PIPELINE INSPECTION REPORT

C7735_20A
November 1998
Part 1 of 1

MP 1475.74 to MP 1479.77 (East Run)
Enbridge (U.S.), Inc.
20 inch Crude Oil Pipeline

LINE 5 (20") SEPT.1998
STRAITS OF MACKINAW

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M.P. 1475.74 to M.P. 1479.77 (EAST RUN)

ENBRIDGE (U.S.) , INC.

20 inch Crude Oil Pipeline

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Executive Summary

A full survey of the ENBRIDGE (U.S.) , INC. M.P. 1475.74 to M.P. 1479.77 (EAST RUN) pipeline was successfully completed by Pipeline Integrity International Inc. on 30 September 1998.

A total of 91 metal loss features have been detected on the inspection survey of which the deepest was 39%. These are distributed throughout the pipeline. Approximately 4% of the total number of spools have metal loss reported within them.

The majority of these are internal and have the appearance of mill / manufacturing faults.

We should hereby like to express our appreciation for the assistance and co-operation which we received from ENBRIDGE (U.S.) , INC. in the course of this project.

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Central File		PII	1

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Inspection Summary

This section presents a summary of inspection operation C7735_20A which was conducted by Pipeline Integrity International Inc. for ENBRIDGE (U.S.) , INC. in the M.P. 1475.74 to M.P. 1479.77 (EAST RUN), 20 inch nominal diameter, 4.1 miles, Crude Oil pipeline.

The pipeline was inspected by the PII magnetic inspection vehicle on 30 September 1998.

1.1. Metal Loss

A total of 91 metal loss features have been detected on the inspection survey of which the deepest was 39%. These are distributed throughout the pipeline. Approximately 4% of the total number of spools have metal loss reported within them.

The majority of these are internal and have the appearance of mill / manufacturing faults.

Mill/manufacturing faults will have been present in the pipeline since it was commissioned. It can be difficult to achieve the normal sizing accuracy for mill/manufacturing faults depending on whether these metal loss features are the result of hot working or cold working of the pipe steel. Consequently, it should be noted that the sizing accuracy specified for corrosion in the Inspection System Performance Specification (Appendix G) contained in the contract may not be applicable to mill/manufacturing faults.

Detailed inspection sheets for 15 of these metal loss features are provided in Section 2. Summaries of all the metal loss features are presented in Section 3.1.

1.2. Pipeline Anomalies

The following is a summary of any pipeline anomalies which have been detected on the inspection survey:

ferrous metal objects:	0
eccentric pipeline casings:	0
dents:	2
girth weld anomalies:	0
shell repairs:	0
patch repaired spools:	0

More information on pipeline anomalies is given in the anomaly reports presented in Sections 3.2.2 to 3.2.6.

1.3. Inspection Quality

Inspection data was obtained for the full length (4.1 miles) of the pipeline.

The quality of the inspection data is satisfactory and this has enabled a comprehensive assessment of the pipeline to be carried out.

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Metal Loss
Feature Report

Metal Loss Feature Report

The Metal Loss Feature Report provides detailed inspection sheets for selected metal loss features.

The metal loss features are selected for detailed analysis and reporting according to the selection rules given in the Specification for the Pipeline Inspection Report (Appendix F).

Those metal loss features that are reported on inspection sheets have predicted axial lengths, predicted peak depths and location details to the accuracy described in the Inspection System Performance Specification (Appendix G).

The Rupture Pressure Ratio (RPR) is calculated using the formula given in the "Reporting" section of the contract (Appendix F).

2.1. Summary Tables

This section provides a summary of the metal loss features reported on the inspection sheets.

Tables summarising the inspection sheets are provided in the following sub-sections:

2.1.1. Summary of Inspection Sheets in Distance Order

This table presents a summary of the inspection sheets with the metal loss features sorted in order of their absolute distance from the launch.

2.1.2. Summary of Inspection Sheets in Feature Selection Order

This table presents a summary of the inspection sheets with the metal loss features sorted in order of their selection rule.

2.1.1 Summary of Inspection Sheets in Distance Order

Insp. Sheet Number	Absolute Distance (feet)	Ext. or Int.	Predicted Dimensions				Pressure Ratio (RPR)	Feature Selection Rule
			Axial (in)	Circ. (in)	Depth % WT			
					Ave.	Peak		
1	382.6	Int	0.9	1.0	28	28	MFG	8
2	1732.4	Ext	1.0	1.5	29	29	MFG	8
3	3264.7	Ext	5.8	2.4	31	39	1.031	5
4	5541.1	Int	0.4	0.9	27	27	MFG	8
5	7470.2	Ext	0.5	1.0	28	28	MFG	8
6	7501.6	Ext	0.6	1.0	30	30	MFG	8
7	9003.7	Ext	0.4	2.5	28	28	MFG	8
8	11793.2	Ext	0.6	1.1	28	28	MFG	8
9	15849.7	Int	1.1	4.4	22	30	MFG	8
10	16198.2	Int	0.2	0.7	29	29	MFG	8
11	17021.4	Int	5.5	8.9	30	30	MFG	8
12	17138.1	Int	2.0	2.2	28	28	MFG	8
13	20313.5	Ext	0.2	0.3	30	30	MFG	8
14	21237.2	Ext	0.6	1.2	29	29	MFG	8
15	21644.5	Int	0.7	0.9	30	30	MFG	8

2.1.2 Summary of Inspection Sheets in Feature Selection Order

Insp. Sheet Number	Absolute Distance (feet)	Ext. or Int.	Predicted Dimensions				Pressure Ratio (RPR)	Feature Selection Rule
			Axial (in)	Circ. (in)	Depth % WT			
					Ave.	Peak		
3	3264.7	Ext	5.8	2.4	31	39	1.031	5
6	7501.6	Ext	0.6	1.0	30	30	MFG	8
9	15849.7	Int	1.1	4.4	22	30	MFG	8
11	17021.4	Int	5.5	8.9	30	30	MFG	8
13	20313.5	Ext	0.2	0.3	30	30	MFG	8
15	21644.5	Int	0.7	0.9	30	30	MFG	8
2	1732.4	Ext	1.0	1.5	29	29	MFG	8
10	16198.2	Int	0.2	0.7	29	29	MFG	8
14	21237.2	Ext	0.6	1.2	29	29	MFG	8
1	382.6	Int	0.9	1.0	28	28	MFG	8
5	7470.2	Ext	0.5	1.0	28	28	MFG	8
7	9003.7	Ext	0.4	2.5	28	28	MFG	8
8	11793.2	Ext	0.6	1.1	28	28	MFG	8
12	17138.1	Int	2.0	2.2	28	28	MFG	8
4	5541.1	Int	0.4	0.9	27	27	MFG	8

2.2. Inspection Sheets

This section provides detailed inspection sheets for selected metal loss features.

The metal loss features are selected for detailed analysis and reporting according to the selection rules specified in the Specification for the Pipeline Inspection Report (Appendix F).

Those metal loss features that are reported on inspection sheets have predicted axial lengths, predicted peak depths and location details to the accuracy described in the Inspection System Performance Specification (Appendix G).

2.2.1. Structure of the Inspection Sheet

Each inspection sheet provides information on the location and predicted dimensions of one metal loss feature.

The inspection sheet consists of three areas:

Feature Description

This section of the inspection sheet provides specific details about the metal loss feature.

Feature Location

This section of the inspection sheet provides information that will enable the metal loss feature 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.

Schematic Location Summary

This provides a schematic diagram of the pipeline within the vicinity of the metal loss feature.

The diagram represents five pipe spools, the spool containing the metal loss feature and two spools either side. The girth weld numbers and spool lengths are also given on the diagram.

2.2.2. Pictorial Representation

Accompanying each inspection sheet are two pictorial representations of the magnetic response derived from the reported metal loss feature.

In both cases the metal loss feature is as viewed from outside the pipe with the upstream end being on the left. The vertical (y) axis is annotated with o'clock orientation as viewed in

the direction of flow (at the time of the inspection). The horizontal (x) axis is annotated with the absolute distance measured from the launch.

The monochrome plot (the Overview Plot) shows the magnetic response in the context of the full circumference of the pipe. In order to assist the Client in identifying the areas of metal loss, it is shaded as if illuminated from the left hand side of the plot.

The colour plot (the Detail Contour Plot) is approximately centred on the area of the pipeline in which the reported metal loss feature is located, and identifies the relative magnitudes of the magnetic responses in this area. The magnitude of change in the magnetic responses is represented by designated colours, with like magnitudes having common colours. Due to the behaviour of this magnetic response, the colour plot will not normally provide a true representation of the physical profile of the reported metal loss feature.

2.2.3. Inspection Sheets 1 to 15

Inspection sheets 1 to 15 are presented on the following pages.

Inspection Sheet Number 1 C7735_20A

Feature Description

Type:	Internal Mill/Manufacturing Fault
Orientation:	05:45 (o'clock)
Axial length:	0.9 in
Circumferential width:	1.0 in
Depth - Peak:	28% WT
- Average:	28% WT
Feature Selection Rule:	8
Nominal Pipe wall thickness for spool:	0.812 in
Absolute Distance from Launch:	382.6 feet

Comments:

This metal loss feature has the appearance of a mill/manufacturing fault.

There is another metal loss feature within this spool.
More information on this feature is given in the Pipeline Listing.

Feature Location

Primary Reference/s:

1. BALL VALVE
   (Girth Weld 40 + 1.3ft)

2. BALL VALVE
   (Girth Weld 8730 + 1.1ft)

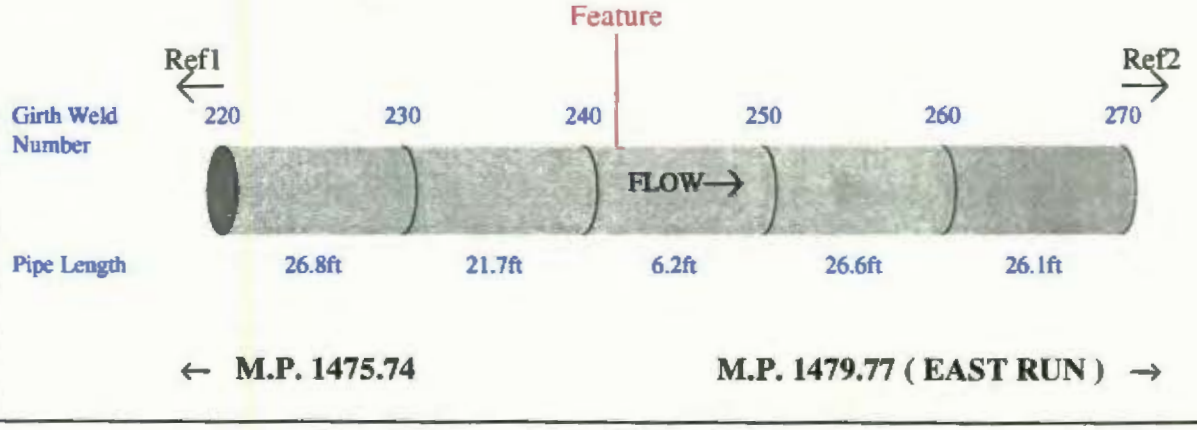
Reference Girth Weld:

The reference girth weld at the M.P. 1475.74 (upstream) end of the feature spool is number 240. The location of this weld is 349.7 feet downstream from reference 1 and 21331.5 feet upstream from reference 2.

Feature:

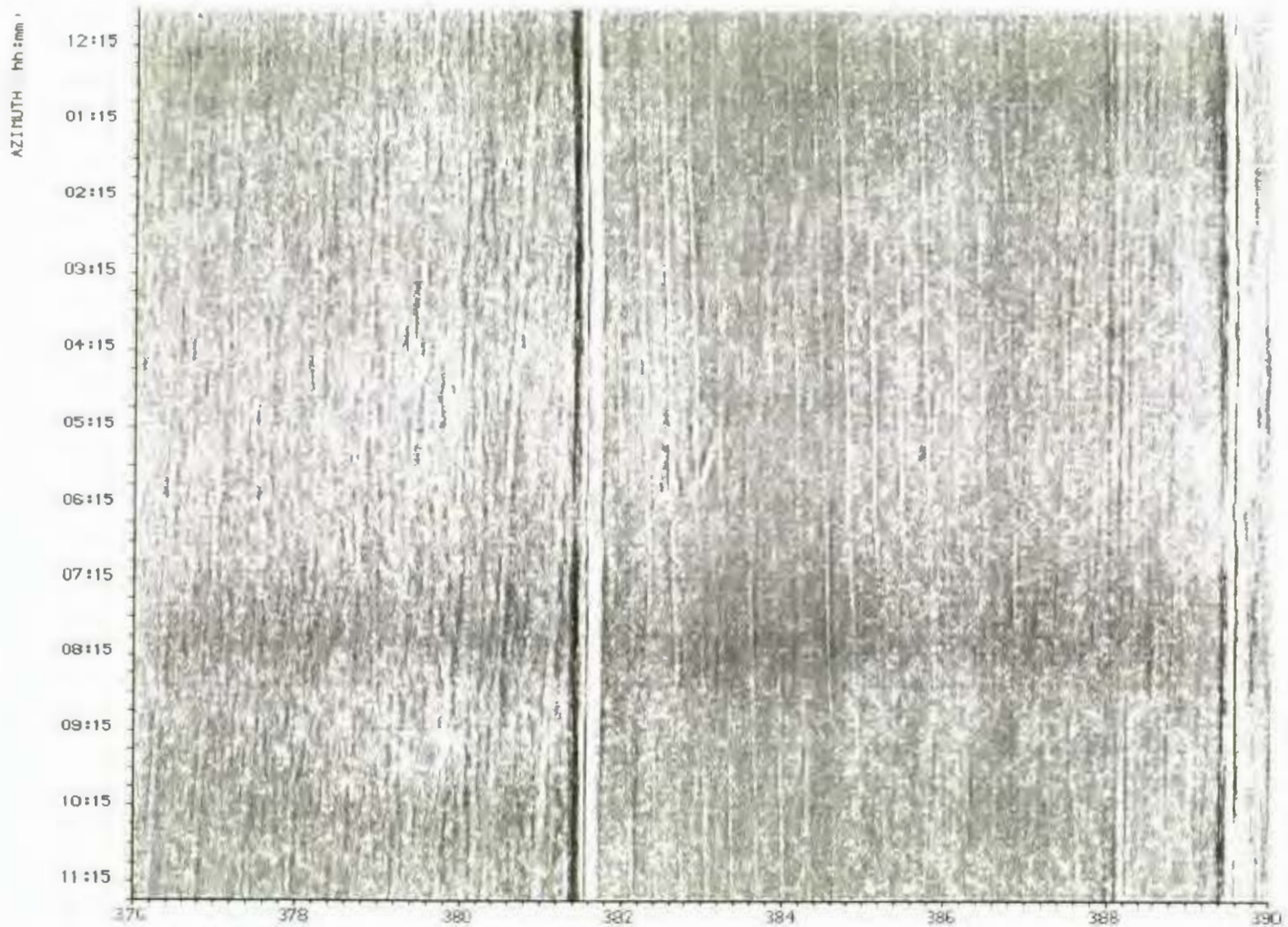
The feature is located 1.1 feet downstream from the reference girth weld.

Schematic Location Summary:



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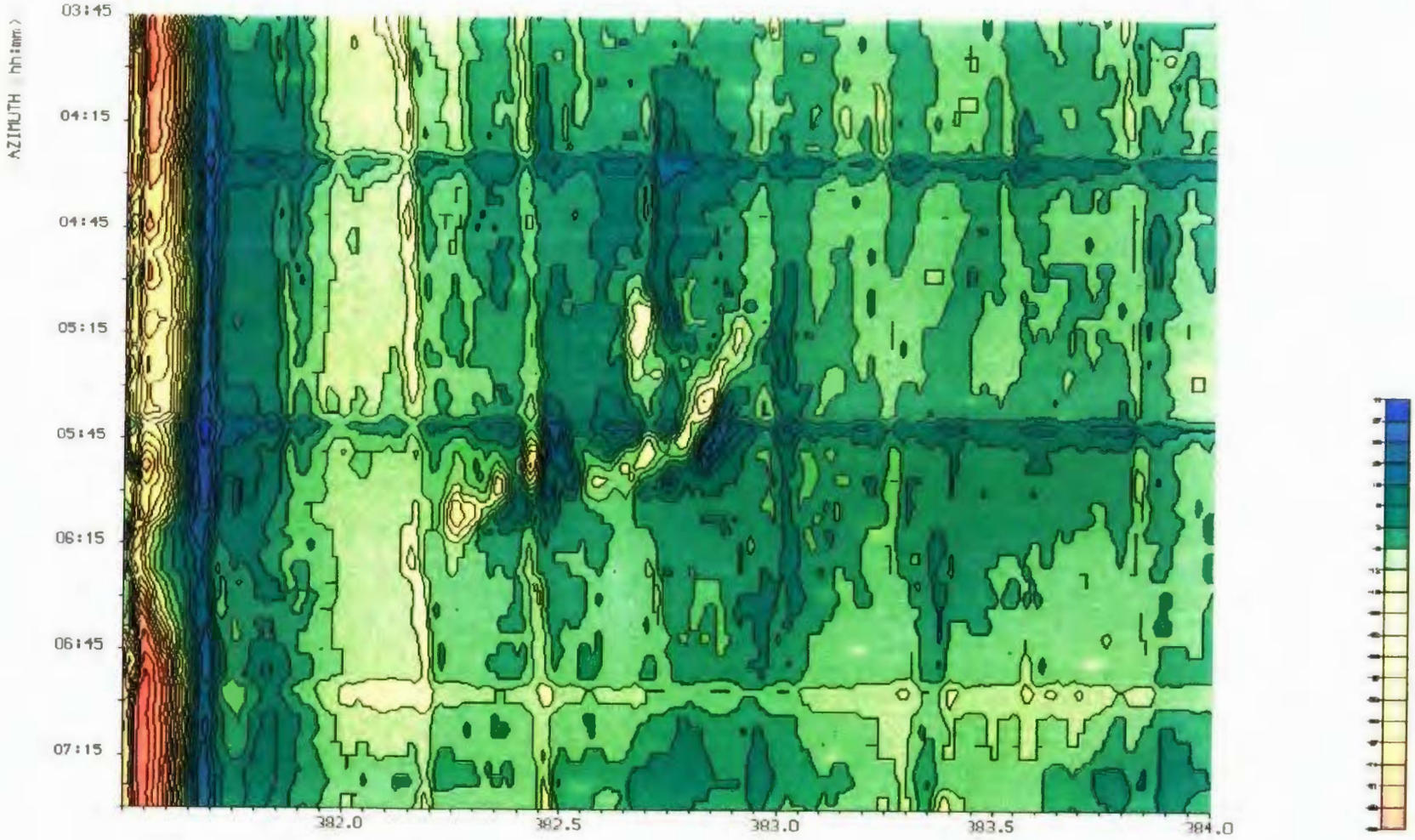
Feature 1 Overview Plot C7735_20A



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ENBDNR0006657

Feature 1 Detail Contour Plot C7735_2QA



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ENBDNR0006658

Inspection Sheet Number 2 C7735_20A

Feature Description

Type:	External Mill/Manufacturing Fault
Orientation:	06:15 (o'clock)
Axial length:	1.0 in
Circumferential width:	1.5 in
Depth - Peak:	29% WT
- Average:	29% WT
Feature Selection Rule:	8
Nominal Pipe wall thickness for spool:	0.812 in
Absolute Distance from Launch:	1732.4 feet

Comments:

This metal loss feature has the appearance of a mill/manufacturing fault.

There are other metal loss features within this spool.
More information on these features is given in the Pipeline Listing.

Feature Location

Primary Reference/s:

1. BALL VALVE
   (Girth Weld 40 + 1.3ft)

2. BALL VALVE
   (Girth Weld 8730 + 1.1ft)

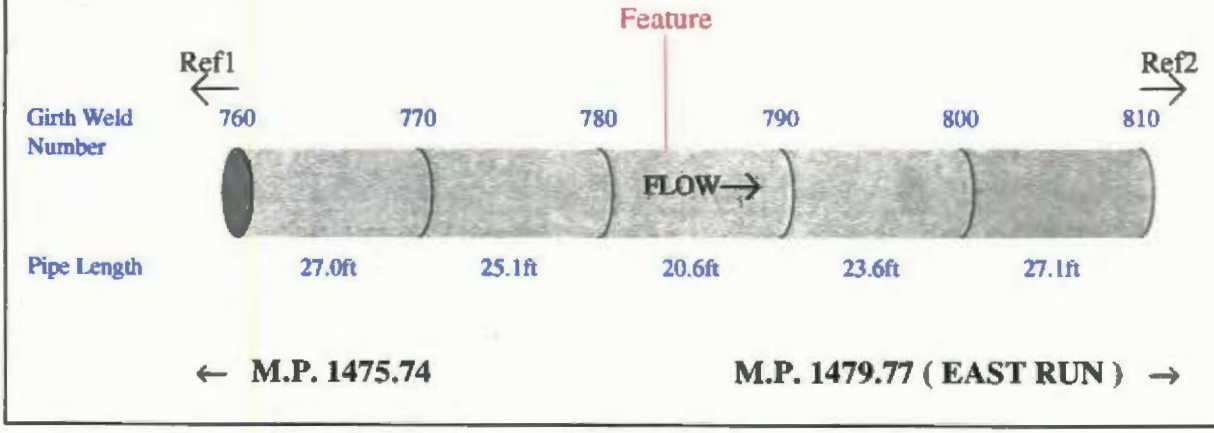
Reference Girth Weld:

The reference girth weld at the M.P. 1475.74 (upstream) end of the feature spool is number 780.
The location of this weld is 1693.0 feet downstream from reference 1 and 19988.1 feet upstream from reference 2.

Feature:

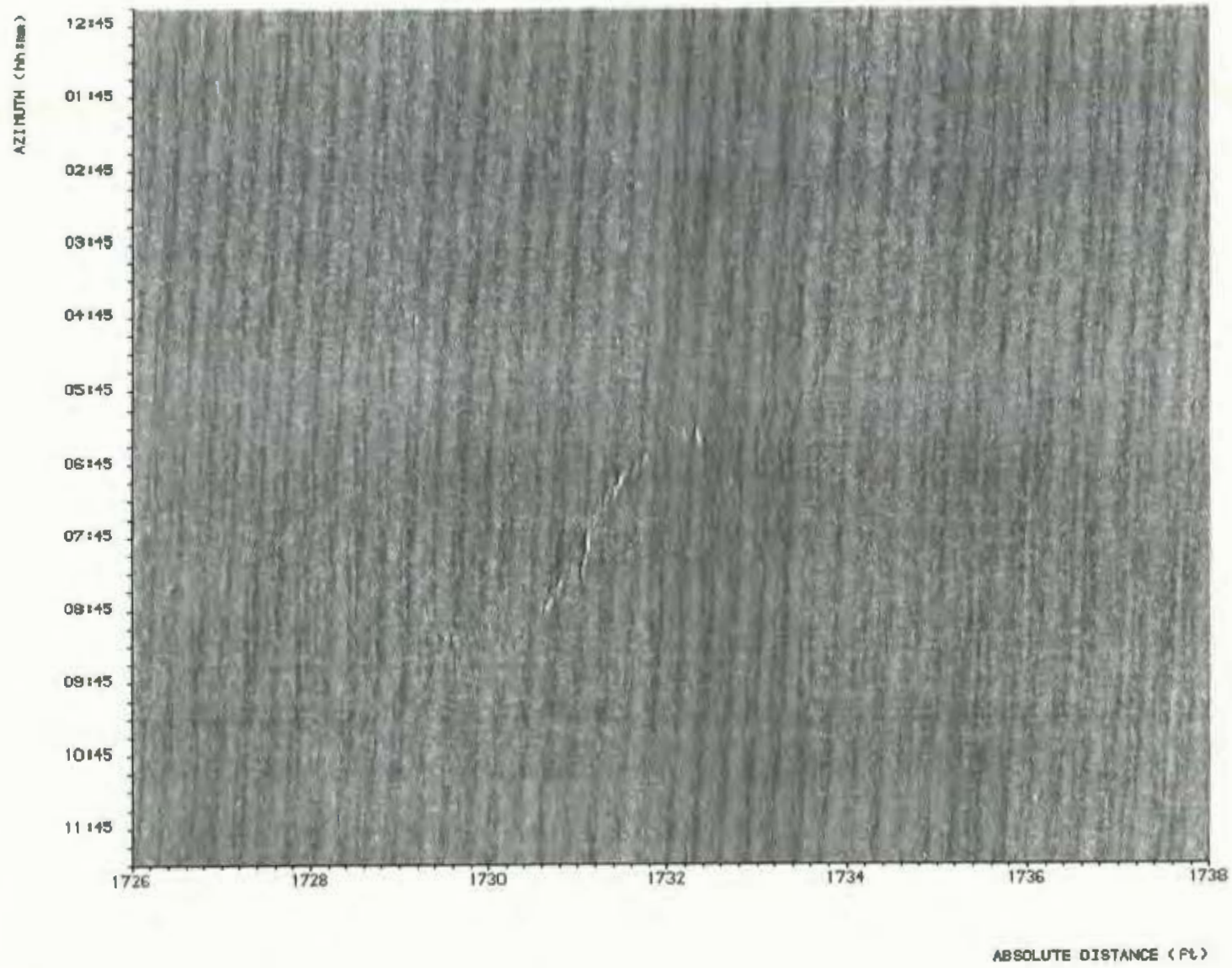
The feature is located 7.6 feet downstream from the reference girth weld.

Schematic Location Summary:



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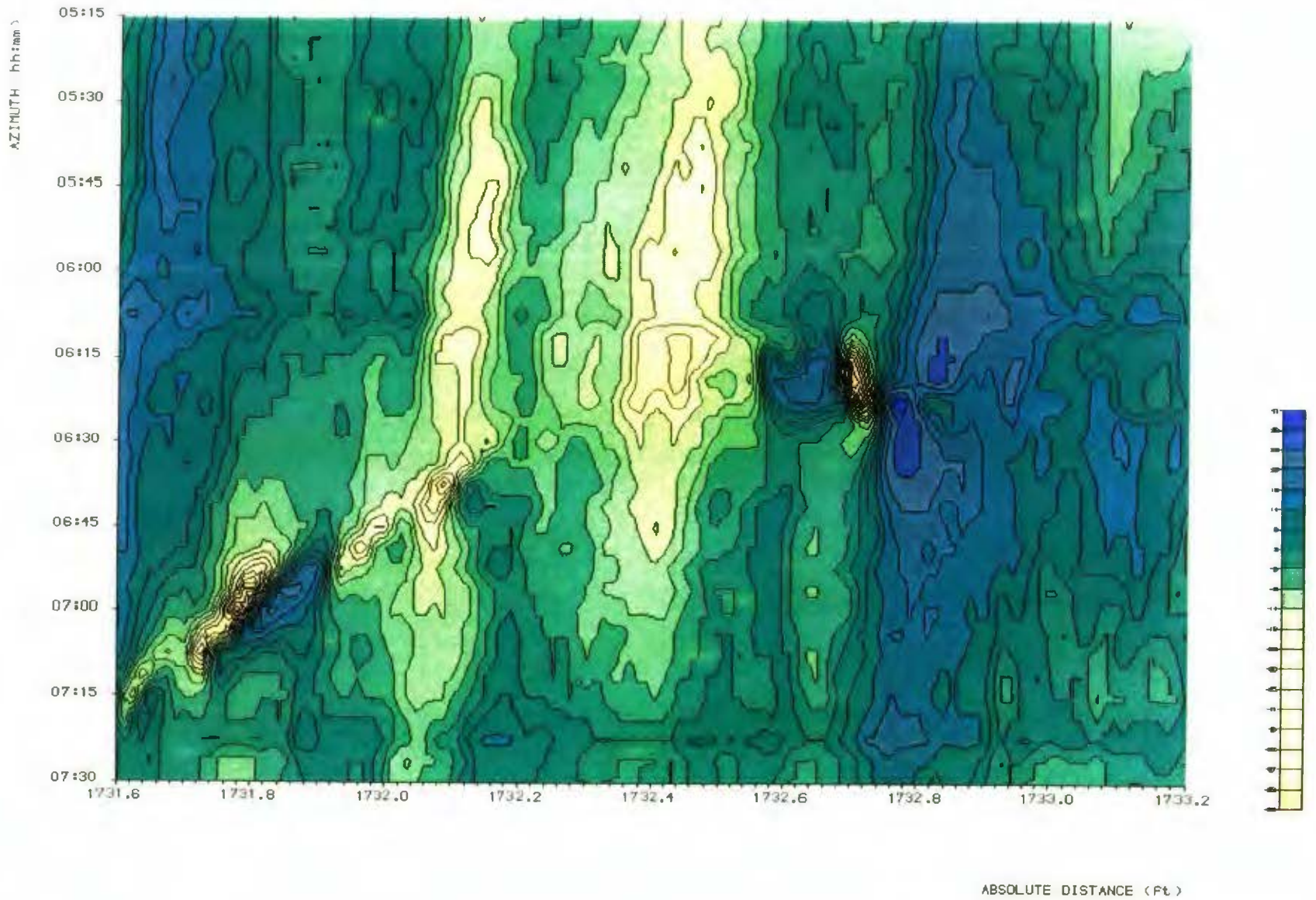
Feature 2 Overview Plot C7735_20A



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ENBDNR0006660

Feature 2 Detail Contour Plot C7735_2MA



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ENBDNR0006661

Inspection Sheet Number 3 C7735_20A

Feature Description

Type:	External Metal Loss
Orientation:	03:15 (o'clock)
Axial length:	5.8 in
Circumferential width:	2.4 in
Depth - Peak:	39% WT
- Average:	31% WT
Pressure Ratio (RPR):	1.031
Feature Selection Rule:	5
Nominal Pipe wall thickness for spool:	0.812 in
Absolute Distance from Launch:	3264.7 feet

Comments:

This metal loss feature has the appearance of corrosion.

There is another metal loss feature within this spool.
More information on this feature is given in the Pipeline Listing.

Feature Location

Primary Reference/s:

1. BALL VALVE
   (Girth Weld 40 + 1.3ft)

2. BALL VALVE
   (Girth Weld 8730 + 1.1ft)

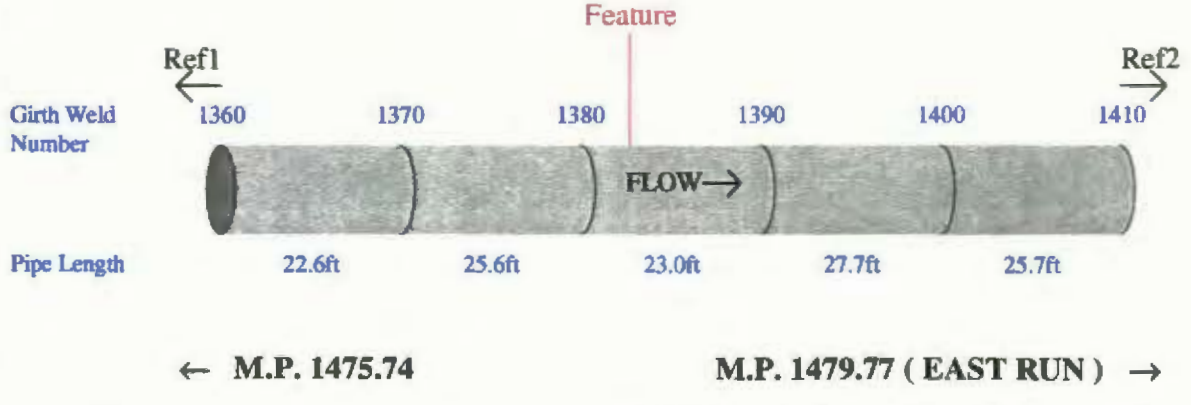
Reference Girth Weld:

The reference girth weld at the M.P. 1475.74 (upstream) end of the feature spool is number 1380. The location of this weld is 3226.6 feet downstream from reference 1 and 18454.6 feet upstream from reference 2.

Feature:

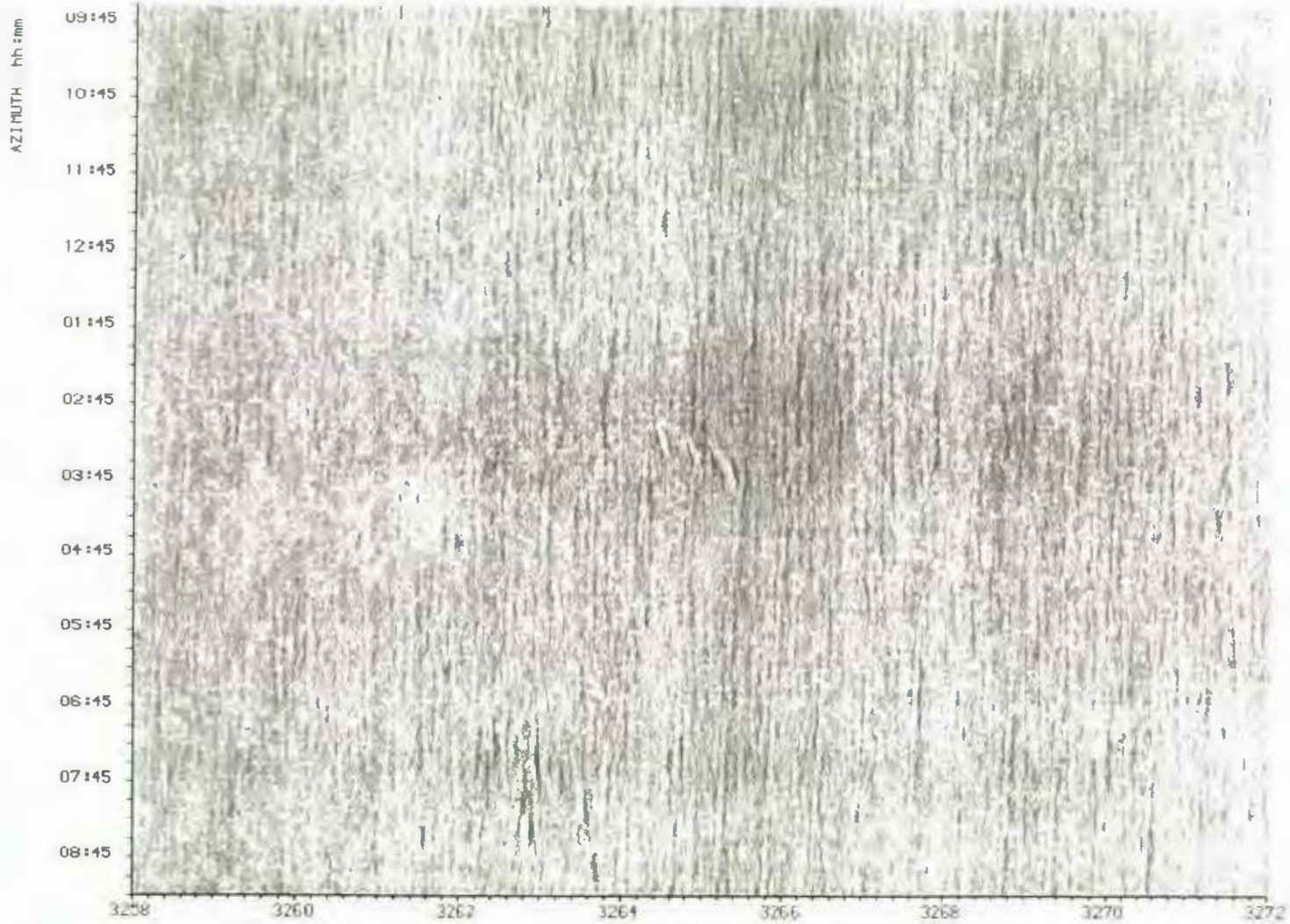
The feature is located 6.3 feet downstream from the reference girth weld.

Schematic Location Summary:



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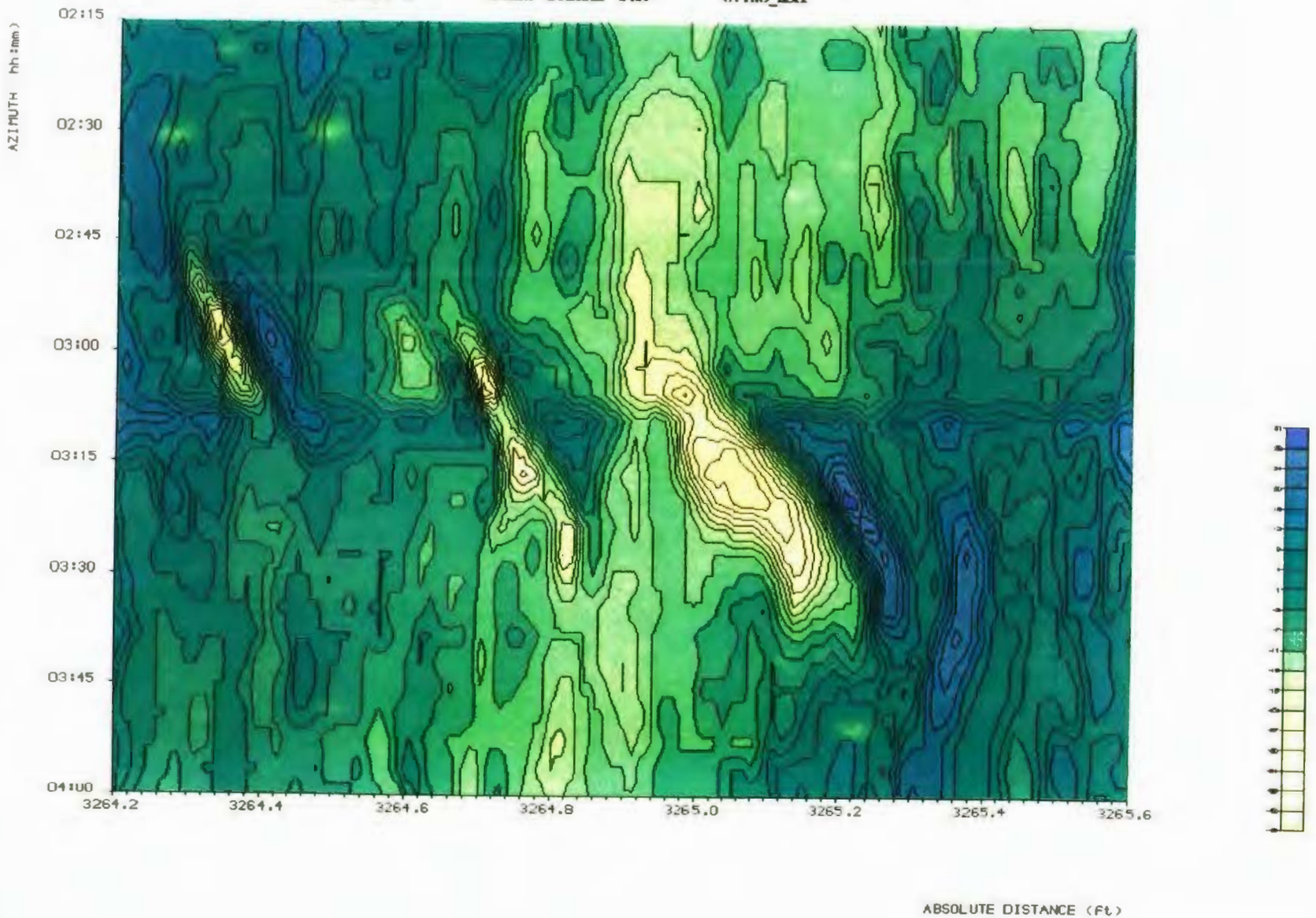
Feature 3 Overview Plot C7735_20A



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ENBDNR0006663

Feature 3 Detail Contour Plot C7735_20A



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ENBDNR0006664

Inspection Sheet Number 4 C7735_20A

Feature Description

Type:	Internal Mill/Manufacturing Fault
Orientation:	09:45 (o'clock)
Axial length:	0.4 in
Circumferential width:	0.9 in
Depth - Peak:	27% WT
- Average:	27% WT
Feature Selection Rule:	8
Nominal Pipe wall thickness for spool:	0.812 in
Absolute Distance from Launch:	5541.1 feet

Comments:

This metal loss feature has the appearance of a mill/manufacturing fault.

