

Pipeline Inspection Report



T.D. Williamson
Pipeline Performance™

Company Name

Hiland Crude, LLC

Project Name

East Camp Creek Loop Launch to Receive

Pipe Size

8"

Inspection Date(s)

Oct 5, 2013

Report Date(s)

Dec 4, 2013

TDW Regional Office

TDW Services, Inc.





Executive Summary - GMFL Inspection

RUN INFORMATION

Hiland Crude, LLC
 Heber Briceno

East Camp Creek Loop Launch to Receive
 8" Crude

	Launcher	Receiver
Location:	East Camp Creek Loop Launch	Receive
Date/Time:	10/5/2013 8:54:42 PM	10/5/2013 10:27:42 PM
Stationing:	0+00	303+30
GPS - LAT:	47.918303507	47.898039513
GPS - LONG:	-103.347090192	-103.444280368
Duration of run - Hours:	1.55	Average Velocity: 5.37 ft/sec
Pipeline Length:	29,993.00 ft	Maximum Velocity: 6.65 ft/sec
On-site Representative:	Jesse Child	Data Analyst: Ben Stehling
Contact:	Heber Briceno	Tool Tracking By: Cherokee Pipeline Services

INSPECTION FINDINGS

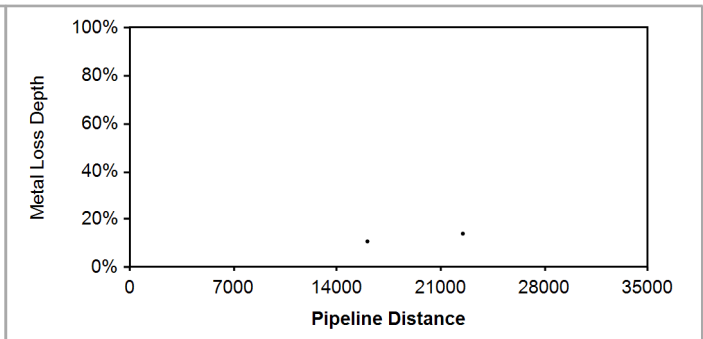
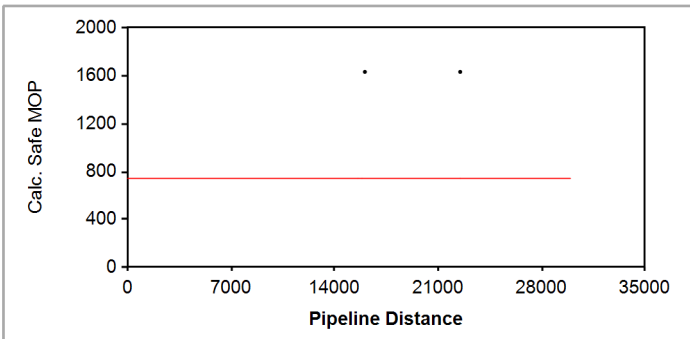
Current Established Maximum

Criteria Used: ASME B31G: Modified

Operating Pressure of Pipeline: 750 psi

Defect Interaction Rule: 1 inch between pits

Welds Detected: 811	Valves Detected: 2	Fittings Detected: 2	Markers Detected: 5	Gains Detected: 0
Casings Detected: 0	Tees Detected: 2	Flanges Detected: 6	Repairs Detected: 0	Deformations Detected: 0
P' < P*: 0	M/L pits: 2	M/L grouping: 2		
Internal groups: 1	External groups: 1			



* The number of anomalies where P' (calculated safe max. pressure for an anomaly) is less than P (current established maximum pressure of pipeline) - see ASME B31G

INSPECTION DETAILS

A total of 2 metal loss groups (1 Internal/1 External) were detected on the inspection survey, of which the deepest is reported at 14%. Using an established maximum operating pressure of 750 psi, 0 of the metal loss features appear to be pressure reducing.

Inspection data was obtained for the full length (29,993 feet / 5.68 miles) of the survey. The quality of the inspection data is satisfactory for a comprehensive assessment of this pipeline segment.

The inspection tool for this project included TDW XYZ Mapping module consisting of a high resolution Inertial Measurement Unit (IMU). The precision navigation data recorded by the IMU along with survey data supplied for specified control points and AGM locations provides a calculation of X, Y and Z coordinates for all objects and features listed in this report. The reported Latitude and Longitude are in NAD83 datum format. Z coordinates are Orthometric heights reported in feet. The final accuracy of reported coordinates is dependent upon the accuracy of the survey points and distance between these points, as well as uniform tool speed; however, the Survey Data Provided for AGM/Control Points is not at the required Sub-Centimeter accuracy level as specified in the document: XYZ Survey Data Requirements (D1902 Rev D).

Executive Summary - GMFL Inspection



Executive Summary - Deformation

RUN INFORMATION

Hiland Crude, LLC
 Heber Briceno

East Camp Creek Loop Launch to Receive
 8" Crude

	Launcher	Receiver
Location:	East Camp Creek Loop Launch	Receive
Date/Time:	10/4/2013 5:04:44 PM	10/4/2013 6:37:27 PM
Stationing:	0+00	303+30
GPS - LAT:	47.918303507	47.898039513
GPS - LONG:	-103.347090192	-103.444280368

Duration of run - Hours: 1.55 **Average Velocity:** 5.39 ft/sec **Tool Tracking By:** Cherokee Pipeline Services
Pipeline Length: 30,001.00 ft **Maximum Velocity:** 6.4 ft/sec
On-site Representative: Jesse Child **Data Analyst:** Ben Stehling

INSPECTION FINDINGS

Deformations Detected: 0 **Ovalities Detected:** 0 **Expansions Detected:** 0 **Heavy Weld Detected:** 0 **Valves Detected:** 2

<p>No dents found meeting minimum report parameters</p>	<p>No dents found meeting minimum report parameters</p>
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INSPECTION DETAILS

Inspection data was obtained for the full length (30,001 feet / 5.68 miles) of the survey. The quality of the inspection data is satisfactory for a comprehensive assessment of this pipeline segment.

A total of 0 deformations were detected on the inspection survey.

One DEF sensor was functionally intermittent throughout the run resulting in 96% coverage; however, an acceptable analysis was completed. Client was notified of the incomplete sensor coverage and accepted the run for analysis.



Metal Loss - Immediate Prioritized Repairs

ID#	Distance (ft)	Depth	Length	Width	Orientation	PSI (P')	% of Est. psi (P'/P)	Latitude	Longitude	Altitude
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Nothing found in this pipeline inspection meets the criteria for Immediate Repair conditions relating to METAL LOSS.

Metal Loss - Immediate Prioritized Repairs



Metal Loss - 180 Day Prioritized Repairs

ID#	Distance (ft)	Depth	Length	Width	Orientation	PSI (P')	% of Est. psi (P'/P)	Latitude	Longitude	Altitude
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Nothing in the inspection meets the criteria for 180 Day Repair conditions relating to METAL LOSS.

Metal Loss - 180 Day Prioritized Repairs



Dent - Immediate Prioritized Repairs

ID#	Distance (ft)	Depth (in)	Depth (%)	Orientation	Metal Loss	On a Weld	Ovality	Description
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Nothing found in the pipeline inspection meets the criteria for Immediate Repair conditions relating to DENTS.

Dent - Immediate Prioritized Repairs



Dent - 60 Day Prioritized Repairs

ID#	Distance (ft)	Depth (in)	Depth (%)	Orientation	Metal Loss	On a Weld	Ovality	Description
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Nothing in the inspection meets of the criteria for 60 Day Repair conditions relating to DENTS.

Dent - 60 Day Prioritized Repairs



Dent - 180 Day Prioritized Repairs

ID#	Distance (ft)	Depth (in)	Depth (%)	Orientation	Metal Loss	On a Weld	Ovality	Description
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Nothing in the inspection meets of the criteria for 180 Day Repair conditions relating to DENTS.

Dent - 180 Day Prioritized Repairs



Metal Loss Summary

DEFINITIONS

This Metal Loss Summary Report provides information regarding indicated anomalies found in this inspection. Anomalies detected during the inspection are sized and assigned a length, width, and depth. The specified formula for determining remaining-strength of the anomaly is then applied to the predicted sizes. The predicted size accuracy is described in the contract specifications.

The Metal Loss Summary Report is a listing of metal loss indications in the pipeline, sorted first by the calculated safe maximum operating pressure (P') ascending, then by depth descending. As an aid in locating these anomalies, the upstream and downstream references are included, as well as distances from the defect to the reference.

ID#	Each location is automatically assigned a number in the software. This number is provided to assist the user of PIGTRAP software to more easily find any given defect.
Dist.	Given in either feet or meters, based on contractual agreements, this is the absolute distance from launch.
Depth	Predicted depth of the defect as a percentage of nominal wall.
Length	Predicted length of the defect, reported in either inches or millimeters.
Width	Predicted width of the defect, reported in either inches or millimeters.
ID/OD	Determination whether the defect exists on the inside (INT) or outside (EXT) surface of the pipe.
Orientation: Deg / O'Clock	Orientation is reported in degrees and o'clock (0 degrees/12:00 at top of pipe) as viewed looking downstream.
P'	Based on the specified formula for determining remaining-strength, it is the predicted safe maximum allowable pressure for the defect (P').
% Est. Press. (P'/P)	Percent of maximum established pressure, this is calculated by dividing the calculated safe pressure of the defect (P') by the current established maximum operating pressure of the pipeline (P). For TDW reporting, P is either established MOP provided by the customer or the calculated pressure rating for the pipe (P). Percentages less than 100% are considered pressure reducing.
Aboveground References	The name of the closest upstream and downstream references, usually either an AGM or a Valve.
Distance from Defect	The distance to the upstream and downstream reference listed in the previous column. Used for locating defects in the field.

See Appendix C for Dig Sheet Preparation



Metal Loss Summary

ID#	Dist (ft)	Depth	Length	Width	ID/OD	Orientation Deg O'clock	P'	% Est. Press. (P'/P)	Above-Ground References	Distance from Defect
40000001	22,496.1	14.1%	0.80	0.84	EXT	155 5:00	1632.2	100.0	U/S: AGM 040, Sta. 220+50, Gravel Rd -- Han #8802 D/S: AGM 050, Sta. 276+86, Gavel Rd -- Han #8043	826.56 4850.73
40000000	16,045.9	10.8%	0.25	0.33	INT	298 9:45	1632.2	100.0	U/S: AGM 030, Sta. 161+50, CR 31 -- Han #100 D/S: AGM 040, Sta. 220+50, Gravel Rd -- Han #8802	198.61 5623.65

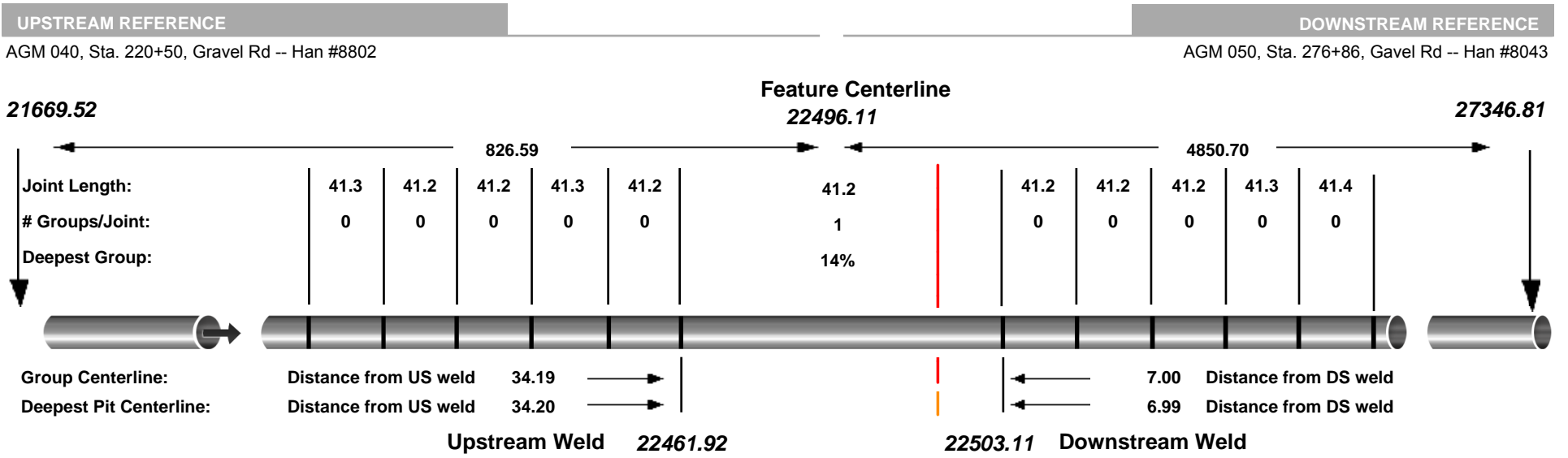
This report shows a maximum of 100 metal loss groups.

Type	Number
Metal Loss	2

Metal Loss Summary



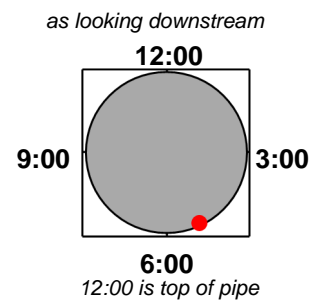
GROUP - Dig Site Information Report



Feature Information

ID:	40000001	Distance from Launcher:	22496.11	Feature Description
Time:	5637.86	Orientation on Pipe Wall:	5:00	Metal Loss - EXTERNAL
Latitude:	47.89399089	Longitude:	-103.41632448	Wall Thickness: 0.188
				Altitude: 2219.330

Feature Orientation



GROUP
 Depth: 14%
 Length: 0.803
 Width: 0.835
 ERF: 0.460

Upstream Locations		Downstream Locations	
12536.07	Bend right - 55 deg., 3D	2394.39	Bend right - 32 deg., 3D
13915.29	Bend left-down - 10 deg., 52D	3984.73	Bend left - 45 deg., 3D
18370.36	Bend left - 10 deg., 175D	7478.26	Bend up - 45 deg., 3D
22129.16	Bend left - 45 deg., 3D	7491.12	Bend down - 45 deg., 3D
22157.58	Bend right - 45 deg., 3D	7493.09	Flange

(relative distance from Feature Centerline)

Safe Operating Pressure: 1632 psi

1. Measurements on this sheet are in ft / in 2. All numbers in italics are Distance from Launch

Dig Site Report



Charts

CHARTS

The Pipeline Summary report provides an overview of the pipeline condition.

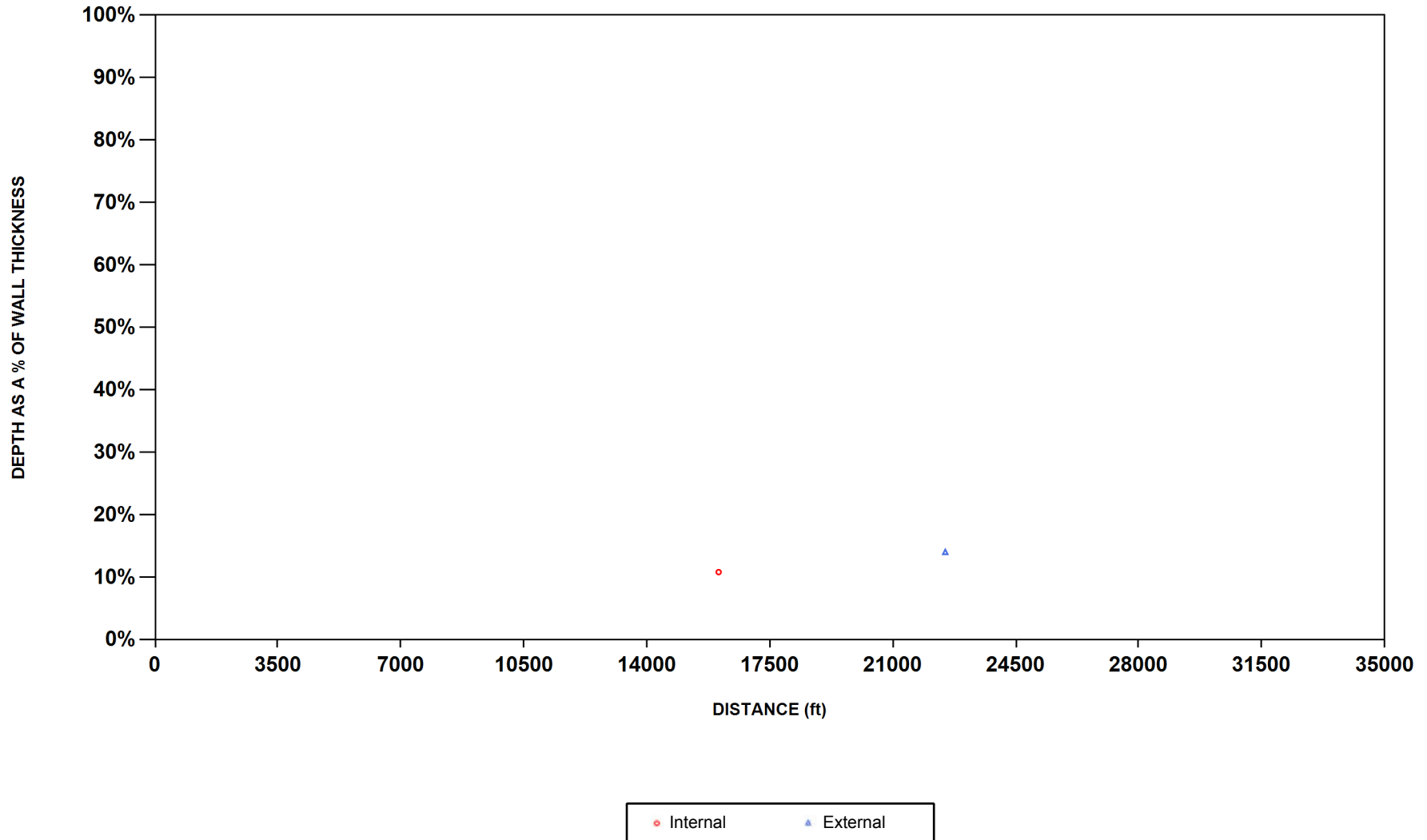
The following charts are utilized in this report:

Metal Loss Depth	This chart highlights the predicted depths of defects as a percentage of wall thickness compared to distance. Areas of concentrated metal loss are easily detected as defects group.
Metal Loss Orientation	The distance from launch is plotted against the orientation of the defect. Orientation is based on 360° in a circle, with 0° or 360° marking the top of the pipe (180° the bottom). Displaying the orientation of defects around the circumference of the pipeline may aid in determining the type of corrosion mechanism present. For example, the majority of defects along the bottom of the pipe might indicate internal channel corrosion.
Metal Loss - Calculated Safe Max. Operating Pressure	The calculated safe maximum operating pressure of each defect is plotted compared to distance.
Velocity - MFL	Displays the speed of the tool relative to distance during the inspection. The specified contractual velocity of the inspection tool is 10 feet per second. If the tool exceeds this speed, the data collected by the tool may be degraded.
Defect Depth Histogram	Displays the total number of defects (pressure reducing groups/defects and non-pressure reducing groups /defects (where $P' < P$)) by predicted depth of the defect as a percentage of nominal wall.
Dent Depth	This chart highlights the predicted depths of deformations in inches or mm compared to distance.
Dent Orientation	The distance from launch is plotted against the orientation of the deformation indications. Orientation is based on 360° in a circle, with 0° or 360° marking the top of the pipe (180° the bottom).
Velocity - DEF	Displays the speed of the tool relative to distance during the inspection. The specified contractual velocity of the inspection tool is 10 feet per second. If the tool exceeds this speed, the data collected by the tool may be degraded.



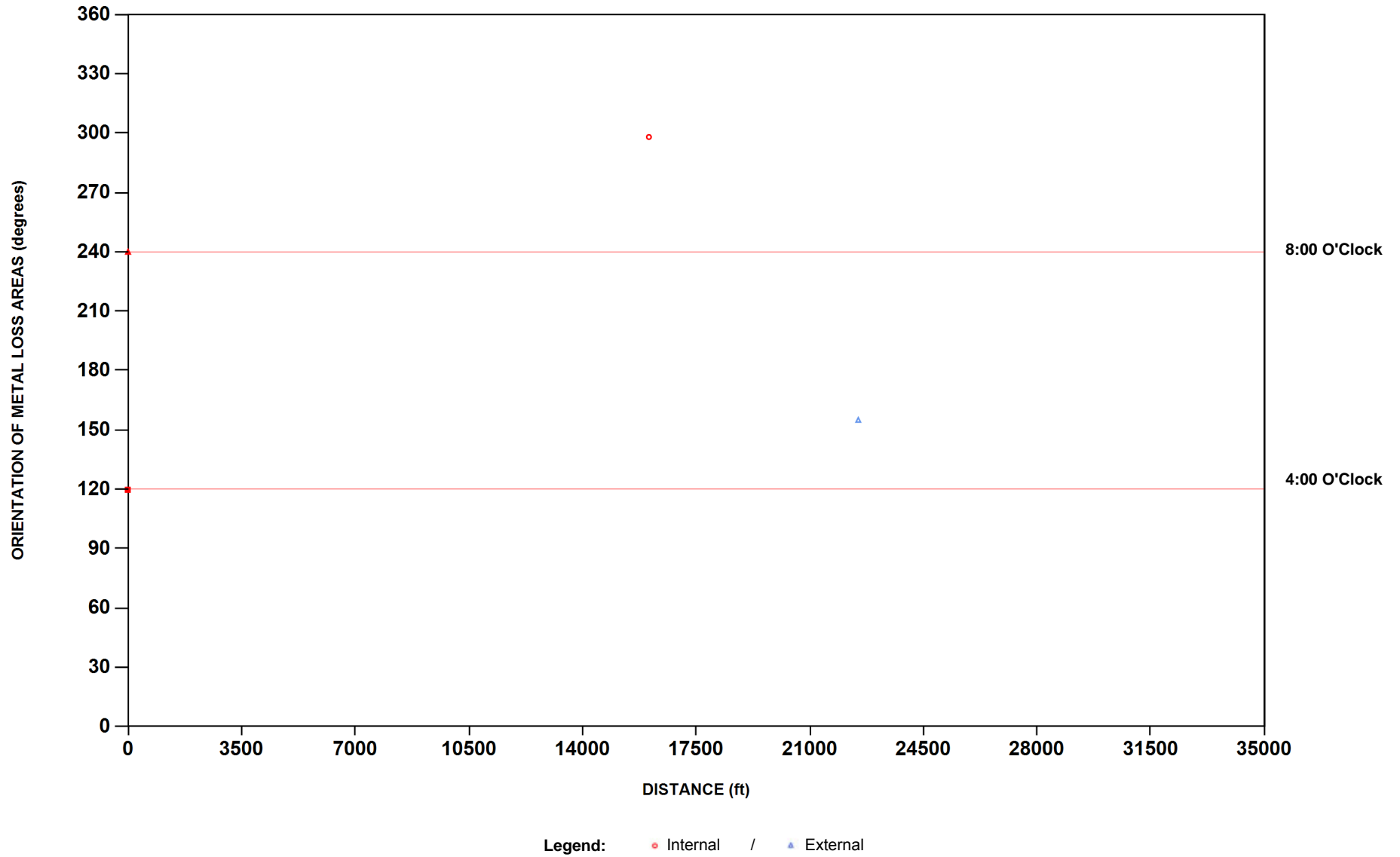
Metal Loss Depth Graph

Metal Loss Depth Graph





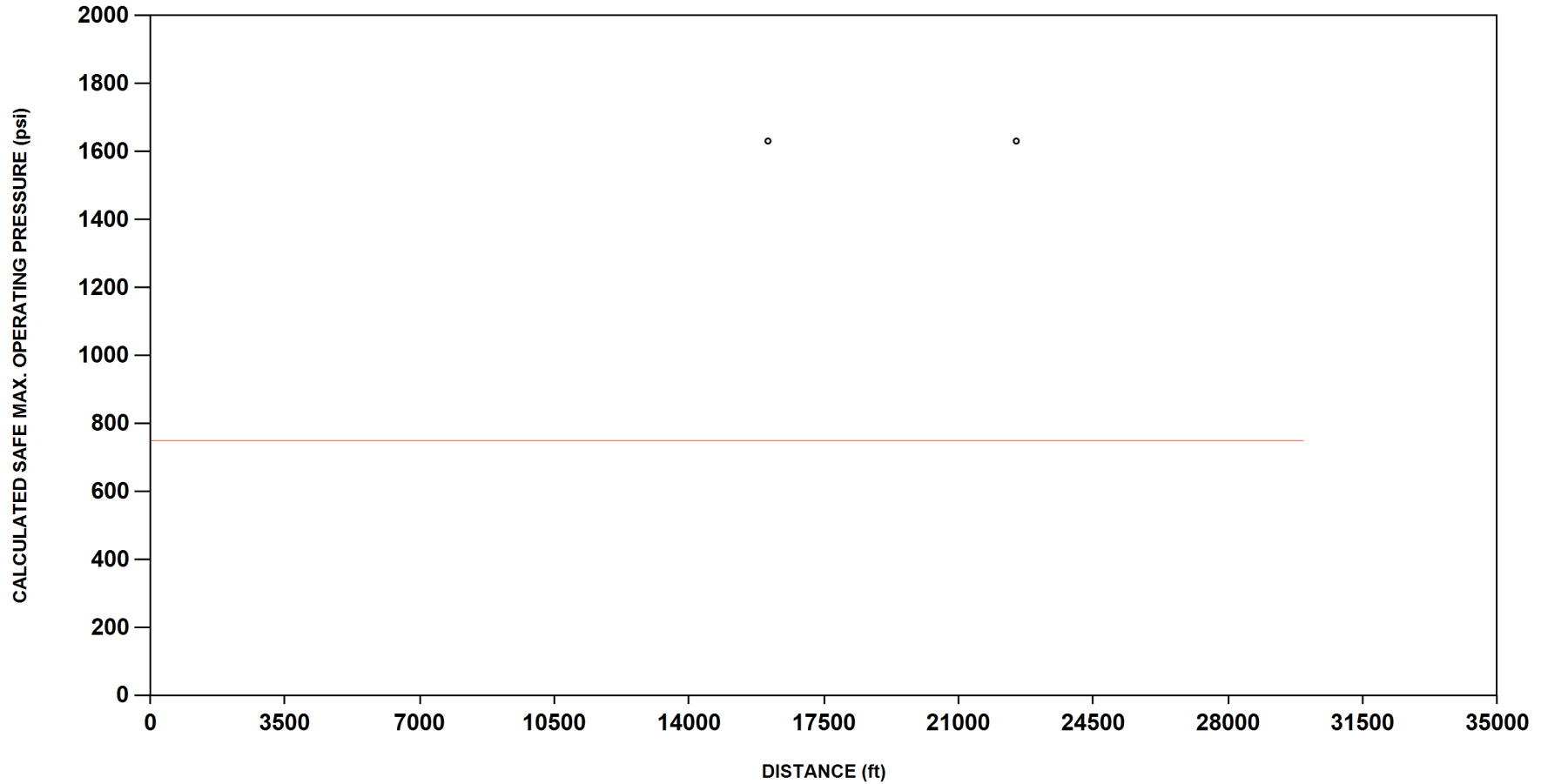
Metal Loss Orientation Graph



Metal Loss Orientation Graph



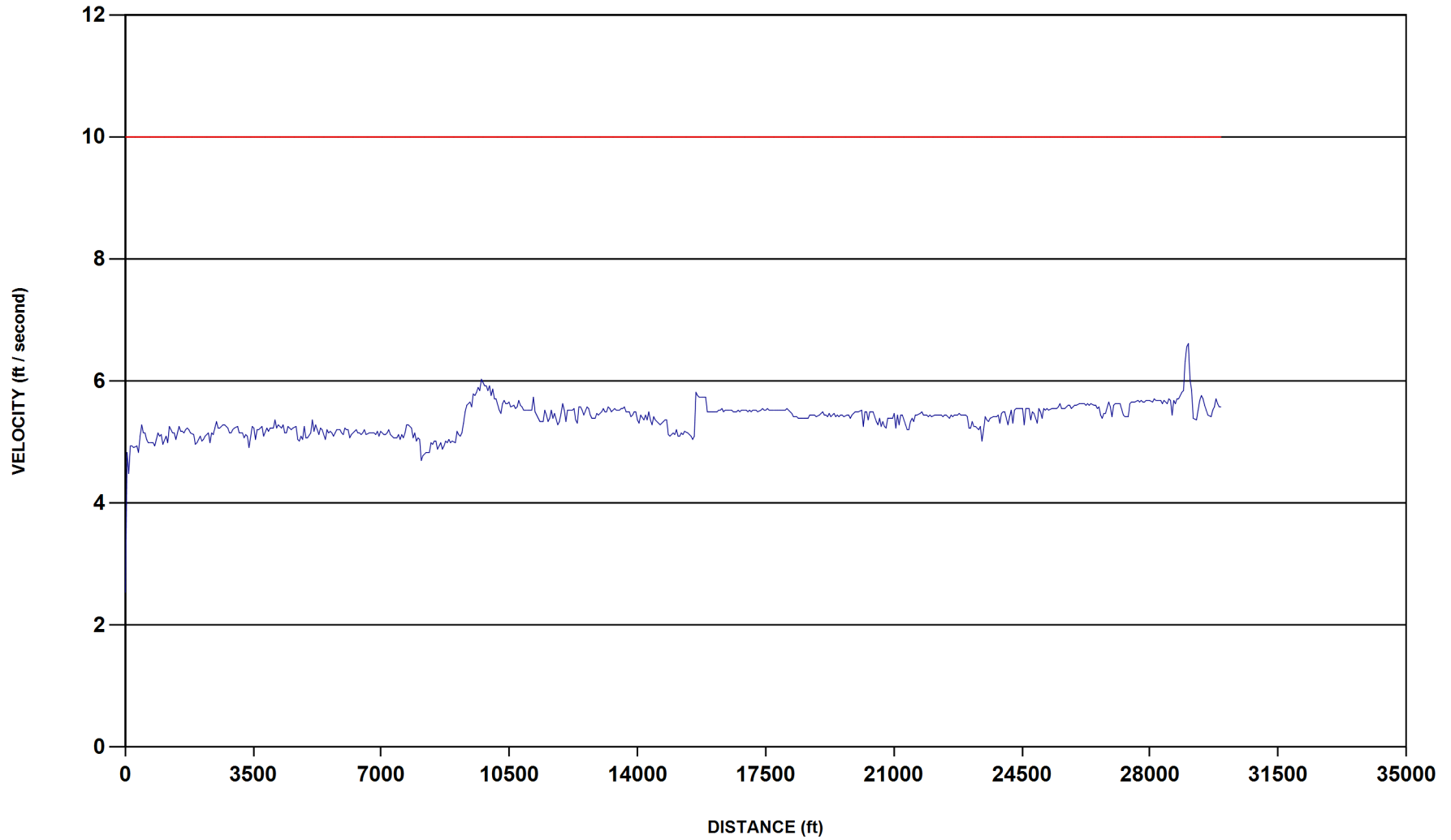
Metal Loss - Calculated Safe Max. Operating Pressure Graph



