The oil pipeline industry has undertaken a voluntary environmental performance tracking initiative, recording detailed information about spills and releases, their causes and consequences.

The pipeline members of the American Petroleum Institute and the Association of Oil Pipe Lines believe that tracking and learning from spills will improve performance, thus demonstrating the industry's firm commitment to safety and environmental protection by its results.

This is one of a series of fact sheets and industry advisories about the Pipeline Performance Tracking System, "PPTS."

FACILITIES PIPING AND EQUIPMENT: FACTS FROM PPTS DATA FROM 1999 - 2001

Lower consequence but higher probability

Fortunately, releases occurring in Facilities Piping and Equipment (FP&E) tend to be smaller in size, remain contained on company property, and rarely impact the general public or water. However, focusing prevention efforts on FP&E spills could have a significant impact on reducing the total number of spill occurrences for an operator. Evaluation of maintenance procedures for pumps and valves, training for employees, and internal corrosion mitigation measures may provide benefits towards spill reduction.

Facts from PPTS Data

- Nearly half of all spills occurred in FP&E, however more than 75% of these incidents are less than 5 barrels.
- FP&E spills tend to be smaller in size than those from pipelines – accounting for only 17% of the total volume released.

Table 1

Role of Facilities Piping & Equipment Spills, 1999-2001

		Spill Size (Barrels)			
System Part	Units	<5*	5-49	50+	Total
Facilities piping	Number	694	144	57	895
All Releases	Number	1,246	367	269	1,882
Facilities piping	% of Total	56%	39%	21%	48%
Facilities piping	Barrels		2,611	50,707	53,318
All Releases	Barrels		6,756	310,859	317,615
Facilities piping	% of Total		39%	16%	17%

*Volume not recorded for spills of less than 5 barrels

- The vast majority were contained on company property (90%) and had no impact on water (94%).

- **Equipment or non-pipe failure** was identified as the most prevalent cause (57% short form / 44% long form). Long form spill data (for spills of 5 barrels or more, or involving a death, injury, fire or explosion) reveals pumps as being the part most frequently involved (33%), followed by valves (22%), and threaded or other fittings (21%, primarily stripped threads). Seal or packing failures caused the majority of the pump related spills.

Table 2

Long Form - Part Most Frequently Involved in Equipment or Non-Pipe Releases

Equipment Details	Pump	Threaded or Other Fitting	Valve	Other	Scraper Trap	Sump / Separator	Meter / Prover	Grand Total	Percent
Gasket or O-ring failure	1	1	7	3	3		1	16	18%
Malfunction	1	1	2	2		2		8	9%
Other equip or non-pipe	8	4	8	6	1			27	30%
Seal or packing failure	18		2				1	21	23%
Stripped threads etc	2	13	1	3				19	21%
Grand Total	30	19	20	14	4	2	2	91	100%
Percent	33%	22%	21%	15%	4%	2%	2%	100%	

Long form: spills of 5 barrels or more, or involving a death, injury, fire or explosion

- **Operator Error** was the next leading cause (17%). Valves left or placed in the wrong position accounted for the greatest share (45%) of Operator Error spills, followed by Other Human Error (26%), Motor Vehicle (9%), and Overpressure (9%).
- **Corrosion** was the third-ranked cause overall (12%). Internal corrosion in crude oil systems accounted for the majority of the Corrosion spills (54%) and volume (90%). Internal mitigation was reported for 24% of the crude oil internal corrosion spills. The remainder did not have internal mitigation (52%) or reported Unknown (24%).

Considerations for Operators

Once an operator has addressed higher consequence areas, focusing on Facilities Piping & Equipment spill causes can provide a significant reduction in the number of releases. The following may provide paths to improvement:

- Evaluation of maintenance procedures and containment options for pumps and valves
- Reviewing operational and maintenance procedures focusing on drivers for operator error
- Removal of dead legs in station piping where feasible
- Development and use of technology to find internal corrosion in station piping

For more information on Operator Error, see *PPTS Advisory: An Expanded View of Operator Error* (2003-7).