There is another metal loss feature within this spool.
More information on this feature is given in the Pipeline Listing.

Feature Location

Primary Reference/s:

1. BALL VALVE
   (Girth Weld 40 + 1.3ft)

2. BALL VALVE
   (Girth Weld 8730 + 1.1ft)

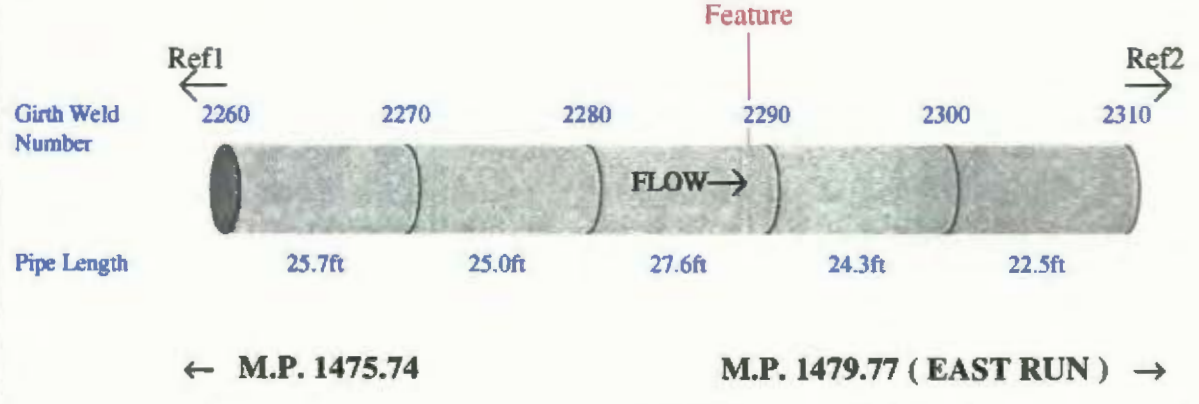
Reference Girth Weld:

The reference girth weld at the M.P. 1475.74 (upstream) end of the feature spool is number 2280. The location of this weld is 5484.6 feet downstream from reference 1 and 16196.6 feet upstream from reference 2.

Feature:

The feature is located 24.7 feet downstream from the reference girth weld.

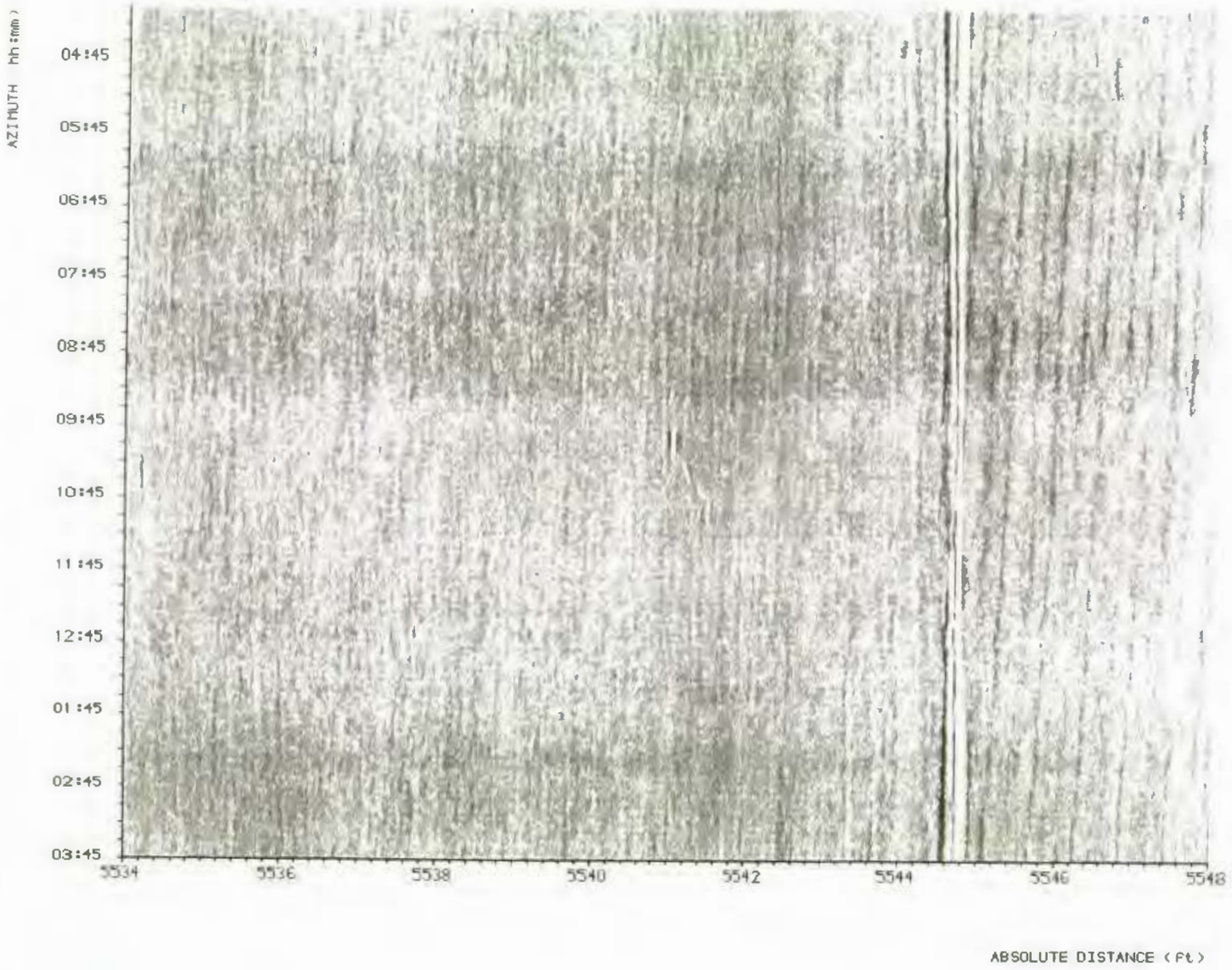
Schematic Location Summary:



← M.P. 1475.74 M.P. 1479.77 (EAST RUN) →

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Feature 4 Overview Plot C7735_20A

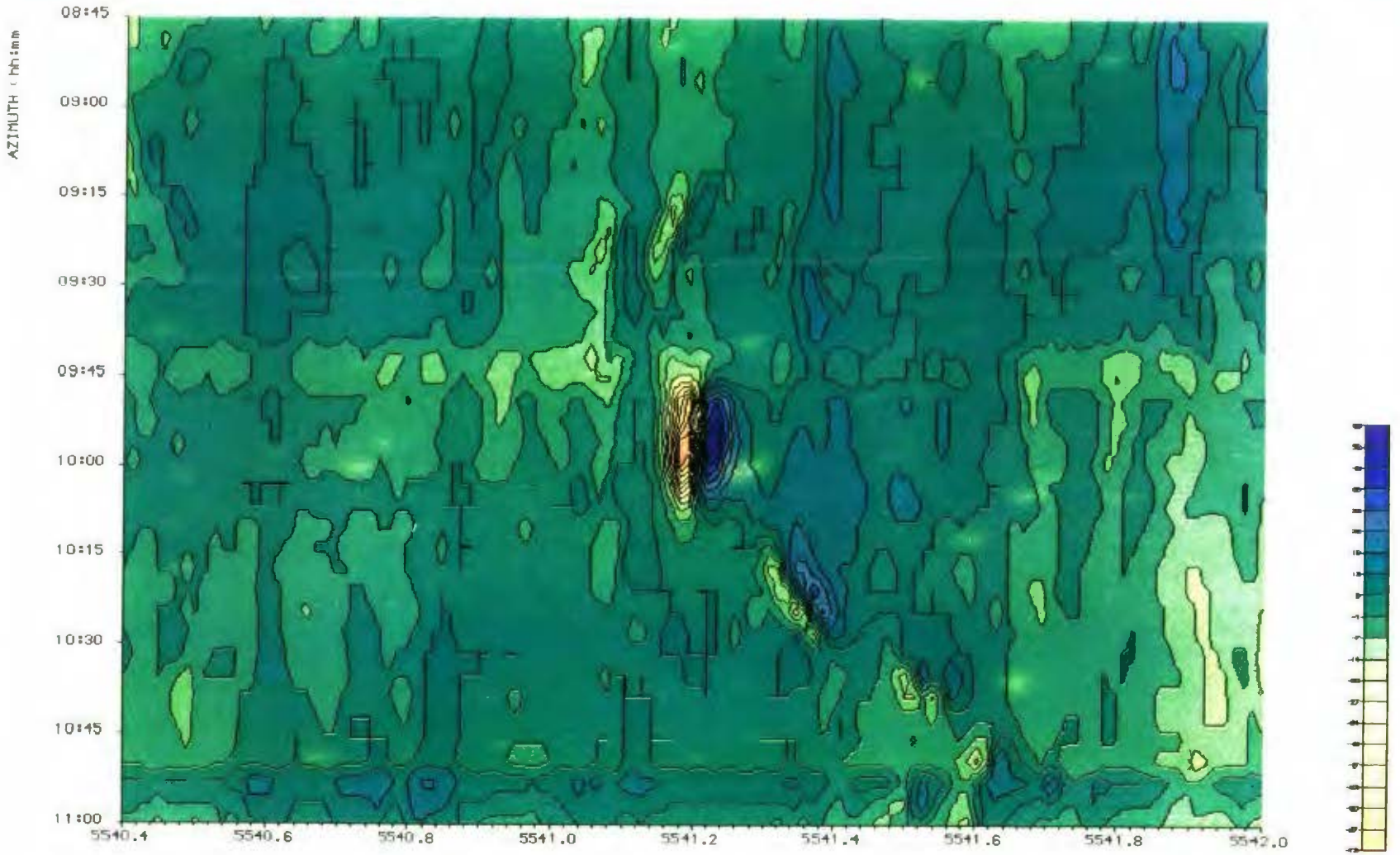


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ENBDNR0006996

Feature 4 Detail Contour Plot C7735_20A



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ENBDNR0006667

Inspection Sheet Number 5 C7735_20A

Feature Description

Type:	External Mill/Manufacturing Fault
Orientation:	07:00 (o'clock)
Axial length:	0.5 in
Circumferential width:	1.0 in
Depth - Peak:	28% WT
- Average:	28% WT
Feature Selection Rule:	8
Nominal Pipe wall thickness for spool:	0.812 in
Absolute Distance from Launch:	7470.2 feet

Comments:

This isolated metal loss feature has the appearance of a mill/manufacturing fault.

Feature Location

Primary Reference/s:

1. BALL VALVE
   (Girth Weld 40 + 1.3ft)

2. BALL VALVE
   (Girth Weld 8730 + 1.1ft)

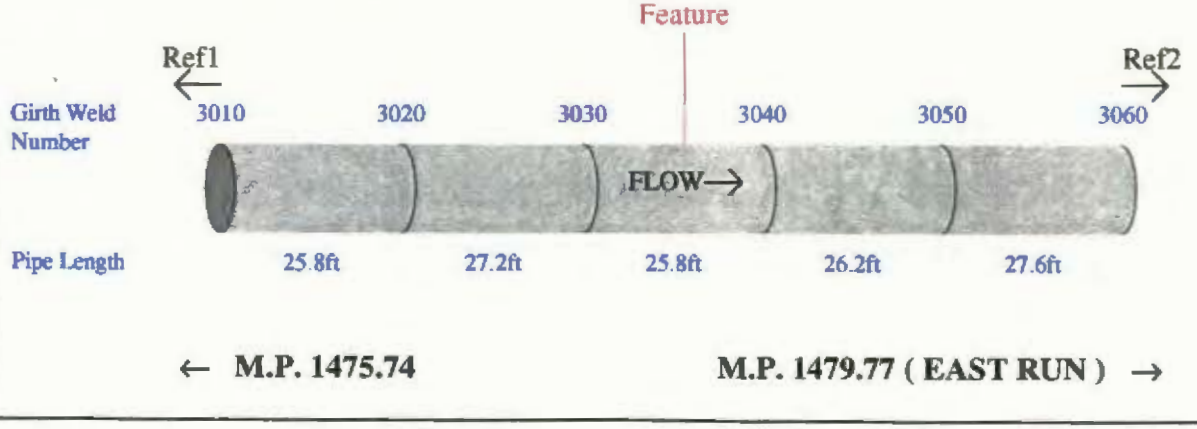
Reference Girth Weld:

The reference girth weld at the M.P. 1475.74 (upstream) end of the feature spool is number 3030. The location of this weld is 7423.8 feet downstream from reference 1 and 14257.4 feet upstream from reference 2.

Feature:

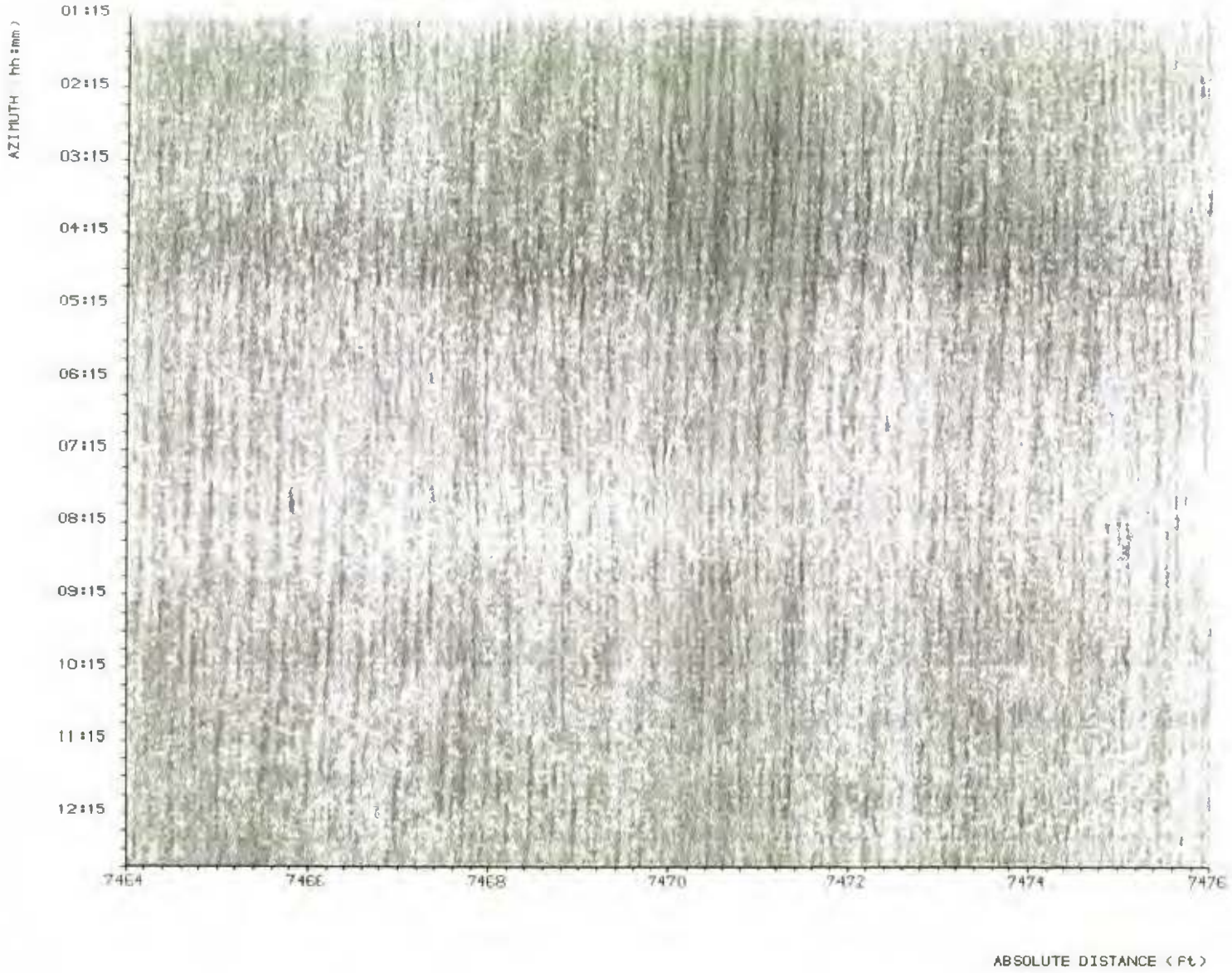
The feature is located 14.6 feet downstream from the reference girth weld.

Schematic Location Summary:



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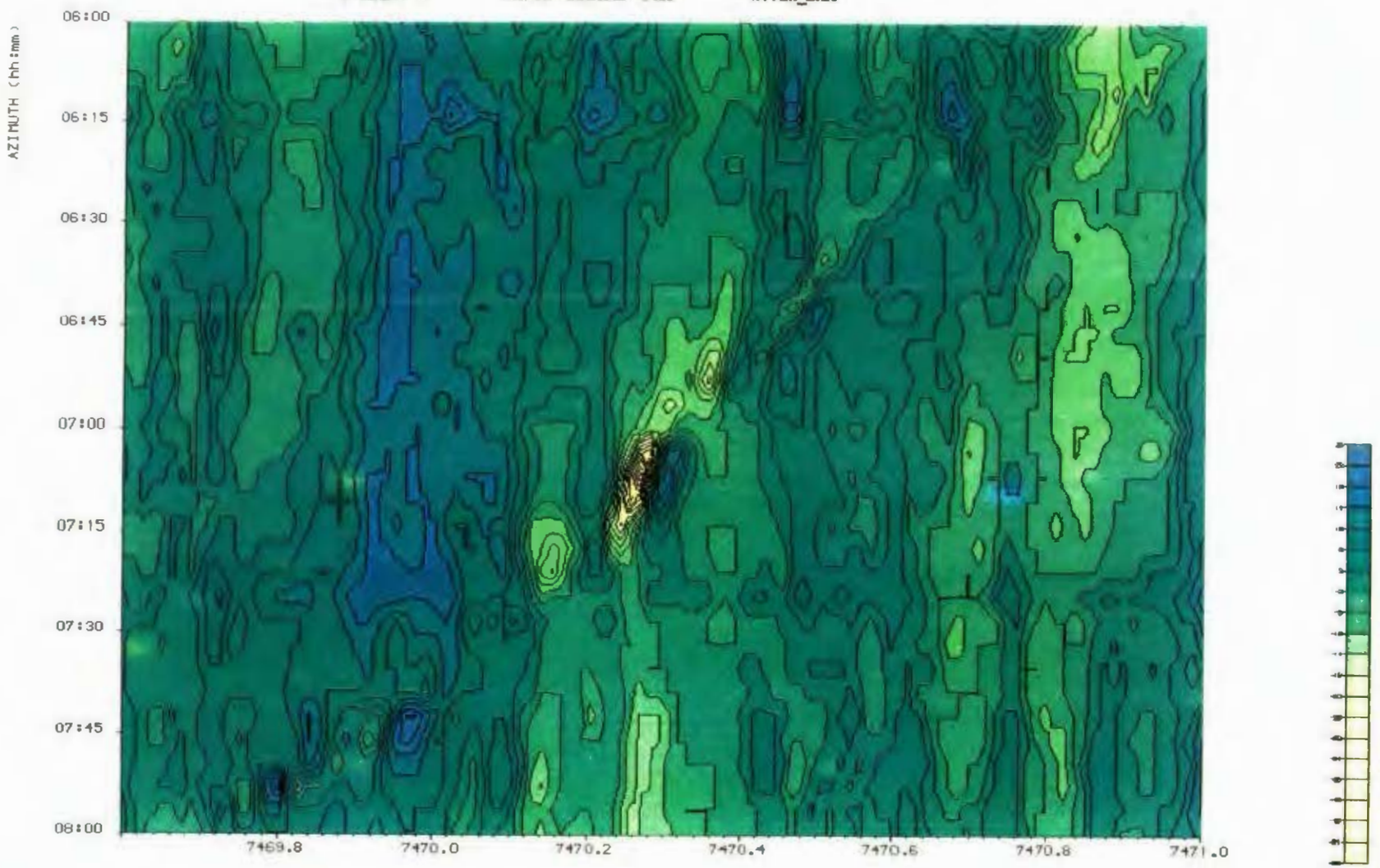
Feature 5 Overview Plot C7735_20A



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ENBDNR0006669

Feature 5 Detail Contour Plot C7735_20A



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ENBDNR0006670

Inspection Sheet Number 6 C7735_20A

Feature Description

Type:	External Mill/Manufacturing Fault
Orientation:	02:30 (o'clock)
Axial length:	0.6 in
Circumferential width:	1.0 in
Depth - Peak:	30% WT
- Average:	30% WT
Feature Selection Rule:	8
Nominal Pipe wall thickness for spool:	0.812 in
Absolute Distance from Launch:	7501.6 feet

Comments:

This isolated metal loss feature has the appearance of a mill/manufacturing fault.

Feature Location

Primary Reference/s:

1. BALL VALVE
   (Girth Weld 40 + 1.3ft)

2. BALL VALVE
   (Girth Weld 8730 + 1.1ft)

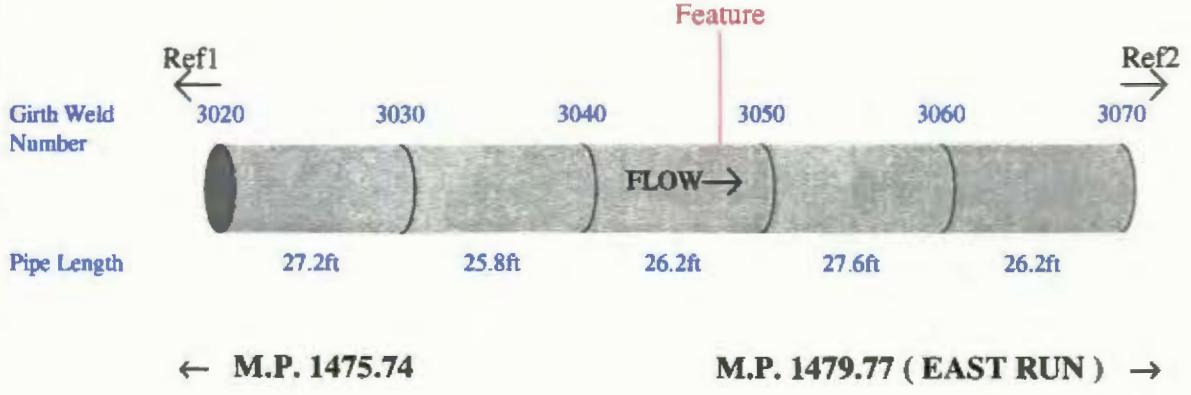
Reference Girth Weld:

The reference girth weld at the M.P. 1475.74 (upstream) end of the feature spool is number 3040. The location of this weld is 7449.7 feet downstream from reference 1 and 14231.5 feet upstream from reference 2.

Feature:

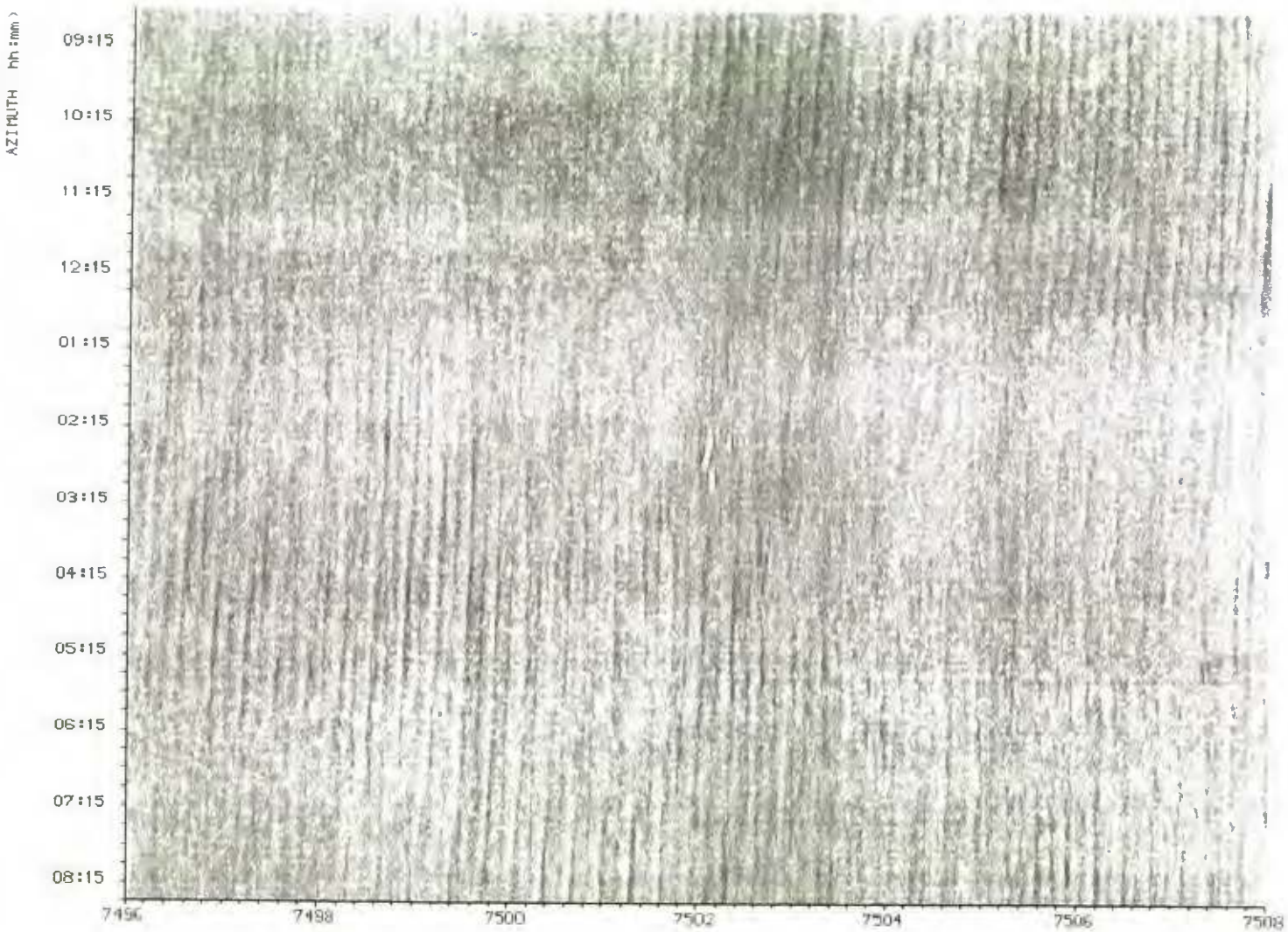
The feature is located 20.1 feet downstream from the reference girth weld.

Schematic Location Summary:



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Feature 6 Overview Plot C7735_20A

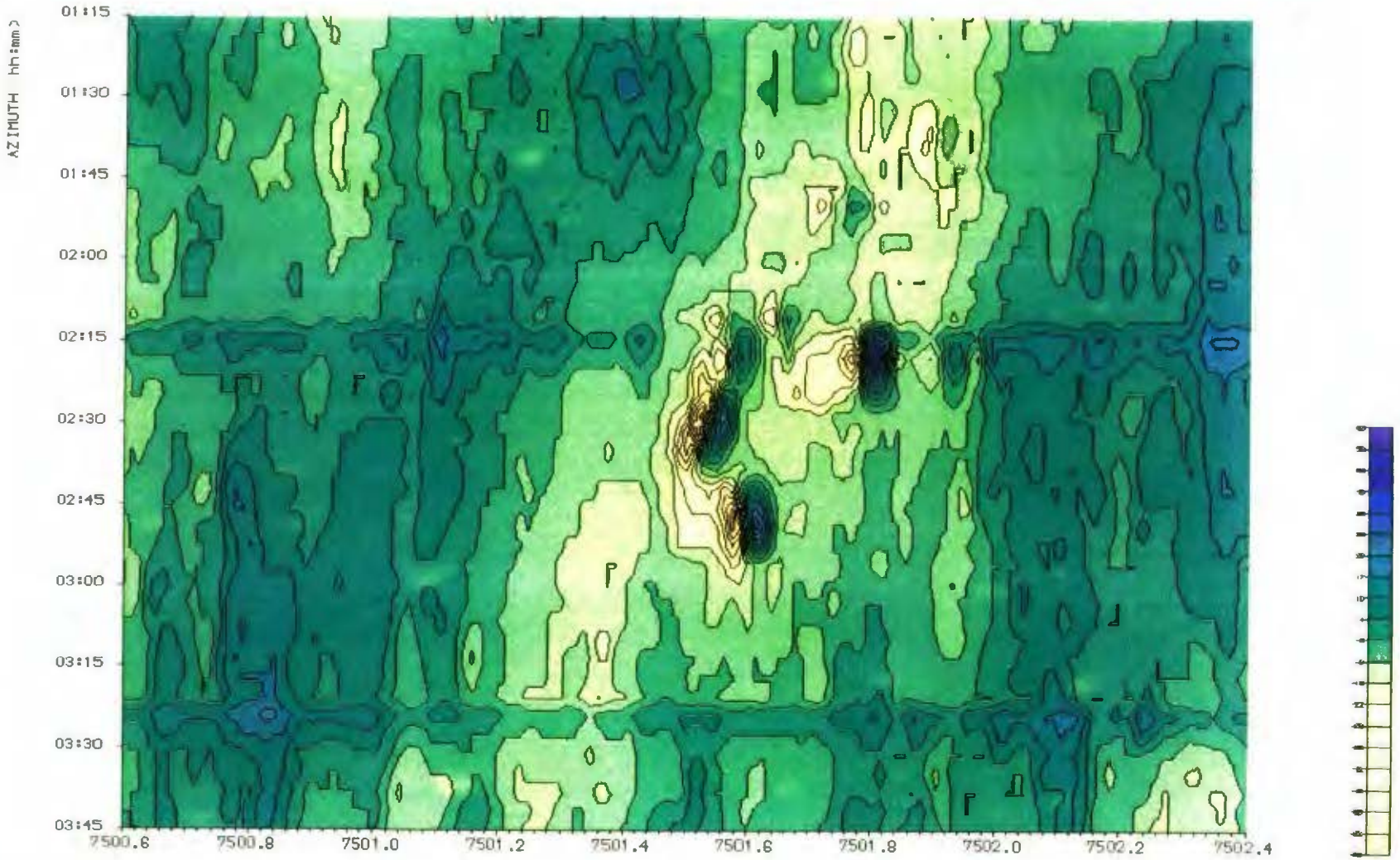


Pipeline Integrity INTERNATIONAL

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ENBDNR0006672

Feature 6 Detail Contour Plot C7735_20A



Pipeline Integrity INTERNATIONAL

ENBDNR0006673

Inspection Sheet Number 7 C7735_20A

Feature Description

Type:	External Mill/Manufacturing Fault
Orientation:	01:30 (o'clock)
Axial length:	0.4 in
Circumferential width:	2.5 in
Depth - Peak:	28% WT
- Average:	28% WT
Feature Selection Rule:	8
Nominal Pipe wall thickness for spool:	0.812 in
Absolute Distance from Launch:	9003.7 feet

Comments:

This isolated metal loss feature has the appearance of a mill/manufacturing fault.

Feature Location

Primary Reference/s:

1. BALL VALVE
   (Girth Weld 40 + 1.3ft)

2. BALL VALVE
   (Girth Weld 8730 + 1.1ft)

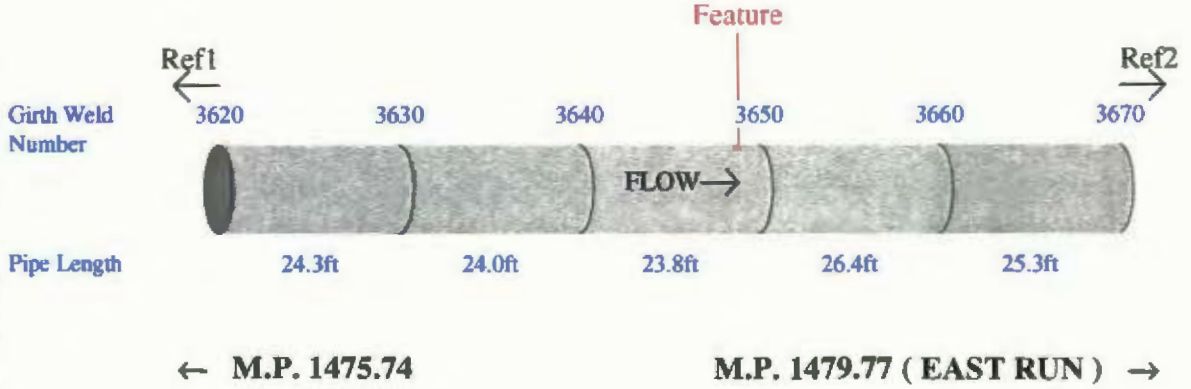
Reference Girth Weld:

The reference girth weld at the M.P. 1475.74 (upstream) end of the feature spool is number 3640. The location of this weld is 8951.0 feet downstream from reference 1 and 12730.2 feet upstream from reference 2.

Feature:

The feature is located 20.9 feet downstream from the reference girth weld.