Metal Loss - Calculated Safe Max. Operating Pressure Graph



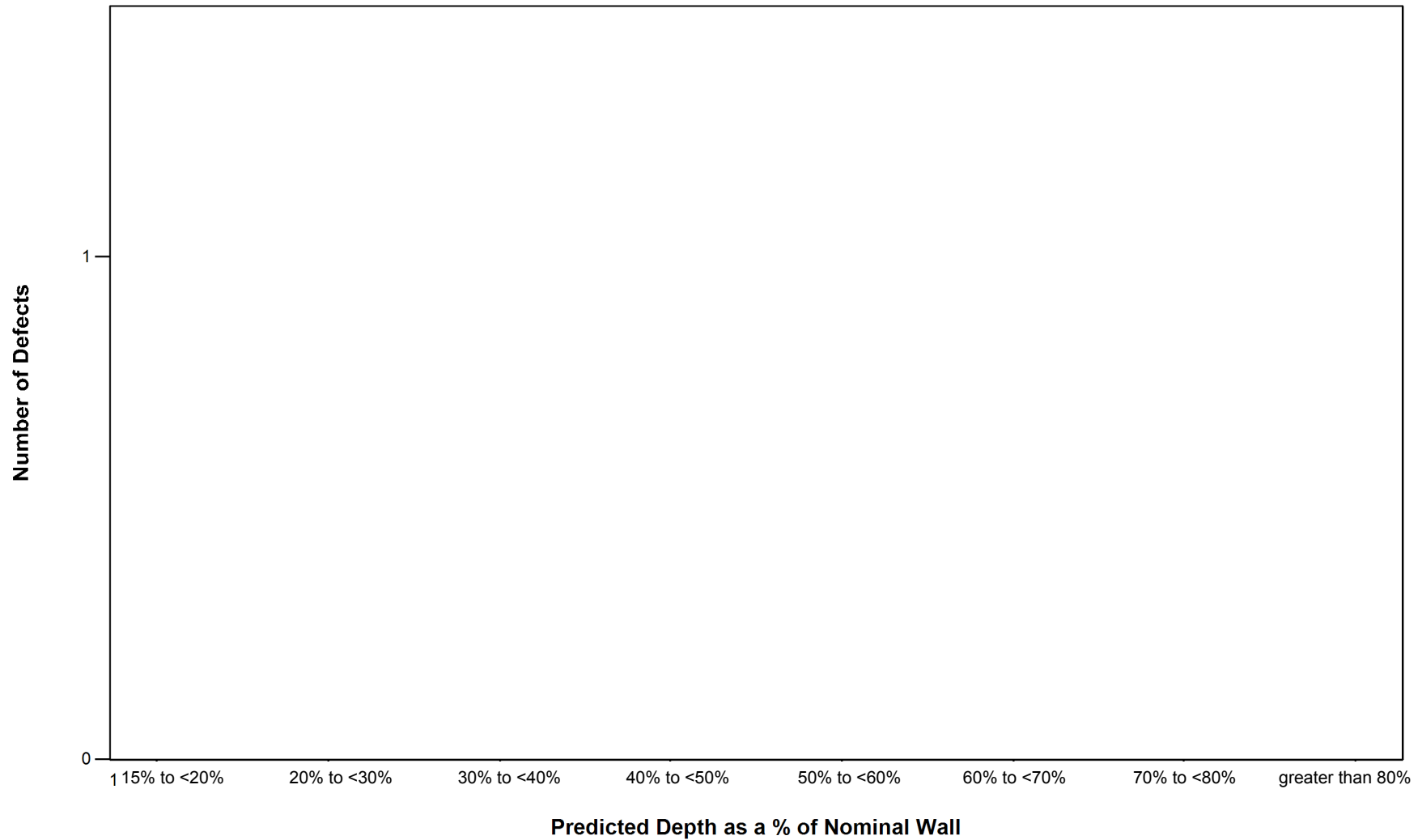
Velocity Graph - MFL



Velocity Graph - MFL



Defect Depth Histogram



Defect Depth Histogram

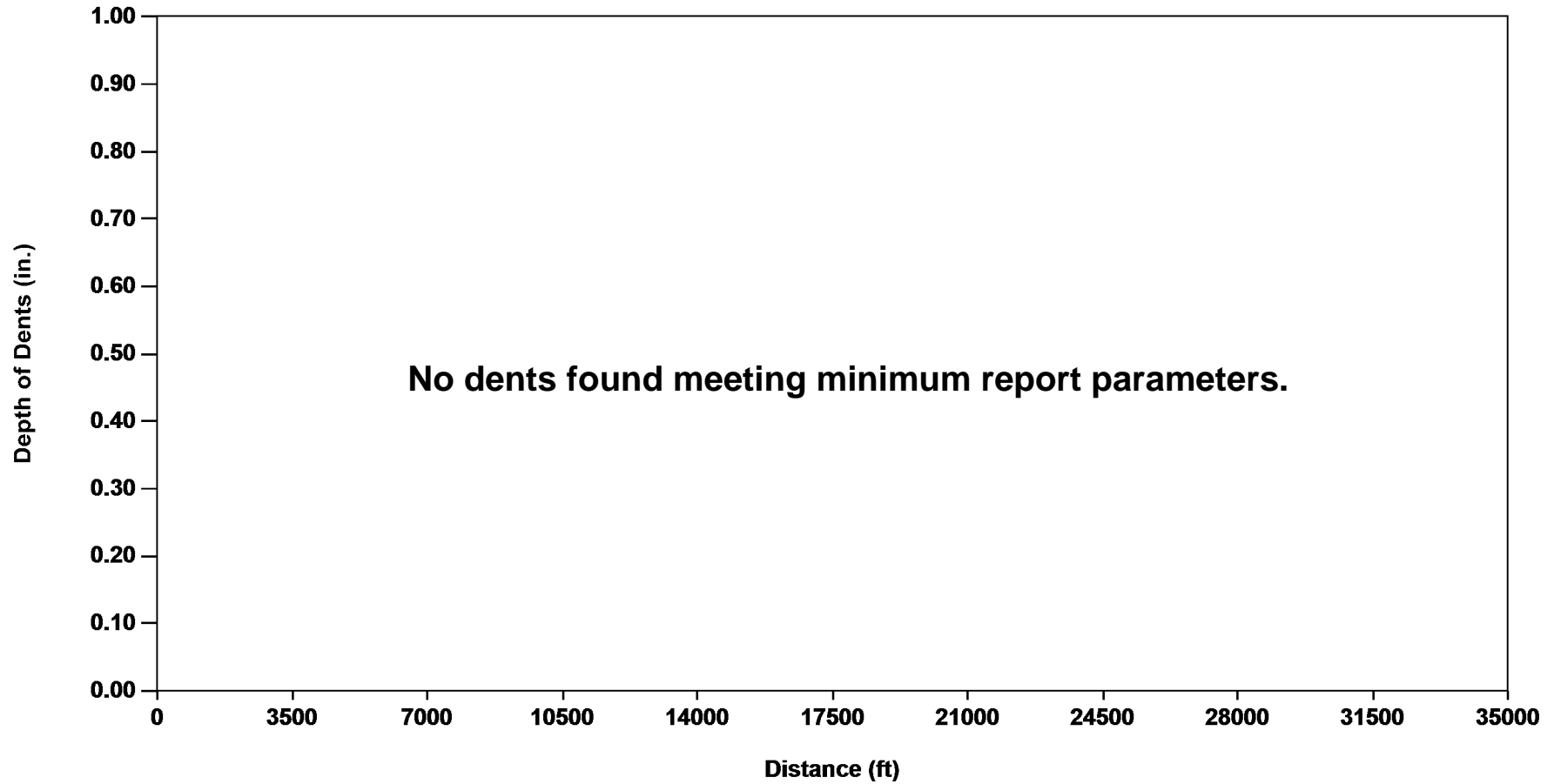
Total Defects: 2

■ Non-Pressure-Reducing Groups

■ Pressure-Reducing Groups (where $P' < P$)



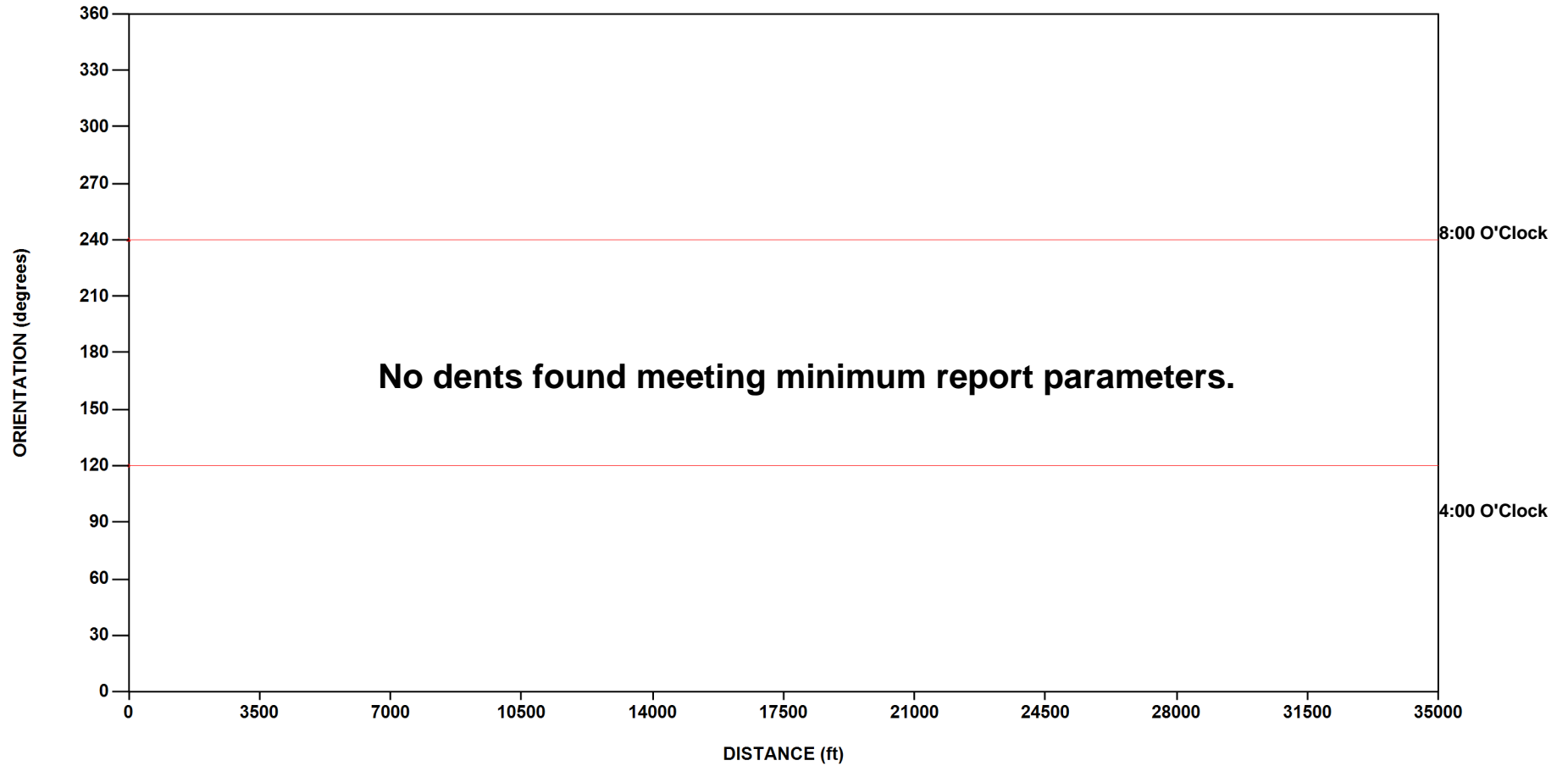
Dent Depth Graph



Dent Depth Graph



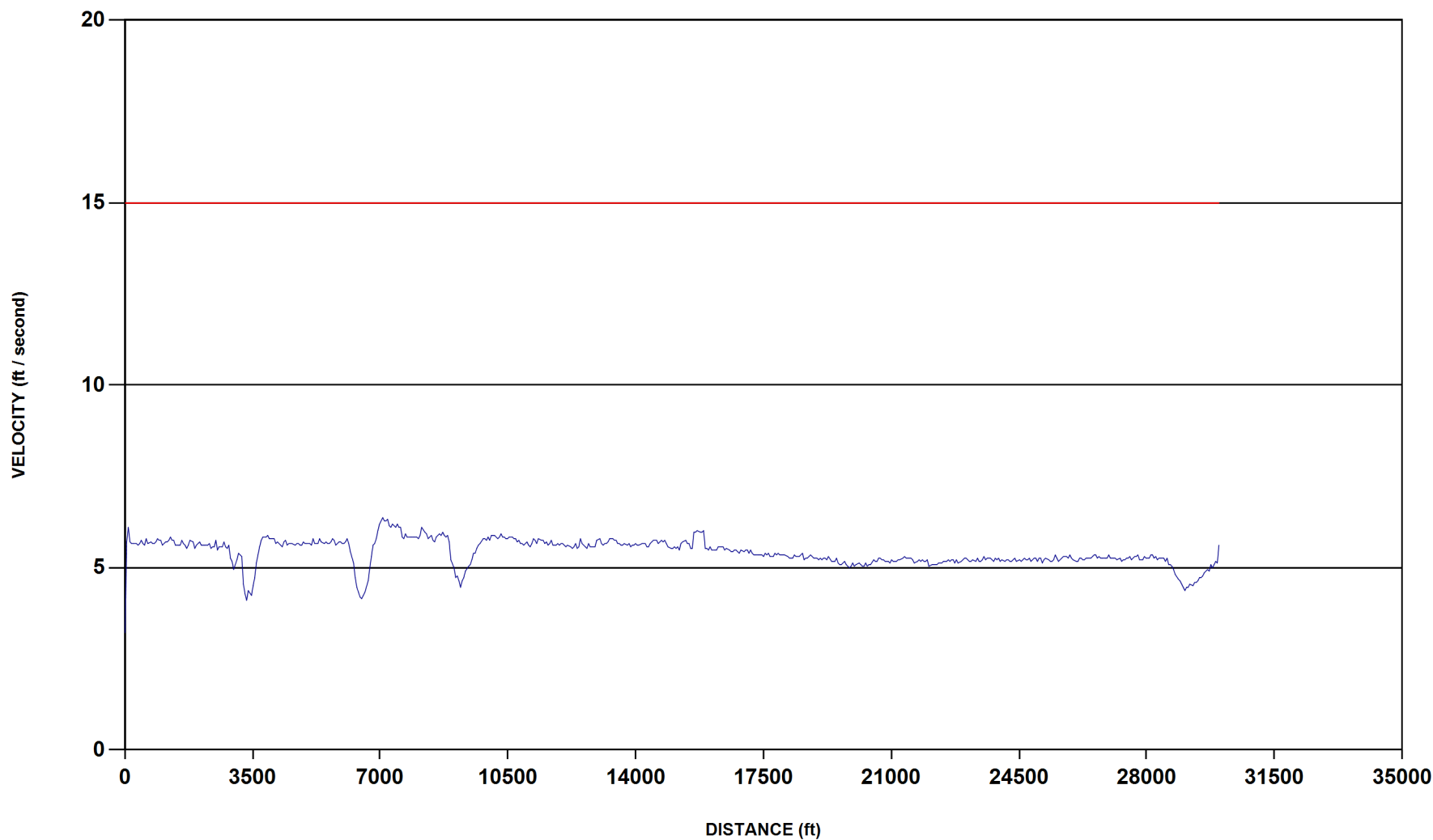
Dent Orientation Graph



Dent Orientation Graph



Velocity Graph - DEF



Velocity Graph - DEF



Locations Summary

DEFINITIONS

A location is a feature in the pipeline that can be used to correlate the inspection tool data to above ground references. Common location features include valves, fittings, flanges, tees, casings, repairs and aboveground markers (AGMs).

For example, a metal loss area could be referenced as being 200 feet down stream from a valve. Not all locations can be easily found from above ground. Some locations might not be useful if they are not above ground.

ID#	Each location is automatically assigned a number in the software. This number is provided to assist the user of PIGTRAP software to more easily find any given defect.
Time	A reference time from the inspection tool. May also be used to locate features in the PIGTRAP software.
Distance	Given in either feet or meters, based on contractual agreements, this is the absolute distance measured by the tool from launch.
Joint #	This unique number identifies the girth weld number.
U/S Weld Dist.	The distance to the upstream (U/S) weld (in feet or meters).
D/S Weld Dist.	The distance to the downstream (D/S) weld (in feet or meters).
Description	Describes the location in greater detail. Possible entries include valves, flanges, fittings, tees, markers, etc.
Latitude	This shows the north/south position of the Location as supplied by the customer or recorded by an AGM box. For XYZ mapping runs, these values are the supplied survey points or were calculated by the tool.
Longitude	This shows the east/west position of the Location as supplied by the customer or recorded by an AGM box. For XYZ mapping runs, these values are the supplied survey points or were calculated by the tool.
Altitude	For XYZ mapping runs, this shows the elevation above sea level of the location as supplied by the customer or calculated by the tool.

Zeros in Latitude and Longitude mean that no data was supplied by the customer. Calculated or estimated values can be viewed in the Pipe Listing report.



Locations Summary

ID#	Time	Dist (ft)	Joint #	U/S Weld Dist.	D/S Weld Dist.	Description	Latitude	Longitude	Altitude
10000001	1,408.60	0.0	110	1.8	1.6	Valve (Launcher), Sta. 0+00, East Camp Creek Loop Launch	47.91830351	-103.34709019	2424.687
10000002	1,408.98	1.1	110	2.9	0.5	Flange	47.91830309	-103.34709450	2424.688
10000003	1,409.20	1.8	120	0.2	1.0	Fitting on top of pipe	47.91830280	-103.34709738	2424.688
10000004	1,409.26	2.1	120	0.5	0.8	Pipe Support	47.91830269	-103.34709856	2424.688
10000005	1,409.48	3.3	130	0.2	1.0	Tee at 270 deg.	47.91830223	-103.34710333	2424.694
10000006	1,409.67	4.4	140	0.4	0.4	Flange	47.91830182	-103.34710776	2424.688
10000007	1,409.88	5.6	150	0.3	1.3	Bend down - 45 deg., 1.5D	47.91830135	-103.34711254	2424.454
10000008	1,412.40	19.9	170	0.2	1.4	Bend up - 45 deg., 3D	47.91829757	-103.34715343	2414.399
10000009	1,416.48	40.1	190	0.2	2.9	Bend left - 75 deg., 3D	47.91829057	-103.34723492	2413.725
10000010	1,428.02	96.9	220	0.2	3.0	Bend right - 75 deg., 3D	47.91813640	-103.34723064	2415.441
10000011	1,477.32	339.2	290	0.1	1.4	Bend right - 45 deg., 3D	47.91813785	-103.34821516	2413.027
10000012	1,483.07	367.6	320	0.1	1.5	Bend left - 45 deg., 3D	47.91818588	-103.34830559	2412.320
10000013	2,216.94	4,138.7	1,260	11.7	29.7	Bend left - 10 deg., 175D	47.91671894	-103.36345257	2386.188
10000014	2,606.53	6,155.0	1,750	18.3	23.0	AGM 010, Sta. 64+94, ROW -- Survey Point	47.91202824	-103.36741350	2365.795
10000015	3,084.82	8,585.9	2,350	22.1	19.4	Bend left-down - 10 deg., 52D	47.90543633	-103.36805370	2326.839
10000016	3,339.33	9,960.9	2,700	0.1	1.8	Bend right - 55 deg., 3D	47.90177346	-103.36864266	2290.750
10000017	3,358.34	10,071.2	2,760	21.8	19.6	AGM 020, Sta. 104+00, ROW -- Han #8802	47.90170737	-103.36908097	2295.840
10000018	4,418.44	15,847.3	4,350	1.6	12.5	AGM 030, Sta. 161+50, CR 31 -- Han #100	47.89796112	-103.39121873	2231.241
10000019	5,485.92	21,669.5	5,960	16.1	26.6	AGM 040, Sta. 220+50, Gravel Rd -- Han #8802	47.89342526	-103.41307089	2197.631
10000020	6,081.54	24,890.9	6,760	0.1	0.9	Bend right - 32 deg., 3D	47.89432793	-103.42595093	2263.326
10000021	6,366.78	26,481.5	7,170	0.1	1.5	Bend left - 45 deg., 3D	47.89764551	-103.43005897	2354.230
10000022	6,523.01	27,346.8	7,410	7.5	35.2	AGM 050, Sta. 276+86, Gavel Rd -- Han #8043	47.89760254	-103.43356755	2351.889
10000023	6,985.71	29,975.0	8,140	0.1	1.4	Bend up - 45 deg., 3D	47.89804137	-103.44421885	2391.083
10000024	6,987.89	29,987.9	8,160	0.1	1.5	Bend down - 45 deg., 3D	47.89804000	-103.44425717	2399.645
10000025	6,988.11	29,989.2	8,170	0.5	0.5	Flange	47.89803987	-103.44426232	2399.824
10000026	6,988.28	29,990.2	8,180	0.2	1.0	Tee at 90 deg.	47.89803978	-103.44426650	2399.820
10000027	6,988.52	29,991.6	8,190	0.6	0.6	Pipe Support	47.89803965	-103.44427212	2399.807
10000028	6,988.55	29,991.8	8,190	0.9	0.4	Fitting on top of pipe	47.89803964	-103.44427288	2399.804
10000029	6,988.68	29,992.5	8,200	0.4	2.5	Flange	47.89803957	-103.44427590	2399.793
10000030	6,988.86	29,993.4	8,200	1.4	1.6	Valve (Receiver), Sta. 303+30, East Camp Creek Loop Receive	47.89803951	-103.44428037	2399.783

Locations Summary



Locations Summary

Locations	Number
Bend	13
Casing	0
Flange	6
Fitting	2
Marker	5
Repair	0
Tee	2
Valve	2
Pipe Support	2



Casings Summary

DEFINITIONS

A casing is a section of larger diameter pipe through which the pipeline passes. Usually installed to protect a pipeline from excessive external loading, casings can also shield pipelines from protective cathodic protection currents. Therefore, the condition of a pipeline inside a casing can provide valuable information.

TDW MFL tools detect when a casing is not centered around the pipeline. These casings are referred to as being eccentric. The closer the casing is to the pipeline, the stronger the signal seen by the inspection tool. The tool will not detect if the casing is shorted to the pipe wall. The tool might see evidence of a short, such as metal loss.

This information may be useful in updating pipeline databases and alignment sheets.

Sometimes spacers are identified inside casings. These are mechanical devices used to center the pipeline inside the casing and are not considered harmful.

ID#	Each location is automatically assigned a number in the software. This number is provided to assist the user of PIGTRAP software to more easily find any given defect.
Time	A reference time from the inspection tool. May also be used to locate features in the PIGTRAP software.
Distance Start, End	Given in either feet or meters, this is the absolute distance measured by the tool from launch to the beginning and ending of the casing.
Casing Length	The total predicted casing length (in feet or meters).
Eccentric (side)	Identifies one of four conditions associated with the casing: 1- no eccentricity (blank); 2- eccentric on upstream side (upstream); 3- eccentric on downstream side (downstream); 4- eccentric on both ends (both)
# of Metal Loss in Casing	Provides the number of metal loss groups identified inside the casing.
Max. Depth of Metal Loss	If metal loss is identified inside the casing, this column provides the maximum predicted depth of all metal loss features.
Above Ground References	The name of the closest upstream and downstream references, usually an Aboveground Marker or a Valve.
Distance from Start/Upstream Side of Casing	The distance from the Aboveground Reference (AGM or Valve) to the start (upstream) side of the casing.



Casings Summary

ID#	Time	Distance (ft) Start	Distance (ft) End	Casing Length (ft)	Eccentric (side)	# of Metal Loss in Casing	Max. Depth of Metal Loss	Above Ground References	Distance from Start/Upstream Side of Casing
No Casings appear in this pipeline inspection									

Casings Summary



Deformation Summary

DEFINITIONS

The Deformation Summary Report lists all the deformations and dents detected during the inspection, sorted by depth of deformation (descending)

Dents may affect the integrity of the pipeline and are considered harmful. A dent with associated metal loss is potentially more significant than a dent alone.

ID#	Each Deformation is automatically assigned a number in the software. This number is provided to assist the user of PIGTRAP software to more easily find any given defect.
Distance	Given in either feet or meters, based on contractual agreements, this is the absolute distance measured by the tool from launch.
Depth	Depth of the indication in inches or mm.
Orientation	The orientation of the deformation indication in degrees (top of pipe = 0) and clock position, as viewed facing downstream.
Sub Type	The sub type of deformation if other than dent (i.e. Heavy Weld, Ovality, Buckle, Expansion).
Min X Sec Dia	The minimum measured Cross-Section (ID) measured within the scope of the deformation.
Description	Text describing a deformation in greater detail. Any special conditions are noted.
On Weld	Determination whether the indication crosses a girth (or seam) weld.
Metal Loss	"Yes" is listed if there is any metal loss associated with a dent.
Above-Ground References	The name of the closest upstream and downstream references, usually either an AGM or a valve.
Distance from Defect	The distance to the upstream and downstream reference listed in the previous column. Used for locating defects in the field.



Deformation Summary

ID#	Distance (ft)	Depth (in)	Depth %	Orientation (Deg / O'Clock)	Sub Type	Min X Sec Dia	Description	On Weld	Metal Loss	Above-Ground References	Distance from Defect
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No Dents have been detected on this pipeline inspection

Deformation Summary



Gains (Metal in Close Proximity)

DEFINITIONS

The inspection tool may detect ferrous metal objects located close to or touching the pipeline. They appear as additional metal added to the pipe, and are referred to as gains. This table identifies gains detected during the inspection.

Clamps or anchors around the pipeline are considered gains. Some metal objects can be potentially harmful to the pipeline. They can damage the pipeline's protective coating, or over time may dent or cause damage to the pipeline.

