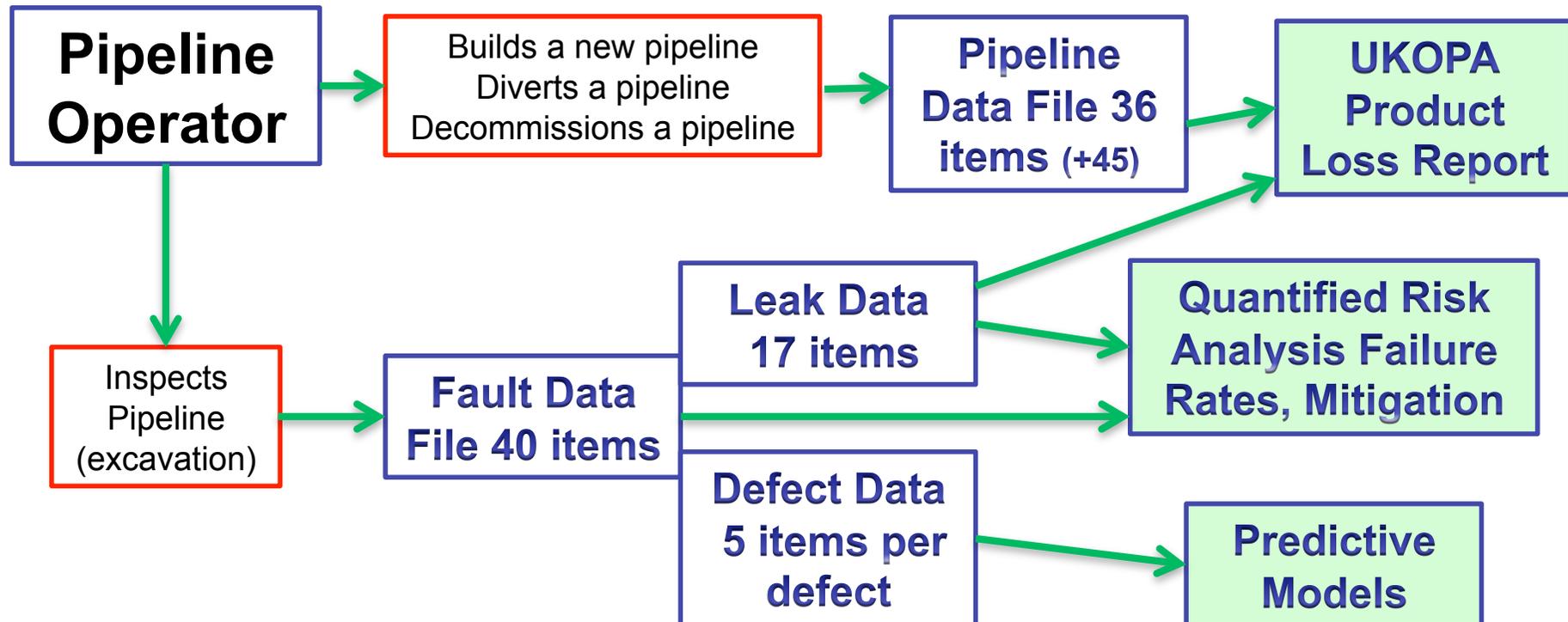




### FDMG – Excel-based Database How IT Works 1962-2010 Product Loss Report

October 2011

# Excel-based Fault and Leak Database



A FAULT is a feature that has been confirmed by field investigation, excavation and measurement. Any features that are inferred by other measurements such as an intelligent pig in line inspections, CIPS, etc and have not been verified in the field should not be included. However pipeline defects comprising of coating damage or grinding marks confirmed by inspection should be included. The date of the fault should be the date of the field inspection.

# Data Format – Pipeline Data

Database - Pipeline Operator		List of Pipelines			Press to view database and change data								
2	3	4	5	6	7	8	9	10	11	12	13	14	15
Pipeline Operator	Operator's pipeline reference number	Operator's pipeline name	Product	Phase	Outside Diameter mm	MAIN Nominal Wall Thickness mm	Nominal Wall Thickness 2 - mm	Length of pipeline with wall thickness 2 - km	Nominal Wall Thickness 3 - mm	Length of pipeline with wall thickness 3 - km	Pipeline Design Pressure Bar	Pipeline Max Operating Pressure Bar	Date Pipeline was Commissioned
Pipeline Operator	Pipe01	Pipeline name	Natural Gas (Dry)	Gas Phase	610	11.1	0	0	0	0	49.6	32.6	01 October 1964
Pipeline Operator	Pipe01	Pipeline name	Natural Gas (Dry)	Gas Phase	325	6.4	0	0	0	0	49.6	32.6	01 October 1964
Pipeline Operator	Pipe01	Pipeline name	Natural Gas (Dry)	Gas Phase	325	7.1	0	0	0	0	68.9	68.9	01 September 1970
Pipeline Operator	Pipe01	Pipeline name	Natural Gas (Dry)	Gas Phase	325	7.9	0	0	0	0	49.6	32.6	01 October 1970
Pipeline Operator	Pipe01	Pipeline name	Natural Gas (Dry)	Gas Phase	325	6.4	11.9	0.21	0	0	49.6	32.6	01 February 1969
Pipeline Operator	Pipe01	Pipeline name	Natural Gas (Dry)	Gas Phase	218	6.4	0	0	0	0	49.6	13.8	01 May 1968
Pipeline Operator	Pipe01	Pipeline name	Natural Gas (Dry)	Gas Phase	457	9.5	0	0	0	0	49.6	32.6	01 December 1966
Pipeline Operator	Pipe01	Pipeline name	Natural Gas (Dry)	Gas Phase	356	7.9	0	0	0	0	49.6	32.6	01 December 1966
Pipeline Operator	Pipe01	Pipeline name	Natural Gas (Dry)	Gas Phase	274	7.1	0	0	0	0	49.6	13.8	01 December 1966
Pipeline Operator	Pipe01	Pipeline name	Natural Gas (Dry)	Gas Phase	274	6.4	0	0	0	0	49.6	32.6	01 December 1964
Pipeline Operator	Pipe01	Pipeline name	Natural Gas (Dry)	Gas Phase	325	6.4	0	0	0	0	49.6	32.6	01 December 1964
Pipeline Operator	Pipe01	Pipeline name	Natural Gas (Dry)	Gas Phase	356	7.9	0	0	0	0	49.6	24.1	01 January 1968
Pipeline Operator	Pipe01	Pipeline name	Natural Gas (Dry)	Gas Phase	508	9.5	0	0	0	0	49.6	33.8	01 January 1968
Pipeline Operator	Pipe01	Pipeline name	Natural Gas (Dry)	Gas Phase	356	7.9	0	0	0	0	49.6	6.9	01 July 1968
Pipeline Operator	Pipe01	Pipeline name	Natural Gas (Dry)	Gas Phase	508	11.1	0	0	0	0	49.6	33.8	01 January 1968
Pipeline Operator	Pipe01	Pipeline name	Natural Gas (Dry)	Gas Phase	508	9.5	0	0	0	0	49.6	13.8	01 December 1966
Pipeline Operator	Pipe01	Pipeline name	Natural Gas (Dry)	Gas Phase	325	7.9	0	0	0	0	49.6	13.8	01 December 1966
Pipeline Operator	Pipe01	Pipeline name	Natural Gas (Dry)	Gas Phase	325	7.9	0	0	0	0	49.6	13.8	01 January 1967
Pipeline Operator	Pipe01	Pipeline name	Natural Gas (Dry)	Gas Phase	325	7.9	0	0	0	0	49.6	32.6	01 January 1967
Pipeline Operator	Pipe01	Pipeline name	Natural Gas (Dry)	Gas Phase	325	6.4	0	0	0	0	49.6	32.6	01 October 1968
Pipeline Operator	Pipe01	Pipeline name	Natural Gas (Dry)	Gas Phase	325	6.4	0	0	0	0	49.6	32.6	01 November 1969
Pipeline Operator	Pipe01	Pipeline name	Natural Gas (Dry)	Gas Phase	76	6.4	0	0	0	0	49.6	17.2	01 September 1969
Pipeline Operator	Pipe01	Pipeline name	Natural Gas (Dry)	Gas Phase	168	6.4	0	0	0	0	49.6	17.2	01 September 1969
Pipeline Operator	Pipe01	Pipeline name	Natural Gas (Dry)	Gas Phase	76	6.4	0	0	0	0	49.6	17.2	01 September 1969
Pipeline Operator	Pipe01	Pipeline name	Natural Gas (Dry)	Gas Phase	274	7.1	0	0	0	0	49.6	31	01 August 1971
Pipeline Operator	Pipe01	Pipeline name	Natural Gas (Dry)	Gas Phase	168	6.4	12.7	0.081	0	0	49.6	36.4	01 June 1971
Pipeline Operator	Pipe01	Pipeline name	Natural Gas (Dry)	Gas Phase	218	6.4	0	0	0	0	49.6	36.4	01 October 1970
Pipeline Operator	Pipe01	Pipeline name	Natural Gas (Dry)	Gas Phase	325	7.1	0	0	0	0	49.6	36.4	01 January 1971
Pipeline Operator	Pipe01	Pipeline name	Natural Gas (Dry)	Gas Phase	356	7.9	0	0	0	0	49.6	24.1	01 June 1974
Pipeline Operator	Pipe01	Pipeline name	Natural Gas (Dry)	Gas Phase	218	6.4	0	0	0	0	49.6	36.4	01 May 1973
Pipeline Operator	Pipe01	Pipeline name	Natural Gas (Dry)	Gas Phase	168	5.6	0	0	0	0	49.6	13.8	01 April 1974
Pipeline Operator	Pipe01	Pipeline name	Natural Gas (Dry)	Gas Phase	325	7.1	0	0	0	0	49.6	13.8	01 December 1973
Pipeline Operator	Pipe01	Pipeline name	Natural Gas (Dry)	Gas Phase	356	7.9	0	0	0	0	49.6	24.1	01 August 1974
Pipeline Operator	Pipe01	Pipeline name	Natural Gas (Dry)	Gas Phase	168	6.4	0	0	0	0	49.6	13.8	01 June 1971
Pipeline Operator	Pipe01	Pipeline name	Natural Gas (Dry)	Gas Phase	168	4.8	0	0	0	0	49.6	31	01 September 1971

