



UKOPA PIWG

Update on Development of GPGs

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Overview

- ❑ PIWIG current development of GPGs:
 - ❑ AC Induced Corrosion
 - ❑ Seismic Screening
 - ❑ Ground Movement
 - ❑ Investigation of features identified by ILI
 - ❑ Life Extension
- ❑ Approach:
 - ❑ Review of relevant standards
 - ❑ Review of operator practices
 - ❑ Peer review of working drafts

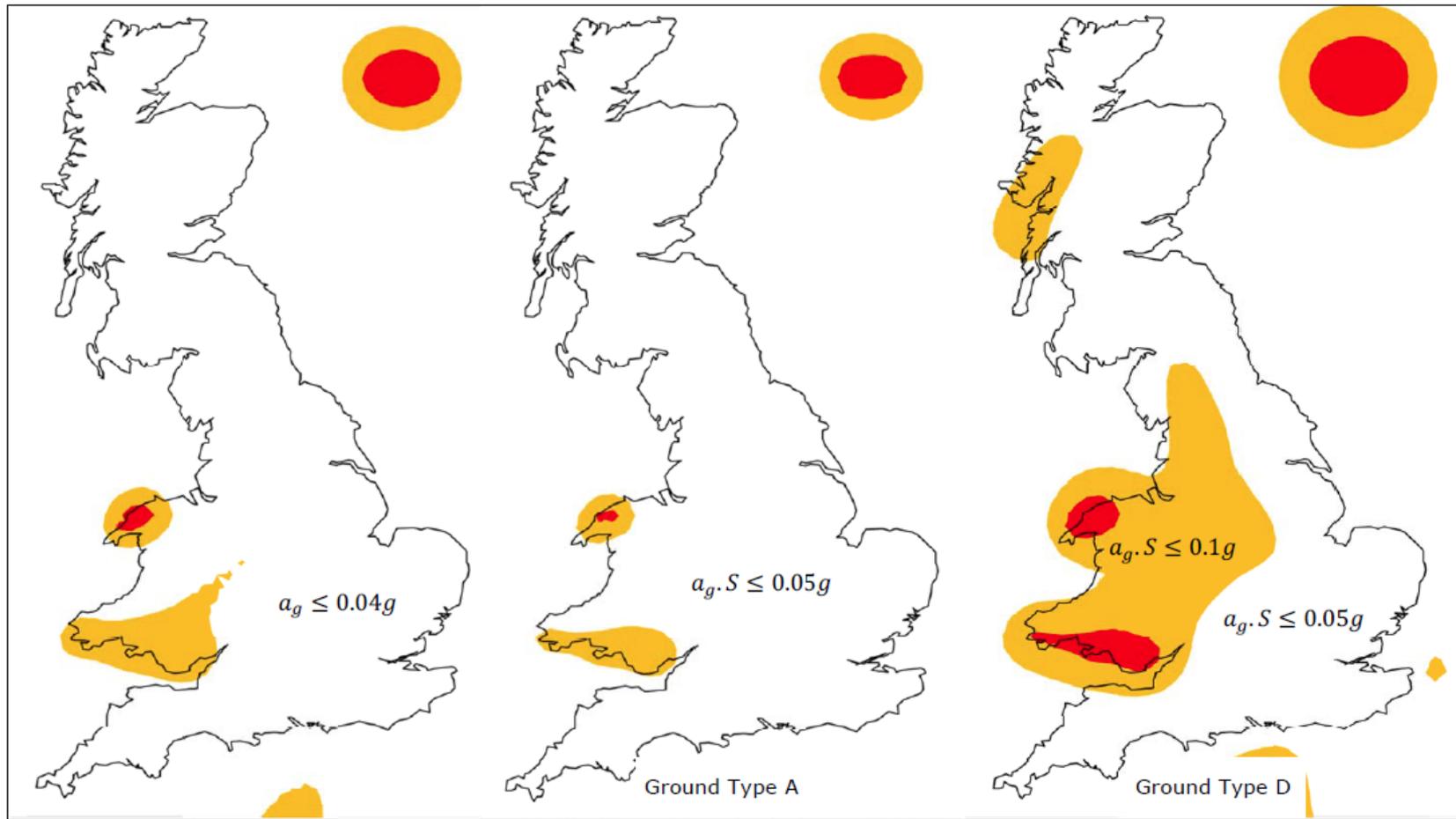
Screening of Assessment of Pipelines and Associated Installations – GPG 19