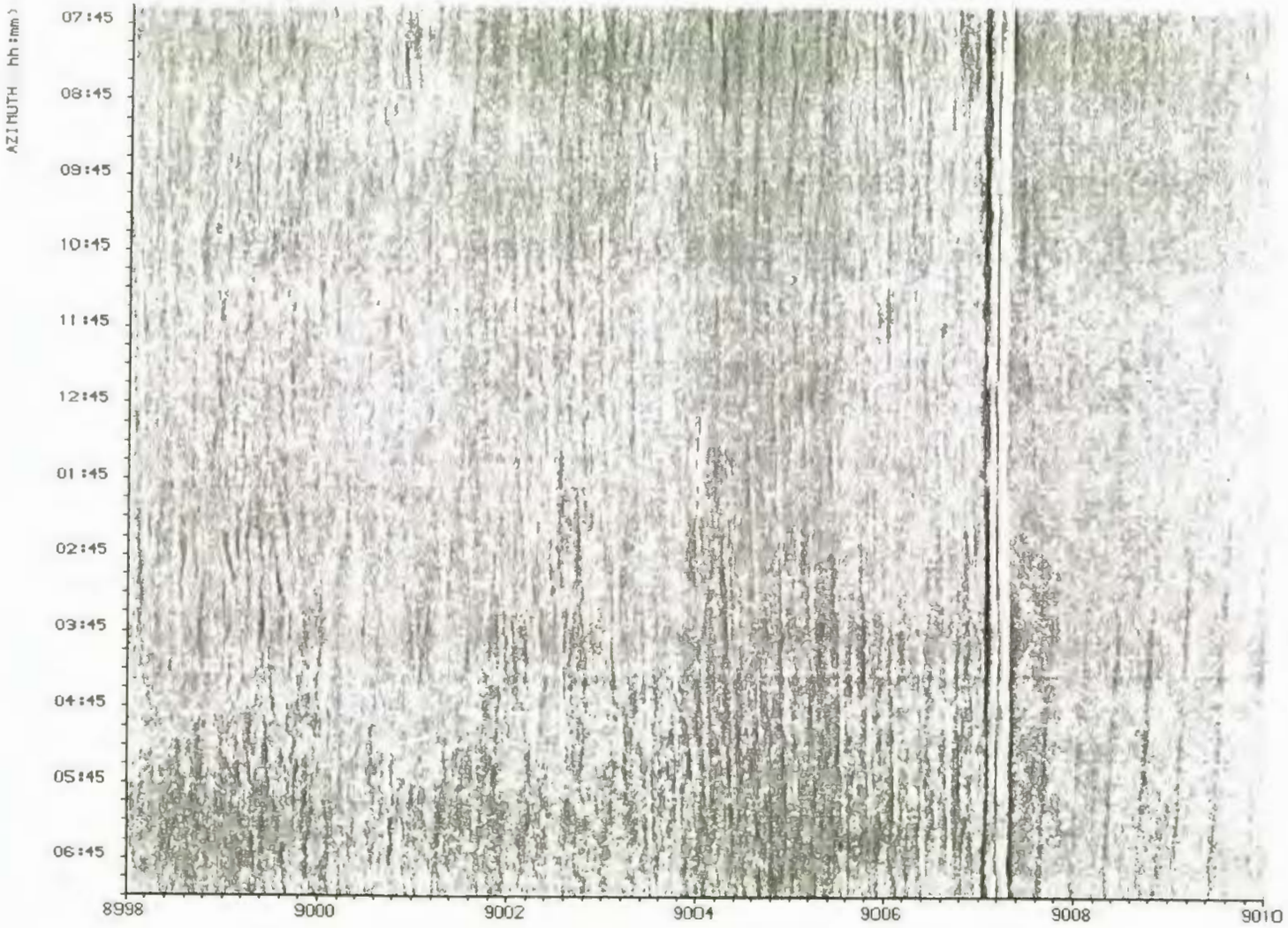
Schematic Location Summary:



← M.P. 1475.74 M.P. 1479.77 (EAST RUN) →

Pipeline Integrity INTERNATIONAL

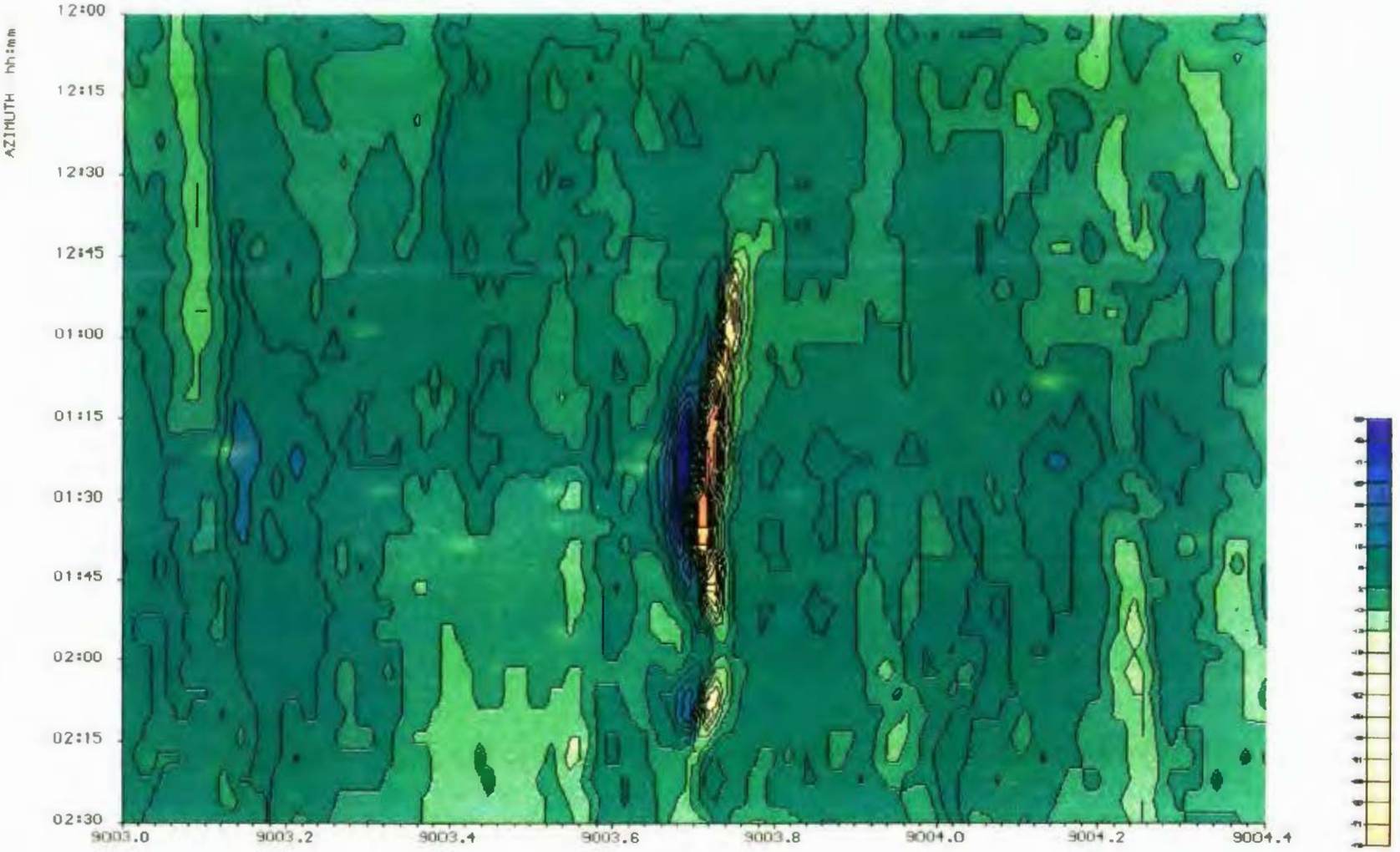
Feature 7 Overview Plot C7735_20A



Pipeline Integrity INTERNATIONAL

ENBDNR0006675

Feature 7 Detail Contour Plot C7735_20A



Pipeline Integrity INTERNATIONAL

ENBDNR0006676

Inspection Sheet Number 8

C7735_20A

Feature Description

Type:	External Mill/Manufacturing Fault
Orientation:	01:00 (o'clock)
Axial length:	0.6 in
Circumferential width:	1.1 in
Depth - Peak:	28% WT
- Average:	28% WT
Feature Selection Rule:	8
Nominal Pipe wall thickness for spool:	0.812 in
Absolute Distance from Launch:	11793.2 feet

Comments:

This metal loss feature has the appearance of a mill/manufacturing fault.

There are other metal loss features within this spool.
More information on these features is given in the Pipeline Listing.

Feature Location

Primary Reference/s:

1. BALL VALVE
   (Girth Weld 40 + 1.3ft)

2. BALL VALVE
   (Girth Weld 8730 + 1.1ft)

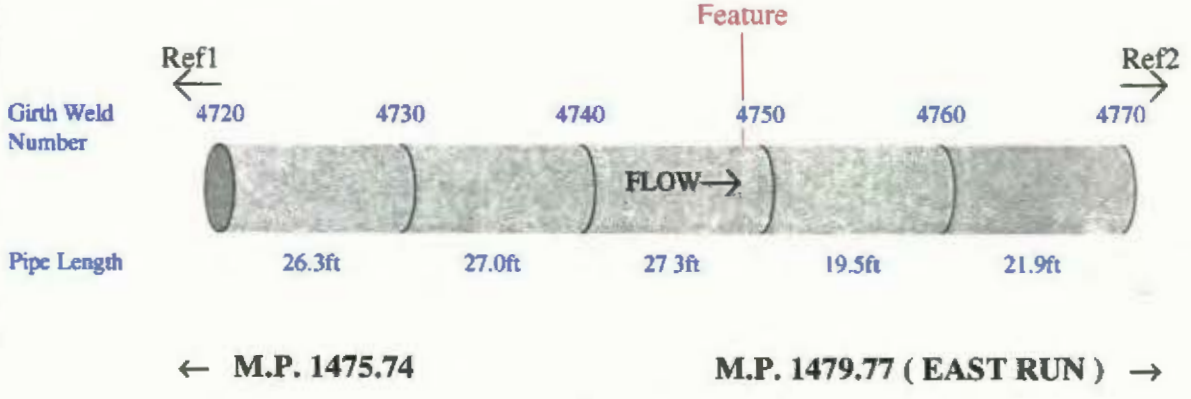
Reference Girth Weld:

The reference girth weld at the M.P. 1475.74 (upstream) end of the feature spool is number 4740. The location of this weld is 11736.8 feet downstream from reference 1 and 9944.4 feet upstream from reference 2.

Feature:

The feature is located 24.6 feet downstream from the reference girth weld.

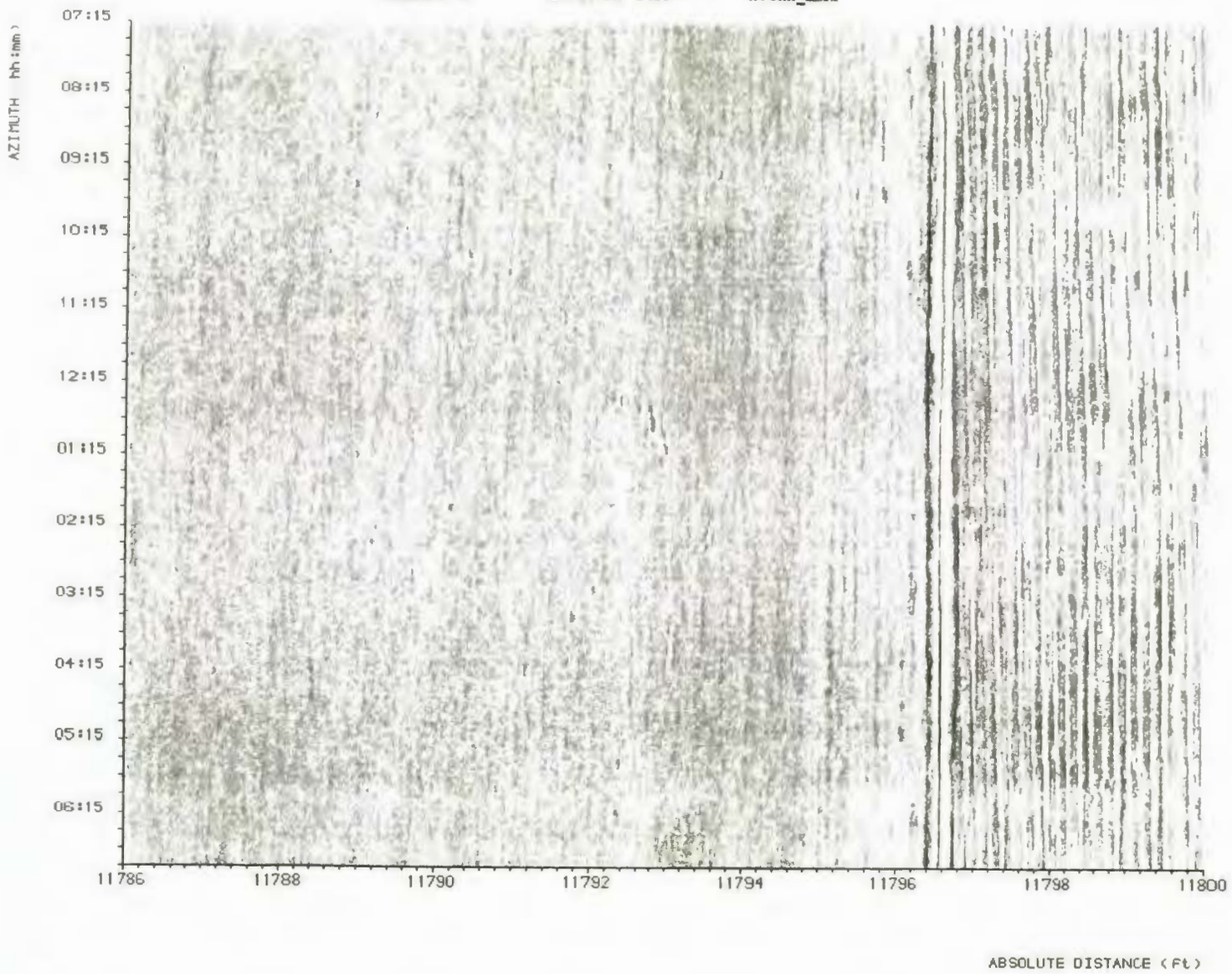
Schematic Location Summary:



← M.P. 1475.74 M.P. 1479.77 (EAST RUN) →

Pipeline Integrity INTERNATIONAL

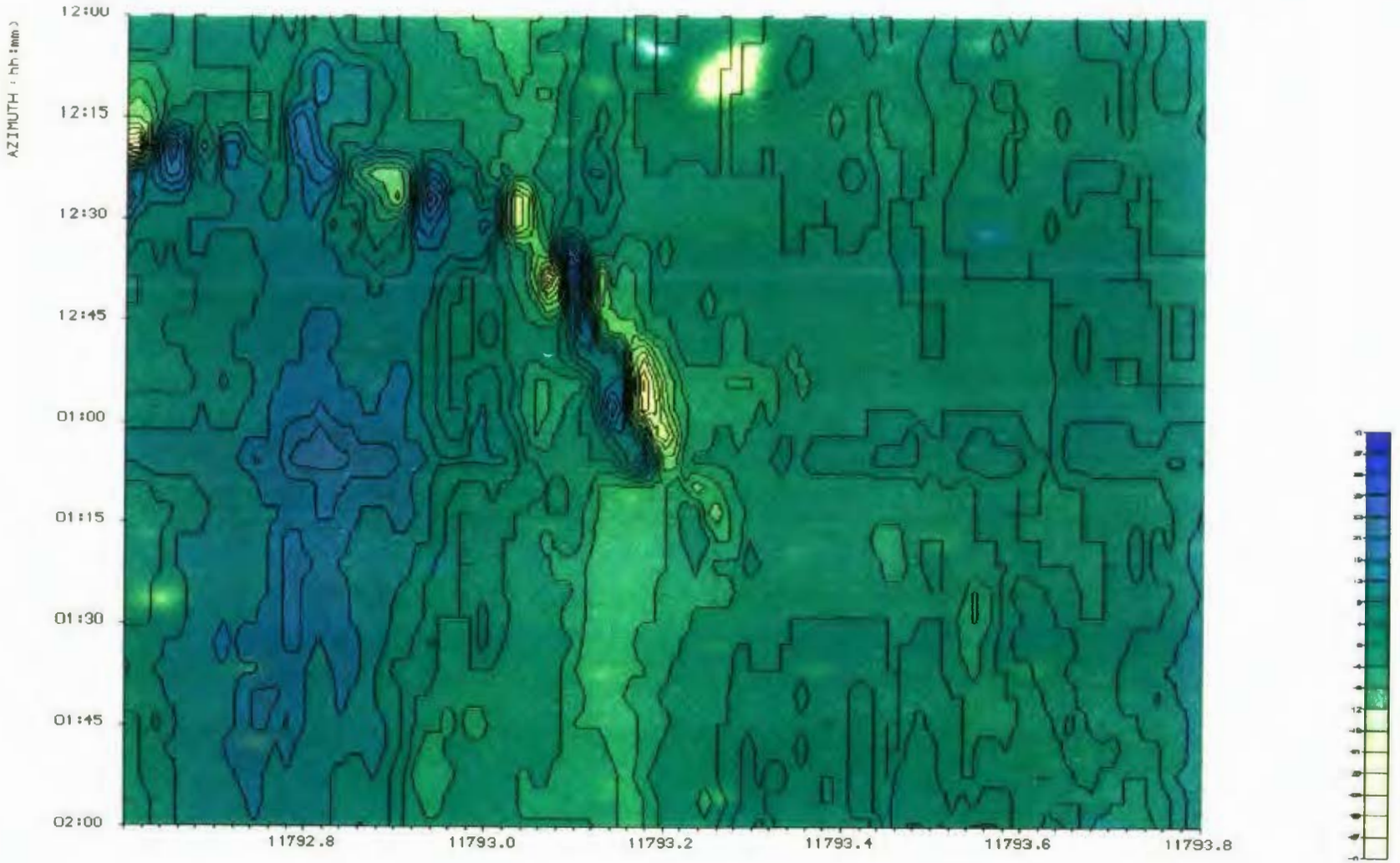
Feature 8 Overview Plot C7735_20A



Pipeline Integrity INTERNATIONAL

ENBDNR0006678

Feature 8 Detail Contour Plot C7735_20A



Pipeline Integrity INTERNATIONAL

ENBDNR0006679

Inspection Sheet Number 9 C7735_20A

Feature Description

Type:	Internal Mill/Manufacturing Fault
Orientation:	09:45 (o'clock)
Axial length:	1.1 in
Circumferential width:	4.4 in
Depth - Peak:	30% WT
- Average:	22% WT
Feature Selection Rule:	8
Nominal Pipe wall thickness for spool:	0.812 in
Absolute Distance from Launch:	15849.7 feet

Comments:

This metal loss feature has the appearance of a mill/manufacturing fault.

There is another metal loss feature within this spool.
More information on this feature is given in the Pipeline Listing.

Feature Location

Primary Reference/s:

1. BALL VALVE
   (Girth Weld 40 + 1.3ft)

2. BALL VALVE
   (Girth Weld 8730 + 1.1ft)

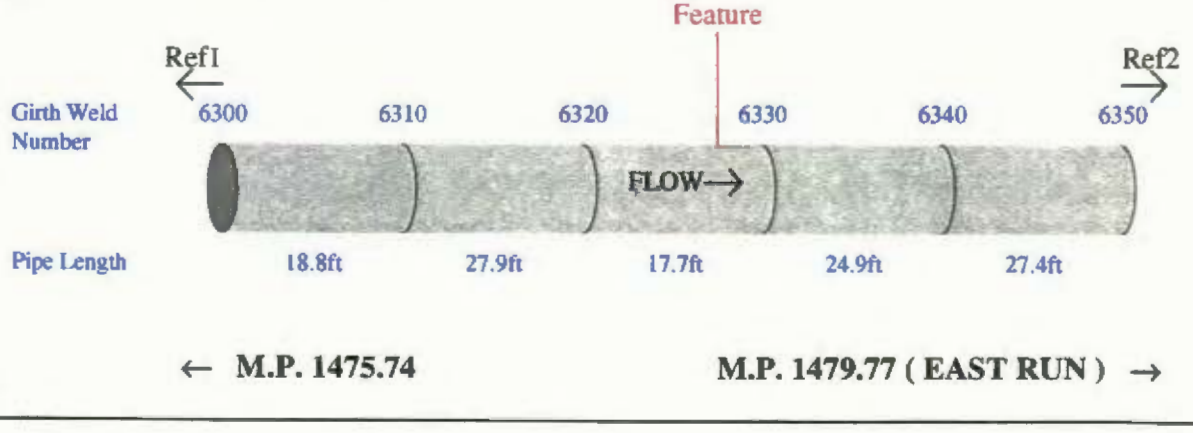
Reference Girth Weld:

The reference girth weld at the M.P. 1475.74 (upstream) end of the feature spool is number 6320. The location of this weld is 15804.7 feet downstream from reference 1 and 5876.5 feet upstream from reference 2.

Feature:

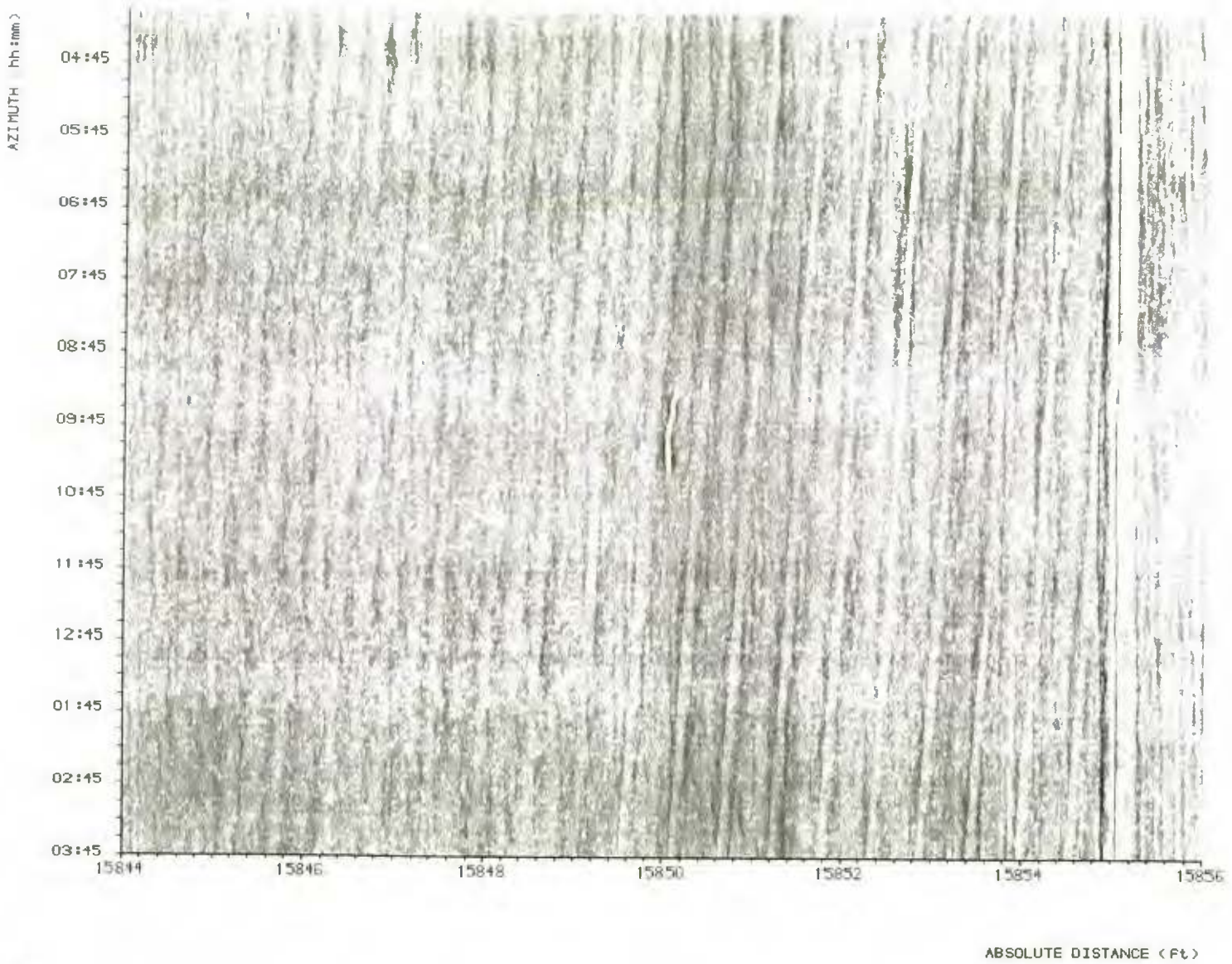
The feature is located 13.1 feet downstream from the reference girth weld.

Schematic Location Summary:



Pipeline Integrity INTERNATIONAL

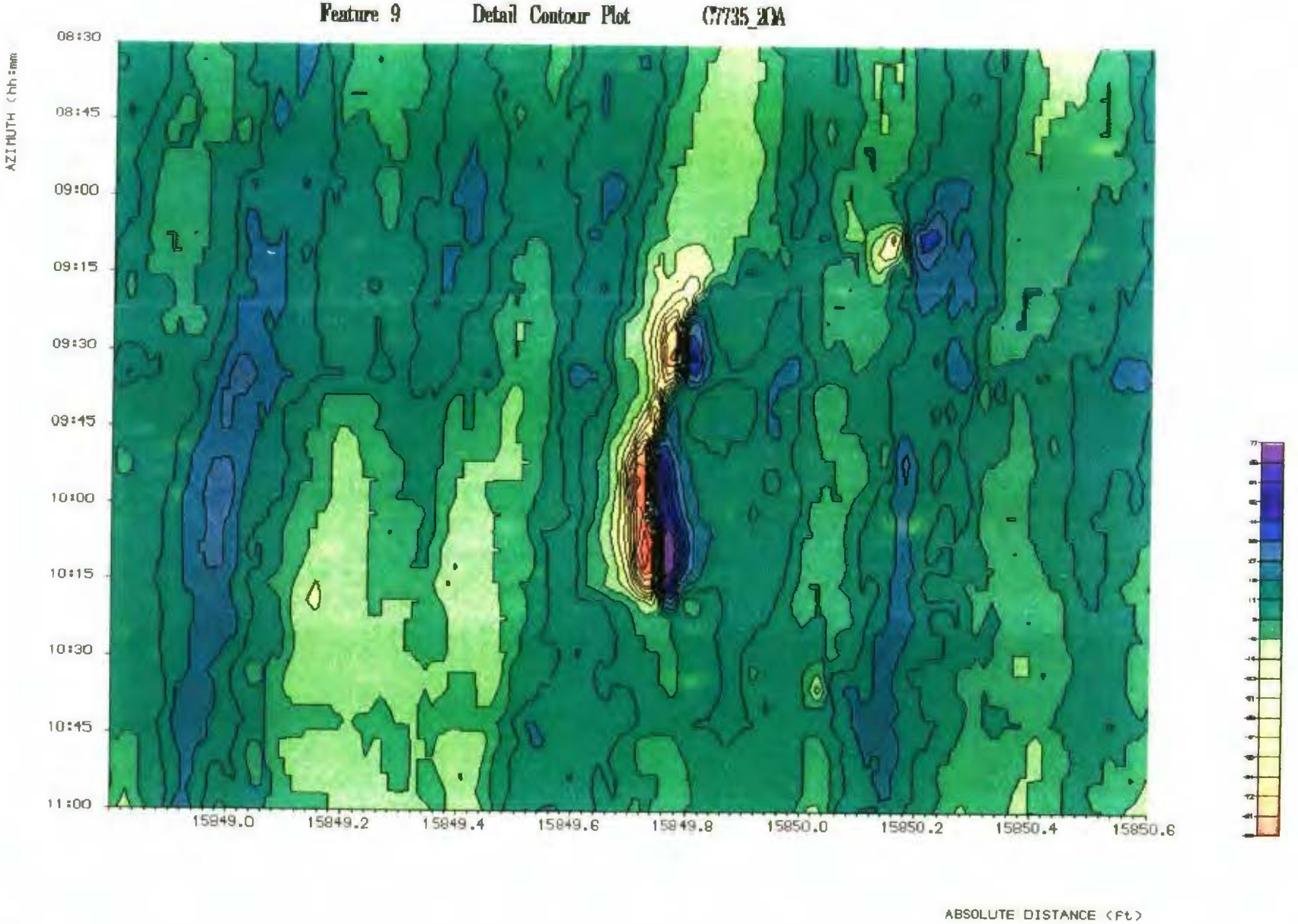
Feature 9 Overview Plot C7735_20A



Pipeline Integrity INTERNATIONAL

pii

ENBDNR0006681



Pipeline Integrity INTERNATIONAL

ENBDNR0006682

Inspection Sheet Number 10 C7735_20A

Feature Description

Type:	Internal Mill/Manufacturing Fault
Orientation:	02:15 (o'clock)
Axial length:	0.2 in
Circumferential width:	0.7 in
Depth - Peak:	29% WT
- Average:	29% WT
Feature Selection Rule:	8
Nominal Pipe wall thickness for spool:	0.812 in
Absolute Distance from Launch:	16198.2 feet

Comments:

This metal loss feature has the appearance of a mill/manufacturing fault.

There is another metal loss feature within this spool.
More information on this feature is given in the Pipeline Listing.

Feature Location

Primary Reference/s:

1. BALL VALVE
   (Girth Weld 40 + 1.3ft)

2. BALL VALVE
   (Girth Weld 8730 + 1.1ft)

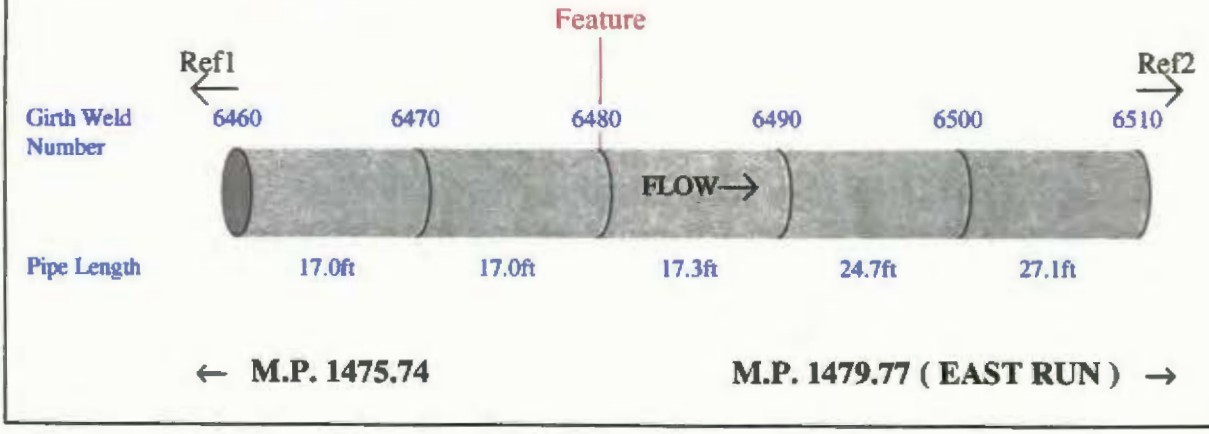
Reference Girth Weld:

The reference girth weld at the M.P. 1475.74 (upstream) end of the feature spool is number 6480. The location of this weld is 16166.0 feet downstream from reference 1 and 5515.2 feet upstream from reference 2.

Feature:

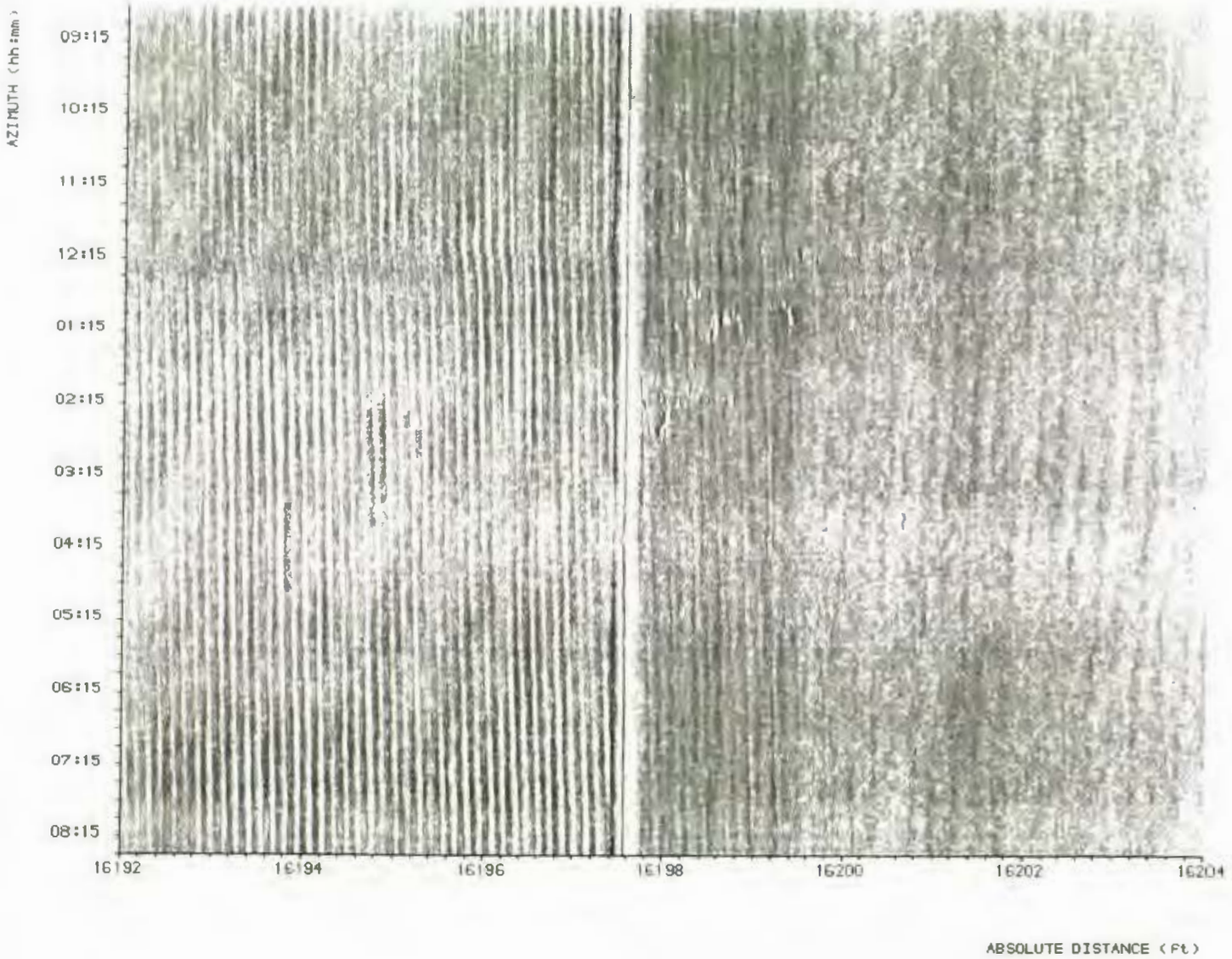
The feature is located 0.4 feet downstream from the reference girth weld.

Schematic Location Summary:



Pipeline Integrity INTERNATIONAL

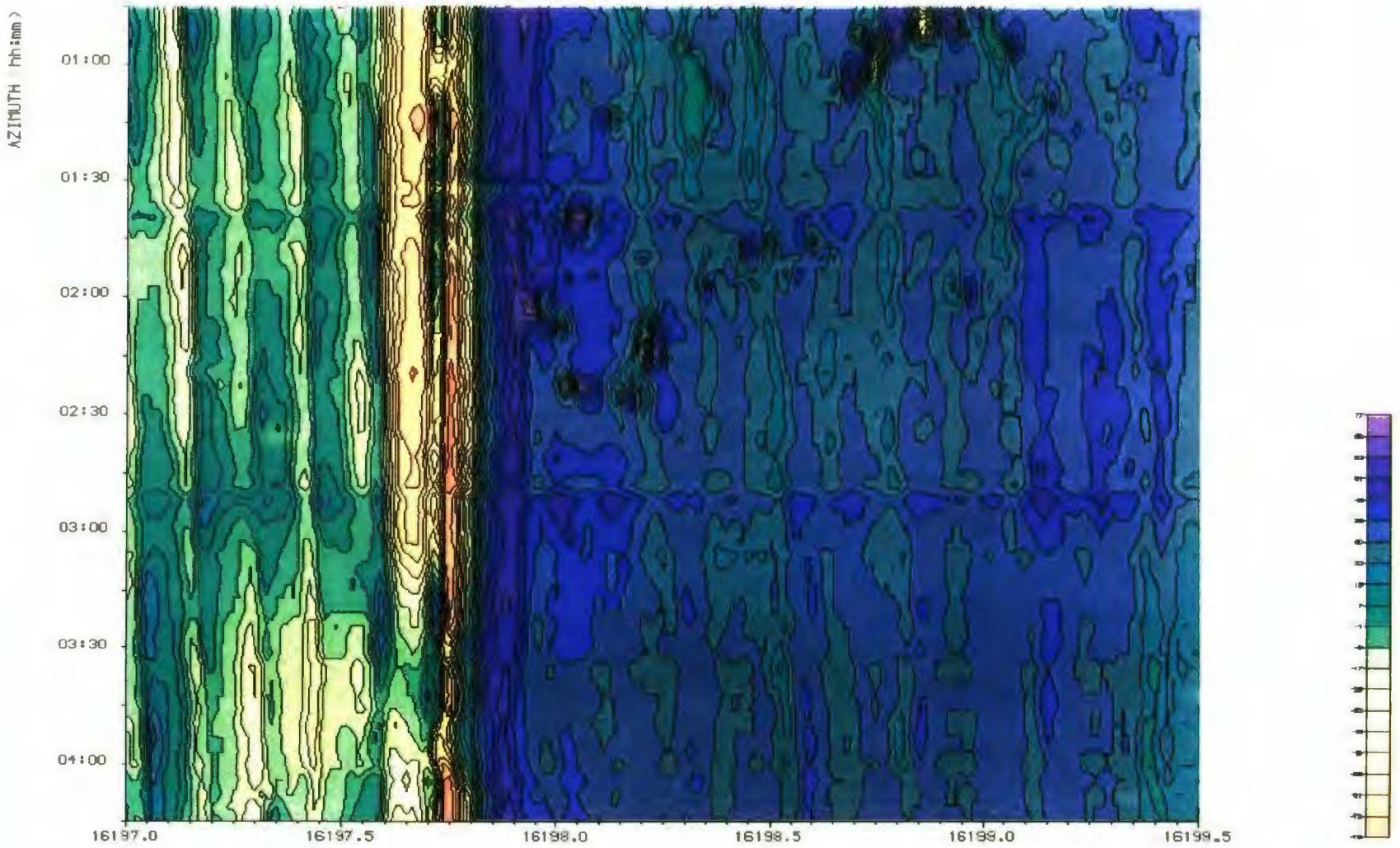
Feature 10 Overview Plot C7735_20A



Pipeline Integrity INTERNATIONAL

ENBDNR0006684

Feature 10 Detail Contour Plot C7735_20A



Pipeline Integrity INTERNATIONAL

pii

ENBDNR0006685

Inspection Sheet Number 11 C7735_20A

Feature Description

Type:	Internal Mill/Manufacturing Fault
Orientation:	06:00 (o'clock)
Axial length:	5.5 in
Circumferential width:	8.9 in
Depth - Peak:	30% WT
- Average:	30% WT
Feature Selection Rule:	8
Nominal Pipe wall thickness for spool:	0.812 in
Absolute Distance from Launch:	17021.4 feet

Comments:

This isolated metal loss feature has the appearance of a mill/manufacturing fault.

Feature Location

Primary Reference/s:

1. BALL VALVE
   (Girth Weld 40 + 1.3ft)

2. BALL VALVE
   (Girth Weld 8730 + 1.1ft)

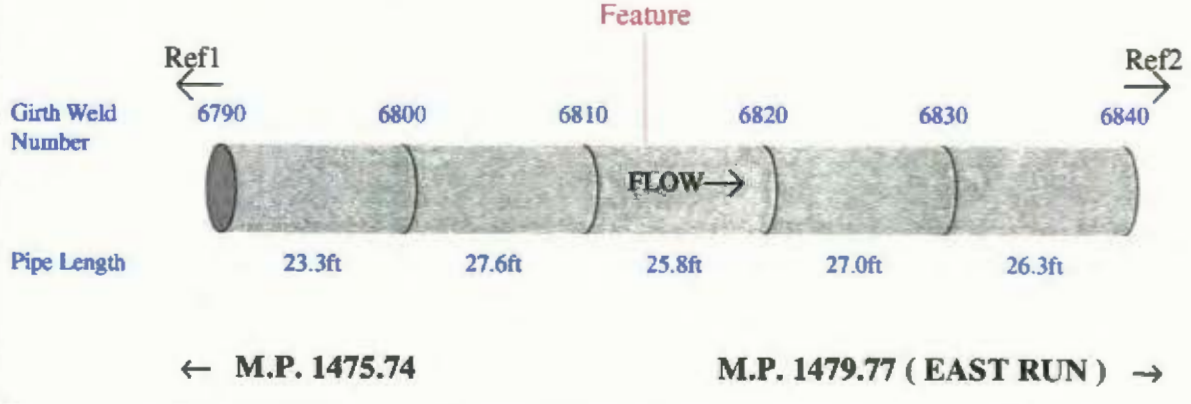
Reference Girth Weld:

The reference girth weld at the M.P. 1475.74 (upstream) end of the feature spool is number 6810. The location of this weld is 16980.9 feet downstream from reference 1 and 4700.3 feet upstream from reference 2.