# Pipeline Data Format – FORMS Format

Pipeline Data in database - To change data - type in new data - press SAVE DATA

<b>Index Number</b>	<input type="text" value="1"/>	<b>1 GL ID No.</b>	<input type="text" value="1549"/>	<b>3 Pipeline ID</b>	<input type="text" value="Pipe01"/>
<b>MOVE CURSOR</b>	<input type="button" value="←"/>	<input type="button" value="→"/>	<b>4 Pipeline Name</b>	<input type="text" value="Pipeline name"/>	
<b>7 Pipeline OD mm</b>	<input type="text" value="610"/>	<b>5 Product</b>	<input type="text" value="Natural Gas (Dry)"/>	<b>6 Phase</b>	<input type="text" value="Gas Phase"/>
<b>8 Main Wall Thickness mm</b>	<input type="text" value="11.1"/>	<b>Pipeline data created:-</b>		<b>21 Construction Type</b>	<input type="text" value="Longitudinal SAW"/>
<b>9 Second Wall Thickness mm</b>	<input type="text" value="0"/>	<b>33 By</b>	<input type="text" value="D. Browne"/>	<b>22 Design depth of Cover</b>	<input type="text"/>
<b>10 Length 2nd Wall Thickness km</b>	<input type="text" value="0"/>	<b>34 Date</b>	<input type="text" value="11/10/2004"/>	<b>23 Main Pipe Steel Grade</b>	<input type="text" value="X46"/>
<b>11 Third Wall Thickness mm</b>	<input type="text" value="0"/>	<b>Pipeline data last changed:-</b>		<b>24 Second Steel Grade</b>	<input type="text" value="0"/>
<b>12 Length 3rd Wall Thickness km</b>	<input type="text" value="0"/>	<b>35 By</b>	<input type="text" value="D. Browne"/>	<b>25 Length 2nd Steel Grade km</b>	<input type="text" value="0"/>
<b>13 Design Pressure barg</b>	<input type="text" value="49.6"/>	<b>36 Date</b>	<input type="text" value="11/10/2004"/>	<b>26 External Coating</b>	<input type="text" value="Coal Tar (Not In"/>
<b>14 Max. Pressure barg</b>	<input type="text" value="32.6"/>	<b>SAVE CHANGED DATA</b>		<b>27 Internal Coating</b>	<input type="text" value="Red Lead"/>
<b>15 Date Pipeline Commissioned</b>	<input type="text" value="01/10/1964"/>			<b>28 Girth Weld Coating</b>	<input type="text" value="Flood"/>
<b>16 Date Pipeline De-Commissioned</b>	<input type="text" value="NULL"/>	<b>18 Length rural km</b>	<input type="text" value="7.99"/>	<b>29 Cathodic Protection</b>	<input type="text" value="Impressed Current"/>
<b>17 Length below ground km</b>	<input type="text" value="12.92"/>	<b>19 Length suburban km</b>	<input type="text" value="4.93"/>	<b>30 Hydrotest date</b>	<input type="text" value="01/08/1964"/>
		<b>20 Length Urban km</b>	<input type="text" value="0"/>	<b>31 Hydrotest pressure bar</b>	<input type="text" value="74.5"/>
<b>32 Pipeline Comments</b>	<input type="text" value="."/>				

# Data Format – Fault Data

Pipeline Operator's FAULTS				November 2010	View / Change Fault Data									
1	2	3	4	5	6	7	8	9	10	11	12	13	14	
Original GL ID Fault Number	Pipeline Operator	Operator's pipeline reference number	Operator's pipeline name	Operator's fault reference number	Pipe Outside Diameter at Fault mm	Local Wall Thickness mm	Fault Material Grade	Type of Pipe Construction at Fault	Ordnance Survey Grid at Fault	Fault Pipeline Location	Fault Specific Location	How Fault was Discovered	Fault Discovery Date	
893	Pipeline Operator	Pipe 01	Pipeline Name	1494	457	6.4	X52	Spiral	NT186770	Rural	Pipeline	?S/Pearson Sur	09 May 1984	
894	Pipeline Operator	Pipe 02	Pipeline Name	1609	457	7.1	X52	Spiral	NS056777	Rural	Pipeline	Other	10 October 1985	
895	Pipeline Operator	Pipe 03	Pipeline Name	1610	457	7.1	X52	Spiral	NS056777	Rural	Pipeline	Other	29 October 1985	
1330	Pipeline Operator	Pipe 04	Pipeline Name	1947	914	12.7	X60	Longitudinal	SU247368	Rural	Pipeline	OLI	24 April 1989	
1331	Pipeline Operator	Pipe 05	Pipeline Name	1954	914	12.7	X60	Longitudinal	SU228394	Rural	Pipeline	OLI	24 April 1989	
1332	Pipeline Operator	Pipe 06	Pipeline Name	1709	406	7.9	B	Seamless	SU422213	Unknown	Pipeline	Ground Patrol	21 November 1986	
1333	Pipeline Operator	Pipe 07	Pipeline Name	391	406	7.9	X42	Seamless	999999	Urban	Pipeline	Unknown	01 February 1973	
1334	Pipeline Operator	Pipe 08	Pipeline Name	58	406	7.9	X42	Seamless	999999	Rural	Pipeline	Site Contractor	14 May 1968	
1335	Pipeline Operator	Pipe 09	Pipeline Name	460	610	9.5	X46	Longitudinal	999999	Rural	Pipeline	Air Patrol	18 September 1973	
1336	Pipeline Operator	Pipe 10	Pipeline Name	2188	610	9.5	X46	Longitudinal	999999	Rural	Pipeline	OLI	05 April 1993	
1337	Pipeline Operator	Pipe 11	Pipeline Name	63	610	11.9	X52	Longitudinal	999999	Suburban	Pipeline	Site Contractor	16 January 1970	
1338	Pipeline Operator	Pipe 12	Pipeline Name	1661	610	11.9	X52	Longitudinal	999999	Suburban	Pipeline	Public	18 September 1985	
1339	Pipeline Operator	Pipe 13	Pipeline Name	2024	610	11.9	X52	Longitudinal	999999	Rural	Pipeline	CIPS/Pearson	04 September 1990	
1340	Pipeline Operator	Pipe 14	Pipeline Name	2025	610	11.9	X52	Longitudinal	999999	Suburban	Pipeline	CIPS/Pearson	14 August 1990	
1341	Pipeline Operator	Pipe 15	Pipeline Name	2026	610	11.9	X52	Longitudinal	999999	Suburban	Pipeline	CIPS/Pearson	07 August 1990	
1342	Pipeline Operator	Pipe 16	Pipeline Name	2027	610	11.9	X52	Longitudinal	999999	Suburban	Pipeline	CIPS/Pearson	06 August 1990	
1343	Pipeline Operator	Pipe 17	Pipeline Name	2131	610	11.9	X52	Longitudinal	999999	Rural	Pipeline	CIPS/Pearson	17 November 1992	
1344	Pipeline Operator	Pipe 18	Pipeline Name	66	406	7.9	B	Seamless	999999	Rural	Pipeline	Unknown	18 November 1968	
1345	Pipeline Operator	Pipe 19	Pipeline Name	67	406	7.9	B	Seamless	999999	Rural	Pipeline	Unknown	31 October 1968	
1346	Pipeline Operator	Pipe 20	Pipeline Name	779	406	7.9	B	Seamless	999999	Suburban	Pipeline	Ground Patrol	26 June 1979	
1347	Pipeline Operator	Pipe 21	Pipeline Name	1173	406	7.9	B	Seamless	999999	Rural	Pipeline	Ground Patrol	19 November 1982	
1348	Pipeline Operator	Pipe 22	Pipeline Name	1865	406	7.9	B	Seamless	999999	Rural	Pipeline	CIPS/Pearson	02 March 1988	
1349	Pipeline Operator	Pipe 23	Pipeline Name	1866	406	7.9	B	Seamless	999999	Rural	Pipeline	CIPS/Pearson	30 March 1988	
1350	Pipeline Operator	Pipe 24	Pipeline Name	778	406	7.9	B	Seamless	999999	Rural	Pipeline	Ground Patrol	24 May 1979	
1351	Pipeline Operator	Pipe 25	Pipeline Name	918	406	7.9	B	Seamless	999999	Rural	Pipeline	Ground Patrol	04 November 1981	
1352	Pipeline Operator	Pipe 26	Pipeline Name	1533	406	7.9	B	Seamless	999999	Rural	Pipeline	CIPS/Pearson	11 June 1984	
1353	Pipeline Operator	Pipe 27	Pipeline Name	60	508	7.1	X42	Longitudinal	999999	Rural	Pipeline	Site Contractor	19 August 1968	
1354	Pipeline Operator	Pipe 28	Pipeline Name	348	508	7.1	X42	Longitudinal	999999	Rural	Pipeline	Site Contractor	16 November 1971	
1355	Pipeline Operator	Pipe 29	Pipeline Name	1662	508	7.1	X42	Longitudinal	999999	Rural	Pipeline	Public	10 April 1986	
1356	Pipeline Operator	Pipe 30	Pipeline Name	69	406	7.1	X42	Seamless	999999	Rural	Pipeline	Unknown	11 November 1970	
1357	Pipeline Operator	Pipe 31	Pipeline Name	397	406	7.9	X42	Seamless	999999	Rural	Pipeline	Site Contractor	23 March 1973	
1358	Pipeline Operator	Pipe 32	Pipeline Name	56	610	9.5	X46	Longitudinal	999999	Rural	Pipeline	Unknown	24 February 1970	
1359	Pipeline Operator	Pipe 33	Pipeline Name	64	610	9.5	X46	Longitudinal	999999	Rural	Pipeline	Unknown	01 September 1969	
1360	Pipeline Operator	Pipe 34	Pipeline Name	396	610	9.5	X46	Longitudinal	999999	Rural	Pipeline	Site Contractor	29 March 1973	
1361	Pipeline Operator	Pipe 35	Pipeline Name	2228	610	9.5	X46	Longitudinal	999999	Rural	Pipeline	Site Contractor	11 July 1994	

