APPENDIX II

1. Information Provided by Dixie on May 8, 2008. (3+cover sheet)

2. Information Provided by Dixie on May 6, 2008. (25+cover sheet)

3. 2. Information Provided by Dixie on July 17, 2008. (13+cover sheet)

1. Information Provided by Dixie on May 8, 2008. (3+cover sheet)

From: [redacted]
Sent: Tuesday, November 06, 2007 1:28 PM
To: [redacted]
Cc: [redacted]
Subject: Hattiesburg Station to Demopolis Station 12"

[redacted]

In response to your written request of November 2, 2007, Magpie has reviewed the data for Line ID 120, Dixie Pipeline Company Mainline, Hattiesburg Station to Demopolis Station, run dates March 28 (EGP/DEF) and March 30 (IDOD/MFL) of 2006, starting from Carmichael Pump Station (MP 425.5 & ESN 22467+70) for approximately one mile downstream. In 2006, Dixie Pipeline Company requested that Magpie provide a DEF inline inspection tool and an inline Axial MFL tool for these referenced runs.

Nothing was found or identified in the one mile area in either the IDOD/MFL data or EGP/DEF tool data that was not included in the original report that was sent to you on June 9, 2006.

As you know, neither a DEF tool or an Axial MFL tool are designed to detect long seam welds in pipe. Even the possibility of identification of a long seam weld by these tools is remote. However, in response to your verbal request of Monday, November 5, 2007 for Magpie to review the data from the referenced 2006 runs to determine if a long seam weld could be detected, Magpie attempted to identify the long seam weld for the joint (U/S weld #58340 / 310766.964 feet to D/S weld #58350 / 310819.095 feet) immediately following the joint (U/S weld #58330 / 310708.363 feet to D/S weld # 58340 / 310766.964 feet) with Permanent Magnet # 111 (STA 22494+27) from the data generated by the referenced 2006 runs. In this particular case we were not able to identify the long seam weld or its orientation from our data generated by the referenced 2006 runs.

Please don't hesitate to contact me with any additional requests that you may need in the ongoing investigation of this line.

Thank you for your attention and for allowing us to be of service.

[redacted]

Magpie Systems, Inc.
[redacted]
Toll Free: (800) 922-6088 [redacted]
[redacted]

From: [redacted]
Sent: Tuesday, November 13, 2007 8:43 AM
To: [redacted]
Subject: RE: Hattiesburg to Demopolis_Station

The joint which correlates to Magpie's joint 58340 is located on the 1998 survey from Tuboscope Wheel Count 309090 to Tuboscope Wheel Count 309142. This joint contains some very small indications which are too small to determine their cause. If these indications were due to corrosion, the corrosion would be estimated at less than 5% depth, based on this 1998 survey data. When you have located your copy of the raw data, you can turn to these wheel counts to see this joint. It is also available for viewing on microfilm at Tuboscope's facility on Holmes Rd in Houston. Due to the low level of the indications, any reproduction of the microfilm would likely make it difficult to see the indications. Please let me know if you need something further.

[redacted]
NOV Tuboscope Pipeline Services
2835 Holmes Road, Houston, TX 77051

[redacted]

From: [redacted]
Sent: Wednesday, November 07, 2007 5:54 PM
To: [redacted]
Cc: [redacted]
Subject: RE: Dixie HA-DM GE-PII USCD Final Report Rev 3, 7-12-2006

[redacted]

I'd like to answer your questions in turn

Q: In the final report, Joint 5808 has a LW at 233 degrees. Is the LW at 17 degrees a correction for Joint 5808?
A: Yes

Q: Also, there are two features listed, a notch like and a geometry. These were previously called at the base metal (bm). Are they now considered to be in the weld (iw) or at the weld (aw)?
A: These two features are now considered Adjoining Weld (AW).

Q: Please review the USCD tool for all the raw UT data for this joint of pipe to determine if there are any other features (reportable or non-reportable).
A: We have reviewed all data from pipe 5808, which included two reported features (the notch like and geometry you mentioned above), one non-reported feature, and 33 other signals locations. The non-reported feature was classified as an Inclusion, in the base material at 240 degrees. The other 33 locations in pipe 5808 were signals that did not meet our software's automated boxing criteria, which identifies the signals that an analyst will review. Therefore, an analyst did not review these signals during the course of the original project. Of these 33 locations, there is one indication six meters from the upstream girth weld that aligns with the position of the long weld. We believe this indication to be the long weld itself, but there is a possibility that it is an anomaly given that it has higher amplitude from the surrounding area. There is insufficient data captured at this location to make a definitive classification.

Sincerely

[redacted]

2. Information Provided by Dixie on May 6, 2008. (25+cover sheet)

Dixie Pipeline Company

May 6, 2008

Mr. Ravindra Chhatre
Office of Railroad, Pipeline, and Hazardous Materials Safety
National Transportation Safety Board ("NTSB")
490 L'Enfant Plaza, SW
Washington, DC 20594

Re: NTSB Information Request letter dated April 2, 2008 (the "Request")
Dixie Pipeline Company
Release of propane from 12" Dixie Pipeline Company line near Carmichael, Mississippi on November 1, 2007

Dear Mr. Chhatre:

The following information is being provided in response to your Request regarding the release of propane from the 12" Dixie Pipeline Company ("Dixie") line near Carmichael, Mississippi on November 1, 2007.

Per your request, the following items refer to API standard 1163, First Edition, August 2005 as a general reference. Applicable item numbers are given at the beginning.

<u>NTSB Inquiry 1</u>

6.2, P.9: Dixie's goals and objectives for all In-Line Inspections [ILI] since 1998, of the 12-inch liquid propane pipeline that contained rupture. Please include purpose for conducting ILI inspections, reasons for choosing ILI versus hydro testing; and how did Dixie assess effectiveness of these ILI inspections in maintaining integrity of the 12-inch liquid propane pipeline. If there were any particular reasons for choosing a specific vendor, please include that information.

<u>Dixie Response</u>

Since 1998, Dixie has utilized the following assessment methods in assessing the Hattiesburg to Demopolis segment (this is the assessment segment that included the November 1, 2007 release near Carmichael, Mississippi):

- 1998 Tuboscope Linalog ILI Tool
- 2005 GE PII Ultrasonic Crack Detection ILI Tool
- 2006 TDW/Magpie Deformation and MFL ILI Tools

In 1998, Dixie performed the Tuboscope Linalog inline inspection to evaluate for metal loss. At that time, Dixie only performed hydrostatic tests to increase or validate a maximum operating pressure (MOP). Since Tuboscope was Dixie's preferred vendor for ILI tools at that time, the Tuboscope tool was utilized.

In late 2004 when the assessment method for the 2005 assessment schedule was being determined, the procedure for performing the assessment method selection was as outlined in the previous Dixie procedure Section 6 – Baseline Assessment Plan. The previous Dixie procedure Section 6 – Baseline Assessment Plan states the following in regards to the assessment method selection process:

Dixie Pipeline will conduct baseline assessments of line pipe by:

- Internal inspection tool or tools capable of detecting corrosion and deformation anomalies including dents, gouges and grooves.
- Pressure test conducted in accordance with Subpart E of Part 195; or
- Other technology that Dixie Pipeline demonstrates can provide equivalent understanding of the condition of the line pipe. Use of this option will require notification to the Office of Pipeline Safety (OPS) prior the assessment being done. Notification will be made in accordance with 195.452(m).

If pipe segments contain electric resistance welded (ERW) line pipe or other pipe of questionable seam integrity, an evaluation to determine if the pipe is susceptible to longitudinal seam failure due to fatigue is required. The evaluation process is summarized in Figure 6.1 below. If a special seam integrity assessment is warranted, in-line inspection of the pipeline segment using Transverse (transaxial) Magnetic Flux Leakage (MFL) or ultrasonic shear wave technology or hydrostatic testing shall be done.

The noted Dixie procedure does not require any additional analysis or documentation of the assessment method selection process.

Based on the review of the above noted information for the Hattiesburg to Demopolis segment, the segment was determined to be susceptible to longitudinal seam weld failure and the assessment method options available for assessing this were UT, TFI/AFD, or Hydrostatic test. The selected assessment method for the 2005 assessment of the Hattiesburg to Demopolis pipeline segment was a UT ILI.

In late 2005 when the assessment method for the 2006 assessment schedule was being determined, the procedure for performing the assessment method selection was as outlined in the Assessment Method Process outlined in Article 4 (Assessments Plan and Risk Ranking) of the May 31, 2005 Dixie Pipeline Company Pipeline Integrity Management Plan. Article 4 (Assessments Plan and Risk Ranking) of the May 31, 2005 Dixie Pipeline Company Pipeline Integrity Management Plan states the following in regards to the assessment method selection process:

1. Dixie Pipeline Company will select assessment methods based on requirements in §195.452(c)(i). Assessment constitutes all of the actions that must be performed to determine the condition of the pipe.
2. The methods selected to assess low frequency electric resistance welded pipe or lap welded pipe susceptible to longitudinal seam failure will be capable of assessing seam integrity and of detecting corrosion and deformation anomalies. Dixie uses the process detailed in the Flow Chart that follows to evaluate if electric resistance welded pipe or lap welded pipe is susceptible to longitudinal seam failure (See Flow Chart 1 - Long Seam Susceptibility Criteria for Baseline Assessment).
3. Dixie Pipeline Company will assess the integrity of the line pipe using one or more of the following methods:
    A. Internal inspection tool or tools capable of detecting corrosion and deformation anomalies including dents, gouges and grooves (See Flow Chart 2 - In-Line Inspection Tool Selection);
    B. Pressure test conducted in accordance with subpart E of §195; or
    C. Other technology that can provide an equivalent understanding of the condition of the line pipe. If other technology is utilized Dixie Pipeline Company will notify the

> Office of Pipeline Safety (OPS) 90 days before conducting the assessment, by sending a notice to the address or facsimile number specified in §195.

The noted Dixie procedure does not require any additional analysis or documentation of the assessment method selection process.

Based on the review of the above noted information for the Hattiesburg to Demopolis segment, the segment was determined to be susceptible to corrosion and mechanical damage and the assessment method options available for assessing these were MFL and Ultrasonic for metal loss (corrosion) and Caliper for geometry (mechanical damage). The selected assessment methods for the 2006 assessment of the Hattiesburg to Demopolis pipeline segment were a MFL ILI Tool and a Deformation ILI Tool.

In 2006, TDW/Magpie was Enterprise Products Company's (EPCO) preferred vendor for MFL and Deformation ILI tools.

All of the ILI inspections performed since 1998 had excavated digs and field inspections to assess the effectiveness of the tool. Details are provided in our response to NTSB inquiry 4.

<u>NTSB Inquiry 2</u>

7.2, P.10: Performance specification provided by vendors who conducted various ILI inspections since 1998. This should include, but is not limited to, detection threshold, probability of detection [POD] for various anomalies, probability of identification [POI], sizing capacity and accuracy, tolerances, certainties and confidence, and tool limitations, if any.

<u>Dixie Response</u>

The performance specifications are provided by the vendor based on their specific tool capabilities and experience with the tool's performance. Although the vendor may provide the performance specifications to their customers, each vendor considers this information confidential and proprietary.

Tuboscope and TDW/Magpie have provided the performance specifications (attached) for the types of tools that were run in the Hattiesburg to Demopolis pipeline in 1998 and 2006 respectively. GE has provided the performance specification for the USCD tool utilized in 2005 in a separate e-mail directly to NTSB on April 28, 2008.

<u>NTSB Inquiry 3</u>

For the MAOP of the ruptured pipe joint, had Dixie identified a maximum flaw size [or range of flaw sizes] that it would have considered acceptable in base metal and longitudinal low frequency ERW weld seam?

<u>Dixie Response</u>

GE-PII created and provided a graph to determine the critical size envelope between length and depth of longitudinal seam weld flaws that would pass or fail the API 579 FAD Level II calculations. This chart and associated spreadsheet (attached "105411_Dixie_Critical_Crack-Sizes_FAD_Level-II_Seam Weld.xls") was previously provided via e-mail on April 8, 2008.

NTSB Inquiry 4

9.2, P.18: Validation activities for these ILI inspections. Please include information related to verification measurements such as anomaly types, size and distance [location accuracy]. Additionally, include how did Dixie and GE established and/or correlated ILI inspection data for the ruptured pipe joint. Include information as to how did the Magpie MFL data correlated with the ruptured pipe joint.

