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United Kingdom Onshore Pipeline Operators' Association

UKOPA MAHP 2021 Product Loss & Fault Report

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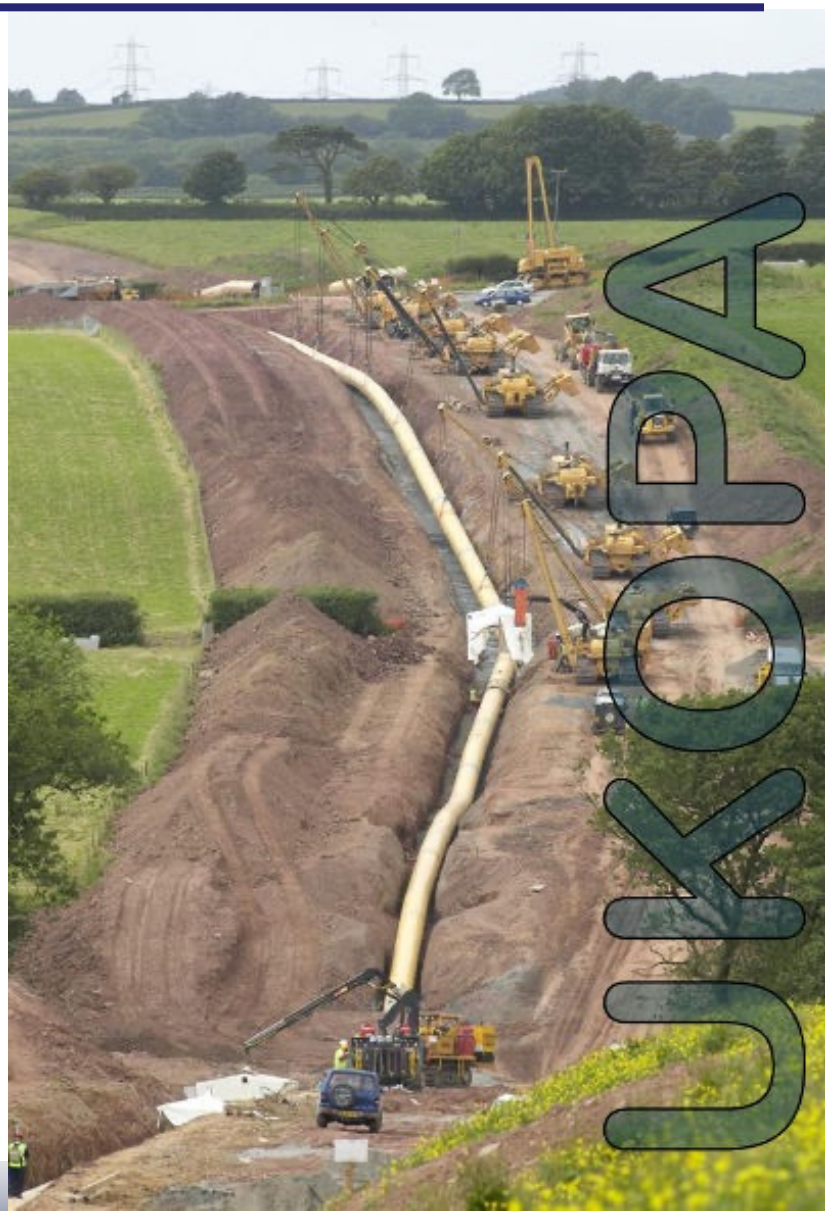
Birmingham 17th October 2023



2021 Data Collection Timetable

- Initial Data request by Chris Lyons
  - 30th May 2022
    - Later this year to allow operators more time to collate data
- 1st Response – 30th May 2022
  - Neil Price at E.On
- Majority of responses following 1st chase up email
  - 30th June 2022
- Flurry of late returns following October Main Meeting
  - Mostly confirming they had no faults to report for 2021
- Last data received from Shell – 24th July 2023
  - Coating only defect on NWEP
- Draft Report issued to FARWG – 2nd August 2023
- Comments received – 11th August 2023
  - Fridolin Jenny, Swissgas
- Report completed – 30th August 2023
- Board Approval to Issue – 17th October 2023

2021 Summary – Contributions

- 9 members have provided fault data
  - Cadent, GNI, INEOS FPS, NG, NGN, Sabic, SGN Scot & South, Shell, WWU
- 6 members have confirmed they have no data for 2021
  - E.On, Essar, INEOS, Sabic, Uniper, Wood
- 3 members who (we think) operate MAHPs currently not contributing
  - Drax, ENI, Mutual Energy
- Number of members who don't respond decreased this year after increased follow up

  - Especially from Nikki
  - If you've done no digs, and therefore have no fault data, telling us you have none is still required – and useful!

