

Pipeline Inspection Report



T.D. Williamson
Pipeline Performance™

Company Name

Hiland Crude, LLC

Project Name

Epping Injection to Catwalk

Pipe Size

8"

Inspection Date(s)

May 13, 2014

Report Date(s)

Jul 1, 2014

TDW Regional Office

TDW Services, Inc.





Executive Summary - GMFL Inspection

Executive Summary - GMFL Inspection

RUN INFORMATION

Hiland Crude, LLC
 David Wint

Epping Injection to Catwalk
 8" Crude

	Launcher	Receiver
Location:	Epping Injection	Catwalk
Date/Time:	5/12/2014 7:35:16 PM	5/13/2014 7:35:33 PM
Stationing:		
GPS - LAT:	48.255926626	48.270715712
GPS - LONG:	-103.274712843	-103.452932796
Duration of run - Hours:	9.6	Average Velocity: 1.38 ft/sec
Pipeline Length:	47,803.00 ft	Maximum Velocity: 4.02 ft/sec
On-site Representative:	Florian Pamer	Data Analyst: Ben Stehling
Contact:	David Wint	
		Tool Tracking By: Cherokee

INSPECTION FINDINGS

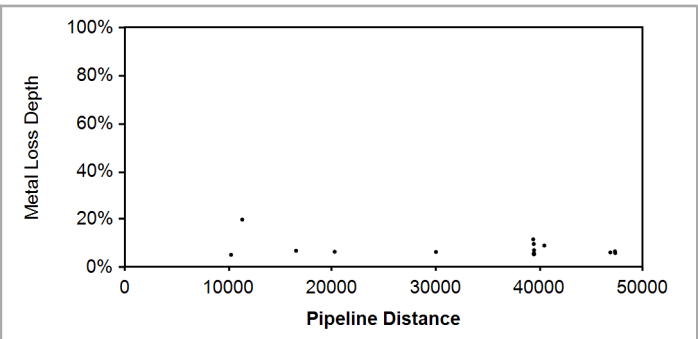
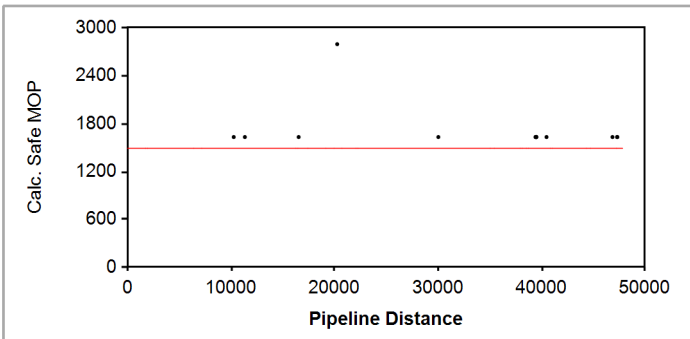
Current Established Maximum

Criteria Used: ASME B31G: Modified

Operating Pressure of Pipeline: 1,480.00 psi

Defect Interaction Rule: 1 inch between pits

Welds Detected: 1,150	Valves Detected: 2	Fittings Detected: 0	Markers Detected: 10	Gains Detected: 1
Casings Detected: 1	Tees Detected: 3	Flanges Detected: 5	Repairs Detected: 0	Deformations Detected: 1
P' < P*: 0	M/L pits: 17	M/L grouping: 16		
Internal groups: 6	External groups: 10			



* 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 16 metal loss groups (6 Internal/10 External) were detected on the inspection survey, of which the deepest is reported at 20%. Using an established maximum operating pressure of 1,480 psi, 0 of the metal loss features appear to be pressure reducing.

Inspection data was obtained for the full length (47,803 feet / 9.05 miles) of the survey. The quality of the inspection data is satisfactory for a comprehensive assessment of this pipeline segment.

This run experienced a tool reversal of 8000' causing duplicate data of 16,000' beginning at 30,438'. Duplicate data was removed and restored to the correct distance corresponding to the DEF run.



Executive Summary - GMFL Inspection

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. Due to the tool backup and subsequent fix to the odometer data on both the GMFL and XYZ data, we cannot guarantee the specification accuracy of within 1 meter 80% of the time.



Executive Summary - Deformation

RUN INFORMATION

Hiland Crude, LLC
 David Wint

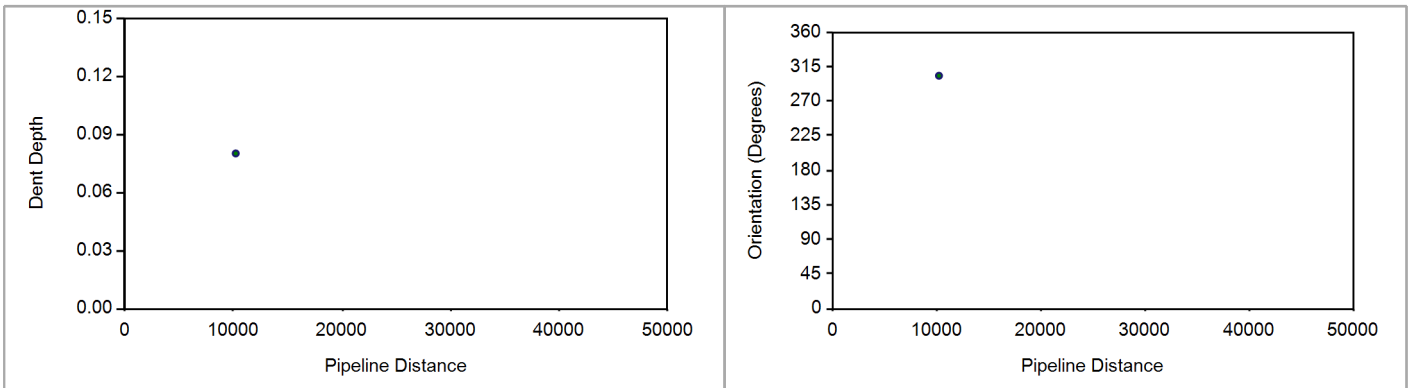
Epping Injection to Catwalk
 8" Crude

	Launcher	Receiver
Location:	Epping Injection	Catwalk
Date/Time:	5/12/2014 1:04:40 PM	5/12/2014 4:54:20 PM
Stationing:		
GPS - LAT:	48.255926626	48.270715712
GPS - LONG:	-103.274712843	-103.452932796

Duration of run - Hours: 3.83 **Average Velocity:** 3.46 ft/sec **Tool Tracking By:** Cherokee
Pipeline Length: 47,680.00 ft **Maximum Velocity:** 5.01 ft/sec
On-site Representative: Florian Pamer **Data Analyst:** Ben Stehling

INSPECTION FINDINGS

Deformations Detected: 1 **Ovalities Detected:** 0 **Expansions Detected:** 0 **Heavy Weld Detected:** 0 **Valves Detected:** 2



INSPECTION DETAILS

Inspection data was obtained for the full length (47,680 feet / 9.03 miles) of the survey. The quality of the inspection data is satisfactory for a comprehensive assessment of this pipeline segment.

A total of 1 deformation (1 dent) was detected on the inspection survey which is reported at 0.08 inch.



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.



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

Metal Loss Summary

ID#	Dist (ft)	Depth	Length	Width	ID/OD	Orientation		P'	% Est. Press. (P'/P)	Above-Ground References	Distance from Defect
						Deg	O'clock				
40000001	11,322.3	19.9%	0.79	0.48	INT	134	4:15	1632.2	100.0	U/S: AGM 030 -- Han #8607 D/S: AGM 040 -- Han #8592	689.97 3721.18
40000005	39,411.0	11.7%	0.32	0.33	EXT	99	3:15	1632.2	100.0	U/S: AGM 070 -- Han #8749 D/S: AGM 080 -- Han #3672	3260.88 3845.71
40000006	39,464.8	9.8%	0.39	0.33	EXT	204	6:45	1632.2	100.0	U/S: AGM 070 -- Han #8749 D/S: AGM 080 -- Han #3672	3314.72 3791.87
40000012	40,481.8	9.1%	0.47	0.40	EXT	206	6:45	1632.2	100.0	U/S: AGM 070 -- Han #8749 D/S: AGM 080 -- Han #3672	4331.71 2774.87
40000011	39,487.8	7.2%	0.37	0.51	INT	193	6:15	1632.2	100.0	U/S: AGM 070 -- Han #8749 D/S: AGM 080 -- Han #3672	3337.75 3768.84
40000002	16,519.8	6.9%	0.28	0.34	EXT	69	2:15	1632.2	100.0	U/S: AGM 040 -- Han #8592 D/S: AGM 050 -- Survey Point	1476.36 5784.77
40000014	47,298.7	6.7%	0.62	0.74	EXT	239	7:45	1632.2	100.0	U/S: AGM 080 -- Han #3672 D/S: Pipe Exiting the Ground, Catwalk -- Han #8023	4041.99 493.78
40000004	30,022.8	6.4%	0.41	0.33	INT	5	12:00	1632.2	100.0	U/S: AGM 050 -- Survey Point D/S: AGM 060 -- Han #8764	7718.25 811.29
40000013	46,855.1	6.2%	0.49	0.53	EXT	87	2:45	1632.2	100.0	U/S: AGM 080 -- Han #3672 D/S: Pipe Exiting the Ground, Catwalk -- Han #8023	3598.45 937.31
40000015	47,328.0	6.0%	0.77	0.66	EXT	255	8:30	1632.2	100.0	U/S: AGM 080 -- Han #3672 D/S: Pipe Exiting the Ground, Catwalk -- Han #8023	4071.28 464.48
40000008	39,481.1	5.9%	0.39	0.37	EXT	194	6:15	1632.2	100.0	U/S: AGM 070 -- Han #8749 D/S: AGM 080 -- Han #3672	3331.04 3775.55
40000007	39,467.7	5.7%	0.33	0.38	EXT	203	6:45	1632.2	100.0	U/S: AGM 070 -- Han #8749 D/S: AGM 080 -- Han #3672	3317.56 3789.02
40000010	39,482.9	5.5%	1.54	0.58	INT	199	6:30	1632.2	100.0	U/S: AGM 070 -- Han #8749 D/S: AGM 080 -- Han #3672	3332.79 3773.80
40000009	39,482.5	5.4%	0.33	0.52	INT	199	6:30	1632.2	100.0	U/S: AGM 070 -- Han #8749 D/S: AGM 080 -- Han #3672	3332.44 3774.15
40000000	10,245.4	5.2%	0.53	0.91	EXT	289	9:30	1632.2	100.0	U/S: AGM 020 -- Han #8208 D/S: AGM 030 -- Han #8607	4257.20 386.87



Metal Loss Summary

ID#	Dist (ft)	Depth	Length	Width	ID/OD	Orientation		P'	% Est. Press. (P'/P)	Above-Ground References	Distance from Defect
						Deg	O'clock				
40000003	20,245.8	6.5%	1.14	0.95	INT	91	3:00	2795.5	100.0	U/S: AGM 040 -- Han #8592 D/S: AGM 050 -- Survey Point	5202.29 2058.84

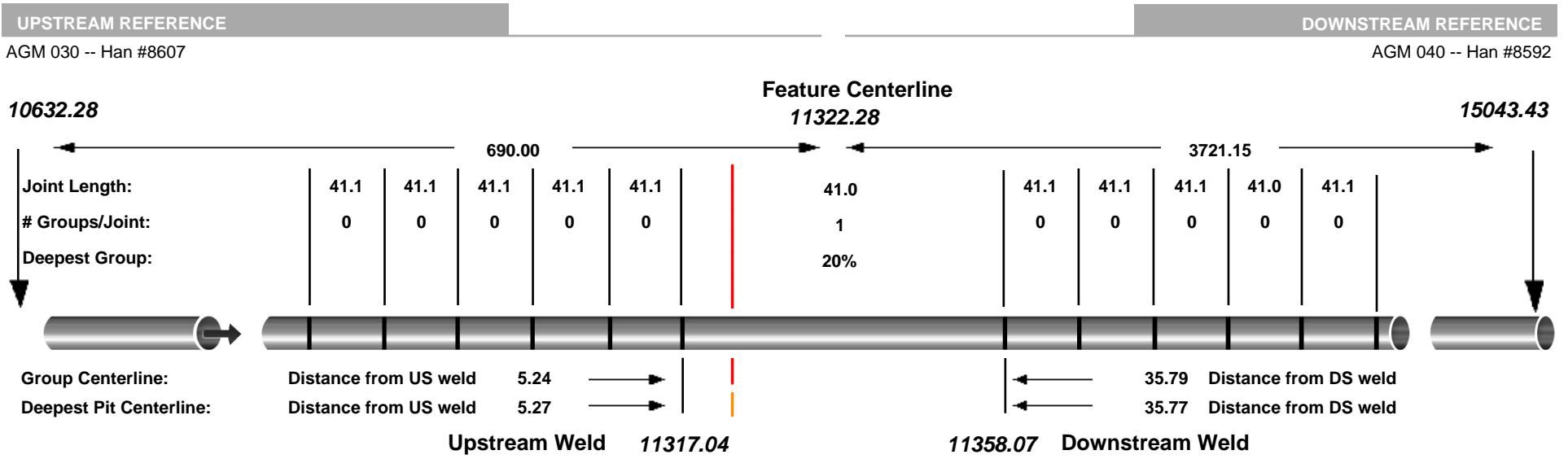
This report shows a maximum of 100 metal loss groups.

Type	Number
Metal Loss	16

Metal Loss Summary



GROUP - Dig Site Information Report

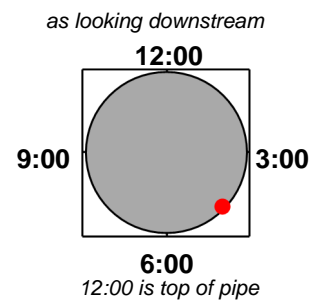


Dig Site Report

Feature Information

ID:	40000001	Distance from Launcher:	11322.28	Feature Description
Time:	5889.49	Orientation on Pipe Wall:	4:15	Metal Loss - INTERNAL
Latitude:	48.25807316	Longitude:	-103.32029891	Wall Thickness: 0.188
				Altitude: 2223.079

Feature Orientation



Upstream Locations		Downstream Locations	
663.26	Bend left - 26 deg., 3D	1981.43	Bend left - 21 deg., 3D
890.99	Bend right - 25 deg., 3D	3827.30	Bend right - 45 deg., 3D
4210.58	Bend right - 15 deg., 1.5D	8028.07	Bend right - 40 deg., 3D
4238.53	Bend left - 20 deg., 3D	10451.54	Bend left - 45 deg., 3D
5257.12	Bend right - 24 deg., 3D	10986.09	Tee at 90 deg.

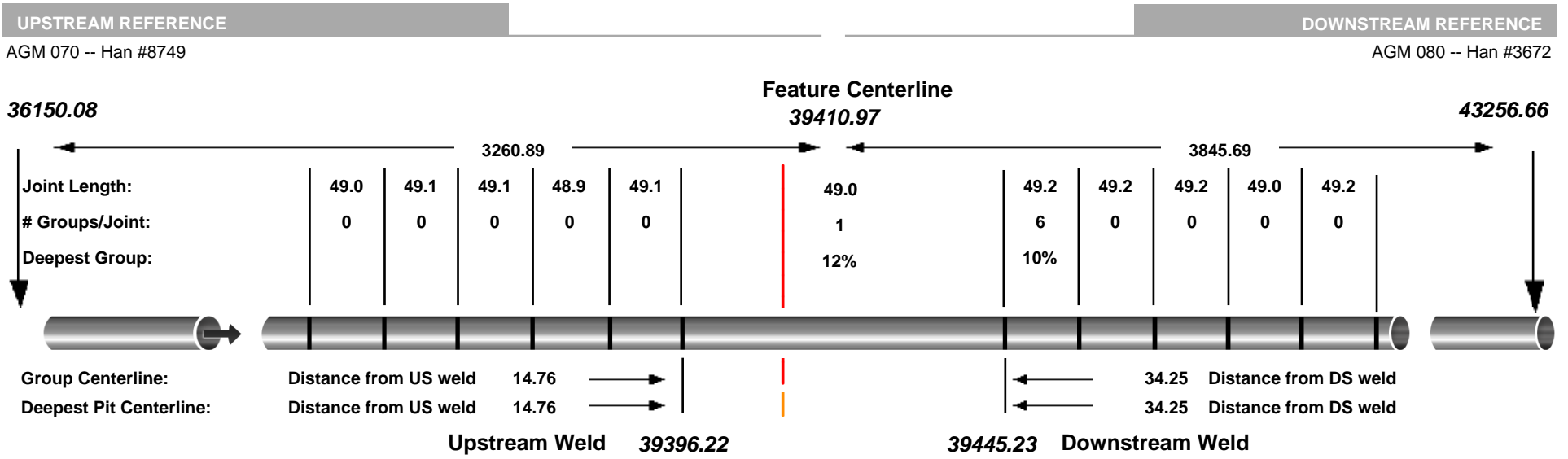
(relative distance from Feature Centerline)

GROUP
 Depth: **20%**
 Length: **0.795**
 Width: **0.476**
 ERF: **0.907**
 Safe Operating Pressure: **1632 psi**

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



GROUP - Dig Site Information Report

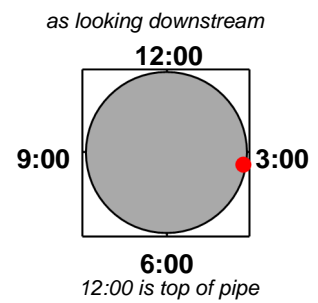


Dig Site Report

Feature Information

ID:	40000005	Distance from Launcher: 39410.97	<u>Feature Description</u>
Time:	86649.43	Orientation on Pipe Wall: 3:15	Metal Loss - EXTERNAL
Latitude:	48.27343476	Longitude: -103.42301969	Wall Thickness: 0.188
			Altitude: 2118.471

Feature Orientation



Upstream Locations		Downstream Locations	
5342.45	Bend rightt - 16 deg., 3D	1686.50	Bend left - 90 deg., 6D
5978.08	Bend left - 21 deg., 3D	837.92	Bend right - 45 deg., 3D
1779.41	Bend left - 18 deg., 3D	902.16	Bend right - 32 deg., 3D
3442.19	Bend right - 38 deg., 1.5D	1188.30	Bend left - 15 deg., 3D
12453.13	Bend left - 30 deg., 3D	1321.80	Bend left - 18 deg., 1.5D

(relative distance from Feature Centerline)

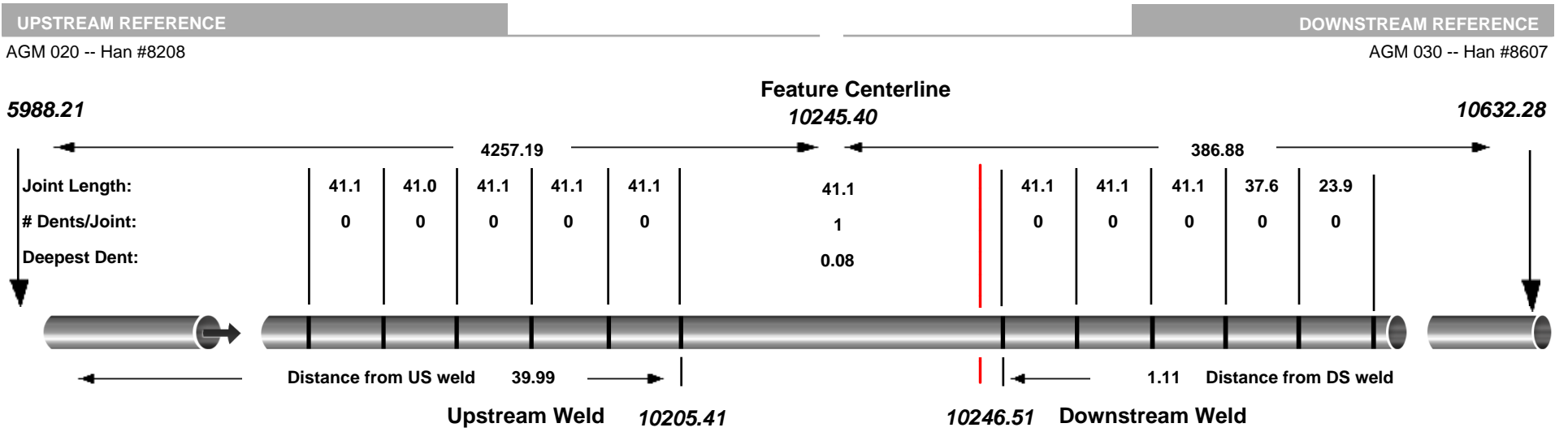
GROUP
 Depth: **12%**
 Length: **0.319**
 Width: **0.333**
 ERF: **0.907**

Safe Operating Pressure: **1632 psi**

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



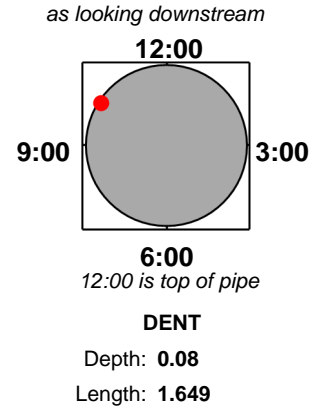
DENT - Dig Site Information Report



Feature Information

ID:	14000000	Distance from Launcher:	10245.40	Feature Description
Time:	5579.70	Orientation on Pipe Wall:	10:00	DENT
Latitude:	48.25776248	Longitude:	-103.31596338	Wall Thickness: 0.188
Altitude:				Altitude: 2225.043
Additional Information:	With possible associated metal loss, repaired			

Feature Orientation



Upstream Locations		Downstream Locations	
3133.70	Bend right - 15 deg., 1.5D	185.89	Bend right - 25 deg., 3D
3161.65	Bend left - 20 deg., 3D	413.62	Bend left - 26 deg., 3D
4180.24	Bend right - 24 deg., 3D	3058.31	Bend left - 21 deg., 3D
4417.61	Bend left - 24 deg., 3D	4904.18	Bend right - 45 deg., 3D
8229.37	Bend right - 15 deg., 1.5D	9104.95	Bend right - 40 deg., 3D

(relative distance from Feature Centerline)

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



Charts

CHARTS

Charts

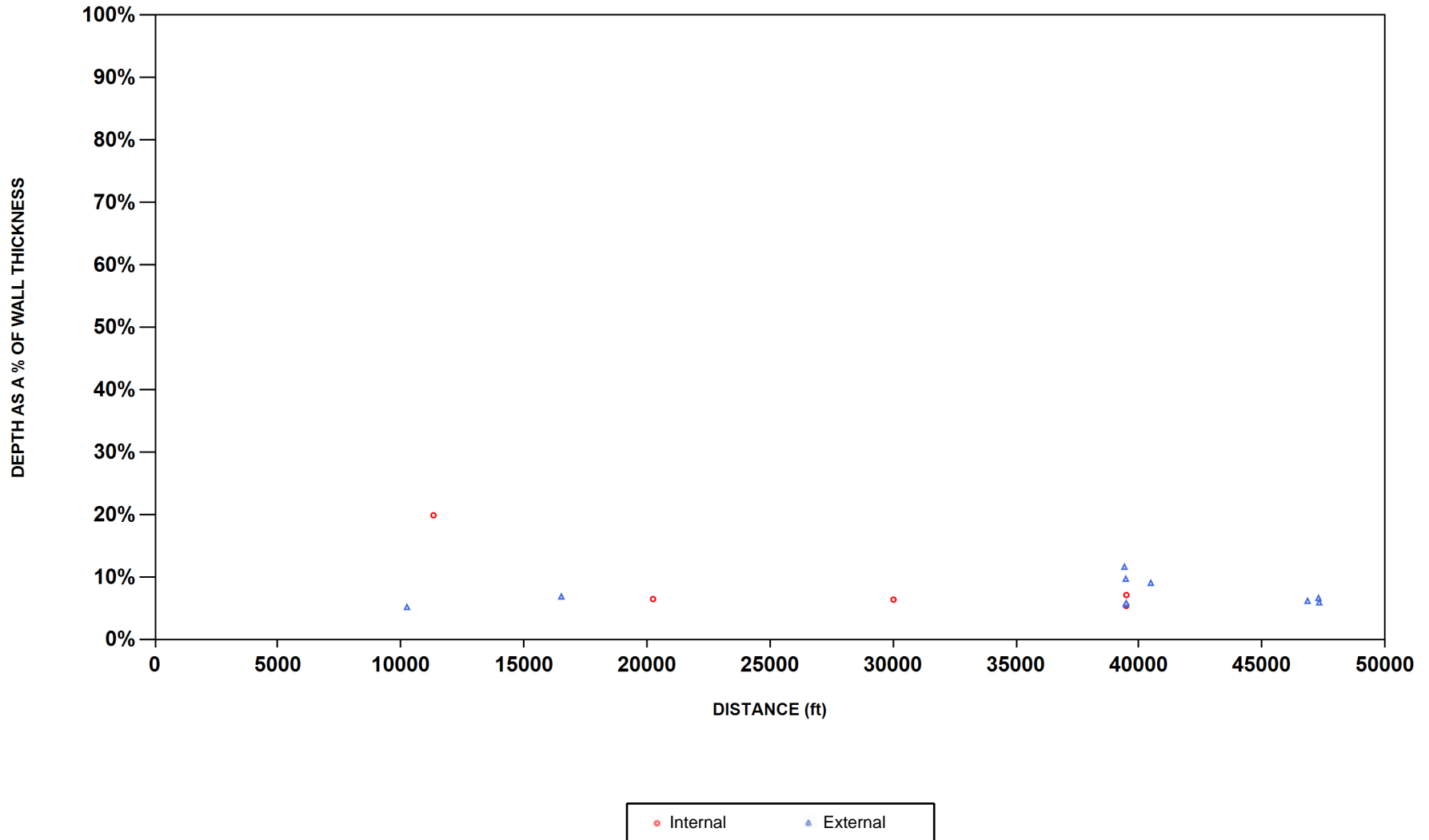
The Pipeline Summary report provides an overview of the pipeline condition.

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.



