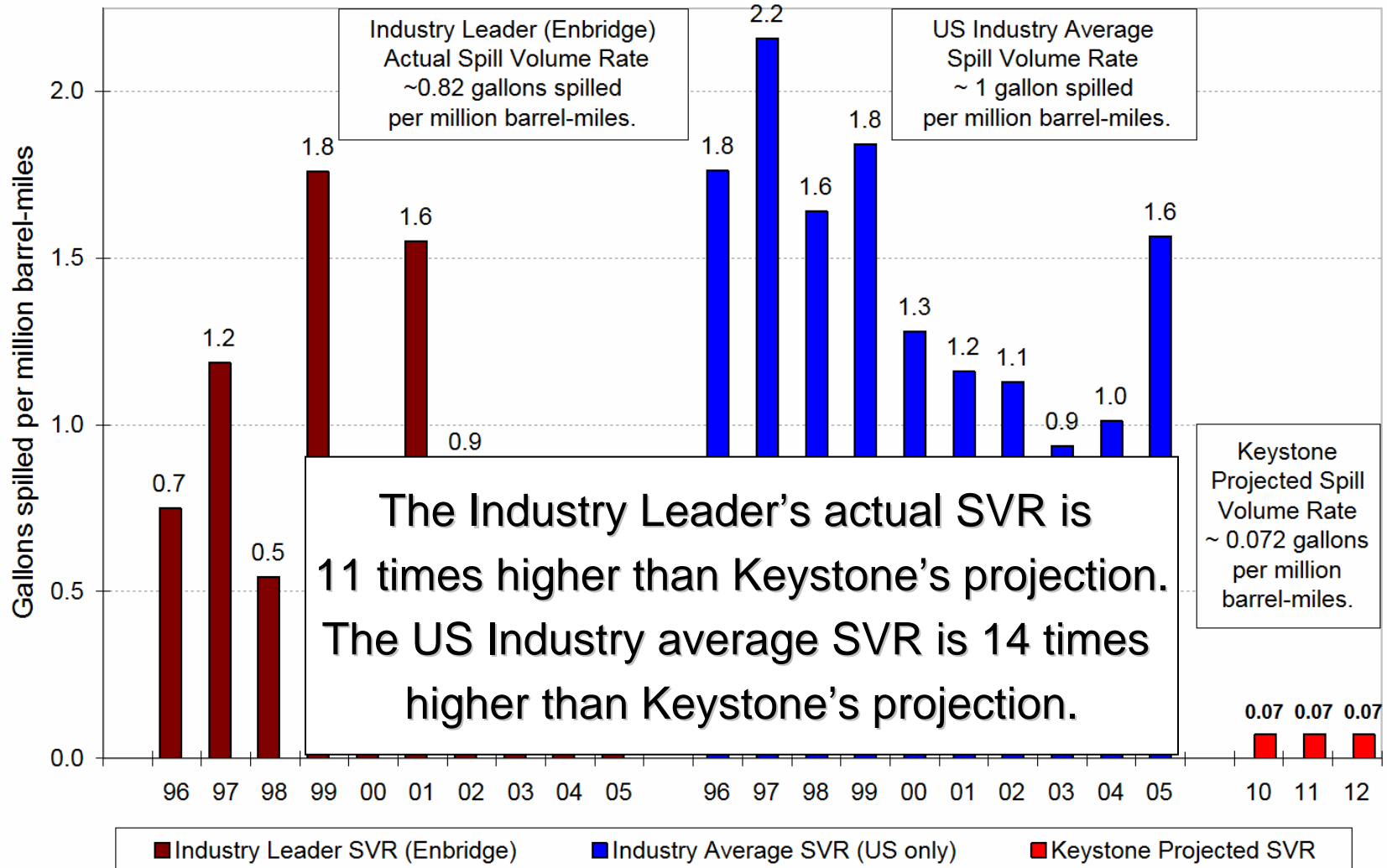


Hazardous Liquid Pipelines in North America

Spill Volume Rate (SVR) Comparisons

Gallons of Oil Spilled per Million Barrel-Miles

Source: Enbridge, USDOT-OPS, TransCanada



Keystone Spill Projections

Are significantly lower than the actual historical track record of hazardous liquid pipelines in North America.

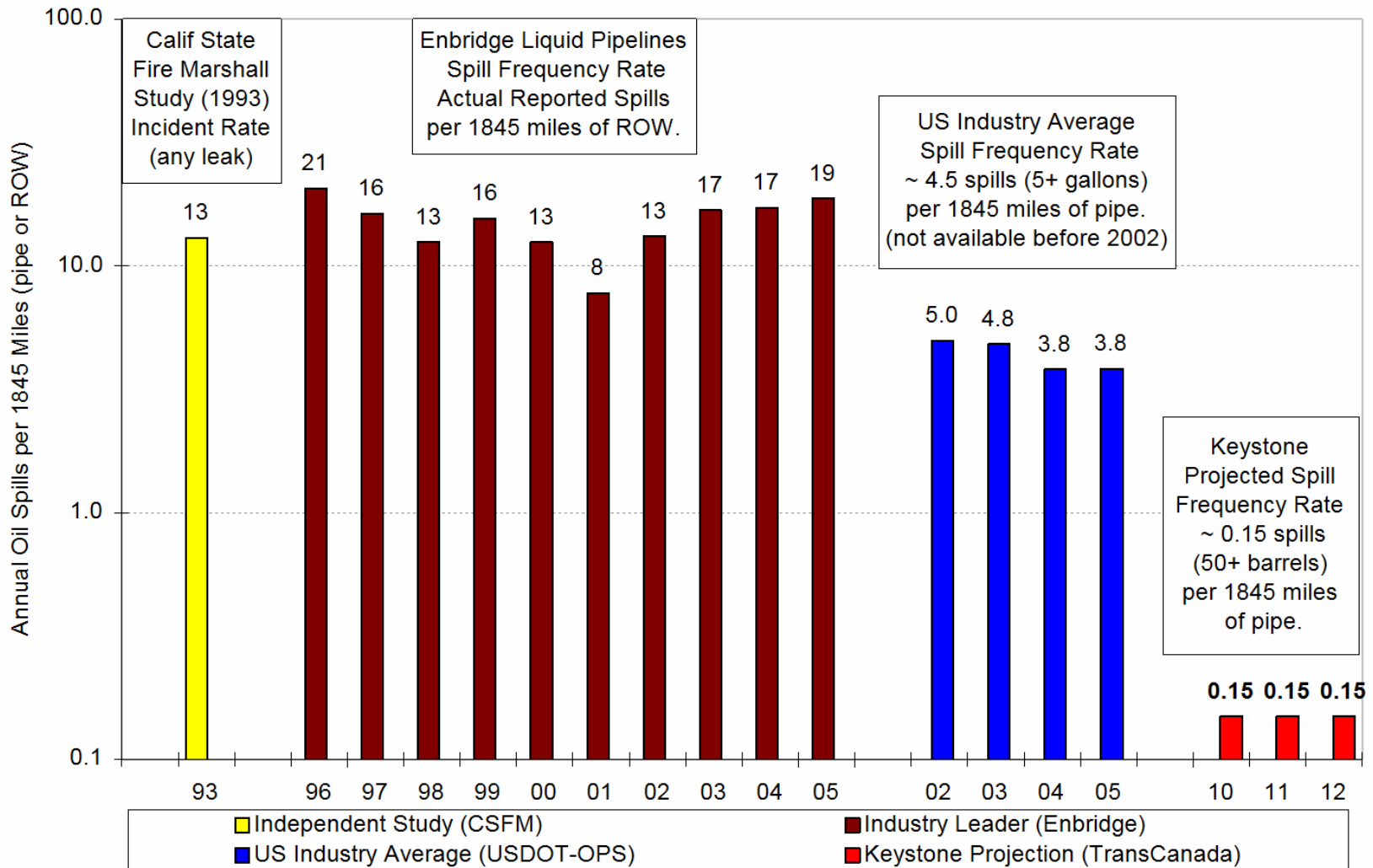


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Source: CSFM, Enbridge, USDOT-OPS, TransCanada

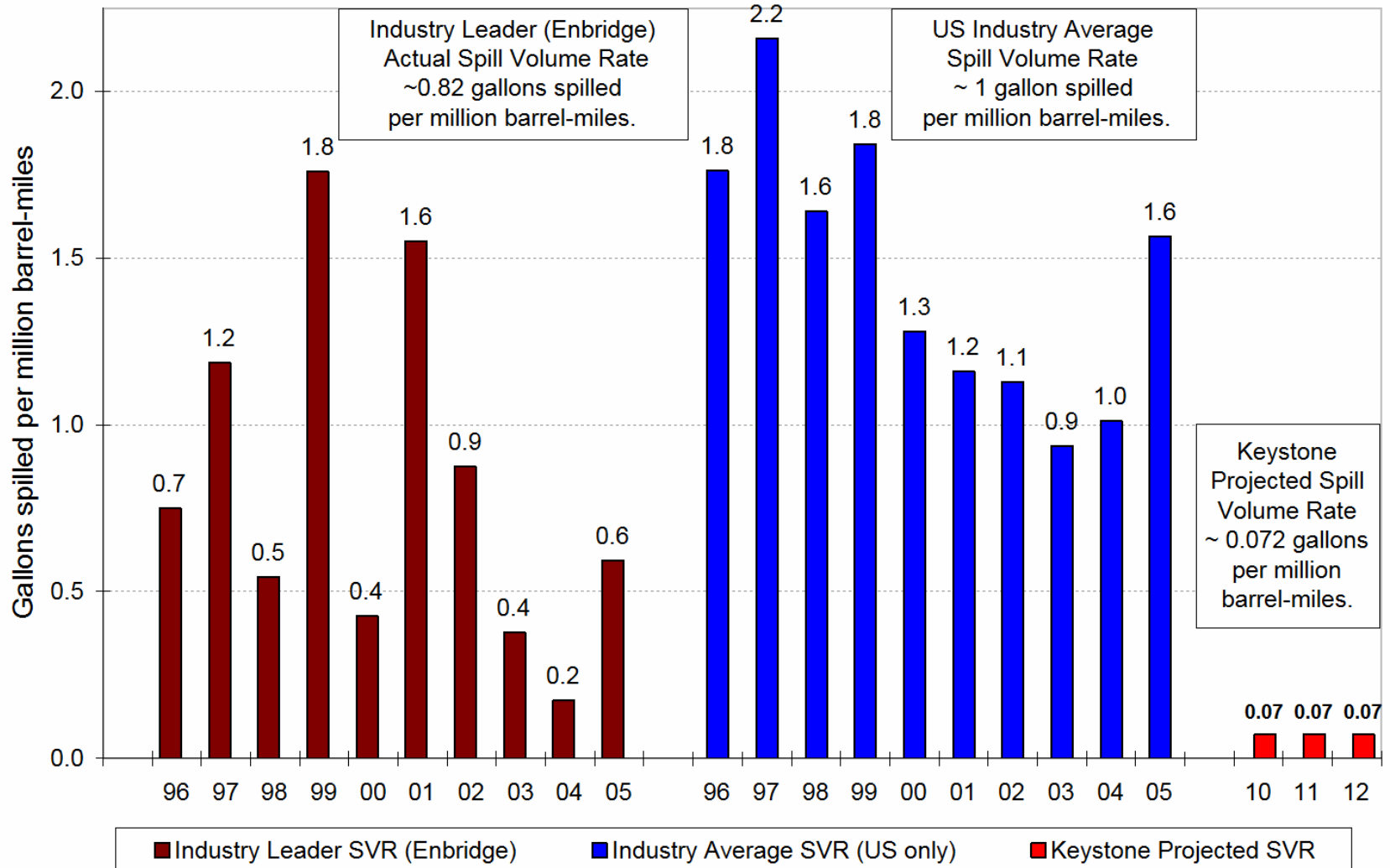


Hazardous Liquid Pipelines in North America

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Keystone Pipeline Frequency and Volume Analysis

