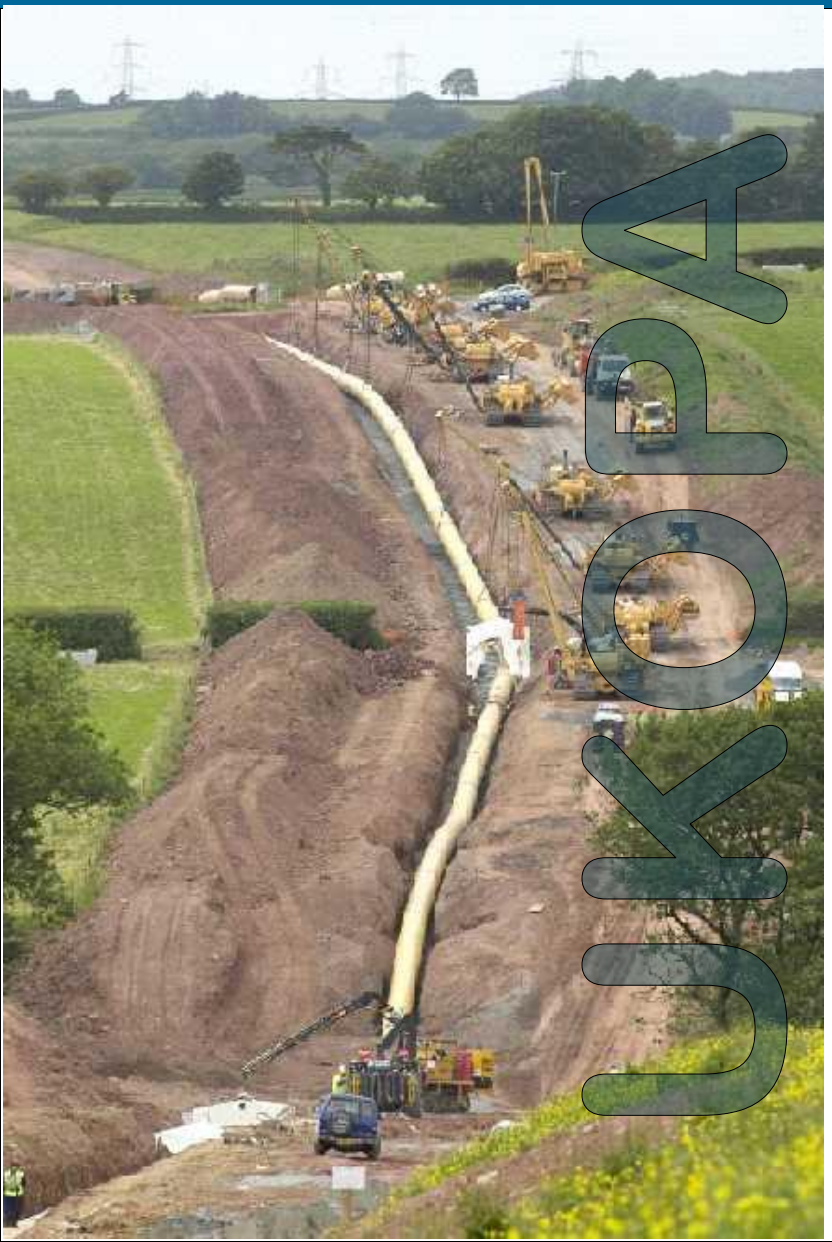
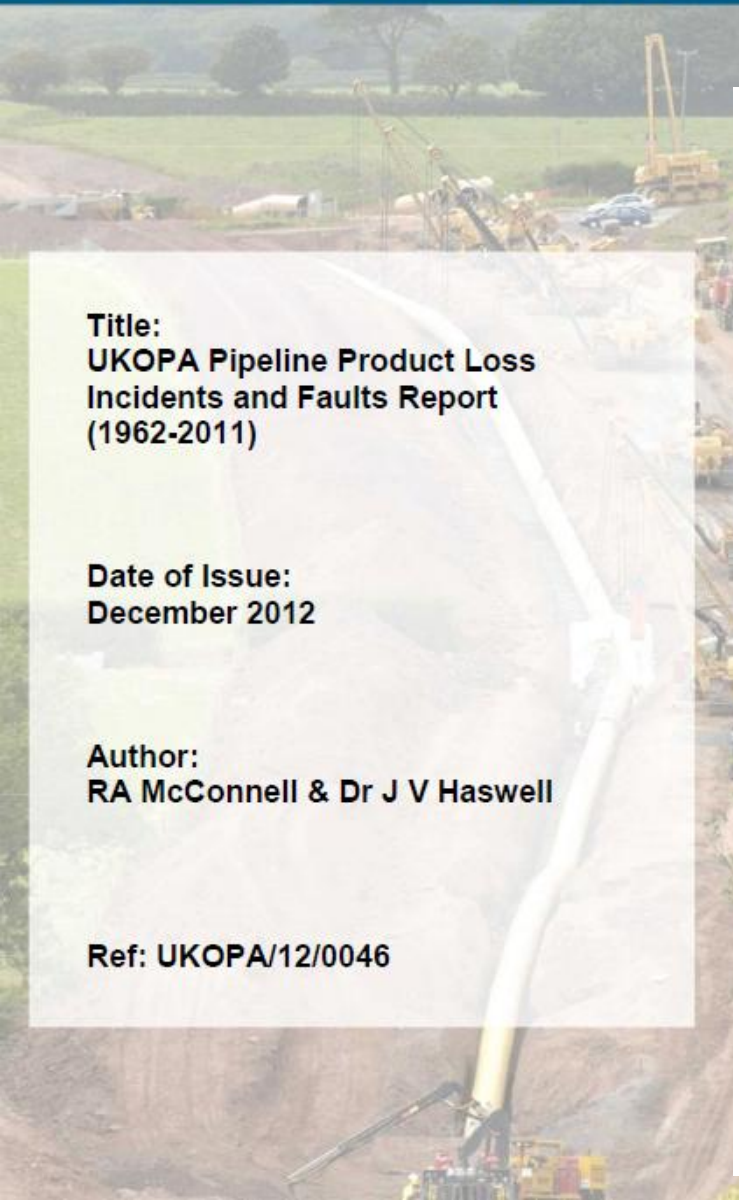


FDMG – Excel-based Database-

Update for UKOPA Meeting
13 February 2013

Rod McConnell

UKOPA/13/022



Title:
UKOPA Pipeline Product Loss Incidents and Faults Report (1962-2011)

Date of Issue:
December 2012

Author:
RA McConnell & Dr J V Haswell

Ref: UKOPA/12/0046

UKOPA
United Kingdom
Onshore Pipeline Operators' Association

UKOPA

Pipeline Product Loss Incidents and Faults Report

(1962 - 2011)

Report of the UKOPA **F**ault **D**atabase **M**anagement **G**roup

Comprising:

National Grid
Scotia Gas Networks
Northern Gas Networks
Wales & West Utilities
BP
Ineos
Sabic
Essar Oil (UK) Limited
Shell
E-ON UK

and supported by:
Health and Safety Executive

Report Introduction

1.2 Purpose of the Database

The purpose of the database is to:

- record leak and fault data for UK Major Accident Hazard Pipelines,
- estimate leak and pipeline rupture frequencies for UK pipelines, based directly on historical failure rate data for UK pipelines,
- provide the means to estimate failure rates for UK pipelines for risk assessment purposes based on analysis of damage data for UK pipelines,
- provide the means to test design intentions and determine the effect of engineering changes (e.g. wall thickness of pipe, depth of burial, diameter, protection measures, inspection methods and frequencies, design factor etc.).