# Data Format – Fault Data

Fault Data in database - To change data - type in new data - press SAVE DATA

<b>Index Number</b> 1	<b>1 Database Fault ID</b> 893	<b>2 Operator</b> Pipeline Operator
<b>MOVE CURSOR</b>	<b>3 Operator's Pipeline Ref.</b> Pipe 01	<b>View / Change Leak Details</b>
<b>6 Pipe OD at Fault</b> 457	<b>4 Pipeline Name</b> Pipeline Name	
<b>7 Local Wallthickness</b> 6.4	<b>5 Operator's Fault Ref.</b> 1494	
<b>8 Pipe Grade at Fault</b> X52	<b>36 Number of Defects for this Fault</b> 2	<b>20 Affected Component</b> Pipe
<b>9 Pipe Construction</b> Spiral	<b>Fault data created:-</b>	<b>21 Extent of Damage</b> No Loss - Slight
<b>10 Map Grid Reference</b> NT186770	<b>37 By</b> D Browne	<b>22 Fault Centre Location 0-360 deg.</b> 10
<b>11 Fault Area Location</b> Rural	<b>38 Date</b> 11/10/2004	<b>23 Repair Method</b> Coating only
<b>12 Specific Location</b> Pipeline	<b>Fault data last changed:-</b>	<b>24 Cathodic Protection Status</b> Operational
<b>13 How discovered</b> CIPS/Pearson Survey	<b>39 By</b> D Browne	<b>25 Fault Protection</b> MARKER POSTS
<b>14 Date Discovered</b> 09/05/1984	<b>40 Date</b> 11/10/2004	<b>26 Type of Backfill</b> Heavy Soil
<b>15 Operating Pressure</b> 24.1	<b>SAVE CHANGED DATA</b>	<b>27 Fault depth of cover</b> 1.37
<b>16 Product Supply Action</b> Unaltered		<b>28 External Coating type</b> Coal Tar
<b>17 Fault Cause</b> Ground Movement		<b>29 Was Pipeline Insulated?</b> No
<b>18 Fault other cause</b> NULL		<b>30 Internal Coating type</b> Epoxy Resin
<b>19 External Interference</b> Unknown		<b>31 Date of Previous CP Inspection</b>
<b>34 Fault Inspection details</b> NONE/NONE		<b>32 Date of Previous ILI Inspection</b>
<b>35 Fault additional comments</b> DENT INIT. BY GROUND MVMNT.		<b>33 Date of Previous Aerial Survey</b>

# Data Format – Leak Data

Fault Data in database - To change data - type in new data - press SAVE DATA

**Index Number** 19    **1 Database Fault ID** 1345    **2 Operator** Pipeline Operator

**3 Operator's Pipeline Ref.** Pipe 19    **View / Change Leak Details**

**4 Pipeline Name** Pipeline Name

**6 Pipe OD at Fault** 406    **5 Operator's Fault Ref.** 67

**7 Local Wallthickness** 7.9

**8 Pipe Grade at Fault**

**9 Pipe Construction**

**10 Map Grid Reference**

**11 Fault Area Location**

**12 Specific Location**

**13 How discovered**

**14 Date Discovered**

**15 Operating Pressure**

**16 Product Supply**

**17 Fault Cause**

**18 Fault other cause** NULL

**19 External Interference** Construction on adjacent pipeline

**34 Fault Inspection details** UNKNOWN/UNKNOWN

**35 Fault additional comments** DIP PIPE TORN FROM WELDOLET

**20 Affected Length**

**21 Affected Length**

**22 Affected Length**

**23 Affected Length**

**24 Affected Length**

**25 Affected Length**

**26 Affected Length**

**27 Affected Length**

**28 Affected Length**

**29 Affected Length**

**30 Affected Length**

**31 Date of Previous CP Inspection**

**32 Date of Previous ILI Inspection**

**33 Date of Previous Aerial Survey**

**46 Was Crater formed?** No    **51 Was there ignition?** No

**47 Crater length m** 0    **52 Ignition type** Unknown

**48 Crater width m** 0    **53 Fire type** Unknown

**49 Crater depth m** 0    **54 Radius of damage m** 0

**50 Crater affected radius m** 0    **55 Flame Length m** 0

**56 Flame Inclination m** 0

**41 Hole area mm** 999

**42 Hole length mm** 0

**43 Hole width mm** 0

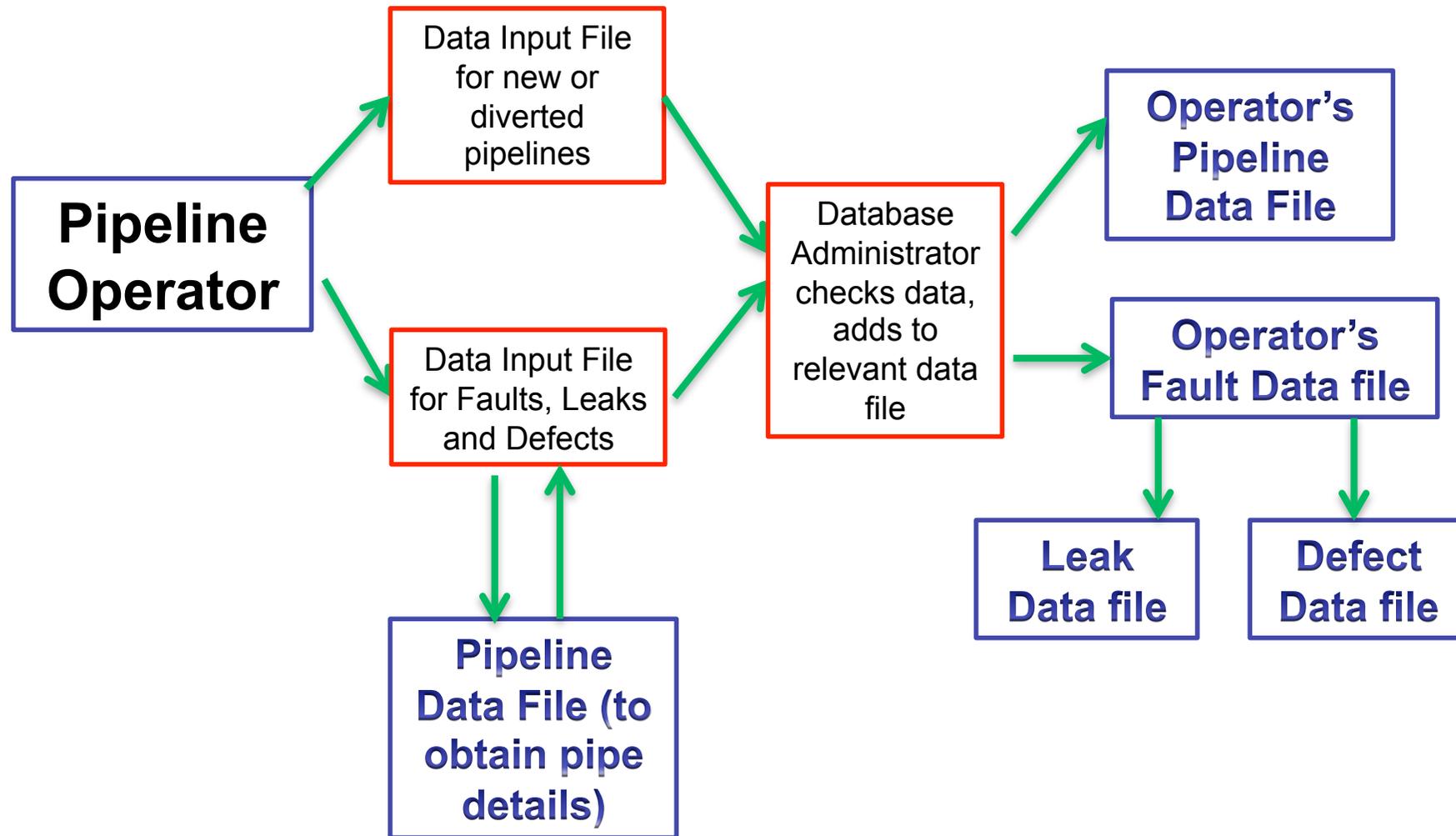
**44 Hole circular position** 180

**45 Amount of Product released - Te** 0

**57 Failure Comments** DIP PIPE TORN FROM WELDOLET

**SAVE CHANGED DATA**

# Data Input





**UKOPA**

United Kingdom  
Onshore Pipeline Operators' Association

New Fault Data Input File View | Developer | Nuance PDF | Import | Document Panel

Insert | Page Layout | Formulas | Data | Review | View | Properties | Map Properties | Expansion Packs | Export | Source | Refresh Data

Record Macro | Use Relative References | Macro Security | Add-Ins | COM Add-Ins | Insert | Design Mode | Run Dialog

Input Fault Data

### UKOPA INPUT FAULT / LEAK DATA - SHEET 1

Move cursor over input box to obtain HELP on input data

1 Number in List 1 | 2 Pipeline Operator | 3 Pipeline ID

View Pipeline List | 4 Operator's Pipeline Name | 6 Outside Diameter at Fault

Confirm Pipeline Selection | 5 Operator's Fault Reference | 9 Construction

7 Wall Thickness at Fault mm | 8 Pipe Material | 11 Pipeline Location Classification

10 Ordnance Survey Map Ref. | 13 How Discovered | 16

12 Fault Specific Location | 15 Operating Pressure

14 Discovery Date dd/mm/yyyy | 18 Secondary Fault Cause

17 Fault Cause | 19 External Interference

21 Extent of Damage | Check

**UKOPA**

United Kingdom Onshore Pipeline Operators' Association

## GUIDE TO UKOPA DATABASE FAULT DATA INPUT SPREADSHEET

24 August 2011

This Guide has been produced to assist UKOPA Fault Database members to add new fault data to the UKOPA Fault Database.  
The new format for the database is Microsoft Excel – the programs work in 2003, 2007 and 2010 versions although the current programs were written in the 2003 version.

Input Pipeline Data

### UKOPA INPUT PIPELINE DATA

Move cursor over input box to obtain HELP on input data

1 Number in List 1 | 2 Pipeline Operator | 17 Length below ground km

3 Pipeline ID | 18 Length in rural areas km

4 Operator's Pipeline Name | 19 Length in suburban areas km

5 Product | 6 Product Phase | 20 Length in urban areas km

7 Outside Diameter mm | 21 Construction Type

8 Main Wall Thickness mm | 22 Main Design Depth of Cover

9 Second Wall Thickness | 10 Length 2nd Wall km | 23 Main Pipe Material Grade

11 Third Wall Thickness | 12 Length 3rd Wall km | 24 Second Pipe Material Grade

13 Design Pressure bar | 24 Length 2nd Material Grade km

14 Max Op Pressure bar | 26 External Coating

15 Date Pipeline Commissioned (dd/mm/yyyy) | 27 Internal Coating

16 Date Pipeline Decommissioned (dd/mm/yyyy) | 28 Girth Weld Coating

33 Record Created by: | 29 Cathodic Protection

32 Pipeline Comments | 30 Hydrotest Date (dd/mm/yyyy) | 31 Hydrotest Pressure Bar

Press to Save Data

defined as a major accident hazard and any associated equipment outside the reduction station, compressor, etc)  
Investigation, excavation and measurements such as an intelligent survey should be verified in the field should not be missing any damage or grinding marks of the fault should be the date of the  
PIPELINE DATA AND FAULT DATA.