Report for TransCanada Keystone Pipeline L.P.
Report no.: 70020509 Revision 3,
28 March 2007

Frequency Volume Analysis

Flaws Affecting Spill Frequency

(lower the number of spills)

Data Selection Flaws

- 1) Wrong Location - Out of North America
- 2) Wrong Subject – Natural Gas Pipelines



Frequency Volume Analysis
 References & Literature

I.3 References and Literature Review

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DOT, 1989	United States Department of Transportation, "Annual Report on Pipeline Safety", Research and Special Programs Administration, Office of Pipeline Safety, Washington DC, USA, 1989.
DOT, 2005a	United States Department of Transportation, "Liquid Accident Yearly Summaries (1986-2004)", (http://ops.dot.gov/stats/stats.htm)

Wrong Locations (blue);
 Outside North America

Wrong Subject (yellow);
 Natural Gas Pipelines, etc.

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28 March 2007
Generic Failure Rate Data - Project 70020509 Rev 2
TransCanada Keystone Pipeline L.P.

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Wrong Locations (blue);
Outside North America

Wrong Subjects (yellow);
Natural Gas Pipelines, etc.

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Wrong Locations (blue);
Outside North America

Wrong Subjects (yellow);
Natural Gas Pipelines, etc.

Frequency Volume Analysis

28 Total References

15 were the wrong location
(Outside of North America)

11 were the wrong subject
(Natural Gas Pipelines, etc.)

➔ 19 out of 28 were either the wrong location or the wrong subject or both.



Frequency Volume Analysis

Flaws Affecting Spill Volumes

(lower the amount of oil spilled)

- 1) Data Omission Example
- 2) Data Interpretation Example
- 3) General Assumptions



Data Omission Example from the Frequency Volume Study

28 March 2007
 Keystone Pipeline Frequency
 TransCanada Keystone Pipe

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 DNV ENERGY

Data Omission Flaw: The time to shutdown the pumps is omitted, which reduces the spill sizes.

5.1 Detection, Verification, Response and Isolation

Table 5-1 Time from Leak Start to Closure of RGVs for Reported Causes

Hole size	Response Time	Valve Closure
Small	30 minutes	3 minutes
Medium	15 minutes	3 minutes
Large	9 minutes	3 minutes

Table 5.1 Time from Leak Start to Closure of RGVs for Reported Causes

Hole Size	Response Time	Pump Shutdown	Valve Closure	Total Time	Time/Spill Increase
Small	30	omitted	3	33	
Actual	30	9	3	42	27%
Medium	15	omitted	3	18	
Actual	15	9	3	27	50%
Large	9	omitted	3	12	
Actual	9	9	3	21	75%

Impact: The pipeline isolation times and potential spill sizes increase up to 75%.

Flaws Affecting Spill Volumes

Data Interpretation Example

CONFIDENTIAL

28 March 2007

Keystone Pipeline Frequency and Volume Analysis Report 70020509 (rev 3)
TransCanada Keystone Pipeline L.P.

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6.5 Comparison with Generic Pipeline Leak Frequency

Table 6-5 Leak Volume Summary

Case	Leak Volume (per mile per year)
M435S	0.24
M591S	0.29
M435DB	0.30
K591DB	0.45

In summary, the average leak volume per mile for the Keystone Pipeline is estimated in the range of 0.24 bbl to 0.45 bbl per mile per year (**Table 6-5**). For purposes of comparison, pipelines in the U.S. had an average leak frequency of 0.49 bbl per pipeline mile per year during the period 1992 to 2003 (OPS 2006). Thus, the Keystone Pipeline is estimated as better than average regarding oil spill frequency.

Frequency Volume Study - Data Interpretation Flaw

Hazardous Liquids Pipelines Incident Database (Source: OPS)

Year	Total Pipeline Mileage (miles)	Gross Loss Total Oil Spilled (barrels)	Net Loss Oil Never Recovered (barrels)
1992	155,113	137,065	68,810
1993	153,444	116,802	57,559
1994	154,731	164,387	114,002
1995	154,933	110,237	53,113
1996	163,422	160,316	100,949
1997	156,638	195,549	103,129
1998	154,528	149,500	60,791
1999	158,248	167,230	104,487
2000	160,900	108,652	56,953
2001	159,889	98,348	77,456
2002	161,670	95,642	77,269
2003	159,512	80,112	50,523
Totals	1,893,028 (Total Miles)	1,583,840 (Total Spill)	925,041 (Net Loss)

Real World Calculation

Average leak volume per mile ==== > **0.84** barrels
(TOTAL SPILL divided by TOTAL MILES)

Frequency Volume Study

Average leak volume per mile ===== > **0.49** barrels
(NET LOSS divided by TOTAL MILES)

The Real World
Average leak volume per mile is **71%** higher than their interpretation.

The Frequency Volume study doesn't use the TOTAL Spill in the calculation.
They subtract the amount of oil recovered from the original spill total.
The net result is that the average spill size is reduced because of data interpretation.

Frequency Volume Analysis

General Assumptions

- 1) Response Times to stop leaks
- 2) SCADA systems always work



Frequency Volume Analysis

References and Literature Review

Countries/Locations Mentioned

Australia, Brunei, Brussels, Europe,
Hong Kong, Norway, United
Kingdom, United States, United
Soviet Socialist Republic



Frequency Volume Analysis

References and Literature Review

Countries/Locations Not Mentioned

What about Canada?

Why isn't Canada mentioned in the
Frequency Volume Analysis?



What about Canada?

Never Mentioned:

- 1) NEB – National Energy Board
- 2) EUB – Alberta Energy & Utilities Board
- 3) CAPP – Assoc of Petroleum Producers
- 4) TSB – Transportation Safety Board
- 5) CEPA – Canada Energy Pipeline Assn





Pipeline Performance in Alberta, 1990-2005

April 2007

Alberta Energy and Utilities Board

EXHIBIT L

Figure 19. Pipeline releases by substance released per year

All pipeline releases from January 1, 1990, to December 31, 2005 (test failures are excluded)

EXHIBIT L

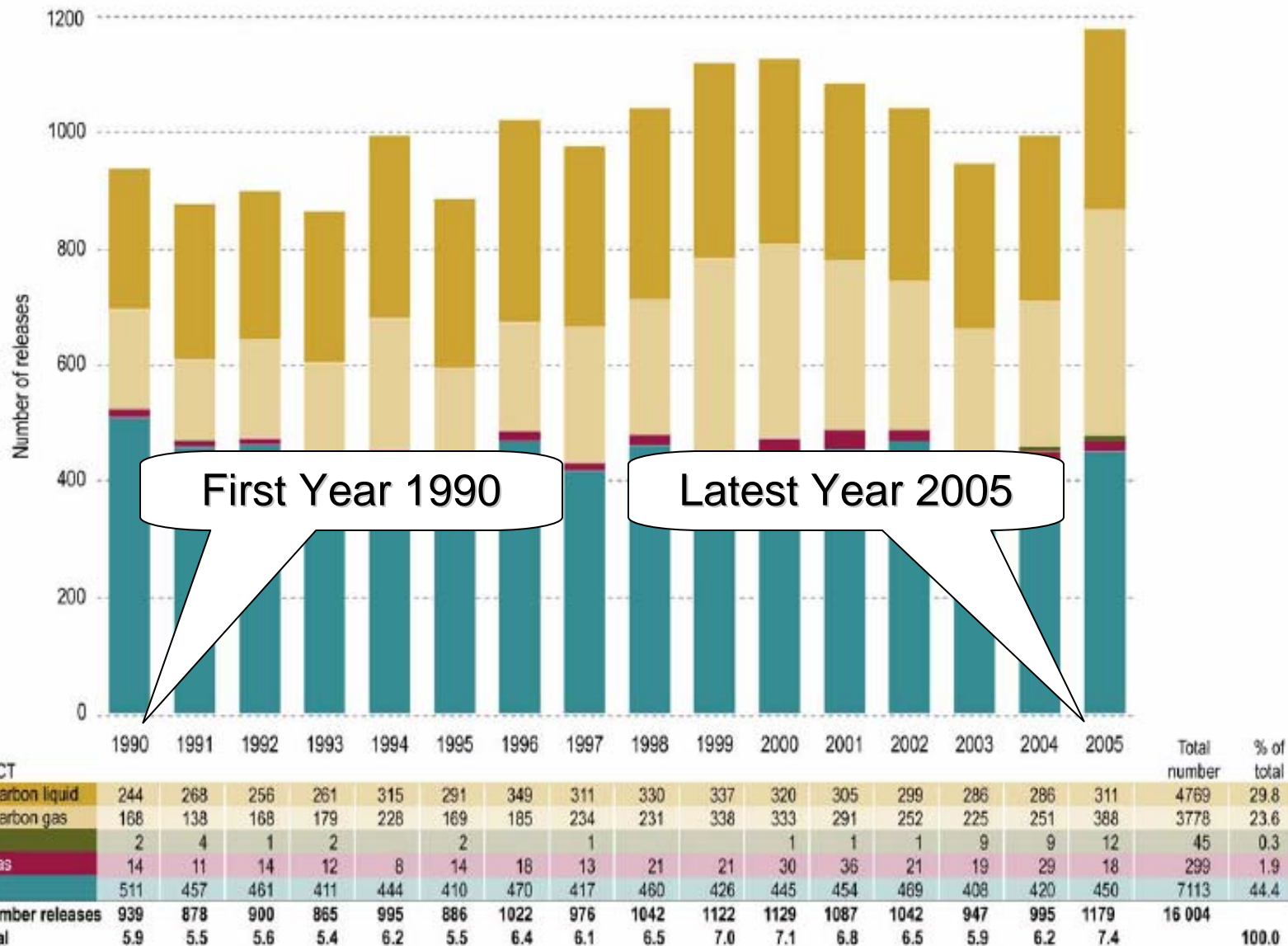


Figure 19. Pipeline releases by substance released per year

All pipeline releases from January 1, 1990, to December 31, 2005 (test failures are excluded)

