



CRYSTAL GAUGE RECAP LOG DATA SHEET (C-7.b)

Project Mustang 10P AFE/Work Order No. 5000268

Pipeline 6" oil uoa (Name) 1+00 - 21+56 (Location)

Testing Contractor Wood

Pipe O.D. 6.625 Wall thickness. .280 Grade X52 MFG'R: _____

Test Fluid water Additive none

Test Location: 6" oil Receiver PK090 21+56 Section No. 1+00 - 21+56

Instrumentation: 6" oil launcher 21+56 (Location) Crystal Gauge (Type)

Crystal Engineering (Mfg'r) 576537 (S/N) 2-19-19 (Date Calibrated)

Chart Recorder
242E-46974
Chart recorder
687923

Time	Pressure PSIG	Ambient Temp.
11:45	1061	55.17
12:15	1063	55.98
12:45	1066	57.29
1:15	1069	66.13
1:45	1073	62.87
2:15	1079	64.39
2:45	1091	67.85
3:15	1085	67.67
3:45	1084	62.42
4:15	1091	66.47
4:45	1094	58.80

Time	Pressure PSIG	Ambient Temp.
5:15	1094	50.94
5:45	1094	49.94
6:15	1094	47.45
6:45	1093	37.50
7:15	1090	34.20
7:45	1086	23.52
8:00	1085	15.52

Time	Pressure PSIG	Ambient Temp.

Test Started 11:45 (Time) AM/PM 3-22-19 (Date) Test Ended 8:00 (Time) AM/PM 3/22/19 (Date)

Remarks: _____

Weather: _____

Testing Contractor's Representative Logan Loggins (Name) Tester (Title) [Signature] (Signature) 3-22-19 (Date)

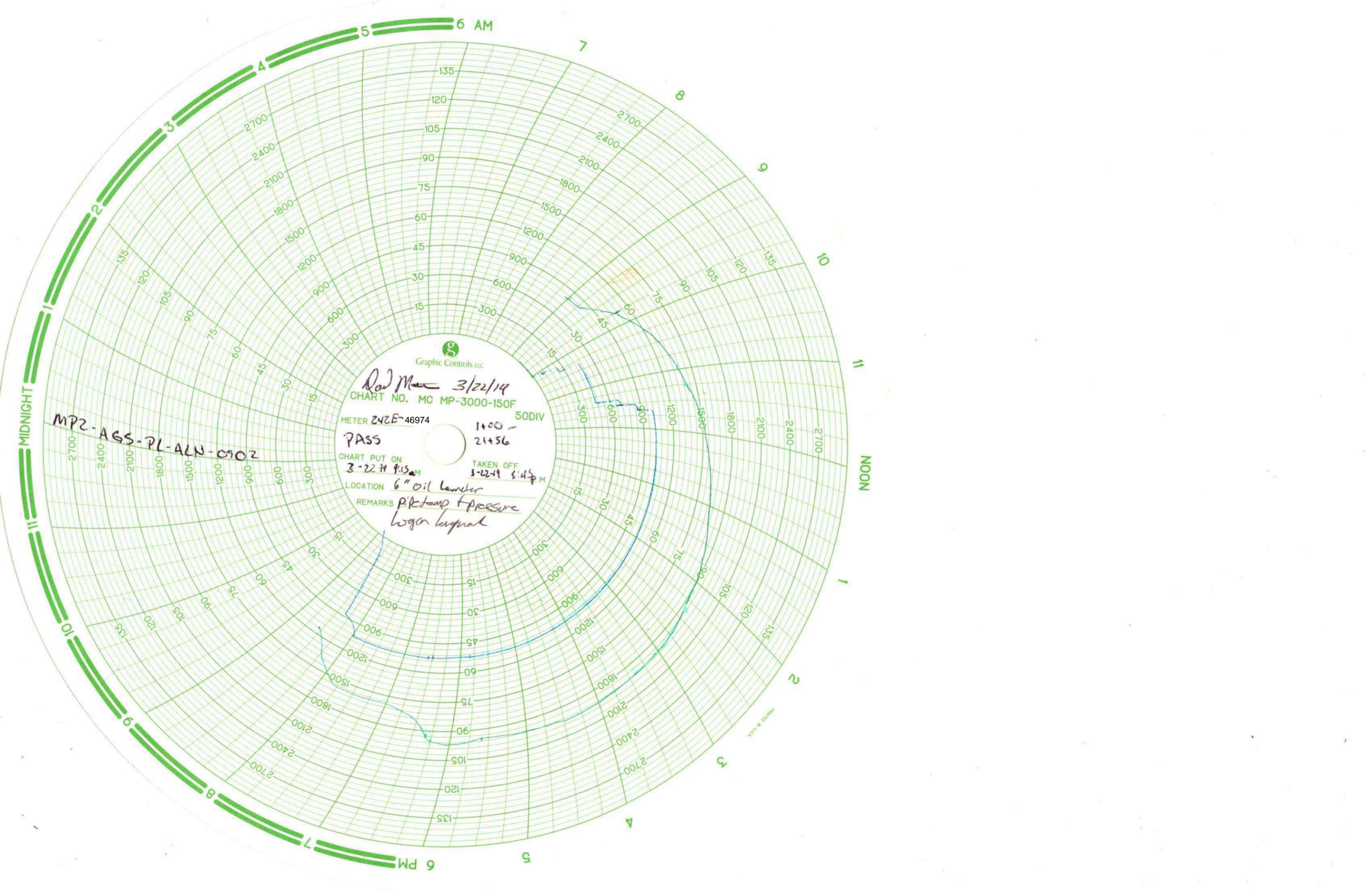
Constr. Contractor's Representative Richard Peyer (Name) Foreman (Title) [Signature] (Signature) 3-22-19 (Date)