Feature:

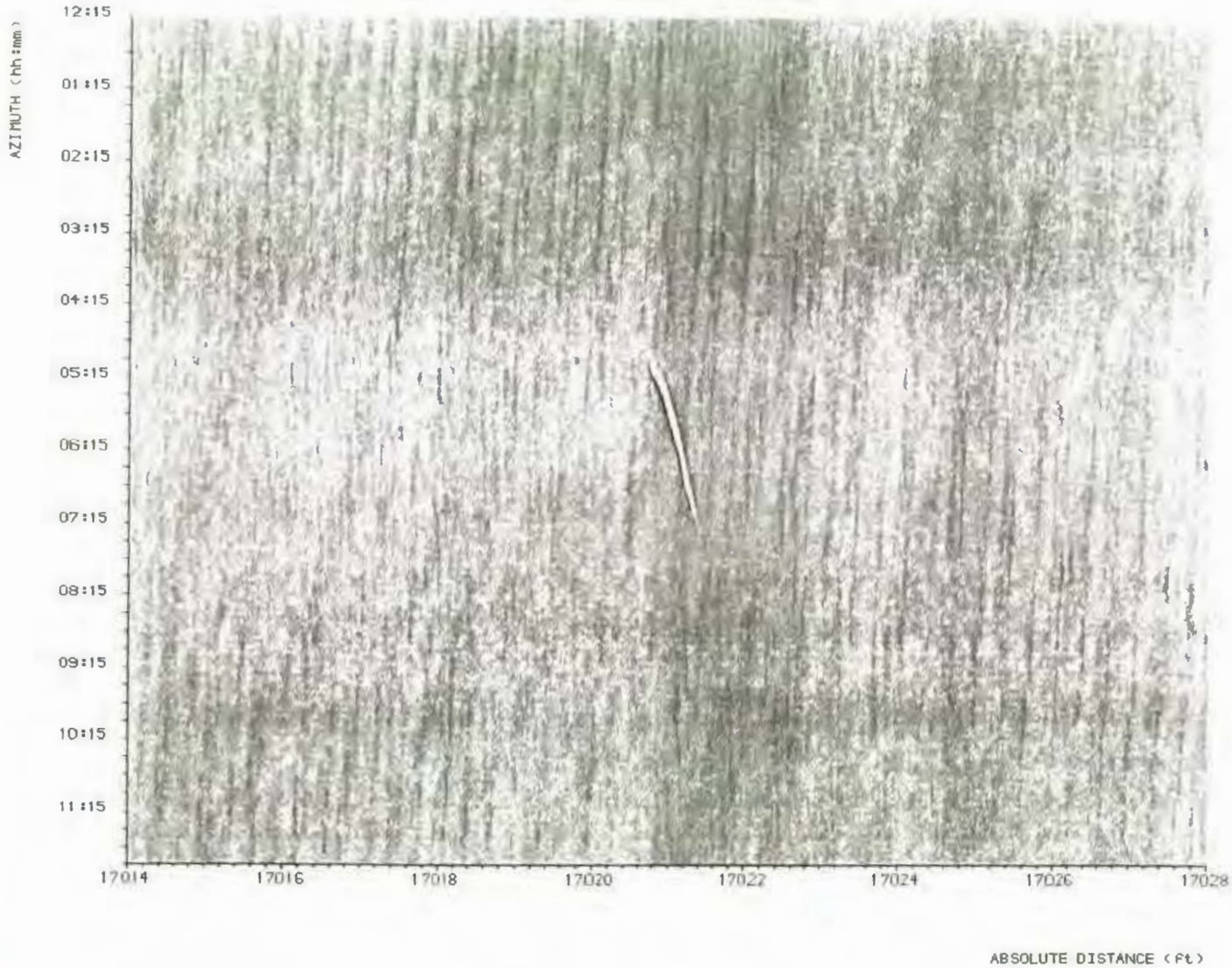
The feature is located 8.7 feet downstream from the reference girth weld.

Schematic Location Summary:



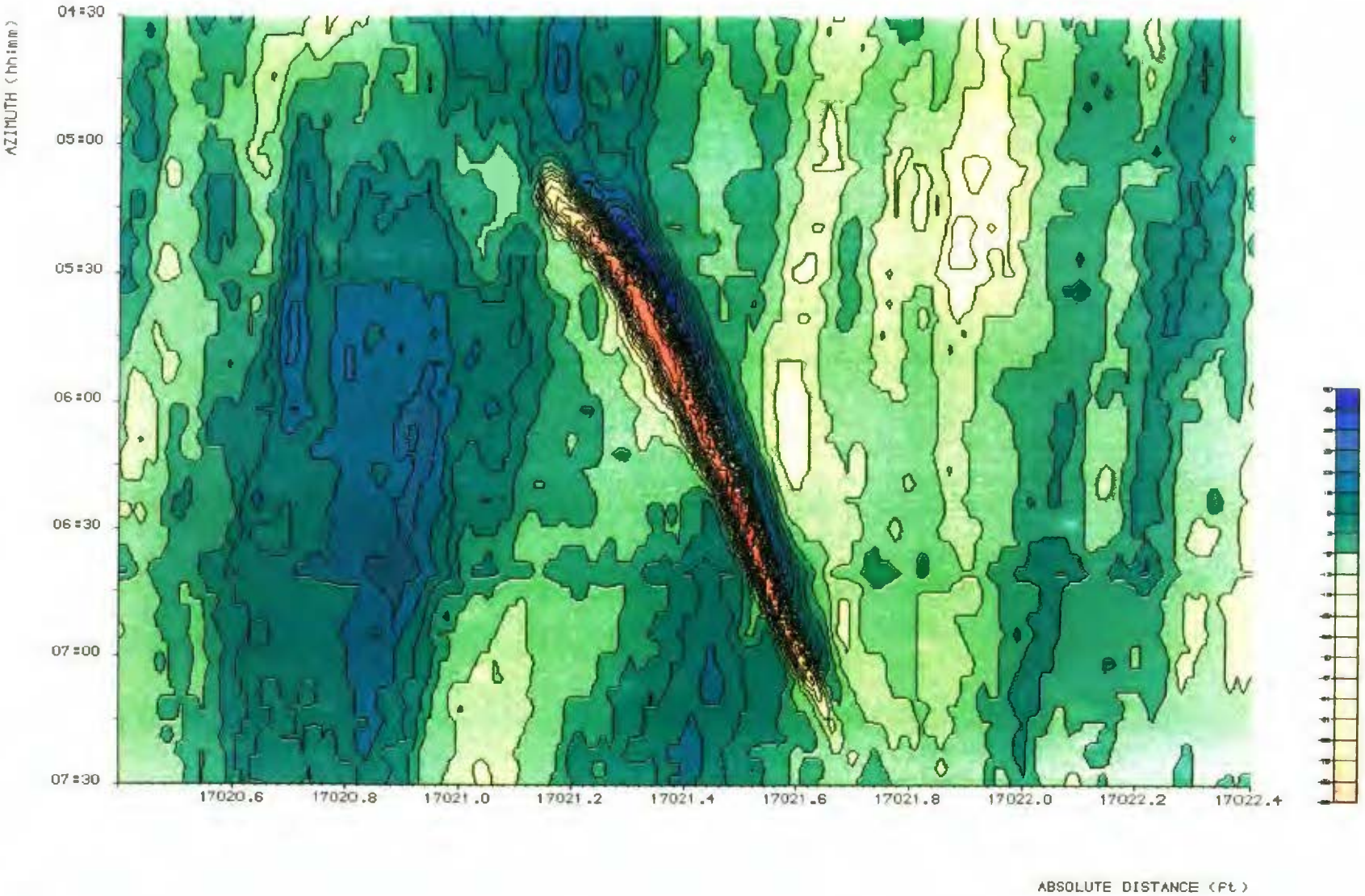
Pipeline Integrity INTERNATIONAL

Feature 11 Overview Plot C7735_20A



Pipeline Integrity INTERNATIONAL

Feature 11 Detail Contour Plot C7735_20A



Pipeline Integrity INTERNATIONAL

ENBDNR0006688

Inspection Sheet Number 12

C7735_20A

Feature Description

Type:	Internal Mill/Manufacturing Fault
Orientation:	07:45 (o'clock)
Axial length:	2.0 in
Circumferential width:	2.2 in
Depth - Peak:	28% WT
- Average:	28% WT
Feature Selection Rule:	8
Nominal Pipe wall thickness for spool:	0.812 in
Absolute Distance from Launch:	17138.1 feet

Comments:

This metal loss feature has the appearance of a mill/manufacturing fault.

There are other metal loss features within this spool.
More information on these features is given in the Pipeline Listing.

Feature Location

Primary Reference/s:

1. BALL VALVE
   (Girth Weld 40 + 1.3ft)

2. BALL VALVE
   (Girth Weld 8730 + 1.1ft)

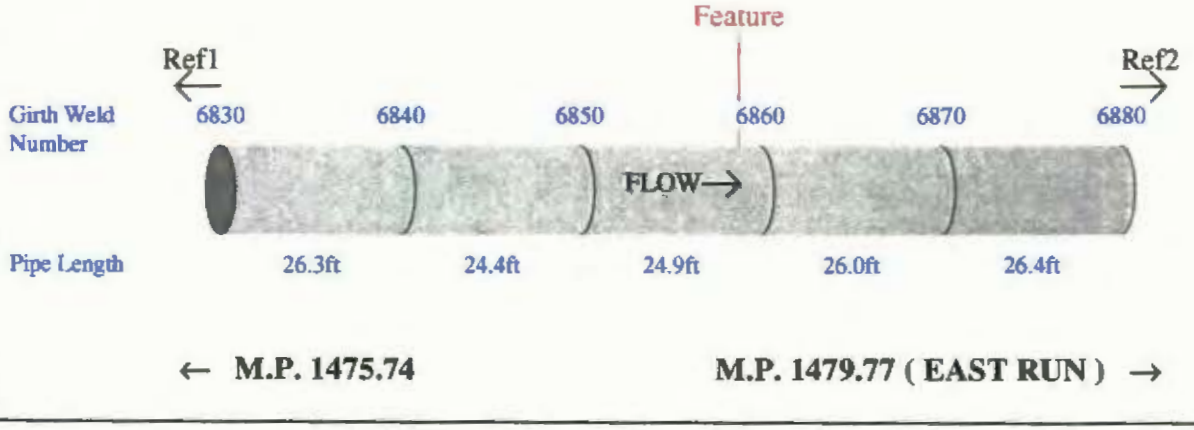
Reference Girth Weld:

The reference girth weld at the M.P. 1475.74 (upstream) end of the feature spool is number 6850.
The location of this weld is 17084.4 feet downstream from reference 1 and 4596.8 feet upstream from reference 2.

Feature:

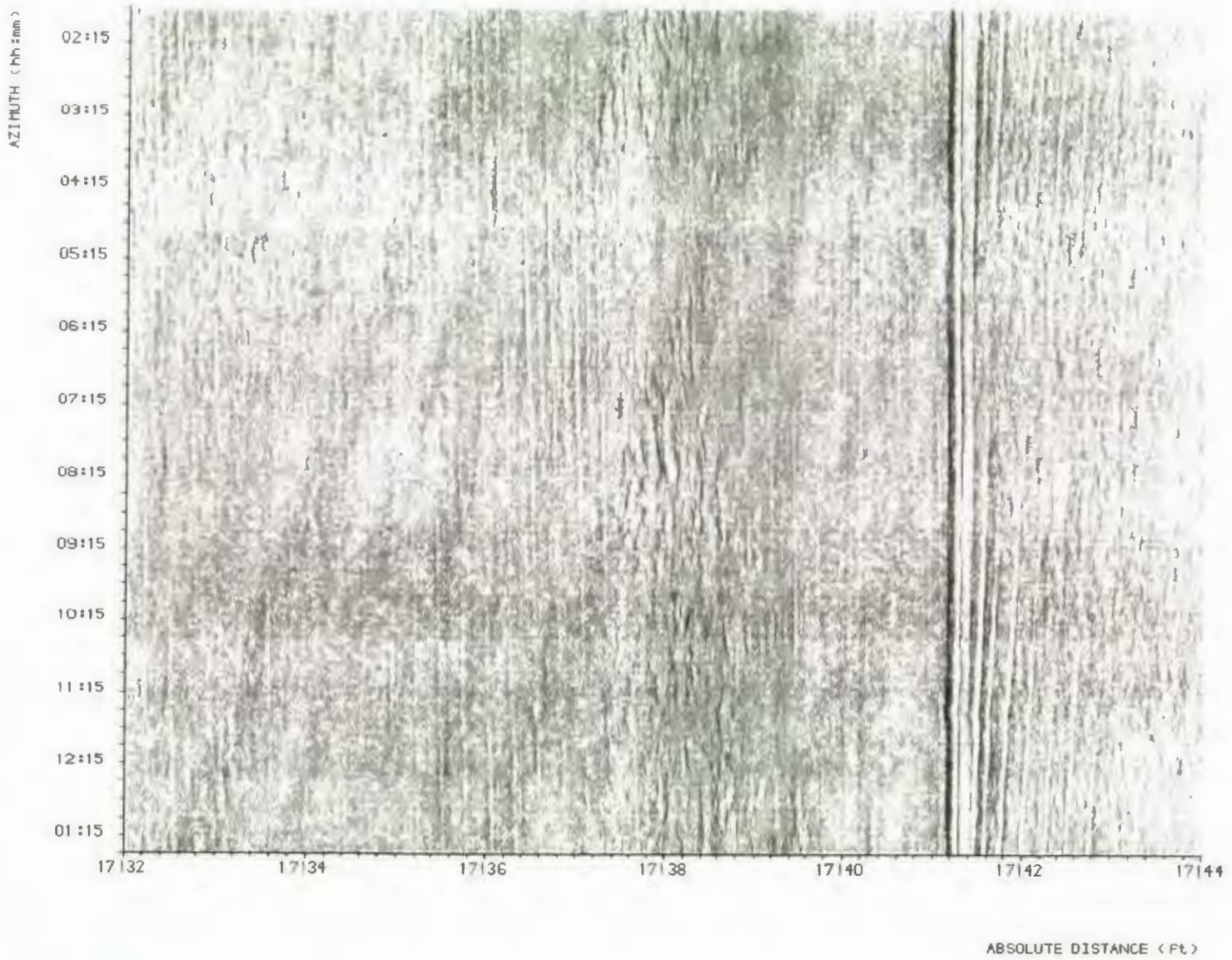
The feature is located 21.9 feet downstream from the reference girth weld.

Schematic Location Summary:



Pipeline Integrity INTERNATIONAL

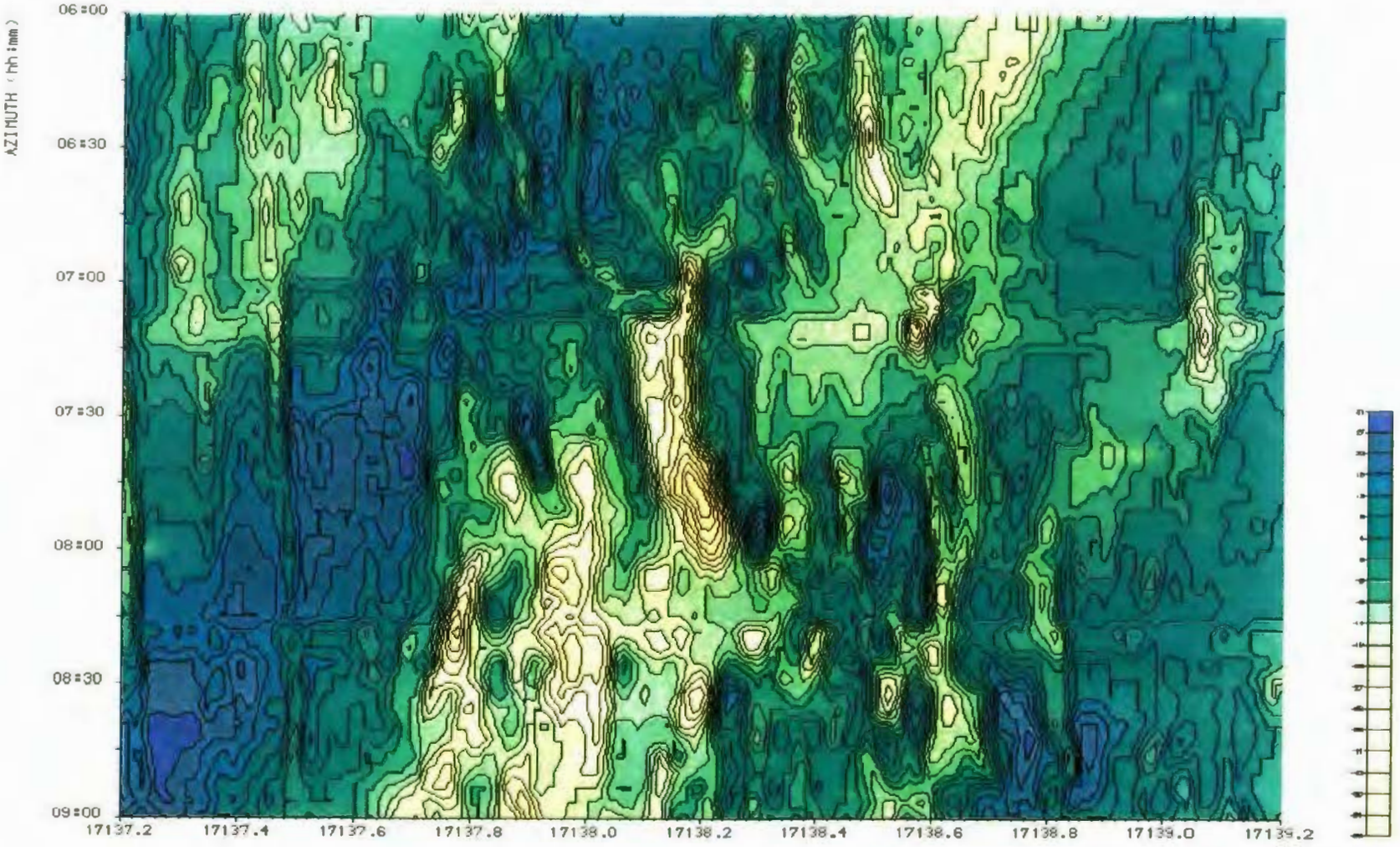
Feature 12 Overview Plot C7735_20A



Pipeline Integrity INTERNATIONAL

ENBDNR0006690

Feature 12 Detail Contour Plot C7735_20A



Pipeline Integrity INTERNATIONAL

ENBDNR0006691

Inspection Sheet Number 13 C7735_20A

Feature Description

Type:	External Mill/Manufacturing Fault
Orientation:	00:15 (o'clock)
Axial length:	0.2 in
Circumferential width:	0.3 in
Depth - Peak:	30% WT
- Average:	30% WT
Feature Selection Rule:	8
Nominal Pipe wall thickness for spool:	0.812 in
Absolute Distance from Launch:	20313.5 feet

Comments:

This metal loss feature has the appearance of a mill/manufacturing fault.

There are other metal loss features within this spool.
More information on these features is given in the Pipeline Listing.

Feature Location

Primary Reference/s:

1. BALL VALVE
   (Girth Weld 40 + 1.3ft)

2. BALL VALVE
   (Girth Weld 8730 + 1.1ft)

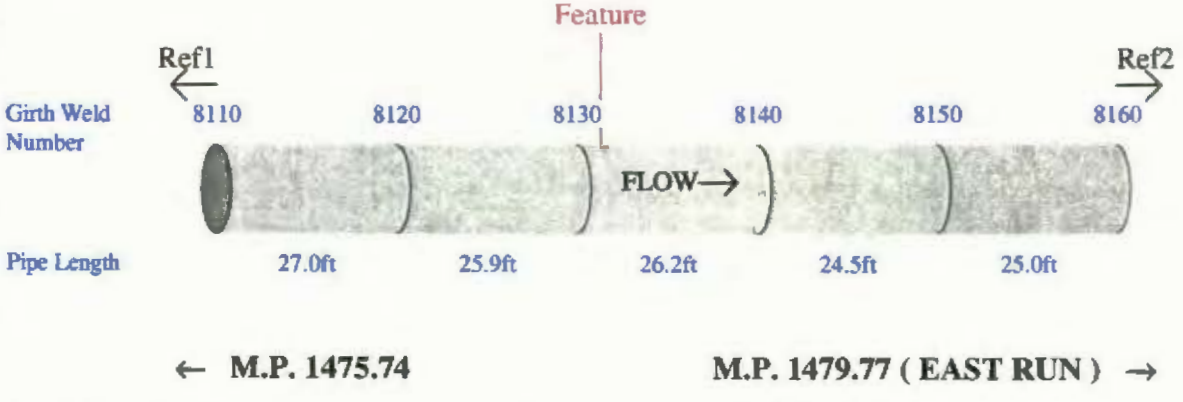
Reference Girth Weld:

The reference girth weld at the M.P. 1475.74 (upstream) end of the feature spool is number 8130. The location of this weld is 20278.4 feet downstream from reference 1 and 1402.8 feet upstream from reference 2.

Feature:

The feature is located 3.3 feet downstream from the reference girth weld.

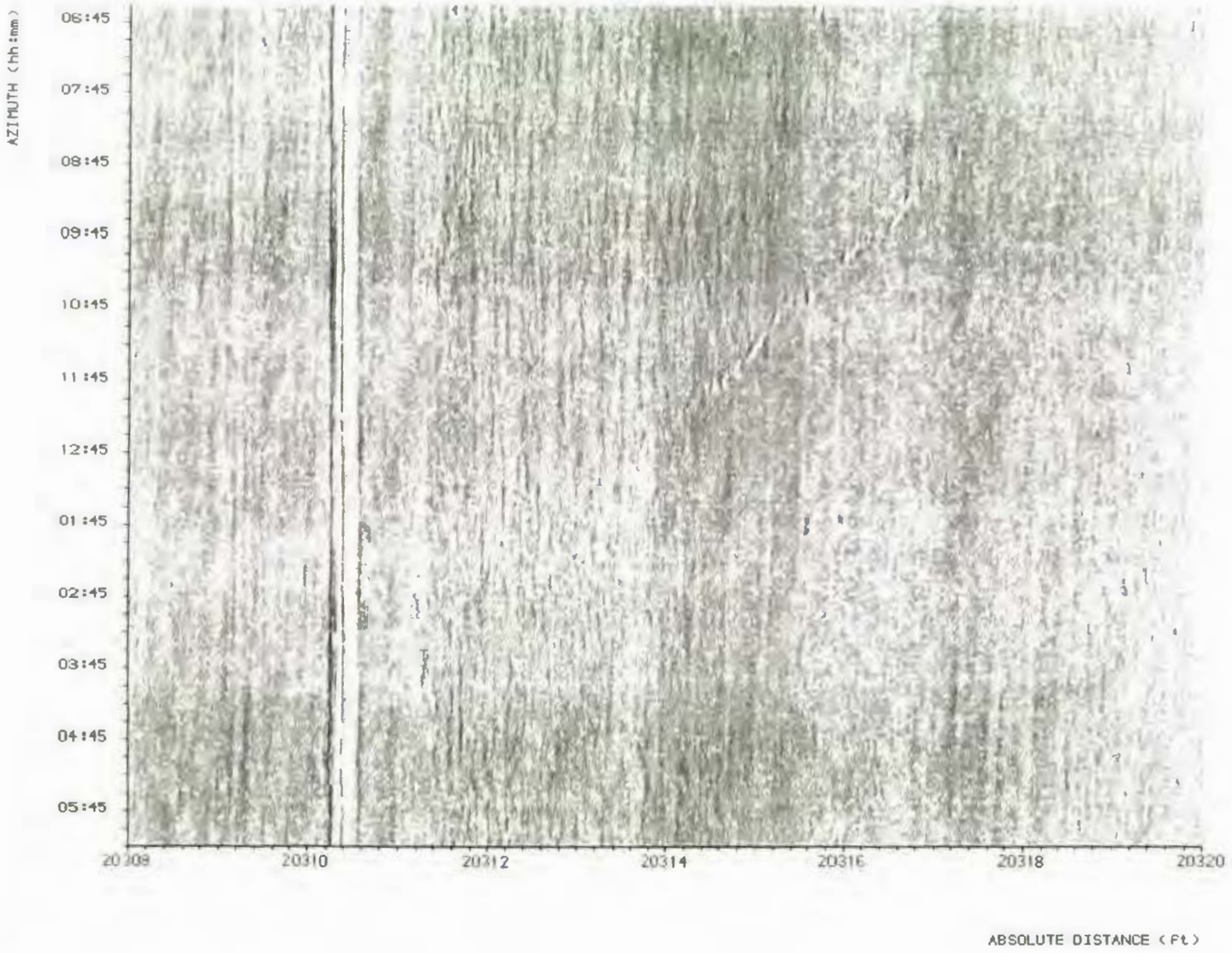
Schematic Location Summary:



← M.P. 1475.74 M.P. 1479.77 (EAST RUN) →

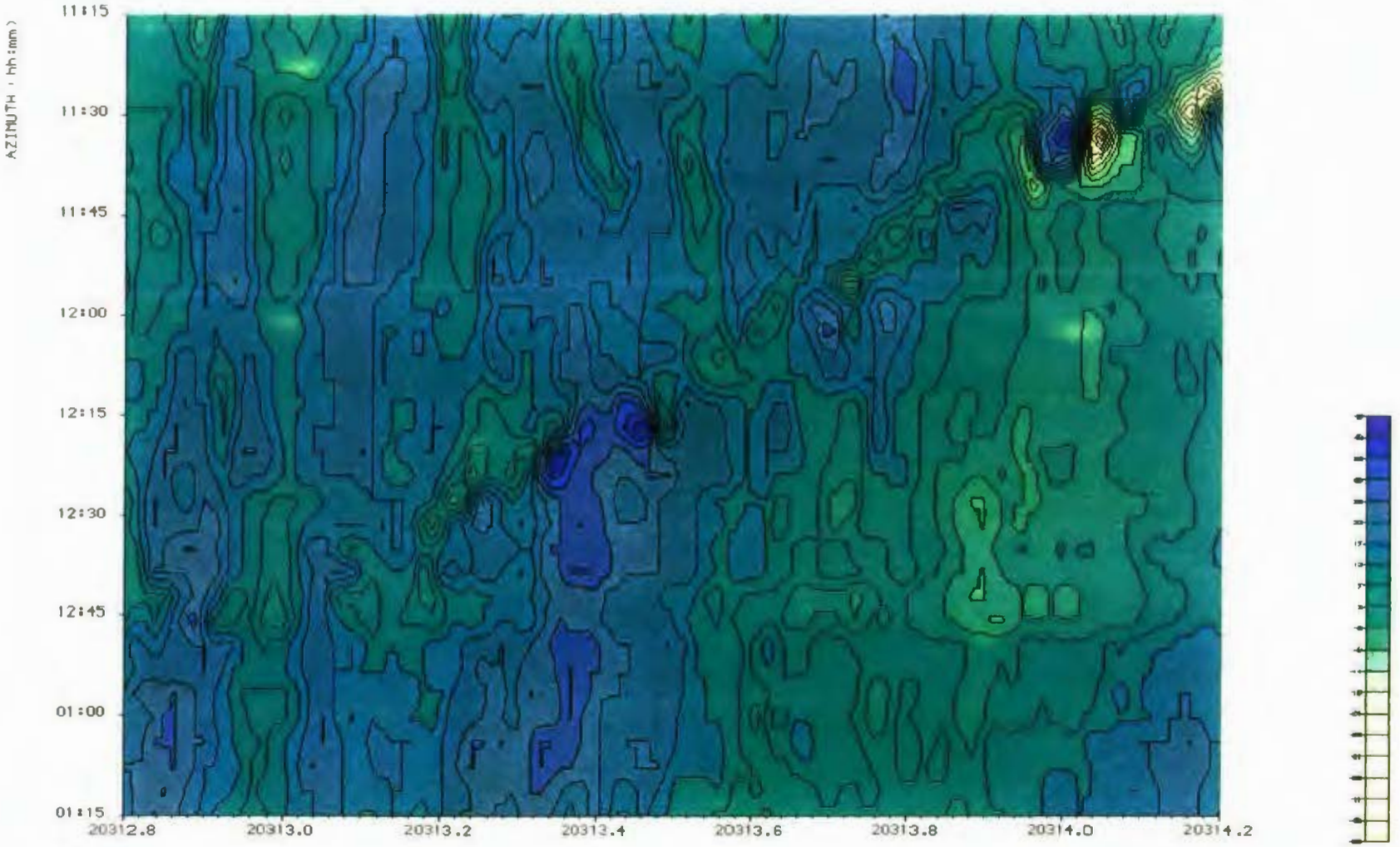
Pipeline Integrity INTERNATIONAL

Feature 13 Overview Plot C7735_20A



Pipeline Integrity INTERNATIONAL

Feature 13 Detail Contour Plot C7735_2YA



Pipeline Integrity INTERNATIONAL

ENBDNR0006694

Inspection Sheet Number 14 C7735_20A

Feature Description

Type:	External Mill/Manufacturing Fault
Orientation:	04:00 (o'clock)
Axial length:	0.6 in
Circumferential width:	1.2 in
Depth - Peak:	29% WT
- Average:	29% WT
Feature Selection Rule:	8
Nominal Pipe wall thickness for spool:	0.812 in
Absolute Distance from Launch:	21237.2 feet

Comments:

This metal loss feature has the appearance of a mill/manufacturing fault.

There are other metal loss features within this spool.
More information on these features is given in the Pipeline Listing.

Feature Location

Primary Reference/s:

1. BALL VALVE
   (Girth Weld 40 + 1.3ft)

2. BALL VALVE
   (Girth Weld 8730 + 1.1ft)

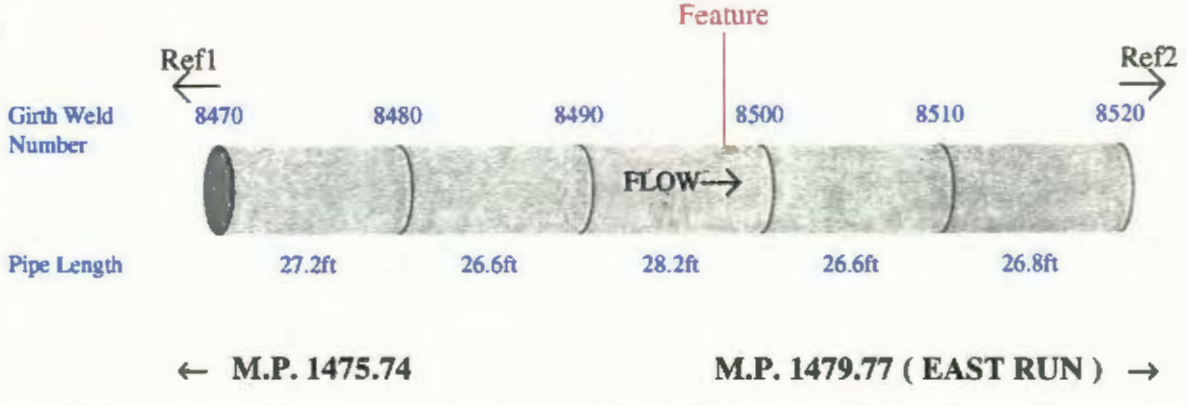
Reference Girth Weld:

The reference girth weld at the M.P. 1475.74 (upstream) end of the feature spool is number 8490. The location of this weld is 21182.9 feet downstream from reference 1 and 498.3 feet upstream from reference 2.

Feature:

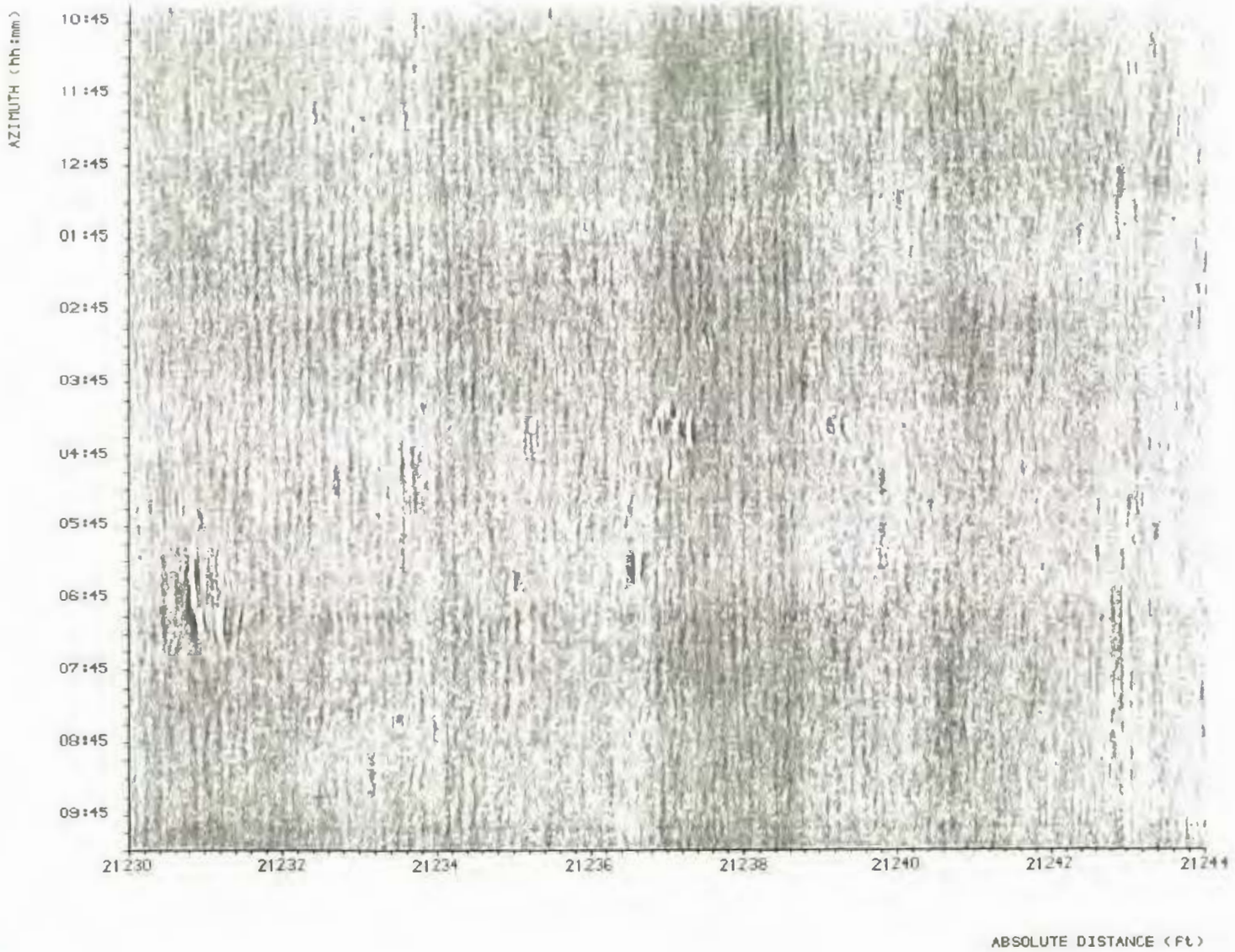
The feature is located 22.5 feet downstream from the reference girth weld.

Schematic Location Summary:



Pipeline Integrity INTERNATIONAL

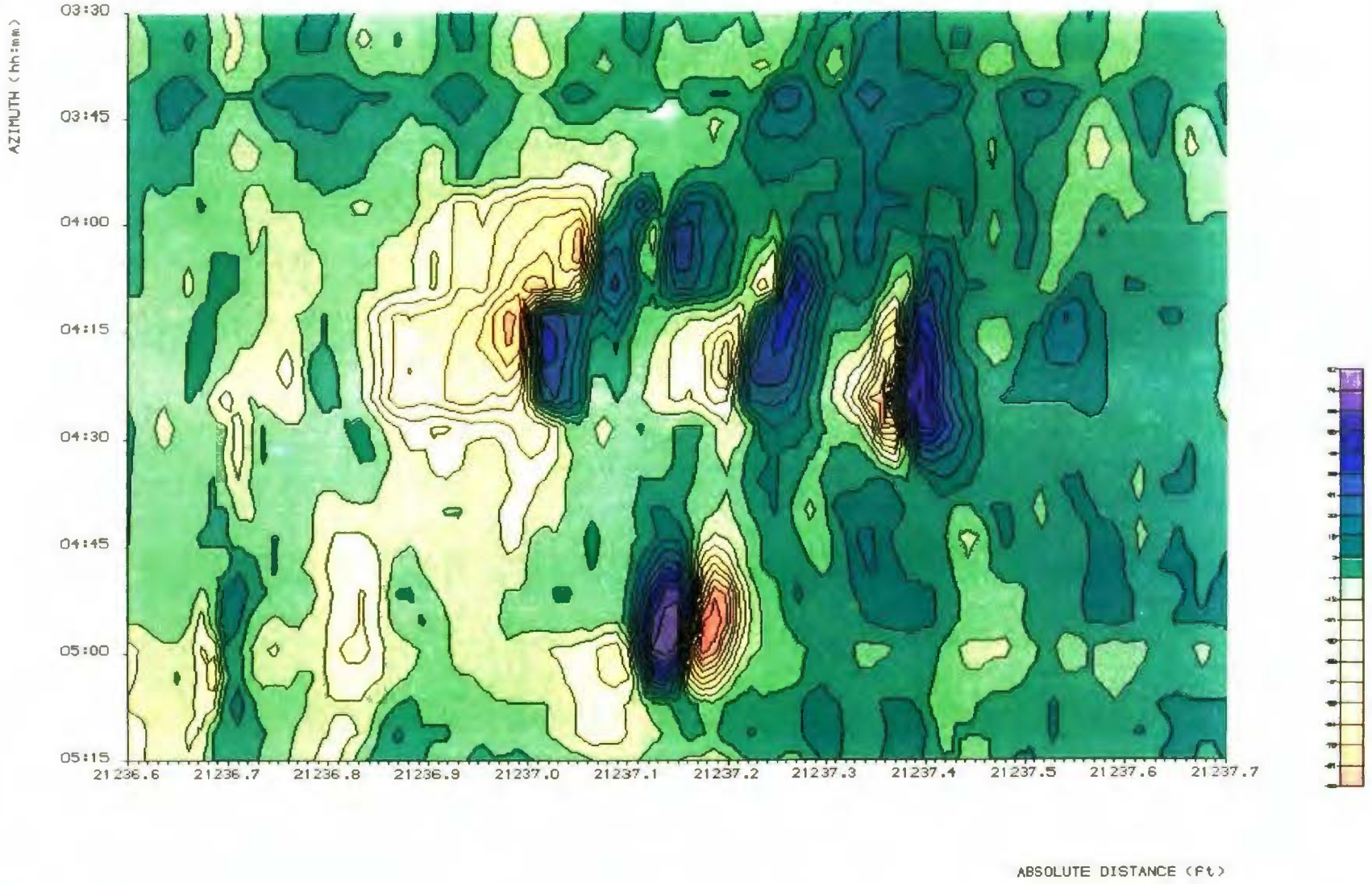
Feature 14 Overview Plot C7735_20A



Pipeline Integrity INTERNATIONAL

ENBDNR0006696

Feature 14 Detail Contour Plot C7735_20A



Pipeline Integrity INTERNATIONAL

ENBDNR0006697

Inspection Sheet Number 15 C7735_20A

Feature Description

Type:	Internal Mill/Manufacturing Fault
Orientation:	01:15 (o'clock)
Axial length:	0.7 in
Circumferential width:	0.9 in
Depth - Peak:	30% WT
- Average:	30% WT
Feature Selection Rule:	8
Nominal Pipe wall thickness for spool:	0.812 in
Absolute Distance from Launch:	21644.5 feet

Comments:

This metal loss feature has the appearance of a mill/manufacturing fault.

