GW - 007

MITs

From:	Chavez, Carl J, EMNRD
To:	Flessner, Samuel J.
Cc:	O"Brien, Jessica
Subject:	RE: [EXTERNAL] Marathon Jal Cavern #3, #4 - Compliance Extension
Date:	Friday, March 4, 2022 2:36:00 PM
Attachments:	image002.png

Sam,

Hi.

All sundries with well work should be submitted via OCD E-Permitting.

All subsequent non-sundry submittals, may be sent via e-mail to me.

I hope this helps? OCD Mgt. has directed me to E-doc (internal) non-sundry matters into the "GW-7" Admin. Order or Imaging File Admin. Record.

Please call me if you have questions.

Thank you.

Carl J. Chavez ● UIC Group
Engineering Bureau
EMNRD - Oil Conservation Division
5200 Oakland Avenue, N.E. Suite 100 | Albuquerque, NM 87113
505.660.7923
www.emnrd.nm.gov

From: Flessner, Samuel J. <sjflessner@marathonpetroleum.com>
Sent: Friday, February 25, 2022 3:59 PM
To: Chavez, Carl J, EMNRD <CarlJ.Chavez@state.nm.us>
Subject: RE: [EXTERNAL] Marathon Jal Cavern #3, #4 - Compliance Extension

Carl – Ok, thanks. Are you referring to a specific document when you say "submittals should be transmitted to OCD via the new "E-Permitting" process"? Or is this just a general comment?

Thanks,
Sam

From: Chavez, Carl J, EMNRD <CarlJ.Chavez@state.nm.us>
Sent: Friday, February 25, 2022 10:50 AM
To: Flessner, Samuel J. <sjflessner@marathonpetroleum.com>

Subject: RE: [EXTERNAL] Marathon Jal Cavern #3, #4 - Compliance Extension

Sam,

Received. OCD Mgt. is considering the explanation and will respond soon.

Also, submittals should be transmitted to OCD via the new "E-Permitting" process. Jessica O'Brien is familiar with this process with Marathon.

Thank you.

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From: Flessner, Samuel J. <sjflessner@marathonpetroleum.com>
Sent: Friday, February 25, 2022 10:07 AM
To: Chavez, Carl J, EMNRD <CarlJ.Chavez@state.nm.us>
Subject: RE: [EXTERNAL] Marathon Jal Cavern #3, #4 - Compliance Extension

Carl – There was an abnormal relief event at the facility (September 2021) which spurred a PSV study. In order to complete maintenance activities at Cavern #3 and Cavern #4, product needs to be transferred to Cavern #2 prior to flaring. However, some of the PSV study findings need to be implemented in order to safely transfer product at the facility. We are in the process of evaluating how this can be done and what scope needs to be completed prior to LPG transfer. There is a chance we can will can finalize this scope and implement with enough time to complete cavern maintenance; however, schedule is unclear at the moment. I have a meeting today to discuss further with operations and local engineers.

I have attached historic (2017) MIT testing results for Cavern #3 and #4.

Thanks,
Sam

From: Chavez, Carl J, EMNRD <CarlJ.Chavez@state.nm.us>
Sent: Thursday, February 24, 2022 9:11 AM
To: Flessner, Samuel J. <sjflessner@marathonpetroleum.com>
Subject: RE: [EXTERNAL] Marathon Jal Cavern #3, #4 - Compliance Extension

Sam,

Good morning!

Regarding your request of 2/14 below, could you please provide clarification on the "extenuating circumstances" as the general rule for extensions states "for good cause shown" and the condition of the above subject wells supported by historical testing.

Thank you.

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From: Flessner, Samuel J. <sjflessner@marathonpetroleum.com>
Sent: Monday, February 14, 2022 6:11 PM
To: Chavez, Carl J, EMNRD <CarlJ.Chavez@state.nm.us>
Cc: Rose-Coss, Dylan H, EMNRD <DylanH.Rose-Coss@state.nm.us>; Goetze, Phillip, EMNRD <Phillip.Goetze@state.nm.us>
Subject: [EXTERNAL] Marathon Jal Cavern #3, #4 - Compliance Extension

Hi Carl – We spoke last week about Marathon Jal Cavern #3 and #4. Due to extenuating circumstances, I don't believe we will be able to perform mechanical integrity tests (MITs) at these caverns before their mid-May compliance dates. I am reaching out regarding the potential for a compliance date extension and/or temporary cavern closure. Please note, the caverns are currently being emptied – no additional LPG is being added.

Although I don't have a definitive schedule, I think it's likely that Marathon management will provide approval to complete maintenance activities on these caverns by the end of the year. Would you be willing to grant a compliance date extension through December 2022 if Marathon guarantees that no additional LPG will be added before an MIT is complete? This would provide Marathon time to further evaluate facility operations and to complete other safety-sensitive project work. If for some reason, Marathon management has not approved MIT completion by the end of the year, I will notify you and we can discuss path forward.

Please let me know if you are amenable to this plan and/or if you would like me to set up a meeting to discuss with a broader group at the OCD.

Thanks,
Sam

Sam Flessner
Project Engineer II
L3S West - Terminal Engineering
Marathon Petroleum Logistics Services LLC
803 N 300 W, Salt Lake City, UT 84103
C: (419) 348-4269
sjflessner@marathonpetroleum.com

Marathon Petroleum Company LP

From:	Chavez, Carl J, EMNRD
To:	Flessner, Samuel J.; O"Brien, Jessica
Cc:	Goetze, Phillip, EMNRD; Rose-Coss, Dylan H, EMNRD; Thompson, Joseph, EMNRD
Bcc:	Kautz, Paul, EMNRD; Martinez, Patricia L, EMNRD; Robinson, Gary, EMNRD; Fortner, Kerry, EMNRD
Subject:	RE: [EXTERNAL] Marathon Jal Cavern #3, #4 - Compliance Extension
Date:	Friday, March 4, 2022 2:25:00 PM
Attachments:	UIC Class III Cavern MIT Guidence 10-12-16CJC..pdf OCD MIT Pass-Fail Criteria Electronic Calc.pdf image002.png

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Sam and Jessica,

The New Mexico Oil Conservation Division (OCD) has completed its review of the original request of 2/14/22 (see msg. below) for a well maintenance and MIT compliance date extension through December 2022 for LPG Storage Wells 3 and 4. Western indicated, "it was reaching out regarding the potential for a compliance date extension and/or temporary cavern closure. Please note, the caverns are currently being emptied – no additional LPG is being added."

For clarification, OCD's understanding of "caverns being emptied" means the caverns are filled with fluids to remove or empty the cavern of LPG, and this presents an ideal condition to run an OCD "Cavern MIT" (4-Hr.) as opposed to a "nitrogen-brine interface" MIT when the cavern is not filled with liquid and nitrogen gas is introduced at formation temperature to pressure up the cavern quicker to allow for stabilization prior to running an MIT. OCD just wants to make sure the cavern liquid fluids (not gas fluids) are at least semi-full for cavern stability as opposed to empty presenting stability issues.

OCD hereby **approves** the extension to complete the "PSV" well maintenance, etc., and Cavern MITs on the above subject caverns on or before Midnight MST on 12/31/22 with the following conditions:

1. Follow the attached "Cavern MIT" Guidelines;
2. Achieve a minimum start cavern pressure (surface tubing pressure) of 500 psig (closed static system);
3. Post-test, submit within 15-calendar days, the original chart pdf doc. with test info., signatures of witnesses, start-stop pressures, relative percent differential pressure calc., chart recorder serial no. with clock speed setting w max. 12 hr. chart, and spring weight. Based on the start pressure of 500 psig, a max. spring weight of 500 lbs. is required; and
4. Via E-Permitting, submit the sundries for the cavern maintenance and MITs for the above subject wells within 30-calendar days of today's date and provide "Action ID#s" for OCD to process them.

Please contact me if you have questions or feel additional communication is necessary.

Thank you.

Carl J. Chavez ● UIC Group
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From: Flessner, Samuel J. <sjflessner@marathonpetroleum.com>
Sent: Friday, February 25, 2022 10:07 AM
To: Chavez, Carl J, EMNRD <CarlJ.Chavez@state.nm.us>
Subject: RE: [EXTERNAL] Marathon Jal Cavern #3, #4 - Compliance Extension

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To: Flessner, Samuel J. <sjflessner@marathonpetroleum.com>
Subject: RE: [EXTERNAL] Marathon Jal Cavern #3, #4 - Compliance Extension

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Cc: Rose-Coss, Dylan H, EMNRD <DylanH.Rose-Coss@state.nm.us>; Goetze, Phillip, EMNRD <Phillip.Goetze@state.nm.us>
Subject: [EXTERNAL] Marathon Jal Cavern #3, #4 - Compliance Extension

CAUTION: This email originated outside of our organization. Exercise caution prior to clicking on links or opening attachments.

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Please let me know if you are amenable to this plan and/or if you would like me to set up a meeting to discuss with a broader group at the OCD.

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Sam Flessner
Project Engineer II
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Marathon Petroleum Company LP

OCD UIC Program
Draft Brine Well Cavern MIT Guidance (4-hour hydrostatic well test open to the salt formation)

1) The cavern and all piping must be filled, pressured up and stabilized for a period of at least 24 hours prior to testing. If this test requires a packer then casing/tubing annulus must be loaded with inert fluid 24 hours prior to testing.

2) Have manpower and equipment available for pressure test. Wellhead shall be prepared for test and all valves and gauges should be in good working order.

3) Pumps, tanks, external lines etc. must be isolated from the wellhead during test.

4) A continuous recording pressure device with an **8 or 12-hour clock** shall be installed on the casing/tubing annulus. The pressure range shall not be greater than 500 psig. The operator must provide proof that the pressure-recording device has been calibrated within the past 6 months. **Note: Wells with packer installed: If this test requires both the casing/tubing annulus and cavern to be tested then two recording devices must be supplied or one recording device with two pins.**

5) A minimum of one pressure gauge shall be installed on the casing/tubing annulus.

6) OCD must witness the beginning of test (putting chart on) and ending of test (removing chart). Ensure that fluids from the well are not spilled onto the ground.

7) The Operator shall supply the following information on the pressure chart:

   A. Company Name, Well Name, API #, Legal Location.
   B. Test Procedure (1) Casing + Formation (2) Casing Test Only (3) Both (4) Other
   C. Testing Media: Water, Gas, Oil, Etc.
   D. Date, time started and ending.
   E. Name (printed) and signature of company representative and OCD

Inspector

8) **TEST ACCEPTANCE:** The OCD will use the following criteria in determining if a well has passed the Mechanical Integrity Test:

A. **Passes** if Zero Bleed-Off during the test.

B. **Passes** if Final Test Pressure is within ± 1% of Starting Pressure, if approved by the OCD inspector.

C. **Fails** if any Final Test Pressure is greater than ± 1% of Starting Pressure. Operators must investigate for leaks and demonstrate that mechanical integrity of the well(s) by ensuring there are no leaks in the tubing, casing, or packer, and injected/produced fluids are confined within the piping and injection zones. Wells shall not resume operations until approved by OCD. Caution is urged to reduce pressure appropriately as a function of depth to the salt cavern to prevent fracturing during testing.

Note: OCD recognizes that different operations, well designs, formation characteristics and field conditions may cause variations in the above procedures. If operator wishes to make or anticipate changes please notify the OCD for approval. All operators are responsible to notify OCD of any procedure that may cause harm to the well system or formation. Please be advised that OCD approval does not relieve any operator of liability should operations result in pollution of surface water, groundwater, or the environment.

Also note: This document is intended to provide technical guidance to operators on technical means to achieve compliance with the rules and regulations of the Oil Conservation Division and the Oil and Gas Act. The test procedures set forth are not regulations or policies and therefore other methods may exist to achieve compliance with the rules and regulations and the Oil and Gas Act.

OCD recommends that a licensed professional engineer or licensed geologist, or a licensed professional engineer or licensed geologist designee supervise all test procedures and associated field activity.

OCD
MIT PASS/FAIL CRITERIA

Relative Percent Difference (RPD) Equation

The equation for determining the percent difference, (assuming both x_1 and x_2 are positive), by comparing values x_1 and x_2 is:

$$\%\text{Diff} = \frac{|x_1 - x_2|}{((x_1 + x_2)/2)} \times 100$$

Class I Well Casing MIT Pass/Fail = +/- 10% (0.10)

Class III Well Formation/Cavern MIT Pass/Fail = +/- 1% (0.01)

Maximum Surface Injection Pressure Calculations:

UIC Class I Well

MSIP= 0.2 * (DTP)

Max. Surface Injection Pressure= MSIP (dimensionless)
Depth to Top Perforation= DTP (Ft.)

UIC Class II Well

MSIP= 0.2 * (DTP)

Max. Surface Injection Pressure= MSIP (psig)
Depth to Top Perforation= DTP (Ft.)

UIC Class III Well

MSIP= MBHIP - FPIC

MBHIP[#]= 0.75 * (DTCS)

H (height of fluid in casing-ft)
DTCS (depth to casing shoe- ft)
FPIC (fluid pressure in casing- psi)
FPIC ~ H * 0.518 psi/ft
MBHIP (max. bottom hole injection pressure- psi)
MSIP (max. surface injection pressure- psig)

Note: *DTCS may be multiplied by a lower fracture gradient value than 0.75 to reflect shallow salt cavern conditions. The OCD is concerned about over-pressuring and fracturing the salt cavern during MIT formation testing. The OCD has recommended the use of N_2 gas during Formation or Cavern MITs in order to eliminate additional hydrostatic casing fluid pressure on the cavern during testing when lower pressures are required to prevent fracturing of the salt cavern. The OCD is currently developing siting criteria that may eliminate shallow salt cavern brine wells in the future.*

UIC Class V Geothermal Injection Well

MSIP = Generally not an issue due to the fractured nature of the geothermal reservoirs.
Depth to Top Perforation or open hole= DTP (Ft.) =

MIT Pass: BLM Regulatory Gradient of 0.6 psi/ft * Well Casing Depth, i.e., 0.6 * 1500 ft. = 900 psi. If well maintains a minimum bottom hole pressure of 900 psi for at least 30 min., this is a "pass".

MIT Fail: Abnormal spikes and/or decreasing pressure due to pressure loss within well annulus and decrease below the minimum bottom hole pressure, this is a "fail".

MIT Testing
LPG Storage Gas Storage Wells
(9-25-09)

LPG Storage Well MIT Requirements:

In general, the OCD requires cavity configuration, production and EPA 5-Yr. MITs on these wells. There is no mention of Bradenhead Testing, but if they exist, OCD should consider monitoring during MITs.

GW-003:

No MIT requirements specified in expired permit.

http://ocdimage.emnrd.state.nm.us/imaging/AEOrderFileView.aspx?appNo=pENV000GW00003

GW-007:

http://ocdimage.emnrd.state.nm.us/imaging/AEOrderFileView.aspx?appNo=pENV000GW00007

21. LPG Storage Well(s) Identification, Operation, Monitoring, Bonding and Reporting.

A. Well Identification: API #s: Well #1 30-025-35954; Well #2 30-025-35955; Well #3 30-025-35956; and Well #4 30-025-35957.

B. Well Work Over Operations: QOD approval shall be obtained prior to performing remedial work, pressure test or any other work. Approval will be requested on OCD Form 0-103 'Sundry Notices and Reports on Wells" (OCD Rule 1103.A.) with appropriate copies sent to the OCD Environmental Bureau and District Office.

C. Production Method: Brine water shall be injected down the tubing to the base of the cavern to push or recover LPG upward through the casing. LPG storage shall be increased by withdrawing brine water from the tubing while injecting LPG down the casing. Brine water will be stored at ground level in two brine storage ponds. Fresh water injection down. the tubing to dissolve or clear salt from the tubing for a maximum period of 24 hours shall be allowed when the structural stability of the cavern will not be compromised. Alternative cleaning methods must be approved by the OCD.

D. Well Pressure Limits: The maximum operating*surface injection and/or test pressure measured at the wellhead shall not exceed:

LPG Well #1: 850 psig unless otherwise approved.
LPG Well #2: 850 psig unless otherwise approved.
LPG Well #3: 850 psig unless otherwise approved.
LPG Well #4: 850 psig unless otherwise approved.

The operator shall have a working pressure limiting device or controls to prevent over pressure. Any pressure that causes new fractures or propagate existing fractures or causes damage to the system shall be reported to 000' within 24 hours of discovery.

E. Mechanical Integrity Testing (MIT): Conduct an annual open to formation pressure test by pressuring up the formation with approved fluids or gas to a minimum of 300 psig measured on the surface casing for four hours. However, no operator may exceed test pressures that may cause formation fracturing (see item 21.D above) or system failure. Systems requiring test pressures less than 300 psig or methods that use testing media other than fluids, i.e., gas, must be approved by OCD prior to testing. In accordance with EPA UIC Well requirements, at least once every five years and during well work-overs, the salt cavern formation shall be isolated from the casing/tubing annuals and the casing pressure tested at 300 psig for 30 minutes. All pressure tests must be performed per the schedule shown below and witnessed by OCD unless otherwise approved.

MIT Testing Schedule:

Well No. 1	4/25/2013	Well No. 1 Nitrogen/Brine Interface Test* (Pass: Allowable Loss ~ 0.11 bbl./hr.)
Well No. 2	3/14/2013	Same as Well No. 1 above.
Well No. 3	8/19/2012	Same as Well No. 1 above.
Well No. 4	8/19/2012	Same as Well No. 1 above.
Above Wells	Work-over	EPA 5 Yr.**

Notes:

* The owner/operator shall perform a 72 hour Nitrogen/Brine Interface Mechanical Integrity Test - Internal (casing) and/or External (cavern) a minimum of every 5 years.
** An EPA 5 Yr. MIT 30 mm @ minimum 300 psig casing test only (set packer above casing shoe to isolate formation from tubing/annuals- Pass: +/- 10% of start

pressure) shall be performed immediately after any well work-over.

F. Capacity/ Cavity Configuration and Subsidence Survey: The operator shall provide information on the size and extent of the solution cavern and geologic/engineering data demonstrating that continued brine extraction will not cause surface subsidence, collapse or damage to property, or become a threat to public health and the environment. This information shall be supplied in each annual report. A subsidence monitoring work plan shall be submitted by the operator within 90 days of permit issuance to perform additional well surveys, test, and install subsidence monitoring in order to demonstrate the integrity of the system. If the operator cannot demonstrate the integrity of the system to the satisfaction of the Division then the operator may be required to shut-down, close the site and properly plug and abandoned the well.

Any subsidence must be reported within 24 hours of discovery.

G. Production/Injection Volumes: The volumes of fluids injected (produced brine) vs. LPG will be recorded monthly (C-131A) and submitted to the QOD Santa Fe Office in the annual report (C-131B).

H. Analysis of Injection Fluid or Brine: Provide an analysis of the injection fluid with each annual report. Analysis will be for General Chemistry (method 40 CFR 136.3) using EPA methods.

I. Area of Review (AOR): The operator shall report within 24 hours of discovery of any new wells, conduits, or any other device that penetrates or may penetrate the injection zone within 1/2 mile from any LPG Storage Well.

J. Loss of Mechanical Integrity: The operator shall report within 24 hours of discovery of any failure of the casing or tubing or movement of fluids outside of the injection zone. The operator shall cease operations until proper repairs are made and receive 0CD approval to re-start injection operations.

GW-019:

http://ocdimage.emnrd.state.nm.us/imaging/AEOrderFileView.aspx?appNo=pENV000GW00020

7. Mechanical Integrity Testing: Columbia Propane will conduct an annual open hole cavern

pressure test equal to one and one-half times the normal operating pressure (not to exceed formation fracture pressure) or 300 psi, whichever is greater, for four hours. At least once every five years and during well workovers the cavern formation will be isolated from the casing/tubing annuals and the casing pressure tested at 300 psig for 30 minutes. All pressure test must be witnessed and approved by OCD.

8. Capacity and Cavity Configuration: A test will be conducted to determine the size and configuration of the mined cavities prior to discharge plan renewal (February 27, 2005). The method and time of testing will be approved by the OCD prior to performing the test.

   Columbia Propane will provide to the OCD the calculated size of the cavities and demonstrate the stability of the salt formation cavities from collapse and/or subsidence. Please include this information in the first annual report due on July 31, 2000.

9. Operation Reports: Monthly operation reports shall be submitted on OCD C-131A forms and Annual operation reports shall be submitted on OCD C- 131 B forms in the annual report due on July 31, 2000.

10. Analysis of Injection Fluid and Brine: Provide an analysis of the injection fluid and produced brine with each annual report. Analysis will be for General Chemistry (Method 40 CFR 136.3) using EPA methods.

GW-025:

17. Underground Gas Storage Systems:

    LPG Well #1 API # 30-025-13228
    LPG Well #2 API # 30-025-13229

A. Production Method: Brine water will be injected and withdrawn through the tubing and gas products shall be injected and withdrawn through the casing/tubing annulus. Deviations will be allowed for maintenance reasons once a month for up to 24 hours.

B. Maximum Injection Pressure: The maximum operating injection and/or test pressure at the well head will be such that the fracture pressure of the injection formation will not be exceeded.

C. Mechanical Integrity Testing Dynegy Midstream Services, L.P. will conduct an annual open hole cavern pressure test equal to one and one-half

times the normal operating pressure (not to exceed formation fracture pressure) or 300 psi, whichever is greater, for four hours. At least once every five years and during well workovers the cavern formation will be isolated from the casing/tubing annuals and the casing pressure tested at 300 psig for 30 minutes. Other test methods (i.e. Nitrogen/Brine Interface Test) may be utilized in lieu of above test methods if pre-approved by OCD. All pressure tests must be witnessed and approved by OCD.

D. Capacity and Cavity Configuration A test will be conducted to determine the size and configuration of the mined cavities prior to discharge plan renewal (July 31, 2010). The method and time of testing will be approved by the OCD prior to performing the test.

E. Dynegy Midstream Services, L.P. will provide to the OC[) the calculated size of the cavities and demonstrate the stability of the salt formation cavities from collapse and/or subsidence. Please include this information by July 31, 2010.

F. Operation Reports: Monthly operation reports shall be submitted on OCD C- 131 A forms and Annual operation reports shall be submitted on OCD C-131B forms.

G. Analysis of Injection Fluid and Brine: Provide an analysis of the injection fluid and produced brine with each annual report. Analysis will be for General Chemistry (Method 40 CFR 136.3) using EPA methods.

H. Well Work Over Operation: OCD approval will be obtained from the Director prior to performing remedial work, pressure test or any other Work over. Approval will be requested on OCD Form C-103 "Sundry Notices and Reports on Wells" (OCD Rule 1 103.A.) with appropriate copies sent to the OCD Hobbs District Office.

Note: *LPG Storage Wells regulated under the Federal UIC Program must be liquid at Standard Temperature and Pressure (STP). OCD has permitted LPG (methane, butane and propane) Storage Wells in salt under discharge permits GWs- 3, 7, 19 & 25 in the past. However, OCD is aware that propane and butane are not liquid at STP; therefore, does not fall under the Federal UIC Program as a Class II Injection Well as incorrectly stated in OCD's UIC Brochure. An example of an LPG Storage Well would be the Federal Strategic Petroleum Reserve near Houston, Texas where LPG is stored in salt caverns within large salt dome(s).*

OCD Regulated Natural Gas Storage Well MIT Requirements:

In general, the OCD does not specify MIT requirements in any of the Orders associated with the natural gas wells listed below. These wells go straight to hearing and have not been permitted under OCD discharge permits and WQCC. Are there MIT requirements in the OCC Regulations for Natural Gas Storage Wells? I don't think so…..

Operator	Project	Status	Order
El Paso Natural Gas	Washington Ranch	A	R-6175, R-6175-A, R-6175-B
LG&E***	Grama Ridge Morrow Unit	A	R-4473, R-4491
PNM	Las Milpas Gas Storage Project (San Ysidro)	A	R-5079
Gruy Petroleum Mgt.	Rhodes Gas Storage Unit	I	Order 772, R-3886, R-4522

Active Underground Gas Storage Facilities
Inactive Underground Gas Storage Facilities

*** Now known as Grama Ridge Storage & Transportation LLC

Note: *Natural Gas Storage Wells in New Mexico are regulated under OCC Regulations and fall outside of the authority of the Federal EPA UIC Program. These wells when applied for under an OCD C-108 Form, go directly to hearing and bypass a review by the OCD- Environmental Bureau. Consequently, any MIT requirements may be present under Order numbers.*

El Paso Natural Gas (R-6175, R-6175-A, R-6175-B):

MIT requirements are not specified in the Order.

R-6175 (Case No. 6703) 8/29/1979

http://ocdimage.emnrd.state.nm.us/imaging/CaseFileView.aspx?CaseNo=6703&FilingDate=8/29/1979%2012:00:00%20AM

Grama Ridge Storage & Transportation L.L.C. (R-4473, R-4491):

MIT requirements are not specified in the Order.

R-4473 (Case No. 4895) 11/25/1971

http://ocdimage.emnrd.state.nm.us/imaging/CaseFileView.aspx?CaseNo=4895&FilingDate=11/25/1971%2012:00:00%20AM

R-4491

No file found online.

PNM (R-5079):

Order could not be found on-line to determine whether MIT requirements were specified in Order.

R-5079

No file found online.

Gruy Petroleum Mgt. (Order 772, R-3886, R-4522):

MIT requirements are not specified in the Order.

Order 772

R-3886 (Case No. 4268) 9/28/1969

http://ocdimage.emnrd.state.nm.us/imaging/CaseFileView.aspx?CaseNo=4268&FilingDate=9/28/1969%2012:00:00%20AM

R-4522 (Case No. 4935) 3/13/1973

http://ocdimage.emnrd.state.nm.us/imaging/CaseFileView.aspx?CaseNo=4935&FilingDate=3/13/1973%2012:00:00%20AM

Chavez, Carl J, EMNRD

From: Chavez, Carl J, EMNRD
Sent: Thursday, December 7, 2017 10:44 AM
To: Sanchez, Daniel J., EMNRD; Jones, William V, EMNRD; Griswold, Jim, EMNRD; Goetze, Phillip, EMNRD; Brown, Maxey G, EMNRD; Podany, Raymond, EMNRD
Subject: LPG Storage Wells and the Nitrogen-Brine Interface or MDLR MIT Method
Attachments: Jal Facility Geostock MITs 2011.pdf; OCD MIT Allowable Gas Loss.pdf; OGScience and Tech.pdf; Jal MITs 2017.pdf; MIT Requirements UIC Class II LPG Storage vs. OCD Natural Gas Storage Wells.doc; Will Jones NG Storage Well Info. 5-30-2017.pdf; 2017-GasStorageRegulatoryConsiderations May 2017-reduce.pdf; Kansas UICLPG-20.pdf

Gentlemen:

I am involved in this above subject matter based on Nitrogen-Brine Interface Tests or MITs run on LPG Storage Wells at Western's Jal LPG Storage Facility, and observing that DO1 Field Staff had approved the MIT Method in 2017 (see attached Jal MITs 2017), and after asking the question if OCD had reviewed literature on this MIT Method before approving the experimental MITs run in 2017. There was no responses from OCD District Staff or Western to literature requests from the OCD Environmental Bureau. Consequently, Jim asked me to look into the matter. Please click here for additional information on this subject discovered via Google™.

It appears that OCD has not yet officially approved the Nitrogen-Brine Interface MIT Method on its LPG Storage Wells, and LPG Orders do not reference the method. I notice in the GWPC Table on Nitrogen-Brine Interface and Freshwater-Brine Interface Tests or MITs below that they may be applicable to domal and bedded salt caverns. It appears to be a method applied by Western over a 72 hr. period bringing the salt cavern to a start and end pressure with Nitrogen. The changes in pressure are monitored (early abrupt changes may indicate a well MIT problem). The Nitrogen-Brine interface is monitored at depth for fluctuations (anomalous fluctuations may indicate a well MIT problem). A constant interface is a good thing with differential pressure at the casing shoe allowed a 10% pass/fail. OCD has used 1% pass/fail on brine cavern MITs due to the tremendous volume of fluids in the cavern.

After looking into literature on the Nitrogen-Brine Interface MIT Method, it has been applied successfully in other states according to Will Jones (see attached OCD MIT Allowable Gas Loss), but has yet to be officially approved by OCD, but that the "leak pressure of the reservoir should be determined or estimated- OCD usually limits storage pressure to the original reservoir pressure or leak pressure if that is known." Consequently, it appears that Nitrogen-Brine Interface MIT Methods may be applied on LPG Storage Wells, although to date at OCD it may be considered experimental, until OCD decides to officially approve it in OCD Orders. This message I believe moves OCD closer to a decision on officially accepting the LPG Storage Well Nitrogen-Brine Interface MIT Method in NM and removing any "experimental" connotation to the MIT.

GWPC (see attached GWPC 2017 Regulatory Considerations document) includes the following table (pages 44-45) of MITs for LPG Storage Wells.

Mechanical Integrity Testing Methods	Internal or External Integrity	Test/Log Objective	Well Preparation	Comments/Considerations
Mechanical Integrity Test				

Standard Annular Pressure Test	Internal	– Demonstrate no leaks in the casing-tubing annulus – Casing/packer leak detection	Wellbore and well must be full of fluid Must stabilize temperature in well and annulus Must pull tubing and set bridge plug for wells without a packer	– Pass/Fail Criteria can be established – Can be used on any well – No unapproved fluid additives – Testing pressure should be equal to at least the maximum allowable injection pressure
Annular Pressure Build-up Test	External (including wellhead) & Internal	– Identify gas flow outside of casing (annular pressure)	Annuli and casing must be bled to 0 psig prior to initiating test Shut-in annuli should be allowed to vent for a period of time prior to testing.	– Pass/Fail Criteria can be established – Interpretation is relatively straightforward (type curves are available for comparison) – Test can be influenced by outside factors such as barometric pressure, mud clogging or freezing of lines, etc. – Gauges must be properly sized for the anticipated pressures – Continuous data recording are important to confirm quality of results

Annular Venting Flow Rate Test	External & Internal	– Identify flow of gas to surface as an indication of a leak	Shut-in annuli should be allowed to vent for a period of time prior to testing.	– Pass/Fail Criteria can be established
				– Simple interpretation
				– Two test types:
				  – Manometer Tests: Quantitative assessment of flow
				  – Balloon Test/Bubble Test: Qualitative assessment of flow (used when flow is below quantifiable rates)

Wellhead Methane Monitoring	External & Internal	- Identify flow of gas to surface as an indication of a leak	- None	- Pass/Fail Criteria can be established - Simple interpretation - Various direct-reading instruments are available that can detect methane either directly or as a component of combustible gas - Field procedures must be standardized to ensure consistent results
Nitrogen – Brine Interface Test	External (Cavern) & Internal (Well)	- For domal and bedded salt caverns and mined-out caverns - Identify internal or external leaks as well as integrity of the storage cavern itself	- Not necessary to remove tubing - Must allow stabilization of pressure/temperature - Use of fully saturated brine helps reduce stabilization time	- Pass/Fail Criteria can be established - The test is not practical for caverns with large, flat roofs and no cavern neck -
Cavern Wellhead – Freshwater – Brine Interface Test	Internal	- For domal, bedded and mined salt reservoirs	- Useful when packer or plug seating is difficult - May avoid depressurizing cavern	- Pass/Fail Criteria can be established - Does not account for changes in cavern pressure; a reference well or tubing must be used for comparison - May not be an approved test method in some states
Geophysical Logging				
Temperature Log	External & Internal	- Casing Leak Detection - Identify Behind Casing Flow - Entry/Exit Point Delineation	- Remove Tubing - Wellbore must be full of fluid - Stabilization Period (at least 12-24 hours)	- Misinterpretation of results is possible - Run logs in sets: production casing closed and surface casing open, production casing open and surface casing closed - Sensitive to the differing thermal conductivities of different sedimentary rock types

Mechanical Integrity Testing Methods	**Internal or External Integrity**	**Test/Log Objective**	**Well Preparation**	**Comments/Considerations**
Audio Log	External & Internal	– Casing Leak Detection – Identify Behind Casing Flow – Entry/Exit Point Delineation – Distinguish Flow Type	– Remove Tubing -Wellbore must be full of fluid – Stabilization Period (at least 12-24 hours)	– Misinterpretation of results is possible – Run logs in sets: production casing closed and surface casing open, production casing open and surface casing closed
Ultrasonic Noise Log	Internal	– Casing Leak Detection – Can detect leaks through tubing and casing	– Remove Tubing -Operate in d1y hole – May be rnn inside tubing – Logging rate - 30fym	- Run logs in sets: production casing closed and surface casing open, production casing open and surface casing closed
Cement Evaluation Logs - 1st Generation				
Cement Bond Log (CBL)	External	– TOC Detern1ination – Casing / Formation Bond Evaluation	- Remove Tubing - Wellbore must be full of fluid	- Tool widely available - Historical use results in consistent interpretation - Sensitive to wellbore conditions
Radial Cement Bond Log (RCBL)	External	- TOC Determination - Casing /Fornrntion Bond Evaluation	- Remove Tubing -Wellbore must be full of fluid	- Tool widely available - Historical use results in consistent interpretation - Sensitive to wellbore conditions

		- Casing Bond Radial Display		
Cement Evaluation Logs - 2nd Generation				
Cement Evaluation Tool (CET)	External & Internal	- Casing Cement Bond Evaluation - Identify Cement Channeling - Cement Compressive Strength - Casing wear/corrosion Indication	- Remove Tubing -Wellbore mu st be full of fluid	- Simpler interpretation - Less sensitive to borehole conditions - No cement to formation bond information
Segmented Bond Tool (SBT)	External	- Determining Cement Seal - Identify Cement Channeling - Cement Compressive Strength	- Remove Tubing - Can be run in fluid or gas	- Insensitive to wellbore conditions
Ultrasonic ImagerTool (USTT)	External & Internal	- Casin g Cement Bond Evaluation - Identify Cement Channeling - Cement Compressive Strength - Casing Corrosion Detection - Casing Internal/External Damage - Casing Thickness Measurement	- Remove Tubing - Scrap casing -Wellbore mu st be full of fluid	- Simpler interpretation - Less sensitive to wellbore conditions - No formation to cement bond information - Newer tools such as slim memory CBL and radial CBL can be run thrn tubing
Corrosion Logs				
Multi-Finger Caliper Log	Internal	- Radial measurement of tubing/casing inside diameter	- Remove Tubing - Scrap casing	- Used to identify zones of thinned casing wall thickness assuming a uniform (constant) external diameter
Electromagnetic Casing Inspection Log	Internal	- Casing Internal and External Corrosion Indication - Casing Thickness Measurement	- Some can be run though 111bing	- Operates in liquid or gas environments - Low Frequency pass can scan multiple casing strings
Magnetic Flux Leakage Tool	Internal	- Casing Corrosion Indication - Casing Thickness Measurement	- Remove Tubing - Scrap casing	- The tool can measure metal loss both internally and externally.

				- May not be effective if corrosion is continuous or has limited variation over an entire segment of casing.

- Carl on 12/6 completed researching MITs for LPG Storage Wells, and did find some literature supporting a Minimum Detectable Leakage Rate (MDLR) MIT Method or "Nitrogen-Brine Interface" MIT Method on OCD LPG Storage Wells. MITs were recently completed on LPGs 3 and 4 at the facility, and were less than the stated MDLR of 1,000 bbl/yr. and the nitrogen/brine interface remained constant with depth over several days. Carl located an MIT performed on LPG Well #4 on 12/22/12 (see attachment Jal Facility Geostock MITs 2011) that specified an MDLR of 2.64 bbl/day or 963.6 bbl/yr. LPG Well # 4 recorded an MDLR of 187.32 bbl/yr at that time. Also, it was noted that the pressure loss at the casing shoe was less than 10%. Carl also identified some info. from Will Jones (OCD Engr. Bureau) on LPG Storage Well MITs, which indicates OCD has not yet officially approved the MDLR MIT Method. Also, Will states that " ."The recent LPG #3 and #4 Wells MDLR MITs met this criteria. Therefore, OCD Environmental Bureau regards the last MITs to meet LPG Storage Well Standards. OCD will consider approving other MIT methods if the operator can provide a credible technical basis for such proposals. Carl forwarded this paragraph with some attached LPG Storage Well MIT Criteria to Daniel, Will, Jim, Phil, Maxey and Ray for concurrence with Carl that OCD should now approve the MDLR MIT Method on its LPG Storage Wells. This methods has been the experimental MIT Method applied at Western's Jal LPG Storage Facility.

If possible, your responses are appreciated in this matter before December 31, 2017. If no decision is rendered, I believe OCD may continue to regard the LPG Storage Well Nitrogen-Brine Interface MITs (see attached Kansas UIC document) as "experimental" until officially approved by OCD Order. Please note that LPG Storage Wells are not subject to the EPA UIC Program regulatory requirements.

Thank you in advance.

Mr. Carl J. Chavez, CHMM (#13099)
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Energy Minerals and Natural Resources Department
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Santa Fe, New Mexico 87505
Ph. (505) 476-3490
E-mail: CarlJ.Chavez@state.nm.us

"Why not prevent pollution, minimize waste to reduce operating costs, reuse or recycle, and move forward with the rest of the Nation?" (To see how, go to: http://www.emnrd.state.nm.us/OCD and see "Publications")

OCD
MIT PASS/FAIL CRITERIA

Relative Percent Difference (RPD) Equation

The equation for determining the percent difference, (assuming both x_1 and x_2 are positive), by comparing values x_1 and x_2 is:

$$\%\text{Diff} = \frac{|x_1 - x_2|}{((x_1 + x_2)/2)} \times 100$$

Class I Well Casing MIT Pass/Fail = +/- 10% (0.10)

Class III Well Formation/Cavern MIT Pass/Fail = +/- 1% (0.01)

Maximum Surface Injection Pressure Calculations:

UIC Class I Well

MSIP= 0.2 * (DTP)

Max. Surface Injection Pressure= MSIP (dimensionless)
Depth to Top Perforation= DTP (Ft.)

UIC Class II Well

MSIP= 0.2 * (DTP)

Max. Surface Injection Pressure= MSIP (psig)
Depth to Top Perforation= DTP (Ft.)

UIC Class III Well

MSIP= MBHIP - FPIC

MBHIP[#]= 0.75 * (DTCS)

H (height of fluid in casing-ft)
DTCS (depth to casing shoe- ft)
FPIC (fluid pressure in casing- psi)
FPIC ~ H * 0.518 psi/ft
MBHIP (max. bottom hole injection pressure- psi)
MSIP (max. surface injection pressure- psig)

Note: *DTCS may be multiplied by a lower fracture gradient value than 0.75 to reflect shallow salt cavern conditions. The OCD is concerned about over-pressuring and fracturing the salt cavern during MIT formation testing. The OCD has recommended the use of N_2 gas during Formation or Cavern MITs in order to eliminate additional hydrostatic casing fluid pressure on the cavern during testing when lower pressures are required to prevent fracturing of the salt cavern. The OCD is currently developing siting criteria that may eliminate shallow salt cavern brine wells in the future.*

UIC Class V Geothermal Injection Well

MSIP = Generally not an issue due to the fractured nature of the geothermal reservoirs.
Depth to Top Perforation or open hole= DTP (Ft.) =

MIT Pass: BLM Regulatory Gradient of 0.6 psi/ft * Well Casing Depth, i.e., 0.6 * 1500 ft. = 900 psi. If well maintains a minimum bottom hole pressure of 900 psi for at least 30 min., this is a "pass".

MIT Fail: Abnormal spikes and/or decreasing pressure due to pressure loss within well annulus and decrease below the minimum bottom hole pressure, this is a "fail".

OCD UIC Program
Draft Brine Well Cavern MIT Guidance (4-hour hydrostatic well test open to the salt formation)

1) The cavern and all piping must be filled, pressured up and stabilized for a period of at least 24 hours prior to testing. If this test requires a packer then casing/tubing annulus must be loaded with inert fluid 24 hours prior to testing.

2) Have manpower and equipment available for pressure test. Wellhead shall be prepared for test and all valves and gauges should be in good working order.

3) Pumps, tanks, external lines etc. must be isolated from the wellhead during test.

4) A continuous recording pressure device with an **8 or 12-hour clock** shall be installed on the casing/tubing annulus. The pressure range shall not be greater than 500 psig. The operator must provide proof that the pressure-recording device has been calibrated within the past 6 months. **Note: Wells with packer installed: If this test requires both the casing/tubing annulus and cavern to be tested then two recording devices must be supplied or one recording device with two pins.**

5) A minimum of one pressure gauge shall be installed on the casing/tubing annulus.

6) OCD must witness the beginning of test (putting chart on) and ending of test (removing chart). Ensure that fluids from the well are not spilled onto the ground.

7) The Operator shall supply the following information on the pressure chart:

   A. Company Name, Well Name, API #, Legal Location.
   B. Test Procedure (1) Casing + Formation (2) Casing Test Only (3) Both (4) Other
   C. Testing Media: Water, Gas, Oil, Etc.
   D. Date, time started and ending.
   E. Name (printed) and signature of company representative and OCD

Inspector

8) **TEST ACCEPTANCE:** The OCD will use the following criteria in determining if a well has passed the Mechanical Integrity Test:

A. **Passes** if Zero Bleed-Off during the test.
B. **Passes** if Final Test Pressure is within ± 1% of Starting Pressure, if approved by the OCD inspector.
C. **Fails** if any Final Test Pressure is greater than ± 1% of Starting Pressure. Operators must investigate for leaks and demonstrate that mechanical integrity of the well(s) by ensuring there are no leaks in the tubing, casing, or packer, and injected/produced fluids are confined within the piping and injection zones. Wells shall not resume operations until approved by OCD. Caution is urged to reduce pressure appropriately as a function of depth to the salt cavern to prevent fracturing during testing.

Note: OCD recognizes that different operations, well designs, formation characteristics and field conditions may cause variations in the above procedures. If operator wishes to make or anticipate changes please notify the OCD for approval. All operators are responsible to notify OCD of any procedure that may cause harm to the well system or formation. Please be advised that OCD approval does not relieve any operator of liability should operations result in pollution of surface water, groundwater, or the environment.

Also note: This document is intended to provide technical guidance to operators on technical means to achieve compliance with the rules and regulations of the Oil Conservation Division and the Oil and Gas Act. The test procedures set forth are not regulations or policies and therefore other methods may exist to achieve compliance with the rules and regulations and the Oil and Gas Act.

OCD recommends that a licensed professional engineer or licensed geologist, or a licensed professional engineer or licensed geologist designee supervise all test procedures and associated field activity.

Reply to: (785) 296-7254 FAX (785) 296-5509
Bureau of Water - Geology Section
1000 S. W. Jackson, Ste. 420
Topeka, KS 66612-1367

NITROGEN/BRINE INTERFACE MECHANICAL INTEGRITY TEST (MIT)
PART I: CASING (INTERNAL) MIT
PART II: CAVERN (EXTERNAL) MIT

Procedure #: UICLPG-20
(6/11)

~~Narrative:~~

K.A.R. 28-45-16 requires that each well and each cavern be tested for integrity every five years. The nitrogen/brine interface test is designed to evaluate the internal (well) mechanical integrity and/or the external (cavern) mechanical integrity. The MIT procedure consists of filling the cavern with brine and then injecting nitrogen into the well and establishing an interface at a depth appropriate for either a well or cavern test. The nitrogen test pressure should be equal to the maximum allowable operating pressure gradient based on the casing seat. The interface, temperature and pressure data are used to calculate the pre-test and post-test nitrogen volumes. Comparison of the pre-test and post-test nitrogen volumes and movement of the nitrogen/brine interface are used to evaluate the well/cavern integrity.

TEST PROCEDURE SUMMARY
NITROGEN/BRINE INTERFACE MECHANICAL INTEGRITY TEST (MIT)
PART I: CASING (INTERNAL) MIT
PART II: CAVERN (EXTERNAL) MIT

All nitrogen/brine mechanical integrity tests must be conducted by a party that has experience in conducting this type of test due to the complexity of the test and associated safety requirements. The test contractor must have knowledge of: 1) the pressure rating of the well and wellhead components; 2) the use of dead-weight tests or calibrated data loggers to verify brine and nitrogen pressure; 3) methods to track the volume of nitrogen injected before and during the test; 4) differential pressure monitoring to prevent collapse of the tubing; and 5) a working knowledge of other procedural tasks that ensure a viable and safe test.

The permittee is responsible for verifying that the party/company contracted to conduct the mechanical integrity test has experience and is qualified to conduct the test in a safe manner. Failure to follow test procedure and failure to submit any supporting data required by KDHE may result in the test being considered invalid by KDHE. An invalid test will not meet the regulatory requirement.

Submit a test plan as specified in Procedure #UICLPG-21 to KDHE for review and approval at least 30 days prior to test commencement. Do not commence test operations until approval for the plan is received from the Kansas Department of Health and Environment (KDHE).

TEST PREPARATION:

- Certify that pressure ratings of the wellhead and the tubulars are adequate for the test pressures.
- Visually inspect the wellhead.
- Ensure fittings are adequate to facilitate wireline equipment, nitrogen injection, and pressure instrumentation. Install an accurate electronic pressure recording system on the well's annulus and brine tubing.
- Remove all product (feasible) from the cavern prior to conducting the test.
- Note the presence of any product in the annulus.
- Coordinate the test time with KDHE so that KDHE may have the opportunity to witness the test.

PRE-PRESSURIZATION: (Typically for cavern test)

Prepressure the cavern with brine prior to nitrogen injection, if necessary. The compressibility of the cavern and the volume of nitrogen to be injected must be considered (estimated) in calculating the pressure required prior to nitrogen injection.

1. Record the volume of fluid injected and the rate of pressurization. The fluid used for pre-pressuring should be saturated brine. The rate of pressurization typically should not exceed 2.5 psi/min. The casing seat pressure is not to exceed the regulatory MAOP of either 0.75 or 0.8 psi/ft. K.A.R. 28-45-12 requires that a wellhead be equipped with a continuous pressure monitoring system that is capable of maintaining a pressure history before the well can be operated with a MAOP greater than 0.75 psi/ft. The well should be tested at the MAOP allowed by regulation.
2. Record the tubing and annulus pressures.
3. Monitor the cavern pressure until the rate of pressure change is 10 psi/day or less. Stabilization period must be a minimum of 24 hours.

PRE-NITROGEN INJECTION:

4. Check with nitrogen supplier for the nitrogen volume required for equipment "cool down".
5. Nitrogen must be measured with a meter. Connect pressure and flow recording equipment to the wellhead so that accurate nitrogen pressure and volume data can be obtained for the test analysis.
6. Prior to nitrogen injection, conduct a temperature survey (base log) from the surface to 50 ft below the expected nitrogen interface for the casing or cavern MIT.
7. Conduct a density survey from 50 feet below the lowest expected nitrogen interface to 50 feet above the uppermost. Note the location of any product present in the annulus. Optimal logging speed for the density log is approximately 15 – 20 ft/min. Subsequent logging runs with the density tool should be at approximately the same speed as the initial logging run for accuracy and correlation purposes.

PART I: CASING TEST

NITROGEN INJECTION:

8. Inject nitrogen into the annulus between the cemented casing and the hanging string at a constant rate and at (approximately) the same temperature indicated by the temperature log. Measure nitrogen with a nitrogen meter.
9. Position the logging tools at regular depth intervals and record the annulus, brine pressure, nitrogen temperature and time as the nitrogen interface passes.
10. Terminate nitrogen injection when the interface depth is just above the casing seat (if this is the only interval being tested). If multiple intervals are to be tested, test shallow intervals before testing the deep intervals.
11. If a single test interval is used to test the casing, use the following formula to calculate the time required to achieve a minimum detectable leak rate (MDLR), or test sensitivity, of less than 100 barrels of nitrogen per year.

$$T = \frac{V * R * 365 days / year * 24 hours / day}{100 bbls / year}$$

T = Duration of test in hours
V = Unit annular volume of casing, bbls/ft
R = Resolution of the interface tool in feet
Note: reference programs or tables and show calculations for converting weight or volume (SCF) of nitrogen to barrels (bbls) of nitrogen.

The test duration may be shortened if a leak is identified.

A one-hour casing test may be conducted if it is followed by a cavern nitrogen/brine interface test. The minimum test duration for the cavern test is 24 hours.

12. Record the time, nitrogen pressure, tubing pressure and the interface depth. Initialize the test for the calculated test duration.
13. At the end of the test, relog the interface depth with the density tool and record the surface pressures. Down-hole movement of the interface may indicate that the test length should be extended.
14. If the nitrogen interface test is being run on the casing only, run a final temperature log.
15. Any up-hole movement of the interface accompanied by a loss in nitrogen pressure indicates nitrogen is being lost from that portion of the casing in contact with the nitrogen. Any interface movement greater than the resolution of the tool should be explained. If a leak is located in the casing above the interface depth, the interface may move up hole to the location of the leak. If multiple leaks are present in the casing, the interface may rise to the location of the greatest leak, however, conclusive determination of the leak location may not be possible.

If the casing test is not followed by a cavern test, calculate the MDLR and the CNLR.

16. Calculate the minimum detectable leak rate (MDLR):

$$\text{MDLR (bbls/yr)} = \frac{V * R * 365 days / year}{T}$$

V = Unit volume of borehole, bbls/ft
R = Resolution of the interface tool, ft
T = Duration of test, days

17. Calculate the nitrogen leak rate (CNLR). Submit supporting data for determination of nitrogen volume (charts, conversion tables, weight measurements, mass-balance calculations accounting for temperature and pressure, source for values used in equation, data from software packages, etc)

$$\text{CNLR (bbls/day)} = \frac{1}{T}\left[(VS) - \frac{(PF)(VF)}{(PS)}\right]$$

CNLR = Calculated nitrogen leak rate
T = test duration, days
VS = nitrogen volume at test start (bbls)
VF = nitrogen volume at test finish (bbls)
PS = nitrogen pressure at the test start (psia)
PF = nitrogen pressure at test finish (psia)
CNLR (bbls/yr) = CNLR (bbls/day) * 365 days/year

Pass/fail criteria: The MDLR must be less than 100 barrels of nitrogen per year.
The CNLR must be less than the MDLR to demonstrate integrity.

PART II: CAVERN TEST

1. Resume the nitrogen injection and monitor the interface location with the logging tools. Record the time and surface pressures as the interface crosses the casing seat.
2. Spot the nitrogen below the casing seat and terminate the nitrogen injection.
3. Calculate the initial nitrogen volume at the start of the test. Submit formulas (PVT) and calculations used to determine nitrogen volume. The unit volume of the borehole can be determined from casing and tubing sizes. The open-hole volume below the casing seat may be determined with a sonar survey. Another method for determining the annular or borehole unit volume is as follows:

Pump a finite volume of nitrogen into the annulus and log the interface.

Calculate unit volume:

$$\left[\frac{nitrogen(bbls)}{depth(ft)}\right]$$ Nitrogen pumped/change in interface depth

4. Run the post-nitrogen injection density survey to log the nitrogen interface.
5. Record the nitrogen and brine wellhead pressures.
6. Conduct a temperature survey over the test interval.
7. The test length is typically not less than 24 hours. Monitor the brine and nitrogen wellhead pressures during the test period. The test duration should ensure that the leak rate can be resolved with the accuracy of the instrumentation used.
8. At the end of the test, record the final brine and nitrogen wellhead pressures.
9. Run a density survey to determine if the nitrogen interface has moved. Down-hole movement of the interface may indicate that the test length should be extended.
10. Run a final temperature log over the test interval.
11. Calculate the final nitrogen volume. Submit formulas (PVT) and calculations used to determine nitrogen volume. Accurate nitrogen volume is necessary to determine if pressure changes were affected by temperature, salt leaching, salt creep or from volume loss in the cavern system.
12. Calculate the minimum detectable leak rate (MDLR).

$$\text{MDLR (bbls/yr)} = \frac{V * R * 365 days / year}{T}$$

V = Unit volume of borehole, bbls/ft
R = Resolution of the interface tool, ft
T = Duration of test, days

Pass/fail criteria: The MDLR must be less than 1000 barrels of nitrogen per year.
The CNLR must be less than the MDLR to demonstrate integrity.

13. Calculate the nitrogen leak rate (CNLR):

$$\text{CNLR (bbls/day)} = \frac{1}{T}\left[(VS) - \frac{(PF)(VF)}{(PS)}\right]$$

CNLR = Calculated nitrogen leak rate
T = test duration, days
VS = nitrogen volume at test start (bbls)
VF = nitrogen volume at test finish (bbls)
PS = nitrogen pressure at the test finish (psia)
PF = nitrogen pressure at test start (psia)
CNLR (bbls/yr) = CNLR (bbls/day) * 365 days/year

<u>References:</u>

Mechanical Integrity Test-Nitrogen Interface Method; SMRI Short Course; Spring 1998 Meeting
Goin, Kennith L., 1983, A Plan For Certification and Related Activities For The Department of Energy Strategic Petroleum Reserve Oil Storage Caverns: SPR Geotechnical Division 6257, Sandia National Laboratories, Albuquerque, New Mexico
McDonald, Larry K., Nitrogen Leak-Rate Testing; Subsurface Technology, Inc.: 2003 KDHE/KCC Underground Liquid Hydrocarbon and Natural Gas Cavern Well Technology Fair
Joe Ratigan, PB Energy Storage Services, Inc., Rapid City, South Dakota

From: O"Brien, Jessica L.
To: Goetze, Phillip, EMNRD
Cc: Martinez, Patricia L, EMNRD; Kautz, Paul, EMNRD; Chavez, Carl J, EMNRD
Subject: RE: [EXTERNAL] RE: Jal Cavern #1 - Project Updates
Date: Friday, February 25, 2022 8:20:24 AM
Attachments: image001.png
image002.png
image003.png
image004.png

Good Morning Mr. Goetze,
Thank you for sending me this update. I want to make you aware that Marathon did proceed with the proposed annual pressure test using the Brine Hydrostatic Test Method on January 27, 2022. The test was completed on January 28, 2022. I received the report from our third party last week and have submitted a subsequent C-103 to communicate such results.

Recent Actions

All Actions in the last month (5 items)

20 Rows

Action Id	Type	Status	Status Date
84211	[C-103] Sub General Sundry	SUBMITTED	02/25/2022

I've attached here for your reference and included the executive summary below:

Brine MIT Report – Marathon Petroleum Company, LP
State LPG Storage Well No. 001

Executive Summary

Lonquist Field Services, LLC was contracted by Marathon Petroleum Company, LP ("Marathon") to conduct a Brine Mechanical Integrity Test on State LPG Storage Well No. 001 ("Well No. 1"), operated by Marathon Petroleum Company, LP at the Jal Station Field in Lea County, New Mexico. The Brine Hydrostatic Test Method was used for this test. Brine was injected down the 5-1/2" x 3-1/2" annulus from January 24th, 2022 to January 27th, 2022 to pre-pressure the cavern to the test gradient. The Brine MIT was initialized on January 28th, 2022 at 7:50 with an annulus pressure of 363.47 psig. The test was finalized 4 hours later with an annulus pressure of 363.17 psig. The resulting pressure loss was 0.3 psi or 0.08% loss over the 4 hours. This pressure loss was less than the requirement of 1% by the Oil Conservation Division of New Mexico, "NM OCD". The well was tested to a test gradient of 0.76 psi/ft at the 7" cemented casing shoe (1,521'). Considering these results and the guidelines set forth by the NM OCD, Well No. 1 at the Jal Station Field, at the time of this test, demonstrated the mechanical integrity required for the storage of hydrocarbons.

Please let me know if you would like to discuss further any details of this report or have questions.

Respectfully,

Jessica O'Brien
Environmental Manager (Permian/Rockies/NGP)
MPLX Gathering & Processing
19100 Ridgewood Parkway
6th Floor, 6C034
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Office: 210.626.7774
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Email: jobrien@marathonpetroleum.com

From: Goetze, Phillip, EMNRD <Phillip.Goetze@state.nm.us>
Sent: Thursday, February 24, 2022 10:32 AM
To: O'Brien, Jessica L. <JOBrien@Marathonpetroleum.com>
Cc: Martinez, Patricia L, EMNRD <Patricia.L.Martinez@state.nm.us>; Kautz, Paul, EMNRD <paul.kautz@state.nm.us>; Chavez, Carl J, EMNRD <CarlJ.Chavez@state.nm.us>
Subject: RE: [EXTERNAL] RE: Jal Cavern #1 - Project Updates

Good morning, Ms. O'Brien. The UIC group has not forgotten this pending NOI, but we are considering the NOI along with the ongoing effort of the other two Jal LPG facilities operated by Marathon. We are attempting to process this NOI in the next few weeks and will contact you with any requests should the review result in question on the procedures. PRG

From: O'Brien, Jessica <JOBrien@Marathonpetroleum.com>
Sent: Tuesday, January 11, 2022 2:25 PM
To: Goetze, Phillip, EMNRD <Phillip.Goetze@state.nm.us>
Cc: Martinez, Patricia L, EMNRD <Patricia.L.Martinez@state.nm.us>; Kautz, Paul, EMNRD <paul.kautz@state.nm.us>
Subject: FW: [EXTERNAL] RE: Jal Cavern #1 - Project Updates

Good afternoon Mr. Goetze,
I was hoping you could help me follow-up on the approval of the proposed test plan. I realize that OCD has made some organizational & role changes since we submitted this testing plan so I've copied Patricia & Paul.

Marathon would like to proceed with this plan if NM OCD approves. Below is the Action ID from the E-Permitting system.

61902	[C-103] NOI General Sundry	SUBMITTED	11/15/2021

Please feel free to contact me if you need further information on this request.

Thanks,

Jessica O'Brien
Environmental Supervisor (Permian/Rockies/NGP)
MPLX Gathering & Processing
19100 Ridgewood Parkway
6th Floor, 6C034
San Antonio, TX 78259
Office: 210.626.7774
Mobile: 409.454.3777
Email: jobrien@marathonpetroleum.com

Submit 1 Copy To Appropriate District Office
District I – (575) 393-6161
1625 N. French Dr., Hobbs, NM 88240
District II – (575) 748-1283
811 S. First St., Artesia, NM 88210
District III – (505) 334-6178
1000 Rio Brazos Rd., Aztec, NM 87410
District IV – (505) 476-3460
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy, Minerals and Natural Resources

OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-103
Revised July 18, 2013

WELL API NO. 30-025-35954

5. Indicate Type of Lease STATE ☐ FEE ☐

6. State Oil & Gas Lease No.

SUNDRY NOTICES AND REPORTS ON WELLS
(DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT" (FORM C-101) FOR SUCH PROPOSALS.)

7. Lease Name or Unit Agreement Name: State LPG Storage Well

1. Type of Well: Oil Well ☐ Gas Well ☐ Other LPG Storage

8. Well Number #001

2. Name of Operator: Western Refining Company, LP

9. OGRID Number: 248440

3. Address of Operator: 19100 Ridgewood Parkway, San Antonio, TX 78259

10. Pool name or Wildcat: Salado

4. Well Location
Unit Letter M : 450 feet from the South line and 780 feet from the North line
Section 32 Township 23S Range 37E NMPM Lea County

11. Elevation *(Show whether DR, RKB, RT, GR, etc.)*

12. Check Appropriate Box to Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:		SUBSEQUENT REPORT OF:	
PERFORM REMEDIAL WORK ☐	PLUG AND ABANDON ☐	REMEDIAL WORK ☐	ALTERING CASING ☐
TEMPORARILY ABANDON ☐	CHANGE PLANS ☐	COMMENCE DRILLING OPNS. ☐	P AND A ☐
PULL OR ALTER CASING ☐	MULTIPLE COMPL ☐	CASING/CEMENT JOB ☐	
DOWNHOLE COMMINGLE ☐			
CLOSED-LOOP SYSTEM ☐			
OTHER: ☐		OTHER: MIT Test Report ☐	

13. Describe proposed or completed operations. (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work). SEE RULE 19.15.7.14 NMAC. For Multiple Completions: Attach wellbore diagram of proposed completion or recompletion.

Purpose: Pressure Test (with Brine) as a verification of cavern integrity of LPG Storage Well #1
Date Work completed: January 27 – 28, 2022
Test Detail: Marathon submits the attached MIT test report that confirms integrity of Well No. 1 as determined by Hydrostatic Brine Test and requests to place it in monitoring status for 1 year.

See attachment for test results.

Spud Date: Rig Release Date:

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNATURE Jessica O'Brien TITLE **Environmental Supervisor** DATE **February 25, 2022**

Type or print name Jessica O'Brien E-mail address: jobrien@marathonpetroleum.com PHONE: (409) 454-3777

For State Use Only

APPROVED BY: Carl J. Chavez TITLE Environmental Engineer DATE 02/25/2022

Conditions of Approval (if any):

Brine Mechanical Integrity Test Report
State LPG Storage Well No. 001
Operator: Marathon Petroleum Company, LP
API: 30-025-35954
Jal Station Field
Lea County, New Mexico, USA

Prepared for:

Marathon Petroleum Company, LP

By:

Lonquist Field Service, LLC
Texas Registered Firm No. F-9147
Houston, Texas

February 2022

Executive Summary

Lonquist Field Services, LLC was contracted by Marathon Petroleum Company, LP ("Marathon") to conduct a Brine Mechanical Integrity Test on State LPG Storage Well No. 001 ("Well No. 1"), operated by Marathon Petroleum Company, LP at the Jal Station Field in Lea County, New Mexico. The Brine Hydrostatic Test Method was used for this test. Brine was injected down the 5-1/2" x 3-1/2" annulus from January 24th, 2022 to January 27th, 2022 to pre-pressure the cavern to the test gradient. The Brine MIT was initialized on January 28th, 2022 at 7:50 with an annulus pressure of 363.47 psig. The test was finalized 4 hours later with an annulus pressure of 363.17 psig. The resulting pressure loss was 0.3 psi or 0.08% loss over the 4 hours. This pressure loss was less than the requirement of 1% by the Oil Conservation Division of New Mexico, "NM OCD". The well was tested to a test gradient of 0.76 psi/ft at the 7" cemented casing shoe (1,521'). Considering these results and the guidelines set forth by the NM OCD, Well No. 1 at the Jal Station Field, at the time of this test, demonstrated the mechanical integrity required for the storage of hydrocarbons.

CERTIFIED BY:
LONQUIST FIELD SERVICE, LLC
Texas Registration No. 9147

William H. George, P.E.
Principal Engineer

Date Signed: February 15th, 2022
Austin, Texas

Table of Contents

Introduction

Lonquist Field Service, LLC was contracted by Marathon Petroleum Company, LP to conduct a Brine Mechanical Integrity Test on State LPG Storage Well No. 001 ("Well No. 1") at the Jal Station Field in Lea County, New Mexico.

Well No. 1 was tested using the Hydrostatic Brine Test Method. Typically this procedure begins with the initial injection in 10 ppg brine into the cavern system to bring the pressure at the casing shoe to the desired testing gradient. This injection can continue until the cavern is deemed to be stable. A pressure recorder is then set up to record the pressure over a 4 hour period. The requirement by the NM OCD is that the pressure loss is less than 1 percent.

The following report will outline the brine mechanical integrity test for Well No. 1. The report includes the cavern and wellbore configuration and pressure records completed during the test.

Summary

On January 24th, 2022 at 08:30, the brine pump was rigged up to the 5-1/2" x 3-1/2" annulus. The beginning annuls pressure was 345 psig. Then 280 bbls of 10 ppg brine was injected down the annulus to bring the pressure up to 400 psig. On January 25th, 2022 the pressure had dropped 10 psi. The brine pump was rigged up and 70 bbls of brine was injected to bring the annulus pressure from 390 psig to 400 psig. The well was allowed to stabilize over a day and on January 27th, 2022, 5 more bbls of brine was injected to bring the annulus pressure from 358 psig to 362 psig.

The cavern was deemed to be stable and on January 28th, 2022 the brine MIT was performed. The test was initialized at 7:50 with an annulus pressure of 363.47 psig with a 0.76 psi/ft gradient at the 7" production casing shoe. The test was finalized at 11:50 with an annulus pressure of 363.17 psig and a 0.76 psi/ft gradient. The resultant pressure loss was 0.3 psi. The pump and equipment was rigged down, the well secured and turned back over to Marathon.

Conclusions

The mechanical integrity of Well No. 1 was established with the Hydrostatic Brine Test Method. This test monitored the pressure loss of the brine full cavern over 4 hours. Well No. 1 was initialized with an annulus pressure of 363.47 psig and a test gradient of 0.76 psi/ft.

Well No. 1 was finalized with an annulus pressure of 363.17 psig and a test gradient of 0.76 psi/ft. Well No. 1 had a test length of 4 hours and maintained the 0.76 psi/ft gradient at the 7" production casing shoe.

The resulting pressure loss was 0.3 psi over the test period. This is a 0.08% pressure loss from the initial pressure of 363.47 psig. The pressure loss is less than the requirement of 1% by the Oil Conservation Division of New Mexico, "NM OCD". The well was tested to a test gradient of 0.76 psi/ft at the 7" cemented casing shoe (1,521').

At the completion of this test, Well No. 1 exhibited the characteristics of a well that has mechanical integrity as required for hydrocarbon storage, in accordance with the guidelines established by the Oil Conservation Division of New Mexico.

Calculations

Pressure Loss Percentage

$$\boldsymbol{P_{\%} = \frac{P_I - P_F}{P_I} * 100\%}$$

Where

$P_{\%}$ = Percent Pressure Loss (%)

P_I = Initial Pressure (psig)

P_F = Final Pressure (psig)

$$\boldsymbol{P_{\%} = \frac{363.47 - 363.17}{363.47} * 100\%}$$

$P_{\%}$ = 0.08%

Gradient at Casing Shoe

$$\boldsymbol{G_P = \frac{P_S + (D_{CS} * 0.052 * W_B)}{D_{CS}}}$$

Where

G_P = Pressure Gradient (psi/ft)

P_S = Surface Pressure (psig)

D_{CS} = Depth of Casing Shoe (ft)

W_B = Weight of Brine (ppg)

Gradient at Initialization:

$$\boldsymbol{G_P = \frac{363.47 + (1,521 * 0.052 * 10)}{1,521}}$$

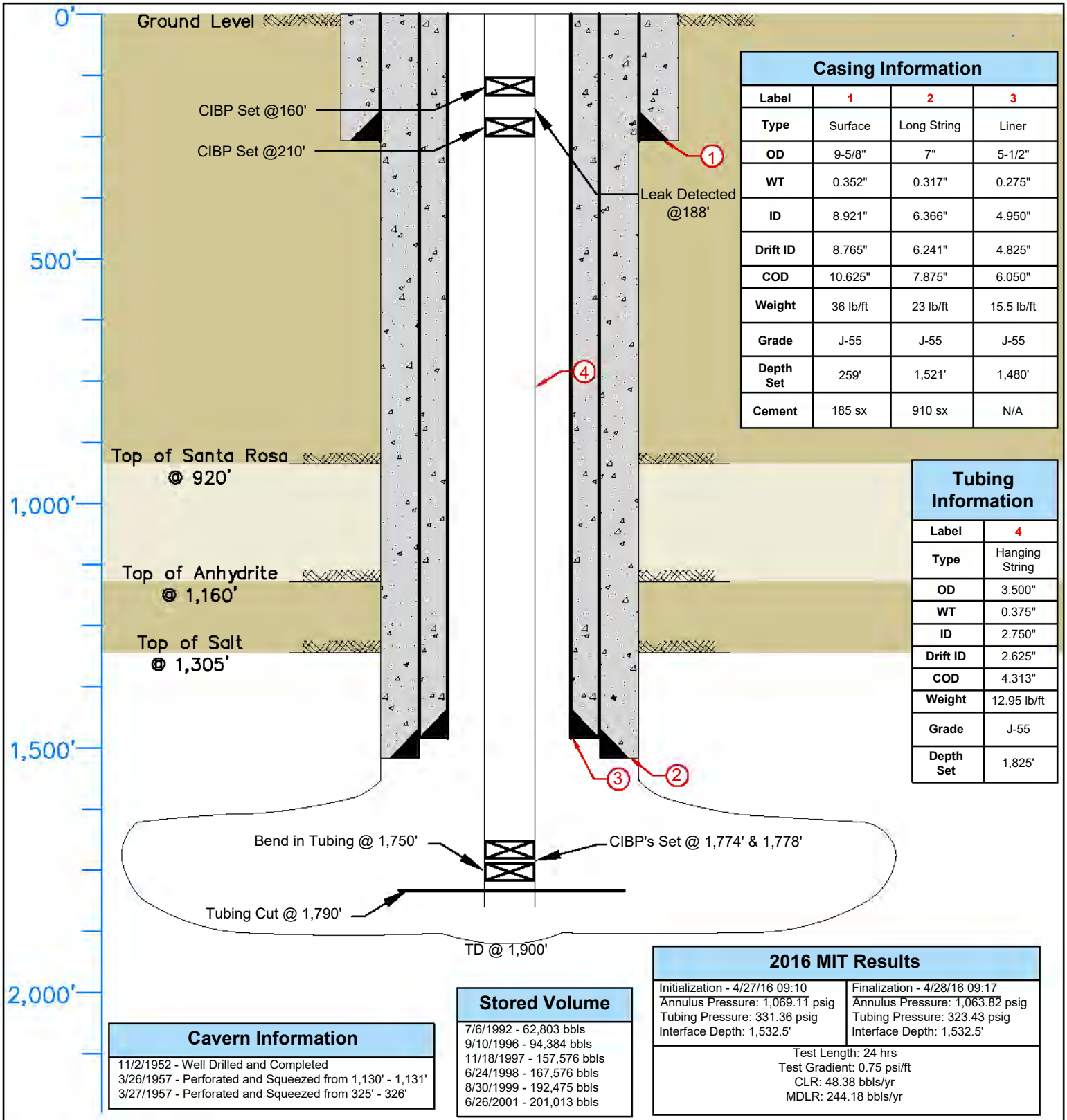
G_P = 0.76 psi/ft

Gradient at Finalization:

$$\boldsymbol{G_P = \frac{363.17 + (1,521 * 0.052 * 10)}{1,521}}$$

G_P = 0.76 psi/ft

MIT/Well Schematic



Casing Information

Label	1	2	3
Type	Surface	Long String	Liner
OD	9-5/8"	7"	5-1/2"
WT	0.352"	0.317"	0.275"
ID	8.921"	6.366"	4.950"
Drift ID	8.765"	6.241"	4.825"
COD	10.625"	7.875"	6.050"
Weight	36 lb/ft	23 lb/ft	15.5 lb/ft
Grade	J-55	J-55	J-55
Depth Set	259'	1,521'	1,480'
Cement	185 sx	910 sx	N/A

Tubing Information

Label	4
Type	Hanging String
OD	3.500"
WT	0.375"
ID	2.750"
Drift ID	2.625"
COD	4.313"
Weight	12.95 lb/ft
Grade	J-55
Depth Set	1,825'

Cavern Information

11/2/1952 - Well Drilled and Completed
3/26/1957 - Perforated and Squeezed from 1,130' - 1,131'
3/27/1957 - Perforated and Squeezed from 325' - 326'

Stored Volume

7/6/1992 - 62,803 bbls
9/10/1996 - 94,384 bbls
11/18/1997 - 157,576 bbls
6/24/1998 - 167,576 bbls
8/30/1999 - 192,475 bbls
6/26/2001 - 201,013 bbls

2016 MIT Results

Initialization - 4/27/16 09:10	Finalization - 4/28/16 09:17
Annulus Pressure: 1,069.11 psig	Annulus Pressure: 1,063.82 psig
Tubing Pressure: 331.36 psig	Tubing Pressure: 323.43 psig
Interface Depth: 1,532.5'	Interface Depth: 1,532.5'

Test Length: 24 hrs
Test Gradient: 0.75 psi/ft
CLR: 48.38 bbls/yr
MDLR: 244.18 bbls/yr

LONQUIST FIELD SERVICE
HOUSTON | CALGARY
AUSTIN | WICHITA | DENVER
Texas License F-9147
12912 Hill Country Blvd., Suite F-200
Austin, Texas 78738
Tel: 512.732.9812
Fax: 512.732.9816

Marathon Petroleum Company

State LPG Well No. 1

Country: USA	**State/Province:** New Mexico	**County/Parish:** Lea
Survey/STR: M-32-23S-37E	**Site:** Jal, NM	**Status:** Active Storage
API No.: 30-025-35954	**Field:** Langlie Mattix	**Ground Elevation:** 3,312'
Serial No.:	**Project No:**	**Date:** 1/19/21
Drawn: WHG	**Reviewed:**	**Approved:** WHG
Rev No:	**Notes:**	

Appendix A – MIT Test Procedure

Well: Well No. 1	**State:** New Mexico	**County:** Lea	**Field:** Jal Station
API: 30-025-35954	**Operator:** Marathon	**Location:** Jal	**Status:** Active Storage

INTRODUCTION

Well No. 1 is operated by Marathon Petroleum Company LP (MPC) located in the Jal Station Field in Lea County, New Mexico. The purpose of this Mechanical Integrity Test (MIT) is to test the integrity of the underground storage system that includes the cavern, cemented casing, and wellhead to determine if the system demonstrates the mechanical integrity required to support monitoring status for one year.

In accordance with the Oil Conservation Division of New Mexico, Well No. 1 is undergoing a MIT to remain compliant.

The test procedure includes the following information:

- Contact Information
- Wellbore Schematic
- Historic Sonar Survey

Well: Well No. 1	**State:** New Mexico	**County:** Lea	**Field:** Jal Station
API: 30-025-35954	**Operator:** Marathon	**Location:** Jal	**Status:** Active Storage

Well Preparation

1. *Wellhead should be isolated from all surface piping during the test. This may include blind flanges, skillet flanges, and 2" test flanges.*
    a. *Wellhead should maintain the ability to bleed excess brine pressure during the test.*

2. *Install pressure recording equipment on wellhead. Pressure equipment should be able to record wellhead pressures and wellhead temperatures during the test period.*

Well Injection Phase

3. *Start Brine Injection at a slow rate **(<1 BPM)** until cavern reaches test pressure.*
    a. *The targeted pressure gradient is 0.75 psi/ft at the effective casing shoe and cannot exceed a test pressure gradient of 0.80 psi/ft at the effective casing shoe.*
    b. *With injection of 10 ppg brine, the targeted surface pressure is 350 psi and cannot exceed a surface pressure of 425 psi.*

4. *Repeat Step 3 daily until the cavern pressure has stabilized.*
    a. *Monitor volume of brine required each day to reach test gradient*

Mechanical Integrity Test

5. *Repeat Step 3 to reach the targeted test pressure gradient of 0.75 psi/ft.*
    a. *Surface pressure of 350 psi with injection of 10 ppg brine.*

6. *Shut in the well and record wellbore pressures for 4 hours.*

7. *Complete test calculations based on injection volumes and wellhead pressure measurements.*
    a. *Calculate the stabilized seepage rate (bbl/psi).*
    b. *Calculate the apparent leak rate during the 4 hour test.*

8. *Determine if the test is complete or should be extended based on results.*

Test Reporting

A written report will be prepared within 30 days of completion and submitted to the NMOCD. The report will include the test procedures, test chronology, test results and conclusions, pressure information, and all supporting documentation.

CONTACT INFORMATION

Well Owner

Marathon Petroleum Logistics Services LLC
803 N 300 W
Salt Lake City, UT 84103

- Sam Flessner – Owner's Representative
  - Telephone – (419) 348-4269
  - Email – sjflessner@marathonpetroleum.com

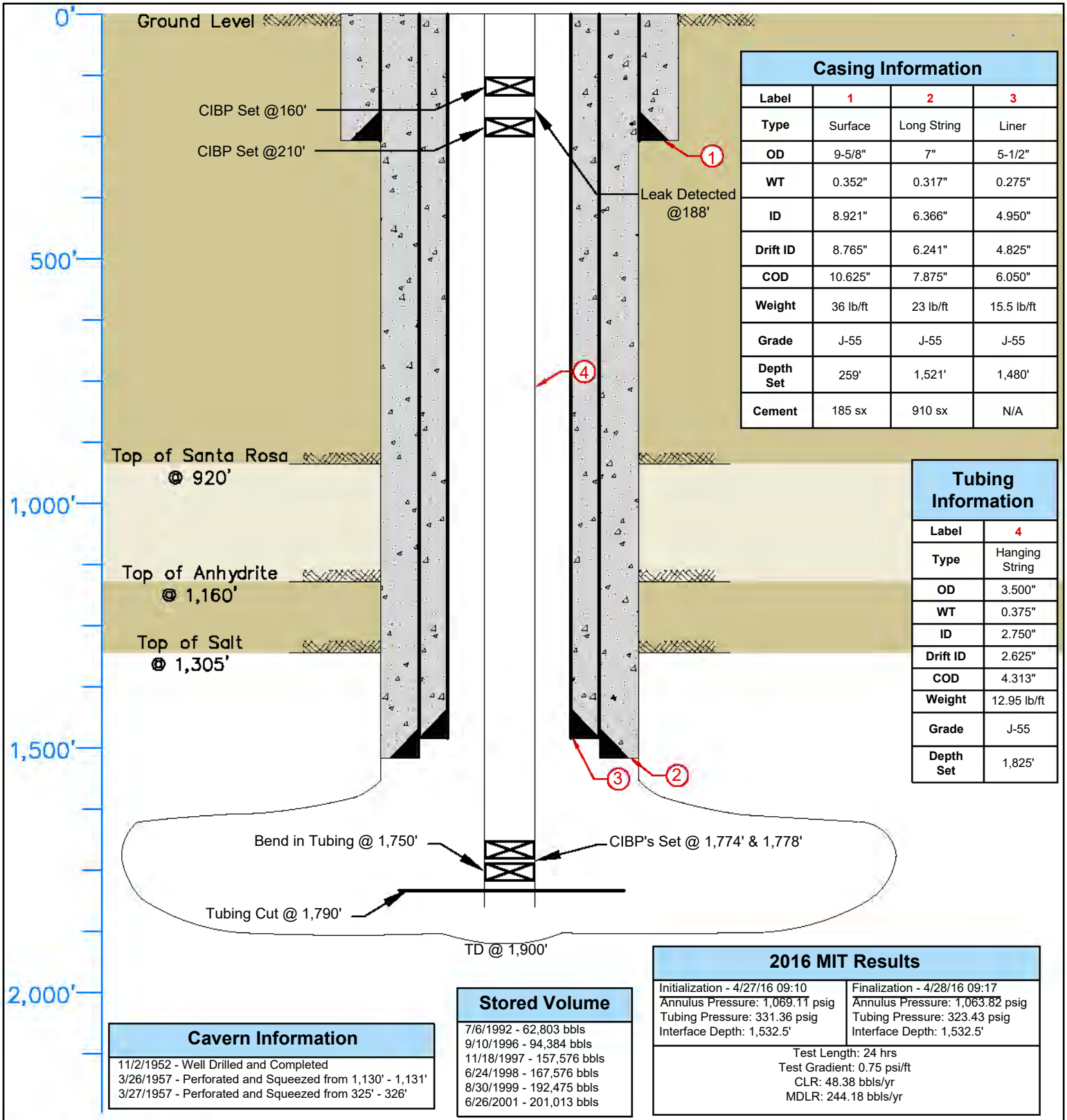
Engineering Consultants

Lonquist Field Service, LLC
1415 Louisiana St., Suite 3800
Houston, Texas 77002

- Richard R. Lonquist, P.E. – Chairman
  - Telephone – (512) 732-9812
  - Fax – (512) 732-9816
  - Email – richard@lonquist.com
- William H. George, P.E. – Principal Engineer / Project Manager
  - Telephone – (512) 787-7478
  - Fax – (512) 732-9816
  - Email – will@lonquist.com

Well: Well No. 1	**State:** New Mexico	**County:** Lea	**Field:** Jal Station
API: 30-025-35954	**Operator:** Marathon	**Location:** Jal	**Status:** Active Storage

Wellbore Schematic



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Marathon Petroleum Company

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Serial No.:	**Project No:**	**Date:** 1/19/21
Drawn: WHG	**Reviewed:**	**Approved:** WHG
Rev No:	**Notes:**	

Historic Sonar Survey

SONARWIRE GLOBAL

P.O. BOX 976
MANVEL, TX 77578
Office: 985-264-7746
Email: sean@empirewireline.com

Survey conducted by: Sean McCool

WESTERN REFINING
JAL, NM
STORAGE WELL NO. 1
APRIL 18, 2008
SONAR THROUGH PIPE SURVEY

Survey from 1521 ft. to 1750 ft.
7 5/8 inch cemented casing at 1521 ft.
3 1/2 inch intermediate pipe at 1807 ft.
Tool sat down at 1750 ft.
Zero sonar tool at B.H.F.
Site personnel: Mr. Jerry Lindt

- Sonar tool could not obtain data below depth 1750 ft. due to a restriction in the tubing.

SONARWIRE GLOBAL, LLC
Depth versus Volume

WESTERN REFINING
STORAGE WELL NO. 1

JAL, NM
Fri, Apr 18, 2008

Depth	Cubic ft. per ft.	Cubic ft. total	Barrels per ft.	Barrels total
1522	1.5	1.5	0.3	0.3
1523	1.6	3.1	0.3	0.6
1524	1.8	4.9	0.3	0.9
1525	2.1	7.0	0.4	1.2
1526	2.3	9.3	0.4	1.7
1527	3.6	13.0	0.6	2.3
1528	5.2	18.2	0.9	3.2
1529	4.5	22.7	0.8	4.0
1530	3.8	26.4	0.7	4.7
1531	3.1	29.6	0.6	5.3
1532	1116.8	1146.3	198.9	204.2
1533	1110.1	2256.5	197.7	401.9
1534	514.8	2771.3	91.7	493.6
1535	145.5	2916.8	25.9	519.5
1536	2.1	2918.8	0.4	519.9
1537	2.4	2921.2	0.4	520.3
1538	2.7	2924.0	0.5	520.8
1539	521.1	3445.1	92.8	613.6
1540	512.9	3958.0	91.3	704.9
1541	506.7	4464.7	90.3	795.2
1542	538.2	5002.9	95.9	891.0
1543	571.2	5574.0	101.7	992.8
1544	561.5	6135.5	100.0	1092.8
1545	552.0	6687.5	98.3	1191.1
1546	1.5	6689.0	0.3	1191.4
1547	546.6	7235.5	97.3	1288.7
1548	519.7	7755.2	92.6	1381.3
1549	493.6	8248.9	87.9	1469.2
1550	476.6	8725.5	84.9	1554.1
1551	460.3	9185.8	82.0	1636.1
1552	453.6	9639.5	80.8	1716.9
1553	447.3	10086.8	79.7	1796.5
1554	447.7	10534.5	79.7	1876.3
1555	448.6	10983.1	79.9	1956.2
1556	455.4	11438.5	81.1	2037.3
1557	462.7	11901.2	82.4	2119.7
1558	434.6	12335.8	77.4	2197.1
1559	408.0	12743.9	72.7	2269.8
1560	378.6	13122.4	67.4	2337.2
1561	352.4	13474.8	62.8	2400.0
1562	310.9	13785.6	55.4	2455.3
1563	273.7	14059.4	48.8	2504.1
1564	234.7	14294.1	41.8	2545.9
1565	199.2	14493.3	35.5	2581.4
1566	295.0	14788.3	52.5	2633.9
1567	418.9	15207.2	74.6	2708.5
1568	411.5	15618.6	73.3	2781.8
1569	404.7	16023.4	72.1	2853.9
1570	351.5	16374.9	62.6	2916.5
1571	302.5	16677.5	53.9	2970.4
1572	333.3	17010.7	59.4	3029.7
1573	366.0	17376.7	65.2	3094.9

WESTERN REFINING JAL, NM
STORAGE WELL NO. 1 Fri, Apr 18, 2008

Depth	Cubic ft. per ft.	Cubic ft. total	Barrels per ft.	Barrels total
1574	425.2	17801.9	75.7	3170.7
1575	489.6	18291.5	87.2	3257.9
1576	397.7	18689.2	70.8	3328.7
1577	315.9	19005.1	56.3	3384.9
1578	249.6	19254.7	44.5	3429.4
1579	193.8	19448.5	34.5	3463.9
1580	127.6	19576.1	22.7	3486.7
1581	81.4	19657.6	14.5	3501.2
1582	29.0	19686.5	5.2	3506.3
1583	3.3	19689.9	0.6	3506.9
1584	3.0	19692.9	0.5	3507.5
1585	2.7	19695.6	0.5	3507.9
1586	2.4	19698.0	0.4	3508.4
1587	2.1	19700.1	0.4	3508.7
1588	1.9	19702.0	0.3	3509.1
1589	46.9	19748.9	8.4	3517.4
1590	160.3	19909.2	28.6	3546.0
1591	420.5	20329.7	74.9	3620.9
1592	928.4	21258.0	165.3	3786.2
1593	254.7	21512.8	45.4	3831.6
1594	2.1	21514.9	0.4	3832.0
1595	2.2	21517.1	0.4	3832.4
1596	2.3	21519.4	0.4	3832.8
1597	2.4	21521.8	0.4	3833.2
1598	2.5	21524.3	0.4	3833.7
1599	2.6	21527.0	0.5	3834.1
1600	2.7	21529.7	0.5	3834.6
1601	2.8	21532.5	0.5	3835.1
1602	2.9	21535.5	0.5	3835.6
1603	683.8	22219.3	121.8	3957.4
1604	535.9	22755.2	95.5	4052.9
1605	407.8	23163.0	72.6	4125.5
1606	216.9	23379.9	38.6	4164.1
1607	96.9	23476.8	17.3	4181.4
1608	30.2	23507.0	5.4	4186.8
1609	1.7	23508.8	0.3	4187.1
1610	187.9	23696.6	33.5	4220.6
1611	682.2	24378.8	121.5	4342.1
1612	671.1	25049.8	119.5	4461.6
1613	662.5	25712.3	118.0	4579.6
1614	675.8	26388.1	120.4	4699.9
1615	689.9	27078.1	122.9	4822.8
1616	695.8	27773.8	123.9	4946.7
1617	702.2	28476.0	125.1	5071.8
1618	646.1	29122.2	115.1	5186.9
1619	592.9	29715.0	105.6	5292.5
1620	483.7	30198.7	86.1	5378.6
1621	386.0	30584.7	68.8	5447.4
1622	279.6	30864.3	49.8	5497.2
1623	192.1	31056.4	34.2	5531.4
1624	58.7	31115.1	10.5	5541.8
1625	2.2	31117.3	0.4	5542.2
1626	1.2	31118.5	0.2	5542.5
1627	1.8	31120.3	0.3	5542.8

WESTERN REFINING JAL, NM
STORAGE WELL NO. 1 Fri, Apr 18, 2008

Depth	Cubic ft. per ft.	Cubic ft. total	Barrels per ft.	Barrels total
1628	2.4	31122.8	0.4	5543.2
1629	3.2	31126.0	0.6	5543.8
1630	4.0	31130.0	0.7	5544.5
1631	5.0	31135.0	0.9	5545.4
1632	5.0	31139.9	0.9	5546.3
1633	5.0	31144.9	0.9	5547.1
1634	5.0	31149.9	0.9	5548.0
1635	5.0	31154.9	0.9	5548.9
1636	5.0	31159.8	0.9	5549.8
1637	5.0	31164.8	0.9	5550.7
1638	5.0	31169.8	0.9	5551.6
1639	5.0	31174.8	0.9	5552.5
1640	5.0	31179.7	0.9	5553.4
1641	5.0	31184.7	0.9	5554.2
1642	5.0	31189.7	0.9	5555.1
1643	5.0	31194.7	0.9	5556.0
1644	5.0	31199.7	0.9	5556.9
1645	5.0	31204.6	0.9	5557.8
1646	5.0	31209.6	0.9	5558.7
1647	5.0	31214.6	0.9	5559.6
1648	5.0	31219.6	0.9	5560.4
1649	5.0	31224.6	0.9	5561.3
1650	5.0	31229.5	0.9	5562.2
1651	5.0	31234.5	0.9	5563.1
1652	5.0	31239.5	0.9	5564.0
1653	5.0	31244.5	0.9	5564.9
1654	5.0	31249.5	0.9	5565.8
1655	5.0	31254.5	0.9	5566.7
1656	5.0	31259.4	0.9	5567.5
1657	1390.7	32650.1	247.7	5815.2
1658	1345.4	33995.5	239.6	6054.9
1659	1293.3	35288.8	230.4	6285.2
1660	1244.1	36533.0	221.6	6506.8
1661	1257.6	37790.6	224.0	6730.8
1662	1272.4	39063.0	226.6	6957.4
1663	1241.1	40304.1	221.1	7178.5
1664	1212.2	41516.3	215.9	7394.4
1665	1143.4	42659.7	203.7	7598.0
1666	1083.4	43743.1	193.0	7791.0
1667	1065.7	44808.9	189.8	7980.8
1668	1051.3	45860.1	187.2	8168.0
1669	961.9	46822.1	171.3	8339.4
1670	880.6	47702.7	156.8	8496.2
1671	851.6	48554.2	151.7	8647.9
1672	827.7	49381.9	147.4	8795.3
1673	1078.5	50460.4	192.1	8987.4
1674	1369.6	51830.0	243.9	9231.3
1675	1215.7	53045.6	216.5	9447.8
1676	1077.5	54123.1	191.9	9639.7
1677	1074.9	55198.0	191.4	9831.2
1678	1073.0	56271.0	191.1	10022.3
1679	1080.8	57351.8	192.5	10214.8
1680	1089.9	58441.7	194.1	10408.9
1681	1037.1	59478.8	184.7	10593.6

WESTERN REFINING JAL, NM
STORAGE WELL NO. 1 Fri, Apr 18, 2008

Depth	Cubic ft. per ft.	Cubic ft. total	Barrels per ft.	Barrels total
1682	1001.6	60480.4	178.4	10772.0
1683	1270.7	61751.1	226.3	10998.3
1684	1602.7	63353.8	285.4	11283.8
1685	1252.7	64606.5	223.1	11506.9
1686	989.6	65596.1	176.3	11683.2
1687	1079.2	66675.4	192.2	11875.4
1688	1205.1	67880.4	214.6	12090.0
1689	369.3	68249.8	65.8	12155.8
1690	14.6	68264.3	2.6	12158.4
1691	14.8	68279.1	2.6	12161.0
1692	15.3	68294.4	2.7	12163.8
1693	564.6	68859.0	100.6	12264.3
1694	1909.7	70768.7	340.1	12604.5
1695	2025.5	72794.2	360.8	12965.2
1696	2147.3	74941.5	382.5	13347.7
1697	2129.0	77070.6	379.2	13726.9
1698	2112.0	79182.6	376.2	14103.0
1699	2165.4	81348.0	385.7	14488.7
1700	2221.3	83569.3	395.6	14884.3
1701	2260.2	85829.4	402.6	15286.9
1702	2303.3	88132.7	410.2	15697.1
1703	2461.6	90594.4	438.4	16135.6
1704	2626.5	93220.8	467.8	16603.4
1705	2601.9	95822.8	463.4	17066.8
1706	2579.2	98402.0	459.4	17526.2
1707	2646.6	101048.6	471.4	17997.5
1708	2717.0	103765.6	483.9	18481.5
1709	2722.7	106488.3	484.9	18966.4
1710	2729.7	109218.0	486.2	19452.6
1711	2621.3	111839.3	466.9	19919.4
1712	2517.5	114356.7	448.4	20367.8
1713	2294.7	116651.5	408.7	20776.5
1714	2084.7	118736.2	371.3	21147.8
1715	2024.2	120760.3	360.5	21508.3
1716	1965.2	122725.5	350.0	21858.4
1717	1905.0	124630.5	339.3	22197.6
1718	1846.4	126476.9	328.9	22526.5
1719	1816.0	128292.9	323.4	22849.9
1720	1787.2	130080.1	318.3	23168.3
1721	1722.7	131802.8	306.8	23475.1
1722	1663.6	133466.4	296.3	23771.4
1723	1638.7	135105.1	291.9	24063.3
1724	1620.9	136726.0	288.7	24351.9
1725	1490.8	138216.7	265.5	24617.5
1726	1371.1	139587.8	244.2	24861.7
1727	1469.0	141056.8	261.6	25123.3
1728	1577.1	142633.9	280.9	25404.2
1729	1935.5	144569.4	344.7	25748.9
1730	2344.2	146913.6	417.5	26166.4
1731	2817.4	149730.9	501.8	26668.2
1732	3362.3	153093.2	598.8	27267.1
1733	1931.9	155025.1	344.1	27611.2
1734	895.3	155920.4	159.5	27770.6
1735	252.5	156173.0	45.0	27815.6

WESTERN REFINING JAL, NM
STORAGE WELL NO. 1 Fri, Apr 18, 2008

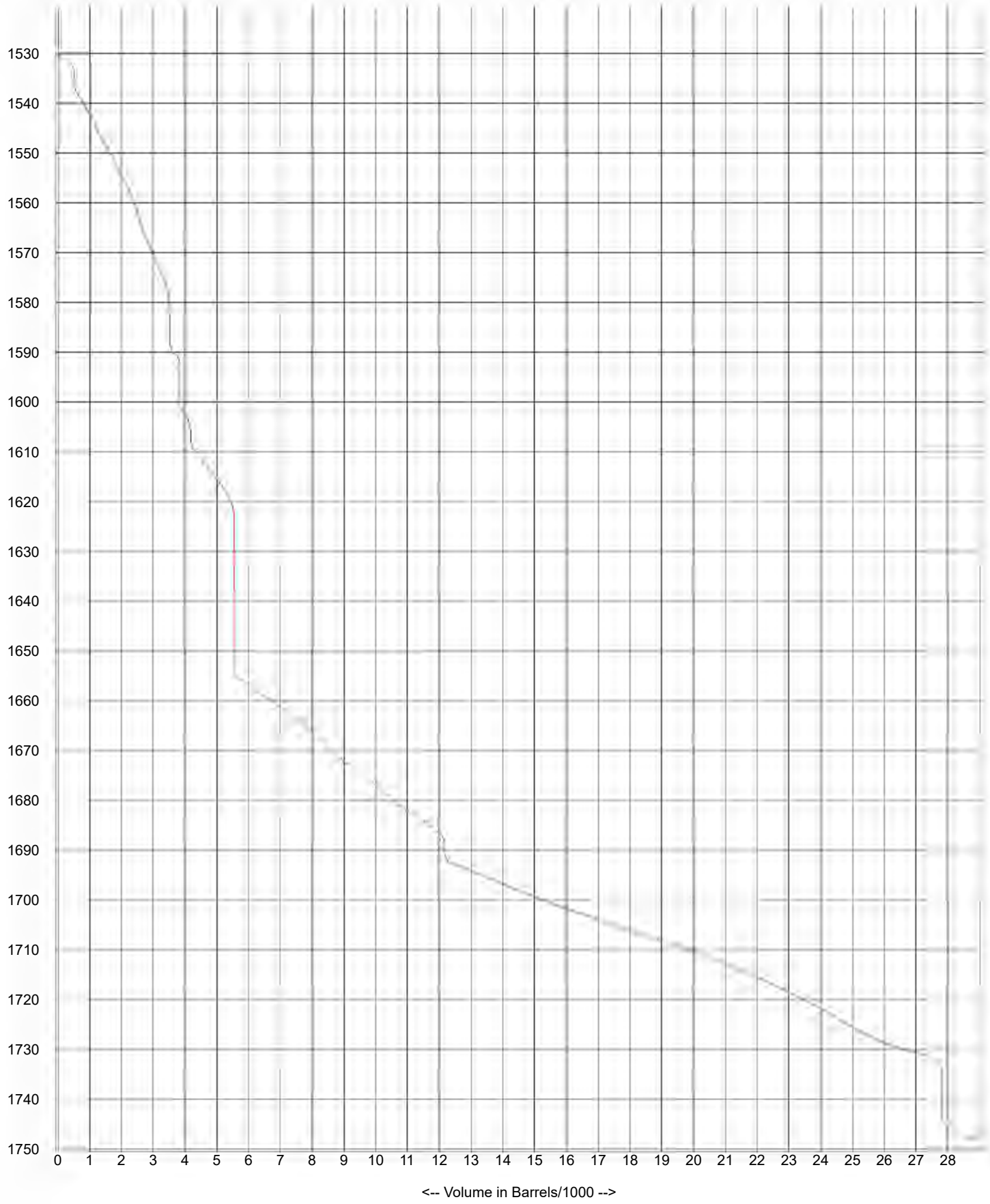
Depth	Cubic ft. per ft.	Cubic ft. total	Barrels per ft.	Barrels total
1736	3.5	156176.4	0.6	27816.2
1737	3.2	156179.7	0.6	27816.8
1738	3.0	156182.7	0.5	27817.3
1739	2.8	156185.5	0.5	27817.8
1740	2.6	156188.1	0.5	27818.3
1741	2.4	156190.5	0.4	27818.7
1742	2.2	156192.7	0.4	27819.1
1743	2.6	156195.3	0.5	27819.6
1744	3.0	156198.3	0.5	27820.1
1745	3.5	156201.8	0.6	27820.7
1746	332.3	156534.1	59.2	27879.9
1747	1197.1	157731.2	213.2	28093.1
1748	1897.2	159628.4	337.9	28431.0
1749	2758.1	162386.4	491.2	28922.3
1750	714.1	163100.5	127.2	29049.5

WESTERN REFINING
STORAGE WELL NO. 1

SONARWIRE GLOBAL, LLC

Depth -vs- Volume

JAL, NM
Fri, Apr 18, 2008



SONARWIRE GLOBAL, LLC
Max Radius & Depth vs Bearing

WESTERN REFINING — JAL, NM
STORAGE WELL NO. 1 — Fri, Apr 18, 2008

This table lists the maximum radius (in feet) found at each of the 128 bearings at which soundings were taken. Also listed after each radius, (separated by ':'), is the depth (in feet) at which that maximum radius was found. Bearings are shown, (in degrees), for each row of four 'radius : depth' pairs.

Bearing	+0.0	+2.8	+5.6	+8.4
0.0	31.2: 1731	31.5: 1731	31.2: 1731	31.2: 1731
11.3	31.2: 1731	31.2: 1731	31.5: 1731	31.5: 1731
22.5	31.5: 1731	31.8: 1731	32.5: 1731	32.5: 1731
33.8	33.1: 1731	33.4: 1731	34.0: 1731	34.0: 1731
45.0	34.3: 1731	34.3: 1731	34.0: 1731	34.0: 1731
56.3	33.7: 1731	33.4: 1731	33.1: 1731	32.8: 1731
67.5	32.8: 1731	32.8: 1707	32.8: 1707	33.1: 1707
78.8	32.8: 1707	32.8: 1707	32.8: 1709	33.4: 1709
90.0	33.7: 1709	33.7: 1709	33.7: 1709	33.7: 1709
101.3	33.4: 1709	33.7: 1709	33.4: 1709	33.1: 1731
112.5	33.1: 1731	33.1: 1731	33.4: 1707	33.7: 1707
123.8	33.7: 1731	33.7: 1731	34.3: 1731	34.7: 1731
135.0	35.3: 1731	35.6: 1731	35.3: 1731	35.3: 1731
146.3	35.0: 1731	35.0: 1731	35.0: 1731	35.0: 1731
157.5	34.7: 1731	34.7: 1731	34.7: 1731	34.3: 1731
168.8	34.3: 1731	34.3: 1731	34.3: 1731	34.3: 1731
180.0	33.7: 1731	33.4: 1731	33.4: 1731	33.1: 1731
191.3	33.1: 1731	32.8: 1731	32.8: 1731	32.8: 1731
202.5	32.8: 1731	32.8: 1731	33.1: 1731	32.8: 1731
213.8	32.1: 1731	32.1: 1709	32.1: 1709	31.5: 1709
225.0	31.2: 1709	31.2: 1709	31.5: 1731	31.8: 1731
236.3	31.8: 1731	32.1: 1731	32.8: 1731	33.1: 1731
247.5	33.1: 1731	33.1: 1731	33.1: 1731	33.4: 1731
258.8	33.1: 1731	33.1: 1731	32.5: 1731	32.5: 1731
270.0	32.1: 1731	32.1: 1731	32.1: 1731	31.8: 1731
281.3	31.8: 1731	31.8: 1731	31.5: 1731	31.5: 1731
292.5	31.2: 1731	31.5: 1731	31.8: 1731	31.8: 1731
303.8	32.1: 1731	32.5: 1731	32.5: 1731	32.1: 1731
315.0	32.5: 1731	32.1: 1731	31.8: 1731	31.8: 1731
326.3	31.5: 1731	31.5: 1731	31.2: 1731	31.2: 1731
337.5	31.5: 1731	31.2: 1731	31.8: 1731	31.8: 1731
348.8	32.1: 1731	32.1: 1731	31.8: 1731	31.5: 1731

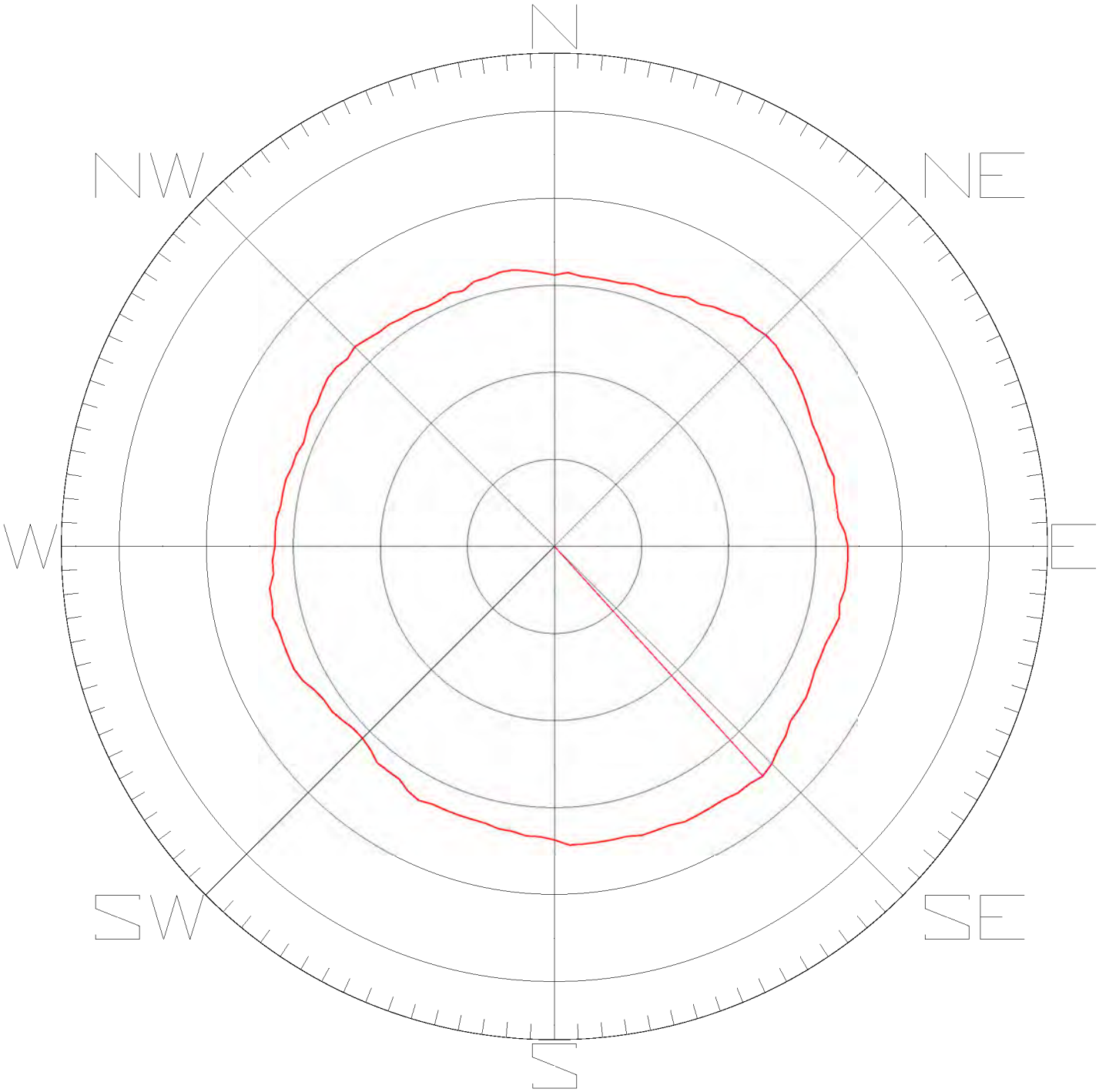
Between 1521 and 1750 foot depths, maximum radius
was 35.6 feet at bearing 137.8 at 1731.0 foot depth

WESTERN REFINING
JAL, NM
STORAGE WELL NO. 1

SONARWIRE GLOBAL, LLC

Max Range vs Bearing

Max Radius= 35.6 ft @ 137.8 deg
Depth= 1731 ft. Fri, Apr 18, 2008



1 inch = 17.0 ft.