Company Representative David Martin (Name) Inspector (Title) [Signature] (Signature) 3/22/19 (Date)

Construction Superintendent Chris Harrell (Name) QC (Title) [Signature] (Signature) 3/22/19 (Date)

Project Name / No.: <u>Messing</u>		P&ID No. _____	
Test Package #: _____		_____	
System: <u>6" oil</u>			
Applicable Code: _____		Design Pressure: <u>740</u> PSIG	
<input checked="" type="checkbox"/> Above Ground Piping	<input checked="" type="checkbox"/> Below Ground Piping	<input type="checkbox"/> Vessel/Other _____	
Test Type: <input checked="" type="checkbox"/> Hydrostatic		<input type="checkbox"/> Pneumatic: <input type="checkbox"/> Leak <input type="checkbox"/> Service <input type="checkbox"/> Other _____	
Test Medium: <u>water</u>		Required Pressure: <u>1000</u> PSIG	Actual Pressure: <u>1061</u> PSIG
Required Test Pressure Hold Time: <u>8</u> Hours <u>0</u> Minutes		_____	
Ambient Temperature: <u>55.</u> °F		Average Temperature: _____ °F	
Test Start Time: <u>11:45</u>		Test Finish Time: <u>8:00</u> Actual Test Hold Time: <u>8</u> Hour <u>15</u> Min.	
Allowable Leakage/Pressure Drop: <u>75 PSF</u>		Actual Leakage/Pressure Drop: <u>0</u>	
Test Acceptable: <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		_____	
If Test Not Acceptable; State Why: _____			
CALIBRATION DATA			
Chart Recorder ID: <u>242E-46974</u>	Calibration Date: <u>2-13-19</u>	Static Range: <u>0-3000</u>	
Chart Recorder ID: <u>112563368003</u>	Calibration Date: <u>3-4-19</u>	Static Range: <u>0-3000</u>	
Pressure Gauge ID: <u>576537</u>	Calibration Date: <u>2-18-19</u>	Gauge Range: <u>0-10000</u>	
Pressure Gauge ID: _____	Calibration Date: _____	Gauge Range: _____	
Deadweight ID: _____	Calibration Date: _____	Weight Range: _____	
Lines Included: _____			
TEST ACCEPTANCE			
Test Performed By: <u>Logan Lerquardt</u>		Date: <u>3-22-19</u>	
Wood Superintendent: <u>Phil Lips</u>		Date: <u>3-22-19</u>	
Client Representative: <u>David Mair</u>		Date: <u>3-22-19</u>	
Other: <u>QC</u> <u>[Signature]</u>		Date: <u>3/22/19</u>	





3/22/14
 CHART NO. MC MP-3000-150F
 METER 242E-46974
 1100 -
 2156
 CHART PUT ON 3-22-14 9:15 AM
 TAKEN OFF 3-22-14 5:45 PM
 LOCATION 6" Oil Launcher
 REMARKS pit temp & pressure
 log on launch

