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VEDANTA LIMITED

PRELIMINARY REPORT
FOR
IN LINE INSPECTION RUN

14 INCH RD TO RT WATER INJECTION PIPELINE, 10.64 km

SUBCONTRACT NO- PF-109943-R-24-189

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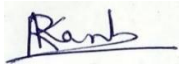
Revision	Date	Description
0	20.03.2024	Initial Release

Item	Name	Title	Signatures	Date
Prepared by	Abhinav Singh	Data Analyst		20.03.2024
Reviewed by	Fazal Khan	Manager (DA)		20.03.2024
Approved by	Rakesh Kant	Project Manager		20.03.2024

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1. Report Summary

This report gives a summary of the EGP and MFL tool inspection of the 14 inch RD to RT, 10.64 km, Water Injection Pipeline. Which was conducted by VDT Pipeline Integrity Solutions Private Limited for VEDANTA LIMITED. The EGP inspection was performed on 14.11.2024 and MFL inspection run #2 was performed on 02.03.2025.

Prior to the inline inspection runs, the pipeline was cleaned using the Cup pig cleaning tool. The amount of debris recovered from the pipeline after the last cleaning run was negligible, so it was acceptable to proceed with further pigging programs.

The Inspection tool was calibrated and adjusted to suit the flow conditions and the operational parameters of the Pipeline.

At the end of the runs, the Inspection tool was received in good mechanical condition. The data collected was downloaded and processed on-site. It was confirmed that the data recorded covered the whole length of the Pipeline and is suitable for further analysis to determine the integrity of the Pipeline.

2. Pipeline Data

This information is based on the Pipeline Questionnaire provided by the client prior to the Inspection operation.

Pipeline name	14 inch RD to RT Water Injection Pipeline, 10.64 km
Launcher	Ravva Despatch (RD)
Receiver	Ravva Terminal (RT)
Diameter	14 inch
Length	10.64 km
Pipe Grade	API 5L X60
Nominal Wall Thickness	14.7 mm
Design Pressure	84.5 kg/cm^2
MAOP	84.5 kg/cm^2
Anomaly Assessment Code	ASME B31G 2012
Product	Water
Year of Commission	1996

3. Pipeline Operational Data

3.1 EGP Tool Run Operating Conditions

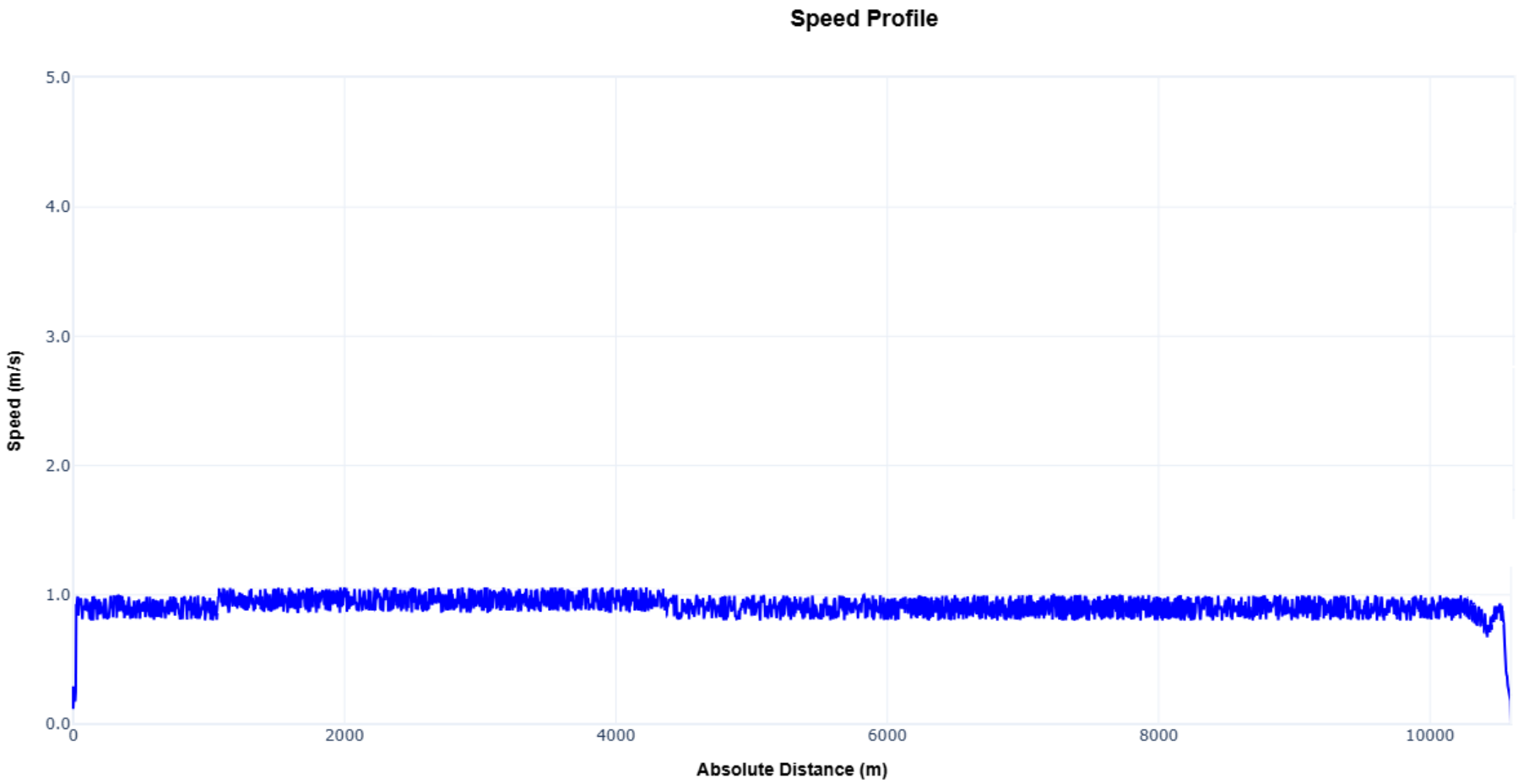
The following operational conditions were observed during the course of the inspection operation during run.

Total Inspection duration time	3 Hour 7 Minutes
Average Speed	0.9 m/s
Average Temperature	38° C
Maximum Pressure	70.3 Kg/cm^2

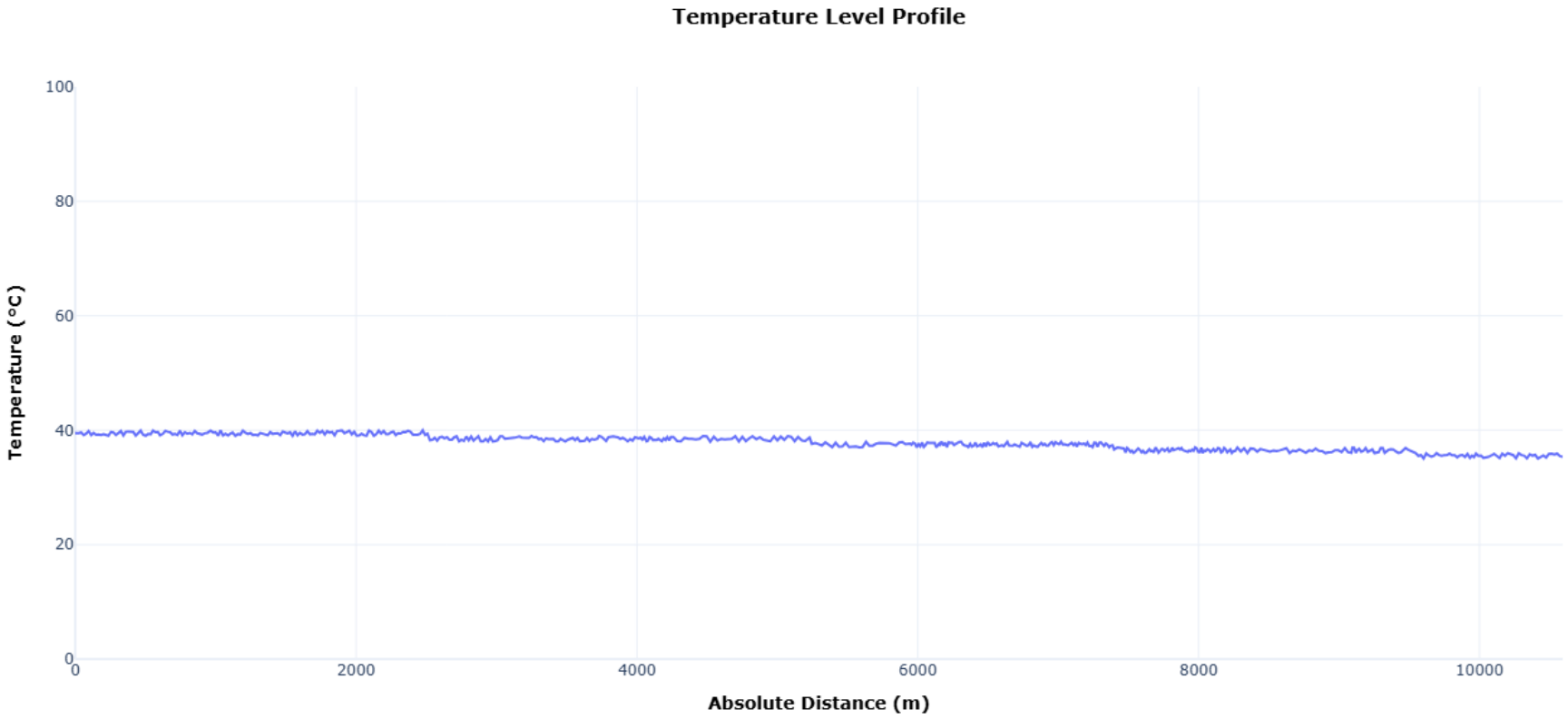
Comprehensive details on runs performed during this operation are supplied
The Speed range during the EGP inspection run is between 0.75 m/s to 1 m/s.