2021 Product Loss Incidents

- 1 leaking girth weld (WWU)
  - Pontardulais Showground
  - Found during CIPS dig

2021 Product Loss Incidents

- 1 additional product loss from INEOS
  - Leaking BV flange within Grangemouth site
  - Recorded in database but not in Product Loss report
    - Only product losses that are
      - Unintentional
      - In the public domain
      - Not from associated equipment

2021 Fault & Product Loss Data

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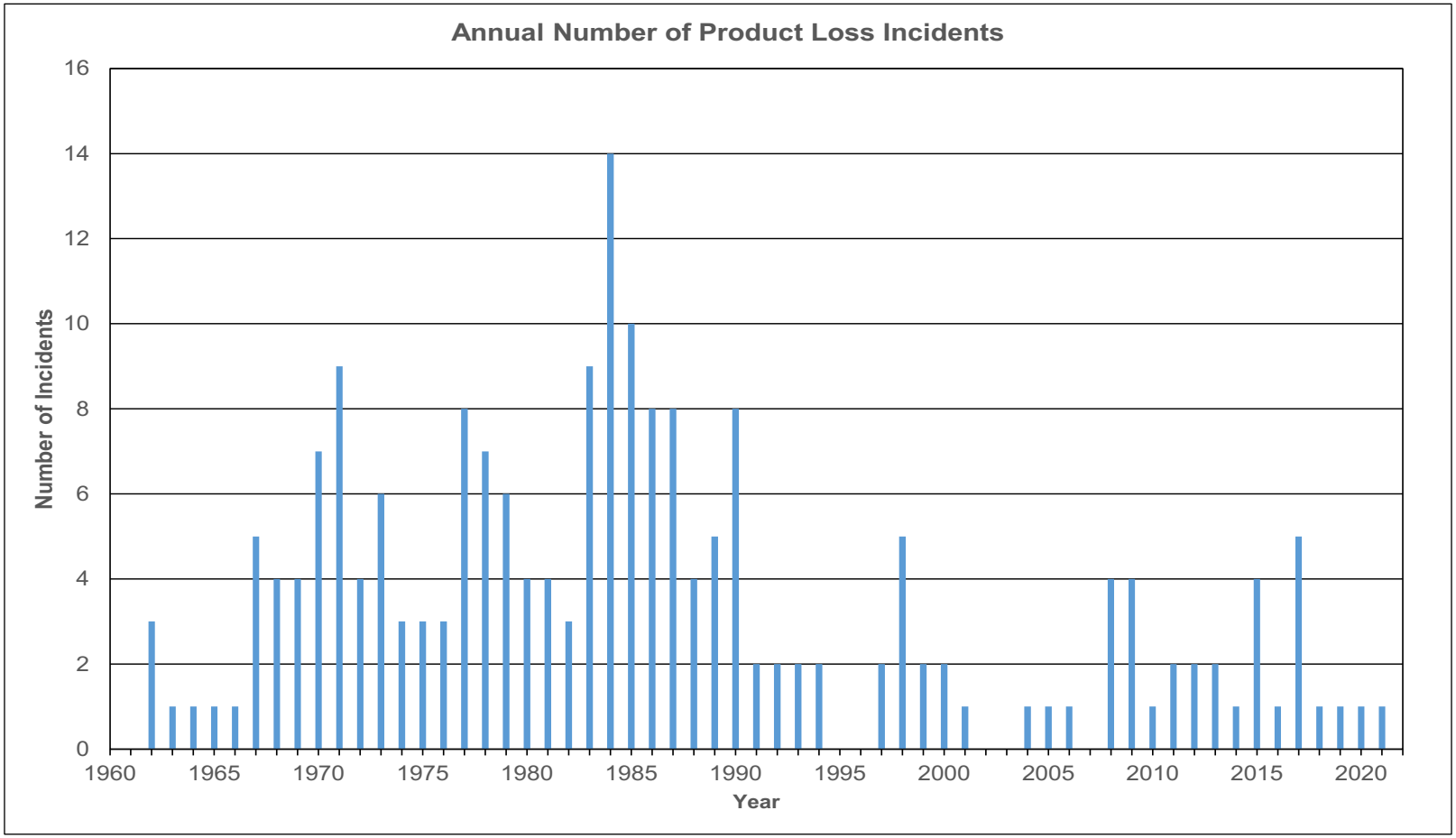
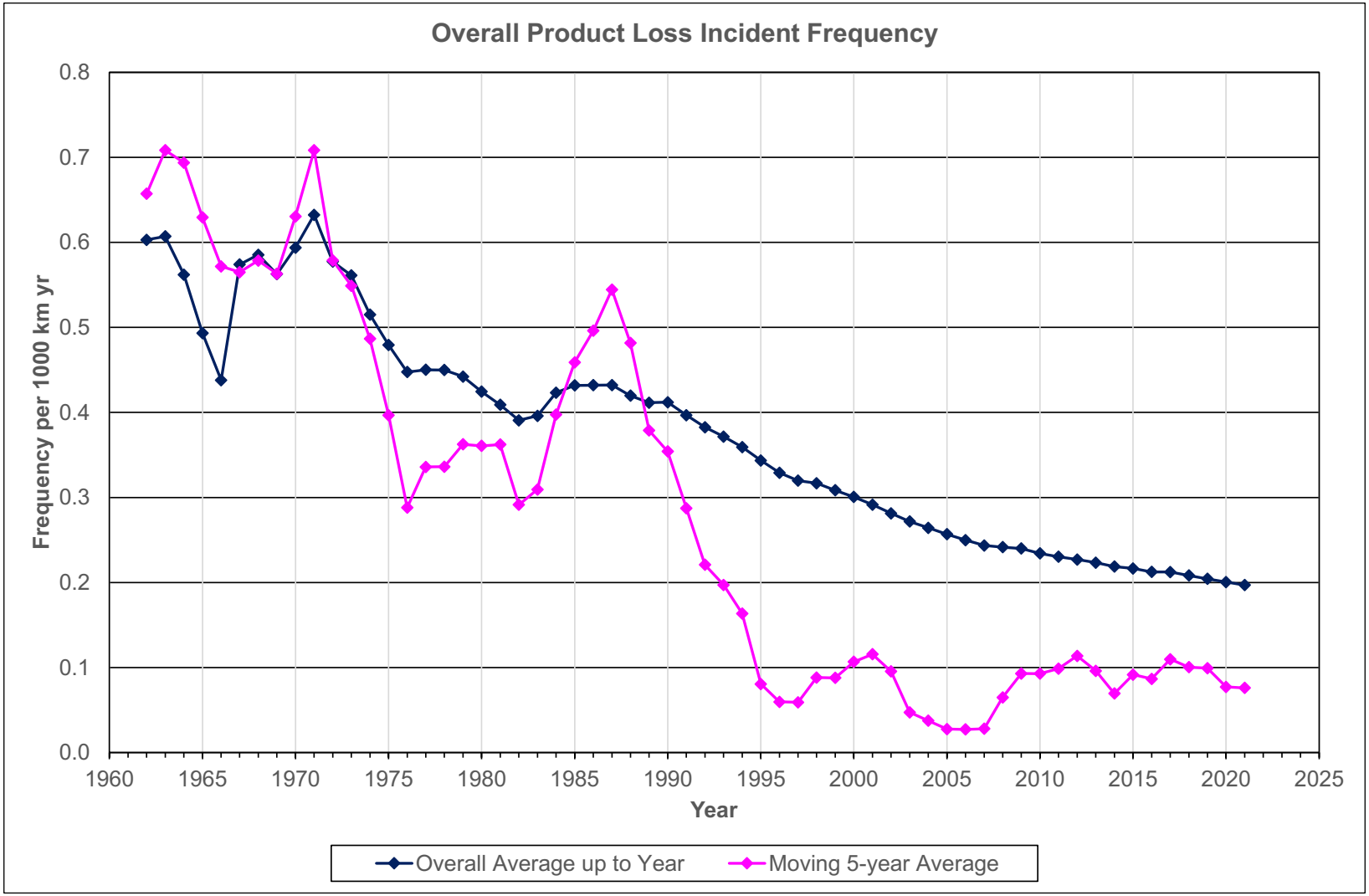
Cause	Faults	Product Loss
External Corrosion	5	
Internal Corrosion	0	
External Interference	8	
Original Construction Damage	4	
Material defect (pipe, mill damage, seam weld)	3	
Girth weld defect	5	1
Ground movement	0	
Other/unknown	1	
TOTAL	**26**	**1**