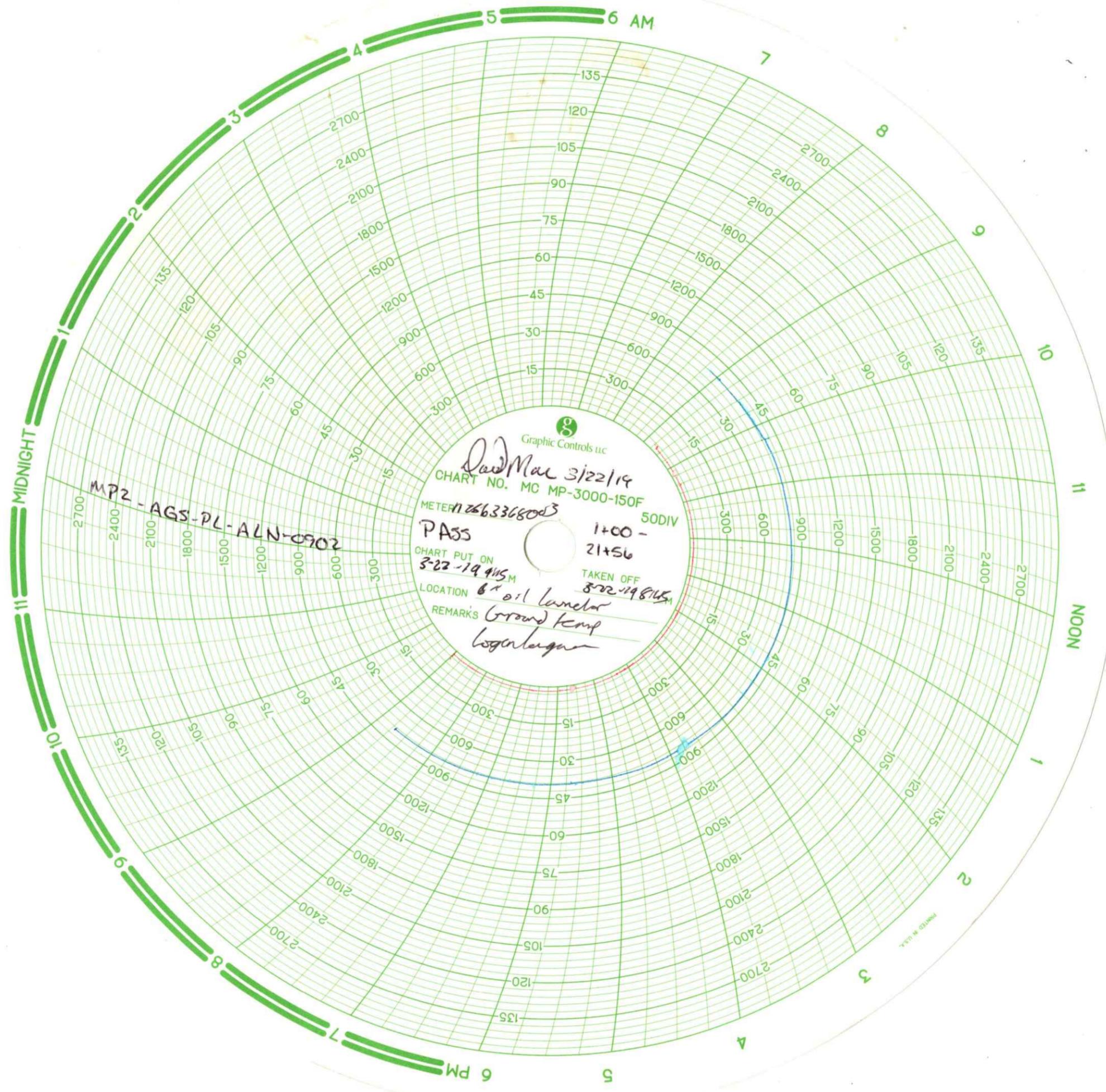
MP2-AGS-PL-ALN-0902

MIDNIGHT

NOON

6 PM

6 AM



Graphic Controls Inc

David Mac 3/22/19
CHART NO. MC MP-3000-150F

METER *1266336803* 50DIV

PASS 1+00 -
21+56

CHART PUT ON 3-22-19 4:15 M
TAKEN OFF 3-22-19 8:45 M

LOCATION *6" oil lamellar*

REMARKS *Ground temp
log on log on*

MP2 - AGS-PL-ALN-0902

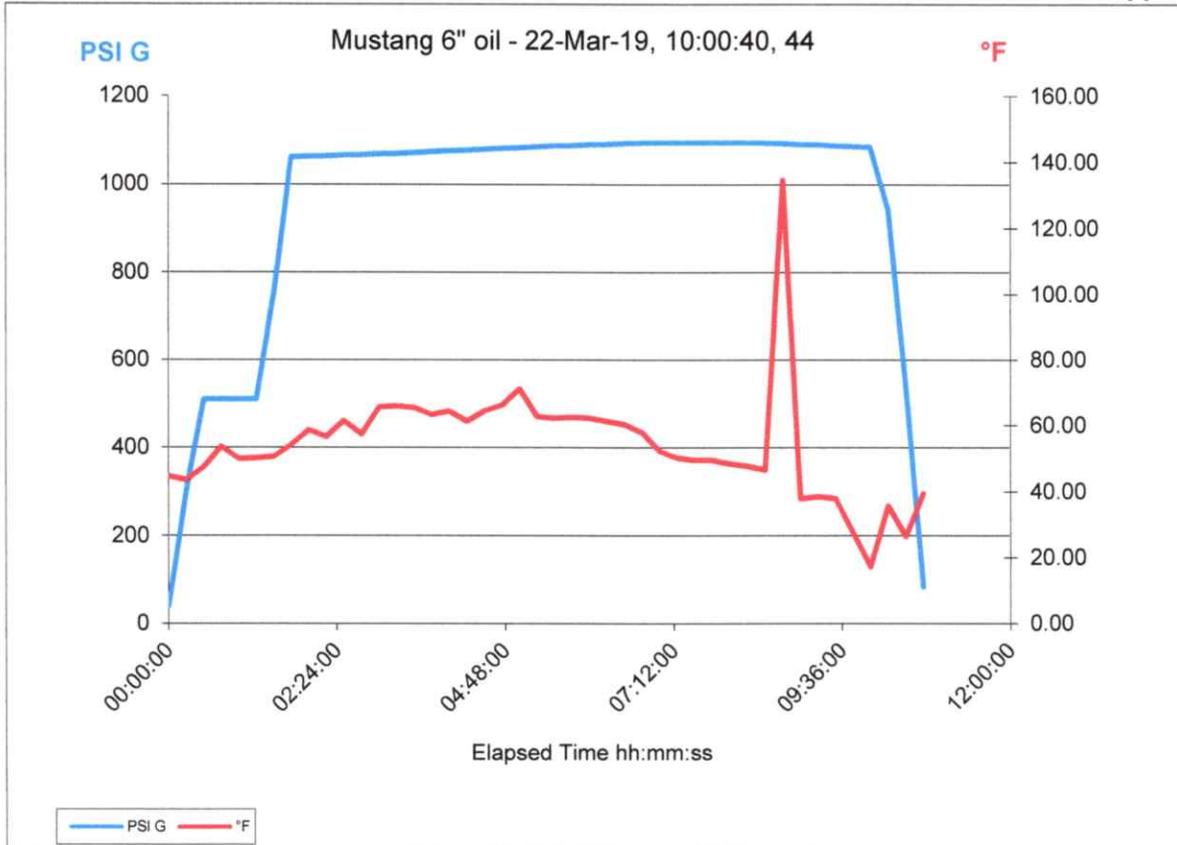
PRINTED IN U.S.A.

Data Collection Report

	Chassis	Left Scale	Right Scale
Serial Number	683559	576537	687923
Datatype		Lower	Upper
Units		PSI G	°F

Lower

Upper



	Chassis	Lower Module	Upper Module	BARO Module	Left Scale	Right Scale
Serial Number	683559	576537	687923		576537	687923
Model	NV	10KPSI	RTD100			
Message Store						
Userspan		1.00000	1.00000			
Offset						
Datatype					Lower	Upper
Units		PSI G	°F		PSI G	°F
Tare						
Average						
User Factor						
User Offset						
User Resolution						
Firmware Version	R080016	R090009	R100006			
Calibration Due		18-Feb-20	19-Feb-20			
Run Index	15					
Run Start Time			22-Mar-19/10:00:40			
Run Duration			10 hours 45 minutes			
Run Tag			Mustang 6" oil			
Logging Interval	900.0					

