



UKOPA Fault Data – Why it's vital for operators and how we collect it

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Teams Webinar

Thursday 4th June 2020

Webinar Etiquette

Please

1. Ensure your microphone is muted & webcam is off
2. Sign in to chat so we can keep a record of attendance
 - and get back to you if we didn't have time to answer your question

Agenda

- History of UKOPA MAHP Database
- Why Fault Data Collection is Important for UKOPA
- How Data is Collected
- FR/1 Form
 - Review of Existing Forms
 - Updated Form
- Next Steps
- Questions

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Definitions – MAHP

- Major Accident Hazard Pipeline (MAHP) defined in Pipelines Safety Regulations 1996 (PSR96) as
 - A pipeline conveying a dangerous fluid!

- Dangerous fluids include:
 - Natural gas (above 8 bara)
 - Ethylene
 - Ethane / Propane / LPG
 - Spiked Crude
 - Toxic
 - Etc.

- See Schedule 2 for full definition of dangerous fluid

Definitions – Fault & Defect

Fault

- Pipeline 'feature' confirmed by field investigation, excavation and measurement
 - Any product loss incident
 - Any external interference incident involving damage to the pipe or coating
 - Any external (or internal) corrosion damage to the pipe
 - Any other damage or defect to the pipe
- Effectively each dig location is a fault where you might discover more than one defect

Defect

- Specific individual piece of damage to pipe
 - Dent / Gouge / Crack / Corrosion / Mill Defect / Weld Defect

History of UKOPA MAHP Database

- ❑ UKOPA MAHP Database is successor to British Gas Database
 - ❑ Technically 3 linked databases
 - ❑ Pipeline data
 - ❑ Product Loss
 - ❑ **Fault & Defect data**

- ❑ First Product Loss Fault recorded in 1962
 - ❑ Leak due to Pipe/Mill Defect in Scotland
 - ❑ Unknown repair method...

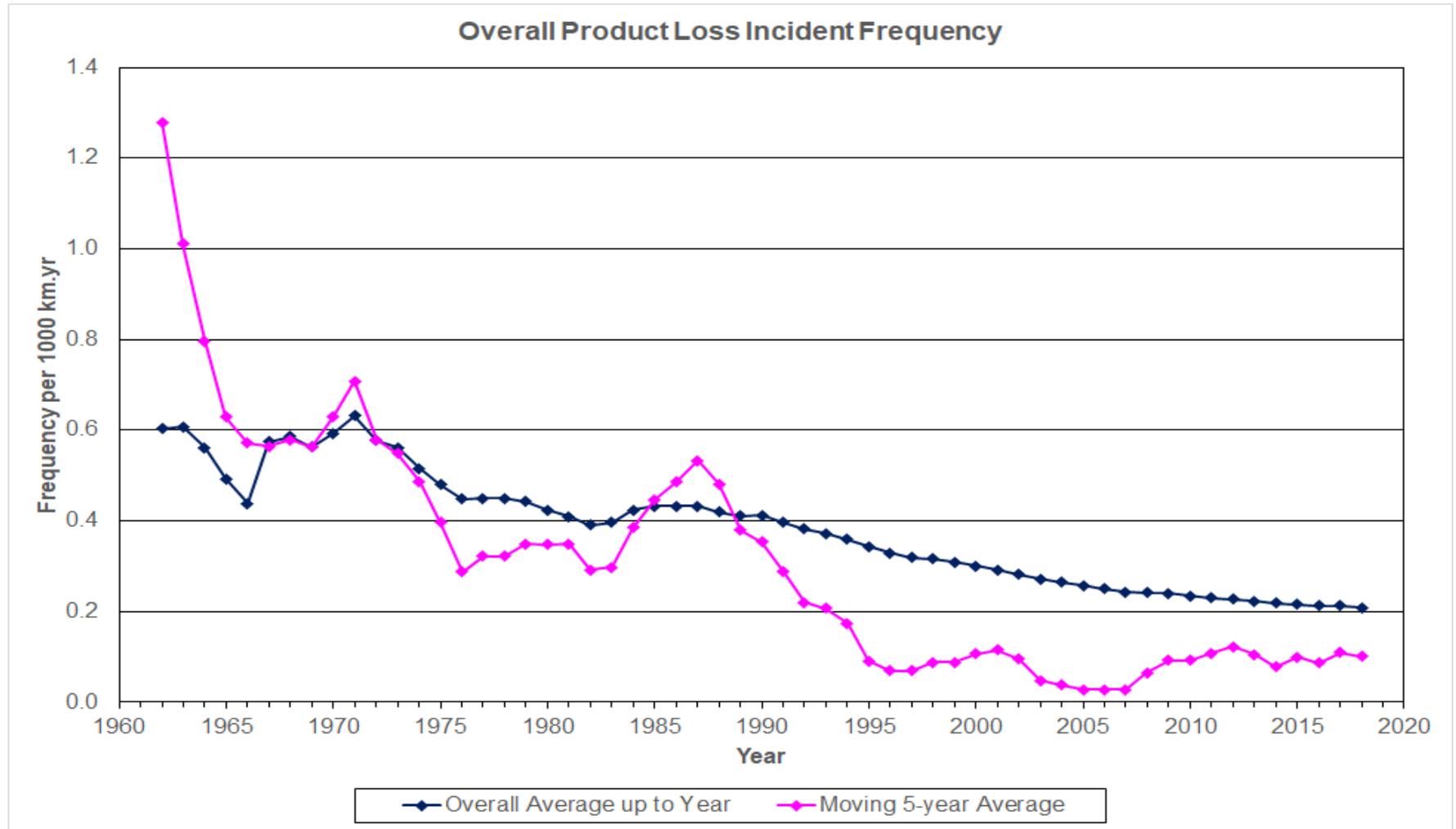
- ❑ First non through-wall Fault recorded in 1966
 - ❑ Slight damage – discovered by CIPS, repaired by dress and rewrap but no cause given...
 - ❑ ...but likely to be external corrosion