Dixie Response

Three of the defects reported in the Tuboscope ILI report were excavated and inspected in July/August 1998. Defect number 5 was repaired with a Clock Spring. Defect number 9 was inspected, found not to be external metal loss and recoated. Defect number 24 was repaired with a Clock Spring. Details are documented on the attached "Reports of Visual Inspection & Repair".

In 2005, forty-one dig locations that included 43 full joints of pipe were excavated and inspected in the field with manual and phased array UT. The correlation data comparing the field data to the GE-PII USCD ILI data was previously provided in the e-mail sent April 8, 2008 and is also attached ("USCD Tool Validation Dig Project Fall 2005 Assessment Summary"). In 2006, twenty-one joints of pipe were excavated and removed from the pipeline to be burst tested and further analyzed. The detailed report of the laboratory testing from Stork Metallurgical Consultants was previously sent to NTSB on February 7, 2008.

Nineteen digs were excavated to inspect 19 joints of pipe for 11 dents and 12 metal loss groups reported by the TDW/Magpie MFL/DEF inline inspection tools in 2006. Repairs were performed with 13 full encirclement sleeves and one cut out. Four areas were recoated and one metal loss group was found to have been previously repaired by a Clock Spring that did not have identifying steel bands. The repairs performed are included in the attached dig summary (previously sent via e-mail on April 8, 2008) and dig list.

The correlation between the GE-PII USCD ILI data and Magpie's MFL ILI data was performed using joint lengths and fixed components, such as valves, as noted in the attached spreadsheet ("HA-DM GE-PII vs Magpie Joint Correlation_CRS.xls") that was also provided via e-mail on April 8, 2008. The spreadsheet shows the upstream valve location highlighted in yellow and the failed joint of pipe in pink. Magnet#111 was visually identified onsite to be just a few feet upstream in the adjacent joint of pipe. Magnet#111 is the only magnet between the valve at Carmichael station and the failed joint.

NTSB Inquiry 5

Also provide Dixie's future plans for conducting ILI inspections or other tests to insure integrity for the 12-inch liquid propane pipeline that contained rupture.

Dixie Response

Dixie's immediate plans are to inspect all of the 12-inch pipeline segments with Rosen's Axial Flaw Detection (AFD) inline inspection tools and to also hydrostatic test, including spike test, the Hattiesburg to Demopolis pipeline segment.

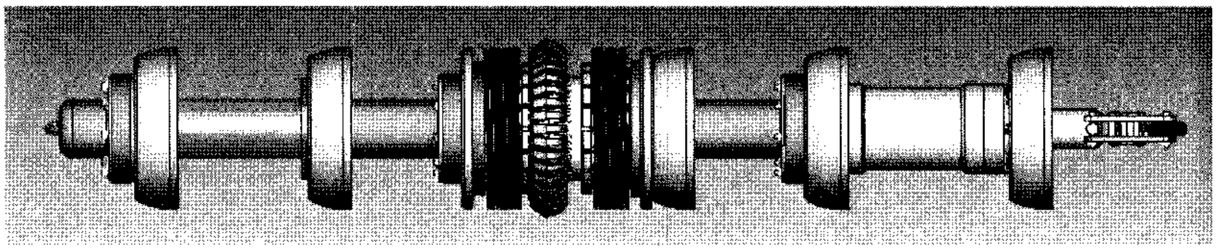
Dixie appreciates having the opportunity to respond to the Request and looks forward to continuing to work with the NTSB to assure the safe operation of our pipelines. Please let me know if you have any questions.

Sincerely yours,

[redacted]

Enclosures

Standard 12" (325 mm) IDOD/MFL Tool Specification



Tool Specifications

Magnetic sensor type	Ratiometric linear hall effect
ID/OD sensor type	Discrete proximity
Sampling frequency	Up to 750 samples per second
Data discarded by filtering	None
Magnetization direction	Longitudinal
Tool transmitter	Pulsed low frequency
Inertial navigation sensors	Solid state INS
Operating pressure range[1]	300 to 2000 psi (21 to 137.8 bar)
In-line temperature range	14 to 131 °F (−10 to 55 °C)
Maximum tool speed[2]	≈10 ft/s (3.0 m/s)
Minimum bend radius	1.5D
Minimum bore in 1.5D bend	11.25 in (286 mm)
Minimum bore for straight pipe	11.03 in (280 mm)
Maximum wall thickness[2]	0.562 in (14.3 mm)
Defect location aids	GPS equipped AGMs, on board INS and pipeline features
Odometer resolution	0.118 in (2.99 mm)
Number of odometers	2

Hall Sensors	IDOD Sensors	Length[3]	Weight[3]	Standard Run Time[4]
120 tracks	40 tracks	88 in (2.23 m)	385 lb (175 kg)	40 hr

[1] Approximate pressure range. Consult Magpie for operation in low pressure gas lines.
[2] For full MFL reporting accuracy. Features in thicker walls or higher speeds can often be sized at reduced accuracy.
[3] With one battery pack. Each additional battery pack is 87 lb (39 kg) and an additional 25 in (635 mm).
[4] With one alkaline battery pack. Consult Magpie for special configurations yielding longer run times.

Pipeline Features Detected:

- Valves, Flanges, Fittings
- Bends and Elbows
- Girth Welds
- Lateral and Vertical direction changes and upheaval buckling
- ID changes
- Grounding/Lifting Lugs
- Repairs

Pipe Anomalies Identified:

- Metal Loss: corrosion, circumferential gouges & grooves
- Deformation: buckles, dents and wrinkles
- Pinholes
- Manufacturing Anomalies such as laminations, slivers, slugs, and scabs
- Welding

Defect Characterization Performance:

See separate detailed specification for Probability of Identification (POI) Performance

See separate detailed specification for Defect Characterization Performance

Bend radius	±0.25D
Bend angle	±10°
Location from closest weld girth weld:	±0.5%
Circumferential orientation	±10°

Interaction Rules

1 in (25mm) between pits, length of shorter pits; 6x wall thickness and 6x wall (cir); 1 in (25mm) (axial)

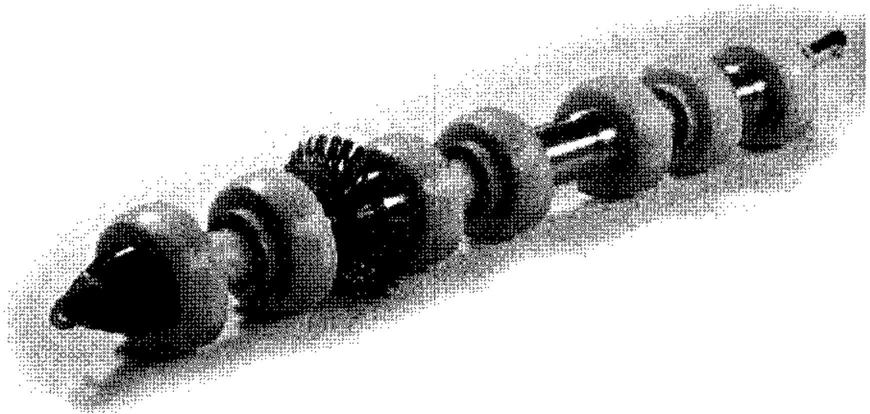
Estimated Repair Factor (ERF)

$ERF = MOP/P_{safe}$

Assessment methodology used: ASME B 31G, Modified B31G, RSTRENG, DNV

Quality Record; Title: 12" DEF Tool Specification			Page 1 of 2
Number: D1043	Rev. B	Date:	
Written by:	Date:	Approved By:	Date:

Standard 12" (305 mm) Deformation Tool Specification



DEF Tool Specifications

Deformation sensor type	Low mass, direct measuring arms
Sample frequency	Up to 500 samples per second
Data discarded by filtering	None
Data storage	Solid state flash memory
Tool transmitter	Pulsed low frequency
Inertial navigation sensors	Solid state INS
Operating pressure range[1]	300 to 2000 psi (21 to 137.8 bar)
In-line temperature range	14 to 131 °F (−10 to 55 °C)
Maximum tool speed[2]	15 ft/s (4.6 m/s)
Minimum bend radius	1.5D
Minimum bore in 1.5D bend	10.75 in (273 mm)
Minimum bore for straight pipe	9.56 in (243 mm)
Defect location aids	GPS equipped AGMs, on board INS and pipeline features
Odometer resolution	0.118 in (2.99 mm)
Number of odometers	2

Def Arms	Length[3]	Weight[3]	Standard Run Time[4]
40 arms	106 in (2.7 m)	350 lb (159 kg)	140 hr

[1] Approximate pressure range. Consult TDW for operation in low pressure gas.
[2] For full reporting accuracy.
[3] With one battery pack. Each additional battery pack is 87 lb (39 kg) and an additional 25 in (635 mm).
[4] With one battery pack. Consult TDW for special configurations yielding longer run times.

Pipeline Features Detected:

- Valves, Flanges, Fittings
- Bends and Elbows
- Girth Welds
- Lateral and Vertical direction changes
- ID changes

Pipe Anomalies Identified:

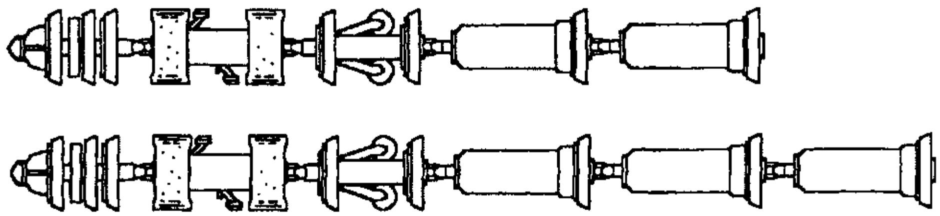
- Seamless pipe variations
- Misalignment
- Weld variations
- Ovality, buckles, dents and wrinkles.

Defect Characterization Performance:

(See separate detailed DEF Sizing Specification for detection and accuracy specifications.)

- Bend radius ±0.25D
- Bend angle ±10°
- Location from closest weld girth weld ±0.5%
- Circumferential orientation ±10°

12 INCH (300 mm) TYPE 3A LINALOG TOOL



INSPECTION CAPABILITY			DIMENSIONAL DATA		
				inch	mm
Min. wall thickness:	.188 in	4.78 mm	Section 1	21	533
Max. wall thickness:	.625 in	15.88 mm	Section 2	23	584
			Section 3	19	483
OPERATING PARAMETERS*			Section 4	27	686
Speed Range	.5 to 5.0 mph	.8 to 8.0 km/h	Section 5	30	762
			Section 6	29	737
Temp. Range	40° to 140°F	4° to 60°C			

	RUN TIME	TOOL LENGTH		TOOL MASS		TRAY MASS	
	hrs	inch	mm	lbs	kg	lbs	kg
Single Batt. Pkg.	22	119	3,023	740	336	66	30
Dual Batt. Pkg.	44	149	3,785	810	368	88	40

BEND CAPABILITY						
PIPE DIA.	MIN. STRAIGHT PIPE DISTANCE BETWEEN BENDS		MINIMUM I.D. IN BEND		TYPICAL WALL THICKNESS **	
	inch	mm	inch	mm	inch	mm
3D	28	711	12.05	306.1	.281	7.14
4D	28	711	11.58	294.1	.500	12.70
5D	18	457	11.32	287.5	.562	14.27
6D	14	356	11.14	283.0	.688	17.48
8D	7	178	11.03	280.2	.688	17.48
10D	0	0	10.99	279.1	.750	19.05
12D	0	0	10.96	278.4	.750	19.05
Straight Pipe (Fittings)			10.80	274.3	.812	20.62
Straight Pipe (Continuous)			11.05	280.7	.688	17.48