The Speed, temperature and sensor loss profile plot are presented overleaf.

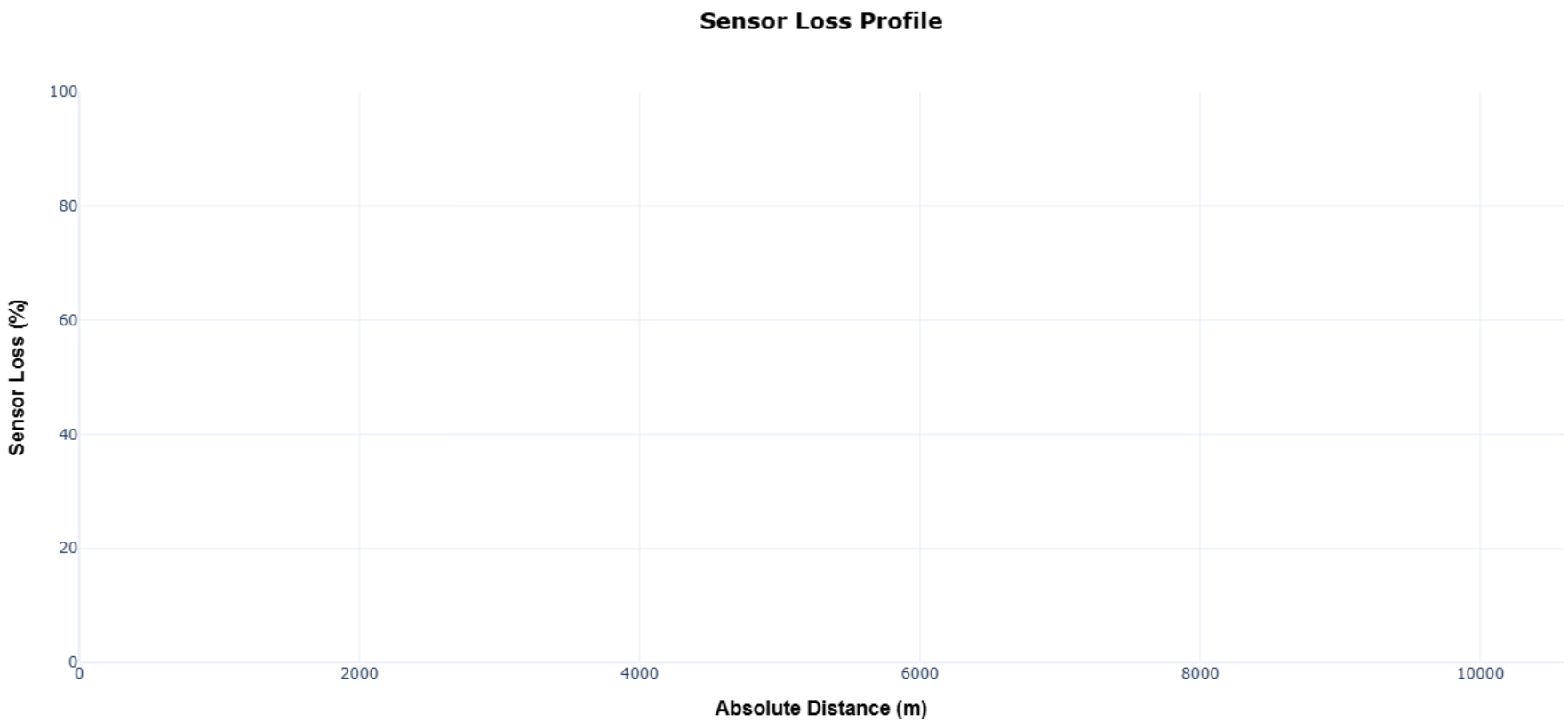
3.2 Speed Profile EGP Tool



3.3 Temperature Profile EGP Tool



3.4 Sensor Loss Profile EGP Tool



3.5 MFL Tool Run Operating Conditions

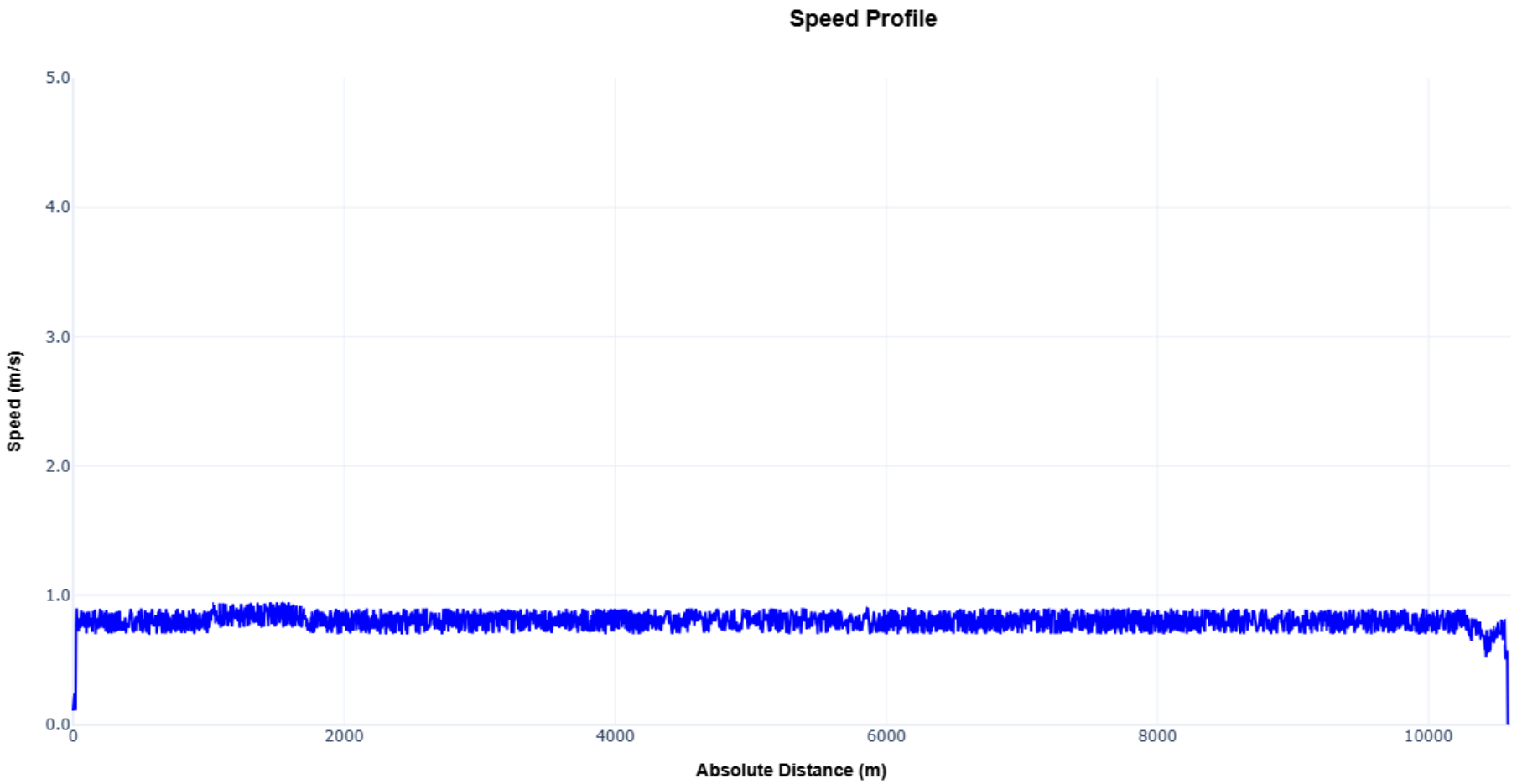
The following operational conditions were observed during the course of the inspection operation during run.