55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55

SONARWIRE GLOBAL, LLC
Average Wall Range versus Depth (ft.)

WESTERN REFINING
STORAGE WELL NO. 1

JAL, NM
Fri, Apr 18, 2008

Depth	Avg Rad ft.	Min Rad ft @ Az	Max Rad ft @ Az	Min Dia ft @ Az	Max Dia ft @ Az
1521	1	1 @ 180.1	1 @ 0.1	2 @ 0.1-180.1	2 @ 143.5-323.5
1523	1	1 @ 250.4	1 @ 11.3	2 @ 81.6-261.6	2 @ 11.3-191.3
1525	1	1 @ 289.7	2 @ 19.7	2 @ 109.7-289.7	2 @ 19.7-199.7
1527	2	2 @ 0.1	2 @ 112.6	3 @ 0.1-180.1	3 @ 112.6-292.6
1530	1	1 @ 180.1	2 @ 0.1	2 @ 11.3-191.3	3 @ 104.1-284.1
1531	19	18 @ 11.3	21 @ 84.4	37 @ 149.1-329.1	39 @ 81.6-261.6
1532	19	18 @ 16.9	21 @ 87.2	37 @ 22.6-202.6	40 @ 81.6-261.6
1535	1	1 @ 180.1	1 @ 0.1	2 @ 0.1-180.1	2 @ 16.9-196.9
1537	1	1 @ 180.1	2 @ 225.1	2 @ 0.1-180.1	2 @ 45.0-225.1
1538	13	11 @ 25.4	16 @ 143.5	25 @ 28.2-208.2	28 @ 163.2-343.2
1540	13	12 @ 104.1	14 @ 157.6	25 @ 112.6-292.6	27 @ 64.7-244.7
1542	14	13 @ 289.7	15 @ 84.4	27 @ 109.7-289.7	28 @ 84.4-264.4
1544	14	13 @ 267.2	15 @ 78.8	26 @ 53.5-233.5	28 @ 137.9-317.9
1545	1	1 @ 180.1	1 @ 61.9	2 @ 0.1-180.1	2 @ 61.9-241.9
1546	14	13 @ 205.4	15 @ 81.6	26 @ 16.9-196.9	28 @ 84.4-264.4
1548	13	12 @ 236.3	14 @ 61.9	25 @ 50.7-230.7	26 @ 8.5-188.5
1550	13	11 @ 312.2	14 @ 61.9	24 @ 132.2-312.2	26 @ 61.9-241.9
1552	12	11 @ 244.7	14 @ 101.3	23 @ 14.1-194.1	25 @ 101.3-281.3
1554	12	12 @ 270.1	14 @ 146.3	24 @ 0.1-180.1	26 @ 39.4-219.4
1556	13	12 @ 244.7	14 @ 47.9	24 @ 151.9-331.9	25 @ 47.9-227.9
1558	12	10 @ 292.6	14 @ 70.4	22 @ 33.8-213.8	24 @ 70.4-250.4
1560	11	8 @ 284.1	13 @ 121.0	20 @ 174.4-354.4	24 @ 56.3-236.3
1562	10	6 @ 298.2	14 @ 140.7	17 @ 31.0-211.0	20 @ 140.7-320.7
1564	8	5 @ 334.7	12 @ 98.5	14 @ 25.4-205.4	18 @ 98.5-278.5
1566	12	10 @ 326.3	13 @ 247.6	22 @ 151.9-331.9	25 @ 67.5-247.6
1568	12	10 @ 303.8	13 @ 132.2	22 @ 154.7-334.7	24 @ 98.5-278.5
1570	10	9 @ 28.2	12 @ 143.5	19 @ 28.2-208.2	21 @ 140.7-320.7
1572	11	9 @ 340.4	13 @ 129.4	20 @ 160.4-340.4	24 @ 64.7-244.7
1574	13	12 @ 28.2	14 @ 149.1	25 @ 42.2-222.2	26 @ 149.1-329.1
1576	11	9 @ 64.7	12 @ 211.0	20 @ 76.0-256.0	21 @ 154.7-334.7
1578	8	7 @ 241.9	11 @ 73.2	14 @ 135.1-315.1	18 @ 76.0-256.0
1580	5	3 @ 340.4	8 @ 191.3	9 @ 104.1-284.1	13 @ 53.5-233.5
1582	2	2 @ 180.1	2 @ 0.1	3 @ 0.1-180.1	3 @ 0.1-180.1
1587	1	1 @ 180.1	1 @ 0.1	2 @ 53.5-233.5	2 @ 0.1-180.1
1589	6	1 @ 0.1	12 @ 163.2	4 @ 59.1-239.1	13 @ 163.2-343.2
1591	18	17 @ 25.4	19 @ 92.9	34 @ 25.4-205.4	36 @ 92.9-272.9
1593	1	1 @ 180.1	1 @ 0.1	2 @ 0.1-180.1	2 @ 73.2-253.2
1601	1	1 @ 0.1	2 @ 180.1	2 @ 0.1-180.1	3 @ 16.9-196.9
1602	15	13 @ 331.9	16 @ 194.1	29 @ 157.6-337.6	31 @ 109.7-289.7
1604	12	10 @ 19.7	14 @ 222.2	22 @ 61.9-241.9	24 @ 42.2-222.2
1606	5	2 @ 295.4	9 @ 106.9	7 @ 53.5-233.5	12 @ 67.5-247.6
1608	1	1 @ 180.1	1 @ 0.1	2 @ 0.1-180.1	2 @ 0.1-180.1
1610	15	12 @ 5.7	17 @ 151.9	27 @ 8.5-188.5	33 @ 59.1-239.1
1612	15	13 @ 292.6	17 @ 132.2	28 @ 22.6-202.6	31 @ 61.9-241.9
1614	15	13 @ 8.5	17 @ 188.5	29 @ 104.1-284.1	31 @ 61.9-241.9
1616	15	13 @ 315.1	18 @ 157.6	29 @ 31.0-211.0	31 @ 53.5-233.5
1618	14	12 @ 320.7	17 @ 146.3	27 @ 61.9-241.9	29 @ 166.0-346.0
1620	12	10 @ 312.2	13 @ 90.0	22 @ 53.5-233.5	23 @ 90.0-270.1
1622	8	6 @ 261.6	11 @ 112.6	14 @ 64.7-244.7	17 @ 14.1-194.1
1624	1	1 @ 180.1	1 @ 0.1	2 @ 0.1-180.1	2 @ 0.1-180.1
1625	1	1 @ 180.1	1 @ 0.1	2 @ 0.1-180.1	2 @ 0.1-180.1
1630	2	2 @ 14.1	2 @ 0.1	3 @ 14.1-194.1	3 @ 0.1-180.1
1655	2	2 @ 180.1	2 @ 0.1	3 @ 0.1-180.1	3 @ 0.1-180.1

WESTERN REFINING
STORAGE WELL NO. 1

JAL, NM
Fri, Apr 18, 2008

Depth	Avg Rad ft.	Min Rad ft @ Az	Max Rad ft @ Az	Min Dia ft @ Az	Max Dia ft @ Az
1656	21	17 @ 306.6	24 @ 256.0	39 @ 129.4-309.4	46 @ 78.8-258.8
1657	21	17 @ 315.1	24 @ 92.9	39 @ 135.1-315.1	47 @ 92.9-272.9
1659	20	17 @ 348.8	23 @ 180.1	39 @ 45.0-225.1	42 @ 90.0-270.1
1661	20	18 @ 0.1	24 @ 132.2	38 @ 56.3-236.3	42 @ 123.8-303.8
1663	20	17 @ 306.6	25 @ 98.5	37 @ 31.0-211.0	42 @ 98.5-278.5
1665	19	14 @ 323.5	25 @ 121.0	34 @ 42.2-222.2	40 @ 101.3-281.3
1667	18	12 @ 343.2	24 @ 126.6	32 @ 2.9-182.9	41 @ 112.6-292.6
1669	17	11 @ 329.1	24 @ 92.9	31 @ 36.6-216.6	39 @ 90.0-270.1
1671	16	10 @ 11.3	20 @ 92.9	28 @ 28.2-208.2	37 @ 92.9-272.9
1673	21	16 @ 357.2	24 @ 261.6	38 @ 177.2-357.2	46 @ 104.1-284.1
1675	19	16 @ 0.1	22 @ 95.7	35 @ 25.4-205.4	40 @ 84.4-264.4
1677	19	17 @ 0.1	22 @ 126.6	35 @ 28.2-208.2	40 @ 78.8-258.8
1679	19	16 @ 31.0	24 @ 135.1	35 @ 33.8-213.8	41 @ 126.6-306.6
1681	18	13 @ 19.7	25 @ 123.8	27 @ 25.4-205.4	41 @ 123.8-303.8
1683	23	20 @ 301.0	26 @ 73.2	44 @ 56.3-236.3	48 @ 73.2-253.2
1685	17	9 @ 281.3	25 @ 47.9	29 @ 101.3-281.3	45 @ 36.6-216.6
1687	20	16 @ 303.8	24 @ 78.8	36 @ 132.2-312.2	44 @ 45.0-225.1
1689	3	2 @ 0.1	3 @ 191.3	4 @ 109.7-289.7	5 @ 45.0-225.1
1691	3	2 @ 0.1	3 @ 208.2	4 @ 174.4-354.4	5 @ 28.2-208.2
1693	25	21 @ 309.4	29 @ 81.6	47 @ 0.1-180.1	52 @ 81.6-261.6
1695	27	23 @ 0.1	31 @ 129.4	50 @ 11.3-191.3	54 @ 84.4-264.4
1697	26	23 @ 284.1	29 @ 87.2	51 @ 168.8-348.8	54 @ 28.2-208.2
1699	27	23 @ 284.1	30 @ 95.7	51 @ 129.4-309.4	58 @ 50.7-230.7
1701	27	23 @ 289.7	32 @ 95.7	53 @ 2.9-182.9	57 @ 22.6-202.6
1703	29	24 @ 286.9	33 @ 199.7	56 @ 106.9-286.9	61 @ 31.0-211.0
1705	29	24 @ 329.1	33 @ 92.9	55 @ 149.1-329.1	60 @ 67.5-247.6
1707	30	24 @ 337.6	35 @ 160.4	58 @ 95.7-275.7	62 @ 59.1-239.1
1709	30	24 @ 323.5	35 @ 163.2	57 @ 143.5-323.5	61 @ 53.5-233.5
1711	29	24 @ 326.3	33 @ 132.2	54 @ 5.7-185.7	61 @ 53.5-233.5
1713	26	22 @ 343.2	30 @ 118.2	50 @ 163.2-343.2	54 @ 112.6-292.6
1715	25	22 @ 323.5	29 @ 182.9	49 @ 143.5-323.5	52 @ 11.3-191.3
1717	25	20 @ 0.1	29 @ 109.7	47 @ 0.1-180.1	51 @ 115.4-295.4
1719	24	20 @ 295.4	29 @ 149.1	46 @ 45.0-225.1	49 @ 149.1-329.1
1721	23	19 @ 70.4	29 @ 160.4	41 @ 81.6-261.6	49 @ 160.4-340.4
1723	23	17 @ 0.1	33 @ 154.7	41 @ 28.2-208.2	51 @ 151.9-331.9
1725	21	15 @ 36.6	26 @ 109.7	37 @ 39.4-219.4	47 @ 104.1-284.1
1727	23	18 @ 343.2	27 @ 151.9	42 @ 11.3-191.3	48 @ 92.9-272.9
1729	27	22 @ 295.4	35 @ 137.9	49 @ 56.3-236.3	59 @ 137.9-317.9
1731	33	31 @ 222.2	36 @ 137.9	64 @ 14.1-194.1	68 @ 135.1-315.1
1735	2	2 @ 180.1	2 @ 0.1	3 @ 0.1-180.1	3 @ 0.1-180.1
1741	1	1 @ 180.1	1 @ 0.1	2 @ 0.1-180.1	2 @ 0.1-180.1
1744	2	2 @ 180.1	2 @ 0.1	3 @ 0.1-180.1	3 @ 0.1-180.1
1746	20	19 @ 67.5	22 @ 137.9	38 @ 78.8-258.8	41 @ 137.9-317.9
1748	30	28 @ 70.4	33 @ 140.7	58 @ 70.4-250.4	63 @ 140.7-320.7
1750	1	1 @ 180.1	1 @ 0.1	2 @ 0.1-180.1	2 @ 0.1-180.1

SONARWIRE GLOBAL, LLC
Wall Ranges versus Depth (ft.)

WESTERN REFINING
STORAGE WELL NO. 1

JAL, NM
Fri, Apr 18, 2008

Depth	Tilt	N	NE	E	SE	S	SW	W	NW
1521	0	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.6
1523	0	0.8	0.8	0.7	0.7	0.7	0.7	0.6	0.6
1525	0	0.9	1.0	0.8	0.8	0.8	0.8	0.8	0.7
1527	0	1.2	1.3	1.3	1.5	1.3	1.2	1.2	1.2
1530	0	1.1	0.9	1.1	1.1	0.9	0.9	0.9	1.1
1531	0	18.4	19.6	20.6	18.8	19.9	18.7	17.9	19.0
1532	0	18.7	18.8	20.7	19.0	19.7	18.5	18.2	19.0
1535	0	0.8	0.8	0.7	0.7	0.7	0.8	0.8	0.8
1537	0	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0
1538	0	11.5	11.9	12.8	15.0	15.3	13.4	11.5	11.2
1540	0	12.6	12.2	12.9	12.6	13.1	12.8	13.1	12.6
1542	0	13.2	13.8	14.4	14.0	13.5	13.4	12.8	13.1
1544	0	13.2	13.7	13.8	13.8	13.2	12.6	12.4	13.2
1545	0	0.7	0.7	0.6	0.6	0.6	0.6	0.7	0.7
1546	0	13.2	13.5	13.7	13.7	12.8	12.9	12.9	12.8
1548	0	12.8	12.6	12.6	12.8	12.4	12.1	12.5	12.6
1550	0	11.6	12.8	12.8	12.2	11.9	11.9	11.8	10.9
1552	0	11.5	12.2	12.8	12.5	12.4	11.3	11.3	11.2
1554	0	11.8	12.8	12.3	12.5	11.3	12.8	11.0	11.2
1556	0	11.9	13.2	12.8	12.8	12.2	11.6	11.6	11.6
1558	0	10.6	11.5	12.6	12.8	11.8	10.7	10.7	10.4
1560	0	8.4	11.5	12.6	12.5	11.8	11.5	8.1	8.1
1562	0	6.8	9.9	11.2	12.6	10.4	8.4	6.9	6.0
1564	0	5.0	7.4	10.3	10.3	9.3	6.8	5.7	5.1
1566	0	10.4	11.8	12.1	12.6	12.1	11.5	11.6	9.8
1568	0	10.1	11.2	11.9	12.5	11.9	11.8	11.5	10.1
1570	0	9.0	8.8	10.3	11.0	11.0	10.1	9.1	9.4
1572	0	9.7	10.1	11.3	12.0	11.8	11.5	10.6	9.7
1574	0	11.6	11.3	13.4	13.2	13.4	12.9	11.6	11.6
1576	0	9.4	9.6	9.6	10.3	10.4	10.7	10.0	9.8
1578	0	8.1	8.7	9.7	7.2	7.8	7.1	7.6	6.8
1580	0	2.6	4.7	4.9	6.0	6.9	7.1	4.0	2.6
1582	0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1587	0	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.8
1589	0	0.9	0.9	10.3	10.9	10.9	6.8	0.9	0.9
1591	0	16.5	17.0	18.2	16.7	17.2	17.2	17.2	17.6
1593	0	0.9	0.9	0.9	0.7	0.7	0.7	0.9	0.9
1601	0	0.9	1.0	1.0	1.0	1.0	0.9	0.9	0.9
1602	0	14.3	13.7	14.4	15.6	15.0	15.1	15.0	13.5
1604	0	10.0	10.3	12.1	12.8	13.1	13.2	10.1	10.1
1606	0	1.9	2.2	8.2	8.2	7.9	4.8	2.5	1.8
1608	0	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
1610	0	11.6	14.8	15.3	16.3	16.2	15.9	15.9	11.6
1612	0	13.2	13.5	16.3	16.7	16.2	15.0	12.9	12.2
1614	0	12.6	13.4	16.2	16.0	16.6	15.9	12.9	13.2
1616	0	13.4	14.2	15.4	17.0	16.5	15.3	14.2	12.9
1618	0	11.9	12.5	14.6	15.9	15.7	15.0	12.6	11.8
1620	0	9.7	10.9	12.8	12.2	12.6	11.2	9.8	9.3
1622	0	6.9	7.9	8.8	10.0	9.1	6.9	5.5	6.2
1624	0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
1625	0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
1630	0	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
1655	0	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3

WESTERN REFINING JAL, NM
STORAGE WELL NO. 1 Fri, Apr 18, 2008

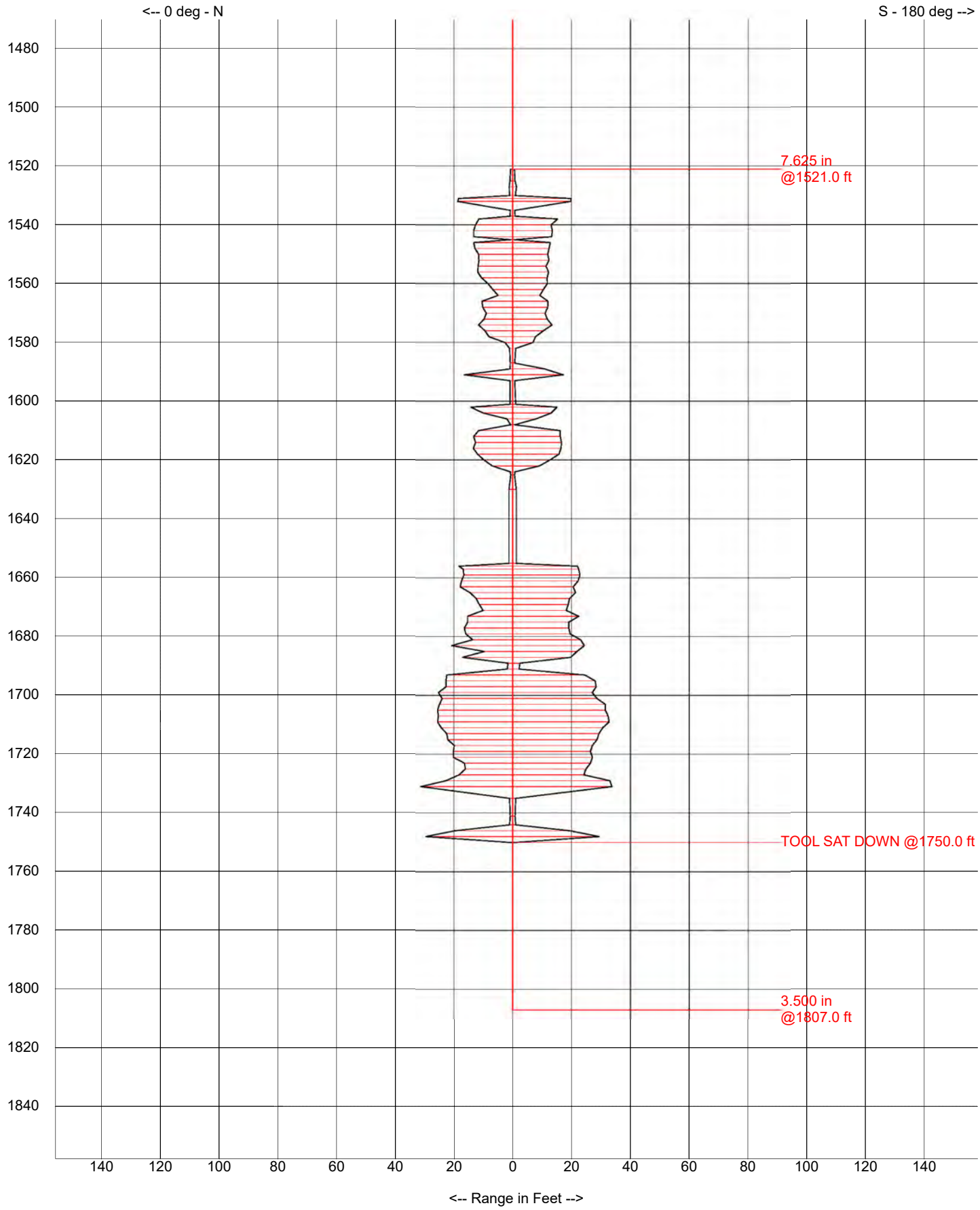
Depth	Tilt	N	NE	E	SE	S	SW	W	NW
1656	0	18.3	21.4	22.5	22.3	22.1	22.3	23.1	16.4
1657	0	16.8	18.1	22.9	22.7	22.5	22.7	22.5	16.2
1659	0	16.6	17.0	22.3	22.3	22.9	21.0	19.7	17.2
1661	0	17.4	18.3	22.9	23.5	22.3	19.7	17.6	17.6
1663	0	17.8	18.3	23.5	22.3	20.6	19.3	17.8	16.8
1665	0	14.5	14.1	22.0	23.5	21.4	19.1	16.8	13.9
1667	0	12.4	15.8	22.1	22.7	19.3	19.3	18.5	14.9
1669	0	11.3	12.4	23.1	21.2	18.9	17.9	15.3	11.3
1671	0	10.1	11.5	19.3	18.9	18.3	17.8	17.0	13.0
1673	0	15.3	17.6	21.6	22.3	22.5	22.5	23.3	19.5
1675	0	15.3	17.6	21.2	21.6	19.1	17.4	18.1	15.7
1677	0	16.4	18.3	20.6	21.8	19.1	16.6	17.8	16.4
1679	0	16.0	17.0	20.2	23.5	19.5	18.3	17.4	17.4
1681	0	13.7	13.2	23.9	24.8	23.1	13.4	13.7	15.1
1683	0	20.8	21.8	24.2	24.6	24.4	22.7	21.2	20.0
1685	0	9.7	24.4	20.6	20.6	21.8	20.6	9.0	9.4
1687	0	17.0	22.9	23.1	19.5	19.7	20.6	17.4	16.0
1689	0	1.6	1.9	1.9	1.9	2.5	2.8	2.5	1.9
1691	0	1.9	1.9	1.9	1.9	2.2	2.5	2.5	2.5
1693	0	22.4	26.5	28.4	27.1	24.6	24.3	22.7	20.8
1695	0	22.7	25.8	29.3	29.9	28.0	26.2	24.6	23.0
1697	0	22.7	25.8	28.7	28.4	28.4	26.5	23.0	22.4
1699	0	25.2	28.4	29.3	27.7	27.1	28.4	23.6	23.0
1701	0	23.9	27.7	30.9	30.9	28.7	25.5	23.0	23.0
1703	0	24.9	29.6	32.5	32.5	31.5	29.6	25.2	24.3
1705	0	25.5	29.3	32.5	32.5	31.5	27.7	25.2	24.3
1707	0	25.2	28.0	32.1	33.4	32.4	30.2	25.5	24.6
1709	0	25.5	28.0	33.7	32.4	32.8	31.2	26.1	24.3
1711	0	24.3	28.0	29.9	32.5	30.6	30.6	26.5	23.9
1713	0	22.4	23.0	28.0	29.6	29.3	26.8	23.6	22.4
1715	0	22.0	23.3	26.5	27.4	28.7	26.8	22.7	21.4
1717	0	19.8	22.0	25.2	27.7	27.1	26.1	21.7	20.8
1719	0	20.2	20.5	26.8	27.7	26.5	25.2	20.5	19.8
1721	0	20.2	19.5	21.7	27.4	27.1	24.6	19.8	19.5
1723	0	16.4	16.7	23.6	27.1	26.5	23.9	22.4	18.3
1725	0	16.1	15.1	19.2	24.6	24.9	21.7	22.1	18.6
1727	0	18.3	20.2	24.3	25.5	24.3	24.3	23.0	19.5
1729	0	22.7	25.5	30.9	34.3	33.1	23.6	23.3	23.3
1731	0	31.2	34.3	32.1	35.3	33.7	30.6	32.1	32.5
1735	0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1741	0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
1744	0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1746	0	19.5	20.0	18.7	21.2	19.3	19.3	18.9	19.5
1748	0	29.4	29.7	28.8	32.3	29.4	29.4	29.1	29.4
1750	0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5

WESTERN REFINING
STORAGE WELL NO. 1

SONARWIRE GLOBAL, LLC

Vertical Cross Section

JAL, NM
Fri, Apr 18, 2008

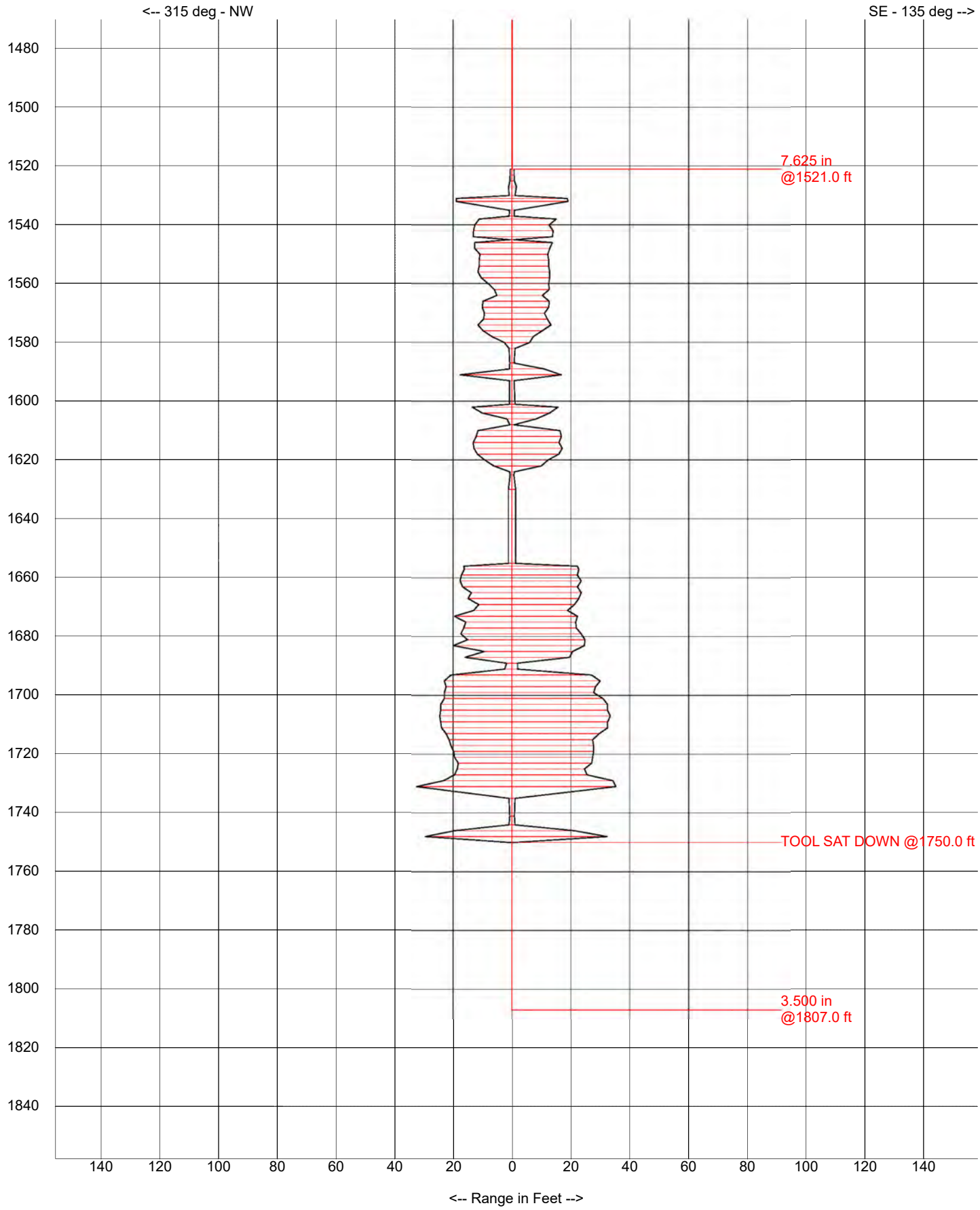


WESTERN REFINING
STORAGE WELL NO. 1

SONARWIRE GLOBAL, LLC

Vertical Cross Section

JAL, NM
Fri, Apr 18, 2008

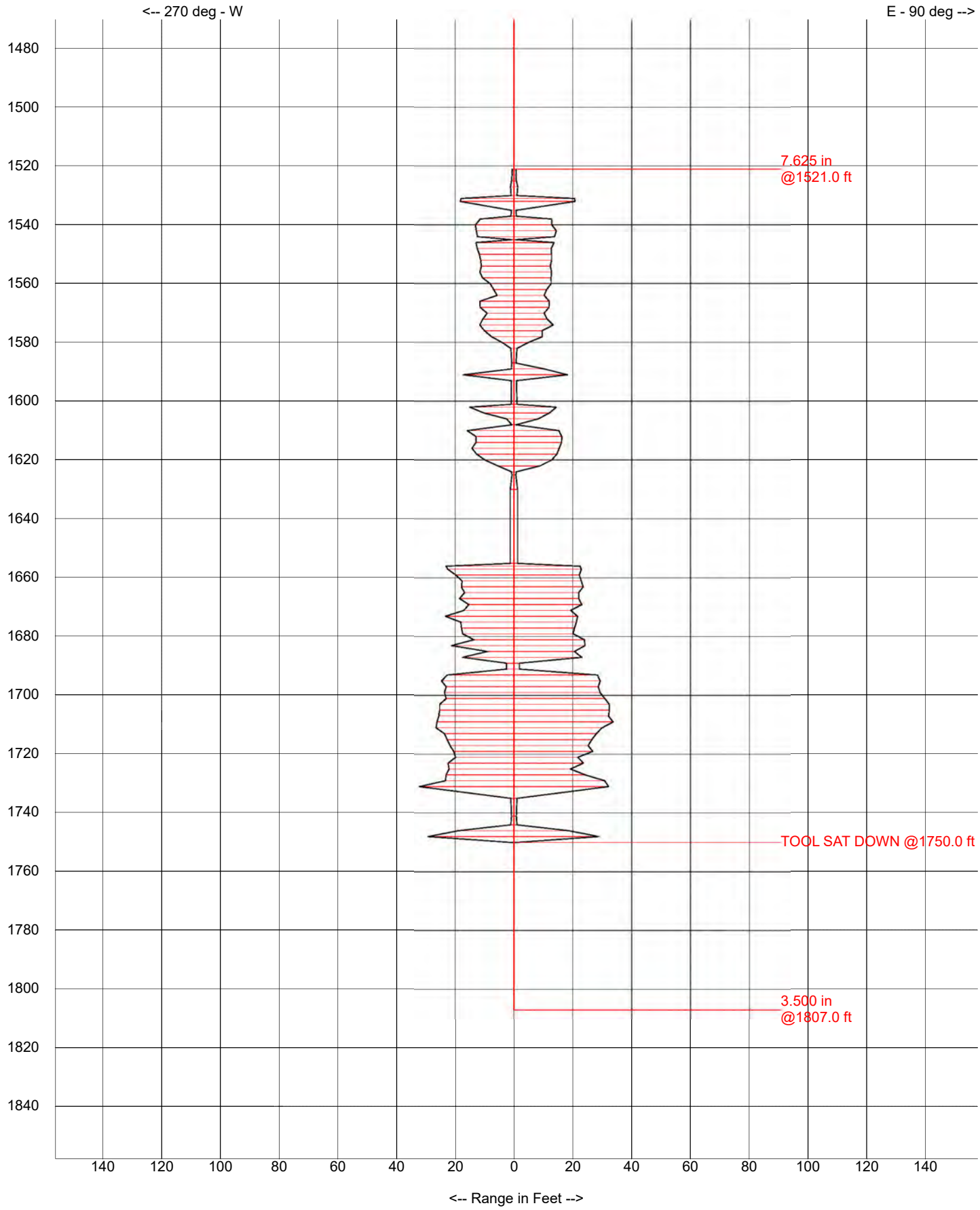


WESTERN REFINING
STORAGE WELL NO. 1

SONARWIRE GLOBAL, LLC

Vertical Cross Section

JAL, NM
Fri, Apr 18, 2008

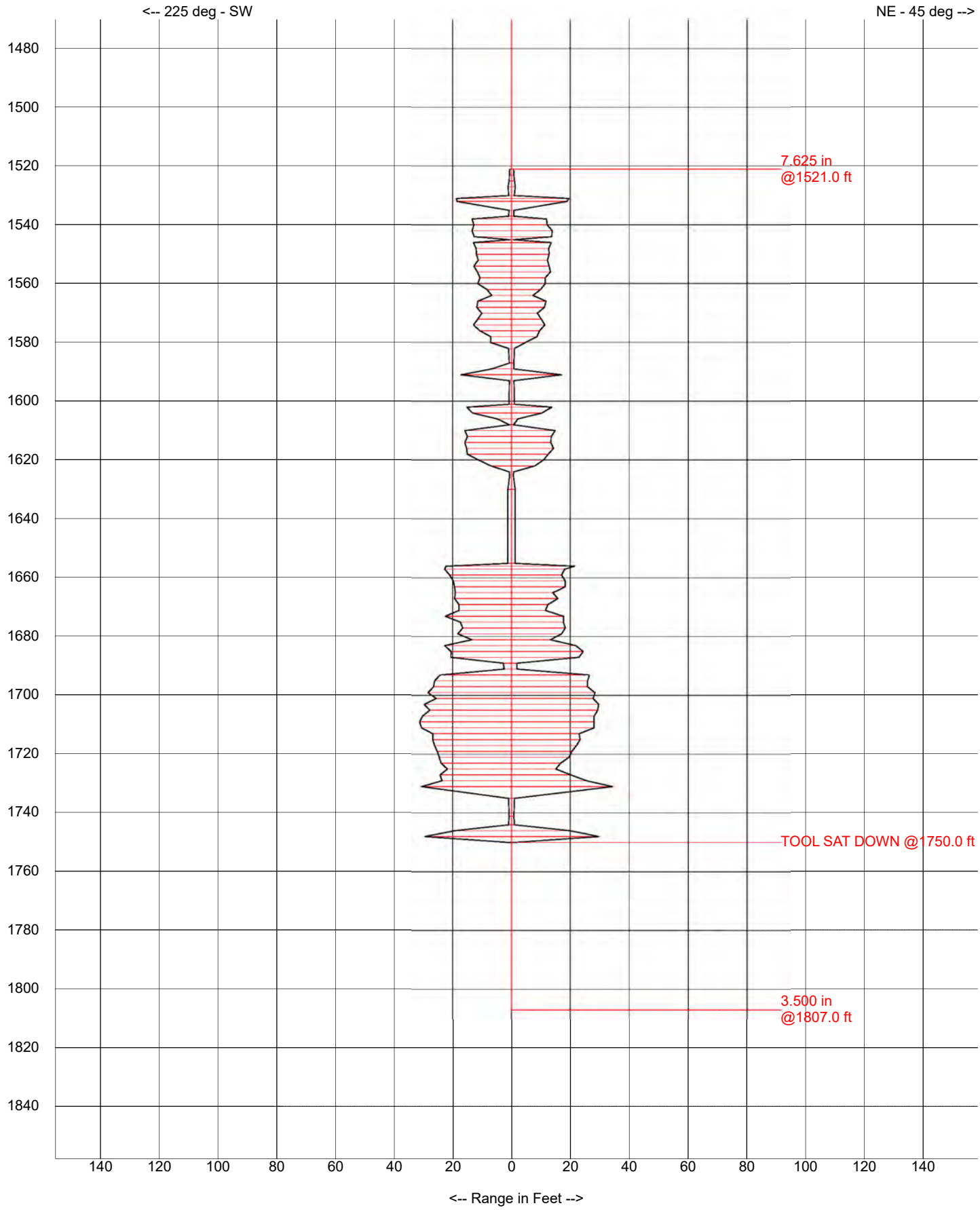


WESTERN REFINING
STORAGE WELL NO. 1

SONARWIRE GLOBAL, LLC

Vertical Cross Section

JAL, NM
Fri, Apr 18, 2008



3D SHADE PLOT

WESTERN REFINING
JAL, NM
STORAGE WELL NO. 1
APRIL 18, 2008

VIEWING AZIMUTH: 45 DEGS.
AXIS TILT: -2 DEGS.

3D SHADE PLOT

WESTERN REFINING
JAL, NM
STORAGE WELL NO. 1
APRIL 18, 2008

VIEWING AZIMUTH: 135 DEGS.
AXIS TILT: -2 DEGS.

3D SHADE PLOT

WESTERN REFINING
JAL, NM
STORAGE WELL NO. 1
APRIL 18, 2008

VIEWING AZIMUTH: 225 DEGS.
AXIS TILT: -2 DEGS.

3D SHADE PLOT

WESTERN REFINING
JAL, NM
STORAGE WELL NO. 1
APRIL 18, 2008

VIEWING AZIMUTH: 315 DEGS.
AXIS TILT: -2 DEGS.

SONARWIRE GLOBAL, LLC
Wall Ranges versus Depth (ft.)

WESTERN REFINING — JAL, NM
STORAGE WELL NO. 1 — Fri, Apr 18, 2008

DEPTH: 1521 TILT: 0 RANGE: 24.9 VOS: 6009

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
22.5	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
45.0	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
67.5	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
90.0	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
112.5	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
135.0	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6
157.5	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6
180.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
202.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
225.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
247.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
270.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
292.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
315.0	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7
337.5	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7

DEPTH: 1523 TILT: 0 RANGE: 24.9 VOS: 6009

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9
22.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
45.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
67.5	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7
90.0	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
112.5	0.8	0.7	0.8	0.8	0.7	0.7	0.7	0.7
135.0	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
157.5	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
180.0	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
202.5	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
225.0	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
247.5	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6
270.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
292.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
315.0	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7
337.5	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8

DEPTH: 1525 TILT: 0 RANGE: 24.9 VOS: 6009

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0
22.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
45.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.8
67.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
90.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
112.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
135.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
157.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
180.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
202.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
225.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
247.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
270.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7
292.5	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
315.0	0.7	0.8	0.8	0.8	0.7	0.8	0.8	0.8
337.5	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9

DEPTH: 1527 TILT: 0 RANGE: 34.8 VOS: 6001

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.3
22.5	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
45.0	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
67.5	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
90.0	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
112.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
135.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
157.5	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
180.0	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
202.5	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
225.0	1.2	1.3	1.2	1.2	1.2	1.2	1.2	1.2
247.5	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
270.0	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
292.5	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
315.0	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
337.5	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2

DEPTH: 1530 TILT: 0 RANGE: 24.9 VOS: 6002

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	1.1	1.1	1.1	1.1	0.9	0.9	0.9	0.9
22.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
45.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
67.5	0.9	0.9	1.1	1.1	1.1	1.1	1.1	1.1
90.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
112.5	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
135.0	1.1	1.1	1.1	1.1	1.1	0.9	0.9	0.9
157.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
180.0	0.9	0.9	0.9	0.9	0.9	0.9	1.1	1.1
202.5	1.1	1.1	1.1	1.1	1.1	1.1	0.9	0.9
225.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
247.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
270.0	0.9	0.9	0.9	0.9	0.9	1.1	0.9	1.1
292.5	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
315.0	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
337.5	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1

DEPTH: 1531 TILT: 0 RANGE: 34.9 VOS: 6002

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	18.4	18.2	17.9	17.6	17.5	17.5	17.6	17.8
22.5	17.9	18.1	18.1	18.4	18.7	19.0	19.3	19.4
45.0	19.6	19.4	19.4	19.4	19.4	19.4	19.3	19.1
67.5	19.1	19.3	19.4	19.7	20.4	20.7	20.9	20.9
90.0	20.6	20.3	19.7	19.4	19.1	18.8	18.7	18.7
112.5	18.7	18.8	18.8	18.8	19.0	19.1	19.1	19.0
135.0	18.8	18.7	18.5	18.4	18.4	18.2	18.4	18.4
157.5	18.8	18.8	19.0	19.0	19.1	19.1	19.4	19.7
180.0	19.9	19.9	19.9	19.9	20.0	20.0	19.7	19.4
202.5	19.1	19.1	19.0	19.0	19.0	18.8	19.0	18.8
225.0	18.7	18.5	18.5	18.5	18.4	18.4	18.4	18.2
247.5	18.2	18.2	18.2	18.1	18.1	18.1	17.9	17.9
270.0	17.9	18.1	18.1	18.2	18.5	18.7	18.7	18.8
292.5	18.7	18.8	19.0	19.1	19.1	19.1	19.1	19.0
315.0	19.0	19.0	19.0	18.7	18.5	18.2	18.1	18.1
337.5	18.2	18.5	18.5	18.4	18.4	18.4	18.5	18.4

DEPTH: 1532 TILT: 0 RANGE: 34.9 VOS: 6002

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	18.7	18.7	18.5	18.4	18.2	17.9	17.8	17.8
22.5	17.9	18.2	18.4	18.5	18.8	18.8	18.8	18.8
45.0	18.8	18.8	19.0	19.1	19.0	19.0	19.0	18.8
67.5	19.0	19.3	19.6	19.6	20.4	20.7	20.7	20.9
90.0	20.7	20.3	19.7	19.3	18.8	18.7	18.7	19.0
112.5	19.0	19.0	18.8	18.8	18.8	18.7	18.8	18.8
135.0	19.0	19.0	19.0	19.1	19.0	19.0	19.0	19.0
157.5	19.0	19.0	19.0	19.1	19.3	19.4	19.6	19.7
180.0	19.7	19.6	19.4	19.3	19.0	18.8	18.5	18.5
202.5	18.2	18.1	18.1	18.1	18.2	18.4	18.5	18.7
225.0	18.5	18.5	18.7	18.5	18.5	19.1	19.0	19.0
247.5	19.0	19.0	18.7	18.5	18.4	18.4	18.4	18.2
270.0	18.2	17.9	18.1	18.1	18.4	18.5	18.5	18.7
292.5	18.7	18.7	18.7	18.5	18.5	18.7	18.5	18.7
315.0	19.0	19.3	19.1	18.7	18.4	18.2	18.1	18.1
337.5	17.9	18.1	18.1	18.1	18.2	18.2	18.4	18.5

DEPTH: 1535 TILT: 0 RANGE: 24.9 VOS: 6002

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
22.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
45.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
67.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
90.0	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
112.5	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
135.0	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
157.5	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
180.0	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8
202.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
225.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
247.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
270.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
292.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
315.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
337.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8

DEPTH: 1537 TILT: 0 RANGE: 34.9 VOS: 6002

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
22.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
45.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
67.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
90.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
112.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
135.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
157.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
180.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
202.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
225.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
247.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
270.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
292.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
315.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
337.5	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9

DEPTH: 1538 TILT: 0 RANGE: 34.9 VOS: 6002

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.3
22.5	11.0	10.9	10.9	11.0	11.2	11.3	11.6	11.6
45.0	11.9	12.1	12.2	12.5	12.8	12.9	12.9	12.9
67.5	12.8	12.9	12.8	12.8	12.8	12.8	12.6	12.8
90.0	12.8	12.8	12.8	12.9	12.9	13.1	13.1	13.1
112.5	12.9	12.9	12.9	13.2	13.7	13.8	14.3	14.6
135.0	15.0	15.1	15.3	15.4	15.4	15.3	15.1	15.1
157.5	15.1	15.1	15.0	15.1	15.1	15.0	15.1	15.1
180.0	15.3	15.0	14.9	14.7	14.4	14.3	14.0	13.5
202.5	13.4	13.4	13.2	13.2	13.2	13.2	13.4	13.2
225.0	13.4	13.5	13.5	13.5	13.5	13.7	13.5	13.5
247.5	13.4	13.2	12.8	12.6	12.2	11.8	11.6	11.6
270.0	11.5	11.6	11.6	11.6	11.6	11.8	11.8	11.8
292.5	11.9	12.1	12.1	11.9	11.8	11.6	11.5	11.3
315.0	11.2	11.0	11.2	11.2	11.2	11.3	11.3	11.6
337.5	11.6	11.8	12.1	11.9	11.9	11.9	11.6	11.6

DEPTH: 1540 TILT: 0 RANGE: 34.8 VOS: 6020

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	12.6	12.5	12.5	12.6	12.5	12.5	12.5	12.5
22.5	12.5	12.3	12.3	12.2	12.0	12.0	12.2	12.2
45.0	12.2	12.2	12.3	12.3	12.3	12.5	12.8	12.9
67.5	12.9	12.9	12.9	12.8	12.8	12.8	12.9	12.9
90.0	12.9	12.9	12.9	12.9	12.9	11.9	12.0	12.0
112.5	12.0	12.0	12.0	12.0	12.2	12.5	12.5	12.6
135.0	12.6	12.6	12.9	12.9	13.1	13.1	13.1	13.2
157.5	13.4	13.4	13.4	13.2	13.2	13.1	12.9	12.9
180.0	13.1	12.9	13.1	13.1	12.9	13.1	13.1	13.1
202.5	13.1	12.9	12.8	12.8	12.8	12.8	12.8	12.8
225.0	12.8	12.8	12.8	12.9	12.9	13.1	13.2	13.2
247.5	13.2	13.1	13.1	12.9	13.1	12.9	12.9	13.1
270.0	13.1	13.1	13.1	12.9	12.8	12.8	12.5	12.3
292.5	12.2	12.2	12.2	12.3	12.6	12.6	12.8	12.8
315.0	12.6	12.8	12.6	12.5	12.5	12.3	12.3	12.2
337.5	12.2	12.2	12.3	12.5	12.3	12.5	12.6	12.6

DEPTH: 1542 TILT: 0 RANGE: 34.8 VOS: 6020

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	13.2	13.4	13.5	13.5	13.7	13.8	13.8	14.0
22.5	14.0	14.0	13.8	13.8	13.7	13.5	13.5	13.7
45.0	13.8	14.1	14.1	14.1	14.0	14.0	13.8	13.8
67.5	14.0	14.0	14.1	14.1	14.4	14.5	14.7	14.3
90.0	14.4	14.3	14.3	14.0	14.1	14.0	13.8	13.8
112.5	13.8	13.7	13.5	13.7	13.8	13.8	13.8	14.0
135.0	14.0	13.8	13.8	13.7	13.5	13.5	13.5	13.5
157.5	13.7	13.5	13.5	13.7	13.7	13.7	13.7	13.5
180.0	13.5	13.4	13.4	13.4	13.2	13.2	13.2	13.4
202.5	13.4	13.2	13.1	13.2	13.2	13.2	13.4	13.4
225.0	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4
247.5	13.2	13.1	13.1	13.1	13.1	12.9	12.9	12.8
270.0	12.8	12.9	12.8	12.8	12.6	12.6	12.6	12.3
292.5	12.3	12.5	12.6	12.8	13.1	13.2	13.2	12.9
315.0	13.1	12.9	12.9	13.1	13.1	13.4	13.4	13.4
337.5	13.4	13.4	13.4	13.2	13.2	13.2	13.4	13.2

DEPTH: 1544 TILT: 0 RANGE: 34.9 VOS: 6002

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	13.2	13.2	13.2	13.2	13.2	13.4	13.5	13.7
22.5	13.7	13.5	13.5	13.5	13.4	13.4	13.5	13.5
45.0	13.7	13.7	13.5	13.4	13.4	13.5	13.5	13.7
67.5	13.7	13.8	14.0	14.0	14.1	14.1	14.0	14.0
90.0	13.8	13.8	14.0	13.7	13.7	13.7	13.7	13.8
112.5	13.8	13.8	13.8	13.7	13.7	13.7	13.8	13.8
135.0	13.8	13.8	13.7	13.5	13.4	13.4	13.4	13.4
157.5	13.4	13.5	13.7	13.8	13.7	13.5	13.4	13.2
180.0	13.2	13.2	13.2	13.2	13.1	13.2	13.4	13.4
202.5	13.4	13.4	13.1	12.8	12.8	12.8	12.8	12.6
225.0	12.6	12.5	12.6	12.5	12.6	12.6	12.8	12.8
247.5	12.8	12.6	12.6	12.6	12.6	12.5	12.5	12.4
270.0	12.4	12.5	12.4	12.5	12.5	12.8	12.8	12.6
292.5	12.6	12.5	12.5	12.5	12.6	12.8	12.9	12.9
315.0	13.2	13.4	13.4	13.5	13.4	13.2	13.2	12.9
337.5	12.9	13.1	13.1	12.9	12.9	12.9	13.1	13.1

DEPTH: 1545 TILT: 0 RANGE: 24.9 VOS: 6003

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
22.5	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
45.0	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.7
67.5	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.6
90.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
112.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
135.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
157.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
180.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
202.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
225.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
247.5	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
270.0	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
292.5	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
315.0	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
337.5	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7

DEPTH: 1546 TILT: 0 RANGE: 34.9 VOS: 6002

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	13.2	13.4	13.5	13.5	13.7	13.7	13.5	13.7
22.5	13.7	13.7	13.5	13.7	13.7	13.7	13.5	13.5
45.0	13.5	13.5	13.7	13.7	13.8	13.8	13.8	13.8
67.5	13.7	13.8	13.8	13.8	14.0	14.1	14.1	13.7
90.0	13.7	13.8	14.0	13.8	13.7	13.5	13.4	13.2
112.5	13.4	13.2	13.1	13.1	13.2	13.2	13.5	13.5
135.0	13.7	13.7	13.7	13.7	13.5	13.4	13.4	13.4
157.5	13.4	13.4	13.2	13.1	12.9	12.8	12.8	12.8
180.0	12.8	12.8	12.8	12.8	12.6	12.5	12.4	12.4
202.5	12.4	12.2	12.4	12.2	12.4	12.5	12.8	12.8
225.0	12.9	12.9	12.8	12.8	12.8	12.6	12.6	12.6
247.5	12.8	12.8	12.8	12.8	12.9	12.8	12.9	12.8
270.0	12.9	12.9	12.9	12.9	12.8	12.8	12.9	13.1
292.5	13.1	13.1	13.1	12.9	12.9	12.8	12.8	12.8
315.0	12.8	12.8	12.8	12.9	13.1	13.1	13.4	13.2
337.5	13.2	13.1	13.1	13.1	13.1	13.1	13.1	13.1

DEPTH: 1548 TILT: 0 RANGE: 34.8 VOS: 6001

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	12.8	12.9	12.9	13.1	12.9	12.8	12.8	12.6
22.5	12.6	12.8	12.8	12.8	12.9	12.8	12.8	12.5
45.0	12.6	12.6	12.6	12.8	12.9	13.1	13.4	13.4
67.5	13.2	13.1	13.1	12.9	12.9	12.8	12.6	12.5
90.0	12.6	12.6	12.8	13.1	13.2	13.2	13.1	12.9
112.5	12.8	12.8	12.6	12.6	12.6	12.6	12.8	12.8
135.0	12.8	12.6	12.6	12.6	12.6	12.8	12.6	12.5
157.5	12.6	12.5	12.5	12.5	12.4	12.4	12.4	12.4
180.0	12.4	12.5	12.4	12.5	12.4	12.4	12.4	12.4
202.5	12.4	12.2	12.2	12.2	12.1	12.1	12.1	12.1
225.0	12.1	11.9	11.8	11.8	11.6	11.6	11.9	12.1
247.5	12.2	12.2	12.2	12.1	12.2	12.2	12.4	12.4
270.0	12.5	12.5	12.5	12.5	12.4	12.4	12.4	12.5
292.5	12.4	12.2	12.1	12.2	12.1	12.4	12.5	12.6
315.0	12.6	12.6	12.6	12.6	12.5	12.5	12.5	12.5
337.5	12.5	12.2	12.2	12.2	12.2	12.4	12.5	12.6

DEPTH: 1550 TILT: 0 RANGE: 34.8 VOS: 6003

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	11.6	11.8	11.8	11.9	11.8	11.9	11.9	12.0
22.5	12.0	12.0	11.9	12.2	12.2	12.3	12.5	12.6
45.0	12.8	13.1	13.1	13.1	13.1	13.1	13.2	13.2
67.5	13.2	13.1	13.1	12.9	12.9	12.8	12.8	12.8
90.0	12.8	12.8	12.8	12.9	12.9	12.8	12.9	12.9
112.5	12.9	12.8	12.8	12.8	12.9	12.6	12.3	12.3
135.0	12.2	12.2	12.2	12.2	12.2	12.2	12.3	12.5
157.5	12.5	12.5	12.5	12.3	12.2	12.3	12.2	12.0
180.0	11.9	11.9	11.8	11.8	11.8	11.8	11.6	11.8
202.5	11.8	11.8	11.9	11.9	11.9	11.9	11.9	11.8
225.0	11.9	11.9	12.0	12.2	12.2	12.2	12.2	12.2
247.5	12.0	11.9	11.9	11.9	11.8	11.9	11.8	11.8
270.0	11.8	11.6	11.6	11.6	11.6	11.5	11.5	11.5
292.5	11.3	11.3	11.2	11.2	11.0	11.0	10.9	10.7
315.0	10.9	10.9	10.9	11.0	11.3	11.5	11.8	11.9
337.5	12.0	12.0	11.9	11.9	11.8	11.6	11.6	11.6

DEPTH: 1552 TILT: 0 RANGE: 34.9 VOS: 6002

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	11.5	11.6	11.6	11.8	11.8	11.9	12.2	12.4
22.5	12.4	12.4	12.2	12.2	12.1	12.2	12.2	12.2
45.0	12.2	12.4	12.4	12.4	12.4	12.4	12.5	12.5
67.5	12.5	12.6	12.9	13.1	12.9	12.9	12.9	12.8
90.0	12.8	13.1	13.2	13.4	13.5	13.4	13.2	13.1
112.5	12.9	12.8	12.6	12.6	12.5	12.2	12.2	12.2
135.0	12.5	12.6	12.6	12.8	12.9	12.8	12.6	12.4
157.5	12.4	12.2	12.2	12.4	12.4	12.5	12.5	12.5
180.0	12.4	12.2	12.1	11.8	11.3	11.0	11.0	11.2
202.5	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3
225.0	11.3	11.3	11.3	11.3	11.3	11.3	11.0	10.9
247.5	10.9	10.9	10.9	10.9	10.9	11.0	10.9	11.0
270.0	11.3	11.3	11.5	11.3	11.3	11.2	11.3	11.2
292.5	11.0	10.9	10.9	10.9	10.9	11.0	11.0	11.2
315.0	11.2	11.2	11.3	11.3	11.3	11.5	11.6	11.8
337.5	11.8	11.8	11.8	11.8	11.8	11.9	11.8	11.6

DEPTH: 1554 TILT: 0 RANGE: 34.8 VOS: 6020

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	11.8	11.8	11.8	11.9	12.0	12.2	12.3	12.2
22.5	12.2	12.2	12.2	12.3	12.3	12.6	12.9	12.8
45.0	12.8	12.5	12.5	12.2	12.0	12.0	11.9	12.2
67.5	12.2	12.2	12.3	12.3	12.3	12.6	12.3	12.3
90.0	12.3	12.3	12.5	12.6	12.6	12.6	12.6	12.6
112.5	12.6	12.6	12.6	12.6	12.6	12.6	12.5	12.6
135.0	12.5	12.6	12.6	12.8	13.1	13.1	12.8	12.6
157.5	12.3	12.0	11.8	11.6	11.5	11.5	11.3	11.3
180.0	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.5
202.5	11.3	11.5	12.0	12.6	12.8	12.8	12.8	12.6
225.0	12.8	12.6	12.5	12.2	11.9	11.8	11.8	11.8
247.5	11.6	11.6	11.5	11.5	11.3	11.5	11.2	11.2
270.0	11.0	11.2	11.0	11.0	11.0	11.0	11.0	11.2
292.5	11.2	11.0	11.0	11.0	11.0	11.0	11.0	11.0
315.0	11.2	11.2	11.2	11.3	11.3	11.5	11.5	11.6
337.5	11.6	11.8	11.6	11.6	11.6	11.8	11.8	11.8

DEPTH: 1556 TILT: 0 RANGE: 34.8 VOS: 6001

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	11.9	11.9	11.8	11.9	11.8	11.8	11.8	11.8
22.5	11.8	11.8	11.9	12.2	12.4	12.5	12.8	13.1
45.0	13.2	13.4	13.4	13.4	13.2	13.1	13.2	12.9
67.5	13.1	13.2	13.2	13.2	13.1	13.1	12.9	12.8
90.0	12.8	12.8	12.8	12.8	12.8	12.9	13.1	13.1
112.5	13.2	13.4	13.4	13.4	13.1	12.9	12.9	12.8
135.0	12.8	12.6	12.6	12.4	12.4	12.2	12.2	12.2
157.5	12.2	12.2	12.2	12.4	12.4	12.4	12.5	12.4
180.0	12.2	12.1	12.1	12.2	12.2	12.4	12.2	12.4
202.5	12.1	12.1	11.9	11.9	12.1	11.9	11.8	11.6
225.0	11.6	11.6	11.6	11.5	11.3	11.3	11.3	11.2
247.5	11.3	11.2	11.2	11.2	11.2	11.3	11.3	11.6
270.0	11.6	11.6	11.6	11.5	11.5	11.5	11.5	11.3
292.5	11.3	11.2	11.2	11.3	11.3	11.5	11.6	11.6
315.0	11.6	11.6	11.3	11.5	11.5	11.5	11.3	11.3
337.5	11.3	11.3	11.5	11.5	11.6	11.6	11.6	11.8

DEPTH: 1558 TILT: 0 RANGE: 34.8 VOS: 6020

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	10.6	10.6	10.6	10.6	10.4	10.3	10.4	10.4
22.5	10.3	10.6	10.7	10.7	10.7	10.9	11.0	11.2
45.0	11.5	11.5	11.8	11.9	12.0	12.3	12.5	12.6
67.5	12.9	13.2	13.2	13.1	12.9	12.9	12.8	12.8
90.0	12.6	12.6	12.6	12.5	12.6	12.6	12.6	12.8
112.5	12.8	12.8	12.8	12.9	12.9	12.9	12.8	12.8
135.0	12.8	12.8	12.9	12.8	12.8	12.6	12.8	12.6
157.5	12.5	12.5	12.5	12.3	12.0	11.9	11.8	11.8
180.0	11.8	11.8	11.6	11.6	11.6	11.6	11.6	11.6
202.5	11.6	11.6	11.3	11.2	11.0	10.9	10.7	10.6
225.0	10.7	10.7	10.6	10.6	10.6	10.4	10.6	10.6
247.5	10.6	10.6	10.4	10.6	10.6	10.7	10.7	10.9
270.0	10.7	10.6	10.3	10.1	10.0	9.8	9.7	9.6
292.5	9.4	9.4	9.4	9.6	9.7	9.8	10.1	10.3
315.0	10.4	10.6	10.6	10.6	10.6	10.6	10.6	10.4
337.5	10.6	10.4	10.4	10.6	10.6	10.6	10.7	10.6

DEPTH: 1560 TILT: 0 RANGE: 34.9 VOS: 6002

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	8.4	8.4	8.5	8.7	8.8	9.0	9.3	9.6
22.5	9.7	9.9	10.1	10.4	10.6	11.0	11.2	11.3
45.0	11.5	11.6	11.8	11.9	12.1	12.2	12.4	12.4
67.5	12.5	12.4	12.4	12.4	12.4	12.4	12.4	12.6
90.0	12.6	12.8	12.8	12.8	12.6	12.5	12.5	12.5
112.5	12.4	12.5	12.5	12.9	12.8	12.6	12.6	12.6
135.0	12.5	12.5	12.5	12.4	12.4	12.4	12.4	12.4
157.5	12.1	12.1	11.9	11.8	11.8	11.8	11.8	11.8
180.0	11.8	11.8	11.8	11.9	12.1	11.9	11.9	11.3
202.5	11.0	10.9	10.9	11.0	11.0	11.2	11.6	11.6
225.0	11.5	11.5	11.5	11.5	11.6	8.4	8.2	8.2
247.5	8.2	8.2	8.1	8.1	7.9	7.9	7.9	8.1
270.0	8.1	7.9	8.1	7.9	7.9	7.8	7.9	7.8
292.5	7.8	7.8	7.8	7.8	7.8	7.9	8.1	8.1
315.0	8.1	8.2	8.2	8.2	8.2	8.2	8.2	8.2
337.5	8.1	8.1	7.9	7.9	7.9	7.9	7.8	8.2

DEPTH: 1562 TILT: 0 RANGE: 34.9 VOS: 6010

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	6.8	6.8	6.9	7.1	7.1	7.4	7.5	7.8
22.5	7.9	7.9	8.1	8.1	8.2	8.2	9.1	9.6
45.0	9.9	9.7	9.9	10.0	10.0	10.1	10.1	10.3
67.5	10.4	10.6	10.7	10.7	10.9	11.0	11.0	11.2
90.0	11.2	11.3	11.5	11.6	11.9	12.5	12.6	12.6
112.5	12.8	12.8	12.6	12.6	12.5	12.5	12.4	12.5
135.0	12.6	12.8	13.1	12.9	12.8	12.5	12.2	12.1
157.5	11.9	11.9	11.8	11.5	11.3	11.0	10.7	10.6
180.0	10.4	10.3	10.3	10.3	10.3	10.3	10.4	10.3
202.5	9.9	9.4	9.0	8.7	8.5	8.5	8.4	8.4
225.0	8.4	8.2	8.2	8.1	8.1	8.1	8.1	8.1
247.5	8.2	8.1	8.1	8.1	7.8	7.5	7.4	7.2
270.0	6.9	6.9	6.8	6.6	6.5	6.5	6.3	6.2
292.5	6.0	6.0	5.9	5.9	5.9	5.9	6.0	6.0
315.0	6.0	6.0	6.0	6.0	5.9	5.9	5.9	5.9
337.5	5.9	5.9	6.0	6.2	6.2	6.3	6.5	6.6

DEPTH: 1564 TILT: 0 RANGE: 34.9 VOS: 6002

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	5.0	5.1	5.3	5.4	5.6	5.7	5.9	6.0
22.5	6.0	6.0	6.2	6.3	6.6	6.9	7.4	7.6
45.0	7.4	7.5	7.6	7.8	7.9	8.2	8.7	9.0
67.5	9.6	10.1	10.9	10.7	10.1	10.0	9.9	10.1
90.0	10.3	10.7	11.0	11.5	11.3	11.3	11.2	11.2
112.5	11.2	11.0	11.0	10.7	10.6	10.4	10.3	10.1
135.0	10.3	10.4	10.4	10.6	10.4	10.6	10.4	10.3
157.5	10.3	10.3	10.1	10.0	10.0	9.7	9.1	9.0
180.0	9.3	9.9	10.0	10.3	9.4	8.4	8.4	8.2
202.5	8.1	7.9	7.9	7.8	7.5	7.4	7.2	6.9
225.0	6.8	6.8	6.8	6.8	6.8	6.6	6.6	6.5
247.5	6.3	6.0	6.0	5.9	5.9	5.7	5.7	5.7
270.0	5.7	5.7	5.7	5.6	5.4	5.4	5.4	5.3
292.5	5.3	5.3	5.1	5.1	5.1	5.1	5.1	5.1
315.0	5.1	5.0	5.0	5.0	4.9	4.9	4.9	4.7
337.5	4.9	4.9	4.9	4.9	4.9	4.9	4.9	5.0

DEPTH: 1566 TILT: 0 RANGE: 34.8 VOS: 6000

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	10.4	10.6	10.7	11.0	11.2	11.3	11.6	11.6
22.5	11.8	11.9	11.9	11.9	11.9	11.9	11.8	11.8
45.0	11.8	11.8	11.9	11.9	11.9	11.9	12.1	12.1
67.5	12.1	12.1	11.9	12.1	12.1	12.1	12.1	12.1
90.0	12.1	11.9	12.1	12.1	12.1	12.1	12.1	12.2
112.5	12.3	12.3	12.2	12.2	12.2	12.2	12.2	12.6
135.0	12.6	12.2	12.2	12.2	12.2	12.2	12.1	12.1
157.5	12.2	12.2	12.2	12.3	12.3	12.2	12.2	12.1
180.0	12.1	11.9	11.9	11.9	11.8	11.8	11.8	11.8
202.5	11.8	11.6	11.5	11.5	11.5	11.3	11.5	11.5
225.0	11.5	11.6	11.6	11.8	12.1	12.3	12.5	12.5
247.5	12.6	12.6	12.6	12.6	12.5	12.3	12.1	11.8
270.0	11.6	11.5	11.3	11.3	11.2	11.2	10.9	10.9
292.5	10.7	10.6	10.4	10.4	10.3	10.1	10.1	10.0
315.0	9.8	9.6	9.6	9.4	9.3	9.3	9.3	9.3
337.5	9.3	9.4	9.4	9.7	10.0	10.1	10.1	10.3

DEPTH: 1568 TILT: 0 RANGE: 34.9 VOS: 6002

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	10.1	10.1	10.1	10.3	10.3	10.3	10.6	10.6
22.5	10.6	10.6	10.4	10.4	10.6	10.6	10.9	11.0
45.0	11.2	11.3	11.5	11.5	11.5	11.5	11.6	11.6
67.5	11.6	11.8	11.6	11.8	11.8	11.8	11.8	11.8
90.0	11.9	12.1	12.1	12.2	12.2	12.4	12.2	12.2
112.5	12.2	12.2	12.2	12.4	12.4	12.4	12.4	12.5
135.0	12.5	12.4	12.2	11.9	11.8	11.8	11.8	11.6
157.5	11.6	11.8	11.8	11.9	11.8	11.8	11.8	11.9
180.0	11.9	12.1	12.1	12.2	12.2	12.2	12.1	12.1
202.5	12.1	11.9	11.9	11.8	11.8	11.8	11.8	11.8
225.0	11.8	11.8	11.9	11.9	11.5	11.2	11.2	11.0
247.5	11.2	11.2	11.2	11.3	11.3	11.3	11.2	11.3
270.0	11.5	11.6	11.6	11.8	11.8	11.6	11.3	10.9
292.5	10.6	10.4	10.3	10.1	10.0	10.0	10.0	10.1
315.0	10.1	10.3	10.1	10.3	10.3	10.3	10.3	10.3
337.5	10.3	10.1	10.1	10.1	10.1	10.1	10.1	10.1

DEPTH: 1570 TILT: 0 RANGE: 34.8 VOS: 6004

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	9.0	9.0	8.8	9.0	9.0	9.0	8.8	8.7
22.5	8.7	8.7	8.5	8.5	8.5	8.5	8.7	8.7
45.0	8.8	9.0	9.1	9.3	9.4	9.5	9.7	9.7
67.5	9.8	10.0	10.0	10.0	10.0	10.1	10.1	10.1
90.0	10.3	10.3	10.6	10.7	10.9	10.9	11.0	10.9
112.5	10.7	10.7	10.6	10.6	10.4	10.4	10.6	10.6
135.0	11.0	11.0	11.3	11.5	11.3	11.3	11.2	11.0
157.5	10.7	10.7	10.7	10.9	10.9	11.0	11.2	11.2
180.0	11.0	11.2	11.2	10.3	10.3	10.1	10.0	10.0
202.5	9.8	10.0	9.8	9.8	10.0	10.1	10.3	10.1
225.0	10.1	10.1	10.1	10.3	10.3	10.4	10.3	10.0
247.5	9.8	9.7	9.5	9.4	9.4	9.3	9.3	9.3
270.0	9.1	9.1	9.1	9.1	9.1	9.0	8.8	8.7
292.5	8.7	8.5	8.5	8.7	8.8	8.8	9.0	9.1
315.0	9.4	9.4	9.3	9.1	9.3	9.3	9.1	9.1
337.5	9.3	9.1	9.1	9.1	9.1	9.0	9.0	9.0

DEPTH: 1572 TILT: 0 RANGE: 34.8 VOS: 6021

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	9.7	9.7	9.7	9.8	9.8	9.8	9.8	9.7
22.5	9.8	9.8	9.7	9.7	9.8	9.8	10.0	10.1
45.0	10.1	10.3	10.4	10.7	11.0	11.2	11.3	11.5
67.5	11.5	11.5	11.5	11.5	11.5	11.5	11.3	11.3
90.0	11.3	11.3	11.5	11.6	11.6	11.6	11.6	11.6
112.5	11.6	11.6	11.6	11.8	11.9	11.9	12.0	12.0
135.0	12.0	12.0	11.9	11.9	11.8	11.5	11.3	11.2
157.5	11.2	11.2	11.3	11.3	11.5	11.6	11.6	11.6
180.0	11.8	11.6	11.6	11.6	11.5	11.3	11.3	11.3
202.5	11.3	11.3	11.3	11.3	11.3	11.3	11.5	11.5
225.0	11.5	11.5	11.5	11.6	11.6	11.6	11.6	11.6
247.5	11.6	11.5	11.5	11.3	11.3	11.2	11.0	10.7
270.0	10.6	10.3	10.1	10.0	9.8	9.7	9.6	9.7
292.5	9.6	9.6	9.7	9.8	9.8	9.8	9.8	10.0
315.0	9.7	9.6	9.3	9.1	9.0	8.8	8.8	8.8
337.5	8.8	8.7	8.8	9.1	9.3	9.4	9.6	9.6

DEPTH: 1574 TILT: 0 RANGE: 34.9 VOS: 6002

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	11.6	11.6	11.6	11.6	11.5	11.5	11.5	11.5
22.5	11.3	11.3	11.2	11.2	11.2	11.2	11.2	11.2
45.0	11.3	11.5	11.6	11.6	11.8	11.9	12.1	12.2
67.5	12.2	12.4	12.6	12.9	12.9	13.1	13.2	13.4
90.0	13.4	13.2	13.4	13.4	13.4	13.4	13.2	13.1
112.5	13.2	13.2	13.4	13.4	13.4	13.5	13.5	13.4
135.0	13.2	13.4	13.4	13.5	13.7	13.8	13.7	13.8
157.5	13.7	13.7	13.5	13.5	13.4	13.4	13.4	13.4
180.0	13.4	13.5	13.5	13.5	13.5	13.7	13.7	13.7
202.5	13.7	13.7	13.7	13.7	13.5	13.4	13.2	13.1
225.0	12.9	12.8	12.9	12.9	12.9	12.8	12.9	12.5
247.5	12.4	12.2	12.1	11.9	11.9	11.9	11.8	11.6
270.0	11.6	11.6	11.5	11.3	11.3	11.2	11.2	11.2
292.5	11.3	11.2	11.3	11.3	11.3	11.5	11.5	11.6
315.0	11.6	11.6	11.8	11.8	11.8	11.9	12.1	11.9
337.5	11.8	11.6	11.8	11.8	11.8	11.6	11.6	11.6

DEPTH: 1576 TILT: 0 RANGE: 34.8 VOS: 6013

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	9.4	9.4	9.6	9.6	9.6	9.6	9.6	9.6
22.5	9.6	9.6	9.6	9.6	9.6	9.7	9.6	9.6
45.0	9.6	9.4	9.4	9.1	9.1	9.0	9.0	8.8
67.5	8.8	9.0	9.1	9.3	9.4	9.6	9.7	9.6
90.0	9.6	9.6	9.6	9.8	9.8	10.0	10.1	10.1
112.5	10.1	10.1	10.1	10.3	10.3	10.3	10.3	10.3
135.0	10.3	10.4	10.4	10.4	10.7	10.7	10.9	11.0
157.5	11.0	11.0	10.9	10.9	10.6	10.4	10.4	10.4
180.0	10.4	10.6	10.6	10.6	10.4	10.4	10.4	10.6
202.5	10.6	10.7	10.9	11.0	10.9	10.9	10.9	10.7
225.0	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7
247.5	10.6	10.4	10.1	10.0	9.8	9.8	10.0	10.0
270.0	10.0	10.0	10.1	10.1	10.1	10.0	10.0	10.0
292.5	10.0	10.0	9.8	10.0	10.1	10.0	10.0	10.0
315.0	9.8	9.8	9.7	9.7	9.7	9.8	9.7	9.7
337.5	9.6	9.4	9.4	9.3	9.3	9.1	9.3	9.3

DEPTH: 1578 TILT: 0 RANGE: 34.8 VOS: 6022

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	8.1	8.4	8.5	8.5	8.5	8.5	8.4	8.4
22.5	8.4	8.4	8.4	8.4	8.4	8.4	8.5	8.5
45.0	8.7	8.7	8.8	8.8	9.0	9.0	9.1	9.4
67.5	9.7	10.1	10.3	10.3	10.0	9.8	9.8	9.7
90.0	9.7	9.6	9.3	9.1	8.8	8.7	8.4	8.1
112.5	7.8	7.8	7.5	7.5	7.3	7.5	7.3	7.3
135.0	7.2	7.3	7.3	7.2	7.2	7.2	7.3	7.3
157.5	7.5	7.5	7.5	7.5	7.5	7.5	7.6	7.8
180.0	7.8	7.9	7.8	7.8	7.8	7.6	7.5	7.5
202.5	7.5	7.5	7.3	7.2	7.2	7.1	7.1	7.1
225.0	7.1	7.1	6.9	6.8	6.5	6.5	6.2	6.2
247.5	6.2	6.3	6.8	7.6	7.9	8.1	7.8	7.6
270.0	7.6	7.5	7.3	7.3	7.3	7.2	7.2	7.1
292.5	7.1	7.1	6.9	6.9	6.9	6.9	6.9	6.9
315.0	6.8	6.9	6.9	7.1	7.1	7.1	7.2	7.3
337.5	7.5	7.5	7.5	7.5	7.6	7.6	7.8	7.9

DEPTH: 1580 TILT: 0 RANGE: 34.9 VOS: 6002

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	2.6	2.6	2.6	2.8	2.8	2.8	2.9	2.6
22.5	2.6	2.8	2.9	3.1	3.5	3.8	4.1	4.3
45.0	4.7	4.9	5.0	5.1	5.1	5.1	5.0	5.0
67.5	5.0	5.0	5.0	4.9	4.9	4.9	4.9	4.9
90.0	4.9	4.9	4.9	5.0	5.0	5.0	5.1	5.1
112.5	5.1	5.3	5.3	5.4	5.4	5.6	5.7	5.9
135.0	6.0	6.2	6.3	6.3	6.5	6.8	6.8	6.9
157.5	6.9	6.8	6.8	6.8	6.8	6.8	6.8	6.9
180.0	6.9	7.1	7.1	7.1	7.2	7.2	6.9	6.8
202.5	6.9	6.9	6.9	6.9	6.9	6.9	6.9	7.2
225.0	7.1	7.1	7.1	7.1	7.1	6.9	6.5	6.0
247.5	5.6	5.3	5.1	5.0	4.9	4.7	4.4	4.1
270.0	4.0	3.8	3.5	3.4	3.4	3.1	3.1	3.1
292.5	3.1	3.1	3.1	2.9	2.9	2.8	2.9	2.8
315.0	2.6	2.8	2.8	2.6	2.6	2.6	2.6	2.6
337.5	2.6	2.5	2.6	2.6	2.6	2.6	2.5	2.5

DEPTH: 1582 TILT: 0 RANGE: 34.9 VOS: 6002

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
22.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
45.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
67.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
90.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
112.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
135.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
157.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
180.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
202.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
225.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
247.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
270.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
292.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
315.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
337.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

DEPTH: 1587 TILT: 0 RANGE: 24.9 VOS: 6001

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
22.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
45.0	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7
67.5	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
90.0	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
112.5	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
135.0	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
157.5	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
180.0	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
202.5	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
225.0	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
247.5	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
270.0	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
292.5	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8
315.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
337.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8

DEPTH: 1589 TILT: 0 RANGE: 34.9 VOS: 6002

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
22.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
45.0	0.9	0.9	0.9	0.9	0.9	0.9	8.4	8.5
67.5	8.8	9.1	9.3	9.7	9.9	10.0	10.0	10.1
90.0	10.3	10.3	10.3	10.3	10.4	10.3	10.3	10.3
112.5	10.6	10.7	10.9	10.9	10.9	10.9	10.9	10.7
135.0	10.9	10.6	10.7	10.9	11.0	11.2	11.2	11.2
157.5	11.3	11.3	11.5	11.2	10.9	10.7	10.7	10.7
180.0	10.9	10.9	10.9	10.7	10.7	10.7	10.7	10.9
202.5	10.7	10.6	10.3	10.3	10.0	8.8	7.5	7.1
225.0	6.8	6.3	5.7	5.1	4.9	2.9	2.6	2.6
247.5	2.5	2.2	2.1	2.1	2.1	2.1	2.1	1.0
270.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
292.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
315.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
337.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9

DEPTH: 1591 TILT: 0 RANGE: 34.8 VOS: 6003

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	16.5	16.5	16.6	16.6	16.6	16.5	16.5	16.5
22.5	16.2	16.0	16.0	16.2	16.3	16.5	16.6	16.7
45.0	17.0	17.5	17.6	17.6	17.8	17.8	17.8	17.6
67.5	17.5	17.3	17.3	17.5	17.5	17.5	17.8	17.9
90.0	18.2	18.4	18.4	18.1	17.9	17.6	17.6	17.3
112.5	17.0	16.9	16.9	17.0	16.7	16.7	16.6	16.6
135.0	16.7	16.7	16.7	16.9	17.0	17.0	17.0	17.2
157.5	17.2	17.3	17.3	17.5	17.5	17.5	17.5	17.2
180.0	17.2	17.2	17.2	17.2	17.0	16.7	16.9	16.9
202.5	17.0	17.0	17.0	17.2	17.3	17.5	17.3	17.3
225.0	17.2	17.2	17.0	16.9	16.7	16.7	16.7	16.9
247.5	17.0	17.0	17.0	17.0	17.0	17.2	17.2	17.2
270.0	17.2	17.3	17.3	17.3	17.5	17.5	17.5	17.6
292.5	17.8	17.8	17.8	17.6	17.6	17.6	17.6	17.6
315.0	17.6	17.8	17.8	17.9	17.9	17.9	17.6	17.5
337.5	17.3	17.2	17.0	16.9	16.7	16.6	16.5	16.3

DEPTH: 1593 TILT: 0 RANGE: 34.8 VOS: 6011

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
22.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
45.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
67.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
90.0	0.9	0.9	0.9	0.7	0.9	0.7	0.7	0.7
112.5	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
135.0	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
157.5	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
180.0	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
202.5	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
225.0	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
247.5	0.7	0.7	0.9	0.9	0.9	0.9	0.9	0.9
270.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
292.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
315.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
337.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9

DEPTH: 1601 TILT: 0 RANGE: 34.8 VOS: 6003

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0
22.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
45.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
67.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
90.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
112.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
135.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
157.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
180.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
202.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
225.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
247.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
270.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
292.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
315.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
337.5	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9

DEPTH: 1602 TILT: 0 RANGE: 34.8 VOS: 6016

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	14.3	14.3	14.1	14.0	13.8	13.8	13.8	14.0
22.5	14.1	14.0	14.1	14.1	14.0	13.8	13.8	13.8
45.0	13.7	13.7	13.8	14.0	14.3	14.7	15.4	15.6
67.5	15.6	15.3	15.1	15.0	14.7	14.4	14.3	14.3
90.0	14.4	14.7	14.8	15.1	15.3	15.3	15.6	15.6
112.5	15.6	15.7	15.7	15.7	15.9	15.9	15.9	15.6
135.0	15.6	15.4	15.4	15.4	15.6	15.6	15.6	15.6
157.5	15.4	15.3	15.1	15.0	15.0	15.0	14.8	15.0
180.0	15.0	15.3	15.4	15.6	15.7	15.9	15.9	15.7
202.5	15.6	15.4	15.4	15.4	15.3	15.3	15.1	15.3
225.0	15.1	15.1	15.0	14.8	14.7	14.7	14.7	14.8
247.5	15.0	15.1	15.1	15.1	15.0	15.0	15.1	15.0
270.0	15.0	15.0	14.8	14.8	14.7	14.8	15.0	15.1
292.5	15.1	15.0	14.8	14.6	14.3	14.1	13.8	13.7
315.0	13.5	13.4	13.2	13.1	13.1	13.1	12.9	12.9
337.5	12.9	13.1	13.2	13.5	13.8	14.1	14.3	14.4

DEPTH: 1604 TILT: 0 RANGE: 34.9 VOS: 6010

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	10.0	10.0	10.0	9.9	9.9	9.9	9.7	9.6
22.5	9.6	9.6	9.6	9.6	9.6	9.7	9.9	10.1
45.0	10.3	10.6	10.6	10.6	10.6	10.7	10.7	10.9
67.5	10.9	11.0	11.3	11.3	11.3	11.5	11.8	11.8
90.0	12.1	12.1	12.4	12.5	12.6	12.8	12.6	12.6
112.5	12.6	12.5	12.5	12.5	12.5	12.5	12.6	12.8
135.0	12.8	12.9	12.9	12.9	13.1	13.1	13.1	12.9
157.5	12.9	12.9	12.9	12.9	13.1	13.1	13.1	13.1
180.0	13.1	12.9	12.9	12.8	12.8	12.8	12.8	12.8
202.5	12.8	12.8	12.6	12.8	12.9	13.1	13.4	13.5
225.0	13.2	12.8	12.6	12.2	11.5	10.6	10.4	10.4
247.5	10.3	10.1	10.0	10.0	10.0	10.3	10.3	10.3
270.0	10.1	10.1	10.0	9.9	9.9	9.9	9.9	9.9
292.5	10.0	10.1	10.3	10.3	10.3	10.1	10.1	10.1
315.0	10.1	10.1	10.3	10.3	10.3	10.4	10.6	10.4
337.5	10.4	10.4	10.4	10.4	10.3	10.3	10.1	10.1

DEPTH: 1606 TILT: 0 RANGE: 34.8 VOS: 6004

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	1.9	1.9	1.9	1.9	1.9	1.9	2.1	2.1
22.5	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.2
45.0	2.2	2.2	2.2	2.2	4.3	4.3	5.9	6.5
67.5	7.1	7.3	7.8	7.9	8.1	8.1	8.1	8.2
90.0	8.2	8.2	8.1	8.2	8.2	8.4	8.5	8.2
112.5	8.1	8.1	8.2	8.2	8.2	8.2	8.2	8.2
135.0	8.2	8.4	8.4	8.4	8.4	8.5	8.4	8.2
157.5	8.2	8.1	8.1	8.1	7.9	7.9	7.9	7.9
180.0	7.9	7.8	7.8	7.8	7.8	7.8	7.6	7.3
202.5	6.8	5.6	5.3	5.3	5.3	5.1	5.0	5.0
225.0	4.8	4.8	4.8	4.7	4.7	4.7	4.6	4.6
247.5	4.4	3.8	3.5	3.4	3.2	2.9	2.8	2.6
270.0	2.5	2.5	2.4	2.2	2.2	2.1	2.1	1.9
292.5	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8
315.0	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
337.5	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9

DEPTH: 1608 TILT: 0 RANGE: 25.0 VOS: 6021

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
22.5	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
45.0	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
67.5	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
90.0	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
112.5	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
135.0	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
157.5	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
180.0	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
202.5	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
225.0	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
247.5	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
270.0	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
292.5	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
315.0	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
337.5	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7

DEPTH: 1610 TILT: 0 RANGE: 34.8 VOS: 6003

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	11.6	11.6	11.3	11.3	11.3	11.3	11.5	11.6
22.5	11.8	11.9	12.2	12.5	12.6	12.9	13.1	13.8
45.0	14.8	16.3	16.0	16.0	16.0	16.2	16.0	15.9
67.5	15.9	15.7	15.3	15.1	15.1	15.1	15.0	15.1
90.0	15.3	15.6	15.6	15.7	15.7	15.9	15.9	16.0
112.5	15.9	16.0	16.0	16.2	16.2	16.2	16.2	16.3
135.0	16.3	16.3	16.3	16.3	16.5	16.6	16.7	16.7
157.5	16.6	16.5	16.3	16.2	16.2	16.2	16.3	16.3
180.0	16.2	16.0	15.7	15.6	15.6	15.6	15.7	16.0
202.5	16.0	15.9	15.7	15.9	15.7	15.9	15.7	15.7
225.0	15.9	16.0	16.5	16.5	16.5	16.5	16.3	16.3
247.5	16.2	16.0	16.0	16.0	16.0	16.2	16.3	16.2
270.0	15.9	15.6	15.4	15.1	14.7	14.5	13.8	12.8
292.5	12.3	12.0	11.8	11.6	11.6	11.6	11.6	11.6
315.0	11.6	11.5	11.5	11.3	11.3	11.5	11.9	11.8
337.5	11.8	11.8	11.9	11.9	12.0	11.9	11.9	11.9

DEPTH: 1612 TILT: 0 RANGE: 34.8 VOS: 6003

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	13.2	13.2	13.2	13.1	12.9	12.8	12.8	12.8
22.5	12.8	12.9	13.1	13.2	13.2	13.2	13.4	13.5
45.0	13.5	13.8	14.5	14.7	15.0	16.0	16.2	16.0
67.5	16.0	16.2	16.0	16.2	16.5	16.6	16.6	16.5
90.0	16.3	16.3	16.3	16.3	16.2	16.2	16.2	16.2
112.5	16.0	16.0	16.0	16.2	16.2	16.3	16.5	16.7
135.0	16.7	16.6	16.6	16.5	16.3	16.2	16.2	16.0
157.5	16.0	16.0	16.0	15.9	15.9	16.0	16.0	16.2
180.0	16.2	16.0	16.0	15.7	15.4	15.3	15.1	15.0
202.5	14.8	14.8	14.8	14.8	15.0	15.1	15.0	15.0
225.0	15.0	14.8	14.7	14.4	14.4	14.4	14.4	14.2
247.5	14.1	13.7	13.2	13.2	13.5	13.2	13.1	12.9
270.0	12.9	12.8	12.6	12.6	12.6	12.6	12.6	12.5
292.5	12.2	12.3	12.2	12.2	12.2	12.2	12.2	12.2
315.0	12.2	12.3	12.3	12.5	12.6	12.8	12.6	12.6
337.5	12.6	12.5	12.8	12.8	12.9	13.2	13.4	13.4

DEPTH: 1614 TILT: 0 RANGE: 34.8 VOS: 6003

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	12.6	12.5	12.5	12.3	12.5	12.6	12.8	12.9
22.5	12.9	13.2	13.2	13.2	13.2	13.2	13.2	13.2
45.0	13.4	13.5	13.7	13.8	14.2	14.8	15.3	15.4
67.5	15.4	15.4	15.4	15.6	15.7	15.7	15.7	16.0
90.0	16.2	16.3	16.5	16.3	16.2	16.0	16.3	16.5
112.5	16.6	16.5	16.5	16.5	16.5	16.3	16.2	16.0
135.0	16.0	16.2	16.3	16.6	16.9	16.9	16.9	16.7
157.5	16.6	16.6	16.3	16.5	16.6	16.7	16.9	16.7
180.0	16.6	16.6	16.3	16.9	16.9	16.7	16.6	16.5
202.5	16.6	16.6	16.5	16.3	16.3	16.2	16.0	15.9
225.0	15.9	15.6	15.4	15.7	15.4	15.3	15.1	14.8
247.5	14.8	14.7	14.5	14.1	13.8	13.2	13.1	12.9
270.0	12.9	12.8	12.8	12.6	12.6	12.6	12.6	12.8
292.5	12.9	12.9	13.1	13.1	13.1	13.1	13.1	13.2
315.0	13.2	13.2	13.1	12.9	12.8	12.8	13.1	13.2
337.5	13.4	13.4	13.4	13.2	13.2	13.2	13.1	12.9

DEPTH: 1616 TILT: 0 RANGE: 34.8 VOS: 6003

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	13.4	13.2	13.4	13.4	13.4	13.4	13.2	13.4
22.5	13.4	13.4	13.4	13.4	13.5	13.8	14.0	14.1
45.0	14.2	14.7	15.0	15.1	15.4	15.6	15.6	15.3
67.5	15.3	15.1	15.3	15.3	15.4	15.4	15.4	15.4
90.0	15.4	15.6	15.7	15.9	15.9	16.0	16.0	16.0
112.5	16.3	16.5	16.6	16.6	16.7	16.9	16.7	16.9
135.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
157.5	17.2	17.2	17.0	16.9	16.7	16.6	16.5	16.5
180.0	16.5	16.5	16.2	16.2	16.0	16.0	15.9	15.7
202.5	15.7	15.6	15.4	15.3	15.1	14.8	14.8	15.0
225.0	15.3	15.4	15.6	15.7	15.4	15.3	15.3	15.1
247.5	15.1	15.0	14.8	14.7	14.4	14.4	14.4	14.2
270.0	14.2	14.1	13.8	13.7	13.4	13.4	13.2	13.1
292.5	13.1	13.1	13.2	13.2	13.4	13.4	13.2	13.2
315.0	12.9	13.2	13.2	13.4	13.2	13.2	13.2	13.2
337.5	13.2	13.1	13.1	13.1	13.1	13.2	13.2	13.2

DEPTH: 1618 TILT: 0 RANGE: 34.8 VOS: 6008

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	11.9	12.1	11.9	11.9	11.8	11.9	11.8	11.9
22.5	12.1	12.2	12.3	12.3	12.5	12.5	12.3	12.5
45.0	12.5	12.6	12.6	12.9	13.1	13.2	13.2	13.4
67.5	13.4	13.5	13.8	14.1	14.1	14.3	14.6	14.6
90.0	14.6	14.6	14.6	14.6	14.6	14.7	14.7	15.0
112.5	15.0	15.0	15.0	15.0	15.3	15.4	15.4	15.7
135.0	15.9	16.0	16.0	16.2	16.3	16.3	16.2	16.0
157.5	15.9	16.0	16.0	16.2	16.2	16.2	16.0	15.9
180.0	15.7	15.6	15.4	15.4	15.4	15.3	15.3	15.0
202.5	15.0	14.8	14.7	14.8	14.8	15.0	15.1	15.3
225.0	15.0	14.4	14.1	13.7	13.4	13.1	12.9	12.8
247.5	12.8	12.8	12.8	12.6	12.5	12.6	12.6	12.8
270.0	12.6	12.5	12.3	12.3	12.3	12.3	12.5	12.5
292.5	12.5	12.3	12.3	12.2	12.1	12.1	12.1	12.1
315.0	11.8	11.8	11.6	11.8	11.6	11.6	11.8	11.8
337.5	11.8	11.9	12.2	12.3	12.2	12.2	12.1	12.1

DEPTH: 1620 TILT: 0 RANGE: 34.8 VOS: 6022

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	9.7	9.6	9.6	9.4	9.4	9.4	9.4	9.4
22.5	9.4	9.6	9.7	10.0	10.1	10.4	10.6	10.7
45.0	10.9	10.7	10.9	10.9	11.0	11.2	11.3	11.8
67.5	12.2	12.5	12.5	12.6	12.6	12.6	12.6	12.6
90.0	12.8	12.6	12.6	12.6	12.6	12.5	12.3	12.2
112.5	12.3	12.5	12.6	12.6	12.5	12.3	12.2	12.2
135.0	12.2	12.2	12.5	12.6	12.6	12.8	12.8	12.8
157.5	12.6	12.6	12.6	12.8	12.6	12.6	12.6	12.6
180.0	12.6	12.5	12.3	12.3	12.2	12.2	12.1	12.1
202.5	12.1	11.9	11.9	11.8	11.8	11.8	11.6	11.3
225.0	11.2	10.9	10.7	10.4	10.3	10.1	10.0	9.8
247.5	9.8	9.7	9.7	9.8	9.8	9.8	9.8	9.8
270.0	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8
292.5	9.8	9.8	9.8	9.7	9.6	9.4	9.3	9.1
315.0	9.3	9.1	9.3	9.3	9.4	9.4	9.6	9.6
337.5	9.6	9.6	9.6	9.7	9.8	9.7	9.7	9.7

DEPTH: 1622 TILT: 0 RANGE: 24.9 VOS: 6004

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	6.9	7.1	7.2	7.6	7.9	8.3	8.4	8.6
22.5	8.8	8.8	8.8	8.6	8.4	8.1	8.1	8.0
45.0	7.9	7.9	7.8	7.8	7.8	7.7	7.7	7.7
67.5	7.7	7.8	7.9	8.0	8.1	8.4	8.5	8.7
90.0	8.8	9.2	9.4	9.8	9.8	10.0	10.1	10.2
112.5	10.3	10.3	10.3	10.1	10.0	10.1	10.1	10.0
135.0	10.0	10.0	9.9	9.8	9.8	9.8	9.6	9.5
157.5	9.4	9.4	9.3	9.2	9.2	9.2	9.2	9.1
180.0	9.1	9.0	8.9	8.7	8.5	8.4	8.0	7.7
202.5	7.6	7.4	7.3	7.3	7.2	7.1	7.0	7.0
225.0	6.9	6.8	6.7	6.4	6.1	5.7	5.7	5.6
247.5	5.6	5.5	5.5	5.5	5.3	5.2	5.2	5.3
270.0	5.5	5.6	5.6	5.7	5.7	5.9	5.8	5.9
292.5	5.9	6.0	5.9	6.0	6.0	6.0	6.1	6.1
315.0	6.2	6.3	6.3	6.3	6.3	6.3	6.2	6.2
337.5	6.4	6.3	6.3	6.3	6.4	6.6	6.7	6.8

DEPTH: 1624 TILT: 0 RANGE: 24.9 VOS: 6002

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
22.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
45.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
67.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
90.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
112.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
135.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
157.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
180.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
202.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
225.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
247.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
270.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
292.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
315.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
337.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8

DEPTH: 1625 TILT: 0 RANGE: 24.9 VOS: 6003

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
22.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
45.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
67.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
90.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
112.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
135.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
157.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
180.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
202.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
225.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
247.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
270.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
292.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
315.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
337.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6

DEPTH: 1630 TILT: 0 RANGE: 49.8 VOS: 6004

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	1.3	1.3	1.3	1.3	1.3	1.0	1.3	1.3
22.5	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
45.0	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
67.5	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
90.0	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
112.5	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
135.0	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
157.5	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
180.0	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
202.5	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
225.0	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
247.5	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
270.0	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
292.5	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
315.0	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
337.5	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3

DEPTH: 1655 TILT: 0 RANGE: 49.8 VOS: 6004

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
22.5	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
45.0	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
67.5	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
90.0	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
112.5	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
135.0	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
157.5	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
180.0	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
202.5	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
225.0	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
247.5	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
270.0	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
292.5	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
315.0	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
337.5	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3

DEPTH: 1656 TILT: 0 RANGE: 49.8 VOS: 6002

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	18.3	18.5	18.9	18.9	18.9	19.1	19.3	19.5
22.5	20.0	20.0	20.2	20.4	20.6	20.8	21.0	21.2
45.0	21.4	21.2	21.2	21.4	21.6	21.6	21.6	21.6
67.5	21.8	22.1	22.1	21.8	22.3	22.3	22.3	22.5
90.0	22.5	22.9	23.1	23.1	22.9	22.7	22.3	22.3
112.5	22.3	22.3	22.5	22.9	23.1	22.5	22.3	22.3
135.0	22.3	22.3	22.3	22.3	22.3	22.1	22.1	21.8
157.5	21.6	21.8	22.1	22.1	22.3	22.3	22.3	22.3
180.0	22.1	21.8	21.6	21.6	21.4	21.2	21.0	21.2
202.5	21.6	21.6	21.8	21.8	21.8	22.1	22.1	22.3
225.0	22.3	22.3	22.3	22.3	22.7	22.7	22.9	23.1
247.5	23.1	23.3	23.3	23.5	23.3	23.3	23.1	22.9
270.0	23.1	22.7	22.5	22.1	21.6	21.4	20.8	20.0
292.5	18.7	17.9	17.2	16.8	16.6	16.4	16.4	16.4
315.0	16.4	16.6	16.6	16.6	16.6	16.8	17.0	17.0
337.5	17.2	17.4	17.4	17.6	17.6	18.1	18.1	18.3

DEPTH: 1657 TILT: 0 RANGE: 49.8 VOS: 6002

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	16.8	16.8	16.8	17.0	17.0	17.2	17.2	17.4
22.5	17.4	17.6	17.6	17.6	17.6	17.6	17.9	17.9
45.0	18.1	18.3	18.3	18.7	18.7	18.9	18.9	19.1
67.5	19.3	19.7	20.2	20.6	21.0	21.6	22.1	22.5
90.0	22.9	23.5	23.5	23.5	23.1	23.1	23.1	23.1
112.5	23.1	23.1	23.1	22.9	22.7	22.9	23.1	23.1
135.0	22.7	22.7	22.7	22.9	22.9	22.7	22.7	22.9
157.5	23.1	23.1	23.3	22.9	23.1	22.9	22.5	22.5
180.0	22.5	22.5	22.5	22.7	22.7	22.7	22.7	22.7
202.5	22.5	22.7	22.7	22.7	22.7	22.7	22.7	22.7
225.0	22.7	22.7	22.7	22.7	22.7	22.5	22.5	22.5
247.5	22.7	22.5	22.7	22.7	22.7	22.9	22.7	22.7
270.0	22.5	22.5	22.3	22.3	21.6	21.0	20.2	19.3
292.5	18.5	17.9	17.6	17.2	16.8	16.6	16.4	16.4
315.0	16.2	16.2	16.4	16.4	16.8	16.6	16.6	16.6
337.5	16.2	16.2	16.4	16.4	16.8	16.8	16.8	16.8

DEPTH: 1659 TILT: 0 RANGE: 49.8 VOS: 6004

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	16.6	16.6	16.8	17.0	17.0	17.0	17.0	17.0
22.5	17.0	16.8	16.8	16.8	16.8	16.8	17.0	17.0
45.0	17.0	17.2	17.4	17.6	18.1	18.5	18.9	19.1
67.5	19.5	19.7	20.2	20.6	21.0	21.6	21.8	22.0
90.0	22.3	22.5	22.5	22.5	22.7	22.7	22.7	22.7
112.5	22.3	21.8	22.0	22.0	22.0	22.0	22.0	22.3
135.0	22.3	22.5	22.5	22.3	22.5	22.3	22.5	22.7
157.5	22.9	22.9	22.9	22.9	22.7	22.7	22.7	22.7
180.0	22.9	22.9	22.9	22.7	22.7	22.7	22.5	22.5
202.5	22.5	22.5	22.3	22.0	21.6	21.4	21.2	21.2
225.0	21.0	20.8	20.6	20.4	20.2	19.9	19.7	19.5
247.5	19.3	19.1	18.9	19.5	19.5	19.5	19.7	19.5
270.0	19.7	19.5	19.3	18.7	18.7	18.3	18.3	18.1
292.5	17.8	17.6	17.6	17.6	17.4	17.4	17.4	17.2
315.0	17.2	17.2	17.0	16.8	16.8	16.8	16.6	16.6
337.5	16.4	16.4	16.4	16.4	16.2	16.4	16.2	16.4

