



Collecting Onsite Information – UKOPA Best Practice

Update February 2014

UKOPA/14/014

UKOPA FR1 Form

This form should be completed whenever an operational fault occurs on a steel pipeline operating at pressures of 7 bar and above.

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

- Any incident involving product loss 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
- Any other defect or damage to the pipe or fitting or associated equipment e.g. cracks, mill defects etc.

Purpose of Update

To ensure best practice in capturing onsite information based on:

- Operator experience
- Experience in using recorded data for failure frequency model development
- Difficulties interpreting information
- Ensure onsite data collection is as easy and practical as possible

Onsite Investigations - conditions



Onsite investigations - conditions



Onsite investigations - access



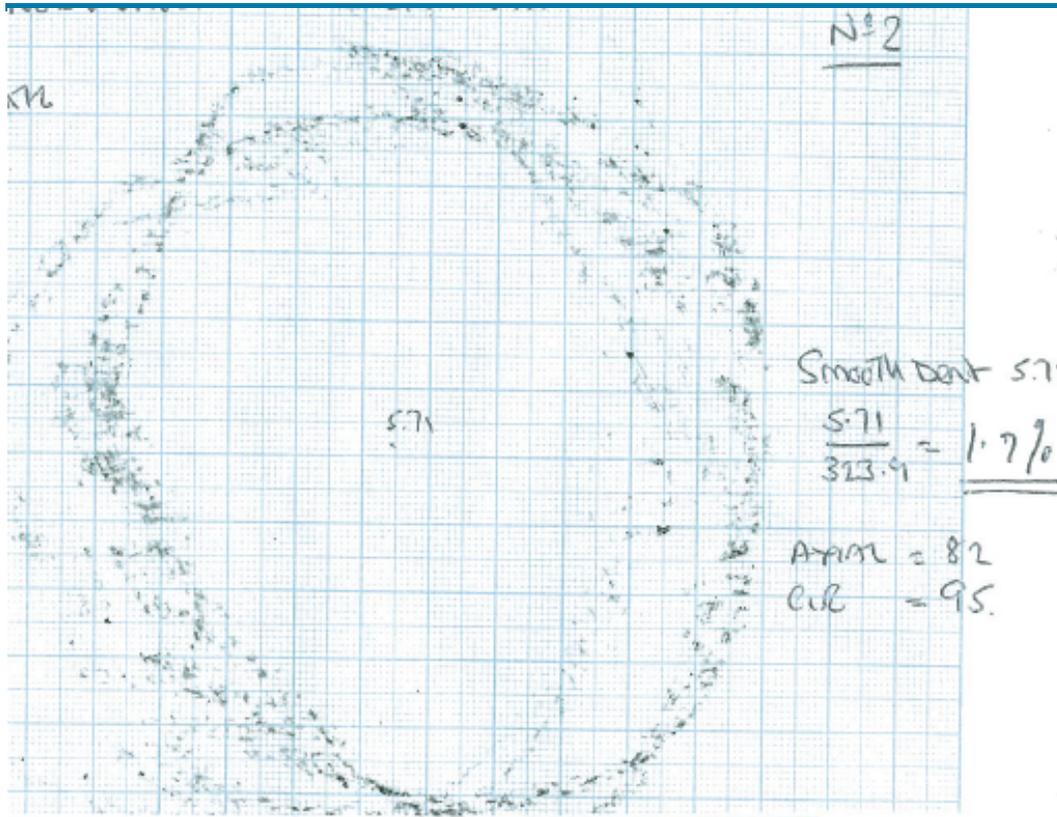
Onsite data recording - accuracy



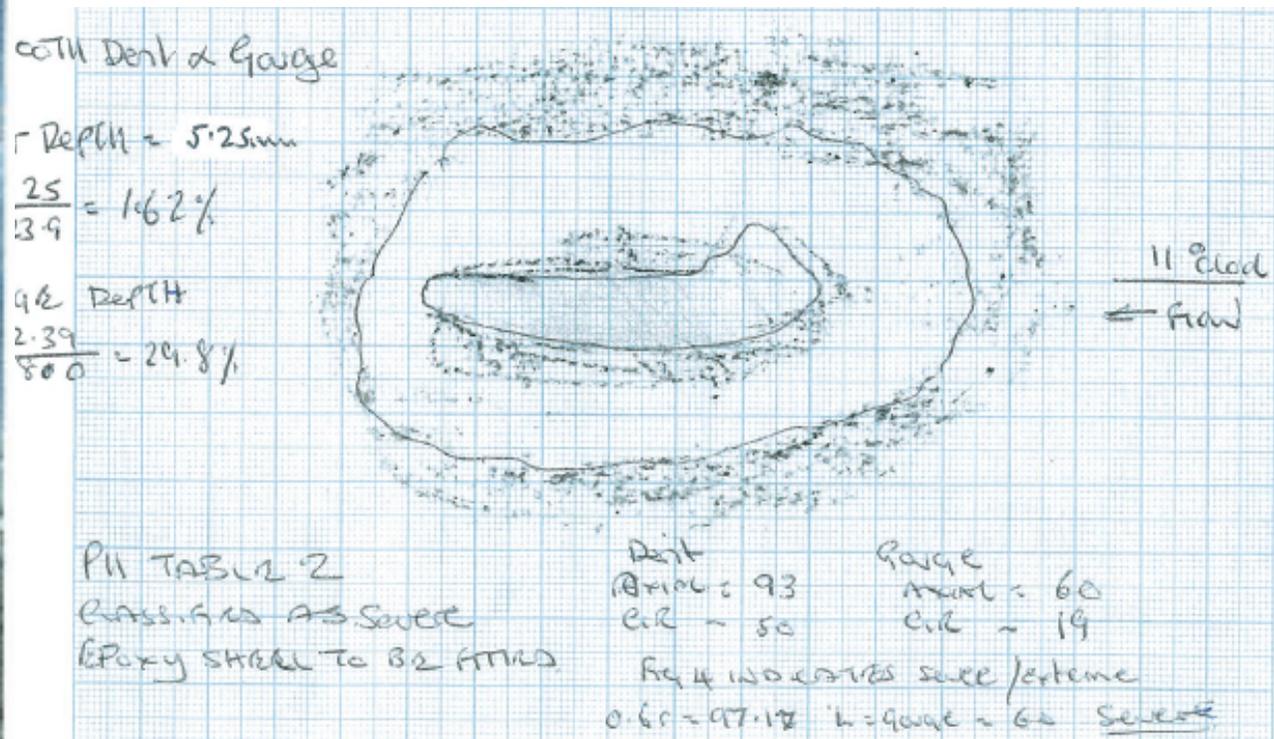
UKOPA FR1 Form - General

- Reference data (Operator and UKOPA)
- Pipeline details
 - OD, wt, grade, type of pipe
- Any relevant details not included on form
- Hard copy evidence – rubbings, photographs

Evidence



Evidence



UKOPA FR1 Form – Section A

All Faults

Fault details

- Grid reference, area type, location description, **PSR number, fault on original pipeline or diversion**

How fault was reported?