EXHIBIT L

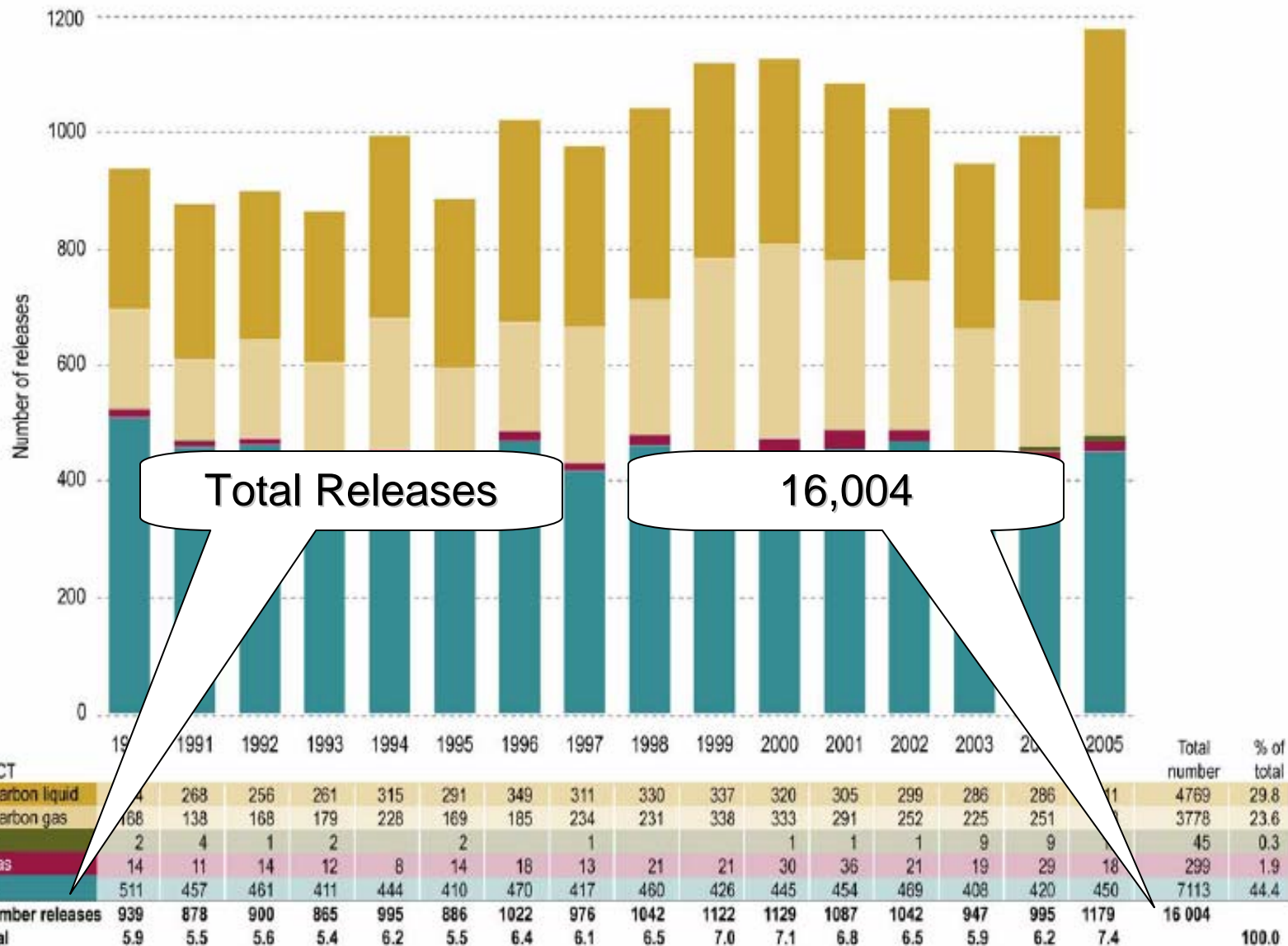


Figure 19. Pipeline releases by substance released per year

All pipeline releases from January 1, 1990, to December 31, 2005 (test failures are excluded)

EXHIBIT L

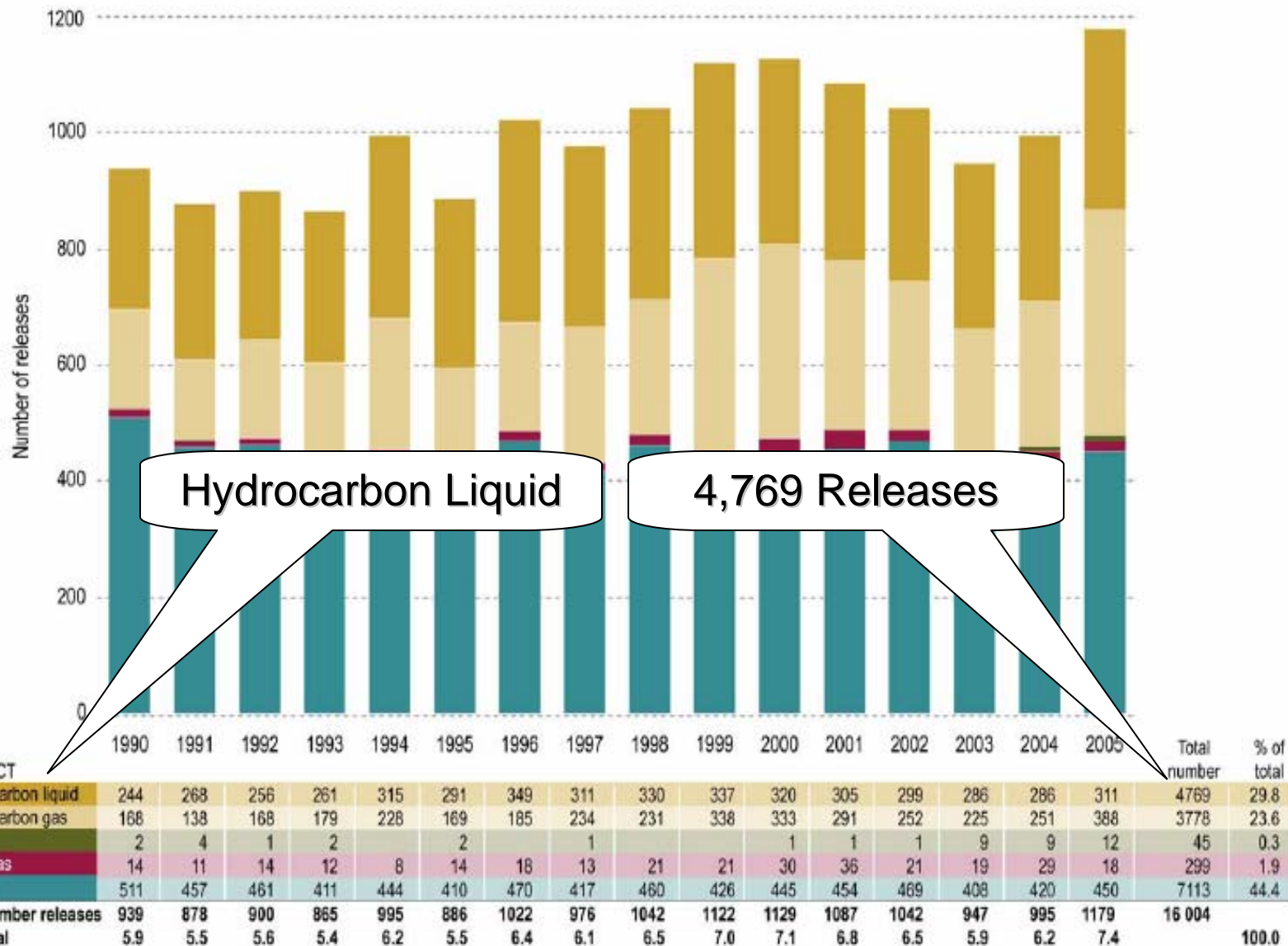
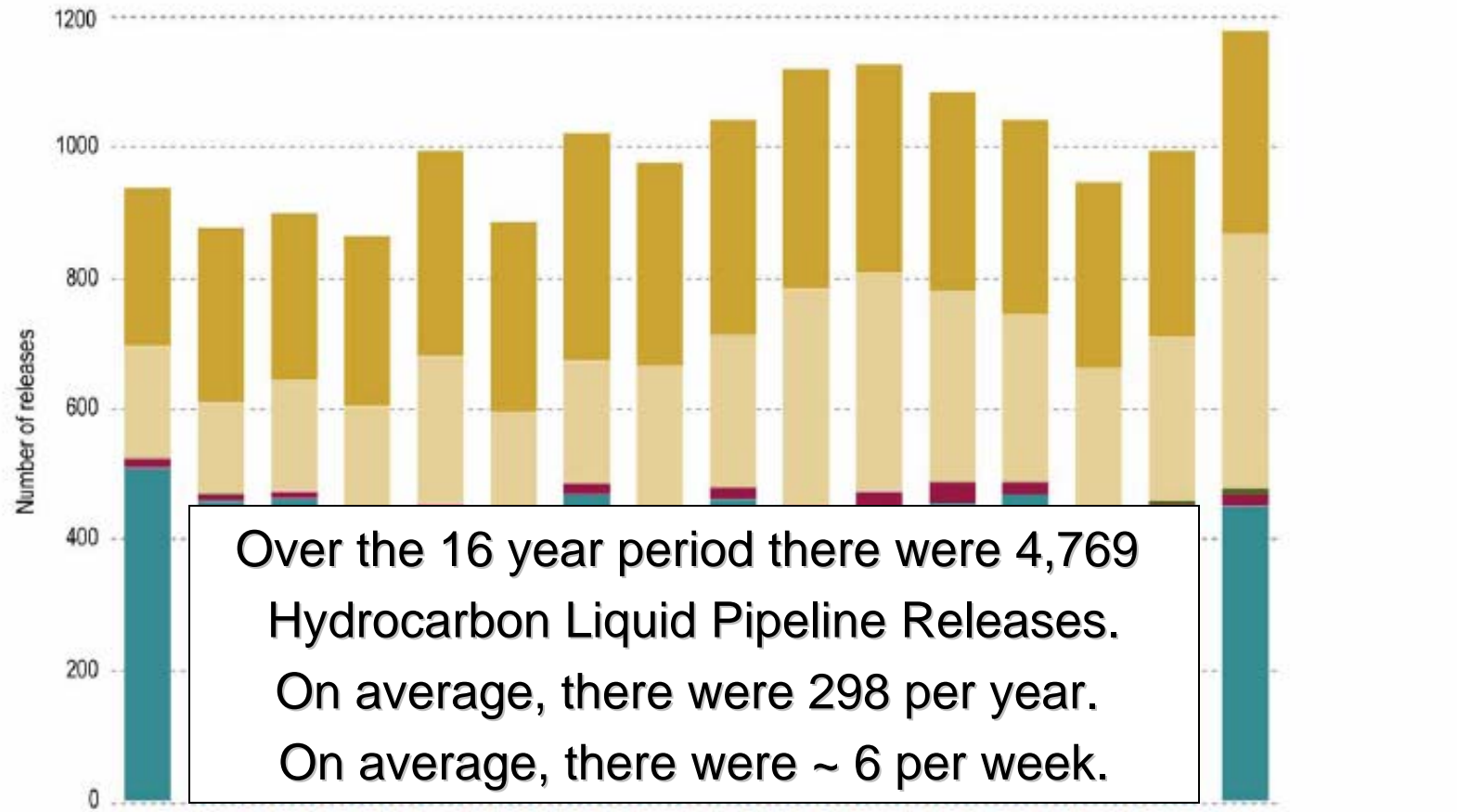


