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Statistical analysis of spills from Western European cross-country oil pipelines 1971-2012

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on behalf of CONCAWE

Content

- The "CONCAWE" network
- Safety record
- Spillage incidents
  - Number and frequency
  - Spilled volumes
  - Ground area affected
  - Causes
  - Hole size

The "CONCAWE" network in picture

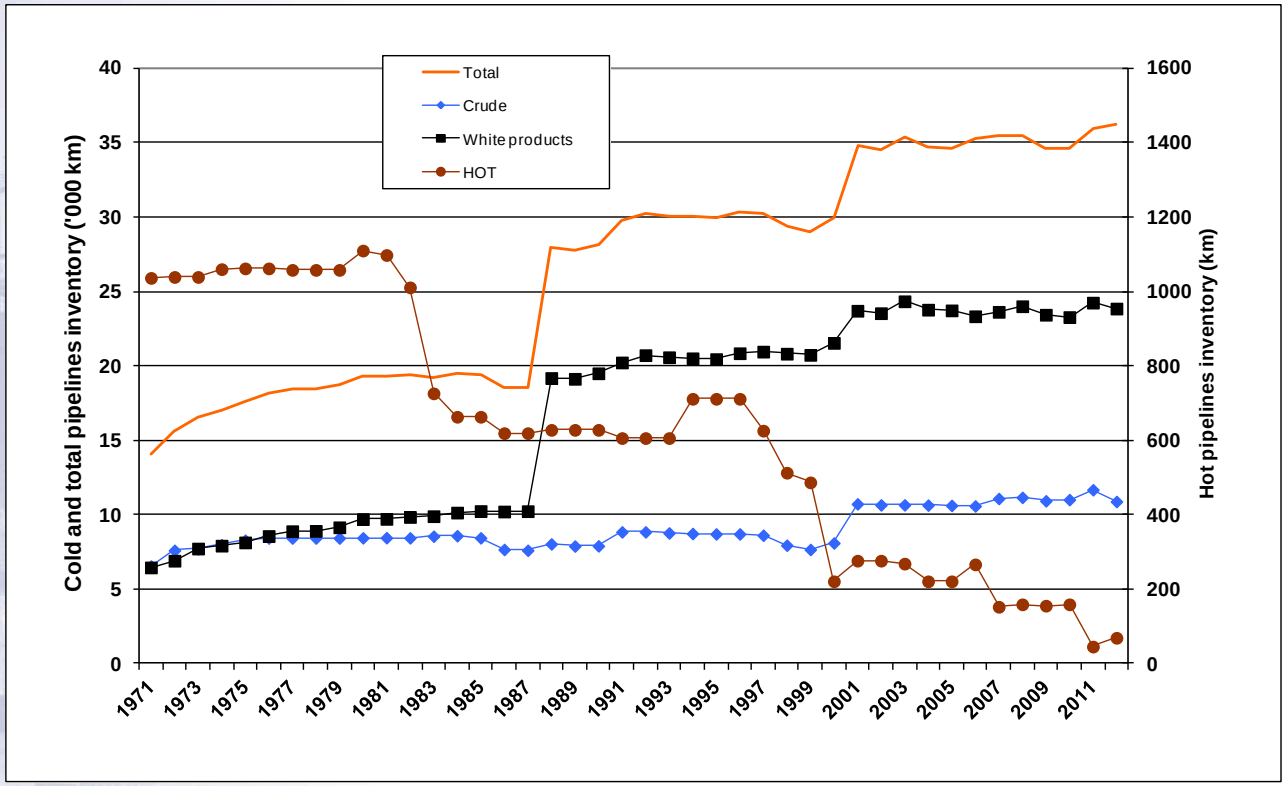
The "CONCAWE" network in figures

- **CONCAWE maintains contact with 79 companies**
  - **About 180 separate pipeline systems**
  - **Divided in over 730 sections**
  - **Combined length: > 37,000 km**
- **For 2012 we received information from 71 companies**
  - **156 systems**
  - **680 sections**
  - **36,251 km combined length**
  - **Combined throughput ± 700 Mm^3**
  - **Traffic* volume ± 115 10^9 m^3.km**
    - Crude: 77 10^9 m^3.km
    - Products: 38 10^9 m^3.km

**Traffic = flow rate x distance travelled*

The "CONCAWE" network in figures (cont'd)

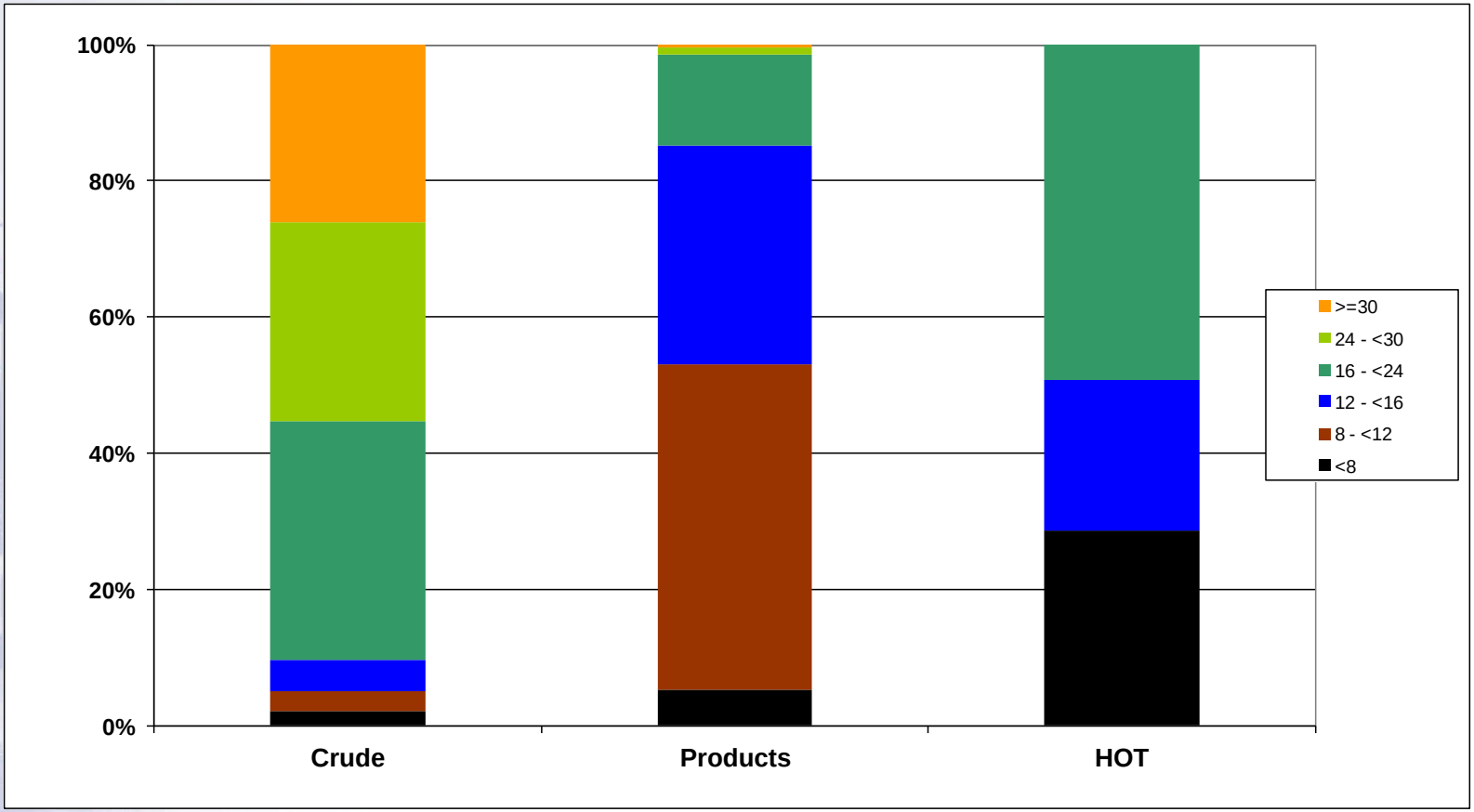
Inventory by service and over time



- The inventory has increased over the years as more operators joined (NATO, former Eastern bloc)
- "Hot" pipelines has virtually all been retired

The "CONCAWE" network in figures (cont'd)

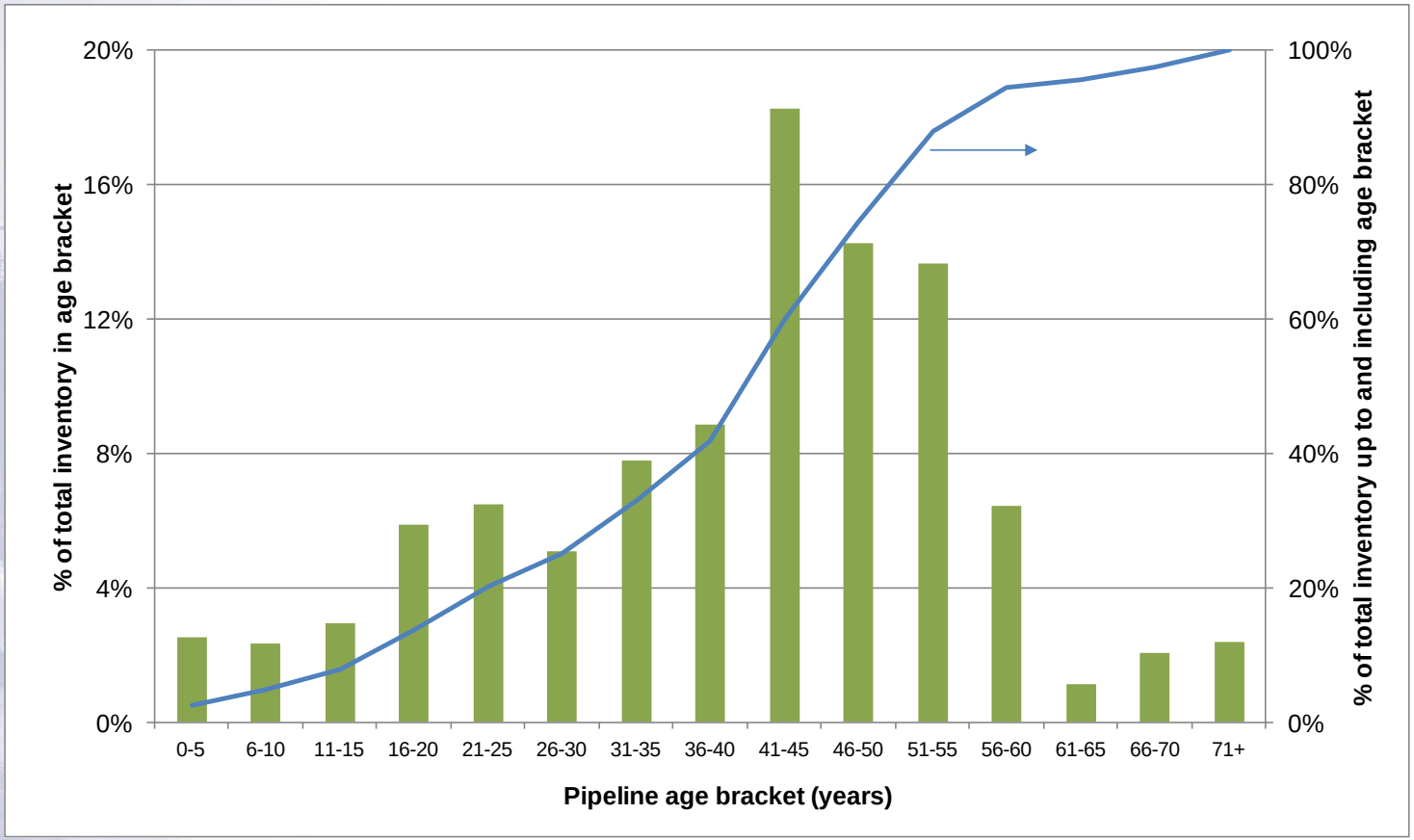
Diameter distribution (2012)



