Western Refining Southwest LLC
A subsidiary of Marathon Petroleum Corporation
I-40 Exit 39
Jamestown, NM 87347

May 25, 2022

Mr. Kevin Pierard, Chief
New Mexico Environment Department
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505

RE: Disapproval
[Revised] Tank 570 Release and Additional Areas LIF/HP Investigation Report
Western Refining Southwest LLC, D/B/A Marathon Gallup Refinery
EPA ID #NMD000333211, HWB-WRG-21-021

Dear Mr. Pierard:

Attached please find the response to comments contained in the New Mexico Environment Department (NMED) Disapproval with Modifications letter dated January 31, 2021. This submittal consists of the response letter; two hard copies of the replacement pages, revised tables, and figures; and two CDs with an electronic copy of the revised report and red-line/strike-out text. Electronic copies will also be submitted by email to NMED.

A timeline of the report is shown below:

- *Tank 570 Release and Additional Areas LIF/HP Investigation Report*, submitted November 1, 2021
- *Disapproval*, received January 31, 2022

If you have any questions or comments regarding the information contained herein, please do not hesitate to contact Mr. John Moore at (505) 879-7643.

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Certification

I certify under penalty of law that this document and all attachments were prepared under my direction of supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Sincerely,
Western Refining Southwest LLC, Marathon Gallup Refinery

Ruth A Cade

Ruth Cade
Vice-President

Enclosure

cc: D. Cobrain, NMED HWB
M. Suzuki, NMED HWB
L. Barr, NMOCD
M. Bracey, Marathon Petroleum Corporation
K. Luka, Marathon Petroleum Corporation
J. Moore, Marathon Gallup Refinery
L. King, EPA Region 6
H. Jones, Trihydro Corporation

ATTACHMENT A. RESPONSE TO COMMENTS

New Mexico Environment Department (NMED) to Western Refining Southwest LLC (dba Marathon Gallup Refinery [Refinery]) Comment Letter "Disapproval Tank 570 and Additional Areas Laser-Induced Fluorescence/Hydraulic Profiling Investigation Report" (January 31, 2022)

NMED Comments	Refinery Responses
Comment 1:	**Response 1:**
In Section 1.0 (Introduction and Background), page 7 of 20, paragraph 2, the Permittee states, "[t]he investigation scope was conducted in accordance with a series of verbal discussions and agreements between the New Mexico Environment Department (NMED) and the Refinery." Although the investigation scope was discussed verbally, NMED prefers a written form of communication for our record so that they are accessible to the public and will also facilitate with tracking the course of the investigations. Therefore, for future investigations, the Permittee must submit written work plans for review and approval by NMED prior to the investigations being conducted. No revision is required to the Report.	This comment is acknowledged.
Comment 2:	**Response 2:**
In Section 1.0 (Introduction and Background), page 7 of 20, bullet 2, the Permittee states, "[t]he results for the Marketing Tank Farm investigations (November 2019 and February 2021) were summarized in the "Marketing Tank Farm Laser-Induced Fluorescence/Hydraulic Profiling Investigation Report" (MKTF Report) (MPC 2021) submitted on March 31, 2021 and disapproved in the NMED letter dated June 2, 2021." The Permittee submitted the *[Revised] Marketing Tank Farm Laser-Induced Fluorescence/Hydraulic Profiling Investigation Report*, dated September 14, 2021. Subsequently, NMED's *Approval with Modifications* for the revised report was issued on December 2, 2021. As a reminder, the response letter, the replacement pages, table and figure, and an electronic version on	This comment is acknowledged.

New Mexico Environment Department (NMED) to Western Refining Southwest LLC (dba Marathon Gallup Refinery [Refinery]) Comment Letter "Disapproval Tank 570 and Additional Areas Laser-Induced Fluorescence/Hydraulic Profiling Investigation Report" (January 31, 2022)

NMED Comments	Refinery Responses
a CD/DVD for the revised MKTF Report are due no later than February 18, 2022. No revision is necessary.	
Comment 3:	**Response 3:**
Section 3.2.1 (Process Area), pages 13 through 14, provides a discussion regarding the results of the Laser-Induced Fluorescence (LIF) investigation in the Process Area. According to Table 1-1 (LIF Boring Destination and Investigation Date), page 3 of 4, the results of the Process Area Investigation (e.g., borings PA-LIF-1 through -8) are not included in the Report. Since the Report includes the discussion of the Process Area, Table 1-1 is not accurate. Resolve the discrepancy by correcting Table 1-1 in the revised Report.	Table 1-1 has been revised.
Comment 4:	**Response 4:**
In Section 3.2.2 (Active Refinery Western Boundary), page 14 of 20, paragraph 5, the Permittee states, "[i]t is likely that the ponds function as a migration barrier to the [separate phase hydrocarbons (SPH)] impacts within the subsurface." The statement is speculative since the supporting data has not been provided to demonstrate that the ponds function as a migration barrier. Comment 2 of the NMED's December 27, 2021 *Approval with Modifications Investigation Report, SMW-2 and GWM-1 Areas* requires the Permittee to "[p]rovide accurate surface elevation survey data for boring OW-69 to confirm that the depth of boring OW-69 was completed to a depth comparable to groundwater levels detected in well GWM-1." Unless the survey data is provided, NMED is unable to evaluate whether boring OW-69 was advanced to a sufficient depth to intercept the	The statement in Section 3.2.2, page 15 of 21, was removed from the revised Report.

New Mexico Environment Department (NMED) to Western Refining Southwest LLC (dba Marathon Gallup Refinery [Refinery]) Comment Letter "Disapproval Tank 570 and Additional Areas Laser-Induced Fluorescence/Hydraulic Profiling Investigation Report" (January 31, 2022)

NMED Comments	Refinery Responses
saturated zone which would help support the assertion that the ponds function as a migration barrier. In addition, it appears that the LIF/hydraulic profiling (HP) log for boring WB-LIF-113 advanced on the western perimeter of pond AL-2 approximately 100 feet south of well GWM-1 indicates that SPH was absent; however, the LIF/HP boring WB-LIF-113 was only advanced to a depth of 18.92 feet below ground surface (bgs). Since the depths to groundwater (DTW) historically exceed 20 feet bgs in well GWM-1, the depth of boring WB-LlF-113 (13.92 feet bgs) was likely too shallow to intercept the water table where SPH may potentially be present. Remove the statement from the revised Report or provide the supporting data and provide a discussion in the appropriate sections) in the revised Report.	
Comment 5:	**Response 5:**
In Sections 3.2.2 (Active Refinery Western Boundary), page 14 of 20, paragraph 5, and 4.0 (Conclusions and Recommendations), page 19 of 20, bullet 2 under *Recommendations*, the Permittee states, "[b]ased on the data presented in this report, sufficient data have been collected for future engineering evaluation." If the LIF/HP borings were not advanced to the saturated zone, SPH would be undetected and the data from the investigation would be incomplete for use for future remedial design. Although some LIF/HP borings were advanced to the adequate depth, others were not (e.g., WB-LIF-113). In order to verify whether each boring was advanced to the saturated zone, provide a table that summarizes all of the LIF/HP borings included in Appendix C (LIF/HP Logs) with the following information: (a) final depth of the boring, (b)	The Refinery respectfully disagrees with the comment. Whether or not the borings were advanced to the saturated zone does not discount the information attained from each boring. The intent of the Laser-Induced Fluorescence (LIF) borings was to identify where separate phase hydrocarbons (SPH) potentially exist. As has been demonstrated and reported in the past, SPH at the Refinery exists both above and below the potentiometric surface. The LIF/HP borings provide a semi-quantitative guide for any future data collection needs, which could be used for engineering or remedial assessment purposes, regardless of the potentiometric surface depth. A new table labeled Table 3-1, with the requested data, has been provided summarizing the pertinent information as requested.

New Mexico Environment Department (NMED) to Western Refining Southwest LLC (dba Marathon Gallup Refinery [Refinery]) Comment Letter "Disapproval Tank 570 and Additional Areas Laser-Induced Fluorescence/Hydraulic Profiling Investigation Report" (January 31, 2022)

NMED Comments	Refinery Responses
estimated DTW at the boring location (e.g., based on historical/average DTW data collected from the neighboring wells and/or data obtained from HP, where applicable), and (c) maximum % RE observed from the boring and depth interval. Based on the data listed in the summary table, evaluate and discuss whether each boring was adequately advanced to the saturated zone in the revised Report.	Text has been added to Section 3.0 (Investigation Results), page 13 of 21, to state, " In total, 139 LIF/HP borings have been drilled at the site: 46 borings in November 2019, 45 borings in February 2021, and 48 borings in May 2021. The locations are presented on Figure 3-1 and the LIF/HP logs are provided in Appendix C. Elevation data for the LIF borings are provided in Appendix D. Based on the LIF/HP logs (Appendix C), SPH type and extent are presented on Figure 3-1 and summarized in Tables 3-1 and 3-2 for the borings drilled during the three LIF/HP investigations. Table 3-1 presents the total depth, estimated depth to water, and maximum % RE value and depth. Table 3-2 provides the impacted depth intervals (surface, vadose zone, and estimated aquifer zone) and % RE measured within the impacted zone. Of the 139 borings drilled, all but 34 intercepted the estimated potentiometric surface. The information obtained regarding the occurrence of SPH, regardless of the potentiometric surface depth, provides a semi-quantitative guide for any future data collection needs, which could be used for engineering or remedial assessment purposes." Please note, due to the addition of this table and the table requested under Comment 6, the Section 3.0 report tables have been reorganized as follows: • Table 3-1: LIF Boring Depth, Depth to Water, and Maximum Recorded % RE (new table requested per Comment 5)

New Mexico Environment Department (NMED) to Western Refining Southwest LLC (dba Marathon Gallup Refinery [Refinery]) Comment Letter "Disapproval Tank 570 and Additional Areas Laser-Induced Fluorescence/Hydraulic Profiling Investigation Report" (January 31, 2022)

NMED Comments	Refinery Responses
	• Table 3-2: Depth of Impacted Interval and % RE Measured within Impacted Zone (new table requested per Comment 6) • Table 3-3: Soil Sample Results (previous Table 3-1) • Table 3-4: Grain Size Analysis (previous Table 3-2)
Comment 6:	**Response 6:**
In Section 3.2.3 (Eastern Boundary), page 15 of 20, paragraph 2, the Permittee states, "[a] gasoline-type waveform was noted in EB-LIF-93 (27 %) northeast of the Marketing Tank Farm area." Although the statement is true, the highest response (34.5 % RE) was observed at a depth of 1.23 feet bgs and the SPH detected at a depth of 1.23 feet bgs does not appear to be gasoline according to the LIF/HP log for boring EB-LlF-93. Regardless, a gasoline-type waveform (27 % RE) was observed at approximately 13 feet bgs where the water table may be present at the location. The presence of SPH at 13 feet bgs may indicate that the SPH migrated from an upgradient source(s) with groundwater. Concurrently, the presence of SPH at 1.23 feet bgs may indicate that a separate surface release occurred in the vicinity of boring EB-LlF-93. The SPH detections near ground surface and the water table must be addressed separately since the remedial approach addressing the contamination is likely different. In order to identify the type of contamination (e.g., surface vs. aquifer contamination), provide a table that lists all LIF borings included in Appendix C with the following information: (a) an identification of surface contamination, (b) an identification of aquifer contamination, (c) an identification of the vadose zone contamination above the water table, (d) corresponding depth(s)	In the example used by NMED regarding EP-LIF-93, the Refinery agrees that the % RE measured at 1.23 feet below ground surface (ft bgs) appears to have a different LIF reflectance signature than the % RE observed at 13 ft bgs and the SPH observed in those locations, although speculative, could be attributed to different sources. However, the maximum reflectance signals at both intervals are relatively weak, indicating minimal hydrocarbon present in the pore space. The Refinery also agrees that surface impacts may be addressed separately from vadose zone or aquifer zone impacts during remedial evaluations depending upon spatial distribution and SPH type. A new table labeled Table 3-2 has been provided summarizing the pertinent information as requested, if possible. LIF borings cleared for utilities using air knifing do not have data available between 0 ft bgs and 5 ft bgs due to the air knifing soil disturbance. Text has been added to Section 3.0 (Investigation Results), page 13 of 21, to state, "In total, 139 LIF/HP borings have been drilled at the site: 46 borings in November 2019, 45 borings in February 2021, and 48 borings in May 2021. The

New Mexico Environment Department (NMED) to Western Refining Southwest LLC (dba Marathon Gallup Refinery [Refinery]) Comment Letter "Disapproval Tank 570 and Additional Areas Laser-Induced Fluorescence/Hydraulic Profiling Investigation Report" (January 31, 2022)

NMED Comments	Refinery Responses
where such contamination is identified, and (e) % RE observed at the field measured depth(s) in the revised Report. This table must be separate from the table referenced in Comment 5.	locations are presented on Figure 3-1 and the LIF/HP logs are provided in Appendix C. Elevation data for the LIF borings are provided in Appendix D. Based on the LIF/HP logs (Appendix C), SPH type and extent are presented on Figure 3-1 and summarized in Tables 3-1 and 3-2 for the borings drilled during the three LIF/HP investigations. Table 3-1 presents the total depth, estimated depth to water, and maximum % RE value and depth. Table 3-2 provides the impacted depth intervals (surface, vadose zone, and estimated aquifer zone) and % RE measured within the impacted zone. Of the 139 borings drilled, all but 34 intercepted the estimated potentiometric surface. The information obtained regarding the occurrence of SPH, regardless of the potentiometric surface depth, provides a semi-quantitative guide for any future data collection needs, which could be used for engineering or remedial assessment purposes." Please note, due to the addition of this table and the table requested under Comment 6, the Section 3.0 report tables have been reorganized as follows: • Table 3-1: LIF Boring Depth, Depth to Water, and Maximum Recorded % RE (new table requested per Comment 5) • Table 3-2: Depth of Impacted Interval and % RE Measured within Impacted Zone (new table requested per Comment 6) • Table 3-3: Soil Sample Results (previous Table 3-1) • Table 3-4: Grain Size Analysis (previous Table 3-2)

New Mexico Environment Department (NMED) to Western Refining Southwest LLC (dba Marathon Gallup Refinery [Refinery]) Comment Letter "Disapproval Tank 570 and Additional Areas Laser-Induced Fluorescence/Hydraulic Profiling Investigation Report" (January 31, 2022)

NMED Comments	Refinery Responses
Comment 7:	**Response 7:**
In Section 3.2.3 (Eastern Boundary), page 15 of 20, paragraph 4, the Permittee states, "[d]ata suggest that SPH impacts may exist east of EB-LlF-07, EB-LlF-12, and EB-LlF-13 and further delineation may be warranted. Additional assessment of the eastern boundary would be offsite. The Refinery has attempted to contact the adjacent property owner regarding access but has not received any response." NMED agrees that further delineation is warranted east of EB-LIF-07, EB-LlF-12, and EB-LIF-13. The Permittee must continue to make efforts to contact the adjacent property owner to gain access to the site.	The Refinery has been made aware that the property was sold during 2021. The Refinery is continuing to reach out to the new property owner for site access.
Comment 8:	**Response 8:**
In Section 3.3 (Hydraulic Profiling Results), page 15 of 20, paragraphs 5 and 6, the Permittee states, "[t]he HP data were collected from 107 of the borings drilled during the November 2019, February 2021, and May 2021 field events [and t]he dissipation test allows the pressure to equilibrate to hydrostatic pressure for a particular depth, and from that measurement, a potentiometric surface (water table) can be calculated." Include the estimated depth of the water table at each boring where the HP data were collected in the table required by Comment 5.	Dissipation tests were conducted at only four borings because the majority of the intervals were of very low permeability. The estimated water table depths, mapped from measured potentiometric data, are included on [new] Table 3-1.

New Mexico Environment Department (NMED) to Western Refining Southwest LLC (dba Marathon Gallup Refinery [Refinery]) Comment Letter "Disapproval Tank 570 and Additional Areas Laser-Induced Fluorescence/Hydraulic Profiling Investigation Report" (January 31, 2022)

NMED Comments	Refinery Responses
Comment 9:	**Response 9:**
In Section 3.3 (Hydraulic Profiling Results), page 16 of 20, paragraph 1, the Permittee states, "[t]he hydrostatic pressure gradient increases with depth and permeability decreases with depth, making deeper zones less ideal for dissipation testing." While a permeability of the soil clearly affects injection pressure exerted from the probe, it is not clear whether or why the depth of the probe would affect the hydrostatic pressure gradient. Provide further explanation in the revised Report.	The text in Section 3.3 (Hydraulic Profiling Results), page 17 of 21, has been revised to state, " Ideally, dissipation tests are performed in subsurface zones below the water table, which have low pressure and high. The hydrostatic pressure gradient increases with depth due to the weight of water above the probe increasing and permeability decreasing. These factors furthermore affect the injection pressure exerted by the probe, which makes deeper zones less ideal for dissipation testing. In deeper zones with higher pressure and/or very low permeability zones, the probe's injection flow is minimal, rendering it difficult to measure a response signal, which is the case at the Refinery. Examples of this observed response is present in logs MKTF-LIF-45 and MKTF-LIF-46. The LIF signal shows significant hydrocarbon, but the P-Dwn log shows a consistent pattern from around 20 ft bgs of high downhole pressure readings (100+ pounds per square inch). Dissipation tests within this type of soil/sediment would not yield accurate results. If a dissipation test was completed at a boring, K values were provided on the HP log." Additional information is provided in Response 17.

New Mexico Environment Department (NMED) to Western Refining Southwest LLC (dba Marathon Gallup Refinery [Refinery]) Comment Letter "Disapproval Tank 570 and Additional Areas Laser-Induced Fluorescence/Hydraulic Profiling Investigation Report" (January 31, 2022)

NMED Comments	Refinery Responses
Comment 10:	**Response 10:**
In Section 3.3 (Hydraulic Profiling Results), page 16 of 20, paragraph 2, the Permittee states, "Figures 3-3 through 3-7 present the cross sections with maximum historical SPH thickness." There appears to be a typographical error that is carried throughout Figures 3-3 through 3-7. The numbers below the horizontal axis are not consistent with the horizontal scale presented in Figures 3-3 through 3-7. Revise the horizontal axis to be consistent with the horizontal scale in the figures and provide replacement figures with the revised Report.	The horizonal axis and the horizontal scale on the figures are correct, i.e., 1+20' is the same as 120'. However, to remove the inconsistency in nomenclature, the horizontal axis has been revised to show the 100 ft increments as 100, 200, etc. instead of 1+00, 2+00, etc.
Comment 11:	**Response 11:**
In Section 3.3 (Hydraulic Profiling Results), page 16 of 20, paragraph 3, the Permittee states, "[b]edding planes and changes in soil material are possible pathways for SPH migration in the subsurface and are indicated by a slight decrease in P Dwn on the HP logs." Provide examples of the data in the text to support the Permittee's assertion in the revised Report.	Text in Section 3.3 (Hydraulic Profiling Results), page 18 of 21, was revised to state, "Bedding planes and changes in soil type are possible pathways for SPH migration in the subsurface and are indicated by a slight decrease in P Dwn on the HP logs. An example of this is shown on the log for EB-LIF-93 (Appendix C). This log shows two different waveform signatures at two different depths (1.23 ft bgs and 13 ft bgs). The HP log data also show distinct low and high permeability zones. The LIF fluorescence at 13 ft bgs (27 % RE) suggests the presence of SPH in a very thin, more permeable interval."

New Mexico Environment Department (NMED) to Western Refining Southwest LLC (dba Marathon Gallup Refinery [Refinery]) Comment Letter "Disapproval Tank 570 and Additional Areas Laser-Induced Fluorescence/Hydraulic Profiling Investigation Report" (January 31, 2022)

NMED Comments	Refinery Responses
Comment 12:	**Response 12:**
In Section 3.4 (Electrical Conductivity Results), page 16 of 20, paragraph 5, the Permittee states, "[a]ll soil [hydraulic conductivity (K)] data gathered via HP or [electrical conductivity (EC)] tools should be correlated with physical soil samples to ensure that the tools are accurately representing subsurface conditions." Although geologic soil samples were not collected from most of the boring locations depicted on Figures 3-3 through 3-7 (e.g., WB-LlF-129), specific soil types at the locations were presented on the figures, presumably, based on the readings. General soil types may roughly be estimated from K values; however, it would not be possible to distinguish specific soil types within similar permeabilities unless additional data is available. For example, LIF/HP boring WB-LlF-129 depicted on Figure 3-4 appears to be advanced to "clayey sand, clayey silt, and shale/mudstone" based on the readings. Although the LIF/HP boring log for WB-LIF-129 depicts a steep reduction of K values at depths below 5 feet bgs (e.g., possibly transition from clayey sand to clayey silt), it is unclear how K values on the log can distinguish clayey silt from shale/mudstone without soil sample classification. Provide an explanation and the supporting data in the revised Report.	The cross sections were prepared using a combination of existing soil boring and well logs, LIF investigation soil data, and correlation of HP log data. The example cited, WB-LIF-129, does follow the lithology depicted in the cross-section B to B'. The process of collecting data from the HP log tool is an estimation and interpretation process. While the HP log is not as accurate as a continuously sampled/logged soil boring, it is consistent with available physical data within the area. Text was revised in Section 3.3 (Hydraulic Profiling Results), page 17 of 21, to state, " HP data were used to approximate subsurface geology with respect to potential SPH flow. Cross sections were developed using a combination of existing soil boring and monitoring well logs, LIF soil investigation data, and all three investigations' HP and LIF data for the entire Refinery (Marketing Tank Farm release area, Tank 570 release area, and additional areas). The process of collecting data from the HP log tool is an estimation and interpretation process. For example, the P-Dwn portion of the log at WB-LIF-129 (Appendix C) suggests a more permeable zone from 0 to 5 ft bgs, followed by a slightly less permeable zone from 5 to 10 ft bgs. The remaining intervals of that boring are characterized by very high P-Dwn readings indicative of a very fine-grained soil/sediment interval, consistent of a clay to shale/mudstone, followed by refusal at 22 ft bgs. While the log is not as accurate as a continuously sampled/logged soil boring, it is consistent with available physical data within the area."

New Mexico Environment Department (NMED) to Western Refining Southwest LLC (dba Marathon Gallup Refinery [Refinery]) Comment Letter "Disapproval Tank 570 and Additional Areas Laser-Induced Fluorescence/Hydraulic Profiling Investigation Report" (January 31, 2022)

NMED Comments	Refinery Responses
Comment 13:	**Response 13:**
In Section 3.5 (Soil Sampling Results), page 17 of 20, paragraph 1, the Permittee states, "soil samples were collected to represent a variety of % RE and waveform types" from eight soil boring locations/depths where soil samples were collected for the laboratory analyses. In the revised Report, explain why these soil boring locations/depths were selected in relation to the results of the LIF/HP data.	Samples were collected at soil depths exhibiting a LIF response (% RE) in addition to supporting visual and olfactory observations. Therefore, that statement was removed from the revised Report. The text was revised in Section 3.5 (Soil Sampling Results), page 18 of 21, to state, "Locations were determined by the on-site Professional Geologist based on interpretation of the LIF/HP logs, where LIF/HP results suggested the presence of SPH (occurrence of measurable % RE). Sample depths were based on LIF % RE, visual, and olfactory observations (Figure 3-8)."
Comment 14:	**Response 14:**
In Section 3.5 (Soil Sampling Results), page 17 of 20, paragraph 3, the Permittee states, "[i]n the Process Area (EB-LIF-34, EB-LlF-108, EB-LIF-109, and PA-LlF-7), TPH-DRO concentrations ranged from 130 milligrams per kilogram (mg/kg) to 2,500 mg/kg. TPH-GRO concentrations ranged from 17 mg/kg to 300 mg/kg. TPH-MRO was non-detect for all Process Area samples. In the Tank Farm (EB-LIF-19, EB-LIF-20, EB-LIF-28, EB-LIF-99), TPH-DRO ranged from non-detect to 3,200 mg/kg. TPH-GRO concentrations ranged from 7.6 mg/kg to 18,000 mg/kg. TPH-MRO was non-detect for all Tank Farm samples." NMED agrees that the LIF data may be a better indicator of the SPH presence/absence at the location and TPH data may be a better indicator of SPH saturation than the LIF data. However, it is NMED's opinion that the results obtained from the LIF and TPH data should correlate to one another; otherwise, the LIF screening data would be meaningless. Provide a brief discussion	The Refinery agrees that the total petroleum hydrocarbon-gasoline range organic and total petroleum hydrocarbon-diesel range organic soil sample concentrations do not match directly to the individual LIF log data at specific depths. However, this is to be expected because the TPH-GRO and TPH-DRO data are quantitative and the LIF data are qualitative. In general, the subsurface-SPH instrument responses depend on the SPH properties (e.g., quantity and type) and subsurface soil properties. LIF response intensity is influenced by the quantity of hydrocarbons present and the waveform pattern is a function of the relative proportions of the SPH present. The LIF response is compared to that of a known reference standard (i.e., calibration fuel blend) and is presented as % RE. The fuel blend is used to allow a wider range of fuel identification. Therefore, the LIF % RE signal correlates to the analytical properties,

New Mexico Environment Department (NMED) to Western Refining Southwest LLC (dba Marathon Gallup Refinery [Refinery]) Comment Letter "Disapproval Tank 570 and Additional Areas Laser-Induced Fluorescence/Hydraulic Profiling Investigation Report" (January 31, 2022)

NMED Comments	Refinery Responses
regarding the correlation of the TPH results with % RE and the accuracy of the LIF screening data in the appropriate sections of the revised Report.	similarity, and concentration in reference to the calibration blend as opposed to a single fuel type. In addition, the calibration fuel blend is made from fresh, unweathered, nondegraded product; whereas the SPH in the ground has been altered (weathered and degraded) from its fresh condition and the state of the standard. Therefore, there would not be an exact quantitative correlation without analyzing both the calibration blend and the SPH present in the soil. Additional details on the LIF method are provided in Appendix B (LIF/HP Methods). The Refinery disagrees that the information is meaningless. The LIF logs show the different intervals of SPH, presence or absence of SPH, and the type of SPH present and degree of weathering. It is not meant to provide quantitative data comparable to laboratory analytical data. To clarify that LIF information is not quantitative, text has been added to the Executive Summary, page 1 of 21 and Section 1.0 (Introduction and Background), page 8 of 21, to state, "This investigation was conducted to further evaluate the extent of SPH at the Refinery and to assist in remedial design. The LIF data gathered provide a semi-quantitative measure of the different intervals of SPH, presence or absence of SPH, and the type of SPH present and degree of weathering. It is not meant to provide quantitative data comparable to laboratory analytical data"

New Mexico Environment Department (NMED) to Western Refining Southwest LLC (dba Marathon Gallup Refinery [Refinery]) Comment Letter "Disapproval Tank 570 and Additional Areas Laser-Induced Fluorescence/Hydraulic Profiling Investigation Report" (January 31, 2022)

NMED Comments	Refinery Responses
	Text has been revised in Section 2.0 (Investigation Methods), page 11 of 21, to state " The LIF/HP probing output provides a comparison of the LIF response to that of a known calibration fuel blend reference standard and is presented as percent of the reference emitter (% RE). The calibration fuel blend, which is made from fresh, unweathered, nondegraded product, is used to allow a wider range of fuel identification. Therefore, the LIF % RE signal correlates to the analytical properties, similarity, and concentration in reference to the calibration blend as opposed to a single fuel type. LIF response intensity (i.e., % RE) is influenced by the concentration, composition, and state (e.g., weathered, degraded) of SPH present in refence to the calibration fuel blend and the waveform pattern is a function of the relative proportions of the PAHs present."
Comment 15:	**Response 15:**
Section 4.0 (Conclusions and Recommendations), page 19 of 20, paragraph 1 lists four significant conclusions obtained from the investigation. However, the data to support the conclusions were not referenced in the discussion. Provide the data (e.g., examples, references) to support the listed conclusions in the revised Report.	Text has been revised in the Executive Summary, page 2 of 21 and Section 4.0 (Conclusions and Recommendations), page 20 of 21, to state "Significant conclusions include: • SPH impacts appear to follow relatively coarser lithologies (sandy clays, sands, and gravel dominated lithologies) as shown in the cross sections, Figures 3-3 through 3-7. • These appear to occur as lenses, filled in erosional surfaces, or possible paleochannels as shown in the cross sections, Figures 3-3 through 3-7. • Product types are mixed in some areas and lighter product types are widely dispersed across the site. Releases of some lighter-end product types such as gasoline and naphtha have

New Mexico Environment Department (NMED) to Western Refining Southwest LLC (dba Marathon Gallup Refinery [Refinery]) Comment Letter "Disapproval Tank 570 and Additional Areas Laser-Induced Fluorescence/Hydraulic Profiling Investigation Report" (January 31, 2022)

NMED Comments	Refinery Responses
	occurred in the last 5 years, e.g., the Marketing Tank Farm release, Tank 570 release, and diesel and naphtha occurrences (Section 1.4). • To verify saturation and to aid in the design of future remedial alternatives, collection of soil cores and verification of fuel types will be evaluated."
Comment 16:	**Response 16:**
In Section 4.0 (Conclusions and Recommendations), page 19 of 20, bullet 1 under recommendations, the Permittee states, "[f]uture investigations in the Process Area will be addressed in the Process Area Work Plan, requested by NMED in Comment 9 of the Marketing Tank Farm LIF report disapproval letter (NMED 2021)." NMED has received the Permittee's *Area of Concern 26 - Process Units and Area of Concern 27 - Boiler and Cooling Unit Area* Investigation Work Plan, dated November 30, 2021. This comment serves as an acknowledgement. No response is required.	This comment is acknowledged.
Comment 17:	**Response 17:**
In Appendix B (LIF/HP Methods), page 2 of 2, paragraph 1, the Permittee states, "[t]he estimated K (ft/d) is calculated using the equation: K = ln(Q/P')*20.0 + 7.0 where: P'= downhole pressure in psi 0.433 (psi/ft) * depth below water table (ft)) - atmospheric pressure (psi) 0.433 psi/ft = hydrostatic pressure gradient Q = flow rate (mL/min)." Address the following comments about the equation in the revised Report:	This comment is acknowledged. This methodology is used to estimate the hydraulic conductivity of the soil/sediments. These values maintain qualitative value and may be used to lend insight into vadose zone preferential pathways (Appendix B). In the vadose zone, the P' value is not corrected for depth below water table (water table – atm (psi) = 0) and the values are estimated by the processor using the remainder of the referenced equation. The constants 20 and 7.0 are merely curve fitting

New Mexico Environment Department (NMED) to Western Refining Southwest LLC (dba Marathon Gallup Refinery [Refinery]) Comment Letter "Disapproval Tank 570 and Additional Areas Laser-Induced Fluorescence/Hydraulic Profiling Investigation Report" (January 31, 2022)

NMED Comments	Refinery Responses
a) While the equation explains how the K is calculated from the HP data, it is not clear how the potentiometric surface (water table) can be calculated from the data. Include a separate equation to calculate the potentiometric surface (water table) and provide an explanation with an example. Furthermore, clarify whether the "depth below water table" is calculated from the potentiometric surface (water table) obtained from the dissipation testing; otherwise, explain how it is estimated. b) The Permittee provided the unitless constants, 20 and 7, in the equation but did not define these values. Provide an explanation for the unitless constants (20 and 7) used in the equation. Define all constants when providing equations for future submittals. c) Although the Permittee defines "0.433 psi/ft" as the hydrostatic pressure gradient, the Permittee does not reference where the value is from or discuss how it was determined. Discuss and explain why 0.433 psi/ft was used to calculate the equation, if the value is being applied to the vadose zone. d) The Permittee did not define P' from the equation. Define P' in the equation and provide value's unit. e) P' appears to have a unit with pound per square inch (psi), Q has a unit with milliliter per minute (mL/min) and the output value for K has a unit with feet per day (ft/d). It is unclear how the unit conversion is accomplished from the equation. Provide conversion details to the equation for clarity and include an example calculation with units. Additionally, the equation to calculate K that is presented in Appendix B was not discussed in the text of the Report. Include an additional section that discusses the equation in the text of the revised Report.	parameters that have been chosen using this equation to fit against a well-characterized soil column used by Dakota Technologies. A head dissipation test is the method used to estimate the water table. That approximated water table depth is then used in this process to estimate a K value of the soil/sediment below the water table. The value of 0.433 psi/ft is the equivalent weight of one square inch of water in the estimation below the water table. P' is the measured downhole pressure recording. The Q value is converted into English units in the estimation in the curve fitting process for the constants A and B (20 and 7.0). Because the typical injection rates are very small, it is more appropriate for this estimation to list the flow rate (Q) in milliliters per minute (mL/min). For example, 1 mL/min = 0.00026 gallons per minute. As a result, the K values are estimates. The K value estimates are more accurate above the water table than below the water table. The intent, in general, is to understand what types of soil/sediment were encountered and not to calculate a definitive value for K. The purpose of the data was not to use the conductivity data for any type of remedial design effort. This information is presented in Appendix B, which is referenced in Section 2.0, and no additional text has been added to the report.

New Mexico Environment Department (NMED) to Western Refining Southwest LLC (dba Marathon Gallup Refinery [Refinery]) Comment Letter "Disapproval Tank 570 and Additional Areas Laser-Induced Fluorescence/Hydraulic Profiling Investigation Report" (January 31, 2022)

NMED Comments	Refinery Responses
Comment 18:	**Response 18:**
Appendix D (LIF/HP Elevation Data) provides latitude, longitude, easting, and northing data for each LIF boring; however, the Permittee does not provide ground surface elevation data. The Permittee's September 15, 2021 Response to the NMED's Disapproval Comment 26 states, "[e]levation surface data were collected by Dakota using a GPS during the field event but were not included on the LIF/HP logs. The data are included Appendix D of the Sitewide LIF/HP investigation Report, which will be submitted to NMED on or before October 31, 2021." NMED has not received the elevation surface data. Submit the surface elevation data for each LIF boring in the revised Report.	During preparation of the "Tank 570 and Additional Areas Laser-Induced Fluorescence/Hydraulic Profiling Investigation Report" (referenced as the Sitewide LIF/HP investigation report in the NMED comment), the Refinery noted that the surface elevation data measured by GPS were incorrect. Therefore, the data were not included in the original Tank 570 and Additional Areas LIF Report. Corrected data were compiled and are submitted as Appendix D in the revised Report.

ATTACHMENT B. RED LINE STRIKE OUT REVISIONS

WESTERN REFINING SOUTHWEST LLC

D/B/A MARATHON GALLUP REFINERY

[REVISED] TANK 570 RELEASE AND ADDITIONAL AREAS

LASER-INDUCED FLUORESCENCE/HYDRAULIC PROFILING INVESTIGATION REPORT

OCTOBER 27, 2021

REVISED MAY 25, 2022

Executive Summary

The Western Refining Southwest LLC (dba Marathon Gallup Refinery) (Refinery) is submitting this Tank 570 Release and Additional Areas laser-induced fluorescence (LIF) and hydraulic profiling (HP) investigation to identify areas where residual and/or mobile separate phase hydrocarbons (SPH) from releases may potentially exist. This investigation was conducted to further evaluate the extent of SPH at the Refinery and to assist in remedial design. The LIF data gathered provide a semi-quantitative measure of the different intervals of SPH, presence or absence of SPH, and the type of SPH present and degree of weathering. It is not meant to provide quantitative data comparable to laboratory analytical data.

As a result of two releases in 2019, Marketing Tank Farm release and Tank 570 release, LIF/HP was proposed to investigate the extents. Three investigations have been conducted between November 2019 and May 2021. The investigations are summarized as follows:

- Week of November 18, 2019: Borings were drilled in the Marketing Tank Farm and around Tank 570 to address the releases in these areas.
- Week of February 1, 2021: Borings were drilled in the Marketing Tank Farm and the Process Area to address data gaps in the Marketing Tank Farm area. The results for the Marketing Tank Farm investigations (November 2019 and February 2021) were summarized in the "Marketing Tank Farm Laser-Induced Fluorescence/Hydraulic Profiling Investigation Report" (MKTF Report) submitted on March 31, 2021 and disapproved in the New Mexico Environment Department (NMED) letter dated June 2, 2021.
- Week of May 10, 2021: Borings were drilled at various locations around the refinery, including the northern and eastern boundary, Tank Farm, Marketing Tank Farm, and in and around the wastewater treatment area to further address the Tank 570 area, refinery boundaries, and other areas with data gaps. The Tank 570 (November 2019 and May 2021), Process Area (February 2021), and additional areas (May 2021) data are discussed in this report. The additional Marketing Tank Farm data collected in May 2021 will be presented in an addendum to the MKTF Report (MPC 2021), which will be submitted by November 19, 2021.

The investigation scope was conducted in accordance with a series of verbal discussions and agreements between the NMED and the Refinery. In total, 139 LIF/HP borings have been drilled at the site: 46 borings in November 2019, 45 borings in February 2021, and 48 borings in May 2021. Refer to Section 1.0, Table 1-1 for the LIF boring designations, associated investigation dates, and cross-references to the applicable report where data analysis is provided. Refer to Section 3.0, Figure 3-1, and Tables 3-1 and 3-2 for the locations and extent of the SPH occurrences.

This report presents the Tank 570 and the additional areas data collected in November 2019, February 2021, and May 2021. This report ~~can~~should be considered complimentary to the March 2021 MKTF Report and addendum.

The LIF/HP investigation for the Tank 570 release and the additional areas spanned the three field events and consisted of advancing 28 direct push (DP) borings in November 2019, 8 DP borings in February 2021, and 41 DP borings in May 2021. In conjunction with the LIF/HP borings, soil samples were collected at eight locations. The February and May 2021 locations were selected to close data gaps identified during the November 2019 LIF/HP investigation located on the Eastern Boundary of the Refinery and near the 2019 Tank 570 release. Utility clearance using ground-penetrating radar was completed by Ground Penetrating Radar Systems in the week prior to the drilling activities. Gallup Pipeline and Compliance Services performed borehole clearance using air-knife excavation in a V-trench formation. Terracon performed the DP drilling and Dakota Technologies, LLC performed LIF/HP probing activities.

Significant conclusions include:

- SPH impacts appear to follow relatively coarser lithologies (sandy clays, sands, and gravel dominated lithologies~~).~~) as shown in the cross sections, Figures 3-3 through 3-7.
- These appear to occur as lenses, filled in erosional surfaces, or possible paleochannels as shown in the cross sections, Figures 3-3 through 3-7.
- Product types are mixed in some areas and lighter product types are widely dispersed across the site. Releases of some lighter-end product types such as gasoline and naphtha have occurred in the last 5 years~~.~~, e.g., the Marketing Tank Farm release, Tank 570 release, and diesel and naphtha occurrences (see Section 1.4).
- To verify saturation and to aid in the design of future remedial alternatives, collection of soil cores and verification of fuel types will be evaluated.

Based on the information collected during this investigation, the recommendations include:

- Process Area: The potential SPH is bounded to the north by the Eastern Boundary LIF borings. Future investigations in the Process Area will be addressed in the Process Area Work Plan, requested by NMED in Comment 9 of the Marketing Tank Farm LIF report disapproval letter (NMED 2021).
- Western Boundary Area: Additional groundwater monitoring wells were completed in July and August 2021 along the North Drainage Ditch and near the Evaporation Ponds for dissolved-phase groundwater assessment and monitoring of these Refinery features. Based on the data presented in this report, sufficient LIF data have been collected to aid in remedial design.

- Eastern Boundary Area: Hydraulic gradient and the dip of the Chinle Formation suggest that the primary direction of SPH migration in this area is toward the north, where the extent of impacts is well delineated. To verify the extent of SPH along the eastern boundary (east of EB-LIF-07, EB-LIF-12, and EB-LIF-13), additional assessment will be conducted off site once access is obtained from property owners. An assessment of shallow soils in the vicinity of the Rail Car Release is planned for 2021 and also would provide some information near EB-LIF-07.
- Tank Farm Area: Data from borings EB-LIF-103, EB-LIF-105, and EB-LIF-107 indicate that SPH above residual saturation exists. Groundwater monitoring wells OW-30, OW-55, and OW-13, located down gradient of the LIF borings, show no evidence of SPH, indicating that the SPH terminates in the area between the LIF borings and the wells. Based on the data presented in this report, sufficient LIF data have been collected to aid in remedial design.

Table of Contents

List of Figures

List of Tables

List of Appendices

List of Acronyms and Abbreviations

% RE	percent of reference emitter
bgs	below ground surface
cm/sec	centimeters per second
DP	direct push
EC	electrical conductivity
ft	foot or feet
GPS	Global Positioning System
HP	hydraulic profiling
K	hydraulic conductivity
LIF	laser-induced fluorescence
Refinery	Marathon Gallup Refinery
mS/m	millisiemens per meter
NM	New Mexico
NMED	New Mexico Environment Department
P Dwn	downhole hydraulic pressure
SPH	separate phase hydrocarbon

1.0 INTRODUCTION AND BACKGROUND

This report summarizes the Tank 570 release and additional areas Laser-Induced Fluorescence/Hydraulic Profiling (LIF/HP) investigation conducted at the Western Refining Southwest LLC (dba Marathon Gallup Refinery) (Refinery) in Gallup, New Mexico (NM) (Figure 1-1). This investigation was conducted to identify areas where residual and/or mobile separate phase hydrocarbons (SPH) may exist due to hydrocarbon releases and to assist in remedial design. The LIF data gathered provide a semi-quantitative measure of the different intervals of SPH, presence or absence of SPH, and the type of SPH present and degree of weathering. It is not meant to provide quantitative data comparable to laboratory analytical data.

As a result of two releases in 2019, Marketing Tank Farm release and Tank 570 release, LIF/HP was proposed to investigate the extents. The investigation scope was conducted in accordance with a series of verbal discussions and agreements between the New Mexico Environment Department (NMED) and the Refinery. Three investigations have been conducted between November 2019 and May 2021. In total, 139 LIF/HP borings have been drilled at the site: 46 borings in November 2019, 45 borings in February 2021, and 48 borings in May 2021.

The investigations are summarized as follows:

- Week of November 18, 2019: Borings were drilled in the Marketing Tank Farm and around Tank 570 to address the releases in these areas.
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- Week of May 10, 2021: Borings were drilled at various locations around the refinery, including the northern and eastern boundary, Tank Farm, Marketing Tank Farm, and in and around the wastewater treatment area to further address the Tank 570 area, refinery boundaries, and other areas with data gaps. The Tank 570 (November 2019 and May 2021), Process Area (February 2021), and additional areas (May 2021) data are discussed in this report. The additional Marketing Tank Farm data collected in May 2021 will be presented in an addendum to the MKTF Report (MPC 2021), which will be submitted by November 19, 2021.

This report presents the Tank 570 and the additional areas data collected in November 2019, February 2021, and May 2021. This report ~~can~~should be considered complimentary to the March 2021 MKTF Report and addendum. Table 1-1 presents the LIF boring designations, associated investigation dates, and cross-referenced to the applicable report where data analysis is provided.

The Tank 570 and additional areas LIF/HP investigation spanned the three field events and consisted of advancing 28 direct push (DP) borings in November 2019, 8 DP borings in February 2021, and 41 DP borings in May 2021. In conjunction with the LIF/HP borings, soil samples were collected at eight locations. This investigation focused on the eastern (including Tank 570), northern, and northwestern areas of the Refinery. The November investigation was concentrated on the area surrounding Tank 570. The February and May 2021 locations were selected to close data gaps identified during the November 2019 LIF/HP investigation located on the Eastern Boundary of the Refinery and near the 2019 Tank 570 release.

1.1 Background

The Refinery is located approximately 17 miles east of Gallup, McKinley County, NM along the north side of Interstate Highway I-40 (Figure 1-1). The physical address is I-40, Exit #39 Jamestown, NM, 87347. The Refinery property covers approximately 810 acres. The Refinery was officially idled indefinitely on October 9, 2020. While operating, the Refinery processed crude oil transported by pipeline or tanker truck from the Four Corners region. Various process units operated at the Refinery included crude distillation, reformer, fluidized catalytic cracker, alkylation, sulfur recovery, merox treater, and hydrotreater. Past operations have produced gasoline, diesel fuels, jet fuels, kerosene, propane, butane, and residual fuel. Refinery operations were idled in April 2020.

1.2 Investigation Objectives

As determined by the Refinery, the objectives of the LIF investigation were to:

- Identify areas where residual and/or mobile SPH may exist.
- Use the investigation results to assist in the selection of remedial alternatives for evaluation.

1.3 Site Surface and Subsurface Conditions

Site topographic features include high ground in the southeast gradually decreasing to a lowland fluvial plain to the northwest. Elevations on the refinery property range from 7,040 feet (ft) to 6,860 ft. Surface soils within most of the area of investigation are primarily Rehobeth silty clay loam, which is a common soil type in the area.

Based on existing boring logs, shallow subsurface fluvial and alluvial soils are comprised of primarily clays and silts with minor inter-bedded sand layers. Very low permeability bedrock (e.g., claystones and siltstones) underlie the surface soils and effectively form an aquitard. The Chinle Group, from the Upper Triassic period, crops out over a large area on the southern margin of the San Juan Basin. The

uppermost recognized local Formation is the Petrified Forest Formation. The Sonsela Sandstone Bed is the uppermost recognized regional aquifer. Aquifer tests of the Sonsela Bed northeast of Prewitt indicated a transmissivity of greater than 100 ft^2/day (Stone et al., 1983). The Sonsela Sandstone's highest point occurs southeast of the site and slopes downward to the northwest as it passes under the Refinery. The Sonsela Sandstone forms a water-bearing reservoir with artesian conditions throughout the central and western portions of the Refinery property. The regional stratigraphy around the Refinery is shown on Figure 1-2.

The diverse properties and complex, irregular stratigraphy of the surface soils across the Refinery cause a wide range of hydraulic conductivity (K) ranging from less than 10^{-2} centimeters per second (cm/sec) for gravel-like sands immediately overlying the Petrified Forest Formation to 10^{-8} cm/sec in the clay soils located near the surface. Generally, shallow groundwater at the Refinery follows the upper contact of the Petrified Forest Formation (Chinle Group) with prevailing flow from the southeast to the northwest, although localized areas may have varying flow directions based on the subsurface geology.

1.4 Existing Data

Historically, releases have occurred in the investigation area, including an October 2019 gasoline release from a subsurface pipeline between the Truck Loading Rack and the Marketing Tank Farm. During this investigation, the project scope was expanded from the 2019 gasoline release to evaluate other releases in the area, including the Tank 570 release, and diesel and naphtha occurrences. Historical measurements of SPH thickness and depth in monitoring wells across the Refinery were used to develop the scope of work for the three LIF/HP investigations. SPH thicknesses in the Refinery monitoring wells are shown on Figure 1-3. Measurements of SPH thickness and depth in the monitoring wells are in Appendix A.

2.0 INVESTIGATION METHODS

During these investigations, site characterization was conducted with LIF. At a subset of the LIF borings, an HP tool was added to the probe. Details on the LIF/HP technique are described in Appendix B. The investigation results are presented in Section 3.0. The concepts of mobility and migration are discussed with respect to the investigation results in Sections 3.0 and 4.0.

LIF is a DP site characterization method in which a transparent sapphire window is fitted into the side of a DP probe that is pushed through the soil column. As this sapphire-windowed probe is advanced steadily down into the soil column, pulses of laser light are emitted onto passing soil. The laser light excites fluorescent molecules that exist in most petroleum fuels and oils. At this site, the type of LIF probe utilized was an Ultra-Violet Optical Screening Tool (UVOST®) probe, which is designed for detecting light to mid-weight fuels and oils containing 2- to 4-ring polycyclic aromatic hydrocarbons (PAH), such as gasoline, diesel, kerosene, motor oils, cutting fluids, hydraulic fluid, light crude oils, and fuel oils.

The HP tool is used to assess formation permeability and hydrostratigraphy. During advancement, water is injected at a controlled rate into the formation through a screened port on the side of the HP probe. A transducer in the probe measures the total pressure required to inject the water into the formation while a flow controller at the surface monitors the injection flow rate. These data can be used to estimate K in the formation. The HP tool also measures electrical conductivity (EC). EC is the proportionality factor relating to the current that flows in a medium to the electric force field that is applied. It is a measure of the ability of the material to conduct an electrical current to move through the material. The EC of subsurface materials is influenced by metal content, porosity, permeability, and clay content, among other factors. The EC log is reviewed to better define formation permeability and hydrostratigraphy.

The combination of LIF and HP tools on a single DP probe facilitates investigation of SPH while simultaneously characterizing lithologic variability that influences SPH mass storage and transport. This combination reduces time and cost, while eliminating the need to integrate LIF and HP data from adjacent borings.

The LIF/HP probing output provides a comparison of the LIF response to that of a known calibration fuel blend reference standard and is presented as percent of the reference emitter (% RE). The calibration blend, which is made from fresh, unweathered, nondegraded product, is used to allow a wider range of fuel identification. Therefore, the LIF % RE signal correlates to the analytical properties, similarity, and concentration in reference to the calibration blend as opposed to a single fuel type. LIF response intensity (i.e., % RE) is influenced by the ~~quantity~~concentration, composition, and state (e.g., weathered, degraded) of SPH present in refence to the calibration fuel blend and the waveform pattern is a function of the relative proportions of the PAHs present.

For clarity, in discussing the migration potential of SPH, a distinction should be drawn between potential SPH mobility and migration, as these terms can be confused (ITRC 2009). In this report, mobility and mobility potential refer to the potential of SPH to gravity drain from the soil pore space, which can only occur if the residual saturation is exceeded. This gravity drainage typically manifests itself as SPH in a monitoring well. In contrast, SPH migration refers to the lateral spread of SPH under the influence of SPH characteristics, the prevailing groundwater hydraulic gradient, and permeability, as governed by Darcy's Law. Exceedance of local residual saturation is a necessary condition for migration, but it is not alone sufficient for migration. Sufficient SPH head and other conditions described in this report must be present for SPH to migrate downgradient.

3.0 INVESTIGATION RESULTS

In total, 139 LIF/HP borings have been drilled at the site: 46 borings in November 2019, 45 borings in February 2021, and 48 borings in May 2021. The locations are presented on Figure 3-1 and the LIF/HP logs are provided in Appendix C. Elevation data for the LIF borings are provided in Appendix D. Based on the LIF/HP logs (Appendix C), SPH type and extent are presented on Figure 3-1 and summarized in Tables 3-1 and 3-2 for the borings drilled during the three LIF/HP investigations. Table 3-1 presents the total depth, estimated depth to water, and maximum % RE value and depth. Table 3-2 provides the impacted depth intervals (surface, vadose zone, and estimated aquifer zone) and % RE measured within the impacted zone. Of the 139 borings drilled, all but 34 intercepted the estimated potentiometric surface. The information obtained regarding the occurrence of SPH, regardless of the potentiometric surface depth, provides a semi-quantitative guide for any future data collection needs, which could be used for engineering or remedial assessment purposes.

The LIF/HP Investigations were conducted because of two simultaneous releases in the Marketing Tank Farm and the Tank 570 area. The November 2019 data addressed both the Marketing Tank Farm and Tank 570 releases. The February 2021 data addressed the Marketing Tank Farm Release. The May 2021 data addressed the Tank 570 Release and the refinery boundaries per NMED comments and other data gaps. The November 2019 and February 2021 LIF data associated with the Marketing Tank Farm (designated MKTF-LIF) were discussed in the Marketing Tank Farm LIF report (MPC 2021). The additional Marketing Tank Farm data collected in May 2021 will be presented in an addendum to the MKTF Report (MPC 2021), which will be submitted by November 19, 2021.

The Tank 570 and additional areas data collected in November 2019, February 2021, and May 2021 are discussed in the following sections. This report can be considered a complimentary to the March 2021 MKTF Report and addendum.

3.1 Utility Clearance

During the November 2019 and February 2021 investigations, utility clearance was conducted using air-knifing from 0 to 5 ft. In the December 18, 2020 "Response to Comments Approval with Modifications OW-61 through OW-65 Well Installation Report" submitted to the NMED, the Refinery proposed to hydro-excavate v-trenches to locate subsurface utilities as requested by NMED. The advantage of v-trenching is that undisturbed shallow soils can be evaluated for potential impacts. NMED approved the method and requested additional information in the "Approval, Response to Comments Approval with Modifications OW-61 through OW-65 Well Installation Report" letter dated January 13, 2021. Per the NMED approval letter, v-trenching was to be performed for the February 2021 LIF investigation. The NMED approval letter was received after planning and scheduling for the February 2021 LIF event was completed. Therefore, v-trenching was not used in the February 2021 investigation.

During the May 2021 investigation, v-trenching clearance activities were completed and LIF/HP intervals from 0 to 5 ft are representative of undisturbed subsurface conditions as required by NMED. Terracon performed the DP drilling and Dakota Technologies, LLC performed LIF/HP probing activities. Borings completed during the May 2021 investigation were abandoned using bentonite chips emplaced from the bottom of the borehole to the surface. During the November 2019 and February 2021 investigations, soil borings with no LIF response were abandoned with soil cuttings from the borehole and a bentonite plug was placed from 2 ft below ground surface (bgs) to ground surface. Impacted borings were abandoned using bentonite chips.

3.2 Laser-Induced Fluorescence Results

LIF borings discussed in this Tank 570 Release and Additional Areas LIF/HP Investigation Report (Table 1-1) were distributed as follows:

- Eight borings (designated PA-LIF) were advanced in the Process Area.
- Twenty borings (designated WB-LIF) were advanced along the Active Refinery Western Boundary.
- Forty-nine borings (designated EB-LIF) were advanced along the Eastern Boundary.

~~Based on the LIF logs (Appendix C), SPH type and extent are presented on Figure 3-1.~~ LIF fluorescence intensity is likely to increase with SPH saturation magnitude. However, LIF data should not be taken as an indication of SPH mobility. The distinction between residual and mobile SPH is complex and depends on fine scale hydrostatic conditions which can change over time. The primary output variable of the LIF borings and the % RE from the UVOST®, is a measure of fluorescence relative to a standard reference. While it is influenced by the SPH saturation of pore space within the subsurface it is also affected by the nature of aquifer materials, and the type and composition of the SPH.

For qualitative analysis of the LIF data, values of approximately 20 % RE or less are considered a minimal response, i.e., SPH present at low levels. Values of 0 % RE were considered to have no SPH. This was determined by:

- Potential for LIF false positives having been documented for certain waveform patterns and at low % RE (Dakota 2021)
- Collection of soil samples for comparison to % RE values in general correlate to concentrations of TPH, 50% of the samples that contained Total TPH of 1000 mg/kg correlated in general to a 20 % RE threshold.

Based on the data presented in the Marketing Tank Farm LIF report (MPC 2021) and this report, sufficient data have been collected for future engineering remediation evaluations.

3.2.1 Process Area

In February 2021, eight LIF borings were advanced in the Process Area in the southeast area of the Refinery. No additional Process Area LIF borings were drilled in May 2021. PA-LIF-1 has a waveform signature similar to a diesel-type product peaking at 464.7 % RE between 12.25 and 13.5 ft and a smaller diesel-type product signature between 16 and 17 ft bgs. To the west of this location, PA-LIF-2 has a gasoline-type waveform signature with 77.7 % RE between 16 and 17 ft bgs. South of these two locations, a mixture of gasoline-type and diesel-type waveform signatures were identified in PA-LIF-4, PA-LIF-7, and PA-LIF-8. Directly south of PA-LIF-1, PA-LIF-6 has a diesel-type waveform signature with 562.8 % RE and was shown to cover a much broader depth range from 14 to 22 ft bgs. Two of the locations, PA-LIF-3 and PA-LIF-5, had no response and were advanced east of PA-LIF-4 and PA-LIF-7, respectively.

Soil samples were collected from PA-LIF-7 at depths of 11-13 ft bgs and 13-14 ft bgs. Results are included in ~~Table~~Tables 3-~~1~~3 and 3-4, and discussed in Section 3.4.

The potential SPH in the Process Area is bounded to the north by the Eastern Boundary LIF borings and to the west by the Marketing Tank Farm LIF borings. Future investigations in the Process Area towards the east and south will be addressed in the Process Area Work Plan, requested by NMED in Comment 9 of the Marketing Tank Farm LIF report disapproval letter (NMED 2021).

3.2.2 Active Refinery Western Boundary

The active refinery western boundary LIF borings are generally north of the Marketing Tank Farm within the wastewater treatment area. Of the 20 active refinery western boundary LIF borings completed, 15 had a response of less than 20 % RE. The waveform detections were noted as being a diesel-type in the following borings: WB-LIF-112 (58.3 %), WB-LIF-114 (78.7 %), WB-LIF-119 (350.5 %), WB-LIF-128 (329.6 %), and WB-LIF-136 (144.5 %).

Access to install additional borings was difficult due to pond slopes within the area. ~~It is likely that the ponds function as a migration barrier to the SPH impacts within the subsurface.~~ Based on the data presented in this report, sufficient data have been collected for future engineering evaluation.

3.2.3 Eastern Boundary

The eastern boundary is generally the area north of the Process Area and in the Tank Farm. In May 2021, 21 LIF borings were advanced in the eastern boundary to supplement the 28 LIF borings collected in November 2019/February 2021. Initial LIF borings were done around Tank 570, which had a documented gasoline release in 2019. LIF waveforms from EB-LIF-02 (west of the tank, 255 % RE) ~~indicate~~suggest gasoline- and diesel-type product mixed at depths between 10 and 36 ft bgs. Gasoline-type LIF waveforms were also noted in the following borings above 100 % RE: EB-LIF-12 (401 %), EB-LIF-18 (272.3 %), EB-LIF-20 (185.7 %), EB-LIF-21 (217.3 %), EB-LIF-28 (304 %). LIF waveforms similar to a diesel-type product were detected above 100 % RE in EB-LIF-03 (179.2 %), EB-LIF-04 (711.7 %), and EB-

LIF-26 (435.9 %), which were all adjacent to and east and south of Tank 570. A mix of diesel- and gasoline-type waveforms were also noted in several locations east of Tank 570 in EB-LIF-05, EB-LIF-06, and EB-LIF-07. To the south of these three locations, a % RE response less than 20 % was noted in LIF borings EB-LIF-08, EB-LIF-09, and EB-LIF-23, as well as the area to the north of the diesel- and gasoline-type waveform borings (EB-LIF-05, EB-LIF-06, EB-LIF-07) in EB-LIF-11 and EB-LIF-122 (May 2021).

The May 2021 LIF borings advanced in the eastern boundary further assessed:

- The northern portion of the refinery (EB-LIF-96, EB-LIF-99, EB-LIF-101, EB-LIF-102, EB-LIF-103, EB-LIF-104, EB-LIF-105, EB-LIF-106, EB-LIF -107, EB-LIF-121, and EB-LIF-138)
- The western portion of the Tank Farm (EB-LIF-91, EB-LIF-93, EB-LIF-94, EB-LIF-97, EB-LIF-98, and EB-LIF-109)
- The area between the Process Area and Tank 570 (EB-LIF-108)

For the northern portion of the eastern boundary, gasoline-type LIF waveforms were noted in the following borings above 100 % RE: EB-LIF-99 (353.3 %), EB-LIF-103 (174.3 %), EB-LIF-104 (191.2 %). A diesel- and gasoline-type mixed waveform was noted in EB-LIF-101 (77.5 %), which is between the detected waveforms similar to a diesel-type product in LIF borings south of EB-LIF-97 and EB-LIF-98. The northernmost eastern boundary LIFs did have waveforms similar to a gasoline-type product in 2 of the 3 borings (EB-LIF-105 and EB-LIF-107), and were less than 100 % RE. These borings are south of wells OW-55 and OW-30 where no SPH has been observed.

For the western portion of the Tank Farm, EB-LIF-109 contained a waveform similar to a gasoline- and diesel-type mix. This location had one of the highest responses in the eastern boundary borings, and was measured at 703.6 % RE. To the north of this location, EB-LIF-91 had a diesel-type only waveform with a response of 23.3 %. Additionally in the west, diesel-type waveforms were observed in EB-LIF-97 (50.4 %), and EB-LIF-98 (150.5 %). A gasoline-type waveform was noted in EB-LIF-93 (27 %) northeast of the Marketing Tank Farm area. LIF responses below 20 % RE were observed in EB-LIF-94 and EB-LIF-95.

LIF boring EB-LIF-108 (320 %) was located between the Process Area and Tank 570, just south of EB-LIF-25 (435.9 % diesel type). The waveform for the LIF was noted as a diesel type. This boring suggests that there may be some mixing of product types between Tank 570 and the Process Area (PA-LIF-01 [464.7 % diesel type]).

Data suggest that SPH impacts may exist east of EB-LIF-07, EB-LIF-12, and EB-LIF-13 and further delineation may be warranted. Additional assessment of the eastern boundary would be offsite. The Refinery has attempted to contact the adjacent property owner regarding access but has not received any response.

3.3 Hydraulic Profiling Results

The HP data were collected from 107 of the borings drilled during the November 2019, February 2021, and May 2021 field events (Appendix C) and the data are included on the right-hand side of the LIF/HP logs, if applicable.

During HP, water is pumped through a down-hole transducer at approximately 250 milliliters per minute into the formation. Pressure and flow are measured as the tool is advanced. A calibration procedure called a dissipation test is performed at one or more discrete depths within each boring logged with the HP tool. The dissipation test allows the pressure to equilibrate to hydrostatic pressure for a particular depth, and from that measurement, a potentiometric surface (water table) can be calculated. ~~Once~~After the water table surface is calculated, estimated K values can be calculated for the saturated portion of the boring. Ideally, dissipation tests are performed in subsurface zones below the water table, which have low pressure and high flow. The hydrostatic pressure gradient increases with depth ~~and permeability decreases with depth, making~~due to the weight of water above the probe increasing and permeability decreasing. These factors furthermore affect the injection pressure exerted by the probe, which makes deeper zones less ideal for dissipation testing. In deeper zones with higher pressure and/or very low permeability zones, ~~little~~the probe's injection flow ~~occurs even during the initiation of a dissipation test and a response signal~~ is minimal, rendering it difficult to measure~~.~~ a response signal, which is the case at the Refinery. Examples of this observed response is present in logs MKTF-LIF-45 and MKTF-LIF-46. The LIF signal shows significant hydrocarbon, but the P-Dwn log shows a consistent pattern from around 20 ft bgs of high downhole pressure readings (100+ pounds per square inch). Dissipation tests within this type of soil/sediment would not yield accurate results. If a dissipation test ~~could not be~~was completed at a boring, K values ~~are not~~were provided on the HP log. ~~The coefficients used to calculate K are displayed in the equation at the bottom of the HP log.~~

HP data were used to ~~evaluate~~approximate subsurface geology with respect to potential SPH flow. Cross sections were developed using a combination of existing soil boring and monitoring well logs, LIF soil investigation data, and all three ~~investigations~~investigations' HP and LIF data for the entire Refinery (Marketing Tank Farm release area, Tank 570 release area, and additional areas). The process of collecting data from the HP log tool is an estimation and interpretation process. For example, the P Dwn portion of the log at WB-LIF-129 (Appendix C) suggests a more permeable zone from 0 to 5 ft bgs, followed by a slightly less permeable zone from 5 to 10 ft bgs. The remaining intervals of that boring are characterized by very high P Dwn readings indicative of a very fine-grained soil/sediment interval, consistent of a clay to weathered shale, followed by refusal at 22 ft bgs. While the log is not as accurate as a continuously sampled/logged soil boring, it is consistent with available physical data within the area.

Figure 3-2 presents the cross-section location map. Figures 3-3 through 3-7 present the cross sections with maximum historical SPH thickness. The northing and easting locations of the borings were

determined with Global Positioning System (GPS) following completion of LIF investigation and the data are included as Appendix D. Ground surface elevations were determined using unmanned aerial vehicle data.

Based on the log signatures, low K values (high downhole hydraulic pressure [P Dwn]) on the HP logs appear to represent a low K boundary between the alluvium/Chinle Group contact as seen on the cross sections. Bedding planes and changes in soil ~~material~~type are possible pathways for SPH migration in the subsurface and are indicated by a slight decrease in P Dwn on the HP logs. An example of this is shown on the log for EB-LIF-93 (Appendix C). This log shows two different waveform signatures at two different depths (1.23 ft bgs and 13 ft bgs). The HP log data also show distinct low and high permeability zones. The LIF fluorescence at 13 ft bgs (27 % RE) suggests the presence of SPH in a very thin, more permeable interval.

3.4 Electrical Conductivity Results

EC was measured in 32 of the November 2019 and February 2021 LIF borings and the data are included on the right-hand side of the LIF/EC log (Appendix C). EC logs were not collected during the May 2021 investigation due to probe malfunctioning. The conductivity value on the EC log represents the electrical conductivity of the soils. EC in the 0 to 50 millisiemens per meter (mS/m) range can be interpreted as sand (coarser to finer), silts are normally in the 50 to 100 mS/m range, clayey silts and silty clays range up to 200 mS/m, and clays are normally greater than 200 mS/m (Christy, et al., 1994).

The EC data were used to evaluate subsurface geology with respect to potential SPH flow. High conductivity on the EC logs roughly correlates with the Chinle Group contact as shown on the cross sections. All soil K data gathered via HP or EC tools should be correlated with physical soil samples to ensure that the tools are accurately representing subsurface conditions.

3.5 Soil Sampling Results

Soil cores were collected using a Geoprobe© by driving a 5-ft long by 2-inch diameter macro-core barrel within 2 ft of the selected LIF/HP boring locations. Locations were determined by the on-site Professional Geologist ~~after~~based on interpretation of the ~~May~~ LIF/HP logs, where LIF/HP results suggested the presence of SPH (occurrence of measurable % RE). Sample depths were based on LIF % RE, visual, and olfactory observations (Figure 3-8). LIF data are a better indicator of the presence or absence as well as location of SPH than the TPH data. TPH data are a better indicator of SPH saturation than the LIF data. ~~Therefore, soil samples were collected to represent a variety of % RE and waveform types.~~ Soil samples were collected from the following locations:

- Process Area
  - EB-LIF-34 (20 to 21 ft)
  - EB-LIF-108 (10 to 11 ft)

  - EB-LIF-109 (11.5 to 12 ft and 15 to 15.5 ft)
  - PA-LIF-7 (11 to 13 ft and 13 to 14 ft)
- Tank Farm
  - EB-LIF-19 (16 to 18 ft)
  - EB-LIF-20 (27 to 28 ft)
  - EB-LIF-28 (20 to 21 ft and 21 to 23 ft)
  - EB-LIF-99 (19 to 20 ft and 20 to 21 ft)

Samples were analyzed for total petroleum hydrocarbon-diesel range organics (TPH-DRO) and total petroleum hydrocarbon-motor oil range organics (TPH-MRO) analysis by the United States Environmental Protection Agency (USEPA) Method 8015M, and total petroleum hydrocarbon-gasoline range organics (TPH-GRO) analysis by the USEPA Method 8260B. In addition, a subset of the samples was collected for particle size analysis by American Society of Agronomy Method 15-5. Laboratory analytical results are presented in Table 3-~~1~~3 (TPH analysis) and Table 3-~~2~~4 (grain-size analysis). Laboratory data are provided in Appendix E.

In the Process Area (EB-LIF-34, EB-LIF-108, EB-LIF-109, and PA-LIF-7), TPH-DRO concentrations ranged from 130 milligrams per kilogram (mg/kg) to 2,500 mg/kg. TPH-GRO concentrations ranged from 17 mg/kg to 300 mg/kg. TPH-MRO was non-detect for all Process Area samples. In the Tank Farm (EB-LIF-19, EB-LIF-20, EB-LIF-28, EB-LIF-99), TPH-DRO ranged from non-detect to 3,200 mg/kg. TPH-GRO concentrations ranged from 7.6 mg/kg to 18,000 mg/kg. TPH-MRO was non-detect for all Tank Farm samples.

Four samples in the Process Area were analyzed for grain size.

- PA-LIF-7 (11 to 13 ft) consisted of gravel and sand with some finer material.
- EB-LIF-108 (12 to 13 ft) and EB-LIF-109 (10.5 to 11.5 ft) consisted of silts and clays with some sand and gravel.
- EB-LIF-34 (20 to 21 ft) consisted primarily of sand, silts, and clays.

Five samples in the Tank Farm were also analyzed for grain size.

- EB-LIF-19 (16 to 18 ft) and EB-LIF-99 (18 to 19 ft) consisted of sands, silts, and clays.
- EB-LIF-28 (20 to 21 ft and 21 to 23 ft) consisted of sands and gravels with some finer material.
- EB-LIF-20 (27 to 28 ft) was mostly sand with some fines and gravel.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Significant conclusions include:

- SPH impacts appear to follow relatively coarser lithologies (sandy clays, sands, and gravel dominated lithologies~~).~~) as shown in the cross sections, Figures 3-3 through 3-7.
- These appear to occur as lenses, filled in erosional surfaces, or possible paleochannels as shown in the cross sections, Figures 3-3 through 3-7.
- Product types are mixed in some areas and lighter product types are widely dispersed across the site. Releases of some lighter-end product types such as gasoline and naphtha have occurred in the last 5 years~~.~~ the Marketing Tank Farm release, Tank 570 release, and diesel and naphtha occurrences (Section 1.4).
- To verify saturation and to aid in the design of future remedial alternatives, collection of soil cores and verification of fuel types will be evaluated.

Based on the information collected ~~during~~as part of this investigation, the recommendations include:

- Process Area: The potential SPH is bounded to the north by the Eastern Boundary LIF borings. Future investigations in the Process Area will be addressed in the Process Area Work Plan, requested by NMED in Comment 9 of the Marketing Tank Farm LIF report disapproval letter (NMED 2021).
- Western Boundary Area: Additional groundwater monitoring wells were completed in July and August 2021 along the North Drainage Ditch and near the Evaporation Ponds for dissolved-phase groundwater assessment and monitoring of these Refinery features. Based on the data presented in this report, sufficient LIF data have been collected for future engineering evaluations.
- Eastern Boundary Area: Hydraulic gradient and the dip of the Chinle Formation suggest that the primary direction of SPH migration in this area is toward the north, where the extent of impacts is well delineated. To verify the extent of SPH along the eastern boundary (east of EB-LIF-07, EB-LIF-12, and EB-LIF-13), additional assessment will be conducted off site ~~once~~after access is ~~obtained~~granted from property owners. An assessment of shallow soils in the vicinity of the Rail Car Release is planned for 2021 and also would provide some information near EB-LIF-07.
- Tank Farm Area: Data from borings EB-LIF-103, EB-LIF-105, and EB-LIF-107 ~~indicate~~suggests that SPH above residual saturation exists. Groundwater monitoring wells OW-30, OW-55, and OW-13, located down gradient of the LIF borings, show no evidence of SPH, ~~indicating~~suggesting that the SPH terminates in the area between the LIF borings and the wells. Based on the data presented in this report, sufficient LIF data have been collected to aid in remedial design.

5.0 REFERENCES

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ATTACHMENT C. CLEAN COPY OF REPORT

WESTERN REFINING SOUTHWEST LLC

D/B/A MARATHON GALLUP REFINERY

[REVISED] TANK 570 RELEASE AND ADDITIONAL AREAS

LASER-INDUCED FLUORESCENCE/HYDRAULIC PROFILING INVESTIGATION REPORT

OCTOBER 27, 2021

REVISED MAY 25, 2022

Executive Summary

The Western Refining Southwest LLC (dba Marathon Gallup Refinery) (Refinery) is submitting this Tank 570 Release and Additional Areas laser-induced fluorescence (LIF) and hydraulic profiling (HP) investigation to identify areas where residual and/or mobile separate phase hydrocarbons (SPH) from releases may potentially exist. This investigation was conducted to further evaluate the extent of SPH at the Refinery and to assist in remedial design. The LIF data gathered provide a semi-quantitative measure of the different intervals of SPH, presence or absence of SPH, and the type of SPH present and degree of weathering. It is not meant to provide quantitative data comparable to laboratory analytical data.

As a result of two releases in 2019, Marketing Tank Farm release and Tank 570 release, LIF/HP was proposed to investigate the extents. Three investigations have been conducted between November 2019 and May 2021. The investigations are summarized as follows:

- Week of November 18, 2019: Borings were drilled in the Marketing Tank Farm and around Tank 570 to address the releases in these areas.
- Week of February 1, 2021: Borings were drilled in the Marketing Tank Farm and the Process Area to address data gaps in the Marketing Tank Farm area. The results for the Marketing Tank Farm investigations (November 2019 and February 2021) were summarized in the "Marketing Tank Farm Laser-Induced Fluorescence/Hydraulic Profiling Investigation Report" (MKTF Report) submitted on March 31, 2021 and disapproved in the New Mexico Environment Department (NMED) letter dated June 2, 2021.
- Week of May 10, 2021: Borings were drilled at various locations around the refinery, including the northern and eastern boundary, Tank Farm, Marketing Tank Farm, and in and around the wastewater treatment area to further address the Tank 570 area, refinery boundaries, and other areas with data gaps. The Tank 570 (November 2019 and May 2021), Process Area (February 2021), and additional areas (May 2021) data are discussed in this report. The additional Marketing Tank Farm data collected in May 2021 will be presented in an addendum to the MKTF Report (MPC 2021), which will be submitted by November 19, 2021.

The investigation scope was conducted in accordance with a series of verbal discussions and agreements between the NMED and the Refinery. In total, 139 LIF/HP borings have been drilled at the site: 46 borings in November 2019, 45 borings in February 2021, and 48 borings in May 2021. Refer to Section 1.0, Table 1-1 for the LIF boring designations, associated investigation dates, and cross-references to the applicable report where data analysis is provided. Refer to Section 3.0, Figure 3-1, and Tables 3-1 and 3-2 for the locations and extent of the SPH occurrences.

This report presents the Tank 570 and the additional areas data collected in November 2019, February 2021, and May 2021. This report should be considered complimentary to the March 2021 MKTF Report and addendum.

The LIF/HP investigation for the Tank 570 release and the additional areas spanned the three field events and consisted of advancing 28 direct push (DP) borings in November 2019, 8 DP borings in February 2021, and 41 DP borings in May 2021. In conjunction with the LIF/HP borings, soil samples were collected at eight locations. The February and May 2021 locations were selected to close data gaps identified during the November 2019 LIF/HP investigation located on the Eastern Boundary of the Refinery and near the 2019 Tank 570 release. Utility clearance using ground-penetrating radar was completed by Ground Penetrating Radar Systems in the week prior to the drilling activities. Gallup Pipeline and Compliance Services performed borehole clearance using air-knife excavation in a V-trench formation. Terracon performed the DP drilling and Dakota Technologies, LLC performed LIF/HP probing activities.

Significant conclusions include:

- SPH impacts appear to follow relatively coarser lithologies (sandy clays, sands, and gravel dominated lithologies) as shown in the cross sections, Figures 3-3 through 3-7.
- These appear to occur as lenses, filled in erosional surfaces, or possible paleochannels as shown in the cross sections, Figures 3-3 through 3-7.
- Product types are mixed in some areas and lighter product types are widely dispersed across the site. Releases of some lighter-end product types such as gasoline and naphtha have occurred in the last 5 years, e.g., the Marketing Tank Farm release, Tank 570 release, and diesel and naphtha occurrences (see Section 1.4).
- To verify saturation and to aid in the design of future remedial alternatives, collection of soil cores and verification of fuel types will be evaluated.

Based on the information collected during this investigation, the recommendations include:

- Process Area: The potential SPH is bounded to the north by the Eastern Boundary LIF borings. Future investigations in the Process Area will be addressed in the Process Area Work Plan, requested by NMED in Comment 9 of the Marketing Tank Farm LIF report disapproval letter (NMED 2021).
- Western Boundary Area: Additional groundwater monitoring wells were completed in July and August 2021 along the North Drainage Ditch and near the Evaporation Ponds for dissolved-phase groundwater assessment and monitoring of these Refinery features. Based on the data presented in this report, sufficient LIF data have been collected to aid in remedial design.

- Eastern Boundary Area: Hydraulic gradient and the dip of the Chinle Formation suggest that the primary direction of SPH migration in this area is toward the north, where the extent of impacts is well delineated. To verify the extent of SPH along the eastern boundary (east of EB-LIF-07, EB-LIF-12, and EB-LIF-13), additional assessment will be conducted off site once access is obtained from property owners. An assessment of shallow soils in the vicinity of the Rail Car Release is planned for 2021 and also would provide some information near EB-LIF-07.
- Tank Farm Area: Data from borings EB-LIF-103, EB-LIF-105, and EB-LIF-107 indicate that SPH above residual saturation exists. Groundwater monitoring wells OW-30, OW-55, and OW-13, located down gradient of the LIF borings, show no evidence of SPH, indicating that the SPH terminates in the area between the LIF borings and the wells. Based on the data presented in this report, sufficient LIF data have been collected to aid in remedial design.

Table of Contents

List of Figures

List of Tables

List of Appendices

List of Acronyms and Abbreviations

% RE	percent of reference emitter
bgs	below ground surface
cm/sec	centimeters per second
DP	direct push
EC	electrical conductivity
ft	foot or feet
GPS	Global Positioning System
HP	hydraulic profiling
K	hydraulic conductivity
LIF	laser-induced fluorescence
Refinery	Marathon Gallup Refinery
mS/m	millisiemens per meter
NM	New Mexico
NMED	New Mexico Environment Department
P Dwn	downhole hydraulic pressure
SPH	separate phase hydrocarbon

1.0 INTRODUCTION AND BACKGROUND

This report summarizes the Tank 570 release and additional areas Laser-Induced Fluorescence/Hydraulic Profiling (LIF/HP) investigation conducted at the Western Refining Southwest LLC (dba Marathon Gallup Refinery) (Refinery) in Gallup, New Mexico (NM) (Figure 1-1). This investigation was conducted to identify areas where residual and/or mobile separate phase hydrocarbons (SPH) may exist due to hydrocarbon releases and to assist in remedial design. The LIF data gathered provide a semi-quantitative measure of the different intervals of SPH, presence or absence of SPH, and the type of SPH present and degree of weathering. It is not meant to provide quantitative data comparable to laboratory analytical data.

As a result of two releases in 2019, Marketing Tank Farm release and Tank 570 release, LIF/HP was proposed to investigate the extents. The investigation scope was conducted in accordance with a series of verbal discussions and agreements between the New Mexico Environment Department (NMED) and the Refinery. Three investigations have been conducted between November 2019 and May 2021. In total, 139 LIF/HP borings have been drilled at the site: 46 borings in November 2019, 45 borings in February 2021, and 48 borings in May 2021.

The investigations are summarized as follows:

- Week of November 18, 2019: Borings were drilled in the Marketing Tank Farm and around Tank 570 to address the releases in these areas.
- Week of February 1, 2021: Borings were drilled in the Marketing Tank Farm and the Process Area to address data gaps in the Marketing Tank Farm area. The results for the Marketing Tank Farm investigations (November 2019 and February 2021) were summarized in the "Marketing Tank Farm Laser-Induced Fluorescence/Hydraulic Profiling Investigation Report" (MKTF Report) (MPC 2021) submitted on March 31, 2021 and disapproved in the NMED letter dated June 2, 2021.
- Week of May 10, 2021: Borings were drilled at various locations around the refinery, including the northern and eastern boundary, Tank Farm, Marketing Tank Farm, and in and around the wastewater treatment area to further address the Tank 570 area, refinery boundaries, and other areas with data gaps. The Tank 570 (November 2019 and May 2021), Process Area (February 2021), and additional areas (May 2021) data are discussed in this report. The additional Marketing Tank Farm data collected in May 2021 will be presented in an addendum to the MKTF Report (MPC 2021), which will be submitted by November 19, 2021.

This report presents the Tank 570 and the additional areas data collected in November 2019, February 2021, and May 2021. This report should be considered complimentary to the March 2021 MKTF Report and addendum. Table 1-1 presents the LIF boring designations, associated investigation dates, and cross-referenced to the applicable report where data analysis is provided.

The Tank 570 and additional areas LIF/HP investigation spanned the three field events and consisted of advancing 28 direct push (DP) borings in November 2019, 8 DP borings in February 2021, and 41 DP borings in May 2021. In conjunction with the LIF/HP borings, soil samples were collected at eight locations. This investigation focused on the eastern (including Tank 570), northern, and northwestern areas of the Refinery. The November investigation was concentrated on the area surrounding Tank 570. The February and May 2021 locations were selected to close data gaps identified during the November 2019 LIF/HP investigation located on the Eastern Boundary of the Refinery and near the 2019 Tank 570 release.

1.1 Background

The Refinery is located approximately 17 miles east of Gallup, McKinley County, NM along the north side of Interstate Highway I-40 (Figure 1-1). The physical address is I-40, Exit #39 Jamestown, NM, 87347. The Refinery property covers approximately 810 acres. The Refinery was officially idled indefinitely on October 9, 2020. While operating, the Refinery processed crude oil transported by pipeline or tanker truck from the Four Corners region. Various process units operated at the Refinery included crude distillation, reformer, fluidized catalytic cracker, alkylation, sulfur recovery, merox treater, and hydrotreater. Past operations have produced gasoline, diesel fuels, jet fuels, kerosene, propane, butane, and residual fuel. Refinery operations were idled in April 2020.

1.2 Investigation Objectives

As determined by the Refinery, the objectives of the LIF investigation were to:

- Identify areas where residual and/or mobile SPH may exist.
- Use the investigation results to assist in the selection of remedial alternatives for evaluation.

1.3 Site Surface and Subsurface Conditions

Site topographic features include high ground in the southeast gradually decreasing to a lowland fluvial plain to the northwest. Elevations on the refinery property range from 7,040 feet (ft) to 6,860 ft. Surface soils within most of the area of investigation are primarily Rehobeth silty clay loam, which is a common soil type in the area.

Based on existing boring logs, shallow subsurface fluvial and alluvial soils are comprised of primarily clays and silts with minor inter-bedded sand layers. Very low permeability bedrock (e.g., claystones and siltstones) underlie the surface soils and effectively form an aquitard. The Chinle Group, from the Upper Triassic period, crops out over a large area on the southern margin of the San Juan Basin. The

uppermost recognized local Formation is the Petrified Forest Formation. The Sonsela Sandstone Bed is the uppermost recognized regional aquifer. Aquifer tests of the Sonsela Bed northeast of Prewitt indicated a transmissivity of greater than 100 ft^2/day (Stone et al., 1983). The Sonsela Sandstone's highest point occurs southeast of the site and slopes downward to the northwest as it passes under the Refinery. The Sonsela Sandstone forms a water-bearing reservoir with artesian conditions throughout the central and western portions of the Refinery property. The regional stratigraphy around the Refinery is shown on Figure 1-2.

The diverse properties and complex, irregular stratigraphy of the surface soils across the Refinery cause a wide range of hydraulic conductivity (K) ranging from less than 10^{-2} centimeters per second (cm/sec) for gravel-like sands immediately overlying the Petrified Forest Formation to 10^{-8} cm/sec in the clay soils located near the surface. Generally, shallow groundwater at the Refinery follows the upper contact of the Petrified Forest Formation (Chinle Group) with prevailing flow from the southeast to the northwest, although localized areas may have varying flow directions based on the subsurface geology.

1.4 Existing Data

Historically, releases have occurred in the investigation area, including an October 2019 gasoline release from a subsurface pipeline between the Truck Loading Rack and the Marketing Tank Farm. During this investigation, the project scope was expanded from the 2019 gasoline release to evaluate other releases in the area, including the Tank 570 release, and diesel and naphtha occurrences. Historical measurements of SPH thickness and depth in monitoring wells across the Refinery were used to develop the scope of work for the three LIF/HP investigations. SPH thicknesses in the Refinery monitoring wells are shown on Figure 1-3. Measurements of SPH thickness and depth in the monitoring wells are in Appendix A.

2.0 INVESTIGATION METHODS

During these investigations, site characterization was conducted with LIF. At a subset of the LIF borings, an HP tool was added to the probe. Details on the LIF/HP technique are described in Appendix B. The investigation results are presented in Section 3.0. The concepts of mobility and migration are discussed with respect to the investigation results in Sections 3.0 and 4.0.

LIF is a DP site characterization method in which a transparent sapphire window is fitted into the side of a DP probe that is pushed through the soil column. As this sapphire-windowed probe is advanced steadily down into the soil column, pulses of laser light are emitted onto passing soil. The laser light excites fluorescent molecules that exist in most petroleum fuels and oils. At this site, the type of LIF probe utilized was an Ultra-Violet Optical Screening Tool (UVOST®) probe, which is designed for detecting light to mid-weight fuels and oils containing 2- to 4-ring polycyclic aromatic hydrocarbons (PAH), such as gasoline, diesel, kerosene, motor oils, cutting fluids, hydraulic fluid, light crude oils, and fuel oils.

The HP tool is used to assess formation permeability and hydrostratigraphy. During advancement, water is injected at a controlled rate into the formation through a screened port on the side of the HP probe. A transducer in the probe measures the total pressure required to inject the water into the formation while a flow controller at the surface monitors the injection flow rate. These data can be used to estimate K in the formation. The HP tool also measures electrical conductivity (EC). EC is the proportionality factor relating to the current that flows in a medium to the electric force field that is applied. It is a measure of the ability of the material to conduct an electrical current to move through the material. The EC of subsurface materials is influenced by metal content, porosity, permeability, and clay content, among other factors. The EC log is reviewed to better define formation permeability and hydrostratigraphy.

The combination of LIF and HP tools on a single DP probe facilitates investigation of SPH while simultaneously characterizing lithologic variability that influences SPH mass storage and transport. This combination reduces time and cost, while eliminating the need to integrate LIF and HP data from adjacent borings.

The LIF/HP probing output provides a comparison of the LIF response to that of a known calibration fuel blend reference standard and is presented as percent of the reference emitter (% RE). The calibration blend, which is made from fresh, unweathered, nondegraded product, is used to allow a wider range of fuel identification. Therefore, the LIF % RE signal correlates to the analytical properties, similarity, and concentration in reference to the calibration blend as opposed to a single fuel type. LIF response intensity (i.e., % RE) is influenced by the concentration, composition, and state (e.g., weathered, degraded) of SPH present in refence to the calibration fuel blend and the waveform pattern is a function of the relative proportions of the PAHs present.

For clarity, in discussing the migration potential of SPH, a distinction should be drawn between potential SPH mobility and migration, as these terms can be confused (ITRC 2009). In this report, mobility and mobility potential refer to the potential of SPH to gravity drain from the soil pore space, which can only occur if the residual saturation is exceeded. This gravity drainage typically manifests itself as SPH in a monitoring well. In contrast, SPH migration refers to the lateral spread of SPH under the influence of SPH characteristics, the prevailing groundwater hydraulic gradient, and permeability, as governed by Darcy's Law. Exceedance of local residual saturation is a necessary condition for migration, but it is not alone sufficient for migration. Sufficient SPH head and other conditions described in this report must be present for SPH to migrate downgradient.

3.0 INVESTIGATION RESULTS

In total, 139 LIF/HP borings have been drilled at the site: 46 borings in November 2019, 45 borings in February 2021, and 48 borings in May 2021. The locations are presented on Figure 3-1 and the LIF/HP logs are provided in Appendix C. Elevation data for the LIF borings are provided in Appendix D. Based on the LIF/HP logs (Appendix C), SPH type and extent are presented on Figure 3-1 and summarized in Tables 3-1 and 3-2 for the borings drilled during the three LIF/HP investigations. Table 3-1 presents the total depth, estimated depth to water, and maximum % RE value and depth. Table 3-2 provides the impacted depth intervals (surface, vadose zone, and estimated aquifer zone) and % RE measured within the impacted zone. Of the 139 borings drilled, all but 34 intercepted the estimated potentiometric surface. The information obtained regarding the occurrence of SPH, regardless of the potentiometric surface depth, provides a semi-quantitative guide for any future data collection needs, which could be used for engineering or remedial assessment purposes.

The LIF/HP Investigations were conducted because of two simultaneous releases in the Marketing Tank Farm and the Tank 570 area. The November 2019 data addressed both the Marketing Tank Farm and Tank 570 releases. The February 2021 data addressed the Marketing Tank Farm Release. The May 2021 data addressed the Tank 570 Release and the refinery boundaries per NMED comments and other data gaps. The November 2019 and February 2021 LIF data associated with the Marketing Tank Farm (designated MKTF-LIF) were discussed in the Marketing Tank Farm LIF report (MPC 2021). The additional Marketing Tank Farm data collected in May 2021 will be presented in an addendum to the MKTF Report (MPC 2021), which will be submitted by November 19, 2021.

The Tank 570 and additional areas data collected in November 2019, February 2021, and May 2021 are discussed in the following sections. This report can be considered a complimentary to the March 2021 MKTF Report and addendum.

3.1 Utility Clearance

During the November 2019 and February 2021 investigations, utility clearance was conducted using air-knifing from 0 to 5 ft. In the December 18, 2020 “Response to Comments Approval with Modifications OW-61 through OW-65 Well Installation Report” submitted to the NMED, the Refinery proposed to hydro-excavate v-trenches to locate subsurface utilities as requested by NMED. The advantage of v-trenching is that undisturbed shallow soils can be evaluated for potential impacts. NMED approved the method and requested additional information in the “Approval, Response to Comments Approval with Modifications OW-61 through OW-65 Well Installation Report” letter dated January 13, 2021. Per the NMED approval letter, v-trenching was to be performed for the February 2021 LIF investigation. The NMED approval letter was received after planning and scheduling for the February 2021 LIF event was completed. Therefore, v-trenching was not used in the February 2021 investigation.

During the May 2021 investigation, v-trenching clearance activities were completed and LIF/HP intervals from 0 to 5 ft are representative of undisturbed subsurface conditions as required by NMED. Terracon performed the DP drilling and Dakota Technologies, LLC performed LIF/HP probing activities. Borings completed during the May 2021 investigation were abandoned using bentonite chips emplaced from the bottom of the borehole to the surface. During the November 2019 and February 2021 investigations, soil borings with no LIF response were abandoned with soil cuttings from the borehole and a bentonite plug was placed from 2 ft below ground surface (bgs) to ground surface. Impacted borings were abandoned using bentonite chips.

3.2 Laser-Induced Fluorescence Results

LIF borings discussed in this Tank 570 Release and Additional Areas LIF/HP Investigation Report (Table 1-1) were distributed as follows:

- Eight borings (designated PA-LIF) were advanced in the Process Area.
- Twenty borings (designated WB-LIF) were advanced along the Active Refinery Western Boundary.
- Forty-nine borings (designated EB-LIF) were advanced along the Eastern Boundary.

LIF fluorescence intensity is likely to increase with SPH saturation magnitude. However, LIF data should not be taken as an indication of SPH mobility. The distinction between residual and mobile SPH is complex and depends on fine scale hydrostatic conditions which can change over time. The primary output variable of the LIF borings and the % RE from the UVOST®, is a measure of fluorescence relative to a standard reference. While it is influenced by the SPH saturation of pore space within the subsurface it is also affected by the nature of aquifer materials, and the type and composition of the SPH.

For qualitative analysis of the LIF data, values of approximately 20 % RE or less are considered a minimal response, i.e., SPH present at low levels. Values of 0 % RE were considered to have no SPH. This was determined by:

- Potential for LIF false positives having been documented for certain waveform patterns and at low % RE (Dakota 2021)
- Collection of soil samples for comparison to % RE values in general correlate to concentrations of TPH, 50% of the samples that contained Total TPH of 1000 mg/kg correlated in general to a 20 % RE threshold.

Based on the data presented in the Marketing Tank Farm LIF report (MPC 2021) and this report, sufficient data have been collected for future engineering remediation evaluations.

3.2.1 Process Area

In February 2021, eight LIF borings were advanced in the Process Area in the southeast area of the Refinery. No additional Process Area LIF borings were drilled in May 2021. PA-LIF-1 has a waveform signature similar to a diesel-type product peaking at 464.7 % RE between 12.25 and 13.5 ft and a smaller diesel-type product signature between 16 and 17 ft bgs. To the west of this location, PA-LIF-2 has a gasoline-type waveform signature with 77.7 % RE between 16 and 17 ft bgs. South of these two locations, a mixture of gasoline-type and diesel-type waveform signatures were identified in PA-LIF-4, PA-LIF-7, and PA-LIF-8. Directly south of PA-LIF-1, PA-LIF-6 has a diesel-type waveform signature with 562.8 % RE and was shown to cover a much broader depth range from 14 to 22 ft bgs. Two of the locations, PA-LIF-3 and PA-LIF-5, had no response and were advanced east of PA-LIF-4 and PA-LIF-7, respectively.

Soil samples were collected from PA-LIF-7 at depths of 11-13 ft bgs and 13-14 ft bgs. Results are included in Tables 3-3 and 3-4, and discussed in Section 3.4.

The potential SPH in the Process Area is bounded to the north by the Eastern Boundary LIF borings and to the west by the Marketing Tank Farm LIF borings. Future investigations in the Process Area towards the east and south will be addressed in the Process Area Work Plan, requested by NMED in Comment 9 of the Marketing Tank Farm LIF report disapproval letter (NMED 2021).

3.2.2 Active Refinery Western Boundary

The active refinery western boundary LIF borings are generally north of the Marketing Tank Farm within the wastewater treatment area. Of the 20 active refinery western boundary LIF borings completed, 15 had a response of less than 20 % RE. The waveform detections were noted as being a diesel-type in the following borings: WB-LIF-112 (58.3 %), WB-LIF-114 (78.7 %), WB-LIF-119 (350.5 %), WB-LIF-128 (329.6 %), and WB-LIF-136 (144.5 %).

Access to install additional borings was difficult due to pond slopes within the area. Based on the data presented in this report, sufficient data have been collected for future engineering evaluation.

3.2.3 Eastern Boundary

The eastern boundary is generally the area north of the Process Area and in the Tank Farm. In May 2021, 21 LIF borings were advanced in the eastern boundary to supplement the 28 LIF borings collected in November 2019/February 2021. Initial LIF borings were done around Tank 570, which had a documented gasoline release in 2019. LIF waveforms from EB-LIF-02 (west of the tank, 255 % RE) suggest gasoline- and diesel-type product mixed at depths between 10 and 36 ft bgs. Gasoline-type LIF waveforms were also noted in the following borings above 100 % RE: EB-LIF-12 (401 %), EB-LIF-18 (272.3 %), EB-LIF-20 (185.7 %), EB-LIF-21 (217.3 %), EB-LIF-28 (304 %). LIF waveforms similar to a diesel-type product were detected above 100 % RE in EB-LIF-03 (179.2 %), EB-LIF-04 (711.7 %), and EB-LIF-26 (435.9 %), which were all adjacent to and east and south of Tank 570. A mix of diesel- and gasoline-type

waveforms were also noted in several locations east of Tank 570 in EB-LIF-05, EB-LIF-06, and EB-LIF-07. To the south of these three locations, a % RE response less than 20 % was noted in LIF borings EB-LIF-08, EB-LIF-09, and EB-LIF-23, as well as the area to the north of the diesel- and gasoline-type waveform borings (EB-LIF-05, EB-LIF-06, EB-LIF-07) in EB-LIF-11 and EB-LIF-122 (May 2021).

The May 2021 LIF borings advanced in the eastern boundary further assessed:

- The northern portion of the refinery (EB-LIF-96, EB-LIF-99, EB-LIF-101, EB-LIF-102, EB-LIF-103, EB-LIF-104, EB-LIF-105, EB-LIF-106, EB-LIF -107, EB-LIF-121, and EB-LIF-138)
- The western portion of the Tank Farm (EB-LIF-91, EB-LIF-93, EB-LIF-94, EB-LIF-97, EB-LIF-98, and EB-LIF-109)
- The area between the Process Area and Tank 570 (EB-LIF-108)

For the northern portion of the eastern boundary, gasoline-type LIF waveforms were noted in the following borings above 100 % RE: EB-LIF-99 (353.3 %), EB-LIF-103 (174.3 %), EB-LIF-104 (191.2 %). A diesel- and gasoline-type mixed waveform was noted in EB-LIF-101 (77.5 %), which is between the detected waveforms similar to a diesel-type product in LIF borings south of EB-LIF-97 and EB-LIF-98. The northernmost eastern boundary LIFs did have waveforms similar to a gasoline-type product in 2 of the 3 borings (EB-LIF-105 and EB-LIF-107), and were less than 100 % RE. These borings are south of wells OW-55 and OW-30 where no SPH has been observed.

For the western portion of the Tank Farm, EB-LIF-109 contained a waveform similar to a gasoline- and diesel-type mix. This location had one of the highest responses in the eastern boundary borings, and was measured at 703.6 % RE. To the north of this location, EB-LIF-91 had a diesel-type only waveform with a response of 23.3 %. Additionally in the west, diesel-type waveforms were observed in EB-LIF-97 (50.4 %), and EB-LIF-98 (150.5 %). A gasoline-type waveform was noted in EB-LIF-93 (27 %) northeast of the Marketing Tank Farm area. LIF responses below 20 % RE were observed in EB-LIF-94 and EB-LIF-95.

LIF boring EB-LIF-108 (320 %) was located between the Process Area and Tank 570, just south of EB-LIF-25 (435.9 % diesel type). The waveform for the LIF was noted as a diesel type. This boring suggests that there may be some mixing of product types between Tank 570 and the Process Area (PA-LIF-01 [464.7 % diesel type]).

Data suggest that SPH impacts may exist east of EB-LIF-07, EB-LIF-12, and EB-LIF-13 and further delineation may be warranted. Additional assessment of the eastern boundary would be offsite. The Refinery has attempted to contact the adjacent property owner regarding access but has not received any response.

3.3 Hydraulic Profiling Results

The HP data were collected from 107 of the borings drilled during the November 2019, February 2021, and May 2021 field events (Appendix C) and the data are included on the right-hand side of the LIF/HP logs, if applicable.

During HP, water is pumped through a down-hole transducer at approximately 250 milliliters per minute into the formation. Pressure and flow are measured as the tool is advanced. A calibration procedure called a dissipation test is performed at one or more discrete depths within each boring logged with the HP tool. The dissipation test allows the pressure to equilibrate to hydrostatic pressure for a particular depth, and from that measurement, a potentiometric surface (water table) can be calculated. After the water table surface is calculated, estimated K values can be calculated for the saturated portion of the boring. Ideally, dissipation tests are performed in subsurface zones below the water table, which have low pressure and high flow. The hydrostatic pressure gradient increases with depth due to the weight of water above the probe increasing and permeability decreasing. These factors furthermore affect the injection pressure exerted by the probe, which makes deeper zones less ideal for dissipation testing. In deeper zones with higher pressure and/or very low permeability zones, the probe's injection flow is minimal, rendering it difficult to measure a response signal, which is the case at the Refinery. Examples of this observed response is present in logs MKTF-LIF-45 and MKTF-LIF-46. The LIF signal shows significant hydrocarbon, but the P-Dwn log shows a consistent pattern from around 20 ft bgs of high downhole pressure readings (100+ pounds per square inch). Dissipation tests within this type of soil/sediment would not yield accurate results. If a dissipation test was completed at a boring, K values were provided on the HP log.

HP data were used to approximate subsurface geology with respect to potential SPH flow. Cross sections were developed using a combination of existing soil boring and monitoring well logs, LIF soil investigation data, and all three investigations' HP and LIF data for the entire Refinery (Marketing Tank Farm release area, Tank 570 release area, and additional areas). The process of collecting data from the HP log tool is an estimation and interpretation process. For example, the P Dwn portion of the log at WB-LIF-129 (Appendix C) suggests a more permeable zone from 0 to 5 ft bgs, followed by a slightly less permeable zone from 5 to 10 ft bgs. The remaining intervals of that boring are characterized by very high P Dwn readings indicative of a very fine-grained soil/sediment interval, consistent of a clay to weathered shale, followed by refusal at 22 ft bgs. While the log is not as accurate as a continuously sampled/logged soil boring, it is consistent with available physical data within the area.

Figure 3-2 presents the cross-section location map. Figures 3-3 through 3-7 present the cross sections with maximum historical SPH thickness. The northing and easting locations of the borings were determined with Global Positioning System (GPS) following completion of LIF investigation and the data are included as Appendix D. Ground surface elevations were determined using unmanned aerial vehicle data.

Based on the log signatures, low K values (high downhole hydraulic pressure [P Dwn]) on the HP logs appear to represent a low K boundary between the alluvium/Chinle Group contact as seen on the cross sections. Bedding planes and changes in soil type are possible pathways for SPH migration in the subsurface and are indicated by a slight decrease in P Dwn on the HP logs. An example of this is shown on the log for EB-LIF-93 (Appendix C). This log shows two different waveform signatures at two different depths (1.23 ft bgs and 13 ft bgs). The HP log data also show distinct low and high permeability zones. The LIF fluorescence at 13 ft bgs (27 % RE) suggests the presence of SPH in a very thin, more permeable interval.

3.4 Electrical Conductivity Results

EC was measured in 32 of the November 2019 and February 2021 LIF borings and the data are included on the right-hand side of the LIF/EC log (Appendix C). EC logs were not collected during the May 2021 investigation due to probe malfunctioning. The conductivity value on the EC log represents the electrical conductivity of the soils. EC in the 0 to 50 millisiemens per meter (mS/m) range can be interpreted as sand (coarser to finer), silts are normally in the 50 to 100 mS/m range, clayey silts and silty clays range up to 200 mS/m, and clays are normally greater than 200 mS/m (Christy, et al., 1994).

The EC data were used to evaluate subsurface geology with respect to potential SPH flow. High conductivity on the EC logs roughly correlates with the Chinle Group contact as shown on the cross sections. All soil K data gathered via HP or EC tools should be correlated with physical soil samples to ensure that the tools are accurately representing subsurface conditions.

3.5 Soil Sampling Results

Soil cores were collected using a Geoprobe© by driving a 5-ft long by 2-inch diameter macro-core barrel within 2 ft of the selected LIF/HP boring locations. Locations were determined by the on-site Professional Geologist based on interpretation of the LIF/HP logs, where LIF/HP results suggested the presence of SPH (occurrence of measurable % RE). Sample depths were based on LIF % RE, visual, and olfactory observations (Figure 3-8). LIF data are a better indicator of the presence or absence as well as location of SPH than the TPH data. TPH data are a better indicator of SPH saturation than the LIF data. Soil samples were collected from the following locations:

- Process Area
  - EB-LIF-34 (20 to 21 ft)
  - EB-LIF-108 (10 to 11 ft)
  - EB-LIF-109 (11.5 to 12 ft and 15 to 15.5 ft)
  - PA-LIF-7 (11 to 13 ft and 13 to 14 ft)

- Tank Farm
  - EB-LIF-19 (16 to 18 ft)
  - EB-LIF-20 (27 to 28 ft)
  - EB-LIF-28 (20 to 21 ft and 21 to 23 ft)
  - EB-LIF-99 (19 to 20 ft and 20 to 21 ft)

Samples were analyzed for total petroleum hydrocarbon-diesel range organics (TPH-DRO) and total petroleum hydrocarbon-motor oil range organics (TPH-MRO) analysis by the United States Environmental Protection Agency (USEPA) Method 8015M, and total petroleum hydrocarbon-gasoline range organics (TPH-GRO) analysis by the USEPA Method 8260B. In addition, a subset of the samples was collected for particle size analysis by American Society of Agronomy Method 15-5. Laboratory analytical results are presented in Table 3-3 (TPH analysis) and Table 3-4 (grain-size analysis). Laboratory data are provided in Appendix E.

In the Process Area (EB-LIF-34, EB-LIF-108, EB-LIF-109, and PA-LIF-7), TPH-DRO concentrations ranged from 130 milligrams per kilogram (mg/kg) to 2,500 mg/kg. TPH-GRO concentrations ranged from 17 mg/kg to 300 mg/kg. TPH-MRO was non-detect for all Process Area samples. In the Tank Farm (EB-LIF-19, EB-LIF-20, EB-LIF-28, EB-LIF-99), TPH-DRO ranged from non-detect to 3,200 mg/kg. TPH-GRO concentrations ranged from 7.6 mg/kg to 18,000 mg/kg. TPH-MRO was non-detect for all Tank Farm samples.

Four samples in the Process Area were analyzed for grain size.

- PA-LIF-7 (11 to 13 ft) consisted of gravel and sand with some finer material.
- EB-LIF-108 (12 to 13 ft) and EB-LIF-109 (10.5 to 11.5 ft) consisted of silts and clays with some sand and gravel.
- EB-LIF-34 (20 to 21 ft) consisted primarily of sand, silts, and clays.

Five samples in the Tank Farm were also analyzed for grain size.

- EB-LIF-19 (16 to 18 ft) and EB-LIF-99 (18 to 19 ft) consisted of sands, silts, and clays.
- EB-LIF-28 (20 to 21 ft and 21 to 23 ft) consisted of sands and gravels with some finer material.
- EB-LIF-20 (27 to 28 ft) was mostly sand with some fines and gravel.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Significant conclusions include:

- SPH impacts appear to follow relatively coarser lithologies (sandy clays, sands, and gravel dominated lithologies) as shown in the cross sections, Figures 3-3 through 3-7.
- These appear to occur as lenses, filled in erosional surfaces, or possible paleochannels as shown in the cross sections, Figures 3-3 through 3-7.
- Product types are mixed in some areas and lighter product types are widely dispersed across the site. Releases of some lighter-end product types such as gasoline and naphtha have occurred in the last 5 years the Marketing Tank Farm release, Tank 570 release, and diesel and naphtha occurrences (Section 1.4).
- To verify saturation and to aid in the design of future remedial alternatives, collection of soil cores and verification of fuel types will be evaluated.

Based on the information collected as part of this investigation, the recommendations include:

- Process Area: The potential SPH is bounded to the north by the Eastern Boundary LIF borings. Future investigations in the Process Area will be addressed in the Process Area Work Plan, requested by NMED in Comment 9 of the Marketing Tank Farm LIF report disapproval letter (NMED 2021).
- Western Boundary Area: Additional groundwater monitoring wells were completed in July and August 2021 along the North Drainage Ditch and near the Evaporation Ponds for dissolved-phase groundwater assessment and monitoring of these Refinery features. Based on the data presented in this report, sufficient LIF data have been collected for future engineering evaluations.
- Eastern Boundary Area: Hydraulic gradient and the dip of the Chinle Formation suggest that the primary direction of SPH migration in this area is toward the north, where the extent of impacts is well delineated. To verify the extent of SPH along the eastern boundary (east of EB-LIF-07, EB-LIF-12, and EB-LIF-13), additional assessment will be conducted off site after access is granted from property owners. An assessment of shallow soils in the vicinity of the Rail Car Release is planned for 2021 and also would provide some information near EB-LIF-07.
- Tank Farm Area: Data from borings EB-LIF-103, EB-LIF-105, and EB-LIF-107 suggests that SPH above residual saturation exists. Groundwater monitoring wells OW-30, OW-55, and OW-13, located down gradient of the LIF borings, show no evidence of SPH, suggesting that the SPH terminates in the area between the LIF borings and the wells. Based on the data presented in this report, sufficient LIF data have been collected to aid in remedial design.

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Figures

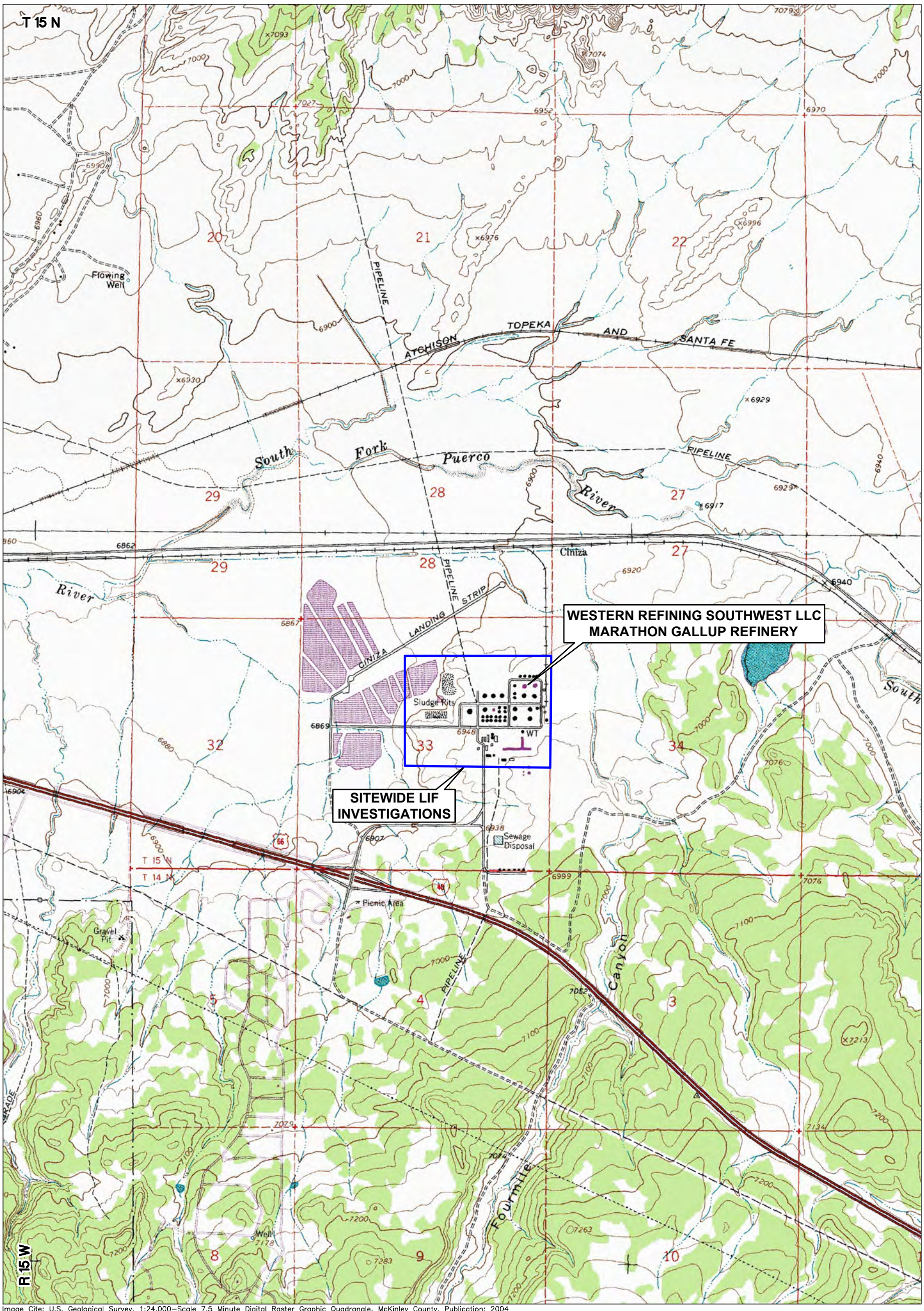

Image Cite: U.S. Geological Survey, 1:24,000–Scale 7.5 Minute Digital Raster Graphic Quadrangle, McKinley County, Publication: 2004

NEW MEXICO

QUADRANGLE LOCATION

NOTES:

1. SITE LEGAL DESCRIPTION - TOWNSHIP 15 NORTH, RANGE 15 WEST, SECTION 33
2. LIF = LASER-INDUCED FLUORESCENCE

N

0 2,000'

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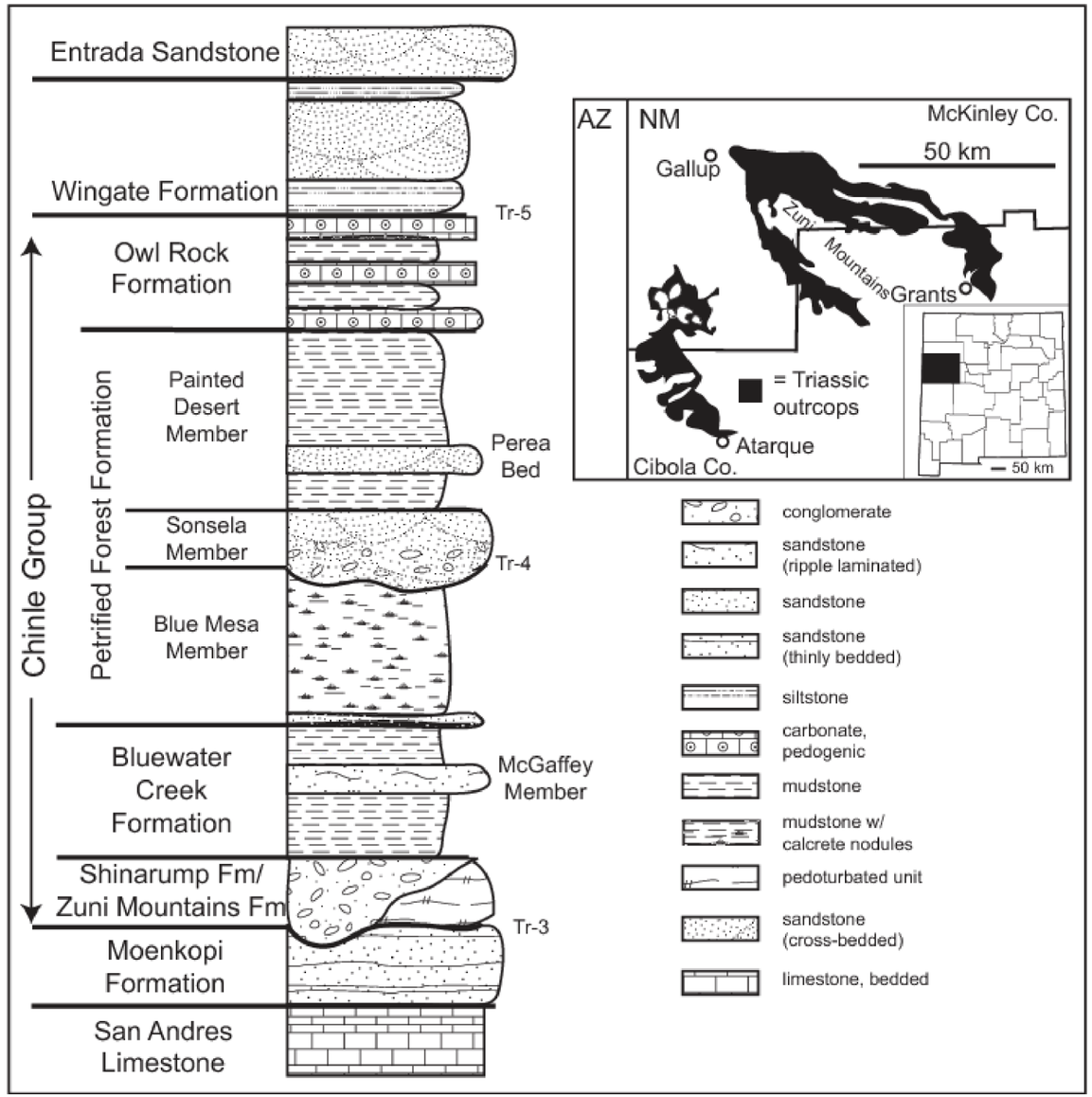
FIGURE 1-1

REFINERY AND LIF INVESTIGATION LOCATIONS

WESTERN REFINING SOUTHWEST LLC
MARATHON GALLUP REFINERY
GALLUP, NEW MEXICO

Drawn By: REP	Checked By: WG	Scale: 1" = 2,000'	Date: 7/15/2021	File: 697-SITELOC-202103

M:\TION\MARATHON\CADD\GALLUP_REPORTS\LIF\202102_ADDITIONAL_LIF\697-SITELOC-202103



SOURCE:

TRIASSIC STRATIGRAPHY IN THE ZUNI MOUNTAINS, WEST-CENTRAL NEW MEXICO, A.B. HECKERT, 2011

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FIGURE 1-2

GALLUP REGIONAL STRATIGRAPHY

WESTERN REFINING SOUTHWEST LLC
MARATHON GALLUP REFINERY
GALLUP, NEW MEXICO

Drawn By: KEJ	Checked By: PH		Date: 8/13/21	File: 1-2_GallupStratigraphy_Fig1-2.mxd

EXPLANATION

- MONITORING WELL - FOLLOWED BY SPH (SEPARATE PHASE HYDROCARBON) IN FEET
- MONITORING WELL - SPH NOT DETECTED
- SITE FEATURE

NOTES:

- SPH - SEPARATE PHASE HYDROCARBON
- MAXIMUM SPH THICKNESS BETWEEN 2019 - 2021

N

0 160 320'

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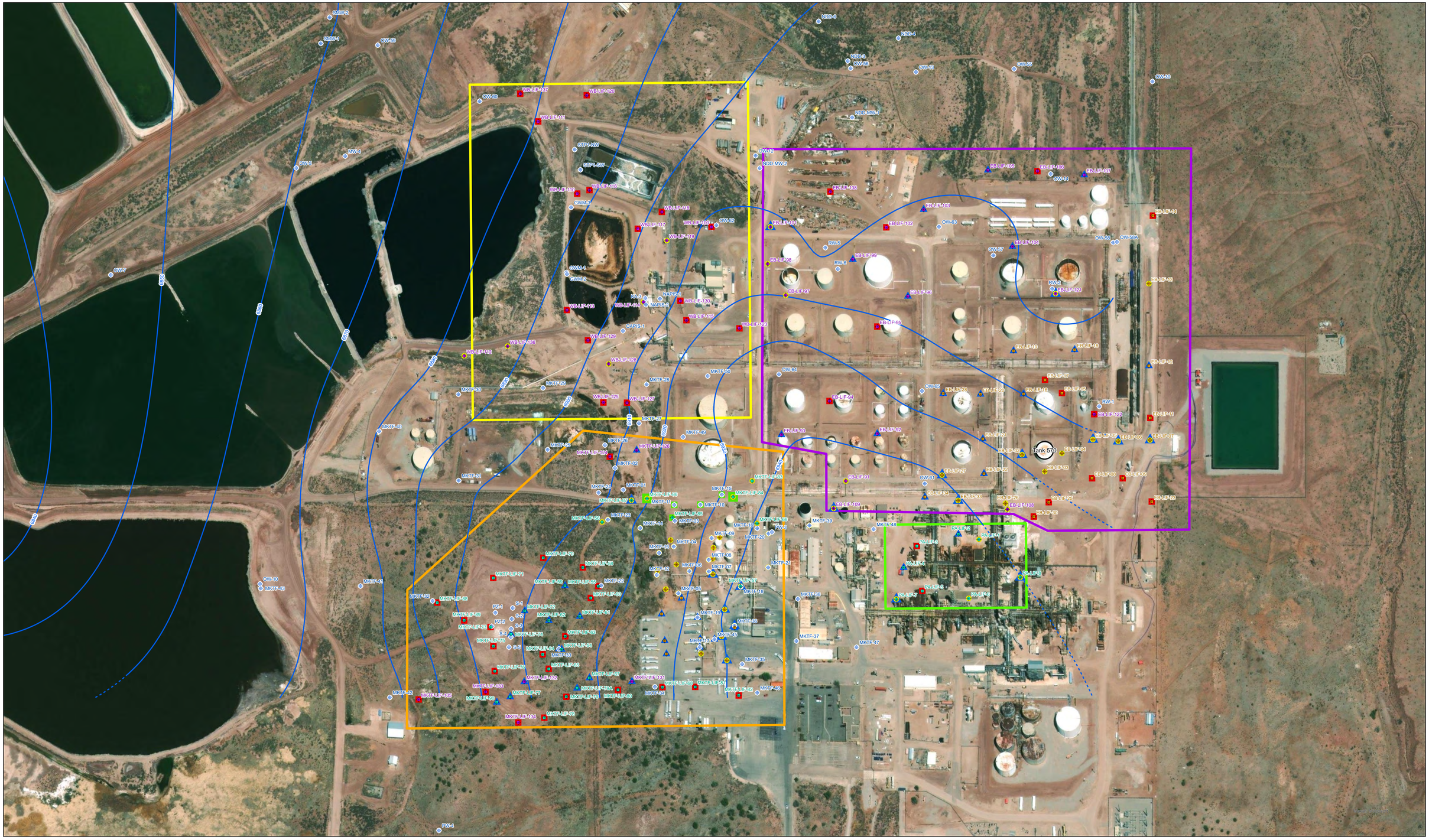
FIGURE 1-3

SITEWIDE MAXIMUM SPH THICKNESS

WESTERN REFINING SOUTHWEST LLC
MARATHON GALLUP REFINERY
GALLUP, NEW MEXICO

Drawn By: KEJ	Checked By: MS	Scale: 1" = 160'	Date: 10/28/21	File: 1-3_Sitewide_SPH_Thinkess_Fig1-3_Dsize



EXPLANATION

- 05/2021 LIF BORING LOCATION
- 02/2021 LIF BORING LOCATION
- 11/2019 LIF BORING LOCATION
- MONITORING WELL

SPH OCCURRENCE
- DIESEL
- GASOLINE
- NAPHTHA
- RESIDUAL/NO RESPONSE

- DECEMBER 2020 GROUNDWATER ELEVATION IN FT AMSL, DASHED WHERE INFERRED
- ACTIVE REFINERY WESTERN BOUNDARY LIF AREA (05/2021)
- EASTERN BOUNDARY LIF AREA (05/2021)
- MKTF LIF AREA (11/2019, 02/2021, AND 05/2021)
- PROCESS AREA LIF AREA (02/2021)

NOTES:

-LIF - LASER-INDUCED FLORESCENCE
-SPH - SEPARATE PHASE HYDROCARBON
-FT AMSL - FEET ABOVE MEAN SEA LEVEL

N

0 160 320'

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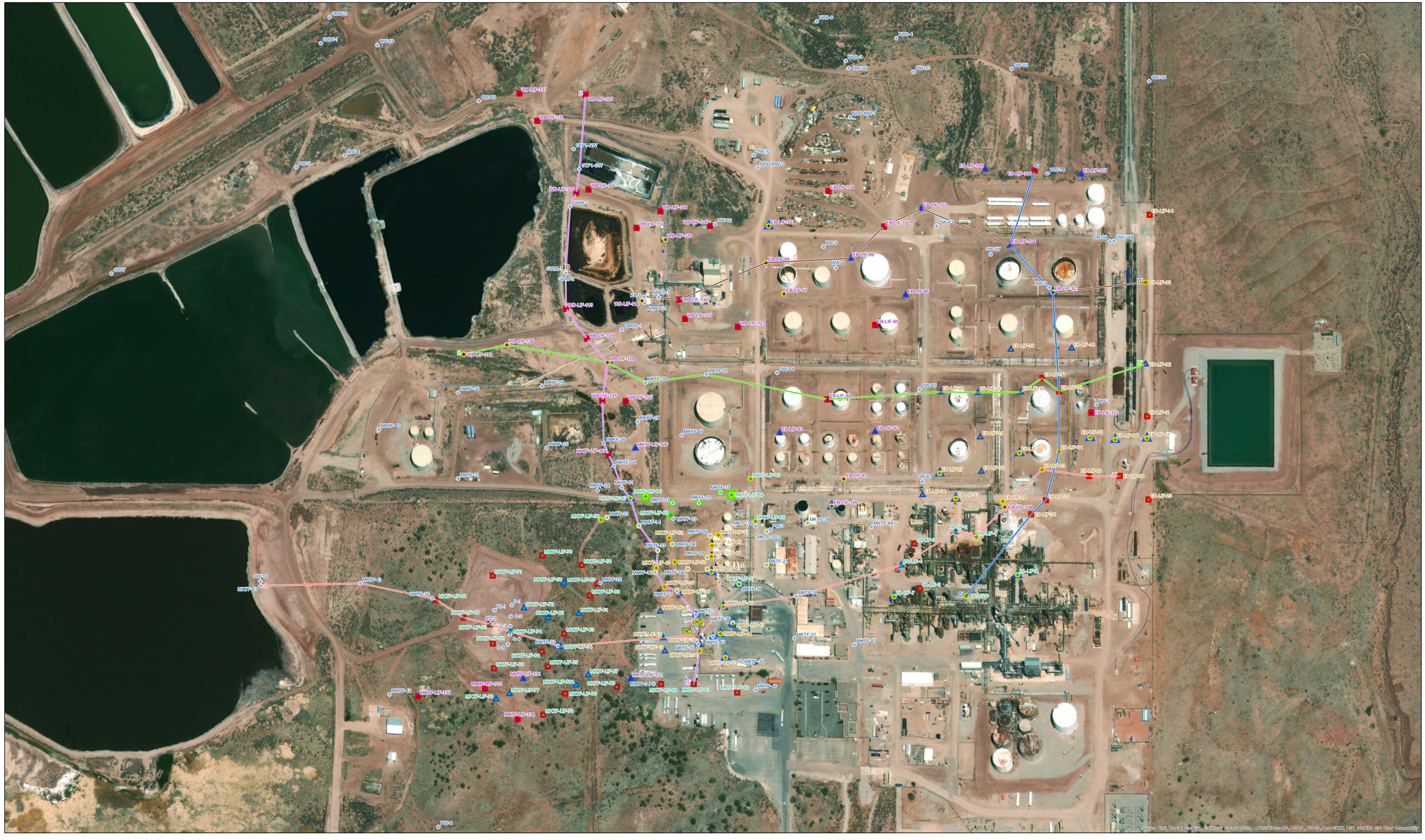
FIGURE 3-1

2019 AND 2021 LIF SAMPLE LOCATIONS AND RESIDUAL PRODUCT TYPE

WESTERN REFINING SOUTHWEST LLC MARATHON GALLUP REFINERY GALLUP, NEW MEXICO

Drawn By: KEJ	Checked By: MS	Scale: 1" = 160'	Date: 10/28/21	File: 3-1_Sitewide_LIF_Results_Fig3-1_Dsize



EXPLANATION

- 05/2021 LIF BORING LOCATION
- 02/2021 LIF BORING LOCATION
- 11/2019 LIF BORING LOCATION
- HISTORICAL BORING
- MONITORING WELL

SPH OCCURRENCE
- DIESEL
- GASOLINE
- NAPHTHA
- RESIDUAL/NO RESPONSE

CROSS-SECTION LINE
- A
- B
- C
- D
- E

NOTES:

-LIF - LASER-INDUCED FLORESCENCE
-SPH - SEPARATE PHASE HYDROCARBON

N

0 160 320'

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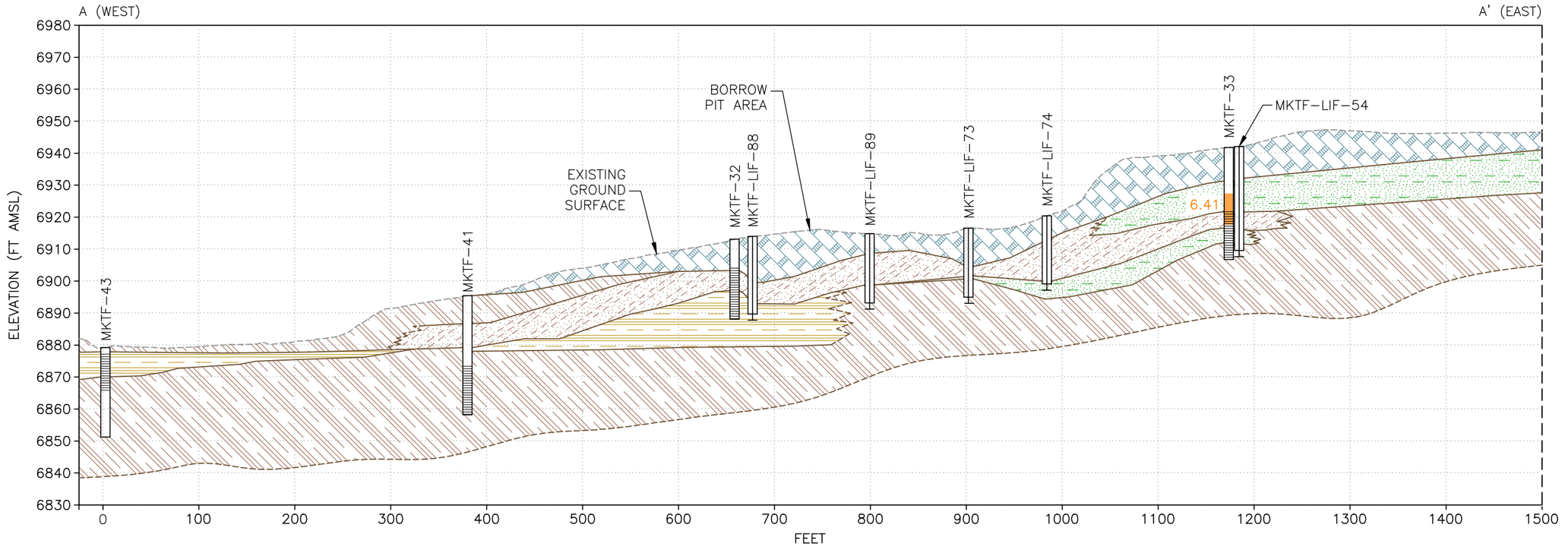
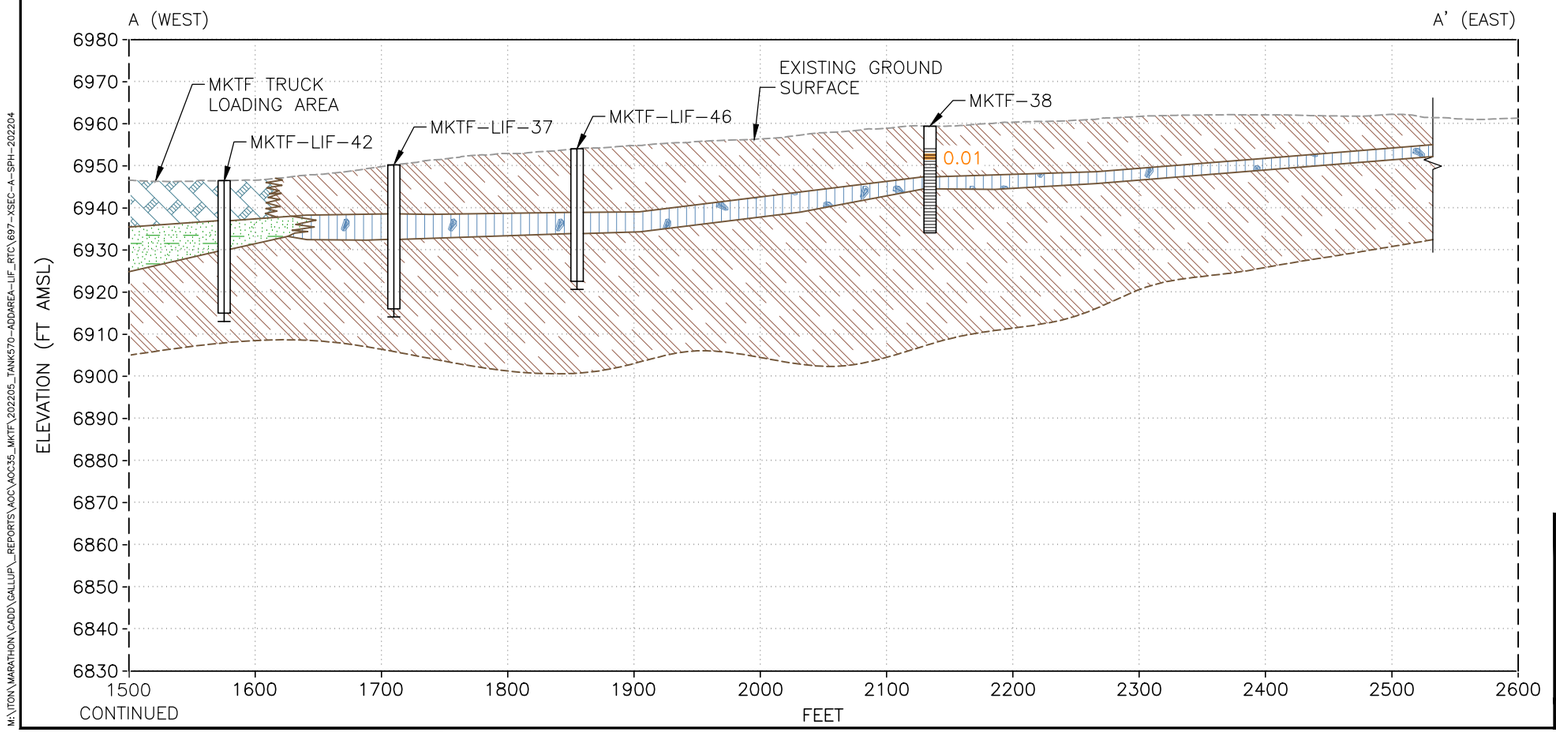
FIGURE 3-2

CROSS-SECTION LOCATION MAP

WESTERN REFINING SOUTHWEST LLC
MARATHON GALLUP REFINERY
GALLUP, NEW MEXICO

Drawn By: KEJ	Checked By: MS	Scale: 1 " = 160 '	Date: 10/28/21	File: 3-2_XSect_Fig3-2_Dsize.mxd





EXPLANATION

- MKTF-LIF-46 — DESIGNATION
- WELL OR BORING
- SCREENED INTERVAL
- GEOLOGIC CONTACT (DASHED WHERE INFERRED)
- 0.01 — HISTORICAL MAXIMUM SPH THICKNESS (SHOWN IN FEET, NOT TO SCALE)
- FT AMSL — FEET ABOVE MEAN SEA LEVEL
- SPH — SEPARATE PHASE HYDROCARBONS

