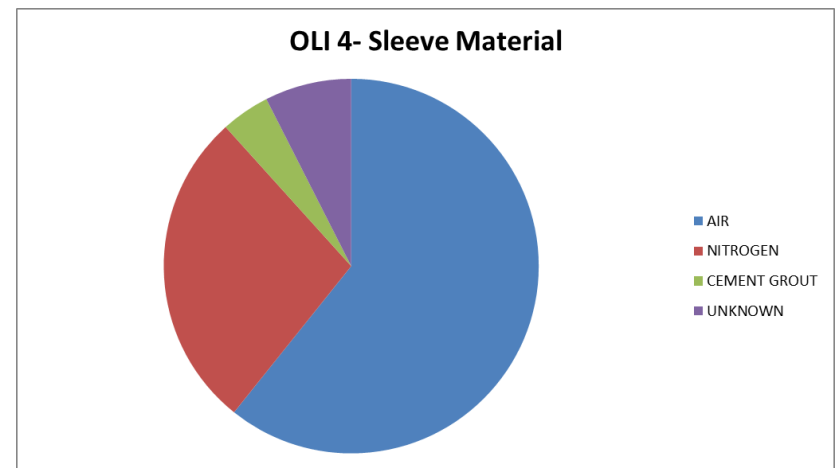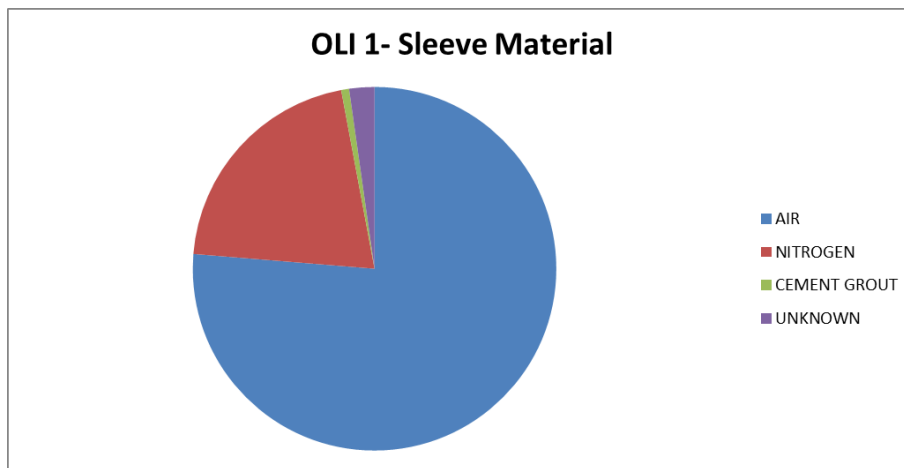# Sleeve/Casing Corrosion ILI Data Assessment Tool

Background

☐ UKOPA members operate a number of pipelines with external sleeves/casings

  ☐ Road, rail, river crossings

☐ Located on both piggable OLI1 pipelines and non-piggable OLI4 pipelines

OLI 1- Sleeve Material

- AIR
- NITROGEN
- CEMENT GROUT
- UNKNOWN

OLI 4- Sleeve Material

- AIR
- NITROGEN
- CEMENT GROUT
- UNKNOWN

Background

☐ Sleeves prone to corrosion

  ☐ End seals break down

  ☐ Water and soil enters annular space

  ☐ Corrosive environment created

  ☐ Electrical contact - sleeve and pipeline

  ☐ CP system affected

www.iksonic.com
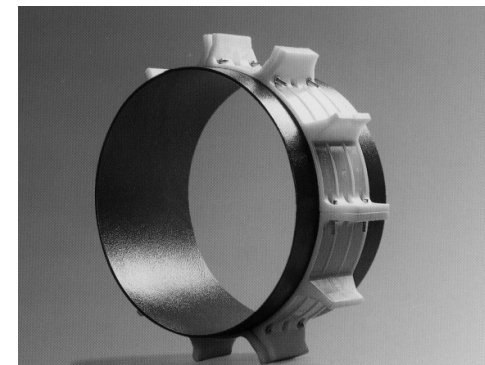
Background

- ❑ Operators concerned about possibility of localised corrosion issues associated with sleeves/casings

- ❑ In particular, interested if the prevalence of corrosion associated with sleeves exceeds un-sleeved pipeline sections

- ❑ This information would help inform where to concentrate future inspection and maintenance efforts