Crude lines tend to be larger than product lines

The "CONCAWE" network in figures (cont'd)

Age distribution (2012)

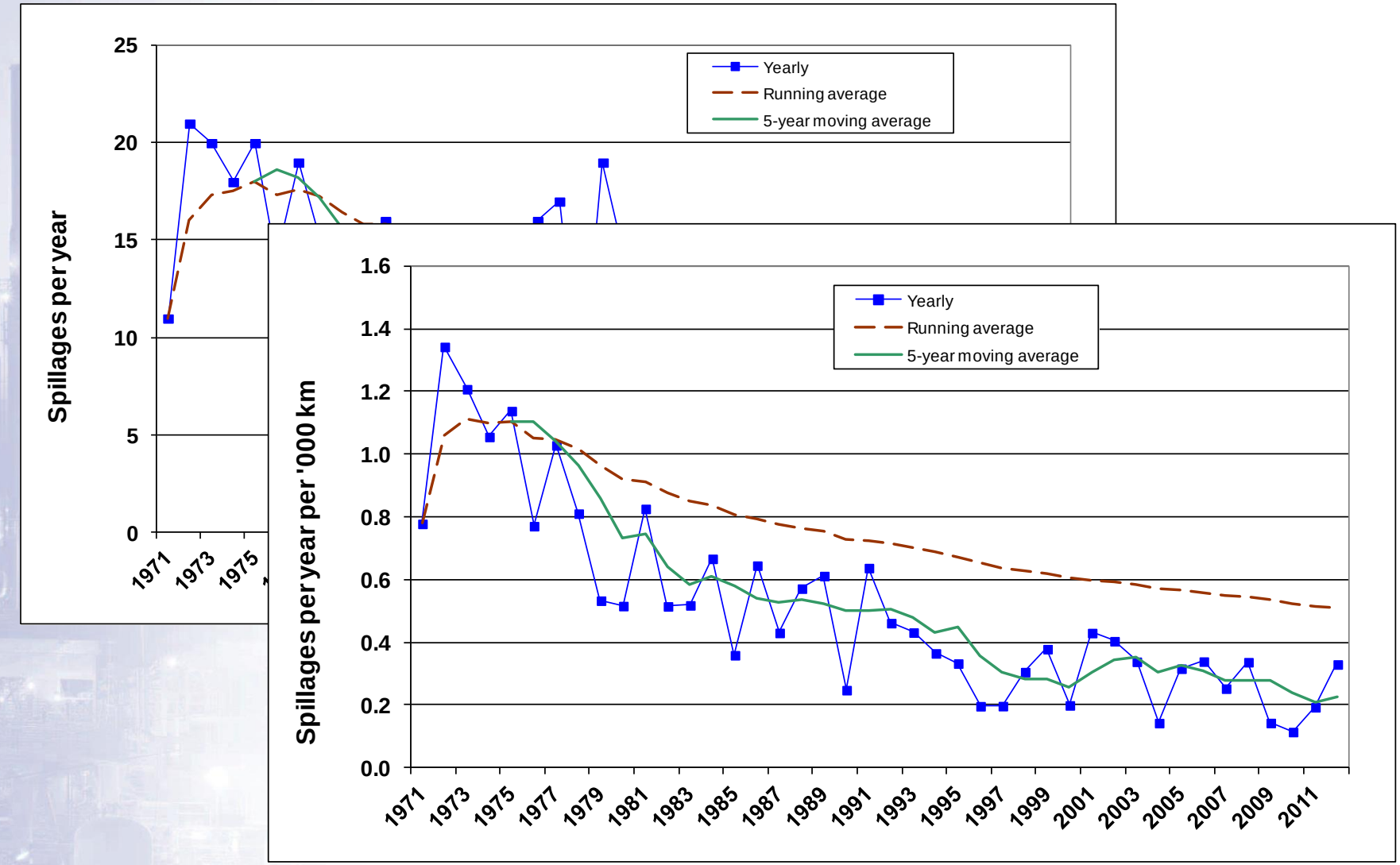


Nearly 60% of the inventory is over 40 years old

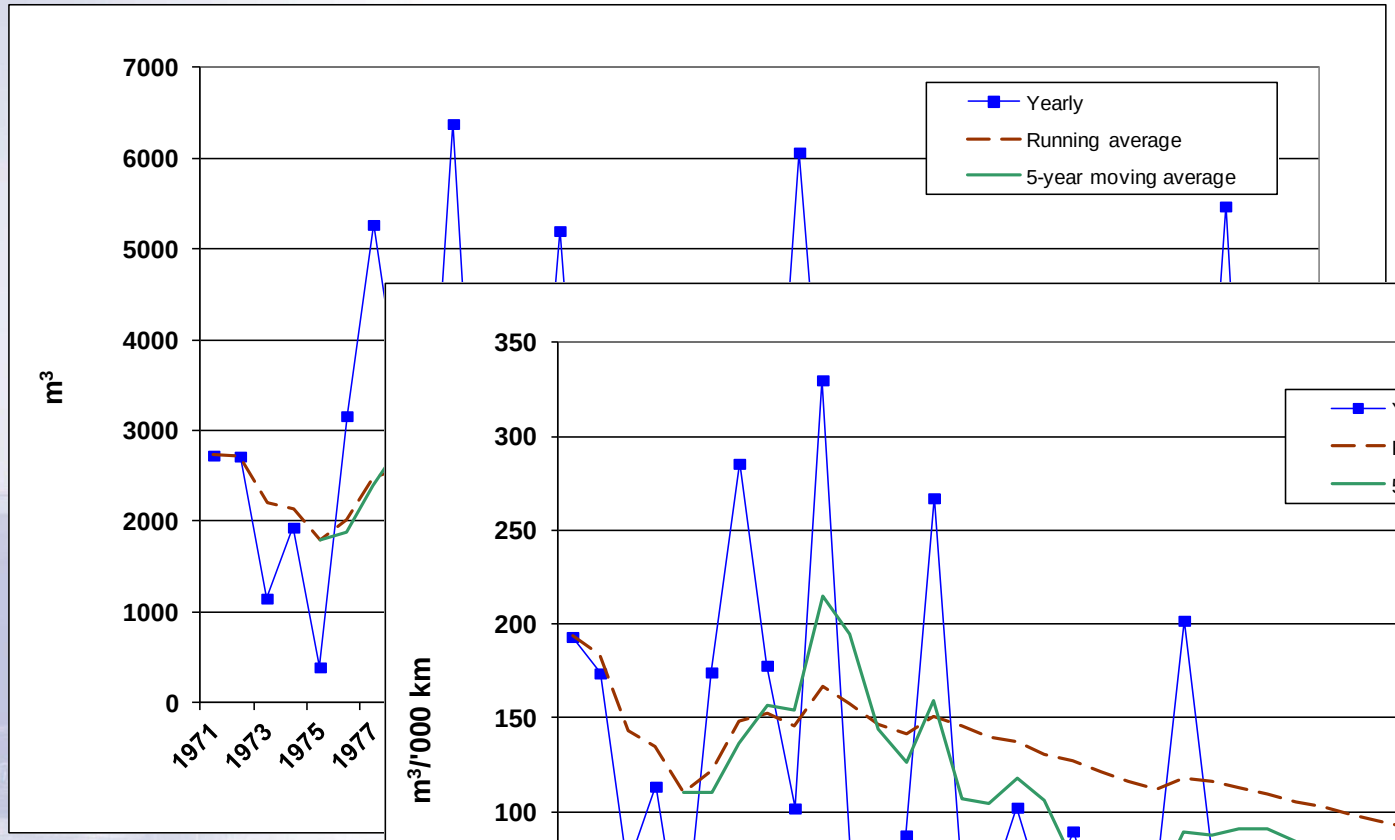
Safety record
(in relation to spillage incidents)