Figure 19. Pipeline releases by substance released per year

All pipeline releases from January 1, 1990, to December 31, 2005 (test failures are excluded)

EXHIBIT L



PRODUCT	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total number	% of total
Hydrocarbon liquid	244	268	256	261	315	291	349	311	330	337	320	305	299	286	286	311	4769	29.8
Hydrocarbon gas	168	138	168	179	228	169	185	234	231	338	333	291	252	225	251	388	3778	23.6
Other	2	4	1	2		2		1			1	1	1	9	9	12	45	0.3
Sour gas	14	11	14	12	8	14	18	13	21	21	30	36	21	19	29	18	299	1.9
Water	511	457	461	411	444	410	470	417	460	426	445	454	489	408	420	450	7113	44.4
Total number releases	939	878	900	865	995	886	1022	976	1042	1122	1129	1087	1042	947	995	1179	16 004	
% of total	5.9	5.5	5.6	5.4	6.2	5.5	6.4	6.1	6.5	7.0	7.1	6.8	6.5	5.9	6.2	7.4		100.0

Alberta EUB Pipeline Performance Report (1990 - 2005)

Most of the 4,769 spills are “small”,
that is, less than 26,400 gallons

<100 m³ or cubic meters (26,400 gallons)

100 – 1000 m³ (up to 264,000 gallons)

1000 - 10,000 m³ (up to 2,640,000 gallons)

> 10,000 m³ (more than 2,640,000 gallons)



A Canadian Case Study

Burnaby, British Columbia

July 2007 Oil Spill

Source: Canadian News Reports



The city hired a local contractor to upgrade the city sewer system.

Source: Canadian News Reports



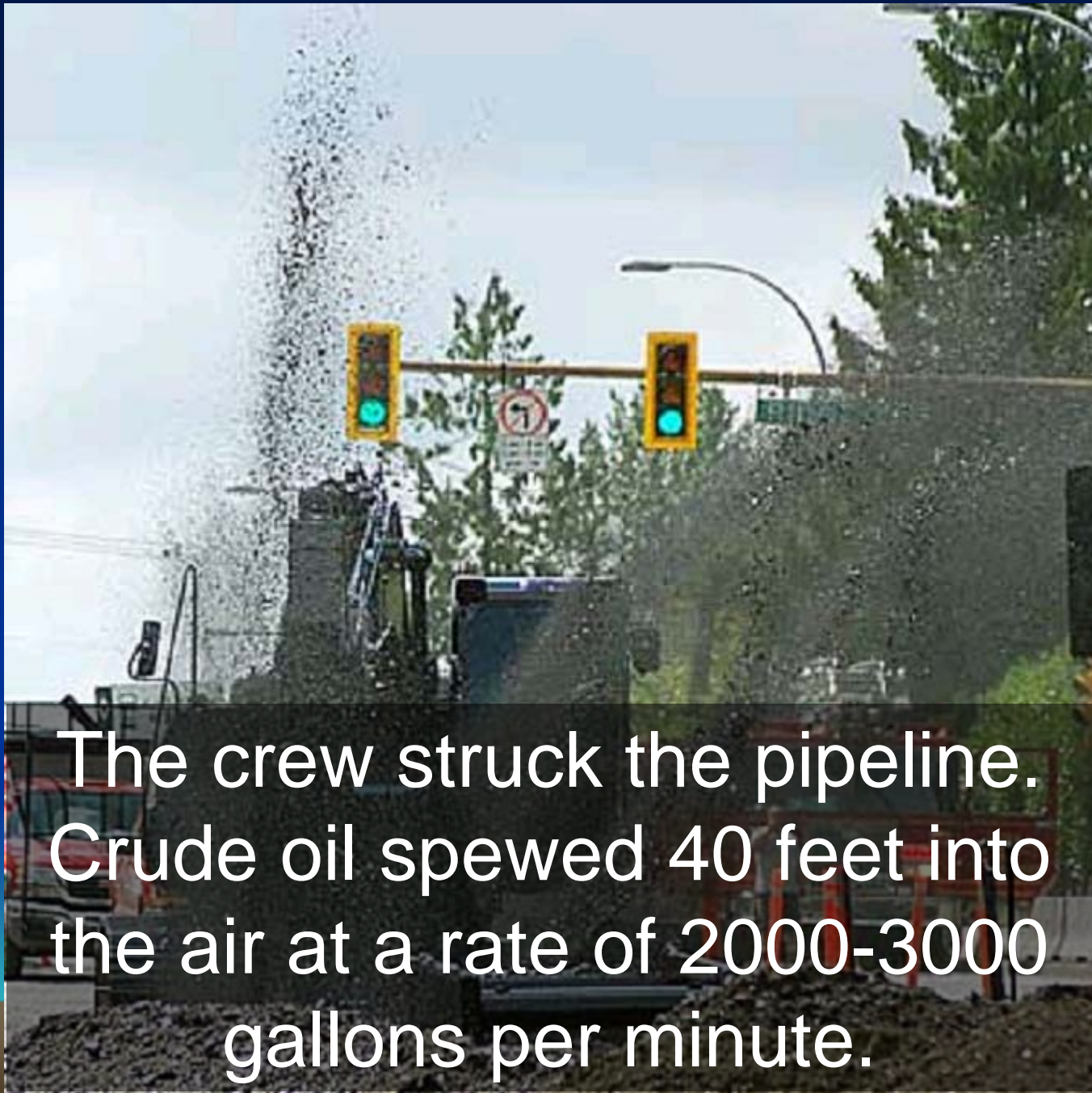
After reviewing the project plans with the local pipeline company, digging started.

Something went wrong ...

Source: Canadian News Reports







The crew struck the pipeline.
Crude oil spewed 40 feet into
the air at a rate of 2000-3000
gallons per minute.

The pipeline was shutdown immediately. An estimated 60,000 gallons leaked within 20 to 30 minutes.

Source: Canadian News Reports





Crude oil coated the street
and everything nearby.

The local residential area
sustained significant
damage ...

Source: Canadian News Reports





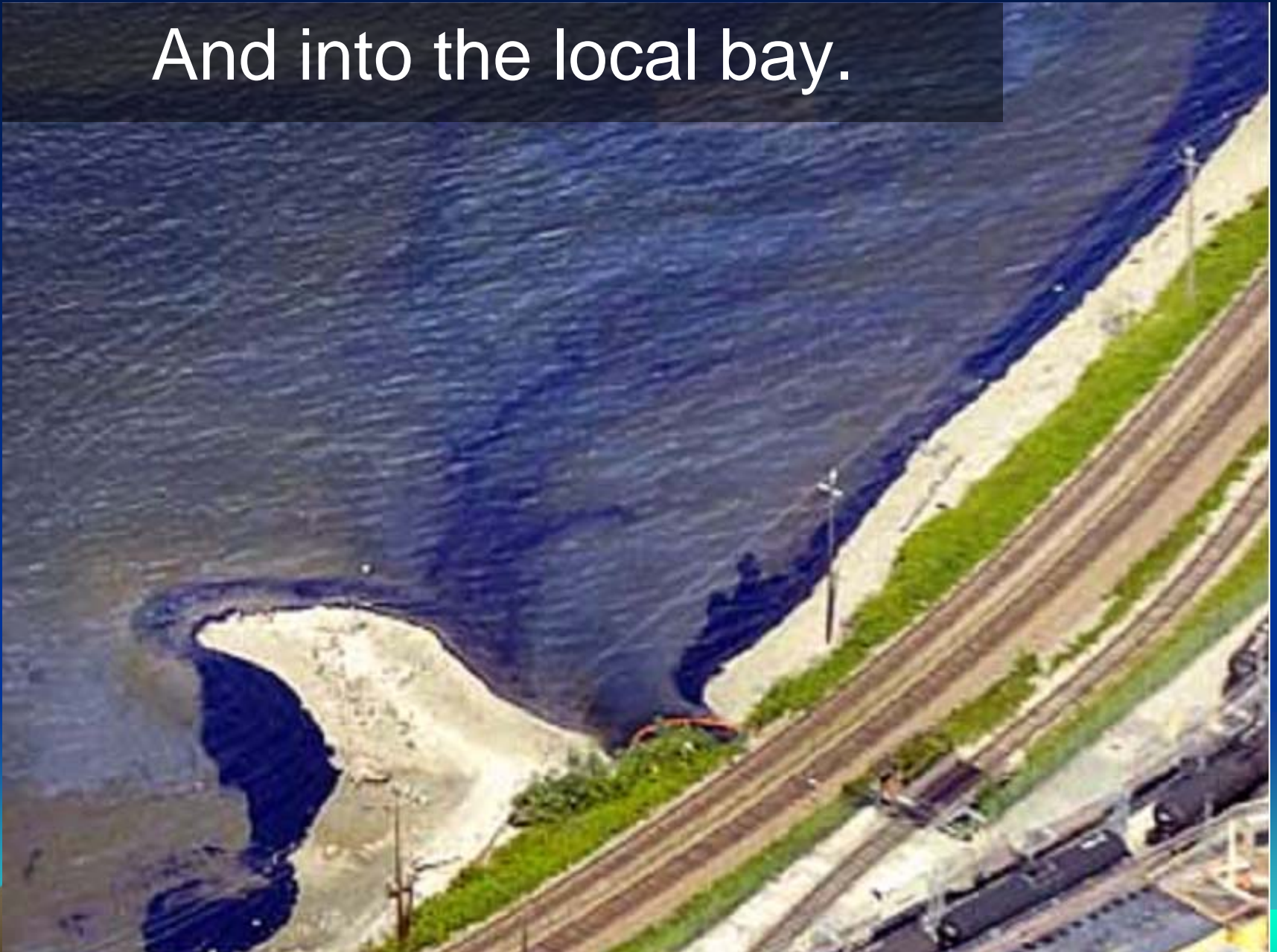
Crude oil flowed down the
streets into the city storm
sewers ...