- ❑ Pipeline operating data goes back to 1952

Current UKOPA MAHP Database

1962 – 2018 Data	
Contributing members	13
Network Length	23,674 km
Operating Experience	974,923 km years
Faults	3,685
Defects	6,305
Product Loss	203

UKOPA MAHP Database – Overall Product Loss Incident Frequency

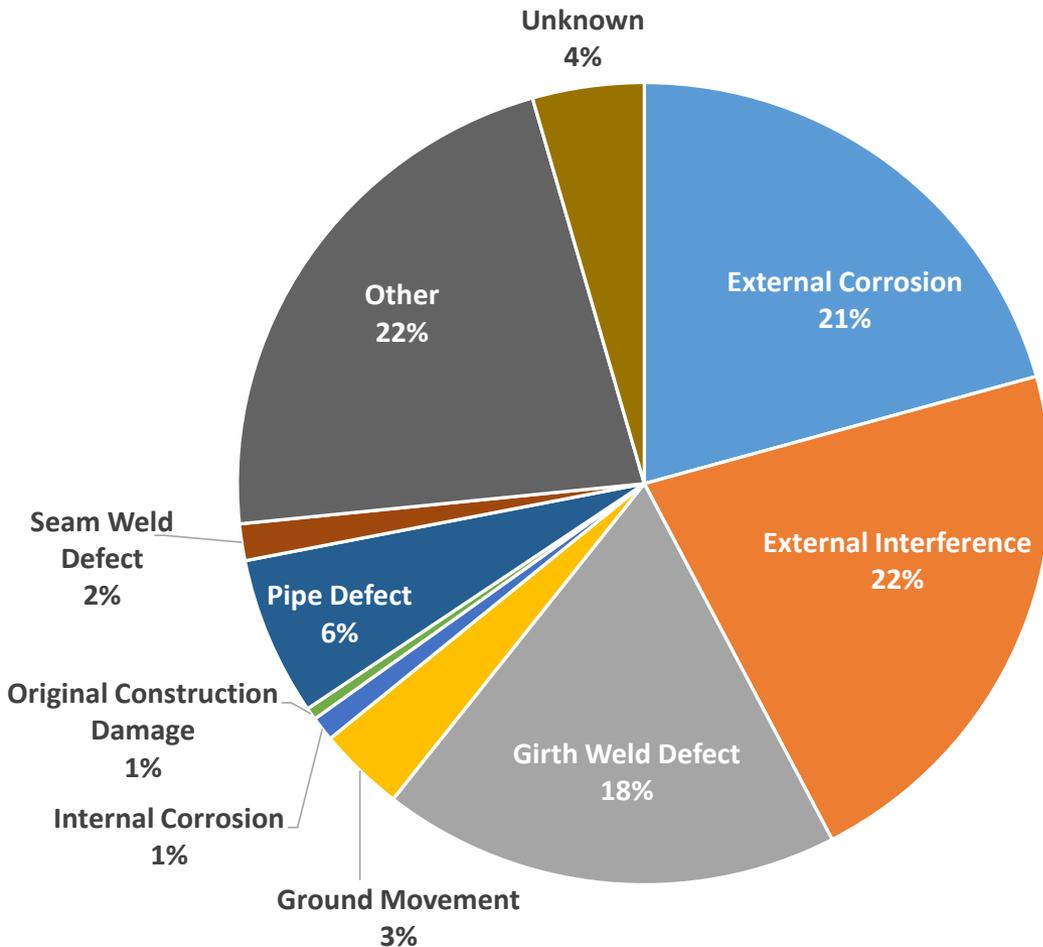


UKOPA MAHP Database – Faults & Product Loss (1962 – 2018)

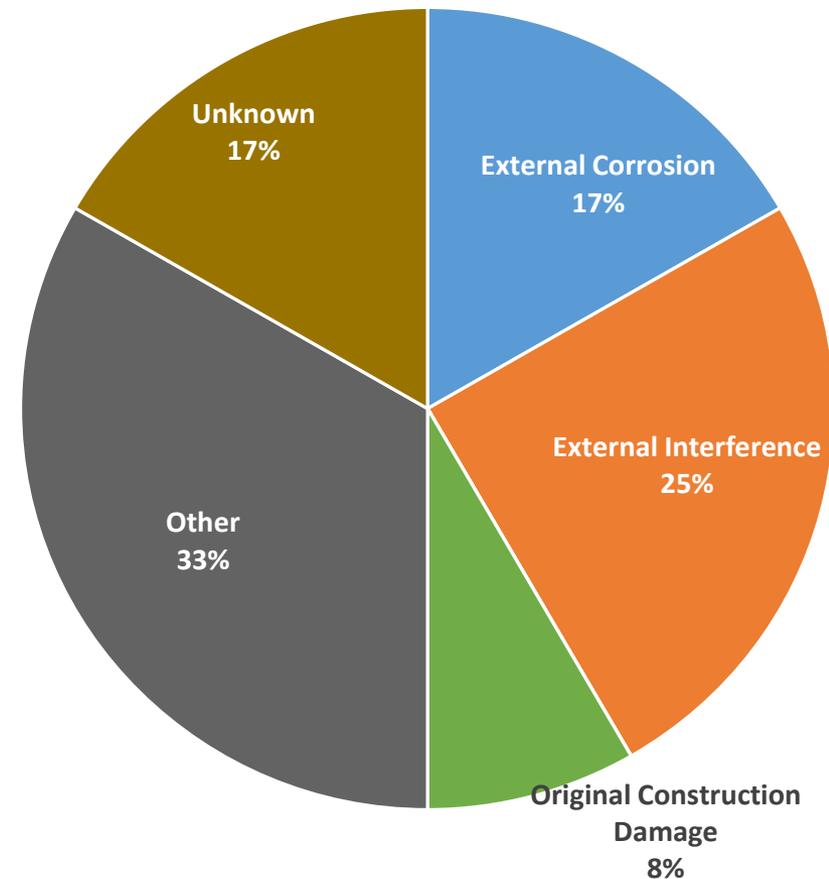
Cause	Faults	Product Loss
External Corrosion	1,352	42
External Interference	724	44
Girth Weld Defect	208	37
Ground Movement	41	7
Internal Corrosion / SCC	32	2
Material Defect (pipe, mill damage, seam weld)	443	16
Original Construction Damage	302	1
Other	389	45
Unknown	194	9
TOTAL	3,685	203

UKOPA MAHP Database – Product Loss by Cause

1962 - 2018



2014 - 2018



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Why Fault Data Collection is Important

- ❑ Takes a lot of time and effort from members providing data and UKOPA to analyse it
 - ❑ Seen by some as a pain...