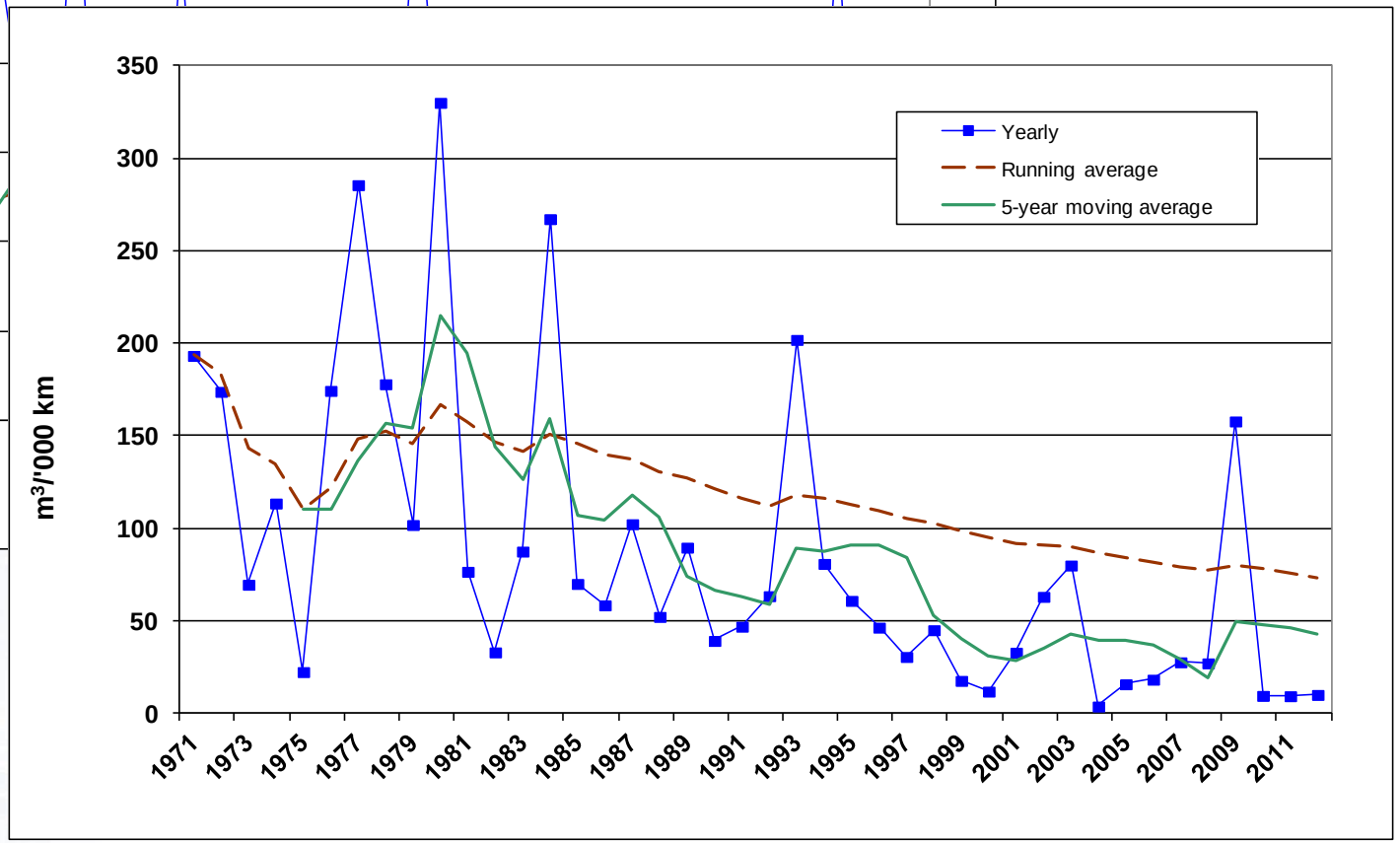
- 3 injuries reported since 1971
  - Last recorded injury was in 2006
- 14 fatalities in 42 years, none involving members of the public
  - Last recorded fatality was in 1999 (1 fatality)
- 9 fires in 38 years
  - Last fire in 1999