Length & Exposure

Product System Data
Exposure

Total length of Major Accident Hazard Pipelines in operation at the end of 2011

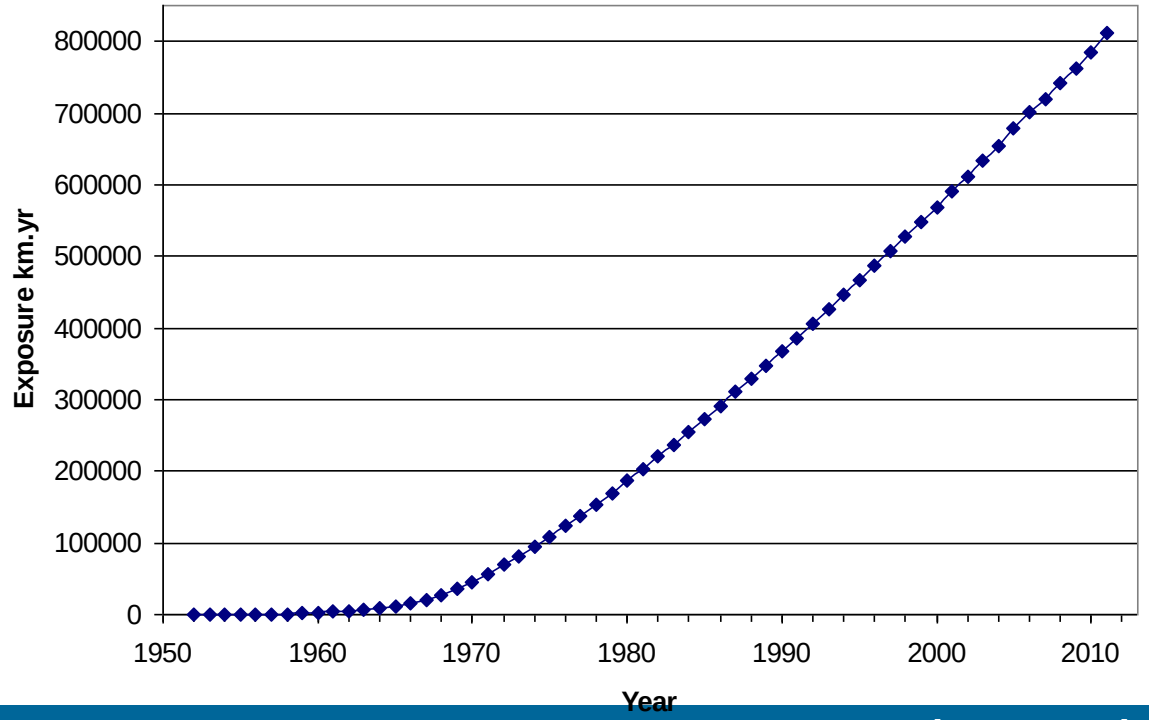
= 22,409 km.

Total exposure in the period 1952 to the end of 2011

= 811,923 km.years

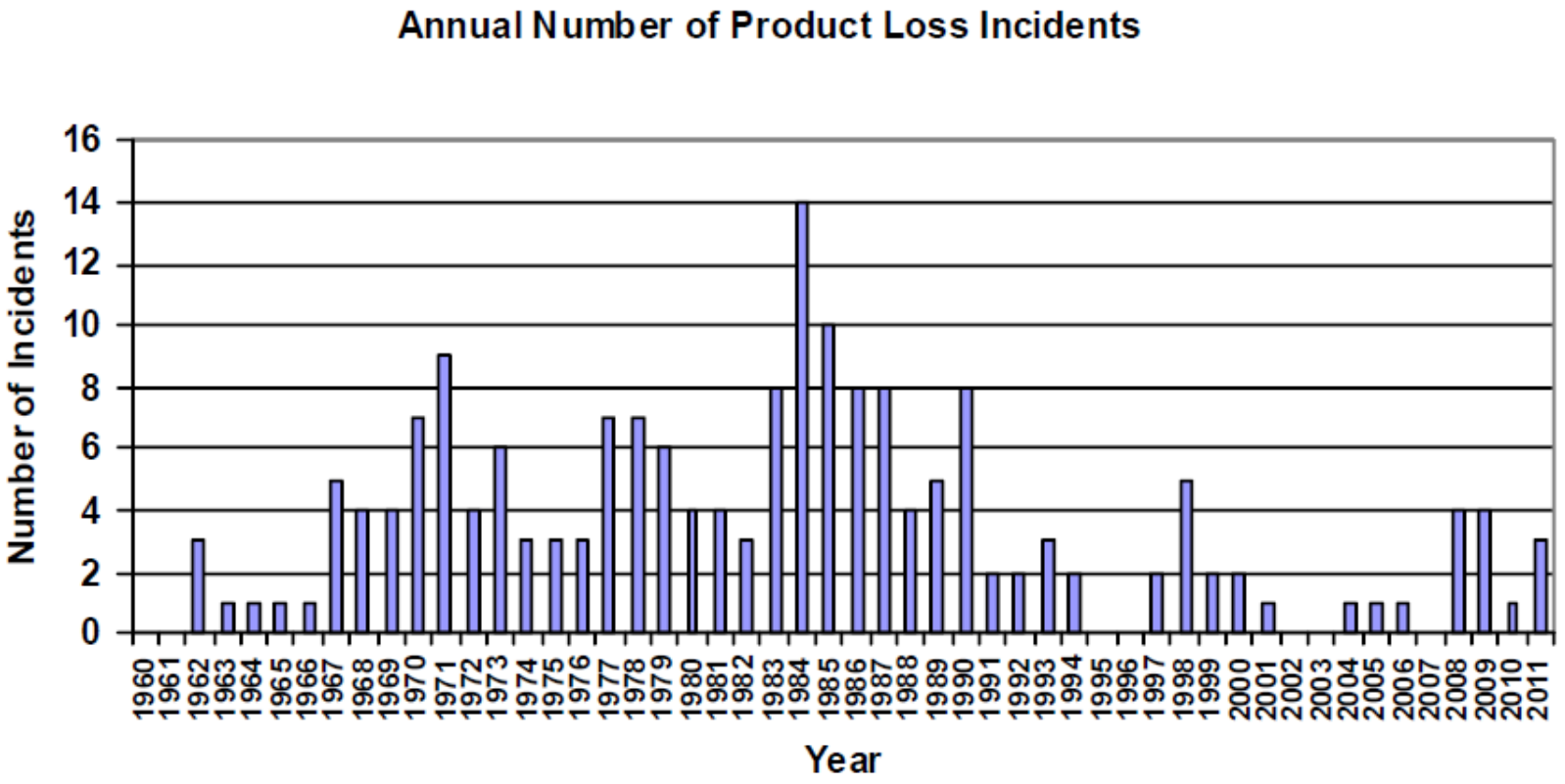
Natural Gas (Dry)	20,640	Propylene	38
Ethylene	1,140	Condensate	24
Natural Gas Liquids	251	Propane	20
Crude Oil (Spiked)	224	Butane	29
Ethane	38	**TOTAL**	**22,409**
Hydrogen	14		**kilometres**