Product Loss Incident Data

- 206 Incidents (1962 – 2021)



Overall Product Loss Incident Frequency



Product Loss Incident Data

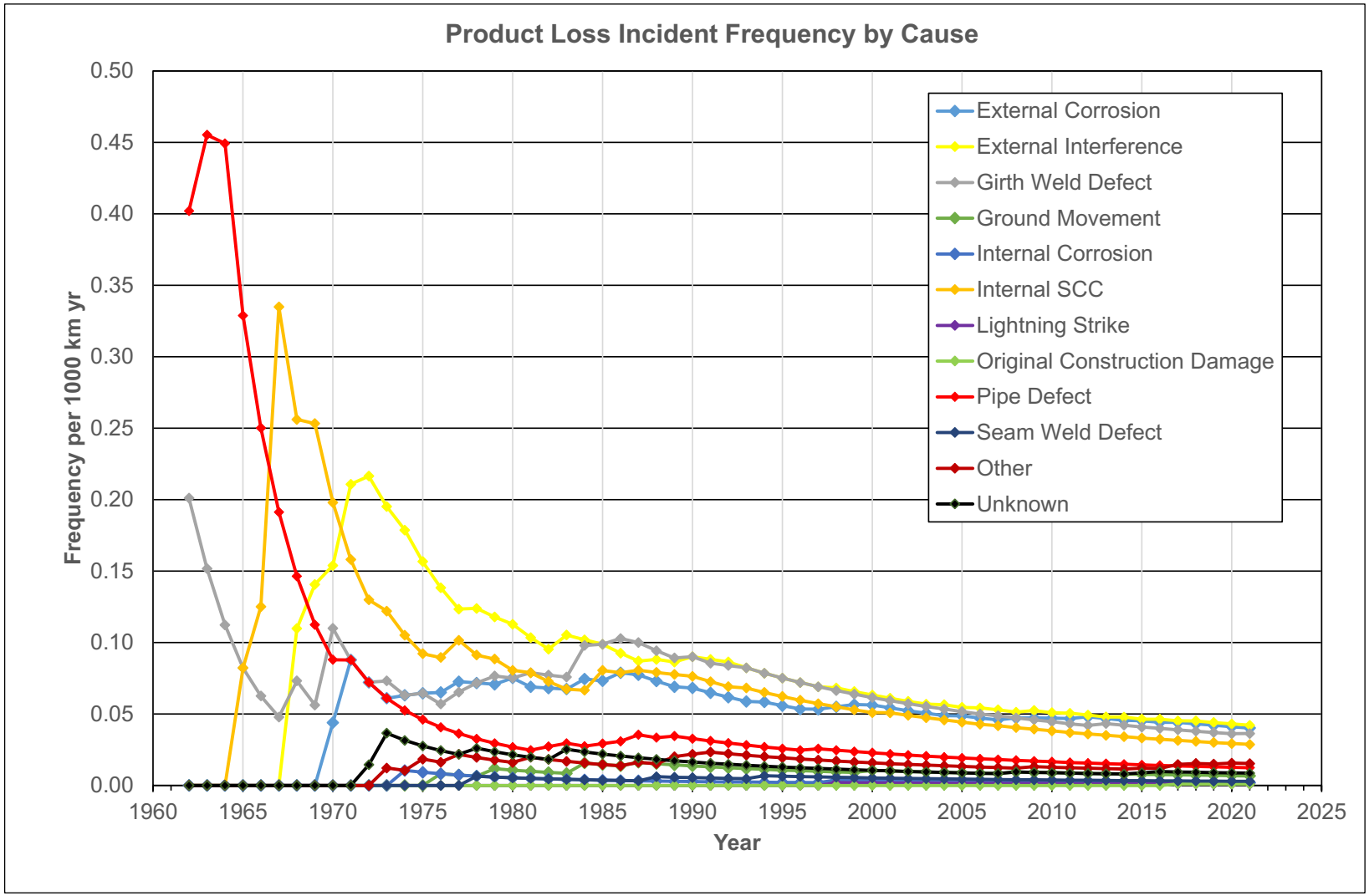
- 2021 MAHP Pipeline Population – 23,576 km
  - 92.5% natural gas networks