Spillage incidents

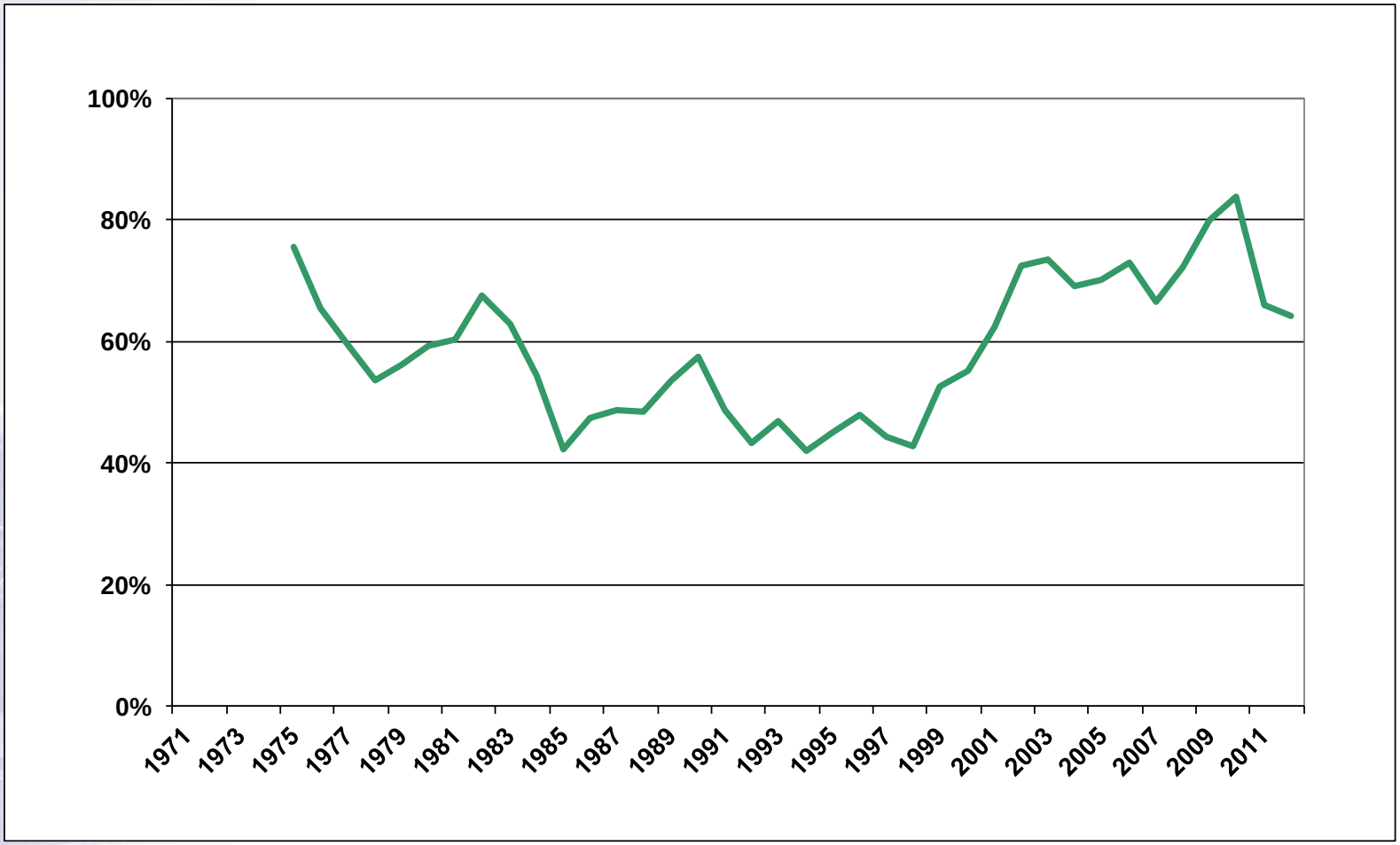


Gross volume spilled



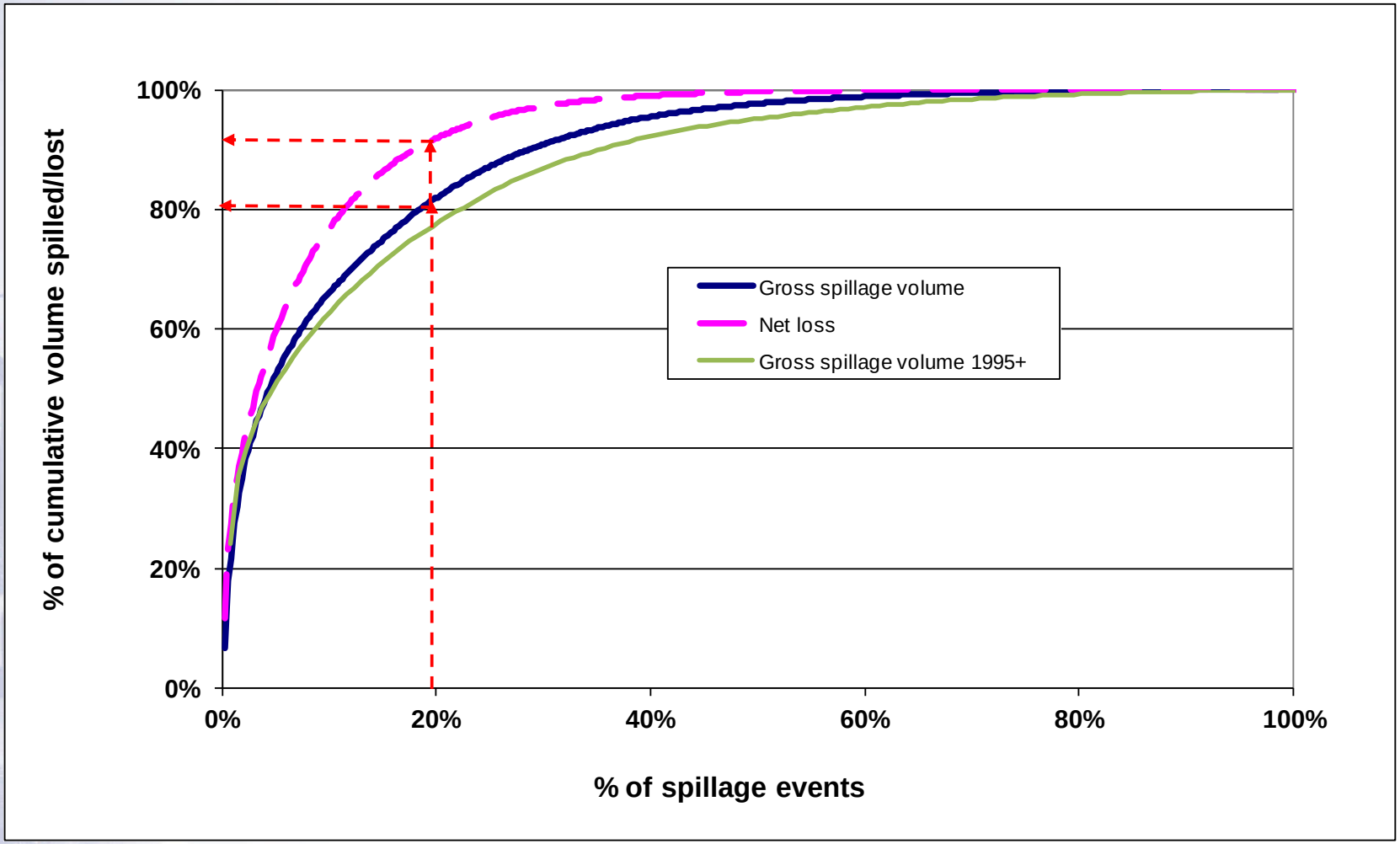


Spilled volume recovered



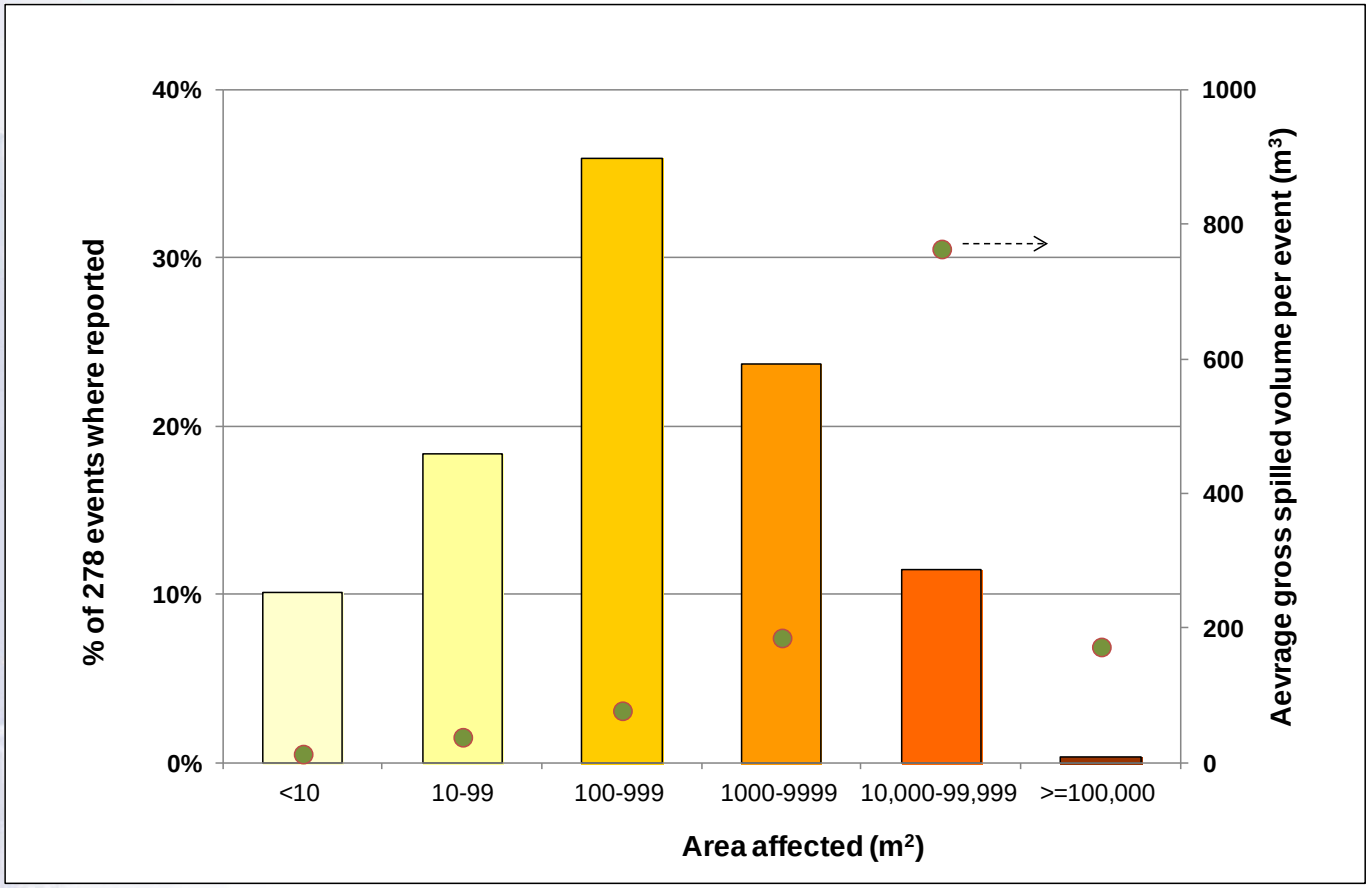
- About 60% of spilled volume is recovered on average

Spillage volume distribution



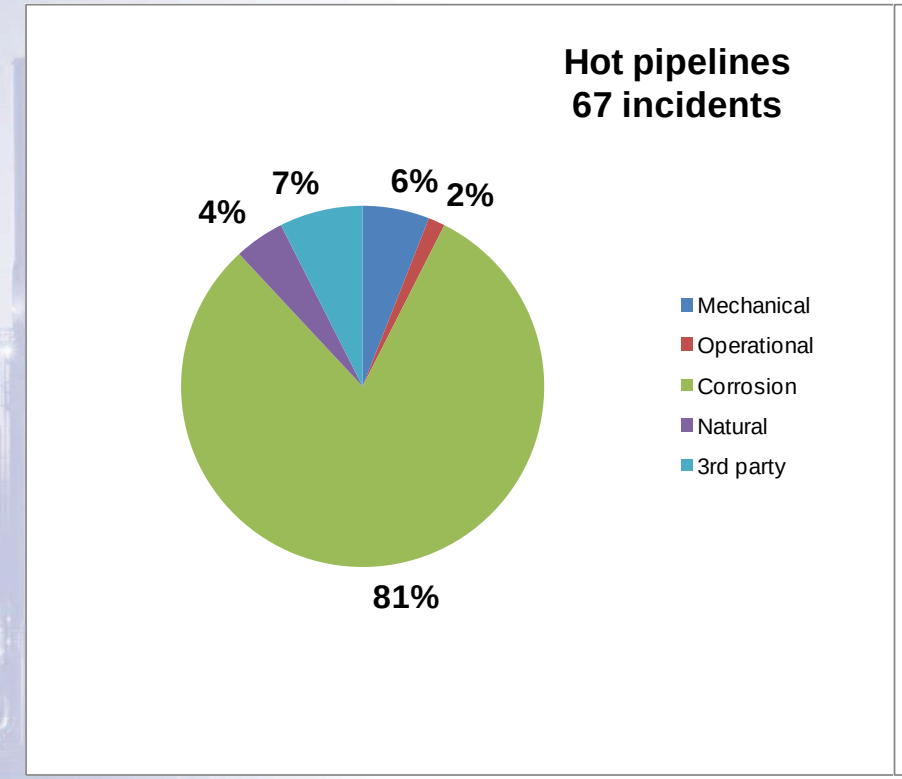
- **20% of events account for 80% of the gross spillage and 90% of the net loss**
  - The picture has not changed much with time