Point #	Time	Data Points	
		Left - PSI G	Right - °F
1	00:00:00.0	39	44.69
2	00:15:00.0	300	43.57
3	00:30:00.0	509	47.39
4	00:45:00.0	509	53.62
5	01:00:00.0	509	49.91
6	01:15:00.0	510	50.05
7	01:30:00.0	753	50.60
8	01:45:00.0	1061	54.18
9	02:00:00.0	1062	58.60
10	02:15:00.0	1063	56.60
11	02:30:00.0	1065	61.41
12	02:45:00.0	1066	57.39
13	03:00:00.0	1068	65.64
14	03:15:00.0	1069	65.96
15	03:30:00.0	1071	65.43
16	03:45:00.0	1073	63.32
17	04:00:00.0	1075	64.32
18	04:15:00.0	1077	61.23
19	04:30:00.0	1079	64.42
20	04:45:00.0	1081	66.22
21	05:00:00.0	1083	71.20
22	05:15:00.0	1085	62.72
23	05:30:00.0	1087	62.23
24	05:45:00.0	1088	62.49
25	06:00:00.0	1090	62.21
26	06:15:00.0	1091	61.29
27	06:30:00.0	1093	60.31
28	06:45:00.0	1094	57.82
29	07:00:00.0	1094	52.20
30	07:15:00.0	1094	50.18
31	07:30:00.0	1094	49.49
32	07:45:00.0	1094	49.55
33	08:00:00.0	1094	48.44
34	08:15:00.0	1094	47.73
35	08:30:00.0	1094	46.62
36	08:45:00.0	1093	134.66
37	09:00:00.0	1091	37.91
38	09:15:00.0	1090	38.54
39	09:30:00.0	1088	37.96
40	09:45:00.0	1086	27.80
41	10:00:00.0	1085	17.29
42	10:15:00.0	944	35.74
43	10:30:00.0	542	26.54
44	10:45:00.0	84	39.56