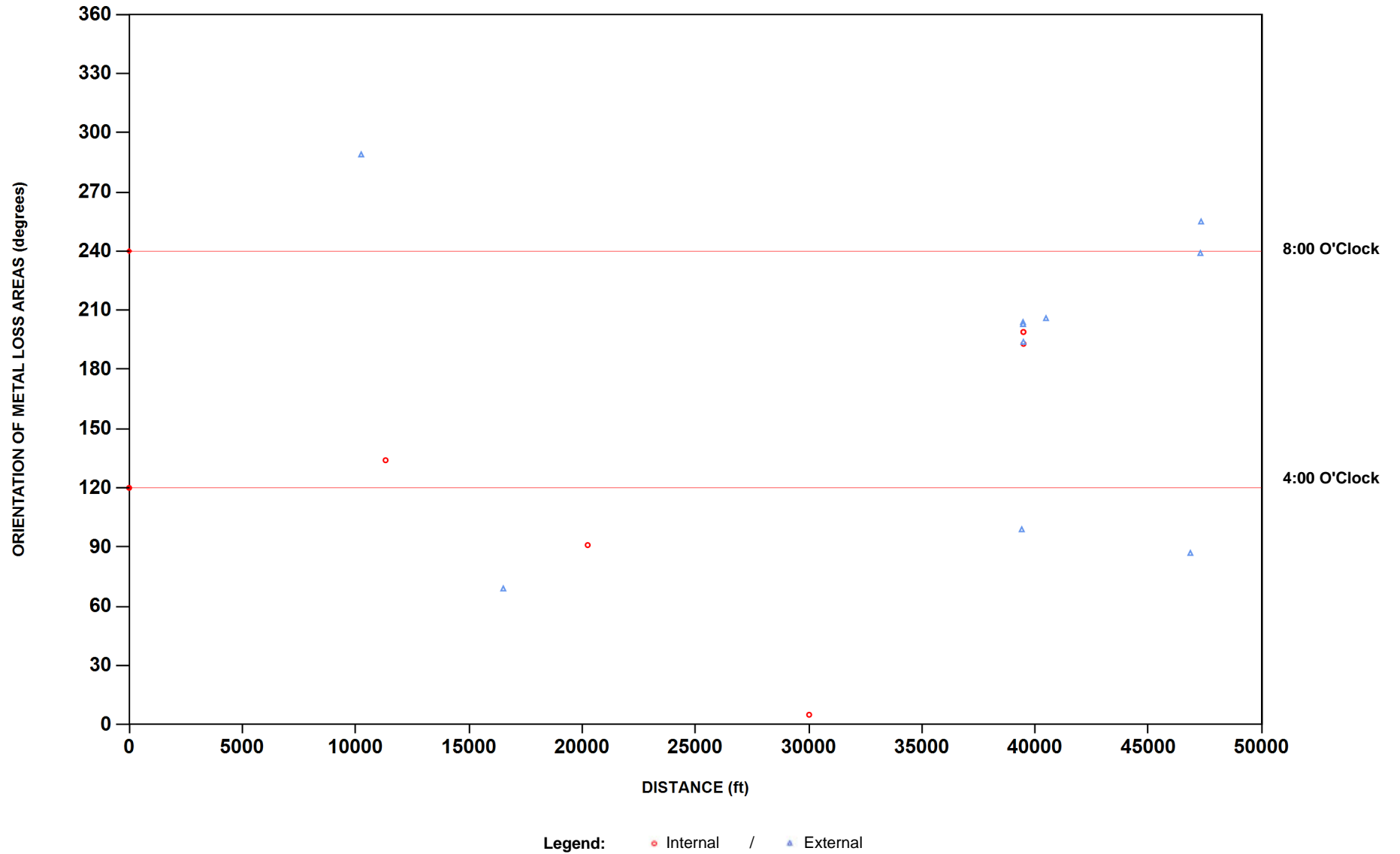
Metal Loss Depth Graph



Metal Loss Depth Graph



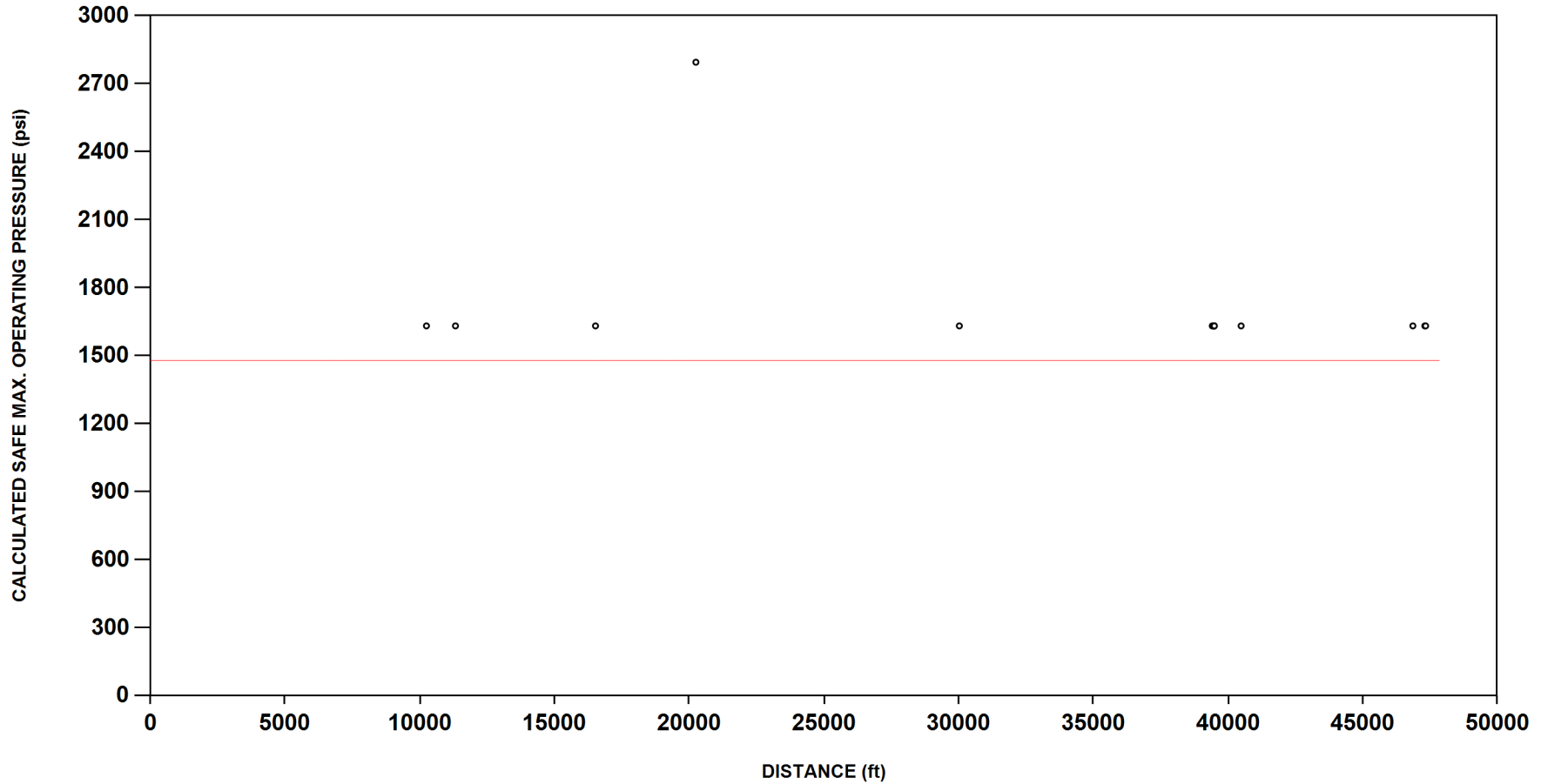
Metal Loss Orientation Graph



Metal Loss Orientation Graph



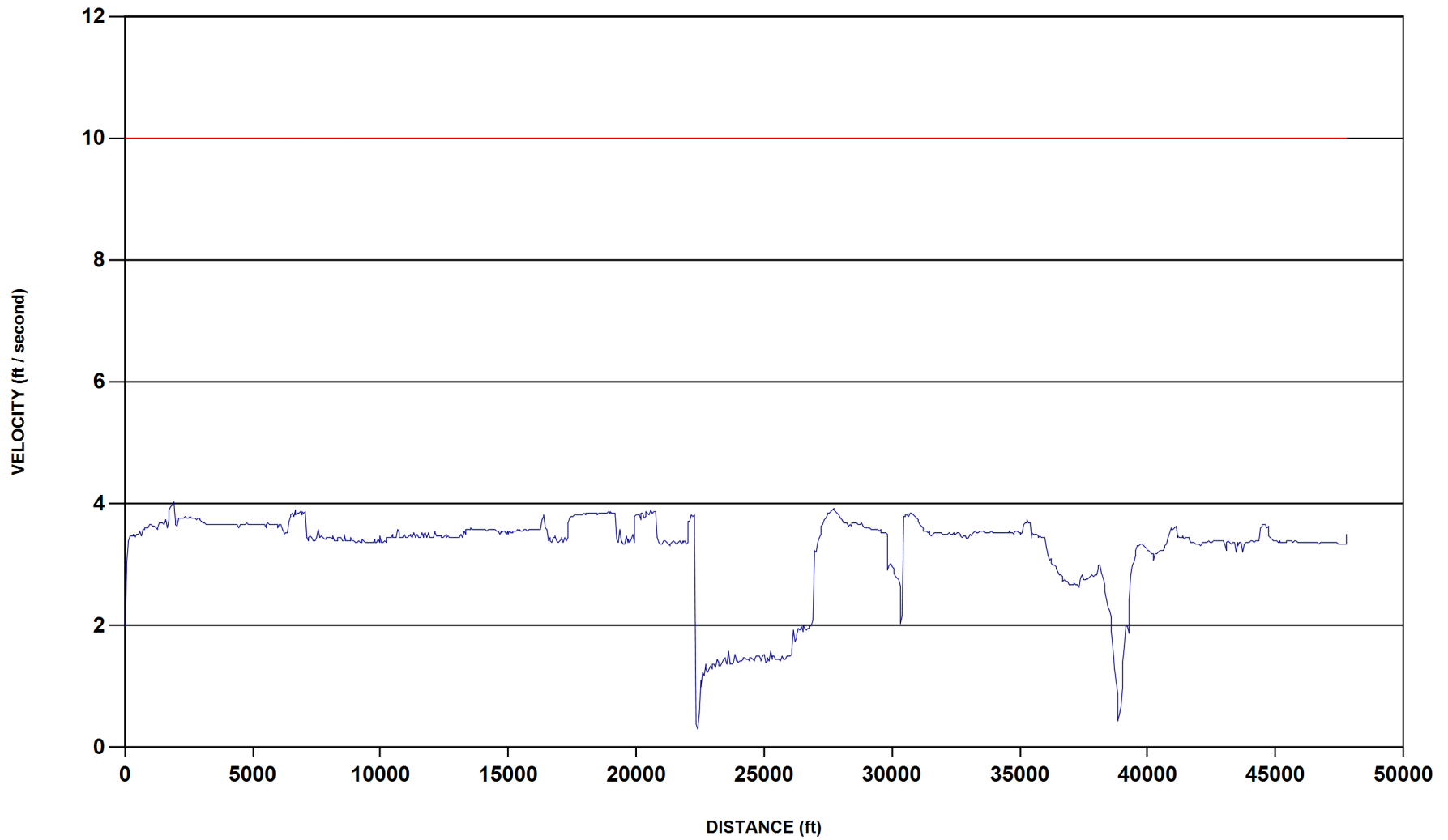
Metal Loss - Calculated Safe Max. Operating Pressure Graph



Metal Loss - Calculated Safe Max. Operating Pressure Graph



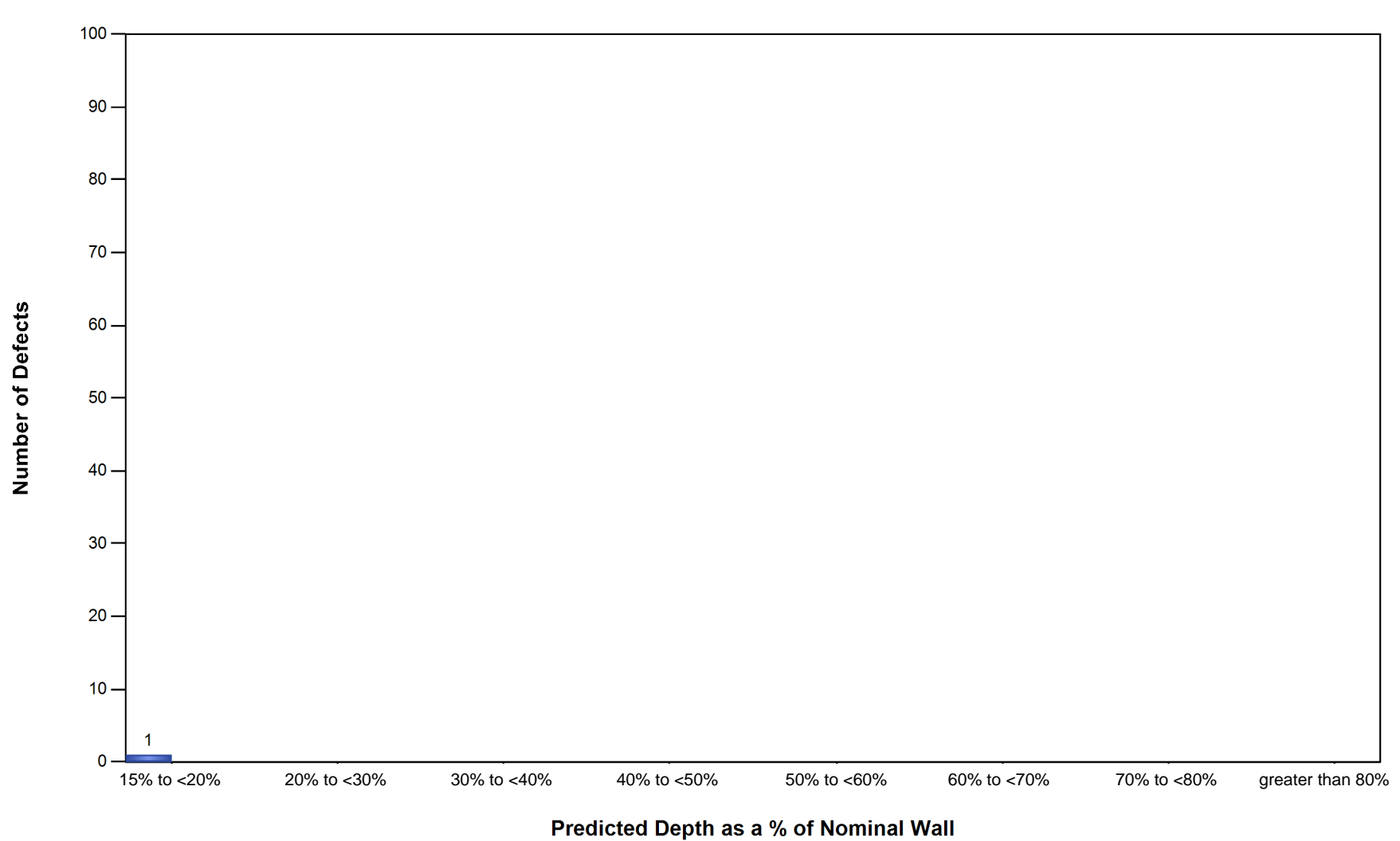
Velocity Graph - MFL



Velocity Graph - MFL



Defect Depth Histogram



Defect Depth Histogram

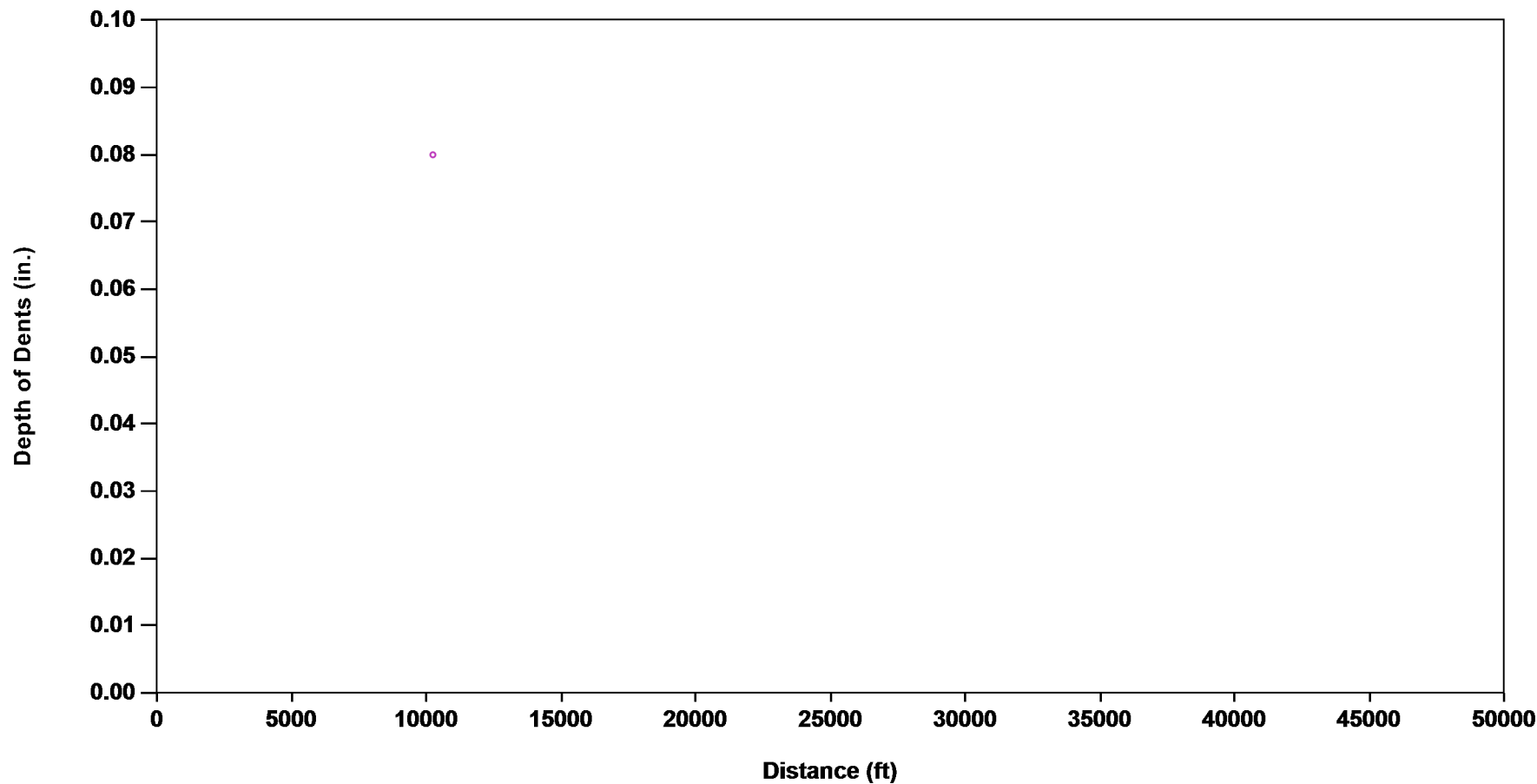
Total Defects: 16

■ Non-Pressure-Reducing Groups

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



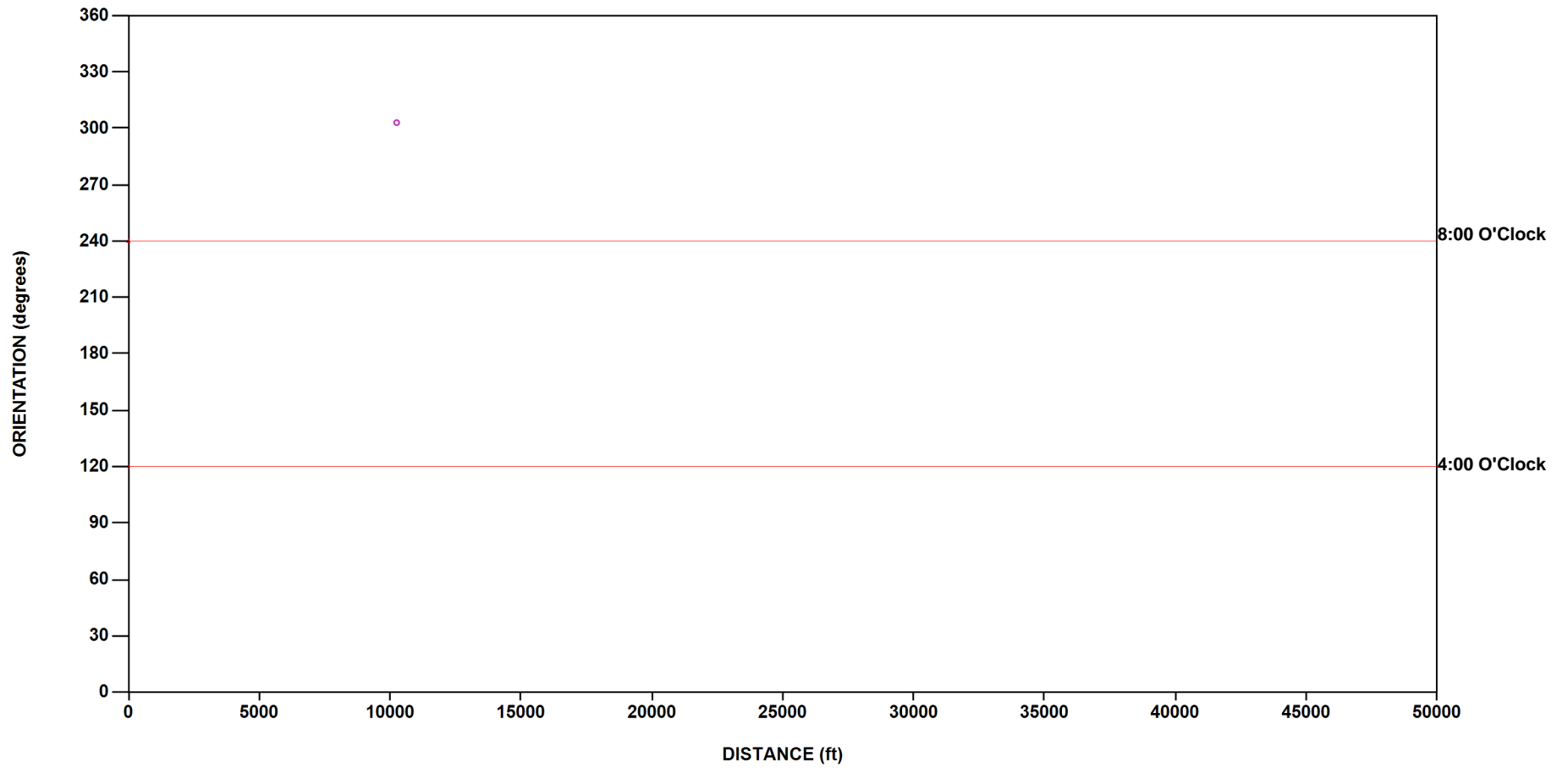
Dent Depth Graph



Dent Depth Graph



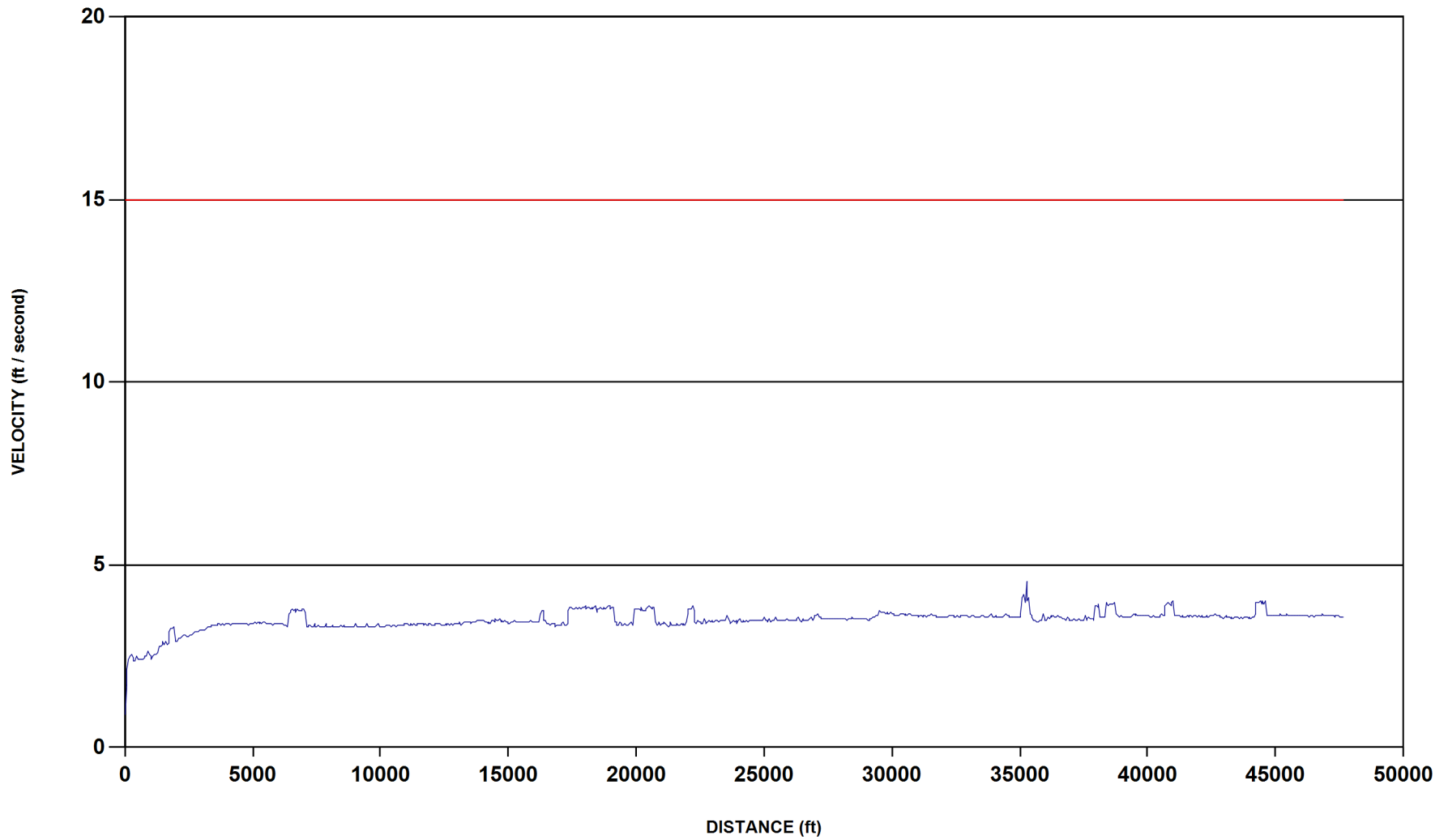
Dent Orientation Graph



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	D/S Weld	Description	Latitude	Longitude	Altitude
				Dist.	Dist.				
10000001	2,721.18	0.0	110	1.5	1.5	Valve (Launcher), Epping Injection Station	48.25592663	-103.27471284	2305.608
10000002	2,721.68	1.1	110	2.6	0.5	Flange	48.25592667	-103.27471726	2305.619
10000003	2,722.53	3.5	120	1.9	2.2	Pipe Support	48.25592677	-103.27472740	2305.650
10000004	2,723.36	6.1	130	0.2	1.0	Tee at 270 deg.	48.25592685	-103.27473854	2305.687
10000005	2,724.08	8.4	140	1.6	0.9	Pipe Support	48.25592693	-103.27474783	2305.723
10000006	2,724.50	9.7	150	0.4	0.5	Flange	48.25592696	-103.27475332	2305.757
10000007	2,724.90	10.9	160	0.3	1.3	Bend down - 45 deg., 1.5D	48.25592697	-103.27475854	2305.587
10000008	2,726.14	15.0	170	3.3	7.2	Pipe Entering the Ground, Epping Inj. Station -- Survey Point	48.25592694	-103.27477094	2302.823
10000009	2,728.52	23.0	180	0.1	1.4	Bend up - 45 deg., 3D	48.25592665	-103.27479411	2297.183
10000010	2,731.00	30.6	200	0.1	1.4	Bend right - 45 deg., 3D	48.25592659	-103.27482506	2296.743
10000011	2,734.37	41.5	220	0.1	1.2	Bend right - 45 deg., 1.5D	48.25594649	-103.27485832	2297.121
10000012	2,755.16	104.3	250	0.0	0.9	Bend left - 50 deg., 1.5D	48.25611367	-103.27491914	2298.068
10000013	3,139.75	1,475.7	600	0.0	0.4	Bend right - 12 deg., 3D	48.25760242	-103.28009685	2316.028
10000014	3,168.50	1,581.6	640	0.1	1.1	Bend left - 35 deg., 3D	48.25776516	-103.28045755	2318.733
10000015	3,239.41	1,851.9	710	12.2	29.7	AGM 010 -- Han #8749	48.25780153	-103.28156594	2311.579
10000016	3,282.42	2,016.2	760	0.0	0.4	Bend right - 15 deg., 1.5D	48.25770751	-103.28222623	2308.874
10000017	4,316.42	5,828.1	1,550	0.0	0.7	Bend left - 24 deg., 3D	48.25773062	-103.29789583	2289.603
10000018	4,360.24	5,988.2	1,590	17.8	31.5	AGM 020 -- Han #8208	48.25755843	-103.29850114	2285.014
10000019	4,381.45	6,065.5	1,610	0.0	0.8	Bend right - 24 deg., 3D	48.25747633	-103.29879458	2283.789
10000020	4,653.37	7,084.1	1,870	0.1	0.7	Bend left - 20 deg., 3D	48.25774964	-103.30295304	2264.717
10000021	4,661.34	7,111.9	1,890	0.0	0.4	Bend right - 15 deg., 1.5D	48.25773370	-103.30306501	2263.922
10000022	5,633.70	10,431.7	2,720	0.1	0.8	Bend right - 25 deg., 3D	48.25776121	-103.31673002	2226.358
10000023	5,691.07	10,632.3	2,790	10.2	26.7	AGM 030 -- Han #8607	48.25800387	-103.31747143	2231.653
10000024	5,698.66	10,659.4	2,800	0.0	0.9	Bend left - 26 deg., 3D	48.25803575	-103.31757236	2232.327
10000025	6,459.43	13,304.0	3,470	0.0	0.7	Bend left - 21 deg., 3D	48.25825127	-103.32844931	2212.113
10000026	6,946.83	15,043.4	3,840	26.0	8.3	AGM 040 -- Han #8592	48.25736791	-103.33538803	2188.468
10000027	6,977.00	15,150.3	3,870	0.1	1.4	Bend right - 45 deg., 3D	48.25736233	-103.33582796	2187.574
10000028	8,128.59	19,350.9	4,880	0.1	1.2	Bend right - 40 deg., 3D	48.26370978	-103.35016711	2172.543
10000029	8,815.28	21,774.5	5,500	0.1	1.5	Bend left - 45 deg., 3D	48.26973061	-103.35443130	2197.976
10000030	8,964.27	22,304.6	5,640	5.3	1.6	AGM 050 -- Survey Point	48.26978991	-103.35661312	2188.141
10000031	8,965.48	22,308.8	5,670	0.2	1.0	Tee at 90 deg.	48.26979064	-103.35663056	2187.980
10000032	27,114.14	22,321.2	5,700	0.4	0.7	Tee at 90 deg.	48.26979238	-103.35668171	2187.998
10000033	28,384.19	23,601.1	6,030	0.0	1.5	Bend right - 45 deg., 3D	48.26996519	-103.36194682	2159.575

Locations Summary



Locations Summary

ID#	Time	Dist (ft)	Joint #	U/S Weld	D/S Weld	Description	Latitude	Longitude	Altitude
				Dist.	Dist.				
10000034	28,393.35	23,614.7	6,050	0.0	0.4	Bend right - 16 deg., 1.5D	48.26999202	-103.36198582	2159.633
10000035	29,242.30	24,834.8	6,360	0.1	1.5	Bend left - 45 deg., 3D	48.27293925	-103.36438251	2174.503
10000036	30,541.61	26,958.2	6,910	0.0	0.8	Bend left - 30 deg., 3D	48.27462017	-103.37274416	2163.853
10000040	33,111.89	35,969.3	8,830	0.1	1.1	Bend right - 38 deg., 1.5D	48.27139140	-103.40934248	2141.465
10000042	33,696.41	37,631.8	9,240	0.0	0.5	Bend left - 18 deg., 3D	48.27309959	-103.41570460	2119.767
10000049	35,309.36	41,100.8	10,060	1.4	8.2	Bend left - 90 deg., 6D	48.27570487	-103.42795628	2119.393
10000037	83,512.93	30,834.1	7,710	6.6	42.6	AGM 060 -- Han #8764	48.27366636	-103.38863761	2173.724
10000038	84,247.98	33,433.3	8,240	0.1	0.8	Bend left - 21 deg., 3D	48.27316322	-103.39932184	2161.277
10000039	84,427.44	34,068.7	8,380	0.0	0.5	Bend right - 16 deg., 3D	48.27239768	-103.40167555	2156.282
10000041	85,019.64	36,150.1	8,880	23.1	17.6	AGM 070 -- Han #8749	48.27157729	-103.41003351	2144.985
10000043	86,908.17	40,249.6	9,820	0.1	1.5	Bend right - 45 deg., 3D	48.27370518	-103.42644909	2115.902
10000044	86,928.28	40,313.6	9,850	0.1	1.0	Bend right - 32 deg., 3D	48.27384733	-103.42660165	2116.306
10000045	87,016.96	40,599.5	9,920	0.0	0.5	Bend left - 15 deg., 3D	48.27462990	-103.42673016	2114.889
10000046	87,057.45	40,733.0	9,960	0.0	0.5	Bend left - 18 deg., 1.5D	48.27497208	-103.42692849	2115.107
10000047	87,087.16	40,834.3	9,990	11.4	30.5	Casing Begin	48.27517885	-103.42720892	2114.614
10000048	87,149.04	41,056.2	10,040	23.3	18.6	Casing End	48.27562660	-103.42783095	2118.310
10000050	87,797.58	43,256.7	10,510	40.6	0.3	AGM 080 -- Han #3672	48.27185894	-103.43467930	2118.600
10000051	87,942.91	43,740.6	10,640	0.1	1.2	Bend right - 45 deg., 3D	48.27100205	-103.43620501	2119.115
10000052	89,133.38	47,786.5	11,550	0.1	1.4	Bend up - 45 deg., 3D	48.27071547	-103.45286732	2147.015
10000053	89,135.08	47,792.4	11,560	5.2	1.0	Pipe Exiting the Ground, Catwalk -- Han #8023	48.27071543	-103.45288440	2151.282
10000054	89,137.37	47,800.5	11,580	0.1	1.5	Bend down - 45 deg., 3D	48.27071567	-103.45292094	2155.176
10000055	89,137.72	47,801.8	11,590	0.5	2.6	Flange	48.27071568	-103.45292735	2155.382
10000056	89,138.02	47,802.8	11,590	1.5	1.6	Valve (Receiver), Catwalk	48.27071571	-103.45293280	2155.548

Locations Summary



Locations Summary

Locations	Number
Bend	34
Casing	1
Flange	5
Fitting	0
Marker	10
Repair	0
Tee	3
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)		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
		Start	End						
10000048	87149.04	40834.25	41056.19	221.93		0	0%	U/S: AGM 070 -- Han #8749 D/S: AGM 080 -- Han #3672	4684.17 2422.41

Total	Number with metal loss	Number eccentric	Total footage
1	0	0	221.93

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
14000000	10,245.4	0.08	1.0%	303 10:00		8.12	With possible associated metal loss, repaired	Yes		U/S: AGM 020 -- Han #8208 D/S: AGM 030 -- Han #8607	4257.12 386.95

Type	Number
DENT	1

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 AGM Dist.	The distance to the upstream (U/S) AGM (in feet or meters).
D/S AGM Dist.	The distance to the downstream (D/S) AGM (in feet or meters).