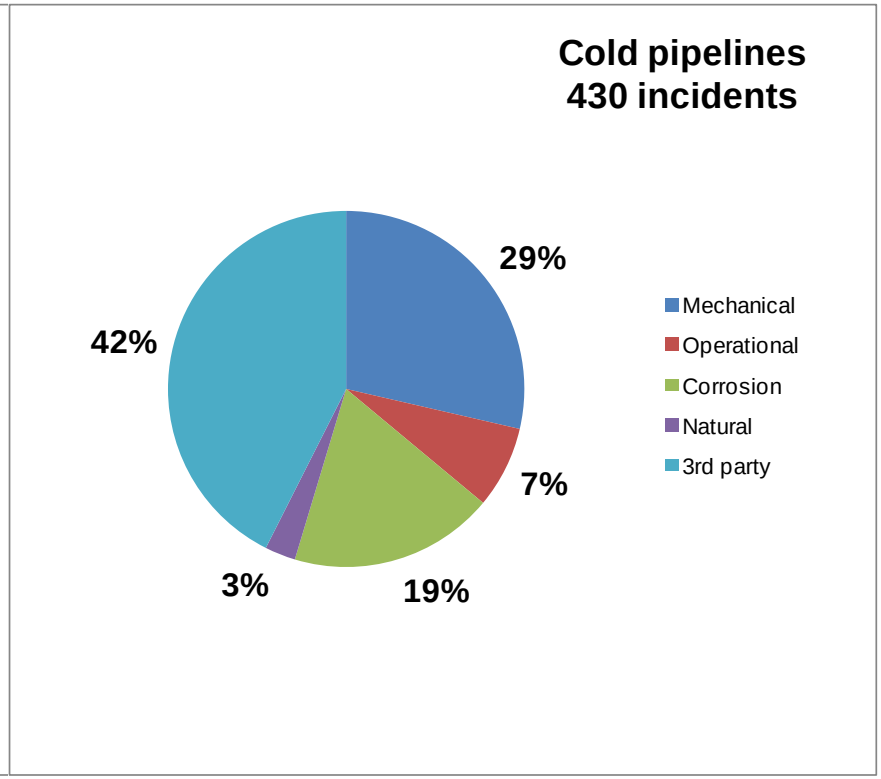
Ground area affected by spills



- **A relatively small spilled volume can contaminate a large area**

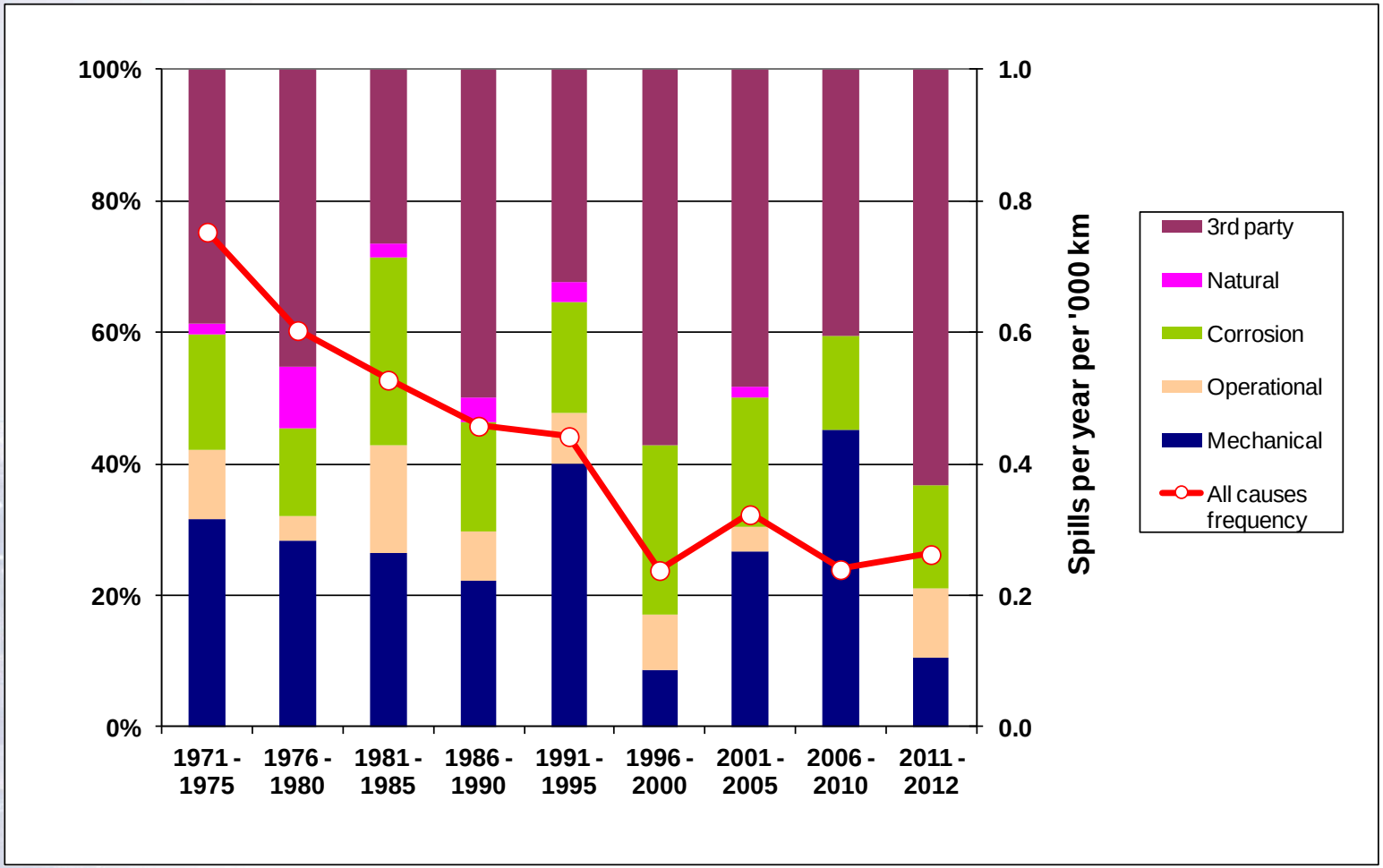
Causes of spills: all events





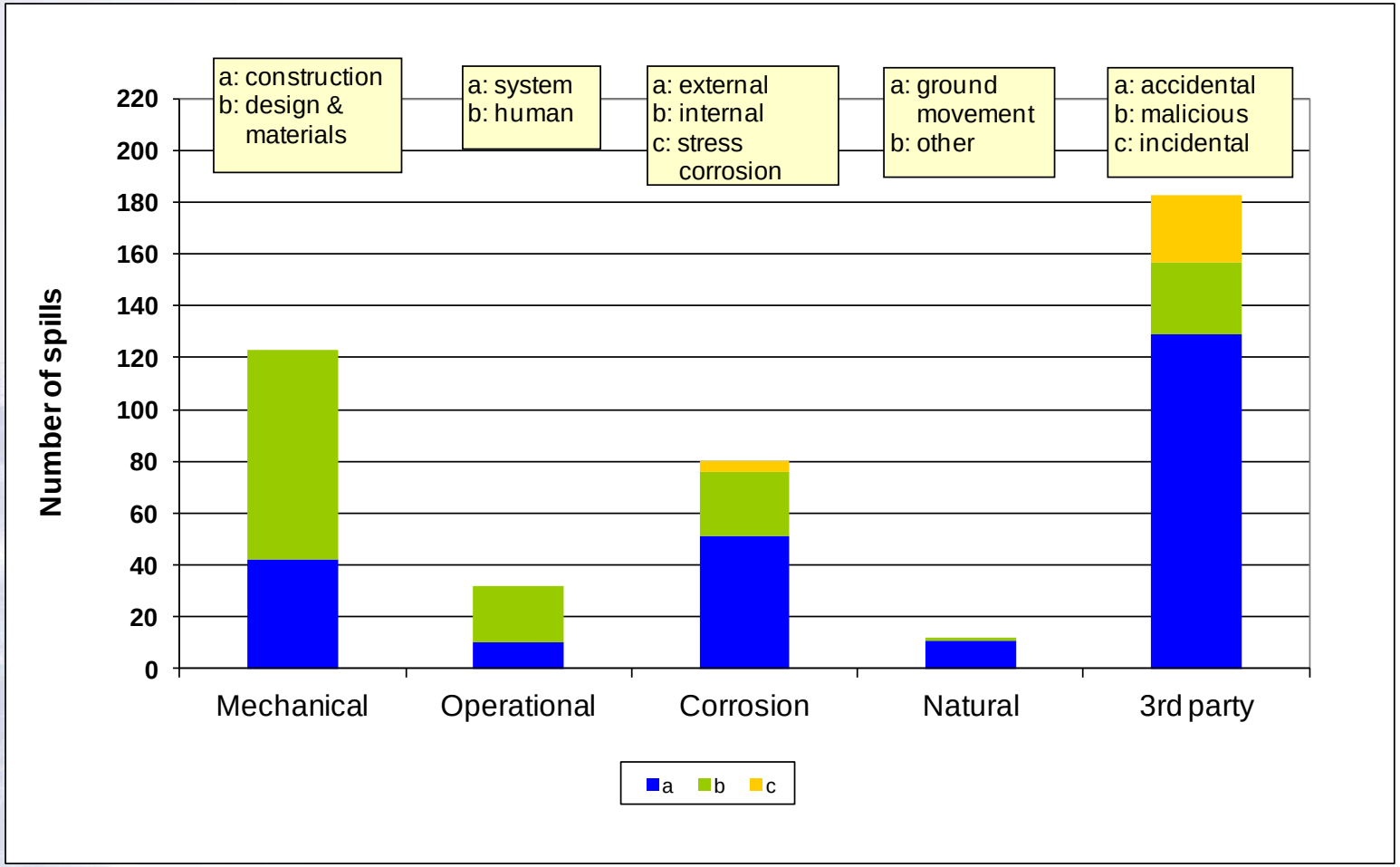
- **Most spills on hot pipelines are corrosion related**
  - **Hot lines have virtually all been shutdown**
- **On cold pipelines the main causes are mechanical and third party interference**

Causes of spills in cold pipelines over time



- **Third party interference remains the main cause**
- **After an increase in the last decade mechanical causes have become less prevalent in the last two years**

Causes of spills in cold pipelines

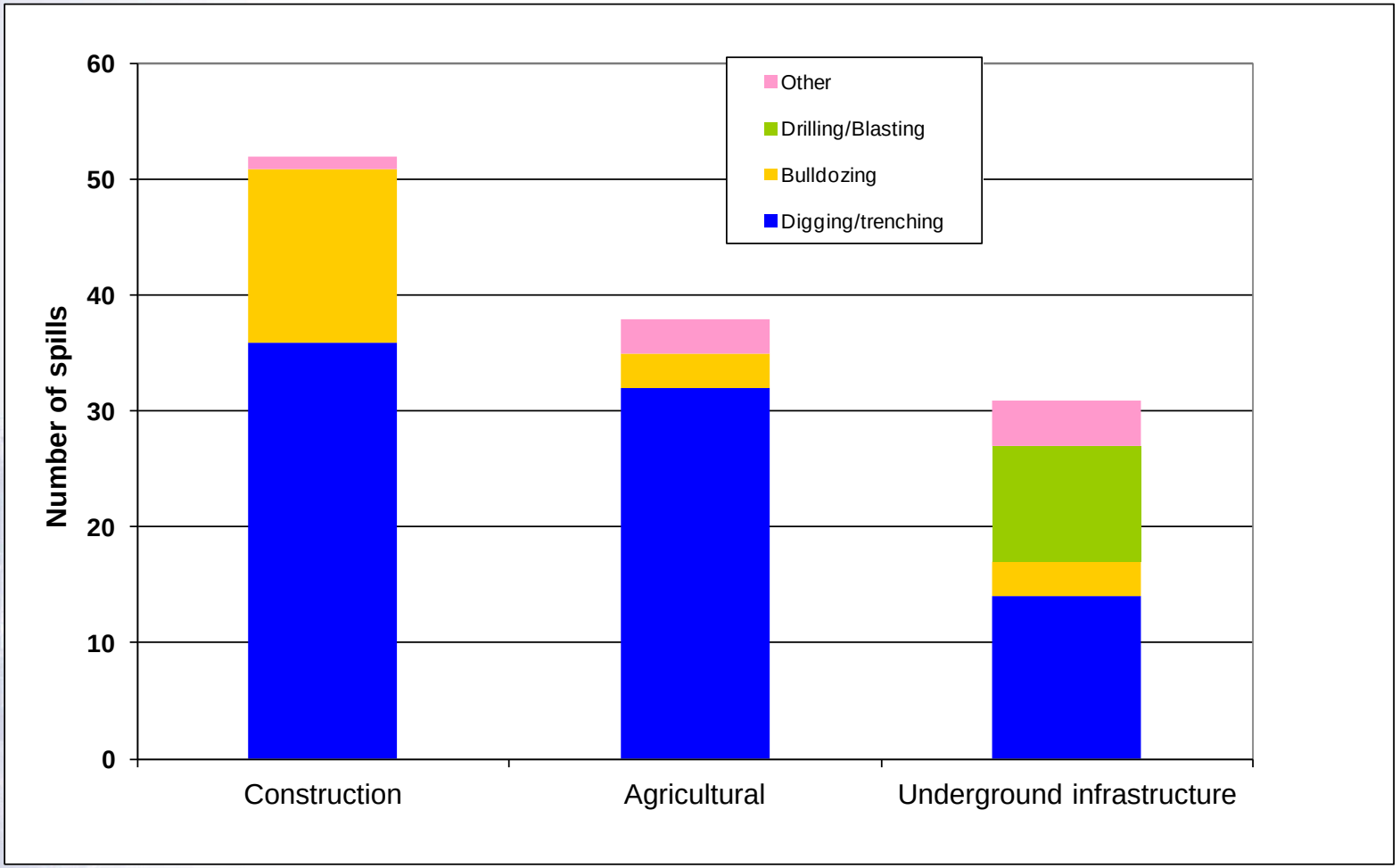


Spillage incidents in the last 5 years

	2008	2009	2010	2011	2012	2008-2012
Spillage incidents	**12**	**5**	**4**	**7**	**12**	**40**
MECHANICAL FAILURE						
Construction	2	1				3
Design and Materials	5	3	2	1	1	12
OPERATIONAL						
System						
Human				2		2
CORROSION						
External	1		1		2	4
Internal					1	1
Stress corrosion cracking						
NATURAL HAZARD						
Subsidence						
Flooding						
Other						
THIRD PARTY ACTIVITY						
Accidental	4		1	1	4	10
Intentional/Malicious				3	2	5
Incidental		1			2	3