ID#	Each location is automatically assigned a number in the software. This number is provided to assist the user of PIGTRAP software to more easily find any given defect.
Distance	Given in either feet or meters, based on contractual agreements, this is the absolute distance measured by the tool from launch.
Length	The measured length of the gain measured in feet or meters.
Width	The measured width of the gain measured in inches or millimeters. When full circumference, this is usually typical of a clamp or banding around the circumference of the pipeline.
Depth in Gauss	The difference in gauss reading (magnetic strength) at the gain. The greater the number, the greater the mass of the object, or the closer the proximity to the pipeline, or both. This table is sorted with highest depth in gauss listed in a descending order.
Orientation: Degrees / O'Clock	The distance from launch is plotted against the orientation of the defect. Orientation is based on 360 degrees in a circle, with 0 / 360 degrees marking the top of the pipe (180 degrees the bottom).
Joint #	This unique number identifies the girth weld number.
U/S Weld Dist.	The distance to the upstream (U/S) weld (in feet or meters).
D/S Weld Dist.	The distance to the downstream (D/S) weld (in feet or meters).

Gains (Metal in Close Proximity)



Gains (Metal in Close Proximity)

ID#	Distance (ft)	Length (in)	Width (in)	Depth in Gauss	Orientation Degrees	Orientation / O'Clock	Joint #	U/S Weld Dist.	D/S Weld Dist.
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No Gains have been detected on this pipeline inspection

Gains (Metal in Close Proximity)



Nominal Wall Thickness

DEFINITIONS

The following list provides locations along the pipeline where changes in wall thickness or pipe type occur. While the TDW inspection tool can easily detect changes in wall thickness, it cannot take direct thickness measurements. Therefore, where wall thicknesses are known, the tool can identify the locations where the thickness changes. Where wall thicknesses are not known, best efforts will be made to estimate thicknesses based on best available data.

ID#	Each wall thickness change ID is automatically assigned a number in the software. This number is provided to assist the user of PIGTRAP software to more easily find any given defect.
Distance	Given in either feet or meters, based on contractual agreements, this is the absolute distance measured by the tool from launch.
Wall Thickness	The predicted wall thickness in inches or millimeters.
Pipetype	Type of pipe construction. Electric Resistance Weld (ERW), Seamless (SMLS), Lap Weld (LW), etc.
Yield Strength (SMYS)	Specified Minimum Yield Strength – A required strength level that measured yield stress of a pipe material must exceed, which is a function of pipe grade. The measured yield stress is the tensile stress required to produce a total elongation of 0.5 percent of a gage length as determined by an extensometer during a tensile test.
Safety Factor	(or design factor) Typically 0.72 per ASME B31.4 In setting the safety factor, due consideration has been given to and allowances made for the manufacturing tolerance and maximum allowable depth of imperfections provided for in the specifications.
Length of Segment	The length of the pipe for the specified wall thickness, measured in feet or meters.

Nominal Wall Thickness



Nominal Wall Thickness

ID#	Distance (ft)	Wall Thickness (in)	Pipetype	Yield Strength (SMYS)	Safety Factor	Length of Segment (ft)
11000000	-1.84	0.322	ERW	52000	0.72	22.46
11000001	20.63	0.188	ERW	52000	0.72	15575.2
11000002	15595.83	0.322	ERW	52000	0.72	263.86
11000003	15859.69	0.188	ERW	52000	0.72	14114.53
11000004	29974.22	0.322	ERW	52000	0.72	19.19

Wall Thickness	Pipetype	Total Length (ft)	Total Length (miles)	Percent of Total Distance
0.188	ERW	29,690	5.623	99.0%
0.322	ERW	306	0.058	1.0%

Nominal Wall Thickness



Repair Report

DEFINITIONS

This table lists all the repairs to the pipeline detected during the inspection.

Pipeline repairs that are typically detected include:

- Sleeves
- Half sole
- Patches
- Stopples
- Clamps
- Weld + End
- Clock Spring

ID# Each repair is automatically assigned a number in the software. This number is provided to assist the user of PIGTRAP software to more easily find any given defect.

Distance Given in either feet or meters, based on contractual agreements, this is the absolute distance measured by the tool from launch.

Length Gives the linear length of the repair.

Type of Repair Describes the type of repair detected during the inspection.



Repair Report

Repair Report

ID#

Distance (ft)

Length (ft)

Type of Repair

No Repairs have been detected on this pipeline inspection



AGM Information Summary

DEFINITIONS

This table includes all values and above ground marker sites in the inspection run.

ID#	Each location is automatically assigned a number in the software. This number is provided to assist the user of PIGTRAP software to more easily find any given defect.
Time	A reference time from the inspection tool. May also be used to locate features in the PIGTRAP software.
Distance	Given in either feet or meters, based on contractual agreements, this is the absolute distance measured by the tool from launch.
Description	Describes the AGM in greater detail. Generally includes only valves and markers.
Latitude	This shows the north/south position of the Location as supplied by the customer or recorded by an AGM box. For XYZ mapping runs, these values are the supplied survey points or were calculated by the tool.
Longitude	This shows the east/west position of the Location as supplied by the customer or recorded by an AGM box. For XYZ mapping runs, these values are the supplied survey points or were calculated by the tool.
Altitude	For XYZ mapping runs, this shows the elevation above sea level of the location as supplied by the customer or calculated by the tool.

Zeroes in Latitude and Longitude mean that no data was supplied by the customer. Calculated or estimated values can be viewed in the Pipe Listing report.



AGM Information Summary

AGM Information Summary

ID#	Time	Distance(ft)	Description	Latitude	Longitude	Altitude
10000001	1408.60	0.00	Valve (Launcher), Sta. 0+00, East Camp Creek Loop Launch	47.91830351	-103.34709019	2424.687
10000014	2606.53	6155.02	AGM 010, Sta. 64+94, ROW -- Survey Point	47.91202824	-103.36741350	2365.795
10000017	3358.34	10071.22	AGM 020, Sta. 104+00, ROW -- Han #8802	47.90170737	-103.36908097	2295.840
10000018	4418.44	15847.25	AGM 030, Sta. 161+50, CR 31 -- Han #100	47.89796112	-103.39121873	2231.241
10000019	5485.92	21669.52	AGM 040, Sta. 220+50, Gravel Rd -- Han #8802	47.89342526	-103.41307089	2197.631
10000022	6523.01	27346.81	AGM 050, Sta. 276+86, Gavel Rd -- Han #8043	47.89760254	-103.43356755	2351.889
10000030	6988.86	29993.41	Valve (Receiver), Sta. 303+30, East Camp Creek Loop Receive	47.89803951	-103.44428037	2399.783

TYPE	NUMBER
Valves	2
Markers	5



Miscellaneous

DEFINITIONS

There are occasions when special notations or circumstances require the addition of a note. These notes are included in this table for your reference.

ID#	Each miscellaneous note is automatically assigned a number in the software. This number is provided to assist the user of PIGTRAP software to more easily find any given defect.
Time	A reference time from the inspection tool. May also be used to locate features in the PIGTRAP software.
Distance	Given in either feet or meters, based on contractual agreements, this is the absolute distance measured by the tool from launch.
Memo	A description of the entry.

MEMO EXAMPLES

Gap or dent in casing	When the casing is not welded, or when a gap occurs in the weld, this signature is detected by the tool, and identified with a Misc. remark.
Inclusion	An anomaly in the cross section of the pipeline. Inclusions may be detrimental if they protrude through the pipe wall.
Mill anomaly	The process of manufacturing pipe can often leave indications in the pipe wall. Typically these anomalies are not detrimental, and are identified for the benefit of the client.
Sensor problems	Noting locations where anomalous sensor readings occurred.
Tool stops/starts	All tools are setup on a time-based system. When the tool stops, it continues to record, although not moving. When the tool moves very slowly, it is possible that its movement is not detected, and therefore, reported distances may appear shorter than actual. Many stops and starts may affect the overall distance accuracy of the tool.



Miscellaneous

Miscellaneous

ID#	Time	Distance (ft)	Memo
12000000	166.48	-15.32	Begin Run Tickle
12000001	5,963.58	24,243.89	Debris @ 5:00
12000002	10,246.28	30,036.71	End Run Tickle

Total	Number
Misc listings	3



Other Anomalies

DEFINITIONS

This Report lists anomalies that appear in the data which do not fall into typical metal loss categories. Examples range from manufacturing/mill anomalies in the pipe body and seam weld to construction-related and girth weld anomalies. Predicted wall loss depth estimations as well as pressure calculations are not generally applicable to these features and therefore these values do not appear in this table.

ID#	Each item is automatically assigned a number in the software. This number is provided to assist the user of PIGTRAP software to more easily find any given defect.
Feature Description / Comments	Classification of the feature along with any additional comments if applicable.
Dist (ft)	Given in either feet or meters, based on contractual agreements, this is the absolute distance from launch.
Length (in)	Predicted length of the defect, reported in either inches or millimeters.
Width (in)	Predicted width of the defect, reported in either inches or millimeters.
Gauss Delta	The difference between high and low gauss readings (magnetic strength) at the feature. This table is sorted with the highest gauss listed in a descending order. Gauss delta indicates relative disturbance of the magnetic field at that location and does not necessarily represent relative severity when comparing one feature to another.
ID/OD	Determination whether the defect exists on the inside (INT) or outside (EXT) surface of the pipe.
Anomaly / Seam Orientation	Orientation of both the feature and the seam weld in the joint of pipe is reported in o'clock (12:00 at top of pipe) as viewed looking downstream. If the pipe is determined to be seamless construction and therefore has no seam, "SMLS" will appear. "N/D" will be populated for joints where the seam is not detected.
Aboveground References	The name of the closest upstream and downstream references, usually either an AGM or a Valve.
Distance from Defect	The distance to the upstream and downstream reference listed in the previous column. Used for locating defects in the field.



Other Anomalies

ID#	Feature Description/Comments	Dist (ft)	Length	Width	Gauss Delta	ID/OD	Anomaly/Seam Orientation		Above-Ground References	Distance from Defect
								O'clock		
20000012	Seam Variation	18,087.8	0.59	0.45	31	INT	9:00 / N/D	U/S:	AGM 030, Sta. 161+50, CR 31 -- Han #100	2240.55
								D/S:	AGM 040, Sta. 220+50, Gravel Rd -- Han #8802	3581.71
20000008	Seam Variation	16,661.5	0.59	0.44	28	INT	6:15 / N/D	U/S:	AGM 030, Sta. 161+50, CR 31 -- Han #100	814.17
								D/S:	AGM 040, Sta. 220+50, Gravel Rd -- Han #8802	5008.09
20000001	Seam Variation	11,983.7	0.59	0.51	29	INT	9:00 / N/D	U/S:	AGM 020, Sta. 104+00, ROW -- Han #8802	1912.42
								D/S:	AGM 030, Sta. 161+50, CR 31 -- Han #100	3863.61
20000007	Seam Variation	16,563.6	0.71	0.51	25	INT	2:15 / N/D	U/S:	AGM 030, Sta. 161+50, CR 31 -- Han #100	716.32
								D/S:	AGM 040, Sta. 220+50, Gravel Rd -- Han #8802	5105.94
20000003	Mill Anomaly	14,277.5	0.47	0.53	28	INT	6:45 / N/D	U/S:	AGM 020, Sta. 104+00, ROW -- Han #8802	4206.29
								D/S:	AGM 030, Sta. 161+50, CR 31 -- Han #100	1569.75
20000009	Mill Anomaly	17,487.3	0.47	0.44	26	INT	7:45 / N/D	U/S:	AGM 030, Sta. 161+50, CR 31 -- Han #100	1640.02
								D/S:	AGM 040, Sta. 220+50, Gravel Rd -- Han #8802	4182.25
20000005	Seam Variation	16,552.3	0.59	0.52	25	INT	2:30 / N/D	U/S:	AGM 030, Sta. 161+50, CR 31 -- Han #100	705.02
								D/S:	AGM 040, Sta. 220+50, Gravel Rd -- Han #8802	5117.24
20000002	Seam Variation	12,270.2	0.35	0.37	25	INT	10:15 / N/D	U/S:	AGM 020, Sta. 104+00, ROW -- Han #8802	2198.92
								D/S:	AGM 030, Sta. 161+50, CR 31 -- Han #100	3577.12
20000013	Mill Anomaly	18,218.8	0.35	0.39	26	INT	8:15 / N/D	U/S:	AGM 030, Sta. 161+50, CR 31 -- Han #100	2371.56
								D/S:	AGM 040, Sta. 220+50, Gravel Rd -- Han #8802	3450.71
20000006	Seam Variation	16,558.7	0.82	0.59	23	INT	2:30 / N/D	U/S:	AGM 030, Sta. 161+50, CR 31 -- Han #100	711.44
								D/S:	AGM 040, Sta. 220+50, Gravel Rd -- Han #8802	5110.82

Other Anomalies



Other Anomalies

ID#	Feature Description/Comments	Dist (ft)	Length	Width	Gauss Delta	ID/OD	Anomaly/Seam Orientation O'clock	Above-Ground References	Distance from Defect
20000010	Seam Variation	17,794.6	0.47	0.36	19	INT	11:30 / N/D	U/S: AGM 030, Sta. 161+50, CR 31 -- Han #100	1947.31
								D/S: AGM 040, Sta. 220+50, Gravel Rd -- Han #8802	3874.96
20000000	Seam Variation	11,845.4	0.71	0.61	25	INT	9:45 / N/D	U/S: AGM 020, Sta. 104+00, ROW -- Han #8802	1774.18
								D/S: AGM 030, Sta. 161+50, CR 31 -- Han #100	4001.85
20000011	Seam Variation	17,796.6	0.59	0.46	18	INT	11:15 / N/D	U/S: AGM 030, Sta. 161+50, CR 31 -- Han #100	1949.28
								D/S: AGM 040, Sta. 220+50, Gravel Rd -- Han #8802	3872.98

Other Anomalies

Other Anomalies Type	Number
Girth Weld Anomaly	0
Mill Anomaly	3
Seam Variation	10

DEFINITIONS

The Pipeline Listing Report presents all detected pipeline data in sequential order, beginning at launcher and ending at the receiver. The table includes welds, locations, metal loss defects, AGMs, wall thickness changes, etc.

ID#	Each item is automatically assigned a number in the software. This number is provided to assist the user of PIGTRAP software to more easily find any given defect.
Description	Describes the event at the particular location. Identifies the type of the descriptive, being a weld, location, pipe thickness change, etc.
Distance	Given in either feet or meters, based on contractual agreements, this is the absolute distance from launch.
Joint #	This unique number identifies the girth weld number.
U/S Weld	The distance to the upstream (U/S) weld (in feet or meters).
D/S Weld	The distance to the downstream (D/S) weld (in feet or meters).
Latitude	If GPS coordinates were provided for launch, receive and AGMs, this provides the predicted Latitude reading of the location from the first GPS reading based on INS readings obtained by the tool during the inspection.
Longitude	If GPS coordinates were provided for launch, receive and AGMs, this provides the predicted Longitude reading of the location from the first GPS reading based on INS readings obtained by the tool during the inspection.
Altitude	If GPS coordinates were provided for launch, receive and AGMs, this provides the predicted Altitude reading of the location from the first GPS reading based on INS readings obtained by the tool during the inspection.
Orientation: Deg. / O'Clock	Orientation is reported in degrees or o'clock (0 degrees/12:00 at top of pipe) as viewed looking downstream.
% Depth	Predicted depth of the defect as a percentage of nominal wall.
Length or WT (Pipe Thickness)	Predicted length of the defect, reported in either inches or millimeters – or if a wall thickness change, the new wall thickness begins at this point.
Width or YS (Yield Strength)	Predicted width of the defect, reported in either inches or millimeters – or if a wall thickness change, the new SMYS begins at this point.
P' (Calc. Safe Max. Operating Pressure) or SF (Safety Factor)	Calculated safe maximum operating pressure for the pipeline segment as calculated based on information provided by the Customer. TDW software uses either ASME B31G, MODIFIED ASME B31G or Z662-99 to calculate the calculated safe maximum allowable operating pressure (P') of the pipeline at a metal loss area.
(P'/P)	Percent of maximum established pressure, this is calculated by dividing the calculated safe pressure of the defect (P') by the current established maximum operating pressure of the pipeline (P). For TDW reporting, P is either established MOP provided by the customer or the calculated pressure rating for the pipe (P). Percentages less than 100% are considered pressure reducing.



Pipeline Listing

TDW Services, Inc.

Hiland Crude, LLC

East Camp Creek Loop Launch to Receive

ID#	Description	Distance (ft)	Joint #	U/S Weld	D/S Weld	Latitude	Longitude	Altitude	Orientation (Deg / O'Clock)	Depth (%)	Length or WT	Width or YS	P' or SF	(P'/P)
12000000	Begin Run Tickle	-15.3	0	-	13.5	47.91830351	-103.34709022	2424.688						
11000000	WT CHANGE	-1.8	0	0.0	0.0	47.91830351	-103.34709022	2424.688			0.322	52000	0.72	
	110 WELD	-1.8	110	0.0	3.4	47.91830351	-103.34709022	2424.688						
10000000	Flange	-1.1	110	0.7	2.7	47.91830351	-103.34709022	2424.688	0	12:00				
10000001	Valve (Launcher), Sta. 0+00, East Camp Creek Loop Launch	0.0	110	1.8	1.6	47.91830351	-103.34709019	2424.687						
10000002	Flange	1.1	110	2.9	0.5	47.91830309	-103.34709450	2424.688	0	12:00				
	120 WELD	1.6	120	0.0	1.2	47.91830291	-103.34709633	2424.688						
10000003	Fitting on top of pipe	1.8	120	0.2	1.0	47.91830280	-103.34709738	2424.688	356	11:45				
10000004	Pipe Support	2.1	120	0.5	0.8	47.91830269	-103.34709856	2424.688						
	130 WELD	2.8	130	0.0	1.2	47.91830243	-103.34710126	2424.688						
10000005	Tee at 270 deg.	3.3	130	0.2	1.0	47.91830223	-103.34710333	2424.694	264	8:45				
	140 WELD	4.0	140	0.0	0.9	47.91830198	-103.34710596	2424.695						
10000006	Flange	4.4	140	0.4	0.4	47.91830182	-103.34710776	2424.688	0	12:00				
	150 WELD	4.8	150	0.0	1.6	47.91830165	-103.34710951	2424.642						
10000007	Bend down - 45 deg., 1.5D	5.6	150	0.3	1.3	47.91830135	-103.34711254	2424.454	0	12:00				
	160 WELD	6.5	160	0.0	12.6	47.91830110	-103.34711521	2424.002						
	170 WELD	19.1	170	0.0	1.6	47.91829779	-103.34715091	2414.796						
10000008	Bend up - 45 deg., 3D	19.9	170	0.2	1.4	47.91829757	-103.34715343	2414.399	0	12:00				
11000001	WT CHANGE	20.6	170	0.0	0.1	47.91829737	-103.34715613	2414.211			0.188	52000	0.72	
	180 WELD	20.7	180	0.0	17.8	47.91829735	-103.34715636	2414.203						
	190 WELD	38.5	190	0.0	3.1	47.91829263	-103.34722964	2413.734						
10000009	Bend left - 75 deg., 3D	40.1	190	0.2	2.9	47.91829057	-103.34723492	2413.725	0	12:00				
	200 WELD	41.6	200	0.0	37.6	47.91828672	-103.34723704	2413.718						
	210 WELD	79.3	210	0.0	16.0	47.91818384	-103.34723083	2414.484						
	220 WELD	95.3	220	0.0	3.1	47.91814018	-103.34722833	2415.455						
10000010	Bend right - 75 deg., 3D	96.9	220	0.2	3.0	47.91813640	-103.34723064	2415.441	0	12:00				
	230 WELD	98.4	230	0.0	37.6	47.91813472	-103.34723611	2415.284						
	240 WELD	136.0	240	0.0	42.5	47.91813246	-103.34739145	2409.384						
	250 WELD	178.5	250	0.0	42.6	47.91813270	-103.34756441	2409.852						
	260 WELD	221.1	260	0.0	42.5	47.91813364	-103.34773718	2412.873						
	270 WELD	263.6	270	0.0	42.6	47.91813824	-103.34790912	2414.429						
	280 WELD	306.2	280	0.0	32.2	47.91814151	-103.34808190	2414.938						
	290 WELD	338.4	290	0.0	1.6	47.91813743	-103.34821227	2413.069						
10000011	Bend right - 45 deg., 3D	339.2	290	0.1	1.4	47.91813785	-103.34821516	2413.027	0	12:00				
	300 WELD	340.0	300	0.0	8.2	47.91813877	-103.34821786	2412.997						



Pipeline Listing

TDW Services, Inc.

Hiland Crude, LLC

East Camp Creek Loop Launch to Receive

ID#	Description	Distance (ft)	Joint #	U/S Weld	D/S Weld	Latitude	Longitude	Altitude	Orientation (Deg / O'Clock)	Depth (%)	Length or WT	Width or YS	P' or SF	(P'/P)
310	WELD	348.1	310	0.0	18.7	47.91815307	-103.34824348	2412.867						
320	WELD	366.8	320	0.0	1.6	47.91818508	-103.34830270	2412.341						
10000012	Bend left - 45 deg., 3D	367.6	320	0.1	1.5	47.91818588	-103.34830559	2412.320	0	12:00				
330	WELD	368.4	330	0.0	39.5	47.91818610	-103.34830866	2412.297						
340	WELD	408.0	340	0.0	41.2	47.91817132	-103.34846932	2410.939						
350	WELD	449.2	350	0.0	41.2	47.91815374	-103.34863504	2411.017						
360	WELD	490.4	360	0.0	41.3	47.91813521	-103.34880044	2409.711						
370	WELD	531.6	370	0.0	41.2	47.91811668	-103.34896608	2408.284						
380	WELD	572.9	380	0.0	41.2	47.91809645	-103.34913097	2407.957						
390	WELD	614.1	390	0.0	41.3	47.91807571	-103.34929551	2405.577						
400	WELD	655.4	400	0.0	41.3	47.91805547	-103.34945986	2401.627						
410	WELD	696.7	410	0.0	41.3	47.91803516	-103.34962444	2398.591						
420	WELD	738.0	420	0.0	41.3	47.91801466	-103.34978942	2397.769						
430	WELD	779.4	430	0.0	41.3	47.91799182	-103.34995374	2399.233						
440	WELD	820.7	440	0.0	41.1	47.91797220	-103.35011937	2399.012						
450	WELD	861.8	450	0.0	41.2	47.91796462	-103.35028660	2398.423						
460	WELD	903.0	460	0.0	41.2	47.91796892	-103.35045428	2397.483						
470	WELD	944.2	470	0.0	41.2	47.91797832	-103.35062150	2397.242						
480	WELD	985.4	480	0.0	33.7	47.91798860	-103.35078861	2398.144						
490	WELD	1,019.0	490	0.0	41.2	47.91799479	-103.35092534	2398.486						
500	WELD	1,060.2	500	0.0	41.2	47.91799562	-103.35109307	2399.532						
510	WELD	1,101.5	510	0.0	41.2	47.91798620	-103.35126020	2400.390						
520	WELD	1,142.6	520	0.0	41.3	47.91796973	-103.35142605	2399.646						
530	WELD	1,183.9	530	0.0	32.9	47.91795039	-103.35159143	2398.496						
540	WELD	1,216.8	540	0.0	33.3	47.91793470	-103.35172328	2398.349						
550	WELD	1,250.0	550	0.0	38.7	47.91791780	-103.35185612	2398.115						
560	WELD	1,288.8	560	0.0	30.8	47.91789659	-103.35201012	2398.172						
570	WELD	1,319.6	570	0.0	33.7	47.91788137	-103.35213352	2398.374						
580	WELD	1,353.2	580	0.0	41.3	47.91786620	-103.35226851	2399.532						
590	WELD	1,394.5	590	0.0	41.2	47.91784675	-103.35243406	2401.391						
600	WELD	1,435.7	600	0.0	34.1	47.91782638	-103.35259874	2404.045						
610	WELD	1,469.9	610	0.0	41.2	47.91780774	-103.35273496	2405.876						
620	WELD	1,511.1	620	0.0	41.2	47.91778607	-103.35289978	2405.167						
630	WELD	1,552.3	630	0.0	41.3	47.91776645	-103.35306490	2402.664						
640	WELD	1,593.6	640	0.0	41.3	47.91774680	-103.35322980	2400.103						
650	WELD	1,634.9	650	0.0	41.3	47.91772588	-103.35339537	2398.530						
660	WELD	1,676.2	660	0.0	41.3	47.91770375	-103.35355984	2397.515						



Pipeline Listing

TDW Services, Inc.