Gains (Metal in Close Proximity)

ID#	Distance (ft)	Length (in)	Width (in)	Depth in Gauss	Orientation		Joint #	U/S AGM	D/S AGM
					Degrees	O'Clock		Dist.	Dist.
13000000	212.51	4.96	3.84	39	15 to 70	12:15 to 2:15	290	197.3	1639.5

Total Number of Gains

1

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	-1.56	0.322	ERW	52000	0.72	25.31
11000001	23.75	0.188	ERW	52000	0.72	1689.92
11000002	1713.67	0.322	ERW	52000	0.72	209.74
11000003	1923.41	0.188	ERW	52000	0.72	4465.43
11000004	6388.84	0.322	ERW	52000	0.72	695.6
11000005	7084.44	0.188	ERW	52000	0.72	9195.2
11000006	16279.63	0.322	ERW	52000	0.72	125.89
11000007	16405.52	0.188	ERW	52000	0.72	938.69
11000008	17344.21	0.322	ERW	52000	0.72	1821.93
11000009	19166.14	0.188	ERW	52000	0.72	741.65
11000010	19907.79	0.322	ERW	52000	0.72	875.7
11000011	20783.49	0.188	ERW	52000	0.72	1264.79
11000012	22048.28	0.322	ERW	52000	0.72	250.93
11000013	22299.21	0.188	ERW	52000	0.72	12827.53
11000014	35126.74	0.322	ERW	52000	0.72	323.48
11000015	35450.21	0.188	ERW	52000	0.72	2582.19
11000016	38032.41	0.322	ERW	52000	0.72	167.74
11000017	38200.15	0.188	ERW	52000	0.72	243.34
11000018	38443.48	0.322	ERW	52000	0.72	377.47
11000019	38820.95	0.188	ERW	52000	0.72	1959.9
11000020	40780.86	0.322	ERW	52000	0.72	293.89
11000021	41074.74	0.188	ERW	52000	0.72	3280.69
11000022	44355.43	0.322	ERW	52000	0.72	376.78
11000023	44732.21	0.188	ERW	52000	0.72	3049.19
11000024	47781.41	0.322	ERW	52000	0.72	21.43

Nominal Wall Thickness

Wall Thickness	Pipetype	Total Length (ft)	Total Length (miles)	Percent of Total Distance
0.188	ERW	42,239	8.000	88.4%
0.322	ERW	5,566	1.054	11.6%



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

ID#	Distance (ft)	Length (ft)	Type of Repair
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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	2721.18	0.00	Valve (Launcher), Epping Injection Station	48.25592663	-103.27471284	2305.608
10000008	2726.14	14.97	Pipe Entering the Ground, Epping Inj. Station -- Survey Point	48.25592694	-103.27477094	2302.823
10000015	3239.41	1851.85	AGM 010 -- Han #8749	48.25780153	-103.28156594	2311.579
10000018	4360.24	5988.21	AGM 020 -- Han #8208	48.25755843	-103.29850114	2285.014
10000023	5691.07	10632.28	AGM 030 -- Han #8607	48.25800387	-103.31747143	2231.653
10000026	6946.83	15043.43	AGM 040 -- Han #8592	48.25736791	-103.33538803	2188.468
10000030	8964.27	22304.56	AGM 050 -- Survey Point	48.26978991	-103.35661312	2188.141
10000037	83512.93	30834.10	AGM 060 -- Han #8764	48.27366636	-103.38863761	2173.724
10000041	85019.64	36150.08	AGM 070 -- Han #8749	48.27157729	-103.41003351	2144.985
10000050	87797.58	43256.67	AGM 080 -- Han #3672	48.27185894	-103.43467930	2118.600
10000053	89135.08	47792.43	Pipe Exiting the Ground, Catwalk -- Han #8023	48.27071543	-103.45288440	2151.282
10000056	89138.02	47802.84	Valve (Receiver), Catwalk	48.27071571	-103.45293280	2155.548

TYPE	NUMBER
Valves	2
Markers	10



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	273.85	-20.78	Begin Run Tickle
12000001	5,579.69	10,245.35	Dig#18-Verification Digs were performed in 2014 to validate the MFL tool run. Actual .67%D x 1.80"L x 2.0"W - Dent (repaired w/Res-Q wrap)
12000002	5,579.71	10,245.43	Dig#18-Verification Digs were performed in 2014 to validate the MFL tool run. Actual 15%D x .60"L x 1.20"W - ML/Gouge (repaired w/Res-Q wrap)
12000003	5,889.49	11,322.29	Dig#19-Verification Digs were performed in 2014 to validate the MFL tool run. Actual: No Metal Loss found (pipe recoated)
12000004	31,556.87	30,438.08	Stitch point for removing duplicate data
12000005	86,649.43	39,410.98	Dig#20-Verification Digs were performed in 2014 to validate the MFL tool run. Actual 9.57%D x .10"L x .60"W (pipe recoated)
12000006	86,667.11	39,464.81	Dig#20-Verification Digs were performed in 2014 to validate the MFL tool run. Actual 2.12%D x .25"L x .25"W (pipe recoated)
12000007	86,668.02	39,467.65	Dig#20-Verification Digs were performed in 2014 to validate the MFL tool run. Actual 5.30%D x .25"L x .90"W (pipe recoated)
12000008	86,672.34	39,481.13	Dig#20-Verification Digs were performed in 2014 to validate the MFL tool run. Actual 4.78%D x .40"L x .30"W (pipe recoated)
12000009	86,672.79	39,482.54	Dig#20-Verification Digs were performed in 2014 to validate the MFL tool run. Actual 2.66%D x .20"L x .20"W (pipe recoated)
12000010	86,672.90	39,482.88	Dig#20-Verification Digs were performed in 2014 to validate the MFL tool run. Actual 5.30%D x .25"L x .25"W (pipe recoated)
12000011	86,672.93	39,482.97	Dig#20-Verification Digs were performed in 2014 to validate the MFL tool run. Actual 2.66%D x .25"L x .25"W (pipe recoated)
12000012	86,674.48	39,487.85	Dig#20-Verification Digs were performed in 2014 to validate the MFL tool run. Actual 8.0%D x .50"L x .40"W (pipe recoated)
12000013	90,544.28	47,843.51	End Run Tickle

Total	Number
Misc listings	14



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 O'clock	Above-Ground References		Distance from Defect
								U/S:	D/S:	
20000000	Seam Variation	3,086.0	0.82	0.65	44	INT	5:15 / N/D	U/S: AGM 010 -- Han #8749	1234.08	
								D/S: AGM 020 -- Han #8208	2902.28	
20000001	Seam Variation	3,086.6	0.71	0.74	36	INT	5:15 / N/D	U/S: AGM 010 -- Han #8749	1234.73	
								D/S: AGM 020 -- Han #8208	2901.62	
20000002	Seam Variation	3,087.2	0.94	0.64	31	INT	5:15 / N/D	U/S: AGM 010 -- Han #8749	1235.29	
								D/S: AGM 020 -- Han #8208	2901.06	
20000003	Seam Variation	3,087.8	0.94	0.83	31	INT	5:15 / N/D	U/S: AGM 010 -- Han #8749	1235.86	
								D/S: AGM 020 -- Han #8208	2900.50	
20000006	Seam Variation	14,238.0	0.71	0.60	41	INT	2:00 / N/D	U/S: AGM 030 -- Han #8607	3605.71	
								D/S: AGM 040 -- Han #8592	805.44	
20000010	Seam Variation	31,109.5	0.59	0.40	30	EXT	6:45 / N/D	U/S: AGM 060 -- Han #8764	275.39	
								D/S: AGM 070 -- Han #8749	5040.59	
20000011	Seam Variation	35,106.2	1.06	0.36	25	EXT	9:15 / N/D	U/S: AGM 060 -- Han #8764	4272.05	
								D/S: AGM 070 -- Han #8749	1043.93	
20000021	Seam Variation	42,452.5	1.06	0.94	38	INT	10:00 / N/D	U/S: AGM 070 -- Han #8749	6302.35	
								D/S: AGM 080 -- Han #3672	804.24	
20000022	Seam Variation	45,229.4	0.47	0.33	30	EXT	9:00 / N/D	U/S: AGM 080 -- Han #3672	1972.74	
								D/S: Pipe Exiting the Ground, Catwalk -- Han #8023	2563.02	
20000023	Seam Variation	45,232.0	0.59	0.33	35	INT	9:00 / N/D	U/S: AGM 080 -- Han #3672	1975.29	
								D/S: Pipe Exiting the Ground, Catwalk -- Han #8023	2560.48	
20000024	Seam Variation	45,232.1	0.35	0.33	31	INT	9:00 / N/D	U/S: AGM 080 -- Han #3672	1975.40	
								D/S: Pipe Exiting the Ground, Catwalk -- Han #8023	2560.36	
20000027	Seam Variation	47,298.7	0.47	0.37	34	EXT	1:45 / N/D	U/S: AGM 080 -- Han #3672	4042.06	
								D/S: Pipe Exiting the Ground, Catwalk -- Han #8023	493.70	

Other Anomalies



Other Anomalies

Other Anomalies Type	Number
Girth Weld Anomaly	0
Mill Anomaly	
Seam Variation	12

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
Epping Injection to Catwalk

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	-20.8	0	-	19.3	48.25592662	-103.27471285	2305.607	0	12:00				
11000000	WT CHANGE	-1.6	0	0.0	0.0	48.25592662	-103.27471285	2305.607	0	12:00	0.322	52000	0.72	
	110 WELD	-1.5	110	0.0	3.0	48.25592662	-103.27471285	2305.607	0	12:00				
10000000	Flange	-1.1	110	0.4	2.6	48.25592662	-103.27471285	2305.607	0	12:00				
10000001	Valve (Launcher), Epping Injection Station	0.0	110	1.5	1.5	48.25592663	-103.27471284	2305.608	0	12:00				
10000002	Flange	1.1	110	2.6	0.5	48.25592667	-103.27471726	2305.619	0	12:00				
	120 WELD	1.5	120	0.0	4.0	48.25592670	-103.27471927	2305.626	0	12:00				
10000003	Pipe Support	3.5	120	1.9	2.2	48.25592677	-103.27472740	2305.650	0	12:00				
	130 WELD	5.6	130	0.0	1.2	48.25592684	-103.27473615	2305.675	0	12:00				
10000004	Tee at 270 deg.	6.1	130	0.2	1.0	48.25592685	-103.27473854	2305.687	238	7:45				
	140 WELD	6.7	140	0.0	2.5	48.25592688	-103.27474099	2305.699	0	12:00				
10000005	Pipe Support	8.4	140	1.6	0.9	48.25592693	-103.27474783	2305.723	0	12:00				
	150 WELD	9.2	150	0.0	0.9	48.25592695	-103.27475146	2305.742	0	12:00				
10000006	Flange	9.7	150	0.4	0.5	48.25592696	-103.27475332	2305.757	0	12:00				
	160 WELD	10.1	160	0.0	1.6	48.25592696	-103.27475517	2305.745	0	12:00				
10000007	Bend down - 45 deg., 1.5D	10.9	160	0.3	1.3	48.25592697	-103.27475854	2305.587	0	12:00				
	170 WELD	11.7	170	0.0	10.5	48.25592697	-103.27476120	2305.167	0	12:00				
10000008	Pipe Entering the Ground, Epping Inj. Station -- Survey Point	15.0	170	3.3	7.2	48.25592694	-103.27477094	2302.823	0	12:00				
	180 WELD	22.2	180	0.0	1.6	48.25592670	-103.27479153	2297.636	0	12:00				
10000009	Bend up - 45 deg., 3D	23.0	180	0.1	1.4	48.25592665	-103.27479411	2297.183	0	12:00				
11000001	WT CHANGE	23.7	180	0.0	0.0	48.25592663	-103.27479703	2296.981	0	12:00	0.188	52000	0.72	
	190 WELD	23.8	190	0.0	6.1	48.25592663	-103.27479714	2296.974	0	12:00				
	200 WELD	29.8	200	0.0	1.5	48.25592619	-103.27482198	2296.750	0	12:00				
10000010	Bend right - 45 deg., 3D	30.6	200	0.1	1.4	48.25592659	-103.27482506	2296.743	0	12:00				
	210 WELD	31.4	210	0.0	9.5	48.25592766	-103.27482768	2296.753	0	12:00				
	220 WELD	40.9	220	0.0	1.3	48.25594511	-103.27485675	2297.064	0	12:00				
10000011	Bend right - 45 deg., 1.5D	41.5	220	0.1	1.2	48.25594649	-103.27485832	2297.121	0	12:00				
	230 WELD	42.1	230	0.0	40.3	48.25594812	-103.27485929	2297.181	0	12:00				
	240 WELD	82.5	240	0.0	21.3	48.25605591	-103.27489701	2298.101	0	12:00				
	250 WELD	103.8	250	0.0	0.9	48.25611270	-103.27491798	2298.068	0	12:00				
10000012	Bend left - 50 deg., 1.5D	104.3	250	0.0	0.9	48.25611367	-103.27491914	2298.068	0	12:00				
	260 WELD	104.7	260	0.0	12.5	48.25611455	-103.27492047	2298.067	0	12:00				
	270 WELD	117.3	270	0.0	5.5	48.25612938	-103.27496706	2297.951	0	12:00				
	280 WELD	122.8	280	0.0	48.9	48.25613569	-103.27498759	2298.135	0	12:00				



Pipeline Listing

TDW Services, Inc.

Hiland Crude, LLC
Epping Injection to Catwalk

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)
290 WELD		171.7	290	0.0	49.4	48.25619067	-103.27517095	2299.002	0	12:00				
13000000 GAIN		212.5	290	40.6	8.7	48.25623590	-103.27532462	2299.701	42	1:15				
300 WELD		221.1	300	0.0	49.4	48.25624527	-103.27535676	2299.839	0	12:00				
310 WELD		270.4	310	0.0	49.3	48.25629869	-103.27554326	2300.618	0	12:00				
320 WELD		319.7	320	0.0	49.3	48.25635232	-103.27572941	2301.194	0	12:00				
330 WELD		369.0	330	0.0	41.0	48.25640572	-103.27591572	2301.456	0	12:00				
340 WELD		410.0	340	0.0	40.9	48.25644991	-103.27607079	2302.110	0	12:00				
350 WELD		451.0	350	0.0	40.9	48.25649470	-103.27622521	2302.460	0	12:00				
360 WELD		491.9	360	0.0	40.9	48.25653935	-103.27637961	2302.452	0	12:00				
370 WELD		532.8	370	0.0	41.0	48.25658349	-103.27653414	2302.876	0	12:00				
380 WELD		573.8	380	0.0	40.9	48.25662816	-103.27668866	2302.337	0	12:00				
390 WELD		614.7	390	0.0	41.0	48.25667338	-103.27684266	2302.428	0	12:00				
400 WELD		655.6	400	0.0	40.9	48.25671807	-103.27699718	2302.187	0	12:00				
410 WELD		696.6	410	0.0	40.9	48.25676269	-103.27715171	2301.946	0	12:00				
420 WELD		737.5	420	0.0	40.9	48.25680754	-103.27730610	2302.457	0	12:00				
430 WELD		778.5	430	0.0	40.9	48.25685213	-103.27746055	2303.378	0	12:00				
440 WELD		819.4	440	0.0	40.9	48.25689564	-103.27761563	2304.929	0	12:00				
450 WELD		860.3	450	0.0	41.0	48.25693799	-103.27777146	2306.092	0	12:00				
460 WELD		901.4	460	0.0	41.0	48.25698119	-103.27792727	2307.297	0	12:00				
470 WELD		942.4	470	0.0	41.0	48.25702509	-103.27808242	2308.950	0	12:00				
480 WELD		983.4	480	0.0	41.0	48.25706942	-103.27823744	2309.593	0	12:00				
490 WELD		1,024.4	490	0.0	41.0	48.25711411	-103.27839217	2308.947	0	12:00				
500 WELD		1,065.5	500	0.0	41.0	48.25715871	-103.27854712	2308.476	0	12:00				
510 WELD		1,106.4	510	0.0	41.0	48.25720342	-103.27870159	2307.385	0	12:00				
520 WELD		1,147.4	520	0.0	41.0	48.25724737	-103.27885683	2307.983	0	12:00				
530 WELD		1,188.4	530	0.0	41.0	48.25729138	-103.27901198	2308.968	0	12:00				
540 WELD		1,229.4	540	0.0	41.0	48.25733532	-103.27916703	2310.390	0	12:00				
550 WELD		1,270.5	550	0.0	41.0	48.25737946	-103.27932223	2311.001	0	12:00				
560 WELD		1,311.5	560	0.0	41.0	48.25742397	-103.27947725	2311.647	0	12:00				
570 WELD		1,352.5	570	0.0	41.0	48.25746927	-103.27963171	2311.923	0	12:00				
580 WELD		1,393.6	580	0.0	41.1	48.25751398	-103.27978655	2312.939	0	12:00				
590 WELD		1,434.6	590	0.0	40.9	48.25755804	-103.27994184	2314.284	0	12:00				
600 WELD		1,475.5	600	0.0	0.4	48.25760215	-103.28009610	2316.021	0	12:00				
10000013 Bend right - 12 deg., 3D		1,475.7	600	0.0	0.4	48.25760242	-103.28009685	2316.028	0	12:00				
610 WELD		1,475.9	610	0.0	27.4	48.25760268	-103.28009760	2316.034	0	12:00				
620 WELD		1,503.3	620	0.0	41.0	48.25764582	-103.28018997	2316.596	0	12:00				
630 WELD		1,544.3	630	0.0	36.8	48.25770944	-103.28032894	2317.021	0	12:00				



Pipeline Listing

TDW Services, Inc.

Hiland Crude, LLC
Epping Injection to Catwalk

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)
640 WELD		1,581.0	640	0.0	1.1	48.25776455	-103.28045545	2318.710	0	12:00				
10000014	Bend left - 35 deg., 3D	1,581.6	640	0.1	1.1	48.25776516	-103.28045755	2318.733	0	12:00				
650 WELD		1,582.2	650	0.0	43.4	48.25776542	-103.28045979	2318.728	0	12:00				
660 WELD		1,625.5	660	0.0	40.6	48.25776704	-103.28063802	2317.929	0	12:00				
670 WELD		1,666.1	670	0.0	47.6	48.25777017	-103.28080460	2316.997	0	12:00				
11000002	WT CHANGE	1,713.7	670	0.0	0.0	48.25777647	-103.28100000	2316.619	0	12:00	0.322	52000	0.72	
680 WELD		1,713.7	680	0.0	42.0	48.25777648	-103.28100021	2316.620	0	12:00				
690 WELD		1,755.7	690	0.0	42.0	48.25778672	-103.28117183	2314.826	0	12:00				
700 WELD		1,797.7	700	0.0	42.0	48.25779680	-103.28134366	2313.422	0	12:00				
710 WELD		1,839.6	710	0.0	42.0	48.25780271	-103.28151572	2312.043	0	12:00				
10000015	AGM 010 -- Han #8749	1,851.9	710	12.2	29.7	48.25780153	-103.28156594	2311.579	0	12:00				
720 WELD		1,881.6	720	0.0	41.9	48.25779010	-103.28168689	2310.552	0	12:00				
11000003	WT CHANGE	1,923.4	720	0.0	0.1	48.25776445	-103.28185448	2309.737	0	12:00	0.188	52000	0.72	
730 WELD		1,923.5	730	0.0	40.9	48.25776441	-103.28185471	2309.736	0	12:00				
740 WELD		1,964.4	740	0.0	40.9	48.25773899	-103.28201848	2310.111	0	12:00				
750 WELD		2,005.3	750	0.0	10.7	48.25771423	-103.28218246	2308.996	0	12:00				
760 WELD		2,016.0	760	0.0	0.4	48.25770760	-103.28222536	2308.873	0	12:00				
10000016	Bend right - 15 deg., 1.5D	2,016.2	760	0.0	0.4	48.25770751	-103.28222623	2308.874	0	12:00				
770 WELD		2,016.4	770	0.0	40.8	48.25770746	-103.28222706	2308.875	0	12:00				
780 WELD		2,057.2	780	0.0	49.2	48.25771004	-103.28239481	2308.336	0	12:00				
790 WELD		2,106.4	790	0.0	49.0	48.25771101	-103.28259707	2307.645	0	12:00				
800 WELD		2,155.4	800	0.0	49.3	48.25771061	-103.28279845	2306.159	0	12:00				
810 WELD		2,204.8	810	0.0	49.4	48.25770989	-103.28300127	2306.725	0	12:00				
820 WELD		2,254.2	820	0.0	49.1	48.25770970	-103.28320432	2308.494	0	12:00				
830 WELD		2,303.2	830	0.0	49.4	48.25771053	-103.28340607	2309.723	0	12:00				
840 WELD		2,352.6	840	0.0	49.4	48.25771057	-103.28360902	2309.815	0	12:00				
850 WELD		2,402.0	850	0.0	49.4	48.25771029	-103.28381200	2309.297	0	12:00				
860 WELD		2,451.3	860	0.0	49.3	48.25770951	-103.28401500	2309.764	0	12:00				
870 WELD		2,500.7	870	0.0	49.5	48.25770918	-103.28421786	2310.562	0	12:00				
880 WELD		2,550.1	880	0.0	49.4	48.25770852	-103.28442113	2311.439	0	12:00				
890 WELD		2,599.5	890	0.0	49.4	48.25770800	-103.28462438	2311.783	0	12:00				
900 WELD		2,648.9	900	0.0	49.5	48.25770728	-103.28482750	2311.337	0	12:00				
910 WELD		2,698.4	910	0.0	49.4	48.25770579	-103.28503091	2310.844	0	12:00				
920 WELD		2,747.9	920	0.0	49.5	48.25770505	-103.28523407	2309.380	0	12:00				
930 WELD		2,797.3	930	0.0	49.5	48.25770586	-103.28543743	2308.717	0	12:00				
940 WELD		2,846.8	940	0.0	49.2	48.25770726	-103.28564073	2307.629	0	12:00				
950 WELD		2,896.0	950	0.0	49.3	48.25770819	-103.28584308	2307.617	0	12:00				



Pipeline Listing

TDW Services, Inc.

Hiland Crude, LLC
Epping Injection to Catwalk

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)
960	WELD	2,945.3	960	0.0	49.5	48.25770879	-103.28604573	2308.376	0	12:00				
970	WELD	2,994.8	970	0.0	49.5	48.25770878	-103.28624915	2309.716	0	12:00				
980	WELD	3,044.2	980	0.0	49.1	48.25770989	-103.28645254	2309.826	0	12:00				
20000000	Seam Variation	3,086.0	980	41.7	7.4	48.25771077	-103.28662418	2309.829	158	5:15	-	0.82	0.65	
20000001	Seam Variation	3,086.6	980	42.4	6.8	48.25771079	-103.28662688	2309.829	158	5:15	-	0.71	0.74	
20000002	Seam Variation	3,087.2	980	42.9	6.2	48.25771080	-103.28662926	2309.829	158	5:15	-	0.94	0.64	
20000003	Seam Variation	3,087.8	980	43.5	5.6	48.25771081	-103.28663158	2309.829	158	5:15	-	0.94	0.83	
990	WELD	3,093.4	990	0.0	49.4	48.25771096	-103.28665462	2309.850	0	12:00				
1000	WELD	3,142.8	1000	0.0	49.2	48.25771177	-103.28685788	2310.791	0	12:00				
1010	WELD	3,192.0	1010	0.0	49.4	48.25771214	-103.28706026	2311.795	0	12:00				
1020	WELD	3,241.4	1020	0.0	46.5	48.25771363	-103.28726316	2312.290	0	12:00				
1030	WELD	3,287.9	1030	0.0	49.4	48.25771462	-103.28745426	2312.025	0	12:00				
1040	WELD	3,337.2	1040	0.0	49.5	48.25771428	-103.28765722	2312.683	0	12:00				
1050	WELD	3,386.7	1050	0.0	49.4	48.25771201	-103.28786053	2313.850	0	12:00				
1060	WELD	3,436.0	1060	0.0	49.3	48.25771162	-103.28806343	2314.178	0	12:00				
1070	WELD	3,485.3	1070	0.0	49.5	48.25771310	-103.28826598	2315.401	0	12:00				
1080	WELD	3,534.7	1080	0.0	49.5	48.25771495	-103.28846932	2315.832	0	12:00				
1090	WELD	3,584.2	1090	0.0	49.3	48.25771600	-103.28867258	2314.716	0	12:00				
1100	WELD	3,633.5	1100	0.0	49.5	48.25771518	-103.28887535	2314.117	0	12:00				
1110	WELD	3,683.0	1110	0.0	49.4	48.25771386	-103.28907878	2314.638	0	12:00				
1120	WELD	3,732.4	1120	0.0	49.1	48.25771291	-103.28928165	2313.286	0	12:00				
1130	WELD	3,781.5	1130	0.0	49.4	48.25771290	-103.28948343	2312.687	0	12:00				
1140	WELD	3,830.8	1140	0.0	49.4	48.25771459	-103.28968654	2312.688	0	12:00				
1150	WELD	3,880.2	1150	0.0	49.4	48.25771574	-103.28988945	2313.454	0	12:00				
1160	WELD	3,929.6	1160	0.0	48.6	48.25771507	-103.29009262	2313.665	0	12:00				
1170	WELD	3,978.2	1170	0.0	49.4	48.25771464	-103.29029253	2313.245	0	12:00				
1180	WELD	4,027.6	1180	0.0	49.4	48.25771597	-103.29049574	2312.703	0	12:00				
1190	WELD	4,077.0	1190	0.0	49.3	48.25771666	-103.29069859	2312.096	0	12:00				
1200	WELD	4,126.3	1200	0.0	49.3	48.25771726	-103.29090129	2311.123	0	12:00				
1210	WELD	4,175.6	1210	0.0	49.4	48.25771711	-103.29110413	2310.684	0	12:00				
1220	WELD	4,225.0	1220	0.0	49.4	48.25771705	-103.29130704	2309.042	0	12:00				
1230	WELD	4,274.4	1230	0.0	49.3	48.25771787	-103.29150986	2306.452	0	12:00				
1240	WELD	4,323.7	1240	0.0	49.4	48.25771921	-103.29171252	2304.928	0	12:00				
1250	WELD	4,373.1	1250	0.0	49.4	48.25771960	-103.29191545	2304.519	0	12:00				
1260	WELD	4,422.5	1260	0.0	49.2	48.25771952	-103.29211854	2304.535	0	12:00				
1270	WELD	4,471.7	1270	0.0	49.2	48.25771942	-103.29232104	2305.022	0	12:00				
1280	WELD	4,520.9	1280	0.0	49.3	48.25771959	-103.29252350	2305.700	0	12:00				



Pipeline Listing

TDW Services, Inc.

Hiland Crude, LLC
Epping Injection to Catwalk

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)
1290	WELD	4,570.3	1290	0.0	49.4	48.25772138	-103.29272624	2305.850	0	12:00				
1300	WELD	4,619.6	1300	0.0	49.3	48.25772381	-103.29292914	2306.933	0	12:00				
1310	WELD	4,668.9	1310	0.0	49.3	48.25772368	-103.29313186	2307.564	0	12:00				
1320	WELD	4,718.2	1320	0.0	49.3	48.25772375	-103.29333452	2308.340	0	12:00				
1330	WELD	4,767.5	1330	0.0	49.4	48.25772367	-103.29353742	2308.838	0	12:00				
1340	WELD	4,816.9	1340	0.0	49.0	48.25772333	-103.29374011	2311.397	0	12:00				
1350	WELD	4,865.9	1350	0.0	49.3	48.25772439	-103.29394152	2312.070	0	12:00				
1360	WELD	4,915.2	1360	0.0	49.0	48.25772569	-103.29414435	2311.812	0	12:00				
1370	WELD	4,964.3	1370	0.0	49.0	48.25772621	-103.29434598	2311.555	0	12:00				
1380	WELD	5,013.3	1380	0.0	49.3	48.25772593	-103.29454753	2311.448	0	12:00				
1390	WELD	5,062.5	1390	0.0	49.2	48.25772515	-103.29475003	2310.777	0	12:00				
1400	WELD	5,111.8	1400	0.0	49.3	48.25772512	-103.29495247	2309.988	0	12:00				
1410	WELD	5,161.1	1410	0.0	49.4	48.25772612	-103.29515519	2309.291	0	12:00				
1420	WELD	5,210.4	1420	0.0	49.4	48.25772794	-103.29535804	2307.310	0	12:00				
1430	WELD	5,259.8	1430	0.0	49.3	48.25772875	-103.29556074	2305.025	0	12:00				
1440	WELD	5,309.1	1440	0.0	49.4	48.25772830	-103.29576310	2302.675	0	12:00				
1450	WELD	5,358.4	1450	0.0	49.4	48.25772758	-103.29596587	2300.850	0	12:00				
1460	WELD	5,407.8	1460	0.0	49.4	48.25772858	-103.29616882	2299.100	0	12:00				
1470	WELD	5,457.2	1470	0.0	49.4	48.25773018	-103.29637143	2296.448	0	12:00				
1480	WELD	5,506.5	1480	0.0	49.4	48.25773160	-103.29657428	2294.540	0	12:00				
1490	WELD	5,555.9	1490	0.0	49.2	48.25773294	-103.29677725	2293.218	0	12:00				
1500	WELD	5,605.1	1500	0.0	49.3	48.25773335	-103.29697944	2292.806	0	12:00				
1510	WELD	5,654.4	1510	0.0	49.3	48.25773253	-103.29718228	2293.260	0	12:00				
1520	WELD	5,703.7	1520	0.0	49.3	48.25773139	-103.29738505	2294.198	0	12:00				
1530	WELD	5,753.1	1530	0.0	49.2	48.25773107	-103.29758778	2293.617	0	12:00				
1540	WELD	5,802.3	1540	0.0	25.5	48.25773089	-103.29778978	2290.929	0	12:00				
1550	WELD	5,827.8	1550	0.0	0.8	48.25773076	-103.29789433	2289.601	0	12:00				
10000017	Bend left - 24 deg., 3D	5,828.1	1550	0.0	0.7	48.25773062	-103.29789583	2289.603	0	12:00				
1560	WELD	5,828.5	1560	0.0	43.1	48.25773030	-103.29789733	2289.602	0	12:00				
1570	WELD	5,871.6	1570	0.0	49.4	48.25768460	-103.29806092	2288.594	0	12:00				
1580	WELD	5,921.0	1580	0.0	49.3	48.25763164	-103.29824772	2287.413	0	12:00				
1590	WELD	5,970.4	1590	0.0	49.3	48.25757794	-103.29843383	2285.428	0	12:00				
10000018	AGM 020 -- Han #8208	5,988.2	1590	17.8	31.5	48.25755843	-103.29850114	2285.014	0	12:00				
1600	WELD	6,019.7	1600	0.0	45.4	48.25752437	-103.29862033	2284.282	0	12:00				
1610	WELD	6,065.1	1610	0.0	0.8	48.25747659	-103.29879303	2283.789	0	12:00				
10000019	Bend right - 24 deg., 3D	6,065.5	1610	0.0	0.8	48.25747633	-103.29879458	2283.789	0	12:00				
1620	WELD	6,065.9	1620	0.0	49.3	48.25747631	-103.29879623	2283.782	0	12:00				