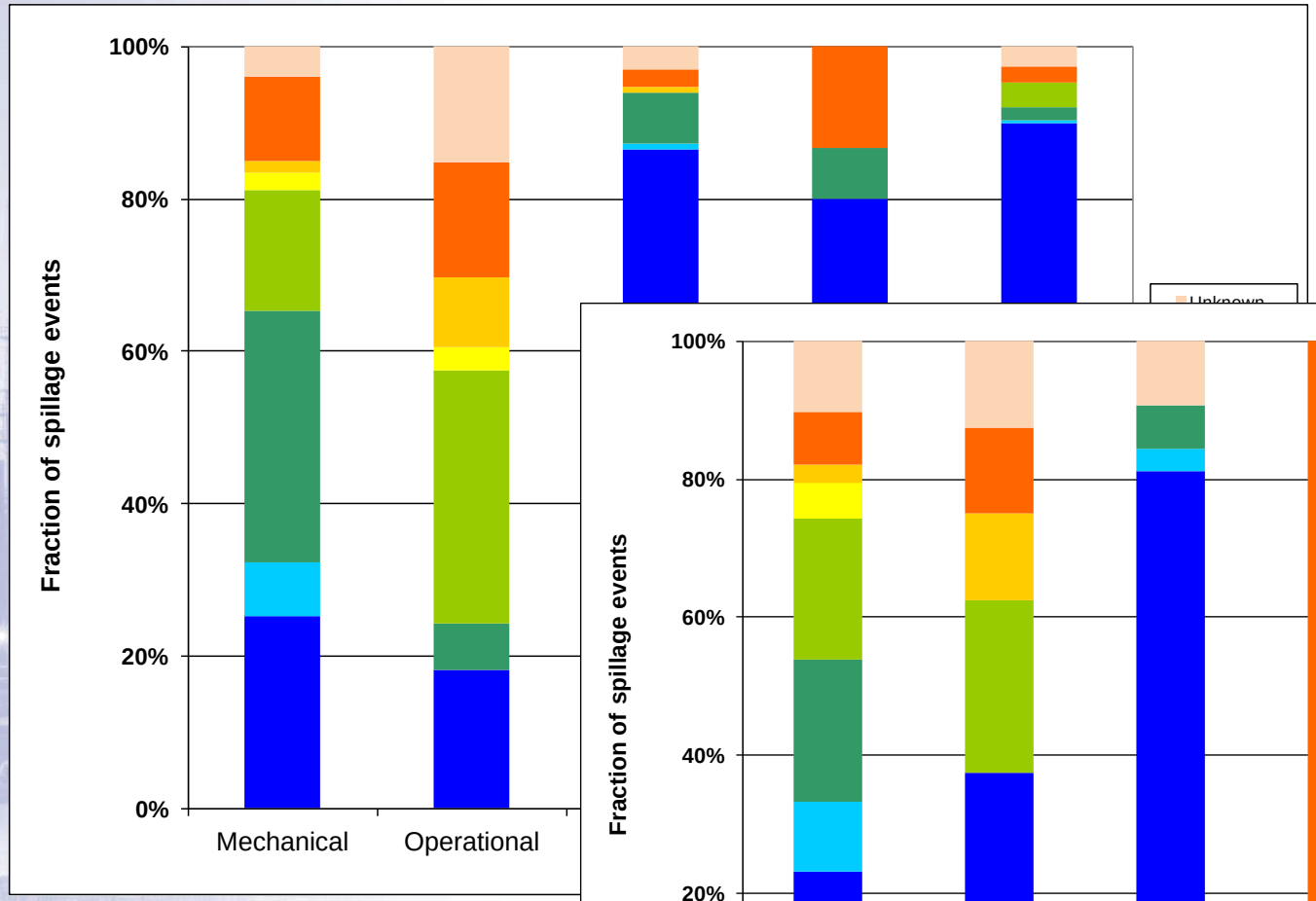
- **The picture for recent years is similar to the long term trend**
  - **The proportion of intentional or malicious damage is twice the long-term average**

Circumstances of third party spills



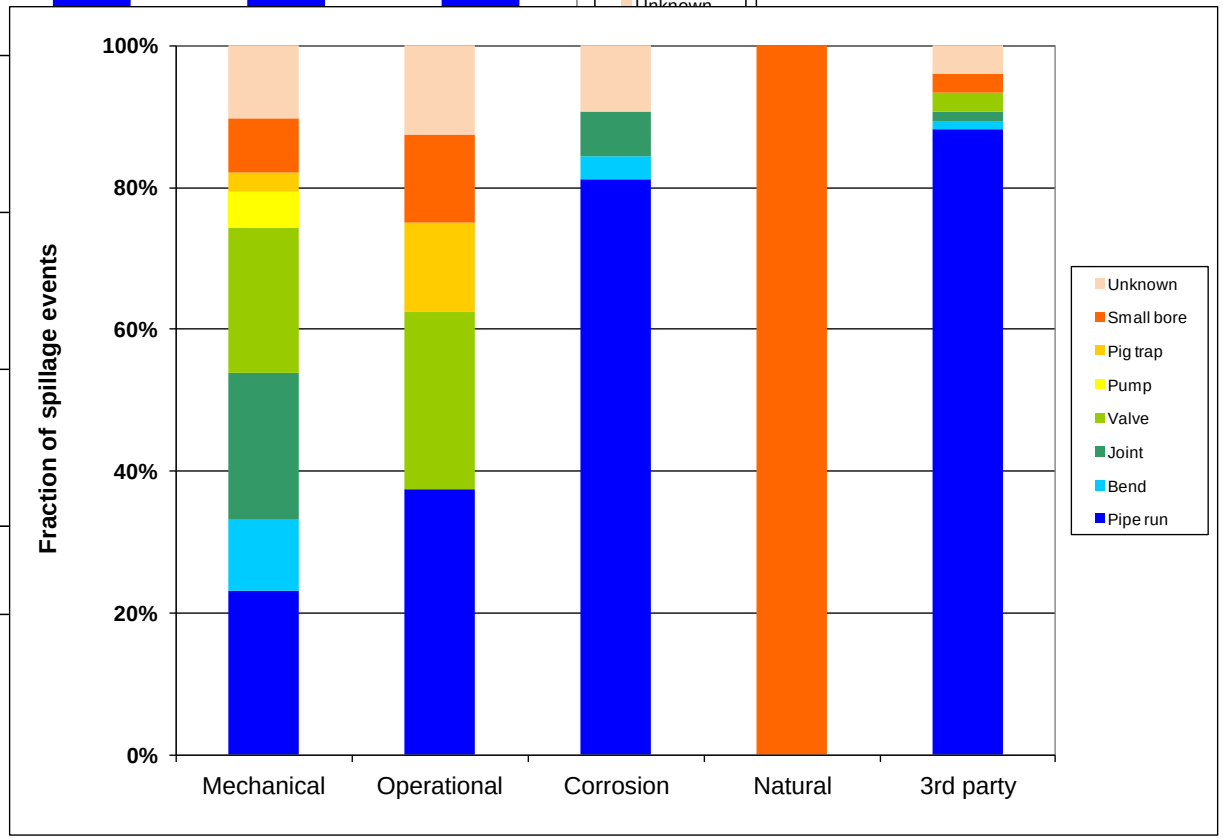
- **Most third party related spills occur during digging or trenching activities**