- National Grid provided detailed work carried out by Jacobs to PIWG for consideration
- PIWG actioned expert review
- Consideration of Draft ISO Standard 20074

4 Step Screening Methodology

- 1 Assignment of importance classification (according to area class and criticality)
- 2 Assignment of importance factor
- 3 Calculation of seismic action parameters (ground acceleration, soil factor)
- 4 Application of ground acceleration criteria (reference - PD6698 Seismic Hazard Map)

Regions of very low (white), low (yellow) and increased (red) seismicity (EN 1998-4)



Status

- Simplifications identified
- PIWG comments actioned
- Workshop – apply screening procedure, develop worked examples and application algorithm

Managing Pipelines Subject to Ground Movement – GPG 20

□ Scope:

- Identification of locations on the pipeline route which are susceptible to ground movement.
- Advice on reducing loading applied to the pipeline.
- Requirements for measuring and monitoring ground movement.
- Mitigation and repair.

Technical Content

References:

- ❑ ASME B31.8S, Draft ISO 20074
- ❑ British Geological Survey (GeoSure Classes)

Operator Case Studies



Technical Content



Status

- PIWG comments incorporated
- Operator examples/experience requested (photographs, case studies)
- Updated document to be re-circulated to PIWG

Verification of Features Identified by In Line Inspection – GPG 26

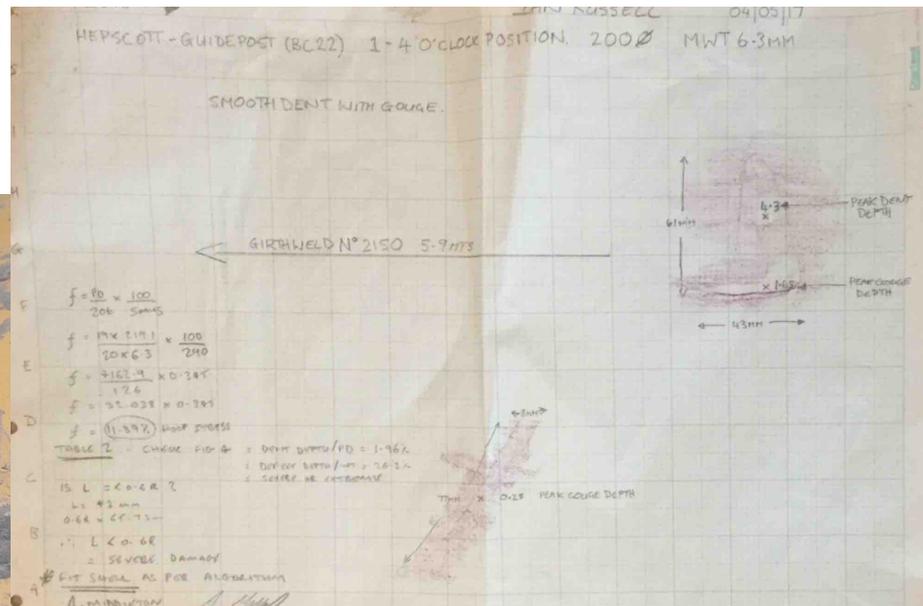
- ❑ UKOPA In Line Inspection GPG recommends the need for feature investigation for verification of ILI results
- ❑ The objectives of GPG 26 are:
 - ❑ Development of consistent approach for the minimum requirements for the confirmation and prioritisation of features identified by ILI for field investigation,
 - ❑ Define requirements for operator verification of the accuracy of the ILI tools
 - ❑ Recommendations for field investigation procedure