- Total Operational exposure – 1,045,750 km yrs
  - Includes 3,740 km yr between 1952 and 1961 (before first product loss)

- Overall leak rate (1962 – 2021) = 0.197×10^{-3} per km yr
- 20-year leak rate (2002 – 2021) = 0.072×10^{-3} per km yr
- 5-year leak rate (2017 – 2021) = 0.076×10^{-3} per km yr

- *2021 leak rate* = *0.042×10^{-3} per km yr*

Product Loss Incident Frequency by Cause



Product Loss Incident Frequency by Cause

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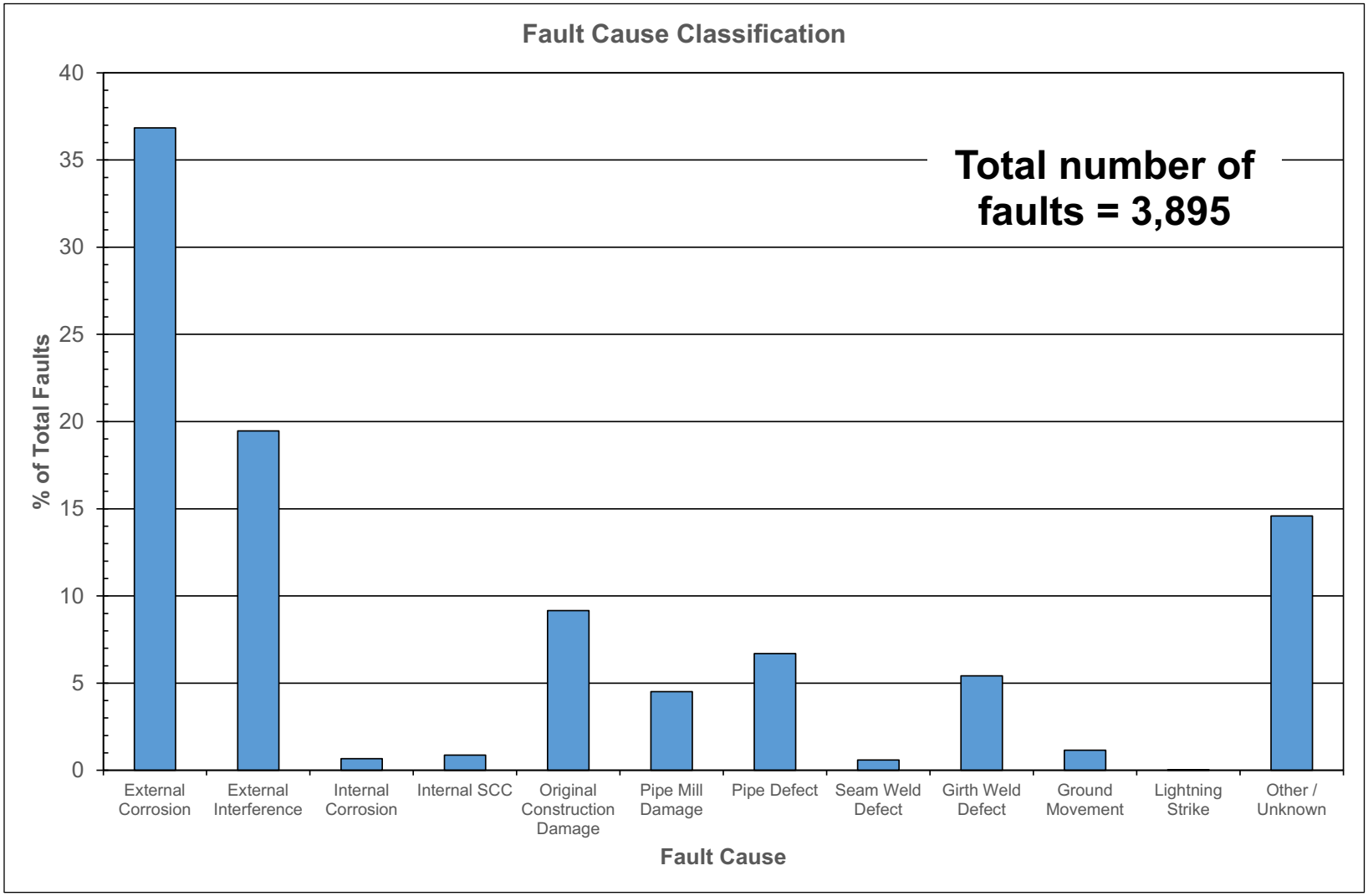
Cause	1962 - 2021	2017 - 2021
External Corrosion	42	1
External Interference	44	1
Girth Weld Defect	38	1
Ground Movement	7	0
Internal Corrosion / SCC	32	0
Lightning Strike	1	0
Pipe & Seam Weld Defects	16	0
Original Construction Damage	1	1
Other	17	5
Unknown	9	0
TOTAL	**206**	**9**