Hiland Crude, LLC

East Camp Creek Loop Launch to Receive

ID#	Description	Distance (ft)	Joint #	U/S Weld	D/S Weld	Latitude	Longitude	Altitude	Orientation (Deg / O'Clock)	Depth (%)	Length or WT	Width or YS	P' or SF	(P'/P)
670	WELD	1,717.5	670	0.0	41.3	47.91768337	-103.35372508	2397.913						
680	WELD	1,758.8	680	0.0	41.3	47.91766413	-103.35389052	2398.543						
690	WELD	1,800.1	690	0.0	41.3	47.91764461	-103.35405590	2397.223						
700	WELD	1,841.4	700	0.0	41.3	47.91762386	-103.35422049	2393.968						
710	WELD	1,882.7	710	0.0	41.3	47.91760282	-103.35438526	2391.117						
720	WELD	1,924.0	720	0.0	41.2	47.91758220	-103.35455050	2389.589						
730	WELD	1,965.2	730	0.0	41.2	47.91756261	-103.35471592	2389.688						
740	WELD	2,006.4	740	0.0	41.3	47.91754345	-103.35488114	2389.441						
750	WELD	2,047.6	750	0.0	41.2	47.91752451	-103.35504664	2387.898						
760	WELD	2,088.9	760	0.0	41.2	47.91750725	-103.35521244	2385.444						
770	WELD	2,130.1	770	0.0	41.2	47.91748973	-103.35537819	2384.368						
780	WELD	2,171.3	780	0.0	41.2	47.91747023	-103.35554348	2384.016						
790	WELD	2,212.5	790	0.0	41.2	47.91745060	-103.35570915	2385.064						
800	WELD	2,253.8	800	0.0	41.2	47.91743216	-103.35587461	2386.122						
810	WELD	2,295.0	810	0.0	41.3	47.91741239	-103.35603986	2385.788						
820	WELD	2,336.3	820	0.0	41.3	47.91738959	-103.35620453	2385.838						
830	WELD	2,377.5	830	0.0	41.2	47.91736679	-103.35636906	2387.445						
840	WELD	2,418.8	840	0.0	41.3	47.91734454	-103.35653328	2389.477						
850	WELD	2,460.0	850	0.0	38.9	47.91732118	-103.35669764	2390.501						
860	WELD	2,498.9	860	0.0	32.1	47.91729978	-103.35685247	2390.853						
870	WELD	2,531.0	870	0.0	41.3	47.91728284	-103.35698074	2390.671						
880	WELD	2,572.3	880	0.0	41.3	47.91726208	-103.35714585	2390.456						
890	WELD	2,613.6	890	0.0	41.2	47.91724281	-103.35731112	2389.580						
900	WELD	2,654.8	900	0.0	41.2	47.91722417	-103.35747667	2387.913						
910	WELD	2,696.0	910	0.0	40.9	47.91720583	-103.35764211	2386.710						
920	WELD	2,736.9	920	0.0	40.9	47.91718943	-103.35780692	2385.000						
930	WELD	2,777.9	930	0.0	41.3	47.91717101	-103.35797260	2384.054						
940	WELD	2,819.1	940	0.0	41.4	47.91714824	-103.35813674	2384.923						
950	WELD	2,860.5	950	0.0	41.3	47.91711662	-103.35829804	2385.452						
960	WELD	2,901.8	960	0.0	41.2	47.91708204	-103.35845758	2385.967						
970	WELD	2,943.0	970	0.0	41.3	47.91704977	-103.35861856	2386.728						
980	WELD	2,984.3	980	0.0	41.2	47.91702273	-103.35878193	2387.513						
990	WELD	3,025.6	990	0.0	41.2	47.91699837	-103.35894624	2388.647						
1000	WELD	3,066.8	1000	0.0	41.2	47.91697555	-103.35911068	2389.676						
1010	WELD	3,108.0	1010	0.0	41.3	47.91695348	-103.35927555	2390.615						
1020	WELD	3,149.3	1020	0.0	41.3	47.91693184	-103.35944011	2392.411						
1030	WELD	3,190.5	1030	0.0	41.3	47.91691025	-103.35960502	2394.255						



Pipeline Listing

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ID#	Description	Distance (ft)	Joint #	U/S Weld	D/S Weld	Latitude	Longitude	Altitude	Orientation (Deg / O'Clock)	Depth (%)	Length or WT	Width or YS	P' or SF	(P'/P)
1040	WELD	3,231.8	1040	0.0	41.2	47.91689079	-103.35977060	2395.592						
1050	WELD	3,273.0	1050	0.0	41.2	47.91687335	-103.35993645	2397.096						
1060	WELD	3,314.2	1060	0.0	41.3	47.91685815	-103.36010289	2398.256						
1070	WELD	3,355.5	1070	0.0	41.3	47.91684595	-103.36027036	2398.474						
1080	WELD	3,396.8	1080	0.0	40.9	47.91683751	-103.36043808	2398.530						
1090	WELD	3,437.7	1090	0.0	41.3	47.91683211	-103.36060590	2398.674						
1100	WELD	3,478.9	1100	0.0	41.4	47.91682735	-103.36077400	2398.009						
1110	WELD	3,520.3	1110	0.0	41.4	47.91682213	-103.36094208	2396.506						
1120	WELD	3,561.7	1120	0.0	41.4	47.91681507	-103.36111014	2394.439						
1130	WELD	3,603.0	1130	0.0	41.2	47.91680704	-103.36127752	2392.555						
1140	WELD	3,644.3	1140	0.0	41.3	47.91679804	-103.36144484	2390.829						
1150	WELD	3,685.5	1150	0.0	41.2	47.91678872	-103.36161236	2389.542						
1160	WELD	3,726.8	1160	0.0	41.3	47.91677963	-103.36178006	2388.706						
1170	WELD	3,768.0	1170	0.0	41.2	47.91677197	-103.36194782	2387.966						
1180	WELD	3,809.3	1180	0.0	41.3	47.91676547	-103.36211538	2386.801						
1190	WELD	3,850.5	1190	0.0	41.3	47.91676030	-103.36228340	2386.025						
1200	WELD	3,891.8	1200	0.0	41.3	47.91675652	-103.36245134	2384.636						
1210	WELD	3,933.1	1210	0.0	41.3	47.91675359	-103.36261931	2383.978						
1220	WELD	3,974.4	1220	0.0	41.1	47.91674923	-103.36278696	2384.397						
1230	WELD	4,015.4	1230	0.0	40.0	47.91674439	-103.36295405	2384.239						
1240	WELD	4,055.4	1240	0.0	31.8	47.91673845	-103.36311655	2384.558						
1250	WELD	4,087.2	1250	0.0	26.8	47.91673308	-103.36324542	2385.039						
1260	WELD	4,114.1	1260	0.0	41.4	47.91672823	-103.36335397	2385.768						
10000013	Bend left - 10 deg., 175D	4,138.7	1260	11.7	29.7	47.91671894	-103.36345257	2386.188	0	12:00				
1270	WELD	4,155.5	1270	0.0	41.3	47.91670588	-103.36351753	2386.371						
1280	WELD	4,196.8	1280	0.0	41.4	47.91665774	-103.36366830	2386.134						
1290	WELD	4,238.1	1290	0.0	41.2	47.91658476	-103.36379587	2385.005						
1300	WELD	4,279.3	1300	0.0	41.2	47.91650228	-103.36391023	2385.051						
1310	WELD	4,320.5	1310	0.0	41.2	47.91641391	-103.36401456	2386.461						
1320	WELD	4,361.7	1320	0.0	41.2	47.91632065	-103.36410908	2385.681						
1330	WELD	4,402.9	1330	0.0	41.3	47.91622746	-103.36420398	2385.387						
1340	WELD	4,444.2	1340	0.0	41.2	47.91613279	-103.36429564	2383.532						
1350	WELD	4,485.5	1350	0.0	41.2	47.91603769	-103.36438614	2381.820						
1360	WELD	4,526.7	1360	0.0	41.3	47.91594313	-103.36447702	2379.380						
1370	WELD	4,568.0	1370	0.0	41.2	47.91584841	-103.36456831	2377.831						
1380	WELD	4,609.1	1380	0.0	41.2	47.91575343	-103.36465909	2377.595						
1390	WELD	4,650.4	1390	0.0	41.3	47.91565809	-103.36474903	2378.033						



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ID#	Description	Distance (ft)	Joint #	U/S Weld	D/S Weld	Latitude	Longitude	Altitude	Orientation (Deg / O'Clock)	Depth (%)	Length or WT	Width or YS	P' or SF	(P'/P)
1400	WELD	4,691.7	1400	0.0	41.3	47.91556183	-103.36483754	2378.094						
1410	WELD	4,733.0	1410	0.0	41.3	47.91546630	-103.36492585	2378.107						
1420	WELD	4,774.3	1420	0.0	41.4	47.91537045	-103.36501532	2377.915						
1430	WELD	4,815.7	1430	0.0	41.3	47.91527448	-103.36510398	2377.047						
1440	WELD	4,857.0	1440	0.0	41.4	47.91517854	-103.36519271	2376.367						
1450	WELD	4,898.4	1450	0.0	41.3	47.91508286	-103.36528218	2375.279						
1460	WELD	4,939.7	1460	0.0	41.3	47.91498699	-103.36537092	2373.915						
1470	WELD	4,980.9	1470	0.0	41.3	47.91489101	-103.36545944	2373.537						
1480	WELD	5,022.2	1480	0.0	41.3	47.91479522	-103.36554871	2374.662						
1490	WELD	5,063.5	1490	0.0	41.3	47.91469993	-103.36563800	2377.626						
1500	WELD	5,104.8	1500	0.0	41.2	47.91460443	-103.36572729	2380.152						
1510	WELD	5,146.0	1510	0.0	41.3	47.91450800	-103.36581428	2381.240						
1520	WELD	5,187.3	1520	0.0	41.2	47.91441097	-103.36590044	2380.272						
1530	WELD	5,228.5	1530	0.0	41.3	47.91431469	-103.36598730	2377.118						
1540	WELD	5,269.8	1540	0.0	41.3	47.91421897	-103.36607590	2373.597						
1550	WELD	5,311.1	1550	0.0	41.3	47.91412374	-103.36616542	2370.021						
1560	WELD	5,352.4	1560	0.0	41.3	47.91402869	-103.36625528	2366.459						
1570	WELD	5,393.7	1570	0.0	41.4	47.91393345	-103.36634477	2363.201						
1580	WELD	5,435.0	1580	0.0	41.3	47.91383816	-103.36643350	2360.081						
1590	WELD	5,476.3	1590	0.0	41.3	47.91374255	-103.36652208	2357.821						
1600	WELD	5,517.6	1600	0.0	41.3	47.91364664	-103.36661094	2357.311						
1610	WELD	5,558.9	1610	0.0	41.2	47.91355146	-103.36670144	2358.462						
1620	WELD	5,600.1	1620	0.0	41.3	47.91345701	-103.36679342	2360.097						
1630	WELD	5,641.4	1630	0.0	41.2	47.91336149	-103.36688353	2361.278						
1640	WELD	5,682.6	1640	0.0	41.3	47.91326412	-103.36696856	2361.040						
1650	WELD	5,723.9	1650	0.0	41.3	47.91316506	-103.36704958	2360.196						
1660	WELD	5,765.1	1660	0.0	41.3	47.91306483	-103.36712675	2360.085						
1670	WELD	5,806.4	1670	0.0	41.2	47.91296340	-103.36720084	2361.303						
1680	WELD	5,847.6	1680	0.0	41.1	47.91285863	-103.36726169	2363.612						
1690	WELD	5,888.6	1690	0.0	41.3	47.91275023	-103.36730775	2365.292						
1700	WELD	5,929.9	1700	0.0	41.4	47.91264045	-103.36734670	2365.390						
1710	WELD	5,971.3	1710	0.0	41.4	47.91252905	-103.36737415	2364.996						
1720	WELD	6,012.7	1720	0.0	41.3	47.91241660	-103.36739154	2364.824						
1730	WELD	6,054.0	1730	0.0	41.4	47.91230397	-103.36740345	2364.686						
1740	WELD	6,095.4	1740	0.0	41.3	47.91219089	-103.36740985	2364.429						
1750	WELD	6,136.7	1750	0.0	41.3	47.91207791	-103.36741290	2365.127						



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10000014	AGM 010, Sta. 64+94, ROW -- Survey Point	6,155.0	1750	18.3	23.0	47.91202824	-103.36741350	2365.795						
1760	WELD	6,178.0	1760	0.0	41.3	47.91196497	-103.36741370	2366.277						
1770	WELD	6,219.3	1770	0.0	41.3	47.91185218	-103.36741339	2366.904						
1780	WELD	6,260.5	1780	0.0	41.2	47.91173966	-103.36741178	2366.402						
1790	WELD	6,301.7	1790	0.0	41.3	47.91162683	-103.36740980	2366.706						
1800	WELD	6,343.0	1800	0.0	41.3	47.91151399	-103.36740930	2367.333						
1810	WELD	6,384.3	1810	0.0	41.3	47.91140100	-103.36741209	2367.987						
1820	WELD	6,425.6	1820	0.0	41.2	47.91128807	-103.36741610	2367.978						
1830	WELD	6,466.8	1830	0.0	41.3	47.91117550	-103.36741716	2364.083						
1840	WELD	6,508.1	1840	0.0	41.3	47.91106301	-103.36741850	2359.759						
1850	WELD	6,549.3	1850	0.0	41.4	47.91095017	-103.36741960	2357.678						
1860	WELD	6,590.7	1860	0.0	41.3	47.91083715	-103.36741900	2357.568						
1870	WELD	6,632.0	1870	0.0	32.9	47.91072418	-103.36742072	2359.296						
1880	WELD	6,664.9	1880	0.0	9.1	47.91063437	-103.36742340	2359.247						
1890	WELD	6,674.0	1890	0.0	40.7	47.91060970	-103.36742330	2358.983						
1900	WELD	6,714.7	1900	0.0	41.3	47.91049880	-103.36742132	2355.950						
1910	WELD	6,756.0	1910	0.0	41.2	47.91038608	-103.36741990	2353.071						
1920	WELD	6,797.2	1920	0.0	41.3	47.91027307	-103.36742050	2352.562						
1930	WELD	6,838.5	1930	0.0	41.3	47.91016025	-103.36742240	2352.753						
1940	WELD	6,879.7	1940	0.0	41.3	47.91004734	-103.36742629	2353.425						
1950	WELD	6,921.0	1950	0.0	41.3	47.90993454	-103.36743030	2354.930						
1960	WELD	6,962.3	1960	0.0	41.1	47.90982158	-103.36742980	2355.720						
1970	WELD	7,003.4	1970	0.0	41.0	47.90970939	-103.36743089	2355.044						
1980	WELD	7,044.4	1980	0.0	41.3	47.90959783	-103.36744295	2351.310						
1990	WELD	7,085.7	1990	0.0	36.9	47.90948699	-103.36747375	2350.102						
2000	WELD	7,122.6	2000	0.0	37.2	47.90938923	-103.36750947	2349.745						
2010	WELD	7,159.8	2010	0.0	41.3	47.90929102	-103.36754697	2347.396						
2020	WELD	7,201.1	2020	0.0	41.3	47.90918054	-103.36757465	2344.068						
2030	WELD	7,242.5	2030	0.0	41.4	47.90906894	-103.36759108	2340.095						
2040	WELD	7,283.8	2040	0.0	41.3	47.90895723	-103.36760454	2335.002						
2050	WELD	7,325.1	2050	0.0	41.3	47.90884543	-103.36761558	2330.330						
2060	WELD	7,366.4	2060	0.0	41.3	47.90873350	-103.36762466	2325.776						
2070	WELD	7,407.6	2070	0.0	41.2	47.90862170	-103.36763500	2320.680						
2080	WELD	7,448.8	2080	0.0	41.3	47.90851013	-103.36764640	2315.234						
2090	WELD	7,490.1	2090	0.0	41.3	47.90839911	-103.36765845	2308.598						
2100	WELD	7,531.4	2100	0.0	41.3	47.90828801	-103.36767027	2301.899						



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2110	WELD	7,572.7	2110	0.0	41.2	47.90817685	-103.36768037	2296.027						
2120	WELD	7,613.9	2120	0.0	41.3	47.90806418	-103.36768710	2296.041						
2130	WELD	7,655.2	2130	0.0	41.3	47.90795173	-103.36769391	2299.708						
2140	WELD	7,696.5	2140	0.0	41.2	47.90783963	-103.36770220	2304.024						
2150	WELD	7,737.7	2150	0.0	41.3	47.90772742	-103.36771181	2307.227						
2160	WELD	7,779.0	2160	0.0	41.3	47.90761494	-103.36772147	2309.393						
2170	WELD	7,820.3	2170	0.0	41.3	47.90750250	-103.36773173	2310.768						
2180	WELD	7,861.6	2180	0.0	41.2	47.90738989	-103.36774262	2311.446						
2190	WELD	7,902.8	2190	0.0	41.3	47.90727737	-103.36775418	2311.853						
2200	WELD	7,944.1	2200	0.0	41.3	47.90716499	-103.36776651	2313.119						
2210	WELD	7,985.3	2210	0.0	41.2	47.90705337	-103.36778110	2317.462						
2220	WELD	8,026.5	2220	0.0	39.0	47.90694234	-103.36779806	2321.430						
2230	WELD	8,065.5	2230	0.0	39.3	47.90683633	-103.36781393	2324.139						
2240	WELD	8,104.8	2240	0.0	40.9	47.90672965	-103.36782657	2323.213						
2250	WELD	8,145.7	2250	0.0	41.2	47.90662020	-103.36784146	2315.810						
2260	WELD	8,187.0	2260	0.0	41.3	47.90651051	-103.36786286	2307.709						
2270	WELD	8,228.3	2270	0.0	41.3	47.90640011	-103.36788563	2301.299						
2280	WELD	8,269.6	2280	0.0	41.3	47.90628907	-103.36790955	2299.146						
2290	WELD	8,310.8	2290	0.0	41.2	47.90617753	-103.36793277	2301.292						
2300	WELD	8,352.1	2300	0.0	41.4	47.90606579	-103.36795435	2303.381						
2310	WELD	8,393.4	2310	0.0	41.3	47.90595411	-103.36797570	2306.198						
2320	WELD	8,434.7	2320	0.0	41.3	47.90584297	-103.36799565	2310.373						
2330	WELD	8,476.0	2330	0.0	41.4	47.90573214	-103.36801684	2316.027						
2340	WELD	8,517.4	2340	0.0	41.4	47.90562175	-103.36803796	2323.166						
2350	WELD	8,558.8	2350	0.0	41.4	47.90550994	-103.36805356	2327.366						
10000015	Bend left-down - 10 deg., 52D	8,585.9	2350	22.1	19.4	47.90543633	-103.36805370	2326.839	0	12:00				
2360	WELD	8,600.2	2360	0.0	41.3	47.90539838	-103.36804632	2324.387						
2370	WELD	8,641.5	2370	0.0	41.2	47.90528807	-103.36802284	2317.342						
2380	WELD	8,682.7	2380	0.0	41.2	47.90517699	-103.36800667	2311.166						
2390	WELD	8,723.9	2390	0.0	41.3	47.90506516	-103.36799352	2306.609						
2400	WELD	8,765.2	2400	0.0	41.3	47.90495334	-103.36797772	2302.877						
2410	WELD	8,806.5	2410	0.0	41.3	47.90484122	-103.36796126	2299.859						
2420	WELD	8,847.8	2420	0.0	41.3	47.90472909	-103.36794535	2297.564						
2430	WELD	8,889.0	2430	0.0	41.3	47.90461684	-103.36792959	2295.673						
2440	WELD	8,930.4	2440	0.0	41.3	47.90450441	-103.36791431	2294.529						
2450	WELD	8,971.6	2450	0.0	41.2	47.90439190	-103.36789880	2293.646						



Pipeline Listing

TDW Services, Inc.

Hiland Crude, LLC

East Camp Creek Loop Launch to Receive

ID#	Description	Distance (ft)	Joint #	U/S Weld	D/S Weld	Latitude	Longitude	Altitude	Orientation (Deg / O'Clock)	Depth (%)	Length or WT	Width or YS	P' or SF	(P'/P)
2460	WELD	9,012.8	2460	0.0	41.3	47.90427956	-103.36788400	2292.792						
2470	WELD	9,054.1	2470	0.0	41.2	47.90416709	-103.36786937	2292.076						
2480	WELD	9,095.3	2480	0.0	41.3	47.90405475	-103.36785319	2291.221						
2490	WELD	9,136.6	2490	0.0	41.4	47.90394226	-103.36783791	2290.801						
2500	WELD	9,178.0	2500	0.0	41.4	47.90382954	-103.36782660	2290.156						
2510	WELD	9,219.3	2510	0.0	41.3	47.90371670	-103.36781552	2289.487						
2520	WELD	9,260.7	2520	0.0	39.6	47.90360373	-103.36781964	2289.057						
2530	WELD	9,300.2	2530	0.0	40.7	47.90349634	-103.36784038	2288.832						
2540	WELD	9,341.0	2540	0.0	41.0	47.90338675	-103.36787129	2288.875						
2550	WELD	9,382.0	2550	0.0	41.3	47.90327864	-103.36791561	2288.563						
2560	WELD	9,423.2	2560	0.0	41.3	47.90317070	-103.36796487	2288.899						
2570	WELD	9,464.5	2570	0.0	41.3	47.90306300	-103.36801626	2288.503						
2580	WELD	9,505.7	2580	0.0	41.3	47.90295573	-103.36806874	2288.757						
2590	WELD	9,547.0	2590	0.0	41.3	47.90284840	-103.36812135	2288.947						
2600	WELD	9,588.3	2600	0.0	41.3	47.90274127	-103.36817398	2289.459						
2610	WELD	9,629.6	2610	0.0	41.3	47.90263375	-103.36822614	2290.162						
2620	WELD	9,670.9	2620	0.0	41.2	47.90252631	-103.36827651	2290.601						
2630	WELD	9,712.1	2630	0.0	41.3	47.90241821	-103.36832424	2291.311						
2640	WELD	9,753.4	2640	0.0	41.2	47.90231052	-103.36837308	2292.431						
2650	WELD	9,794.6	2650	0.0	41.2	47.90220345	-103.36842590	2291.549						
2660	WELD	9,835.8	2660	0.0	40.4	47.90209607	-103.36847703	2290.583						
2670	WELD	9,876.3	2670	0.0	41.3	47.90199114	-103.36852839	2289.830						
2680	WELD	9,917.6	2680	0.0	37.3	47.90188418	-103.36858215	2289.631						
2690	WELD	9,954.9	2690	0.0	5.0	47.90178837	-103.36863291	2290.544						
2700	WELD	9,959.9	2700	0.0	2.0	47.90177549	-103.36864025	2290.732						
10000016	Bend right - 55 deg., 3D	9,960.9	2700	0.1	1.8	47.90177346	-103.36864266	2290.750	0	12:00				
2710	WELD	9,961.9	2710	0.0	2.9	47.90177229	-103.36864611	2290.771						
2720	WELD	9,964.8	2720	0.0	3.1	47.90177059	-103.36865766	2290.817						
2730	WELD	9,967.9	2730	0.0	3.5	47.90176863	-103.36867266	2290.877						
2740	WELD	9,971.4	2740	0.0	36.6	47.90176680	-103.36868668	2290.917						
2750	WELD	10,008.1	2750	0.0	41.4	47.90174690	-103.36883229	2292.258						
2760	WELD	10,049.4	2760	0.0	41.4	47.90172173	-103.36899520	2295.040						
10000017	AGM 020, Sta. 104+00, ROW -- Han #8802	10,071.2	2760	21.8	19.6	47.90170737	-103.36908097	2295.840						
2770	WELD	10,090.8	2770	0.0	41.3	47.90169450	-103.36915810	2295.730						
2780	WELD	10,132.1	2780	0.0	41.3	47.90166768	-103.36932118	2293.900						
2790	WELD	10,173.4	2790	0.0	41.3	47.90164235	-103.36948432	2291.124						



Pipeline Listing

TDW Services, Inc.

Hiland Crude, LLC

East Camp Creek Loop Launch to Receive

ID#	Description	Distance (ft)	Joint #	U/S Weld	D/S Weld	Latitude	Longitude	Altitude	Orientation (Deg / O'Clock)	Depth (%)	Length or WT	Width or YS	P' or SF	(P'/P)
2800	WELD	10,214.7	2800	0.0	41.2	47.90161664	-103.36964760	2288.326						
2810	WELD	10,255.9	2810	0.0	41.3	47.90159075	-103.36981105	2286.298						
2820	WELD	10,297.1	2820	0.0	41.3	47.90156453	-103.36997425	2283.913						
2830	WELD	10,338.4	2830	0.0	41.3	47.90153750	-103.37013689	2281.714						
2840	WELD	10,379.7	2840	0.0	41.2	47.90151346	-103.37030033	2279.423						
2850	WELD	10,420.9	2850	0.0	41.3	47.90148699	-103.37046300	2276.511						
2860	WELD	10,462.3	2860	0.0	41.3	47.90146003	-103.37062580	2275.290						
2870	WELD	10,503.5	2870	0.0	41.3	47.90143323	-103.37078847	2273.315						
2880	WELD	10,544.8	2880	0.0	41.3	47.90140622	-103.37095109	2270.812						
2890	WELD	10,586.1	2890	0.0	41.3	47.90137921	-103.37111408	2268.830						
2900	WELD	10,627.4	2900	0.0	41.2	47.90135228	-103.37127707	2267.034						
2910	WELD	10,668.6	2910	0.0	41.3	47.90132496	-103.37143948	2264.575						
2920	WELD	10,709.9	2920	0.0	41.3	47.90129771	-103.37160193	2263.998						
2930	WELD	10,751.2	2930	0.0	41.3	47.90127179	-103.37176468	2267.016						
2940	WELD	10,792.5	2940	0.0	40.4	47.90124704	-103.37192840	2269.364						
2950	WELD	10,832.9	2950	0.0	39.5	47.90122369	-103.37208797	2271.687						
2960	WELD	10,872.4	2960	0.0	41.3	47.90120055	-103.37224425	2274.039						
2970	WELD	10,913.8	2970	0.0	39.2	47.90117559	-103.37240750	2277.818						
2980	WELD	10,953.0	2980	0.0	41.1	47.90115097	-103.37256068	2283.094						
2990	WELD	10,994.1	2990	0.0	41.3	47.90112330	-103.37272025	2289.669						
3000	WELD	11,035.4	3000	0.0	41.3	47.90109401	-103.37287963	2296.892						
3010	WELD	11,076.7	3010	0.0	41.3	47.90106436	-103.37303653	2306.860						
3020	WELD	11,117.9	3020	0.0	39.5	47.90103734	-103.37319397	2317.227						
3030	WELD	11,157.4	3030	0.0	41.3	47.90102512	-103.37335154	2321.879						
3040	WELD	11,198.7	3040	0.0	41.3	47.90101750	-103.37351943	2321.874						
3050	WELD	11,240.0	3050	0.0	41.3	47.90101321	-103.37368677	2319.103						
3060	WELD	11,281.3	3060	0.0	41.3	47.90101139	-103.37385353	2314.487						
3070	WELD	11,322.5	3070	0.0	41.3	47.90101144	-103.37402087	2310.754						
3080	WELD	11,363.8	3080	0.0	41.3	47.90101261	-103.37418807	2307.599						
3090	WELD	11,405.1	3090	0.0	41.3	47.90101458	-103.37435576	2304.376						
3100	WELD	11,446.4	3100	0.0	41.2	47.90101706	-103.37452260	2301.208						
3110	WELD	11,487.6	3110	0.0	41.2	47.90101943	-103.37468979	2298.327						
3120	WELD	11,528.8	3120	0.0	41.3	47.90102223	-103.37485680	2295.761						
3130	WELD	11,570.1	3130	0.0	41.3	47.90102445	-103.37502426	2292.839						
3140	WELD	11,611.4	3140	0.0	41.3	47.90102609	-103.37519205	2290.706						
3150	WELD	11,652.7	3150	0.0	45.2	47.90102775	-103.37535975	2288.794						
3160	WELD	11,698.0	3160	0.0	41.3	47.90102975	-103.37554316	2286.015						



Pipeline Listing

TDW Services, Inc.

Hiland Crude, LLC

East Camp Creek Loop Launch to Receive

ID#	Description	Distance (ft)	Joint #	U/S Weld	D/S Weld	Latitude	Longitude	Altitude	Orientation (Deg / O'Clock)	Depth (%)	Length or WT	Width or YS	P' or SF	(P'/P)
3170	WELD	11,739.3	3170	0.0	41.3	47.90103091	-103.37571054	2282.857						
3180	WELD	11,780.5	3180	0.0	41.3	47.90103228	-103.37587777	2279.738						
3190	WELD	11,821.8	3190	0.0	31.3	47.90103493	-103.37604522	2276.527						
20000000	Seam Variation	11,845.4	3190	23.6	7.8	47.90103633	-103.37614102	2274.700	293	9:45	-	0.71	0.61	
3200	WELD	11,853.2	3200	0.0	34.0	47.90103674	-103.37617242	2274.153						
3210	WELD	11,887.2	3210	0.0	33.8	47.90103855	-103.37631044	2271.132						
3220	WELD	11,921.0	3220	0.0	41.1	47.90104075	-103.37644776	2268.243						
3230	WELD	11,962.1	3230	0.0	38.0	47.90104421	-103.37661459	2265.062						
20000001	Seam Variation	11,983.7	3230	21.5	16.5	47.90104656	-103.37670193	2263.651	276	9:00	-	0.59	0.51	
3240	WELD	12,000.1	3240	0.0	27.0	47.90104857	-103.37676867	2262.840						
3250	WELD	12,027.2	3250	0.0	43.7	47.90105241	-103.37687854	2262.018						
3260	WELD	12,070.8	3260	0.0	33.7	47.90105686	-103.37705597	2259.544						
3270	WELD	12,104.6	3270	0.0	35.4	47.90106020	-103.37719311	2257.630						
3280	WELD	12,140.0	3280	0.0	39.3	47.90106280	-103.37733708	2255.956						
3290	WELD	12,179.2	3290	0.0	33.1	47.90106541	-103.37749701	2253.669						
3300	WELD	12,212.4	3300	0.0	39.4	47.90106698	-103.37763198	2252.403						
3310	WELD	12,251.8	3310	0.0	30.8	47.90106848	-103.37779272	2251.527						
20000002	Seam Variation	12,270.2	3310	18.3	12.5	47.90106975	-103.37786748	2251.013	311	10:15	-	0.35	0.37	
3320	WELD	12,282.6	3320	0.0	27.4	47.90107098	-103.37791824	2250.149						
3330	WELD	12,310.0	3330	0.0	30.2	47.90107409	-103.37802827	2245.860						
3340	WELD	12,340.2	3340	0.0	29.7	47.90107803	-103.37814870	2239.937						
3350	WELD	12,369.9	3350	0.0	37.7	47.90108200	-103.37826820	2237.071						
3360	WELD	12,407.6	3360	0.0	35.4	47.90108729	-103.37842008	2241.148						
3370	WELD	12,443.0	3370	0.0	37.4	47.90108939	-103.37856225	2245.362						
3380	WELD	12,480.4	3380	0.0	38.8	47.90109033	-103.37871301	2243.469						
3390	WELD	12,519.2	3390	0.0	31.6	47.90109267	-103.37886740	2236.186						
3400	WELD	12,550.7	3400	0.0	31.7	47.90109461	-103.37899340	2230.465						
3410	WELD	12,582.4	3410	0.0	28.1	47.90109683	-103.37912190	2227.646						
3420	WELD	12,610.5	3420	0.0	28.1	47.90109976	-103.37923602	2227.067						
3430	WELD	12,638.6	3430	0.0	29.3	47.90110299	-103.37935014	2228.834						
3440	WELD	12,668.0	3440	0.0	27.8	47.90110475	-103.37946924	2231.038						
3450	WELD	12,695.8	3450	0.0	32.6	47.90110688	-103.37958258	2231.456						
3460	WELD	12,728.4	3460	0.0	35.8	47.90111028	-103.37971515	2231.338						
3470	WELD	12,764.1	3470	0.0	29.7	47.90111528	-103.37986085	2231.369						
3480	WELD	12,793.8	3480	0.0	28.4	47.90111644	-103.37998191	2233.113						
3490	WELD	12,822.2	3490	0.0	35.6	47.90111165	-103.38009630	2235.189						
3500	WELD	12,857.8	3500	0.0	28.0	47.90109717	-103.38023922	2235.820						



Pipeline Listing

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East Camp Creek Loop Launch to Receive