Draft Guidance

| Guidance Note | Type of Damage | Guidance | Action | |
|---------------|---------------------------------|--|--|--|
| 1 | General corrosion | Includes clusters, See Note 3 | $D \leq 20\% \text{ NWT}$, $L/W < 3 \times \text{NWT}$, monitor | $D > 20\% \text{ NWT}$, $L > 3 \times \text{NWT}$, Inspect, assess & repair as required |
| 2 | Pitting corrosion | See note 3 | $D \leq 50\% \text{ NWT}$, $L < 3 \times \text{NWT}$, monitor | $D > 50\% \text{ NWT}$, $L < 3 \times \text{NWT}$ Inspect, assess & repair |
| 3 | Corrosion associated with weld | Corrosion associated with a seam or girth weld is coincident with welding defects, repair | As for general or pitting corrosion | |
| 4 | Crack | Not acceptable | Inspect & repair ASAP | |
| 5 | Kinked dent | Not acceptable | Inspect & repair ASAP | |
| 6 | Dent, TOL | If new feature, may be due to external interference, carry out DCVG | Assess and rank using UKOPA/GPG/06 Inspect, assess and plan to repair if required | |
| 7 | Dent, BOL | Do not excavate, monitor, carry out static and fatigue assessment assess as unconstrained | Assess and rank using UKOPA/GPG/06 Excavate to repair only (failure may occur when constraint is released) | |
| 8 | Dent associated with weld | See notes 6 & 7. If pipeline is pressure cycled, carry out fatigue assessment. Assess weld quality in accordance with UKOPA/GPG/06 | If weld is poor quality, repair. Otherwise, if $D \leq 2\%$ monitor | $D > 2\% \text{ OD}$ Inspect and repair if subject to fatigue |
| 9 | Dent associated with metal loss | See Guidance Notes 6 & 7 above. If feature is due to external interference, metal | Dent depth $\leq 6\% \text{ OD}$ and metal loss due to corrosion $\leq 20\% \text{ NWT}$, monitor | Dent depth $> 6\% \text{ OD}$ or metal loss due to corrosion $> 20\% \text{ NWT}$, inspect and repair |

Status

- ❑ PIWG comments incorporated
- ❑ Workshop to develop prioritisation flowchart, consider further technical requirements (assessment of welding defects, number of features to be investigated, practical requirements for field measurements)



Remnant Life of Pipelines and Associated Installations – GPG 18

- ❑ UKOPA 2015 Strategy Workshop identified requirement for Life Extension GPG
- ❑ PIWG actioned development of scope - 2016
- ❑ Review of relevant standards:
 - ❑ ISO TS 12747 – Recommended practice for pipeline life extension
 - ❑ IGEM/TD/1
 - ❑ PD 8010-1
- ❑ Review of operator practices

PIWG Standards Review

- ❑ Definition of Life extension requirements
 - ❑ ISO TS 12747
- ❑ Data compilation
 - ❑ IGEM/TD/1, PD 8010-1
- ❑ Design, integrity and condition assessment
 - ❑ IGEM/TD/1, PD 8010-1, PD 8010-4
- ❑ Life extension – technical assessments
 - ❑ Operator practice
 - ❑ UKOPA GPGs
- ❑ Life extension report
 - ❑ ISO TS 12747

Scope

- Risk Assessment
- Design and construction review
- Current integrity and condition
- Life extension – technical assessments
- Future integrity management

Scope and Issues identified by PIWG

- ❑ Risk Assessment:
 - ❑ Impact of corrosion and fatigue with age
- ❑ Design and construction review
 - ❑ Availability of records
- ❑ Current integrity and condition
 - ❑ Assessment of historical fatigue
 - ❑ Assessment of corrosion on non inspectable pipelines and buried installation pipework
- ❑ Life extension – technical assessments
 - ❑ Historical and future fatigue assessment
 - ❑ Prediction of corrosion growth
 - ❑ Assessment of vibration damage
- ❑ Future integrity management

Progress to date

- GPG Life extension of Pipelines and Associated Installations Draft A
 - Circulated to PIWG for comment
 - PIWG comments being collated
- PIWG Sub Group formed to progress further studies
 - Lead – Chris Rodgerson, NGN
 - Members – CLH, BPA, Cadent
- Further Studies
 - Corrosion
 - Fatigue
 - Vibration
 - Lack of records