- SILTY CLAY
- SANDY CLAY
- CLAYEY SAND
- SANDY GRAVEL
- CLAY
- CLAYEY SILT

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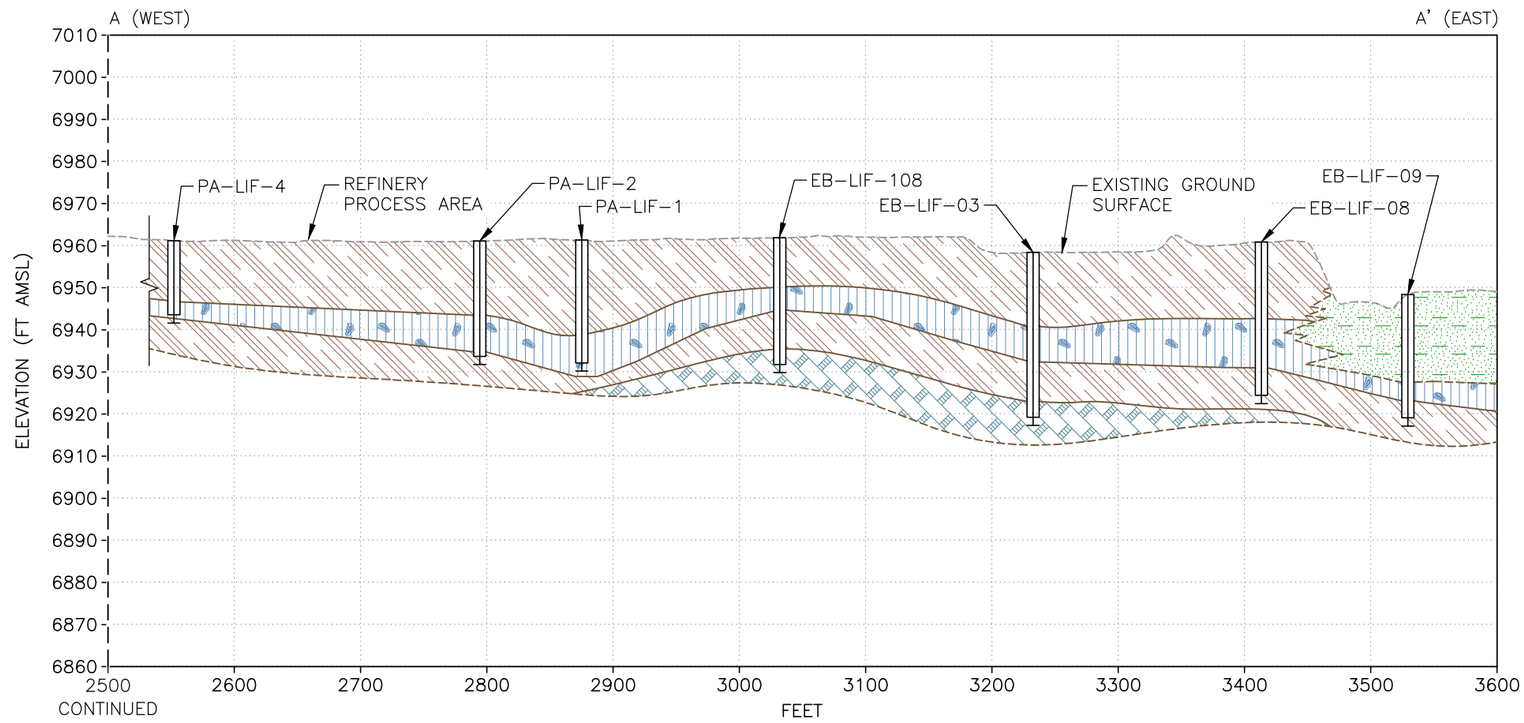
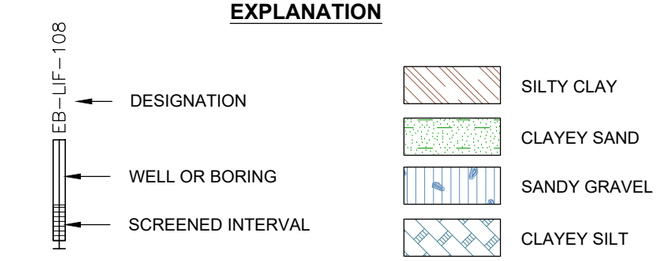
FIGURE 3-3A
CROSS SECTION A-A'
WITH MAXIMUM HISTORICAL THICKNESS OF SEPARATE PHASE HYDROCARBONS
WESTERN REFINING SOUTHWEST LLC
MARATHON GALLUP REFINERY
GALLUP, NEW MEXICO

Drawn By: REP	Checked By: WG	Scale: AS SHOWN	Date: 4/13/22	File: 697-XSEC-A-SPH-202204

M:\TON\MARATHON\CAD\GALLUP_REPORTS\AOC\AOC35_MKTF\202205_TANK570-ADDAREA-LIF_RTC\697-XSEC-A-SPH-202204



EXPLANATION



FT AMSL FEET ABOVE MEAN SEA LEVEL

0 120'
HORIZONTAL SCALE

0 36'
VERTICAL SCALE

M:\TON\MARATHON\CADD\GALLUP_REPORTS\AOC\AOC35_MKTF\202205_TANK570-ADDAREA-LIF_RTC\697-XSEC-A-SPH-202204

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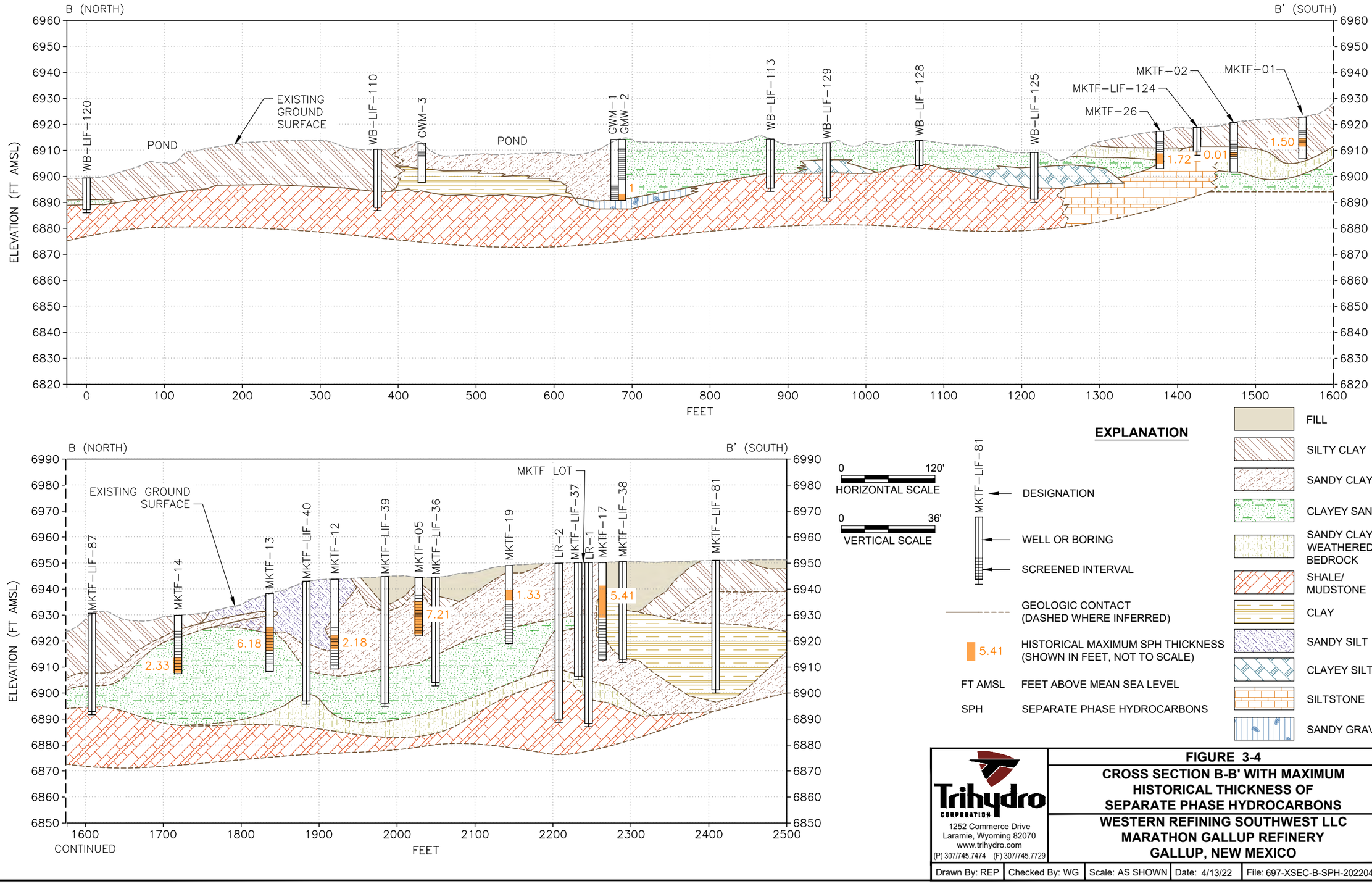
FIGURE 3-3B
CROSS SECTION A-A' (CONTINUED) WITH MAXIMUM HISTORICAL THICKNESS OF SEPARATE PHASE HYDROCARBONS
WESTERN REFINING SOUTHWEST LLC MARATHON GALLUP REFINERY GALLUP, NEW MEXICO

Drawn By: REP	Checked By: WG	Scale: AS SHOWN	Date: 4/13/22	File: 697-XSEC-A-SPH-202204



M:\TON\MARATHON\CADD\GALLUP_REPORTS\AOC\AOC35_MKTF\202205_TANK570-ADDAREA-LIF_RTC\697-XSEC-B-SPH-202204

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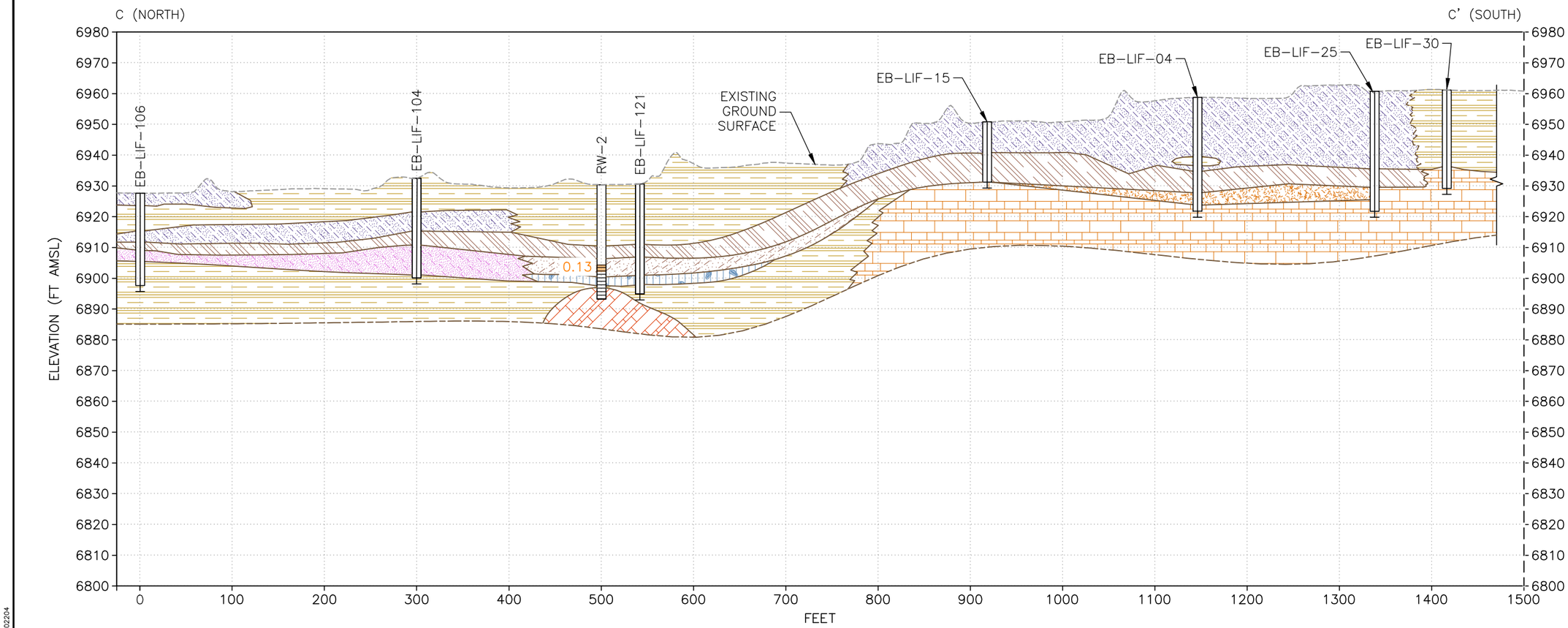
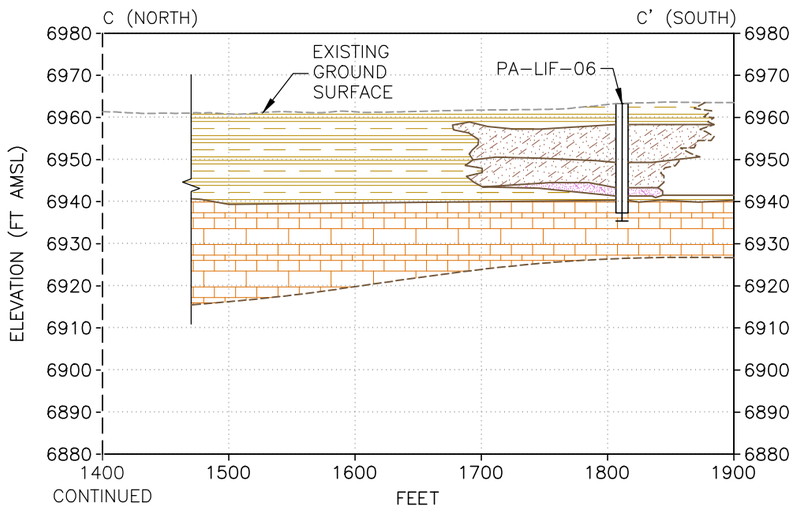
FIGURE 3-4
CROSS SECTION B-B' WITH MAXIMUM HISTORICAL THICKNESS OF SEPARATE PHASE HYDROCARBONS
WESTERN REFINING SOUTHWEST LLC
MARATHON GALLUP REFINERY
GALLUP, NEW MEXICO

Drawn By: REP	Checked By: WG	Scale: AS SHOWN	Date: 4/13/22	File: 697-XSEC-B-SPH-202204





GEOLOGIC CONTACT (DASHED WHERE INFERRED)

0.13 HISTORICAL MAXIMUM SPH THICKNESS (SHOWN IN FEET, NOT TO SCALE)

FT AMSL FEET ABOVE MEAN SEA LEVEL

SPH SEPARATE PHASE HYDROCARBONS

0 120'
HORIZONTAL SCALE

0 36'
VERTICAL SCALE

EXPLANATION

- SILTY CLAY
- SANDY CLAY
- SANDY GRAVEL
- SHALE/ MUDSTONE
- CLAY
- SANDY SILT
- SILTY SAND
- SILT
- SILTSTONE

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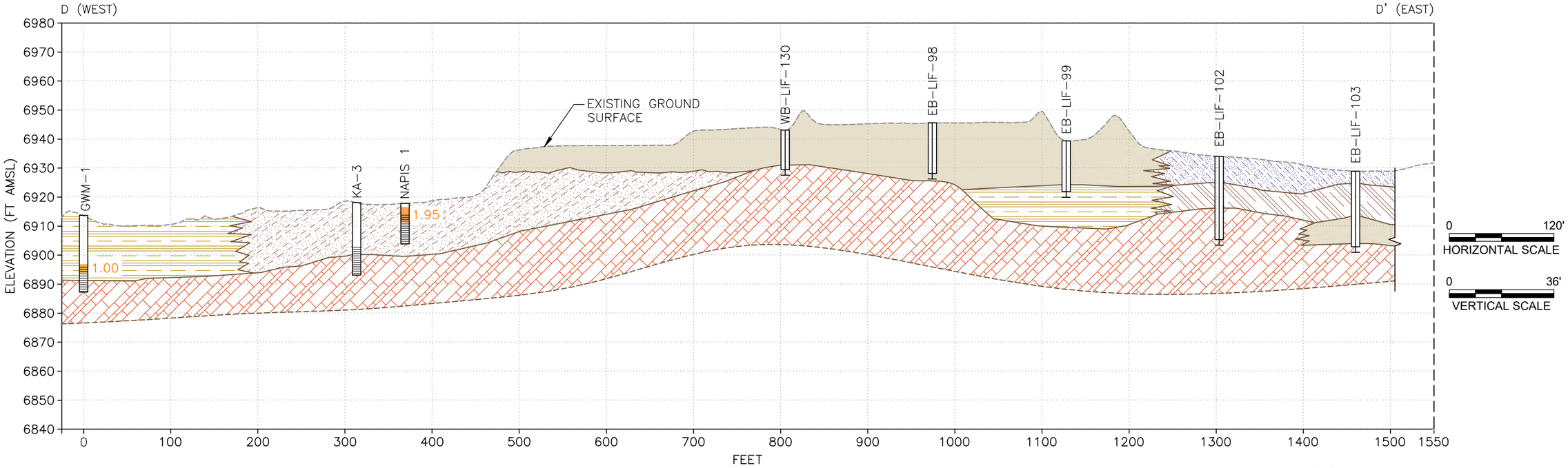
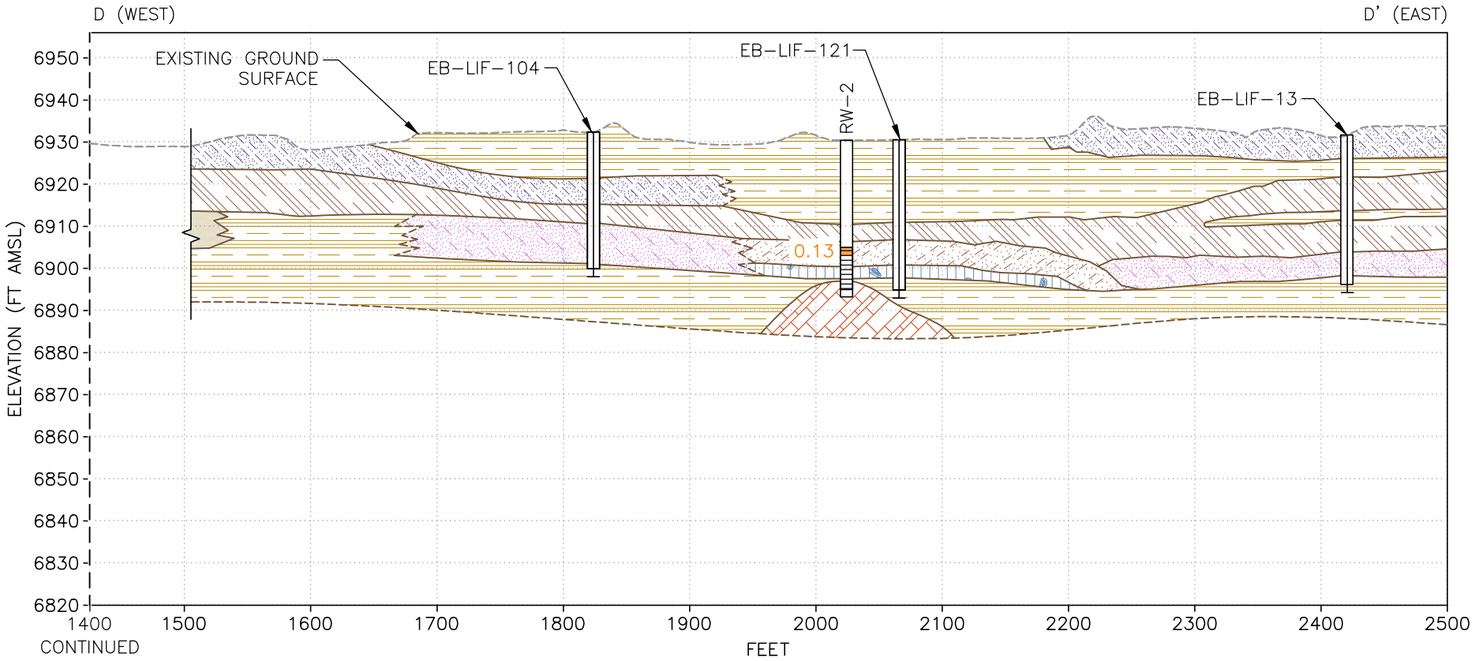
FIGURE 3-5
CROSS SECTION C-C' WITH MAXIMUM HISTORICAL THICKNESS OF SEPARATE PHASE HYDROCARBONS
WESTERN REFINING SOUTHWEST LLC
MARATHON GALLUP REFINERY
GALLUP, NEW MEXICO

Drawn By: REP	Checked By: WG	Scale: AS SHOWN	Date: 4/14/22	File: 697-XSEC-C-SPH-202204

M:\TION\MARATHON\CADD\GALLUP_REPORTS\AOC\AOC35_MKTF\202205_TANK570-ADDAREA-LIF_RTC\697-XSEC-C-SPH-202204





EXPLANATION

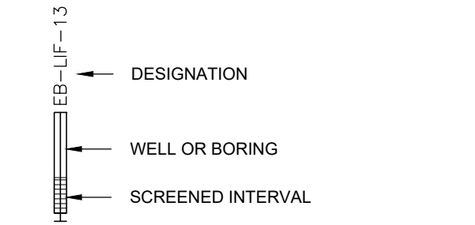


FIGURE 3-6

CROSS SECTION D-D' WITH MAXIMUM HISTORICAL THICKNESS OF SEPARATE PHASE HYDROCARBONS

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Drawn By: REP	Checked By: WG	Scale: AS SHOWN	Date: 4/13/22	File: 697-XSEC-D-SPH-202204

M:_ITON\MARATHON_GAS\D\GALLUP_REPORTS\AOC\AOC35_MKTP\202205_TANK570-ADDAREA-LIF_RTC\697-XSEC-D-SPH-202204

E (WEST)

E' (EAST)

WB-LIF-112

WB-LIF-136

EXISTING GROUND SURFACE

WB-LIF-128

MKTF-28

MKTF-50

0.01

EB-LIF-94

ELEVATION (FT AMSL)

FEET

E (WEST) CONTINUED

E' (EAST)

EB-LIF-28

EB-LIF-20

EB-LIF-16

EB-LIF-17

EB-LIF-15

EXISTING GROUND SURFACE

EB-LIF-12

ELEVATION (FT AMSL)

FEET

HORIZONTAL SCALE 0 120'

VERTICAL SCALE 0 36'

MKTF-LIF-81

EXPLANATION

- DESIGNATION
- WELL OR BORING
- SCREENED INTERVAL
- GEOLOGIC CONTACT (DASHED WHERE INFERRED)
- 0.01 HISTORICAL MAXIMUM SPH THICKNESS (SHOWN IN FEET, NOT TO SCALE)
- FT AMSL FEET ABOVE MEAN SEA LEVEL
- SPH SEPARATE PHASE HYDROCARBONS

- FILL
- SILTY CLAY
- CLAYEY SAND
- SANDY GRAVEL
- CLAY
- SANDY SILT
- SILTY SAND
- CLAYEY GRAVEL
- SILTSTONE

M:\TOM\MARATHON\CADD\GALLUP_REPORTS\AOC\AOC35_MKTF\202205_TANK570-ADDAREA-LIF_RTC\697-XSEC-E_SPH-202204

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FIGURE 3-7

CROSS SECTION E-E' WITH MAXIMUM HISTORICAL THICKNESS OF SEPARATE PHASE HYDROCARBONS

WESTERN REFINING SOUTHWEST LLC
MARATHON GALLUP REFINERY
GALLUP, NEW MEXICO

Drawn By: REP	Checked By: WG	Scale: AS SHOWN	Date: 4/13/22	File: 697-XSEC-E-SPH-202204

EXPLANATION

- 05/2021 LIF BORING LOCATION
- 02/2021 LIF BORING LOCATION
- 11/2019 LIF BORING LOCATION
- MONITORING WELL
- SOIL SAMPLE LOCATION
- SITE FEATURE

NOTES:

-LIF - LASER-INDUCED FLORESCENCE
-SPH - SEPARATE PHASE HYDROCARBON

N

0 160 320'

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FIGURE 3-8

SITEWIDE LIF SOIL SAMPLE LOCATIONS

WESTERN REFINING SOUTHWEST LLC
MARATHON GALLUP REFINERY
GALLUP, NEW MEXICO

Drawn By: KEJ	Checked By: MS	Scale: 1 " = 160 '	Date: 10/28/21	File: 3-8_SitewideSoilSamplesFig3-8_Dsize.mxd

Tables

TABLE 1-1. LIF BORING DESIGNATION AND INVESTIGATION DATE
WESTERN REFINING SOUTHWEST LLC, MARATHON GALLUP REFINERY, GALLUP, NEW MEXICO

Location Name	LIF Investigation Date	Reported in Marketing Tank Farm Report [1]	Reported in Tank 570 Release and Additional Areas Report [2]	Reported in Marketing Tank Farm Report Addendum [3]
EB-LIF-02	Nov-19	--	Y	--
EB-LIF-03	Nov-19	--	Y	--
EB-LIF-04	Nov-19	--	Y	--
EB-LIF-05	Nov-19	--	Y	--
EB-LIF-06	Nov-19	--	Y	--
EB-LIF-07	Nov-19	--	Y	--
EB-LIF-08	Nov-19	--	Y	--
EB-LIF-09	Nov-19	--	Y	--
EB-LIF-11	Nov-19	--	Y	--
EB-LIF-12	Nov-19	--	Y	--
EB-LIF-13	Nov-19	--	Y	--
EB-LIF-14	Nov-19	--	Y	--
EB-LIF-15	Nov-19	--	Y	--
EB-LIF-16	Nov-19	--	Y	--
EB-LIF-17	Nov-19	--	Y	--
EB-LIF-18	Nov-19	--	Y	--
EB-LIF-19	Nov-19	--	Y	--
EB-LIF-20	Nov-19	--	Y	--
EB-LIF-21	Nov-19	--	Y	--
EB-LIF-22	Nov-19	--	Y	--
EB-LIF-23	Nov-19	--	Y	--
EB-LIF-25	Nov-19	--	Y	--
EB-LIF-26	Nov-19	--	Y	--
EB-LIF-27	Nov-19	--	Y	--
EB-LIF-28	Nov-19	--	Y	--
EB-LIF-30	Nov-19	--	Y	--
EB-LIF-33	Nov-19	--	Y	--
EB-LIF-34	Nov-19	--	Y	--
EB-LIF-91	May-21	--	Y	--
EB-LIF-92	May-21	--	Y	--
EB-LIF-93	May-21	--	Y	--
EB-LIF-94	May-21	--	Y	--
EB-LIF-95	May-21	--	Y	--
EB-LIF-96	May-21	--	Y	--
EB-LIF-97	May-21	--	Y	--
EB-LIF-98	May-21	--	Y	--
EB-LIF-99	May-21	--	Y	--
EB-LIF-101	May-21	--	Y	--
EB-LIF-102	May-21	--	Y	--
EB-LIF-103	May-21	--	Y	--
EB-LIF-104	May-21	--	Y	--
EB-LIF-105	May-21	--	Y	--
EB-LIF-106	May-21	--	Y	--
EB-LIF-107	May-21	--	Y	--

TABLE 1-1. LIF BORING DESIGNATION AND INVESTIGATION DATE
WESTERN REFINING SOUTHWEST LLC, MARATHON GALLUP REFINERY, GALLUP, NEW MEXICO

Location Name	LIF Investigation Date	Reported in Marketing Tank Farm Report [1]	Reported in Tank 570 Release and Additional Areas Report [2]	Reported in Marketing Tank Farm Report Addendum [3]
EB-LIF-108	May-21	--	Y	--
EB-LIF-109	May-21	--	Y	--
EB-LIF-121	May-21	--	Y	--
EB-LIF-122	May-21	--	Y	--
EB-LIF-138	May-21	--	Y	--
MKTF-LIF-36	Nov-19	Y	--	--
MKTF-LIF-37	Nov-19	Y	--	--
MKTF-LIF-38	Nov-19	Y	--	--
MKTF-LIF-39	Nov-19	Y	--	--
MKTF-LIF-40	Nov-19	Y	--	--
MKTF-LIF-41	Nov-19	Y	--	--
MKTF-LIF-42	Nov-19	Y	--	--
MKTF-LIF-43	Nov-19	Y	--	--
MKTF-LIF-44	Nov-19	Y	--	--
MKTF-LIF-45	Nov-19	Y	--	--
MKTF-LIF-46	Nov-19	Y	--	--
MKTF-LIF-47	Nov-19	Y	--	--
MKTF-LIF-48	Nov-19	Y	--	--
MKTF-LIF-49	Nov-19	Y	--	--
MKTF-LIF-50	Nov-19	Y	--	--
MKTF-LIF-51	Nov-19	Y	--	--
MKTF-LIF-52	Nov-19	Y	--	--
MKTF-LIF-53	Nov-19	Y	--	--
MKTF-LIF-54	Feb-21	Y	--	--
MKTF-LIF-55	Feb-21	Y	--	--
MKTF-LIF-56	Feb-21	Y	--	--
MKTF-LIF-57	Feb-21	Y	--	--
MKTF-LIF-58	Feb-21	Y	--	--
MKTF-LIF-59	Feb-21	Y	--	--
MKTF-LIF-60	Feb-21	Y	--	--
MKTF-LIF-61	Feb-21	Y	--	--
MKTF-LIF-62	Feb-21	Y	--	--
MKTF-LIF-63	Feb-21	Y	--	--
MKTF-LIF-64	Feb-21	Y	--	--
MKTF-LIF-65	Feb-21	Y	--	--
MKTF-LIF-66	Feb-21	Y	--	--
MKTF-LIF-67	Feb-21	Y	--	--
MKTF-LIF-68	Feb-21	Y	--	--
MKTF-LIF-70	Feb-21	Y	--	--
MKTF-LIF-71	Feb-21	Y	--	--
MKTF-LIF-72	Feb-21	Y	--	--
MKTF-LIF-73	Feb-21	Y	--	--
MKTF-LIF-74	Feb-21	Y	--	--
MKTF-LIF-75	Feb-21	Y	--	--

TABLE 1-1. LIF BORING DESIGNATION AND INVESTIGATION DATE
WESTERN REFINING SOUTHWEST LLC, MARATHON GALLUP REFINERY, GALLUP, NEW MEXICO

Location Name	LIF Investigation Date	Reported in Marketing Tank Farm Report [1]	Reported in Tank 570 Release and Additional Areas Report [2]	Reported in Marketing Tank Farm Report Addendum [3]
MKTF-LIF-76	Feb-21	Y	--	--
MKTF-LIF-77	Feb-21	Y	--	--
MKTF-LIF-78	Feb-21	Y	--	--
MKTF-LIF-79	Feb-21	Y	--	--
MKTF-LIF-79A	Feb-21	Y	--	--
MKTF-LIF-80	Feb-21	Y	--	--
MKTF-LIF-81	Feb-21	Y	--	--
MKTF-LIF-82	Feb-21	Y	--	--
MKTF-LIF-83	Feb-21	Y	--	--
MKTF-LIF-84	Feb-21	Y	--	--
MKTF-LIF-85	Feb-21	Y	--	--
MKTF-LIF-86	Feb-21	Y	--	--
MKTF-LIF-87	Feb-21	Y	--	--
MKTF-LIF-88	Feb-21	Y	--	--
MKTF-LIF-89	Feb-21	Y	--	--
MKTF-LIF-90	Feb-21	Y	--	--
MKTF-LIF-124	May-21	--	--	Y
MKTF-LIF-126	May-21	--	--	Y
MKTF-LIF-131	May-21	--	--	Y
MKTF-LIF-132	May-21	--	--	Y
MKTF-LIF-133	May-21	--	--	Y
MKTF-LIF-134	May-21	--	--	Y
MKTF-LIF-135	May-21	--	--	Y
PA-LIF-1	Feb-21	--	Y	--
PA-LIF-2	Feb-21	--	Y	--
PA-LIF-3	Feb-21	--	Y	--
PA-LIF-4	Feb-21	--	Y	--
PA-LIF-5	Feb-21	--	Y	--
PA-LIF-6	Feb-21	--	Y	--
PA-LIF-7	Feb-21	--	Y	--
PA-LIF-8	Feb-21	--	Y	--
WB-LIF-100	May-21	--	Y	--
WB-LIF-110	May-21	--	Y	--
WB-LIF-111	May-21	--	Y	--
WB-LIF-112	May-21	--	Y	--
WB-LIF-113	May-21	--	Y	--
WB-LIF-114	May-21	--	Y	--
WB-LIF-115	May-21	--	Y	--
WB-LIF-116	May-21	--	Y	--
WB-LIF-117	May-21	--	Y	--
WB-LIF-118	May-21	--	Y	--
WB-LIF-119	May-21	--	Y	--
WB-LIF-120	May-21	--	Y	--
WB-LIF-123	May-21	--	Y	--

TABLE 1-1. LIF BORING DESIGNATION AND INVESTIGATION DATE
WESTERN REFINING SOUTHWEST LLC, MARATHON GALLUP REFINERY, GALLUP, NEW MEXICO

Location Name	LIF Investigation Date	Reported in Marketing Tank Farm Report [1]	Reported in Tank 570 Release and Additional Areas Report [2]	Reported in Marketing Tank Farm Report Addendum [3]
WB-LIF-125	May-21	--	Y	--
WB-LIF-127	May-21	--	Y	--
WB-LIF-128	May-21	--	Y	--
WB-LIF-129	May-21	--	Y	--
WB-LIF-130	May-21	--	Y	--
WB-LIF-136	May-21	--	Y	--
WB-LIF-137	May-21	--	Y	--

Notes:

-- - Not applicable

LIF/HP - Laser-Induced Fluorescence/Hydraulic Profiling

Y - Yes

[1] Marketing Tank Farm LIF/HP Investigation Report. March 31, 2021.

[2] Tank 570 Release and Additional Areas LIF/HP Investigation Report. October 31, 2021.

[3] These data will be included in an Addendum to the Marketing Tank Farm LIF/HP Investigation Report, which will be submitted by November 19, 2021

TABLE 3-1. LIF BORING DEPTH, DEPTH TO WATER, AND MAXIMUM % RE
WESTERN REFINING SOUTHWEST LLC, MARATHON GALLUP REFINERY, GALLUP, NEW MEXICO

LIF Boring ID	Date	Total Depth	Estimated Depth to Water (ft bgs)	Maximum % RE	% RE Depth Interval (ft bgs)
EB-LIF-02	11/18/2019	46.35	30	255.2	34.59
EB-LIF-03	11/20/2019	39.13	30	179.2	29.6
EB-LIF-04	11/18/2019	37.89	34	711.7	33.37
EB-LIF-05	11/20/2019	32.25	30	194.4	25.97
EB-LIF-06	11/20/2019	17.75	16	172	14.64
EB-LIF-07	11/21/2019	37.66	17	231.2	34.05
EB-LIF-08	11/20/2019	36.43	36	3.4	34.26
EB-LIF-09	11/22/2019	29.33	12	19.1	26.02
EB-LIF-11	11/21/2019	30.88	22	19.3	27.04
EB-LIF-12	11/21/2019	33.46	24	401	26.87
EB-LIF-13	11/21/2019	35.47	24	263.7	34.21
EB-LIF-14	11/22/2019	39.76	28	28.7	0.88
EB-LIF-15	11/20/2019	**19.58**	36	0.4	0.82
EB-LIF-16	11/20/2019	**27.61**	31	54.5	27.48
EB-LIF-17	11/20/2019	**21.01**	36	1.1	0
EB-LIF-18	11/25/2019	37.34	17	272.3	21.4
EB-LIF-19	11/25/2019	45.21	17	67	17.48
EB-LIF-20	11/23/2019	36.74	29	185.7	26.62
EB-LIF-21	11/23/2019	41.35	29	217.3	38.91
EB-LIF-22	11/22/2019	33.78	23	63.7	14.19
EB-LIF-23	11/20/2019	30.83	29	17.9	26.28
EB-LIF-25	11/21/2019	39.13	31	4.5	6.52
EB-LIF-26	11/21/2019	38.08	27	435.9	34.12
EB-LIF-27	11/22/2019	28.65	20	272.2	14.46
EB-LIF-28	11/23/2019	42.12	28	304	29.44
EB-LIF-30	11/25/2019	32.30	28	4.3	2.3
EB-LIF-33	11/21/2019	37.23	20	156.1	22.79
EB-LIF-34	11/21/2019	31.02	17	43.4	20.32
EB-LIF-91	5/13/2021	**16.31**	17	23.3	13.51
EB-LIF-92	5/13/2021	22.33	19	57.7	12.97
EB-LIF-93	5/13/2021	19.07	14	34.5	1.23
EB-LIF-94	5/14/2021	17.43	15	9.9	14.1
EB-LIF-95	5/14/2021	**30.05**	31	1.7	7.51
EB-LIF-96	5/14/2021	30.03	27	47.8	22.91
EB-LIF-97	5/14/2021	**23.55**	30	50.4	11.97
EB-LIF-98	5/11/2021	**17.53**	29	150.5	14.84
EB-LIF-99	5/14/2021	28.49	26	353.3	20.84
EB-LIF-101	5/11/2021	**30.12**	30	77.5	28.17
EB-LIF-102	5/10/2021	28.65	22	5.8	5.44
EB-LIF-103	5/10/2021	26.03	17	174.3	19
EB-LIF-104	5/14/2021	32.42	22	191.2	27.89
EB-LIF-105	5/11/2021	30.14	17	51.9	22.4
EB-LIF-106	5/11/2021	30.14	20	10.7	18.15
EB-LIF-107	5/11/2021	29.29	23	28.1	19.69

TABLE 3-1. LIF BORING DEPTH, DEPTH TO WATER, AND MAXIMUM % RE
WESTERN REFINING SOUTHWEST LLC, MARATHON GALLUP REFINERY, GALLUP, NEW MEXICO

LIF Boring ID	Date	Total Depth	Estimated Depth to Water (ft bgs)	Maximum % RE	% RE Depth Interval (ft bgs)
EB-LIF-108	5/13/2021	30.08	25	370	10.56
EB-LIF-109	5/13/2021	21.29	15	703.6	11.91
EB-LIF-121	5/14/2021	35.72	22	55.8	17.62
EB-LIF-122	5/13/2021	**18.25**	33	2.7	6.25
EB-LIF-138	5/10/2021	**20.43**	35	7.5	0.19
MKTF-LIF-36	11/19/2019	27.04	16	419.5	19.24
MKTF-LIF-37	11/19/2019	29.24	19	338.7	26.08
MKTF-LIF-38	11/19/2019	25.07	19	365.1	5.77
MKTF-LIF-39	11/19/2019	32.46	21	179.8	14.67
MKTF-LIF-40	11/19/2019	30.72	21	362.5	19.22
MKTF-LIF-41	11/20/2019	33.82	19	54.9	20.8
MKTF-LIF-42	11/19/2019	31.51	21	366.7	16.5
MKTF-LIF-43	11/19/2019	28.72	22	287	14.61
MKTF-LIF-44	11/24/2019	26.74	19	315	9.11
MKTF-LIF-45	11/24/2019	33.41	14	329.2	8.92
MKTF-LIF-46	11/24/2019	34.66	14	409.2	23.54
MKTF-LIF-47	11/22/2019	31.20	14	515.2	6.05
MKTF-LIF-48	11/22/2019	34.94	16	32.6	20.3
MKTF-LIF-49	11/22/2019	27.54	16	11	11.39
MKTF-LIF-50	11/22/2019	27.39	14	463.2	15.88
MKTF-LIF-51	11/22/2019	31.50	15	60.2	13.6
MKTF-LIF-52	11/22/2019	19.64	13	52.8	11.06
MKTF-LIF-53	11/24/2019	20.65	16	70.6	7.87
MKTF-LIF-54	2/3/2021	32.48	30	34.4	24.58
MKTF-LIF-55	2/2/2021	32.84	29	4.5	25.28
MKTF-LIF-56	2/2/2021	21.67	21	164.5	14.33
MKTF-LIF-57	2/2/2021	29.42	13	510.7	8.23
MKTF-LIF-58	2/3/2021	**4.97**	31	2.9	1.98
MKTF-LIF-59	2/3/2021	**33.07**	35	48.1	27.99
MKTF-LIF-60	2/2/2021	**4.78**	31	3.6	4.55
MKTF-LIF-61	2/2/2021	43.33	32	105.2	23.73
MKTF-LIF-62	2/3/2021	34.76	32	361.3	26.32
MKTF-LIF-63	2/3/2021	**7.14**	31	3.1	1.81
MKTF-LIF-64	2/3/2021	33.28	33	3.1	2.9
MKTF-LIF-65	2/3/2021	37.15	34	2.2	6.23
MKTF-LIF-66	2/1/2021	18.58	14	708.9	8.57
MKTF-LIF-67	2/3/2021	33.16	29	56.4	19.91
MKTF-LIF-68	2/2/2021	29.54	20	1.6	0.51
MKTF-LIF-70	2/3/2021	**9.39**	39	3.8	3.36
MKTF-LIF-71	2/4/2021	25.29	16	0.5	25.24
MKTF-LIF-72	2/4/2021	25.72	15	305.1	5.78
MKTF-LIF-73	2/4/2021	21.59	15	0.6	0.3
MKTF-LIF-74	2/4/2021	21.33	15	537.6	2.86
MKTF-LIF-75	2/4/2021	21.41	16	1.8	0.66

TABLE 3-1. LIF BORING DEPTH, DEPTH TO WATER, AND MAXIMUM % RE
WESTERN REFINING SOUTHWEST LLC, MARATHON GALLUP REFINERY, GALLUP, NEW MEXICO

LIF Boring ID	Date	Total Depth	Estimated Depth to Water (ft bgs)	Maximum % RE	% RE Depth Interval (ft bgs)
MKTF-LIF-76	2/4/2021	**21.23**	22	0.5	0.05
MKTF-LIF-77	2/4/2021	**25.55**	30	320.9	18.03
MKTF-LIF-78	2/4/2021	**29.29**	32	2	3.74
MKTF-LIF-79	2/3/2021	**6.71**	37	9.5	5.06
MKTF-LIF-79A	2/4/2021	**24.99**	33	75	19.73
MKTF-LIF-80	2/4/2021	28.10	25	4.6	7.39
MKTF-LIF-81	2/2/2021	33.21	18	20	12.31
MKTF-LIF-82	2/4/2021	15.07	12	10.1	4.84
MKTF-LIF-83	2/1/2021	**19.29**	12.4*	238.7	10.77
MKTF-LIF-84	2/1/2021	**16.78**	14.2*	524	16.06
MKTF-LIF-85	2/5/2021	16.30	11	608.7	11
MKTF-LIF-86	2/5/2021	17.76	12	319.3	9.52
MKTF-LIF-87	2/1/2021	25.17	13	394.3	11.64
MKTF-LIF-88	2/4/2021	24.29	17	6	1.76
MKTF-LIF-89	2/4/2021	21.61	15	0.7	1.62
MKTF-LIF-90	2/5/2021	**25.23**	31	83.2	16.86
MKTF-LIF-124	5/12/2021	**9.54**	11	2.3	1.43
MKTF-LIF-126	5/12/2021	14.09	5	41.6	5.53
MKTF-LIF-131	5/13/2021	30.10	22	37.2	17.18
MKTF-LIF-132	5/13/2021	**30.07**	37	23	19.5
MKTF-LIF-133	5/13/2021	**30.05**	33	7	17.72
MKTF-LIF-134	5/13/2021	**30.10**	32	2.2	3.8
MKTF-LIF-135	5/14/2021	**7.68**	20	1.9	0.89
PA-LIF-01	2/5/2021	29.19	17	464.7	13.15
PA-LIF-02	2/1/2021	**27.39**	13.0*	77.7	16.57
PA-LIF-03	2/1/2021	16.96	13	4.3	2.55
PA-LIF-04	2/1/2021	17.60	14	196.1	10.48
PA-LIF-05	2/1/2021	15.94	12	3.5	12.27
PA-LIF-06	2/1/2021	**26.12**	12.1*	562.8	17.68
PA-LIF-07	2/5/2021	16.40	12	213.7	11.68
PA-LIF-08	2/5/2021	**15.17**	24	500	12.62
WB-LIF-100	5/11/2021	31.28	21	14.6	20.55
WB-LIF-110	5/11/2021	22.36	19	2.9	10.97
WB-LIF-111	5/10/2021	**10.92**	12	1.7	2.18
WB-LIF-112	5/12/2021	17.56	11	58.3	3.04
WB-LIF-113	5/12/2021	**18.92**	22	3.9	0.59
WB-LIF-114	5/12/2021	18.93	15	78.7	11.77
WB-LIF-115	5/12/2021	15.49	6	2.9	1.8
WB-LIF-116	5/11/2021	**14.70**	20	15.4	7.38
WB-LIF-117	5/12/2021	19.33	14	1.3	4.57
WB-LIF-118	5/11/2021	20.60	12	3.7	6.48
WB-LIF-119	5/11/2021	22.56	11	350.5	5.16
WB-LIF-120	5/10/2021	12.13	11	1	3.43
WB-LIF-123	5/12/2021	16.05	12	3.1	0.13

TABLE 3-1. LIF BORING DEPTH, DEPTH TO WATER, AND MAXIMUM % RE
WESTERN REFINING SOUTHWEST LLC, MARATHON GALLUP REFINERY, GALLUP, NEW MEXICO

LIF Boring ID	Date	Total Depth	Estimated Depth to Water (ft bgs)	Maximum % RE	% RE Depth Interval (ft bgs)
WB-LIF-125	5/12/2021	17.98	4	14.7	1.55
WB-LIF-127	5/12/2021	18.04	4	1.4	1.13
WB-LIF-128	5/12/2021	9.72	9	329.6	6.8
WB-LIF-129	5/12/2021	21.12	15	2.5	0.04
WB-LIF-130	5/12/2021	14.05	7	2	6.05
WB-LIF-136	5/12/2021	13.79	11	144.5	5.77
WB-LIF-137	5/10/2021	14.13	12	2	2.17

% RE = Percent reference emitter
ft bgs = Feet below ground surface
ID = Identification
LIF = Laser induced fluorescence
NA = Not available
* = Depth to groundwater from dissipation test results
Bold indicates total boring depth (ft bgs) is less than estimated groundwater depth (ft bgs)
Unless otherwise specified, depth to groundwater is interpolated from 3rd quarter 2020 sitewide groundwater data.

TABLE 3-2. DEPTH OF IMPACTED INTERVAL AND % RE MEASURED WITHIN IMPACTED ZONE
WESTERN REFINING SOUTHWEST LLC, MARATHON GALLUP REFINERY, GALLUP, NEW MEXICO

LIF Boring ID	Zones of Interest					
	Surface		Vadose		Aquifer	
	Depth Interval of Impacted Zone (ft bgs)	% RE Range within Impacted Zone	Depth Interval of Impacted Zone (ft bgs)	% RE Range within Impacted Zone	Depth Interval of Impacted Zone (ft bgs)	% RE Range within Impacted Zone
EB-LIF-02	Potholed	UA	10-30	0-85	30-36	0-255.2
EB-LIF-03	Potholed	UA	26-30	0-179.2	30-39	0-20
EB-LIF-04	Potholed	UA	32-34	30-711.7	34-35	0-650
EB-LIF-05	Potholed	UA	24-29	0-194.4	NA	NA
EB-LIF-06	Potholed	UA	14-15	0-172	NA	NA
EB-LIF-07	Potholed	UA	NA	NA	25-36	0-231.2
EB-LIF-08	Potholed	UA	NA	NA	NA	NA
EB-LIF-09	Potholed	UA	NA	NA	26-27	1-19.1
EB-LIF-11	Potholed	UA	NA	NA	22-30.88	0-19.3
EB-LIF-12	Potholed	UA	18-24	0-100	24-33	0-401
EB-LIF-13	Potholed	UA	NA	NA	25-35	0-263.7
EB-LIF-14	Potholed	UA	NA	NA	NA	NA
EB-LIF-15	Potholed	UA	NA	NA	UA	UA
EB-LIF-16	Potholed	UA	27-28	0-54.5	UA	UA
EB-LIF-17	Potholed	UA	NA	NA	UA	UA
EB-LIF-18	Potholed	UA	NA	NA	19-27	0-272.3
EB-LIF-19	Potholed	UA	NA	NA	17-22	1-67
EB-LIF-20	Potholed	UA	19-27	0-185.7	29-32	0-30
EB-LIF-21	Potholed	UA	23-29	0-115	39-40	0-217.3
EB-LIF-22	Potholed	UA	13-22	0-63.7	24-30	0-42
EB-LIF-23	Potholed	UA	25-28	0-17.9	NA	NA
EB-LIF-25	Potholed	UA	NA	NA	NA	NA
EB-LIF-26	Potholed	UA	6-27	5-200	27-38.08	0-435.9
EB-LIF-27	Potholed	UA	12-19	0-272.2	NA	NA
EB-LIF-28	Potholed	UA	19-28	0-280	28-33	5-304
EB-LIF-30	Potholed	UA	NA	NA	NA	NA
EB-LIF-33	Potholed	UA	15-20	0-50	20-24	0-156.1
EB-LIF-34	Potholed	UA	NA	NA	19-25	0-43.4
EB-LIF-91	NA	NA	13-14	1-23.3	UA	UA
EB-LIF-92	NA	NA	4-14	1-57.7	NA	NA
EB-LIF-93	NA	NA	1-13	1-34.5	NA	NA
EB-LIF-94	NA	NA	NA	NA	NA	NA
EB-LIF-95	NA	NA	NA	NA	UA	UA
EB-LIF-96	NA	NA	22-26	4-47.8	NA	NA
EB-LIF-97	NA	NA	11-13	1-50.4	UA	UA
EB-LIF-98	NA	NA	13-17	0-150.5	UA	UA
EB-LIF-99	NA	NA	19-26	0-353.3	26-27	5-40
EB-LIF-101	NA	NA	21-29	0-77.5	UA	UA
EB-LIF-102	NA	NA	NA	NA	NA	NA
EB-LIF-103	NA	NA	NA	NA	18-22	1-174.3
EB-LIF-104	NA	NA	20-21	0-20	26-30	0-191.2
EB-LIF-105	NA	NA	15-16	1-10	17-25	1-51.9
EB-LIF-106	NA	NA	18-19	1-10.7	NA	NA
EB-LIF-107	NA	NA	19-20	1-28.1	NA	NA
EB-LIF-108	NA	NA	6-25	0-370	25-30.08	5-25
EB-LIF-109	NA	NA	6-15	0-703.6	15-18	1-610
EB-LIF-121	NA	NA	17-21	1-55.8	23-31	2-30
EB-LIF-122	NA	NA	NA	NA	UA	UA
EB-LIF-138	NA	NA	NA	NA	UA	UA
MKTF-LIF-36	Potholed	UA	5-16	0-400	16-23	5-419.5
MKTF-LIF-37	Potholed	UA	5-17	35-320	21-29	0-338.7
MKTF-LIF-38	Potholed	UA	5-11	0-365.1	UA	UA

TABLE 3-2. DEPTH OF IMPACTED INTERVAL AND % RE MEASURED WITHIN IMPACTED ZONE
WESTERN REFINING SOUTHWEST LLC, MARATHON GALLUP REFINERY, GALLUP, NEW MEXICO

LIF Boring ID	Zones of Interest					
	Surface		Vadose		Aquifer	
	Depth Interval of Impacted Zone (ft bgs)	% RE Range within Impacted Zone	Depth Interval of Impacted Zone (ft bgs)	% RE Range within Impacted Zone	Depth Interval of Impacted Zone (ft bgs)	% RE Range within Impacted Zone
MKTF-LIF-39	Potholed	UA	14-16	0-179.8	NA	NA
MKTF-LIF-40	Potholed	UA	16-21	10-362.5	21-23	0-345
MKTF-LIF-41	Potholed	UA	9-14	0-17	20-24	0-54.9
MKTF-LIF-42	Potholed	UA	11-21	0-366.7	21-28	0-350
MKTF-LIF-43	Potholed	UA	10-18	0-287	UA	UA
MKTF-LIF-44	Potholed	UA	7-19	0-315	19-26	0-30
MKTF-LIF-45	Potholed	UA	5-14	5-329.2	14-33	0-180
MKTF-LIF-46	Potholed	UA	5-14	5-370	14-34.66	5-409.2
MKTF-LIF-47	Potholed	UA	5-14	0-515.2	14-31	0-300
MKTF-LIF-48	Potholed	UA	15-16	1-11	16-21	1-32.6
MKTF-LIF-49	Potholed	UA	11-12	0-11	NA	NA
MKTF-LIF-50	Potholed	UA	8-14	0-425	14-21	0-463.2
MKTF-LIF-51	Potholed	UA	11-15	0-60.2	NA	NA
MKTF-LIF-52	Potholed	UA	7-12	0-52.8	NA	NA
MKTF-LIF-53	Potholed	UA	7-9	0-70.6	NA	NA
MKTF-LIF-54	Potholed	UA	24-25	0-34.4	NA	NA
MKTF-LIF-55	Potholed	UA	NA	NA	NA	NA
MKTF-LIF-56	Potholed	UA	13-15	0-164.5	NA	NA
MKTF-LIF-57	Potholed	UA	6-12	0-510.7	12-16	0-10
MKTF-LIF-58	Potholed	UA	UA	UA	UA	UA
MKTF-LIF-59	Potholed	UA	28-30	0-48.1	UA	UA
MKTF-LIF-60	Potholed	UA	UA	UA	UA	UA
MKTF-LIF-61	Potholed	UA	21-31	0-105.2	NA	NA
MKTF-LIF-62	Potholed	UA	23-27	5-361.3	NA	NA
MKTF-LIF-63	Potholed	UA	NA	NA	UA	UA
MKTF-LIF-64	Potholed	UA	NA	NA	NA	NA
MKTF-LIF-65	Potholed	UA	NA	NA	NA	NA
MKTF-LIF-66	Potholed	UA	7-13	0-708.9	NA	NA
MKTF-LIF-67	Potholed	UA	17-21	0-56.4	NA	NA
MKTF-LIF-68	Potholed	UA	NA	NA	NA	NA
MKTF-LIF-70	Potholed	UA	NA	NA	UA	UA
MKTF-LIF-71	Potholed	UA	NA	NA	NA	NA
MKTF-LIF-72	Potholed	UA	5-7	5-305.1	NA	NA
MKTF-LIF-73	Potholed	UA	NA	NA	NA	NA
MKTF-LIF-74	Potholed	UA	5-6	0-95	NA	NA
MKTF-LIF-75	Potholed	UA	NA	NA	NA	NA
MKTF-LIF-76	Potholed	UA	NA	NA	UA	UA
MKTF-LIF-77	Potholed	UA	17-19	0-320.9	UA	UA
MKTF-LIF-78	Potholed	UA	NA	NA	UA	UA
MKTF-LIF-79	Potholed	UA	NA	NA	NA	NA
MKTF-LIF-79A	Potholed	UA	19-21	0-75	UA	UA
MKTF-LIF-80	Potholed	UA	NA	NA	NA	NA
MKTF-LIF-81	Potholed	UA	12-13	0-20	NA	NA
MKTF-LIF-82	Potholed	UA	NA	NA	NA	NA
MKTF-LIF-83	Potholed	UA	11-12.4	10-238.7	12.4-16	0-210
MKTF-LIF-84	Potholed	UA	NA	NA	14.2-16.78	0-524
MKTF-LIF-85	Potholed	UA	7-11	0-608.7	11-13	0-608.7
MKTF-LIF-86	Potholed	UA	8-12	10-319.3	13-14	0-70
MKTF-LIF-87	Potholed	UA	8-13	0-394.3	13-16	0-385
MKTF-LIF-88	Potholed	UA	NA	NA	NA	NA
MKTF-LIF-89	Potholed	UA	NA	NA	NA	NA
MKTF-LIF-90	Potholed	UA	16-18	0-83.2	UA	UA

TABLE 3-2. DEPTH OF IMPACTED INTERVAL AND % RE MEASURED WITHIN IMPACTED ZONE
WESTERN REFINING SOUTHWEST LLC, MARATHON GALLUP REFINERY, GALLUP, NEW MEXICO

LIF Boring ID	Zones of Interest					
	Surface		Vadose		Aquifer	
	Depth Interval of Impacted Zone (ft bgs)	% RE Range within Impacted Zone	Depth Interval of Impacted Zone (ft bgs)	% RE Range within Impacted Zone	Depth Interval of Impacted Zone (ft bgs)	% RE Range within Impacted Zone
MKTF-LIF-124	NA	NA	NA	NA	UA	UA
MKTF-LIF-126	NA	NA	4-5	1-12	5-6	3-41.6
MKTF-LIF-131	NA	NA	17-18	1-37.2	NA	NA
MKTF-LIF-132	NA	NA	19-20	1-23	UA	UA
MKTF-LIF-133	NA	NA	NA	NA	UA	UA
MKTF-LIF-134	NA	NA	NA	NA	UA	UA
MKTF-LIF-135	NA	NA	NA	NA	UA	UA
PA-LIF-01	Potholed	UA	12-17	0-464.7	NA	NA
PA-LIF-02	Potholed	UA	NA	NA	16-24	0-77.7
PA-LIF-03	Potholed	UA	NA	NA	NA	NA
PA-LIF-04	Potholed	UA	9-13	0-196.1	NA	NA
PA-LIF-05	Potholed	UA	NA	NA	NA	NA
PA-LIF-06	Potholed	UA	NA	NA	14-24	0-562.8
PA-LIF-07	Potholed	UA	11-12	0-213.7	12-13	5-213
PA-LIF-08	Potholed	UA	10-15.17	5-500	UA	UA
WB-LIF-100	NA	NA	20-21	1-14.6	NA	NA
WB-LIF-110	NA	NA	NA	NA	NA	NA
WB-LIF-111	NA	NA	NA	NA	UA	UA
WB-LIF-112	NA	NA	2-5	6-58.3	NA	NA
WB-LIF-113	NA	NA	NA	NA	UA	UA
WB-LIF-114	NA	NA	11-15	1-78.7	15-16	7-13
WB-LIF-115	NA	NA	NA	NA	NA	NA
WB-LIF-116	NA	NA	7-8	1-15.4	UA	UA
WB-LIF-117	NA	NA	NA	NA	NA	NA
WB-LIF-118	NA	NA	NA	NA	NA	NA
WB-LIF-119	NA	NA	4-6	1-350.5	NA	NA
WB-LIF-120	NA	NA	NA	NA	NA	NA
WB-LIF-123	NA	NA	NA	NA	NA	NA
WB-LIF-125	NA	NA	1-2	1-14.7	NA	NA
WB-LIF-127	NA	NA	NA	NA	NA	NA
WB-LIF-128	NA	NA	5-9	1-329.6	NA	NA
WB-LIF-129	NA	NA	NA	NA	NA	NA
WB-LIF-130	NA	NA	NA	NA	NA	NA
WB-LIF-136	NA	NA	2-11	2-144.5	NA	NA
WB-LIF-137	NA	NA	NA	NA	NA	NA

%RE = Percent reference emitter
ft bgs = Feet below ground surface
ID = Identification
LIF = Laser induced fluorescence
NA = Not applicable
UA = Unavailable
Locations where pothole clearance occurred from 0-5 feet were not analyzed for impacts in the potholed interval.

TABLE 3-3. GRAIN SIZE ANALYSIS
WESTERN REFINING SOUTHWEST LLC, MARATHON GALLUP REFINERY, GALLUP NEW MEXICO

Sample ID	Date Sampled	Sample Depth (ft)	DRO (mg/kg)	GRO (mg/kg)	MRO (mg/kg)
EB-LIF-19	11/25/2019	16 - 18	2100	**18000**	ND(580)
EB-LIF-20	11/25/2019	27 - 28	200	**670**	ND(56)
EB-LIF-28	11/25/2019	20 - 21	240	**1800**	ND(550)
EB-LIF-28	11/25/2019	21 - 23	781	**2100**	ND(500)
EB-LIF-34	11/25/2019	20 - 21	1300	210	ND(540)
PA-LIF-07	2/5/2021	11 - 13	130	300	ND(50)
PA-LIF-07	2/5/2021	13 - 14	11	82	ND(53)
EB-LIF-99	5/14/2021	19 - 20	ND(9.8)	7.6	ND(49)
EB-LIF-99	5/14/2021	21 - 22	**3200**	**2100**	ND(240)
EB-LIF-108	5/14/2021	10 - 11	2500	110	ND(480)
EB-LIF-109	5/14/2021	11.5 - 12	630	24	ND(49)
EB-LIF-109	5/14/2021	15 - 15.5	730	17	ND(50)
NMED Industrial Soil Screening Levels			**3000**	**500**	**3000**

Notes:
DRO = Diesel range organics
ft = Feet
GRO = Gasoline range organics
ID = Identification
LIF = Laser induced fluorescence
mg/kg = Milligrams per kilogram
MRO = Motor oil range organics
ND = Not detected at the reporting limit
NMED = New Mexico Environment Department
SSL = Soil Screening Level
Bolded values indicated exceedance above the NMED Industrial SSL

TABLE 3-4. GRAIN SIZE ANALYSIS
WESTERN REFINING SOUTHWEST LLC, MARATHON GALLUP REFINERY, GALLUP NEW MEXICO

Sample ID	Date Sampled	Sample Depth (ft)	% Med-Coarse Gravel (> 8mm)	% Fine Gravel (8mm-2mm)	% Gravel (> 4.75mm)	% Coarse Sand (2mm-0.5mm)	% Medium Sand (0.5mm-0.25mm)	% Fine Sand (0.25mm-0.125mm)	% Very Fine Sand (0.125mm-0.063mm)	% Sand (4.75mm-0.075mm)	% Coarse Silt (0.063mm-0.038mm)	% Fine Silt (0.038mm-0.002mm)	% Silt (0.075mm-0.002mm)	% Clay [1] (<0.002mm)
EB-LIF-19	11/25/2019	16 - 18	0.0	0.1	NA	2.5	7.2	9.1	9.7	NA	7.1	30.6	NA	33.7
EB-LIF-20	11/25/2019	27 - 28	1.3	7.6	NA	13.1	26.9	20.1	8.9	NA	3.4	11.1	NA	7.7
EB-LIF-28	11/25/2019	20 - 21	18.3	9.5	NA	11.5	19.2	14.4	4.9	NA	2.3	10.5	NA	9.4
EB-LIF-28	11/25/2019	21 - 23	14.6	20.9	NA	19.5	14.4	8.7	4.0	NA	1.9	9.1	NA	6.9
EB-LIF-34	11/25/2019	20 - 21	1.8	3.2	NA	4.8	10.7	13.6	14.6	NA	8.0	23.9	NA	19.6
EB-LIF-99	5/14/2021	18 - 19	NA	NA	1.3	NA	NA	NA	NA	33.3	NA	NA	42.0	23.4
EB-LIF-108	5/14/2021	12 - 13	NA	NA	1.6	NA	NA	NA	NA	18.7	NA	NA	56.0	23.8
EB-LIF-109	5/14/2021	10.5 - 11.5	NA	NA	0.0	NA	NA	NA	NA	14.2	NA	NA	54.2	31.6
PA-LIF-07	2/5/2021	11 - 13	NA	NA	13.5	NA	NA	NA	NA	59.0	NA	NA	19.4	8.1

[1] United Soil Classification System does not classify clay fraction based on particle size. United States Department of Agriculture definition of clay (< 0.002mm) used in this table.

Notes:
> = Greater than
< = Less than
% = Percent
ft - Feet
ID = Identification
LIF = Laser induced fluorescence
mm = Millimeter
NA = Not analyzed

Appendices

Appendix A – Fluid Level Measurements

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
BW-1A	9/8/2014	6885.12	NA	Dry	Dry	ND	NA	46.06
BW-1A	8/10/2015	6885.12	NA	Dry	Dry	ND	NA	46.06
BW-1A	9/8/2016	6885.12	NA	Dry	Dry	ND	NA	46.06
BW-1A	9/13/2017	6885.12	NA	Dry	Dry	ND	NA	46.06
BW-1A	8/15/2018	6885.12	NA	Dry	Dry	ND	NA	42.61
BW-1A	8/14/2019	6885.12	NA	Dry	Dry	ND	NA	42.61
BW-1A	9/14/2020	6885.12	NA	Dry	Dry	ND	NA	43.70
BW-1B	9/8/2014	6885.78	NA	Dry	Dry	ND	NA	76.29
BW-1B	8/10/2015	6885.78	NA	Dry	Dry	ND	NA	76.29
BW-1B	9/8/2016	6885.78	NA	Dry	Dry	ND	NA	76.29
BW-1B	9/13/2017	6885.78	NA	Dry	Dry	ND	NA	76.29
BW-1B	8/15/2018	6885.78	NA	Dry	Dry	ND	NA	73.55
BW-1B	8/14/2019	6885.78	NA	6813.56	72.22	ND	NA	73.55
BW-1B	9/14/2020	6885.78	NA	Dry	Dry	ND	NA	73.38
BW-1C	9/10/2014	6885.68	NA	6872.71	12.97	ND	NA	145.29
BW-1C	8/10/2015	6885.68	NA	6873.35	12.33	ND	NA	145.29
BW-1C	9/8/2016	6885.68	NA	6873.13	12.55	ND	NA	145.29
BW-1C	9/13/2017	6885.68	NA	6873.08	12.60	ND	NA	145.29
BW-1C	8/15/2018	6885.68	NA	6872.78	12.90	ND	NA	145.29
BW-1C	8/14/2019	6885.68	NA	6873.29	12.39	ND	NA	145.29
BW-1C	9/14/2020	6885.68	NA	6871.79	13.89	ND	NA	145.29
BW-2A	9/9/2014	6874.69	NA	6842.44	32.25	ND	NA	67.57
BW-2A	8/10/2015	6874.69	NA	6842.69	32.00	ND	NA	67.57
BW-2A	9/8/2016	6874.69	NA	6842.40	32.29	ND	NA	67.57
BW-2A	9/13/2017	6874.69	NA	6842.25	32.44	ND	NA	67.57
BW-2A	8/15/2018	6874.69	NA	6842.35	32.34	ND	NA	67.57
BW-2A	8/14/2019	6874.69	NA	6842.43	32.26	ND	NA	67.57
BW-2A	9/14/2020	6874.69	NA	6841.76	32.93	ND	NA	67.21
BW-2B	9/9/2014	6874.50	NA	6846.35	28.15	ND	NA	92.26
BW-2B	8/10/2015	6874.50	NA	6846.50	28.00	ND	NA	92.26
BW-2B	9/8/2016	6874.50	NA	6846.66	27.84	ND	NA	92.26
BW-2B	9/13/2017	6874.50	NA	6846.22	28.28	ND	NA	92.26
BW-2B	8/15/2018	6874.50	NA	6846.25	28.25	ND	NA	92.26
BW-2B	8/14/2019	6874.50	NA	6846.05	28.45	ND	NA	92.26
BW-2B	9/14/2020	6874.50	NA	6845.71	28.79	ND	NA	92.26
BW-2C	9/10/2014	6875.30	NA	6854.60	20.70	ND	NA	152.84
BW-2C	8/10/2015	6875.30	NA	6854.74	20.56	ND	NA	152.84
BW-2C	9/8/2016	6875.30	NA	6854.67	20.63	ND	NA	152.84
BW-2C	9/13/2017	6875.30	NA	6854.40	20.90	ND	NA	152.84
BW-2C	8/15/2018	6875.30	NA	6854.45	20.85	ND	NA	152.84
BW-2C	8/14/2019	6875.30	NA	6854.10	21.20	ND	NA	152.84
BW-2C	9/14/2020	6875.30	NA	6853.98	21.32	ND	NA	149.10
BW-3A	9/8/2014	6878.39	NA	Dry	Dry	ND	NA	52.35
BW-3A	8/10/2015	6878.39	NA	Dry	Dry	ND	NA	52.35
BW-3A	9/8/2016	6878.39	NA	Dry	Dry	ND	NA	52.35
BW-3A	9/13/2017	6878.39	NA	Dry	Dry	ND	NA	52.35
BW-3A	8/15/2018	6878.39	NA	Dry	Dry	ND	NA	52.38

APPENDIX A. FLUID LEVEL MEASUREMENTS
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GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
BW-3A	8/14/2019	6878.39	NA	Dry	Dry	ND	NA	52.38
BW-3A	9/14/2020	6878.39	NA	Dry	Dry	ND	NA	53.30
BW-3B	9/10/2014	6878.59	NA	6845.34	33.25	ND	NA	69.40
BW-3B	8/10/2015	6878.59	NA	6845.59	33.00	ND	NA	69.40
BW-3B	9/8/2016	6878.59	NA	6845.17	33.42	ND	NA	69.40
BW-3B	9/13/2017	6878.59	NA	6845.21	33.38	ND	NA	69.40
BW-3B	8/15/2018	6878.59	NA	6845.24	33.35	ND	NA	69.40
BW-3B	8/14/2019	6878.59	NA	6845.28	33.31	ND	NA	69.40
BW-3B	9/14/2020	6878.59	NA	6844.35	34.24	ND	NA	69.54
BW-3C	9/10/2014	6877.95	NA	6870.12	7.83	ND	NA	154.55
BW-3C	8/10/2015	6877.95	NA	6870.20	7.75	ND	NA	154.55
BW-3C	9/8/2016	6877.95	NA	6869.65	8.30	ND	NA	154.55
BW-3C	9/13/2017	6877.95	NA	6870.15	7.80	ND	NA	154.55
BW-3C	8/15/2018	6877.95	NA	6869.77	8.18	ND	NA	154.55
BW-3C	8/14/2019	6877.95	NA	6870.09	7.86	ND	NA	154.55
BW-3C	9/14/2020	6877.95	NA	6869.43	8.52	ND	NA	150.20
BW-4A	9/21/2017	6873.18	NA	Dry	Dry	ND	NA	38.80
BW-4A	12/8/2017	6873.18	NA	Dry	Dry	ND	NA	38.30
BW-4A	2/26/2018	6873.18	NA	Dry	Dry	ND	NA	38.80
BW-4A	4/25/2018	6873.18	NA	Dry	Dry	ND	NA	38.80
BW-4A	8/15/2018	6873.18	NA	Dry	Dry	ND	NA	38.80
BW-4A	11/7/2018	6873.18	NA	Dry	Dry	ND	NA	38.30
BW-4A	3/27/2019	6873.18	NA	Dry	Dry	ND	NA	38.32
BW-4A	5/21/2019	6873.18	NA	Dry	Dry	ND	NA	38.32
BW-4A	8/23/2019	6873.18	NA	Dry	Dry	ND	NA	38.32
BW-4A	10/16/2019	6873.18	NA	Dry	Dry	ND	NA	38.32
BW-4A	9/14/2020	6873.18	NA	Dry	Dry	ND	NA	38.90
BW-4A	12/7/2020	6873.18	NA	Dry	Dry	ND	NA	38.90
BW-4B	9/21/2017	6873.23	NA	6841.65	31.58	ND	NA	63.50
BW-4B	12/8/2017	6873.23	NA	6835.28	37.95	ND	NA	63.50
BW-4B	2/26/2018	6873.23	NA	6834.80	38.43	ND	NA	63.50
BW-4B	4/25/2018	6873.23	NA	6829.63	43.60	ND	NA	63.50
BW-4B	8/15/2018	6873.23	NA	6834.18	39.05	ND	NA	63.50
BW-4B	11/13/2018	6873.23	NA	6828.36	44.87	ND	NA	63.50
BW-4B	3/27/2019	6873.23	NA	6833.93	39.30	ND	NA	63.50
BW-4B	5/21/2019	6873.23	NA	6827.22	46.01	ND	NA	63.50
BW-4B	8/23/2019	6873.23	NA	6827.23	46.00	ND	NA	63.50
BW-4B	10/16/2019	6873.23	NA	6825.73	47.50	ND	NA	63.50
BW-4B	9/14/2020	6873.23	6833.38	6833.37	39.86	39.85	0.01	63.50
BW-4B	12/7/2020	6873.23	NA	6837.37	35.86	ND	NA	63.50
BW-5A	9/21/2017	6877.00	NA	Dry	Dry	ND	NA	23.00
BW-5A	12/8/2017	6877.00	NA	Dry	Dry	ND	NA	23.02
BW-5A	2/26/2018	6877.00	NA	Dry	Dry	ND	NA	23.02
BW-5A	4/25/2018	6877.00	NA	Dry	Dry	ND	NA	23.02
BW-5A	8/15/2018	6877.00	NA	Dry	Dry	ND	NA	23.02
BW-5A	11/13/2018	6877.00	NA	Dry	Dry	ND	NA	23.02
BW-5A	3/27/2019	6877.00	NA	6853.75	23.25	ND	NA	23.00

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
BW-5A	5/21/2019	6877.00	NA	6853.70	23.30	ND	NA	23.00
BW-5A	8/15/2019	6877.00	NA	6855.74	21.26	ND	NA	23.02
BW-5A	10/16/2019	6877.00	NA	6853.75	23.25	ND	NA	23.30
BW-5A	9/14/2020	6877.00	NA	Dry	Dry	ND	NA	23.40
BW-5A	12/7/2020	6877.00	NA	6853.73	23.27	ND	NA	23.40
BW-5B	9/21/2017	6876.82	NA	6868.17	8.65	ND	NA	61.45
BW-5B	12/8/2017	6876.82	NA	6867.82	9.00	ND	NA	61.45
BW-5B	2/26/2018	6876.82	NA	6866.54	10.28	ND	NA	61.45
BW-5B	4/25/2018	6876.82	NA	6867.07	9.75	ND	NA	61.45
BW-5B	8/15/2018	6876.82	NA	6866.78	10.04	ND	NA	61.45
BW-5B	11/13/2018	6876.82	NA	6866.25	10.57	ND	NA	61.45
BW-5B	3/27/2019	6876.82	NA	6867.44	9.38	ND	NA	61.45
BW-5B	5/21/2019	6876.82	NA	6867.62	9.20	ND	NA	61.45
BW-5B	8/15/2019	6876.82	NA	6867.15	9.67	ND	NA	61.45
BW-5B	10/16/2019	6876.82	NA	6866.55	10.27	ND	NA	61.45
BW-5B	9/14/2020	6876.82	NA	6866.21	10.61	ND	NA	61.45
BW-5B	12/7/2020	6876.82	NA	6866.29	10.53	ND	NA	61.45
BW-5C	9/21/2017	6876.85	NA	6873.86	2.99	ND	NA	76.35
BW-5C	12/8/2017	6876.85	NA	6874.05	2.80	ND	NA	76.35
BW-5C	2/26/2018	6876.85	NA	6874.22	2.63	ND	NA	76.35
BW-5C	4/25/2018	6876.85	NA	6874.30	2.55	ND	NA	76.35
BW-5C	8/15/2018	6876.85	NA	6873.53	3.32	ND	NA	76.35
BW-5C	11/13/2018	6876.85	NA	6873.36	3.49	ND	NA	76.35
BW-5C	3/27/2019	6876.85	NA	6874.86	1.99	ND	NA	76.35
BW-5C	5/21/2019	6876.85	NA	6875.25	1.60	ND	NA	76.35
BW-5C	8/15/2019	6876.85	NA	6874.16	2.69	ND	NA	76.35
BW-5C	10/16/2019	6876.85	NA	6873.35	3.50	ND	NA	76.35
BW-5C	9/14/2020	6876.85	NA	6872.49	4.36	ND	NA	76.35
BW-5C	12/7/2020	6876.85	NA	6872.58	4.27	ND	NA	76.35
GWM-1	3/11/2014	6912.61	NA	6893.69	18.92	ND	NA	26.20
GWM-1	6/5/2014	6912.61	NA	6893.51	19.10	ND	NA	26.20
GWM-1	9/12/2014	6912.61	NA	6893.05	19.56	ND	NA	26.20
GWM-1	11/13/2014	6912.61	NA	6892.53	20.08	ND	NA	26.20
GWM-1	3/10/2015	6912.61	NA	6891.62	20.99	ND	NA	26.20
GWM-1	6/2/2015	6912.61	NA	6891.69	20.92	ND	NA	26.20
GWM-1	8/11/2015	6912.61	6891.21	NA	NA	21.40	NA	26.20
GWM-1	8/24/2015	6912.61	6891.61	6891.16	21.45	21.00	0.45	26.20
GWM-1	10/29/2015	6912.61	6891.48	6891.14	21.47	21.13	0.34	26.20
GWM-1	3/1/2016	6912.61	6889.77	6889.73	22.88	22.84	0.04	26.20
GWM-1	6/7/2016	6912.61	6891.25	6891.22	21.39	21.36	0.03	26.20
GWM-1	9/13/2016	6912.61	6891.32	NA	NA	21.29	NA	26.20
GWM-1	11/14/2016	6912.61	6891.11	6891.09	21.52	21.50	0.02	26.20
GWM-1	3/16/2017	6912.61	6890.87	6890.57	22.04	21.74	0.30	26.20
GWM-1	6/2/2017	6912.61	6891.07	6890.63	21.98	21.54	0.44	26.20
GWM-1	9/8/2017	6912.61	6891.12	6890.90	21.71	21.49	0.22	26.20
GWM-1	12/4/2017	6912.61	6892.91	6891.91	20.70	19.70	1.00	26.20
GWM-1	2/12/2018	6912.61	6890.78	6890.41	22.20	21.83	0.37	26.20

APPENDIX A. FLUID LEVEL MEASUREMENTS
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GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

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GWM-1	4/26/2018	6912.61	6890.76	6890.36	22.25	21.85	0.40	26.38
GWM-1	8/15/2018	6912.61	6891.11	6891.07	21.54	21.50	0.04	26.42
GWM-1	11/19/2018	6912.61	6891.19	6891.06	21.55	21.42	0.13	26.20
GWM-1	3/28/2019	6912.61	6891.02	6890.54	22.07	21.59	0.48	26.20
GWM-1	5/8/2019	6912.61	6891.29	6891.00	21.61	21.32	0.29	26.20
GWM-1	8/6/2019	6912.61	6891.84	6891.71	20.90	20.77	0.13	26.42
GWM-1	10/21/2019	6912.61	6891.97	6891.78	20.83	20.64	0.19	26.20
GWM-1	9/15/2020	6912.61	6891.88	6891.21	21.40	20.73	0.67	26.65
GWM-1	11/9/2020	6912.61	6891.73	6890.89	21.72	20.88	0.84	26.65
GWM-1	12/7/2020	6912.61	6891.70	6890.76	21.85	20.91	0.94	26.45
GWM-2	3/11/2014	6913.09	NA	Dry	Dry	ND	NA	18.81
GWM-2	6/5/2014	6913.09	NA	Dry	Dry	ND	NA	18.81
GWM-2	9/12/2014	6913.09	NA	Dry	Dry	ND	NA	18.81
GWM-2	11/11/2014	6913.09	NA	Dry	Dry	ND	NA	18.81
GWM-2	3/10/2015	6913.09	NA	Dry	Dry	ND	NA	18.81
GWM-2	6/2/2015	6913.09	NA	Dry	Dry	ND	NA	18.81
GWM-2	8/11/2015	6913.09	NA	Dry	Dry	ND	NA	18.81
GWM-2	10/29/2015	6913.09	NA	Dry	Dry	ND	NA	18.81
GWM-2	3/1/2016	6913.09	NA	Dry	Dry	ND	NA	18.81
GWM-2	6/7/2016	6913.09	NA	Dry	Dry	ND	NA	18.81
GWM-2	9/13/2016	6913.09	NA	Dry	Dry	ND	NA	18.81
GWM-2	11/14/2016	6913.09	NA	Dry	Dry	ND	NA	18.81
GWM-2	3/16/2017	6913.09	NA	Dry	Dry	ND	NA	18.81
GWM-2	6/2/2017	6913.09	NA	Dry	Dry	ND	NA	18.81
GWM-2	9/5/2017	6913.09	NA	Dry	Dry	ND	NA	18.81
GWM-2	12/4/2017	6913.09	NA	Dry	Dry	ND	NA	18.81
GWM-2	2/12/2018	6913.09	NA	Dry	Dry	ND	NA	19.05
GWM-2	4/26/2018	6913.09	NA	Dry	Dry	ND	NA	19.01
GWM-2	8/15/2018	6913.09	NA	Dry	Dry	ND	NA	19.04
GWM-2	11/19/2018	6913.09	NA	Dry	Dry	ND	NA	18.81
GWM-2	3/28/2019	6913.09	NA	Dry	Dry	ND	NA	19.09
GWM-2	5/8/2019	6913.09	NA	Dry	Dry	ND	NA	19.09
GWM-2	8/6/2019	6913.09	NA	Dry	Dry	ND	NA	19.04
GWM-2	10/19/2019	6913.09	NA	Dry	Dry	ND	NA	18.81
GWM-2	9/15/2020	6913.09	NA	Dry	Dry	ND	NA	18.08
GWM-2	11/10/2020	6913.09	NA	Dry	Dry	ND	NA	18.08
GWM-2	12/7/2020	6913.09	NA	Dry	Dry	ND	NA	18.08
GWM-3	3/11/2014	6910.25	NA	Dry	Dry	ND	NA	17.80
GWM-3	6/5/2014	6910.25	NA	Dry	Dry	ND	NA	17.80
GWM-3	9/12/2014	6910.25	NA	Dry	Dry	ND	NA	17.80
GWM-3	11/11/2014	6910.25	NA	Dry	Dry	ND	NA	17.80
GWM-3	3/10/2015	6910.25	NA	Dry	Dry	ND	NA	17.80
GWM-3	6/2/2015	6910.25	NA	Dry	Dry	ND	NA	17.80
GWM-3	8/11/2015	6910.25	NA	Dry	Dry	ND	NA	17.80
GWM-3	10/29/2015	6910.25	NA	Dry	Dry	ND	NA	17.80
GWM-3	3/1/2016	6910.25	NA	Dry	Dry	ND	NA	17.80
GWM-3	6/7/2016	6910.25	NA	Dry	Dry	ND	NA	17.80

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MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
GWM-3	9/13/2016	6910.25	NA	Dry	Dry	ND	NA	17.80
GWM-3	11/14/2016	6910.25	NA	Dry	Dry	ND	NA	17.80
GWM-3	3/16/2017	6910.25	NA	Dry	Dry	ND	NA	17.80
GWM-3	6/2/2017	6910.25	NA	Dry	Dry	ND	NA	17.80
GWM-3	9/5/2017	6910.25	NA	Dry	Dry	ND	NA	17.80
GWM-3	12/4/2017	6910.25	NA	Dry	Dry	ND	NA	17.80
GWM-3	2/12/2018	6910.25	NA	Dry	Dry	ND	NA	18.05
GWM-3	4/26/2018	6910.25	NA	Dry	Dry	ND	NA	18.02
GWM-3	8/15/2018	6910.25	NA	Dry	Dry	ND	NA	18.04
GWM-3	11/19/2018	6910.25	NA	Dry	Dry	ND	NA	17.80
GWM-3	3/28/2019	6910.25	NA	Dry	Dry	ND	NA	18.06
GWM-3	5/8/2019	6910.25	NA	Dry	Dry	ND	NA	18.06
GWM-3	8/6/2019	6910.25	NA	Dry	Dry	ND	NA	18.04
GWM-3	9/15/2020	6910.25	NA	Dry	Dry	ND	NA	19.15
GWM-3	10/11/2020	6910.25	NA	Dry	Dry	ND	NA	19.15
GWM-3	12/7/2020	6910.25	NA	Dry	Dry	ND	NA	19.15
KA-3	3/10/2014	6912.52	NA	6904.49	8.03	ND	NA	23.20
KA-3	6/5/2014	6912.52	NA	6904.57	7.95	ND	NA	23.20
KA-3	9/11/2014	6912.52	NA	6903.52	9.00	ND	NA	23.20
KA-3	11/11/2014	6912.52	NA	6904.52	8.00	ND	NA	23.20
KA-3	3/10/2015	6912.52	NA	6904.28	8.24	ND	NA	23.20
KA-3	6/2/2015	6912.52	NA	6903.93	8.59	ND	NA	23.20
KA-3	8/10/2015	6912.52	NA	6903.74	8.78	ND	NA	23.20
KA-3	10/28/2015	6912.52	NA	6904.32	8.20	ND	NA	23.20
KA-3	3/3/2016	6912.52	NA	6904.84	7.68	ND	NA	23.20
KA-3	6/6/2016	6912.52	NA	6905.10	7.42	ND	NA	23.20
KA-3	9/1/2016	6912.52	NA	6904.39	8.13	ND	NA	23.20
KA-3	11/14/2016	6912.52	NA	6904.24	8.28	ND	NA	23.20
KA-3	2/21/2017	6912.52	NA	6905.15	7.37	ND	NA	23.20
KA-3	6/1/2017	6912.52	NA	6904.30	8.22	ND	NA	23.20
KA-3	9/5/2017	6912.52	NA	6904.31	8.21	ND	NA	23.20
KA-3	12/4/2017	6912.52	NA	6904.52	8.00	ND	NA	24.28
KA-3	2/9/2018	6912.52	NA	6904.12	8.40	ND	NA	24.30
KA-3	4/26/2018	6912.52	NA	6904.02	8.50	ND	NA	24.24
KA-3	8/15/2018	6912.52	NA	NA	NA	NA	NA	24.24
KA-3	11/8/2018	6912.52	NA	NA	NA	NA	NA	24.24
KA-3	3/28/2019	6912.52	NA	NA	NA	NA	NA	24.24
KA-3	5/28/2019	6912.52	NA	6902.57	9.95	ND	NA	23.20
KA-3	8/22/2019	6912.52	NA	6903.47	9.05	ND	NA	23.20
KA-3	10/21/2019	6912.52	NA	6903.36	9.16	ND	NA	23.20
KA-3	12/7/2020	6912.52	NA	6902.96	9.56	ND	NA	23.20
MKTF-01	1/13/2014	6920.67	6912.77	6912.33	8.34	7.90	0.44	17.42
MKTF-01	2/12/2014	6920.67	6913.94	6913.19	7.48	6.73	0.75	17.42
MKTF-01	3/11/2014	6920.67	6914.57	6914.29	6.38	6.10	0.28	17.42
MKTF-01	6/6/2014	6920.67	NA	6913.67	7.00	ND	NA	17.42
MKTF-01	9/15/2014	6920.67	6913.73	6913.69	6.98	6.94	0.04	17.42
MKTF-01	11/14/2014	6920.67	6913.37	6913.35	7.32	7.30	0.02	17.42

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
MKTF-01	3/11/2015	6920.67	NA	6914.82	5.85	ND	NA	17.42
MKTF-01	6/9/2015	6920.67	NA	6913.52	7.15	ND	NA	17.42
MKTF-01	8/21/2015	6920.67	NA	6914.44	6.23	ND	NA	17.42
MKTF-01	11/4/2015	6920.67	NA	6914.80	5.87	ND	NA	17.42
MKTF-01	2/24/2016	6920.67	NA	6914.83	5.84	ND	NA	17.42
MKTF-01	6/10/2016	6920.67	NA	6913.65	7.02	ND	NA	17.42
MKTF-01	9/7/2016	6920.67	6913.55	6912.05	8.62	7.12	1.50	17.42
MKTF-01	11/4/2016	6920.67	NA	6914.80	5.87	ND	NA	17.42
MKTF-01	3/14/2017	6920.67	6916.02	6915.86	4.81	4.65	0.16	17.42
MKTF-01	6/7/2017	6920.67	6915.78	6915.25	5.42	4.89	0.53	17.42
MKTF-01	10/3/2017	6920.67	6914.47	6914.11	6.56	6.20	0.36	17.42
MKTF-01	11/20/2017	6920.67	6916.05	6915.72	4.95	4.62	0.33	17.42
MKTF-01	2/7/2018	6920.67	6915.62	6915.27	5.40	5.05	0.35	17.42
MKTF-01	4/25/2018	6920.67	6914.45	6914.15	6.52	6.22	0.30	17.35
MKTF-01	8/15/2018	6920.67	6914.27	6913.96	6.71	6.40	0.31	17.27
MKTF-01	11/27/2018	6920.67	6915.17	6914.80	5.87	5.50	0.37	17.42
MKTF-01	2/19/2019	6920.67	6916.27	6915.93	4.74	4.40	0.34	17.42
MKTF-01	5/6/2019	6920.67	6916.28	6915.93	4.74	4.39	0.35	17.42
MKTF-01	8/30/2019	6920.67	6916.09	6915.72	4.95	4.58	0.37	17.42
MKTF-01	11/19/2019	6920.67	6915.53	6915.22	5.45	5.14	0.31	17.42
MKTF-01	2/24/2020	6920.67	6915.80	6915.51	5.16	4.87	0.29	17.42
MKTF-01	6/26/2020	6920.67	6915.17	6914.96	5.71	5.50	0.21	17.42
MKTF-01	9/15/2020	6920.67	6915.06	6915.05	5.62	5.61	0.01	17.48
MKTF-01	11/10/2020	6920.67	6915.06	6914.78	5.89	5.61	0.28	17.48
MKTF-01	12/3/2020	6920.67	6914.93	6914.65	6.02	5.74	0.28	17.43
MKTF-02	1/13/2014	6917.45	NA	6909.96	7.49	ND	NA	20.48
MKTF-02	2/12/2014	6917.45	NA	6909.97	7.48	ND	NA	20.48
MKTF-02	3/11/2014	6917.45	NA	6910.42	7.03	ND	NA	20.48
MKTF-02	6/6/2014	6917.45	NA	6909.85	7.60	ND	NA	20.48
MKTF-02	9/15/2014	6917.45	NA	6909.04	8.41	ND	NA	20.48
MKTF-02	11/14/2014	6917.45	NA	6909.24	8.21	ND	NA	20.48
MKTF-02	3/11/2015	6917.45	NA	6910.57	6.88	ND	NA	20.48
MKTF-02	6/9/2015	6917.45	NA	6909.90	7.55	ND	NA	20.48
MKTF-02	8/21/2015	6917.45	NA	6910.15	7.30	ND	NA	20.48
MKTF-02	11/4/2015	6917.45	NA	6910.20	7.25	ND	NA	20.48
MKTF-02	2/24/2016	6917.45	NA	6910.23	7.22	ND	NA	20.48
MKTF-02	6/10/2016	6917.45	NA	6909.36	8.09	ND	NA	20.48
MKTF-02	9/7/2016	6917.45	NA	6909.17	8.28	ND	NA	20.48
MKTF-02	11/4/2016	6917.45	NA	6910.20	7.25	ND	NA	20.48
MKTF-02	3/16/2017	6917.45	NA	6910.11	7.34	ND	NA	20.48
MKTF-02	6/7/2017	6917.45	6910.35	6910.34	7.11	7.10	0.01	20.48
MKTF-02	10/3/2017	6917.45	NA	6910.78	6.67	ND	NA	20.48
MKTF-02	11/20/2017	6917.45	NA	6910.45	7.00	ND	NA	20.35
MKTF-02	2/6/2018	6917.45	NA	6910.01	7.44	ND	NA	20.34
MKTF-02	4/25/2018	6917.45	NA	6909.50	7.95	ND	NA	20.36
MKTF-02	8/15/2018	6917.45	NA	6909.05	8.40	ND	NA	20.43
MKTF-02	11/27/2018	6917.45	NA	6909.05	8.40	ND	NA	20.35

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
MKTF-02	3/28/2019	6917.45	NA	6911.11	6.34	ND	NA	20.48
MKTF-02	5/6/2019	6917.45	NA	6911.21	6.24	ND	NA	20.48
MKTF-02	8/23/2019	6917.45	NA	6910.40	7.05	ND	NA	20.43
MKTF-02	11/19/2019	6917.45	NA	6910.31	7.14	ND	NA	20.35
MKTF-02	2/24/2020	6917.45	NA	6910.93	6.52	ND	NA	20.48
MKTF-02	6/26/2020	6917.45	NA	6909.75	7.70	ND	NA	20.48
MKTF-02	9/15/2020	6917.45	NA	6909.57	7.88	ND	NA	20.54
MKTF-02	11/10/2020	6917.45	NA	6910.02	7.43	ND	NA	20.54
MKTF-02	12/3/2020	6917.45	NA	6909.73	7.72	ND	NA	20.54
MKTF-03	1/15/2014	6931.69	6923.59	6922.29	9.40	8.10	1.30	18.45
MKTF-03	2/13/2014	6931.69	NA	6923.36	8.33	ND	NA	18.45
MKTF-03	3/11/2014	6931.69	6923.54	6922.62	9.07	8.15	0.92	18.45
MKTF-03	6/4/2014	6931.69	6922.84	6922.37	9.32	8.85	0.47	18.45
MKTF-03	9/15/2014	6931.69	6922.63	6922.53	9.16	9.06	0.10	18.45
MKTF-03	11/13/2014	6931.69	6922.38	NA	NA	9.31	NA	18.45
MKTF-03	3/17/2015	6931.69	6923.23	6922.43	9.26	8.46	0.80	18.45
MKTF-03	6/4/2015	6931.69	6922.99	6922.37	9.32	8.70	0.62	18.45
MKTF-03	8/18/2015	6931.69	6923.60	6922.78	8.91	8.09	0.82	18.45
MKTF-03	11/3/2015	6931.69	6923.39	6922.29	9.40	8.30	1.10	18.45
MKTF-03	3/17/2016	6931.69	6923.23	6922.43	9.26	8.46	0.80	18.45
MKTF-03	6/9/2016	6931.69	6924.14	6919.86	11.83	7.55	4.28	18.45
MKTF-03	9/12/2016	6931.69	6923.77	6921.37	10.32	7.92	2.40	18.45
MKTF-03	11/3/2016	6931.69	6923.39	6922.29	9.40	8.30	1.10	18.45
MKTF-03	3/2/2017	6931.69	6925.27	6924.10	7.59	6.42	1.17	18.45
MKTF-03	6/7/2017	6931.69	6924.74	6923.44	8.25	6.95	1.30	18.45
MKTF-03	9/26/2017	6931.69	6925.34	6924.54	7.15	6.35	0.80	18.45
MKTF-03	11/28/2017	6931.69	6924.69	6923.74	7.95	7.00	0.95	18.45
MKTF-03	2/8/2018	6931.69	6924.29	6923.44	8.25	7.40	0.85	18.45
MKTF-03	4/25/2018	6931.69	6924.39	6923.47	8.22	7.30	0.92	18.45
MKTF-03	8/16/2018	6931.69	6924.39	6923.44	8.25	7.30	0.95	18.53
MKTF-03	11/19/2018	6931.69	6924.84	6923.84	7.85	6.85	1.00	18.45
MKTF-03	3/25/2019	6931.69	6927.19	6926.09	5.60	4.50	1.10	18.45
MKTF-03	5/13/2019	6931.69	6927.14	6926.03	5.66	4.55	1.11	18.45
MKTF-03	8/21/2019	6931.69	6925.65	6924.42	7.27	6.04	1.23	18.53
MKTF-03	10/30/2019	6931.69	6924.99	6923.69	8.00	6.70	1.30	18.45
MKTF-03	3/5/2020	6931.69	6925.22	6923.85	7.84	6.47	1.37	18.45
MKTF-03	6/26/2020	6931.69	6924.33	6923.06	8.63	7.36	1.27	18.45
MKTF-03	9/15/2020	6931.69	6924.61	6924.60	7.09	7.08	0.01	18.59
MKTF-03	11/10/2020	6931.69	6924.56	6923.26	8.43	7.13	1.30	18.59
MKTF-03	12/3/2020	6931.69	6924.23	6923.07	8.62	7.46	1.16	18.58
MKTF-04	1/15/2014	6933.57	NA	6923.29	10.28	ND	NA	22.15
MKTF-04	2/13/2014	6933.57	NA	6922.89	10.68	ND	NA	22.15
MKTF-04	3/11/2014	6933.57	NA	6923.37	10.20	ND	NA	22.15
MKTF-04	6/4/2014	6933.57	NA	6922.58	10.99	ND	NA	22.15
MKTF-04	9/15/2014	6933.57	NA	6922.48	11.09	ND	NA	22.15
MKTF-04	11/13/2014	6933.57	NA	6922.22	11.35	ND	NA	22.15
MKTF-04	3/16/2015	6933.57	NA	6923.32	10.25	ND	NA	22.15

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
MKTF-04	6/4/2015	6933.57	NA	6922.57	11.00	ND	NA	22.15
MKTF-04	8/18/2015	6933.57	NA	6922.93	10.64	ND	NA	22.15
MKTF-04	11/3/2015	6933.57	NA	6929.34	4.23	ND	NA	22.15
MKTF-04	2/29/2016	6933.57	NA	6922.89	10.68	ND	NA	22.15
MKTF-04	6/9/2016	6933.57	NA	6923.27	10.30	ND	NA	22.15
MKTF-04	9/11/2016	6933.57	NA	6923.34	10.23	ND	NA	22.15
MKTF-04	11/3/2016	6933.57	NA	6923.17	10.40	ND	NA	22.15
MKTF-04	3/2/2017	6933.57	NA	6925.26	8.31	ND	NA	22.15
MKTF-04	6/7/2017	6933.57	NA	6924.29	9.28	ND	NA	22.15
MKTF-04	9/26/2017	6933.57	NA	6924.77	8.80	ND	NA	22.15
MKTF-04	11/29/2017	6933.57	NA	6924.27	9.30	ND	NA	22.30
MKTF-04	2/14/2018	6933.57	NA	6923.72	9.85	ND	NA	22.37
MKTF-04	4/25/2018	6933.57	NA	6923.87	9.70	ND	NA	22.29
MKTF-04	8/16/2018	6933.57	NA	6923.87	9.70	ND	NA	22.39
MKTF-04	11/19/2018	6933.57	NA	6925.18	8.39	ND	NA	22.30
MKTF-04	3/25/2019	6933.57	NA	6927.12	6.45	ND	NA	22.15
MKTF-04	5/13/2019	6933.57	NA	6927.02	6.55	ND	NA	22.15
MKTF-04	8/21/2019	6933.57	NA	6925.30	8.27	ND	NA	22.39
MKTF-04	10/30/2019	6933.57	NA	6924.64	8.93	ND	NA	22.30
MKTF-04	3/2/2020	6933.57	NA	6925.10	8.47	ND	NA	22.21
MKTF-04	6/26/2020	6933.57	NA	6923.82	9.75	ND	NA	22.15
MKTF-04	9/15/2020	6933.57	6924.18	6924.17	9.40	9.39	0.01	22.72
MKTF-04	11/10/2020	6933.57	NA	6924.37	9.20	ND	NA	22.72
MKTF-04	12/3/2020	6933.57	6923.87	6923.86	9.71	9.70	0.01	22.72
MKTF-05	1/13/2014	6942.22	6927.18	6927.12	15.10	15.04	0.06	17.75
MKTF-05	2/13/2014	6942.22	6926.89	6926.85	15.37	15.33	0.04	17.75
MKTF-05	3/11/2014	6942.22	NA	6926.99	15.23	ND	NA	17.75
MKTF-05	6/4/2014	6942.22	6926.62	6926.57	15.65	15.60	0.05	17.75
MKTF-05	9/15/2014	6942.22	6926.92	6926.56	15.66	15.30	0.36	17.75
MKTF-05	11/13/2014	6942.22	6926.43	6926.05	16.17	15.79	0.38	17.75
MKTF-05	3/16/2015	6942.22	6926.50	6926.14	16.08	15.72	0.36	17.75
MKTF-05	6/4/2015	6942.22	6926.45	6925.82	16.40	15.77	0.63	17.75
MKTF-05	8/18/2015	6942.22	6926.78	6926.59	15.63	15.44	0.19	17.75
MKTF-05	11/3/2015	6942.22	6926.75	6925.91	16.31	15.47	0.84	17.75
MKTF-05	3/16/2016	6942.22	6926.50	6926.14	16.08	15.72	0.36	17.75
MKTF-05	6/9/2016	6942.22	6926.88	6926.35	15.87	15.34	0.53	17.75
MKTF-05	9/11/2016	6942.22	6927.48	6924.44	17.78	14.74	3.04	17.75
MKTF-05	11/3/2016	6942.22	6926.75	6925.91	16.31	15.47	0.84	17.75
MKTF-05	3/2/2017	6942.22	6928.89	6928.60	13.62	13.33	0.29	17.75
MKTF-05	6/7/2017	6942.22	6928.43	6927.97	14.25	13.79	0.46	17.75
MKTF-05	9/26/2017	6942.22	6929.21	6928.72	13.50	13.01	0.49	17.75
MKTF-05	11/28/2017	6942.22	6928.24	6927.47	14.75	13.98	0.77	17.75
MKTF-05	2/8/2018	6942.22	6927.44	6927.02	15.20	14.78	0.42	17.75
MKTF-05	4/25/2018	6942.22	6927.26	6927.03	15.19	14.96	0.23	17.70
MKTF-05	8/16/2018	6942.22	6927.61	6927.42	14.80	14.61	0.19	17.75
MKTF-05	11/19/2018	6942.22	6927.60	6927.39	14.83	14.62	0.21	17.75
MKTF-05	2/19/2019	6942.22	6928.35	6928.25	13.97	13.87	0.10	17.75

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
MKTF-05	5/13/2019	6942.22	6929.27	6929.10	13.12	12.95	0.17	17.75
MKTF-05	8/30/2019	6942.22	6928.82	6928.62	13.60	13.40	0.20	17.75
MKTF-05	10/30/2019	6942.22	6928.32	6928.02	14.20	13.90	0.30	17.75
MKTF-05	11/12/2019	6942.22	6930.58	6925.49	16.73	11.64	5.09	17.75
MKTF-05	11/13/2019	6942.22	6931.26	6925.07	17.15	10.96	6.19	17.75
MKTF-05	11/14/2019	6942.22	6931.44	6925.05	17.17	10.78	6.39	17.75
MKTF-05	11/15/2019	6942.22	6931.68	6925.06	17.16	10.54	6.62	17.75
MKTF-05	11/19/2019	6942.22	6932.18	6925.04	17.18	10.04	7.14	17.75
MKTF-05	11/21/2019	6942.22	6932.25	6925.04	17.18	9.97	7.21	17.75
MKTF-05	12/2/2019	6942.22	6931.58	6925.05	17.17	10.64	6.53	17.75
MKTF-05	3/5/2020	6942.22	6928.64	6928.50	13.72	13.58	0.14	17.75
MKTF-05	6/25/2020	6942.22	6928.16	6927.42	14.80	14.06	0.74	17.75
MKTF-05	9/15/2020	6942.22	6928.57	6927.54	14.68	13.65	1.03	17.83
MKTF-05	11/10/2020	6942.22	6928.20	6927.32	14.90	14.02	0.88	17.83
MKTF-05	12/3/2020	6942.22	6928.10	6927.29	14.93	14.12	0.81	17.80
MKTF-06	1/13/2014	6946.81	6928.67	6928.50	18.31	18.14	0.17	23.77
MKTF-06	2/13/2014	6946.81	6928.47	6928.04	18.77	18.34	0.43	23.77
MKTF-06	3/11/2014	6946.81	6928.61	6927.86	18.95	18.20	0.75	23.77
MKTF-06	6/6/2014	6946.81	NA	6932.81	14.00	NA	NA	23.77
MKTF-06	9/15/2014	6946.81	6928.66	6927.91	18.90	18.15	0.75	23.77
MKTF-06	11/14/2014	6946.81	6928.23	NA	NA	18.58	NA	23.77
MKTF-06	3/16/2015	6946.81	6928.57	6926.87	19.94	18.24	1.70	23.77
MKTF-06	6/4/2015	6946.81	6928.25	6927.41	19.40	18.56	0.84	23.77
MKTF-06	8/15/2015	6946.81	6929.28	6928.42	18.39	17.53	0.86	23.77
MKTF-06	11/3/2015	6946.81	6928.77	6928.03	18.78	18.04	0.74	23.77
MKTF-06	3/16/2016	6946.81	6928.57	6926.87	19.94	18.24	1.70	23.77
MKTF-06	6/9/2016	6946.81	6928.79	6927.85	18.96	18.02	0.94	23.77
MKTF-06	9/11/2016	6946.81	6929.41	6928.33	18.48	17.40	1.08	23.77
MKTF-06	11/3/2016	6946.81	6928.77	6928.03	18.78	18.04	0.74	23.77
MKTF-06	3/15/2017	6946.81	6930.86	6930.76	16.05	15.95	0.10	23.77
MKTF-06	6/12/2017	6946.81	6930.21	6929.57	17.24	16.60	0.64	23.77
MKTF-06	9/26/2017	6946.81	6930.80	6930.09	16.72	16.01	0.71	23.77
MKTF-06	11/28/2017	6946.81	6930.26	6929.11	17.70	16.55	1.15	23.77
MKTF-06	2/8/2018	6946.81	6929.67	6928.29	18.52	17.14	1.38	23.77
MKTF-06	4/25/2018	6946.81	6929.52	6928.20	18.61	17.29	1.32	23.72
MKTF-06	8/16/2018	6946.81	6929.98	6928.81	18.00	16.83	1.17	23.79
MKTF-06	11/19/2018	6946.81	6929.96	6928.80	18.01	16.85	1.16	23.77
MKTF-06	2/19/2019	6946.81	6931.02	6930.26	16.55	15.79	0.76	23.77
MKTF-06	5/13/2019	6946.81	6931.26	6930.42	16.39	15.55	0.84	23.77
MKTF-06	8/30/2019	6946.81	6930.99	6930.21	16.60	15.82	0.78	23.79
MKTF-06	10/30/2019	6946.81	6930.01	6928.90	17.91	16.80	1.11	23.77
MKTF-06	11/12/2019	6946.81	6930.29	6929.33	17.48	16.52	0.96	23.77
MKTF-06	11/13/2019	6946.81	6930.48	6929.63	17.18	16.33	0.85	23.77
MKTF-06	11/14/2019	6946.81	6930.39	6929.50	17.31	16.42	0.89	23.77
MKTF-06	11/15/2019	6946.81	6930.46	6929.61	17.20	16.35	0.85	23.77
MKTF-06	11/19/2019	6946.81	6930.73	6929.98	16.83	16.08	0.75	23.77
MKTF-06	11/21/2019	6946.81	6930.88	6929.57	17.24	15.93	1.31	23.77

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
MKTF-06	12/2/2019	6946.81	6932.06	6925.45	21.36	14.75	6.61	23.77
MKTF-06	3/5/2020	6946.81	6929.92	6928.21	18.60	16.89	1.71	23.77
MKTF-06	6/25/2020	6946.81	6932.76	6927.91	18.90	14.05	4.85	23.77
MKTF-06	9/15/2020	6946.81	6930.03	6928.10	18.71	16.78	1.93	23.79
MKTF-06	11/10/2020	6946.81	6929.61	6928.22	18.59	17.20	1.39	23.79
MKTF-06	12/3/2020	6946.81	6929.43	6928.32	18.49	17.38	1.11	23.79
MKTF-07	1/13/2014	6947.18	6935.27	6934.17	13.01	11.91	1.10	17.62
MKTF-07	2/13/2014	6947.18	6935.30	6934.18	13.00	11.88	1.12	17.62
MKTF-07	3/11/2014	6947.18	6935.48	6934.33	12.85	11.70	1.15	17.62
MKTF-07	6/6/2014	6947.18	NA	6934.08	13.10	NA	NA	17.62
MKTF-07	9/15/2014	6947.18	6935.18	6933.58	13.60	12.00	1.60	17.62
MKTF-07	11/14/2014	6947.18	6933.86	NA	NA	13.32	NA	17.62
MKTF-07	3/16/2015	6947.18	6934.08	6932.95	14.23	13.10	1.13	17.62
MKTF-07	6/4/2015	6947.18	6934.23	6932.58	14.60	12.95	1.65	17.62
MKTF-07	8/18/2015	6947.18	6934.47	6933.34	13.84	12.71	1.13	17.62
MKTF-07	11/3/2015	6947.18	6934.28	6932.30	14.88	12.90	1.98	17.62
MKTF-07	3/16/2016	6947.18	6934.08	6932.95	14.23	13.10	1.13	17.62
MKTF-07	6/9/2016	6947.18	6935.17	6932.58	14.60	12.01	2.59	17.62
MKTF-07	9/11/2016	6947.18	6934.98	6932.57	14.61	12.20	2.41	17.62
MKTF-07	11/3/2016	6947.18	6934.28	6932.30	14.88	12.90	1.98	17.62
MKTF-07	3/15/2017	6947.18	6936.55	6934.58	12.60	10.63	1.97	17.62
MKTF-07	6/12/2017	6947.18	6936.98	6935.68	11.50	10.20	1.30	17.62
MKTF-07	9/26/2017	6947.18	6937.38	6936.08	11.10	9.80	1.30	17.62
MKTF-07	11/28/2017	6947.18	6936.78	6935.38	11.80	10.40	1.40	17.62
MKTF-07	2/8/2018	6947.18	6935.85	6934.63	12.55	11.33	1.22	17.62
MKTF-07	4/25/2018	6947.18	6936.34	6935.16	12.02	10.84	1.18	17.58
MKTF-07	8/16/2018	6947.18	6935.76	6934.68	12.50	11.42	1.08	17.47
MKTF-07	11/27/2018	6947.18	6934.83	6933.66	13.52	12.35	1.17	17.62
MKTF-07	2/19/2019	6947.18	6936.79	6935.58	11.60	10.39	1.21	17.62
MKTF-07	5/13/2019	6947.18	6936.46	6936.36	10.82	10.72	0.10	17.62
MKTF-07	8/30/2019	6947.18	6936.00	6934.89	12.29	11.18	1.11	17.47
MKTF-07	10/30/2019	6947.18	6934.98	6933.79	13.39	12.20	1.19	17.62
MKTF-07	11/12/2019	6947.18	6935.15	6933.99	13.19	12.03	1.16	17.62
MKTF-07	11/13/2019	6947.18	6935.37	6934.29	12.89	11.81	1.08	17.62
MKTF-07	11/14/2019	6947.18	6935.20	6934.04	13.14	11.98	1.16	17.62
MKTF-07	11/15/2019	6947.18	6935.18	6934.02	13.16	12.00	1.16	17.62
MKTF-07	11/19/2019	6947.18	6935.78	6933.01	14.17	11.40	2.77	17.62
MKTF-07	11/21/2019	6947.18	6936.35	6930.63	16.55	10.83	5.72	17.62
MKTF-07	12/2/2019	6947.18	6935.80	6930.06	17.12	11.38	5.74	17.62
MKTF-07	3/5/2020	6947.18	6934.68	6933.46	13.72	12.50	1.22	17.62
MKTF-07	6/25/2020	6947.18	6934.95	6933.42	13.76	12.23	1.53	17.62
MKTF-07	9/18/2020	6947.18	6935.76	6933.41	13.77	11.42	2.35	17.43
MKTF-07	11/10/2020	6947.18	6934.62	6933.42	13.76	12.56	1.20	17.43
MKTF-07	12/3/2020	6947.18	6934.25	6933.38	13.80	12.93	0.87	17.66
MKTF-08	1/13/2014	6947.09	6932.89	6932.47	14.62	14.20	0.42	21.98
MKTF-08	2/13/2014	6947.09	6932.84	6932.40	14.69	14.25	0.44	21.98
MKTF-08	3/11/2014	6947.09	6932.88	6932.44	14.65	14.21	0.44	21.98

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
MKTF-08	6/6/2014	6947.09	6932.79	6932.09	15.00	14.30	0.70	21.98
MKTF-08	9/15/2014	6947.09	6932.73	6932.04	15.05	14.36	0.69	21.98
MKTF-08	11/14/2014	6947.09	6932.21	NA	NA	14.88	NA	21.98
MKTF-08	3/16/2015	6947.09	6932.84	6932.59	14.50	14.25	0.25	21.98
MKTF-08	6/4/2015	6947.09	6932.74	6932.18	14.91	14.35	0.56	21.98
MKTF-08	8/18/2015	6947.09	6933.30	6932.34	14.75	13.79	0.96	21.98
MKTF-08	11/8/2015	6947.09	6933.25	6931.77	15.32	13.84	1.48	21.98
MKTF-08	3/16/2016	6947.09	6932.84	6932.59	14.50	14.25	0.25	21.98
MKTF-08	6/9/2016	6947.09	6933.61	6932.91	14.18	13.48	0.70	21.98
MKTF-08	9/11/2016	6947.09	6933.46	6932.80	14.29	13.63	0.66	21.98
MKTF-08	11/8/2016	6947.09	6933.25	6931.77	15.32	13.84	1.48	21.98
MKTF-08	3/15/2017	6947.09	6935.10	6934.49	12.60	11.99	0.61	21.98
MKTF-08	6/12/2017	6947.09	6935.11	6934.69	12.40	11.98	0.42	21.98
MKTF-08	9/26/2017	6947.09	6934.94	6934.49	12.60	12.15	0.45	21.98
MKTF-08	11/28/2017	6947.09	6934.41	6933.89	13.20	12.68	0.52	21.98
MKTF-08	2/8/2018	6947.09	6933.80	6933.46	13.63	13.29	0.34	21.98
MKTF-08	4/25/2018	6947.09	6934.09	6933.76	13.33	13.00	0.33	21.94
MKTF-08	8/16/2018	6947.09	6934.13	6933.74	13.35	12.96	0.39	21.98
MKTF-08	11/27/2018	6947.09	6933.68	6933.29	13.80	13.41	0.39	21.98
MKTF-08	2/19/2019	6947.09	6935.74	6935.09	12.00	11.35	0.65	21.98
MKTF-08	5/13/2019	6947.09	6935.14	6934.66	12.43	11.95	0.48	21.98
MKTF-08	8/30/2019	6947.09	6934.59	6934.19	12.90	12.50	0.40	21.98
MKTF-08	10/30/2019	6947.09	6933.55	6933.10	13.99	13.54	0.45	21.98
MKTF-08	11/21/2019	6947.09	6933.62	6933.24	13.85	13.47	0.38	21.98
MKTF-08	12/2/2019	6947.09	6933.37	6932.96	14.13	13.72	0.41	21.98
MKTF-08	3/5/2020	6947.09	6933.06	6932.72	14.37	14.03	0.34	21.98
MKTF-08	6/25/2020	6947.09	6933.09	6932.69	14.40	14.00	0.40	21.98
MKTF-08	9/18/2020	6947.09	6933.33	6932.94	14.15	13.76	0.39	22.00
MKTF-08	11/10/2020	6947.09	6932.86	6932.40	14.69	14.23	0.46	22.00
MKTF-08	12/3/2020	6947.09	6932.73	6932.33	14.76	14.36	0.40	22.01
MKTF-09	1/13/2014	6946.50	NA	6931.72	14.78	ND	NA	22.70
MKTF-09	2/13/2014	6946.50	NA	6931.68	14.82	ND	NA	22.70
MKTF-09	3/11/2014	6946.50	NA	6931.70	14.80	ND	NA	22.70
MKTF-09	6/5/2014	6946.50	NA	6931.60	14.90	ND	NA	22.70
MKTF-09	9/15/2014	6946.50	NA	6931.61	14.89	ND	NA	22.70
MKTF-09	11/14/2014	6946.50	NA	6931.29	15.21	ND	NA	22.70
MKTF-09	3/16/2015	6946.50	NA	6932.02	14.48	ND	NA	22.70
MKTF-09	6/4/2015	6946.50	NA	6931.82	14.68	ND	NA	22.70
MKTF-09	8/18/2015	6946.50	NA	6932.01	14.49	ND	NA	22.70
MKTF-09	11/3/2015	6946.50	NA	6932.21	14.29	ND	NA	22.70
MKTF-09	2/29/2016	6946.50	NA	6932.35	14.15	ND	NA	22.70
MKTF-09	6/9/2016	6946.50	NA	6932.58	13.92	ND	NA	22.70
MKTF-09	9/11/2016	6946.50	NA	6932.30	14.20	ND	NA	22.70
MKTF-09	11/3/2016	6946.50	NA	6932.21	14.29	ND	NA	22.70
MKTF-09	3/15/2017	6946.50	NA	6933.86	12.64	ND	NA	22.70
MKTF-09	6/12/2017	6946.50	NA	6933.86	12.64	ND	NA	22.70
MKTF-09	9/28/2017	6946.50	NA	6933.81	12.69	ND	NA	22.70

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
MKTF-09	11/29/2017	6946.50	NA	6933.35	13.15	ND	NA	22.75
MKTF-09	2/14/2018	6946.50	NA	6932.74	13.76	ND	NA	22.74
MKTF-09	4/25/2018	6946.50	NA	6933.08	13.42	ND	NA	22.69
MKTF-09	8/16/2018	6946.50	NA	6933.01	13.49	ND	NA	22.74
MKTF-09	11/27/2018	6946.50	NA	6932.69	13.81	ND	NA	22.75
MKTF-09	3/25/2019	6946.50	NA	6935.40	11.10	ND	NA	22.70
MKTF-09	5/13/2019	6946.50	NA	6934.23	12.27	ND	NA	22.70
MKTF-09	8/28/2019	6946.50	NA	6933.22	13.28	ND	NA	22.74
MKTF-09	11/18/2019	6946.50	NA	6932.53	13.97	ND	NA	22.75
MKTF-09	3/2/2020	6946.50	NA	6932.27	14.23	ND	NA	22.76
MKTF-09	6/25/2020	6946.50	NA	6931.95	14.55	ND	NA	22.77
MKTF-09	9/18/2020	6946.50	6932.31	6932.30	14.20	14.19	0.01	22.41
MKTF-09	11/10/2020	6946.50	6931.89	6931.88	14.62	14.61	0.01	22.41
MKTF-09	12/3/2020	6946.50	6931.75	6931.74	14.76	14.75	0.01	22.78
MKTF-10	1/13/2014	6937.16	NA	6928.41	8.75	ND	NA	15.99
MKTF-10	2/13/2014	6937.16	NA	6928.27	8.89	ND	NA	15.99
MKTF-10	3/11/2014	6937.16	NA	6928.28	8.88	ND	NA	15.99
MKTF-10	6/5/2014	6937.16	NA	6928.26	8.90	ND	NA	15.99
MKTF-10	9/15/2014	6937.16	NA	6928.17	8.99	ND	NA	15.99
MKTF-10	11/14/2014	6937.16	NA	6927.11	10.05	ND	NA	15.99
MKTF-10	3/16/2015	6937.16	NA	6928.20	8.96	ND	NA	15.99
MKTF-10	6/4/2015	6937.16	NA	6928.34	8.82	ND	NA	15.99
MKTF-10	8/18/2015	6937.16	NA	6928.44	8.72	ND	NA	15.99
MKTF-10	11/3/2015	6937.16	NA	6928.32	8.84	ND	NA	15.99
MKTF-10	2/29/2016	6937.16	NA	6928.56	8.60	ND	NA	15.99
MKTF-10	6/9/2016	6937.16	NA	6928.96	8.20	ND	NA	15.99
MKTF-10	9/11/2016	6937.16	NA	6928.71	8.45	ND	NA	15.99
MKTF-10	11/3/2016	6937.16	NA	6928.32	8.84	ND	NA	15.99
MKTF-10	3/2/2017	6937.16	NA	6929.69	7.47	ND	NA	15.99
MKTF-10	6/7/2017	6937.16	NA	6930.14	7.02	ND	NA	15.99
MKTF-10	9/27/2017	6937.16	NA	6930.38	6.78	ND	NA	15.99
MKTF-10	11/29/2017	6937.16	NA	6930.16	7.00	ND	NA	15.99
MKTF-10	2/14/2018	6937.16	NA	6929.86	7.30	ND	NA	16.10
MKTF-10	4/25/2018	6937.16	NA	6930.11	7.05	ND	NA	16.05
MKTF-10	8/16/2018	6937.16	NA	6930.08	7.08	ND	NA	16.28
MKTF-10	11/19/2018	6937.16	NA	6929.91	7.25	ND	NA	15.99
MKTF-10	3/25/2019	6937.16	NA	6931.46	5.70	ND	NA	15.99
MKTF-10	5/13/2019	6937.16	NA	6930.93	6.23	ND	NA	15.99
MKTF-10	8/21/2019	6937.16	NA	6929.51	7.65	ND	NA	16.28
MKTF-10	10/30/2019	6937.16	NA	6929.88	7.28	ND	NA	15.99
MKTF-10	3/2/2020	6937.16	NA	6929.49	7.67	ND	NA	15.99
MKTF-10	6/25/2020	6937.16	NA	6930.09	7.07	ND	NA	15.99
MKTF-10	9/18/2020	6937.16	6929.64	6929.63	7.53	7.52	0.01	16.41
MKTF-10	11/10/2020	6937.16	NA	6929.37	7.79	ND	NA	16.41
MKTF-10	12/3/2020	6937.16	NA	6929.36	7.80	ND	NA	16.50
MKTF-11	1/15/2014	6931.34	NA	6922.85	8.49	ND	NA	18.14
MKTF-11	2/13/2014	6931.34	NA	6922.70	8.64	ND	NA	18.14

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
MKTF-11	3/11/2014	6931.34	NA	6922.84	8.50	ND	NA	18.14
MKTF-11	6/5/2014	6931.34	NA	6922.14	9.20	ND	NA	18.14
MKTF-11	9/15/2014	6931.34	NA	6921.99	9.35	ND	NA	18.14
MKTF-11	11/13/2014	6931.34	NA	6921.79	9.55	ND	NA	18.14
MKTF-11	3/16/2015	6931.34	NA	6922.54	8.80	ND	NA	18.14
MKTF-11	6/4/2015	6931.34	NA	6922.34	9.00	ND	NA	18.14
MKTF-11	8/18/2015	6931.34	NA	6922.89	8.45	ND	NA	18.14
MKTF-11	11/3/2015	6931.34	NA	6922.71	8.63	ND	NA	18.14
MKTF-11	2/29/2016	6931.34	NA	6922.54	8.80	ND	NA	18.14
MKTF-11	6/9/2016	6931.34	NA	6922.68	8.66	ND	NA	18.14
MKTF-11	9/11/2016	6931.34	NA	6922.64	8.70	ND	NA	18.14
MKTF-11	11/3/2016	6931.34	NA	6922.71	8.63	ND	NA	18.14
MKTF-11	3/2/2017	6931.34	NA	6924.38	6.96	ND	NA	18.14
MKTF-11	6/7/2017	6931.34	NA	6923.95	7.39	ND	NA	18.14
MKTF-11	9/26/2017	6931.34	NA	6924.64	6.70	ND	NA	18.14
MKTF-11	11/29/2017	6931.34	NA	6923.34	8.00	ND	NA	18.14
MKTF-11	2/8/2018	6931.34	NA	6923.47	7.87	ND	NA	18.31
MKTF-11	4/25/2018	6931.34	NA	6923.49	7.85	ND	NA	18.39
MKTF-11	8/16/2018	6931.34	NA	6923.86	7.48	ND	NA	18.48
MKTF-11	11/19/2018	6931.34	NA	6924.14	7.20	ND	NA	18.14
MKTF-11	3/25/2019	6931.34	NA	6926.38	4.96	ND	NA	18.14
MKTF-11	5/13/2019	6931.34	NA	6926.10	5.24	ND	NA	18.14
MKTF-11	8/21/2019	6931.34	NA	6925.12	6.22	ND	NA	18.48
MKTF-11	10/30/2019	6931.34	NA	6924.28	7.06	ND	NA	18.14
MKTF-11	3/2/2020	6931.34	NA	6923.45	7.89	ND	NA	18.14
MKTF-11	6/26/2020	6931.34	6923.67	6923.66	7.68	7.67	0.01	18.14
MKTF-11	9/18/2020	6931.34	6923.75	6923.74	7.60	7.59	0.01	18.45
MKTF-11	11/10/2020	6931.34	NA	6923.73	7.61	ND	NA	18.45
MKTF-11	12/3/2020	6931.34	6923.45	6923.43	7.91	7.89	0.02	18.45
MKTF-12	1/13/2014	6942.11	6922.85	6922.58	19.53	19.26	0.27	25.60
MKTF-12	2/12/2014	6942.11	6922.66	6922.24	19.87	19.45	0.42	25.60
MKTF-12	3/11/2014	6942.11	6922.96	6922.68	19.43	19.15	0.28	25.60
MKTF-12	6/4/2014	6942.11	6922.37	6922.29	19.82	19.74	0.08	25.60
MKTF-12	9/15/2014	6942.11	6922.30	6921.11	21.00	19.81	1.19	25.60
MKTF-12	11/17/2014	6942.11	6921.91	6920.73	21.38	20.20	1.18	25.60
MKTF-12	3/12/2015	6942.11	6922.98	6921.17	20.94	19.13	1.81	25.60
MKTF-12	6/9/2015	6942.11	6922.64	6920.46	21.65	19.47	2.18	25.60
MKTF-12	8/18/2015	6942.11	6922.65	6922.12	19.99	19.46	0.53	25.60
MKTF-12	11/3/2015	6942.11	6922.45	6921.84	20.27	19.66	0.61	25.60
MKTF-12	3/12/2016	6942.11	6922.98	6921.17	20.94	19.13	1.81	25.60
MKTF-12	6/10/2016	6942.11	6923.88	6922.56	19.55	18.23	1.32	25.60
MKTF-12	9/10/2016	6942.11	6922.88	6922.56	19.55	19.23	0.32	25.60
MKTF-12	11/3/2016	6942.11	6922.45	6921.84	20.27	19.66	0.61	25.60
MKTF-12	3/15/2017	6942.11	6924.36	6924.30	17.81	17.75	0.06	25.60
MKTF-12	6/7/2017	6942.11	6923.51	6923.32	18.79	18.60	0.19	25.60
MKTF-12	10/3/2017	6942.11	6924.81	6924.68	17.43	17.30	0.13	25.60
MKTF-12	11/27/2017	6942.11	6923.68	6923.55	18.56	18.43	0.13	25.60

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
MKTF-12	2/7/2018	6942.11	6923.00	6922.83	19.28	19.11	0.17	25.60
MKTF-12	4/26/2018	6942.11	6923.00	6922.88	19.23	19.11	0.12	25.58
MKTF-12	8/15/2018	6942.11	6923.10	6922.91	19.20	19.01	0.19	25.60
MKTF-12	11/27/2018	6942.11	6923.71	6923.57	18.54	18.40	0.14	25.60
MKTF-12	3/26/2019	6942.11	6925.46	6925.11	17.00	16.65	0.35	25.60
MKTF-12	5/9/2019	6942.11	6924.86	6924.76	17.35	17.25	0.10	25.60
MKTF-12	8/20/2019	6942.11	6924.19	6924.10	18.01	17.92	0.09	25.60
MKTF-12	10/28/2019	6942.11	6923.76	6923.64	18.47	18.35	0.12	25.60
MKTF-12	11/12/2019	6942.11	6923.97	6923.89	18.22	18.14	0.08	25.60
MKTF-12	11/13/2019	6942.11	6924.09	6923.99	18.12	18.02	0.10	25.60
MKTF-12	11/14/2019	6942.11	6924.00	6923.92	18.19	18.11	0.08	25.60
MKTF-12	11/15/2019	6942.11	6924.01	6923.93	18.18	18.10	0.08	25.60
MKTF-12	11/19/2019	6942.11	6924.11	6924.02	18.09	18.00	0.09	25.60
MKTF-12	11/21/2019	6942.11	6924.07	6923.91	18.20	18.04	0.16	25.60
MKTF-12	12/2/2019	6942.11	6924.41	6924.36	17.75	17.70	0.05	25.60
MKTF-12	2/27/2020	6942.11	6924.27	6924.19	17.92	17.84	0.08	25.60
MKTF-12	6/29/2020	6942.11	6922.98	6922.86	19.25	19.13	0.12	25.60
MKTF-12	9/18/2020	6942.11	6923.47	6923.46	18.65	18.64	0.01	25.82
MKTF-12	11/10/2020	6942.11	6924.14	6924.11	18.00	17.97	0.03	25.82
MKTF-12	12/3/2020	6942.11	6923.21	6923.05	19.06	18.90	0.16	25.89
MKTF-13	1/13/2014	6935.18	6922.38	6922.08	13.10	12.80	0.30	21.25
MKTF-13	2/12/2014	6935.18	6922.20	6921.86	13.32	12.98	0.34	21.25
MKTF-13	3/11/2014	6935.18	6922.51	6922.18	13.00	12.67	0.33	21.25
MKTF-13	6/4/2014	6935.18	6920.58	6919.93	15.25	14.60	0.65	21.25
MKTF-13	9/15/2014	6935.18	6920.57	6919.43	15.75	14.61	1.14	21.25
MKTF-13	11/17/2014	6935.18	6920.25	6918.85	16.33	14.93	1.40	21.25
MKTF-13	3/12/2015	6935.18	6921.43	6919.36	15.82	13.75	2.07	21.25
MKTF-13	6/9/2015	6935.18	6920.96	6919.31	15.87	14.22	1.65	21.25
MKTF-13	8/21/2015	6935.18	6921.24	6919.56	15.62	13.94	1.68	21.25
MKTF-13	11/3/2015	6935.18	6920.96	6919.63	15.55	14.22	1.33	21.25
MKTF-13	3/12/2016	6935.18	6921.43	6919.36	15.82	13.75	2.07	21.25
MKTF-13	6/10/2016	6935.18	6922.19	6920.99	14.19	12.99	1.20	21.25
MKTF-13	9/10/2016	6935.18	6921.30	6920.32	14.86	13.88	0.98	21.25
MKTF-13	11/3/2016	6935.18	6920.96	6919.63	15.55	14.22	1.33	21.25
MKTF-13	3/15/2017	6935.18	NA	6922.58	12.60	ND	NA	21.25
MKTF-13	6/7/2017	6935.18	6921.83	6921.77	13.41	13.35	0.06	21.25
MKTF-13	10/3/2017	6935.18	6923.27	6923.24	11.94	11.91	0.03	21.25
MKTF-13	11/27/2017	6935.18	6922.04	6922.03	13.15	13.14	0.01	21.25
MKTF-13	2/7/2018	6935.18	6921.41	6921.40	13.78	13.77	0.01	21.25
MKTF-13	4/26/2018	6935.18	NA	6921.43	13.75	ND	NA	21.66
MKTF-13	8/15/2018	6935.18	NA	6921.50	13.68	ND	NA	21.55
MKTF-13	11/27/2018	6935.18	NA	6922.46	12.72	ND	NA	21.25
MKTF-13	3/26/2019	6935.18	NA	6924.28	10.90	ND	NA	21.25
MKTF-13	5/9/2019	6935.18	NA	6923.58	11.60	ND	NA	21.25
MKTF-13	8/20/2019	6935.18	NA	6922.73	12.45	ND	NA	21.55
MKTF-13	10/28/2019	6935.18	NA	6922.23	12.95	ND	NA	21.25
MKTF-13	11/12/2019	6935.18	NA	6922.36	12.82	ND	NA	21.25

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
MKTF-13	11/13/2019	6935.18	NA	6922.43	12.75	ND	NA	21.25
MKTF-13	11/14/2019	6935.18	NA	6922.33	12.85	ND	NA	21.25
MKTF-13	11/15/2019	6935.18	NA	6922.38	12.80	ND	NA	21.25
MKTF-13	11/19/2019	6935.18	NA	6922.47	12.71	ND	NA	21.25
MKTF-13	11/21/2019	6935.18	NA	6922.43	12.75	ND	NA	21.25
MKTF-13	12/2/2019	6935.18	NA	6922.78	12.40	ND	NA	21.25
MKTF-13	2/27/2020	6935.18	6924.05	6917.87	17.31	11.13	6.18	21.25
MKTF-13	6/29/2020	6935.18	6922.51	6916.97	18.21	12.67	5.54	21.25
MKTF-13	9/18/2020	6935.18	6922.63	6918.26	16.92	12.55	4.37	22.13
MKTF-13	11/10/2020	6935.18	6923.20	6918.82	16.36	11.98	4.38	22.13
MKTF-13	12/3/2020	6935.18	6922.34	6918.53	16.65	12.84	3.81	21.92
MKTF-14	1/13/2014	6928.02	6920.64	6919.03	8.99	7.38	1.61	17.46
MKTF-14	2/12/2014	6928.02	6920.42	6919.25	8.77	7.60	1.17	17.46
MKTF-14	3/11/2014	6928.02	6920.75	6919.60	8.42	7.27	1.15	17.46
MKTF-14	6/4/2014	6928.02	6920.11	6919.29	8.73	7.91	0.82	17.46
MKTF-14	9/15/2014	6928.02	6919.72	6919.27	8.75	8.30	0.45	17.46
MKTF-14	11/17/2014	6928.02	6919.45	6919.08	8.94	8.57	0.37	17.46
MKTF-14	3/12/2015	6928.02	6920.42	6919.87	8.15	7.60	0.55	17.46
MKTF-14	6/9/2015	6928.02	6920.02	6919.65	8.37	8.00	0.37	17.46
MKTF-14	8/21/2015	6928.02	6920.41	6919.99	8.03	7.61	0.42	17.46
MKTF-14	11/3/2015	6928.02	6920.31	6919.92	8.10	7.71	0.39	17.46
MKTF-14	3/12/2016	6928.02	6920.42	6919.87	8.15	7.60	0.55	17.46
MKTF-14	6/10/2016	6928.02	6920.89	6918.56	9.46	7.13	2.33	17.46
MKTF-14	9/10/2016	6928.02	6920.71	6919.02	9.00	7.31	1.69	17.46
MKTF-14	11/3/2016	6928.02	6920.31	6919.92	8.10	7.71	0.39	17.46
MKTF-14	3/8/2017	6928.02	6922.25	6921.27	6.75	5.77	0.98	17.46
MKTF-14	6/7/2017	6928.02	6921.34	6920.50	7.52	6.68	0.84	17.46
MKTF-14	10/3/2017	6928.02	6922.32	6921.91	6.11	5.70	0.41	17.46
MKTF-14	11/27/2017	6928.02	6921.46	6921.09	6.93	6.56	0.37	17.46
MKTF-14	2/7/2018	6928.02	6921.04	6920.63	7.39	6.98	0.41	17.46
MKTF-14	4/26/2018	6928.02	6921.01	6920.63	7.39	7.01	0.38	17.43
MKTF-14	8/15/2018	6928.02	6921.07	6920.72	7.30	6.95	0.35	17.45
MKTF-14	11/27/2018	6928.02	6921.76	6921.37	6.65	6.26	0.39	17.46
MKTF-14	3/25/2019	6928.02	6924.13	6923.77	4.25	3.89	0.36	17.46
MKTF-14	5/9/2019	6928.02	6923.37	6922.98	5.04	4.65	0.39	17.46
MKTF-14	8/20/2019	6928.02	6922.38	6922.10	5.92	5.64	0.28	17.45
MKTF-14	10/28/2019	6928.02	6922.00	6921.63	6.39	6.02	0.37	17.46
MKTF-14	2/27/2020	6928.02	6922.67	6922.37	5.65	5.35	0.30	17.46
MKTF-14	6/29/2020	6928.02	6921.64	6919.44	8.58	6.38	2.20	17.46
MKTF-14	9/18/2020	6928.02	6921.84	6919.86	8.16	6.18	1.98	17.32
MKTF-14	11/10/2020	6928.02	6922.04	6921.74	6.28	5.98	0.30	17.32
MKTF-14	12/3/2020	6928.02	6921.23	6920.96	7.06	6.79	0.27	17.55
MKTF-15	1/13/2014	6943.48	NA	6929.60	13.88	ND	NA	19.48
MKTF-15	2/13/2014	6943.48	NA	6929.60	13.88	ND	NA	19.48
MKTF-15	3/11/2014	6943.48	NA	6929.62	13.86	ND	NA	19.48
MKTF-15	6/5/2014	6943.48	NA	6929.67	13.81	ND	NA	19.48
MKTF-15	9/15/2014	6943.48	NA	6929.77	13.71	ND	NA	19.48