Calibration Certificate

7200 E. Dry Creek Rd, STE C-102, Centennial, CO 80112
Ph. 303-804-0667 Cal.Lab@Apex-Instruments.com

Certificate Number: 190896

Customer:

Wood Group Ekhorn
Greeley, CO

Manufacturer: Crystal Engineering
Model Number: nVision 10,000 psi
Serial Number: 576537
Description: Pressure Module
Procedure: CI-001
Calibrated To: Manufacturer's Specifications
Technician: Austin Molyneux

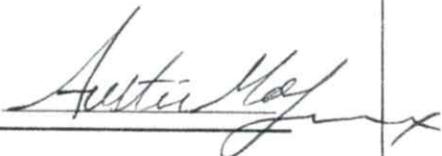
Calibration Date: 2/18/2019
Due Date: 2/18/2020
As Found: In Tolerance
As Left: As Found
Temperature: 69.8 F
Humidity: 18.8 %

Tolerance Specs:

0 to 30% of FS: +/- 0.015% of FS
30% to 110% of FS: +/- 0.05% of Rdg

Technician Notes:

As Left Userspan: 1.00000

Approved Signatory: 

Apex Instruments certifies that the instrument listed above meets the specifications of the manufacturer at the completion of its calibration. Standards used are traceable to the National Institute of Standards and Technology (NIST), or have been derived from accepted values, natural physical constants, or through the use of the ratio method of self-calibration techniques.

Methods used are in accordance with the procedure listed above. This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

Unless otherwise contractually specified, a binary decision rule, utilizing simple acceptance, and simple rejection criteria will be used for the determination of compliance. When compliance statements are present, they are reported without factoring in the effects of uncertainty and the limits are defined by the manufacturer's stated accuracy.

This certificate does not guarantee the continued performance of the instrument listed above. Any modifications or services performed hereafter may void this certificate.

This certificate is not to be reproduced other than in full, except with prior written approval from Apex Instruments Inc.



APX01014

Standards Used

Description	Model Number	Serial Number	Calibration Date	Due Date	ID
Electronic Deadweight Tester	RPM4-E-DWT A100M/A10M	1709	11/19/2018	11/19/2019	APX00024
Temp / RH Datalogger	UX100-011	20369499	8/28/2018	8/28/2019	APX04795

Compass Import

10000PSI

Test Description	Nominal	As Found - As Left		UUT Error	Status
		Test Results	Tolerance (+/-)		
0	0.00 psi	0.0 psi	1.5 psi	0.0 psi	Pass
2000	2000.09 psi	2000.5 psi	1.5 psi	0.4 psi	Pass
4000	4000.60 psi	4001.0 psi	2.0 psi	0.4 psi	Pass
6000	5999.37 psi	6000.0 psi	3.0 psi	0.6 psi	Pass
8000	8000.03 psi	8000.5 psi	4.0 psi	0.5 psi	Pass
10000	10001.83 psi	10002.2 psi	5.0 psi	0.4 psi	Pass
8000	7998.44 psi	7999.0 psi	4.0 psi	0.6 psi	Pass
6000	6001.52 psi	6002.0 psi	3.0 psi	0.5 psi	Pass
4000	3998.91 psi	3999.8 psi	2.0 psi	0.9 psi	Pass
2000	2001.03 psi	2002.0 psi	1.5 psi	1.0 psi	Pass
0	-0.10 psi	0.0 psi	1.5 psi	0.1 psi	Pass

- End of measurement results-



Cross Country Pipeline Supply CO. 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	242E-46974	WOOD	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
	56 DEG	56 DEG
	115 DEG	115 DEG
	147 DEG	147 DEG

PO Number	Sales Order Number	Date of Test
Recalibrated	Recerted	2/13/2019 5:26:30 PM

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	08/08/2018	17-043
Tech Instrumentation	TM99A	Thermometer	08/18/2018	59448

Don F.