Source: Canadian News Reports





And into the local bay.





The cleanup could take
several years and cost
“tens of millions” of dollars.

Source: Canadian News Reports



The pipeline company claims that they are not at fault. The city may have to pay for the spill.

Source: Canadian News Reports



How long before this
happens in South Dakota?

It is only a matter of when,
where, and how much.



Major Pipeline Spills in Canada



National Energy Board of Canada List of Pipeline Ruptures

Transportation Safety Board Investigations

Enbridge, TransCanada, Others
1992 - 2007



National Energy Board of Canada
List of Pipeline Ruptures (1992 – 2007)
Transportation Safety Board Investigations

(Grouped by Enbridge, TransCanada, Others; Sorted by date)

TSB #	Company	Date	Age	City	Product	Comment
P07H0014	Enbridge	04/15/07	39	Glenavon, SK	Crude	261,000 gal spill.
P01H0049	Enbridge	09/29/01	29	Binbrook, ON	Crude	13,200 gal spill
P01H0004	Enbridge	01/17/01	33	Hardisty, AB	Crude	1+ million gal spill
P99H0021	Enbridge	05/20/99	31	Regina, SK	Crude	825,000 gal spill
P96H0008	Enbridge	02/27/96	28	Glenavon, SK	Crude	211,000 gal spill.
P95H0047	Enbridge	11/13/95	30	Langbank, SK	Crude	203,000 gal spill.
P95H0023	Enbridge	06/16/95	27	Windthorst, SK	Condensate	
P94H0048	Enbridge	10/03/94	31	St. Leon, MB	SynCrude	1.1 million gal spill
P02H0017	TransCanada	04/14/02	33	Brookdale, MB	Gas	Immediate ignition
P97H0063	TransCanada	12/02/97	28	Cabri, SK	Gas	Resulted in ignition.
P96H0049	TransCanada	12/11/96	39	Stewart Lake, ON	Gas	Delayed ignition.
P96H0012	TransCanada	04/15/96	34	St. Norbert, MB	Gas	Delayed ignition.
P95H0036	TransCanada	07/29/95	22	Rapid City, SK	Gas	Immediate ignition.
P95H0003	TransCanada	02/04/95	22	Vermillion Bay, ON	Gas	Immediate ignition.
P94H0049	TransCanada	10/06/94	37	Williamstown, ON	Gas	
P94H0036	TransCanada	07/23/94	22	Latchford, ON	Gas	Resulted in ignition.
P92T0005	TransCanada	07/15/92	19	Potter, ON	Gas	Resulted in ignition.
P02H0052	TNPL	12/07/02	50	St-Clet, QU	Diesel	
P02H0024	Westcoast	05/15/02	45	Fort St. John, BC	Sour gas	
P00H0037	Westcoast	08/07/00	43	Hope, BC	Gas	
P98H0044	Westcoast	12/08/98	40	Kobes Creek, BC	Sour gas	Resulted in ignition.
P97H0024	Westcoast	04/30/97	19	Ft. St. John, BC	Sour gas	Resulted in ignition.
P94H0018	BP Canada	05/10/94	17	Regina, SK	Ethane	Fire from pump.
	Westcoast	04/25/94	32	Rigel, BC	Sour gas	
P94H0003	Foothills	02/15/94	12	Maple Creek, SK	Gas	Resulted in ignition.
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Total – There were 26 pipeline ruptures over a 15 year period investigated by the TSB.

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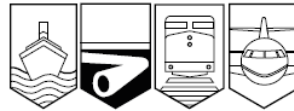
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Total – There were 26 pipeline ruptures over a 15 year period investigated by the TSB.



PIPELINE INVESTIGATION REPORT

P01H0004



CRUDE OIL PIPELINE RUPTURE

ENBRIDGE PIPELINES INC.
864-MILLIMETRE LINE 3/4, MILE POST 109.42
NEAR HARDISTY, ALBERTA
17 JANUARY 2001



PIPELINE INVESTIGATION REPORT P01H0004

Summary

At 0045 mountain standard time on 17 January 2001, a rupture occurred on the Enbridge Pipelines Inc. 864-millimetre outside diameter Line 3/4 at Mile Post 109.42, 0.8 kilometres downstream of the Hardisty pump station near Hardisty, Alberta. The rupture occurred in a permanent slough that was fed by an underground spring. Although the line was shut down at the control centre in Edmonton, Alberta, within minutes of the rupture, the exact location of the rupture was not found until 1415 mountain standard time. Approximately 3800 cubic metres of crude oil was released and contained within a 2.7-hectare section. As of 01 May 2001, 3760 cubic metres of crude oil had been recovered.

Other Factual Information

At 0045 mountain standard time (MST),¹ the control centre operator in Edmonton, Alberta, controlling Line 3/4 noticed a pressure drop at the Hardisty pump station and immediately began to shut down the mainline units at that pump station. As the line was being shut down, the emergency notification procedure was begun.

During the morning of 17 January 2001, the pipeline route downstream of the Hardisty pump station was both walked and flown along numerous times in an effort to identify the possible leak location. At approximately 1415, company personnel walking the line noticed that crude oil had surfaced through a crack in the ice near the edge of a slough about 300 metres (m) downstream of the Hardisty pump station. At that time, company personnel secured the site and began to implement oil containment, oil recovery and pipeline repair operations.

Enbridge Pipeline Rupture

Jan 2001 - Summary

- 1) Pipe Failure - Rupture
- 2) SCADA System worked well
- 3) Spill more than 1 million gallons
- 4) SCADA cannot prevent all large spills
- 5) Spill site not found for ~14 hours
- 6) Disproves Freq Volume Assumption
that leaks can be clamped within 4 hours



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P01H0004	Enbridge	01/17/01	33	Hardisty, AB	Crude	1+ million gal spill
P99H0021	Enbridge	05/20/99	31	Regina, SK	Crude	825,000 gal spill
P96H0008	Enbridge	02/27/96	28	Glenavon, SK	Crude	211,000 gal spill.
P95H0047	Enbridge	11/13/95	30	Langbank, SK	Crude	203,000 gal spill.
P95H0023	Enbridge	06/16/95	27	Windthorst, SK	Condensate	
P94H0048	Enbridge	10/03/94	31	St. Leon, MB	SynCrude	1.1 million gal spill
P02H0017	TransCanada	04/14/02	33	Brookdale, MB	Gas	Immediate ignition
P97H0063	TransCanada	12/02/97	28	Cabri, SK	Gas	Resulted in ignition.
P96H0049	TransCanada	12/11/96	39	Stewart Lake, ON	Gas	Delayed ignition.
P96H0012	TransCanada	04/15/96	34	St. Norbert, MB	Gas	Delayed ignition.
P95H0036	TransCanada	07/29/95	22	Rapid City, SK	Gas	Immediate ignition.
P95H0003	TransCanada	02/04/95	22	Vermillion Bay, ON	Gas	Immediate ignition.
P94H0049	TransCanada	10/06/94	37	Williamstown, ON	Gas	
P94H0036	TransCanada	07/23/94	22	Latchford, ON	Gas	Resulted in ignition.
P92T0005	TransCanada	07/15/92	19	Potter, ON	Gas	Resulted in ignition.
P02H0052	TNPL	12/07/02	50	St-Clet, QU	Diesel	
P02H0024	Westcoast	05/15/02	45	Fort St. John, BC	Sour gas	
P00H0037	Westcoast	08/07/00	43	Hope, BC	Gas	
P98H0044	Westcoast	12/08/98	40	Kobes Creek, BC	Sour gas	Resulted in ignition.
P97H0024	Westcoast	04/30/97	19	Ft. St. John, BC	Sour gas	Resulted in ignition.
P94H0018	BP Canada	05/10/94	17	Regina, SK	Ethane	Fire from pump.
	Westcoast	04/25/94	32	Rigel, BC	Sour gas	
P94H0003	Foothills	02/15/94	12	Maple Creek, SK	Gas	Resulted in ignition.
P93H0007	Westcoast	05/13/93	24	Fort St. John, BC	Sour gas	Delayed rupture.

Total – There were 26 pipeline ruptures over a 15 year period investigated by the TSB.

Enbridge Pipeline Rupture

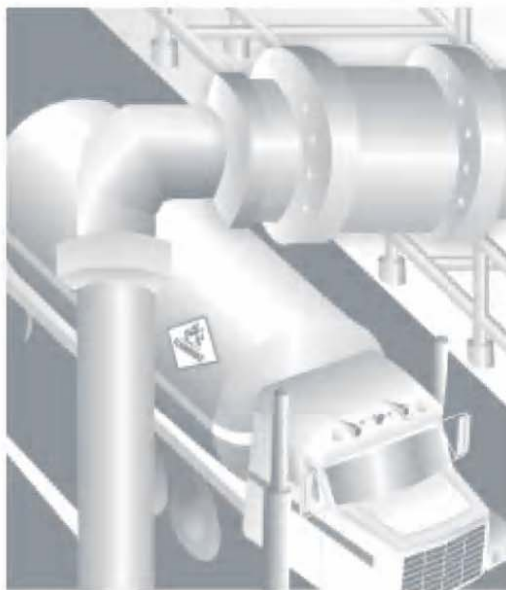
Oct 1994 - Summary

- 1) Pipeline shutdown for maintenance
- 2) Restarted with a valve still closed
- 3) SCADA did not detect closed valve
- 4) Large spill; 1+ million gallons

Disproves Freq Volume Assumption
that SCADA Systems always work



Supervisory Control and Data Acquisition (SCADA) in Liquid Pipelines



Safety Study

NTSB/SS-05/02

PB2005-917005

Notation 7505A



**National
Transportation
Safety Board**

Washington, D.C.

