		Pipeline Pressure Test Documentation				
Pressure Test Report		Form :	Revision 3	Revision Date		
Project Name : DP-433 8" PW						
AFE No. : 5000773						
Contractor / Testing Company :		Northwinds		Technician : Osiel Lima		
Test Section No. : 1		From Station No. : 0+00				
Test Description : PW Coreline pipe 8"x.550 Approx 29,674ft / Test from DP-433 pad site.		To Station No. : 296+74				
Test Type : Hydro-Test		Start of Test Period : Date : 9/17/2021		Time : 5:50 AM		
Min. Test Duration : 20Hrs		End of Test Period : Date : 9/18/2021		Time : 5:35 AM		
Class Location : 1						
Low Strength Pipe : O.D. : 8.625 W.T. : 0.550 SMYS :		Grade : X-52		Station Piping : NA		
Test Medium : Water		Source of Medium : Greeley Water				
Corrosion Inhibitor : No		Inhibitor Type : NA		Rate : NA		
Leak Detection : No		Material Type : NA		Rate : NA		
Deadweight Tester : Mfg : NA		Serial # : NA		Calibration Date : NA		
Deadweight Tester Location : Station No. (ESN) : NA		Elevation (ft) : NA				
Pressure Recorder : Mfg : Barton		Serial # : 242E-2671		Calibration Date : 4/21/2021		
Pipe Temp. Recorder : Mfg : Barton		Serial # : 242E-2671		Calibration Date : 4/21/2021		
Pre-approved Target Test Pressure : 1,025.0 psig		Target Test Pressure Range				
Max Elevation Change : 165ft		Maximum Test Pressure : 1,125.0 psig		Minimum Test Pressure : 925.0 psig		
Time	Pressure (psig)	Pipe Temp.	Amb. Temp.	Weather	Visual Inspection	Comments
5:50 AM	0	63	51	Cloudy/Calm	Yes	Hold at 0 PSI 15Min
6:07 AM	0	64	62	" "	"	Build to 50 PSI
6:10 AM	55	64	62	" "	"	Hold at 50 PSI 9 hrs
6:40 AM	50	65	64	" "	"	Pressure Stable
7:10 AM	50	65	64	" "	"	Pressure Stable
7:40 AM	50	65	65	" "	"	Pressure Stable
8:10 AM	50	65	65	Cloudy/Calm	Yes	Pressure Stable
8:40 AM	50	65	65	" "	"	Pressure Stable
9:10 AM	50	66	65	" "	"	Pressure Stable
9:40 AM	50	67	65	" "	"	Pressure Stable
10:10 AM	50	68	65	" "	"	Pressure Stable
10:40 AM	50	68	65	" "	"	Pressure Stable
11:10 AM	50	71	66	Cloudy/Calm	Yes	Pressure Stable
11:40 AM	50	72	66	" "	"	Pressure Stable
12:10 PM	50	75	67	Clear/Calm	Yes	Pressure Stable
12:40 PM	50	76	67	" "	"	Pressure Stable
1:10 PM	50	78	68	" "	"	Pressure Stable
1:40 PM	50	80	69	" "	"	Pressure Stable
2:10 PM	50	81	69	" "	"	Pressure Stable
2:40 PM	50	83	70	" "	"	Pressure Stable
3:10 PM	50	83	70	Clear/Calm	Yes	Pressure Stable/Build to 300 PSI
4:54 PM	306	75	70	" "	"	Hold at 300 PSI 15 Min
<div>Project Name : DP-433 8" PW</div> <div>AFE No. : 5000773 Test Section No. : 1</div>						
Time	Pressure (psig)	Pipe Temp.	Amb. Temp.	Weather	Visual Inspection	Comments
5:10 PM	302	77	70	Clear/Calm	Yes	Build to 500 PSI
5:30 PM	510	75	70	" "	"	Hold at 500 PSI 15 Min
5:45 PM	506	75	69	" "	"	Build to 700 PSI
6:00 PM	703	75	69	" "	"	Hold at 700 PSI 15 Min
6:15 PM	700	75	69	" "	"	Build to 925 PSI

Start 9Hrs at 50PSI

END 9HR HOLD

[illegible]

Comments

Pressure Test is : Good

Recorded by :

Osiel Lima

(Contractor Representative) Print/Sign

9/18/2021

(Date)

Witnessed by:

Darrell Hamilton

(Inspector/Integrity Representative) Print/Sign

9/18/2021

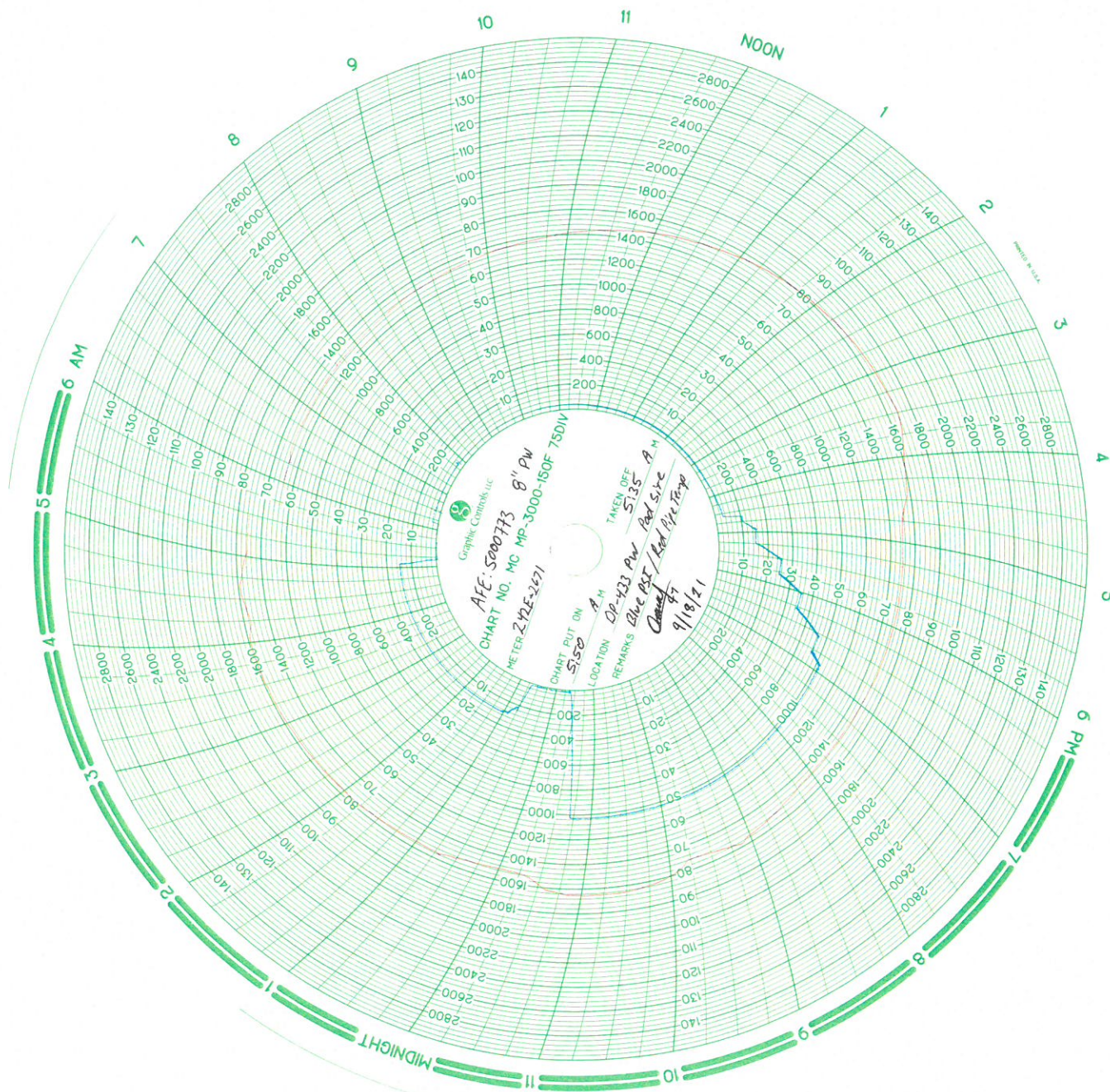
(Date)

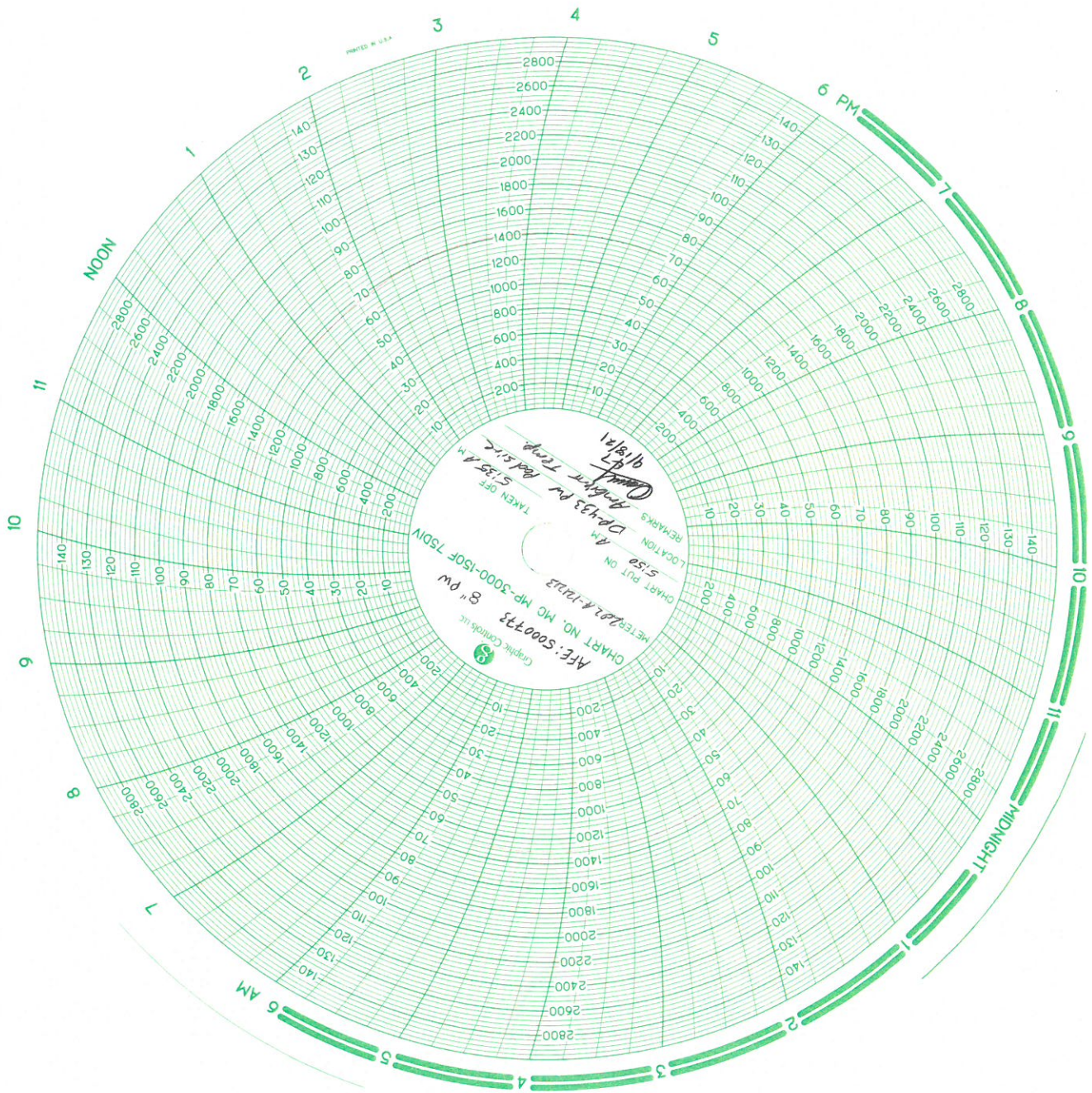
Approved by :