Signature Don Frick 2-13-19



Calibration Certificate

7200 E. Dry Creek Rd, STE C-102, Centennial, CO 80112
Ph. 303-804-0667 Cal.Lab@Apex-Instruments.com

Certificate Number: 190895

Customer:

Wood Group Ekhorn
Greeley, CO

Manufacturer: Crystal Engineering
Model Number: nVision RTD100
Serial Number: 687923
Description: Temperature Module (RTD)
Procedure: CRY_R_RTD100p
Calibrated To: Manufacturer's Specifications
Technician: Austin Molyneux

Calibration Date: 2/19/2019
Due Date: 2/19/2020
As Found: In Tolerance
As Left: As Found
Temperature: 68.4 F
Humidity: 19.5 %

Tolerance Specs:

Range: 0 to 400 ohms ; -328 to 1562 degF (PT100 0.00385)
Resistance 0 to 100% of FS +/- (0.015% of Rdg + 0.02 ohms)
Class B Probe Temperature Deviation: +/- (0.3 + 0.005*T) degC

Technician Notes:

As Left Userspan: 1.00000
R0: 100.000

Approved Signatory:

Apex Instruments certifies that the instrument listed above meets the specifications of the manufacturer at the completion of its calibration. Standards used are traceable to the National Institute of Standards and Technology (NIST), or have been derived from accepted values, natural physical constants, or through the use of the ratio method of self-calibration techniques.

Methods used are in accordance with the procedure listed above. This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

Unless otherwise contractually specified, a binary decision rule, utilizing simple acceptance, and simple rejection criteria will be used for the determination of compliance. When compliance statements are present, they are reported without factoring in the effects of uncertainty and the limits are defined by the manufacturer's stated accuracy.

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APX01013

Standards Used

Description	Model Number	Serial Number	Calibration Date	Due Date	ID
Digital Multimeter, 8 1/2 Digit	3458A	2823A11060	1/4/2019	1/4/2020	APX00012
Reference Thermometer Readout / PRT	1502A / 5628-12-D	B64070 / 3526	8/29/2018	8/29/2019	APX00014
Reference Thermometer Readout / PRT	1502A / 5628-12-D	B0B641 / 3780	6/26/2018	6/26/2019	APX00015
Decade Resistor	1433-28	E1-17295164	7/27/2018	7/27/2019	APX02856
Temp / RH Datalogger	UX100-011	20369499	8/28/2018	8/28/2019	APX04795

Crystal nVision RTD100 w/Probe

Manual Template

Test Description	Nominal	As Found - As Left		UUT Error	Status	Pass
		Test Results	Tolerance (+/-)			
Measure Resistance						
5 Ohms	5.00 Ω	5.00 Ω	0.02 Ω	0.00 Ω	Pass	
100 Ohms	100.00 Ω	100.00 Ω	0.03 Ω	0.00 Ω	Pass	
200 Ohms	200.00 Ω	200.00 Ω	0.04 Ω	0.00 Ω	Pass	
300 Ohms	300.00 Ω	300.00 Ω	0.06 Ω	0.00 Ω	Pass	
400 Ohms	400.00 Ω	400.01 Ω	0.08 Ω	0.01 Ω	Pass	

RTD Probe Verification

Class B / 3-Wire / PT100 0.00385

Serial Number	Nominal	Test Results	Tolerance (+/-)	UUT Error	Status
32 F	32.06 °F	32.22 °F	0.56 °F	0.16 °F	Pass
250 F	250.08 °F	250.55 °F	1.64 °F	0.47 °F	Pass

– End of measurement results–



PSS-COMPANIES



9700 E. 104TH AVE, UNIT F- HENDERSON, CO 80640 - Phone (303)857-7986 - Fax (303)389-4945

CALIBRATION CERTIFICATE

CERTIFICATE NUMBER: CO

Details +/-: 1.0% ACCURACY

DATE CALIBRATED: 03/04/2019

DUE DATE: 03/04/2020

INDICATED TEMPERATURE RANGE: # 0 – 150°F

INDICATED PRESSURE RANGE: #0 – 3000 PSI

SERIAL NO: 11256368003 **ID NO:** 006980

MANUFACTURER: BARTON/ 12" RECORDER

TYPE OF INSTRUMENT CALIBRATED: TEMPERATURE / PRESSURE RECORDER

INSTRUMENT FINDINGS/STATUS: UNIT IS IN TOLERANCE/ INSTRUMENT MEETS OR EXCEEDS SPECIFICATIONS.

BASED ON INTERNATIONAL STANDARDS OF GRAVITY: (980.665 cm./sq.).

TYPE OF STANDARD USED TO CALIBRATE: REFINERY DEADWEIGHT TEST UNIT SPT. (35225-3) SERIAL No. 5268: KESSLER TEST THERMOMETERS; SERIAL NO. CALIBRATION

ALL STANDARD DIRECTLY TRACEABLE TO NATIONAL INSTITUTE OF STANDARDS & TECHNOLOGIES TEST NO: (N.I.S.T.) 2.6/172490 & 6.6/139577.