- ❑ ...and not just to produce Product Loss Report but vital for UKOPA members

- ❑ 2 main (connected) areas
 - ❑ Land Use Planning (LUP)
 - ❑ Pipeline QRA & QRA Code Supplements

Land Use Planning

- ❑ UKOPA Product Loss data influenced HSE change away from multiples of BPD for NG and use of CONCAWE data for other MAHPs
 - ❑ Reduced risk-based land used planning zones

Period	UKOPA	CONCAWE
	Failure Frequency (per 1000 km yrs)	
1971 – 2017	0.193	0.71 / 0.45
1998 – 2017	0.088	-
2013 – 2017	0.110	1.49 / 0.15

- ❑ Need to maintain confidence in the UKOPA database

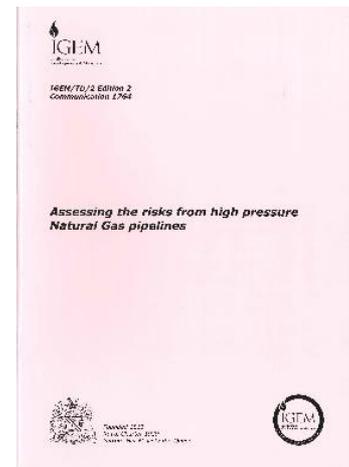
LUP & Pipeline QRA

- ❑ Fault data used to
 - ❑ Develop predictive model for external interference failure frequency
 - ❑ Develop risk reduction factors for risk mitigation measures
 - ❑ Depth of cover
 - ❑ Concrete slabbing
 - ❑ Aerial surveillance
 - ❑ Support predictive model for natural landsliding

Accepted by HSE

- ❑ Failure data also used to
 - ❑ Produce recommendations on historic failure frequencies

- ❑ All incorporated in IGEM/TD/2 and PD 8010-3



Why Fault Data Collection is Important - Summary

- ❑ Without recognised database
 - ❑ Land Use Planning zones would increase
 - ❑ More loss of development compensation
 - ❑ Pipeline QRA models not accepted by HSE
 - ❑ No ability to smooth over LUP issues
 - ❑ All proximity, population density & xing infringements would need relaying or slabbing

- ❑ Leads to
 - ❑ Increased OPEX costs
 - ❑ Increased risk to staff from hot-tap and stopples
 - ❑ Reduced ability to meet UKOPA strategic aims

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How Data is Collected

- ❑ Operator conducts excavations and field measurement of defects throughout Year 1
 - ❑ Complete company FR/1 or P11 etc. forms at dig site or later

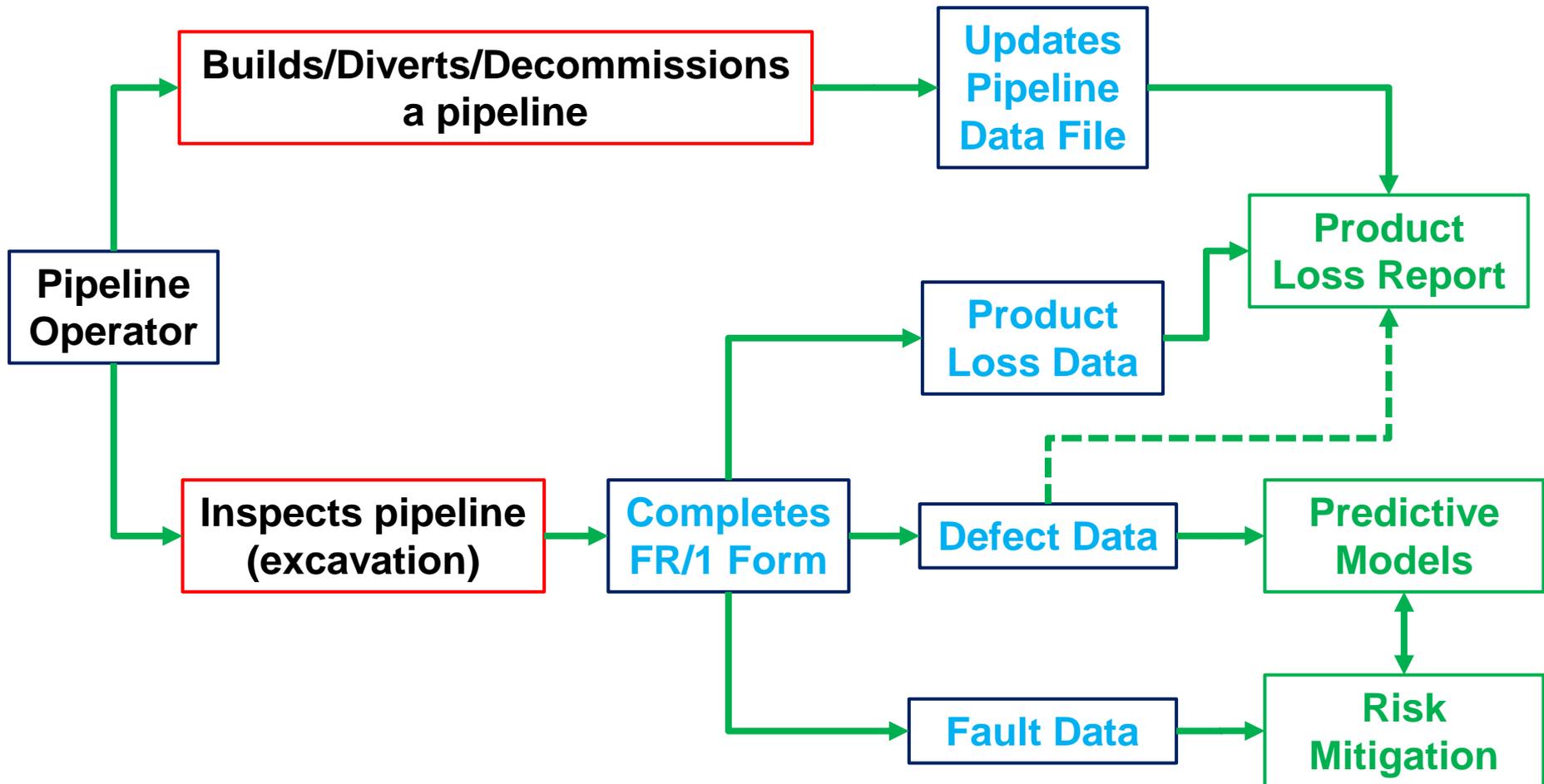
- ❑ FARWG (through PIE) requests Year 1 fault data and update to pipeline data in Spring Year 2
 - ❑ Blank fault and defect spreadsheets issued to each company