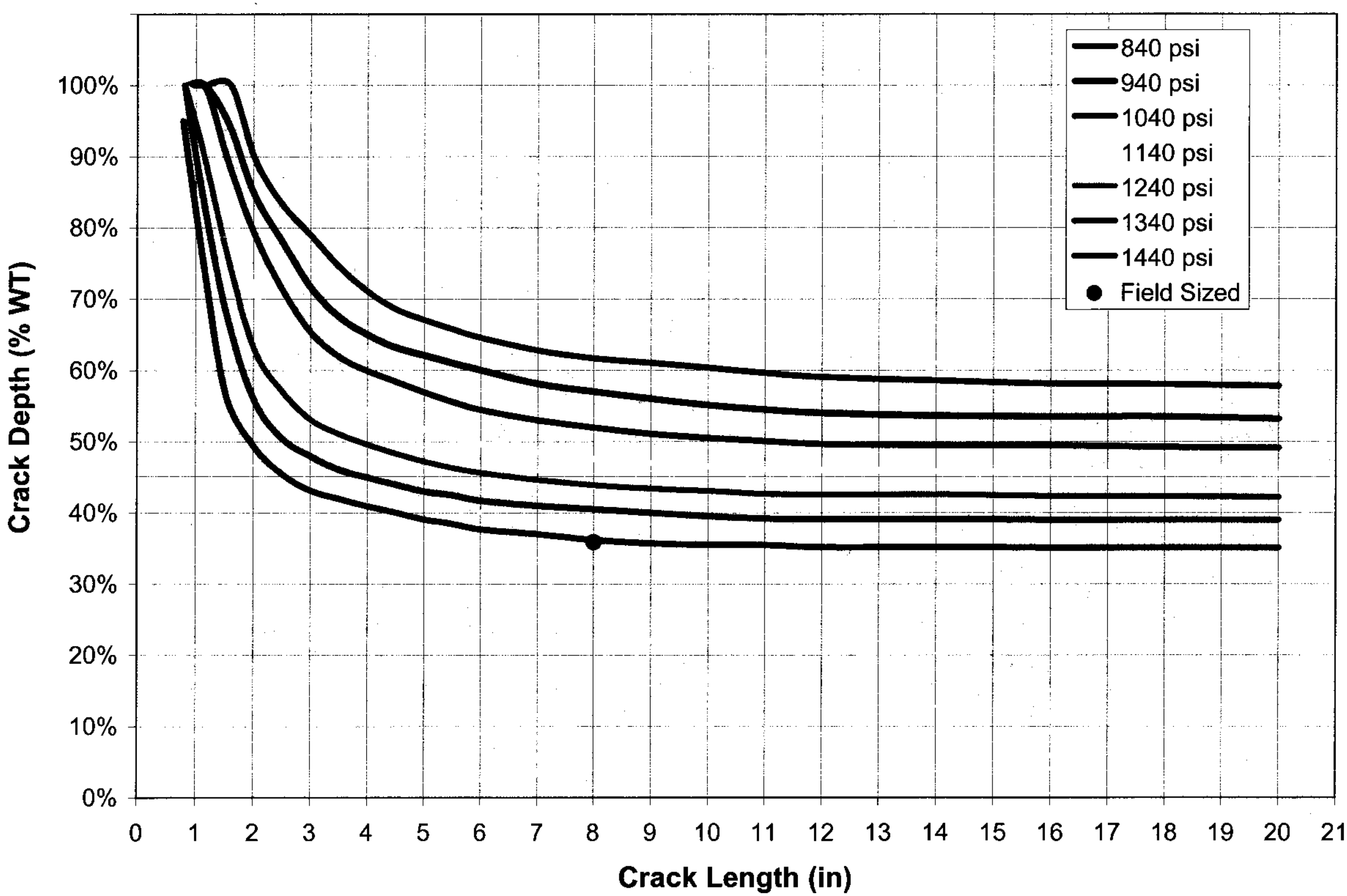
Note: *Minimum recommended operating conditions in gas: English: 60°F, 850 psi, 14.5 mmcfd and 2 mph
Metric: 15°C, 5860 kPa, .41 mmcmd & 3.2 km/h

**The typical wall thickness is provided as a convenience only. Abnormal conditions in the pipe such as unusual ovality may make the typical wall thickness value unusable. The value for the minimum I.D. is the most critical value.

This information is intended only for the use of Linalog customers. This data is subject to revision without notice, and is not to be construed as a warranty or guarantee of any nature. If you have any questions, please contact your local representative or call 713-799-5410.

Field Sized			
	length	8	in
	depth	36%	% WT

1440 psi			1340 psi			1240 psi			1140 psi			1040 psi			940 psi			840 psi		
Length (in)	Depth (in)	Depth (% WT)	Length (in)	Depth (in)	Depth (% WT)	Length (in)	Depth (in)	Depth (% WT)	Length (in)	Depth (in)	Depth (% WT)	Length (in)	Depth (in)	Depth (% WT)	Length (in)	Depth (in)	Depth (% WT)	Length (in)	Depth (in)	Depth (% WT)
0.8	0.238	95.0%	0.8	0.250	100.0%	0.8	0.250	100.0%	0.8	0.250	100.0%	0.8	0.250	100.0%	0.8	0.250	100.0%	0.9	0.250	100.0%
1.1	0.196	78.6%	1.1	0.215	86.0%	1.1	0.228	91.0%	1.1	0.243	97.0%	1.1	0.250	100.0%	1.1	0.250	100.0%	1.1	0.250	100.0%
1.5	0.143	57.0%	1.5	0.171	68.5%	1.5	0.191	76.5%	1.5	0.213	85.2%	1.6	0.224	89.5%	1.6	0.236	94.5%	1.6	0.250	100.0%
2.0	0.124	49.5%	2.0	0.140	56.0%	2.0	0.158	63.0%	2.0	0.179	71.5%	2.0	0.198	79.3%	2.0	0.212	84.6%	2.0	0.224	89.5%
2.5	0.114	45.5%	2.5	0.126	50.5%	2.5	0.143	57.0%	2.5	0.161	64.5%	2.5	0.179	71.5%	2.5	0.195	78.0%	2.5	0.208	83.2%
3.0	0.108	43.2%	3.0	0.120	48.0%	3.0	0.133	53.0%	3.0	0.148	59.0%	3.0	0.164	65.5%	3.0	0.179	71.6%	3.0	0.197	78.9%
3.5	0.105	42.0%	3.5	0.115	46.1%	3.5	0.128	51.0%	3.5	0.140	56.1%	3.5	0.155	62.0%	3.5	0.169	67.5%	3.5	0.186	74.5%
4.0	0.103	41.0%	4.0	0.113	45.0%	4.0	0.124	49.5%	4.0	0.136	54.5%	4.0	0.150	60.0%	4.0	0.163	65.0%	4.0	0.178	71.0%
4.5	0.100	40.1%	4.5	0.110	44.0%	4.5	0.121	48.2%	4.5	0.133	53.0%	4.5	0.146	58.5%	4.5	0.158	63.2%	4.5	0.171	68.5%
5.0	0.098	39.1%	5.0	0.108	43.0%	5.0	0.118	47.1%	5.0	0.129	51.7%	5.0	0.143	57.0%	5.0	0.155	62.1%	5.0	0.168	67.0%
5.5	0.096	38.5%	5.5	0.106	42.5%	5.5	0.116	46.2%	5.5	0.127	50.6%	5.5	0.139	55.6%	5.5	0.153	61.0%	5.5	0.164	65.7%
6.0	0.094	37.7%	6.0	0.104	41.7%	6.0	0.114	45.5%	6.0	0.124	49.7%	6.0	0.136	54.5%	6.0	0.150	60.0%	6.0	0.161	64.5%
7.0	0.093	37.0%	7.0	0.103	41.0%	7.0	0.111	44.5%	7.0	0.121	48.5%	7.0	0.133	53.0%	7.0	0.145	58.1%	7.0	0.157	62.7%
8.0	0.091	36.2%	8.0	0.101	40.5%	8.0	0.110	43.8%	8.0	0.119	47.6%	8.0	0.130	52.0%	8.0	0.143	57.0%	8.0	0.154	61.6%
9.0	0.089	35.7%	9.0	0.100	40.0%	9.0	0.108	43.3%	9.0	0.118	47.0%	9.0	0.128	51.1%	9.0	0.140	56.0%	9.0	0.153	61.0%
10.0	0.089	35.5%	10.0	0.099	39.5%	10.0	0.108	43.0%	10.0	0.116	46.5%	10.0	0.126	50.5%	10.0	0.138	55.1%	10.0	0.151	60.3%
11.0	0.089	35.5%	11.0	0.098	39.2%	11.0	0.107	42.6%	11.0	0.115	46.1%	11.0	0.125	50.1%	11.0	0.136	54.5%	11.0	0.149	59.6%
12.0	0.088	35.2%	12.0	0.098	39.1%	12.0	0.106	42.5%	12.0	0.115	46.0%	12.0	0.124	49.7%	12.0	0.135	54.0%	12.0	0.148	59.0%
14.0	0.088	35.2%	14.0	0.098	39.1%	14.0	0.106	42.5%	14.0	0.115	45.8%	14.0	0.124	49.5%	14.0	0.134	53.6%	14.0	0.146	58.5%
16.0	0.088	35.1%	16.0	0.098	39.0%	16.0	0.106	42.3%	16.0	0.114	45.7%	16.0	0.124	49.5%	16.0	0.134	53.5%	16.0	0.145	58.1%
18.0	0.088	35.1%	18.0	0.098	39.0%	18.0	0.106	42.3%	18.0	0.114	45.6%	18.0	0.123	49.2%	18.0	0.134	53.5%	18.0	0.145	58.0%
20.0	0.088	35.1%	20.0	0.098	39.0%	20.0	0.106	42.2%	20.0	0.114	45.5%	20.0	0.123	49.1%	20.0	0.133	53.2%	20.0	0.145	57.8%



840 psi
940 psi
1040 psi
1140 psi
1240 psi
1340 psi
1440 psi
Field Sized
Crack Depth (% WT)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
Crack Length (in)

Critical Cracks Sizes were Determined Based on:

1. FAD Level-II per API 579
2. External semi-elliptical surface crack
3. Axially oriented single crack with no coalescence modeled
4. Stationary cracks (cracks are not growing. Only a limited amount of ductile tearing/crack extension is allowed before failure
5. The calculated crack sizes do not represent the actual critical crack size that would fail at the prescribed pressure
6. The actual critical crack size or failure pressure is more accurately predicted by FAD Level-III Tearing Instability Approach
7. Nominal wall thickness of 0.250-inch
8. Nominal outside diameter of 12.75-inch
9. Lower bound material properties as shown below (eliminates the use of partial safety factors):

Yield Strength (SMYS)	52	ksi
Tensile Strength (minimum per API 5L)	66	ksi
Young's Modulus (E)	30,000	ksi
Fracture Toughness at the Seam Weld (K_{JMAT})	54.7	ksi$\sqrt{in}$
Fracture Toughness in Base Material (K_{JMAT})	111	ksi$\sqrt{in}$

34-971

DIXIE PIPELINE COMPANY
REPORT OF VISUAL INSPECTION & REPAIR

LOCATION DATE BEGUN 2-3-98 COMPLETE 8-5-98

Name of Line Section or Station Hattiesburg STA. To Carmichael STA., Line size 12"

Location Description M.P. 375.42 -

R/W Tract 39 Alignment Sht# 63 City Petal State MS

1/4 Section SW Section 26 TWNSP T6N RGE R-12-W

R/W Inventory Numbers 1922+00 to 1982+00 Block ____ Survey ____

WORK DESCRIPTION

Detailed Account Dug Creek out - Cleaned Pipe and Repaired Defect # 5 with Clock Spring - Primed and Taped - Then Wax Taped over Greenline tape and Put Rock Shield over Tape - Rip Rap'ed Ten foot Below Crossing and Covered pipe with Dirt

Contractor Sammie Bonner Construction, Inc

AFE Name & Number AFE 6654

INSPECTION RESULTS

FACILITY INSPECTED: ☒ Pipe ☐ Valve ☐ Fitting ☒ Coating ☐ Other ____

LAND USE: Timber

EXTERNAL CORROSION: Pit Depth .047" to .067" Pit Diameter 1" to 3.3" Length of Facility Affected 4" No Measureable Corrosion was Found ☐

DEPTH OF COVER: Exposed

INTERNAL CORROSION: ☐ N/A Pit Depth ____" to ____" Pit Diameter ____" to ____" Length of Facility Affected ____ No Measureable Corrosion was Found ☐

REMARKS: ____

TYPE OF COATING: ☒ TGF ☐ Mastic ☐ FBE ☐ X Tru Cote ☐ Paint ■ Primer & Tape ☐ Concrete ☐ Somastic

CONDITION OF COATING: ☐ Good ☐ Fair ☒ Poor

FACILITY ENVIRONMENT: ☐ Sand ☐ Loam ☐ Clay ☒ Rock ☐ Air ☒ Water ☐ Other ____

REPAIR RESULTS N/A ☐

FACILITY: Repaired ☒ Replaced ☐

REPAIRED BY: Full Wrap ☐ Leak Clamp ☐ Recoat ☐ Clock Spring

COATING Type used Royston Primer & Greenline Tape - Trenton Wax Tape

Description of Repair or Replacement item(s): Clock Spring over Defect - Then Primed and Taped and Wax Taped over That - and used Rock Shield