- Aerial surveillance, ground patrol, CIPS/DCVG/Pearson survey, ILI, landowner, contractor, public, police, leak detection system, unknown

Date of occurrence (3rd party) or fault discovered

Operating pressure at time of fault

If fault discovered by ILI

- ILI Report ref no, date of inspection run, dig sheet reference, absolute distance of fault**

UKOPA FR1 Form – Section A

- Action taken on supply
 - Pressure reduced, isolated, unaltered, non, unknown, other
- Cause of fault
 - Construction, external interference, corrosion, pipe defect, mill damage, girth/seam weld, ground movement, unknown
 - If external interference – cable laying, construction, drainage, farming, road works, unknown
- Affected component
 - Pipe, bend, sleeve, tee, valve etc
- Extent of damage
 - coating only, no loss, slight/severe, product loss leak/fracture, unknown

UKOPA FR1 Form – Section A

- Repair method used
 - Coating only, dress and wrap, leak clamp, shells, cut out/replace
- Cathodic Protection Status
 - Operational, not operational, none, unknown
 - Evidence of calcareous deposit (resulting from CP activity)
- Protective measures at fault location
 - Slabs, sleeve, marker tape, increased wall thickness, additional marker posts (tick all that apply)
- Type of backfill
 - Clay, light soil, heavy soil, sand, gravel, rock, unknown
 - Evidence of loose large stones / rocks which may cause coating/dent damage?
- Measured depth of cover