DEPTH: 1661 TILT: 0 RANGE: 49.8 VOS: 6022

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	17.4	17.4	17.4	17.6	17.6	17.9	17.9	18.1
22.5	17.9	17.9	18.1	18.1	18.1	18.1	18.1	18.3
45.0	18.3	18.5	18.5	18.7	18.7	18.9	19.1	19.5
67.5	20.0	20.4	20.6	21.6	21.8	21.8	22.3	22.7
90.0	22.9	23.1	22.9	22.7	22.7	22.9	22.9	23.1
112.5	23.1	23.1	23.1	23.1	23.3	23.3	23.3	23.5
135.0	23.5	23.5	23.5	23.3	22.9	22.7	22.7	22.7
157.5	22.9	22.9	22.9	22.9	22.9	22.9	22.5	22.5
180.0	22.3	22.5	22.5	22.5	22.3	22.3	22.7	22.7
202.5	22.9	22.7	22.7	21.8	21.4	20.8	20.6	20.2
225.0	19.7	19.5	19.3	18.9	18.5	18.3	18.3	18.5
247.5	18.5	18.9	18.7	18.5	18.1	18.1	18.1	17.9
270.0	17.6	17.6	17.6	17.9	18.1	17.9	17.9	17.6
292.5	17.6	17.6	17.6	17.9	17.9	17.9	17.4	17.4
315.0	17.6	17.4	17.6	17.6	17.4	17.6	17.6	17.6
337.5	17.6	17.9	17.9	17.9	17.6	17.6	17.4	17.4

DEPTH: 1663 TILT: 0 RANGE: 49.8 VOS: 6003

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	17.8	18.1	18.3	18.3	18.5	18.5	18.7	18.7
22.5	18.7	18.5	18.3	18.1	18.3	18.3	18.3	18.3
45.0	18.3	18.7	18.7	18.9	18.7	18.9	19.1	19.5
67.5	19.9	20.6	21.2	21.8	22.3	22.5	22.7	23.1
90.0	23.5	23.9	23.7	24.1	23.9	23.7	23.7	23.3
112.5	23.1	22.9	23.1	23.1	23.1	22.9	22.7	22.5
135.0	22.3	22.0	21.6	21.6	21.6	21.6	21.6	21.2
157.5	21.0	20.8	20.8	20.6	20.6	20.6	20.6	20.6
180.0	20.6	20.4	20.4	20.2	19.9	19.7	19.5	19.3
202.5	19.3	19.1	19.1	18.9	18.9	19.3	19.5	19.3
225.0	19.3	19.3	19.3	19.3	19.3	19.5	19.7	19.5
247.5	19.5	19.1	18.9	18.7	18.3	18.3	18.1	18.1
270.0	17.8	17.6	17.6	17.6	17.4	17.2	17.2	17.2
292.5	17.2	17.2	17.0	17.0	17.0	16.8	16.8	16.8
315.0	16.8	17.0	17.2	17.6	17.6	17.6	17.6	17.4
337.5	17.2	17.2	17.2	17.2	17.0	17.2	17.4	17.6

DEPTH: 1665 TILT: 0 RANGE: 49.8 VOS: 6004

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	14.5	14.7	14.5	14.5	14.5	14.5	14.3	14.5
22.5	14.3	14.3	14.3	14.1	13.9	13.9	13.9	13.9
45.0	14.1	14.1	14.7	15.1	15.5	16.0	16.6	17.2
67.5	17.4	18.5	19.3	19.5	19.3	20.8	21.0	21.6
90.0	22.0	22.3	22.9	23.3	23.5	23.5	23.7	23.9
112.5	24.1	24.4	24.4	24.6	24.4	24.1	23.9	23.7
135.0	23.5	23.3	23.1	22.9	22.7	22.7	22.5	22.5
157.5	22.5	22.0	21.8	21.6	21.4	21.2	21.2	21.4
180.0	21.4	21.4	21.2	21.0	20.4	20.2	20.2	20.2
202.5	20.2	19.9	19.7	19.7	19.5	19.5	19.5	19.3
225.0	19.1	19.1	19.1	19.1	19.1	19.5	19.5	19.5
247.5	19.3	18.7	18.5	17.6	17.2	17.2	17.2	17.2
270.0	16.8	16.6	16.4	16.4	16.4	16.2	16.0	15.5
292.5	15.1	14.9	14.7	14.5	14.3	14.3	14.1	14.1
315.0	13.9	13.6	13.6	13.4	13.6	13.6	13.9	13.9
337.5	13.9	13.9	13.9	13.9	14.1	14.1	14.3	14.5

DEPTH: 1667 TILT: 0 RANGE: 49.8 VOS: 6002

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	12.4	12.4	12.4	12.6	12.6	12.8	12.8	13.0
22.5	13.2	13.4	13.7	13.7	13.9	14.3	15.3	15.8
45.0	15.8	16.0	16.2	16.4	16.8	17.0	17.2	17.9
67.5	18.3	19.1	19.5	20.2	20.6	21.2	21.6	22.1
90.0	22.1	22.1	22.1	22.3	22.5	22.5	22.7	22.7
112.5	22.9	22.9	22.9	22.9	22.7	23.1	23.1	23.1
135.0	22.7	22.3	22.3	22.1	21.8	21.6	21.4	21.2
157.5	20.8	20.6	20.2	20.0	19.7	19.5	19.3	19.3
180.0	19.3	19.1	19.1	19.1	19.1	19.5	19.5	19.3
202.5	19.1	19.1	19.1	18.9	19.3	19.3	19.3	19.3
225.0	19.3	19.1	19.1	19.3	19.3	19.3	19.3	18.9
247.5	18.7	18.5	18.1	18.1	18.1	18.3	18.3	18.3
270.0	18.5	18.5	18.5	18.3	18.3	18.1	17.9	17.9
292.5	18.1	18.1	17.9	17.6	17.4	16.4	16.0	15.3
315.0	14.9	14.1	13.7	13.4	13.0	12.8	12.6	12.4
337.5	12.2	12.2	12.0	12.0	12.2	12.2	12.4	12.4

DEPTH: 1669 TILT: 0 RANGE: 49.8 VOS: 6012

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3
22.5	11.3	11.3	11.3	11.6	11.6	11.8	12.0	12.2
45.0	12.4	12.6	13.2	13.2	13.4	13.7	13.9	14.5
67.5	15.3	16.2	17.2	18.5	20.2	21.2	22.1	22.5
90.0	23.1	23.5	23.5	23.5	23.1	23.1	22.7	22.5
112.5	22.3	22.1	21.8	21.8	21.6	21.4	21.4	21.4
135.0	21.2	21.0	20.6	20.4	20.2	20.0	19.7	19.3
157.5	19.1	18.9	18.9	18.9	19.1	19.1	19.1	18.9
180.0	18.9	18.9	19.1	19.3	19.5	19.3	19.1	18.9
202.5	18.9	18.9	18.9	18.7	18.7	18.3	18.3	18.1
225.0	17.9	17.4	17.4	17.4	17.2	17.2	17.0	17.0
247.5	16.8	16.8	16.6	16.6	16.4	16.2	16.0	15.8
270.0	15.3	14.9	14.5	14.3	14.1	14.1	13.9	13.4
292.5	13.4	12.8	12.6	12.2	12.2	11.8	11.8	11.6
315.0	11.3	11.3	11.1	11.1	11.1	10.9	11.1	10.9
337.5	11.1	11.1	11.1	11.3	11.1	11.3	11.3	11.3

DEPTH: 1671 TILT: 0 RANGE: 49.8 VOS: 6004

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	10.1	9.9	9.9	9.9	9.7	9.7	9.7	9.7
22.5	9.7	9.7	9.7	9.7	9.9	10.1	10.5	10.9
45.0	11.5	12.2	12.6	13.0	13.6	14.3	15.1	15.7
67.5	16.4	17.0	17.4	18.1	18.5	18.7	18.7	19.1
90.0	19.3	19.5	19.3	19.3	19.5	19.5	19.3	19.3
112.5	19.3	19.3	19.5	19.3	19.3	19.1	18.9	18.9
135.0	18.9	18.9	19.1	19.5	19.5	19.5	19.3	19.1
157.5	19.1	18.9	18.9	18.9	18.7	18.7	18.5	18.5
180.0	18.3	18.3	18.3	18.3	18.3	18.5	18.5	18.3
202.5	18.1	18.1	17.6	17.8	17.8	17.8	18.1	18.1
225.0	17.8	17.8	17.6	17.6	17.6	17.6	17.6	17.6
247.5	17.4	17.2	17.0	17.0	17.0	16.8	17.0	17.2
270.0	17.0	17.2	17.2	17.2	17.0	16.6	16.6	16.4
292.5	16.6	16.4	16.2	16.0	15.5	14.7	14.3	13.6
315.0	13.0	12.8	12.4	12.2	12.0	11.8	11.5	11.1
337.5	10.9	10.9	10.7	10.5	10.5	10.3	10.3	10.1

DEPTH: 1673 TILT: 0 RANGE: 49.8 VOS: 6004

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	15.3	15.3	15.7	16.0	16.4	16.6	16.8	16.8
22.5	16.8	16.8	17.0	17.0	17.2	17.2	17.4	17.6
45.0	17.6	17.8	18.1	18.3	18.7	18.9	19.3	19.3
67.5	19.3	19.5	19.5	19.7	19.9	20.2	20.6	21.2
90.0	21.6	22.3	22.7	23.1	23.1	23.1	22.7	22.3
112.5	22.3	22.0	21.8	21.6	21.6	21.8	22.0	22.0
135.0	22.3	22.7	22.9	23.1	23.1	23.1	23.1	22.9
157.5	22.9	22.7	22.7	22.7	22.7	22.7	22.7	22.5
180.0	22.5	22.5	22.5	22.5	22.5	22.7	22.7	22.7
202.5	22.7	22.5	22.7	22.5	22.5	22.5	22.5	22.5
225.0	22.5	22.7	22.7	22.7	22.5	22.7	22.7	22.7
247.5	22.7	22.7	23.1	23.5	23.7	23.9	23.9	23.5
270.0	23.3	23.1	22.7	22.7	22.7	22.9	22.9	22.9
292.5	22.9	22.7	22.5	22.0	21.8	21.4	20.6	19.9
315.0	19.5	18.9	18.7	18.3	18.1	17.8	17.2	16.8
337.5	16.6	16.2	16.0	15.7	15.5	15.5	15.3	15.1

DEPTH: 1675 TILT: 0 RANGE: 49.8 VOS: 6004

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	15.3	15.7	16.0	16.0	16.2	16.2	16.2	16.2
22.5	16.4	16.4	17.4	17.6	17.4	17.4	17.6	17.6
45.0	17.6	17.8	18.3	18.5	18.7	18.9	19.3	19.7
67.5	20.2	20.6	20.6	20.6	20.8	20.8	21.0	21.0
90.0	21.2	21.4	21.6	21.6	21.6	21.6	21.4	21.4
112.5	21.4	21.4	21.4	21.4	21.6	21.6	21.6	21.4
135.0	21.6	21.4	21.4	21.2	21.0	20.8	20.6	20.4
157.5	20.2	20.2	20.2	20.2	20.2	20.2	19.7	19.3
180.0	19.1	18.9	18.9	18.7	18.7	18.7	18.7	18.5
202.5	18.1	17.6	17.4	17.4	17.4	17.4	17.4	17.4
225.0	17.4	17.6	17.6	17.6	17.8	17.8	18.1	17.8
247.5	18.1	18.1	17.8	18.3	18.3	18.3	18.3	18.3
270.0	18.1	17.8	17.6	17.4	17.4	17.4	17.4	17.8
292.5	17.8	17.8	17.6	17.4	17.0	16.6	16.2	16.0
315.0	15.7	15.7	15.7	15.7	15.7	15.5	15.5	15.5
337.5	15.7	15.7	15.7	15.5	15.5	15.3	15.3	15.3

DEPTH: 1677 TILT: 0 RANGE: 49.8 VOS: 6004

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	16.4	16.6	16.6	16.8	16.8	17.0	17.2	17.2
22.5	17.2	17.0	17.0	17.0	17.2	17.4	17.6	17.8
45.0	18.3	18.1	18.1	17.8	18.1	18.3	18.3	18.7
67.5	19.1	19.5	20.2	21.0	21.2	21.0	20.8	20.6
90.0	20.6	20.4	20.6	20.8	21.0	21.0	21.2	21.2
112.5	21.2	21.4	21.4	21.4	21.6	21.8	21.8	21.8
135.0	21.8	21.6	21.4	21.4	21.2	20.8	20.4	20.2
157.5	19.9	19.9	19.9	19.9	19.5	19.5	19.5	19.3
180.0	19.1	18.7	18.7	18.3	18.1	17.8	17.6	17.6
202.5	17.6	17.6	17.4	17.4	17.2	17.2	16.8	16.6
225.0	16.6	16.8	17.0	17.4	17.6	17.6	17.8	17.8
247.5	17.8	17.8	17.8	17.8	17.8	18.1	18.1	18.1
270.0	17.8	17.6	17.6	17.4	17.4	17.2	17.2	17.2
292.5	17.0	16.8	16.8	16.6	16.6	16.4	16.4	16.4
315.0	16.4	16.6	16.8	17.0	17.0	17.4	17.4	17.4
337.5	17.0	16.8	16.8	16.8	16.6	16.4	16.4	16.6

DEPTH: 1679 TILT: 0 RANGE: 49.8 VOS: 6005

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	16.0	16.0	16.2	16.2	16.2	16.2	16.2	16.0
22.5	16.0	15.7	15.7	15.5	15.7	16.0	16.4	16.6
45.0	17.0	17.2	17.6	17.6	17.8	18.3	18.5	19.1
67.5	19.9	20.6	21.2	21.8	22.0	21.6	21.0	20.6
90.0	20.2	20.2	19.9	19.9	19.7	19.7	19.5	19.5
112.5	19.9	20.8	21.8	22.7	23.1	23.3	23.3	23.3
135.0	23.5	23.3	23.1	22.7	22.0	21.2	21.0	20.4
157.5	20.2	20.2	19.9	19.7	19.5	19.5	19.5	19.5
180.0	19.5	19.3	18.9	18.7	18.9	19.1	19.1	19.1
202.5	18.9	18.9	18.9	18.7	18.5	18.3	18.3	18.1
225.0	18.3	18.3	18.3	18.5	18.5	18.5	18.5	18.5
247.5	18.3	18.3	18.1	18.1	17.8	17.6	17.6	17.6
270.0	17.4	17.2	17.2	17.0	17.0	17.0	17.0	17.0
292.5	17.2	17.4	17.6	17.8	17.6	17.6	17.6	17.6
315.0	17.4	17.0	16.6	16.4	16.2	16.2	16.0	16.0
337.5	16.0	16.0	16.0	16.0	16.0	15.7	16.0	16.0

DEPTH: 1681 TILT: 0 RANGE: 49.8 VOS: 6013

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	13.7	13.7	13.2	13.0	12.6	12.6	12.6	12.4
22.5	12.6	12.6	12.8	12.8	13.0	13.0	13.0	13.0
45.0	13.2	13.2	13.7	14.1	14.7	14.9	16.2	17.2
67.5	18.5	19.7	20.6	21.2	21.8	22.5	22.9	23.5
90.0	23.9	24.2	24.4	24.4	24.2	24.2	24.2	23.9
112.5	23.9	24.2	24.4	24.6	24.8	24.8	24.8	24.8
135.0	24.8	24.6	24.6	24.4	24.2	23.9	23.9	23.7
157.5	23.7	23.7	23.5	23.3	23.3	23.3	23.5	23.5
180.0	23.1	22.9	21.6	20.2	18.3	16.8	15.8	14.7
202.5	14.3	14.1	13.9	13.9	13.7	13.7	13.7	13.7
225.0	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4
247.5	13.4	13.4	13.4	13.4	13.4	13.7	13.7	13.7
270.0	13.7	13.4	13.4	13.4	14.9	14.9	15.1	15.1
292.5	15.3	15.8	16.0	16.0	16.0	15.8	15.3	15.1
315.0	15.1	14.9	14.5	14.3	14.1	13.9	13.4	13.4
337.5	13.4	13.4	13.4	13.7	13.4	13.4	13.4	13.7

DEPTH: 1683 TILT: 0 RANGE: 49.8 VOS: 6007

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	20.8	21.0	21.0	21.0	21.0	21.0	21.0	21.0
22.5	21.2	21.4	21.4	21.6	21.6	21.6	21.6	21.6
45.0	21.8	21.6	21.6	21.4	21.4	21.8	22.7	23.7
67.5	24.4	25.0	25.2	25.2	25.2	24.8	24.6	24.4
90.0	24.2	23.9	23.9	23.9	23.9	24.2	24.4	24.4
112.5	24.6	25.0	25.0	25.0	24.8	24.6	24.8	24.8
135.0	24.6	24.6	24.4	24.4	24.6	24.8	24.4	24.2
157.5	23.7	23.5	23.5	23.7	23.9	23.9	24.2	24.4
180.0	24.4	24.6	24.6	24.4	24.4	24.2	24.2	23.9
202.5	23.9	23.9	23.9	23.7	23.5	23.3	22.9	22.7
225.0	22.7	22.5	22.5	22.3	22.1	21.8	21.8	22.1
247.5	21.8	21.8	21.8	21.8	21.8	21.8	21.8	21.4
270.0	21.2	21.0	21.0	20.8	20.4	20.4	20.2	20.2
292.5	20.0	20.0	20.0	19.7	19.7	19.7	20.0	20.2
315.0	20.0	19.7	19.7	20.0	20.2	20.6	20.8	21.0
337.5	21.2	21.4	21.4	21.2	21.0	21.0	20.8	20.8

DEPTH: 1685 TILT: 0 RANGE: 49.8 VOS: 6014

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	9.7	9.7	9.7	9.9	9.7	9.7	9.9	10.1
22.5	18.3	19.1	20.2	21.2	22.5	24.1	23.9	24.1
45.0	24.4	24.6	24.6	24.4	24.1	24.1	24.1	24.4
67.5	24.1	23.7	23.1	22.9	22.3	21.8	21.4	21.2
90.0	20.6	20.2	19.9	19.9	19.7	19.5	19.5	19.5
112.5	19.7	19.7	19.7	19.7	19.9	19.9	19.9	20.2
135.0	20.6	20.6	21.0	21.4	21.6	21.8	22.0	21.8
157.5	21.6	21.8	21.6	21.8	21.8	22.0	22.0	21.6
180.0	21.8	21.6	21.6	21.6	21.4	21.4	21.4	21.6
202.5	21.8	21.8	21.6	21.4	20.8	20.8	20.6	20.6
225.0	20.6	19.9	18.3	15.7	14.5	14.3	13.6	13.2
247.5	12.8	12.6	12.2	11.5	11.1	10.5	9.9	9.7
270.0	9.0	8.8	8.6	8.6	8.4	8.6	8.6	8.6
292.5	8.8	9.0	9.2	9.2	9.2	9.2	9.2	9.4
315.0	9.4	9.2	9.4	9.2	9.2	9.2	9.2	9.2
337.5	9.2	9.2	9.2	9.2	9.2	9.2	9.4	9.4

DEPTH: 1687 TILT: 0 RANGE: 49.8 VOS: 6007

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	17.0	17.0	17.2	17.2	17.2	17.2	17.2	17.0
22.5	17.0	22.9	22.9	22.7	22.7	22.5	22.7	22.9
45.0	22.9	22.9	23.1	23.1	23.1	22.7	22.3	22.7
67.5	22.7	22.9	22.7	23.3	23.5	23.3	23.3	23.1
90.0	23.1	23.3	23.5	23.5	23.3	22.7	22.3	21.4
112.5	20.8	20.6	20.2	20.2	20.2	20.0	20.0	19.5
135.0	19.5	19.5	19.3	19.3	19.3	19.1	19.1	19.3
157.5	19.3	19.1	19.1	19.1	18.9	18.9	19.1	19.3
180.0	19.7	20.0	19.7	19.7	20.0	20.2	20.4	20.6
202.5	20.6	20.4	20.4	20.6	20.6	20.6	20.6	20.4
225.0	20.6	20.2	20.0	19.7	19.5	19.5	19.5	19.7
247.5	19.5	19.3	19.1	18.9	18.7	18.7	18.3	18.1
270.0	17.4	16.8	16.4	16.2	16.0	16.2	16.0	16.2
292.5	16.2	16.0	16.0	16.0	15.8	15.8	15.8	15.8
315.0	16.0	16.0	16.0	16.2	16.2	16.2	16.2	16.4
337.5	16.4	16.6	16.4	16.6	16.6	16.8	16.8	16.8

DEPTH: 1689 TILT: 0 RANGE: 74.6 VOS: 6006

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
22.5	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
45.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
67.5	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
90.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
112.5	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
135.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
157.5	1.9	2.2	2.2	2.2	2.2	2.5	2.5	2.5
180.0	2.5	2.5	2.5	2.5	2.8	2.8	2.8	2.8
202.5	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
225.0	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
247.5	2.8	2.8	2.8	2.5	2.5	2.5	2.5	2.5
270.0	2.5	2.2	2.2	2.2	2.2	2.2	2.2	1.9
292.5	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
315.0	1.9	1.9	1.9	1.9	2.2	2.2	2.2	1.9
337.5	1.9	1.9	1.9	1.9	1.9	1.9	1.6	1.6

DEPTH: 1691 TILT: 0 RANGE: 74.7 VOS: 6007

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
22.5	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
45.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
67.5	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
90.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
112.5	1.9	1.9	1.9	1.9	2.2	1.9	1.9	1.9
135.0	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
157.5	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
180.0	2.2	2.2	2.2	2.2	2.5	2.5	2.5	2.5
202.5	2.5	2.5	2.8	2.8	2.8	2.8	2.8	2.5
225.0	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
247.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
270.0	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
292.5	2.5	2.5	2.5	2.5	2.5	2.8	2.5	2.5
315.0	2.5	2.5	2.5	2.5	2.5	2.2	2.2	2.2
337.5	2.2	2.2	2.2	2.2	2.2	2.2	1.9	1.9

DEPTH: 1693 TILT: 0 RANGE: 74.7 VOS: 6005

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	22.4	22.7	23.0	23.3	23.6	23.9	23.9	24.3
22.5	24.3	24.6	24.9	25.5	26.2	26.5	26.5	26.5
45.0	26.5	26.5	26.5	26.8	26.8	26.8	27.1	27.1
67.5	27.4	27.7	27.7	28.0	28.0	28.4	28.0	28.4
90.0	28.4	28.4	28.0	27.7	27.7	27.7	27.4	27.1
112.5	27.1	27.1	27.1	27.1	26.8	27.1	27.1	27.1
135.0	27.1	27.1	27.1	27.1	26.8	26.2	25.8	25.8
157.5	25.5	25.8	25.5	25.2	25.2	24.9	24.9	24.9
180.0	24.6	24.9	24.6	24.3	24.3	24.3	23.9	24.3
202.5	24.3	24.3	24.6	24.6	24.6	24.3	24.3	24.3
225.0	24.3	24.3	24.6	24.3	24.3	23.9	23.6	23.3
247.5	23.3	23.3	23.3	22.7	22.7	23.0	23.0	22.7
270.0	22.7	22.4	22.1	22.1	21.7	21.7	21.7	21.7
292.5	21.7	21.4	21.4	21.1	21.1	21.1	20.8	20.8
315.0	20.8	21.1	21.1	21.4	21.4	21.7	21.7	21.4
337.5	21.7	21.7	22.1	22.1	22.4	22.4	22.1	22.1

DEPTH: 1695 TILT: 0 RANGE: 74.7 VOS: 6009

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	22.7	22.7	22.7	22.7	22.7	23.0	23.0	23.6
22.5	23.9	24.3	24.6	25.2	25.2	25.2	25.5	25.8
45.0	25.8	25.8	25.8	26.2	26.5	26.5	26.8	26.8
67.5	27.1	27.4	27.7	28.4	28.7	29.0	29.3	29.0
90.0	29.3	29.0	29.0	29.0	29.3	29.3	29.3	29.6
112.5	29.3	29.6	29.6	29.9	30.2	30.2	30.6	29.9
135.0	29.9	29.6	29.3	29.0	29.0	28.7	28.7	28.7
157.5	29.0	29.0	29.0	29.0	28.4	28.4	28.4	28.4
180.0	28.0	28.0	27.7	27.7	27.1	26.8	26.8	27.1
202.5	27.1	27.1	26.8	27.1	27.1	26.8	26.5	26.2
225.0	26.2	25.8	25.5	25.5	25.2	24.6	24.6	24.3
247.5	24.3	24.3	24.3	23.9	24.3	24.3	24.6	24.6
270.0	24.6	24.3	24.3	24.3	23.9	23.9	23.9	23.6
292.5	23.6	23.6	23.3	23.0	23.3	23.0	23.0	22.7
315.0	23.0	22.7	22.7	23.0	23.0	23.0	23.0	23.3
337.5	23.3	23.3	23.3	23.0	23.0	23.0	22.7	22.7

DEPTH: 1697 TILT: 0 RANGE: 74.7 VOS: 6016

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	22.7	23.0	23.6	23.6	23.9	24.6	24.9	24.9
22.5	25.5	25.5	25.8	26.2	25.5	25.8	25.5	25.5
45.0	25.8	25.8	25.8	26.5	26.5	26.8	27.1	27.4
67.5	27.7	28.0	28.4	28.4	28.4	28.4	28.4	29.0
90.0	28.7	28.7	29.0	29.0	29.0	28.7	28.7	28.7
112.5	28.7	28.7	28.4	28.4	28.4	28.7	28.7	28.4
135.0	28.4	28.4	28.4	28.7	28.4	28.4	28.4	28.4
157.5	28.0	28.0	28.4	28.4	28.0	28.0	28.4	28.4
180.0	28.4	28.0	27.7	27.7	27.4	27.4	27.4	27.4
202.5	27.4	27.7	27.7	27.4	27.1	26.8	26.5	26.5
225.0	26.5	26.5	26.5	26.2	26.2	26.2	25.8	25.5
247.5	25.2	24.9	24.3	24.3	23.9	23.6	23.3	23.3
270.0	23.0	23.0	22.7	22.7	22.4	22.1	22.1	22.1
292.5	22.1	22.1	22.4	22.4	22.4	22.4	22.4	22.4
315.0	22.4	22.4	22.7	22.4	22.4	22.4	22.4	22.7
337.5	22.7	22.7	22.7	22.7	22.1	22.1	22.1	22.4

DEPTH: 1699 TILT: 0 RANGE: 74.7 VOS: 6008

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	25.2	25.5	25.5	26.1	26.8	26.8	27.1	27.1
22.5	26.8	26.8	26.8	26.8	27.4	28.0	28.0	28.4
45.0	28.4	28.4	28.4	28.0	28.0	28.4	28.4	28.7
67.5	28.7	29.0	29.0	29.3	29.3	29.3	29.3	29.3
90.0	29.3	29.3	29.6	29.3	29.3	29.0	29.0	29.0
112.5	29.0	29.3	29.0	29.0	29.0	28.4	27.7	27.7
135.0	27.7	28.4	28.4	28.0	28.0	28.0	28.0	27.7
157.5	27.7	27.7	27.7	27.4	27.4	27.1	27.1	27.1
180.0	27.1	27.1	27.1	27.4	27.4	27.7	27.1	26.8
202.5	26.8	26.5	26.8	26.8	27.4	27.4	27.7	28.0
225.0	28.4	28.7	29.0	29.0	28.4	27.7	26.1	25.5
247.5	24.6	24.6	24.3	24.3	23.9	23.9	23.6	23.6
270.0	23.6	23.3	23.0	23.0	23.0	22.7	22.7	22.7
292.5	22.7	23.0	23.0	23.0	23.0	23.0	23.0	23.0
315.0	23.0	23.0	23.0	23.3	23.3	23.3	23.3	23.3
337.5	23.3	23.3	23.6	23.9	24.3	24.3	24.9	24.9

DEPTH: 1701 TILT: 0 RANGE: 74.7 VOS: 6008

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	23.9	23.9	24.3	24.3	24.6	24.9	25.5	26.1
22.5	26.5	26.5	26.8	27.1	27.4	27.4	27.4	27.4
45.0	27.7	27.7	27.7	28.0	28.4	28.7	28.7	29.0
67.5	29.0	29.3	29.6	30.2	30.2	30.2	30.6	30.6
90.0	30.9	30.9	31.2	31.2	31.2	30.9	30.9	30.9
112.5	30.6	30.6	30.2	30.2	30.2	30.2	30.2	30.2
135.0	30.9	31.2	31.2	30.6	30.6	30.2	30.6	30.2
157.5	29.9	29.9	29.6	29.6	29.3	28.7	28.7	28.7
180.0	28.7	28.4	28.7	29.0	29.3	29.6	29.9	29.9
202.5	30.2	30.2	29.3	28.4	27.4	26.8	26.1	25.5
225.0	25.5	24.9	24.6	24.6	24.6	24.6	24.6	24.3
247.5	24.3	24.3	24.3	23.9	24.3	24.3	23.9	23.6
270.0	23.0	23.0	22.7	22.7	22.7	22.7	22.7	22.4
292.5	23.0	23.0	23.0	23.0	23.0	22.7	22.7	22.7
315.0	23.0	23.3	23.6	23.6	23.9	23.6	23.9	23.9
337.5	24.3	24.3	24.3	24.3	24.3	24.3	23.9	23.9

DEPTH: 1703 TILT: 0 RANGE: 74.7 VOS: 6009

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	24.9	25.2	25.2	24.9	25.8	26.2	26.5	27.1
22.5	27.7	28.0	28.4	28.7	29.0	29.0	29.0	29.3
45.0	29.6	29.6	30.2	30.6	30.9	31.2	31.2	31.2
67.5	31.5	31.8	31.8	31.5	31.8	31.8	32.1	32.1
90.0	32.5	32.8	32.8	32.5	32.1	31.5	31.5	31.5
112.5	31.5	31.2	31.5	31.5	31.8	32.1	32.1	32.1
135.0	32.5	32.1	32.1	31.8	31.8	31.5	31.5	31.8
157.5	31.8	31.8	31.8	31.8	31.8	31.5	31.2	31.5
180.0	31.5	31.5	31.8	31.8	32.1	32.5	32.5	32.8
202.5	32.5	32.1	31.8	31.8	31.2	30.9	30.2	29.9
225.0	29.6	29.3	28.4	28.4	28.0	27.4	27.1	26.8
247.5	26.8	26.8	26.8	26.5	26.2	25.8	25.2	25.2
270.0	25.2	25.2	24.6	24.6	24.3	24.3	23.9	24.3
292.5	24.6	24.3	23.9	23.9	23.9	23.9	23.9	23.9
315.0	24.3	24.3	24.3	24.3	24.3	24.6	24.9	24.9
337.5	24.9	24.6	24.9	24.9	25.2	24.9	24.9	24.9

DEPTH: 1705 TILT: 0 RANGE: 74.7 VOS: 6009

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	25.5	25.5	25.8	26.2	26.8	27.1	27.1	27.1
22.5	27.1	27.4	27.4	27.4	27.7	28.4	28.7	29.0
45.0	29.3	29.3	29.3	29.6	29.6	30.6	30.9	31.2
67.5	31.8	32.1	32.1	32.5	32.1	32.5	32.1	32.1
90.0	32.5	32.8	32.8	32.8	32.8	32.8	32.8	32.5
112.5	32.5	32.5	32.5	32.1	32.1	32.1	32.1	32.1
135.0	32.5	32.1	31.8	31.5	31.2	31.2	31.2	30.9
157.5	31.2	31.2	31.5	31.5	31.2	31.2	31.2	31.2
180.0	31.5	31.5	31.5	31.8	31.5	31.2	30.2	29.3
202.5	29.0	28.4	28.0	28.0	27.7	27.7	27.4	27.7
225.0	27.7	27.7	27.4	27.7	27.7	27.7	27.7	27.7
247.5	27.4	27.1	26.8	26.5	26.5	26.2	25.8	25.5
270.0	25.2	25.2	25.2	24.9	24.9	24.6	24.9	24.9
292.5	24.9	24.6	24.3	24.3	24.3	24.3	24.3	23.9
315.0	24.3	24.3	24.3	23.9	23.9	23.6	23.9	23.9
337.5	24.6	24.6	24.9	24.9	25.5	25.5	25.5	25.5

DEPTH: 1707 TILT: 0 RANGE: 74.7 VOS: 6008

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	25.2	25.8	26.5	26.8	26.8	26.8	26.8	26.8
22.5	26.8	27.1	27.1	27.4	27.4	27.4	27.4	27.7
45.0	28.0	28.4	29.0	29.9	30.9	31.8	32.1	32.1
67.5	32.4	32.8	32.8	33.1	32.8	32.8	32.4	32.1
90.0	32.1	31.8	31.5	31.8	31.8	31.8	32.1	32.4
112.5	32.8	33.1	33.4	33.7	33.4	33.1	33.1	33.1
135.0	33.4	33.4	33.1	33.4	33.4	33.7	33.7	33.7
157.5	33.7	34.0	33.7	33.7	33.1	33.4	33.1	32.8
180.0	32.4	32.1	32.1	32.1	31.8	31.8	32.1	31.8
202.5	31.5	31.5	31.5	31.2	30.9	30.6	30.6	30.6
225.0	30.2	29.9	29.9	29.6	29.9	29.6	29.3	29.3
247.5	29.0	28.4	27.7	26.8	26.5	26.1	25.8	25.5
270.0	25.5	25.8	25.5	25.5	25.5	25.5	25.2	25.2
292.5	24.9	24.9	24.9	24.9	24.9	24.9	24.6	24.9
315.0	24.6	24.6	24.3	24.3	24.3	24.3	24.3	24.3
337.5	23.9	23.9	23.9	23.9	23.9	24.3	24.6	24.9

DEPTH: 1709 TILT: 0 RANGE: 74.7 VOS: 6029

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	25.5	25.8	25.8	25.8	26.1	26.1	26.1	26.1
22.5	26.5	26.1	26.5	26.5	26.8	26.8	27.4	27.4
45.0	28.0	28.4	29.0	29.3	29.6	29.9	30.2	30.6
67.5	31.2	31.2	31.2	31.5	31.5	31.8	32.8	33.4
90.0	33.7	33.7	33.7	33.7	33.4	33.7	33.4	33.1
112.5	33.1	32.4	32.4	32.4	32.8	32.4	32.4	32.4
135.0	32.4	32.4	32.4	32.4	32.8	33.1	33.1	33.4
157.5	33.4	33.7	34.0	33.7	33.7	33.7	33.7	33.4
180.0	32.8	32.4	32.1	32.1	32.1	32.1	31.8	31.8
202.5	31.8	31.8	31.8	31.8	32.1	32.1	32.1	31.5
225.0	31.2	31.2	30.9	31.2	29.3	29.0	29.3	28.4
247.5	29.0	28.7	28.4	28.0	27.4	27.1	26.8	26.1
270.0	26.1	26.1	26.1	25.8	25.8	25.8	25.8	25.8
292.5	25.5	25.5	25.5	25.2	24.9	24.3	24.3	24.3
315.0	24.3	24.3	24.3	23.9	24.3	24.3	24.3	24.3
337.5	24.6	24.9	25.2	25.5	25.5	25.5	25.5	25.5

DEPTH: 1711 TILT: 0 RANGE: 74.7 VOS: 6027

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	24.3	23.9	23.6	23.9	24.3	24.3	24.3	24.6
22.5	24.6	24.9	25.2	25.5	26.2	26.8	27.1	27.7
45.0	28.0	28.7	29.3	29.6	29.6	29.9	29.6	29.6
67.5	29.3	29.3	29.0	29.0	29.3	29.6	29.6	30.2
90.0	29.9	29.9	29.6	29.6	29.6	29.9	29.9	30.2
112.5	30.6	30.9	31.2	31.8	32.1	32.1	32.1	32.5
135.0	32.5	32.5	32.5	32.5	32.5	32.1	31.8	31.5
157.5	30.9	30.6	30.6	30.9	30.9	31.2	30.9	30.9
180.0	30.6	30.2	29.9	29.6	29.6	29.6	29.6	29.6
202.5	29.6	29.6	29.9	30.2	30.2	30.6	30.6	30.6
225.0	30.6	30.9	30.9	30.9	30.9	30.2	29.9	29.6
247.5	29.3	28.7	28.7	28.4	28.7	27.4	27.1	27.1
270.0	26.5	26.2	25.8	25.5	25.5	25.5	25.8	25.8
292.5	25.8	25.5	25.2	25.2	24.9	24.3	24.3	23.9
315.0	23.9	23.6	23.6	23.6	23.3	23.6	23.6	23.9
337.5	23.9	23.6	23.9	23.9	24.3	24.3	24.3	24.3

DEPTH: 1713 TILT: 0 RANGE: 74.6 VOS: 6024

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	22.4	22.4	22.4	22.4	22.0	22.7	22.7	22.7
22.5	23.0	23.3	23.3	23.0	23.3	23.0	23.0	23.0
45.0	23.0	22.7	23.0	23.0	23.9	24.3	24.9	25.5
67.5	25.8	26.5	27.1	27.4	27.4	27.7	27.7	28.0
90.0	28.0	28.0	28.3	28.3	28.7	28.7	29.0	29.0
112.5	29.6	29.6	29.9	29.6	29.9	29.6	29.3	29.3
135.0	29.6	29.3	29.3	28.7	29.0	29.0	28.7	28.3
157.5	28.3	28.3	28.0	28.3	28.3	28.7	29.0	29.3
180.0	29.3	29.6	29.3	29.0	28.7	28.7	28.3	28.0
202.5	28.0	27.7	27.4	27.4	27.1	27.1	27.1	26.8
225.0	26.8	27.1	27.4	27.1	26.8	26.1	25.5	25.2
247.5	24.9	24.6	24.3	24.3	23.9	23.9	23.9	23.9
270.0	23.6	23.6	23.6	23.3	23.6	23.3	23.6	23.6
292.5	23.6	23.6	23.3	23.3	23.3	23.0	22.7	22.7
315.0	22.4	22.4	22.4	22.4	22.7	22.0	22.0	22.0
337.5	21.7	21.7	21.1	21.1	21.4	22.4	22.0	22.4

DEPTH: 1715 TILT: 0 RANGE: 74.7 VOS: 6025

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	22.0	22.4	22.7	22.7	23.0	23.0	23.0	22.7
22.5	22.7	22.4	22.7	22.4	22.4	22.4	22.7	23.0
45.0	23.3	23.3	23.6	23.6	23.9	24.3	24.6	24.9
67.5	24.9	25.2	25.2	25.2	25.5	25.5	25.5	25.8
90.0	26.5	26.8	27.1	27.4	27.4	27.7	28.0	28.0
112.5	28.3	28.0	28.0	28.0	28.0	28.0	28.0	27.7
135.0	27.4	27.4	27.4	27.4	27.7	27.7	27.7	27.7
157.5	27.7	28.0	28.0	28.0	28.0	28.0	28.3	28.3
180.0	28.7	29.0	28.7	28.7	28.7	28.7	28.3	28.3
202.5	27.7	27.4	27.4	26.8	26.8	26.5	26.8	26.8
225.0	26.8	26.5	26.1	25.8	25.5	25.2	24.6	24.3
247.5	24.3	24.3	24.3	23.9	23.6	23.3	23.3	23.3
270.0	22.7	22.7	23.0	22.7	22.4	22.7	22.4	22.4
292.5	22.4	22.4	22.4	22.0	22.0	21.7	21.7	21.4
315.0	21.4	21.4	21.4	21.1	21.4	21.4	21.1	21.1
337.5	21.4	21.1	21.1	21.4	21.7	22.0	21.7	22.0

DEPTH: 1717 TILT: 0 RANGE: 74.6 VOS: 6017

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	19.8	20.2	20.5	20.5	20.8	20.8	20.8	21.1
22.5	21.1	21.1	21.4	21.4	21.4	21.7	22.0	21.7
45.0	22.0	22.0	22.4	22.4	23.0	23.3	23.6	23.9
67.5	24.3	24.3	24.3	24.3	24.3	24.6	24.9	25.2
90.0	25.2	25.8	26.1	26.5	27.1	27.4	28.0	28.3
112.5	28.3	28.3	28.3	28.3	28.3	28.0	28.0	28.0
135.0	27.7	27.7	27.7	27.7	27.7	28.0	27.4	27.4
157.5	27.4	27.1	27.1	27.1	27.1	27.1	27.1	27.1
180.0	27.1	27.1	27.4	27.4	27.4	27.4	27.4	27.4
202.5	27.1	27.1	26.8	26.5	26.8	26.8	26.5	26.5
225.0	26.1	26.1	25.5	24.9	24.6	24.6	24.3	24.3
247.5	23.9	23.9	23.3	23.0	23.3	23.0	22.4	22.0
270.0	21.7	21.7	21.7	21.7	21.4	21.4	21.4	21.4
292.5	21.4	21.7	21.7	21.4	21.4	21.1	20.8	20.5
315.0	20.8	20.5	20.8	21.1	20.8	20.8	20.5	20.5
337.5	20.5	20.2	20.2	20.2	20.2	20.5	20.2	20.2

DEPTH: 1719 TILT: 0 RANGE: 74.7 VOS: 6026

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	20.2	20.2	20.2	20.2	20.5	20.2	20.2	20.5
22.5	20.5	20.8	20.8	20.8	20.5	20.5	20.5	20.8
45.0	20.5	21.1	21.1	21.4	22.1	22.1	22.7	23.0
67.5	23.6	24.3	24.3	24.9	25.2	25.5	25.8	26.1
90.0	26.8	27.4	28.0	28.0	28.0	28.0	28.0	28.0
112.5	28.4	28.4	28.4	28.4	28.0	28.0	28.0	28.0
135.0	27.7	28.0	28.0	28.4	28.4	28.7	28.7	28.7
157.5	28.7	28.7	28.4	28.4	28.0	27.7	27.4	26.8
180.0	26.5	26.5	26.1	25.8	26.1	26.1	26.1	26.1
202.5	26.5	26.1	26.1	26.1	25.8	26.1	26.1	25.8
225.0	25.2	24.9	24.9	24.6	24.3	23.9	23.3	22.7
247.5	22.1	22.1	21.4	21.4	21.1	20.8	20.8	20.5
270.0	20.5	20.5	20.5	20.5	20.5	20.2	20.2	20.2
292.5	19.8	19.5	19.5	19.5	19.5	19.8	19.8	19.8
315.0	19.8	20.2	20.2	20.2	20.2	20.2	20.2	20.2
337.5	19.8	19.8	19.5	20.2	20.2	20.2	20.2	20.2

DEPTH: 1721 TILT: 0 RANGE: 74.6 VOS: 6024

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	20.2	20.5	20.2	20.2	19.8	20.2	20.2	20.2
22.5	20.2	20.5	20.5	20.2	20.2	19.8	19.5	19.8
45.0	19.5	19.8	19.8	19.8	19.8	19.8	19.5	19.5
67.5	18.9	18.6	18.6	18.9	19.2	19.5	20.2	21.1
90.0	21.7	23.6	24.9	25.2	25.5	25.8	26.1	26.5
112.5	26.8	27.1	27.1	26.8	27.1	27.1	27.1	27.1
135.0	27.4	27.7	28.0	28.3	28.3	28.3	28.3	28.3
157.5	28.7	29.0	29.0	28.7	28.3	28.3	27.7	27.4
180.0	27.1	26.8	26.5	26.1	25.8	25.8	25.5	25.5
202.5	25.2	25.2	25.2	25.2	25.5	24.9	24.9	24.6
225.0	24.6	24.6	24.9	25.2	25.5	25.5	25.5	25.2
247.5	24.9	23.6	23.3	22.4	22.0	21.1	20.8	20.8
270.0	19.8	19.5	19.5	19.5	19.5	19.2	18.9	18.9
292.5	18.6	18.9	18.6	18.9	18.9	18.9	18.9	19.2
315.0	19.5	19.5	19.5	19.8	19.8	19.8	19.8	19.8
337.5	19.8	19.8	19.5	19.5	19.5	19.2	19.5	19.8

DEPTH: 1723 TILT: 0 RANGE: 74.7 VOS: 6029

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	16.4	16.7	16.4	16.4	16.4	16.4	16.4	16.4
22.5	16.4	16.4	16.4	16.7	16.7	16.7	16.7	16.7
45.0	16.7	16.7	17.6	18.0	18.3	18.6	18.6	18.9
67.5	19.2	19.5	20.5	20.5	21.1	21.7	22.4	23.0
90.0	23.6	23.9	24.6	24.9	25.2	25.2	24.9	25.5
112.5	25.8	25.8	26.5	26.8	27.1	27.1	27.4	27.1
135.0	27.1	26.1	26.1	26.1	29.0	30.6	31.8	32.1
157.5	32.1	32.1	32.1	31.8	32.1	31.5	29.6	28.0
180.0	26.5	24.9	24.6	24.3	24.3	24.3	23.9	23.9
202.5	23.9	23.9	23.6	23.9	23.9	23.9	23.9	23.6
225.0	23.9	23.9	24.3	24.3	24.3	24.3	24.6	24.9
247.5	24.9	25.2	25.2	25.2	24.6	23.6	22.7	22.4
270.0	22.4	22.1	21.7	21.4	21.1	21.1	21.4	21.7
292.5	21.1	20.5	19.8	19.5	18.9	18.6	18.6	18.3
315.0	18.3	18.3	18.3	18.6	18.6	18.6	18.3	18.0
337.5	17.6	17.3	17.3	17.0	16.7	16.7	16.7	16.4

DEPTH: 1725 TILT: 0 RANGE: 74.7 VOS: 6023

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	16.1	15.8	16.1	15.8	15.8	15.8	15.4	15.4
22.5	15.1	15.1	15.1	15.1	15.1	14.8	14.8	15.1
45.0	15.1	15.4	15.4	15.8	15.8	15.8	16.1	16.4
67.5	16.7	16.7	17.0	17.3	17.3	18.0	18.0	18.6
90.0	19.2	20.2	21.4	23.6	24.6	24.9	25.2	25.8
112.5	25.8	25.2	25.5	25.5	25.2	25.2	24.9	24.6
135.0	24.6	24.6	24.6	24.6	24.6	24.3	24.6	24.6
157.5	24.6	24.6	25.2	25.8	25.8	25.5	25.5	25.2
180.0	24.9	24.9	24.6	24.6	24.6	24.3	24.3	24.3
202.5	23.9	23.6	23.3	23.0	22.7	22.4	22.1	22.1
225.0	21.7	21.7	21.7	21.7	21.7	21.7	22.1	21.7
247.5	21.7	21.7	21.4	21.4	21.4	21.7	21.7	22.1
270.0	22.1	22.1	22.1	22.1	22.1	22.1	21.7	21.1
292.5	20.5	19.8	18.9	18.6	18.3	18.3	18.3	18.6
315.0	18.6	18.9	18.6	18.6	18.6	18.6	18.6	18.0
337.5	18.0	17.6	17.3	17.0	16.7	16.4	16.1	16.1

DEPTH: 1727 TILT: 0 RANGE: 74.7 VOS: 6032

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	18.3	18.3	18.3	18.3	18.0	18.3	18.3	18.6
22.5	18.6	18.9	18.9	19.2	19.2	19.5	19.5	19.8
45.0	20.2	20.5	20.5	20.8	21.1	21.4	21.4	21.7
67.5	22.0	22.0	22.0	22.0	22.4	23.0	23.3	23.9
90.0	24.3	24.6	24.6	24.6	24.3	24.3	24.3	24.3
112.5	24.3	24.9	24.6	24.9	24.9	25.2	25.5	25.2
135.0	25.5	25.5	25.5	25.8	25.8	25.8	26.1	26.1
157.5	26.1	26.1	26.1	25.8	25.5	25.2	24.9	24.6
180.0	24.3	23.9	23.9	23.9	23.6	23.3	23.6	23.3
202.5	23.3	23.3	23.3	23.3	23.3	23.6	23.6	23.9
225.0	24.3	23.9	23.9	23.9	24.3	24.3	24.3	24.3
247.5	23.9	23.9	23.9	23.6	23.3	23.3	23.0	23.0
270.0	23.0	23.0	23.0	22.7	22.4	22.0	21.7	21.7
292.5	21.4	21.4	21.1	20.8	20.8	20.2	19.8	19.5
315.0	19.5	19.2	18.6	18.6	18.6	18.3	18.3	18.0
337.5	17.6	17.6	17.3	17.3	18.0	18.3	18.3	18.3

DEPTH: 1729 TILT: 0 RANGE: 74.6 VOS: 6024

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	22.7	22.7	22.7	22.7	22.7	23.0	23.3	23.9
22.5	23.9	24.3	24.6	24.9	24.9	25.2	25.2	25.5
45.0	25.5	25.8	25.8	25.8	25.8	25.8	26.1	26.5
67.5	26.8	27.4	28.0	29.0	29.6	29.9	30.2	30.5
90.0	30.9	31.2	31.5	31.5	31.8	32.1	31.8	31.5
112.5	31.5	31.5	31.8	31.8	33.1	33.4	34.0	34.3
135.0	34.3	34.6	34.3	33.7	33.4	33.4	33.4	33.7
157.5	33.7	33.7	33.7	33.7	33.4	33.4	33.4	33.7
180.0	33.1	32.8	33.1	33.1	32.8	31.8	30.9	29.9
202.5	29.3	28.7	27.7	27.4	26.1	25.5	24.6	24.3
225.0	23.6	23.6	23.3	23.3	23.0	23.0	23.0	23.0
247.5	23.0	23.0	23.3	23.0	23.0	23.0	23.0	23.3
270.0	23.3	23.3	23.0	23.0	23.0	22.4	22.4	21.7
292.5	21.7	21.4	21.4	21.7	22.0	22.7	23.0	23.3
315.0	23.3	23.6	23.6	23.6	23.6	23.6	23.9	23.6
337.5	23.9	23.9	23.9	23.9	23.6	23.6	23.3	22.7

DEPTH: 1731 TILT: 0 RANGE: 74.7 VOS: 6031

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	31.2	31.5	31.2	31.2	31.2	31.2	31.5	31.5
22.5	31.5	31.8	32.5	32.5	33.1	33.4	34.0	34.0
45.0	34.3	34.3	34.0	34.0	33.7	33.4	33.1	32.8
67.5	32.8	32.5	32.1	32.1	32.1	32.1	31.8	31.8
90.0	32.1	32.1	32.1	32.5	32.5	32.8	32.8	33.1
112.5	33.1	33.1	33.1	33.4	33.7	33.7	34.3	34.7
135.0	35.3	35.6	35.3	35.3	35.0	35.0	35.0	35.0
157.5	34.7	34.7	34.7	34.3	34.3	34.3	34.3	34.3
180.0	33.7	33.4	33.4	33.1	33.1	32.8	32.8	32.8
202.5	32.8	32.8	33.1	32.8	32.1	31.5	30.9	30.6
225.0	30.6	30.9	31.5	31.8	31.8	32.1	32.8	33.1
247.5	33.1	33.1	33.1	33.4	33.1	33.1	32.5	32.5
270.0	32.1	32.1	32.1	31.8	31.8	31.8	31.5	31.5
292.5	31.2	31.5	31.8	31.8	32.1	32.5	32.5	32.1
315.0	32.5	32.1	31.8	31.8	31.5	31.5	31.2	31.2
337.5	31.5	31.2	31.8	31.8	32.1	32.1	31.8	31.5

DEPTH: 1735 TILT: 0 RANGE: 49.8 VOS: 6031

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
22.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
45.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
67.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
90.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
112.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
135.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
157.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
180.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
202.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
225.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
247.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
270.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
292.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
315.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
337.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

DEPTH: 1741 TILT: 0 RANGE: 49.8 VOS: 6040

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
22.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
45.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
67.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
90.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
112.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
135.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
157.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
180.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
202.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
225.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
247.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
270.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
292.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
315.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
337.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8

DEPTH: 1744 TILT: 0 RANGE: 49.7 VOS: 6046

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
22.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
45.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
67.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
90.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
112.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
135.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
157.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
180.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
202.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
225.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
247.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
270.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
292.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
315.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
337.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

DEPTH: 1746 TILT: 0 RANGE: 49.8 VOS: 6038

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	19.5	19.5	19.5	19.5	19.3	19.7	19.7	19.7
22.5	20.0	20.0	20.2	20.4	20.4	20.8	20.8	20.4
45.0	20.0	19.7	19.5	19.3	18.9	18.7	18.9	18.7
67.5	18.5	18.5	18.7	18.7	18.5	18.5	18.5	18.5
90.0	18.7	18.9	19.1	19.3	19.7	19.7	20.2	20.2
112.5	20.2	20.2	20.2	20.4	20.6	20.8	21.0	21.0
135.0	21.2	21.4	21.4	21.2	21.0	20.8	20.4	20.2
157.5	20.2	20.0	19.7	19.7	19.5	19.5	19.5	19.3
180.0	19.3	19.3	19.3	19.3	19.3	19.3	19.1	18.9
202.5	18.9	18.7	18.7	18.7	18.7	19.1	19.3	19.3
225.0	19.3	19.5	19.7	20.0	20.2	20.4	20.6	20.4
247.5	20.0	19.5	19.3	19.1	18.9	18.9	18.9	18.9
270.0	18.9	19.1	18.9	19.1	18.9	19.1	18.9	18.7
292.5	18.7	18.7	18.7	18.9	18.9	19.3	19.3	19.5
315.0	19.5	19.5	19.3	19.3	19.1	19.1	19.3	19.3
337.5	19.1	19.1	19.1	19.1	19.1	19.3	19.1	19.3

DEPTH: 1748 TILT: 0 RANGE: 75.0 VOS: 6021

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	29.4	29.1	29.1	28.8	28.8	29.1	29.1	29.1
22.5	29.1	29.4	29.4	29.4	29.7	30.0	30.0	30.0
45.0	29.7	29.4	29.1	28.8	28.5	28.1	28.1	28.1
67.5	27.8	27.5	27.5	27.8	28.1	28.1	28.1	28.5
90.0	28.8	28.8	29.1	29.4	29.7	29.7	30.0	30.4
112.5	30.7	31.0	31.3	31.3	31.3	31.3	31.6	31.9
135.0	32.3	32.6	32.9	32.6	32.6	32.3	31.9	31.6
157.5	31.3	31.0	30.7	30.4	30.4	30.4	30.0	29.7
180.0	29.4	29.4	29.4	29.4	29.7	29.7	29.4	29.1
202.5	29.1	29.1	29.1	28.8	28.8	28.8	29.1	29.1
225.0	29.4	29.4	29.7	30.0	30.4	30.7	30.4	30.0
247.5	30.0	29.7	29.7	29.7	29.4	29.4	29.1	29.1
270.0	29.1	29.1	29.1	29.1	28.8	29.1	29.1	29.1
292.5	28.8	28.8	28.5	28.5	28.8	28.8	29.1	29.1
315.0	29.4	29.4	29.4	29.4	29.4	29.4	29.7	29.7
337.5	29.7	29.4	29.4	29.4	29.4	29.1	29.4	29.4

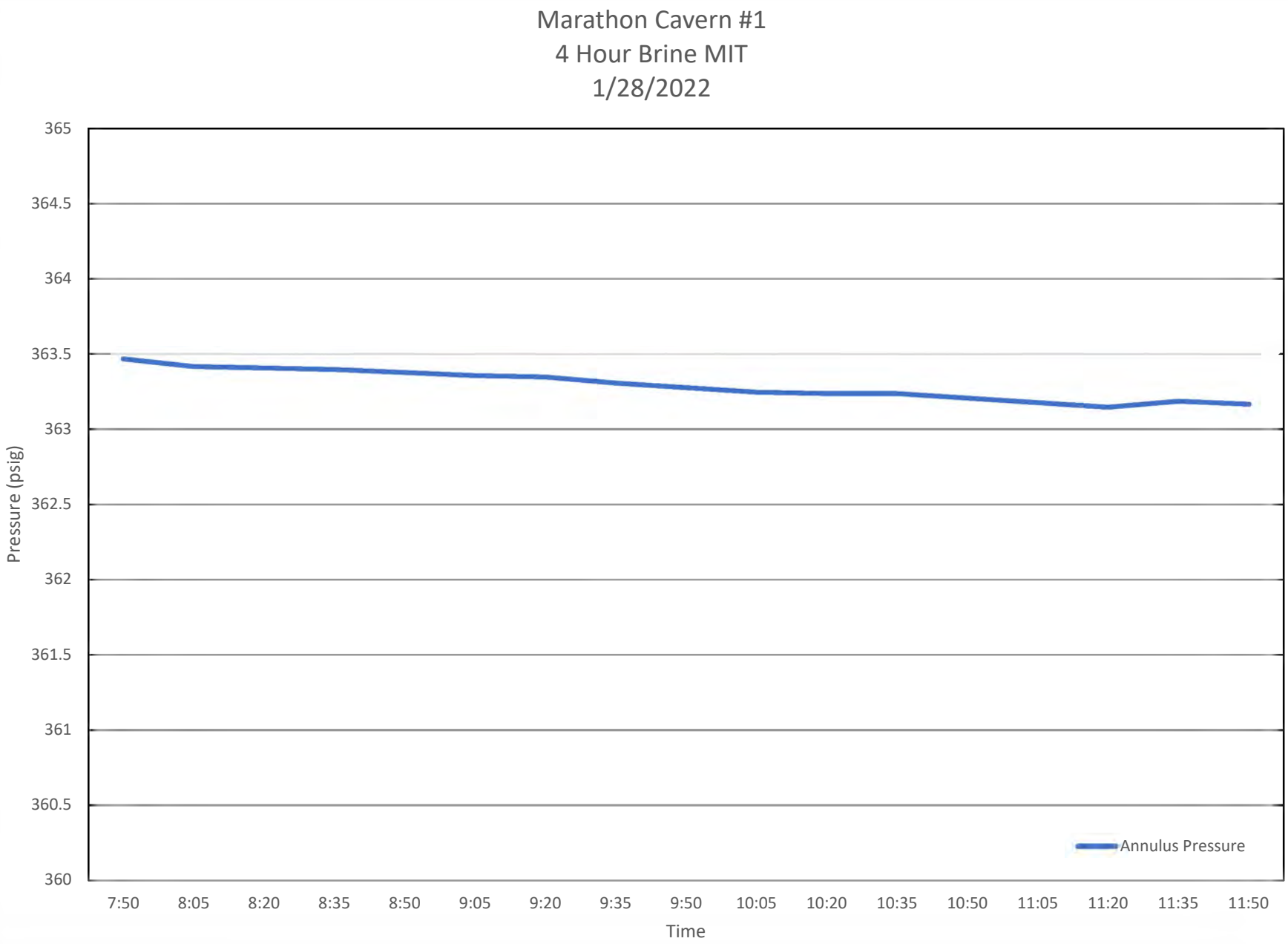
DEPTH: 1750 TILT: 0 RANGE: 24.9 VOS: 6039

Bearing	+ 0.0	+ 2.8	+ 5.6	+ 8.4	+11.3	+14.1	+16.9	+19.7
0.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
22.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
45.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
67.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
90.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
112.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
135.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
157.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
180.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
202.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
225.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
247.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
270.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
292.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
315.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
337.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5

Appendix B – Pressure Table

Marathon Cavern #1	
Brine MIT	
Time	Annulus (PSI)
7:50	363.47
8:05	363.42
8:20	363.41
8:35	363.4
8:50	363.38
9:05	363.36
9:20	363.35
9:35	363.31
9:50	363.28
10:05	363.25
10:20	363.24
10:35	363.24
10:50	363.21
11:05	363.18
11:20	363.15
11:35	363.19
11:50	363.17
4 Hr Press Loss	0.30
% Press Loss	0.08%

Appendix C – Pressure Graph

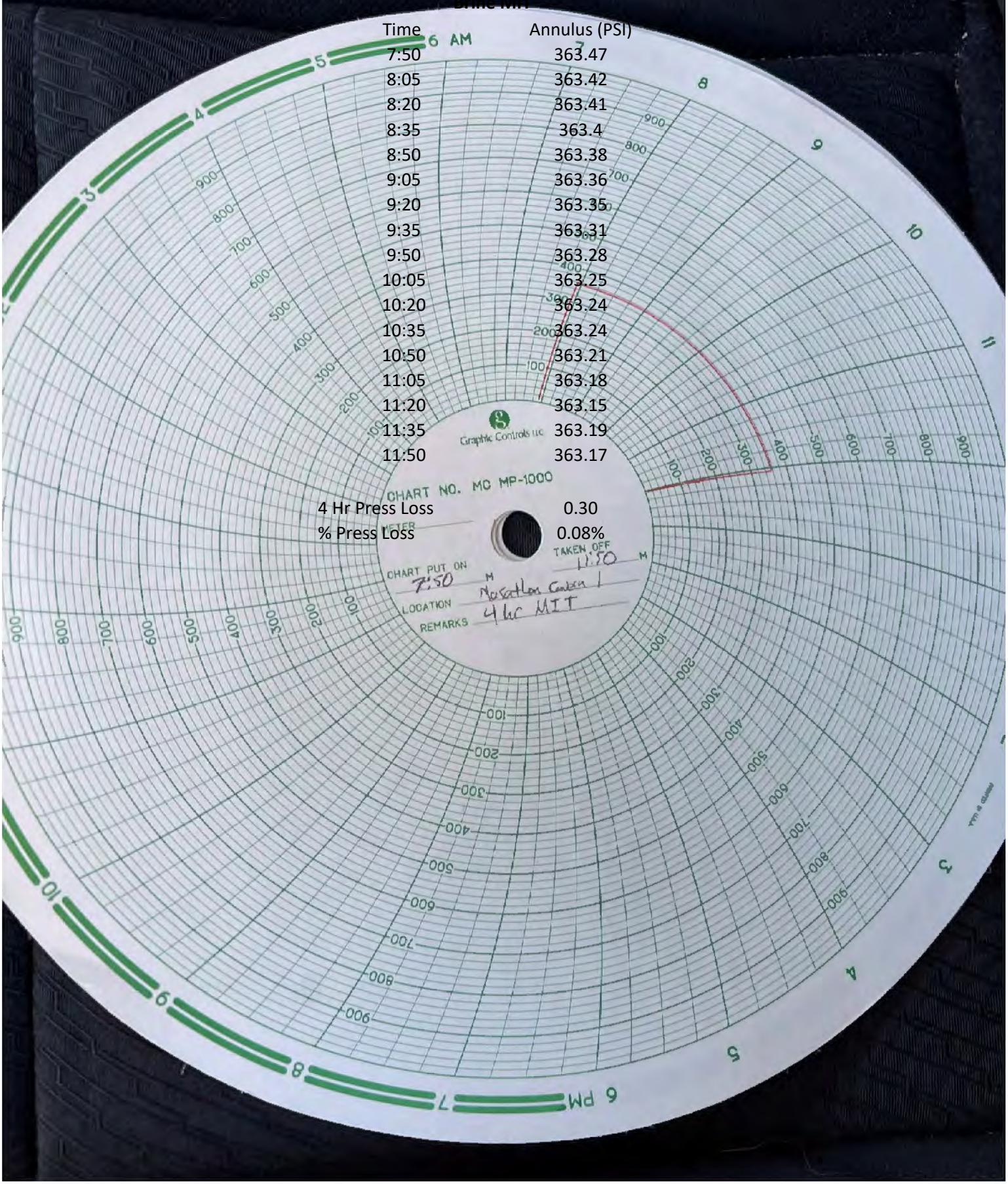

Marathon Cavern #1
4 Hour Brine MIT
1/28/2022
365
364.5
364
363.5
363
362.5
362
361.5
361
360.5
360
Pressure (psig)
7:50
8:05
8:20
8:35
8:50
9:05
9:20
9:35
9:50
10:05
10:20
10:35
10:50
11:05
11:20
11:35
11:50
Time
Annulus Pressure

Appendix D – Chart Recorder

Marathon Cavern #1

Brine MIT

Time	Annulus (PSI)
7:50	363.47
8:05	363.42
8:20	363.41
8:35	363.4
8:50	363.38
9:05	363.36
9:20	363.35
9:35	363.31
9:50	363.28
10:05	363.25
10:20	363.24
10:35	363.24
10:50	363.21
11:05	363.18
11:20	363.15
11:35	363.19
11:50	363.17
4 Hr Press Loss	0.30
% Press Loss	0.08%



Mechanical Integrity Test Report
State LPG Storage No. 3
Operator: Western Refining Company, LP
API: 30-025-35956
Jal Station Field
Lea County, New Mexico, USA

Prepared for:

Western Refining Company, LP

By:

Lonquist Field Service, LLC
Texas Registered Firm No. F-9147
Houston, Texas

June 2017

Executive Summary

Lonquist Field Services, LLC was contracted by Western Refining Company, LP ("Western Refining") to conduct a Mechanical Integrity Test on State LPG Storage No. 3 ("Well No. 3"), operated by Western Refining Company, LP at the Jal Station Field in Lea County, New Mexico. The Nitrogen-Brine Interface Test Method was used for this test. Nitrogen was injected on May 10th, 2017 to achieve the desired interface depth below the casing shoe. The well was allowed to stabilize for approximately 15 hours and on May 11th, 2017 at 10:45 the MIT was initialized with an annulus (nitrogen) pressure of 1,203.38 psig and a tubing (brine) pressure of 387.07 psig with the nitrogen-brine interface at 1,690'. The test was finalized on May 12th, 2017 at 10:45 with an annulus (nitrogen) pressure of 1,199.40 psig and a tubing (brine) pressure of 382.88 psig with the nitrogen-brine interface at 1,690'. The calculations yielded a calculated leak rate ("CLR") of 475.54 barrels per year and a Minimum Detectable Leak Rate ("MDLR") of 927.39 barrels per year. The well was tested to a test gradient of 0.77 psi/ft at the 9-5/8" cemented casing shoe (1,665'). Considering these results and the guidelines set forth by the State of New Mexico Oil Conservation Division, Well No. 3 at the Jal Station Field, at the time of this test, demonstrated the mechanical integrity required for the storage of hydrocarbons.

Reviewed By:
Lonquist Field Service, LLC
Ben H. Bergman, Sr. Engineer

Date Signed: June 20th, 2017
Houston, Texas

Table of Contents

Introduction

Lonquist Field Service, LLC was contracted by Western Refining Company, LP to conduct a Mechanical Integrity Test on State LPG Storage No. 3 ("Well No. 3") at the Jal Station Field in Lea County, New Mexico.

Well No. 3 was tested using the Nitrogen-Brine Interface Test Method (See Appendix A). Typically this procedure begins with an initial injection of nitrogen into the well to check for wellhead and casing leaks. The initial injection is followed by continued injection of nitrogen into the storage well until the interface is located below the casing shoe and a sufficient test pressure has been reached. The interface depth and the nitrogen (annulus) pressure are monitored during the test period. The test is evaluated by calculating the nitrogen mass (volume) at the commencement and completion of the test period. This difference yields an apparent mass (volume) change. As the test occurs over a finite time period, the apparent mass (volume) rate of change can be calculated and linearly forecasted to an annual rate. The annual mass (volume) rate of change is usually expressed in barrels of nitrogen per year (at average well pressure and temperature conditions). The mass (volume) rate of change is subject to the accuracy of the test or Minimum Detectable Leak Rate (MDLR), also expressed in barrels per year.

The following report will outline the mechanical integrity test for Well No. 3. The report includes the cavern and wellbore configuration, temperature logs, and density logs completed during the test.

Summary

On May 8th, 2017 at 07:00, wireline and nitrogen units were rigged up and a gauge run, base temperature log and base density log were completed. At 12:00, nitrogen was injected into Well No. 3 with a target temperature of 77° F until the nitrogen-brine interface was measured at a depth of 1,552'. The liner test began on May 8th, 2017 at 15:30 with the nitrogen-brine interface at 1,552', an annular (nitrogen) pressure of 891.71 psig, and a tubing (brine) pressure of 160.37 psig. The liner test ended with the nitrogen-brine interface at 1,552', an annular (nitrogen) pressure of 891.48 psig, and a tubing (brine) pressure of 159.86 psig. The 60-minute liner test passed with a stabilizing pressure trend throughout the testing period. Following the liner test, nitrogen injection continued until the nitrogen-brine interface was measured at a depth of 1,643'. The casing test began on May 8th, 2017 at 17:00 with the nitrogen-brine interface at 1,643', an annular (nitrogen) pressure of 944.64 psig, and a tubing (brine) pressure of 170.99 psig. The casing test ended with the nitrogen-brine interface at 1,643', an annular (nitrogen) pressure of 944.23 psig, and a tubing (brine) pressure of 170.23 psig. The 60-minute casing test passed with a stabilizing pressure trend throughout the testing period.

On May 10th, 2017, nitrogen was injected into Well No. 3 with a target temperature of 77° F until the nitrogen-brine interface was measured at a depth of 1,690' at an adequate test pressure.

After an approximate 15 hour stabilization period, on May 11th, 2017 at 10:45 the MIT on Well No. 3 was initialized with an annulus (nitrogen) pressure of 1,203.38 psig, a tubing (brine) pressure of 387.07 psig, and with the nitrogen-brine interface at a depth of 1,690'. The well was shut in for a 24 hour test period. On May 12th, 2017 at 10:45 the MIT on Well No. 3 was finalized with an annulus (nitrogen) pressure of 1,199.40 psig, a tubing (brine) pressure of 382.88 psig and with the nitrogen-brine interface at a depth of 1,690'. This concluded the MIT on Well No. 3.

Conclusions

The mechanical integrity of Well No. 3 was established with the Nitrogen-Brine Interface Test Method. This test monitored the Nitrogen-Brine Interface for a 24 hour test period. Well No. 3 was initialized with an annulus (nitrogen) pressure of 1,203.38 psig, a tubing (brine) pressure of 387.07 psig, and the nitrogen-brine interface at 1,690'.

Well No. 3 was finalized with an annulus (nitrogen) pressure of 1.199.40 psig, a tubing (brine) pressure of 382.88 psig, and the nitrogen-brine interface at 1,690'. Well No. 3 had a test length of 24 hours and a test gradient of 0.77 psi/ft at the 9-5/8" cemented casing shoe.

The total gas volume in the annulus and the wellbore was calculated to be 195,524.30 SCF at the start of the test and 194,909.15 SCF at the end of the test for a calculated "decrease" in gas volume of 615.15 SCF. The calculated gas volume was based on the measured wellhead pressure, measured wellbore temperature, known casing annulus volume, and calculated borehole volumes (Appendix D).

The calculated leak rate ("CLR") was 475.54 barrels per year. Considering the calculations, the calculated leak rate is less than the Minimum Detectable Leak Rate ("MDLR") of 927.39 barrels per year.

At the completion of this test, Well No. 3 exhibited the characteristics of a well that has mechanical integrity as required for hydrocarbon storage, in accordance with industry standards and the guidelines established by the State of New Mexico Oil Conservation Division.

Daily Activities

May 8th, 2017

Arrive on location and spot equipment. Hold daily safety meeting and review JSAs. Rig up wireline and nitrogen equipment. Run in hole with gauge run and tag TD at 2,439'. Run in hole with wireline and record base temperature and density logs. Start nitrogen injection and spot nitrogen-brine interface above the 7" liner shoe at 1,552' for the 60 minute liner test. The test started with an annulus pressure of 891.71 psig and a tubing pressure of 160.37 psig. The test ended with an annulus pressure of 891.48 psig and a tubing pressure of 159.86 psig. The interface at the beginning and end of the test was measured at 1,552'. The pressure trend during the 60 minute liner test showed a stabilization curve with pressure flattening out over the test. The test passed and nitrogen injection was continued. The nitrogen-brine interface was spotted above the 9-5/8" casing shoe at 1,643' for the 60 minute casing test. The test started with an annulus pressure of 944.64 psig and a tubing pressure of 170.99 psig. The test ended with an annulus pressure of 944.23 psig and a tubing pressure of 170.23 psig. The interface at the beginning and end of the test was measured at 1,643'. The test passed with a pressure trend during the 60 minute casing test showing a stabilization curve with pressure flattening out over the test.

May 10th, 2017

Arrive on location, hold daily safety meeting, and review JSAs. Inject nitrogen while bleeding off brine in order to spot the nitrogen-brine interface at 1,690' at an adequate test pressure. Complete post injection log. Rig down lubricator, crane, and nitrogen unit. Secure well and allow to stabilize overnight.

May 11th, 2017

Arrive on location, hold daily safety meeting, and review JSAs. Rig up lubricator and crane. Run in hole with temperature log and initialize test with density log. The nitrogen-brine interface was located at 1,690'. Test initialization annulus pressure was 1,203.38 psig and initialization tubing pressure was 387.07 psig. Rig down crane and lubricator. Secure well for the night.

May 12th, 2017

Arrive on location, hold daily safety meeting, and review JSAs. Rig up lubricator and crane. Run in hole with temperature log and finalize test with density log. The nitrogen-brine interface was located at 1,690'. Test finalization annulus pressure was 1,199.40 psig and finalization tubing pressure was 382.88 psig. Rig down crane and lubricator. Secure and return well to Western Refining.

Test Participants

Western Refining Company, LP

Ken Parker……..……...…..Project Manager

Lonquist Field Service, LLC

Eric Busch……...Operations Manager

Tadd Busch…….Operations Manager

Will George.....Petroleum / Test Engineer

Ben Bergman……..Sr. Engineer

Empire Wireline, LLC

Wireline Personnel…….……...…..…….Wireline Operator

CUDD Energy Services

Nitrogen Personnel…….……...…….……..Nitrogen Injection

Double R Transportation, LLC

Double R Personnel…….…….……...…….....……..Pump Truck

Calculations

Minimum Detectable Leak Rate – MDLR

The test sensitivity is defined as the ability of the test calculations and measurements to determine the status of the mechanical integrity of the well and wellbore. The conventional test sensitivity calculation using this test methodology is the Minimum Detectable Leak Rate (MDLR).

$$MDLR = \left[B_V * L_R * (T_c)\right] / T_L$$

Where:

B_v	=	5.08 bbls/ft (APPENDIX D)
L_R	=	0.50 feet
T_c	=	365 days/year
T_L	=	1 day
MDLR	**=**	**927.39 bbls/year**

Therefore: (5.08 x 0.50 x 365)/1 = 927.39 bbls/year*
*Hand calculations may yield different final MDLR due to rounding.

Volume Calculations – Annular Space & Borehole

Using the methodology outlined in the MIT procedure the following volumes were calculated:

Initial Wellbore Volume (**$V_{I(Borehole)}$**)

- Annulus Pressure – 1,203.38 psig
- Tubing Pressure – 387.07 psig
- Wellbore Temperature – Logged (APPENDIX F)
- Volume
  - 7” x 3-1/2” Annulus – 0.027 bbls/ft
  - 9-5/8” x 3-1/2” Annulus – 0.065 bbls/ft
  - Borehole – APPENDIX D

$$(V_I) = \sum_{o}^{I/F} (N_2)_i$$

$V_{I(Borehole)}$ = 195,524.30 SCF

Final Wellbore Volume (**$V_{F(Borehole)}$**)

- Annulus Pressure – 1,199.40 psig
- Tubing Pressure – 382.88 psig
- Wellbore Temperature – Logged (APPENDIX F)
- Volume
  - 7” x 3-1/2” Annulus – 0.027 bbls/ft
  - 9-5/8” x 3-1/2” Annulus – 0.065 bbls/ft
  - Borehole – APPENDIX D

$$(V_F) = \sum_{o}^{I/F} (N_2)_i$$

$V_{F(Borehole)}$ = 194,909.15 SCF

Borehole Volume Change:

$$(\Delta V)_{STP(Borehole)} = (\Delta V)_{I(Borehole)} - (\Delta V)_{F(Borehole)}$$

$$(\Delta V)_{STP(Borehole)} = 615.15 SCF$$

The calculated volume/mass change is based on standard temperature and pressure and to evaluate the test results against the MDLR the calculated volume/mass change is converted to downhole conditions with the following equation:

$$(\Delta V_{WB}) = \left(\frac{[(Z_A)*(T_A)*R*(\Delta V)_{STP}]}{[(P_A)*N_{GC}]} \right)$$

Where:

(Z_A)	=	1.00244
(T_A)	=	536.58 ◦R
R	=	Specific Gas Constant
$(\Delta V)_{STP}$	=	615.15 SCF
(P_A)	=	1,255.58 psi
N_{GC}	=	Nitrogen Gas Conversion (13.80 SCF = 1 lb)
(ΔV_{WB})	**=**	**7.31 ft^3/day**

To calculate an annual volume change to compare to the MDLR the following calculations were completed:

$$(\Delta V_{ANNUAL}) = (\Delta V_{WB}) * 365 (day / year)$$

Where:

(ΔV_{WB})	=	7.31 ft^3/day
1 year	=	365 days
(ΔV_{ANNUAL})	**=**	**2,668.15 ft^3 /yr**

Where:

(ΔV_{ANNUAL})	=	2,668.15 ft^3/yr
1 bbl	=	5.6146 ft^3
CLR (bbls/year)	**=**	(ΔV_{ANNUAL}) / 5.6146 ft^3
Calculated Leak Rate	**=**	**475.54 bbls/year***

***Hand calculations may yield different final CLR due to rounding.**

Well Data Sheet

TEST INFORMATION AND RESULTS

Well Name:	State LPG Storage No. 3
Operator:	Western Refining Company, L.P.
State:	NM
County/Parish:	Lea
Field:	Jal
Serial/API:	30-025-35956

WELL INFORMATION

Production Casing			Casing Liner		
Casing Size	9 5/8	inches	**Casing Size**	7	inches
Casing ID	8.921	inches	**Casing ID**	6.366	inches
Casing Weight	36	lbs/ft	**Casing Weight**	23	lbs/ft
Grade	J-55		**Grade**	J-55	
Depth	1665	feet	**Depth**	1578	feet

Outer Hanging String			Inner Hanging String		
Casing Size	3 1/2	inches	**Casing Size**		inches
Casing ID	2.250	inches	**Casing ID**		inches
Casing Weight	NA	lbs/ft	**Casing Weight**		lbs/ft
Grade	NA		**Grade**		
Depth	2430	feet	**Depth**		feet

Cavern		
Cavern Size	68558	bbls
Compressibility	0.21	bbls/psi
Cavern TD	2439	feet

FINAL TEST INFORMATION

Effective Casing Shoe	1665	feet	**Casing Shoe Pressure (avg)**	1286.35	psi
Test Gradient	0.77	psi/ft	**Interface Pressure (avg)**	1287.43	psi
Brine Specific Gravity	1.2		**Surface Tubing Pressure (avg)**	384.97	psi
Nitrogen Temperature (avg)	76.89	deg F	**Surface Annulus Pressure (avg)**	1201.39	psi
Interface Depth	1690	feet	**Pressure Increase**	-3.98	psi
Gas Compressibility (avg)	1.00		**Conversion**	14.70	psi

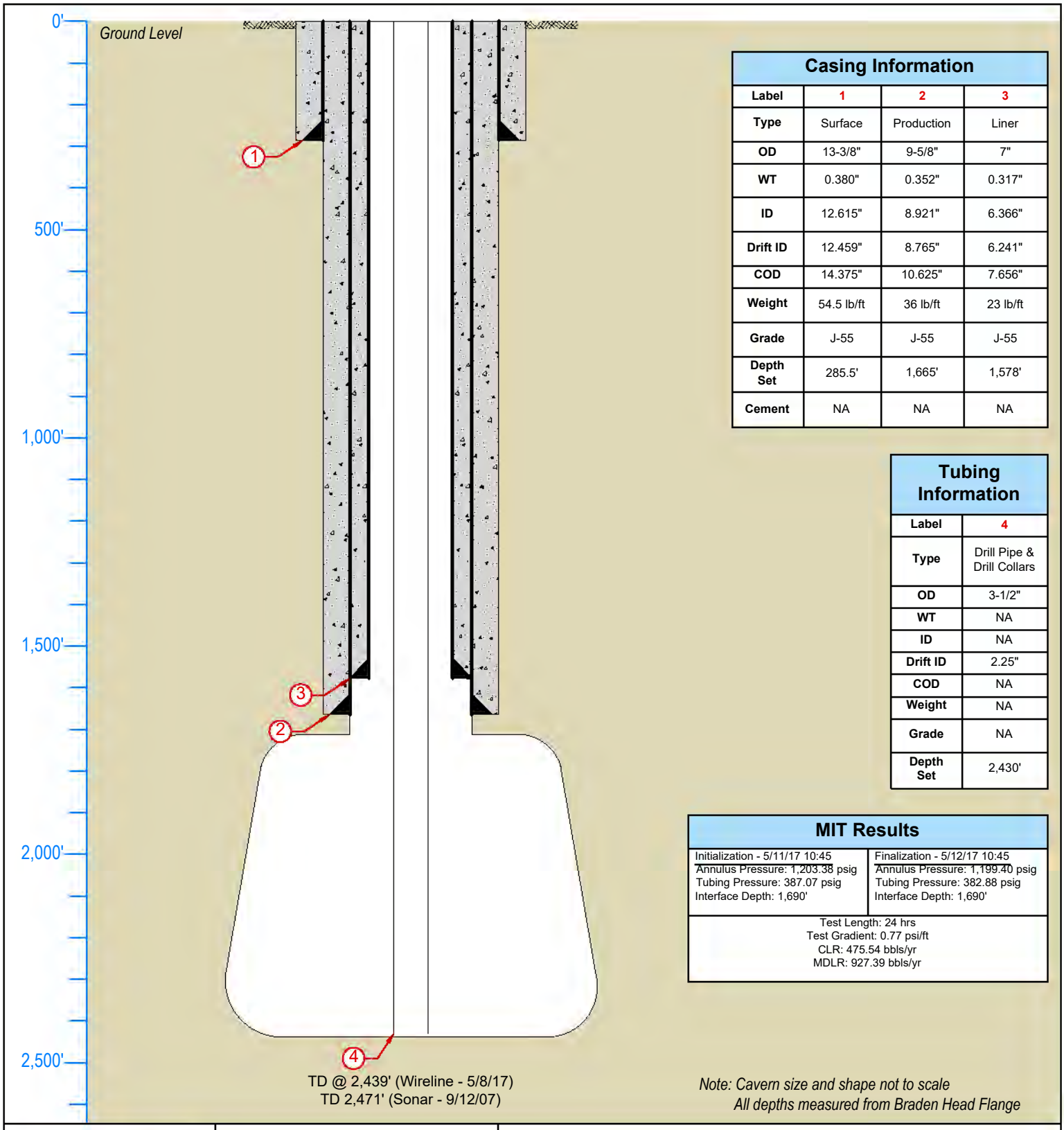
Volume			Nitrogen		
Annular Volume No. 1	0.03	bbls/ft	**Surface to Casing Shoe (avg)**	23173.37	SCF
Annular Volume No. 2	0.07	bbls/ft	**Casing Shoe to Interface (avg)**	172043.35	SCF
Surface to Liner Shoe	43.3	bbls	**Total (avg)**	195216.73	SCF
Surface to Casing Shoe	49.0	bbls	**Brine**		
Casing Shoe to Interface	343.3	bbls	**Cavern Pre-Pressure**	50.00	psi
Total	392.3	bbls	**Brine Injection**	10.39	bbls

TEST RESULTS

Test Initialization Information			Test Finalization Information		
Date / Time	5/11/17 10:45		**Date / Time**	5/12/17 10:45	
Tubing Pressure	387.07	psig	**Tubing Pressure**	382.88	psig
Annulus Pressure	1,203.38	psig	**Annulus Pressure**	1,199.40	psig
Wellbore Temperature (avg)	77.03	deg F	**Wellbore Temperature (avg)**	76.75	deg F
Nitrogen/Brine Interface	1690	feet	**Nitrogen/Brine Interface**	1690	feet

Test Results					
CLR	475.54	bbls/yr	**Test Length**	24.00	hours
MDLR	927.39	bbls/yr	**Test Length**	1	days
Test Gradient	0.77	psi/ft	**Logging Resolution**	0.50	feet
Tubing Pressure Change	-4.19	psi			
Annulus Pressure Change	-3.98	psi			

MIT/Well Schematic



Casing Information

Label	1	2	3
Type	Surface	Production	Liner
OD	13-3/8"	9-5/8"	7"
WT	0.380"	0.352"	0.317"
ID	12.615"	8.921"	6.366"
Drift ID	12.459"	8.765"	6.241"
COD	14.375"	10.625"	7.656"
Weight	54.5 lb/ft	36 lb/ft	23 lb/ft
Grade	J-55	J-55	J-55
Depth Set	285.5'	1,665'	1,578'
Cement	NA	NA	NA

Tubing Information

Label	4
Type	Drill Pipe & Drill Collars
OD	3-1/2"
WT	NA
ID	NA
Drift ID	2.25"
COD	NA
Weight	NA
Grade	NA
Depth Set	2,430'

MIT Results

Initialization - 5/11/17 10:45	Finalization - 5/12/17 10:45
Annulus Pressure: 1,203.38 psig	Annulus Pressure: 1,199.40 psig
Tubing Pressure: 387.07 psig	Tubing Pressure: 382.88 psig
Interface Depth: 1,690'	Interface Depth: 1,690'

Test Length: 24 hrs
Test Gradient: 0.77 psi/ft
CLR: 475.54 bbls/yr
MDLR: 927.39 bbls/yr

Note: Cavern size and shape not to scale
All depths measured from Braden Head Flange

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Western Refining Company, LP

State LPG Storage No. 3 - MIT Results

Country: USA	**State/Province:** New Mexico	**County/Parish:** Lea
Survey/STR: M-32-23S-37E	**Site:** 1000' FSL & 530' FWL	**Status:** Storage
API No.: 30-025-35956	**Field:**	**Ground Elevation:** 3,312'
Serial No.:	**Project No:** F1203	**Date:** 6/9/2017
Drawn: WHG	**Reviewed:** ETB	**Approved:** ETB
Rev No:	**Notes:**	

Appendix A – MIT Test Procedure

INTRODUCTION

Well No. 3 is operated by Western Refining Company, LP located in the Jal Station Field in Lea County, New Mexico. The purpose of this Mechanical Integrity Test (MIT) is to test the integrity of the underground storage system that includes the cavern, cemented casing, and wellhead to determine if the system demonstrates the mechanical integrity required to support hydrocarbon storage operations.

In accordance with the Oil Conservation Division of New Mexico, Well No. 3 is undergoing a MIT to remain compliant.

The test procedure will consist of the following basic steps:

1. Pre-pressure the cavern to the required pre pressure.
   - Tubing Pressure: **50.0 psig**
   - 0.75 psi/ft final test gradient at the effective casing shoe (1,655.5').
2. Complete pre-test temperature and density logs.
3. Inject nitrogen into Well No. 3 and locate the nitrogen/brine interface above the cemented liner to complete a test on the cemented liner.
4. Inject nitrogen into Well No. 3 and locate the nitrogen/brine interface above the cemented casing shoe to complete a test on the cemented casing.
5. Inject nitrogen into Well No. 3 and locate the nitrogen/brine interface below the effective cemented casing shoe.
6. Monitor wellhead pressures, wellbore temperature, and the nitrogen/brine interface location during the specified test period.
7. Secure Well No. 3 and return to Western Refining.
8. Complete and submit a MIT report to Western Refining Company, LP and the Oil Conservation Division of New Mexico within 45 days.

The test procedure includes the following information:

- Nitrogen/Brine Interface Test Planning Sheet
- Wellbore Schematic
- Contact Information
- 2007 Sonar Data

Well Preparation

1. Wellhead should be isolated from all surface piping during the test. This may include blind flanges, skillet flanges, and 2" test flanges.
    a. Wellhead should maintain the ability to bleed excess brine pressure during the test.

2. Install pressure recording equipment on wellhead. Pressure equipment should be able to record wellhead pressures and wellhead temperatures during the test period. Additional equipment to measure the nitrogen stream injected into the well will be necessary.
    a. All equipment calibration certifications will be provided with final reports.

3. Wellhead configuration should permit the use of a wireline lubricator and logging tools.

4. Pre-pressure the cavern to predetermined pressure with saturated brine.
    a. Tubing Pressure: 50.0 psig

5. Wellhead pressure should be stable prior to starting the test.
    a. Stable wellhead pressure – Decline less than 10 psi/day.

Well Injection Phase

6. Move in and rig up wireline unit, logging tools, pressure equipment, and nitrogen services.

7. Make a gauge run to ensure logging and sonar tools will pass through the tubing.

8. Complete wellbore temperature log and base density log.
    a. Base Temperature Log – (0' –TD)
    b. Base Density Log – (TD' – 200' above effective casing shoe depth)
    c. Density logs should include: tubing collars, effective casing shoe, and approved logging scales.
    d. All depths are approximate.

9. Start Nitrogen Injection at a slow rate (<500 SCFM). Nitrogen temperature should be regulated to the average wellbore temperature.

10. Monitor the nitrogen/brine interface and wellbore pressures to locate the interface above the liner shoe and conduct a liner test.
    a. Liner Test – Minimum of 60 minutes.
    b. Monitor and record wellhead pressures and interface at the start and completion of the test.

11. Inject nitrogen and monitor the nitrogen/brine interface and wellbore pressures to locate the interface above the casing shoe and conduct a casing test.
    a. Casing Test – Minimum of 60 minutes.
    b. Monitor and record wellhead pressures and interface at the start and completion of the test.

12. Continue nitrogen injection and monitor the nitrogen/brine interface and wellbore pressures to locate the nitrogen/brine interface below the effective casing shoe. The targeted gradient is 0.75 psi/ft at the effective casing shoe and cannot exceed a test pressure gradient of 0.81 psi/ft at the effective casing shoe at any time.
    a. Pressure may need to be relieved by bleeding off brine during nitrogen injection.

13. After the nitrogen/brine interface is located sufficiently below the cemented casing shoe, stop nitrogen injection and shut well in for a short stabilization period.

14. Shut in for 30 minutes – Monitor pressures, interface location, and check wellhead for possible leak paths.

15. Complete post injection density logs.
    a. Post Injection Density Log – (TD' – 200' above effective casing shoe).
    b. Record wellhead pressures.
    c. Density logs should include: tubing collars, nitrogen/brine interface, production casing shoe, and approved logging scales.
    d. All depths are approximate.

16. Remove logging tools and shut well for the stabilization period.

17. Complete pre-test calculations based on wellhead pressure measurements, nitrogen volume measurements, wellbore temperatures, and interface locations.
    a. Refer to Test Calculations Section.

18. MIRU sonar tools and perform a sonar survey on the cavern.
    a. Shoot the roof of the cavern with upshots.
    b. Shoot the floor of the cavern with downshots.
    c. Record data every 2'.

Test Initialization

19. Move in and rig up wireline unit, logging tools, and pressure equipment.

20. Complete wellbore temperature log and initial density log.
    a. Initial Temperature Log – (0' – TD')
    b. Initial Density Log – (TD' – 200' above effective casing shoe)
    c. Density logs should include: tubing collars, nitrogen/brine interface, production casing shoe, and approved logging scales.
    d. All depths are approximate.

21. Shut well in for test period – Minimum of 24 hours.

Test Finalization

22. After planned test duration, move in and rig up wireline unit, logging tools, and pressure equipment.
    a. Complete wellbore temperature log and final density log.
    b. Final Temperature Log – (0' – TD')
    c. Final Density Log – (TD' – 200' above effective casing shoe)
    d. Density logs should include: tubing collars, nitrogen/brine interface, production casing shoe, and approved logging scales.
    e. All depths are approximate.

23. Determine if the test is complete or should be extended based on results.

Nitrogen/Brine Interface Test Calculations

The test methodology proposed in this procedure is developed using the industry standard nitrogen/brine interface test method.

The wellhead pressures and temperature, wellbore temperatures, nitrogen volumes, and interface location will be recorded throughout the test period and will allow for the calculation of the borehole volumes, test sensitivity, minimum test durations, and final test calculations.

All test calculations are based on the following measured parameters: wellhead pressure, nitrogen volumes, annular casing unit volume, wellbore temperatures, and interface locations. In addition to the measured parameters, the following calculated parameters are important in completing the test: unit borehole volume, MDLR, and test length.

To evaluate the test the calculated nitrogen volume/mass at the start of the test is compared to the calculated nitrogen volume/mass at the end of the test. This rate of volume change and it's comparison to the test sensitivity is one of the components in determining the final results of the MIT.

TEST SENSITIVITY AND TEST LENGTH

Test sensitivity calculations are the functions of three factors:

Casing volume – Calculated
Log Resolution – Recommended: 5":100' logging scale
Minimum test duration – 24 hours

The test sensitivity is defined at the ability of the test calculations and measurements to determine the status of the mechanical integrity of the well and wellbore. The conventional test sensitivity calculation using this test methodology is the Minimum Detectable Leak Rate (MDLR).

$$MDLR = \left[B_V * L_R * (T_c)\right] / T_L$$

Where:

MDLR	=	Minimum Detectable Leak Rate (bbl/year)
B_v	=	Borehole Volume (bbls/ft)
L_R	=	Log Resolution (feet)
T_c	=	Time Constant (365 days/year)
T_L	=	Test Length (days)

Using the MDLR method a reasonable and acceptable test accuracy and sensitivity can be calculated for the Mechanical Integrity Test. The MDLR calculation is based on downhole measurements of the test conditions.

The MDLR must be less than 1000 bbl/year for the designated test period. The length of the test must a minimum of 24 hours and sufficient in length to keep the MDLR below 1000 bbl/year and allow for a proper evaluation of the well test.

TEST EVALUATIONS

The volume/mass of nitrogen located in the wellbore can be affected by following: temperature stabilization, cavern leaching/creep, and volume changes. Using P-V-T gas calculations, any changes in the volume/mass of the nitrogen in the wellbore can be evaluated based on wellbore temperature changes, pressure changes, and/or wellbore leakage.

Pressure Calculations

The average wellbore pressure is calculated based on the wellhead surface pressure, wellbore temperature, and depth of the specific interval. The following equation is used to calculate the average wellbore pressure

$$(P_A)_i = (P_A)_{i-1}\left[1+\left(\frac{D}{(R)(Z_A)_i(T)_i}\right)\right]$$

Where:

$(P_A)_i$	=	Pressure @ Depth Interval (Calculated) (psia)
$(P_A)_{i-1}$	=	Pressure @ Previous Depth Interval (Calculated) (psi)
D	=	Depth Interval (ft)
$(Z_A)_i$	=	Gas Compressibility Factor @ Depth Interval
R	=	Specific Gas Constant
$(T)_i$	=	Wellbore Temperature (◦R)

Nitrogen Calculations

The following calculation is used to calculate the volume/mass of nitrogen for specific intervals over the entire wellbore at the start and end of the test period:

$$(N_2)_i = \left(\frac{[(P_A)_i * (B_v)_i]}{[(Z_A)_i * (T_A)_i * R]}\right) * N_{GC}$$

Where:

$(N_2)_i$	=	Nitrogen Volume (SCF)
$(P_A)_i$	=	Average Wellbore Pressure (psi)
$(B_v)_i$	=	Wellbore Volume (ft^3)

$(Z_A)_i$ = Gas Compressibility Factor

$(T_A)_i$ = Wellbore Temperature (◦R)

R = Specific Gas Constant

N_{GC} = Nitrogen Gas Conversion (13.8 SCF = 1 lb)

Upon completion of each specific volume/mass calculation the sum of the each interval is calculated to determine the volume/mass of nitrogen in the wellbore at the beginning of the test. After the test is complete the calculation and summation is repeated to determine the final test results.

The following equations represent the summation of the intervals to the nitrogen/brine interface at the start and completion of the test:

$$(V_I) = \sum_{o}^{I/F} (N_2)_i$$

$$(V_F) = \sum_{o}^{I/F} (N_2)_i$$

The results of the beginning and completion of the test are compared and evaluated to determine the change in nitrogen volume during the test period. The following equation is used for the comparison:

$$(\Delta V)_{STP} = (V_I) - (V_F)$$

The calculated volume/mass change is based on standard temperature and pressure and to evaluate the test results against the MDLR the calculated volume/mass change is converted to downhole conditions with the following equation:

$$(\Delta V_{WB}) = \left(\frac{[(Z_A) * (T_A) * R * (\Delta V)_{STP}]}{[(P_A) * N_{GC}]} \right)$$

Where:

(ΔV_{WB}) = Nitrogen Volume Change (ft^3) – Wellbore Conditions

(Z_A) = Average Gas Compressibility Factor for Test Period

(T_A) = Average Wellbore Temperature (◦R) for Test Period

R = Specific Gas Constant

$(\Delta V)_{STP}$ = Nitrogen Volume Change (SCF) – Standard Conditions

(P_A) = Average Wellbore Pressure for Test Period (psi)

N_{GC} = Nitrogen Gas Conversion (13.8 SCF = 1 lb)

The change in wellbore volume for the test period is converted into a calculated annual volume change. The following equation determines this volume change:

$$(\Delta V_{ANNUAL}) = \frac{[(\Delta V_{WB}) * 24(hr/day) * 365(day/yr)]}{T_L}$$

Where:

(ΔV_{ANNUAL})	=	Calculated Volume Change (bbls/year)
(ΔV_{WB})	=	Nitrogen Volume Change (ft^3) – Wellbore Conditions
(T_L)	=	Test Length (hrs)

A positive change in wellbore volume indicates a calculated loss of nitrogen from the wellbore during the test period. A negative change in wellbore volume indicates a calculated increase (apparent nitrogen influx) in nitrogen volume during the test period.

Pass/Fail Criteria

Test results are evaluated for a successful test using the following criteria:

- MDLR less than 1000 bbls/day
- Calculated Annual Volume Change less than the MDLR
- Pressure response, wellbore temperature, and interface movement should respond in a way that represents the cavern has mechanical integrity

Test Reporting

A written report will be prepared within 45 days of completion and submitted to the Oil Conservation Division of New Mexico. The report will include the test procedures, test chronology, test results and conclusions, wireline logs, pressure information, and all supporting documentation.