Development of Pipeline Exposure



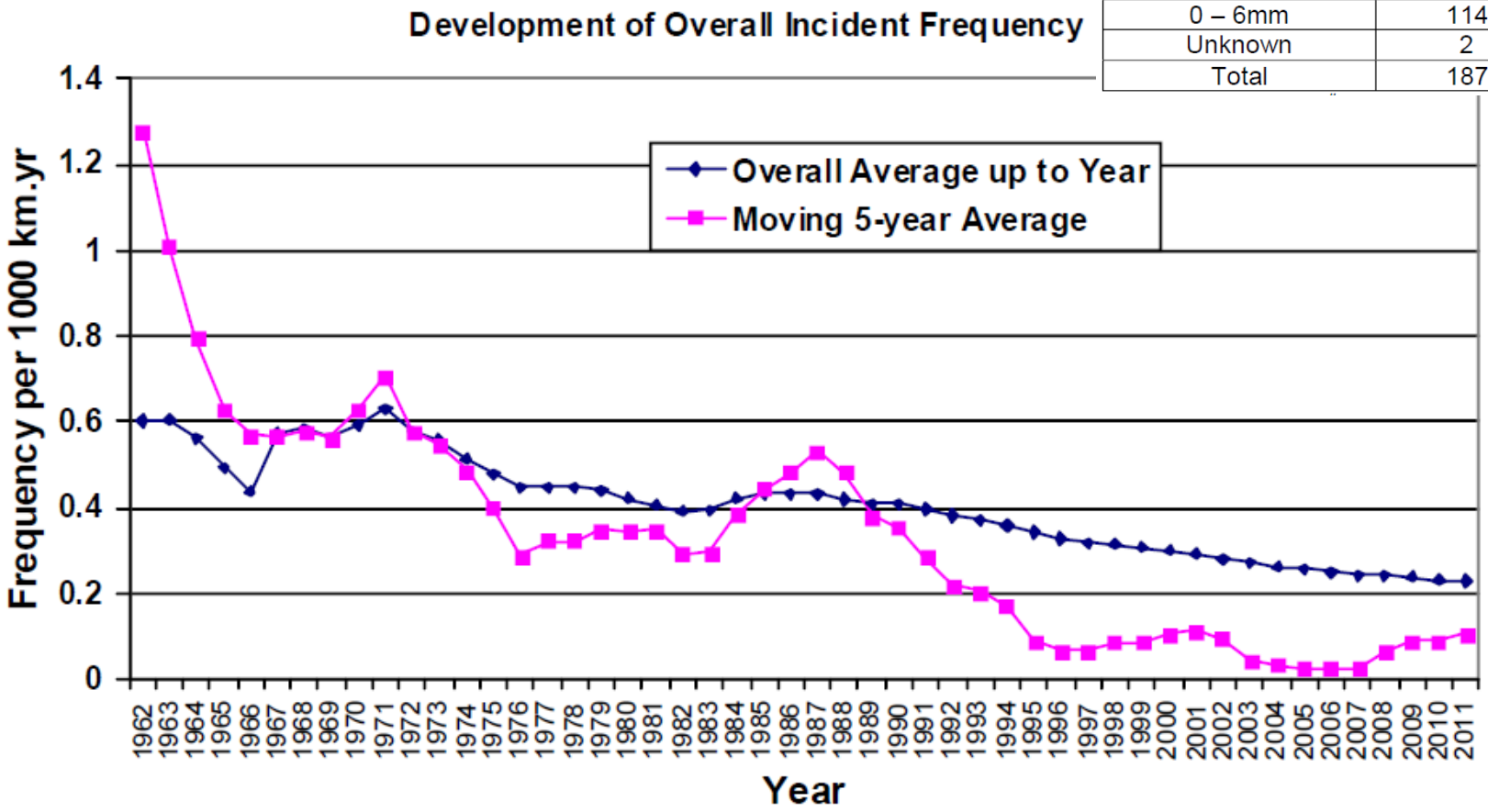
Product Loss Incidents

- 3 product loss incidents in 2011
  2 minor external corrosion leaks
  1 external interference (plough damage due to farming).
- 187 product loss incidents over the period 1962 - 2011

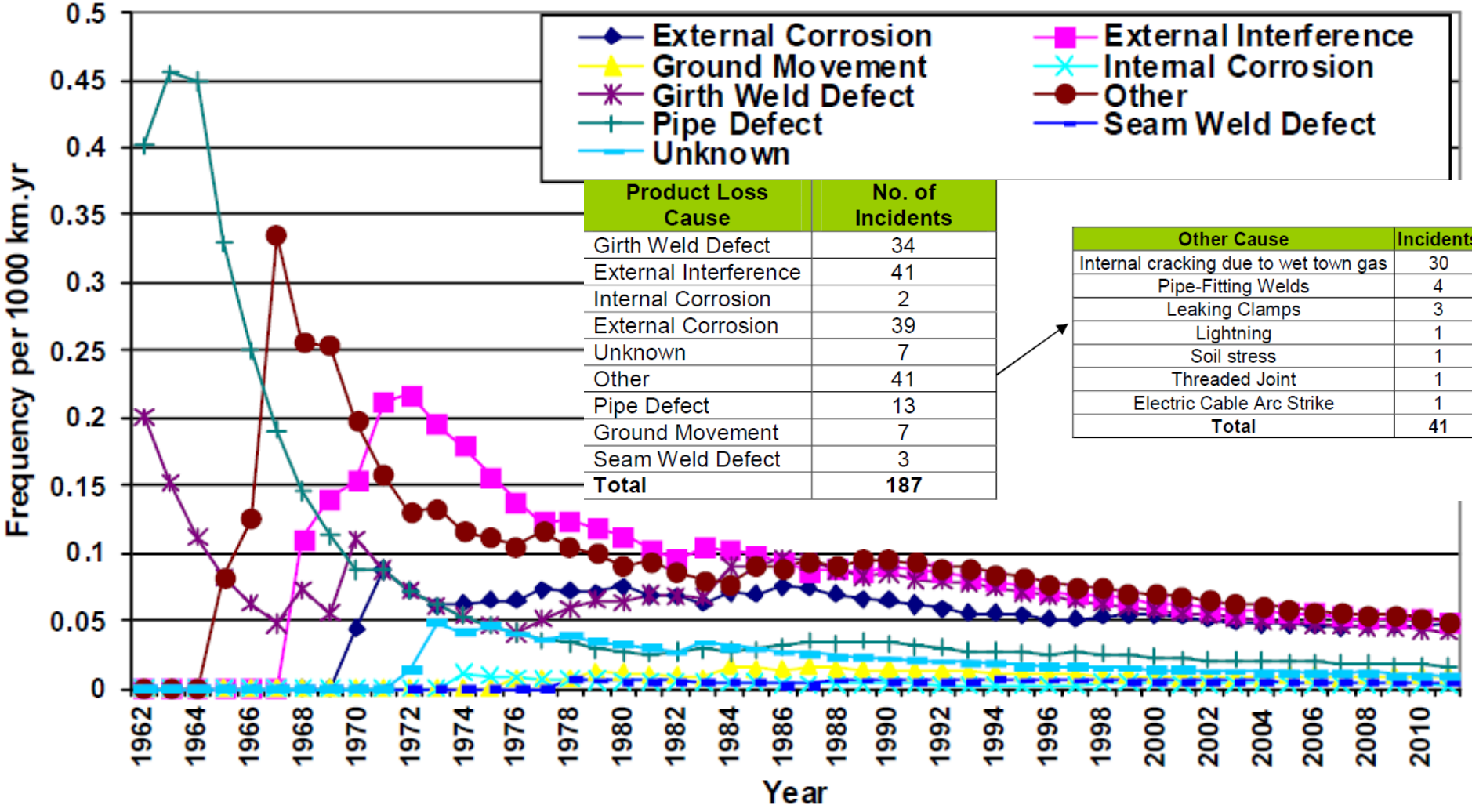


Product Loss Frequency

Equivalent Hole# Size Class	Number of Incidents	Frequency [Incidents per 1000 km.yr]
Full Bore* and Above	7	0.009
110mm – Full Bore*	3	0.004
40mm – 110mm	7	0.009
20mm – 40mm	23	0.028
6mm – 20mm	31	0.038
0 – 6mm	114	0.140
Unknown	2	0.002
Total	187	0.230