NTSB Safety Study (US) SCADA in Liquid Pipelines

Report NTSB/SS-05/02

PB2005-917005

Adopted November 29, 2005



NTSB Safety Study (US) SCADA in Liquid Pipelines

SCADA systems contributed to the severity of hazardous liquid pipeline spills in 10 out of 13 cases studied.

Report Adopted November 29, 2005



**National Energy Board of Canada
List of Pipeline Ruptures (1992 – 2007)
Transportation Safety Board Investigations**

(Grouped by Enbridge, TransCanada, Others; Sorted by date)

TSB #	Company	Date	Age	City	Product	Comment
P07H0014	Enbridge	04/15/07	39	Glenavon, SK	Crude	261,000 gal spill.
P01H0049	Enbridge	09/29/01	29	Binbrook, ON	Crude	13,200 gal spill
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P96H0008	Enbridge	02/27/96	28			
P95H0047	Enbridge	11/13/95	30			
P95H0023	Enbridge	06/16/95	27			
P94H0048	Enbridge	10/03/94	31			
P02H0017	TransCanada	04/14/02	33			
P97H0063	TransCanada	12/02/97	28	Caonagan, SK		
P96H0049	TransCanada	12/11/96	39	Stewart, AB	Gas	Delayed ignition.
P96H0012	TransCanada	04/15/96	34	St. John's, MB	Gas	Delayed ignition.
P95H0036	TransCanada	07/29/95	22	Rapid City, SK	Gas	Immediate ignition.
P95H0003	TransCanada	02/04/95	22	Vermillion Bay, ON	Gas	Immediate ignition.
P94H0049	TransCanada	10/06/94	37	Williamstown, ON	Gas	
P94H0036	TransCanada	07/23/94	22	Latchford, ON		
P92T0005	TransCanada	07/15/92	19			
P02H0052	TNPL	12/07/02	50			
P02H0024	Westcoast	05/15/02	45			
P00H0037	Westcoast	08/07/00	43			
P98H0044	Westcoast	12/08/98	40			
P97H0024	Westcoast	04/30/97	19			
P94H0018	BP Canada	05/10/94	17	Regina, SK		
	Westcoast	04/25/94	32	Rigel, AB	Sour gas	
P94H0003	Foothills	02/15/94	12	Maple Creek, SK	Gas	Resulted in ignition.
P93H0007	Westcoast	05/13/93	24	Fort St. John, BC	Sour gas	Delayed rupture.

TransCanada had several failures in the mid 1990s. The pipe was about age 20

TransCanada owns and operates Foothills. This pipe was age 12; it was installed in 1982.

Total – There were 26 pipeline ruptures over a 15 year period investigated by the TSB.

**National Energy Board of Canada
List of Pipeline Ruptures (1992 – 2007)
Transportation Safety Board Investigations**

Total – There were 26 pipeline ruptures over a 15 year period investigated by the TSB.

Ruptures – Age of Pipe Distribution

Number of years from installation to failure (above listed ruptures)						<u>Totals</u>
Age of Pipe	0-10 yrs	11-20 yrs	21-30 yrs	31-40 yrs	41-50 yrs	12-50 yrs
Ruptures	0	4	9	10	3	26

Average ages of the pipe at time of rupture ~ 30 years; the range is 12 – 50 years.

EXHIBIT M

TransCanada Corporate Social Responsibility

Ms Kothari testified regarding 576 spills
on TransCanada's Corporate Social
Responsibility Reports (2000-2005)



BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION)
BY TRANSCANADA KEYSTONE PIPELINE,)
LP FOR A PERMIT UNDER THE SOUTH)
DAKOTA ENERGY CONVERSION AND)
TRANSMISSION FACILITIES ACT TO)
CONSTRUCT THE KEYSTONE PIPELINE)
PROJECT)

HP 07-001

**DIRECT TESTIMONY OF
MEERA KOTHARI**

19. Tell me specifically about the 576 spills posted on TransCanada's website?

Answer: Most importantly, none of these spills represent pipeline operational leaks.

5

Under TransCanada's spill classification system, between 2000-2005, there were 576 spills. Of the 576 spills, 20 were near misses, 523 spills were classified as Minor, 28 were classified as Serious, four spills were classified as Major and one as Critical. In the case of all four "major" spills, less than 20 gallons in total were spilled. The "critical" spill involved the release of approximately 100 gallons of various liquids such as lube oils.

6

National Energy Board of Canada
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P93H0007	Westcoast	05/13/93	24	Fort St. John, BC	Sour gas	Delayed rupture.

Total – There were 26 pipeline ruptures over a 15 year period investigated by the TSB.

TransCanada Pipeline Rupture

Brookdale, MB

April 14, 2002

Transportation Safety Board
Investigation Report P02H0017



Transportation Safety Board
of Canada



Bureau de la sécurité des transports
du Canada

PIPELINE INVESTIGATION REPORT

P02H0017



NATURAL GAS PIPELINE RUPTURE

TRANSCANADA PIPELINES

LINE 100-3, 914-MILLIMETRE-DIAMETER LINE

MAIN-LINE VALVE 31-3 + 5.539 KILOMETRES

NEAR THE VILLAGE OF BROOKDALE, MANITOBA

14 APRIL 2002

Canada

EXHIBIT O



PIPELINE INVESTIGATION REPORT P02H0017

TSB Investigation Report Excerpt 1

“At approximately 2310, the first verbal report from a member of the public indicated that there was an explosion and fire on TransCanada’s system near Brookdale, approximately 1.2 km from Rural Road 464. At the same time, TransCanada’s SCADA system gave very strong visual and graphical evidence to the CGCC of a possible line break between Stations 30 and 34. From this time on, several calls from the public and emergency services organizations were received by the CGCC related to the explosion and fire.”

TSB Investigation Report Excerpt 2

“At approximately 2318, TransCanada advised the Royal Canadian Mounted Police (RCMP) of a possible line break near Brookdale and that TransCanada personnel had been dispatched to the rupture site. The RCMP advised TransCanada that it would be implementing a 4 km radius evacuation area around the rupture site and would be evacuating local residents within this perimeter.”

TSB Investigation Report Excerpt 3

“At approximately 0230, the major fire self-extinguished at the break site due to actions undertaken at 0130. The isolation of the break site was accomplished with the automatic closure of four MLVs and various tie-over valves with adjacent lines, by low-pressure shut-off devices and the remote closure of 22 valves by the CGCC through the SCADA system. As a precaution, the operating pressures for Lines 100-2 and 100-4 were temporarily reduced to 1000 kPa, until the integrity of these two adjacent main lines could be confirmed. At the time of the break, the estimated pressure at the rupture site was 6010 kPa. The total volume of natural gas consumed by the fire and lost to atmosphere was estimated at 6 812 600 cubic metres.”
(conversion: 240,583,000 cubic feet)

Pipeline Incident Update

CALGARY, Alberta – April 15, 2002 – (TSE: TRP) (NYSE: TRP) – All but two residents in or near the community of Brookdale, Manitoba who were evacuated due to a line break have been cleared to return to their homes.

About 100 residents were evacuated as a result of a line break that occurred on Sunday, April 14, at approximately 11:00 p.m. (CDT). Two people occupying the house nearest the incident were advised not to return home tonight, but are expected to be able to return on Tuesday. Their home is not at risk.

TransCanada, which owns and operates the line, implemented its emergency response plan as a result of the line break. Company representatives are working with authorities, including the Transportation Safety Board and the National Energy Board, to investigate the incident.

TransCanada has isolated sections of two pipelines running adjacent to the affected pipeline to determine if they are damaged. Inspections of the adjacent pipelines are made difficult by water accumulation in the area. These sections of pipeline will remain isolated until a full inspection can be made and they can be safely returned to operation.

Some customers shipping natural gas on the TransCanada system have been impacted. TransCanada notified customers with interruptible transportation service (IT), of the need to reduce transportation by approximately 450 million cubic feet of natural gas effective 5:00 p.m. (MDT) today. No firm service transportation (FT) was affected. The situation will be re-assessed when more information is known about the condition of the adjacent pipelines. TransCanada's Mainline System typically carries about five to seven billion cubic feet of natural gas each day.

TransCanada Pipeline Rupture

April 14, 2002 Summary

- 1) Explosion and Major Fire
- 2) Evacuation (100 people) by RCMP ~12PM
- 3) Major Product Loss (240+ MCF gas)
- 4) Adverse Environmental Impact
- 5) Emergency Response Plan Activated
- 6) Customers were Impacted
- 7) Investigation by the TSB (P02H0017)

Q: Is this the critical spill?



TransCanada Pipeline Rupture

April 14, 2002 Summary

- 1) This incident doesn't match the description of the "critical" spill. There were 100 lives involved here, not 100 gal of various liquids.
- 2) This incident doesn't match the description of the "major" spills, where less than 20 gallons in total were spilled for all four spills.

How can this NOT be a critical or major spill?



TransCanada Corporate Social Responsibility Report

“Most importantly, none of these spills represent operational pipeline leaks.”