Total Inspection duration time	3 Hour 42 Minutes
Average Speed	0.8 m/s
Average Temperature	42° C
Maximum Pressure	70.2 Kg/cm^2

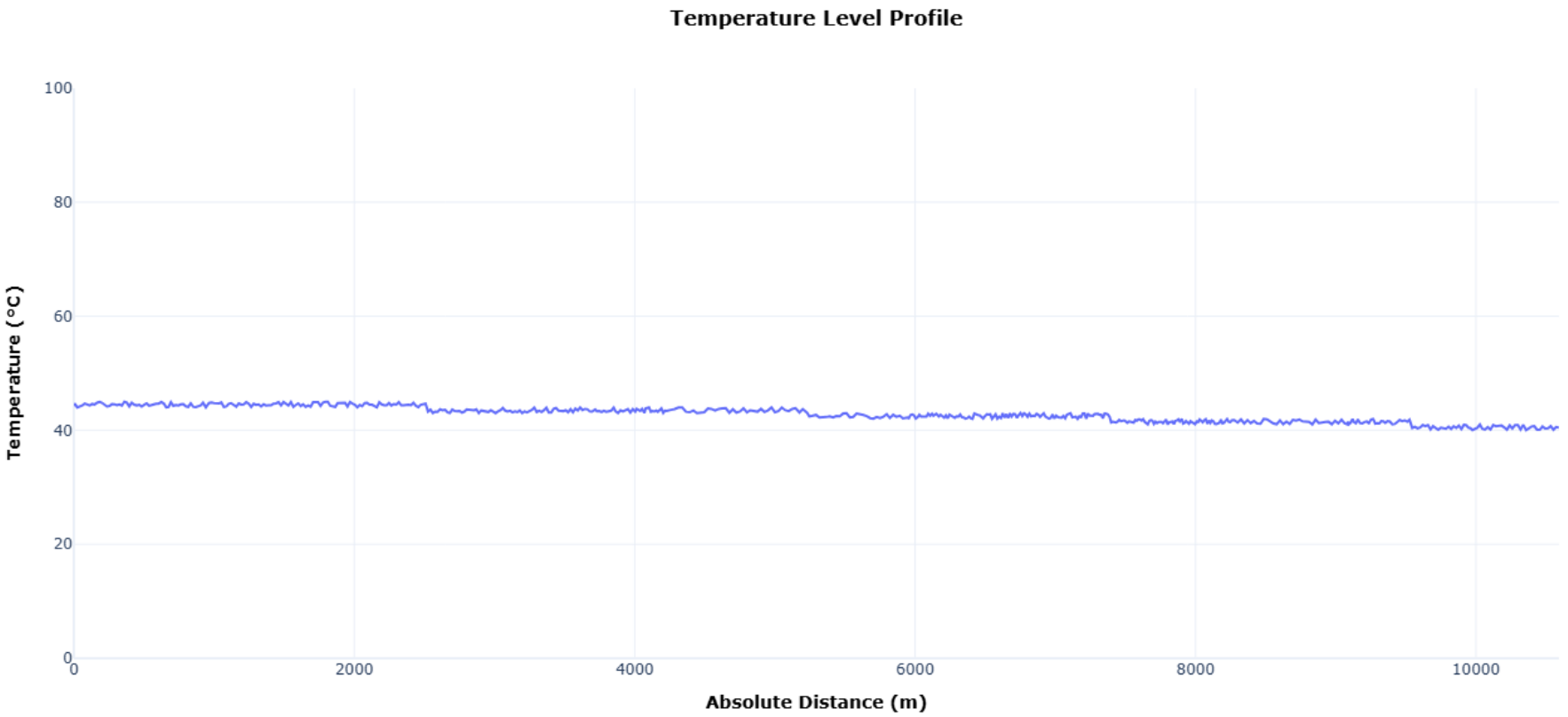
Comprehensive details on runs performed during this operation are supplied
The Speed range during the MFL inspection run is between 0.65 m/s to 0.9 m/s.

The Speed, temperature, Magnetization and sensor loss profile plot are presented overleaf.

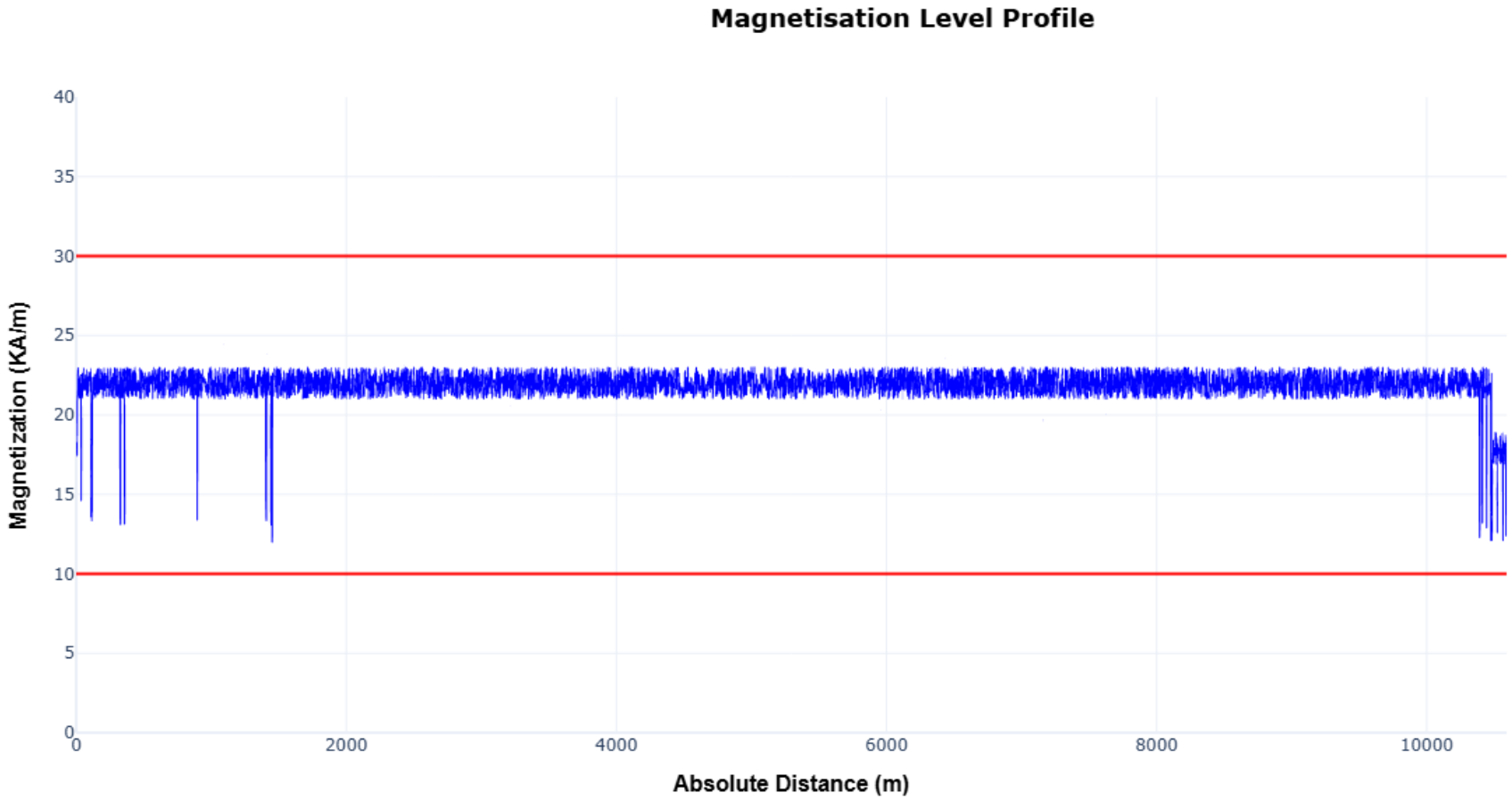
3.6 Speed Profile MFL Tool Run #2



3.7 Temperature Profile MFL Tool Run #2



3.8 Magnetization Profile MFL Tool Run #2



3.9 Sensor Loss Profile MFL Tool Run #2

4. Data Recording and Quality

EGP Inspection run details

Run Direction	RD to RT	
Run Number	1	
Launching Details	**Date:** 14.11.2024	**Time:** 10:08
Receiving Details	**Date:** 14.11.2024	**Time:** 13:15
Data Received at Head office	**Date:** 15.11.2024	

EGP Tool Condition after Inspection run

Disc/Cup Wear	Negligible
Quantity of recovered debris	2 Minutes black water
Type of recovered debris	Black Water
Tool damage	No Damage

EGP Tool Condition after Inspection run

Start of Data Recording	Reducer at RD
End of Data Recording	Reducer at RT
Total Recorded length	10.610 Km
Average Speed	0.9 m/s

MFL Inspection run details

Run Direction	RD to RT	
Run Number	1	
Launching Details	**Date:** 12.11.2024	**Time:** 08:24
Receiving Details	**Date:** 12.11.2024	**Time:** 11:04
Data Received at Head office	**Date:** 15.11.2024	

MFL Tool Condition after Inspection run

Disc/Cup Wear	Negligible
Quantity of recovered debris	3 Minutes black water
Type of recovered debris	Black Water
Tool damage	No Damage

NOTE: The run has failed because the data could not be retrieved from the SD card. A re-run was recommended after checking the issue.