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
MKTF-15	11/14/2014	6943.48	6929.98	6928.93	14.55	13.50	1.05	19.48
MKTF-15	3/16/2015	6943.48	6930.31	6929.56	13.92	13.17	0.75	19.48
MKTF-15	6/4/2015	6943.48	6930.28	6929.70	13.78	13.20	0.58	19.48
MKTF-15	8/18/2015	6943.48	6930.39	6930.14	13.34	13.09	0.25	19.48
MKTF-15	11/3/2015	6943.48	6930.58	6929.93	13.55	12.90	0.65	19.48
MKTF-15	3/16/2016	6943.48	6930.31	6929.56	13.92	13.17	0.75	19.48
MKTF-15	6/9/2016	6943.48	6930.88	6930.66	12.82	12.60	0.22	19.48
MKTF-15	9/11/2016	6943.48	NA	6930.48	13.00	ND	NA	19.48
MKTF-15	11/3/2016	6943.48	6930.58	6929.93	13.55	12.90	0.65	19.48
MKTF-15	3/2/2017	6943.48	NA	6931.33	12.15	ND	NA	19.48
MKTF-15	6/7/2017	6943.48	NA	6931.55	11.93	ND	NA	19.48
MKTF-15	9/26/2017	6943.48	6931.48	6931.38	12.10	12.00	0.10	19.48
MKTF-15	11/29/2017	6943.48	NA	6931.35	12.13	ND	NA	19.48
MKTF-15	2/8/2018	6943.48	6931.08	6931.01	12.47	12.40	0.07	19.48
MKTF-15	4/25/2018	6943.48	NA	6931.28	12.20	ND	NA	19.40
MKTF-15	8/16/2018	6943.48	NA	6931.08	12.40	ND	NA	19.50
MKTF-15	11/19/2018	6943.48	6930.91	6930.78	12.70	12.57	0.13	19.48
MKTF-15	3/25/2019	6943.48	6932.50	6932.48	11.00	10.98	0.02	19.48
MKTF-15	5/13/2019	6943.48	NA	6931.89	11.59	ND	NA	19.48
MKTF-15	8/21/2019	6943.48	6931.46	6931.45	12.03	12.02	0.01	19.50
MKTF-15	10/30/2019	6943.48	6930.83	6930.78	12.70	12.65	0.05	19.48
MKTF-15	2/3/2020	6943.48	6930.46	6930.37	13.11	13.02	0.09	19.48
MKTF-15	6/26/2020	6943.48	6930.37	6930.31	13.17	13.11	0.06	19.48
MKTF-15	9/18/2020	6943.48	6930.48	6930.45	13.03	13.00	0.03	19.18
MKTF-15	11/10/2020	6943.48	6930.09	6929.88	13.60	13.39	0.21	19.52
MKTF-16	1/13/2014	6950.58	NA	6941.13	9.45	ND	NA	14.10
MKTF-16	2/13/2014	6950.58	NA	6940.95	9.63	ND	NA	14.10
MKTF-16	3/11/2014	6950.58	NA	6940.92	9.66	ND	NA	14.10
MKTF-16	6/5/2014	6950.58	NA	6940.06	10.52	ND	NA	14.10
MKTF-16	9/15/2014	6950.58	NA	6939.98	10.60	ND	NA	14.10
MKTF-16	11/18/2014	6950.58	NA	6938.92	11.66	ND	NA	14.10
MKTF-16	3/16/2015	6950.58	NA	6939.65	10.93	ND	NA	14.10
MKTF-16	6/8/2015	6950.58	NA	6941.72	8.86	ND	NA	14.10
MKTF-16	8/23/2015	6950.58	NA	6940.79	9.79	ND	NA	14.10
MKTF-16	11/3/2015	6950.58	NA	6941.09	9.49	ND	NA	14.10
MKTF-16	2/29/2016	6950.58	NA	6940.68	9.90	ND	NA	14.10
MKTF-16	6/8/2016	6950.58	NA	6941.00	9.58	ND	NA	14.10
MKTF-16	9/11/2016	6950.58	NA	6940.93	9.65	ND	NA	14.10
MKTF-16	11/3/2016	6950.58	NA	6941.09	9.49	ND	NA	14.10
MKTF-16	3/14/2017	6950.58	NA	6943.13	7.45	ND	NA	14.10
MKTF-16	6/7/2017	6950.58	NA	6942.92	7.66	ND	NA	14.10
MKTF-16	9/26/2017	6950.58	NA	6942.58	8.00	ND	NA	14.10
MKTF-16	11/28/2017	6950.58	NA	6942.36	8.22	ND	NA	14.10
MKTF-16	2/14/2018	6950.58	NA	6941.78	8.80	ND	NA	14.10
MKTF-16	4/25/2018	6950.58	NA	6942.23	8.35	ND	NA	13.96
MKTF-16	8/16/2018	6950.58	NA	6942.03	8.55	ND	NA	14.08
MKTF-16	11/29/2018	6950.58	NA	6941.04	9.54	ND	NA	14.10

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
MKTF-16	2/20/2019	6950.58	NA	6943.53	7.05	ND	NA	14.10
MKTF-16	5/13/2019	6950.58	NA	6942.23	8.35	ND	NA	14.10
MKTF-16	8/21/2019	6950.58	NA	6941.36	9.22	ND	NA	14.08
MKTF-16	10/30/2019	6950.58	NA	6940.69	9.89	ND	NA	14.10
MKTF-16	2/5/2020	6950.58	NA	6940.90	9.68	ND	NA	14.10
MKTF-16	6/26/2020	6950.58	NA	6941.04	9.54	ND	NA	14.10
MKTF-16	9/18/2020	6950.58	6941.40	6941.39	9.19	9.18	0.01	10.92
MKTF-16	11/10/2020	6950.58	NA	6943.38	7.20	ND	NA	10.92
MKTF-16	12/8/2020	6950.58	NA	6940.88	9.70	ND	NA	10.95
MKTF-17	1/13/2014	6945.76	NA	6936.95	8.81	ND	NA	24.11
MKTF-17	2/13/2014	6945.76	NA	6935.95	9.81	ND	NA	24.11
MKTF-17	3/11/2014	6945.76	NA	6935.76	10.00	ND	NA	24.11
MKTF-17	6/6/2014	6945.76	NA	6934.48	11.28	ND	NA	24.11
MKTF-17	9/15/2014	6945.76	NA	6934.49	11.27	ND	NA	24.11
MKTF-17	11/18/2014	6945.76	NA	6933.01	12.75	ND	NA	24.11
MKTF-17	3/12/2015	6945.76	NA	6932.95	12.81	ND	NA	24.11
MKTF-17	6/8/2015	6945.76	NA	6932.36	13.40	ND	NA	24.11
MKTF-17	8/18/2015	6945.76	NA	6933.78	11.98	ND	NA	24.11
MKTF-17	11/3/2015	6945.76	NA	6933.42	12.34	ND	NA	24.11
MKTF-17	2/25/2016	6945.76	NA	6933.94	11.82	ND	NA	24.11
MKTF-17	6/10/2016	6945.76	NA	6934.46	11.30	ND	NA	24.11
MKTF-17	9/12/2016	6945.76	NA	6933.36	12.40	ND	NA	24.11
MKTF-17	11/3/2016	6945.76	NA	6933.42	12.34	ND	NA	24.11
MKTF-17	3/8/2017	6945.76	NA	6937.56	8.20	ND	NA	24.11
MKTF-17	6/14/2017	6945.76	NA	6935.78	9.98	ND	NA	24.11
MKTF-17	9/26/2017	6945.76	NA	6936.43	9.33	ND	NA	24.11
MKTF-17	11/30/2017	6945.76	NA	6932.08	13.68	ND	NA	24.65
MKTF-17	2/15/2018	6945.76	NA	6934.11	11.65	ND	NA	24.68
MKTF-17	4/26/2018	6945.76	NA	6933.48	12.28	ND	NA	24.55
MKTF-17	8/15/2018	6945.76	NA	6933.26	12.50	ND	NA	24.68
MKTF-17	11/27/2018	6945.76	NA	6932.11	13.65	ND	NA	24.65
MKTF-17	3/25/2019	6945.76	NA	6935.06	10.70	ND	NA	24.11
MKTF-17	5/9/2019	6945.76	NA	6931.71	14.05	ND	NA	24.11
MKTF-17	8/19/2019	6945.76	NA	6934.97	10.79	ND	NA	24.68
MKTF-17	10/28/2019	6945.76	NA	6936.76	9.00	ND	NA	24.65
MKTF-17	10/29/2019	6945.76	NA	6930.56	15.20	ND	NA	24.65
MKTF-17	11/12/2019	6945.76	NA	6933.90	11.86	ND	NA	24.65
MKTF-17	11/19/2019	6945.76	6933.41	6931.81	13.95	12.35	1.60	24.65
MKTF-17	11/21/2019	6945.76	6933.34	6930.46	15.30	12.42	2.88	24.65
MKTF-17	12/2/2019	6945.76	6932.59	6927.71	18.05	13.17	4.88	24.65
MKTF-17	2/3/2020	6945.76	6934.32	6928.91	16.85	11.44	5.41	24.11
MKTF-17	6/29/2020	6945.76	6935.57	6930.26	15.50	10.19	5.31	24.11
MKTF-17	9/14/2020	6945.76	6935.76	6930.39	15.37	10.00	5.37	24.67
MKTF-17	11/10/2020	6945.76	6934.37	6934.17	11.59	11.39	0.20	24.67
MKTF-17	12/4/2020	6945.76	6934.48	6934.29	11.47	11.28	0.19	24.66
MKTF-18	1/13/2014	6950.65	NA	6942.32	8.33	ND	NA	25.38
MKTF-18	2/13/2014	6950.65	NA	6942.32	8.33	ND	NA	25.38

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
MKTF-18	3/11/2014	6950.65	NA	6942.56	8.09	ND	NA	25.38
MKTF-18	6/6/2014	6950.65	NA	6942.20	8.45	ND	NA	25.38
MKTF-18	9/15/2014	6950.65	NA	6941.84	8.81	ND	NA	25.38
MKTF-18	11/18/2014	6950.65	NA	6941.19	9.46	ND	NA	25.38
MKTF-18	3/17/2015	6950.65	NA	6941.73	8.92	ND	NA	25.38
MKTF-18	6/8/2015	6950.65	NA	6941.79	8.86	ND	NA	25.38
MKTF-18	8/18/2015	6950.65	NA	6941.82	8.83	ND	NA	25.38
MKTF-18	11/3/2015	6950.65	NA	6942.13	8.52	ND	NA	25.38
MKTF-18	2/26/2016	6950.65	NA	6942.31	8.34	ND	NA	25.38
MKTF-18	6/10/2016	6950.65	NA	6938.80	11.85	ND	NA	25.38
MKTF-18	9/12/2016	6950.65	NA	6942.90	7.75	ND	NA	25.38
MKTF-18	11/3/2016	6950.65	NA	6942.13	8.52	ND	NA	25.38
MKTF-18	3/1/2017	6950.65	NA	6942.84	7.81	ND	NA	25.38
MKTF-18	6/14/2017	6950.65	NA	6944.35	6.30	ND	NA	25.38
MKTF-18	9/27/2017	6950.65	6944.30	6944.28	6.37	6.35	0.02	25.38
MKTF-18	11/30/2017	6950.65	6944.36	6944.35	6.30	6.29	0.01	25.38
MKTF-18	2/15/2018	6950.65	NA	6944.18	6.47	ND	NA	26.80
MKTF-18	4/26/2018	6950.65	NA	6942.43	8.22	ND	NA	26.70
MKTF-18	8/16/2018	6950.65	NA	6943.53	7.12	ND	NA	27.45
MKTF-18	11/27/2018	6950.65	NA	6942.71	7.94	ND	NA	25.38
MKTF-18	3/25/2019	6950.65	NA	6943.33	7.32	ND	NA	25.38
MKTF-18	5/16/2019	6950.65	NA	6943.11	7.54	ND	NA	25.38
MKTF-18	8/19/2019	6950.65	6942.94	6942.93	7.72	7.71	0.01	27.45
MKTF-18	10/28/2019	6950.65	NA	6942.86	7.79	ND	NA	25.38
MKTF-18	10/29/2019	6950.65	NA	6942.35	8.30	ND	NA	25.38
MKTF-18	11/12/2019	6950.65	NA	6942.46	8.19	ND	NA	25.38
MKTF-18	2/5/2020	6950.65	NA	6941.55	9.10	ND	NA	25.38
MKTF-18	6/30/2020	6950.65	NA	6941.67	8.98	ND	NA	25.38
MKTF-18	9/18/2020	6950.65	6942.16	6942.15	8.50	8.49	0.01	21.73
MKTF-18	11/10/2020	6950.65	NA	6941.91	8.74	ND	NA	21.73
MKTF-18	12/4/2020	6950.65	NA	6941.85	8.80	ND	NA	25.50
MKTF-19	6/4/2014	6944.67	NA	6932.76	11.91	ND	NA	17.47
MKTF-19	9/24/2014	6944.67	NA	6932.20	12.47	ND	NA	17.47
MKTF-19	11/18/2014	6944.67	NA	6930.91	13.76	ND	NA	17.47
MKTF-19	3/12/2015	6944.67	NA	6931.72	12.95	ND	NA	17.47
MKTF-19	6/8/2015	6944.67	NA	6931.91	12.76	ND	NA	17.47
MKTF-19	8/18/2015	6944.67	NA	6932.07	12.60	ND	NA	17.47
MKTF-19	11/3/2015	6944.67	NA	6931.83	12.84	ND	NA	17.47
MKTF-19	2/25/2016	6944.67	NA	6932.05	12.62	ND	NA	17.47
MKTF-19	6/10/2016	6944.67	NA	6932.77	11.90	ND	NA	17.47
MKTF-19	9/12/2016	6944.67	NA	6933.42	11.25	ND	NA	17.47
MKTF-19	11/3/2016	6944.67	NA	6931.83	12.84	ND	NA	17.47
MKTF-19	3/8/2017	6944.67	NA	6934.85	9.82	ND	NA	17.47
MKTF-19	6/14/2017	6944.67	NA	6934.09	10.58	ND	NA	17.47
MKTF-19	9/26/2017	6944.67	NA	6933.67	11.00	ND	NA	17.47
MKTF-19	11/30/2017	6944.67	NA	6932.97	11.70	ND	NA	18.20
MKTF-19	2/15/2018	6944.67	NA	6932.67	12.00	ND	NA	18.45

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
MKTF-19	4/26/2018	6944.67	NA	6932.62	12.05	ND	NA	18.19
MKTF-19	8/15/2018	6944.67	NA	6932.47	12.20	ND	NA	19.30
MKTF-19	11/27/2018	6944.67	NA	6932.30	12.37	ND	NA	18.20
MKTF-19	3/25/2019	6944.67	NA	6933.27	11.40	ND	NA	17.47
MKTF-19	5/9/2019	6944.67	NA	6933.36	11.31	ND	NA	17.47
MKTF-19	8/19/2019	6944.67	NA	6933.61	11.06	ND	NA	19.30
MKTF-19	10/28/2019	6944.67	NA	6933.76	10.91	ND	NA	18.20
MKTF-19	10/29/2019	6944.67	NA	6928.91	15.76	ND	NA	18.20
MKTF-19	11/12/2019	6944.67	NA	6933.82	10.85	ND	NA	18.20
MKTF-19	11/19/2019	6944.67	NA	6933.77	10.90	ND	NA	18.20
MKTF-19	11/21/2019	6944.67	NA	6933.62	11.05	ND	NA	18.20
MKTF-19	12/2/2019	6944.67	6933.04	6932.17	12.50	11.63	0.87	18.20
MKTF-19	2/3/2020	6944.67	6933.32	6932.27	12.40	11.35	1.05	17.47
MKTF-19	6/29/2020	6944.67	6932.59	6931.38	13.29	12.08	1.21	17.47
MKTF-19	9/14/2020	6944.67	6932.72	6932.70	11.97	11.95	0.02	19.24
MKTF-19	11/10/2020	6944.67	6932.45	6931.12	13.55	12.22	1.33	19.24
MKTF-19	12/4/2020	6944.67	6932.49	6931.25	13.42	12.18	1.24	19.38
MKTF-20	6/4/2014	6951.78	NA	6943.87	7.91	ND	NA	9.89
MKTF-20	9/23/2014	6951.78	NA	6943.40	8.38	ND	NA	9.89
MKTF-20	11/18/2014	6951.78	NA	6943.38	8.40	ND	NA	9.89
MKTF-20	3/16/2015	6951.78	NA	6944.52	7.26	ND	NA	9.89
MKTF-20	6/8/2015	6951.78	NA	6943.89	7.89	ND	NA	9.89
MKTF-20	8/23/2015	6951.78	NA	6943.99	7.79	ND	NA	9.89
MKTF-20	11/9/2015	6951.78	NA	6944.00	7.78	ND	NA	9.89
MKTF-20	2/29/2016	6951.78	NA	6943.97	7.81	ND	NA	9.89
MKTF-20	6/8/2016	6951.78	NA	6944.55	7.23	ND	NA	9.89
MKTF-20	9/11/2016	6951.78	NA	6944.13	7.65	ND	NA	9.89
MKTF-20	11/9/2016	6951.78	NA	6944.00	7.78	ND	NA	9.89
MKTF-20	3/14/2017	6951.78	NA	6946.08	5.70	ND	NA	9.89
MKTF-20	6/12/2017	6951.78	NA	6946.21	5.57	ND	NA	9.89
MKTF-20	9/26/2017	6951.78	NA	6945.55	6.23	ND	NA	9.89
MKTF-20	11/28/2017	6951.78	NA	6945.25	6.53	ND	NA	9.58
MKTF-20	2/14/2018	6951.78	NA	6944.33	7.45	ND	NA	9.55
MKTF-20	4/25/2018	6951.78	NA	6944.88	6.90	ND	NA	9.50
MKTF-20	8/16/2018	6951.78	NA	6944.58	7.20	ND	NA	9.56
MKTF-20	11/29/2018	6951.78	NA	6944.26	7.52	ND	NA	9.58
MKTF-20	2/20/2019	6951.78	NA	6945.49	6.29	ND	NA	8.83
MKTF-20	5/13/2019	6951.78	NA	6944.64	7.14	ND	NA	8.83
MKTF-20	8/20/2019	6951.78	NA	6943.75	8.03	ND	NA	8.83
MKTF-20	11/4/2019	6951.78	NA	6944.10	7.68	ND	NA	8.83
MKTF-20	2/5/2020	6951.78	NA	6942.76	9.02	ND	NA	8.83
MKTF-20	6/26/2020	6951.78	NA	6943.11	8.67	ND	NA	8.83
MKTF-20	9/15/2020	6951.78	6943.24	6942.43	9.35	8.54	0.81	9.62
MKTF-20	11/10/2020	6951.78	6943.68	6942.88	8.90	8.10	0.80	9.62
MKTF-20	12/8/2020	6951.78	6943.02	6942.83	8.95	8.76	0.19	9.60
MKTF-21	6/4/2014	6952.57	NA	6944.89	7.68	ND	NA	9.89
MKTF-21	9/23/2014	6952.57	NA	6944.18	8.39	ND	NA	9.89

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
MKTF-21	11/18/2014	6952.57	NA	6944.57	8.00	ND	NA	9.89
MKTF-21	3/16/2015	6952.57	NA	6944.95	7.62	ND	NA	9.89
MKTF-21	6/10/2015	6952.57	NA	6944.61	7.96	ND	NA	9.89
MKTF-21	8/23/2015	6952.57	NA	6944.95	7.62	ND	NA	9.89
MKTF-21	11/9/2015	6952.57	NA	6945.11	7.46	ND	NA	9.89
MKTF-21	2/29/2016	6952.57	NA	6945.33	7.24	ND	NA	9.89
MKTF-21	6/8/2016	6952.57	NA	6945.59	6.98	ND	NA	9.89
MKTF-21	9/11/2016	6952.57	NA	6944.95	7.62	ND	NA	9.89
MKTF-21	11/9/2016	6952.57	NA	6945.11	7.46	ND	NA	9.89
MKTF-21	3/14/2017	6952.57	NA	6947.07	5.50	ND	NA	9.89
MKTF-21	6/21/2017	6952.57	NA	6947.48	5.09	ND	NA	9.89
MKTF-21	9/26/2017	6952.57	NA	6946.88	5.69	ND	NA	9.89
MKTF-21	11/28/2017	6952.57	NA	6946.32	6.25	ND	NA	8.81
MKTF-21	2/14/2018	6952.57	NA	6945.69	6.88	ND	NA	8.80
MKTF-21	4/25/2018	6952.57	NA	6946.25	6.32	ND	NA	8.75
MKTF-21	8/16/2018	6952.57	NA	6946.52	6.05	ND	NA	8.80
MKTF-21	11/29/2018	6952.57	NA	6945.05	7.52	ND	NA	8.81
MKTF-21	2/20/2019	6952.57	NA	6946.95	5.62	ND	NA	8.81
MKTF-21	5/13/2019	6952.57	NA	6945.87	6.70	ND	NA	8.81
MKTF-21	8/20/2019	6952.57	NA	6945.35	7.22	ND	NA	8.81
MKTF-21	10/30/2019	6952.57	NA	6944.25	8.32	ND	NA	8.81
MKTF-21	2/5/2020	6952.57	NA	6944.32	8.25	ND	NA	8.83
MKTF-21	6/26/2020	6952.57	6944.40	6944.37	8.20	8.17	0.03	8.83
MKTF-21	9/15/2020	6952.57	6945.49	6945.48	7.09	7.08	0.01	8.84
MKTF-21	11/10/2020	6952.57	NA	6946.16	6.41	ND	NA	8.84
MKTF-21	12/4/2020	6952.57	6944.53	6944.52	8.05	8.04	0.01	8.80
MKTF-22	6/4/2014	6942.31	NA	6916.06	26.25	ND	NA	35.25
MKTF-22	11/17/2014	6942.31	NA	6915.64	26.67	ND	NA	35.25
MKTF-22	3/12/2015	6942.31	NA	6916.24	26.07	ND	NA	35.25
MKTF-22	6/9/2015	6942.31	NA	6916.13	26.18	ND	NA	35.25
MKTF-22	8/20/2015	6942.31	NA	6916.11	26.20	ND	NA	36.25
MKTF-22	11/9/2015	6942.31	NA	6916.26	26.05	ND	NA	35.25
MKTF-22	2/25/2016	6942.31	NA	6916.18	26.13	ND	NA	35.25
MKTF-22	6/10/2016	6942.31	NA	6916.25	26.06	ND	NA	35.25
MKTF-22	9/10/2016	6942.31	NA	6916.18	26.13	ND	NA	36.25
MKTF-22	11/9/2016	6942.31	NA	6916.26	26.05	ND	NA	35.25
MKTF-22	3/8/2017	6942.31	NA	6917.21	25.10	ND	NA	35.25
MKTF-22	6/7/2017	6942.31	NA	6917.00	25.31	ND	NA	35.25
MKTF-22	10/3/2017	6942.31	NA	6917.12	25.19	ND	NA	35.25
MKTF-22	11/27/2017	6942.31	NA	6917.13	25.18	ND	NA	35.60
MKTF-22	2/7/2018	6942.31	NA	6916.81	25.50	ND	NA	35.60
MKTF-22	4/26/2018	6942.31	NA	6916.91	25.40	ND	NA	35.51
MKTF-22	8/15/2018	6942.31	NA	6916.51	25.80	ND	NA	35.62
MKTF-22	11/27/2018	6942.31	NA	6916.74	25.57	ND	NA	35.60
MKTF-22	3/25/2019	6942.31	NA	6917.88	24.43	ND	NA	35.25
MKTF-22	5/9/2019	6942.31	NA	6917.67	24.64	ND	NA	35.25
MKTF-22	8/20/2019	6942.31	NA	6917.36	24.95	ND	NA	35.62

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
MKTF-22	10/24/2019	6942.31	NA	6916.91	25.40	ND	NA	35.60
MKTF-22	2/27/2020	6942.31	6917.83	6916.78	25.53	24.48	1.05	35.25
MKTF-22	6/29/2020	6942.31	6917.74	6914.60	27.71	24.57	3.14	35.25
MKTF-22	9/14/2020	6942.31	6917.33	6914.63	27.68	24.98	2.70	35.09
MKTF-22	11/10/2020	6942.31	6917.37	6915.02	27.29	24.94	2.35	35.09
MKTF-22	12/4/2020	6942.31	6917.21	6914.76	27.55	25.10	2.45	35.09
MKTF-23	6/4/2014	6929.98	NA	6915.13	14.85	ND	NA	20.36
MKTF-23	9/23/2014	6929.98	NA	6914.59	15.39	ND	NA	20.36
MKTF-23	11/17/2014	6929.98	NA	6914.71	15.27	ND	NA	20.36
MKTF-23	3/12/2015	6929.98	NA	6915.19	14.79	ND	NA	20.36
MKTF-23	6/9/2015	6929.98	NA	6916.16	13.82	ND	NA	20.36
MKTF-23	8/21/2015	6929.98	NA	6915.22	14.76	ND	NA	21.36
MKTF-23	11/9/2015	6929.98	NA	6915.37	14.61	ND	NA	20.36
MKTF-23	2/25/2016	6929.98	NA	6915.31	14.67	ND	NA	20.36
MKTF-23	6/10/2016	6929.98	NA	6915.34	14.64	ND	NA	20.36
MKTF-23	9/10/2016	6929.98	6914.94	6914.83	15.15	15.04	0.11	21.36
MKTF-23	11/9/2016	6929.98	NA	6915.37	14.61	ND	NA	20.36
MKTF-23	3/8/2017	6929.98	NA	6915.78	14.20	ND	NA	20.36
MKTF-23	6/7/2017	6929.98	6915.78	6915.08	14.90	14.20	0.70	20.36
MKTF-23	10/3/2017	6929.98	6915.79	6915.73	14.25	14.19	0.06	20.36
MKTF-23	11/27/2017	6929.98	6916.05	6916.04	13.94	13.93	0.01	20.36
MKTF-23	2/7/2018	6929.98	6915.87	6915.78	14.20	14.11	0.09	20.36
MKTF-23	4/26/2018	6929.98	6915.91	6915.89	14.09	14.07	0.02	20.27
MKTF-23	8/15/2018	6929.98	6914.50	6914.40	15.58	15.48	0.10	20.38
MKTF-23	11/27/2018	6929.98	6915.78	6915.74	14.24	14.20	0.04	20.36
MKTF-23	3/25/2019	6929.98	NA	6917.43	12.55	ND	NA	20.36
MKTF-23	5/9/2019	6929.98	6917.03	6916.96	13.02	12.95	0.07	20.36
MKTF-23	8/20/2019	6929.98	6916.51	6916.48	13.50	13.47	0.03	20.38
MKTF-23	10/28/2019	6929.98	NA	6916.03	13.95	ND	NA	20.36
MKTF-23	2/27/2020	6929.98	NA	6916.56	13.42	ND	NA	20.36
MKTF-23	6/29/2020	6929.98	NA	6916.73	13.25	ND	NA	20.36
MKTF-23	9/19/2020	6929.98	6914.56	6914.54	15.44	15.42	0.02	20.02
MKTF-23	11/10/2020	6929.98	NA	6915.75	14.23	ND	NA	20.02
MKTF-23	12/4/2020	6929.98	6915.83	6915.82	14.16	14.15	0.01	20.39
MKTF-24	6/4/2014	6928.72	NA	6907.22	21.50	ND	NA	30.47
MKTF-24	9/23/2014	6928.72	NA	6906.15	22.57	ND	NA	30.47
MKTF-24	11/14/2014	6928.72	NA	6906.51	22.21	ND	NA	30.47
MKTF-24	3/11/2015	6928.72	NA	6907.18	21.54	ND	NA	30.47
MKTF-24	6/10/2015	6928.72	NA	6907.07	21.65	ND	NA	30.47
MKTF-24	8/20/2015	6928.72	NA	6907.19	21.53	ND	NA	31.47
MKTF-24	11/4/2015	6928.72	NA	6907.00	21.72	ND	NA	30.47
MKTF-24	2/22/2016	6928.72	NA	6907.38	21.34	ND	NA	30.47
MKTF-24	6/8/2016	6928.72	NA	6907.49	21.23	ND	NA	30.47
MKTF-24	9/7/2016	6928.72	NA	6906.03	22.69	ND	NA	31.47
MKTF-24	11/4/2016	6928.72	NA	6907.00	21.72	ND	NA	30.47
MKTF-24	3/6/2017	6928.72	NA	6908.11	20.61	ND	NA	30.47
MKTF-24	6/5/2017	6928.72	NA	6907.65	21.07	ND	NA	30.47

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
MKTF-24	10/3/2017	6928.72	NA	6907.20	21.52	ND	NA	30.47
MKTF-24	11/20/2017	6928.72	NA	6907.19	21.53	ND	NA	30.82
MKTF-24	2/6/2018	6928.72	NA	6907.12	21.60	ND	NA	30.83
MKTF-24	4/25/2018	6928.72	NA	6906.96	21.76	ND	NA	30.78
MKTF-24	8/15/2018	6928.72	NA	6906.07	22.65	ND	NA	30.85
MKTF-24	11/14/2018	6928.72	NA	6905.42	23.30	ND	NA	30.82
MKTF-24	2/25/2019	6928.72	NA	6906.29	22.43	ND	NA	30.47
MKTF-24	5/6/2019	6928.72	NA	6907.19	21.53	ND	NA	30.47
MKTF-24	8/23/2019	6928.72	NA	6906.67	22.05	ND	NA	30.85
MKTF-24	10/22/2019	6928.72	NA	6905.51	23.21	ND	NA	30.82
MKTF-24	2/24/2020	6928.72	NA	6906.55	22.17	ND	NA	30.47
MKTF-24	6/26/2020	6928.72	NA	6905.92	22.80	ND	NA	30.47
MKTF-24	9/15/2020	6928.72	NA	6905.37	23.35	ND	NA	31.13
MKTF-24	11/10/2020	6928.72	NA	6905.40	23.32	ND	NA	31.13
MKTF-24	12/4/2020	6928.72	NA	6905.50	23.22	ND	NA	31.18
MKTF-25	6/6/2014	6916.19	NA	6905.31	10.88	ND	NA	19.43
MKTF-25	9/23/2014	6916.19	NA	6904.06	12.13	ND	NA	19.43
MKTF-25	11/5/2014	6916.19	NA	6904.99	11.20	ND	NA	19.43
MKTF-25	11/14/2014	6916.19	NA	6904.73	11.46	ND	NA	19.43
MKTF-25	3/11/2015	6916.19	NA	6905.34	10.85	ND	NA	19.43
MKTF-25	6/10/2015	6916.19	NA	6905.15	11.04	ND	NA	19.43
MKTF-25	8/21/2015	6916.19	NA	6905.59	10.60	ND	NA	20.43
MKTF-25	2/23/2016	6916.19	NA	6905.36	10.83	ND	NA	19.43
MKTF-25	6/9/2016	6916.19	NA	6904.97	11.22	ND	NA	19.43
MKTF-25	9/8/2016	6916.19	NA	6904.02	12.17	ND	NA	20.43
MKTF-25	11/5/2016	6916.19	NA	6904.99	11.20	ND	NA	19.43
MKTF-25	3/6/2017	6916.19	NA	6906.67	9.52	ND	NA	19.43
MKTF-25	6/5/2017	6916.19	NA	6905.96	10.23	ND	NA	19.43
MKTF-25	9/25/2017	6916.19	NA	6905.15	11.04	ND	NA	19.43
MKTF-25	11/21/2017	6916.19	NA	6905.08	11.11	ND	NA	19.80
MKTF-25	2/5/2018	6916.19	NA	6904.99	11.20	ND	NA	19.55
MKTF-25	4/25/2018	6916.19	NA	6905.01	11.18	ND	NA	19.50
MKTF-25	8/15/2018	6916.19	NA	6903.83	12.36	ND	NA	19.78
MKTF-25	11/14/2018	6916.19	NA	6902.84	13.35	ND	NA	19.80
MKTF-25	2/14/2019	6916.19	NA	6903.06	13.13	ND	NA	19.43
MKTF-25	5/6/2019	6916.19	NA	6904.19	12.00	ND	NA	19.43
MKTF-25	8/23/2019	6916.19	NA	6903.07	13.12	ND	NA	19.78
MKTF-25	8/27/2019	6916.19	NA	6902.96	13.23	ND	NA	20.78
MKTF-25	10/22/2019	6916.19	NA	6902.47	13.72	ND	NA	19.80
MKTF-25	2/26/2020	6916.19	NA	6903.25	12.94	ND	NA	19.43
MKTF-25	6/26/2020	6916.19	NA	6902.86	13.33	ND	NA	19.43
MKTF-25	9/15/2020	6916.19	NA	6902.29	13.90	ND	NA	20.09
MKTF-25	11/10/2020	6916.19	NA	6902.44	13.75	ND	NA	20.09
MKTF-25	12/4/2020	6916.19	NA	6902.57	13.62	ND	NA	20.38
MKTF-26	6/4/2014	6915.31	NA	6906.68	8.63	ND	NA	17.15
MKTF-26	9/23/2014	6915.31	NA	6906.01	9.30	ND	NA	17.15
MKTF-26	11/14/2014	6915.31	NA	6906.59	8.72	ND	NA	17.15

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
MKTF-26	3/11/2015	6915.31	NA	6907.31	8.00	ND	NA	17.15
MKTF-26	6/10/2015	6915.31	NA	6906.74	8.57	ND	NA	17.15
MKTF-26	8/20/2015	6915.31	NA	6906.77	8.54	ND	NA	18.15
MKTF-26	11/4/2015	6915.31	NA	6906.91	8.40	ND	NA	17.15
MKTF-26	2/22/2016	6915.31	NA	6907.14	8.17	ND	NA	17.15
MKTF-26	6/9/2016	6915.31	NA	6905.71	9.60	ND	NA	17.15
MKTF-26	9/7/2016	6915.31	6905.87	6904.50	10.81	9.44	1.37	18.15
MKTF-26	11/4/2016	6915.31	NA	6906.91	8.40	ND	NA	17.15
MKTF-26	3/6/2017	6915.31	6907.87	6907.12	8.19	7.44	0.75	17.15
MKTF-26	6/5/2017	6915.31	6907.28	6906.32	8.99	8.03	0.96	17.15
MKTF-26	10/3/2017	6915.31	6907.54	6906.71	8.60	7.77	0.83	17.15
MKTF-26	11/20/2017	6915.31	6907.22	6906.38	8.93	8.09	0.84	17.15
MKTF-26	2/7/2018	6915.31	6906.78	6905.95	9.36	8.53	0.83	17.15
MKTF-26	4/25/2018	6915.31	6906.75	6905.94	9.37	8.56	0.81	17.05
MKTF-26	8/15/2018	6915.31	6906.58	6905.74	9.57	8.73	0.84	17.17
MKTF-26	11/14/2018	6915.31	6906.86	6905.41	9.90	8.45	1.45	17.15
MKTF-26	2/14/2019	6915.31	6906.93	6906.16	9.15	8.38	0.77	17.15
MKTF-26	5/6/2019	6915.31	6907.51	6906.66	8.65	7.80	0.85	17.15
MKTF-26	8/23/2019	6915.31	6907.09	6906.26	9.05	8.22	0.83	17.17
MKTF-26	10/22/2019	6915.31	6906.68	6905.95	9.36	8.63	0.73	17.15
MKTF-26	2/26/2020	6915.31	6906.96	6906.20	9.11	8.35	0.76	17.15
MKTF-26	6/26/2020	6915.31	6906.70	6905.81	9.50	8.61	0.89	17.15
MKTF-26	9/15/2020	6915.31	6906.50	6905.75	9.56	8.81	0.75	16.85
MKTF-26	11/10/2020	6915.31	6906.66	6905.95	9.36	8.65	0.71	16.85
MKTF-26	12/4/2020	6915.31	6907.64	6905.92	9.39	7.67	1.72	17.16
MKTF-27	6/4/2014	6917.90	NA	6910.23	7.67	ND	NA	14.72
MKTF-27	9/23/2014	6917.90	NA	6909.30	8.60	ND	NA	14.72
MKTF-27	11/14/2014	6917.90	NA	6909.75	8.15	ND	NA	14.72
MKTF-27	3/11/2015	6917.90	NA	6910.80	7.10	ND	NA	14.72
MKTF-27	6/9/2015	6917.90	NA	6910.46	7.44	ND	NA	14.72
MKTF-27	8/20/2015	6917.90	NA	6910.05	7.85	ND	NA	15.72
MKTF-27	11/4/2015	6917.90	NA	6910.37	7.53	ND	NA	14.72
MKTF-27	2/22/2016	6917.90	NA	6910.70	7.20	ND	NA	14.72
MKTF-27	6/8/2016	6917.90	NA	6910.39	7.51	ND	NA	14.72
MKTF-27	9/7/2016	6917.90	NA	6909.84	8.06	ND	NA	15.72
MKTF-27	11/4/2016	6917.90	NA	6910.37	7.53	ND	NA	14.72
MKTF-27	3/6/2017	6917.90	NA	6911.88	6.02	ND	NA	14.72
MKTF-27	6/5/2017	6917.90	NA	6911.58	6.32	ND	NA	14.72
MKTF-27	10/3/2017	6917.90	NA	6912.00	5.90	ND	NA	14.72
MKTF-27	11/20/2017	6917.90	NA	6911.92	5.98	ND	NA	14.72
MKTF-27	2/6/2018	6917.90	NA	6911.65	6.25	ND	NA	14.72
MKTF-27	4/25/2018	6917.90	NA	6911.56	6.34	ND	NA	14.62
MKTF-27	8/15/2018	6917.90	NA	6911.75	6.15	ND	NA	14.72
MKTF-27	11/14/2018	6917.90	NA	6911.59	6.31	ND	NA	14.72
MKTF-27	2/25/2019	6917.90	NA	6914.15	3.75	ND	NA	14.72
MKTF-27	5/6/2019	6917.90	NA	6912.17	5.73	ND	NA	14.72
MKTF-27	8/21/2019	6917.90	NA	6912.24	5.66	ND	NA	14.72

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
MKTF-27	10/30/2019	6917.90	NA	6911.76	6.14	ND	NA	14.72
MKTF-27	2/24/2020	6917.90	NA	6914.29	3.61	ND	NA	14.72
MKTF-27	6/30/2020	6917.90	NA	6911.20	6.70	ND	NA	14.72
MKTF-27	9/15/2020	6917.90	NA	6911.69	6.21	ND	NA	14.72
MKTF-27	11/10/2020	6917.90	NA	6911.18	6.72	ND	NA	14.72
MKTF-27	12/4/2020	6917.90	NA	6911.43	6.47	ND	NA	14.74
MKTF-28	6/6/2014	6921.52	NA	6909.72	11.80	ND	NA	16.16
MKTF-28	9/23/2014	6921.52	NA	6915.32	6.20	ND	NA	16.16
MKTF-28	11/14/2014	6921.52	NA	6915.52	6.00	ND	NA	16.16
MKTF-28	3/11/2015	6921.52	NA	6914.88	6.64	ND	NA	16.16
MKTF-28	6/9/2015	6921.52	NA	6916.12	5.40	ND	NA	16.16
MKTF-28	8/20/2015	6921.52	NA	6915.10	6.42	ND	NA	17.16
MKTF-28	11/4/2015	6921.52	NA	6915.78	5.74	ND	NA	16.16
MKTF-28	2/23/2016	6921.52	NA	6916.20	5.32	ND	NA	16.16
MKTF-28	6/8/2016	6921.52	NA	6916.24	5.28	ND	NA	16.16
MKTF-28	9/8/2016	6921.52	NA	6915.12	6.40	ND	NA	17.16
MKTF-28	11/4/2016	6921.52	NA	6915.78	5.74	ND	NA	16.16
MKTF-28	3/6/2017	6921.52	NA	6916.84	4.68	ND	NA	16.16
MKTF-28	6/5/2017	6921.52	NA	6913.62	7.90	ND	NA	16.16
MKTF-28	10/3/2017	6921.52	NA	6917.24	4.28	ND	NA	16.16
MKTF-28	11/20/2017	6921.52	NA	6913.62	7.90	ND	NA	16.13
MKTF-28	2/6/2018	6921.52	NA	6914.79	6.73	ND	NA	16.13
MKTF-28	4/25/2018	6921.52	NA	6914.54	6.98	ND	NA	16.04
MKTF-28	8/15/2018	6921.52	NA	6917.07	4.45	ND	NA	16.15
MKTF-28	11/14/2018	6921.52	NA	6915.40	6.12	ND	NA	16.13
MKTF-28	2/25/2019	6921.52	NA	6916.61	4.91	ND	NA	16.16
MKTF-28	5/6/2019	6921.52	NA	6912.25	9.27	ND	NA	16.16
MKTF-28	8/21/2019	6921.52	NA	6917.70	3.82	ND	NA	16.15
MKTF-28	10/22/2019	6921.52	NA	6915.14	6.38	ND	NA	16.13
MKTF-28	2/24/2020	6921.52	NA	6916.99	4.53	ND	NA	16.16
MKTF-28	6/30/2020	6921.52	NA	6916.68	4.84	ND	NA	16.16
MKTF-28	9/15/2020	6921.52	NA	6916.93	4.59	ND	NA	16.17
MKTF-28	11/10/2020	6921.52	NA	6912.71	8.81	ND	NA	16.17
MKTF-28	12/4/2020	6921.52	NA	6914.39	7.13	ND	NA	16.16
MKTF-29	6/6/2014	6901.62	NA	6899.48	2.14	ND	NA	22.84
MKTF-29	9/23/2014	6901.62	NA	6897.22	4.40	ND	NA	22.84
MKTF-29	11/14/2014	6901.62	NA	6898.57	3.05	ND	NA	22.84
MKTF-29	3/11/2015	6901.62	NA	6899.58	2.04	ND	NA	22.84
MKTF-29	6/10/2015	6901.62	NA	6898.93	2.69	ND	NA	22.84
MKTF-29	8/20/2015	6901.62	NA	6899.32	2.30	ND	NA	23.84
MKTF-29	11/4/2015	6901.62	NA	6899.22	2.40	ND	NA	22.84
MKTF-29	2/23/2016	6901.62	NA	6899.70	1.92	ND	NA	22.84
MKTF-29	6/9/2016	6901.62	NA	6898.93	2.69	ND	NA	22.84
MKTF-29	9/7/2016	6901.62	NA	6897.10	4.52	ND	NA	23.84
MKTF-29	11/4/2016	6901.62	NA	6899.22	2.40	ND	NA	22.84
MKTF-29	3/6/2017	6901.62	NA	6900.63	0.99	ND	NA	22.84
MKTF-29	6/5/2017	6901.62	NA	6900.67	0.95	ND	NA	22.84

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
MKTF-29	10/3/2017	6901.62	NA	6900.03	1.59	ND	NA	22.84
MKTF-29	11/20/2017	6901.62	NA	6899.71	1.91	ND	NA	22.80
MKTF-29	2/6/2018	6901.62	NA	6899.69	1.93	ND	NA	22.81
MKTF-29	4/25/2018	6901.62	NA	6899.50	2.12	ND	NA	22.77
MKTF-29	8/15/2018	6901.62	NA	6897.70	3.92	ND	NA	22.82
MKTF-29	11/14/2018	6901.62	NA	6897.53	4.09	ND	NA	22.80
MKTF-29	2/25/2019	6901.62	NA	6897.89	3.73	ND	NA	22.84
MKTF-29	5/6/2019	6901.62	NA	6897.90	3.72	ND	NA	22.84
MKTF-29	8/23/2019	6901.62	NA	6895.79	5.83	ND	NA	22.82
MKTF-29	10/22/2019	6901.62	NA	6895.30	6.32	ND	NA	22.80
MKTF-29	2/24/2020	6901.62	NA	6897.13	4.49	ND	NA	22.84
MKTF-29	6/26/2020	6901.62	NA	6895.20	6.42	ND	NA	22.84
MKTF-29	9/15/2020	6901.62	NA	6893.61	8.01	ND	NA	22.78
MKTF-29	11/10/2020	6901.62	NA	6894.64	6.98	ND	NA	22.78
MKTF-29	12/4/2020	6901.62	NA	6895.22	6.40	ND	NA	22.85
MKTF-30	6/4/2014	6900.80	NA	6886.09	14.71	ND	NA	23.20
MKTF-30	9/23/2014	6900.80	NA	6884.91	15.89	ND	NA	23.20
MKTF-30	11/17/2014	6900.80	NA	6884.93	15.87	ND	NA	23.20
MKTF-30	3/11/2015	6900.80	NA	6886.06	14.74	ND	NA	23.20
MKTF-30	6/10/2015	6900.80	NA	6886.23	14.57	ND	NA	23.20
MKTF-30	8/20/2015	6900.80	NA	6885.51	15.29	ND	NA	24.20
MKTF-30	11/4/2015	6900.80	NA	6886.06	14.74	ND	NA	23.20
MKTF-30	2/23/2016	6900.80	NA	6886.40	14.40	ND	NA	23.20
MKTF-30	6/9/2016	6900.80	NA	6886.79	14.01	ND	NA	23.20
MKTF-30	9/7/2016	6900.80	NA	6885.32	15.48	ND	NA	24.20
MKTF-30	11/4/2016	6900.80	NA	6886.06	14.74	ND	NA	23.20
MKTF-30	3/6/2017	6900.80	NA	6886.67	14.13	ND	NA	23.20
MKTF-30	6/5/2017	6900.80	NA	6886.93	13.87	ND	NA	23.20
MKTF-30	10/3/2017	6900.80	NA	6885.77	15.03	ND	NA	23.20
MKTF-30	11/20/2017	6900.80	NA	6885.89	14.91	ND	NA	23.19
MKTF-30	2/6/2018	6900.80	NA	6886.60	14.20	ND	NA	23.20
MKTF-30	4/25/2018	6900.80	NA	6887.01	13.79	ND	NA	23.10
MKTF-30	8/15/2018	6900.80	NA	6886.15	14.65	ND	NA	23.20
MKTF-30	11/14/2018	6900.80	NA	6885.65	15.15	ND	NA	23.19
MKTF-30	3/28/2019	6900.80	NA	6887.12	13.68	ND	NA	23.20
MKTF-30	5/6/2019	6900.80	NA	6886.99	13.81	ND	NA	23.20
MKTF-30	8/23/2019	6900.80	NA	6885.92	14.88	ND	NA	23.20
MKTF-30	10/22/2019	6900.80	NA	6884.98	15.82	ND	NA	23.19
MKTF-30	2/26/2020	6900.80	NA	6885.49	15.31	ND	NA	23.20
MKTF-30	6/26/2020	6900.80	NA	6884.61	16.19	ND	NA	23.20
MKTF-30	9/15/2020	6900.80	NA	6884.14	16.66	ND	NA	23.22
MKTF-30	11/10/2020	6900.80	NA	6883.93	16.87	ND	NA	23.22
MKTF-30	12/4/2020	6900.80	NA	6884.04	16.76	ND	NA	23.22
MKTF-31	6/4/2014	6906.87	NA	6899.17	7.70	ND	NA	22.81
MKTF-31	9/23/2014	6906.87	NA	6898.52	8.35	ND	NA	22.81
MKTF-31	11/17/2014	6906.87	NA	6898.47	8.40	ND	NA	22.81
MKTF-31	3/11/2015	6906.87	NA	6898.89	7.98	ND	NA	22.81

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
MKTF-31	6/10/2015	6906.87	NA	6899.12	7.75	ND	NA	22.81
MKTF-31	8/21/2015	6906.87	NA	6898.78	8.09	ND	NA	23.81
MKTF-31	11/4/2015	6906.87	NA	6898.73	8.14	ND	NA	22.81
MKTF-31	2/23/2016	6906.87	NA	6898.92	7.95	ND	NA	22.81
MKTF-31	6/9/2016	6906.87	NA	6899.12	7.75	ND	NA	22.81
MKTF-31	9/8/2016	6906.87	NA	6898.39	8.48	ND	NA	23.81
MKTF-31	11/4/2016	6906.87	NA	6898.73	8.14	ND	NA	22.81
MKTF-31	3/7/2017	6906.87	NA	6899.03	7.84	ND	NA	22.81
MKTF-31	6/5/2017	6906.87	NA	6899.29	7.58	ND	NA	22.81
MKTF-31	9/25/2017	6906.87	NA	6898.58	8.29	ND	NA	23.81
MKTF-31	11/21/2017	6906.87	NA	6898.72	8.15	ND	NA	19.30
MKTF-31	2/5/2018	6906.87	NA	6898.97	7.90	ND	NA	19.31
MKTF-31	4/25/2018	6906.87	NA	6899.14	7.73	ND	NA	19.26
MKTF-31	8/15/2018	6906.87	NA	6898.62	8.25	ND	NA	19.35
MKTF-31	11/14/2018	6906.87	NA	6898.43	8.44	ND	NA	19.30
MKTF-31	2/14/2019	6906.87	NA	6898.62	8.25	ND	NA	22.81
MKTF-31	5/6/2019	6906.87	NA	6899.15	7.72	ND	NA	22.81
MKTF-31	8/23/2019	6906.87	NA	6898.57	8.30	ND	NA	19.35
MKTF-31	10/22/2019	6906.87	NA	6898.23	8.64	ND	NA	19.30
MKTF-31	2/24/2020	6906.87	NA	6898.77	8.10	ND	NA	22.81
MKTF-31	6/26/2020	6906.87	NA	6898.62	8.25	ND	NA	22.81
MKTF-31	9/15/2020	6906.87	NA	6898.12	8.75	ND	NA	19.34
MKTF-31	11/10/2020	6906.87	NA	6898.08	8.79	ND	NA	19.34
MKTF-31	12/4/2020	6906.87	NA	6898.14	8.73	ND	NA	19.37
MKTF-32	6/4/2014	6911.11	NA	6894.59	16.52	ND	NA	27.75
MKTF-32	9/23/2014	6911.11	NA	6894.43	16.68	ND	NA	27.75
MKTF-32	11/17/2014	6911.11	NA	6894.63	16.48	ND	NA	27.75
MKTF-32	3/12/2015	6911.11	NA	6895.62	15.49	ND	NA	27.75
MKTF-32	6/9/2015	6911.11	NA	6895.62	15.49	ND	NA	27.75
MKTF-32	8/21/2015	6911.11	NA	6895.96	15.15	ND	NA	28.75
MKTF-32	11/5/2015	6911.11	NA	6896.27	14.84	ND	NA	27.75
MKTF-32	2/24/2016	6911.11	NA	6896.58	14.53	ND	NA	27.75
MKTF-32	6/9/2016	6911.11	NA	6896.80	14.31	ND	NA	27.75
MKTF-32	9/9/2016	6911.11	NA	6896.71	14.40	ND	NA	28.75
MKTF-32	11/5/2016	6911.11	NA	6896.27	14.84	ND	NA	27.75
MKTF-32	3/7/2017	6911.11	NA	6897.41	13.70	ND	NA	27.75
MKTF-32	6/6/2017	6911.11	NA	6897.32	13.79	ND	NA	27.75
MKTF-32	9/25/2017	6911.11	NA	6897.00	14.11	ND	NA	28.75
MKTF-32	11/27/2017	6911.11	NA	6897.54	13.57	ND	NA	27.75
MKTF-32	2/7/2018	6911.11	NA	6897.41	13.70	ND	NA	27.75
MKTF-32	4/25/2018	6911.11	NA	6897.63	13.48	ND	NA	27.66
MKTF-32	8/15/2018	6911.11	NA	6897.11	14.00	ND	NA	27.77
MKTF-32	11/14/2018	6911.11	NA	6897.01	14.10	ND	NA	27.75
MKTF-32	2/13/2019	6911.11	NA	6897.62	13.49	ND	NA	27.75
MKTF-32	5/7/2019	6911.11	NA	6897.86	13.25	ND	NA	27.75
MKTF-32	8/20/2019	6911.11	NA	6897.08	14.03	ND	NA	27.77
MKTF-32	10/23/2019	6911.11	NA	6897.10	14.01	ND	NA	27.75

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
MKTF-32	2/26/2020	6911.11	NA	6897.33	13.78	ND	NA	27.75
MKTF-32	6/29/2020	6911.11	NA	6896.86	14.25	ND	NA	27.75
MKTF-32	9/14/2020	6911.11	NA	6896.53	14.58	ND	NA	27.46
MKTF-32	11/10/2020	6911.11	NA	6896.80	14.31	ND	NA	27.46
MKTF-32	12/4/2020	6911.11	NA	6896.86	14.25	ND	NA	27.82
MKTF-33	6/6/2014	6939.75	NA	6916.35	23.40	ND	NA	33.20
MKTF-33	9/23/2014	6939.75	NA	6916.06	23.69	ND	NA	33.20
MKTF-33	11/17/2014	6939.75	NA	6915.96	23.79	ND	NA	33.20
MKTF-33	3/12/2015	6939.75	NA	6916.43	23.32	ND	NA	33.20
MKTF-33	6/9/2015	6939.75	NA	6916.45	23.30	ND	NA	33.20
MKTF-33	8/21/2015	6939.75	NA	6916.43	23.32	ND	NA	34.20
MKTF-33	11/9/2015	6939.75	NA	6916.56	23.19	ND	NA	33.20
MKTF-33	2/25/2016	6939.75	NA	6916.55	23.20	ND	NA	33.20
MKTF-33	6/10/2016	6939.75	NA	6916.46	23.29	ND	NA	33.20
MKTF-33	9/10/2016	6939.75	NA	6916.55	23.20	ND	NA	34.20
MKTF-33	11/9/2016	6939.75	NA	6916.56	23.19	ND	NA	33.20
MKTF-33	3/8/2017	6939.75	NA	6917.59	22.16	ND	NA	33.20
MKTF-33	6/7/2017	6939.75	NA	6917.68	22.07	ND	NA	33.20
MKTF-33	9/25/2017	6939.75	NA	6917.25	22.50	ND	NA	33.20
MKTF-33	11/27/2017	6939.75	NA	6917.48	22.27	ND	NA	33.22
MKTF-33	2/7/2018	6939.75	NA	6917.10	22.65	ND	NA	33.20
MKTF-33	4/26/2018	6939.75	NA	6917.20	22.55	ND	NA	33.11
MKTF-33	8/15/2018	6939.75	NA	6916.90	22.85	ND	NA	33.23
MKTF-33	11/27/2018	6939.75	NA	6917.03	22.72	ND	NA	33.22
MKTF-33	3/25/2019	6939.75	NA	6917.75	22.00	ND	NA	33.20
MKTF-33	5/9/2019	6939.75	NA	6917.71	22.04	ND	NA	33.20
MKTF-33	8/20/2019	6939.75	NA	6917.40	22.35	ND	NA	33.23
MKTF-33	10/24/2019	6939.75	NA	6917.25	22.50	ND	NA	33.22
MKTF-33	2/27/2020	6939.75	NA	6917.04	22.71	ND	NA	33.20
MKTF-33	6/29/2020	6939.75	NA	6918.58	21.17	ND	NA	33.20
MKTF-33	9/14/2020	6939.75	6918.14	6911.73	28.02	21.61	6.41	33.15
MKTF-33	11/10/2020	6939.75	6918.10	6911.94	27.81	21.65	6.16	33.15
MKTF-33	12/4/2020	6939.75	6918.06	6911.98	27.77	21.69	6.08	33.57
MKTF-34	6/6/2014	6945.35	NA	6926.76	18.59	ND	NA	27.68
MKTF-34	9/23/2014	6945.35	NA	6926.27	19.08	ND	NA	27.68
MKTF-34	11/17/2014	6945.35	NA	6925.77	19.58	ND	NA	27.68
MKTF-34	3/12/2015	6945.35	NA	6926.58	18.77	ND	NA	27.68
MKTF-34	6/8/2015	6945.35	NA	6926.45	18.90	ND	NA	27.68
MKTF-34	8/18/2015	6945.35	NA	6926.61	18.74	ND	NA	28.68
MKTF-34	11/3/2015	6945.35	NA	6926.35	19.00	ND	NA	27.68
MKTF-34	2/25/2016	6945.35	NA	6926.15	19.20	ND	NA	27.68
MKTF-34	6/10/2016	6945.35	NA	6926.75	18.60	ND	NA	27.68
MKTF-34	9/12/2016	6945.35	NA	6927.32	18.03	ND	NA	28.68
MKTF-34	11/3/2016	6945.35	NA	6926.35	19.00	ND	NA	27.68
MKTF-34	3/1/2017	6945.35	NA	6928.85	16.50	ND	NA	27.68
MKTF-34	6/14/2017	6945.35	NA	6927.72	17.63	ND	NA	27.68
MKTF-34	9/26/2017	6945.35	NA	6927.73	17.62	ND	NA	27.68

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
MKTF-34	11/30/2017	6945.35	NA	6927.32	18.03	ND	NA	27.70
MKTF-34	2/15/2018	6945.35	NA	6926.55	18.80	ND	NA	27.71
MKTF-34	4/26/2018	6945.35	NA	6926.72	18.63	ND	NA	27.60
MKTF-34	8/15/2018	6945.35	NA	6926.77	18.58	ND	NA	27.70
MKTF-34	11/27/2018	6945.35	NA	6926.40	18.95	ND	NA	27.70
MKTF-34	3/25/2019	6945.35	NA	6928.40	16.95	ND	NA	27.68
MKTF-34	5/9/2019	6945.35	NA	6927.26	18.09	ND	NA	27.68
MKTF-34	8/19/2019	6945.35	NA	6927.65	17.70	ND	NA	27.70
MKTF-34	10/29/2019	6945.35	NA	6927.32	18.03	ND	NA	27.70
MKTF-34	11/12/2019	6945.35	NA	6927.29	18.06	ND	NA	27.70
MKTF-34	2/5/2020	6945.35	NA	6927.57	17.78	ND	NA	27.70
MKTF-34	6/29/2020	6945.35	6926.31	6926.29	19.06	19.04	0.02	27.70
MKTF-34	9/14/2020	6945.35	NA	6926.26	19.09	ND	NA	27.76
MKTF-34	11/10/2020	6945.35	NA	6926.27	19.08	ND	NA	27.76
MKTF-34	12/4/2020	6945.35	6926.44	6926.43	18.92	18.91	0.01	27.78
MKTF-35	11/20/2014	6951.65	NA	6942.00	9.65	ND	NA	16.45
MKTF-35	3/17/2015	6951.65	NA	6942.72	8.93	ND	NA	16.45
MKTF-35	6/4/2015	6951.65	NA	6942.72	8.93	ND	NA	16.45
MKTF-35	8/18/2015	6951.65	NA	6942.74	8.91	ND	NA	16.45
MKTF-35	11/3/2015	6951.65	NA	6942.63	9.02	ND	NA	16.45
MKTF-35	2/26/2016	6951.65	NA	6943.25	8.40	ND	NA	16.45
MKTF-35	6/10/2016	6951.65	NA	6944.28	7.37	ND	NA	16.45
MKTF-35	9/12/2016	6951.65	NA	6945.00	6.65	ND	NA	16.45
MKTF-35	11/3/2016	6951.65	NA	6942.63	9.02	ND	NA	16.45
MKTF-35	3/1/2017	6951.65	NA	6945.47	6.18	ND	NA	16.45
MKTF-35	6/14/2017	6951.65	NA	6944.53	7.12	ND	NA	16.45
MKTF-35	9/27/2017	6951.65	NA	6943.95	7.70	ND	NA	16.45
MKTF-35	11/30/2017	6951.65	NA	6943.50	8.15	ND	NA	16.45
MKTF-35	2/15/2018	6951.65	NA	6942.95	8.70	ND	NA	16.47
MKTF-35	4/26/2018	6951.65	NA	6943.12	8.53	ND	NA	16.40
MKTF-35	8/16/2018	6951.65	NA	6942.95	8.70	ND	NA	16.48
MKTF-35	11/27/2018	6951.65	NA	6942.55	9.10	ND	NA	16.45
MKTF-35	3/25/2019	6951.65	NA	6943.11	8.54	ND	NA	16.45
MKTF-35	5/16/2019	6951.65	NA	6943.16	8.49	ND	NA	16.45
MKTF-35	8/19/2019	6951.65	NA	6943.56	8.09	ND	NA	16.48
MKTF-35	10/28/2019	6951.65	NA	6943.23	8.42	ND	NA	16.45
MKTF-35	10/29/2019	6951.65	NA	6943.25	8.40	ND	NA	16.45
MKTF-35	11/12/2019	6951.65	NA	6943.05	8.60	ND	NA	16.45
MKTF-35	2/5/2020	6951.65	NA	6942.37	9.28	ND	NA	16.45
MKTF-35	6/30/2020	6951.65	NA	6942.40	9.25	ND	NA	16.45
MKTF-35	9/14/2020	6951.65	NA	6943.06	8.59	ND	NA	16.23
MKTF-35	11/10/2020	6951.65	NA	6942.79	8.86	ND	NA	16.23
MKTF-35	12/4/2020	6951.65	6942.63	6942.62	9.03	9.02	0.01	16.39
MKTF-36	11/20/2014	NA	NA	NA	7.99	ND	NA	15.45
MKTF-36	3/17/2015	NA	NA	NA	7.71	ND	NA	15.45
MKTF-36	6/4/2015	NA	NA	NA	7.53	ND	NA	15.45
MKTF-36	8/18/2015	NA	NA	NA	7.50	ND	NA	15.45

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
MKTF-36	11/3/2015	NA	NA	NA	7.66	7.00	0.66	15.45
MKTF-36	3/17/2016	NA	NA	NA	7.71	ND	NA	15.45
MKTF-36	6/10/2016	NA	NA	NA	6.80	6.78	0.02	15.45
MKTF-36	9/13/2016	NA	NA	NA	6.55	6.54	0.01	15.45
MKTF-36	11/3/2016	NA	NA	NA	7.66	7.00	0.66	15.45
MKTF-36	3/1/2017	NA	NA	NA	5.56	ND	NA	15.45
MKTF-36	6/14/2017	NA	NA	NA	5.40	ND	NA	15.45
MKTF-36	9/27/2017	NA	NA	NA	5.80	ND	NA	15.45
MKTF-36	11/30/2017	NA	NA	NA	6.45	ND	NA	15.45
MKTF-36	2/15/2018	NA	NA	NA	6.86	ND	NA	15.45
MKTF-36	4/26/2018	NA	NA	NA	6.56	ND	NA	15.40
MKTF-36	9/5/2018	NA	NA	NA	6.52	ND	NA	15.43
MKTF-36	11/29/2018	NA	NA	NA	NA	NA	NA	15.43
MKTF-36	3/25/2019	NA	NA	NA	NA	NA	NA	15.43
MKTF-36	5/14/2019	NA	NA	NA	NA	NA	NA	15.43
MKTF-36	8/19/2019	NA	NA	NA	NA	NA	NA	15.43
MKTF-36	11/6/2019	NA	NA	NA	10.33	5.08	5.25	15.40
MKTF-36	11/7/2019	NA	NA	NA	10.21	4.30	5.91	15.61
MKTF-36	11/12/2019	NA	NA	NA	9.65	6.80	2.85	15.61
MKTF-36	11/13/2019	NA	NA	NA	9.40	6.95	2.45	15.61
MKTF-36	11/14/2019	NA	NA	NA	9.61	7.14	2.47	15.61
MKTF-36	11/15/2019	NA	NA	NA	9.46	7.31	2.15	15.61
MKTF-36	11/19/2019	NA	NA	NA	8.98	7.80	1.18	15.61
MKTF-36	11/21/2019	NA	NA	NA	8.78	8.00	0.78	15.61
MKTF-36	12/2/2019	NA	NA	NA	8.95	8.25	0.70	15.61
MKTF-36	2/3/2020	6950.12	6942.23	6941.68	8.44	7.89	0.55	15.61
MKTF-36	6/30/2020	6950.12	6942.08	6941.87	8.25	8.04	0.21	15.61
MKTF-36	9/14/2020	6950.12	NA	6942.25	7.87	ND	NA	15.58
MKTF-36	11/10/2020	6950.12	6942.14	6942.09	8.03	7.98	0.05	15.58
MKTF-36	12/4/2020	6950.12	6942.02	6941.95	8.17	8.10	0.07	15.58
MKTF-37	11/20/2014	6958.87	NA	6943.82	15.05	ND	NA	24.60
MKTF-37	3/17/2015	6958.87	NA	6949.66	9.21	ND	NA	24.60
MKTF-37	6/4/2015	6958.87	NA	6949.39	9.48	ND	NA	24.60
MKTF-37	8/18/2015	6958.87	NA	6949.42	9.45	ND	NA	24.60
MKTF-37	11/3/2015	6958.87	6949.33	6949.30	9.57	9.54	0.03	24.60
MKTF-37	3/17/2016	6958.87	NA	6949.66	9.21	ND	NA	24.60
MKTF-37	6/10/2016	6958.87	6950.66	6950.64	8.23	8.21	0.02	24.60
MKTF-37	9/12/2016	6958.87	NA	6951.22	7.65	ND	NA	24.60
MKTF-37	11/3/2016	6958.87	6949.33	6949.30	9.57	9.54	0.03	24.60
MKTF-37	3/1/2017	6958.87	NA	6951.97	6.90	ND	NA	24.60
MKTF-37	6/14/2017	6958.87	6951.67	6951.63	7.24	7.20	0.04	24.60
MKTF-37	9/27/2017	6958.87	6951.04	6950.98	7.89	7.83	0.06	24.60
MKTF-37	11/30/2017	6958.87	6950.48	6950.46	8.41	8.39	0.02	24.60
MKTF-37	2/15/2018	6958.87	6949.91	6949.87	9.00	8.96	0.04	24.60
MKTF-37	4/26/2018	6958.87	NA	6950.35	8.52	ND	NA	24.54
MKTF-37	8/16/2018	6958.87	NA	6950.17	8.70	ND	NA	24.59
MKTF-37	11/27/2018	6958.87	6949.47	6949.35	9.52	9.40	0.12	24.60

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
MKTF-37	3/25/2019	6958.87	NA	6950.48	8.39	ND	NA	24.60
MKTF-37	5/16/2019	6958.87	6949.77	6949.69	9.18	9.10	0.08	24.60
MKTF-37	8/23/2019	6958.87	6950.02	6950.00	8.87	8.85	0.02	24.59
MKTF-37	10/28/2019	6958.87	6949.57	6949.54	9.33	9.30	0.03	24.60
MKTF-37	10/29/2019	6958.87	6949.70	6949.67	9.20	9.17	0.03	24.60
MKTF-37	11/12/2019	6958.87	6949.35	6949.31	9.56	9.52	0.04	24.60
MKTF-37	2/3/2020	6958.87	6949.10	6948.98	9.89	9.77	0.12	24.60
MKTF-37	6/30/2020	6958.87	6949.26	6949.24	9.63	9.61	0.02	24.60
MKTF-37	9/14/2020	6958.87	NA	6950.11	8.76	ND	NA	24.54
MKTF-37	11/10/2020	6958.87	6949.51	6949.50	9.37	9.36	0.01	24.54
MKTF-37	12/4/2020	6958.87	6949.23	6949.22	9.65	9.64	0.01	24.61
MKTF-38	3/16/2015	6954.89	NA	6945.89	9.00	ND	NA	20.29
MKTF-38	6/10/2015	6954.89	NA	6945.55	9.34	ND	NA	20.29
MKTF-38	8/24/2015	6954.89	NA	6945.64	9.25	ND	NA	20.29
MKTF-38	11/9/2015	6954.89	NA	6945.44	9.45	ND	NA	20.29
MKTF-38	2/29/2016	6954.89	NA	6946.26	8.63	ND	NA	20.29
MKTF-38	6/8/2016	6954.89	NA	6946.46	8.43	ND	NA	20.29
MKTF-38	9/13/2016	6954.89	NA	6946.89	8.00	ND	NA	20.29
MKTF-38	11/9/2016	6954.89	NA	6945.44	9.45	ND	NA	20.29
MKTF-38	3/14/2017	6954.89	NA	6948.48	6.41	ND	NA	20.29
MKTF-38	6/21/2017	6954.89	NA	6948.49	6.40	ND	NA	20.29
MKTF-38	9/28/2017	6954.89	NA	6948.57	6.32	ND	NA	20.29
MKTF-38	11/30/2017	6954.89	NA	6947.06	7.83	ND	NA	20.29
MKTF-38	2/12/2018	6954.89	NA	6946.49	8.40	ND	NA	20.30
MKTF-38	4/25/2018	6954.89	NA	6947.10	7.79	ND	NA	20.28
MKTF-38	8/16/2018	6954.89	NA	6946.84	8.05	ND	NA	20.27
MKTF-38	11/19/2018	6954.89	NA	6945.90	8.99	ND	NA	20.29
MKTF-38	3/26/2019	6954.89	NA	6943.59	11.30	ND	NA	20.29
MKTF-38	5/14/2019	6954.89	NA	6946.23	8.66	ND	NA	20.29
MKTF-38	6/27/2019	6954.89	NA	6946.14	8.75	ND	NA	20.29
MKTF-38	8/20/2019	6954.89	NA	6946.12	8.77	ND	NA	20.27
MKTF-38	12/3/2019	6954.89	NA	6945.39	9.50	ND	NA	20.29
MKTF-38	3/4/2020	6954.89	NA	6945.28	9.61	ND	NA	20.31
MKTF-38	6/26/2020	6954.89	NA	6945.51	9.38	ND	NA	20.33
MKTF-38	9/14/2020	6954.89	NA	6946.34	8.55	ND	NA	20.18
MKTF-38	11/10/2020	6954.89	NA	6945.77	9.12	ND	NA	20.18
MKTF-38	12/4/2020	6954.89	6945.54	6945.53	9.36	9.35	0.01	21.30
MKTF-39	11/18/2014	6953.75	NA	6943.50	10.25	ND	NA	15.20
MKTF-39	3/16/2015	6953.75	NA	6944.87	8.88	ND	NA	15.20
MKTF-39	6/10/2015	6953.75	NA	6944.44	9.31	ND	NA	15.20
MKTF-39	8/23/2015	6953.75	NA	6944.51	9.24	ND	NA	15.20
MKTF-39	11/9/2015	6953.75	NA	6944.36	9.39	ND	NA	15.20
MKTF-39	3/3/2016	6953.75	NA	6945.25	8.50	ND	NA	15.20
MKTF-39	6/8/2016	6953.75	NA	6945.42	8.33	ND	NA	15.20
MKTF-39	9/13/2016	6953.75	NA	6945.35	8.40	ND	NA	15.20
MKTF-39	11/9/2016	6953.75	NA	6944.36	9.39	ND	NA	15.20
MKTF-39	3/14/2017	6953.75	NA	6947.31	6.44	ND	NA	15.20

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
MKTF-39	6/8/2017	6953.75	NA	6947.50	6.25	ND	NA	15.20
MKTF-39	9/28/2017	6953.75	NA	6946.43	7.32	ND	NA	15.20
MKTF-39	11/28/2017	6953.75	NA	6946.20	7.55	ND	NA	15.18
MKTF-39	2/8/2018	6953.75	NA	6945.57	8.18	ND	NA	15.20
MKTF-39	4/25/2018	6953.75	NA	6945.93	7.82	ND	NA	15.13
MKTF-39	8/16/2018	6953.75	NA	6945.45	8.30	ND	NA	15.20
MKTF-39	11/19/2018	6953.75	NA	6944.75	9.00	ND	NA	15.18
MKTF-39	3/28/2019	6953.75	NA	NA	NA	NA	NA	15.20
MKTF-39	6/5/2019	6953.75	NA	6945.06	8.69	ND	NA	15.20
MKTF-39	8/20/2019	6953.75	NA	6944.71	9.04	ND	NA	15.20
MKTF-39	11/4/2019	6953.75	NA	6944.16	9.59	ND	NA	15.18
MKTF-39	2/3/2020	6953.75	NA	6943.65	10.10	ND	NA	15.20
MKTF-39	6/26/2020	6953.75	NA	6944.12	9.63	ND	NA	15.00
MKTF-39	9/15/2020	6953.75	NA	6944.17	9.58	ND	NA	14.19
MKTF-39	11/10/2020	6953.75	NA	6943.70	10.05	ND	NA	14.19
MKTF-39	12/4/2020	6953.75	NA	6943.60	10.15	ND	NA	15.19
MKTF-40	11/18/2014	6894.33	NA	6874.39	19.94	ND	NA	23.64
MKTF-40	3/11/2015	6894.33	NA	6879.73	14.60	ND	NA	23.64
MKTF-40	6/10/2015	6894.33	NA	6880.13	14.20	ND	NA	23.64
MKTF-40	8/21/2015	6894.33	NA	6880.50	13.83	ND	NA	23.64
MKTF-40	11/4/2015	6894.33	NA	6880.42	13.91	ND	NA	23.64
MKTF-40	2/23/2016	6894.33	NA	6880.45	13.88	ND	NA	23.64
MKTF-40	6/9/2016	6894.33	NA	6881.02	13.31	ND	NA	23.64
MKTF-40	9/8/2016	6894.33	NA	6880.81	13.52	ND	NA	23.64
MKTF-40	11/4/2016	6894.33	NA	6880.42	13.91	ND	NA	23.64
MKTF-40	3/7/2017	6894.33	NA	6881.19	13.14	ND	NA	23.64
MKTF-40	6/5/2017	6894.33	NA	6881.04	13.29	ND	NA	23.64
MKTF-40	9/25/2017	6894.33	NA	6881.05	13.28	ND	NA	23.64
MKTF-40	11/21/2017	6894.33	NA	6880.62	13.71	ND	NA	23.62
MKTF-40	2/5/2018	6894.33	NA	6881.15	13.18	ND	NA	23.62
MKTF-40	4/25/2018	6894.33	NA	6881.39	12.94	ND	NA	23.53
MKTF-40	8/15/2018	6894.33	NA	6881.59	12.74	ND	NA	23.54
MKTF-40	11/14/2018	6894.33	NA	6880.69	13.64	ND	NA	23.62
MKTF-40	2/20/2019	6894.33	NA	6881.54	12.79	ND	NA	23.64
MKTF-40	5/6/2019	6894.33	NA	6881.97	12.36	ND	NA	23.64
MKTF-40	8/22/2019	6894.33	NA	6882.18	12.15	ND	NA	23.54
MKTF-40	10/22/2019	6894.33	NA	6881.29	13.04	ND	NA	23.62
MKTF-40	2/27/2020	6894.33	NA	6881.10	13.23	ND	NA	23.64
MKTF-40	6/26/2020	6894.33	NA	6881.58	12.75	ND	NA	23.64
MKTF-40	9/15/2020	6894.33	NA	6880.94	13.39	ND	NA	23.66
MKTF-40	11/10/2020	6894.33	NA	6880.62	13.71	ND	NA	23.66
MKTF-40	12/4/2020	6894.33	NA	6880.34	13.99	ND	NA	23.67
MKTF-41	11/18/2014	6893.64	NA	6866.74	26.90	ND	NA	40.10
MKTF-41	3/12/2015	6893.64	NA	6873.57	20.07	ND	NA	40.10
MKTF-41	6/9/2015	6893.64	NA	6873.87	19.77	ND	NA	40.10
MKTF-41	8/21/2015	6893.64	NA	6873.74	19.90	ND	NA	40.10
MKTF-41	11/5/2015	6893.64	NA	6873.87	19.77	ND	NA	40.10

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
MKTF-41	2/24/2016	6893.64	NA	6873.74	19.90	ND	NA	40.10
MKTF-41	6/9/2016	6893.64	NA	6873.99	19.65	ND	NA	40.10
MKTF-41	9/9/2016	6893.64	NA	6873.53	20.11	ND	NA	40.10
MKTF-41	11/5/2016	6893.64	NA	6873.87	19.77	ND	NA	40.10
MKTF-41	3/7/2017	6893.64	NA	6874.04	19.60	ND	NA	40.10
MKTF-41	6/6/2017	6893.64	NA	6875.15	18.49	ND	NA	40.10
MKTF-41	9/25/2017	6893.64	NA	6873.39	20.25	ND	NA	40.10
MKTF-41	11/27/2017	6893.64	NA	6873.83	19.81	ND	NA	39.71
MKTF-41	2/7/2018	6893.64	NA	6873.41	20.23	ND	NA	39.72
MKTF-41	4/25/2018	6893.64	NA	6873.67	19.97	ND	NA	39.91
MKTF-41	8/15/2018	6893.64	NA	6873.38	20.26	ND	NA	39.74
MKTF-41	11/14/2018	6893.64	NA	6873.13	20.51	ND	NA	39.71
MKTF-41	2/13/2019	6893.64	NA	6873.54	20.10	ND	NA	40.10
MKTF-41	5/7/2019	6893.64	NA	6874.12	19.52	ND	NA	40.10
MKTF-41	8/22/2019	6893.64	NA	6874.09	19.55	ND	NA	39.74
MKTF-41	10/23/2019	6893.64	NA	6873.62	20.02	ND	NA	39.71
MKTF-41	2/26/2020	6893.64	NA	6873.49	20.15	ND	NA	40.10
MKTF-41	6/29/2020	6893.64	NA	6873.87	19.77	ND	NA	40.10
MKTF-41	9/14/2020	6893.64	NA	6872.92	20.72	ND	NA	39.66
MKTF-41	11/10/2020	6893.64	NA	6872.63	21.01	ND	NA	39.66
MKTF-41	12/4/2020	6893.64	NA	6872.74	20.90	ND	NA	39.80
MKTF-42	11/18/2014	6892.95	NA	6874.16	18.79	ND	NA	33.15
MKTF-42	3/11/2015	6892.95	NA	6874.98	17.97	ND	NA	33.15
MKTF-42	6/9/2015	6892.95	NA	6875.35	17.60	ND	NA	33.15
MKTF-42	8/21/2015	6892.95	NA	6875.51	17.44	ND	NA	33.15
MKTF-42	11/5/2015	6892.95	NA	6875.69	17.26	ND	NA	33.15
MKTF-42	2/24/2016	6892.95	NA	6875.26	17.69	ND	NA	33.15
MKTF-42	6/9/2016	6892.95	NA	6875.65	17.30	ND	NA	33.15
MKTF-42	9/9/2016	6892.95	NA	6875.65	17.30	ND	NA	33.15
MKTF-42	11/5/2016	6892.95	NA	6875.69	17.26	ND	NA	33.15
MKTF-42	3/7/2017	6892.95	NA	6877.23	15.72	ND	NA	33.15
MKTF-42	6/6/2017	6892.95	NA	6875.83	17.12	ND	NA	33.15
MKTF-42	9/25/2017	6892.95	NA	6876.12	16.83	ND	NA	33.15
MKTF-42	11/27/2017	6892.95	NA	6876.14	16.81	ND	NA	33.18
MKTF-42	2/7/2018	6892.95	NA	6875.54	17.41	ND	NA	32.90
MKTF-42	4/25/2018	6892.95	NA	6875.82	17.13	ND	NA	33.08
MKTF-42	8/15/2018	6892.95	NA	6876.18	16.77	ND	NA	33.20
MKTF-42	11/14/2018	6892.95	NA	6876.01	16.94	ND	NA	33.18
MKTF-42	2/13/2019	6892.95	NA	6875.77	17.18	ND	NA	33.15
MKTF-42	5/7/2019	6892.95	NA	6876.27	16.68	ND	NA	33.15
MKTF-42	8/22/2019	6892.95	NA	6876.55	16.40	ND	NA	33.20
MKTF-42	10/23/2019	6892.95	NA	6876.43	16.52	ND	NA	33.18
MKTF-42	2/26/2020	6892.95	NA	6876.16	16.79	ND	NA	33.15
MKTF-42	6/30/2020	6892.95	NA	6876.70	16.25	ND	NA	33.15
MKTF-42	9/14/2020	6892.95	NA	6876.60	16.35	ND	NA	33.10
MKTF-42	11/10/2020	6892.95	NA	6877.65	15.30	ND	NA	33.10
MKTF-42	12/4/2020	6892.95	NA	6876.54	16.41	ND	NA	32.95

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
MKTF-43	11/18/2014	6876.90	NA	6869.95	6.95	ND	NA	15.43
MKTF-43	3/11/2015	6876.90	NA	6871.70	5.20	ND	NA	15.43
MKTF-43	6/10/2015	6876.90	NA	6873.27	3.63	ND	NA	15.43
MKTF-43	8/21/2015	6876.90	NA	6873.10	3.80	ND	NA	15.43
MKTF-43	11/5/2015	6876.90	NA	6871.78	5.12	ND	NA	15.43
MKTF-43	2/24/2016	6876.90	NA	6871.90	5.00	ND	NA	15.43
MKTF-43	6/9/2016	6876.90	NA	6873.23	3.67	ND	NA	15.43
MKTF-43	9/9/2016	6876.90	NA	6872.92	3.98	ND	NA	15.43
MKTF-43	11/5/2016	6876.90	NA	6871.78	5.12	ND	NA	15.43
MKTF-43	3/8/2017	6876.90	NA	6871.56	5.34	ND	NA	15.43
MKTF-43	6/6/2017	6876.90	NA	6873.28	3.62	ND	NA	15.43
MKTF-43	9/25/2017	6876.90	NA	6872.76	4.14	ND	NA	15.43
MKTF-43	11/27/2017	6876.90	NA	6871.25	5.65	ND	NA	15.38
MKTF-43	2/7/2018	6876.90	NA	6870.47	6.43	ND	NA	15.38
MKTF-43	4/25/2018	6876.90	NA	6871.85	5.05	ND	NA	15.30
MKTF-43	8/15/2018	6876.90	NA	6874.24	2.66	ND	NA	15.41
MKTF-43	11/14/2018	6876.90	NA	6871.48	5.42	ND	NA	15.38
MKTF-43	2/13/2019	6876.90	NA	6870.91	5.99	ND	NA	15.43
MKTF-43	5/8/2019	6876.90	NA	6872.93	3.97	ND	NA	15.43
MKTF-43	8/22/2019	6876.90	NA	6873.23	3.67	ND	NA	15.41
MKTF-43	10/24/2019	6876.90	NA	6872.56	4.34	ND	NA	15.38
MKTF-43	2/26/2020	6876.90	NA	6870.57	6.33	ND	NA	15.43
MKTF-43	6/30/2020	6876.90	NA	6871.40	5.50	ND	NA	15.43
MKTF-43	9/14/2020	6876.90	NA	6870.45	6.45	ND	NA	16.22
MKTF-43	11/10/2020	6876.90	NA	6869.42	7.48	ND	NA	16.22
MKTF-43	12/4/2020	6876.90	NA	6868.78	8.12	ND	NA	16.92
MKTF-44	11/18/2014	6869.95	NA	6821.15	48.80	ND	NA	51.15
MKTF-44	3/12/2015	6869.95	NA	6831.51	38.44	ND	NA	51.15
MKTF-44	6/10/2015	6869.95	NA	6840.40	29.55	ND	NA	51.15
MKTF-44	8/17/2015	6869.95	NA	6838.72	31.23	ND	NA	51.15
MKTF-44	11/9/2015	6869.95	NA	6836.63	33.32	ND	NA	51.15
MKTF-44	2/24/2016	6869.95	NA	6841.21	28.74	ND	NA	51.15
MKTF-44	6/9/2016	6869.95	NA	6842.12	27.83	ND	NA	51.15
MKTF-44	9/8/2016	6869.95	NA	6838.61	31.34	ND	NA	51.15
MKTF-44	11/9/2016	6869.95	NA	6836.63	33.32	ND	NA	51.15
MKTF-44	3/8/2017	6869.95	NA	6844.56	25.39	ND	NA	51.15
MKTF-44	6/5/2017	6869.95	NA	6837.05	32.90	ND	NA	51.15
MKTF-44	9/25/2017	6869.95	NA	6839.77	30.18	ND	NA	51.15
MKTF-44	11/27/2017	6869.95	NA	6836.25	33.70	ND	NA	51.16
MKTF-44	2/7/2018	6869.95	NA	6832.39	37.56	ND	NA	51.16
MKTF-44	4/25/2018	6869.95	NA	6833.23	36.72	ND	NA	51.08
MKTF-44	8/15/2018	6869.95	NA	6834.25	35.70	ND	NA	51.20
MKTF-44	11/14/2018	6869.95	NA	6843.53	26.42	ND	NA	51.16
MKTF-44	2/13/2019	6869.95	NA	6836.56	33.39	ND	NA	51.15
MKTF-44	5/8/2019	6869.95	NA	6835.75	34.20	ND	NA	51.15
MKTF-44	8/22/2019	6869.95	NA	6838.99	30.96	ND	NA	51.20
MKTF-44	10/24/2019	6869.95	NA	6831.41	38.54	ND	NA	51.16

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
MKTF-44	3/4/2020	6869.95	NA	6839.61	30.34	ND	NA	51.15
MKTF-44	6/26/2020	6869.95	NA	6836.87	33.08	ND	NA	51.15
MKTF-44	9/14/2020	6869.95	NA	6841.95	28.00	ND	NA	51.95
MKTF-44	12/4/2020	6869.95	NA	6830.36	39.59	ND	NA	51.39
MKTF-45	2/10/2015	6949.59	6936.01	6933.07	16.52	13.58	2.94	30.24
MKTF-45	3/17/2015	6949.59	6936.45	6934.65	14.94	13.14	1.80	30.24
MKTF-45	6/8/2015	6949.59	6936.39	6932.84	16.75	13.20	3.55	30.24
MKTF-45	8/18/2015	6949.59	6936.09	6935.98	13.61	13.50	0.11	30.24
MKTF-45	11/3/2015	6949.59	6935.89	6935.57	14.02	13.70	0.32	30.24
MKTF-45	3/17/2016	6949.59	6936.45	6934.65	14.94	13.14	1.80	30.24
MKTF-45	6/10/2016	6949.59	6937.11	6936.79	12.80	12.48	0.32	30.24
MKTF-45	9/13/2016	6949.59	6937.64	6937.19	12.40	11.95	0.45	30.24
MKTF-45	11/3/2016	6949.59	6935.89	6935.57	14.02	13.70	0.32	30.24
MKTF-45	3/1/2017	6949.59	6939.27	6938.96	10.63	10.32	0.31	30.24
MKTF-45	6/14/2017	6949.59	6938.09	6937.59	12.00	11.50	0.50	30.24
MKTF-45	10/3/2017	6949.59	6938.11	6937.58	12.01	11.48	0.53	30.24
MKTF-45	11/30/2017	6949.59	6936.83	6936.36	13.23	12.76	0.47	30.24
MKTF-45	2/15/2018	6949.59	6936.50	6936.35	13.24	13.09	0.15	30.24
MKTF-45	4/26/2018	6949.59	6936.72	6936.29	13.30	12.87	0.43	30.28
MKTF-45	8/16/2018	6949.59	6936.44	6936.01	13.58	13.15	0.43	30.33
MKTF-45	11/27/2018	6949.59	6935.99	6935.44	14.15	13.60	0.55	30.24
MKTF-45	3/26/2019	6949.59	6937.59	6937.09	12.50	12.00	0.50	30.24
MKTF-45	5/14/2019	6949.59	6937.16	6936.57	13.02	12.43	0.59	30.24
MKTF-45	8/19/2019	6949.59	6935.57	6935.11	14.48	14.02	0.46	30.33
MKTF-45	10/28/2019	6949.59	6937.62	6936.59	13.00	11.97	1.03	30.24
MKTF-45	10/29/2019	6949.59	6938.21	6935.84	13.75	11.38	2.37	30.24
MKTF-45	11/6/2019	6949.59	6940.02	6927.07	22.52	9.57	12.95	30.24
MKTF-45	11/7/2019	6949.59	6940.59	6927.34	22.25	9.00	13.25	30.24
MKTF-45	11/11/2019	6949.59	6940.84	6925.99	23.60	8.75	14.85	30.24
MKTF-45	11/12/2019	6949.59	6939.97	6925.67	23.92	9.62	14.30	30.24
MKTF-45	11/13/2019	6949.59	6939.89	6923.66	25.93	9.70	16.23	30.24
MKTF-45	11/14/2019	6949.59	6939.53	6924.30	25.29	10.06	15.23	30.24
MKTF-45	11/15/2019	6949.59	6939.31	6925.02	24.57	10.28	14.29	30.24
MKTF-45	11/19/2019	6949.59	6938.75	6926.84	22.75	10.84	11.91	30.24
MKTF-45	11/21/2019	6949.59	6938.59	6927.69	21.90	11.00	10.90	30.24
MKTF-45	12/2/2019	6949.59	6937.21	6930.64	18.95	12.38	6.57	30.24
MKTF-45	2/3/2020	6949.59	6939.99	6930.97	18.62	9.60	9.02	30.24
MKTF-45	6/30/2020	6949.59	6938.51	6930.51	19.08	11.08	8.00	30.24
MKTF-45	9/14/2020	6949.59	6936.45	6931.16	18.43	13.14	5.29	37.45
MKTF-45	11/10/2020	6949.59	6936.65	6934.83	14.76	12.94	1.82	37.45
MKTF-45	12/4/2020	6949.59	6936.93	6935.08	14.51	12.66	1.85	30.45
MKTF-46	10/29/2019	NA	NA	NA	10.28	ND	NA	21.29
MKTF-46	11/12/2019	NA	NA	NA	10.46	ND	NA	21.29
MKTF-46	12/2/2019	NA	NA	NA	10.70	ND	NA	21.29
MKTF-46	3/5/2020	6957.60	NA	6946.67	10.93	ND	NA	18.00
MKTF-46	6/30/2020	6957.60	NA	6946.52	11.08	ND	NA	18.00
MKTF-46	9/14/2020	6957.60	NA	6947.42	10.18	ND	NA	25.29

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
MKTF-46	11/10/2020	6957.60	NA	6947.03	10.57	ND	NA	25.29
MKTF-46	12/4/2020	6957.60	NA	6946.83	10.77	ND	NA	21.30
MKTF-47	12/2/2019	NA	NA	NA	9.78	ND	NA	14.30
MKTF-47	3/5/2020	6959.09	NA	6949.20	9.89	ND	NA	14.00
MKTF-47	6/29/2020	6959.09	NA	6949.59	9.50	ND	NA	14.00
MKTF-47	9/15/2020	6959.09	6950.56	6950.55	8.54	8.53	0.01	14.31
MKTF-47	11/10/2020	6959.09	NA	6949.76	9.33	ND	NA	14.31
MKTF-47	12/4/2020	6959.09	6949.51	6949.50	9.59	9.58	0.01	14.31
MKTF-48	12/2/2019	NA	NA	NA	11.85	ND	NA	20.92
MKTF-48	3/3/2020	6961.73	6949.07	6948.91	12.82	12.66	0.16	18.00
MKTF-48	6/29/2020	6961.73	NA	6950.15	11.58	ND	NA	18.00
MKTF-48	9/15/2020	6961.73	6949.88	6949.87	11.86	11.85	0.01	19.91
MKTF-48	11/10/2020	6961.73	6949.33	6949.22	12.51	12.40	0.11	19.91
MKTF-48	12/4/2020	6961.73	6948.96	6948.63	13.10	12.77	0.33	20.94
MKTF-49	12/3/2019	NA	NA	NA	19.90	ND	NA	24.90
MKTF-49	3/4/2020	6946.76	NA	6926.49	20.27	ND	NA	28.00
MKTF-49	6/30/2020	6946.76	NA	6926.11	20.65	ND	NA	28.00
MKTF-49	9/15/2020	6946.76	NA	6926.43	20.33	ND	NA	24.96
MKTF-49	11/10/2020	6946.76	NA	6926.01	20.75	ND	NA	24.96
MKTF-49	12/4/2020	6946.76	NA	6925.95	20.81	ND	NA	24.97
MKTF-50	12/3/2019	NA	NA	NA	15.61	ND	NA	21.65
MKTF-50	3/4/2020	6942.82	NA	6926.95	15.87	ND	NA	26.00
MKTF-50	6/30/2020	6942.82	NA	6926.82	16.00	ND	NA	26.00
MKTF-50	9/15/2020	6942.82	6927.46	6927.45	15.37	15.36	0.01	22.64
MKTF-50	11/10/2020	6942.82	NA	6926.79	16.03	ND	NA	22.64
MKTF-50	12/4/2020	6942.82	NA	6926.65	16.17	ND	NA	21.63
MW-1	9/16/2014	6878.12	NA	6871.01	7.11	ND	NA	130.83
MW-1	8/10/2015	6878.12	NA	6871.22	6.90	ND	NA	130.83
MW-1	9/7/2016	6878.12	NA	6871.11	7.01	ND	NA	130.83
MW-1	9/20/2017	6878.12	NA	6871.10	7.02	ND	NA	130.83
MW-1	8/15/2018	6878.12	NA	6870.37	7.75	ND	NA	130.83
MW-1	12/5/2018	6878.12	NA	6870.76	7.36	ND	NA	130.83
MW-1	8/12/2019	6878.12	NA	6871.18	6.94	ND	NA	130.83
MW-1	9/14/2020	6878.12	NA	6870.40	7.72	ND	NA	135.30
MW-2	9/16/2014	6880.30	NA	6871.10	9.20	ND	NA	137.48
MW-2	8/10/2015	6880.30	NA	6871.17	9.13	ND	NA	137.48
MW-2	9/7/2016	6880.30	NA	6866.20	14.10	ND	NA	137.48
MW-2	9/20/2017	6880.30	NA	6864.66	15.64	ND	NA	137.48
MW-2	8/15/2018	6880.30	NA	6870.95	9.35	ND	NA	137.48
MW-2	12/5/2018	6880.30	NA	6863.67	16.63	ND	NA	137.48
MW-2	8/13/2019	6880.30	NA	6871.30	9.00	ND	NA	137.48
MW-2	9/14/2020	6880.30	NA	6870.56	9.74	ND	NA	138.20
MW-4	9/17/2014	6881.63	NA	6873.95	7.68	ND	NA	121.72
MW-4	8/10/2015	6881.63	NA	6874.33	7.30	ND	NA	121.72
MW-4	9/7/2016	6881.63	NA	6874.25	7.38	ND	NA	121.72
MW-4	9/21/2017	6881.63	NA	6874.07	7.56	ND	NA	121.72
MW-4	8/15/2018	6881.63	NA	6873.92	7.71	ND	NA	121.72

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
MW-4	12/5/2018	6881.63	NA	6873.80	7.83	ND	NA	121.72
MW-4	8/13/2019	6881.63	NA	6874.63	7.00	ND	NA	121.72
MW-4	9/14/2020	6881.63	NA	6873.63	8.00	ND	NA	125.90
MW-5	9/17/2014	6882.83	NA	6871.45	11.38	ND	NA	130.83
MW-5	8/10/2015	6882.83	NA	6871.63	11.20	ND	NA	130.83
MW-5	9/7/2016	6882.83	NA	6869.33	13.50	ND	NA	130.83
MW-5	9/11/2017	6882.83	NA	6871.61	11.22	ND	NA	130.83
MW-5	8/15/2018	6882.83	NA	6871.32	11.51	ND	NA	130.83
MW-5	12/6/2018	6882.83	NA	6866.03	16.80	ND	NA	130.83
MW-5	8/14/2019	6882.83	NA	6871.78	11.05	ND	NA	130.83
MW-5	9/14/2020	6882.83	NA	6870.84	11.99	ND	NA	133.00
NAPIS-1	3/10/2014	6913.86	NA	6907.08	6.78	ND	NA	13.53
NAPIS-1	6/5/2014	6913.86	NA	6907.00	6.86	ND	NA	13.53
NAPIS-1	9/11/2014	6913.86	NA	6907.01	6.85	ND	NA	13.53
NAPIS-1	11/11/2014	6913.86	NA	6906.90	6.96	ND	NA	13.53
NAPIS-1	3/10/2015	6913.86	NA	6906.96	6.90	ND	NA	13.53
NAPIS-1	6/2/2015	6913.86	NA	6906.86	7.00	ND	NA	13.53
NAPIS-1	8/10/2015	6913.86	NA	6906.86	7.00	ND	NA	13.53
NAPIS-1	10/28/2015	6913.86	NA	6906.66	7.20	ND	NA	13.53
NAPIS-1	3/1/2016	6913.86	NA	6907.21	6.65	ND	NA	13.53
NAPIS-1	6/7/2016	6913.86	NA	6907.22	6.64	ND	NA	13.53
NAPIS-1	9/1/2016	6913.86	NA	6906.87	6.99	ND	NA	13.53
NAPIS-1	11/14/2016	6913.86	NA	6907.04	6.82	ND	NA	13.53
NAPIS-1	2/21/2017	6913.86	NA	6907.16	6.70	ND	NA	13.53
NAPIS-1	6/2/2017	6913.86	NA	6907.01	6.85	ND	NA	13.53
NAPIS-1	9/5/2017	6913.86	6907.54	6906.68	7.18	6.32	0.86	13.53
NAPIS-1	12/4/2017	6913.86	6907.66	6907.01	6.85	6.20	0.65	13.75
NAPIS-1	2/12/2018	6913.86	6907.71	6905.76	8.10	6.15	1.95	13.53
NAPIS-1	4/25/2018	6913.86	6907.28	6906.04	7.82	6.58	1.24	13.76
NAPIS-1	8/15/2018	6913.86	NA	NA	NA	NA	NA	13.76
NAPIS-1	11/8/2018	6913.86	NA	NA	NA	NA	NA	13.76
NAPIS-1	3/28/2019	6913.86	NA	NA	NA	NA	NA	13.76
NAPIS-1	5/28/2019	6913.86	6906.14	6905.98	7.88	7.72	0.16	13.53
NAPIS-1	8/22/2019	6913.86	6906.41	6906.33	7.53	7.45	0.08	13.53
NAPIS-1	10/21/2019	6913.86	6906.20	6906.00	7.86	7.66	0.20	13.53
NAPIS-1	9/15/2020	6913.86	6907.16	6907.15	6.71	6.70	0.01	13.58
NAPIS-1	11/10/2020	6913.86	6906.67	6906.66	7.20	7.19	0.01	13.58
NAPIS-1	12/7/2020	6913.86	NA	6906.42	7.44	ND	NA	13.76
NAPIS-2	3/10/2014	6912.65	NA	6904.62	8.03	ND	NA	13.61
NAPIS-2	6/5/2014	6912.65	NA	6904.45	8.20	ND	NA	13.61
NAPIS-2	9/11/2014	6912.65	NA	6904.55	8.10	ND	NA	13.61
NAPIS-2	11/11/2014	6912.65	NA	6904.45	8.20	ND	NA	13.61
NAPIS-2	3/10/2015	6912.65	NA	6904.21	8.44	ND	NA	13.61
NAPIS-2	6/2/2015	6912.65	NA	6904.11	8.54	ND	NA	13.61
NAPIS-2	8/10/2015	6912.65	NA	6904.25	8.40	ND	NA	13.61
NAPIS-2	10/28/2015	6912.65	NA	6904.33	8.32	ND	NA	13.61
NAPIS-2	3/1/2016	6912.65	NA	6905.00	7.65	ND	NA	13.61

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
NAPIS-2	6/7/2016	6912.65	NA	6906.25	6.40	ND	NA	13.61
NAPIS-2	9/1/2016	6912.65	NA	6903.81	8.84	ND	NA	13.61
NAPIS-2	11/14/2016	6912.65	NA	6904.45	8.20	ND	NA	13.61
NAPIS-2	2/21/2017	6912.65	NA	6904.76	7.89	ND	NA	13.61
NAPIS-2	6/1/2017	6912.65	NA	6904.30	8.35	ND	NA	13.61
NAPIS-2	9/5/2017	6912.65	NA	6904.33	8.32	ND	NA	13.61
NAPIS-2	12/4/2017	6912.65	NA	6904.67	7.98	ND	NA	14.60
NAPIS-2	2/9/2018	6912.65	NA	6904.40	8.25	ND	NA	14.60
NAPIS-2	4/26/2018	6912.65	NA	6904.07	8.58	ND	NA	14.52
NAPIS-2	8/15/2018	6912.65	NA	NA	NA	NA	NA	14.52
NAPIS-2	11/8/2018	6912.65	NA	NA	NA	NA	NA	14.52
NAPIS-2	3/28/2019	6912.65	NA	NA	NA	NA	NA	14.52
NAPIS-2	5/28/2019	6912.65	NA	6903.11	9.54	ND	NA	13.61
NAPIS-2	8/22/2019	6912.65	NA	6903.50	9.15	ND	NA	13.61
NAPIS-2	10/21/2019	6912.65	NA	6903.25	9.40	ND	NA	13.61
NAPIS-2	9/15/2020	6912.65	NA	6904.53	8.12	ND	NA	14.60
NAPIS-2	11/10/2020	6912.65	NA	6904.14	8.51	ND	NA	14.60
NAPIS-2	12/7/2020	6912.65	NA	6903.93	8.72	ND	NA	14.61
NAPIS-3	3/10/2014	6912.76	NA	6903.86	8.90	ND	NA	30.42
NAPIS-3	6/5/2014	6912.76	NA	6903.91	8.85	ND	NA	30.42
NAPIS-3	9/11/2014	6912.76	NA	6904.79	7.97	ND	NA	30.42
NAPIS-3	11/13/2014	6912.76	NA	6903.58	9.18	ND	NA	30.42
NAPIS-3	3/10/2015	6912.76	NA	6903.17	9.59	ND	NA	30.42
NAPIS-3	6/2/2015	6912.76	NA	6903.66	9.10	ND	NA	30.42
NAPIS-3	8/10/2015	6912.76	NA	6904.27	8.49	ND	NA	30.42
NAPIS-3	10/28/2015	6912.76	NA	6903.54	9.22	ND	NA	30.42
NAPIS-3	3/1/2016	6912.76	NA	6904.21	8.55	ND	NA	30.42
NAPIS-3	6/7/2016	6912.76	NA	6905.04	7.72	ND	NA	30.42
NAPIS-3	9/1/2016	6912.76	NA	6903.66	9.10	ND	NA	30.42
NAPIS-3	11/14/2016	6912.76	NA	6903.65	9.11	ND	NA	30.42
NAPIS-3	2/21/2017	6912.76	NA	6903.56	9.20	ND	NA	30.42
NAPIS-3	6/1/2017	6912.76	NA	6902.56	10.20	ND	NA	30.42
NAPIS-3	9/8/2017	6912.76	NA	6903.66	9.10	ND	NA	30.42
NAPIS-3	12/14/2017	6912.76	NA	6903.76	9.00	ND	NA	31.58
NAPIS-3	2/9/2018	6912.76	NA	6903.06	9.70	ND	NA	31.60
NAPIS-3	4/26/2018	6912.76	NA	6903.16	9.60	ND	NA	31.51
NAPIS-3	8/15/2018	6912.76	NA	NA	NA	NA	NA	31.51
NAPIS-3	11/8/2018	6912.76	NA	NA	NA	NA	NA	31.51
NAPIS-3	3/28/2019	6912.76	NA	NA	NA	NA	NA	31.51
NAPIS-3	5/28/2019	6912.76	NA	6902.19	10.57	ND	NA	30.42
NAPIS-3	8/22/2019	6912.76	NA	6902.58	10.18	ND	NA	30.42
NAPIS-3	10/21/2019	6912.76	NA	6902.74	10.02	ND	NA	30.42
NAPIS-3	9/15/2020	6912.76	NA	6903.51	9.25	ND	NA	31.50
NAPIS-3	11/10/2020	6912.76	NA	6903.29	9.47	ND	NA	31.50
NAPIS-3	12/7/2020	6912.76	NA	6904.25	8.51	ND	NA	31.50
OAPIS-1	3/10/2014	6916.73	NA	6905.23	11.50	ND	NA	28.30
OAPIS-1	6/5/2014	6916.73	NA	6904.98	11.75	ND	NA	28.30

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
OAPIS-1	9/12/2014	6916.73	NA	6905.62	11.11	ND	NA	28.30
OAPIS-1	11/11/2014	6916.73	NA	6899.52	17.21	ND	NA	28.30
OAPIS-1	3/10/2015	6916.73	NA	6904.89	11.84	ND	NA	28.30
OAPIS-1	6/2/2015	6916.73	NA	6904.72	12.01	ND	NA	28.30
OAPIS-1	8/10/2015	6916.73	NA	6905.40	11.33	ND	NA	28.30
OAPIS-1	10/29/2015	6916.73	NA	6905.71	11.02	ND	NA	28.30
OAPIS-1	3/1/2016	6916.73	NA	6904.87	11.86	ND	NA	28.30
OAPIS-1	6/7/2016	6916.73	NA	6905.23	11.50	ND	NA	28.30
OAPIS-1	9/1/2016	6916.73	NA	6905.41	11.32	ND	NA	28.30
OAPIS-1	11/14/2016	6916.73	NA	6905.29	11.44	ND	NA	28.30
OAPIS-1	2/21/2017	6916.73	NA	6905.13	11.60	ND	NA	28.30
OAPIS-1	6/1/2017	6916.73	NA	6905.27	11.46	ND	NA	28.30
OAPIS-1	9/5/2017	6916.73	NA	6905.64	11.09	ND	NA	28.30
OAPIS-1	12/4/2017	6916.73	NA	6904.85	11.88	ND	NA	27.78
OAPIS-1	2/9/2018	6916.73	NA	6904.13	12.60	ND	NA	27.78
OAPIS-1	4/26/2018	6916.73	NA	6904.31	12.42	ND	NA	27.75
OAPIS-1	8/15/2018	6916.73	NA	6905.13	11.60	ND	NA	27.86
OAPIS-1	11/19/2018	6916.73	NA	6904.84	11.89	ND	NA	27.78
OAPIS-1	3/28/2019	6916.73	NA	6905.30	11.43	ND	NA	26.00
OAPIS-1	5/8/2019	6916.73	NA	6904.64	12.09	ND	NA	26.00
OAPIS-1	8/22/2019	6916.73	NA	6905.64	11.09	ND	NA	27.86
OAPIS-1	10/21/2019	6916.73	NA	6905.29	11.44	ND	NA	27.78
OAPIS-1	9/15/2020	6916.73	NA	6904.83	11.90	ND	NA	28.00
OAPIS-1	11/10/2020	6916.73	NA	6904.71	12.02	ND	NA	28.00
OAPIS-1	12/7/2020	6916.73	NA	6904.42	12.31	ND	NA	28.00
OW-01	3/7/2014	6866.62	NA	6866.62	0.00	ND	NA	94.55
OW-01	6/3/2014	6866.62	NA	6866.62	0.00	ND	NA	94.55
OW-01	9/11/2014	6866.62	NA	6866.61	0.01	ND	NA	94.55
OW-01	11/10/2014	6866.62	NA	6866.62	0.00	ND	NA	94.55
OW-01	3/9/2015	6866.62	NA	6866.62	0.00	ND	NA	94.55
OW-01	6/3/2015	6866.62	NA	6866.62	0.00	ND	NA	94.55
OW-01	8/12/2015	6866.62	NA	6866.62	0.00	ND	NA	94.55
OW-01	10/28/2015	6866.62	NA	6866.62	0.00	ND	NA	94.55
OW-01	3/3/2016	6866.62	NA	6866.62	0.00	ND	NA	94.55
OW-01	6/6/2016	6866.62	NA	6866.62	0.00	ND	NA	94.55
OW-01	9/6/2016	6866.62	NA	6866.62	0.00	ND	NA	94.55
OW-01	11/15/2016	6866.62	NA	6864.90	1.72	ND	NA	94.55
OW-01	2/27/2017	6866.62	NA	6864.91	1.71	ND	NA	94.55
OW-01	5/31/2017	6866.62	NA	6864.85	1.77	ND	NA	94.55
OW-01	9/6/2017	6866.62	NA	6864.92	1.70	ND	NA	94.55
OW-01	12/8/2017	6866.62	NA	6864.91	1.71	ND	NA	94.55
OW-01	2/27/2018	6866.62	NA	6865.17	1.45	ND	NA	94.55
OW-01	4/25/2018	6866.62	NA	6864.82	1.80	ND	NA	94.54
OW-01	8/14/2018	6866.62	NA	6864.82	1.80	ND	NA	94.55
OW-01	11/7/2018	6866.62	NA	6865.29	1.33	ND	NA	94.55
OW-01	3/27/2019	6866.62	NA	6864.93	1.69	ND	NA	94.55
OW-01	5/21/2019	6866.62	NA	6864.89	1.73	ND	NA	94.55

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
OW-01	8/15/2019	6866.62	NA	6865.25	1.37	ND	NA	94.55
OW-01	10/16/2019	6866.62	NA	6865.17	1.45	ND	NA	94.55
OW-01	9/15/2020	6866.62	NA	6865.17	1.45	ND	NA	99.39
OW-01	12/7/2020	6866.62	NA	6864.87	1.75	ND	NA	99.39
OW-10	3/7/2014	6874.91	NA	6874.91	0.00	ND	NA	60.33
OW-10	6/3/2014	6874.91	NA	6873.46	1.45	ND	NA	60.33
OW-10	9/12/2014	6874.91	NA	6872.58	2.33	ND	NA	60.33
OW-10	11/10/2014	6874.91	NA	6872.11	2.80	ND	NA	60.33
OW-10	3/9/2015	6874.91	NA	6873.95	0.96	ND	NA	60.33
OW-10	6/3/2015	6874.91	NA	6873.91	1.00	ND	NA	60.33
OW-10	8/12/2015	6874.91	NA	6874.53	0.38	ND	NA	60.33
OW-10	10/28/2015	6874.91	NA	6873.44	1.47	ND	NA	60.33
OW-10	3/3/2016	6874.91	NA	6873.49	1.42	ND	NA	60.33
OW-10	6/6/2016	6874.91	NA	6873.69	1.22	ND	NA	60.33
OW-10	9/6/2016	6874.91	NA	6873.21	1.70	ND	NA	60.33
OW-10	11/15/2016	6874.91	NA	6874.37	0.54	ND	NA	60.33
OW-10	2/27/2017	6874.91	NA	6874.35	0.56	ND	NA	60.33
OW-10	5/31/2017	6874.91	NA	6873.84	1.07	ND	NA	60.33
OW-10	9/7/2017	6874.91	NA	6873.03	1.88	ND	NA	60.33
OW-10	12/7/2017	6874.91	NA	6872.66	2.25	ND	NA	60.33
OW-10	2/27/2018	6874.91	NA	6872.93	1.98	ND	NA	60.33
OW-10	4/25/2018	6874.91	NA	6873.05	1.86	ND	NA	60.13
OW-10	8/15/2018	6874.91	NA	6872.50	2.41	ND	NA	60.13
OW-10	11/8/2018	6874.91	NA	6872.41	2.50	ND	NA	60.33
OW-10	3/27/2019	6874.91	NA	6874.91	0.00	ND	NA	60.33
OW-10	5/22/2019	6874.91	NA	6874.91	0.00	ND	NA	60.33
OW-10	8/15/2019	6874.91	NA	6873.89	1.02	ND	NA	60.13
OW-10	10/17/2019	6874.91	NA	6872.58	2.33	ND	NA	60.33
OW-10	9/20/2020	6874.91	NA	6867.21	7.70	ND	NA	66.30
OW-10	10/9/2020	6874.91	NA	6867.21	7.70	ND	NA	66.30
OW-10	12/7/2020	6874.91	NA	6867.30	7.61	ND	NA	66.30
OW-11	9/12/2014	6923.51	NA	6903.40	20.11	ND	NA	65.79
OW-11	8/10/2015	6923.51	NA	6904.21	19.30	ND	NA	65.79
OW-11	9/9/2016	6923.51	NA	6904.72	18.79	ND	NA	65.79
OW-11	9/18/2017	6923.51	NA	6905.43	18.08	ND	NA	65.79
OW-11	8/15/2018	6923.51	NA	6904.31	19.20	ND	NA	65.79
OW-11	8/20/2019	6923.51	NA	6905.81	17.70	ND	NA	65.79
OW-11	9/15/2020	6923.51	NA	6905.00	18.51	ND	NA	65.83
OW-12	9/12/2014	6940.69	NA	6892.91	47.78	ND	NA	128.85
OW-12	8/13/2015	6940.69	NA	6893.27	47.42	ND	NA	128.85
OW-12	9/8/2016	6940.69	NA	6893.46	47.23	ND	NA	128.85
OW-12	9/19/2017	6940.69	NA	6893.95	46.74	ND	NA	128.85
OW-12	8/15/2018	6940.69	NA	6894.19	46.50	ND	NA	128.85
OW-12	9/14/2020	6940.69	NA	6894.24	46.45	ND	NA	131.20
OW-12	11/9/2020	6940.69	NA	6894.20	46.49	ND	NA	131.20
OW-13	3/7/2014	6920.07	NA	6898.30	21.77	ND	NA	99.15
OW-13	6/3/2014	6920.07	NA	6898.12	21.95	ND	NA	99.15

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
OW-13	9/15/2014	6920.07	NA	6897.46	22.61	ND	NA	99.15
OW-13	11/10/2014	6920.07	NA	6897.62	22.45	ND	NA	99.15
OW-13	3/9/2015	6920.07	NA	6898.15	21.92	ND	NA	99.15
OW-13	6/1/2015	6920.07	NA	6898.31	21.76	ND	NA	99.15
OW-13	8/10/2015	6920.07	NA	6897.93	22.14	ND	NA	99.15
OW-13	10/27/2015	6920.07	NA	6897.97	22.10	ND	NA	99.15
OW-13	3/4/2016	6920.07	NA	6898.64	21.43	ND	NA	99.15
OW-13	6/6/2016	6920.07	NA	6898.62	21.45	ND	NA	99.15
OW-13	8/31/2016	6920.07	NA	6898.13	21.94	ND	NA	99.15
OW-13	11/15/2016	6920.07	NA	6898.39	21.68	ND	NA	99.15
OW-13	2/27/2017	6920.07	NA	6898.96	21.11	ND	NA	99.15
OW-13	5/31/2017	6920.07	NA	6898.62	21.45	ND	NA	99.15
OW-13	9/6/2017	6920.07	NA	6898.66	21.41	ND	NA	99.15
OW-13	12/11/2017	6920.07	NA	6899.07	21.00	ND	NA	99.15
OW-13	2/28/2018	6920.07	NA	6899.57	20.50	ND	NA	99.15
OW-13	4/26/2018	6920.07	NA	6899.66	20.41	ND	NA	99.00
OW-13	8/14/2018	6920.07	NA	6899.37	20.70	ND	NA	102.00
OW-13	11/6/2018	6920.07	NA	6899.37	20.70	ND	NA	99.15
OW-13	2/5/2019	6920.07	NA	6899.69	20.38	ND	NA	99.15
OW-13	5/1/2019	6920.07	NA	6900.07	20.00	ND	NA	99.15
OW-13	8/12/2019	6920.07	NA	6899.57	20.50	ND	NA	102.00
OW-13	10/14/2019	6920.07	NA	6899.33	20.74	ND	NA	99.15
OW-13	9/14/2020	6920.07	NA	6899.08	20.99	ND	NA	91.65
OW-13	11/9/2020	6920.07	NA	6899.69	20.38	ND	NA	91.65
OW-13	12/7/2020	6920.07	NA	6899.83	20.24	ND	NA	91.65
OW-14	3/7/2014	6926.65	NA	6902.53	24.12	ND	NA	46.52
OW-14	6/3/2014	6926.65	NA	6902.50	24.15	ND	NA	46.52
OW-14	9/15/2014	6926.65	NA	6902.25	24.40	ND	NA	46.52
OW-14	11/10/2014	6926.65	NA	6902.40	24.25	ND	NA	46.52
OW-14	3/9/2015	6926.65	NA	6902.70	23.95	ND	NA	46.52
OW-14	6/1/2015	6926.65	NA	6902.77	23.88	ND	NA	46.52
OW-14	8/10/2015	6926.65	NA	6902.69	23.96	ND	NA	46.52
OW-14	10/27/2015	6926.65	NA	6902.96	23.69	ND	NA	46.52
OW-14	3/4/2016	6926.65	NA	6903.45	23.20	ND	NA	46.52
OW-14	6/6/2016	6926.65	NA	6903.47	23.18	ND	NA	46.52
OW-14	8/31/2016	6926.65	NA	6903.15	23.50	ND	NA	46.52
OW-14	11/15/2016	6926.65	NA	6903.37	23.28	ND	NA	46.52
OW-14	2/27/2017	6926.65	NA	6903.82	22.83	ND	NA	46.52
OW-14	5/30/2017	6926.65	NA	6903.47	23.18	ND	NA	46.52
OW-14	9/6/2017	6926.65	NA	6904.09	22.56	ND	NA	46.52
OW-14	12/11/2017	6926.65	NA	6904.45	22.20	ND	NA	46.52
OW-14	2/27/2018	6926.65	NA	6904.85	21.80	ND	NA	46.52
OW-14	4/26/2018	6926.65	NA	6904.90	21.75	ND	NA	46.75
OW-14	8/14/2018	6926.65	NA	6904.70	21.95	ND	NA	46.78
OW-14	11/6/2018	6926.65	NA	6904.83	21.82	ND	NA	46.52
OW-14	2/5/2019	6926.65	NA	6905.01	21.64	ND	NA	46.52
OW-14	5/1/2019	6926.65	NA	6905.20	21.45	ND	NA	46.52

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
OW-14	8/12/2019	6926.65	NA	NA	NA	NA	NA	46.78
OW-14	11/1/2019	6926.65	NA	NA	NA	NA	NA	46.52
OW-14	9/14/2020	6926.65	NA	NA	NA	NA	NA	46.52
OW-14	12/7/2020	6926.65	NA	6902.25	24.40	NA	NA	46.52
OW-29	3/7/2014	6917.00	NA	6898.15	18.85	ND	NA	51.08
OW-29	6/2/2014	6917.00	NA	6898.05	18.95	ND	NA	51.08
OW-29	9/15/2014	6917.00	NA	6897.65	19.35	ND	NA	51.08
OW-29	11/11/2014	6917.00	NA	6897.84	19.16	ND	NA	51.08
OW-29	3/9/2015	6917.00	NA	6898.33	18.67	ND	NA	51.08
OW-29	6/1/2015	6917.00	NA	6898.33	18.67	ND	NA	51.08
OW-29	8/10/2015	6917.00	NA	6898.06	18.94	ND	NA	51.08
OW-29	10/27/2015	6917.00	NA	6898.28	18.72	ND	NA	51.08
OW-29	3/4/2016	6917.00	NA	6898.85	18.15	ND	NA	51.08
OW-29	6/6/2016	6917.00	NA	6898.84	18.16	ND	NA	51.08
OW-29	8/31/2016	6917.00	NA	6898.40	18.60	ND	NA	51.08
OW-29	11/15/2016	6917.00	NA	6898.77	18.23	ND	NA	51.08
OW-29	2/27/2017	6917.00	NA	6899.18	17.82	ND	NA	51.08
OW-29	5/30/2017	6917.00	NA	6898.84	18.16	ND	NA	51.08
OW-29	9/6/2017	6917.00	NA	6898.95	18.05	ND	NA	51.08
OW-29	12/11/2017	6917.00	NA	6899.50	17.50	ND	NA	51.08
OW-29	2/27/2018	6917.00	NA	6899.88	17.12	ND	NA	51.08
OW-29	4/26/2018	6917.00	NA	6900.02	16.98	ND	NA	51.90
OW-29	8/14/2018	6917.00	NA	6899.48	17.52	ND	NA	52.40
OW-29	11/6/2018	6917.00	NA	6899.78	17.22	ND	NA	51.08
OW-29	2/5/2019	6917.00	NA	6900.08	16.92	ND	NA	51.08
OW-29	5/1/2019	6917.00	NA	6900.29	16.71	ND	NA	51.08
OW-29	8/12/2019	6917.00	NA	6899.84	17.16	ND	NA	52.40
OW-29	10/14/2019	6917.00	NA	6899.76	17.24	ND	NA	51.08
OW-29	9/14/2020	6917.00	NA	6902.43	14.57	ND	NA	51.05
OW-29	11/9/2020	6917.00	NA	6899.77	17.23	ND	NA	51.05
OW-29	12/7/2020	6917.00	NA	6899.85	17.15	ND	NA	51.05
OW-30	3/7/2014	6924.69	NA	6901.27	23.42	ND	NA	49.90
OW-30	6/3/2014	6924.69	NA	6901.18	23.51	ND	NA	49.90
OW-30	9/17/2014	6924.69	NA	6900.85	23.84	ND	NA	49.90
OW-30	11/11/2014	6924.69	NA	6900.99	23.70	ND	NA	49.90
OW-30	3/9/2015	6924.69	NA	6901.44	23.25	ND	NA	49.90
OW-30	6/1/2015	6924.69	NA	6901.49	23.20	ND	NA	49.90
OW-30	8/10/2015	6924.69	NA	6901.27	23.42	ND	NA	49.90
OW-30	10/27/2015	6924.69	NA	6901.55	23.14	ND	NA	49.90
OW-30	3/8/2016	6924.69	NA	6902.14	22.55	ND	NA	49.90
OW-30	6/6/2016	6924.69	NA	6902.05	22.64	ND	NA	49.90
OW-30	8/31/2016	6924.69	NA	6901.39	23.30	ND	NA	49.90
OW-30	11/14/2016	6924.69	NA	6901.94	22.75	ND	NA	49.90
OW-30	2/27/2017	6924.69	NA	6902.45	22.24	ND	NA	49.90
OW-30	5/31/2017	6924.69	NA	6902.05	22.64	ND	NA	49.90
OW-30	9/6/2017	6924.69	NA	6902.41	22.28	ND	NA	49.90
OW-30	12/12/2017	6924.69	NA	6902.94	21.75	ND	NA	49.90

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
OW-30	2/28/2018	6924.69	NA	6903.36	21.33	ND	NA	49.90
OW-30	4/26/2018	6924.69	NA	6903.41	21.28	ND	NA	50.20
OW-30	8/15/2018	6924.69	NA	6902.99	21.70	ND	NA	51.40
OW-30	12/3/2018	6924.69	NA	6903.39	21.30	ND	NA	49.90
OW-30	3/27/2019	6924.69	NA	6903.56	21.13	ND	NA	49.90
OW-30	6/5/2019	6924.69	NA	6903.55	21.14	ND	NA	49.90
OW-30	8/12/2019	6924.69	NA	NA	NA	NA	NA	51.40
OW-30	11/1/2019	6924.69	NA	NA	NA	ND	NA	49.90
OW-30	9/15/2020	6924.69	NA	NA	NA	ND	NA	49.90
OW-30	12/7/2020	6924.69	NA	6902.47	22.22	ND	NA	49.90
OW-50	9/15/2014	6914.21	NA	6897.35	16.86	ND	NA	64.00
OW-50	8/10/2015	6914.21	NA	6897.74	16.47	ND	NA	64.00
OW-50	9/9/2016	6914.21	NA	6898.02	16.19	ND	NA	64.00
OW-50	9/11/2017	6914.21	NA	6898.61	15.60	ND	NA	64.00
OW-50	8/14/2018	6914.21	NA	6899.09	15.12	ND	NA	65.25
OW-50	11/7/2018	6914.21	NA	6899.01	15.20	ND	NA	64.00
OW-50	3/27/2019	6914.21	NA	6899.81	14.40	ND	NA	64.00
OW-50	5/1/2019	6914.21	NA	6899.82	14.39	ND	NA	64.00
OW-50	8/16/2019	6914.21	NA	6899.47	14.74	ND	NA	64.00
OW-50	10/15/2019	6914.21	NA	6899.29	14.92	ND	NA	64.00
OW-50	9/14/2020	6914.21	NA	6899.10	15.11	ND	NA	39.02
OW-50	11/9/2020	6914.21	NA	6899.34	14.87	ND	NA	39.02
OW-50	12/7/2020	6914.21	NA	6899.49	14.72	ND	NA	39.02
OW-52	9/15/2014	6907.68	NA	6891.88	15.80	ND	NA	77.74
OW-52	8/10/2015	6907.68	NA	6892.19	15.49	ND	NA	77.74
OW-52	9/9/2016	6907.68	NA	6892.40	15.28	ND	NA	77.74
OW-52	9/11/2017	6907.68	NA	6892.83	14.85	ND	NA	77.74
OW-52	8/15/2018	6907.68	NA	6893.16	14.52	ND	NA	79.00
OW-52	11/7/2018	6907.68	NA	6893.24	14.44	ND	NA	77.74
OW-52	3/27/2019	6907.68	NA	6893.71	13.97	ND	NA	77.74
OW-52	5/1/2019	6907.68	NA	6893.94	13.74	ND	NA	77.74
OW-52	8/16/2019	6907.68	NA	6893.47	14.21	ND	NA	77.74
OW-52	10/15/2019	6907.68	NA	6893.28	14.40	ND	NA	77.74
OW-52	9/14/2020	6907.68	NA	6893.12	14.56	ND	NA	40.43
OW-52	10/9/2020	6907.68	NA	6893.16	14.52	ND	NA	40.43
OW-52	12/7/2020	6907.68	NA	6893.26	14.42	ND	NA	40.43
OW-53	3/29/2017	6914.38	NA	Dry	Dry	ND	NA	33.90
OW-53	6/21/2017	6914.38	NA	Dry	Dry	ND	NA	33.90
OW-53	9/11/2017	6914.38	NA	Dry	Dry	ND	NA	33.90
OW-53	12/5/2017	6914.38	NA	Dry	Dry	ND	NA	33.90
OW-53	2/21/2018	6914.38	NA	Dry	Dry	ND	NA	33.90
OW-53	4/26/2018	6914.38	NA	Dry	Dry	ND	NA	33.90
OW-53	8/15/2018	6914.38	NA	Dry	Dry	ND	NA	33.91
OW-53	11/6/2018	6914.38	NA	Dry	Dry	ND	NA	33.90
OW-53	2/6/2019	6914.38	NA	Dry	Dry	ND	NA	33.91
OW-53	5/2/2019	6914.38	NA	Dry	Dry	ND	NA	33.91
OW-53	8/21/2019	6914.38	NA	Dry	Dry	ND	NA	33.91

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
OW-53	10/15/2019	6914.38	NA	Dry	Dry	ND	NA	33.91
OW-53	9/14/2020	6914.38	NA	Dry	Dry	ND	NA	33.91
OW-53	11/9/2020	6914.38	NA	Dry	Dry	ND	NA	33.91
OW-53	12/7/2020	6914.38	NA	Dry	Dry	ND	NA	33.91
OW-54	3/29/2017	6918.92	NA	6900.48	18.44	ND	NA	31.04
OW-54	6/21/2017	6918.92	NA	6900.29	18.63	ND	NA	31.04
OW-54	9/11/2017	6918.92	NA	6900.22	18.70	ND	NA	31.04
OW-54	12/5/2017	6918.92	NA	6900.65	18.27	ND	NA	31.06
OW-54	2/21/2018	6918.92	NA	6900.87	18.05	ND	NA	30.87
OW-54	4/26/2018	6918.92	NA	6901.09	17.83	ND	NA	29.70
OW-54	8/14/2018	6918.92	NA	6900.69	18.23	ND	NA	29.62
OW-54	11/6/2018	6918.92	NA	6901.02	17.90	ND	NA	31.06
OW-54	2/6/2019	6918.92	NA	6901.34	17.58	ND	NA	31.04
OW-54	5/2/2019	6918.92	NA	6901.40	17.52	ND	NA	31.04
OW-54	8/21/2019	6918.92	NA	6900.92	18.00	ND	NA	29.62
OW-54	10/15/2019	6918.92	NA	6900.83	18.09	ND	NA	31.06
OW-54	9/14/2020	6918.92	NA	6900.75	18.17	ND	NA	24.58
OW-54	10/9/2020	6918.92	NA	6901.00	17.92	ND	NA	24.58
OW-54	12/7/2020	6918.92	NA	6901.14	17.78	ND	NA	24.58
OW-55	3/29/2017	6923.25	NA	6904.86	18.39	ND	NA	30.70
OW-55	6/21/2017	6923.25	NA	6904.78	18.47	ND	NA	30.70
OW-55	9/11/2017	6923.25	NA	6904.76	18.49	ND	NA	30.70
OW-55	12/5/2017	6923.25	NA	6905.20	18.05	ND	NA	30.90
OW-55	2/21/2018	6923.25	NA	6905.45	17.80	ND	NA	30.95
OW-55	4/26/2018	6923.25	NA	6905.64	17.61	ND	NA	30.92
OW-55	8/14/2018	6923.25	NA	6905.31	17.94	ND	NA	30.70
OW-55	11/6/2018	6923.25	NA	6905.53	17.72	ND	NA	30.90
OW-55	2/6/2019	6923.25	NA	6905.88	17.37	ND	NA	30.70
OW-55	5/2/2019	6923.25	NA	6905.87	17.38	ND	NA	30.70
OW-55	8/21/2019	6923.25	NA	6905.55	17.70	ND	NA	30.70
OW-55	10/15/2019	6923.25	NA	6905.52	17.73	ND	NA	30.90
OW-55	9/14/2020	6923.25	NA	6905.29	17.96	ND	NA	24.48
OW-55	10/9/2020	6923.25	NA	6905.55	17.70	ND	NA	24.48
OW-55	12/7/2020	6923.25	NA	6905.64	17.61	ND	NA	24.48
OW-56	3/29/2017	6920.18	NA	6907.89	12.29	ND	NA	18.59
OW-56	6/21/2017	6920.18	NA	6906.65	13.53	ND	NA	18.59
OW-56	9/11/2017	6920.18	NA	6905.68	14.50	ND	NA	18.59
OW-56	12/5/2017	6920.18	NA	6906.75	13.43	ND	NA	18.58
OW-56	2/21/2018	6920.18	NA	6907.34	12.84	ND	NA	18.59
OW-56	4/26/2018	6920.18	NA	6907.56	12.62	ND	NA	18.59
OW-56	8/14/2018	6920.18	NA	6906.36	13.82	ND	NA	18.59
OW-56	11/6/2018	6920.18	NA	6906.13	14.05	ND	NA	18.58
OW-56	2/6/2019	6920.18	NA	6907.18	13.00	ND	NA	18.59
OW-56	5/2/2019	6920.18	NA	6907.68	12.50	ND	NA	18.59
OW-56	8/21/2019	6920.18	NA	6906.52	13.66	ND	NA	18.59
OW-56	10/15/2019	6920.18	NA	6905.80	14.38	ND	NA	18.58
OW-56	9/14/2020	6920.18	NA	6905.82	14.36	ND	NA	18.58

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
OW-56	11/9/2020	6920.18	NA	6905.97	14.21	ND	NA	18.58
OW-56	12/7/2020	6920.18	NA	6906.45	13.73	ND	NA	18.58
OW-57	3/30/2017	6933.10	NA	NA	NA	NA	NA	28.35
OW-57	6/20/2017	6933.10	NA	6912.58	20.52	ND	NA	28.35
OW-57	9/19/2017	6933.10	NA	6912.95	20.15	ND	NA	28.35
OW-57	12/5/2017	6933.10	NA	6912.99	20.11	ND	NA	28.35
OW-57	2/19/2018	6933.10	NA	6913.22	19.88	ND	NA	28.35
OW-57	4/25/2018	6933.10	NA	6913.08	20.02	ND	NA	28.06
OW-57	8/15/2018	6933.10	NA	6912.94	20.16	ND	NA	28.07
OW-57	11/29/2018	6933.10	NA	6912.80	20.30	ND	NA	28.35
OW-57	2/19/2019	6933.10	NA	6912.81	20.29	ND	NA	28.10
OW-57	5/15/2019	6933.10	NA	6913.08	20.02	ND	NA	28.10
OW-57	8/20/2019	6933.10	NA	6913.32	19.78	ND	NA	28.07
OW-57	11/4/2019	6933.10	NA	6913.13	19.97	ND	NA	28.35
OW-57	9/14/2020	6933.10	NA	6912.60	20.50	ND	NA	28.09
OW-57	11/9/2020	6933.10	NA	6912.57	20.53	ND	NA	28.09
OW-57	12/7/2020	6933.10	NA	6912.46	20.64	ND	NA	28.39
OW-58	3/29/2017	6934.50	NA	6908.50	26.00	ND	NA	47.55
OW-58	6/21/2017	6934.50	NA	6909.36	25.14	ND	NA	47.55
OW-58	9/19/2017	6934.50	NA	6909.46	25.04	ND	NA	47.55
OW-58	12/6/2017	6934.50	NA	6909.83	24.67	ND	NA	47.50
OW-58	2/20/2018	6934.50	NA	6909.98	24.52	ND	NA	47.62
OW-58	4/25/2018	6934.50	NA	6910.25	24.25	ND	NA	47.50
OW-58	8/16/2018	6934.50	NA	6910.02	24.48	ND	NA	47.49
OW-58	11/29/2018	6934.50	NA	6910.23	24.27	ND	NA	47.50
OW-58	3/28/2019	6934.50	NA	6910.22	24.28	ND	NA	47.30
OW-58	6/5/2019	6934.50	NA	6910.41	24.09	ND	NA	47.30
OW-58	8/20/2019	6934.50	NA	6910.50	24.00	ND	NA	47.49
OW-58	11/18/2019	6934.50	NA	6910.51	23.99	ND	NA	47.50
OW-58	9/14/2020	6934.50	NA	6910.95	23.55	ND	NA	48.00
OW-58	11/9/2020	6934.50	NA	6911.19	23.31	ND	NA	48.00
OW-58	12/8/2020	6934.50	NA	6910.18	24.32	ND	NA	47.95
OW-58A	9/15/2020	6935.88	NA	6909.01	26.87	ND	NA	36.00
OW-58A	11/9/2020	6935.88	NA	6911.57	24.31	ND	NA	36.91
OW-58A	12/8/2020	6935.88	NA	6909.17	26.71	ND	NA	36.38
OW-59	9/21/2017	6889.73	NA	6865.43	24.30	ND	NA	38.30
OW-59	12/5/2017	6889.73	NA	6865.43	24.30	ND	NA	38.50
OW-59	2/21/2018	6889.73	NA	6865.73	24.00	ND	NA	38.55
OW-59	4/26/2018	6889.73	NA	6865.68	24.05	ND	NA	38.48
OW-59	8/14/2018	6889.73	NA	6865.60	24.13	ND	NA	38.52
OW-59	11/6/2018	6889.73	NA	6865.83	23.90	ND	NA	38.50
OW-59	2/13/2019	6889.73	NA	6865.83	23.90	ND	NA	38.30
OW-59	5/2/2019	6889.73	NA	6865.93	23.80	ND	NA	38.30
OW-59	8/21/2019	6889.73	NA	6865.71	24.02	ND	NA	38.52
OW-59	10/15/2019	6889.73	NA	6865.62	24.11	ND	NA	38.50
OW-59	9/14/2020	6889.73	NA	6865.67	24.06	ND	NA	38.52
OW-59	12/7/2020	6889.73	NA	6865.82	23.91	ND	NA	38.55