LONQUIST FIELD SERVICE	WELL TEST	Project No.:
	Western Refining Company, LP State LPG Storage Well No. 3 Mechanical Integrity Test	Date: March 2017
		Page: 9 of 12

Well: No. 3	**State:** New Mexico	**County:** LEA	**Field:** Jal Station
API: 30-025-35956	**Oper:** Western Refining Company,LP	**Location:** Jal	**Status:** Active

TEST PLANNING SHEET

Well Name:	State LPG Storage No. 3
Operator:	Western Refining Company, L.P.
State:	NM
County/Parish:	Lea
Field:	Jal
Serial/API:	30-025-35956

WELL INFORMATION

Production Casing			Casing Liner		
Casing Size	9 5/8	inches	Casing Size	7	inches
Casing ID	8.921	inches	Casing ID	6.366	inches
Casing Weight	36	lbs/ft	Casing Weight	23	lbs/ft
Grade	J-55		Grade	J-55	
Depth	1666	feet	Depth	1579	feet

Outer Hanging String			Inner Hanging String		
Casing Size	3 1/2	inches	Casing Size		inches
Casing ID		inches	Casing ID		inches
Casing Weight		lbs/ft	Casing Weight		lbs/ft
Grade			Grade		
Depth	2447	feet	Depth		feet

Cavern		
Cavern Size	79,692	bbls
Compressibility	0.24	bbls/psi
Cavern TD	2455	feet

TEST INFORMATION

Effective Casing Shoe	1666	feet	Casing Shoe Pressure	1249.50	psi
Test Gradient	0.75	psi/ft	Interface Pressure	1250.53	psi
Brine Specific Gravity	1.2		Surface Tubing Pressure	372.40	psi
Nitrogen Temperature	75	deg F	Surface Annulus Pressure	1182.13	psi
Interface Depth	1890	feet	Pressure Increase	1624.76	psi
Gas Compressibility	1.0021		Conversion	14.70	psi

Volume			Nitrogen		
Annular Volume No. 1	0.03	bbls/ft	Surface to Casing Shoe	42399.62	SCF
Annular Volume No. 2	0.07	bbls/ft	Casing Shoe to Interface	161901.55	SCF
Surface to Liner Shoe	43.4	bbls	Total	204301.37	SCF
Surface to Casing Shoe	49.1	bbls	Brine		
Casing Shoe to Interface	343.3	bbls	Cavern Pre-Pressure	-1252.35	psi
Total	392.4	bbls	Brine Injection	-302	bbls

PREPARED BY	DATE	APPROVED BY	DATE	CLIENT APPROVAL	DATE	Lonquist Field Service, LLC
WHG	3/23/2017	ETB	3/23/2017			Texas Registration No. F-9147

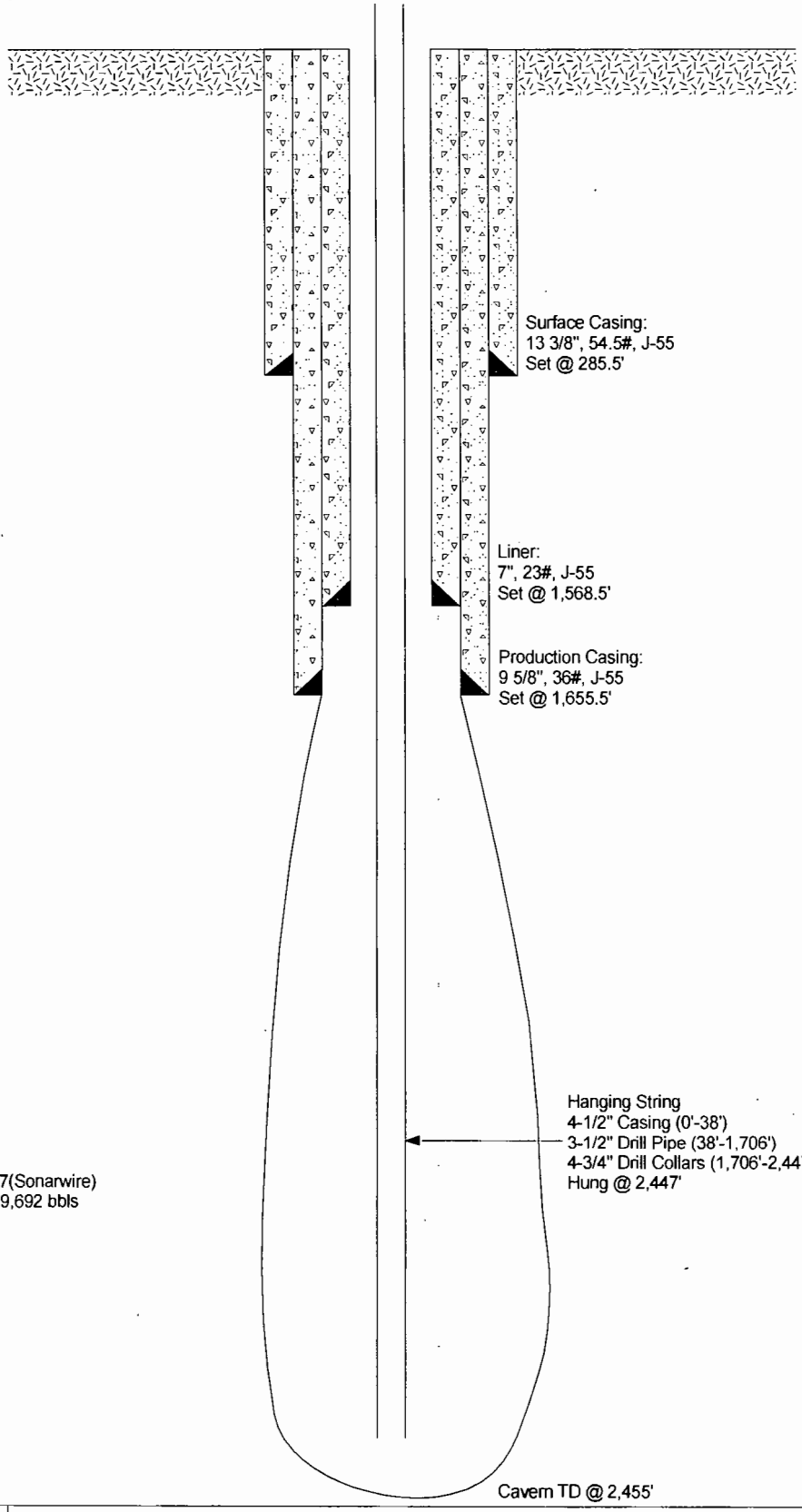
LONQUIST FIELD SERVICE	WELL TEST	Project No.:
	Western Refining Company, LP State LPG Storage Well No. 3 Mechanical Integrity Test	Date: March 2017
		Page: 10 of 12

Well: No. 3	**State:** New Mexico	**County:** LEA	**Field:** Jal Station
API: 30-025-35956	**Oper:** Western Refining Company,LP	**Location:** Jal	**Status:** Active

WELL SCHEMATIC

PREPARED BY	DATE	APPROVED BY	DATE	CLIENT APPROVAL	DATE	Lonquist Field Service, LLC
WHG	3/23/2017	ETB	3/23/2017			Texas Registration No. F-9147

Well Information
Operator: Western Refining Company, L.P.
API Number: 30-025-35956
Well Number: 3
Well Name: State LPG Storage
Field Name: Jal
County: Lea
State: New Mexico



LONQUIST FIELD SERVICE	State LPG Storage Well No. 3				
	Western Refining Company, L.P.				PROJECT NUMBER:
DRAWN: CMO	REVIEWED: ETB	APPROVAL: NONE	SCALE: NONE	DATE: August 2013	Lonquist Field Service, LLC Texas Registered Firm No. F-9147

CONTACT INFORMATION

Well Owner

Western Refining
PO Box 1345
Jal, New Mexico 88252

- Ken Parker – Site Manager
  - Telephone – (505) 395-2632
  - Mobile – (915) 471-1607
  - Email – ken.parker@wnr.com

Engineering Consultants

Lonquist Field Service, LLC
1001 McKinney, Suite 1650
Houston, Texas 77002

- Eric Busch – Senior Vice President
  - Telephone – (832) 216-0785
  - Fax – (713) 559-9959
  - Email – eric@lonquist.com
- Will George – Petroleum Engineer
  - Telephone – (512) 787-7478
  - Fax – (512) 732-9816
  - Email – will@lonquist.com

2007 SONAR VOLUME TABLE

SONARWIRE, INC.

P.O. BOX 576
ABITA SPRINGS, LA 70420
Office: 985-893-9221
Toll free: 888-211-6037
Fax: 985-893-4798
E-mail: gary@sonarwire.com

Survey conducted by: Gary McCool

WESTERN REFINING
JAL, NM
STATE LPG WELL NO. 3
SEPTEMBER 12, 2007
SONAR-THRU-PIPE SURVEY

Survey from 1666 ft. to 2470 ft.
Sonar T.D. at 2471 ft.
9 5/8 inch cemented casing at 1666 ft.
4 1/2 inch tubing at 2449 ft.
Zero sonar tool at B.H.F.
Site personnel: Mr. Jerry Lindt
Lonquist Field Services

SONARWIRE INC.
Depth versus Volume

WESTERN REFINING
JAL, NM

STATE LPG WELL NO. 3
Wed, Sep 12, 2007

Depth	Cubic ft. per ft.	Cubic ft. total	Barrels per ft.	Barrels total
1667	151.7	151.7	27.0	27.0
1668	127.1	278.8	22.6	49.7
1669	104.8	383.6	18.7	68.3
1670	100.5	484.1	17.9	86.2
1671	96.3	580.3	17.1	103.4
1672	94.4	674.7	16.8	120.2
1673	92.5	767.2	16.5	136.6
1674	92.0	859.2	16.4	153.0
1675	91.4	950.6	16.3	169.3
1676	90.0	1040.6	16.0	185.3
1677	88.6	1129.2	15.8	201.1
1678	87.2	1216.4	15.5	216.6
1679	85.8	1302.2	15.3	231.9
1680	84.9	1387.1	15.1	247.1
1681	84.1	1471.2	15.0	262.0
1682	83.4	1554.7	14.9	276.9
1683	82.8	1637.5	14.8	291.6
1684	74.0	1711.5	13.2	304.8
1685	65.8	1777.3	11.7	316.6
1686	51.5	1828.8	9.2	325.7
1687	39.2	1868.1	7.0	332.7
1688	27.6	1895.6	4.9	337.6
1689	18.3	1913.9	3.3	340.9
1690	13.8	1927.7	2.5	343.3
1691	10.5	1938.1	1.9	345.2
1692	29.9	1968.0	5.3	350.5
1693	63.4	2031.4	11.3	361.8
1694	58.9	2090.3	10.5	372.3
1695	54.6	2144.9	9.7	382.0
1696	50.6	2195.5	9.0	391.0
1697	46.8	2242.3	8.3	399.4
1698	20.9	2263.2	3.7	403.1
1699	6.2	2269.4	1.1	404.2
1700	0.9	2270.2	0.2	404.3
1701	0.9	2271.1	0.2	404.5
1702	0.9	2272.0	0.2	404.7
1703	48.5	2320.5	8.6	413.3
1704	50.2	2370.7	8.9	422.2
1705	51.9	2422.5	9.2	431.5
1706	53.6	2476.1	9.5	441.0
1707	55.4	2531.5	9.9	450.9
1708	53.5	2585.0	9.5	460.4
1709	51.7	2636.7	9.2	469.6
1710	49.9	2686.6	8.9	478.5
1711	48.1	2734.7	8.6	487.1
1712	47.1	2781.8	8.4	495.5

Appendix B – Injection Pressure Data

Nitrogen Injection

Well Name:	State LPG Storage No. 3
Operator:	Western Refining Company, L.P.
State:	NM
County/Parish:	Lea
Field:	Jal
Serial/API:	30-025-35956

Flow Conditions

Date / Time	Annulus Gauge		Tubing Gauge		Flow Conditions
	Pressure	Temp	Pressure	Temp	Temp
	psig	deg F	psig	deg F	deg F
5/10/17 11:34	90.31	82.62	63.07	82.60	91.02
5/10/17 11:35	164.98	82.64	69.51	82.60	89.40
5/10/17 11:36	228.31	82.63	79.30	82.57	86.92
5/10/17 11:37	278.30	82.61	85.34	82.54	84.57
5/10/17 11:38	320.76	82.61	89.99	82.54	83.20
5/10/17 11:39	358.38	82.67	93.49	82.56	83.27
5/10/17 11:40	390.31	82.77	97.33	82.65	83.53
5/10/17 11:41	421.57	82.86	100.31	82.74	83.60
5/10/17 11:42	451.21	82.95	104.00	82.82	82.31
5/10/17 11:43	477.60	82.98	107.22	82.84	81.62
5/10/17 11:44	503.54	82.99	109.99	82.86	82.50
5/10/17 11:45	528.68	83.00	112.57	82.89	83.55
5/10/17 11:46	550.29	83.04	115.16	82.92	85.02
5/10/17 11:47	570.80	83.15	117.53	83.01	86.63
5/10/17 11:48	593.02	83.33	120.05	83.15	88.56
5/10/17 11:49	614.07	83.56	121.86	83.36	89.53
5/10/17 11:50	633.75	83.75	123.54	83.52	89.65
5/10/17 11:51	653.27	83.89	125.84	83.67	89.29
5/10/17 11:52	671.64	83.98	127.82	83.76	88.71
5/10/17 11:53	689.71	84.00	130.73	83.80	88.18
5/10/17 11:54	706.51	83.97	132.74	83.80	87.64
5/10/17 11:55	724.19	83.90	134.71	83.74	87.04
5/10/17 11:56	739.89	83.81	136.53	83.66	86.64
5/10/17 11:57	755.58	83.75	138.31	83.60	86.23
5/10/17 11:58	770.93	83.70	140.11	83.55	86.18
5/10/17 11:59	787.97	83.65	141.88	83.49	86.22
5/10/17 12:00	803.90	83.56	143.60	83.42	86.49
5/10/17 12:01	818.78	83.48	145.35	83.33	86.75
5/10/17 12:02	833.31	83.44	146.94	83.29	87.22
5/10/17 12:03	848.28	83.45	148.62	83.29	88.77
5/10/17 12:04	861.94	83.59	150.08	83.41	90.54
5/10/17 12:05	875.75	83.75	151.43	83.55	91.57
5/10/17 12:06	889.18	83.87	153.30	83.66	91.81
5/10/17 12:07	902.21	83.96	154.93	83.75	91.39
5/10/17 12:08	910.32	84.01	156.87	83.80	90.58
5/10/17 12:09	918.88	84.04	158.88	83.84	89.62
5/10/17 12:10	926.42	84.07	160.84	83.87	88.51
5/10/17 12:11	934.78	84.07	162.82	83.87	87.52
5/10/17 12:12	943.30	84.08	164.69	83.88	86.80

Nitrogen Injection

Well Name:	State LPG Storage No. 3
Operator:	Western Refining Company, L.P.
State:	NM
County/Parish:	Lea
Field:	Jal
Serial/API:	30-025-35956

Flow Conditions

Date / Time	Annulus Gauge		Tubing Gauge		Flow Conditions
	Pressure	Temp	Pressure	Temp	Temp
	psig	deg F	psig	deg F	deg F
5/10/17 12:13	946.78	84.18	165.08	83.95	86.89
5/10/17 12:14	946.42	84.37	165.46	84.11	88.32
5/10/17 12:15	946.25	84.62	165.32	84.34	89.12
5/10/17 12:16	946.14	84.94	165.13	84.61	89.59
5/10/17 12:17	946.06	85.22	165.02	84.89	89.90
5/10/17 12:18	945.98	85.38	164.91	85.05	90.13
5/10/17 12:19	945.95	85.47	164.63	85.17	90.32
5/10/17 12:20	945.89	85.53	164.82	85.25	90.51
5/10/17 12:21	945.87	85.58	164.74	85.32	90.77
5/10/17 12:22	945.81	85.70	164.71	85.45	91.06
5/10/17 12:23	945.77	85.80	164.65	85.53	91.30
5/10/17 12:24	946.83	85.83	164.83	85.58	93.15
5/10/17 12:25	952.81	85.82	166.97	85.59	85.58
5/10/17 12:26	954.89	85.84	169.37	85.62	79.77
5/10/17 12:27	957.38	85.88	171.78	85.66	76.62
5/10/17 12:28	960.17	85.99	174.12	85.76	76.02
5/10/17 12:29	962.79	86.16	177.01	85.89	76.71
5/10/17 12:30	967.40	86.23	181.84	85.96	78.54
5/10/17 12:31	971.84	86.25	186.57	86.00	81.22
5/10/17 12:32	976.46	86.24	191.29	86.00	82.73
5/10/17 12:33	980.90	86.21	195.89	85.98	82.68
5/10/17 12:34	985.33	86.21	200.53	85.97	81.62
5/10/17 12:35	989.49	86.21	205.03	85.97	80.12
5/10/17 12:36	993.94	86.22	209.56	85.97	78.88
5/10/17 12:37	998.12	86.27	213.97	86.01	78.88
5/10/17 12:38	1003.76	86.41	219.39	86.13	88.26
5/10/17 12:39	1010.43	86.60	226.57	86.30	104.11
5/10/17 12:40	1017.07	86.82	233.45	86.49	103.44
5/10/17 12:41	1023.43	86.98	240.19	86.66	94.51
5/10/17 12:42	1029.77	87.13	246.83	86.81	85.90
5/10/17 12:43	1036.01	87.30	253.37	86.99	81.08
5/10/17 12:44	1042.24	87.55	259.85	87.22	80.57
5/10/17 12:45	1048.36	87.76	266.25	87.43	81.03
5/10/17 12:46	1054.37	87.87	272.60	87.57	81.37
5/10/17 12:47	1060.44	87.94	278.81	87.64	81.42
5/10/17 12:48	1066.29	88.02	284.98	87.71	81.54
5/10/17 12:49	1072.12	88.11	291.03	87.80	81.28
5/10/17 12:50	1077.85	88.24	297.12	87.92	81.20
5/10/17 12:51	1083.62	88.40	303.07	88.08	81.36

Nitrogen Injection

Well Name:	State LPG Storage No. 3
Operator:	Western Refining Company, L.P.
State:	NM
County/Parish:	Lea
Field:	Jal
Serial/API:	30-025-35956

Flow Conditions

Date / Time	Annulus Gauge		Tubing Gauge		Flow Conditions
	Pressure	Temp	Pressure	Temp	Temp
	psig	deg F	psig	deg F	deg F
5/10/17 12:52	1089.22	88.66	308.97	88.33	81.63
5/10/17 12:53	1094.81	89.05	314.79	88.64	81.10
5/10/17 12:54	1100.30	89.46	320.59	89.04	81.15
5/10/17 12:55	1105.81	89.89	326.29	89.42	82.31
5/10/17 12:56	1111.24	90.31	331.98	89.83	83.85
5/10/17 12:57	1116.57	90.76	337.62	90.29	85.58
5/10/17 12:58	1121.83	91.19	343.11	90.73	84.40
5/10/17 12:59	1127.12	91.57	348.60	91.13	82.67
5/10/17 13:00	1132.39	91.82	354.04	91.45	80.90
5/10/17 13:01	1137.54	91.98	359.45	91.65	80.15
5/10/17 13:02	1142.65	92.12	364.77	91.83	80.19
5/10/17 13:03	1147.68	92.29	370.04	92.02	80.05
5/10/17 13:04	1152.73	92.47	375.21	92.21	79.79
5/10/17 13:05	1157.70	92.59	380.43	92.33	79.84
5/10/17 13:06	1162.72	92.61	385.54	92.35	79.92
5/10/17 13:07	1167.54	92.43	390.66	92.21	79.87
5/10/17 13:08	1172.61	92.16	395.65	91.92	80.32
5/10/17 13:09	1177.36	91.81	400.71	91.60	81.84
5/10/17 13:10	1182.25	91.41	405.73	91.22	83.41
5/10/17 13:11	1186.99	91.07	410.55	90.88	83.95
5/10/17 13:12	1191.60	90.77	415.50	90.57	83.99
5/10/17 13:13	1196.26	90.53	420.31	90.32	83.42
5/10/17 13:14	1200.82	90.35	425.09	90.10	82.03
5/10/17 13:15	1205.46	90.26	429.82	89.99	82.39
5/10/17 13:16	1209.75	90.24	434.74	89.97	83.46
5/10/17 13:17	1214.26	90.47	439.15	90.12	84.53
5/10/17 13:18	1218.59	90.81	443.75	90.42	85.01
5/10/17 13:19	1222.99	91.14	448.30	90.70	85.10
5/10/17 13:20	1227.37	91.39	452.83	90.94	85.15
5/10/17 13:21	1231.73	91.53	457.31	91.11	83.61
5/10/17 13:22	1235.87	91.59	461.73	91.17	78.96
5/10/17 13:23	1239.70	91.56	466.04	91.18	78.10
5/10/17 13:24	1239.38	91.40	465.64	91.04	78.23
5/10/17 13:25	1238.58	91.18	464.88	90.84	80.33
5/10/17 13:26	1237.95	90.93	464.19	90.62	81.40
5/10/17 13:27	1237.38	90.67	463.60	90.39	82.04
5/10/17 13:28	1236.89	90.42	463.06	90.12	82.49
5/10/17 13:29	1236.43	90.19	462.54	89.87	82.92
5/10/17 13:30	1235.98	89.95	462.11	89.66	83.35

Nitrogen Injection

Well Name:	State LPG Storage No. 3
Operator:	Western Refining Company, L.P.
State:	NM
County/Parish:	Lea
Field:	Jal
Serial/API:	30-025-35956

Flow Conditions

Date / Time	Annulus Gauge		Tubing Gauge		Flow Conditions
	Pressure	Temp	Pressure	Temp	Temp
	psig	deg F	psig	deg F	deg F
5/10/17 13:31	1235.57	89.68	461.71	89.38	83.74
5/10/17 13:32	1235.19	89.35	461.33	89.05	84.09
5/10/17 13:33	1234.91	89.01	460.95	88.71	84.43
5/10/17 13:34	1234.61	88.71	460.66	88.41	84.90
5/10/17 13:35	1234.33	88.49	460.33	88.17	85.17
5/10/17 13:36	1234.13	88.39	460.04	88.03	85.93
5/10/17 13:37	1233.80	88.34	459.75	87.99	86.07
5/10/17 13:38	1233.47	88.36	459.48	87.99	86.45
5/10/17 13:39	1233.23	88.45	459.22	88.10	86.99
5/10/17 13:40	1232.94	88.55	458.95	88.20	87.21
5/10/17 13:41	1232.73	88.63	458.58	88.28	87.60
5/10/17 13:42	1232.54	88.70	458.47	88.37	88.03
5/10/17 13:43	1232.36	88.72	458.20	88.42	88.55
5/10/17 13:44	1232.19	88.57	458.04	88.44	89.04
5/10/17 13:45	1232.14	88.30	457.83	88.40	89.54
5/10/17 13:46	1231.96	88.11	457.62	88.37	90.02
5/10/17 13:47	1231.80	88.08	457.42	88.39	90.54
5/10/17 13:48	1231.60	88.06	457.23	88.41	90.96
5/10/17 13:49	1231.42	87.96	457.07	88.35	91.27
5/10/17 13:50	1231.24	87.83	456.91	88.24	91.61
5/10/17 13:51	1231.08	87.73	456.72	88.12	91.98
5/10/17 13:52	1230.88	87.57	456.56	87.94	92.23
5/10/17 13:53	1230.77	87.40	456.42	87.73	92.48
5/10/17 13:54	1230.60	87.25	456.26	87.53	92.62
5/10/17 13:55	1230.43	87.11	456.12	87.33	92.76
5/10/17 13:56	1230.26	86.96	455.97	87.10	92.93
5/10/17 13:57	1230.13	86.79	455.80	86.85	93.13
5/10/17 13:58	1229.99	86.62	455.69	86.62	93.33
5/10/17 13:59	1229.84	86.47	455.55	86.39	93.51
5/10/17 14:00	1229.71	86.32	455.42	86.19	93.69
5/10/17 14:01	1229.59	86.20	455.30	86.05	93.87
5/10/17 14:02	1229.47	86.15	455.18	85.96	94.09
5/10/17 14:03	1229.35	86.12	455.05	85.89	94.21
5/10/17 14:04	1229.21	86.11	454.91	85.84	94.37
5/10/17 14:05	1229.05	86.12	454.75	85.83	94.58
5/10/17 14:06	1228.94	86.18	454.62	85.85	94.79
5/10/17 14:07	1228.83	86.24	454.52	85.88	94.94
5/10/17 14:08	1228.70	86.28	454.43	85.91	94.99
5/10/17 14:09	1228.58	86.32	454.30	85.94	94.96

Nitrogen Injection

Well Name:	State LPG Storage No. 3
Operator:	Western Refining Company, L.P.
State:	NM
County/Parish:	Lea
Field:	Jal
Serial/API:	30-025-35956

Flow Conditions

Date / Time	Annulus Gauge		Tubing Gauge		Flow Conditions
	Pressure	Temp	Pressure	Temp	Temp
	psig	deg F	psig	deg F	deg F
5/10/17 14:10	1228.46	86.39	454.19	85.99	94.91
5/10/17 14:11	1228.37	86.46	454.05	86.05	94.83
5/10/17 14:12	1228.24	86.50	453.98	86.07	94.81
5/10/17 14:13	1228.14	86.52	453.90	86.08	94.84
5/10/17 14:14	1228.05	86.53	453.79	86.08	94.89
5/10/17 14:15	1227.95	86.53	453.69	86.08	94.96
5/10/17 14:16	1227.88	86.53	453.61	86.06	94.99
5/10/17 14:17	1227.80	86.52	453.48	86.03	94.98
5/10/17 14:18	1227.71	86.51	453.38	86.01	94.96
5/10/17 14:19	1227.56	86.51	453.30	86.01	94.95
5/10/17 14:20	1227.50	86.52	453.18	86.02	94.84
5/10/17 14:21	1227.37	86.55	453.09	86.04	94.75
5/10/17 14:22	1227.30	86.59	453.02	86.06	94.69
5/10/17 14:23	1227.24	86.64	452.90	86.11	94.66
5/10/17 14:24	1227.13	86.72	452.81	86.19	94.74
5/10/17 14:25	1227.03	86.85	452.73	86.30	94.91
5/10/17 14:26	1226.94	87.00	452.61	86.45	95.12
5/10/17 14:27	1226.86	87.14	452.55	86.61	95.26
5/10/17 14:28	1226.71	87.35	452.44	86.85	95.36
5/10/17 14:29	1226.63	87.58	452.37	87.09	95.43
5/10/17 14:30	1226.52	87.77	452.26	87.29	95.47
5/10/17 14:31	1226.48	87.91	452.20	87.43	95.47
5/10/17 14:32	1226.41	87.96	452.12	87.50	95.48
5/10/17 14:33	1226.38	87.96	452.02	87.52	95.54
5/10/17 14:34	1226.33	87.95	451.96	87.53	95.63
5/10/17 14:35	1226.26	87.93	451.89	87.53	95.77
5/10/17 14:36	1226.14	87.96	451.78	87.57	95.92
5/10/17 14:37	1226.07	88.04	451.74	87.66	95.99
5/10/17 14:38	1225.99	88.11	451.62	87.74	95.99
5/10/17 14:39	1225.94	88.14	451.57	87.78	95.97
5/10/17 14:40	1225.90	88.14	451.52	87.78	95.98
5/10/17 14:41	1225.80	88.08	451.44	87.74	95.98
5/10/17 14:42	1225.72	88.00	451.38	87.66	95.88
5/10/17 14:43	1225.65	87.90	451.30	87.58	95.79
5/10/17 14:44	1225.62	87.80	451.23	87.48	95.74
5/10/17 14:45	1225.58	87.70	451.16	87.38	95.72
5/10/17 14:46	1225.51	87.65	451.11	87.32	95.73
5/10/17 14:47	1225.47	87.63	451.04	87.31	95.74
5/10/17 14:48	1225.41	87.72	450.97	87.37	95.79

Nitrogen Injection

Well Name:	State LPG Storage No. 3
Operator:	Western Refining Company, L.P.
State:	NM
County/Parish:	Lea
Field:	Jal
Serial/API:	30-025-35956

Flow Conditions

Date / Time	Annulus Gauge		Tubing Gauge		Flow Conditions
	Pressure	Temp	Pressure	Temp	Temp
	psig	deg F	psig	deg F	deg F
5/10/17 14:49	1225.32	87.83	450.87	87.49	95.80
5/10/17 14:50	1225.22	87.96	450.80	87.61	95.81
5/10/17 14:51	1225.09	88.07	450.75	87.75	95.82
5/10/17 14:52	1225.09	88.24	450.66	87.91	95.82
5/10/17 14:53	1225.00	88.44	450.58	88.10	95.85
5/10/17 14:54	1224.88	88.67	450.52	88.32	95.92
5/10/17 14:55	1224.85	88.87	450.40	88.53	95.96
5/10/17 14:56	1224.75	88.99	450.38	88.67	95.96
5/10/17 14:57	1224.71	89.11	450.32	88.80	95.82
5/10/17 14:58	1224.66	89.21	450.27	88.90	95.66
5/10/17 14:59	1224.62	89.26	450.22	88.99	95.53
5/10/17 15:00	1224.56	89.33	450.15	89.06	95.52
5/10/17 15:01	1224.49	89.46	441.95	89.22	95.53
5/10/17 15:02	1224.41	89.62	449.67	89.42	95.55
5/10/17 15:03	1224.30	89.83	449.77	89.64	95.35
5/10/17 15:04	1224.24	90.08	449.69	89.88	95.06
5/10/17 15:05	1224.18	90.33	449.64	90.12	94.92
5/10/17 15:06	1224.08	90.55	449.99	90.36	94.91
5/10/17 15:07	1223.99	90.70	449.26	90.53	94.95
5/10/17 15:08	1223.96	90.77	449.34	90.63	94.86
5/10/17 15:09	1223.95	90.80	449.31	90.71	94.70
5/10/17 15:10	1223.90	90.83	449.19	90.77	94.59
5/10/17 15:11	1223.85	90.85	449.17	90.80	94.51
5/10/17 15:12	1223.79	90.82	449.16	90.80	94.43
5/10/17 15:13	1226.41	90.75	457.72	90.73	90.45
5/10/17 15:14	1231.02	90.69	440.14	90.66	80.32
5/10/17 15:15	1233.77	90.60	400.93	90.58	78.93
5/10/17 15:16	1236.15	90.52	398.07	90.50	81.80
5/10/17 15:17	1238.49	90.46	389.26	90.44	85.42
5/10/17 15:18	1240.77	90.41	383.50	90.39	86.61
5/10/17 15:19	1242.68	90.38	367.17	90.36	85.46
5/10/17 15:20	1244.21	90.38	367.56	90.36	86.49
5/10/17 15:21	1245.92	90.40	367.87	90.36	86.19
5/10/17 15:22	1247.20	90.41	369.01	90.37	83.31
5/10/17 15:23	1246.95	90.43	369.46	90.38	66.85
5/10/17 15:24	1246.77	90.43	369.45	90.37	50.18
5/10/17 15:25	1246.65	90.40	369.60	90.35	51.62
5/10/17 15:26	1246.44	90.36	369.24	90.30	60.72
5/10/17 15:27	1246.33	90.27	369.42	90.22	70.15

Nitrogen Injection

Well Name:	State LPG Storage No. 3
Operator:	Western Refining Company, L.P.
State:	NM
County/Parish:	Lea
Field:	Jal
Serial/API:	30-025-35956

Flow Conditions

Date / Time	Annulus Gauge		Tubing Gauge		Flow Conditions
	Pressure	Temp	Pressure	Temp	Temp
	psig	deg F	psig	deg F	deg F
5/10/17 15:28	1246.25	90.16	369.40	90.11	77.18
5/10/17 15:29	1246.09	90.03	369.19	90.00	80.82
5/10/17 15:30	1246.07	89.95	368.84	89.91	82.19
5/10/17 15:31	1245.94	89.89	368.43	89.86	82.32
5/10/17 15:32	1245.78	89.86	368.58	89.82	82.18
5/10/17 15:33	1245.69	89.85	369.55	89.81	82.35
5/10/17 15:34	1245.62	89.84	368.80	89.80	82.78
5/10/17 15:35	1245.50	89.83	368.49	89.80	82.86
5/10/17 15:36	1245.37	89.82	368.54	89.81	82.95
5/10/17 15:37	1245.37	89.85	368.18	89.85	83.19
5/10/17 15:38	1245.27	89.86	368.23	89.86	83.18
5/10/17 15:39	1245.19	89.84	368.25	89.84	82.86
5/10/17 15:40	1245.18	89.82	368.36	89.83	82.00
5/10/17 15:41	1245.25	89.83	367.99	89.83	80.78
5/10/17 15:42	1244.93	89.84	368.12	89.84	80.62
5/10/17 15:43	1244.93	89.82	368.10	89.83	81.06
5/10/17 15:44	1244.89	89.75	368.19	89.76	81.37
5/10/17 15:45	1244.87	89.67	367.47	89.67	81.62
5/10/17 15:46	1244.83	89.61	367.45	89.60	81.51
5/10/17 15:47	1244.70	89.54	367.63	89.53	81.15
5/10/17 15:48	1244.65	89.47	367.03	89.46	81.04
5/10/17 15:49	1244.65	89.42	366.89	89.41	81.33
5/10/17 15:50	1244.64	89.39	366.79	89.37	81.59
5/10/17 15:51	1244.32	89.38	367.49	89.36	81.84
5/10/17 15:52	1244.58	89.38	367.14	89.35	81.94
5/10/17 15:53	1244.43	89.40	366.87	89.37	82.01
5/10/17 15:54	1244.38	89.47	367.12	89.44	82.14
5/10/17 15:55	1244.38	89.55	367.30	89.53	82.17
5/10/17 15:56	1244.28	89.61	366.91	89.58	82.30
5/10/17 15:57	1244.26	89.63	367.00	89.61	82.44
5/10/17 15:58	1244.15	89.60	366.35	89.59	82.55
5/10/17 15:59	1244.27	89.47	366.98	89.49	82.59
5/10/17 16:00	1244.23	89.34	366.32	89.36	82.54
5/10/17 16:01	1244.17	89.27	365.98	89.30	82.38
5/10/17 16:02	1244.11	89.26	365.55	89.29	82.23
5/10/17 16:03	1244.08	89.28	365.69	89.29	82.14
5/10/17 16:04	1244.04	89.31	365.74	89.31	82.12
5/10/17 16:05	1244.04	89.36	366.10	89.35	82.18
5/10/17 16:06	1244.10	89.42	365.99	89.43	82.31

Nitrogen Injection

Well Name:	State LPG Storage No. 3
Operator:	Western Refining Company, L.P.
State:	NM
County/Parish:	Lea
Field:	Jal
Serial/API:	30-025-35956

Flow Conditions

Date / Time	Annulus Gauge		Tubing Gauge		Flow Conditions
	Pressure	Temp	Pressure	Temp	Temp
	psig	deg F	psig	deg F	deg F
5/10/17 16:07	1244.11	89.53	365.99	89.54	82.58
5/10/17 16:08	1244.04	89.64	365.19	89.67	82.93
5/10/17 16:09	1243.97	89.76	365.19	89.79	83.16
5/10/17 16:10	1244.00	89.88	365.50	89.91	83.41
5/10/17 16:11	1243.91	89.95	365.41	89.99	83.66
5/10/17 16:12	1243.98	90.02	365.49	90.06	83.47
5/10/17 16:13	1243.98	90.06	365.31	90.10	82.93
5/10/17 16:14	1244.03	90.07	409.61	90.12	82.36
5/10/17 16:15	1243.06	90.06	433.04	90.12	83.14
5/10/17 16:16	1242.92	90.01	434.24	90.09	83.69
5/10/17 16:17	1242.88	89.99	434.19	90.07	84.08
5/10/17 16:18	1242.83	89.98	434.15	90.06	84.41
5/10/17 16:19	1242.78	89.97	434.11	90.05	84.82
5/10/17 16:20	1242.71	89.93	434.07	90.01	85.23
5/10/17 16:21	1242.64	89.84	434.01	89.92	85.71

Appendix C – Test Pressure Data

TEST PRESSURE

Well Name:	State LPG Storage No. 3
Operator:	Western Refining Company, L.P.
State:	NM
County/Parish:	Lea
Field:	Jal
Serial/API:	30-025-35956

PRESSURE INFORMATION

Date / Time	Annulus Pressure		Tubing Pressure	
	Pressure	Temp	Pressure	Temp
	psig	deg F	psig	deg F
5/11/17 10:45	1203.38	80.79	387.07	80.67
5/11/17 10:50	1203.42	81.51	387.40	81.41
5/11/17 10:55	1203.34	82.13	387.12	82.08
5/11/17 11:00	1203.36	82.00	387.16	81.99
5/11/17 11:05	1203.34	81.97	388.34	81.89
5/11/17 11:10	1203.23	82.78	387.47	82.66
5/11/17 11:15	1203.21	83.26	387.08	83.13
5/11/17 11:20	1203.22	83.17	4.43	83.08
5/11/17 11:25	1203.37	82.14	3.18	82.11
5/11/17 11:30	1203.30	82.35	386.95	82.35
5/11/17 11:35	1203.13	83.71	386.90	83.61
5/11/17 11:40	1203.21	83.13	386.89	83.10
5/11/17 11:45	1203.20	83.02	386.89	82.96
5/11/17 11:50	1203.20	83.15	386.88	83.06
5/11/17 11:55	1203.13	83.70	386.86	83.49
5/11/17 12:00	1203.20	83.34	386.84	83.25
5/11/17 12:05	1203.13	83.87	386.82	83.64
5/11/17 12:10	1203.11	84.47	386.80	84.27
5/11/17 12:15	1203.09	84.49	386.78	84.34
5/11/17 12:20	1203.06	84.76	386.76	84.57
5/11/17 12:25	1203.06	84.95	386.75	84.74
5/11/17 12:30	1203.14	84.21	386.75	84.09
5/11/17 12:35	1203.18	83.49	386.76	83.35
5/11/17 12:40	1203.16	83.11	386.74	82.94
5/11/17 12:45	1203.00	83.98	386.74	83.66
5/11/17 12:50	1202.94	85.07	386.67	84.74
5/11/17 12:55	1202.93	85.62	386.64	85.28
5/11/17 13:00	1203.04	84.93	386.64	84.75
5/11/17 13:05	1202.94	85.57	386.61	85.21
5/11/17 13:10	1202.94	85.80	386.59	85.49
5/11/17 13:15	1202.85	86.80	386.53	86.41
5/11/17 13:20	1202.78	88.00	386.52	87.61
5/11/17 13:25	1202.82	87.88	386.49	87.63
5/11/17 13:30	1202.82	87.85	386.50	87.59
5/11/17 13:35	1202.83	87.96	386.48	87.68
5/11/17 13:40	1202.84	87.61	386.47	87.36
5/11/17 13:45	1202.90	87.05	386.46	86.97
5/11/17 13:50	1202.96	86.58	386.43	86.71
5/11/17 13:55	1202.94	86.15	386.42	86.18
5/11/17 14:00	1202.81	86.50	386.43	86.27
5/11/17 14:05	1202.72	86.86	386.37	86.53
5/11/17 14:10	1202.66	87.28	386.38	86.84
5/11/17 14:15	1202.58	88.50	386.34	88.13
5/11/17 14:20	1202.69	87.97	386.30	87.78
5/11/17 14:25	1202.67	87.92	386.28	87.76
5/11/17 14:30	1202.66	87.85	386.27	87.69
5/11/17 14:35	1202.62	87.79	386.25	87.63

TEST PRESSURE

Well Name:	State LPG Storage No. 3
Operator:	Western Refining Company, L.P.
State:	NM
County/Parish:	Lea
Field:	Jal
Serial/API:	30-025-35956

PRESSURE INFORMATION

Date / Time	Annulus Pressure		Tubing Pressure	
	Pressure	Temp	Pressure	Temp
	psig	deg F	psig	deg F
5/11/17 14:40	1202.62	87.93	386.22	87.80
5/11/17 14:45	1202.54	88.19	386.22	88.05
5/11/17 14:50	1202.46	89.04	386.19	88.88
5/11/17 14:55	1202.46	89.45	386.14	89.40
5/11/17 15:00	1202.50	89.27	386.13	89.32
5/11/17 15:05	1202.41	90.27	386.09	90.26
5/11/17 15:10	1202.36	91.33	386.09	91.38
5/11/17 15:15	1202.39	92.14	386.06	92.20
5/11/17 15:20	1202.30	93.29	386.00	93.35
5/11/17 15:25	1202.31	93.87	386.00	94.01
5/11/17 15:30	1202.36	94.30	385.99	94.47
5/11/17 15:35	1202.32	94.68	385.96	94.85
5/11/17 15:40	1202.33	95.01	385.95	95.19
5/11/17 15:45	1202.30	94.98	385.92	95.15
5/11/17 15:50	1202.39	94.31	385.95	94.52
5/11/17 15:55	1202.31	94.86	385.94	94.96
5/11/17 16:00	1202.29	95.16	385.90	95.24
5/11/17 16:05	1202.27	95.51	385.89	95.57
5/11/17 16:10	1202.17	96.64	385.85	96.72
5/11/17 16:15	1202.19	96.64	385.82	96.81
5/11/17 16:20	1202.28	96.06	385.82	96.18
5/11/17 16:25	1202.21	96.25	385.81	96.30
5/11/17 16:30	1202.14	96.99	385.78	97.01
5/11/17 16:35	1202.13	97.16	385.76	97.24
5/11/17 16:40	1202.17	96.76	385.76	96.89
5/11/17 16:45	1202.20	95.58	385.76	95.75
5/11/17 16:50	1202.19	95.30	385.75	95.32
5/11/17 16:55	1202.17	95.24	385.74	95.25
5/11/17 17:00	1202.14	95.24	385.73	95.25
5/11/17 17:05	1202.09	95.40	385.70	95.42
5/11/17 17:10	1202.08	95.46	385.69	95.46
5/11/17 17:15	1202.03	95.75	385.66	95.74
5/11/17 17:20	1202.08	95.13	385.65	95.22
5/11/17 17:25	1202.02	95.05	385.64	95.08
5/11/17 17:30	1202.06	94.49	385.62	94.62
5/11/17 17:35	1202.00	94.67	385.60	94.71
5/11/17 17:40	1201.94	94.81	385.59	94.82
5/11/17 17:45	1201.95	94.69	385.56	94.76
5/11/17 17:50	1201.91	94.76	385.56	94.80
5/11/17 17:55	1201.83	95.25	385.54	95.28
5/11/17 18:00	1201.82	95.03	385.49	95.11
5/11/17 18:05	1201.85	94.76	385.48	94.83
5/11/17 18:10	1201.88	93.91	385.50	94.00
5/11/17 18:15	1201.86	94.04	385.49	94.09
5/11/17 18:20	1201.83	93.72	385.44	93.77
5/11/17 18:25	1201.81	93.55	385.44	93.61
5/11/17 18:30	1201.79	93.65	385.43	93.71

TEST PRESSURE

Well Name:	State LPG Storage No. 3
Operator:	Western Refining Company, L.P.
State:	NM
County/Parish:	Lea
Field:	Jal
Serial/API:	30-025-35956

PRESSURE INFORMATION

Date / Time	Annulus Pressure		Tubing Pressure	
	Pressure	Temp	Pressure	Temp
	psig	deg F	psig	deg F
5/11/17 18:35	1201.74	93.63	385.41	93.72
5/11/17 18:40	1201.72	93.39	385.38	93.48
5/11/17 18:45	1201.76	92.78	385.37	92.89
5/11/17 18:50	1201.73	92.42	385.38	92.52
5/11/17 18:55	1201.72	92.20	385.35	92.29
5/11/17 19:00	1201.70	91.90	385.34	92.00
5/11/17 19:05	1201.70	91.75	385.31	91.85
5/11/17 19:10	1201.68	91.28	385.31	91.40
5/11/17 19:15	1201.65	91.10	385.30	91.20
5/11/17 19:20	1201.66	90.68	385.28	90.81
5/11/17 19:25	1201.65	90.08	385.29	90.20
5/11/17 19:30	1201.66	89.32	385.27	89.45
5/11/17 19:35	1201.64	88.81	385.25	88.94
5/11/17 19:40	1201.68	88.17	385.26	88.29
5/11/17 19:45	1201.68	87.36	385.24	87.48
5/11/17 19:50	1201.65	86.66	385.22	86.76
5/11/17 19:55	1201.65	85.93	385.22	86.02
5/11/17 20:00	1201.65	85.15	385.22	85.23
5/11/17 20:05	1201.71	83.72	385.24	83.74
5/11/17 20:10	1201.75	81.94	385.27	81.93
5/11/17 20:15	1201.80	80.26	385.28	80.21
5/11/17 20:20	1201.80	78.95	385.27	78.87
5/11/17 20:25	1201.69	78.26	385.25	78.20
5/11/17 20:30	1201.64	77.70	385.24	77.65
5/11/17 20:35	1201.63	77.06	385.20	77.01
5/11/17 20:40	1201.61	76.15	385.19	76.07
5/11/17 20:45	1201.69	75.08	385.22	74.98
5/11/17 20:50	1201.64	74.07	385.22	73.96
5/11/17 20:55	1201.62	73.17	385.20	73.04
5/11/17 21:00	1201.60	72.31	385.20	72.17
5/11/17 21:05	1201.60	71.49	385.19	71.34
5/11/17 21:10	1201.56	70.70	385.19	70.56
5/11/17 21:15	1201.52	69.95	385.18	69.78
5/11/17 21:20	1201.53	69.23	385.17	69.06
5/11/17 21:25	1201.50	68.50	385.18	68.34
5/11/17 21:30	1201.51	67.85	385.16	67.67
5/11/17 21:35	1201.45	67.24	385.13	67.06
5/11/17 21:40	1201.46	66.76	385.14	66.59
5/11/17 21:45	1201.40	66.37	385.10	66.21
5/11/17 21:50	1201.39	66.06	385.10	65.90
5/11/17 21:55	1201.34	65.77	385.08	65.61
5/11/17 22:00	1201.30	65.44	385.07	65.31
5/11/17 22:05	1201.32	65.11	385.07	64.98
5/11/17 22:10	1201.29	64.72	385.04	64.59
5/11/17 22:15	1201.29	64.45	385.03	64.32
5/11/17 22:20	1201.27	64.23	385.02	64.12
5/11/17 22:25	1201.26	63.97	385.01	63.87

TEST PRESSURE

Well Name:	State LPG Storage No. 3
Operator:	Western Refining Company, L.P.
State:	NM
County/Parish:	Lea
Field:	Jal
Serial/API:	30-025-35956

PRESSURE INFORMATION

Date / Time	Annulus Pressure		Tubing Pressure	
	Pressure	Temp	Pressure	Temp
	psig	deg F	psig	deg F
5/11/17 22:30	1201.25	63.74	384.98	63.64
5/11/17 22:35	1201.23	63.44	384.99	63.36
5/11/17 22:40	1201.25	63.16	384.96	63.06
5/11/17 22:45	1201.21	62.84	384.95	62.76
5/11/17 22:50	1201.19	62.54	384.94	62.47
5/11/17 22:55	1201.19	62.28	384.94	62.20
5/11/17 23:00	1201.19	62.06	384.92	61.98
5/11/17 23:05	1201.16	61.95	384.91	61.88
5/11/17 23:10	1201.13	61.88	384.90	61.81
5/11/17 23:15	1201.11	61.83	384.88	61.77
5/11/17 23:20	1201.09	61.83	384.87	61.78
5/11/17 23:25	1201.08	61.80	384.85	61.76
5/11/17 23:30	1201.04	61.81	384.83	61.79
5/11/17 23:35	1201.03	61.88	384.81	61.87
5/11/17 23:40	1201.04	62.03	384.79	62.02
5/11/17 23:45	1200.98	62.13	384.77	62.13
5/11/17 23:50	1200.98	62.13	384.76	62.14
5/11/17 23:55	1200.98	62.06	384.75	62.08
5/12/17 0:00	1200.97	61.88	384.74	61.91
5/12/17 0:05	1200.98	61.61	384.74	61.63
5/12/17 0:10	1200.96	61.26	384.72	61.28
5/12/17 0:15	1201.00	60.87	384.70	60.89
5/12/17 0:20	1200.98	60.43	384.71	60.44
5/12/17 0:25	1200.98	59.99	384.71	59.99
5/12/17 0:30	1200.98	59.58	384.70	59.55
5/12/17 0:35	1200.97	59.18	384.69	59.17
5/12/17 0:40	1200.94	58.86	384.67	58.83
5/12/17 0:45	1200.93	58.58	384.68	58.55
5/12/17 0:50	1200.93	58.36	384.65	58.34
5/12/17 0:55	1200.91	58.16	384.65	58.12
5/12/17 1:00	1200.88	57.93	384.63	57.92
5/12/17 1:05	1200.88	57.71	384.61	57.68
5/12/17 1:10	1200.85	57.54	384.61	57.52
5/12/17 1:15	1200.82	57.34	384.59	57.33
5/12/17 1:20	1200.81	57.10	384.58	57.09
5/12/17 1:25	1200.79	56.84	384.57	56.83
5/12/17 1:30	1200.80	56.64	384.56	56.62
5/12/17 1:35	1200.80	56.49	384.55	56.47
5/12/17 1:40	1200.78	56.34	384.55	56.31
5/12/17 1:45	1200.76	56.16	384.52	56.15
5/12/17 1:50	1200.74	55.98	384.50	55.96
5/12/17 1:55	1200.72	55.84	384.50	55.83
5/12/17 2:00	1200.71	55.78	384.48	55.77
5/12/17 2:05	1200.70	55.74	384.48	55.73
5/12/17 2:10	1200.67	55.73	384.45	55.73
5/12/17 2:15	1200.66	55.77	384.44	55.78
5/12/17 2:20	1200.63	55.76	384.43	55.77

TEST PRESSURE

Well Name:	State LPG Storage No. 3
Operator:	Western Refining Company, L.P.
State:	NM
County/Parish:	Lea
Field:	Jal
Serial/API:	30-025-35956

PRESSURE INFORMATION

Date / Time	Annulus Pressure		Tubing Pressure	
	Pressure	Temp	Pressure	Temp
	psig	deg F	psig	deg F
5/12/17 2:25	1200.62	55.71	384.41	55.73
5/12/17 2:30	1200.63	55.61	384.41	55.64
5/12/17 2:35	1200.62	55.49	384.39	55.52
5/12/17 2:40	1200.59	55.41	384.38	55.43
5/12/17 2:45	1200.60	55.32	384.36	55.34
5/12/17 2:50	1200.58	55.20	384.36	55.23
5/12/17 2:55	1200.57	55.07	384.34	55.10
5/12/17 3:00	1200.57	54.92	384.34	54.95
5/12/17 3:05	1200.56	54.78	384.33	54.82
5/12/17 3:10	1200.54	54.64	384.32	54.68
5/12/17 3:15	1200.51	54.48	384.30	54.52
5/12/17 3:20	1200.52	54.38	384.30	54.41
5/12/17 3:25	1200.51	54.25	384.28	54.28
5/12/17 3:30	1200.50	54.15	384.28	54.18
5/12/17 3:35	1200.47	54.05	384.27	54.09
5/12/17 3:40	1200.47	53.94	384.24	53.97
5/12/17 3:45	1200.47	53.84	384.24	53.88
5/12/17 3:50	1200.44	53.74	384.22	53.78
5/12/17 3:55	1200.44	53.61	384.21	53.64
5/12/17 4:00	1200.44	53.39	384.20	53.44
5/12/17 4:05	1200.42	53.16	384.20	53.21
5/12/17 4:10	1200.42	52.97	384.19	53.00
5/12/17 4:15	1200.41	52.79	384.18	52.83
5/12/17 4:20	1200.41	52.65	384.17	52.68
5/12/17 4:25	1200.39	52.52	384.15	52.56
5/12/17 4:30	1200.37	52.44	384.14	52.48
5/12/17 4:35	1200.36	52.35	384.13	52.39
5/12/17 4:40	1200.33	52.26	384.12	52.31
5/12/17 4:45	1200.33	52.18	384.11	52.23
5/12/17 4:50	1200.31	52.13	384.10	52.18
5/12/17 4:55	1200.31	52.06	384.09	52.10
5/12/17 5:00	1200.30	51.97	384.07	52.02
5/12/17 5:05	1200.27	51.86	384.07	51.91
5/12/17 5:10	1200.26	51.74	384.06	51.79
5/12/17 5:15	1200.26	51.60	384.05	51.65
5/12/17 5:20	1200.26	51.46	384.03	51.50
5/12/17 5:25	1200.24	51.31	384.02	51.36
5/12/17 5:30	1200.24	51.17	384.02	51.22
5/12/17 5:35	1200.21	51.04	384.00	51.08
5/12/17 5:40	1200.21	50.93	384.00	50.98
5/12/17 5:45	1200.19	50.86	383.98	50.91
5/12/17 5:50	1200.19	50.82	383.97	50.87
5/12/17 5:55	1200.18	50.77	383.96	50.81
5/12/17 6:00	1200.16	50.67	383.95	50.72
5/12/17 6:05	1200.14	50.55	383.94	50.60
5/12/17 6:10	1200.15	50.40	383.94	50.45
5/12/17 6:15	1200.13	50.25	383.93	50.30

TEST PRESSURE

Well Name:	State LPG Storage No. 3
Operator:	Western Refining Company, L.P.
State:	NM
County/Parish:	Lea
Field:	Jal
Serial/API:	30-025-35956

PRESSURE INFORMATION

Date / Time	Annulus Pressure		Tubing Pressure	
	Pressure	Temp	Pressure	Temp
	psig	deg F	psig	deg F
5/12/17 6:20	1200.12	50.14	383.91	50.20
5/12/17 6:25	1200.11	50.07	383.90	50.12
5/12/17 6:30	1200.10	50.03	383.90	50.08
5/12/17 6:35	1200.09	49.94	383.87	49.99
5/12/17 6:40	1200.06	49.84	383.87	49.90
5/12/17 6:45	1200.07	49.73	383.85	49.78
5/12/17 6:50	1200.05	49.61	383.85	49.65
5/12/17 6:55	1200.04	49.50	383.84	49.55
5/12/17 7:00	1200.04	49.45	383.82	49.50
5/12/17 7:05	1200.04	49.51	383.80	49.56
5/12/17 7:10	1200.01	49.82	383.79	49.89
5/12/17 7:15	1199.96	50.32	383.77	50.39
5/12/17 7:20	1199.93	50.97	383.75	51.06
5/12/17 7:25	1199.87	51.76	383.72	51.87
5/12/17 7:30	1199.84	52.65	383.69	52.77
5/12/17 7:35	1199.81	53.64	383.65	53.76
5/12/17 7:40	1199.72	54.64	383.64	54.82
5/12/17 7:45	1199.73	55.64	383.61	55.80
5/12/17 7:50	1199.72	56.51	383.59	56.69
5/12/17 7:55	1199.70	57.33	383.56	57.48
5/12/17 8:00	1199.70	58.17	383.56	58.32
5/12/17 8:05	1199.69	58.97	383.53	59.13
5/12/17 8:10	1199.63	59.91	383.48	60.06
5/12/17 8:15	1199.66	60.66	383.47	60.86
5/12/17 8:20	1199.63	61.42	383.46	61.62
5/12/17 8:25	1199.63	62.13	383.44	62.31
5/12/17 8:30	1199.62	62.87	383.42	63.03
5/12/17 8:35	1199.61	63.59	3.43	63.68
5/12/17 8:40	1199.56	64.36	3.41	64.50
5/12/17 8:45	1199.26	65.47	383.02	65.69
5/12/17 8:50	1199.27	66.17	383.02	66.34
5/12/17 8:55	1199.28	66.91	383.03	67.05
5/12/17 9:00	1199.21	67.95	383.01	68.05
5/12/17 9:05	1199.24	68.87	382.98	68.96
5/12/17 9:10	1199.18	69.92	382.95	69.98
5/12/17 9:15	1199.18	70.85	382.95	70.91
5/12/17 9:20	1199.20	71.74	382.93	71.80
5/12/17 9:25	1199.15	72.78	382.91	72.81
5/12/17 9:30	1199.12	74.14	382.89	74.15
5/12/17 9:35	1199.18	74.88	382.86	74.93
5/12/17 9:40	1199.20	75.26	382.79	75.32
5/12/17 9:45	1199.24	75.62	382.77	75.66
5/12/17 9:50	1199.25	76.08	382.82	76.10
5/12/17 9:55	1199.26	76.69	382.81	76.68
5/12/17 10:00	1199.30	76.66	382.81	76.68
5/12/17 10:05	1199.30	77.23	382.81	77.22
5/12/17 10:10	1199.29	77.99	382.70	77.95

TEST PRESSURE

Well Name:	State LPG Storage No. 3
Operator:	Western Refining Company, L.P.
State:	NM
County/Parish:	Lea
Field:	Jal
Serial/API:	30-025-35956

PRESSURE INFORMATION

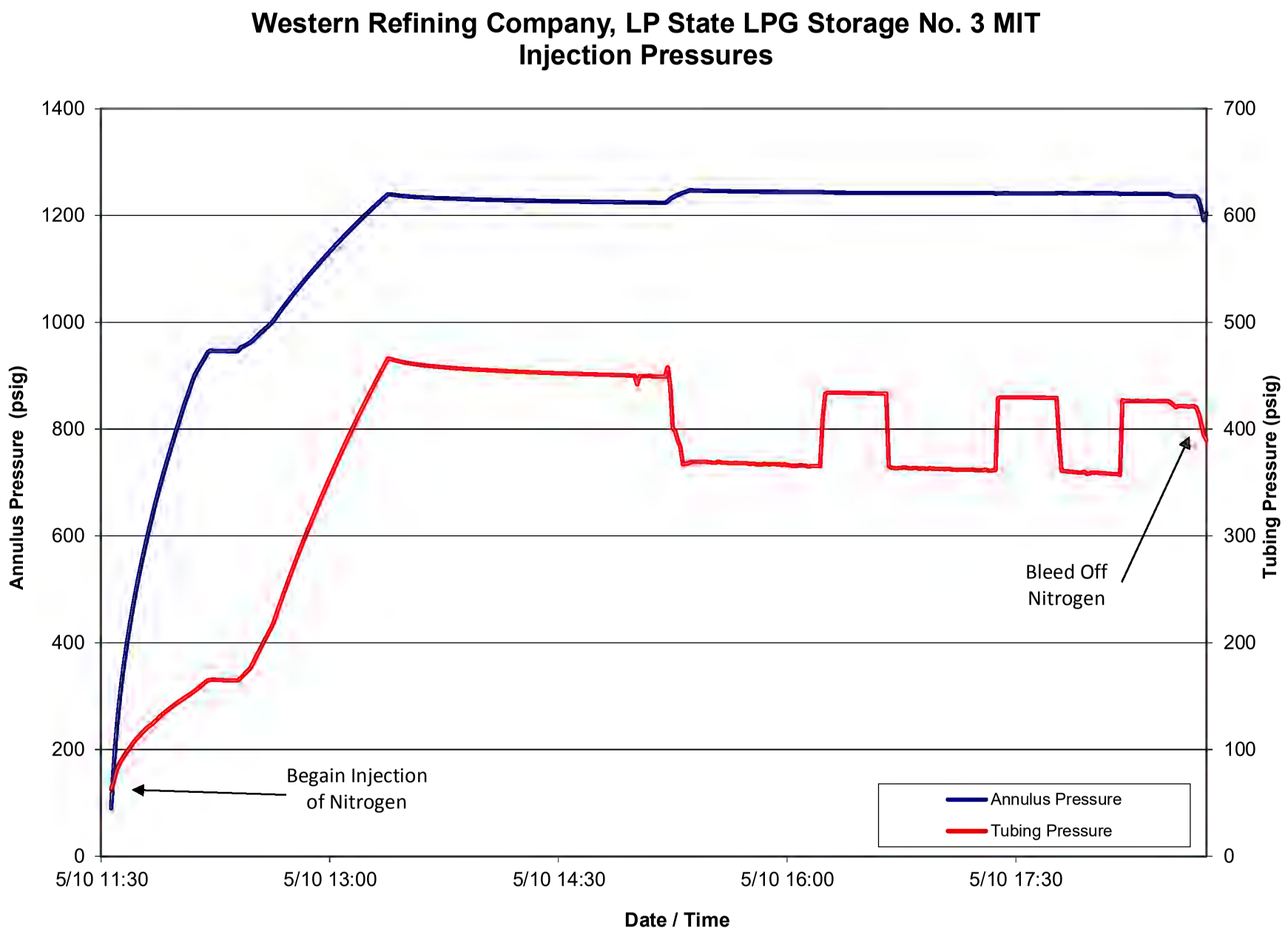
Date / Time	Annulus Pressure		Tubing Pressure	
	Pressure	Temp	Pressure	Temp
	psig	deg F	psig	deg F
5/12/17 10:15	1199.27	78.95	382.65	78.89
5/12/17 10:20	1199.26	79.83	382.66	79.77
5/12/17 10:25	1199.30	80.64	382.58	80.61
5/12/17 10:30	1199.22	81.48	383.65	81.44
5/12/17 10:35	1199.31	81.16	383.95	81.20
5/12/17 10:40	1199.36	80.51	382.87	80.50
5/12/17 10:45	1199.41	79.93	518.65	79.89

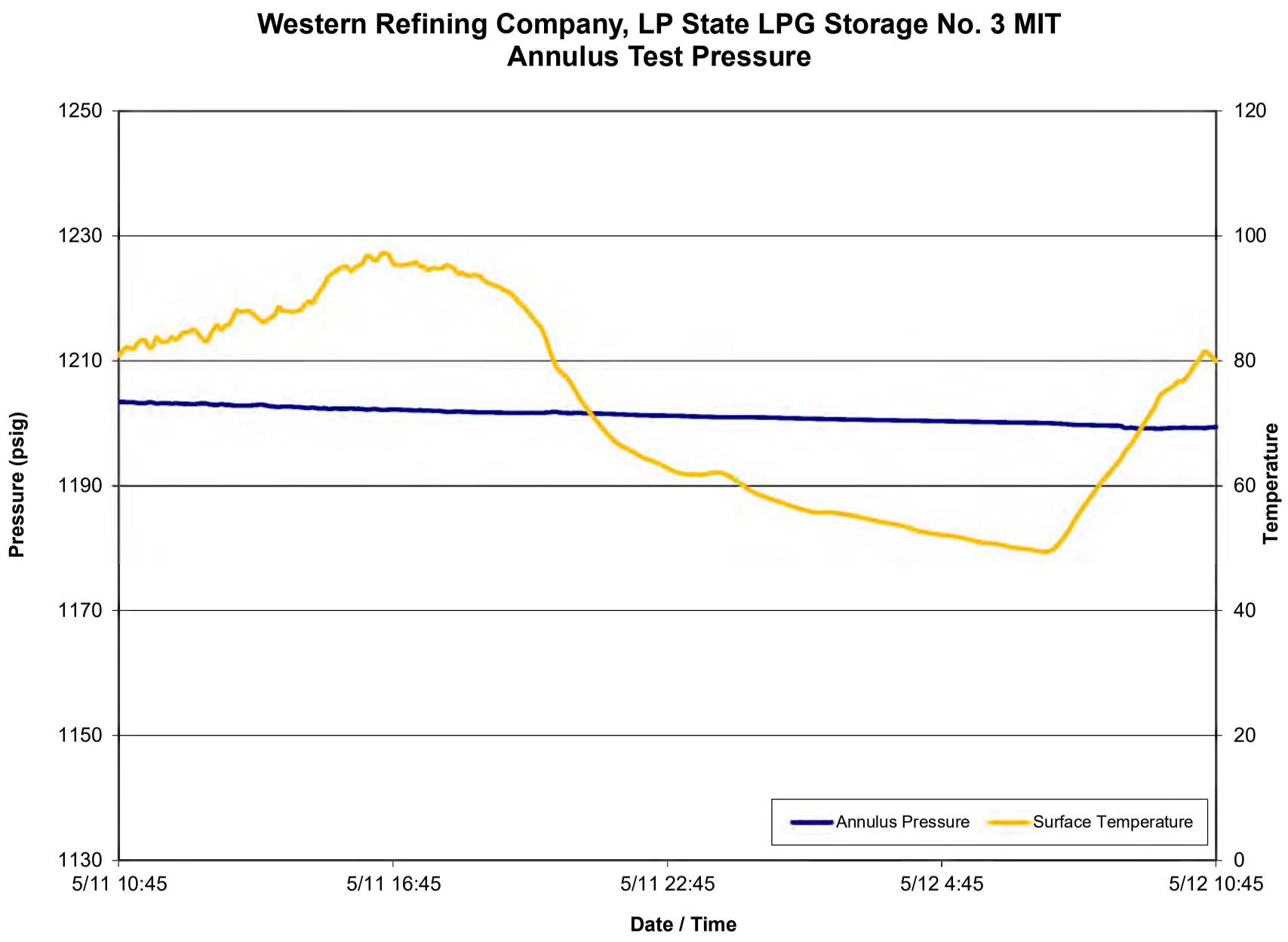
Appendix D – Calculated Borehole Volumes

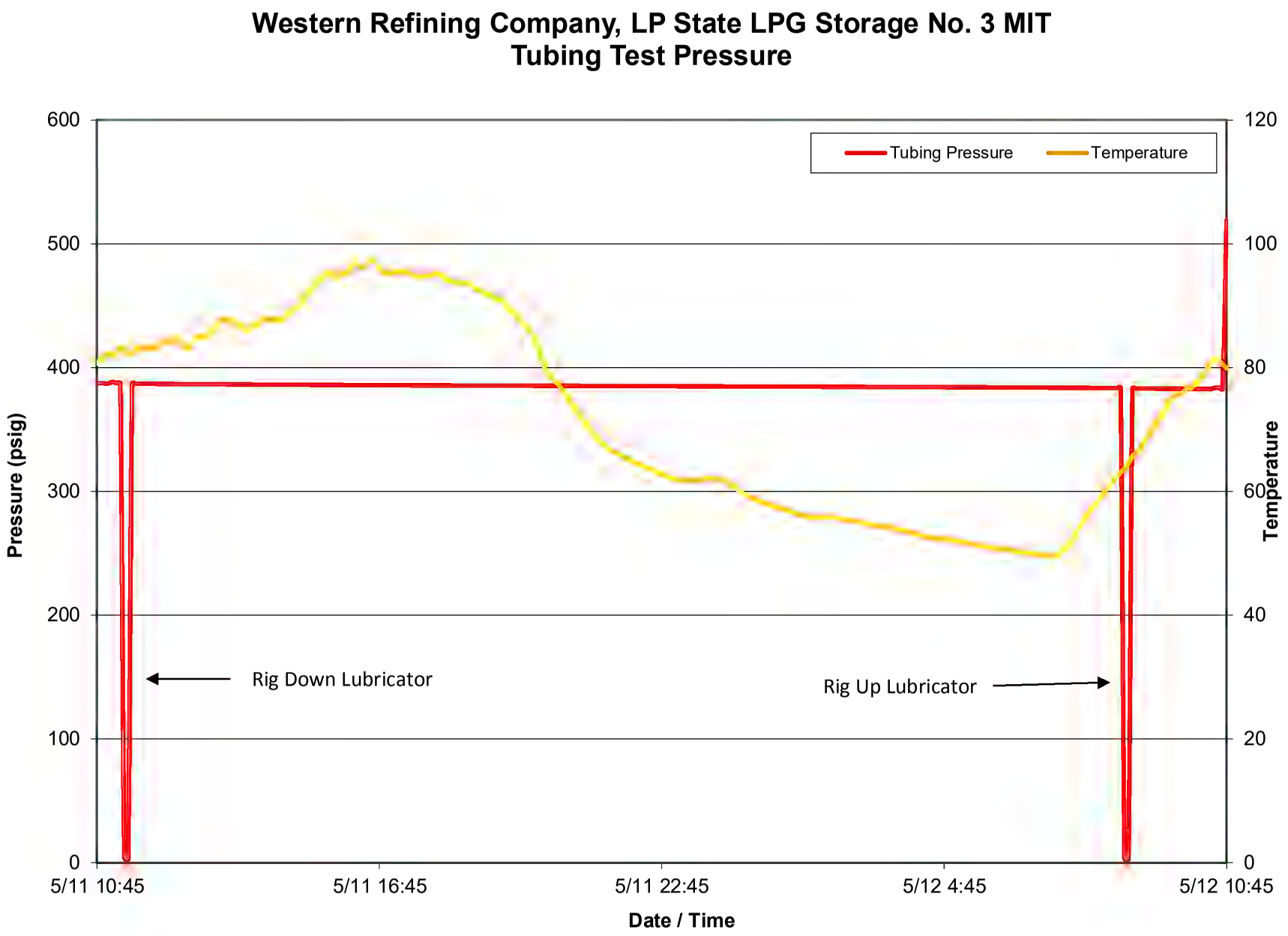
Western Refining Company, LP State LPG Storage No. 3 MIT - Borehole Calculations
Nitrogen Volumes

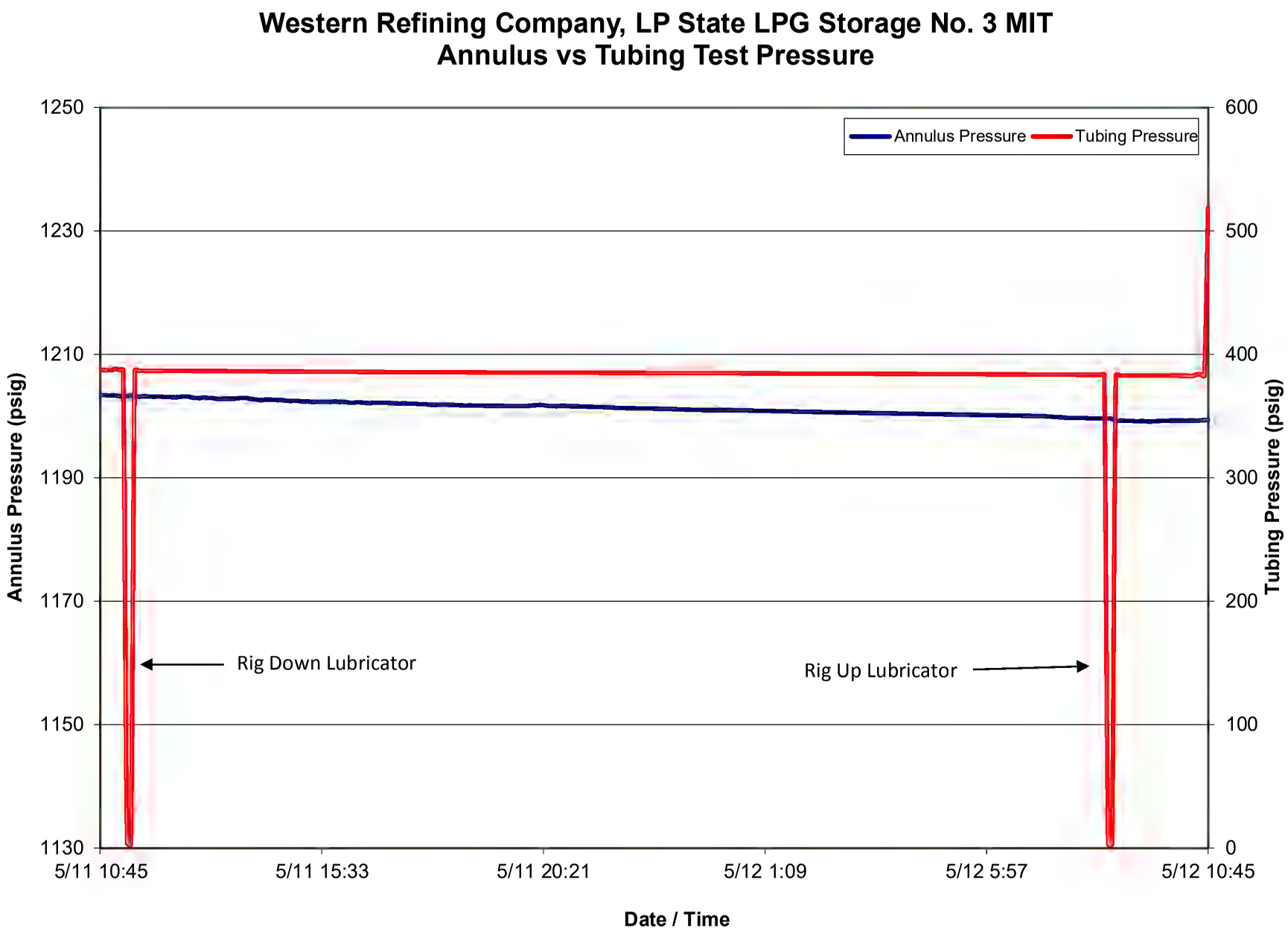
I/F Depth Logged [ft]	N2 Volume Turbine Cumulative [scf]	N2 Pressure Gauge [psig]	Borehole Volume Cumulative [bbls]	Borehole Volume Incremental Per Interval [bbls]	Borehole Volume Incremental Per Foot [bbls/ft]
1667	42000	1075.09	101.13	46.56	23.28
1668	51285	1113.00	119.40	18.26	18.26
1669	59594	1144.39	135.04	15.64	15.64
1670	68304	1175.30	150.82	15.78	15.78
1671	78616	1209.15	168.88	18.05	18.05
1672	87744	1237.66	184.28	15.40	15.40
1673	98162	1243.20	205.26	20.99	20.99
1674	106100	1246.44	221.30	16.04	16.04
1675	112933	1245.57	235.71	14.41	14.41
1676	121549	1244.86	253.83	18.12	18.12
1677	127635	1244.32	266.64	12.82	12.82
1678	135705	1244.23	283.52	16.87	16.87
1679	141540	1244.07	295.74	12.22	12.22
1680	148948	1242.42	311.61	15.87	15.87
1681	154742	1242.39	323.74	12.12	12.12
1682	162296	1242.17	339.59	15.86	15.86
1683	169172	1242.02	354.02	14.42	14.42
1684	174868	1242.03	365.93	11.91	11.91
1685	179597	1242.18	375.77	9.85	9.85
1686	184086	1242.15	385.17	9.39	9.39
1687	188261	1241.59	394.07	8.90	8.90
1688	191893	1241.79	401.60	7.53	7.53
1689	194787	1241.83	407.64	6.04	6.04
1690	197231	1241.91	412.72	5.08	5.08

Appendix E – Pressure and Temperature Graphs

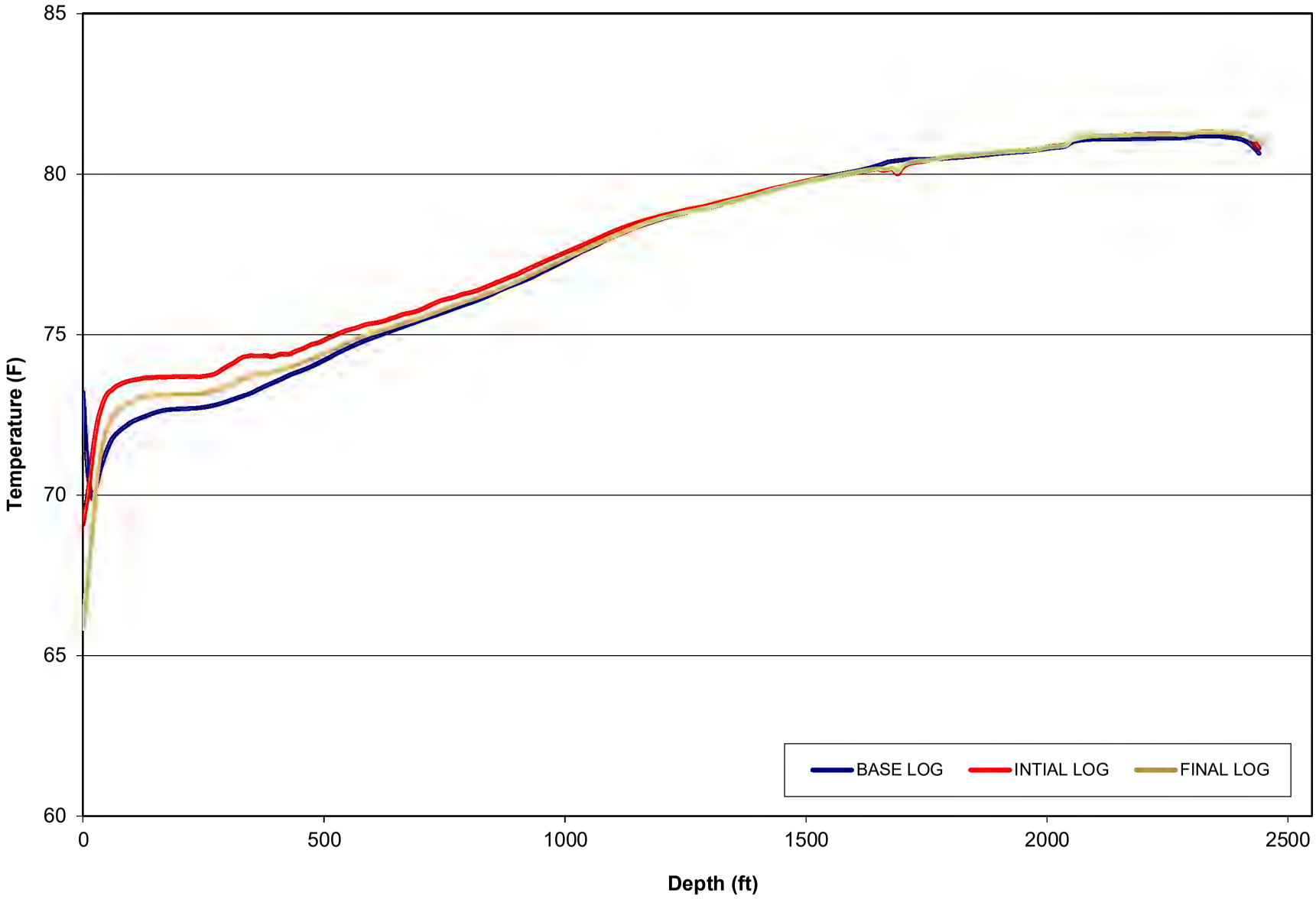

Western Refining Company, LP State LPG Storage No. 3 MIT
Injection Pressures
Annulus Pressure (psig)
Tubing Pressure (psig)
Date / Time
1400
1200
1000
800
600
400
200
0
700
600
500
400
300
200
100
0
5/10 11:30
5/10 13:00
5/10 14:30
5/10 16:00
5/10 17:30
Begain Injection
of Nitrogen
Bleed Off
Nitrogen
Annulus Pressure
Tubing Pressure


Western Refining Company, LP State LPG Storage No. 3 MIT
Annulus Test Pressure
1250
1230
1210
1190
1170
1150
1130
Pressure (psig)
120
100
80
60
40
20
0
Temperature
5/11 10:45
5/11 16:45
5/11 22:45
5/12 4:45
5/12 10:45
Date / Time
Annulus Pressure
Surface Temperature


Western Refining Company, LP State LPG Storage No. 3 MIT
Tubing Test Pressure
Tubing Pressure
Temperature
Pressure (psig)
Temperature
600
500
400
300
200
100
0
120
100
80
60
40
20
0
Rig Down Lubricator
Rig Up Lubricator
5/11 10:45
5/11 16:45
5/11 22:45
5/12 4:45
5/12 10:45
Date / Time


Western Refining Company, LP State LPG Storage No. 3 MIT
Annulus vs Tubing Test Pressure
Annulus Pressure
Tubing Pressure
Rig Down Lubricator
Rig Up Lubricator
Annulus Pressure (psig)
Tubing Pressure (psig)
Date / Time
1250
1230
1210
1190
1170
1150
1130
600
500
400
300
200
100
0
5/11 10:45
5/11 15:33
5/11 20:21
5/12 1:09
5/12 5:57
5/12 10:45

Western Refining Company, LP State LPG Storage No. 3 MIT
Wellbore Temperature Graph



Appendix F – Well Logs

EMPIRE WIRELINE, LLC

MIT - Density

Company: Western Refining Company, LP
Well: State LPG Storage No. 003
Field: Jal
Area: Lea County
State: New Mexico

Company: Western Refining Company, LP
Well: State LPG Storage No. 003
Field: Jal
Area: Lea County
State: New Mexico

Location: N/A
API # : 30-025-35956 | SEC: N/A | TWP: N/A | RGE: N/A

Other Services

Temperature

Permanent Datum: Ground Level
Log Measured From: B.H.F.
Drilling Measured From: Kelly Bushing
Elevation: N/A
N/A Above P.D.

Elevation's
K.B. N/A
D.F. N/A
G.L. N/A

Run Information		Run No. 1	Run No. 2	Run No. 3	Run No. 4
Date of Service		08-May-2017	10-May-2017	11-May-2017	12-May-2017
Depth	Depth Driller or PBTD	N/A	N/A	N/A	N/A
	Empire Depth	2,439 ft	2,439 ft	2,439 ft	2,439 ft
	Bottom Log Interval	2,438 ft	2,438 ft	2,438 ft	2,438 ft
	Top Log Interval	Surface	Surface	Surface	Surface
	Interface Depth	N/A	1,690 ft	1,690 ft	1,690 ft
Well Info	Fluid Type	Brine	Brine	Brine	Brine
	Fluid Density	N/A	N/A	N/A	N/A
	Fluid Level	Surface	Surface	Surface	Surface
	Tubing Pressure	50 PsiA	400 PsiA	400 PsiA	400 PsiA
	Wellhead Connection	4-1/16 in 3K	4-1/16 in 3K	4-1/16 in 3K	4-1/16 in 3K
Time	Time - Ran In Well	08:00	10:00	08:30	08:15
	Time - Temp. Start	09:15	N/A	08:45	08:30
	Time - Density Start	N/A	10:15	09:45	09:45
	Time - Out of Well	17:30	19:00	10:30	10:30
Time	Location	Broussard, LA	Broussard, LA	Broussard, LA	Broussard, LA
	Unit No. / Wire Size	P-03 / 1/4 in	P-03 / 1/4 in	P-03 / 1/4 in	P-03 / 1/4 in
	Recorded By	C. Cross	C. Cross	C. Cross	C. Cross
	Witnessed By	Mr. Will George	Mr. Will George	Mr. Will George	Mr. Will George

CSG / TBG Record	Size	Wt/Ft	Top	Bottom
Surface Casing	13-5/8 in	54.5 lb/ft	Surface	285.5 ft
Production Casing	9-5/8 in	36 lb/ft	Surface	1,665 ft
Liner	7 in	23 lb/ft	Surface	1,578 ft
Hanging String	4-1/2 in	N/A	Surface	38 ft
Hanging String	3-1/2 in	Drill Pipe	38 ft	2,430 ft

<< Fold Here >>

Comments

Log correlated to the 9-5/8 in Casing Shoe at 1,665 ft

Sensor	Offset (ft)	Schematic	Description	Length (ft)	O.D. (in)	Weight (lb

Tungsten-1-11/16x7 Weigh Bar Tungten 1-11/16" x 7'	7.00	1.69	84.00
GDT_WTC-WTS06 (14023103) Digital Telemetry GDTBus	1.82	1.69	8.60
GDT_CCL-CCL10 (14023401) Digital CCL GDTBus	1.35	1.69	6.20
GDT_RDT-RDT04 (14023128)	1.19	0.00	
GDT_GRT2-GRT10-1 (14023359) Secondary Gamma Ray Tool GDTBus	2.23	1.69	10.40
Density-DensitySub (01)	1.63	1.88	8.00

CRCCnt	6.39
FrmCnt	6.39
WTSTime	6.39
WTSTemp	6.39
CHV	6.39
CCL	5.47
RDTTemp	4.14
GR2	1.63
Density2	1.12
Density1	1.12

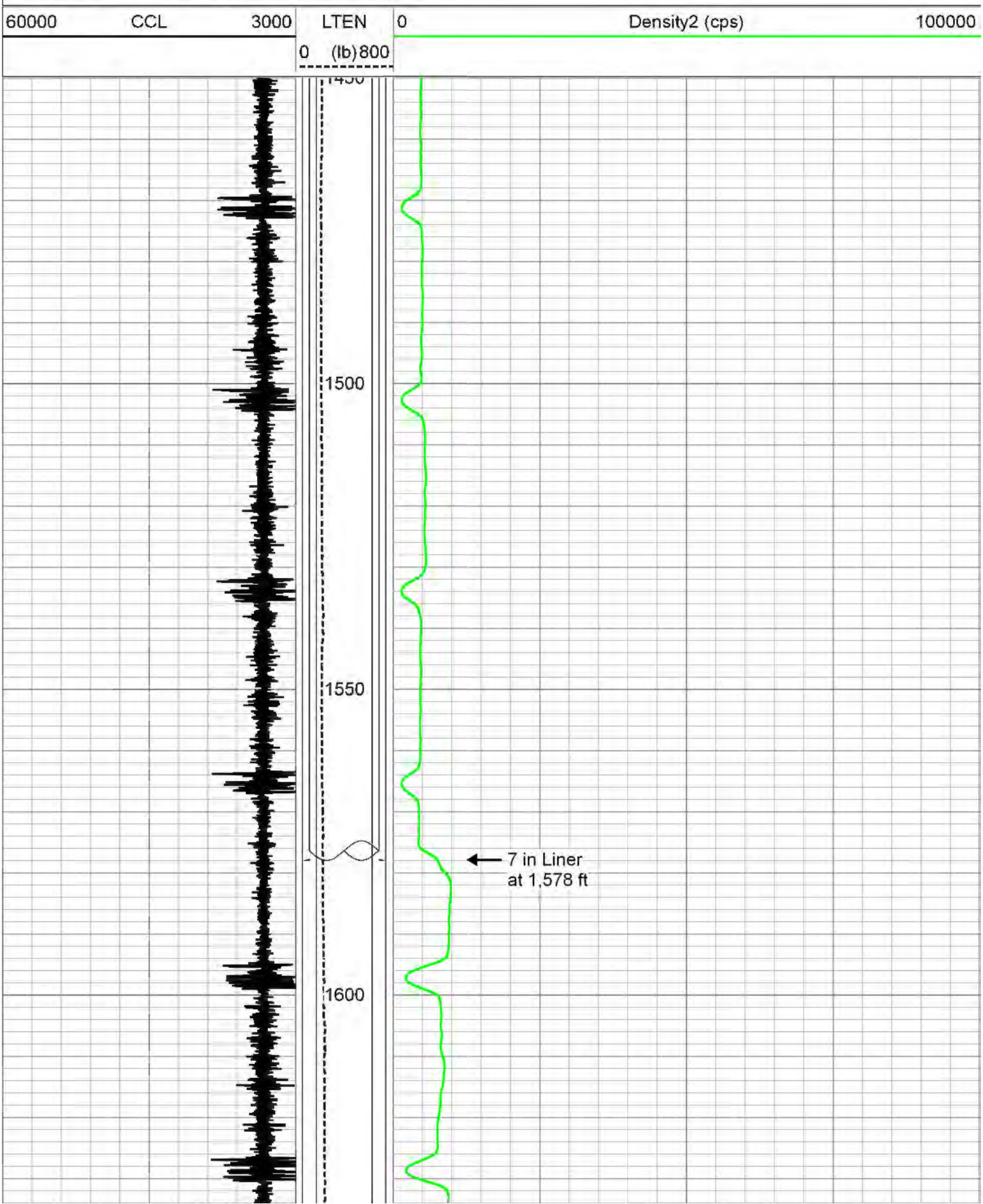
Dataset: westernrefinery_lpgs03_20170508_gdt-mit.db: field/well/run1/170511-0945_Den-Final
Total length: 15.21 ft
Total weight: 117.20 lb
O.D.: 1.88 in

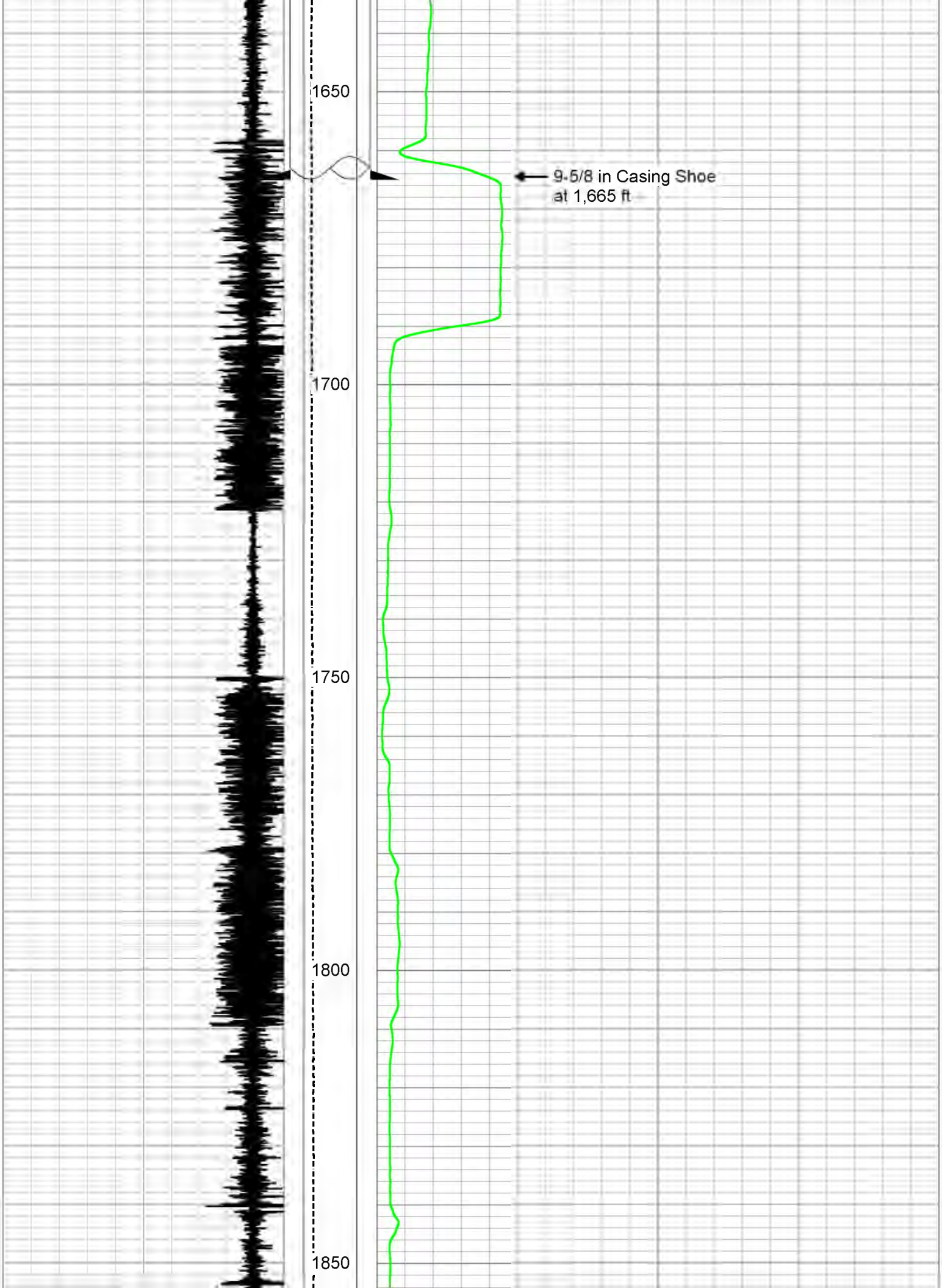
EMPIRE WIRELINE, LLC

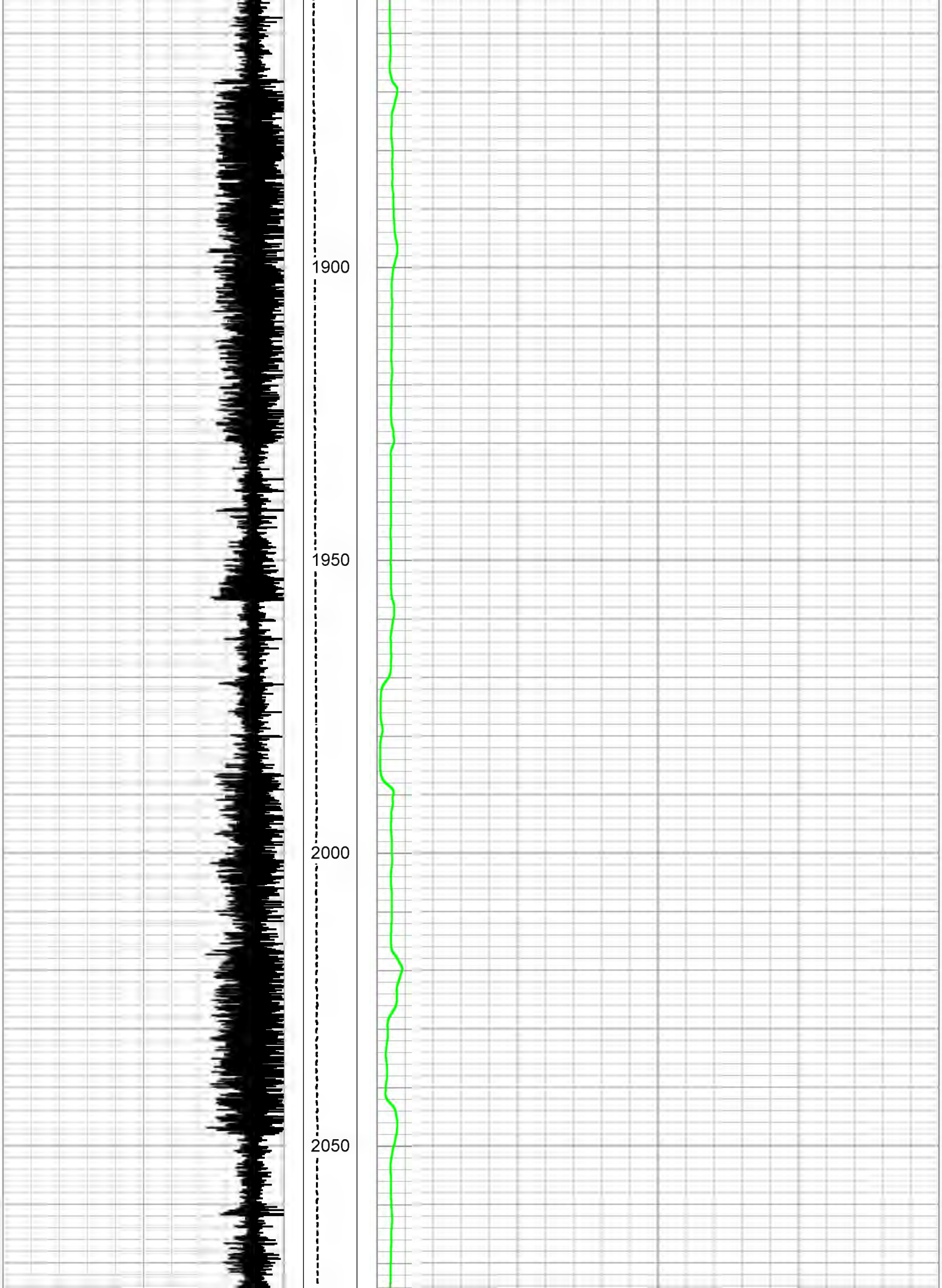
Density - Baseline

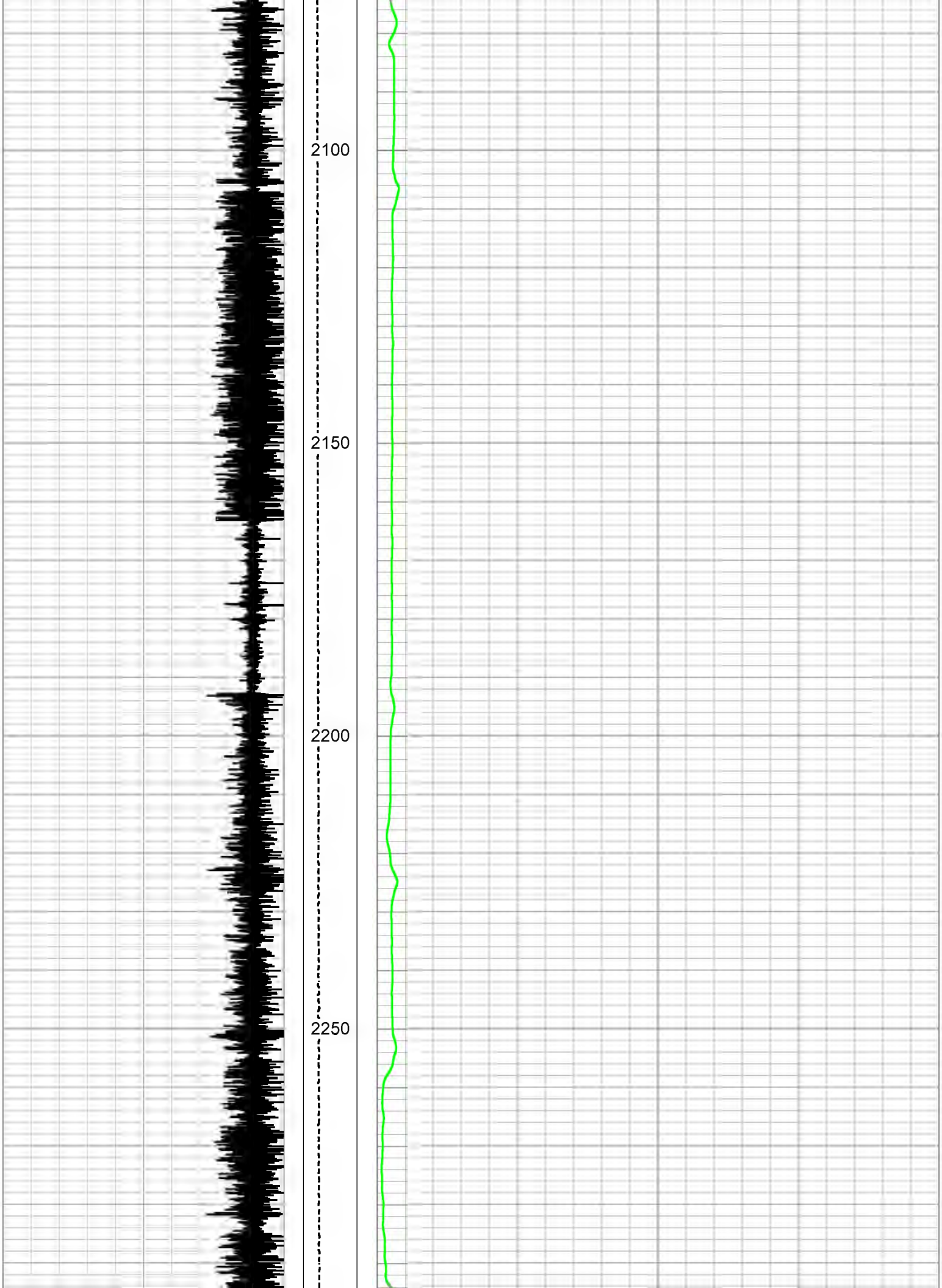
08-May-2017 at 09:15

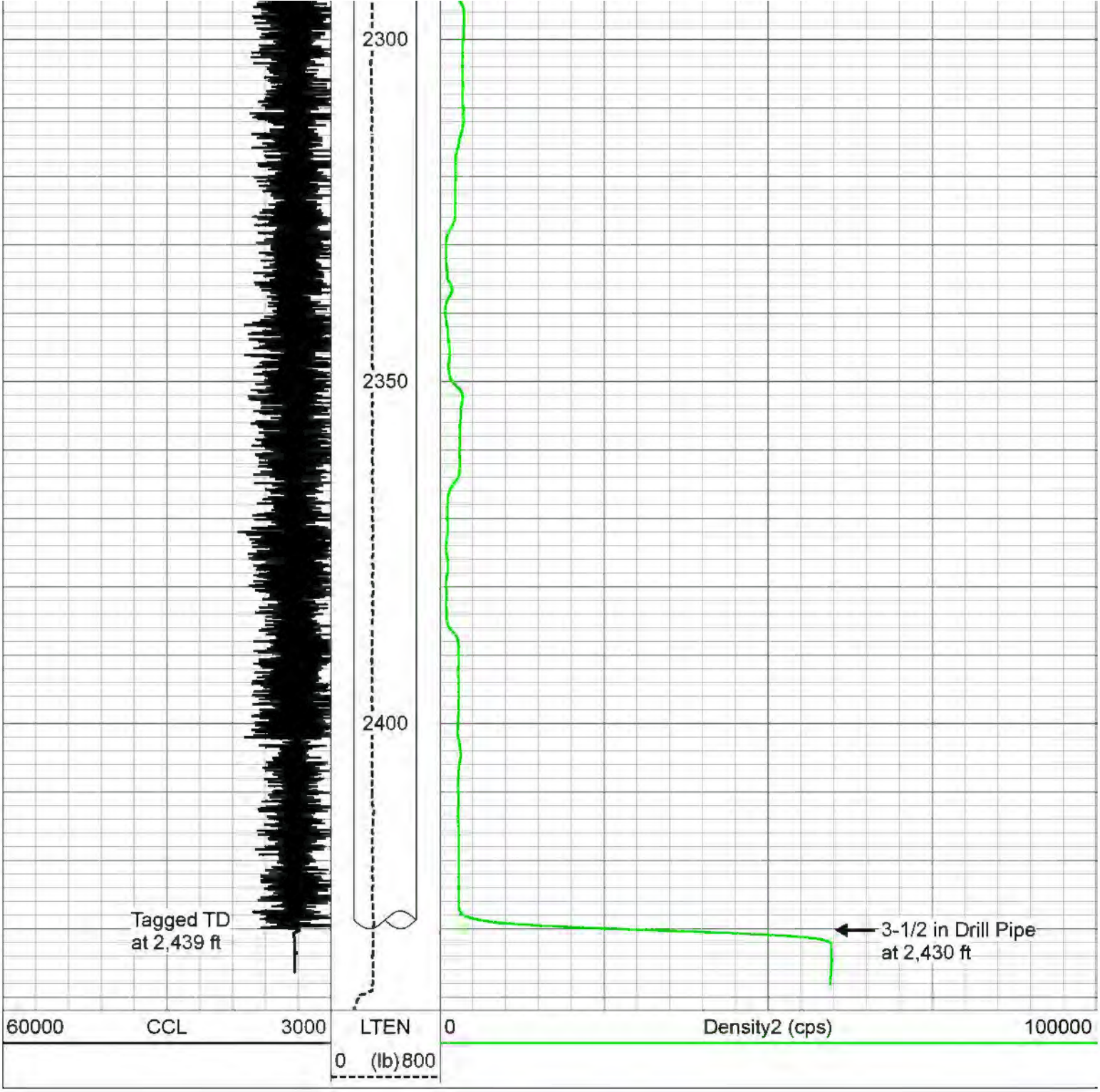
Database File	westernrefinery_lpgs03_20170508_gdt-mit.db
Dataset Pathname	170508-0915_Temp-Base
Presentation Format	cc-tempdensity
Dataset Creation	Mon May 08 09:14:55 2017
Charted by	Depth in Feet scaled 1:240