Data Input Forms and Guidance

## Pipeline Product Loss Incidents

(1962 - 2010)

Draft 7<sup>th</sup> Report of the UKOPA Fault Database Management Group

Comprising:

National Grid

BP

Ineos

Sabir

Shell UK Limited

Shell EPE

E-ON UK

Wales & West Utilities

Scotia Gas Networks

Northern Gas Networks

Health and Safety Executive

# Headline Results

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Overall failure frequency 1962 to 2010 = **0.234** incidents per 1000 km.year  
 Previous report 1962 to 2008 = 0.242

Failure frequency over the last 5 years = **0.093** incidents per 1000 km.year  
 Previous report 192004-2008 = 0.064

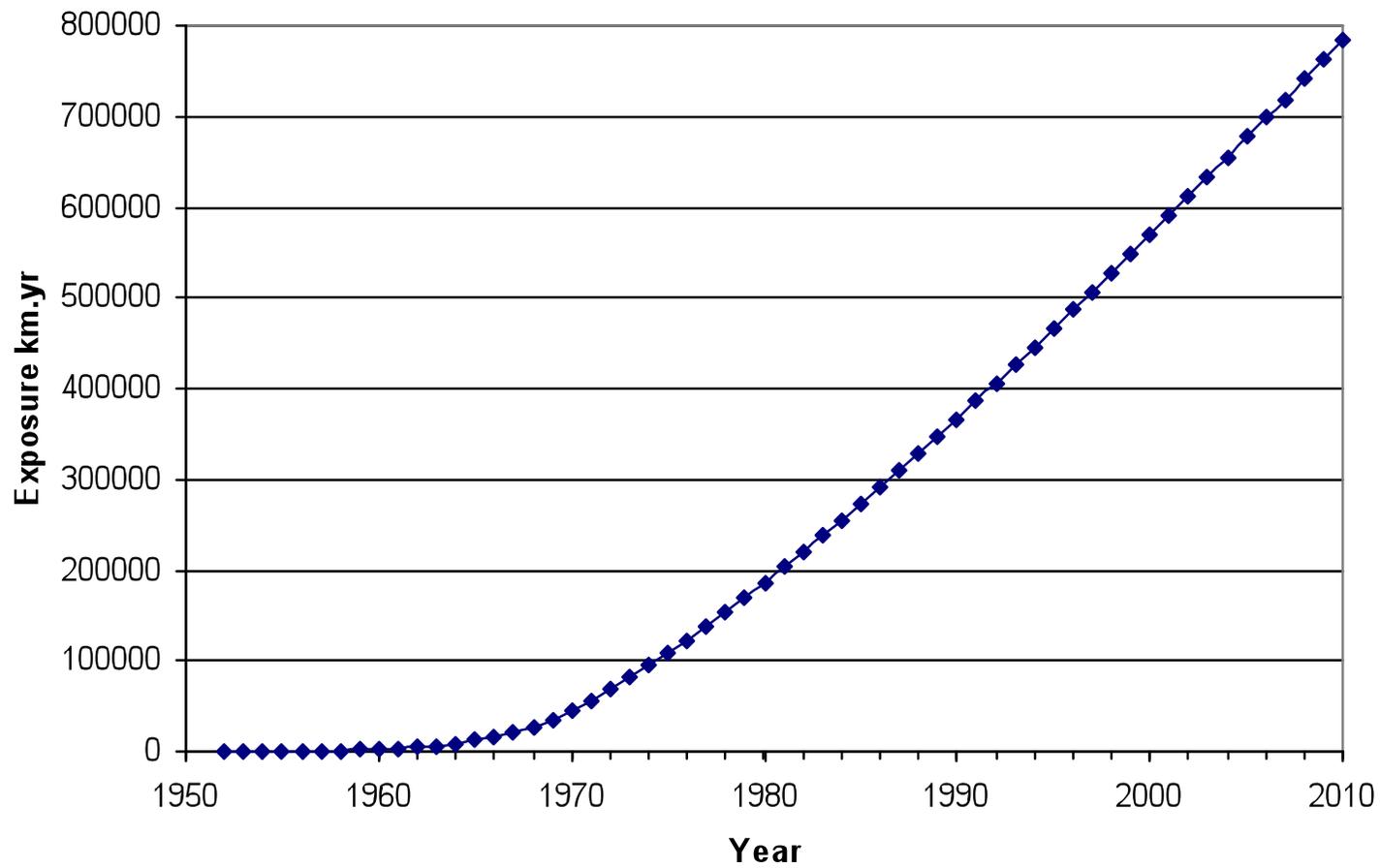
Total Pipeline length in operation end 2010 = 22,370 km

Total Exposure (km.years) to end 2010 = 785,385 km.years

Natural Gas (Dry)	21,053	Propylene	36.3
Ethylene	1,153	Condensate	24.0
Natural Gas Liquids	225.8	Propane	19.5
Crude Oil (Spiked)	212.6	Butane	19.5
Ethane	38.1	<b>TOTAL</b>	<b>22,370</b>