ID#	Description	Distance (ft)	Joint #	U/S Weld	D/S Weld	Latitude	Longitude	Altitude	Orientation (Deg / O'Clock)	Depth (%)	Length or WT	Width or YS	P' or SF	(P'/P)
3510	WELD	12,885.8	3510	0.0	27.6	47.90108199	-103.38035054	2236.664						
3520	WELD	12,913.4	3520	0.0	38.0	47.90106601	-103.38046022	2236.647						
3530	WELD	12,951.4	3530	0.0	29.6	47.90104324	-103.38061097	2236.902						
3540	WELD	12,981.0	3540	0.0	39.8	47.90102552	-103.38072846	2237.449						
3550	WELD	13,020.8	3550	0.0	38.7	47.90100243	-103.38088643	2237.592						
3560	WELD	13,059.4	3560	0.0	40.8	47.90098191	-103.38104059	2237.294						
3570	WELD	13,100.2	3570	0.0	40.4	47.90096148	-103.38120378	2238.460						
3580	WELD	13,140.6	3580	0.0	32.5	47.90093859	-103.38136458	2238.676						
3590	WELD	13,173.1	3590	0.0	32.2	47.90092003	-103.38149370	2238.278						
3600	WELD	13,205.4	3600	0.0	28.8	47.90090222	-103.38162204	2237.949						
3610	WELD	13,234.2	3610	0.0	27.4	47.90088673	-103.38173679	2237.420						
3620	WELD	13,261.6	3620	0.0	31.3	47.90087188	-103.38184629	2236.935						
3630	WELD	13,292.8	3630	0.0	31.2	47.90085415	-103.38197069	2236.364						
3640	WELD	13,324.0	3640	0.0	29.1	47.90083596	-103.38209446	2235.981						
3650	WELD	13,353.2	3650	0.0	39.5	47.90081832	-103.38221023	2235.732						
3660	WELD	13,392.7	3660	0.0	28.6	47.90079362	-103.38236654	2235.541						
3670	WELD	13,421.3	3670	0.0	27.2	47.90077742	-103.38248021	2235.389						
3680	WELD	13,448.5	3680	0.0	37.9	47.90076368	-103.38258887	2235.594						
3690	WELD	13,486.3	3690	0.0	33.6	47.90074561	-103.38274081	2236.588						
3700	WELD	13,520.0	3700	0.0	35.3	47.90072882	-103.38287583	2237.682						
3710	WELD	13,555.2	3710	0.0	29.5	47.90070996	-103.38301653	2239.087						
3720	WELD	13,584.7	3720	0.0	29.4	47.90069293	-103.38313406	2240.569						
3730	WELD	13,614.2	3730	0.0	39.8	47.90067597	-103.38325102	2241.560						
3740	WELD	13,654.0	3740	0.0	37.2	47.90065331	-103.38340955	2242.715						
3750	WELD	13,691.1	3750	0.0	31.0	47.90063245	-103.38355794	2243.468						
3760	WELD	13,722.2	3760	0.0	33.8	47.90061568	-103.38368186	2244.051						
3770	WELD	13,756.0	3770	0.0	38.4	47.90059730	-103.38381683	2244.129						
3780	WELD	13,794.3	3780	0.0	36.2	47.90057608	-103.38396982	2244.383						
3790	WELD	13,830.5	3790	0.0	32.1	47.90055604	-103.38411449	2245.465						
3800	WELD	13,862.6	3800	0.0	38.4	47.90053659	-103.38424212	2245.344						
3810	WELD	13,901.0	3810	0.0	32.7	47.90051264	-103.38439443	2245.303						
3820	WELD	13,933.7	3820	0.0	28.5	47.90049346	-103.38452414	2245.485						
3830	WELD	13,962.2	3830	0.0	29.3	47.90047766	-103.38463774	2246.256						
3840	WELD	13,991.4	3840	0.0	32.3	47.90046335	-103.38475460	2246.699						
3850	WELD	14,023.7	3850	0.0	36.4	47.90044897	-103.38488422	2246.834						
3860	WELD	14,060.1	3860	0.0	28.2	47.90043174	-103.38502997	2247.312						
3870	WELD	14,088.3	3870	0.0	36.7	47.90041434	-103.38514142	2247.786						



Pipeline Listing

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East Camp Creek Loop Launch to Receive

ID#	Description	Distance (ft)	Joint #	U/S Weld	D/S Weld	Latitude	Longitude	Altitude	Orientation (Deg / O'Clock)	Depth (%)	Length or WT	Width or YS	P' or SF	(P'/P)
3880	WELD	14,125.0	3880	0.0	41.2	47.90038500	-103.38528405	2248.492						
3890	WELD	14,166.2	3890	0.0	32.3	47.90034252	-103.38543894	2249.123						
3900	WELD	14,198.6	3900	0.0	30.2	47.90030602	-103.38555841	2250.251						
3910	WELD	14,228.8	3910	0.0	42.8	47.90027084	-103.38566964	2252.038						
3920	WELD	14,271.6	3920	0.0	27.5	47.90022084	-103.38582724	2254.254						
20000003	Mill Anomaly	14,277.5	3920	5.9	21.6	47.90021383	-103.38584891	2254.584	203	6:45	-	0.47	0.53	
3930	WELD	14,299.2	3930	0.0	35.5	47.90018842	-103.38592828	2256.366						
3940	WELD	14,334.6	3940	0.0	43.5	47.90014618	-103.38605775	2259.978						
3950	WELD	14,378.1	3950	0.0	31.6	47.90009185	-103.38621464	2263.863						
3960	WELD	14,409.7	3960	0.0	38.2	47.90005091	-103.38632722	2266.411						
3970	WELD	14,447.9	3970	0.0	27.4	47.89999999	-103.38646290	2268.493						
3980	WELD	14,475.3	3980	0.0	29.0	47.89996239	-103.38655947	2268.556						
3990	WELD	14,504.3	3990	0.0	37.5	47.89992238	-103.38666167	2268.752						
4000	WELD	14,541.8	4000	0.0	32.8	47.89987091	-103.38679406	2269.487						
4010	WELD	14,574.6	4010	0.0	29.1	47.89982687	-103.38691008	2270.275						
4020	WELD	14,603.7	4020	0.0	32.2	47.89978762	-103.38701290	2270.535						
4030	WELD	14,636.0	4030	0.0	39.3	47.89974319	-103.38712620	2270.614						
4040	WELD	14,675.3	4040	0.0	30.4	47.89968881	-103.38726437	2270.012						
4050	WELD	14,705.6	4050	0.0	29.2	47.89964662	-103.38737134	2269.559						
4060	WELD	14,734.9	4060	0.0	30.5	47.89960561	-103.38747386	2268.946						
4070	WELD	14,765.3	4070	0.0	35.4	47.89956303	-103.38758054	2268.445						
4080	WELD	14,800.7	4080	0.0	39.3	47.89951363	-103.38770468	2267.251						
4090	WELD	14,840.0	4090	0.0	41.4	47.89945909	-103.38784241	2265.856						
4100	WELD	14,881.4	4100	0.0	36.2	47.89940244	-103.38798833	2263.487						
4110	WELD	14,917.7	4110	0.0	19.2	47.89935360	-103.38811652	2261.601						
4120	WELD	14,936.9	4120	0.0	41.2	47.89932753	-103.38818446	2260.548						
4130	WELD	14,978.1	4130	0.0	34.7	47.89927146	-103.38833027	2259.832						
4140	WELD	15,012.8	4140	0.0	40.9	47.89922349	-103.38845214	2260.522						
4150	WELD	15,053.7	4150	0.0	41.1	47.89916594	-103.38859481	2261.503						
4160	WELD	15,094.8	4160	0.0	41.2	47.89910838	-103.38873849	2263.167						
4170	WELD	15,136.0	4170	0.0	41.4	47.89905261	-103.38888389	2263.821						
4180	WELD	15,177.3	4180	0.0	41.2	47.89899513	-103.38902799	2265.770						
4190	WELD	15,218.5	4190	0.0	41.3	47.89893042	-103.38916436	2265.618						
4200	WELD	15,259.7	4200	0.0	41.3	47.89885729	-103.38928984	2261.410						
4210	WELD	15,301.1	4210	0.0	41.2	47.89878062	-103.38941035	2255.525						
4220	WELD	15,342.3	4220	0.0	41.4	47.89870305	-103.38952945	2249.848						
4230	WELD	15,383.7	4230	0.0	41.1	47.89862454	-103.38964900	2245.083						



Pipeline Listing

TDW Services, Inc.

Hiland Crude, LLC

East Camp Creek Loop Launch to Receive

ID#	Description	Distance (ft)	Joint #	U/S Weld	D/S Weld	Latitude	Longitude	Altitude	Orientation (Deg / O'Clock)	Depth (%)	Length or WT	Width or YS	P' or SF	(P'/P)
4240	WELD	15,424.8	4240	0.0	41.1	47.89854551	-103.38976701	2241.117						
4250	WELD	15,465.9	4250	0.0	41.2	47.89846503	-103.38988325	2238.463						
4260	WELD	15,507.0	4260	0.0	41.1	47.89838400	-103.38999945	2238.044						
4270	WELD	15,548.2	4270	0.0	41.3	47.89830633	-103.39012030	2238.225						
4280	WELD	15,589.4	4280	0.0	6.5	47.89824874	-103.39026346	2237.629						
11000002	WT CHANGE	15,595.8	4280	0.0	0.1	47.89824106	-103.39028690	2237.644			0.322	52000	0.72	
4290	WELD	15,595.9	4290	0.0	39.0	47.89824097	-103.39028718	2237.644						
4300	WELD	15,634.9	4300	0.0	42.2	47.89819380	-103.39042911	2235.605						
4310	WELD	15,677.1	4310	0.0	42.2	47.89814071	-103.39058063	2233.418						
4320	WELD	15,719.2	4320	0.0	42.2	47.89809127	-103.39073558	2232.717						
4330	WELD	15,761.4	4330	0.0	42.1	47.89804633	-103.39089343	2233.107						
4340	WELD	15,803.5	4340	0.0	42.2	47.89800415	-103.39105284	2232.718						
4350	WELD	15,845.7	4350	0.0	14.1	47.89796265	-103.39121258	2231.305						
10000018	AGM 030, Sta. 161+50, CR 31 -- Han #100	15,847.3	4350	1.6	12.5	47.89796112	-103.39121873	2231.241						
11000003	WT CHANGE	15,859.7	4350	0.0	0.1	47.89794930	-103.39126612	2230.960			0.188	52000	0.72	
4360	WELD	15,859.8	4360	0.0	44.5	47.89794920	-103.39126649	2230.958						
4370	WELD	15,904.3	4370	0.0	37.8	47.89790481	-103.39143538	2229.860						
4380	WELD	15,942.1	4380	0.0	39.1	47.89786613	-103.39157795	2228.796						
4390	WELD	15,981.2	4390	0.0	28.5	47.89782421	-103.39172440	2226.788						
4400	WELD	16,009.7	4400	0.0	33.3	47.89779258	-103.39183015	2225.383						
4410	WELD	16,043.0	4410	0.0	36.9	47.89775396	-103.39195280	2224.591						
40000000	Metal Loss - INTERNAL	16,045.9	4410	2.9	34.0	47.89775052	-103.39196345	2224.533	298	9:45	11%	0.25	0.33	1760 100%
4420	WELD	16,079.9	4420	0.0	30.6	47.89771074	-103.39208836	2223.010						
4430	WELD	16,110.4	4430	0.0	28.5	47.89767507	-103.39220010	2221.416						
4440	WELD	16,139.0	4440	0.0	35.4	47.89764066	-103.39230417	2220.644						
4450	WELD	16,174.4	4450	0.0	35.3	47.89759883	-103.39243378	2218.313						
4460	WELD	16,209.7	4460	0.0	36.1	47.89755793	-103.39256362	2216.153						
4470	WELD	16,245.8	4470	0.0	36.5	47.89751690	-103.39269703	2214.161						
4480	WELD	16,282.3	4480	0.0	37.3	47.89747521	-103.39283199	2213.231						
4490	WELD	16,319.6	4490	0.0	29.4	47.89743310	-103.39296977	2211.941						
4500	WELD	16,349.0	4500	0.0	33.9	47.89740017	-103.39307918	2210.810						
4510	WELD	16,382.9	4510	0.0	37.2	47.89736281	-103.39320554	2209.336						
4520	WELD	16,420.2	4520	0.0	29.0	47.89732183	-103.39334407	2207.736						
4530	WELD	16,449.1	4530	0.0	36.4	47.89728965	-103.39345162	2207.111						
4540	WELD	16,485.5	4540	0.0	41.3	47.89724940	-103.39358739	2206.377						
4550	WELD	16,526.8	4550	0.0	38.2	47.89720246	-103.39374029	2207.377						



Pipeline Listing

TDW Services, Inc.

Hiland Crude, LLC

East Camp Creek Loop Launch to Receive

ID#	Description	Distance (ft)	Joint #	U/S Weld	D/S Weld	Latitude	Longitude	Altitude	Orientation (Deg / O'Clock)	Depth (%)	Length or WT	Width or YS	P' or SF	(P'/P)
20000005	Seam Variation	16,552.3	4550	25.5	12.7	47.89717289	-103.39383432	2208.524	80 2:30	-	0.59	0.52		
20000006	Seam Variation	16,558.7	4550	31.9	6.3	47.89716542	-103.39385804	2208.692	76 2:30	-	0.82	0.59		
20000007	Seam Variation	16,563.6	4550	36.8	1.4	47.89715978	-103.39387598	2208.780	73 2:15	-	0.71	0.51		
	4560 WELD	16,565.0	4560	0.0	37.1	47.89715815	-103.39388117	2208.802						
	4570 WELD	16,602.1	4570	0.0	30.6	47.89711510	-103.39401811	2209.108						
	4580 WELD	16,632.7	4580	0.0	31.5	47.89708035	-103.39413113	2209.585						
20000008	Seam Variation	16,661.5	4580	28.7	2.7	47.89704755	-103.39423761	2210.309	194 6:15	-	0.59	0.44		
	4590 WELD	16,664.1	4590	0.0	28.6	47.89704455	-103.39424769	2210.341						
	4600 WELD	16,692.7	4600	0.0	36.5	47.89701294	-103.39435415	2210.330						
	4610 WELD	16,729.3	4610	0.0	28.4	47.89697208	-103.39448994	2210.238						
	4620 WELD	16,757.6	4620	0.0	28.3	47.89693974	-103.39459476	2210.490						
	4630 WELD	16,786.0	4630	0.0	37.0	47.89690673	-103.39469931	2211.057						
	4640 WELD	16,823.0	4640	0.0	39.5	47.89686366	-103.39483490	2212.120						
	4650 WELD	16,862.4	4650	0.0	32.9	47.89681745	-103.39497972	2213.287						
	4660 WELD	16,895.3	4660	0.0	38.0	47.89677927	-103.39510066	2214.118						
	4670 WELD	16,933.4	4670	0.0	32.0	47.89673570	-103.39524090	2215.463						
	4680 WELD	16,965.4	4680	0.0	27.8	47.89669946	-103.39535907	2217.093						
	4690 WELD	16,993.1	4690	0.0	41.1	47.89666796	-103.39546175	2218.056						
	4700 WELD	17,034.2	4700	0.0	40.4	47.89662051	-103.39561302	2219.921						
	4710 WELD	17,074.6	4710	0.0	34.0	47.89657430	-103.39576216	2221.621						
	4720 WELD	17,108.6	4720	0.0	34.4	47.89653522	-103.39588765	2223.123						
	4730 WELD	17,143.0	4730	0.0	30.1	47.89649498	-103.39601424	2224.272						
	4740 WELD	17,173.1	4740	0.0	31.2	47.89645910	-103.39612473	2224.941						
	4750 WELD	17,204.2	4750	0.0	34.1	47.89642202	-103.39623905	2225.636						
	4760 WELD	17,238.3	4760	0.0	33.6	47.89638152	-103.39636364	2227.130						
	4770 WELD	17,271.9	4770	0.0	28.1	47.89634161	-103.39648696	2228.494						
	4780 WELD	17,300.0	4780	0.0	29.5	47.89630842	-103.39659006	2229.763						
	4790 WELD	17,329.5	4790	0.0	30.6	47.89627392	-103.39669790	2231.535						
	4800 WELD	17,360.0	4800	0.0	40.7	47.89623776	-103.39680985	2233.799						
	4810 WELD	17,400.7	4810	0.0	32.1	47.89618927	-103.39695830	2236.778						
	4820 WELD	17,432.8	4820	0.0	28.2	47.89615088	-103.39707520	2238.938						
	4830 WELD	17,461.1	4830	0.0	39.9	47.89611712	-103.39717793	2240.520						
20000009	Mill Anomaly	17,487.3	4830	26.2	13.7	47.89608561	-103.39727356	2242.308	237 7:45	-	0.47	0.44		
	4840 WELD	17,500.9	4840	0.0	38.0	47.89606920	-103.39732327	2243.327						
	4850 WELD	17,539.0	4850	0.0	40.6	47.89602343	-103.39746153	2246.101						
	4860 WELD	17,579.6	4860	0.0	33.6	47.89597459	-103.39760916	2249.547						
	4870 WELD	17,613.2	4870	0.0	27.5	47.89593370	-103.39773135	2252.759						



Pipeline Listing

TDW Services, Inc.

Hiland Crude, LLC

East Camp Creek Loop Launch to Receive

ID#	Description	Distance (ft)	Joint #	U/S Weld	D/S Weld	Latitude	Longitude	Altitude	Orientation (Deg / O'Clock)	Depth (%)	Length or WT	Width or YS	P' or SF	(P'/P)
4880	WELD	17,640.7	4880	0.0	38.7	47.89589989	-103.39783076	2255.235						
4890	WELD	17,679.4	4890	0.0	39.3	47.89585147	-103.39797041	2258.526						
4900	WELD	17,718.7	4900	0.0	40.2	47.89580323	-103.39811311	2261.698						
4910	WELD	17,759.0	4910	0.0	32.8	47.89575499	-103.39825918	2266.066						
4920	WELD	17,791.8	4920	0.0	32.3	47.89571516	-103.39837788	2269.795						
20000010	Seam Variation	17,794.6	4920	2.8	29.6	47.89571176	-103.39838797	2270.083	345 11:30	-	0.47	0.36		
20000011	Seam Variation	17,796.6	4920	4.7	27.6	47.89570933	-103.39839506	2270.284	344 11:15	-	0.59	0.46		
4930	WELD	17,824.1	4930	0.0	32.7	47.89567564	-103.39849457	2272.824						
4940	WELD	17,856.8	4940	0.0	31.2	47.89563506	-103.39861306	2275.171						
4950	WELD	17,888.0	4950	0.0	34.6	47.89559641	-103.39872588	2277.471						
4960	WELD	17,922.6	4960	0.0	44.6	47.89555341	-103.39885027	2280.814						
4970	WELD	17,967.2	4970	0.0	35.6	47.89549697	-103.39900987	2284.913						
4980	WELD	18,002.8	4980	0.0	31.7	47.89545014	-103.39913608	2287.873						
4990	WELD	18,034.4	4990	0.0	39.8	47.89540869	-103.39924873	2289.799						
5000	WELD	18,074.3	5000	0.0	33.6	47.89535813	-103.39939187	2291.199						
20000012	Seam Variation	18,087.8	5000	13.5	20.1	47.89534105	-103.39944074	2291.698	277 9:00	-	0.59	0.45		
5010	WELD	18,107.9	5010	0.0	29.5	47.89531572	-103.39951296	2292.903						
5020	WELD	18,137.4	5020	0.0	29.4	47.89527872	-103.39961918	2295.293						
5030	WELD	18,166.8	5030	0.0	41.5	47.89524239	-103.39972462	2299.078						
5040	WELD	18,208.3	5040	0.0	44.5	47.89519249	-103.39987185	2308.006						
20000013	Mill Anomaly	18,218.8	5040	10.5	33.9	47.89517984	-103.39990864	2310.877	248 8:15	-	0.35	0.39		
5050	WELD	18,252.8	5050	0.0	45.6	47.89513888	-103.40002751	2319.627						
5060	WELD	18,298.3	5060	0.0	41.5	47.89508578	-103.40018871	2331.149						
5070	WELD	18,339.9	5070	0.0	30.3	47.89503601	-103.40033876	2336.523						
5080	WELD	18,370.2	5080	0.0	30.2	47.89499722	-103.40044787	2337.125						
5090	WELD	18,400.4	5090	0.0	40.0	47.89495830	-103.40055603	2337.288						
5100	WELD	18,440.4	5100	0.0	31.9	47.89490735	-103.40070002	2337.821						
5110	WELD	18,472.3	5110	0.0	38.2	47.89486730	-103.40081520	2339.074						
5120	WELD	18,510.5	5120	0.0	30.1	47.89481912	-103.40095282	2340.822						
5130	WELD	18,540.6	5130	0.0	41.7	47.89478126	-103.40106120	2341.178						
5140	WELD	18,582.4	5140	0.0	35.6	47.89472859	-103.40121133	2339.180						
5150	WELD	18,618.0	5150	0.0	31.4	47.89468429	-103.40133943	2335.980						
5160	WELD	18,649.4	5160	0.0	26.1	47.89464549	-103.40145255	2332.558						
5170	WELD	18,675.5	5170	0.0	28.0	47.89461327	-103.40154672	2329.895						
5180	WELD	18,703.5	5180	0.0	29.0	47.89457871	-103.40164761	2326.885						
5190	WELD	18,732.5	5190	0.0	29.1	47.89454365	-103.40175239	2322.871						
5200	WELD	18,761.6	5200	0.0	39.7	47.89451137	-103.40185927	2318.445						



Pipeline Listing

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East Camp Creek Loop Launch to Receive

ID#	Description	Distance (ft)	Joint #	U/S Weld	D/S Weld	Latitude	Longitude	Altitude	Orientation (Deg / O'Clock)	Depth (%)	Length or WT	Width or YS	P' or SF	(P'/P)
5210	WELD	18,801.3	5210	0.0	37.6	47.89446980	-103.40200716	2313.494						
5220	WELD	18,838.9	5220	0.0	27.4	47.89443175	-103.40214719	2307.916						
5230	WELD	18,866.2	5230	0.0	30.3	47.89440348	-103.40224870	2303.848						
5240	WELD	18,896.6	5240	0.0	39.3	47.89437192	-103.40236199	2299.876						
5250	WELD	18,935.8	5250	0.0	44.5	47.89433083	-103.40250875	2296.134						
5260	WELD	18,980.4	5260	0.0	42.0	47.89428426	-103.40267613	2293.912						
5270	WELD	19,022.4	5270	0.0	45.4	47.89424186	-103.40283452	2292.720						
5280	WELD	19,067.8	5280	0.0	30.9	47.89419579	-103.40300536	2293.476						
5290	WELD	19,098.6	5290	0.0	36.8	47.89416317	-103.40312082	2293.945						
5300	WELD	19,135.4	5300	0.0	33.1	47.89412673	-103.40326016	2294.874						
5310	WELD	19,168.5	5310	0.0	31.0	47.89409405	-103.40338586	2293.411						
5320	WELD	19,199.5	5320	0.0	27.3	47.89406321	-103.40350321	2291.872						
5330	WELD	19,226.9	5330	0.0	39.7	47.89403723	-103.40360691	2289.007						
5340	WELD	19,266.6	5340	0.0	27.6	47.89400169	-103.40375813	2283.546						
5350	WELD	19,294.2	5350	0.0	32.7	47.89397684	-103.40386367	2280.666						
5360	WELD	19,326.9	5360	0.0	41.2	47.89394660	-103.40398818	2276.943						
5370	WELD	19,368.1	5370	0.0	35.0	47.89390767	-103.40414388	2271.385						
5380	WELD	19,403.0	5380	0.0	28.7	47.89387493	-103.40427648	2267.301						
5390	WELD	19,431.8	5390	0.0	29.6	47.89384767	-103.40438611	2266.089						
5400	WELD	19,461.3	5400	0.0	33.5	47.89382090	-103.40449966	2264.886						
5410	WELD	19,494.8	5410	0.0	38.6	47.89379215	-103.40462861	2262.869						
5420	WELD	19,533.4	5420	0.0	32.7	47.89375863	-103.40477747	2262.255						
5430	WELD	19,566.1	5430	0.0	37.1	47.89372930	-103.40490290	2262.520						
5440	WELD	19,603.2	5440	0.0	27.6	47.89369590	-103.40504532	2262.618						
5450	WELD	19,630.8	5450	0.0	32.2	47.89367018	-103.40515099	2263.236						
5460	WELD	19,663.0	5460	0.0	31.8	47.89363995	-103.40527426	2263.511						
5470	WELD	19,694.8	5470	0.0	30.7	47.89360987	-103.40539590	2264.023						
5480	WELD	19,725.5	5480	0.0	31.7	47.89358068	-103.40551317	2264.463						
5490	WELD	19,757.3	5490	0.0	27.4	47.89355058	-103.40563465	2264.436						
5500	WELD	19,784.7	5500	0.0	40.6	47.89352455	-103.40573905	2264.637						
5510	WELD	19,825.3	5510	0.0	41.2	47.89348610	-103.40589437	2264.135						
5520	WELD	19,866.5	5520	0.0	42.6	47.89344723	-103.40605165	2261.476						
5530	WELD	19,909.1	5530	0.0	35.7	47.89340954	-103.40621465	2257.278						
5540	WELD	19,944.8	5540	0.0	38.3	47.89337921	-103.40635233	2254.675						
5550	WELD	19,983.1	5550	0.0	30.6	47.89334712	-103.40650051	2252.443						
5560	WELD	20,013.7	5560	0.0	35.6	47.89332153	-103.40661867	2250.879						
5570	WELD	20,049.4	5570	0.0	35.9	47.89329231	-103.40675650	2247.920						



Pipeline Listing

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Hiland Crude, LLC

East Camp Creek Loop Launch to Receive

ID#	Description	Distance (ft)	Joint #	U/S Weld	D/S Weld	Latitude	Longitude	Altitude	Orientation (Deg / O'Clock)	Depth (%)	Length or WT	Width or YS	P' or SF	(P'/P)
5580	WELD	20,085.2	5580	0.0	42.0	47.89326186	-103.40689404	2244.419						
5590	WELD	20,127.2	5590	0.0	41.3	47.89322240	-103.40705342	2239.899						
5600	WELD	20,168.5	5600	0.0	41.2	47.89318197	-103.40720975	2236.135						
5610	WELD	20,209.7	5610	0.0	40.6	47.89314188	-103.40736644	2233.885						
5620	WELD	20,250.4	5620	0.0	41.2	47.89310482	-103.40752223	2231.758						
5630	WELD	20,291.6	5630	0.0	41.3	47.89306871	-103.40768136	2230.548						
5640	WELD	20,332.9	5640	0.0	38.4	47.89303287	-103.40784029	2231.026						
5650	WELD	20,371.3	5650	0.0	41.3	47.89299935	-103.40798835	2231.735						
5660	WELD	20,412.5	5660	0.0	41.3	47.89296325	-103.40814757	2232.101						
5670	WELD	20,453.8	5670	0.0	41.3	47.89292806	-103.40830720	2231.383						
5680	WELD	20,495.1	5680	0.0	41.3	47.89289368	-103.40846721	2229.778						
5690	WELD	20,536.4	5690	0.0	41.3	47.89285741	-103.40862536	2225.684						
5700	WELD	20,577.8	5700	0.0	41.3	47.89281897	-103.40878132	2219.534						
5710	WELD	20,619.1	5710	0.0	41.3	47.89278547	-103.40894063	2214.282						
5720	WELD	20,660.3	5720	0.0	41.2	47.89276156	-103.40910337	2208.858						
5730	WELD	20,701.6	5730	0.0	41.3	47.89275197	-103.40926965	2204.155						
5740	WELD	20,742.9	5740	0.0	41.3	47.89276202	-103.40943645	2200.768						
5750	WELD	20,784.2	5750	0.0	41.3	47.89278616	-103.40960059	2199.585						
5760	WELD	20,825.5	5760	0.0	41.3	47.89281797	-103.40976196	2199.240						
5770	WELD	20,866.8	5770	0.0	41.3	47.89285382	-103.40992142	2199.121						
5780	WELD	20,908.1	5780	0.0	40.8	47.89289072	-103.41008030	2199.321						
5790	WELD	20,948.8	5790	0.0	41.3	47.89292502	-103.41023836	2199.371						
5800	WELD	20,990.1	5800	0.0	41.3	47.89295820	-103.41039902	2199.362						
5810	WELD	21,031.5	5810	0.0	40.7	47.89299102	-103.41055979	2199.819						
5820	WELD	21,072.2	5820	0.0	38.7	47.89302278	-103.41071820	2199.467						
5830	WELD	21,110.9	5830	0.0	41.3	47.89305261	-103.41086937	2199.606						
5840	WELD	21,152.2	5840	0.0	41.3	47.89308343	-103.41103085	2199.342						
5850	WELD	21,193.4	5850	0.0	41.3	47.89311239	-103.41119306	2199.026						
5860	WELD	21,234.8	5860	0.0	41.2	47.89314223	-103.41135522	2198.684						
5870	WELD	21,276.0	5870	0.0	37.1	47.89317210	-103.41151707	2198.960						
5880	WELD	21,313.1	5880	0.0	42.4	47.89319837	-103.41166281	2198.862						
5890	WELD	21,355.5	5890	0.0	42.7	47.89322798	-103.41182976	2197.205						
5900	WELD	21,398.2	5900	0.0	42.8	47.89325187	-103.41199925	2194.548						
5910	WELD	21,441.0	5910	0.0	42.5	47.89327591	-103.41216959	2193.851						
5920	WELD	21,483.5	5920	0.0	42.3	47.89330076	-103.41233842	2192.831						
5930	WELD	21,525.8	5930	0.0	42.7	47.89332584	-103.41250660	2191.402						
5940	WELD	21,568.5	5940	0.0	42.3	47.89335554	-103.41267464	2190.702						