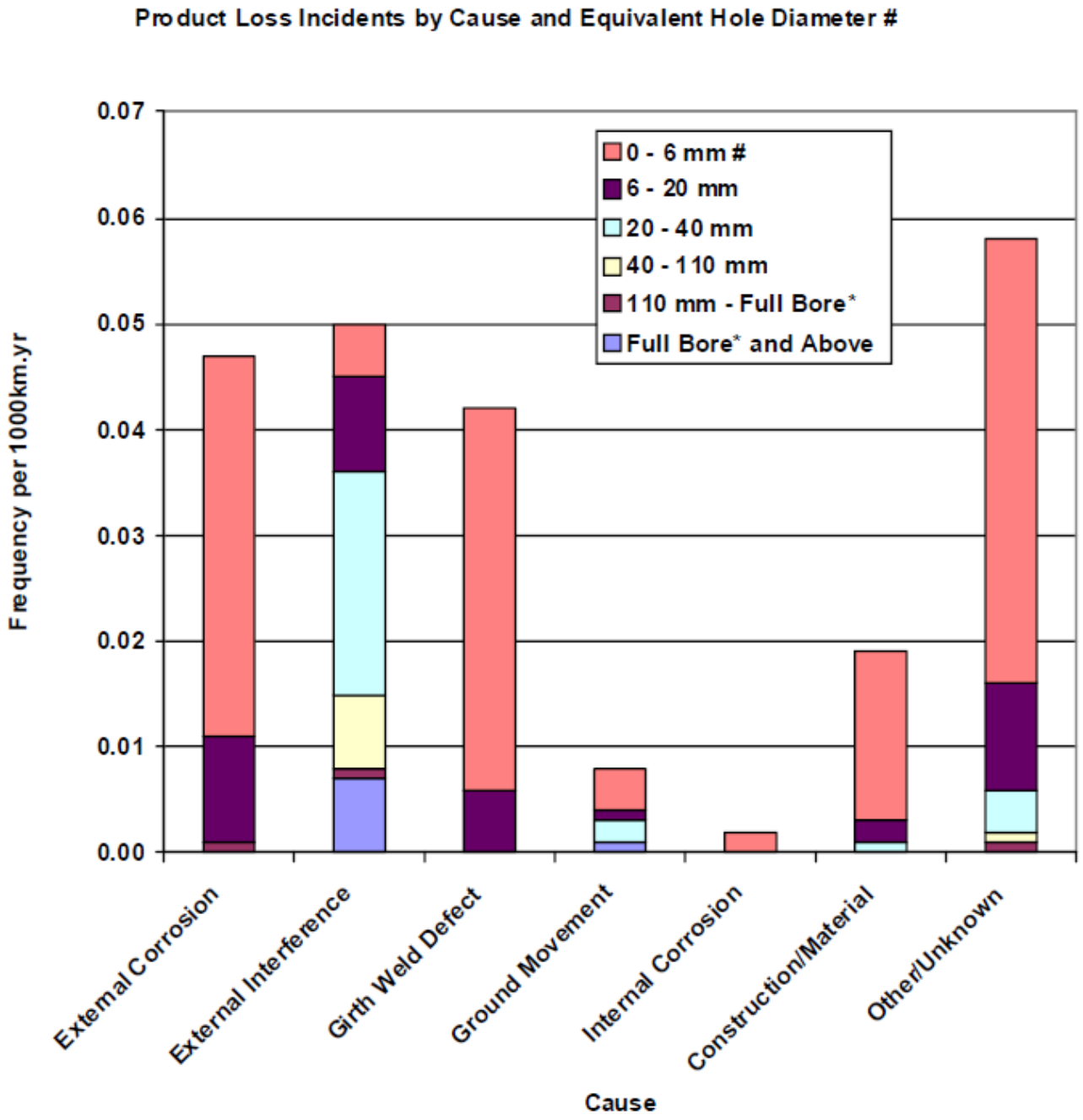


Product Loss Cause

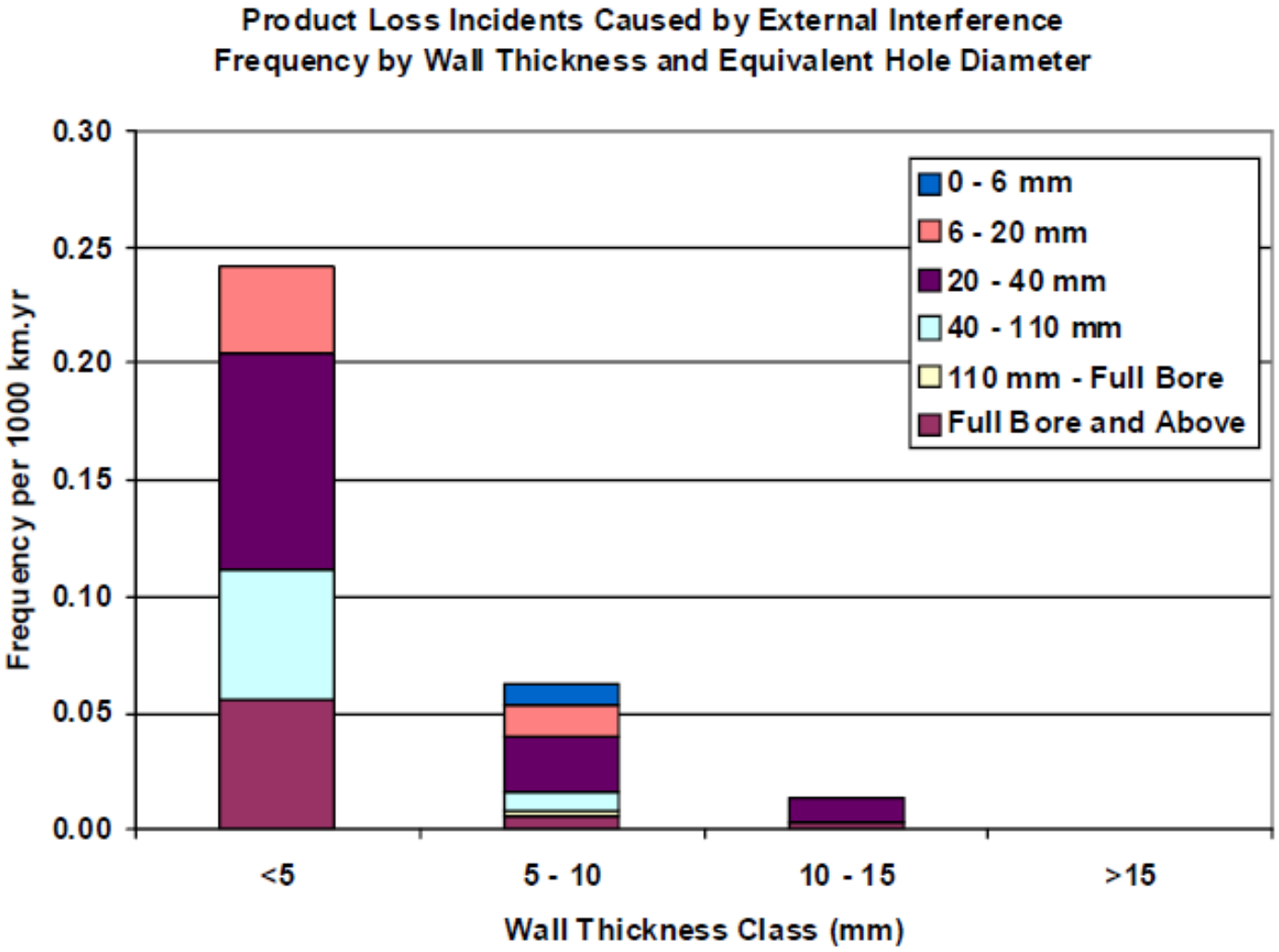


Product Loss Cause	No. of Incidents
Girth Weld Defect	34
External Interference	41
Internal Corrosion	2
External Corrosion	39
Unknown	7
Other	41
Pipe Defect	13
Ground Movement	7
Seam Weld Defect	3
Total	**187**