1650
1700
1750
1800
1850
9-5/8 in Casing Shoe
at 1,665 ft


1900
1950
2000
2050


2100
2150
2200
2250



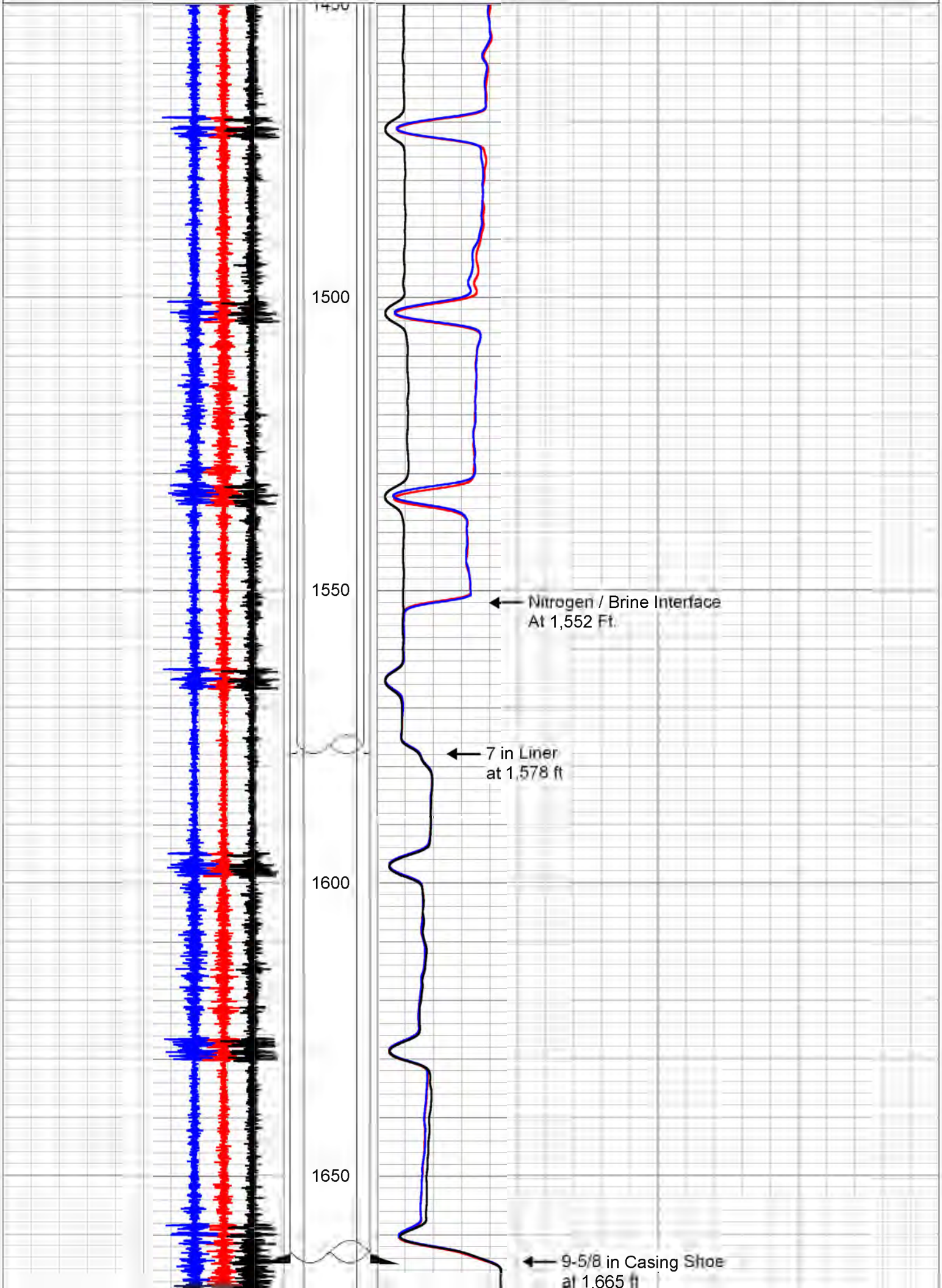
EMPIRE WIRELINE, LLC

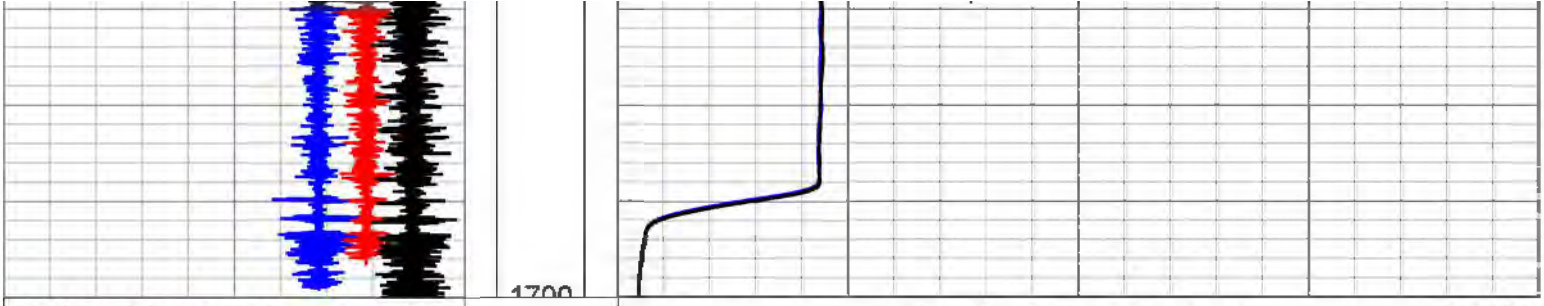
Density - Liner Test

08-May-2017 - Black = Baseline at 09:15,
Red = Initialization at 14:30, Blue = Finalization at 15:30

Database File	westernrefinery_lpgs03_20170508_gdt-mit.db
Dataset Pathname	M-LNR
Presentation Format	cc-tempdensitymerg
Dataset Creation	Mon May 08 16:13:47 2017
Charted by	Depth in Feet scaled 1:240

80000	CCL - Initialization	-10000	0	Density - Initializaiton (cps)	100000
70000	CCL - Finalization	-19000	0	Density - Finalization (cps)	100000
90000	CCL - Baseline	-1000	0	Density - Baseline (cps)	100000


1500
1550
1600
1650
Nitrogen / Brine Interface
At 1,552 Ft.
7 in Liner
at 1,578 ft
9-5/8 in Casing Shoe
at 1,665 ft



80000	CCL - Initialization	-10000	0	Density - Initializaiton (cps)	100000
70000	CCL - Finalization	-19000	0	Density - Finalization (cps)	100000
90000	CCL - Baseline	-1000	0	Density - Baseline (cps)	100000

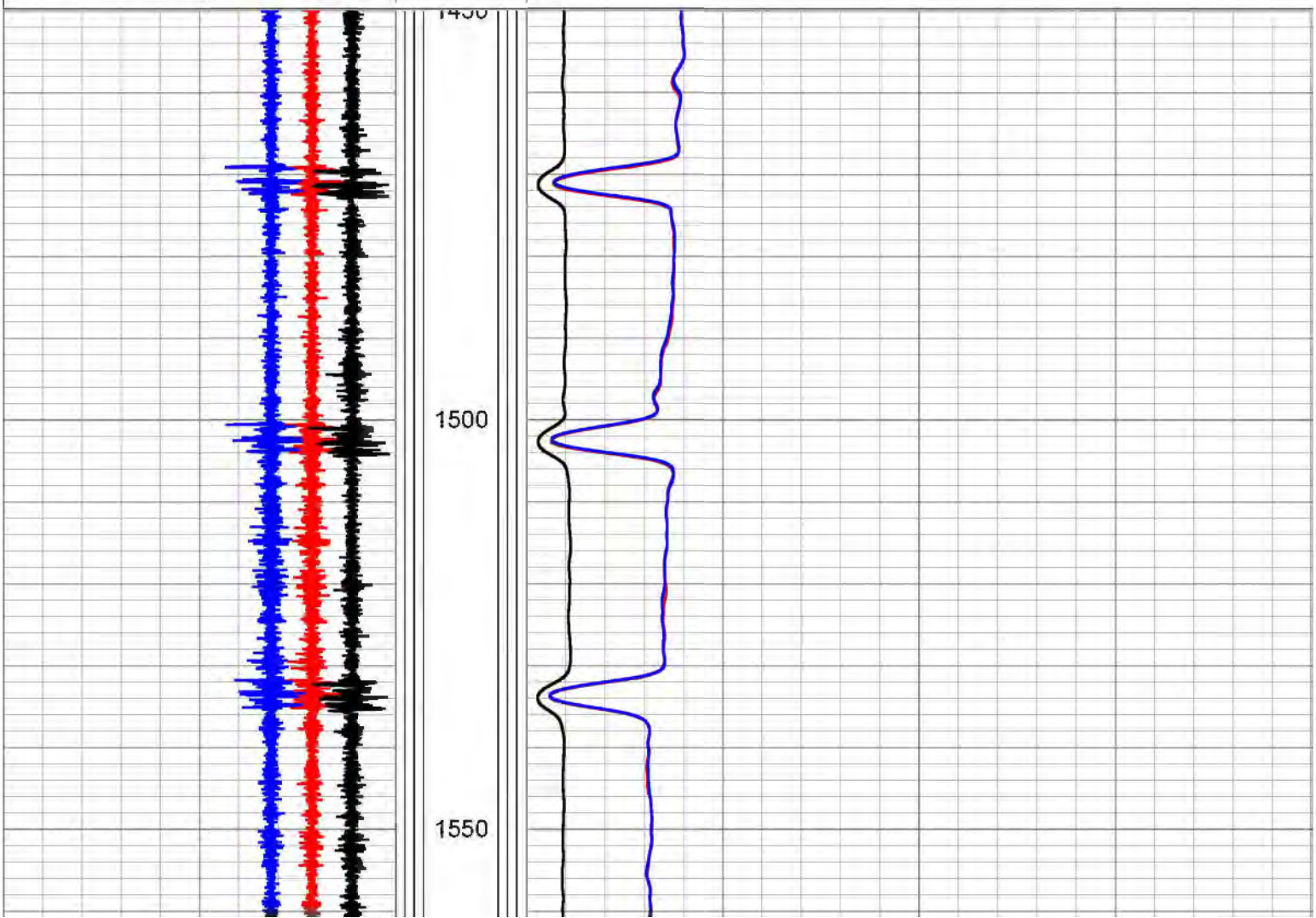
EMPIRE WIRELINE, LLC

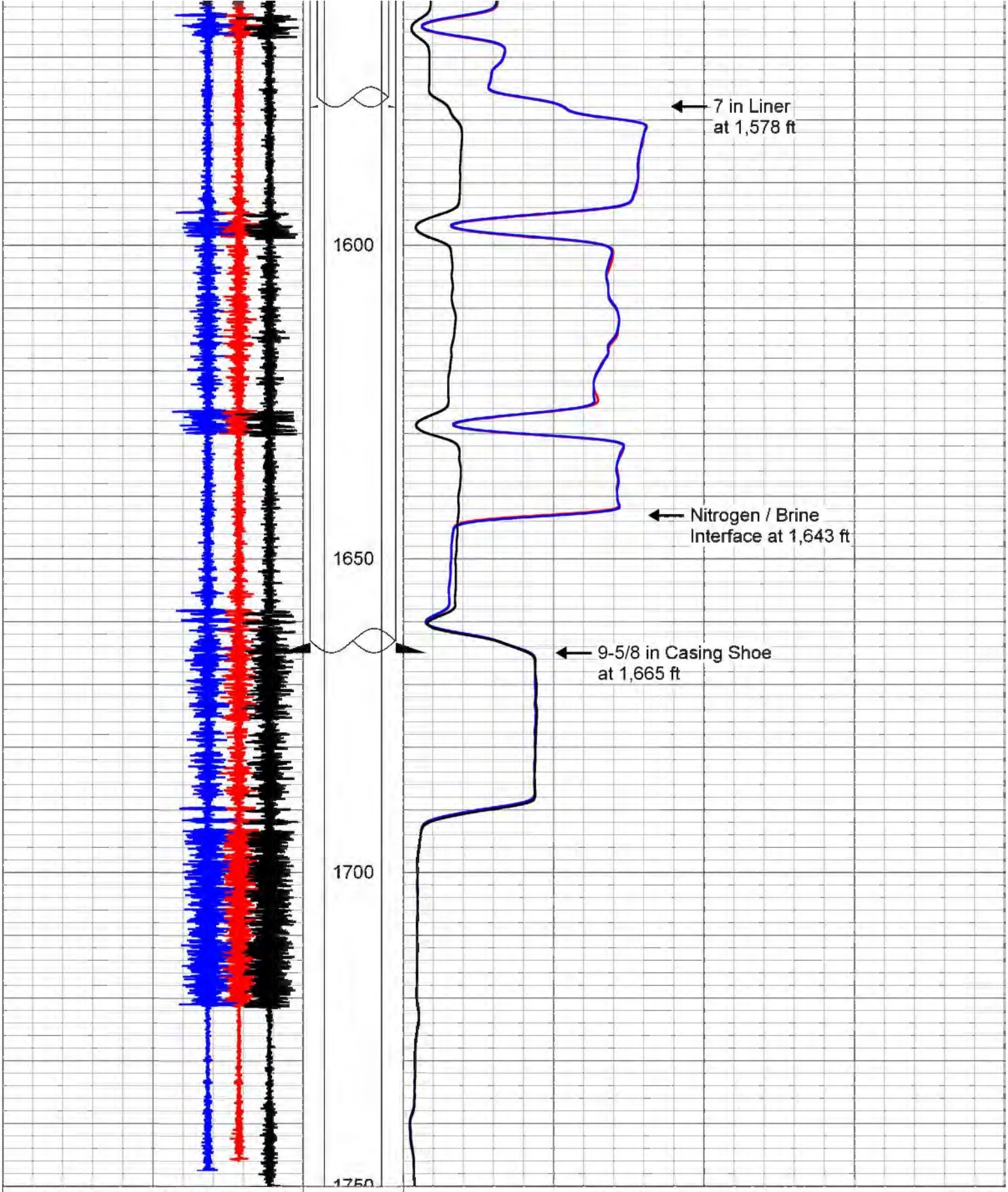
Density - Casing Test

08-May-2017 - Black = Baseline at 09:15,
Red = Initialization at 16:00, Blue = Finalization at 17:00

Database File	westernrefinery_lpgs03_20170508_gdt-mit.db
Dataset Pathname	M-CSG
Presentation Format	cc-tempdensitymerg
Dataset Creation	Mon May 08 17:25:03 2017
Charted by	Depth in Feet scaled 1:240

80000	CCL - Initialization	-10000	0	Density - Initializaiton (cps)	100000
70000	CCL - Finalization	-19000	0	Density - Finalization (cps)	100000
90000	CCL - Baseline	-1000	0	Density - Baseline (cps)	100000





EMPIRE

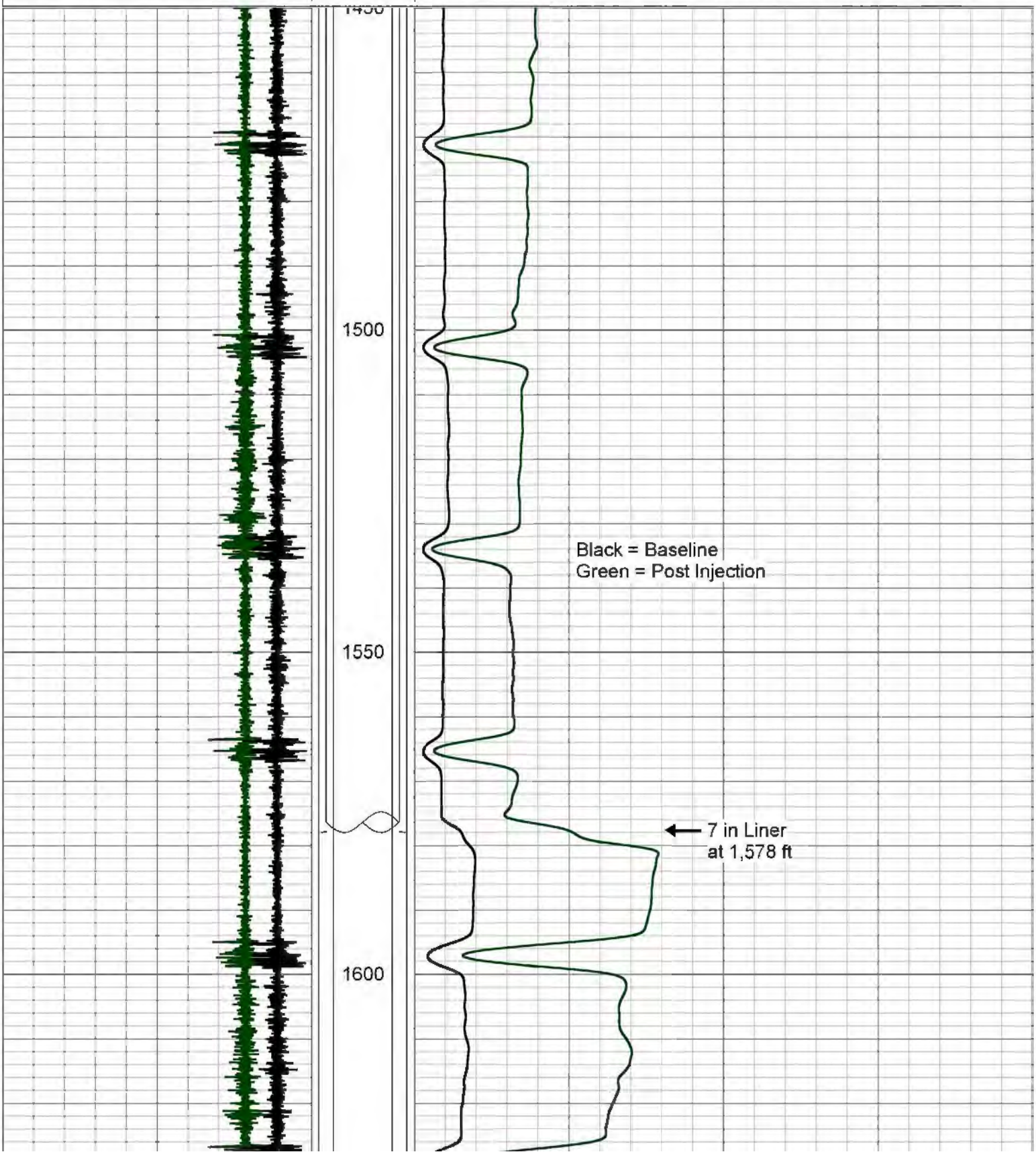
Density - Post Injection Overlay

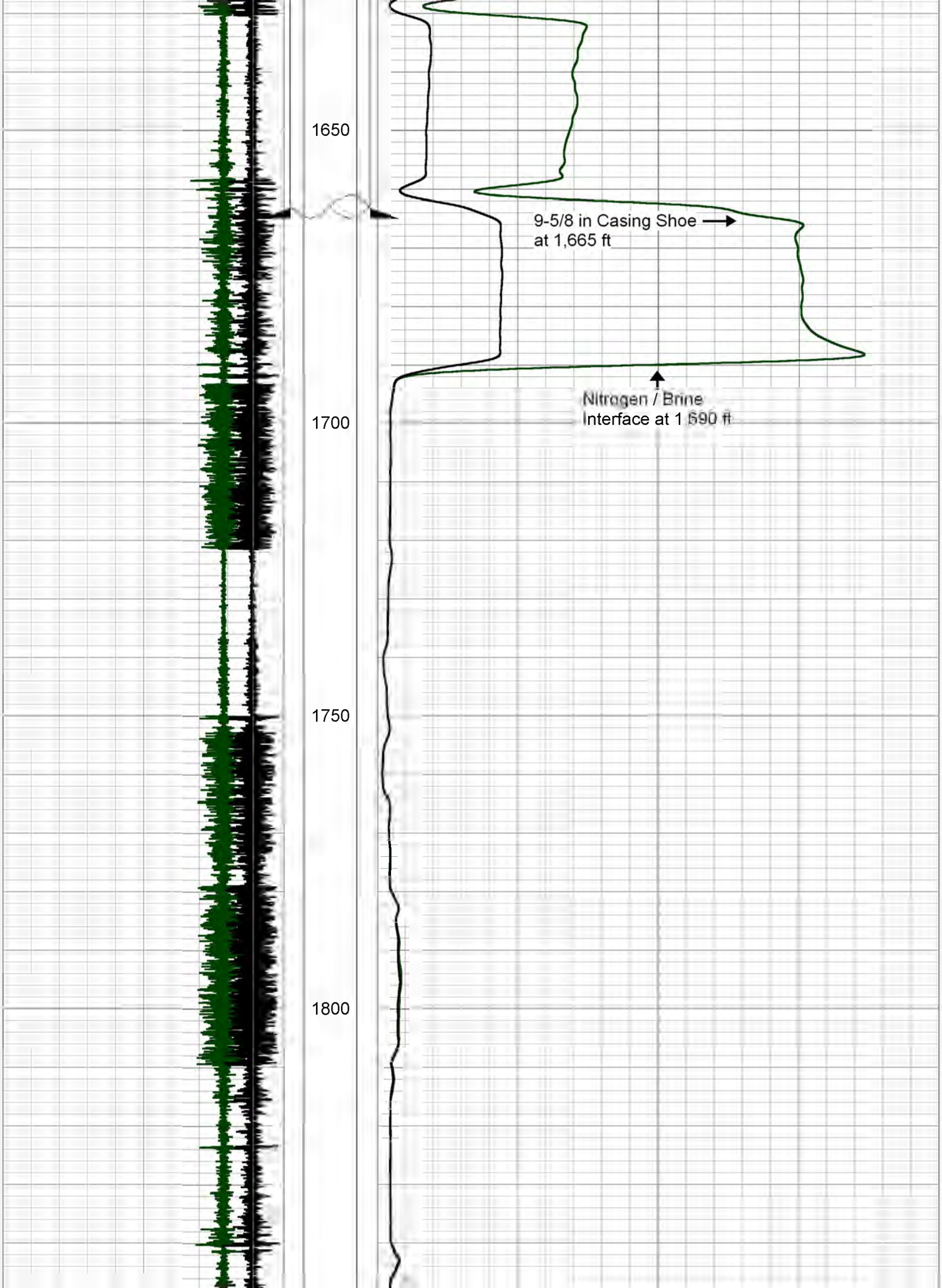
EMPIRE WIRELINE, LLC

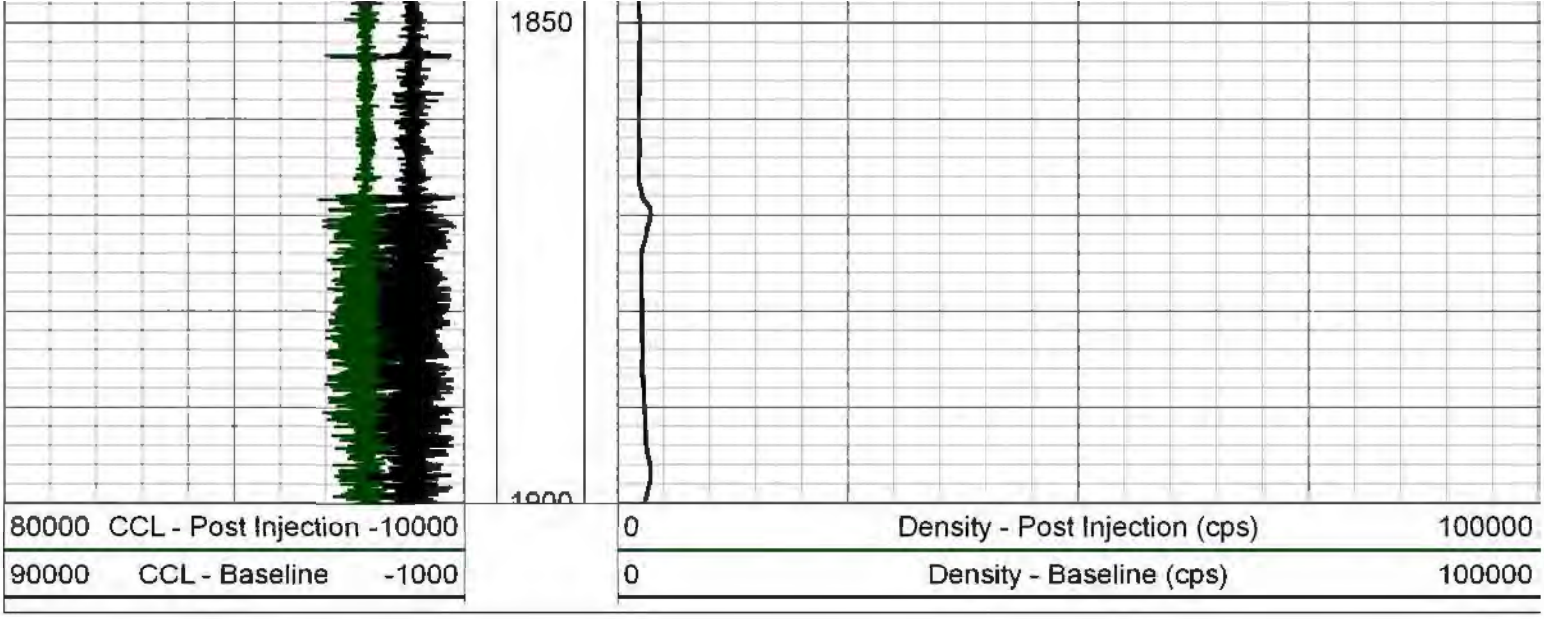
Black = Baseline on 08-May-2017 at 09:15,
Green = Finalization on 10-May-2017 at 18:00

Database File	westernrefinery_lpgs03_20170508_gdt-mit.db
Dataset Pathname	M-PostInj
Presentation Format	cc-tempdensitymerg
Dataset Creation	Wed May 10 18:16:47 2017
Charted by	Depth in Feet scaled 1:240

80000	CCL - Post Injection -10000	0	Density - Post Injection (cps)	100000
90000	CCL - Baseline -1000	0	Density - Baseline (cps)	100000




1650
1700
1750
1800
9-5/8 in Casing Shoe
at 1,665 ft
Nitrogen / Brine
Interface at 1,690 ft

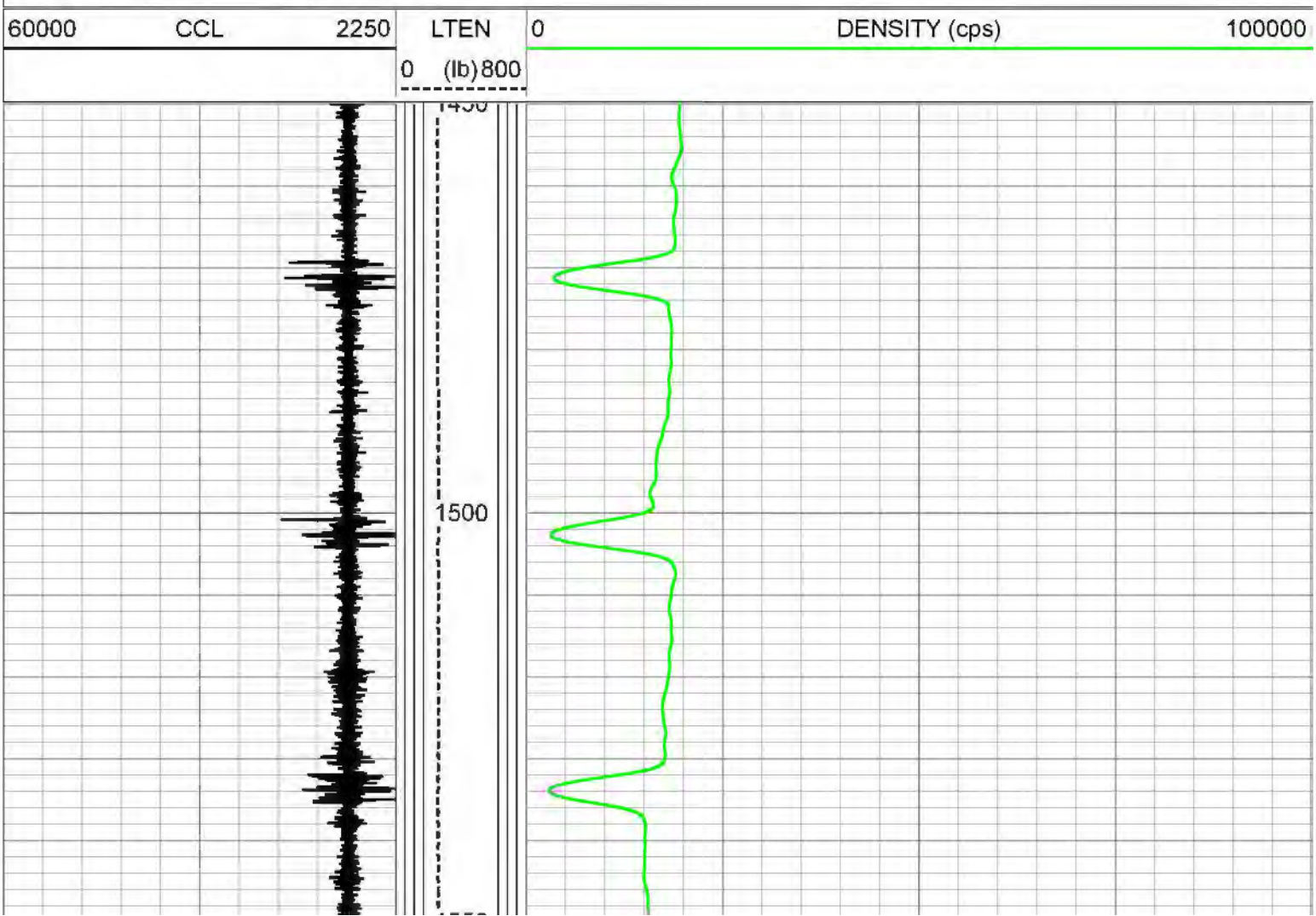


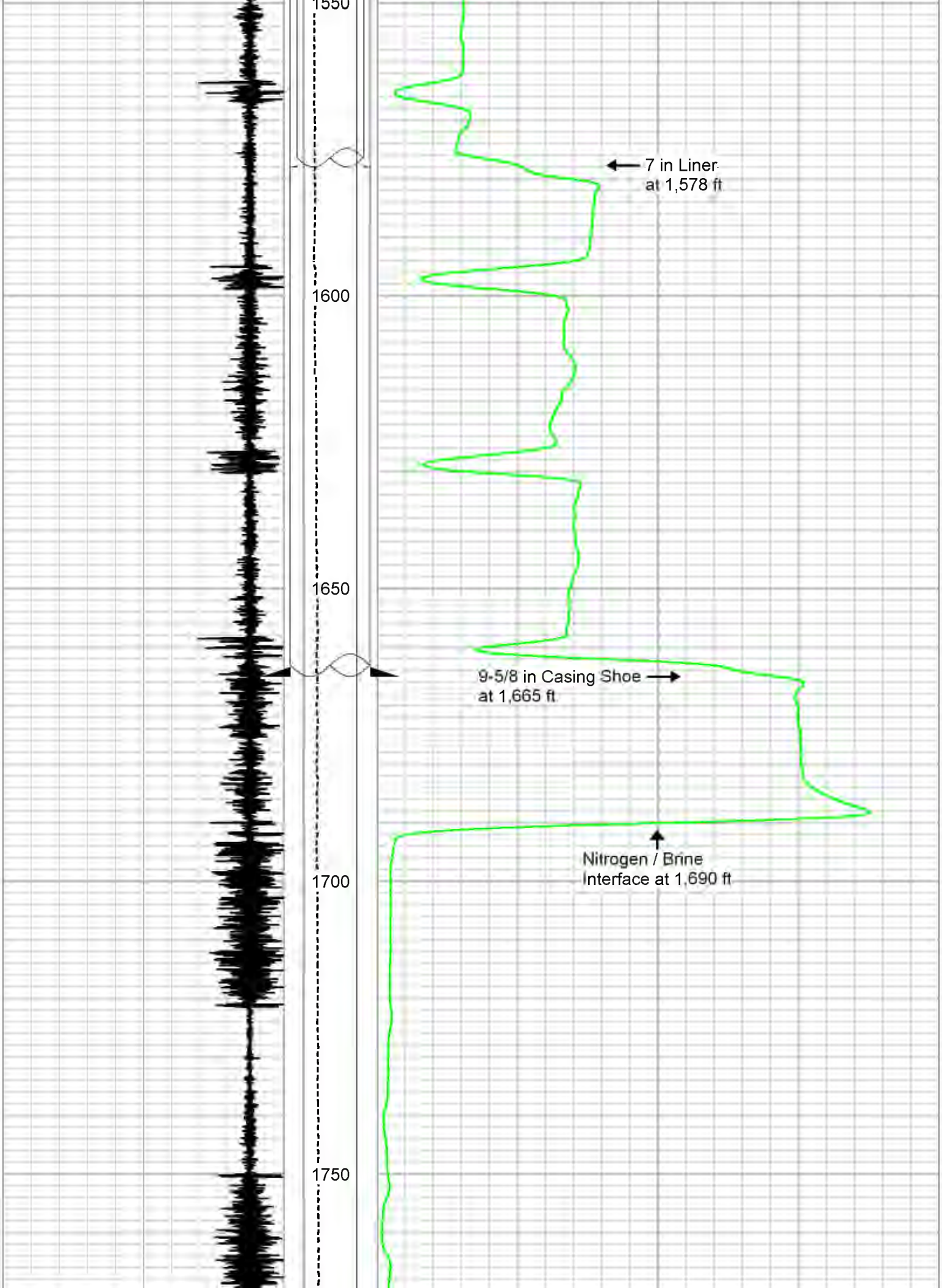
EMPIRE WIRELINE, LLC

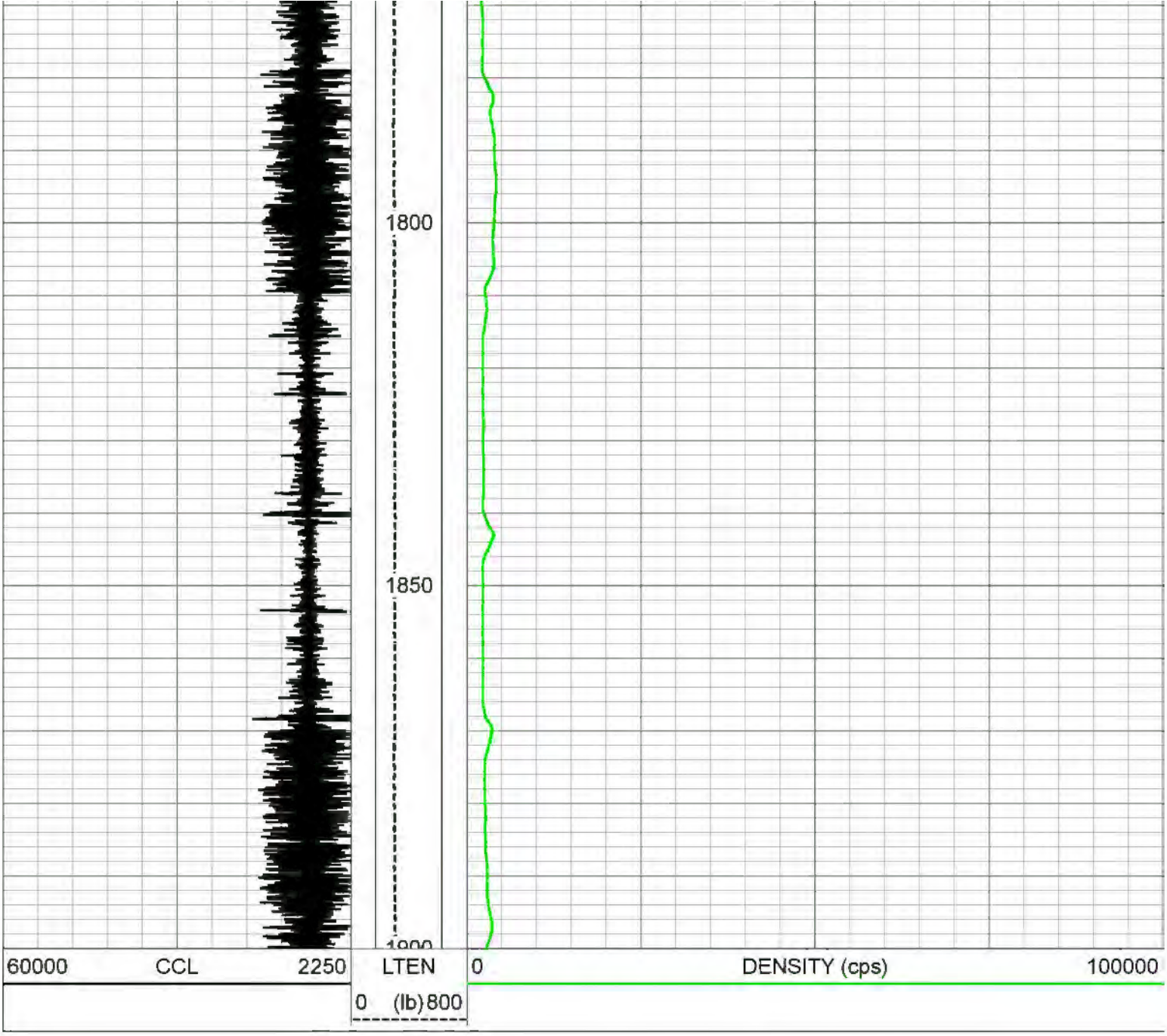
Density - Initialization

11-May-2017 at 09:45

Database File	westernrefinery_lpgs03_20170508_gdt-mit.db
Dataset Pathname	170511-0945_Den-Initial
Presentation Format	cc-tempdensity
Dataset Creation	Thu May 11 09:44:54 2017
Charted by	Depth in Feet scaled 1:240




1550
1600
1650
1700
1750
7 in Liner
at 1,578 ft
9-5/8 in Casing Shoe
at 1,665 ft
Nitrogen / Brine
Interface at 1,690 ft

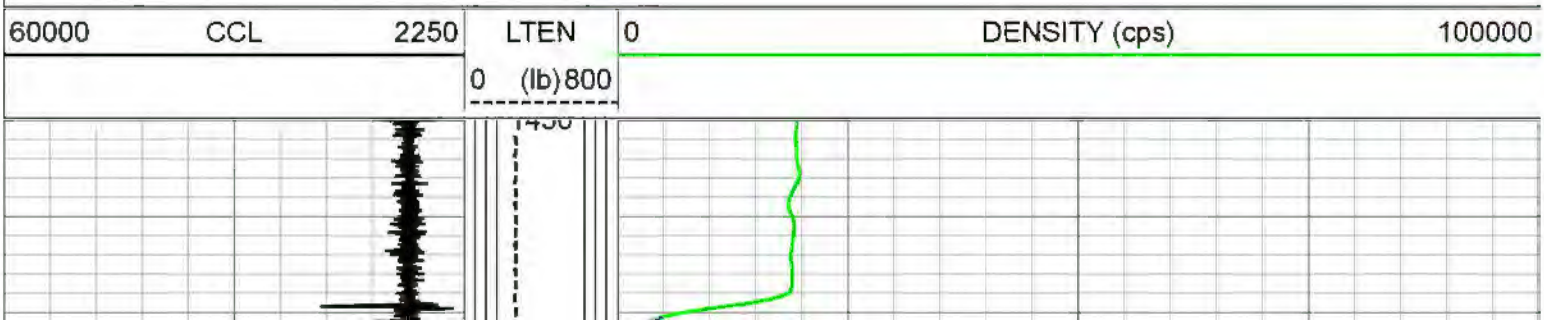


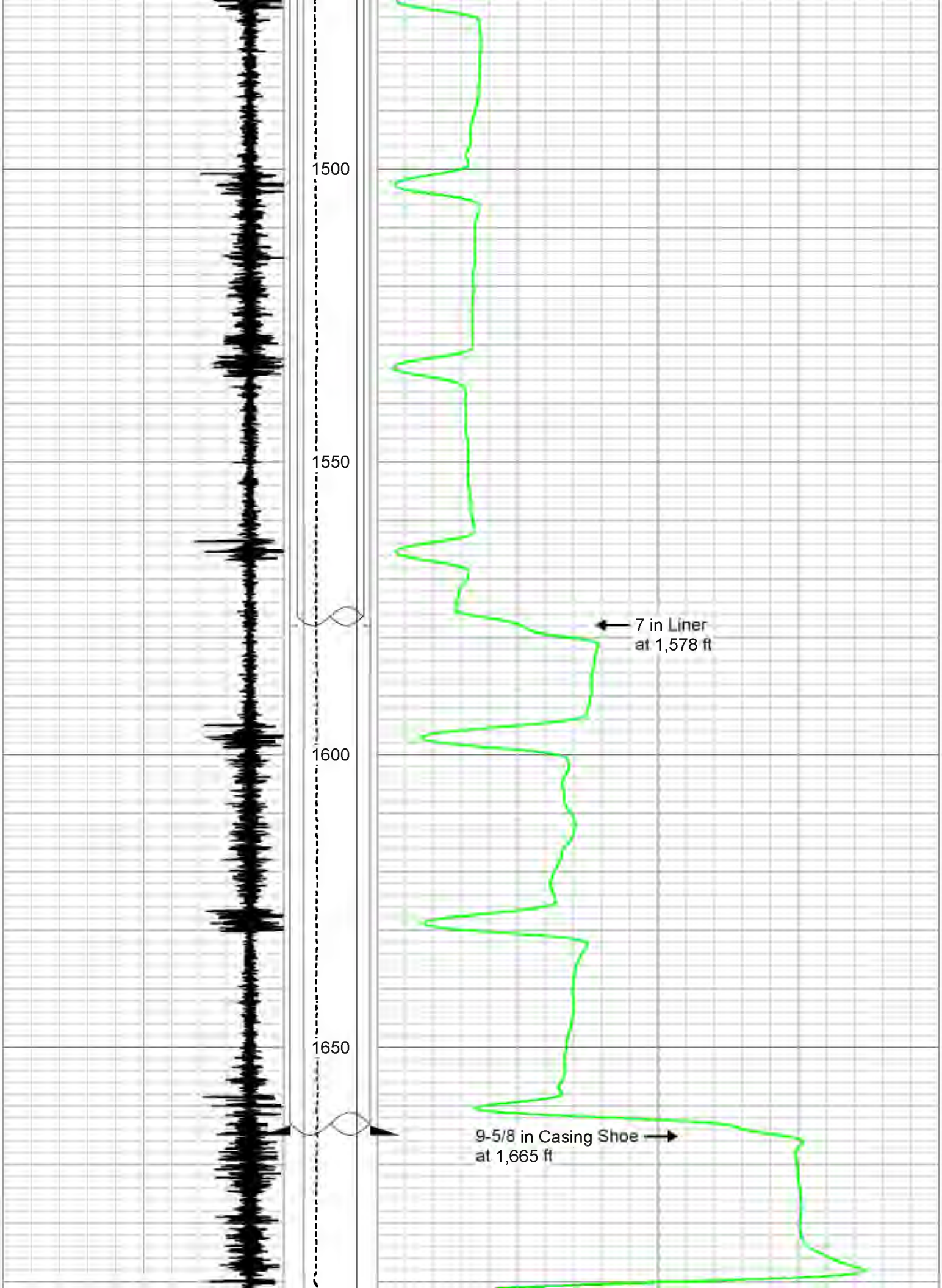
EMPIRE WIRELINE, LLC

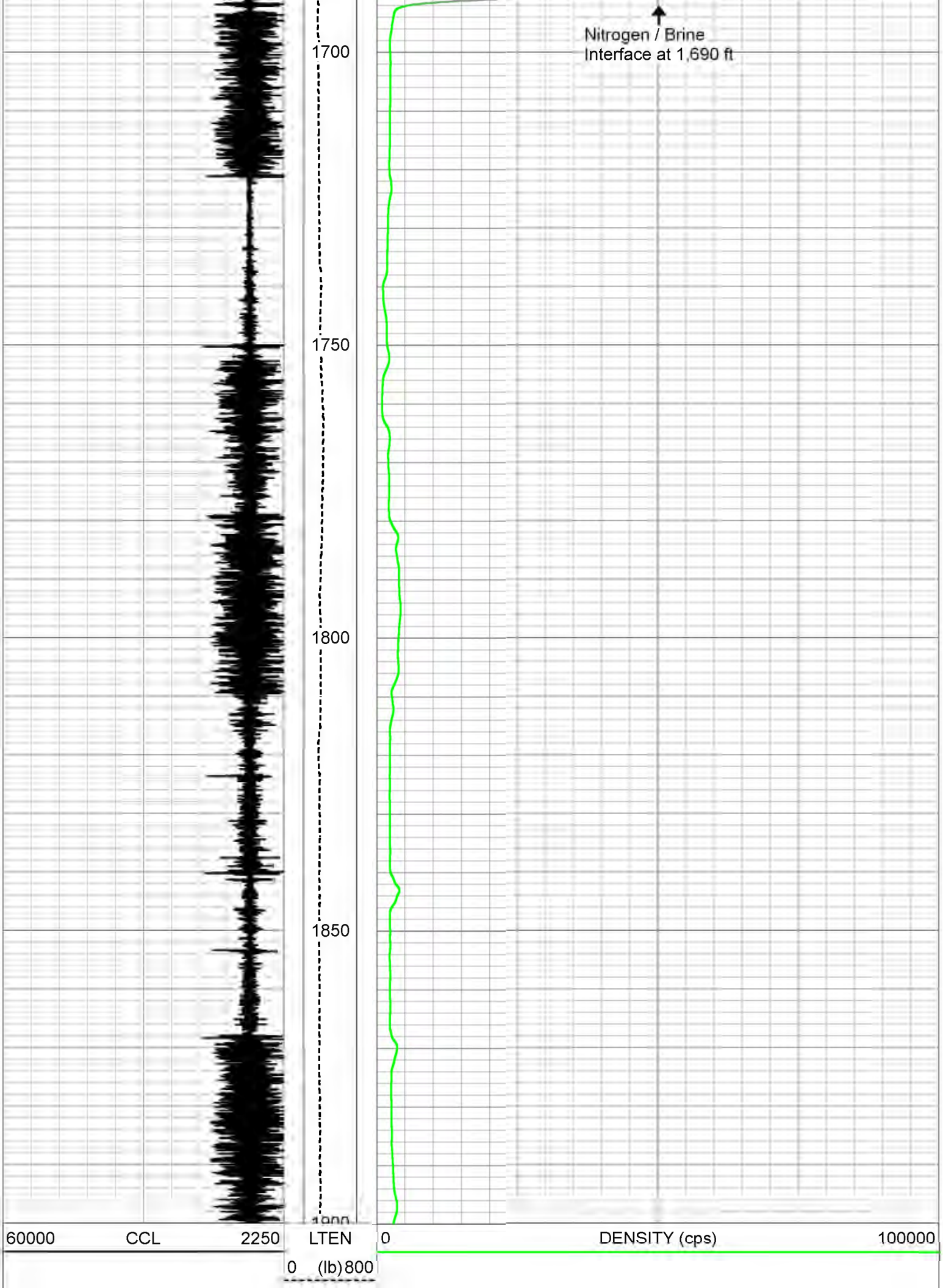
Density - Finalization

12-May-2017 at 09:45

Database File	westernrefinery_lpgs03_20170508_gdt-mit.db
Dataset Pathname	170511-0945_Den-Final
Presentation Format	cc-tempdensity
Dataset Creation	Fri May 12 09:44:35 2017
Charted by	Depth in Feet scaled 1:240




1500
1550
1600
1650
7 in Liner
at 1,578 ft
9-5/8 in Casing Shoe
at 1,665 ft

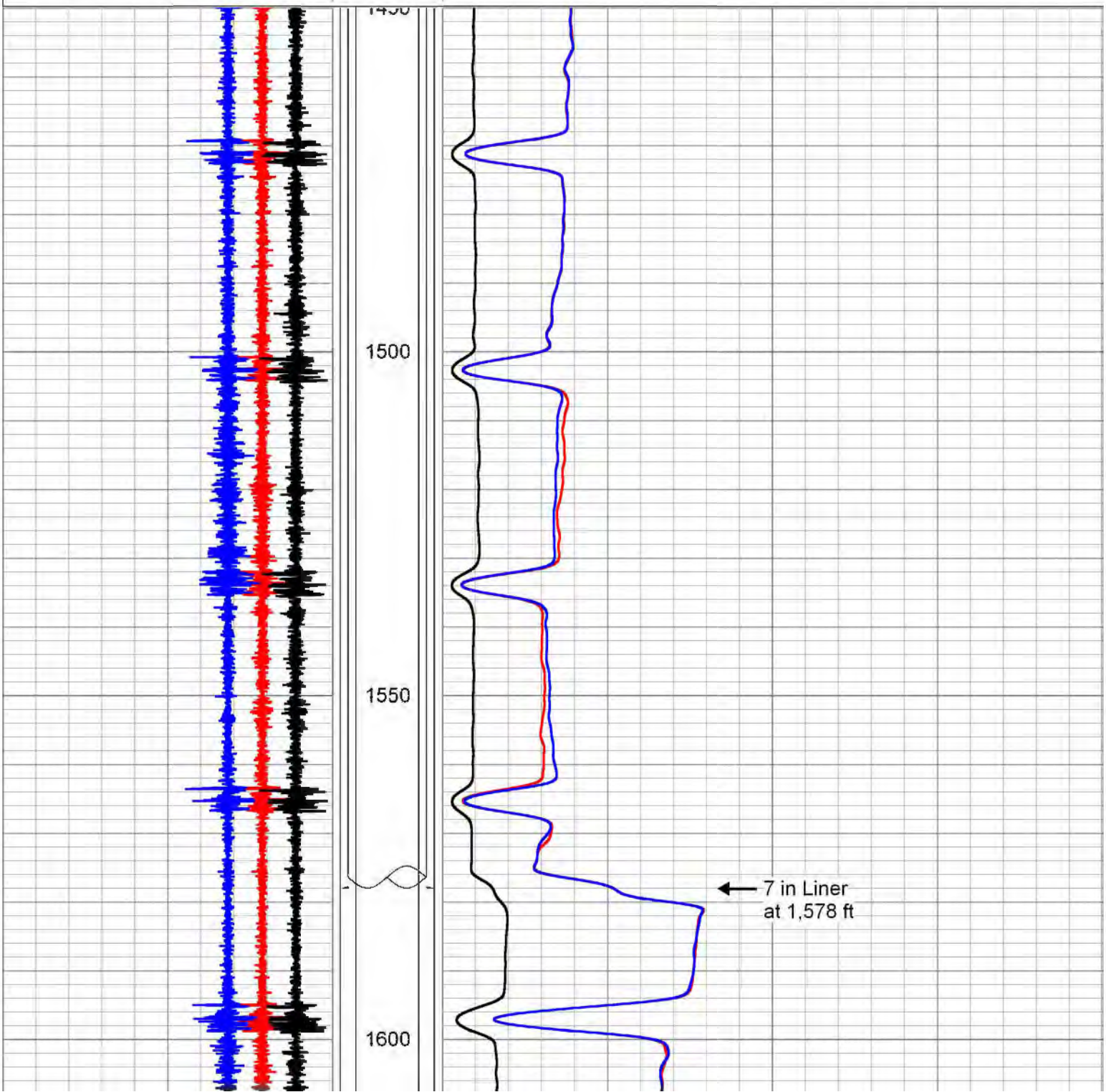

Nitrogen / Brine
Interface at 1,690 ft
1700
1750
1800
1850
60000
CCL
2250
LTEN
0
(lb) 800
0
DENSITY (cps)
100000

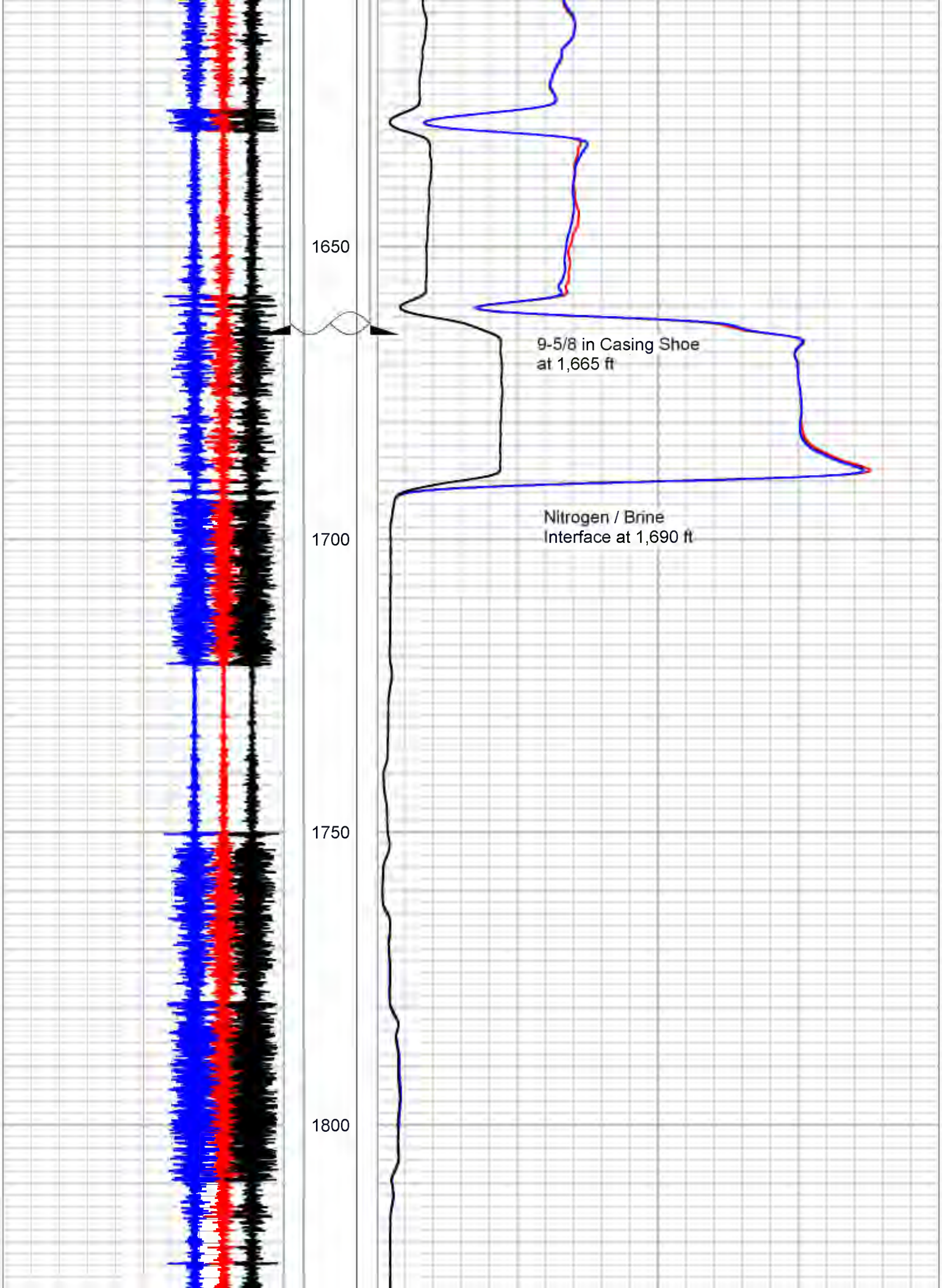
Density - MIT Overlay

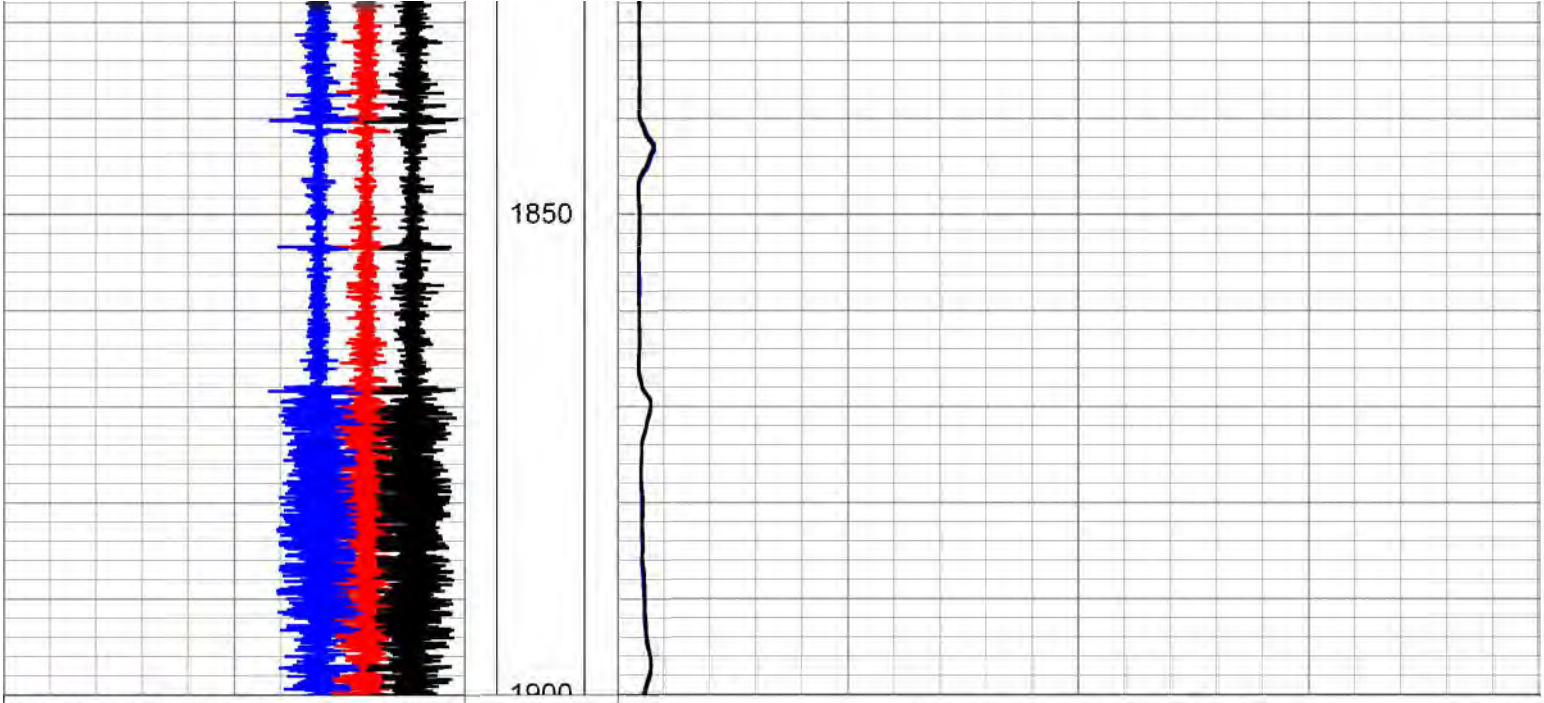
Black = Baseline on 08-May-17 at 09:15, Red = Initialization on 11-May-17 at 16:00, Blue = Finalization on 12-May-17 at 17:00

Database File	westernrefinery_lpgs03_20170508_gdt-mit.db
Dataset Pathname	M-MIT
Presentation Format	cc-tempdensitymerg
Dataset Creation	Fri May 12 10:02:19 2017
Charted by	Depth in Feet scaled 1:240

80000	CCL - Initialization	-10000	0	Density - Initializaiton (cps)	100000
70000	CCL - Finalization	-19000	0	Density - Finalization (cps)	100000
90000	CCL - Baseline	-1000	0	Density - Baseline (cps)	100000




1650
1700
1750
1800
9-5/8 in Casing Shoe
at 1,665 ft
Nitrogen / Brine
Interface at 1,690 ft



80000	CCL - Initialization	-10000	0	Density - Initializaiton (cps)	100000
70000	CCL - Finalization	-19000	0	Density - Finalization (cps)	100000
90000	CCL - Baseline	-1000	0	Density - Baseline (cps)	100000

EMPIRE WIRELINE, LLC

Company	Western Refining Company, LP	
Well	State LPG Storage No. 003	
Field	Jal	
County	Lea County	
State	New Mexico	Country

EMPIRE WIRELINE, LLC

MIT - Temperature

Company: Western Refining Company, LP
Well: State LPG Storage No. 003
Field: Jal
Area: Lea County
State: New Mexico

Company: Western Refining Company, LP
Well: State LPG Storage No. 003
Field: Jal
Area: Lea County
State: New Mexico

Location: N/A
API # : 30-025-35956 | SEC: N/A | TWP: N/A | RGE: N/A

Other Services: Temperature

Permanent Datum: Ground Level | Elevation: N/A
Log Measured From: B.H.F. | N/A Above P.D.
Drilling Measured From: Kelly Bushing

Elevation's
K.B. N/A
D.F. N/A
G.L. N/A

	Run Information	Run No. 1	Run No. 2	Run No. 3	Run No. 4
	Date of Service	08-May-2017	10-May-2017	11-May-2017	12-May-2017
Depth	Depth Driller or PBTD	N/A	N/A	N/A	N/A
Depth	Empire Depth	2,439 ft	2,439 ft	2,439 ft	2,439 ft
Depth	Bottom Log Interval	2,438 ft	2,438 ft	2,438 ft	2,438 ft
Depth	Top Log Interval	Surface	Surface	Surface	Surface
Depth	Interface Depth	N/A	1,690 ft	1,690 ft	1,690 ft
Well Info	Fluid Type	Brine	Brine	Brine	Brine
Well Info	Fluid Density	N/A	N/A	N/A	N/A
Well Info	Fluid Level	Surface	Surface	Surface	Surface
Well Info	Tubing Pressure	50 PsiA	400 PsiA	400 PsiA	400 PsiA
Well Info	Wellhead Connection	4-1/16 in 3K	4-1/16 in 3K	4-1/16 in 3K	4-1/16 in 3K
Time	Time - Ran In Well	08:00	10:00	08:30	08:15
Time	Time - Temp. Start	09:15	N/A	08:45	08:30
Time	Time - Density Start	N/A	10:15	09:45	09:45
Time	Time - Out of Well	17:30	19:00	10:30	10:30
Time	Location	Broussard, LA	Broussard, LA	Broussard, LA	Broussard, LA
Time	Unit No. / Wire Size	P-03 / 1/4 in	P-03 / 1/4 in	P-03 / 1/4 in	P-03 / 1/4 in
Time	Recorded By	C. Cross	C. Cross	C. Cross	C. Cross
Time	Witnessed By	Mr. Will George	Mr. Will George	Mr. Will George	Mr. Will George

CSG / TBG Record	Size	Wt/Ft	Top	Bottom
Surface Casing	13-5/8 in	54.5 lb/ft	Surface	285.5 ft
Production Casing	9-5/8 in	36 lb/ft	Surface	1,665 ft
Liner	7 in	23 lb/ft	Surface	1,578 ft
Hanging String	4-1/2 in	N/A	Surface	38 ft
Hanging String	3-1/2 in	Drill Pipe	38 ft	2,430 ft

<< Fold Here >>

Comments

Log correlated to the 9-5/8 in Casing Shoe at 1,665 ft

Sensor	Offset (ft)	Schematic	Description	Length (ft)	O.D. (in)	Weight (lb

Tungsten-1-11/16x7 Weigh Bar Tungten 1-11/16" x 7'	7.00	1.69	84.00
GDT_WTC-WTS06 (14023103) Digital Telemetry GDTBus	1.82	1.69	8.60
GDT_CCL-CCL10 (14023401) Digital CCL GDTBus	1.35	1.69	6.20
GDT_RDT-RDT04 (14023128)	1.19	0.00	
GDT_GRT2-GRT10-1 (14023359) Secondary Gamma Ray Tool GDTBus	2.23	1.69	10.40
Density-DensitySub (01)	1.63	1.88	8.00

CRCCnt	6.39
FrmCnt	6.39
WTSTime	6.39
WTSTemp	6.39
CHV	6.39
CCL	5.47
RDTTemp	4.14
GR2	1.63
Density2	1.12
Density1	1.12

Dataset: westernrefinery_lpgs03_20170508_gdt-mit.db: field/well/run1/170511-0945_Den-Final
Total length: 15.21 ft
Total weight: 117.20 lb
O.D.: 1.88 in

EMPIRE WIRELINE, LLC

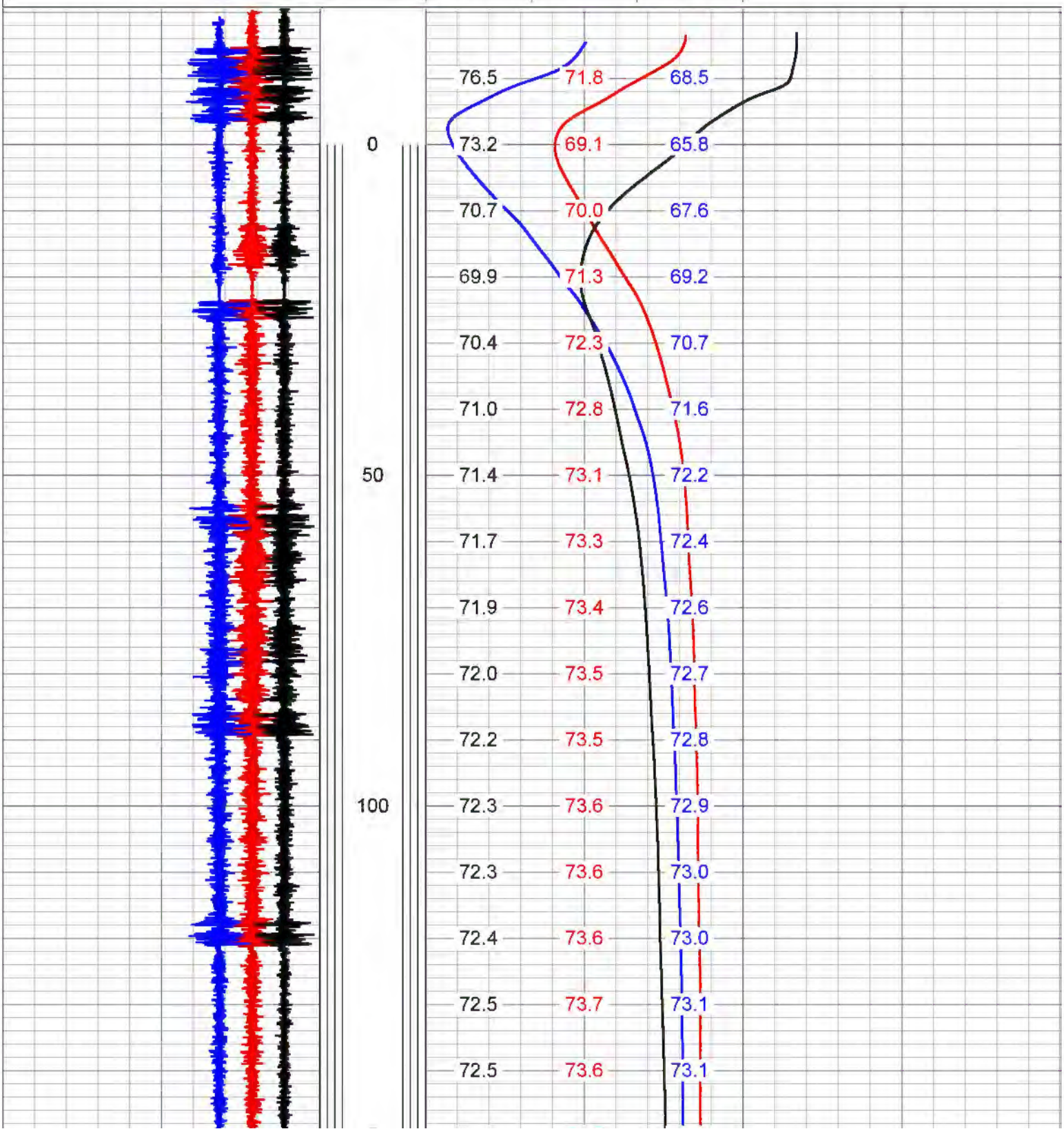
Merged Temperature Overlay

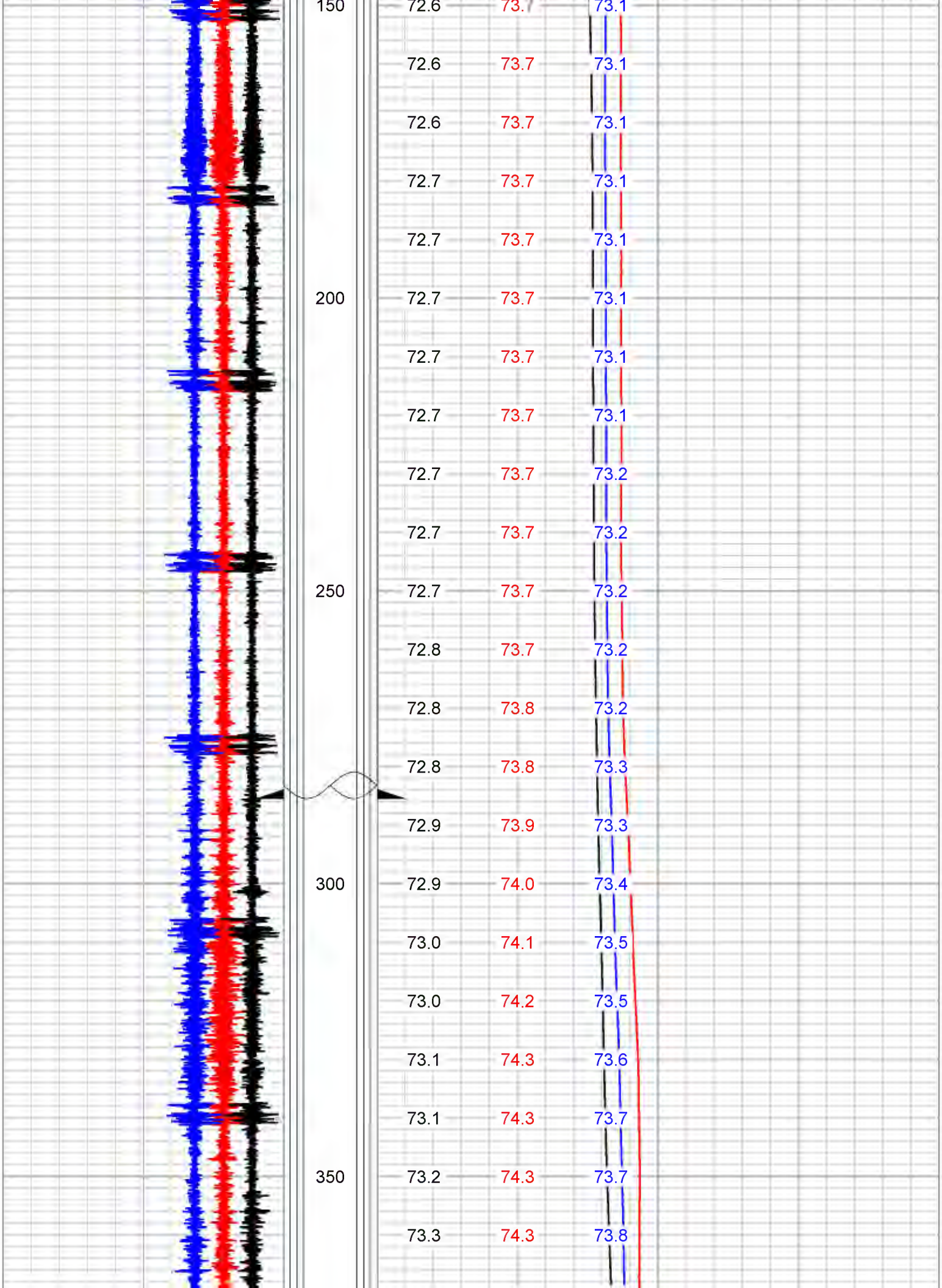
08-May-2017 - Black = Baseline at 09:15,

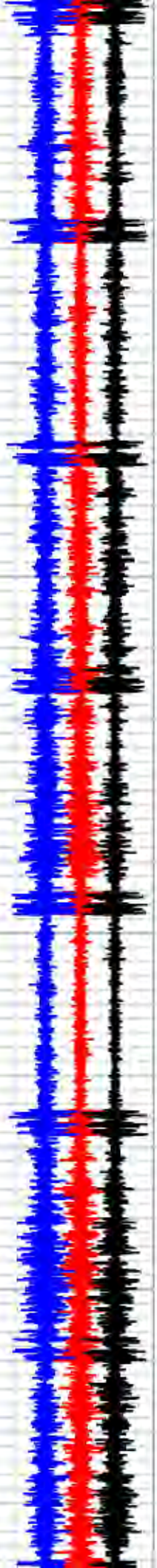
Red = Initialization at 08:45, Blue = Finalization at 08:30

Database File	westernrefinery_lpgs03_20170508_gdt-mit.db
Dataset Pathname	M-Temp
Presentation Format	cc-tempdensitymerg
Dataset Creation	Fri May 12 09:37:53 2017
Charted by	Depth in Feet scaled 1:240

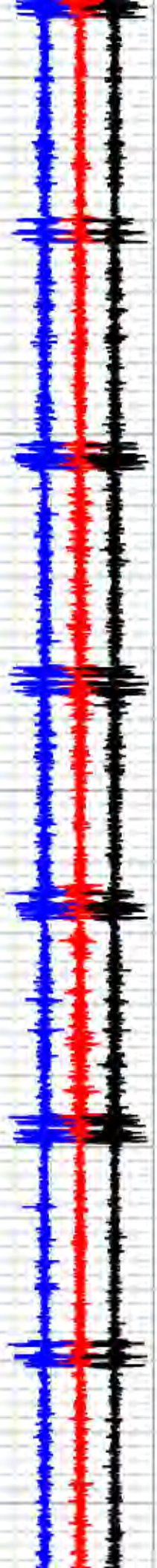
80000	CCL - Initialization	-10000	65	Temp - Initializaiton (degF)	85
70000	CCL - Finalization	-19000	65	Temp - Finalization (degF)	85
90000	CCL - Baseline	-1000	65	Temp - Baseline (degF)	85



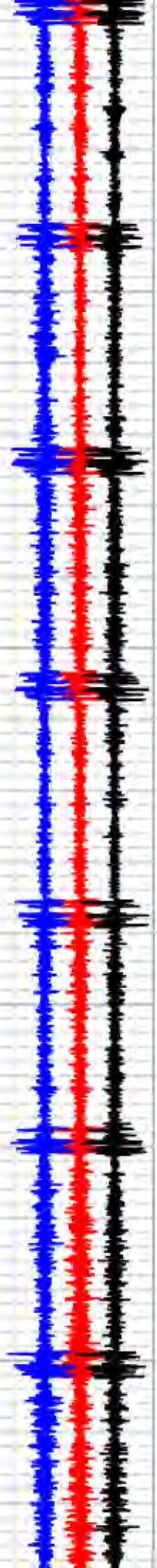

150
200
250
300
350
72.6 73.7 73.1
72.6 73.7 73.1
72.6 73.7 73.1
72.7 73.7 73.1
72.7 73.7 73.1
72.7 73.7 73.1
72.7 73.7 73.1
72.7 73.7 73.1
72.7 73.7 73.2
72.7 73.7 73.2
72.7 73.7 73.2
72.8 73.7 73.2
72.8 73.8 73.2
72.8 73.8 73.3
72.9 73.9 73.3
72.9 74.0 73.4
73.0 74.1 73.5
73.0 74.2 73.5
73.1 74.3 73.6
73.1 74.3 73.7
73.2 74.3 73.7
73.3 74.3 73.8



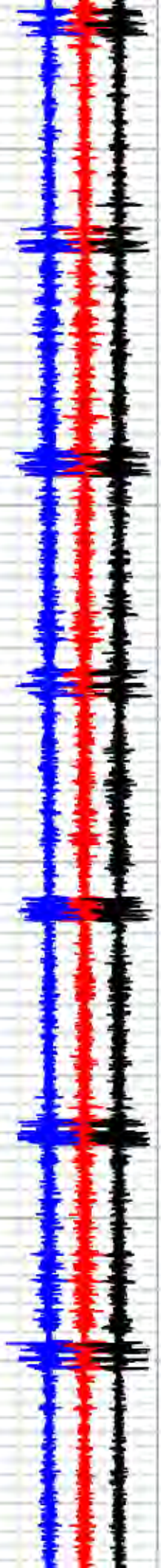
	73.3	74.3	73.8
	73.4	74.3	73.8
	73.5	74.3	73.8
400	73.5	74.3	73.9
	73.6	74.4	73.9
	73.7	74.4	73.9
	73.7	74.4	74.0
	73.8	74.5	74.0
450	73.9	74.5	74.1
	73.9	74.6	74.2
	74.0	74.7	74.2
	74.0	74.7	74.3
	74.1	74.7	74.3
500	74.2	74.8	74.4
	74.3	74.9	74.5
	74.4	75.0	74.5
	74.4	75.0	74.6
	74.5	75.1	74.7
550	74.6	75.1	74.7
	74.6	75.2	74.8
	74.7	75.2	74.9
	74.8	75.3	74.9



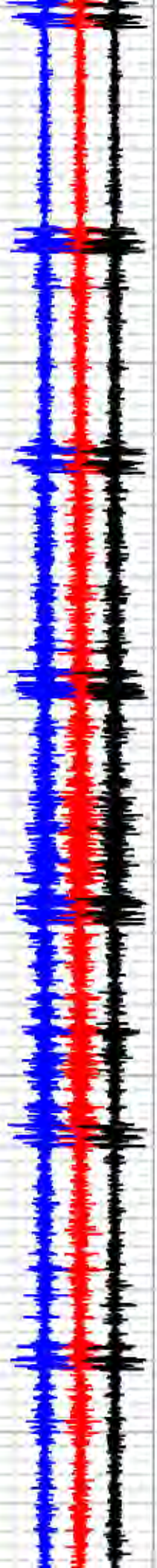
	74.8	75.3	75.0
600	74.9	75.3	75.0
	74.9	75.4	75.1
	75.0	75.4	75.1
	75.1	75.4	75.2
	75.1	75.5	75.2
650	75.2	75.5	75.3
	75.2	75.6	75.3
	75.3	75.7	75.4
	75.3	75.7	75.4
	75.4	75.7	75.5
700	75.4	75.8	75.5
	75.5	75.8	75.6
	75.5	75.9	75.6
	75.6	76.0	75.7
	75.6	76.0	75.7
750	75.7	76.1	75.8
	75.8	76.1	75.9
	75.8	76.2	75.9
	75.9	76.2	76.0
	75.9	76.3	76.0
800	76.0	76.3	76.1



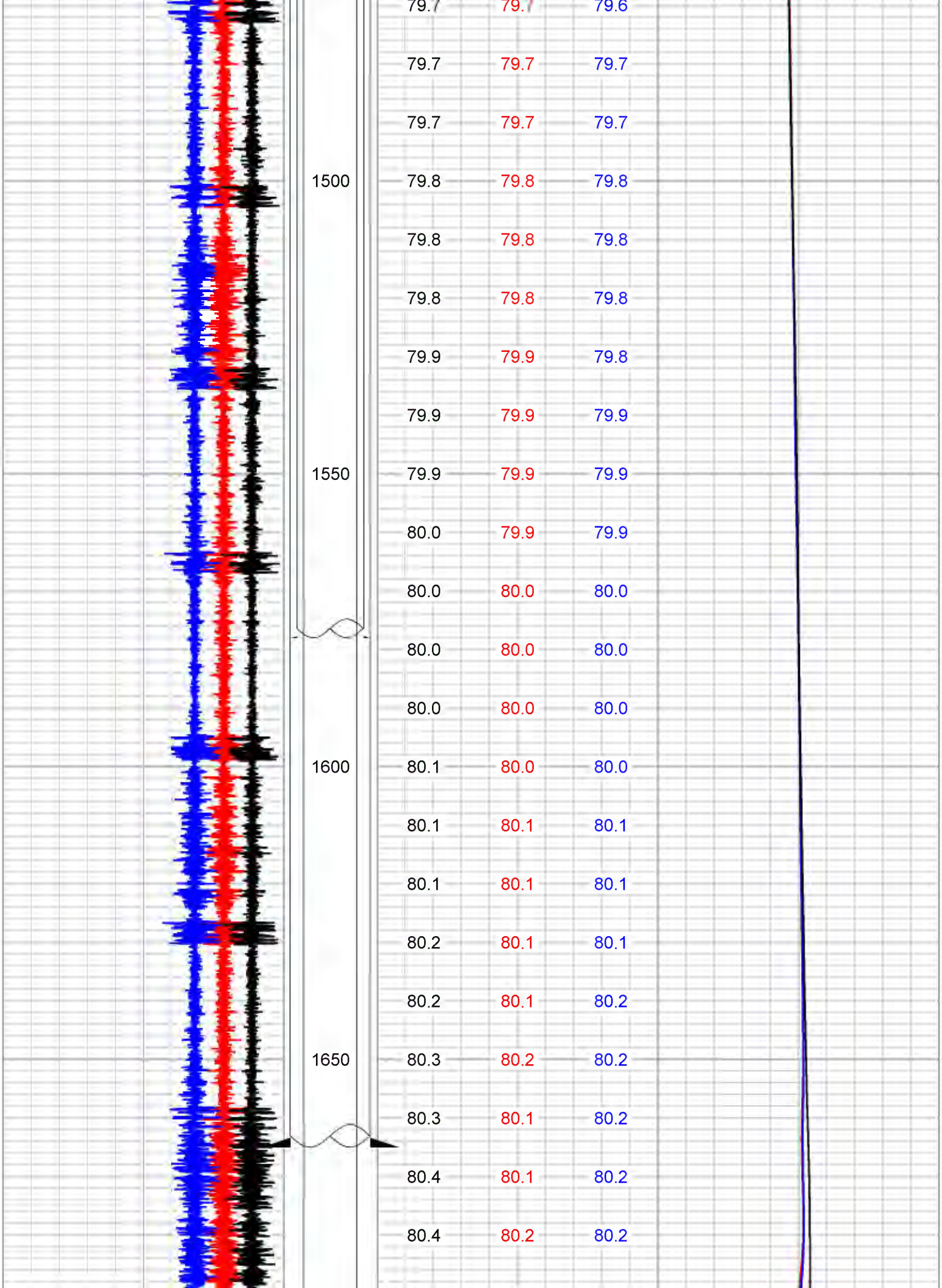
	76.0	76.3	76.1
	76.1	76.4	76.2
	76.1	76.4	76.2
	76.2	76.5	76.3
850	76.3	76.6	76.3
	76.3	76.6	76.4
	76.4	76.7	76.5
	76.5	76.8	76.5
	76.5	76.8	76.6
900	76.6	76.9	76.7
	76.6	76.9	76.7
	76.7	77.0	76.8
	76.8	77.1	76.9
	76.8	77.1	76.9
950	76.9	77.2	77.0
	77.0	77.3	77.1
	77.1	77.4	77.2
	77.1	77.4	77.2
	77.2	77.5	77.3
1000	77.3	77.5	77.4
	77.4	77.6	77.4
	77.5	77.7	77.5

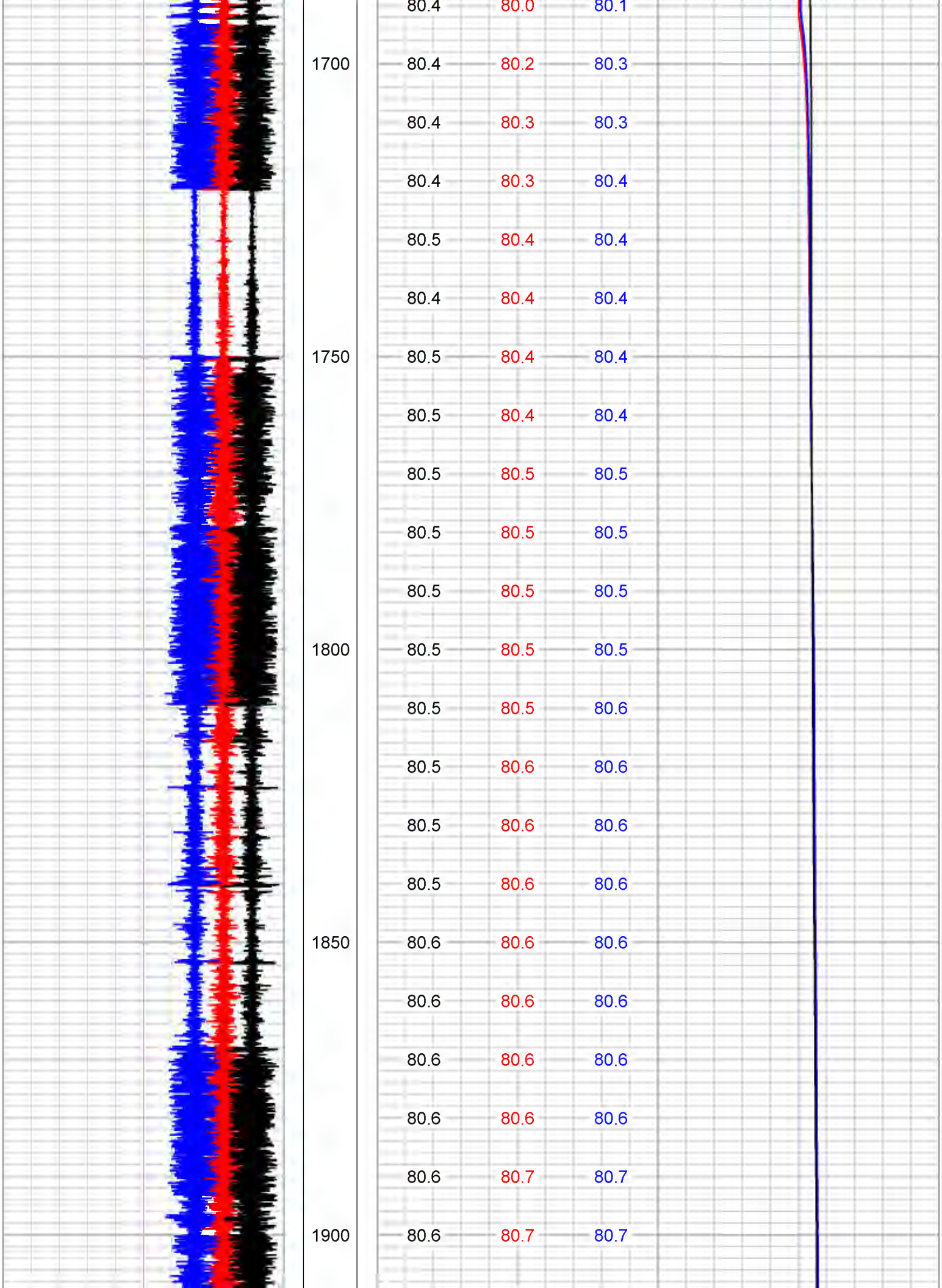


	77.5	77.7	77.6
	77.6	77.8	77.7
1050	77.7	77.9	77.7
	77.8	77.9	77.8
	77.8	78.0	77.9
	77.9	78.1	77.9
	78.0	78.1	78.0
1100	78.0	78.2	78.1
	78.1	78.3	78.1
	78.2	78.3	78.2
	78.2	78.4	78.3
	78.3	78.4	78.3
1150	78.4	78.5	78.4
	78.4	78.5	78.4
	78.5	78.6	78.5
	78.5	78.6	78.5
	78.6	78.7	78.6
1200	78.6	78.7	78.6
	78.6	78.7	78.7
	78.7	78.8	78.7
	78.7	78.8	78.7
	78.8	78.8	78.8



1250	78.8	78.9	78.8
	78.8	78.9	78.8
	78.9	78.9	78.9
	78.9	79.0	78.9
	78.9	79.0	78.9
1300	79.0	79.0	79.0
	79.0	79.1	79.0
	79.0	79.1	79.0
	79.1	79.2	79.1
	79.1	79.2	79.1
1350	79.2	79.2	79.2
	79.2	79.3	79.2
	79.2	79.3	79.2
	79.3	79.3	79.3
	79.3	79.4	79.3
1400	79.4	79.4	79.4
	79.4	79.5	79.4
	79.5	79.5	79.5
	79.5	79.5	79.5
	79.6	79.6	79.5
1450	79.6	79.6	79.6
	79.6	79.6	79.6


1500
1550
1600
1650
79.7 79.7 79.6
79.7 79.7 79.7
79.7 79.7 79.7
79.8 79.8 79.8
79.8 79.8 79.8
79.8 79.8 79.8
79.9 79.9 79.8
79.9 79.9 79.9
79.9 79.9 79.9
80.0 79.9 79.9
80.0 80.0 80.0
80.0 80.0 80.0
80.0 80.0 80.0
80.1 80.0 80.0
80.1 80.1 80.1
80.1 80.1 80.1
80.2 80.1 80.1
80.2 80.1 80.2
80.3 80.2 80.2
80.3 80.1 80.2
80.4 80.1 80.2
80.4 80.2 80.2



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1750	80.5	80.4	80.4
	80.5	80.4	80.4
	80.5	80.5	80.5
	80.5	80.5	80.5
	80.5	80.5	80.5
1800	80.5	80.5	80.5
	80.5	80.5	80.6
	80.5	80.6	80.6
	80.5	80.6	80.6
	80.5	80.6	80.6
1850	80.6	80.6	80.6
	80.6	80.6	80.6
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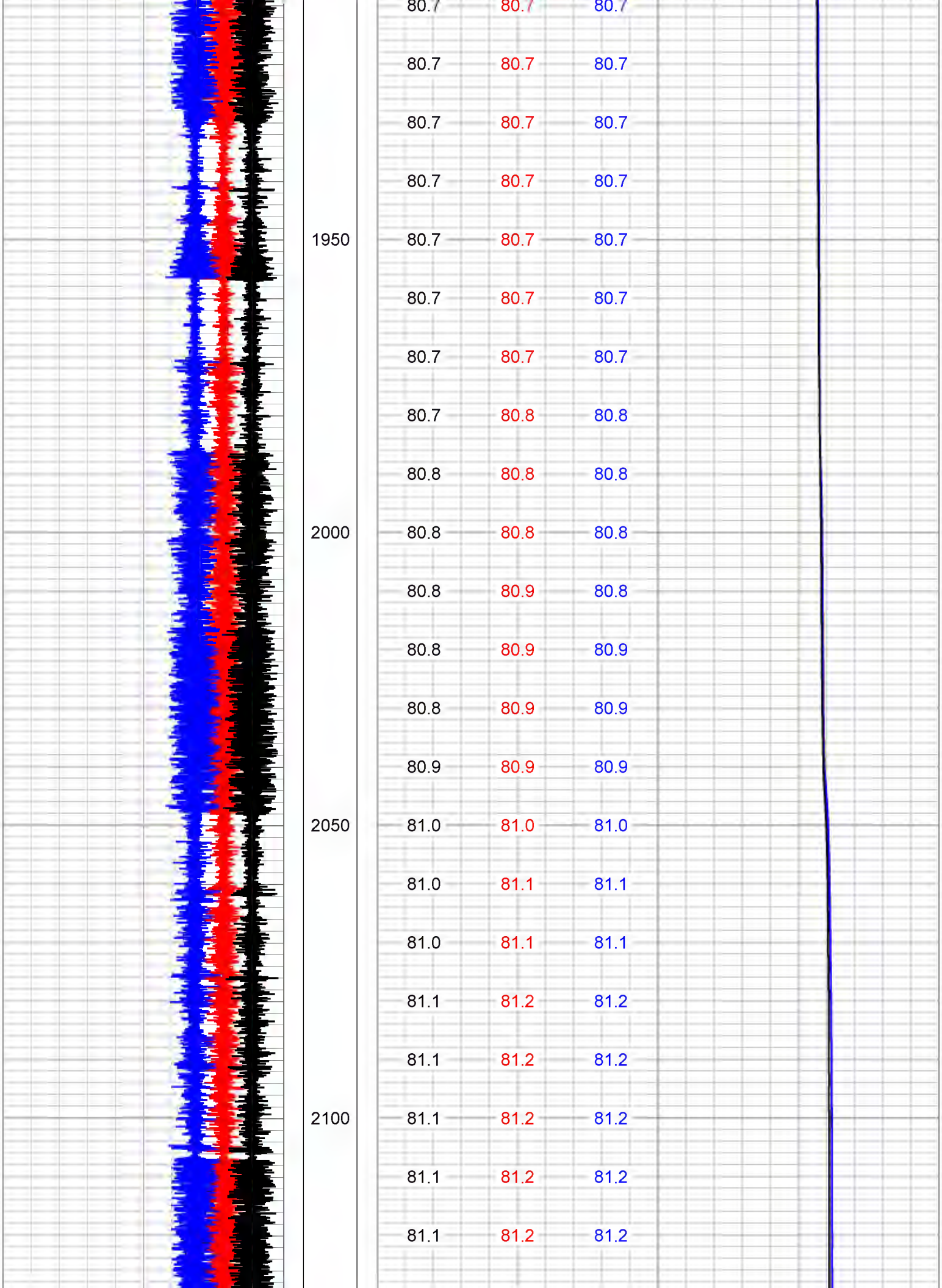
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2300	81.2	81.3	81.3
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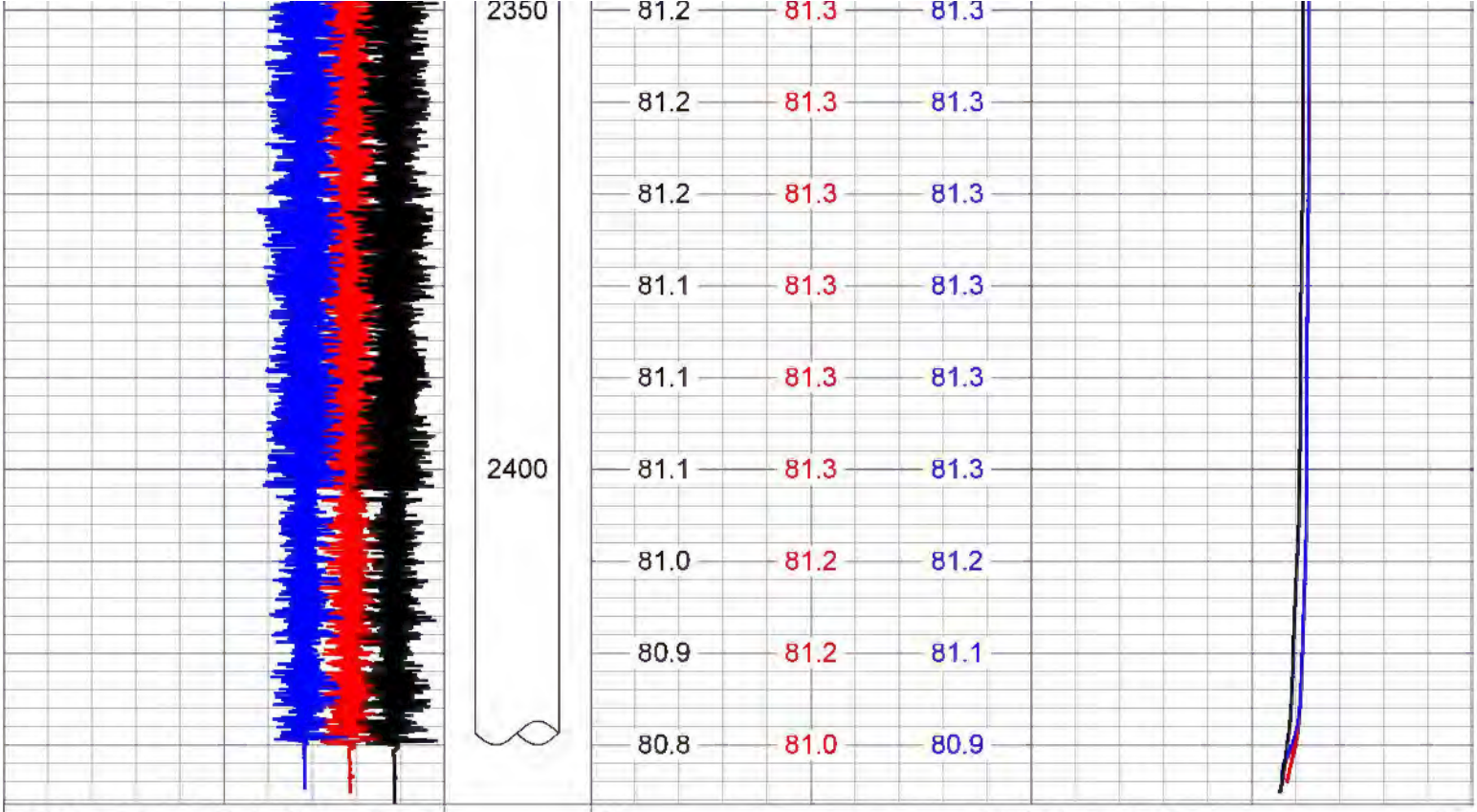
	81.2	81.3	81.3



80000	CCL - Initialization	-10000
70000	CCL - Finalization	-19000
90000	CCL - Baseline	-1000

65	Temp - Initializaiton (degF)	85
65	Temp - Finalization (degF)	85
65	Temp - Baseline (degF)	85

Temp-Base (degF)	Temp-Initial (degF)	Temp-Final (degF)

EMPIRE WIRELINE, LLC

Company	Western Refining Company, LP
Well	State LPG Storage No. 003
Field	Jal
County	Lea County
State	New Mexico

Country

Mechanical Integrity Test Report
State LPG Storage No. 4
Operator: Western Refining Company, LP
API: 30-025-35957
Jal Station Field
Lea County, New Mexico, USA

Prepared for:

Western Refining Company, LP

By:

Lonquist Field Service, LLC
Texas Registered Firm No. F-9147
Houston, Texas

June 2017

Executive Summary

Lonquist Field Services, LLC was contracted by Western Refining Company, LP ("Western Refining") to conduct a Mechanical Integrity Test on State LPG Storage No. 4 ("Well No. 4"), operated by Western Refining Company, LP at the Jal Station Field in Lea County, New Mexico. The Nitrogen-Brine Interface Test Method was used for this test. Nitrogen was injected on May 9th, 2017 to achieve the desired interface depth below the casing shoe. The well was allowed to stabilize for approximately 11 hours and on May 10th, 2017 at 09:00 the MIT was initialized with an annulus (nitrogen) pressure of 1,187.44 psig and a tubing (brine) pressure of 527.10 psig with the nitrogen-brine interface at 1,682'. The test was finalized on May 13th, 2017 at 09:00 with an annulus (nitrogen) pressure of 1,180.72 psig and a tubing (brine) pressure of 740.365 psig with the nitrogen-brine interface at 1,682'. The calculations yielded a calculated leak rate ("CLR") of 224.07 barrels per year and a Minimum Detectable Leak Rate ("MDLR") of 756.06 barrels per year. The well was tested to a test gradient of 0.77 psi/ft at the 9-5/8" cemented casing shoe (1,659'). Considering these results and the guidelines set forth by the State of New Mexico Oil Conservation Division, Well No. 4 at the Jal Station Field, at the time of this test, demonstrated the mechanical integrity required for the storage of hydrocarbons.

Reviewed By:
Lonquist Field Service, LLC
Ben H. Bergman, Sr. Engineer

Date Signed: June 20th, 2017
Houston, Texas

Table of Contents

Introduction

Lonquist Field Service, LLC was contracted by Western Refining Company, LP to conduct a Mechanical Integrity Test on State LPG Storage No. 4 ("Well No. 4") at the Jal Station Field in Lea County, New Mexico.

Well No. 4 was tested using the Nitrogen-Brine Interface Test Method (See Appendix A). Typically this procedure begins with an initial injection of nitrogen into the well to check for wellhead and casing leaks. The initial injection is followed by continued injection of nitrogen into the storage well until the interface is located below the casing shoe and a sufficient test pressure has been reached. The interface depth and the nitrogen (annulus) pressure are monitored during the test period. The test is evaluated by calculating the nitrogen mass (volume) at the commencement and completion of the test period. This difference yields an apparent mass (volume) change. As the test occurs over a finite time period, the apparent mass (volume) rate of change can be calculated and linearly forecasted to an annual rate. The annual mass (volume) rate of change is usually expressed in barrels of nitrogen per year (at average well pressure and temperature conditions). The mass (volume) rate of change is subject to the accuracy of the test or Minimum Detectable Leak Rate (MDLR), also expressed in barrels per year.

The following report will outline the mechanical integrity test for Well No. 4. The report includes the cavern and wellbore configuration, temperature logs, and density logs completed during the test.

Summary

On May 9th, 2017 at 07:00, wireline and nitrogen units were rigged up and a gauge run, base temperature log and base density log were completed. At 10:45, nitrogen was injected into Well No. 4 with a target temperature of 77° F until the nitrogen-product interface was measured at a depth of 1,549'. The liner test began on May 9th, 2017 at 13:15 with the nitrogen-product interface at 1,549', an annular (nitrogen) pressure of 992.43 psig, and a tubing (brine) pressure of 237.24 psig. The liner test ended with the nitrogen-product interface at 1,549', an annular (nitrogen) pressure of 991.54 psig, and a tubing (brine) pressure of 236.19 psig. The 60-minute liner test passed with a stabilizing pressure trend throughout the testing period. Following the liner test, nitrogen injection continued until the nitrogen-product interface was measured at a depth of 1,635'. The casing test began on May 9th, 2017 at 15:00 with the nitrogen-product interface at 1,635', an annular (nitrogen) pressure of 1,037.04 psig, and a tubing (brine) pressure of 246.05 psig. The casing test ended with the nitrogen-product interface at 1,635', an annular (nitrogen) pressure of 1,036.23 psig, and a tubing (brine) pressure of 244.96 psig. The 60-minute casing test passed with a stabilizing pressure trend throughout the testing period. Nitrogen injection continued while bleeding off brine until the nitrogen-brine interface was measured at a depth of 1,682' at an adequate test pressure.

After an approximate 11 hour stabilization period, on May 10th, 2017 at 09:00 the MIT on Well No. 4 was initialized with an annulus (nitrogen) pressure of 1,187.44 psig, a tubing (brine) pressure of 527.10 psig, and with the nitrogen-brine interface at a depth of 1,682'. The well was shut in for a 72 hour test period. On May 13th, 2017 at 09:00 the MIT on Well No. 4 was finalized with an annulus (nitrogen) pressure of 1,180.72 psig, a tubing (brine) pressure of 740.37 psig (tubing pressure increase indicated a small tubing leak) and with the nitrogen-brine interface at a depth of 1,682'. Per Western Refining Company, LP the tubing does not accumulate hydrocarbon products during storage. This concluded the MIT on Well No. 4 which passed the MIT.

Conclusions

The mechanical integrity of Well No. 4 was established with the Nitrogen-Brine Interface Test Method. This test monitored the Nitrogen-Brine Interface for a 72 hour test period. Well No. 4 was initialized with an annulus (nitrogen) pressure of 1,187.44 psig, a tubing (brine) pressure of 527.10 psig, and the nitrogen-brine interface at 1,682'.

