

APPENDIX D

Leak Frequencies of Other Pipeline Operations

Leak Frequencies of Other Pipeline Companies

It is useful to compare the leak frequency experienced on the EPC pipeline to the leak frequencies of other pipeline companies. The leak rate from the EPC pipeline over the last 10 years of its operation was compared to leak rates of other pipeline companies. There were four leaks of more than 50 barrels from the EPC pipeline over the period of 1985 to 1995. The average leak frequency over the 450-mile long pipeline was $8.9\text{E-}04$ leaks/mile/year for these size leaks.

The numbers of reportable spills (> 50 barrels, or other trigger points) of refined petroleum products from pipelines were obtained from the US Department of Transportation (DOT), Office of Pipeline Safety (OPS) database at their web site (www.dot.ops.gov). The pipeline company associated with each reported leak is identified in the database, so it is possible to compile the total number of reportable leaks for each pipeline company. However, the miles of pipeline operated by each company are also needed to calculate the leak frequency in units of leaks/mile/year. The miles of pipeline operated by major companies were obtained from *Oil & Gas Journal* (OGJ) (True, Warren R., *Weather, Construction Inflation could Squeeze North American Pipelines*, OGJ, 96 (35), August 31, 1998). The DOT leak data were combined with the pipeline mileage information from the OGJ to calculate the average leak frequencies for nearly 60 pipeline companies. These failure rates and associated information are summarized in Table D-1. Some pipeline companies in the DOT database were not included in the OGJ article, so leak frequencies could not be determined for these companies. Also, changes in pipeline lengths due to changes in service, mergers and acquisitions, and line abandonments, make these calculations problematic.

The data in Table D-1 are sorted in order of increasing leak frequencies. The leak frequency of the EPC pipeline, $8.9\text{E-}04$, falls slightly below the average leak frequency of $6.2\text{E-}04$ leaks/mile/year for the companies listed in Table D-1. To bring the leak frequency of the Longhorn Pipeline down to the average leak frequency of $6.2\text{E-}04$ would require mitigation of about 30 percent. The best (lowest) leak frequency listed in Table D-1 was $7.4\text{E-}05$ for Company 1. The Longhorn Pipeline would need to achieve a mitigation level of approximately 92 percent to bring its leak frequency to the level of Company 1. Company 14 is one-quarter of the way down the leak frequency compilation. Thus, to bring the Longhorn Pipeline into the top quartile of companies with the lowest leak frequencies would require mitigation of 76 percent.

There are very few data in the public domain relating to the effects of mitigation on the degree of improvement achieved or achievable in reducing leak frequencies. However, in a 1995 article (Goc, J.M., *Risk Assessment/Management Program Evolves with Experience*. Pipeline and Gas Industry, June 1995, p. 45-46), Amoco Pipeline Company (APL) described its safety and integrity program that was started in 1987 for the purpose of reducing pipeline leak frequency. Through the application of mitigation measures (including a risk assessment methodology very similar to the EA model), APL was able to reduce the number of leaks by nearly 80 percent over a period of 9 years. This performance provides evidence that the application of mitigation measures can be effective in reducing leak frequencies.

The magnitudes of potential reductions are in the range shown by the tentative Index Sum-probability relationship discussed in the EA.

**Table D-1
Number of Spills of Petroleum Products
from Pipelines in the Last Ten Years (<1990)**

Company ID	PETROLEUM PRODUCTS (INCLUDING CRUDE OIL)			
	Accident Count, Last 10 Years	Mileage (Total) ²	Accidents per Mile	Accidents per Mile per year
1	13	17601	7.4E-04	7.4E-05
2	1	1303	7.7E-04	7.7E-05
3	1	1233	8.1E-04	8.1E-05
4	1	1176	8.5E-04	8.5E-05
5	1	750	1.3E-03	1.3E-04
6	5	3221	1.6E-03	1.6E-04
7	2	1284	1.6E-03	1.6E-04
8	1	619	1.6E-03	1.6E-04
9	9	5393	1.7E-03	1.7E-04
10	1	579	1.7E-03	1.7E-04
11	8	4339	1.8E-03	1.8E-04
12	2	1080	1.9E-03	1.9E-04
13	3	1608	1.9E-03	1.9E-04
14	2	962	2.1E-03	2.1E-04
15	2	962	2.1E-03	2.1E-04
16	2	951	2.1E-03	2.1E-04
17	1	460	2.2E-03	2.2E-04
18	1	425	2.4E-03	2.4E-04
19	2	755	2.6E-03	2.6E-04
20	1	366	2.7E-03	2.7E-04
21	2	696	2.9E-03	2.9E-04
22	18	6257	2.9E-03	2.9E-04
23	5	1688	3.0E-03	3.0E-04
24	15	4996	3.0E-03	3.0E-04
25	1	331	3.0E-03	3.0E-04
26	2	624	3.2E-03	3.2E-04
27	6	1732	3.5E-03	3.5E-04
28	11	3141	3.5E-03	3.5E-04
29	2	557	3.6E-03	3.6E-04
30	29	6130	4.7E-03	4.7E-04
31	34	7107	4.8E-03	4.8E-04
32	26	5353	4.9E-03	4.9E-04
33	14	2867	4.9E-03	4.9E-04
34	53	10408	5.1E-03	5.1E-04
35	1	177	5.6E-03	5.6E-04
36	24	4167	5.8E-03	5.8E-04
37	33	5322	6.2E-03	6.2E-04
38	18	2643	6.8E-03	6.8E-04
39	4	541	7.4E-03	7.4E-04
40	7	882	7.9E-03	7.9E-04

← Minimum

← Average

Company ID	PETROLEUM PRODUCTS (INCLUDING CRUDE OIL)			
	Accident Count, Last 10 Years	Mileage (Total) ²	Accidents per Mile	Accidents per Mile per year
41	4	476	8.4E-03	8.4E-04
42	13	1413	9.2E-03	9.2E-04
43	4	419	9.5E-03	9.5E-04
44	4	417	9.6E-03	9.6E-04
45	32	2802	1.1E-02	1.1E-03
46	33	2857	1.2E-02	1.2E-03
47	4	321	1.2E-02	1.2E-03
48	35	2769	1.3E-02	1.3E-03
49	1	78	1.3E-02	1.3E-03
50	11	720	1.5E-02	1.5E-03
51	2	122	1.6E-02	1.6E-03
52	6	339	1.8E-02	1.8E-03
53	2	113	1.8E-02	1.8E-03
54	11	615	1.8E-02	1.8E-03
55	1	55	1.8E-02	1.8E-03
56	48	2635	1.8E-02	1.8E-03
			MAX	1.8E-03
			MIN	7.4E-05
			AVERAGE	6.2E-04
			MEDIAN	3.5E-04

← Maximum