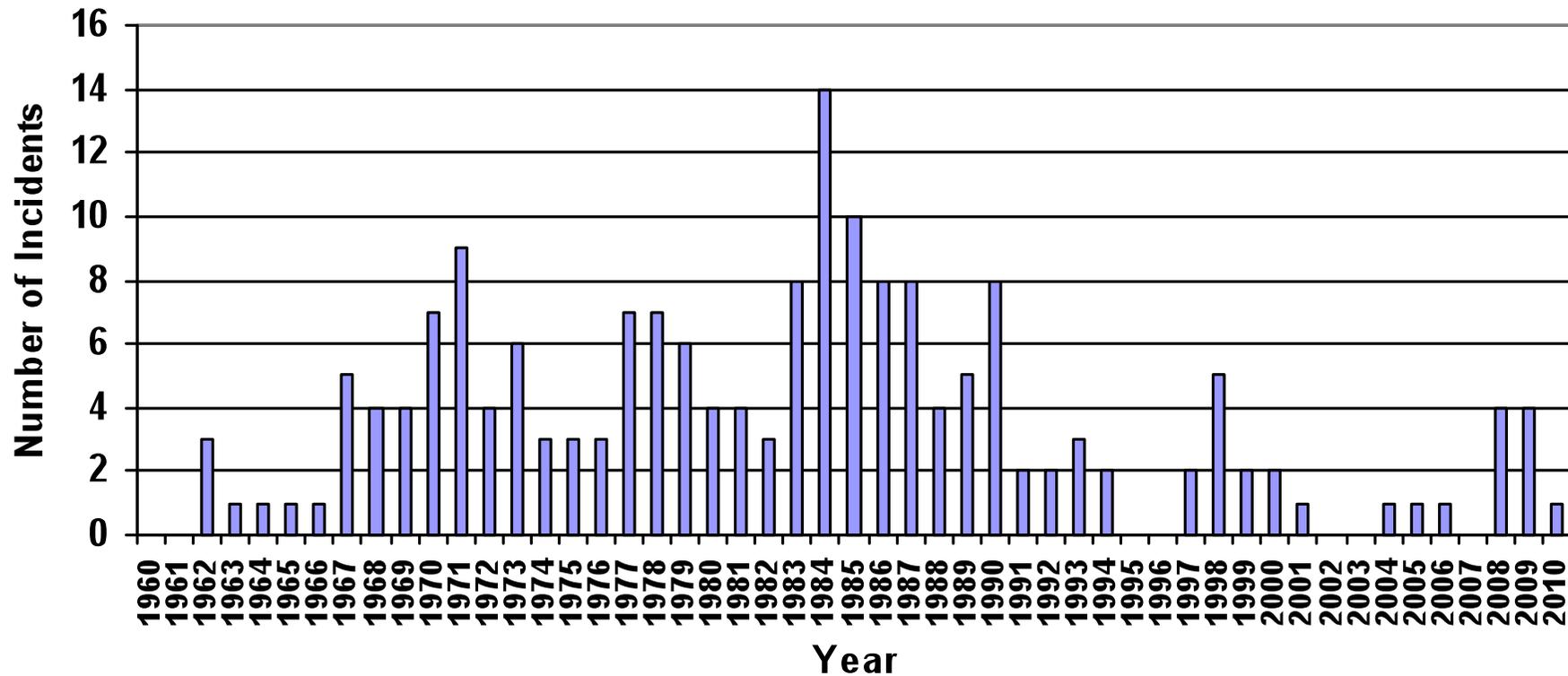
# Exposure

Development of Pipeline Exposure



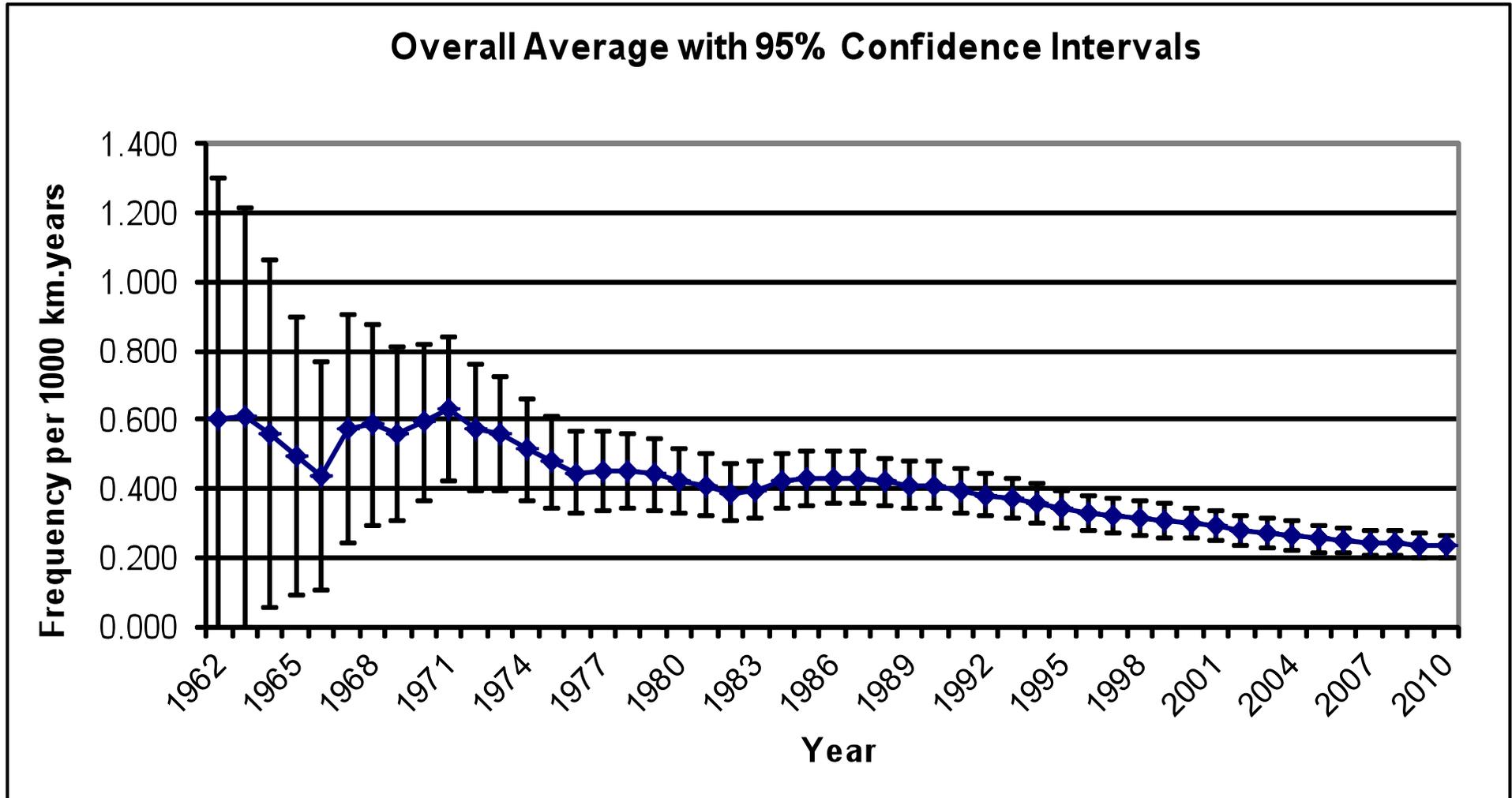
# Product Loss Incidents

Annual Number of Product Loss Incidents

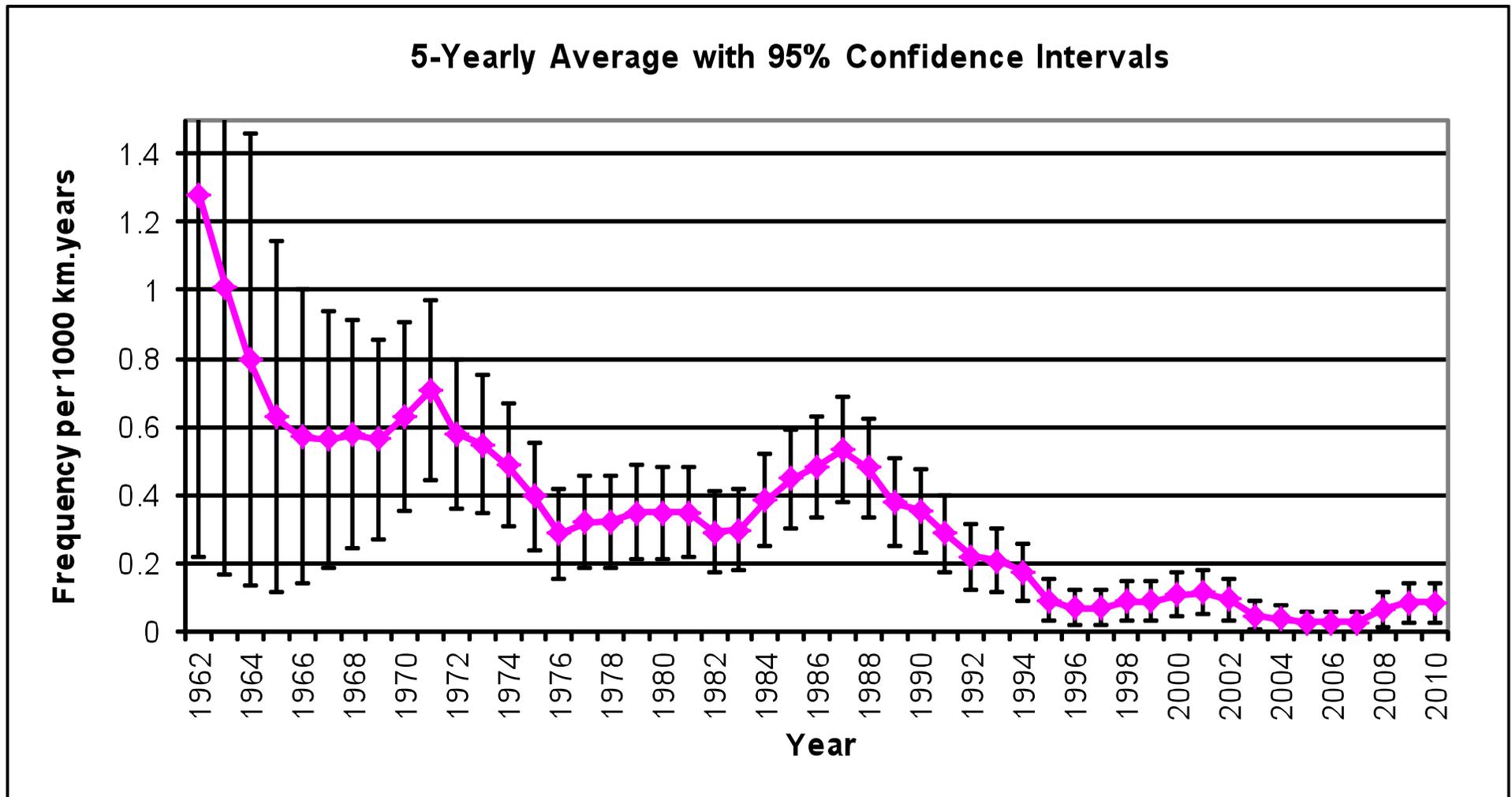


4 in 2009,                    2 x External Interference (6-20mm and 20-40mm)  
                                   1 x Other (0-6mm),  
                                   1 x External Corrosion (6-20mm)  
 1 in 2010                    1 x External Corrosion (0-6mm)

# Overall Failure Rate



# 5-yearly Failure Rate

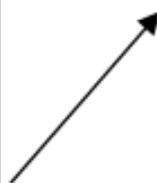


# Leak Causes

Product Loss Cause	No. of Incidents
Girth Weld Defect	34
External Interference	40
Internal Corrosion	2
External Corrosion	37
Unknown	7
Other	41
Pipe Defect	13
Ground Movement	7
Seam Weld Defect	3
<b>Total</b>	<b>184</b>

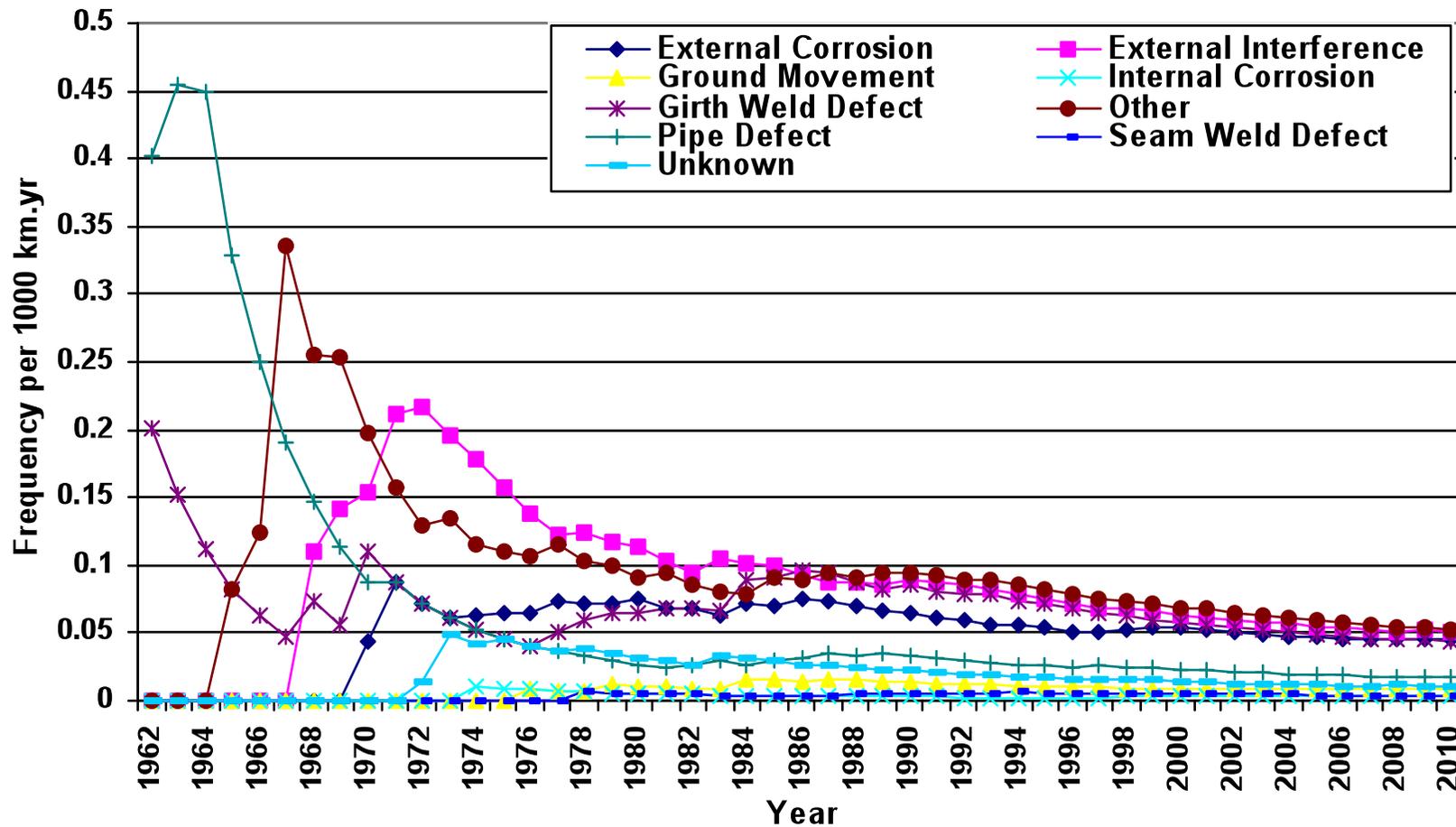
Cause = 'Other':