- ❑ Operators collate Fault Data and return spreadsheets & Pipeline update by end Autumn Year 2

- ❑ FARWG process data and draft Product Loss Winter Year 2
 - ❑ Usually issued after FARWG and Board comments in Spring Year 3

- ❑ FARWG request review of defect data parameters every 5 years (approximately)

UKOPA Database Idealised Process



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Review of Existing FR/1 Forms

- Completed through 2019

- Overall aims
 - Improve/maintain data quality
 - Make completion easier for operators

- Operator feedback provided at FR/1 Workshop
 - 19th June 2019, Ambergate

UKOPA FR/1 Form (April 2014)

- 6 Sections
 - Operator contact data
 - Section A1 - Pipeline data
 - 8 items
 - Section A2 – Fault data
 - 33 items
 - Section B – Defect data
 - 6 items per defect
 - Section C – Product Loss data
 - 17 items
 - Section D – Optional data
 - 27 items

- Less than one third currently used in Product Loss Report!

UKOPA vs Operator FR/1 Forms

	Section	UKOPA	NGG	Cadent	NGN	SGN	WWU
A1	Pipeline	8	7	7	7	7	8
A2	Fault	32	25	25	21	21	32
B	Defect	6	5	5	6	6	6
C	Product Loss	17	16	16	15	15	17
D	Optional	27	14	14	14	12	27
	TOTAL	90	67	67	63	61	90

- Between 23-29 items that will never be provided...
 - ...but small number of key items not on any form

FR/1 Issues - Data Completeness

- Most database records have something in each field
 - Including Unknown/Other/None & 'bad' data

- Fields with limited data
 - Date of previous aerial inspection (2% completed)
 - Date of previous CP survey (6%)
 - Date of previous ILI (12%)

 - Failure comments (6%)

FR/1 Issues - Data 'Correctness'

Field that need the most 'intervention'

Defect Type

- Corrosion when comments refer to external interference or construction damage

Fault Cause

- 'Other' instead of Internal SCC or Original Construction Damage

Fault Secondary Cause & Defect Comments

- Fault Cause actually written here

Inconsistencies in these 4 entries good way to spot suspect data

Improvements – Classification of Dent-Gouges

❑ Defect data statistics now in 5 separate distributions

- ❑ 'Plain' dent
- ❑ 'Plain' gouge
- ❑ Dent with gouge in it
- ❑ Gouge in dent
- ❑ Dent force
 - ❑ from dent depth