P.O. # of Repair or Replacement item(s): ____

PROPERTY DAMAGE

LANDOWNER: ☒ TENANT ☐ [redacted]

ADDRESS ____

ZIP CODE & TELEPHONE ____

DESCRIPTION OF DAMAGE None

ESTIMATED VALUE OF PROPERTY DAMAGE: None

COMMENTS: ____

RELATED FORMS & REPORTS: ____

INSPECTED BY: [redacted] APPROVED [redacted] DATE 8-5-98

Back of Form may be used for sketch or additional information

DIXIE PIPELINE COMPANY 34 571

REPORT OF VISUAL INSPECTION & REPAIR

LOCATION

DATE BEGUN 2-3-98 COMPLETE 8-3-98

Name of Line Section or Station: Hattiesburg STA. To Carmichael STA. Line size: 12"

Location Description: MP 406.36 - Jim Taylor Property

R/W Tract: 66 Alignment Sht#: 67 City: Waynesboro State: MS

1/4 Section: SE Section: 12 TWNSP: T8N RGE: R9W

R/W Inventory Numbers: 2113P+00 to 2114G+00 Block: ______ Survey: ______

WORK DESCRIPTION

Detailed Account: Dug out Pipeline To Look For Defect #9. No External Corrosion was Found. Cleaned Pipe and Primed & Taped. Backfilled and Cleanup.
~~ASSUMED TO BE AN INTERNAL MILL DEFECT.~~
~~FURTHER CALLS INDICATE NO EFFECT ON MOP~~
[redacted]

Contractor: Sammie Bonner Construction Inc. 8-3-98

AFE Name & Number: AFE 6654

INSPECTION RESULTS

FACILITY INSPECTED: ☒ Pipe ☐ Valve ☐ Fitting ☒ Coating ☐ Other ______

LAND USE: Timber

EXTERNAL CORROSION: Pit Depth ____" to ____" Pit Diameter ____" to ____" Length of Facility Affected ____ No Measureable Corrosion was Found ☒

DEPTH OF COVER: 36"

INTERNAL CORROSION: ☒ N/A Pit Depth ____" to ____" Pit Diameter ____" to ____" Length of Facility Affected ____ No Measureable Corrosion was Found ☐

REMARKS: Hauled 5 Loads Dirt in on Right of Way To Fill in Holes.

TYPE OF COATING: ☒ TGF ☐ Mastic ☐ FBE ☐ X-Tru Cote ☐ Paint ☐ Primer & Tape ☐ Concrete ☐ Somastic

CONDITION OF COATING: ☒ Good ☐ Fair ☐ Poor

FACILITY ENVIRONMENT: ☐ Sand ☒ Loam ☒ Clay ☐ Rock ☐ Air ☐ Water ☐ Other ______

REPAIR RESULTS

N/A ☐

FACILITY: Repaired ☒ Replaced ☐

REPAIRED BY: Full Wrap ☐ Leak Clamp ☐ Recoat ☐

COATING: Type used Royston Primer & Greenline Tape

Description of Repair or Replacement item(s): ______

P.O. # of Repair or Replacement item(s): ______

PROPERTY DAMAGE

LANDOWNER ☒ TENANT ☐ [redacted]

ADDRESS: ______

ZIP CODE & TELEPHONE: ______

DESCRIPTION OF DAMAGE: None

ESTIMATED VALUE OF PROPERTY DAMAGE: ______

COMMENTS: ______

RELATED FORMS & REPORTS:

INSPECTED BY: [redacted] APPROVED [redacted] DATE 8-3-98

Back of Form may be used for sketch or additional information

DIXIE PIPELINE COMPANY
REPORT OF VISUAL INSPECTION & REPAIR

21-593

LOCATION DATE BEGUN 7-22-98 COMPLETE 7-24-98

Name of Line Section or Station Ala/Ms State Line To Demopolis, Line size 12"

Location Description M.P. 441.58 - West of Tenn. Northern Railroad

R W Tract 65 Alignment Sht# 74 City Baltzer State Alabama

1/4 Section SE Section 23 TWNSP T13N RGE R4W

R W Inventory Numbers 23314+05 to 23316+05 Block ____ Survey ____

WORK DESCRIPTION

Detailed Account: Dug out Each End of span at 23315+05 looking For Defect #24 - Removed Coating To look For Defect. Used Clock Spring To Repair Defect Where Coating had not Bonded To Pipe and Moisture had Caused External Corrosion. Area Was Cleaned and Primed With Royston Primer and Taped with Greenline Tape

Contractor Sammie Bonner Construction

AFE Name & Number AFE 6654

INSPECTION RESULTS

FACILITY INSPECTED: ☒ Pipe ☐ Valve ☐ Fitting ☒ Coating ☐ Other

LAND USE Timber

EXTERNAL CORROSION: Pit Depth .020" to .080"; Pit Diameter 1/2" to 3/8"; Length of Facility Affected 5 Feet; No Measureable Corrosion was Found ☐

DEPTH OF COVER: 28" To Exposed (Span)

INTERNAL CORROSION ☒ N.A: Pit Depth ____ to ____; Pit Diameter ____ to ____; Length of Facility Affected ____; No Measureable Corrosion was Found ☐

REMARKS: Defect was in Span After Repair Span Was Covered and now has 24" cover

TYPE OF COATING: ☒ TGF ☐ Mastic ☐ FBE ☐ X-Tru Cote ☐ Paint ☐ Primer & Tape ☐ Concrete ☐ Somastic

CONDITION OF COATING: ☒ Good ☐ Fair ☐ Poor

FACILITY ENVIRONMENT: ☐ Sand ☐ Loam ☐ Clay ☒ Rock ☒ Air ☐ Water ☐ Other ____

REPAIR RESULTS N/A ☐

FACILITY Repaired ☒ Replaced ☐

REPAIRED BY Full Wrap ☐ Leak Clamp ☐ Recoat ☒ Clock Spring

COATING Type used Royston Primer and Greenline Tape - Wax Tape

Description of Repair or Replacement item(s) Clock Spring used To Repair Defect #24 - Wax Tape Coating over Clock Spring, Rest was Royston Primer and Greenline Tape

P.O. # of Repair or Replacement item(s) ____

PROPERTY DAMAGE

LANDOWNER ☒ TENANT ☐ [redacted]

ADDRESS ____

ZIP CODE & TELEPHONE ____

DESCRIPTION OF DAMAGE N/A

ESTIMATED VALUE OF PROPERTY DAMAGE N/A

COMMENTS ____

RELATED FORMS & REPORTS:

INSPECTED BY [redacted] APPROVED [redacted] DATE 7-24-98

Back of Form may be used for sketch or additional information

GE Infrastructure

GE Inspection Services
17619 Aldine Westfield Road
Houston, TX
77073
(281) 982-1933

USCD Tool Validation Dig Project Fall 2005 Assessment Summary

There were 41 in-field digs conducted on the Dixie Pipeline Company 12inch Hattiesburg to Demopolis system from October through December 2005. These digs were selected to validate the listed USCD Tool Features by determining the types of defects that existed, & measuring their dimensions in field.

There were a total of 102 listed USCD Features that were validated during these 41 digs:

- 46 Crack-Like Features
    - 4 @ N/A Depth
    - 13 @ 12.5-25% Depth
    - 26 @ 25-40% Depth
    - 3 @ > 40% Depth
- 7 Crack-Field Features
    - 3 @ <12.5 Depth
    - 4 @ 12.5-25% Depth
- 25 Notch-Like Features
    - 24 @ N/A Depth
    - 1 @ < 12.5% Depth

- 22 Not Decidable Features
    - All N/A Depth

- 2 Dent Features

These USCD Features were investigated with Black & White Magnetic Particle testing, Advanced manual crack assessments, & Phased Array ultrasonic scanning was brought in-field on some of the larger or more complex features discovered during this validation process.

GE Infrastructure

Complete USCD Correlation Results from Phase 1 of the Fall 2005 Validation Project

There were 829 anomalies discovered whose locations correlated with the 102 listed USCD Features associated with both the ERW long seam, & body of the pipe. The following results list how the discovered anomalies correlated with each of the USCD features & their associated depth classifications: (refer to results table attached)

The 4 Crack-Like Features @ N/A Depth – correlated to these anomalies:

- 2 External Lack of Fusion @ < 12.5% depth
- 7 External Lack of Fusion @ 12.5-25% depth
- 1 External Lack of Fusion @ > 40% depth
- 1 Internal Lack of Fusion @ 12.5-25% depth
- 3 Laminations @ > 40% depth
- 1 Area of Multiple Linear Cracks @ < 12.5% depth
- 3 Areas of Multiple Linear Cracks @ 12.5-25% depth
- 1 Area of Internal Inclusions @ < 12.5% depth
- 2 Areas of Internal Metal Loss @ < 12.5% depth
- 2 Areas of Internal Metal Loss @ 12.5-25% depth
- 1 Area of External Metal Loss @ < 12.5% depth
- 1 Lack of Fusion & Crack @ 25-40% depth

The 13 Crack-Like Features @ 12.5-25% Depth – correlated to these anomalies:

- 1 External Lack of Fusion @ < 12.5% depth
- 24 External Lack of Fusion @ 12.5-25% depth
- 2 External Lack of Fusion @ 25-40% depth
- 1 Hook Crack @ < 12.5% depth
- 3 Hook Cracks @ 12.5-25% depth
- 2 Laminations @ 12.5-25% depth
- 17 Laminations @ > 40% depth
- 8 Single Cracks @ < 12.5% depth
- 3 Single Cracks @ 12.5-25% depth
- 20 Single Cracks @ 25-40% depth
- 1 Single Crack @ > 40% depth
- 44 Area of Multiple Linear Cracks @ < 12.5% depth
- 42 Areas of Multiple Linear Cracks @ 12.5-25% depth
- 1 Area of Internal Inclusions @ < 12.5% depth
- 12 Areas of Internal Metal Loss @ < 12.5% depth
- 1 Areas of Internal Metal Loss @ 12.5-25% depth
- 3 Area of External Metal Loss @ < 12.5% depth
- 2 Area of External Metal Loss @ 12.5-25% depth

The 26 Crack-Like Features @ 25-40% Depth – correlated to these anomalies:

- 19 External Lack of Fusion @ < 12.5% depth
- 22 External Lack of Fusion @ 12.5-25% depth
- 6 External Lack of Fusion @ 25-40% depth
- 1 External Lack of Fusion @ > 40% depth
- 3 Internal Lack of Fusion @ 25-40% depth
- 1 Internal Lack of Fusion @ > 40% depth
- 1 Hook Crack @ 12.5-25% depth
- 1 Lamination @ 12.5-25% depth
- 36 Laminations @ > 40% depth
- 149 Single Cracks @ < 12.5% depth
- 198 Single Cracks @ 12.5-25% depth
- 9 Single Cracks @ 25-40% depth
- 5 Single Cracks @ > 40% depth
- 14 Area of Multiple Linear Cracks @ < 12.5% depth
- 41 Areas of Multiple Linear Cracks @ 12.5-25% depth
- 4 Areas of Multiple Linear Cracks @ 25-40% depth
- 1 Area of External Metal Loss @ < 12.5% depth
- 2 Lack of Fusion & Crack areas @ < 12.5% depth
- 1 Lack of Fusion & Crack @ 12.5-25% depth
- 1 Crack & Lamination @ 25-40% depth

The 3 Crack-Like Features @ > 40% Depth – correlated to these anomalies:

- 2 External Lack of Fusion @ 12.5-25% depth
- 2 External Lack of Fusion @ 25-40% depth
- 2 Hook Cracks @ 25-40% depth
- 1 Lamination @ > 40% depth
- 1 Single Crack @ 12.5-25% depth
- 1 Single Crack @ 25-40% depth

The 3 Crack-Field Features @ < 12.5% Depth – correlated to these anomalies:

- 1 Area of Internal Inclusions @ 25-40% depth
- 1 External Metal Loss Area @ < 12.5% depth
- 1 Lack of Fusion & Crack @ < 12.5% depth
- 1 Crack & Lamination @ < 12.5% depth

The 4 Crack-Field Features @ 12.5-25% Depth – correlated to these anomalies:

- 1 External Lack of Fusion @ < 12.5% depth
- 1 Lamination @ > 40% depth
- 3 Multiple Linear Crack Areas @ 12.5-25% depth
- 1 Multiple Linear Crack Area @ 25-40% depth
- 1 Area of Internal Inclusions @ 12.5-25% depth

The 24 Notch-Like Features @ N/A Depth – correlated to these anomalies:

- 3 External Lack of Fusion @ < 12.5% depth
- 10 External Lack of Fusion @ 12.5-25% depth
- 6 External Lack of Fusion @ 25-40% depth
- 1 External Lack of Fusion @ > 40% depth
- 1 Internal Lack of Fusion @ 25-40% depth
- 4 Laminations @ > 40% depth
- 5 Single Crack @ 12.5-25% depth
- 4 Single Crack @ 25-40% depth
- 5 Multiple Linear Crack Areas @ 25-40% depth
- 2 Multiple Linear Crack Areas @ > 40% depth
- 2 Internal Metal Loss Areas @ < 12.5% depth
- 1 Internal Metal Loss Area @ 12.5-25% depth
- 1 Lack of Fusion & Crack @ > 40% depth

The 1 Notch-Like Feature @ 12.5-25% Depth – correlated to these anomalies:

- 1 External Lack of Fusion @ < 12.5% depth

The 22 Not Decidable Features @ N/A Depth – correlated to these anomalies:

- 1 External Lack of Fusion @ < 12.5% depth
- 12 External Lack of Fusion @ 12.5-25% depth
- 7 External Lack of Fusion @ 25-40% depth
- 2 External Lack of Fusion @ > 40% depth
- 12 Laminations @ > 40% depth
- 1 Area of Internal Inclusions @ 12.5-25% depth
- 2 Internal Metal Loss Areas @ < 12.5% depth
- 3 Lack of Fusion & Crack Areas @ 25-40% depth

GE Infrastructure

Complete USCD Phase 1 Project Field Correlation Results										
Discovered Anomalies		Crack-Like				Crack-Field		Notch-Like		Not Decidable
		N/A	12.5-25%	25-40%	>40%	<12.5%	12.5-25%	N/A	< 12.5%	N/A
		4	*13*	*26*	*3*	*3*	*4*	*24*	*1*	*22*
External Lack of Fusion	<12.5%	2	1	19			1	3	1	1
	12.5-25%	7	24	22	2			10		12
	25-40%		2	6	2			6		7
	>40%	1		1				1		2
Internal Lack of Fusion	<12.5%									
	12.5-25%	1								
	25-40%			3				1		
	>40%			1						
Hook Cracks	<12.5%		1							
	12.5-25%		3	1						
	25-40%				2					
	>40%									
Laminations	<12.5%									
	12.5-25%		2	1						
	25-40%									
	>40%	3	17	42	1		1	4		12
Single Crack	<12.5%		8	149						
	12.5-25%		3	198	1			5		
	25-40%		20	9				4		
	>40%		1	5	1					
Multiple Linear Cracks	<12.5%	1	44	14						
	12.5-25%	3	42	41			3			
	25-40%			4			1	5		
	>40%							2		
Internal Inclusions	<12.5%	1	1							
	12.5-25%						1			1
	25-40%					1				
	>40%									
Internal Metal Loss	<12.5%	2	12					2		2
	12.5-25%	2	1					1		
	25-40%									
	>40%									
External Metal Loss	<12.5%	1	3	1		1				
	12.5-25%		2							
	25-40%									
	>40%									
Lack of Fusion + Crack	<12.5%			2		1				
	12.5-25%			1						
	25-40%	1								3
	>40%							1		
Crack + Lamination	<12.5%					1				
	12.5-25%									
	25-40%			1						
	>40%									

USCD Results Table 1.0

Dig Summary from 2006 MFL/Def ILI Data

Dig #	CODE	ID#	Feature	Wheel Count (ft)	Sta. Num. (ft)	MP	Immediate	60 Day	180 Day	Type B Sleeve	Cut Out & Replace	Recoat & Backfill	Prev Repair	Comments
1	W	3770	WELD	18,304.34	19577+21	370.78			Dent	2'				
2	W	4760	WELD	23,647.40	19627+55	371.73				2'				Internal-need UT (dug out)
3	W	4940	WELD	24,634.67	19639+44	371.96		ML		5'4"				
4	W	8160	WELD	41,920.15	19813+84	375.26			ML		99'			In Creek
5	W	11800	WELD	62,175.81	20016+32	379.10		Dent	Dent	2'				
6	W	13260	WELD	69,343.32	20087+64	380.45			ML	2'				Front yard of house
7	W	58150	WELD	309,732.58	22484+02	425.83			Dent	18"				Middle of gravel road near homes
8	W	58620	WELD	312,286.38	22509+75	426.32				2'				Internal-need UT (hayfield)
9	W	64690	WELD	345,597.04	22841+14	432.60			Dent	2'				
10	W	67240	WELD	359,680.64	22981+47	435.26		Dent	Dent			x		
11	W	72630	WELD	388,987.93	23273+65	440.79						ML		
12	W	72970	WELD	390,920.75	23292+97	441.15		Dent		2'				
13	W	73200	WELD	392,219.60	23306+01	441.40				2'				ML(2)
14	W	73360	WELD	393,107.95	23314+91	441.57							CS	
15	W	86450	WELD	462,974.95	24011+68	454.77			Dent			x		
16	W	87410	WELD	467,928.70	24060+51	455.69	Dent w/ML (2)			x				
17	W	99040	WELD	531,218.38	24688+94	467.59			ML	x				
18	W	107340	WELD	574,485.98	25120+05	475.76			Dent	x				
19	W	118040	WELD	631,800.16	25686+05	486.48			ML			ML		

