

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 results.

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

CORROSION: JUST THE FACTS

Corrosion, 1999-2001: largest number of onshore pipe spills, but no deaths, no injuries, few public safety impacts.

- ❖ Releases due to corrosion accounted for 29% of all releases and 49% of releases on onshore pipe over the 1999-2001 period. Almost three-quarters of the Corrosion incidents occurred on onshore pipe, as opposed to other parts of the pipeline system. Crude oil spills account for 84% of all Corrosion spills.
- ❖ Corrosion causes 46% of all crude spills, but only 14% of the HVL releases and 9% of the refined products spills.
- ❖ Almost all Corrosion incidents (95% of External Corrosion incidents and 87% of Internal Corrosion incidents) involve pinhole leaks or cracks, not ruptures or other types of failures.
- ❖ No deaths or injuries occurred due to any Corrosion incident, and only 1 (per year) involved a fire or explosion.

Corrosion Spills in PPTS, 1999-2001

Average Annual Number		Corrosion	All Other	Total	% Corrosion
<i>By System Location</i>	Tanks, Caverns	4	42	46	9%
	Facilities Piping /Equip	43	255	298	14%
	Offshore Pipe	3	8	11	30%
	Onshore Pipe	134	138	272	49%
	Grand Total	184	443	627	29%
<i>Onshore Pipe %</i>		<i>73%</i>	<i>31%</i>	<i>43%</i>	
<i>By Commodity</i>	Crude	154	184	338	46%
	HVL's+	8	48	56	14 %
	Refined Products	22	211	233	9%
	Grand Total	184	443	627	29%
	<i>Crude %</i>	<i>84%</i>	<i>42%</i>	<i>54%</i>	

Internal Corrosion accounts for over half of the Corrosion incidents on crude oil pipelines, and because of its crude oil share, 48% of all Corrosion incidents.

- ❖ Of the Corrosion incidents (an annual average of 71) reported to PPTS in increased detail because they involved a spill of 5 barrels or more or a public safety impact, 52% of them were due to External Corrosion, and 48% were due to Internal Corrosion.
- ❖ Crude oil accounted for 76% of the External Corrosion incidents, and for 93% of the Internal Corrosion incidents.

Corrosion Location by Commodity, 1999-2001				
<i>Spills of 5 bbls and more</i>		<i>External</i>	<i>Internal</i>	<i>Total</i>
<i>Average Annual Number</i>	Crude	28	32	60
	HVL's+	2	0	2
	Refined Products	7	2	9
	Total	37	34	71
<i>% by Commodity (Read down)</i>	Crude	76%	93%	84%
	HVL's+	5%	1%	3%
	Refined Products	19%	6%	13%
	Total	100%	100%	100%
<i>% of Commodity by Location (Read across)</i>	Crude	47%	53%	100%
	HVL's+	83%	17%	100%
	Refined Products	78%	22%	100%
	Total	52%	48%	100%

- ❖ Of 110 External Corrosion Releases reported for 1999-2001 (or 37 per year)
 - 86% were on Onshore Pipe
 - 80 of 94 onshore pipe were from galvanic corrosion
 - 12 of 94 onshore pipe had had ILI
 - 89 of 94 onshore pipe were leaks not ruptures
 - 64 of 94 onshore pipe had cathodic protection
 - 55 of 94 either didn't know or didn't specify coating type; 24 had coal tar coating; 5 had fusion-bonded epoxy
- ❖ Of 102 Internal Corrosion Releases reported (34 per year)
 - 70% were on Onshore Pipe
 - 5 of 71 onshore pipe had had ILI
 - 38 of 71 onshore pipe had Internal Corrosion Mitigation Measures in place

Considerations for Operators

Corrosion is an important cause of spills from crude oil systems but causes relatively small share of spills from HVL and refined product systems. For crude oil systems, the data also show that about as many incidents are due to Internal Corrosion as External Corrosion, but for HVL and refined product systems, Internal Corrosion is a small share of a small number of incidents.

While incidents related to External Corrosion in refined products and HVL pipe are already relatively infrequent, reducing the number even further should be possible through inspection with newer high resolution inline inspection tools. For crude oil pipeline systems, additional improvement in the number of spills may also be more readily available with the increased use and enhancement of inline inspection tools designed to discriminate between external and internal metal loss, thus allowing the more reliable identification of active Internal Corrosion.

For further information about PPTS and its lessons, go to <http://ppts.api.org/>.