- ❑ Type of Defect needs to include each option and be clear what each means

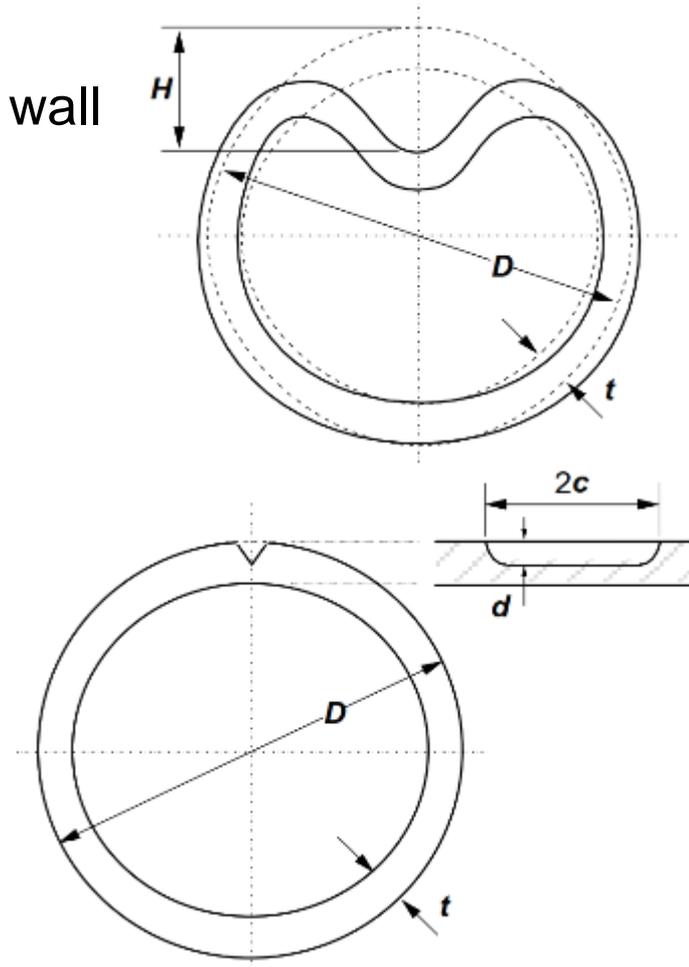
'Plain' Dent and Gouge

□ Plain dent

- Smooth change in curvature of the pipe wall with no wall thickness reduction

□ Plain gouge

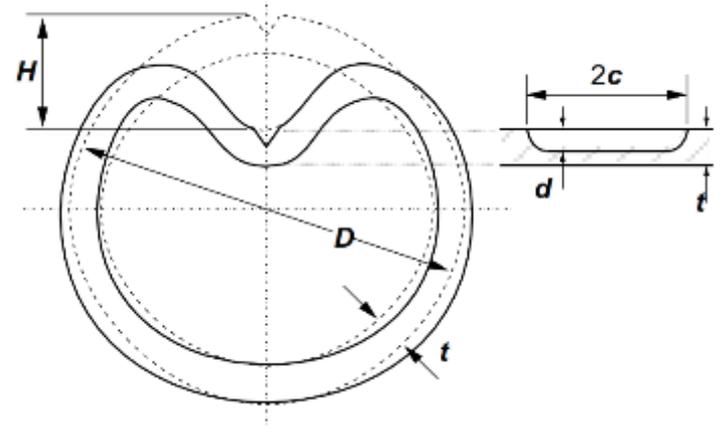
- surface damage to a pipeline caused by contact with a foreign object that has displaced or removed material from the pipe wall, resulting in metal-loss.