Calcareous deposit



Hard deposit – calcium carbonate
 CaCO_3

Soft deposit – calcium hydroxide
 Ca(OH)_2



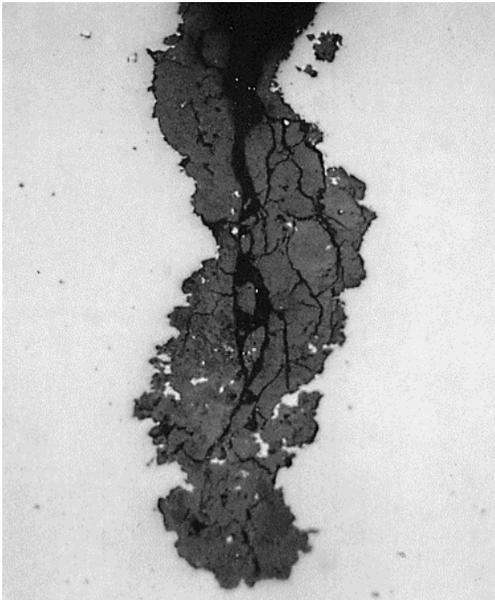
UKOPA FR1 Form – Section A

- Coating at fault location
 - Bitumen, coal tar, epoxy, polyethylene, none, unknown
 - Was pipe thermally insulated at fault location?
 - Internal coating?
- Date of previous Cathodic protection inspection
 - CIPS, DCVG, Pearson
- Date of previous patrol inspection
 - Aerial, walking, vantage
- Date of previous in-line inspection
- Measured depth of cover
- Other inspection details relating to fault
- Additional comments about fault

Additional information

- Can operating temperatures greater than 35°C occur at excavated location
- Is there any evidence of coating disbondment?
- Has disbonded coating been removed, any corrosion assessed, pipe surface cleaned and MPI inspection undertaken?
- Is there evidence of SCC?
- Is there evidence of MIC?
- Is the pipe subject to pressure cycling?

Stress Corrosion Cracking (SCC)



High pH SCC - Irregular, intergranular cracks that are most commonly aligned axially on the pipe. Cracks are not usually associated with any pitting or general corrosion.

Near Neutral SCC – Axial, transgranular cracks that are typically oxide or scale filled. Cracks may occur in association with pits and general corrosion



Microbially Induced Corrosion (MIC)



MIC – Typically deep, sharp sided pits. Usually found under disbonded coating or hard accumulations on the pipe surface. When disturbed, the area may smell of hydrogen sulphide

The corrosion product within the pits is often soft, has no structure and is black in colour.



UKOPA FR1 Form – Section B

Fault Defects

- Number of defects
- Type and dimensions of each defect
 - Type – dent, gouge, crack, mill defect, weld defect, corrosion, other
 - Length width, depth, circumferential location
- Additional comments about fault

UKOPA FR1 Form – Section C

Additional data not included in UKOPA database

- Time to shut off/pressure reduction, time to restore
- No customers cut off
- Type of valve
 - Manual, slam shut, remote, relief, other
- Was operator aware of activity prior to incident?
- Type of machine
 - Bulldozer, backacter, digger, dragline, drill, plough, scraper, trencher, drain layer, spike, other, non , unknown
- Who was work being carried out for?
 - Landowner/tenant, local authority, electricity, telecoms, water builder,

UKOPA FR1 Form – Section D

Product loss faults

- Hole area, length, width, circumferential position
- Type of product released**, approximate amount
- Was crater formed? (yes, no, unknown)
 - Length, width, depth
- Did ignition occur (yes, no, unknown)
- Type of fire
 - Explosion, fireball, jet, crater, flash, unknown
 - Flame length, inclination
 - Fire damage radius
- Additional comments

CONCAWE Requirements

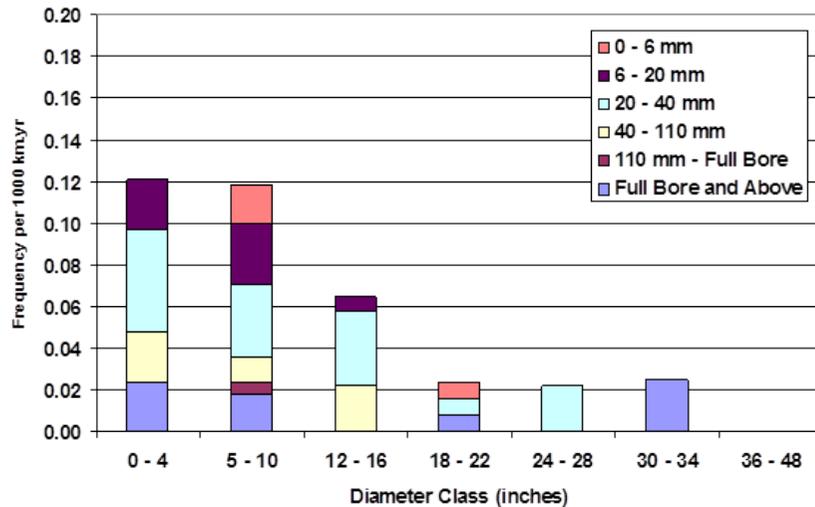
- Age of pipe/fitting at time of failure
- Test pressure
- Date of last ILI by metal loss, crack detection, geometry pig
- Flow rate at time of failure
- Leak detection and stoppage
- Leak rate prior to shut down m³/hr
- Failure impact
 - Volume spilled/lost/recovered
 - Area affected, water pollution, effect on environments (timescale)