TOAD PETERSON (Project Mgr./Construction Mgr.) Print/Sign

9/21/2021

(Date)





Cross Country Infrastructure Services. Inc

Sales and Service

2251 Rifle Street - Aurora, Colorado 80011

Phone 303.361.6797 Fax 303.361.6836

NIST CALIBRATION DATA

Model Number	Serial Number	Customer	Range	Accuracy
Barton	202A-121213	NorthWinds of Wyo.	3000# - 150F	1/2%
Work Performed:		Calibration: Output/Reading	Results: Pressure	
Calibrate to Mfg. Spec.		0 PSI	0 PSI	
		600 PSI	600 PSI	
		1200 PSI	1200 PSI	
		1800 PSI	1800 PSI	
		2400 PSI	2400 PSI	
		3000 PSI	3000 PSI	
		33 Deg	32 DEG	
		62 DEG	62 DEG	
		97 DEG	97 DEG	
144 DEG	144 DEG			
PO Number		Sales Order Number	Date of Test	
Calibrated		Certified	6/1/2021 9:18:16 AM	

Remarks: ALL CALIBRATIONS ARE GOOD FOR ONE YEAR FROM DATE OF TEST

Standard Used:

Manufacturer	Model	Instrument	Calibration Date	Certification #
Perma-Cal	101FTM15B21	Pressure Gauge	03/05/2021	17-043
Tech Instrumentation	TM99A	Thermometer	03/05/2021	59448

Don F.

Signature

Don Frick 6-1-21

Cross Country Infrastructure Services. Inc

Sales and Service

2251 Rifle Street - Aurora, Colorado 80011

Phone 303.361.6797 Fax 303.361.6836

C-3

NIST CALIBRATION DATA

Model Number	Serial Number	Customer	Range	Accuracy
Barton	242E-2671	NorthWinds of Wyo.	3000# - 150F	1/2%
Work Performed:		Calibration: Output/Reading	Results: Pressure	
Calibrate to Mfg. Spec.		0 PSI	0 PSI	
		600 PSI	600 PSI	
		1200 PSI	1200 PSI	
		1800 PSI	1800 PSI	
		2400 PSI	2400 PSI	
		3000 PSI	3000 PSI	
		33 Deg	33 DEG	
		68 DEG	68 DEG	
		100 DEG	100 DEG	
150 DEG	150 DEG			
PO Number		Sales Order Number	Date of Test	
Calibrated		Certified	4/21/2021 11:02:37 AM	

Remarks: ALL CALIBRATIONS ARE GOOD FOR ONE YEAR FROM DATE OF TEST

Standard Used:

Manufacturer	Model	Instrument	Calibration Date	Certification #
Perma-Cal	101FTM15B21	Pressure Gauge	03/05/2021	17-043
Tech Instrumentation	TM99A	Thermometer	03/05/2021	59448

Don F.

Signature

Don Erick 4-21-21



Hydrostatic Pressure Test Procedure
Mustang IDP DP433 Lateral – 8" Produced Water Pipeline
(CORE Linepipe)

DJBU

NMP Doc.
No.:

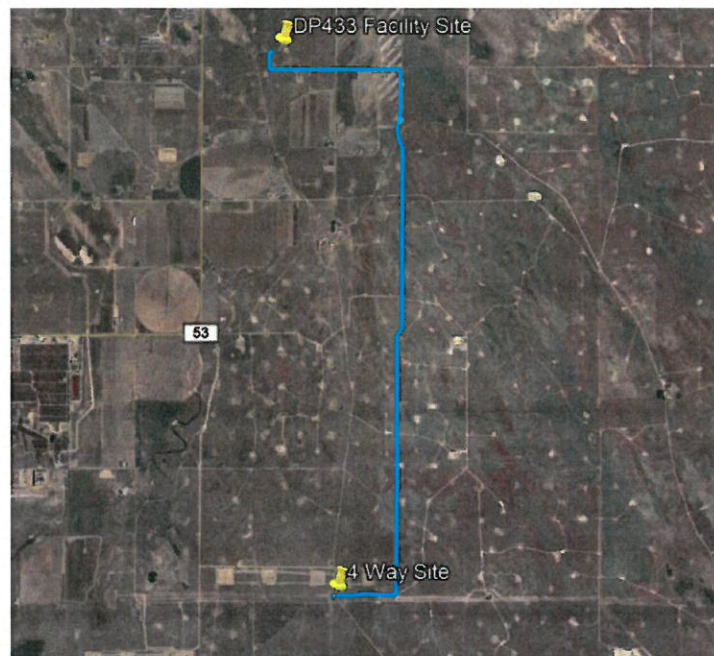
NMP-DP433-MUP-HYD-001

Rev.:

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Mustang IDP DP433 Lateral – 8" Produced Water Pipeline (CL 300)
Hydrostatic Pressure Test Procedure



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REV	DATE	BY	DESCRIPTION	CHKD	APPVD
			Noble Midstream Partners, LLC		
			Hydrostatic Pressure Test Procedure		
			Doc. No. N/A		



	Hydrostatic Pressure Test Procedure Mustang IDP DP433 Lateral – 8" Produced Water Pipeline (CORE Linepipe)				DJBU
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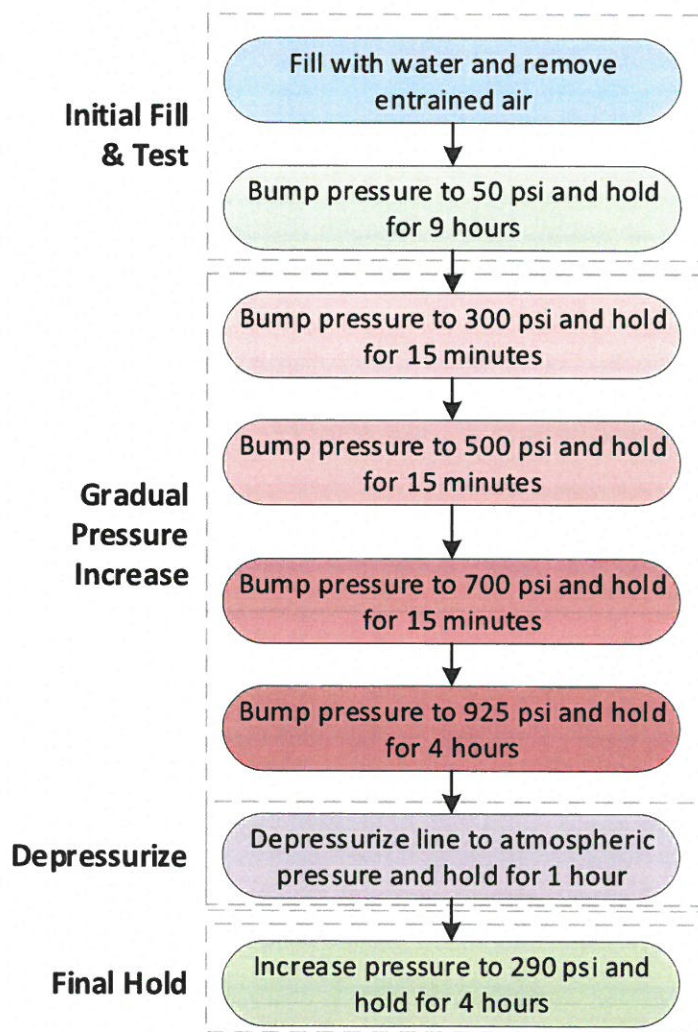
	Hydrostatic Pressure Test Procedure Mustang IDP DP433 Lateral – 8" Produced Water Pipeline (CORE Linepipe)				DJBU
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1 EXECUTIVE SUMMARY

This procedure and the accompanying site-specific Hydrostatic Test Plan define the minimum requirements for the hydrostatic pressure testing of the **Mustang IDP DP433 Lateral – 8" Produced Water Pipeline**. The piping and components to be tested using this procedure meet or exceed the pressure requirements of the ASME Class 300 flange rating for Type 1.1 materials between -20 °F and 100 °F.

This pipeline contains Core Linepipe which is a dual layer pipe that consists of an outer steel pipe with an inner HDPE liner intended for pipeline service in corrosive environments. Despite the two materials in the pipeline, the hydrotest can be completed in a single test, with two phases, though **the procedure for testing is different from a traditional steel pipeline**.

The hydrostatic pressure test has been analyzed for acceptable practices per applicable codes and follows the manufacturer guidelines for testing.



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2 PRE-TEST CONSIDERATIONS

The pressure test shall comply with American Petroleum Institute's "Pressure Testing of Steel Pipelines for the Transportation of Gas, Petroleum Gas, Hazardous Liquids, Highly Volatile Liquids or Carbon Dioxide." (*API RP 1110*) Chapter 6 of API's handbook provides general guidelines for pressure test implementation of steel pipe. In addition, testing will be in accordance with *ASME B31.4*, *ASME B16.5*, and *49 CFR Part 195*. Information from the manufacturer has been incorporated into this procedure.

2.1 TEST PRESSURE

The **Mustang IDP DP433 8" Produced Water Pipeline** shall be tested at a minimum test pressure of 125% of the internal design pressure and a maximum test pressure of 150% the internal design pressure rounded to the next higher 25 psig increment. The upper and lower bounds of the test pressures are derived from *ASME B16.5* and *ASME B31.4 / 49 CFR Part 195* respectively.

The **Mustang DP433 Produced Water Pipeline** internal design pressure is **740 PSIG**, limited by the flange rating. The pipeline MOP is **740 PSIG**.