Further Studies – Corrosion Condition



Installations



Corrosion – Operator Studies - CP Systems



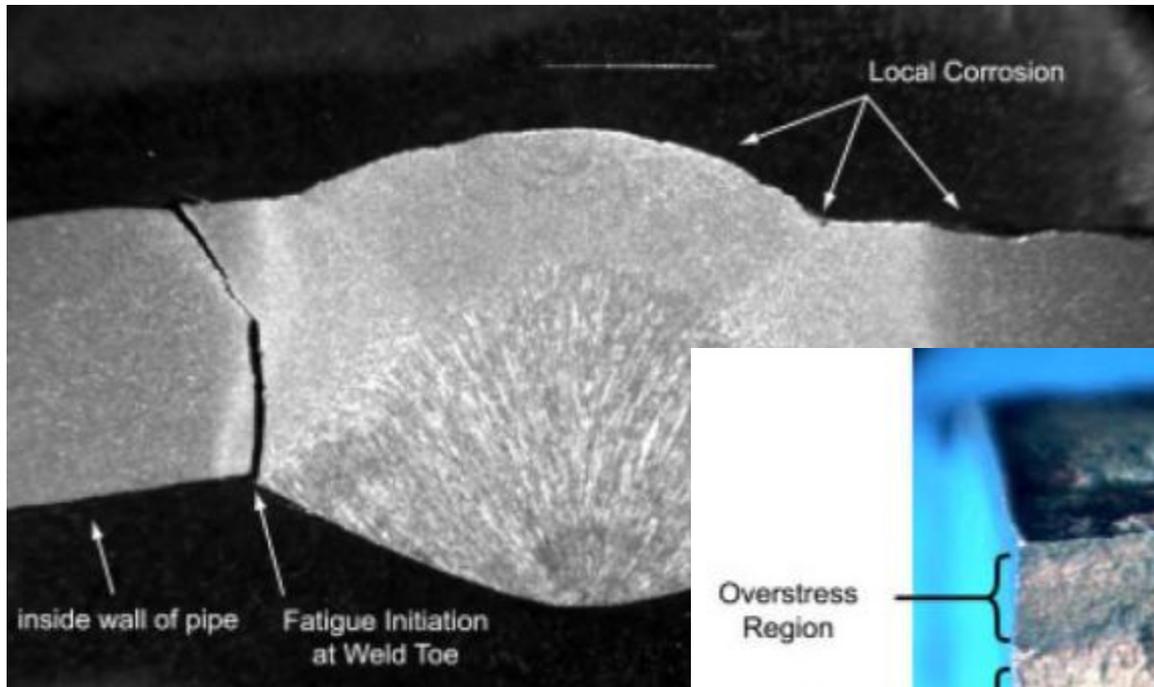
Operational assessments at installations - NGN

Corrosion – Operator Studies

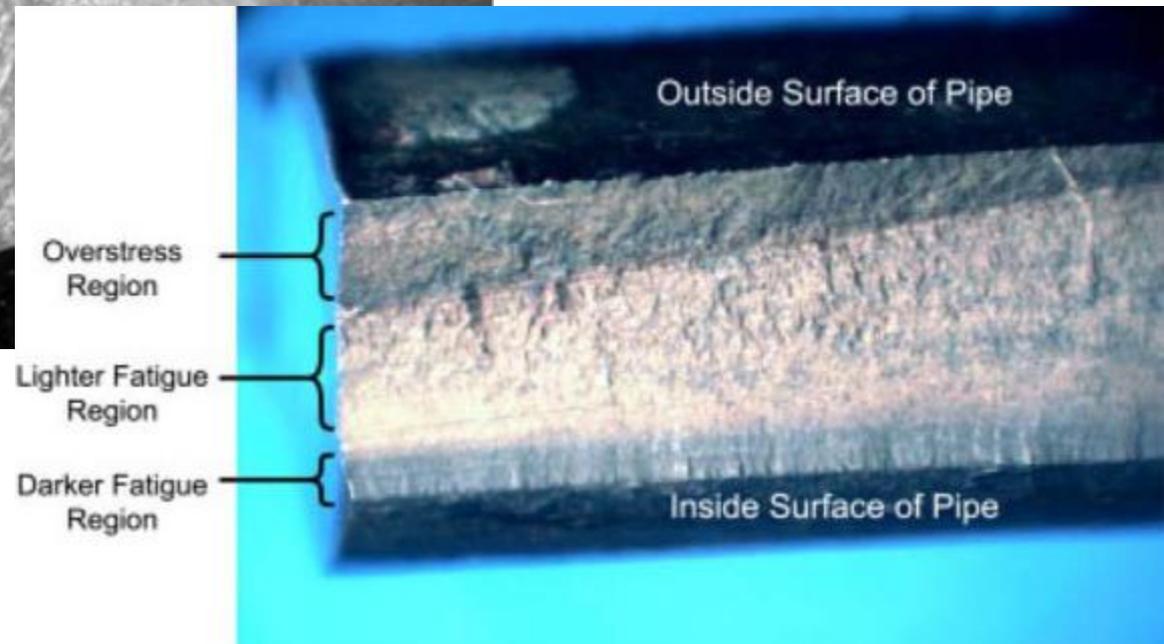
National Grid CM4
Presentation given to
UKOPA February 2017