Well No. 4 was finalized with an annulus (nitrogen) pressure of 1,180.72 psig, a tubing (brine) pressure of 740.37 psig, and the nitrogen-brine interface at 1,682'. Well No. 4 had a test length of 72 hours and a test gradient of 0.77 psi/ft at the 9-5/8" cemented casing shoe.

The total gas volume in the annulus and the wellbore was calculated to be 319,582.52 SCF at the start of the test and total gas volume in the annulus, wellbore and upper tubing was calculated to be 318,723.06 SCF at the end of the test for a calculated "decrease" in gas volume of 859.46 SCF. The calculated gas volume was based on the measured wellhead pressure, measured wellbore temperature, known casing annulus volume, and calculated borehole volumes (Appendix D).

The calculated leak rate ("CLR") was 224.07 barrels per year. Considering the calculations, the calculated leak rate is less than the Minimum Detectable Leak Rate ("MDLR") of 756.06 barrels per year.

At the completion of this test, Well No. 4 exhibited the characteristics of a well that has mechanical integrity as required for hydrocarbon storage, in accordance with industry standards and the guidelines established by the State of New Mexico Oil Conservation Division.

Daily Activities

May 9th, 2017

Arrive on location and spot equipment. Hold daily safety meeting and review JSAs. Rig up wireline and nitrogen equipment. Run in hole with gauge run and tag TD at 2,613'. Run in hole with wireline and record base temperature and density logs. Start nitrogen injection and spot nitrogen-product interface above the 7" liner shoe at 1,549' for the 60 minute liner test. The test started with an annulus pressure of 992.43 psig and a tubing pressure of 237.24 psig. The test ended with an annulus pressure of 991.54 psig and a tubing pressure of 236.19 psig. The interface at the beginning and end of the test was measured at 1,549'. The pressure trend during the 60 minute liner test showed a stabilization curve with pressure flattening out over the test. The test passed and nitrogen injection was continued. The nitrogen-product interface was spotted above the 9-5/8" casing shoe at 1,635' for the 60 minute casing test. The test started with an annulus pressure of 1,037.04 psig and a tubing pressure of 246.05 psig. The test ended with an annulus pressure of 1,036.23 psig and a tubing pressure of 244.96 psig. The interface at the beginning and end of the test was measured at 1,635'. The pressure trend during the 60 minute casing test showing a stabilization curve with pressure flattening out over the test. The test passed and nitrogen injection continued while bleeding off brine in order to spot the nitrogen-brine interface at 1,682' at an adequate test pressure. Complete post injection log. Rig down lubricator, crane, and nitrogen unit. Secure well and allow to stabilize overnight.

May 10th, 2017

Arrive on location, hold daily safety meeting, and review JSAs. Rig up lubricator and crane. Run in hole with temperature log and initialize test with density log. The nitrogen-brine interface was located at 1,682'. Test initialization annulus pressure was 1,187.44 psig and initialization tubing pressure was 527.10 psig. Rig down crane and lubricator. Secure well for the night.

May 12th, 2017

Arrive on location, hold daily safety meeting, and review JSAs. Rig up lubricator and crane. Run in hole with temperature log and pull out of hole with density log. The nitrogen-brine interface was located at 1,682'. Rig down crane and lubricator. Secure well for the night.

May 13th, 2017

Arrive on location, hold daily safety meeting, and review JSAs. Rig up lubricator and crane. Run in hole with temperature log and finalize test with density log. The nitrogen-brine interface was located at 1,682'. Test finalization annulus pressure was 1,180.72 psig and finalization tubing pressure was 740.37 psig. Rig down crane and lubricator. Secure and return well to Western Refining.

Test Participants

Western Refining Company, LP

Ken Parker……..……...…..Project Manager

Lonquist Field Service, LLC

Eric Busch……...Operations Manager

Tadd Busch…….Operations Manager

Will George.....Petroleum / Test Engineer

Ben Bergman……..Sr. Engineer

Empire Wireline, LLC

Wireline Personnel…….……...…..…….Wireline Operator

CUDD Energy Services

Nitrogen Personnel…….……...……..……..Nitrogen Injection

Double R Transportation, LLC

Double R Personnel…….…….……...…….....……..Pump Truck

Calculations

Minimum Detectable Leak Rate – MDLR

The test sensitivity is defined as the ability of the test calculations and measurements to determine the status of the mechanical integrity of the well and wellbore. The conventional test sensitivity calculation using this test methodology is the Minimum Detectable Leak Rate (MDLR).

$$MDLR = \left[B_V * L_R * (T_c)\right] / T_L$$

Where:

B_v	=	12.43 bbls/ft (APPENDIX D)
L_R	=	0.50 feet
T_c	=	365 days/year
T_L	=	3 day
MDLR	**=**	**756.06 bbls/year**

Therefore: (12.43 x 0.50 x 365)/3 = 756.06 bbls/year*
*Hand calculations may yield different final MDLR due to rounding.

Volume Calculations – Annular Space & Borehole

Using the methodology outlined in the MIT procedure the following volumes were calculated:

Initial Wellbore Volume (**$V_{I(Borehole)}$**)

- Annulus Pressure – 1,187.44 psig
- Tubing Pressure – 527.10 psig
- Wellbore Temperature – Logged (APPENDIX F)
- Volume
  - 7” x 3-1/2” Annulus – 0.027 bbls/ft
  - 9-5/8” x 3-1/2” Annulus – 0.065 bbls/ft
  - Borehole – APPENDIX D

$$(V_I) = \sum_o^{I/F} (N_2)_i$$

$V_{I(Borehole)}$ = 319,582.52 SCF

Final Wellbore Volume & Tubing Volume to 543’ (**$V_{F(Borehole)}$**)

- Annulus Pressure – 1,180.72 psig
- Tubing Pressure – 740.37 psig
- Wellbore Temperature – Logged (APPENDIX F)
- Volume
  - 3-1/2” Tubing – 0.00494 bbls/ft
  - 7” x 3-1/2” Annulus – 0.027 bbls/ft
  - 9-5/8” x 3-1/2” Annulus – 0.065 bbls/ft
  - Borehole – APPENDIX D

$$(V_F) = \sum_o^{I/F} (N_2)_i$$

$V_{F(Borehole)}$ = 318,723.06 SCF

Borehole Volume Change:

$$(\Delta V)_{STP(Borehole)} = (\Delta V)_{I(Borehole)} - (\Delta V)_{F(Borehole)}$$

$$(\Delta V)_{STP(Borehole)} = 859.46 SCF$$

The calculated volume/mass change is based on standard temperature and pressure and to evaluate the test results against the MDLR the calculated volume/mass change is converted to downhole conditions with the following equation:

$$(\Delta V_{WB}) = \left(\frac{[(Z_A)*(T_A)*R*(\Delta V)_{STP}]}{[(P_A)*N_{GC}]} \right)$$

Where:

(Z_A)	=	1.00181
(T_A)	=	535.112 ◦R
R	=	Specific Gas Constant
$(\Delta V)_{STP}$	=	859.46 SCF
(P_A)	=	1,236.84 psi
N_{GC}	=	Nitrogen Gas Conversion (13.80 SCF = 1 lb)
(ΔV_{WB})	**=**	**3.45 ft³/day**

To calculate an annual volume change to compare to the MDLR the following calculations were completed:

$$(\Delta V_{ANNUAL}) = (\Delta V_{WB}) * 365 (day / year)$$

Where:

(ΔV_{WB})	=	3.45 ft³/day
1 year	=	365 days
(ΔV_{ANNUAL})	**=**	**1,259.25 ft³ /yr**

Where:

(ΔV_{ANNUAL})	=	1,259.25 ft³/yr
1 bbl	=	5.6146 ft³
CLR (bbls/year)	**=**	(ΔV_{ANNUAL}) / 5.6146 ft³
Calculated Leak Rate	**=**	**224.07 bbls/year***

***Hand calculations may yield different final CLR due to rounding.**

Well Data Sheet

TEST INFORMATION AND RESULTS

Well Name:	State LPG Storage No. 4
Operator:	Western Refining Company, L.P.
State:	NM
County/Parish:	Lea
Field:	Jal
Serial/API:	30-025-35957

WELL INFORMATION

Production Casing			Casing Liner		
Casing Size	9 5/8	inches	**Casing Size**	7	inches
Casing ID	8.921	inches	**Casing ID**	6.366	inches
Casing Weight	36	lbs/ft	**Casing Weight**	23	lbs/ft
Grade	J-55		**Grade**	J-55	
Depth	1659	feet	**Depth**	1575	feet

Outer Hanging String			Inner Hanging String		
Casing Size	3 1/2	inches	**Casing Size**		inches
Casing ID	2.250	inches	**Casing ID**		inches
Casing Weight	NA	lbs/ft	**Casing Weight**		lbs/ft
Grade	NA		**Grade**		
Depth	2592	feet	**Depth**		feet

Cavern		
Cavern Size	136,626	bbls
Compressibility	0.41	bbls/psi
Cavern TD	2613	feet

FINAL TEST INFORMATION

Effective Casing Shoe	1659	feet	**Casing Shoe Pressure (avg)**	1268.01	psi
Test Gradient	0.77	psi/ft	**Interface Pressure (avg)**	1268.99	psi
Brine Specific Gravity	1.2		**Surface Tubing Pressure (avg)**	633.74	psi
Nitrogen Temperature (avg)	75.43	deg F	**Surface Annulus Pressure (avg)**	1182.58	psi
Interface Depth	1682	feet	**Pressure Increase**	-3.72	psi
Gas Compressibility (avg)	1.00		**Conversion**	14.70	psi

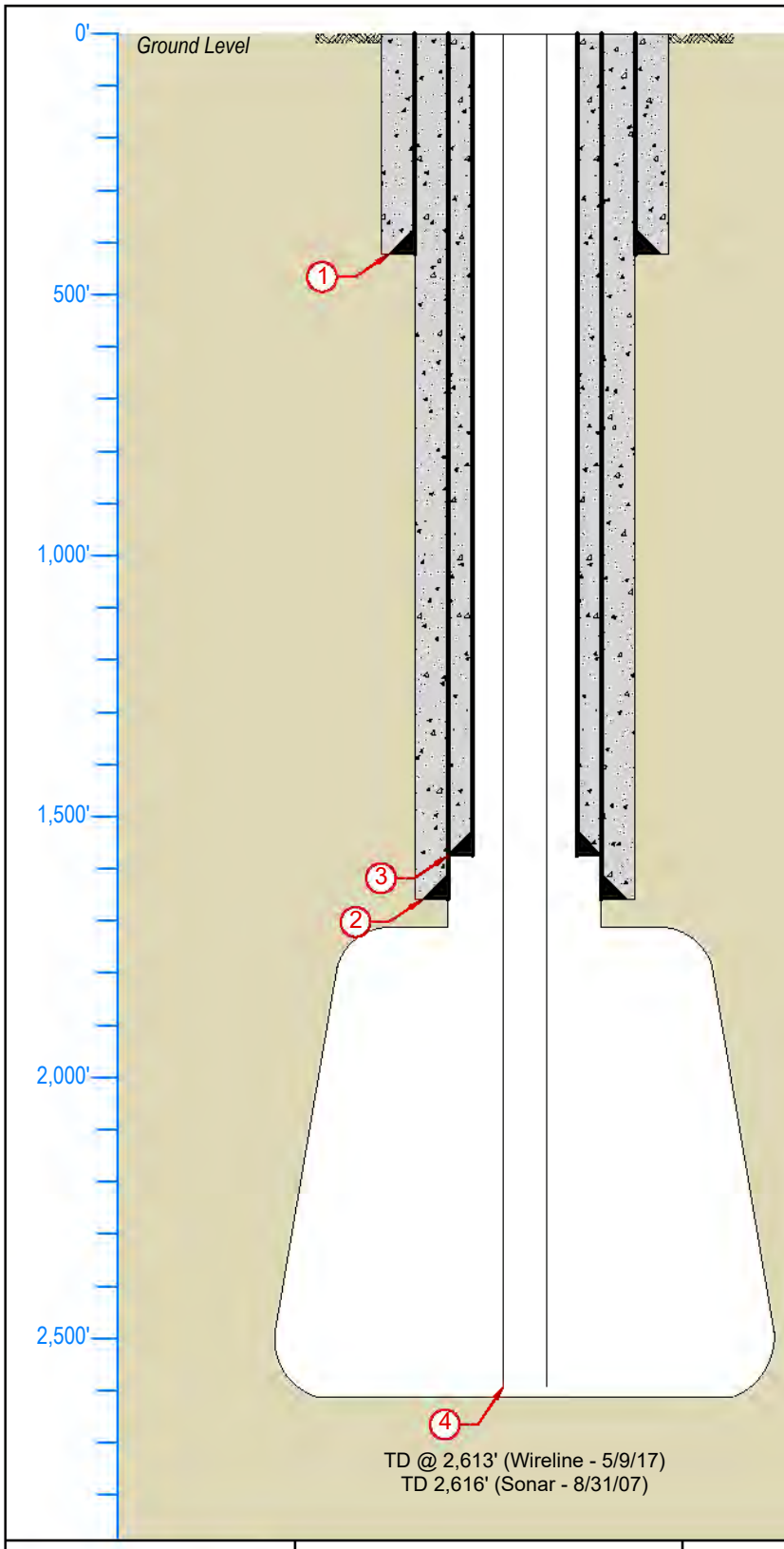
Volume			Nitrogen		
Annular Volume No. 1	0.03	bbls/ft	**Surface to Casing Shoe (avg)**	22729.06	SCF
Annular Volume No. 2	0.07	bbls/ft	**Casing Shoe to Interface (avg)**	296205.35	SCF
Surface to Liner Shoe	43.3	bbls	**Total (avg)**	318934.41	SCF
Surface to Casing Shoe	48.8	bbls	**Brine**		
Casing Shoe to Interface	480.3	bbls	**Cavern Pre-Pressure**	50.00	psi
Total	529.1	bbls	**Brine Injection**	20.70	bbls

TEST RESULTS

Test Initialization Information			Test Finalization Information		
Date / Time	5/10/17 9:00		**Date / Time**	5/13/17 9:00	
Tubing Pressure	527.10	psig	**Tubing Pressure**	740.37	psig
Annulus Pressure	1,184.44	psig	**Annulus Pressure**	1,180.72	psig
Wellbore Temperature (avg)	75.80	deg F	**Wellbore Temperature (avg)**	75.06	deg F
Nitrogen/Brine Interface	1682	feet	**Nitrogen/Brine Interface**	1682	feet

Test Results					
CLR	428.05	bbls/yr	**Test Length**	72.00	hours
MDLR	764.75	bbls/yr	**Test Length**	3	days
Test Gradient	0.77	psi/ft	**Logging Resolution**	0.50	feet
Tubing Pressure Change	213.27	psi			
Annulus Pressure Change	-3.72	psi			

MIT/Well Schematic



Casing Information

Label	1	2	3
Type	Surface	Production	Liner
OD	13-3/8"	9-5/8"	7"
WT	0.380"	0.352"	0.317"
ID	12.615"	8.921"	6.366"
Drift ID	12.459"	8.765"	6.241"
COD	14.375"	10.625"	7.656"
Weight	54.5 lb/ft	36 lb/ft	23 lb/ft
Grade	J-55	J-55	J-55
Depth Set	423'	1,659'	1,575'
Cement	NA	NA	NA

Tubing Information

Label	4
Type	Drill Pipe & Drill Collars
OD	3-1/2"
WT	NA
ID	NA
Drift ID	2.25"
COD	NA
Weight	NA
Grade	NA
Depth Set	2,592'

MIT Results

Initialization - 5/10/17 09:00	Finalization - 5/13/17 09:00
Annulus Pressure: 1,187.44 psig	Annulus Pressure: 1,180.72 psig
Tubing Pressure: 527.10 psig	Tubing Pressure: 740.37 psig
Interface Depth: 1,682'	Interface Depth: 1,682'

Test Length: 72 hrs
Test Gradient: 0.77 psi/ft
CLR: 224.07 bbls/yr
MDLR: 756.06 bbls/yr

Note: Cavern size and shape not to scale
All depths measured from Braden Head Flange

LONQUIST & CO. LLC
PETROLEUM ENGINEERS | ENERGY ADVISORS
AUSTIN WICHITA HOUSTON CALGARY

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Fax: 512.732.9816

Western Refining Company, LP

State LPG Storage No. 4 - MIT Results

Country: USA	**State/Province:** New Mexico	**County/Parish:** Lea
Survey/STR: M-32-23S-37E	**Site:** 1000' FSL & 1230' FWL	**Status:** Storage
API No.: 30-025-35957	**Field:**	**Ground Elevation:** 3,312'
Serial No.:	**Project No:** F1204	**Date:** 6/13/2017
Drawn: WHG	**Reviewed:** ETB	**Approved:** ETB
Rev No:	**Notes:**	

Appendix A – MIT Test Procedure

Well: No. 4	**State:** New Mexico	**County:** LEA	**Field:** Jal Station
API: 30-025-35957	**Oper:** Western Refining Company,LP	**Location:** Jal	**Status:** Active

INTRODUCTION

Well No. 4 is operated by Western Refining Company, LP located in the Jal Station Field in Lea County, New Mexico. The purpose of this Mechanical Integrity Test (MIT) is to test the integrity of the underground storage system that includes the cavern, cemented casing, and wellhead to determine if the system demonstrates the mechanical integrity required to support hydrocarbon storage operations.

In accordance with the Oil Conservation Division of New Mexico, Well No. 4 is undergoing a MIT to remain compliant.

The test procedure will consist of the following basic steps:

1. Pre-pressure the cavern to the required pre pressure.
   - Tubing Pressure: **50.0 psig**
   - 0.75 psi/ft final test gradient at the effective casing shoe (1,659').
2. Complete pre-test temperature and density logs.
3. Inject nitrogen into Well No. 4 and locate the nitrogen/brine interface above the cemented liner to complete a test on the cemented liner.
4. Inject nitrogen into Well No. 4 and locate the nitrogen/brine interface above the cemented casing shoe to complete a test on the cemented casing.
5. Inject nitrogen into Well No. 4 and locate the nitrogen/brine interface below the effective cemented casing shoe.
6. Monitor wellhead pressures, wellbore temperature, and the nitrogen/brine interface location during the specified test period.
7. Secure Well No. 4 and return to Western Refining.
8. Complete and submit a MIT report to Western Refining Company, LP and the Oil Conservation Division of New Mexico within 45 days.

The test procedure includes the following information:

- Nitrogen/Brine Interface Test Planning Sheet
- Wellbore Schematic
- Contact Information
- 2007 Sonar Data

Well Preparation

1. Wellhead should be isolated from all surface piping during the test. This may include blind flanges, skillet flanges, and 2" test flanges.
    a. Wellhead should maintain the ability to bleed excess brine pressure during the test.

2. Install pressure recording equipment on wellhead. Pressure equipment should be able to record wellhead pressures and wellhead temperatures during the test period. Additional equipment to measure the nitrogen stream injected into the well will be necessary.
    a. All equipment calibration certifications will be provided with final reports.

3. Wellhead configuration should permit the use of a wireline lubricator and logging tools.

4. Pre-pressure the cavern to predetermined pressure with saturated brine.
    a. Tubing Pressure: 50.0 psig

5. Wellhead pressure should be stable prior to starting the test.
    a. Stable wellhead pressure – Decline less than 10 psi/day.

Well Injection Phase

6. Move in and rig up wireline unit, logging tools, pressure equipment, and nitrogen services.

7. Make a gauge run to ensure logging and sonar tools will pass through the tubing.

8. Complete wellbore temperature log and base density log.
    a. Base Temperature Log – (0' –TD)
    b. Base Density Log – (TD' – 200' above effective casing shoe depth)
    c. Density logs should include: tubing collars, effective casing shoe, and approved logging scales.
    d. All depths are approximate.

9. Start Nitrogen Injection at a slow rate (<500 SCFM). Nitrogen temperature should be regulated to the average wellbore temperature.

10. Monitor the nitrogen/brine interface and wellbore pressures to locate the interface above the liner shoe and conduct a liner test.
    a. Liner Test – Minimum of 60 minutes.
    b. Monitor and record wellhead pressures and interface at the start and completion of the test.

11. Inject nitrogen and monitor the nitrogen/brine interface and wellbore pressures to locate the interface above the casing shoe and conduct a casing test.
    a. Casing Test – Minimum of 60 minutes.
    b. Monitor and record wellhead pressures and interface at the start and completion of the test.

12. Continue nitrogen injection and monitor the nitrogen/brine interface and wellbore pressures to locate the nitrogen/brine interface below the effective casing shoe. The targeted gradient is 0.75 psi/ft at the effective casing shoe and cannot exceed a test pressure gradient of 0.81 psi/ft at the effective casing shoe at any time.
    a. Pressure may need to be relieved by bleeding off brine during nitrogen injection.

13. After the nitrogen/brine interface is located sufficiently below the cemented casing shoe, stop nitrogen injection and shut well in for a short stabilization period.

14. Shut in for 30 minutes – Monitor pressures, interface location, and check wellhead for possible leak paths.

15. Complete post injection density logs.
    a. Post Injection Density Log – (TD' – 200' above effective casing shoe).
    b. Record wellhead pressures.
    c. Density logs should include: tubing collars, nitrogen/brine interface, production casing shoe, and approved logging scales.
    d. All depths are approximate.

16. Remove logging tools and shut well for the stabilization period.

17. Complete pre-test calculations based on wellhead pressure measurements, nitrogen volume measurements, wellbore temperatures, and interface locations.
    a. Refer to Test Calculations Section.

18. MIRU sonar tools and perform a sonar survey on the cavern.
    a. Shoot the roof of the cavern with upshots.
    b. Shoot the floor of the cavern with downshots.
    c. Record data every 2'.

Test Initialization

19. Move in and rig up wireline unit, logging tools, and pressure equipment.

20. Complete wellbore temperature log and initial density log.
    a. Initial Temperature Log – (0' – TD')
    b. Initial Density Log – (TD' – 200' above effective casing shoe)
    c. Density logs should include: tubing collars, nitrogen/brine interface, production casing shoe, and approved logging scales.
    d. All depths are approximate.

21. Shut well in for test period – Minimum of 24 hours.

Test Finalization

22. After planned test duration, move in and rig up wireline unit, logging tools, and pressure equipment.
    a. Complete wellbore temperature log and final density log.
    b. Final Temperature Log – (0' – TD')
    c. Final Density Log – (TD' – 200' above effective casing shoe)
    d. Density logs should include: tubing collars, nitrogen/brine interface, production casing shoe, and approved logging scales.
    e. All depths are approximate.

23. Determine if the test is complete or should be extended based on results.

Nitrogen/Brine Interface Test Calculations

The test methodology proposed in this procedure is developed using the industry standard nitrogen/brine interface test method.

The wellhead pressures and temperature, wellbore temperatures, nitrogen volumes, and interface location will be recorded throughout the test period and will allow for the calculation of the borehole volumes, test sensitivity, minimum test durations, and final test calculations.

All test calculations are based on the following measured parameters: wellhead pressure, nitrogen volumes, annular casing unit volume, wellbore temperatures, and interface locations. In addition to the measured parameters, the following calculated parameters are important in completing the test: unit borehole volume, MDLR, and test length.

To evaluate the test the calculated nitrogen volume/mass at the start of the test is compared to the calculated nitrogen volume/mass at the end of the test. This rate of volume change and it's comparison to the test sensitivity is one of the components in determining the final results of the MIT.

TEST SENSITIVITY AND TEST LENGTH

Test sensitivity calculations are the functions of three factors:

Casing volume – Calculated
Log Resolution – Recommended: 5":100' logging scale
Minimum test duration – 24 hours

The test sensitivity is defined at the ability of the test calculations and measurements to determine the status of the mechanical integrity of the well and wellbore. The conventional test sensitivity calculation using this test methodology is the Minimum Detectable Leak Rate (MDLR).

$$MDLR = \left[B_V * L_R * (T_c)\right] / T_L$$

Where:

MDLR	=	Minimum Detectable Leak Rate (bbl/year)
B_v	=	Borehole Volume (bbls/ft)
L_R	=	Log Resolution (feet)
T_c	=	Time Constant (365 days/year)
T_L	=	Test Length (days)

Using the MDLR method a reasonable and acceptable test accuracy and sensitivity can be calculated for the Mechanical Integrity Test. The MDLR calculation is based on downhole measurements of the test conditions.

The MDLR must be less than 1000 bbl/year for the designated test period. The length of the test must a minimum of 24 hours and sufficient in length to keep the MDLR below 1000 bbl/year and allow for a proper evaluation of the well test.

TEST EVALUATIONS

The volume/mass of nitrogen located in the wellbore can be affected by following: temperature stabilization, cavern leaching/creep, and volume changes. Using P-V-T gas calculations, any changes in the volume/mass of the nitrogen in the wellbore can be evaluated based on wellbore temperature changes, pressure changes, and/or wellbore leakage.

Pressure Calculations

The average wellbore pressure is calculated based on the wellhead surface pressure, wellbore temperature, and depth of the specific interval. The following equation is used to calculate the average wellbore pressure

$$(P_A)_i = (P_A)_{i-1}\left[1+\left(\frac{D}{(R)(Z_A)_i(T)_i}\right)\right]$$

Where:

$(P_A)_i$ = Pressure @ Depth Interval (Calculated) (psia)

$(P_A)_{i-1}$ = Pressure @ Previous Depth Interval (Calculated) (psi)

D = Depth Interval (ft)

$(Z_A)_i$ = Gas Compressibility Factor @ Depth Interval

R = Specific Gas Constant

$(T)_i$ = Wellbore Temperature (◦R)

Nitrogen Calculations

The following calculation is used to calculate the volume/mass of nitrogen for specific intervals over the entire wellbore at the start and end of the test period:

$$(N_2)_i = \left(\frac{[(P_A)_i * (B_v)_i]}{[(Z_A)_i * (T_A)_i * R]}\right) * N_{GC}$$

Where:

$(N_2)_i$ = Nitrogen Volume (SCF)

$(P_A)_i$ = Average Wellbore Pressure (psi)

$(B_v)_i$ = Wellbore Volume (ft^3)

$(Z_A)_i$ = Gas Compressibility Factor

$(T_A)_i$ = Wellbore Temperature (◦R)

R = Specific Gas Constant

N_{GC} = Nitrogen Gas Conversion (13.8 SCF = 1 lb)

Upon completion of each specific volume/mass calculation the sum of the each interval is calculated to determine the volume/mass of nitrogen in the wellbore at the beginning of the test. After the test is complete the calculation and summation is repeated to determine the final test results.

The following equations represent the summation of the intervals to the nitrogen/brine interface at the start and completion of the test:

$$(V_I) = \sum_{o}^{I \text{ or } F} (N_2)_i$$

$$(V_F) = \sum_{o}^{I \text{ or } F} (N_2)_i$$

The results of the beginning and completion of the test are compared and evaluated to determine the change in nitrogen volume during the test period. The following equation is used for the comparison:

$$(\Delta V)_{STP} = (V_I) - (V_F)$$

The calculated volume/mass change is based on standard temperature and pressure and to evaluate the test results against the MDLR the calculated volume/mass change is converted to downhole conditions with the following equation:

$$(\Delta V_{WB}) = \left(\frac{[(Z_A) * (T_A) * R * (\Delta V)_{STP}]}{[(P_A) * N_{GC}]} \right)$$

Where:

(ΔV_{WB}) = Nitrogen Volume Change (ft^3) – Wellbore Conditions

(Z_A) = Average Gas Compressibility Factor for Test Period

(T_A) = Average Wellbore Temperature (◦R) for Test Period

R = Specific Gas Constant

$(\Delta V)_{STP}$ = Nitrogen Volume Change (SCF) – Standard Conditions

(P_A) = Average Wellbore Pressure for Test Period (psi)

N_{GC} = Nitrogen Gas Conversion (13.8 SCF = 1 lb)

The change in wellbore volume for the test period is converted into a calculated annual volume change. The following equation determines this volume change:

$$(\Delta V_{ANNUAL}) = \frac{[(\Delta V_{WB}) * 24(hr/day) * 365(day/yr)]}{T_L}$$

Where:

(ΔV_{ANNUAL})	=	Calculated Volume Change (bbls/year)
(ΔV_{WB})	=	Nitrogen Volume Change (ft^3) – Wellbore Conditions
(T_L)	=	Test Length (hrs)

A positive change in wellbore volume indicates a calculated loss of nitrogen from the wellbore during the test period. A negative change in wellbore volume indicates a calculated increase (apparent nitrogen influx) in nitrogen volume during the test period.

Pass/Fail Criteria

Test results are evaluated for a successful test using the following criteria:

- MDLR less than 1000 bbls/day
- Calculated Annual Volume Change less than the MDLR
- Pressure response, wellbore temperature, and interface movement should respond in a way that represents the cavern has mechanical integrity

Test Reporting

A written report will be prepared within 45 days of completion and submitted to the Oil Conservation Division of New Mexico. The report will include the test procedures, test chronology, test results and conclusions, wireline logs, pressure information, and all supporting documentation.

LONQUIST FIELD SERVICE	WELL TEST	Project No.:
	Western Refining Company, LP State LPG Storage Well No. 4 Mechanical Integrity Test	Date: March 2017
		Page: 9 of 12

Well: No. 4	**State:** New Mexico	**County:** LEA	**Field:** Jal Station
API: 30-025-35957	**Oper:** Western Refining Company,LP	**Location:** Jal	**Status:** Active

TEST PLANNING SHEET

Well Name:	State LPG Storage No. 4
Operator:	Western Refining Company, L.P.
State:	NM
County/Parish:	Lea
Field:	Jal
Serial/API:	30-025-35957

WELL INFORMATION

Production Casing			Casing Liner		
Casing Size	9 5/8	inches	Casing Size	7	inches
Casing ID	8.921	inches	Casing ID	6.366	inches
Casing Weight	36	lbs/ft	Casing Weight	23	lbs/ft
Grade	J-55		Grade	J-55	
Depth	1659	feet	Depth	1575	feet

Outer Hanging String			Inner Hanging String		
Casing Size	3 1/2	inches	Casing Size		inches
Casing ID		inches	Casing ID		inches
Casing Weight		lbs/ft	Casing Weight		lbs/ft
Grade			Grade		
Depth	2601	feet	Depth		feet

Cavern		
Cavern Size	136,626	bbls
Compressibility	0.41	bbls/psi
Cavern TD	2610	feet

TEST INFORMATION

Effective Casing Shoe	1659	feet	Casing Shoe Pressure	1244.25	psi
Test Gradient	0.75	psi/ft	Interface Pressure	1245.14	psi
Brine Specific Gravity	1.2		Surface Tubing Pressure	372.22	psi
Nitrogen Temperature	75	deg F	Surface Annulus Pressure	1177.42	psi
Interface Depth	1680	feet	Pressure Increase	1277.86	psi
Gas Compressibility	1.0020		Conversion	14.70	psi

Volume			Nitrogen		
Annular Volume No. 1	0.03	bbls/ft	Surface to Casing Shoe	42039.38	SCF
Annular Volume No. 2	0.07	bbls/ft	Casing Shoe to Interface	225565.90	SCF
Surface to Liner Shoe	43.3	bbls	Total	267605.28	SCF
Surface to Casing Shoe	48.8	bbls	**Brine**		
Casing Shoe to Interface	480.3	bbls	Cavern Pre-Pressure	-906.64	psi
Total	529.1	bbls	Brine Injection	-375	bbls

PREPARED BY	DATE	APPROVED BY	DATE	CLIENT APPROVAL	DATE	Lonquist Field Service, LLC
WHG	3/27/2017	ETB	3/27/2017			Texas Registration No. F-9147

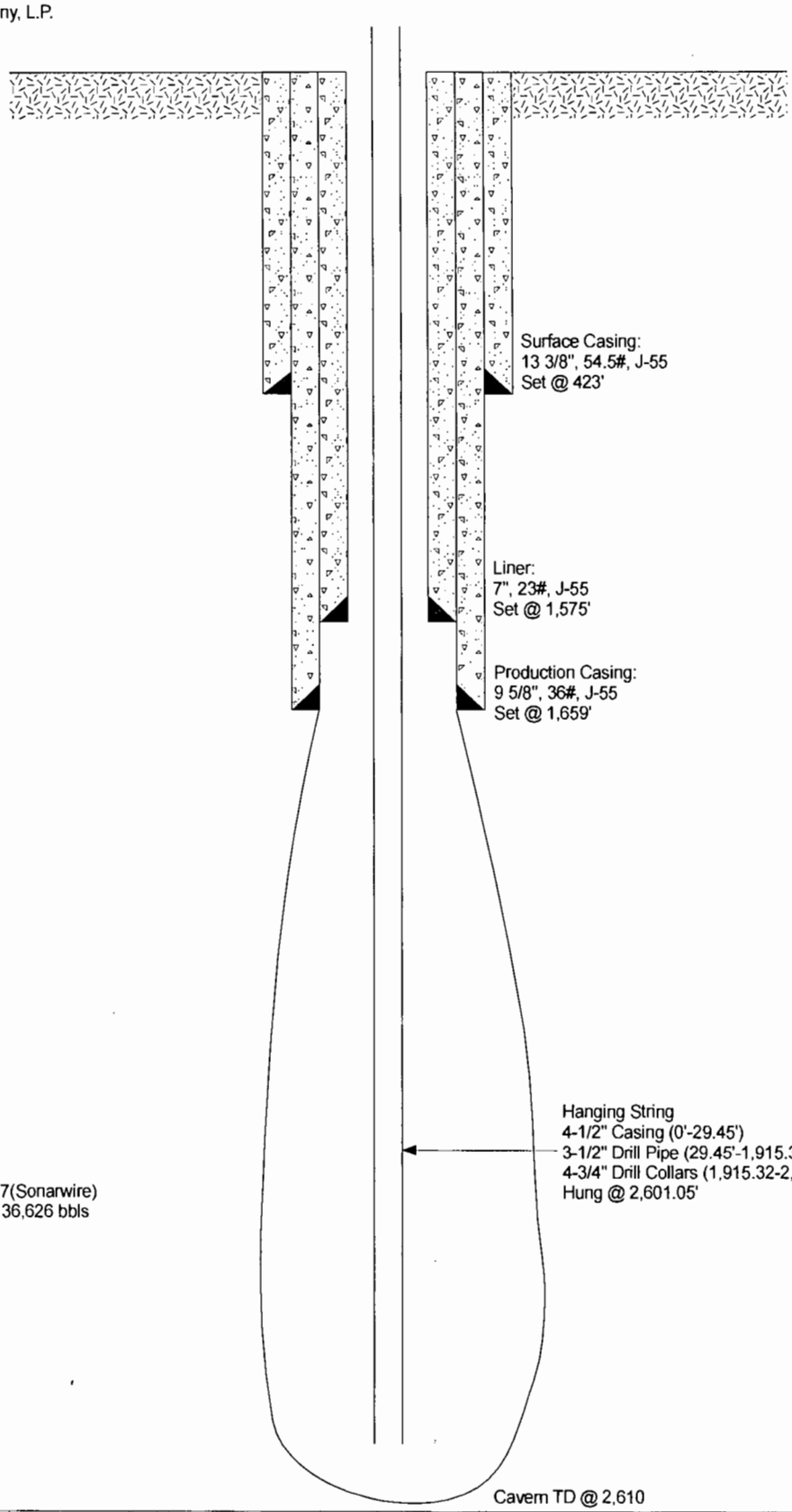
LONQUIST FIELD SERVICE	WELL TEST	Project No.:
	Western Refining Company, LP State LPG Storage Well No. 4 Mechanical Integrity Test	Date: March 2017
		Page: 10 of 12

Well: No. 4	**State:** New Mexico	**County:** LEA	**Field:** Jal Station
API: 30-025-35957	**Oper:** Western Refining Company,LP	**Location:** Jal	**Status:** Active

WELL SCHEMATIC

PREPARED BY	DATE	APPROVED BY	DATE	CLIENT APPROVAL	DATE	Lonquist Field Service, LLC
WHG	3/27/2017	ETB	3/27/2017			Texas Registration No. F-9147

Well Information
Operator: Western Refining Company, L.P.
API Number: 30-025-35957
Well Number: 4
Well Name: State LPG Storage
Field Name: Jal
County: Lea
State: New Mexico



Sonar Survey - 8/31/2007(Sonarwire)
Total Cavern Volume = 136,626 bbls

LONQUIST FIELD SERVICE

State LPG Storage Well No. 4

Western Refining Company, L.P.

PROJECT NUMBER:

DRAWN:	REVIEWED:	APPROVAL:	SCALE:	DATE:	
CMO	ETB	NONE	NONE	August 2013	Lonquist Field Service, LLC Texas Registered Firm No. F-9147

CONTACT INFORMATION

Well Owner

Western Refining
PO Box 1345
Jal, New Mexico 88252

- Ken Parker – Site Manager
  - Telephone – (505) 395-2632
  - Mobile – (915) 471-1607
  - Email – ken.parker@wnr.com

Engineering Consultants

Lonquist Field Service, LLC
1001 McKinney, Suite 1650
Houston, Texas 77002

- Eric Busch – Senior Vice President
  - Telephone – (832) 216-0785
  - Fax – (713) 559-9959
  - Email – eric@lonquist.com
- Will George – Petroleum Engineer
  - Telephone – (512) 787-7478
  - Fax – (512) 732-9816
  - Email – will@lonquist.com

LONQUIST FIELD SERVICE	WELL TEST	Project No.:
	Western Refining Company, LP State LPG Storage Well No. 4 Mechanical Integrity Test	Date: March 2017
		Page: 12 of 12

Well: No. 4	**State:** New Mexico	**County:** LEA	**Field:** Jal Station
API: 30-025-35957	**Oper:** Western Refining Company,LP	**Location:** Jal	**Status:** Active

2007 SONAR VOLUME TABLE

PREPARED BY	DATE	APPROVED BY	DATE	CLIENT APPROVAL	DATE	Lonquist Field Service, LLC
WHG	3/27/2017	ETB	3/27/2017			Texas Registration No. F-9147

SONARWIRE, INC.

P.O. BOX 576
ABITA SPRINGS, LA 70420
Office: 985-893-9221
Toll free: 888-211-6037
Fax: 985-893-4798
E-mail: gary@sonarwire.com

Survey conducted by: Gary McCool

WESTERN REFINING
JAL, NM
STATE LPG WELL NO. 4
AUGUST 31, 2007
SONAR-THRU-PIPE SURVEY

Survey from 1666 ft. to 2614 ft.
Sonar T.D. at 2616 ft.
9 5/8 inch cemented casing at 1666 ft.
4 1/2 inch tubing at 2607 ft.
Zero sonar tool at B.H.F.
Site personnel: Mr. Jerry Lindt
Lonquist Field Services

SONARWIRE INC.
Depth versus Volume

WESTERN REFINING
JAL, NM

STATE LPG WELL NO. 4
Fri, Aug 31, 2007

Depth	Cubic ft. per ft.	Cubic ft. total	Barrels per ft.	Barrels total
1667	325.6	325.6	58.0	58.0
1668	264.4	589.9	47.1	105.1
1669	209.6	799.5	37.3	142.4
1670	205.7	1005.2	36.6	179.0
1671	201.8	1207.1	36.0	215.0
1672	200.9	1407.9	35.8	250.8
1673	199.9	1607.8	35.6	286.4
1674	198.9	1806.7	35.4	321.8
1675	198.0	2004.8	35.3	357.1
1676	180.0	2184.7	32.1	389.1
1677	163.1	2347.8	29.0	418.2
1678	147.2	2495.0	26.2	444.4
1679	132.4	2627.5	23.6	468.0
1680	69.1	2696.6	12.3	480.3
1681	28.6	2725.2	5.1	485.4
1682	1.3	2726.5	0.2	485.6
1683	1.3	2727.7	0.2	485.8
1684	1.3	2729.0	0.2	486.1
1685	1.3	2730.2	0.2	486.3
1686	1.3	2731.5	0.2	486.5
1687	1.3	2732.7	0.2	486.7
1688	1.3	2734.0	0.2	486.9
1689	1.3	2735.2	0.2	487.2
1690	1.3	2736.5	0.2	487.4
1691	139.8	2876.3	24.9	512.3
1692	135.2	3011.5	24.1	536.4
1693	130.8	3142.3	23.3	559.7
1694	126.4	3268.7	22.5	582.2
1695	122.1	3390.9	21.8	603.9
1696	1.3	3392.1	0.2	604.2
1697	1.3	3393.4	0.2	604.4
1698	1.3	3394.6	0.2	604.6
1699	1.3	3395.9	0.2	604.8
1700	1.3	3397.1	0.2	605.1
1701	116.0	3513.1	20.7	625.7
1702	114.3	3627.4	20.4	646.1
1703	112.6	3740.0	20.1	666.1
1704	111.0	3851.0	19.8	685.9
1705	109.4	3960.3	19.5	705.4
1706	107.7	4068.1	19.2	724.6
1707	106.1	4174.2	18.9	743.5
1708	104.5	4278.7	18.6	762.1
1709	103.0	4381.7	18.3	780.4
1710	101.4	4483.1	18.1	798.5
1711	99.9	4583.0	17.8	816.3
1712	98.3	4681.3	17.5	833.8

Appendix B – Injection Pressure Data

Nitrogen Injection

Well Name:	State LPG Storage No. 4
Operator:	Western Refining Company, L.P.
State:	NM
County/Parish:	Lea
Field:	Jal
Serial/API:	30-025-35957

Flow Conditions

Date / Time	Annulus Gauge		Tubing Gauge		Flow Conditions
	Pressure	Temp	Pressure	Temp	Temp
	psig	deg F	psig	deg F	deg F
5/9/17 10:40	147.15	83.67	146.95	83.99	87.00
5/9/17 10:45	162.42	83.32	148.54	83.58	79.78
5/9/17 10:50	235.95	84.49	156.65	84.73	85.83
5/9/17 10:55	385.25	84.30	173.71	84.57	80.31
5/9/17 11:00	485.28	83.79	184.39	84.05	76.57
5/9/17 11:05	567.46	83.62	193.53	83.93	76.51
5/9/17 11:10	639.32	82.42	201.64	82.73	78.84
5/9/17 11:15	700.72	81.67	208.65	81.88	81.30
5/9/17 11:20	760.81	81.90	215.08	82.19	81.31
5/9/17 11:25	814.20	83.38	220.95	83.62	83.22
5/9/17 11:30	863.73	85.83	226.42	86.05	81.47
5/9/17 11:35	910.43	85.76	231.37	86.14	77.95
5/9/17 11:40	953.16	86.99	235.79	87.14	75.76
5/9/17 11:45	978.72	87.59	238.49	88.30	78.05
5/9/17 11:50	978.27	88.24	238.22	89.00	80.69
5/9/17 11:55	977.97	89.00	237.91	89.31	83.03
5/9/17 12:00	977.73	90.43	237.60	90.47	86.25
5/9/17 12:05	977.63	89.71	237.46	89.91	86.80
5/9/17 12:10	977.58	89.17	237.19	89.25	88.15
5/9/17 12:15	977.53	88.33	237.10	88.48	88.33
5/9/17 12:20	985.04	89.32	237.81	89.21	92.23
5/9/17 12:25	993.43	88.98	238.76	89.04	91.45
5/9/17 12:30	993.19	90.07	238.44	89.99	93.35
5/9/17 12:35	993.00	91.64	238.34	91.50	95.71
5/9/17 12:40	992.95	90.72	238.16	90.86	95.09
5/9/17 12:45	992.87	91.46	237.91	91.45	96.41
5/9/17 12:50	992.70	92.49	237.87	92.46	97.79
5/9/17 12:55	992.69	91.05	237.73	91.18	97.10
5/9/17 13:00	992.66	91.36	237.57	91.46	98.24
5/9/17 13:05	992.61	91.24	237.53	91.64	99.19
5/9/17 13:10	992.48	91.42	237.37	91.63	99.61
5/9/17 13:15	992.42	90.99	237.25	91.29	99.01
5/9/17 13:20	992.40	90.20	237.22	90.24	99.11
5/9/17 13:25	992.34	89.89	236.69	89.90	98.61
5/9/17 13:30	992.16	91.47	236.93	91.25	100.58
5/9/17 13:35	991.97	93.48	236.90	93.25	102.41
5/9/17 13:40	991.91	94.61	236.77	94.47	103.68
5/9/17 13:45	991.84	95.42	236.63	95.47	104.17
5/9/17 13:50	991.87	95.48	236.65	95.90	104.91

Nitrogen Injection

Well Name:	State LPG Storage No. 4
Operator:	Western Refining Company, L.P.
State:	NM
County/Parish:	Lea
Field:	Jal
Serial/API:	30-025-35957

Flow Conditions

Date / Time	Annulus Gauge		Tubing Gauge		Flow Conditions
	Pressure	Temp	Pressure	Temp	Temp
	psig	deg F	psig	deg F	deg F
5/9/17 13:55	991.85	95.39	236.55	95.80	105.92
5/9/17 14:00	991.82	95.31	236.45	95.60	107.14
5/9/17 14:05	991.76	95.11	236.44	95.40	106.81
5/9/17 14:10	991.61	95.85	236.34	96.02	107.20
5/9/17 14:15	991.53	96.92	236.16	97.00	108.17
5/9/17 14:20	991.51	96.68	236.20	96.79	108.77
5/9/17 14:25	991.62	94.81	236.15	95.05	107.26
5/9/17 14:30	991.48	95.64	235.99	95.57	107.78
5/9/17 14:35	991.27	97.53	235.84	97.50	105.04
5/9/17 14:40	1012.98	95.63	240.67	95.79	99.20
5/9/17 14:45	1034.43	94.19	245.61	94.32	93.91
5/9/17 14:50	1033.84	95.60	244.84	95.43	97.67
5/9/17 14:55	1037.27	97.64	246.32	97.52	95.47
5/9/17 15:00	1037.03	99.22	246.05	99.19	99.89
5/9/17 15:05	1036.99	99.53	246.00	100.12	101.03
5/9/17 15:10	1036.88	99.70	245.71	100.09	101.31
5/9/17 15:15	1036.86	99.24	245.72	99.58	101.15
5/9/17 15:20	1036.97	96.78	245.77	97.00	100.44
5/9/17 15:25	1036.78	97.57	245.64	97.57	101.20
5/9/17 15:30	1036.78	96.57	245.48	96.71	101.01
5/9/17 15:35	1036.71	96.52	245.44	96.51	102.08
5/9/17 15:40	1036.72	95.25	245.36	95.34	101.51
5/9/17 15:45	1036.53	96.88	245.24	96.78	103.31
5/9/17 15:50	1036.40	98.46	245.20	98.44	104.69
5/9/17 15:55	1036.25	99.77	245.09	99.77	106.14
5/9/17 16:00	1036.23	99.77	244.98	99.91	106.86
5/9/17 16:05	1036.19	99.81	244.99	99.87	108.05
5/9/17 16:10	1036.17	99.36	244.92	99.40	108.69
5/9/17 16:15	1036.23	97.93	244.86	98.01	107.98
5/9/17 16:20	1036.13	98.25	244.67	98.27	108.38
5/9/17 16:25	1036.06	98.40	244.65	98.40	109.09
5/9/17 16:30	1036.00	98.90	244.52	98.90	109.83
5/9/17 16:35	1036.09	97.76	244.50	98.07	108.29
5/9/17 16:40	1036.36	92.07	244.53	92.71	104.45
5/9/17 16:45	1038.42	87.66	244.97	88.52	101.55
5/9/17 16:50	1043.61	86.33	246.86	86.57	96.87
5/9/17 16:55	1045.54	88.11	247.66	87.96	96.93
5/9/17 17:00	1045.28	90.25	247.53	90.13	90.51
5/9/17 17:05	1045.18	90.82	247.45	90.76	94.69

Nitrogen Injection

Well Name:	State LPG Storage No. 4
Operator:	Western Refining Company, L.P.
State:	NM
County/Parish:	Lea
Field:	Jal
Serial/API:	30-025-35957

Flow Conditions

Date / Time	Annulus Gauge		Tubing Gauge		Flow Conditions
	Pressure	Temp	Pressure	Temp	Temp
	psig	deg F	psig	deg F	deg F
5/9/17 17:10	1045.07	90.77	247.39	90.82	94.76
5/9/17 17:15	1047.86	89.47	248.79	89.56	94.16
5/9/17 17:20	1047.69	89.33	248.98	89.41	95.93
5/9/17 17:25	1047.69	89.33	248.98	89.41	95.93
5/9/17 17:30	1047.12	93.31	248.42	93.43	95.60
5/9/17 17:35	1047.00	94.17	248.32	94.33	96.86
5/9/17 17:40	1046.89	95.30	248.23	95.44	98.21
5/9/17 17:45	1046.90	94.76	248.19	95.00	97.53
5/9/17 17:50	1053.73	92.59	254.87	92.82	90.02
5/9/17 17:55	1063.82	92.74	265.75	92.85	88.85
5/9/17 18:00	1079.43	93.03	281.85	93.14	70.95
5/9/17 18:05	1098.41	92.61	301.49	92.74	78.56
5/9/17 18:10	1117.68	92.50	321.35	92.69	88.42
5/9/17 18:15	1145.05	90.96	350.02	91.14	82.65
5/9/17 18:20	1170.43	90.23	376.69	90.37	80.49
5/9/17 18:25	1193.49	88.93	370.08	89.10	79.75
5/9/17 18:30	1199.59	89.00	260.09	89.05	79.92
5/9/17 18:35	1198.04	89.36	213.24	89.47	80.73
5/9/17 18:40	1196.43	89.42	212.68	89.57	83.07
5/9/17 18:45	1195.56	89.17	212.17	89.30	81.52
5/9/17 18:50	1194.88	88.85	211.95	89.00	81.06
5/9/17 18:55	1194.44	88.39	211.96	88.53	81.70
5/9/17 19:00	1194.09	87.81	211.65	87.96	81.50
5/9/17 19:05	1193.81	87.11	211.53	87.24	82.96
5/9/17 19:10	1193.58	86.97	211.90	87.10	82.57
5/9/17 19:15	1193.38	86.77	211.90	86.92	82.45
5/9/17 19:20	1193.23	86.64	211.96	86.79	83.73
5/9/17 19:25	1192.88	86.16	210.21	86.32	82.98
5/9/17 19:30	1192.78	85.36	210.61	85.49	82.09
5/9/17 19:35	1192.75	84.33	210.59	84.44	82.20
5/9/17 19:40	1192.81	83.42	210.32	83.48	81.65
5/9/17 19:45	1192.76	83.59	209.88	83.62	80.76
5/9/17 19:50	1192.78	83.93	210.33	84.03	81.00
5/9/17 19:55	1192.86	83.71	210.12	83.86	79.25
5/9/17 20:00	1193.12	82.59	210.62	82.72	79.30
5/9/17 20:05	1193.33	81.53	210.68	81.62	76.90
5/9/17 20:10	1193.46	80.58	209.98	80.60	76.97
5/9/17 20:15	1193.57	80.02	209.94	80.00	83.44
5/9/17 20:20	1193.66	79.69	210.08	79.67	81.13

Nitrogen Injection

Well Name:	State LPG Storage No. 4
Operator:	Western Refining Company, L.P.
State:	NM
County/Parish:	Lea
Field:	Jal
Serial/API:	30-025-35957

Flow Conditions

Date / Time	Annulus Gauge		Tubing Gauge		Flow Conditions
	Pressure	Temp	Pressure	Temp	Temp
	psig	deg F	psig	deg F	deg F
5/9/17 20:25	1193.80	79.13	210.17	79.13	81.91
5/9/17 20:30	1193.93	78.53	209.91	78.52	80.81
5/9/17 20:35	1194.01	78.03	210.13	78.00	80.94
5/9/17 20:40	1194.10	77.68	209.82	77.65	80.59
5/9/17 20:45	1194.28	77.45	209.82	77.39	81.73
5/9/17 20:50	1194.37	77.34	209.70	77.31	80.54
5/9/17 20:55	1194.51	77.21	209.55	77.17	81.08
5/9/17 21:00	1195.23	77.11	209.23	77.08	81.98
5/9/17 21:05	1195.55	77.00	208.83	76.96	82.20

Appendix C – Test Pressure Data

TEST PRESSURE

Well Name:	State LPG Storage No. 4
Operator:	Western Refining Company, L.P.
State:	NM
County/Parish:	Lea
Field:	Jal
Serial/API:	30-025-35957

PRESSURE INFORMATION

Date / Time	Annulus Pressure		Tubing Pressure	
	Pressure	Temp	Pressure	Temp
	psig	deg F	psig	deg F
5/10/17 9:00	1187.44	64.62	527.10	64.32
5/10/17 9:10	1187.45	66.06	528.09	66.05
5/10/17 9:20	1187.33	67.88	530.23	67.82
5/10/17 9:30	1187.26	69.37	330.75	69.26
5/10/17 9:40	1187.19	71.23	-1.92	71.15
5/10/17 9:50	1187.25	71.50	-1.92	71.37
5/10/17 10:00	1187.24	72.45	-1.89	72.42
5/10/17 10:10	1187.27	72.27	-1.88	72.39
5/10/17 10:20	1187.23	73.76	-1.85	73.74
5/10/17 10:30	1187.22	74.40	-1.81	74.36
5/10/17 10:40	1187.18	75.49	-1.77	75.43
5/10/17 10:50	1187.18	76.33	-1.74	76.27
5/10/17 11:00	1187.18	76.96	-1.72	76.85
5/10/17 11:10	1187.18	77.39	-1.69	77.23
5/10/17 11:20	1187.13	78.41	-1.67	78.28
5/10/17 11:30	1187.10	79.02	-1.64	78.88
5/10/17 11:40	1187.11	79.60	-1.62	79.42
5/10/17 11:50	1187.08	79.96	-1.62	79.76
5/10/17 12:00	1187.07	80.11	-1.60	79.78
5/10/17 12:10	1187.05	80.56	-1.59	80.30
5/10/17 12:20	1187.02	81.42	-1.55	81.10
5/10/17 12:30	1186.98	82.46	-1.52	82.10
5/10/17 12:40	1186.96	83.01	-1.51	82.64
5/10/17 12:50	1187.00	83.36	-1.48	82.98
5/10/17 13:00	1186.79	87.34	-1.43	86.90
5/10/17 13:10	1186.87	88.02	-1.43	87.65
5/10/17 13:20	1186.92	87.32	-1.38	86.87
5/10/17 13:30	1186.86	87.40	-1.40	86.93
5/10/17 13:40	1186.87	85.75	-1.42	85.32
5/10/17 13:50	1186.88	85.83	-1.40	85.73
5/10/17 14:00	1186.92	84.51	-1.39	84.45
5/10/17 14:10	1186.78	84.14	-1.37	83.88
5/10/17 14:20	1186.76	83.78	-1.39	83.43
5/10/17 14:30	1186.67	86.06	-1.35	85.91
5/10/17 14:40	1186.72	86.48	-1.34	86.24
5/10/17 14:50	1186.70	86.21	-1.35	85.99
5/10/17 15:00	1186.65	86.98	-1.34	86.82
5/10/17 15:10	1186.66	87.05	-1.34	86.96
5/10/17 15:20	1186.64	86.13	-1.36	85.97
5/10/17 15:30	1186.61	86.19	-1.36	85.97
5/10/17 15:40	1186.59	86.07	-1.36	86.06
5/10/17 15:50	1186.56	85.93	-1.36	85.76
5/10/17 16:00	1186.57	86.28	-1.37	86.06
5/10/17 16:10	1186.52	86.22	-1.38	86.13
5/10/17 16:20	1186.49	85.93	-1.38	85.81
5/10/17 16:30	1186.47	85.23	-1.40	85.05
5/10/17 16:40	1186.44	85.68	-1.40	85.51

TEST PRESSURE

Well Name:	State LPG Storage No. 4
Operator:	Western Refining Company, L.P.
State:	NM
County/Parish:	Lea
Field:	Jal
Serial/API:	30-025-35957

PRESSURE INFORMATION

Date / Time	Annulus Pressure		Tubing Pressure	
	Pressure	Temp	Pressure	Temp
	psig	deg F	psig	deg F
5/10/17 16:50	1186.39	86.35	-1.38	86.21
5/10/17 17:00	1186.34	87.05	-1.37	86.95
5/10/17 17:10	1186.35	86.89	-1.37	86.81
5/10/17 17:20	1186.33	86.26	-1.39	86.14
5/10/17 17:30	1186.34	85.67	-1.40	85.51
5/10/17 17:40	1186.42	82.80	-1.48	82.65
5/10/17 17:50	1186.34	79.14	-1.55	79.00
5/10/17 18:00	1186.20	80.75	-1.52	80.71
5/10/17 18:10	1186.13	83.00	-1.50	82.95
5/10/17 18:20	1186.10	82.96	-1.50	82.91
5/10/17 18:30	1186.14	82.20	-1.53	82.12
5/10/17 18:40	1186.10	81.93	-1.54	81.86
5/10/17 18:50	1186.11	80.87	-1.56	80.85
5/10/17 19:00	1186.07	80.49	-1.59	80.44
5/10/17 19:10	1186.02	79.91	-1.61	79.83
5/10/17 19:20	1186.10	75.99	-1.69	75.82
5/10/17 19:30	1186.01	75.38	-1.72	75.32
5/10/17 19:40	1185.97	74.51	-1.76	74.39
5/10/17 19:50	1185.95	73.20	-1.79	73.08
5/10/17 20:00	1185.86	73.26	-1.81	73.18
5/10/17 20:10	1185.79	72.26	589.19	72.14
5/10/17 20:20	1185.77	72.08	589.79	72.07
5/10/17 20:30	1185.73	71.55	590.47	71.47
5/10/17 20:40	1185.71	70.71	591.14	70.58
5/10/17 20:50	1185.67	70.10	591.85	69.96
5/10/17 21:00	1185.67	69.54	592.62	69.40
5/10/17 21:10	1185.64	69.26	593.35	69.12
5/10/17 21:20	1185.59	69.05	594.07	68.92
5/10/17 21:30	1185.60	68.57	594.82	68.45
5/10/17 21:40	1185.58	68.20	595.59	68.06
5/10/17 21:50	1185.55	68.08	596.36	67.95
5/10/17 22:00	1185.54	68.40	597.15	68.26
5/10/17 22:10	1185.49	68.53	598.00	68.41
5/10/17 22:20	1185.47	68.38	598.83	68.25
5/10/17 22:30	1185.45	68.47	599.66	68.34
5/10/17 22:40	1185.44	68.43	600.57	68.31
5/10/17 22:50	1185.43	68.22	601.41	68.09
5/10/17 23:00	1185.40	68.20	602.27	68.07
5/10/17 23:10	1185.39	68.24	603.19	68.11
5/10/17 23:20	1185.36	68.18	604.11	68.06
5/10/17 23:30	1185.35	68.07	605.04	67.94
5/10/17 23:40	1185.34	67.92	605.94	67.79
5/10/17 23:50	1185.32	67.69	606.91	67.57
5/11/17 0:00	1185.31	67.41	607.91	67.29
5/11/17 0:10	1185.28	67.10	608.93	66.97
5/11/17 0:20	1185.27	66.62	609.93	66.50
5/11/17 0:30	1185.26	65.93	610.91	65.81

TEST PRESSURE

Well Name:	State LPG Storage No. 4
Operator:	Western Refining Company, L.P.
State:	NM
County/Parish:	Lea
Field:	Jal
Serial/API:	30-025-35957

PRESSURE INFORMATION

Date / Time	Annulus Pressure		Tubing Pressure	
	Pressure	Temp	Pressure	Temp
	psig	deg F	psig	deg F
5/11/17 0:40	1185.27	65.47	611.91	65.34
5/11/17 0:50	1185.23	65.20	612.91	65.07
5/11/17 1:00	1185.22	64.71	613.94	64.59
5/11/17 1:10	1185.20	64.31	614.91	64.19
5/11/17 1:20	1185.18	64.16	615.92	64.04
5/11/17 1:30	1185.16	63.51	616.93	63.38
5/11/17 1:40	1185.17	62.75	617.88	62.61
5/11/17 1:50	1185.16	61.79	618.88	61.65
5/11/17 2:00	1185.14	60.64	619.87	60.51
5/11/17 2:10	1185.14	59.10	620.86	58.97
5/11/17 2:20	1185.19	57.39	621.87	57.25
5/11/17 2:30	1185.17	55.79	622.91	55.64
5/11/17 2:40	1185.13	54.75	623.96	54.59
5/11/17 2:50	1185.10	53.99	624.87	53.85
5/11/17 3:00	1185.01	54.99	625.77	54.85
5/11/17 3:10	1185.00	54.65	626.69	54.47
5/11/17 3:20	1185.01	53.94	627.64	53.81
5/11/17 3:30	1185.04	53.02	628.60	52.87
5/11/17 3:40	1184.99	52.12	629.50	51.99
5/11/17 3:50	1185.03	51.54	630.44	51.37
5/11/17 4:00	1184.99	51.30	631.35	51.12
5/11/17 4:10	1184.96	51.02	632.31	50.87
5/11/17 4:20	1184.93	50.96	633.22	50.83
5/11/17 4:30	1184.92	50.52	634.18	50.37
5/11/17 4:40	1184.91	50.22	635.09	50.04
5/11/17 4:50	1184.88	50.61	636.01	50.44
5/11/17 5:00	1184.87	50.68	636.96	50.50
5/11/17 5:10	1184.85	51.26	637.87	51.09
5/11/17 5:20	1184.82	51.85	638.89	51.73
5/11/17 5:30	1184.80	52.01	639.91	51.90
5/11/17 5:40	1184.77	51.66	640.88	51.53
5/11/17 5:50	1184.79	51.41	641.83	51.26
5/11/17 6:00	1184.79	51.50	642.79	51.38
5/11/17 6:10	1184.76	52.07	643.74	51.96
5/11/17 6:20	1184.78	51.03	644.72	50.92
5/11/17 6:30	1184.78	50.29	645.68	50.16
5/11/17 6:40	1184.76	49.77	646.64	49.66
5/11/17 6:50	1184.76	49.14	647.58	49.03
5/11/17 7:00	1184.74	48.81	648.55	48.70
5/11/17 7:10	1184.73	49.20	649.52	49.16
5/11/17 7:20	1184.68	50.81	650.47	50.86
5/11/17 7:30	1184.60	52.64	651.45	52.78
5/11/17 7:40	1184.57	54.70	652.38	54.89
5/11/17 7:50	1184.53	56.78	653.39	57.02
5/11/17 8:00	1184.46	59.34	654.47	59.58
5/11/17 8:10	1184.43	62.07	655.42	62.35
5/11/17 8:20	1184.45	63.80	656.44	64.08

TEST PRESSURE

Well Name:	State LPG Storage No. 4
Operator:	Western Refining Company, L.P.
State:	NM
County/Parish:	Lea
Field:	Jal
Serial/API:	30-025-35957

PRESSURE INFORMATION

Date / Time	Annulus Pressure		Tubing Pressure	
	Pressure	Temp	Pressure	Temp
	psig	deg F	psig	deg F
5/11/17 8:30	1184.42	66.33	657.44	66.56
5/11/17 8:40	1184.35	69.58	658.42	69.84
5/11/17 8:50	1184.39	71.70	659.32	72.02
5/11/17 9:00	1184.53	70.36	660.31	70.68
5/11/17 9:10	1184.53	69.59	661.29	69.84
5/11/17 9:20	1184.53	69.62	662.18	69.83
5/11/17 9:30	1184.52	70.25	663.07	70.44
5/11/17 9:40	1184.50	70.84	663.98	71.02
5/11/17 9:50	1184.46	71.47	664.82	71.64
5/11/17 10:00	1184.50	71.82	665.66	71.97
5/11/17 10:10	1184.46	72.85	666.48	72.96
5/11/17 10:20	1184.42	73.68	667.30	73.76
5/11/17 10:30	1184.40	74.74	668.07	74.82
5/11/17 10:40	1184.38	75.48	668.87	75.53
5/11/17 10:50	1184.41	75.34	669.67	75.37
5/11/17 11:00	1184.40	75.82	670.39	75.84
5/11/17 11:10	1184.39	75.72	671.07	75.69
5/11/17 11:20	1184.40	75.97	671.75	75.94
5/11/17 11:30	1184.35	76.72	672.42	76.67
5/11/17 11:40	1184.37	77.58	673.06	77.54
5/11/17 11:50	1184.35	78.03	673.74	77.95
5/11/17 12:00	1184.36	78.56	674.33	78.47
5/11/17 12:10	1184.37	78.24	674.93	78.12
5/11/17 12:20	1184.38	78.62	675.53	78.44
5/11/17 12:30	1184.34	79.01	676.13	78.83
5/11/17 12:40	1184.33	79.84	676.72	79.65
5/11/17 12:50	1184.33	80.72	677.29	80.50
5/11/17 13:00	1184.34	81.28	677.88	81.05
5/11/17 13:10	1184.28	82.34	678.40	82.10
5/11/17 13:20	1184.32	82.73	679.01	82.39
5/11/17 13:30	1184.32	83.30	679.58	82.92
5/11/17 13:40	1184.30	83.29	680.07	82.99
5/11/17 13:50	1184.34	83.46	680.62	83.35
5/11/17 14:00	1184.34	82.26	681.14	82.23
5/11/17 14:10	1184.26	82.49	681.70	82.17
5/11/17 14:20	1184.23	83.83	682.18	83.49
5/11/17 14:30	1184.23	85.30	682.65	84.94
5/11/17 14:40	1184.24	85.15	683.16	84.81
5/11/17 14:50	1184.22	85.93	683.66	85.55
5/11/17 15:00	1184.26	86.12	684.19	85.81
5/11/17 15:10	1184.20	87.29	684.69	86.86
5/11/17 15:20	1184.17	87.90	685.21	87.39
5/11/17 15:30	1184.20	87.91	685.63	87.53
5/11/17 15:40	1184.19	87.27	686.03	86.95
5/11/17 15:50	1184.22	86.71	686.44	86.46
5/11/17 16:00	1184.17	86.64	686.83	86.32
5/11/17 16:10	1184.18	87.97	687.26	87.62

TEST PRESSURE

Well Name:	State LPG Storage No. 4
Operator:	Western Refining Company, L.P.
State:	NM
County/Parish:	Lea
Field:	Jal
Serial/API:	30-025-35957

PRESSURE INFORMATION

Date / Time	Annulus Pressure		Tubing Pressure	
	Pressure	Temp	Pressure	Temp
	psig	deg F	psig	deg F
5/11/17 16:20	1184.18	88.48	687.63	88.32
5/11/17 16:30	1184.16	88.65	688.02	88.31
5/11/17 16:40	1184.18	88.47	688.37	88.35
5/11/17 16:50	1184.13	87.43	688.73	87.30
5/11/17 17:00	1184.14	87.20	689.03	87.00
5/11/17 17:10	1184.12	87.20	689.38	87.04
5/11/17 17:20	1184.12	87.18	689.72	87.08
5/11/17 17:30	1184.11	86.95	690.03	86.83
5/11/17 17:40	1184.07	86.80	690.33	86.68
5/11/17 17:50	1184.08	86.65	690.65	86.54
5/11/17 18:00	1184.04	87.20	690.97	87.11
5/11/17 18:10	1184.02	86.57	691.23	86.50
5/11/17 18:20	1184.03	85.93	691.54	85.81
5/11/17 18:30	1184.00	85.79	691.81	85.70
5/11/17 18:40	1183.96	85.79	692.13	85.68
5/11/17 18:50	1183.93	85.48	692.39	85.31
5/11/17 19:00	1183.93	84.84	692.70	84.75
5/11/17 19:10	1183.94	84.19	692.97	84.14
5/11/17 19:20	1183.89	84.03	693.27	83.93
5/11/17 19:30	1183.88	83.12	693.57	83.00
5/11/17 19:40	1183.89	82.42	693.86	82.32
5/11/17 19:50	1183.86	81.57	694.13	81.45
5/11/17 20:00	1183.83	80.64	694.44	80.53
5/11/17 20:10	1183.80	79.59	694.77	79.51
5/11/17 20:20	1183.82	78.37	695.06	78.19
5/11/17 20:30	1183.78	76.56	695.34	76.35
5/11/17 20:40	1183.81	74.48	695.67	74.25
5/11/17 20:50	1183.81	72.23	695.99	72.01
5/11/17 21:00	1183.74	70.45	696.26	70.23
5/11/17 21:10	1183.72	68.85	696.61	68.65
5/11/17 21:20	1183.75	67.43	696.93	67.23
5/11/17 21:30	1183.68	66.07	697.27	65.88
5/11/17 21:40	1183.65	65.63	697.62	65.49
5/11/17 21:50	1183.61	65.40	697.99	65.27
5/11/17 22:00	1183.60	64.95	698.36	64.83
5/11/17 22:10	1183.58	64.31	698.79	64.19
5/11/17 22:20	1183.56	63.99	699.23	63.88
5/11/17 22:30	1183.56	63.61	699.64	63.50
5/11/17 22:40	1183.55	63.07	700.06	62.96
5/11/17 22:50	1183.53	62.48	700.48	62.35
5/11/17 23:00	1183.53	62.05	700.92	61.95
5/11/17 23:10	1183.50	62.05	701.35	61.97
5/11/17 23:20	1183.48	62.13	701.81	62.05
5/11/17 23:30	1183.46	62.26	702.30	62.19
5/11/17 23:40	1183.45	62.51	702.80	62.44
5/11/17 23:50	1183.43	62.47	703.32	62.39
5/12/17 0:00	1183.41	62.13	703.87	62.04

TEST PRESSURE

Well Name:	State LPG Storage No. 4
Operator:	Western Refining Company, L.P.
State:	NM
County/Parish:	Lea
Field:	Jal
Serial/API:	30-025-35957

PRESSURE INFORMATION

Date / Time	Annulus Pressure		Tubing Pressure	
	Pressure	Temp	Pressure	Temp
	psig	deg F	psig	deg F
5/12/17 0:10	1183.44	61.41	704.44	61.31
5/12/17 0:20	1183.45	60.47	704.99	60.35
5/12/17 0:30	1183.42	59.40	705.58	59.27
5/12/17 0:40	1183.43	58.55	706.19	58.42
5/12/17 0:50	1183.41	58.01	706.79	57.88
5/12/17 1:00	1183.39	57.57	707.41	57.45
5/12/17 1:10	1183.39	57.14	708.05	57.03
5/12/17 1:20	1183.39	56.73	708.69	56.62
5/12/17 1:30	1183.36	56.28	709.33	56.17
5/12/17 1:40	1183.35	56.17	709.99	56.08
5/12/17 1:50	1183.34	55.93	710.64	55.83
5/12/17 2:00	1183.31	55.87	711.27	55.80
5/12/17 2:10	1183.29	56.01	711.94	55.94
5/12/17 2:20	1183.28	56.06	712.61	56.00
5/12/17 2:30	1183.29	55.91	713.28	55.83
5/12/17 2:40	1183.28	55.69	714.03	55.63
5/12/17 2:50	1183.25	55.47	714.79	55.39
5/12/17 3:00	1183.25	55.20	715.50	55.12
5/12/17 3:10	1183.24	54.87	716.22	54.79
5/12/17 3:20	1183.23	54.64	716.92	54.57
5/12/17 3:30	1183.24	54.41	717.63	54.33
5/12/17 3:40	1183.22	54.19	718.36	54.13
5/12/17 3:50	1183.22	54.03	719.07	53.96
5/12/17 4:00	1183.18	53.62	719.80	53.54
5/12/17 4:10	1183.19	53.13	720.53	53.05
5/12/17 4:20	1183.20	52.79	721.26	52.71
5/12/17 4:30	1183.18	52.49	721.98	52.41
5/12/17 4:40	1183.16	52.28	722.68	52.20
5/12/17 4:50	1183.17	52.19	723.40	52.12
5/12/17 5:00	1183.14	52.14	724.15	52.07
5/12/17 5:10	1183.12	51.93	724.89	51.86
5/12/17 5:20	1183.12	51.57	725.61	51.51
5/12/17 5:30	1183.13	51.28	726.37	51.20
5/12/17 5:40	1183.15	51.03	727.10	50.96
5/12/17 5:50	1183.10	51.00	727.80	50.94
5/12/17 6:00	1183.10	50.85	728.56	50.79
5/12/17 6:10	1183.09	50.51	729.37	50.43
5/12/17 6:20	1183.08	50.23	730.09	50.15
5/12/17 6:30	1183.07	50.19	730.82	50.12
5/12/17 6:40	1183.06	50.13	731.57	50.05
5/12/17 6:50	1183.06	49.89	732.29	49.82
5/12/17 7:00	1183.05	49.72	733.03	49.64
5/12/17 7:10	1183.02	50.02	733.74	50.02
5/12/17 7:20	1183.02	51.00	734.52	51.09
5/12/17 7:30	1182.97	52.43	735.24	52.57
5/12/17 7:40	1182.93	53.94	735.99	54.13
5/12/17 7:50	1182.95	55.26	736.72	55.43

TEST PRESSURE

Well Name:	State LPG Storage No. 4
Operator:	Western Refining Company, L.P.
State:	NM
County/Parish:	Lea
Field:	Jal
Serial/API:	30-025-35957

PRESSURE INFORMATION

Date / Time	Annulus Pressure		Tubing Pressure	
	Pressure	Temp	Pressure	Temp
	psig	deg F	psig	deg F
5/12/17 8:00	1182.93	56.46	737.45	56.62
5/12/17 8:10	1182.91	57.65	738.23	57.80
5/12/17 8:20	1182.87	58.85	738.93	59.02
5/12/17 8:30	1182.89	59.59	739.69	59.75
5/12/17 8:40	1182.86	60.55	740.41	60.69
5/12/17 8:50	1182.86	61.24	741.19	61.33
5/12/17 9:00	1182.84	62.24	741.95	62.32
5/12/17 9:10	1182.83	63.03	742.65	63.05
5/12/17 9:20	1182.84	64.11	743.39	64.11
5/12/17 9:30	1182.83	65.16	744.19	65.18
5/12/17 9:40	1182.83	65.99	744.97	65.95
5/12/17 9:50	1182.80	67.20	745.68	67.14
5/12/17 10:00	1182.77	67.85	746.39	67.74
5/12/17 10:10	1182.77	68.88	747.11	68.77
5/12/17 10:20	1182.77	70.27	747.82	70.08
5/12/17 10:30	1182.72	71.42	748.50	71.24
5/12/17 10:40	1182.73	72.25	749.10	72.14
5/12/17 10:50	1182.75	72.96	749.81	72.76
5/12/17 11:00	1182.71	74.82	750.45	74.62
5/12/17 11:10	1182.72	76.07	751.06	75.84
5/12/17 11:20	1182.74	77.32	751.67	77.12
5/12/17 11:30	1182.74	77.69	752.23	77.45
5/12/17 11:40	1182.79	78.05	752.87	77.82
5/12/17 11:50	1182.77	79.52	753.46	79.21
5/12/17 12:00	1182.76	80.47	753.96	80.22
5/12/17 12:10	1182.73	82.33	-1.78	82.01
5/12/17 12:20	1182.74	82.59	-1.79	82.24
5/12/17 12:30	1182.68	82.51	749.98	82.14
5/12/17 12:40	1182.65	82.31	750.53	81.88
5/12/17 12:50	1182.70	81.81	751.09	81.45
5/12/17 13:00	1182.69	82.31	751.60	81.90
5/12/17 13:10	1182.68	83.01	752.17	82.46
5/12/17 13:20	1182.66	83.97	-1.83	83.41
5/12/17 13:30	1182.41	84.80	739.29	84.26
5/12/17 13:40	1182.43	85.73	739.95	85.31
5/12/17 13:50	1182.43	85.10	735.08	84.78
5/12/17 14:00	1182.45	83.06	733.94	82.78
5/12/17 14:10	1182.32	83.65	730.14	83.26
5/12/17 14:20	1182.36	84.40	730.41	83.91
5/12/17 14:30	1182.34	85.94	729.35	85.37
5/12/17 14:40	1182.26	87.27	729.25	86.65
5/12/17 14:50	1182.25	88.14	729.63	87.57
5/12/17 15:00	1182.25	89.93	730.05	89.55
5/12/17 15:10	1182.29	90.11	730.54	89.71
5/12/17 15:20	1182.15	93.03	731.46	92.74
5/12/17 15:30	1182.15	94.04	-1.84	93.52
5/12/17 15:40	1182.04	91.97	724.61	91.51

TEST PRESSURE

Well Name:	State LPG Storage No. 4
Operator:	Western Refining Company, L.P.
State:	NM
County/Parish:	Lea
Field:	Jal
Serial/API:	30-025-35957

PRESSURE INFORMATION

Date / Time	Annulus Pressure		Tubing Pressure	
	Pressure	Temp	Pressure	Temp
	psig	deg F	psig	deg F
5/12/17 15:50	1182.07	92.75	724.99	92.34
5/12/17 16:00	1182.07	93.43	725.37	93.07
5/12/17 16:10	1182.07	92.07	725.68	91.65
5/12/17 16:20	1182.12	91.40	726.06	91.03
5/12/17 16:30	1182.05	93.73	726.36	93.52
5/12/17 16:40	1182.06	93.02	726.67	92.64
5/12/17 16:50	1182.09	92.75	726.96	92.50
5/12/17 17:00	1182.09	92.32	727.33	92.10
5/12/17 17:10	1182.03	93.11	727.61	92.79
5/12/17 17:20	1182.09	92.32	727.91	92.07
5/12/17 17:30	1182.06	93.06	728.23	92.88
5/12/17 17:40	1182.06	91.60	728.45	91.40
5/12/17 17:50	1182.05	91.47	728.72	91.29
5/12/17 18:00	1182.01	92.78	729.03	92.74
5/12/17 18:10	1182.00	92.86	729.22	92.77
5/12/17 18:20	1182.05	91.47	729.47	91.29
5/12/17 18:30	1181.98	91.88	729.70	91.62
5/12/17 18:40	1182.01	91.57	729.97	91.50
5/12/17 18:50	1181.96	91.07	730.19	91.06
5/12/17 19:00	1182.01	89.05	730.41	89.04
5/12/17 19:10	1181.92	90.19	730.65	90.10
5/12/17 19:20	1181.97	88.35	730.88	88.36
5/12/17 19:30	1181.89	88.93	731.16	88.94
5/12/17 19:40	1181.90	88.52	731.36	88.57
5/12/17 19:50	1181.90	87.87	731.60	87.94
5/12/17 20:00	1181.90	86.31	731.84	86.32
5/12/17 20:10	1181.89	84.58	732.07	84.55
5/12/17 20:20	1181.89	82.69	732.31	82.58
5/12/17 20:30	1181.84	80.56	732.52	80.39
5/12/17 20:40	1181.89	78.01	732.76	77.77
5/12/17 20:50	1181.85	75.21	732.96	74.95
5/12/17 21:00	1181.81	72.92	733.27	72.68
5/12/17 21:10	1181.83	71.05	733.49	70.79
5/12/17 21:20	1181.80	69.52	733.76	69.27
5/12/17 21:30	1181.77	68.32	734.03	68.08
5/12/17 21:40	1181.70	67.34	734.31	67.08
5/12/17 21:50	1181.67	66.74	734.63	66.50
5/12/17 22:00	1181.67	66.34	734.90	66.09
5/12/17 22:10	1181.63	65.84	735.23	65.62
5/12/17 22:20	1181.61	65.22	735.55	65.02
5/12/17 22:30	1181.64	64.43	735.93	64.24
5/12/17 22:40	1181.61	63.71	736.27	63.52
5/12/17 22:50	1181.61	62.96	736.64	62.76
5/12/17 23:00	1181.60	62.28	736.99	62.08
5/12/17 23:10	1181.60	61.69	737.39	61.47
5/12/17 23:20	1181.58	61.16	737.80	60.95
5/12/17 23:30	1181.59	60.65	738.25	60.45

TEST PRESSURE

Well Name:	State LPG Storage No. 4
Operator:	Western Refining Company, L.P.
State:	NM
County/Parish:	Lea
Field:	Jal
Serial/API:	30-025-35957

PRESSURE INFORMATION

Date / Time	Annulus Pressure		Tubing Pressure	
	Pressure	Temp	Pressure	Temp
	psig	deg F	psig	deg F
5/12/17 23:40	1181.56	60.29	738.67	60.10
5/12/17 23:50	1181.56	60.01	739.14	59.83
5/13/17 0:00	1181.54	59.65	739.60	59.49
5/13/17 0:10	1181.53	59.35	740.08	59.15
5/13/17 0:20	1181.52	59.08	740.57	58.88
5/13/17 0:30	1181.52	58.86	741.03	58.66
5/13/17 0:40	1181.51	58.81	741.48	58.59
5/13/17 0:50	1181.51	58.51	742.00	58.33
5/13/17 1:00	1181.48	58.29	742.51	58.13
5/13/17 1:10	1181.48	57.86	743.12	57.72
5/13/17 1:20	1181.47	57.26	743.65	57.12
5/13/17 1:30	1181.50	56.60	744.19	56.44
5/13/17 1:40	1181.48	56.11	744.72	55.95
5/13/17 1:50	1181.47	55.61	745.23	55.47
5/13/17 2:00	1181.46	55.15	745.74	55.03
5/13/17 2:10	1181.45	55.10	746.27	54.95
5/13/17 2:20	1181.42	55.23	746.79	55.04
5/13/17 2:30	1181.41	55.25	747.35	55.06
5/13/17 2:40	1181.39	55.22	747.89	55.03
5/13/17 2:50	1181.39	55.35	748.44	55.16
5/13/17 3:00	1181.37	55.25	749.05	55.09
5/13/17 3:10	1181.40	54.83	749.60	54.68
5/13/17 3:20	1181.41	54.47	750.18	54.30
5/13/17 3:30	1181.38	54.38	750.72	54.19
5/13/17 3:40	1181.37	54.50	751.31	54.30
5/13/17 3:50	1181.34	54.37	751.90	54.19
5/13/17 4:00	1181.33	54.13	752.49	53.96
5/13/17 4:10	1181.37	53.74	753.07	53.58
5/13/17 4:20	1181.34	53.31	753.67	53.15
5/13/17 4:30	1181.35	52.96	754.28	52.80
5/13/17 4:40	1181.34	52.61	754.84	52.48
5/13/17 4:50	1181.34	52.09	755.44	51.97
5/13/17 5:00	1181.35	51.79	756.02	51.68
5/13/17 5:10	1181.34	51.55	756.61	51.44
5/13/17 5:20	1181.31	51.42	757.28	51.29
5/13/17 5:30	1181.30	51.19	757.92	51.06
5/13/17 5:40	1181.30	50.89	758.52	50.77
5/13/17 5:50	1181.29	50.71	759.10	50.61
5/13/17 6:00	1181.30	50.26	759.68	50.14
5/13/17 6:10	1181.30	49.60	760.28	49.49
5/13/17 6:20	1181.30	48.94	760.88	48.82
5/13/17 6:30	1181.29	48.33	761.51	48.23
5/13/17 6:40	1181.31	47.90	762.11	47.78
5/13/17 6:50	1181.29	47.65	762.69	47.55
5/13/17 7:00	1181.26	47.78	763.28	47.72
5/13/17 7:10	1180.97	48.54	749.37	48.61
5/13/17 7:20	1180.98	50.15	750.16	50.22

TEST PRESSURE

Well Name:	State LPG Storage No. 4
Operator:	Western Refining Company, L.P.
State:	NM
County/Parish:	Lea
Field:	Jal
Serial/API:	30-025-35957

PRESSURE INFORMATION

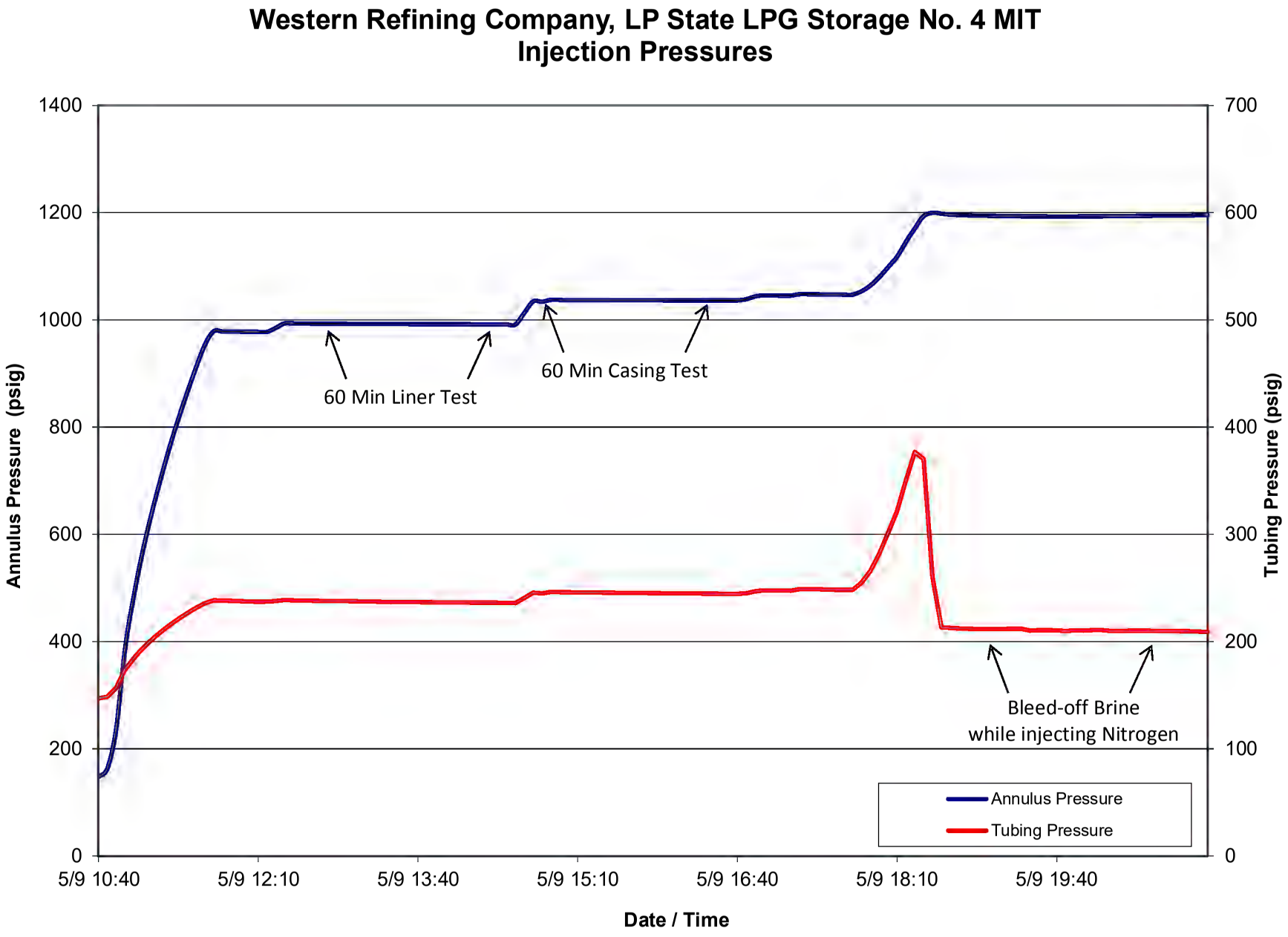
Date / Time	Annulus Pressure		Tubing Pressure	
	Pressure	Temp	Pressure	Temp
	psig	deg F	psig	deg F
5/13/17 7:30	1180.88	52.28	750.85	52.43
5/13/17 7:40	1180.85	54.65	751.12	54.81
5/13/17 7:50	1180.83	56.90	750.86	57.13
5/13/17 8:00	1180.82	59.26	747.39	59.52
5/13/17 8:10	1180.74	61.95	744.80	62.22
5/13/17 8:20	1180.70	64.61	743.13	64.94
5/13/17 8:30	1180.71	66.65	741.03	67.05
5/13/17 8:40	1180.75	67.66	740.35	68.13
5/13/17 8:50	1180.71	68.50	739.79	68.89
5/13/17 9:00	1180.72	69.93	740.37	70.31

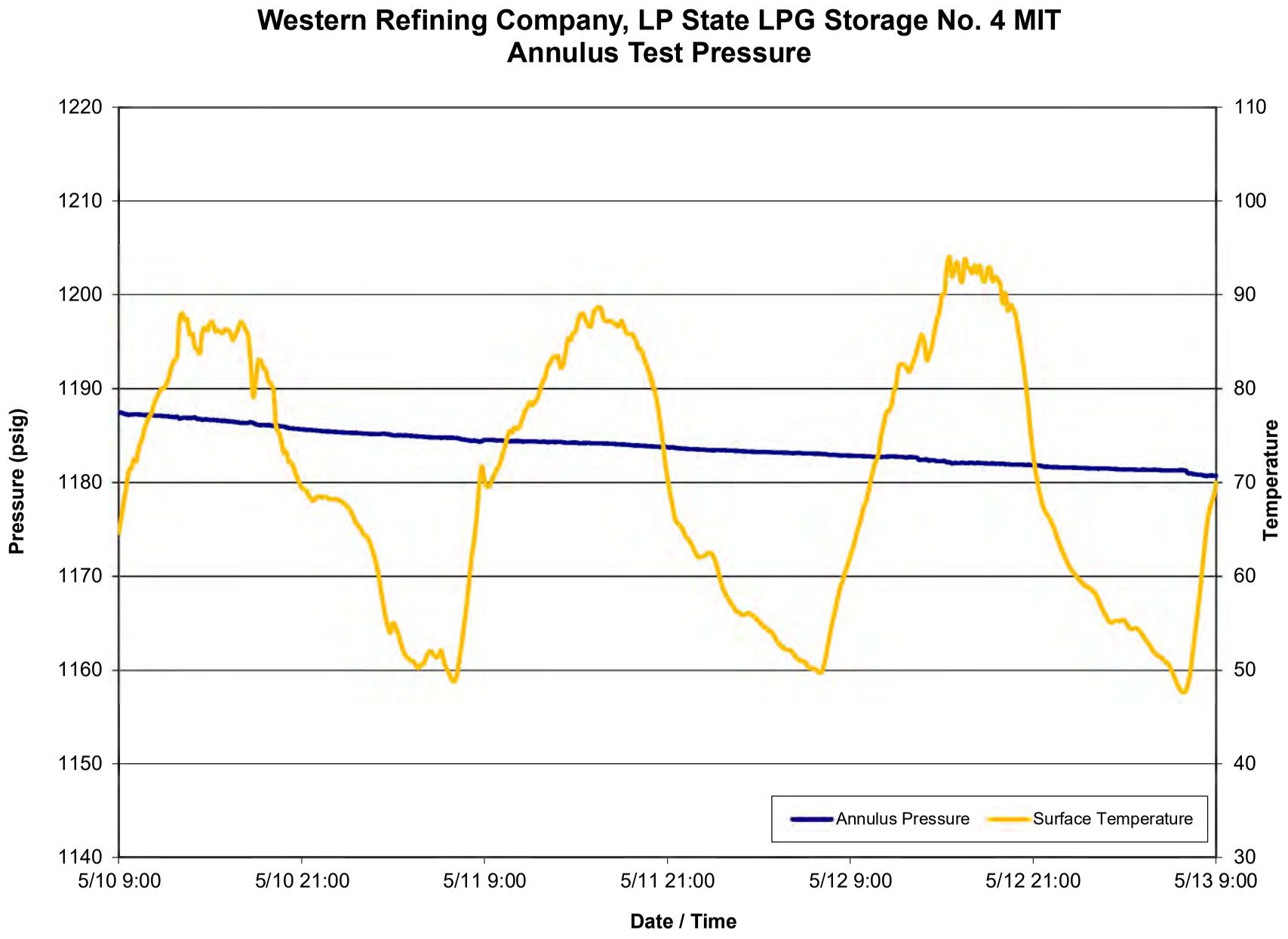
Appendix D – Calculated Borehole Volumes

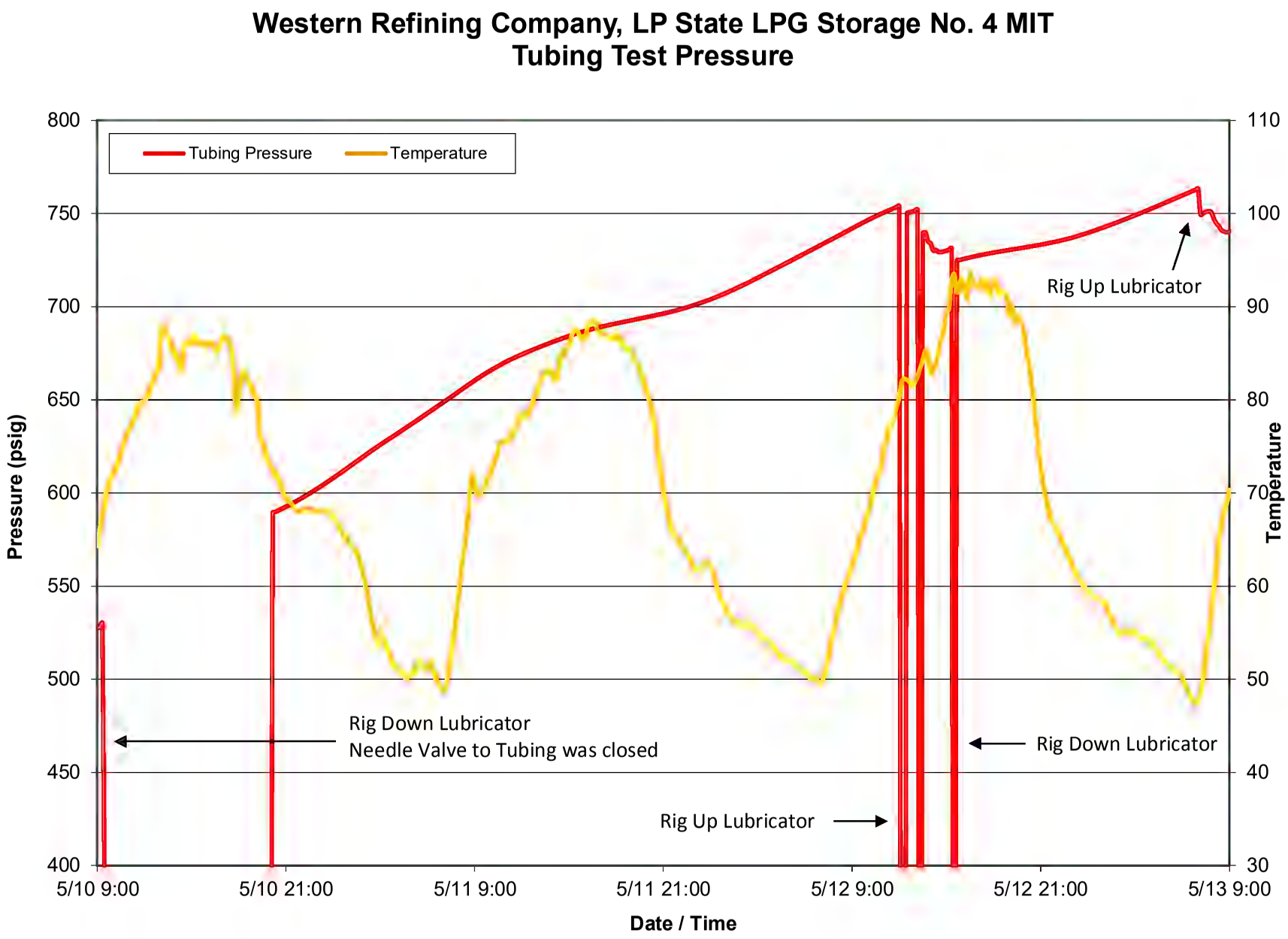
Western Refining Company, LP State LPG Storage No. 4 MIT - Borehole Calculations
Nitrogen Volumes

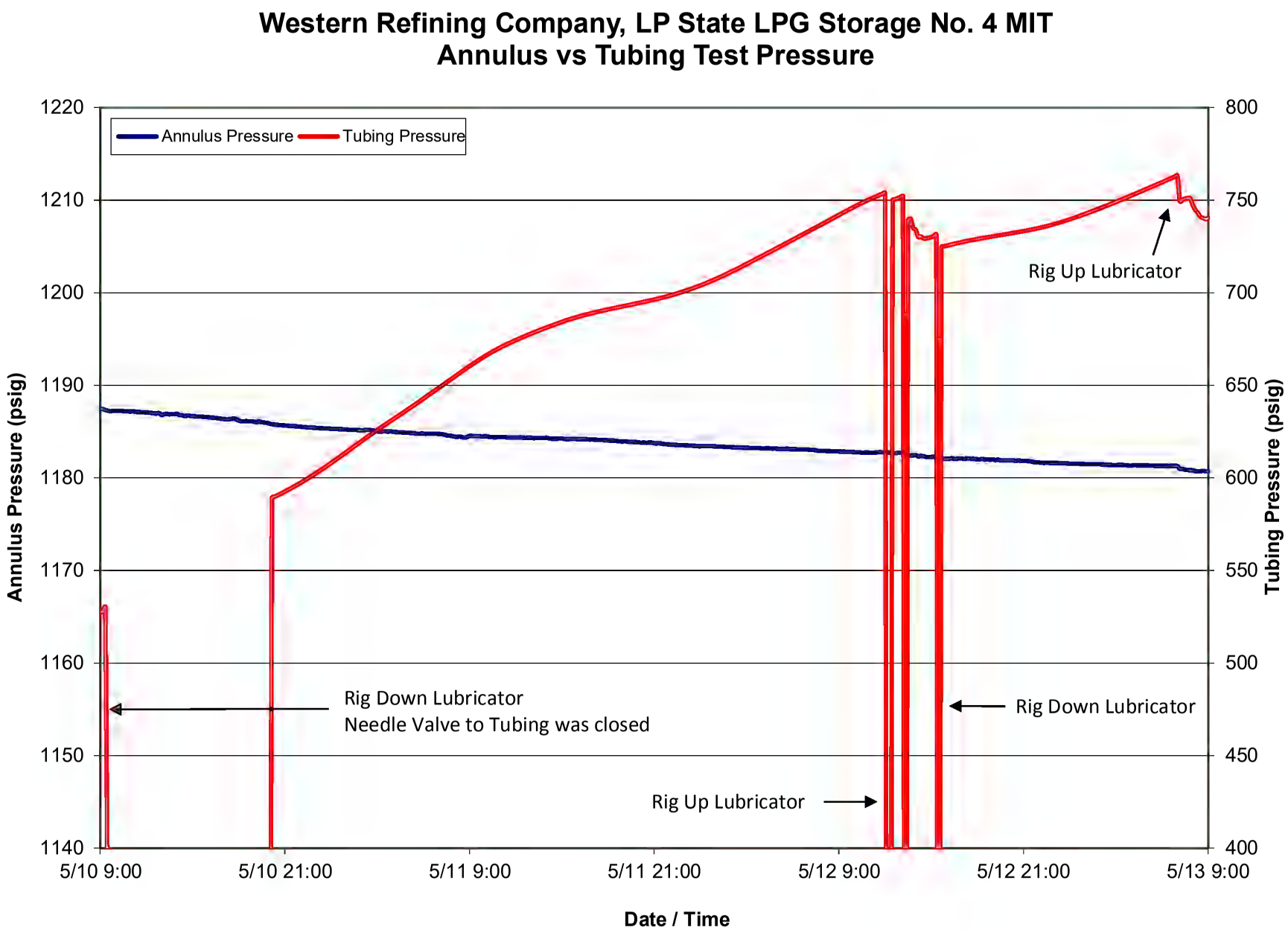
I/F Depth Logged [ft]	N2 Volume Turbine Cumulative [scf]	N2 Pressure Gauge [psig]	Borehole Volume Cumulative [bbls]	Borehole Volume Incremental Per Interval [bbls]	Borehole Volume Incremental Per Foot [bbls/ft]
1665	39700	1110.49	92.51	43.11	7.18
1666	67200	1198.44	145.42	52.91	52.91
1667	82800	1196.98	179.38	33.97	33.97
1668	107300	1194.83	232.86	53.48	53.48
1669	125965	1193.89	273.57	40.71	40.71
1670	142665	1193.41	309.96	36.38	36.38
1671	162865	1192.79	354.02	44.06	44.06
1672	177465	1192.74	385.76	31.74	31.74
1673	194665	1192.76	423.14	37.37	37.37
1674	214265	1193.15	465.59	42.45	42.45
1675	228565	1193.43	496.54	30.95	30.95
1676	244565	1193.74	531.15	34.62	34.62
1677	259265	1193.96	562.97	31.81	31.81
1678	273665	1194.11	594.15	31.19	31.19
1679	285665	1194.34	620.08	25.93	25.93
1680	295865	1194.73	642.01	21.92	21.92
1681	304465	1195.41	660.29	18.29	18.29
1682	310265	1195.67	672.72	12.43	12.43

Appendix E – Pressure and Temperature Graphs

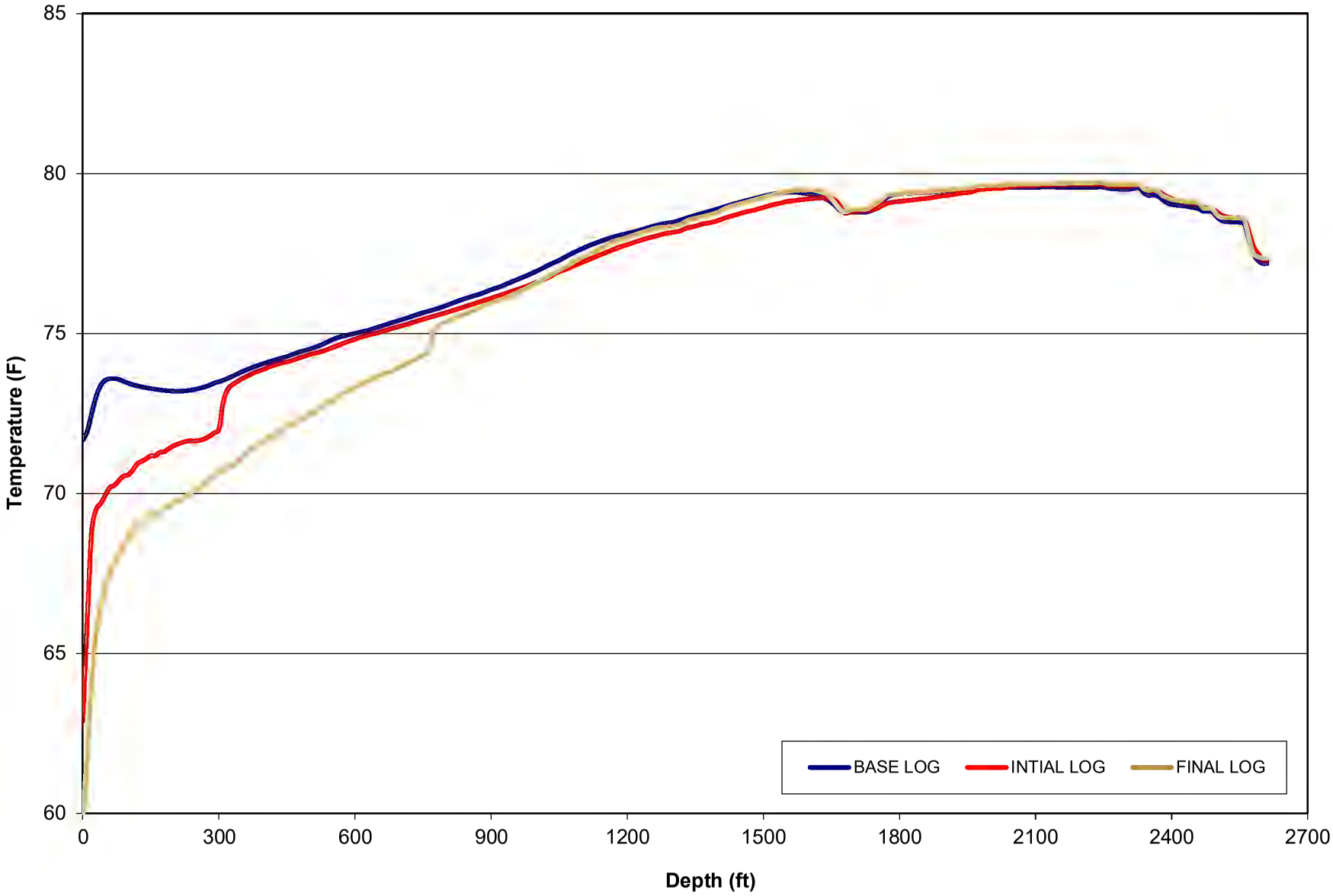

Western Refining Company, LP State LPG Storage No. 4 MIT
Injection Pressures
Annulus Pressure (psig)
Tubing Pressure (psig)
Date / Time
1400
1200
1000
800
600
400
200
0
700
600
500
400
300
200
100
0
5/9 10:40
5/9 12:10
5/9 13:40
5/9 15:10
5/9 16:40
5/9 18:10
5/9 19:40
60 Min Liner Test
60 Min Casing Test
Bleed-off Brine
while injecting Nitrogen
Annulus Pressure
Tubing Pressure


Western Refining Company, LP State LPG Storage No. 4 MIT
Annulus Test Pressure
Pressure (psig)
Temperature
Date / Time
1220
1210
1200
1190
1180
1170
1160
1150
1140
110
100
90
80
70
60
50
40
30
5/10 9:00
5/10 21:00
5/11 9:00
5/11 21:00
5/12 9:00
5/12 21:00
5/13 9:00
Annulus Pressure
Surface Temperature


Western Refining Company, LP State LPG Storage No. 4 MIT
Tubing Test Pressure
Tubing Pressure
Temperature
Pressure (psig)
Temperature
Date / Time
800
750
700
650
600
550
500
450
400
110
100
90
80
70
60
50
40
30
5/10 9:00
5/10 21:00
5/11 9:00
5/11 21:00
5/12 9:00
5/12 21:00
5/13 9:00
Rig Up Lubricator
Rig Down Lubricator
Needle Valve to Tubing was closed
Rig Down Lubricator
Rig Up Lubricator


Western Refining Company, LP State LPG Storage No. 4 MIT
Annulus vs Tubing Test Pressure
Annulus Pressure
Tubing Pressure
Annulus Pressure (psig)
Tubing Pressure (psig)
1220
1210
1200
1190
1180
1170
1160
1150
1140
800
750
700
650
600
550
500
450
400
5/10 9:00
5/10 21:00
5/11 9:00
5/11 21:00
5/12 9:00
5/12 21:00
5/13 9:00
Date / Time
Rig Up Lubricator
Rig Down Lubricator
Needle Valve to Tubing was closed
Rig Down Lubricator
Rig Up Lubricator

Western Refining Company, LP State LPG Storage No. 4 MIT
Wellbore Temperature Graph



Appendix F – Well Logs

EMPIRE WIRELINE, LLC

MIT - Density Survey

Company: Western Refining Company, LP
Well: State LPG Storage No. 004
Field: Jal
Area: Lea County
State: New Mexico

Company: Western Refining Company, LP
Well: State LPG Storage No. 004
Field: Jal
Area: Lea County
State: New Mexico

Location: N/A
API # : 30-025-35957 SEC: N/A TWP: N/A RGE: N/A

Other Services

Temperature

Permanent Datum: Ground Level Elevation: N/A
Log Measured From: B.H.F. N/A Above P.D.
Drilling Measured From: Kelly Bushing

Elevation's
K.B. N/A
D.F. N/A
G.L. N/A

	Run Information	Run No. 1	Run No. 2	Run No. 3	Run No. 4
	Date of Service	09-May-2017	10-May-2017	12-May-2017	13-May-2017
Depth	Depth Driller or PBTD	N/A	N/A	N/A	N/A
	Empire Depth	2,613 ft	2,613 ft	2,613 ft	2,613 ft
	Bottom Log Interval	2,612 ft	2,612 ft	2,612 ft	2,612 ft
	Top Log Interval	Surface	Surface	Surface	Surface
	Interface Depth	N/A	1,682 ft	1,682 ft	1,682 ft
Well Info	Fluid Type	Brine	Brine	Brine	Brine
	Fluid Density	N/A	N/A	N/A	N/A
	Fluid Level	Surface	308 ft	748 ft	778 ft
	Tubing Pressure	50 PsiA	500 PsiA	700 PsiA	730 PsiA
	Wellhead Connection	4-1/16 in 3K	4-1/16 in 3K	4-1/16 in 3K	4-1/16 in 3K
Time	Time - Ran In Well	08:15	06:30	12:15	06:15
	Time - Temp. Start	08:15	06:45	12:30	06:30
	Time - Density Start	08:15	08:00	13:40	08:00
	Time - Out of Well	21:15	09:00	14:30	09:00
Time	Location	Broussard, LA	Broussard, LA	Broussard, LA	Broussard, LA
	Unit No. / Wire Size	P-03 / 1/4 in	P-03 / 1/4 in	P-03 / 1/4 in	P-03 / 1/4 in
	Recorded By	C. Cross	C. Cross	C. Cross	C. Cross
	Witnessed By	Mr. Will George	Mr. Will George	Mr. Will George	Mr. Will George

CSG / TBG Record	Size	Wt/Ft	Top	Bottom
Surface Casing	13-5/8 in	54.5 lb/ft	Surface	423 ft
Production Casing	9-5/8 in	36 lb/ft	Surface	1,659 ft
Liner	7 in	23 lb/ft	Surface	1,575 ft
Hanging String	4-1/2 in	N/A	Surface	29.45 ft
Hanging String	3-1/2 in	Drill Pipe	29.45 ft	2,592 ft

<< Fold Here >>

Comments

Tool Zeroed at B.H.F. with no depth correction applied.