There are other metal loss features within this spool.
More information on these features is given in the Pipeline Listing.

Feature Location

Primary Reference/s:

1. BALL VALVE
   (Girth Weld 40 + 1.3ft)

2. BALL VALVE
   (Girth Weld 8730 + 1.1ft)

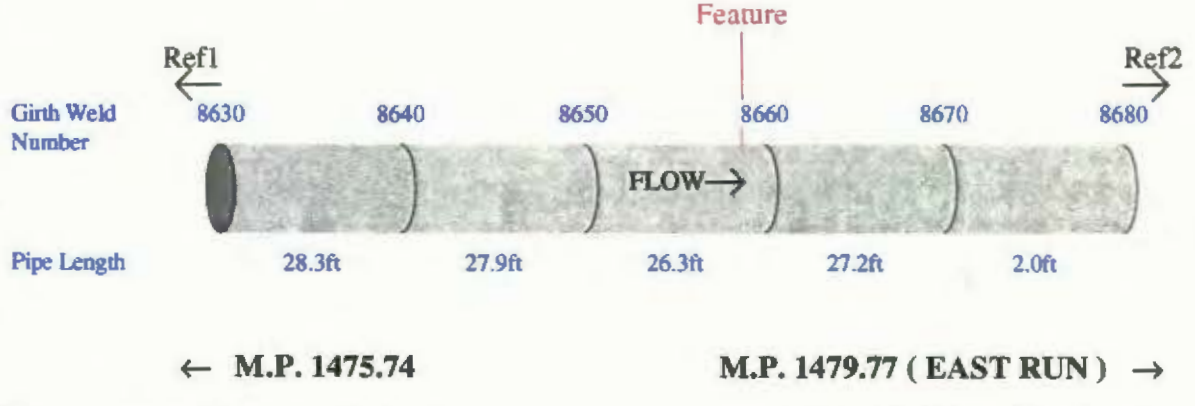
Reference Girth Weld:

The reference girth weld at the M.P. 1475.74 (upstream) end of the feature spool is number 8650. The location of this weld is 21589.7 feet downstream from reference 1 and 91.4 feet upstream from reference 2.

Feature:

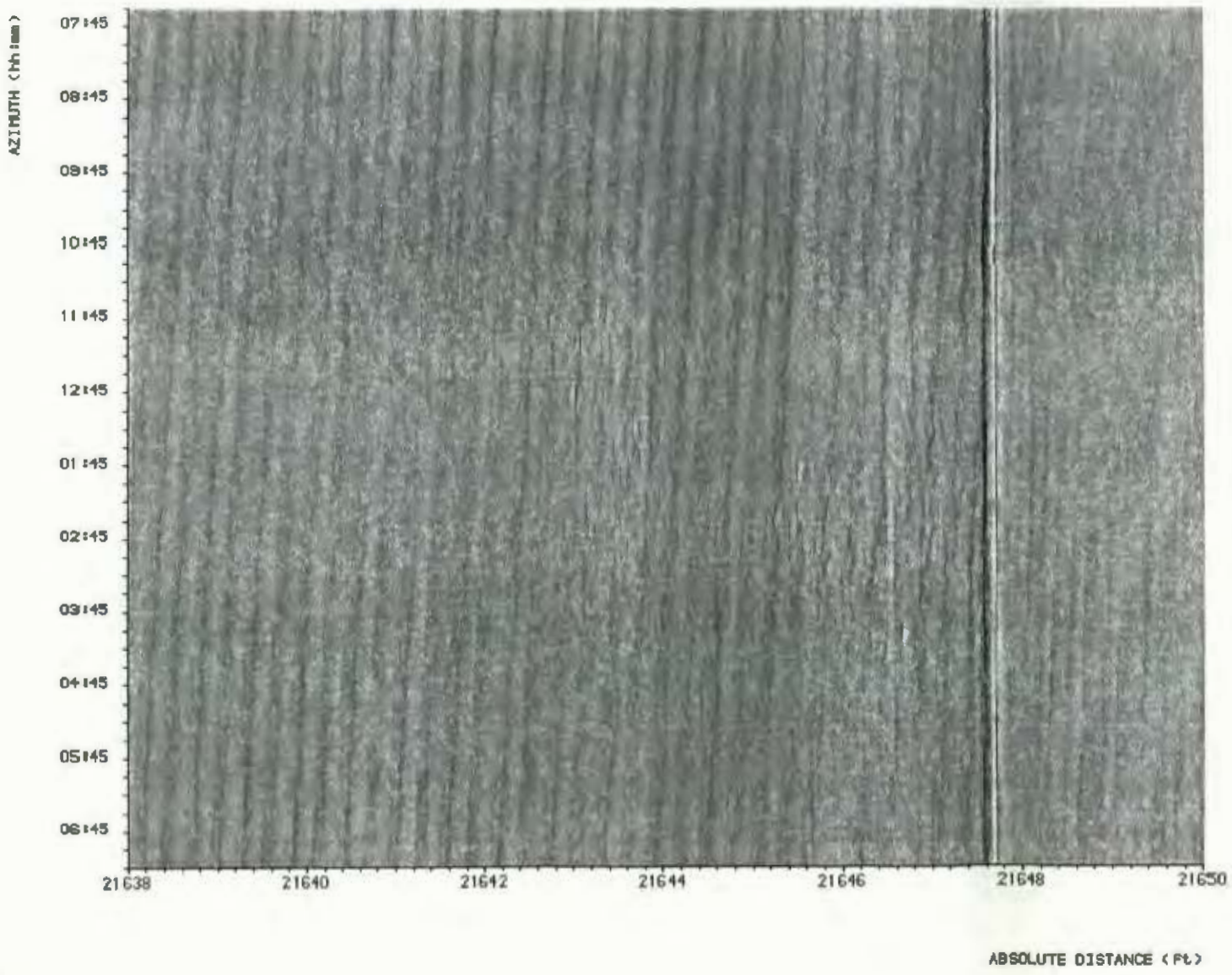
The feature is located 22.9 feet downstream from the reference girth weld.

Schematic Location Summary:



Pipeline Integrity INTERNATIONAL

Feature 15 Overview Plot C7735_20A

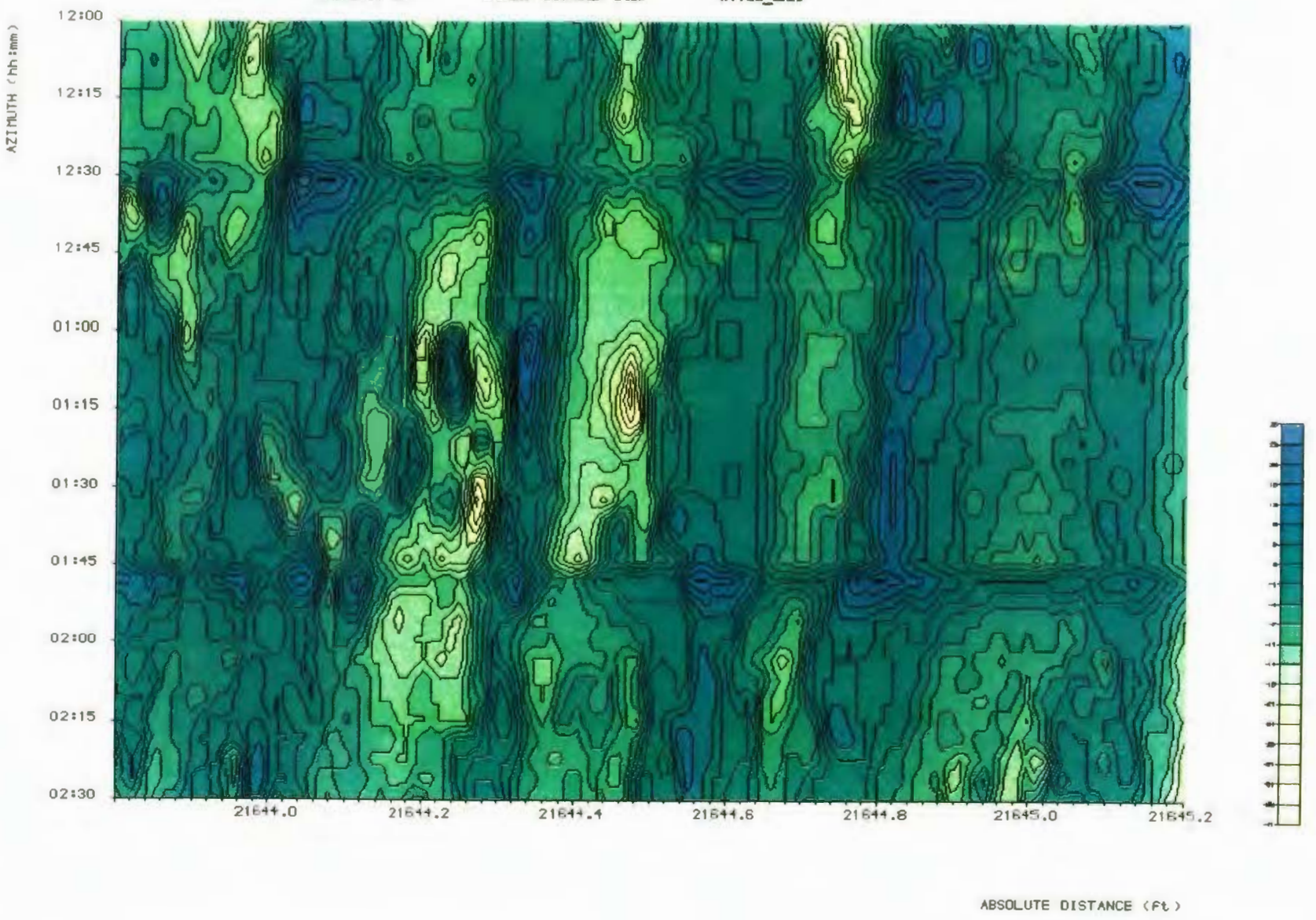


Pipeline Integrity INTERNATIONAL

pii

ENBDNR0006699

Feature 15 Detail Contour Plot C7735_20A



Pipeline Integrity INTERNATIONAL

ENBDNR0006700



Pipeline Integrity

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Pipeline Summary Report

Pressure Based Pipeline Summary Report

The Pressure Based Pipeline Summary Report provides an overview of the pipeline condition.

3.1. Metal Loss Information

This section provides summaries of all the metal loss features detected along the pipeline in the following formats:

- Pressure Sentenced Plot
- Pressure Based Histograms
- Depth Based Histograms
- Orientation Plot
- Severity Table

3.1.1. Pressure Sentenced Plot

The pressure sentenced plot shows the relative significance of each detected metal loss feature.

Metal loss features that have been identified as manufacturing faults are not included on the pressure sentenced plot.

The significance of each metal loss feature has been assessed using the pressure sentencing formulae as supplied by the client and defined in the Appendix to the Specification for the Pipeline Inspection Report (Appendix F).

These formulae depend on the following five variables;

two measured by the PII inspection system:

- the predicted peak depth of the metal loss feature, or the area ratio if the metal loss feature consists of two or more metal losses that have been clustered together;
- the predicted axial length of the metal loss feature, or the overall predicted axial length if the metal loss feature consists of two or more metal losses that have been clustered together;

and three specified by the pipeline operator:

- the external pipe radius (r);
- the nominal pipe wall thickness (nwt); and,
- the assumed depth of background corrosion (B).

The pressure sentenced plot shows the relative significance of each metal loss feature by plotting the sentenced depth of the metal loss feature against its predicted axial length and by indicating on the graph the appropriate curve that represents an RPR of 1. The curve representing an RPR of 1 will move if the value for r or nwt changes.

Those metal loss features with RPR values <1 will be plotted above the curve. The lower the value, the higher the significance and the further away from the curve the metal loss feature will be plotted.

The report contains one pressure sentenced plot for each major pipeline segment defined by the pipeline operator. Only those metal loss features within the major segment, and any minor segments within the major segment, are shown on the respective pressure sentenced plot. The RPR unity curve is calculated using the values of r and nwt that have been specified for the major segment by the pipeline operator; these values are also given on each plot.

A pressure sentenced plot will not be provided if the major segment does not contain any metal loss features.

A list of the major segments and the value of nwt that applies within each segment are provided in the nominal wall thickness listing presented in Section 3.2.8. The value for r is assumed to be constant throughout the pipeline.

There are four symbols used on the pressure sentenced plot to represent metal loss features. These are:

+	The metal loss feature is within the major segment. That is the spool containing the metal loss feature has pipeline parameters equal to those used to calculate the RPR unity curve.
⊕	The metal loss feature is reported on an inspection sheet and is within the major segment.
Δ	The metal loss feature is within a minor segment. That is the spool containing the metal loss feature has pipeline parameters different to those used to calculate the RPR unity curve.
⊚	The metal loss feature is reported on an inspection sheet and is within a minor segment.

Each pressure sentenced plot is presented overleaf.

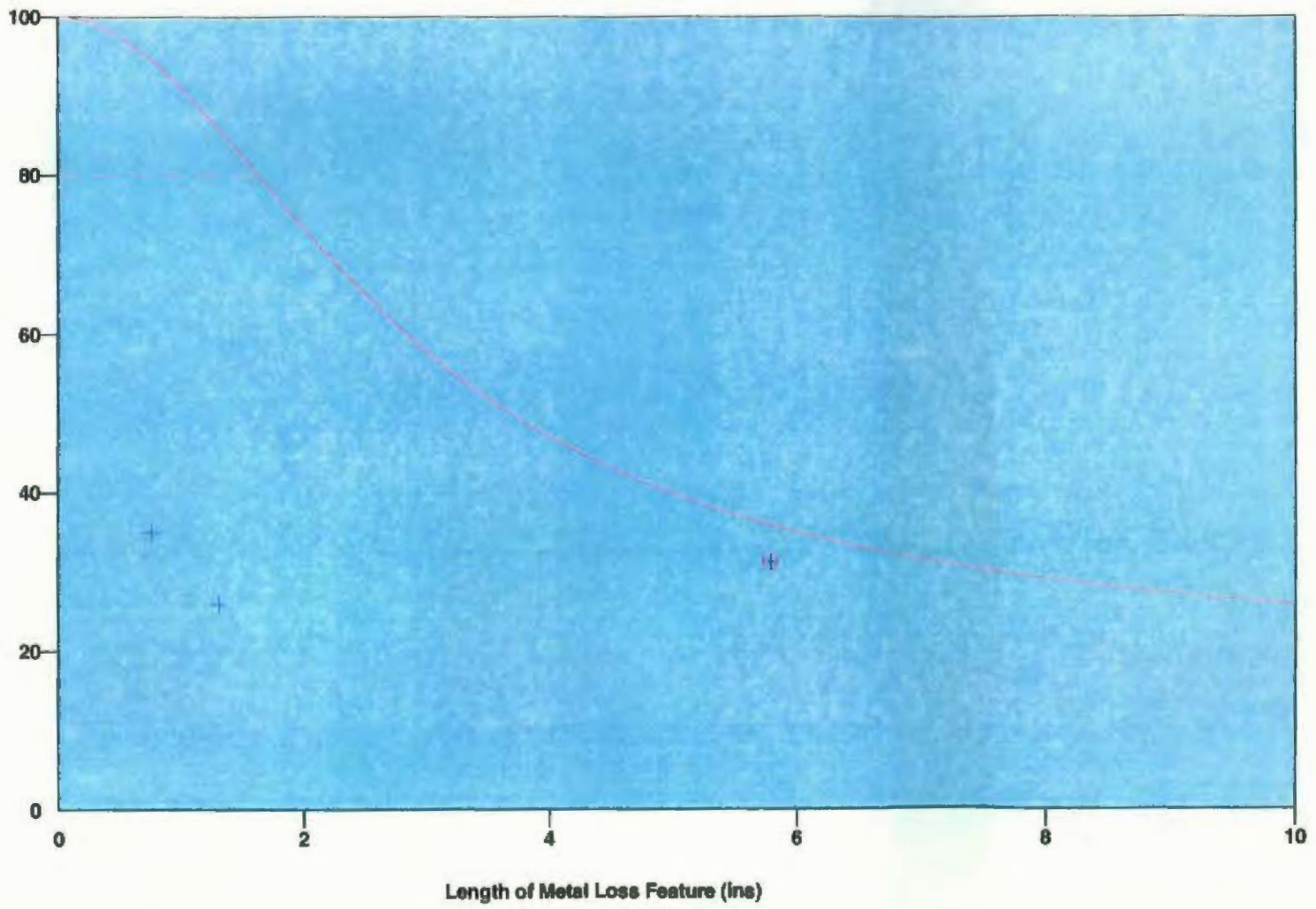
SENTENCED PLOT

M.P. 1475.74 to M.P. 1479.77 (EAST RUN)

Major Segment 1

Ext. Diameter 20 ins
Wall Thickness 0.812 ins

C7735_20A
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Pipeline Integrity International

ENBDNR0006705

3.1.2. Pressure Based Histograms

The pressure based histograms show the distribution of the most significant metal loss features along the pipeline.

Metal loss features that have been identified as manufacturing faults are not included in the pressure based histograms.

The significance of each metal loss feature has been assessed using the pressure sentencing formulae supplied by the client and defined in the Appendix to the Specification for the Pipeline Inspection Report (Appendix F).

Each pressure based histogram shows the distribution along the pipeline of those metal loss features with RPR values below a chosen pressure sentenced threshold.

Each bar on the histogram represents the number of occurrences within a 50 ft section of the pipeline.

The pressure sentenced thresholds chosen to highlight the most significant metal loss features are as follows:

- all metal loss features with RPR values <0.900
- all metal loss features with RPR values <1.000
- all metal loss features with RPR values <1.300

Summarising from the histograms:

0 metal loss features with RPR values <0.900

0 metal loss features with RPR values <1.000

3 metal loss features with RPR values <1.300

In addition, a single three-dimensional summary histogram is included which shows the distribution along the pipeline of those metal loss features with RPR values below each of the chosen pressure sentenced thresholds.

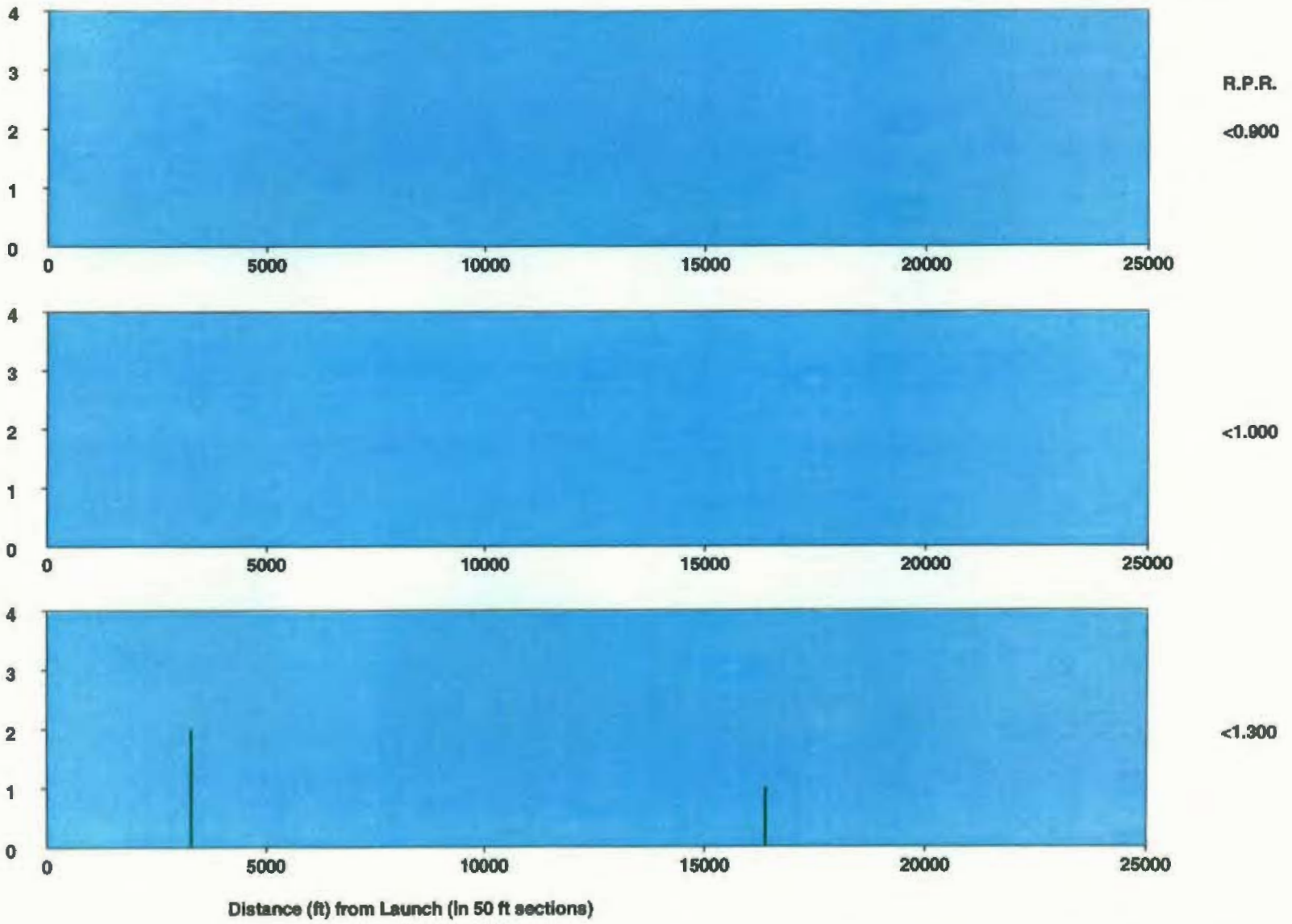
The pressure based histograms are presented overleaf.

Number of Metal Loss Features

PRESSURE BASED HISTOGRAM

M.P. 1475.74 to M.P. 1479.77 (EAST RUN)

C7735_20A
Page 1 of 2
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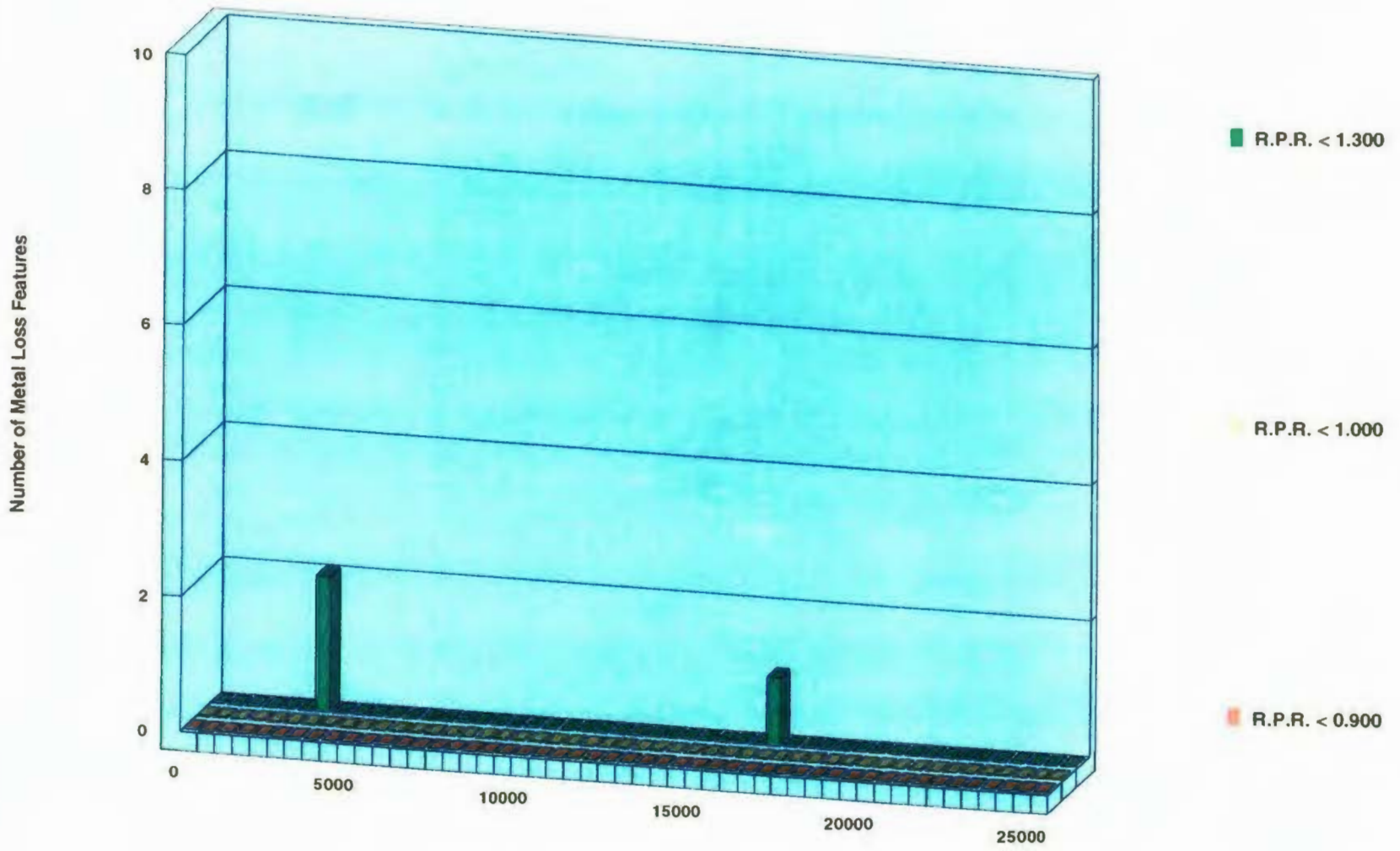
Pipeline Integrity International

ENBDNR0006707

PRESSURE BASED HISTOGRAM

M.P. 1475.74 to M.P. 1479.77 (EAST RUN)

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ENBDNR0006708

3.1.3. Depth Based Histograms

The depth based histograms show the distribution of all detected metal loss features along the pipeline.

Twelve histograms are presented in this section:

- three ungraded metal loss histograms
- eight graded metal loss histograms
- one three-dimensional summary histogram

Ungraded Metal Loss Histograms

The total metal loss histogram shows the distribution of all metal loss features along the pipeline. Each bar on the histogram represents the number of occurrences within a 50 ft section of the pipeline.

The area metal loss histogram shows how much of the pipe surface has been affected by metal loss. Each bar on the histogram represents the total surface area of the metal loss within a 50 ft section of the pipeline. This is expressed as a percentage of the surface area of an undamaged pipe section.

The volume metal loss histogram shows how the volume of metal in the pipeline has been affected by metal loss. Each bar on the histogram represents the total volume of the metal loss features within a 50 ft section of the pipeline. This is expressed as a percentage of the volume of metal in an undamaged pipe section.

Graded Metal Loss Histograms

The metal loss features are graded into eight categories, which are derived from combinations of two predicted length and four predicted peak depth categories.

There is one graded metal loss histogram for each category. Each bar on the histogram represents the number of occurrences within a 50 ft section of the pipeline.

Summarising from the histograms, a total of 91 metal loss features have been identified within the pipeline. These have been graded as follows:

87 metal loss features with predicted axial lengths ≤ 3t.
Of these:

56	have a predicted peak depth of ≤ 20%t.
31	have a predicted peak depth of > 20%t and ≤ 40%t.
0	have a predicted peak depth of > 40%t and ≤ 60%t.
0	have a predicted peak depth of > 60%t.

4 metal loss features with a predicted length > 3t.
Of these:

0	have a predicted peak depth of ≤ 20%t.
4	have a predicted peak depth of > 20%t and ≤ 40%t.
0	have a predicted peak depth of > 40%t and ≤ 60%t.
0	have a predicted peak depth of > 60%t.

Three-Dimensional Summary Histogram

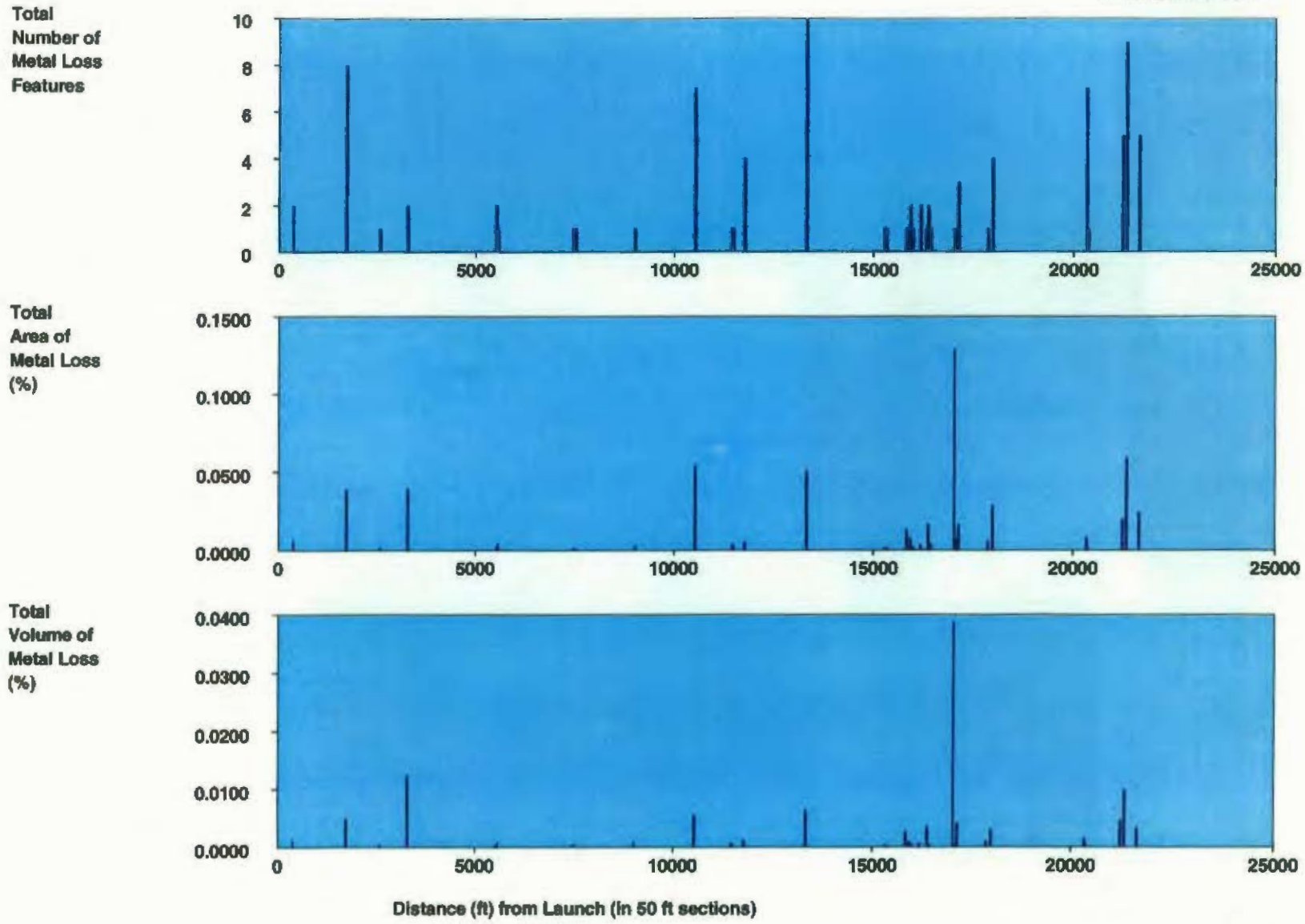
The metal loss features are graded into nine depth categories and displayed on a single three-dimensional histogram. Each bar on the summary histogram represents the number of metal loss occurrences within the appropriate depth category for a specific section of the pipeline.

The histograms are presented on four pages overleaf.