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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)
1630	WELD	6,115.2	1630	0.0	49.3	48.25748177	-103.29899916	2283.790	0	12:00				
1640	WELD	6,164.6	1640	0.0	41.0	48.25748311	-103.29920229	2283.024	0	12:00				
1650	WELD	6,205.6	1650	0.0	41.1	48.25748323	-103.29937123	2282.377	0	12:00				
1660	WELD	6,246.7	1660	0.0	41.1	48.25748253	-103.29954030	2281.718	0	12:00				
1670	WELD	6,287.8	1670	0.0	40.5	48.25748106	-103.29970933	2281.170	0	12:00				
1680	WELD	6,328.3	1680	0.0	19.8	48.25747831	-103.29987594	2279.166	0	12:00				
1690	WELD	6,348.1	1690	0.0	40.8	48.25747643	-103.29995757	2278.797	0	12:00				
11000004	WT CHANGE	6,388.8	1690	0.0	0.1	48.25747299	-103.30012492	2277.044	0	12:00	0.322	52000	0.72	
1700	WELD	6,388.9	1700	0.0	23.0	48.25747298	-103.30012523	2277.045	0	12:00				
1710	WELD	6,412.0	1710	0.0	43.4	48.25747211	-103.30022003	2277.147	0	12:00				
1720	WELD	6,455.4	1720	0.0	41.9	48.25747623	-103.30039860	2277.026	0	12:00				
1730	WELD	6,497.2	1730	0.0	42.0	48.25749027	-103.30056967	2276.175	0	12:00				
1740	WELD	6,539.2	1740	0.0	42.0	48.25750792	-103.30074042	2275.100	0	12:00				
1750	WELD	6,581.2	1750	0.0	42.0	48.25752693	-103.30091105	2274.504	0	12:00				
1760	WELD	6,623.2	1760	0.0	42.0	48.25754626	-103.30108130	2273.182	0	12:00				
1770	WELD	6,665.2	1770	0.0	42.0	48.25756516	-103.30125142	2270.784	0	12:00				
1780	WELD	6,707.2	1780	0.0	41.9	48.25758430	-103.30142194	2269.244	0	12:00				
1790	WELD	6,749.1	1790	0.0	41.9	48.25760356	-103.30159214	2268.133	0	12:00				
1800	WELD	6,791.1	1800	0.0	42.0	48.25762264	-103.30176241	2267.319	0	12:00				
1810	WELD	6,833.0	1810	0.0	42.0	48.25764029	-103.30193307	2266.319	0	12:00				
1820	WELD	6,875.0	1820	0.0	42.0	48.25765691	-103.30210394	2265.213	0	12:00				
1830	WELD	6,916.9	1830	0.0	41.9	48.25767349	-103.30227481	2264.697	0	12:00				
1840	WELD	6,958.9	1840	0.0	41.9	48.25768998	-103.30244568	2264.333	0	12:00				
1850	WELD	7,000.8	1850	0.0	42.0	48.25770891	-103.30261589	2263.908	0	12:00				
1860	WELD	7,042.7	1860	0.0	40.9	48.25773327	-103.30278466	2264.386	0	12:00				
1870	WELD	7,083.7	1870	0.0	0.8	48.25774959	-103.30295145	2264.713	0	12:00				
10000020	Bend left - 20 deg., 3D	7,084.1	1870	0.1	0.7	48.25774964	-103.30295304	2264.717	0	12:00				
11000005	WT CHANGE	7,084.4	1870	0.0	0.0	48.25774956	-103.30295454	2264.713	0	12:00	0.188	52000	0.72	
1880	WELD	7,084.5	1880	0.0	27.2	48.25774954	-103.30295466	2264.713	0	12:00				
1890	WELD	7,111.7	1890	0.0	0.4	48.25773376	-103.30306412	2263.924	0	12:00				
10000021	Bend right - 15 deg., 1.5D	7,111.9	1890	0.0	0.4	48.25773370	-103.30306501	2263.922	0	12:00				
1900	WELD	7,112.1	1900	0.0	13.9	48.25773368	-103.30306590	2263.919	0	12:00				
1910	WELD	7,126.0	1910	0.0	40.8	48.25773495	-103.30312312	2263.713	0	12:00				
1920	WELD	7,166.8	1920	0.0	40.9	48.25773567	-103.30329119	2262.690	0	12:00				
1930	WELD	7,207.8	1930	0.0	41.0	48.25773657	-103.30345973	2262.395	0	12:00				
1940	WELD	7,248.8	1940	0.0	41.0	48.25773781	-103.30362846	2261.696	0	12:00				
1950	WELD	7,289.8	1950	0.0	41.0	48.25773732	-103.30379714	2261.740	0	12:00				



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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)
1960	WELD	7,330.7	1960	0.0	41.0	48.25773721	-103.30396577	2260.368	0	12:00				
1970	WELD	7,371.7	1970	0.0	41.0	48.25773835	-103.30413437	2260.017	0	12:00				
1980	WELD	7,412.7	1980	0.0	41.0	48.25773981	-103.30430301	2259.424	0	12:00				
1990	WELD	7,453.7	1990	0.0	41.0	48.25774103	-103.30447182	2258.459	0	12:00				
2000	WELD	7,494.7	2000	0.0	41.0	48.25774152	-103.30464058	2257.758	0	12:00				
2010	WELD	7,535.7	2010	0.0	41.0	48.25774164	-103.30480935	2256.497	0	12:00				
2020	WELD	7,576.7	2020	0.0	41.0	48.25774099	-103.30497796	2254.954	0	12:00				
2030	WELD	7,617.7	2030	0.0	41.0	48.25774061	-103.30514684	2254.613	0	12:00				
2040	WELD	7,658.7	2040	0.0	41.0	48.25774164	-103.30531566	2253.871	0	12:00				
2050	WELD	7,699.7	2050	0.0	41.0	48.25774277	-103.30548449	2253.600	0	12:00				
2060	WELD	7,740.8	2060	0.0	41.0	48.25774401	-103.30565348	2253.002	0	12:00				
2070	WELD	7,781.8	2070	0.0	41.0	48.25774480	-103.30582227	2252.840	0	12:00				
2080	WELD	7,822.8	2080	0.0	41.1	48.25774495	-103.30599127	2253.061	0	12:00				
2090	WELD	7,863.9	2090	0.0	41.1	48.25774525	-103.30616031	2252.861	0	12:00				
2100	WELD	7,904.9	2100	0.0	40.7	48.25774529	-103.30632931	2252.359	0	12:00				
2110	WELD	7,945.6	2110	0.0	41.1	48.25774531	-103.30649676	2251.170	0	12:00				
2120	WELD	7,986.7	2120	0.0	41.0	48.25774543	-103.30666581	2250.273	0	12:00				
2130	WELD	8,027.7	2130	0.0	41.0	48.25774523	-103.30683475	2249.158	0	12:00				
2140	WELD	8,068.7	2140	0.0	41.0	48.25774477	-103.30700332	2248.500	0	12:00				
2150	WELD	8,109.7	2150	0.0	41.0	48.25774474	-103.30717202	2248.206	0	12:00				
2160	WELD	8,150.7	2160	0.0	41.1	48.25774541	-103.30734095	2247.265	0	12:00				
2170	WELD	8,191.8	2170	0.0	41.1	48.25774610	-103.30750998	2246.353	0	12:00				
2180	WELD	8,232.9	2180	0.0	41.1	48.25774647	-103.30767927	2245.535	0	12:00				
2190	WELD	8,274.0	2190	0.0	41.1	48.25774673	-103.30784859	2244.633	0	12:00				
2200	WELD	8,315.1	2200	0.0	41.1	48.25774728	-103.30801774	2243.428	0	12:00				
2210	WELD	8,356.2	2210	0.0	41.1	48.25774750	-103.30818697	2243.641	0	12:00				
2220	WELD	8,397.3	2220	0.0	41.1	48.25774763	-103.30835616	2244.221	0	12:00				
2230	WELD	8,438.5	2230	0.0	41.1	48.25774773	-103.30852545	2244.957	0	12:00				
2240	WELD	8,479.6	2240	0.0	41.1	48.25774865	-103.30869476	2244.622	0	12:00				
2250	WELD	8,520.7	2250	0.0	41.1	48.25774971	-103.30886388	2243.410	0	12:00				
2260	WELD	8,561.8	2260	0.0	41.1	48.25774986	-103.30903293	2243.267	0	12:00				
2270	WELD	8,602.9	2270	0.0	41.1	48.25774950	-103.30920232	2242.926	0	12:00				
2280	WELD	8,644.0	2280	0.0	41.1	48.25774961	-103.30937146	2241.813	0	12:00				
2290	WELD	8,685.1	2290	0.0	41.1	48.25774981	-103.30954052	2241.381	0	12:00				
2300	WELD	8,726.2	2300	0.0	41.1	48.25775086	-103.30970956	2239.945	0	12:00				
2310	WELD	8,767.3	2310	0.0	41.1	48.25775216	-103.30987878	2238.855	0	12:00				
2320	WELD	8,808.4	2320	0.0	41.1	48.25775278	-103.31004790	2237.430	0	12:00				



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2330	WELD	8,849.4	2330	0.0	41.1	48.25775291	-103.31021684	2235.905	0	12:00				
2340	WELD	8,890.6	2340	0.0	41.1	48.25775357	-103.31038600	2234.743	0	12:00				
2350	WELD	8,931.6	2350	0.0	41.1	48.25775390	-103.31055510	2234.115	0	12:00				
2360	WELD	8,972.7	2360	0.0	41.1	48.25775423	-103.31072424	2234.041	0	12:00				
2370	WELD	9,013.8	2370	0.0	41.1	48.25775430	-103.31089344	2233.112	0	12:00				
2380	WELD	9,054.9	2380	0.0	41.1	48.25775399	-103.31106252	2232.780	0	12:00				
2390	WELD	9,096.0	2390	0.0	41.1	48.25775334	-103.31123170	2232.877	0	12:00				
2400	WELD	9,137.1	2400	0.0	41.1	48.25775276	-103.31140081	2233.822	0	12:00				
2410	WELD	9,178.2	2410	0.0	41.1	48.25775324	-103.31157015	2233.413	0	12:00				
2420	WELD	9,219.3	2420	0.0	41.1	48.25775383	-103.31173922	2232.292	0	12:00				
2430	WELD	9,260.4	2430	0.0	41.1	48.25775431	-103.31190855	2232.214	0	12:00				
2440	WELD	9,301.5	2440	0.0	41.1	48.25775501	-103.31207774	2231.833	0	12:00				
2450	WELD	9,342.6	2450	0.0	41.1	48.25775461	-103.31224683	2231.846	0	12:00				
2460	WELD	9,383.7	2460	0.0	41.1	48.25775452	-103.31241614	2231.901	0	12:00				
2470	WELD	9,424.8	2470	0.0	41.1	48.25775420	-103.31258552	2231.818	0	12:00				
2480	WELD	9,465.9	2480	0.0	41.1	48.25775521	-103.31275456	2231.568	0	12:00				
2490	WELD	9,507.0	2490	0.0	41.0	48.25775685	-103.31292377	2231.229	0	12:00				
2500	WELD	9,548.0	2500	0.0	41.1	48.25775770	-103.31309259	2230.044	0	12:00				
2510	WELD	9,589.1	2510	0.0	41.1	48.25775746	-103.31326173	2228.929	0	12:00				
2520	WELD	9,630.2	2520	0.0	41.1	48.25775673	-103.31343083	2227.981	0	12:00				
2530	WELD	9,671.3	2530	0.0	41.1	48.25775691	-103.31360008	2227.466	0	12:00				
2540	WELD	9,712.4	2540	0.0	41.1	48.25775729	-103.31376929	2227.270	0	12:00				
2550	WELD	9,753.5	2550	0.0	41.1	48.25775823	-103.31393842	2227.059	0	12:00				
2560	WELD	9,794.6	2560	0.0	41.0	48.25775917	-103.31410761	2225.542	0	12:00				
2570	WELD	9,835.7	2570	0.0	41.0	48.25775979	-103.31427652	2224.547	0	12:00				
2580	WELD	9,876.7	2580	0.0	41.1	48.25776035	-103.31444552	2224.370	0	12:00				
2590	WELD	9,917.8	2590	0.0	41.1	48.25776066	-103.31461475	2224.154	0	12:00				
2600	WELD	9,958.9	2600	0.0	41.0	48.25776132	-103.31478399	2223.828	0	12:00				
2610	WELD	10,000.0	2610	0.0	41.1	48.25776209	-103.31495295	2223.960	0	12:00				
2620	WELD	10,041.1	2620	0.0	41.0	48.25776261	-103.31512212	2223.420	0	12:00				
2630	WELD	10,082.1	2630	0.0	41.1	48.25776286	-103.31529115	2223.534	0	12:00				
2640	WELD	10,123.2	2640	0.0	41.1	48.25776303	-103.31546044	2223.981	0	12:00				
2650	WELD	10,164.4	2650	0.0	41.1	48.25776239	-103.31562975	2224.428	0	12:00				
2660	WELD	10,205.4	2660	0.0	41.1	48.25776203	-103.31579880	2224.603	0	12:00				
14000000	DENT	10,245.4	2660	39.9	1.2	48.25776248	-103.31596338	2225.043	303	10:00	1.0%			



Pipeline Listing

TDW Services, Inc.

Hiland Crude, LLC
Epping Injection to Catwalk

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)
12000001	Dig#18-Verification Digs were performed in 2014 to validate the MFL tool run. Actual .67%D x 1.80"L x 2.0"W - Dent (repaired w/Res-Q wrap)	10,245.4	2660	39.9	1.2	0.00000000	0.00000000	0.000	0 12:00					
40000000	Metal Loss - EXTERNAL	10,245.4	2660	40.0	1.1	48.25776249	-103.31596350	2225.043	289 9:30	5%	0.53	0.91	1760	100%
12000002	Dig#18-Verification Digs were performed in 2014 to validate the MFL tool run. Actual 15%D x .60"L x 1.20"W - ML/Gouge (repaired w/Res-Q wrap)	10,245.4	2660	40.0	1.1	0.00000000	0.00000000	0.000	0 12:00					
	2670 WELD	10,246.5	2670	0.0	41.1	48.25776251	-103.31596798	2225.053	0 12:00					
	2680 WELD	10,287.6	2680	0.0	41.1	48.25776282	-103.31613718	2225.140	0 12:00					
	2690 WELD	10,328.7	2690	0.0	41.1	48.25776334	-103.31630635	2224.617	0 12:00					
	2700 WELD	10,369.8	2700	0.0	37.6	48.25776253	-103.31647548	2225.354	0 12:00					
	2710 WELD	10,407.3	2710	0.0	23.9	48.25776097	-103.31663003	2225.387	0 12:00					
	2720 WELD	10,431.2	2720	0.0	0.9	48.25776091	-103.31672836	2226.335	0 12:00					
10000022	Bend right - 25 deg., 3D	10,431.7	2720	0.1	0.8	48.25776121	-103.31673002	2226.358	0 12:00					
	2730 WELD	10,432.1	2730	0.0	5.9	48.25776161	-103.31673175	2226.380	0 12:00					
	2740 WELD	10,438.0	2740	0.0	24.5	48.25776870	-103.31675376	2226.668	0 12:00					
	2750 WELD	10,462.6	2750	0.0	41.0	48.25779944	-103.31684355	2227.376	0 12:00					
	2760 WELD	10,503.6	2760	0.0	41.1	48.25785047	-103.31699414	2228.509	0 12:00					
	2770 WELD	10,544.7	2770	0.0	41.1	48.25789982	-103.31714616	2229.985	0 12:00					
	2780 WELD	10,585.7	2780	0.0	36.3	48.25794868	-103.31729852	2230.983	0 12:00					
	2790 WELD	10,622.0	2790	0.0	36.9	48.25799178	-103.31743333	2231.481	0 12:00					
10000023	AGM 030 -- Han #8607	10,632.3	2790	10.2	26.7	48.25800387	-103.31747143	2231.653	0 12:00					
	2800 WELD	10,659.0	2800	0.0	0.9	48.25803542	-103.31757053	2232.327	0 12:00					
10000024	Bend left - 26 deg., 3D	10,659.4	2800	0.0	0.9	48.25803575	-103.31757236	2232.327	0 12:00					
	2810 WELD	10,659.9	2810	0.0	6.0	48.25803587	-103.31757429	2232.307	0 12:00					
	2820 WELD	10,665.9	2820	0.0	35.2	48.25803603	-103.31759905	2232.056	0 12:00					
	2830 WELD	10,701.2	2830	0.0	41.1	48.25803630	-103.31774403	2230.785	0 12:00					
	2840 WELD	10,742.2	2840	0.0	41.0	48.25803629	-103.31791300	2229.409	0 12:00					
	2850 WELD	10,783.3	2850	0.0	41.0	48.25803717	-103.31808181	2229.093	0 12:00					
	2860 WELD	10,824.3	2860	0.0	41.0	48.25803922	-103.31825057	2228.616	0 12:00					
	2870 WELD	10,865.3	2870	0.0	41.1	48.25804089	-103.31841950	2227.967	0 12:00					
	2880 WELD	10,906.4	2880	0.0	41.1	48.25804115	-103.31858851	2227.508	0 12:00					
	2890 WELD	10,947.4	2890	0.0	41.1	48.25804118	-103.31875751	2227.859	0 12:00					
	2900 WELD	10,988.5	2900	0.0	41.1	48.25804166	-103.31892658	2227.517	0 12:00					



Pipeline Listing

TDW Services, Inc.

Hiland Crude, LLC
Epping Injection to Catwalk

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)	
2910	WELD	11,029.5	2910	0.0	41.0	48.25804188	-103.31909560	2227.203	0	12:00					
2920	WELD	11,070.6	2920	0.0	41.1	48.25804216	-103.31926439	2228.096	0	12:00					
2930	WELD	11,111.6	2930	0.0	41.1	48.25804281	-103.31943343	2228.462	0	12:00					
2940	WELD	11,152.7	2940	0.0	41.1	48.25804592	-103.31960241	2228.563	0	12:00					
2950	WELD	11,193.8	2950	0.0	41.1	48.25805217	-103.31977133	2227.791	0	12:00					
2960	WELD	11,234.8	2960	0.0	41.1	48.25805945	-103.31993991	2227.042	0	12:00					
2970	WELD	11,275.9	2970	0.0	41.1	48.25806653	-103.32010866	2225.309	0	12:00					
2980	WELD	11,317.0	2980	0.0	41.0	48.25807243	-103.32027742	2223.426	0	12:00					
40000001	Metal Loss - INTERNAL	11,322.3	2980	5.2	35.8	48.25807316	-103.32029891	2223.079	134	4:15	20%	0.79	0.48	1760	100%
12000003	Dig#19-Verification Digs were performed in 2014 to validate the MFL tool run. Actual: No Metal Loss found (pipe recoated)	11,322.3	2980	5.3	35.8	0.00000000	0.00000000	0.000	0	12:00					
2990	WELD	11,358.1	2990	0.0	41.1	48.25807775	-103.32044601	2221.687	0	12:00					
3000	WELD	11,399.2	3000	0.0	41.1	48.25808266	-103.32061495	2220.730	0	12:00					
3010	WELD	11,440.2	3010	0.0	41.1	48.25808716	-103.32078389	2220.241	0	12:00					
3020	WELD	11,481.4	3020	0.0	41.0	48.25809171	-103.32095300	2219.075	0	12:00					
3030	WELD	11,522.4	3030	0.0	41.1	48.25809627	-103.32112174	2218.609	0	12:00					
3040	WELD	11,563.5	3040	0.0	41.1	48.25810111	-103.32129083	2218.397	0	12:00					
3050	WELD	11,604.6	3050	0.0	41.1	48.25810577	-103.32145968	2217.618	0	12:00					
3060	WELD	11,645.7	3060	0.0	41.1	48.25811052	-103.32162864	2217.090	0	12:00					
3070	WELD	11,686.7	3070	0.0	41.1	48.25811485	-103.32179761	2216.605	0	12:00					
3080	WELD	11,727.8	3080	0.0	41.1	48.25811886	-103.32196670	2216.432	0	12:00					
3090	WELD	11,768.9	3090	0.0	41.1	48.25812280	-103.32213582	2215.815	0	12:00					
3100	WELD	11,810.1	3100	0.0	41.1	48.25812740	-103.32230487	2215.292	0	12:00					
3110	WELD	11,851.2	3110	0.0	41.1	48.25813308	-103.32247387	2214.804	0	12:00					
3120	WELD	11,892.3	3120	0.0	41.1	48.25813932	-103.32264278	2214.701	0	12:00					
3130	WELD	11,933.3	3130	0.0	41.1	48.25814511	-103.32281167	2214.173	0	12:00					
3140	WELD	11,974.4	3140	0.0	41.1	48.25815068	-103.32298067	2214.890	0	12:00					
3150	WELD	12,015.6	3150	0.0	41.1	48.25815640	-103.32314966	2214.246	0	12:00					
3160	WELD	12,056.6	3160	0.0	41.1	48.25816160	-103.32331867	2214.311	0	12:00					
3170	WELD	12,097.7	3170	0.0	41.1	48.25816731	-103.32348749	2214.691	0	12:00					
3180	WELD	12,138.8	3180	0.0	41.1	48.25817278	-103.32365647	2215.196	0	12:00					
3190	WELD	12,179.9	3190	0.0	41.1	48.25817715	-103.32382558	2215.285	0	12:00					
3200	WELD	12,221.1	3200	0.0	41.2	48.25818151	-103.32399488	2215.410	0	12:00					
3210	WELD	12,262.2	3210	0.0	41.1	48.25818630	-103.32416413	2215.161	0	12:00					



Pipeline Listing

TDW Services, Inc.

Hiland Crude, LLC
Epping Injection to Catwalk

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)
3220	WELD	12,303.3	3220	0.0	41.1	48.25818938	-103.32433330	2214.846	0	12:00				
3230	WELD	12,344.5	3230	0.0	41.1	48.25819309	-103.32450256	2214.861	0	12:00				
3240	WELD	12,385.6	3240	0.0	41.1	48.25819607	-103.32467178	2214.369	0	12:00				
3250	WELD	12,426.7	3250	0.0	41.1	48.25819982	-103.32484088	2213.241	0	12:00				
3260	WELD	12,467.8	3260	0.0	41.1	48.25820498	-103.32500998	2212.476	0	12:00				
3270	WELD	12,509.0	3270	0.0	41.0	48.25821066	-103.32517906	2212.766	0	12:00				
3280	WELD	12,550.0	3280	0.0	41.1	48.25821622	-103.32534778	2212.618	0	12:00				
3290	WELD	12,591.1	3290	0.0	41.1	48.25822181	-103.32551655	2211.979	0	12:00				
3300	WELD	12,632.1	3300	0.0	41.1	48.25822821	-103.32568531	2212.003	0	12:00				
3310	WELD	12,673.2	3310	0.0	41.1	48.25823446	-103.32585433	2212.568	0	12:00				
3320	WELD	12,714.3	3320	0.0	41.1	48.25823972	-103.32602335	2213.370	0	12:00				
3330	WELD	12,755.4	3330	0.0	41.1	48.25824424	-103.32619239	2213.762	0	12:00				
3340	WELD	12,796.6	3340	0.0	41.1	48.25824878	-103.32636151	2214.658	0	12:00				
3350	WELD	12,837.7	3350	0.0	41.1	48.25825378	-103.32653055	2215.891	0	12:00				
3360	WELD	12,878.8	3360	0.0	41.1	48.25825852	-103.32669958	2215.662	0	12:00				
3370	WELD	12,919.9	3370	0.0	41.1	48.25826170	-103.32686855	2214.083	0	12:00				
3380	WELD	12,961.0	3380	0.0	41.0	48.25826363	-103.32703770	2212.508	0	12:00				
3390	WELD	13,002.0	3390	0.0	41.1	48.25826438	-103.32720661	2211.627	0	12:00				
3400	WELD	13,043.1	3400	0.0	41.0	48.25826313	-103.32737551	2212.773	0	12:00				
3410	WELD	13,084.1	3410	0.0	41.0	48.25826203	-103.32754406	2211.644	0	12:00				
3420	WELD	13,125.0	3420	0.0	41.0	48.25826091	-103.32771280	2210.787	0	12:00				
3430	WELD	13,166.0	3430	0.0	41.0	48.25826000	-103.32788138	2210.004	0	12:00				
3440	WELD	13,207.0	3440	0.0	40.9	48.25825834	-103.32805000	2210.764	0	12:00				
3450	WELD	13,247.9	3450	0.0	46.1	48.25825575	-103.32821852	2211.308	0	12:00				
3460	WELD	13,294.0	3460	0.0	9.7	48.25825236	-103.32840798	2212.016	0	12:00				
3470	WELD	13,303.7	3470	0.0	0.7	48.25825144	-103.32844797	2212.108	0	12:00				
10000025	Bend left - 21 deg., 3D	13,304.0	3470	0.0	0.7	48.25825127	-103.32844931	2212.113	0	12:00				
3480	WELD	13,304.4	3480	0.0	49.1	48.25825094	-103.32845067	2212.117	0	12:00				
3490	WELD	13,353.4	3490	0.0	49.2	48.25820160	-103.32863865	2211.980	0	12:00				
3500	WELD	13,402.7	3500	0.0	49.3	48.25815070	-103.32882640	2212.128	0	12:00				
3510	WELD	13,452.0	3510	0.0	49.3	48.25809931	-103.32901435	2212.251	0	12:00				
3520	WELD	13,501.3	3520	0.0	49.1	48.25804783	-103.32920228	2212.819	0	12:00				
3530	WELD	13,550.4	3530	0.0	47.7	48.25799668	-103.32938932	2213.060	0	12:00				
3540	WELD	13,598.2	3540	0.0	49.0	48.25794647	-103.32957083	2213.940	0	12:00				
3550	WELD	13,647.2	3550	0.0	49.3	48.25789537	-103.32975759	2214.572	0	12:00				
3560	WELD	13,696.5	3560	0.0	48.1	48.25784354	-103.32994507	2216.127	0	12:00				
3570	WELD	13,744.6	3570	0.0	49.1	48.25779378	-103.33012814	2218.865	0	12:00				



Pipeline Listing

TDW Services, Inc.

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Epping Injection to Catwalk

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)
3580	WELD	13,793.7	3580	0.0	49.1	48.25775335	-103.33032058	2219.403	0	12:00				
3590	WELD	13,842.8	3590	0.0	48.9	48.25771694	-103.33051493	2216.528	0	12:00				
3600	WELD	13,891.7	3600	0.0	49.3	48.25768224	-103.33070941	2214.507	0	12:00				
3610	WELD	13,941.0	3610	0.0	49.3	48.25764758	-103.33090553	2213.250	0	12:00				
3620	WELD	13,990.3	3620	0.0	49.0	48.25761211	-103.33110127	2212.455	0	12:00				
3630	WELD	14,039.3	3630	0.0	48.5	48.25757879	-103.33129645	2210.359	0	12:00				
3640	WELD	14,087.8	3640	0.0	49.1	48.25754405	-103.33148921	2209.484	0	12:00				
3650	WELD	14,136.9	3650	0.0	49.0	48.25750941	-103.33168460	2208.510	0	12:00				
3660	WELD	14,186.0	3660	0.0	49.1	48.25747528	-103.33187990	2207.917	0	12:00				
3670	WELD	14,235.1	3670	0.0	49.0	48.25743968	-103.33207485	2208.486	0	12:00				
20000006	Seam Variation	14,238.0	3670	2.9	46.1	48.25743754	-103.33208661	2208.514	65	2:00	-	0.71	0.60	
3680	WELD	14,284.1	3680	0.0	7.5	48.25740443	-103.33226959	2209.351	0	12:00				
3690	WELD	14,291.6	3690	0.0	46.4	48.25739909	-103.33229946	2209.427	0	12:00				
3700	WELD	14,338.0	3700	0.0	43.7	48.25737375	-103.33248595	2208.922	0	12:00				
3710	WELD	14,381.7	3710	0.0	49.2	48.25737031	-103.33266557	2206.067	0	12:00				
3720	WELD	14,430.9	3720	0.0	49.3	48.25736958	-103.33286792	2204.089	0	12:00				
3730	WELD	14,480.2	3730	0.0	45.9	48.25736991	-103.33307043	2201.846	0	12:00				
3740	WELD	14,526.1	3740	0.0	49.0	48.25737037	-103.33325919	2199.073	0	12:00				
3750	WELD	14,575.2	3750	0.0	49.3	48.25737155	-103.33346084	2197.031	0	12:00				
3760	WELD	14,624.4	3760	0.0	49.1	48.25737024	-103.33366351	2195.383	0	12:00				
3770	WELD	14,673.5	3770	0.0	49.1	48.25736953	-103.33386573	2194.704	0	12:00				
3780	WELD	14,722.7	3780	0.0	49.3	48.25736981	-103.33406795	2195.014	0	12:00				
3790	WELD	14,772.0	3790	0.0	49.3	48.25736937	-103.33427087	2194.794	0	12:00				
3800	WELD	14,821.3	3800	0.0	49.4	48.25737027	-103.33447376	2193.437	0	12:00				
3810	WELD	14,870.6	3810	0.0	49.0	48.25737004	-103.33467684	2192.009	0	12:00				
3820	WELD	14,919.7	3820	0.0	48.9	48.25736960	-103.33487868	2190.541	0	12:00				
3830	WELD	14,968.6	3830	0.0	48.9	48.25736929	-103.33507992	2189.946	0	12:00				
3840	WELD	15,017.5	3840	0.0	34.3	48.25736832	-103.33528105	2188.977	0	12:00				
10000026	AGM 040 -- Han #8592	15,043.4	3840	26.0	8.3	48.25736791	-103.33538803	2188.468	0	12:00				
3850	WELD	15,051.8	3850	0.0	49.2	48.25736759	-103.33542232	2188.258	0	12:00				
3860	WELD	15,101.0	3860	0.0	48.5	48.25736612	-103.33562525	2187.743	0	12:00				
3870	WELD	15,149.5	3870	0.0	1.5	48.25736164	-103.33582512	2187.566	0	12:00				
10000027	Bend right - 45 deg., 3D	15,150.3	3870	0.1	1.4	48.25736233	-103.33582796	2187.574	0	12:00				
3880	WELD	15,151.0	3880	0.0	48.3	48.25736360	-103.33583052	2187.584	0	12:00				
3890	WELD	15,199.3	3890	0.0	49.3	48.25745147	-103.33598001	2187.784	0	12:00				
3900	WELD	15,248.7	3900	0.0	49.4	48.25753731	-103.33613757	2188.155	0	12:00				
3910	WELD	15,298.1	3910	0.0	49.4	48.25762175	-103.33629698	2187.558	0	12:00				



Pipeline Listing

TDW Services, Inc.

Hiland Crude, LLC
Epping Injection to Catwalk

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)	
3920	WELD	15,347.4	3920	0.0	49.4	48.25770718	-103.33645540	2187.810	0	12:00					
3930	WELD	15,396.8	3930	0.0	49.3	48.25779219	-103.33661409	2187.309	0	12:00					
3940	WELD	15,446.1	3940	0.0	49.4	48.25787795	-103.33677172	2187.528	0	12:00					
3950	WELD	15,495.5	3950	0.0	49.3	48.25796340	-103.33693002	2187.338	0	12:00					
3960	WELD	15,544.8	3960	0.0	49.0	48.25804865	-103.33708829	2186.854	0	12:00					
3970	WELD	15,593.8	3970	0.0	49.3	48.25813356	-103.33724517	2186.393	0	12:00					
3980	WELD	15,643.1	3980	0.0	49.3	48.25821877	-103.33740309	2186.546	0	12:00					
3990	WELD	15,692.4	3990	0.0	49.3	48.25830416	-103.33756125	2186.929	0	12:00					
4000	WELD	15,741.7	4000	0.0	49.3	48.25838968	-103.33771922	2187.802	0	12:00					
4010	WELD	15,791.0	4010	0.0	49.3	48.25847507	-103.33787715	2188.192	0	12:00					
4020	WELD	15,840.3	4020	0.0	49.0	48.25856035	-103.33803523	2188.442	0	12:00					
4030	WELD	15,889.4	4030	0.0	49.0	48.25864538	-103.33819228	2188.590	0	12:00					
4040	WELD	15,938.4	4040	0.0	48.5	48.25873062	-103.33834908	2188.125	0	12:00					
4050	WELD	15,987.0	4050	0.0	49.2	48.25881508	-103.33850411	2188.479	0	12:00					
4060	WELD	16,036.2	4060	0.0	48.9	48.25890036	-103.33866145	2187.599	0	12:00					
4070	WELD	16,085.1	4070	0.0	48.7	48.25898505	-103.33881844	2187.984	0	12:00					
4080	WELD	16,133.8	4080	0.0	49.1	48.25906964	-103.33897434	2188.147	0	12:00					
4090	WELD	16,182.9	4090	0.0	47.6	48.25915467	-103.33913174	2188.422	0	12:00					
4100	WELD	16,230.5	4100	0.0	49.2	48.25923727	-103.33928389	2188.442	0	12:00					
11000006	WT CHANGE	16,279.6	4100	0.0	0.1	48.25932235	-103.33944128	2188.324	0	12:00	0.322	52000	0.72		
4110	WELD	16,279.7	4110	0.0	42.0	48.25932245	-103.33944146	2188.324	0	12:00					
4120	WELD	16,321.7	4120	0.0	42.0	48.25939569	-103.33957536	2188.489	0	12:00					
4130	WELD	16,363.7	4130	0.0	41.9	48.25946938	-103.33970871	2188.441	0	12:00					
11000007	WT CHANGE	16,405.5	4130	0.0	0.0	48.25954239	-103.33984219	2187.921	0	12:00	0.188	52000	0.72		
4140	WELD	16,405.6	4140	0.0	48.7	48.25954244	-103.33984229	2187.921	0	12:00					
4150	WELD	16,454.3	4150	0.0	46.7	48.25962693	-103.33999806	2189.540	0	12:00					
4160	WELD	16,501.0	4160	0.0	23.1	48.25970929	-103.34014611	2189.885	0	12:00					
40000002	Metal Loss - EXTERNAL	16,519.8	4160	18.8	4.3	48.25974156	-103.34020661	2190.133	69	2:15	7%	0.28	0.34	1760	100%
4170	WELD	16,524.1	4170	0.0	40.6	48.25974881	-103.34022071	2190.285	0	12:00					
4180	WELD	16,564.7	4180	0.0	40.6	48.25981617	-103.34035402	2190.248	0	12:00					
4190	WELD	16,605.3	4190	0.0	41.0	48.25988547	-103.34048500	2188.594	0	12:00					
4200	WELD	16,646.3	4200	0.0	41.1	48.25995660	-103.34061617	2187.554	0	12:00					
4210	WELD	16,687.4	4210	0.0	41.1	48.26002773	-103.34074806	2187.207	0	12:00					
4220	WELD	16,728.5	4220	0.0	41.1	48.26009839	-103.34088022	2186.944	0	12:00					
4230	WELD	16,769.5	4230	0.0	41.1	48.26016952	-103.34101176	2187.165	0	12:00					
4240	WELD	16,810.6	4240	0.0	41.1	48.26024000	-103.34114427	2186.340	0	12:00					
4250	WELD	16,851.7	4250	0.0	41.0	48.26031082	-103.34127633	2185.570	0	12:00					



Pipeline Listing

TDW Services, Inc.