The **Mustang DP433 Produced Water Pipeline** final hydrostatic test pressure shall be **977 PSIG** or **1,025 PSIG**, at the point of filling, depending on where the operator chooses to fill the pipeline. See the table in **Section 3.4** for the two possible locations.

The minimum pipeline test pressure shall be **925 PSIG** and the maximum test pressure shall be **1,125 PSIG**.

Table 1: Upper and Lower Bound Test Pressures

ASME Flange Classification	Pipeline Wall Thickness (in)	Pressure Rating (psig)	Minimum Test Pressure 125% DP (psig)	Maximum Test Pressure 150% DP (psig)
300	0.550	740	925	1,125


2.2 TEST DURATION

The hydrostatic test pressure shall be maintained for **9 hours** at 50 psi and **4 hours** after final test pressure has stabilized. Refer to procedure outlined in **Section 3.4** for proper procedure and duration.

The test pressure shall be considered stabilized once it has reached the final bump minimum test pressure after **5 minutes** without fluctuation.

2.3 SAFETY PRECAUTIONS

This safety information is in addition to the safety information in other sections of this document.

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Always take precautions to eliminate hazards to persons near lines being tested. For the entire duration of the procedure, including filling, initial pressurization, time at test pressure, and depressurization, only persons conducting the test or inspecting the system should be allowed near the section under test. These persons should be fully informed of the hazards of field pressure testing. All other persons should be kept a safe distance away. The test section must be supervised at all times. Failure may result in sudden, violent, uncontrolled, and dangerous movement of system piping, or components, or parts of components.

2.4 TEST EQUIPMENT AND MATERIALS

Pressure test equipment shall be selected to meet the hydrostatic test conditions and shall be in working order. The measurement equipment shall be designed for the pressures expected during the pressure test.

2.4.1 FILL PUMP

The pump used to fill the line shall be a high-volume pump which provides adequate pressure to overcome static head and maintains sufficient velocity to move pigs, spheres, and any debris in the pipeline.

The fill pump or associated discharge piping shall be equipped with a flow measurement device capable of maintaining a specified fill rate.

2.4.2 SUPPLY WATER FILTER

The pump discharge piping shall be equipped with an in-line filter capable of capturing debris greater than **1 mm**.

2.4.3 PRESSURIZATION PUMP


The pressurization pump shall be a variable speed, positive displacement pump that pressurizes the line to the specified test pressure. The pump shall have a known volume per stroke and shall be equipped with a stroke counter.

A constant-speed pump with a variable flowrate control may be used in lieu of the above pump if the liquid test medium injected into the pipeline is measured during pressurization.

2.4.4 CALIBRATION DEVICES

2.4.4.1 Pressure Calibration Device

A deadweight tester or an equivalent pressure sensing device that is capable of measuring in increments of less than or equal to one (1) psig shall be used. The device shall have a certificate of calibration that is not more than one year old at the start of testing.

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2.4.4.2 Temperature Calibration Device

A certified thermometer shall be provided. The device shall have a certificate of calibration that is not more than one year old at the start of testing.

2.4.5 RECORDING DEVICES

2.4.5.1 Pressure Recording

This procedure refers to the recording device used during the test duration as a chart recorder. A digital recorder may be used in lieu of the more traditional chart recorder.

Pressure recording equipment shall be provided and qualified as follows:

- A continuous-recording pressure measurement device that provides a permanent record of pressure versus time. This device should be calibrated immediately before each use with the deadweight tester.
- Electronic pressure/temperature monitoring and recording systems that assist in the analysis of test data. Such systems can be used in lieu of the components listed above provided that the individual pressure sensors included in the systems have a level of sensitivity and can be field calibrated in a manner similar to those instruments listed above.


2.4.5.2 Temperature Recording

Temperature recording equipment shall be provided and qualified as follows:

- A test medium temperature sensing and display instrument that is properly calibrated to a range suitable for anticipated test temperatures. Temperature instrument accuracy should be within 1 °F of actual temperature. Temperature instrument sensitivity should be within 0.1 °F.
- A continuous-recording temperature measurement device that provides a permanent record of test medium temperature versus time. This device should be calibrated immediately before each use with a certified thermometer.
- An ambient temperature sensing and display instrument that is properly calibrated to a range suitable for anticipated ambient temperatures. Temperature instrument accuracy should be within 1 °F of actual temperature. Temperature instrument sensitivity should be within 0.1 °F.
- A continuous-recording temperature measurement device that provides a permanent record of ambient temperature versus time. This device should be calibrated immediately before each use with a certified thermometer.

2.4.6 SAFETY RELIEF VALVE

The hydrostatic test fill pump and pressurization pump or associated discharge piping shall be equipped with a pressure relief valve. The pressure relief valve shall be set to relieve at **1,125 PSIG**.

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2.5 QUALIFICATION OF CONTRACTOR AND OPERATOR PERSONNEL

Qualifications of contractor and operator personnel for conducting pressure tests will be based on certification requirements by *49 CFR Part 195*, Code, or Noble standards and procedures.

Noble personnel and contractors involved with designing, planning, conducting, or approval of a pressure test should be qualified by both training and experience. Noble is responsible for establishing these qualifications. The following factors to determine qualifications are recommended per *API RP 1110*:

- Performance of applicable calculations and interpretation of test data and results.
- Knowledge of code requirements and regulations.
- Qualification requirements of governing authority to conduct or witness testing.
- Governmental or operator requirements to certify test results.
- Familiarity with equipment and pressure test set-up.
- Familiarity with test procedures.