CONCAWE Requirements

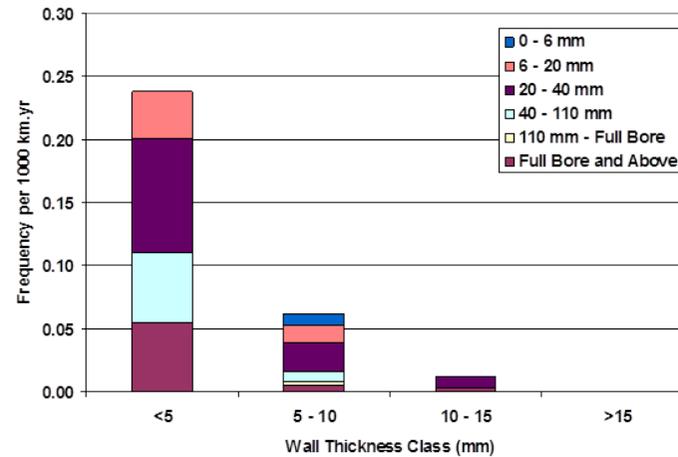
- Cause of leak or failure
 - If overpressure
 - If external corrosion, internal corrosion
 - External interference (including vandalism)
 - Outside force (landslide, earth movement, heavy rain, storm, frost, other)
- Awareness of activity in vicinity of pipeline
 - Notified, pipeline marked/exposed in advance
- Additional report details
 - Leak detection, failure impact and cause, clean-up method, casualties

The Need for High Quality Data

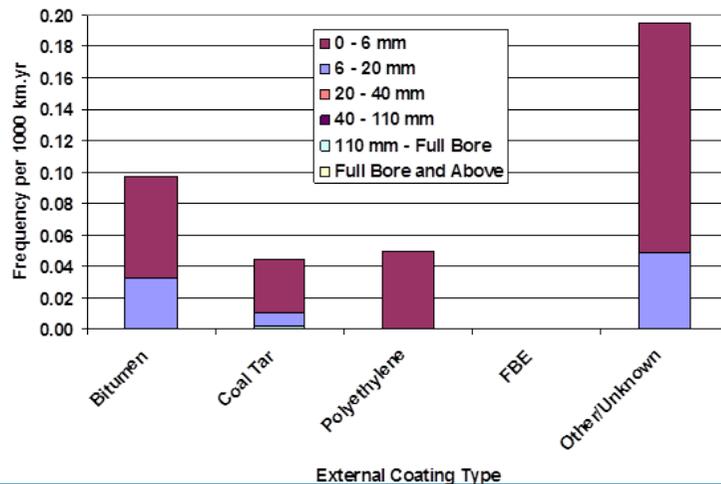
Product Loss Incidents Caused by External Interference
Frequency by Pipe Diameter and Equivalent Hole Diameter



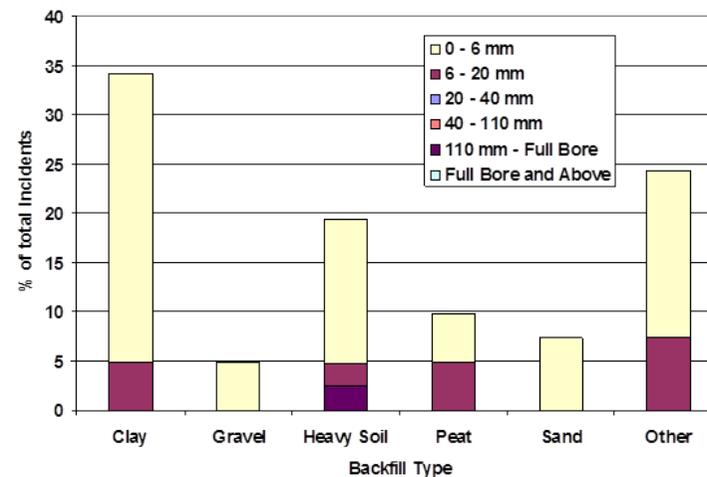
Product Loss Incidents Caused by External Interference
Frequency by Wall Thickness and Equivalent Hole Diameter



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



Product Loss Incidents Caused by External Corrosion
Percentage of Incidents by Backfill Type and Equivalent Hole Diameter



Conclusions

- Review of FR1 form – work to date will be used to revise and update the form, which will be issued in the near future
- The 2013 data is currently being collated, returns are required by 31st March 2014
- In submitting reports, members are requested where possible to provide additional evidence, this will be included in the UKOPA database