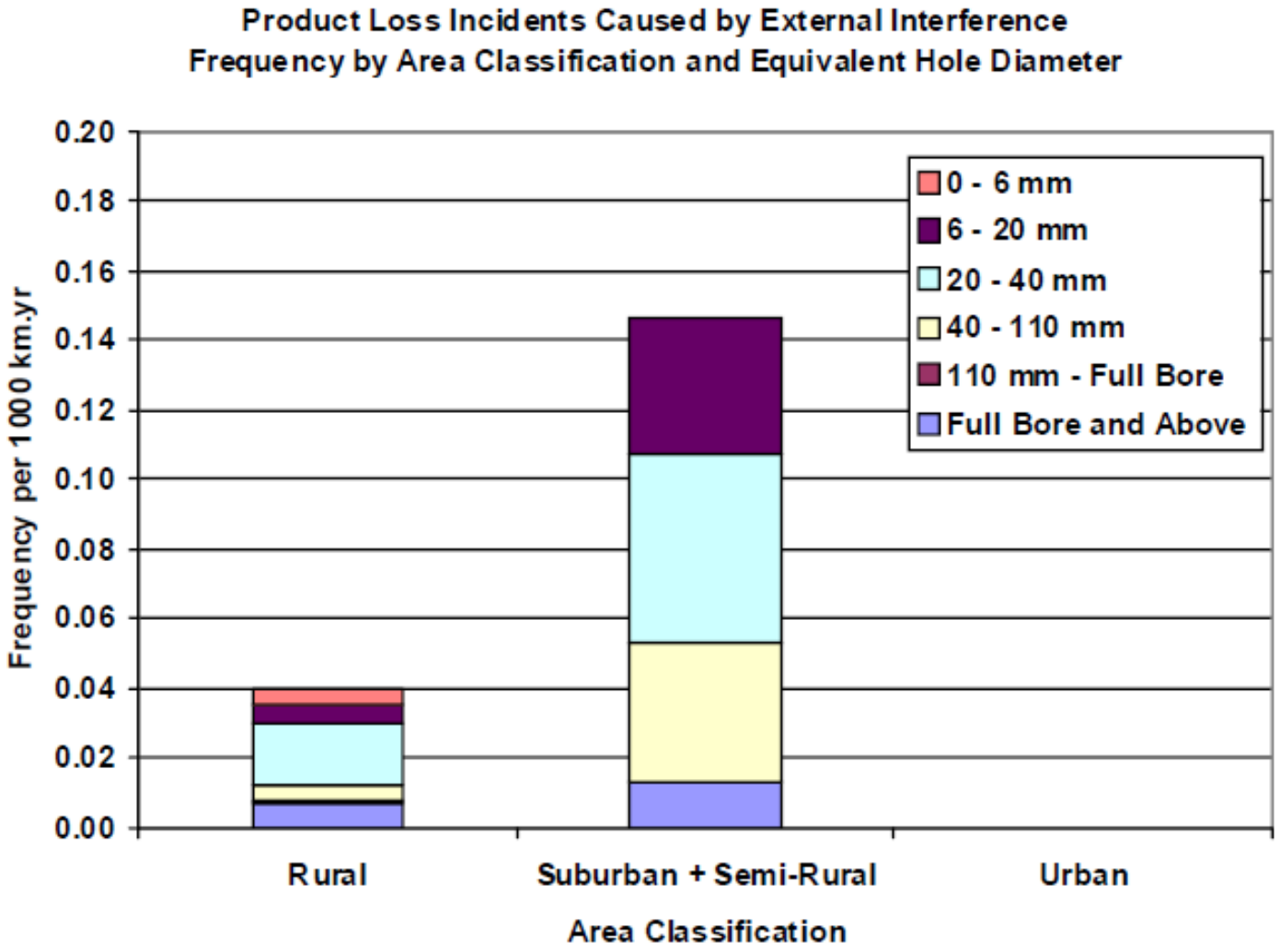
Other Cause	Incidents
Internal cracking due to wet town gas	30
Pipe-Fitting Welds	4
Leaking Clamps	3
Lightning	1
Soil stress	1
Threaded Joint	1
Electric Cable Arc Strike	1
Total	**41**


Product Loss Incidents by Cause and Equivalent Hole Diameter #
0 - 6 mm #
6 - 20 mm
20 - 40 mm
40 - 110 mm
110 mm - Full Bore*
Full Bore* and Above
Frequency per 1000km.yr
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
External Corrosion
External Interference
Girth Weld Defect
Ground Movement
Internal Corrosion
Construction/Material
Other/Unknown
Cause