Gouged Dents

- Combination of dent with gouge

- Reduction in wall thickness **and** change in radius of curvature



- If dent has a gouge in

 - Classify as Dent associated with gouge

 - Refer to associated gouge in dent in comments

- If gouge is in a dent

 - Classify as Gouge in Dent

Other FR/1 Improvements – Summary

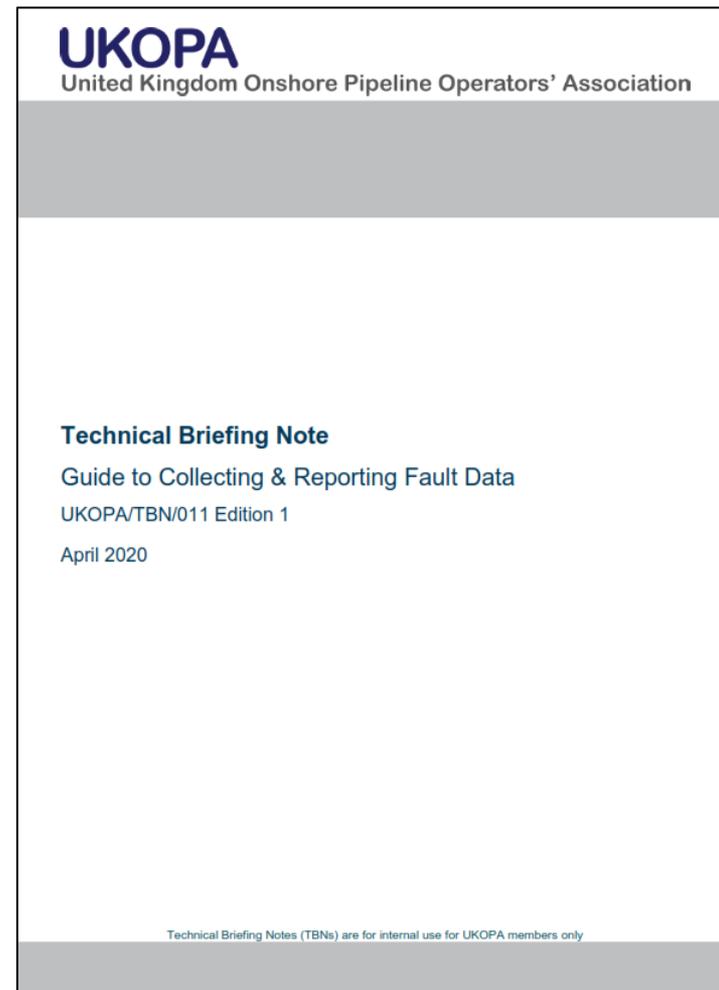
- Delete / Modify some comments fields
 - Inspection details / comments (34)
- Delete unnecessary / unhelpful fields
 - Fault Secondary / Other Cause (18)
- Modify / Clarify confusing field titles / options
 - Area Classification (10)
 - Design code options only
 - Extent of Damage (21)
- Add small number of fields
 - Product
 - Fatality / Casualty Numbers
 - Building Damage

EGIG
Requirement

New FR/1 Form (January 2020)

- ❑ UKOPA/TBN/011 (April 2020)
 - ❑ Summary of review & recommended improvements
 - ❑ Updated FR/1 Form
 - ❑ Guidance on completing form

- ❑ Operator input spreadsheets updated and issued for 2019 data collection



New FR/1 Form (January 2020)

UKOPA UKOPA MAHP Database FR/1 Form

UKOPA MAHP FAULT DATABASE
Form FR/1 – FAULT INPUT DATA – Revised January 2020

This form should be completed whenever an operational fault occurs on a steel major accident hazard pipeline operating at pressures of 7 bar and above. It is intended for use by the person responsible for excavating and inspecting damage to a pipeline. The data is then recorded and sent to UKOPA to be included in the MAHP Fault Database.

An operational fault is defined as a pipeline feature (damage) that has been confirmed by field investigation, excavation and measurement and includes:

- Any product loss incident involving other than minor leakage from valve stems or flange gaskets;
- Any external interference incident involving damage to the pipe (or fitting or associated equipment) or to its coating;
- Any external/internal corrosion damage to the pipe, fitting or associated equipment; or,
- Any other defect or damage to the pipe or fitting or associated equipment e.g. cracks, mill defects etc.

Please return this completed form to: *Insert name of Company's UKOPA FARWG Contact here*

For help, contact: *Insert name, phone number & email of Company's UKOPA FARWG Contact here*

NOTE: Data item numbers  refer to the column number for the UKOPA data input worksheet

OPERATOR'S FAULT REFERENCE NUMBER: 

Contact Person (i.e. person completing this form):

Telephone Number: Email address:

Company: Date of Completion:

Complete Section A for each pipeline Fault & Section B for all Defects measured for this Fault.
Section C must be completed if Product Loss (leak or rupture) occurred.

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UKOPA UKOPA MAHP Database FR/1 Form

SECTION A – ALL FAULTS

A1 – PIPELINE DETAILS

Pipeline Name: 

Pipeline Reference: 

Product in Pipeline: 

Natural Gas	Ethylene (Dense Phase)	Hydrogen	
Biogas	Carbon Dioxide (Dense Phase)	Other:	

A2 – FAULT DETAILS

Description of Fault: 

Grid Reference at Fault Location: E N 

Operating Pressure at time of Fault (barg): 

Outside Diameter at Fault Location (mm): 

Measured Wall Thickness at Fault (mm): 

Material Grade at Fault Location: 

Grade A	Grade B	X42	X46	X52	X56	
X60	X65	X70	X80	L245	L290	
L360	L415	L450	L485	L555	Other:	

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New FR/1 Form (January 2020)