Sensor	Offset (ft)	Schematic	Description	Length (ft)	O.D. (in)	Weight (lb

Tungsten-1-11/16x7 Weigh Bar Tungten 1-11/16" x 7'	7.00	1.69	84.00
GDT_WTC-WTS06 (14023103) Digital Telemetry GDTBus	1.82	1.69	8.60
GDT_CCL-CCL10 (14023401) Digital CCL GDTBus	1.35	1.69	6.20
GDT_RDT-RDT04 (14023128)	1.19	0.00	
GDT_GRT2-GRT10-1 (14023359) Secondary Gamma Ray Tool GDTBus	2.23	1.69	10.40
Density-DensitySub (01)	1.63	1.88	8.00

CRCCnt	6.39
FrmCnt	6.39
WTSTime	6.39
WTSTemp	6.39
CHV	6.39
CCL	5.47
RDTTemp	4.14
GR2	1.63
Density2	1.12
Density1	1.12

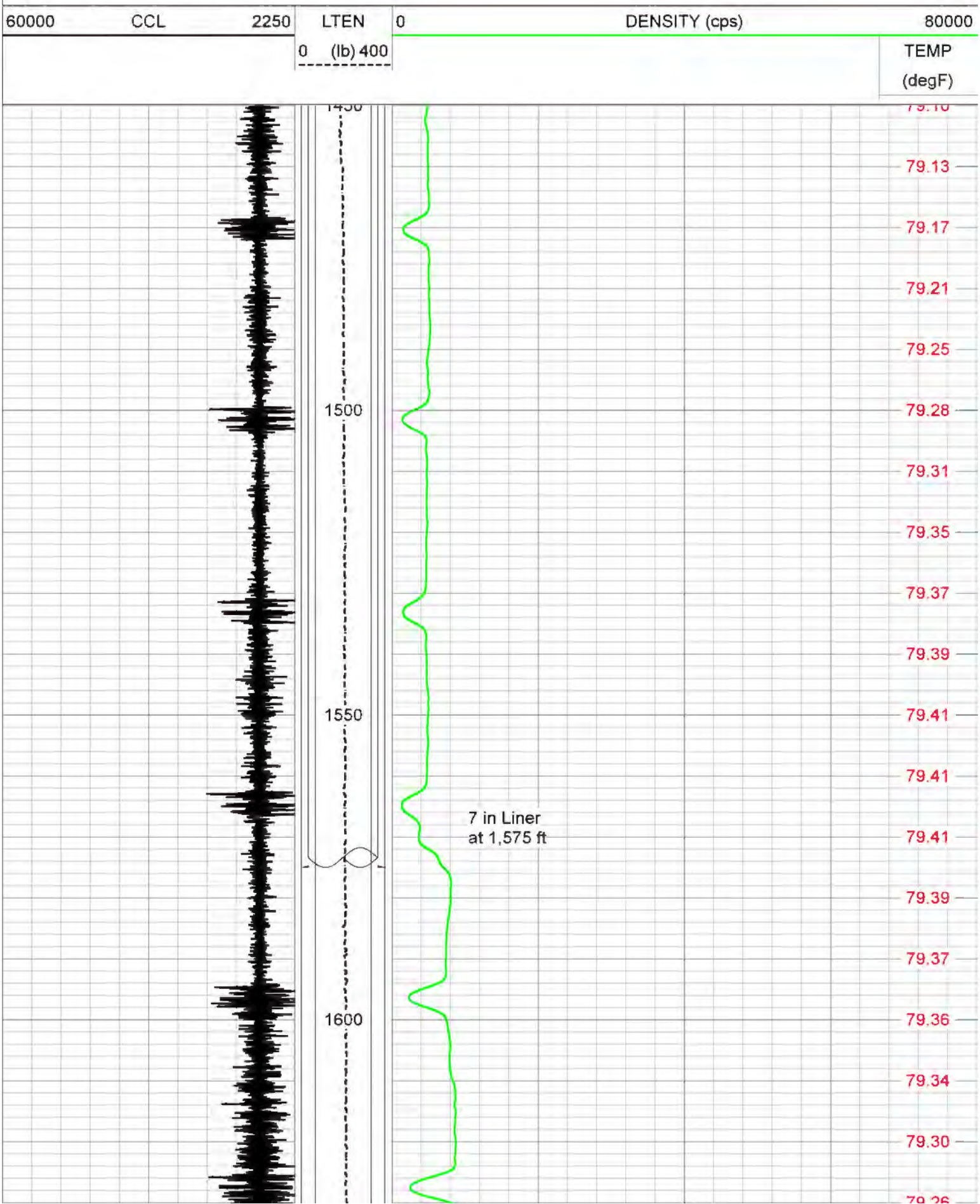
Dataset: westernrefinery_lpgs04_20170509_gdt-mit.db: field/well/run1/170513-0800_Density-Final
Total length: 15.21 ft
Total weight: 117.20 lb
O.D.: 1.88 in

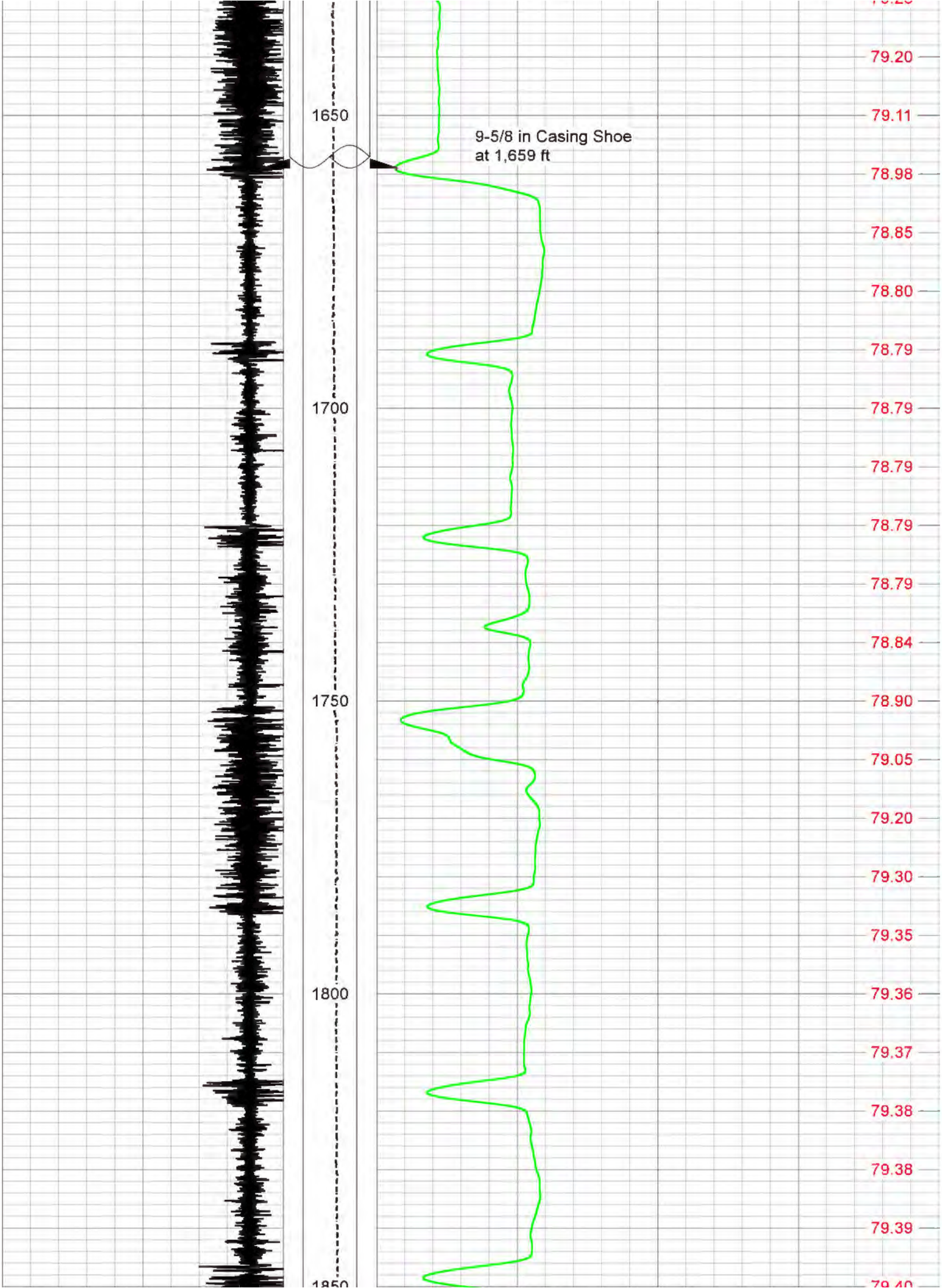
EMPIRE WIRELINE, LLC

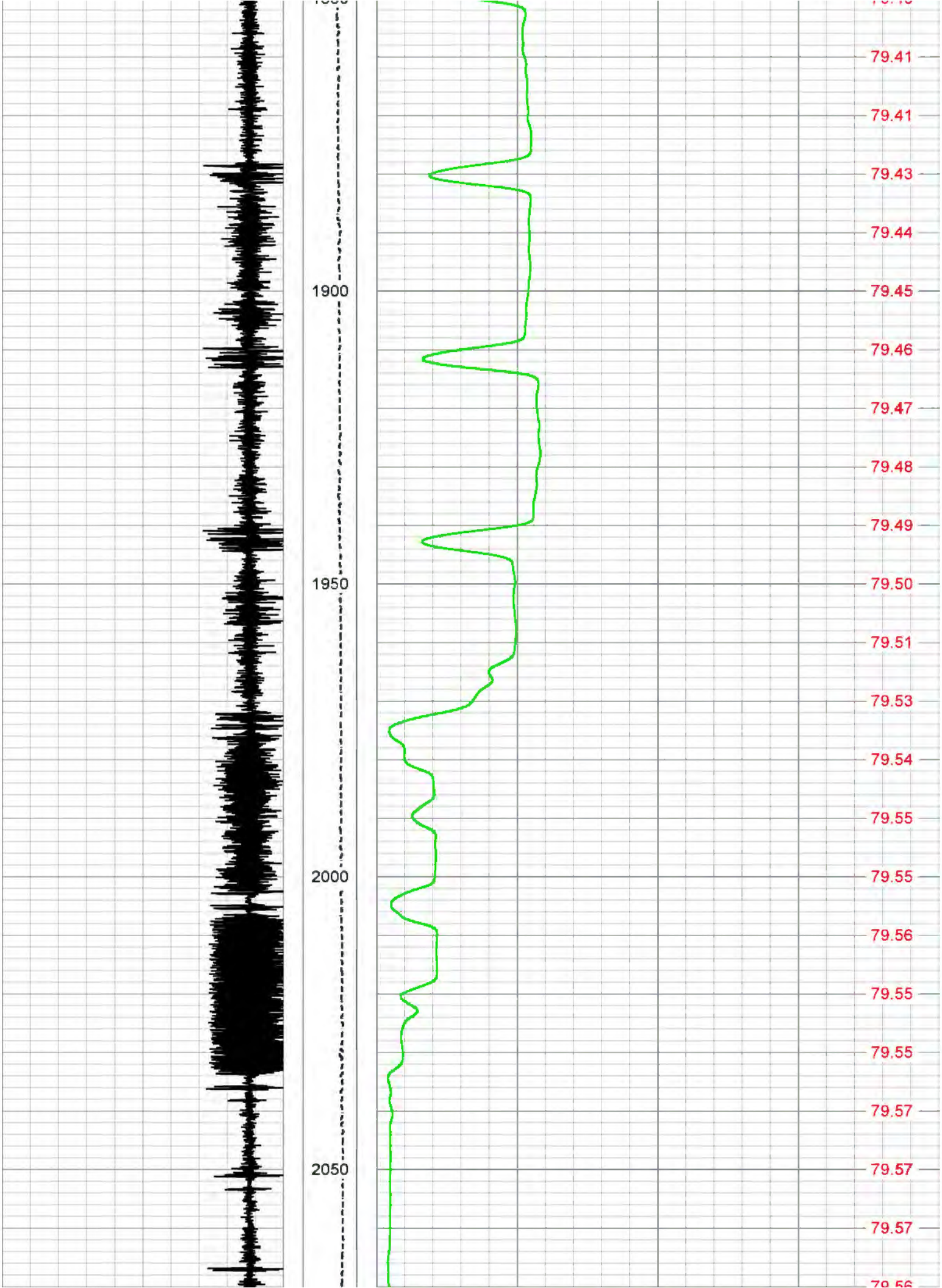
Density - Baseline

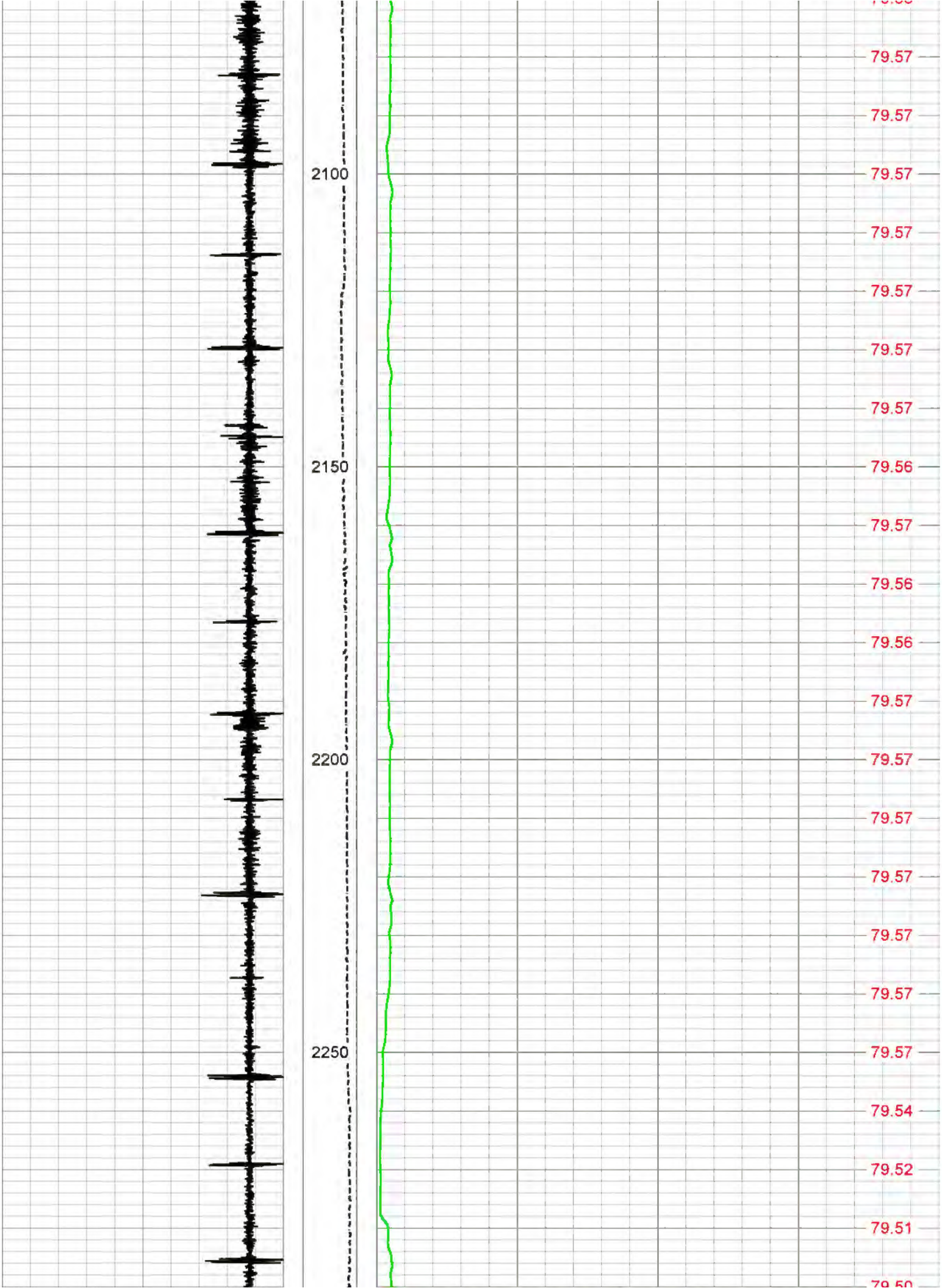
09-May-2017 at 08:15

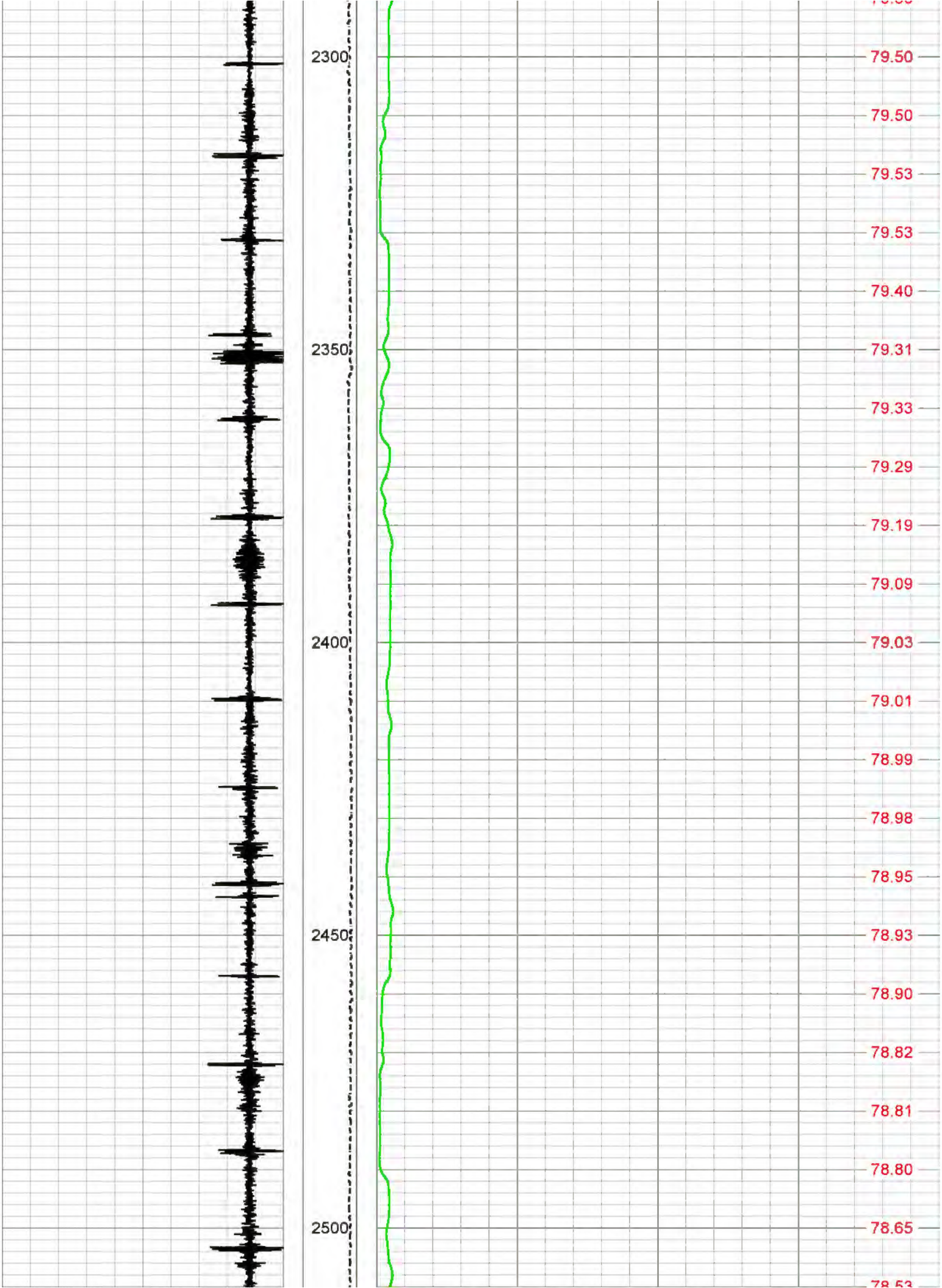
Database File	westernrefinery_lpgs04_20170509_gdt-mit.db
Dataset Pathname	170509-0815_Temp-Den
Presentation Format	cc-tempdensity
Dataset Creation	Tue May 09 09:15:01 2017
Charted by	Depth in Feet scaled 1:240

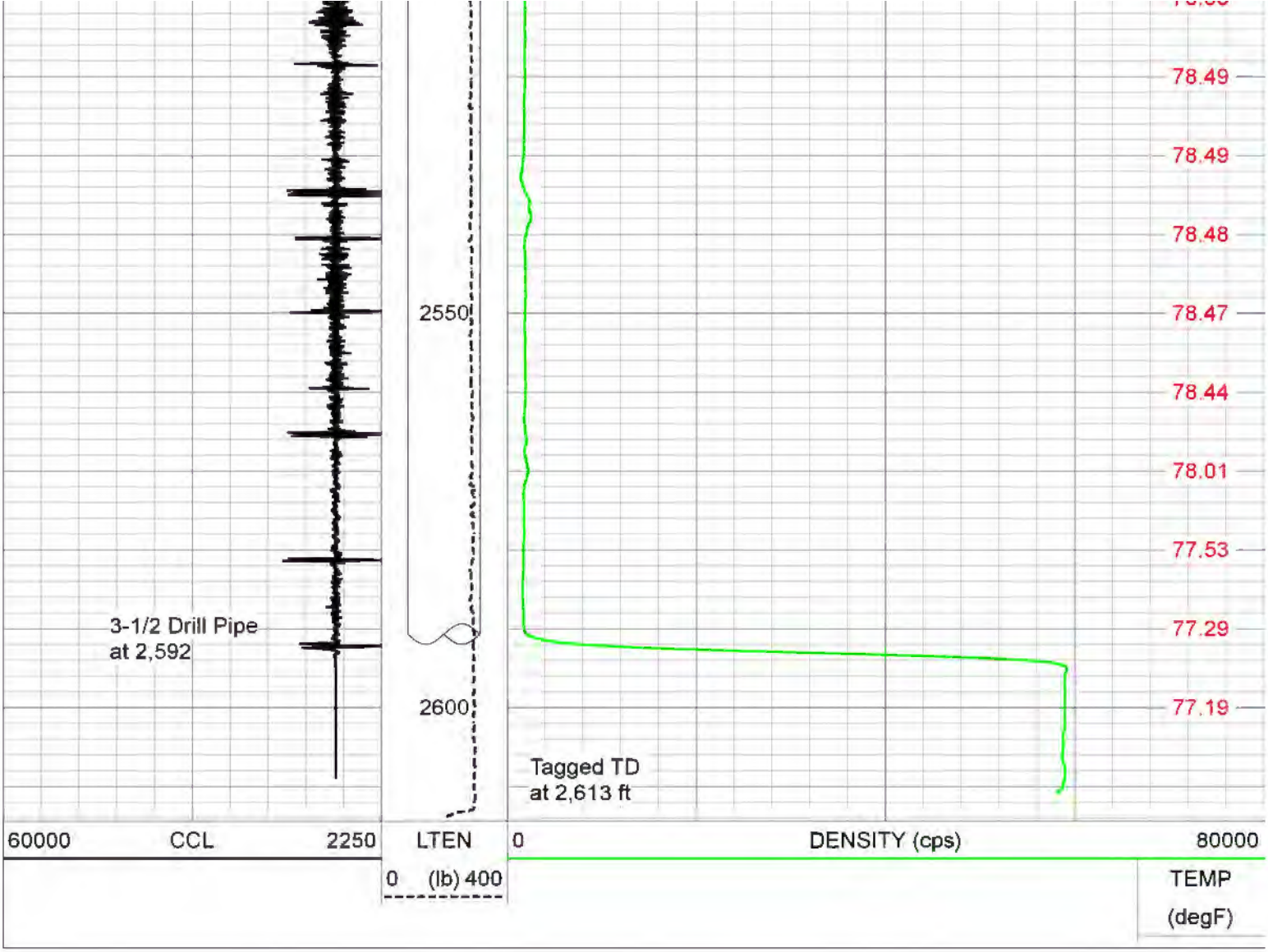



1650
1700
1750
1800
1850
9-5/8 in Casing Shoe
at 1,659 ft
79.20
79.11
78.98
78.85
78.80
78.79
78.79
78.79
78.79
78.79
78.84
78.90
79.05
79.20
79.30
79.35
79.36
79.37
79.38
79.38
79.39
79.40


1900
1950
2000
2050
79.41
79.41
79.43
79.44
79.45
79.46
79.47
79.48
79.49
79.50
79.51
79.53
79.54
79.55
79.55
79.56
79.55
79.55
79.57
79.57
79.57
79.56


2100
2150
2200
2250
79.57
79.57
79.57
79.57
79.57
79.57
79.57
79.56
79.57
79.56
79.56
79.57
79.57
79.57
79.57
79.57
79.57
79.57
79.54
79.52
79.51
79.50


2300
2350
2400
2450
2500
79.50
79.50
79.53
79.53
79.40
79.31
79.33
79.29
79.19
79.09
79.03
79.01
78.99
78.98
78.95
78.93
78.90
78.82
78.81
78.80
78.65



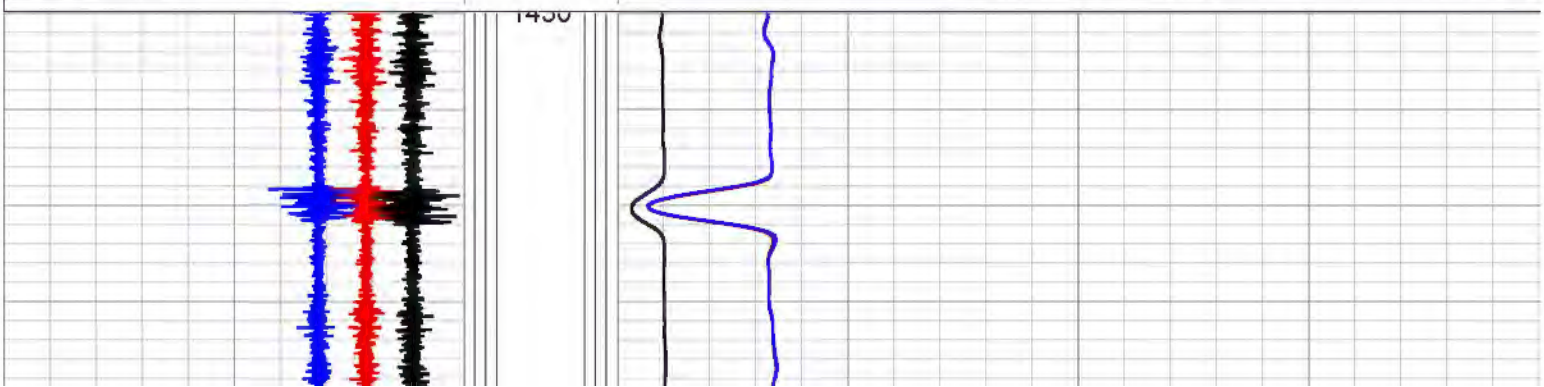
EMPIRE WIRELINE, LLC

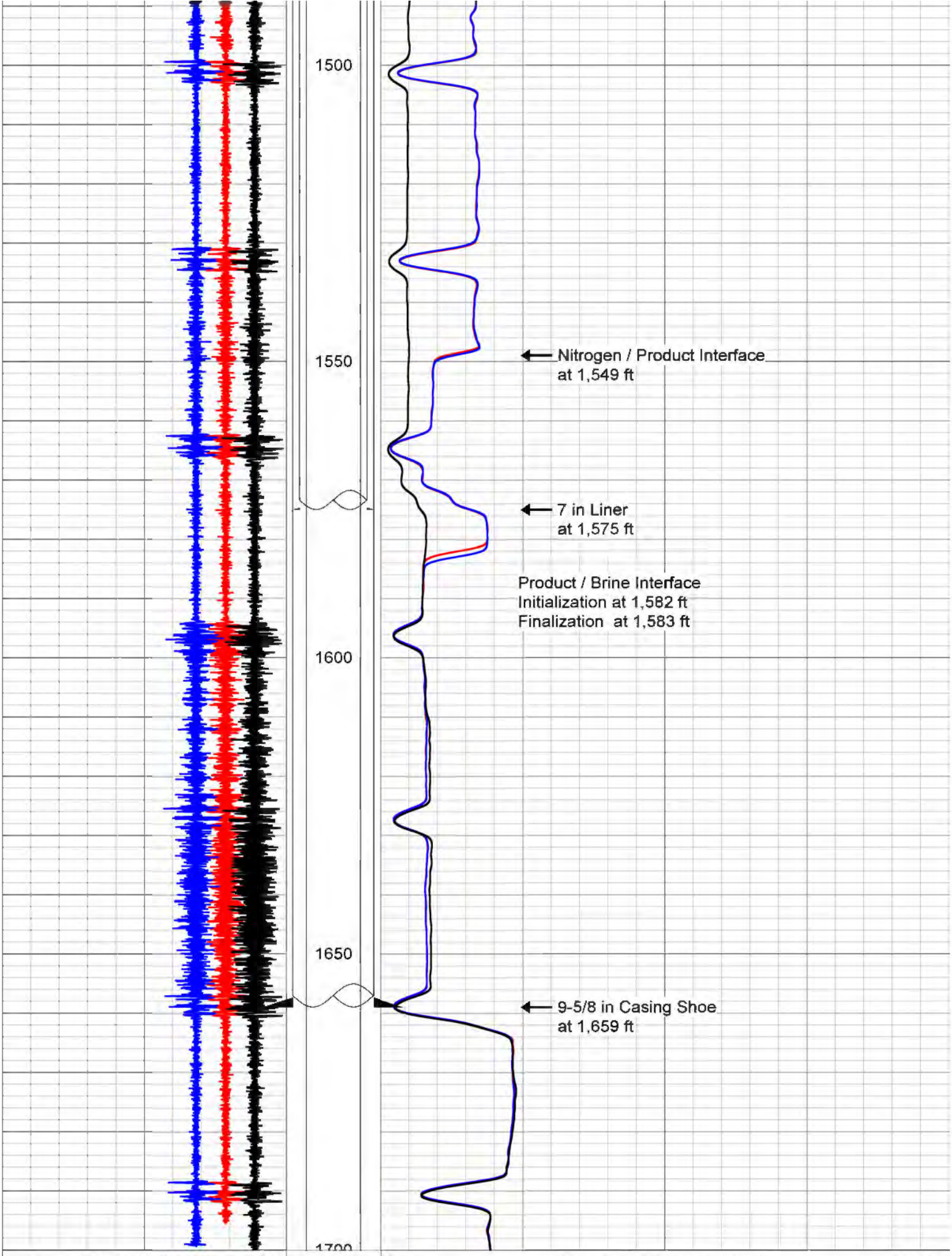
Density - Liner Test

09-May-2017 - Black = Baseline at 08:15,
Red = Initialization at 12:15, Blue = Finalizatin at 13:15

Database File	westernrefinery_lpgs04_20170509_gdt-mit.db
Dataset Pathname	M-Liner
Presentation Format	cc-tempdensitymerg
Dataset Creation	Tue May 09 15:52:11 2017
Charted by	Depth in Feet scaled 1:240

80000	CCL - Initialization	-10000	0	Density - Initializaiton (cps)	100000
70000	CCL - Finalization	-19000	0	Density - Finalization (cps)	100000
90000	CCL - Baseline	-1000	0	Density - Baseline (cps)	100000




1500
1550
1600
1650
1700
Nitrogen / Product Interface
at 1,549 ft
7 in Liner
at 1,575 ft
Product / Brine Interface
Initialization at 1,582 ft
Finalization at 1,583 ft
9-5/8 in Casing Shoe
at 1,659 ft
80000 CCL - Initialization -10000
70000 CCL - Finalization -19000
0 Density - Initializaiton (cps) 100000
0 Density - Finalization (cps) 100000

90000	CCL - Baseline	-1000	0	Density - Baseline (cps)	100000

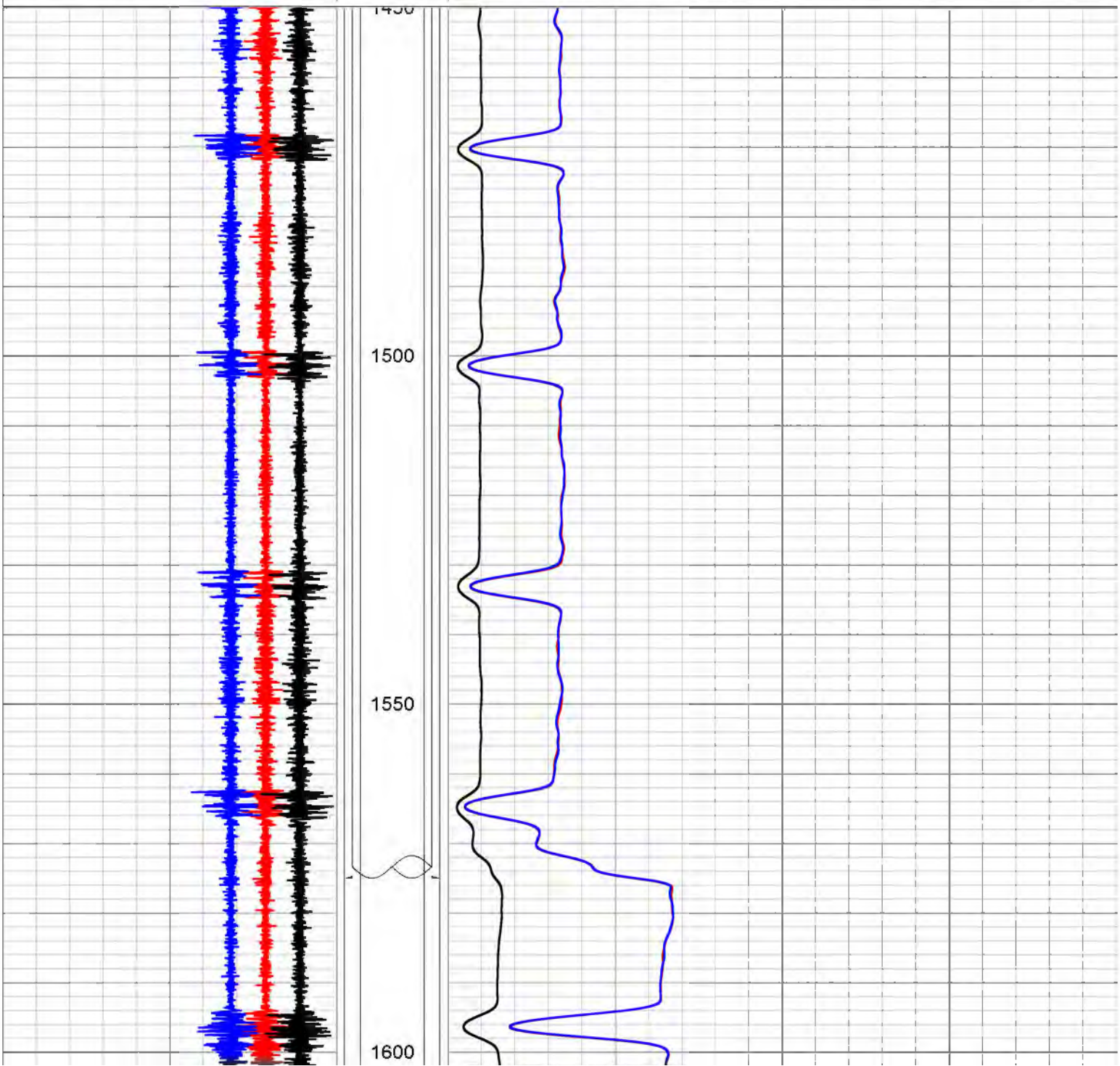
EMPIRE WIRELINE, LLC

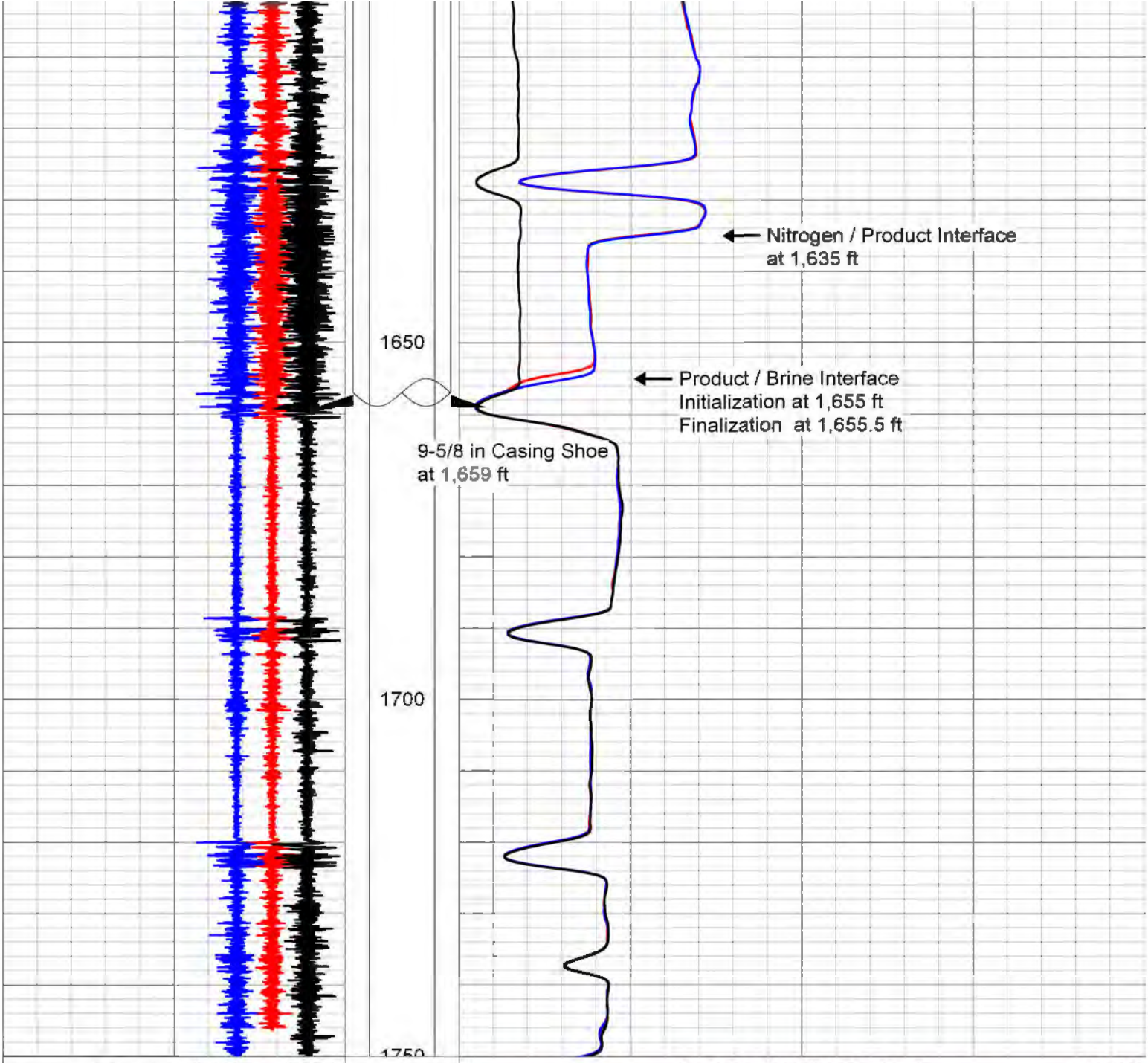
Density - Casing Test

09-May-2017 - Black = Baseline at 08:15,
Red = Initialization at 14:00, Blue = Finalizatin at 15:00

Database File	westernrefinery_lpgs04_20170509_gdt-mit.db
Dataset Pathname	M-CSG
Presentation Format	cc-tempdensitymerg
Dataset Creation	Tue May 09 16:20:20 2017
Charted by	Depth in Feet scaled 1:240

80000	CCL - Initialization	-10000	0	Density - Initializaiton (cps)	100000
70000	CCL - Finalization	-19000	0	Density - Finalization (cps)	100000
90000	CCL - Baseline	-1000	0	Density - Baseline (cps)	100000





80000	CCL - Initialization	-10000	0	Density - Initializaiton (cps)	100000
70000	CCL - Finalization	-19000	0	Density - Finalization (cps)	100000
90000	CCL - Baseline	-1000	0	Density - Baseline (cps)	100000

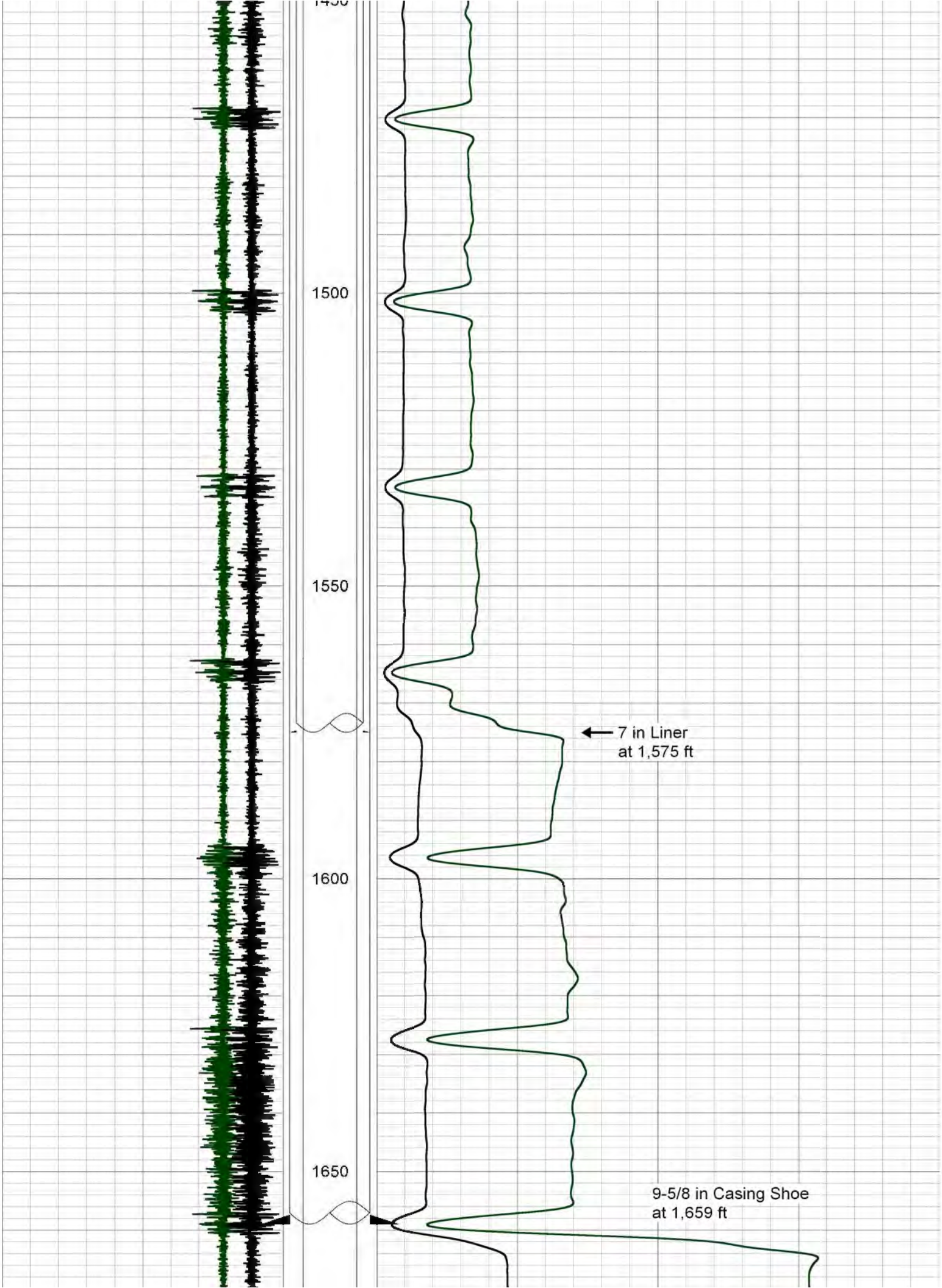
EMPIRE WIRELINE, LLC

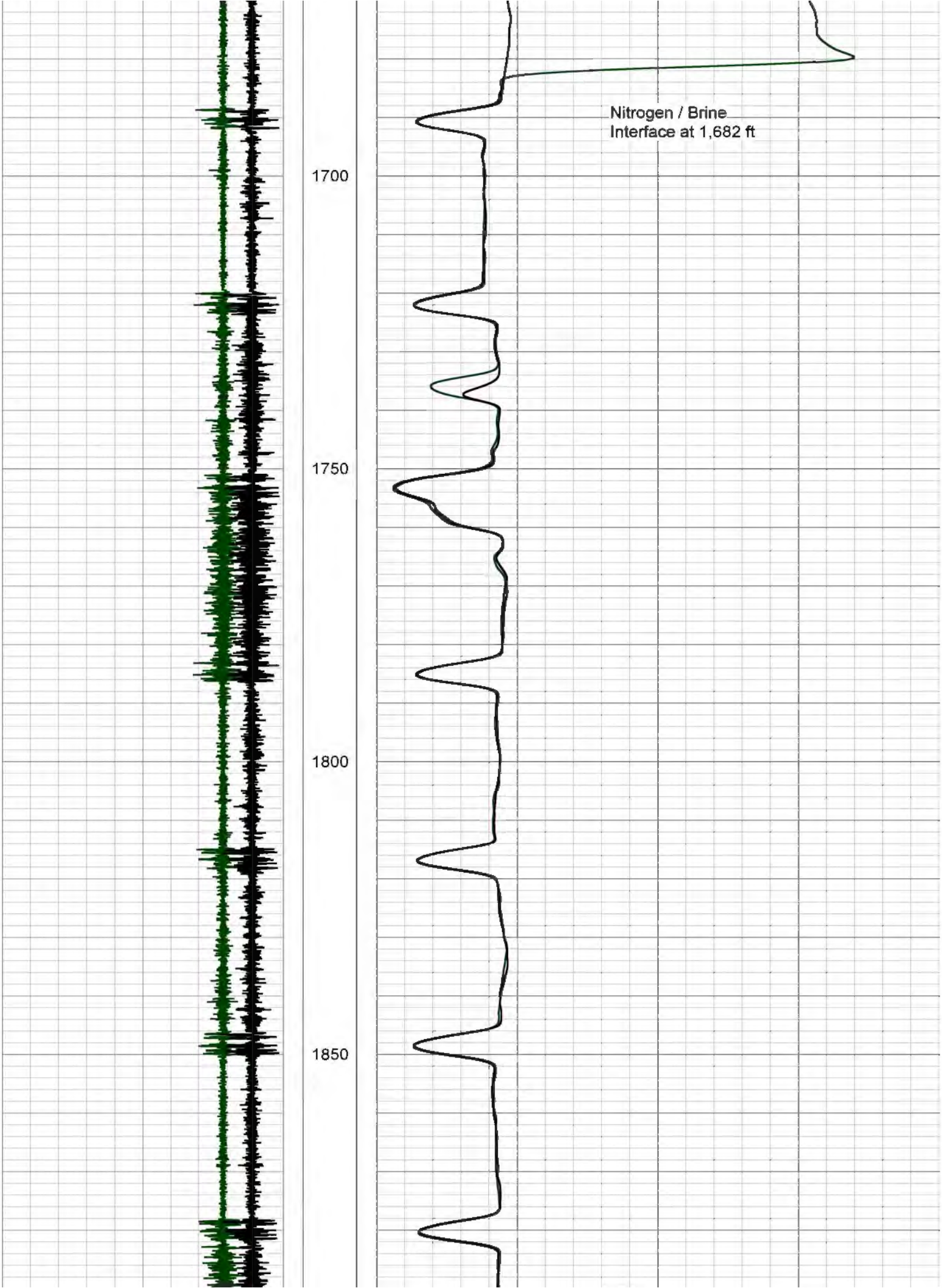
Density - Post Injection Overlay

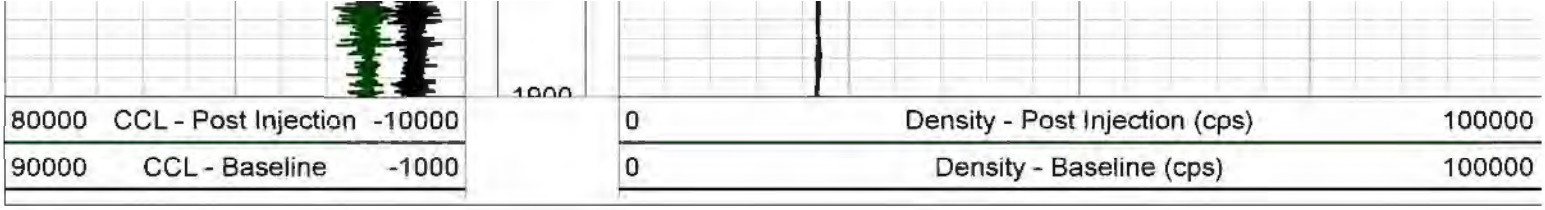
Black = Baseline on 09-May-2017 at 08:15,
Green = Post Injection on 09-May-2017 at 20:40

Database File	westernrefinery_lpgs04_20170509_gdt-mit.db
Dataset Pathname	M-PostInj
Presentation Format	cc-tempdensitymerg
Dataset Creation	Tue May 09 22:03:11 2017
Charted by	Depth in Feet scaled 1:240

80000	CCL - Post Injection	-10000	0	Density - Post Injection (cps)	100000
90000	CCL - Baseline	-1000	0	Density - Baseline (cps)	100000


1500
1550
1600
1650
7 in Liner
at 1,575 ft
9-5/8 in Casing Shoe
at 1,659 ft


Nitrogen / Brine
Interface at 1,682 ft
1700
1750
1800
1850

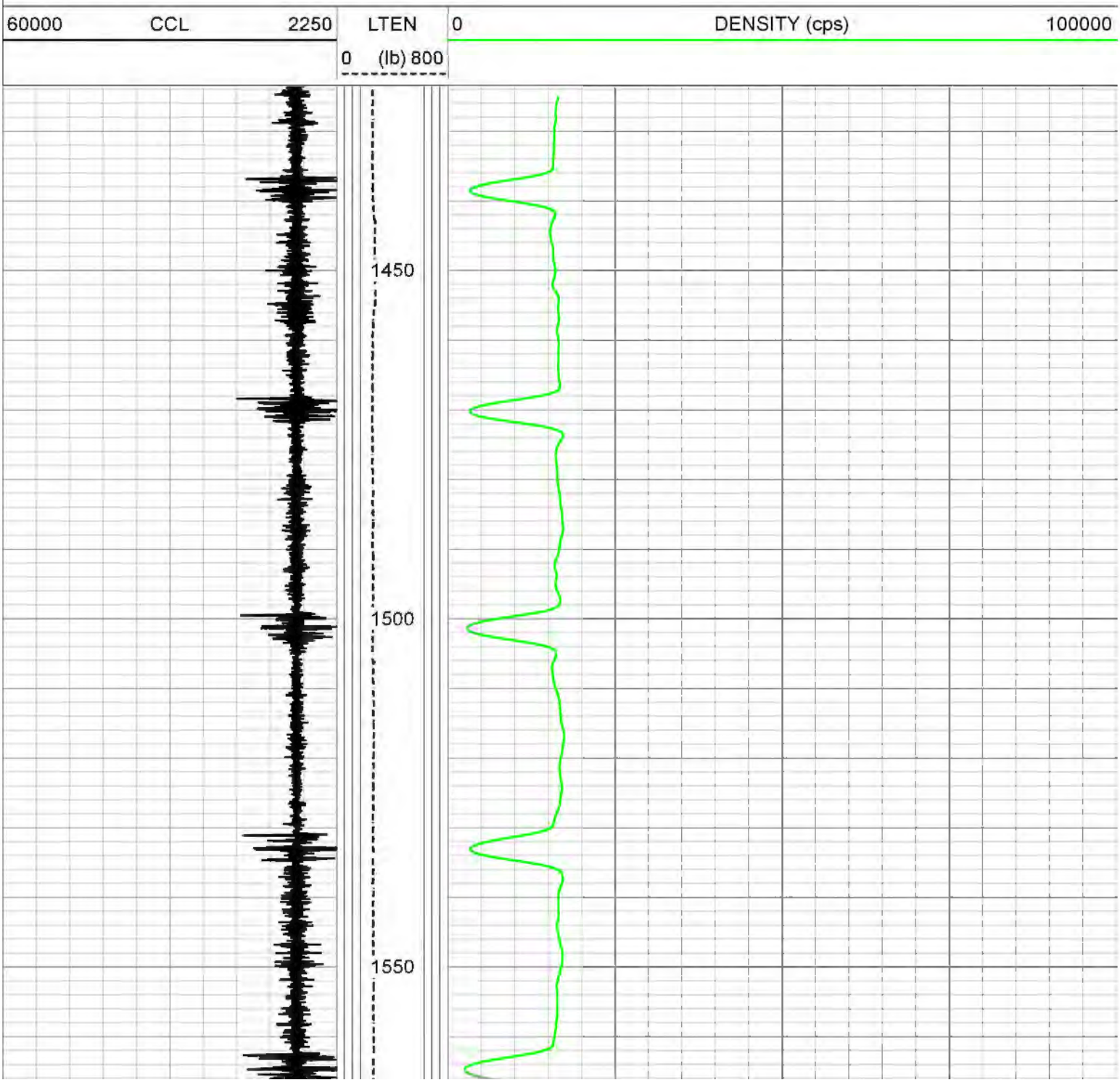


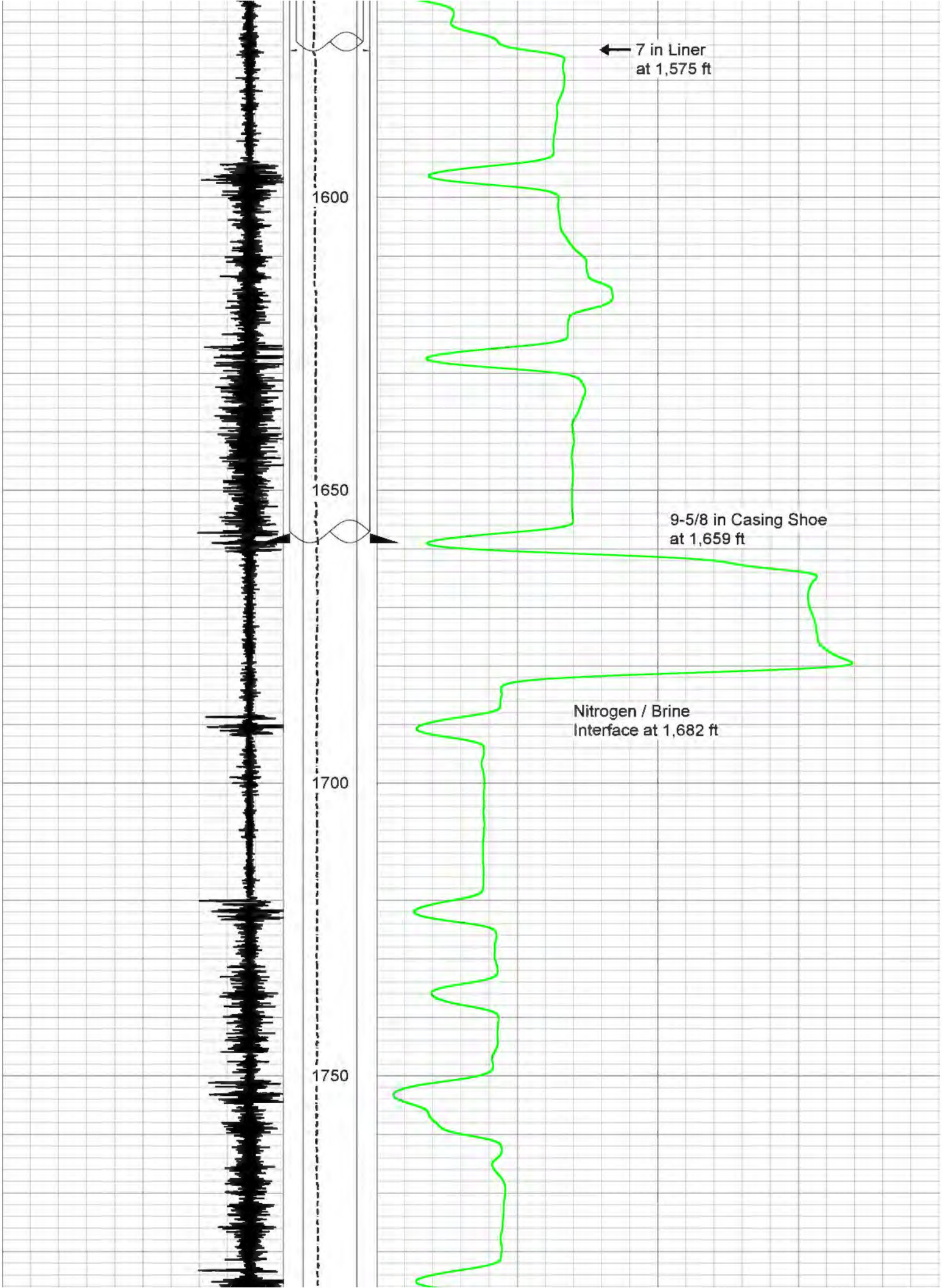
EMPIRE WIRELINE, LLC

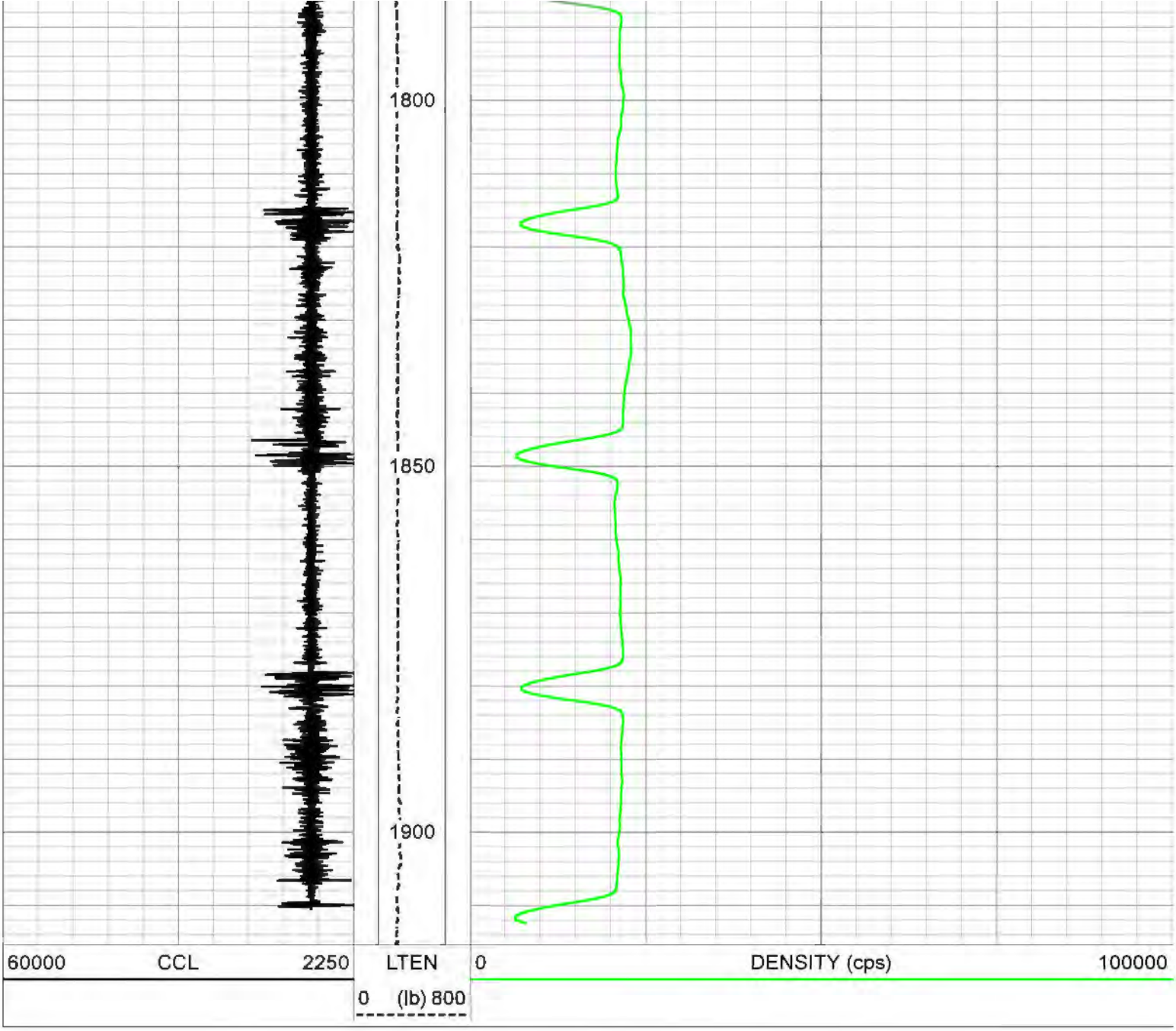
Density - Initializatin

10-May-2017 at 08:00

Database File	westernrefinery_lpgs04_20170509_gdt-mit.db
Dataset Pathname	170510-0800_Density
Presentation Format	cc-tempdensity
Dataset Creation	Wed May 10 08:59:55 2017
Charted by	Depth in Feet scaled 1:240




7 in Liner
at 1,575 ft
1600
1650
9-5/8 in Casing Shoe
at 1,659 ft
Nitrogen / Brine
Interface at 1,682 ft
1700
1750

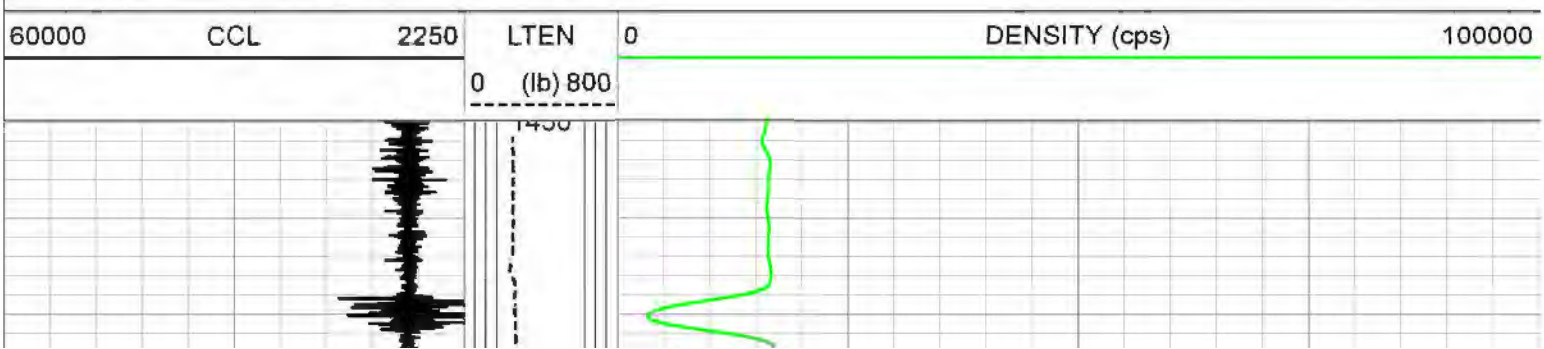


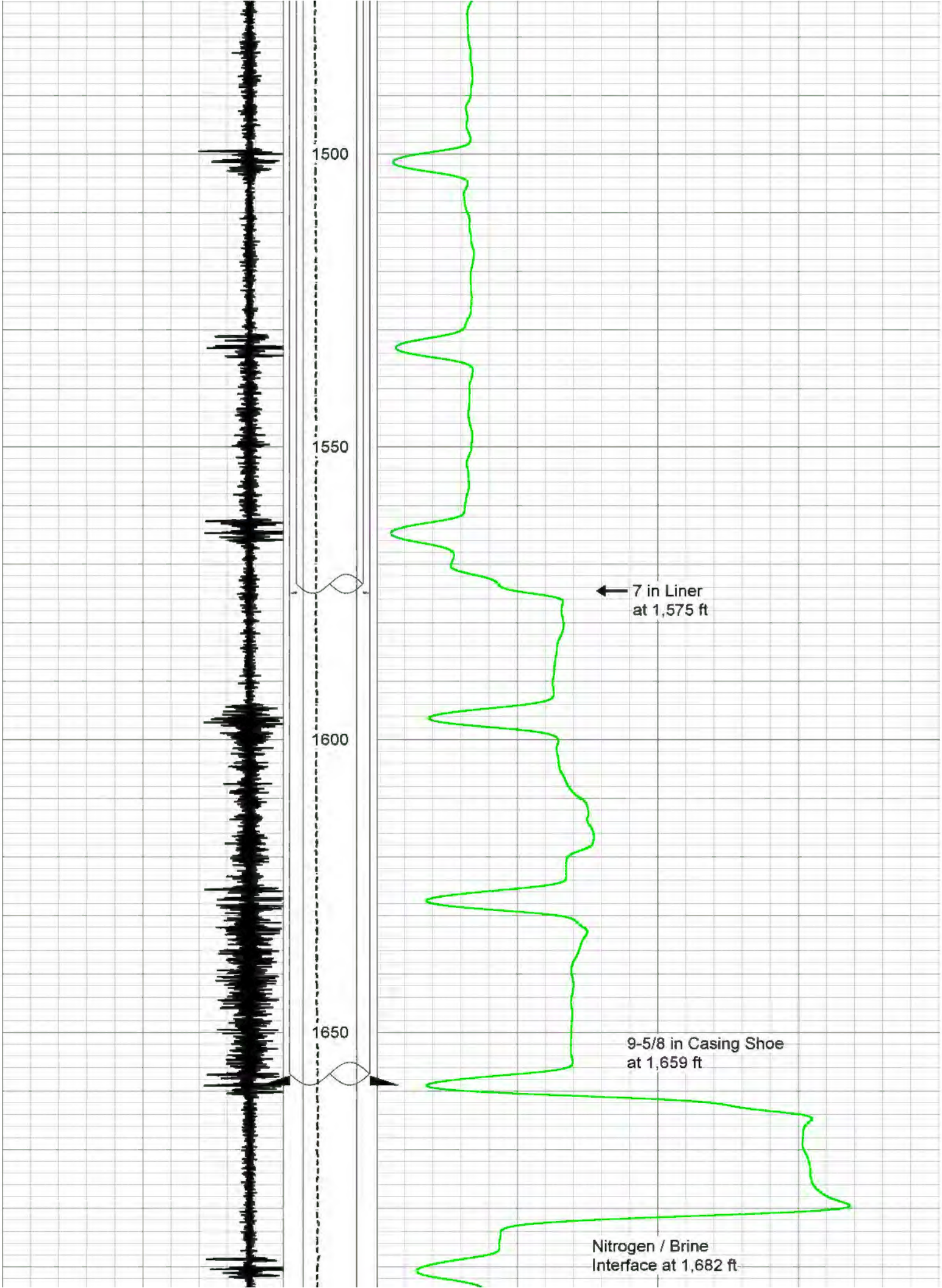
EMPIRE WIRELINE, LLC

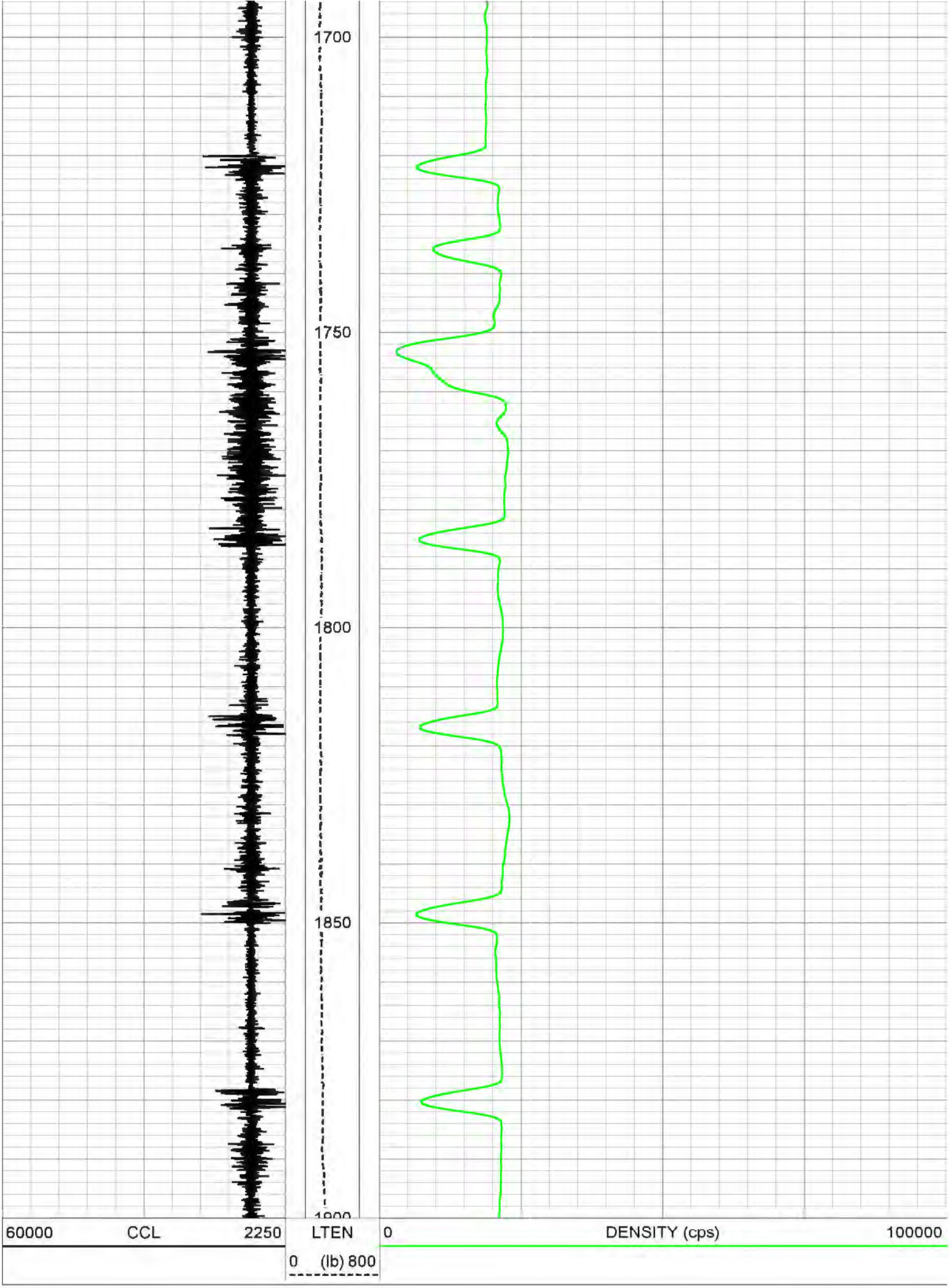
Density - Finalization

13-May-2017 at 08:00

Database File	westernrefinery_lpgs04_20170509_gdt-mit.db
Dataset Pathname	170513-0800_Density-Final
Presentation Format	cc-tempdensity
Dataset Creation	Sat May 13 08:59:45 2017
Charted by	Depth in Feet scaled 1:240




1500
1550
1600
1650
7 in Liner
at 1,575 ft
9-5/8 in Casing Shoe
at 1,659 ft
Nitrogen / Brine
Interface at 1,682 ft

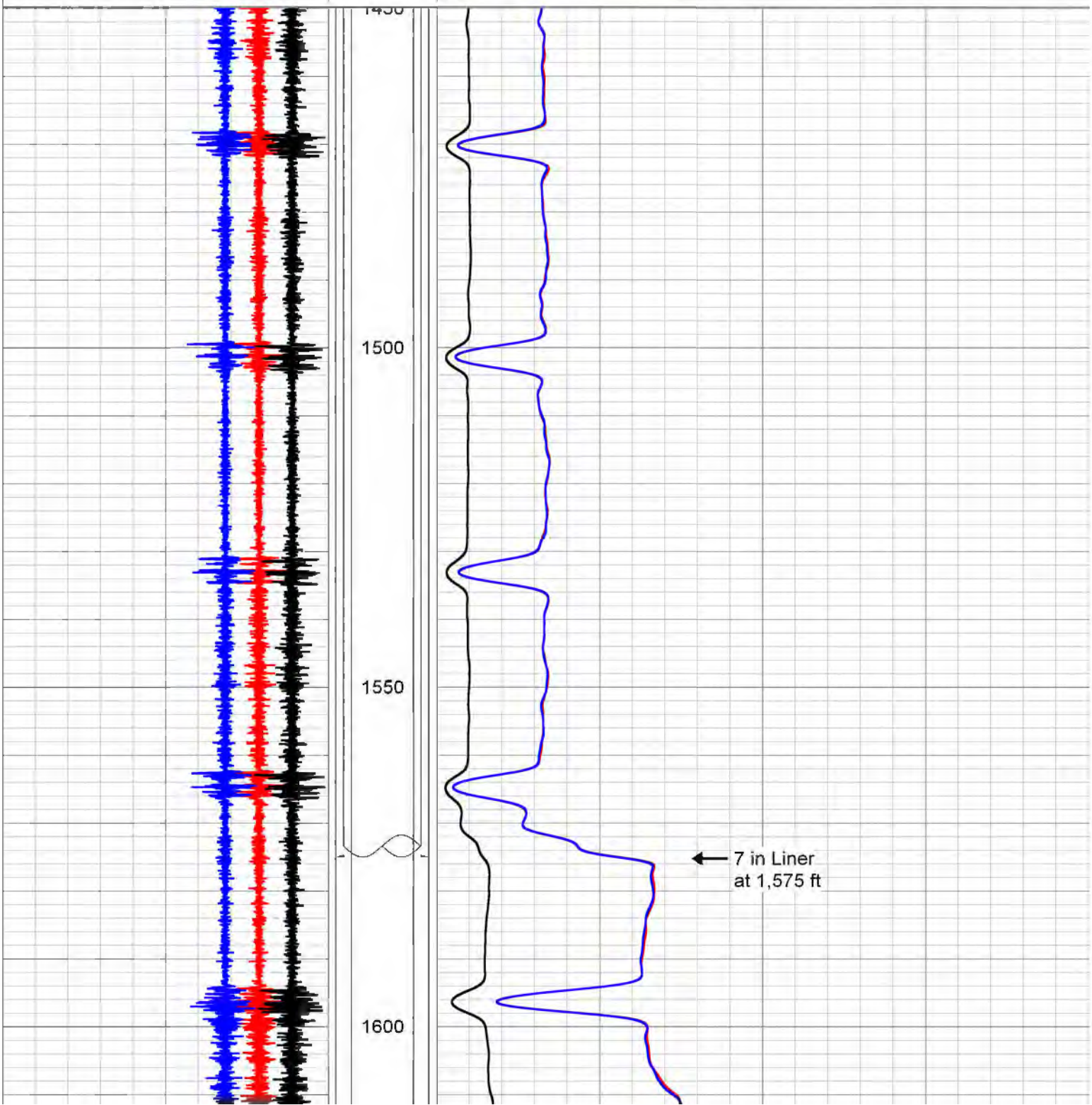

1700
1750
1800
1850
60000
CCL
2250
LTEN
0
(lb) 800
0
DENSITY (cps)
100000

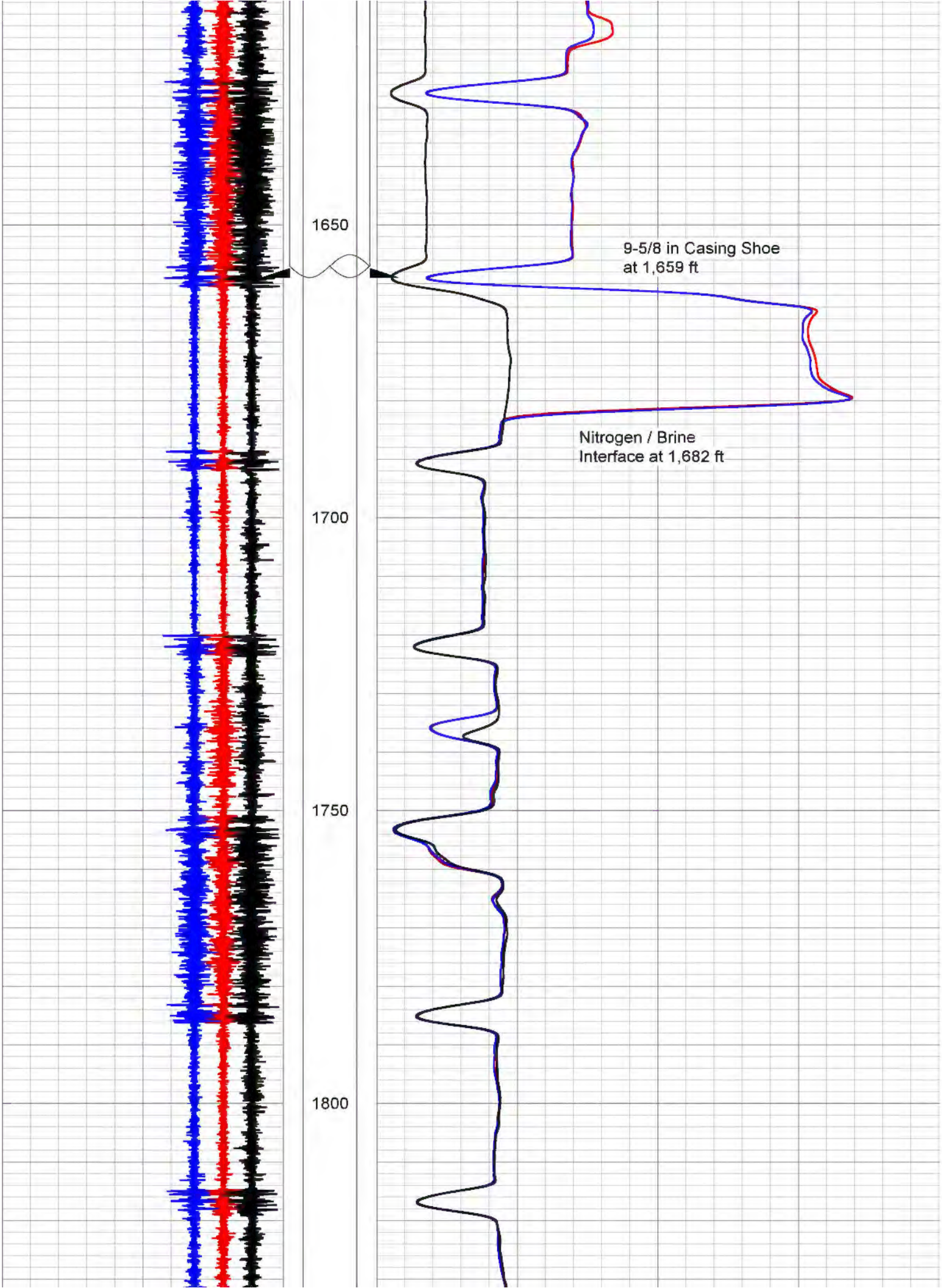
Density - MIT Overlay

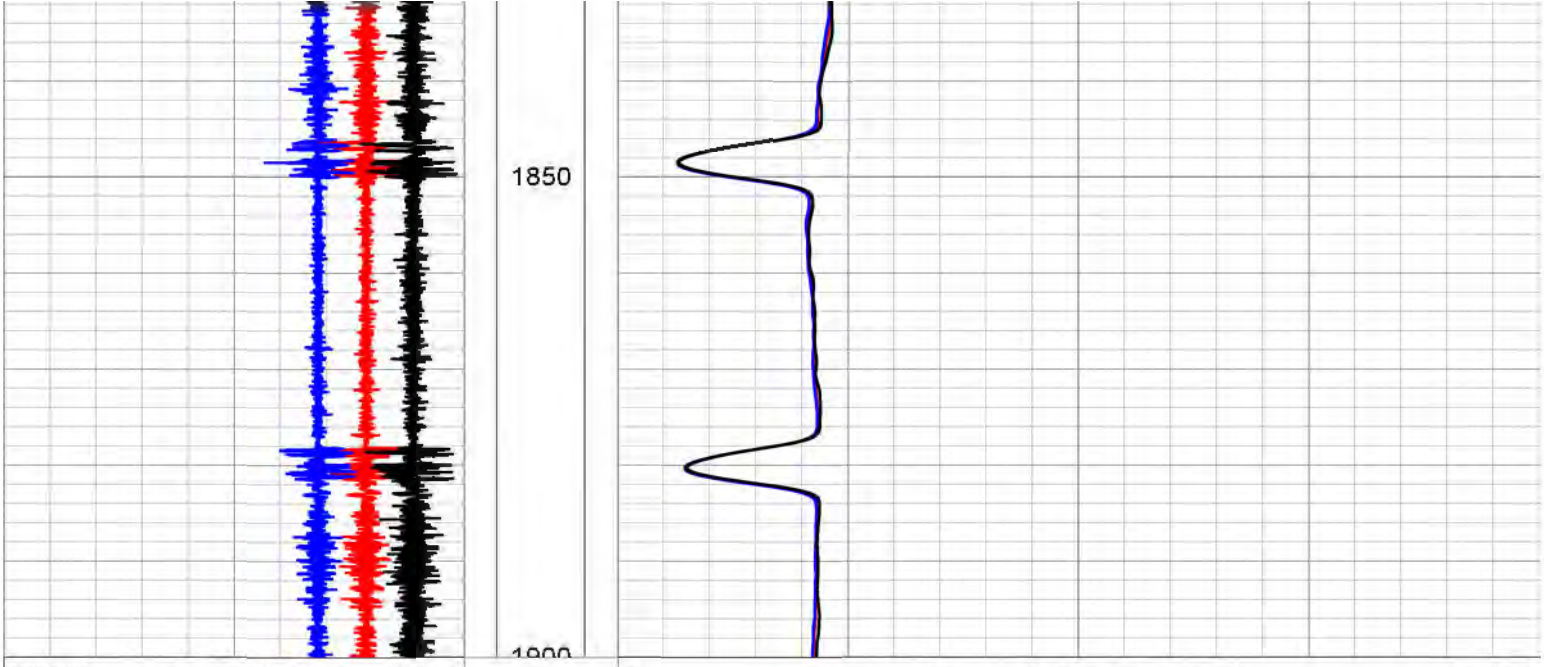
Black = Baseline on 09May17 at 08:15, Red = Initializatin on 10May17 at 08:00, Blue = Finalizatin on 13May17 at 08:00

Database File	westernrefinery_lpgs04_20170509_gdt-mit.db
Dataset Pathname	M-Density
Presentation Format	cc-tempdensitymerg
Dataset Creation	Sat May 13 09:23:21 2017
Charted by	Depth in Feet scaled 1:240

80000	CCL - Initialization	-10000	0	Density - Initializaiton (cps)	100000
70000	CCL - Finalization	-19000	0	Density - Finalization (cps)	100000
90000	CCL - Baseline	-1000	0	Density - Baseline (cps)	100000




1650
1700
1750
1800
9-5/8 in Casing Shoe
at 1,659 ft
Nitrogen / Brine
Interface at 1,682 ft



80000	CCL - Initialization	-10000	0	Density - Initializaiton (cps)	100000
70000	CCL - Finalization	-19000	0	Density - Finalization (cps)	100000
90000	CCL - Baseline	-1000	0	Density - Baseline (cps)	100000

EMPIRE WIRELINE, LLC

Company	Western Refining Company, LP	
Well	State LPG Storage No. 004	
Field	Jal	
County	Lea County	
State	New Mexico	Country

EMPIRE WIRELINE, LLC

MIT - Temperature Survey

Company: Western Refining Company, LP
Well: State LPG Storage No. 004
Field: Jal
Area: Lea County
State: New Mexico

Company: Western Refining Company, LP
Well: State LPG Storage No. 004
Field: Jal
Area: Lea County
State: New Mexico

Location: N/A
API # : 30-025-35957 SEC: N/A TWP: N/A RGE: N/A

Other Services
Temperature

Permanent Datum: Ground Level
Log Measured From: B.H.F.
Drilling Measured From: Kelly Bushing
Elevation: N/A
N/A Above P.D.

Elevation's
K.B. N/A
D.F. N/A
G.L. N/A

	Run Information	Run No. 1	Run No. 2	Run No. 3	Run No. 4
	Date of Service	09-May-2017	10-May-2017	12-May-2017	13-May-2017
Depth	Depth Driller or PBTD	N/A	N/A	N/A	N/A
Depth	Empire Depth	2,613 ft	2,613 ft	2,613 ft	2,613 ft
Depth	Bottom Log Interval	2,612 ft	2,612 ft	2,612 ft	2,612 ft
Depth	Top Log Interval	Surface	Surface	Surface	Surface
Depth	Interface Depth	N/A	1,682 ft	1,682 ft	1,682 ft
Well Info	Fluid Type	Brine	Brine	Brine	Brine
Well Info	Fluid Density	N/A	N/A	N/A	N/A
Well Info	Fluid Level	Surface	308 ft	748 ft	778 ft
Well Info	Tubing Pressure	50 PsiA	500 PsiA	700 PsiA	730 PsiA
Well Info	Wellhead Connection	4-1/16 in 3K	4-1/16 in 3K	4-1/16 in 3K	4-1/16 in 3K
Time	Time - Ran In Well	08:15	06:30	12:15	06:15
Time	Time - Temp. Start	08:15	06:45	12:30	06:30
Time	Time - Density Start	08:15	08:00	13:40	08:00
Time	Time - Out of Well	21:15	09:00	14:30	09:00
Time	Location	Broussard, LA	Broussard, LA	Broussard, LA	Broussard, LA
Time	Unit No. / Wire Size	P-03 / 1/4 in	P-03 / 1/4 in	P-03 / 1/4 in	P-03 / 1/4 in
Time	Recorded By	C. Cross	C. Cross	C. Cross	C. Cross
Time	Witnessed By	Mr. Will George	Mr. Will George	Mr. Will George	Mr. Will George

CSG / TBG Record	Size	Wt/Ft	Top	Bottom
Surface Casing	13-5/8 in	54.5 lb/ft	Surface	423 ft
Production Casing	9-5/8 in	36 lb/ft	Surface	1,659 ft
Liner	7 in	23 lb/ft	Surface	1,575 ft
Hanging String	4-1/2 in	N/A	Surface	29.45 ft
Hanging String	3-1/2 in	Drill Pipe	29.45 ft	2,592 ft

<<< Fold Here >>>

Comments

Tool Zeroed at B.H.F. with no depth correction applied.