MFL Inspection run details

Run Direction	RD to RT	
Run Number	2	
Launching Details	**Date:** 02.03.2025	**Time:** 12:41
Receiving Details	**Date:** 02.03.2025	**Time:** 16:23
Data Received at Head office	**Date:** 03.03.2025	

MFL Tool Condition after Inspection run

Disc/Cup Wear	Negligible
Quantity of recovered debris	2 Minutes black water
Type of recovered debris	Black Water
Tool damage	No Damage

MFL Tool Condition after Inspection run

Start of Data Recording	Reducer at RD
End of Data Recording	Reducer at RT
Total Recorded length	10.610 Km
Average Speed	0.8 m/s
Magnetization Level	Acceptable

5. Preliminary Defect Verification

The detailed feature report presents information on the **10** most severe metal loss anomalies that have been detected. These anomalies have been selected in accordance with the following feature selection rules:

Rule 1 General corrosion defects with length and width greater than 3t x 3t and metal loss depth 20% of wall thickness or more.

Rule 2 Pitting corrosion defects with length and width greater than 2t x 2t and metal loss depth 40% of wall thickness or more.

Where a reported metal loss feature does not satisfy a specified priority rule, such features will be identified with 'X' in the selection rule field.

The information is presented in two formats:

- Anomaly severity list
- Fully assessed feature sheets

❖ There are no features with a peak depth exceeding 80% and no features with an ERF ≥ 1.0. The deepest feature is reported as a metal loss of **28%** of the reference WT.

5.1 Anomaly severity list

The anomaly severity list provides details of identified anomalies according to the feature selection rules.

The anomaly severity list includes the following information:

- Feature number (S. No.)
- Absolute distance to start of reported anomaly from launch (m)
- Relative distance to the upstream girth weld to the start of the anomaly (m)
- Pipe ID
- Joint/Pipe length (m)
- Feature type per POF requirement
- Feature identification per POF requirement
- Dimension classification per POF requirement
- Orientation (o'clock)
- Axial length of reported anomaly (mm)
- Width of reported anomaly (mm)
- Peak depth of anomaly (%WT)
- Location on the pipe surface
- Calculated ERF value (ASME B31G)
- Calculated Psafe value (Bar) (ASME B31G)
- Comments if any concerning the anomaly

In accordance with ASME B31G standard, ERF values and the associated Psafe calculation have not been provided for those anomalies with a peak depth greater than 80% NWT or less than 10% NWT

Further listing options can be obtained from the VDT USB accompanying this report. These lists can be found in the Excel Sheet or can be custom generated through the program.

Anomaly Severity List 14 inch RD to RT Water Injection Pipeline, 10.64 km																		
SL NO	Pipe Number	Abs. Distance (m)	Distance to U/S GW(m)	Pipe Length(m)	Feature Type	Feature Identification	Dimensions Classification	Orientation o' clock	WT (mm)	Length (mm)	Width (mm)	Depth (%) WT	Depth (mm)	severity	Location	ERF (ASME B31G)	Psafe (ASME B31G) kg/cm²	Comment
1	25	186.20	0.30	12.60	Metal Loss	MFG	CIGR	01:38	14.7	20	54	25	3.7	x	Internal	0.308	274.36	poss. Ext
2	61	603.29	11.67	12.60	Metal Loss	MFG	GENERAL	01:35	14.7	100	75	22	3.2	1	Internal	0.319	264.87	poss. Ext
3	76	781.21	0.98	12.60	Metal Loss	MFG	GENERAL	01:57	14.7	55	60	19	2.8	x	Internal	0.308	274.67	poss. Ext
4	136	1477.39	1.05	12.00	Metal Loss	MFG	PITTING	02:17	14.7	33	59	19	2.8	x	External	0.303	278.61	poss. Int
5	201	2277.37	0.84	12.10	Metal Loss	MFG	GENERAL	08:37	15.0	70	141	18	2.7	x	Internal	0.310	272.65	poss. Ext
6	333	3904.96	3.01	12.42	Metal Loss	MFG	GENERAL	03:39	15.2	75	63	28	4.3	1	External	0.314	269.01	poss. Int
7	333	3905.16	3.21	12.42	Metal Loss	MFG	PITTING	03:39	15.2	45	50	17	2.6	x	External	0.301	280.92	poss. Int
8	354	4160.64	0.02	12.50	Metal Loss	MFG	GENERAL	03:27	14.7	46	104	18	2.6	x	Internal	0.305	276.75	Adj. to GW
9	442	5253.00	10.93	12.10	Metal Loss	MFG	GENERAL	03:49	14.7	45	95	17	2.5	x	Internal	0.305	277.11	
10	732	8820.03	0.84	12.45	Metal Loss	MFG	CIGR	02:48	15.2	29	59	17	2.6	x	Internal	0.298	283.29	

5.2 Fully assessed feature sheets

A fully assessed feature sheet has been prepared for each anomaly contained in the anomaly severity list. Each feature sheet provides details on the predicted axial length, width, peak depth and location details to the agreed accuracy in the contract. Each fully assessed feature sheet provides information on the location and predicted dimensions of one metal loss feature. The fully assessed feature sheet provides information in four fields

1. **Feature description**

   This section provides specific detail about the metal loss feature. For the fully assessed feature sheet have been used calculation results (ERF and safe pressure) based on ASME B31G, as more conservative criterion.

2. **Feature location on pipe**

   This section is a schematic representation of the anomaly location relative to joint welds and orientation in direction of flow. The identified location relates to deepest point of the anomaly.

3. **Pipe description**

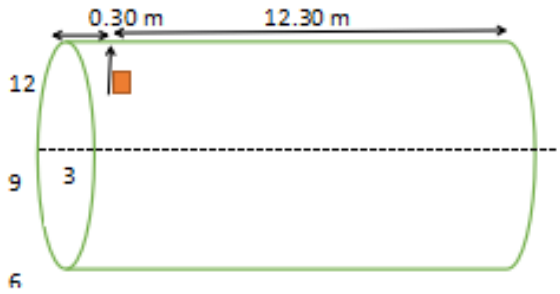
   This is an optional field which may be populated to give other information on the anomaly or surrounding areas.

4. **Pipe location**

   This section provides information that will enable the reference joint to be located for excavation. Wherever possible, the position of the metal loss feature is related to reference points that can easily be identified and located from the surface. There is a schematic diagram giving details of 3 pipe spools upstream and downstream of the reference joint.

The fully assessed feature sheets are presented on the following pages.

Feature Location on Pipe:



Pipe Description:

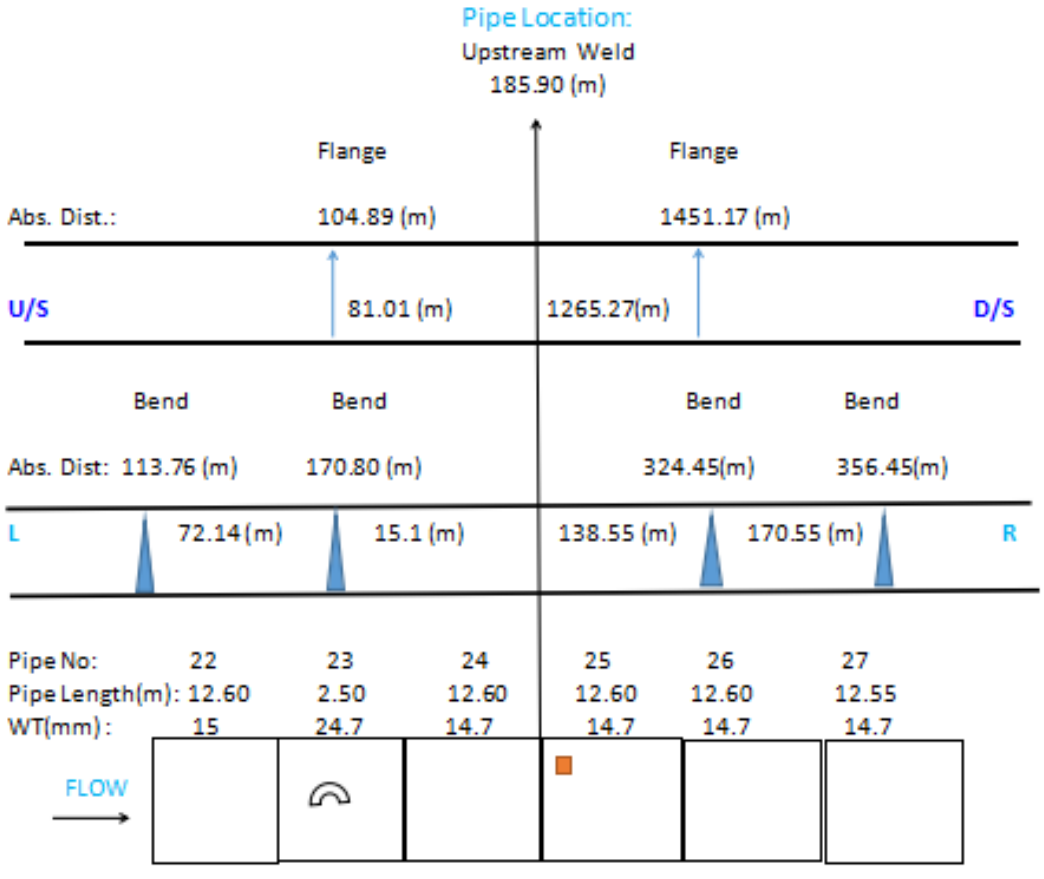
Pipe Number: 25
Pipe Length (m): 12.6
Wall Thickness (mm): 14.7