523 Minor Spills

28 Serious Spills

4 Major Spills -in all 4 spills, less than 20 gallons in total were spilled

1 Critical Spill -release of ~100 gallons of various liquids (lube oil)



TransCanada Pipeline
Nova Gas Transmission
Multiple Pipeline Ruptures

Outside Grande Prairie, AB

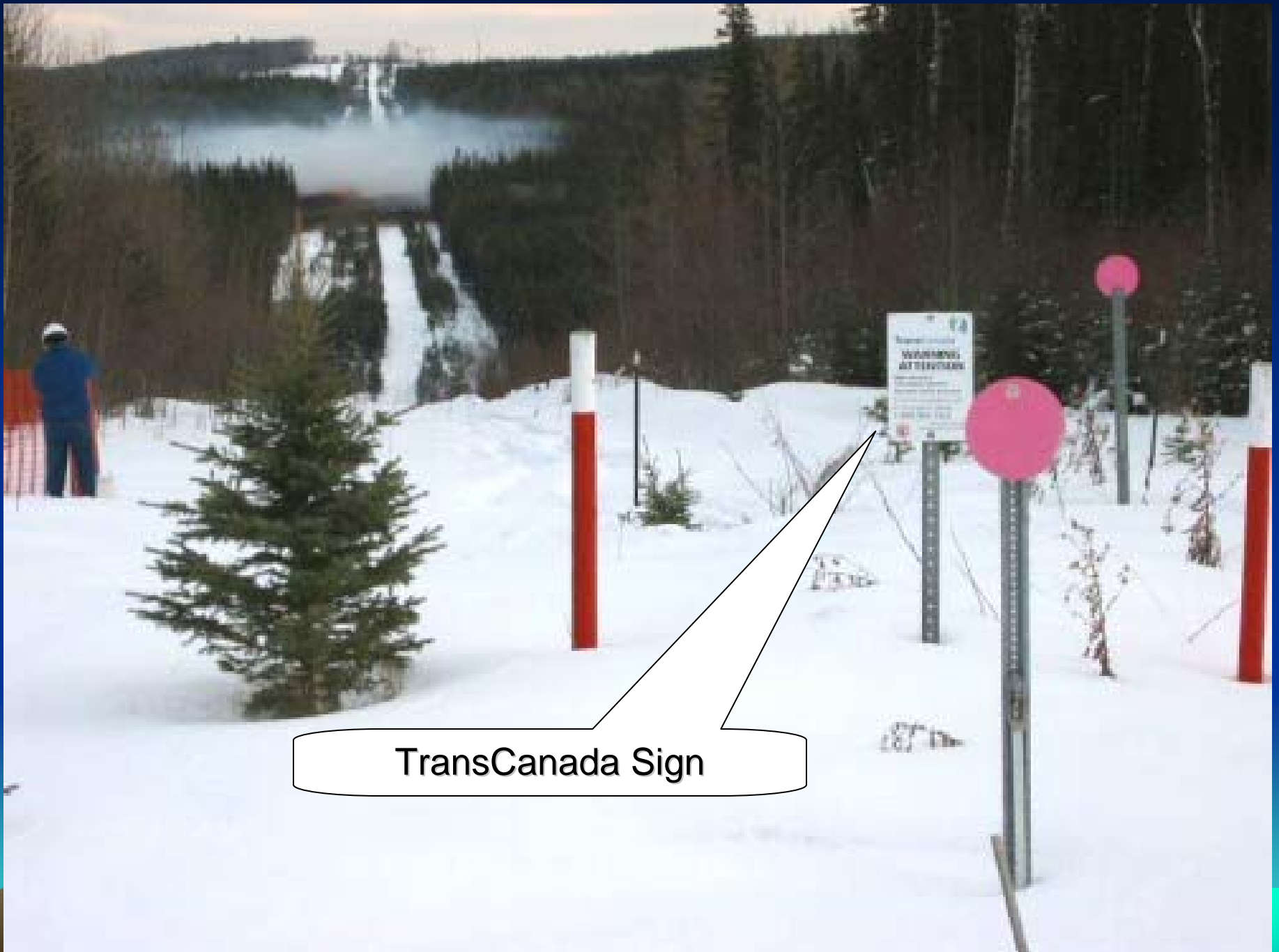
Dec 1-2, 2003



TransCanada Pipeline Nova Gas Transmission Multiple Pipeline Ruptures

The following photographs of one of the ruptures were provided by Don Gronlund of Fort St John, BC.



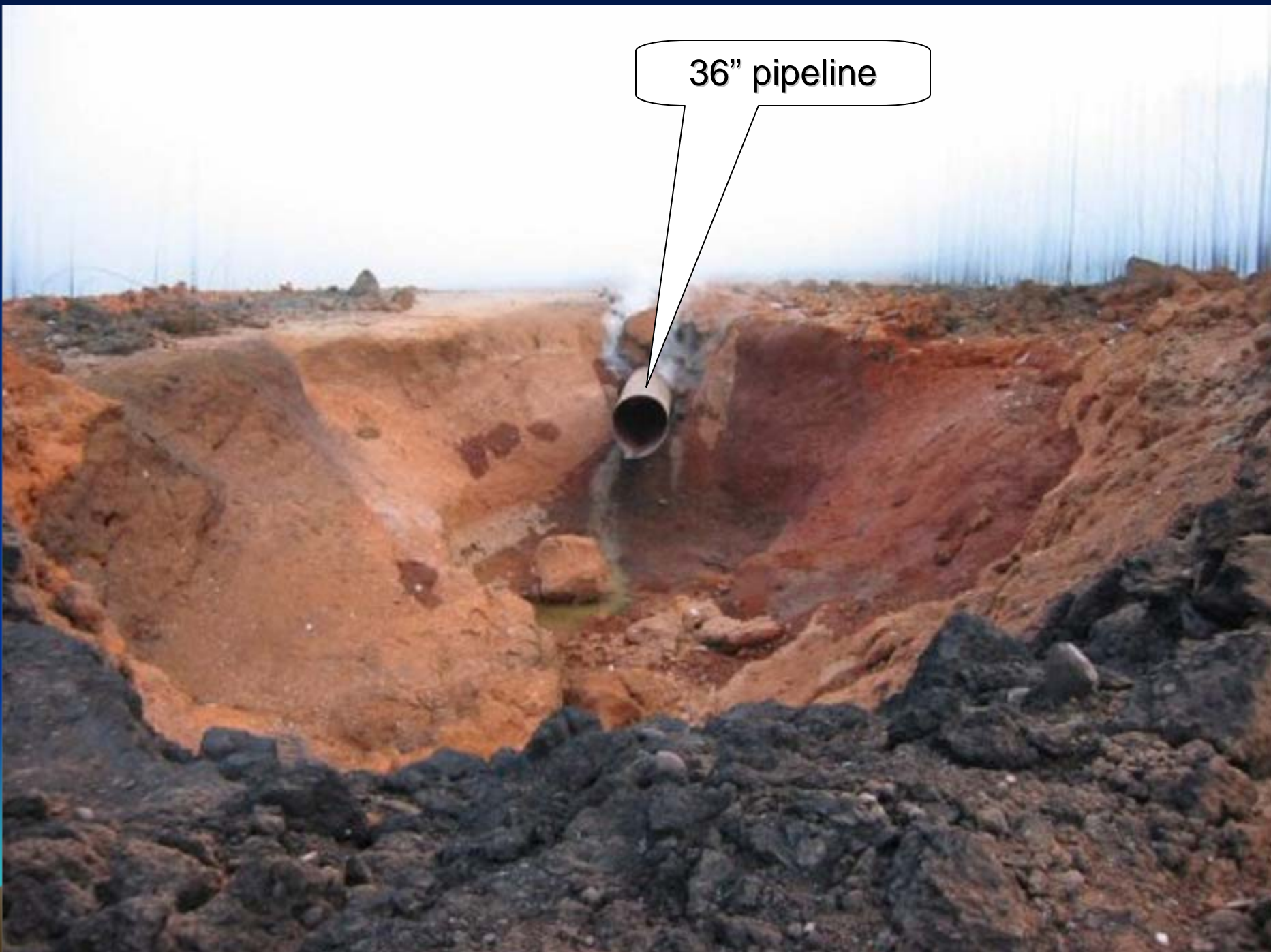


TransCanada Sign





36" pipeline







Western Alberta System Pipeline Incidents

CALGARY, Alberta - Dec. 2, 2003 - 1:00 p.m. MST - (TSX: TRP) (NYSE: TRP) - At approximately 7 a.m. MST , a natural gas pipeline break and resulting fire occurred on TransCanada's Alberta System, approximately 20 kilometres southwest of the communities of Valleyview and the Sturgeon Lake First Nation.

This is the second line break in the area in less than 24 hours. The first line break occurred approximately 15 km downstream of this incident at approximately 5:45 p.m. MST, Dec. 1, about 30 km southwest of the community of Little Smokey. The incident sites are about 90 and 110 km southeast of Grande Prairie.

TransCanada immediately activated its emergency response plan to isolate damaged sections of pipelines and allow the natural gas fires to burn themselves out. No injuries have been reported as a result of either incident. The extent of the damage to our system has not yet been determined.

Some shippers were impacted as a result of yesterday's break; however, there are no further impacts as a result of this second incident. Deliveries of gas to local communities have not been impacted as a result of either incident.

TransCanada Multiple Ruptures Dec 1–2, 2003 Summary

- 1) Multiple Explosions and Major Fires
 - 2) Emergency Response Plan Activated
 - 3) Major Product Loss (~200 MCF gas)
 - 4) Adverse Environmental Impact
 - 5) Shippers were Impacted
 - 6) Regulatory Investigation
- Q: Are these major or critical spills?



TransCanada Multiple Ruptures

Dec 1 – Dec 2, 2003

- 1) These multiple ruptures don't match the description of the "critical" spill, (release of ~100 gallons of various liquids)
- 2) These multiple ruptures don't match the description of the "major" spills, ("less than 20 gallons in total were spilled.")

What spills are these?



TransCanada Corporate Social Responsibility Report

“Most importantly, none of these spills represent operational pipeline leaks.”

523 Minor Spills

28 Serious Spills

4 Major Spills -in all 4 spills, less than 20 gallons in total were spilled

1 Critical Spill -release of ~100 gallons of various liquids (lube oil)



TransCanada Pipeline Nova Gas Transmission Additional Ruptures

Oct 8, 2005 12.4 MCF Natural Gas

Aug 17, 2005 9.9 MCF Natural Gas



TransCanada Corporate Social Responsibility

These events and photos have
nothing to do with a crude oil pipeline.

These are not pipeline issues,
they are credibility issues.



BEFORE THE PUBLIC UTILITIES COMMISSION
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IN THE MATTER OF THE APPLICATION)
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LP FOR A PERMIT UNDER THE SOUTH)
DAKOTA ENERGY CONVERSION AND)
TRANSMISSION FACILITIES ACT TO)
CONSTRUCT THE KEYSTONE PIPELINE)
PROJECT)

HP 07-001

**DIRECT TESTIMONY OF
MEERA KOTHARI**

19. Tell me specifically about the 576 spills posted on TransCanada's website?

Answer: Most importantly, none of these spills represent pipeline operational leaks.

5

Not Credible.
Under TransCanada's spill classification system, between 2004-2005, there were 576
spills. Of the 576 spills, 20 were near misses, 523 spills were classified as Minor, 28 were

classified as Serious, four spills were classified as Major and one as Critical. In the case of all
four "major" spills, less than 20 gallons in total were spilled. The "critical" spill involved the
release of approximately 100 gallons of various liquids such as lube oils.

6

TransCanada Statements Regarding Historical Spills



TransCanada Statements Regarding Historical Spills

Ms Tillquist has stated that Keystone's spill assessment is highly conservative and that the average size of pipeline spills from 2002–2007 is 12 barrels.