2.6 PERMIT TO WORK

Prior to commencing work, work permits shall be obtained. At a minimum, the below documents shall be submitted:

- Operator Qualification records for each person performing tasks.
- Test equipment certifications.
- Water source.
- Biocide injection plan.
- Biocide Safety Data Sheets (SDS).
- Leak monitoring plan.
- Depressurization plan.
- Water disposal plan.
- Drying plan.

3 TEST PROCEDURE


As part of the work permit, a hydrostatic test plan for each section of pipe shall be developed and submitted to the appointed Noble representative prior to commencing work. The test plan shall, at a minimum, address the requirements specified in this procedure.

3.1 SOURCE WATER

The quality and source of the test water shall be determined prior to the permitting process.

Non-potable water shall be treated with biocide prior to entering the pipeline. The SDS sheets and injection rate for the Biocide shall be submitted and approved by a Noble representative prior to work permit issuance.

Water shall be filtered prior to entering the pipeline. The maximum allowable particle size is **1 mm**.

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3.2 EQUIPMENT INSTALLATION

If possible, excavated segments shall be backfilled prior to the initial pressurization.

Temporary piping shall be properly anchored and adequately secured from movement. Pipe couplings shall have safety devices or restraints to limit movement due to unexpected piping separation.

A flow meter shall be placed in the line to monitor and maintain the planned design rate of fill.

The sensor on each temperature recording device shall be installed so that it is in contact with the pipeline at a point where it has normal cover. Additionally, it shall be at a distance far enough from the injection point so that the effects of the exposed piping and make-up injection(s) on temperature is minimized. The backfill around the temperature recording device sensor shall be tamped.

Insulation, if appropriate, shall be used on the capillary lines to the temperature recorder and the temperature recorder should be installed in an insulated box. Large centrifugal pumps and storage tanks will affect the temperature of the test medium.

3.3 LINE FILL

Calculated line fill water volume: **1,633 US Oil Barrels, or 68,586 Gallons**

All temporary piping and test heads shall be adequately secured before the line fill process is started.


If pigs or spheres are used in the filling process, they shall be equipped with trackers for monitoring location and speed during the line fill process.

The fill pump shall be sized for the pigs to travel at a speed that will maintain a seal with the pipeline. This will reduce the risk of introducing air behind the pigs. A travel speed of 2 – 3 mph shall be maintained. The line fill flow rate for the **Mustang DP433 Produced Water Pipeline** must be **407 – 610 GPM (10 – 15 BPM)** in order to maintain the pig velocity in the 2 – 3 mph range.

High velocities may cause excessive wearing of the pigs and may cause the displaced air to mix with the test medium. As pigs travel down the line and down a slope, unless backpressure is applied during the line fill, the weight of the column of fluid could cause the pig to travel faster than the specified speed and introduce air behind the pig.

Air shall be bled during the filling process to minimize the time for line pressure stabilization. The total amount of residual air shall be less than 0.2% of the volume of the test section.

If it is determined that air is trapped in the pipeline, vents or traps at high elevation points may be installed in order to bleed the air from the pipeline. Any equipment added to the pipeline shall be removed after the pipeline has been dewatered.

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The temperature, pressure, and flow rate of the test medium during line fill shall be recorded. All applicable conditions shall be monitored to prevent over-pressurization during line fill.

3.4 INITIAL PRESSURIZATION

A pipe maintained at high pressure is potentially dangerous. Established safety guidelines in accordance with the work permit shall be followed at all times.

The amount of water required to increase the pressure from the initial fill to the final test pressure shall be calculated prior to the pressure test and made available to test personnel.

The initial pressurization of the segment of pipe to be tested begins once the segment is full of fluid and the appropriate measures have been taken to bleed all air.

Personnel conducting the test shall maintain continuous surveillance over the operation to ensure that it is carefully controlled. Test personnel should be located at a safe distance from the test section.

Pipe connections shall be periodically checked for leaks during the pressurization process.

The flowrate shall be monitored and logged for the preparation of a pressure-volume plot.

A pressure-volume plot shall be initiated at the start of the pressurization process and continue until the test pressure is reached. The lower end of the pressure-volume plot can be used to determine the total amount of residual air in the test section. The upper end of the pressure-volume plot can be used to determine if any pipe in the test segment may have reached its elastic limit.

The **Mustang DP433 Produced Water Pipeline** is approximately **29,674 feet** of **8.625" OD 0.220" w.t.** pipe with **0.330" w.t.** HDPE liner, for a total of **0.550" w.t.** It will be pressurized to either of the following hydrostatic test pressures at the corresponding location:


DP433 Facility Site 8" (0+00)	1,025 psig
4-Way Site 8" Receiver (296+73.83)	977 psig

Due to the nature of the lined pipe consisting of two materials (Steel and HDPE) and specific procedure is required for testing the CORE Linepipe.

a. Fill the Line with water, removing all trapped air.

b. Bump pressure to **50 psi** and hold for **9 hours**.

c. Bump pressure to **300 psi** and hold for **15 minutes** or until stable or rising pressure is achieved.

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d. Bump pressure to **500 psi** and hold for **15 minutes** or until stable or rising pressure is achieved.

e. Bump pressure to **700 psi** and hold for **15 minutes** or until stable or rising pressure is achieved.

f. Bump pressure to **925 psi** and hold until stable or rising pressure is achieved.

g. Adjust the pressure to the appropriate test pressure and hold for at least **4 hours**. A flat or slightly increasing pressure is desired over the 4 hour hold period. A slight pressure drop over the hold period combined with a quick reduction in the rate of the pressure drop typically indicates the pressure is stabilizing rather than the presence of a leak.