DEPTH BASED HISTOGRAM - ALL METAL LOSS

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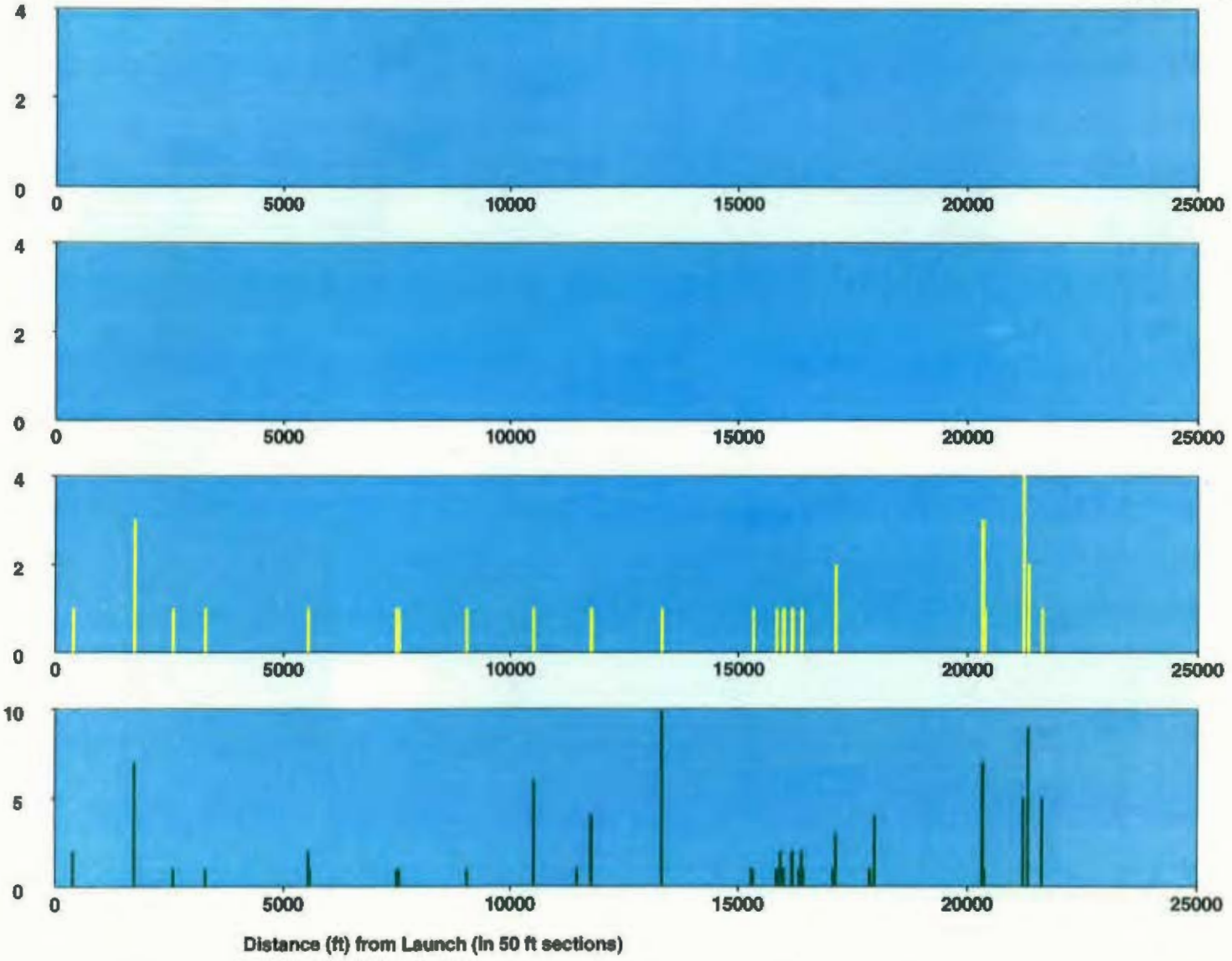
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ENBDNR0006711

Number of
Metal Loss
Features

DEPTH BASED HISTOGRAM
Axial Length ≤ 3t
M.P. 1475.74 to M.P. 1479.77 (EAST RUN)

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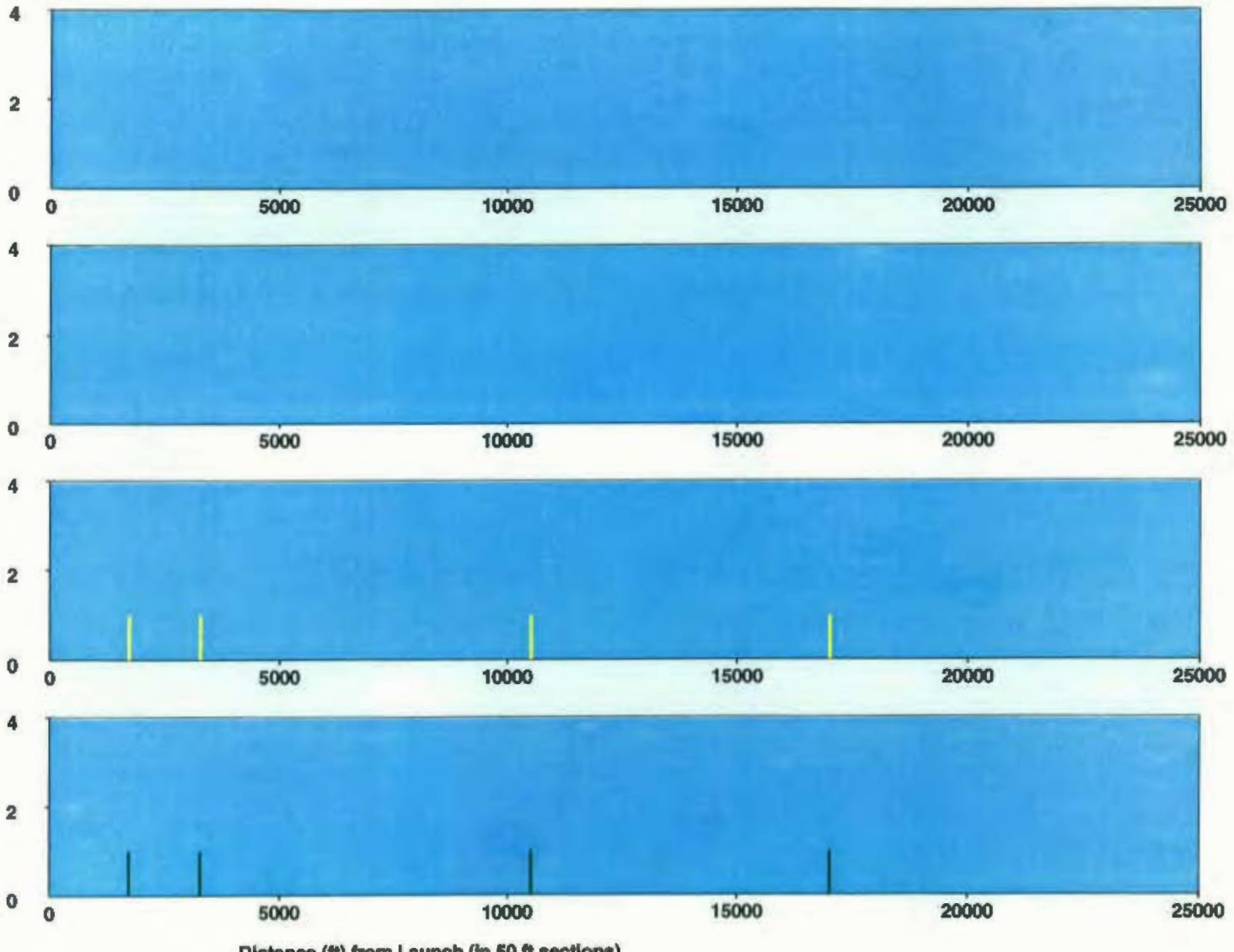
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ENBDNR0006712

Number of
Metal Loss
Features

DEPTH BASED HISTOGRAM
Axial Length > 3t
M.P. 1475.74 to M.P. 1479.77 (EAST RUN)

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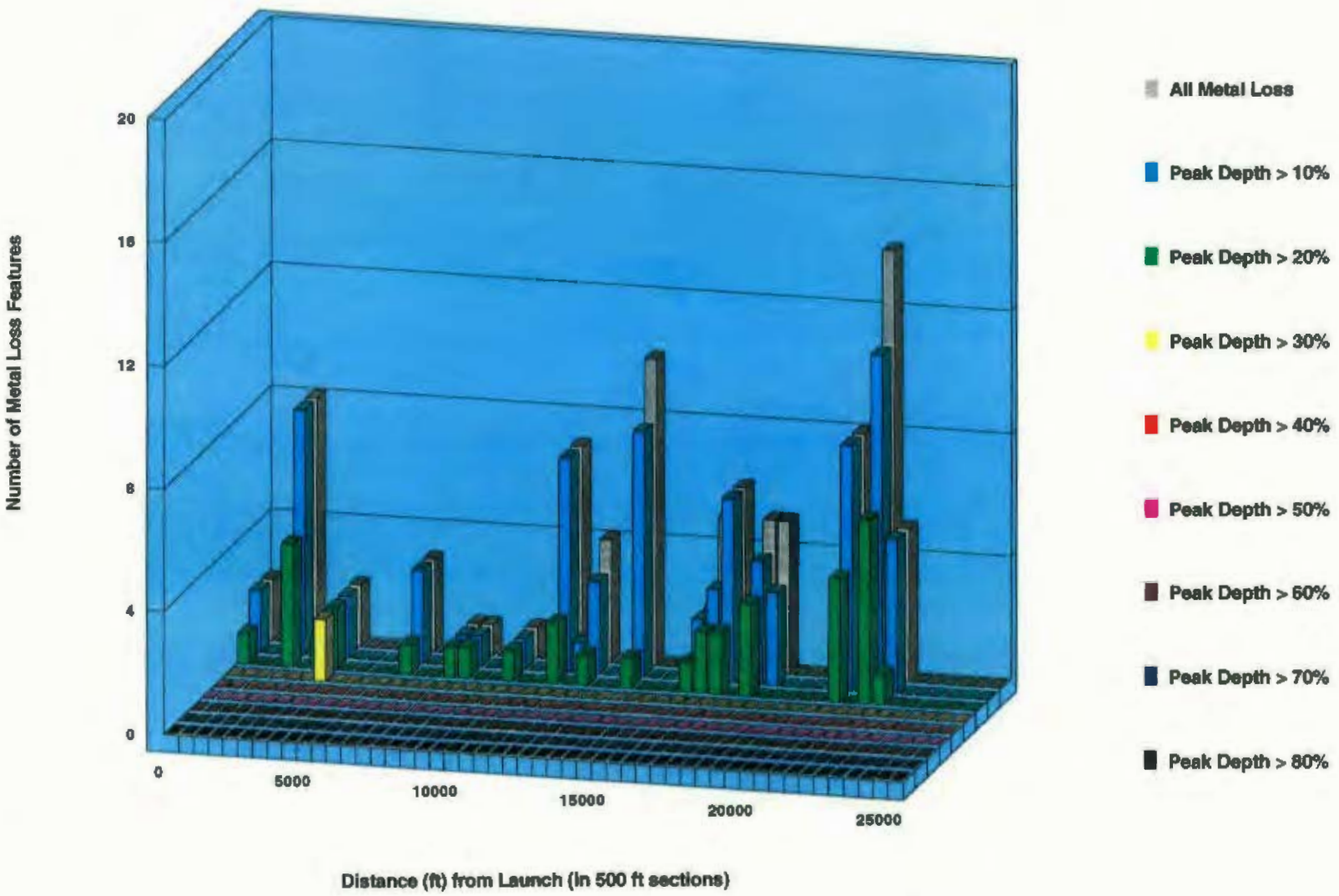
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ENBDNR0006713

DEPTH BASED HISTOGRAM

M.P. 1475.74 to M.P. 1479.77 (EAST RUN)

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3.1.4. Orientation Plot

The orientation plot shows the location and extent of each metal loss feature around the pipe's circumference.

The absolute distance from the launch is plotted against the orientation of the metal loss. The orientation is based on a 12 hour clock as viewed in the direction of product flow; for example, twelve indicates the top of the pipe and six indicates the bottom.

For each metal loss feature a box is drawn on the plot showing the predicted circumferential and axial extent of the metal loss feature. Due to the scale along the distance axis, each metal loss feature appears as a solid vertical line on the plot.

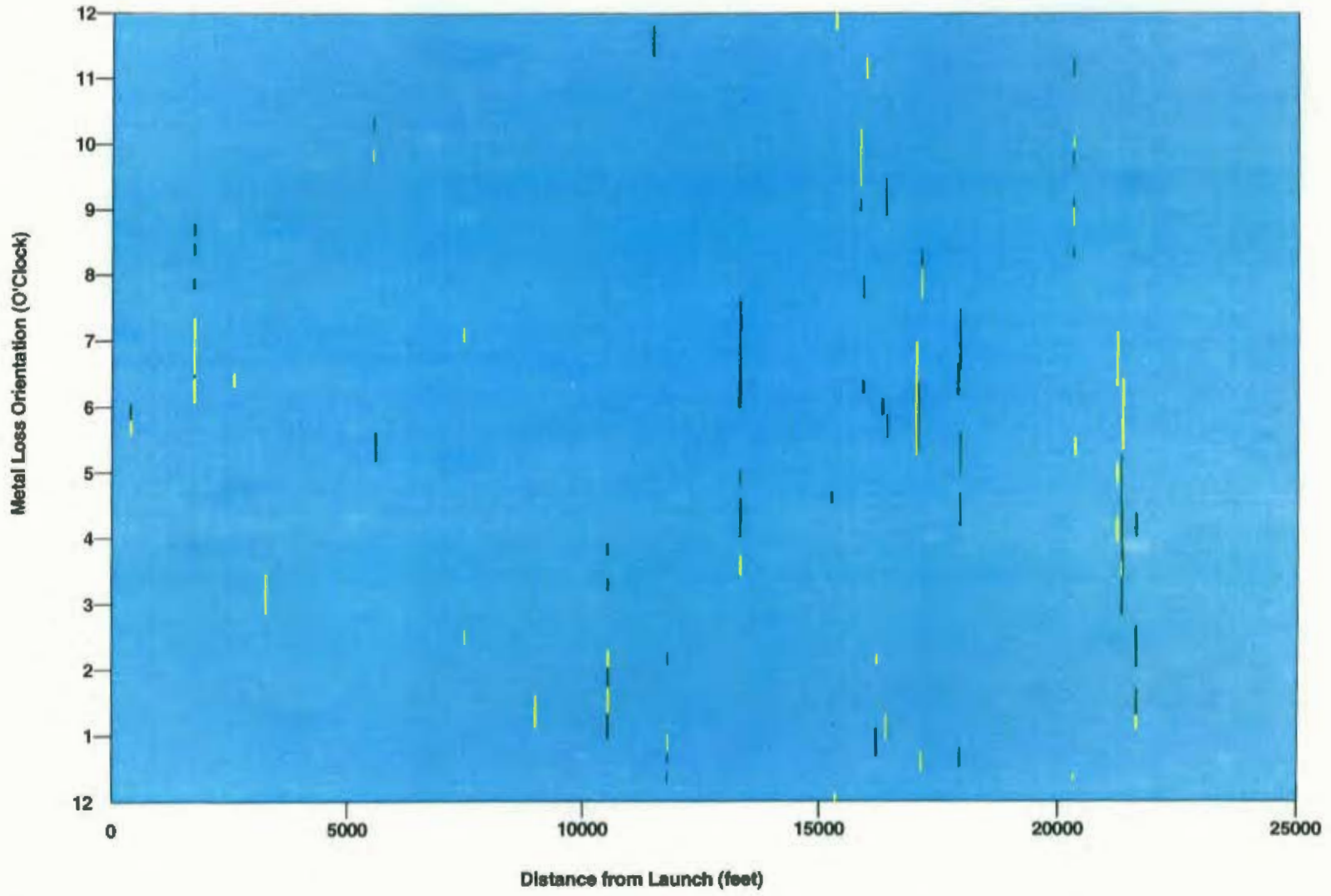
The orientation plot is presented overleaf.

ORIENTATION PLOT

M.P. 1475.74 to M.P. 1479.77 (EAST RUN)

Peak Depth < 20%
Peak Depth 20%-40%
Peak Depth 40%-60%
Peak Depth > 60%

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ENBDNR0006716

3.1.5. Severity Table

The severity table identifies those pipe spools which contain the most severe metal loss features.

Metal loss features that have been identified as manufacturing faults are not included in the severity table.

Only the worst metal loss feature in each spool is considered and these are listed in severity order as defined by the selection rules specified in the Specification for the Pipeline Inspection Report contained in the contract (Appendix F).

Due to the lack of metal loss in the line, all clusters have been displayed in the severity table.

The RPR value for undamaged pipe is 1.333.

The severity table is presented overleaf.

Severity Table

M.P. 1475.74 to M.P. 1479.77 (EAST RUN)

Feature Selection Rule	RPR	Peak Depth (%)	Axial Length (in)	Upstream Girth Weld Number	Absolute Distance (feet)	Orientation (hrs:mins)
5	1.031	39	5.8	1380	3264.7	3:15
8	1.177	26	1.3	6550	16389.5	1:15

3.2. Pipeline Information

The Pipeline Information presents summaries of any pipeline anomalies, repairs, location reference points and changes in the nominal pipe wall thickness along the pipeline. The following summaries are provided:

- Velocity Plot
- Metal Object Report
- Eccentric Casing Report
- Dent Report
- Girth Weld Anomaly Report
- Repair Listing
- Location Reference Point Listing
- Nominal Wall Thickness Listing

3.2.1. Velocity Plot

The velocity plot shows the speed of the inspection vehicle during the inspection run.

The red line on the velocity plot indicates the specified maximum velocity for the inspection vehicle. If the vehicle exceeds the specified maximum velocity then the performance of the inspection vehicle may be degraded.

The inspection vehicle did not exceed the specified maximum velocity during the inspection survey.

The inspection vehicle's average velocity during the inspection run was 6.8 ft/s.

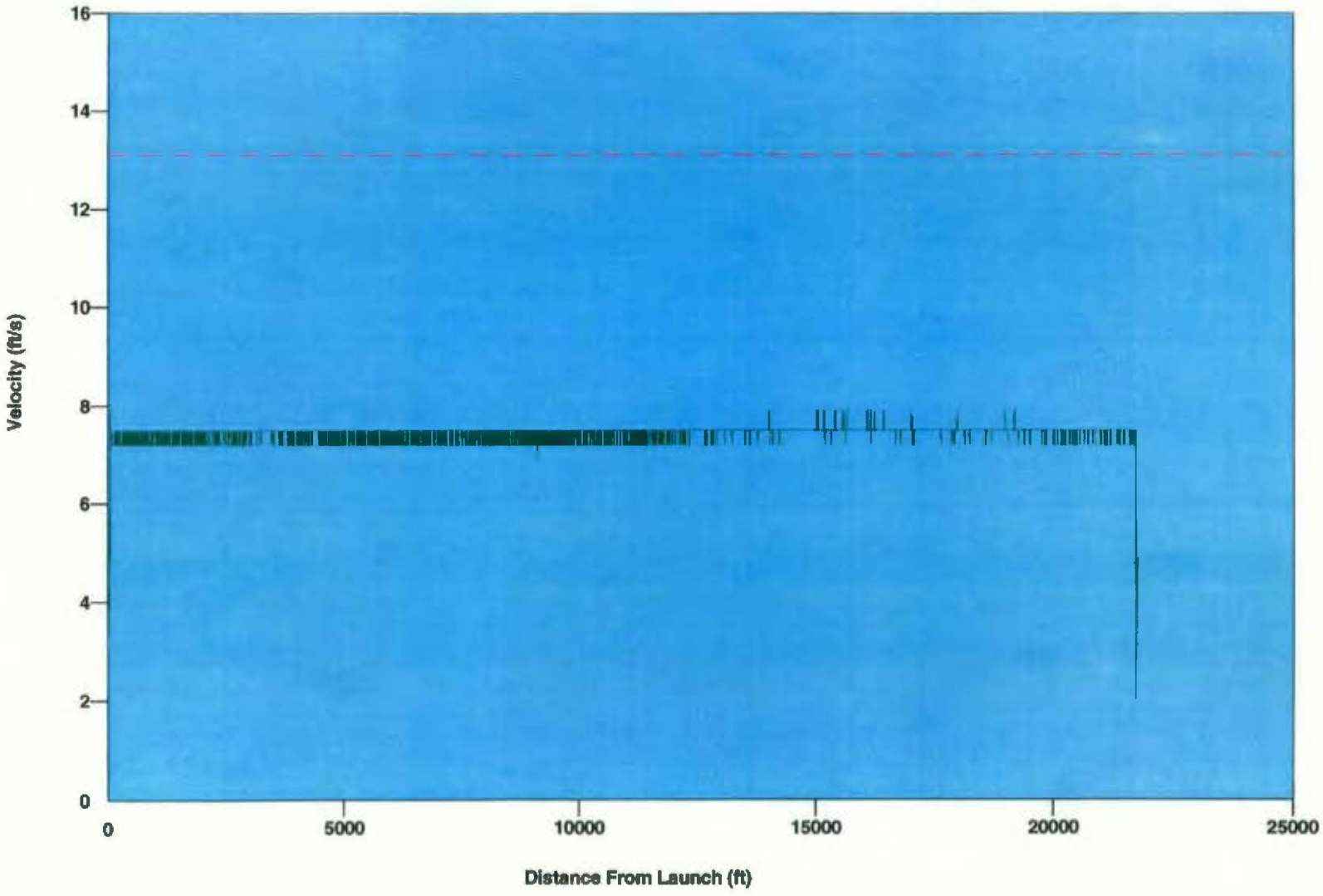
The velocity profile plot is presented overleaf

VELOCITY PLOT

M.P. 1475.74 to M.P. 1479.77 (EAST RUN)

Contractual Maximum Velocity

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3.2.2. Metal Object Report

The metal object report provides a list of all ferrous metal objects that have been detected along the pipeline.

Metal objects can be potentially hazardous to the pipeline. They can impair the pipeline's protective coating or the cathodic protection system, and over time they can also dent or damage the pipe itself.

Metal objects are classified as close to or touching the pipeline. Those metal objects classified as touching are considered to have damaged the pipeline's protective coating or impaired the cathodic protection system. Metal objects that are considered to be part of the pipeline build, such as supports but excluding attachments, will only be reported if they are touching the pipeline. Pipeline casings that are touching the pipe will be reported in the eccentric pipeline casing report presented in Section 3.2.3.

No metal objects have been detected during this pipeline inspection.

3.2.3. Eccentric Casing Report

The eccentric casing report provides a list of all casings detected along the pipeline which appear to be eccentric to the pipe and may, therefore, have damaged the pipeline's protective coating or impaired the cathodic protection system.

No eccentric casings have been detected during this pipeline inspection.

3.2.4. Dent Report

The dent report provides a list of all dents that have been detected along the pipeline.

Dents will affect the integrity of the pipeline and are potentially dangerous. It should be noted that a dent associated with metal loss is potentially more significant than a dent alone.

2 dents have been detected during this pipeline inspection.

A table listing the dents is presented overleaf.

Dent Report

M.P. 1475.74 to M.P. 1479.77 (EAST RUN)

Upstream Girth Weld	Relative Distance (feet)	Absolute Distance (feet)	Associated Metal Loss	Associated Girth Weld	Associated Seam Weld	Orientation (hrs:mins)	Upstream Reference	Distance U/S Ref. to Girth Weld (feet)	Downstream Reference	Distance D/S Ref. to Girth Weld (feet)
3870	5.2	9571.5	NO	NO	NO	08:45	BALL VALVE	9534.4	BALL VALVE	12146.7
7920	19.6	19798.2	NO	NO	NO	01:15	BALL VALVE	19746.7	BALL VALVE	1934.5

ENBDNR0006725

3.2.5. Girth Weld Anomaly Report

The girth weld anomaly report provides a list of all significant girth weld anomalies that have been detected along the pipeline.

Incomplete welds and circumferential cracks within the weld are examples of girth weld anomalies.

No girth weld anomalies have been detected during this pipeline inspection.

3.2.6. Repair Listing

The repair listing provides a list of all fully circumferential repair shells and patch repaired spools that have been detected along the pipeline.

It should be noted that any metal loss detected beneath a repair shell or repair patch will not be included in the inspection analysis.

If a patch repair is detected within the spool then the spool will be reported on this listing as a patch repaired spool. Details of the individual patch repairs within the patch repaired spool will not normally be provided.

The inspection system has detected **no repair shells** and **no patch repaired spools** during this pipeline inspection.

3.2.7. Location Reference Point Listing

This is a list of the line markers (timer boxes), magnets, mainline valves, major offtakes and anodes, as appropriate, that have been detected by the inspection system and that can be used to locate features along the pipeline. A major offtake is defined as an offtake with an internal bore of more than half the diameter of the mainline pipe.

Line markers were not used on the inspection survey.

A table listing the location reference points along the pipeline is presented overleaf.

Location Reference Point Listing

M.P. 1475.74 to M.P. 1479.77 (EAST RUN)

Upstream Girth Weld	Relative Distance (feet)	Absolute Distance (feet)	Comment	Identification
40	1.3	31.8	BALL VALVE	
8730	1.1	21713.0	BALL VALVE	

3.2.8. Nominal Wall Thickness Listing

The nominal wall thickness listing provides a list of the locations along the pipeline where a change in the nominal pipe wall thickness, or other parameter of the pipeline, has been detected by the inspection system. This listing identifies the major and minor pipeline segments used during the analysis of the inspection data.

A pipeline segment is a section of the pipeline where the nominal wall thickness (nwt) and the assumed depth of background corrosion (B) are constant. The value of B is used in the Calculated Pressure equation for a metal loss cluster.

Pipeline segments can be categorised as either major or minor segments.

A major segment is a pipeline segment that has been defined by the pipeline operator in the table provided in the Company Defined Operating Parameters section of the contract. In this table the pipeline operator specifies the locations of the start and end of the segment and the values of nwt and B that apply within it.

A minor segment is a pipeline segment identified by the inspection system. The minor segment is a section within the major segment where the nominal wall thickness is distinctly different from that detected for the major segment.

In the absence of information from the pipeline operator, the B value for the minor segment will be assumed to be the same as that specified for the major segment in which it is located.

The nominal wall thickness within the minor segment will be estimated from readings obtained from the inspection survey. The estimated nominal wall thickness will be either a wall thickness stated by the pipeline operator as being present in the pipeline, or the nearest American Petroleum Institute (API) nominal wall thickness.

The values of nwt and B specified for each segment are used to calculate the RPR value of each metal loss feature detected within the segment.

A table listing the pipeline segments is presented overleaf.

Nominal Wall Thickness Listing

M.P. 1475.74 to M.P. 1479.77 (EAST RUN)

Upstream Girth Weld	Absolute Distance (feet)	Length of Segment (feet)	NWT (in)	Segment Number
10	0.0	21774.2	0.812	1

3.3. Pipeline Listing

The pipeline listing presents the sequence of girth welds, metal loss features, metal objects, eccentric pipeline casings, dents, girth weld anomalies and repairs detected along the pipeline. Location reference points and changes in the nominal pipe wall thickness are also included in the pipeline listing.

There are four types of entry in the pipeline listing. These are:

Girth Welds

Each girth weld entry consists of:

- a girth weld number;
- the relative distance along the pipeline to the girth weld from the previous (upstream) girth weld; and,
- the absolute distance from the start of the pipeline.

Metal Loss Features

Each entry for a metal loss feature consists of:

- the relative distance along the pipeline to the upstream edge of the metal loss feature from the previous (upstream) girth weld;
- the absolute distance along the pipeline to the upstream edge of the metal loss feature;
- ML to denote that the entry refers to a metal loss feature;
- EXT or INT to denote whether the metal loss feature is on the external or internal surface of the pipe. It should be noted that mid-wall metal loss features would be classified as external;
- the predicted peak depth of the metal loss feature;
- the predicted axial length of the metal loss feature; and,
- the orientation of the metal loss feature, as viewed in the direction of flow.
- the calculated RPR value for the metal loss feature.
- those metal loss features which have undergone detailed processing and analysis are indicated by a *. This includes all features reported on inspection sheets.

Please be aware that the RPR values in the Pipeline Listing are allocated to individual features. In the case of future corrosion, increasing depth of individual corrosion features is

not the only consideration. Individual features in close proximity may link together through low level corrosion leading to lower net RPR values.

Identified Manufacturing Faults

The entry for an identified manufacturing fault is the same as that for a metal loss feature with the following differences:

- MFG (in place of ML) to denote that the entry refers to an identified manufacturing fault; and,
- there is no calculated RPR value for an identified manufacturing fault.

Pipeline Anomalies and Fittings

Other entries in the pipeline listing relate to pipeline fittings and pipeline anomalies. These entries consist of:

- the relative distance along the pipeline to the fitting or anomaly relative from the previous (upstream) girth weld;
- the absolute distance along the pipeline to the fitting or anomaly; and,
- a comment describing the fitting or anomaly.

It should be noted that where the orientation of a pipeline fitting has not been specified then the fitting is centred on the 12-00 position.

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Pipeline Listing

Pipeline Listing

M.P. 1475.74 to M.P. 1479.77 (EAST RUN)

Girth Weld Number	Relative Distance (feet)	Absolute Distance (feet)	Comment	Peak Depth	Length	RPR	Orientation (hrs:mins)
10	0.0	0.0					
20	8.8	8.8					
30	21.4	30.2					
40	0.3	30.5					
	1.3	31.8	BALL VALVE M.P. 1475.74 LAUNCH				
50	2.8	33.3					
60	0.4	33.7					
70	2.9	36.5					
	1.3	37.8	16 IN OFFTAKE-FORGED				09:00
80	2.4	39.0					
	5.1	44.1	2 IN OFFTAKE-WELDOLET				09:00
90	18.1	57.1					
100	2.1	59.2					
			JOINT-INSULATED				
110	2.0	61.2					
120	27.9	89.2					
130	28.1	117.2					
140	20.1	137.3					
150	24.9	162.2					
160	26.5	188.7					
170	20.0	208.7					
180	26.3	235.1					
190	17.3	252.3					
200	25.9	278.3					
210	27.9	306.2					
220	26.9	333.1					
230	26.8	359.8					
240	21.7	381.5					
	0.8	382.3	INT MFG	20%	1.3		06:00
	1.1	382.6	*INT MFG	28%	0.9		05:45
250	6.2	387.7					
260	26.6	414.4					
270	26.1	440.4					
280	26.1	466.5					
290	27.6	494.1					
300	28.0	522.1					
310	20.8	542.9					
320	28.2	571.0					
330	26.6	597.6					
340	21.7	619.3					
350	27.5	646.8					
360	19.0	665.8					
370	8.3	674.1					

M.P. 1475.74 to M.P. 1479.77 (EAST RUN)

Girth Weld Number	Relative Distance (feet)	Absolute Distance (feet)	Comment	Peak Depth	Length	RPR	Orientation (hrs:mins)
1170	20.0	2716.1					
1180	26.0	2742.0					
1190	26.4	2768.4					
1200	25.7	2794.1					
1210	27.4	2821.5					
1220	25.9	2847.4					
1230	22.9	2870.3					
1240	26.2	2896.5					
1250	26.7	2923.2					
1260	26.8	2950.0					
1270	27.2	2977.2					
1280	27.0	3004.1					
1290	28.1	3032.2					
1300	21.7	3053.9					
1310	27.1	3081.0					
1320	26.2	3107.2					
1330	27.1	3134.3					
1340	26.8	3161.0					
1350	22.0	3183.1					
1360	27.2	3210.3					
1370	22.6	3232.8					
1380	25.6	3258.5					
	6.0	3264.4	*EXT ML	35%	0.7	1.183	03:00
	6.3	3264.7	*EXT ML	39%	5.8	1.031	03:15
1390	23.0	3281.5					
1400	27.7	3309.1					
1410	25.7	3334.8					
1420	24.7	3359.5					
1430	25.1	3384.7					
1440	19.5	3404.2					
1450	24.2	3428.4					
1460	27.5	3455.9					
1470	27.1	3482.9					
1480	26.9	3509.8					
1490	27.4	3537.2					
1500	17.3	3554.5					
1510	26.9	3581.4					
1520	24.7	3606.1					
1530	24.5	3630.6					
1540	22.4	3652.9					
1550	24.4	3677.4					
1560	24.0	3701.4					
1570	27.2	3728.6					
1580	22.1	3750.7					

M.P. 1475.74 to M.P. 1479.77 (EAST RUN)

Girth Weld Number	Relative Distance (feet)	Absolute Distance (feet)	Comment	Peak Depth	Length	RPR	Orientation (hrs:mins)
1590	24.0	3774.7					
1600	26.5	3801.3					
1610	26.3	3827.5					
1620	22.0	3849.5					
1630	26.3	3875.8					
1640	26.7	3902.5					
1650	19.4	3921.9					
1660	26.2	3948.1					
1670	26.5	3974.5					
1680	25.4	3999.9					
1690	26.2	4026.1					
1700	26.5	4052.6					
1710	27.3	4079.9					
1720	24.5	4104.4					
1730	17.8	4122.3					
1740	17.7	4139.9					
1750	27.4	4167.3					
1760	25.9	4193.2					
1770	22.6	4215.7					
1780	27.6	4243.3					
1790	22.6	4265.9					
1800	26.6	4292.6					
1810	23.7	4316.3					
1820	23.6	4339.9					
1830	27.5	4367.4					
1840	25.5	4392.9					
1850	27.2	4420.1					
1860	26.2	4446.3					
1870	27.0	4473.3					
1880	26.5	4499.9					
1890	22.8	4522.6					
1900	23.2	4545.9					
1910	25.8	4571.7					
1920	27.1	4598.8					
1930	26.4	4625.2					
1940	27.2	4652.3					
1950	27.0	4679.3					
1960	25.9	4705.2					
1970	27.0	4732.2					
1980	27.0	4759.2					
1990	27.3	4786.6					
2000	27.0	4813.6					
2010	24.4	4838.0					
2020	22.7	4860.8					

M.P. 1475.74 to M.P. 1479.77 (EAST RUN)

Girth Weld Number	Relative Distance (feet)	Absolute Distance (feet)	Comment	Peak Depth	Length	RPR	Orientation (hrs:mins)
2030	26.1	4886.8					
2040	26.5	4913.3					
2050	27.6	4941.0					
2060	21.5	4962.4					
2070	27.0	4989.4					
2080	27.8	5017.2					
2090	27.4	5044.6					
2100	27.5	5072.1					
2110	25.6	5097.7					
2120	22.8	5120.5					
2130	20.8	5141.4					
2140	25.0	5166.3					
2150	28.0	5194.3					
2160	17.8	5212.1					
2170	28.3	5240.4					
2180	25.6	5266.0					
2190	23.8	5289.8					
2200	26.0	5315.8					
2210	20.1	5336.0					
2220	27.5	5363.5					
2230	27.4	5390.9					
2240	22.6	5413.5					
2250	27.7	5441.2					
2260	24.5	5465.7					
2270	25.7	5491.4					
2280	25.0	5516.4					
	24.7	5541.1	*INT MFG	27%	0.4		09:45
	24.9	5541.3	INT MFG	11%	0.4		10:15
2290	27.6	5544.0					
2300	24.3	5568.2					
	21.7	5590.0	INT MFG	19%	0.8		05:30
2310	22.5	5590.8					
2320	24.4	5615.1					
2330	24.9	5640.0					
2340	25.0	5664.9					
2350	24.8	5689.8					
2360	25.1	5714.9					
2370	25.8	5740.7					
2380	27.6	5768.3					
2390	22.6	5791.0					
2400	24.3	5815.3					
2410	26.4	5841.7					
2420	27.4	5869.1					
2430	26.7	5895.9					

M.P. 1475.74 to M.P. 1479.77 (EAST RUN)

Girth Weld Number	Relative Distance (feet)	Absolute Distance (feet)	Comment	Peak Depth	Length	RPR	Orientation (hrs:mins)
2440	26.8	5922.7					
2450	24.4	5947.1					
2460	27.3	5974.3					
2470	27.6	6001.9					
2480	26.5	6028.4					
2490	27.0	6055.4					
2500	24.3	6079.7					
2510	25.8	6105.5					
2520	26.6	6132.1					
2530	24.4	6156.5					
2540	26.0	6182.5					
2550	24.0	6206.4					
2560	27.1	6233.5					
2570	24.0	6257.5					
2580	26.6	6284.1					
2590	27.0	6311.1					
2600	25.1	6336.2					
2610	27.6	6363.8					
2620	27.3	6391.2					
2630	25.0	6416.2					
2640	23.0	6439.3					
2650	26.1	6465.4					
2660	26.2	6491.5					
2670	27.4	6518.9					
2680	24.8	6543.7					
2690	25.2	6568.9					
2700	27.4	6596.3					
2710	27.0	6623.3					
2720	27.8	6651.1					
2730	25.4	6676.4					
2740	25.3	6701.7					
2750	24.4	6726.1					
2760	27.4	6753.5					
2770	27.6	6781.1					
2780	27.4	6808.5					
2790	26.6	6835.1					
2800	27.2	6862.3					
2810	27.2	6889.6					
2820	26.3	6915.8					
2830	26.5	6942.3					
2840	26.5	6968.8					
2850	25.7	6994.5					
2860	25.6	7020.1					
2870	24.0	7044.1					

Pipeline Listing

M.P. 1475.74 to M.P. 1479.77 (EAST RUN)

Girth Weld Number	Relative Distance (feet)	Absolute Distance (feet)	Comment	Peak Depth	Length	RPR	Orientation (hrs:mins)
2880	26.7	7070.8					
2890	27.3	7098.1					
2900	25.9	7124.0					
2910	24.4	7148.4					
2920	25.3	7173.7					
2930	23.0	7196.7					
2940	25.2	7222.0					
2950	22.7	7244.7					
2960	25.8	7270.5					
2970	28.0	7298.5					
2980	26.4	7324.9					
2990	26.9	7351.8					
3000	25.9	7377.7					
3010	25.0	7402.7					
3020	25.8	7428.5					
3030	27.2	7455.7					
	14.6	7470.2	*EXT MFG	28%	0.5		07:00
3040	25.8	7481.5					
	20.1	7501.6	*EXT MFG	30%	0.6		02:30
3050	26.2	7507.7					
3060	27.6	7535.3					
3070	26.2	7561.5					
3080	26.6	7588.1					
3090	26.9	7615.1					
3100	27.3	7642.4					
3110	26.0	7668.4					
3120	26.6	7695.1					
3130	18.4	7713.5					
3140	16.6	7730.1					
3150	26.5	7756.6					
3160	20.2	7776.8					
3170	25.8	7802.6					
3180	28.6	7831.2					
3190	26.8	7858.0					
3200	17.7	7875.8					
3210	25.9	7901.7					
3220	26.0	7927.7					
3230	26.4	7954.1					
3240	21.4	7975.5					
3250	26.3	8001.8					
3260	23.0	8024.8					
3270	18.0	8042.9					
3280	27.6	8070.5					
3290	26.9	8097.4					

M.P. 1475.74 to M.P. 1479.77 (EAST RUN)

Girth Weld Number	Relative Distance (feet)	Absolute Distance (feet)	Comment	Peak Depth	Length	RPR	Orientation (hrs:mins)
3300	26.7	8124.1					
3310	26.5	8150.6					
3320	24.0	8174.5					
3330	24.5	8199.0					
3340	25.6	8224.6					
3350	27.0	8251.6					
3360	18.7	8270.3					
3370	27.1	8297.4					
3380	23.8	8321.1					
3390	19.4	8340.6					
3400	27.4	8368.0					
3410	27.3	8395.3					
3420	27.9	8423.2					
3430	25.9	8449.1					
3440	23.9	8473.0					
3450	25.3	8498.3					
3460	27.2	8525.5					
3470	26.4	8551.9					
3480	20.3	8572.2					
3490	27.1	8599.4					
3500	27.7	8627.1					
3510	27.6	8654.8					
3520	27.2	8682.0					
3530	24.8	8706.8					
3540	24.3	8731.1					
3550	21.7	8752.8					
3560	19.7	8772.5					
3570	26.9	8799.4					
3580	27.8	8827.2					
3590	27.1	8854.3					
3600	28.1	8882.3					
3610	25.0	8907.3					
3620	27.1	8934.5					
3630	24.3	8958.8					
3640	24.0	8982.8					
	20.9	9003.7	*EXT MFG	28%	0.4		01:30
3650	23.8	9006.6					
3660	26.4	9033.0					
3670	25.3	9058.3					
3680	21.8	9080.1					
3690	27.6	9107.7					
3700	27.1	9134.8					
3710	26.2	9161.1					
3720	27.1	9188.2					

M.P. 1475.74 to M.P. 1479.77 (EAST RUN)

Girth Weld Number	Relative Distance (feet)	Absolute Distance (feet)	Comment	Peak Depth	Length	RPR	Orientation (hrs:mins)
3730	27.0	9215.1					
3740	26.4	9241.6					
3750	27.2	9268.7					
3760	20.4	9289.2					
3770	28.4	9317.5					
3780	26.4	9343.9					
3790	25.8	9369.7					
3800	19.0	9388.8					
3810	27.4	9416.2					
3820	20.2	9436.3					
3830	26.2	9462.5					
3840	24.8	9487.3					
3850	23.2	9510.4					
3860	28.2	9538.6					
3870	27.6	9566.3					
	5.2	9571.5	DENT				08:45
3880	26.7	9592.9					
3890	21.1	9614.1					
3900	25.3	9639.4					
3910	28.0	9667.4					
3920	23.6	9691.0					
3930	19.3	9710.3					
3940	23.4	9733.7					
3950	27.2	9760.9					
3960	24.7	9785.6					
3970	26.5	9812.1					
3980	25.6	9837.8					
3990	27.8	9865.6					
4000	23.0	9888.6					
4010	21.9	9910.5					
4020	25.7	9936.3					
4030	22.9	9959.2					
4040	27.3	9986.5					
4050	27.2	10013.7					
4060	26.2	10039.9					
4070	24.6	10064.4					
4080	22.3	10086.8					
4090	28.4	10115.1					
4100	27.4	10142.5					
4110	28.5	10171.0					
4120	25.0	10196.1					
4130	17.2	10213.3					
4140	25.8	10239.1					
4150	26.6	10265.8					

M.P. 1475.74 to M.P. 1479.77 (EAST RUN)