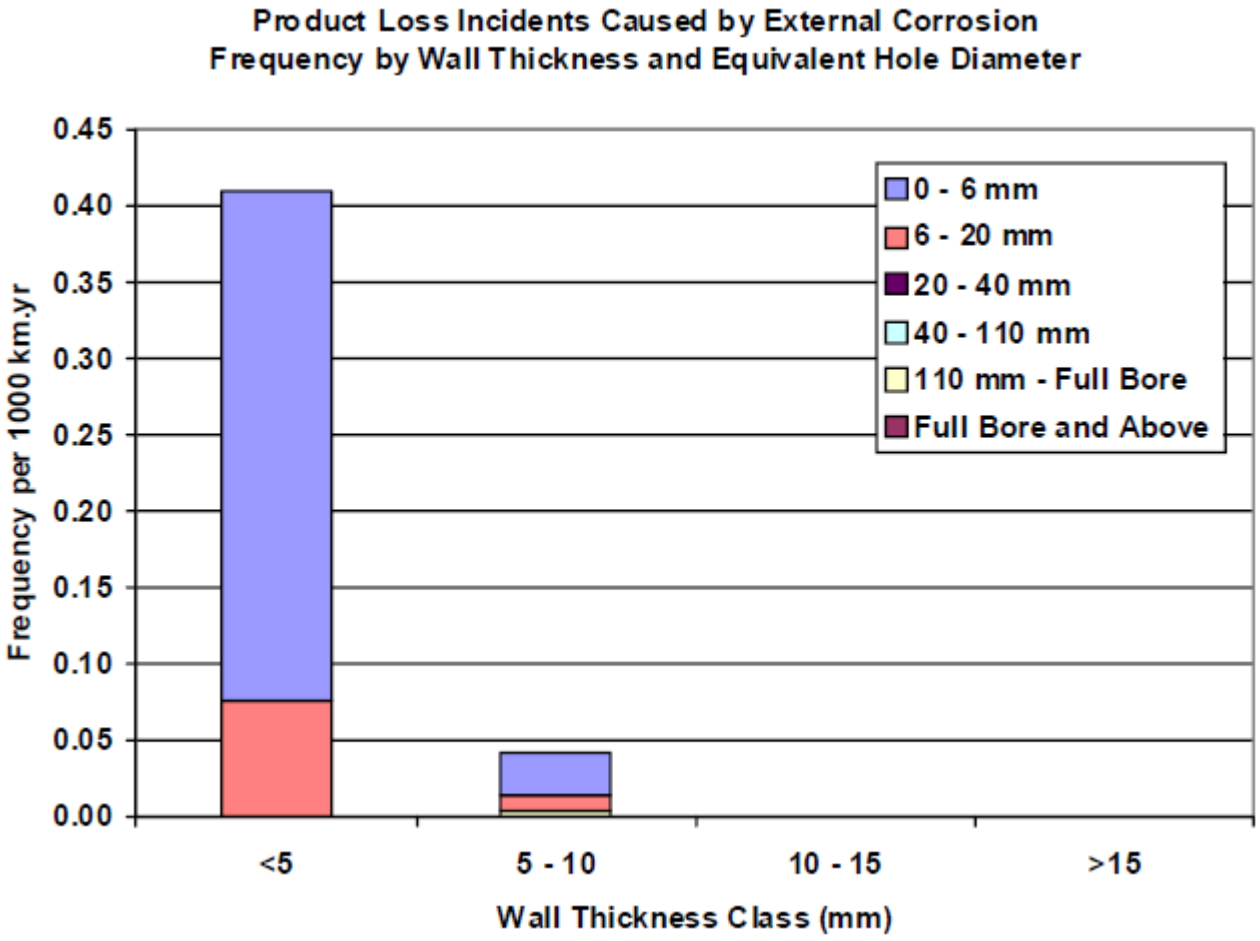
External Interference



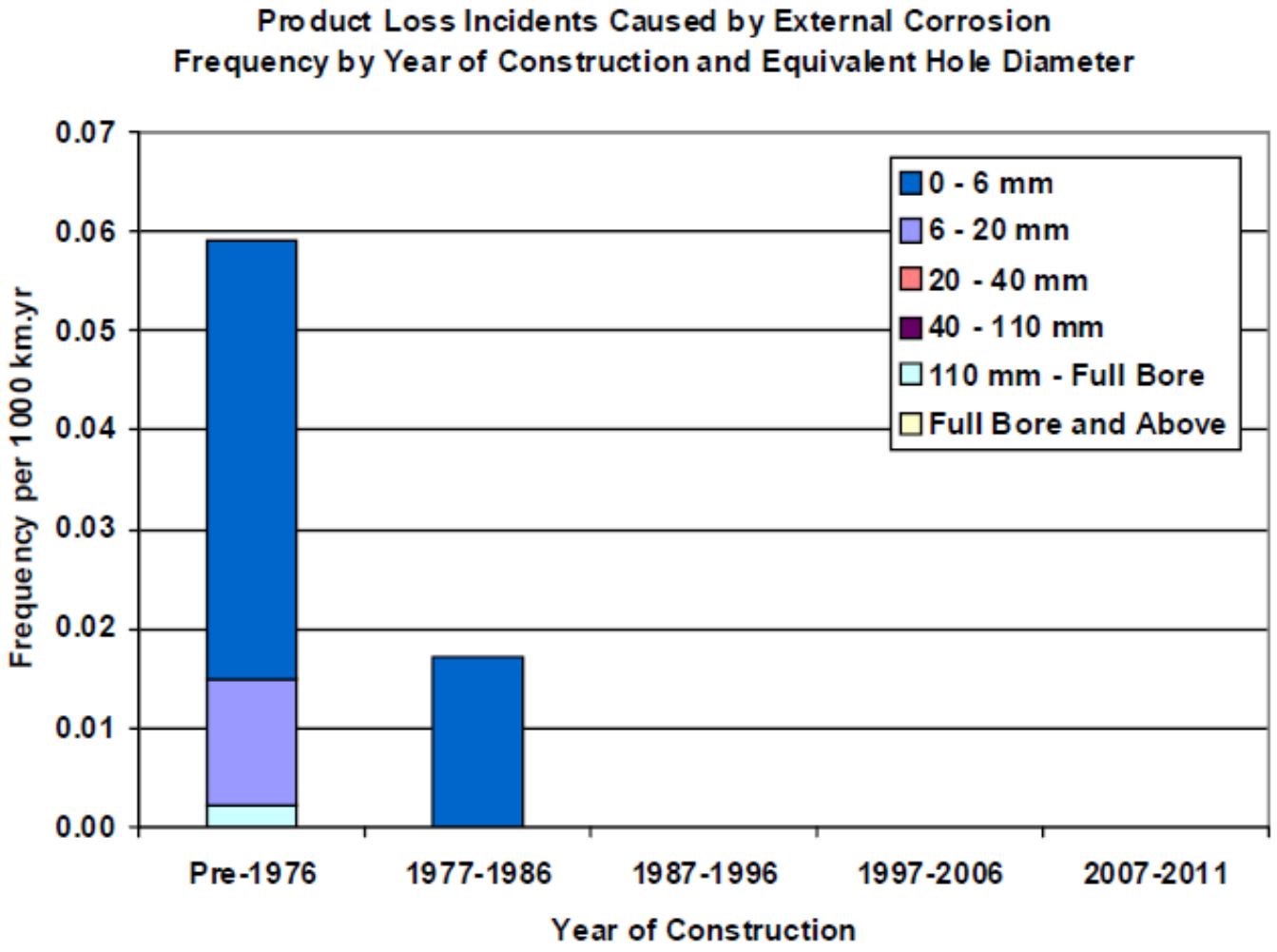
External Interference



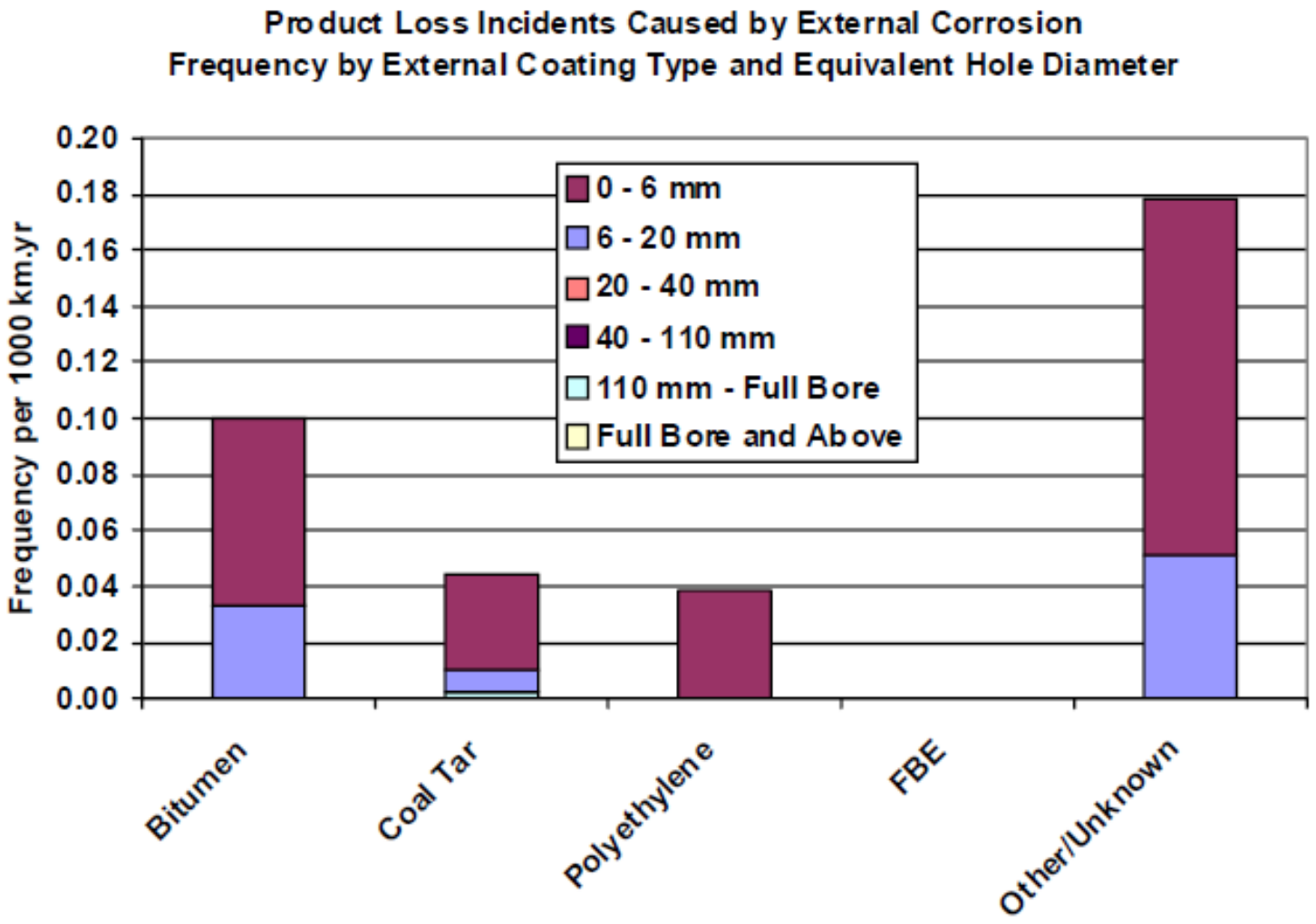
External Corrosion



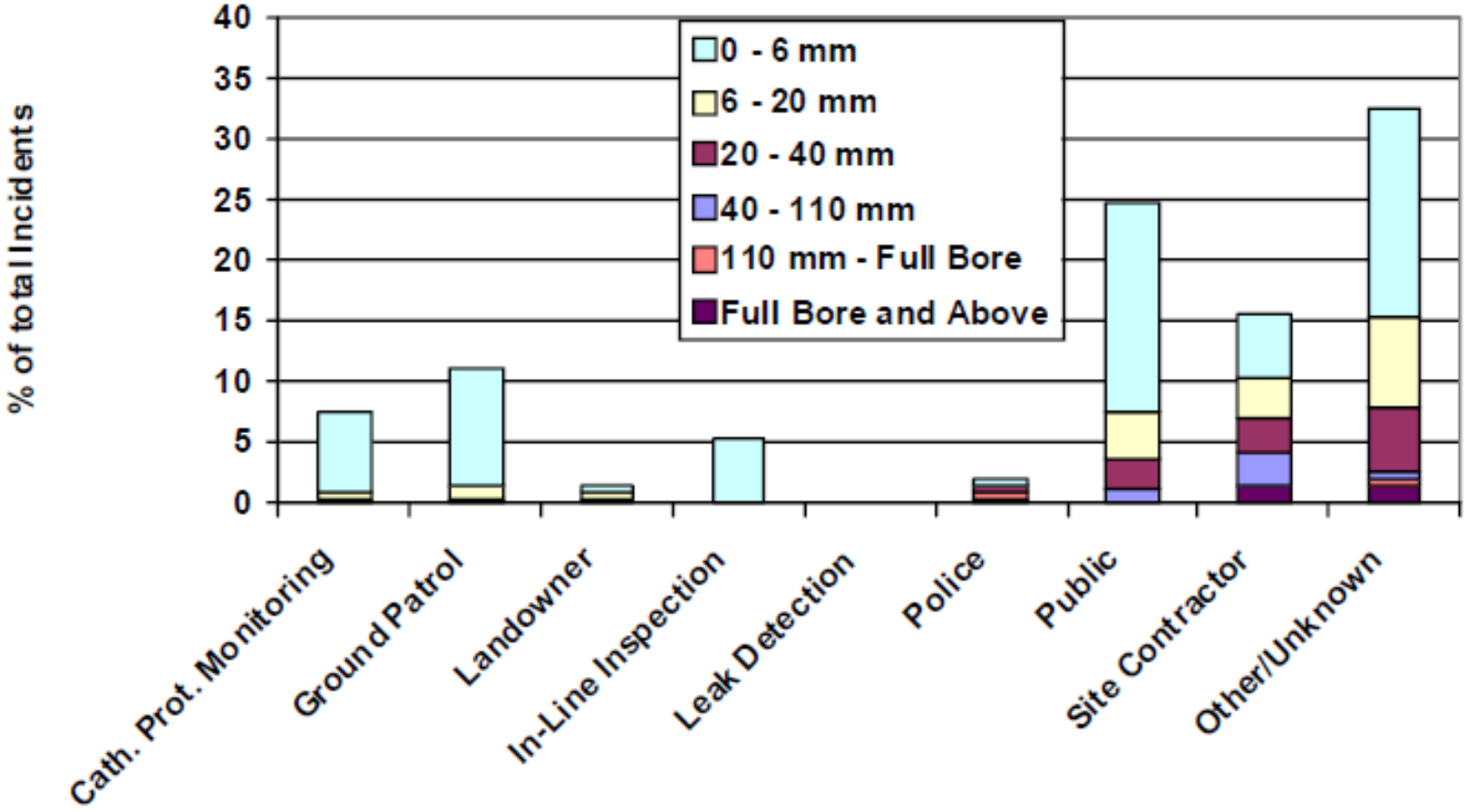
External Corrosion



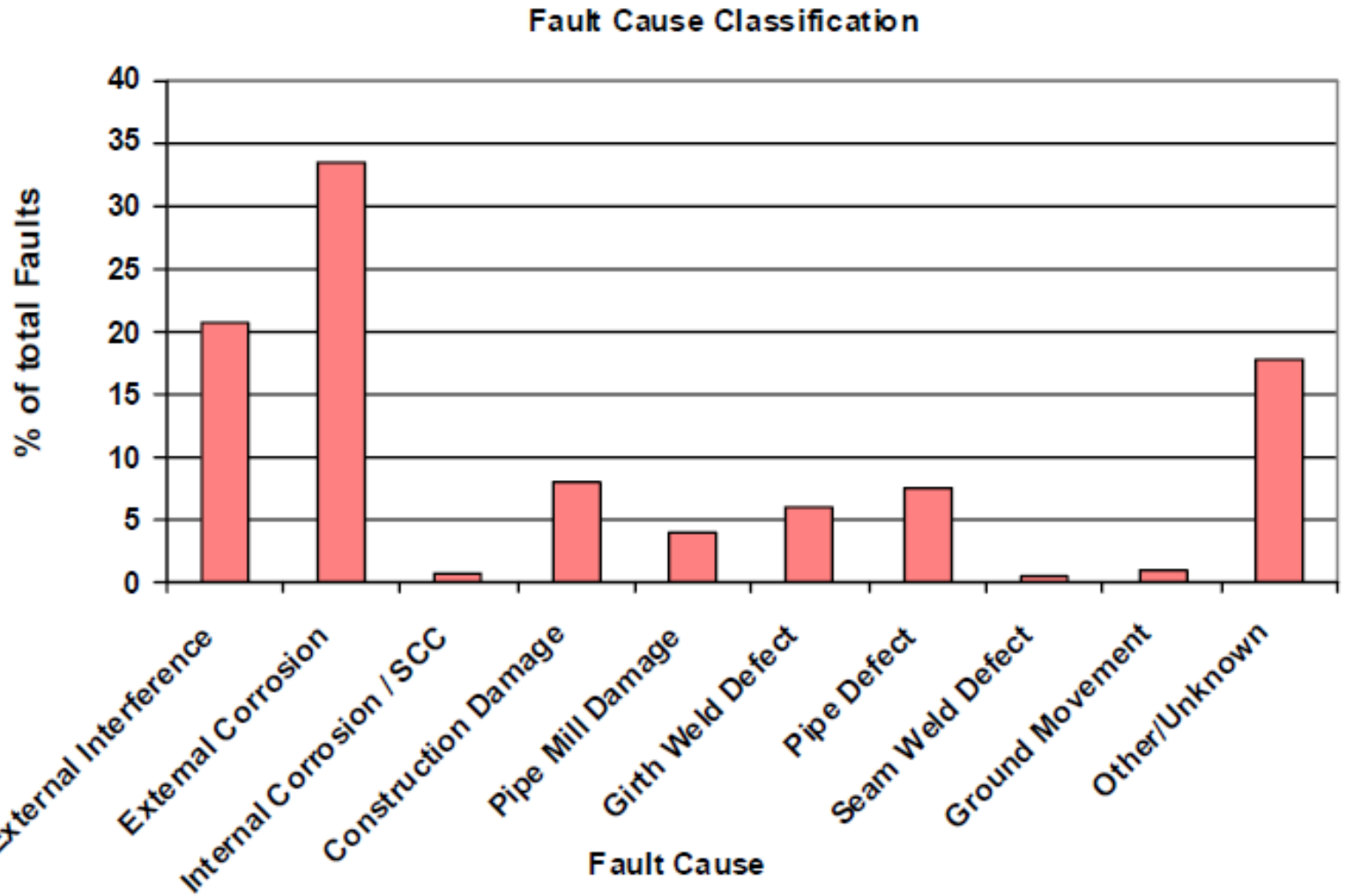
External Corrosion



Detection of Product Loss Incidents



3299 Faults in Database

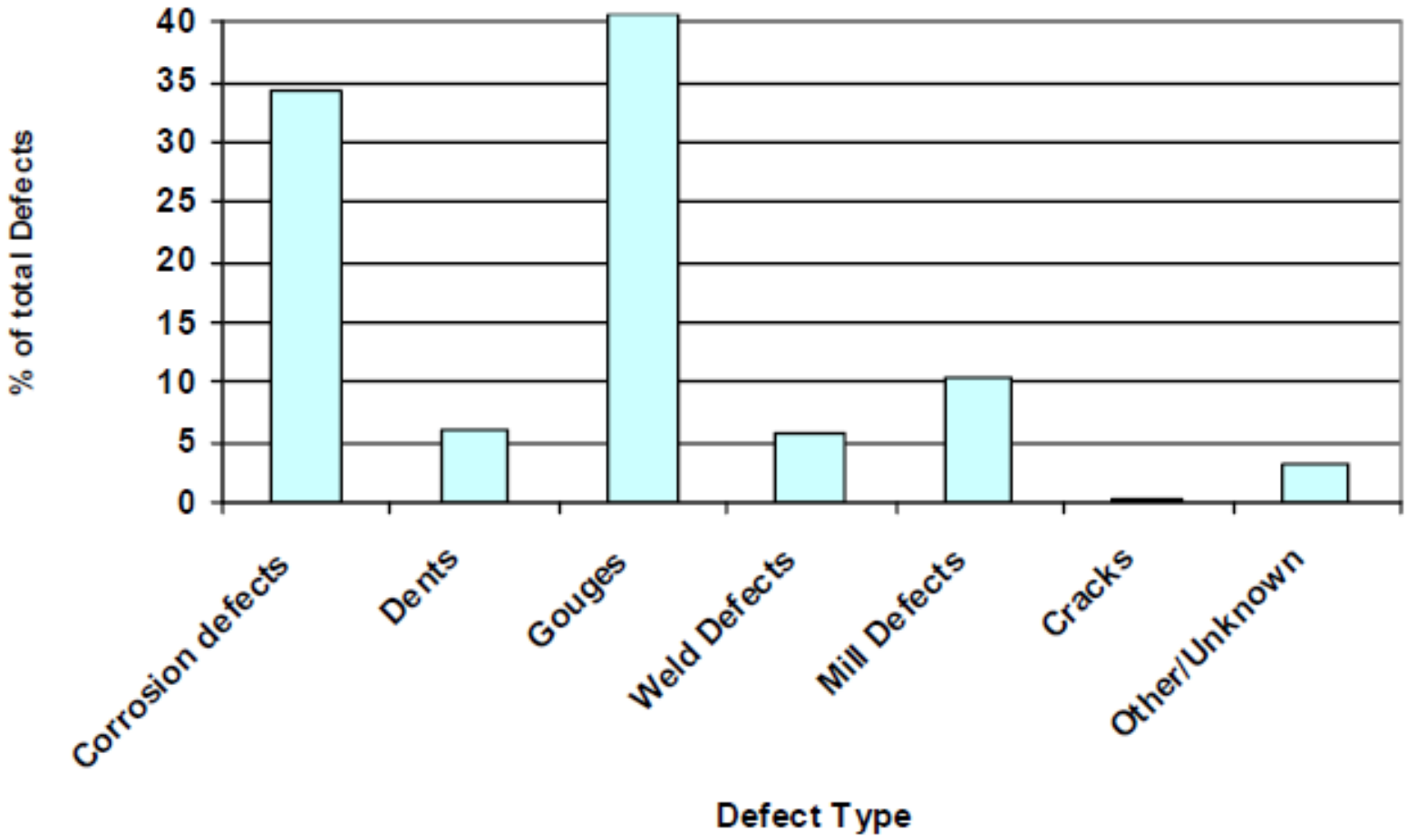


85 New Faults recorded in 2011

Fault cause	Number	%
External Interference	14	16.5%
External Corrosion	44	51.8%
Original Construction Damage	10	11.8%
Girth Weld Defect	5	5.9%
Pipe Mill Damage	2	2.4%
Other	2	2.4%
Unknown	8	9.4%
TOTAL	85	100.0%

How Discovered	Number	%
In Line Inspection	51	60.0%
Excavation after DCVG survey	9	10.6%
CIPS/Pearson Survey	4	4.7%
PSSR Survey	2	2.4%
Excavation after ILI	3	3.5%
Over Crossing Bi-annual survey	5	5.9%
Site Contractor	6	7.1%
Landowner	2	2.4%
Ground Patrol	1	1.2%
Public	1	1.2%
Other	1	1.2%
TOTAL	85	100.0%

5348 Defect in Database



Ongoing Database Activities

1. New Database Members
   -IFI Pipeline Data