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
<b>Total</b>	<b>41</b>



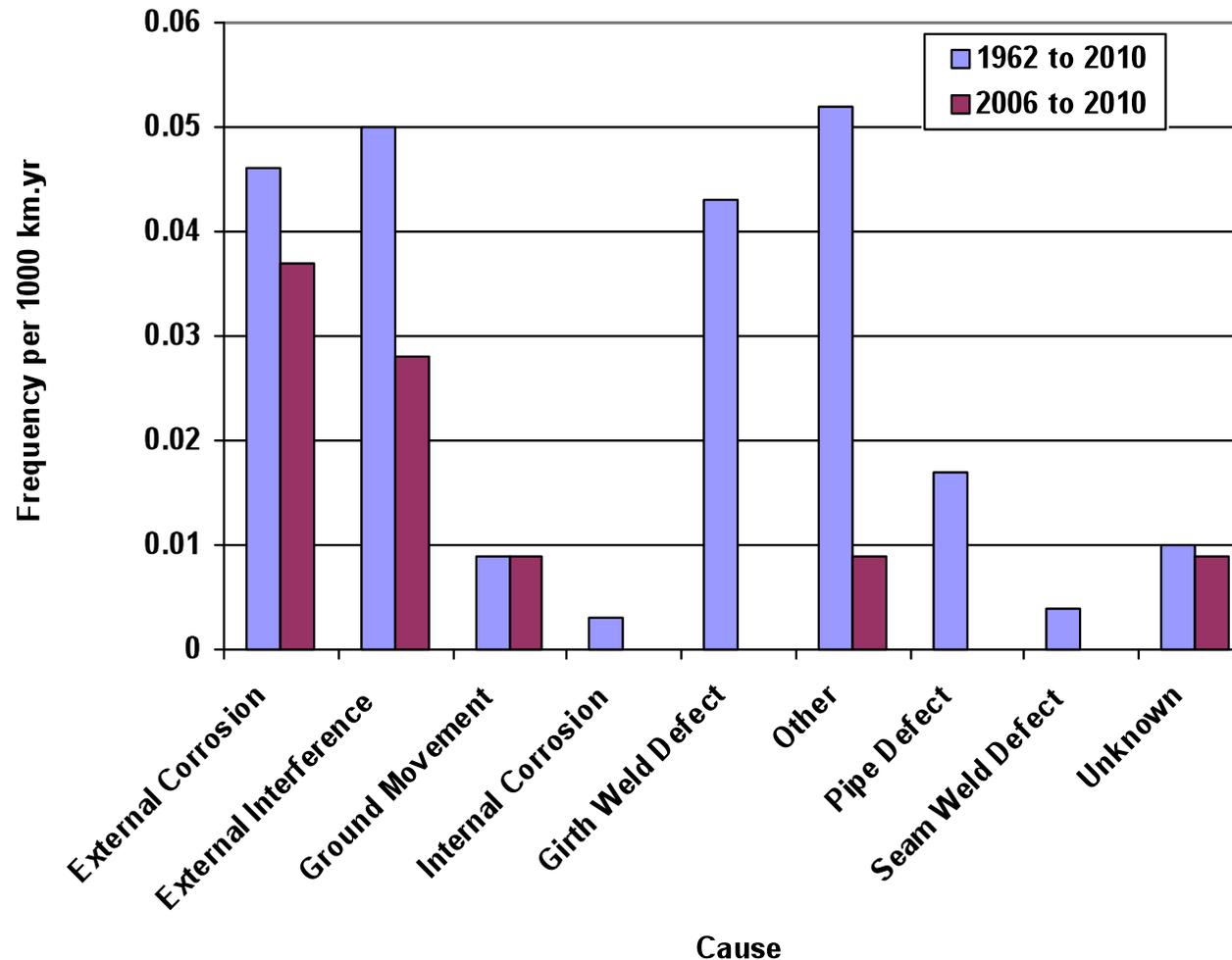
# Causes - trends

Development of Incident Frequency by Cause



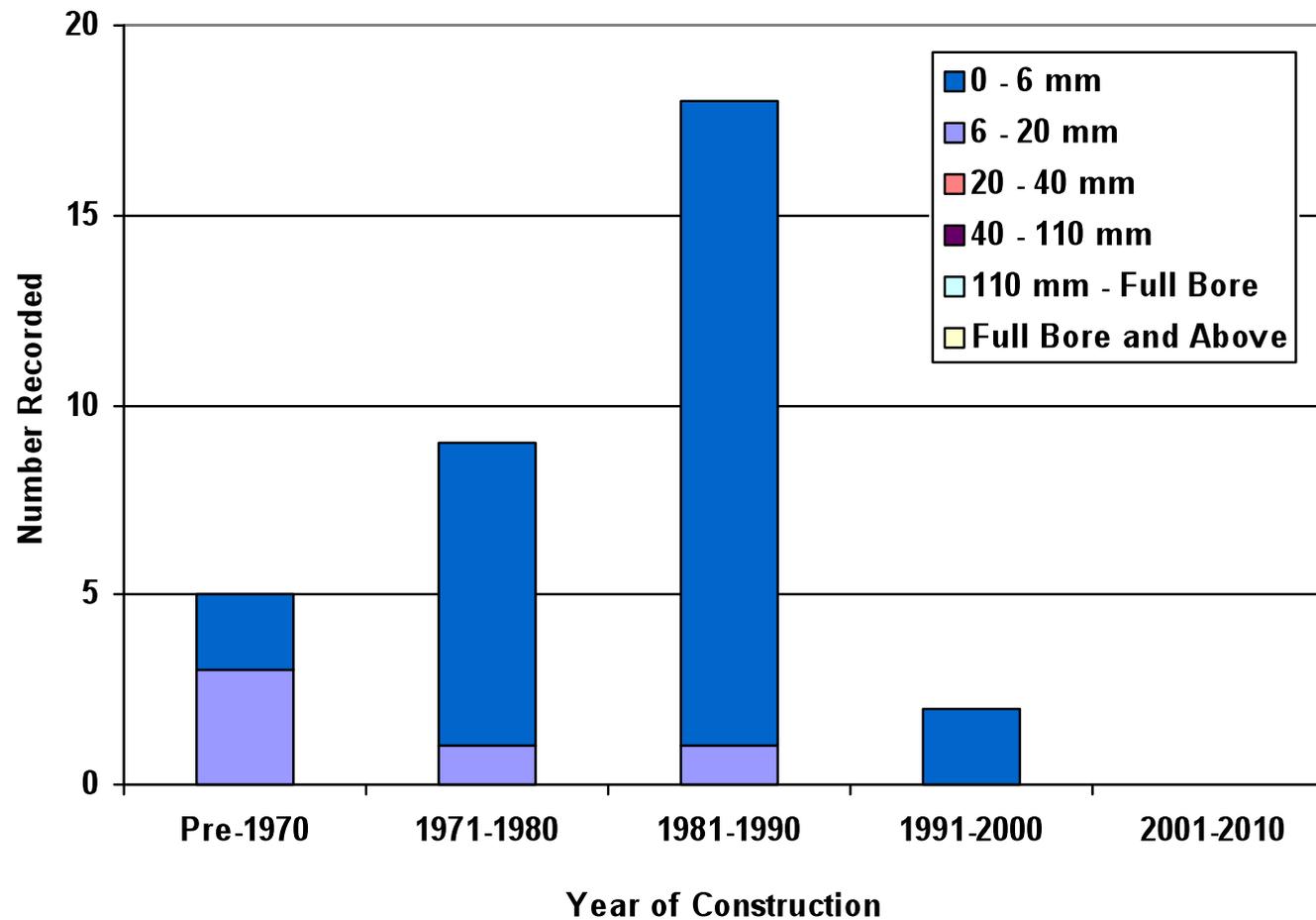
# Recent Causes

Historical and Recent Failure Frequencies

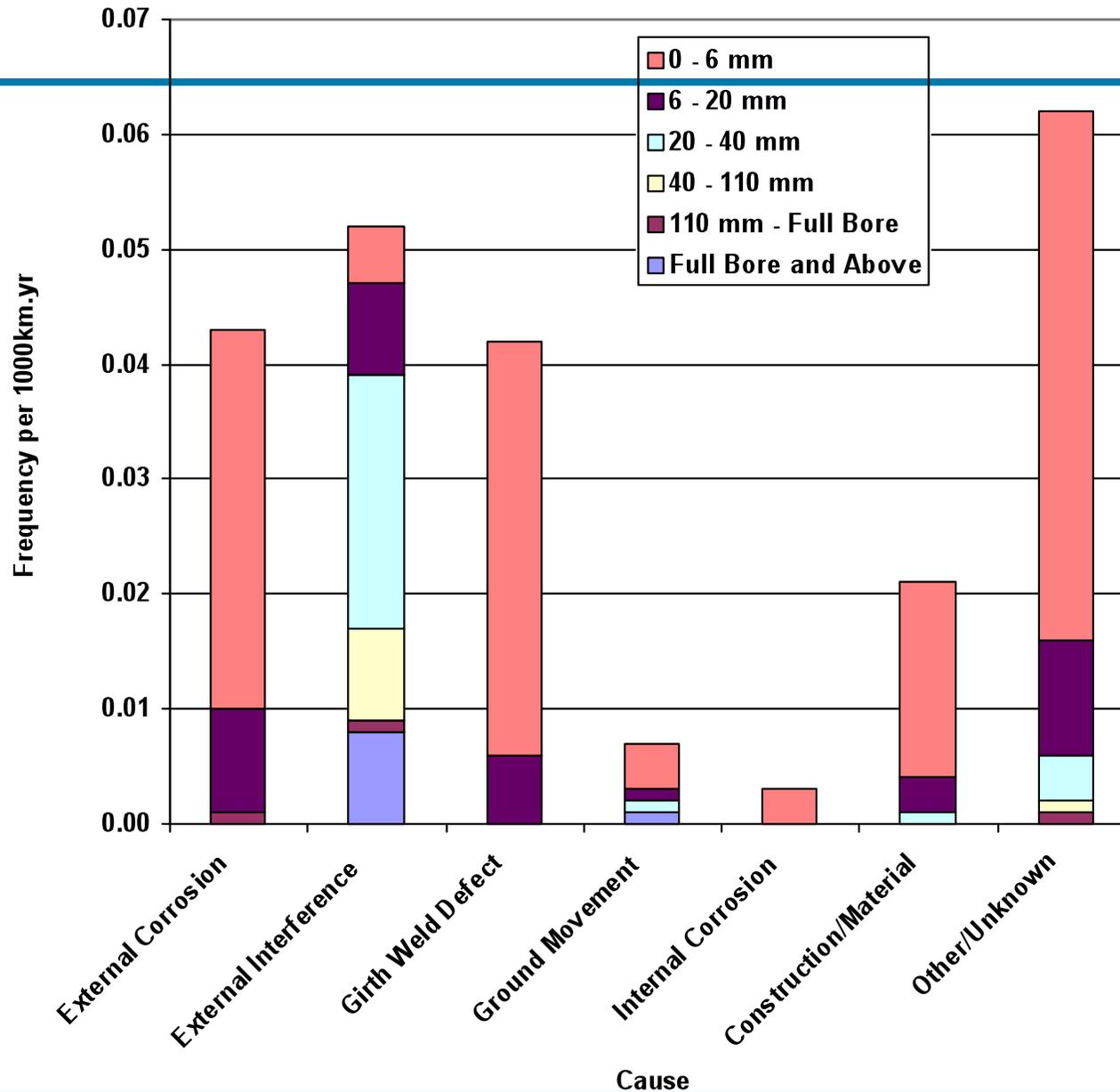


# Girth Weld Defects

Number of Girth Weld Defects by Year of Construction and Equivalent Hole Diameter