Dig #	CODE	ID#	Feature	Wheel Count (ft)	Sta. Num. (ft)	Depth (%)	WT (in.)	Length (in.)	Width (in.)	Orient (clock)	P' MOD B31G (psi)	ERF MOD B31G (MOP/P')	MOP/P' (based on 1454)	Dist from U/S weld (ft)	Dist from D/S weld (ft)	u/s AGM	Dist to U/S AGM (ft)	d/s AGM	Dist to D/S AGM (ft)	Joint Length (ft)	Comments	LAT	LON
1	w	3770	WELD	18,304.34	19577+21															58.47		31.4018272	-89.2264507
	D	14000000	DENT	18,309.03	19577+25	2.8%	0.250	4.24		2:00				4.68	53.79	PM # 5, 19572+04	608.51	PM # 6, 19598+10	2435.73	58.47	DENT - Depth 0.33 inch Magpie Correlated Deformation	31.4018366	-89.2264404
2	w	4760	WELD	23,647.40	19627+55															55.14		31.4124477	-89.2148322
	ii	40000078	GROUP	23,699.65	19628+18	37%	0.250	1.41	4.17	8:15	1469	0.900	0.99	52.26	2.89	PM # 7, 19624+50	305.29	PM # 8, 19650+90	1885.84	55.14	Metal Loss INTERNAL	31.4125476	-89.2145117
3	w	4940	WELD	24,634.67	19639+44															11.80		31.4143327	-89.2123577
	i	40000086	GROUP	24,634.75	19639+44	10%	0.250	2.12	2.89	3:00	1469	0.861	0.99	0.08	11.72	PM # 7, 19624+50	1240.39	PM # 8, 19650+90	950.74	11.80	Metal Loss EXTERNAL	31.4143328	-89.2123575
	i	40000087	GROUP	24,634.79	19639+45	12%	0.250	1.18	2.89	11:15	1469	0.850	0.99	0.12	11.68	PM # 7, 19624+50	1240.43	PM # 8, 19650+90	950.70	11.80	Metal Loss EXTERNAL	31.4143329	-89.2123574
	R2	40000088	GROUP	24,634.79	19639+45	38%	0.250	35.11	23.09	12:30	1211	1.215	1.20	0.12	11.68	PM # 7, 19624+50	1240.43	PM # 8, 19650+90	950.70	11.80	Metal Loss EXTERNAL	31.4143329	-89.2123574
	i	40000089	GROUP	24,634.97	19639+45	10%	0.250	0.47	0.64	8:15	1469	0.840	0.99	0.29	11.51	PM # 7, 19624+50	1240.61	PM # 8, 19650+90	950.53	11.80	Metal Loss EXTERNAL	31.4143333	-89.212357
	i	40000090	GROUP	24,634.97	19639+45	10%	0.250	0.82	1.28	5:00	1469	0.844	0.99	0.29	11.51	PM # 7, 19624+50	1240.61	PM # 8, 19650+90	950.53	11.80	Metal Loss EXTERNAL	31.4143333	-89.212357
	i	40000091	GROUP	24,635.18	19639+45	10%	0.250	1.41	1.60	6:30	1469	0.851	0.99	0.51	11.29	PM # 7, 19624+50	1240.82	PM # 8, 19650+90	950.31	11.80	Metal Loss EXTERNAL	31.4143337	-89.2123565
	i	40000092	GROUP	24,635.30	19639+45	10%	0.250	1.18	0.96	4:45	1469	0.848	0.99	0.63	11.17	PM # 7, 19624+50	1240.94	PM # 8, 19650+90	950.19	11.80	Metal Loss EXTERNAL	31.4143339	-89.2123562
	i	40000093	GROUP	24,635.63	19639+46	10%	0.250	2.59	1.92	5:15	1469	0.866	0.99	0.96	10.84	PM # 7, 19624+50	1241.27	PM # 8, 19650+90	949.86	11.80	Metal Loss EXTERNAL	31.4143345	-89.2123554
	i	40000094	GROUP	24,635.74	19639+46	10%	0.250	0.47	0.64	7:00	1469	0.840	0.99	1.07	10.73	PM # 7, 19624+50	1241.38	PM # 8, 19650+90	949.75	11.80	Metal Loss EXTERNAL	31.4143347	-89.2123552
	i	40000095	GROUP	24,635.86	19639+46	10%	0.250	0.35	0.64	4:45	1469	0.840	0.99	1.19	10.61	PM # 7, 19624+50	1241.50	PM # 8, 19650+90	949.63	11.80	Metal Loss EXTERNAL	31.414335	-89.2123549
	i	40000096	GROUP	24,635.99	19639+46	10%	0.250	0.71	1.60	7:00	1469	0.842	0.99	1.32	10.49	PM # 7, 19624+50	1241.63	PM # 8, 19650+90	949.51	11.80	Metal Loss EXTERNAL	31.4143352	-89.2123546
	i	40000097	GROUP	24,636.12	19639+46	10%	0.250	1.30	0.96	4:30	1469	0.850	0.99	1.45	10.35	PM # 7, 19624+50	1241.76	PM # 8, 19650+90	949.37	11.80	Metal Loss EXTERNAL	31.4143355	-89.2123543
	i	40000098	GROUP	24,636.38	19639+46	10%	0.250	0.47	0.64	4:45	1469	0.840	0.99	1.71	10.09	PM # 7, 19624+50	1242.02	PM # 8, 19650+90	949.11	11.80	Metal Loss EXTERNAL	31.414336	-89.2123537
4	w	8160	WELD	41,920.15	19813+84															58.81		31.4482353	-89.1755191
	g	13000016	GAIN	41,951.66	19814+15					12:45				31.71	27.10	PM # 14, 19800+84	1336.31	PM # 15, 19827+24	1313.89	58.81	GAIN	31.448291	-89.1754408
	i	40000147	GROUP	41,955.23	19814+19	10%	0.250	7.54	5.45	12:15	1469	0.894	0.99	35.09	23.72	PM # 14, 19800+84	1339.68	PM # 15, 19827+24	1310.52	58.81	Metal Loss EXTERNAL	31.448297	-89.1754325
	i	40000148	GROUP	41,956.09	19814+19	10%	0.250	11.90	7.70	11:45	1469	0.900	0.99	35.94	22.86	PM # 14, 19800+84	1340.54	PM # 15, 19827+24	1309.66	58.81	Metal Loss EXTERNAL	31.4482985	-89.1754304
	R2	40000149	GROUP	41,957.75	19814+21	22%	0.250	54.78	20.53	1:15	1428	1.029	1.02	37.60	21.21	PM # 14, 19800+84	1342.20	PM # 15, 19827+24	1308.00	58.81	Metal Loss EXTERNAL	31.4483014	-89.1754263
	i	40000150	GROUP	41,962.48	19814+26	10%	0.250	0.82	0.64	11:30	1469	0.844	0.99	42.33	16.47	PM # 14, 19800+84	1346.93	PM # 15, 19827+24	1303.27	58.81	Metal Loss EXTERNAL	31.4483097	-89.1754146
	R2	40000151	GROUP	41,962.48	19814+26	27%	0.250	20.82	15.39	1:15	1398	1.052	1.04	42.33	16.47	PM # 14, 19800+84	1346.93	PM # 15, 19827+24	1303.27	58.81	Metal Loss EXTERNAL	31.4483097	-89.1754146
5	w	11600	WELD	62,175.81	20016+32															59.60		31.4852305	-89.1281249
	D	14000002	DENT	62,182.08	20016+39	3.0%	0.250	3.77		12:00				6.27	53.33	PM # 21, 19995+32	2099.57	PM # 22, 20022+80	639.21	59.60	DENT - Depth 0.38 inch Magpie Correlated Deformation	31.4852386	-89.1281071
	D	14000003	DENT	62,182.52	20016+39	2.2%	0.250	3.42		1:30				6.71	52.90	PM # 21, 19995+32	2100.00	PM # 22, 20022+80	638.77	59.60	DENT - Depth 0.28 inch Magpie Correlated Deformation	31.4852392	-89.1281059
	i	40000178	GROUP	62,229.23	20016+86	10%	0.250	0.35	0.64	10:00	1469	0.840	0.99	53.42	6.19	PM # 21, 19995+32	2146.71	PM # 22, 20022+80	592.06	59.60	Metal Loss EXTERNAL	31.4852996	-89.1279734
	i	40000179	GROUP	62,229.49	20016+86	11%	0.250	0.35	0.64	10:00	1469	0.840	0.99	53.68	5.92	PM # 21, 19995+32	2146.97	PM # 22, 20022+80	591.80	59.60	Metal Loss EXTERNAL	31.4853	-89.1279726
6	w	13260	WELD	69,343.32	20087+64															56.69		31.4946308	-89.1081023
	e	40000182	GROUP	69,391.98	20088+12	68%	0.250	1.18	4.17	12:00	1469	0.977	0.99	48.64	10.05	PM # 24, 20076+52	1171.02	PM # 25, 20102+92	1493.06	56.69	Metal Loss EXTERNAL	31.4946973	-89.1079967
	i	40000183	GROUP	69,398.69	20088+19	18%	0.250	2.83	3.85	5:30	1469	0.897	0.99	55.37	3.32	PM # 24, 20076+52	1177.75	PM # 25, 20102+92	1486.33	56.69	Metal Loss EXTERNAL	31.4947066	-89.1079483
7	w	58150	WELD	309,732.58	22484+02															57.88		31.9211263	-88.5342273
	D	14000004	DENT	309,782.21	22484+51	2.4%	0.250	5.18		2:00				49.63	8.26	Valve, MP 425.48	1586.99	PM # 111, 22494+27	979.96	57.88	DENT - Depth 0.29 inch Magpie Correlated Deformation	31.9212183	-88.534109
8	w	59620	WELD	312,286.38	22509+75															45.39		31.9258671	-88.5281029
	ii	40000412	GROUP	312,314.45	22510+04	37%	0.250	1.88	5.45	3:15	1469	0.930	0.99	28.08	17.31	PM # 111, 22494+27	1552.26	PM # 112, 22520+67	1046.52	45.39	Metal Loss INTERNAL	31.9259392	-88.528036
9	w	64690	WELD	345,597.04	22841+14															59.33		31.9907506	-88.4555899
	D	14000005	DENT	345,609.28	22841+26	2.2%	0.250	6.13		4:00				12.24	47.08	PM # 124, 22838+19	308.34	PM # 125, 22865+80	2467.36	59.33	DENT - Depth 0.26 inch Magpie Correlated Deformation	31.9907794	-88.4555335
10	w	67240	WELD	359,680.64	22981+47															48.66		32.0183149	-88.42524
	D	14000006	DENT	359,711.75	22981+77	2.5%	0.250	7.19		8:00				31.11	17.54	PM # 129, 22972+14	959.61	PM # 130, 22998+54	1687.65	48.66	DENT - Depth 0.30 inch Magpie Correlated Deformation with associated met	32.0183731	-88.4251664
11	w	72630	WELD	388,987.63	23273+65															39.44		32.074157	-88.359696
	i	40000480	GROUP	388,991.32	23273+68	10%	0.250	0.71	1.28	4:00	1469	0.842	0.99	3.39	36.05	PM # 139, 23254+20	1960.70	PM # 140, 23281+80	817.38	39.44	Metal Loss EXTERNAL	32.0741612	-88.3596862
	E	40000481	GROUP	388,991.55	23273+68	31%	0.250	4.48	7.70	5:15	1469	1.002	0.99	3.62	35.81	PM # 139, 23254+20	1960.93	PM # 140, 23281+80	817.15	39.44	Metal Loss EXTERNAL	32.0741615	-88.3596856
	i	40000482	GROUP	389,013.21	23273+90	10%	0.250	2.12	3.21	7:00	1469	0.861	0.99	25.28	14.16	PM # 139, 23254+20	1982.59	PM # 140, 23281+80	795.49	39.44	Metal Loss EXTERNAL	32.0741881	-88.3596229
12	w	72970	WELD	390,920.75	23292+97															58.46		32.0766771	-88.3541595
	D	14000007	DENT	390,966.63	23293+43	4.3%	0.250	6.95		12:15				45.88	12.59	PM # 140, 23281+80	1157.93	PM # 141, 23308+31	1481.53	58.46	DENT - Depth 0.51 inch Magpie Correlated Deformation	32.0767333	-88.3540285
13	w	73200	WELD	392,219.60	23306+01															46.12		32.0783065	-88.3504849
	M	40000507	GROUP	392,253.29	23306+35	35%	0.250	2.59	6.09	6:00	1469	0.965	0.99	33.69	12.43	PM # 140, 23281+80	2444.59	PM # 141, 23308+31	194.87	46.12	Metal Loss EXTERNAL	32.0783514	-88.3503695
	i	40000508	GROUP	392,253.78	23306+36	28%	0.250	2.71	4.81	6:00	1469	0.934	0.99	34.18	11.94	PM # 140, 23281+80	2445.08	PM # 141, 23308+31	194.38	46.12	Metal Loss EXTERNAL	32.078352	-88.3503681
	i	40000509	GROUP	392,265.02	23306+47	10%	0.250	2.00	4.17	3:00	1469	0.859	0.99	45.43	0.70	PM # 140, 23281+80	2456.32	PM # 141, 23308+31	183.14	46.12	Metal Loss INTERNAL	32.078367	-88.3503563
14	w	73350	WELD	393,107.95	23314+91															59.07		32.0798993	-88.3485142
	i	40000510	GROUP	393,132.09	23315+15	10%	0.250	0.35	0.96	3:00	1469	0.840	0.99	24.14	34.93	PM # 141, 23308+31	683.93	PM # 142, 23334+71	1954.98	59.07	Metal Loss EXTERNAL	32.0799435	-88.3484561
	i	40000511	GROUP	393,132.76	23315+16	10%	0.250	1.30	4.49	11:00	1469	0.850	0.99	24.81	34.26	PM # 141, 23308+31	684.60	PM # 142, 23334+71	1954.32	59.07	Metal Loss EXTERNAL	32.0799448	-88.3484545
	i	40000512	GROUP	393,132.90	23315+16	10%	0.250	0.82	1.28	7:45	1469	0.844	0.99	24.95	34.13	PM # 141, 23308+31	684.74	PM # 142, 23334+71	1954.18	59.07	Metal Loss EXTERNAL	32.079945	-88.3484541
	i	40000513	GROUP	393,133.10	23315+16	10%	0.250	0.59	0.64	5:30	1469	0.841	0.99	25.15	33.92	PM # 141, 23308+31	684.96	PM # 142, 23334+71	1953.97	59.07	Metal Loss EXTERNAL	32.0799454	-88.3484536
	i	40000514	GROUP	393,133.55	23315+17	10%	0.250	0.71	2.24	7:30	1469	0.842	0.99	25.60	33.47	PM # 141, 23308+31	685.40	PM # 142, 23334+71	1953.52	59.07	Metal Loss EXTERNAL	32.0799462	-88.3484525
	i	40000515	GROUP	393,133.76	23315+17	10%	0.250	0.59	0.64	4:45	1469	0.841	0.99	25.81	33.26	PM # 141, 23308+31	685.60	PM # 142, 23334+71	1953.31	59.07	Metal Loss EXTERNAL	32.0799466	-88.3484521
	i	40000516	GROUP	393,133.94	23315+17	10%	0.250	4.12	4.17	7:30	1469	0.860	0.99	25.99	33.08	PM # 141, 23308+31	685.78	PM # 142, 23334+71	1953.14	59.07	Metal Loss EXTERNAL	32.0799469	-88.3484516
	i	40000517	GROUP	393,134.74	23315+18	10%	0.250	0.47	0.64	9:30	1469	0.840	0.99	26.79	32.28	PM # 141, 23308+31	686.59	PM # 142, 23334+71	1952.33	59.07	Metal Loss EXTERNAL	32.0799484	-88.3484497
	R2	40000518	GROUP	393,135.05	23315+18	31%	0.250	15.43	11.55	6:15	1360	1.082	1.07	27.10	31.98	PM # 141, 23308+31	686.89	PM # 142, 23334+71	1952.03	59.07	Metal Loss EXTERNAL	32.079949	-88.348449
	i	40000519	GROUP	393,136.19	23315+19	10%	0.250	3.77	0.64	3:45	1469	0.877	0.99	28.24	30.84	PM # 141, 23308+31	688.03	PM # 142, 23334+71	1950.89	59.07	Metal Loss EXTERNAL	32.0799511	-88.3484462
	i	40000520	GROUP	393,136.45	23315+20	10%	0.250	0.59	1.28	2:15	1469	0.841	0.99	28.50	30.57	PM # 141, 23308+31	688.29	PM # 142, 23334+71	1950.62	59.07	Metal Loss EXTERNAL	32.0799515	-88.3484456
	i	40000521	GROUP	393,136.81	23315+20	10%	0.250	2.12	2.89	12:30	1469	0.861	0.99	28.86	30.21	PM # 141, 23308+31	688.66	PM # 142, 23334+71	1950.26	59.07	Metal Loss EXTERNAL	32.0799522	-88.3484447
	i	40000522	GROUP	393,136.81	23315+20	10%	0.250	0.59	1.92	2:00	1469	0.841	0.99	28.86	30.21	PM # 141, 23308+31	688.66	PM # 142, 23334+71	1950.26	59.07	Metal Loss EXTERNAL	32.0799522	-88.3484447
	i	40000523	GROUP	393,137.17	23315+20	10%	0.250	0.71	0.96	1:30	1469	0.842	0.99	29.22	29.85	PM # 141, 23308+31	689.01	PM # 142, 23334+71	1949.91	59.07	Metal Loss EXTERNAL	32.0799529	-88.3484438
	i	40000524	GROUP	393,137.18	23315+20	12%	0.250	0.94	2.24	10:30	1469	0.847	0.99	29.23	29.85	PM # 141, 23308+31	689.02	PM # 142, 23334+71	1949.90	59.07	Metal Loss EXTERNAL	32.0799529	-88.3484438
	i	40000525	GROUP	393,137.19	23315+20	10%	0.250	1.06	1.92	12:30	1469	0.847	0.99	29.24	29.84	PM # 141, 23308+31	689.03	PM # 142, 23334+71	1949.89	59.07	Metal Loss EXTERNAL	32.0799529	-88.3484438
	i	40000526	GROUP	393,165.27	23315+48	10%	0.250	2.00	2.57	6:30	1469	0.859	0.99	57.32	1.75	PM # 141, 23308+31	717.12	PM # 142, 23334+71	1921.80	59.07	Metal Loss EXTERNAL	32.0800044	-88.3483762
15	w	86450	WELD	462,974.95	24011+68															48.52		32.1954101	-88.1733926
	D	14000008	DENT	463,014.62	24012+07	2.1%	0.250	6.01		11:30				39.67	8.85	PM # 167, 24007+64	449.69	Valve, MP 455.14	2006.61	48.52	DENT - Depth 0.25 inch Magpie Correlated Deformation	32.195482	-88.1732861
16	w	87410	WELD	467,928.70	24060+51															58.56		32.2042549	-88.1613565
	D	14000009	DENT	467,963.99	24060+85	1.4%	0.250	3.77		11:30				35.29	23.27	PM # 168, 24057+96	291.28	PM # 169, 24084+38	2363.60	58.56	DENT - Depth 0.17 inch Magpie Correlated Deformation with associated met	32.2043181	-88.1612699
	i	40000589	GROUP	467,964.10	24060+86	10%	0.250	1.06	1.60	11:45	1469	0.847	0.99	35.40	23.16	PM # 168, 24057+96	291.39	PM # 169, 24084+38	2363.49	58.56	Metal Loss EXTERNAL	32.2043183	-88.1612696
	D	14000010	DENT	467,964.68	24060+86	0.6%	0.250	1.68		10:45				35.98	22.58	PM # 168, 24057+96	291.97	PM # 169, 24084+38	2362.91	58.56	DENT - Depth 0.07 inch Magpie Correlated Deformation with associated met	32.2043194	-88.1612682
	i	40000590	GROUP	467,964.71	24060+86	10%	0.250	1.06	1.92	10:45	1469	0.847	0.99	36.01	22.56	PM # 168, 24057+96	292.00	PM # 169, 24084+38	2362.88	58.56	Metal Loss EXTERNAL	32.2043194	-88.1612681
17	w	99040	WELD	531,218.38	24688+94															57.56		32.3125475	-88.0082468
	R2	40000621	GROUP	531,249.90	24689+25	48%	0.250	3.06	7.38	6:00	1370	1.079	1.06	31.51	26.05	PM # 192, 24682+72	664.69	PM # 193, 24709+12	2021.68	57.56	Metal Loss EXTERNAL	32.3126012	-88.0081663
	i	40000622	GROUP	531,250.30	24689+26	31%	0.250	3.89	4.17	6:15	1469	0.991	0.99	31.92	25.64	PM # 192, 24682+72	665.09	PM # 193, 24709+12	2021.28	57.56	Metal Loss EXTERNAL	32.3126019	-88.0081653
	i	40000623	GROUP	531,250.81	24689+26	11%	0.250	3.77	2.89	6:00	1469	0.880	0.99	32.43	25.13	PM # 192, 24682+72	665.61	PM # 193, 24709+12	2020.77	57.56	Metal Loss EXTERNAL	32.3126028	-88.008164
	i	40000624	GROUP	531,259.15	24689+34	10%	0.250	0.82	0.64	6:00	1469	0.844	0.99	40.77	16.79	PM # 192, 24682+72	673.95	PM # 193, 24709+12	2012.43	57.56	Metal Loss EXTERNAL	32.312617	-88.0081428
	i	40000625	GROUP	531,259.56	24689+35	10%	0.250	1.06	1.28	5:45	1469	0.847	0.99	41.17	16.39	PM # 192, 24682+72	674.35	PM # 193, 24709+12	2012.02	57.56	Metal Loss EXTERNAL	32.3126177	-88.0081418
18	w	107340	WELD	574,485.98	25120+05															48.52		32.3950269	-87.9123714
	i	40000658	GROUP	574,486.78	25120+05	10%	0.250	0.35	0.64	5:30	1469	0.840	0.99	0.81	47.71	PM # 206, 25113+47	662.81	PM # 207, 25140+65	2073.56	48.52	Metal Loss INTERNAL	32.3950286	-87.9123698
	D	14000011	DENT	574,526.77	25120+45	2.2%	0.250	4.12		9:15				40.79	7.73	PM # 206, 25113+47	702.79	PM # 207, 25140+65	2033.57	48.52	DENT - Depth 0.28 inch Magpie Correlated Deformation	32.3951134	-87.9122874
19	w	118040	WELD	631,800.16	25686+06															59.27		32.5055244	-87.7887786
	R2	40000728	GROUP	631,826.01	25686+30	32%	0.250	5.89	6.73	8:15	1419	1.038	1.02	25.85	33.42	PM # 227, 25674+45	1198.82	PM # 228, 25700+85	1471.08	59.27	Metal Loss EXTERNAL	32.5055725	-87.7887168