2. 2012 Faults required from members by end March

3. Include ILI Dent data?

4. SwissGas database

HSL NPD Proposal

Health & Safety Laboratory
National Population Database

- **Proposing a breakdown of population data within 300m of all UKOPA pipelines**
  3 options:-
- **Standard estimate of maximum daytime, non-term-time & nightime**
- **+ breakdown within categories**
- **+ workplace breakdown**

HSL NPD Proposal

Night Time Populations	Day Time Populations
Residential populations	Residential term time populations
	Residential non-term time populations
Hospitals	Hospitals
Care Homes	Care Homes
Child Care	Child Care
Prisons	Prisons
	Schools
	Colleges
	Workplaces *
	Stadia

Table 1 NPD Breakdown

HSL NPD Proposal

Option 1 - Standard estimate of maximum day time term time population; day time non-term time population and night time population

HSL will create an Excel spreadsheet listing for each MAHP (labelled by an ID number to be confirmed with UKOPA) giving a maximum population for each of the three categories

HSL NPD Proposal

Option 2 - A standard population estimate of Option 1 but broken down into individual population totals for each NPD category shown in table 1

HSL will create an Excel spreadsheet listing for each MAHP (labelled by an ID number to be confirmed with UKOPA) giving the maximum population for each of the three categories described above. However, there will be additional columns giving the breakdown of each NPD category. Workplace populations will be smoothed over their corresponding postcode

HSL NPD Proposal

Option 3 - More accurate workplace population estimate

- **can be applied to either Option 1 or 2, with the workplace data being modified before feeding into population calculations. Advanced address matching techniques will be applied to a subset of workplaces known to be in the region of the 300m buffer, with the result being a new dataset containing the building locations of the workplaces.**
- **This will enable more accurate discriminate between workplaces inside a buffer zone, - a more accurate estimate of the working population will be provided to UKOPA.**