CALCULATED USING MASS VALUES, AREA, AO, AND STATED GRAVITY.
ROOM TEMPERATURE/HUMIDITY (AT TIME OF TEST): 66°F / 25%.

CALIBRATED BY: NICK BEDFORD

A handwritten signature in red ink, appearing to read 'NICK BEDFORD', written over a horizontal line.

WELD COUNTY, COLORADO

SEC 19 T3N R64W
121519200006
TEN HAND TRUST (50%)

2,056.28 FT / 124.62 RODS

BILL OF MATERIALS		
NO.	DESCRIPTION	QTY.
1	6.625 O.D. X 0.280 WT API-5L X52 FBE	2,056 LF
4	6" LAUNCHER	1 EA

STATIONING

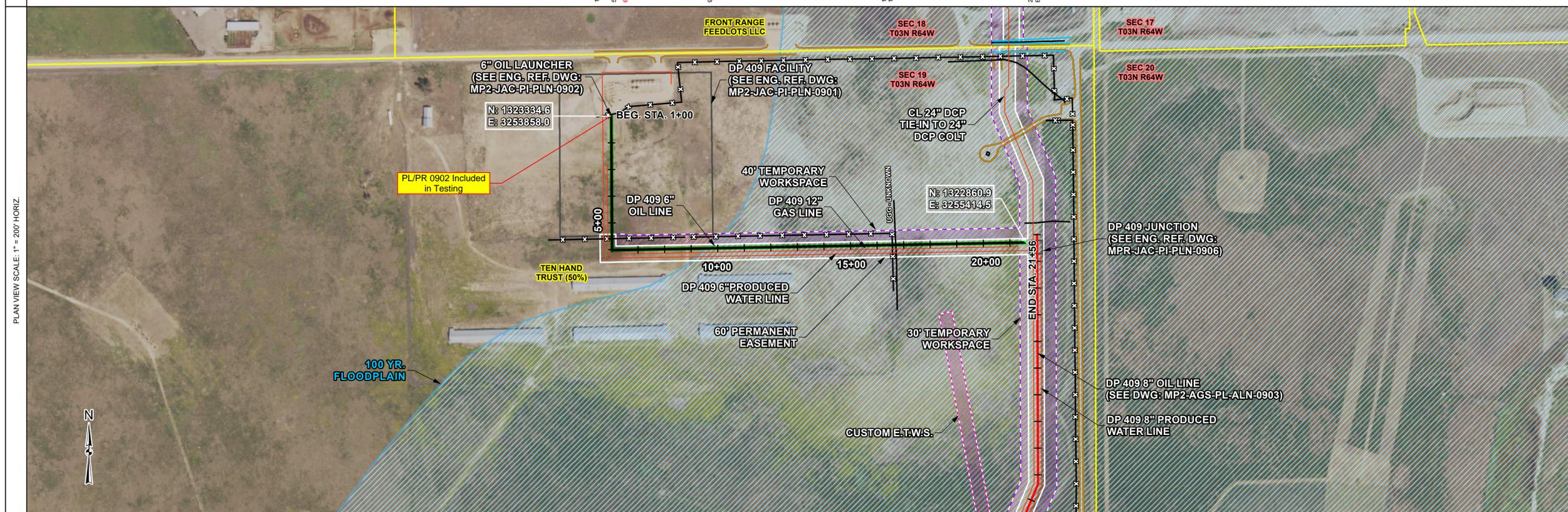
1+00 21+56

1+00 BEGIN STA. @ 90' RANGE ON 6" LAUNCHER
5+59 FENCE LINE
6+02 PI < 90' 00" LT

9+88 BEGIN 100 YR. FLOODPLAIN

16+58 FENCE LINE 16+71 UNKNOWN (GAS)

21+56 END STA. @ 47' RANGE ON PIPELINE BEGIN FACILITIES



P.I. TABLE				
STA.	DESCRIPTION	LATITUDE	LONGITUDE	IB TAG
6+02	PI. < 90° 00' 00" LT	40.216000	-104.590956	

PLAN VIEW SCALE: 1" = 200' HORIZ.