| 5.1 CATEGORISATION FOR GENERAL PIPEWORK AND ANCILLARY EQUIPMENT | | | |
|--|---|--|------------------------------------|
| Visual Grade | Description | Examples | Defect Priority |
| 4 | <p>Corrosion Present Possible Risk of P/11 or P/20 Defects.</p> |  | <p>T/PM/DEFECT/1 12 Months</p> |
| Remedial Action Required | <p>Paint system in fair condition with some small areas of paint breakdown leading to rust staining but no other visual signs of corrosion</p> <p>Patch repair techniques are likely to be cost effective.</p> <p>Raise a defect for issues identified and record all defect numbers in the report.</p> | | |
| 5 | <p>Active Corrosion Present Credible Risk of P/11 or P/20 Defects.</p> |  | <p>T/PM/DEFECT/1 6 Months</p> |
| Remedial Action Required | <p>Paint system in poor condition, with areas of brown coloured corrosion products present, often with associated rust staining</p> <p>Consideration should be given for full repaint as patch repair may not be economical.</p> <p>Raise a defect for issues identified and record all defect numbers in the report.</p> | | |
| 6 | <p>Aggressive Corrosion Present Significant Risk of P/11 or P/20 Defects.</p> |  | <p>T/PM/DEFECT/1 1 Month</p> |
| Remedial Action Required | <p>Paint system in poor condition, with localised areas of black coloured corrosion products present which can result in rapid metal loss.</p> <p>Areas are likely to require a full repaint.</p> <p>Leaking damage shall be isolated and addressed immediately.</p> <p>Raise a defect for issues identified and record all defect numbers in the report.</p> | | |
| <p>Leaks, significant loss of wall thickness and mechanical damage defects shall be classified under as Immediate/next working day for the purpose of T/PM/DEFECT/1.</p> | | | |