  - ❑ Especially important wrt OLI4 pipelines which cannot be internally inspected

New Tool

- Spreadsheet macro has been developed which allows sets of ILI data to be assessed quickly wrt sleeve corrosion
- Macro can assess ILI data sets from different vendors
    - PII, Rosen, Baker Hughes
- Macro has been developed to determine:
    - Total no. of corrosion defects on pipeline
    - Total no. of sleeves on pipeline
    - No. of corrosion defects beneath sleeves
    - No. of corrosion defects on un-sleeved sections
    - Length of sleeved pipeline (% total)
    - Length of un-sleeved pipeline (% total)
    - Details of sleeves
    - Details of defects beneath sleeves
    - Details of defects on un-sleeved sections
    - Average corrosion depth beneath sleeves
    - Average corrosion depth on un-sleeved sections
    - How many sleeves are eccentric, close to or touching pipeline
    - How many corrosion defects within ± 12 m of sleeve
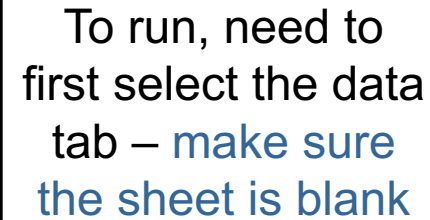
Tool Use – Front Page

Spreadsheet front page

Instructions:
Top left

Buttons to run:
Bottom

Boxes for output:
Top right

Three Tabs:
Title page
Corrosion Incidents
Data

Tool Use – Running the Macro

To run, need to first select the data tab – make sure the sheet is blank

Then paste in the pipe tally data – first column header must be in cell A1

	A	B	C	D	E	F	G		
1	log dist. [m]	easting [m]	northing [m]	heighting [m]	event / cor	joint-numl	J. len [m]		h [m
2									
3	-10.65	292404.727	86473.228		103.628	AS_DatRec			
4	-4.28	292399.34	86476.576		103.733	WT_Chang	10	0.33	12.7
5	-4.11	292399.195	86476.666		103.735	Flange			
6	-3.95	292399.064	86476.748		103.738	Girth Weld	20	0.91	12.7
7	-3.54	292398.72	86476.961		103.745	Offtake / 25 mm			12:00
8	-3.5	292398.685	86476.983		103.745	Support			6:00
9	-3.04	292398.292	86477.227		103.753	Area Start	30	0.44	12.7
10	-2.83	292398.12	86477.334		103.756	Bend / R:3.0D A:22.50° sag			
11	-2.6	292397.92	86477.458		103.76	Area End	40	0.84	12.7
12	-1.76	292397.21	86477.9		103.774	Area Start	50	0.43	12.7
13	-1.54	292397.023	86478.016		103.778	Bend / R:3.0D A:22.50° over			

Tool Use – Running the Macro

Then need to select the Title Page tab

The macro is run by selecting the button appropriate to the type of ILI data used – PII, ROSEN, Baker Hughes

Title Page   Corrosion Incidents   Data   ⊕

Run Corrosion Separation (for PII Data)

Run Corrosion Separation (for ROSEN Data)

Run Corrosion Separation (for Baker Hughes Data)

Alternatively can run the macro using the generic Run button – Macro will guess the type of ILI data used

Run Corrosion Separation Macro (Will Attempt to guess Data Source)

Tool Use – Summary Output

Results Overview	In Casing	Out of Casing	Total
Length of Pipe (km)	0.2	5.9	6.1
No. of Corrosions	1	26	27.0
Corrosions per km of Pipe	6.1	4.4	4.4
Average Depth	13.0%	15.0%	

Casing Summary			
No. of Casing Segments*	5		
	*Segments include Casings and Sleeves		
No of "Eccentric" Segment	1		
No. of Touching Segments	Not Available in Data		
No. of Not Touching	Not Available in Data		
No of Corrosions within 12m of a casin	0		

After running a data summary will be shown on the Title Page

Table gives summary of sleeves and corrosion defects within a single ILI data set, such as:

❑ Length of sleeved and unsleeved pipe
❑ Total no. of defects in sleeved and unsleeved sections
❑ Average depth of defects in sleeved and unsleeved sections
❑ Total no. of sleeves and which are eccentric

Tool Use – Additional Tabs
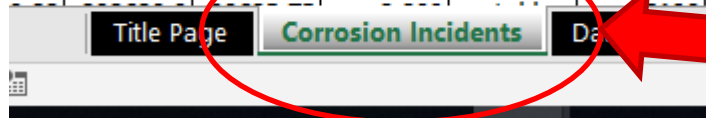
The Corrosion Incidents tab lists details of all corrosion defects within sleeves followed by details of all corrosion defects on un-sleeved sections