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
OW-60	9/21/2017	6893.51	NA	6877.06	16.45	ND	NA	45.55
OW-60	12/5/2017	6893.51	NA	6877.11	16.40	ND	NA	45.70
OW-60	2/21/2018	6893.51	NA	6877.25	16.26	ND	NA	46.06
OW-60	4/26/2018	6893.51	NA	6876.99	16.52	ND	NA	46.15
OW-60	8/14/2018	6893.51	NA	6876.99	16.52	ND	NA	46.42
OW-60	11/6/2018	6893.51	NA	6877.26	16.25	ND	NA	45.70
OW-60	2/13/2019	6893.51	NA	6877.08	16.43	ND	NA	45.50
OW-60	5/2/2019	6893.51	NA	6876.96	16.55	ND	NA	45.50
OW-60	8/21/2019	6893.51	NA	6876.98	16.53	ND	NA	46.42
OW-60	10/15/2019	6893.51	NA	6877.10	16.41	ND	NA	45.70
OW-60	9/14/2020	6893.51	NA	6876.94	16.57	ND	NA	45.70
OW-60	11/9/2020	6893.51	NA	6877.16	16.35	ND	NA	45.70
OW-60	12/7/2020	6893.51	NA	6876.96	16.55	ND	NA	45.70
OW-61	3/21/2018	NA	NA	NA	16.80	16.71	0.09	31.68
OW-61	4/24/2018	NA	NA	NA	18.04	17.22	0.82	31.67
OW-61	8/16/2018	NA	NA	NA	22.10	17.40	4.70	31.70
OW-61	11/29/2018	NA	NA	NA	22.00	17.95	4.05	32.00
OW-61	2/19/2019	NA	NA	NA	22.09	18.00	4.09	32.00
OW-61	5/15/2019	NA	NA	NA	21.13	17.62	3.51	32.00
OW-61	8/20/2019	NA	NA	NA	20.15	17.42	2.73	31.70
OW-61	11/4/2019	NA	NA	NA	20.63	17.54	3.09	32.00
OW-61	9/15/2020	6963.57	6946.69	6944.17	19.40	16.88	2.52	31.85
OW-61	11/9/2020	6963.57	6945.35	6943.99	19.58	18.22	1.36	31.85
OW-61	12/8/2020	6963.57	6945.17	6943.27	20.30	18.40	1.90	31.33
OW-62	3/21/2018	6937.36	NA	6914.43	22.93	ND	NA	31.57
OW-62	4/24/2018	6937.36	NA	6914.22	23.14	ND	NA	31.58
OW-62	8/15/2018	6937.36	NA	6913.66	23.70	ND	NA	31.59
OW-62	11/29/2018	6937.36	NA	6913.37	23.99	ND	NA	31.59
OW-62	2/19/2019	6937.36	6913.61	6912.41	24.95	23.75	1.20	31.47
OW-62	5/15/2019	6937.36	6913.96	6913.36	24.00	23.40	0.60	31.47
OW-62	8/20/2019	6937.36	6913.50	6913.07	24.29	23.86	0.43	31.47
OW-62	11/18/2019	6937.36	6913.64	6913.02	24.34	23.72	0.62	31.47
OW-62	9/15/2020	6937.36	6913.74	6913.49	23.87	23.62	0.25	32.05
OW-62	11/9/2020	6937.36	6913.66	6913.36	24.00	23.70	0.30	32.05
OW-62	12/8/2020	6937.36	6913.67	6913.38	23.98	23.69	0.29	31.66
OW-63	3/21/2018	NA	NA	NA	20.19	ND	NA	32.18
OW-63	4/24/2018	NA	NA	NA	20.33	ND	NA	32.18
OW-63	8/16/2018	NA	NA	NA	20.60	ND	NA	32.20
OW-63	11/29/2018	NA	NA	NA	20.95	ND	NA	32.00
OW-63	2/19/2019	NA	NA	NA	20.74	ND	NA	32.00
OW-63	5/15/2019	NA	NA	NA	20.35	ND	NA	32.00
OW-63	8/19/2019	NA	NA	NA	20.12	ND	NA	32.20
OW-63	11/18/2019	NA	NA	NA	20.30	ND	NA	32.00
OW-63	9/14/2020	6935.06	NA	6914.33	20.73	ND	NA	32.05
OW-63	11/9/2020	6935.06	NA	6914.21	20.85	ND	NA	32.05
OW-63	12/8/2020	6935.06	NA	6914.09	20.97	ND	NA	32.22
OW-64	3/21/2018	NA	NA	NA	7.72	ND	NA	27.62

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
OW-64	4/24/2018	NA	NA	NA	7.85	ND	NA	27.63
OW-64	8/16/2018	NA	NA	NA	7.51	ND	NA	27.35
OW-64	11/29/2018	NA	NA	NA	8.11	8.06	0.05	27.35
OW-64	2/19/2019	NA	NA	NA	7.02	7.00	0.02	27.63
OW-64	5/15/2019	NA	NA	NA	6.83	ND	NA	27.63
OW-64	8/19/2019	NA	NA	NA	7.10	ND	NA	27.35
OW-64	11/18/2019	NA	NA	NA	8.40	ND	NA	27.35
OW-64	9/14/2020	6947.40	NA	6939.45	7.95	ND	NA	27.35
OW-64	11/9/2020	6947.40	NA	6939.22	8.18	ND	NA	27.35
OW-64	12/7/2020	6947.40	NA	6939.14	8.26	ND	NA	27.35
OW-65	3/21/2018	NA	NA	NA	23.60	23.40	0.20	41.66
OW-65	4/24/2018	NA	NA	NA	26.35	23.61	2.74	41.65
OW-65	8/16/2018	NA	NA	NA	26.64	24.96	1.68	41.66
OW-65	11/29/2018	NA	NA	NA	31.80	24.05	7.75	40.00
OW-65	2/19/2019	NA	NA	NA	31.51	22.24	9.27	40.00
OW-65	5/15/2019	NA	NA	NA	32.21	23.47	8.74	40.00
OW-65	8/20/2019	NA	NA	NA	31.15	21.97	9.18	41.66
OW-65	9/14/2020	6954.05	6929.35	6923.29	30.76	24.70	6.06	42.80
OW-65	11/9/2020	6954.05	6929.00	6921.70	32.35	25.05	7.30	42.80
OW-65	12/8/2020	6954.05	6928.26	6922.10	31.95	25.79	6.16	42.50
RW-1	3/14/2014	6946.06	6917.95	6914.41	31.65	28.11	3.54	43.04
RW-1	6/9/2014	6946.06	6918.01	6913.00	33.06	28.05	5.01	43.04
RW-1	9/18/2014	6946.06	6917.75	NA	NA	28.31	NA	43.04
RW-1	11/13/2014	6946.06	6917.91	6913.02	33.04	28.15	4.89	43.04
RW-1	3/23/2015	6946.06	6917.96	6913.26	32.80	28.10	4.70	43.04
RW-1	6/9/2015	6946.06	6918.36	6913.96	32.10	27.70	4.40	43.04
RW-1	8/23/2015	6946.06	6917.98	6916.04	30.02	28.08	1.94	43.04
RW-1	10/29/2015	6946.06	6918.41	6915.96	30.10	27.65	2.45	43.04
RW-1	3/4/2016	6946.06	6918.01	6915.51	30.55	28.05	2.50	43.04
RW-1	6/8/2016	6946.06	6918.08	6914.26	31.80	27.98	3.82	43.04
RW-1	9/13/2016	6946.06	6918.16	6914.02	32.04	27.90	4.14	43.04
RW-1	11/16/2016	6946.06	6918.26	6915.16	30.90	27.80	3.10	43.04
RW-1	3/16/2017	6946.06	6919.01	6915.51	30.55	27.05	3.50	43.04
RW-1	6/20/2017	6946.06	6919.29	6917.64	28.42	26.77	1.65	43.04
RW-1	9/19/2017	6946.06	6919.54	6918.46	27.60	26.52	1.08	43.04
RW-1	12/12/2017	6946.06	6919.56	6918.56	27.50	26.50	1.00	43.04
RW-1	2/13/2018	6946.06	6919.12	6918.84	27.22	26.94	0.28	43.04
RW-1	4/25/2018	6946.06	6919.12	6918.85	27.21	26.94	0.27	43.35
RW-1	8/16/2018	6946.06	6918.62	6918.36	27.70	27.44	0.26	43.45
RW-1	11/7/2018	6946.06	NA	NA	NA	NA	NA	43.45
RW-1	3/28/2019	6946.06	NA	NA	NA	NA	NA	43.45
RW-1	5/8/2019	6946.06	NA	NA	NA	NA	NA	43.45
RW-1	8/16/2019	6946.06	NA	NA	NA	NA	NA	43.45
RW-1	11/1/2019	6946.06	NA	NA	NA	NA	NA	43.45
RW-1	9/19/2020	6946.06	6917.99	6915.86	30.20	28.07	2.13	43.45
RW-1	11/10/2020	6946.06	6916.56	6915.73	30.33	29.50	0.83	43.45
RW-1	12/8/2020	6946.06	6916.56	6915.73	30.33	29.50	0.83	43.45

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
RW-2	3/17/2014	6928.53	NA	6903.94	24.59	ND	NA	39.80
RW-2	6/9/2014	6928.53	NA	6904.74	23.79	ND	NA	39.80
RW-2	9/18/2014	6928.53	NA	6904.58	23.95	ND	NA	39.80
RW-2	11/13/2014	6928.53	NA	6904.63	23.90	ND	NA	39.80
RW-2	3/23/2015	6928.53	NA	6905.01	23.52	ND	NA	39.80
RW-2	6/9/2015	6928.53	NA	6905.51	23.02	ND	NA	39.80
RW-2	8/23/2015	6928.53	NA	6905.16	23.37	ND	NA	39.80
RW-2	10/29/2015	6928.53	NA	6905.73	22.80	ND	NA	39.80
RW-2	3/4/2016	6928.53	NA	6906.08	22.45	ND	NA	39.80
RW-2	6/8/2016	6928.53	NA	6906.22	22.31	ND	NA	39.80
RW-2	9/13/2016	6928.53	NA	6906.06	22.47	ND	NA	39.80
RW-2	11/16/2016	6928.53	NA	6906.31	22.22	ND	NA	39.80
RW-2	3/16/2017	6928.53	NA	6906.88	21.65	ND	NA	39.80
RW-2	6/20/2017	6928.53	NA	6907.34	21.19	ND	NA	39.80
RW-2	9/19/2017	6928.53	NA	6907.82	20.71	ND	NA	39.80
RW-2	12/5/2017	6928.53	NA	6908.19	20.34	ND	NA	40.00
RW-2	2/19/2018	6928.53	NA	6908.53	20.00	ND	NA	40.00
RW-2	4/25/2018	6928.53	NA	6908.50	20.03	ND	NA	39.99
RW-2	8/16/2018	6928.53	NA	6908.43	20.10	ND	NA	40.00
RW-2	11/7/2018	6928.53	NA	NA	NA	NA	NA	40.00
RW-2	3/28/2019	6928.53	NA	NA	NA	NA	NA	40.00
RW-2	5/8/2019	6928.53	NA	NA	NA	NA	NA	40.00
RW-2	8/16/2019	6928.53	NA	NA	NA	NA	NA	40.00
RW-2	11/1/2019	6928.53	NA	NA	NA	NA	NA	40.00
RW-2	9/19/2020	6928.53	6906.43	6906.30	22.23	22.10	0.13	40.00
RW-2	11/9/2020	6928.53	6906.44	6906.25	22.28	22.09	0.19	40.00
RW-2	12/8/2020	6928.53	6906.33	6906.15	22.38	22.20	0.18	40.00
RW-5	3/14/2014	6943.57	NA	6915.65	27.92	ND	NA	39.59
RW-5	6/9/2014	6943.57	NA	6914.77	28.80	ND	NA	39.59
RW-5	9/18/2014	6943.57	NA	6914.76	28.81	ND	NA	39.59
RW-5	11/13/2014	6943.57	NA	6914.87	28.70	ND	NA	39.59
RW-5	3/23/2015	6943.57	NA	6914.47	29.10	ND	NA	39.59
RW-5	6/9/2015	6943.57	NA	6914.77	28.80	ND	NA	39.59
RW-5	8/23/2015	6943.57	NA	6914.49	29.08	ND	NA	39.59
RW-5	10/29/2015	6943.57	NA	6915.60	27.97	ND	NA	39.59
RW-5	3/4/2016	6943.57	NA	6915.35	28.22	ND	NA	39.59
RW-5	6/7/2016	6943.57	NA	6915.35	28.22	ND	NA	39.59
RW-5	9/13/2016	6943.57	NA	6915.87	27.70	ND	NA	39.59
RW-5	11/16/2016	6943.57	NA	6916.17	27.40	ND	NA	39.59
RW-5	3/16/2017	6943.57	NA	6916.04	27.53	ND	NA	39.59
RW-5	6/20/2017	6943.57	6918.27	6910.27	33.30	25.30	8.00	39.59
RW-5	9/19/2017	6943.57	6918.11	6911.92	31.65	25.46	6.19	39.59
RW-5	12/12/2017	6943.57	6918.82	6909.57	34.00	24.75	9.25	39.59
RW-5	2/9/2018	6943.57	6918.07	6909.97	33.60	25.50	8.10	39.59
RW-5	4/25/2018	6943.57	6916.95	6911.23	32.34	26.62	5.72	39.59
RW-5	8/16/2018	6943.57	6916.37	6910.99	32.58	27.20	5.38	39.51
RW-5	11/7/2018	6943.57	NA	NA	NA	NA	NA	39.51

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
RW-5	3/28/2019	6943.57	NA	NA	NA	NA	NA	39.51
RW-5	5/8/2019	6943.57	NA	NA	NA	NA	NA	39.51
RW-5	8/16/2019	6943.57	NA	NA	NA	NA	NA	39.51
RW-5	11/1/2019	6943.57	NA	NA	NA	NA	NA	39.51
RW-5	9/19/2020	6943.57	6913.98	6910.76	32.81	29.59	3.22	39.51
RW-5	11/9/2020	6943.57	6913.71	6910.54	33.03	29.86	3.17	39.51
RW-5	12/8/2020	6943.57	6910.42	6904.06	39.51	33.15	6.36	39.51
RW-6	3/17/2014	6944.01	NA	6915.97	28.04	ND	NA	40.90
RW-6	6/23/2014	6944.01	NA	6915.16	28.85	ND	NA	40.90
RW-6	9/18/2014	6944.01	NA	6915.12	28.89	ND	NA	40.90
RW-6	11/13/2014	6944.01	NA	6915.18	28.83	ND	NA	40.90
RW-6	3/23/2015	6944.01	NA	6914.83	29.18	ND	NA	40.90
RW-6	6/9/2015	6944.01	NA	6915.33	28.68	ND	NA	40.90
RW-6	8/23/2015	6944.01	NA	6914.95	29.06	ND	NA	40.90
RW-6	10/29/2015	6944.01	NA	6916.04	27.97	ND	NA	40.90
RW-6	3/4/2016	6944.01	NA	6915.76	28.25	ND	NA	40.90
RW-6	6/7/2016	6944.01	NA	6915.77	28.24	ND	NA	40.90
RW-6	9/13/2016	6944.01	NA	6916.02	27.99	ND	NA	40.90
RW-6	11/16/2016	6944.01	NA	6916.29	27.72	ND	NA	40.90
RW-6	3/16/2017	6944.01	NA	6916.44	27.57	ND	NA	40.90
RW-6	6/20/2017	6944.01	6918.51	6910.39	33.62	25.50	8.12	40.90
RW-6	9/19/2017	6944.01	6918.12	6913.04	30.97	25.89	5.08	40.90
RW-6	12/12/2017	6944.01	6919.18	6910.16	33.85	24.83	9.02	40.90
RW-6	2/9/2018	6944.01	6918.36	6910.96	33.05	25.65	7.40	40.90
RW-6	4/25/2018	6944.01	6917.08	6912.32	31.69	26.93	4.76	40.83
RW-6	8/16/2018	6944.01	6916.58	6912.23	31.78	27.43	4.35	40.85
RW-6	11/7/2018	6944.01	NA	NA	NA	NA	NA	40.85
RW-6	3/28/2019	6944.01	NA	NA	NA	NA	NA	40.85
RW-6	5/8/2019	6944.01	NA	NA	NA	NA	NA	40.85
RW-6	8/16/2019	6944.01	NA	NA	NA	NA	NA	40.85
RW-6	9/19/2020	6944.01	6914.29	6911.37	32.64	29.72	2.92	40.85
RW-6	11/9/2020	6944.01	6914.03	6910.96	33.05	29.98	3.07	40.85
RW-6	12/8/2020	6944.01	6913.83	6910.70	33.31	30.18	3.13	40.85
SMW-2	9/11/2014	6883.97	NA	6858.87	25.10	ND	NA	52.80
SMW-2	8/10/2015	6883.97	NA	6859.09	24.88	ND	NA	52.80
SMW-2	9/9/2016	6883.97	NA	6859.13	24.84	ND	NA	52.80
SMW-2	9/11/2017	6883.97	NA	6859.18	24.79	ND	NA	52.80
SMW-2	8/15/2018	6883.97	NA	6859.48	24.49	ND	NA	52.80
SMW-2	8/19/2019	6883.97	NA	6858.67	25.30	ND	NA	52.80
SMW-2	9/14/2020	6883.97	NA	6859.27	24.70	ND	NA	53.11
SMW-4	9/11/2014	6879.52	NA	6850.42	29.10	ND	NA	69.68
SMW-4	8/10/2015	6879.52	NA	6850.20	29.32	ND	NA	69.68
SMW-4	9/6/2016	6879.52	NA	6850.52	29.00	ND	NA	69.68
SMW-4	9/11/2017	6879.52	NA	6850.19	29.33	ND	NA	69.68
SMW-4	8/15/2018	6879.52	NA	6850.48	29.04	ND	NA	69.68
SMW-4	12/6/2018	6879.52	NA	6850.27	29.25	ND	NA	69.68
SMW-4	8/13/2019	6879.52	NA	6850.42	29.10	ND	NA	69.68

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
SMW-4	9/14/2020	6879.52	NA	6850.37	29.15	ND	NA	62.90
STP1-NW	3/10/2015	6904.47	NA	6883.73	20.74	ND	NA	50.00
STP1-NW	6/2/2015	6904.47	NA	6883.75	20.72	ND	NA	50.00
STP1-NW	8/11/2015	6904.47	NA	6883.68	20.79	ND	NA	50.00
STP1-NW	10/29/2015	6904.47	NA	6883.87	20.60	ND	NA	50.00
STP1-NW	3/1/2016	6904.47	NA	6883.92	20.55	ND	NA	50.00
STP1-NW	6/7/2016	6904.47	NA	6883.58	20.89	ND	NA	50.00
STP1-NW	9/9/2016	6904.47	NA	6883.27	21.20	ND	NA	50.00
STP1-NW	11/14/2016	6904.47	NA	6883.45	21.02	ND	NA	50.00
STP1-NW	2/21/2017	6904.47	NA	6884.00	20.47	ND	NA	50.00
STP1-NW	6/2/2017	6904.47	NA	6883.81	20.66	ND	NA	50.00
STP1-NW	9/5/2017	6904.47	NA	6883.66	20.81	ND	NA	50.00
STP1-NW	12/4/2017	6904.47	NA	6883.92	20.55	ND	NA	49.74
STP1-NW	2/9/2018	6904.47	NA	6883.92	20.55	ND	NA	49.73
STP1-NW	4/26/2018	6904.47	NA	6883.83	20.64	ND	NA	49.65
STP1-NW	8/15/2018	6904.47	NA	6883.55	20.92	ND	NA	49.78
STP1-NW	11/19/2018	6904.47	NA	NA	NA	NA	NA	49.78
STP1-NW	2/13/2019	6904.47	NA	6884.12	20.35	ND	NA	50.00
STP1-NW	5/8/2019	6904.47	NA	6884.93	19.54	ND	NA	50.00
STP1-NW	8/21/2019	6904.47	NA	6883.68	20.79	ND	NA	50.00
STP1-NW	10/22/2019	6904.47	NA	6883.71	20.76	ND	NA	50.00
STP1-NW	12/8/2020	6904.47	NA	6883.69	20.78	ND	NA	50.28
STP1-SW	3/10/2015	6912.38	NA	Dry	Dry	ND	NA	29.10
STP1-SW	6/2/2015	6912.38	NA	Dry	Dry	ND	NA	29.10
STP1-SW	8/11/2015	6912.38	NA	Dry	Dry	ND	NA	29.10
STP1-SW	10/29/2015	6912.38	NA	Dry	Dry	ND	NA	29.10
STP1-SW	3/8/2016	6912.38	NA	Dry	Dry	ND	NA	29.10
STP1-SW	6/7/2016	6912.38	NA	Dry	Dry	ND	NA	29.10
STP1-SW	9/9/2016	6912.38	NA	Dry	Dry	ND	NA	29.10
STP1-SW	11/14/2016	6912.38	NA	Dry	Dry	ND	NA	29.10
STP1-SW	2/21/2017	6912.38	NA	NA	NA	NA	NA	29.10
STP1-SW	6/2/2017	6912.38	NA	NA	NA	NA	NA	29.10
STP1-SW	9/5/2017	6912.38	NA	NA	NA	NA	NA	29.10
STP1-SW	12/4/2017	6912.38	NA	NA	NA	NA	NA	29.10
STP1-SW	2/9/2018	6912.38	NA	NA	NA	NA	NA	29.10
STP1-SW	4/26/2018	6912.38	NA	NA	NA	NA	NA	29.10
STP1-SW	8/15/2018	6912.38	NA	NA	NA	NA	NA	29.10
STP1-SW	11/19/2018	6912.38	NA	NA	NA	NA	NA	29.10
STP1-SW	2/13/2019	6912.38	NA	NA	NA	NA	NA	29.10
STP1-SW	5/8/2019	6912.38	NA	NA	NA	NA	NA	29.10
STP1-SW	8/21/2019	6912.38	NA	NA	NA	NA	NA	29.10

APPENDIX A. FLUID LEVEL MEASUREMENTS
MARATHON PETROLEUM COMPANY
GALLUP REFINING DIVISION, GALLUP, NEW MEXICO

Location	Date Measured	Measuring Point Elevation (ft amsl)	Product Surface Elevation (ft amsl)	Water Surface Elevation (ft amsl)	Depth To Water (ft)	Depth To Product (ft)	Product Thickness (ft)	Total Depth (ft)
STP1-SW	10/22/2019	6912.38	NA	NA	NA	NA	NA	29.10
STP1-SW	12/8/2020	6912.38	NA	6883.15	29.23	NA	NA	29.25

Notes:
amsl = above mean sea level
ft = feet
NA = Not applicable
ND = Not detected

Appendix B – LIF/HP Methods

APPENDIX B. LIF/HP TECHNOLOGY
LIF/HP INVESTIGATION REPORT
GALLUP REFINERY, GALLUP, NEW MEXICO

Laser-Induced Fluorescence

Dakota Technologies, LLC, describes LIF technology as a direct optical sensing tool that uses laser light to cause certain polycyclic aromatic hydrocarbons (PAHs) found in petroleum derived SPH to fluoresce (Dakota 2021). The UVOST® is housed in a shock-protected optical compartment attached to the end of a DP probe string. Fiber optic cable, pre-strung in the probe rods, continuously transmits fluorescence data back to the rig-mounted computer, providing a real time log of fluorescence data points at sub-inch intervals. The Optical Screening Tool computer software transforms the fluorescence data into multi-wavelength waveforms that are specific to the types of PAHs present in a particular SPH mixture. LIF response intensity is influenced by the quantity of hydrocarbons present and the waveform pattern is a function of the relative proportions of the PAHs present. The LIF response is compared to that of a known reference standard and is presented as percent of the reference emitter (% RE). Direct-push drilling application of LIF provides vertical high-resolution data on SPH distribution in the subsurface. UVOST® signal responses correlate to free phase and residual SPH only. Vapor, sorbed, and dissolved hydrocarbon phases are invisible to the UVOST® system.

The UVOST® LIF log displays total signal logs consisting of four wavelength channels and can callout individual waveforms, a wavelength "fingerprint" display, to aid in identification and depth specific relative SPH quantities. The LIF data log displays depth on the vertical axis and fluorescence signal intensity on the horizontal axis. The signal intensity in % RE is based on a proprietary, calibrated reference emitter, which is a known fluorescence and not a specific petroleum hydrocarbon concentration. In general, the subsurface-SPH instrument responses depend on the SPH properties (e.g., quantity and type) and subsurface soil properties. However, the signal response is not directly correlated to whether a SPH is mobile or to a specific SPH recoverability. In this sense, a UVOST® log provides a semi-quantitative representation of the SPH saturation magnitude and reveals the SPH-impacted soil depth and breadth (Dakota 2021).

Hydraulic Profiling Tool

For this investigation an HP tool was coupled with the LIF tool. The HP tool provides formation permeability data through water injection pressure measurement as the tool is advanced into the subsurface (Geoprobe 2013). The LIF/HP probe is advanced into unconsolidated soils to assess centimeter-scale subsurface permeability. As the probe is pushed through the soil, water is injected into the soil column at a controlled rate. Total injection pressure is measured by a transducer while the injection flow rate is measured (McCall 2011).

The HP tool measures downhole hydraulic pressure (P Dwn), in pounds per square inch (psi), in response to the constant pumping rate of water into the saturated formation. Flow rate (Q) in milliliters per minute (mL/min) is the rate at which water is pumped out of the HP tool probe port. Normally, water is pumped out at a constant Q of 60 mL/min. A change in Q (usually accompanied by an inverse change in P Dwn) is an indicator of soil hydraulic properties. An estimated hydraulic conductivity (K) in feet per day (ft/d) can be internally calculated utilizing pressure and flow data in conjunction with location specific dissipation test(s). If a dissipation test is performed below the water table and the test successfully stabilizes, the result can be corrected to an absolute hydrostatic value, from which a potentiometric surface (water table) can be calculated.

The estimated K (ft/d) is calculated using the equation:

$$K = \ln(Q/P')*20.0 + 7.0$$

where: P'= downhole pressure in psi – (0.433 (psi/ft) * depth below water table (ft)) – atmospheric pressure (psi)

0.433 psi/ft = hydrostatic pressure gradient
Q = flow rate (mL/min).

Vadose zone K values are reported as estimates of the varying dry soil permeability. These values maintain qualitative value and may lend insight into vadose zone preferential pathways (Dakota 2021).

Electrical Conductivity Tool

For this investigation an EC tool was coupled with the LIF tool. The EC tool provides formation conductivity data. The electrical conductivity of unconsolidated materials is a function of the moisture content of the material and the con-ducting properties of the pore fluids and sediments. In the saturated zone, where variations in moisture content are small, fluid and matrix properties are the major factors. In formations where variations in ground water chemistry are small, differences in sediment size and type are the dominant control on electrical conductivity (Schulmeister, et al. 2003).

The electrical conductivity associated with sedimentary materials varies with particle size and mineral species. Silt-and sand-sized particles of covalently bonded minerals, such as quartz, mica, and feldspar, are generally nonconductive.

For this reason, electrical conductivity in sand and gravel aquifers primarily reflects variations in concentrations of dissolved constituents. Clay-sized particles, such as phyllosilicates, humic substances, and iron and manganese oxides and oxyhydroxides, tend to be highly conductive due to their extremely small size, relatively high surface area per unit volume, and charge characteristics. Thus, in formations where clay-sized particles are present, both lateral and vertical variations in lithology may be assessed using EC logs (Schulmeister, et al. 2003).

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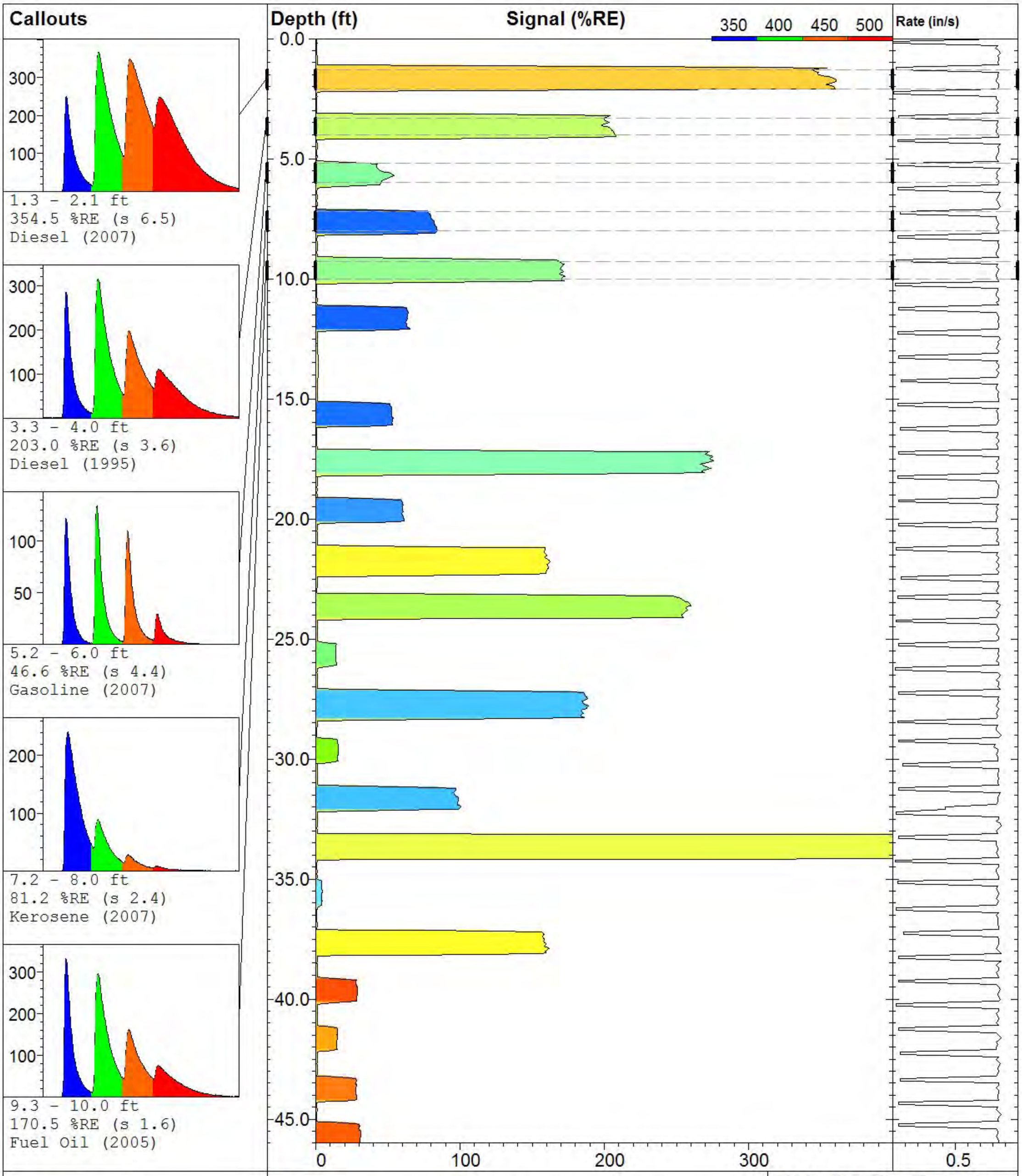
McCall, W. 2011. Application of the Geoprobe® HPT Logging System for Geo-Environmental Investigations. Geoprobe® Technical Bulletin No. MK3184. February.

Schulmeister, M. K., Butler Jr., J. J., Healey, J. M., Zheng, L., Wysocki, D. A., and McCall, G. W. 2003. Direct-Push Electrical Conductivity Logging for High-Resolution Hydrostratigraphic Characterization. Ground Water Monitoring and Remediation. V. 23, No. 3, p 52-62.



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Various products on sand

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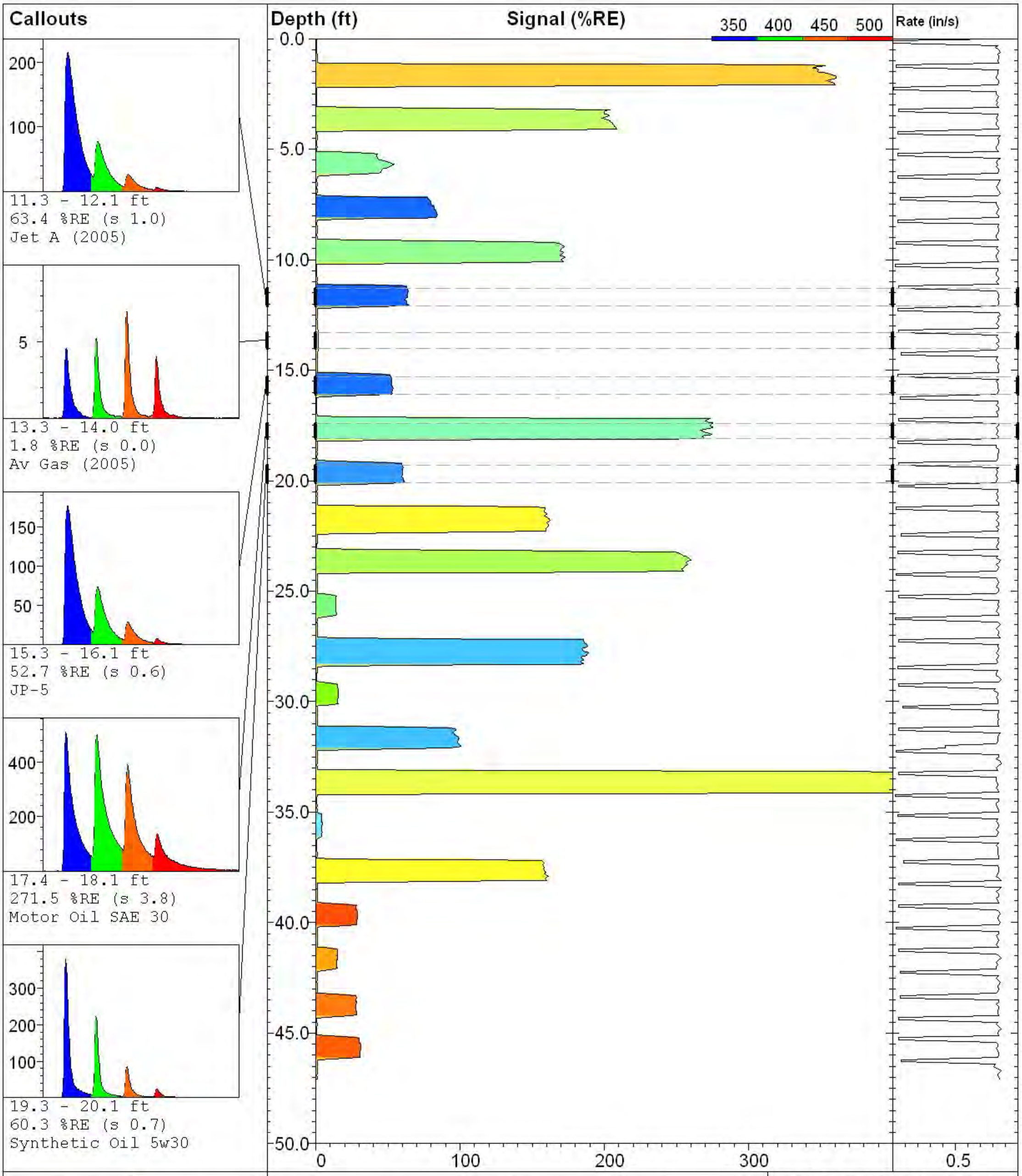
Site: **Examples**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **47.10 ft**
Client: **DTI**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **826.6 % @ 33.20 ft**
Job:	*Operator/Unit:* **T.Rudolph/UVOST1002**	*Date & Time:* **2007-08-24 14:25 CDT**



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Site: **Examples**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **47.10 ft**
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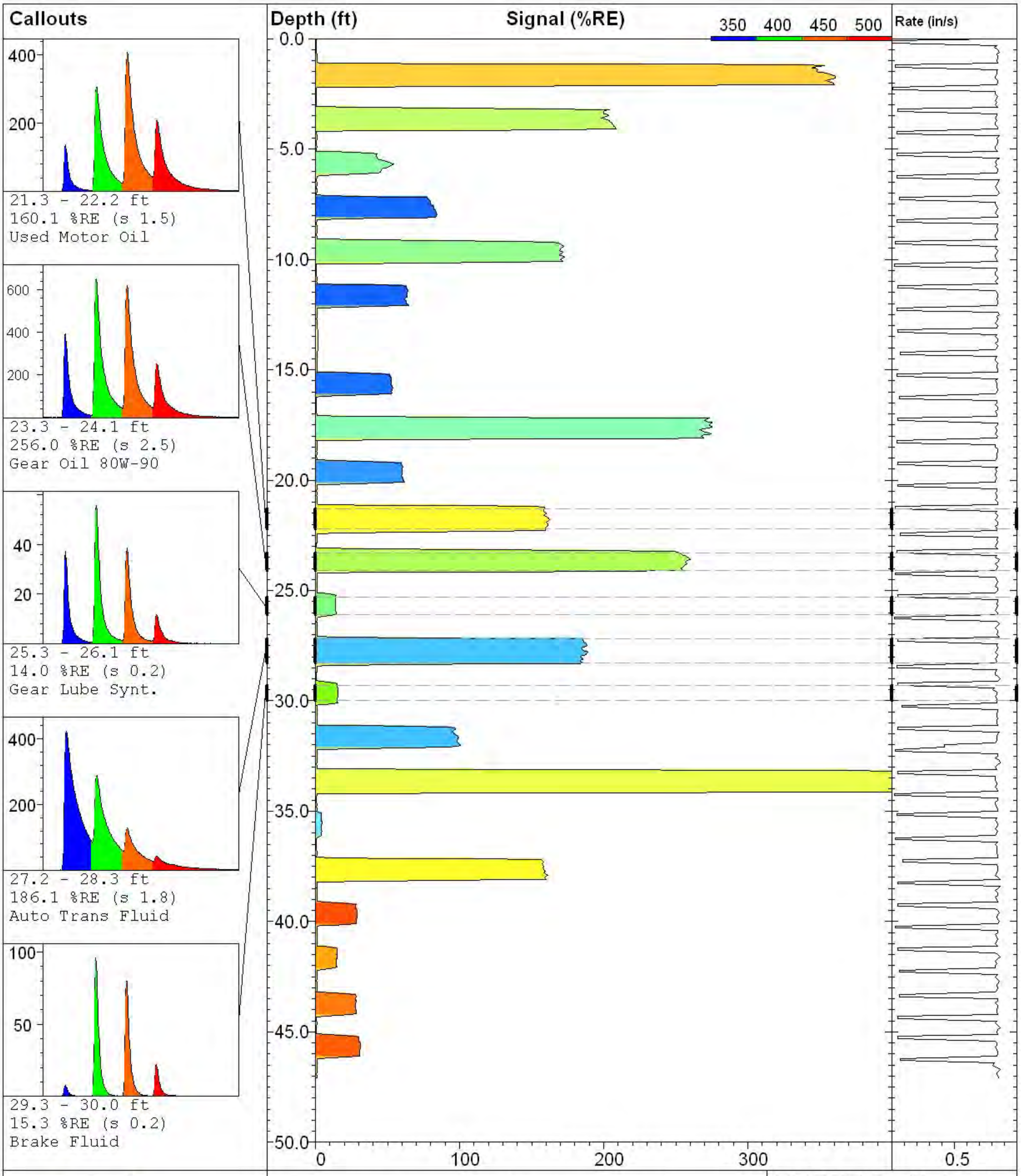
Job:	*Operator/Unit:* **T.Rudolph/UVOST1002**	*Date & Time:* **2007-08-24 14:25 CDT**



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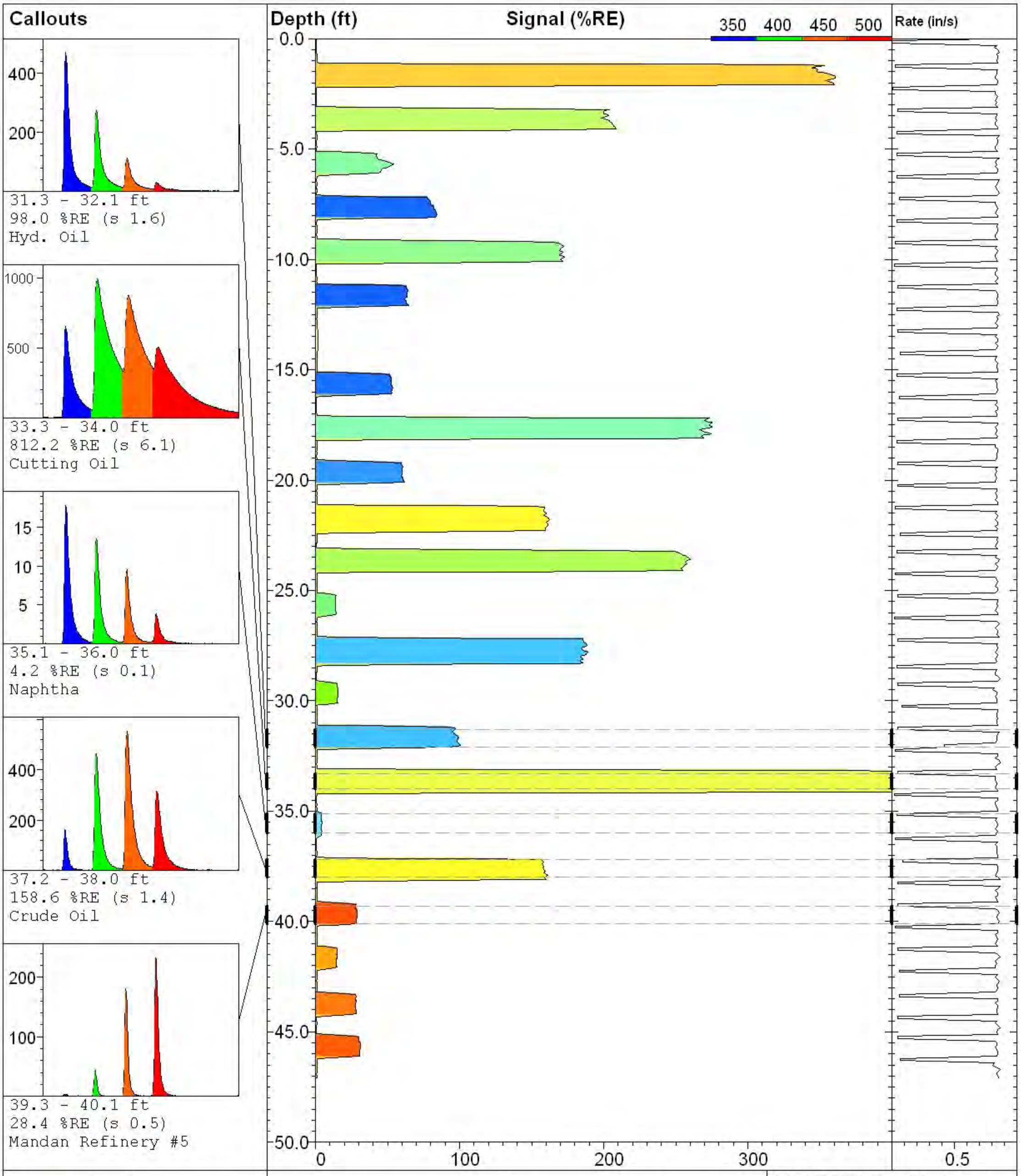
Site: **Examples**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **47.10 ft**
Client: **DTI**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **826.6 % @ 33.20 ft**
Job:	*Operator/Unit:* **T.Rudolph/UVOST1002**	*Date & Time:* **2007-08-24 14:25 CDT**



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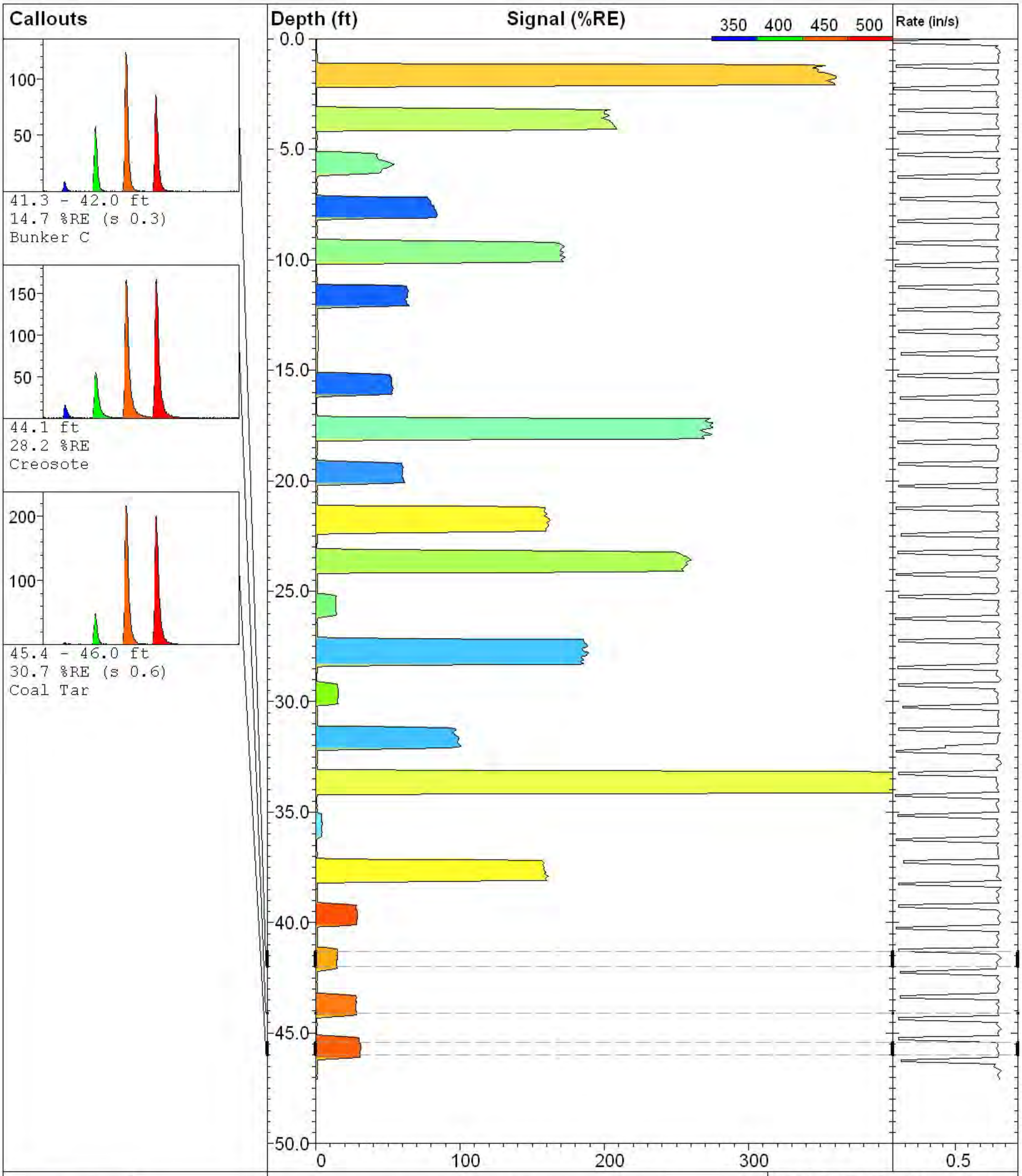
Site: **Examples**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **47.10 ft**
Client: **DTI**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **826.6 % @ 33.20 ft**
Job:	*Operator/Unit:* **T.Rudolph/UVOST1002**	*Date & Time:* **2007-08-24 14:25 CDT**



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Site: **Examples**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **47.10 ft**
Client: **DTI**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **826.6 % @ 33.20 ft**
Job:	*Operator/Unit:* **T.Rudolph/UVOST1002**	*Date & Time:* **2007-08-24 14:25 CDT**

Dakota Technologies
UVOST®-HP Reference Log

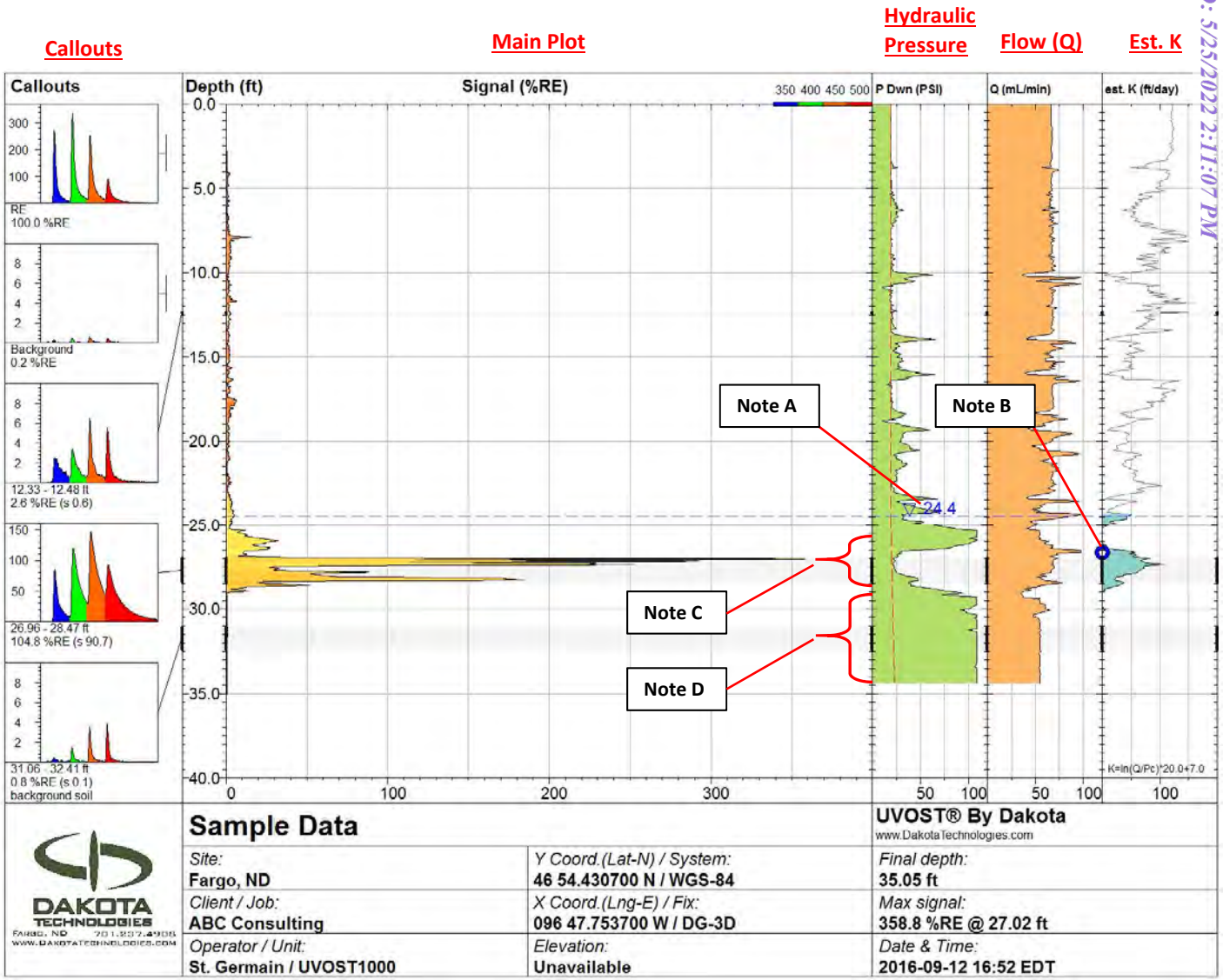
Callouts: Waveforms from selected depths or depth ranges showing the multi-wavelength waveform for that depth. The four peaks are due to fluorescence at four wavelengths and referred to as "channels". Each channel is assigned a color. Various NAPLs will have a unique waveform "fingerprint" due to the relative amplitude of the four channels and/or broadening of one or more channels. Basic waveform statistics and any operator notes are given below the callout.

Main Plot: Signal (total fluorescence) versus depth where signal is relative to the Reference Emitter (RE). The total area of the waveform is divided by the total area of the Reference Emitter yielding the %RE. This %RE scales with the NAPL fluorescence. The fill color is based on the relative distribution of each channel's area to the total waveform area (see callout waveform). The channel-to-color relationship and corresponding wavelengths are given in the upper right corner of the plot.

Hydraulic Pressure (P Dwn): Downhole hydraulic pressure is measured in response to pumping water into the formation at a constant rate. Measurements are logged simultaneously with UVOST data. The resulting log gives insight into the permeability of the soils.

Flow (Q): Water is pumped out of the port of the UVOST-HP probe at a constant rate of 60 mL/min. A change in flow (usually accompanied by an inverse pressure change) is an indicator of hydraulic properties of the soil.

Estimated K: The estimated hydraulic conductivity (K) is internally calculated by utilizing pressure and flow data in conjunction with dissipation test(s) performed at each location. The estimated K is calculated by the equation: K = ln(Q/P')*20.0 + 7.0.



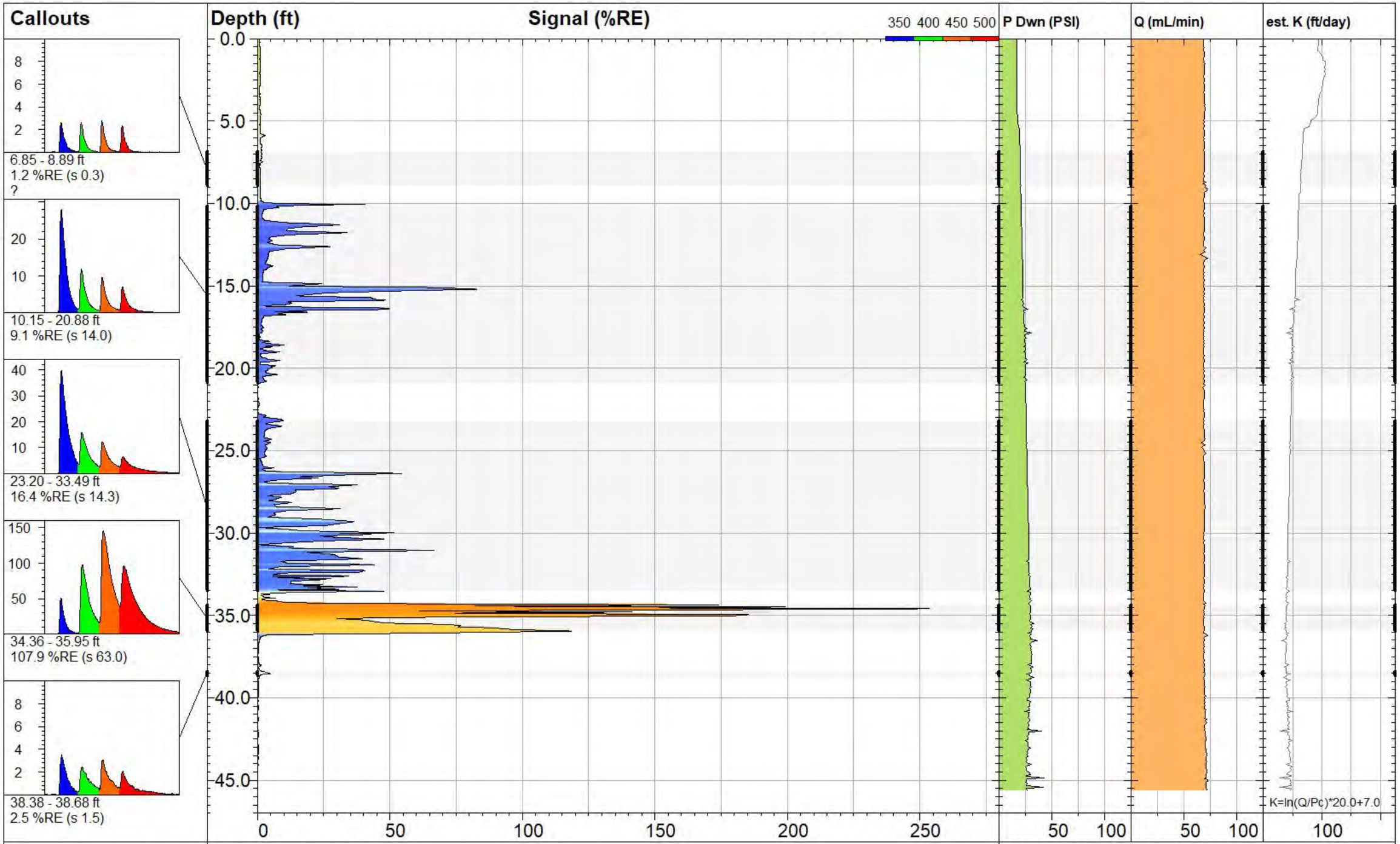
Note A: The water table has been calculated and plotted at 24.4' bgs.

Note B: The circle on the Estimated K plot represents the location(s) of dissipation tests. Here, a single dissipation test was performed at 26.67 bgs'.

Note C: The highest LNAPL response in this log is present in an area of relatively higher permeability, as indicated by low pressure and higher estimated k values at approximately 26' to 28'.

Note D: The increase in pressure starting near 29' (transducer is maxed out, 100 psi) is due to low permeability conditions. In this example, the increase in pressure below the LNAPL represents a potential confining unit.

Appendix C – LIF/HP Logs



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EB-LIF-02

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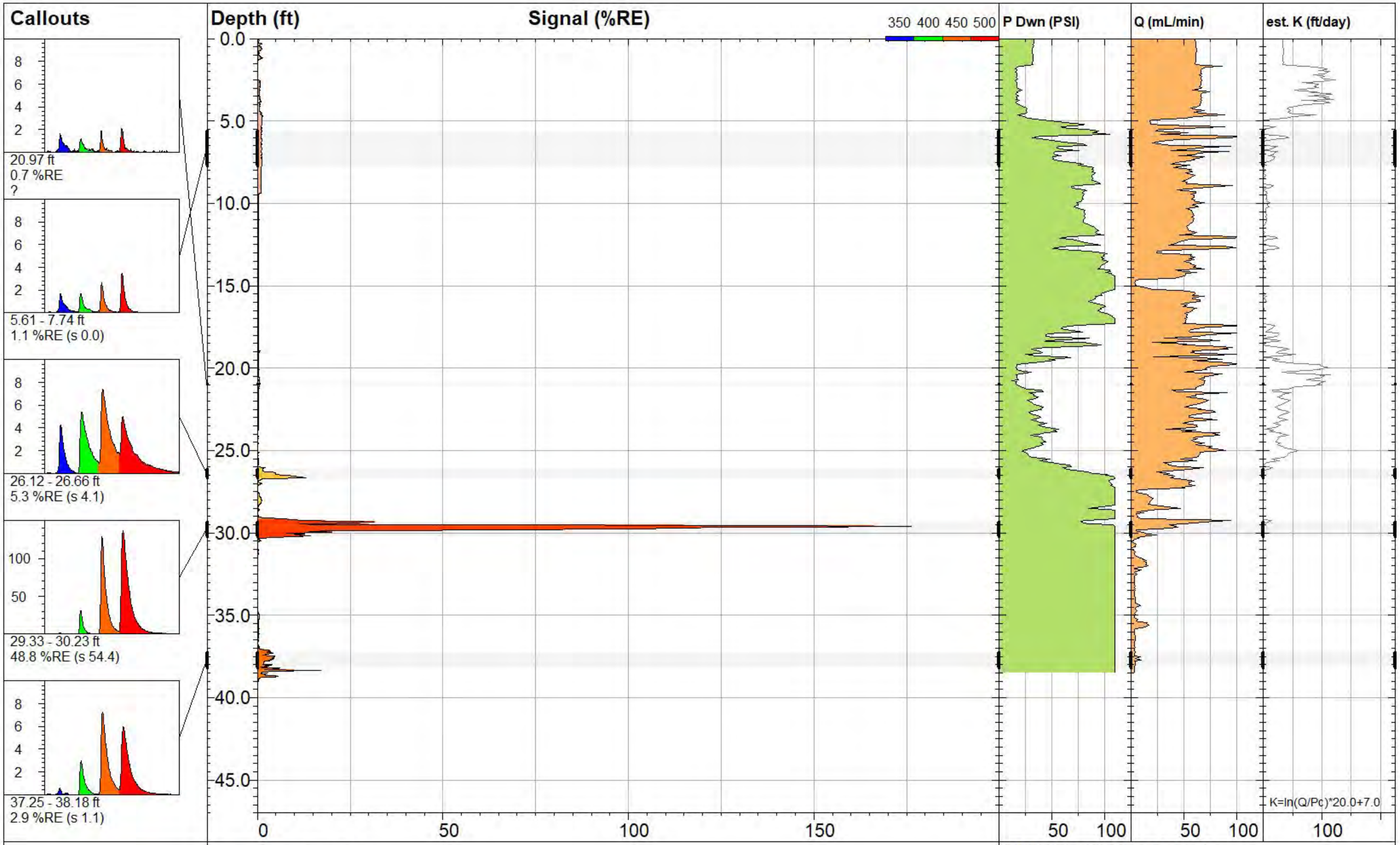
Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **46.35 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **255.2 %RE @ 34.59 ft**
Operator / Unit: **DS / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-18 13:15 MST**



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EB-LIF-03

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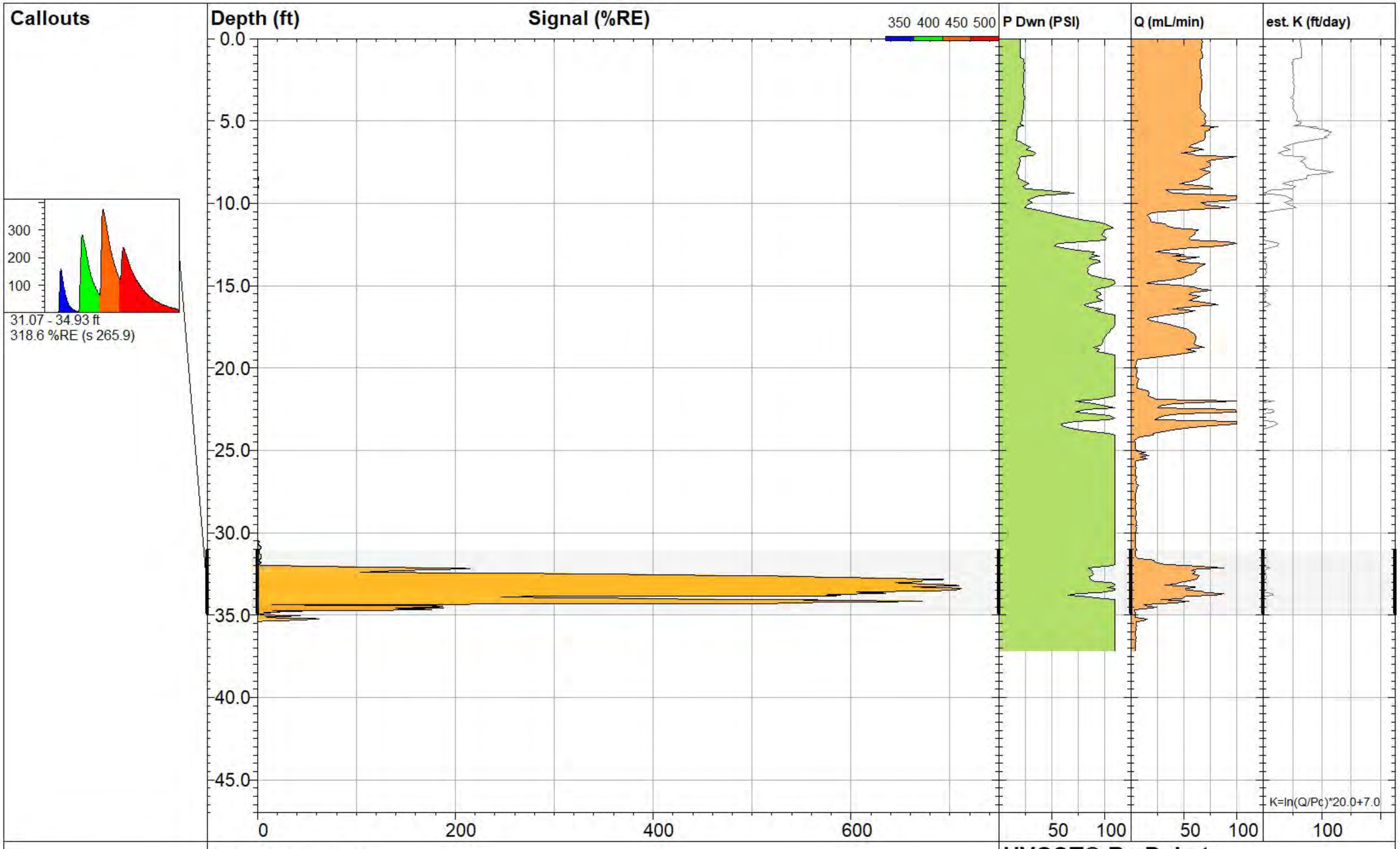
Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **39.13 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **179.2 %RE @ 29.60 ft**
Operator / Unit: **DS / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-20 09:46 MST**



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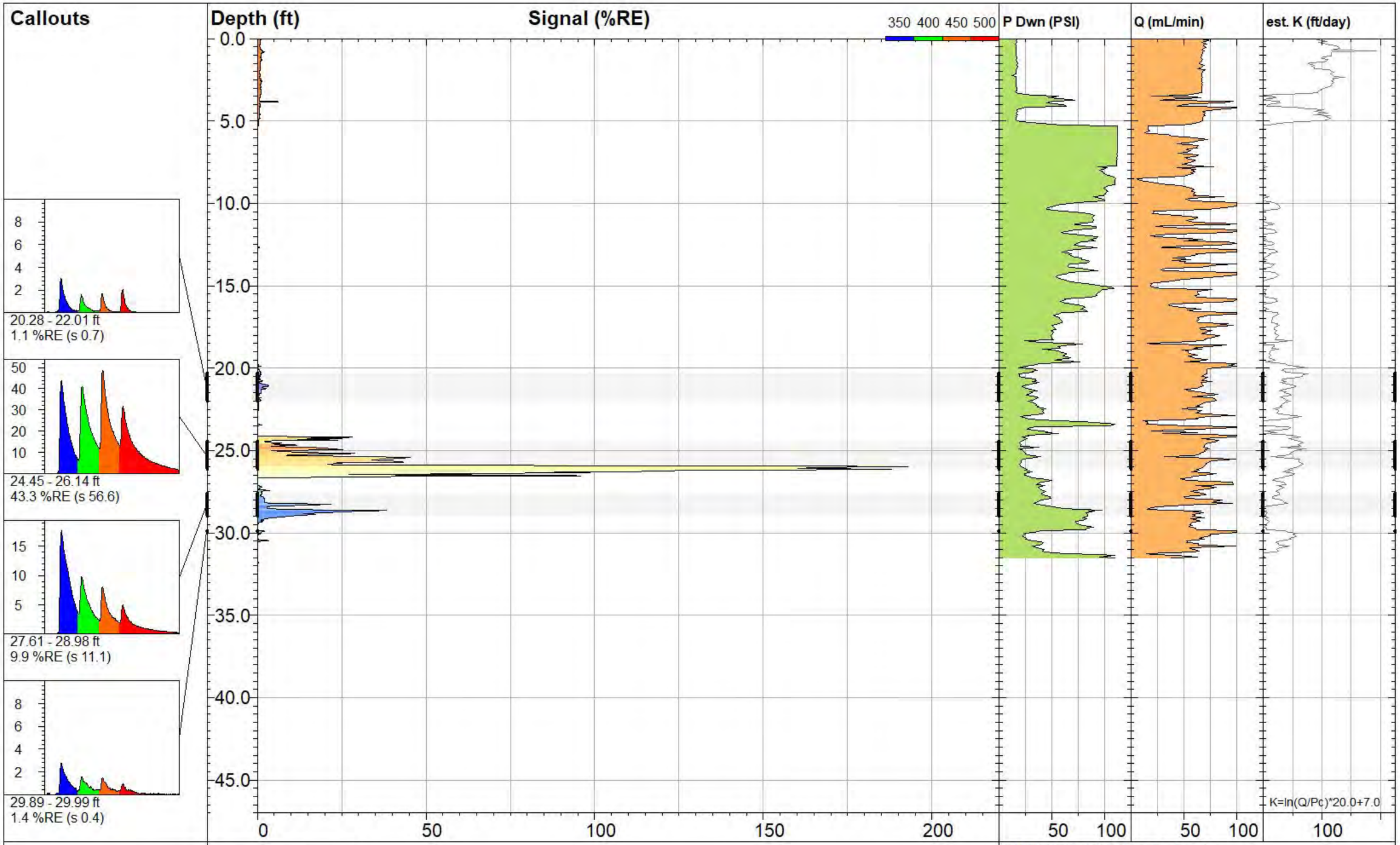
Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **37.89 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **711.7 %RE @ 33.37 ft**
Operator / Unit: **DS / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-18 16:18 MST**



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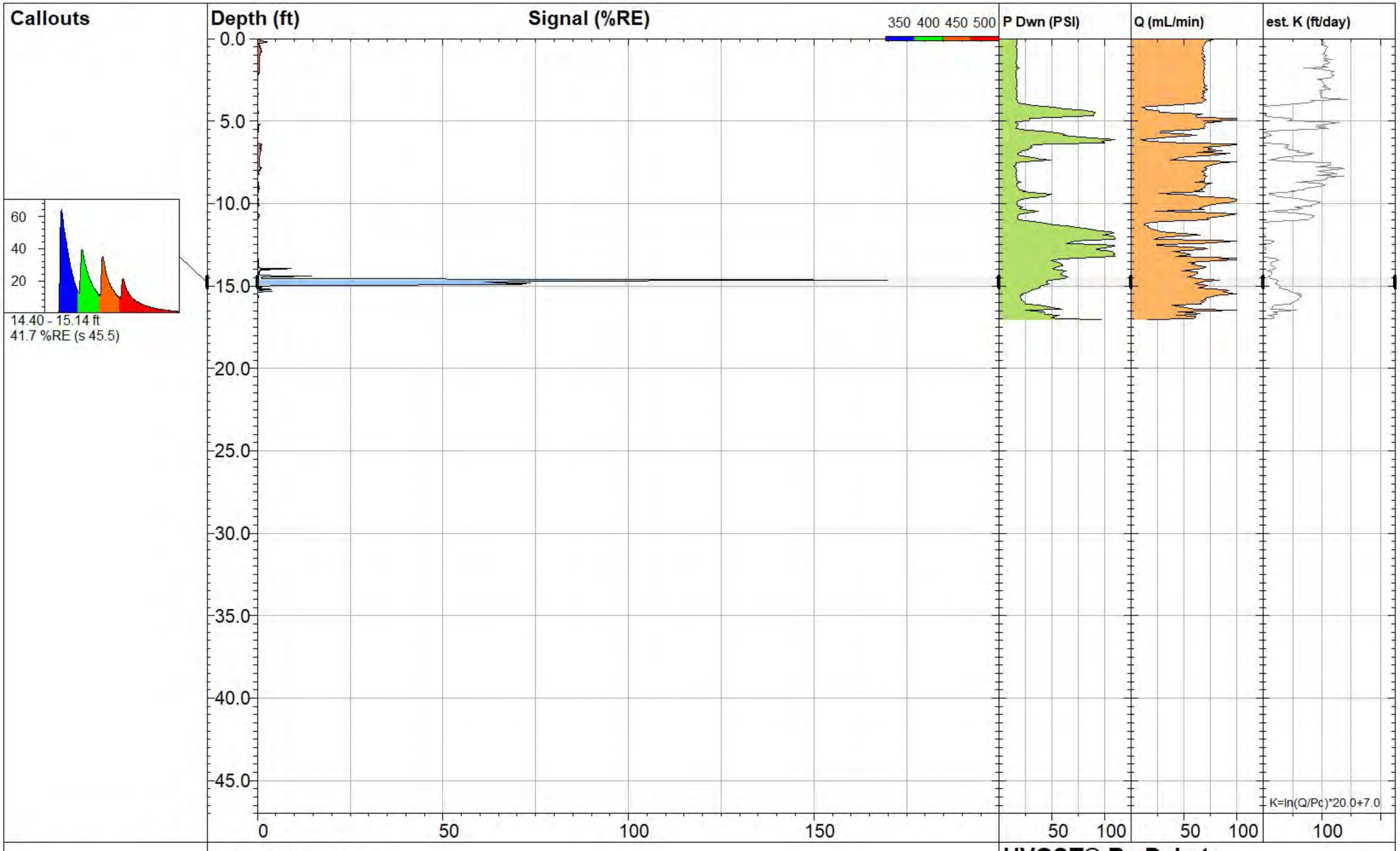
Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **32.25 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **194.4 %RE @ 25.97 ft**
Operator / Unit: **DS / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-20 11:25 MST**



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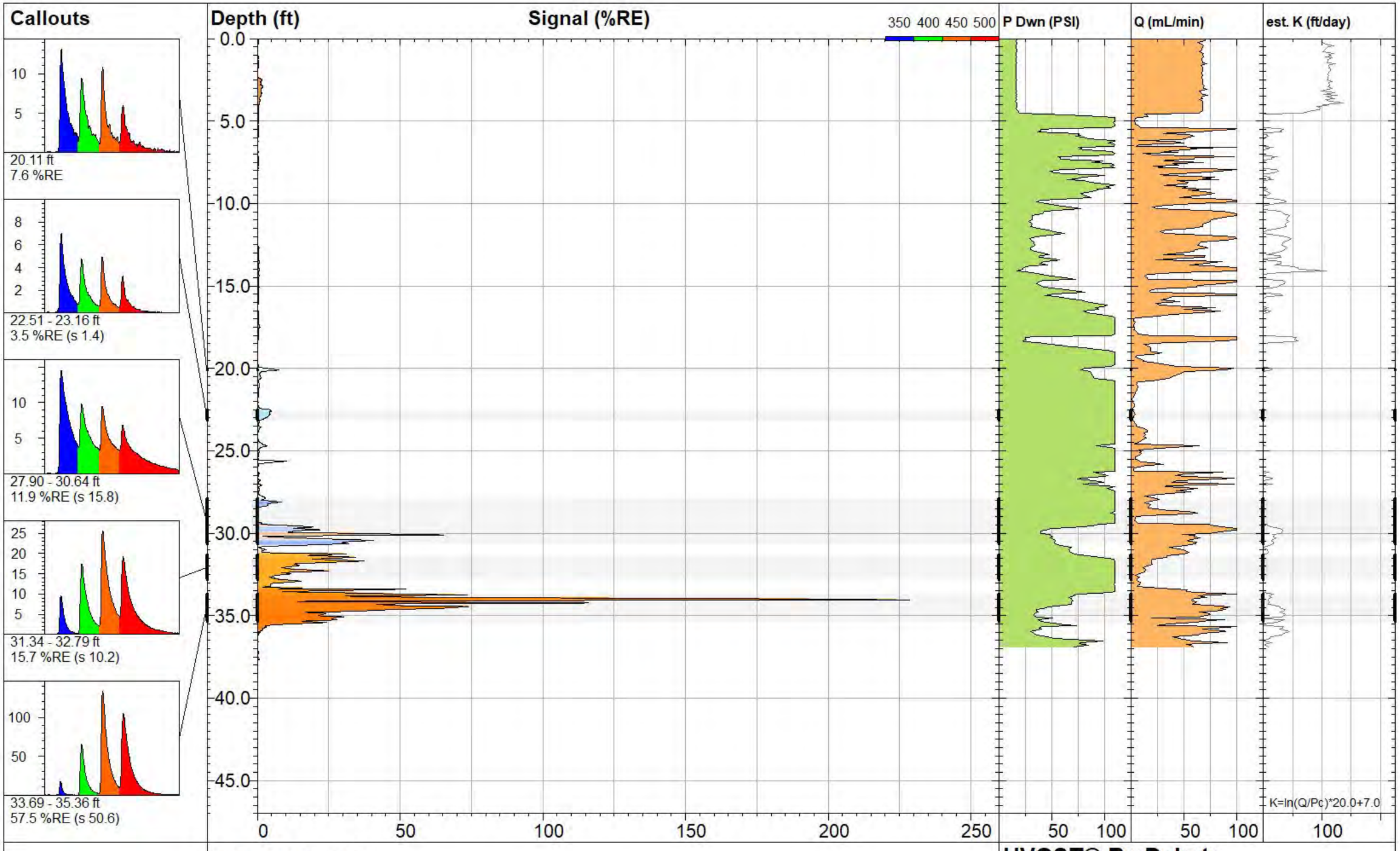
	Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **17.75 ft**
	Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **172.0 %RE @ 14.64 ft**
	Operator / Unit: **DS / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-20 13:13 MST**



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EB-LIF-07

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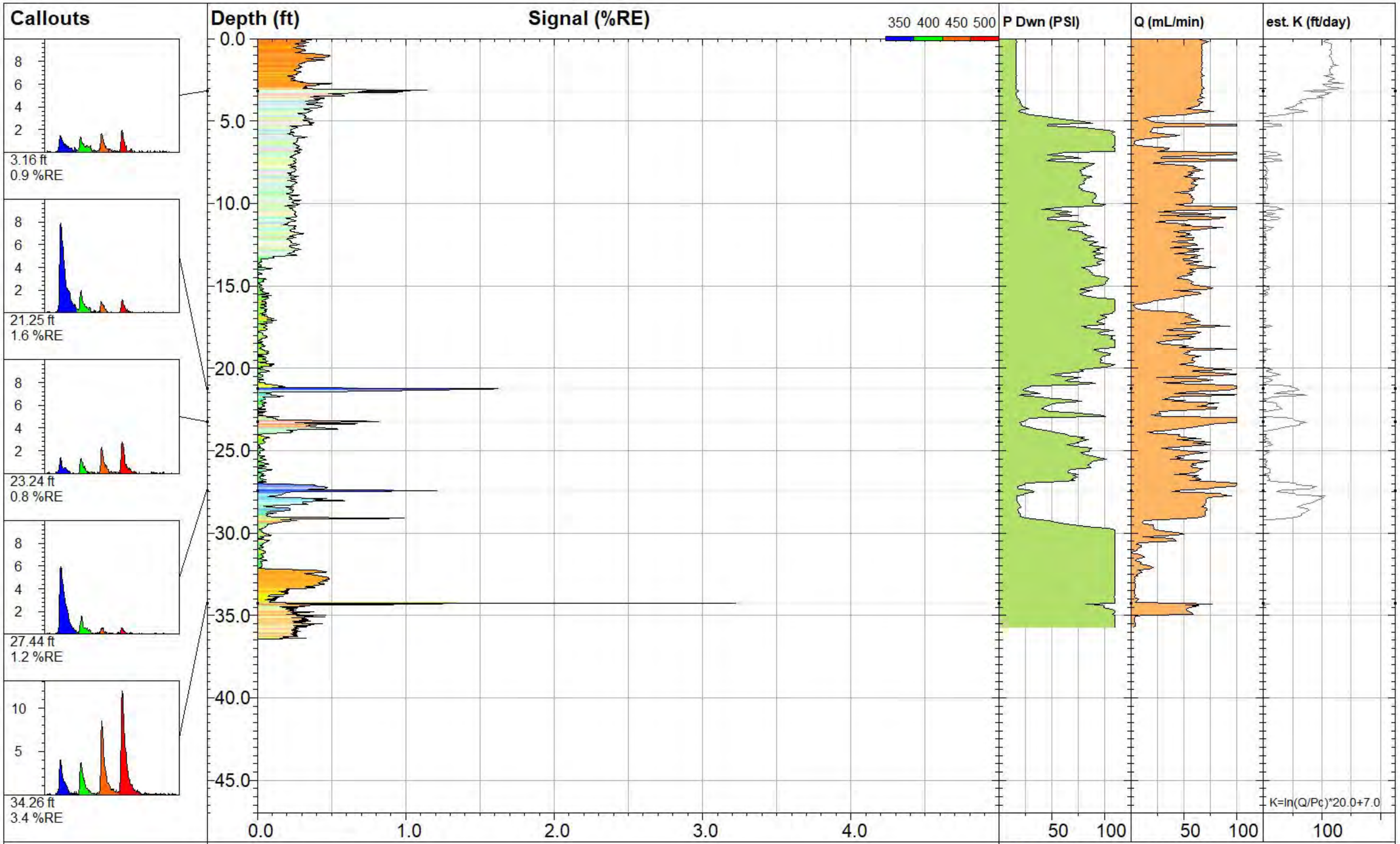
Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **37.66 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **231.2 %RE @ 34.05 ft**
Operator / Unit: **DS / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-21 15:40 MST**



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EB-LIF-08

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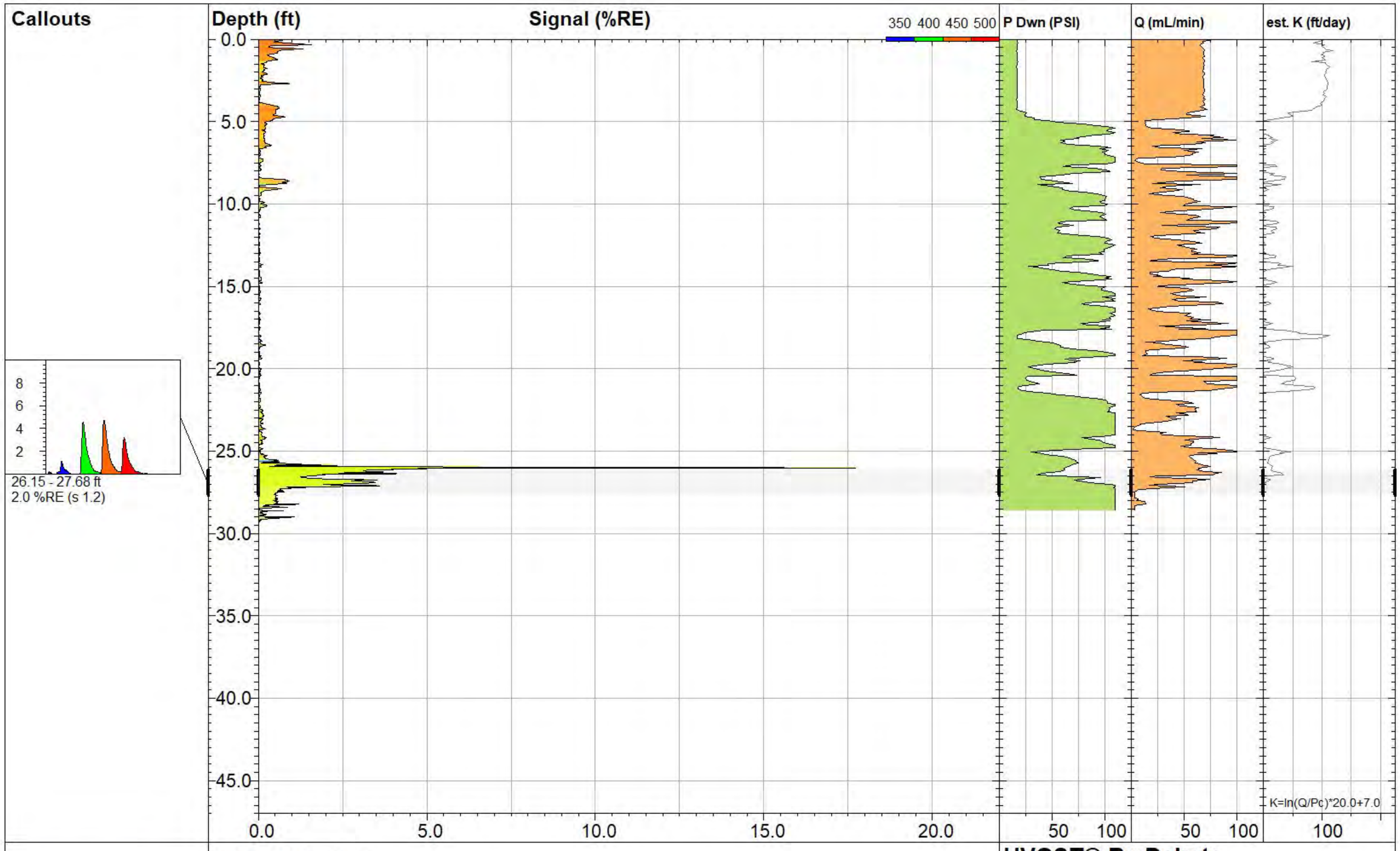
Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **36.43 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **3.4 %RE @ 34.26 ft**
Operator / Unit: **DS / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-20 10:46 MST**



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EB-LIF-09

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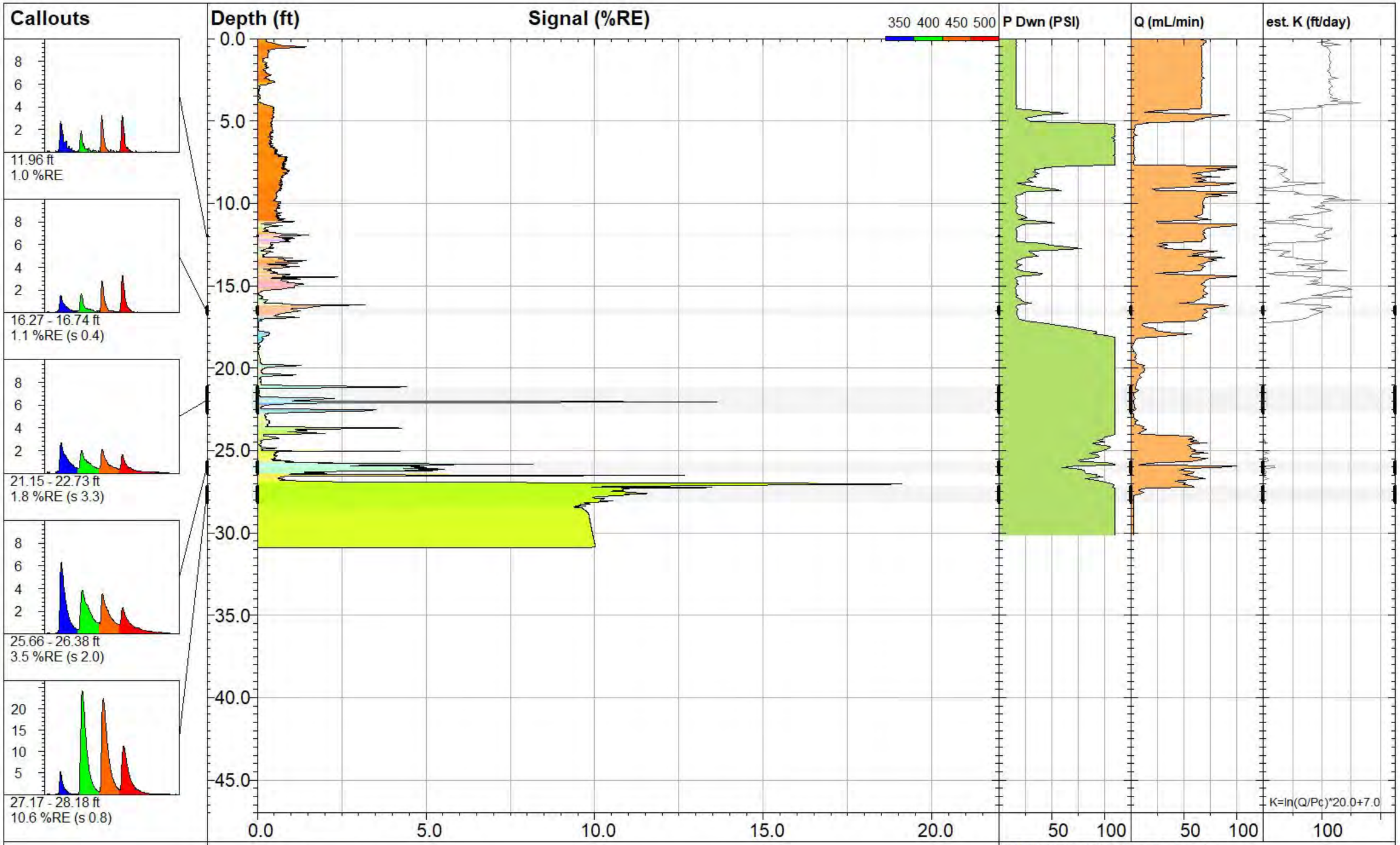
Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **29.33 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **19.1 %RE @ 26.02 ft**
Operator / Unit: **DS / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-22 09:53 MST**



EB-LIF-11

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Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **30.88 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **19.3 %RE @ 27.04 ft**
Operator / Unit: **DS / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-21 14:22 MST**

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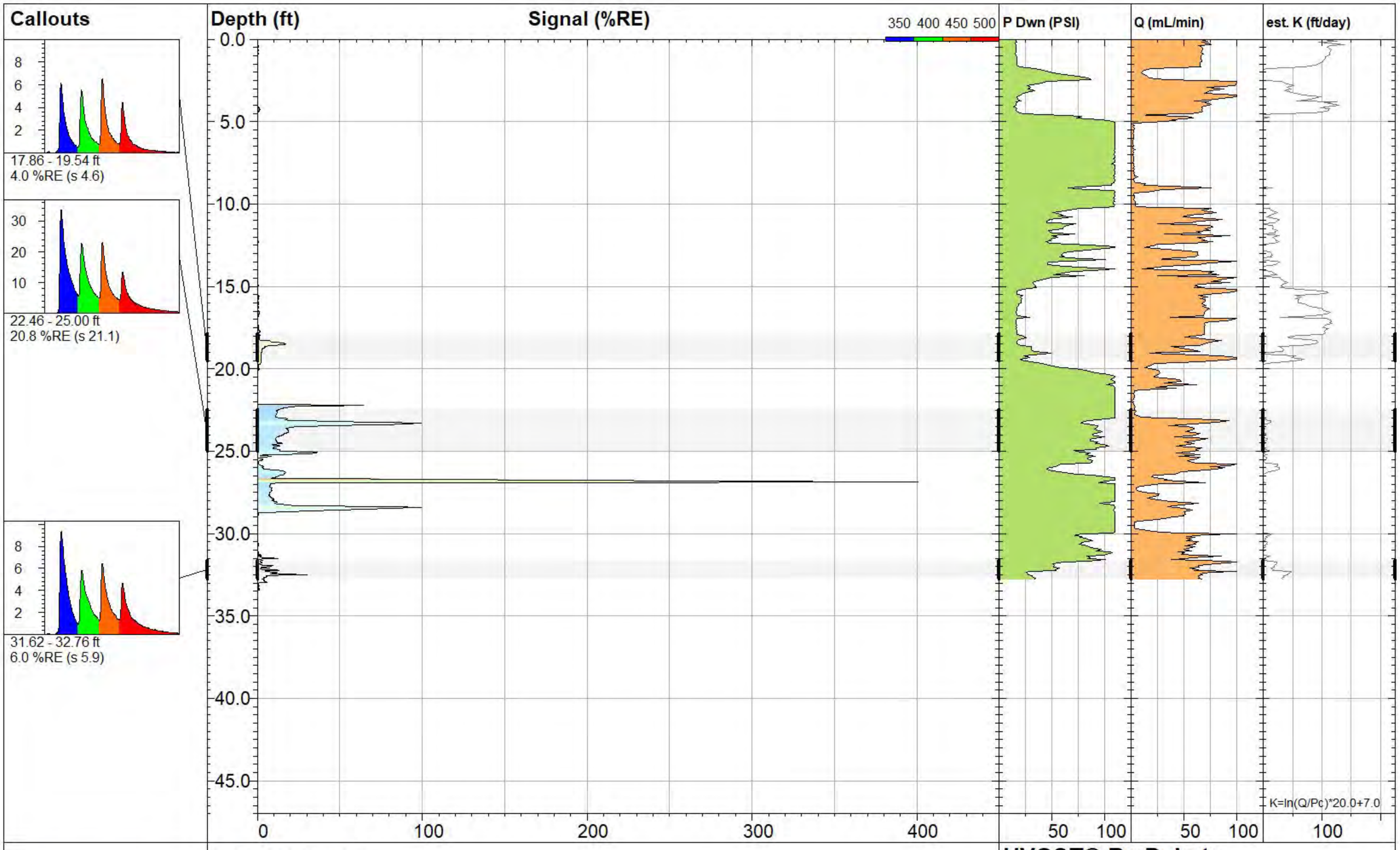

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EB-LIF-12

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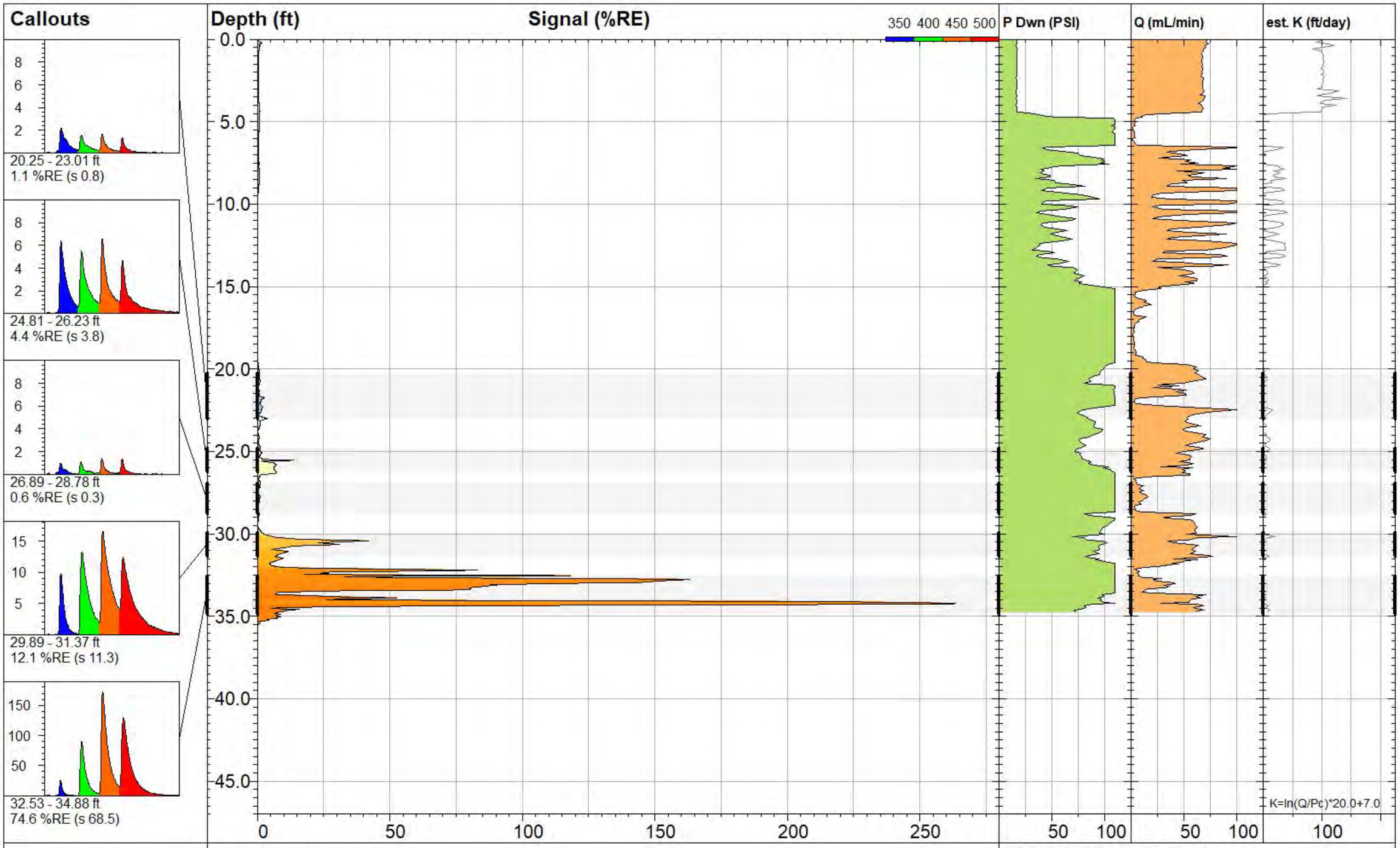
Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **33.46 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **401.0 %RE @ 26.87 ft**
Operator / Unit: **DS / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-21 15:04 MST**



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EB-LIF-13

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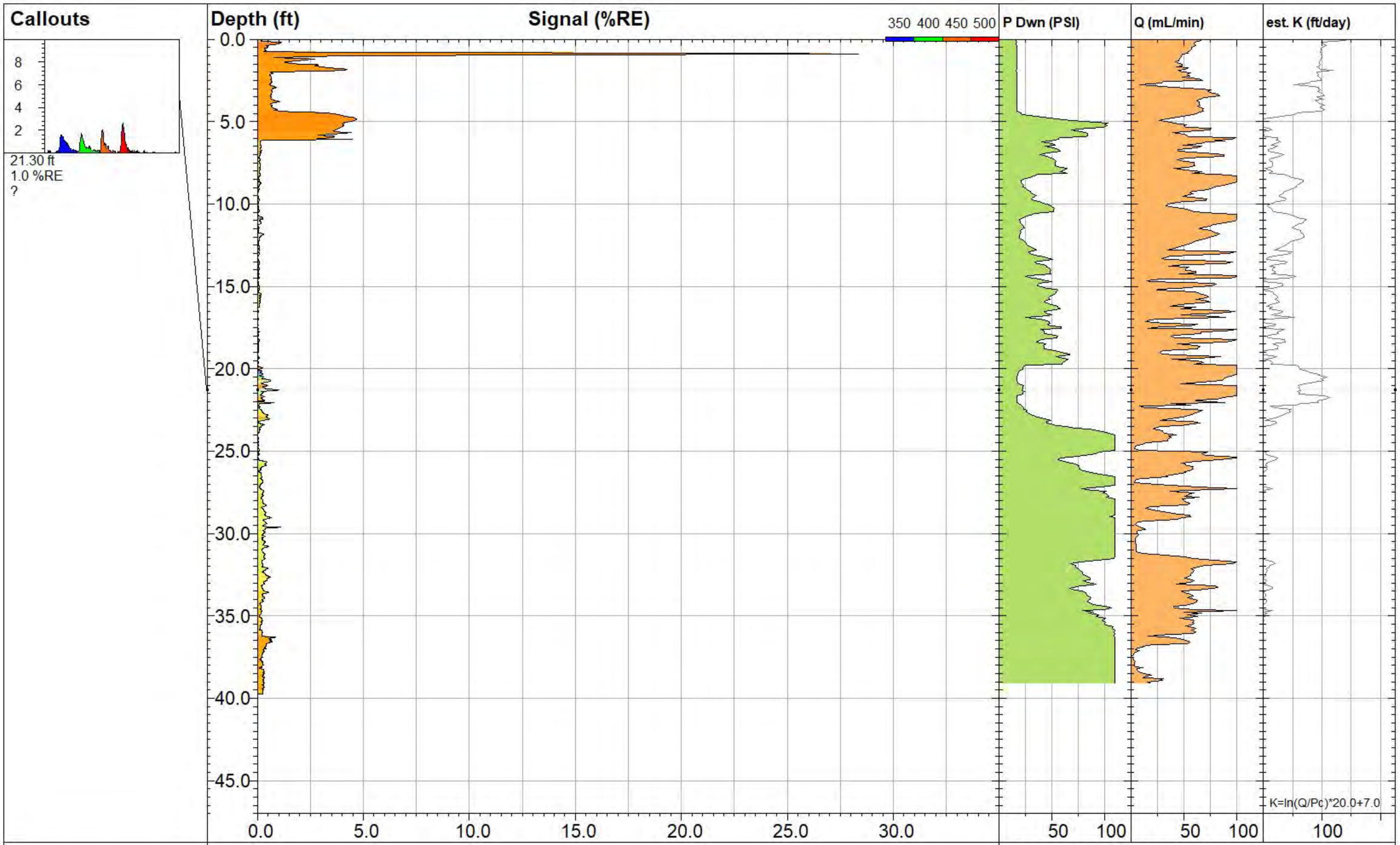
Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **35.47 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **263.7 %RE @ 34.21 ft**
Operator / Unit: **DS / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-21 16:13 MST**



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EB-LIF-14

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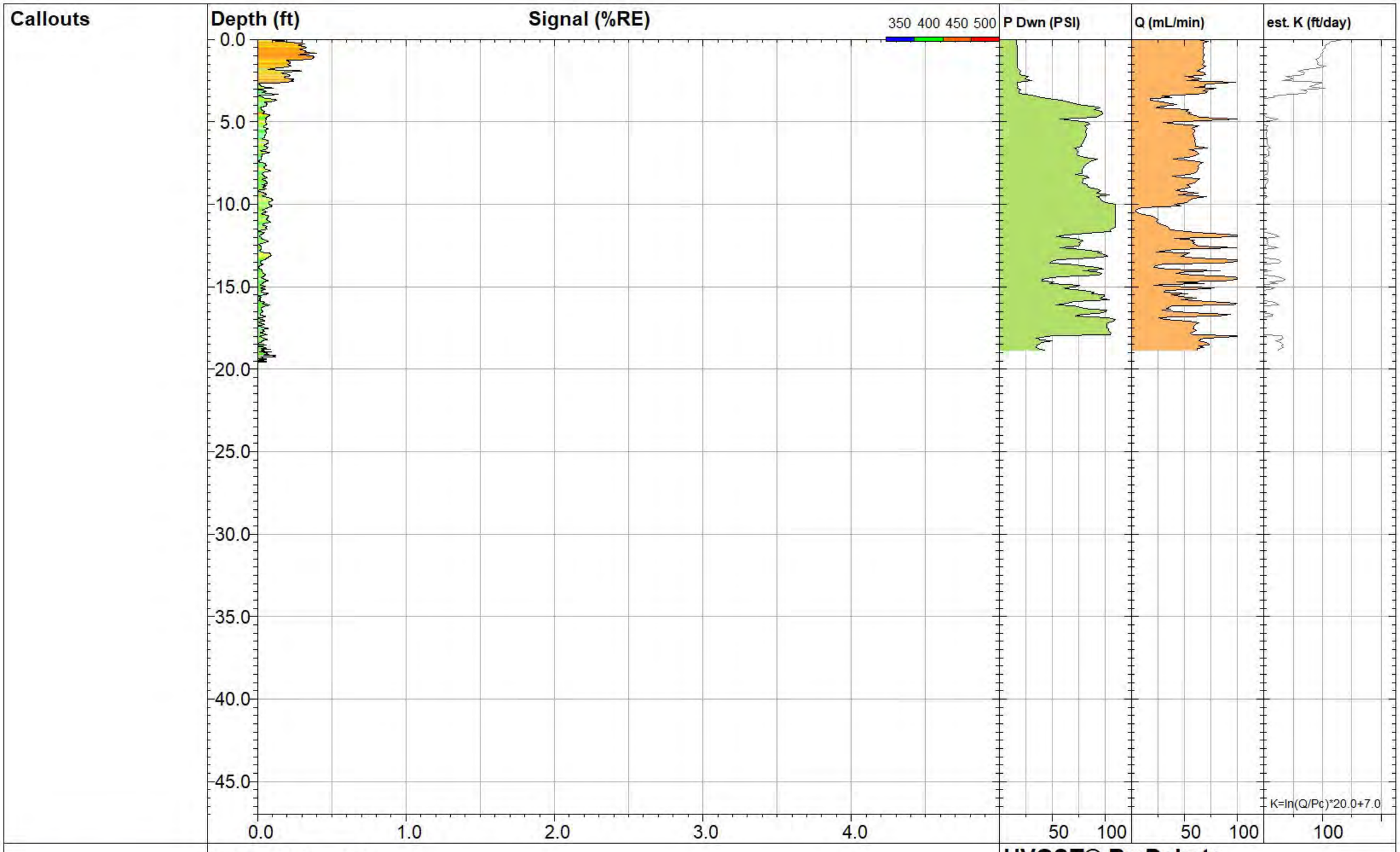
Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **39.76 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **28.7 %RE @ 0.88 ft**
Operator / Unit: **DS / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-22 08:57 MST**



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EB-LIF-15

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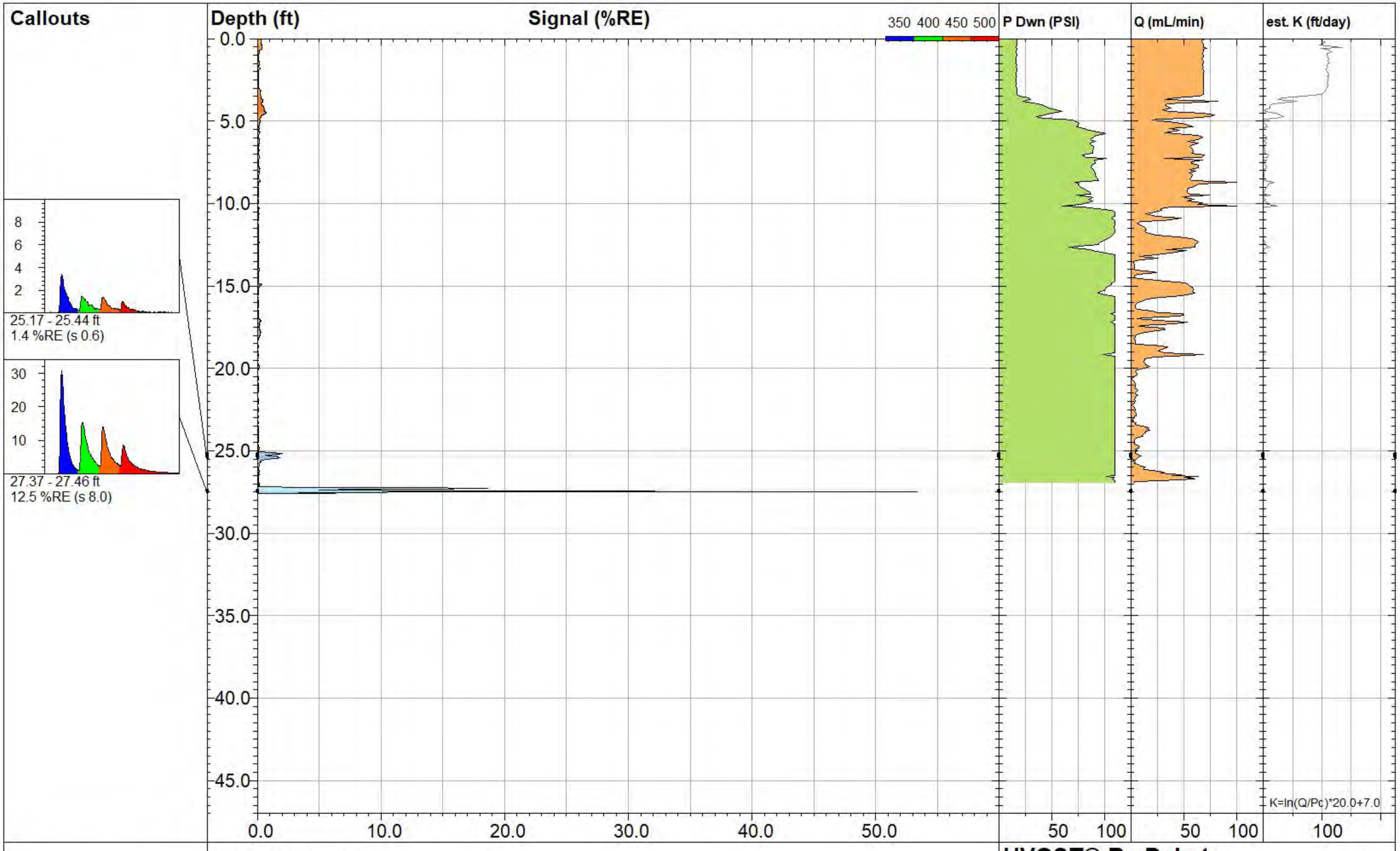
Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **19.58 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **0.4 %RE @ 0.82 ft**
Operator / Unit: **DS / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-20 14:37 MST**



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EB-LIF-16

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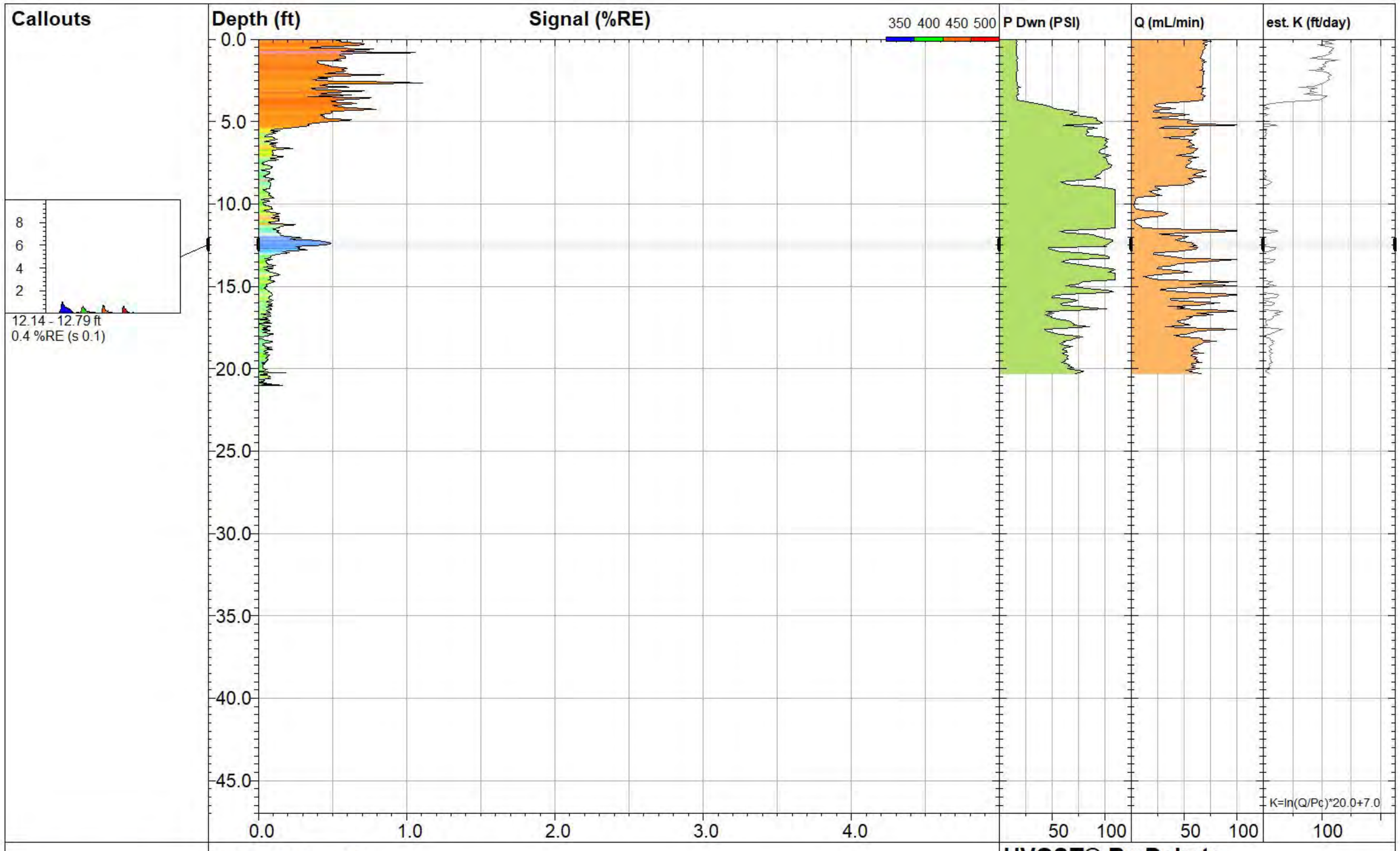
Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **27.61 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **54.5 %RE @ 27.48 ft**
Operator / Unit: **DS / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-20 15:17 MST**



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EB-LIF-17

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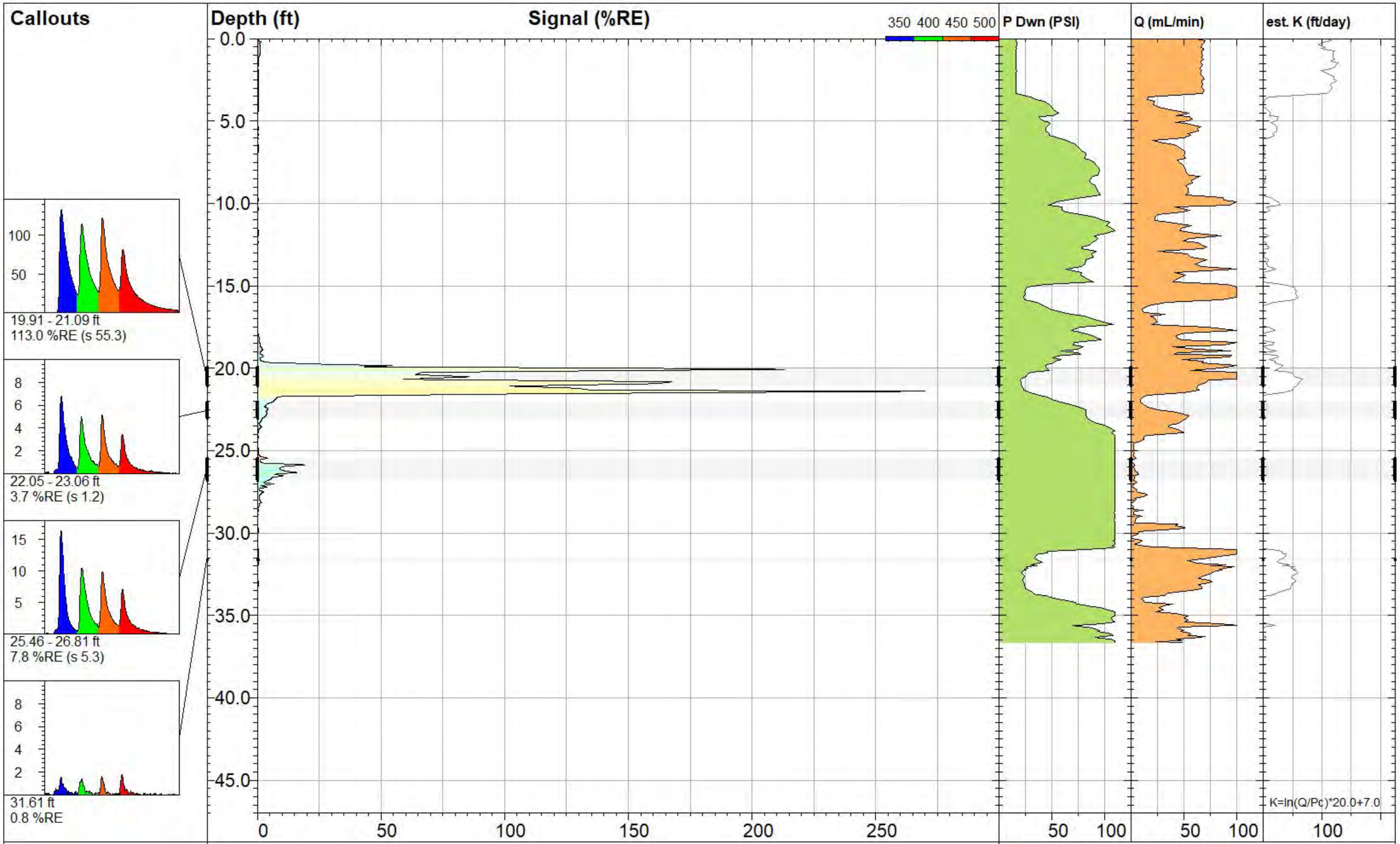
Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **21.01 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **1.1 %RE @ 0.00 ft**
Operator / Unit: **DS / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-20 14:58 MST**



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EB-LIF-18

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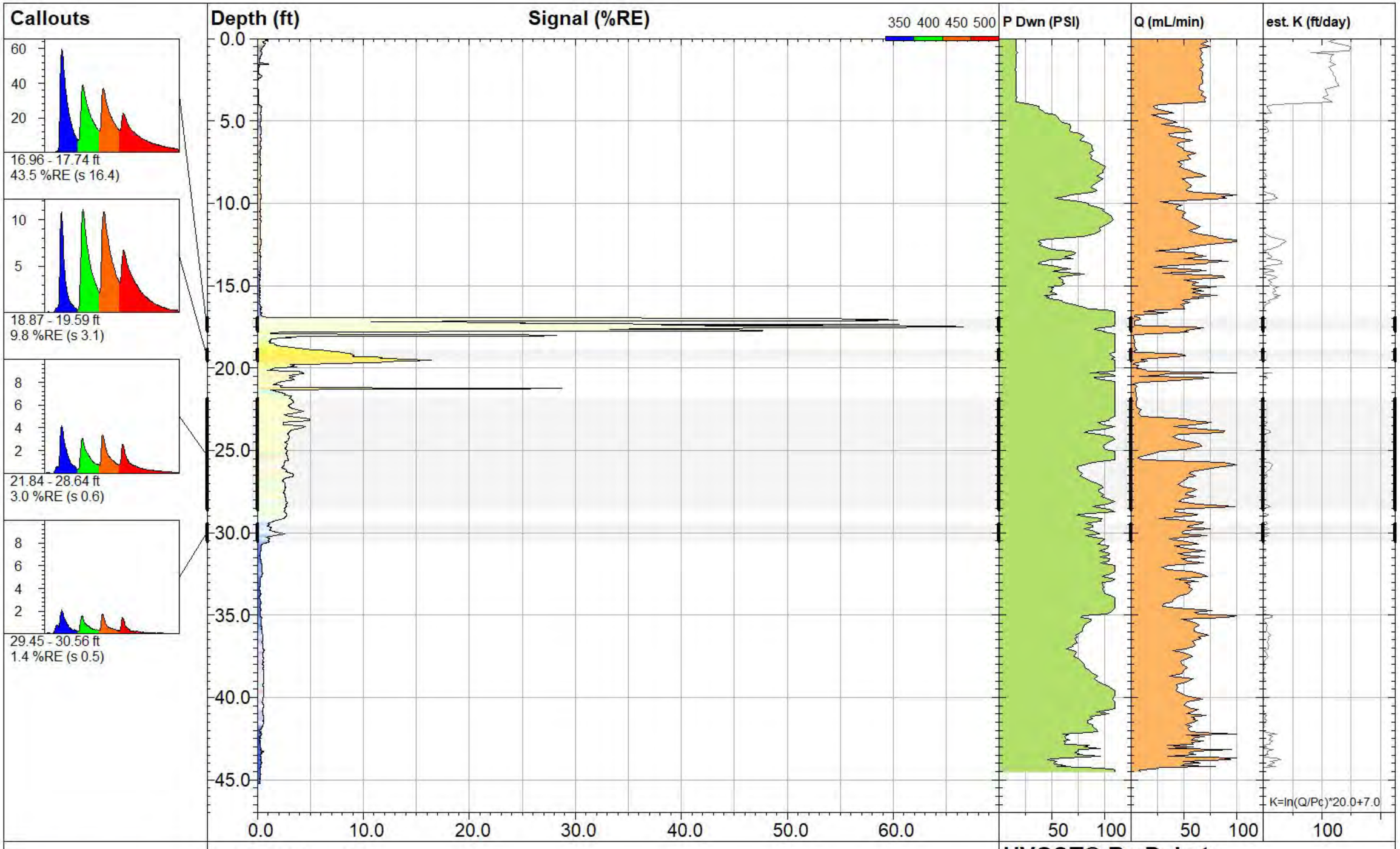
Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **37.34 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **272.3 %RE @ 21.40 ft**
Operator / Unit: **BG / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-25 12:55 MST**



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EB-LIF-19

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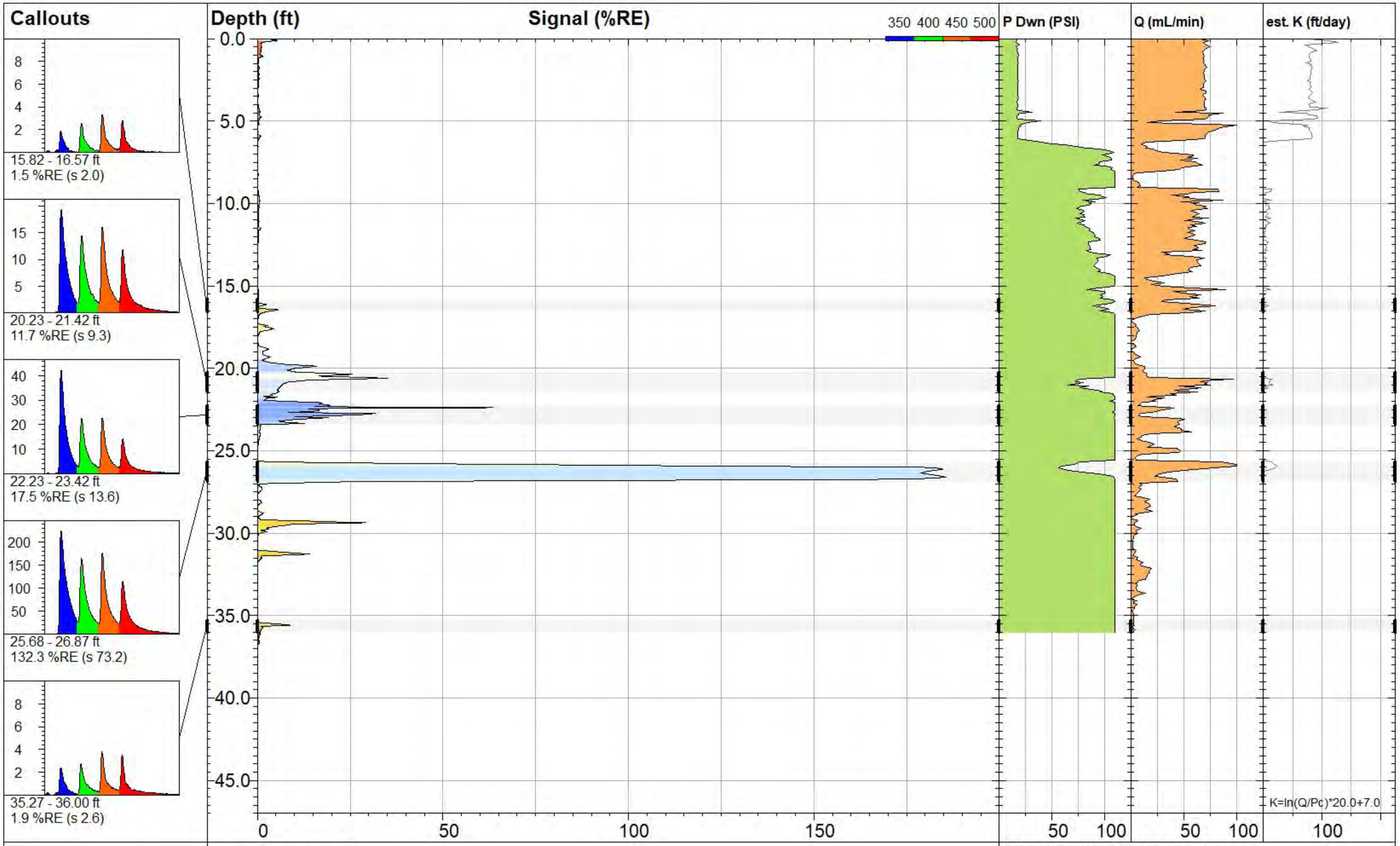
Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **45.21 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **67.0 %RE @ 17.48 ft**
Operator / Unit: **BG / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-25 13:28 MST**



EB-LIF-20

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Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **36.74 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **185.7 %RE @ 26.62 ft**
Operator / Unit: **DS / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-23 10:24 MST**

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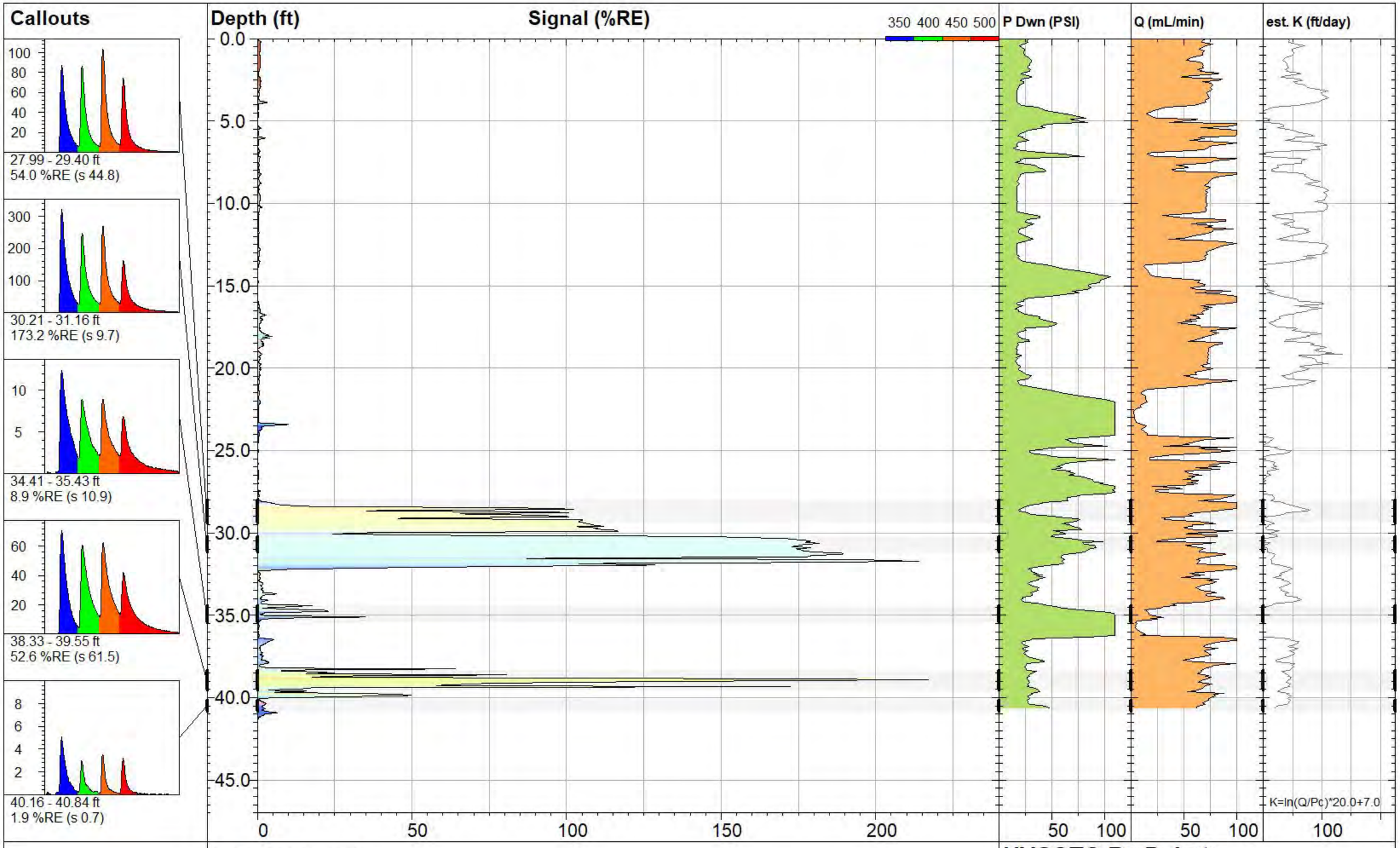

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EB-LIF-21

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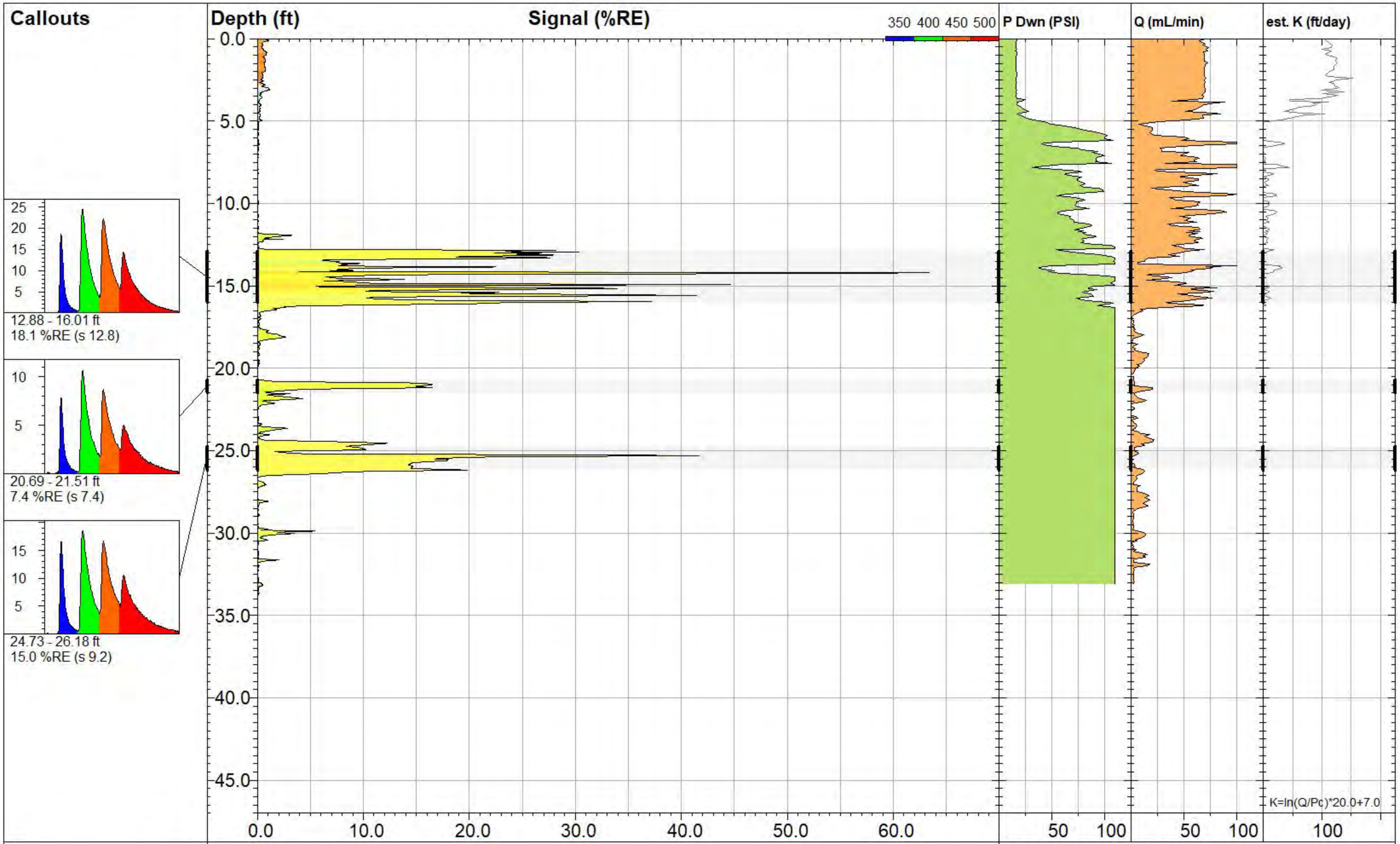
Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **41.35 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **217.3 %RE @ 38.91 ft**
Operator / Unit: **BG / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-23 11:12 MST**



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EB-LIF-22

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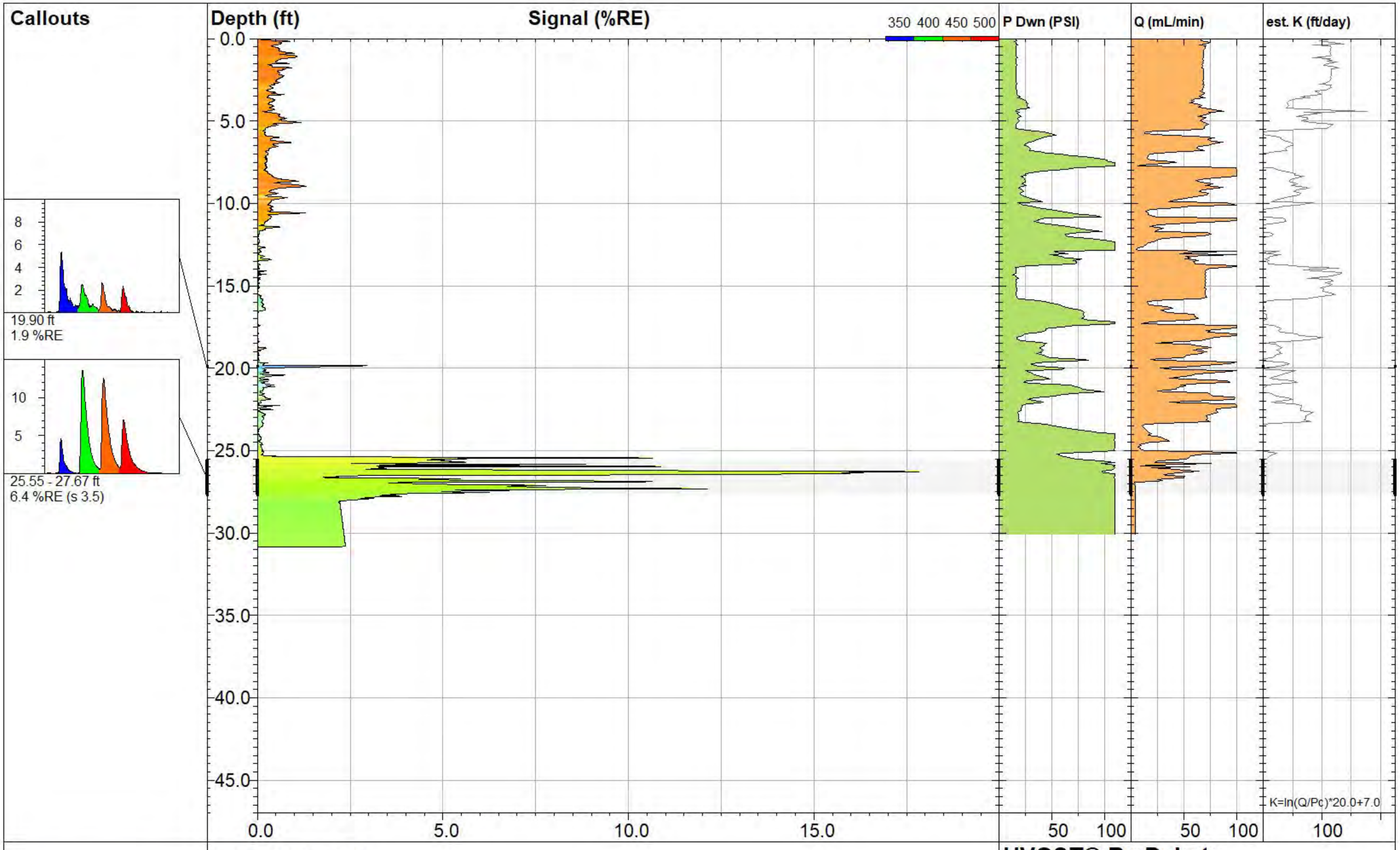
Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **33.78 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **63.7 %RE @ 14.19 ft**
Operator / Unit: **DS / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-22 15:56 MST**