Failure location

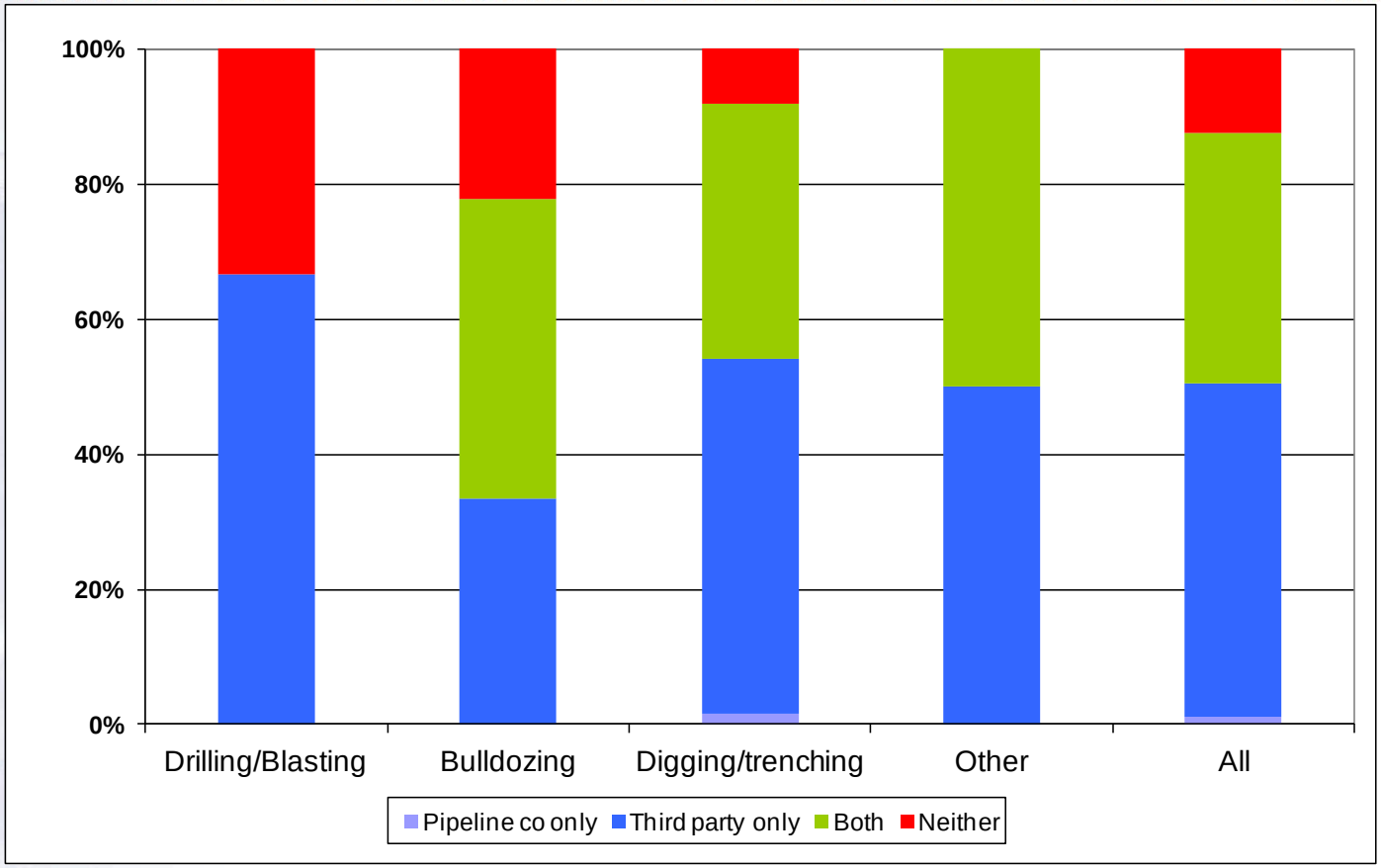


1971-2012

1995-2012

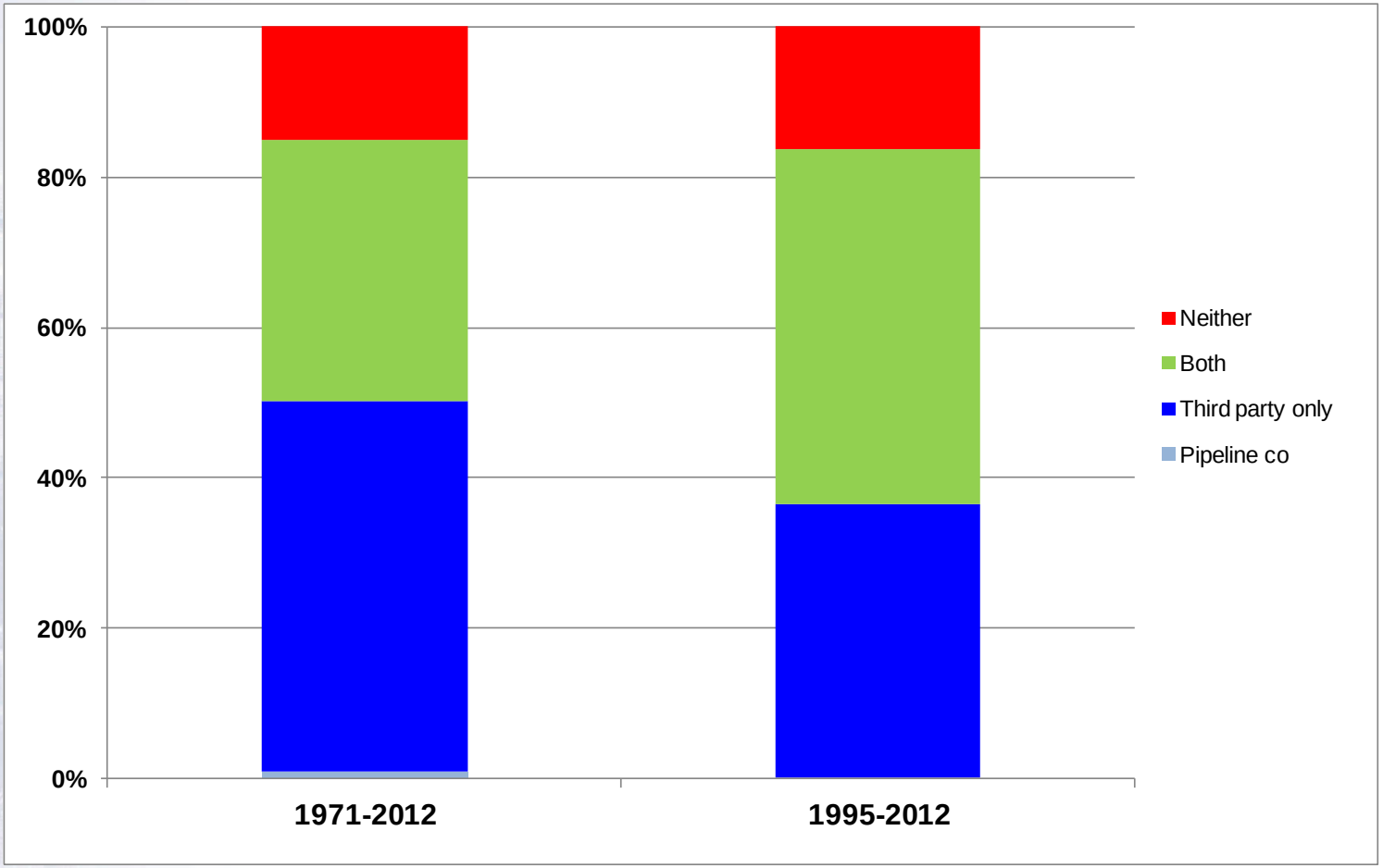


Mutual awareness of activities



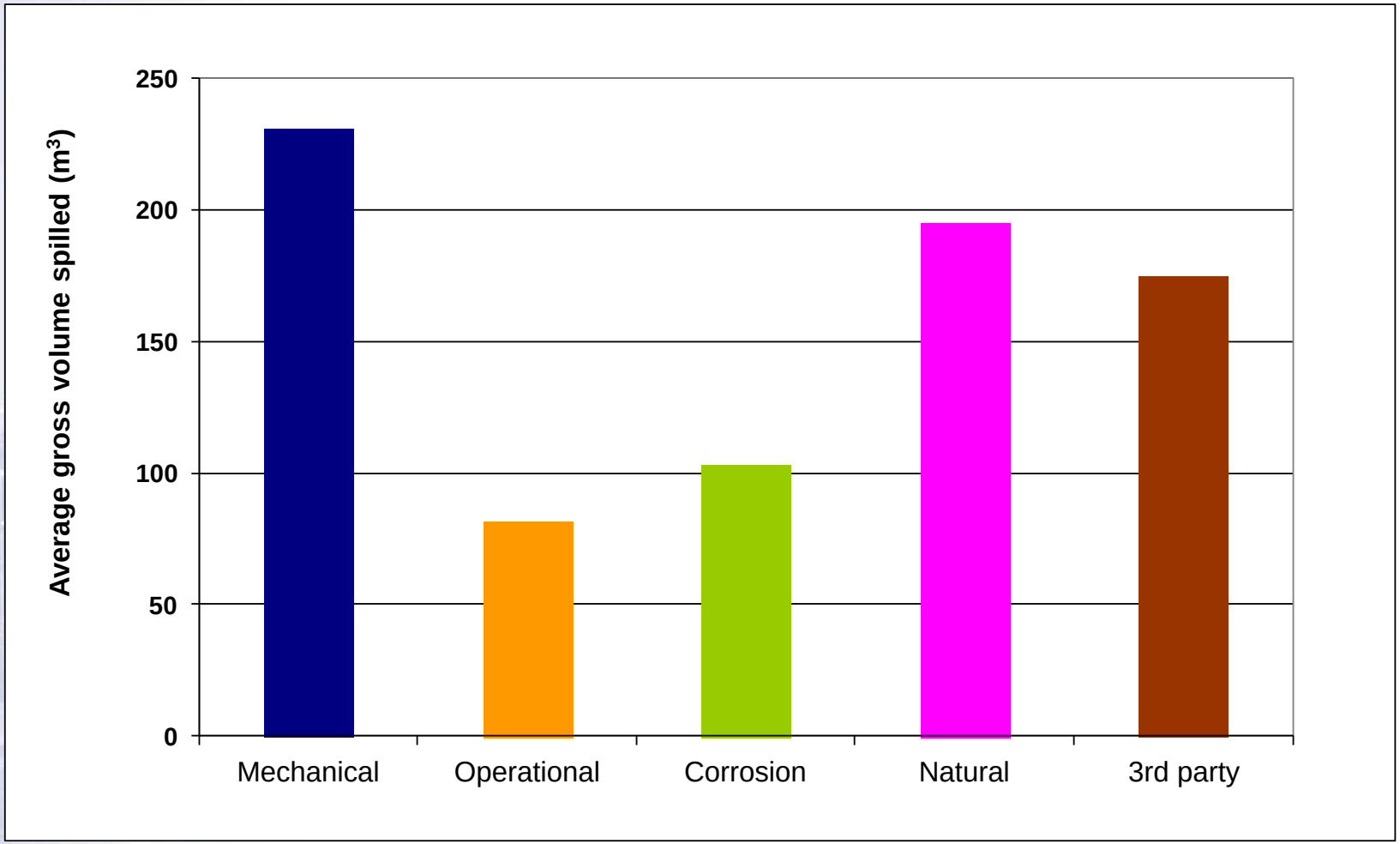
- **In nearly 50% of cases the third party is aware of the presence of a pipeline but the pipeline company is not informed of potentially hazardous activities near the pipeline**
- **Incidents occur even when both parties are mutually aware**
- **In some 12% of cases neither party is aware of the other**