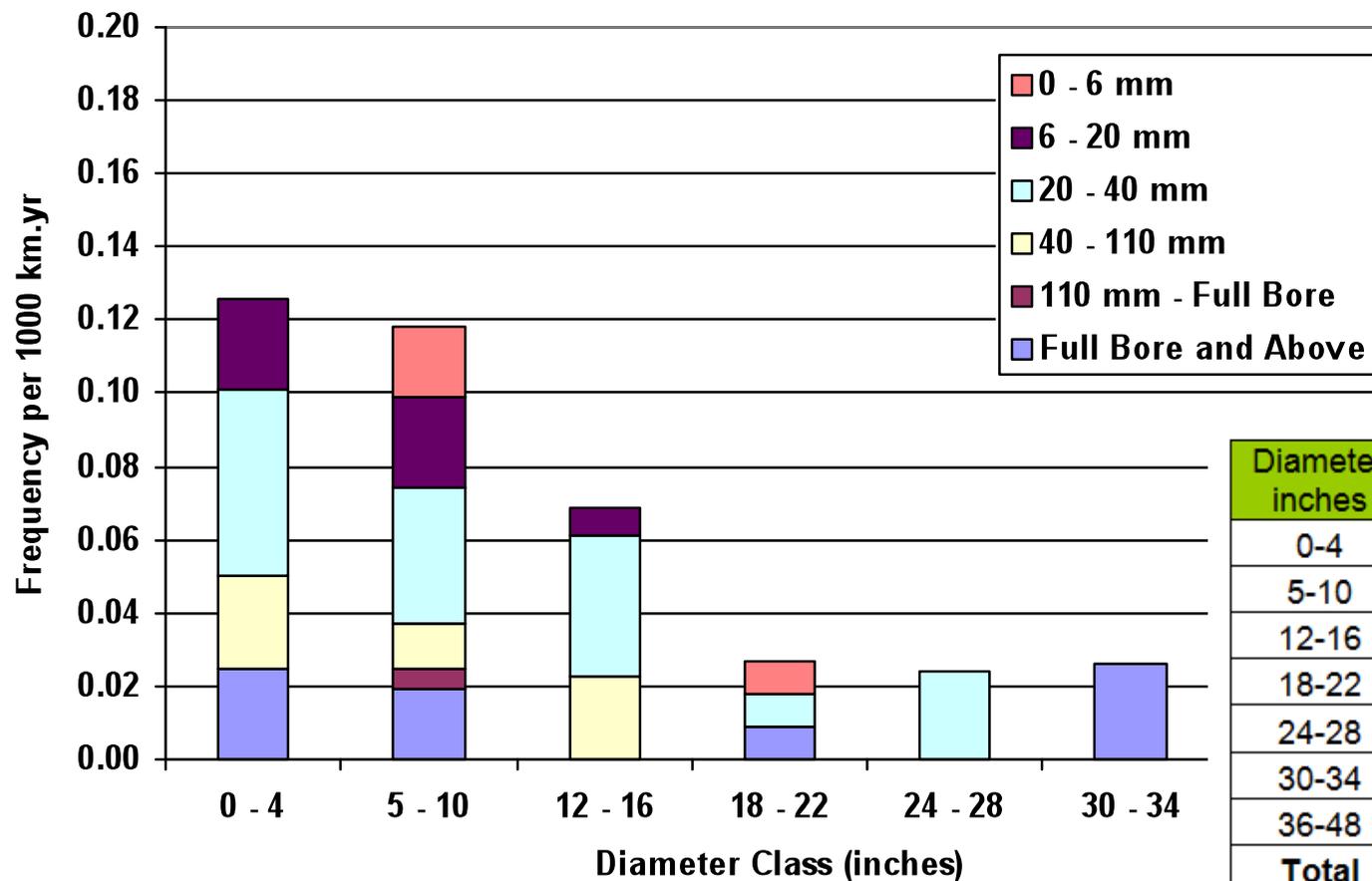


**Product Loss Incidents by Cause and Equivalent Hole Diameter**



# External Interference Vs Diameter

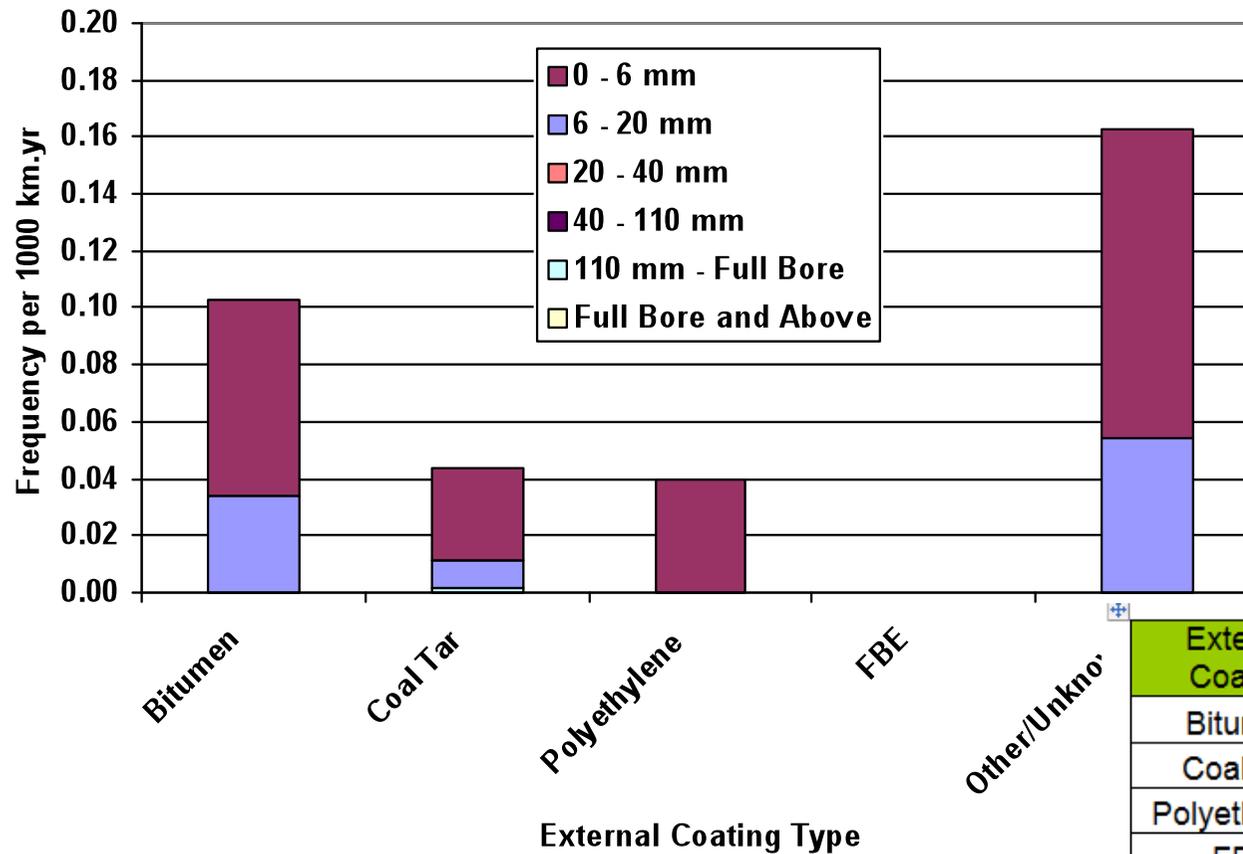
**Product Loss Incidents Caused by External Interference  
Frequency by Pipe Diameter and Equivalent Hole Diameter**



Diameter inches	Exposure km.yr	Incidents	Frequency /1000km.yr
0-4	39239	5	0.127
5-10	161610	19	0.118
12-16	131519	9	0.068
18-22	115165	3	0.026
24-28	127103	3	0.024
30-34	37942	1	0.026
36-48	172806	0	0.000
<b>Total</b>	<b>785350</b>	<b>40</b>	<b>0.051</b>