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EB-LIF-23

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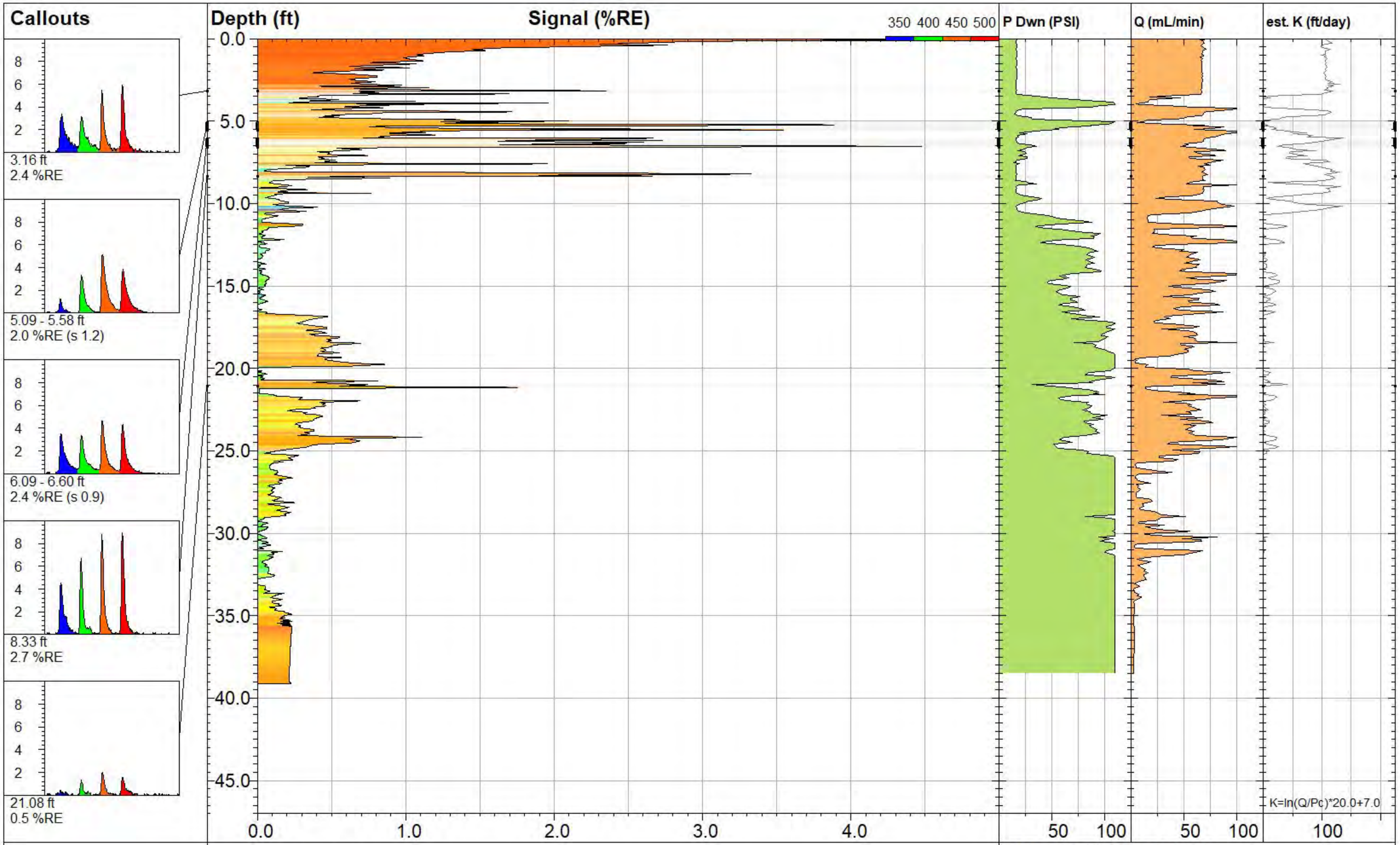
Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **30.83 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **17.9 %RE @ 26.28 ft**
Operator / Unit: **DS / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-20 13:47 MST**



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EB-LIF-25

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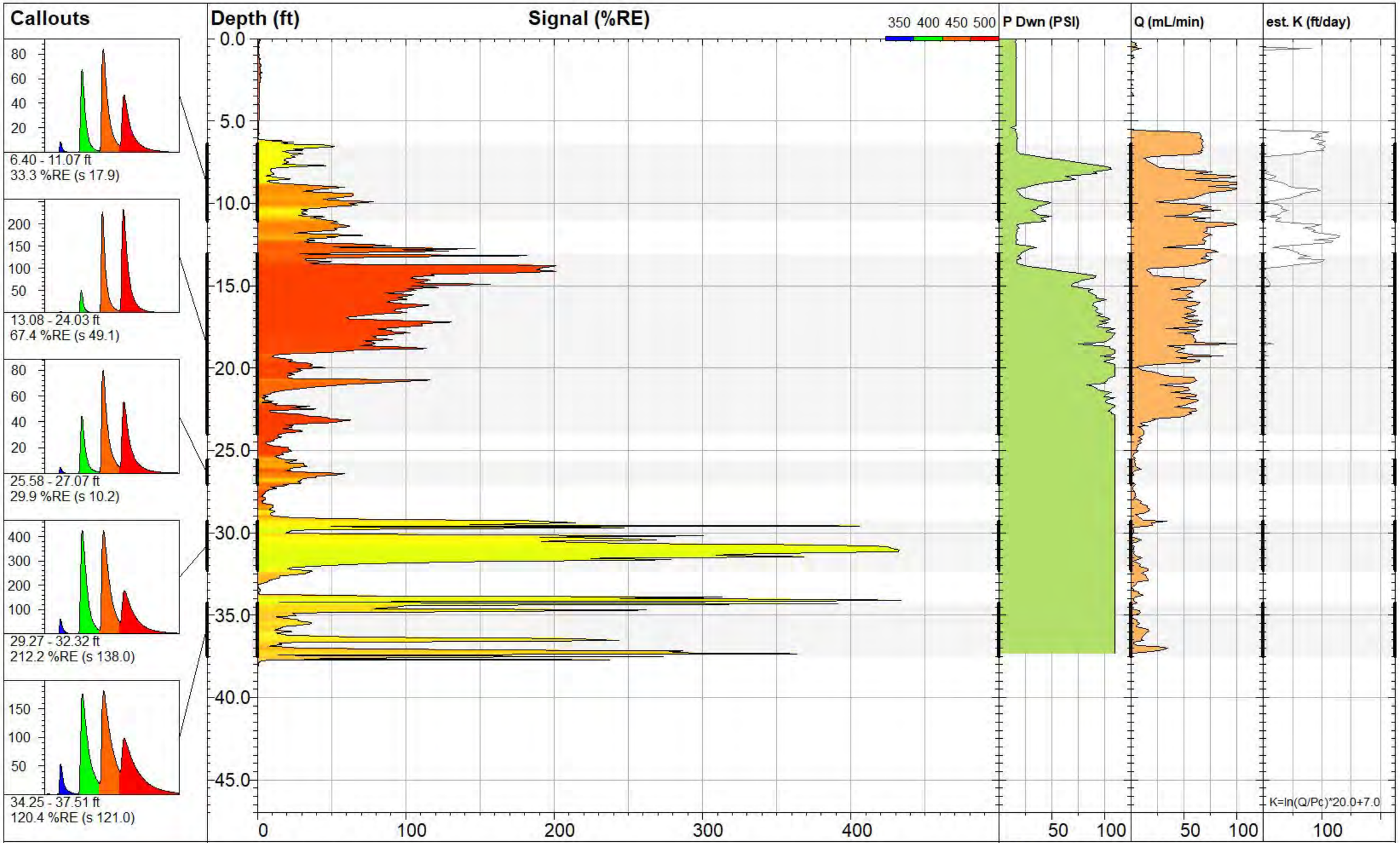
Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **39.13 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **4.5 %RE @ 6.52 ft**
Operator / Unit: **DS / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-21 13:49 MST**



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EB-LIF-26

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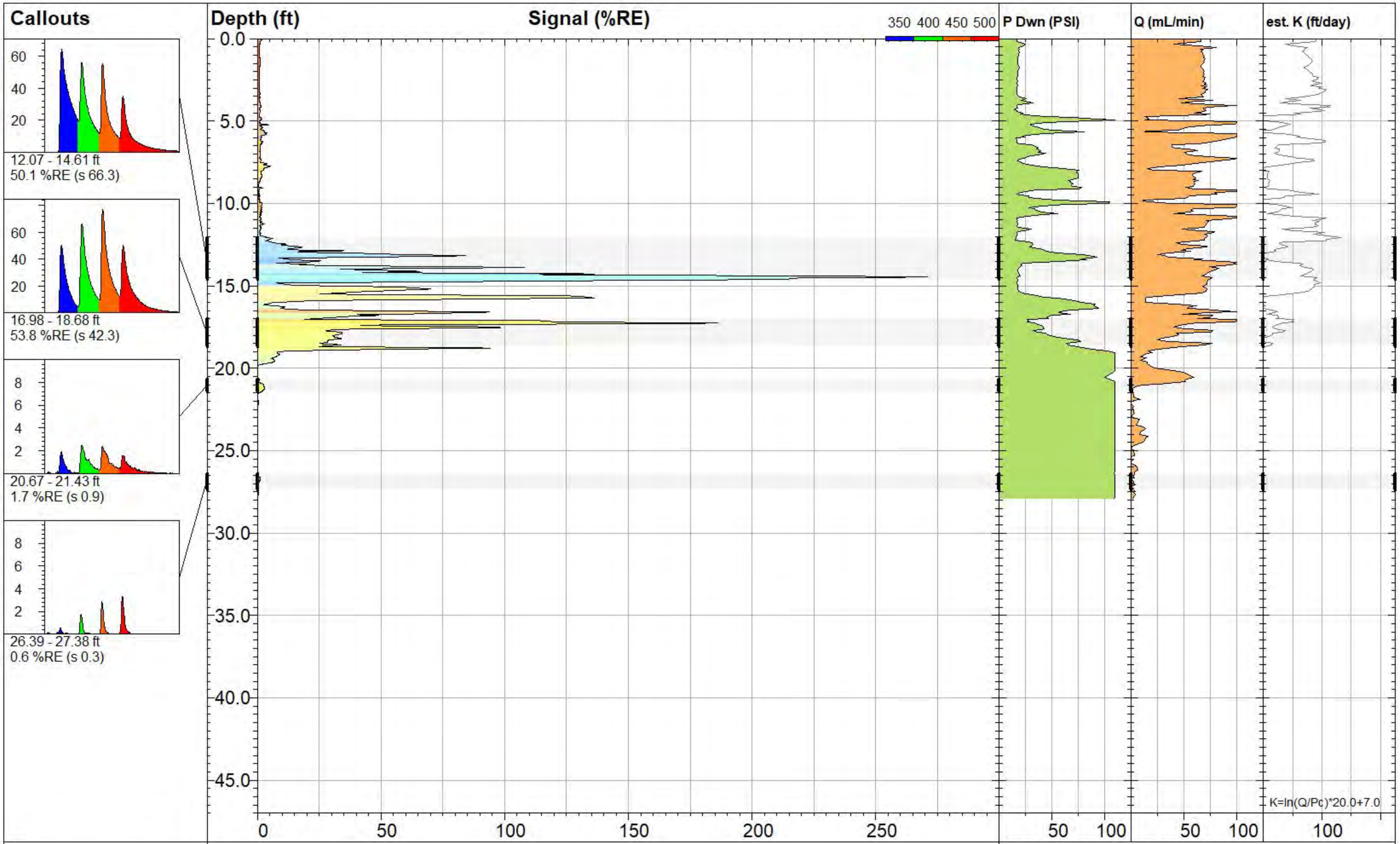
Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **38.08 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **435.9 %RE @ 34.12 ft**
Operator / Unit: **DS / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-21 13:16 MST**



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EB-LIF-27

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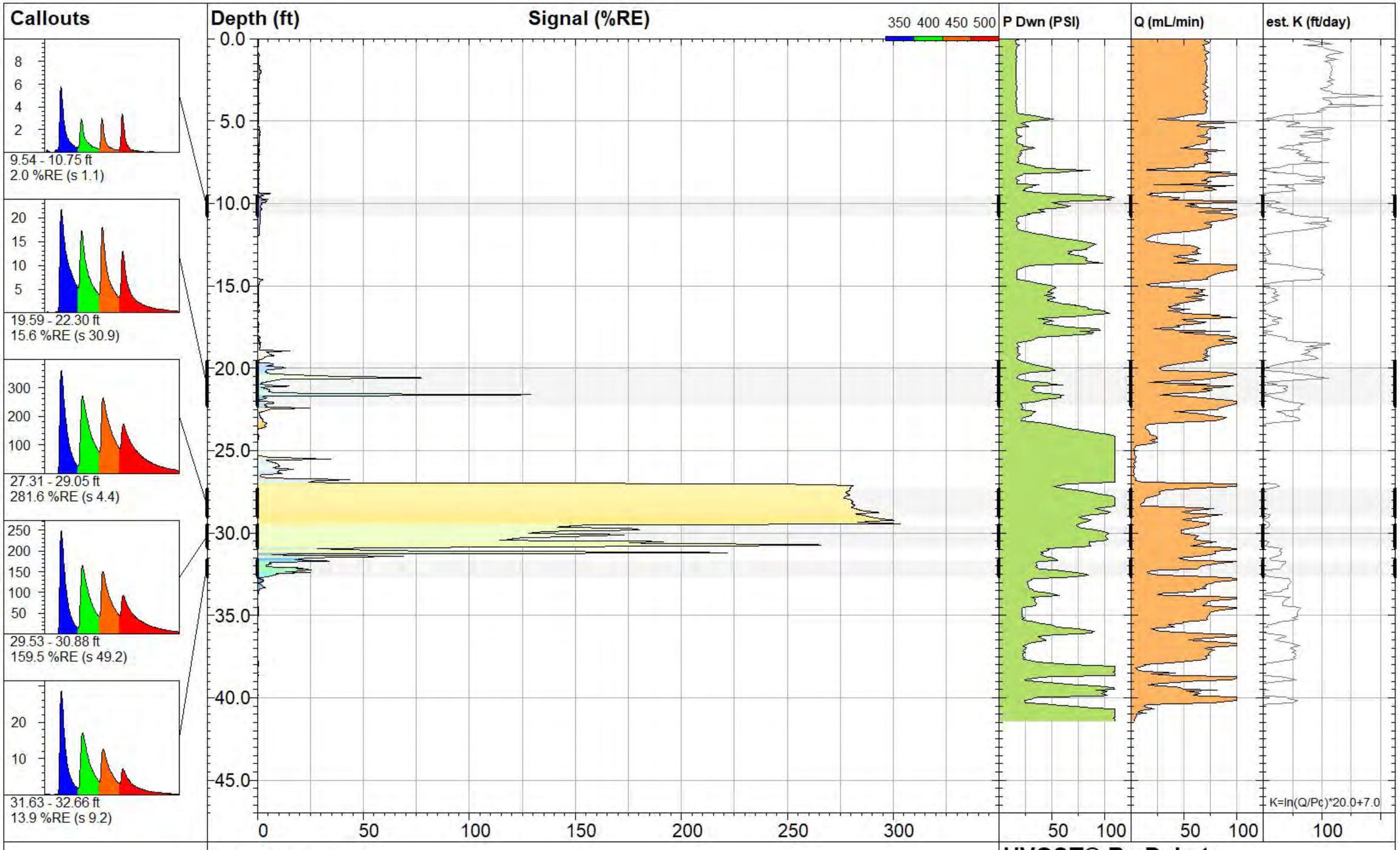
Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **28.65 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **272.2 %RE @ 14.46 ft**
Operator / Unit: **DS / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-22 16:28 MST**



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EB-LIF-28

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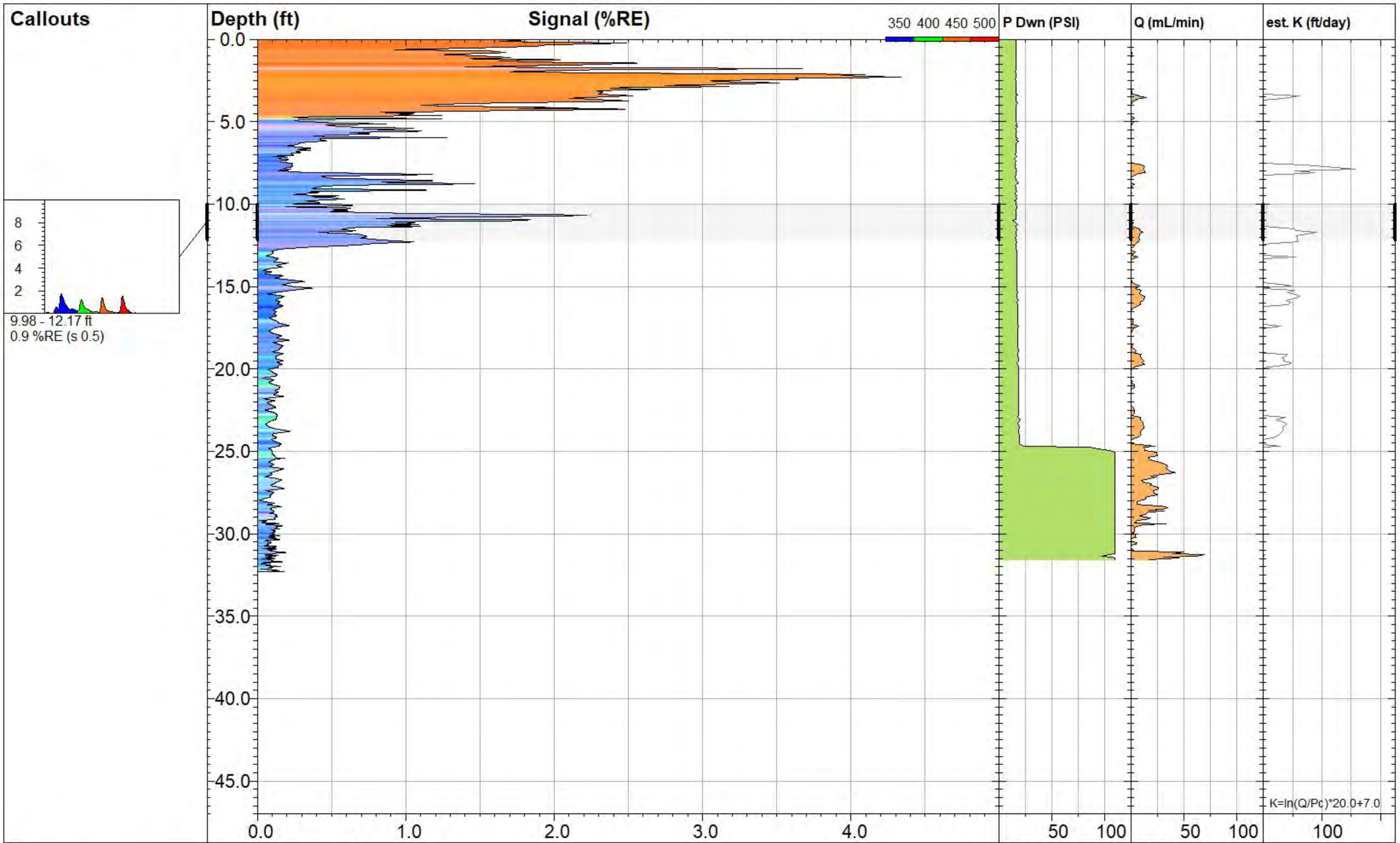
Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **42.12 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **304.0 %RE @ 29.44 ft**
Operator / Unit: **DS / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-23 09:20 MST**



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EB-LIF-30

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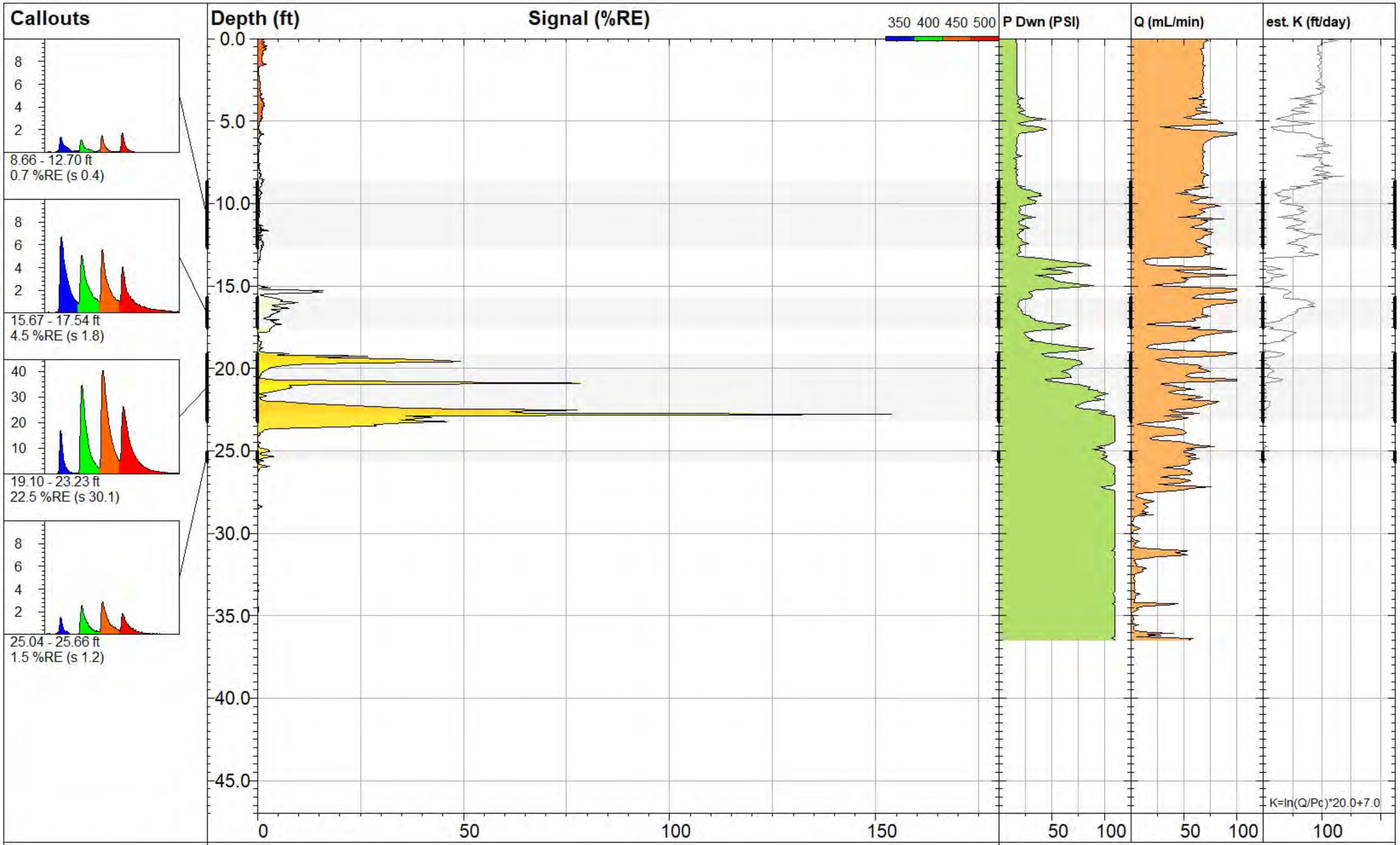
Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **32.30 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **4.3 %RE @ 2.30 ft**
Operator / Unit: **BG / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-25 08:06 MST**



EB-LIF-33

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Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **37.23 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **156.1 %RE @ 22.79 ft**
Operator / Unit: **DS / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-21 11:11 MST**

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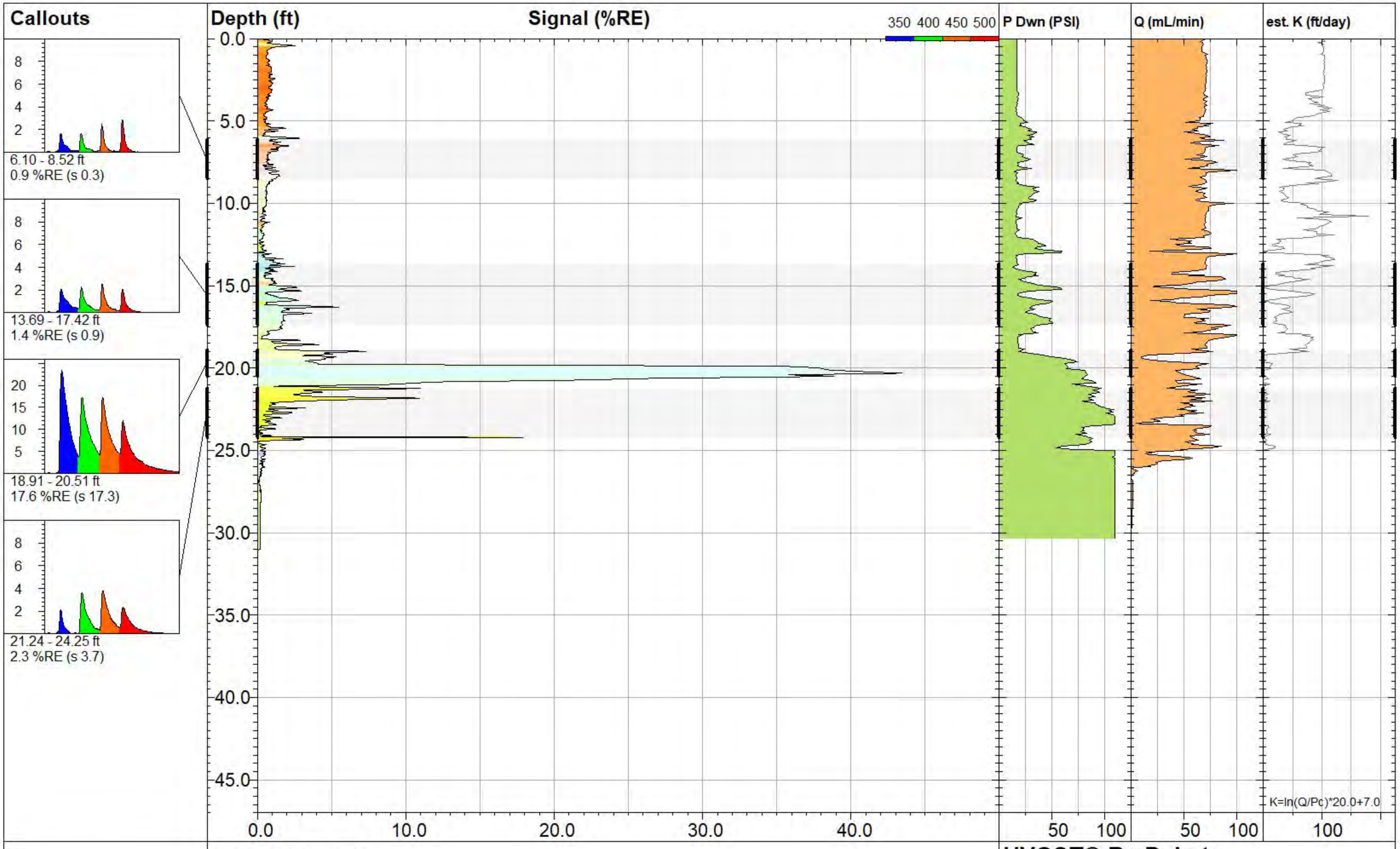

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EB-LIF-34

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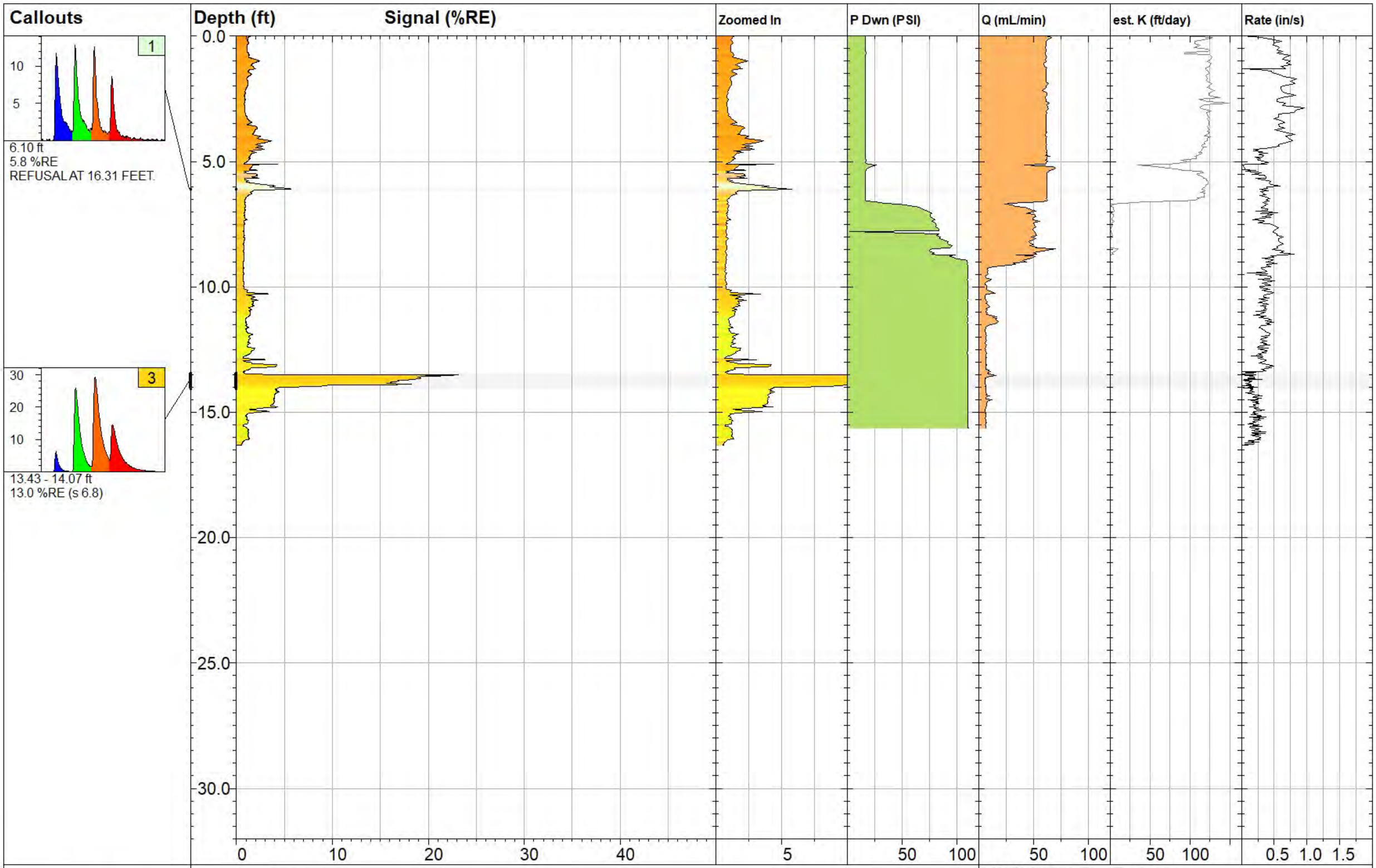
Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **31.02 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **43.4 %RE @ 20.32 ft**
Operator / Unit: **DS / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-21 09:41 MST**



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EB-LIF-91

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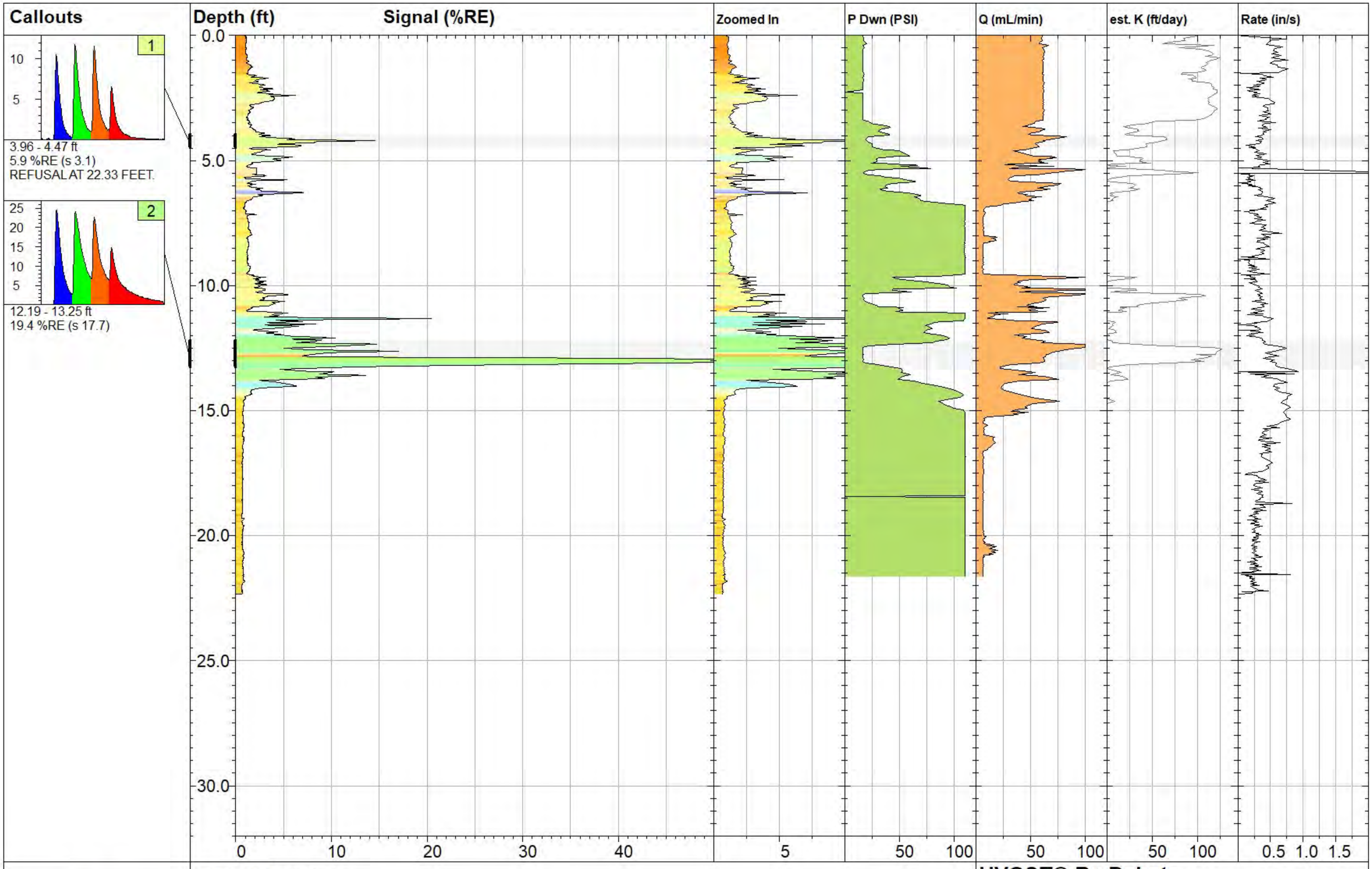
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **16.31 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **23.3 %RE @ 13.51 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-13 08:19 MDT**



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EB-LIF-92

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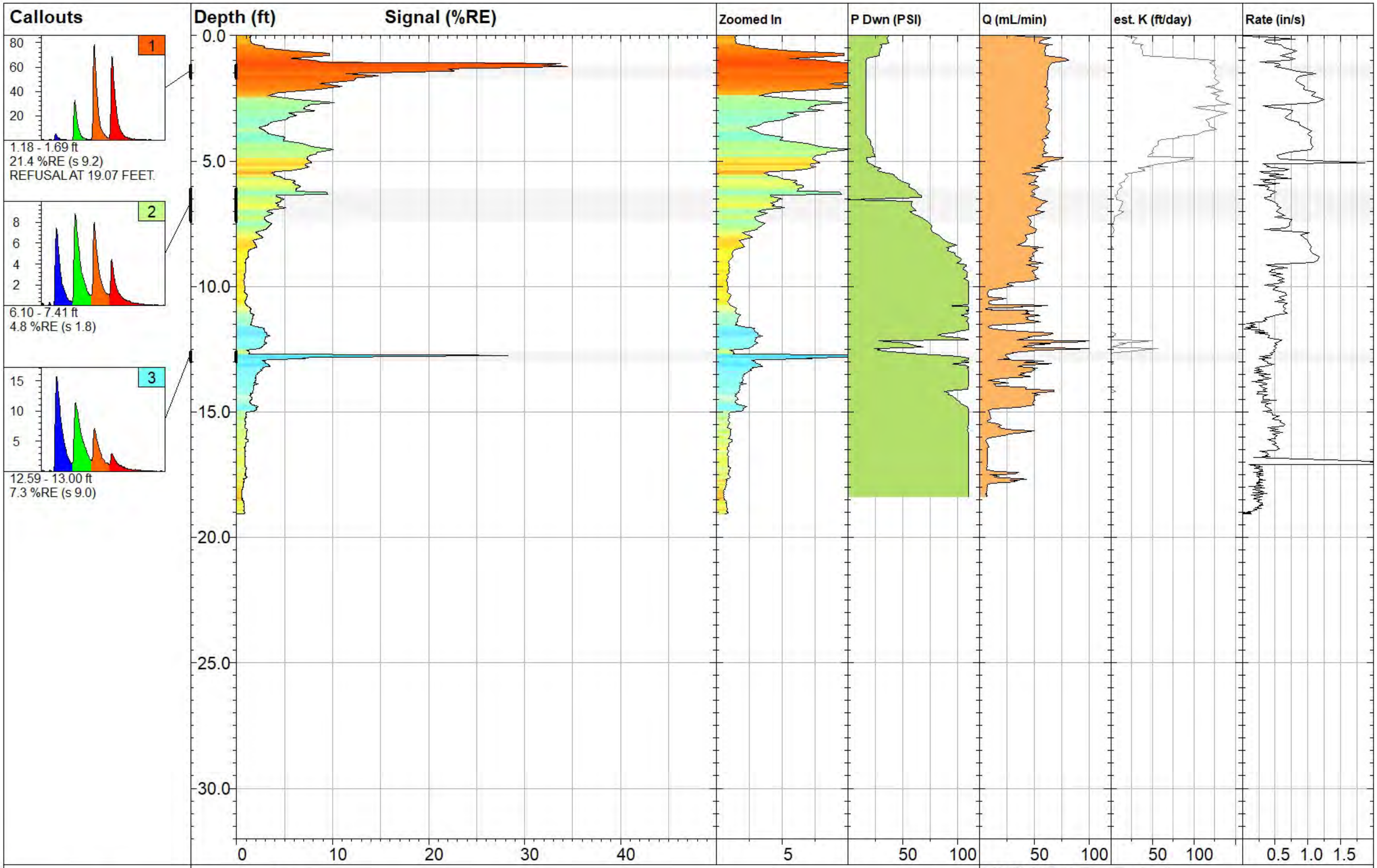
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **22.33 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **57.7 %RE @ 12.97 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-13 08:55 MDT**



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EB-LIF-93

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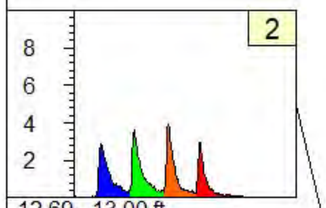
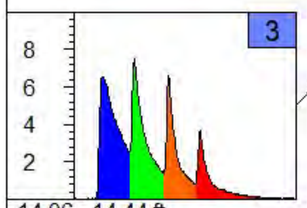
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **19.07 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **34.5 %RE @ 1.23 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-13 09:40 MDT**

Callouts

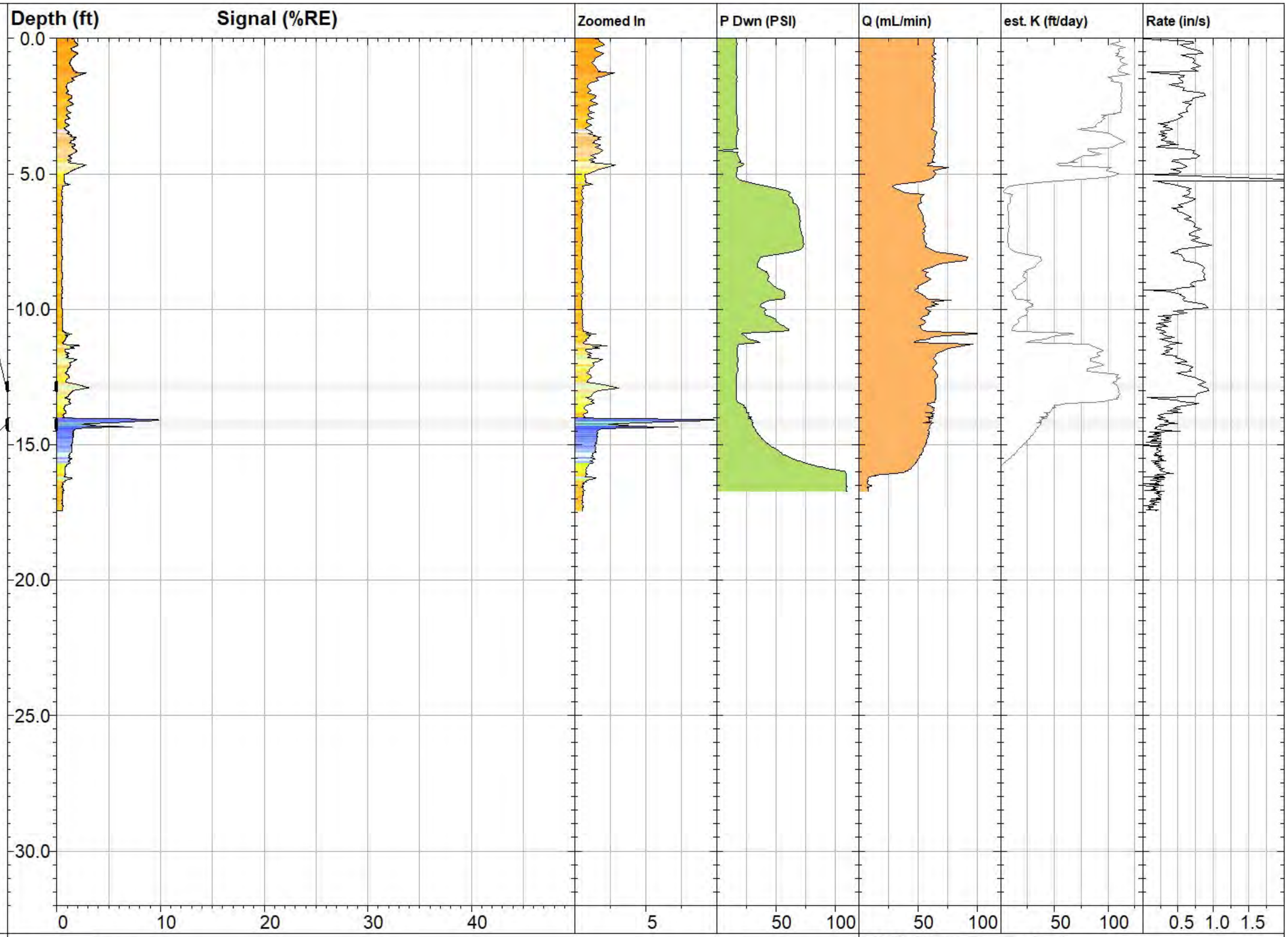
REFUSAL AT 17.43 FEET.



12.69 - 13.00 ft
1.9 %RE (s 0.9)



14.06 - 14.44 ft
5.0 %RE (s 3.0)



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EB-LIF-94

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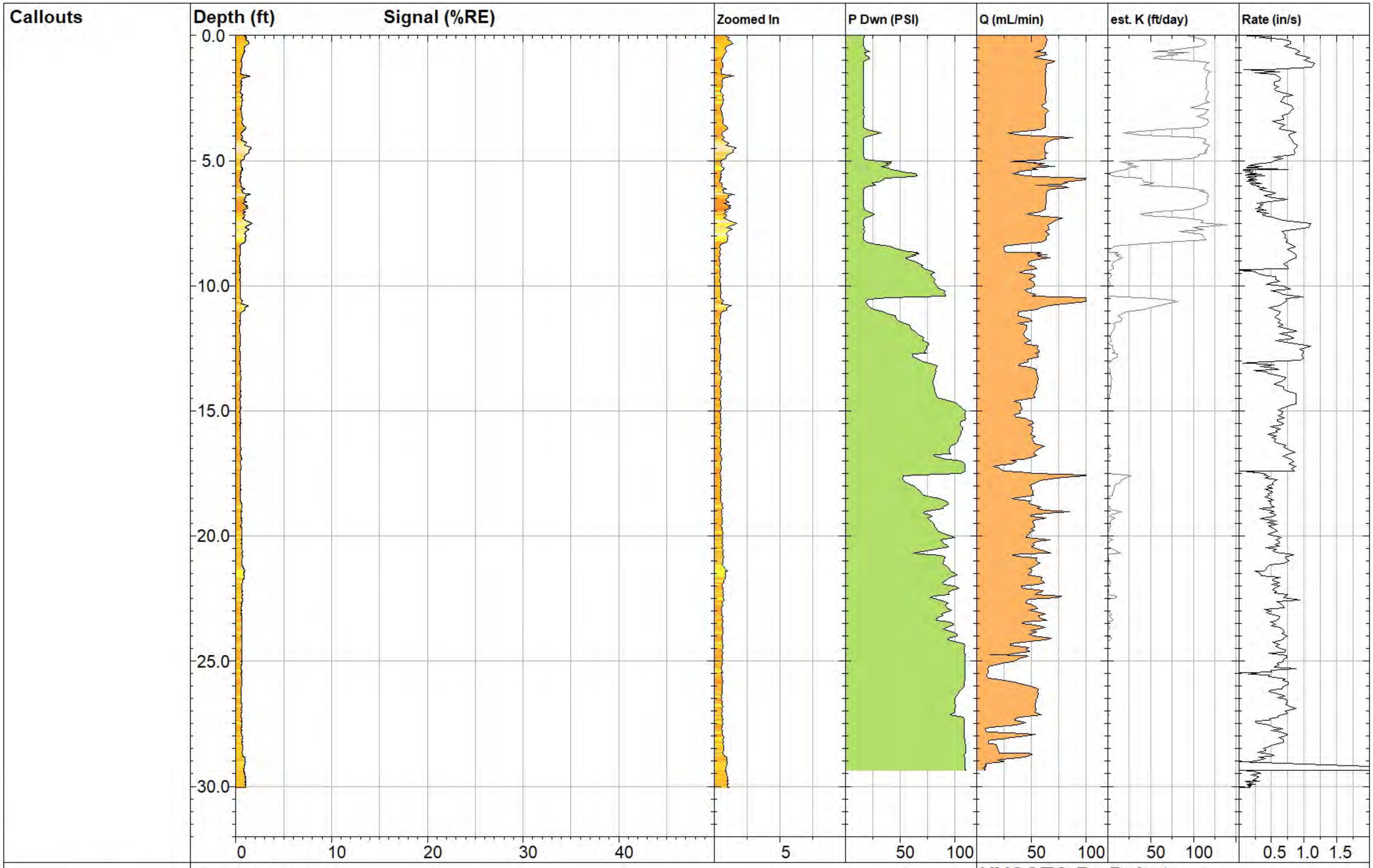
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **17.43 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **9.9 %RE @ 14.10 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-14 10:01 MDT**



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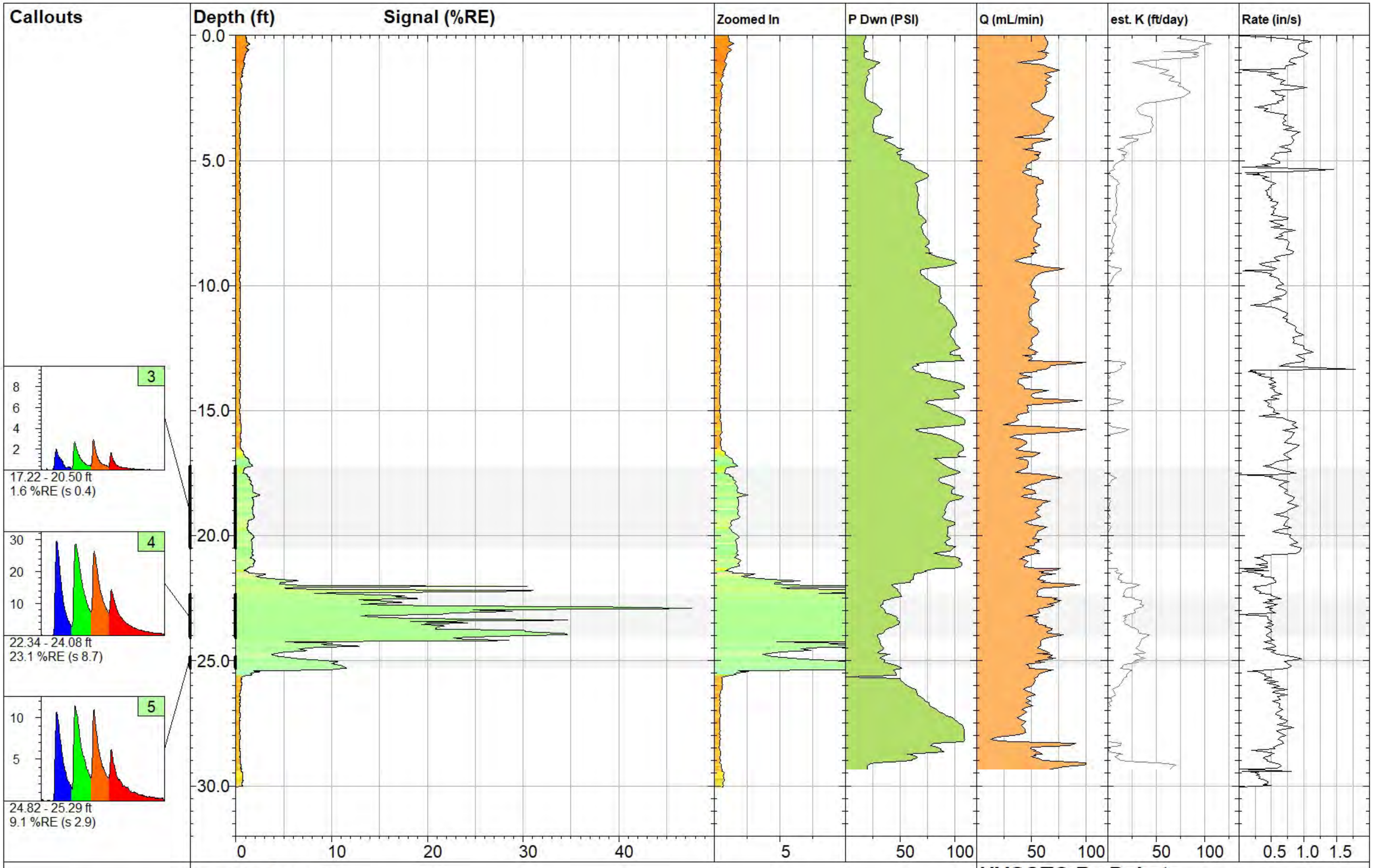
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **30.05 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **1.7 %RE @ 7.51 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-14 12:59 MDT**



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UVOST® By Dakota
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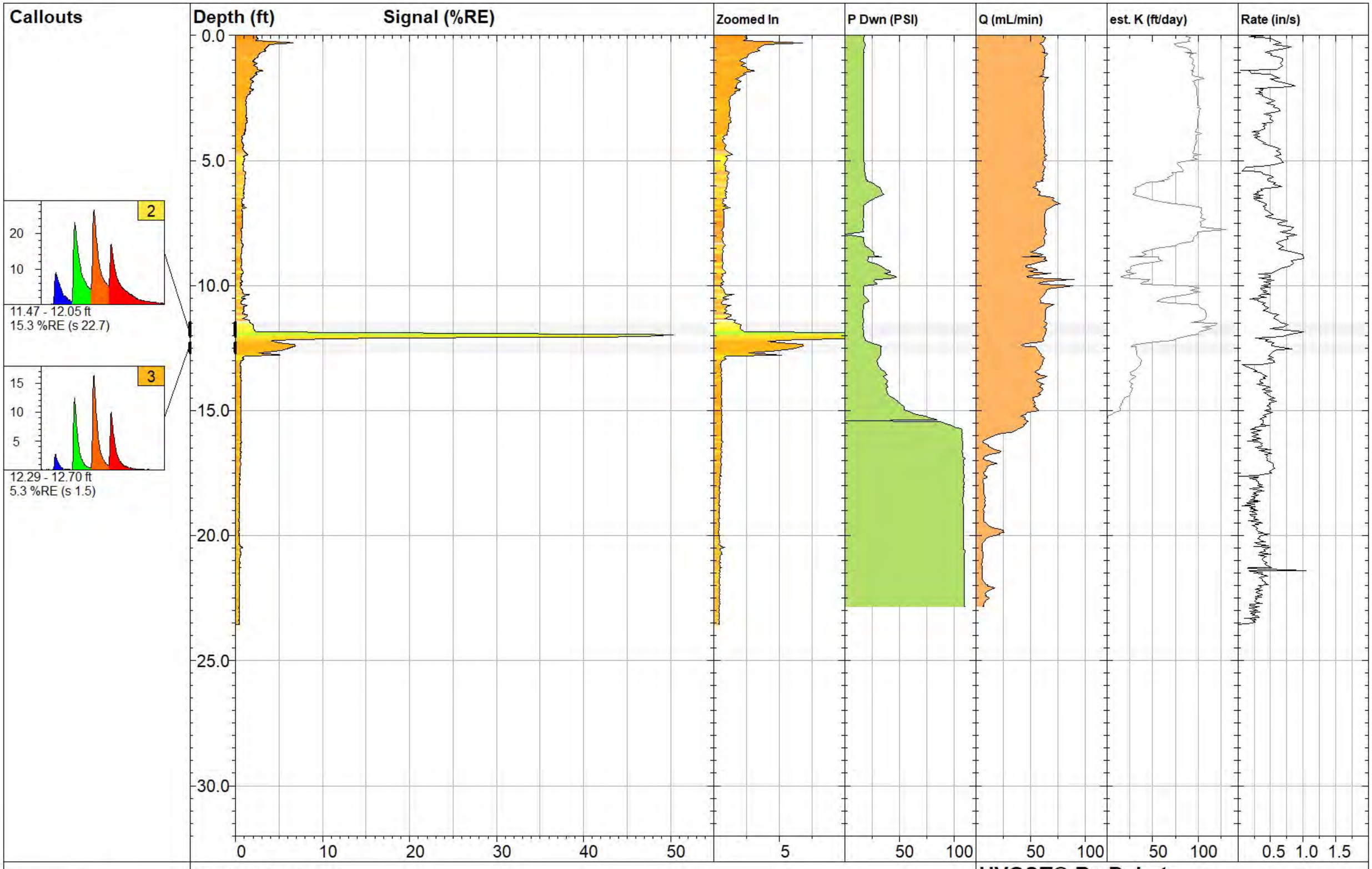
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **30.03 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **47.8 %RE @ 22.91 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-14 11:36 MDT**



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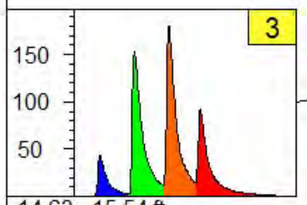
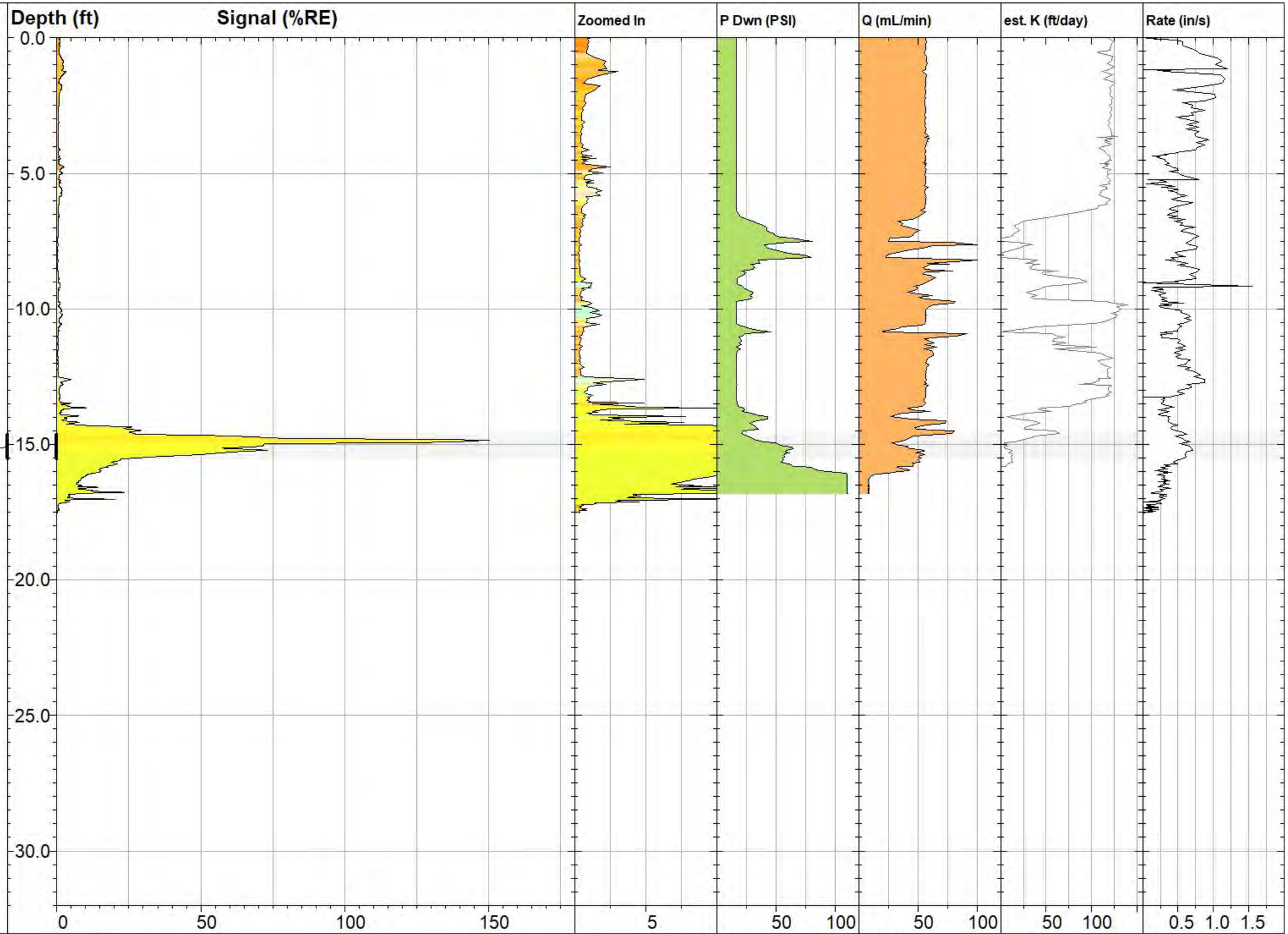
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **23.55 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **50.4 %RE @ 11.97 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-14 10:53 MDT**

Callouts

REFUSAL AT 17.53 FEET.



14.63 - 15.54 ft
68.7 %RE (s 37.7)



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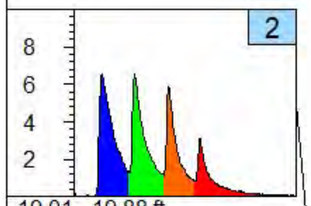
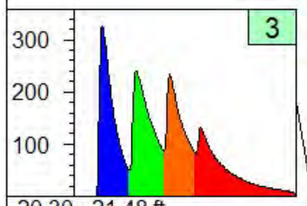
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **17.53 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **150.5 %RE @ 14.84 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-11 09:08 MDT**

Callouts

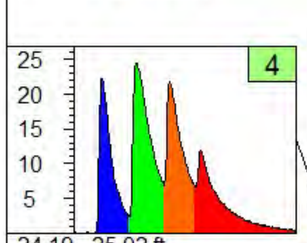
REFUSAL AT 28.49 FEET.



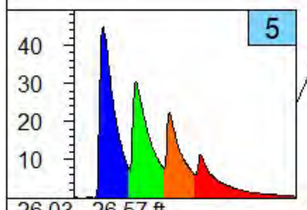
19.01 - 19.88 ft
4.3 %RE (s 2.1)



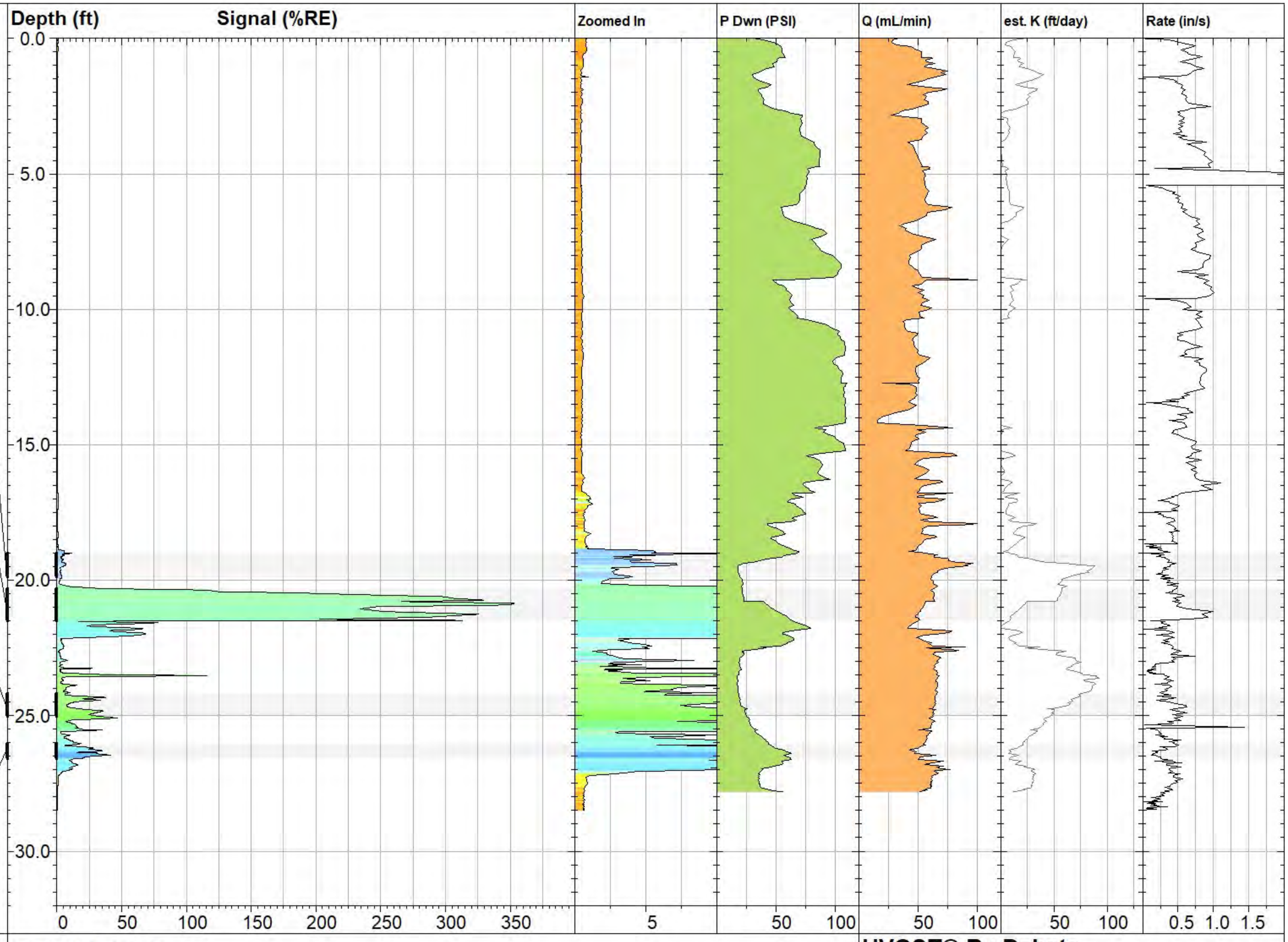
20.30 - 21.48 ft
247.7 %RE (s 88.3)



24.19 - 25.02 ft
19.9 %RE (s 11.6)



26.03 - 26.57 ft
26.0 %RE (s 8.9)



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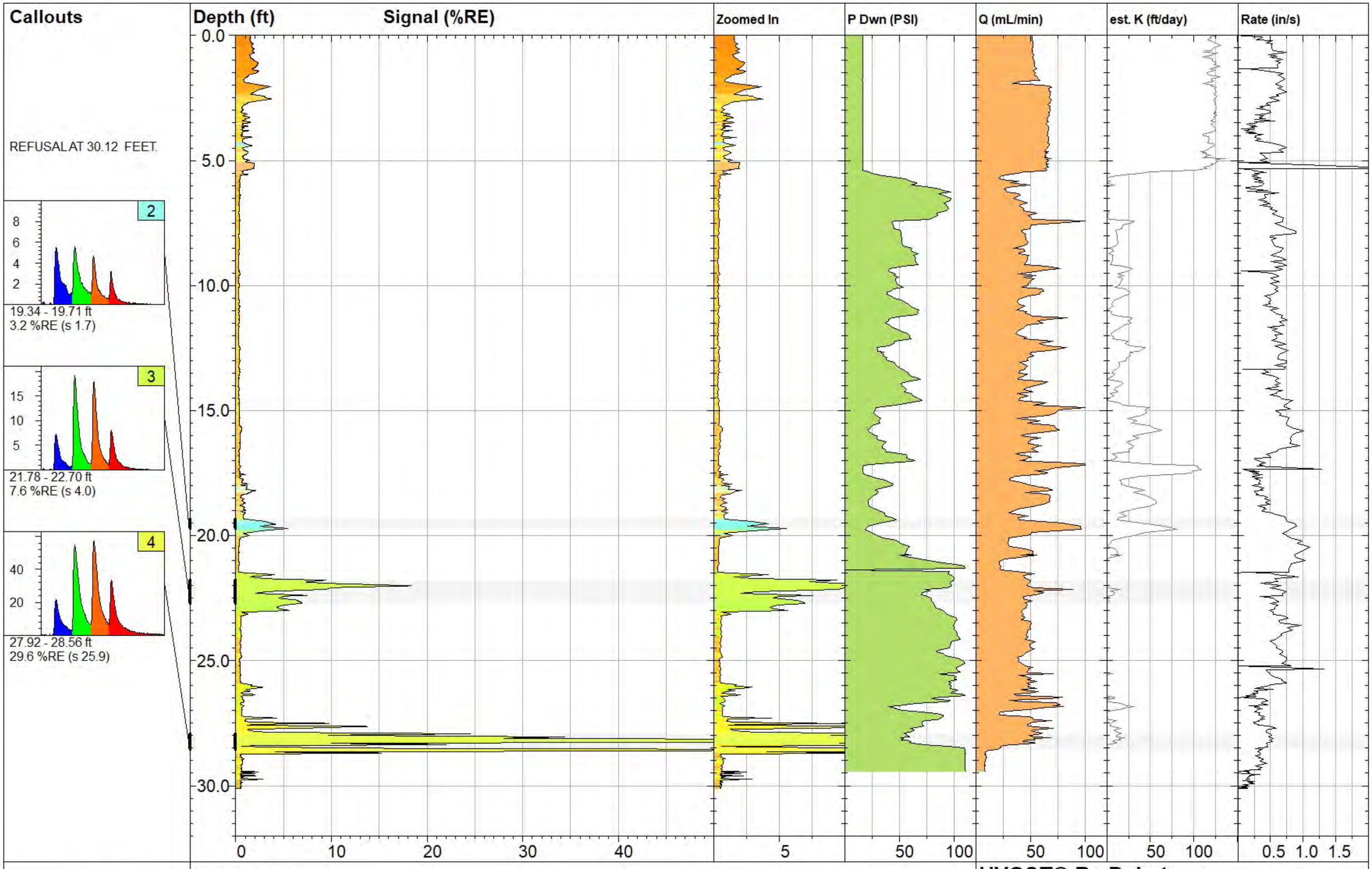
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **28.49 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **353.3 %RE @ 20.84 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-14 12:17 MDT**



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EB-LIF-101

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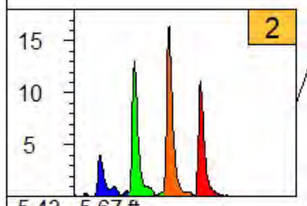
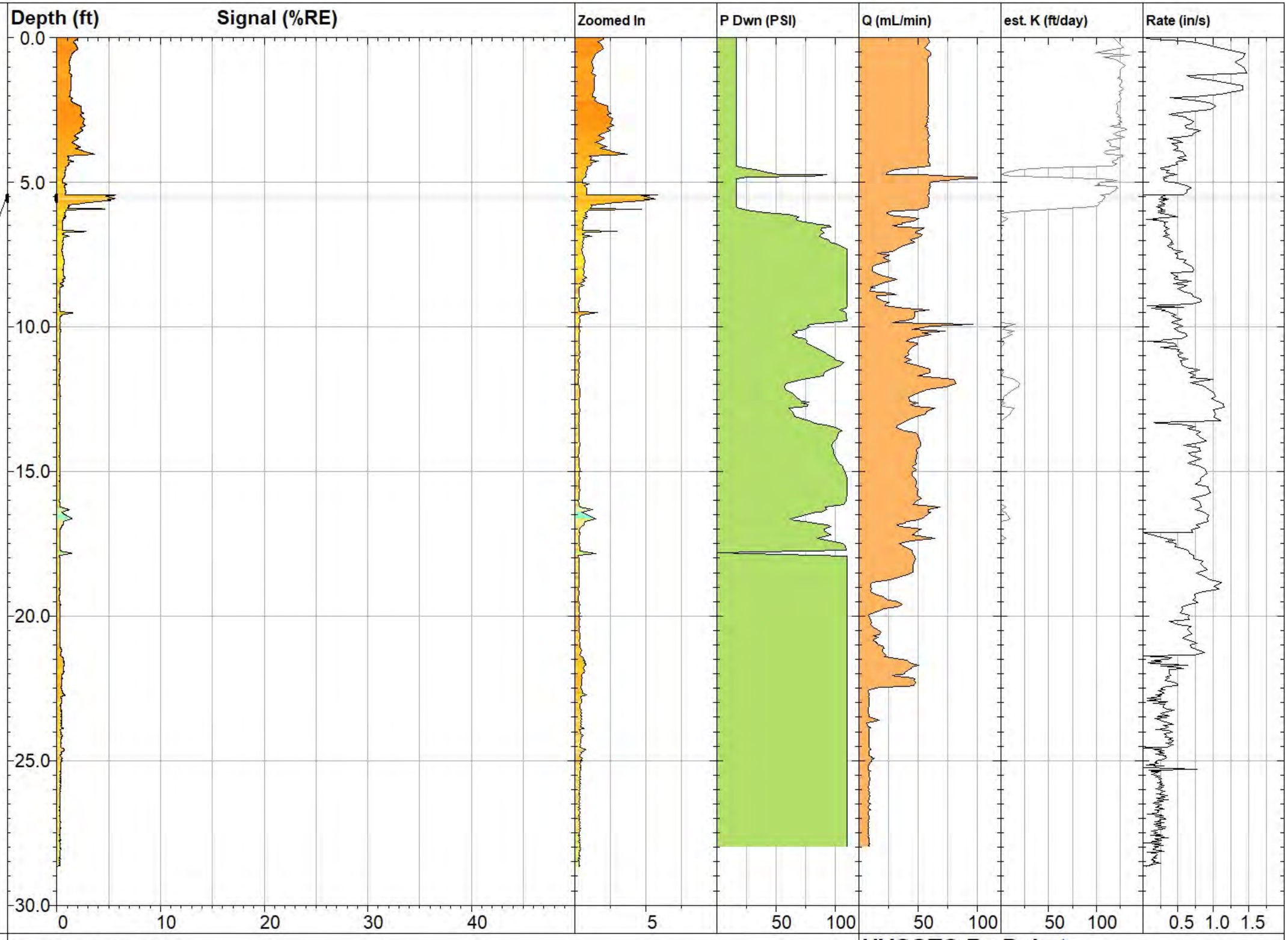
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **30.12 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **77.5 %RE @ 28.17 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-11 08:22 MDT**

Callouts

REFUSAL AT 28.65 FEET.



5.43 - 5.67 ft
4.2 %RE (s 1.7)
?



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EB-LIF-102

UVOST® By Dakota
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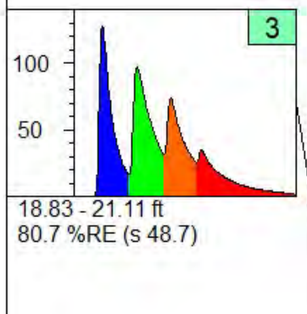
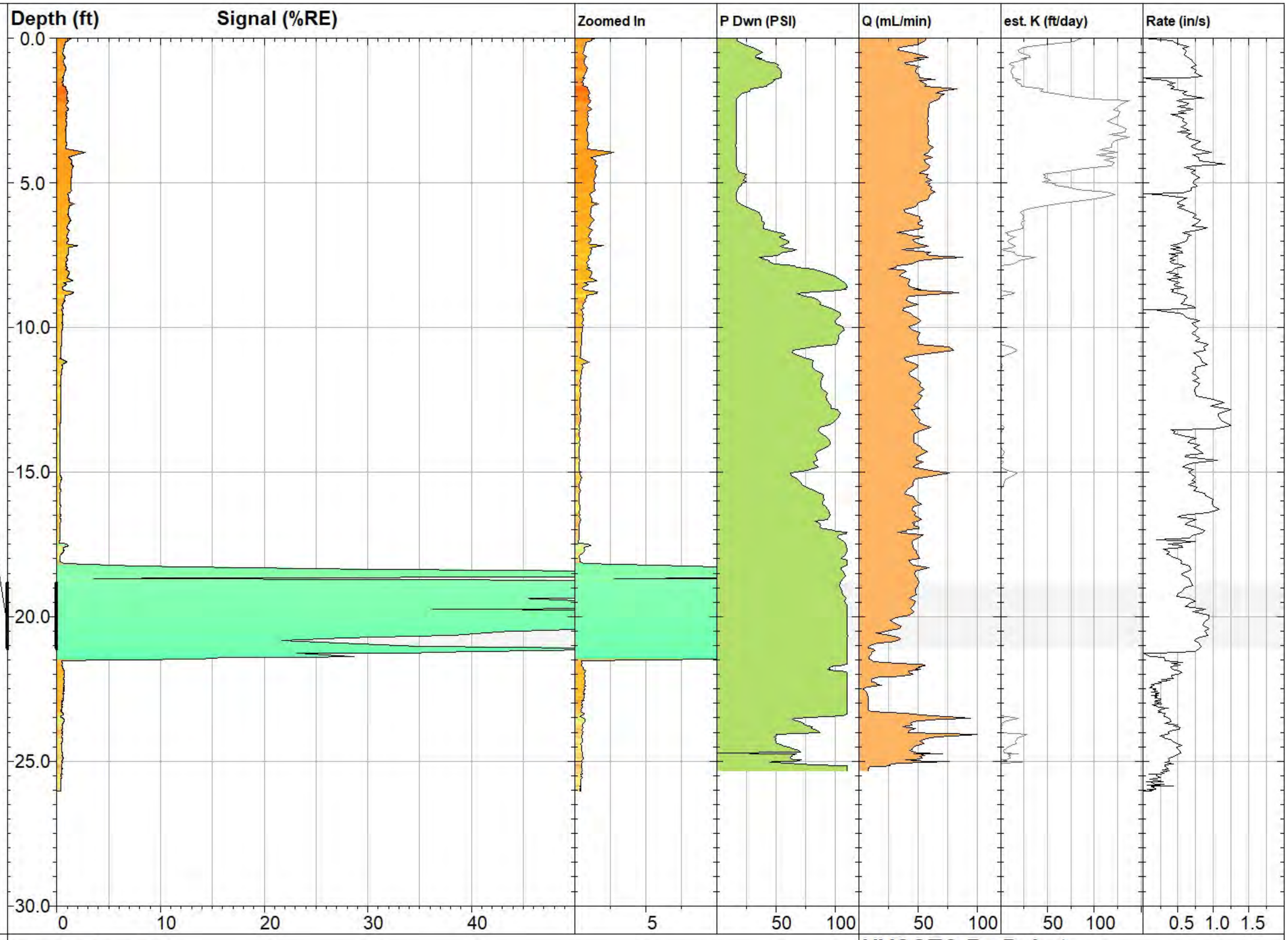
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **28.65 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **5.8 %RE @ 5.44 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-10 13:29 MDT**

Callouts

REFUSAL AT 26.03 FEET.





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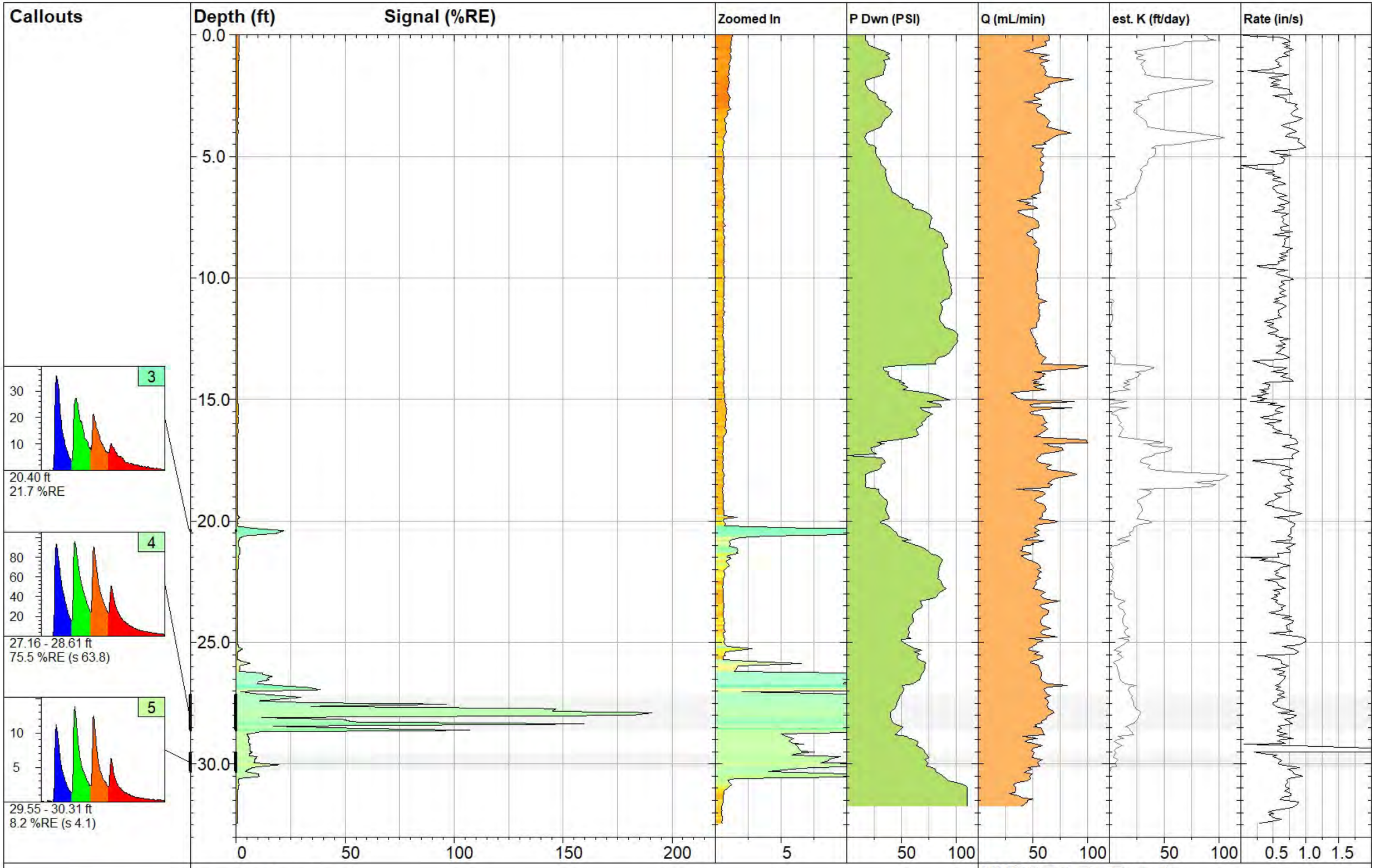
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **26.03 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **174.3 %RE @ 19.00 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-10 14:11 MDT**



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Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **32.42 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **191.2 %RE @ 27.89 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-14 07:55 MDT**

EB-LIF-105

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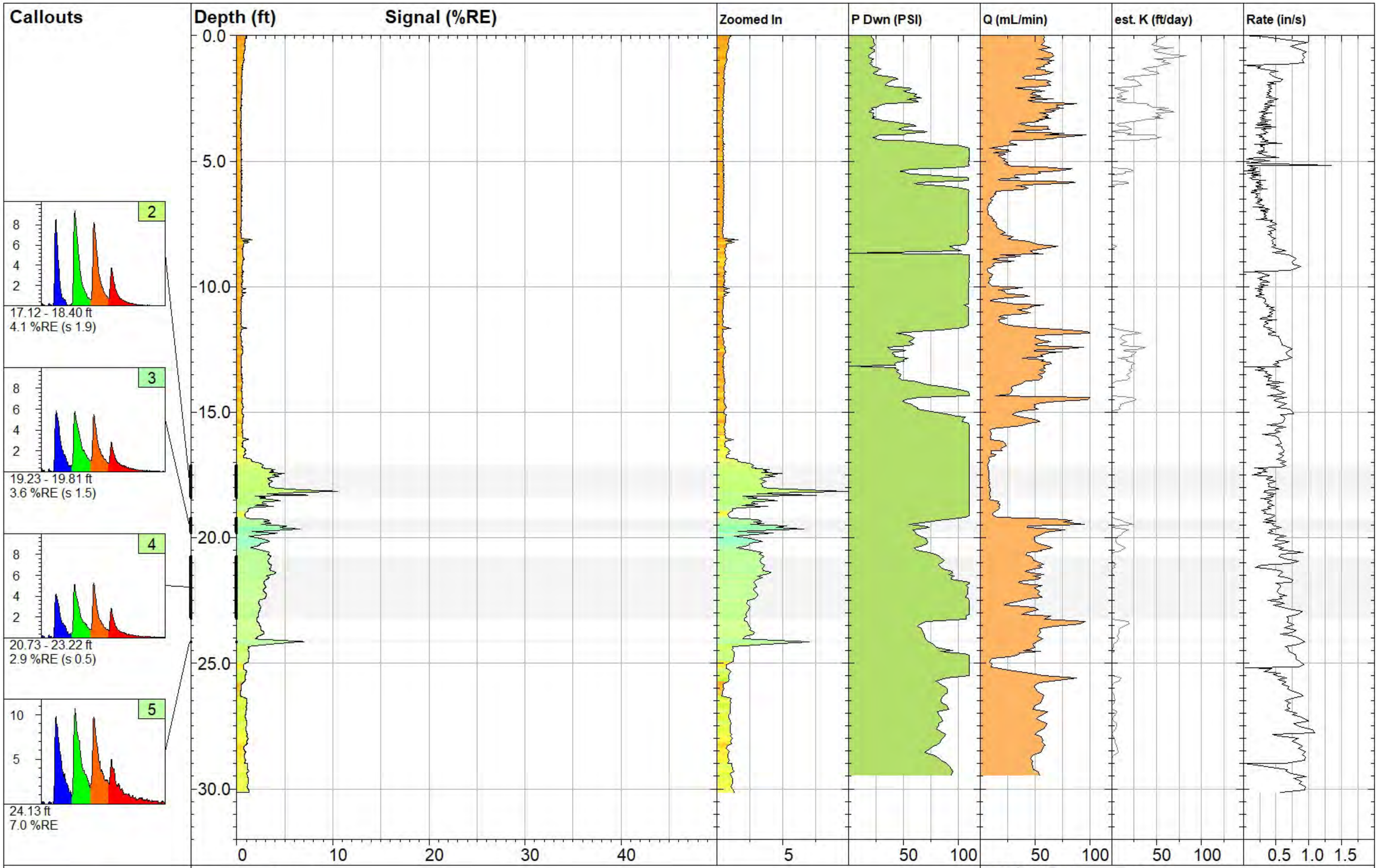
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **30.14 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **51.9 %RE @ 22.40 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-11 12:18 MDT**



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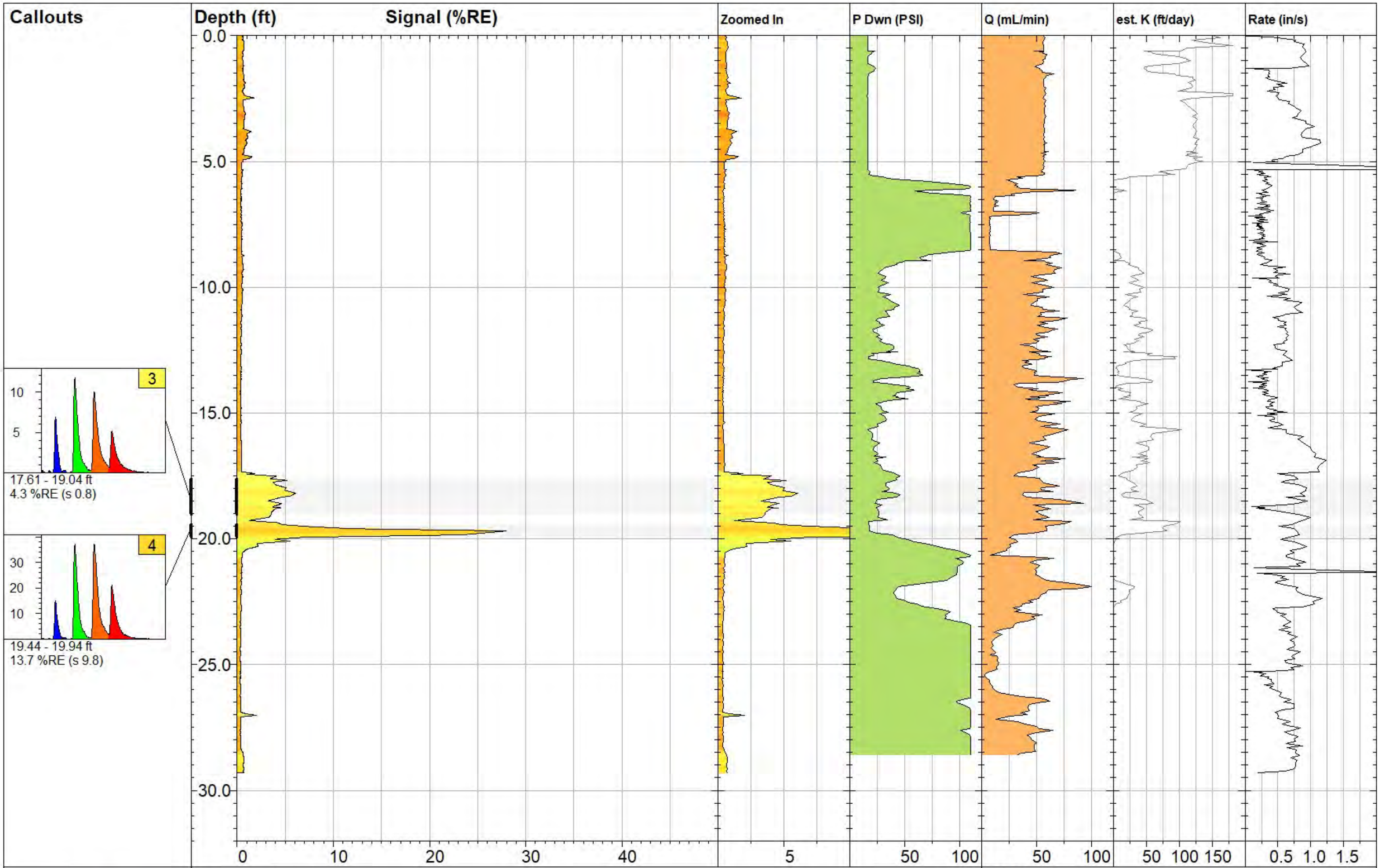
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **30.14 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **10.7 %RE @ 18.15 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-11 11:39 MDT**



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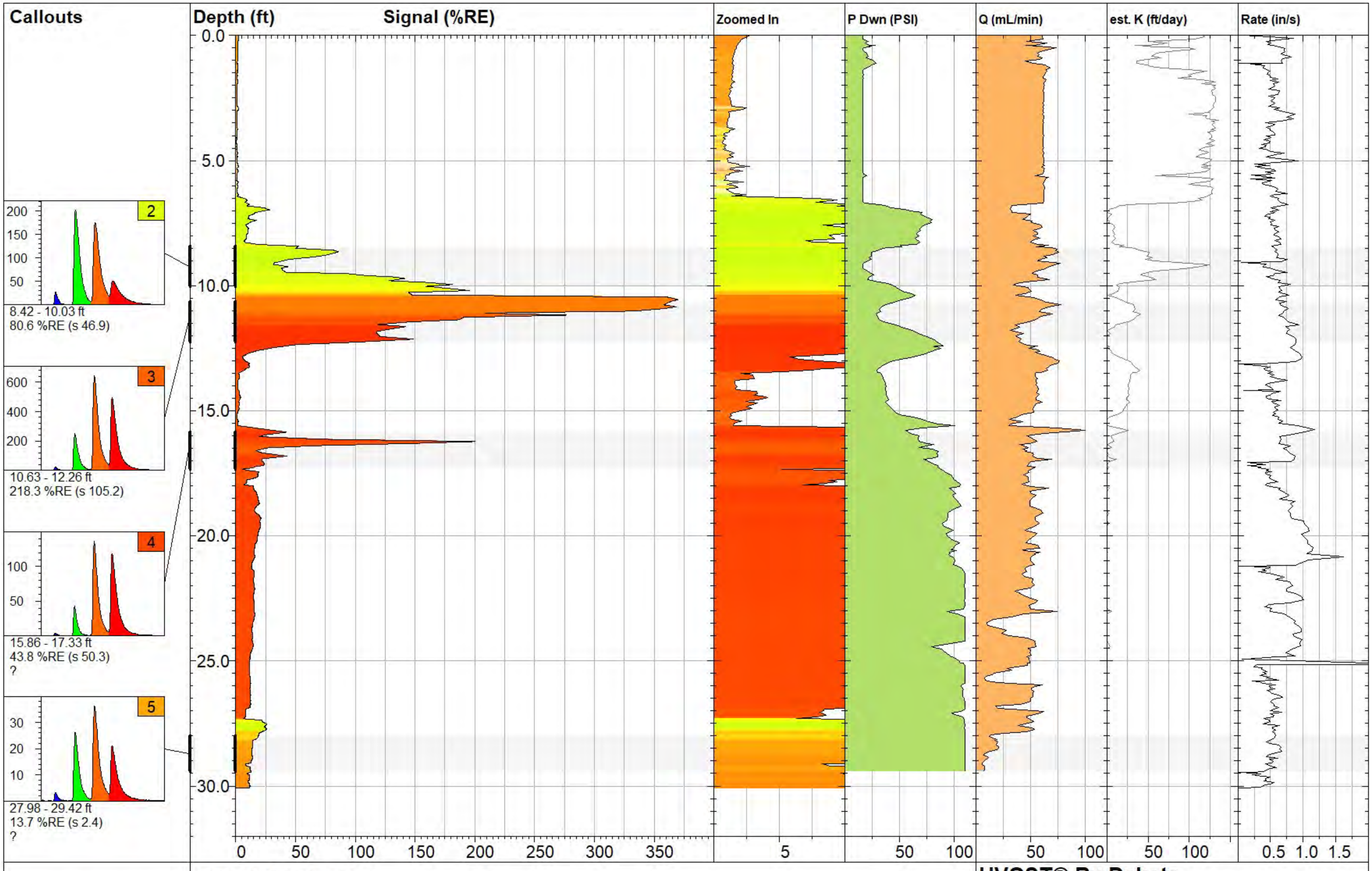
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **29.29 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **28.1 %RE @ 19.69 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-11 10:59 MDT**



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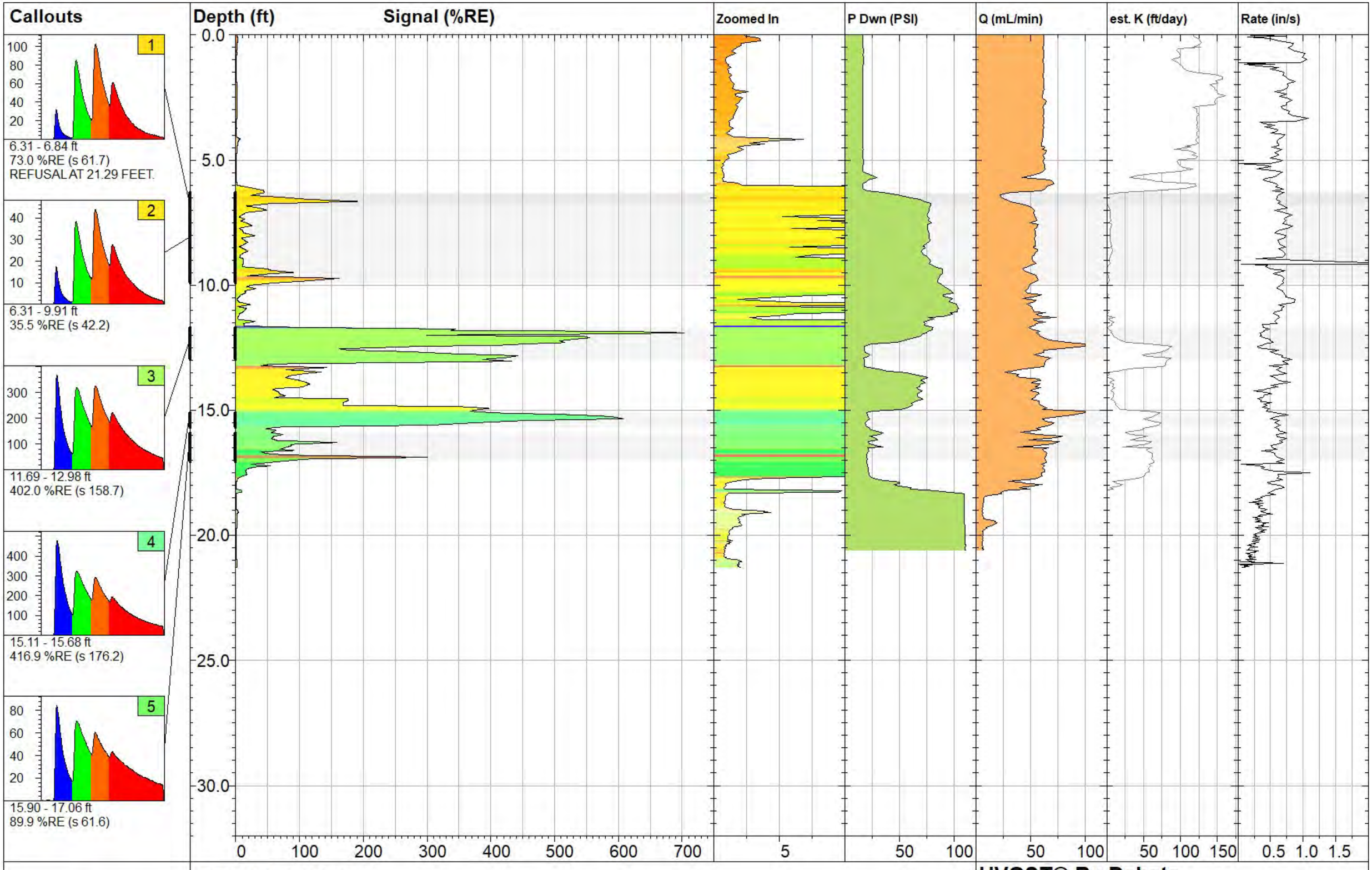
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **30.08 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **370.0 %RE @ 10.56 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-13 10:25 MDT**



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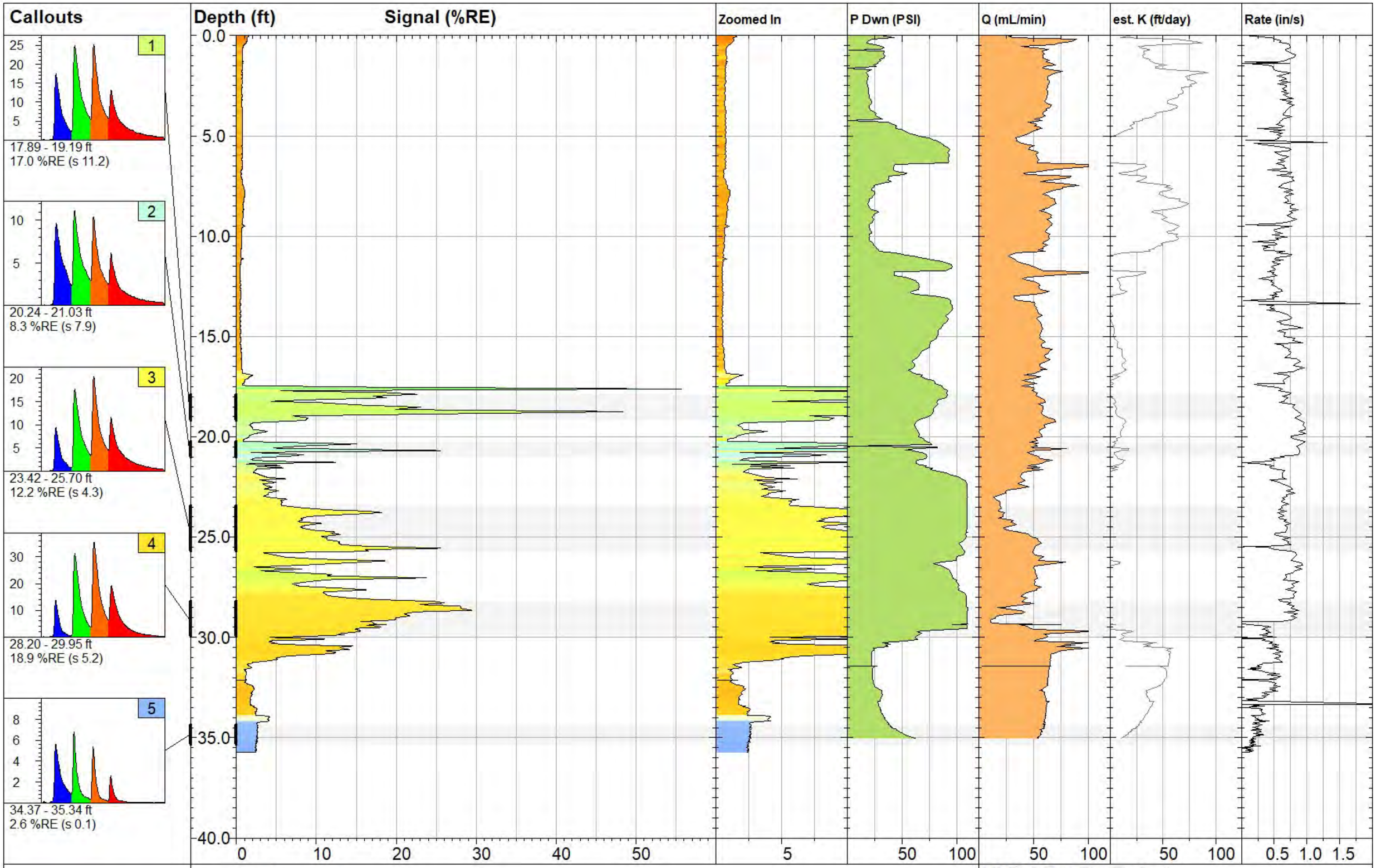
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **21.29 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **703.6 %RE @ 11.91 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-13 07:41 MDT**



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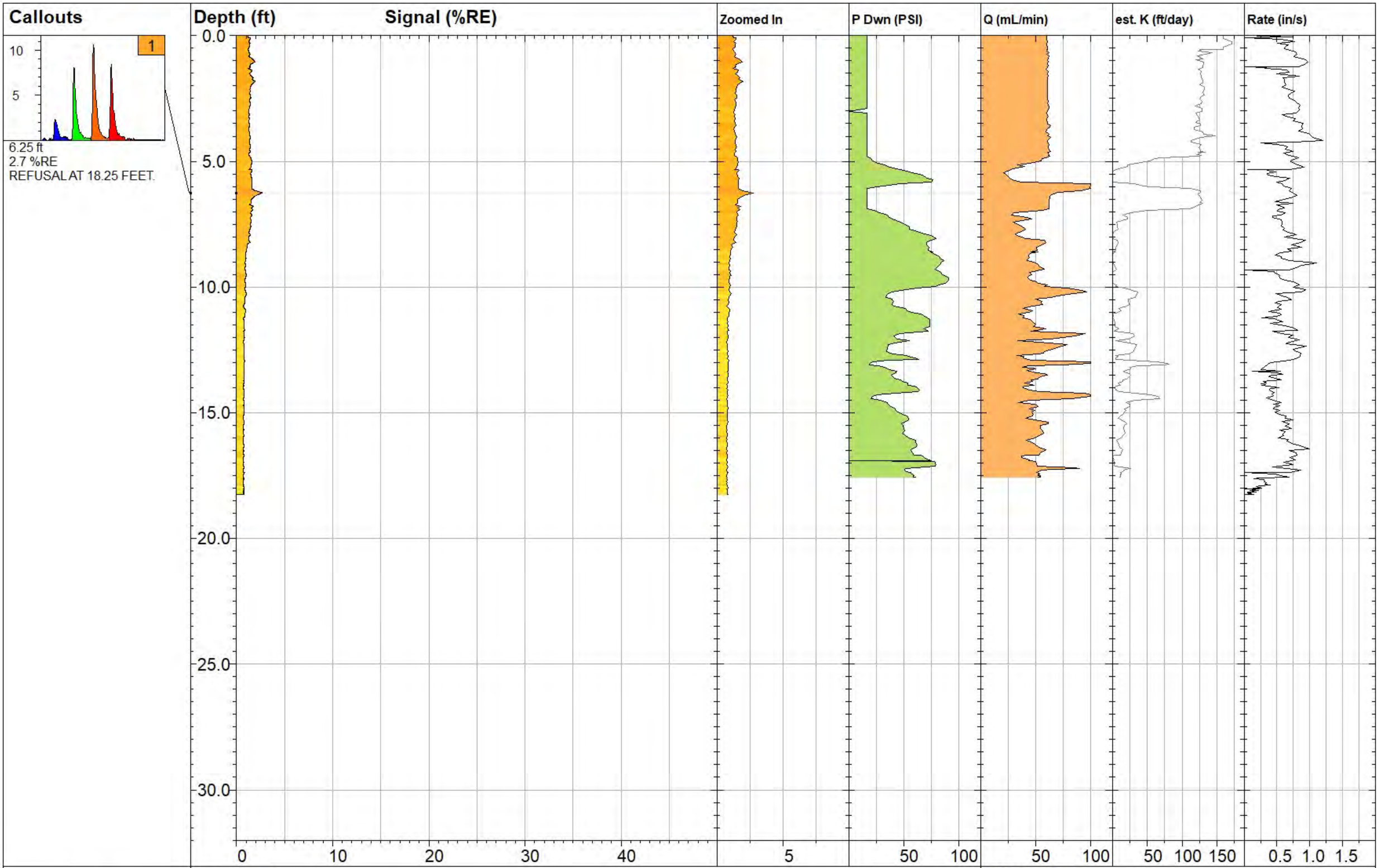
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **35.72 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **55.8 %RE @ 17.62 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-14 08:36 MDT**



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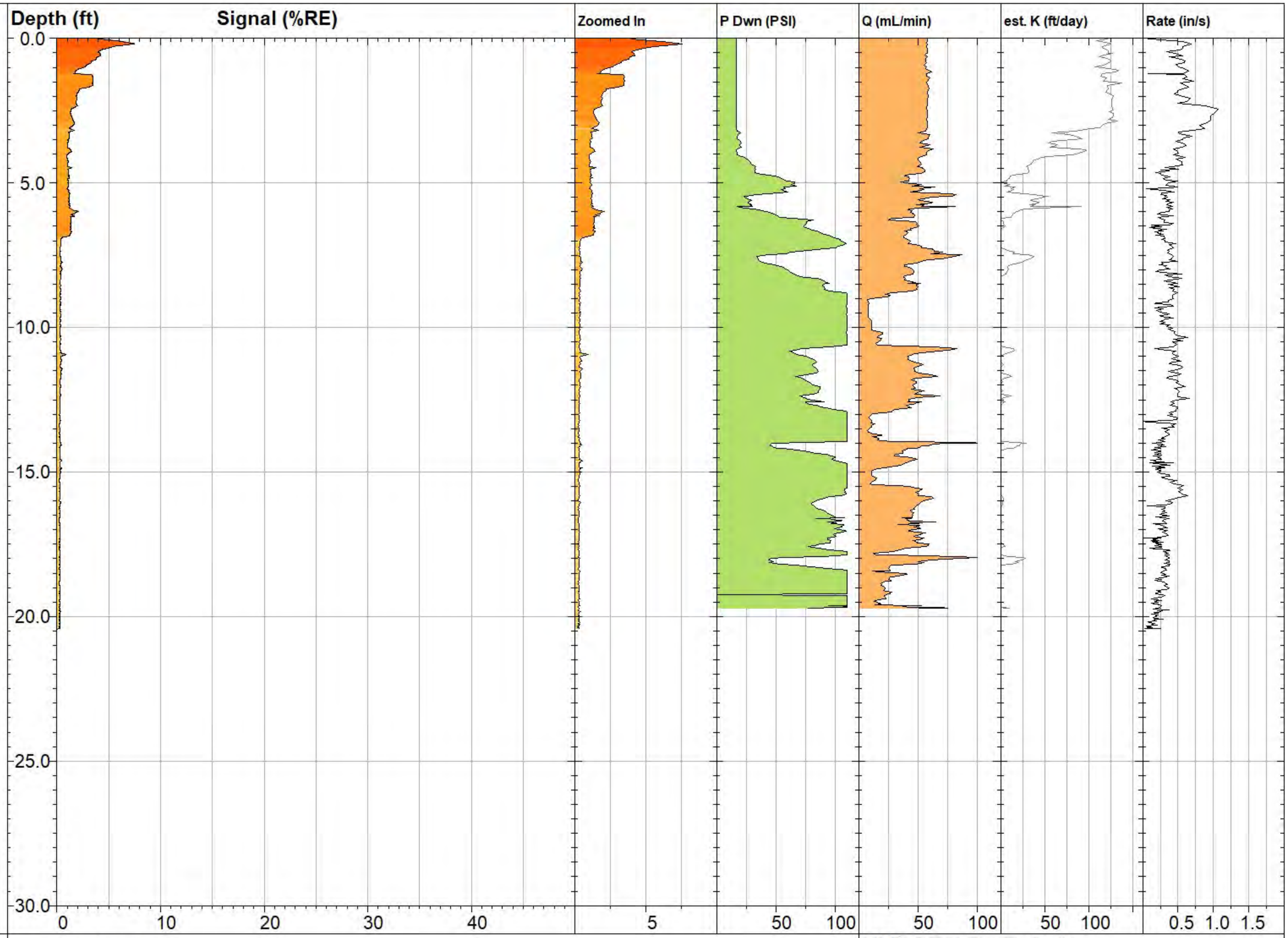
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **18.25 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **2.7 %RE @ 6.25 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-13 11:09 MDT**

Callouts

REFUSAL AT 20.43 FEET.



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EB-LIF-138

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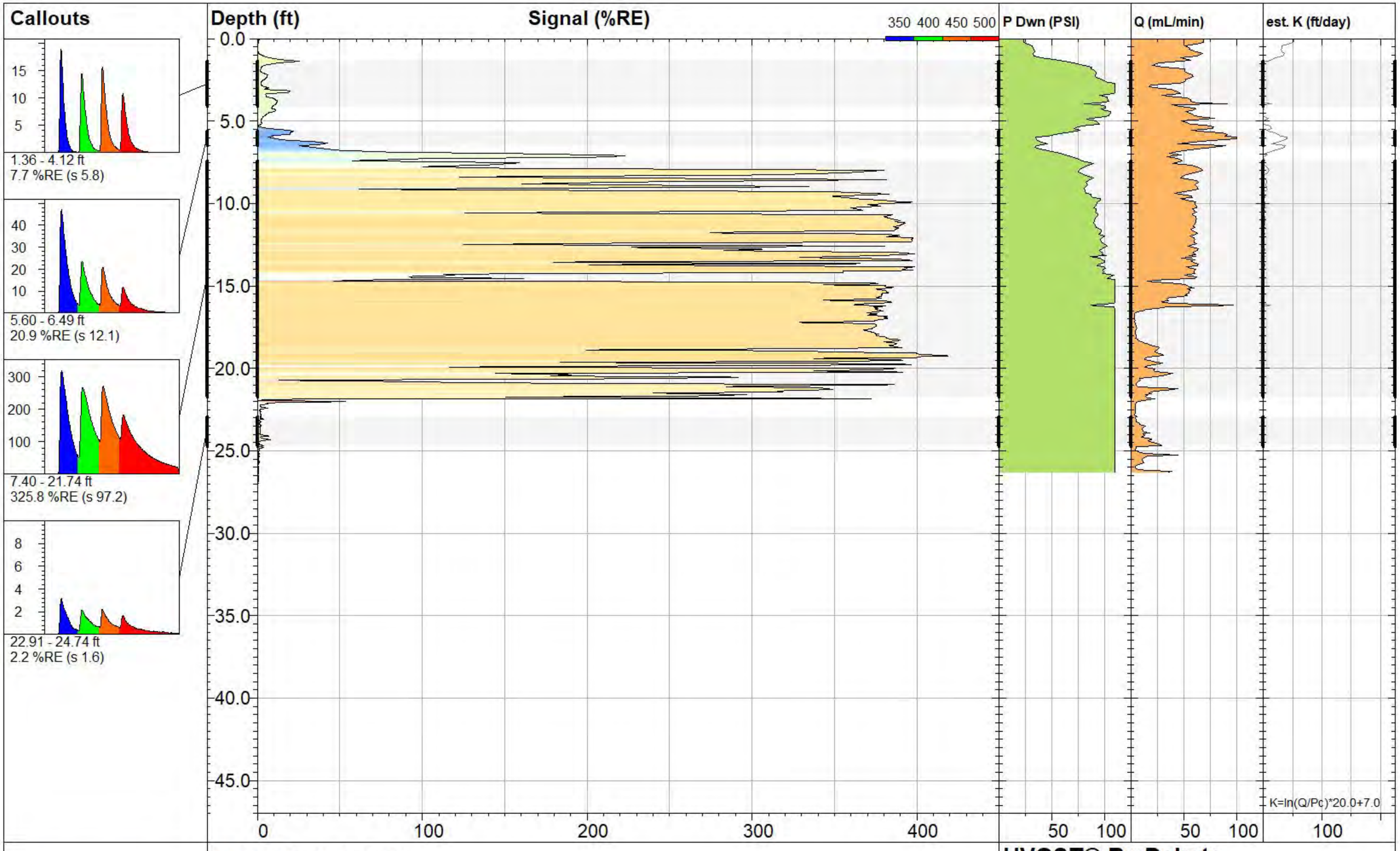
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **20.43 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **7.5 %RE @ 0.19 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-10 14:52 MDT**



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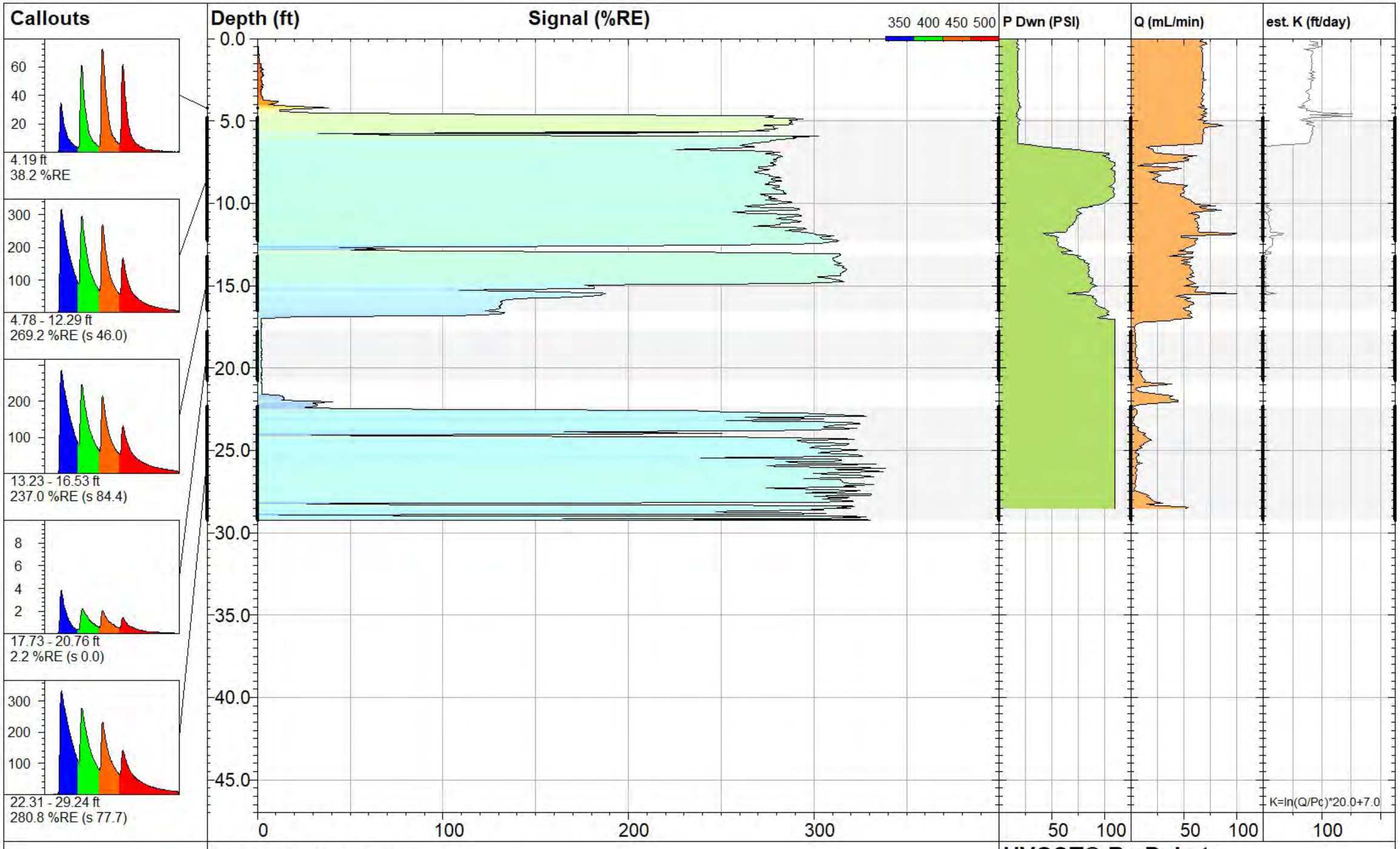
Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **27.04 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **419.5 %RE @ 19.24 ft**
Operator / Unit: **DS / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-19 10:26 MST**



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MKTF-LIF-37

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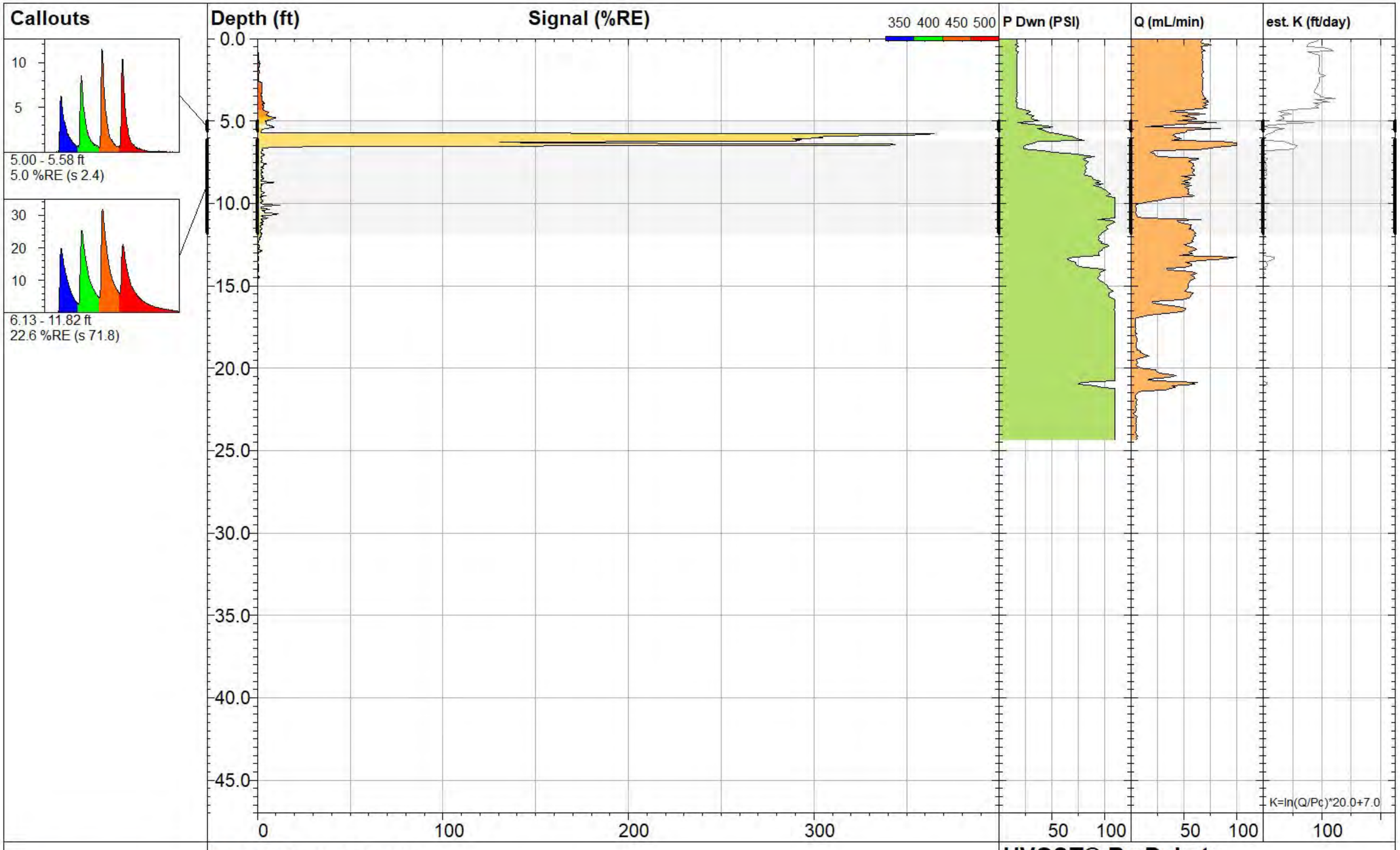
Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **29.24 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **338.7 %RE @ 26.08 ft**
Operator / Unit: **DS / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-19 15:14 MST**



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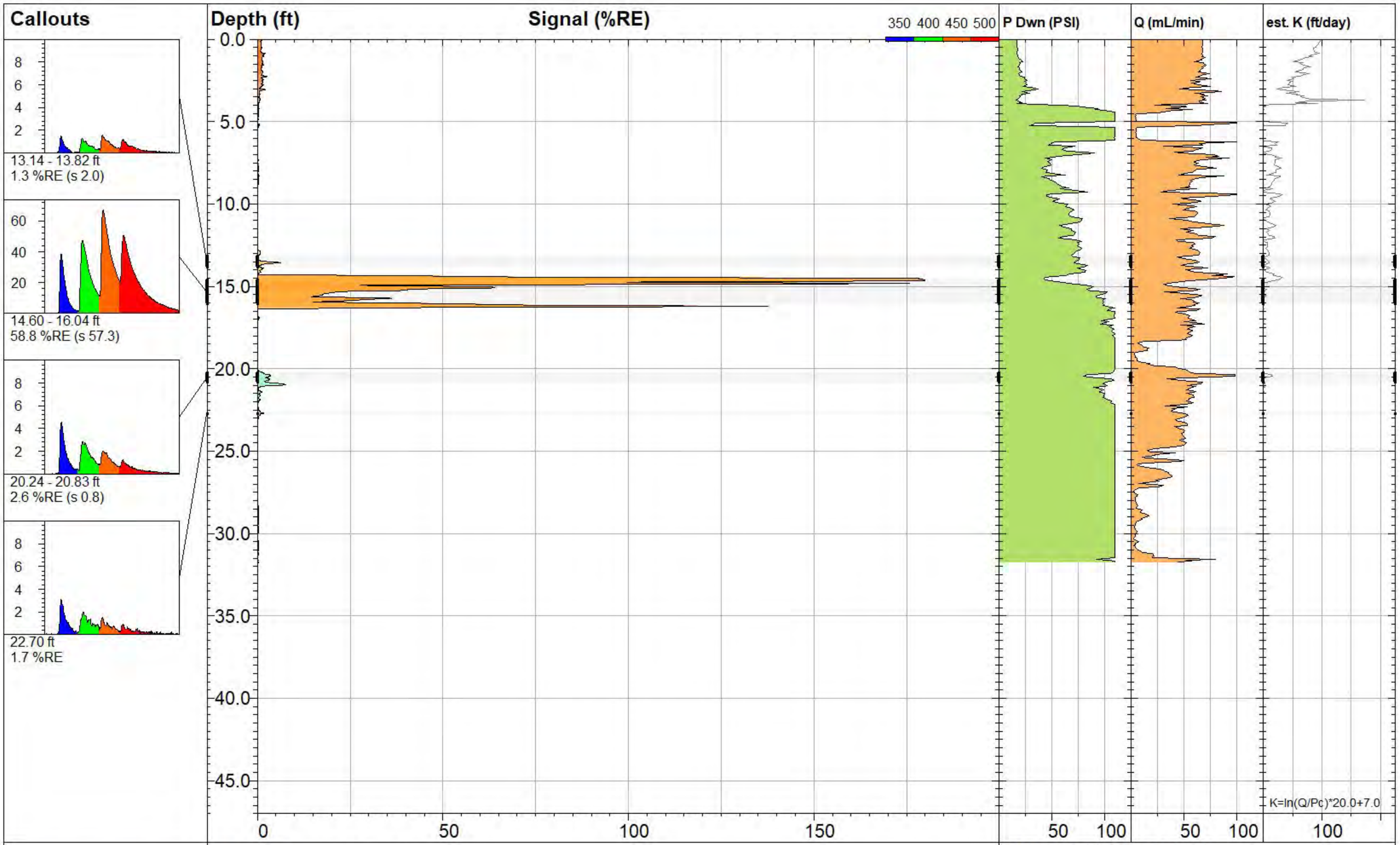
Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **25.07 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **365.1 %RE @ 5.77 ft**
Operator / Unit: **DS / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-19 14:43 MST**



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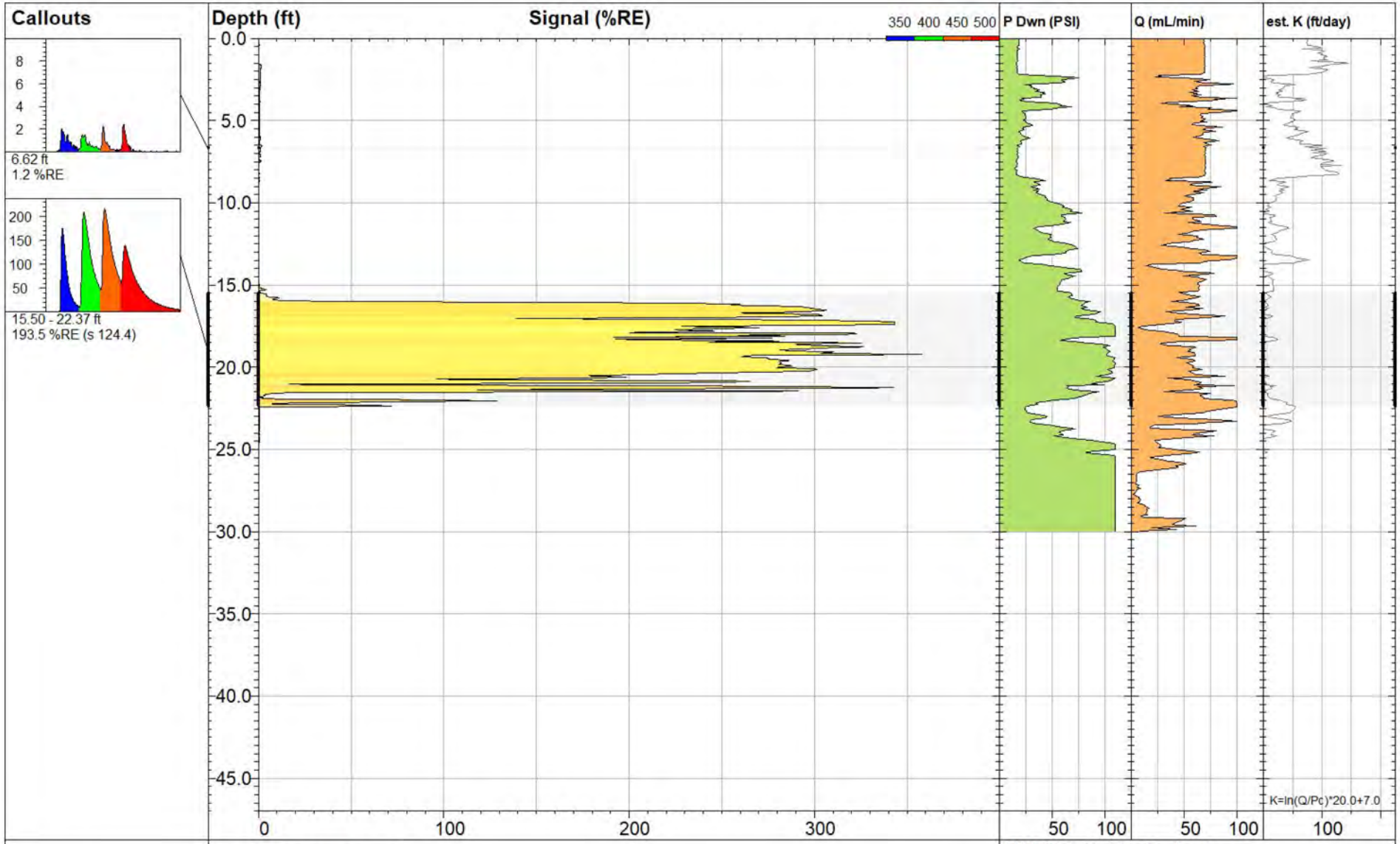
Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **32.46 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **179.8 %RE @ 14.67 ft**
Operator / Unit: **DS / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-19 14:06 MST**



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MKTF-LIF-40

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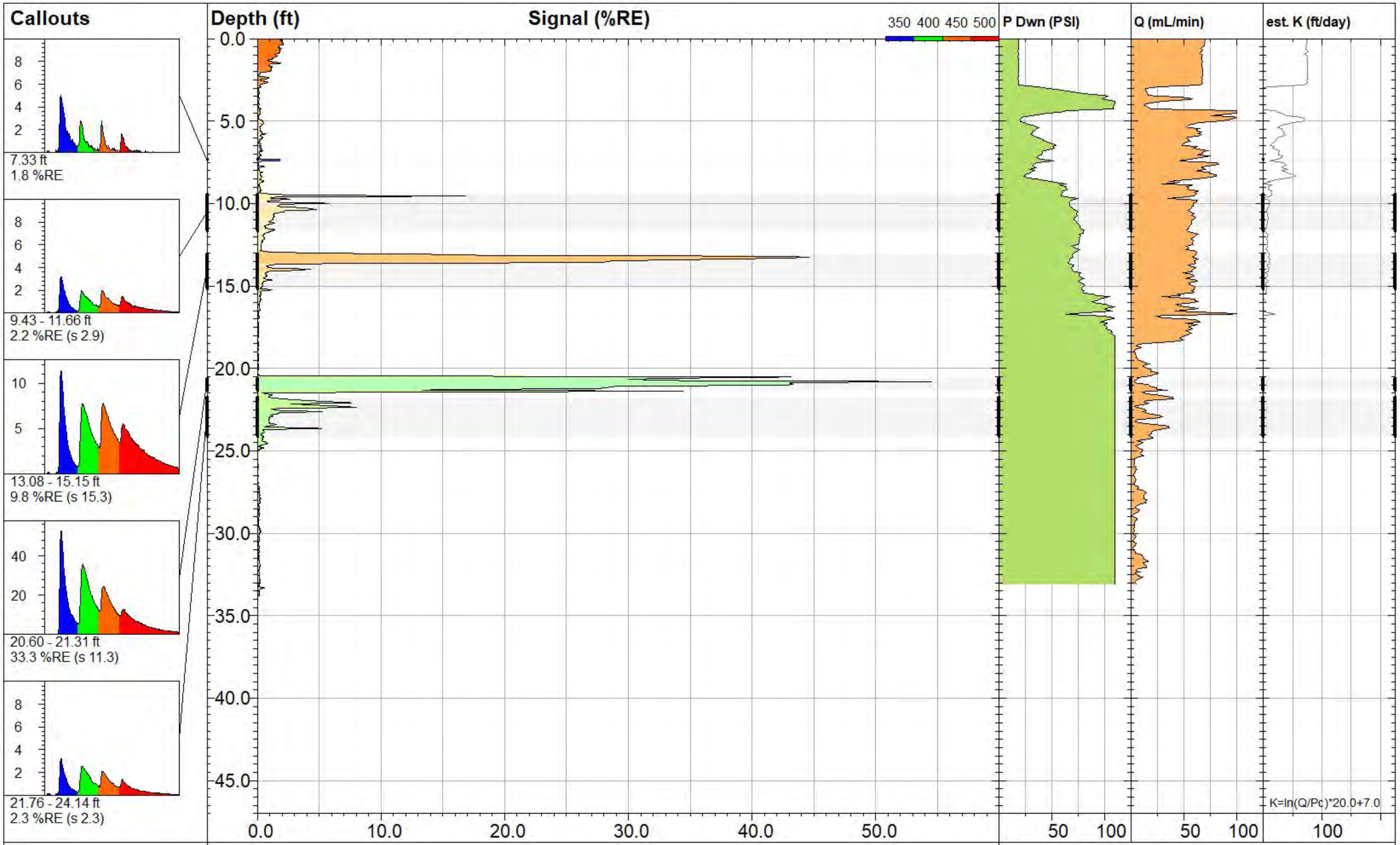
Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **30.72 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **362.5 %RE @ 19.22 ft**
Operator / Unit: **DS / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-19 13:31 MST**



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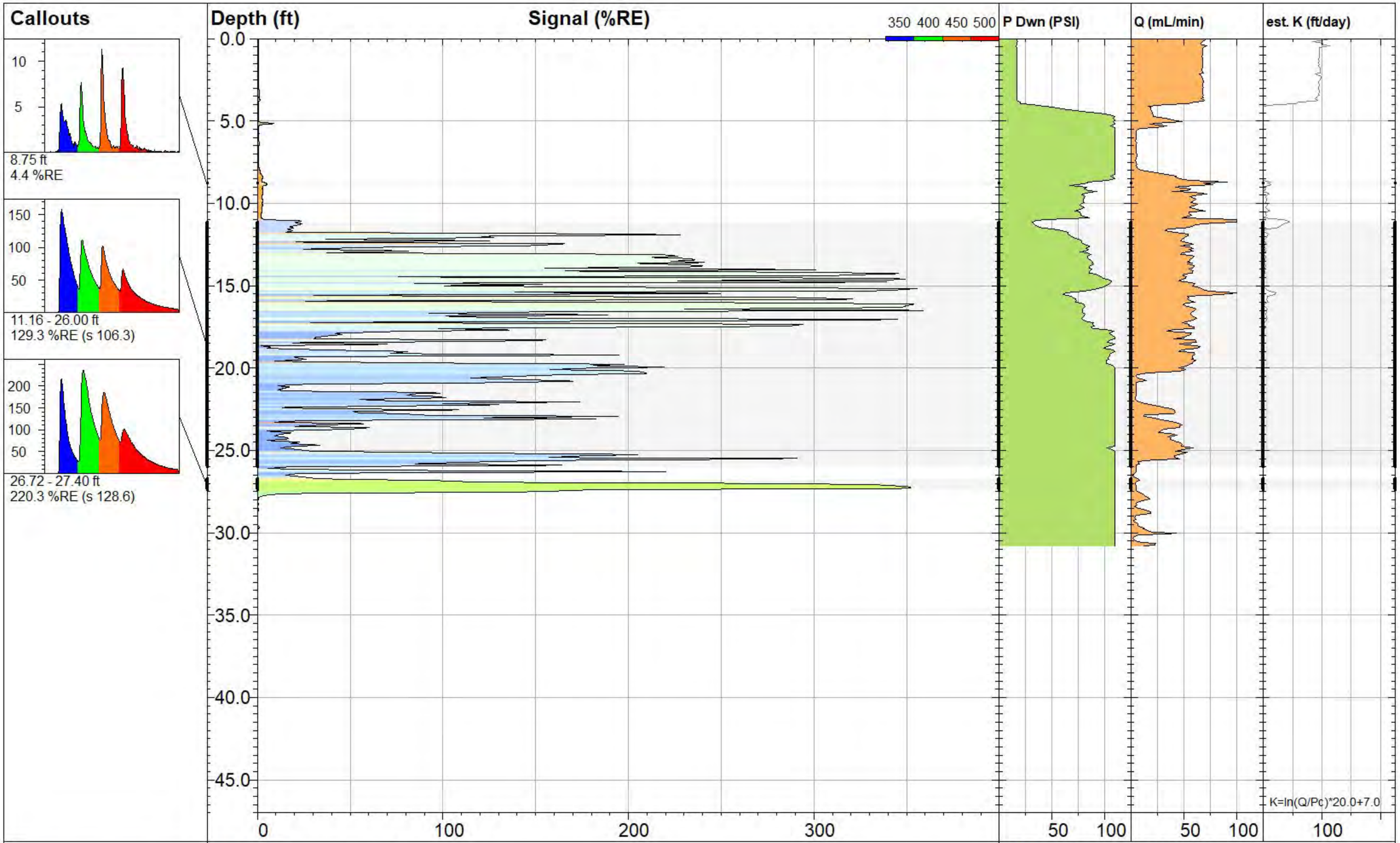
Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **33.82 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **54.9 %RE @ 20.80 ft**
Operator / Unit: **DS / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-20 08:17 MST**