Tool Use – Additional Tabs

The In Casing and Out of Casing tabs are created as part of the output

In Casing shows the parts of the full pipe tally which are beneath sleeves

Out of Casing shows the parts of the full pipe tally which are un-sleeved sections

Tool Use – Detailed Output
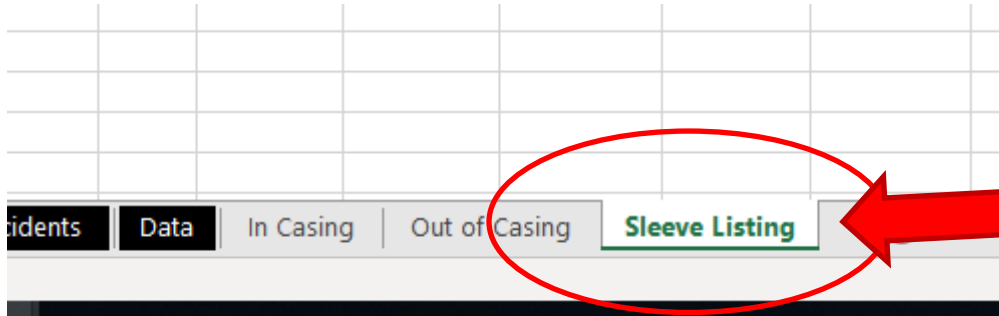
A more detailed results sheet is created and is found in the tab Sleeve Listing

- ❑ Sleeve Listing extracts similar data to overall summary table – but for each individual sleeve

- ❑ Sleeve Listing contains 23 different columns
  - ❑ 10 are populated by the tool using the ILI data
  - ❑ Remaining 13 must be completed manually by the operator using their records

Sleeve Listing – Populated Columns

Start Distance (m)	End Distance (m)	ILI Sleeve Description	ILI Sleeve Length (m)	No. of Corrosion Defects	No. of Corrosion Defects per km.	Average Corrosion Depth (%wt)	Sleeve Eccentric?	Sleeve Touching?	Corrosion Within 12m?
912.326	932.554	ROAD CROSSING	20.228	None	N/A	N/A	No	No	No
1611.429	1637.086	ROAD CROSSING	25.657	None	N/A	N/A	Yes	No	Yes
4347.77	4370.537	ROAD CROSSING	22.767	None	N/A	N/A	Yes	No	No
4419.501	4433.377	RIVER LEVEN CROSSING	13.876	None	N/A	N/A	No	No	No
4901.348	4935.341	A911 ROAD CROSSING	33.993	None	N/A	N/A	Yes	No	Yes
5826.616	5845.323	ROAD CROSSING	18.707	None	N/A	N/A	No	No	No
7795.893	7801.313	LOTHRIE BURN	5.42	None	N/A	N/A	No	No	No
8042.325	8062.581	ROAD CROSSING	20.256	None	N/A	N/A	Yes	No	No
11149.651	11155.199	COUL BURN CROSSING	5.548	None	N/A	N/A	No	No	No

- ❑ Each sleeve is listed in order of log distance
- ❑ Description of sleeve (road crossing etc.) is extracted from the ILI data
- ❑ No. of corrosion defects, average corrosion depth, eccentricity for each sleeve included
- ❑ No. of corrosion defects per km is also included at present although this can give strange values due to the short length of sleeves

Sleeve Listing – Unpopulated Columns

Pipeline Name	Operator Sleeve Description	Annular Fill	End Seal Type	Operator Sleeve Length	Sleeve Material	Sleeve Diameter	Protection Reason	External Coating	Internal Coating	Installation Date	Pipe Diameter	Wall Thickness

❑ Remaining columns to be filled in by operator from their records

Things to Note

- ❑ Sleeve descriptions dependent upon ILI data
  - ❑ Sufficient information may not be included for identification (e.g. road crossing vs. A911 road crossing)
  - ❑ No description data will leave a blank in the output
- ❑ Rosen data does not include a description of the sleeve
  - ❑ Identification must be done using distance
  - ❑ Exception: repair sleeves are noted
- ❑ Sheet developed using mainly PII data, only one set of Rosen and one set of Baker Hughes data
  - ❑ Certain categories may not work correctly in all cases, particularly eccentricity
  - ❑ Need to keep an eye on this and report any bugs

Next Step

❑ Tool to be distributed within UKOPA so operators can test it with their own ILI data

❑ Feedback:

  ❑ Bugs

  ❑ Errors

  ❑ Suggestions for further inclusions or refinements