BEFORE THE PUBLIC UTILITIES COMMISSION
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DAKOTA ENERGY CONVERSION AND) **DIRECT TESTIMONY OF**
TRANSMISSION FACILITIES ACT TO) **HEIDI TILLQUIST**
CONSTRUCT THE KEYSTONE PIPELINE)
PROJECT)

20. Discuss the probable size of a spill from the Keystone pipeline.

Answer: For the Risk Assessment analysis, DNV utilized data based on a reporting criteria of 50 barrels or more. So the assessment, by design, overemphasizes the probable spill size. This is done to ensure conservatism in emergency response planning and other objectives.

Data from actual spills reveals that Keystone's assessment is highly conservative. Since the PHMSA reporting criteria changed in 2002 to require reporting of spills of five barrels or more, the average size of a reported pipeline spill has been 12 barrels, equivalent to approximately 500 gallons. If a spill were to occur on the Keystone Pipeline, these recent data affirm that the spill is very likely to be small.

PHMSA Office of Pipeline Safety

Hazardous Liquid Accident Summary

(Jan 2002 – Sep 2007)

Data from actual spills show that
Keystone's spill statement is
clearly false. The average spill is
nowhere near 12 barrels.



PHMSA Office of Pipeline Safety

Hazardous Liquid Accident Summary

(Jan 2002 – Sep 2007)

The Accident Summary Statistics report directly from PHMSA (available online) can be used to disprove Keystone's statement that the average spill since 2002 is 12 bbl.



**PHMSA OFFICE OF PIPELINE SAFETY
HAZARDOUS LIQUID PIPELINE OPERATORS
ACCIDENT SUMMARY STATISTICS BY YEAR
1/1/1986 - 09/30/2007**

Year	No. of Accidents	Fatalities	Injuries	Property Damage	Gross Loss (Bbls)	Net Loss (Bbls)
1986						220,317
1987						312,794
1988						114,251
1989						121,179
1990						54,663
1991						55,774
1992	212	0	38	\$59,140,002	157,065	68,810
1993	229	0	10	\$28,873,651	116,802	57,559
1994	245	1	7 ⁽¹⁾	\$62,166,058	164,387	114,002
1995	188	3	11	\$32,518,689	110,237	53,113
1996	194	5	13	\$85,136,315	160,316	100,949
1997	171	0	5	\$55,186,642	195,549	103,129
1998	153	2	6	\$63,308,923	149,500	60,791
1999	167	4	20	\$86,355,560	167,230	104,487
2000	146	1	4	\$150,555,745	108,652	56,953
2001	130	0	10	\$25,346,751	98,348	77,456
2002	147	1	0	\$47,410,656	95,642	77,269
2003	131	0	5	\$49,981,280	80,112	50,523
2004	144	5				68,558
2005	139	2				45,814
2006	110	0	2	\$53,713,137	6,263	53,806
2007	83	0	2	\$26,013,791	6,327	48,442
Totals ⁽²⁾	3788	44	276⁽¹⁾	\$1,225,675,095	3,929	2,020,638

Historical totals may change as PHMSA receives supplemental information on incidents.

**PHMSA OFFICE OF PIPELINE SAFETY
HAZARDOUS LIQUID PIPELINE OPERATORS
ACCIDENT SUMMARY STATISTICS BY YEAR
1/1/1986 - 09/30/2007**

Year	No. of Accidents	Fatalities	Injuries	Property Damage	Gross Loss (Bbls)	Net Loss (Bbls)
1986	210	4	32	\$16,077,846	282,791	220,317
1987	237	3	20	\$13,140,434	395,854	312,794
1988	193	2	19	\$32,414,912	198,397	114,251
1989	163	3	38	\$8,813,604	201,758	121,179
1990	180	3	7	\$15,720,422	124,277	54,663
1991	216	0	9	\$37,788,944	200,567	55,774
1992	212	5	28	\$20,146,062	127,065	68,810

A total of **603,598** bbl of oil were spilled at the reporting threshold of 50 barrels or more.

The important number is the total amount spilled.

2000	146	1	4	\$150,555,745	108,652	56,953
2001	130	0	10	\$25,346,751	98,348	77,456
2002	147	1	0	\$47,410,656	95,642	77,269
2003	131	0	5	\$49,981,280	80,112	50,523
2004	144	5	16	\$146,314,940	88,237	68,558
2005	139	2	2	\$149,690,733	137,017	45,814
2006	110	0	2	\$53,713,137	136,263	53,806
2007	83	0	2	\$26,013,791	66,327	48,442

Totals: 754 accidents

603,598 bbl

The average spill for years 2002-2007 = **800** bbl.

Office of Pipeline Safety

Hazardous Liquid Accident Data File

(Jan 2002 – Sep 2007)

In order for the average spill to be 12 barrels, there would have to have been 50,300 spills since 2002, or 20 spills every day.



Office of Pipeline Safety

Hazardous Liquid Accident Data File

(Jan 2002 – Sep 2007)

The OPS accident data file contains only 2,218 accident records, well short of the 50,300 needed for a 12 barrel average.

Keystone's spill statement is clearly false.



The Truth About Spills

Hazardous Liquid Pipelines

The actual average hazardous liquid pipeline spill since 2002 ranges from ~282 barrels (1+ gal) to ~660 barrels (5+ bbl)
... depending on the exact reporting criteria and the version of the database used.



**PHMSA Office of Pipeline Safety
Hazardous Liquid Pipeline Operators
Accident Summary Statistics by Year
Hazardous Liquid Spills - 1 gallon or more**

Year	Number of Accidents	Water Involved	HCAs Involved	Property Damage	Gross Loss Barrels	Net Loss Barrels	Ave Spill Barrels	Ave Spill Gallons
2002	443	43	56	\$49,106,732	92,929	73,926	210	8,810
2003	422	44	64	\$52,526,342	81,310	50,951	193	8,092
2004	362	53	66	\$145,515,991	89,228	68,941	246	10,352
2005	359	47	67	\$150,498,599	138,062	46,239	385	16,152
2006	333	29	60	\$49,798,528	137,486	54,253	413	17,341
2007	230	23	43	\$27,520,068	66,974	48,617	291	12,230
Totals	2149	239 11%	356 17%	\$474,966,260 \$221,017	605,989	342,927	282	11,843

Database Generated on 10/19/2007

There are 2,218 accident records in this database.

There are 69 records that have 0 in the LOSS field/column. They are not included on this report.

EXHIBIT Q

The Truth About Spills Hazardous Liquid Pipelines

Ms. Tillquist has rebutted my direct testimony including EXHIBIT C, stating that she was not able to reproduce many of the values reported (i.e. 660.)

I fully support my testimony as is.



The Truth About Spills Hazardous Liquid Pipelines

In her rebuttal, Ms. Tillquist displayed a “Table 1” showing oil spill statistics. Her own chart clearly shows an average spill of 287 barrels, not 12. The minimum spill listed is 0 barrels (all records included.)



BEFORE THE PUBLIC UTILITIES COMMISSION
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HP 07-001

**REBUTTAL TESTIMONY
OF HEIDI TILLQUIST**

4. Mr. Edward Miller at p. 8 and 9 of his testimony, discusses pipeline spill records from the Office of Pipeline Safety Database. Can you comment?

A. Many of the values reported by Mr. Miller are not reproducible. For example, spill volumes for hazardous liquid pipelines do not average 660 barrels as identified in Exhibit C (Table 1).

Table 1 Spill Volumes Based on the PHMSA Database

	All Hazardous Liquid Pipelines	Crude Oil Pipelines ¹
Mean (barrels)	287	164
Median (barrels)	3.0	3.0
Minimum (barrels)	0.0	0.0
Maximum (barrels)	49,000	33,000

Mean =
Average = 287
barrels

¹PHMSA Database is modified to remove non-petroleum hydrocarbons (e.g., ammonia, CO₂), highly volatile liquids (e.g., ethane, propane), offshore pipelines, and aboveground facilities not associated with Keystone (e.g., aboveground storage tanks).

The Truth About Spills Hazardous Liquid Pipelines

Ms. Tillquist's rebuttal contradicts her own direct testimony (average spill = 12 barrels) by a factor of 24 times (287 bbl versus 12 bbl)

Data from actual spills reveals that Keystone's assessment is highly aggressive.



BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION) HP 07-001
BY TRANSCANADA KEYSTONE PIPELINE,)
LP FOR A PERMIT UNDER THE SOUTH)
DAKOTA ENERGY CONVERSION AND) **DIRECT TESTIMONY OF**
TRANSMISSION FACILITIES ACT TO) **HEIDI TILLQUIST**
CONSTRUCT THE KEYSTONE PIPELINE)
PROJECT)

20. Discuss the probable size of a spill from the Keystone pipeline.

Answer: For the Risk Assessment analysis, DNV utilized data based on a reporting criteria of 50 barrels or more. So the assessment, by design, overemphasizes the probable spill size. This is done to ensure conservatism in emergency response planning and other objectives.

Data from actual spills reveals that Keystone's assessment is highly conservative. Since the PHMSA reporting criteria changed in 2002 to require reporting of spills of five barrels or more, the average size of a reported pipeline spill has been 12 barrels, equivalent to approximately 500 gallons. If a spill were to occur on the Keystone Pipeline, these recent data affirm that the spill is very likely to be small.

The Truth About Spills

Hazardous Liquid Pipelines

Mr. Chairman, land owners deserve the truth regarding pipeline oil spills. We are clearly not getting the truth from TransCanada. Neither are you.



BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA



IN THE MATTER OF THE APPLICATION)
BY TRANSCANADA KEYSTONE PIPELINE,)
LP FOR A PERMIT UNDER THE SOUTH)
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CONSTRUCT THE KEYSTONE PIPELINE)
PROJECT)

HP 07-001

**DIRECT TESTIMONY OF
HEIDI TILLQUIST**

20. Discuss the probable size of a spill from the Keystone pipeline.

Answer: For the Risk Assessment analysis, DNV utilized data based on a reporting criteria of 50 barrels or more. So the assessment, by design, overemphasizes the probable spill size. This is done to ensure conservatism in emergency response planning and other objectives. Data from actual spills reveals that Keystone's assessment is highly conservative. Since the PHMSA reporting criteria changed in 2002 to require reporting of spills of five barrels or more, the average size of a reported pipeline spill has been 12 barrels, equivalent to approximately 500 gallons. If a spill were to occur on the Keystone Pipeline, these recent data affirm that the spill is very likely to be small.

FALSE

The Truth About Spills Hazardous Liquid Pipelines

Thank you, Mr. Chairman.

Thank you very much for giving me
the opportunity to tell you the truth.