811 Know what's below. Call before you dig.

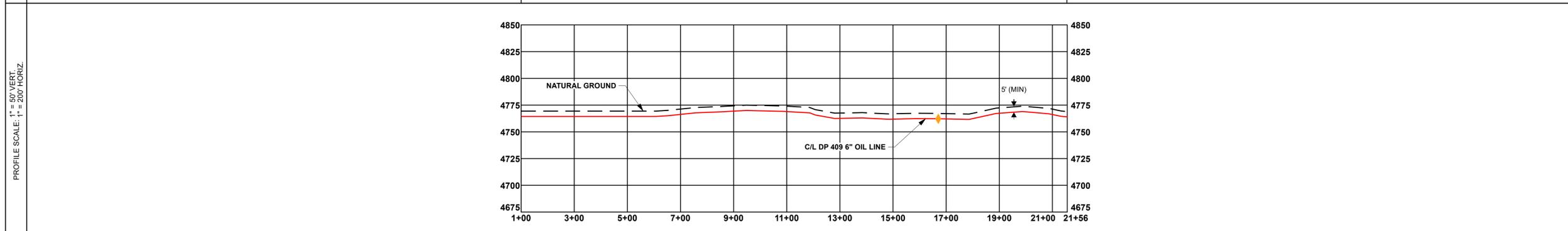
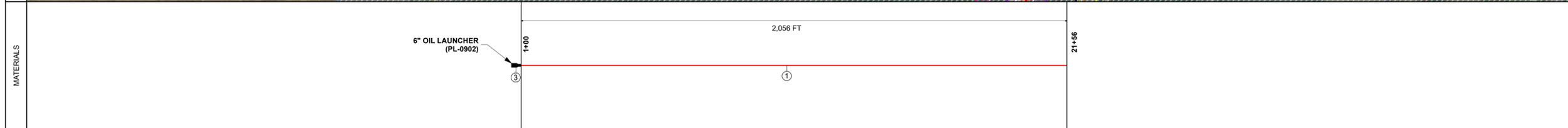
SCALE & PROJECTION

0 100 200 300 400

SCALE: 1" = 200'

COORDINATE SYSTEM:
NAD 1983 STATEPLANE COLORADO NORTH FIPS 0501 FEET

PROJECTION:
LAMBERT CONFORMAL CONIC



PLAN VIEW LEGEND

- PIPELINE
- TEMPORARY WORK SPACE
- EXTRA TEMPORARY WORK SPACE
- PARCEL PROPERTY LINE
- UNDERGROUND WATER LINE
- UNDERGROUND OIL LINE
- UNDERGROUND GAS LINE
- UNDERGROUND FIBER OPTIC
- OVERHEAD UTILITY
- FENCE LINE
- ROAD
- IRRIGATION
- 100 YEAR FLOODPLAIN
- WETLANDS
- BORE/HDD
- POWER POLE

MATERIAL LEGEND

- PIPELINE
- BORE / HDD
- ANODE
- CAP
- CATHODIC PROTECTION
- ELBOW / INDUCTION BEND
- REDUCER
- TEE
- LAUNCHER / RECEIVER
- CASING
- AC MITIGATION
- MARKER
- METER
- TEST STATION
- HYDRANT
- BALL VALVE
- MOTOR OPERATED VALVE
- VALVE

PROFILE LEGEND

- EXISTING GROUND
- TOP OF PIPE
- APPROXIMATE UTILITY LOCATION CONTRACTOR TO VERIFY IN FIELD

NOTES:
LOCATIONS OF UTILITIES AND FOREIGN PIPELINES WERE PROVIDED BY PRIMO LOCATING. THESE LOCATIONS IF SHOWN, MAY NOT BE ACCURATE OR COMPLETE. UTILITIES MAY EXIST AND ARE TO BE FIELD VERIFIED BY OTHERS.

DISCLAIMER:
1) THIS PLOT DOES NOT REPRESENT A MONUMENTED LAND SURVEY AND SHOULD NOT BE RELIED UPON TO DETERMINE BOUNDARY LINES, PROPERTY OWNERSHIP OR OTHER PROPERTY INTERESTS. PARCEL LINES, IF DEPICTED HAVE NOT BEEN FIELD VERIFIED AND MAY BE BASED UPON PUBLICLY AVAILABLE DATA THAT ALSO HAS NOT BEEN INDEPENDENTLY VERIFIED.

DATA SOURCES:
-AERIAL IMAGERY: NAIP 2017
PUBLICLY AVAILABLE DATA SOURCES HAVE NOT BEEN INDEPENDENTLY VERIFIED BY ASCENT GEOMATICS SOLUTIONS.



REVISIONS							
NO.	DESCRIPTION	BY	DATE	CHK BY	CHK DATE	APR BY	APR DATE
0	ISSUED FOR CONSTRUCTION	AMV	11/1/2018	APW	11/5/2018	GFP	11/6/2018

APPROVALS		
SIGNATURE	DATE	
DRAWN		
CHECKED		
APPROVED		
CLIENT APPROVALS		
SIGNATURE	DATE	
OPERATIONS		
ENGINEERING		
PROJ. MGR		

Noble MIDSTREAM PARTNERS

DP 409 6" OIL LINE ALIGNMENT SHEET

WELD COUNTY, COLORADO

1+00 TO 21+56

SCALE: 1" = 200 FT DWG. NO. MP2-AGS-PL-ALN-0902 SHEET NO. 3 OF 5