Pipeline Fatigue



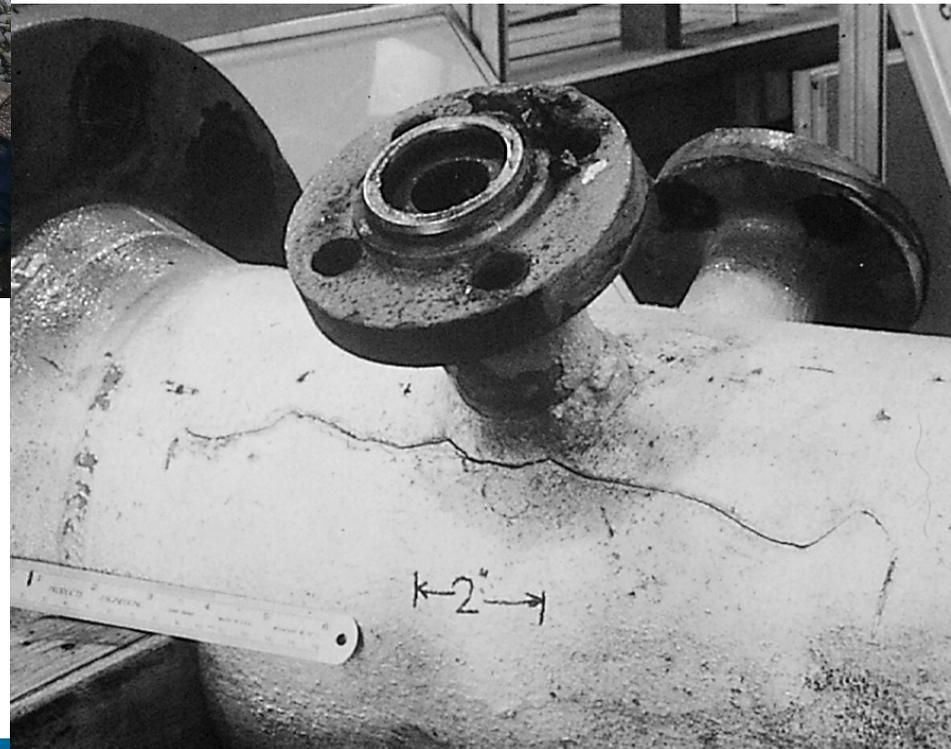
Seam weld fatigue –
 US pipeline



Fatigue at Installations

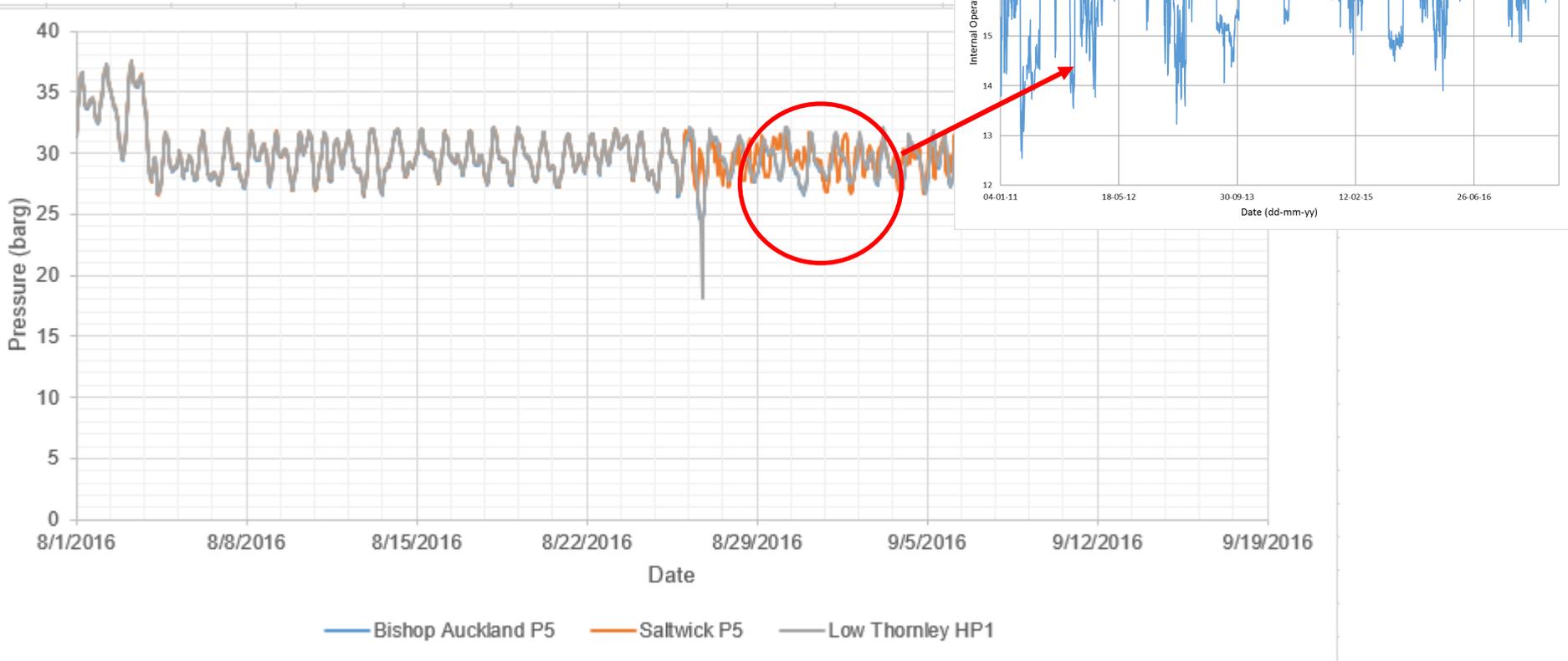


Fatigue at attachment on
regulator stream