Hiland Crude, LLC
Epping Injection to Catwalk

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)
4260	WELD	16,892.7	4260	0.0	41.1	48.26038247	-103.34140704	2185.575	0	12:00				
4270	WELD	16,933.8	4270	0.0	41.1	48.26045429	-103.34153766	2185.974	0	12:00				
4280	WELD	16,974.9	4280	0.0	41.1	48.26052526	-103.34166945	2185.399	0	12:00				
4290	WELD	17,016.0	4290	0.0	41.1	48.26059621	-103.34180154	2185.397	0	12:00				
4300	WELD	17,057.1	4300	0.0	41.1	48.26066784	-103.34193279	2185.846	0	12:00				
4310	WELD	17,098.2	4310	0.0	41.1	48.26073943	-103.34206411	2186.121	0	12:00				
4320	WELD	17,139.3	4320	0.0	41.0	48.26081083	-103.34219545	2185.245	0	12:00				
4330	WELD	17,180.4	4330	0.0	41.1	48.26088186	-103.34232699	2184.799	0	12:00				
4340	WELD	17,221.5	4340	0.0	40.9	48.26095253	-103.34245936	2184.460	0	12:00				
4350	WELD	17,262.4	4350	0.0	40.9	48.26102041	-103.34259394	2183.757	0	12:00				
4360	WELD	17,303.3	4360	0.0	40.9	48.26108904	-103.34272741	2181.937	0	12:00				
11000008	WT CHANGE	17,344.2	4360	0.0	0.0	48.26116203	-103.34285570	2181.363	0	12:00	0.322	52000	0.72	
4370	WELD	17,344.2	4370	0.0	41.9	48.26116209	-103.34285579	2181.362	0	12:00				
4380	WELD	17,386.2	4380	0.0	42.0	48.26123819	-103.34298536	2178.573	0	12:00				
4390	WELD	17,428.2	4390	0.0	42.0	48.26131220	-103.34311767	2175.144	0	12:00				
4400	WELD	17,470.2	4400	0.0	42.0	48.26138492	-103.34325204	2173.547	0	12:00				
4410	WELD	17,512.2	4410	0.0	42.0	48.26145547	-103.34338927	2172.645	0	12:00				
4420	WELD	17,554.2	4420	0.0	42.0	48.26152316	-103.34352959	2171.513	0	12:00				
4430	WELD	17,596.2	4430	0.0	42.0	48.26158608	-103.34367465	2170.195	0	12:00				
4440	WELD	17,638.2	4440	0.0	42.0	48.26164355	-103.34382470	2169.161	0	12:00				
4450	WELD	17,680.2	4450	0.0	42.0	48.26169727	-103.34397793	2168.875	0	12:00				
4460	WELD	17,722.2	4460	0.0	42.0	48.26174816	-103.34413340	2169.005	0	12:00				
4470	WELD	17,764.1	4470	0.0	42.0	48.26179937	-103.34428860	2168.791	0	12:00				
4480	WELD	17,806.2	4480	0.0	42.0	48.26185114	-103.34444349	2168.565	0	12:00				
4490	WELD	17,848.2	4490	0.0	42.0	48.26190249	-103.34459886	2168.752	0	12:00				
4500	WELD	17,890.2	4500	0.0	42.0	48.26195422	-103.34475369	2169.235	0	12:00				
4510	WELD	17,932.3	4510	0.0	42.0	48.26200749	-103.34490756	2169.785	0	12:00				
4520	WELD	17,974.2	4520	0.0	42.1	48.26206197	-103.34506021	2169.984	0	12:00				
4530	WELD	18,016.3	4530	0.0	42.1	48.26211733	-103.34521240	2169.037	0	12:00				
4540	WELD	18,058.4	4540	0.0	42.0	48.26217177	-103.34536516	2166.826	0	12:00				
4550	WELD	18,100.4	4550	0.0	42.0	48.26222341	-103.34551989	2164.790	0	12:00				
4560	WELD	18,142.4	4560	0.0	42.0	48.26227337	-103.34567611	2164.251	0	12:00				
4570	WELD	18,184.4	4570	0.0	42.0	48.26232347	-103.34583230	2163.907	0	12:00				
4580	WELD	18,226.4	4580	0.0	42.0	48.26237332	-103.34598859	2163.384	0	12:00				
4590	WELD	18,268.4	4590	0.0	42.0	48.26242187	-103.34614579	2162.652	0	12:00				
4600	WELD	18,310.5	4600	0.0	42.0	48.26246994	-103.34630331	2161.783	0	12:00				
4610	WELD	18,352.5	4610	0.0	42.0	48.26251760	-103.34646104	2161.264	0	12:00				



Pipeline Listing

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Epping Injection to Catwalk

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)
4620	WELD	18,394.5	4620	0.0	42.0	48.26256533	-103.34661896	2161.129	0	12:00				
4630	WELD	18,436.5	4630	0.0	41.9	48.26261311	-103.34677667	2160.873	0	12:00				
4640	WELD	18,478.5	4640	0.0	42.0	48.26266089	-103.34693406	2160.673	0	12:00				
4650	WELD	18,520.5	4650	0.0	42.0	48.26270945	-103.34709130	2160.852	0	12:00				
4660	WELD	18,562.5	4660	0.0	42.0	48.26275838	-103.34724836	2161.110	0	12:00				
4670	WELD	18,604.5	4670	0.0	42.0	48.26280697	-103.34740538	2161.312	0	12:00				
4680	WELD	18,646.5	4680	0.0	42.0	48.26285509	-103.34756283	2161.441	0	12:00				
4690	WELD	18,688.5	4690	0.0	42.0	48.26290371	-103.34772010	2161.959	0	12:00				
4700	WELD	18,730.6	4700	0.0	42.0	48.26295277	-103.34787702	2162.467	0	12:00				
4710	WELD	18,772.6	4710	0.0	42.0	48.26300266	-103.34803338	2162.563	0	12:00				
4720	WELD	18,814.6	4720	0.0	42.0	48.26305230	-103.34818987	2162.336	0	12:00				
4730	WELD	18,856.6	4730	0.0	42.0	48.26310116	-103.34834675	2162.297	0	12:00				
4740	WELD	18,898.6	4740	0.0	42.0	48.26315001	-103.34850376	2162.815	0	12:00				
4750	WELD	18,940.7	4750	0.0	42.0	48.26319887	-103.34866085	2163.654	0	12:00				
4760	WELD	18,982.7	4760	0.0	14.2	48.26324712	-103.34881826	2164.307	0	12:00				
4770	WELD	18,996.9	4770	0.0	14.4	48.26326338	-103.34887164	2164.611	0	12:00				
4780	WELD	19,011.3	4780	0.0	14.2	48.26328029	-103.34892535	2165.024	0	12:00				
4790	WELD	19,025.5	4790	0.0	34.3	48.26329702	-103.34897813	2165.655	0	12:00				
4800	WELD	19,059.8	4800	0.0	26.7	48.26333692	-103.34910621	2166.701	0	12:00				
4810	WELD	19,086.5	4810	0.0	39.7	48.26336834	-103.34920573	2167.987	0	12:00				
4820	WELD	19,126.2	4820	0.0	40.0	48.26341591	-103.34935279	2169.904	0	12:00				
11000009	WT CHANGE	19,166.1	4820	0.0	0.0	48.26346535	-103.34949971	2170.737	0	12:00	0.188	52000	0.72	
4830	WELD	19,166.2	4830	0.0	26.7	48.26346540	-103.34949985	2170.738	0	12:00				
4840	WELD	19,192.9	4840	0.0	41.1	48.26349936	-103.34959750	2172.080	0	12:00				
4850	WELD	19,234.0	4850	0.0	41.1	48.26355282	-103.34974662	2172.976	0	12:00				
4860	WELD	19,275.1	4860	0.0	41.1	48.26360747	-103.34989503	2173.212	0	12:00				
4870	WELD	19,316.2	4870	0.0	34.1	48.26366260	-103.35004298	2173.307	0	12:00				
4880	WELD	19,350.3	4880	0.0	1.3	48.26370850	-103.35016548	2172.546	0	12:00				
10000028	Bend right - 40 deg., 3D	19,350.9	4880	0.1	1.2	48.26370978	-103.35016711	2172.543	0	12:00				
4890	WELD	19,351.5	4890	0.0	41.0	48.26371135	-103.35016831	2172.530	0	12:00				
4900	WELD	19,392.5	4900	0.0	41.1	48.26381397	-103.35023873	2172.372	0	12:00				
4910	WELD	19,433.7	4910	0.0	41.1	48.26391701	-103.35030888	2172.717	0	12:00				
4920	WELD	19,474.8	4920	0.0	41.1	48.26402011	-103.35037880	2172.454	0	12:00				
4930	WELD	19,515.8	4930	0.0	41.1	48.26412317	-103.35044838	2172.129	0	12:00				
4940	WELD	19,556.9	4940	0.0	41.1	48.26422640	-103.35051767	2172.543	0	12:00				
4950	WELD	19,598.1	4950	0.0	41.1	48.26432970	-103.35058699	2172.437	0	12:00				
4960	WELD	19,639.2	4960	0.0	41.1	48.26443314	-103.35065573	2172.557	0	12:00				



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4970 WELD		19,680.3	4970	0.0	41.2	48.26453648	-103.35072507	2172.080	0	12:00					
4980 WELD		19,721.5	4980	0.0	41.1	48.26463957	-103.35079538	2172.058	0	12:00					
4990 WELD		19,762.6	4990	0.0	41.0	48.26474207	-103.35086706	2171.654	0	12:00					
5000 WELD		19,803.5	5000	0.0	38.4	48.26484418	-103.35093883	2171.657	0	12:00					
5010 WELD		19,842.0	5010	0.0	40.9	48.26493993	-103.35100590	2171.764	0	12:00					
5020 WELD		19,882.9	5020	0.0	11.4	48.26504290	-103.35107420	2171.878	0	12:00					
5030 WELD		19,894.3	5030	0.0	13.6	48.26507167	-103.35109279	2171.500	0	12:00					
11000010 WT CHANGE		19,907.8	5030	0.0	0.1	48.26510579	-103.35111522	2171.254	0	12:00	0.322	52000	0.72		
5040 WELD		19,907.9	5040	0.0	41.9	48.26510596	-103.35111533	2171.254	0	12:00					
5050 WELD		19,949.8	5050	0.0	42.0	48.26521146	-103.35118507	2169.518	0	12:00					
5060 WELD		19,991.8	5060	0.0	42.0	48.26531754	-103.35125373	2168.063	0	12:00					
5070 WELD		20,033.8	5070	0.0	42.0	48.26542332	-103.35132395	2167.710	0	12:00					
5080 WELD		20,075.9	5080	0.0	42.0	48.26552857	-103.35139599	2167.091	0	12:00					
5090 WELD		20,117.9	5090	0.0	42.0	48.26563362	-103.35146859	2165.742	0	12:00					
5100 WELD		20,159.9	5100	0.0	42.0	48.26573828	-103.35154218	2164.593	0	12:00					
5110 WELD		20,201.9	5110	0.0	42.1	48.26584403	-103.35161196	2163.757	0	12:00					
5120 WELD		20,244.0	5120	0.0	42.1	48.26595033	-103.35168050	2162.262	0	12:00					
40000003 Metal Loss - INTERNAL		20,245.8	5120	1.7	40.3	48.26595479	-103.35168340	2162.192	91	3:00	7%	1.14	0.95	3014	100%
5130 WELD		20,286.1	5130	0.0	42.0	48.26605540	-103.35175328	2161.147	0	12:00					
5140 WELD		20,328.1	5140	0.0	42.0	48.26616086	-103.35182417	2161.206	0	12:00					
5150 WELD		20,370.1	5150	0.0	42.0	48.26626520	-103.35189877	2162.839	0	12:00					
5160 WELD		20,412.1	5160	0.0	42.0	48.26636830	-103.35197616	2166.059	0	12:00					
5170 WELD		20,454.1	5170	0.0	42.0	48.26647281	-103.35204793	2170.061	0	12:00					
5180 WELD		20,496.1	5180	0.0	42.0	48.26657847	-103.35211737	2172.458	0	12:00					
5190 WELD		20,538.1	5190	0.0	42.0	48.26668396	-103.35218797	2173.285	0	12:00					
5200 WELD		20,580.1	5200	0.0	42.0	48.26678829	-103.35226264	2173.809	0	12:00					
5210 WELD		20,622.0	5210	0.0	42.0	48.26689327	-103.35233472	2175.462	0	12:00					
5220 WELD		20,664.1	5220	0.0	42.1	48.26699843	-103.35240672	2177.196	0	12:00					
5230 WELD		20,706.1	5230	0.0	42.0	48.26710300	-103.35248116	2177.801	0	12:00					
5240 WELD		20,748.2	5240	0.0	35.4	48.26720776	-103.35255360	2180.622	0	12:00					
11000011 WT CHANGE		20,783.5	5240	0.0	0.1	48.26729580	-103.35261533	2181.746	0	12:00	0.188	52000	0.72		
5250 WELD		20,783.5	5250	0.0	40.6	48.26729595	-103.35261543	2181.746	0	12:00					
5260 WELD		20,824.2	5260	0.0	41.0	48.26739690	-103.35268744	2182.207	0	12:00					
5270 WELD		20,865.2	5270	0.0	41.0	48.26749872	-103.35276040	2183.129	0	12:00					
5280 WELD		20,906.2	5280	0.0	40.9	48.26760097	-103.35283230	2183.655	0	12:00					
5290 WELD		20,947.2	5290	0.0	40.9	48.26770336	-103.35290274	2183.714	0	12:00					
5300 WELD		20,988.1	5300	0.0	41.0	48.26780611	-103.35297213	2184.191	0	12:00					



Pipeline Listing

TDW Services, Inc.

Hiland Crude, LLC
Epping Injection to Catwalk

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)
5310	WELD	21,029.1	5310	0.0	40.9	48.26790901	-103.35304101	2185.161	0	12:00				
5320	WELD	21,070.0	5320	0.0	41.0	48.26801189	-103.35310935	2187.324	0	12:00				
5330	WELD	21,111.0	5330	0.0	41.0	48.26811466	-103.35317908	2188.199	0	12:00				
5340	WELD	21,152.0	5340	0.0	40.9	48.26821715	-103.35324944	2188.248	0	12:00				
5350	WELD	21,192.9	5350	0.0	40.9	48.26831936	-103.35332020	2188.334	0	12:00				
5360	WELD	21,233.8	5360	0.0	41.0	48.26842188	-103.35339021	2188.911	0	12:00				
5370	WELD	21,274.8	5370	0.0	41.0	48.26852467	-103.35345978	2189.869	0	12:00				
5380	WELD	21,315.8	5380	0.0	41.0	48.26862720	-103.35353027	2191.060	0	12:00				
5390	WELD	21,356.8	5390	0.0	41.0	48.26872974	-103.35360068	2191.429	0	12:00				
5400	WELD	21,397.7	5400	0.0	41.0	48.26883226	-103.35367106	2191.394	0	12:00				
5410	WELD	21,438.7	5410	0.0	41.0	48.26893475	-103.35374136	2192.200	0	12:00				
5420	WELD	21,479.7	5420	0.0	41.0	48.26903722	-103.35381198	2193.887	0	12:00				
5430	WELD	21,520.7	5430	0.0	41.0	48.26913978	-103.35388250	2193.956	0	12:00				
5440	WELD	21,561.7	5440	0.0	40.9	48.26924187	-103.35395412	2194.589	0	12:00				
5450	WELD	21,602.6	5450	0.0	41.0	48.26934291	-103.35402835	2195.877	0	12:00				
5460	WELD	21,643.6	5460	0.0	41.0	48.26944167	-103.35410973	2197.193	0	12:00				
5470	WELD	21,684.5	5470	0.0	40.9	48.26953462	-103.35420529	2197.281	0	12:00				
5480	WELD	21,725.5	5480	0.0	40.9	48.26962565	-103.35430483	2196.861	0	12:00				
5490	WELD	21,766.3	5490	0.0	7.4	48.26971413	-103.35440885	2197.772	0	12:00				
5500	WELD	21,773.8	5500	0.0	1.6	48.26972967	-103.35442850	2197.980	0	12:00				
1000029	Bend left - 45 deg., 3D	21,774.5	5500	0.1	1.5	48.26973061	-103.35443130	2197.976	0	12:00				
5510	WELD	21,775.3	5510	0.0	41.1	48.26973099	-103.35443450	2197.951	0	12:00				
5520	WELD	21,816.4	5520	0.0	41.1	48.26973920	-103.35460346	2197.505	0	12:00				
5530	WELD	21,857.5	5530	0.0	41.1	48.26974471	-103.35477258	2197.687	0	12:00				
5540	WELD	21,898.6	5540	0.0	41.0	48.26974996	-103.35494179	2197.250	0	12:00				
5550	WELD	21,939.6	5550	0.0	40.5	48.26975520	-103.35511065	2196.649	0	12:00				
5560	WELD	21,980.1	5560	0.0	27.4	48.26976045	-103.35527754	2195.649	0	12:00				
5570	WELD	22,007.5	5570	0.0	40.8	48.26976373	-103.35539010	2193.738	0	12:00				
1100012	WT CHANGE	22,048.3	5570	0.0	0.0	48.26976740	-103.35555757	2190.375	0	12:00	0.322	52000	0.72	
5580	WELD	22,048.3	5580	0.0	41.5	48.26976740	-103.35555777	2190.374	0	12:00				
5590	WELD	22,089.8	5590	0.0	41.9	48.26976868	-103.35572857	2188.888	0	12:00				
5600	WELD	22,131.7	5600	0.0	41.9	48.26977201	-103.35590111	2189.132	0	12:00				
5610	WELD	22,173.6	5610	0.0	41.9	48.26977845	-103.35607366	2189.090	0	12:00				
5620	WELD	22,215.5	5620	0.0	41.9	48.26978045	-103.35624627	2190.273	0	12:00				
5630	WELD	22,257.3	5630	0.0	41.9	48.26978370	-103.35641884	2190.190	0	12:00				
1100013	WT CHANGE	22,299.2	5630	0.0	0.1	48.26978906	-103.35659115	2188.481	0	12:00	0.188	52000	0.72	
5640	WELD	22,299.3	5640	0.0	6.9	48.26978907	-103.35659139	2188.477	0	12:00				



Pipeline Listing

TDW Services, Inc.

Hiland Crude, LLC
Epping Injection to Catwalk

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)
10000030	AGM 050 -- Survey Point	22,304.6	5640	5.3	1.6	48.26978991	-103.35661312	2188.141	0	12:00				
	5650 WELD	22,306.2	5650	0.0	1.0	48.26979020	-103.35661978	2188.070	0	12:00				
	5660 WELD	22,307.2	5660	0.0	1.0	48.26979038	-103.35662414	2188.035	0	12:00				
	5670 WELD	22,308.2	5670	0.0	1.2	48.26979055	-103.35662811	2187.998	0	12:00				
10000031	Tee at 90 deg.	22,308.8	5670	0.2	1.0	48.26979064	-103.35663056	2187.980	77	2:30				
	5680 WELD	22,309.4	5680	0.0	2.0	48.26979073	-103.35663303	2187.967	0	12:00				
	5690 WELD	22,311.4	5690	0.0	9.3	48.26979104	-103.35664108	2187.919	0	12:00				
	5700 WELD	22,320.7	5700	0.0	1.1	48.26979230	-103.35667930	2187.986	0	12:00				
10000032	Tee at 90 deg.	22,321.2	5700	0.4	0.7	48.26979238	-103.35668171	2187.998	75	2:30				
	5710 WELD	22,321.8	5710	0.0	18.3	48.26979245	-103.35668400	2188.004	0	12:00				
	5720 WELD	22,340.0	5720	0.0	31.9	48.26979490	-103.35675908	2187.390	0	12:00				
	5730 WELD	22,372.0	5730	0.0	40.6	48.26979897	-103.35689053	2186.736	0	12:00				
	5740 WELD	22,412.6	5740	0.0	41.2	48.26980479	-103.35705777	2186.428	0	12:00				
	5750 WELD	22,453.8	5750	0.0	41.1	48.26981045	-103.35722736	2185.270	0	12:00				
	5760 WELD	22,494.9	5760	0.0	41.1	48.26981665	-103.35739646	2183.934	0	12:00				
	5770 WELD	22,536.0	5770	0.0	41.0	48.26982275	-103.35756540	2182.915	0	12:00				
	5780 WELD	22,577.0	5780	0.0	41.0	48.26982831	-103.35773417	2181.259	0	12:00				
	5790 WELD	22,618.0	5790	0.0	40.9	48.26983381	-103.35790279	2179.863	0	12:00				
	5800 WELD	22,658.9	5800	0.0	41.0	48.26983956	-103.35807117	2178.963	0	12:00				
	5810 WELD	22,699.9	5810	0.0	41.0	48.26984512	-103.35823988	2178.424	0	12:00				
	5820 WELD	22,740.8	5820	0.0	41.0	48.26984993	-103.35840859	2177.713	0	12:00				
	5830 WELD	22,781.8	5830	0.0	40.9	48.26985523	-103.35857721	2177.009	0	12:00				
	5840 WELD	22,822.8	5840	0.0	40.8	48.26986120	-103.35874562	2175.151	0	12:00				
	5850 WELD	22,863.6	5850	0.0	40.9	48.26986805	-103.35891315	2172.364	0	12:00				
	5860 WELD	22,904.5	5860	0.0	40.9	48.26987500	-103.35908109	2169.543	0	12:00				
	5870 WELD	22,945.4	5870	0.0	40.9	48.26988084	-103.35924875	2165.648	0	12:00				
	5880 WELD	22,986.4	5880	0.0	41.0	48.26988569	-103.35941687	2162.578	0	12:00				
	5890 WELD	23,027.4	5890	0.0	40.9	48.26989088	-103.35958558	2161.280	0	12:00				
	5900 WELD	23,068.3	5900	0.0	40.9	48.26989611	-103.35975406	2160.383	0	12:00				
	5910 WELD	23,109.2	5910	0.0	40.9	48.26990150	-103.35992247	2159.673	0	12:00				
	5920 WELD	23,150.1	5920	0.0	40.9	48.26990740	-103.36009098	2159.147	0	12:00				
	5930 WELD	23,191.0	5930	0.0	40.9	48.26991327	-103.36025913	2158.153	0	12:00				
	5940 WELD	23,231.9	5940	0.0	40.9	48.26991893	-103.36042751	2157.802	0	12:00				
	5950 WELD	23,272.8	5950	0.0	40.9	48.26992448	-103.36059598	2158.003	0	12:00				
	5960 WELD	23,313.8	5960	0.0	41.0	48.26992974	-103.36076446	2158.316	0	12:00				
	5970 WELD	23,354.7	5970	0.0	41.0	48.26993471	-103.36093313	2159.066	0	12:00				
	5980 WELD	23,395.7	5980	0.0	40.9	48.26994132	-103.36110171	2159.366	0	12:00				



Pipeline Listing

TDW Services, Inc.

Hiland Crude, LLC
Epping Injection to Catwalk

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)
5990	WELD	23,436.6	5990	0.0	41.0	48.26994806	-103.36126999	2159.027	0	12:00				
6000	WELD	23,477.6	6000	0.0	41.0	48.26995473	-103.36143850	2159.544	0	12:00				
6010	WELD	23,518.5	6010	0.0	40.9	48.26996020	-103.36160707	2159.146	0	12:00				
6020	WELD	23,559.5	6020	0.0	40.9	48.26996304	-103.36177588	2159.279	0	12:00				
6030	WELD	23,600.3	6030	0.0	1.5	48.26996418	-103.36194408	2159.561	0	12:00				
10000033	Bend right - 45 deg., 3D	23,601.1	6030	0.0	1.5	48.26996519	-103.36194682	2159.575	0	12:00				
6040	WELD	23,601.8	6040	0.0	12.6	48.26996663	-103.36194910	2159.583	0	12:00				
6050	WELD	23,614.5	6050	0.0	0.5	48.26999147	-103.36198533	2159.636	0	12:00				
10000034	Bend right - 16 deg., 1.5D	23,614.7	6050	0.0	0.4	48.26999202	-103.36198582	2159.633	0	12:00				
6060	WELD	23,614.9	6060	0.0	32.3	48.26999258	-103.36198632	2159.629	0	12:00				
6070	WELD	23,647.3	6070	0.0	41.0	48.27007070	-103.36205021	2159.000	0	12:00				
6080	WELD	23,688.3	6080	0.0	41.0	48.27016994	-103.36213050	2159.226	0	12:00				
6090	WELD	23,729.2	6090	0.0	41.0	48.27026944	-103.36220982	2158.589	0	12:00				
6100	WELD	23,770.2	6100	0.0	40.9	48.27036918	-103.36228870	2159.125	0	12:00				
6110	WELD	23,811.2	6110	0.0	41.0	48.27046876	-103.36236759	2158.954	0	12:00				
6120	WELD	23,852.2	6120	0.0	41.0	48.27056813	-103.36244776	2158.936	0	12:00				
6130	WELD	23,893.2	6130	0.0	40.9	48.27066700	-103.36252919	2159.057	0	12:00				
6140	WELD	23,934.1	6140	0.0	41.0	48.27076582	-103.36261027	2158.949	0	12:00				
6150	WELD	23,975.1	6150	0.0	40.9	48.27086495	-103.36269089	2158.876	0	12:00				
6160	WELD	24,016.1	6160	0.0	41.0	48.27096398	-103.36277139	2158.879	0	12:00				
6170	WELD	24,057.0	6170	0.0	40.9	48.27106320	-103.36285151	2159.740	0	12:00				
6180	WELD	24,098.0	6180	0.0	40.9	48.27116214	-103.36293182	2161.099	0	12:00				
6190	WELD	24,138.9	6190	0.0	41.0	48.27126112	-103.36301170	2163.535	0	12:00				
6200	WELD	24,179.9	6200	0.0	41.0	48.27135952	-103.36309226	2168.230	0	12:00				
6210	WELD	24,220.9	6210	0.0	41.0	48.27145742	-103.36317308	2173.697	0	12:00				
6220	WELD	24,261.9	6220	0.0	40.9	48.27155601	-103.36325345	2177.716	0	12:00				
6230	WELD	24,302.8	6230	0.0	41.0	48.27165469	-103.36333362	2180.864	0	12:00				
6240	WELD	24,343.8	6240	0.0	40.9	48.27175360	-103.36341422	2182.630	0	12:00				
6250	WELD	24,384.7	6250	0.0	40.9	48.27185267	-103.36349408	2183.159	0	12:00				
6260	WELD	24,425.6	6260	0.0	40.9	48.27195185	-103.36357367	2183.653	0	12:00				
6270	WELD	24,466.5	6270	0.0	40.9	48.27205077	-103.36365445	2184.429	0	12:00				
6280	WELD	24,507.4	6280	0.0	40.9	48.27214902	-103.36373676	2183.860	0	12:00				
6290	WELD	24,548.4	6290	0.0	40.9	48.27224751	-103.36381865	2183.598	0	12:00				
6300	WELD	24,589.2	6300	0.0	40.9	48.27234631	-103.36389912	2182.837	0	12:00				
6310	WELD	24,630.2	6310	0.0	40.9	48.27244555	-103.36397895	2182.052	0	12:00				
6320	WELD	24,671.1	6320	0.0	41.0	48.27254490	-103.36405819	2181.007	0	12:00				
6330	WELD	24,712.1	6330	0.0	40.9	48.27264437	-103.36413707	2178.435	0	12:00				



Pipeline Listing

TDW Services, Inc.

Hiland Crude, LLC
Epping Injection to Catwalk

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)
6340	WELD	24,753.0	6340	0.0	41.0	48.27274354	-103.36421654	2176.322	0	12:00				
6350	WELD	24,794.0	6350	0.0	40.1	48.27284221	-103.36429839	2175.600	0	12:00				
6360	WELD	24,834.1	6360	0.0	1.6	48.27293809	-103.36437995	2174.522	0	12:00				
10000035	Bend left - 45 deg., 3D	24,834.8	6360	0.1	1.5	48.27293925	-103.36438251	2174.503	0	12:00				
6370	WELD	24,835.6	6370	0.0	17.7	48.27293991	-103.36438557	2174.487	0	12:00				
6380	WELD	24,853.3	6380	0.0	40.8	48.27295308	-103.36445571	2174.537	0	12:00				
6390	WELD	24,894.1	6390	0.0	41.0	48.27298316	-103.36461769	2175.125	0	12:00				
6400	WELD	24,935.1	6400	0.0	41.0	48.27301243	-103.36478097	2174.386	0	12:00				
6410	WELD	24,976.1	6410	0.0	36.1	48.27304052	-103.36494457	2173.941	0	12:00				
6420	WELD	25,012.2	6420	0.0	34.7	48.27306439	-103.36508861	2176.075	0	12:00				
6430	WELD	25,046.9	6430	0.0	41.0	48.27308687	-103.36522703	2179.194	0	12:00				
6440	WELD	25,087.8	6440	0.0	40.9	48.27311291	-103.36539114	2180.978	0	12:00				
6450	WELD	25,128.7	6450	0.0	40.9	48.27313797	-103.36555556	2181.663	0	12:00				
6460	WELD	25,169.6	6460	0.0	40.9	48.27316193	-103.36572027	2181.637	0	12:00				
6470	WELD	25,210.5	6470	0.0	40.9	48.27318542	-103.36588514	2182.053	0	12:00				
6480	WELD	25,251.4	6480	0.0	40.9	48.27320977	-103.36604971	2182.457	0	12:00				
6490	WELD	25,292.3	6490	0.0	41.0	48.27323466	-103.36621414	2182.918	0	12:00				
6500	WELD	25,333.3	6500	0.0	40.9	48.27325950	-103.36637884	2182.855	0	12:00				
6510	WELD	25,374.2	6510	0.0	40.9	48.27328469	-103.36654313	2182.920	0	12:00				
6520	WELD	25,415.1	6520	0.0	40.9	48.27330986	-103.36670741	2181.931	0	12:00				
6530	WELD	25,456.0	6530	0.0	41.0	48.27333468	-103.36687155	2179.803	0	12:00				
6540	WELD	25,496.9	6540	0.0	40.9	48.27335893	-103.36703604	2176.861	0	12:00				
6550	WELD	25,537.8	6550	0.0	40.9	48.27338305	-103.36720036	2174.481	0	12:00				
6560	WELD	25,578.7	6560	0.0	40.9	48.27340781	-103.36736472	2172.878	0	12:00				
6570	WELD	25,619.6	6570	0.0	40.9	48.27343257	-103.36752879	2171.154	0	12:00				
6580	WELD	25,660.5	6580	0.0	40.9	48.27345681	-103.36769332	2170.440	0	12:00				
6590	WELD	25,701.3	6590	0.0	40.9	48.27348079	-103.36785795	2170.480	0	12:00				
6600	WELD	25,742.2	6600	0.0	40.9	48.27350497	-103.36802264	2170.463	0	12:00				
6610	WELD	25,783.1	6610	0.0	40.9	48.27353054	-103.36818679	2170.392	0	12:00				
6620	WELD	25,824.0	6620	0.0	40.9	48.27355640	-103.36835075	2170.121	0	12:00				
6630	WELD	25,864.9	6630	0.0	40.9	48.27358917	-103.36851190	2169.776	0	12:00				
6640	WELD	25,905.8	6640	0.0	40.9	48.27362693	-103.36867097	2169.803	0	12:00				
6650	WELD	25,946.7	6650	0.0	40.9	48.27366522	-103.36882937	2169.539	0	12:00				
6660	WELD	25,987.6	6660	0.0	40.9	48.27370426	-103.36898735	2169.381	0	12:00				
6670	WELD	26,028.5	6670	0.0	40.9	48.27374428	-103.36914479	2168.800	0	12:00				
6680	WELD	26,069.4	6680	0.0	40.9	48.27378351	-103.36930285	2168.630	0	12:00				
6690	WELD	26,110.3	6690	0.0	40.9	48.27382242	-103.36946106	2168.707	0	12:00				



Pipeline Listing

TDW Services, Inc.