87

19	w	weld
6	R2	Repair <MOP
11	D	dent
1	E	<Design P
1	e	>50% depth
1	M	Magpie Dig
2	ii	inspect internal
45	i	inspect
1	g	gain

87

[redacted]

HA-DM GE-PII vs Magpie Joint Correlation_CRS

Magpie MFL Pipelist (selected columns)					GE-PII USCD DHD 105-205 Pipebook data							
ID#	Feature	Wheel Count (ft)	Sta. Num. (ft)	Joint Length (ft)	PipeNo.	WT [mil]	PipeStart [ft]	PipeEnd [ft]	Length [ft]	LW [deg]	Comment	Joint Length Delta
57770	WELD	308,078.50	22467+56	12.15	5753.00	354.0	306486.81	306498.89	12.07		ERW/FW	-0.08
57780	WELD	308,090.65	22467+68	1.67	5754.00	207.0	306498.89	306500.66	1.77		T-Piece	0.10
57790	WELD	308,092.32	22467+69	0.99	5755.00	246.0	306500.66	306506.76	6.10		Valve	5.11
57800	WELD	308,093.31	22467+70	3.87							**weld u/s of block valve at Carmicahel (MP425.48)**	-3.87
57810	WELD	308,097.18	22467+74	0.99								-0.99
57820	WELD	308,098.17	22467+75	1.66	5756.00		306506.76	306508.47	1.71		T-Piece	0.05
57830	WELD	308,099.83	22467+77	12.12	5757.00	364.0	306508.47	306520.64	12.17		ERW/FW	0.05
57840	WELD	308,111.95	22467+89	2.02	5758.00	325.0	306520.64	306522.58	1.95		ERW/FW	-0.08
57850	WELD	308,113.98	22467+91	2.03	5759.00	246.0	306522.58	306524.67	2.09	73	ERW/FW	0.06
57860	WELD	308,116.01	22467+93	34.98	5760.00	246.0	306524.67	306559.45	34.78	355	ERW/FW - T-Piece in Sleeve - Sleeve	-0.20
57870	WELD	308,150.99	22468+28	58.81	5761.00	246.0	306559.45	306617.89	58.44	85	ERW/FW - T-Piece in Sleeve	-0.36
57880	WELD	308,209.80	22468+86	49.18	5762.00	246.0	306617.89	306666.73	48.83	154	ERW/FW	-0.34
57890	WELD	308,258.97	22469+35	50.66	5763.00	246.0	306666.73	306717.12	50.39	260	ERW/FW	-0.26
57900	WELD	308,309.63	22469+86	57.91	5764.00	246.0	306717.12	306774.76	57.64	46	ERW/FW	-0.28
57910	WELD	308,367.54	22470+43	39.83	5765.00	246.0	306774.76	306814.38	39.62	37	ERW/FW	-0.21
57920	WELD	308,407.37	22470+83	58.44	5766.00	246.0	306814.38	306872.44	58.06	163	ERW/FW	-0.38
57930	WELD	308,465.82	22471+41	55.54	5767.00	246.0	306872.44	306927.50	55.06	226	ERW/FW	-0.48
57940	WELD	308,521.35	22471+96	58.81	5768.00	246.0	306927.50	306986.02	58.52	160	ERW/FW	-0.29
57950	WELD	308,580.16	22472+55	57.56	5769.00	226.0	306986.02	307043.33	57.31	8	ERW/FW	-0.25
57960	WELD	308,637.72	22473+12	58.16	5770.00	246.0	307043.33	307101.17	57.84	37	ERW/FW	-0.32
57970	WELD	308,695.88	22473+70	59.44	5771.00	246.0	307101.17	307160.20	59.03	217	ERW/FW	-0.41
57980	WELD	308,755.31	22474+29	57.02	5772.00	236.0	307160.20	307216.85	56.65	6	ERW/FW	-0.37
57990	WELD	308,812.33	22474+86	58.37	5773.00	246.0	307216.85	307274.79	57.94	274	ERW/FW	-0.43
58000	WELD	308,870.71	22475+44	59.37	5774.00	236.0	307274.79	307333.72	58.93	279	ERW/FW	-0.44
58010	WELD	308,930.07	22476+03	58.97	5775.00	246.0	307333.72	307392.31	58.59	358	ERW/FW	-0.39
58020	WELD	308,989.05	22476+62	58.76	5776.00	246.0	307392.31	307450.77	58.47	299	ERW/FW	-0.29
58030	WELD	309,047.81	22477+20	57.88	5777.00	236.0	307450.77	307508.17	57.40	63	ERW/FW	-0.48
58040	WELD	309,105.69	22477+78	59.15	5778.00	246.0	307508.17	307566.84	58.67	75	ERW/FW	-0.48
58050	WELD	309,164.84	22478+37	59.42	5779.00	246.0	307566.84	307625.84	58.99	4	ERW/FW	-0.42
58060	WELD	309,224.26	22478+96	58.96	5780.00	236.0	307625.84	307684.39	58.55	335	ERW/FW	-0.41
58070	WELD	309,283.22	22479+55	56.95	5781.00	236.0	307684.39	307740.96	56.57	296	ERW/FW	-0.38
58080	WELD	309,340.17	22480+11	59.27	5782.00	236.0	307740.96	307799.85	58.89	36	ERW/FW	-0.38
58090	WELD	309,399.44	22480+70	57.99	5783.00	236.0	307799.85	307857.47	57.62	278	ERW/FW	-0.37
58100	WELD	309,457.43	22481+28	57.71	5784.00	236.0	307857.47	307914.78	57.31	267	ERW/FW	-0.39
58110	WELD	309,515.14	22481+86	57.24	5785.00	236.0	307914.78	307971.62	56.84	351	ERW/FW	-0.40
58120	WELD	309,572.37	22482+43	59.72	5786.00	236.0	307971.62	308030.96	59.33	246	ERW/FW	-0.39
58130	WELD	309,632.09	22483+02	41.15	5787.00	236.0	308030.96	308071.80	40.84	99	ERW/FW	-0.30
58140	WELD	309,673.24	22483+43	59.35	5788.00	236.0	308071.80	308130.69	58.89	191	ERW/FW	-0.45
58150	WELD	309,732.58	22484+02	57.88	5789.00	236.0	308130.69	308188.23	57.54	107	ERW/FW	-0.35
58160	WELD	309,790.47	22484+60	59.11	5790.00	236.0	308188.23	308246.97	58.74		ERW/FW	-0.37
58170	WELD	309,849.58	22485+19	58.86	5791.00	236.0	308246.97	308305.50	58.54	155	ERW/FW	-0.32
58180	WELD	309,908.44	22485+77	59.06	5792.00	236.0	308305.50	308364.41	58.91	330	ERW/FW	-0.15
58190	WELD	309,967.50	22486+36	58.61	5793.00	236.0	308364.41	308422.69	58.28	65	ERW/FW	-0.33
58200	WELD	310,026.11	22486+94	58.33	5794.00	236.0	308422.69	308480.67	57.98	196	ERW/FW	-0.35
58210	WELD	310,084.43	22487+52	42.40	5795.00	236.0	308480.67	308522.87	42.20	6	ERW/FW	-0.20
58220	WELD	310,126.83	22487+95	49.10	5796.00	236.0	308522.87	308571.69	48.82	255	ERW/FW	-0.28
58230	WELD	310,175.93	22488+43	36.80	5797.00	256.0	308571.69	308608.22	36.54	323	ERW/FW	-0.26
58240	WELD	310,212.73	22488+80	45.38	5798.00	256.0	308608.22	308653.39	45.17		ERW/FW	-0.21
58250	WELD	310,258.10	22489+25	41.57	5799.00	236.0	308653.39	308694.71	41.32	148	ERW/FW	-0.25
58260	WELD	310,299.67	22489+67	58.68	5800.00	236.0	308694.71	308753.08	58.37	29	ERW/FW	-0.31
58270	WELD	310,358.35	22490+25	58.33	5801.00	236.0	308753.08	308811.10	58.03	43	ERW/FW	-0.30
58280	WELD	310,416.68	22490+83	59.07	5802.00	236.0	308811.10	308870.06	58.96	14	ERW/FW	-0.11
58290	WELD	310,475.75	22491+42	57.49	5803.00	236.0	308870.06	308927.41	57.35	163	ERW/FW	-0.14
58300	WELD	310,533.24	22491+99	57.92	5804.00	236.0	308927.41	308985.25	57.84	62	ERW/FW	-0.08
58310	WELD	310,591.16	22492+57	59.01	5805.00	256.0	308985.25	309044.20	58.94	278	ERW/FW	-0.07
58320	WELD	310,650.18	22493+15	58.19	5806.00	236.0	309044.20	309102.32	58.13	110	ERW/FW	-0.06
58330	WELD	310,708.36	22493+73	58.60	5807.00	236.0	309102.32	309160.88	58.55		ERW/FW	-0.05
[redacted]												
58350	WELD	310,819.09	22494+85	57.74	5809.00	236.0	309212.97	309270.64	57.67	137	ERW/FW	-0.07
58360	WELD	310,876.83	22495+43	52.42	5810.00	236.0	309270.64	309322.90	52.26	95	ERW/FW	-0.16
58370	WELD	310,929.25	22495+97	47.92	5811.00	236.0	309322.90	309370.76	47.87	117	ERW/FW	-0.05
58380	WELD	310,977.17	22496+45	59.08	5812.00	236.0	309370.76	309429.71	58.94	23	ERW/FW	-0.14

3. Information Provided by Dixie on July 17, 2008. (13+cover sheet)

Metal Loss Inspection Performance Specifications for AFD Tools

Revision No. 1.1, August 17, 2005

Document Name: Standard_AFD_POFspec3-2_rev1.1

| Prepared by: [redacted] |
[redacted]

| Checked by: [redacted] |
[redacted]

| Approved by: [redacted] |
| Global Marketing

Note Original document has been signed.