UKOPA UKOPA MAHP Database FR/1 Form

SECTION B – DEFECTS

How many Defects were recorded at this Fault Location? ³⁴

Please record the Type, Dimensions and Repair Method for each Defect:

No	Type of Defect ¹	Length (mm)	Width (mm)	Depth (mm)	Position around circ. (0–360°)	Repair Method ²	Defect Comment
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							

¹ Type of Defect:

- Plain Dent / Plain Gouge / Gouge (in Dent) / Dent (associated with Gouge) / Crack / Mill Defect / Corrosion / Other (please specify)

² Repair Method:

- Coating Repair Only / Dress & Rewrap / Weld Deposition / Epoxy Shell / Close-fit Shell / Hot Tap / Leak Clamp / Cut Out / None / Unknown / Other (please specify)

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UKOPA UKOPA MAHP Database FR/1 Form

SECTION C – PRODUCT LOSS

Complete this section only if product was released through a hole or rupture.

Approximate Hole Area (mm²): ³⁵

Hole Length (mm): ³⁶ Hole Width (mm): ³⁷

Hole Circumferential Position: ³⁸
(0–360° from top of pipe in direction of flow)

Approximate Amount of Product Released (tonnes): ³⁹

Was a Crater Formed? Yes No Unknown ⁴⁰

Crater Length (m): ⁴¹ Crater Width (m): ⁴²

Crater Depth (m): ⁴³ Radius of Debris Throw (m): ⁴⁴

Did Released Product Ignite? Yes No Unknown ⁴⁵

Ignition Type: Immediate Delayed Unknown ⁴⁶

Type of Fire: ⁴⁷

Vapour Cloud Explosion Flash Fire Fireball Jet Fire Unknown

Flame Length (m): ⁴⁸ Flame Inclination (°): ⁴⁹
(0° = horizontal, 90° = vertical)

Fire Damage Radius (m): ⁵⁰

Buildings Damaged? Yes No Unknown ⁵¹

Number of Casualties (Yes/No/Unknown):

	Injury	Fatality
Operator Staff / Contractors	<input type="text"/> ⁵²	<input type="text"/> ⁵³
3 rd Party Causers	<input type="text"/> ⁵⁴	<input type="text"/> ⁵⁵
Emergency Services	<input type="text"/> ⁵⁶	<input type="text"/> ⁵⁷
Public	<input type="text"/> ⁵⁸	<input type="text"/> ⁵⁹

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New FR/1 Form (January 2020)

UKOPA		UKOPA MAHP Database FR/1 Form	
SECTION D – OPTIONAL ADDITIONAL INFORMATION			
Please note that this section is not included in the UKOPA Database			
FLOW ISOLATION			
Was the product flow isolated?			
Yes	No	Unknown	
Type of valve used (if applicable):			
Manual	Slam Shut	Remote	Relief
None	Unknown	Other (please specify):	
3RD PARTY ACTIVITY			
Was the Company aware of activity prior to the incident?			
Yes	No	Unknown	
Type of machine/implement causing damage:			
Bulldozer Blade	Dragline	Drain Layer	
Back Acter	Plough	Digger	
Scraper	Tracks	Trencher	
Power Drill	Spike	None	
Unknown	Other:		
Manufacturer:		Model no:	
Who was aware of the existence and location of the pipeline? <i>Tick all that apply</i>			
Contractor/Supervisor	Driver /Operator	Landowner /Tenant	
None	Unknown	Other:	
For whom was work being carried out?			
Company	Other Pipe Operator	Landowner / Tenant	
Local Authority	Electricity	Telecoms	
Water	Builder / Developer	None	
Unknown	Other:		
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Next Steps for Database in 2020

- ❑ Transfer Copy of Fault & Defect Data to new database structure
 - ❑ Matching new FR/1 form
- ❑ Review data and clean up any issues
 - ❑ All changes documented
- ❑ Receive 2019 fault and defect data using new input spreadsheets
 - ❑ Review data and work with operators to iron out any teething troubles
- ❑ Process data and draft Product Loss Report

Any Questions?

- Please use chat function

- Any questions not answered now will be covered in a follow up written response.

Future Webinars

- ❑ 18th June 2020
 - ❑ Assessing risks – Overview of pipeline QRA and IGEM/TD/2
- ❑ 2nd July 2020
 - ❑ ALARP and cost-benefit analysis (UKOPA/GP/025)
- ❑ Suggestions for future topics and to sign up, please email Nikki Barker nikki.barker@pieuk.co.uk