‘Other’ Product Loss Incidents

Other Cause	1962 - 2021	2017 - 2021
Pipe / Fitting Weld	4	0
Socket & Spigot Weld	4	3
Leaking Clamps	3	0
Electric Cable Arc Strike	1	0
Stopple Tee Flange	2	2
Syphon Flange	1	0
Threaded Joint	1	0
TOTAL	**16**	**5**

Fault Causes (1962 – 2021)



Faults & Product Loss (1962 – 2021)

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Cause	Faults	Product Loss	% Leaks per Fault
External Corrosion	1435	42	2.9
External Interference	758	44	5.8
Girth Weld Defect	211	38	18.0
Ground Movement	45	7	15.6
Internal Corrosion / SCC	60	32	53.3
Material Defect (pipe, mill damage, seam weld)	460	16	3.5
Original Construction Damage	357	1	0.3
Lightning Strike	1	1	100.0
Other	373	16	4.3
Unknown	197	9	4.6
TOTAL	**3897**	**206**	**5.3**

Any Questions?

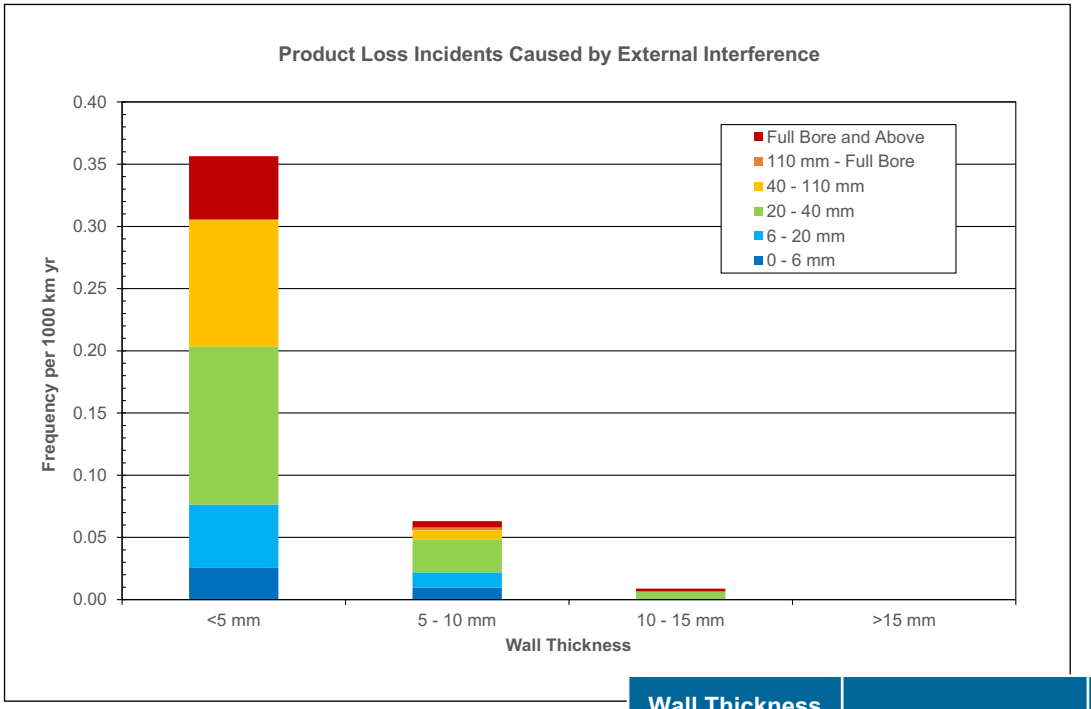
Database Issues

- Correction of incorrect or inconsistent fault & defect data continues
- Recent data provided is (mainly) of good quality
  - Even if some of it is late!
- Current biggest issue is related to pipeline database
  - Calculation of exposure split by key parameters getting more difficult

Use of Exposure Split

- Product Loss Report presents data split by key parameters
  - External Interference
    - Diameter
    - Wall Thickness
    - Area Type
  - External Corrosion
    - Wall Thickness
    - Age (Year of Construction)
    - Coating Type

External Interference by Wall Thickness



Wall Thickness (mm)	Exposure (km yr)	No. of External Interference Incidents	Frequency (Incidents per 1000 km yr)
< 5	39,277	14	0.356
5 – 10	412,055	26	0.063
10 – 15	452,722	4	0.009
> 15	127,998	0	0.000
Unknown	13,697	0	0.000
TOTAL	1,045,750	44	0.042

Pipeline Database History

- Original British Gas data for pipelines had length split by multiple categories
  - e.g. 3 most common wall thicknesses
- British Gas used to provide an update
  - What they had built and decommissioned each year
- Updates became scarcer following privatisation, multiple price controls and split into GDNs
  - Pipeline database was getting out of date
  - Big adjustments had to be made when diversions/decommissioning/construction details finally provided