Depending on the temperature of the hydrotest fluid, there may be a period of time required to reach temperature equilibrium. It is not unusual to take as much as 12 hours for this to occur. During temperature equalization, it is not uncommon to see pressure changes of 0.7 – 2.0 MPa (100 psi – 300 psi).

Stabilization may occur during the evening and/or in cold weather situations and precautions must be taken to eliminate the possibility of freezing in the appurtenances; such precautions may include the use of thermal blankets and heaters.

When the final test pressure is reached and has stabilized, pressurization shall cease and all valves and connections to the line shall be inspected for leakage.

3.5 THE TEST PERIOD


The test period shall begin after the temperature of the test medium, pipe temperature, and ground temperature have stabilized. When this stabilization process is complete, the pressurization pump should be isolated from the test section.

After inspecting for leakage, test personnel shall verify that the specified test pressure is being maintained.

Pressure and temperature shall be continuously monitored during the test. Data shall be recorded every half hour throughout the duration of the test.

The maximum allowable range of pressure fluctuation during the pressure test is defined by the “**Maximum Upper Bound Test Pressure**” and “**Minimum Lower Bound Test Pressure**” as shown in the **site-specific Hydrostatic Test Plan**, which is supplemental to this Hydrostatic Test Procedure. Any pressure excursions outside of these limits shall be reported to the Noble representative for further analysis.

Weather changes, such as the development of rain or clouds, which could affect the pressure and temperature of the pipe and test medium shall be documented on the test log.

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The volume of any added or subtracted test medium shall be documented on the test log as well as its temperature and pressure at that time and be accounted for in the assessment of the results of the pressure test. For any pressure test of piping that cannot be 100% visually checked for leaks, it is mandatory that the volume of any test medium added or removed be accounted for to determine if the pressure test has been completed without evidence of leakage.

3.6 LEAKS AND LINER LEAK TEST

Prior to commencing work, the method(s) for locating leaks or failures shall be approved by the Noble representative. The operator may choose to fly, drive and/or walk the pipeline right-of-way to visually check for evidence of leaks during the pressure test. The operator should develop contingency plans for locating large and small leaks in areas of difficult terrain or in the event of inclement weather.

Acceptable methods for finding leaks during a pressure test are listed as follows:

- Sectioning or segmenting the pipeline and monitoring the pressure of each section. Closing mainline block valves will isolate the pipeline into smaller segments. Freeze plugs may also be used to isolate sections of the pipeline for evaluation.
- Acoustical monitoring equipment may be employed to narrow the search area.
- Odorants or tracers introduced into the test medium during the filling process will allow the operator to detect leaks with sensing equipment.

Immediately following the hydrotest is a liner leak test. The specific requirements for this test for the CORE Linepipe are outlined directly from the manufacturer recommendation.

a. Following the successful completion of the strength test, de-pressurize the line to atmospheric pressure and maintain for a duration of **1 hour**. This is to allow the liner to relax, thus facilitating the detection of a pressure drop in the unlikely event of a leak.


b. Increase the pressure to **290 psi** and stabilize the pressure at **290 psi** until a flat or slightly increasing pressure is achieved.

c. Hold the pressure for **4 hours** at **290 psi**. Ambient temperature fluctuations will affect the recorded pressure. A flat or slightly increasing pressure is desired over the 4-hour hold period. A slight pressure drop over the hold period combined with a quick reduction in the rate of the pressure drop typically indicates the pressure is stabilizing rather than the presence of a leak.

d. During the liner leak test, the vents on the annular space shall be periodically monitored for flow of liquids.

3.7 PRESSURE TEST FAILURES

All leaks and test failures shall be reported to the Noble representative immediately. Any pipeline leaks or failures shall be documented in the test report.

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If a rupture or a substantial leak occurs, the test shall be stopped and the pipeline depressurized. The cause of failure shall be understood, test procedures shall be reevaluated, and approval from the Noble representative shall be obtained before proceeding with repairs and starting a new hydrostatic test.

Pipe, valves, fittings, and test components that fail during a pressure test shall be investigated to determine the cause of failure and to minimize the possibility of a recurrence.

Pipe or other failed components shall be preserved for further examination and failure analysis.

If a small leak occurs, the pressure should be reduced to 80% of the final test pressure while locating the leak. After repairs are completed and authorization from the Noble representative has been obtained, the test can be restarted per the initial pressurization steps above.

Pressure excursions outside of the **Maximum and Minimum Test Pressures** as defined in **Section 2.1** of this procedure are considered test failures.

3.8 DEPRESSURIZATION, DISPLACEMENT, AND DISPOSAL OF TEST WATER

Prior to commencing work, a depressurization, displacement, and disposal plan shall be submitted to and approved by the Noble representative.

Depressurization activities shall not commence without authorization from the Noble representative.

Displacement and disposal activities shall not commence prior to Noble engineering acceptance of the hydrostatic test results.

A disposal plan for the test medium must be developed and the Noble representative shall review and approve the disposal plan.

Pigs or spheres used in the dewatering process shall be equipped with trackers for monitoring location and speed during the dewatering process.


The travel speed for the dewatering pigs shall be maintained at **2 – 3 MPH**.

Depending on the temperature of the hydrotest fluid, there may be a period of time required to reach temperature equilibrium. It is not unusual to take as much as 12 hours for this to occur. During temperature equalization, it is not uncommon to see pressure changes of 0.7 – 100psi – 300psi.