Feature Description:

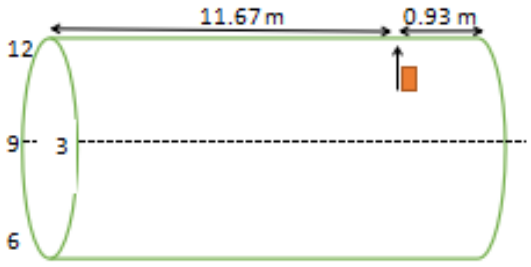
Feature: MFG
Feature type: Metal Loss
Anomaly dimension class: CIGR
Surface Location: Internal
Remaining wall thickness (mm): 11
ERF: 0.308

Absolute Distance (m): 186.20
Max. Depth(%): 25
Orientation (hr:min): 1:38
Width (mm): 54
Length (mm): 20
Safe pressure (kg/cm^2): 274.36

Pipe Location:



Feature Location on Pipe:



Pipe Description:

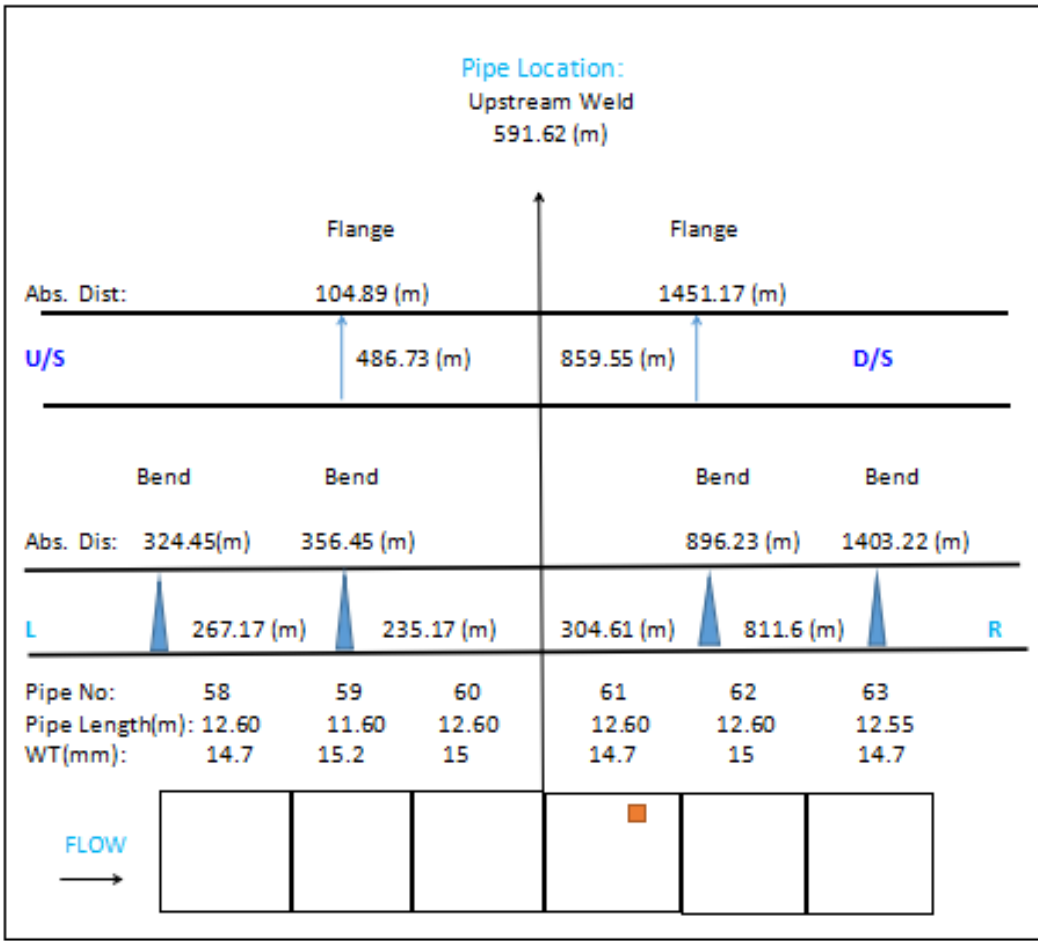
Pipe Number: 61
Pipe Length (m): 12.60
Wall Thickness (mm): 14.7

Feature Description:

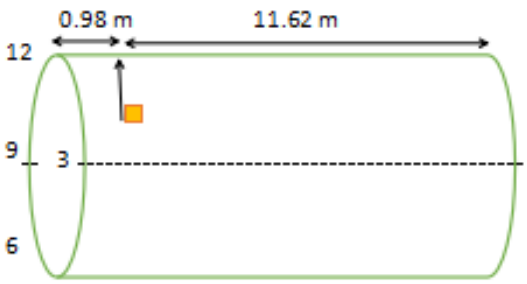
Feature: MFG
Feature type: Metal Loss
Anomaly dimension class: GENERAL
Surface Location: Internal
Remaining wall thickness (mm): 11.5
ERF: 0.319

Absolute Distance (m): 603.29
Max. Depth(%): 22
Orientation (hr:min): 1:35
Width (mm): 75
Length (mm): 100
Safe pressure (kg/cm^2): 264.87

Pipe Location:



Feature Location on Pipe:



Pipe Description:

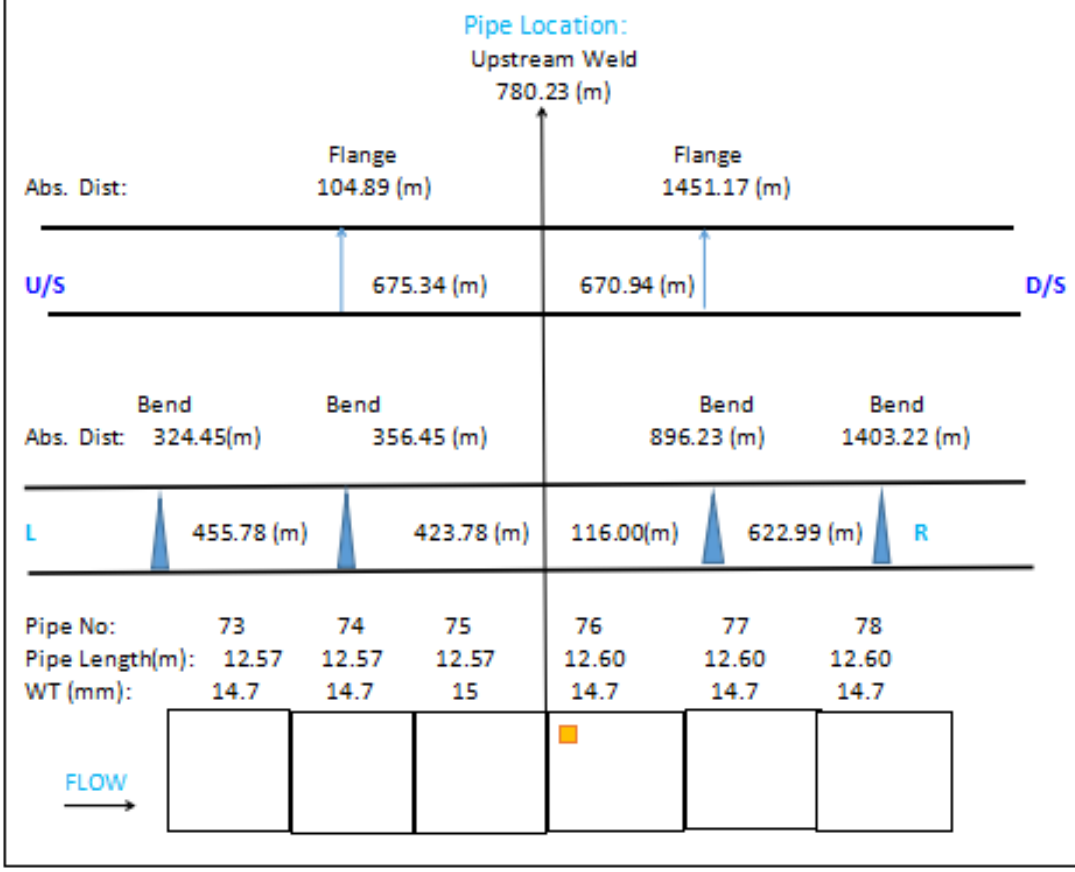
Pipe Number: 76
Pipe Length (m): 12.60
Wall Thickness (mm): 14.7

Feature Description:

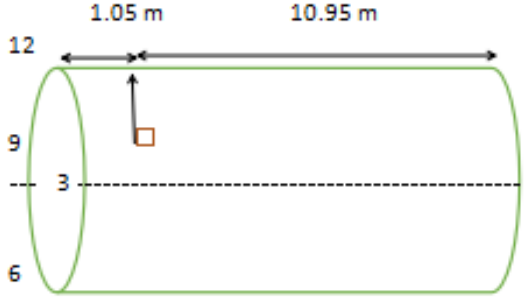
Feature: MFG
Feature type: Metal Loss
Anomaly dimension class: GENERAL
Surface Location: Internal
Remaining wall thickness (mm): 11.9
ERF: 0.308

Absolute Distance (m): 781.21
Max. Depth(%): 19
Orientation (hr:min): 1:57
Width (mm): 60
Length (mm): 55
Safe pressure (kg/cm^2): 274.67

Pipe Location:



Feature Location on Pipe:



Pipe Description:

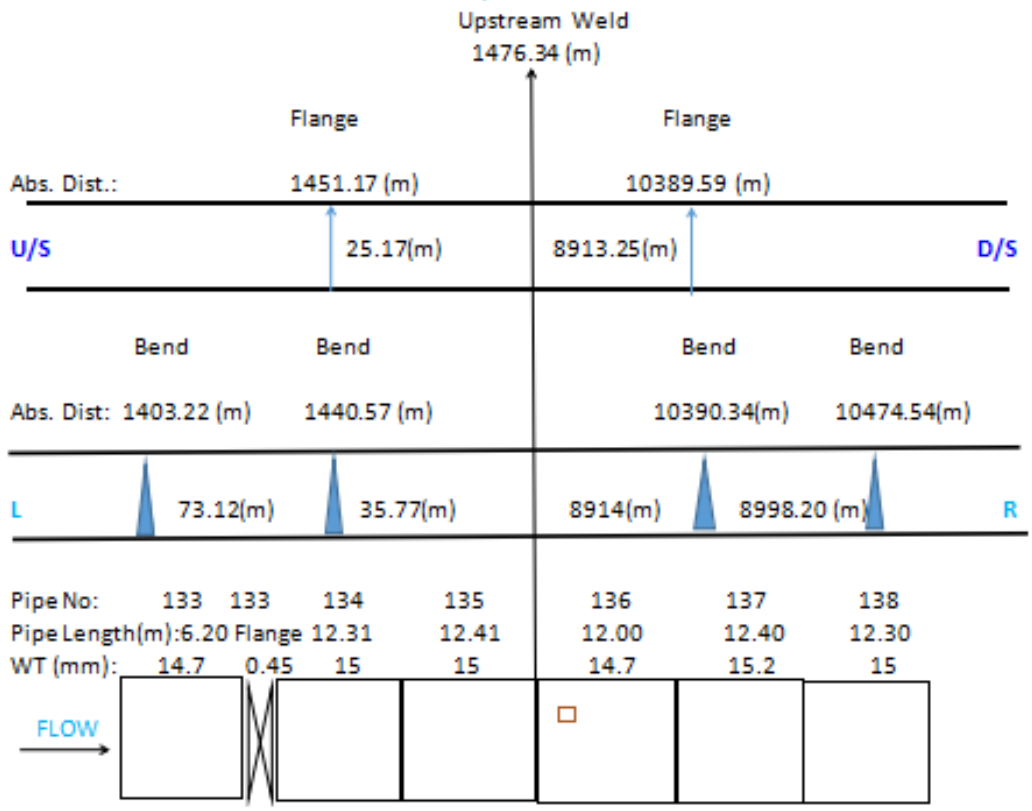
Pipe Number: 136
Pipe Length (m): 12.00
Wall Thickness (mm): 14.7

Feature Description:

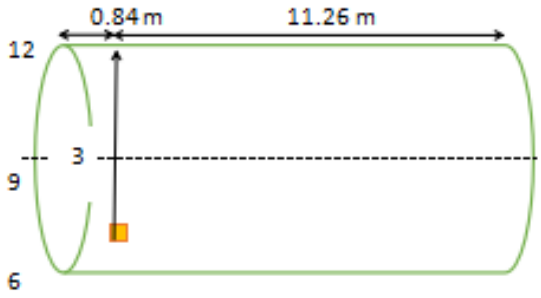
Feature: MFG
Feature type: Metal Loss
Anomaly dimension class: PITTING
Surface Location: External
Remaining wall thickness (mm): 11.9
ERF: 0.303

Absolute Distance (m): 1477.39
Max. Depth(%): 19
Orientation(hr:min): 2:17
Width (mm): 59
Length (mm): 33
Safe pressure (kg/cm^2): 278.61

Pipe Location:



Feature Location on Pipe:



Pipe Description:

Pipe Number: 201
Pipe Length (m): 12.10
Wall Thickness (mm): 15

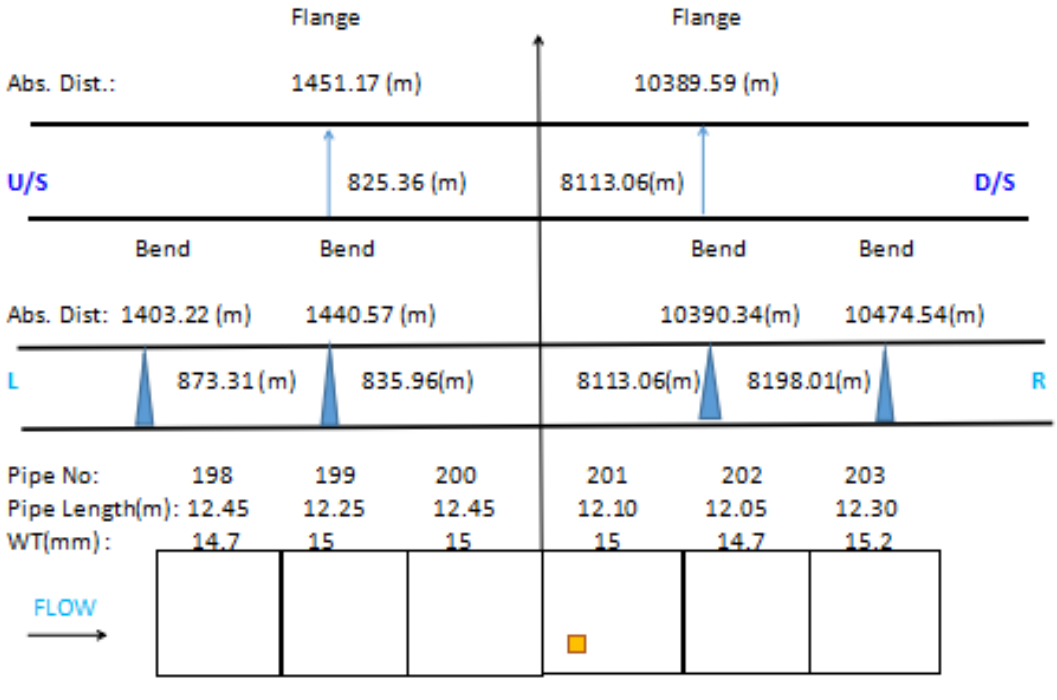
Feature Description:

Feature: MFG
Feature type: Metal Loss
Anomaly dimension class: GENERAL
Surface Location: Internal
Remaining wall thickness (mm): 12.3
ERF: 0.31

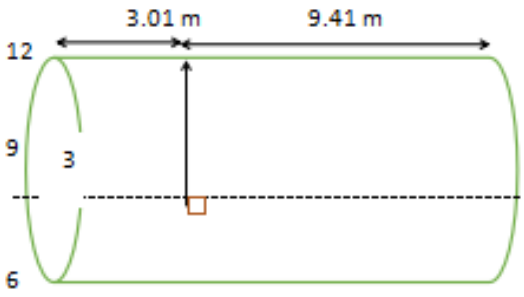
Absolute Distance (m): 2277.37
Max. Depth(%): 18
Orientation(hr:min): 08:37
Width (mm): 141
Length (mm): 70
Safe pressure (kg/cm^2): 272.65

Pipe Location:

Upstream Weld
2276.53(m)



Feature Location on Pipe:



Pipe Description:

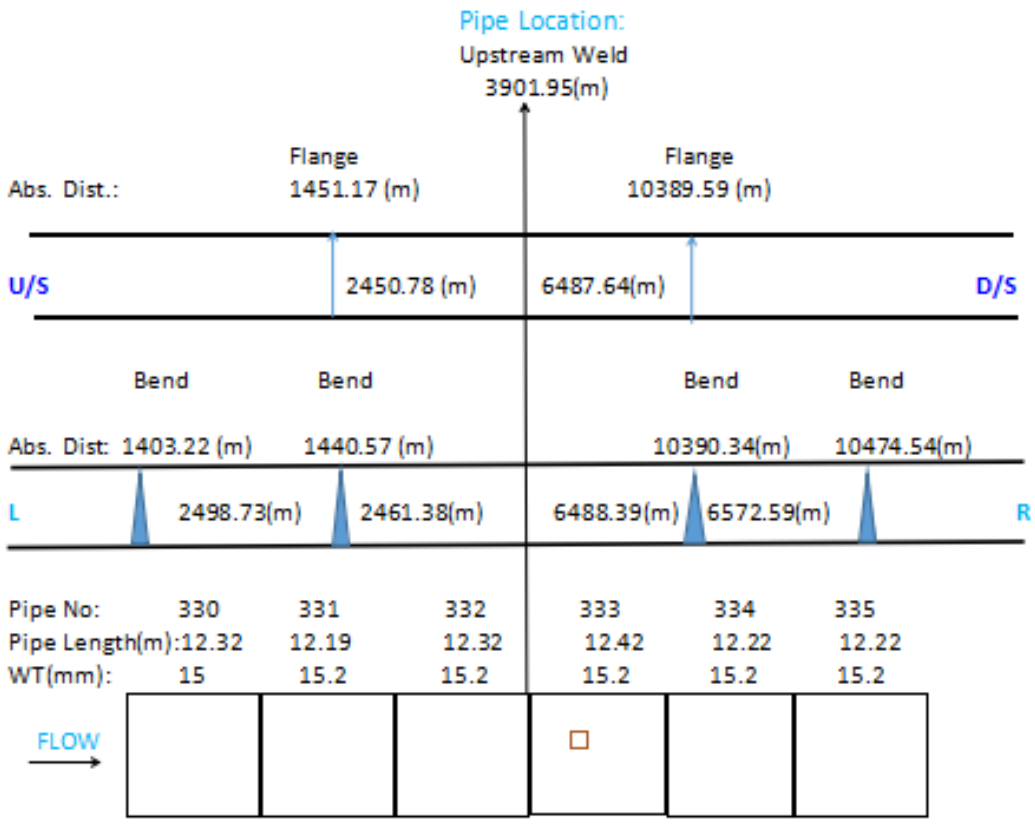
Pipe Number: 333
Pipe Length (m): 12.42
Wall Thickness (mm): 15.2

Feature Description:

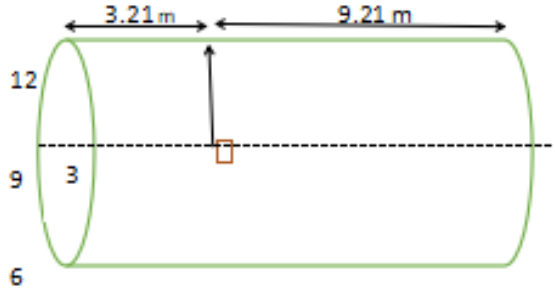
Feature: MFG
Feature type: Metal Loss
Anomaly dimension class: GENERAL
Surface Location: External
Remaining wall thickness (mm): 10.9
ERF: 0.314

Absolute Distance (m): 3904.96
Max. Depth(%): 28
Orientation (hr:min): 03:39
Width (mm): 63
Length (mm): 75
Safe pressure (kg/cm^2): 269.01

Pipe Location:



Feature Location on Pipe:



Pipe Description:

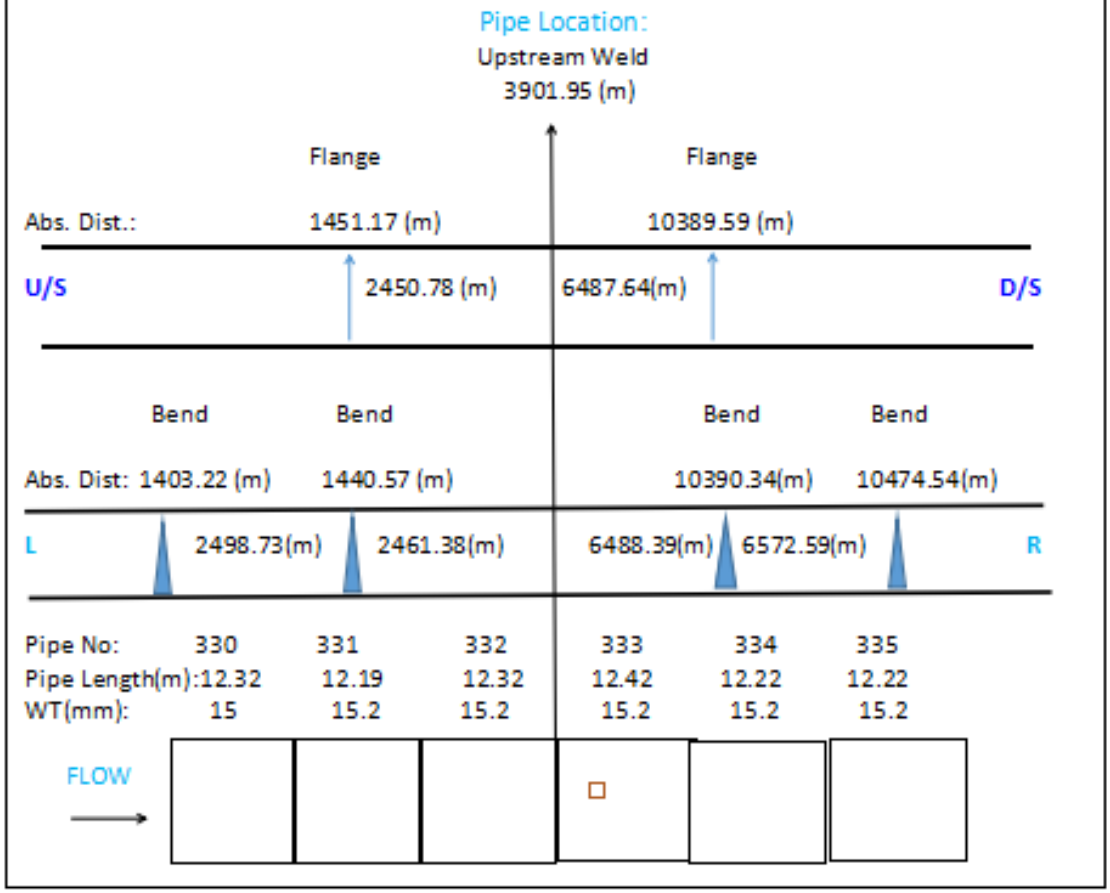
Pipe Number: 333
Pipe Length (m): 12.42
Wall Thickness (mm): 15.2

Feature Description:

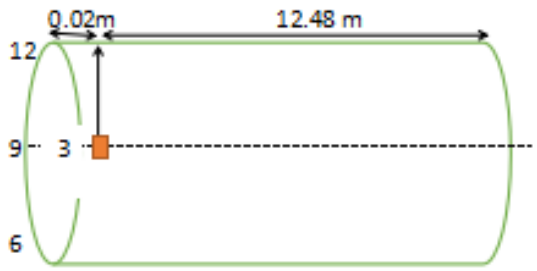
Feature: MFG
Feature type: Metal Loss
Anomaly dimension class: PITTING
Surface Location: External
Remaining wall thickness (mm): 12.6
ERF: 0.301

Absolute Distance (m): 3905.16
Max. Depth (%): 17
Orientation (hr:min): 03:39
Width (mm): 50
Length (mm): 45
Safe pressure (kg/cm^2): 280.92

Pipe Location:



Feature Location on Pipe:



Pipe Description:

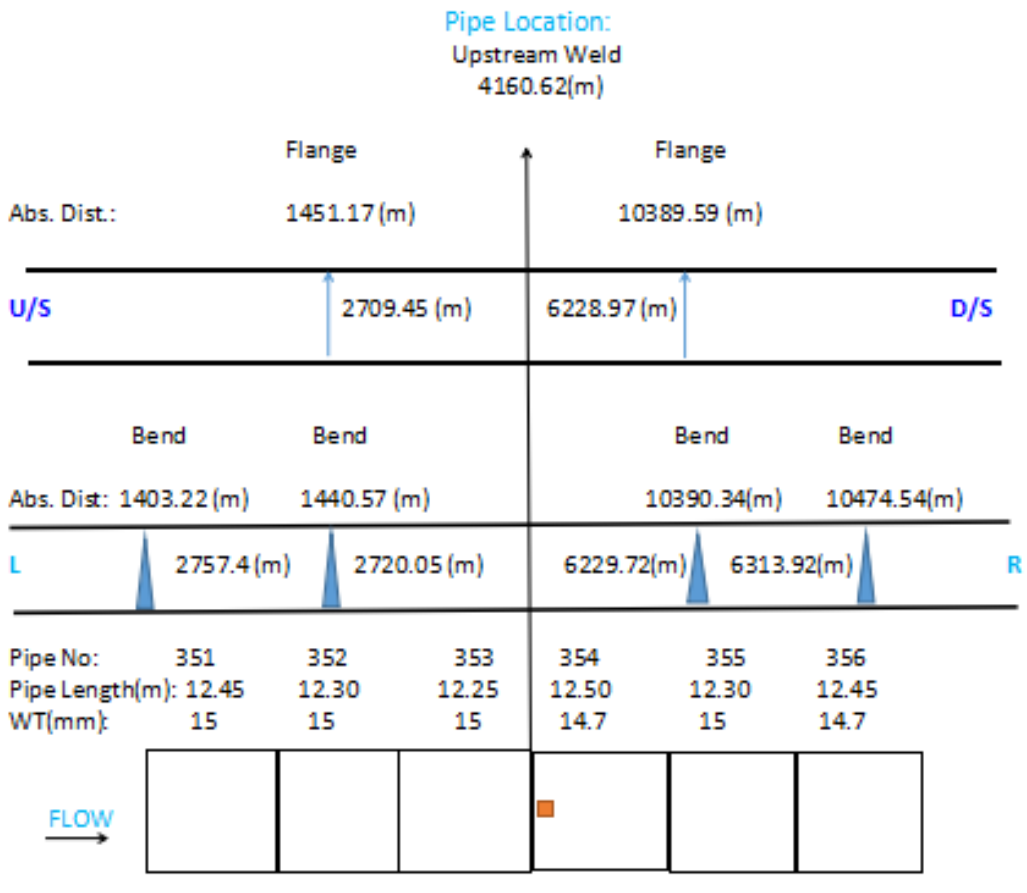
Pipe Number: 354
Pipe Length (m): 12.50
Wall Thickness (mm): 14.7