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Hiland Crude, LLC

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ID#	Description	Distance (ft)	Joint #	U/S Weld	D/S Weld	Latitude	Longitude	Altitude	Orientation (Deg / O'Clock)	Depth (%)	Length or WT	Width or YS	P' or SF	(P'/P)
5950	WELD	21,610.8	5950	0.0	42.7	47.89338576	-103.41283998	2193.680						
5960	WELD	21,653.4	5960	0.0	42.7	47.89341458	-103.41300743	2197.251						
10000019	AGM 040, Sta. 220+50, Gravel Rd -- Han #8802	21,669.5	5960	16.1	26.6	47.89342526	-103.41307089	2197.631						
5970	WELD	21,696.1	5970	0.0	29.7	47.89344342	-103.41317562	2197.384						
5980	WELD	21,725.8	5980	0.0	26.3	47.89346349	-103.41329251	2197.836						
5990	WELD	21,752.1	5990	0.0	8.9	47.89348078	-103.41339620	2198.301						
6000	WELD	21,760.9	6000	0.0	40.9	47.89348648	-103.41343124	2198.565						
6010	WELD	21,801.8	6010	0.0	41.2	47.89351236	-103.41359295	2199.982						
6020	WELD	21,843.0	6020	0.0	41.3	47.89353906	-103.41375590	2200.426						
6030	WELD	21,884.3	6030	0.0	41.2	47.89356544	-103.41391900	2201.128						
6040	WELD	21,925.5	6040	0.0	41.3	47.89359206	-103.41408210	2201.864						
6050	WELD	21,966.8	6050	0.0	41.3	47.89361969	-103.41424490	2202.508						
6060	WELD	22,008.1	6060	0.0	41.2	47.89364786	-103.41440766	2202.592						
6070	WELD	22,049.3	6070	0.0	41.2	47.89367609	-103.41457018	2203.535						
6080	WELD	22,090.6	6080	0.0	41.3	47.89370497	-103.41473223	2204.584						
6090	WELD	22,131.9	6090	0.0	41.3	47.89373398	-103.41489450	2205.390						
6100	WELD	22,173.2	6100	0.0	41.2	47.89376384	-103.41505637	2206.805						
6110	WELD	22,214.4	6110	0.0	41.3	47.89379433	-103.41521735	2207.966						
6120	WELD	22,255.7	6120	0.0	41.3	47.89382400	-103.41537924	2209.372						
6130	WELD	22,297.0	6130	0.0	41.2	47.89385269	-103.41554154	2210.914						
6140	WELD	22,338.2	6140	0.0	41.2	47.89388172	-103.41570356	2212.315						
6150	WELD	22,379.4	6150	0.0	41.3	47.89391093	-103.41586555	2213.814						
6160	WELD	22,420.7	6160	0.0	41.2	47.89393924	-103.41602820	2215.314						
6170	WELD	22,461.9	6170	0.0	41.2	47.89396723	-103.41619014	2217.482						
40000001	Metal Loss - EXTERNAL	22,496.1	6170	34.2	7.0	47.89399089	-103.41632448	2219.330	155	5:00	14%	0.80	0.84	1760 100%
6180	WELD	22,503.1	6180	0.0	41.2	47.89399575	-103.41635197	2219.834						
6190	WELD	22,544.3	6190	0.0	41.2	47.89402313	-103.41651430	2222.541						
6200	WELD	22,585.5	6200	0.0	41.2	47.89405032	-103.41667705	2224.309						
6210	WELD	22,626.8	6210	0.0	41.3	47.89407759	-103.41683971	2226.751						
6220	WELD	22,668.1	6220	0.0	41.4	47.89410489	-103.41700227	2229.164						
6230	WELD	22,709.5	6230	0.0	41.3	47.89413278	-103.41716438	2232.696						
6240	WELD	22,750.8	6240	0.0	41.3	47.89416155	-103.41732526	2237.685						
6250	WELD	22,792.1	6250	0.0	41.3	47.89418998	-103.41748360	2246.484						
6260	WELD	22,833.4	6260	0.0	41.2	47.89421781	-103.41763984	2257.224						
6270	WELD	22,874.7	6270	0.0	41.3	47.89424351	-103.41779677	2268.095						
6280	WELD	22,916.0	6280	0.0	41.3	47.89426531	-103.41795916	2274.304						



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6290	WELD	22,957.3	6290	0.0	41.2	47.89428262	-103.41812488	2276.634						
6300	WELD	22,998.5	6300	0.0	41.3	47.89429365	-103.41829188	2276.562						
6310	WELD	23,039.8	6310	0.0	41.3	47.89429418	-103.41845849	2271.702						
6320	WELD	23,081.0	6320	0.0	41.3	47.89428785	-103.41862442	2265.834						
6330	WELD	23,122.3	6330	0.0	41.3	47.89427905	-103.41879030	2261.291						
6340	WELD	23,163.6	6340	0.0	41.2	47.89426983	-103.41895716	2257.682						
6350	WELD	23,204.8	6350	0.0	41.3	47.89426066	-103.41912361	2253.712						
6360	WELD	23,246.0	6360	0.0	39.6	47.89425113	-103.41929062	2250.192						
6370	WELD	23,285.7	6370	0.0	41.3	47.89424273	-103.41945059	2246.999						
6380	WELD	23,327.0	6380	0.0	41.4	47.89423390	-103.41961760	2243.809						
6390	WELD	23,368.4	6390	0.0	41.3	47.89422452	-103.41978503	2241.132						
6400	WELD	23,409.7	6400	0.0	41.2	47.89421604	-103.41995252	2239.129						
6410	WELD	23,450.9	6410	0.0	36.4	47.89420629	-103.42011911	2236.961						
6420	WELD	23,487.4	6420	0.0	41.3	47.89419751	-103.42026712	2236.299						
6430	WELD	23,528.6	6430	0.0	41.3	47.89418982	-103.42043449	2234.761						
6440	WELD	23,569.9	6440	0.0	41.3	47.89418328	-103.42060220	2233.537						
6450	WELD	23,611.2	6450	0.0	41.2	47.89417542	-103.42076979	2233.502						
6460	WELD	23,652.4	6460	0.0	41.3	47.89416757	-103.42093732	2233.775						
6470	WELD	23,693.8	6470	0.0	41.1	47.89415838	-103.42110452	2234.873						
6480	WELD	23,734.8	6480	0.0	41.2	47.89414693	-103.42127062	2236.764						
6490	WELD	23,776.1	6490	0.0	41.3	47.89413279	-103.42143712	2238.179						
6500	WELD	23,817.3	6500	0.0	41.3	47.89411859	-103.42160335	2240.291						
6510	WELD	23,858.6	6510	0.0	41.3	47.89410741	-103.42177035	2240.295						
6520	WELD	23,899.9	6520	0.0	41.3	47.89410041	-103.42193772	2241.311						
6530	WELD	23,941.2	6530	0.0	41.3	47.89409842	-103.42210555	2242.334						
6540	WELD	23,982.5	6540	0.0	41.3	47.89409833	-103.42227328	2242.658						
6550	WELD	24,023.8	6550	0.0	41.2	47.89409995	-103.42244121	2243.873						
6560	WELD	24,065.0	6560	0.0	41.3	47.89410626	-103.42260847	2244.572						
6570	WELD	24,106.3	6570	0.0	41.3	47.89411401	-103.42277606	2245.599						
6580	WELD	24,147.5	6580	0.0	41.2	47.89412248	-103.42294311	2246.883						
6590	WELD	24,188.8	6590	0.0	41.3	47.89413301	-103.42311021	2247.897						
6600	WELD	24,230.0	6600	0.0	41.3	47.89414440	-103.42327742	2248.816						
12000001	Debris @ 5:00	24,243.9	6600	13.8	27.4	47.89414803	-103.42333347	2249.184						
6610	WELD	24,271.3	6610	0.0	41.3	47.89415500	-103.42344456	2250.258						
6620	WELD	24,312.6	6620	0.0	41.3	47.89416568	-103.42361179	2251.628						
6630	WELD	24,353.9	6630	0.0	41.3	47.89417657	-103.42377885	2253.046						
6640	WELD	24,395.2	6640	0.0	41.3	47.89418739	-103.42394589	2254.398						



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6650	WELD	24,436.5	6650	0.0	41.3	47.89419860	-103.42411282	2255.698						
6660	WELD	24,477.8	6660	0.0	41.4	47.89421078	-103.42427971	2256.699						
6670	WELD	24,519.1	6670	0.0	41.3	47.89422360	-103.42444667	2257.426						
6680	WELD	24,560.4	6680	0.0	41.3	47.89423599	-103.42461348	2258.076						
6690	WELD	24,601.7	6690	0.0	41.3	47.89424768	-103.42478078	2258.760						
6700	WELD	24,643.0	6700	0.0	41.2	47.89425913	-103.42494780	2259.736						
6710	WELD	24,684.2	6710	0.0	41.2	47.89427129	-103.42511446	2260.510						
6720	WELD	24,725.5	6720	0.0	41.3	47.89428273	-103.42528155	2260.847						
6730	WELD	24,766.8	6730	0.0	41.3	47.89429352	-103.42544856	2261.523						
6740	WELD	24,808.0	6740	0.0	41.3	47.89430446	-103.42561543	2261.876						
6750	WELD	24,849.4	6750	0.0	41.0	47.89431511	-103.42578276	2262.727						
6760	WELD	24,890.4	6760	0.0	1.0	47.89432746	-103.42594894	2263.324						
10000020	Bend right - 32 deg., 3D	24,890.9	6760	0.1	0.9	47.89432793	-103.42595093	2263.326	0	12:00				
6770	WELD	24,891.4	6770	0.0	25.8	47.89432852	-103.42595274	2263.330						
6780	WELD	24,917.2	6780	0.0	41.3	47.89437048	-103.42603838	2264.365						
6790	WELD	24,958.5	6790	0.0	41.3	47.89444051	-103.42617006	2265.793						
6800	WELD	24,999.8	6800	0.0	41.3	47.89451569	-103.42629532	2266.798						
6810	WELD	25,041.1	6810	0.0	41.3	47.89459617	-103.42641323	2268.126						
6820	WELD	25,082.3	6820	0.0	41.2	47.89468055	-103.42652473	2269.751						
6830	WELD	25,123.6	6830	0.0	41.3	47.89476632	-103.42663357	2271.505						
6840	WELD	25,164.8	6840	0.0	41.2	47.89485282	-103.42674136	2273.993						
6850	WELD	25,206.0	6850	0.0	41.3	47.89494023	-103.42684695	2276.099						
6860	WELD	25,247.3	6860	0.0	41.3	47.89502869	-103.42695116	2278.010						
6870	WELD	25,288.6	6870	0.0	41.3	47.89511817	-103.42705270	2280.532						
6880	WELD	25,329.9	6880	0.0	41.3	47.89520877	-103.42715210	2283.417						
6890	WELD	25,371.2	6890	0.0	41.3	47.89530075	-103.42724890	2286.298						
6900	WELD	25,412.5	6900	0.0	39.2	47.89539343	-103.42734459	2288.876						
6910	WELD	25,451.7	6910	0.0	41.2	47.89548230	-103.42743246	2291.820						
6920	WELD	25,492.8	6920	0.0	41.3	47.89557756	-103.42752046	2294.362						
6930	WELD	25,534.1	6930	0.0	31.0	47.89567356	-103.42760719	2298.178						
6940	WELD	25,565.1	6940	0.0	41.4	47.89574595	-103.42767201	2300.357						
6950	WELD	25,606.4	6950	0.0	41.2	47.89584125	-103.42776201	2302.194						
6960	WELD	25,647.7	6960	0.0	41.2	47.89593449	-103.42785643	2302.863						
6970	WELD	25,688.9	6970	0.0	41.2	47.89602602	-103.42795492	2303.622						
6980	WELD	25,730.1	6980	0.0	41.2	47.89611677	-103.42805437	2304.380						
6990	WELD	25,771.4	6990	0.0	41.2	47.89620784	-103.42815347	2305.800						
7000	WELD	25,812.6	7000	0.0	41.2	47.89629892	-103.42825265	2304.861						



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7010	WELD	25,853.8	7010	0.0	41.2	47.89638920	-103.42835329	2303.338						
7020	WELD	25,895.0	7020	0.0	41.3	47.89647971	-103.42845353	2303.921						
7030	WELD	25,936.3	7030	0.0	41.3	47.89657102	-103.42855236	2305.341						
7040	WELD	25,977.6	7040	0.0	41.4	47.89666211	-103.42865093	2308.705						
7050	WELD	26,019.0	7050	0.0	41.3	47.89675329	-103.42874877	2313.113						
7060	WELD	26,060.3	7060	0.0	41.3	47.89684386	-103.42884655	2318.434						
7070	WELD	26,101.6	7070	0.0	41.3	47.89693336	-103.42894585	2324.525						
7080	WELD	26,142.9	7080	0.0	41.3	47.89702019	-103.42905043	2330.067						
7090	WELD	26,184.2	7090	0.0	41.2	47.89710330	-103.42916276	2334.152						
7100	WELD	26,225.4	7100	0.0	41.3	47.89718378	-103.42927972	2337.457						
7110	WELD	26,266.7	7110	0.0	41.3	47.89726205	-103.42939998	2341.054						
7120	WELD	26,307.9	7120	0.0	41.3	47.89733690	-103.42952515	2343.868						
7130	WELD	26,349.2	7130	0.0	41.3	47.89741013	-103.42965236	2346.946						
7140	WELD	26,390.4	7140	0.0	41.2	47.89748292	-103.42977987	2349.881						
7150	WELD	26,431.7	7150	0.0	40.1	47.89755553	-103.42990773	2353.212						
7160	WELD	26,471.8	7160	0.0	8.9	47.89762793	-103.43002982	2354.169						
7170	WELD	26,480.7	7170	0.0	1.6	47.89764459	-103.43005649	2354.270						
10000021	Bend left - 45 deg., 3D	26,481.5	7170	0.1	1.5	47.89764551	-103.43005897	2354.230	0	12:00				
7180	WELD	26,482.3	7180	0.0	17.5	47.89764599	-103.43006209	2354.133						
7190	WELD	26,499.8	7190	0.0	28.8	47.89764515	-103.43013350	2351.130						
7200	WELD	26,528.6	7200	0.0	41.2	47.89764443	-103.43024848	2345.931						
7210	WELD	26,569.8	7210	0.0	41.3	47.89764333	-103.43041271	2337.833						
7220	WELD	26,611.1	7220	0.0	41.3	47.89764167	-103.43057913	2331.862						
7230	WELD	26,652.4	7230	0.0	41.3	47.89763928	-103.43074618	2328.524						
7240	WELD	26,693.7	7240	0.0	41.2	47.89763517	-103.43091419	2327.201						
7250	WELD	26,734.9	7250	0.0	41.2	47.89763160	-103.43108209	2327.108						
7260	WELD	26,776.1	7260	0.0	41.3	47.89762886	-103.43125013	2327.084						
7270	WELD	26,817.4	7270	0.0	41.3	47.89762685	-103.43141799	2327.078						
7280	WELD	26,858.7	7280	0.0	40.7	47.89762446	-103.43158596	2327.706						
7290	WELD	26,899.4	7290	0.0	39.3	47.89762185	-103.43175125	2330.639						
7300	WELD	26,938.7	7300	0.0	41.2	47.89762117	-103.43191149	2331.088						
7310	WELD	26,980.0	7310	0.0	29.7	47.89762157	-103.43207937	2331.341						
7320	WELD	27,009.6	7320	0.0	7.4	47.89762214	-103.43219989	2332.989						
7330	WELD	27,017.0	7330	0.0	37.4	47.89762226	-103.43222987	2333.224						
7340	WELD	27,054.4	7340	0.0	41.4	47.89762244	-103.43238155	2335.461						
7350	WELD	27,095.8	7350	0.0	41.3	47.89762182	-103.43254878	2338.614						
7360	WELD	27,137.1	7360	0.0	41.3	47.89762139	-103.43271658	2340.793						



Pipeline Listing

TDW Services, Inc.

Hiland Crude, LLC

East Camp Creek Loop Launch to Receive

ID#	Description	Distance (ft)	Joint #	U/S Weld	D/S Weld	Latitude	Longitude	Altitude	Orientation (Deg / O'Clock)	Depth (%)	Length or WT	Width or YS	P' or SF	(P'/P)
7370	WELD	27,178.4	7370	0.0	41.3	47.89762020	-103.43288389	2343.817						
7380	WELD	27,219.7	7380	0.0	34.6	47.89761852	-103.43305185	2345.039						
7390	WELD	27,254.3	7390	0.0	42.2	47.89761668	-103.43319248	2346.124						
7400	WELD	27,296.5	7400	0.0	42.7	47.89761361	-103.43336388	2348.997						
7410	WELD	27,339.3	7410	0.0	42.8	47.89760409	-103.43353698	2351.480						
10000022	AGM 050, Sta. 276+86, Gavel Rd -- Han #8043	27,346.8	7410	7.5	35.2	47.89760254	-103.43356755	2351.889						
7420	WELD	27,382.0	7420	0.0	27.8	47.89759720	-103.43371045	2354.041						
7430	WELD	27,409.8	7430	0.0	39.3	47.89759460	-103.43382350	2355.396						
7440	WELD	27,449.2	7440	0.0	41.2	47.89759287	-103.43398350	2358.009						
7450	WELD	27,490.4	7450	0.0	41.3	47.89759312	-103.43415115	2360.634						
7460	WELD	27,531.7	7460	0.0	41.2	47.89759391	-103.43431858	2363.843						
7470	WELD	27,572.9	7470	0.0	41.3	47.89759461	-103.43448576	2367.342						
7480	WELD	27,614.2	7480	0.0	41.3	47.89759564	-103.43465231	2372.378						
7490	WELD	27,655.5	7490	0.0	41.4	47.89759652	-103.43481871	2376.839						
7500	WELD	27,696.9	7500	0.0	41.3	47.89759889	-103.43498549	2381.149						
7510	WELD	27,738.2	7510	0.0	41.2	47.89760294	-103.43515258	2385.458						
7520	WELD	27,779.4	7520	0.0	41.3	47.89760757	-103.43531941	2389.177						
7530	WELD	27,820.7	7530	0.0	41.2	47.89761344	-103.43548687	2392.096						
7540	WELD	27,862.0	7540	0.0	41.2	47.89762074	-103.43565448	2394.133						
7550	WELD	27,903.2	7550	0.0	41.2	47.89762849	-103.43582170	2395.528						
7560	WELD	27,944.3	7560	0.0	26.6	47.89763587	-103.43598921	2397.524						
7570	WELD	27,970.9	7570	0.0	28.3	47.89764096	-103.43609720	2398.323						
7580	WELD	27,999.3	7580	0.0	34.4	47.89764686	-103.43621214	2398.279						
7590	WELD	28,033.7	7590	0.0	41.2	47.89765438	-103.43635193	2397.928						
7600	WELD	28,074.9	7600	0.0	28.9	47.89766493	-103.43651904	2396.234						
7610	WELD	28,103.8	7610	0.0	41.2	47.89767330	-103.43663605	2395.662						
7620	WELD	28,145.0	7620	0.0	41.3	47.89768632	-103.43680280	2394.267						
7630	WELD	28,186.3	7630	0.0	41.3	47.89770060	-103.43696932	2394.113						
7640	WELD	28,227.6	7640	0.0	41.3	47.89771433	-103.43713585	2393.477						
7650	WELD	28,268.9	7650	0.0	41.3	47.89772732	-103.43730269	2394.146						
7660	WELD	28,310.2	7660	0.0	41.3	47.89774060	-103.43746918	2395.465						
7670	WELD	28,351.5	7670	0.0	36.9	47.89775347	-103.43763593	2396.197						
7680	WELD	28,388.4	7680	0.0	28.6	47.89776487	-103.43778506	2397.008						
7690	WELD	28,417.0	7690	0.0	29.3	47.89777393	-103.43790087	2397.628						
7700	WELD	28,446.3	7700	0.0	32.0	47.89778263	-103.43801964	2398.235						
7710	WELD	28,478.3	7710	0.0	34.4	47.89779198	-103.43814915	2398.787						



Pipeline Listing

TDW Services, Inc.

Hiland Crude, LLC

East Camp Creek Loop Launch to Receive

ID#	Description	Distance (ft)	Joint #	U/S Weld	D/S Weld	Latitude	Longitude	Altitude	Orientation (Deg / O'Clock)	Depth (%)	Length or WT	Width or YS	P' or SF	(P'/P)
7720	WELD	28,512.7	7720	0.0	30.4	47.89780277	-103.43828818	2399.934						
7730	WELD	28,543.1	7730	0.0	42.8	47.89781227	-103.43841100	2400.526						
7740	WELD	28,585.9	7740	0.0	41.2	47.89782538	-103.43858424	2400.892						
7750	WELD	28,627.1	7750	0.0	34.0	47.89783709	-103.43875142	2400.710						
7760	WELD	28,661.2	7760	0.0	29.7	47.89784621	-103.43888956	2400.485						
7770	WELD	28,690.9	7770	0.0	41.3	47.89785374	-103.43901018	2399.419						
7780	WELD	28,732.2	7780	0.0	36.9	47.89786427	-103.43917750	2398.065						
7790	WELD	28,769.1	7790	0.0	41.4	47.89787359	-103.43932706	2396.849						
7800	WELD	28,810.5	7800	0.0	41.4	47.89788433	-103.43949423	2396.734						
7810	WELD	28,851.8	7810	0.0	28.6	47.89789420	-103.43966168	2396.533						
7820	WELD	28,880.4	7820	0.0	41.3	47.89790034	-103.43977736	2395.460						
7830	WELD	28,921.7	7830	0.0	33.9	47.89790837	-103.43994513	2394.478						
7840	WELD	28,955.6	7840	0.0	33.6	47.89791570	-103.44008243	2393.338						
7850	WELD	28,989.2	7850	0.0	29.3	47.89792360	-103.44021881	2392.270						
7860	WELD	29,018.6	7860	0.0	32.1	47.89793048	-103.44033788	2391.879						
7870	WELD	29,050.7	7870	0.0	36.8	47.89793800	-103.44046830	2391.107						
7880	WELD	29,087.5	7880	0.0	27.3	47.89794666	-103.44061775	2390.281						
7890	WELD	29,114.8	7890	0.0	40.0	47.89795267	-103.44072892	2390.133						
7900	WELD	29,154.8	7900	0.0	33.9	47.89796106	-103.44089138	2389.229						
7910	WELD	29,188.7	7910	0.0	27.2	47.89796833	-103.44102898	2388.068						
7920	WELD	29,215.9	7920	0.0	41.3	47.89797411	-103.44113949	2386.957						
7930	WELD	29,257.2	7930	0.0	41.3	47.89798262	-103.44130735	2386.133						
7940	WELD	29,298.5	7940	0.0	41.1	47.89799117	-103.44147500	2385.911						
7950	WELD	29,339.6	7950	0.0	41.3	47.89799973	-103.44164221	2387.744						
7960	WELD	29,381.0	7960	0.0	35.3	47.89800884	-103.44180933	2390.916						
7970	WELD	29,416.3	7970	0.0	27.3	47.89801682	-103.44195141	2394.787						
7980	WELD	29,443.5	7980	0.0	34.4	47.89802296	-103.44206101	2397.858						
7990	WELD	29,477.9	7990	0.0	30.9	47.89803087	-103.44219956	2401.522						
8000	WELD	29,508.8	8000	0.0	30.8	47.89803769	-103.44232396	2404.670						
8010	WELD	29,539.6	8010	0.0	41.1	47.89804436	-103.44244873	2406.423						
8020	WELD	29,580.7	8020	0.0	27.8	47.89805171	-103.44261572	2406.467						
8030	WELD	29,608.5	8030	0.0	34.4	47.89805543	-103.44272860	2405.011						
8040	WELD	29,642.9	8040	0.0	37.2	47.89805814	-103.44286827	2402.453						
8050	WELD	29,680.1	8050	0.0	42.4	47.89805882	-103.44301938	2399.361						
8060	WELD	29,722.5	8060	0.0	31.1	47.89805840	-103.44319164	2397.947						
8070	WELD	29,753.6	8070	0.0	27.5	47.89805714	-103.44331813	2397.114						
8080	WELD	29,781.1	8080	0.0	40.4	47.89805555	-103.44343026	2396.284						



Pipeline Listing

TDW Services, Inc.