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Epping Injection to Catwalk

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)
6700	WELD	26,151.2	6700	0.0	40.9	48.27386054	-103.36961971	2168.504	0	12:00				
6710	WELD	26,192.0	6710	0.0	40.9	48.27389836	-103.36977844	2168.449	0	12:00				
6720	WELD	26,233.0	6720	0.0	40.9	48.27393649	-103.36993713	2168.207	0	12:00				
6730	WELD	26,273.9	6730	0.0	40.9	48.27397618	-103.37009479	2169.003	0	12:00				
6740	WELD	26,314.8	6740	0.0	41.0	48.27401485	-103.37025319	2168.900	0	12:00				
6750	WELD	26,355.7	6750	0.0	40.9	48.27405367	-103.37041171	2168.635	0	12:00				
6760	WELD	26,396.6	6760	0.0	40.9	48.27409256	-103.37056997	2168.877	0	12:00				
6770	WELD	26,437.5	6770	0.0	40.9	48.27413098	-103.37072836	2168.671	0	12:00				
6780	WELD	26,478.4	6780	0.0	40.8	48.27416900	-103.37088703	2168.789	0	12:00				
6790	WELD	26,519.2	6790	0.0	40.8	48.27420714	-103.37104497	2168.654	0	12:00				
6800	WELD	26,559.9	6800	0.0	40.8	48.27424591	-103.37120245	2167.065	0	12:00				
6810	WELD	26,600.7	6810	0.0	40.6	48.27428507	-103.37135982	2167.086	0	12:00				
6820	WELD	26,641.3	6820	0.0	16.5	48.27432337	-103.37151682	2169.034	0	12:00				
6830	WELD	26,657.8	6830	0.0	24.5	48.27433897	-103.37158072	2169.525	0	12:00				
6840	WELD	26,682.3	6840	0.0	40.9	48.27436185	-103.37167561	2169.712	0	12:00				
6850	WELD	26,723.2	6850	0.0	40.9	48.27439952	-103.37183451	2169.898	0	12:00				
6860	WELD	26,764.1	6860	0.0	40.9	48.27443776	-103.37199318	2169.991	0	12:00				
6870	WELD	26,805.0	6870	0.0	41.0	48.27447606	-103.37215157	2167.933	0	12:00				
6880	WELD	26,846.0	6880	0.0	40.7	48.27451477	-103.37230995	2166.280	0	12:00				
6890	WELD	26,886.7	6890	0.0	40.7	48.27455333	-103.37246737	2165.820	0	12:00				
6900	WELD	26,927.3	6900	0.0	30.5	48.27459201	-103.37262448	2164.253	0	12:00				
6910	WELD	26,957.8	6910	0.0	0.9	48.27462030	-103.37274234	2163.836	0	12:00				
10000036	Bend left - 30 deg., 3D	26,958.2	6910	0.0	0.8	48.27462017	-103.37274416	2163.853	0	12:00				
6920	WELD	26,958.7	6920	0.0	42.1	48.27462005	-103.37274597	2163.871	0	12:00				
6930	WELD	27,000.8	6930	0.0	49.2	48.27460872	-103.37291854	2164.600	0	12:00				
6940	WELD	27,049.9	6940	0.0	49.2	48.27459576	-103.37312022	2163.089	0	12:00				
6950	WELD	27,099.1	6950	0.0	49.2	48.27458352	-103.37332187	2161.203	0	12:00				
6960	WELD	27,148.3	6960	0.0	49.1	48.27457095	-103.37352380	2160.925	0	12:00				
6970	WELD	27,197.4	6970	0.0	49.1	48.27455726	-103.37372509	2160.946	0	12:00				
6980	WELD	27,246.5	6980	0.0	49.0	48.27454389	-103.37392659	2159.270	0	12:00				
6990	WELD	27,295.5	6990	0.0	49.2	48.27453104	-103.37412764	2158.124	0	12:00				
7000	WELD	27,344.7	7000	0.0	48.9	48.27451916	-103.37432946	2157.251	0	12:00				
7010	WELD	27,393.6	7010	0.0	49.3	48.27450683	-103.37453012	2156.894	0	12:00				
7020	WELD	27,442.9	7020	0.0	49.3	48.27449567	-103.37473261	2156.202	0	12:00				
7030	WELD	27,492.1	7030	0.0	49.2	48.27448331	-103.37493492	2155.691	0	12:00				
7040	WELD	27,541.3	7040	0.0	49.0	48.27446877	-103.37513647	2155.774	0	12:00				
7050	WELD	27,590.3	7050	0.0	49.0	48.27445525	-103.37533735	2156.110	0	12:00				



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TDW Services, Inc.

Hiland Crude, LLC
Epping Injection to Catwalk

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)
7060	WELD	27,639.3	7060	0.0	48.8	48.27444185	-103.37553845	2155.909	0	12:00				
7070	WELD	27,688.2	7070	0.0	49.2	48.27442588	-103.37573834	2154.804	0	12:00				
7080	WELD	27,737.4	7080	0.0	49.0	48.27441243	-103.37594024	2154.141	0	12:00				
7090	WELD	27,786.4	7090	0.0	49.0	48.27439955	-103.37614136	2154.064	0	12:00				
7100	WELD	27,835.4	7100	0.0	49.0	48.27438670	-103.37634245	2153.351	0	12:00				
7110	WELD	27,884.5	7110	0.0	49.0	48.27437256	-103.37654343	2152.731	0	12:00				
7120	WELD	27,933.5	7120	0.0	48.2	48.27435896	-103.37674445	2152.282	0	12:00				
7130	WELD	27,981.7	7130	0.0	49.0	48.27434621	-103.37694221	2151.565	0	12:00				
7140	WELD	28,030.7	7140	0.0	49.1	48.27433331	-103.37714329	2151.305	0	12:00				
7150	WELD	28,079.7	7150	0.0	49.2	48.27432075	-103.37734462	2150.691	0	12:00				
7160	WELD	28,129.0	7160	0.0	49.2	48.27430696	-103.37754651	2150.554	0	12:00				
7170	WELD	28,178.1	7170	0.0	49.0	48.27429197	-103.37774795	2150.627	0	12:00				
7180	WELD	28,227.1	7180	0.0	48.7	48.27427766	-103.37794860	2150.600	0	12:00				
7190	WELD	28,275.8	7190	0.0	49.2	48.27426427	-103.37814832	2150.443	0	12:00				
7200	WELD	28,325.0	7200	0.0	49.0	48.27425021	-103.37834994	2150.791	0	12:00				
7210	WELD	28,374.0	7210	0.0	48.7	48.27423589	-103.37855096	2151.028	0	12:00				
7220	WELD	28,422.7	7220	0.0	49.1	48.27422192	-103.37875078	2150.423	0	12:00				
7230	WELD	28,471.8	7230	0.0	49.0	48.27420822	-103.37895207	2150.161	0	12:00				
7240	WELD	28,520.8	7240	0.0	49.3	48.27419471	-103.37915306	2149.931	0	12:00				
7250	WELD	28,570.1	7250	0.0	49.3	48.27418155	-103.37935520	2150.073	0	12:00				
7260	WELD	28,619.4	7260	0.0	49.3	48.27416920	-103.37955754	2150.059	0	12:00				
7270	WELD	28,668.7	7270	0.0	49.3	48.27415572	-103.37975975	2149.920	0	12:00				
7280	WELD	28,718.0	7280	0.0	48.8	48.27414203	-103.37996213	2150.252	0	12:00				
7290	WELD	28,766.8	7290	0.0	49.1	48.27412887	-103.38016216	2150.351	0	12:00				
7300	WELD	28,815.9	7300	0.0	49.0	48.27411573	-103.38036369	2150.587	0	12:00				
7310	WELD	28,865.0	7310	0.0	49.0	48.27410173	-103.38056473	2151.825	0	12:00				
7320	WELD	28,914.0	7320	0.0	49.0	48.27408756	-103.38076564	2152.982	0	12:00				
7330	WELD	28,963.0	7330	0.0	49.3	48.27407339	-103.38096652	2152.674	0	12:00				
7340	WELD	29,012.3	7340	0.0	49.3	48.27405829	-103.38116842	2153.425	0	12:00				
7350	WELD	29,061.6	7350	0.0	49.3	48.27404358	-103.38137054	2154.444	0	12:00				
7360	WELD	29,110.9	7360	0.0	49.4	48.27403153	-103.38157303	2155.743	0	12:00				
7370	WELD	29,160.3	7370	0.0	49.4	48.27401785	-103.38177540	2157.055	0	12:00				
7380	WELD	29,209.7	7380	0.0	49.4	48.27400334	-103.38197768	2158.202	0	12:00				
7390	WELD	29,259.0	7390	0.0	49.1	48.27398962	-103.38218008	2159.260	0	12:00				
7400	WELD	29,308.1	7400	0.0	49.3	48.27397612	-103.38238135	2160.477	0	12:00				
7410	WELD	29,357.4	7410	0.0	49.3	48.27396175	-103.38258327	2162.248	0	12:00				
7420	WELD	29,406.8	7420	0.0	47.6	48.27394737	-103.38278538	2163.713	0	12:00				



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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)	
7430	WELD	29,454.4	7430	0.0	49.3	48.27393331	-103.38298051	2165.105	0	12:00					
7440	WELD	29,503.7	7440	0.0	49.2	48.27391897	-103.38318250	2165.032	0	12:00					
7450	WELD	29,552.9	7450	0.0	49.3	48.27390537	-103.38338422	2166.886	0	12:00					
7460	WELD	29,602.2	7460	0.0	48.9	48.27388966	-103.38358606	2166.993	0	12:00					
7470	WELD	29,651.1	7470	0.0	49.0	48.27387434	-103.38378649	2167.033	0	12:00					
7480	WELD	29,700.1	7480	0.0	49.3	48.27386094	-103.38398758	2166.105	0	12:00					
7490	WELD	29,749.5	7490	0.0	48.0	48.27384743	-103.38418984	2166.743	0	12:00					
7500	WELD	29,797.4	7500	0.0	49.4	48.27383383	-103.38438653	2167.238	0	12:00					
7510	WELD	29,846.8	7510	0.0	49.3	48.27382032	-103.38458912	2167.623	0	12:00					
7520	WELD	29,896.1	7520	0.0	49.4	48.27380595	-103.38479102	2168.009	0	12:00					
7530	WELD	29,945.5	7530	0.0	49.4	48.27379161	-103.38499337	2168.935	0	12:00					
7540	WELD	29,994.8	7540	0.0	49.0	48.27377728	-103.38519572	2169.201	0	12:00					
40000004	Metal Loss - INTERNAL	30,022.8	7540	28.0	21.0	48.27376936	-103.38531063	2169.263	5	12:00	6%	0.41	0.33	1760	100%
7550	WELD	30,043.8	7550	0.0	49.4	48.27376340	-103.38539666	2169.392	0	12:00					
7560	WELD	30,093.2	7560	0.0	49.4	48.27374911	-103.38559911	2170.019	0	12:00					
7570	WELD	30,142.6	7570	0.0	49.2	48.27373511	-103.38580164	2170.318	0	12:00					
7580	WELD	30,191.8	7580	0.0	49.4	48.27372109	-103.38600338	2170.872	0	12:00					
7590	WELD	30,241.2	7590	0.0	49.3	48.27370676	-103.38620588	2172.039	0	12:00					
7600	WELD	30,290.5	7600	0.0	49.3	48.27369303	-103.38640816	2172.165	0	12:00					
7610	WELD	30,339.9	7610	0.0	49.3	48.27368021	-103.38661062	2172.635	0	12:00					
7620	WELD	30,389.2	7620	0.0	49.1	48.27366701	-103.38681302	2173.031	0	12:00					
12000004	Stitch point for removing duplicate data	30,438.1	7620	48.9	0.2	48.27365407	-103.38701354	2172.689	0	12:00					
7630	WELD	30,438.3	7630	0.0	49.2	48.27365400	-103.38701456	2172.690	0	12:00					
7640	WELD	30,487.5	7640	0.0	48.9	48.27364050	-103.38721624	2173.432	0	12:00					
7650	WELD	30,536.4	7650	0.0	49.2	48.27362649	-103.38741663	2174.916	0	12:00					
7660	WELD	30,585.6	7660	0.0	48.7	48.27361454	-103.38761854	2176.248	0	12:00					
7670	WELD	30,634.3	7670	0.0	48.7	48.27361203	-103.38781929	2175.335	0	12:00					
7680	WELD	30,683.0	7680	0.0	46.0	48.27362466	-103.38801879	2173.578	0	12:00					
7690	WELD	30,729.0	7690	0.0	49.5	48.27364164	-103.38820648	2175.091	0	12:00					
7700	WELD	30,778.5	7700	0.0	49.0	48.27365702	-103.38840910	2176.063	0	12:00					
7710	WELD	30,827.5	7710	0.0	49.1	48.27366577	-103.38861059	2174.186	0	12:00					
10000037	AGM 060 -- Han #8764	30,834.1	7710	6.6	42.6	48.27366636	-103.38863761	2173.724	0	12:00					
7720	WELD	30,876.7	7720	0.0	48.2	48.27366751	-103.38881275	2171.073	0	12:00					
7730	WELD	30,924.9	7730	0.0	49.4	48.27366428	-103.38901151	2170.072	0	12:00					
7740	WELD	30,974.3	7740	0.0	49.3	48.27365875	-103.38921501	2171.856	0	12:00					
7750	WELD	31,023.6	7750	0.0	49.0	48.27364985	-103.38941756	2173.770	0	12:00					



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7760 WELD		31,072.6	7760	0.0	49.1	48.27363907	-103.38961898	2174.886	0	12:00				
20000010	Seam Variation	31,109.5	7760	36.8	12.3	48.27362966	-103.38977020	2175.955	204	6:45	-	0.59	0.40	
7770 WELD		31,121.7	7770	0.0	49.3	48.27362660	-103.38982041	2176.062	0	12:00				
7780 WELD		31,171.0	7780	0.0	49.2	48.27361546	-103.39002289	2176.867	0	12:00				
7790 WELD		31,220.3	7790	0.0	49.3	48.27360604	-103.39022534	2177.293	0	12:00				
7800 WELD		31,269.5	7800	0.0	49.0	48.27359701	-103.39042812	2177.083	0	12:00				
7810 WELD		31,318.5	7810	0.0	49.2	48.27358653	-103.39062940	2178.180	0	12:00				
7820 WELD		31,367.8	7820	0.0	49.3	48.27357507	-103.39083155	2179.804	0	12:00				
7830 WELD		31,417.1	7830	0.0	49.4	48.27356512	-103.39103437	2180.389	0	12:00				
7840 WELD		31,466.5	7840	0.0	49.4	48.27355693	-103.39123766	2178.995	0	12:00				
7850 WELD		31,516.0	7850	0.0	49.1	48.27354816	-103.39144103	2177.328	0	12:00				
7860 WELD		31,565.0	7860	0.0	49.0	48.27353829	-103.39164274	2176.228	0	12:00				
7870 WELD		31,614.1	7870	0.0	49.1	48.27352780	-103.39184425	2175.702	0	12:00				
7880 WELD		31,663.2	7880	0.0	49.3	48.27351744	-103.39204617	2175.923	0	12:00				
7890 WELD		31,712.5	7890	0.0	49.2	48.27350692	-103.39224903	2175.910	0	12:00				
7900 WELD		31,761.7	7900	0.0	49.2	48.27349608	-103.39245117	2175.831	0	12:00				
7910 WELD		31,810.9	7910	0.0	49.2	48.27348624	-103.39265332	2176.014	0	12:00				
7920 WELD		31,860.1	7920	0.0	48.9	48.27347660	-103.39285568	2176.360	0	12:00				
7930 WELD		31,909.0	7930	0.0	48.9	48.27346720	-103.39305674	2176.680	0	12:00				
7940 WELD		31,957.9	7940	0.0	48.9	48.27345740	-103.39325793	2176.740	0	12:00				
7950 WELD		32,006.7	7950	0.0	49.1	48.27344719	-103.39345875	2176.729	0	12:00				
7960 WELD		32,055.8	7960	0.0	49.1	48.27343682	-103.39366062	2176.736	0	12:00				
7970 WELD		32,105.0	7970	0.0	49.1	48.27342651	-103.39386252	2177.388	0	12:00				
7980 WELD		32,154.0	7980	0.0	49.3	48.27341600	-103.39406427	2177.189	0	12:00				
7990 WELD		32,203.3	7990	0.0	49.0	48.27340578	-103.39426687	2176.673	0	12:00				
8000 WELD		32,252.3	8000	0.0	49.1	48.27339511	-103.39446829	2177.112	0	12:00				
8010 WELD		32,301.5	8010	0.0	49.4	48.27338432	-103.39467022	2177.912	0	12:00				
8020 WELD		32,350.9	8020	0.0	49.0	48.27337363	-103.39487321	2178.437	0	12:00				
8030 WELD		32,399.9	8030	0.0	49.3	48.27336450	-103.39507484	2178.451	0	12:00				
8040 WELD		32,449.2	8040	0.0	49.3	48.27335418	-103.39527757	2177.781	0	12:00				
8050 WELD		32,498.5	8050	0.0	49.3	48.27334400	-103.39548024	2177.352	0	12:00				
8060 WELD		32,547.8	8060	0.0	49.2	48.27333376	-103.39568279	2177.463	0	12:00				
8070 WELD		32,597.0	8070	0.0	49.2	48.27332377	-103.39588519	2177.254	0	12:00				
8080 WELD		32,646.3	8080	0.0	49.1	48.27331381	-103.39608768	2177.359	0	12:00				
8090 WELD		32,695.4	8090	0.0	48.9	48.27330469	-103.39628968	2177.039	0	12:00				
8100 WELD		32,744.3	8100	0.0	49.2	48.27329612	-103.39649102	2177.509	0	12:00				
8110 WELD		32,793.5	8110	0.0	49.3	48.27328590	-103.39669328	2178.250	0	12:00				



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8120	WELD	32,842.8	8120	0.0	49.0	48.27327419	-103.39689598	2177.974	0	12:00				
8130	WELD	32,891.9	8130	0.0	49.5	48.27326295	-103.39709748	2177.419	0	12:00				
8140	WELD	32,941.3	8140	0.0	49.0	48.27325346	-103.39730074	2175.669	0	12:00				
8150	WELD	32,990.4	8150	0.0	49.3	48.27324418	-103.39750210	2173.226	0	12:00				
8160	WELD	33,039.6	8160	0.0	49.3	48.27323440	-103.39770445	2170.322	0	12:00				
8170	WELD	33,088.9	8170	0.0	49.1	48.27322542	-103.39790710	2168.705	0	12:00				
8180	WELD	33,138.0	8180	0.0	49.0	48.27321681	-103.39810916	2168.297	0	12:00				
8190	WELD	33,187.1	8190	0.0	49.4	48.27320860	-103.39831089	2167.413	0	12:00				
8200	WELD	33,236.5	8200	0.0	49.3	48.27320054	-103.39851401	2165.842	0	12:00				
8210	WELD	33,285.7	8210	0.0	49.1	48.27319344	-103.39871659	2163.757	0	12:00				
8220	WELD	33,334.8	8220	0.0	49.0	48.27318643	-103.39891868	2161.961	0	12:00				
8230	WELD	33,383.9	8230	0.0	49.0	48.27317805	-103.39912053	2161.358	0	12:00				
8240	WELD	33,432.8	8240	0.0	0.9	48.27316375	-103.39932019	2161.287	0	12:00				
10000038	Bend left - 21 deg., 3D	33,433.3	8240	0.1	0.8	48.27316322	-103.39932184	2161.277	0	12:00				
8250	WELD	33,433.7	8250	0.0	47.9	48.27316269	-103.39932350	2161.269	0	12:00				
8260	WELD	33,481.6	8260	0.0	49.2	48.27310436	-103.39950035	2160.282	0	12:00				
8270	WELD	33,530.8	8270	0.0	48.9	48.27304526	-103.39968286	2161.761	0	12:00				
8280	WELD	33,579.7	8280	0.0	49.4	48.27298631	-103.39986379	2163.388	0	12:00				
8290	WELD	33,629.0	8290	0.0	49.3	48.27292681	-103.40004631	2160.352	0	12:00				
8300	WELD	33,678.4	8300	0.0	48.9	48.27286708	-103.40022876	2158.118	0	12:00				
8310	WELD	33,727.3	8310	0.0	48.9	48.27280873	-103.40041049	2157.405	0	12:00				
8320	WELD	33,776.2	8320	0.0	49.0	48.27275034	-103.40059225	2157.024	0	12:00				
8330	WELD	33,825.2	8330	0.0	47.0	48.27269152	-103.40077413	2155.508	0	12:00				
8340	WELD	33,872.2	8340	0.0	49.1	48.27263536	-103.40094837	2154.259	0	12:00				
8350	WELD	33,921.3	8350	0.0	49.0	48.27257658	-103.40113078	2154.914	0	12:00				
8360	WELD	33,970.4	8360	0.0	49.0	48.27251728	-103.40131232	2155.059	0	12:00				
8370	WELD	34,019.4	8370	0.0	49.1	48.27245636	-103.40149264	2155.912	0	12:00				
8380	WELD	34,068.5	8380	0.0	0.5	48.27239783	-103.40167450	2156.287	0	12:00				
10000039	Bend rightt - 16 deg., 3D	34,068.7	8380	0.0	0.5	48.27239768	-103.40167555	2156.282	0	12:00				
8390	WELD	34,069.0	8390	0.0	41.7	48.27239752	-103.40167659	2156.275	0	12:00				
8400	WELD	34,110.7	8400	0.0	48.9	48.27237281	-103.40184447	2155.730	0	12:00				
8410	WELD	34,159.6	8410	0.0	49.0	48.27234483	-103.40204169	2155.920	0	12:00				
8420	WELD	34,208.6	8420	0.0	49.1	48.27231884	-103.40223977	2155.558	0	12:00				
8430	WELD	34,257.7	8430	0.0	48.7	48.27229294	-103.40243846	2156.477	0	12:00				
8440	WELD	34,306.4	8440	0.0	49.2	48.27226605	-103.40263508	2157.911	0	12:00				
8450	WELD	34,355.6	8450	0.0	49.2	48.27223893	-103.40283362	2159.960	0	12:00				
8460	WELD	34,404.8	8460	0.0	49.3	48.27221106	-103.40303209	2161.841	0	12:00				



Pipeline Listing

TDW Services, Inc.

Hiland Crude, LLC
Epping Injection to Catwalk

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)
8470	WELD	34,454.1	8470	0.0	49.2	48.27218384	-103.40323106	2163.123	0	12:00				
8480	WELD	34,503.3	8480	0.0	49.0	48.27215835	-103.40342955	2159.483	0	12:00				
8490	WELD	34,552.3	8490	0.0	49.4	48.27213306	-103.40362359	2149.294	0	12:00				
8500	WELD	34,601.7	8500	0.0	49.2	48.27210753	-103.40382039	2140.538	0	12:00				
8510	WELD	34,650.9	8510	0.0	48.7	48.27208182	-103.40401773	2134.180	0	12:00				
8520	WELD	34,699.6	8520	0.0	49.2	48.27205719	-103.40421440	2129.702	0	12:00				
8530	WELD	34,748.8	8530	0.0	48.8	48.27203224	-103.40441310	2126.020	0	12:00				
8540	WELD	34,797.6	8540	0.0	43.7	48.27200702	-103.40461047	2122.924	0	12:00				
8550	WELD	34,841.3	8550	0.0	43.6	48.27198453	-103.40478699	2119.823	0	12:00				
8560	WELD	34,884.9	8560	0.0	49.1	48.27196165	-103.40496306	2117.924	0	12:00				
8570	WELD	34,934.0	8570	0.0	48.9	48.27193515	-103.40516137	2117.150	0	12:00				
8580	WELD	34,982.8	8580	0.0	48.9	48.27190918	-103.40535902	2116.681	0	12:00				
8590	WELD	35,031.8	8590	0.0	48.9	48.27188463	-103.40555742	2115.902	0	12:00				
8600	WELD	35,080.7	8600	0.0	46.1	48.27185743	-103.40575487	2115.056	0	12:00				
20000011	Seam Variation	35,106.2	8600	25.5	20.6	48.27184318	-103.40585788	2114.574	279	9:15	-	1.06	0.36	
11000014	WT CHANGE	35,126.7	8600	0.0	0.1	48.27183316	-103.40594127	2114.177	0	12:00	0.322	52000	0.72	
8610	WELD	35,126.8	8610	0.0	41.9	48.27183314	-103.40594151	2114.176	0	12:00				
8620	WELD	35,168.7	8620	0.0	42.0	48.27181181	-103.40611116	2112.092	0	12:00				
8630	WELD	35,210.7	8630	0.0	41.9	48.27178898	-103.40628069	2109.871	0	12:00				
8640	WELD	35,252.6	8640	0.0	42.0	48.27176599	-103.40644994	2108.362	0	12:00				
8650	WELD	35,294.6	8650	0.0	42.0	48.27174334	-103.40661971	2108.119	0	12:00				
8660	WELD	35,336.7	8660	0.0	42.0	48.27171990	-103.40678929	2108.639	0	12:00				
8670	WELD	35,378.6	8670	0.0	42.0	48.27169718	-103.40695869	2110.902	0	12:00				
8680	WELD	35,420.6	8680	0.0	29.7	48.27167664	-103.40712801	2114.939	0	12:00				
11000015	WT CHANGE	35,450.2	8680	0.0	0.0	48.27166286	-103.40724821	2116.758	0	12:00	0.188	52000	0.72	
8690	WELD	35,450.3	8690	0.0	36.4	48.27166283	-103.40724842	2116.760	0	12:00				
8700	WELD	35,486.6	8700	0.0	41.0	48.27164352	-103.40739549	2117.233	0	12:00				
8710	WELD	35,527.6	8710	0.0	41.0	48.27162034	-103.40756084	2117.572	0	12:00				
8720	WELD	35,568.6	8720	0.0	41.0	48.27159754	-103.40772636	2118.002	0	12:00				
8730	WELD	35,609.6	8730	0.0	41.0	48.27157413	-103.40789150	2118.698	0	12:00				
8740	WELD	35,650.6	8740	0.0	41.0	48.27155118	-103.40805701	2119.155	0	12:00				
8750	WELD	35,691.6	8750	0.0	41.0	48.27152894	-103.40822275	2120.957	0	12:00				
8760	WELD	35,732.6	8760	0.0	40.9	48.27150668	-103.40838802	2123.341	0	12:00				
8770	WELD	35,773.5	8770	0.0	40.9	48.27148562	-103.40855321	2126.244	0	12:00				
8780	WELD	35,814.4	8780	0.0	41.0	48.27146411	-103.40871852	2128.911	0	12:00				
8790	WELD	35,855.5	8790	0.0	41.0	48.27144314	-103.40888422	2132.227	0	12:00				
8800	WELD	35,896.5	8800	0.0	41.0	48.27142195	-103.40904958	2136.044	0	12:00				



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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)
8810	WELD	35,937.5	8810	0.0	24.6	48.27140104	-103.40921510	2139.511	0	12:00				
8820	WELD	35,962.1	8820	0.0	6.6	48.27138850	-103.40931459	2141.065	0	12:00				
8830	WELD	35,968.7	8830	0.0	1.1	48.27139079	-103.40934041	2141.444	0	12:00				
10000040	Bend right - 38 deg., 1.5D	35,969.3	8830	0.1	1.1	48.27139140	-103.40934248	2141.465	0	12:00				
8840	WELD	35,969.8	8840	0.0	34.0	48.27139201	-103.40934458	2141.486	0	12:00				
8850	WELD	36,003.8	8850	0.0	41.1	48.27142852	-103.40947348	2143.050	0	12:00				
8860	WELD	36,044.9	8860	0.0	41.0	48.27147095	-103.40963030	2145.039	0	12:00				
8870	WELD	36,086.0	8870	0.0	41.0	48.27151247	-103.40978761	2145.870	0	12:00				
8880	WELD	36,127.0	8880	0.0	40.7	48.27155378	-103.40994495	2145.241	0	12:00				
10000041	AGM 070 -- Han #8749	36,150.1	8880	23.1	17.6	48.27157729	-103.41003351	2144.985	0	12:00				
8890	WELD	36,167.6	8890	0.0	48.9	48.27159547	-103.41010064	2144.826	0	12:00				
8900	WELD	36,216.6	8900	0.0	30.1	48.27164562	-103.41028803	2144.840	0	12:00				
8910	WELD	36,246.7	8910	0.0	48.6	48.27167661	-103.41040336	2144.331	0	12:00				
8920	WELD	36,295.3	8920	0.0	49.1	48.27172767	-103.41058879	2144.032	0	12:00				
8930	WELD	36,344.4	8930	0.0	49.1	48.27177806	-103.41077663	2144.125	0	12:00				
8940	WELD	36,393.5	8940	0.0	49.2	48.27182794	-103.41096516	2144.147	0	12:00				
8950	WELD	36,442.7	8950	0.0	49.3	48.27187920	-103.41115292	2143.606	0	12:00				
8960	WELD	36,491.9	8960	0.0	49.0	48.27193108	-103.41134070	2142.769	0	12:00				
8970	WELD	36,540.9	8970	0.0	49.3	48.27198159	-103.41152809	2141.706	0	12:00				
8980	WELD	36,590.2	8980	0.0	49.2	48.27203123	-103.41171731	2140.641	0	12:00				
8990	WELD	36,639.4	8990	0.0	48.9	48.27208104	-103.41190623	2140.230	0	12:00				
9000	WELD	36,688.3	9000	0.0	40.9	48.27213115	-103.41209362	2139.320	0	12:00				
9010	WELD	36,729.3	9010	0.0	40.9	48.27217343	-103.41225005	2138.346	0	12:00				
9020	WELD	36,770.1	9020	0.0	40.9	48.27221537	-103.41240652	2138.079	0	12:00				
9030	WELD	36,811.0	9030	0.0	40.9	48.27225684	-103.41256343	2138.104	0	12:00				
9040	WELD	36,851.9	9040	0.0	40.9	48.27229965	-103.41271943	2137.969	0	12:00				
9050	WELD	36,892.8	9050	0.0	40.9	48.27234261	-103.41287562	2137.812	0	12:00				
9060	WELD	36,933.7	9060	0.0	40.9	48.27238466	-103.41303207	2137.169	0	12:00				
9070	WELD	36,974.6	9070	0.0	41.0	48.27242702	-103.41318862	2137.410	0	12:00				
9080	WELD	37,015.6	9080	0.0	41.0	48.27246971	-103.41334498	2137.017	0	12:00				
9090	WELD	37,056.6	9090	0.0	40.9	48.27251231	-103.41350174	2136.018	0	12:00				
9100	WELD	37,097.5	9100	0.0	41.0	48.27255437	-103.41365831	2135.349	0	12:00				
9110	WELD	37,138.5	9110	0.0	40.9	48.27259592	-103.41381549	2134.688	0	12:00				
9120	WELD	37,179.4	9120	0.0	41.0	48.27263709	-103.41397270	2133.480	0	12:00				
9130	WELD	37,220.4	9130	0.0	40.9	48.27267814	-103.41413008	2132.494	0	12:00				
9140	WELD	37,261.2	9140	0.0	40.8	48.27271912	-103.41428697	2130.922	0	12:00				
9150	WELD	37,302.0	9150	0.0	40.9	48.27276013	-103.41444374	2129.813	0	12:00				



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TDW Services, Inc.