1.1	[redacted]	17-Aug-2005	[redacted]	17-Aug-2005	[redacted]	17-Aug-2005
1.0	[redacted]	19-May-2005	[redacted]	19-May-2005	[redacted]	19-May-2005
Rev.	**Prepared by**	**Date:**	**Checked by:**	**Date:**	**Approved by:**	**Date:**

Table of content

1 | Introduction

This document defines the ROSEN accuracy specifications for Axial Flaw Detection Inline Inspection with Circumferential Magnetic Flux Leakage (CMFL) Technology. It mainly follows well established definitions applicable specifically to pipeline inspection, mainly found in "Specifications and Requirements for Intelligent Pig Inspection of Pipelines" formulated by the Pipeline Operators Forum (POF), current version 3.2, January 2005.

2 | Detection of Features

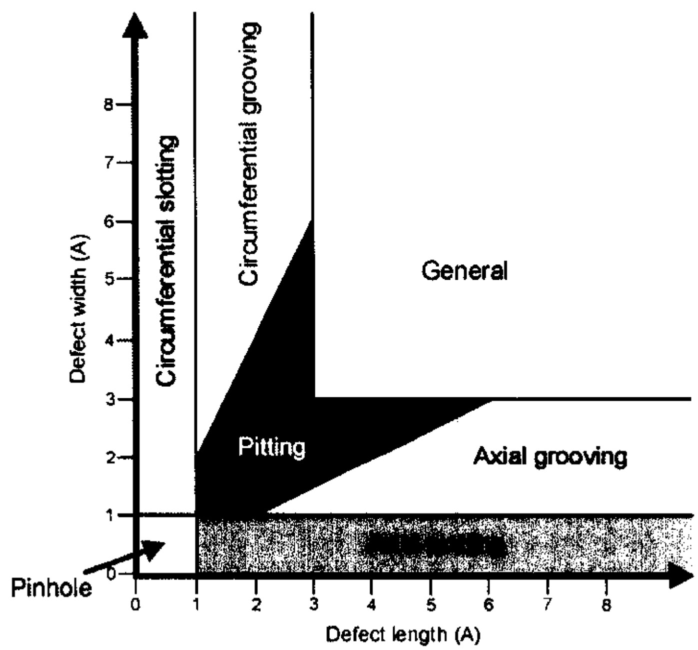
The following list shows the main features that can be detected with the AFD.

Pipe Wall Anomalies	Pitting and general corrosion Gouges Cracks Hard spots
Weld Anomalies	Anomalies in the heat affected zone of seam welds (longitudinal and spiral) and girth welds
Mill Features	Laminations Inclusions
ID Anomalies	Dent Buckle Wrinkle
Wall Thickness Changes	specified below (4.3)
Installations	Seam welds (longitudinal and spiral) Girth welds Tees Taps Bends Anodes Valves
Repairs	Patches Sleeves
Pipe Casings	Locations Eccentricity
Ferrous Metal	Inside the pipe Outside the pipe if in contact

3 | Dimension Classification

Magnetic Flux Leakage (MFL) is an indirect method. It uses and is being affected by more than one physical property. The influence of the defect shape on the sizing accuracy is parameterized by dimension classes, which depend on the outer length and width of the feature

All reported metal loss features are being classified according to these dimensions as per the following POF specification graph.



Note A = wall thickness or 10 mm, whichever value is greater

4 | Detection and Sizing Capabilities

4.1 Detection and sizing accuracy for anomalies in body of pipe

	General metal loss		**Pitting**		**Axial grooving**		**Axial Slotting***	
Depth at POD=90% [Fraction of t]	0.2		0. 2		0.2		0.2	
	80%	90%	80%	90%	80%	90%	80%	90%
Depth sizing accuracy at 80 and 90% confidence [Fraction of t]	± 0.15	± 0.20	± 0.20	± 0.30	± 0.15	± 0.20	± 0.20	± 0.30
Width sizing accuracy at 80 and 90% confidence [mm]	± 15	± 20	± 15	± 20	± 15	± 20	± 10	± 10
Length sizing accuracy at 80 and 90% confidence [mm]	± 15	± 20	± 10	± 15	± 15	± 20	± 15	± 20

* valid for axial slotting feature width ≥ 1mm

Used abbreviation:
POD: Probability of Detection

Note: POF category 'circumferential grooving' and 'circumferential slotting' not specified

For Definitions, requirements and notes please refer to 6.1 – 6.3

4.2 Detection and sizing accuracy for anomalies in girth weld or heat affected zone

Within ± 3A of the weld (A=Max(wt,10 mm)) detection and sizing are affected by the weld. The extent of this effect depends on weld quality and the weld impact on the tool dynamics. During passage of the magnetic yoke over a weld sizing accuracy might be affected slightly.

	General metal loss	**Pitting**	**Axial grooving**	**Axial Slotting***
Depth at POD=90% [Fraction of t]	0.3	0.3	0.3	0.3
Depth sizing accuracy at 80% confidence [Fraction of t]	± 0.30	± 0.35	± 0.30	± 0.35
Width sizing accuracy at 80% confidence [Fraction of t]	± 25 mm	± 25 mm	± 25 mm	± 20 mm
Length sizing accuracy at 80% confidence [Fraction of t]	± 25 mm	± 20 mm	± 25 mm	± 25 mm

* valid for axial slotting feature width ≥ 1mm

Used abbreviation:
POD: Probability of Detection

4.3 Detection and sizing accuracy for crack or crack-like features

	Axial slotting	**Axial crack**
Depth at POD=90% of crack with L=25 mm [L=length of the crack]*	0.2 * t	0.2 * t
Minimum crack opening [mm]	1 mm	0.2 mm
Depth sizing accuracy at 80% confidence	± 0.2 * t	n/a
Length sizing accuracy at 80% confidence	± 15 mm	n/a

* provided that the S/N ratio of the MFL amplitude is ≥ 5

4.4 Detection of Long Seam Weld

(detection and determination of position)

	Type
POD ≥ 90%	ERW
POD ≥ 90%	EFW
POD ≥ 90%	other, (magnetic irregularity provided)

4.5 Wallthickness Measurement

± 1 mm or ± 0.1t, whichever value is greater, at 80 % confidence

5 | Location and Orientation Capabilities

axial position accuracy from reference/marker	1:1000 (1m on 1000m marker distance)
axial position from closest weld	± 0.1 m
circumferential position accuracy	± 10°

The axial positioning accuracy specified is based on following conditions:

- Distance between u/s and d/s marker/reference point < 2000 m.
- Actual above ground distance to both u/s and d/s marker/reference points to be measured and *correlated*.
- Negligible difference between pipeline and soil contour.

6 | Definitions, Requirements and Notes

6.1 Feature Detection and Sizing Capabilities

The given accuracy values were derived from statistical analysis of sizing results originated by straightforward standard procedures. The sizing results were compared with a large number of known feature events.

Definitions

- Specifications are only valid for longitudinally welded pipes
- Parameter t is defined as follows:
  - Wall thickness ≥ 5 mm: t = wall thickness
  - Wall thickness < 5 mm: t = 5 mm
- The depth sizing and the wall thickness evaluation are independent, i.e. the percentage depth is based on the actual wall and not on the calculated.

Requirements

- Data is recorded within the parameter as specified in the respective Tool Data Sheet
- The required minimum magnetization for tabled specifications is 10 kA/m
- The according valid pipe wall material is grade API 5L grade B up to API 5L grade X65 or equivalent grades.
- These specifications are valid generally where no more data were missing than:
  - Primary survey channel ≤ 5%
  - Primary adjacent survey channel gap < 60 mm
  - In case of more data loss the data quality must be approved by procedure.

The proper inspection tool velocity is normally between 0.3 m/s and 3 m/s but might be restricted by well known MFL methodological conditions, please refer to [1] and [2]. In some cases specifications for non standard inspection tools vary.

Notes

- Specifications given above are valid where
  - both yokes and sensors were located in the same straight pipe body and the magnetic field not affected by installations neither internal nor external
  - pipes have smooth surface,
  - pipes are sufficiently clean, i.e. MFL sensors have contact with pipe wall, the odometer wheels were not blocked and the spring-supported magnet yokes are not hindered in their movement.
- Above 3 m/s mechanical influences caused by e.g. weld roots, pipe roughness and dirt might affect the accuracy.
- Features shallower than the specified detection threshold or smaller than the specified dimension classes will be reported as analyzed.
- The accuracy will not be kept in areas where tool acceleration exceeds 3 m/s^2.

6.2 Features at Girth Welds

- Detection of features within ± 25 mm of the weld is restricted due to methodological reasons.

---

[1] R.J. Davis J.B. Nestleroth. The effects of velocity on magnetic flux leakage inspection of gas pipelines. GRI Topical Report GRI-95/0008, Gas Research Institute, June 1996

[2] [redacted] internal report, RTRC Lingen, October 2002.

6.3 Features in Seamless Pipe

In general the Feature Detection and Sizing in seamless pipe depends on the actual noise level of the pipe material concerned. For low noise seamless pipe the specification for longitudinally seamed pipe is valid, for higher noise levels the influence on specified values might be significant.

- The detection threshold and sizing accuracy will be as stated above plus typically 0....0.15t
- Length and width sizing accuracy as stated above plus typically 0....10 mm

7 | Identification of Features

POI (Probability of Identification)

Feature	Yes POI>90%	No POI<50%	May be 50%<=POI<=90%
Internal/ non-internal [1)]	x		
Ext./ midwall discrimination		x	
Additional metal/material:			
- debris	x		
- touching metal to metal	x		
Anode	x		
Anomaly:			
- arc strike			x
- artificial defect	x		
- buckle	x		
- corrosion	x		
- corrosion cluster	x		
- circumferential crack		x	
- axial crack	x		
- dent [2)]	x		(x)
- dent with metal loss [2)]	x		(x)
- gouging	x		
- grinding			x
- girth weld crack		x	
- girth weld anomaly			x
- HIC			x
- lamination			x
- longitudinal weld crack			x
- longitudinal weld anomaly	x		
- ovality	x		
- pipe mill anomaly	x		
- SCC		x	
- spalling	x		
- spiral weld crack			x
- spiral weld anomaly	x		
- wrinkle	x		
Crack arrestor		x	
Eccentric pipeline casing			x
Change in wall thickness	x		
CP connection	x		
External support	x		
Ground anchor	x		
Off take	x		
Pipeline fixture	x		
Reference magnet	x		

Repair:				
- welded sleeve repair	x			
- composite sleeve repair		x		
- weld deposit	x			
- coating		x		
Tee	x			
Valve	x			
Weld:				
- bend	x			
- diameter change	x			
- wall thickness change (pipe/pipe connection)	x			
- adjacent tapering	x			

1) The internal / non internal discrimination may be reduced for features smaller than 20 mm extent (width) and 20 % depth.
2) POI greater 90% only reached in combination with geometry inspection, which is usually perfomed to assure proper MFL tool passage. Without any geometry tool dents are only identified with a probability between 50% and 90% (May be).

Note: Identification of features can be improved by combined evaluation of CDP and AFD data (e.g. for midwall feature POI > 90 % by combined evaluation)