Girth Weld Number	Relative Distance (feet)	Absolute Distance (feet)	Comment	Peak Depth	Length	RPR	Orientation (hrs:mins)
4160	26.7	10292.5					
4170	27.5	10320.0					
4180	26.0	10346.0					
4190	26.5	10372.5					
4200	25.5	10398.1					
4210	27.0	10425.1					
4220	23.8	10448.9					
4230	24.1	10473.0					
4240	26.8	10499.8					
	24.9	10524.7	INT MFG	20%	2.4		01:45
4250	26.8	10526.6					
	7.2	10533.8	INT MFG	19%	0.9		03:45
	7.5	10534.0	INT MFG	21%	0.4		02:15
	7.6	10534.2	INT MFG	18%	0.6		01:00
	8.0	10534.5	INT MFG	18%	0.9		03:15
	8.0	10534.5	INT MFG	21%	2.5		01:30
	8.4	10535.0	INT MFG	13%	1.0		02:00
4260	26.1	10552.6					
4270	26.1	10578.7					
4280	24.8	10603.5					
4290	25.2	10628.7					
4300	25.9	10654.7					
4310	27.0	10681.7					
4320	27.3	10708.9					
4330	18.4	10727.3					
4340	18.4	10745.7					
4350	27.5	10773.3					
4360	26.1	10799.3					
4370	22.3	10821.6					
4380	25.5	10847.1					
4390	22.5	10869.6					
4400	27.9	10897.5					
4410	16.9	10914.4					
4420	16.5	10930.9					
4430	26.6	10957.5					
4440	26.4	10983.9					
4450	25.6	11009.5					
4460	26.7	11036.2					
4470	26.2	11062.4					
4480	26.7	11089.1					
4490	26.3	11115.5					
4500	27.1	11142.6					
4510	24.0	11166.6					
4520	25.1	11191.7					

Pipeline Listing

M.P. 1475.74 to M.P. 1479.77 (EAST RUN)

Girth Weld Number	Relative Distance (feet)	Absolute Distance (feet)	Comment	Peak Depth	Length	RPR	Orientation (hrs:mins)
4530	27.2	11218.9					
4540	28.4	11247.3					
4550	24.4	11271.8					
4560	26.4	11298.2					
4570	27.0	11325.2					
4580	26.9	11352.1					
4590	22.7	11374.8					
4600	26.7	11401.5					
4610	21.5	11423.1					
4620	26.7	11449.7					
	25.3	11475.0	INT MFG	17%	0.6		11:30
4630	27.1	11476.8					
4640	27.0	11503.8					
4650	20.4	11524.3					
4660	27.0	11551.2					
4670	27.7	11579.0					
4680	26.9	11605.9					
4690	27.6	11633.5					
4700	26.3	11659.9					
4710	27.3	11687.2					
4720	28.1	11715.3					
4730	26.3	11741.6					
4740	27.0	11768.6					
	23.6	11792.2	EXT MFG	10%	0.7		12:45
	24.0	11792.6	EXT MFG	19%	0.8		12:15
	24.6	11793.2	*EXT MFG	28%	0.6		01:00
	25.0	11793.6	EXT MFG	18%	0.3		02:15
4750	27.3	11795.9					
4760	19.5	11815.4					
4770	21.9	11837.3					
4780	25.8	11863.1					
4790	27.6	11890.6					
4800	25.2	11915.8					
4810	24.6	11940.4					
4820	27.9	11968.3					
4830	26.0	11994.2					
4840	25.0	12019.2					
4850	20.9	12040.2					
4860	26.8	12067.0					
4870	26.6	12093.6					
4880	19.6	12113.2					
4890	26.7	12139.9					
4900	26.2	12166.0					
4910	28.4	12194.4					

M.P. 1475.74 to M.P. 1479.77 (EAST RUN)

Girth Weld Number	Relative Distance (feet)	Absolute Distance (feet)	Comment	Peak Depth	Length	RPR	Orientation (hrs:mins)
4920	27.6	12222.0					
4930	26.7	12248.8					
4940	27.3	12276.1					
4950	28.2	12304.3					
4960	27.2	12331.5					
4970	27.6	12359.1					
4980	27.5	12386.6					
4990	25.0	12411.6					
5000	24.9	12436.5					
5010	26.0	12462.5					
5020	26.6	12489.1					
5030	22.1	12511.2					
5040	27.0	12538.2					
5050	27.6	12565.8					
5060	26.2	12592.0					
5070	27.4	12619.4					
5080	27.8	12647.2					
5090	27.2	12674.4					
5100	23.3	12697.7					
5110	27.3	12725.0					
5120	26.2	12751.3					
5130	24.5	12775.7					
5140	26.8	12802.6					
5150	24.0	12826.6					
5160	25.6	12852.2					
5170	27.1	12879.3					
5180	26.4	12905.7					
5190	27.4	12933.0					
5200	25.3	12958.3					
5210	27.2	12985.5					
5220	26.9	13012.4					
5230	25.9	13038.3					
5240	27.7	13066.0					
5250	25.6	13091.6					
5260	27.0	13118.6					
5270	27.0	13145.6					
5280	26.2	13171.8					
5290	27.4	13199.2					
5300	26.9	13226.0					
5310	26.7	13252.7					
5320	26.5	13279.2					
5330	26.5	13305.7					
	5.1	13310.8	INT MFG	19%	1.1		06:15
	6.6	13312.3	INT MFG	16%	0.7		07:15

M.P. 1475.74 to M.P. 1479.77 (EAST RUN)

Girth Weld Number	Relative Distance (feet)	Absolute Distance (feet)	Comment	Peak Depth	Length	RPR	Orientation (hrs:mins)
	7.1	13312.8	INT MFG	6%	1.1		07:15
	7.6	13313.3	INT MFG	12%	0.9		06:30
	8.6	13314.3	INT MFG	18%	0.6		05:00
	13.5	13319.2	INT MFG	17%	0.4		06:45
	13.6	13319.3	INT MFG	10%	0.9		04:15
	14.0	13319.7	INT MFG	14%	0.5		06:30
	14.6	13320.3	INT MFG	26%	0.6		03:30
	15.9	13321.6	INT MFG	15%	1.1		07:15
5340	27.6	13333.3					
5350	26.1	13359.4					
5360	27.5	13386.9					
5370	25.0	13411.9					
5380	26.3	13438.1					
5390	27.4	13465.5					
5400	26.6	13492.1					
5410	22.7	13514.8					
5420	22.7	13537.5					
5430	23.6	13561.1					
5440	26.0	13587.1					
5450	22.6	13609.8					
5460	28.3	13638.0					
5470	24.8	13662.9					
5480	26.5	13689.4					
5490	27.7	13717.1					
5500	27.6	13744.7					
5510	26.5	13771.2					
5520	27.7	13798.9					
5530	26.4	13825.2					
5540	26.2	13851.5					
5550	27.0	13878.5					
5560	27.2	13905.7					
5570	26.5	13932.2					
5580	24.9	13957.1					
5590	26.4	13983.6					
5600	25.4	14009.0					
5610	26.0	14035.0					
5620	25.3	14060.3					
5630	25.3	14085.6					
5640	27.3	14113.0					
5650	25.9	14138.9					
5660	27.0	14165.9					
5670	22.2	14188.1					
5680	23.1	14211.2					
5690	26.6	14237.8					

M.P. 1475.74 to M.P. 1479.77 (EAST RUN)

Girth Weld Number	Relative Distance (feet)	Absolute Distance (feet)	Comment	Peak Depth	Length	RPR	Orientation (hrs:mins)
5700	27.0	14264.8					
5710	27.4	14292.1					
5720	25.5	14317.6					
5730	25.7	14343.3					
5740	23.4	14366.7					
5750	27.3	14394.0					
5760	26.4	14420.4					
5770	27.6	14447.9					
5780	25.2	14473.1					
5790	28.2	14501.3					
5800	25.6	14526.9					
5810	27.7	14554.6					
5820	26.8	14581.4					
5830	27.5	14608.9					
5840	19.4	14628.3					
5850	26.7	14655.0					
5860	27.0	14681.9					
5870	24.8	14706.7					
5880	20.9	14727.7					
5890	23.5	14751.1					
5900	25.8	14776.9					
5910	26.9	14803.8					
5920	28.1	14831.9					
5930	22.1	14854.0					
5940	26.3	14880.3					
5950	25.0	14905.3					
5960	27.0	14932.3					
5970	27.8	14960.1					
5980	27.8	14987.9					
5990	24.9	15012.9					
6000	26.9	15039.8					
6010	26.8	15066.7					
6020	24.8	15091.5					
6030	26.5	15118.0					
6040	28.0	15146.0					
6050	27.1	15173.1					
6060	24.8	15197.8					
6070	25.0	15222.8					
6080	25.7	15248.5					
	7.6	15256.1	INT MFG	15%	0.8		04:30
6090	26.1	15274.6					
6100	26.3	15300.9					
6110	27.4	15328.2					
	0.6	15328.8	INT MFG	22%	0.4		12:00

M.P. 1475.74 to M.P. 1479.77 (EAST RUN)

Girth Weld Number	Relative Distance (feet)	Absolute Distance (feet)	Comment	Peak Depth	Length	RPR	Orientation (hrs:mins)
6120	28.0	15356.2					
6130	25.8	15382.0					
6140	26.2	15408.2					
6150	15.6	15423.8					
6160	27.4	15451.3					
6170	26.7	15478.0					
6180	24.7	15502.8					
6190	26.0	15528.8					
6200	25.6	15554.3					
6210	27.0	15581.3					
6220	26.0	15607.3					
6230	20.5	15627.8					
6240	25.1	15652.9					
6250	26.8	15679.7					
6260	27.9	15707.6					
6270	17.8	15725.3					
6280	17.4	15742.7					
6290	21.2	15763.9					
6300	26.0	15789.9					
6310	18.8	15808.7					
6320	27.9	15836.6					
	13.1	15849.7	*INT MFG	30%	1.1		09:45
	13.5	15850.0	EXT MFG	10%	0.6		09:00
6330	17.7	15854.2					
6340	24.9	15879.1					
6350	27.4	15906.5					
	7.1	15913.7	INT MFG	10%	0.6		06:15
	9.9	15916.4	INT MFG	15%	1.5		07:45
6360	26.7	15933.2					
6370	17.6	15950.8					
	18.0	15968.8	INT MFG	21%	0.6		11:15
6380	25.2	15976.0					
6390	26.1	16002.1					
6400	25.6	16027.7					
6410	25.9	16053.6					
6420	27.4	16081.0					
6430	17.9	16098.9					
6440	25.6	16124.6					
6450	16.9	16141.4					
6460	22.4	16163.8					
6470	17.0	16180.8					
6480	17.0	16197.8					
	0.4	16198.2	*INT MFG	29%	0.2		02:15
	1.1	16198.9	INT MFG	20%	0.5		01:00

M.P. 1475.74 to M.P. 1479.77 (EAST RUN)

Girth Weld Number	Relative Distance (feet)	Absolute Distance (feet)	Comment	Peak Depth	Length	RPR	Orientation (hrs:mins)
6490	17.3	16215.1					
6500	24.7	16239.8					
6510	27.1	16266.9					
6520	27.1	16294.0					
	23.5	16317.5	INT MFG	15%	0.2		06:00
6530	25.7	16319.7					
6540	27.2	16346.9					
6550	26.9	16373.8					
	15.7	16389.5	*INT ML	26%	1.3	1.177	01:15
	24.5	16398.3	INT MFG	19%	1.3		09:15
6560	26.4	16400.1					
6570	23.2	16423.4					
	2.8	16426.1	INT MFG	13%	0.9		05:45
6580	17.6	16440.9					
6590	28.0	16468.9					
6600	18.9	16487.8					
6610	27.2	16515.1					
6620	18.3	16533.4					
6630	18.0	16551.4					
6640	18.5	16570.0					
6650	25.3	16595.2					
6660	26.1	16621.4					
6670	26.8	16648.2					
6680	27.0	16675.2					
6690	27.8	16703.0					
6700	26.9	16729.9					
6710	28.0	16757.9					
6720	25.6	16783.5					
6730	26.9	16810.5					
6740	27.3	16837.7					
6750	23.4	16861.1					
6760	25.4	16886.5					
6770	27.0	16913.4					
6780	20.5	16934.0					
6790	27.8	16961.8					
6800	23.3	16985.1					
6810	27.6	17012.7					
	8.7	17021.4	*INT MFG	30%	5.5		06:00
6820	25.8	17038.5					
	23.9	17062.4	INT MFG	9%	0.5		05:45
6830	27.0	17065.5					
6840	26.3	17091.8					
6850	24.4	17116.2					
	21.5	17137.7	INT MFG	20%	0.9		08:15

M.P. 1475.74 to M.P. 1479.77 (EAST RUN)

Girth Weld Number	Relative Distance (feet)	Absolute Distance (feet)	Comment	Peak Depth	Length	RPR	Orientation (hrs:mins)
	21.9	17138.1	*INT MFG	28%	2.0		07:45
	22.4	17138.7	INT MFG	22%	0.5		12:30
6860	24.9	17141.1					
6870	26.0	17167.1					
6880	26.4	17193.5					
6890	27.2	17220.6					
6900	27.6	17248.3					
6910	27.2	17275.5					
6920	27.4	17302.9					
6930	23.8	17326.7					
6940	27.0	17353.7					
6950	24.2	17377.9					
6960	27.3	17405.2					
6970	27.7	17432.8					
6980	27.0	17459.8					
6990	24.8	17484.6					
7000	26.2	17510.7					
7010	25.7	17536.5					
7020	27.6	17564.1					
7030	27.1	17591.2					
7040	28.0	17619.2					
7050	26.6	17645.8					
7060	26.6	17672.4					
7070	23.8	17696.1					
7080	22.3	17718.4					
7090	26.5	17744.9					
7100	18.9	17763.8					
7110	25.1	17788.9					
7120	16.8	17805.7					
7130	27.9	17833.6					
7140	27.8	17861.5					
7150	18.3	17879.7					
7160	18.4	17898.1					
	0.5	17898.6	INT MFG	18%	0.9		06:30
7170	19.9	17918.0					
7180	21.9	17939.9					
	11.1	17951.0	INT MFG	20%	0.8		12:45
	11.6	17951.5	INT MFG	7%	1.0		07:00
	11.6	17951.5	INT MFG	10%	0.2		04:30
	11.9	17951.8	INT MFG	12%	1.4		05:15
7190	27.3	17967.2					
7200	24.5	17991.7					
7210	25.3	18017.0					
7220	27.1	18044.1					

M.P. 1475.74 to M.P. 1479.77 (EAST RUN)

Girth Weld Number	Relative Distance (feet)	Absolute Distance (feet)	Comment	Peak Depth	Length	RPR	Orientation (hrs:mins)
7230	26.9	18071.0					
7240	24.7	18095.7					
7250	24.7	18120.5					
7260	26.1	18146.5					
7270	26.9	18173.4					
7280	24.3	18197.7					
7290	26.9	18224.6					
7300	25.0	18249.6					
7310	19.0	18268.6					
7320	26.6	18295.2					
7330	26.8	18321.9					
7340	27.1	18349.1					
7350	18.5	18367.6					
7360	26.3	18393.8					
7370	16.2	18410.1					
7380	27.7	18437.7					
7390	18.4	18456.1					
7400	26.4	18482.5					
7410	26.8	18509.3					
7420	17.5	18526.8					
7430	16.7	18543.5					
7440	27.2	18570.7					
7450	23.9	18594.6					
7460	24.4	18619.0					
7470	27.2	18646.1					
7480	26.4	18672.6					
7490	26.4	18699.0					
7500	16.1	18715.1					
7510	28.1	18743.3					
7520	27.2	18770.5					
7530	22.0	18792.4					
7540	26.9	18819.4					
7550	19.1	18838.5					
7560	20.6	18859.1					
7570	17.3	18876.4					
7580	25.6	18902.0					
7590	27.3	18929.3					
7600	27.6	18956.9					
7610	19.4	18976.3					
7620	27.8	19004.1					
7630	25.9	19030.0					
7640	23.9	19053.9					
7650	24.0	19077.9					
7660	26.6	19104.6					

M.P. 1475.74 to M.P. 1479.77 (EAST RUN)

Girth Weld Number	Relative Distance (feet)	Absolute Distance (feet)	Comment	Peak Depth	Length	RPR	Orientation (hrs:mins)
7670	25.5	19130.0					
7680	26.6	19156.7					
7690	27.3	19184.0					
7700	25.0	19209.0					
7710	25.6	19234.6					
7720	25.5	19260.1					
7730	24.5	19284.6					
7740	25.7	19310.3					
7750	26.2	19336.5					
7760	27.4	19363.9					
7770	26.3	19390.3					
7780	20.6	19410.9					
7790	27.2	19438.0					
7800	27.1	19465.2					
7810	27.3	19492.5					
7820	20.9	19513.3					
7830	26.6	19539.9					
7840	28.0	19567.9					
7850	26.2	19594.1					
7860	26.5	19620.6					
7870	26.1	19646.7					
7880	27.7	19674.4					
7890	26.6	19701.0					
7900	26.5	19727.5					
7910	23.4	19750.9					
7920	27.6	19778.5					
	19.6	19798.2	DENT				01:15
7930	28.2	19806.7					
7940	24.1	19830.8					
7950	21.6	19852.5					
7960	28.6	19881.1					
7970	26.9	19908.0					
7980	25.1	19933.1					
7990	28.4	19961.5					
8000	27.5	19989.0					
8010	28.1	20017.2					
8020	21.2	20038.4					
8030	26.6	20064.9					
8040	23.6	20088.5					
8050	28.5	20116.9					
8060	26.9	20143.8					
8070	27.9	20171.8					
8080	13.5	20185.3					
8090	20.2	20205.5					

M.P. 1475.74 to M.P. 1479.77 (EAST RUN)

Girth Weld Number	Relative Distance (feet)	Absolute Distance (feet)	Comment	Peak Depth	Length	RPR	Orientation (hrs:mins)
8100	27.0	20232.5					
8110	24.8	20257.3					
8120	27.0	20284.3					
8130	25.9	20310.2					
	3.3	20313.5	*EXT MFG	30%	0.2		12:15
	4.2	20314.4	EXT MFG	16%	0.9		11:15
	5.0	20315.3	EXT MFG	27%	0.2		10:00
	5.2	20315.5	EXT MFG	14%	0.3		09:45
	5.8	20316.0	EXT MFG	16%	0.6		09:00
	5.9	20316.2	EXT MFG	27%	0.4		09:00
	6.3	20316.5	EXT MFG	12%	0.6		08:15
8140	26.2	20336.4					
	20.8	20357.2	INT MFG	27%	0.4		05:30
8150	24.5	20360.9					
8160	25.0	20385.9					
8170	27.4	20413.3					
8180	24.4	20437.7					
8190	24.6	20462.2					
8200	25.3	20487.5					
8210	24.6	20512.1					
8220	17.5	20529.5					
8230	25.8	20555.3					
8240	25.5	20580.8					
8250	27.5	20608.2					
8260	24.6	20632.8					
8270	27.4	20660.2					
8280	24.2	20684.5					
8290	26.8	20711.3					
8300	26.4	20737.7					
8310	27.3	20765.0					
8320	20.8	20785.9					
8330	27.9	20813.8					
8340	24.7	20838.4					
8350	8.6	20847.0					
8360	25.6	20872.6					
8370	25.6	20898.2					
8380	27.3	20925.4					
8390	25.0	20950.4					
8400	25.5	20975.9					
8410	26.3	21002.2					
8420	25.3	21027.5					
8430	27.3	21054.7					
8440	25.8	21080.6					
8450	25.8	21106.4					

M.P. 1475.74 to M.P. 1479.77 (EAST RUN)

Girth Weld Number	Relative Distance (feet)	Absolute Distance (feet)	Comment	Peak Depth	Length	RPR	Orientation (hrs:mins)
8460	27.5	21133.9					
8470	27.1	21161.0					
8480	27.2	21188.1					
8490	26.6	21214.7					
	17.7	21232.4	EXT MFG	22%	1.0		06:45
	22.1	21236.8	EXT MFG	23%	0.4		05:00
	22.3	21237.0	EXT MFG	26%	0.9		04:15
	22.5	21237.2	*EXT MFG	29%	0.6		04:15
	27.1	21241.8	EXT MFG	20%	0.6		06:30
8500	28.2	21242.9					
8510	26.6	21269.5					
8520	26.8	21296.3					
8530	26.7	21322.9					
	6.9	21329.8	INT MFG	9%	0.7		04:45
	7.3	21330.2	INT MFG	10%	0.9		04:00
	7.7	21330.7	INT MFG	27%	1.3		03:30
	10.5	21333.4	INT MFG	11%	0.2		04:15
	13.6	21336.6	INT MFG	19%	1.0		04:00
	14.6	21337.6	INT MFG	16%	0.4		03:45
	19.2	21342.1	INT MFG	4%	0.4		03:30
	22.5	21345.4	INT MFG	25%	1.6		06:00
	23.0	21345.9	INT MFG	18%	0.8		03:45
8540	23.3	21346.3					
8550	19.8	21366.1					
8560	18.9	21384.9					
8570	26.3	21411.3					
8580	26.8	21438.1					
8590	27.2	21465.3					
8600	26.0	21491.2					
8610	25.7	21516.9					
8620	24.8	21541.7					
8630	23.7	21565.4					
8640	28.3	21593.7					
8650	27.9	21621.6					
	22.7	21644.3	INT MFG	13%	0.3		01:30
	22.9	21644.5	*INT MFG	30%	0.7		01:15
	24.3	21645.9	INT MFG	12%	1.0		02:30
	24.7	21646.3	INT MFG	16%	1.5		02:15
	25.2	21646.8	INT MFG	19%	1.0		04:15
8660	26.3	21647.8					
8670	27.2	21675.0					
8680	2.0	21677.1					
			JOINT-INSULATED				
8690	2.0	21679.1					

M.P. 1475.74 to M.P. 1479.77 (EAST RUN)

Girth Weld Number	Relative Distance (feet)	Absolute Distance (feet)	Comment	Peak Depth	Length	RPR	Orientation (hrs:mins)
8700	27.0	21706.1					
	1.2	21707.3	16 IN OFFTAKE-FORGED				09:00
8710	2.5	21708.6					
8720	3.0	21711.6					
8730	0.3	21711.9					
	1.1	21713.0	BALL VALVE				
8740	2.2	21714.2	M.P. 1479.77 RECEIVE				
8750	0.2	21714.4					
8760	24.6	21738.9					
8770	10.0	21748.9					
	2.1	21751.0	2 IN OFFTAKE-WELDOLET				12:00
8780	25.2	21774.2					

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Glossary of Terms

Absolute Distance	The distance from the start of the pipeline to the upstream edge of the metal loss feature.
Axial Length	The predicted axial length of the metal loss feature.
Relative Distance	The distance between the upstream girth weld and the feature under consideration.
ERF	The calculated Estimated Repair Factor value of the metal loss feature.
Ext or Int	Denotes whether the metal loss feature is on the external or internal surface of the pipe. It should be noted that mid-wall metal loss features would be classified as external.
Feature Selection Rule	The number of the selection rule under which the metal loss feature was chosen. The selection rules are specified in the Specification for a Pipeline Inspection Report (Appendix F)
FPR	The calculated Failure Pressure Ratio value of the metal loss feature.
Girth Weld Number	The number of the girth weld at which the pipeline segment begins, as used in the pipeline listing.
Identification	The identification number of the line marker, magnet or anode.
Inspection Sheet Number	The number of the inspection sheet which is summarised by each line in the Summary tables.
Major Segment	A pipeline segment that has been defined by the pipeline operator in the table provided in the Company Defined Operating Parameters section of the contract. In this table the pipeline operator specifies the locations of the start and end of the segment and the values of nwt and B that apply within it.
MAOP	The maximum allowable operating pressure for the pipeline segment, as specified by the pipeline operator.
Minor Segment	A pipeline segment identified by the inspection system. The minor segment is a section within the major segment where the nominal wall thickness is distinctly different from that detected for the major segment.
Nominal Wall Thickness	The pipe wall thickness of the spool containing the metal loss feature.

Orientation

The location of the metal loss feature around the circumference of the pipe, as viewed in the direction of flow. The value has been rounded to the nearest half hour.

Peak Depth

The predicted peak depth of the metal loss feature, expressed as a percentage of nominal wall thickness.

Pi

The internal design pressure for the pipeline segment, as specified by the pipeline operator.

PII

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Predicted Dimensions

The predicted dimensions of a metal loss feature are:

Axial length: The dimension along the pipe and parallel to the pipe axis;

Circumferential width: The dimension around the pipe and perpendicular to the pipe axis;

Peak depth: The depth of the metal loss feature expressed as a percentage of nominal wall thickness.

Pressure Ratio

The Estimated Repair Factor (ERF), Failure Pressure Ratio (FPR) or Rupture Pressure Ratio (RPR) calculated for the metal loss feature. This value was calculated using the formulae defined in the Specification for a Pipeline Inspection Report contained in the contract; a copy of which is given in Appendix F.

Primary Reference

A pipeline fitting or marker from which the metal loss feature can be easily located. More than one reference point may be provided on an inspection sheet.

Reference Girth Weld

The girth weld located at the upstream end of the spool containing the metal loss feature.

RPR

The calculated Rupture Pressure Ratio value of the metal loss feature.

Segment Number

Denotes whether the segment is a major or minor segment. A number (n) indicates that the segment is part of the nth major segment defined by the pipeline operator. A number (n/m) indicates that the segment is the mth minor segment within the nth major segment.

Selection Rule

The selection rule under which the most severe metal loss feature within the pipe spool is rated.

Strip Map Number

The drawing number, where available, of the pipeline strip map on which the metal loss feature is located.

Type	Denotes whether the metal loss feature is on the internal or external surface of the pipe. It should be noted that mid-wall metal loss features would be classified as external.
Upstream Girth Weld Number	The girth weld number of the girth weld located at the upstream end of the pipe spool.

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Appendices

Appendix A. Locating Metal Loss Features And Pipeline Anomalies

Locating metal loss features or pipeline anomalies is a difficult task, which can cost the pipeline operator valuable time and resources. Therefore, it is important that appropriate techniques are used at each stage in locating these features.

This appendix gives guidelines for locating pipeline features efficiently and effectively.

A1. Reference Points

Wherever possible, the position of metal loss features and pipeline anomalies is related to reference points that can be easily identified and located from the surface.

Reference points are either pipeline fittings, such as mainline valves, offtakes, anodes or side bends, or artificial reference points, such as magnets or line markers; these will have been placed on or near the pipeline at the time of the inspection.

At least one reference point is provided for each metal loss feature reported on the inspection sheets. If the reference point is more than 1600 feet from the metal loss feature then a second reference point will usually be provided.

Two reference points are provided for each pipeline anomaly. These reference points are extracted automatically from the pipeline listing and are limited to mainline valves and line markers.

A2. Location of Features

The location of the feature can be carried out in two stages; locating the spool that contains the metal loss feature or pipeline anomaly; then locating the feature within that spool.

To locate the spool containing the feature, the distance from the reference point to the girth weld at the upstream end of the spool is provided.

To locate the feature within the spool, the distance from the upstream girth weld to the feature and the location of the feature around the circumference of the pipe, as viewed in the direction of flow, are provided. Girth weld anomalies will be located within the upstream girth weld.

These distances are given to an accuracy of ±1%. It is recommended that electronic distance measuring equipment (EDM) is used to measure out these distances accurately.

A3. Identification of Features

Metal objects should be easily identified. Metal loss, dents and girth weld anomalies will require an area of the protective wrap to be removed.

A minimum area of approximately 2 ft along the pipe axis by 45° of the circumference, centred on the reported feature position, should be cleaned back to bare metal.

Once this has been done, any external metal loss, dents or the girth weld that contains an anomaly should be easily identified. The position of internal metal loss should be marked on the outside of the pipe in preparation for further examination.

Shallow dents can usually be identified by running one's hand along the pipe surface, or by placing a straight edge along the pipe.

NOTE: Features that are wholly contained within the pipe wall, such as voids, slag inclusions, or non-magnetic alloys, may have been classified as external metal loss, however these anomalies are quite rare.

A4. Contacting Pipeline Integrity International Inc.

Pipeline Integrity International Inc. aims to provide its clients with a quality service. If you cannot locate a metal loss feature from the information provided on the inspection sheet or if the metal loss is very different from the description given on the inspection sheet, then please do not hesitate to contact the contract manager at PII.

PIPELINE INTEGRITY INTERNATIONAL INC. TELEPHONE NUMBERS:

Telephone:	713 849 6300	(USA)
Fax:	713 937 0740	(USA)
Address:	Pipeline Integrity International Inc. Northwest Point Business Park 7105 Business Park Drive Houston Texas 77041 USA.	

ENBDNR0006762

Appendix B. Guidance Notes for Recording Excavation of Metal Loss Features

Contents

B1. Introduction

B2. Preparing pipe surface for inspection and recording

B2.1 Surface Preparation

B3. External metal loss area mapping

B3.1 Rubbing and Photographic Methods

B4. External metal loss depth recording

B5. Wall thickness and remaining ligament thickness recording

B6. Locating and quantifying internal metal loss in gas pipelines using x-radiography

B6.1 Introduction
B6.2 Technique for Quantifying Internal Metal Loss

Illustrations

Figure 1 Example of rubbing

Figure 2 Typical micrometer and bridging bar arrangement

Figure 3 Typical arrangement for X-ray technique

Figure 4 Procedure for inspecting and recording reported metal loss features - simplified flow diagram

Figure 5 Example of completed Pipeline Damage Record form

Blank 7097A for Client use

B1. Introduction

To help maintain and improve the defect sizing accuracy from these high resolution inspection systems it is extremely valuable to have feedback from defect excavations.

Reliable and accurate information from site investigations can be used to monitor actual defect dimensions against the dimensions reported from the inspection survey. This site data can then be used to improve defect sizing methods which brings benefit to all users of the inspection service.

We would ask pipeline operators wherever possible to feed any available comparison data from excavations back to us to help improve our service even more. For guidance, the most useful format for this data is as shown in the sample Damage Record Form in figure 5. This shows feature dimensions and location information.

We would like to express our appreciation to those who have provided this data in the past.

B2. Preparing Pipe Surface For Inspection And Recording

B2.1 Surface Preparation

To achieve satisfactory recording and measurement of the feature it is essential that the specified area of pipe surface is cleaned back to bare bright metal.

There are a number of methods for removing pipe wrap primer including:

(a) Solvent cleaning.

(b) Chemical cleaning.

(c) Wire brushing.

(d) Grit blasting.

For certain types of corrosion product it is possible to produce a finish resembling bright metal when cleaned using a wire brush. In this instance grit blasting is the preferred method in order to remove all the corrosion product.

B3. External Metal Loss Area Mapping

B3.1 Rubbing and Photographic Methods

The preferred method of mapping is by taking a simple rubbing. This is achieved by placing a sheet of paper over the feature, holding the paper firmly in place with, for example, small magnets and rubbing the long edge of a wax crayon over the surface of the paper. The edges of the feature will be delineated and if required, can be highlighted by careful manipulation of the crayon.

The following parameters should be annotated on the paper:

(a) Feature identity (e.g. PII Report Number and Feature Number).

(b) Direction of flow.

(c) Orientation of the feature.

(d) Distance of the feature from the nearest girth weld.

Refer to Figure 1 for an example of a mapped area using the rubbing technique.

The rubbing technique has a definite advantage over photographic recording methods in that it is possible to record all subsequent measurements directly on the rubbing in the appropriate location e.g. each individual pit depth in multiple pitting. Refer to Figure 1 for the example.

Photographic recording can be used but unless a 'polaroid' type film is used it can be a lengthy process before a result is obtained.

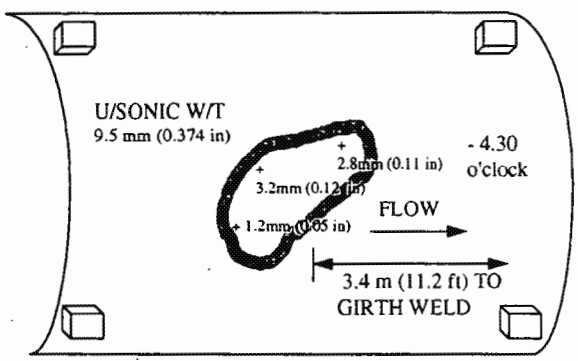


Figure 1: Example of Rubbing

B4. External Metal Loss Depth Recording

The most effective method for recording external metal loss depth is by using a depth micrometer in conjunction with a large bridging bar. Refer to Figure 2 for a typical arrangement.

It is recommended that the micrometer anvil be ground to a taper with a tip diameter of approximately 0.04 inches. This will enable entry into the small diameter pitting and concave surfaces found at the bottom of most metal loss features.

A pit gauge is not recommended because of its potential inaccuracy of up to 0.08 inches. A depth micrometer has a resolution of better than 0.002 inches.

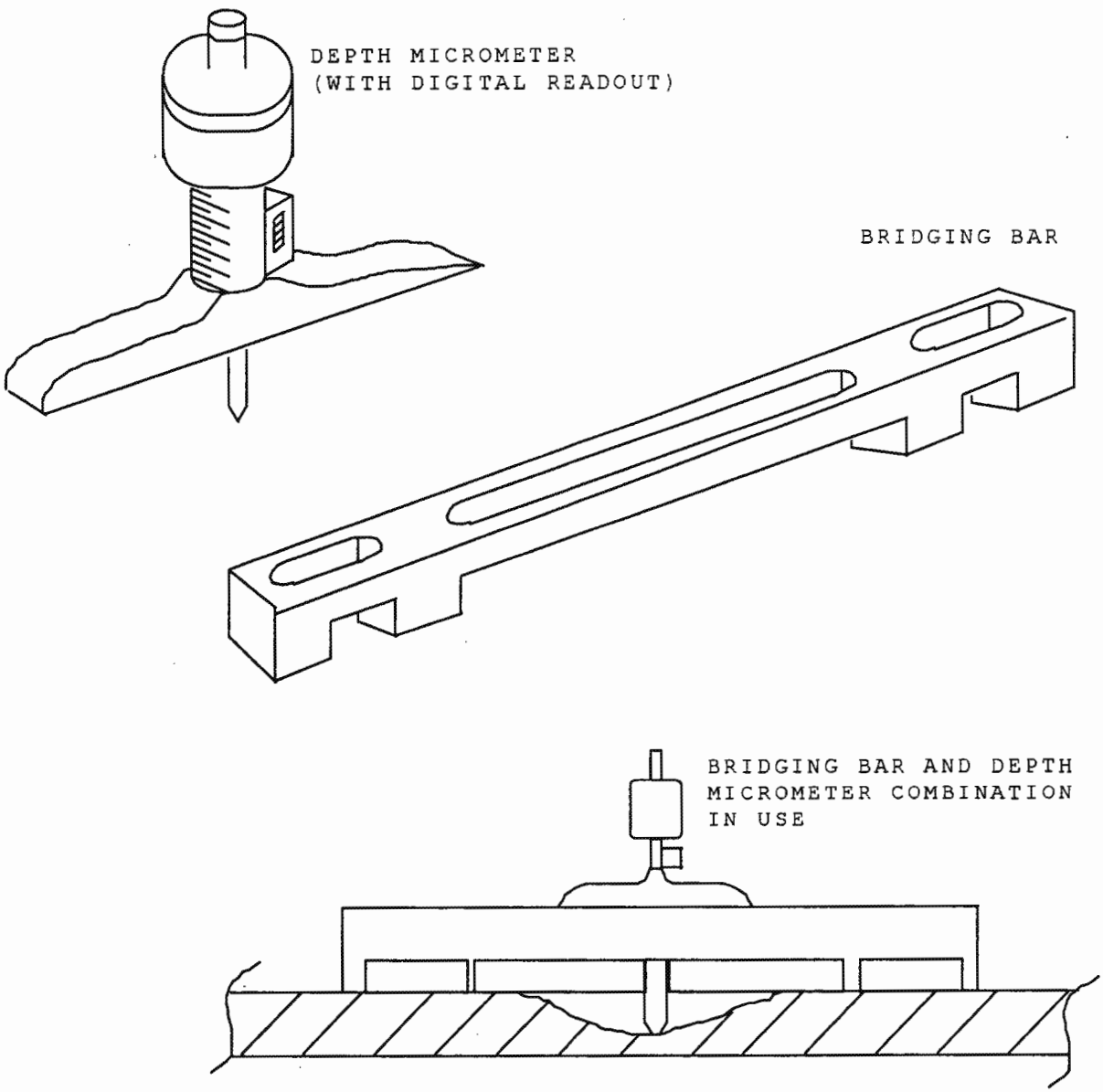


Figure 2: Typical Micrometer and Bridging Bar Arrangement

B5. Wall Thickness And Remaining Ligament Thickness Recording

Pipe wall thicknesses and remaining ligament thicknesses of internal damage can be measured to an accuracy of ±0.002 inches using standard ultrasonic wall thicknesses meters and suitable couplant.

Extreme care should be exercised when attempting to measure remaining ligament thicknesses directly within an area of external damage because there is extra couplant under the transducer when mounted on concave surfaces which results in an overestimated reading.

Decisions on assessing the significance of the damage are primarily based on the remaining ligament thickness. It is therefore important to obtain a reliable reading. This is best accomplished by obtaining the minimum ultrasonic thickness reading immediately surrounding the damage and subtracting the mechanical depth measurement.

B6. Locating And Quantifying Internal Metal Loss In Gas Pipelines Using X-Radiography

B6.1 Introduction

Locating a small area of internal metal loss is occasionally difficult using manual ultrasonic techniques. In these instances it is usually preferable to obtain an X-ray of the suspect area to locate the feature. Although time consuming the X-ray technique does have the advantage of providing a permanent record of the feature, and obtaining full inspection coverage.

Gamma radiography is not recommended since this technique is relatively insensitive to metal loss. Depending on wall thickness and the diameter of the pipe a sensitivity of approximately 10% of wall thickness can be achieved using gamma-ray techniques whereas X-ray techniques can achieve a sensitivity of better than 2% of wall thickness.

B6.2 Technique for Quantifying Internal Metal Loss

The following procedure for quantifying metal loss using X-radiograph has been devised and proved successful by PII. Refer to Figure 3.

(1) Locate area of metal loss using ultrasonic or Double Wall Single Image (DWSI) X-ray techniques.

(2) Place plate of known thickness over the metal loss area or deepest part of the metal loss. The plate thickness must be equal to or greater than the damage through-wall thickness.

(3) Place an ultrasonic step wedge on the pipe surface the adjacent to the metal loss but on sound pipe.

(4) Carry out DWSI X-radiography aiming for a density of approximately 3 on the parent plate.

(5) Using a densitometer on the radiograph compare the density of the darkest part in the metal loss plus plate with that on the step wedge and note the step thickness.

(6) Subtract the step thickness from the plate thickness to give the through-wall depth of the metal loss.

NOTE: It has been shown that slag or air are equally transparent to X-ray when using the energies applied to steel pipelines where the density is equal to that of the metal loss.