Hiland Crude, LLC

East Camp Creek Loop Launch to Receive

ID#	Description	Distance (ft)	Joint #	U/S Weld	D/S Weld	Latitude	Longitude	Altitude	Orientation (Deg / O'Clock)	Depth (%)	Length or WT	Width or YS	P' or SF	(P'/P)
8090	WELD	29,821.5	8090	0.0	31.4	47.89805318	-103.44359440	2395.825						
8100	WELD	29,852.8	8100	0.0	45.0	47.89805206	-103.44372212	2394.751						
8110	WELD	29,897.8	8110	0.0	30.0	47.89804915	-103.44390547	2393.593						
8120	WELD	29,927.8	8120	0.0	33.6	47.89804626	-103.44402752	2392.551						
8130	WELD	29,961.4	8130	0.0	12.9	47.89804262	-103.44416430	2391.462						
11000004	WT CHANGE	29,974.2	8130	0.0	0.1	47.89804144	-103.44421591	2390.910			0.322	52000	0.72	
8140	WELD	29,974.3	8140	0.0	1.5	47.89804143	-103.44421613	2390.922						
10000023	Bend up - 45 deg., 3D	29,975.0	8140	0.1	1.4	47.89804137	-103.44421885	2391.083	0	12:00				
8150	WELD	29,975.8	8150	0.0	11.4	47.89804128	-103.44422157	2391.501						
8160	WELD	29,987.1	8160	0.0	1.6	47.89804008	-103.44425455	2399.283						
10000024	Bend down - 45 deg., 3D	29,987.9	8160	0.1	1.5	47.89804000	-103.44425717	2399.645	0	12:00				
8170	WELD	29,988.8	8170	0.0	0.9	47.89803991	-103.44426052	2399.809						
10000025	Flange	29,989.2	8170	0.5	0.5	47.89803987	-103.44426232	2399.824	0	12:00				
8180	WELD	29,989.7	8180	0.0	1.2	47.89803983	-103.44426425	2399.826						
10000026	Tee at 90 deg.	29,990.2	8180	0.2	1.0	47.89803978	-103.44426650	2399.820	82	2:30				
8190	WELD	29,990.8	8190	0.0	1.2	47.89803972	-103.44426899	2399.815						
10000027	Pipe Support	29,991.6	8190	0.6	0.6	47.89803965	-103.44427212	2399.807						
10000028	Fitting on top of pipe	29,991.8	8190	0.9	0.4	47.89803964	-103.44427288	2399.804	354	11:45				
8200	WELD	29,992.1	8200	0.0	2.9	47.89803961	-103.44427405	2399.800						
10000029	Flange	29,992.5	8200	0.4	2.5	47.89803957	-103.44427590	2399.793	0	12:00				
10000030	Valve (Receiver), Sta. 303+30, East Camp Creek Loop Receive	29,993.4	8200	1.4	1.6	47.89803951	-103.44428037	2399.783						
10000031	Flange	29,994.5	8200	2.4	0.5	47.89803951	-103.44428037	2399.783	0	12:00				
8210	WELD	29,995.0	8210	0.0	-	47.89803951	-103.44428037	2399.783						



Pipeline Listing

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East Camp Creek Loop Launch to Receive

ID#	Description	Distance (ft)	Joint #	U/S Weld	D/S Weld	Latitude	Longitude	Altitude	Orientation (Deg / O'Clock)	Depth (%)	Length or WT	Width or YS	P' or SF	(P'/P)
12000002	End Run Tickle	30,036.7	8210	41.7	-	47.89803951	-103.44428037	2399.783						

Type	Number
DEFORMATION	0
GAINS	0
GROUPED PITS	2
LOCATIONS	32
MILL ANOMALY	3
MISC	3
SEAM VARIATION	10
WT CHANGES	5
WELDS	811



General Inline Inspection Terms

GLOSSARY

AGM (Aboveground Marker)	A portable device placed at an above ground reference point that both detects and records the passage of an in-line inspection tool. AGMs are typically reported using a marker number followed by the aboveground reference point description of the location device (box) placement.
ABOVE-GROUND REFERENCE POINTS	The above ground reference point is a permanent reference on or above the pipeline, which can be used to locate features in the pipeline. Reference points can be valves, fences, test stations, markers posts, or other permanent features.
ACCELEROMETERS	Part of the INS package of the in-line inspection tool. Each TDW tool contains 3 axis-aligned accelerometers measuring orientation and shock.
ANCHOR, WEIGHT OR HANGAR	Non-welded full encirclement pipeline features typically evenly spaced across water crossings. These are usually not detrimental unless associated metal loss is detected.
ANOMALY	Any kind of imperfection or defect that may be present in the wall of the pipe. This includes coating or welding.
APPURTENANCE	A component that is attached to the pipeline; e.g., valve, tee, casing, instrument connection.
ASME B31G, MODIFIED ASME B31G, or DNV RP-F101	Commonly used analysis criterion for metal loss anomalies in a pipeline. TDW software may use ASME B31G, MODIFIED ASME B31G, or DNV RP-F101 to calculate the safe maximum allowable operating pressure or failure pressure at an area of metal loss. These formulas utilize only length and depth - they do not take into consideration the width of the anomaly. The MODIFIED ASME B31G more closely approximates the values obtained via the RSTRENG calculations, which is less conservative than the standard ASME B31G calculation. See also DNV RP-F101.
BEND	A physical pipe configuration that changes pipeline direction.
BEND RADIUS	The radius of the bend in the pipe as related to the pipe diameter (D). Example: A 3-D bend would have a radius of 3 times the diameter of the pipe measured to the centerline of the pipe.
BORE RESTRICTION	Any reduction of the cross-section of the pipe that may restrict the passage of an ILI pig.
BUCKLE	A condition where the pipeline has undergone sufficient plastic deformation to cause permanent wrinkling or deformation of the pipe wall or the pipe's cross section.
BURST PRESSURE	The pressure at which the nominal hoop stress in the wall of a pipe equals the specified minimum yield stress of the pipe grade. It is calculated by $2st/D$ where s = SMYS, t = nominal wall thickness, D = nominal outside diameter of pipe.
CALIBRATION DIG	An exploratory excavation to compare findings of an in-line inspection system to actual conditions with the purpose of improving data analysis.
CASING ANOMALY	When the casing is not welded, or when a gap occurs in the weld, this signature is detected by the tool, and identified with a miscellaneous remark.
CHARACTERIZATION	The process of quantifying the size, shape, orientation, and location of an anomaly, defect, or critical defect after it has been detected.
CHECK VALVE	A valve that prevents reverse flow.
CLAMP	Non-welded full encirclement pipeline feature not located at a bridge or water crossing, in some cases a type of temporary repair.
COMPONENT	Any physical part of the pipeline, other than line pipe, including but not limited to valves, welds, tees, flanges, fitting, taps, branch connections, outlets, supports and anchors.



General Inline Inspection Terms

GLOSSARY PART 2

General Inline Inspection Terms

CONTROL POINT	Control points are know locations used to provide coordinate updates to aid the final processing of the inertial data gathered from the instruments onboard the inspection vehicle.
CORROSION (External)	Metal loss due to electrochemical, galvanic, microbiological, or other attack on the pipe due to environmental conditions surrounding the pipe.
CORROSION (Internal)	Metal loss due to chemical or other attack on the steel from liquids on the inside of the pipe. Electrochemical attack can also occur in local cells, but this is less frequent.
DATA ANALYSIS	The process through which indications are evaluated to classify, characterize and size them as non-relevant conditions, pipeline components, anomalies, imperfections, or defects.
DATUM	A datum is a set of reference points on the earth's surface against which position measurements are made. Horizontal datums are used for describing a point on the earth's surface, in latitude and longitude or another coordinate system. While hundreds of reference datums exists some examples of horizontal datums include, NAD27, NAD83, and WGS84. Vertical datums are tidal, based on sea levels referencing geodetic datums such as NAVD88, or geodetic, based on the same ellipsoid models of the earth used for computing horizontal datums.
DNV RP-F101	An analysis procedure that differs from the commonly used ASME B31G criterion. Developed by the Norwegian company Det Norske Veritas, this method is employed for European and Asian pipelines. The DNV algorithm is generally considered to be more conservative than ASME B31G.
DEFECT	An anomaly for which an analysis, such as ASME B31G, would indicate that the pipe is approaching failure as the nominal hoop stress approaches the specified minimum yield stress (SMYS).
DEFORMATION PIG	A pig designed to record conditions such as dents, wrinkles, ovalities, bend radius and angle by making measurements of the inside surface of the pipeline.
DENTS	Dents are depressions in the pipeline that may be detected by the inline inspection tool. MFL tools may be able to detect dents, but may not be able to accurately size them.
DETECTION THRESHOLD	A characteristic dimension or dimensions of an anomaly that must be exceeded to achieve a stated probability of detection.
DOT192	Part 192 of the Code for Federal Regulations (CFR) Title 49 that addresses Gas Transmission Pipelines.
DOT195	Part 195 of the Code for Federal Regulations (CFR) Title 49 that addresses Transportation of Hazardous Liquids by Pipeline.
ECCENTRIC CASINGS	TDW tools detect when a casing is not centered on the pipeline. These casings are referred to as being eccentric. The closer the casing is to the pipeline, the stronger the signal seen by the inspection tool. The tool may not detect if the casing is shorted to the pipe wall. The tool might see evidence of a short, such as metal loss.
ESTIMATED REPAIR FACTOR (ERF)	The ratio of pipeline design pressure or in some cases MOP to the safe maximum operating pressure (P').
ERW (Electric Resistance Weld)	Describes a process used to form steel from a sheet into tubular form (pipe). Welds are formed by resistance heating of two edges of a metal sheet and then forcing them together to create a solid-state weld.
EXPANSION	Local increase of pipe diameter during service which indicates the yield stress of the pipe at that location has been surpassed.



General Inline Inspection Terms

GLOSSARY PART 3

General Inline Inspection Terms

FAILURE PRESSURE RATIO (FPR)	The ratio of the predicted failure pressure calculated by an analysis criterion (e.g. ASME B31G, RSTRENG, etc.) to the MAOP
FEATURE	Any physical object detected by an in-line inspection system. Features may be anomalies, components, or some other item.
FITTING	A branch connection attached to the pipeline which is smaller than the nominal pipe size that alters flow or diverts product (e.g. tap, offtake, split-tee, weld-o-let, thread-o-let).
GAIN (Metal in Close Proximity)	The inspection tool may detect ferrous metal objects located close to or touching the pipeline. They appear as additional metal added to the pipe and are referred to as gains. Clamps or anchors are considered gains as well as features such as puddle welds or CP connections. Generally, repairs such as patches or sleeves are called out as repairs even though they show appear in the data as gains.
GIRTH WELD	A circumferential weld joining two joints of pipe.
GIS	Geographic Information System is any system that captures, stores, analyzes, manages, and presents data that are linked to location. GIS is the merging of cartography and database technology.
GOUGE	Elongated grooves or cavities caused by mechanical removal of metal.
GPS (Global Positioning System)	The navigational system utilizing satellite technology to provide a user an exact position on the earth's surface. When coupled with known surface locations such as valves and AGMs, an ILI tool's INS or IMU can approximate or calculate the centerline of a pipeline.
GYROSCOPES (Gyros)	Electronic sensors used to measure change in direction of in-line inspection tool during inspection process. Displayed as pitch and yaw in PIGTRAP.
GROUP	A group is several pits that are grouped together using specific interaction rules. If a pit is a mountain peak, then a group is a mountain range. The reason for groups is so that the overall extent of the metal loss area can be evaluated. Most formulas for calculating the strength of the pipe wall around metal loss look at the overall length of metal loss after interaction rules have been applied to pits.
HALF SOLE	A device used to repair a pipeline by welding a small section over half the circumference of the pipe over the defect, literally half of a sleeve.
HALL SENSORS	A sensor that directly measures the remaining magnetic field strength not absorbed by the pipe.
HCA (High Consequence Area)	A criterion for pipelines designed by the Code of Federal Regulations which define what program and practices operators must use to manage pipeline integrity if the pipeline is located near a commercially navigable waterway, a high population area, or an unusually sensitive area.
HEAT AFFECTED ZONE (HAZ)	The region around a weld which has been metallurgically affected during the welding process.
HEAVY WELD	A girth weld in which the root pass or a portion of the root pass intrudes further than normal into the ID of the pipe. Not usually considered detrimental.
HIGH RESOLUTION	A term used to describe the function of TDW tools for use in MFL or Deformation analysis schemes. Both MFL and Deformation tools are considered high resolution.
IMPERFECTION	An anomaly with dimension and characteristics that do not exceed acceptable limits.



General Inline Inspection Terms

GLOSSARY PART 4

IMU (Inertial Measurement Unit)	Inertial measurement unit, or IMU, is the main component of inertial guidance systems. An IMU works by sensing motion including the type, rate, and direction of that motion using a combination of accelerometers and gyroscopes.
INCLUSION	An anomaly in the cross section of the pipeline caused by manufacturing processes. Inclusions may be detrimental if they protrude through the pipe wall. Refer to mill anomaly.
INDICATION	Any measured signal or response from an inspection of a pipe different than the normal baseline signal.
INS (Inertial Navigation System)	Refers to a system of accelerometers and gyroscopes to track the movement and orientation of the inspection tool through bends, turns, etc.
INTERACTION RULES	Specifications that establish spacing criteria between anomalies or defects (pits). If the indications or defects are proximate to one another within the criteria, the anomaly or defect is treated as a single larger unit or group for engineering analysis purposes.
INSPECTION	The use of a non-destructive inspection technique.
JOINT	A single section of pipe that is welded to others to make up a pipeline.
LACK OF FUSION (LOF)	In a weld, any area or zone that lacks complete melting and coalescence of a portion of the weld.
LAUNCHER	Refers to the beginning of the inspection; an oversize section of pipe equipped with sealing door through which the inspection tool is loaded into the pipeline.
LOCATION	A location is a feature in the pipeline that can be used to correlate the inspection tool data to above ground references. Common location features include valves, fitting, flanges, tees, casings, repairs and AGMs. For example, a metal loss area could be referenced as being 200 feet downstream from a valve. Not all locations can be easily found from aboveground.
LATITUDE & LONGITUDE	Latitude is the angular distance north or south from the earth's equator measured through 90 degrees. Longitude is the arc or portion of the earth's equator intersected between the meridian of a given place and the prime meridian and is expressed either in degrees or in time. Latitude and longitude are reported as GPS coordinates. Predicted GPS for features are provided in the Pipeline Listing section.
MAOP (Maximum Allowable Operating Pressure)	(or Design Pressure) The maximum internal pressure permitted in the operation of a pipeline as defined by the Code of Federal Regulations.
MAPPING PIG	An ILI tool that uses an IMU to collect data that can be analyzed to produce an elevation and plan view of the pipeline route.
MEASUREMENT THRESHOLD	A characteristic's dimension or dimensions above which anomaly measurements can be made.
MECHANICAL DAMAGE	A generic term used to describe combinations of dents gouges, and/or cold work caused by the application of external force. Damage includes coating, movement of metal and high residual stress.
METAL LOSS	Any of a number of types of anomalies in pipe in which metal has been removed from the pipe surface, usually due to corrosion or gouging.
MFL (Magnetic Flux Leakage)	An inspection technique in which a magnetic field is applied to a pipe section and measurements are taken of a magnetic flux density at the pipe surface. Changes in measured flux density indicate the presence of a possible defect.



General Inline Inspection Terms

GLOSSARY PART 5

MILL ANOMALY	The process of manufacturing pipe can often leave indications in the pipe wall. Typically these anomalies are not detrimental, and are identified for the benefit of the client.
MINIMUM BORE	The minimum measured Internal Diameter of the pipe at any particular point. Also referred to as minimum cross-section.
MISALIGNMENT	A girth weld anomaly where the two joints of pipe were not aligned properly prior to welding. Sometimes referred to as a hi-lo.
MOP (Maximum Operating Pressure)	The established maximum internal pressure expected during the operation of a pipeline, which cannot normally exceed the maximum allowable operating pressure (MAOP).
ODOMETER	Wheels on in-line inspection tool, which rotate along the pipe to measure the distance the tool has traveled.
ORIENTATION	The location of the reference around the circumference of the pipe, as viewed in the direction of flow (downstream). The value is represented in degrees 0-360° rotating clockwise around pipe. (0° = top of pipe, 90° = 3:00)
OVALITY	A condition in which a circular pipe forms into an ellipse, usually as the result of external forces.
P	Calculated pressure rating for the pipe. Per ASME B31G, it is the greater of either the established MOP for liquid lines (MAOP for gas lines), or $2stFT/D$, where S = SMYS, F = appropriate design factor from ASME B31G, T = Temperature derating factor, D = nominal outside diameter of pipe, and t = nominal wall thickness. See ASME B31G. In application, this variable is identical per DNV RP-F101, however it is calculated using different formulas and factors.
P' (Calculated safe maximum operating pressure)	Calculated safe maximum operating pressure for the pipeline segment as calculated based on information provided by the Customer. TDW software uses ASME B31G, MODIFIED ASME B31G, or DNV RP-F101 to calculate the safe maximum allowable operating pressure (P') of the pipeline at a metal loss area for liquid lines. The calculation also takes into consideration a temperature factor, for use when the line is at elevated temperature, and a safety factor. The default values used in calculations are a temperature factor of 1, and a safety factor of 72% (80% for Canada).
P_{fail} (Calculated failure pressure)	Calculated maximum operating pressure for the pipeline segment as calculated based on information provided by the Customer. TDW software uses ASME B31G, MODIFIED ASME B31G, or DNV RP-F101 to calculate the failure pressure (P _{fail}) of the pipeline at a metal loss area for gas lines. The calculation also takes into consideration a temperature factor, for use when the line is at elevated temperature, and a safety factor. The default values used in calculations are a temperature factor of 1, and a safety factor of 100%.
P'/P	Percent of maximum established pressure, this is calculated by dividing the calculated safe pressure of the defect (P') by the current established maximum operating pressure of the pipeline (P). For TDW reporting, P is either established MOP provided by the customer or the calculated pressure rating for the pipe (P). Percentages less than 100% are considered pressure-reducing.
P_{fail}/MAOP	Percent of MAOP, this is calculated by dividing the calculated failure pressure of the defect (P _{fail}) by the current MAOP of the pipeline (P). For TDW reporting, P is either established MAOP provided by the customer or the calculated pressure rating for the pipe (P).
PATCH	A device used to repair a pipeline by welding a small section of pipe on top of the defect.
PIG	A generic term signifying any independent, self-contained device, tool or vehicle that moves through the interior of the pipeline for purposes of inspecting, batching, dimensioning, or cleaning.



General Inline Inspection Terms

GLOSSARY PART 6

PIGTRAP	Pipeline Inspection Graphical Test Reporting and Analysis Program (PIGTRAP). Proprietary software developed by TDW Inc. for viewing data collected by the inspection tool.
PIPE SUPPORT	Any device used to support an aboveground pipeline.
PIT	Localized concentrated-cell corrosion on the external or internal surfaces that results from generation of a potential (voltage) difference set up by variations in oxygen concentrations within and outside the pit. The oxygen-starved pit acts as anode and the pipe surface acts as the cathode. If several pits are in close proximity to each other, they may be grouped together using interaction rules as one group.
PLANAR	An NDT term indicating a feature has two-dimensional characteristics like a fissure. Sometimes referred to as crack-like.
RSTRENG	A computer program designed to calculate the calculated safe maximum operating pressure (P') of corroded pipe. RSTRENG results are approximated when Modified B31G criteria is used.
REBOUNDING	The process of changing the dent depth and shape by internal pressure in the pipe. Generally, dents due to third-party contact will re-round, while dents due to rocks will not unless the rock causing the dent is removed.
RECEIVER	Refers to the ending of the inspection; an oversize section of pipe equipped with sealing door through which the inspection tool is retrieved from the pipeline.
REPORTING THRESHOLD	A parameter that defines whether or not an anomaly will be reported. The parameter may be a limiting value on the depth, width, or length of the anomaly or feature.
RESIDUAL DENT DEPTH	The dent depth measured under a particular set of conditions, e.g., in pressurized or un-pressurized pipeline. While maximum dent depth does not change, the residual or measured dent depth changes with pressure and loading. Also referred to as the measured dent depth.
RUPTURE PRESSURE RATIO (RPR)	The ratio of the predicted failure pressure calculated by an analysis criterion (e.g. ASME B31G, RSTRENG, etc.) to the pressure at specified minimum yield strength (SMYS)
SAFETY FACTOR	(or Design Factor) Typically 0.72 for liquid lines per ASME B31G (0.80 in Canada) . In setting the safety factor, due consideration has been given to and allowances made for the manufacturing tolerance and maximum allowable depth of imperfections provided for in the specifications. DNV RP-F101 uses a slightly different Total Usage Factor, which is entered as the Safety Factor in PIGTRAP. The typical 0.72 factor becomes 0.648 when applying the DNV modeling factor of 0.9.
SEAMLESS	Pipe that is manufactured by means of extrusion. This process typically creates significantly more variation in pipe wall thickness than ERW pipe.
SEAM VARIATION	Non-detrimental irregularity due to the manufacturing of the seam weld. An example is excess or variance in trim.
SEAM WELD (or SEAM)	The longitudinal or spirally-oriented weld in pipe connecting two edges of a formed plate which was created at the pipe mill.
SLEEVE	A device used to repair a pipeline by welding a small section of pipe over the full circumference of the pipe over the top of the defect.
SpirALL™ Magnetic Flux Leakage	A tool system that unites a conventional axial MFL and a unique spiral MFL tool section into one tool combining the benefits of each for enhanced defect characterization and sizing.



General Inline Inspection Terms

GLOSSARY PART 7

Spiral MFL (SMFL)	A unique type of MFL tool section that creates an oblique, near-45 degree magnetic field within the pipe wall. This allows detection and characterization of long and narrow metal loss or seam features on par with circumferential or transverse MFL tools.
SPACER	A device used to maintain space between a casing and a pipeline.
SMYS (Specified Minimum Yield Strength)	A required strength level that measured yield stress of a pipe material must exceed, which is reported as pipe grade. The measured yield stress is the tensile stress required to produce a total elongation of 0.5 percent of a gage length as determined by an extensometer during a tensile test.
STITCHING	Intermittent or repeating lack of fusion in a seam weld.
TEMPERATURE FACTOR	Typically 1.0 unless the metal temperature is expected to exceed a normal temperature range of -20°F (-30°C) to 250°F (120°C).
THIRD PARTY DAMAGE	Damage to a pipeline system by an outside party. See mechanical damage.
TRACKING	The process used to monitor the progress of the inspection tool through the pipeline. AGM boxes are placed at aboveground marker reference locations to record the passage of the inspection tool.
TRAP	Pipeline facility for launching and receiving tools and pigs.
VOLUMETRIC	A term indicating a feature has three-dimensional characteristic similar to a typical corrosion pit.
WELD ANOMALY	Any area or zone in a weld that lacks complete melting and fusion of a portion of the weld which could have occurred during the welding process or caused by corrosion.
WRINKLE	A smooth and localized bulge visible on the outside wall of the pipe.
WRINKLE BEND	A field bend that contains smooth and localized bulges on the inner radius of the bend, sometimes formed when pipe is cold bent.



Appendix A

Database and Reporting Details

1. The Graphs, Dig Sheets, and Tables used in this report were generated using a standalone reporting engine from data contained in a Microsoft Access™ database.
2. If the end user has Microsoft™ Access on their computer, they have complete access to the inspection database. The database file which has an extension of *.mdb (Microsoft™ database) is stored in the same directory as the tool data. Although the printed reports and report spreadsheet were generated by a standalone reporting engine, using Access the user can customize some basic graphs or tables contained in the database. Alternatively, the data can be exported to a spreadsheet if preferred.
3. The PigTrap™ software, included with this report, provides the user with an easy way to view the data collected by the TDW in-line inspection tool and can also be helpful when trying to locate certain features or specific sections of pipe. The software can be run off various media or installed onto a network or hard drive. Please refer to Appendix B for installation requirements and instructions.
4. For dig sheet creation, please refer to Appendix C.
5. TDW inspection tools are designed to detect various features and anomalies within a pipeline. These various features and anomalies are added to the database using PigTrap™ software by qualified Data Analysts.
6. Database Numbering System: All entries in the database have a unique number assigned to them. The table below lists the number range of each category of database records.

7. All records are numbered sequentially from the beginning of the pipeline section to the end of the pipeline section. By default Welds begin at 110 and are incremented by 10 from one weld to the next. This can be altered to match customer weld or joint numbering by request.

Welds	110	to	9,999,999
Locations	10,000,000	to	10,999,999
Pipe	11,000,000	to	11,999,999
Misc	12,000,000	to	12,999,999
Gains	13,000,000	to	13,999,999
Deformations	14,000,000	to	14,999,999
Bore Restrictions	15,000,000	to	15,999,999
Pits or Other Defects	20,000,000	to	39,999,999
Groups (of Pits)	40,000,000	to	49,999,999
Seam Welds	51,000,000	to	51,999,999

8. All other records are incremented by 1 from one record to the next. For example, the first Location record would be numbered 10,000,000, the second record would be 10,000,001, and the third record would be 10,000,002, etc. Depending on information sent out previous to the final report, numbering may change during analysis of the run.



Appendix B

Installation Instructions for PigTrap™ Pipeline Inspection Graphical Test/Report Analysis Program

The PigTrap™ software allows the user to view all of the data collected during the Magpie/TDW inline inspection survey. Installation requires the disk(s) or external drive that accompany the inspection report.

System Requirements

Before you install and run PigTrap™ please verify that the computer you are installing to meets the minimum requirements needed to successfully open and operate PigTrap™.

Windows OS

- Microsoft® Windows 7, Vista®; Windows® XP Professional, Home Edition
 - o Administrator rights required
- 2.0 GHz Intel® Core™ 2 Duo Processor or higher
- 2 GB RAM or more
- 1 GB available hard drive space plus additional necessary for the run size.
- Qualified hardware-accelerated OpenGL graphics card, 32-bit color, and 256MB of VRAM (latest manufacturer drivers strongly recommended also).
- Microsoft® Access 2003 or higher
- Microsoft® .NET Framework 3.5 Service pack 1
- Microsoft® Visual C++ 2008 SP1 Redistributable Package (x86)
- Microsoft® Report Viewer 2008 SP1

What electronic data accompanied the inspection report

The CD, DVD, or external drive supplied by T.D. Williamson, Inc. for this PigTrap™ inspection of your pipeline contains the following types of files. For CD or DVDs the first disk will contain these files while accompanying disks (if any) contain raw tool data only. External drives will contain this information in the Final Report folder on the external drive under the run name folder.

- Database – .MBD (Microsoft Data Base) Files of this type may be viewed through Microsoft Access. This file contains the analysis of the inspection.
- .rsf – This is a PigTrap™ reference file which holds specific settings for the run to be viewed.
- Spreadsheet – .XLS (Microsoft Excel) A Pipeline Listing is generated for your run in an Excel spreadsheet format. Each event at a particular location is identified and described. You may use Copy and Paste techniques to build your own custom formatted report.
- Setup.exe file – This file executes the installation of the data for the specific run contained on the disk(s) or external drive.

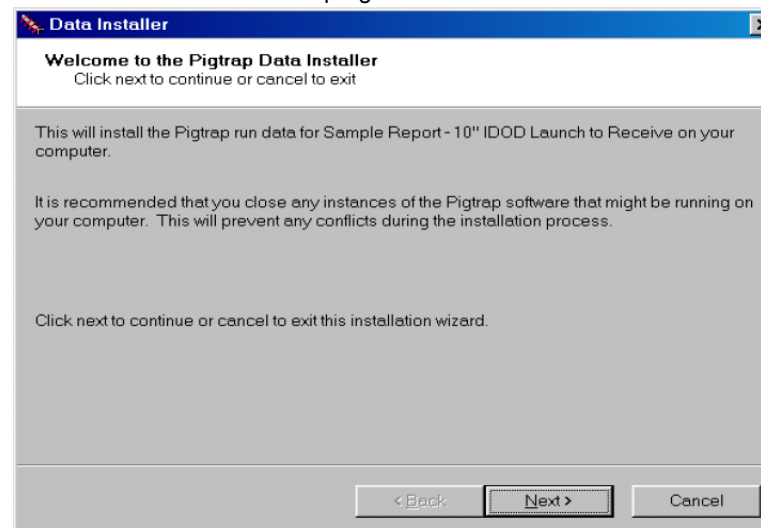
- h*.nnn, c*.nnn, i*.nnn, p*.nnn, t*.nnn, l*.nnn & o*.nnn – The raw tool data created on-board the inspection tool. These files are necessary for PigTrap™ to function properly. CD and DVDs have the option to install these files onto your computer, if chosen not to install them to your computer the disks must be used to view the run.

Run Data and PigTrap™ Installation

The inspection report will be accompanied by either CDs, DVDs, or an external drive containing all files necessary for installation. Installation for CDs and DVDs differs from external drives, if an external drive accompanied your final report please skip to PigTrap™ Installation.

CDs and DVDs

1. Insert Disk 1 from the report binder into your computer's CD/DVD drive.
2. Access the Setup.exe program located on the CD or DVD. This can be done by browsing to your computer's CD/DVD drive and double clicking Setup.exe. This will launch the Data Installer program.



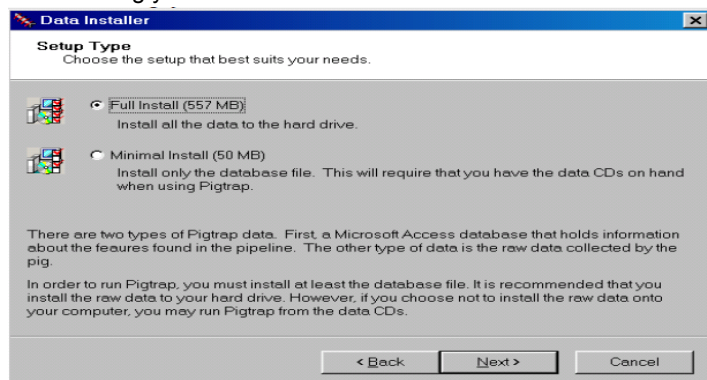
Note: If you want to install only the Pigtrap™ software and not the run data (advanced users only), choose Cancel and go to the Pigtrap™ Installation steps on page 3.

3. Click Next to continue installing the run data.

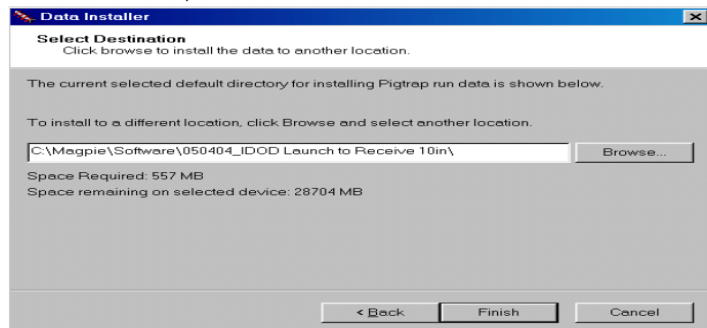


Appendix B

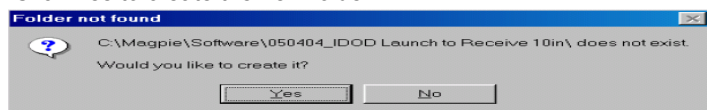
4. Choose the type of install you would like to perform: Full Install (recommended) or Minimal Install. The size of the installation is shown next to each type of installation. The database file must be installed for PigTrap™ to operate properly, but you may choose to not install the raw data. If you choose to not install all the data, you may need to change disks while viewing the data in PigTrap™. Click Next to continue after making your choice.