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Epping Injection to Catwalk

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)
9160	WELD	37,342.9	9160	0.0	40.9	48.27280224	-103.41460032	2128.930	0	12:00				
9170	WELD	37,383.9	9170	0.0	40.9	48.27284525	-103.41475626	2127.635	0	12:00				
9180	WELD	37,424.8	9180	0.0	41.0	48.27288841	-103.41491217	2125.750	0	12:00				
9190	WELD	37,465.8	9190	0.0	41.1	48.27293066	-103.41506903	2124.519	0	12:00				
9200	WELD	37,506.9	9200	0.0	41.1	48.27297309	-103.41522605	2122.849	0	12:00				
9210	WELD	37,548.0	9210	0.0	40.7	48.27301582	-103.41538293	2121.032	0	12:00				
9220	WELD	37,588.7	9220	0.0	32.3	48.27305805	-103.41553833	2120.401	0	12:00				
9230	WELD	37,621.0	9230	0.0	10.6	48.27309130	-103.41566198	2119.904	0	12:00				
9240	WELD	37,631.5	9240	0.0	0.6	48.27309952	-103.41570334	2119.767	0	12:00				
10000042	Bend left - 18 deg., 3D	37,631.8	9240	0.0	0.5	48.27309959	-103.41570460	2119.767	0	12:00				
9250	WELD	37,632.1	9250	0.0	40.6	48.27309965	-103.41570580	2119.766	0	12:00				
9260	WELD	37,672.7	9260	0.0	40.9	48.27310805	-103.41587284	2119.248	0	12:00				
9270	WELD	37,713.5	9270	0.0	48.8	48.27311680	-103.41604085	2118.137	0	12:00				
9280	WELD	37,762.3	9280	0.0	48.8	48.27312637	-103.41624153	2117.194	0	12:00				
9290	WELD	37,811.1	9290	0.0	49.2	48.27313574	-103.41644249	2116.469	0	12:00				
9300	WELD	37,860.3	9300	0.0	49.1	48.27314636	-103.41664468	2116.394	0	12:00				
9310	WELD	37,909.4	9310	0.0	49.1	48.27315656	-103.41684684	2116.776	0	12:00				
9320	WELD	37,958.5	9320	0.0	49.0	48.27316459	-103.41704900	2116.988	0	12:00				
9330	WELD	38,007.5	9330	0.0	25.0	48.27317437	-103.41725064	2117.175	0	12:00				
11000016	WT CHANGE	38,032.4	9330	0.0	0.1	48.27318034	-103.41735286	2115.613	0	12:00	0.322	52000	0.72	
9340	WELD	38,032.5	9340	0.0	41.9	48.27318036	-103.41735314	2115.607	0	12:00				
9350	WELD	38,074.4	9350	0.0	42.0	48.27319048	-103.41752392	2110.273	0	12:00				
9360	WELD	38,116.3	9360	0.0	42.0	48.27319619	-103.41769664	2109.355	0	12:00				
9370	WELD	38,158.3	9370	0.0	41.9	48.27320159	-103.41786908	2112.529	0	12:00				
11000017	WT CHANGE	38,200.1	9370	0.0	0.1	48.27320937	-103.41803985	2118.069	0	12:00	0.188	52000	0.72	
9380	WELD	38,200.2	9380	0.0	47.8	48.27320938	-103.41804009	2118.075	0	12:00				
9390	WELD	38,248.0	9390	0.0	49.1	48.27321886	-103.41823643	2119.941	0	12:00				
9400	WELD	38,297.1	9400	0.0	48.8	48.27323010	-103.41843831	2118.993	0	12:00				
9410	WELD	38,345.9	9410	0.0	49.1	48.27323842	-103.41863949	2119.123	0	12:00				
9420	WELD	38,395.0	9420	0.0	48.5	48.27324313	-103.41884184	2119.449	0	12:00				
11000018	WT CHANGE	38,443.5	9420	0.0	0.0	48.27324939	-103.41904175	2118.652	0	12:00	0.322	52000	0.72	
9430	WELD	38,443.5	9430	0.0	41.8	48.27324940	-103.41904195	2118.650	0	12:00				
9440	WELD	38,485.4	9440	0.0	41.9	48.27325691	-103.41921401	2116.966	0	12:00				
9450	WELD	38,527.3	9450	0.0	42.0	48.27326585	-103.41938615	2114.374	0	12:00				
9460	WELD	38,569.2	9460	0.0	42.0	48.27327581	-103.41955810	2111.150	0	12:00				
9470	WELD	38,611.2	9470	0.0	42.0	48.27328421	-103.41973045	2108.405	0	12:00				
9480	WELD	38,653.2	9480	0.0	41.9	48.27329056	-103.41990331	2107.669	0	12:00				



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)	
9490	WELD	38,695.1	9490	0.0	42.0	48.27329991	-103.42007584	2107.711	0	12:00					
9500	WELD	38,737.1	9500	0.0	42.0	48.27331129	-103.42024835	2108.506	0	12:00					
9510	WELD	38,779.1	9510	0.0	41.9	48.27331990	-103.42042036	2111.911	0	12:00					
11000019	WT CHANGE	38,821.0	9510	0.0	0.0	48.27332305	-103.42059136	2117.617	0	12:00	0.188	52000	0.72		
9520	WELD	38,821.0	9520	0.0	35.1	48.27332305	-103.42059156	2117.620	0	12:00					
9530	WELD	38,856.1	9530	0.0	49.3	48.27332260	-103.42073611	2118.692	0	12:00					
9540	WELD	38,905.4	9540	0.0	49.2	48.27333761	-103.42093842	2119.201	0	12:00					
9550	WELD	38,954.6	9550	0.0	48.9	48.27334749	-103.42114086	2119.226	0	12:00					
9560	WELD	39,003.5	9560	0.0	49.2	48.27335674	-103.42134228	2119.097	0	12:00					
9570	WELD	39,052.7	9570	0.0	49.1	48.27336708	-103.42154475	2119.288	0	12:00					
9580	WELD	39,101.8	9580	0.0	49.2	48.27337653	-103.42174687	2119.556	0	12:00					
9590	WELD	39,151.0	9590	0.0	49.0	48.27338623	-103.42194930	2119.567	0	12:00					
9600	WELD	39,200.0	9600	0.0	49.1	48.27339619	-103.42215106	2119.246	0	12:00					
9610	WELD	39,249.1	9610	0.0	49.1	48.27340624	-103.42235321	2119.288	0	12:00					
9620	WELD	39,298.2	9620	0.0	48.9	48.27341552	-103.42255515	2118.982	0	12:00					
9630	WELD	39,347.1	9630	0.0	49.1	48.27342390	-103.42275670	2118.694	0	12:00					
9640	WELD	39,396.2	9640	0.0	49.0	48.27343216	-103.42295892	2118.485	0	12:00					
40000005	Metal Loss - EXTERNAL	39,411.0	9640	14.7	34.3	48.27343476	-103.42301969	2118.471	99	3:15	12%	0.32	0.33	1760	100%
12000005	Dig#20-Verification Digs were performed in 2014 to validate the MFL tool run. Actual 9.57%D x .10"L x .60"W (pipe recoated)	39,411.0	9640	14.8	34.3	0.00000000	0.00000000	0.000	0	12:00					
9650	WELD	39,445.2	9650	0.0	49.2	48.27344079	-103.42316077	2118.472	0	12:00					
40000006	Metal Loss - EXTERNAL	39,464.8	9650	19.6	29.6	48.27344415	-103.42324142	2118.379	204	6:45	10%	0.39	0.33	1760	100%
12000006	Dig#20-Verification Digs were performed in 2014 to validate the MFL tool run. Actual 2.12%D x .25"L x .25"W (pipe recoated)	39,464.8	9650	19.6	29.6	0.00000000	0.00000000	0.000	0	12:00					
40000007	Metal Loss - EXTERNAL	39,467.7	9650	22.4	26.8	48.27344464	-103.42325315	2118.374	203	6:45	6%	0.33	0.38	1760	100%
12000007	Dig#20-Verification Digs were performed in 2014 to validate the MFL tool run. Actual 5.30%D x .25"L x .90"W (pipe recoated)	39,467.7	9650	22.4	26.8	0.00000000	0.00000000	0.000	0	12:00					
40000008	Metal Loss - EXTERNAL	39,481.1	9650	35.9	13.3	48.27344692	-103.42330867	2118.399	194	6:15	6%	0.39	0.37	1760	100%



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TDW Services, Inc.

Hiland Crude, LLC
Epping Injection to Catwalk

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)
12000008	Dig#20-Verification Digs were performed in 2014 to validate the MFL tool run. Actual 4.78%D x .40"L x .30"W (pipe recoated)	39,481.1	9650	35.9	13.3	0.00000000	0.00000000	0.000	0 12:00					
40000009	Metal Loss - INTERNAL	39,482.5	9650	37.3	11.9	48.27344716	-103.42331437	2118.402	199 6:30	5%	0.33	0.52	1760	100%
12000009	Dig#20-Verification Digs were performed in 2014 to validate the MFL tool run. Actual 2.66%D x .20"L x .20"W (pipe recoated)	39,482.5	9650	37.3	11.9	0.00000000	0.00000000	0.000	0 12:00					
40000010	Metal Loss - INTERNAL	39,482.9	9650	37.6	11.6	48.27344723	-103.42331602	2118.403	199 6:30	6%	1.54	0.58	1760	100%
12000010	Dig#20-Verification Digs were performed in 2014 to validate the MFL tool run. Actual 5.30%D x .25"L x .25"W (pipe recoated)	39,482.9	9650	37.7	11.6	0.00000000	0.00000000	0.000	0 12:00					
12000011	Dig#20-Verification Digs were performed in 2014 to validate the MFL tool run. Actual 2.66%D x .25"L x .25"W (pipe recoated)	39,483.0	9650	37.7	11.5	0.00000000	0.00000000	0.000	0 12:00					
40000011	Metal Loss - INTERNAL	39,487.8	9650	42.6	6.6	48.27344804	-103.42333626	2118.404	193 6:15	7%	0.37	0.51	1760	100%
12000012	Dig#20-Verification Digs were performed in 2014 to validate the MFL tool run. Actual 8.0%D x .50"L x .40"W (pipe recoated)	39,487.8	9650	42.6	6.6	0.00000000	0.00000000	0.000	0 12:00					
9660	WELD	39,494.4	9660	0.0	49.2	48.27344912	-103.42336338	2118.358	0 12:00					
9670	WELD	39,543.6	9670	0.0	49.2	48.27345740	-103.42356614	2118.185	0 12:00					
9680	WELD	39,592.8	9680	0.0	49.0	48.27346481	-103.42376874	2117.553	0 12:00					
9690	WELD	39,641.8	9690	0.0	49.2	48.27347174	-103.42397046	2117.359	0 12:00					
9700	WELD	39,690.9	9700	0.0	49.2	48.27348130	-103.42417288	2116.694	0 12:00					
9710	WELD	39,740.2	9710	0.0	49.2	48.27349468	-103.42437506	2116.509	0 12:00					
9720	WELD	39,789.4	9720	0.0	49.4	48.27351191	-103.42457656	2116.099	0 12:00					
9730	WELD	39,838.8	9730	0.0	49.1	48.27353113	-103.42477840	2116.302	0 12:00					
9740	WELD	39,887.9	9740	0.0	49.1	48.27355048	-103.42497899	2115.459	0 12:00					
9750	WELD	39,937.0	9750	0.0	48.7	48.27356981	-103.42517950	2115.070	0 12:00					
9760	WELD	39,985.7	9760	0.0	48.2	48.27359042	-103.42537809	2115.420	0 12:00					
9770	WELD	40,033.9	9770	0.0	49.1	48.27361099	-103.42557457	2115.660	0 12:00					



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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)	
9780	WELD	40,083.0	9780	0.0	48.9	48.27363233	-103.42577461	2115.842	0	12:00					
9790	WELD	40,132.0	9790	0.0	49.1	48.27365226	-103.42597429	2115.547	0	12:00					
9800	WELD	40,181.1	9800	0.0	48.8	48.27367123	-103.42617495	2115.702	0	12:00					
9810	WELD	40,229.9	9810	0.0	19.0	48.27369040	-103.42637434	2115.719	0	12:00					
9820	WELD	40,248.8	9820	0.0	1.5	48.27370353	-103.42644715	2115.908	0	12:00					
10000043	Bend right - 45 deg., 3D	40,249.6	9820	0.1	1.5	48.27370518	-103.42644909	2115.902	0	12:00					
9830	WELD	40,250.4	9830	0.0	24.8	48.27370685	-103.42645105	2115.887	0	12:00					
9840	WELD	40,275.1	9840	0.0	37.9	48.27376066	-103.42651395	2115.796	0	12:00					
9850	WELD	40,313.1	9850	0.0	1.0	48.27384591	-103.42660145	2116.309	0	12:00					
10000044	Bend right - 32 deg., 3D	40,313.6	9850	0.1	1.0	48.27384733	-103.42660165	2116.306	0	12:00					
9860	WELD	40,314.1	9860	0.0	39.2	48.27384872	-103.42660185	2116.302	0	12:00					
9870	WELD	40,353.3	9870	0.0	49.2	48.27395619	-103.42661839	2115.479	0	12:00					
9880	WELD	40,402.6	9880	0.0	49.3	48.27409109	-103.42663974	2115.165	0	12:00					
9890	WELD	40,451.9	9890	0.0	49.3	48.27422602	-103.42666258	2115.200	0	12:00					
40000012	Metal Loss - EXTERNAL	40,481.8	9890	29.9	19.3	48.27430799	-103.42667709	2115.116	206	6:45	9%	0.47	0.40	1760	100%
9900	WELD	40,501.1	9900	0.0	49.1	48.27436086	-103.42668617	2115.107	0	12:00					
9910	WELD	40,550.3	9910	0.0	49.0	48.27449529	-103.42670967	2115.198	0	12:00					
9920	WELD	40,599.2	9920	0.0	0.6	48.27462919	-103.42672979	2114.892	0	12:00					
10000045	Bend left - 15 deg., 3D	40,599.5	9920	0.0	0.5	48.27462990	-103.42673016	2114.889	0	12:00					
9930	WELD	40,599.8	9930	0.0	43.3	48.27463064	-103.42673056	2114.888	0	12:00					
9940	WELD	40,643.1	9940	0.0	49.1	48.27474347	-103.42678859	2114.959	0	12:00					
9950	WELD	40,692.2	9950	0.0	40.5	48.27487062	-103.42685812	2115.343	0	12:00					
9960	WELD	40,732.7	9960	0.0	0.6	48.27497149	-103.42692771	2115.100	0	12:00					
10000046	Bend left - 18 deg., 1.5D	40,733.0	9960	0.0	0.5	48.27497208	-103.42692849	2115.107	0	12:00					
9970	WELD	40,733.3	9970	0.0	47.6	48.27497266	-103.42692926	2115.113	0	12:00					
11000020	WT CHANGE	40,780.9	9970	0.0	0.0	48.27506998	-103.42706070	2114.893	0	12:00	0.322	52000	0.72		
9980	WELD	40,780.9	9980	0.0	41.9	48.27507006	-103.42706081	2114.892	0	12:00					
9990	WELD	40,822.8	9990	0.0	42.0	48.27515564	-103.42717702	2114.698	0	12:00					
10000047	Casing Begin	40,834.3	9990	11.4	30.5	48.27517885	-103.42720892	2114.614	0	12:00					
10000	WELD	40,864.8	10000	0.0	42.0	48.27524074	-103.42729412	2113.522	0	12:00					
10010	WELD	40,906.8	10010	0.0	42.0	48.27532580	-103.42741172	2111.937	0	12:00					
10020	WELD	40,948.9	10020	0.0	42.0	48.27541064	-103.42752968	2112.004	0	12:00					
10030	WELD	40,990.9	10030	0.0	42.0	48.27549476	-103.42764857	2113.413	0	12:00					
10040	WELD	41,032.9	10040	0.0	41.9	48.27557912	-103.42776651	2116.603	0	12:00					
10000048	Casing End	41,056.2	10040	23.3	18.6	48.27562660	-103.42783095	2118.310	0	12:00					
11000021	WT CHANGE	41,074.7	10040	0.0	0.0	48.27566534	-103.42788058	2119.634	0	12:00	0.188	52000	0.72		
10050	WELD	41,074.8	10050	0.0	21.3	48.27566544	-103.42788070	2119.638	0	12:00					



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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)
10060	WELD	41,096.1	10060	0.0	9.6	48.27570870	-103.42793863	2119.589	0	12:00				
10000049	Bend left - 90 deg., 6D	41,100.8	10060	1.4	8.2	48.27570487	-103.42795628	2119.393	0	12:00				
10070	WELD	41,105.7	10070	0.0	29.9	48.27569650	-103.42797199	2119.170	0	12:00				
10080	WELD	41,135.6	10080	0.0	49.2	48.27564592	-103.42806929	2118.319	0	12:00				
10090	WELD	41,184.7	10090	0.0	49.2	48.27556565	-103.42823251	2117.330	0	12:00				
10100	WELD	41,234.0	10100	0.0	49.2	48.27548642	-103.42839730	2118.335	0	12:00				
10110	WELD	41,283.1	10110	0.0	49.3	48.27540780	-103.42856263	2117.861	0	12:00				
10120	WELD	41,332.4	10120	0.0	48.8	48.27532742	-103.42872648	2117.411	0	12:00				
10130	WELD	41,381.2	10130	0.0	44.6	48.27524798	-103.42888887	2117.022	0	12:00				
10140	WELD	41,425.8	10140	0.0	49.2	48.27517497	-103.42903685	2116.797	0	12:00				
10150	WELD	41,475.0	10150	0.0	49.1	48.27509372	-103.42919961	2116.151	0	12:00				
10160	WELD	41,524.1	10160	0.0	49.3	48.27501310	-103.42936229	2115.485	0	12:00				
10170	WELD	41,573.4	10170	0.0	49.2	48.27493243	-103.42952577	2115.097	0	12:00				
10180	WELD	41,622.6	10180	0.0	49.2	48.27485181	-103.42968905	2114.863	0	12:00				
10190	WELD	41,671.8	10190	0.0	49.0	48.27477166	-103.42985287	2114.879	0	12:00				
10200	WELD	41,720.8	10200	0.0	49.3	48.27469191	-103.43001590	2114.557	0	12:00				
10210	WELD	41,770.1	10210	0.0	49.0	48.27461177	-103.43017995	2114.361	0	12:00				
10220	WELD	41,819.1	10220	0.0	48.9	48.27453281	-103.43034393	2114.633	0	12:00				
10230	WELD	41,867.9	10230	0.0	48.9	48.27445461	-103.43050823	2114.974	0	12:00				
10240	WELD	41,916.8	10240	0.0	49.3	48.27437541	-103.43067133	2115.203	0	12:00				
10250	WELD	41,966.1	10250	0.0	49.4	48.27429357	-103.43083343	2115.381	0	12:00				
10260	WELD	42,015.5	10260	0.0	49.3	48.27421000	-103.43099452	2115.500	0	12:00				
10270	WELD	42,064.8	10270	0.0	48.8	48.27412730	-103.43115615	2115.390	0	12:00				
10280	WELD	42,113.7	10280	0.0	49.2	48.27404558	-103.43131607	2115.338	0	12:00				
10290	WELD	42,162.8	10290	0.0	49.4	48.27396238	-103.43147622	2114.819	0	12:00				
10300	WELD	42,212.2	10300	0.0	46.3	48.27387855	-103.43163693	2114.608	0	12:00				
10310	WELD	42,258.6	10310	0.0	48.7	48.27379739	-103.43178429	2115.174	0	12:00				
10320	WELD	42,307.3	10320	0.0	48.9	48.27369729	-103.43191797	2114.932	0	12:00				
10330	WELD	42,356.3	10330	0.0	49.3	48.27359370	-103.43204726	2114.593	0	12:00				
10340	WELD	42,405.6	10340	0.0	49.3	48.27348937	-103.43217746	2114.587	0	12:00				
20000021	Seam Variation	42,452.5	10340	46.9	2.4	48.27339163	-103.43230421	2114.481	301	10:00	-	1.06	0.94	
10350	WELD	42,454.8	10350	0.0	49.2	48.27338676	-103.43231054	2114.488	0	12:00				
10360	WELD	42,504.0	10360	0.0	49.3	48.27328327	-103.43244151	2114.742	0	12:00				
10370	WELD	42,553.3	10370	0.0	49.3	48.27317803	-103.43257043	2114.888	0	12:00				
10380	WELD	42,602.6	10380	0.0	49.3	48.27307123	-103.43269601	2114.934	0	12:00				
10390	WELD	42,652.0	10390	0.0	49.2	48.27296181	-103.43281669	2114.902	0	12:00				
10400	WELD	42,701.2	10400	0.0	49.0	48.27285495	-103.43294159	2114.892	0	12:00				



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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)
10410	WELD	42,750.1	10410	0.0	49.3	48.27275591	-103.43307831	2115.227	0	12:00				
10420	WELD	42,799.4	10420	0.0	49.2	48.27266638	-103.43323123	2115.742	0	12:00				
10430	WELD	42,848.7	10430	0.0	49.1	48.27257829	-103.43338573	2115.919	0	12:00				
10440	WELD	42,897.8	10440	0.0	48.9	48.27249144	-103.43354117	2115.879	0	12:00				
10450	WELD	42,946.7	10450	0.0	49.1	48.27240482	-103.43369546	2116.556	0	12:00				
10460	WELD	42,995.7	10460	0.0	48.9	48.27231774	-103.43385040	2116.377	0	12:00				
10470	WELD	43,044.6	10470	0.0	40.9	48.27223129	-103.43400519	2116.775	0	12:00				
10480	WELD	43,085.5	10480	0.0	40.9	48.27215934	-103.43413494	2117.195	0	12:00				
10490	WELD	43,126.4	10490	0.0	48.8	48.27208800	-103.43426535	2117.457	0	12:00				
10500	WELD	43,175.2	10500	0.0	40.9	48.27200246	-103.43442059	2118.068	0	12:00				
10510	WELD	43,216.1	10510	0.0	40.9	48.27193077	-103.43455088	2118.173	0	12:00				
10000050	AGM 080 -- Han #3672	43,256.7	10510	40.6	0.3	48.27185894	-103.43467930	2118.600	0	12:00				
10520	WELD	43,257.0	10520	0.0	40.9	48.27185839	-103.43468027	2118.604	0	12:00				
10530	WELD	43,297.9	10530	0.0	41.0	48.27178572	-103.43480936	2118.645	0	12:00				
10540	WELD	43,338.9	10540	0.0	41.1	48.27171235	-103.43493811	2118.616	0	12:00				
10550	WELD	43,380.0	10550	0.0	41.0	48.27163895	-103.43506725	2118.376	0	12:00				
10560	WELD	43,421.1	10560	0.0	41.1	48.27156561	-103.43519609	2118.393	0	12:00				
10570	WELD	43,462.1	10570	0.0	41.1	48.27149266	-103.43532551	2118.805	0	12:00				
10580	WELD	43,503.2	10580	0.0	41.0	48.27142004	-103.43545546	2119.130	0	12:00				
10590	WELD	43,544.2	10590	0.0	41.0	48.27134776	-103.43558535	2119.206	0	12:00				
10600	WELD	43,585.2	10600	0.0	41.0	48.27127548	-103.43571520	2118.976	0	12:00				
10610	WELD	43,626.2	10610	0.0	40.9	48.27120259	-103.43584440	2118.670	0	12:00				
10620	WELD	43,667.1	10620	0.0	40.9	48.27112868	-103.43597182	2118.442	0	12:00				
10630	WELD	43,707.9	10630	0.0	32.1	48.27105437	-103.43609851	2118.620	0	12:00				
10640	WELD	43,740.0	10640	0.0	1.3	48.27100219	-103.43620239	2119.139	0	12:00				
10000051	Bend right - 45 deg., 3D	43,740.6	10640	0.1	1.2	48.27100205	-103.43620501	2119.115	0	12:00				
10650	WELD	43,741.3	10650	0.0	34.6	48.27100190	-103.43620763	2119.089	0	12:00				
10660	WELD	43,775.9	10660	0.0	41.0	48.27099606	-103.43635016	2117.902	0	12:00				
10670	WELD	43,816.9	10670	0.0	41.1	48.27099069	-103.43651904	2116.399	0	12:00				
10680	WELD	43,858.0	10680	0.0	41.1	48.27098474	-103.43668828	2115.436	0	12:00				
10690	WELD	43,899.0	10690	0.0	41.0	48.27097814	-103.43685741	2115.452	0	12:00				
10700	WELD	43,940.1	10700	0.0	41.0	48.27097090	-103.43702615	2113.940	0	12:00				
10710	WELD	43,981.1	10710	0.0	41.1	48.27096329	-103.43719497	2112.248	0	12:00				
10720	WELD	44,022.2	10720	0.0	29.9	48.27095646	-103.43736384	2109.554	0	12:00				
10730	WELD	44,052.1	10730	0.0	10.7	48.27095196	-103.43748705	2108.451	0	12:00				
10740	WELD	44,062.8	10740	0.0	41.0	48.27095032	-103.43753085	2108.097	0	12:00				
10750	WELD	44,103.8	10750	0.0	40.9	48.27094421	-103.43769986	2106.609	0	12:00				



Pipeline Listing

TDW Services, Inc.

Hiland Crude, LLC
Epping Injection to Catwalk

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)
10760	WELD	44,144.7	10760	0.0	40.9	48.27093855	-103.43786847	2105.130	0	12:00				
10770	WELD	44,185.7	10770	0.0	40.9	48.27093351	-103.43803717	2104.129	0	12:00				
10780	WELD	44,226.5	10780	0.0	40.9	48.27092867	-103.43820554	2103.295	0	12:00				
10790	WELD	44,267.4	10790	0.0	40.9	48.27092382	-103.43837399	2103.616	0	12:00				
10800	WELD	44,308.3	10800	0.0	47.2	48.27091770	-103.43854249	2103.676	0	12:00				
11000022	WT CHANGE	44,355.4	10800	0.0	0.1	48.27090839	-103.43873635	2102.388	0	12:00	0.322	52000	0.72	
10810	WELD	44,355.5	10810	0.0	41.8	48.27090838	-103.43873659	2102.385	0	12:00				
10820	WELD	44,397.3	10820	0.0	41.9	48.27090266	-103.43890865	2100.155	0	12:00				
10830	WELD	44,439.2	10830	0.0	41.9	48.27089655	-103.43908090	2097.691	0	12:00				
10840	WELD	44,481.1	10840	0.0	41.9	48.27088870	-103.43925320	2095.475	0	12:00				
10850	WELD	44,523.0	10850	0.0	41.8	48.27088028	-103.43942557	2093.342	0	12:00				
10860	WELD	44,564.8	10860	0.0	41.9	48.27087662	-103.43959799	2092.042	0	12:00				
10870	WELD	44,606.7	10870	0.0	41.9	48.27086910	-103.43977030	2091.579	0	12:00				
10880	WELD	44,648.6	10880	0.0	41.9	48.27086319	-103.43994272	2092.233	0	12:00				
10890	WELD	44,690.5	10890	0.0	41.8	48.27086030	-103.44011452	2096.496	0	12:00				
11000023	WT CHANGE	44,732.2	10890	0.0	0.0	48.27085344	-103.44028316	2104.486	0	12:00	0.188	52000	0.72	
10900	WELD	44,732.3	10900	0.0	48.5	48.27085343	-103.44028336	2104.494	0	12:00				
10910	WELD	44,780.8	10910	0.0	20.9	48.27084330	-103.44048226	2108.294	0	12:00				
10920	WELD	44,801.7	10920	0.0	38.0	48.27083855	-103.44056815	2109.209	0	12:00				
10930	WELD	44,839.7	10930	0.0	48.9	48.27083189	-103.44072432	2110.582	0	12:00				
10940	WELD	44,888.6	10940	0.0	49.2	48.27082570	-103.44092584	2112.468	0	12:00				
10950	WELD	44,937.8	10950	0.0	49.3	48.27081832	-103.44112857	2113.539	0	12:00				
10960	WELD	44,987.1	10960	0.0	49.3	48.27081047	-103.44133127	2115.519	0	12:00				
10970	WELD	45,036.3	10970	0.0	49.4	48.27080231	-103.44153389	2118.154	0	12:00				
10980	WELD	45,085.8	10980	0.0	49.3	48.27079410	-103.44173726	2119.898	0	12:00				
10990	WELD	45,135.0	10990	0.0	49.3	48.27078572	-103.44194011	2121.013	0	12:00				
11000	WELD	45,184.4	11000	0.0	49.3	48.27077756	-103.44214325	2122.698	0	12:00				
20000022	Seam Variation	45,229.4	11000	45.0	4.3	48.27077028	-103.44232850	2125.145	273	9:00	-	0.47	0.33	
20000023	Seam Variation	45,232.0	11000	47.6	1.7	48.27076987	-103.44233899	2125.294	272	9:00	-	0.59	0.33	
20000024	Seam Variation	45,232.1	11000	47.7	1.6	48.27076985	-103.44233943	2125.301	272	9:00	-	0.35	0.33	
11010	WELD	45,233.7	11010	0.0	49.3	48.27076958	-103.44234608	2125.405	0	12:00				
11020	WELD	45,283.0	11020	0.0	49.1	48.27076147	-103.44254876	2127.652	0	12:00				
11030	WELD	45,332.0	11030	0.0	48.9	48.27075352	-103.44275082	2128.601	0	12:00				
11040	WELD	45,381.0	11040	0.0	44.8	48.27074502	-103.44295225	2129.450	0	12:00				
11050	WELD	45,425.7	11050	0.0	49.3	48.27073796	-103.44313661	2129.925	0	12:00				
11060	WELD	45,475.1	11060	0.0	49.3	48.27073240	-103.44334002	2129.464	0	12:00				
11070	WELD	45,524.4	11070	0.0	48.9	48.27073056	-103.44354350	2128.536	0	12:00				

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)	
11080	WELD	45,573.3	11080	0.0	49.0	48.27073011	-103.44374515	2127.184	0	12:00					
11090	WELD	45,622.3	11090	0.0	49.3	48.27072980	-103.44394739	2126.537	0	12:00					
11100	WELD	45,671.6	11100	0.0	49.1	48.27073011	-103.44415102	2126.260	0	12:00					
11110	WELD	45,720.7	11110	0.0	48.2	48.27073038	-103.44435350	2125.726	0	12:00					
11120	WELD	45,768.9	11120	0.0	49.3	48.27073067	-103.44455230	2125.584	0	12:00					
11130	WELD	45,818.2	11130	0.0	43.4	48.27073105	-103.44475570	2126.211	0	12:00					
11140	WELD	45,861.6	11140	0.0	49.2	48.27073032	-103.44493477	2126.581	0	12:00					
11150	WELD	45,910.8	11150	0.0	49.2	48.27072959	-103.44513773	2127.102	0	12:00					
11160	WELD	45,960.0	11160	0.0	49.0	48.27072936	-103.44534079	2127.730	0	12:00					
11170	WELD	46,009.0	11170	0.0	49.3	48.27072864	-103.44554299	2127.860	0	12:00					
11180	WELD	46,058.3	11180	0.0	49.0	48.27072791	-103.44574632	2127.844	0	12:00					
11190	WELD	46,107.3	11190	0.0	48.9	48.27072756	-103.44594844	2128.476	0	12:00					
11200	WELD	46,156.2	11200	0.0	49.0	48.27072773	-103.44615008	2130.286	0	12:00					
11210	WELD	46,205.2	11210	0.0	49.4	48.27072812	-103.44635184	2132.929	0	12:00					
11220	WELD	46,254.5	11220	0.0	49.4	48.27072887	-103.44655535	2134.619	0	12:00					
11230	WELD	46,303.9	11230	0.0	49.3	48.27072877	-103.44675900	2136.350	0	12:00					
11240	WELD	46,353.3	11240	0.0	49.4	48.27072790	-103.44696246	2137.877	0	12:00					
11250	WELD	46,402.6	11250	0.0	49.3	48.27072697	-103.44716607	2139.066	0	12:00					
11260	WELD	46,452.0	11260	0.0	49.4	48.27072543	-103.44736924	2141.415	0	12:00					
11270	WELD	46,501.4	11270	0.0	49.0	48.27072384	-103.44757296	2142.890	0	12:00					
11280	WELD	46,550.4	11280	0.0	49.3	48.27072323	-103.44777528	2142.017	0	12:00					
11290	WELD	46,599.7	11290	0.0	49.1	48.27072328	-103.44797835	2139.727	0	12:00					
11300	WELD	46,648.8	11300	0.0	48.9	48.27072293	-103.44818101	2138.398	0	12:00					
11310	WELD	46,697.7	11310	0.0	49.2	48.27072190	-103.44838255	2136.936	0	12:00					
11320	WELD	46,746.8	11320	0.0	49.1	48.27072141	-103.44858540	2135.642	0	12:00					
11330	WELD	46,796.0	11330	0.0	49.2	48.27072087	-103.44878813	2134.975	0	12:00					
11340	WELD	46,845.2	11340	0.0	49.2	48.27071961	-103.44899120	2134.178	0	12:00					
40000013	Metal Loss - EXTERNAL	46,855.1	11340	9.9	39.3	48.27071936	-103.44903221	2133.912	87	2:45	6%	0.49	0.53	1760	100%
11350	WELD	46,894.4	11350	0.0	49.2	48.27071885	-103.44919412	2132.466	0	12:00					
11360	WELD	46,943.6	11360	0.0	49.2	48.27071852	-103.44939689	2130.779	0	12:00					
11370	WELD	46,992.7	11370	0.0	48.9	48.27071853	-103.44959983	2130.760	0	12:00					
11380	WELD	47,041.7	11380	0.0	49.3	48.27071847	-103.44980164	2132.384	0	12:00					
11390	WELD	47,091.0	11390	0.0	49.3	48.27071763	-103.45000443	2135.652	0	12:00					
11400	WELD	47,140.3	11400	0.0	49.2	48.27071629	-103.45020718	2139.347	0	12:00					
11410	WELD	47,189.5	11410	0.0	49.2	48.27071596	-103.45041016	2140.549	0	12:00					
11420	WELD	47,238.7	11420	0.0	49.3	48.27071575	-103.45061301	2139.584	0	12:00					
11430	WELD	47,287.9	11430	0.0	49.1	48.27071588	-103.45081623	2138.609	0	12:00					



Pipeline Listing

TDW Services, Inc.