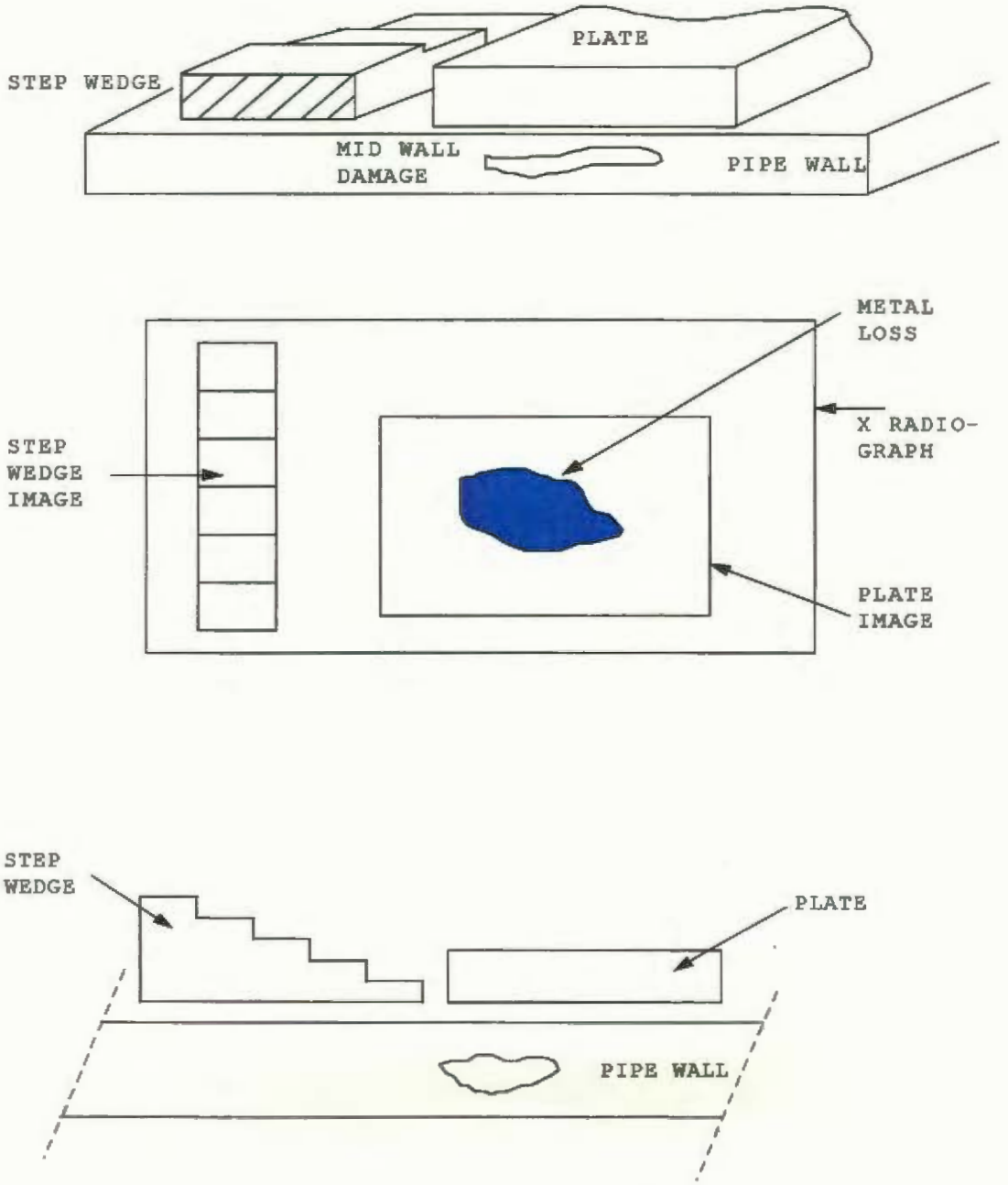


Figure 3: Typical Arrangement for X-ray Technique

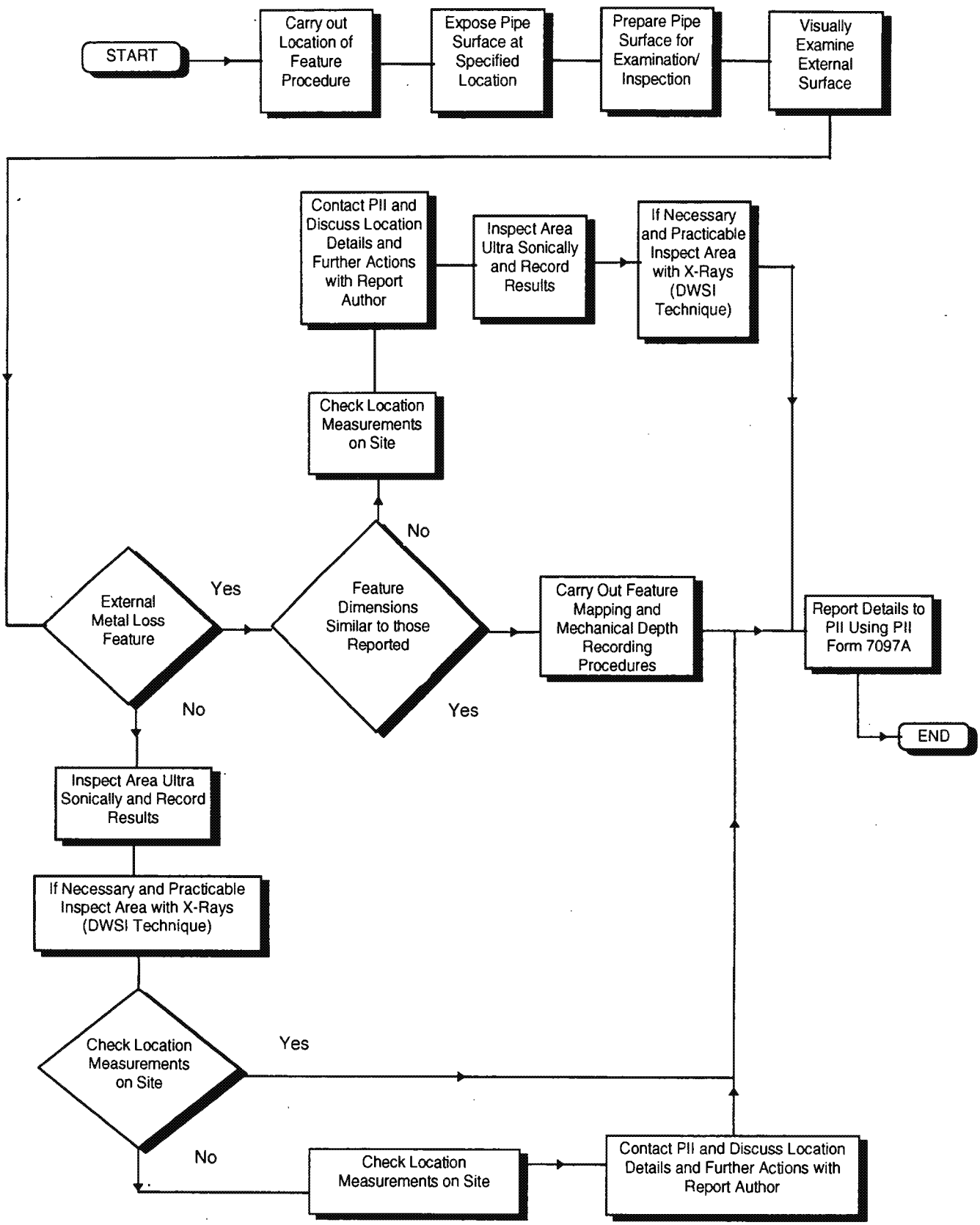


Figure 4: Procedure for Inspecting and Recording Reported Metal Loss Features - Simplified Flow Diagram

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PIPELINE DAMAGE RECORD

7097A
Oct 18/93

1. LOCATION OF DAMAGE

PIPELINE START: .....Somewhere Launch..... END: .....Somewhere Receive.....

FEATURE IDENTITY (PII) - REPORT NUMBER: ..SR 192..... INSP SHEET NO: ....3.....

FEATURE TYPE: General Corrosion ☒ Isolated Pit ☐ Gauge ☐ Manufacturing (Mill) ☐

Other: .....

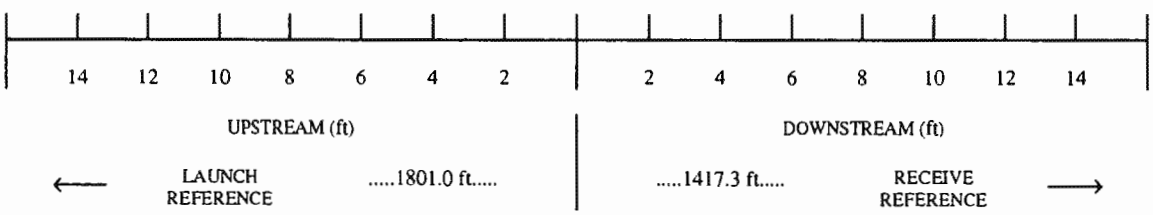
MEASURED WALL THICKNESS: .....0.361in.....

2. FEATURE DIMENSIONS

PII FEATURE NO.	EXACT POSITION UPSTREAM OR DOWNSTREAM OF REF. GIRTH WELD (ft)	ORIENTATION (o'clock)	AXIAL LENGTH (in)	CIRC'L WIDTH (in)	DEPTH	
					AVERAGE in% WT	PEAK in% WT
3/1	4.25 ft down	4.45	2.6	3.2		0.13
3/2	5.10 ft down	4.45	4.1	5.0		0.15
3/3	7.5 ft down	2.45	0.8	0.9		0.28

3. PLAN DIAGRAM OF SPOOL

CLOCK POSITION	REF GIRTH WELD
6 BOTTOM	.....
7	.....
8	.....
9	.....
10	.....
11	.....
12 TOP	.....
1	.....
2	.....3/3.....
3	.....+.....
4	.....3/1.....3/2.....
5	.....+.....+.....
6 BOTTOM	.....



NOTE: FOR COMPLEX FEATURES PLEASE ATTACH A 'RUBBING' OR SKETCH WITH DIMENSIONS AND DEPTHS IDENTIFIED.

RUBBING ATTACHED ☐ SKETCH ATTACHED ☐

DATA OF SITE INSPECTION: ..... SIGNATURE: .....

Figure 5: Example of completed Pipeline Damage Record Form (7097A)

Pipeline Integrity INTERNATIONAL

ENBDNR0006772

PIPELINE DAMAGE RECORD

7097A
Oct 18/93

1. LOCATION OF DAMAGE

PIPELINE START: ..... END: .....

FEATURE IDENTITY (PII) - REPORT NUMBER: ..... INSP SHEET NO: .....

FEATURE TYPE: General Corrosion ☐ Isolated Pit ☐ Gauge ☐ Manufacturing (Mill) ☐

Other: .....

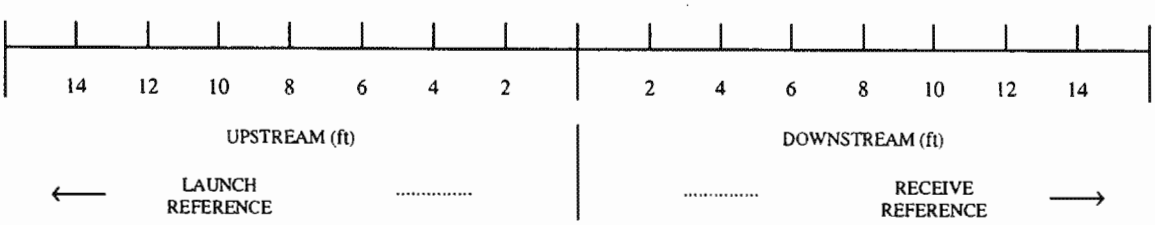
MEASURED WALL THICKNESS: .....

2. FEATURE DIMENSIONS

PII FEATURE NO.	EXACT POSITION UPSTREAM OR DOWNSTREAM OF REF. GIRTH WELD (ft)	ORIENTATION (o'clock)	AXIAL LENGTH (in)	CIRC'L WIDTH (in)	DEPTH	
					AVERAGE in% WT	PEAK in% WT

3. PLAN DIAGRAM OF SPOOL

CLOCK POSITION		REF GIRTH WELD
6	BOTTOM	.....
7	.....	.....
8	.....	.....
9	.....	.....
10	.....	.....
11	.....	.....
12	TOP	.....
1	.....	.....
2	.....	.....
3	.....	.....
4	.....	.....
5	.....	.....
6	BOTTOM	.....



NOTE: FOR COMPLEX FEATURES PLEASE ATTACH A 'RUBBING' OR SKETCH WITH DIMENSIONS AND DEPTHS IDENTIFIED.

RUBBING ATTACHED ☐ SKETCH ATTACHED ☐

DATA OF SITE INSPECTION: ..... SIGNATURE: .....

Appendix C. Operational Details

Contract Number	C7735_20A
Operator	ENBRIDGE (U.S.) , INC.
Launch Site	M.P. 1475.74
Receive Site	M.P. 1479.77 (EAST RUN)

Inspection Run 1

Date of Operation	09/30/1998
Duration of Run	50 minutes
Data Recorded	0.00 miles to 4.1 miles

Inspection Modules	MTV 982 IV1 969 BV 970

Processor Packs

Inspection Run 1	16

Appendix D. Pipeline Details

Contract Number	C7735_20A
Date of Pipeline Commission	Not Supplied
Pipeline Outside Diameter	20 inches nominal
Product	Crude Oil
Pipeline Length (Client Data)	4.0 miles
Pipeline Length (PII Data)	4.1 miles
API Grade	A
Predominant Pipe Type	Seamless
Previous PII Inspection	None

The nominal wall thickness listing, presented in Section 3.2.8, provides a list of the major and minor pipeline segments.

The listing identifies the locations of the start and end of each segment and the values of the nominal wall thickness (nwt) and the assumed depth of background corrosion (B) that apply within it.

Appendix E. Additional Services

As a complement to the inspection service Pipeline Integrity International (PII) can now offer the following:

- Assessment

  This involves a Fitness-For-Purpose (FFP) assessment which relates the severity of any defects reported by the inspection to the required future operating conditions of the pipeline. At PII, Cramlington in the UK we now have a dedicated team of engineers who have:

  - successfully conducted over 60 commercial consultancies for major oil and gas companies world-wide;
  - pioneered new FFP methods now accepted by Regulatory Authorities (which have been included in pipeline codes); and
  - initiated and conducted extensive pipeline research.

- Repair

  Specialist repair services can be provided based on proven technologies established to support British Gas' 11000 miles pipeline transmission system. The repair team, based at Ambergate in the UK, have extensive experience of operating a pipeline repair service, including work for many clients in Europe and the Middle East.

Appendix F. Pipeline Inspection Report Specification

The contents of the pipeline inspection report and the selection rules for selecting individual metal loss features for detailed analysis and reporting are specified in the Specification for the Pipeline Inspection Report, a copy of which is provided overleaf:

TABLE 1 DETECTION, SIZING AND LOCATION ACCURACY (10/20)

	METAL LOSS CATEGORY		
	PITTING <(3t X 3t)*	GENERAL >(3t x 3t)*	GOUGING
Minimum Depth for Accurate Sizing	If surface dimension is > 0.275" x 0.275" or 0.4t x 0.4t (whichever greater): 0.5t	0.3t	If width > 0.5t or 0.275" (whichever greater): 0.3t If width > 3t: 0.3t
Sizing Accuracy (Depth)	±0.15t	±0.15t	±0.15t
Sizing Accuracy (Length)	±0.4"	±0.8"	±0.8"
Sizing Accuracy (width)	±0.8"	±0.8"	±0.8"
Location Accuracy (Axial)	±8" between the feature and the reference girthweld and ±1% of stated distance between reference girthweld and identified location reference		
Location Accuracy (Circumferential)	±7.5 degrees which for ease of reference is stated to the nearest half hour clock position		

t = nominal wall thickness

*Metal loss is characterized by the minimum rectangle of dimensions, circumferential width (W) and axial length (L) which contains the surface area of pipe affected by metal loss.

Pipeline Anomalies (i.e. Dents, Weld Anomalies, Eccentric Casings, Metal Objects) and Pipeline Fittings (i.e. Valves, Offtakes etc.) shall also be located to the accuracy stated above.

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SCHEDULE 5

PIPELINE INSPECTION REPORT

1. The Scope of the Pipeline Inspection Report

For the Pipeline, the subject of this Contract, the Pipeline Inspection Report shall comprise:

A. Metal Loss Feature Report
B. Pipeline Summary Report
C. *PipeVision* Data Management Software
D. LAPA Report

2. Metal Loss Feature Report

The Contractor shall provide, for each Component Line, a Metal Loss Feature Report comprising up to a maximum of fifteen (15) Individual Inspection Sheets describing the severity, type, size and location of Individual Metal Loss Features, all in accordance with those parameters set out in the Performance Specification.

If, due to high levels of metal loss in the Pipeline, the Company requires Individual Inspection Sheets on Features in excess of said maximum, the Company may select additional metal loss features and the Contractor shall report on such Features at an additional charge as set out below:

Up to 15 features	$750 per additional feature
Up to 25 features	$700 per additional feature
Up to 50 features	$650 per additional feature
Up to 100 features	$600 per additional feature

These charges shall be subject to a minimum charge equivalent to a charge for 15 additional features requested in any one batch.

The Terms and Conditions of Contract applicable to such a request for additional Features shall be subject to agreement between the parties.

2.1 Inspection Sheets

(a) Inspection Sheets will be prepared, employing detailed examination and analysis techniques for those sentenced metal loss features (or identified manufacturing faults) selected for detailed reporting using the Selection Rules listed below. The information contained within a typical Inspection Sheet is as follows:-

(i) Metal Loss Feature Description

1. Internal/external characterization
2. Orientation of Metal Loss Feature viewed in the direction of the flow
3. Axial length, circumferential width, peak and, where appropriate, average depth of the Metal Loss Feature to the accuracy specified in the Performance Specifications.
4. Indication of Rupture Pressure Ratio (RPR)
5. Nominal wall thickness of the pipe joint as advised by Company
6. Selection rule number

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7. Distance from the start of the component line section to the Metal Loss Feature (absolute distance)
8. Comment on the general nature of the Metal Loss Feature and the existence of any nearby metal loss

(ii) Metal Loss Feature Location

1. Relevant strip map number, if available
2. Definition of at least one primary reference point on the Component Line which can be used to locate the Metal Loss Feature
3. Definition of the reference girth weld as the nearest upstream girth weld to the Metal Loss Feature
4. Distance between the reference girth weld and the primary reference points to the accuracy specified in the Inspection Performance Specification.
5. Distance between the Metal Loss Feature and the reference girth weld to the accuracy specified in the Inspection Vehicle Performance Specifications.
6. Length of the joint containing the Metal Loss Feature together with the two adjacent joints both upstream and downstream from the Metal Loss Feature joint and, if visible, the orientation of the long seam weld in each of the joints.

(b) Metal loss features will be selected for detailed reporting on Inspection Sheets according to the following Selection Rules:-

Priority 1 - The 3 (three) most significant Metal Loss Features with an RPR less than 1.0

Priority 2 - Metal Loss Features with peak depth greater than 80% wall penetration (0.8t).

Priority 3 - Metal Loss Features with an RPR less than 0.9.

Priority 4 - Metal Loss Features with an RPR between 0.9 and 1.0

Priority 5 - Metal Loss Features with an RPR between 1.0 and 1.05 providing always that such Features are above the Inspection Vehicle reporting parameters set out in the Inspection Performance Specifications of this Schedule.

Priority 6 - Metal Loss Features with peak depth greater than 70% wall penetration (0.7t).

Priority 7 - Metal Loss Features with peak depth greater than 50% wall penetration (0.5t).

Priority 8 - Metal Loss Features with peak depth greater than 30% wall penetration (0.3t) and whose length is greater than (0.3t).

Priority 9 - Those Metal Loss Features with axial length greater than 0.2D (or 6 inches in seamless pipe) and with peak depth greater than 10% wall penetration (0.1t).

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Some of the metal loss features reported under priority rules may fall below the inspection vehicle performance specification detailed in Table 1 of section 2 and such metal loss features will therefore be reported on a best endeavors basis. These features shall be identified as falling below the vehicle performance specification.

5.1.2 Individual Inspection Sheets - cont'd

(c) Initial reporting of metal loss features will be limited to not more than 1 (one) metal loss feature in any one pipe joint. If due to low numbers of corroded pipe joints, the specified maximum number of metal loss features to be separately reported upon has not been achieved for each pipeline section then the one metal loss feature per pipe joint rule will be relaxed. The priority rules will then be reactivated such that, so far as is possible, the balance of the metal loss features up to the maximum specified are selected for inclusion on Individual Inspection Sheets.

(d) if, due to low levels of detected metal loss within the pipeline, the maximum number of metal loss features to be separately reported upon has not been achieved subsequent to the reporting of priority 9 features, then those manufacturing faults identified in the pipeline listing shall be selected for reporting on a best endeavors basis using priority rules 4, 6, 7, 8 and 9.

(e) In the event that subsequent to (b), (c) and (d) above, the maximum number of metal loss features to be separately reported upon for each pipeline section has not been achieved, the Contractor shall have no obligation to report further save that where no metal loss features or manufacturing faults are selected under the priority rules, the Contractor shall select one (1) low level metal loss instance for reporting on a best endeavors basis.

2.2 Color Plots

Accompanying each Inspection Sheet are two pictorial representations of the magnetic response derived from the Metal Loss Feature.

In both cases these pictorial representations are as viewed from the outside of the pipe with the upstream end being on the left. The vertical axis is annotated with o'clock orientation as viewed ion the direction of Inspection Vehicle travel. The horizontal axis is annotated with the absolute distance measured from the launch.

The monochrome plot shows the magnetic response in the context of the full circumference of the pipe. To assist the Company in identifying the areas of metal loss it is shaded as if illuminated from the left side of the plot.

The Color Plot is approximately centered on the area of the Component Line in which the Metal Loss Feature is located and identifies the relative magnitudes of the magnetic responses in this area. The magnitude of change in the magnetic responses is represented by designated colors, with common changes in magnitude having common colors. Due to the behavior of the magnetic response, the Color Plot will not normally provide a true representation of the physical profile of the Metal Loss Feature.

5.2 Pipeline Summary Report

5.2.1 The Pipeline Summary Report (PSR) shall include an overview of the metal loss within each pipeline section and act as an aid to the selection of individual metal loss features for more

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detailed reporting. It should also include data on other pipeline anomalies which have been the subject of detailed analysis. The PSR shall comprise the following:

(a) Metal Loss Information:

i) Sentenced Plot - shall represent for each major segment of pipeline (as detailed by Company in Section 1.1.12, sentenced depth versus length (for all detected metal loss features excluding identified manufacturing faults) and shall include the curve for a pressure sentenced ratio of unity as defined in section 1.1.12. Metal loss features detected in any minor segment of any pipeline section will be represented separately on the sentenced plot.

5.2 Pipeline Summary Report - cont'd

ii) Pressure Based Histogram - indicates the number of occurrences of pressure sentenced metal loss features (excluding identified manufacturing faults) against absolute distance along each pipeline section. Such pressure sentenced metal loss features will be graded into bands by the Contractor after data processing has been completed.

iii) Depth Based Histogram - indicates the number of occurrences of metal loss features and identified manufacturing faults against absolute distance along each pipeline section in the following formats:

1. Total number of metal loss features against absolute distance.
2. Total area of metal loss expressed as a percentage of surface area of pipeline section, against absolute distance.
3. Total volume of metal loss expressed as a percentage of pipe wall volume, against absolute distance.
4. Number of short metal loss features (i.e. axial length <3t) against absolute distance, with one histogram for each of the graded bands:
   - all detected metal loss features;
   - all detected metal loss features with peak depth > 20% wt;
   - all detected metal loss features with peak depth > 40% wt; and all detected t
   - al loss features with peak depth > 60% wt.
5. Number of long metal loss features (i.e., axial length >3t) against absolute distance, graded as detailed in (iv) above.

Iv) Orientation Plot - shows all the instances of metal loss features and identified manufacturing faults detected over the total length of each pipeline section and indicates the orientation of the metal loss viewed in the direction of flow, against the absolute distance along the pipeline section.

v) Severity Table - comprises a list of pipe joints indicating the computer-generated pressure sentenced ratio, peak depth and axial length of the most severe metal loss feature (excluding identified manufacturing faults) within each joint. These are selected in accordance with the priority rules detailed in paragraph 5.1.2 (b) and listed in descending order of severity.

The severity table includes all pipe joints containing a metal loss feature with pressure sentenced ratio equal to or greater than unity.

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5.2 Pipeline Summary Report - cont'd

In the event that there are less than 25 (twenty-five) pipe joints containing a metal loss feature with pressure sentenced ratio equal to or greater than unity, the balance up to 25 shall be made up of the most severe of the remaining pipe joints.

The severity table shall contain the following:

1. Pressure sentenced ratio of the metal loss feature calculated in accordance with section 1.9 of this specification.
2. Peak depth and axial length of the metal loss feature.
3. Weld number of nearest upstream girthweld.
4. Distance from the start of the pipeline section (absolute distance).
5. Orientation of the metal loss feature viewed in the direction of the flow.

(b) Pipeline Information:

i) Velocity Plot - indicates the inspection vehicle velocity against absolute distance along the pipeline section.

ii) Metal Object Report - all ferrous metal objects detected in proximity to a pipeline section will be reported upon in the following format:

1. Number of nearest upstream girthweld from the metal object.
2. Distance of metal object from nearest upstream girthweld (relative distance) to the accuracy set out in Table 1 of section 2.
3. Distance of metal object from the start of the pipeline section (absolute distance).
4. Proximity classification (i.e., close or touching). Those metal objects classified as 'touching', may in the Contractor's opinion, have interfered with the coating or cathodic protection of the pipeline section. Where ferrous metal objects are detected which are considered to be part of the pipeline build, only those that are 'touching' will be reported.
5. Orientation of detected metal object viewed in the direction of the flow.
6. Identification of nearest upstream location reference point.
7. Distance of upstream location reference point from girthweld to the accuracy set out in Table 1 of section 2.
8. Identification of nearest downstream location reference point.
9. Distance of downstream location reference point from nearest downstream girthweld to the accuracy set out in Table 1 of section 2.

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5.2 Pipeline Summary Report - cont'd

iii) Eccentric Casing Report - where a casing is considered by the Contractor to be so eccentric as to affect the carrier protective coating or the cathodic protection system this will be reported upon in the following format:

1. Number of nearest upstream girthweld from the start of the casing.
2. Distance from nearest upstream girthweld to upstream end of casing (relative distance) to the accuracy set out in Table 1 of section 2.
3. Distance from the start of the Component Line to the upstream end of the casing (absolute distance).
4. Category of position (i.e., start, end or intermediate)
   - upstream end
   - downstream end
   - ends of unconnected joints making up the casing, if appropriate.
5. Comment as to whether the point of minimum separation of the casing so affected is "close" or "touching".
6. Comment as to whether corrosion has been detected within the casing.
7. Length of casing.
8. Comment as to whether the affected casing is associated with a road/railway crossing.
9. Orientation of the point of minimum separation between the casing and the carrier page.

iv) Dent Report - all dents detected by the Inspection vehicle will be reported upon in the following format:

1. Number of nearest upstream girthweld from the dent.
2. Distance of dent from nearest upstream girthweld (relative distance) to the accuracy set out in Table 1 of section 2.
3. Distance of dent from the start of the component line (absolute distance).
4. Indication of presence of associated metal loss.
5. Orientation of dent viewed in the direction of the flow.
6. Identification of nearest upstream location reference point.
7. Distance of upstream location reference point from nearest upstream girthweld to the accuracy set out in Table 1 of section 2.
8. Identification of nearest downstream location reference point.
9. Distance of downstream location reference point from nearest downstream girthweld to the accuracy specified in Table 1 of section 2.

5.2 Pipeline Summary Report - cont'd

v) Girthweld Anomaly Report - all girthweld anomalies detected by the inspection vehicle will be reported upon in the following format:

1. The number of the girthweld in which the anomaly occurs.
2. Distance of girthweld from the start of the pipeline section (absolute distance).
3. Indication of the type of girthweld anomaly (e.g., crack, incomplete weld, dressing repairs, etc.)
4. Estimated circumferential extent of the girthweld anomaly.
5. Orientation of detected girthweld anomaly viewed in the direction of the flow.

6. Identification of nearest upstream location reference point.
7. Distance of upstream location reference point from girthweld to the accuracy specified in Table 1 of section 2.
8. Identification of nearest downstream location reference point.
9. Distance of downstream location reference point from girthweld to the accuracy specified in Table 1 of section 2.

vi) Repair Listing - all repair shells (i.e., full circumferential, snug fitting, welded or epoxy filled, or repair clamps) or joints containing repair patches detected by the Inspection vehicle will be reported in the following format:

1. Number of nearest upstream girthweld from the start of the repair shell or the joint containing the repair patch(es).
2. Distance from nearest upstream girthweld to upstream end of repair shell (relative distance) to the accuracy specified in Table 1 of section 2.
3. Distance from the start of the pipeline section to the upstream end of the repair shell or the joint containing the repair patch (absolute distance).
4. Comment as to whether the repair is a shell or a patch-repair joint.
5. Length of repair shell.

NB: Metal loss detected under repair shells and repair patches shall not be included in the pipeline listing or Summary Reports.

5.2 Pipeline Summary Report - cont'd

vii) Location Reference Point Listing - to assist in the location of features the Contractor shall detail the location of timer boxes, magnets and/or anodes, valves and major offtakes (i.e., major offtakes >50% of the pipeline nominal bore), as applicable in the following format:

1. Number of nearest upstream girthweld from location reference point.
2. Distance of location reference point from nearest upstream girthweld (relative distance).
3. Distance of location reference point from the start of the pipeline section (absolute distance).
4. Indication of the presence of a location reference point.
5. Location reference point identification number.

Additionally, the Contractor shall provide a separate listing containing the location reference point identification number against which a description of the above ground geographical location of each such location reference point shall be provided, when available.

viii) Nominal Wall Thickness Listing - all pipe joint nominal wall thickness changes detected by the inspection vehicle will be reported in the following format:

1. The number of the girth weld at which the change in the pipe joint nominal wall thickness occurs.
2. Distance of the girth weld from the start of the pipeline section (absolute distance in metres).
3. Distance from the girth weld to the next identified pipe joint nominal wall thickness change (length).
4. Nominal wall thickness of the joints downstream from the girth weld.

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5. Indication as to whether the joints are in major or minor segments.
6. Failure Pressure Ratio (FPR)
   - Flow stress assigned to the joints when determining the calculated pressure.
   - MAOP assigned to the joints when determining the FPR.
   - Assumed depth of background corrosion assigned to the joints when determining the calculated pressure.

5.2 Pipeline Summary Report - cont'd

(c) Summary

i) Pipeline Listing will consist of the following:

1. Girthweld number.
2. Upstream distance from the weld, detected metal loss feature, identified manufacturing fault, metal object, eccentric casing, dent, girthweld anomaly, repair shell, location reference point and nominal wall thickness change, to the nearest upstream girthweld (relative distance).
3. Distance from the start of the pipeline section to those detailed in (b) above (absolute distance).
4. Indication of those items listed in (b) above.
5. Indication of whether the metal loss feature or identified manufacturing fault is internal or external.
6. Peak depth of metal loss feature or manufacturing fault.
7. Axial length of metal loss feature or manufacturing fault.
8. Pressure sentenced ratio of the metal loss feature calculated in accordance with section 1.1.8 of this specification.
9. Orientation of detected metal loss, manufacturing fault, metal object, dent, girthweld anomaly or major offtakes viewed in the direction of the flow.

5.2.2 Where a pipe joint contains more than 50 metal loss features, a Summary Report will be provided which shall indicate the number of metal loss features detected in the pipe joint instead of a listing of all the detected features, additionally, the worst metal loss feature detected in the joint (determined using the priority rules contained in Section 5.1.2 will be listed.

5.2.3 The processes used to size the metal loss features in the Pipeline Summary Report do not include the detailed examination and analysis employed when reporting metal loss features on individual Inspection Sheets. Hence, the sizing accuracy contained in the Inspection Vehicle Performance Specification - section 2 applies to the Feature Report rather than the Pipeline Summary Report.

5.3 PC Reporting

5.1 The *PipeVision*™ PC Report will be supplied on CD ROM and will include all the information contained within the Pipeline Summary Report and the Metal Loss Feature report.

5.2 For optimal performance of *PipeVision*™ the following personal computer configuration is recommended:

(i) A personal computer using the Intel Pentium processor or equivalent
(ii) A processor speed of 90 Mhz or greater
(iii) 8 Mb memory

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(iv) One 3.5 inch (1.44 megabyte) disk drive
(v) One CD Rom Drive
(vi) VGA video graphics adapter and monitor to support 256 colors
(vii) A mouse
(viii) DOS version 5.0 or later
(ix) Microsoft Windows Version 3.1 or later
(x) For enhanced presentation, a high resolution color printer would be advantageous.

5.5 CD ROM Report

5.5.1 The Pipeline Listing shall be provided on C D ROM using the Microsoft Windows Excel Spreadsheet Package (descriptive headings shall be included at the top of each separate spreadsheet column).

5.6 LAPA Report (Optional)

A Lapa Report (Length Adaptive Pressure Assessment report shall be provided in Excel format for all metal loss features with a calculate R Value of 1.00 or less

5.7 Data Plot (Optional)

A bound paper report containing the 'raw' plot of the data as collected by the inspection vehicle.

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Appendix G. Inspection System Performance Specification

The pipeline inspection system employed by PII has been designed to carry out a genuine high resolution pipeline inspection.

The performance capabilities of the inspection system are defined in the Inspection System Performance Specification, a copy of which is provided overleaf:

APPENDIX 1

1. Definition of Terms

1.1 Box

Where the analysis software has recognized an occurrence of metal loss to be "distinct", the word "box" is used to describe the boundary of such metal loss by its axial length and circumferential width. For small, isolated Metal Loss Features, "distinct" means that the metal loss levels surrounding the box are below the reporting levels set out in the Inspection Vehicle Performance Specification. For more complex areas of corrosion, where pitting occurs within an area of general corrosion, "distinct" shall mean that the metal loss level surrounding the box is significantly lower than that of the box. The calculated depth of the box is the peak depth of metal loss within the box.

1.2 Cluster

A cluster describes the boundary defined by the limits of axial length and circumferential width of the "boxes" linked together by the Interaction Rules as defined in Section 1.5.

1.3 Metal Loss Feature

A Metal Loss Feature is described as being an occurrence of metal loss detected by the Inspection Vehicle and which is either, (a) a cluster, or, (b) a single isolated box which is not affected by the Interaction Rules.

1.4 Manufacturing Fault

A manufacturing fault is an occurrence of metal loss detected by the Inspection Vehicle which has been assessed during the second stage of data processing as having been caused during the manufacture of the line pipe/Component Line. It will be either, (a) a cluster, or, (b) a single isolated box which is not affected by the Interaction Rules.

1.5 Interaction Rules

The Interaction Rules are intended to represent the physical interaction between areas of metal loss (boxes). The Interaction Rules to be used in the compilation of the Pipeline Inspection Report are as follows:

(i) Each box, regardless of its reported depth, should be expanded by 3 wall thicknesses (3t) in each direction. Boxes will be clustered if they overlap.

1.6 Calculated Pressure

The Calculated Rupture Pressure Ratio, RPR is calculated for each Cluster (excluding manufacturing faults) as follows by a formula based on the RSTRENG, 0.85-area criterion:

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$$RPR_{0.85} = \frac{\bar{\sigma}}{SMYS}\left[\frac{1 - 0.85(d/t)}{1 - 0.85(d/t)\ M^{-1}}\right]$$

where

SMYS	=	Specified minimum yield strength, psi
$\bar{\sigma}$	=	Flow Stress = SMYS + 10,000 psi
d/t	=	Peak depth of the cluster divided by the nominal wall thickness of pipe for each Component Line major section as defined in Paragraph 1.9
L	=	Axial length of the Cluster. Note the individual metal loss boxes will have been clustered according to the specified interaction Rules of Paragraph 1.5 of this Appendix.
D	=	Nominal outside diameter of the pipe
M	=	Folias Factor

$$\text{For } \frac{L^2}{Dt} \leq 50,\ M = \sqrt{1 + 0.6275\ \frac{L^2}{Dt} - 0.003375\left(\frac{L^2}{Dt}\right)^2}$$

$$\text{For } \frac{L^2}{Dt} > 50,\ M = 0.032\ \frac{L^2}{Dt} + 3.3$$

1.9 Company Defined Operating Parameters

Pressure Sentenced calculations may be varied for each identifiable segment of a Component Line to suit different operating parameters as required. The Company shall define such major segments, and the appropriate operating parameters in the table below, prior to Contract signature. The major segment transition points should be limited to valves and/or identifiable wall thickness transitions.

Component Line

MAJOR SEGMENT	START	FINISH	SMYS	t mm/ins	t'mm/ins
1	Launch	Receive			
2					
3					
4					

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(Information supplied by Company)

P_i	=	Specified Minimum Yield Strength of the Pipe
t	=	Nominal Wall Thickness of Pipe
t'	=	Nominal Wall Thickness of Pipe within a Major Segment where it is known to vary from t (eg. road, river crossings etc.)

Those Major Segments of the Component Line listed by the Company above will be subdivided into Minor Segments in the event that the Contractor identifies areas of the Major Segment containing line pipe with Nominal Wall Thickness which varies significantly to that stated by the Company (eg. road or river crossings, repair sections etc.).

Where such Minor Segments are identified, the Contractor shall substitute the Normal Wall Thickness of Pipe (t) advised by the Company for the Major Segments concerned with the appropriate Minor Segment wall thickness values (t') supplied by the Company in the table above.

In the absence of any other information from the Company (strip maps, pipe listings, etc.), the Contractor shall assume the Major Segment pressure parameters (Pi, MAOP) for the Minor Segments.

Pressure Sentenced Calculations shall be produced for each Metal Loss Feature in such Minor Segments on this basis.

This additional information relating to the wall thickness in Minor Segments shall be provided in the Nominal Wall Thickness Listing. Detailed sentenced plot data for Minor segments will be presented in the *PipeVision* Software only.

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