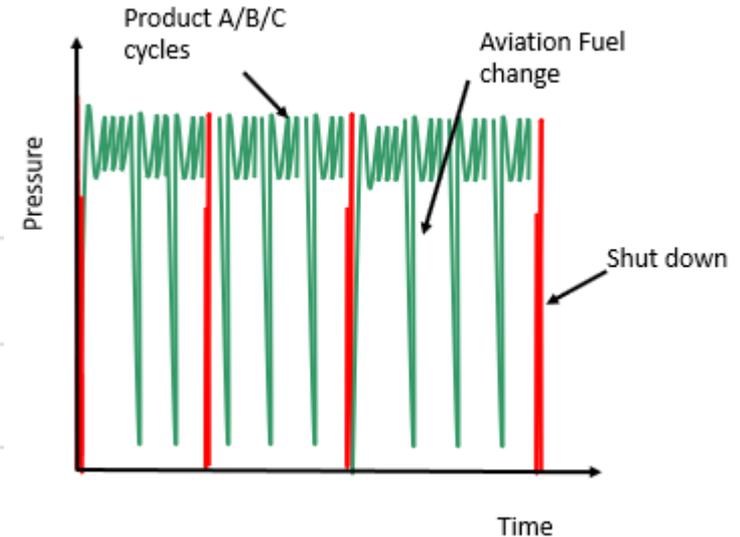
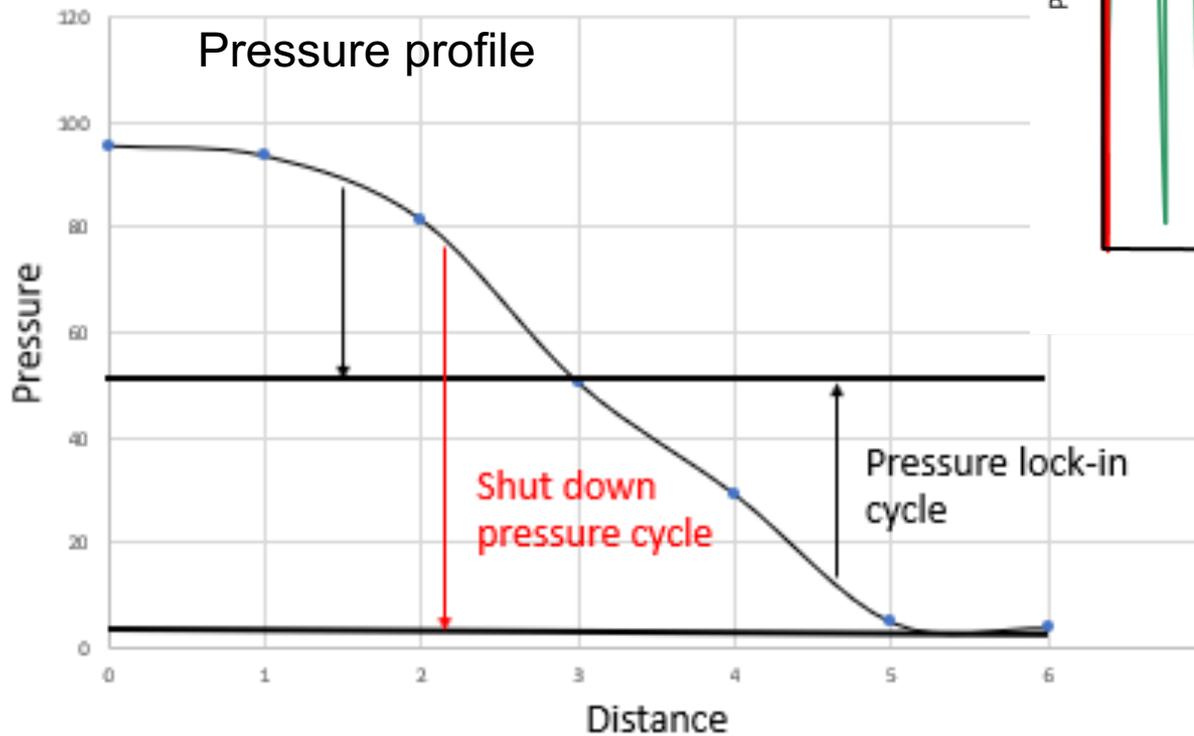
Assessment of fatigue duty

Gas Pipeline



Assessment of Fatigue Duty

Liquid pipeline



Operational pressure cycling (varies along pipeline)