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MKTF-LIF-42

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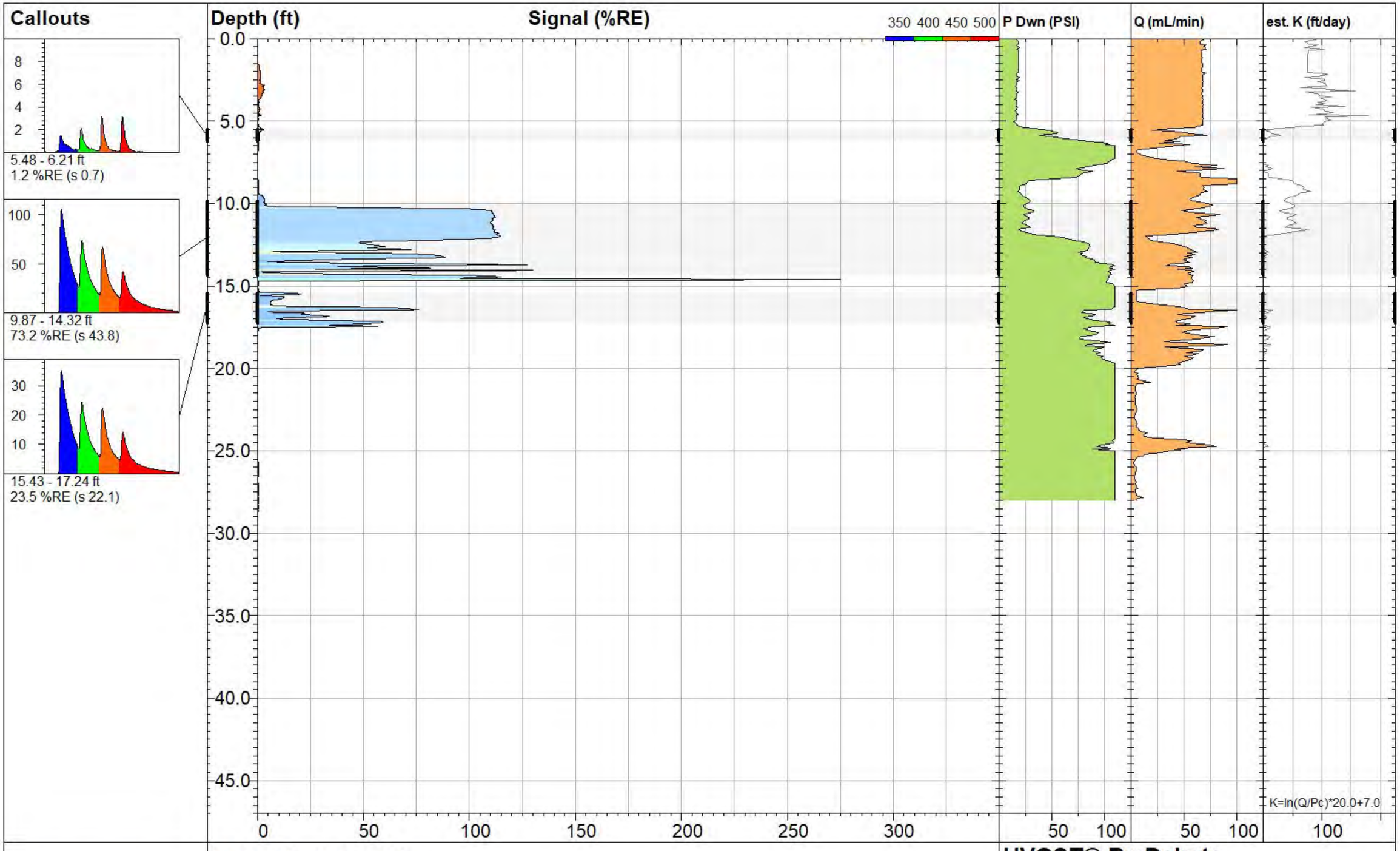
Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **31.51 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **366.7 %RE @ 16.50 ft**
Operator / Unit: **DS / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-19 15:53 MST**



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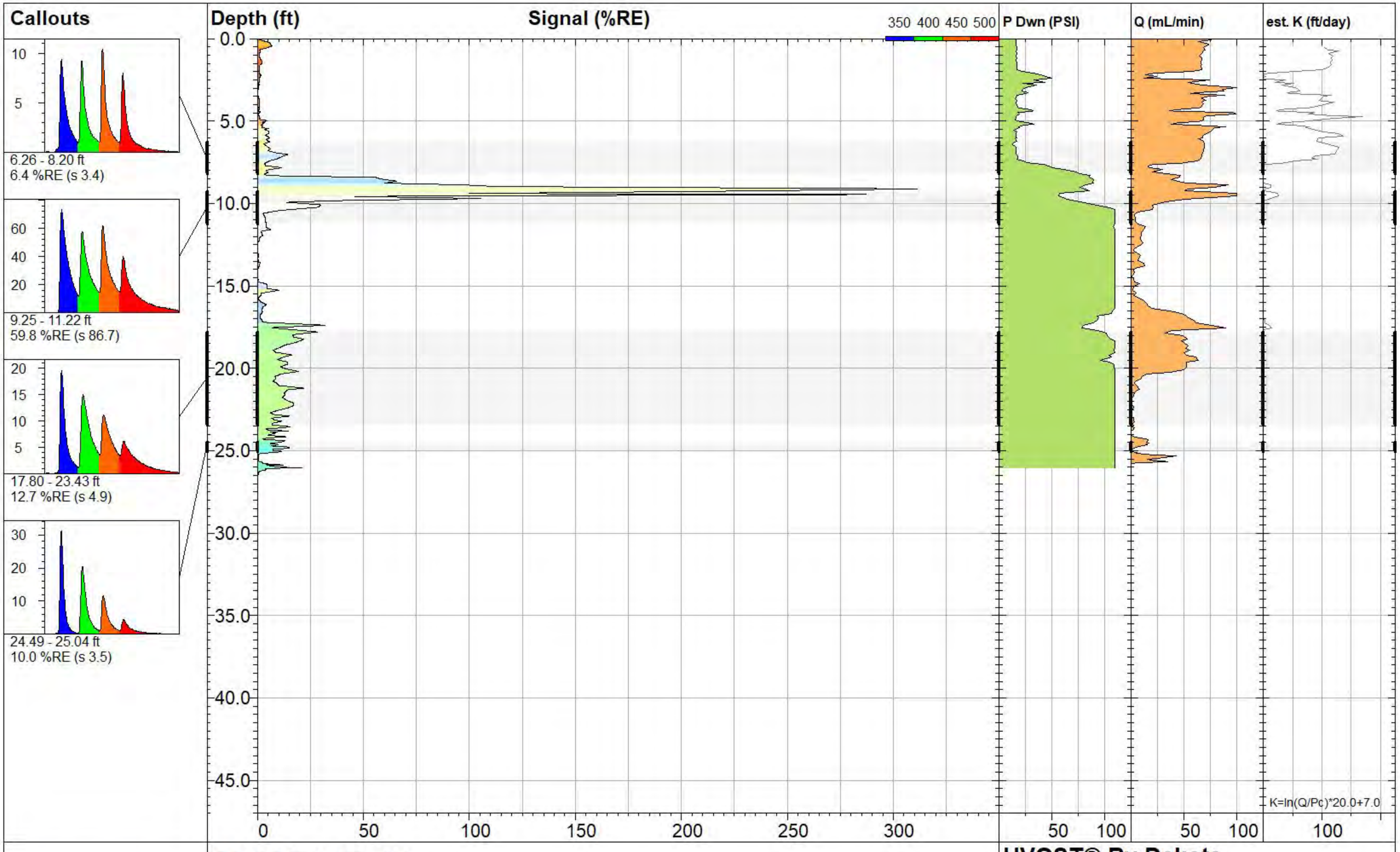
Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **28.72 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **287.0 %RE @ 14.61 ft**
Operator / Unit: **DS / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-19 16:17 MST**



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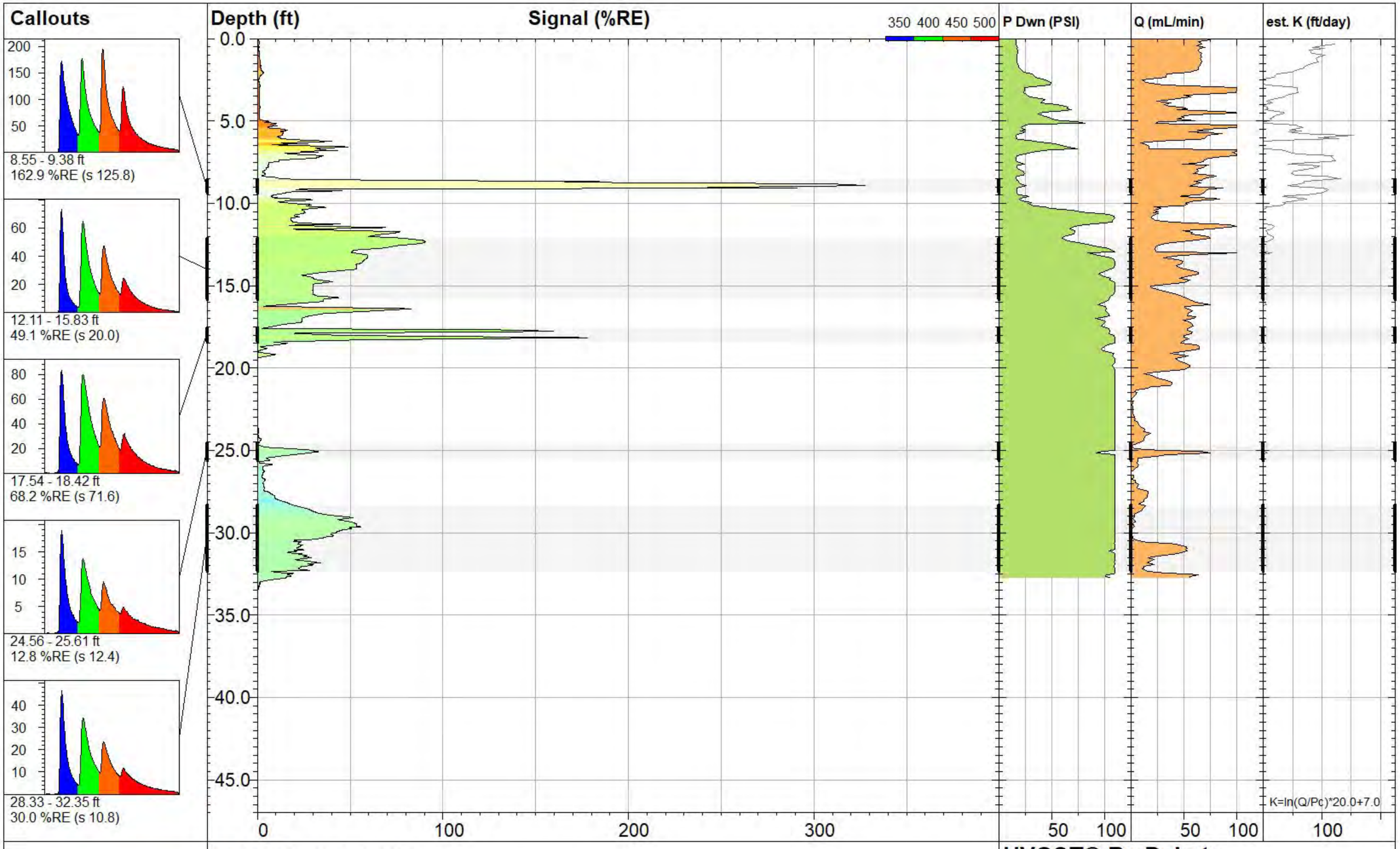
	Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **26.74 ft**
	Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **315.0 %RE @ 9.11 ft**
	Operator / Unit: **BG / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-24 13:40 MST**



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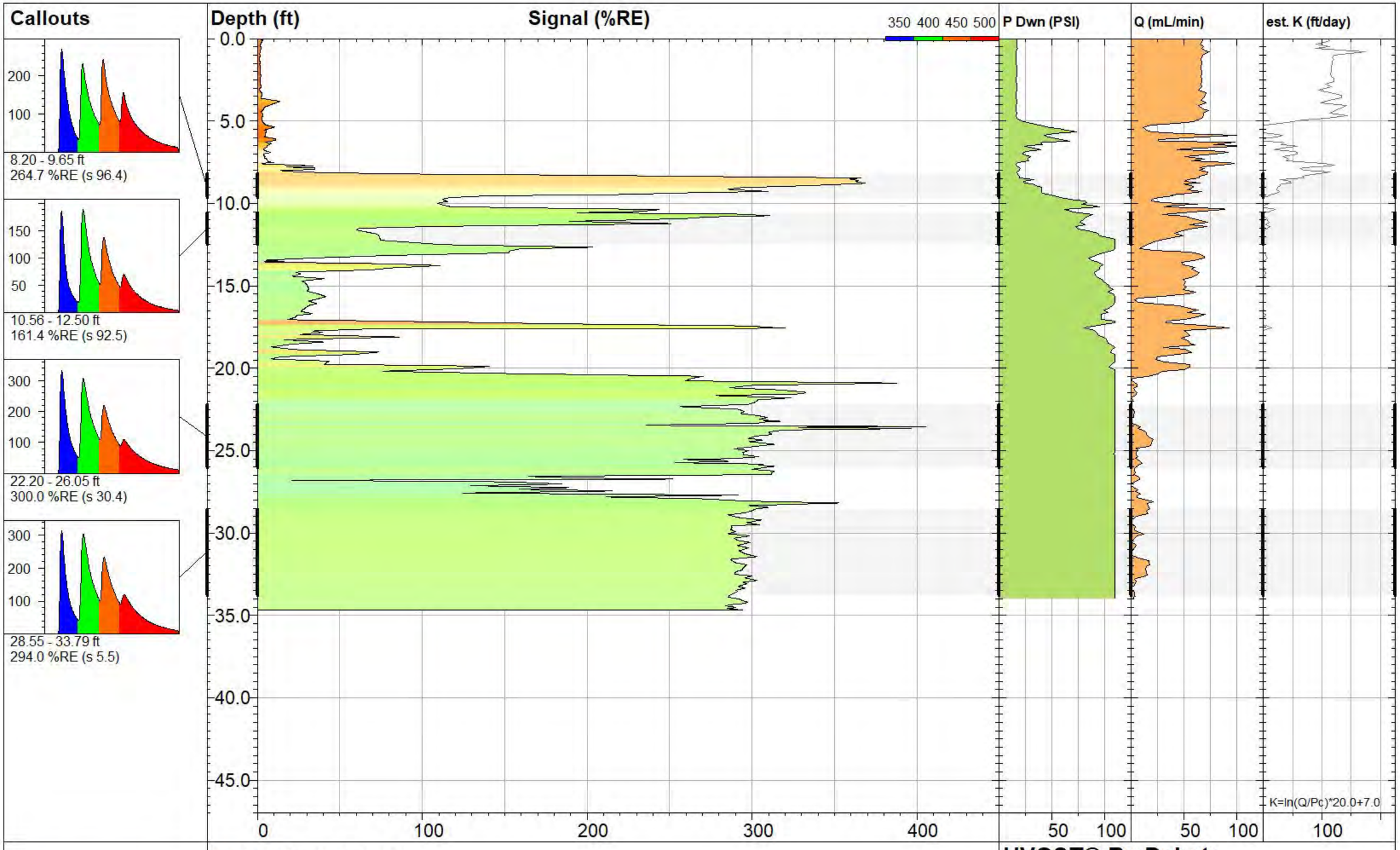
Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **33.41 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **329.2 %RE @ 8.92 ft**
Operator / Unit: **BG / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-24 12:47 MST**



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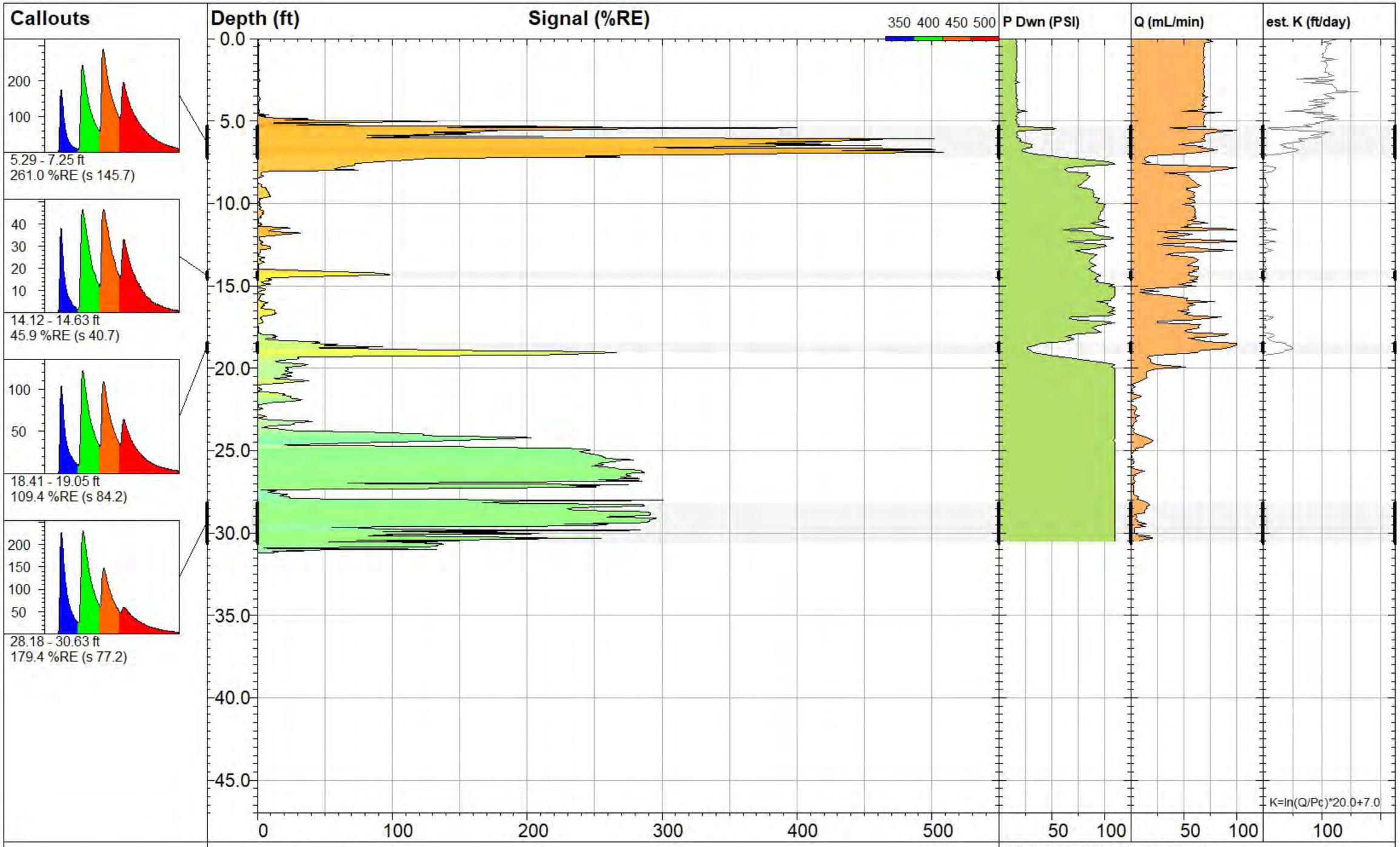
Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **34.66 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **409.2 %RE @ 23.54 ft**
Operator / Unit: **BG / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-24 13:15 MST**



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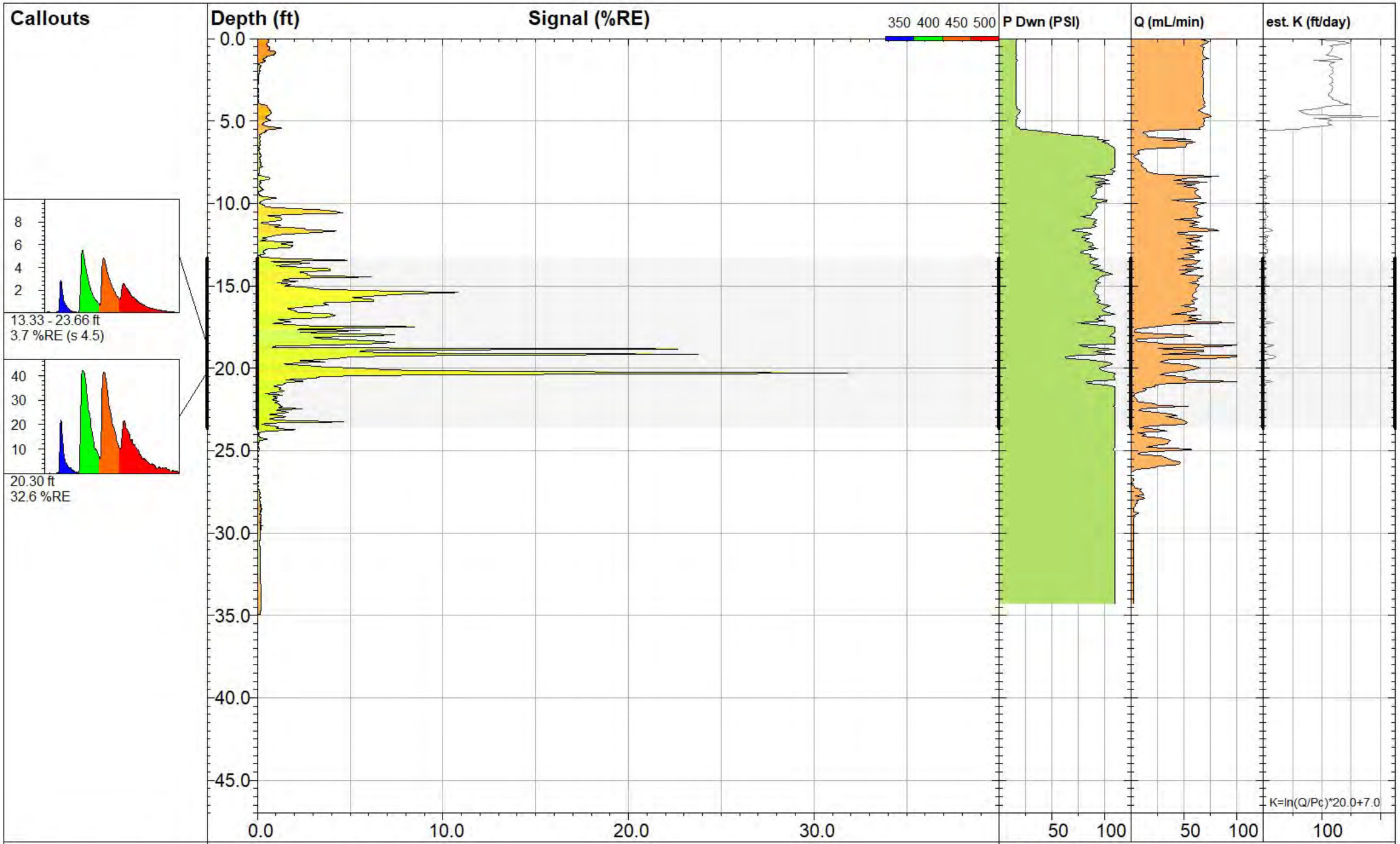
Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **31.20 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **515.2 %RE @ 6.05 ft**
Operator / Unit: **DS / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-22 13:45 MST**



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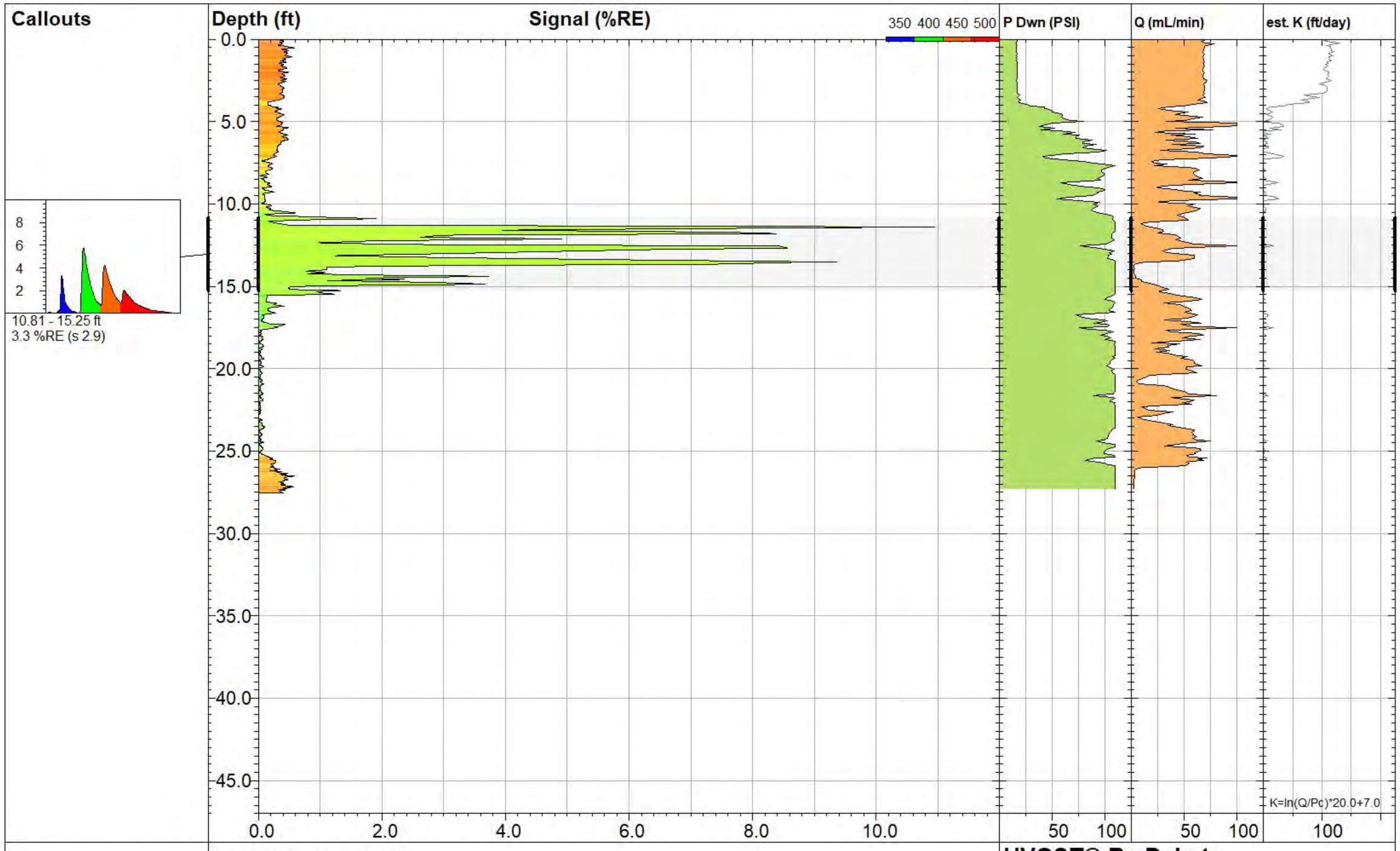
Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **34.94 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **32.6 %RE @ 20.30 ft**
Operator / Unit: **DS / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-22 13:16 MST**



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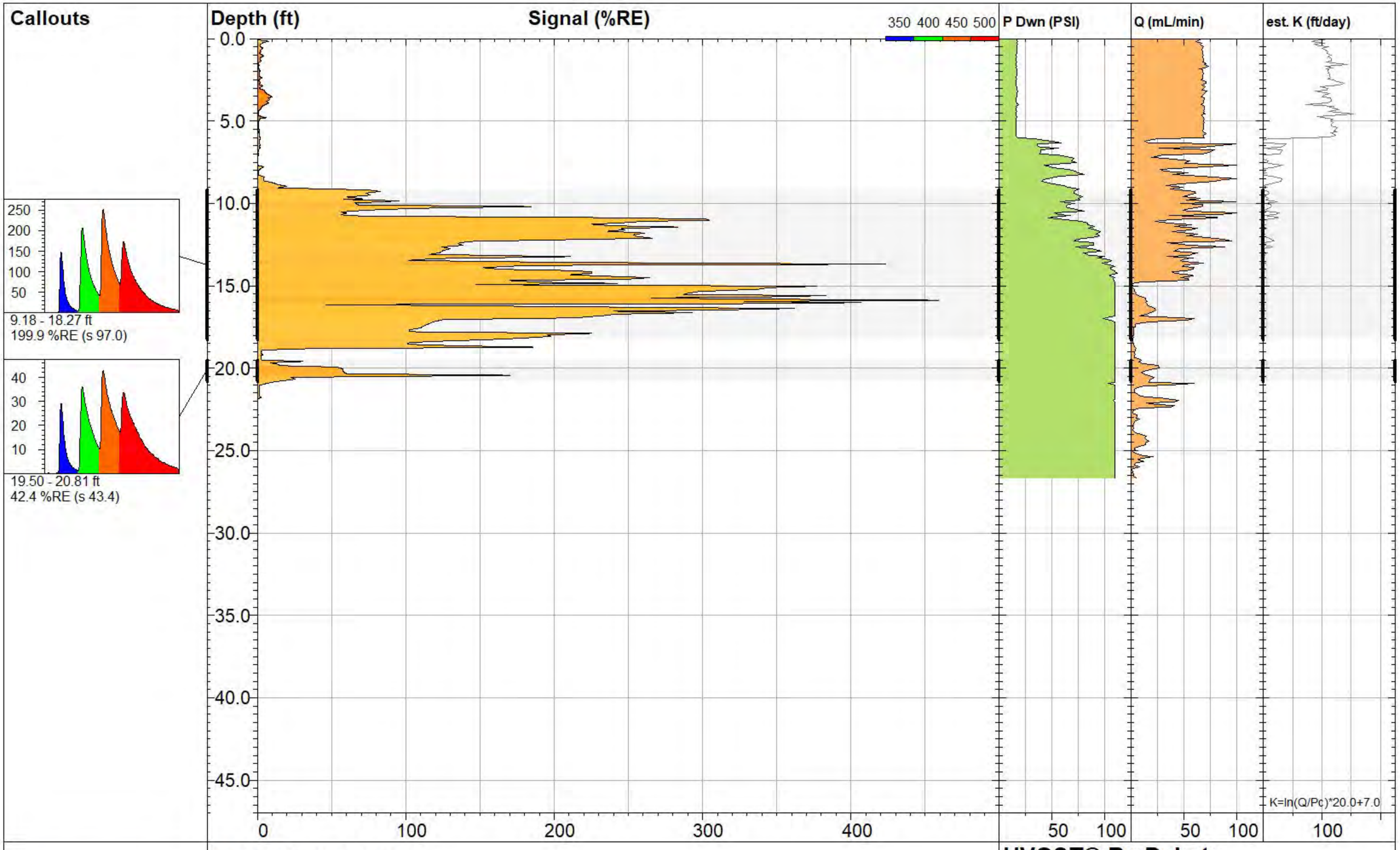
Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **27.54 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **11.0 %RE @ 11.39 ft**
Operator / Unit: **DS / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-22 11:18 MST**



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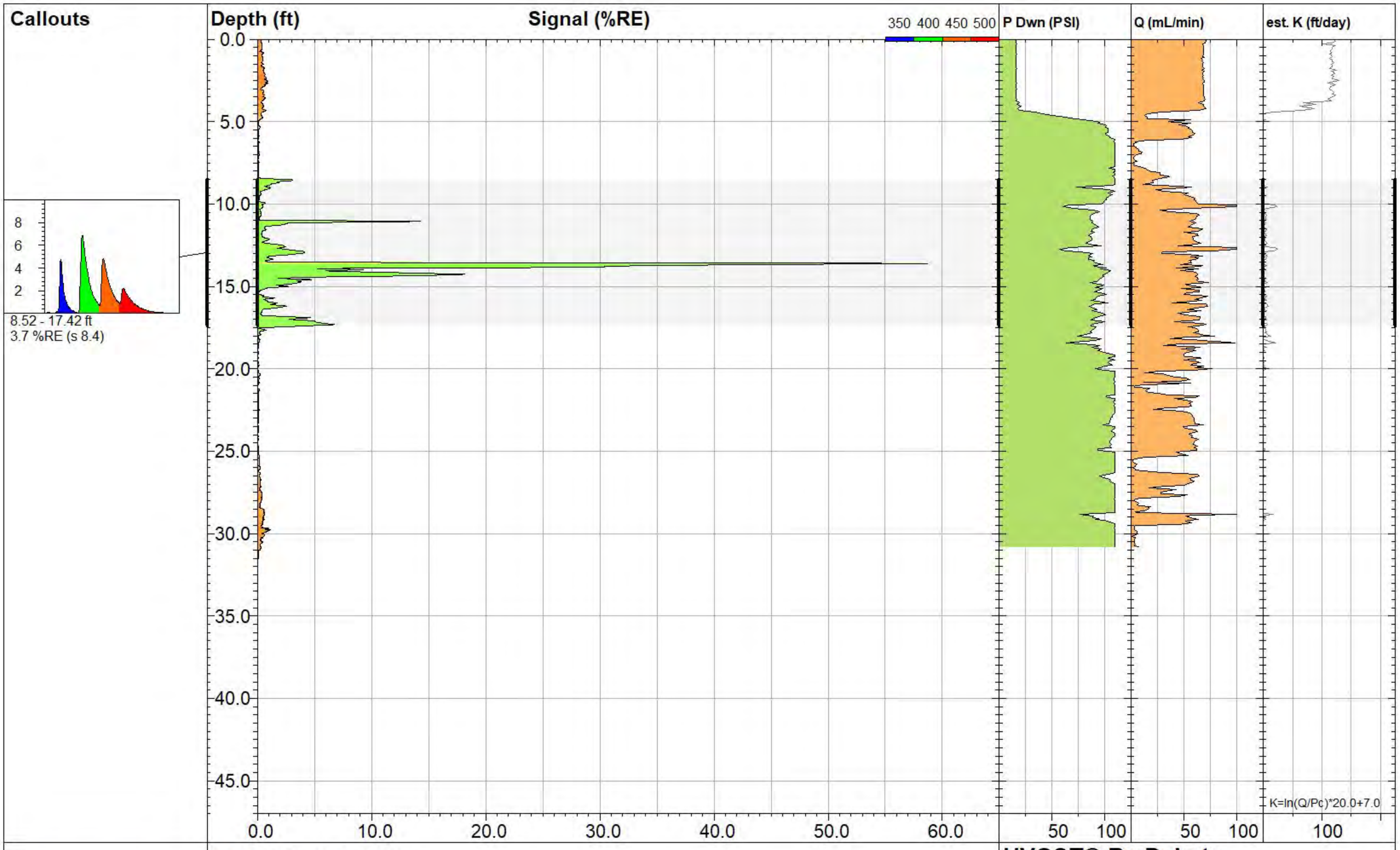
	Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **27.39 ft**
	Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **463.2 %RE @ 15.88 ft**
	Operator / Unit: **DS / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-22 14:42 MST**



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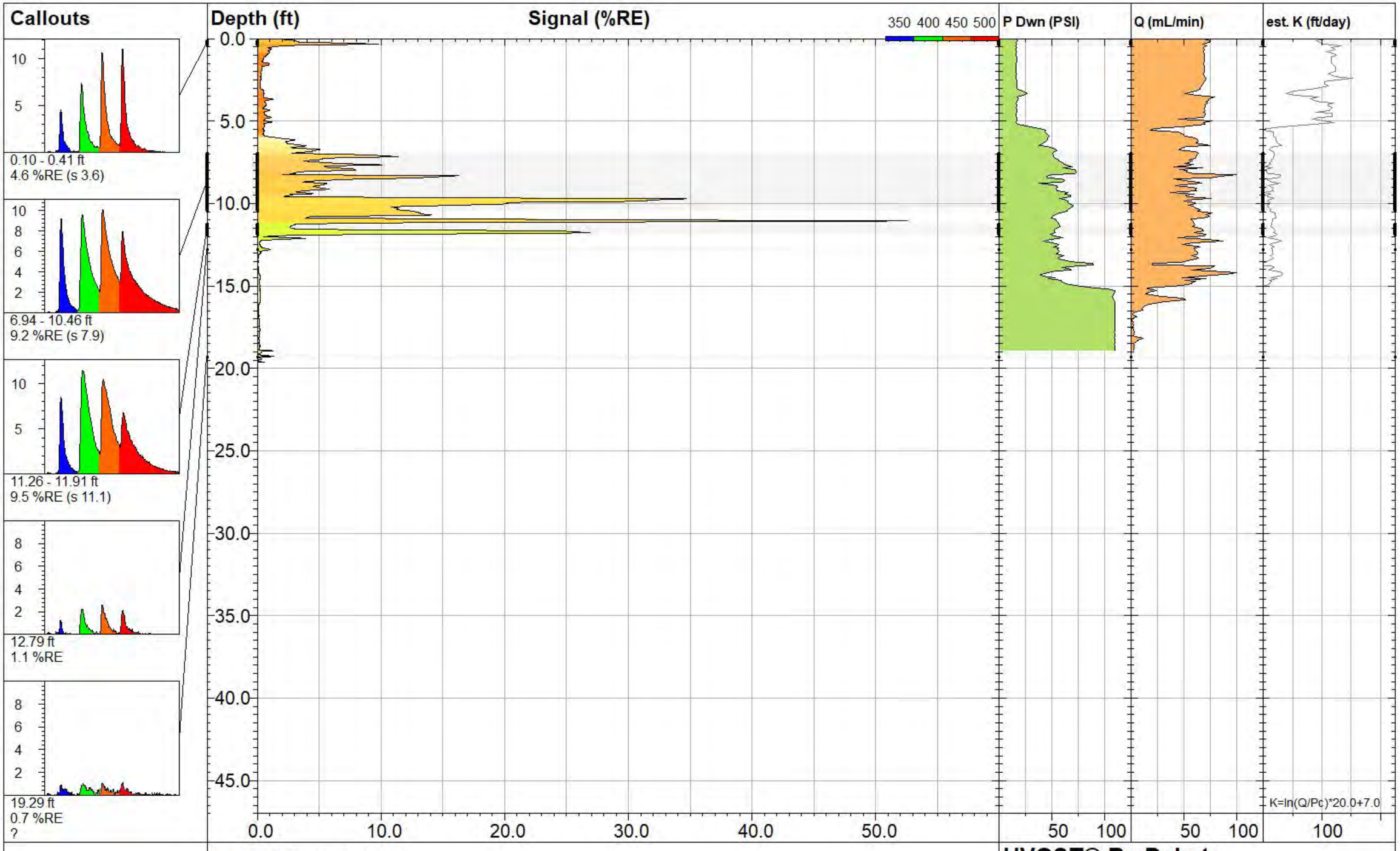
Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **31.50 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **60.2 %RE @ 13.60 ft**
Operator / Unit: **DS / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-22 10:47 MST**



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MKTF-LIF-52

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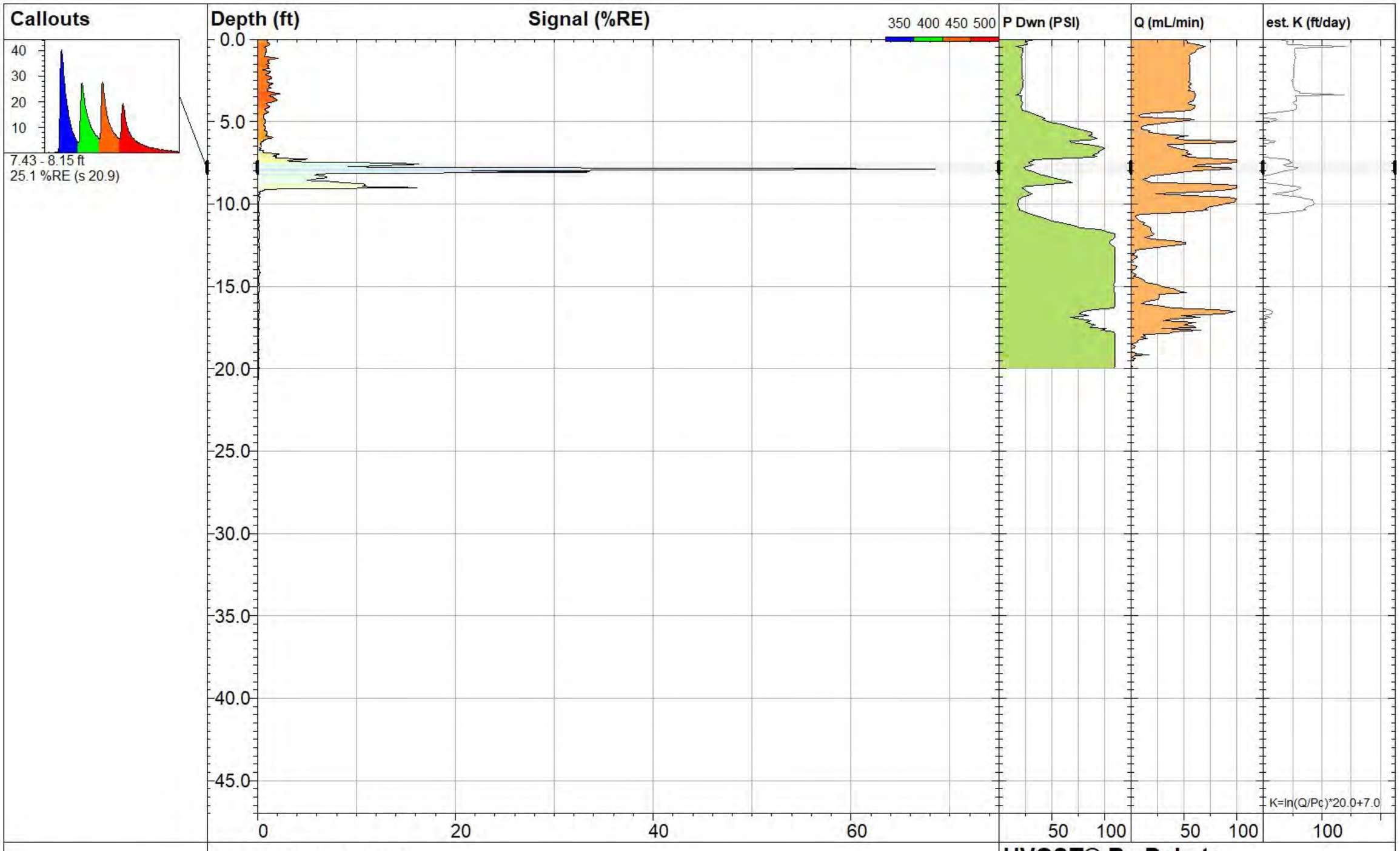
Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **19.64 ft**
Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **52.8 %RE @ 11.06 ft**
Operator / Unit: **BG / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-22 15:10 MST**



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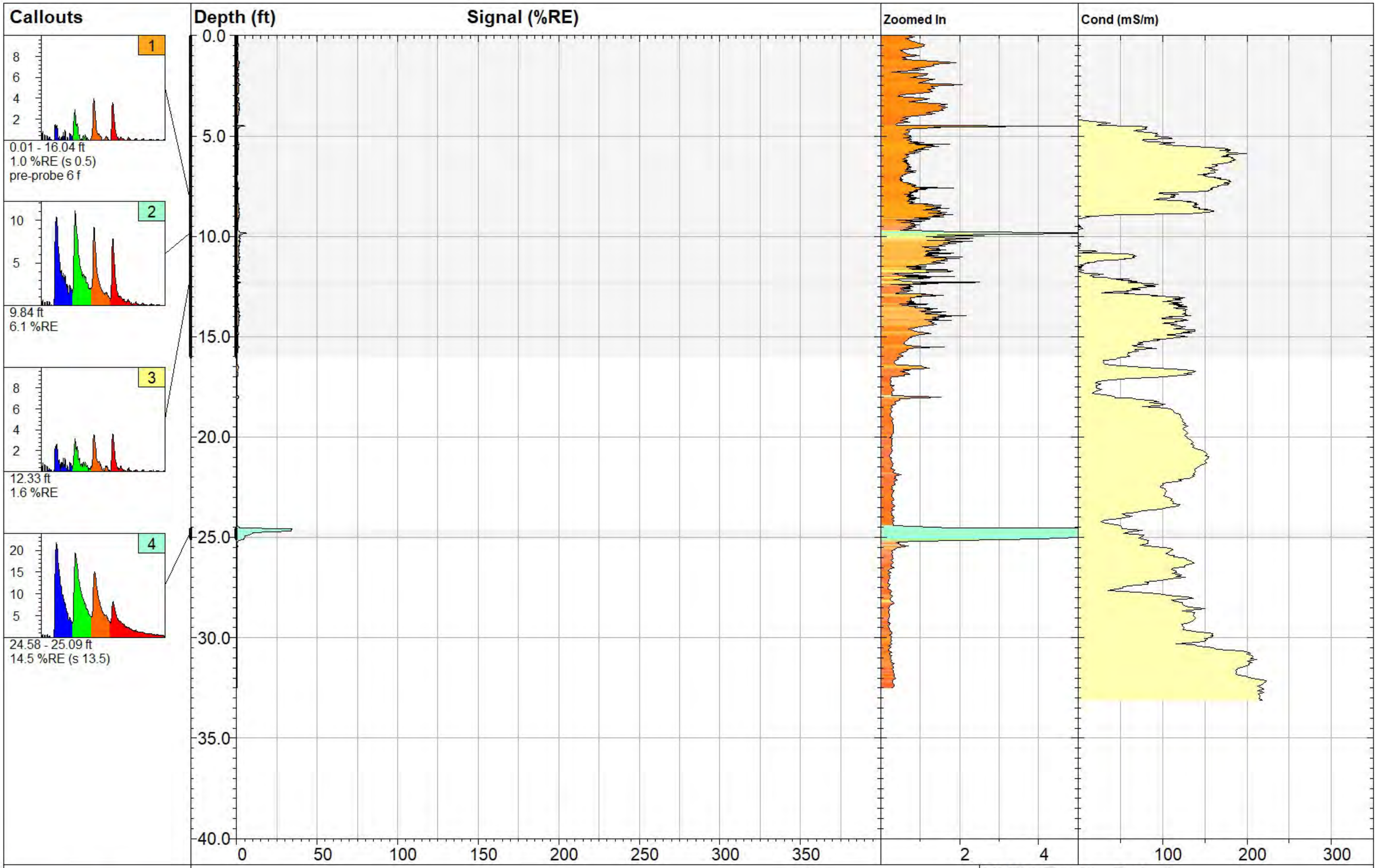
	Site: **Eastern Boundry LIF Investigation**	*Y Coord.(Lat-N) / System:* **Unavailable / NA**	*Final depth:* **20.65 ft**
	Client / Job: **Trihydro / 0408.19**	*X Coord.(Lng-E) / Fix:* **Unavailable / NA**	*Max signal:* **70.6 %RE @ 7.87 ft**
	Operator / Unit: **BG / CP / UVOST1003**	*Elevation:* **Unavailable**	*Date & Time:* **2019-11-24 09:59 MST**



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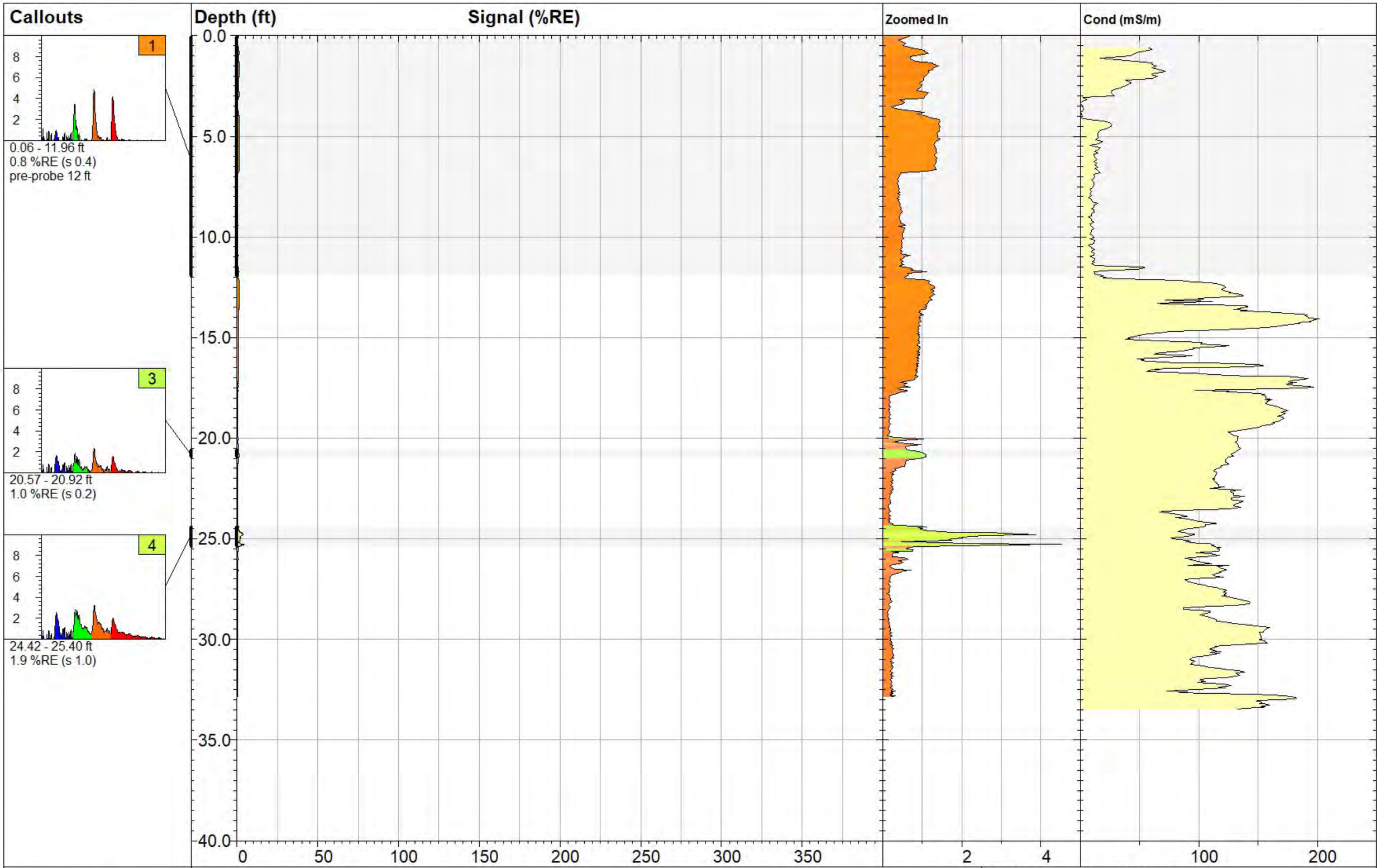
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **32.48 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **34.4 %RE @ 24.58 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-03 12:37 MST**



MKTF-LIF-55

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Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **32.84 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **4.5 %RE @ 25.28 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-02 15:49 MST**

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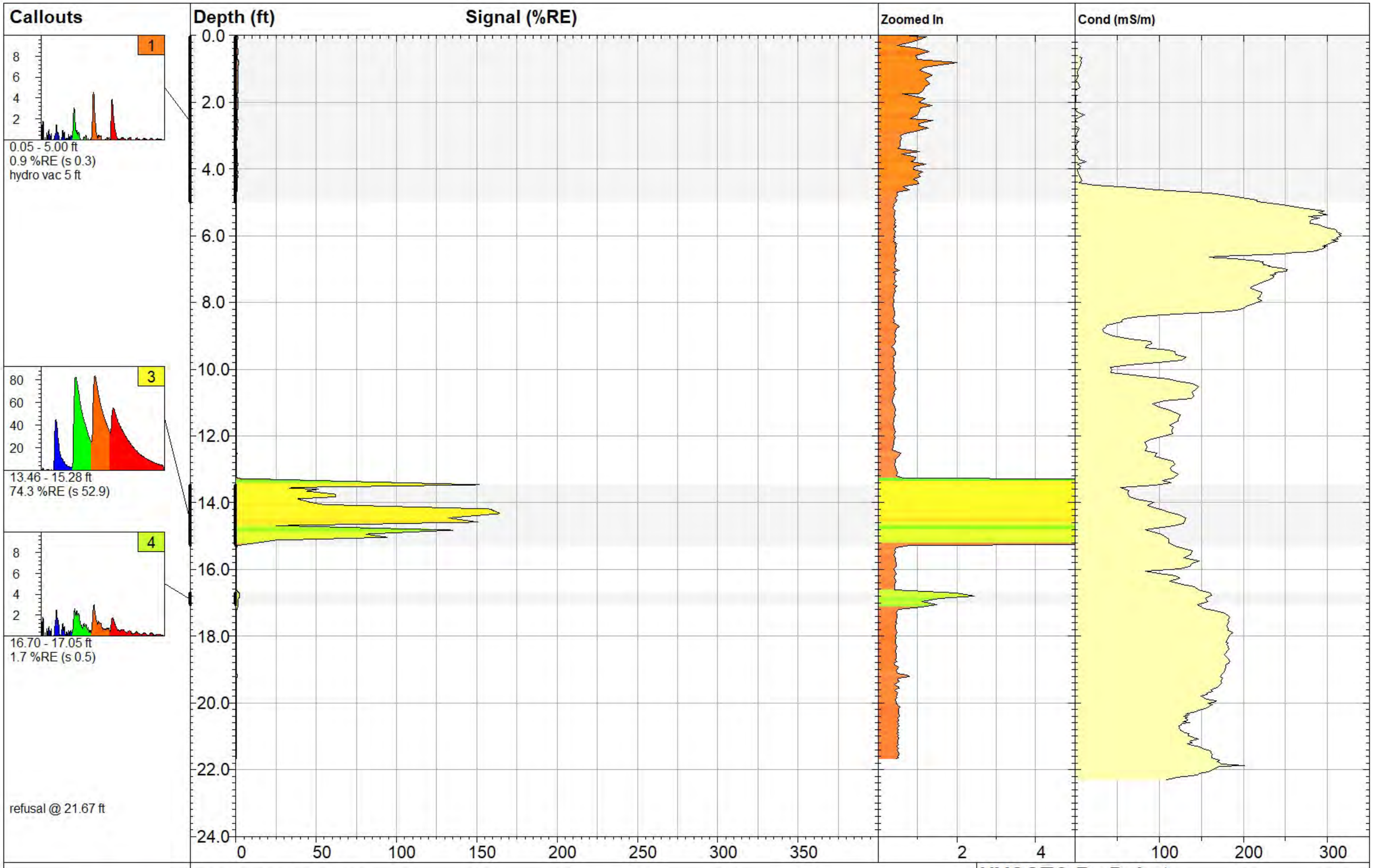

MKTF-LIF-56

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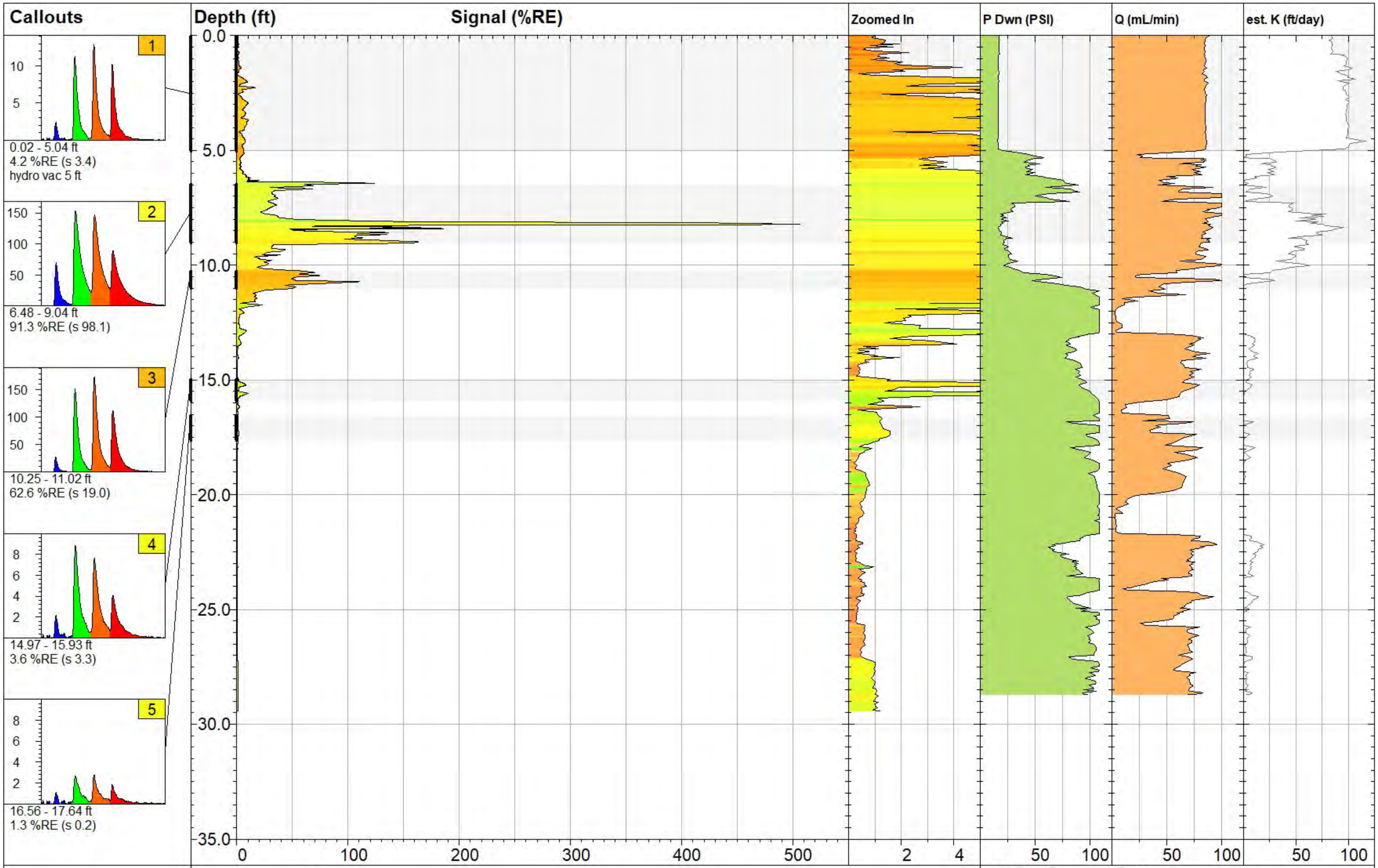
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **21.67 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **164.5 %RE @ 14.33 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-02 16:49 MST**



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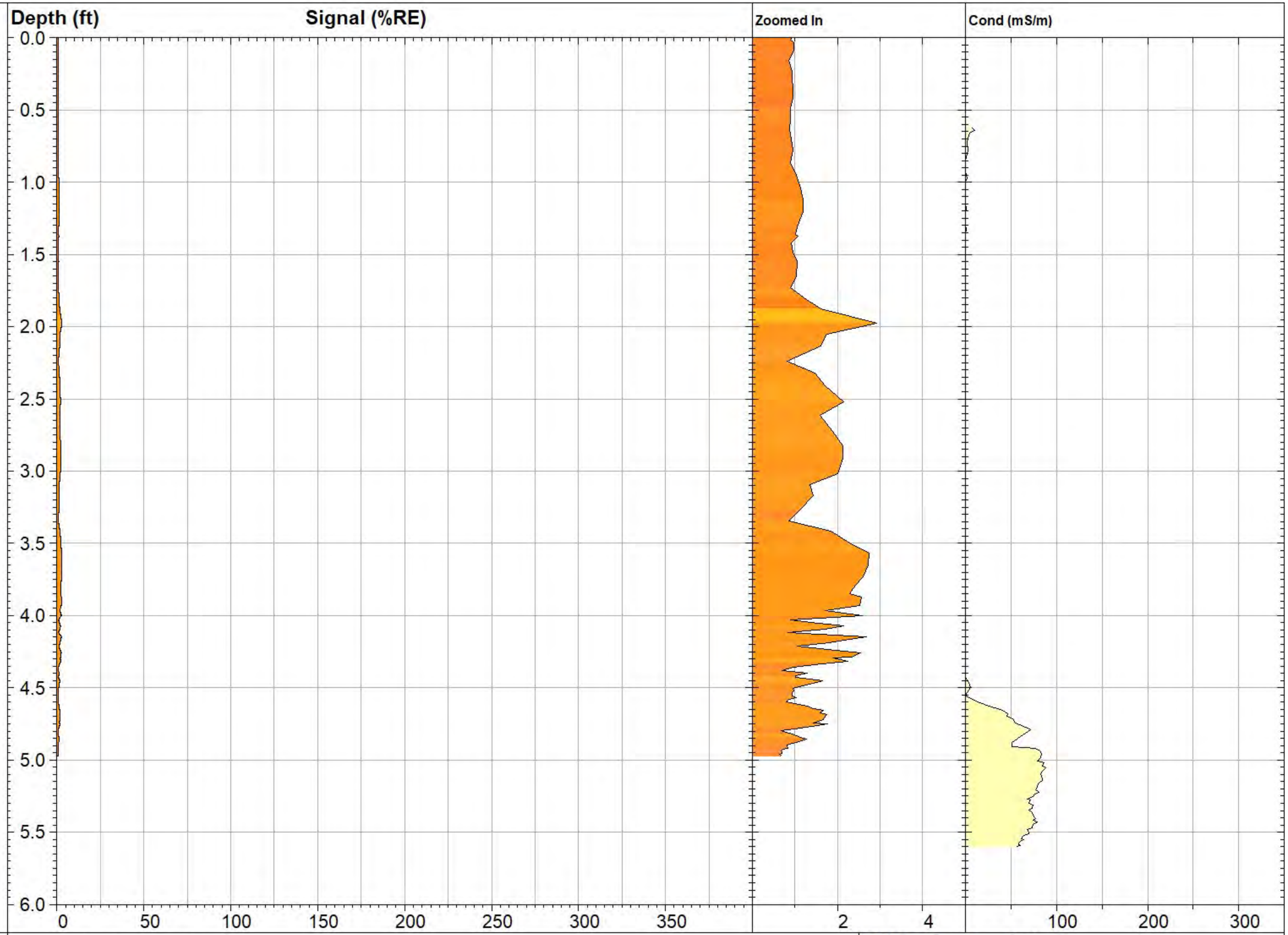
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **29.42 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **510.7 %RE @ 8.23 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-02 08:28 MST**

Callouts

refusal @ 4.97 ft



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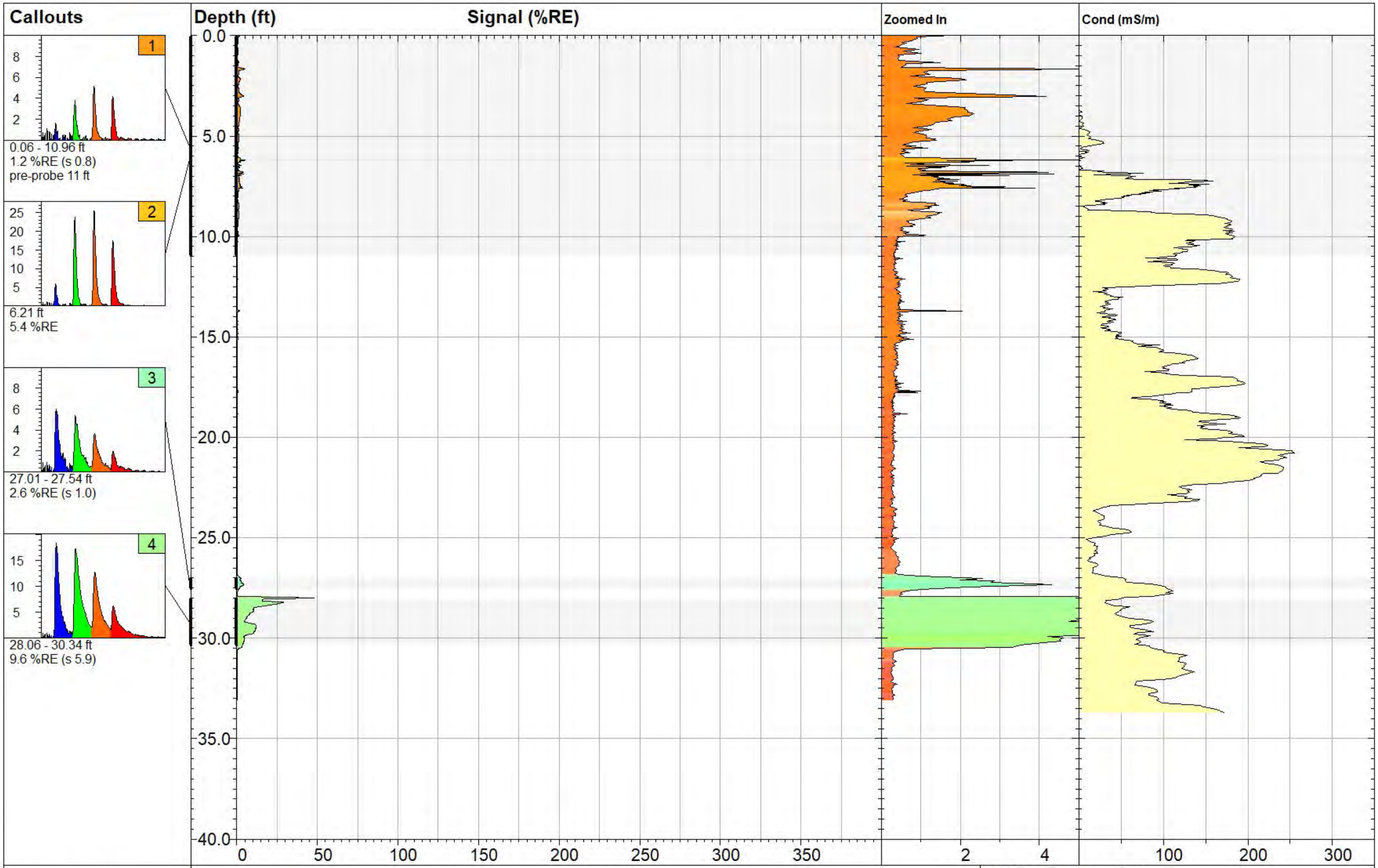
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **4.97 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **2.9 %RE @ 1.98 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-03 07:53 MST**



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MKTF-LIF-59

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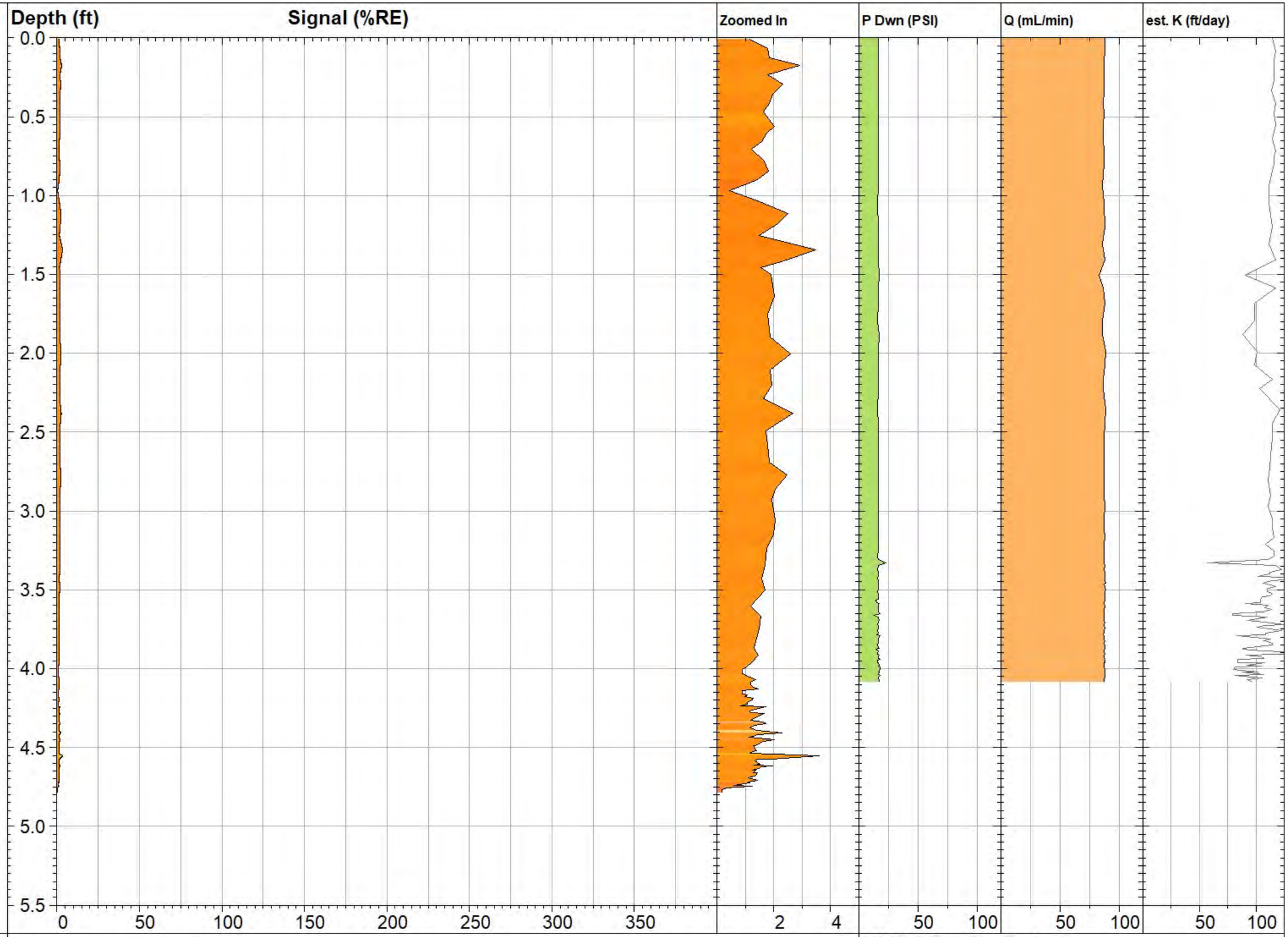
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **33.07 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **48.1 %RE @ 27.99 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-03 09:27 MST**

Callouts

refusal @ 4.78 ft



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MKTF-LIF-60

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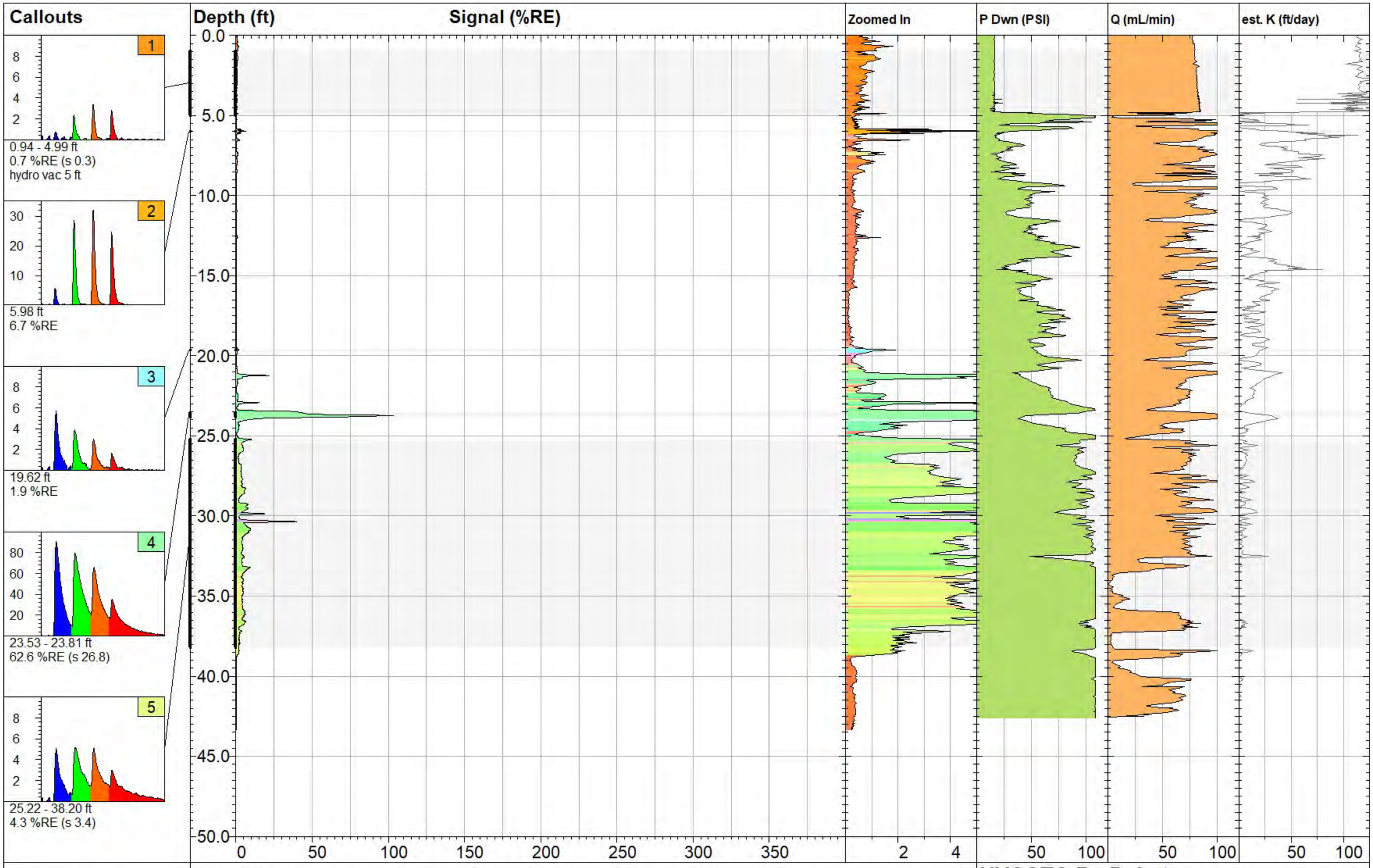
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **4.78 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **3.6 %RE @ 4.55 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-02 12:12 MST**



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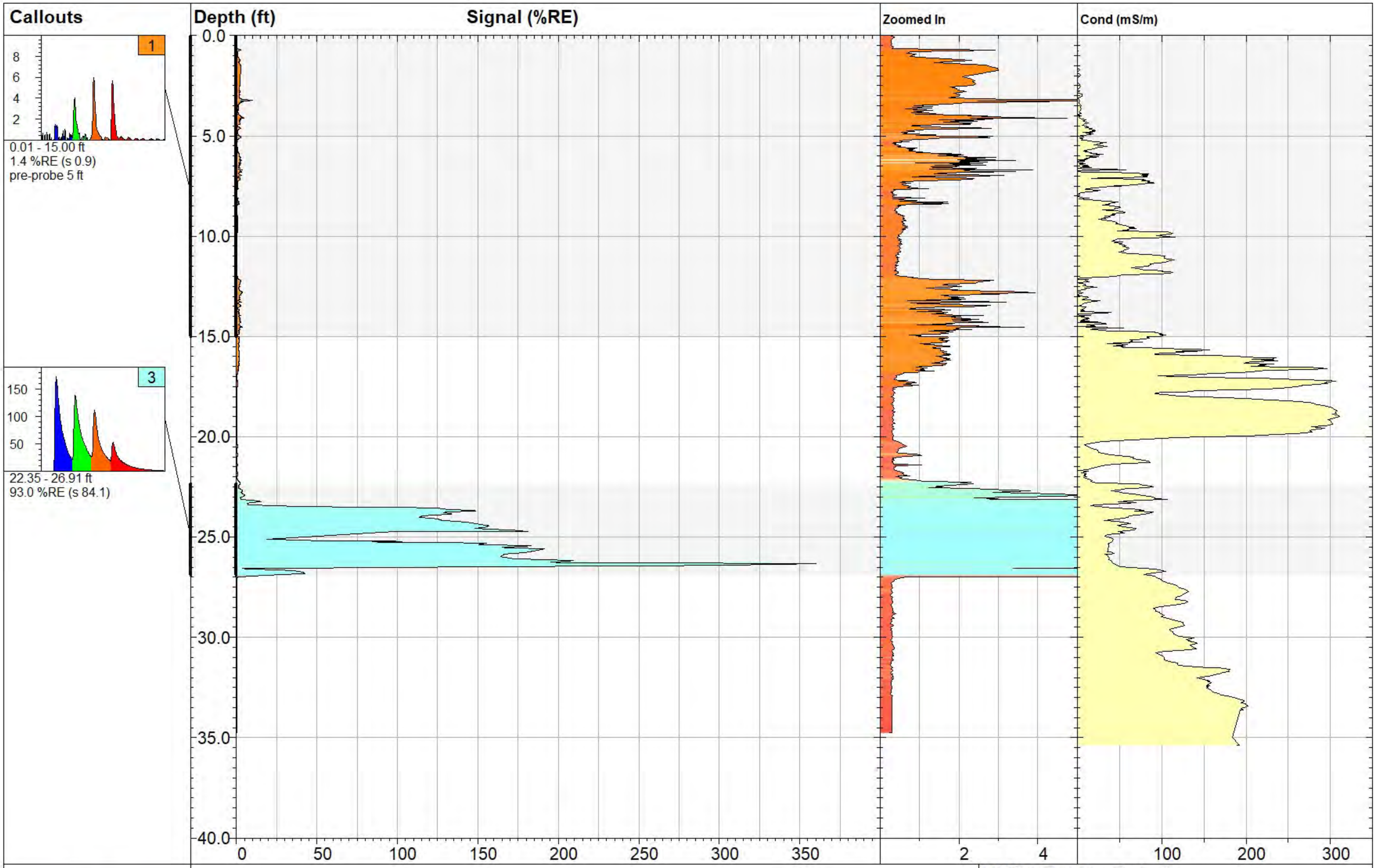
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **43.33 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **105.2 %RE @ 23.73 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-02 10:44 MST**



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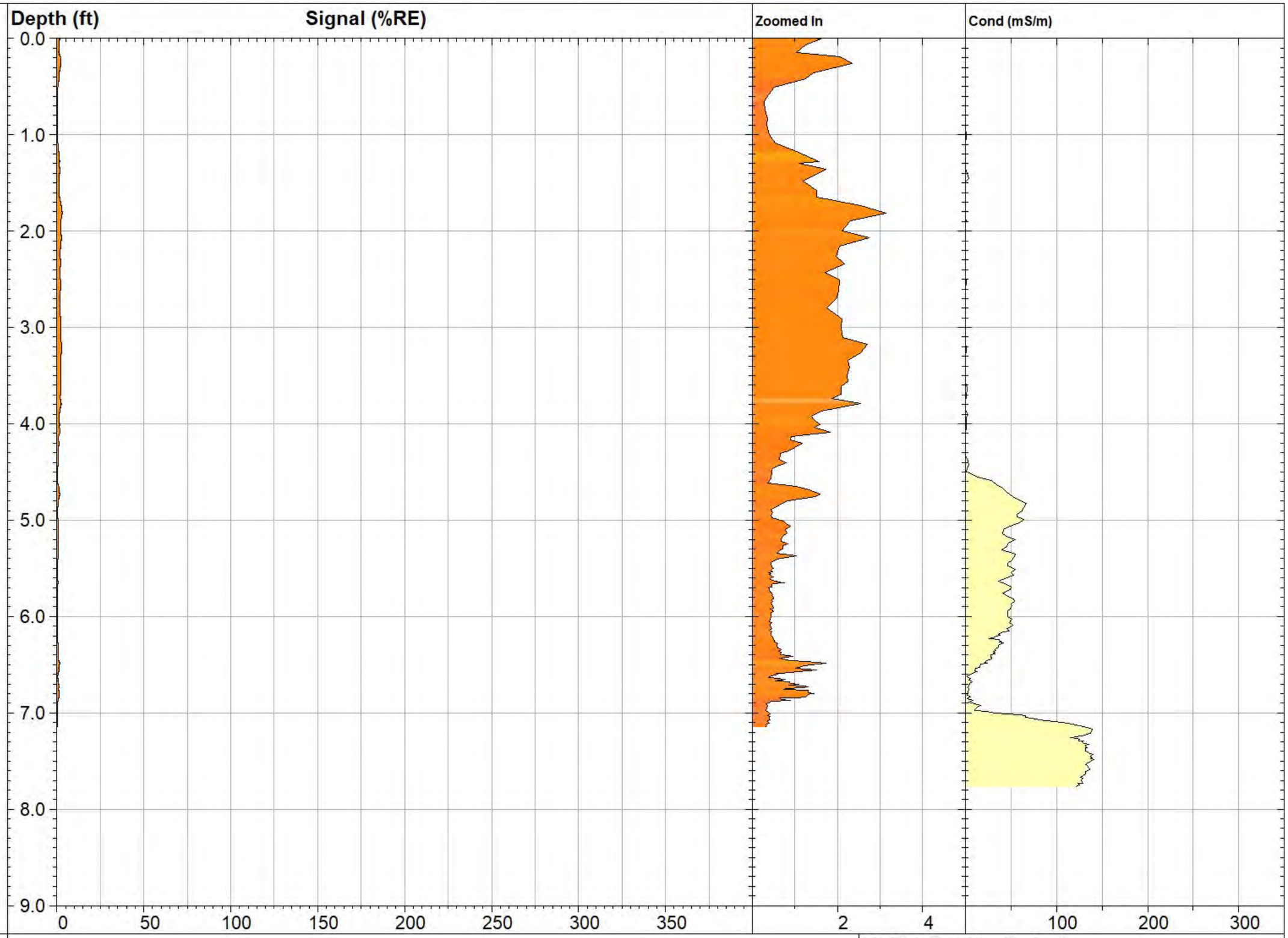
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **34.76 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **361.3 %RE @ 26.32 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-03 11:18 MST**

Callouts

pre-probed to 20 ft

refusal @ 7.14 ft



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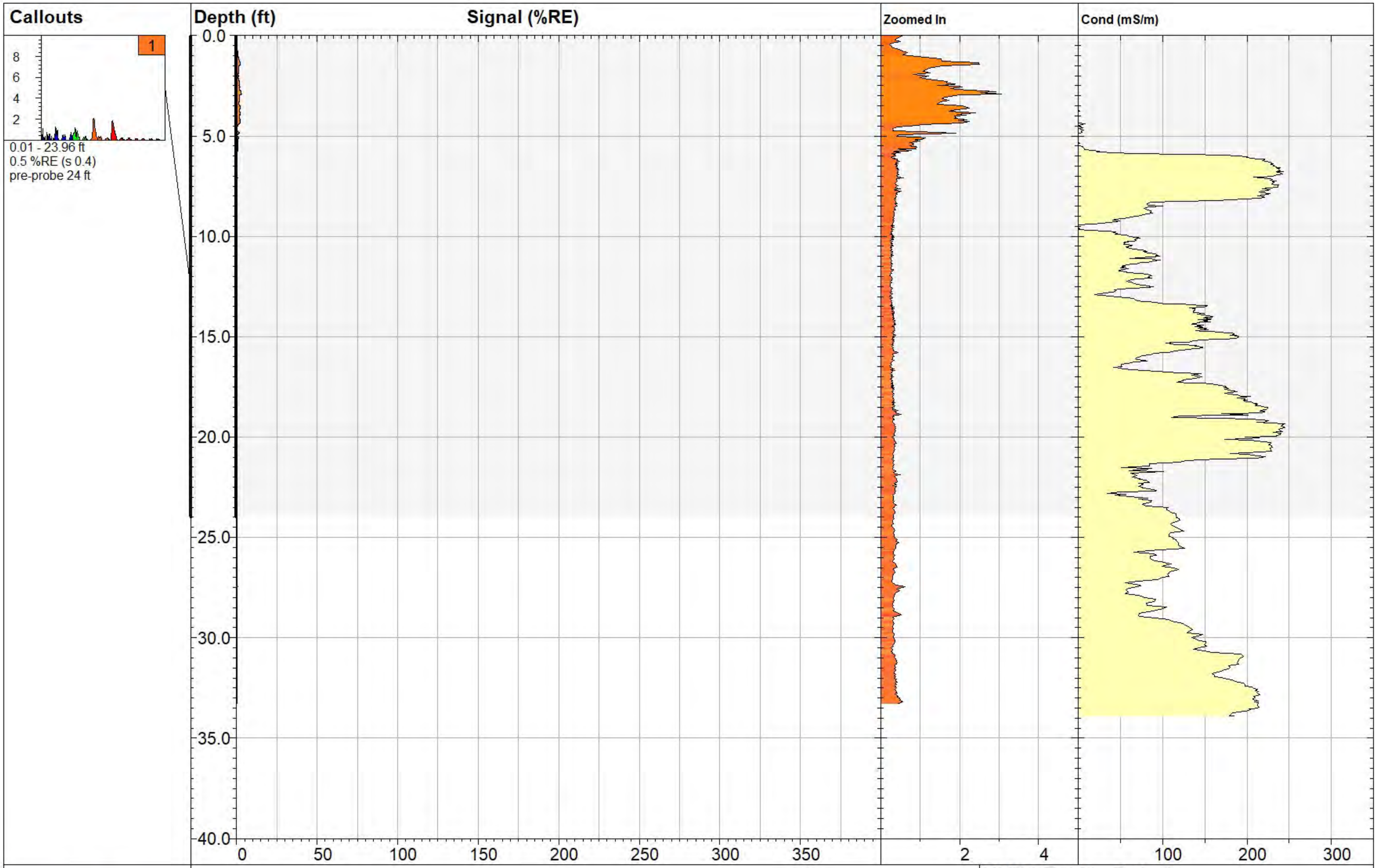
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **7.14 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **3.1 %RE @ 1.81 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-03 10:45 MST**



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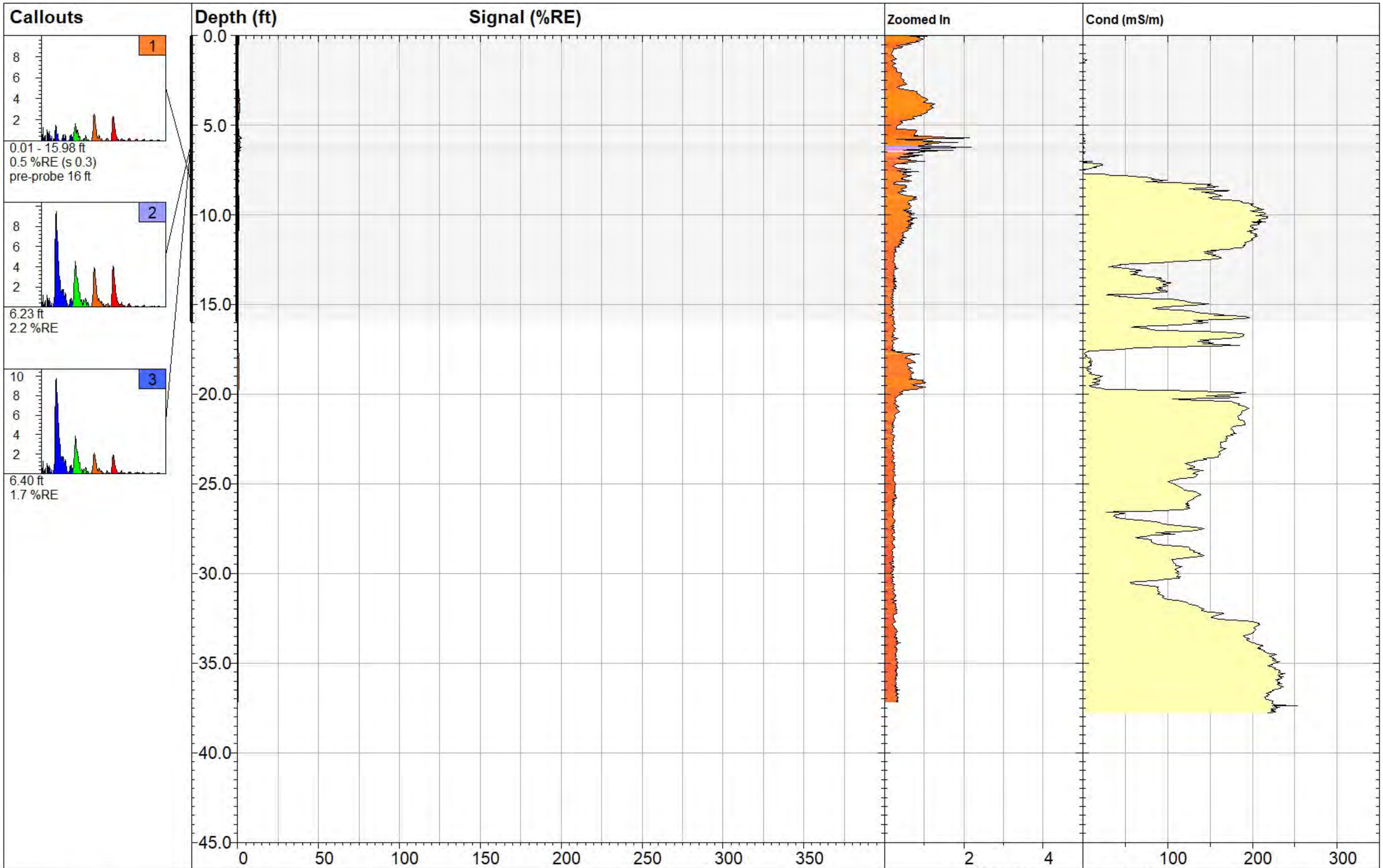
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **33.28 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **3.1 %RE @ 2.90 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-03 13:57 MST**



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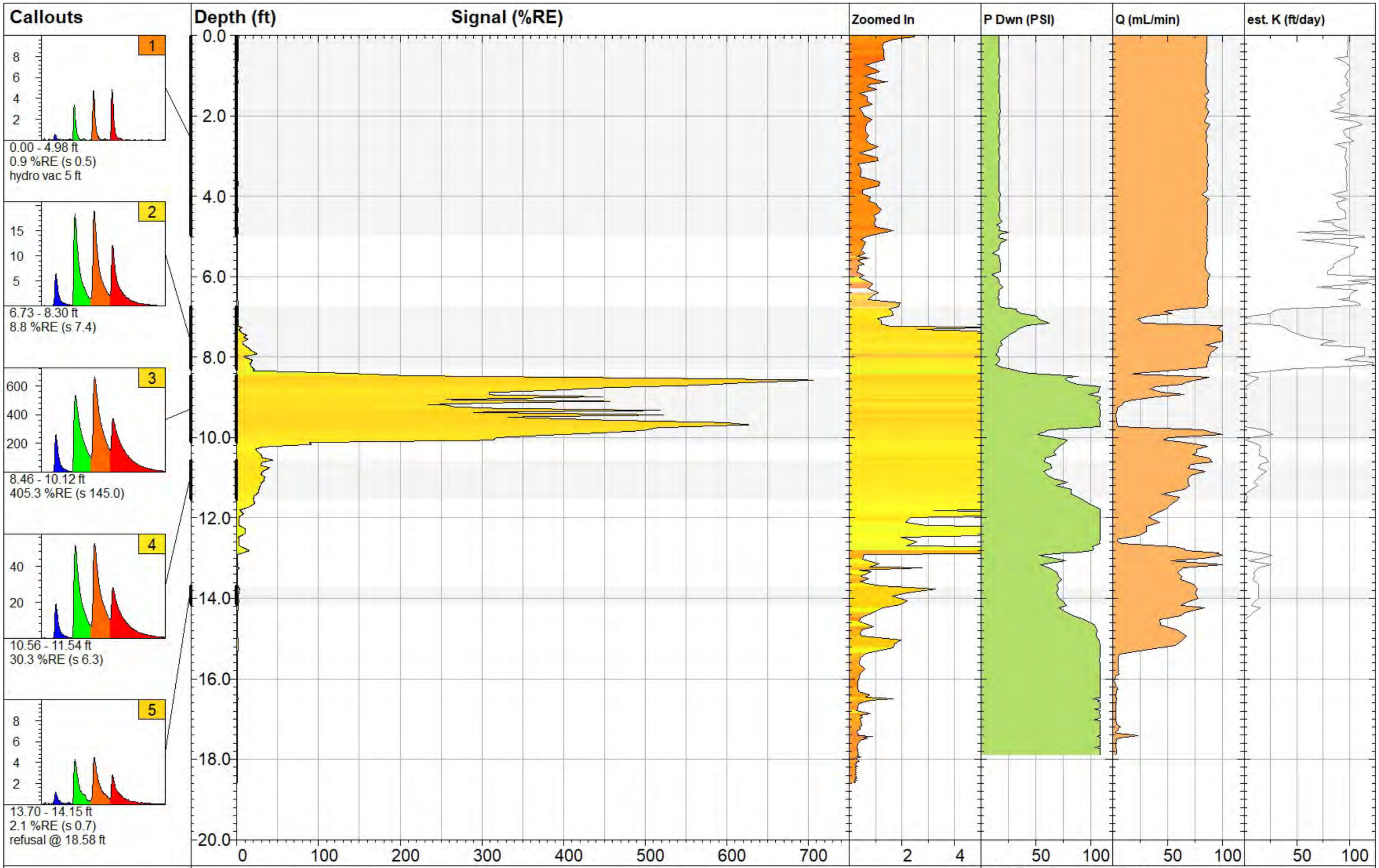
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **37.15 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **2.2 %RE @ 6.23 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-03 14:59 MST**



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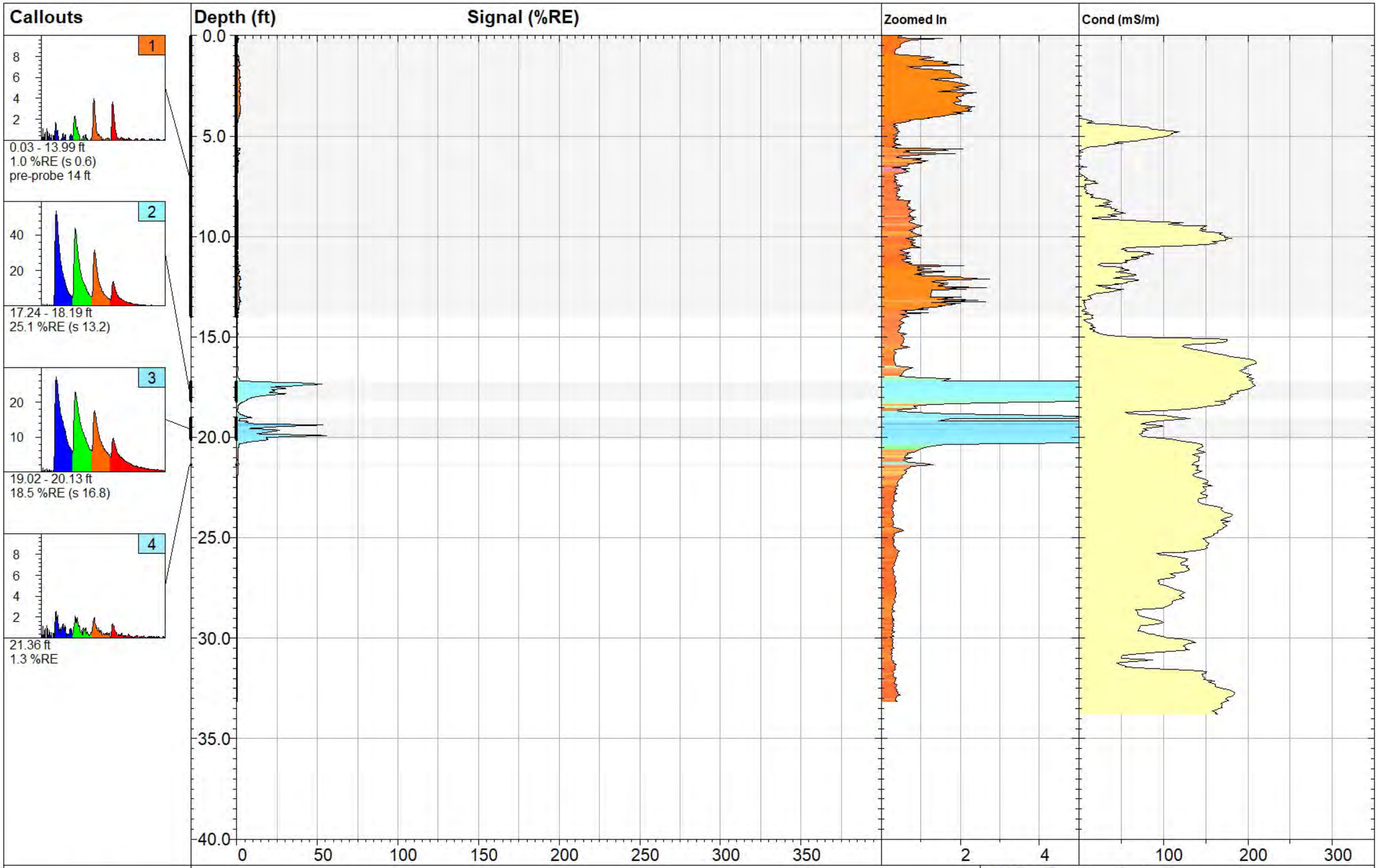
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **18.58 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **708.9 %RE @ 8.57 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-01 14:28 MST**



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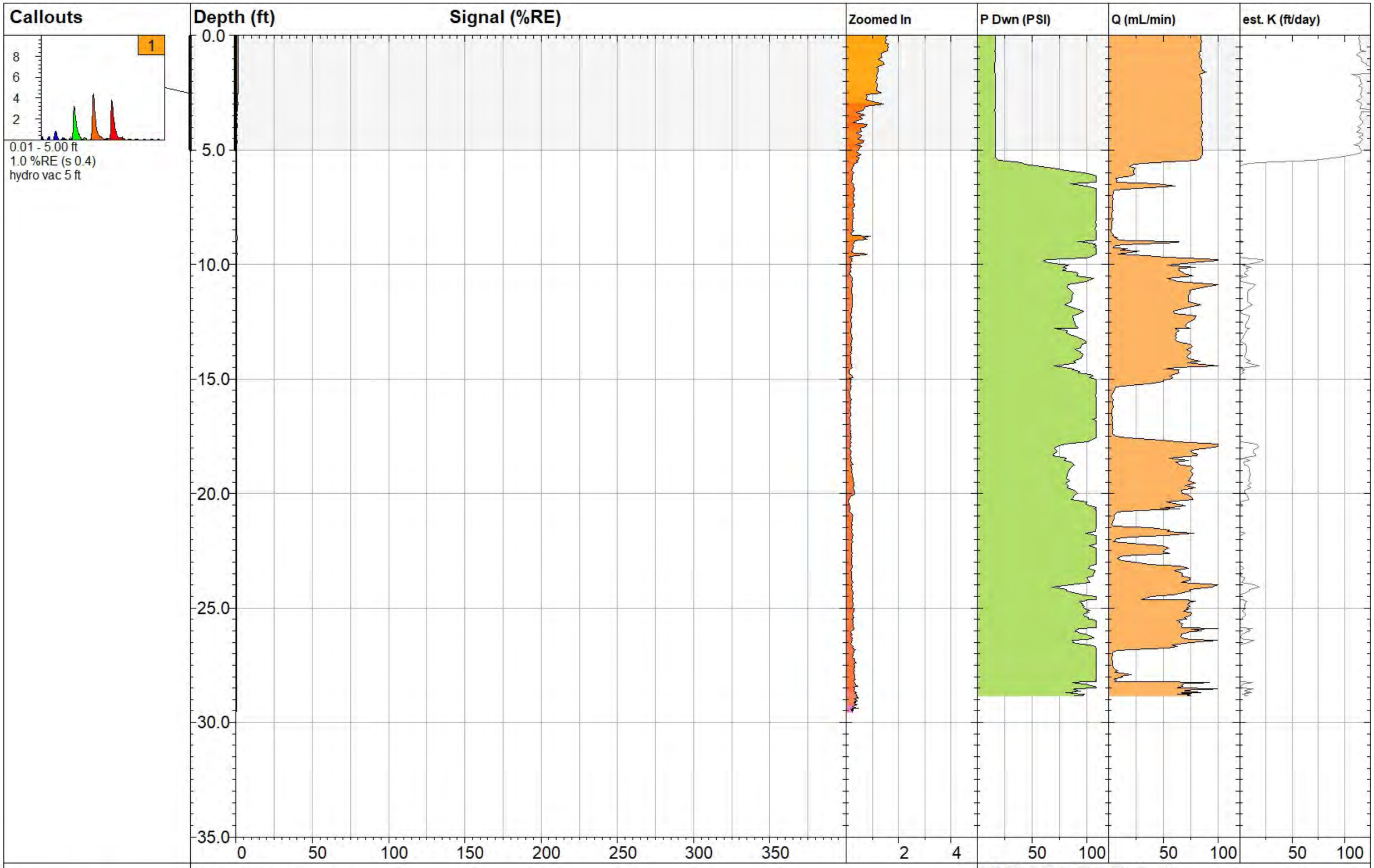
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **33.16 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **56.4 %RE @ 19.91 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-03 16:38 MST**



MKTF-LIF-68

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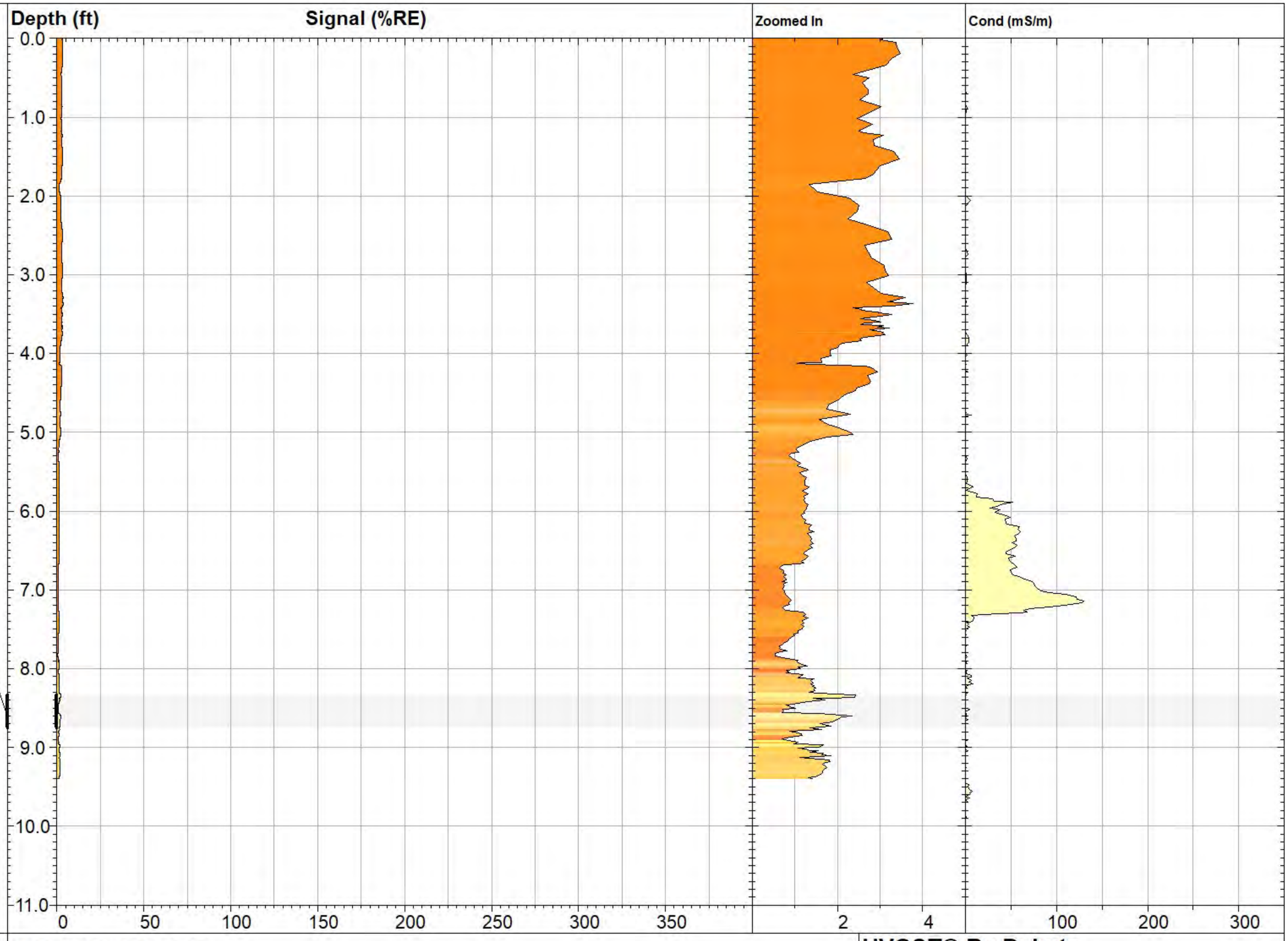
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **29.54 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **1.6 %RE @ 0.51 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-02 10:02 MST**

Callouts

8.34 - 8.75 ft
1.5 %RE (s 0.6)

refusal @ 9.39 ft



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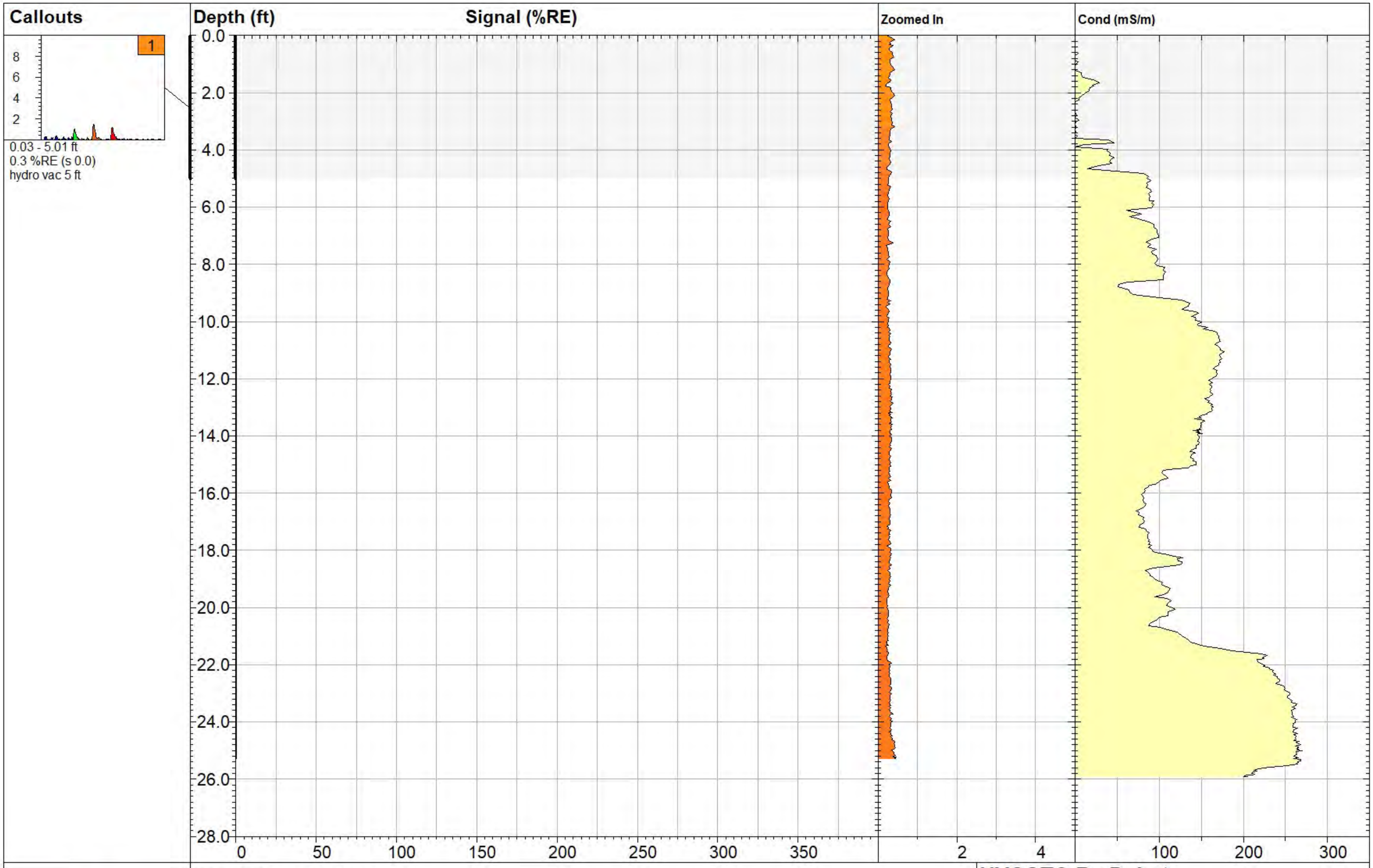
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **9.39 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **3.8 %RE @ 3.36 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-03 08:33 MST**



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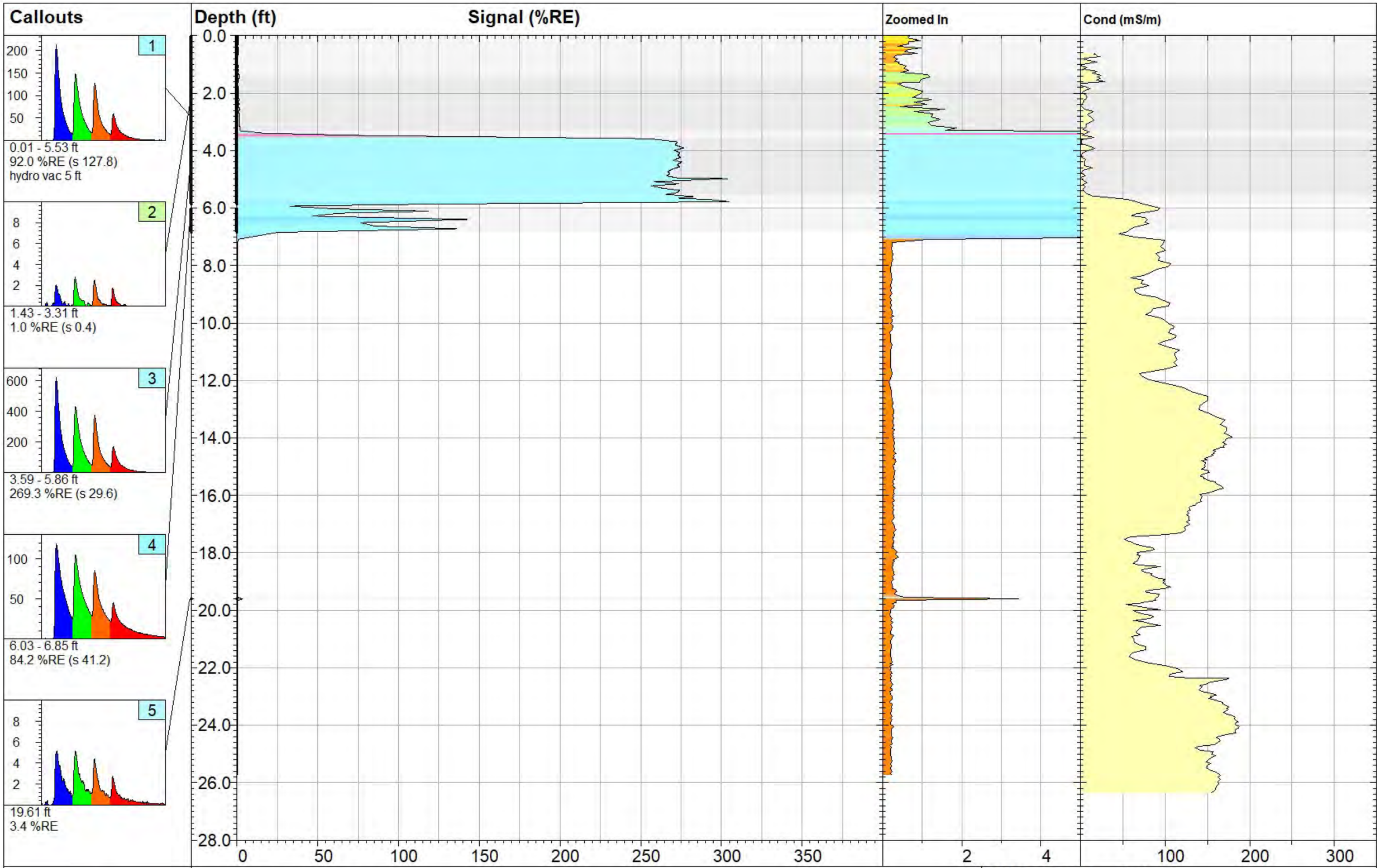
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **25.29 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **0.5 %RE @ 25.24 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-04 07:54 MST**



DAKOTA TECHNOLOGIES WWW.DAKOTATECHNOLOGIES.COM	**MKTF-LIF-72**	**UVOST® By Dakota** www.DakotaTechnologies.com
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **25.72 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **305.1 %RE @ 5.78 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-04 08:37 MST**

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MKTF-LIF-73

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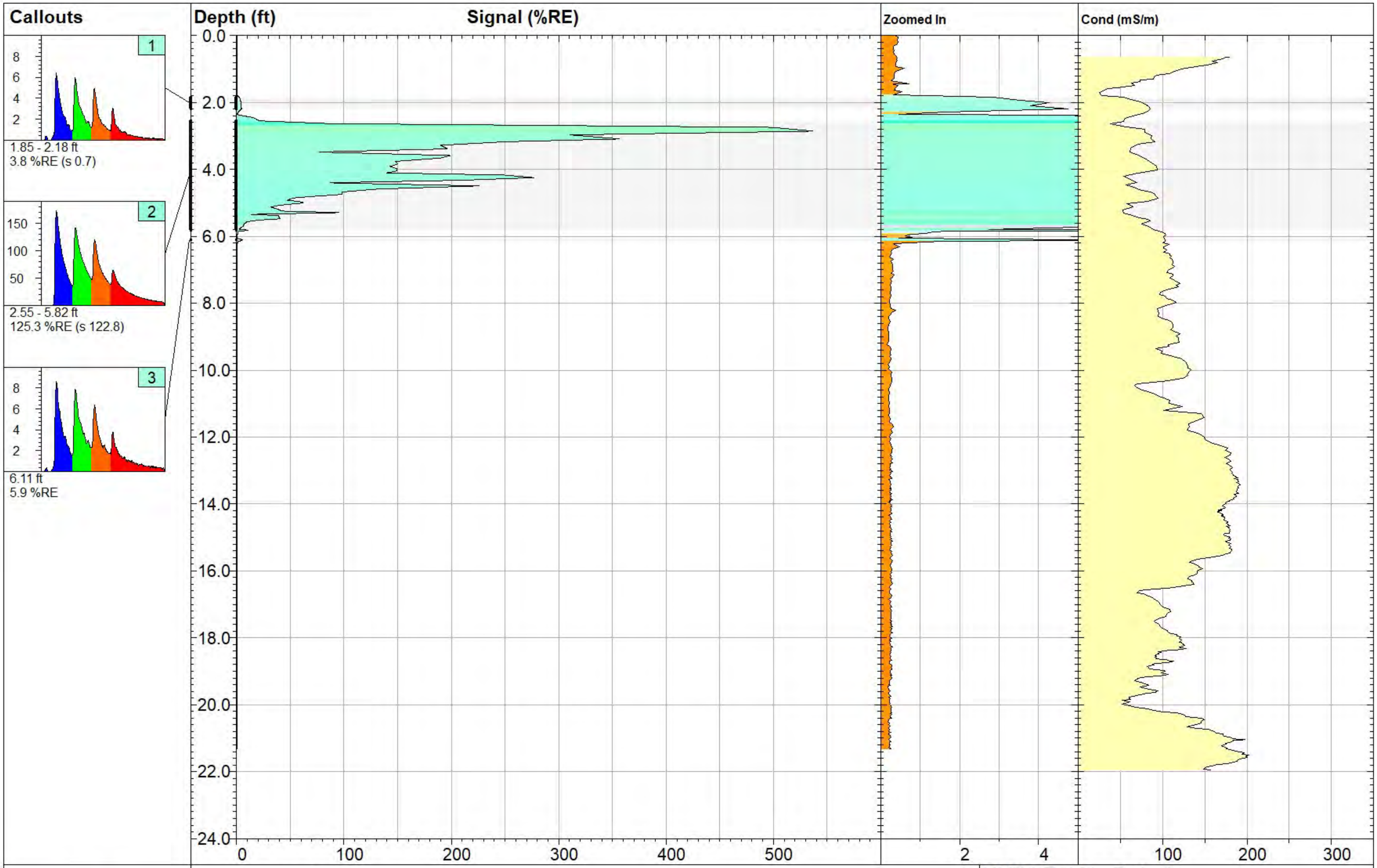
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **21.59 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **0.6 %RE @ 0.30 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-04 11:26 MST**



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MKTF-LIF-74

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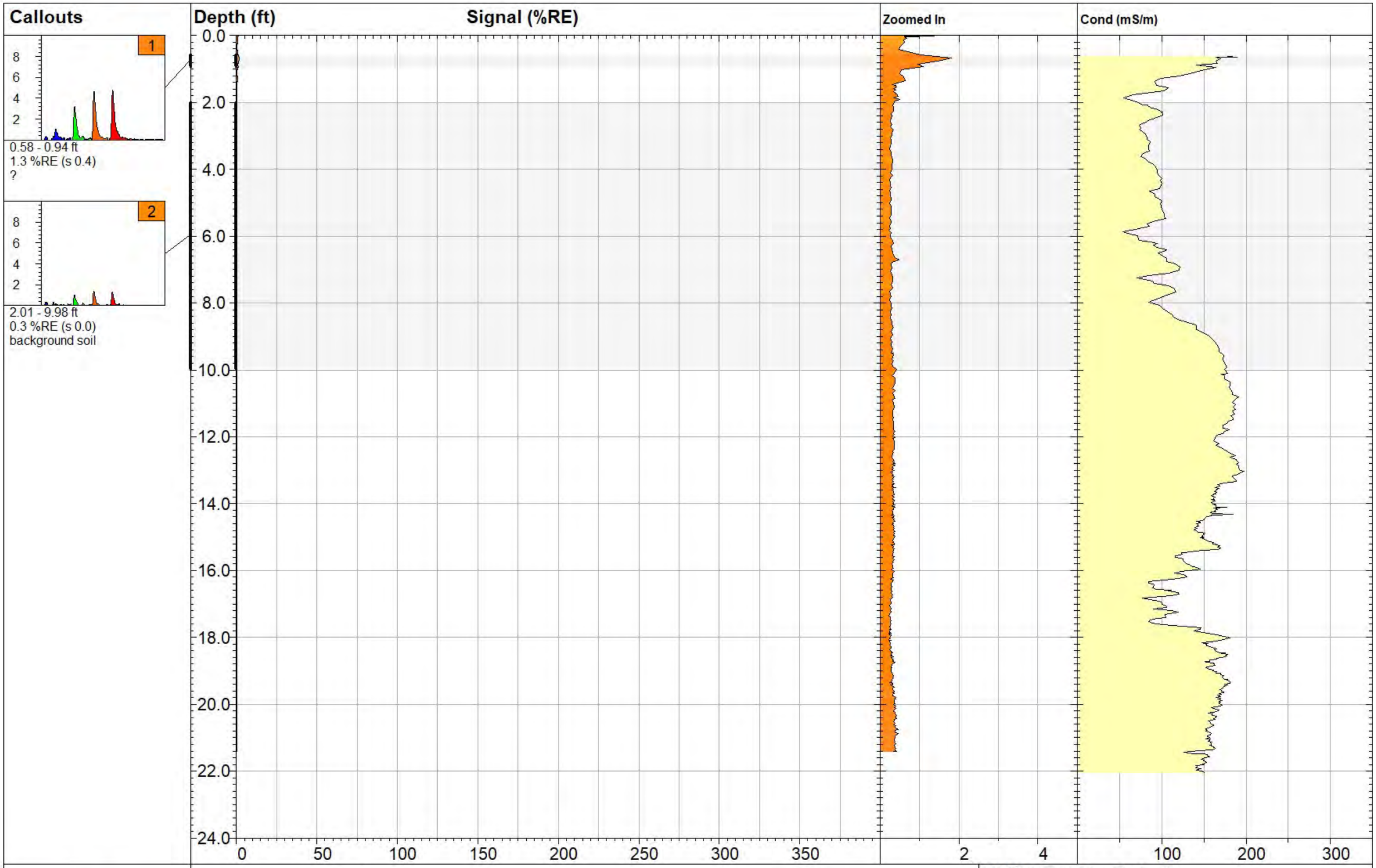
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **21.33 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **537.6 %RE @ 2.86 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-04 09:16 MST**



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MKTF-LIF-75

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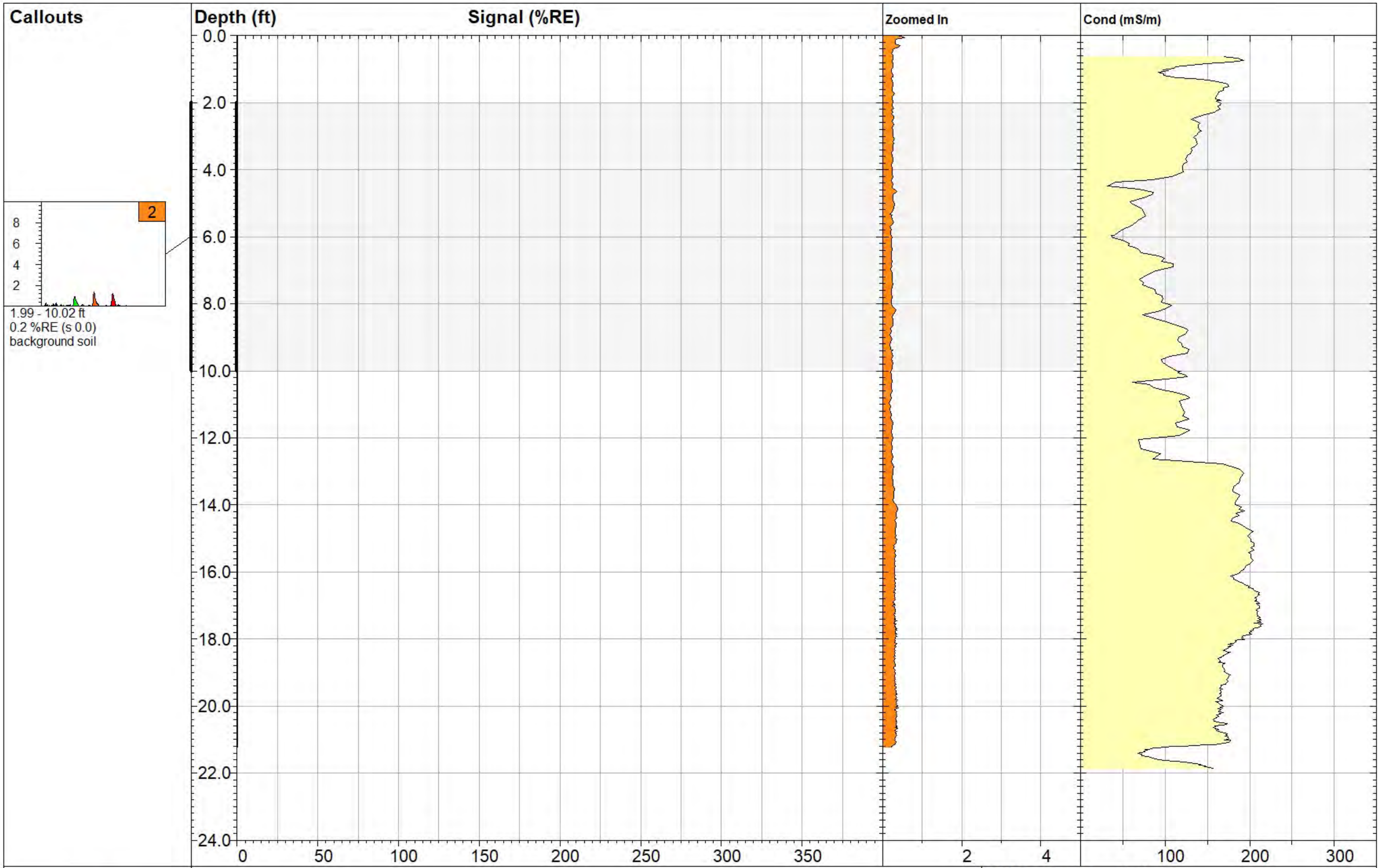
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **21.41 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **1.8 %RE @ 0.66 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-04 11:56 MST**



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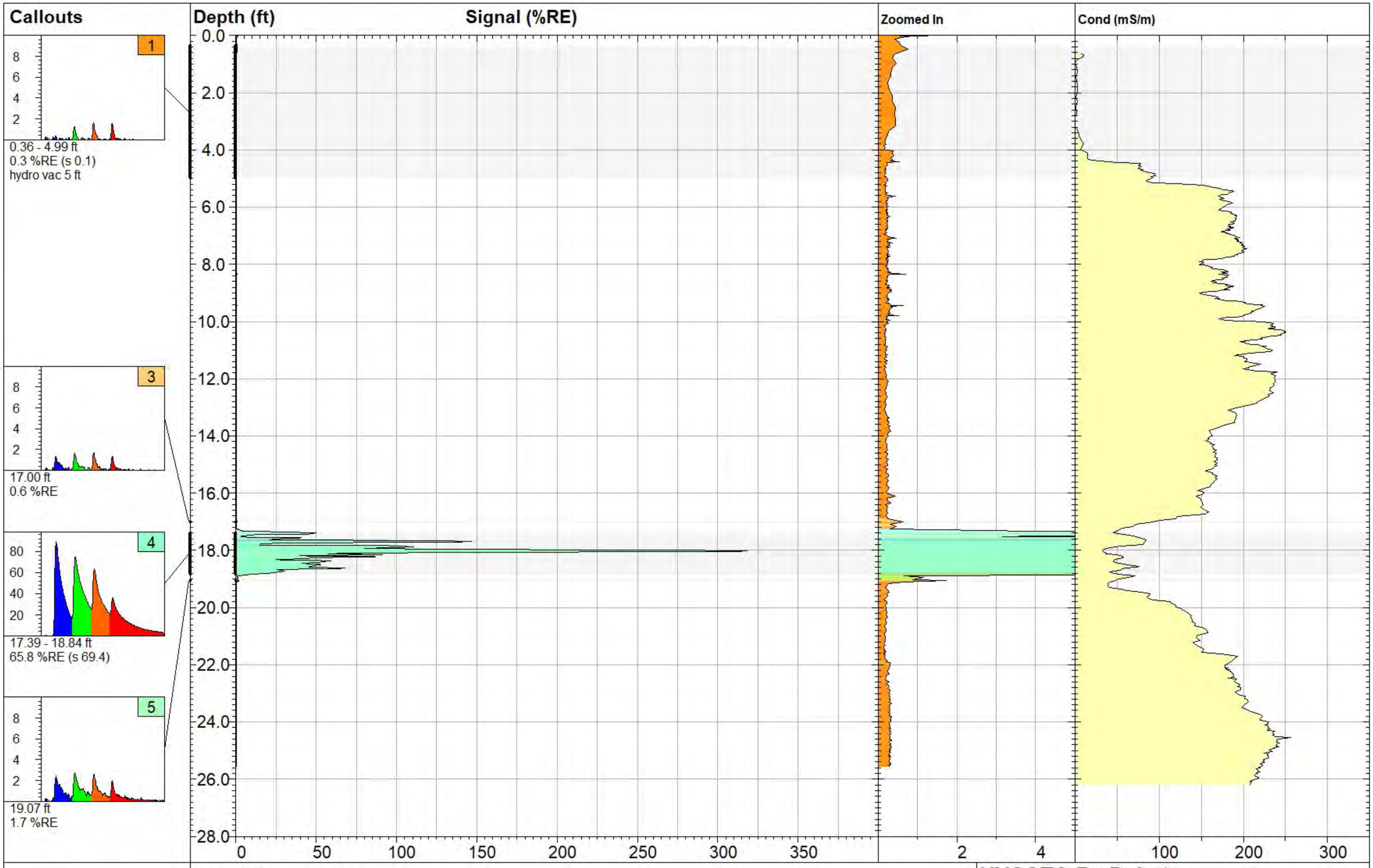
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **21.23 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **0.5 %RE @ 0.05 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-04 12:34 MST**



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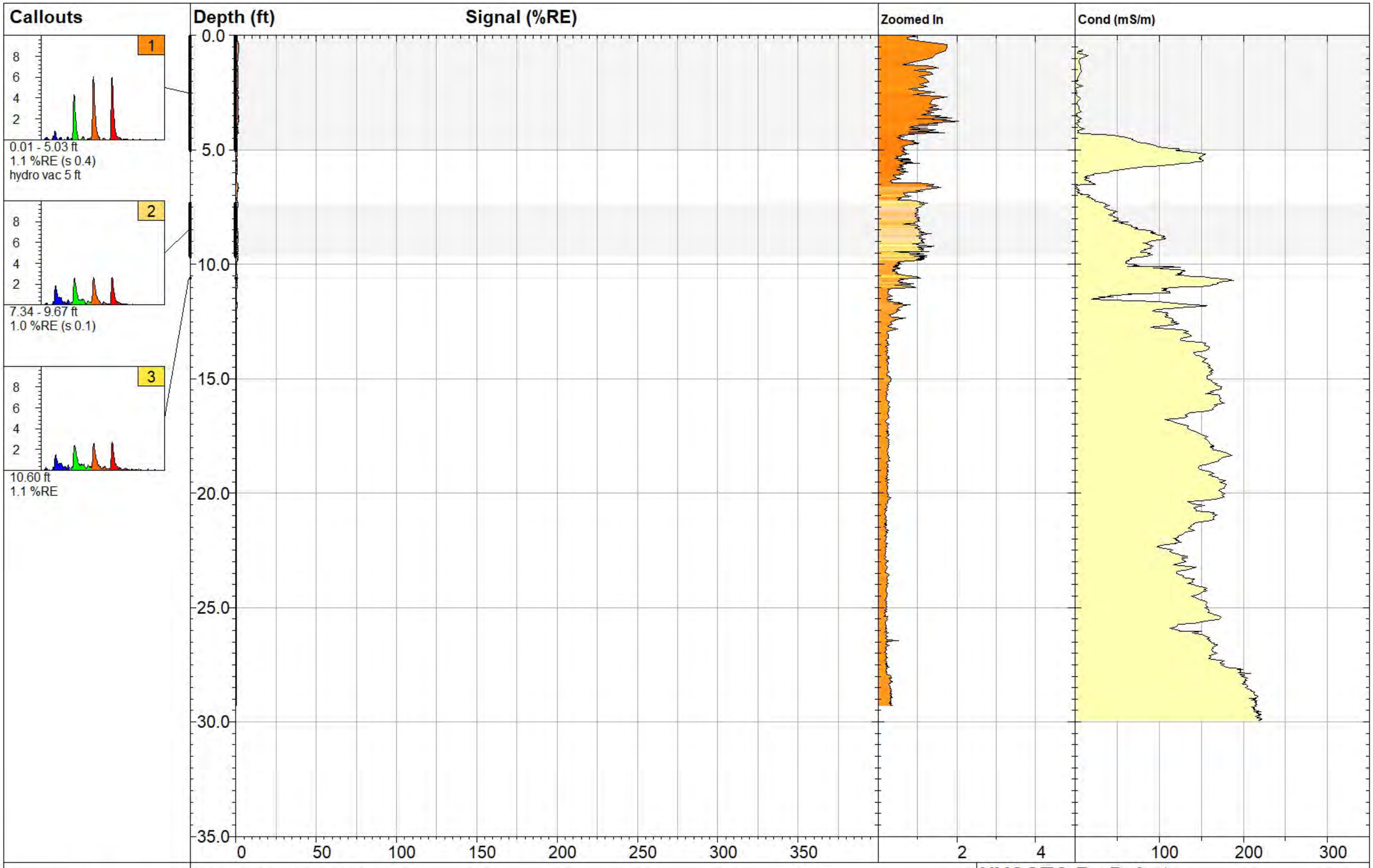
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **25.55 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **320.9 %RE @ 18.03 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-04 13:05 MST**



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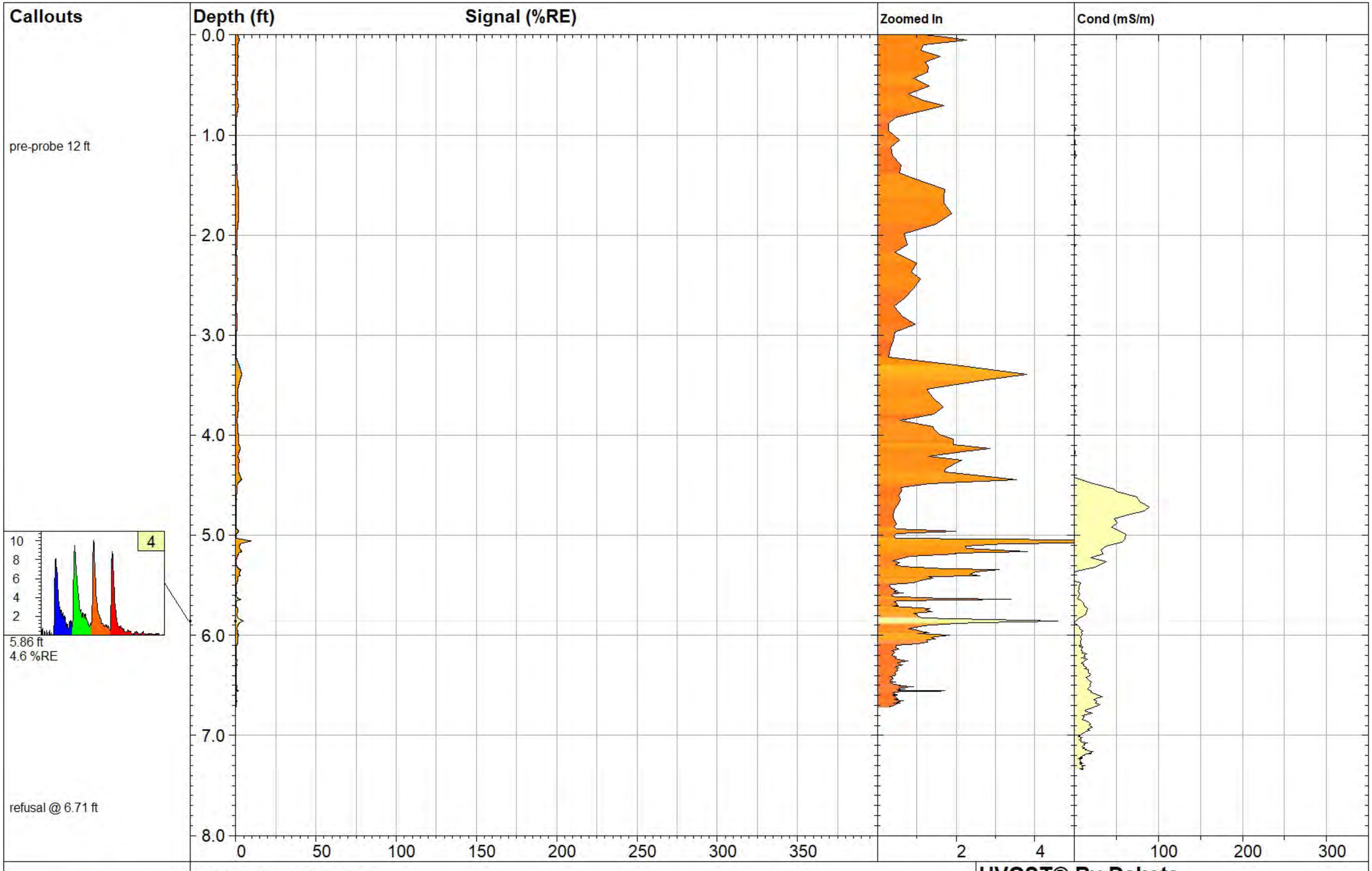
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **29.29 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **2.0 %RE @ 3.74 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-04 13:47 MST**