Hiland Crude, LLC
Epping Injection to Catwalk

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)
40000014	Metal Loss - EXTERNAL	47,298.7	11430	10.7	38.4	48.27071600	-103.45086068	2138.218	239 7:45	7%	0.62	0.74	1760	100%
20000027	Seam Variation	47,298.7	11430	10.8	38.3	48.27071600	-103.45086096	2138.215	55 1:45	-	0.47	0.37		
40000015	Metal Loss - EXTERNAL	47,328.0	11430	40.0	9.1	48.27071641	-103.45098156	2137.611	255 8:30	6%	0.77	0.66	1760	100%
	11440 WELD	47,337.1	11440	0.0	49.3	48.27071651	-103.45101895	2137.568	0 12:00					
	11450 WELD	47,386.3	11450	0.0	45.4	48.27071675	-103.45122230	2136.963	0 12:00					
	11460 WELD	47,431.7	11460	0.0	49.0	48.27071525	-103.45140951	2136.430	0 12:00					
	11470 WELD	47,480.7	11470	0.0	49.1	48.27071452	-103.45161170	2137.183	0 12:00					
	11480 WELD	47,529.9	11480	0.0	48.7	48.27071451	-103.45181431	2138.305	0 12:00					
	11490 WELD	47,578.6	11490	0.0	48.8	48.27071562	-103.45201536	2137.939	0 12:00					
	11500 WELD	47,627.4	11500	0.0	49.0	48.27071577	-103.45221681	2138.581	0 12:00					
	11510 WELD	47,676.4	11510	0.0	49.2	48.27071651	-103.45241883	2140.370	0 12:00					
	11520 WELD	47,725.6	11520	0.0	48.9	48.27071616	-103.45262155	2141.989	0 12:00					
	11530 WELD	47,774.4	11530	0.0	7.0	48.27071565	-103.45282297	2143.649	0 12:00					
11000024	WT CHANGE	47,781.4	11530	0.0	0.0	48.27071552	-103.45285169	2143.788	0 12:00		0.322	52000	0.72	
	11540 WELD	47,781.5	11540	0.0	4.3	48.27071552	-103.45285189	2143.797	0 12:00					
	11550 WELD	47,785.7	11550	0.0	1.5	48.27071547	-103.45286511	2146.474	0 12:00					
10000052	Bend up - 45 deg., 3D	47,786.5	11550	0.1	1.4	48.27071547	-103.45286732	2147.015	0 12:00					
	11560 WELD	47,787.2	11560	0.0	6.2	48.27071547	-103.45286954	2147.552	0 12:00					
10000053	Pipe Exiting the Ground, Catwalk -- Han #8023	47,792.4	11560	5.2	1.0	48.27071543	-103.45288440	2151.282	0 12:00					
	11570 WELD	47,793.4	11570	0.0	6.3	48.27071546	-103.45288793	2152.130	0 12:00					
	11580 WELD	47,799.7	11580	0.0	1.6	48.27071566	-103.45291684	2155.047	0 12:00					
10000054	Bend down - 45 deg., 3D	47,800.5	11580	0.1	1.5	48.27071567	-103.45292094	2155.176	0 12:00					
	11590 WELD	47,801.3	11590	0.0	3.1	48.27071567	-103.45292499	2155.308	0 12:00					
10000055	Flange	47,801.8	11590	0.5	2.6	48.27071568	-103.45292735	2155.382	0 12:00					
10000056	Valve (Receiver), Catwalk	47,802.8	11590	1.5	1.6	48.27071571	-103.45293280	2155.548	0 12:00					
10000057	Flange	47,803.9	11590	2.6	0.5	48.27071571	-103.45293285	2155.551	0 12:00					
	11600 WELD	47,804.4	11600	0.0	-	48.27071571	-103.45293285	2155.551	0 12:00					



Pipeline Listing

TDW Services, Inc.

Hiland Crude, LLC
Epping Injection to Catwalk

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)
12000013	End Run Tickle	47,843.5	11600	39.1	-	48.27071571	-103.45293285	2155.551	0	12:00				

Type	Number
DEFORMATION	1
GAINS	1
GROUPED PITS	16
LOCATIONS	58
MISC	14
SEAM VARIATION	12
WT CHANGES	25
WELDS	1150



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

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

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

General Inline Inspection Terms

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).
Pfail (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 (Pfail) 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.
Pfail/MAOP	Percent of MAOP, this is calculated by dividing the calculated failure pressure of the defect (Pfail) 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

Appendix A

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.

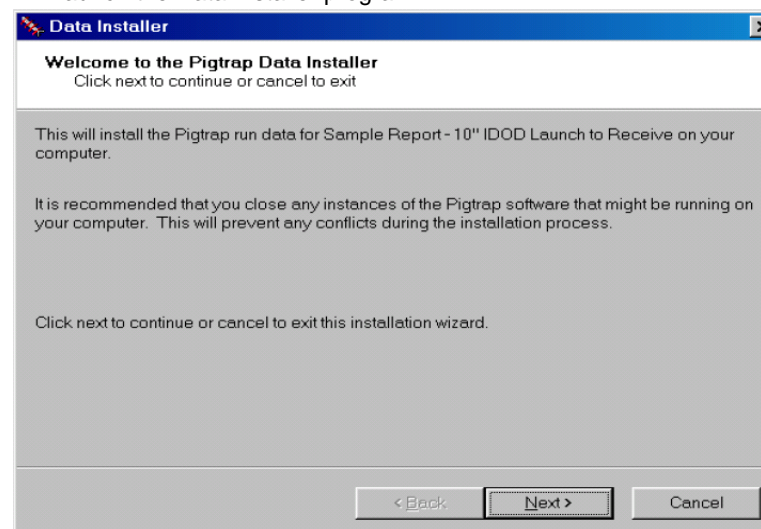
- h*.nnn, c*.nnn, i*.nnn, p*.nnn, t*.nnn, l*.nnn & o*.nnn – The raw tool data created on-board the inspection tool. These files are necessary for PigTrap™ to function properly. CD and DVDs have the option to install these files onto your computer, if chosen not to install them to your computer the disks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



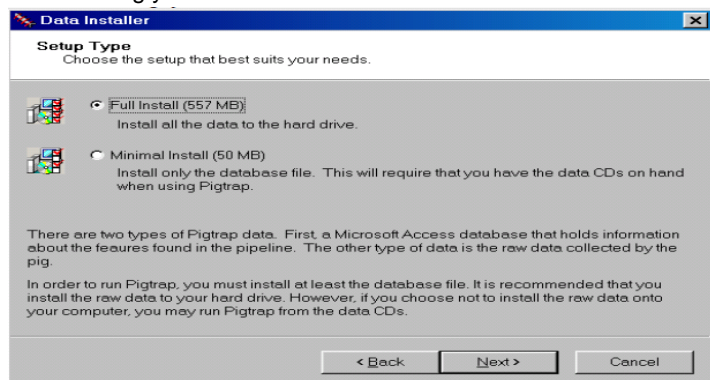
Note: If you want to install only the Pigtrap™ software and not the run data (advanced users only), choose Cancel and go to the Pigtrap™ Installation steps on page 3.

3. Click Next to continue installing the run data.

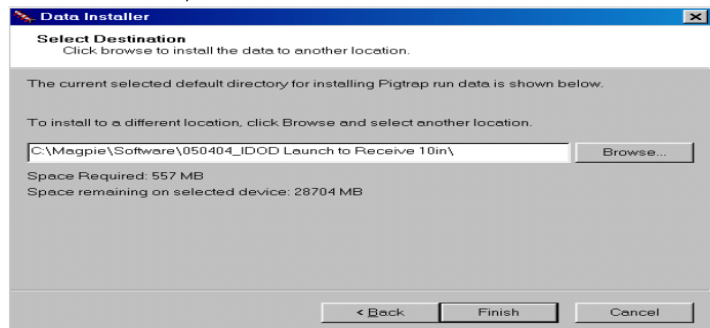


Appendix B

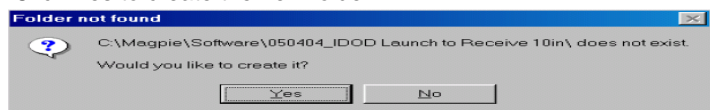
4. Choose the type of install you would like to perform: Full Install (recommended) or Minimal Install. The size of the installation is shown next to each type of installation. The database file must be installed for PigTrap™ to operate properly, but you may choose to not install the raw data. If you 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.



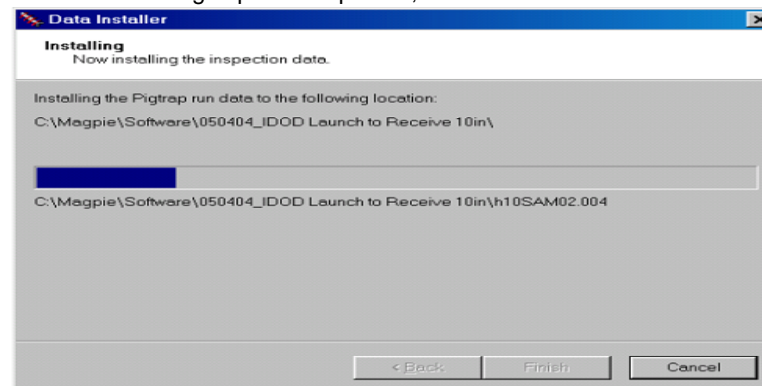
5. Choose the installation location on your computer for the data files. The default and recommended location is C:\Magpie\Software. The location inside this folder is based on the trap date, name, and size of the run. If you would like to specify another location, click the Browse... button. Click Finish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



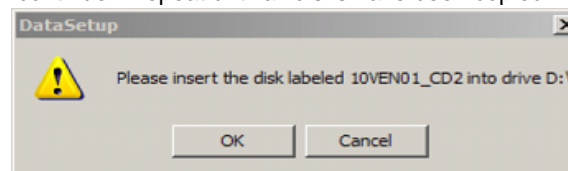
6. If the installation folder does not already exist, then you will be prompted to create it. Click Yes to create the new folder.



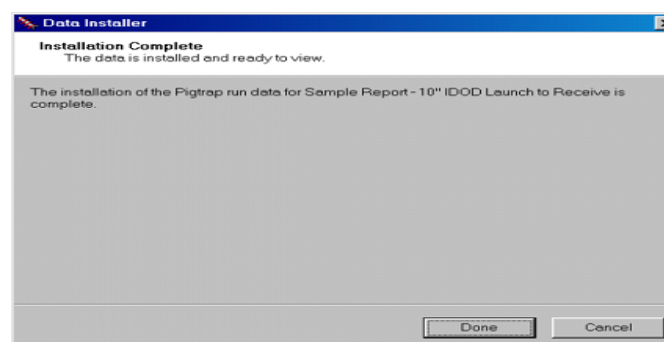
7. The following progress bar will appear. There may be a short delay while the database is being copied. Be patient, this is normal.



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.

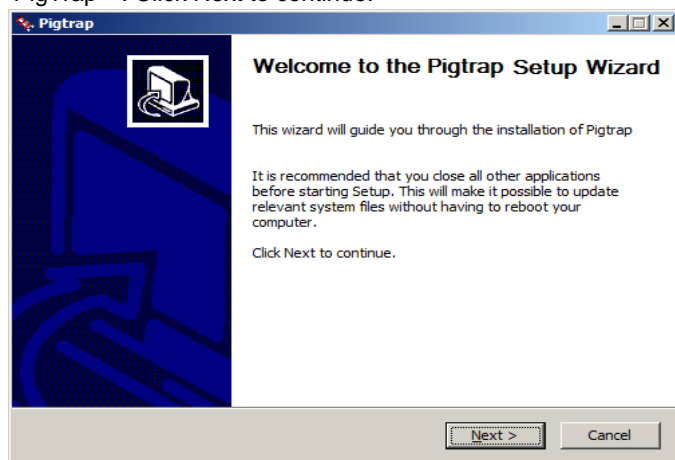


Appendix B

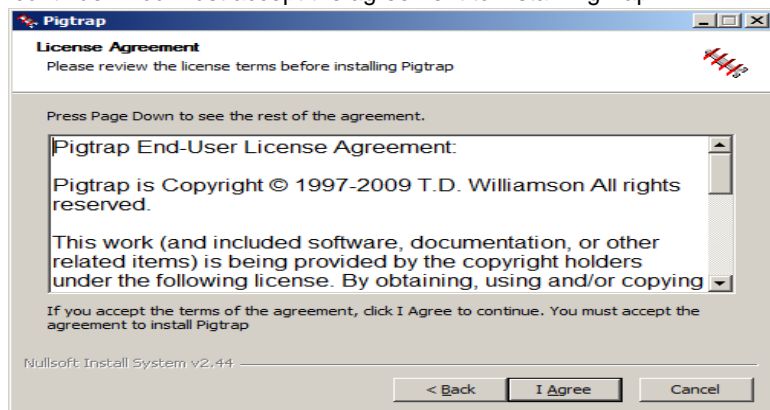
PigTrap™ Installation

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.

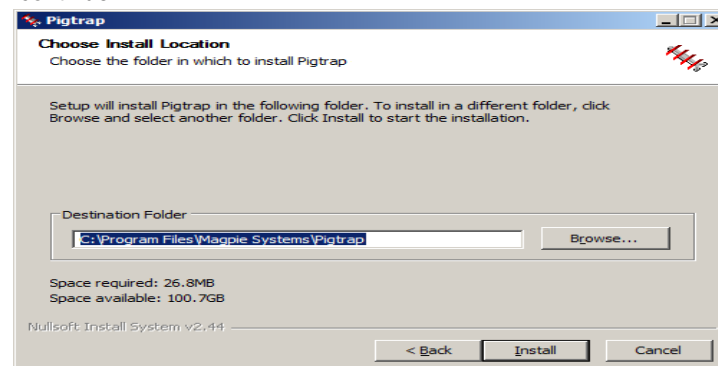
1. Plug the external drive into your computer.
2. Access the PigTrap™ setup.exe located on the external drive. This can be done by browsing to external drive and double clicking PigTrap™ setup.exe.
3. PigTrap™ Setup Wizard will launch. This will guide you through the installation of PigTrap™. Click Next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



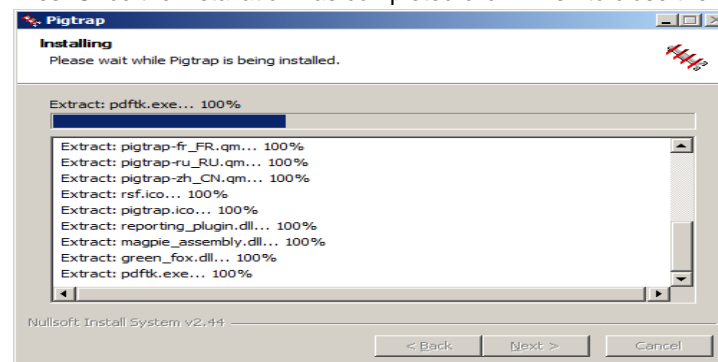
4. The Software License Agreement will appear. Read the agreement select I Agree to continue. You must accept the agreement to install PigTrap™.



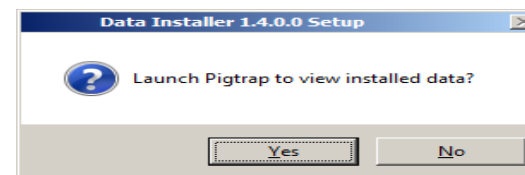
5. Choose the installation location on your computer for the PigTrap™ software. The default and recommended location is C:\Magpie\Software. Click Install to continue.



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.





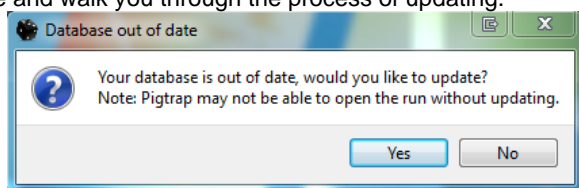
Appendix B

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.

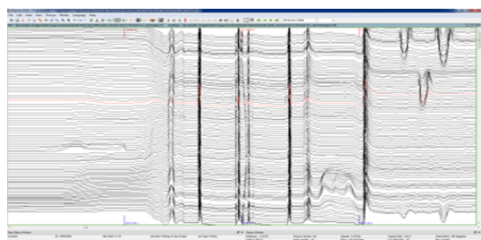
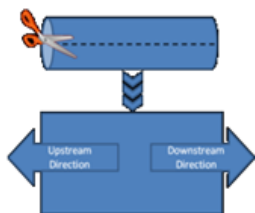
PigTrap™ was designed so you would have the ability to review previous TDW/Magpie inspection data when needed. However, you may need to acquire an updated Microsoft Access Data-base from one of our TDW representatives. When opening previous data in PigTrap™ you may encounter the message, "Your database 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.

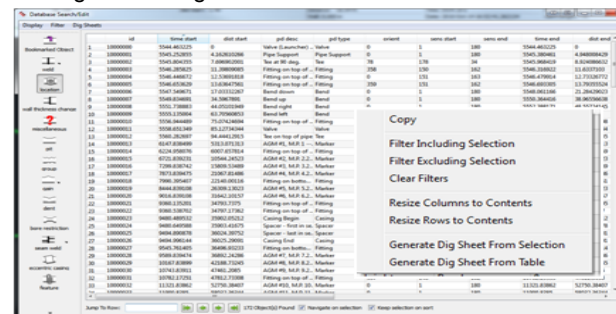


The vertical scrollbar at the right side of the main view rolls the data vertically to a desired orientation of the view.

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

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 (-).



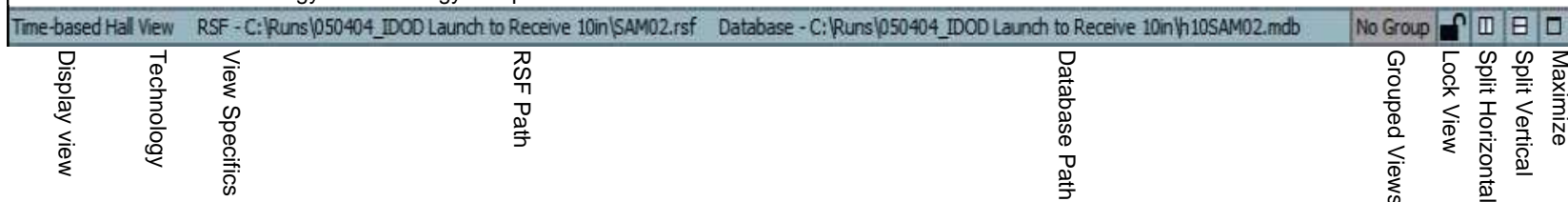
Quick Search

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

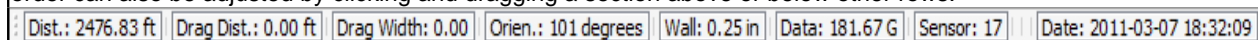
Pipe Object and Status Windows

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.



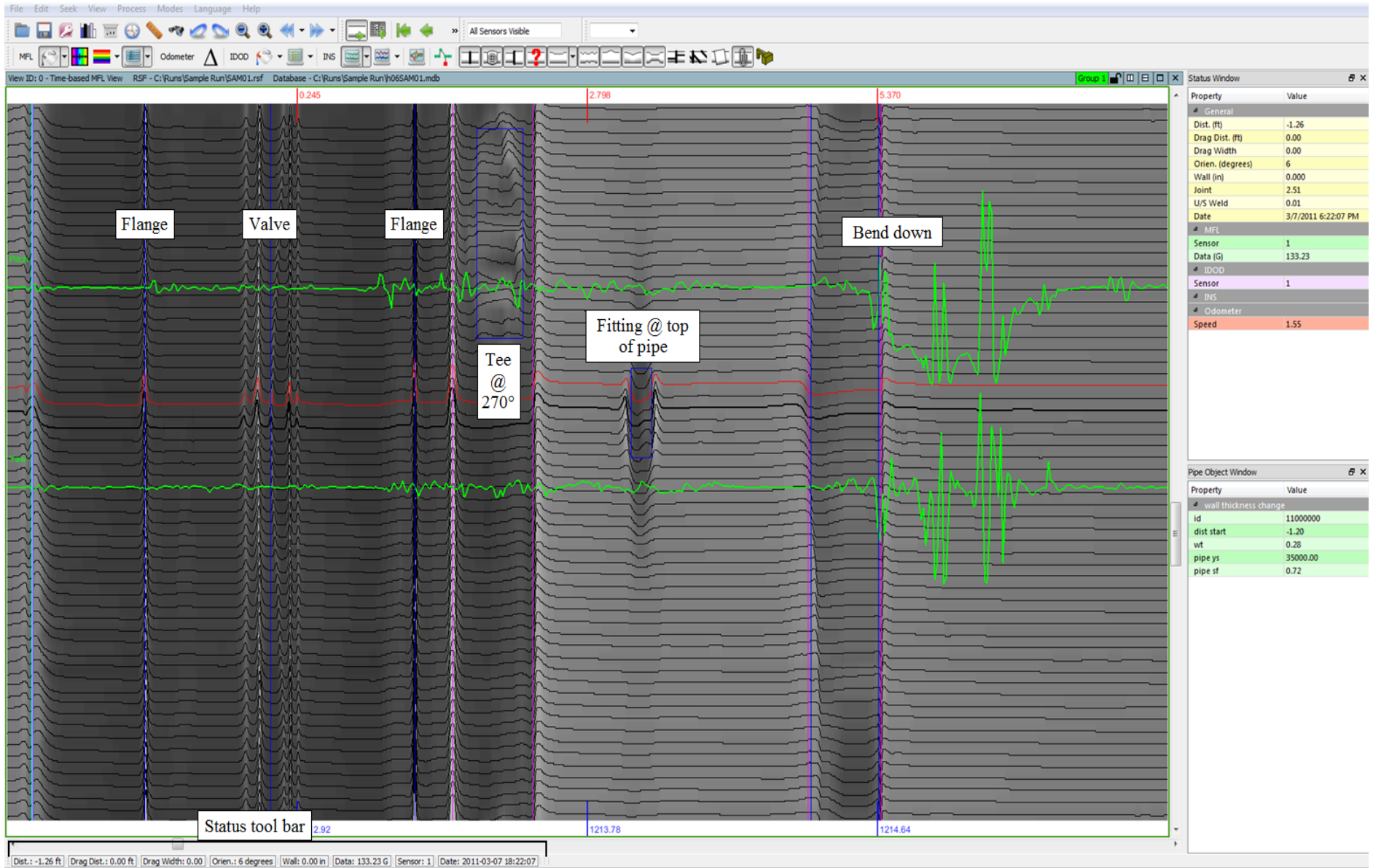
Keyboard Shortcuts

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

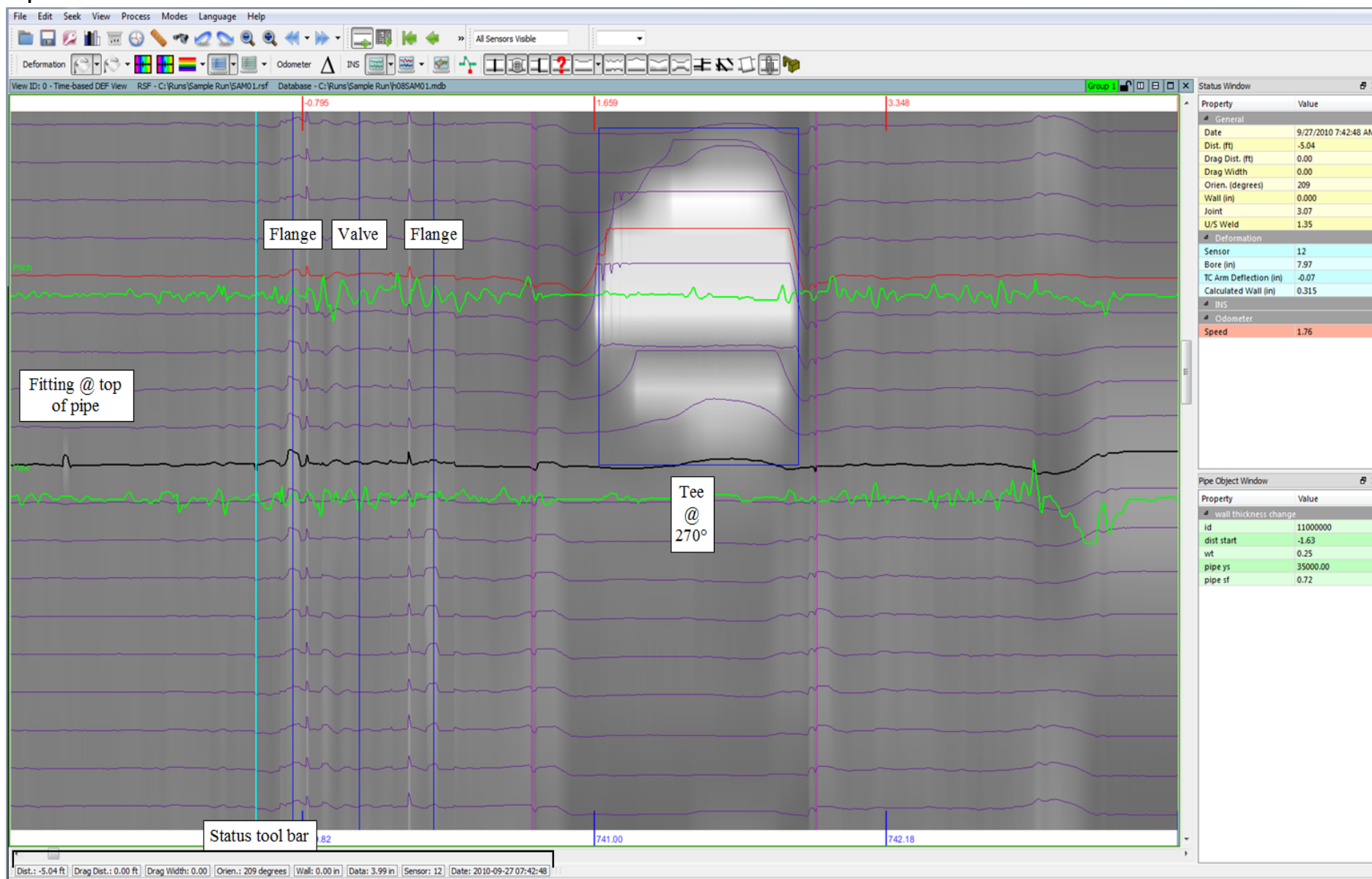


Appendix B



Appendix B

PigTrap™ DEF Runs



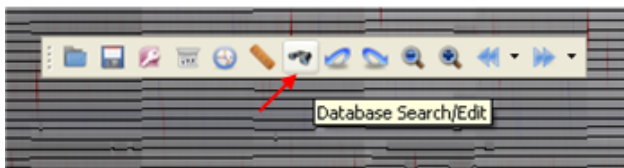
Appendix B



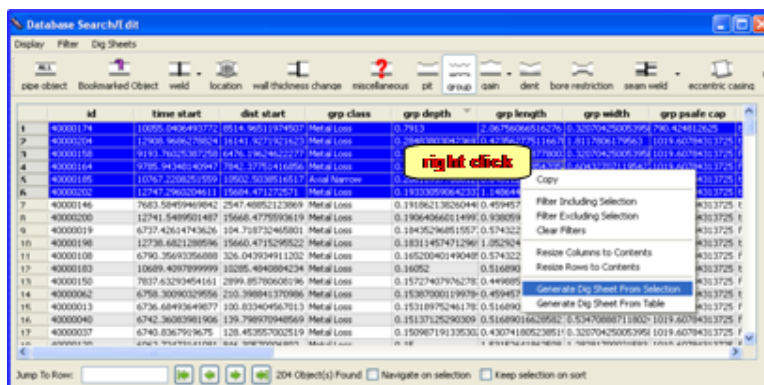
Appendix C

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. 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.