Sensor	Offset (ft)	Schematic	Description	Length (ft)	O.D. (in)	Weight (lb

Tungsten-1-11/16x7 Weigh Bar Tungten 1-11/16" x 7'	7.00	1.69	84.00
GDT_WTC-WTS06 (14023103) Digital Telemetry GDTBus	1.82	1.69	8.60
GDT_CCL-CCL10 (14023401) Digital CCL GDTBus	1.35	1.69	6.20
GDT_RDT-RDT04 (14023128)	1.19	0.00	
GDT_GRT2-GRT10-1 (14023359) Secondary Gamma Ray Tool GDTBus	2.23	1.69	10.40
Density-DensitySub (01)	1.63	1.88	8.00

CRCCnt	6.39
FrmCnt	6.39
WTSTime	6.39
WTSTemp	6.39
CHV	6.39
CCL	5.47
RDTTemp	4.14
GR2	1.63
Density2	1.12
Density1	1.12

Dataset: westernrefinery_lpgs04_20170509_gdt-mit.db: field/well/run1/170513-0800_Density-Final
Total length: 15.21 ft
Total weight: 117.20 lb
O.D.: 1.88 in

EMPIRE WIRELINE, LLC

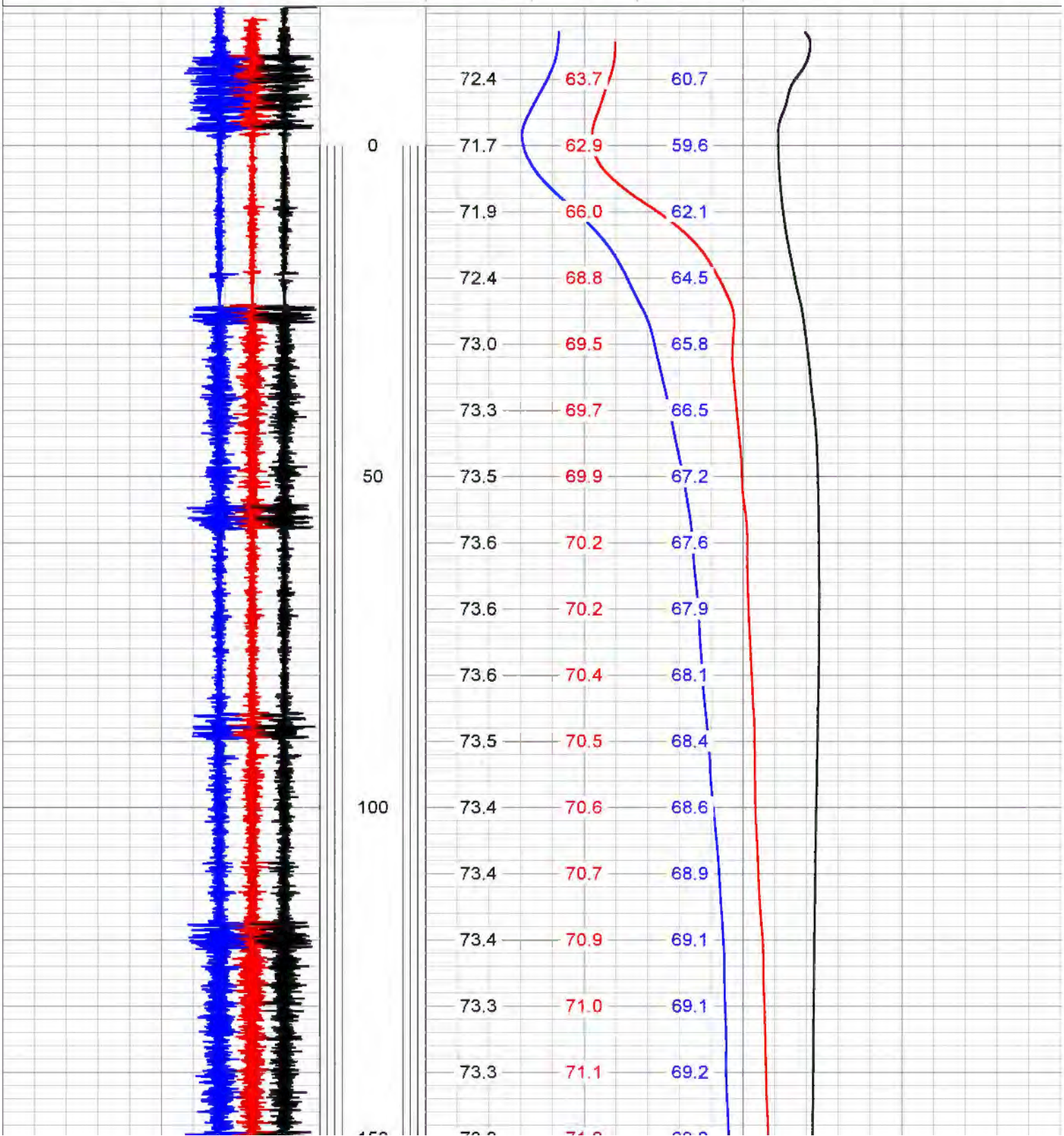
Temperature Overlay

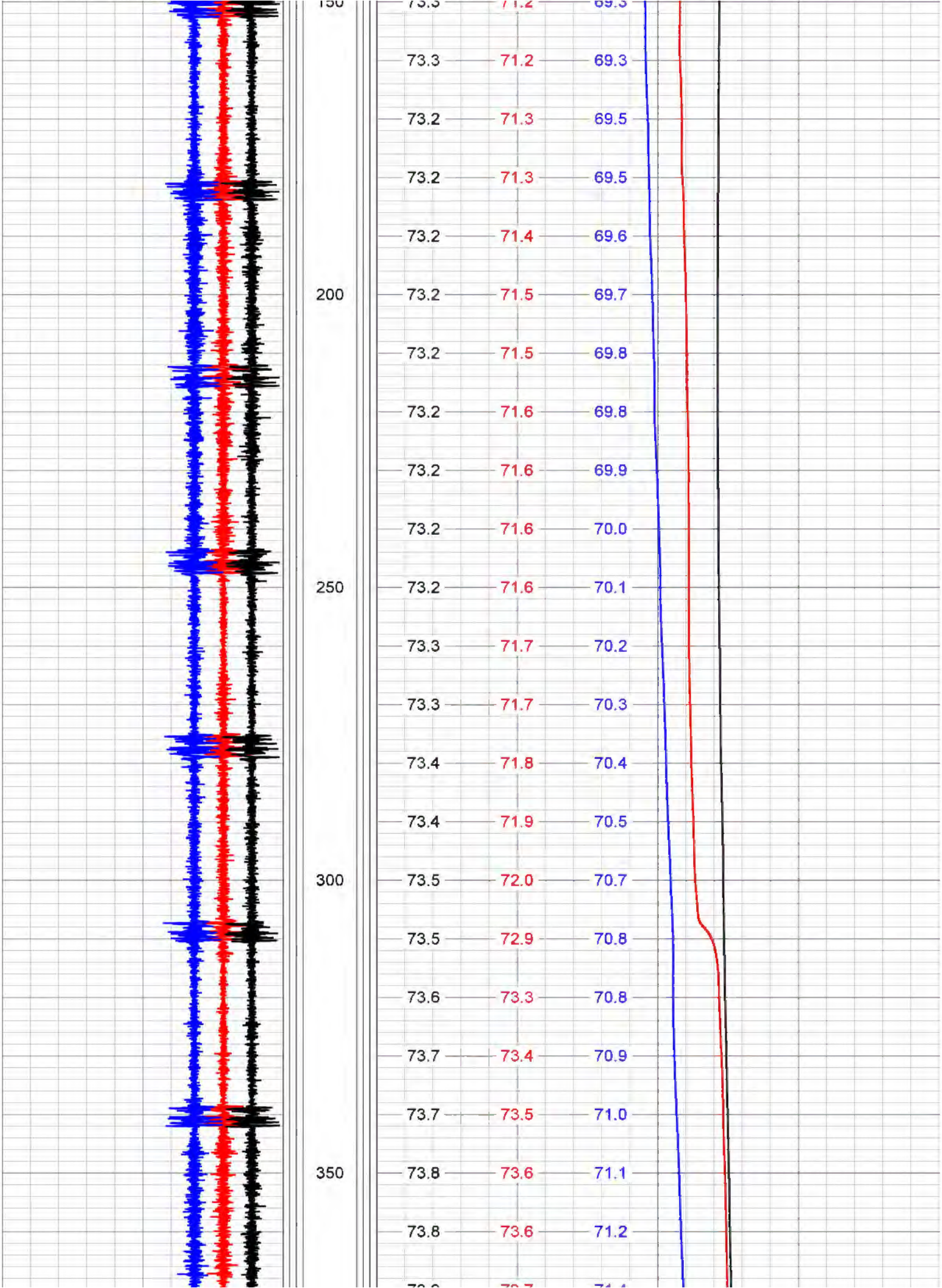
Black = Baseline on 09May17 at 08:15, Red = Initializatin on 10May17

at 06:45, Blue = Finalizatin on 13May17 at 06:35

Database File	westernrefinery_lpgs04_20170509_gdt-mit.db
Dataset Pathname	M-Temperature
Presentation Format	cc-tempmerg
Dataset Creation	Sat May 13 08:49:34 2017
Charted by	Depth in Feet scaled 1:240

80000	CCL - Initialization	-10000	55	Temp - Initializaiton (degF)	85
70000	CCL - Finalizatin	-19000	55	Temp - Finalization (degF)	85
90000	CCL - Baseline	-1000	55	Temp - Baseline (degF)	85

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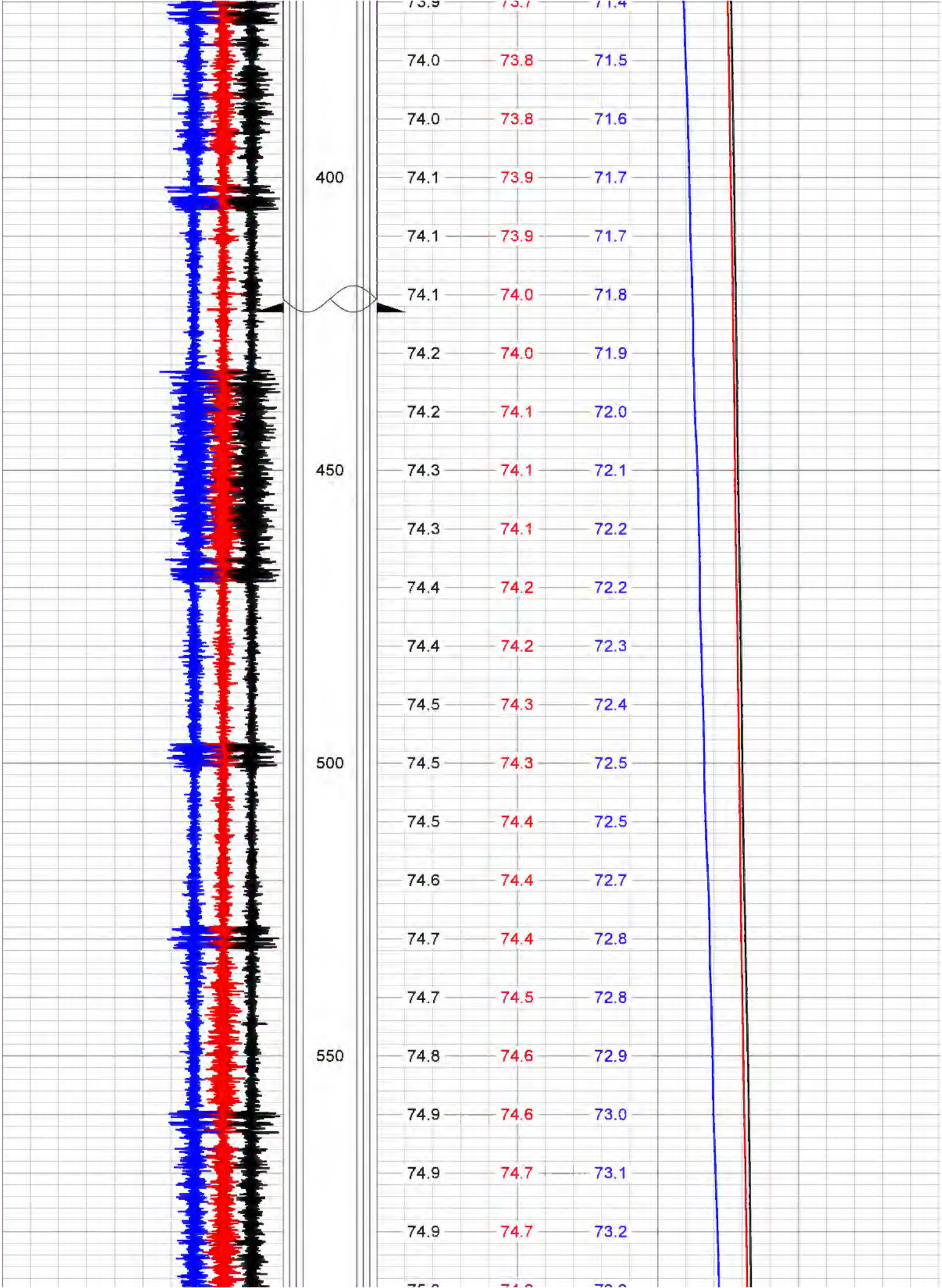
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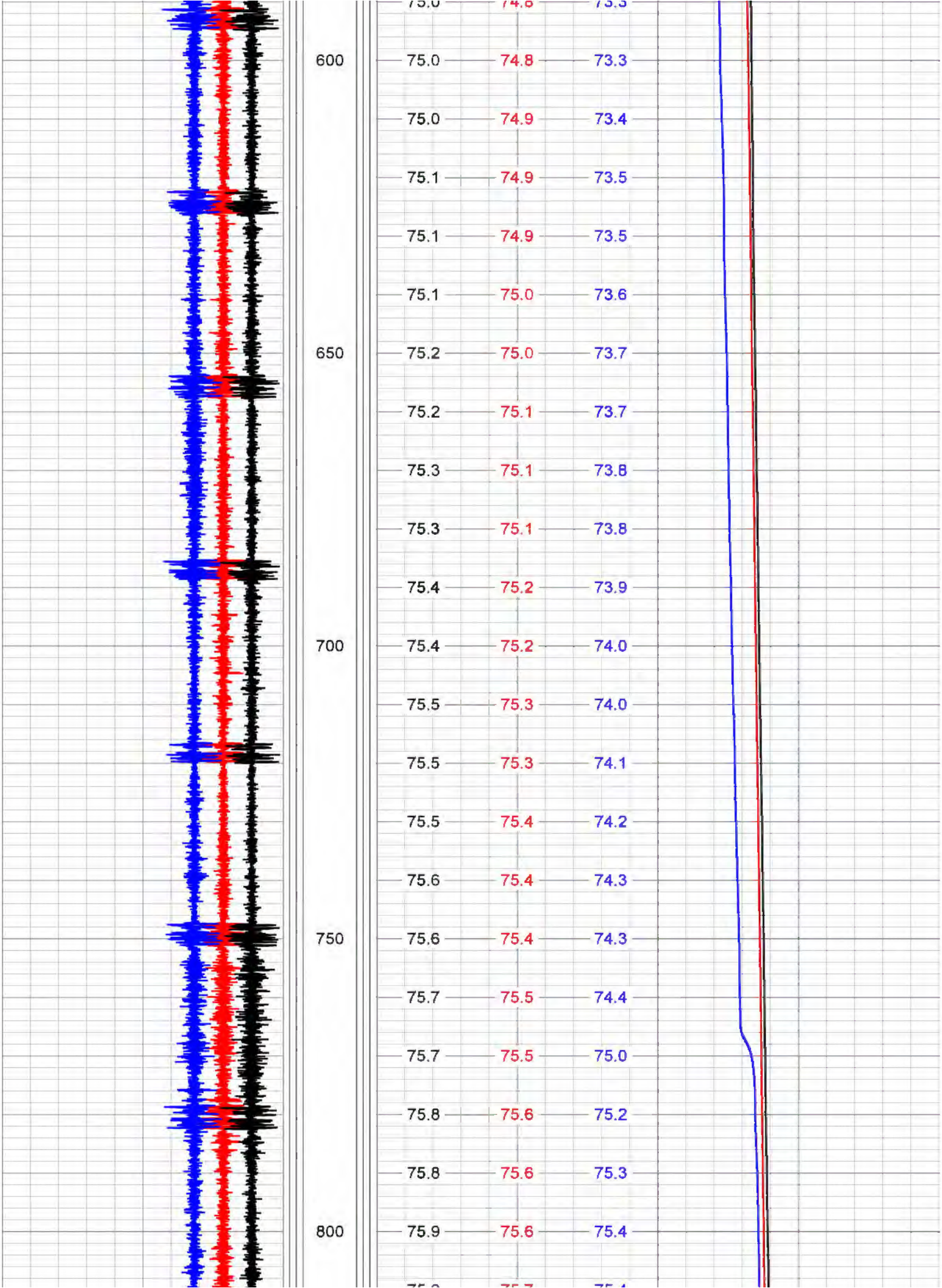
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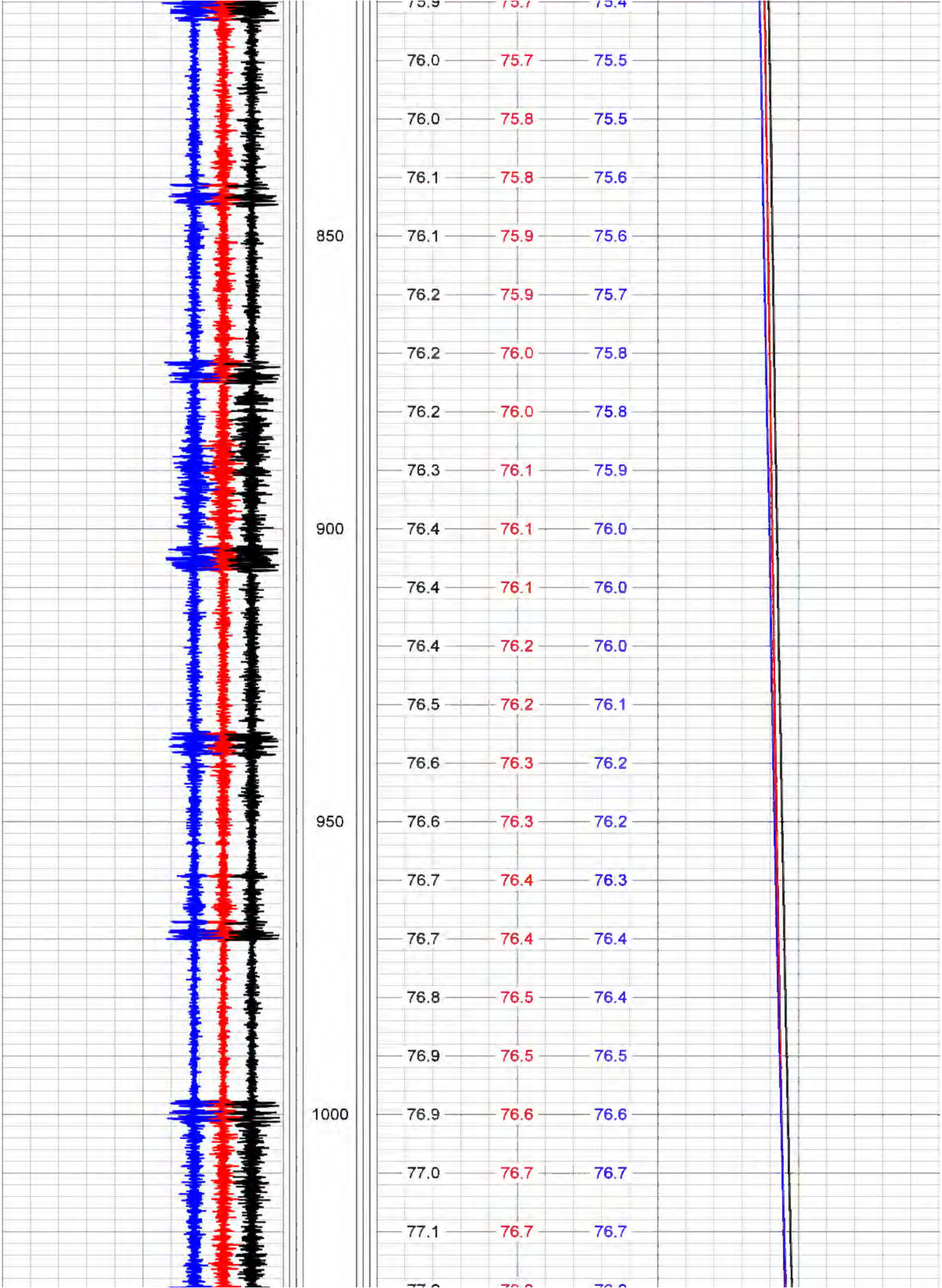
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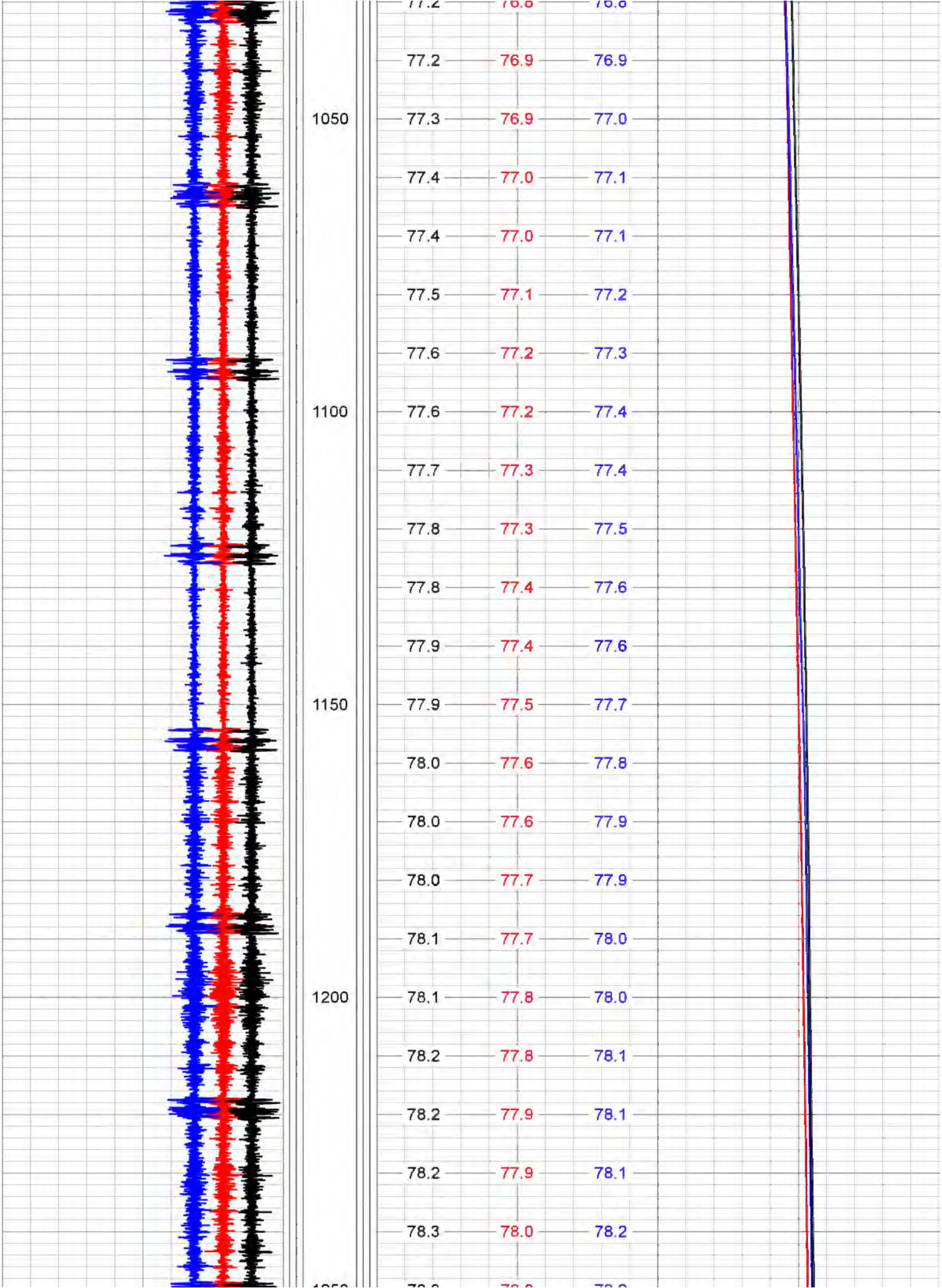
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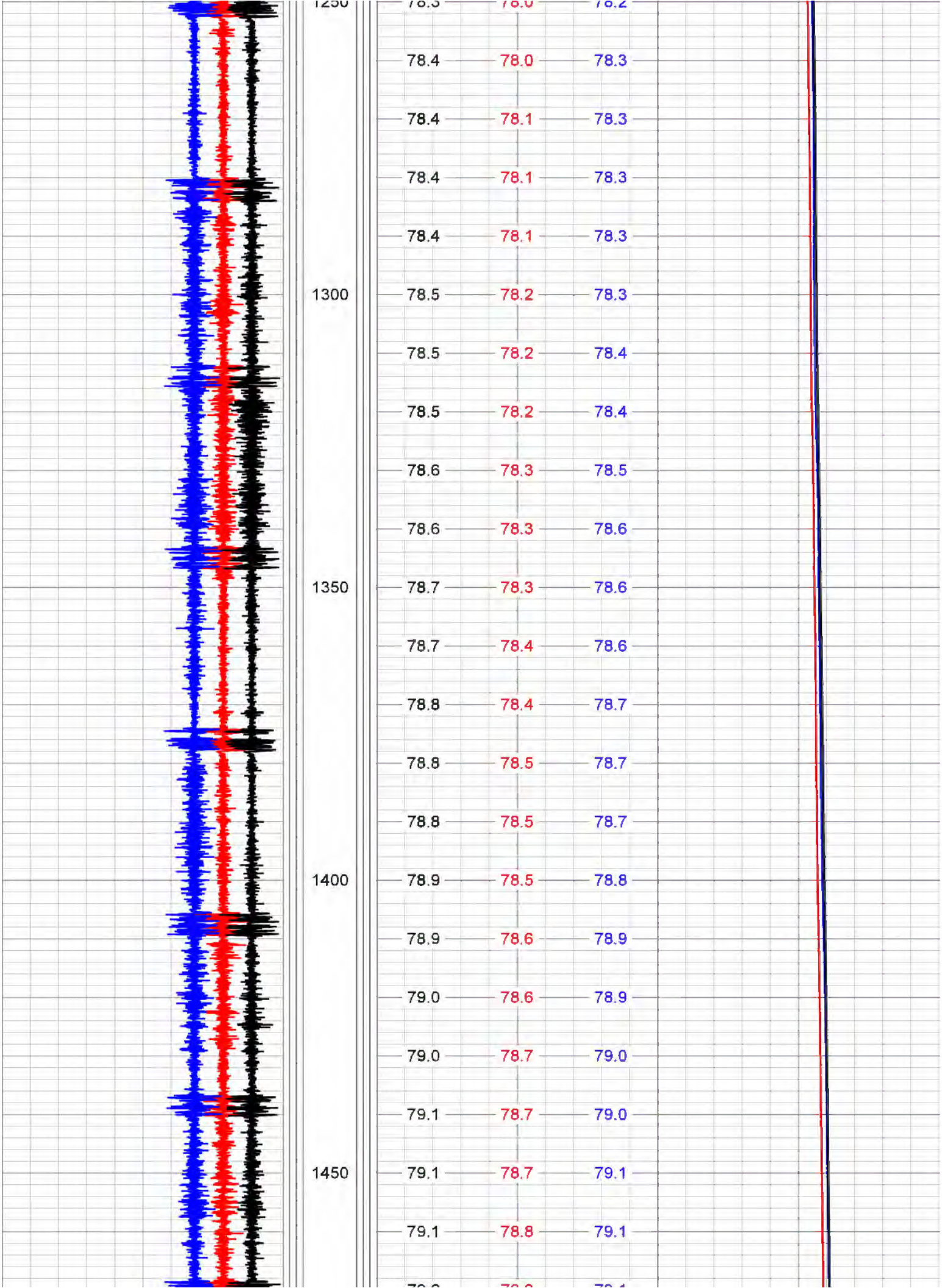
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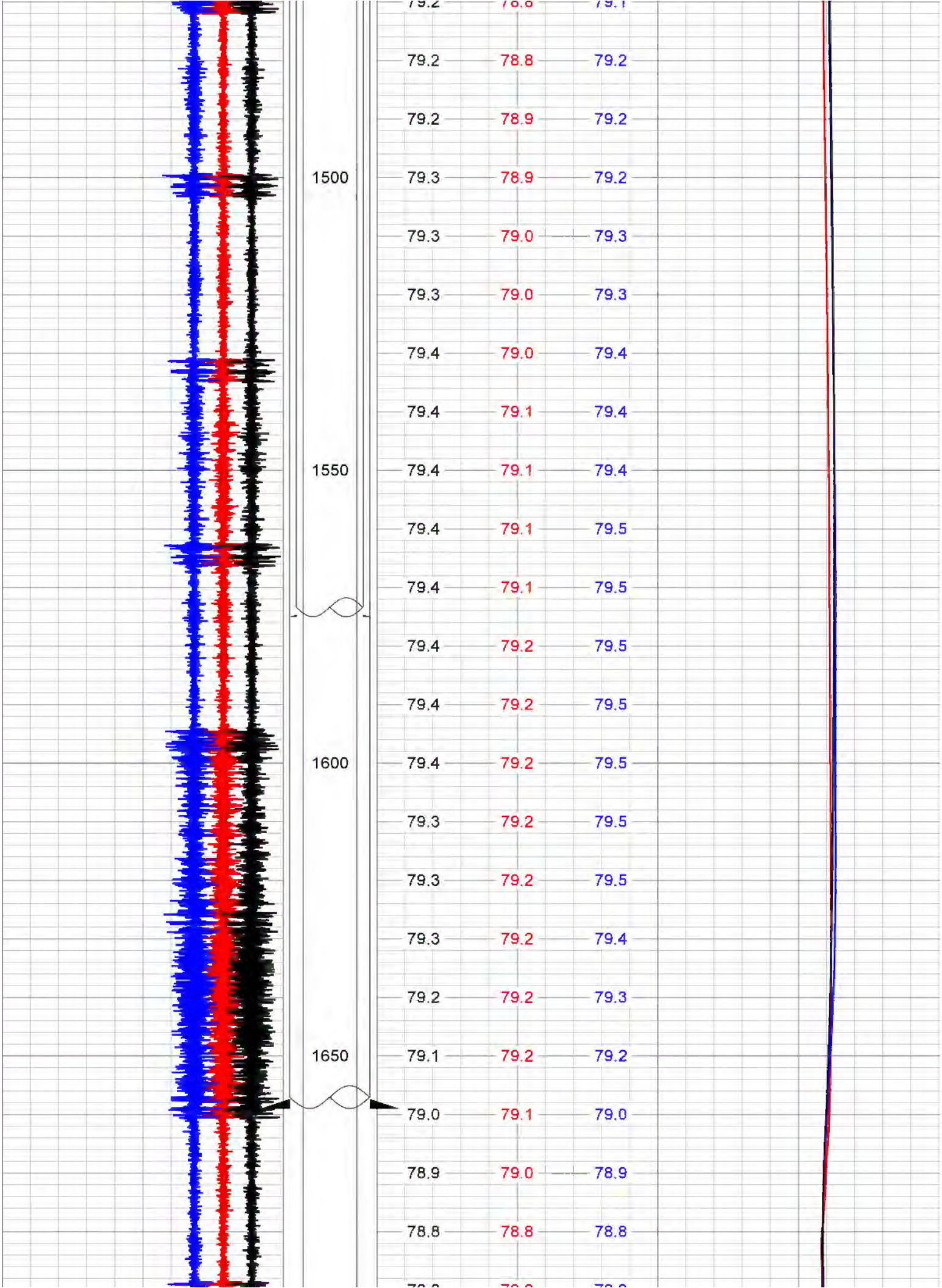
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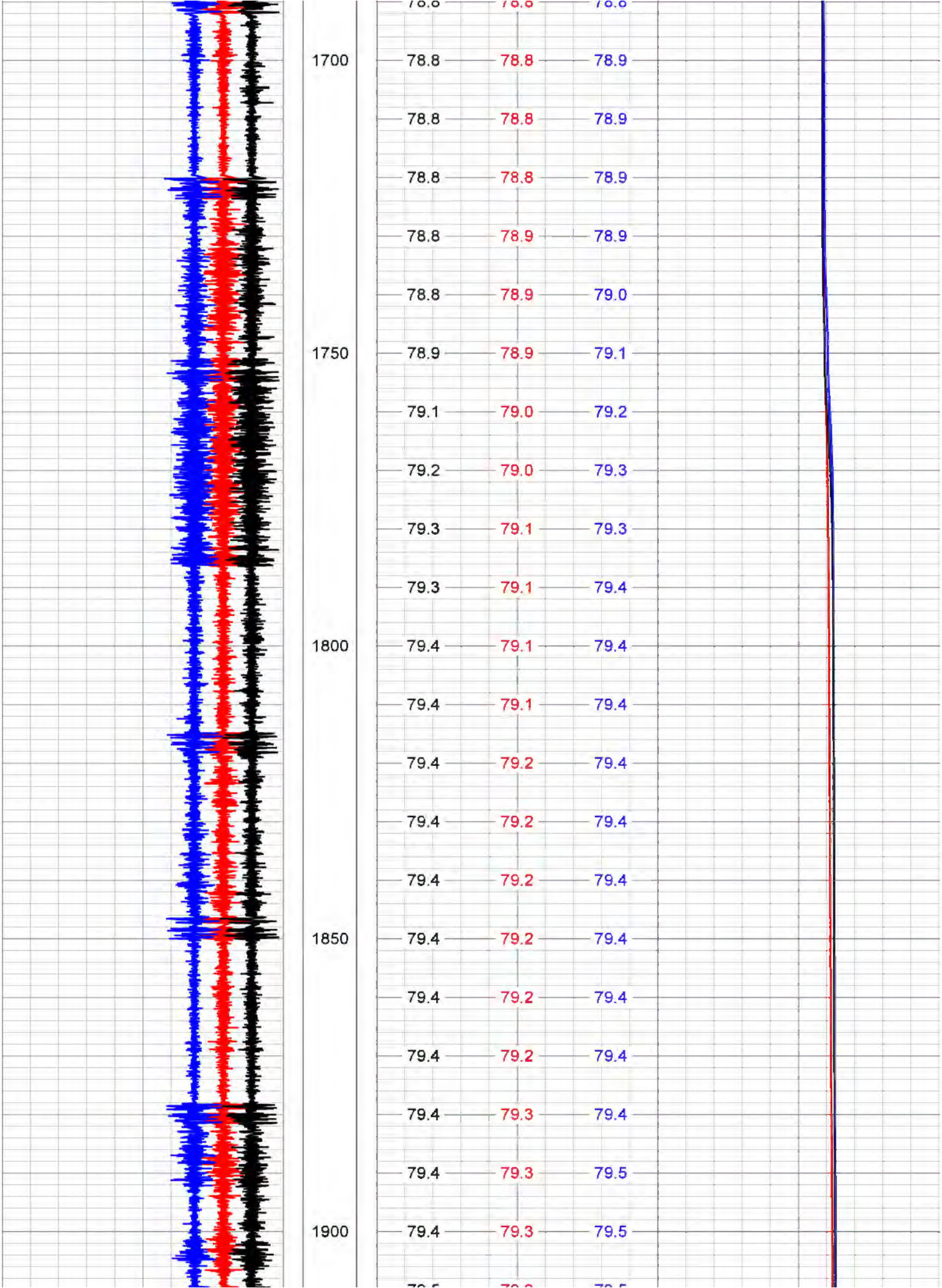
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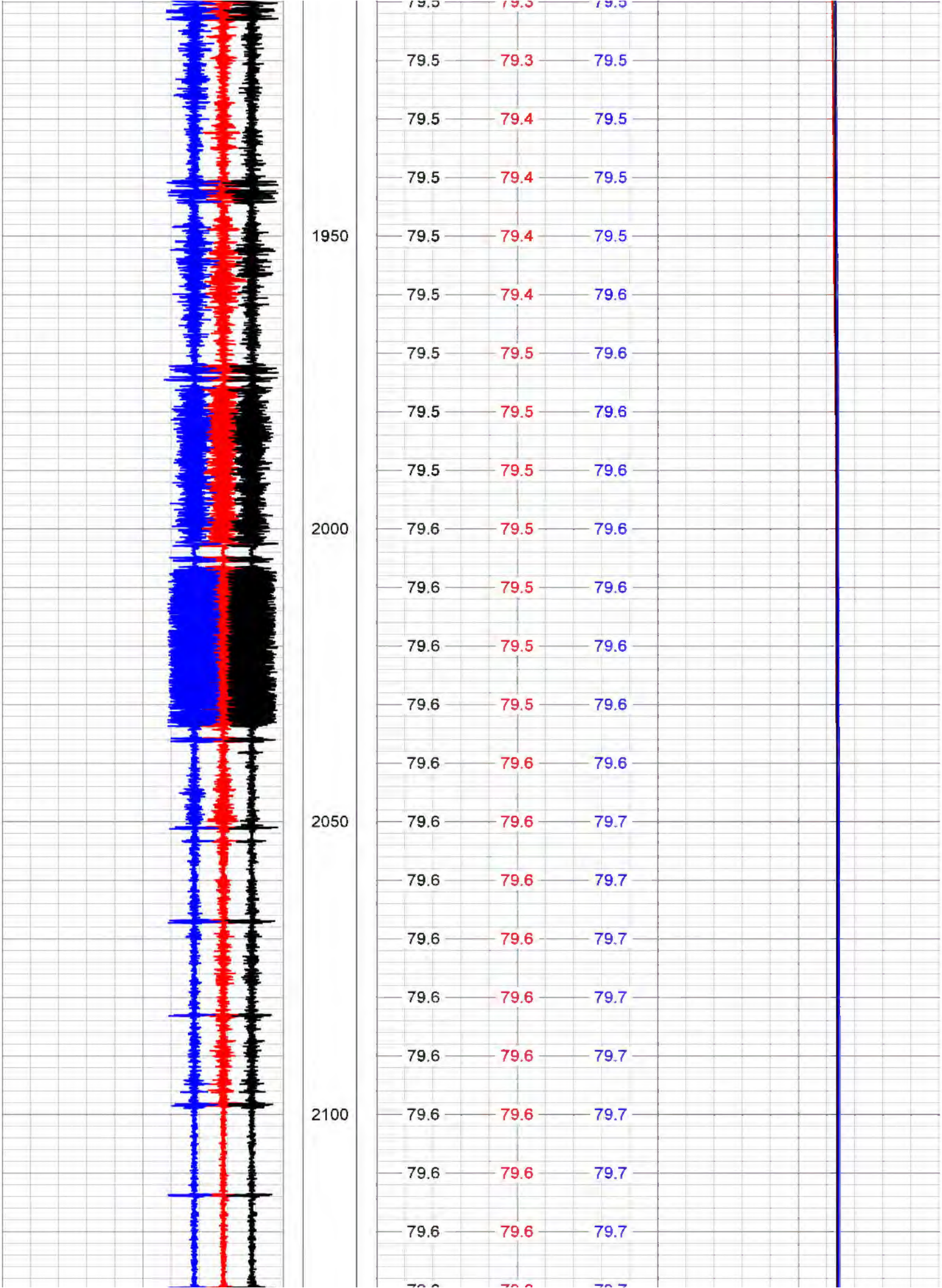
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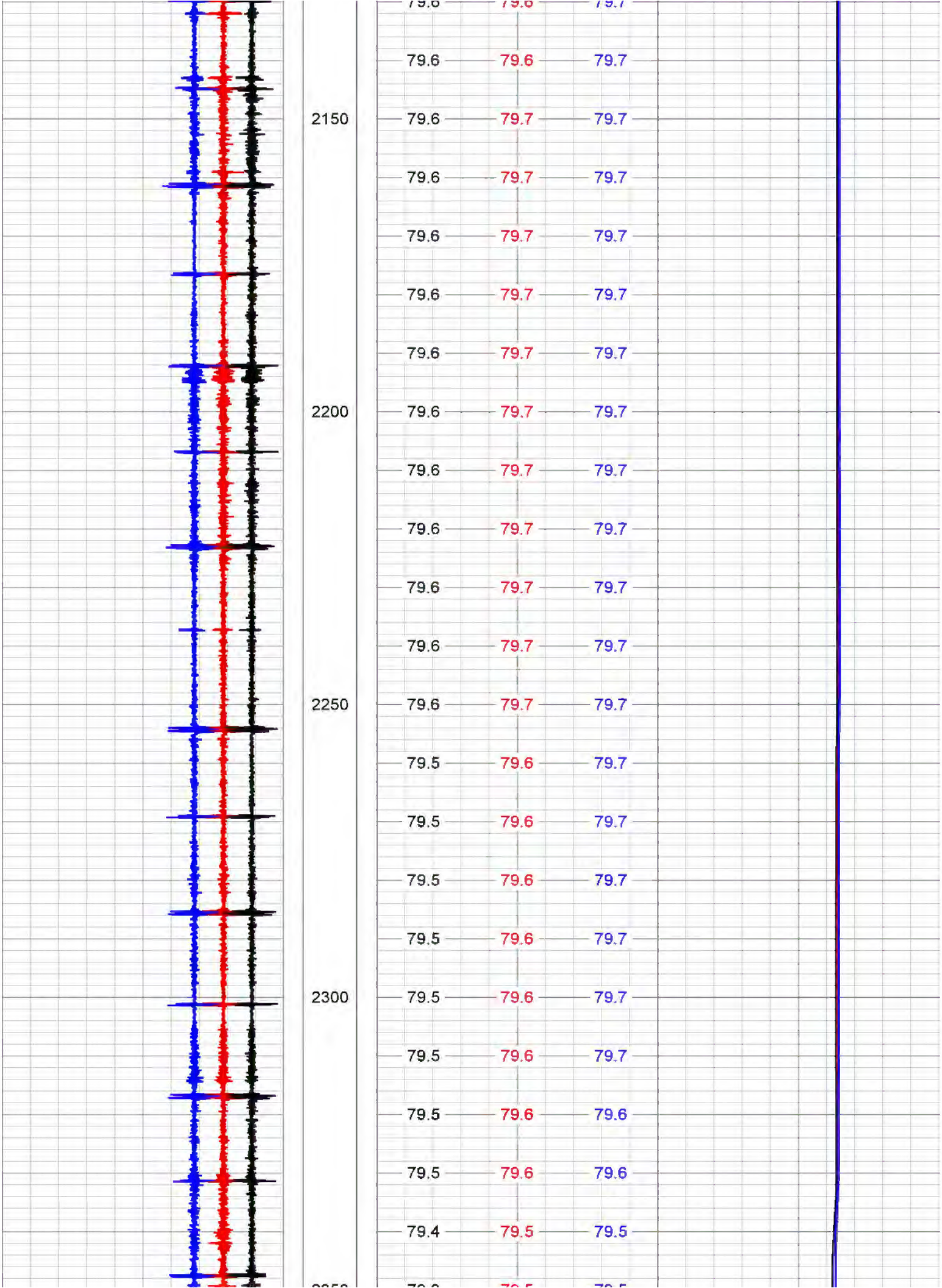
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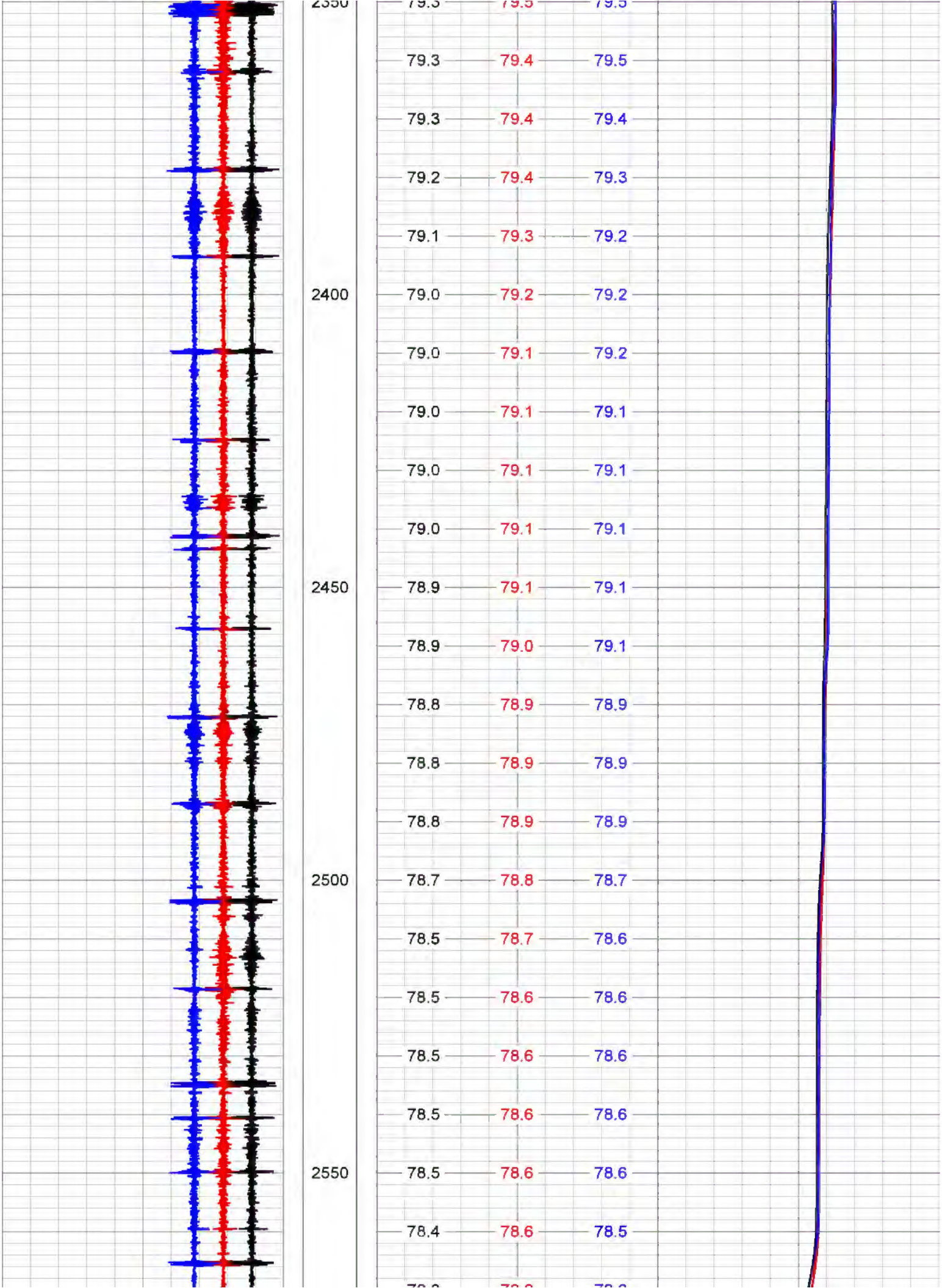
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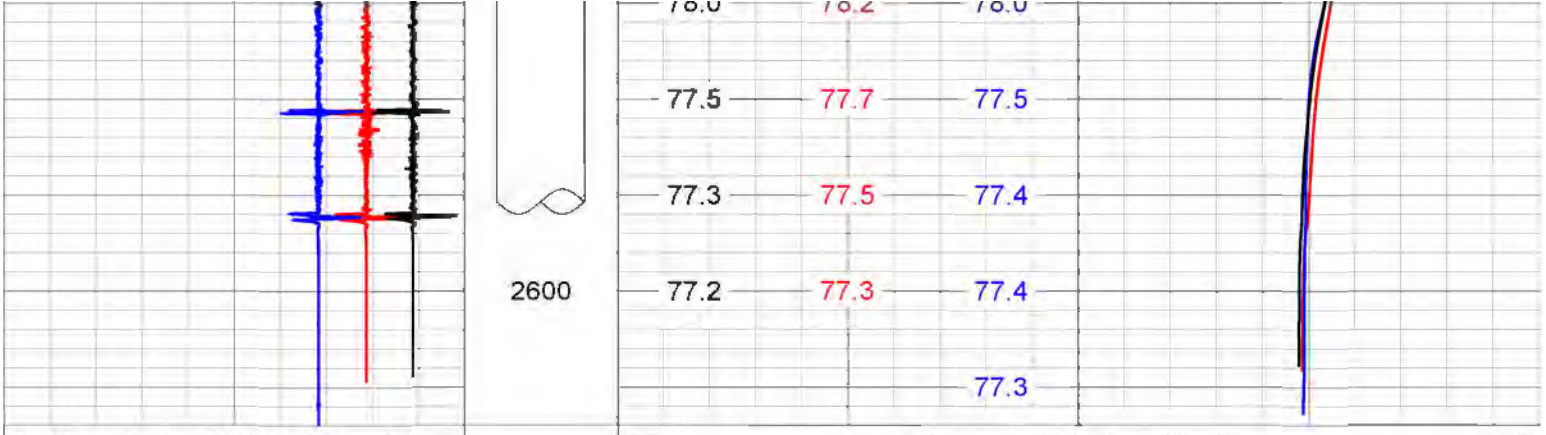

80000	CCL - Initialization	-10000	55	Temp - Initializaiton (degF)	85
70000	CCL - Finalizatin	-19000	55	Temp - Finalization (degF)	85
90000	CCL - Baseline	-1000	55	Temp - Baseline (degF)	85

Temp - Base (degF)	Temp-Initial (degF)	Temp-Final (degF)

EMPIRE WIRELINE, LLC

Company	Western Refining Company, LP	
Well	State LPG Storage No. 004	
Field	Jal	
County	Lea County	
State	New Mexico	Country

From: Chavez, Carl J, EMNRD
To: "Parker, Kenneth J"
Cc: Martinez, Patricia L, EMNRD
Subject: RE: State LPG Storage Well Report 1-4 (GW-7)
Date: Friday, March 20, 2020 9:51:00 AM

Ken:

Good morning and Happy Friday!

The New Mexico Oil Conservation Division (OCD) is writing to request your submittals in Adobe Reader Acrobat™ Format from now on. One attached Acrobat Reader file containing all of the well info. from 1 – 4 is highly recommended.

OCD maintains administrative records in Acrobat and this allow OCD Staff to quickly upload docs into the record.

Please contact me if you questions or need assistance in converting Word Docs to Acrobat and combining them into one doc.

Thank you in advance.

Mr. Carl J. Chavez, CHMM (#13099)
New Mexico Oil Conservation Division (Albuquerque Office)
Energy Minerals and Natural Resources Department
5200 Oakland Avenue, NE
Albuquerque, New Mexico 87113
Ph. (505) 660-7923
E-mail: CarlJ.Chavez@state.nm.us
"Why not prevent pollution, minimize waste to reduce operating costs, reuse or recycle, and move forward with the rest of the Nation?" (To see how, go to: http://www.emnrd.state.nm.us/OCD and see "Publications")

From: Parker, Kenneth J <KJParker@Marathonpetroleum.com>
Sent: Wednesday, March 18, 2020 1:58 PM
To: Chavez, Carl J, EMNRD <CarlJ.Chavez@state.nm.us>
Cc: Martinez, Patricia L, EMNRD <PatriciaL.Martinez@state.nm.us>
Subject: [EXT] State LPG Storage Well Report 1-4

All-Have a nice day!

Chavez, Carl J, EMNRD

From: Chavez, Carl J, EMNRD
Sent: Tuesday, April 30, 2019 3:35 PM
To: 'Kelly.Robinson@andeavor.com'
Subject: Andeavor Jal LPG storage operations (Formerly GW-7) Request Permission for Re-Use of Hydrotest Waters

Kelly:

Approved.

Thank you.

Mr. Carl J. Chavez, CHMM (#13099)
New Mexico Oil Conservation Division
Energy Minerals and Natural Resources Department
1220 South St Francis Drive
Santa Fe, New Mexico 87505
Ph. (505) 476-3490
E-mail: CarlJ.Chavez@state.nm.us
"Why not prevent pollution, minimize waste to reduce operating costs, reuse or recycle, and move forward with the rest of the Nation?" (To see how, go to: http://www.emnrd.state.nm.us/OCD and see "Publications")

From: Griswold, Jim, EMNRD <Jim.Griswold@state.nm.us>
Sent: Tuesday, April 30, 2019 3:11 PM
To: Chavez, Carl J, EMNRD <CarlJ.Chavez@state.nm.us>
Subject: FW: [EXT] RE: Request Permission for Re-Use of Hydrotest Waters

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From: Jones, Brad A., EMNRD <brad.a.jones@state.nm.us>
Sent: Tuesday, April 30, 2019 7:10 AM
To: Griswold, Jim, EMNRD <Jim.Griswold@state.nm.us>
Subject: FW: [EXT] RE: Request Permission for Re-Use of Hydrotest Waters

FYI

Brad A. Jones
Environmental Engineer
EMNRD Oil Conservation Division
1220 S. Saint Francis Drive
Santa Fe, New Mexico 87505
E-mail: brad.a.jones@state.nm.us
Office: (505) 476-3487
Fax: (505) 476-3462

From: Robinson, Kelly <Kelly.Robinson@andeavor.com>
Sent: Wednesday, April 24, 2019 10:36 AM
To: Jones, Brad A., EMNRD <brad.a.jones@state.nm.us>
Subject: [EXT] RE: Request Permission for Re-Use of Hydrotest Waters

Good Afternoon Sir!

I was wondering if NMOCD had a chance to consider the request for approval to re-use hydro test waters as described below? If there are any questions or any additional information I could provide to help facilitate the agency's discussions, I would be more than happy to provide.

Thank you for your time and consideration of this matter!

Sincerely,

Kelly R. Robinson | **Environmental Supervisor– Terminalling, Transportation and Storage**
Andeavor | 111 County Road 4990, Bloomfield, NM 87413
Office: 505.632.4166 | Mobile: 505.801.5616 | Kelly.Robinson@andeavor.com

andeavor

From: Robinson, Kelly
Sent: Thursday, April 11, 2019 5:04 PM
To: brad.a.jones@state.nm.us
Subject: Request Permission for Re-Use of Hydrotest Waters

Good Afternoon Sir,

Thank you so much for taking the time to talk with me earlier today. As I mentioned, Western Refining Terminals, LLC ("Western") would like to perform a hydrotest on a aboveground tank previously used for propane storage. The tank has not been in-service (and thus as remained empty) for over 20 years. We would like to perform some integrity testing on the tank to determine if it possible to be fit for service.

With this said, Western is seeking approval from the New Mexico Oil Conservation (NMOCD) to manage the hydrotest waters for re-use on-site as a supplemental water source to our on-site brine ponds that are used to operate the on-site underground LPG storage operations. Western currently receives fresh water from Energy Transfer (an adjacent land owner) which is used to service the Western office utilities at the Jal Terminal, and is also the source of make-up water for the on-site brine ponds. In order to conduct the planned hydrotesting on-site, Western proposes to use approximately 800 bbls of the fresh water from the on-site fresh water system to hydrotest a horizonal AST tank that previously operated in propane service. As an alternative to wasting the water through an off-site disposal facility, Western would prefer to be granted permission to use the hydrotest waters as make-up waters in the brine ponds. To accommodate any site inspection and/or analytical testing of the test waters prior to mixing into the brine ponds, the hydrotest waters (after testing activities are completed) could be transferred from the hydrotest tank to a rental frac tank. As part of Western's normal required practice, Western will require the third party frac tank rental company to provide a clean rental tank, and Western on-site personnel will inspect the rental tank prior to use. Upon meeting the acceptance criteria, the waters would then be pumped from the frac tank to the on-site brine ponds at a controlled rate such that the brine ponds no not breach the required minimum freeboard level.

Western is continuously seeking opportunities to minimize waste. This requested opportunity to re-use the water for "similar service" activities on-site will allow Western to support the Corporate initiative for finding alternative opportunities for re-use in support of good business practices.

I very much appreciate your time in the consideration of this request. Please let me know if you have any questions or need additional information.

Sincerely,

Kelly R. Robinson | Environmental Supervisor– Terminalling, Transportation and Storage
Andeavor | 111 County Road 4990, Bloomfield, NM 87413
Office: 505.632.4166 | Mobile: 505.801.5616 | Kelly.Robinson@andeavor.com

andeavor

Western Refining Logistics

WNRL LISTED NYSE

NOV 01 2018 -02:22

October 30, 2018

VIA CERTIFIED MAIL
RETURN RECEIPT REQUESTED

New Mexico Energy, Minerals and Natural Resources Department
Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Re: Courtesy Notification Regarding Corporate Transaction
Western Refining Terminals, LLC
Pit Permits Nos. P1-06579, P1-06580, P1-06581
Salt Water Disposal Well (API # 30-025-10920)
LPG Storage Well Permits (API #s 30-025-35954, 30-025-35955, 30-025-35956, 30-025-35957)

Dear Sir or Madam:

I am writing in connection with several permits issued by the Oil Conservation Division of the New Mexico Energy, Minerals and Natural Resources Department for the Jal LPG Facility. I am writing to inform your office about a corporate transaction involving a parent company of Western Refining Terminals, LLC, the owner and operator of the Jal LPG Facility. The affected permits (the "Permits") are identified below:

- P1-06579 for the Proposed Brine Pond
- P1-06580 for the South Brine Pond
- P1-06581 for the North Brine Pond
- Salt Water Disposal Well (API # 30-025-10920)
- LPG Storage Well Permit (API # 30-025-35954)
- LPG Storage Well Permit (API # 30-025-35955)
- LPG Storage Well Permit (API # 30-025-35956)
- LPG Storage Well Permit (API # 30-025-35957)

Ownership of the Jal LPG Facility was transferred from Western Refining Company, L.P., to Western Refining Terminals, LLC on August 6, 2018. We have applied for and are awaiting an Oil and Gas Remittance Identifier for Western Refining Terminals, LLC, in order to complete the paperwork reflecting that transfer. Please let us know if there is anything further we can do to move that process forward.

Western Refining Terminals, LLC is a subsidiary of Andeavor, which was formerly known as Tesoro Corporation. Tesoro Corporation changed its name to Andeavor on August 1, 2017. Andeavor entered into a merger agreement with Marathon Petroleum Corporation earlier this year. The merger transaction closed on October 1, 2018. Upon merging, Andeavor became a subsidiary of Marathon Petroleum Corporation and all of Andeavor's subsidiaries (including Western Refining Terminals, LLC) continue as subsidiaries of Andeavor and thus also subsidiaries of Marathon Petroleum Corporation. In addition, Andeavor converted to an LLC and became known as Andeavor LLC. These merger-related transactions involved only Andeavor, and no changes to Western Refining Terminals, LLC or facility operations have occurred.

Please note that Western Refining Terminals, LLC remains the owner and operator of the Jal LPG Storage Facility after this transaction. We are providing this notice as a courtesy.

Should you have any questions or need more information on the above-described transfer of ownership, please do not hesitate to contact me at 505-761-2648.

Sincerely,

Bruce D Da

Bruce D. Davis
Senior Manager, Southwest Terminals

cc: Sherry L. Hesselbein, Managing Counsel ES&S, Marathon Petroleum Company, LP (via email)
Stoney K. Vining, Senior Counsel, Tesoro Companies, Inc. (via email)

Western Refining

WNR NYSE

June 16, 2017

VIA CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Jim Griswold
New Mexico Energy, Minerals and Natural Resources Department
Oil Conservation Division, Environmental Bureau
1220 South St. Francis Drive
Santa Fe, NM 87505

Re: Courtesy Notification Regarding Corporate Transaction
Western Refining Company L.P.
Pit Permits, Nos. P1-06579, P1-06580, P1-06581

Dear Mr. Griswold:

I am writing in connection with Western Refining Company, L.P.'s Pit Permits, Nos. P1-06579, P1-06580 and P1-06581, for the Jal LPG Storage Facility located in Lea County, New Mexico.

On February 8, 2016, the Energy, Minerals and Natural Resources Department Oil Conservation Division issued three Pit Permits to Western Refining Company, L.P. ("Western") for the Jal LPG Storage Facility:

- P1-06579 for the Proposed Brine Pond;
- P1-06580 for the South Brine Pond; and
- P1-06581 for the North Brine Pond.

Western is an indirect subsidiary of Western Refining, Inc. Tesoro Corporation and Western Refining, Inc. entered into a merger agreement pursuant to which one of Tesoro Corporation's wholly-owned subsidiaries merged with and into Western Refining, Inc., with Western Refining, Inc. surviving the merger as a wholly owned subsidiary of Tesoro Corporation. The transaction occurred on June 1, 2017.

Please note that Western will remain the owner and operator of the Jal LPG Storage Facility. We are providing this notice as a courtesy.

Please do not hesitate to contact me with any questions.

Sincerely,

Ken Parker

Ken Parker
Jal Terminal Manager
Western Refining

cc: R. Schmaltz (WNR – Bloomfield)

OFFICIAL SEAL
LAURIE GREEN
Notary Public
State of New Mexico
My Comm. Expires 9-29-2018

Laurie Green

Chavez, Carl J, EMNRD

From: Weaver, Ron <Ron.Weaver@wnr.com>
Sent: Tuesday, July 24, 2012 10:59 AM
To: Chavez, Carl J, EMNRD
Cc: Schmaltz, Randy; Parker, Ken; Hains, Allen; VonGonten, Glenn, EMNRD; Gonzales, Elidio L, EMNRD
Subject: RE: Jal LPG Storage Facility (GW-007) MIT extension request (LPG Storage Wells 3 & 4)

Thank you sir for your quick response to our request.

From: Chavez, Carl J, EMNRD [mailto:CarlJ.Chavez@state.nm.us]
Sent: Tuesday, July 24, 2012 10:55 AM
To: Weaver, Ron
Cc: Schmaltz, Randy; Parker, Ken; Hains, Allen; VonGonten, Glenn, EMNRD; Gonzales, Elidio L, EMNRD
Subject: RE: Jal LPG Storage Facility (GW-007) MIT extension request (LPG Storage Wells 3 & 4)

Ron:

The New Mexico Oil Conservation Division approves the MIT completion date of November 30, 2012.

Thank you.

Carl J. Chavez, CHMM
New Mexico Energy, Minerals & Natural Resources Department
Oil Conservation Division, Environmental Bureau
1220 South St. Francis Drive, Santa Fe, New Mexico 87505
Office: (505) 476-3490
E-mail: CarlJ.Chavez@State.NM.US
Website: http://www.emnrd.state.nm.us/ocd/
"Why Not Prevent Pollution; Minimize Waste; Reduce the Cost of Operations; & Move Forward With the Rest of the Nation?" To see how, please go to: "Pollution Prevention & Waste Minimization" at
http://www.emnrd.state.nm.us/ocd/environmental.htm#environmental

---

From: Weaver, Ron [mailto:Ron.Weaver@wnr.com]
Sent: Monday, July 23, 2012 9:41 AM
To: Chavez, Carl J, EMNRD
Cc: Schmaltz, Randy; Parker, Ken; Hains, Allen
Subject: MIT extension request

Good morning Carl,

Attached is a request for extension of our Jal Facility MITs for wells #3 and #4. The hard copy of this request has been placed in the mail.

Thanks!

Ron Weaver

Western Refining Company, Inc
Regional Terminals Manager

From: blmrefscanner@wnr.com [mailto:blmrefscanner@wnr.com]
Sent: Sunday, July 22, 2012 10:27 PM
To: Weaver, Ron
Subject: Message from KMBT_C552

Western Refining

WNR LISTED NYSE

RECEIVED OCD

2012 AUG 10 P 12:43

August 8, 2012

Carl J. Chavez, CHMM
New Mexico Energy, Minerals & Natural Resources Department
Oil Conservation Division, Environmental Bureau
1220 South St. Francis Drive, Santa Fe, New Mexico 87505

Mr. Chavez:

This letter is to apprise NMED of the Plan of Action developed by Western Refining Company, L.P. for the Jal LPG underground storage facility south brine pond. The Plan of Action is as follows:

1. Empty the pond of all brine water
2. Cut open the primary liner around the suction piping
3. Make necessary repairs to suction piping
4. Fill and compact area around suction piping
5. Repair primary liner where cut to access piping

Sincerely,

Ron Weaver

Ron Weaver
Western Refining Company, L.P.
Regional Terminals Manager
50 County Road 4990
Bloomfield, NM 87413

Cc:
Randy Schmaltz (WNR)
Allen Hains (WNR)
Ken Parker (WNR

Chavez, Carl J, EMNRD

From: Chavez, Carl J, EMNRD
Sent: Tuesday, July 10, 2012 12:27 PM
To: 'Allen.Hains@wnr.com'; 'Ron.Weaver@wnr.com'
Cc: VonGonten, Glenn, EMNRD
Subject: Jal LPG Storage Facility (GW-007) EPA 5-Yr. MIT Extension Request for Wells 3 & 4

Allen and Ron:

Good afternoon. This message is to document our telephone call this morning where Western Refining Company L.P. (Western) is apparently requesting an extension to the 5-yr. anniversary date of the last MIT (~8/18/2012) on the above subject wells.

The New Mexico Oil Conservation Division (OCD) notices that the permit (GW-007) will expire on December 29, 2012.

The OCD requests the following:

1) Please explain the reason for the extension request.
2) Please propose a date for completion of the MIT within 2 weeks of receipt of this e-mail for the OCD to determine whether the reason for the request and proposed date of the MIT are approvable. This may require Western to contact contractors to ensure the proposed date will be met.

Thank you.

Carl J. Chavez, CHMM
New Mexico Energy, Minerals & Natural Resources Department
Oil Conservation Division, Environmental Bureau
1220 South St. Francis Drive, Santa Fe, New Mexico 87505
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File

Chavez, Carl J, EMNRD

From: Hains, Allen [Allen.Hains@wnr.com]
Sent: Wednesday, February 15, 2012 3:32 PM
To: Chavez, Carl J, EMNRD; Schmaltz, Randy; Parker, Ken; Weaver, Ron
Cc: VonGonten, Glenn, EMNRD
Subject: RE: OCD Discharge Permit (GW-007) Provision 20(C) Operator Clarification Inquiry

Carl,

Thank you for the quick response.

The permit conditions below were prior to Western ownership and were never implemented by the previous owners. The NGL treating and fractionating plant was not put into operation as proposed. Salt contaminated sand was not disposed in the classifier. Therefore, there was no requirement to satisfy the permit conditions. This information was known when we discussed the 2008 permit renewal with you and Wayne. At that time, we discussed closing the classifier by filling it with onsite concrete debris and soil.

The classifier was used to remove grit (solids) from the waste water prior to discharge into the injection well. It was probably cleaned out and placed out-of-service in the mid 1980s when the EPNG gas plant ceased operations. Since Ken Parker first arrived in 1991, the classifier has not been in use. Currently, the classifier is empty with the exception of minor amounts of wind-blown sand and water from precipitation.

How do we move forward?

Thanks again,

Allen

Allen S. Hains
Manager
Remediation Projects

Western Refining
123 W. Mills Ave.
El Paso, Texas 79901
915 534-1483
915 490-1594 (cell)

From: Chavez, Carl J, EMNRD [mailto:CarlJ.Chavez@state.nm.us]
Sent: Wednesday, February 15, 2012 11:33 AM
To: Hains, Allen; Schmaltz, Randy; Parker, Ken
Cc: VonGonten, Glenn, EMNRD
Subject: OCD Discharge Permit (GW-007) Provision 20(C) Operator Clarification Inquiry

Allen, et al.:

Please find the OCD's response (yellow highlighted text below) with supporting documentation from the OCD's Administrative Record based on your clarification question posed to the OCD yesterday. Please contact me if you have questions. Thank you.

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Operator: Clarification on what Section 20(C) requires the operator to do?

Current OCD Discharge Permit Provision:

20. Additional Site Specific Conditions:

C. The closure of the Classifier and associated equipment shall be completed on or before the expiration date of this permit.

OCD Response:

On 3/31/2003 the OCD approved with conditions the "Classifier" to be used for disposal of salt contaminated sand. In the conditions, the operator was required to submit a completion report that included all of the conditions in the approval (see below).

The operator apparently never satisfied the conditions of the OCD approval. Therefore, the OCD included it in the most recent permit revision for resolution.

Please complete the conditions specified in the OCD 3/31/2003 approval with conditions to the OCD on or before the expiration date of the current permit.

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OCD Historical Documentation on the "Classifier":

From: Price, Wayne
Sent: Monday, March 31, 2003 1 :45 PM
To: 'Ken Parker'
Subject: RE: Contaminated Sand Disposal Letter

OCD is in receipt of your letter dated 1-17-03 requesting using the out of service below grade classifier tank as secondary containment for disposal of salt contaminated sand. OCD hereby approves of the plan with the following conditions:

1. Sites maps will be updated to show the exact location for future reference. A gps reading shall be recorded.

3. Collect a representative sample of the waste material and analyze for general chemistry parameters including anions and cations.

2. Please provide photos before, during and after and send in a completion report for OCD approval.

Please be advised that NMOCD approval of this plan does not relieve Texas LPG of liability should their operations fail to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD approval does not relieve Texas LPG of responsibility for compliance with any OCD, federal, state, or local laws and/or regulations.

-----Original Message-----
From: Ken Parker [mailto:Parker_Ken@msn.com]
Sent: Friday, March 28, 2003 2:58 PM
To: Wayne Price

Subject: Contaminated Sand Disposal Letter

Wayne:

Please check your records for a letter dated 1/17/03. I haven't received your response. If necessary, I will e-mail you another copy.

Sincerely :
Ken

****

3/31/2003

State of New Mexico
Energy Minerals and Natural Resources
Oil Conservation Division

1220 South St. Francis Dr.
Santa Fe, New Mexico 87505
Date: 1-17--03

RE: Contaminated Sand Disposal

Dear Mr. Price:

Texas LPG Storage Company is the early stages of repairing the primary liner. It appears that we will need to dispose of some sand that is contaminated with salt. I understand that we have some options for disposal. What I am proposing to do, encapsulate the sand using HOPE 60 Mil lining material. Insert the 60 Milliner into the classifier and cover to surface level with fresh dirt.

The classifier is located on site at the Jal facility and has not been in service since the late 1980's. It is a steel constructed open top tank that is about 50 feet in diameter and buried to a depth of 20 feet. The classifier will be utilized as secondary containment.

Preparing the classifier for contaminated material storage. The HOPE liner will be molded to fit, seams welded, then inserted within the classifier's structure. Fresh dirt will be utilized for a cushion between the classifier's steel bottom, sidewalls, and liner. The minimum thickness of the cushion is twelve inches. The liner will be filled with the contaminated sand within two feet of its top and capped. The cap will be welded. Then the capsule is covered with fresh dirt.

Ken Parker
Manager

CHRISTIE GAS CORPORATION JAL NATURAL GAS PROCESSING PLANT
DISCHARGE PLAN APPLICATION
April, 1997

Natural Gas Liquids Processing-
The natural gas liquids treating and fractionating plant is designed to separate propane, butane, natural gasoline and other impurities from each other. A process flow sheet illustrating the major components of this system are

included in Tab "3" in CGC's January 1992 Discharge Plan Application. With respect to the release of effluents from this process, all process equipment is connected to the facility's drain system which flows by gravity to a classifier which in turn separates insoluble hydrocarbon liquids from the wastewater. The insoluble hydrocarbon-bearing liquids are pumped to a storage tank and the wastewater is pumped to a nearby injection well for disposal. The disposal system will be discussed in greater detail in Part **III** of this application. **Because this facility is not currently in operation, it is not possible at this time to estimate the quantity of effluent that is expected to be generated by this operation; however, CGC will make this information available to the NMOCD as soon as it becomes available.**

B. Quality Characteristics

Because liquid wastes are not currently generated at the facility, it is not possible to provide data relative to the chemical characteristics of the waste streams that will be generated at the facility. Upon commencement of operations, CGC will collect samples and provide analytical data relative to the waste streams to the NMOCD. Unless otherwise required by the NMOCD, CGC proposes to collect samples from the classifier and waste oil tank to meet the requirements of waste stream characterization. In addition, samples from the brine storage ponds will be collected and analyzed should the ponds be put into use.

C. Transfer and Storage of Process Fluids and Effluents

The effluent stream from the processing and fractionating plant will be transported to a classifier via subsurface drain piping from the processing area. The classifier functions as a gravity separator where any hydrocarbon waste liquids are separated from the effluent. The lighter hydrocarbon waste liquids are conveyed from the classifier to a storage tank where the liquid is periodically removed from the tank and shipped to a waste oil reclamation facility. Because the plant is not currently operating, no contract has been executed with a waste oil reclamation facility; however, specific information relative to the reclamation operator will be provided to the NMOCD upon commencement of plant operations. The aqueous phase of the waste fluid in the classifier is conveyed first to an above ground surge tank and then pumped to a permitted disposal well which is located at the north end of the plant site. Any solids that collect in the classifier will be periodically removed and disposed of in an environmentally acceptable manner. Tab "4" in CGC's January 1992 Discharge Plan Application contains a diagram illustrating the wastewater collection system for the natural gas processing plant.

D. Spill Leak Prevention and Housekeeping Procedures

In the event of a spill at the facility, CGC personnel will immediately take measures to contain the spilled materials and clean-up activities will be implemented in an expeditious manner. In addition, CGC will comply with all necessary spill reporting requirements as outlined in Rule 116 of the NMOCD's rules and regulations. CGC will comply with all applicable federal, state, or local regulations relative to spills not specifically mentioned in NMOCD Rule 116.

If in the event of normal plant operations, liquid effluents are generated as a result of vessel cleaning, such effluents will be conveyed to the classifier via the plant drainage system.

Because the classifier installation is partially below grade, the classifier and any other below-grade open-top tanks will be visually inspected annually to assure that the integrity of the vessel is intact.

Should the need arise to shut-in the disposal well for a short period of time for repairs, CGC is confident that the 200-barrel classifier provides ample storage space for contingency storage of waste fluids. If, upon commencement of operations of the natural gas treating and fractionation plant, it is determined that the generation of waste liquids is more than expected, the need for additional contingency wastewater storage tanks will be evaluated. In the event of extended disposal well downtime, additional storage tanks will be rented or purchased to contain the wastewater; if such an activity is impractical or uneconomical, an overall plant shut-down will be implemented if necessary.

Drain Line Testing Procedures For The Jal Plant Introduction

The following procedures are arranged to allow testing of various sections of the drain system with the plant in operation. Some sections will require a plant shutdown to permit testing. If the total system is to be tested during a plant shutdown, the test sequence should be arranged so water from one section can be routed into the next section to be tested where possible. This should shorten filling time and provide more economical use of water. Water used in testing will be raw water from the plant water system. Use of fire hydrants and hoses will be required in some locations to provide sufficient volume and pressure for filling and testing. In most cases, test pressures will be below normal line pressure in plant water mains making use of hydrostatic test pump unnecessary. The higher pressures will require a pump.

The test pressures and duration used in this procedure exceed those specified for drainage and vent systems as set forth in the 1979 ICBO Code, Sections 1004 (A) 1 and 1005. The international Conference of Building Officials (lCBO) Plumbing Code of the Uniform Plumbing Code describes the procedures to be utilized in this testing procedure. The pressures and duration required in the ICBO Code are 4.3 psi and 15 minutes, respectively.

• General Instructions

14. The classifier tank will be filled with water and gauged to verify the maintenance of a constant level for a 4 hour period.

Carl J. Chavez, CHMM
New Mexico Energy, Minerals & Natural Resources Dept.
Oil Conservation Division, Environmental Bureau
1220 South St. Francis Dr., Santa Fe, New Mexico 87505
Office: (505) 476-3490
Fax: (505) 476-3462
E-mail: CarlJ.Chavez@state.nm.us
Website: http://www.emnrd.state.nm.us/ocd/
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http://www.emnrd.state.nm.us/ocd/environmental.htm#environmental)

Chavez, Carl J, EMNRD

From: Hains, Allen [Allen.Hains@wnr.com]
Sent: Thursday, February 16, 2012 11:31 AM
To: Chavez, Carl J, EMNRD; Schmaltz, Randy; Parker, Ken; Weaver, Ron
Cc: VonGonten, Glenn, EMNRD
Subject: RE: OCD Discharge Permit (GW-007) Provision 20(C) Operator Clarification Inquiry
Attachments: DSC00056.jpg

Carl,

Maybe, we should meet to discuss? Randy and I will be in the Santa Fe area next week. We should also discuss the Discharge Plan Renewal which is due in July.

The 2007 picture below should help you recall the classifier. It is empty except for windblown sand and precipitation. Not much has changed since 2007. It is our understanding that EPNG removed and disposed of the sludge. EPNG has also assessed and is mitigating hydrocarbon and brine impacts to the shallow groundwater from its operations.

Allen

Allen S. Hains
Manager
Remediation Projects

Western Refining
123 W. Mills Ave.
El Paso, Texas 79901
915 534-1483
915 490-1594 (cell)

From: Chavez, Carl J, EMNRD [mailto:CarlJ.Chavez@state.nm.us]
Sent: Wednesday, February 15, 2012 3:50 PM
To: Hains, Allen; Schmaltz, Randy; Parker, Ken; Weaver, Ron
Cc: VonGonten, Glenn, EMNRD
Subject: RE: OCD Discharge Permit (GW-007) Provision 20(C) Operator Clarification Inquiry

Is the classifier below grade?

Carl J. Chavez, CHMM
New Mexico Energy, Minerals & Natural Resources Dept.
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1220 South St. Francis Dr., Santa Fe, New Mexico 87505
Office: (505) 476-3490
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From: Hains, Allen [mailto:Allen.Hains@wnr.com]
Sent: Wednesday, February 15, 2012 3:32 PM
To: Chavez, Carl J, EMNRD; Schmaltz, Randy; Parker, Ken; Weaver, Ron
Cc: VonGonten, Glenn, EMNRD
Subject: RE: OCD Discharge Permit (GW-007) Provision 20(C) Operator Clarification Inquiry

Carl,

Thank you for the quick response.

The permit conditions below were prior to Western ownership and were never implemented by the previous owners. The NGL treating and fractionating plant was not put into operation as proposed. Salt contaminated sand was not disposed in the classifier. Therefore, there was no requirement to satisfy the permit conditions. This information was known when we discussed the 2008 permit renewal with you and Wayne. At that time, we discussed closing the classifier by filling it with onsite concrete debris and soil.

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How do we move forward?

Thanks again,

Allen

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Manager
Remediation Projects

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915 534-1483
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From: Chavez, Carl J, EMNRD [mailto:CarlJ.Chavez@state.nm.us]
Sent: Wednesday, February 15, 2012 11:33 AM
To: Hains, Allen; Schmaltz, Randy; Parker, Ken
Cc: VonGonten, Glenn, EMNRD
Subject: OCD Discharge Permit (GW-007) Provision 20(C) Operator Clarification Inquiry

Allen, et al.:

Please find the OCD's response (yellow highlighted text below) with supporting documentation from the OCD's Administrative Record based on your clarification question posed to the OCD yesterday. Please contact me if you have questions. Thank you.

****

Operator: Clarification on what Section 20(C) requires the operator to do?

Current OCD Discharge Permit Provision:

20. Additional Site Specific Conditions:

C. The closure of the Classifier and associated equipment shall be completed on or before the expiration date of this permit.

OCD Response:

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The operator apparently never satisfied the conditions of the OCD approval. Therefore, the OCD included it in the most recent permit revision for resolution.

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****
OCD Historical Documentation on the "Classifier":

From: Price, Wayne
Sent: Monday, March 31, 2003 1 :45 PM
To: 'Ken Parker'
Subject: RE: Contaminated Sand Disposal Letter

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approves of the plan with the following conditions:

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-----Original Message-----
From: Ken Parker [mailto:Parker_Ken@msn.com]
Sent: Friday, March 28, 2003 2:58 PM
To: Wayne Price
Subject: Contaminated Sand Disposal Letter

Wayne:

Please check your records for a letter dated 1/17/03. I haven't received your response. If necessary, I will e-mail you another copy.

Sincerely :
Ken

****

3/31/2003

State of New Mexico
Energy Minerals and Natural Resources
Oil Conservation Division

1220 South St. Francis Dr.
Santa Fe, New Mexico 87505
Date: 1-17--03

RE: Contaminated Sand Disposal

Dear Mr. Price:

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Ken Parker
Manager

CHRISTIE GAS CORPORATION JAL NATURAL GAS PROCESSING PLANT
DISCHARGE PLAN APPLICATION
April, 1997

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Carl J. Chavez, CHMM
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Oil Conservation Division, Environmental Bureau
1220 South St. Francis Dr., Santa Fe, New Mexico 87505
Office: (505) 476-3490
Fax: (505) 476-3462
E-mail: CarlJ.Chavez@state.nm.us
Website: http://www.emnrd.state.nm.us/ocd/

Chavez, Carl J, EMNRD

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Sent: Wednesday, February 15, 2012 11:33 AM
To: 'Hains, Allen'; Schmaltz, Randy; 'Parker, Ken'
Cc: VonGonten, Glenn, EMNRD
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To: Wayne Price
Subject: Contaminated Sand Disposal Letter

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Sincerely :
Ken

****

3/31/2003

State of New Mexico
Energy Minerals and Natural Resources
Oil Conservation Division

1220 South St. Francis Dr.
Santa Fe, New Mexico 87505
Date: 1-17--03

RE: Contaminated Sand Disposal

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The classifier is located on site at the Jal facility and has not been in service since the late 1980's. It is a steel constructed open top tank that is about 50 feet in diameter and buried to a depth of 20 feet. The classifier will be utilized as secondary containment.

Preparing the classifier for contaminated material storage. The HOPE liner will be molded to fit, seams welded, then inserted within the classifier's structure. Fresh dirt will be utilized for a cushion between the classifier's

steel bottom, sidewalls, and liner. The minimum thickness of the cushion is twelve inches. The liner will be filled with the contaminated sand within two feet of its top and capped. The cap will be welded. Then the capsule is covered with fresh dirt.

Ken Parker
Manager

CHRISTIE GAS CORPORATION JAL NATURAL GAS PROCESSING PLANT
DISCHARGE PLAN APPLICATION
April, 1997

Natural Gas Liquids Processing-
The natural gas liquids treating and fractionating plant is designed to separate propane, butane, natural gasoline and other impurities from each other. A process flow sheet illustrating the major components of this system are included in Tab "3" in CGC's January 1992 Discharge Plan Application. With respect to the release of effluents from this process, all process equipment is connected to the facility's drain system which flows by gravity to a classifier which in turn separates insoluble hydrocarbon liquids from the wastewater. The insoluble hydrocarbon-bearing liquids are pumped to a storage tank and the wastewater is pumped to a nearby injection well for disposal. The disposal system will be discussed in greater detail in Part **III** of this application. **Because this facility is not currently in operation, it is not possible at this time to estimate the quantity of effluent that is expected to be generated by this operation; however, CGC will make this information available to the NMOCD as soon as it becomes available.**

B. Quality Characteristics
Because liquid wastes are not currently generated at the facility, it is not possible to provide data relative to the chemical characteristics of the waste streams that will be generated at the facility. Upon commencement of operations, CGC will collect samples and provide analytical data relative to the waste streams to the NMOCD. Unless otherwise required by the NMOCD, CGC proposes to collect samples from the classifier and waste oil tank to meet the requirements of waste stream characterization. In addition, samples from the brine storage ponds will be collected and analyzed should the ponds be put into use.

C. Transfer and Storage of Process Fluids and Effluents

The effluent stream from the processing and fractionating plant will be transported to a classifier via subsurface drain piping from the processing area. The classifier functions as a gravity separator where any hydrocarbon waste liquids are separated from the effluent. The lighter hydrocarbon waste liquids are conveyed from the classifier to a storage tank where the liquid is periodically removed from the tank and shipped to a waste oil reclamation facility. Because the plant is not currently operating, no contract has been executed with a waste oil reclamation facility; however, specific information relative to the reclamation operator will be provided to the NMOCD upon commencement of plant operations. The aqueous phase of the waste fluid in the classifier is conveyed first to an above ground surge tank and then pumped to a permitted disposal well which is located at the north end of the plant site. Any solids that collect in the classifier will be periodically removed and disposed of in an environmentally acceptable manner. Tab "4" in CGC's January 1992 Discharge Plan Application contains a diagram illustrating the wastewater collection system for the natural gas processing plant.

D. Spill Leak Prevention and Housekeeping Procedures
In the event of a spill at the facility, CGC personnel will immediately take measures to contain the spilled materials and clean-up activities will be implemented in an expeditious manner. In addition, CGC will comply with all necessary spill reporting requirements as outlined in Rule 116 of the NMOCD's rules and regulations. CGC will comply with all applicable federal, state, or local regulations relative to spills not specifically mentioned in NMOCD Rule 116.

If in the event of normal plant operations, liquid effluents are generated as a result of vessel cleaning, such effluents will be conveyed to the classifier via the plant drainage system.

Because the classifier installation is partially below grade, the classifier and any other below-grade open-top tanks will be visually inspected annually to assure that the integrity of the vessel is intact.

Should the need arise to shut-in the disposal well for a short period of time for repairs, CGC is confident that the 200-barrel classifier provides ample storage space for contingency storage of waste fluids. If, upon commencement of operations of the natural gas treating and fractionation plant, it is determined that the generation of waste liquids is more than expected, the need for additional contingency wastewater storage tanks will be evaluated. In the event of extended disposal well downtime, additional storage tanks will be rented or purchased to contain the wastewater; if such an activity is impractical or uneconomical, an overall plant shut-down will be implemented if necessary.

Drain Line Testing Procedures For The Jal Plant Introduction

The following procedures are arranged to allow testing of various sections of the drain system with the plant in operation. Some sections will require a plant shutdown to permit testing. If the total system is to be tested during a plant shutdown, the test sequence should be arranged so water from one section can be routed into the next section to be tested where possible. This should shorten filling time and provide more economical use of water. Water used in testing will be raw water from the plant water system. Use of fire hydrants and hoses will be required in some locations to provide sufficient volume and pressure for filling and testing. In most cases, test pressures will be below normal line pressure in plant water mains making use of hydrostatic test pump unnecessary. The higher pressures will require a pump.

The test pressures and duration used in this procedure exceed those specified for drainage and vent systems as set forth in the 1979 ICBO Code, Sections 1004 (A) 1 and 1005. The international Conference of Building Officials (ICBO) Plumbing Code of the Uniform Plumbing Code describes the procedures to be utilized in this testing procedure. The pressures and duration required in the ICBO Code are 4.3 psi and 15 minutes, respectively.

• General Instructions

14. The classifier tank will be filled with water and gauged to verify the maintenance of a constant level for a 4 hour period.

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"Why not Prevent Pollution; Minimize Waste; Reduce the Cost of Operations; & Move Forward with the Rest of the Nation?" To see how, go to "Pollution Prevention & Waste Minimization" at:
http://www.emnrd.state.nm.us/ocd/environmental.htm#environmental)

WESTERN REFINING

Jal, NM Storage Facility

LPG Cavern #4

Mechanical Integrity Test Report

JA3301/12 003/O/J/O

US geostock

Number of pages: 12	Revision: O	Status: FINAL	Date of distribution: December 27, 2012

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Issued (name, signature)	Checked (name, signature)	Approved (name, date, signature)
		12.27.2012

CONTENTS

MAIN PURPOSE OF THE REVISION AND TYPE OF MODIFICATIONS

1. INTRODUCTION

Geostock US has performed a mechanical integrity test on Western Refining Jal, NM LPG Storage well #4 using brine as a test medium. The testing procedures were designed to meet the requirements set forth in the OCD regulations for liquid-filled caverns.

Cavern Well #3 and Cavern Well #4 are used for LPG storage in salt caverns. The production casings were successfully pressure tested with a packer; multi-finger calipers and cement bond logs have been performed to verify the integrity of the wells.

The subject wells and salt formation will be tested at maximum operating pressure at the casing, i.e. 1250 psig which corresponds to a pressure gradient of 0.75 psi/ft.

2. TEST METHODOLOGY

Wellhead pressure and temperature were recorded, however to eliminate any error on the density of the fluid column in the wellbore a surface read-out (SRO) pressure gauge was set at the casing depth (~1666 ft) to measure directly the pressure in the cavern.

The test was conducted by injection of brine to increase the cavern pressure at the casing shoe to test pressure. By this method, both well and salt formation were tested for potential leak.

The first phase of the MIT test consisted of daily brine injection to maintain test pressure at the casing shoe based on the SRO gauge readings. The volume of brine per day required to return the well to test pressure was measured until stabilized conditions were reached.

In the second phase of the MIT test, after a final brine injection to test pressure, the well was isolated with double valve combinations and the downhole and surface pressures were recorded for a test period of 4 hours. Pressures on the 7" x 4 ½" annulus and the 4 ½" tubing were recorded by the use of calibrated chart recorders, with a one hour clock setting for a period of 4 hours (Appendix 3).

3. TEST CHRONOLOGY

Daily brine injection began on 12/17/12. The surface read out gauge was installed on 12/18/12. The MIT began on 12/22/12 at 07:30 and ended on 12/22/12 at 11:30.

	Start Pressure	End Pressure	Volume Injected
	SRO, psi	SRO, psi	bbl
12/17/2012			3.5
12/18/2012	1032	1185	0.4
12/19/2012	1122	1185	0.4
12/20/2012	1108	1185	0.4
12/21/2012	1109	1185	1
12/22/12	1109	1185	0.4

4. RESULTS

4.1. Data Collected

During the pre-test period, the amount of daily brine injection required to return the cavern to test pressure was recorded. (see Appendix 1) The cavern quickly stabilized to the point that the daily brine injection required was less than 1 bbl/day, which an be compared to the acceptable leak rate of 2.64 bbl/day

The wellhead pressures, downhole pressure, and ambient temperature were recorded during the MIT. (see Appendix 2) The wellhead pressure loss recorded by the digital gauges on the 4 ½" tubing during the MIT was:

Initial pressure: 470.95 psi
Final pressure: 459.47 psi
Pressure loss: 11.48 psi (2.44%)

The cavern pressure loss recorded with the SRO gauge during the MIT was:

Initial Pressure: 1180.75 psi
Final Pressure: 1165.25 psi
Pressure loss: 15.48 psi (1.31%)

4.2. Apparent leak rate

Using the pressure increase and daily brine injection from the pre-test period, a stabilized seepage rate can be calculated that relates the amount of pressure change in the cavern to the apparent leak rate.

	ΔP	Volume Injected	Seepage
	psi	bbl	bbl/psi
12/18/12	153	0.4	0.00261
12/19/12	63	0.4	0.00635
12/20/12	76.1	0.4	0.00526
12/21/12	76	1	0.01316
12/22/12	76	0.4	0.00526

*From SRO tool

Using the stabilized observed seepage rate of 0.00526 bbl/psi and recorded pressure loss of 15.48 psi during the 4 hour MIT period, the apparent leak rate during the MIT can be calculated:

15.48 psi x .00526 bbl/psi = .0814 bbl apparent leak during 4 hours
= .489 bbl/day apparent leak rate
= 178.32 bbl/yr apparent leak rate

Using the maximum observed seepage rate of .01316 bbl/psi and performing the same calculation results

15.48 psi x .01316 bbl/psi = .204 bbl apparent leak during 4 hours
= 1.22 bbl/day apparent leak rate
= 446 bbl/yr apparent leak rate

4.3. Pass/fail criteria

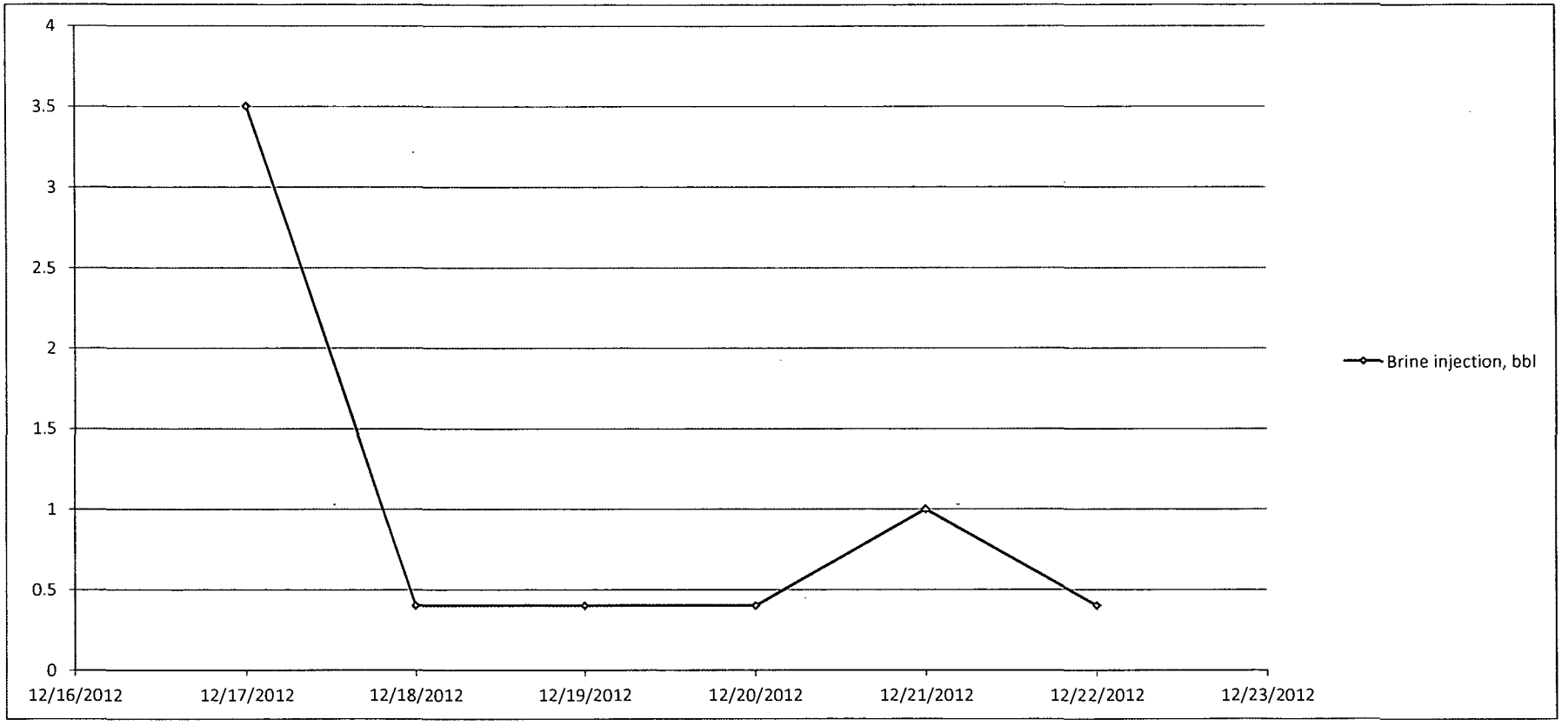
Apparent leak rate, 446 bbl/yr < 963.6 bbl/yr (2.64 bbl/day)

Pressure loss at casing shoe over 4 hour MIT period, 1.31% < 10%

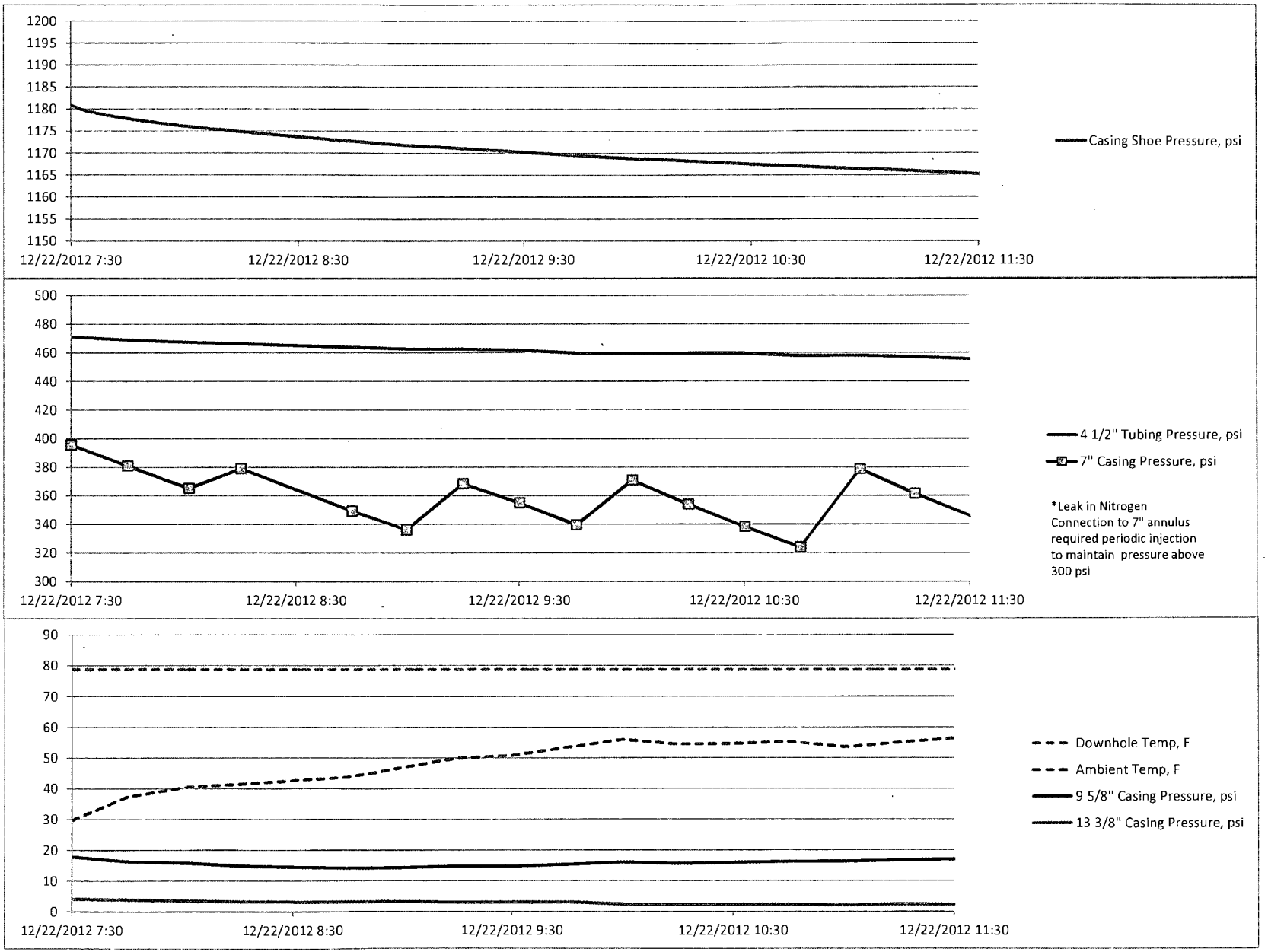
4.4. Test Result

Based on the data collected during the test and the definition of the pass/fail criteria, Well #4 has passed the mechanical integrity test.

APPENDIX 1 – PRE-TEST BEHAVIOR


4
3.5
3
2.5
2
1.5
1
0.5
0
12/16/2012
12/17/2012
12/18/2012
12/19/2012
12/20/2012
12/21/2012
12/22/2012
12/23/2012
Brine injection, bbl

APPENDIX 2 – MIT TEST PERIOD

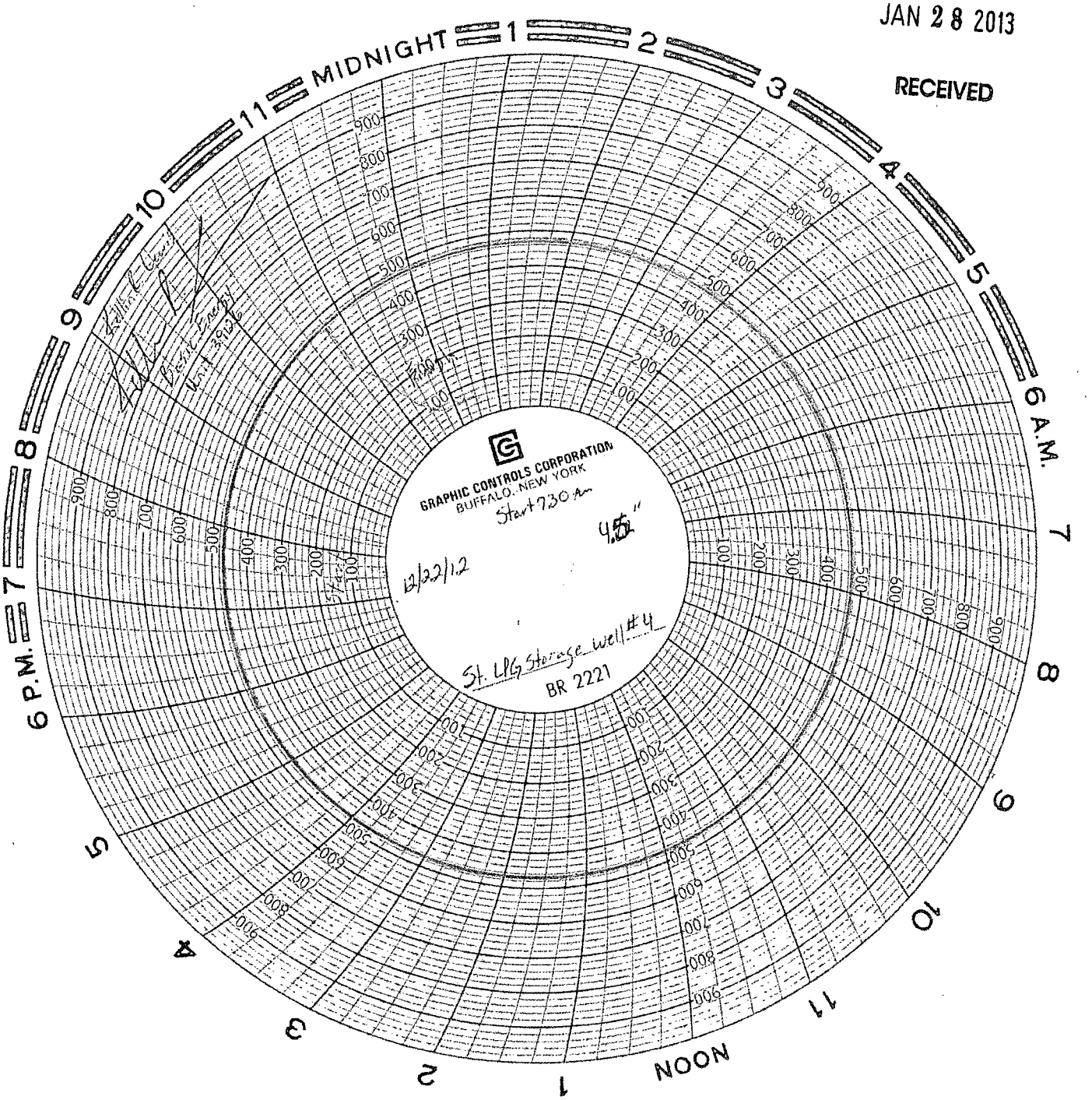

1200
1195
1190
1185
1180
1175
1170
1165
1160
1155
1150
12/22/2012 7:30
12/22/2012 8:30
12/22/2012 9:30
12/22/2012 10:30
12/22/2012 11:30
Casing Shoe Pressure, psi
500
480
460
440
420
400
380
360
340
320
300
12/22/2012 7:30
12/22/2012 8:30
12/22/2012 9:30
12/22/2012 10:30
12/22/2012 11:30
4 1/2" Tubing Pressure, psi
7" Casing Pressure, psi
*Leak in Nitrogen Connection to 7" annulus required periodic injection to maintain pressure above 300 psi
90
80
70
60
50
40
30
20
10
0
12/22/2012 7:30
12/22/2012 8:30
12/22/2012 9:30
12/22/2012 10:30
12/22/2012 11:30
Downhole Temp, F
Ambient Temp, F
9 5/8" Casing Pressure, psi
13 3/8" Casing Pressure, psi

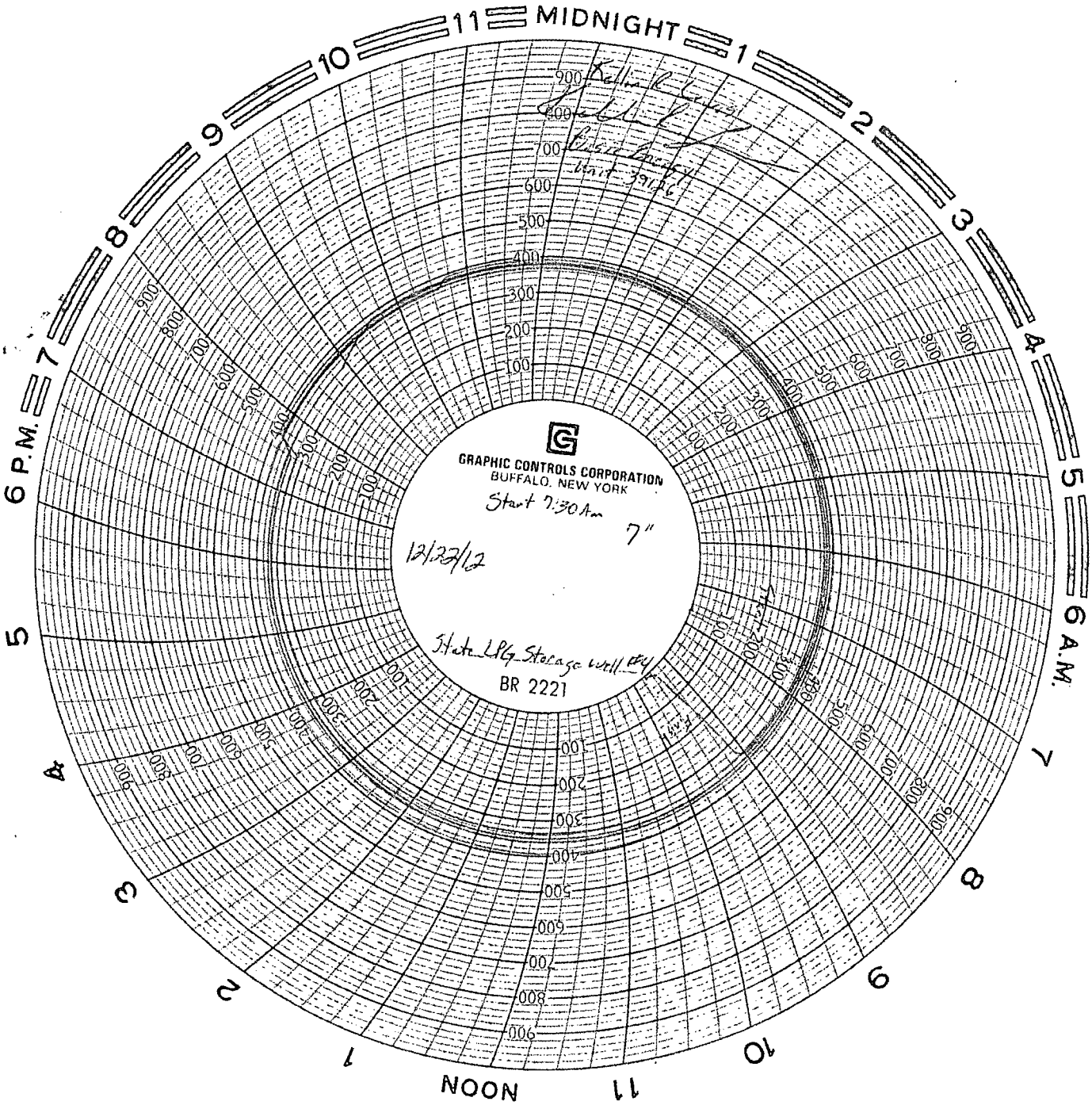
APPENDIX 3 – PRESSURE CHARTS (SCANS)

HOBBS OCD

JAN 28 2013

RECEIVED




MIDNIGHT
NOON
6 P.M.
6 A.M.
GRAPHIC CONTROLS CORPORATION
BUFFALO, NEW YORK
Start 7:30 Am
7"
12/22/62
State LPG Storage Well #4
BR 2221