Feature Description:

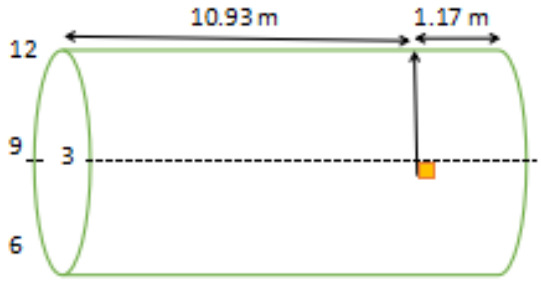
Feature: MFG
Feature type: Metal Loss
Anomaly dimension class: GENERAL
Surface Location: Internal
Remaining wall thickness (mm): 12.1
ERF: 0.305

Absolute Distance (m): 4160.64
Max. Depth (%): 18
Orientation (hr:min): 03:27
Width (mm): 104
Length (mm): 46
Safe pressure (kg/cm^2): 276.75

Pipe Location:



Feature Location on Pipe:



Pipe Description:

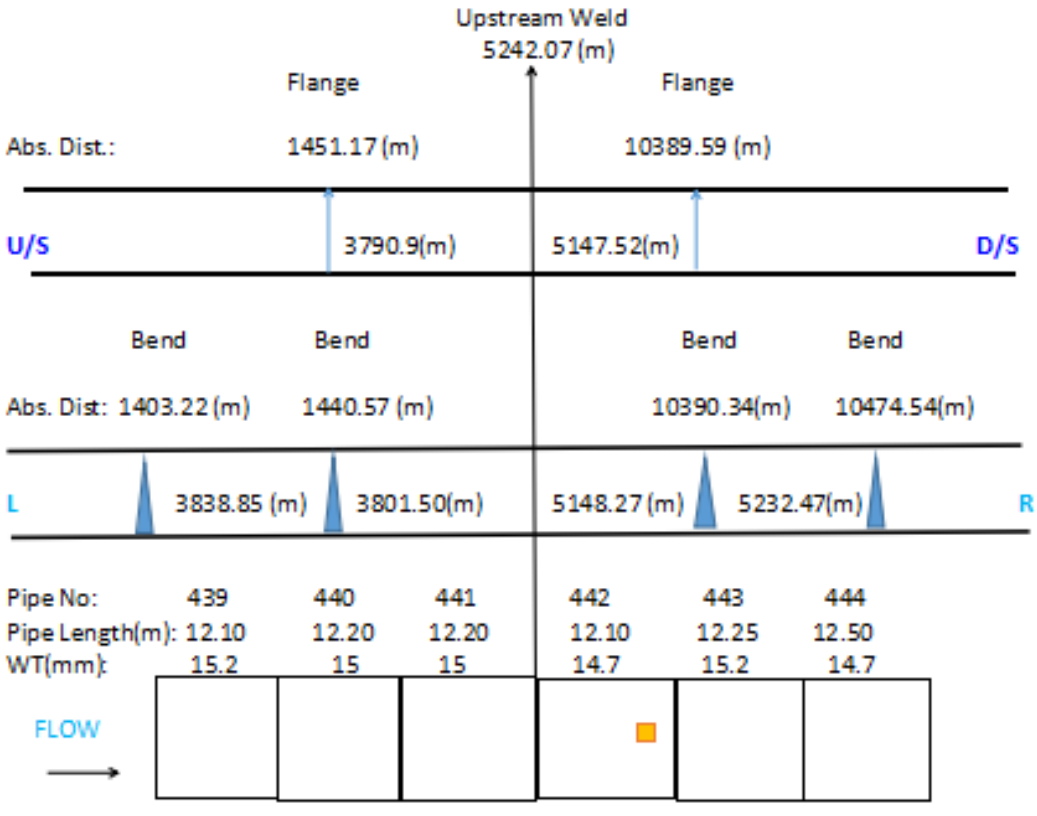
Pipe Number: 442
Pipe Length (m): 12.10
Wall Thickness (mm): 14.7

Feature Description:

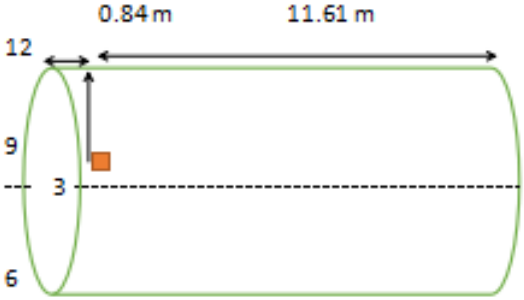
Feature: MFG
Feature type: Metal Loss
Anomaly dimension class: GENERAL
Surface Location: Internal
Remaining wall thickness (mm): 12.2
ERF: 0.305

Absolute Distance (m): 5253.00
Max. Depth (%): 17
Orientation (hr:min): 03:49
Width (mm): 95
Length (mm): 45
Safe pressure (kg/cm^2): 277.11

Pipe Location:



Feature Location on Pipe:



Pipe Description:

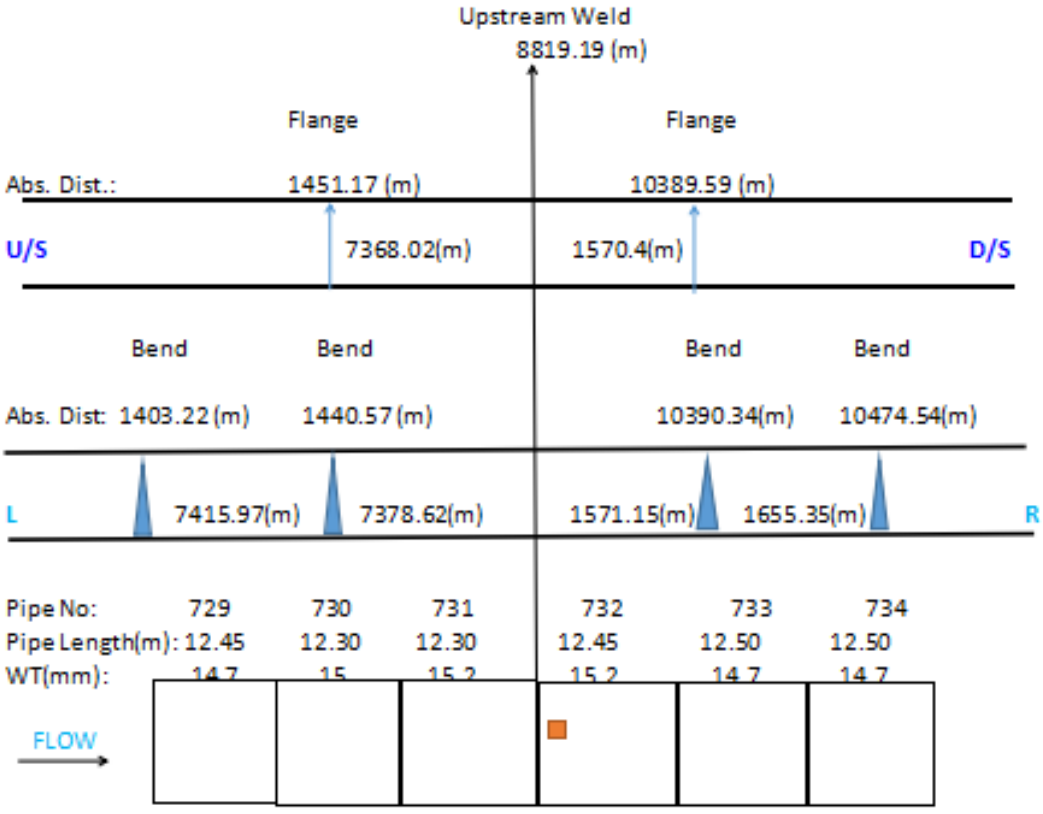
Pipe Number: 732
Pipe Length (m): 12.45
Wall Thickness (mm): 15.2

Feature Description:

Feature: MFG
Feature type: Metal Loss
Anomaly dimension class: CIGR
Surface Location: Internal
Remaining wall thickness (mm): 12.6
ERF: 0.298

Absolute Distance (m): 8820.03
Max. Depth (%): 17
Orientation (hr:min): 02:48
Width (mm): 59
Length (mm): 29
Safe pressure (kg/cm^2): 283.29

Pipe Location:



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