- Now GDNs just provide their current operating list each year
  - In widely different formats!
- Current problem
  - Original historic split couldn't be recreated
    - But was assumed to be correct and each years exposure split added
    - Big adjustments gave concerns over accuracy
    - Analysis took a lot of time and effort

Current Problem

- Following work for TD/2 update, different approach tried this year
  - Assume current km split is representative of split in operating experience
    - Network is mature with majority over 50 years old
- But may
  - Overestimate exposure of larger diameter, thicker wall, rural pipelines
  - Underestimate exposure of smaller diameter, thinner wall, suburban pipelines

Options for Improvement

1. Ask each operator to supply total operating length each year split by required categories
   - Easier for Chris and myself!
     - Possibly easier for operators of smaller networks or those with a good GIS database

2. Get more granular data from each operator
   - e.g. Provide GIS output so we have the parameters (including commissioning date) for each pipeline section

Any Thoughts or Questions?

Hydrogen Pipelines – Fault Data

- Product field
  - Added to fault database last year
    - Previously was implicit
  - Hydrogen added to list of potential products this year
  - Following discussion with PIWG, option to state Hydrogen blend will also be added
    - Additional request to state % blend in additional info field
    - Once further research into effect of H2 on pipeline steel has been completed
      - May split into suitable sub-categories

Hydrogen Pipelines – Pipeline Data

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- But if we want to be able to calculate failure frequencies and compare to NG service…
  - … we'll need to know the operating exposure
- Operators requested to inform us when an MAH pipeline has changed to hydrogen service
  - We'll keep a record with commissioning and conversion dates
  - And calculate the exposure manually

Any Thoughts or Questions?