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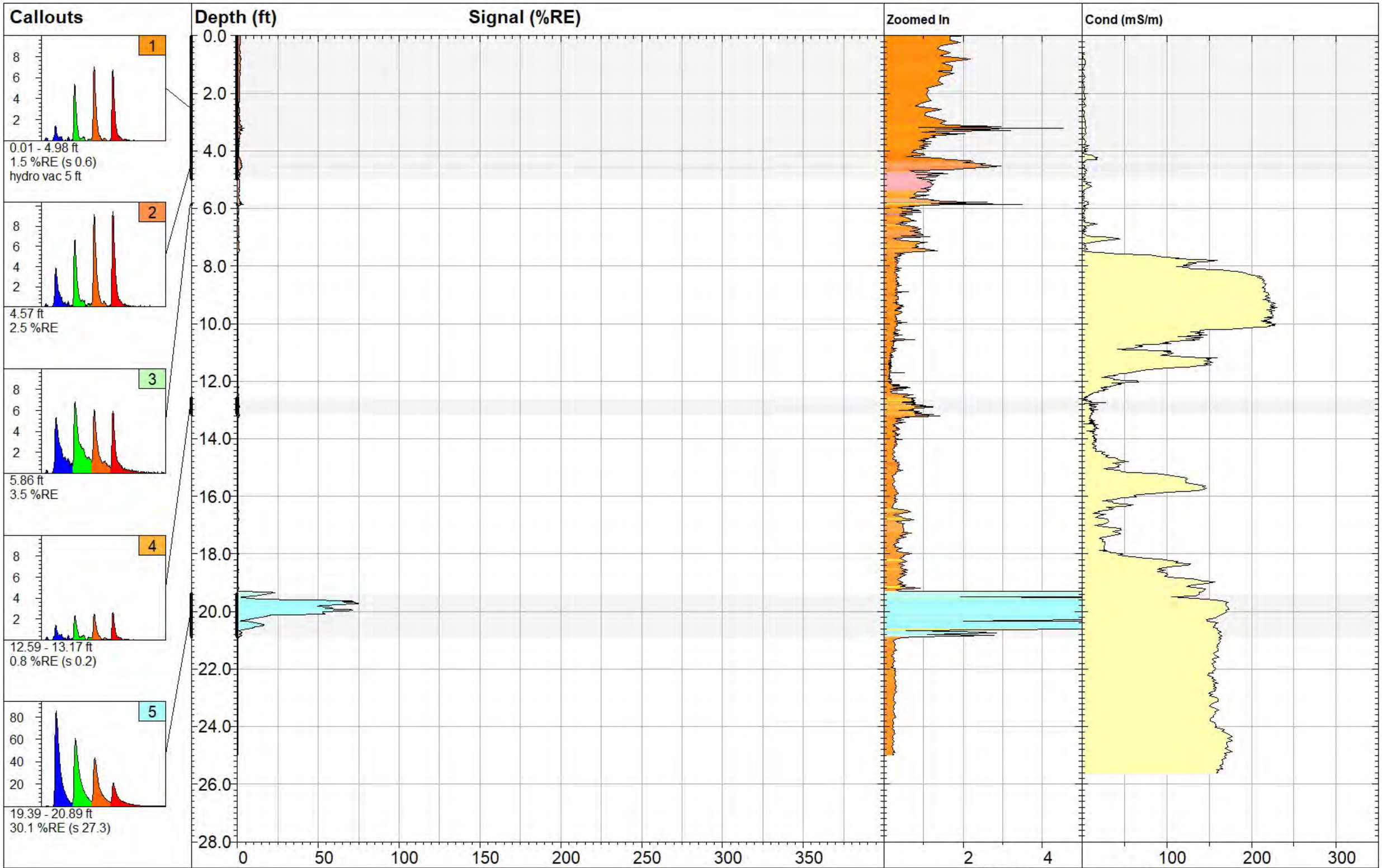
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **6.71 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **9.5 %RE @ 5.06 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-03 16:07 MST**



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MKTF-LIF-79A

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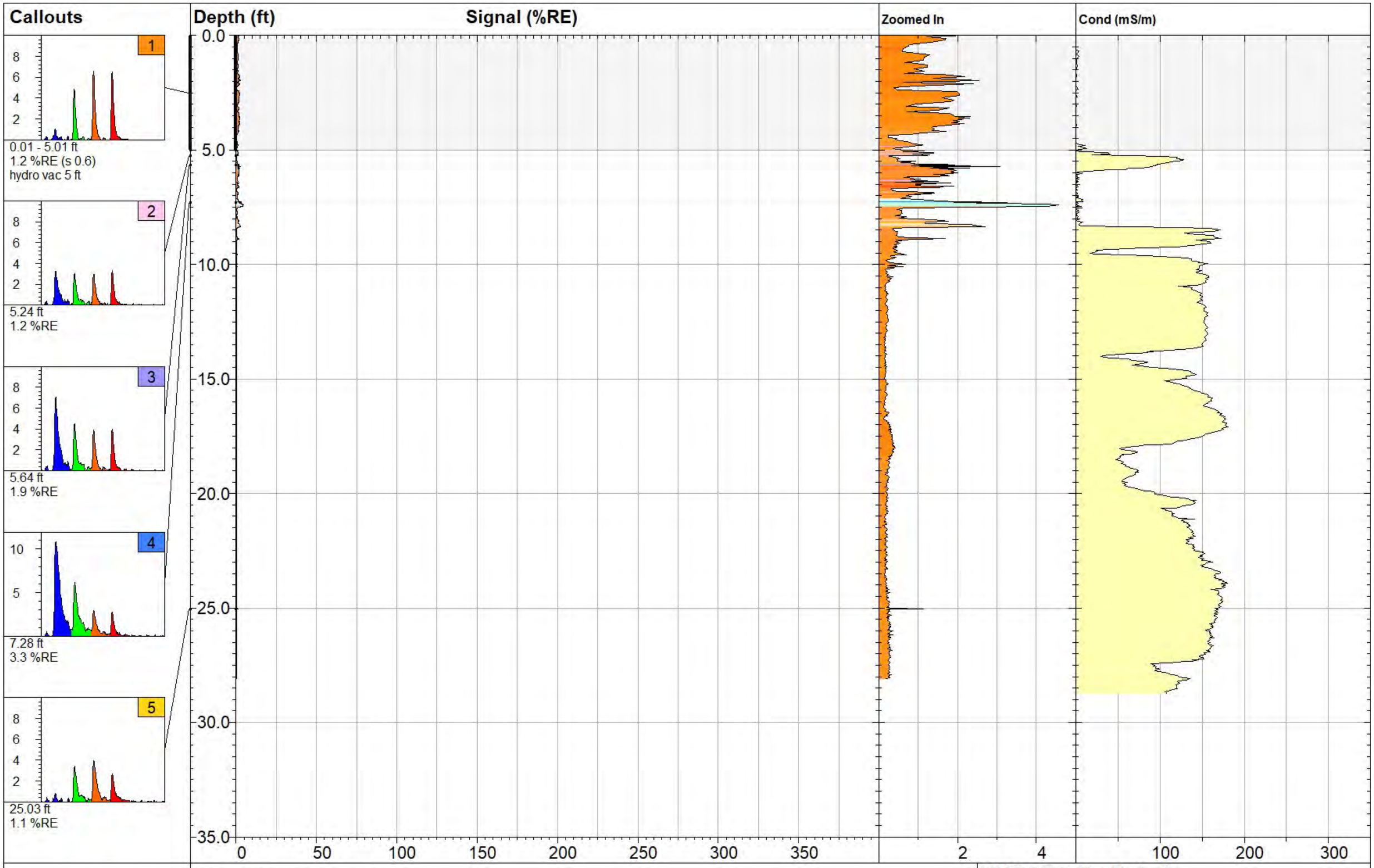
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **24.99 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **75.0 %RE @ 19.73 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-04 14:33 MST**



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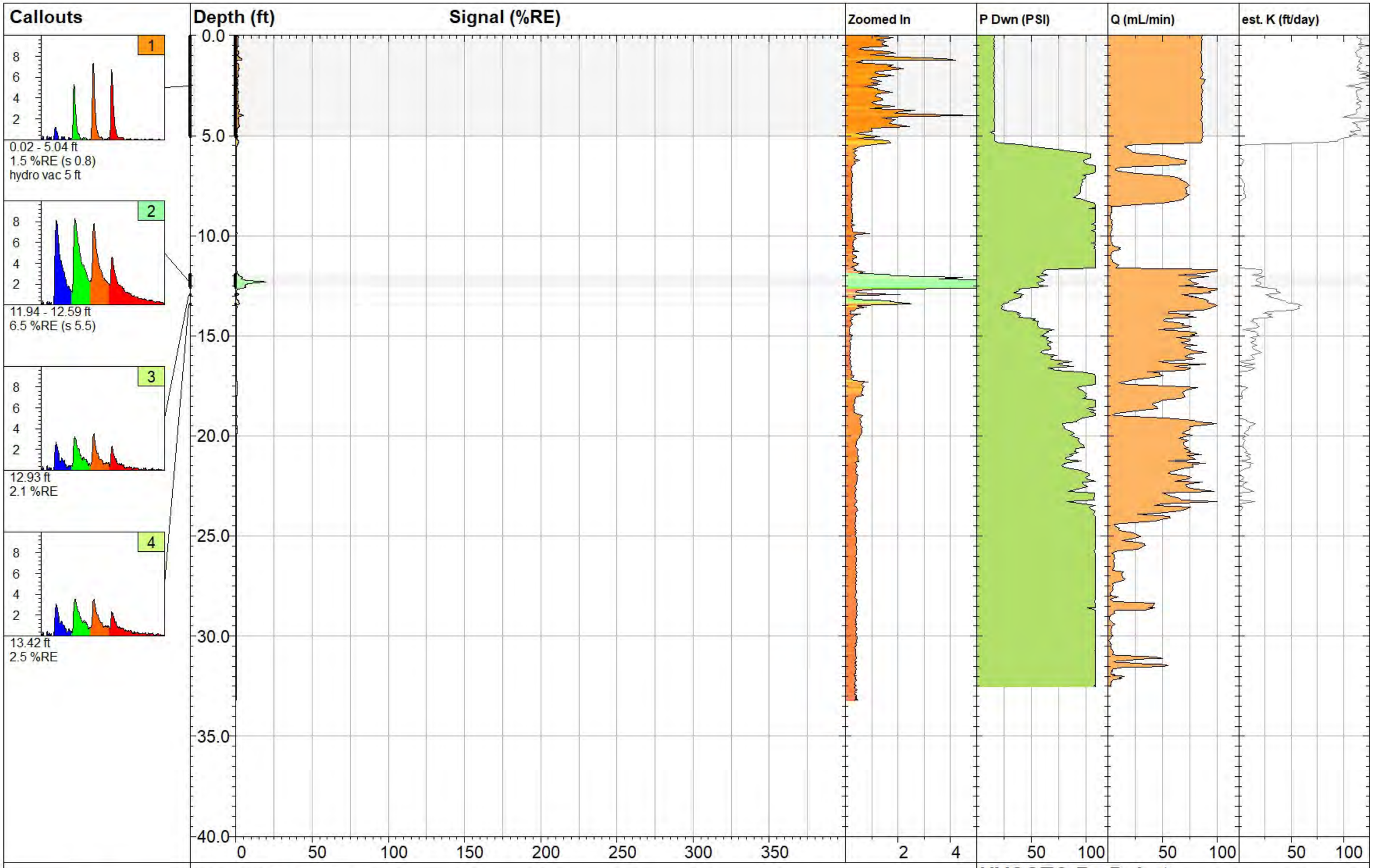
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **28.10 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **4.6 %RE @ 7.39 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-04 15:20 MST**



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Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **33.21 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **20.0 %RE @ 12.31 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-02 09:21 MST**

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MKTF-LIF-82

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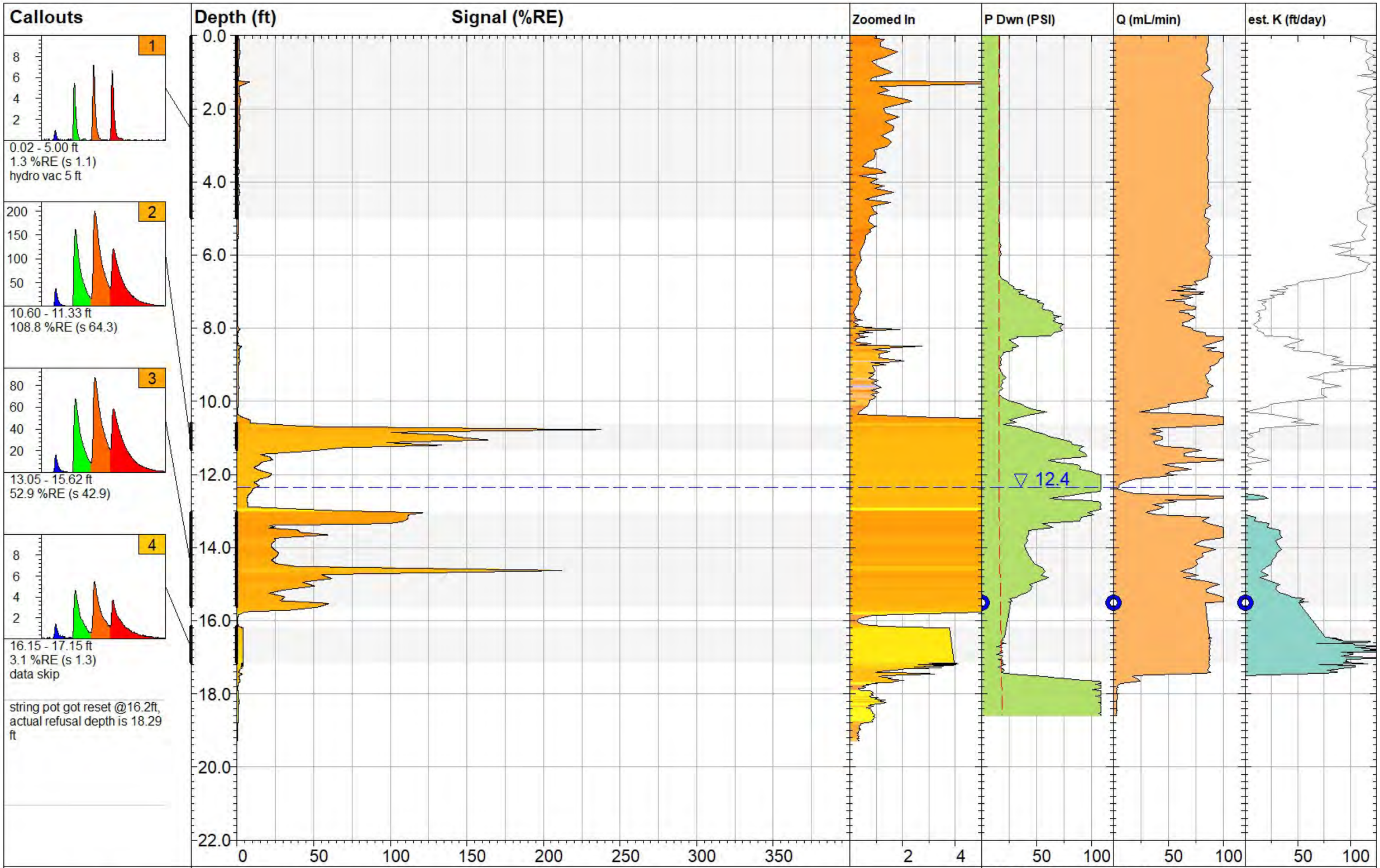
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **15.07 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **10.1 %RE @ 4.84 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-04 16:13 MST**



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MKTF-LIF-83

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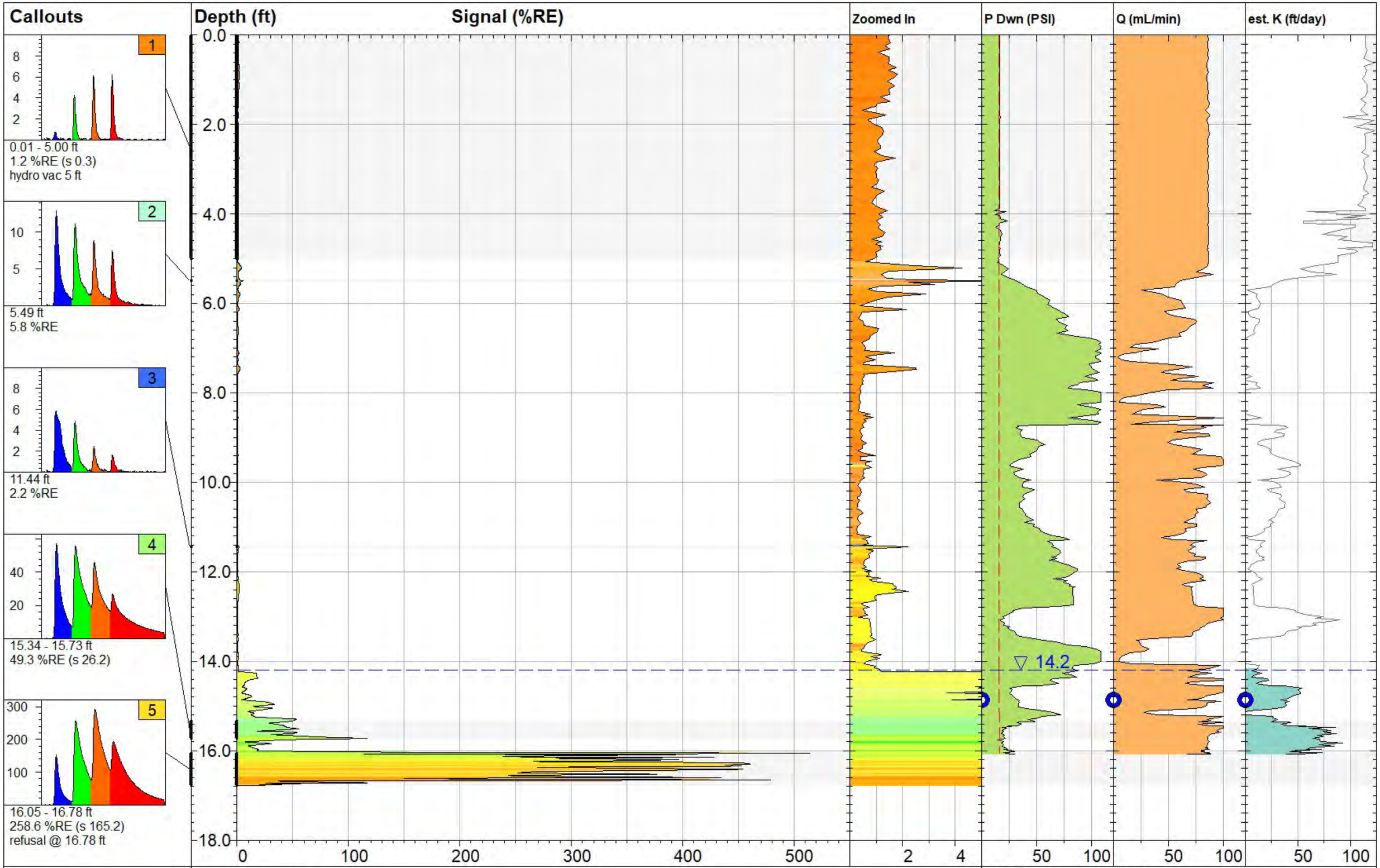
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **19.29 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **238.7 %RE @ 10.77 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-01 15:02 MST**



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MKTF-LIF-84

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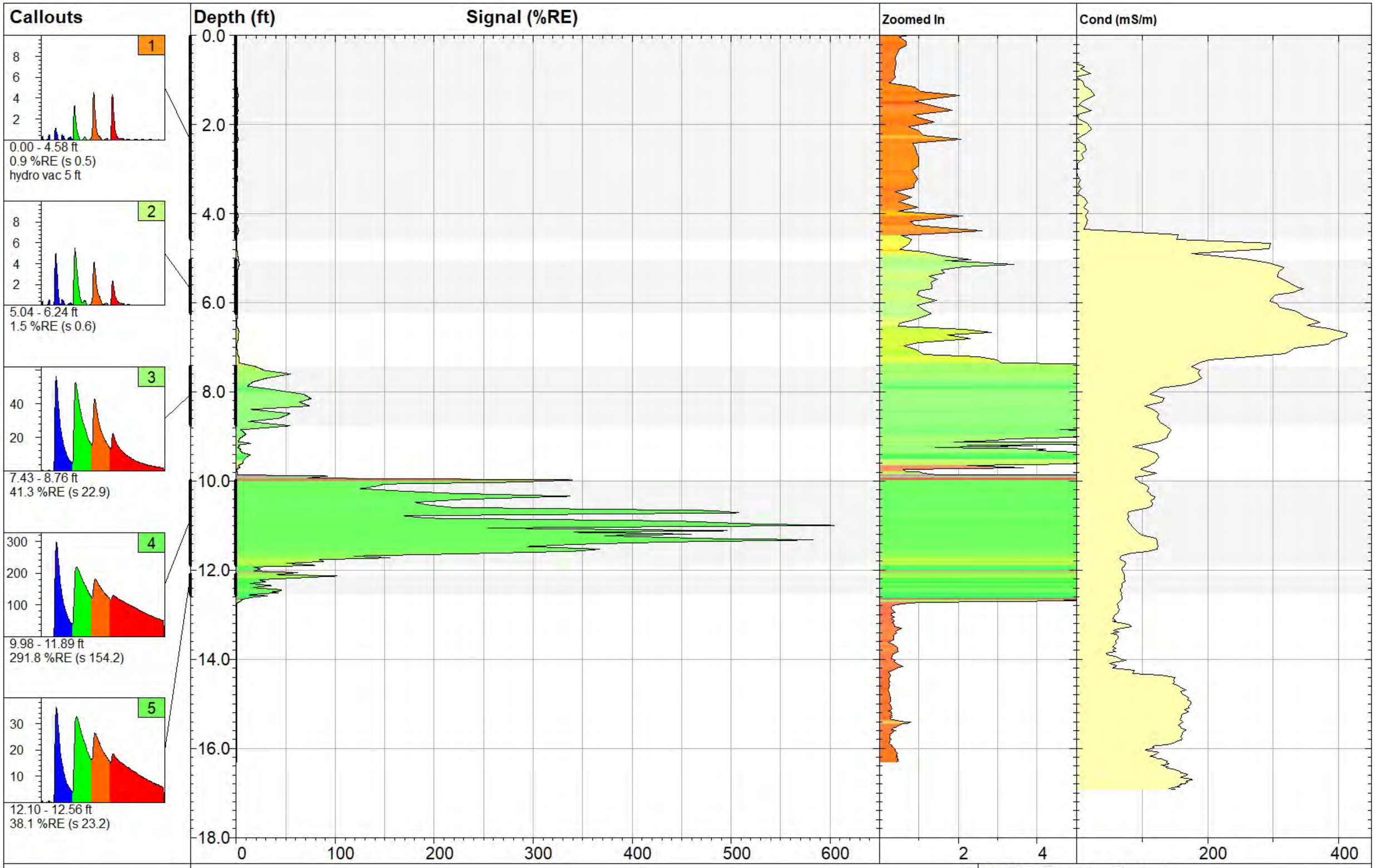
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **16.78 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **524.0 %RE @ 16.06 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-01 15:41 MST**



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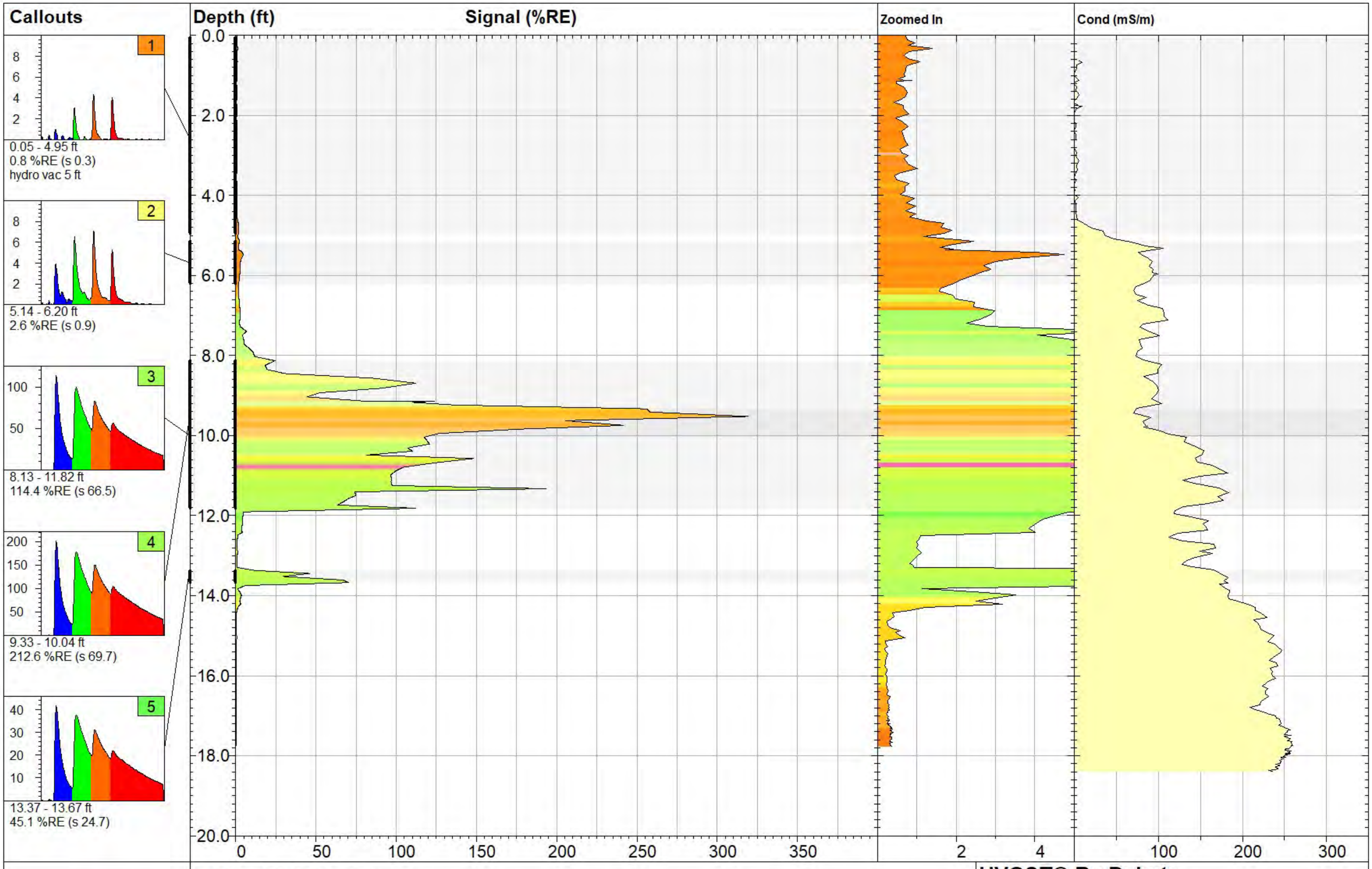
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **16.30 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **608.7 %RE @ 11.00 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-05 09:48 MST**



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MKTF-LIF-86

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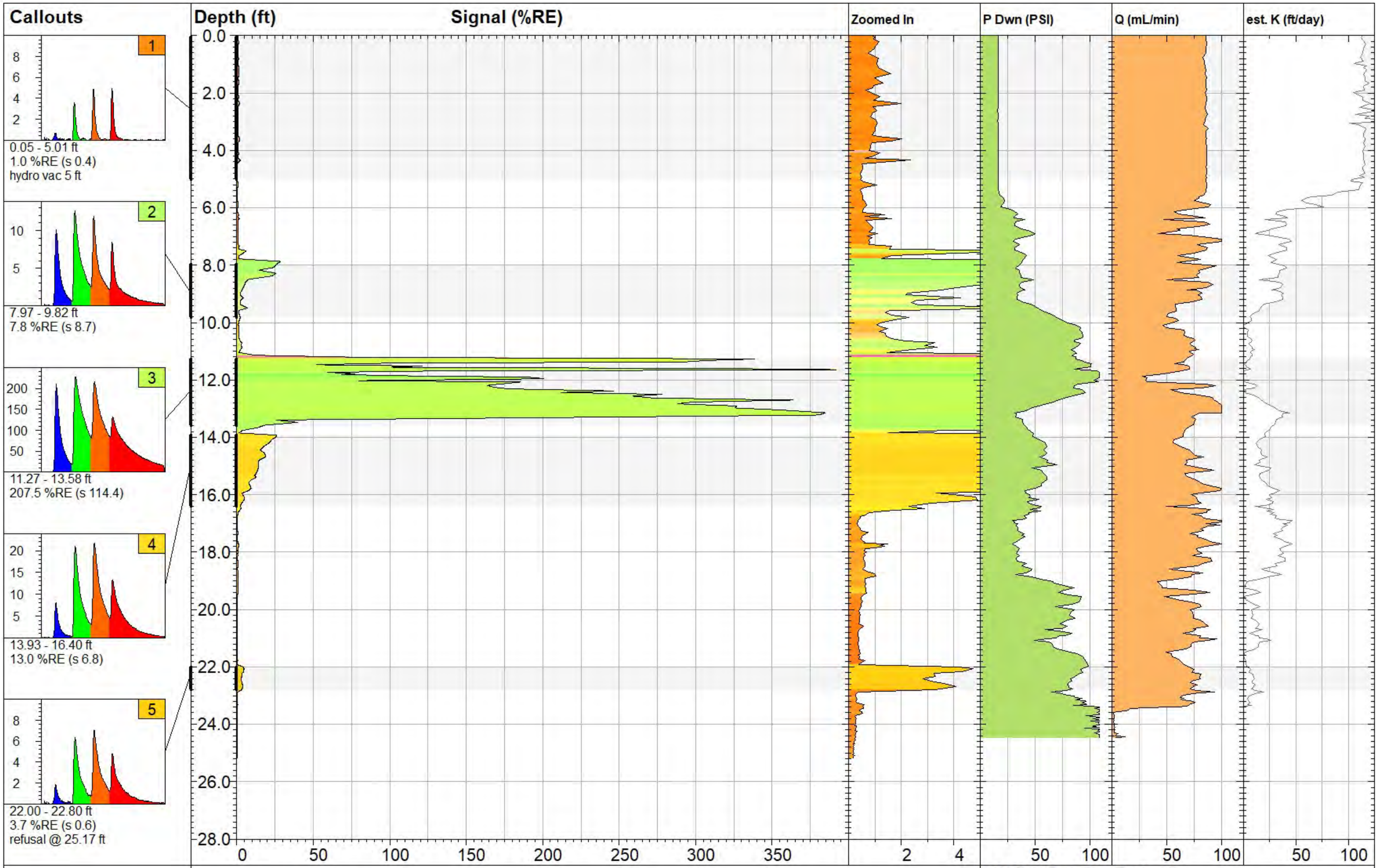
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **17.76 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **319.3 %RE @ 9.52 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-05 09:19 MST**



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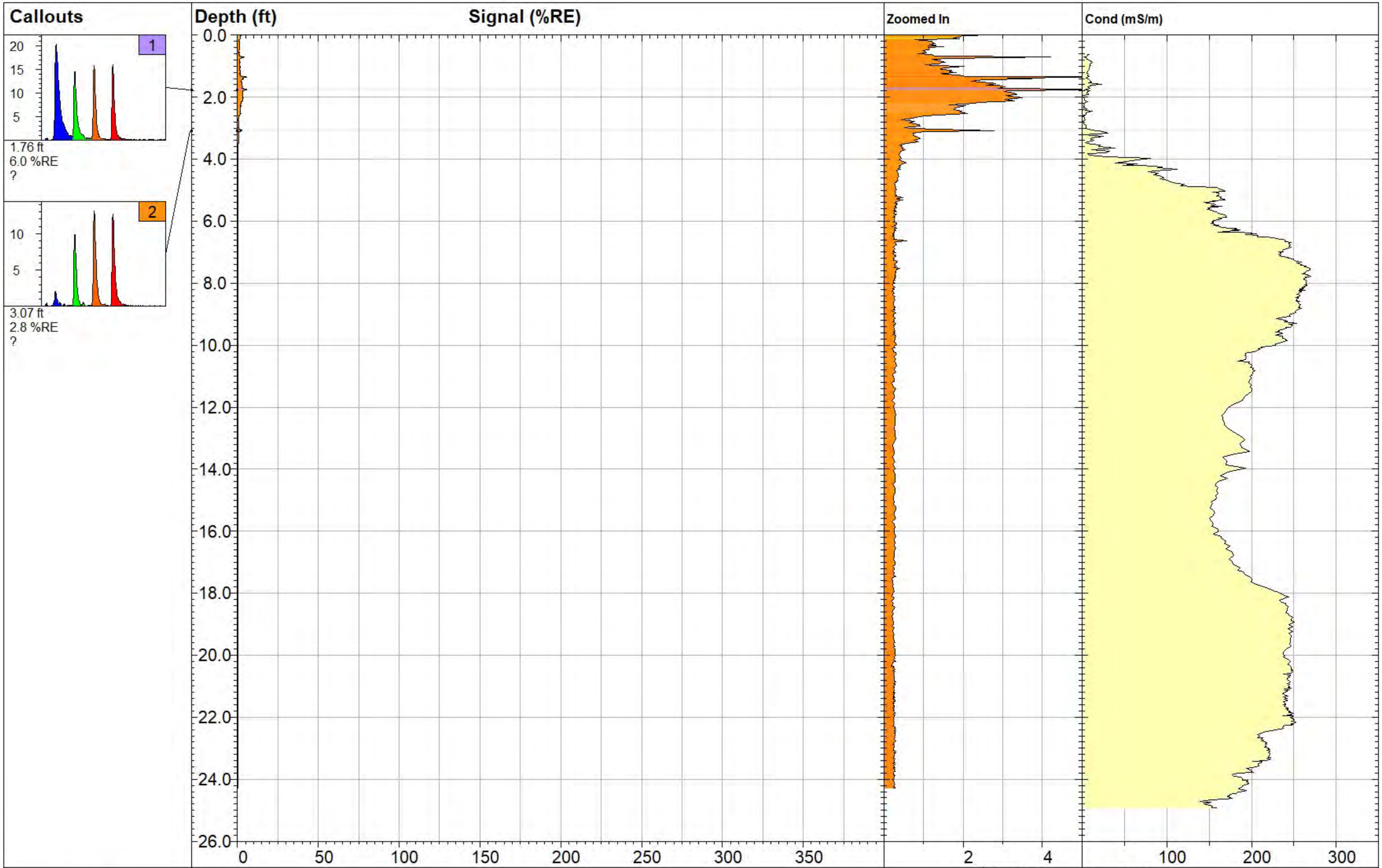
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **25.17 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **394.3 %RE @ 11.64 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-01 16:22 MST**



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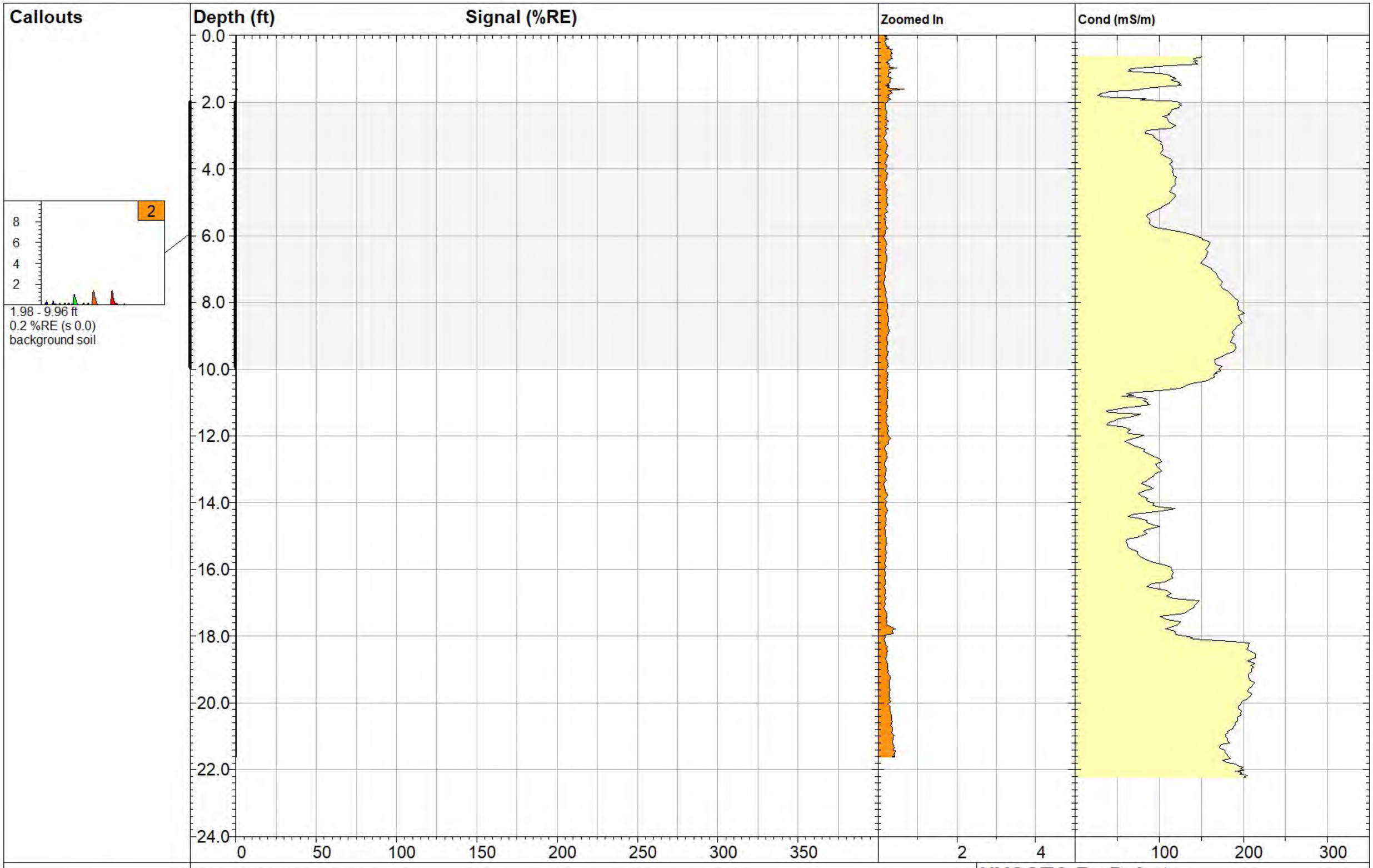
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **24.29 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **6.0 %RE @ 1.76 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-04 10:09 MST**



MKTF-LIF-89

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Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **21.61 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **0.7 %RE @ 1.62 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-04 10:53 MST**

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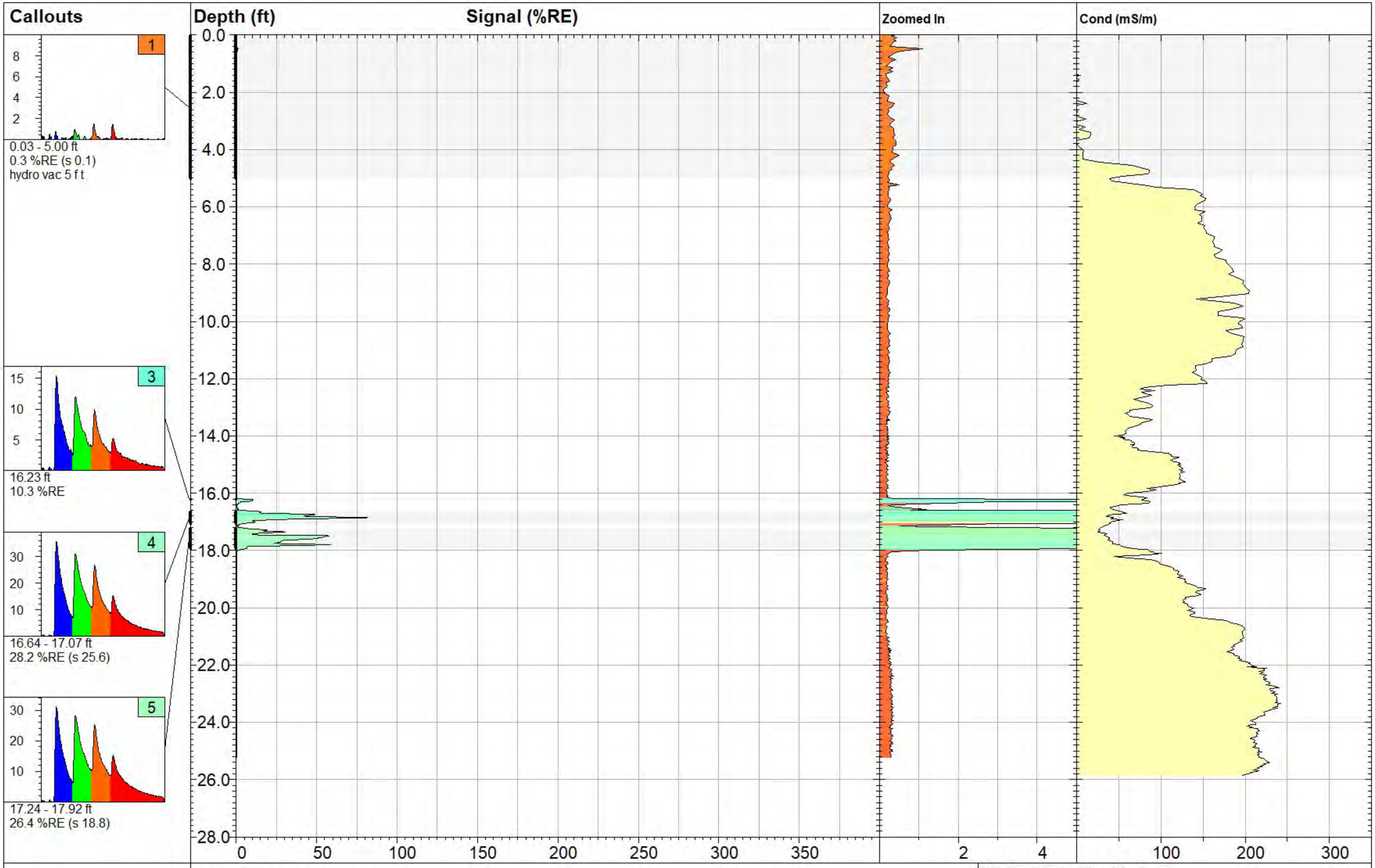

MKTF-LIF-90

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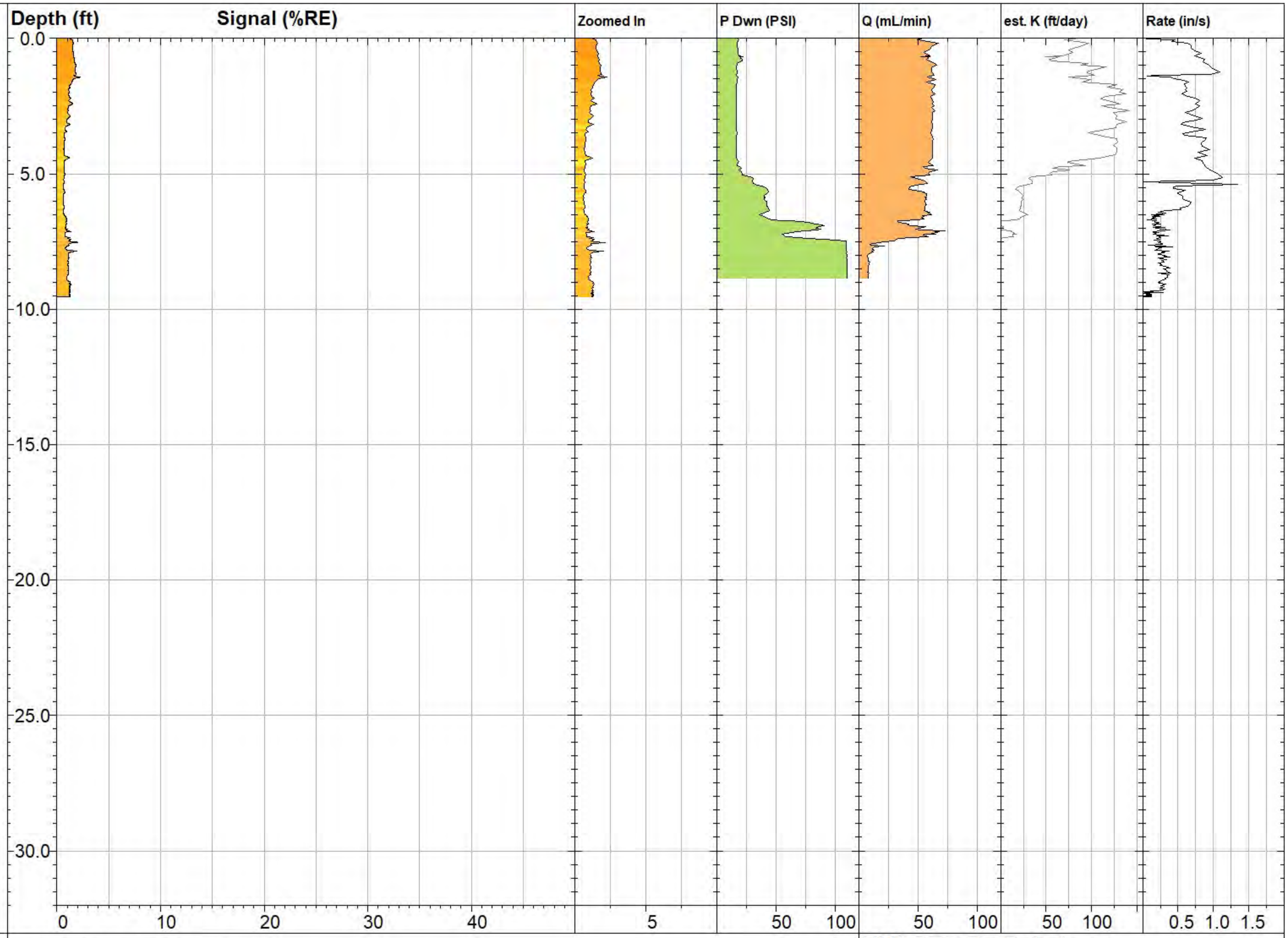
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **25.23 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **83.2 %RE @ 16.86 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-05 07:59 MST**

Callouts

REFUSAL AT 9.54 FEET.



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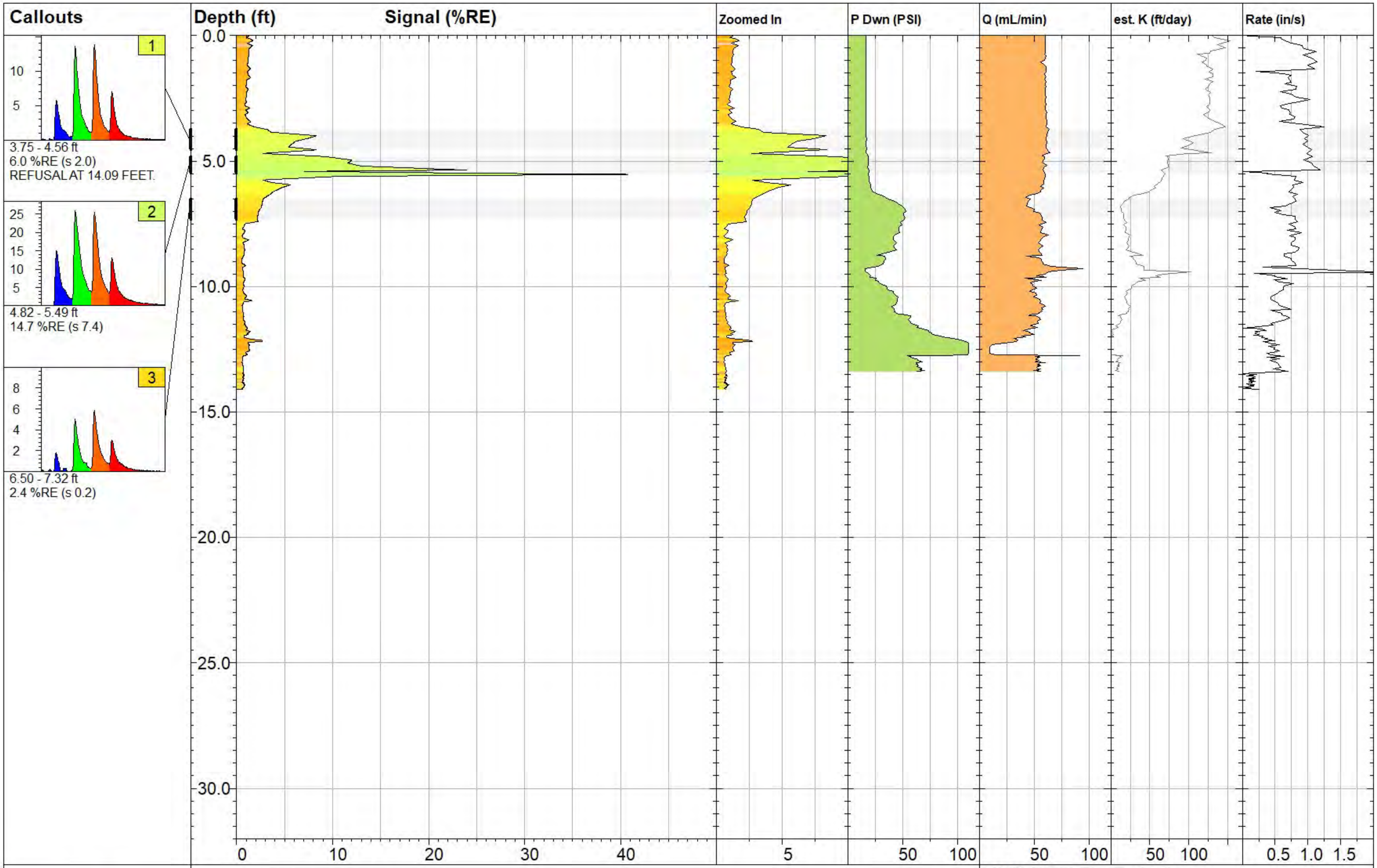
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **9.54 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **2.3 %RE @ 1.43 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-12 14:36 MDT**



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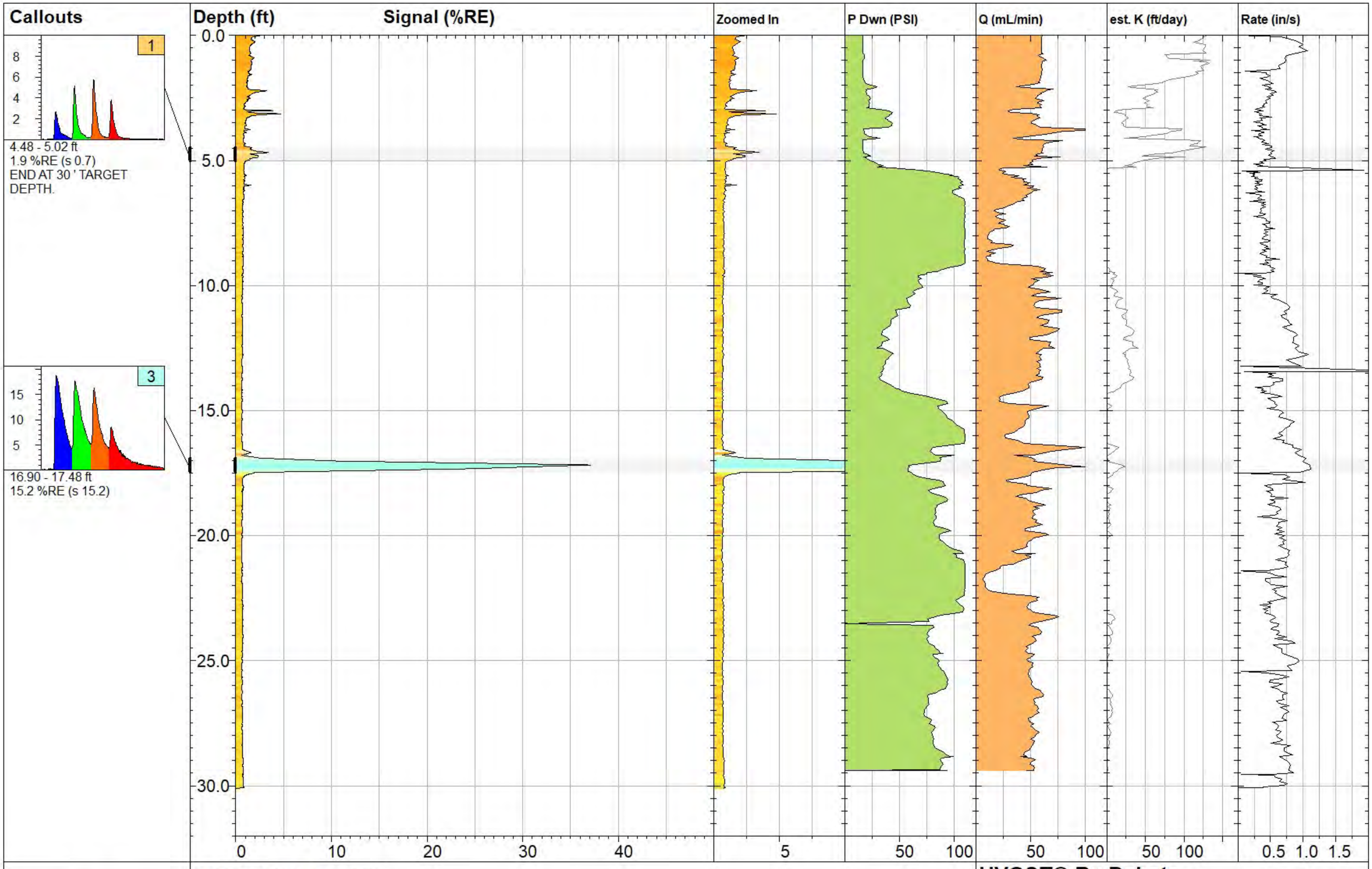
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **14.09 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **41.6 %RE @ 5.53 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-12 14:04 MDT**



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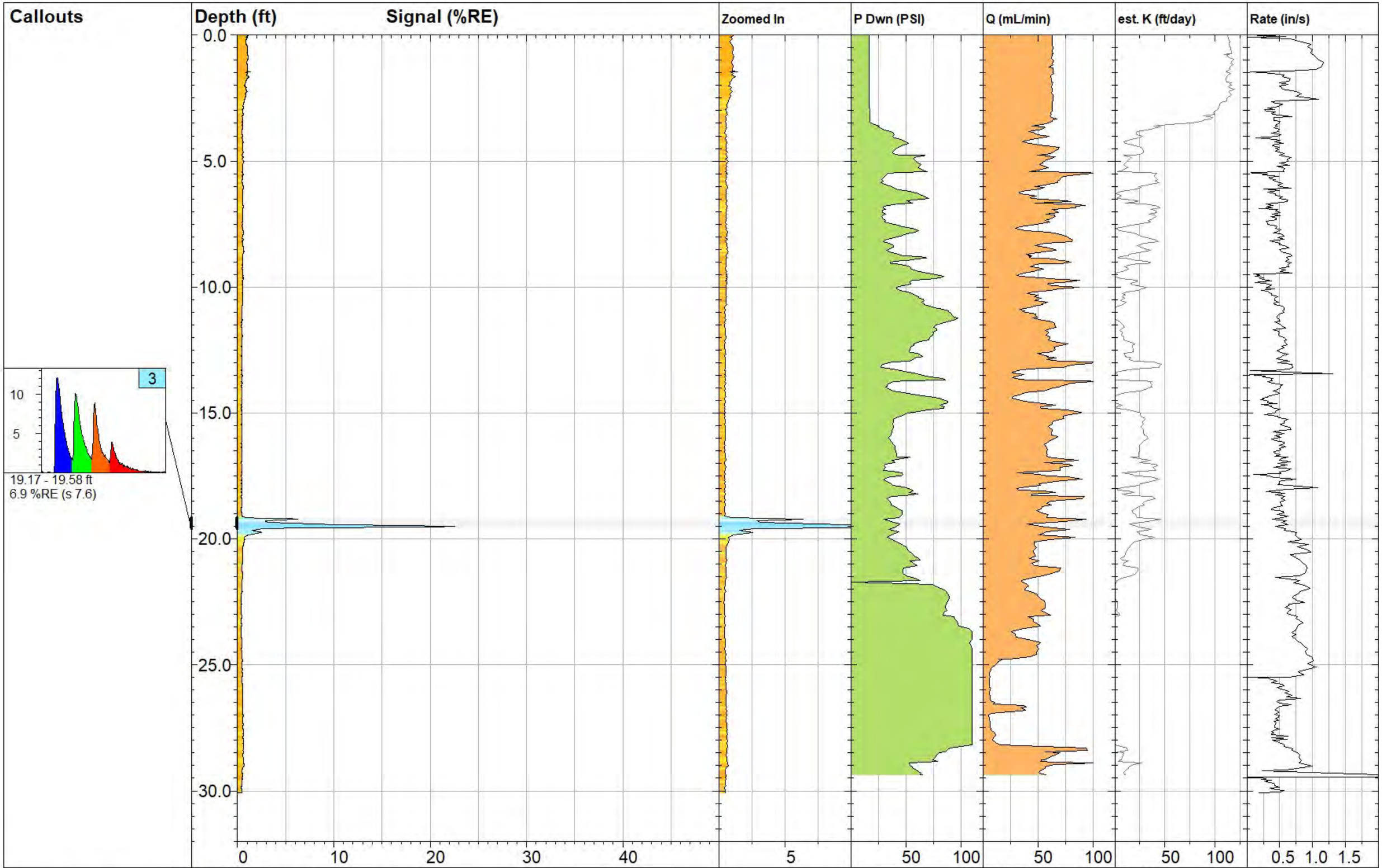
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **30.10 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **37.2 %RE @ 17.18 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-13 12:54 MDT**



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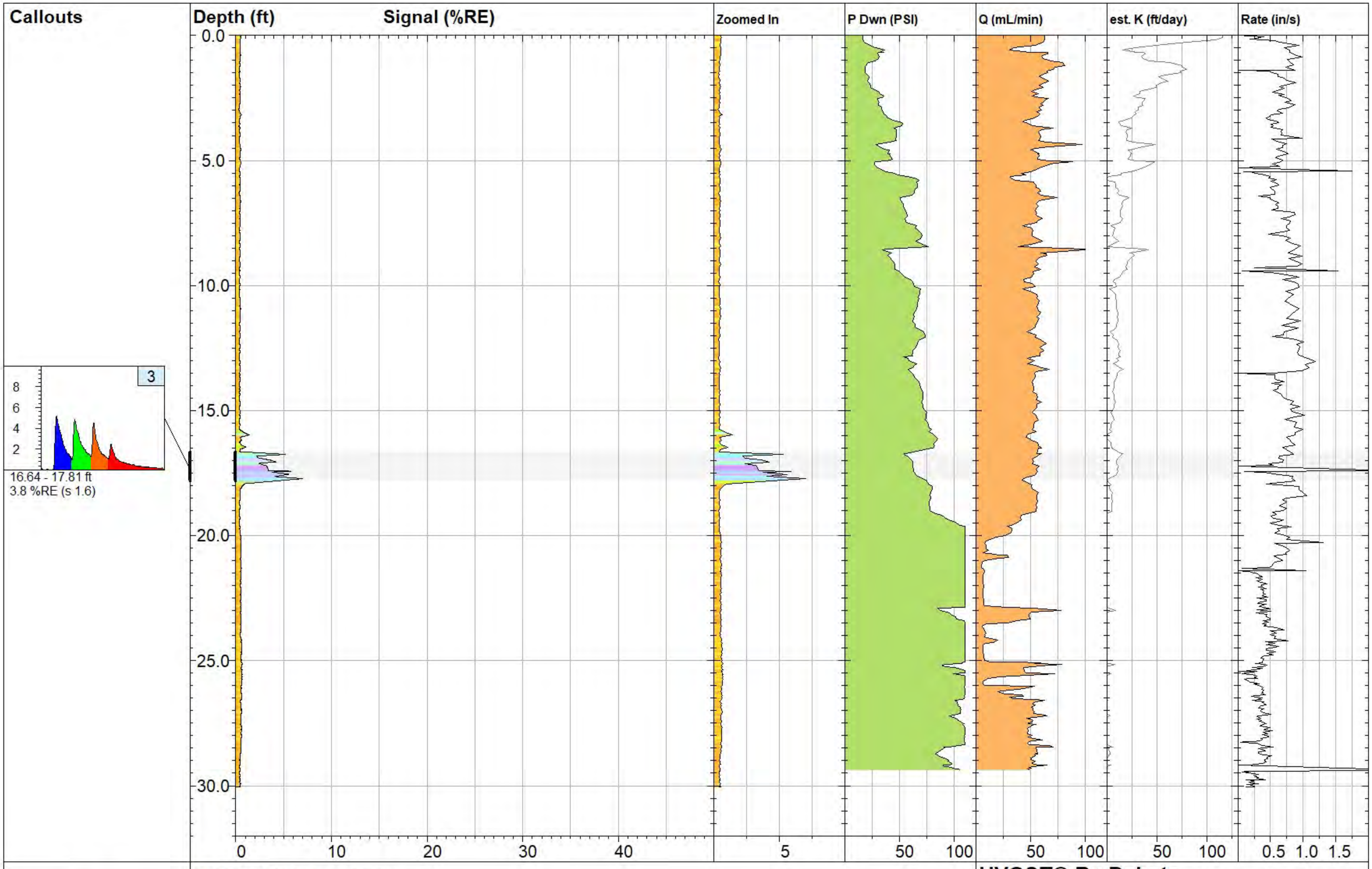
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **30.07 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **23.0 %RE @ 19.50 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-13 15:06 MDT**



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MKTF-LIF-133

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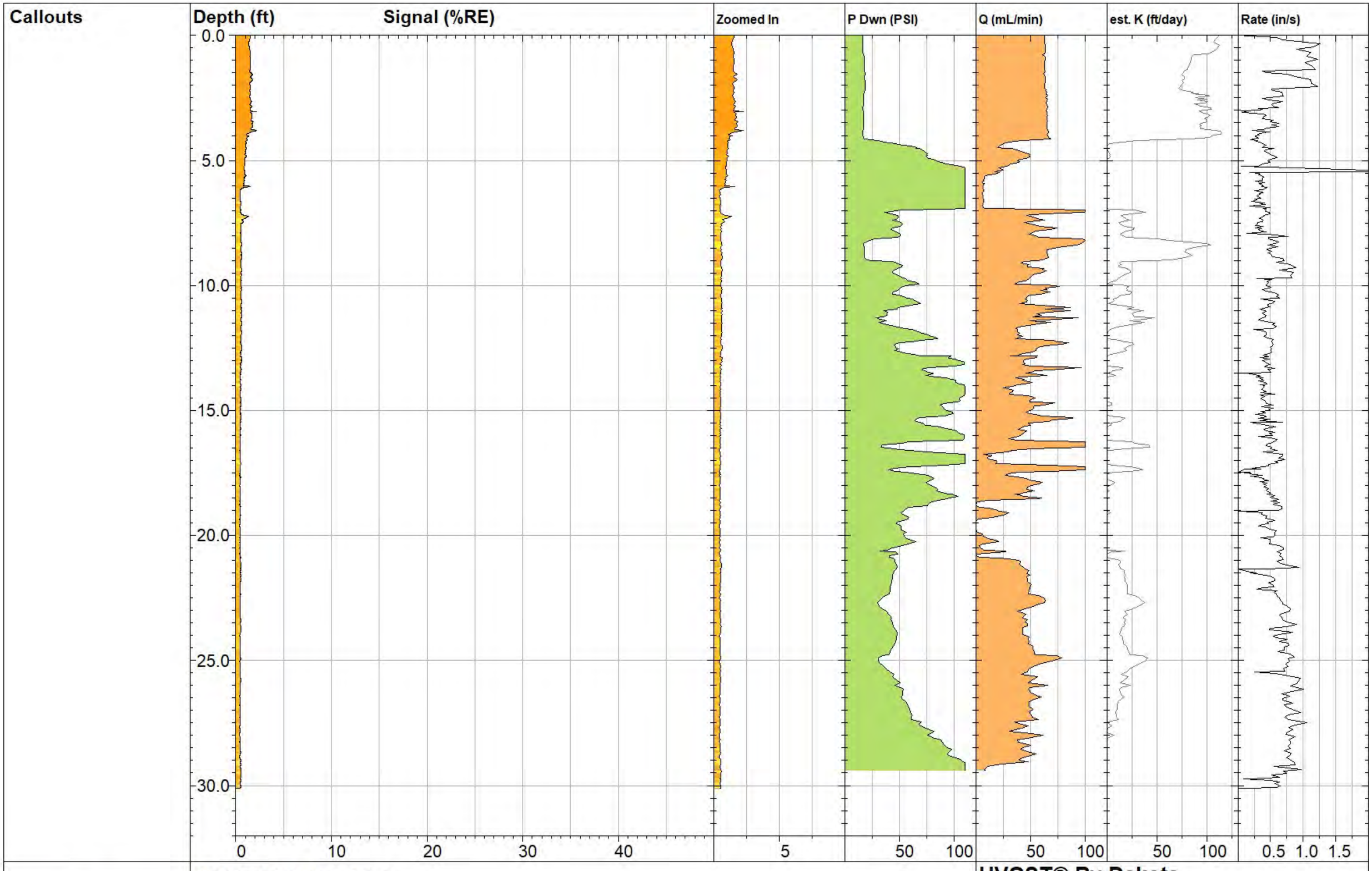
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **30.05 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **7.0 %RE @ 17.72 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-13 15:47 MDT**



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MKTF-LIF-134

UVOST® By Dakota
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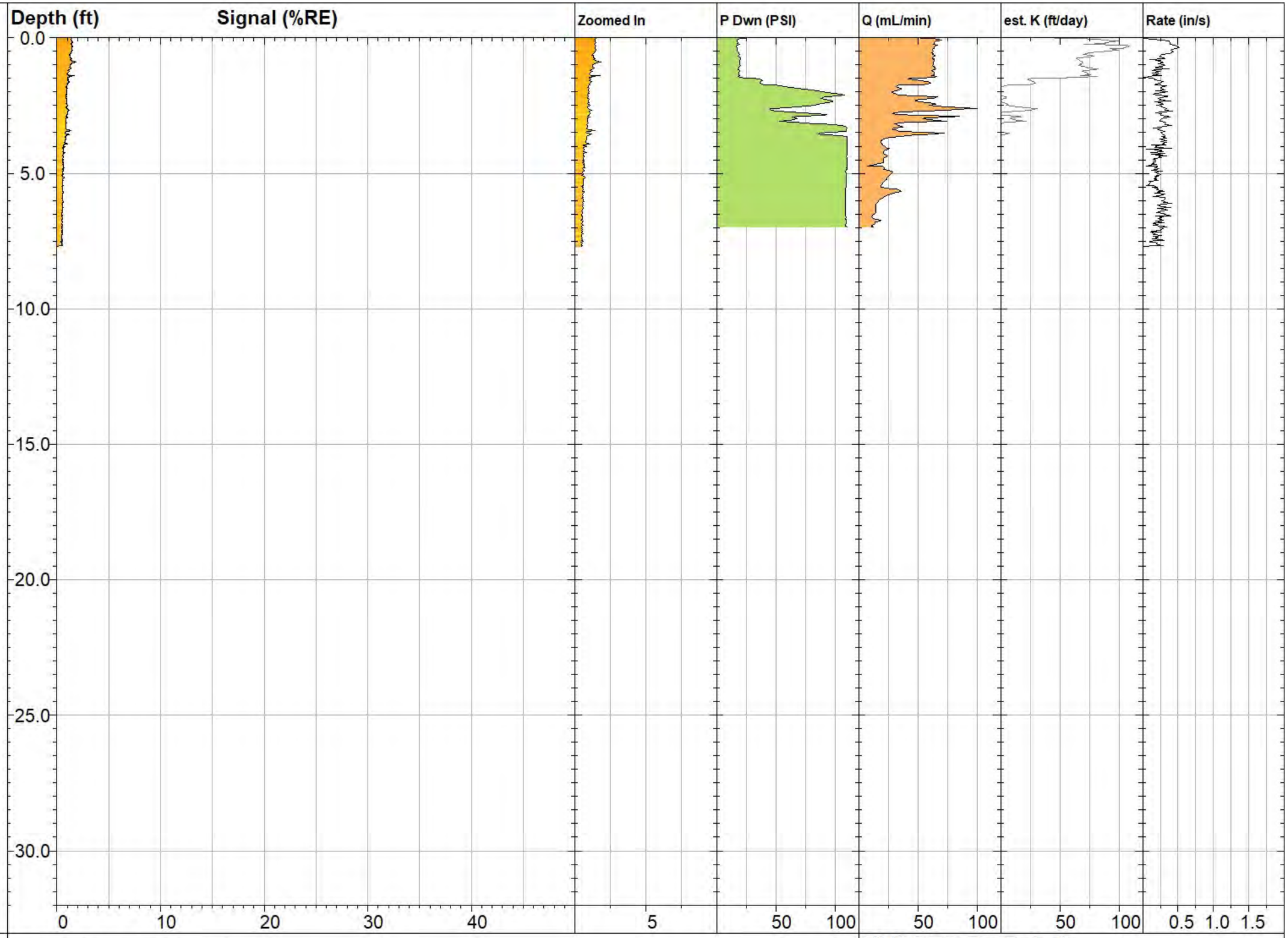
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **30.10 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **2.2 %RE @ 3.80 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-13 14:26 MDT**

Callouts

REFUSAL AT 7.68 FEET.



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MKTF-LIF-135

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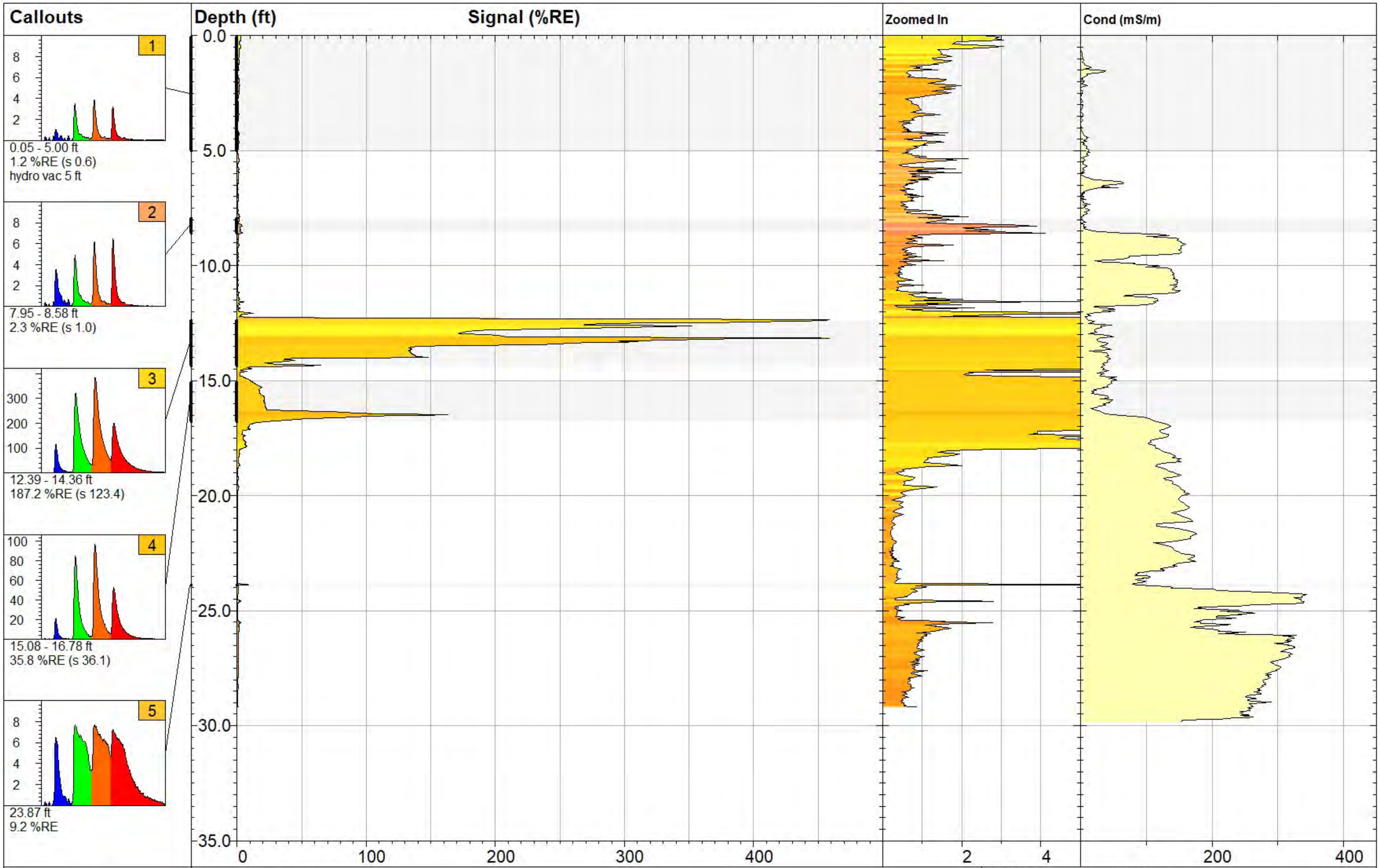
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **7.68 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **1.9 %RE @ 0.89 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-14 07:01 MDT**



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PA-LIF-01

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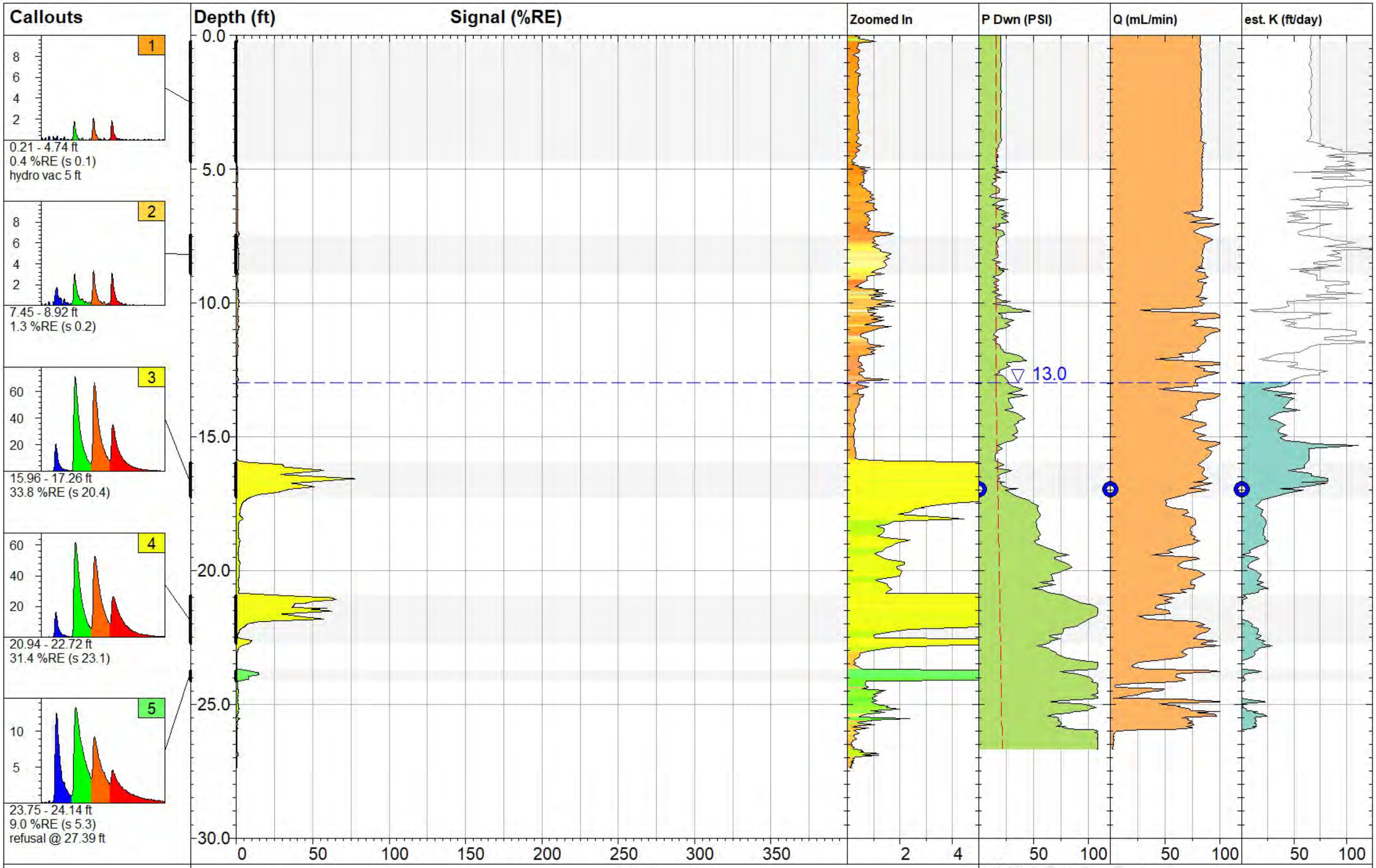
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **29.19 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **464.7 %RE @ 13.15 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-05 11:56 MST**



PA-LIF-02

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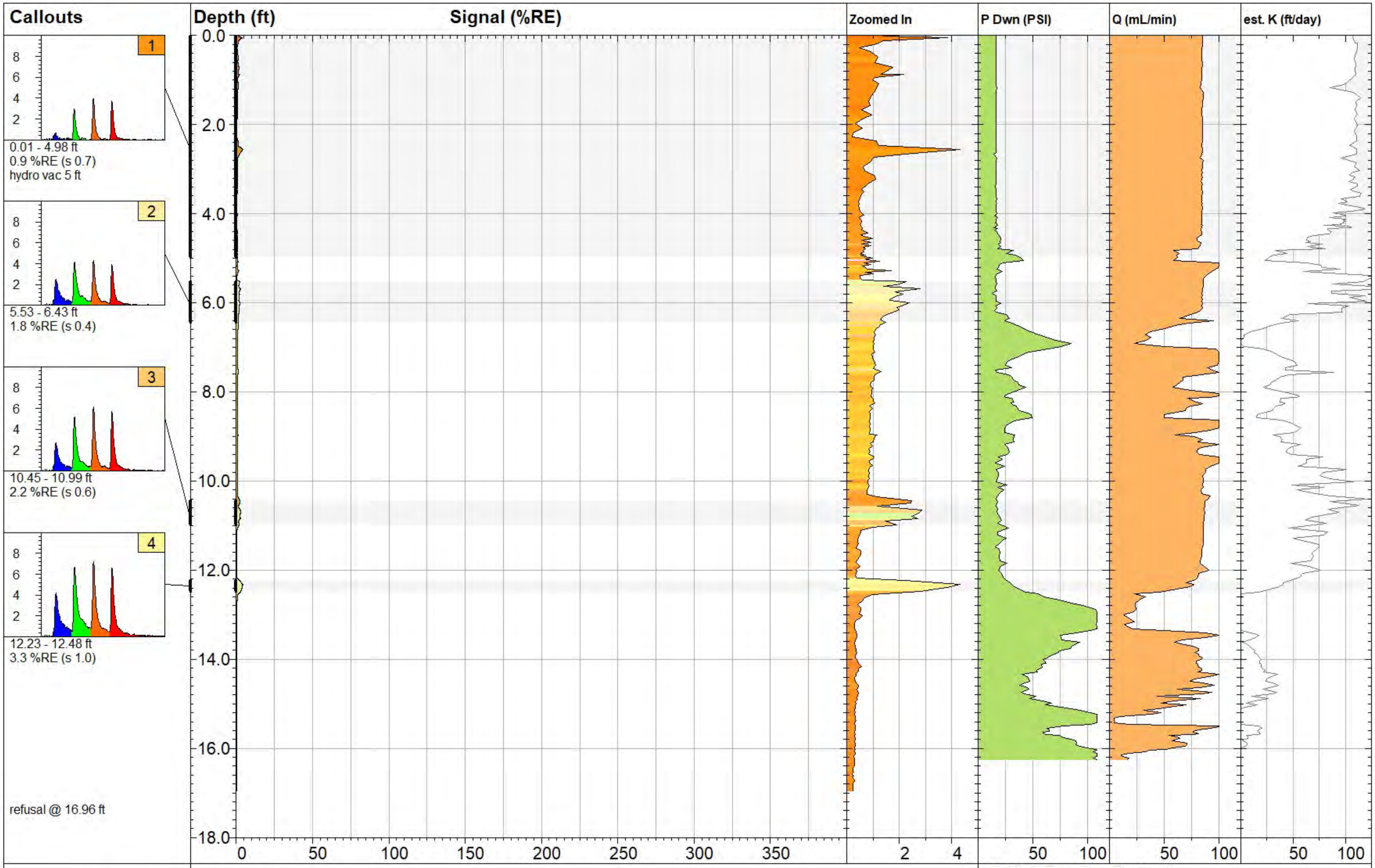
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **27.39 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **77.7 %RE @ 16.57 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-01 10:05 MST**



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PA-LIF-03

UVOST® By Dakota

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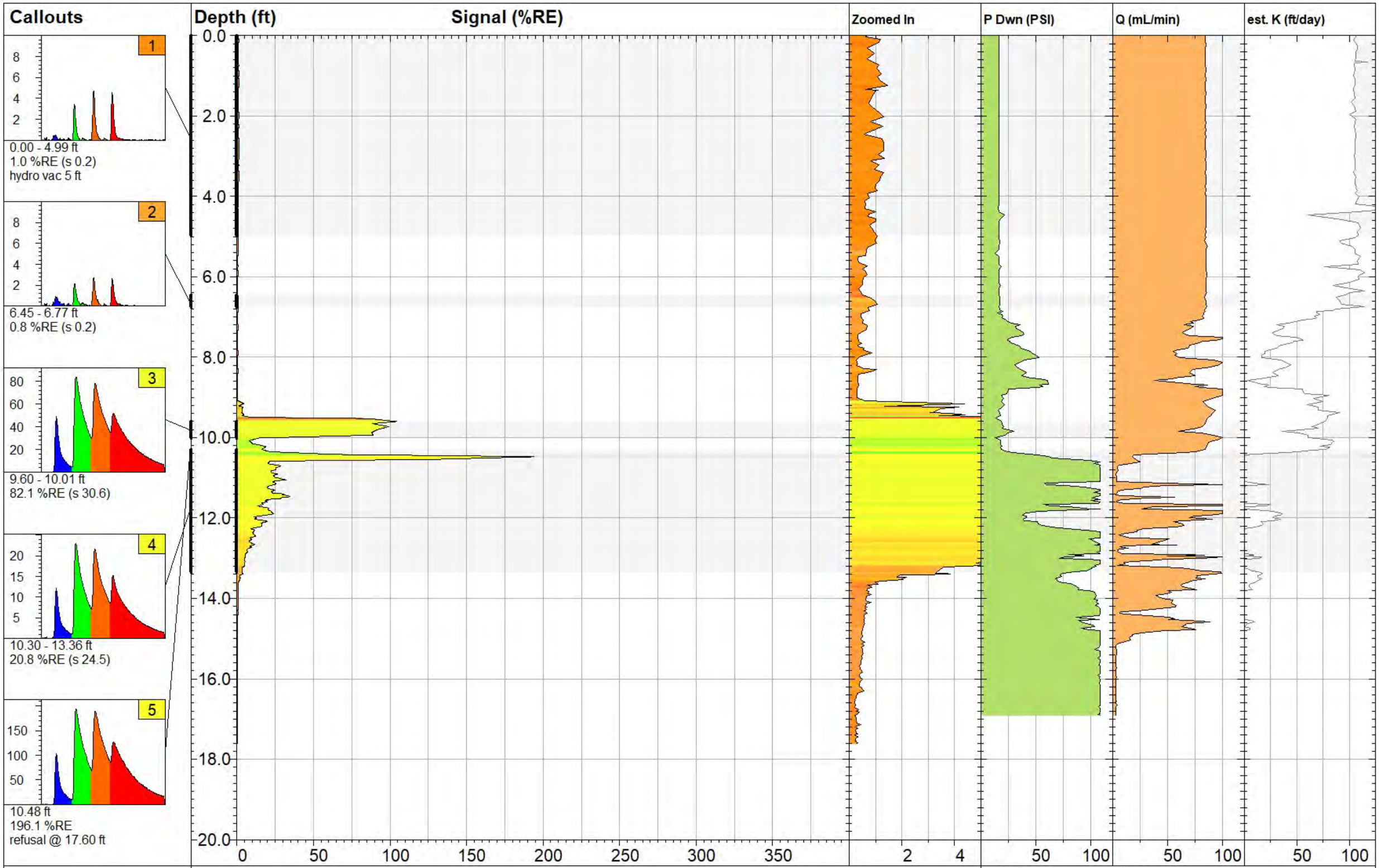
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **16.96 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **4.3 %RE @ 2.55 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-01 11:12 MST**



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PA-LIF-04

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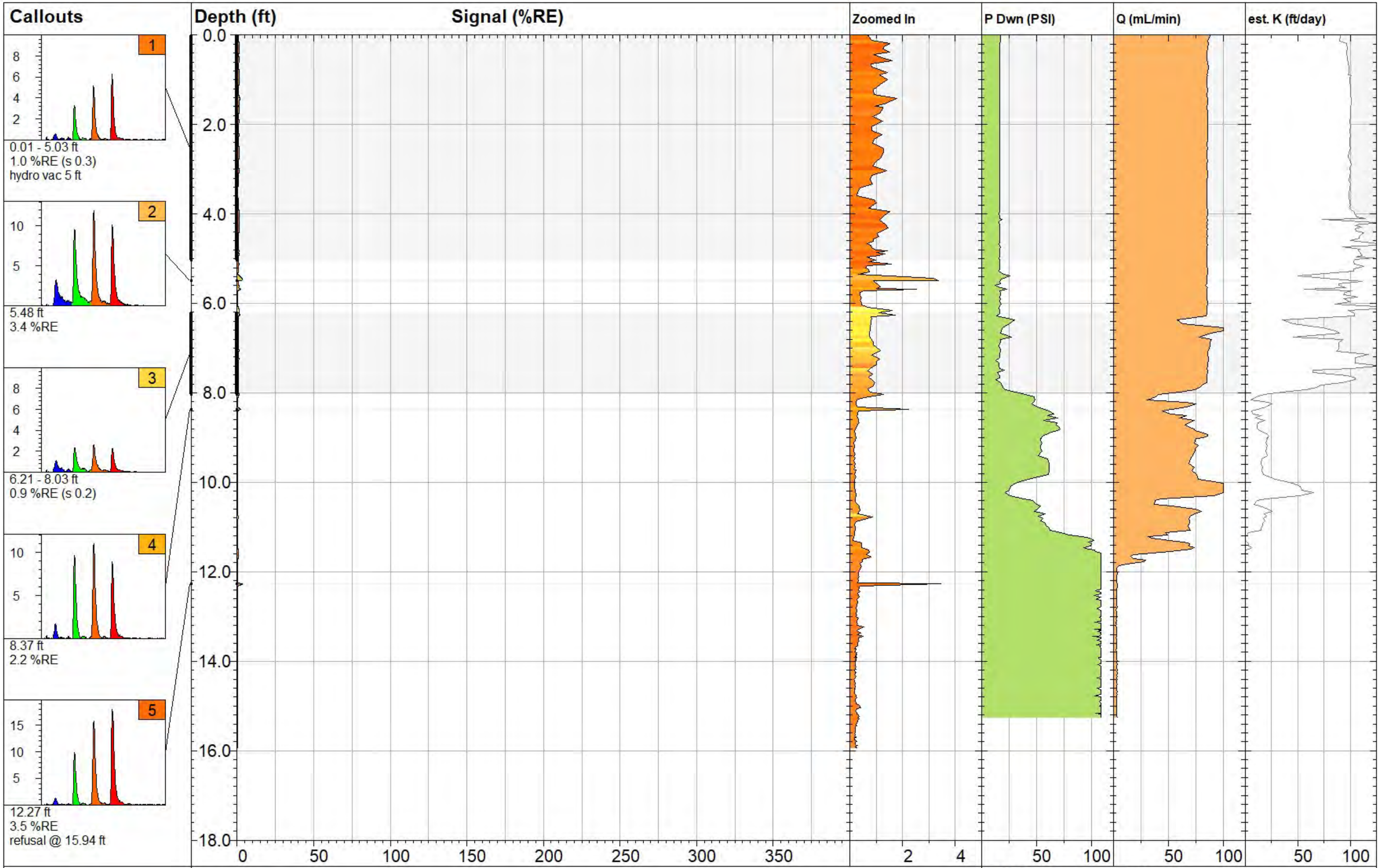
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **17.60 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **196.1 %RE @ 10.48 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-01 11:46 MST**



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PA-LIF-05

UVOST® By Dakota
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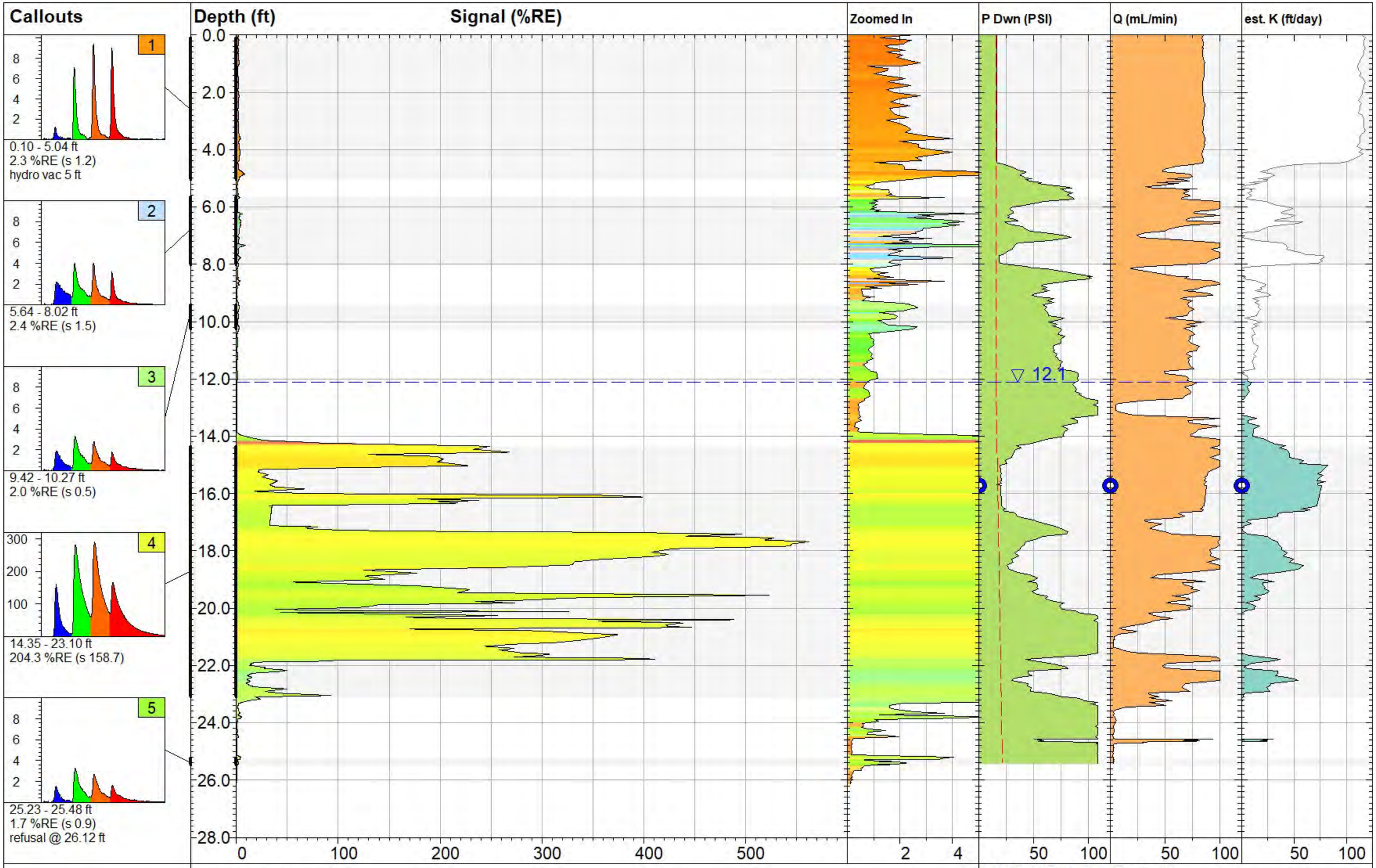
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **15.94 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **3.5 %RE @ 12.27 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-01 12:30 MST**



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PA-LIF-06

UVOST® By Dakota
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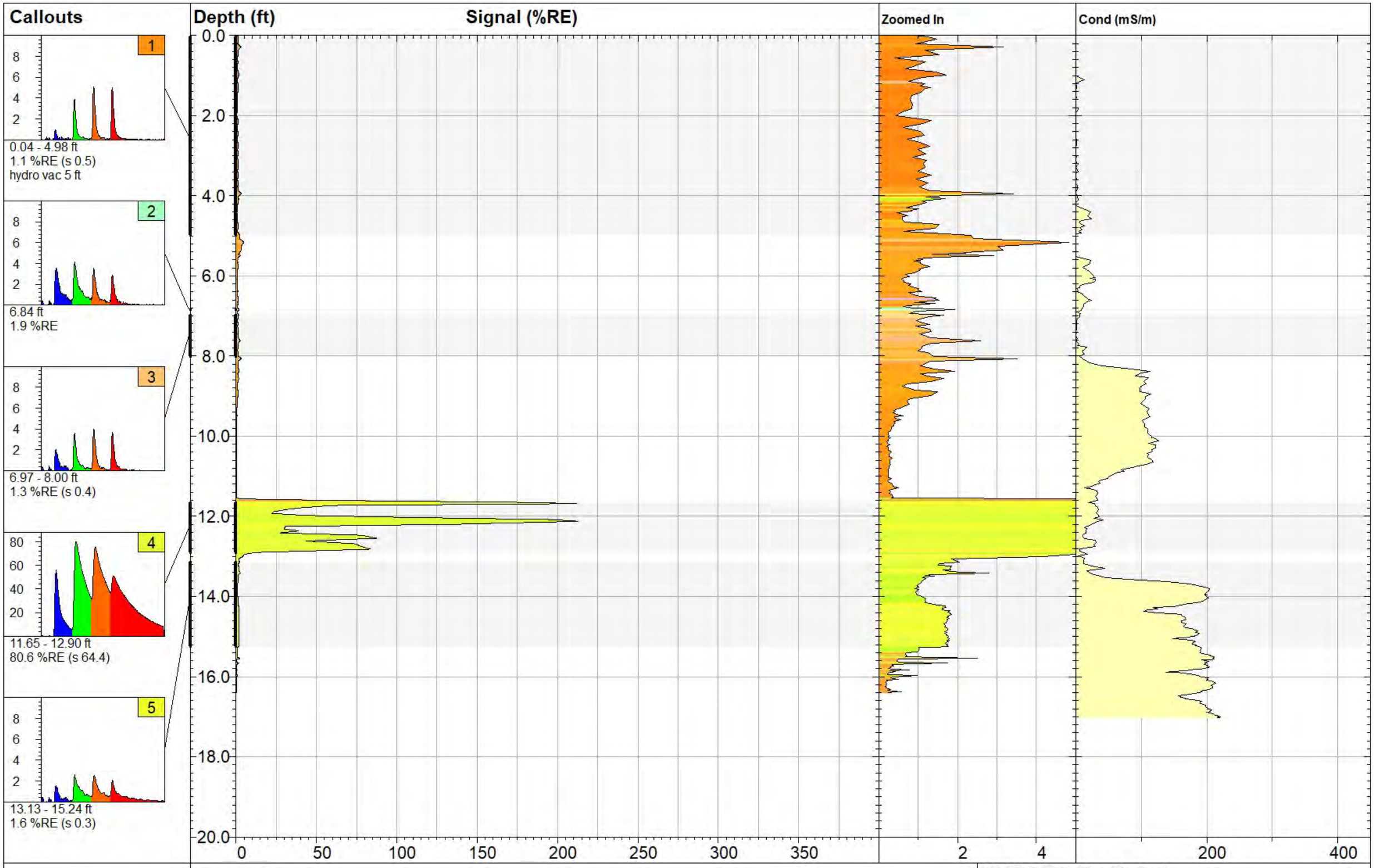
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **26.12 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **562.8 %RE @ 17.68 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-01 13:34 MST**



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PA-LIF-07

UVOST® By Dakota
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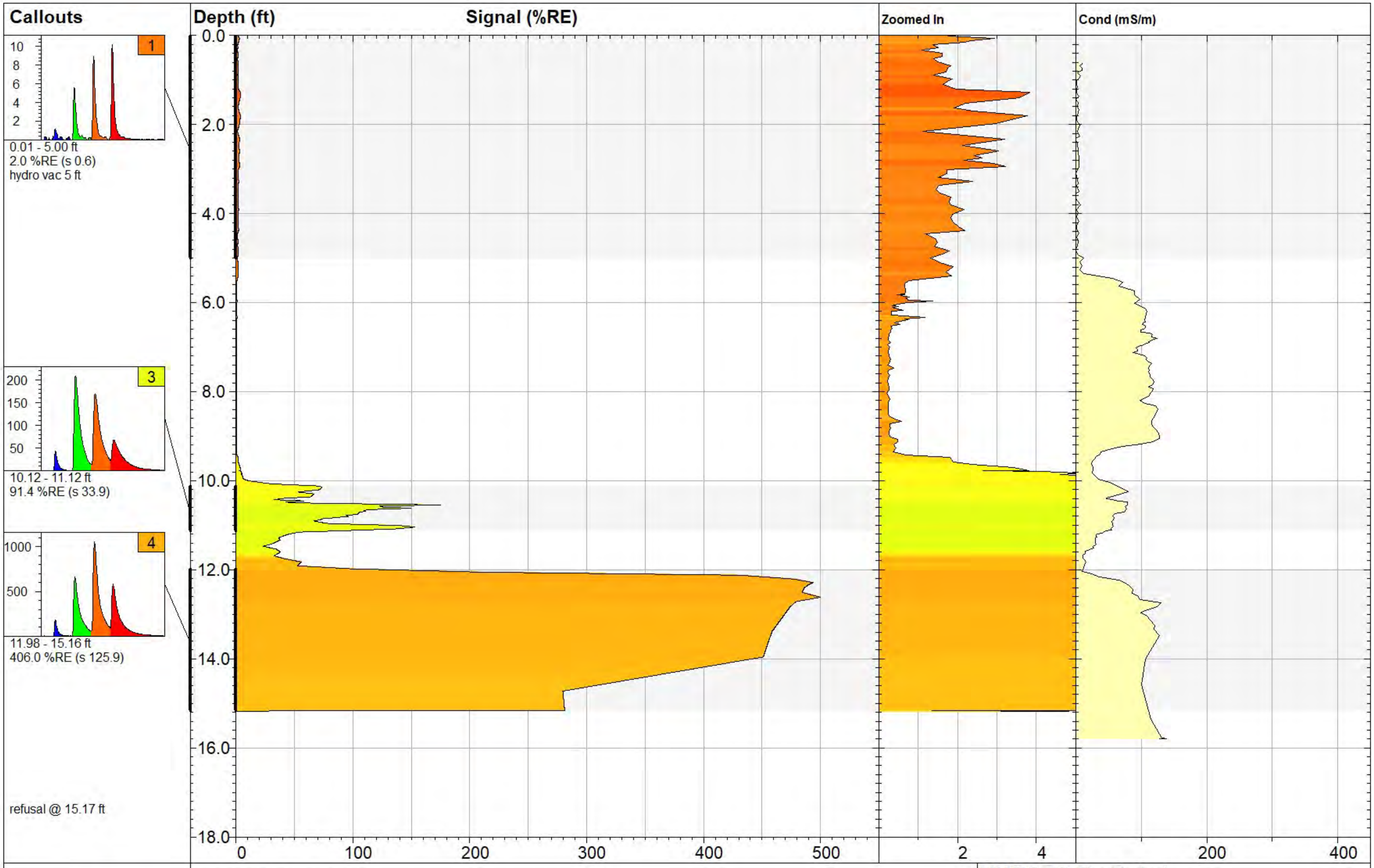
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **16.40 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **213.7 %RE @ 11.68 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-05 12:41 MST**



PA-LIF-08

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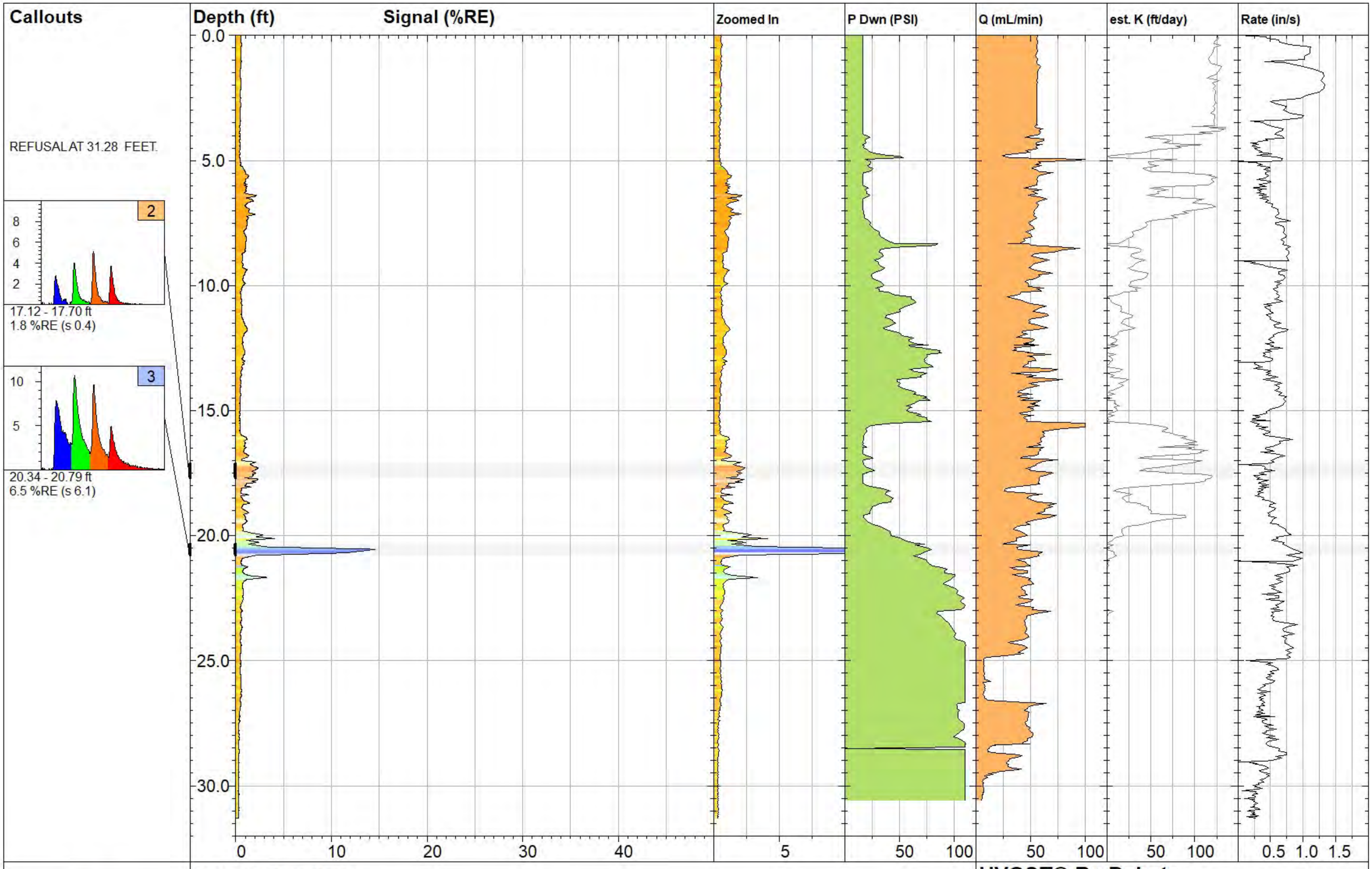
Site: **Marathon Marketing Tank Farm**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **15.17 ft**
Client / Job: **TriHydro / 0049.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **500.0 %RE @ 12.62 ft**
Operator / Unit: **A. Nagle / UVOST1613**	Elevation: **Unavailable**	Date & Time: **2021-02-05 11:15 MST**



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WB-LIF-100

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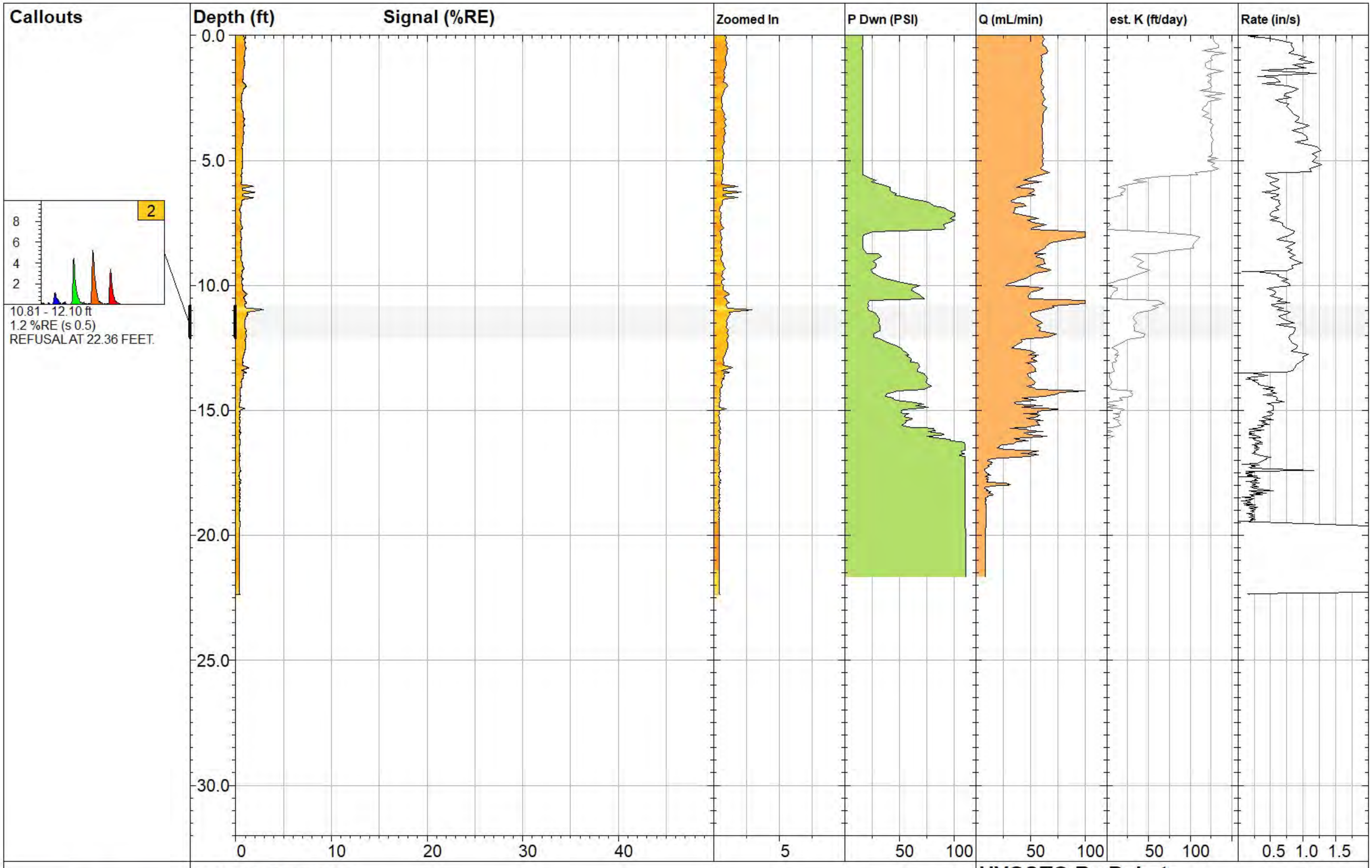
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **31.28 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **14.6 %RE @ 20.55 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-11 09:41 MDT**



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WB-LIF-110

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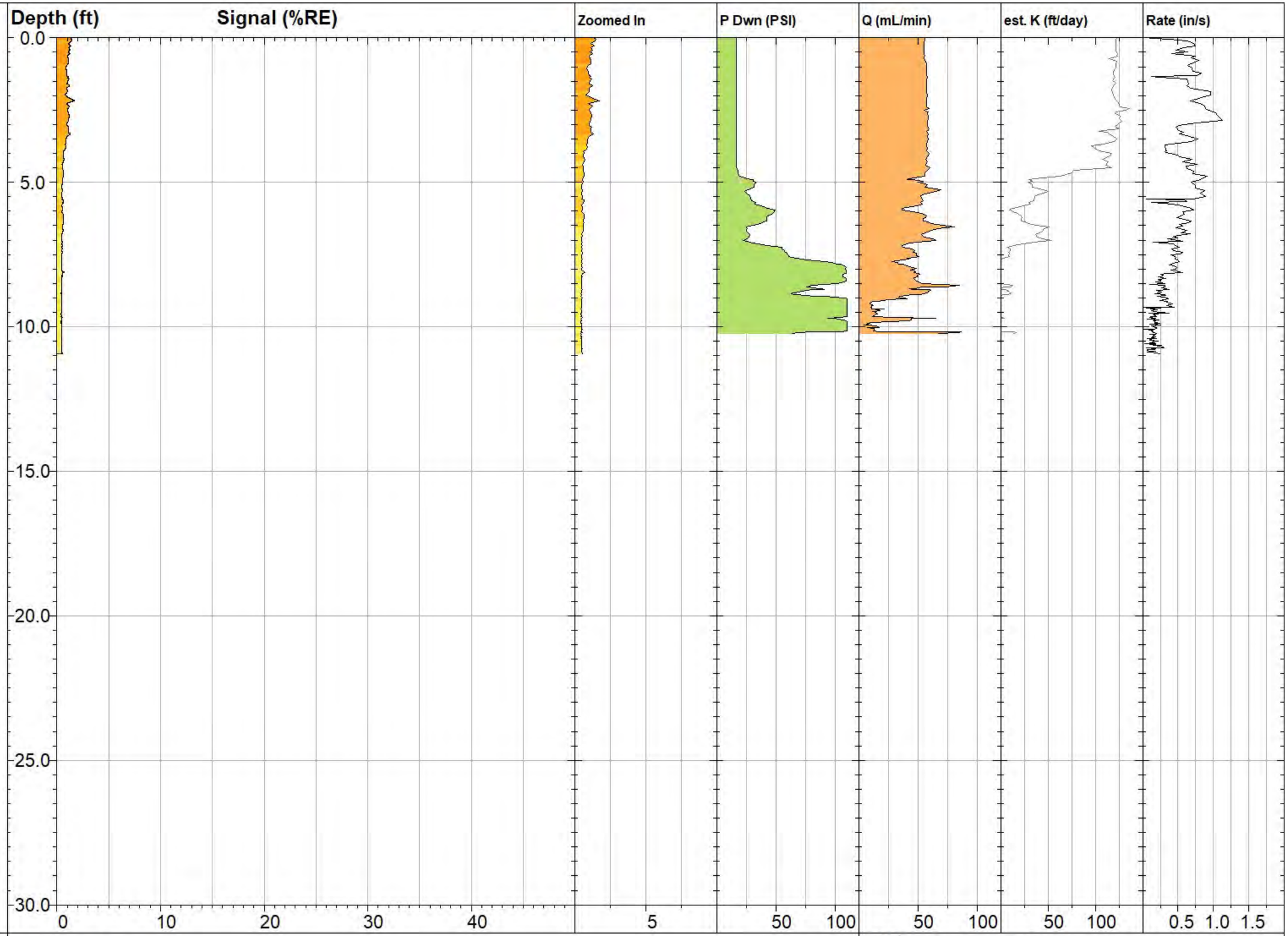
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **22.36 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **2.9 %RE @ 10.97 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-11 14:57 MDT**

Callouts

REFUSAL AT 10.92 FEET.



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WB-LIF-111

UVOST® By Dakota
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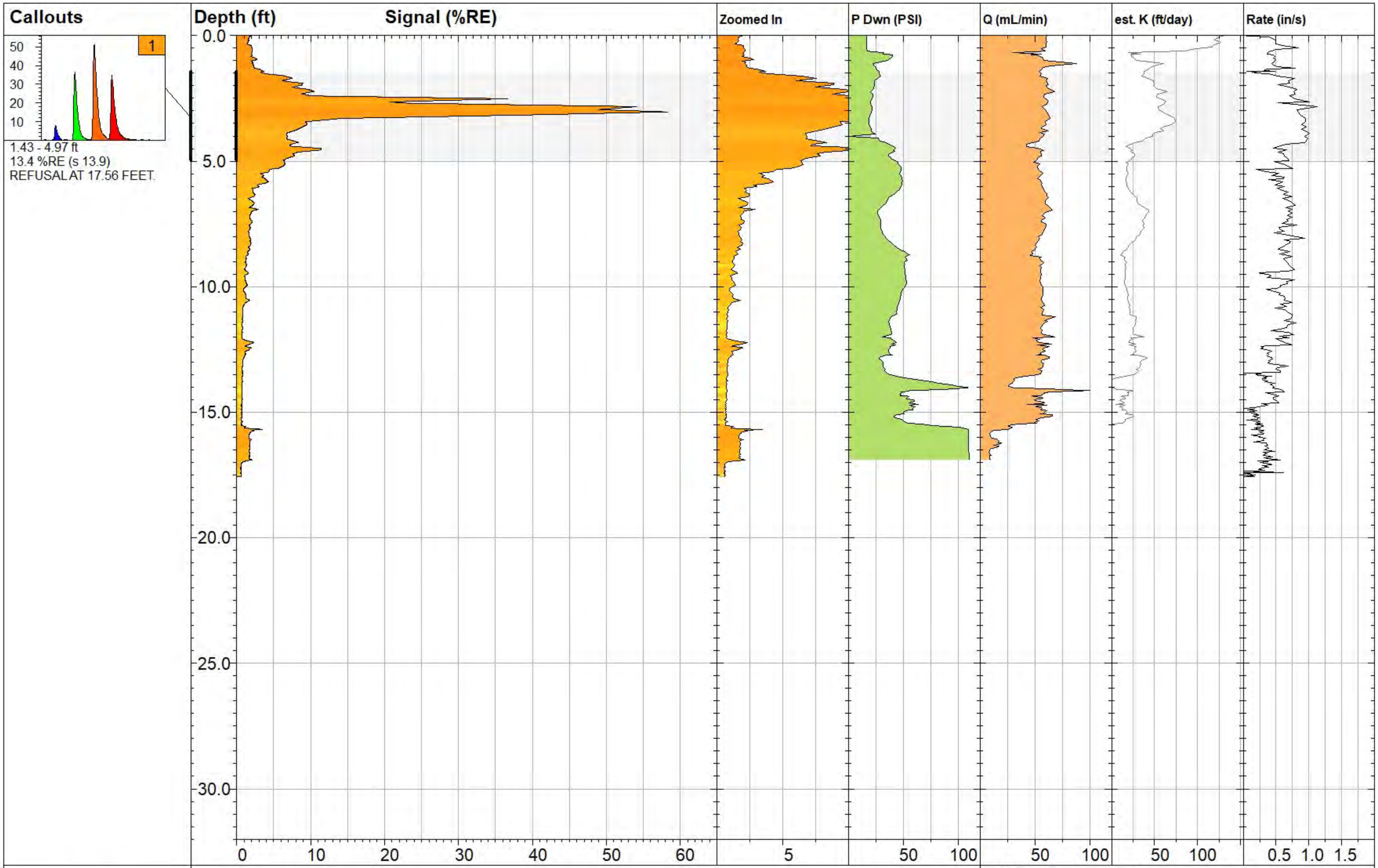
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **10.92 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **1.7 %RE @ 2.18 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-10 11:40 MDT**



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WB-LIF-112

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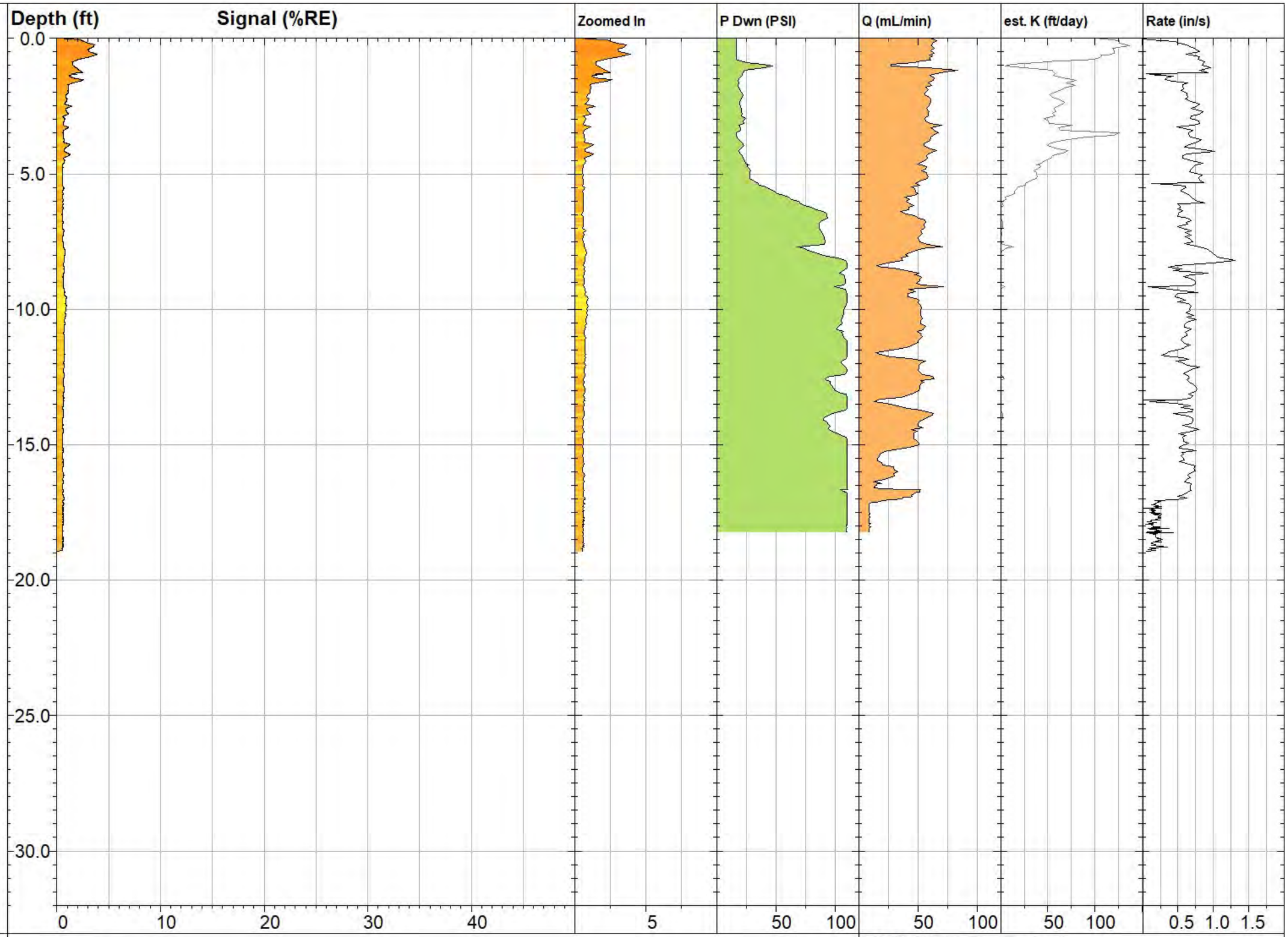
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **17.56 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **58.3 %RE @ 3.04 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-12 16:20 MDT**

Callouts

REFUSAL AT 18.92 FEET.



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WB-LIF-113

UVOST® By Dakota
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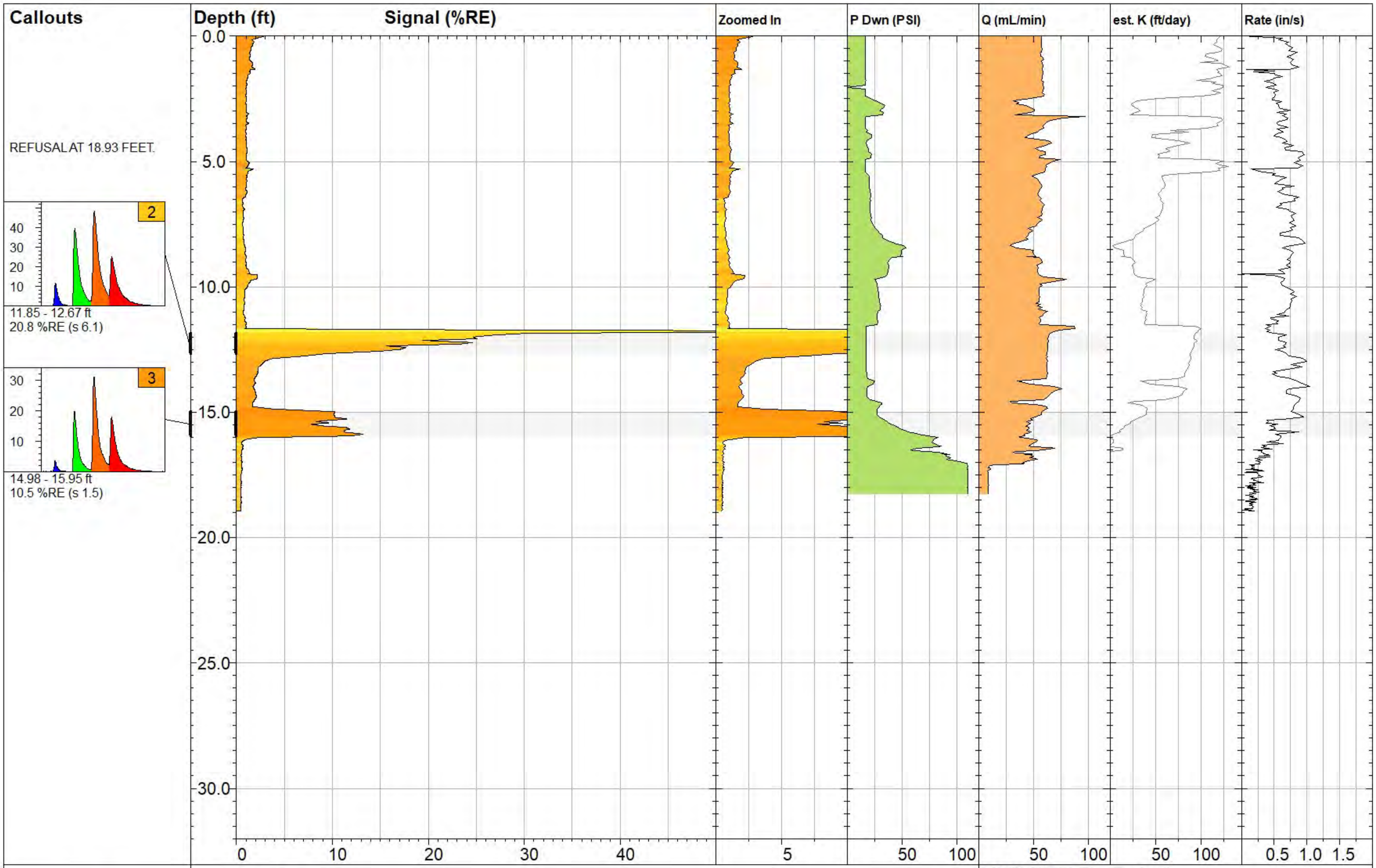
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **18.92 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **3.9 %RE @ 0.59 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-12 15:10 MDT**



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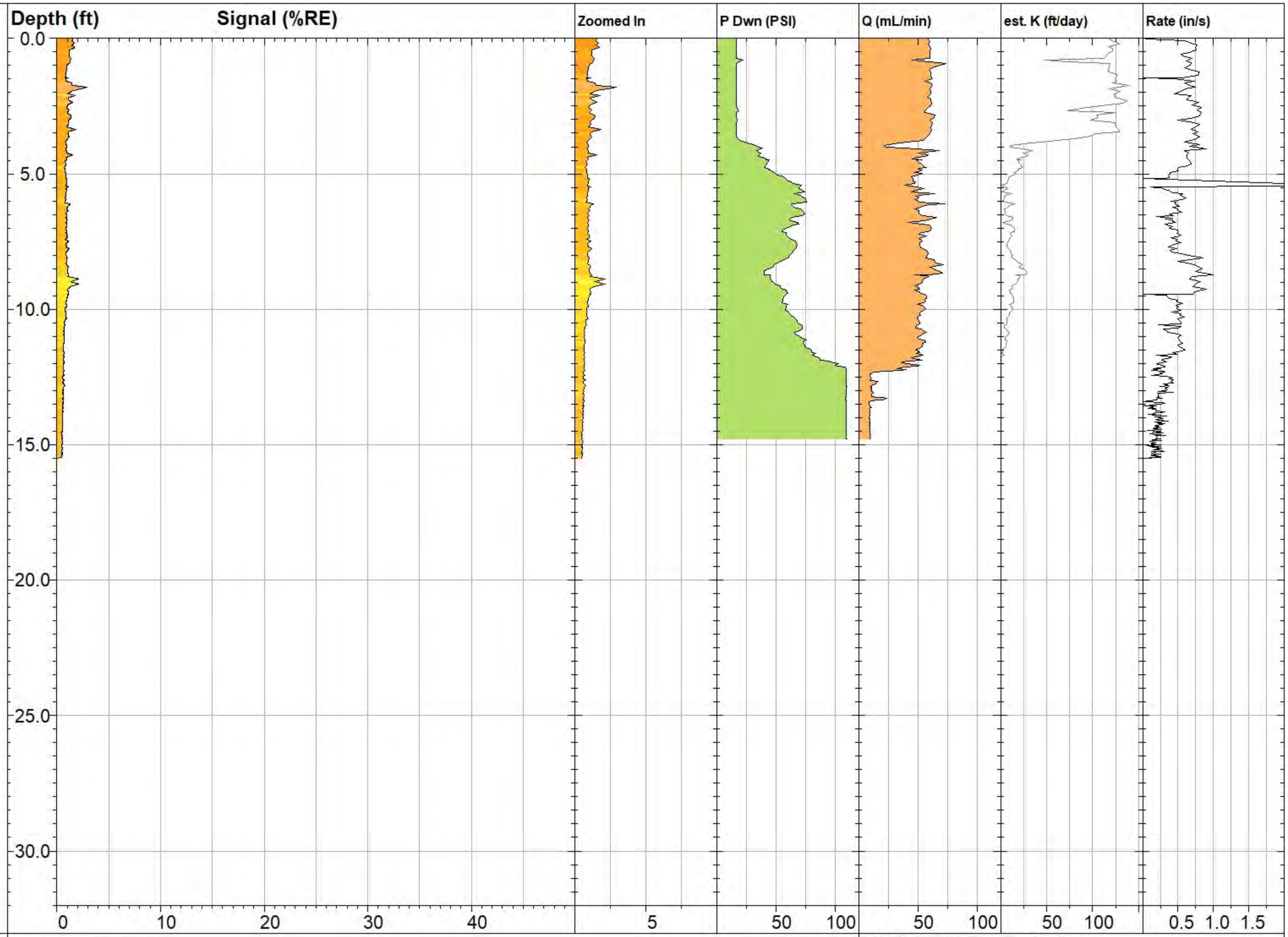
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **18.93 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **78.7 %RE @ 11.77 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-12 08:21 MDT**

Callouts

REFUSAL AT 15.49 FEET.



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WB-LIF-115

UVOST® By Dakota
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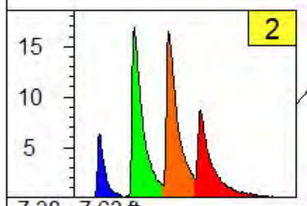
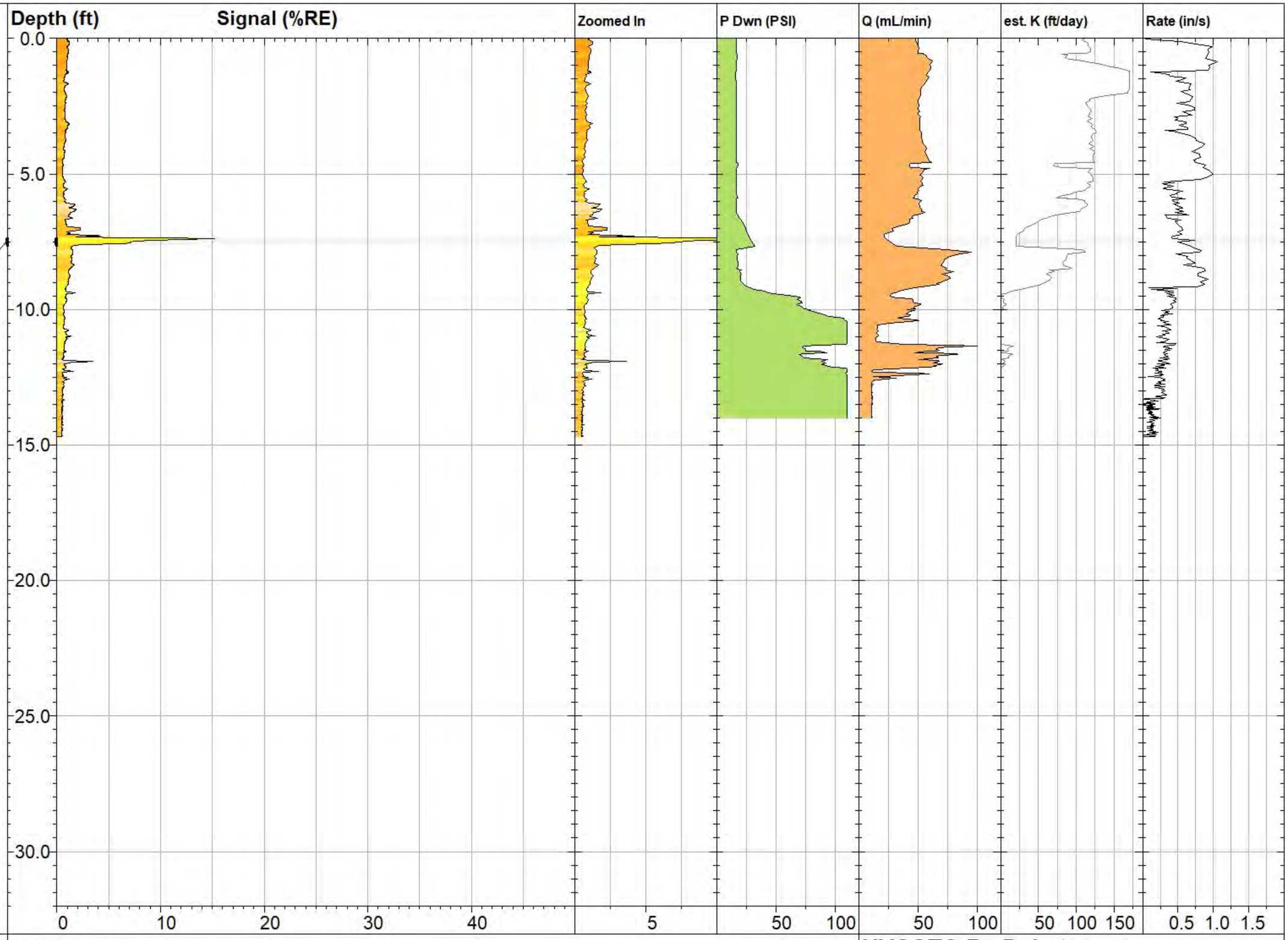
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **15.49 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **2.9 %RE @ 1.80 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-12 10:47 MDT**

Callouts

REFUSAL AT 14.70 FEET.



7.38 - 7.63 ft
8.0 %RE (s 5.0)



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WB-LIF-116

UVOST® By Dakota
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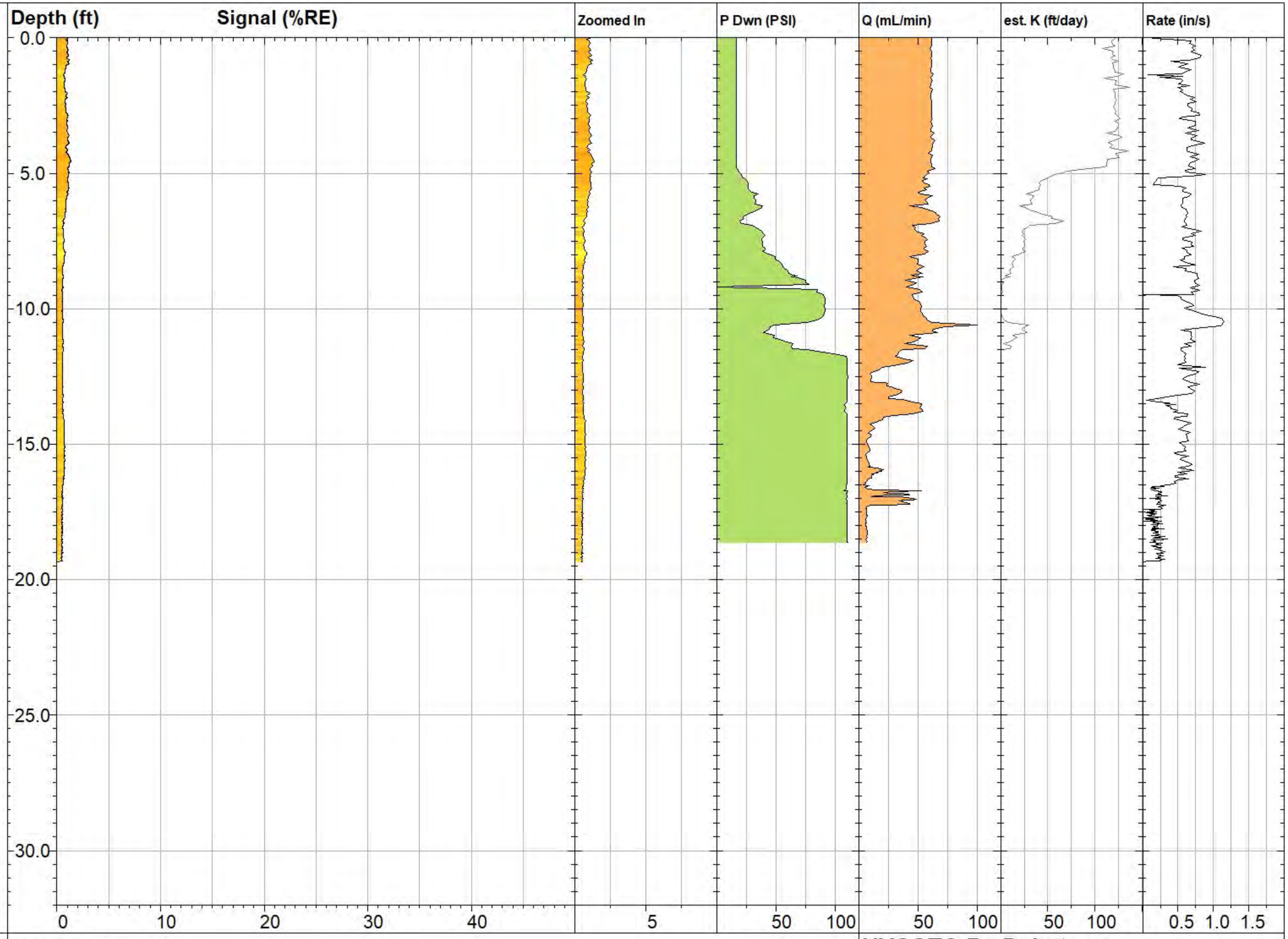
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **14.70 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **15.4 %RE @ 7.38 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-11 14:17 MDT**

Callouts

REFUSAL AT 19.33 FEET.