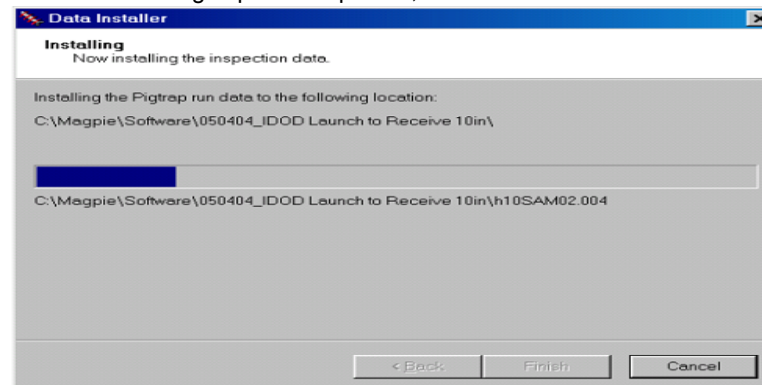
5. Choose the installation location on your computer for the data files. The default and recommended location is C:\Magpie\Software. The location inside this folder is based on the trap date, name, and size of the run. If you would like to specify another location, click the Browse... button. Click Finish to continue.



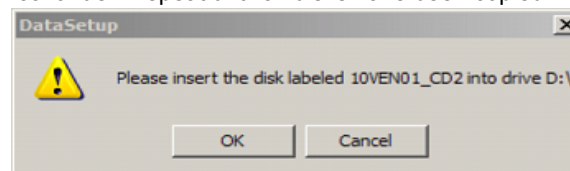
6. If the installation folder does not already exist, then you will be prompted to create it. Click Yes to create the new folder.



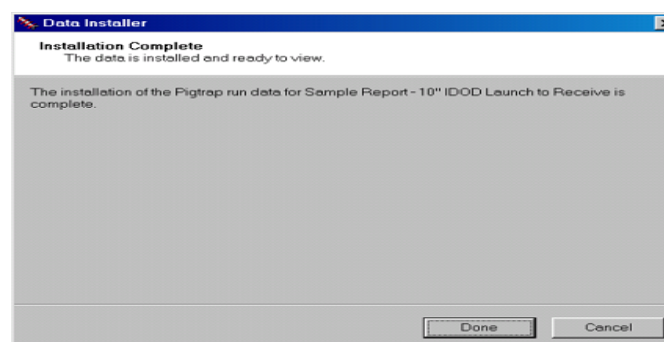
7. The following progress bar will appear. There may be a short delay while the database is being copied. Be patient, this is normal.



8. You may be prompted to insert other disks from the run distribution if data was supplied on more than one disk. Insert the required disk and click OK to continue. Repeat until all disks have been copied.



9. Click Done to complete the run data installation.



10. After clicking Done in the Data Installer PigTrap™ Installation will automatically launch.

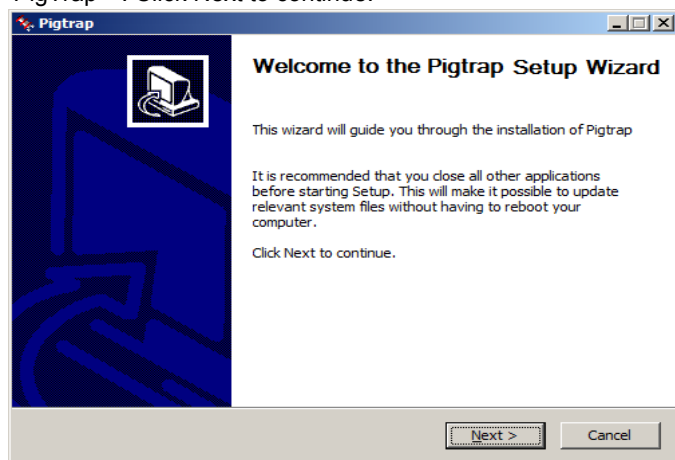


Appendix B

PigTrap™ Installation

Note: CD and DVDs follow a slightly different installation process. Steps 1 and 2 are for external drives, if you are installing from CDs or DVDs please skip to step 3.

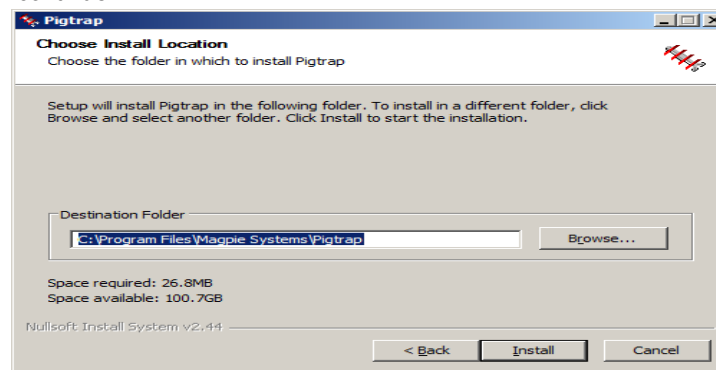
1. Plug the external drive into your computer.
2. Access the PigTrap™ setup.exe located on the external drive. This can be done by browsing to external drive and double clicking PigTrap™ setup.exe.
3. PigTrap™ Setup Wizard will launch. This will guide you through the installation of PigTrap™. Click Next to continue.



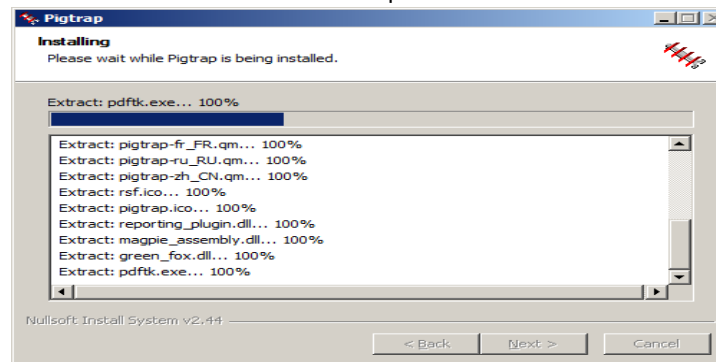
4. The Software License Agreement will appear. Read the agreement select I Agree to continue. You must accept the agreement to install PigTrap™.



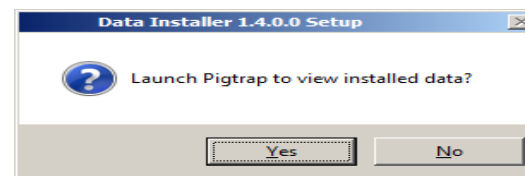
5. Choose the installation location on your computer for the PigTrap™ software. The default and recommended location is C:\Magpie\Software. Click Install to continue.



6. The following progress bar will appear while PigTrap™ installs all the necessary files. Once the installation has completed click Finish to close the wizard.



7. When prompted whether you would like to view the run data, click Yes to launch PigTrap™. Shortcuts are now on the desktop to the run and to PigTrap™. Once PigTrap™ opens with the data, choose save in the upper left of the data view.





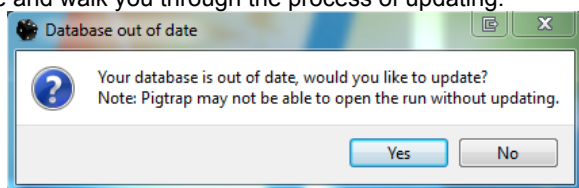
Appendix B

Opening and Viewing the Inspection Data

Viewing the inspection data in PigTrap™ can be done by using one of three different methods.

1. Double click on PigTrap™ .exe icon. Click on the Open Folder icon, then browse to the installed inspection data folder and select the desired .rsf or .mrsf file.
2. Double click on a run settings file (.rsf or .mrsf) that is associated with PigTrap™.
3. Drag and drop a run settings file (.rsf or .mrsf) on top of the PigTrap™ .exe file.

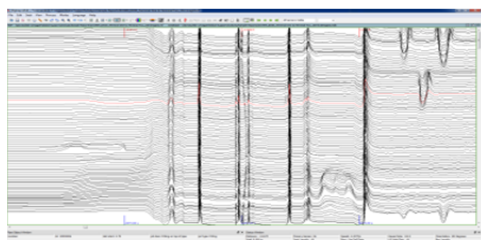
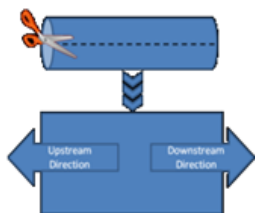
PigTrap™ was designed so you would have the ability to review previous TDW/Magpie inspection data when needed. However, you may need to acquire an updated Microsoft Access Data-base from one of our TDW representatives. When opening previous data in PigTrap™ you may encounter the message, "Your database is very old. You may need to update it." If this happens, don't panic. Chances are you will be able to view the data without any problems. If you can't, just contact your TDW representative and we can send you a newer database and walk you through the process of updating.



We packed so much into the new PigTrap™ the older reference files just couldn't hold it all so a new one may need to be created. Once the new reference file finishes, you will be able to freely navigate around in PigTrap™.

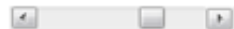
What am I looking at?

The data viewed in PigTrap™ is a 360 degree snapshot of the inside of the inspected pipe. This captured data is sliced down the middle and laid flat in the PigTrap™ main display. The horizontal lines represent sensor data collected from the pigging tool. Each line is one sensor. The left side of the screen is "upstream" while the right side of the screen is "downstream". So, as you scroll from left to right you are moving downstream from the launch valve.



Basic Navigation

The horizontal scrollbar at the bottom of the main view moves the view upstream or downstream. Clicking on the left arrow moves upstream while clicking on the right arrow moves downstream.

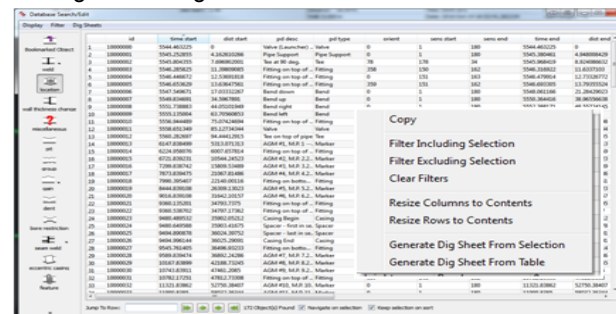


The vertical scrollbar at the right side of the main view rolls the data vertically to a desired orientation of the view.

Zooming IN/OUT on the data is easily performed by clicking on the Zoom buttons.

Select the "Jump to Distance" icon from the run toolbar to enter a desired distance point to navigate in the inspection data. The option "View Width" sets how much viewable area to display (time based).

Click on the binoculars to open the Database/Search Edit (DSE). This displays a table of the pipe objects marked by the Data Analysis personnel. The buttons in the DSE allow for a high level filtering of specific types of marked pipe objects in the table. Right click on any pipe object to display a context menu of filtering, resize columns/rows and generate dig/feature sheets.



For example: Launch and Receive Valves can be found under "location" button, you'll also find Bends, Tees, Markers, etc.

For additional information regarding dig/feature sheet creation, see Appendix C.

Training

For detailed Pigtrap training, contact your TDW representative.

Appendix B



Appendix B

Trouble Shooting

Issue	Possible Cause	Possible Solution
"Data files missing" message displayed on the Main view.	PigTrap™ is not able to load the necessary data file(s) because they are missing, not installed correctly, media/hardware damage (Dirty or scratched CD/DVD, drive failure).	Please reinstall the inspection data, check the run setting has the correct path to the files (Run Settings>Files>Data File Directory), clean the CD/DVD.
"Generate Dig Sheet" is not available from the DSE.	PigTrap™ is not installed correctly.	Please reinstall PigTrap™.
Main window title bar is not visible.	Full screen is enabled.	Press "F11" on the keyboard.
Not able to highlight pipe objects.	The color bit depth is not set correctly.	PigTrap™ requires a 32 bit color depth, please contact IT to assist in changing to the correct setting.
	One of the task specific modes is enabled.	Press the "Done" or "Cancel" buttons from the bottom left.
REF error message.	If this is the first time opening a run with PigTrap™, it may attempt to create a reference file (.ref2). This message appears because a .ref2 file does not exist or it is corrupt.	Select OK to create a new ref2 file.
Can't see the sensor data.	Zoomed in very close.	Click on the Zoom OUT button.
	Sensors are not enabled.	Turn on the sensors from the Run Toolbar.
Can't find the Status/Database Window.	The Status/Database windows are not enabled	Go to View>Status Window and toggle the option ON
Crashes while opening.	The video card drivers are out of date.	Update the graphic card drivers. Note: Before installing the latest driver, you may need to uninstall the current drivers while in Windows safe mode. Can also turn off shaders.
	The .rsf is corrupt and needs replacing.	Reinstall the inspection data.
	Microsoft Visual C++2010 redistributable is corrupt or not installed.	This is typically installed the TDW Inspection data. It is possible to have a corrupt install and additional help may be required to correct the issue. Please contact your local IT department to assist with the prerequisite install.



Appendix B

Tool Bar Layouts and Functions

Run Toolbar

The run toolbar will contain button that will toggle different views, traces and features on and off. Some of the features will be technology specific, such as IDOD as proximity sensors are only present on MFL tools. The arrows next to some buttons will provide additional options related to the specific button. Each window can be undocked by clicking and dragging the dotted left side of the toolbar.



Main

The main toolbar contains navigation buttons that will aid in viewing run data and seeking to specific distances or locations.



Database Navigation

These buttons navigate to features listed in the DSE.



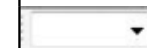
Sensor Visibility

PigTrap™ allows user to zoom in on specific set of sensors, this dialog will display what sensors are currently being viewed. To return to viewing all sensors simply zoom out (-).



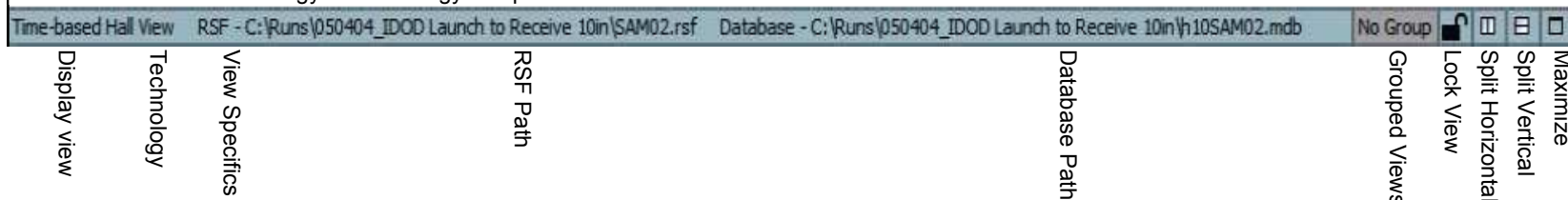
Quick Search

The quick search allows users to quickly search for features by typing in a certain criteria, such as '+valve' this will jump to the next downstream valve.



Run Details Status Bar

The run details status bar displays information regarding the view-type (time or distance), the location of the RSF and database and allows for the splitting of multiple views. Additional views can be split vertically or horizontally and even un-docked into a separate window using the button that appears after a view has been split. Locking a view will keep the current view in place. This feature will allow for multiple runs to be open in the same PigTrap™ for easier run to run or technology to technology comparison.





Appendix B

Displayed Information and Shortcuts

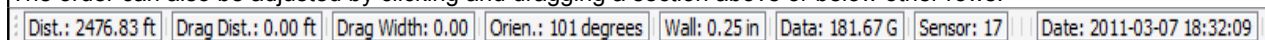
Pipe Object and Status Windows

The Pipe Object and Status Windows will be defaulted to the right side of PigTrap™. Both windows can be docked and undocked by double clicking the title bar, left clicking and dragging or clicking the undock button located in the top right corner. As PigTrap™ has the ability to display multiple datasets the Status Window will update each section depending on which tool technology is selected (refer to the Run Details Status Bar on the Tool Bar Layout and Functions page). The information contained in each section of the Status Window can also be customized by right clicking on the desired section and selecting what data to display.

	<p>The pipe object window will display information about a highlighted feature, such as a weld, providing the weld ID and Distance. Features are highlighted when the cursor is placed upstream of an object and the object becomes highlighted with a teal color.</p>	
	<p>The General section of the Status Window will display information pertaining to all datasets. The information is dependent on the cursor location, displaying the current distance, orientation, wall thickness, joint length, up stream weld and date and time. The drag distance and drag width is populated when a box is drawn and can be useful when manually measuring lengths and widths.</p>	
	<p>The MFL window will display information for the current highlighted sensor. The highlighted sensor will be a red line over the entire sensor. These sensors can be turned on and off using the Esc key.</p>	
	<p>The IDOD window will display information for the current highlighted IDOD sensor. The IDOD sensors can be turned on by pressing the tilde (~) key.</p>	
	<p>The odometer section displays information about the speed for the current cursor location.</p>	

Status Bar

The Status Bar is located at the bottom left of PigTrap™ and contains much of the same information as the General section of the Status Window. It can also be customized by right clicking and selecting what information to display. The order can also be adjusted by clicking and dragging a section above or below other rows.



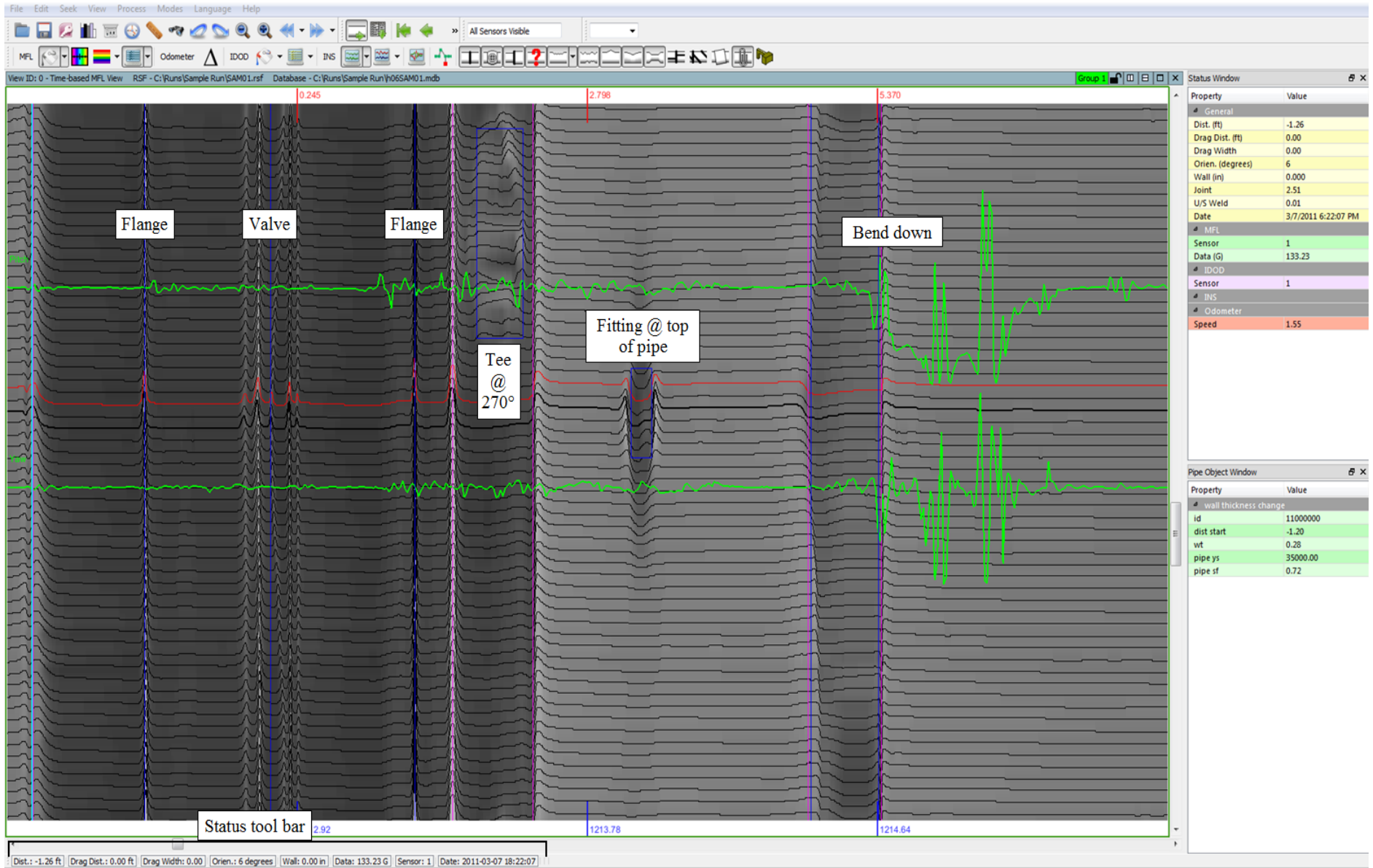
Keyboard Shortcuts

Ôd ÆÁ	Jump to Launch Valve
Ôd ÆÁ	Jump to Receive Valve
	Move Half Screen Downstream
	Move Half Screen Upstream
Page Down	Move Full Screen Downstream
Page Up	Move Full Screen Upstream
	Rotate Orientation Up
	Rotate Orientation Down
Mouse Wheel	Rotate Orientation
Ctrl + F	Open Database Search Edit (DSE)
Spacebar	Repeat Last DSE Find
Ctrl + Z	Undo Last View
Ctrl + Shift + Z	Redo Last View
Ctrl + D	Jump to Distance
Ctrl + T	Jump to Time
Ctrl + H	Open Deformation Cross Section
Ôd ÆÁ	Jump to Downstream Marker Trip
Ôd ÆÁ	Jump to Upstream Marker Trip
Alt + Double Click	Hide Status Windows
Esc	Turn Hall sensors on/off
Tilde (~)	Turn IDOD sensors on/off
M	Measure dragged box



Appendix B

PigTrap™ MFL Runs

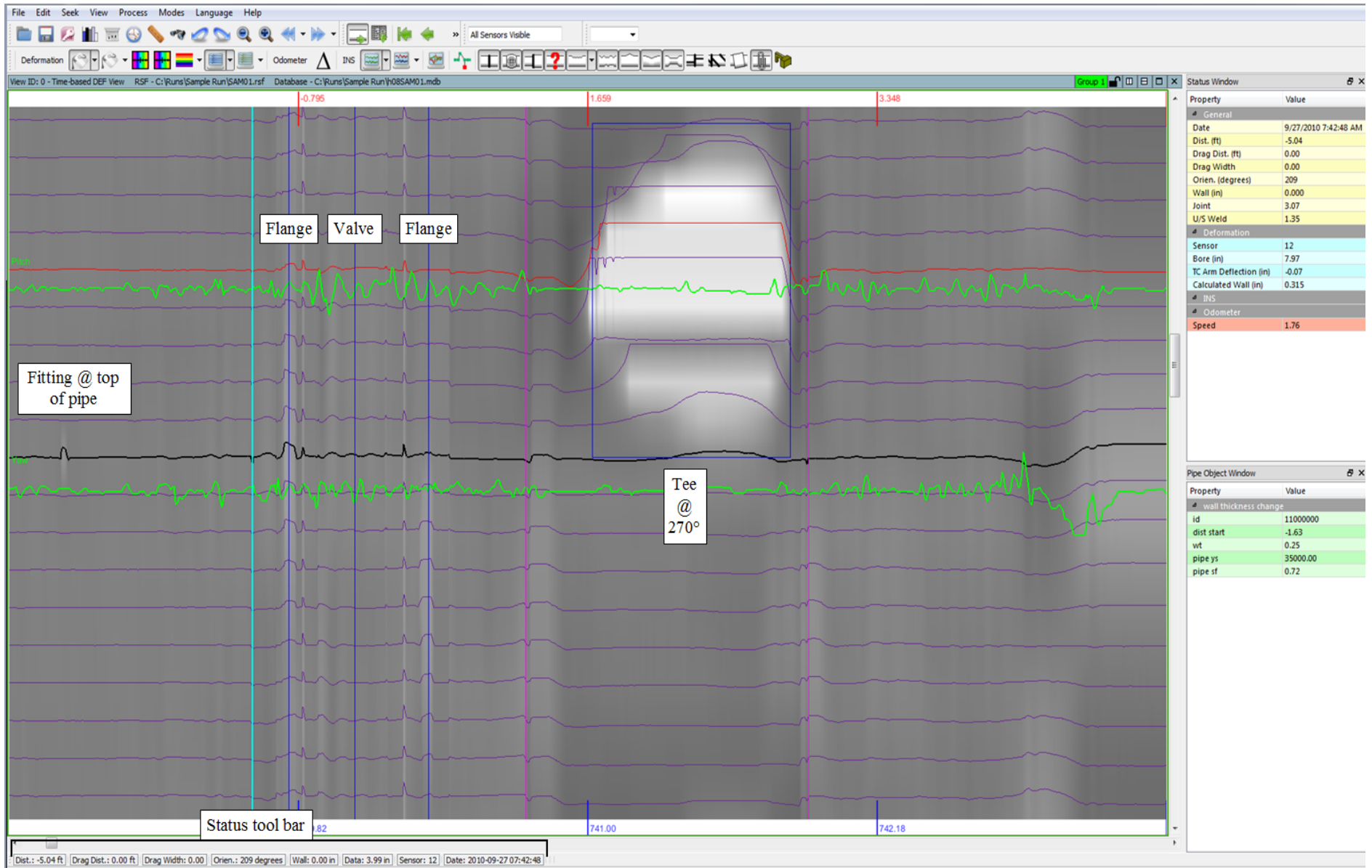


Appendix B



Appendix B

PigTrap™ DEF Runs



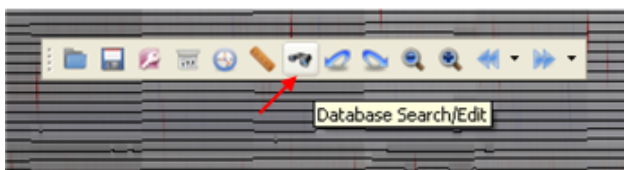
Appendix B



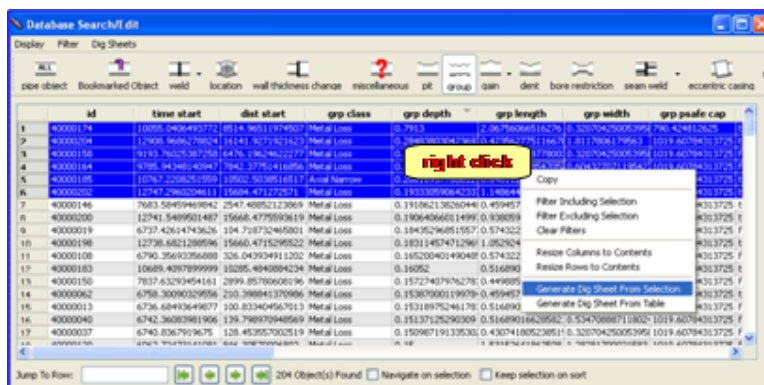
Appendix C

The user can view and print dig sheets for any anomaly or feature detected in the pipeline including Metal Loss (Groups or Pits), Dents, Locations, Gains, Wall Thickness changes, Welds, Miscellaneous notes, etc.

1. Open PigTrap™ to view the inspection data for the run. Please consult Appendix B if you need instructions on installing and viewing the raw data.
2. Click on the Database Search/Edit option either by clicking on the small binoculars icon in the toolbar or choosing the option under the Seek toolbar.
4. Once the list populates with that type of object, you can filter or sort the data to find the object(s) for which you want to create dig sheets.
 - a. Clicking on the header of the column will sort either ascending or descending. Click again to reverse the order.
 - b. You may also use or create various filters by clicking on one of the two Filters buttons.
 - c. There is also a Displayed Columns button which allows you to hide or show the various columns of data.



a. This will bring up the Database Search/Edit (DSE) window.



3. You can choose what type of feature you want to list in the window by clicking on the icon in the margin.
5. Right clicking in the table or choosing the Dig Sheets option in the top toolbar will allow you to create dig sheets one of two ways:
 - a. Generate Dig Sheet From Selection – This will create a separate dig sheet for each of the highlighted rows in the list. Using the Ctrl key or the Shift key and clicking rows will allow for multiple row selection.
 - b. Generate Dig Sheet From Table – This will create a separate dig sheet for every item in the list whether highlighted or not. Note that if the list contains a lot of features, this could lead to numerous dig sheets being created and may impact the short term performance of your computer while they are being generated.
6. The dig sheets you requested will automatically be previewed for easier printing as well as saved to a directory as a pdf file for printing later.
 - a. To choose which directory the dig sheets are saved into, choose Report Creation Settings under the Dig Sheets option in the top toolbar.
7. Also under the Dig Sheets toolbar in the DSE window, you may change various dig sheet formatting preferences by clicking on Dig Sheet Settings option.