Mutual awareness of activities



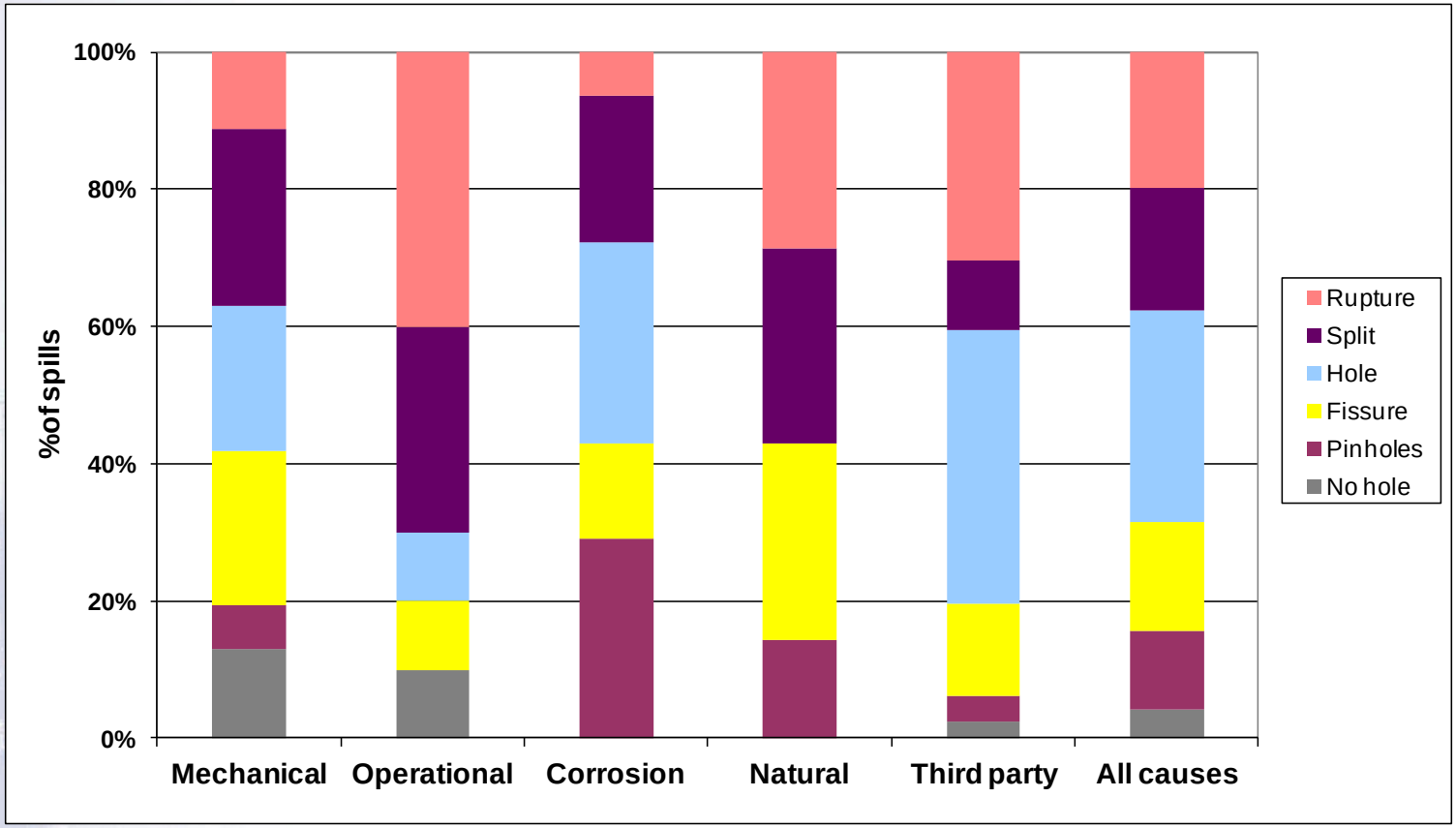
- **Parties are increasingly mutually aware of each others activities…**
- **… But incidents still occur**

Gross volume spilled by cause



- **Operational and corrosion related causes result in lower spilled volumes**

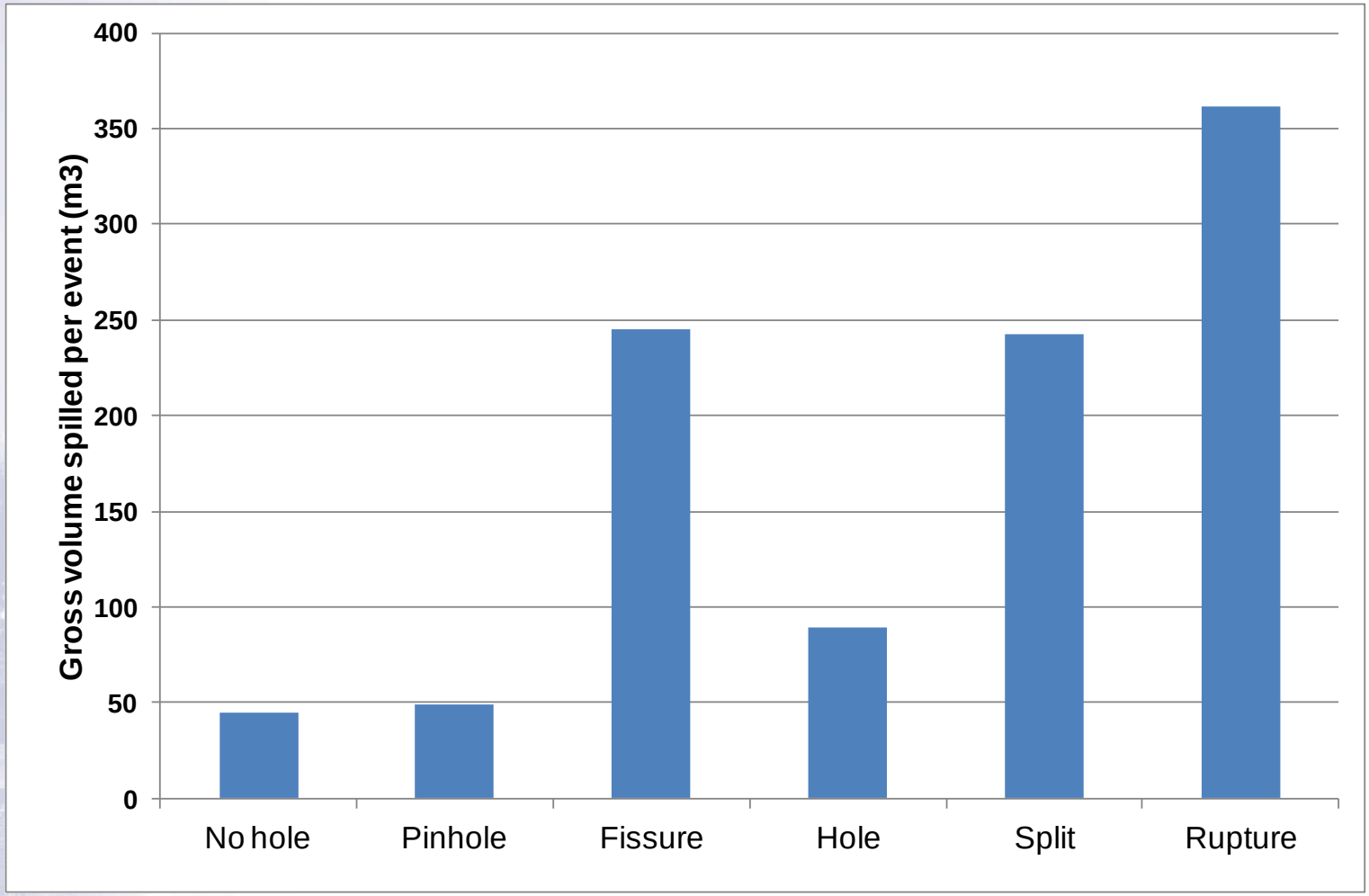
Hole size



- **Mechanical and corrosion related causes tend to result in smaller holes**

Pinhole	Less than 2 mm x 2 mm
Fissure	2 to 75 mm long x 10% max wide
Hole	2 to 75 mm long x 10% min wide
Split	75 to 1000 mm long x 10% max wide
Rupture	>75 mm long x 10% min wide

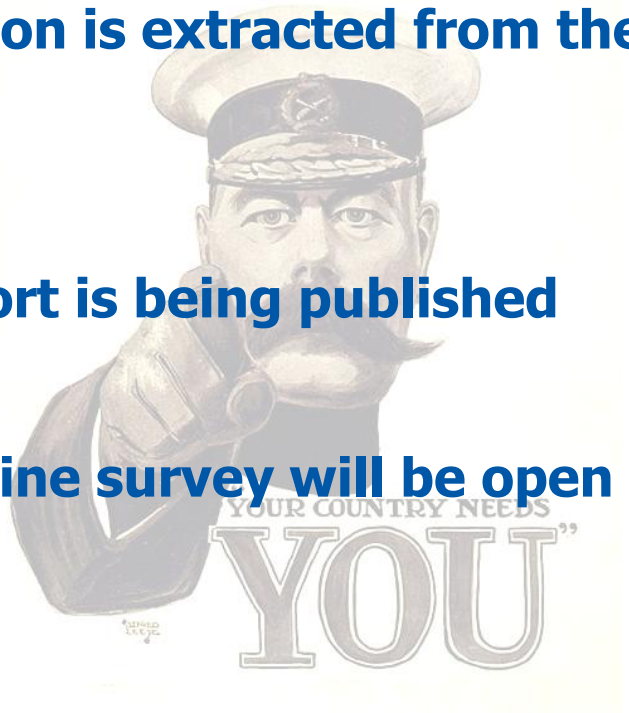
Gross volume spilt by hole size



- **Larger holes lead to bigger spills?**

Putting the report together

- **This information is extracted from the data YOU supply**



- **The 2012 report is being published**
- **The 2013 on-line survey will be open within the next few days**

Please respond promptly!
The objective is to issue the report before year end

2013 spillage survey

- **A letter will be sent within the next few days to invite you to submit the data**
  - We will use the last contact person known to us. If the contact person has changed please let us know
  - For security reasons we allow only one set of log-in credentials for each operator
  - **We aim at collecting all data by end of June**
- **The on-line data submission system remains essentially the same with some improvements**
  - Fill in traffic and in-line inspection data from overview table
  - Download own current and historical data in Excel format
- **Please ensure that data is filled in as completely as possible**
  - It improves the quality and credibility of the database (particularly important for actual spillage reports)
  - It avoids subsequent time consuming rounds of queries and answers

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Thank you for your attention