3.9 DRYING OPERATIONS

Drying operations are required for there are not specific requirements for drying.

Prior to commencing work, a drying plan shall be submitted to and approved by the Noble representative.

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The pipeline must be dried to satisfaction of the Noble representative.

Upon completion of drying, a **50 psig** nitrogen blanket shall be maintained on the pipeline until commissioned.

4 RECORDS

After the hydrostatic test has been completed, the following records shall be submitted as part of the Final Test Report, **which must be reviewed and accepted by an authorized Noble representative**. These records must be retained as long as the pipeline is in use.

- Pressure / Volume Plot
- Pressure Recording Chart / Plot
- Calibration Records
 - Deadweight Tester
 - Chart Recorder
 - Temperature Recorders
 - Certified Thermometer
- 49 CFR Part 195 Operator Qualifications
 - Operator
 - Person responsible for making the test
 - Test company used, if any
- Hydrostatic Test Log, including:
 - Date and time of the test
 - Minimum test pressure
 - Test medium
 - Description of the pipeline tested and the test apparatus
- Leak Reports
- Failure Reports
- Site-specific hydrostatic test plan including:
 - Elevation profile of the pipeline
 - Locations of test sites over the entire length of the pipeline
- Temperature Chart / Plot

5 REFERENCES

- 1) API RP1110 “Recommended Practice for the Pressure Testing of Steel Pipelines for the Transportation of Gas, Petroleum Gas, Hazardous Liquids, Highly Volatile Liquids, or Carbon Dioxide”
- 2) ASME B31.4 “Pipeline Transportation Systems for Liquids and Slurries”
- 3) ASME B16.5 “Pipe Flanges and Flanged Fittings”
- 4) 49 CFR Part 195 “Transportation of Hazardous Liquids by Pipeline”
- 5) Site Specific Hydrostatic Test Plan
- 6) CORE Linepipe US Project Execution Package, May 17, 2019, Rev 6

6 APPENDIX A – CORE LINEPIPE HYDROTEST FORM


See next page for CORE Linepipe Hydrotest Report Form.



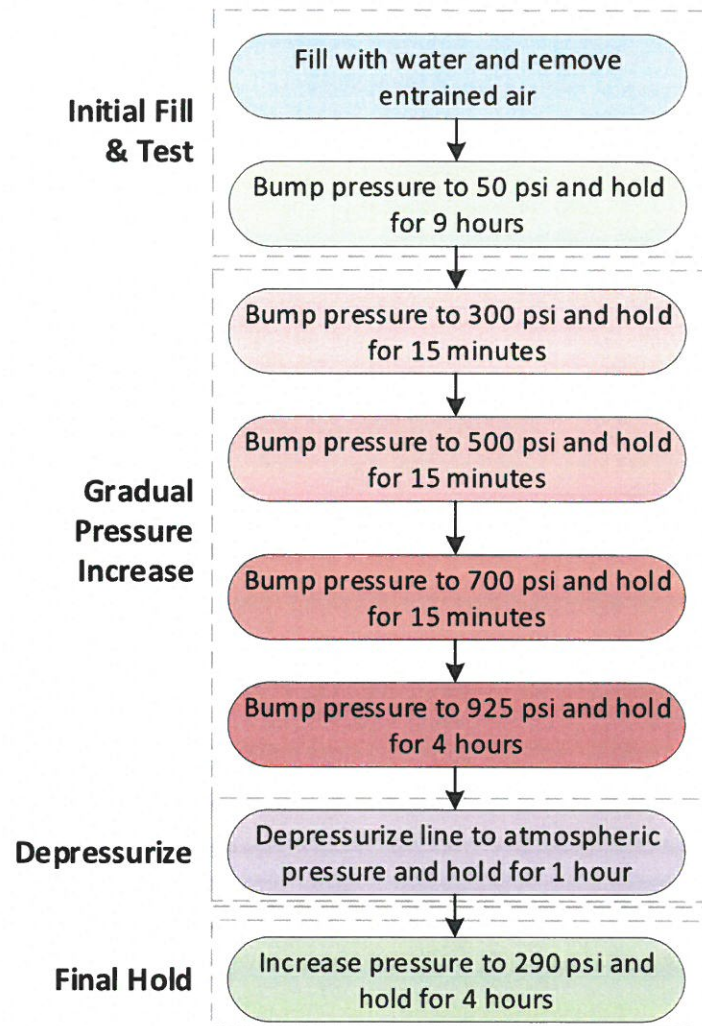
910, 736 - 8th Avenue SW
Calgary, AB, T2P 1H4
Office: (587) 333-6685

CORE Linepipe Hydrotest Report

Test Date	
Customer	
Job Number	
Pipeline Dia	
Test Section Length	
High Point Elevation	
Low Point Elevation	
Test Section Start LSD	
Test Section End LSD	
High Point Riser LSD	
High Point Riser Elevation	
Low Point Riser LSD	
Low Point Riser Elevation	
Pressure Sensor Location	
Test Pressure	
Test Medium	
Water Source	
Antifreeze Type and %	
Mixture Temperature	
Gauge Number	
Dead Weight Number	
Chart Recorder Number	
QC Inspector	
Signature	
Date	
Owner's Inspector	
Signature	
Date	

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7 APPENDIX B - CORE LINEPIPE HYDROTEST FLOW CHART



Mustang IDP DP433 Produced Water Lateral - 8 in PRODUCED WATER Pipeline Hydrostatic Pressure Test Plan