Vibration



Pipework attachments



Impulse pipework

NGN Vibration Assessments



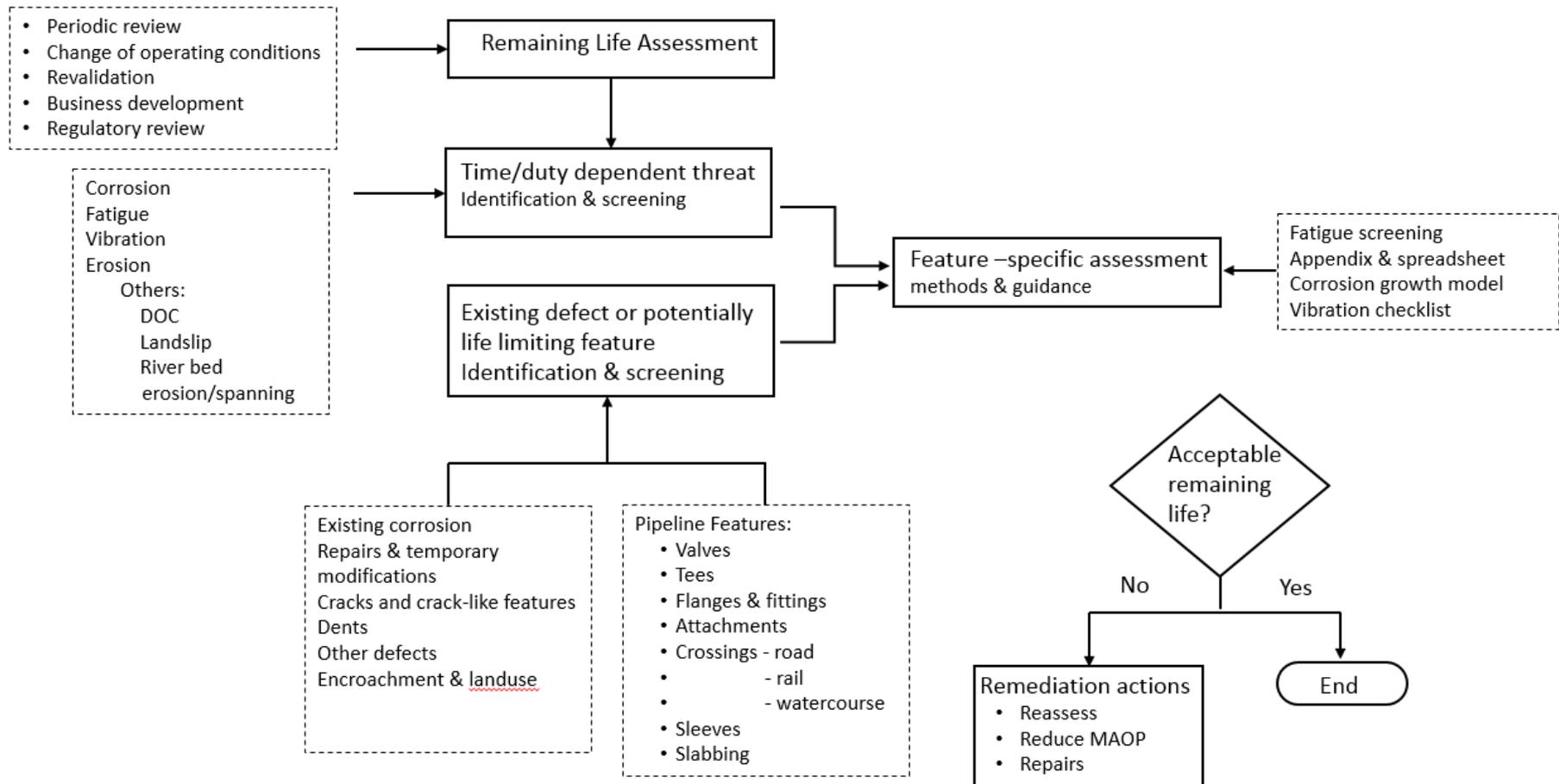
Fretting
wear on
impulse
lines



Lack of Records

- ❑ Original records for pipelines constructed over 40 years ago may not be available
- ❑ Guidance is required for the assessment of criticality and lack of records
- ❑ The approach to records and data uncertainty developed for the Transco 85 Bar Upgrading projects will be reviewed and applied:
 - ❑ Definition of essential data
 - ❑ Primary and secondary records
 - ❑ Use of testing
 - ❑ Assessment of uncertainty
 - ❑ Recommendations for generic assumptions

Remnant Life Flowchart



Status

- ❑ Sub Group formed
- ❑ Sub Group comprises Chris Rodgerson (Chair), Stephen Humphrey (CLH), Richard Price (BPA), Adrian Wathen and Peter Talbot (Cadent)
- ❑ Sub Group is working to define scope of additional studies scope and work programme

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