# External Corrosion Vs Coating

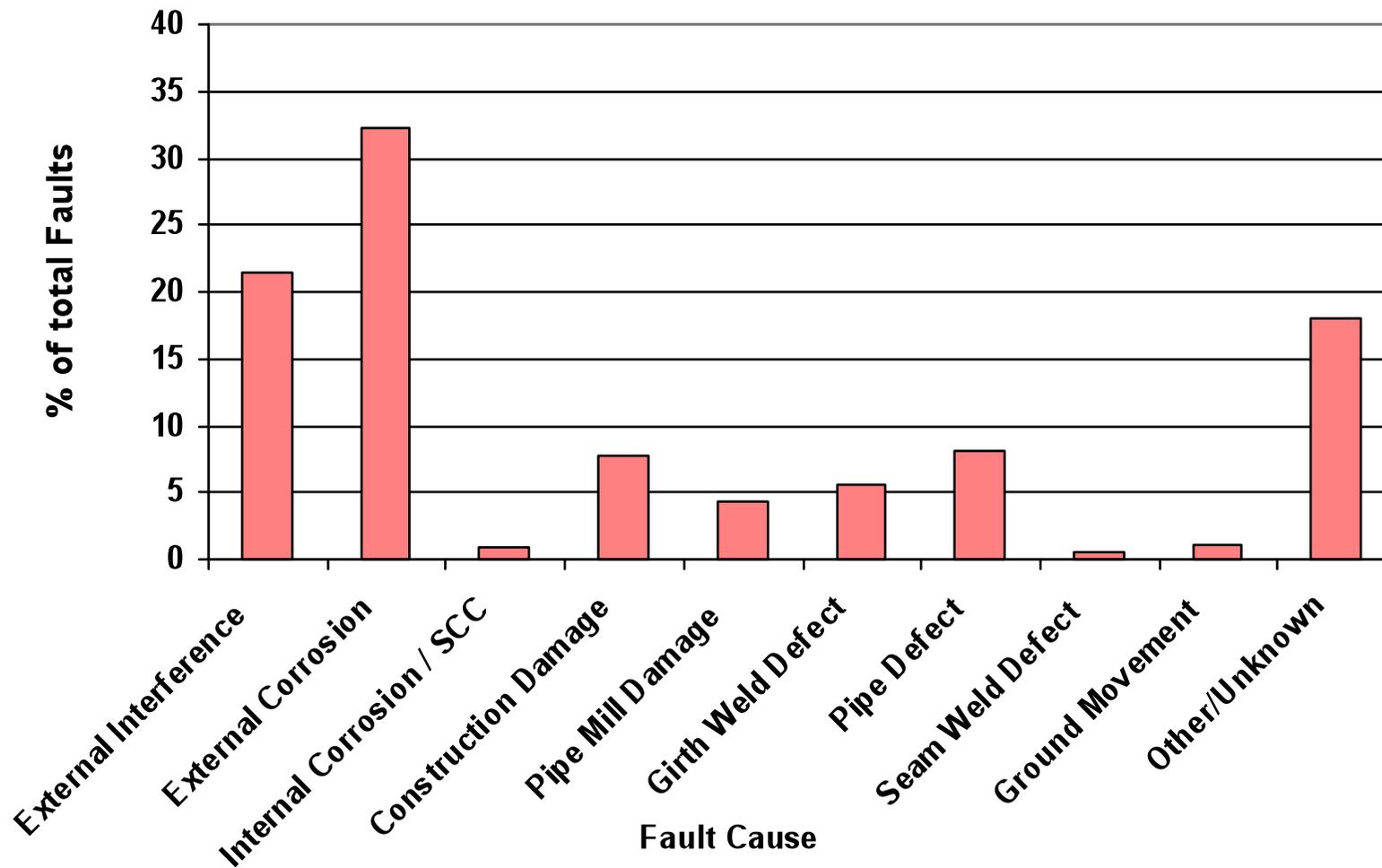
Product Loss Incidents Caused by External Corrosion  
Frequency by External Coating Type and Equivalent Hole Diameter



External Coating	Exposure km.yr	Incidents	Frequency /1000 km.yr
Bitumen	29090	3	0.103
Coal Tar	569393	25	0.044
Polyethylene	75292	3	0.047
FBE	74829	0	0.000
Other/Unknown	36780	6	0.163
<b>Total</b>	<b>785385</b>	<b>37</b>	<b>0.047</b>

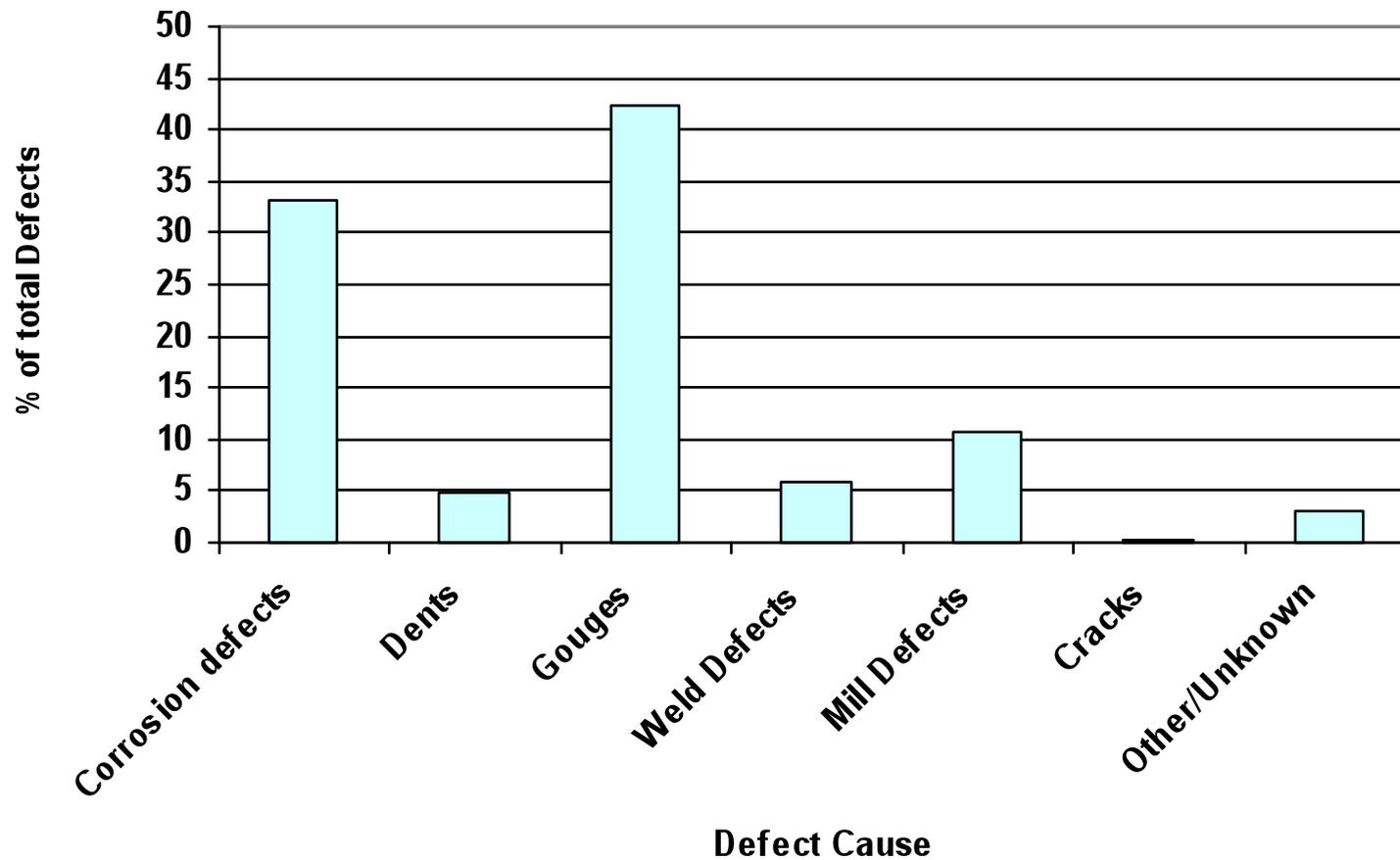
# 3080 Fault in Database

Fault Cause Classification

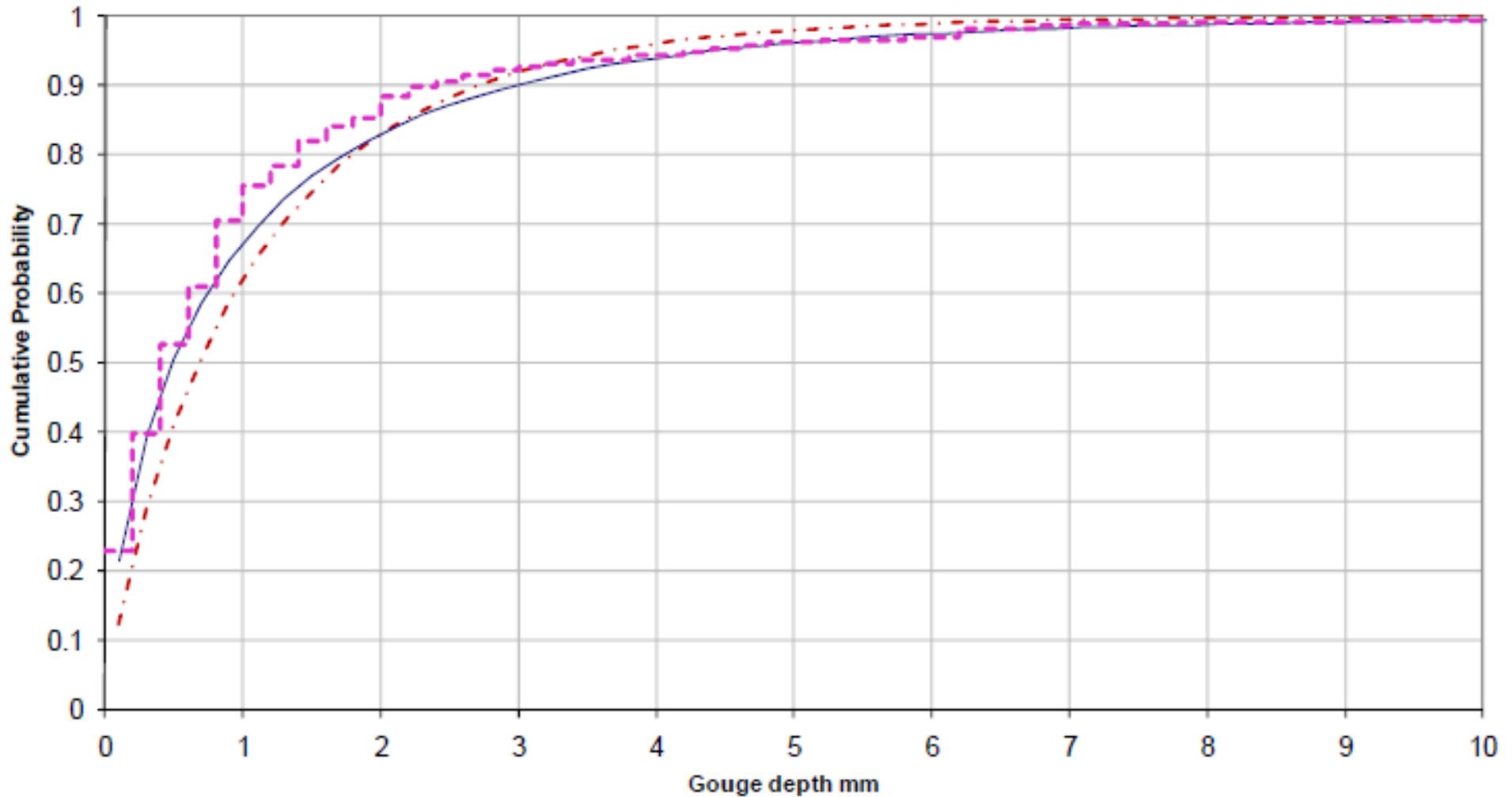


# 5087 Defects in Database

Defect Cause Classification



# Weibull Damage Data Distributions



Susannah Turner, Penspen Integrity Ltd, Units 7-8, Terrace Level , St. Peters Wharf, Newcastle upon Tyne Tyne and Wear  
 NE6 1TZ England, UK