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WB-LIF-117

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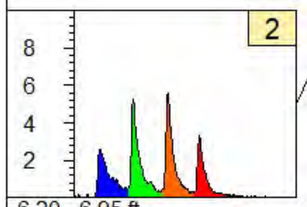
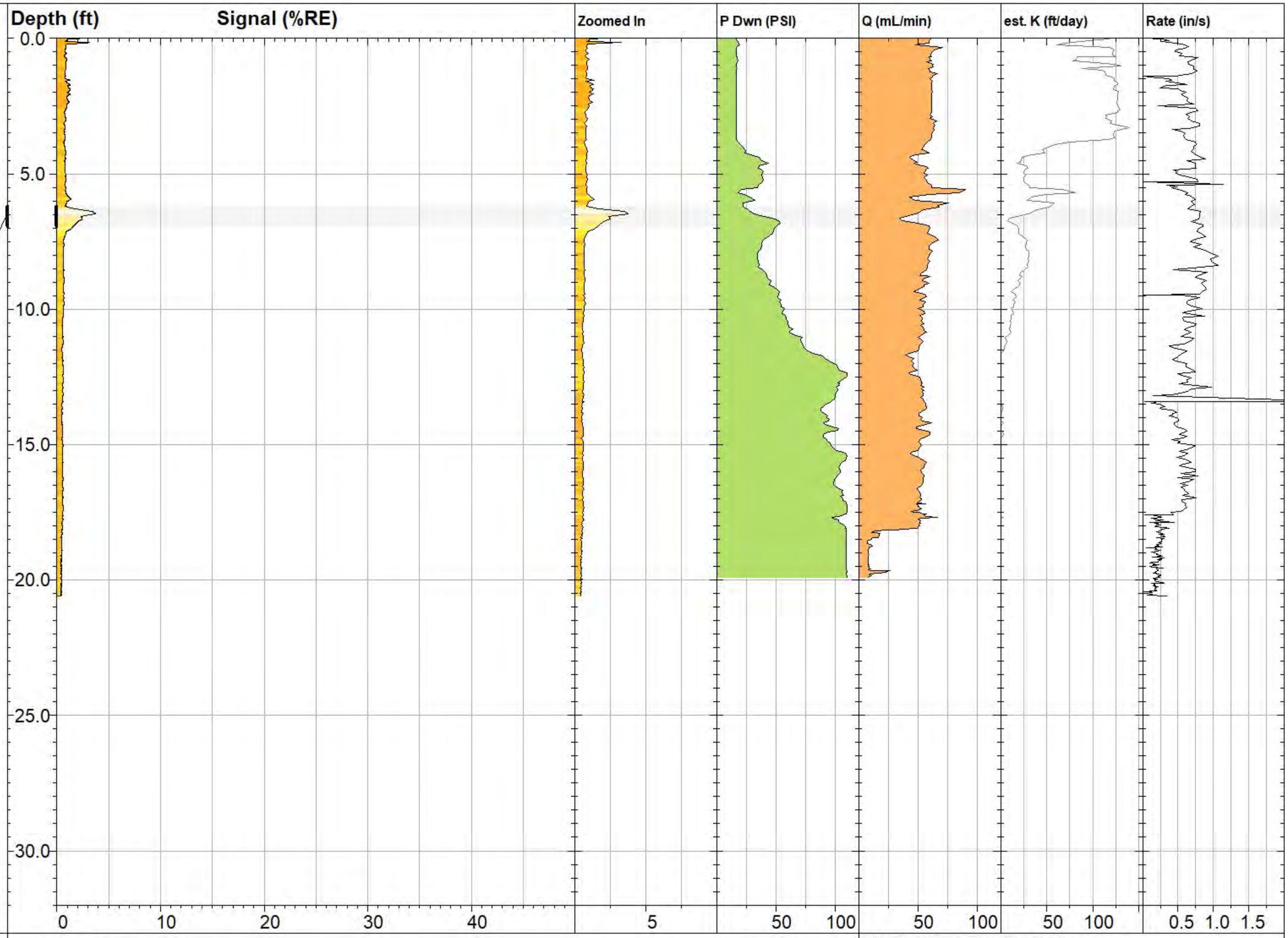
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **19.33 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **1.3 %RE @ 4.57 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-12 07:46 MDT**

Callouts

REFUSAL AT 20.60 FEET.



6.20 - 6.95 ft
2.2 %RE (s 0.9)



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WB-LIF-118

UVOST® By Dakota
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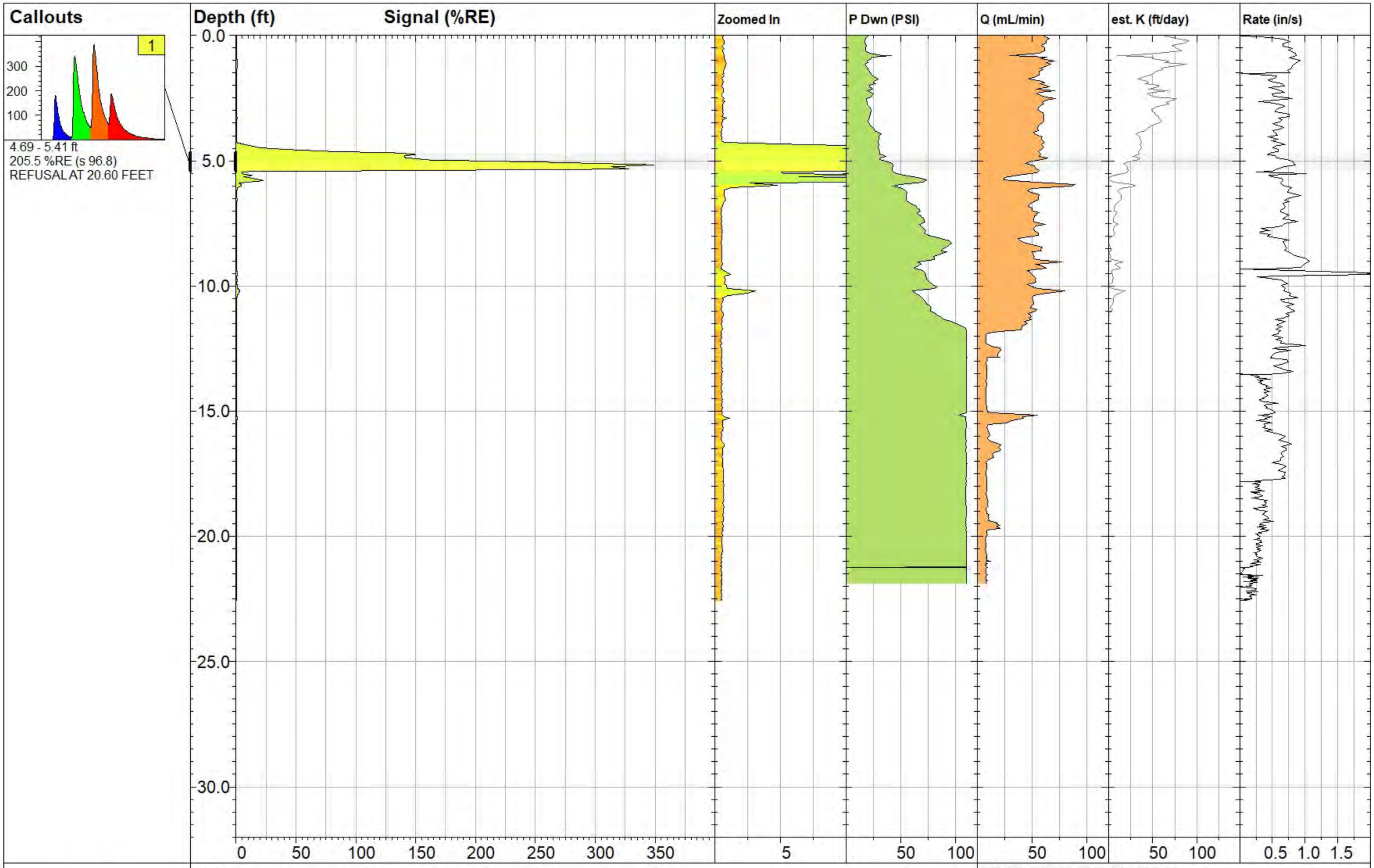
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **20.60 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **3.7 %RE @ 6.48 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-11 15:31 MDT**



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WB-LIF-119

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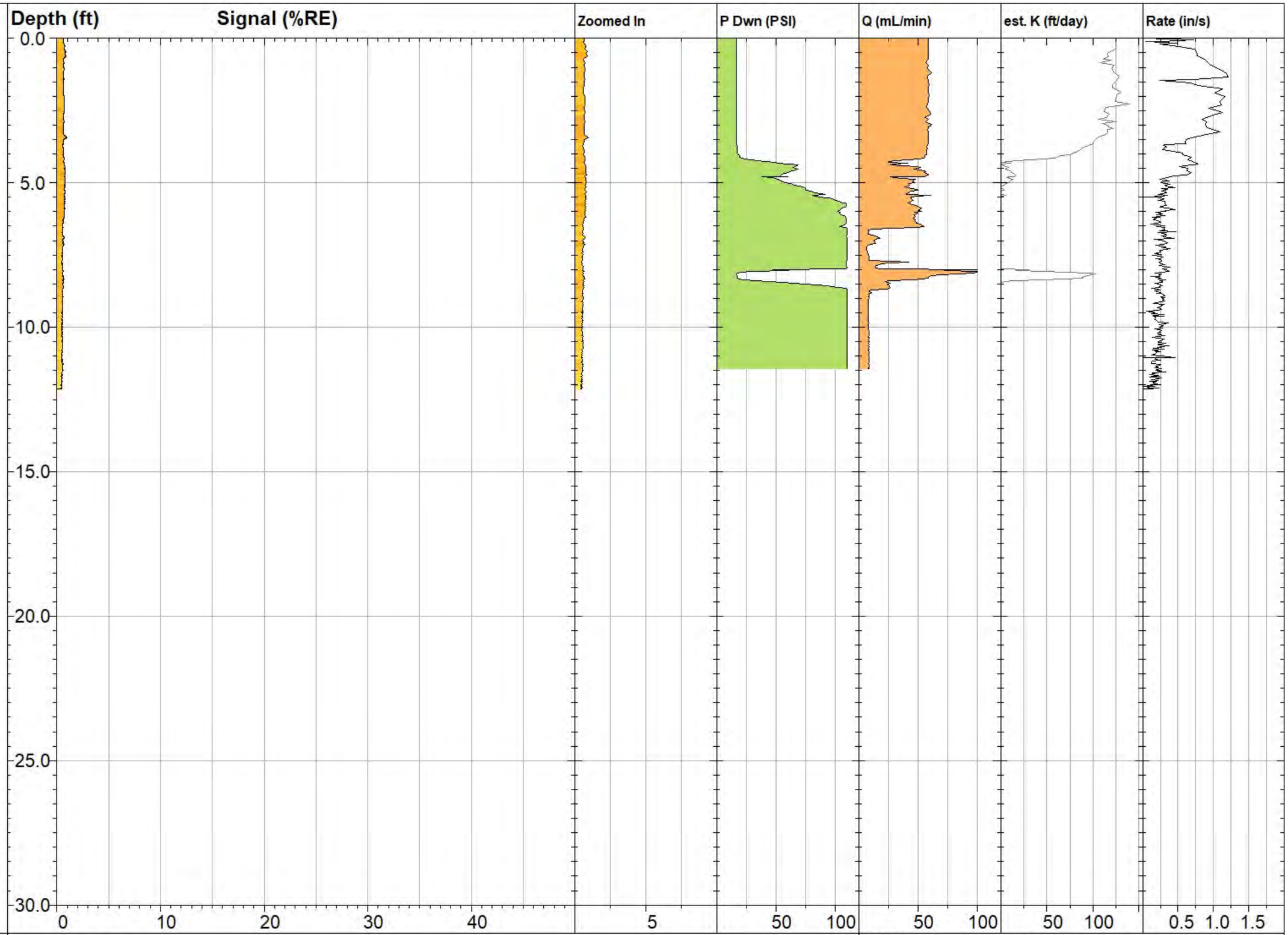
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **22.56 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **350.5 %RE @ 5.16 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-11 16:00 MDT**

Callouts

REFUSAL AT 12.13 FEET.



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WB-LIF-120

UVOST® By Dakota
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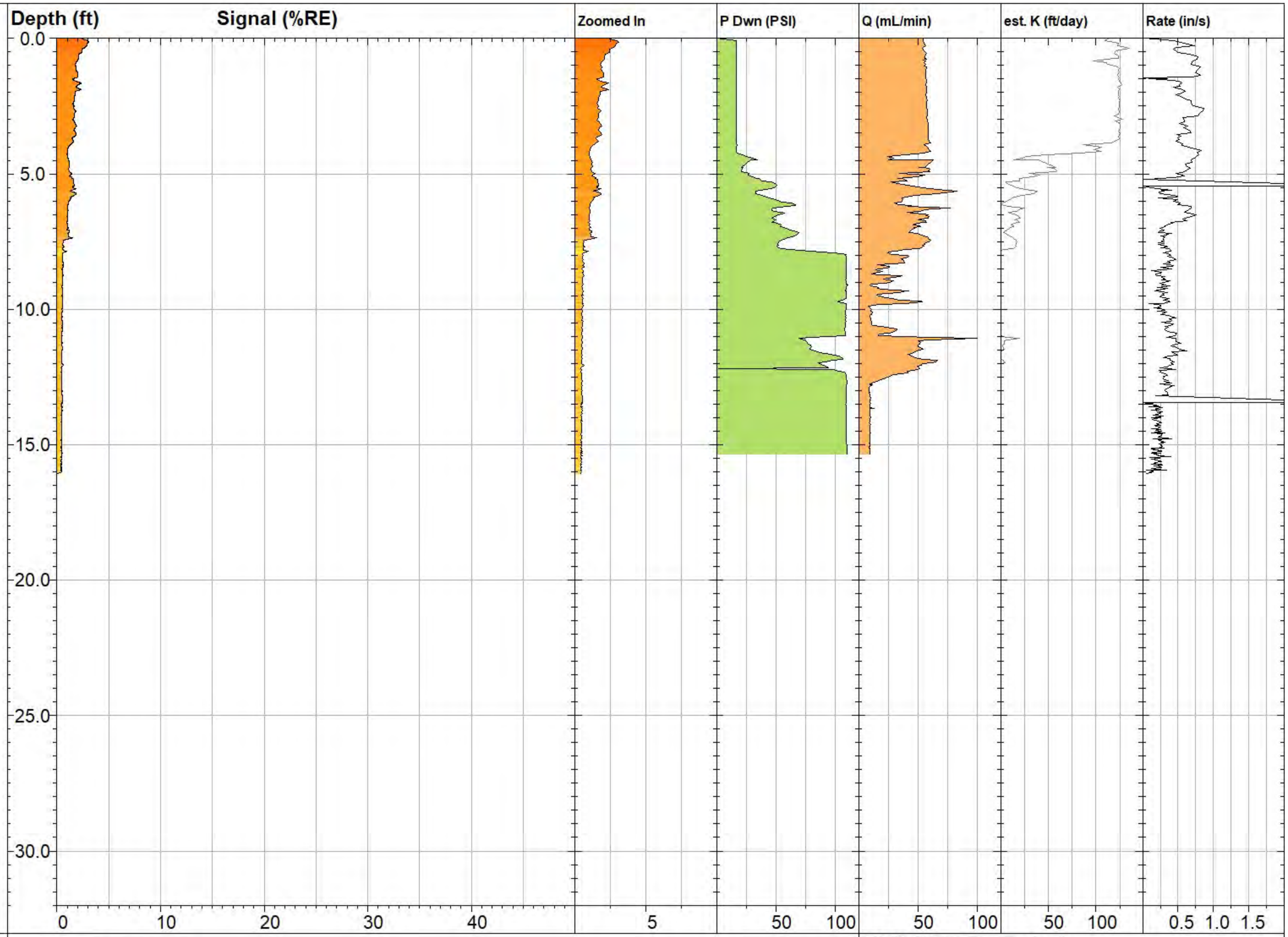
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **12.13 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **1.0 %RE @ 3.43 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-10 12:14 MDT**

Callouts

REFUSAL AT 18.67 FEET.



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WB-LIF-123

UVOST® By Dakota
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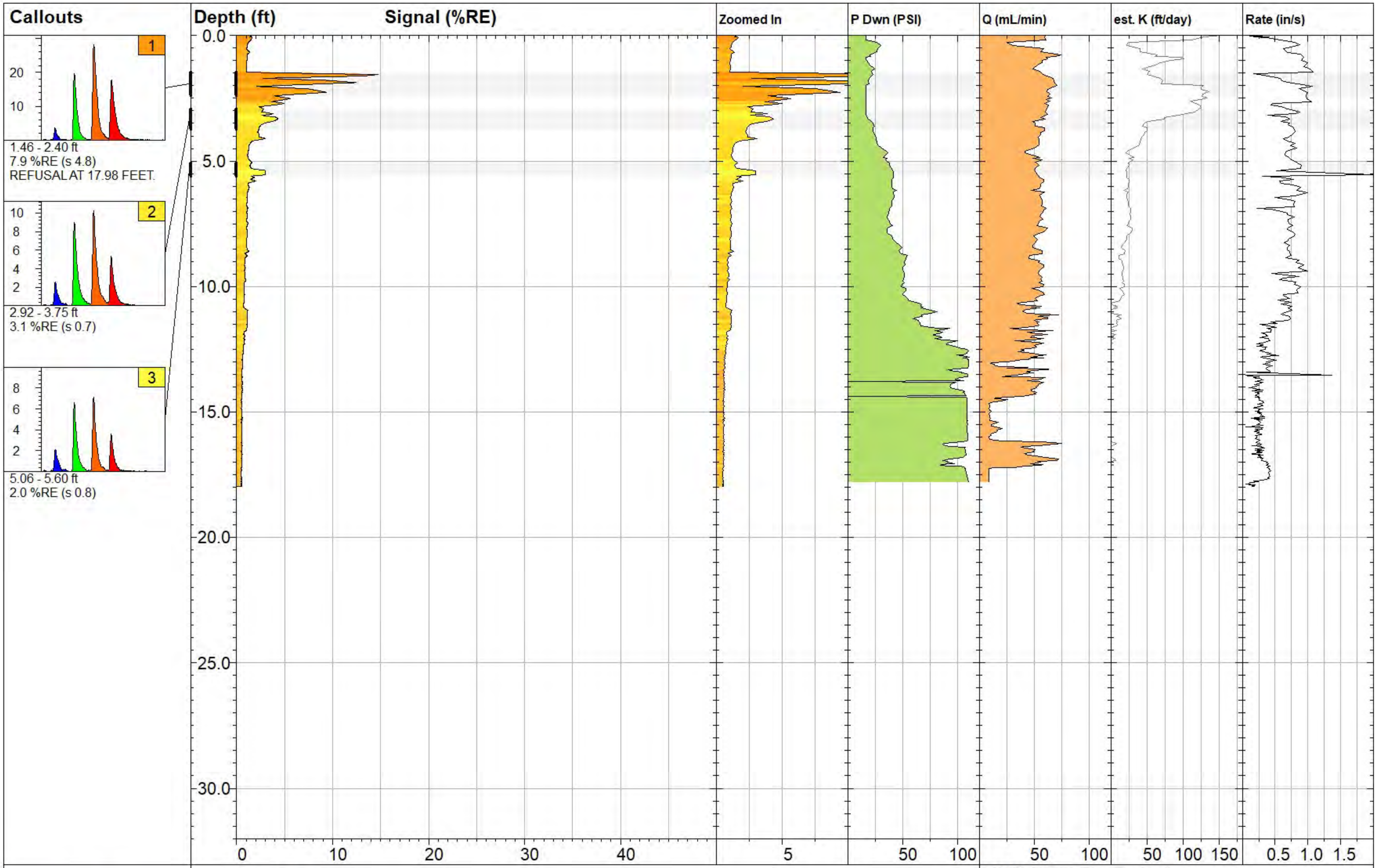
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **16.05 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **3.1 %RE @ 0.13 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-12 09:32 MDT**



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WB-LIF-125

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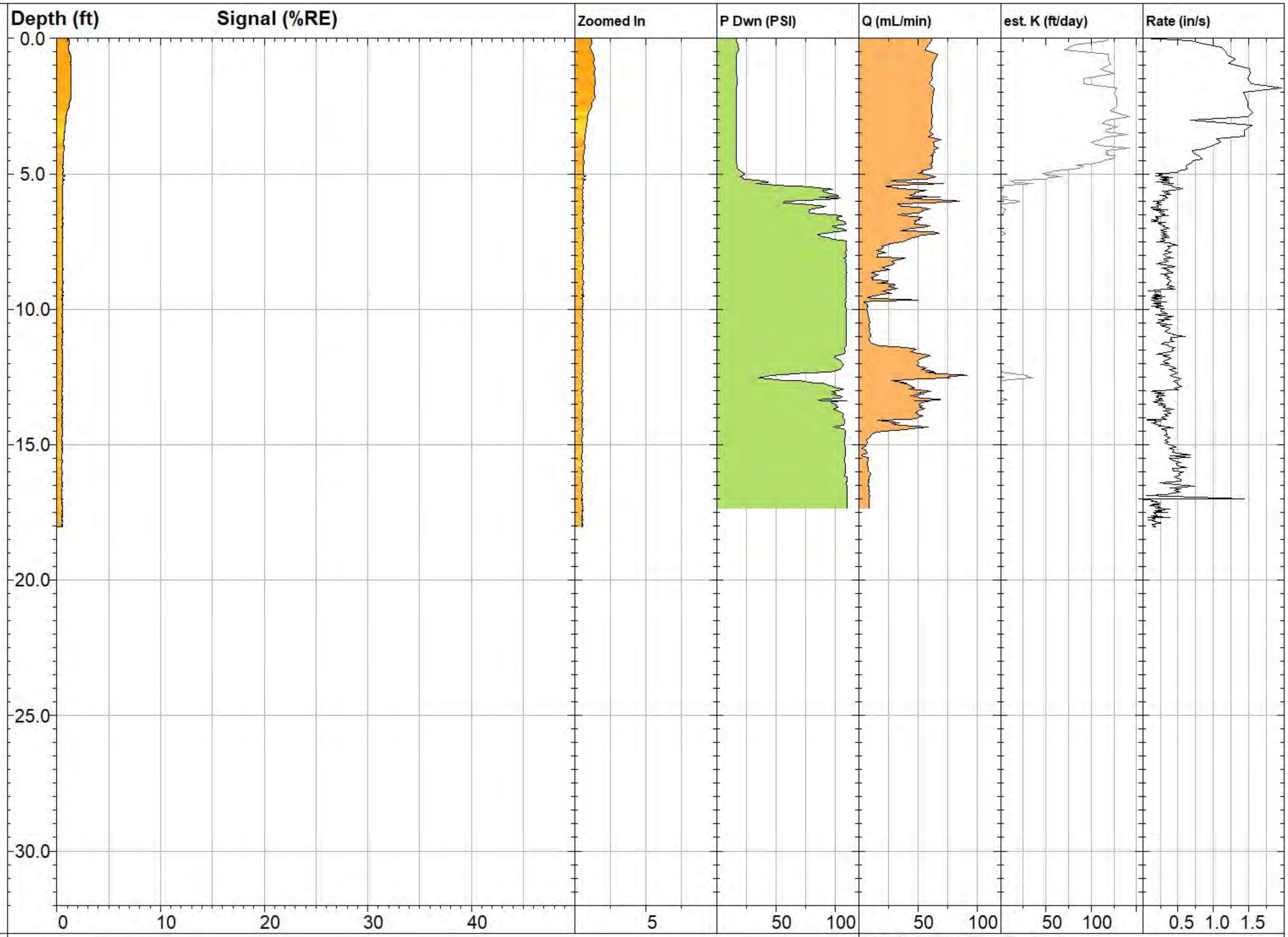
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **17.98 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **14.7 %RE @ 1.55 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-12 12:16 MDT**

Callouts

STOP LOG AT 18.04 FEET.



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WB-LIF-127

UVOST® By Dakota
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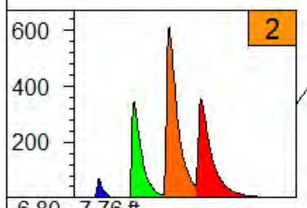
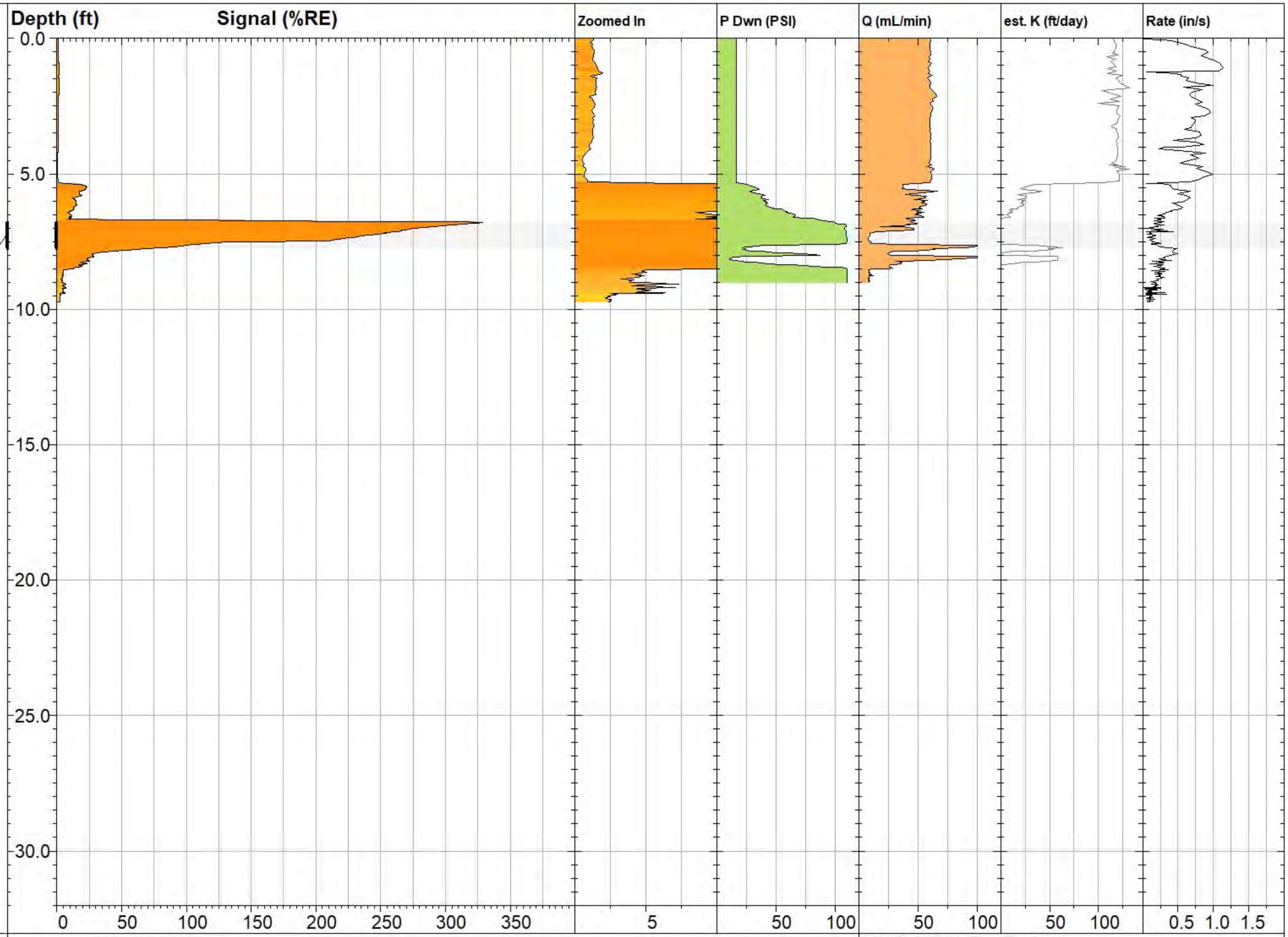
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **18.04 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **1.4 %RE @ 1.13 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-12 12:46 MDT**

Callouts

REFUSAL AT 9.72 FEET.



6.80 - 7.76 ft
223.4 %RE (s 69.5)



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WB-LIF-128

UVOST® By Dakota
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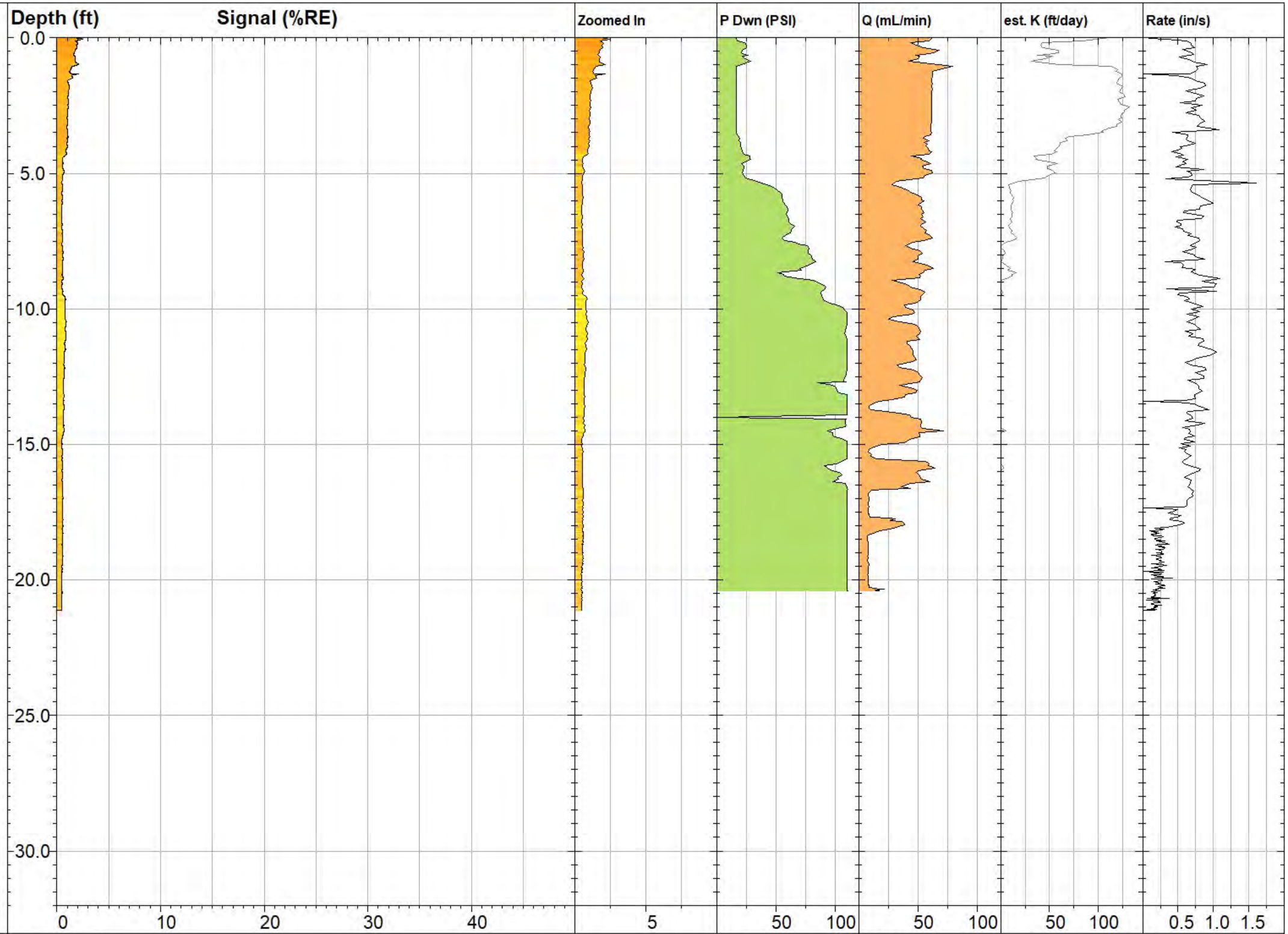
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **9.72 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **329.6 %RE @ 6.80 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-12 13:30 MDT**

Callouts

REFUSAL AT 21.12 FEET.



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WB-LIF-129

UVOST® By Dakota
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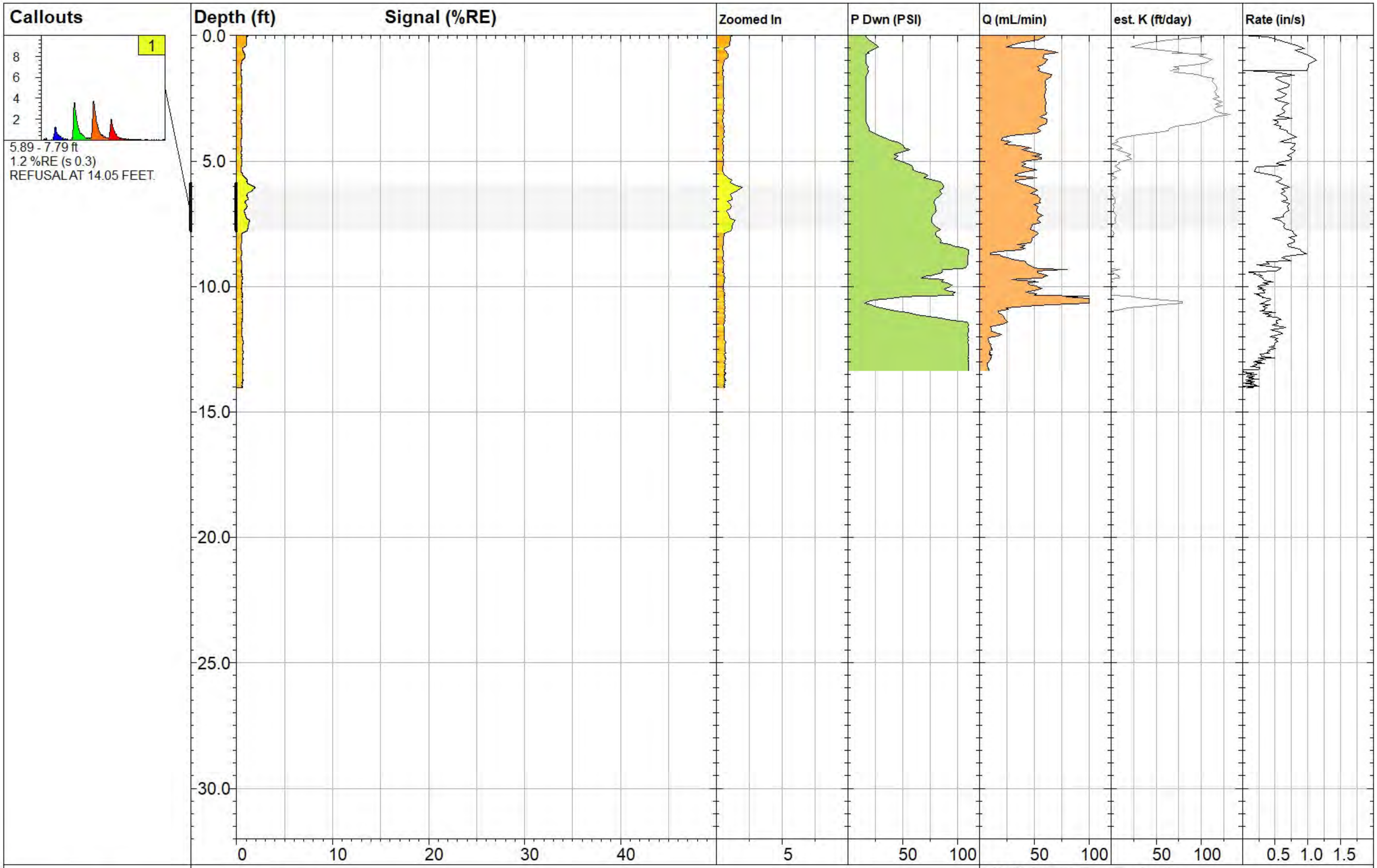
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **21.12 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **2.5 %RE @ 0.04 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-12 08:52 MDT**



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WB-LIF-130

UVOST® By Dakota
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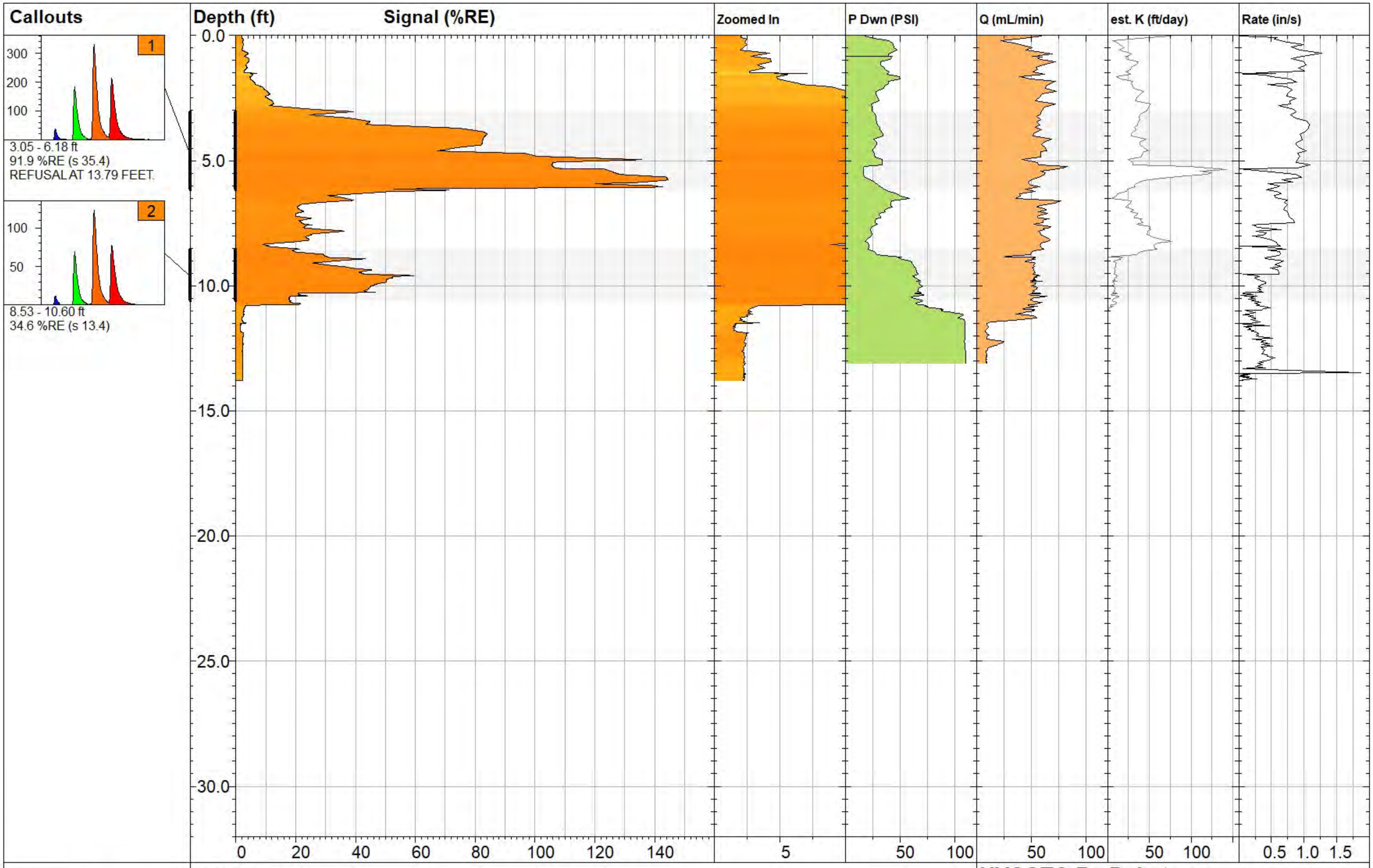
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **14.05 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **2.0 %RE @ 6.05 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-12 10:09 MDT**



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WB-LIF-136

UVOST® By Dakota
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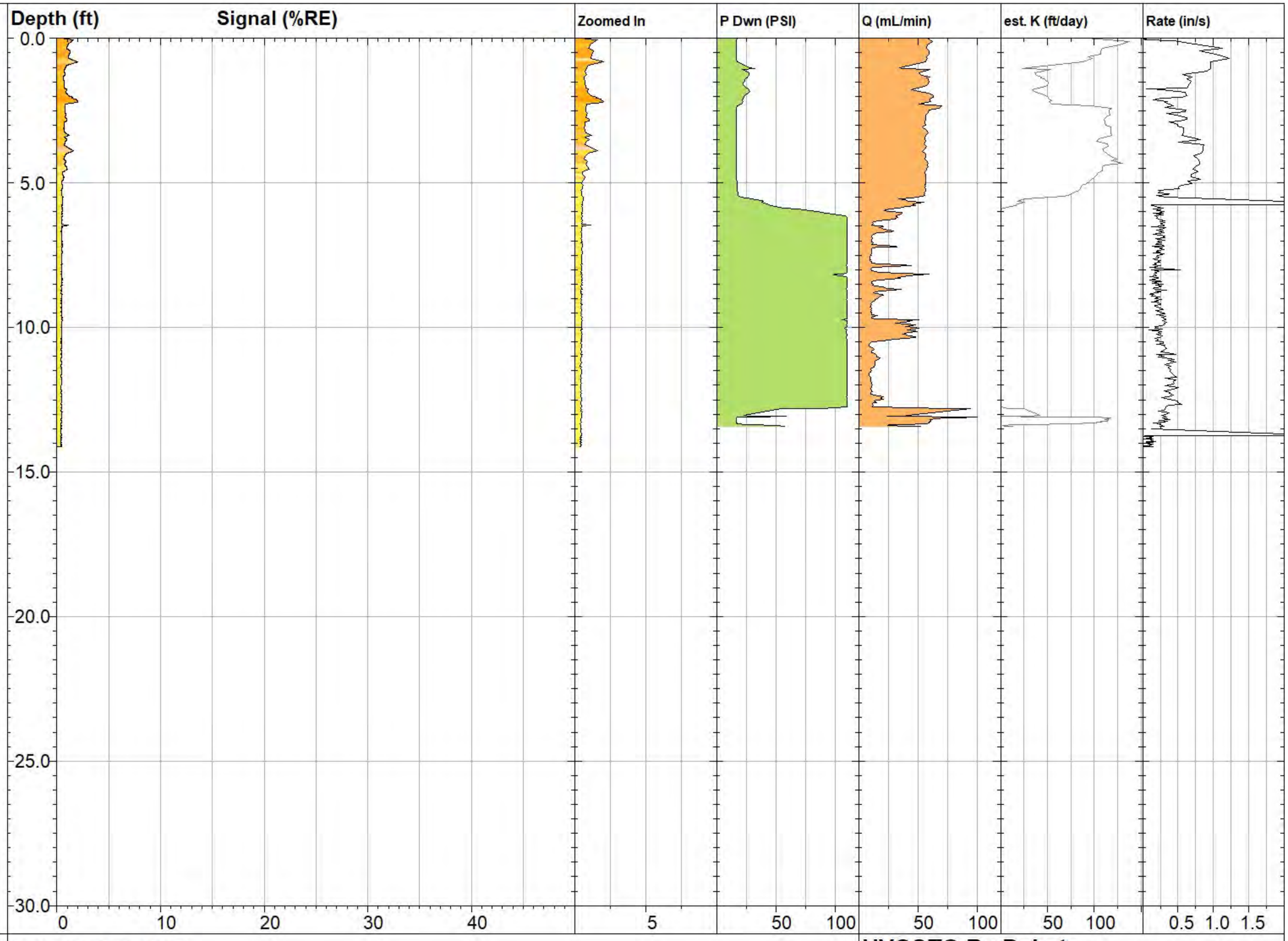
Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **13.79 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **144.5 %RE @ 5.77 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-12 15:49 MDT**

Callouts

REFUSAL AT 14.13 FEET.



DAKOTA TECHNOLOGIES

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WB-LIF-137

UVOST® By Dakota
www.DakotaTechnologies.com

Site: **Marathon Gallup Refinery**	Y Coord.(Lat/North): **Unavailable**	Final Depth: **14.13 ft**
Client / Job: **Trihydro / 0049B.21**	X Coord.(Long/East): **Unavailable**	Max Signal: **2.0 %RE @ 2.17 ft**
Operator / Unit: **BG / UVOST1612**	Elevation: **Unavailable**	Date & Time: **2021-05-10 11:04 MDT**

Appendix D – LIF/HP Elevation Data

APPENDIX D. LIF/HP ELEVATION DATA

Location Name	Latitude	Longitude	Easting	Northing	UAV Ground Surface Elevation (ft msl)
EB-LIF-02	35.48949415	-108.4244757	2547121.323	1633999.546	6958.41
EB-LIF-03	35.4892531	-108.4243654	2547150.535	1633913.67	6958.24
EB-LIF-04	35.48945235	-108.4241815	2547208.808	1633983.808	6958.79
EB-LIF-05	35.48958933	-108.4236912	2547351.967	1634034.85	6950.79
EB-LIF-06	35.48967095	-108.4234147	2547434.446	1634064.065	6935.63
EB-LIF-07	35.49072992	-108.4229797	2547566.243	1634448.738	6935.23
EB-LIF-08	35.48922125	-108.4237995	2547318.937	1633901.067	6961.09
EB-LIF-09	35.48923881	-108.4233514	2547426.075	1634108.011	6934.19
EB-LIF-11	35.48989576	-108.422932	2547581.721	1634142.974	6940.21
EB-LIF-12	35.49025398	-108.4229297	2547580.094	1634275.414	6938.35
EB-LIF-13	35.49117974	-108.4229849	2547565.686	1634612.474	6933.81
EB-LIF-14	35.49181511	-108.4229789	2547568.846	1634843.729	6936.12
EB-LIF-15	35.49007269	-108.4241239	2547224.219	1634211.554	6950.98
EB-LIF-16	35.49003786	-108.4245939	2547084.229	1634199.715	6950.67
EB-LIF-17	35.49015022	-108.4243194	2547166.175	1634240.122	6950.19
EB-LIF-18	35.49198088	-108.4247972	2547027.956	1634907.305	6928.84
EB-LIF-19	35.49197572	-108.4242977	2547176.616	1634904.534	6929.86
EB-LIF-20	35.49015666	-108.4251056	2546932.164	1634243.869	6951.49
EB-LIF-21	35.48966229	-108.4250859	2546936.939	1634063.893	6957.56
EB-LIF-22	35.48926496	-108.4251044	2546930.581	1633919.302	6958.19
EB-LIF-23	35.48905045	-108.4230387	2547545.031	1633837.546	6950.74
EB-LIF-25	35.48899483	-108.4242458	2547185.583	1633819.451	6960.65
EB-LIF-26	35.48900585	-108.4248271	2547012.547	1633824.499	6962.56
EB-LIF-27	35.48924324	-108.4256109	2546779.735	1633912.301	6958.02
EB-LIF-28	35.49017398	-108.4256409	2546772.855	1634251.132	6950.89
EB-LIF-30	35.48879167	-108.4243972	2547140.073	1633745.773	6960.94
EB-LIF-33	35.48899808	-108.4253885	2546845.414	1633822.67	6962.31
EB-LIF-34	35.48900141	-108.4258848	2546697.674	1633824.769	6962.19
MKTF-LIF-36	35.48796781	-108.4289527	2545782.111	1633454.055	6960.28
MKTF-LIF-37	35.48754575	-108.4287125	2545852.698	1633300.003	6954.78
MKTF-LIF-38	35.48739047	-108.4286994	2545856.276	1633243.458	6952.83
MKTF-LIF-39	35.48805981	-108.4291528	2545722.77	1633487.901	6949.63
MKTF-LIF-40	35.48825649	-108.4292596	2545691.385	1633559.68	6946.80

APPENDIX D. LIF/HP ELEVATION DATA

Location Name	Latitude	Longitude	Easting	Northing	UAV Ground Surface Elevation (ft msl)
MKTF-LIF-41	35.4878015	-108.4292045	2545706.797	1633393.972	6941.19
MKTF-LIF-42	35.48752451	-108.4291637	2545718.338	1633293.08	6946.26
MKTF-LIF-43	35.48738666	-108.4291408	2545724.866	1633242.866	6943.12
MKTF-LIF-44	35.48757165	-108.4284391	2545934.146	1633308.937	6939.36
MKTF-LIF-45	35.4876625	-108.4282741	2545983.48	1633341.708	6942.19
MKTF-LIF-46	35.48785391	-108.4284032	2545945.471	1633411.61	6934.04
MKTF-LIF-47	35.4882182	-108.4285556	2545900.9	1633544.478	6928.95
MKTF-LIF-48	35.4883784	-108.4285596	2545900.041	1633602.798	6932.41
MKTF-LIF-49	35.48849343	-108.4285507	2545902.947	1633644.648	6926.63
MKTF-LIF-50	35.48831778	-108.4290209	2545762.605	1633581.562	6927.62
MKTF-LIF-51	35.48860386	-108.4284713	2545926.817	1633684.703	6929.87
MKTF-LIF-52	35.48857081	-108.4290944	2545741.28	1633673.792	6961.89
MKTF-LIF-53	35.48732482	-108.4283712	2545953.809	1633218.972	6959.71
MKTF-LIF-55	35.48808811	-108.4300108	2545467.391	1633499.745	6930.60
MKTF-LIF-56	35.48875371	-108.4299676	2545481.714	1633741.933	6950.60
MKTF-LIF-58	35.48828031	-108.4302091	2545408.798	1633570.058	6945.08
MKTF-LIF-59	35.48808959	-108.4304351	2545341.09	1633501.047	6944.74
MKTF-LIF-60	35.48796243	-108.4301061	2545438.746	1633454.173	6950.29
MKTF-LIF-61	35.48777215	-108.4302447	2545397.079	1633385.162	6950.56
MKTF-LIF-63	35.48756376	-108.4304268	2545342.392	1633309.641	6944.89
MKTF-LIF-65	35.48722289	-108.4306343	2545279.892	1633185.943	6943.68
MKTF-LIF-67	35.48713244	-108.4301175	2545433.538	1633152.089	6944.38
MKTF-LIF-70	35.48837798	-108.4307128	2545259.058	1633606.516	6946.51
MKTF-LIF-72	35.48782592	-108.4309449	2545188.746	1633405.995	6947.51
MKTF-LIF-73	35.48765565	-108.4313767	2545059.84	1633344.797	6954.36
MKTF-LIF-74	35.48758181	-108.4311181	2545136.663	1633317.454	6954.89
MKTF-LIF-77	35.48693071	-108.431122	2545134.058	1633080.474	6954.10
MKTF-LIF-78	35.48671465	-108.4306874	2545262.965	1633001.047	6949.33
MKTF-LIF-84	35.48902399	-108.4283051	2545977.215	1633837.325	6948.97
MKTF-LIF-81	35.48704559	-108.4287717	2545833.991	1633118.059	6948.71
MKTF-LIF-68	35.48704068	-108.4291879	2545710.07	1633117.017	6941.43
MKTF-LIF-62	35.48772597	-108.430637	2545280.194	1633369.058	6949.23
MKTF-LIF-64	35.4873741	-108.4307126	2545256.895	1633241.123	6936.22

APPENDIX D. LIF/HP ELEVATION DATA

Location Name	Latitude	Longitude	Easting	Northing	UAV Ground Surface Elevation (ft msl)
MKTF-LIF-54	35.48742715	-108.4304725	2545328.501	1633259.999	6954.73
MKTF-LIF-88	35.48790589	-108.4320564	2544858.027	1633437.108	6942.07
MKTF-LIF-89	35.48772308	-108.4317128	2544959.923	1633369.949	6944.39
MKTF-LIF-75	35.48745528	-108.4313389	2545070.652	1633271.797	6933.69
MKTF-LIF-76	35.487197	-108.4313205	2545075.557	1633177.755	6955.32
MKTF-LIF-71	35.48816487	-108.4313457	2545070.173	1633530.088	6943.10
MKTF-LIF-79	35.48693499	-108.4304097	2545346.103	1633080.747	6946.46
MKTF-LIF-80	35.4870094	-108.4297533	2545541.695	1633106.651	6945.87
MKTF-LIF-82	35.4869596	-108.4282181	2545998.611	1633085.765	6947.36
MKTF-LIF-85	35.48880313	-108.4290754	2545747.419	1633758.318	6942.50
MKTF-LIF-79A	35.48702532	-108.4302734	2545386.874	1633113.381	6943.59
PA-LIF-7	35.48797078	-108.4262235	2546594.609	1633450.243	6941.62
PA-LIF-5	35.48805736	-108.4258927	2546693.248	1633481.165	6943.60
PA-LIF-6	35.48798305	-108.4253022	2546868.899	1633453.065	6955.03
PA-LIF-4	35.48830053	-108.4261326	2546622.386	1633570.104	6943.74
PA-LIF-3	35.48852451	-108.4259658	2546672.528	1633651.33	6947.94
MKTF-LIF-90	35.48687368	-108.4312927	2545083.106	1633060.021	6945.57
PA-LIF-1	35.48859727	-108.4251775	2546907.341	1633676.405	6919.33
PA-LIF-2	35.48865012	-108.4254399	2546829.36	1633696.113	6922.38
PA-LIF-8	35.48820636	-108.4246497	2547063.617	1633533.18	6916.61
MKTF-LIF-83	35.4891915	-108.4280632	2546049.606	1633897.859	6920.43
MKTF-LIF-86	35.48900206	-108.4293981	2545651.792	1633831.305	6917.87
MKTF-LIF-87	35.48898193	-108.4295961	2545592.819	1633824.335	6922.56
MKTF-LIF-66	35.48874976	-108.4279984	2546067.937	1633736.959	6932.01
MKTF-LIF-57	35.48809507	-108.4282042	2546005.218	1633499.032	6937.68
EB-LIF-109	35.48891713	-108.4270368	2546357.644	1633794.098	6946.72
EB-LIF-96	35.49112717	-108.4261098	2546638.428	1634596.855	6945.42
EB-LIF-99	35.49150697	-108.4268123	2546430.136	1634736.352	6944.86
EB-LIF-95	35.49080958	-108.4264955	2546522.927	1634481.946	6951.08
EB-LIF-97	35.4911302	-108.4276613	2546176.591	1634600.737	6954.46
WB-LIF-100	35.49183633	-108.4286112	2545895.372	1634859.459	6953.79
WB-LIF-119	35.49169249	-108.429177	2545726.622	1634808.119	6949.37
WB-LIF-113	35.49096142	-108.4304413	2545348.667	1634544.3	6934.75

APPENDIX D. LIF/HP ELEVATION DATA

Location Name	Latitude	Longitude	Easting	Northing	UAV Ground Surface Elevation (ft msl)
EB-LIF-92	35.48969616	-108.4264889	2546522.449	1634076.67	6932.08
EB-LIF-93	35.48967884	-108.4277066	2546159.916	1634072.548	6931.34
EB-LIF-94	35.49003166	-108.4270974	2546342.044	1634199.874	6913.99
MKTF-LIF-124	35.48944084	-108.4298849	2545510.942	1633989.829	6914.81
WB-LIF-136	35.49058222	-108.4311923	2545124.279	1634407.628	6931.23
WB-LIF-112	35.49047872	-108.4317431	2544960.093	1634370.951	6918.92
WB-LIF-115	35.49086315	-108.4289217	2545800.802	1634505.798	6920.38
MKTF-LIF-131	35.48710311	-108.4295864	2545594.686	1633138.4	6945.19
MKTF-LIF-134	35.48667014	-108.4310285	2545164.397	1632983.404	6941.09
MKTF-LIF-132	35.48709351	-108.4309556	2545187.052	1633137.372	6931.67
MKTF-LIF-133	35.48698575	-108.4314451	2545041.071	1633099.031	6934.70
MKTF-LIF-135	35.48690336	-108.4322954	2544787.783	1633070.577	6904.83
MKTF-LIF-126	35.48950931	-108.4295453	2545612.187	1634014.142	6961.34
WB-LIF-128	35.49040478	-108.4299067	2545506.586	1634340.729	6961.13
WB-LIF-127	35.49000134	-108.4296711	2545575.829	1634193.459	6960.51
WB-LIF-125	35.49000348	-108.4299704	2545486.736	1634194.776	6961.19
WB-LIF-129	35.49064895	-108.4301719	2545428.185	1634430.078	6963.43
WB-LIF-114	35.49105076	-108.4294711	2545637.664	1634575.069	6963.31
WB-LIF-130	35.49106439	-108.4290007	2545777.737	1634579.187	6963.30
WB-LIF-117	35.49181156	-108.4295463	2545616.962	1634852.124	6962.39
WB-LIF-118	35.49198762	-108.4292424	2545707.81	1634915.66	6933.84
WB-LIF-116	35.49221053	-108.4301636	2545434.078	1634998.453	6910.45
WB-LIF-110	35.49217222	-108.4303201	2545387.404	1634984.79	6894.91
WB-LIF-111	35.49292183	-108.4308211	2545239.915	1635258.54	6894.19
WB-LIF-137	35.49320768	-108.4310511	2545172.087	1635362.998	6915.10
WB-LIF-120	35.49319732	-108.4302066	2545423.467	1635357.704	6918.56
EB-LIF-105	35.4924439	-108.4251029	2546941.035	1635074.323	6922.89
EB-LIF-106	35.49243639	-108.4244724	2547128.708	1635070.467	6911.52
EB-LIF-107	35.49239975	-108.4238776	2547305.698	1635056.069	6914.94
EB-LIF-138	35.49220932	-108.4271024	2546345.328	1634992.515	6915.20
EB-LIF-102	35.49184154	-108.4263891	2546556.864	1634857.372	6918.07
EB-LIF-103	35.49202992	-108.4259172	2546697.734	1634925.098	6899.39
EB-LIF-104	35.49165146	-108.4247851	2547033.923	1634785.323	6939.38

APPENDIX D. LIF/HP ELEVATION DATA

Location Name	Latitude	Longitude	Easting	Northing	UAV Ground Surface Elevation (ft msl)
EB-LIF-121	35.49116383	-108.4242335	2547197.07	1634606.848	6909.20
EB-LIF-122	35.4899109	-108.4237328	2547343.369	1634149.91	6915.10
EB-LIF-108	35.48891822	-108.4248292	2547014.841	1633790.547	6913.82
EB-LIF-91	35.4892014	-108.4268845	2546403.601	1633897.293	6912.91
EB-LIF-101	35.49184005	-108.4278617	2546118.496	1634859.467	6920.27
EB-LIF-98	35.49145438	-108.4278936	2546108.142	1634719.149	6898.36
WB-LIF-123	35.49078308	-108.4282478	2546001.239	1634475.44	6893.13

ft msl - feet mean sea level
UAV - unmanned areal vehicle

Appendix E – Laboratory Analytical Reports

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

December 17, 2019

Brian Moore

Marathon
92 Giant Crossing Rd
Gallup, NM 87301
TEL: (505) 722-3833
FAX:

RE: LIF Investigation OrderNo.: 1911C03

Dear Brian Moore:

Hall Environmental Analysis Laboratory received 11 sample(s) on 11/26/2019 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites. In order to properly interpret your results, it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifiers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0901

Sincerely,

Andy Freeman

Laboratory Manager

4901 Hawkins NE
Albuquerque, NM 87109

Analytical Report
Lab Order **1911C03**
Date Reported: **12/17/2019**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Marathon
Client Sample ID: MKTF-LIF-53 7.8
Project: LIF Investigation
Collection Date: 11/25/2019 10:45:00 AM
Lab ID: 1911C03-001 **Matrix:** SOIL **Received Date:** 11/26/2019 12:20:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
PERCENT MOISTURE						Analyst: **JMR**	
Percent Moisture	15	1.0		wt%	1	11/26/2019 5:45:00 PM	R64814
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **BRM**	
Diesel Range Organics (DRO)	100	11		mg/Kg-dr	1	12/2/2019 10:28:48 AM	49056
Motor Oil Range Organics (MRO)	ND	57		mg/Kg-dr	1	12/2/2019 10:28:48 AM	49056
Surr: DNOP	72.4	70-130		%Rec	1	12/2/2019 10:28:48 AM	49056
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**	
Gasoline Range Organics (GRO)	1600	29		mg/Kg-dr	10	12/2/2019 11:52:49 PM	S64862
Surr: BFB	214	77.4-118	S	%Rec	10	12/2/2019 11:52:49 PM	S64862

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of range due to dilution or matrix		

Analytical Report
Lab Order **1911C03**
Date Reported: **12/17/2019**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Marathon
Client Sample ID: MKTF-LIF-53 8-9
Project: LIF Investigation
Collection Date: 11/25/2019 10:45:00 AM
Lab ID: 1911C03-002 **Matrix:** SOIL **Received Date:** 11/26/2019 12:20:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
PERCENT MOISTURE						Analyst: **JMR**	
Percent Moisture	13	1.0		wt%	1	11/26/2019 5:45:00 PM	R64814
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **BRM**	
Diesel Range Organics (DRO)	270	11		mg/Kg-dr	1	12/2/2019 10:37:56 AM	49056
Motor Oil Range Organics (MRO)	ND	56		mg/Kg-dr	1	12/2/2019 10:37:56 AM	49056
Surr: DNOP	114	70-130		%Rec	1	12/2/2019 10:37:56 AM	49056
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**	
Gasoline Range Organics (GRO)	1100	31		mg/Kg-dr	10	12/3/2019 1:00:52 AM	S64862
Surr: BFB	162	77.4-118	S	%Rec	10	12/3/2019 1:00:52 AM	S64862

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of range due to dilution or matrix		

Analytical Report
Lab Order **1911C03**
Date Reported: **12/17/2019**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Marathon
Project: LIF Investigation
Lab ID: 1911C03-003 **Matrix:** SOIL

Client Sample ID: MKTF-LIF-44 6-7
Collection Date: 11/24/2019 2:30:00 PM
Received Date: 11/26/2019 12:20:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
PERCENT MOISTURE						Analyst: **JMR**	
Percent Moisture	6.2	1.0		wt%	1	11/26/2019 5:45:00 PM	R64814
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **BRM**	
Diesel Range Organics (DRO)	84	10		mg/Kg-dr	1	12/2/2019 10:47:04 AM	49056
Motor Oil Range Organics (MRO)	ND	50		mg/Kg-dr	1	12/2/2019 10:47:04 AM	49056
Surr: DNOP	80.2	70-130		%Rec	1	12/2/2019 10:47:04 AM	49056
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**	
Gasoline Range Organics (GRO)	97	28		mg/Kg-dr	5	12/3/2019 1:23:30 AM	S64862
Surr: BFB	95.0	77.4-118		%Rec	5	12/3/2019 1:23:30 AM	S64862

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of range due to dilution or matrix		

Analytical Report
Lab Order **1911C03**
Date Reported: **12/17/2019**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Marathon
Project: LIF Investigation
Lab ID: 1911C03-004 **Matrix:** SOIL

Client Sample ID: MKTF-LIF-44 8-10
Collection Date: 11/24/2019 2:15:00 PM
Received Date: 11/26/2019 12:20:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
PERCENT MOISTURE						Analyst: **JMR**	
Percent Moisture	13	1.0		wt%	1	11/26/2019 5:45:00 PM	R64814
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **BRM**	
Diesel Range Organics (DRO)	98	11		mg/Kg-dr	1	12/2/2019 10:56:10 AM	49056
Motor Oil Range Organics (MRO)	ND	53		mg/Kg-dr	1	12/2/2019 10:56:10 AM	49056
Surr: DNOP	80.6	70-130		%Rec	1	12/2/2019 10:56:10 AM	49056
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**	
Gasoline Range Organics (GRO)	1400	18		mg/Kg-dr	5	12/3/2019 1:46:09 AM	S64862
Surr: BFB	234	77.4-118	S	%Rec	5	12/3/2019 1:46:09 AM	S64862

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of range due to dilution or matrix		

Analytical Report
Lab Order **1911C03**
Date Reported: **12/17/2019**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Marathon
Client Sample ID: MKTF-LIF-44 18-19
Project: LIF Investigation
Collection Date: 11/24/2019 2:20:00 PM
Lab ID: 1911C03-005 **Matrix:** SOIL **Received Date:** 11/26/2019 12:20:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
PERCENT MOISTURE						Analyst: **JMR**	
Percent Moisture	21	1.0		wt%	1	11/26/2019 5:45:00 PM	R64814
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **BRM**	
Diesel Range Organics (DRO)	840	12		mg/Kg-dr	1	12/2/2019 11:05:15 AM	49056
Motor Oil Range Organics (MRO)	ND	61		mg/Kg-dr	1	12/2/2019 11:05:15 AM	49056
Surr: DNOP	109	70-130		%Rec	1	12/2/2019 11:05:15 AM	49056
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**	
Gasoline Range Organics (GRO)	1500	180		mg/Kg-dr	50	12/3/2019 9:48:07 AM	S64862
Surr: BFB	114	77.4-118		%Rec	50	12/3/2019 9:48:07 AM	S64862

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of range due to dilution or matrix		

Analytical Report
Lab Order **1911C03**
Date Reported: **12/17/2019**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Marathon
Project: LIF Investigation
Lab ID: 1911C03-006 **Matrix:** SOIL

Client Sample ID: EB-LIF-34 20-21
Collection Date: 11/25/2019 8:20:00 AM
Received Date: 11/26/2019 12:20:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
PERCENT MOISTURE						Analyst: **JMR**	
Percent Moisture	16	1.0		wt%	1	11/26/2019 5:45:00 PM	R64814
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **BRM**	
Diesel Range Organics (DRO)	1300	110		mg/Kg-dr	10	12/3/2019 4:00:19 PM	49056
Motor Oil Range Organics (MRO)	ND	540		mg/Kg-dr	10	12/3/2019 4:00:19 PM	49056
Surr: DNOP	0	70-130	S	%Rec	10	12/3/2019 4:00:19 PM	49056
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**	
Gasoline Range Organics (GRO)	210	43		mg/Kg-dr	10	12/3/2019 2:31:27 AM	S64862
Surr: BFB	143	77.4-118	S	%Rec	10	12/3/2019 2:31:27 AM	S64862

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of range due to dilution or matrix		

Analytical Report
Lab Order **1911C03**
Date Reported: **12/17/2019**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Marathon
Client Sample ID: EB-LIF-19 16-18
Project: LIF Investigation
Collection Date: 11/25/2019 9:03:00 AM
Lab ID: 1911C03-007 **Matrix:** SOIL **Received Date:** 11/26/2019 12:20:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
PERCENT MOISTURE						Analyst: **JMR**	
Percent Moisture	17	1.0		wt%	1	11/26/2019 5:45:00 PM	R64814
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **BRM**	
Diesel Range Organics (DRO)	2100	120		mg/Kg-dr	10	12/3/2019 4:09:32 PM	49056
Motor Oil Range Organics (MRO)	ND	580		mg/Kg-dr	10	12/3/2019 4:09:32 PM	49056
Surr: DNOP	0	70-130	S	%Rec	10	12/3/2019 4:09:32 PM	49056
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**	
Gasoline Range Organics (GRO)	18000	420		mg/Kg-dr	100	12/3/2019 2:54:04 AM	S64862
Surr: BFB	162	77.4-118	S	%Rec	100	12/3/2019 2:54:04 AM	S64862

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of range due to dilution or matrix		

Analytical Report
Lab Order **1911C03**
Date Reported: **12/17/2019**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Marathon
Project: LIF Investigation
Lab ID: 1911C03-008 **Matrix:** SOIL

Client Sample ID: EB-LIF-20 27-28
Collection Date: 11/25/2019 1:20:00 PM
Received Date: 11/26/2019 12:20:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
PERCENT MOISTURE						Analyst: **JMR**	
Percent Moisture	12	1.0		wt%	1	11/26/2019 5:45:00 PM	R64814
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **BRM**	
Diesel Range Organics (DRO)	200	11		mg/Kg-dr	1	12/2/2019 11:32:34 AM	49056
Motor Oil Range Organics (MRO)	ND	56		mg/Kg-dr	1	12/2/2019 11:32:34 AM	49056
Surr: DNOP	83.5	70-130		%Rec	1	12/2/2019 11:32:34 AM	49056
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**	
Gasoline Range Organics (GRO)	670	29		mg/Kg-dr	10	12/3/2019 3:16:39 AM	S64862
Surr: BFB	300	77.4-118	S	%Rec	10	12/3/2019 3:16:39 AM	S64862

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
D	Sample Diluted Due to Matrix
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix
B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Limit

Analytical Report
Lab Order **1911C03**
Date Reported: **12/17/2019**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Marathon
Client Sample ID: EB-LIF-28 20-21
Project: LIF Investigation
Collection Date: 11/25/2019 9:40:00 AM
Lab ID: 1911C03-009 **Matrix:** SOIL **Received Date:** 11/26/2019 12:20:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
PERCENT MOISTURE						Analyst: **JMR**	
Percent Moisture	13	1.0		wt%	1	11/26/2019 5:45:00 PM	R64814
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **BRM**	
Diesel Range Organics (DRO)	240	110		mg/Kg-dr	10	12/3/2019 8:48:27 AM	49070
Motor Oil Range Organics (MRO)	ND	550		mg/Kg-dr	10	12/3/2019 8:48:27 AM	49070
Surr: DNOP	0	70-130	S	%Rec	10	12/3/2019 8:48:27 AM	49070
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**	
Gasoline Range Organics (GRO)	1800	31		mg/Kg-dr	10	12/3/2019 3:39:14 AM	S64862
Surr: BFB	783	77.4-118	S	%Rec	10	12/3/2019 3:39:14 AM	S64862

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of range due to dilution or matrix		

Analytical Report
Lab Order **1911C03**
Date Reported: **12/17/2019**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Marathon
Client Sample ID: EB-LIF-28 21-23
Project: LIF Investigation
Collection Date: 11/25/2019 9:30:00 AM
Lab ID: 1911C03-010 **Matrix:** SOIL **Received Date:** 11/26/2019 12:20:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
PERCENT MOISTURE						Analyst: **JMR**	
Percent Moisture	12	1.0		wt%	1	11/26/2019 5:45:00 PM	R64814
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **BRM**	
Diesel Range Organics (DRO)	780	100		mg/Kg-dr	10	12/3/2019 8:57:24 AM	49070
Motor Oil Range Organics (MRO)	ND	500		mg/Kg-dr	10	12/3/2019 8:57:24 AM	49070
Surr: DNOP	0	70-130	S	%Rec	10	12/3/2019 8:57:24 AM	49070
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**	
Gasoline Range Organics (GRO)	2100	69		mg/Kg-dr	20	12/3/2019 4:01:50 AM	S64862
Surr: BFB	448	77.4-118	S	%Rec	20	12/3/2019 4:01:50 AM	S64862

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
D	Sample Diluted Due to Matrix
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix
B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Limit

Analytical Report
Lab Order **1911C03**
Date Reported: **12/17/2019**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Marathon **Client Sample ID:** MeOH Blank
Project: LIF Investigation **Collection Date:**
Lab ID: 1911C03-011 **Matrix:** MEOH BLAN **Received Date:** 11/26/2019 12:20:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **NSB**	
Gasoline Range Organics (GRO)	ND	5.0		mg/Kg	1	12/3/2019 4:24:23 AM	S64862
Surr: BFB	79.2	77.4-118		%Rec	1	12/3/2019 4:24:23 AM	S64862

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of range due to dilution or matrix		

Laboratory Report for
Hall Environmental Analysis Laboratory

Work Order Number: 1911C03

December 16, 2019

Daniel B. Stephens & Associates, Inc.

4400 Alameda Blvd. NE, Suite C • Albuquerque, New Mexico 87113

December 16, 2019

Andy Freeman
Hall Environmental Analysis Laboratory
4901 Hawkins NE, Suite D
Albuquerque, NM 87109
(505) 345-3975

Re: DBS&A Laboratory Report for the Hall Environmental Analysis Laboratory Work Order #1911C03 Project

Dear Mr. Freeman:

Enclosed is the report for the Hall Environmental Analysis Laboratory Work Order #1911C03 project samples. Please review this report and provide any comments as samples will be held for a maximum of 30 days. After 30 days samples will be returned or disposed of in an appropriate manner.

All testing results were evaluated subjectively for consistency and reasonableness, and the results appear to be reasonably representative of the material tested. However, DBS&A does not assume any responsibility for interpretations or analyses based on the data enclosed, nor can we guarantee that these data are fully representative of the undisturbed materials at the field site. We recommend that careful evaluation of these laboratory results be made for your particular application.

The testing utilized to generate the enclosed report employs methods that are standard for the industry. The results do not constitute a professional opinion by DBS&A, nor can the results affect any professional or expert opinions rendered with respect thereto by DBS&A. You have acknowledged that all the testing undertaken by us, and the report provided, constitutes mere test results using standardized methods, and cannot be used to disqualify DBS&A from rendering any professional or expert opinion, having waived any claim of conflict of interest by DBS&A.

We are pleased to provide this service to Hall Environmental Analysis Laboratory and look forward to future laboratory testing on other projects. If you have any questions about the enclosed data, please do not hesitate to call.

Sincerely,

DANIEL B. STEPHENS & ASSOCIATES, INC.
SOIL TESTING & RESEARCH LABORATORY

Adam Bland
Laboratory Operations Manager

Enclosure

Daniel B. Stephens & Associates, Inc.
Soil Testing & Research Laboratory
4400 Alameda Blvd. NE, Suite C
Albuquerque, NM 87113
505-889-7752
FAX 505-889-0258

Summaries

Daniel B. Stephens & Associates, Inc.

Summary of Tests Performed

Laboratory Sample Number	Initial Soil Properties[1]			Saturated Hydraulic Conductivity[2]			Moisture Characteristics[3]								Particle Size[4]			Specific Gravity[5]		Air Perm-eability	Atterberg Limits	Proctor Compaction
	G	VM	VD	CH	FH	FW	HC	PP	FP	DPP	RH	EP	WHC	K_{unsat}	DS	WS	H	F	C			
MKTFLIF-53 7-8																X	X					
MKTFLIF-53 8-9																X	X					
MKTFLIF-44 6-7																X	X					
MKTFLIF-44 8-10																X	X					
MKTFLIF-44 18-19																X	X					
EB-LIF-34 20-21																X	X					
EB-LIF-19 16-19																X	X					
EB-LIF-20 27-28																X	X					
EB-LIF-28 20-21																X	X					
EB-LIF-28 21-23																X	X					

[1] G = Gravimetric Moisture Content, VM = Volume Measurement Method, VD = Volume Displacement Method

[2] CH = Constant Head Rigid Wall, FH = Falling Head Rigid Wall, FW = Falling Head Rising Tail Flexible Wall

[3] HC = Hanging Column, PP = Pressure Plate, FP = Filter Paper, DPP = Dew Point Potentiometer, RH = Relative Humidity Box, EP = Effective Porosity, WHC = Water Holding Capacity, Kunsat = Calculated Unsaturated Hydraulic Conductivity

[4] DS = Dry Sieve, WS = Wet Sieve, H = Hydrometer

[5] F = Fine (<4.75mm), C = Coarse (>4.75mm)

Notes

Sample Receipt:
Ten samples, each as loose material in a 10% full 1-gallon bag, were hand-delivered on December 2, 2019. All samples were contained in a cardboard box and were received in good order.

Sample Preparation and Testing Notes:
Each of the samples was subjected to particle size analysis, using a combination of standard sieves and client specified sieves, as well as hydrometer.

Particle diameter calculations in the hydrometer portion of the particle size analysis testing, are based on the use of an assumed specific gravity value of 2.65.

Daniel B. Stephens & Associates, Inc.

Summary of Particle Size Results

	Sieves (% Passing)													
Standard Sieve Size	3"	2"	1.5"	1"	3/4"	3/8"	#4	#10	#20	#35	#60	#120	#230	#400
Sieve Opening (mm)	75	50	37.5	25	19	9.5	4.75	2.00	0.85	0.50	0.25	0.125	0.063	0.038
Sample Number														
MKTFLIF-53 7-8	100.00	100.00	100.00	100.00	100.00	95.67	94.50	93.85	92.83	91.17	82.62	60.86	48.48	43.01
MKTFLIF-53 8-9	100.00	100.00	100.00	100.00	97.24	80.13	67.88	56.80	46.66	39.66	29.32	20.65	17.24	15.54
MKTFLIF-44 6-7	100.00	100.00	100.00	100.00	100.00	88.97	66.43	47.98	36.84	32.61	26.86	19.88	16.07	14.34
MKTFLIF-44 8-10	100.00	100.00	100.00	95.42	92.13	81.58	71.14	62.91	56.83	53.27	43.00	30.06	25.01	22.64
MKTFLIF-44 18-19	100.00	100.00	100.00	100.00	100.00	100.00	99.88	99.59	99.29	98.79	93.88	76.93	61.17	54.80
EB-LIF-34 20-21	100.00	100.00	100.00	100.00	100.00	98.62	97.09	95.05	92.84	90.27	79.61	66.04	51.47	43.50
EB-LIF-19 16-19	100.00	100.00	100.00	100.00	100.00	100.00	100.00	99.94	99.62	97.39	90.20	81.08	71.38	64.27
EB-LIF-20 27-28	100.00	100.00	100.00	100.00	100.00	100.00	94.92	91.11	85.96	78.04	51.13	31.01	22.14	18.76
EB-LIF-28 20-21	100.00	100.00	100.00	100.00	95.50	83.34	76.92	72.30	66.75	60.78	41.58	27.14	22.23	19.90
EB-LIF-28 21-23	100.00	100.00	100.00	100.00	100.00	88.37	76.41	64.54	53.97	45.01	30.61	21.91	17.90	15.96

Daniel B. Stephens & Associates, Inc.

Percent Gravel, Sand, Silt and Clay

Sample Number	% Medium - Coarse Gravel* (>8mm)	% Fine Gravel* (<8mm, >2mm)	% Coarse Sand (<2mm, >0.5mm)	% Medium Sand (<.5mm, >0.25mm)	% Fine Sand (<0.25mm, >0.125mm)	% Very Fine Sand (<.0.125mm, >0.063mm)	% Coarse Silt (<.0.063mm, >0.038mm)	% Fine Silt (<.0.038mm, >0.002mm)	% Clay** (<0.002mm)
MKTFLIF-53 7-8	4.6	1.5	2.7	8.6	21.8	12.4	5.5	26.0	17.0
MKTFLIF-53 8-9	22.9	20.3	17.1	10.3	8.7	3.4	1.7	8.8	6.8
MKTFLIF-44 6-7	16.6	35.4	15.4	5.8	7.0	3.8	1.7	6.2	8.1
MKTFLIF-44 8-10	21.0	16.1	9.6	10.3	12.9	5.1	2.4	12.2	10.4
MKTFLIF-44 18-19	0.0	0.4	0.8	4.9	16.9	15.8	6.4	31.4	23.4
EB-LIF-34 20-21	1.8	3.2	4.8	10.7	13.6	14.6	8.0	23.9	19.6
EB-LIF-19 16-19	0.0	0.1	2.5	7.2	9.1	9.7	7.1	30.6	33.7
EB-LIF-20 27-28	1.3	7.6	13.1	26.9	20.1	8.9	3.4	11.1	7.7
EB-LIF-28 20-21	18.3	9.5	11.5	19.2	14.4	4.9	2.3	10.5	9.4
EB-LIF-28 21-23	14.6	20.9	19.5	14.4	8.7	4.0	1.9	9.1	6.9

*Percent passing and retained on 8 mm sieve interpolated from percent passing 9.75 and 4.75 mm results.
**USCS classification does not classify clay fraction based on particle size. USDA definition of clay (<0.002mm) used in this table.

Particle Size Analysis

Daniel B. Stephens & Associates, Inc.

Summary of Particle Size Results

	Sieves (% Passing)													
Standard Sieve Size	3"	2"	1.5"	1"	3/4"	3/8"	#4	#10	#20	#35	#60	#120	#230	#400
Sieve Opening (mm)	75	50	37.5	25	19	9.5	4.75	2.00	0.85	0.50	0.25	0.125	0.063	0.038
Sample Number														
MKTFLIF-53 7-8	100.00	100.00	100.00	100.00	100.00	95.67	94.50	93.85	92.83	91.17	82.62	60.86	48.48	43.01
MKTFLIF-53 8-9	100.00	100.00	100.00	100.00	97.24	80.13	67.88	56.80	46.66	39.66	29.32	20.65	17.24	15.54
MKTFLIF-44 6-7	100.00	100.00	100.00	100.00	100.00	88.97	66.43	47.98	36.84	32.61	26.86	19.88	16.07	14.34
MKTFLIF-44 8-10	100.00	100.00	100.00	95.42	92.13	81.58	71.14	62.91	56.83	53.27	43.00	30.06	25.01	22.64
MKTFLIF-44 18-19	100.00	100.00	100.00	100.00	100.00	100.00	99.88	99.59	99.29	98.79	93.88	76.93	61.17	54.80
EB-LIF-34 20-21	100.00	100.00	100.00	100.00	100.00	98.62	97.09	95.05	92.84	90.27	79.61	66.04	51.47	43.50
EB-LIF-19 16-19	100.00	100.00	100.00	100.00	100.00	100.00	100.00	99.94	99.62	97.39	90.20	81.08	71.38	64.27
EB-LIF-20 27-28	100.00	100.00	100.00	100.00	100.00	100.00	94.92	91.11	85.96	78.04	51.13	31.01	22.14	18.76
EB-LIF-28 20-21	100.00	100.00	100.00	100.00	95.50	83.34	76.92	72.30	66.75	60.78	41.58	27.14	22.23	19.90
EB-LIF-28 21-23	100.00	100.00	100.00	100.00	100.00	88.37	76.41	64.54	53.97	45.01	30.61	21.91	17.90	15.96

Daniel B. Stephens & Associates, Inc.

Percent Gravel, Sand, Silt and Clay

Sample Number	% Medium - Coarse Gravel* (>8mm)	% Fine Gravel* (<8mm, >2mm)	% Coarse Sand (<2mm, >0.5mm)	% Medium Sand (<.5mm, >0.25mm)	% Fine Sand (<0.25mm, >0.125mm)	% Very Fine Sand (<.0.125mm, >0.063mm)	% Coarse Silt (<.0.063mm, >0.038mm)	% Fine Silt (<.0.038mm, >0.002mm)	% Clay** (<0.002mm)
MKTFLIF-53 7-8	4.6	1.5	2.7	8.6	21.8	12.4	5.5	26.0	17.0
MKTFLIF-53 8-9	22.9	20.3	17.1	10.3	8.7	3.4	1.7	8.8	6.8
MKTFLIF-44 6-7	16.6	35.4	15.4	5.8	7.0	3.8	1.7	6.2	8.1
MKTFLIF-44 8-10	21.0	16.1	9.6	10.3	12.9	5.1	2.4	12.2	10.4
MKTFLIF-44 18-19	0.0	0.4	0.8	4.9	16.9	15.8	6.4	31.4	23.4
EB-LIF-34 20-21	1.8	3.2	4.8	10.7	13.6	14.6	8.0	23.9	19.6
EB-LIF-19 16-19	0.0	0.1	2.5	7.2	9.1	9.7	7.1	30.6	33.7
EB-LIF-20 27-28	1.3	7.6	13.1	26.9	20.1	8.9	3.4	11.1	7.7
EB-LIF-28 20-21	18.3	9.5	11.5	19.2	14.4	4.9	2.3	10.5	9.4
EB-LIF-28 21-23	14.6	20.9	19.5	14.4	8.7	4.0	1.9	9.1	6.9

*Percent passing and retained on 8 mm sieve interpolated from percent passing 9.75 and 4.75 mm results.
**USCS classification does not classify clay fraction based on particle size. USDA definition of clay (<0.002mm) used in this table.

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Wet Sieve Data (#10 Split)

Job Name: Hall Environmental Analysis Laboratory
Job Number: DB19.1446.00
Sample Number: MKTFLIF-53 7-8
HEAL ID: 1911C03-001B
Lab Label: MK-1
Test Date: 12-Dec-19

Initial Dry Weight of Sample (g): 132.91
Weight Passing #10 (g): 124.73
Weight Retained #10 (g): 8.18
Weight of Hydrometer Sample (g): 62.19
Calculated Weight of Sieve Sample (g): 66.27
Shape: Rounded
Hardness: Hard and durable

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	132.91	100.00
	2"	50	0.00	0.00	132.91	100.00
	1.5"	38.1	0.00	0.00	132.91	100.00
	1"	25	0.00	0.00	132.91	100.00
	3/4"	19.0	0.00	0.00	132.91	100.00
	3/8"	9.5	5.76	5.76	127.15	95.67
	4	4.75	1.55	7.31	125.60	94.50
	10	2.00	0.87	8.18	124.73	93.85
-10			(Based on calculated sieve wt.)			
	20	0.85	0.67	4.75	61.52	92.83
	35	0.500	1.10	5.85	60.42	91.17
	60	0.250	5.67	11.52	54.75	82.62
	120	0.125	14.42	25.94	40.33	60.86
	230	0.063	8.20	34.14	32.13	48.48
	400	0.038	3.63	37.77	28.50	43.01
	dry pan		0.28	38.05	28.22	
	wet pan			28.22	0.00	

Laboratory analysis by: A. Albay-Yenney
Data entered by: A. Albay-Yenney
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Hydrometer Data

Job Name: Hall Environmental Analysis Laboratory
Job Number: DB19.1446.00
Sample Number: MKTFLIF-53 7-8
HEAL ID: 1911C03-001B
Lab Label: MK-1
Test Date: 10-Dec-19
Start Time: 9:00

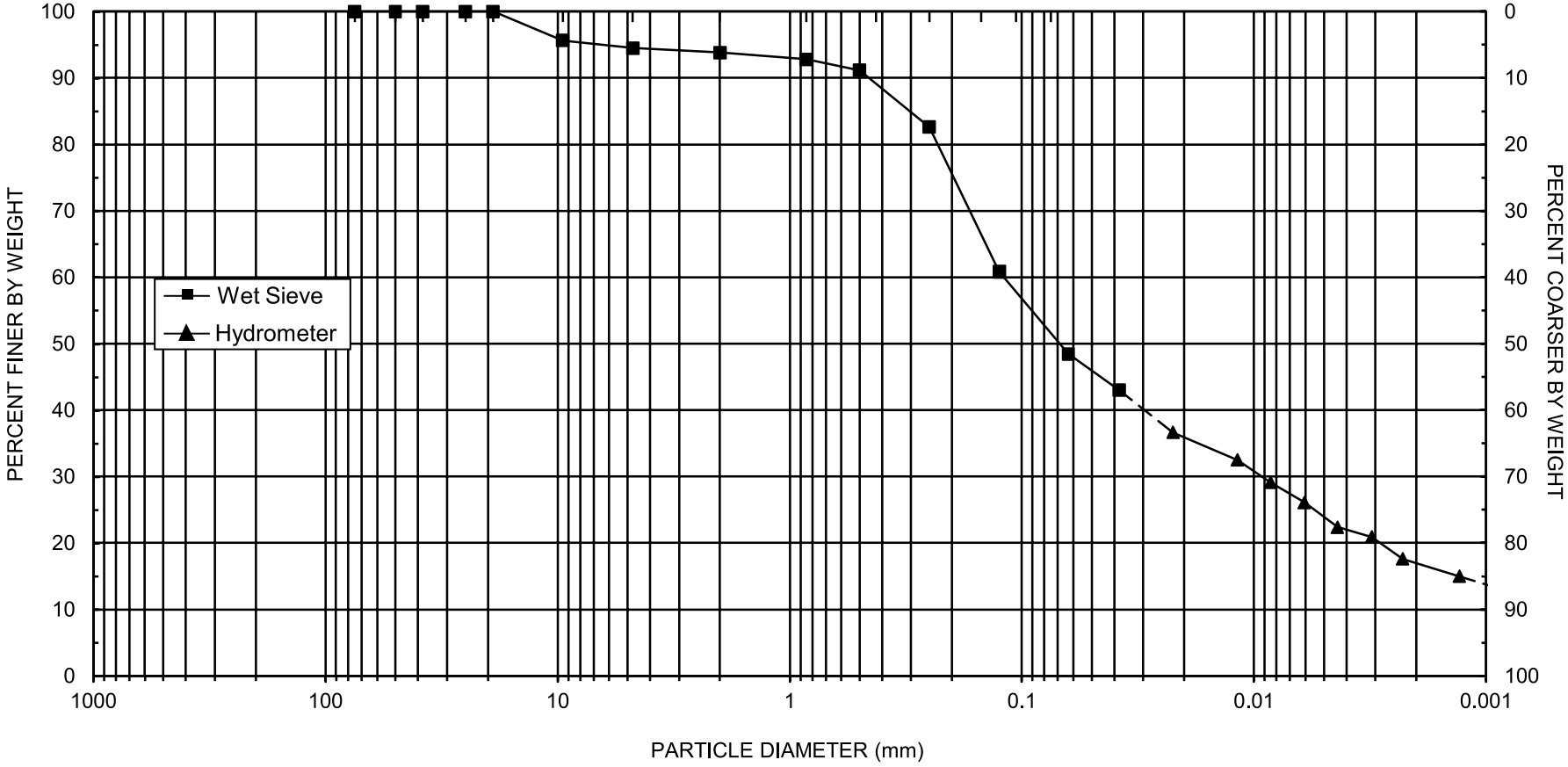
Type of Water Used: DISTILLED
Reaction with H_2O_2*:* NA
Dispersant:* $(NaPO_3)_6$
Assumed particle density: 2.65
Initial Wt. (g)*:* 62.19
Total Sample Wt. (g)*:* 132.91
Wt. Passing #10 (g)*:* 124.73

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	H_m (cm)	D (mm)	P (%)	% Finer
10-Dec-19	4	19.6	31.00	6.70	24.3	11	0.0223	39	36.7
	15	19.6	28.25	6.70	21.5	11	0.0118	35	32.5
	30	19.7	26.00	6.67	19.3	12	0.0085	31	29.2
	60	19.7	24.00	6.67	17.3	12	0.0061	28	26.2
	120	19.8	21.50	6.64	14.9	12	0.0044	24	22.4
	240	19.8	20.50	6.64	13.9	12	0.0031	22	20.9
	458	20.0	18.25	6.57	11.7	13	0.0023	19	17.6
11-Dec-19	1434	18.5	17.00	7.05	10.0	13	0.0013	16	15.0

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: J. Niedbala
Data entered by: A. Albay-Yenney
Checked by: J. Hines



SAMPLE NUMBER	LAB LABEL
MKTFLIF-53 7-8	**MK-1**

Daniel B. Stephens & Associates, Inc.

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Wet Sieve Data (#10 Split)

Job Name: Hall Environmental Analysis Laboratory
Job Number: DB19.1446.00
Sample Number: MKTFLIF-53 8-9
HEAL ID: 1911C03-002B
Lab Label: MK-2
Test Date: 12-Dec-19

Initial Dry Weight of Sample (g): 412.72
Weight Passing #10 (g): 234.41
Weight Retained #10 (g): 178.31
Weight of Hydrometer Sample (g): 55.87
Calculated Weight of Sieve Sample (g): 98.37
Shape: Rounded
Hardness: Hard and durable

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	412.72	100.00
	2"	50	0.00	0.00	412.72	100.00
	1.5"	38.1	0.00	0.00	412.72	100.00
	1"	25	0.00	0.00	412.72	100.00
	3/4"	19.0	11.38	11.38	401.34	97.24
	3/8"	9.5	70.61	81.99	330.73	80.13
	4	4.75	50.56	132.55	280.17	67.88
	10	2.00	45.76	178.31	234.41	56.80
-10			(Based on calculated sieve wt.)			
	20	0.85	9.97	52.47	45.90	46.66
	35	0.500	6.89	59.36	39.01	39.66
	60	0.250	10.17	69.53	28.84	29.32
	120	0.125	8.53	78.06	20.31	20.65
	230	0.063	3.35	81.41	16.96	17.24
	400	0.038	1.67	83.08	15.29	15.54
	dry pan		0.05	83.13	15.24	
	wet pan			15.24	0.00	

Laboratory analysis by: A. Albay-Yenney
Data entered by: A. Albay-Yenney
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Hydrometer Data

Job Name: Hall Environmental Analysis Laboratory
Job Number: DB19.1446.00
Sample Number: MKTFLIF-53 8-9
HEAL ID: 1911C03-002B
Lab Label: MK-2
Test Date: 10-Dec-19
Start Time: 9:06

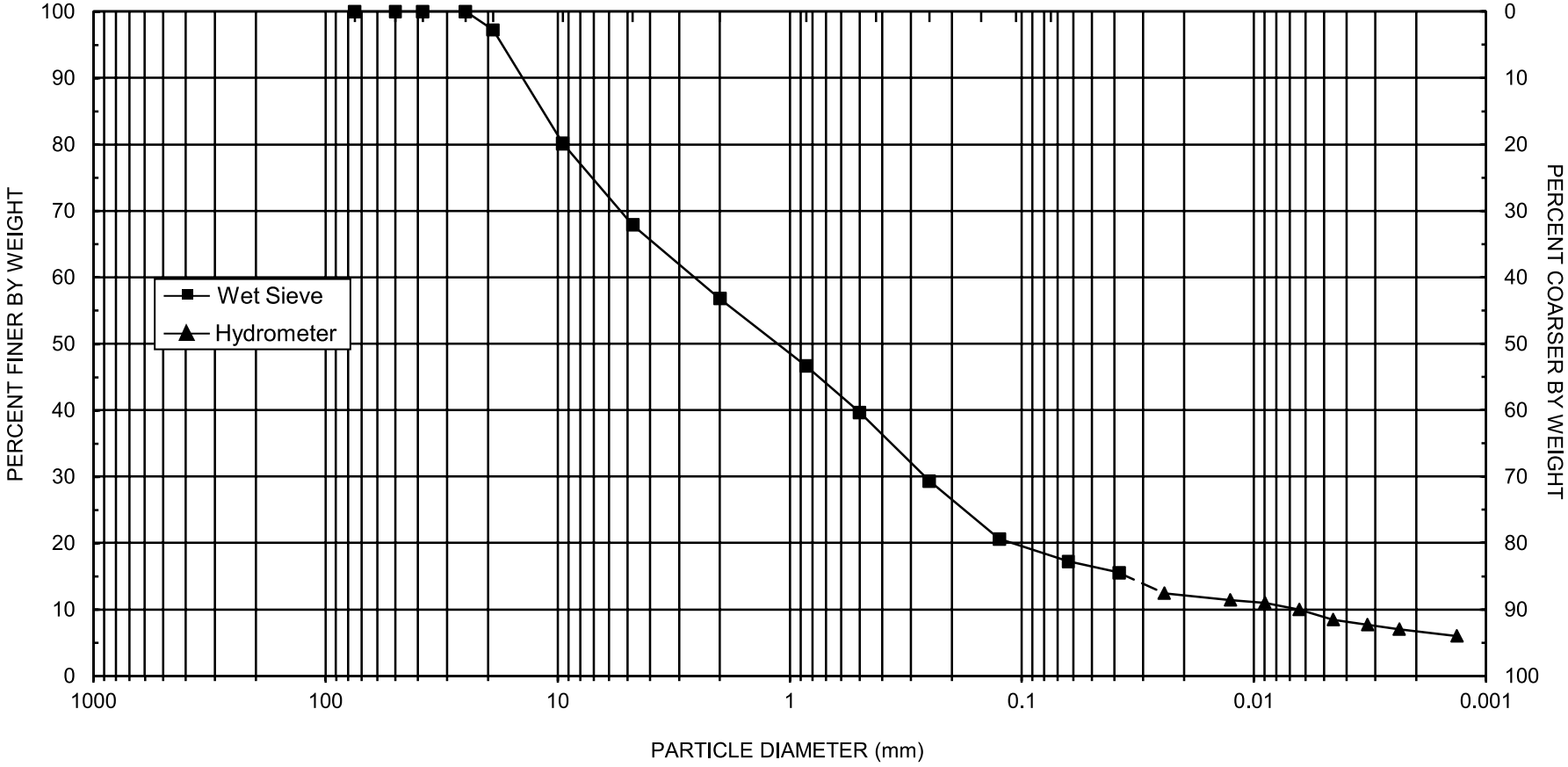
Type of Water Used: DISTILLED
Reaction with H_2O_2*:* NA
Dispersant:* $(NaPO_3)_6$
Assumed particle density: 2.65
Initial Wt. (g)*:* 55.87
Total Sample Wt. (g)*:* 412.72
Wt. Passing #10 (g)*:* 234.41

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	H_m (cm)	D (mm)	P (%)	% Finer
10-Dec-19	4	19.6	19.00	6.70	12.3	13	0.0243	22	12.5
	15	19.6	18.00	6.70	11.3	13	0.0126	20	11.5
	30	19.7	17.50	6.67	10.8	13	0.0090	19	11.0
	60	19.8	16.50	6.64	9.9	13	0.0064	18	10.0
	120	19.8	15.00	6.64	8.4	13	0.0046	15	8.5
	240	19.8	14.25	6.64	7.6	14	0.0032	14	7.7
	454	20.0	13.50	6.57	6.9	14	0.0024	12	7.0
11-Dec-19	1430	18.5	13.00	7.05	6.0	14	0.0013	11	6.1

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: J. Niedbala
Data entered by: A. Albay-Yenney
Checked by: J. Hines



SAMPLE NUMBER	LAB LABEL
MKTFLIF-53 8-9	**MK-2**

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Wet Sieve Data (#10 Split)

Job Name: Hall Environmental Analysis Laboratory
Job Number: DB19.1446.00
Sample Number: MKTFLIF-44 6-7
HEAL ID: 1911C03-003B
Lab Label: MK-3
Test Date: 12-Dec-19

Initial Dry Weight of Sample (g): 268.10
Weight Passing #10 (g): 128.63
Weight Retained #10 (g): 139.47
Weight of Hydrometer Sample (g): 74.08
Calculated Weight of Sieve Sample (g): 154.40

Shape: Rounded
Hardness: Hard and durable

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	268.10	100.00
	2"	50	0.00	0.00	268.10	100.00
	1.5"	38.1	0.00	0.00	268.10	100.00
	1"	25	0.00	0.00	268.10	100.00
	3/4"	19.0	0.00	0.00	268.10	100.00
	3/8"	9.5	29.56	29.56	238.54	88.97
	4	4.75	60.45	90.01	178.09	66.43
	10	2.00	49.46	139.47	128.63	47.98
-10			(Based on calculated sieve wt.)			
	20	0.85	17.20	97.52	56.88	36.84
	35	0.500	6.53	104.05	50.35	32.61
	60	0.250	8.88	112.93	41.47	26.86
	120	0.125	10.77	123.70	30.70	19.88
	230	0.063	5.88	129.58	24.82	16.07
	400	0.038	2.68	132.26	22.14	14.34
	dry pan		0.10	132.36	22.04	
	wet pan			22.04	0.00	

Laboratory analysis by: A. Albay-Yenney
Data entered by: A. Albay-Yenney
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Hydrometer Data

Job Name: Hall Environmental Analysis Laboratory
Job Number: DB19.1446.00
Sample Number: MKTFLIF-44 6-7
HEAL ID: 1911C03-003B
Lab Label: MK-3
Test Date: 10-Dec-19
Start Time: 9:12

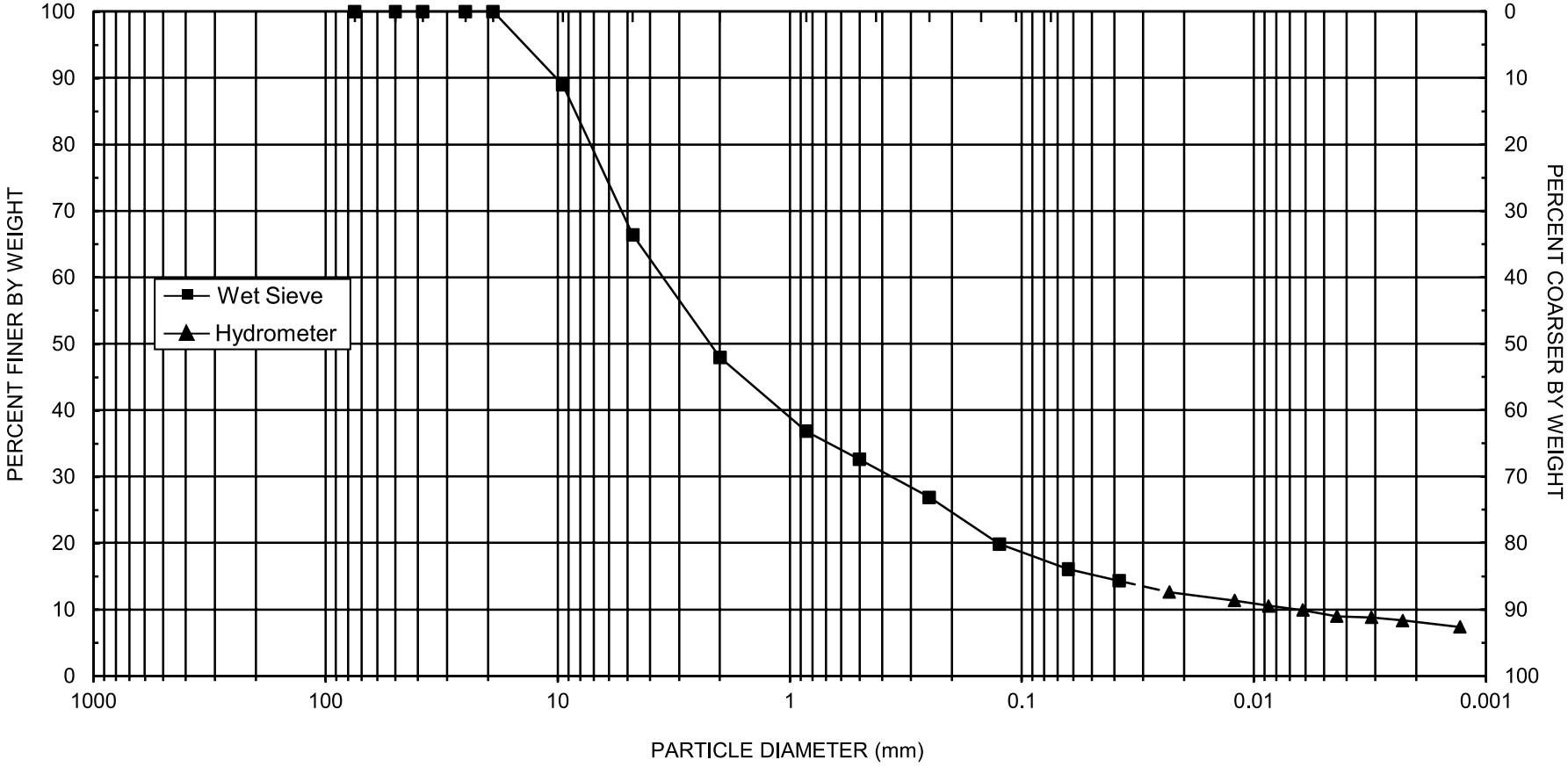
Type of Water Used: DISTILLED
Reaction with H_2O_2*:* NA
Dispersant:* $(NaPO_3)_6$
Assumed particle density: 2.65
Initial Wt. (g)*:* 74.08
Total Sample Wt. (g)*:* 268.10
Wt. Passing #10 (g)*:* 128.63

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	H_m (cm)	D (mm)	P (%)	% Finer
10-Dec-19	4	19.6	26.25	6.70	19.5	12	0.0231	26	12.7
	15	19.7	24.25	6.67	17.6	12	0.0121	24	11.4
	30	19.7	23.00	6.67	16.3	12	0.0086	22	10.6
	60	19.8	22.00	6.64	15.4	12	0.0061	21	9.9
	120	19.8	20.50	6.64	13.9	12	0.0044	19	9.0
	240	19.8	20.25	6.64	13.6	13	0.0031	18	8.8
	449	20.0	19.50	6.57	12.9	13	0.0023	17	8.4
11-Dec-19	1425	18.5	18.50	7.05	11.5	13	0.0013	15	7.4

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: J. Niedbala
Data entered by: A. Albay-Yenney
Checked by: J. Hines



SAMPLE NUMBER	LAB LABEL
MKTFLIF-44 6-7	**MK-3**

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Wet Sieve Data (#10 Split)

Job Name: Hall Environmental Analysis Laboratory
Job Number: DB19.1446.00
Sample Number: MKTFLIF-44 8-10
HEAL ID: 1911C03-004B
Lab Label: MK-4
Test Date: 12-Dec-19

Initial Dry Weight of Sample (g): 580.93
Weight Passing #10 (g): 365.48
Weight Retained #10 (g): 215.45
Weight of Hydrometer Sample (g): 59.02
Calculated Weight of Sieve Sample (g): 93.81
Shape: Rounded
Hardness: Hard and durable

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	580.93	100.00
	2"	50	0.00	0.00	580.93	100.00
	1.5"	38.1	0.00	0.00	580.93	100.00
	1"	25	26.62	26.62	554.31	95.42
	3/4"	19.0	19.10	45.72	535.21	92.13
	3/8"	9.5	61.27	106.99	473.94	81.58
	4	4.75	60.64	167.63	413.30	71.14
	10	2.00	47.82	215.45	365.48	62.91
-10			(Based on calculated sieve wt.)			
	20	0.85	5.71	40.50	53.31	56.83
	35	0.500	3.34	43.84	49.97	53.27
	60	0.250	9.63	53.47	40.34	43.00
	120	0.125	12.14	65.61	28.20	30.06
	230	0.063	4.74	70.35	23.46	25.01
	400	0.038	2.22	72.57	21.24	22.64
	dry pan		0.13	72.70	21.11	
	wet pan			21.11	0.00	

Laboratory analysis by: A. Albay-Yenney
Data entered by: A. Albay-Yenney
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Hydrometer Data

Job Name: Hall Environmental Analysis Laboratory
Job Number: DB19.1446.00
Sample Number: MKTFLIF-44 8-10
HEAL ID: 1911C03-004B
Lab Label: MK-4
Test Date: 10-Dec-19
Start Time: 9:18

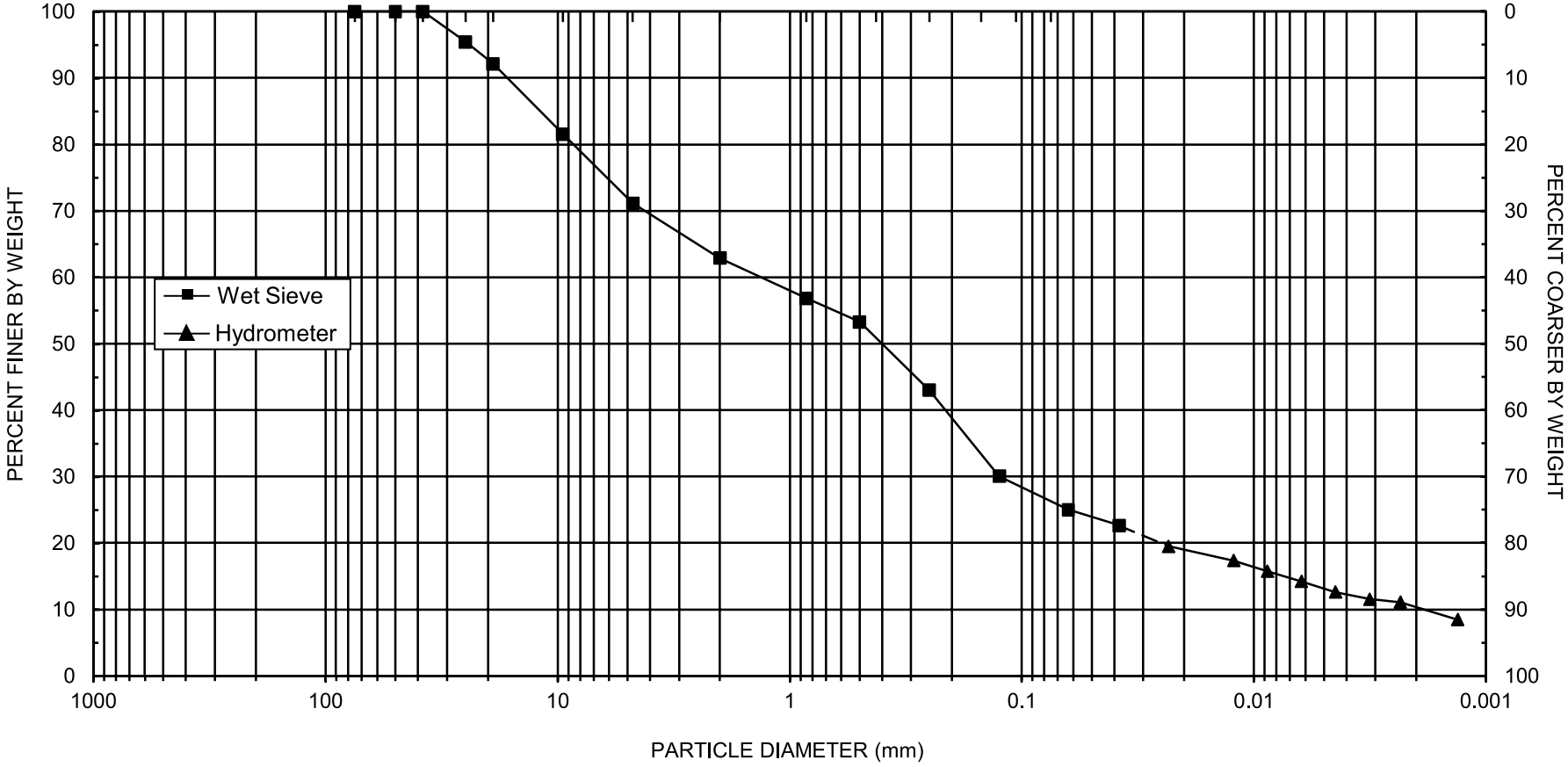
Type of Water Used: DISTILLED
Reaction with H_2O_2*:* NA
Dispersant:* $(NaPO_3)_6$
Assumed particle density: 2.65
Initial Wt. (g)*:* 59.02
Total Sample Wt. (g)*:* 580.93
Wt. Passing #10 (g)*:* 365.48

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	H_m (cm)	D (mm)	P (%)	% Finer
10-Dec-19	4	19.7	25.00	6.67	18.3	12	0.0233	31	19.5
	15	19.7	23.00	6.67	16.3	12	0.0122	28	17.4
	30	19.7	21.50	6.67	14.8	12	0.0087	25	15.8
	60	19.8	20.00	6.64	13.4	13	0.0062	23	14.2
	120	19.8	18.50	6.64	11.9	13	0.0045	20	12.6
	240	19.8	17.50	6.64	10.9	13	0.0032	18	11.6
	444	20.0	17.00	6.57	10.4	13	0.0023	18	11.1
11-Dec-19	1420	18.5	15.00	7.05	8.0	13	0.0013	13	8.5

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: J. Niedbala
Data entered by: A. Albay-Yenney
Checked by: J. Hines



SAMPLE NUMBER	LAB LABEL
MKTFLIF-44 8-10	**MK-4**

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Wet Sieve Data (#10 Split)

Job Name: Hall Environmental Analysis Laboratory
Job Number: DB19.1446.00
Sample Number: MKTFLIF-44 18-19
HEAL ID: 1911C03-005B
Lab Label: MK-5
Test Date: 19-Dec-19

Initial Dry Weight of Sample (g): 283.00
Weight Passing #10 (g): 281.84
Weight Retained #10 (g): 1.16
Weight of Hydrometer Sample (g): 55.94
Calculated Weight of Sieve Sample (g): 56.17
Shape: Rounded
Hardness: Soft

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	283.00	100.00
	2"	50	0.00	0.00	283.00	100.00
	1.5"	38.1	0.00	0.00	283.00	100.00
	1"	25	0.00	0.00	283.00	100.00
	3/4"	19.0	0.00	0.00	283.00	100.00
	3/8"	9.5	0.00	0.00	283.00	100.00
	4	4.75	0.33	0.33	282.67	99.88
	10	2.00	0.83	1.16	281.84	99.59
-10			(Based on calculated sieve wt.)			
	20	0.85	0.17	0.40	55.77	99.29
	35	0.500	0.28	0.68	55.49	98.79
	60	0.250	2.76	3.44	52.73	93.88
	120	0.125	9.52	12.96	43.21	76.93
	230	0.063	8.85	21.81	34.36	61.17
	400	0.038	3.58	25.39	30.78	54.80
	dry pan		0.33	25.72	30.45	
	wet pan			30.45	0.00	

Laboratory analysis by: A. Albay-Yenney
Data entered by: A. Albay-Yenney
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Hydrometer Data

Job Name: Hall Environmental Analysis Laboratory
Job Number: DB19.1446.00
Sample Number: MKTFLIF-44 18-19
HEAL ID: 1911C03-005B
Lab Label: MK-5
Test Date: 10-Dec-19
Start Time: 9:24

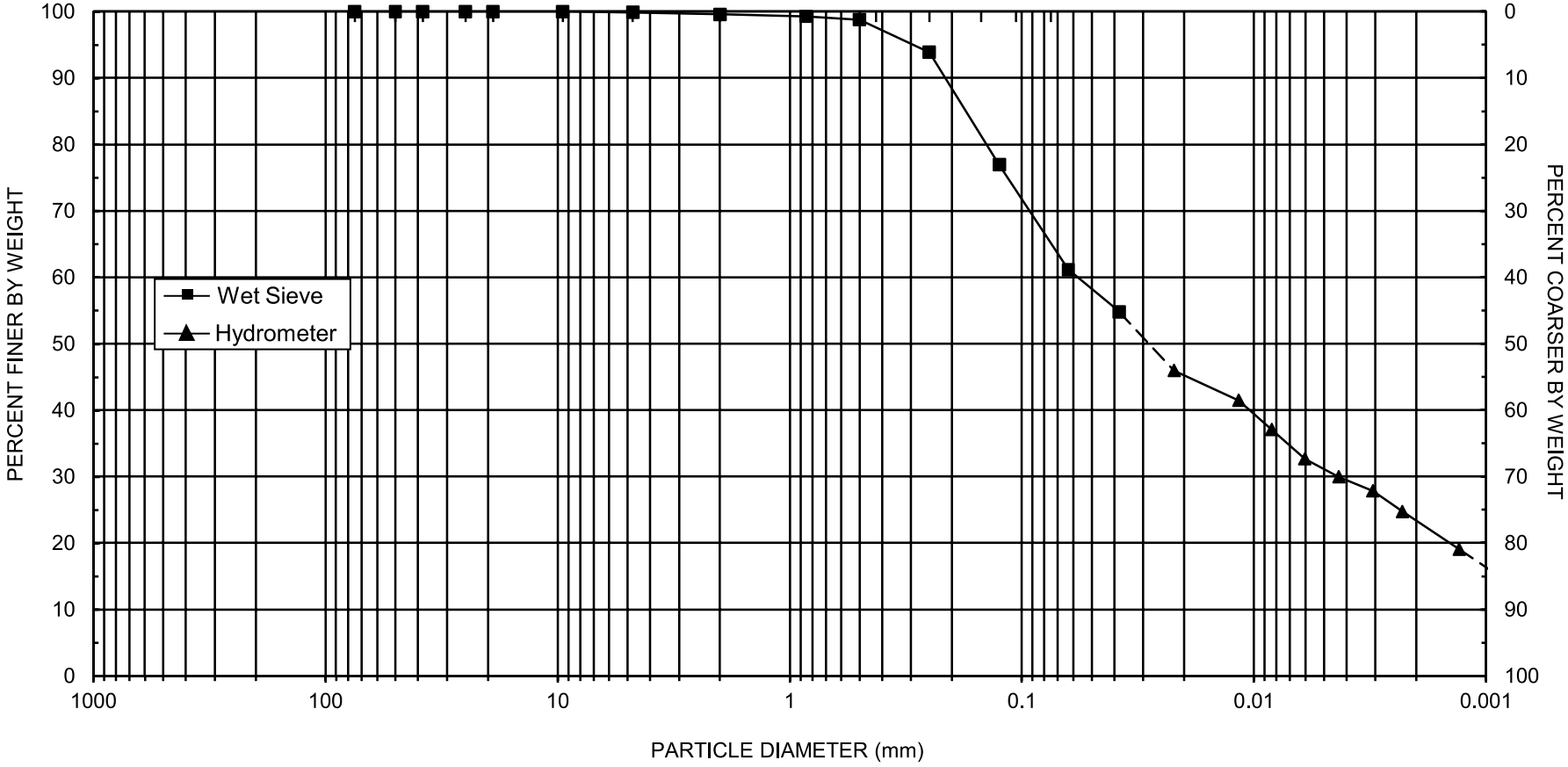
Type of Water Used: DISTILLED
Reaction with H_2O_2*:* NA
Dispersant:* $(NaPO_3)_6$
Assumed particle density: 2.65
Initial Wt. (g)*:* 55.94
Total Sample Wt. (g)*:* 283.00
Wt. Passing #10 (g)*:* 281.84

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	H_m (cm)	D (mm)	P (%)	% Finer
10-Dec-19	4	19.7	32.50	6.67	25.8	10	0.0221	46	46.0
	15	19.7	30.00	6.67	23.3	11	0.0116	42	41.5
	30	19.7	27.50	6.67	20.8	11	0.0084	37	37.1
	60	19.8	25.00	6.64	18.4	12	0.0060	33	32.7
	120	19.8	23.50	6.64	16.9	12	0.0043	30	30.0
	240	19.9	22.25	6.60	15.6	12	0.0031	28	27.9
	441	20.0	20.50	6.57	13.9	12	0.0023	25	24.8
11-Dec-19	1415	18.5	17.75	7.05	10.7	13	0.0013	19	19.1

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: J. Niedbala
Data entered by: A. Albay-Yenney
Checked by: J. Hines



SAMPLE NUMBER	LAB LABEL
MKTFLIF-44 18-19	**MK-5**

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Wet Sieve Data (#10 Split)

Job Name: Hall Environmental Analysis Laboratory
Job Number: DB19.1446.00
Sample Number: EB-LIF-34 20-21
HEAL ID: 1911C03-006B
Lab Label: EB-1
Test Date: 12-Dec-19

Initial Dry Weight of Sample (g): 366.17
Weight Passing #10 (g): 348.06
Weight Retained #10 (g): 18.11
Weight of Hydrometer Sample (g): 55.83
Calculated Weight of Sieve Sample (g): 58.73

Shape: Rounded
Hardness: Hard and durable

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	366.17	100.00
	2"	50	0.00	0.00	366.17	100.00
	1.5"	38.1	0.00	0.00	366.17	100.00
	1"	25	0.00	0.00	366.17	100.00
	3/4"	19.0	0.00	0.00	366.17	100.00
	3/8"	9.5	5.04	5.04	361.13	98.62
	4	4.75	5.60	10.64	355.53	97.09
	10	2.00	7.47	18.11	348.06	95.05
-10			(Based on calculated sieve wt.)			
	20	0.85	1.30	4.20	54.53	92.84
	35	0.500	1.51	5.71	53.02	90.27
	60	0.250	6.26	11.97	46.76	79.61
	120	0.125	7.97	19.94	38.79	66.04
	230	0.063	8.56	28.50	30.23	51.47
	400	0.038	4.68	33.18	25.55	43.50
	dry pan		0.40	33.58	25.15	
	wet pan			25.15	0.00	

Laboratory analysis by: A. Albay-Yenney
Data entered by: A. Albay-Yenney
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Hydrometer Data

Job Name: Hall Environmental Analysis Laboratory
Job Number: DB19.1446.00
Sample Number: EB-LIF-34 20-21
HEAL ID: 1911C03-006B
Lab Label: EB-1
Test Date: 12/10/19q
Start Time: 9:30

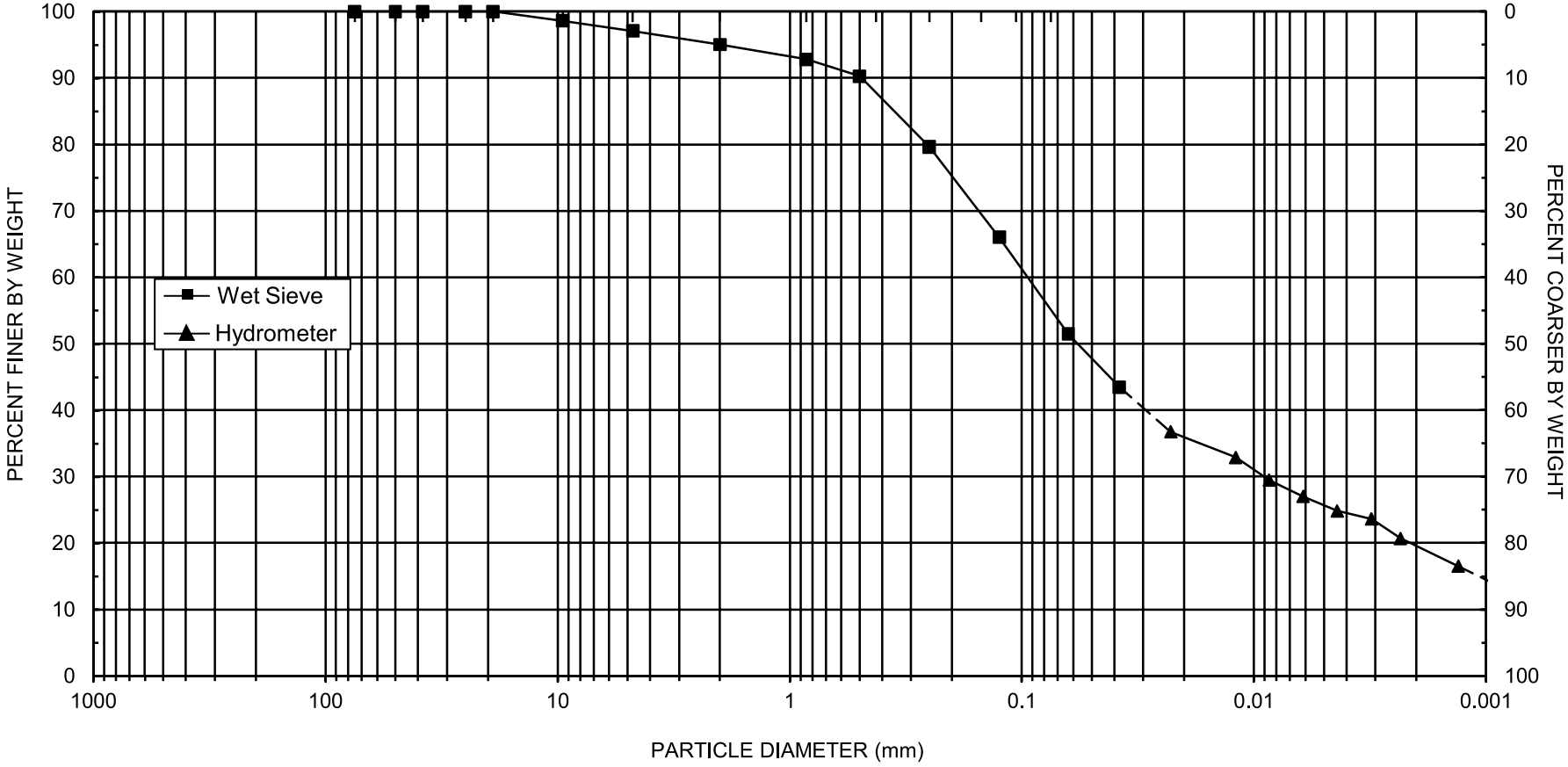
Type of Water Used: DISTILLED
Reaction with H_2O_2*:* NA
Dispersant:* $(NaPO_3)_6$
Assumed particle density: 2.65
Initial Wt. (g)*:* 55.83
Total Sample Wt. (g)*:* 366.17
Wt. Passing #10 (g)*:* 348.06

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	H_m (cm)	D (mm)	P (%)	% Finer
10-Dec-19	4	19.7	28.25	6.67	21.6	11	0.0228	39	36.7
	15	19.7	26.00	6.67	19.3	12	0.0120	35	32.9
	30	19.7	24.00	6.67	17.3	12	0.0086	31	29.5
	60	19.8	22.50	6.64	15.9	12	0.0061	28	27.0
	120	19.8	21.25	6.64	14.6	12	0.0044	26	24.9
	240	19.9	20.50	6.60	13.9	13	0.0031	25	23.7
	436	20.0	18.75	6.57	12.2	13	0.0023	22	20.7
11-Dec-19	1410	18.5	16.75	7.05	9.7	13	0.0013	17	16.5

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: J. Niedbala
Data entered by: A. Albay-Yenney
Checked by: J. Hines



SAMPLE NUMBER	LAB LABEL
EB-LIF-34 20-21	**EB-1**

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Wet Sieve Data (#10 Split)

Job Name: Hall Environmental Analysis Laboratory
Job Number: DB19.1446.00
Sample Number: EB-LIF-19 16-19
HEAL ID: 1911C03-007B
Lab Label: EB-2
Test Date: 12-Dec-19

Initial Dry Weight of Sample (g): 539.36
Weight Passing #10 (g): 539.01
Weight Retained #10 (g): 0.35
Weight of Hydrometer Sample (g): 57.81
Calculated Weight of Sieve Sample (g): 57.85
Shape: Rounded
Hardness: Soft

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	539.36	100.00
	2"	50	0.00	0.00	539.36	100.00
	1.5"	38.1	0.00	0.00	539.36	100.00
	1"	25	0.00	0.00	539.36	100.00
	3/4"	19.0	0.00	0.00	539.36	100.00
	3/8"	9.5	0.00	0.00	539.36	100.00
	4	4.75	0.00	0.00	539.36	100.00
	10	2.00	0.35	0.35	539.01	99.94
-10			(Based on calculated sieve wt.)			
	20	0.85	0.18	0.22	57.63	99.62
	35	0.500	1.29	1.51	56.34	97.39
	60	0.250	4.16	5.67	52.18	90.20
	120	0.125	5.28	10.95	46.90	81.08
	230	0.063	5.61	16.56	41.29	71.38
	400	0.038	4.11	20.67	37.18	64.27
	dry pan		0.45	21.12	36.73	
	wet pan			36.73	0.00	

Laboratory analysis by: A. Albay-Yenney
Data entered by: A. Albay-Yenney
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Hydrometer Data

Job Name: Hall Environmental Analysis Laboratory
Job Number: DB19.1446.00
Sample Number: EB-LIF-19 16-19
HEAL ID: 1911C03-007B
Lab Label: EB-2
Test Date: 10-Dec-19
Start Time: 9:36

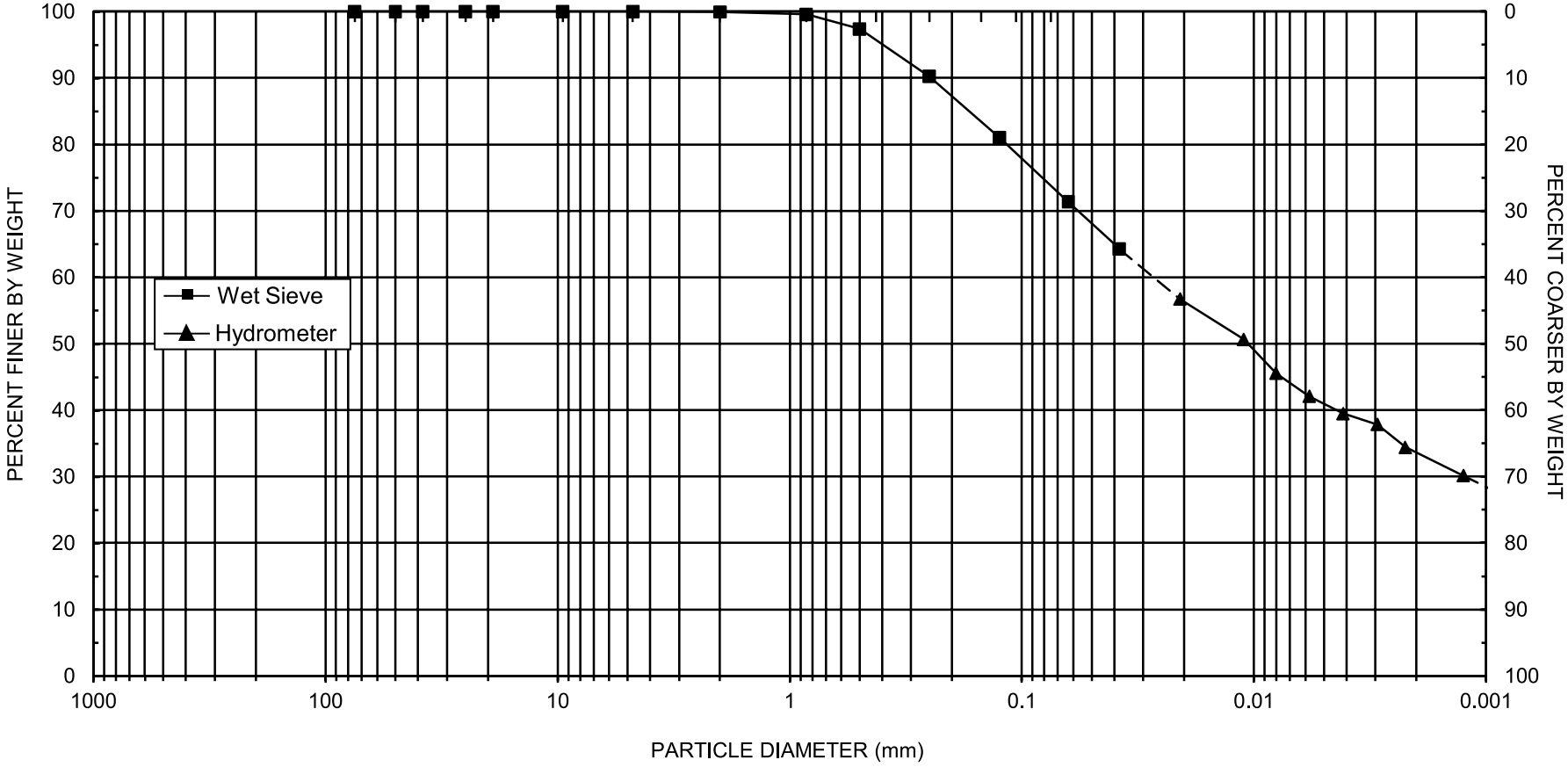
Type of Water Used: DISTILLED
Reaction with H_2O_2*:* NA
Dispersant:* $(NaPO_3)_6$
Assumed particle density: 2.65
Initial Wt. (g)*:* 57.81
Total Sample Wt. (g)*:* 539.36
Wt. Passing #10 (g)*:* 539.01

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	H_m (cm)	D (mm)	P (%)	% Finer
10-Dec-19	4	19.7	39.50	6.67	32.8	9	0.0208	57	56.8
	15	19.7	36.00	6.67	29.3	10	0.0111	51	50.7
	30	19.8	33.00	6.64	26.4	10	0.0080	46	45.6
	60	19.8	31.00	6.64	24.4	11	0.0058	42	42.1
	120	19.8	29.50	6.64	22.9	11	0.0041	40	39.5
	240	19.9	28.50	6.60	21.9	11	0.0029	38	37.8
	431	20.0	26.50	6.57	19.9	11	0.0022	34	34.4
11-Dec-19	1406	18.5	24.50	7.05	17.5	12	0.0012	30	30.2

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: J. Niedbala
Data entered by: A. Albay-Yenney
Checked by: J. Hines



SAMPLE NUMBER	LAB LABEL
EB-LIF-19 16-19	**EB-2**

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Wet Sieve Data (#10 Split)

Job Name: Hall Environmental Analysis Laboratory
Job Number: DB19.1446.00
Sample Number: EB-LIF-20 27-28
HEAL ID: 1911C03-008B
Lab Label: EB-3
Test Date: 12-Dec-19

Initial Dry Weight of Sample (g): 29.70
Weight Passing #10 (g): 27.06
Weight Retained #10 (g): 2.64
Weight of Hydrometer Sample (g): 26.91
Calculated Weight of Sieve Sample (g): 29.54

Shape: Rounded
Hardness: Hard and durable

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	29.70	100.00
	2"	50	0.00	0.00	29.70	100.00
	1.5"	38.1	0.00	0.00	29.70	100.00
	1"	25	0.00	0.00	29.70	100.00
	3/4"	19.0	0.00	0.00	29.70	100.00
	3/8"	9.5	0.00	0.00	29.70	100.00
	4	4.75	1.51	1.51	28.19	94.92
	10	2.00	1.13	2.64	27.06	91.11
-10			(Based on calculated sieve wt.)			
	20	0.85	1.52	4.15	25.39	85.96
	35	0.500	2.34	6.49	23.05	78.04
	60	0.250	7.95	14.44	15.10	51.13
	120	0.125	5.94	20.38	9.16	31.01
	230	0.063	2.62	23.00	6.54	22.14
	400	0.038	1.00	24.00	5.54	18.76
	dry pan		0.01	24.01	5.53	
	wet pan			5.53	0.00	

Laboratory analysis by: A. Albay-Yenney
Data entered by: A. Albay-Yenney
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Hydrometer Data

Job Name: Hall Environmental Analysis Laboratory
Job Number: DB19.1446.00
Sample Number: EB-LIF-20 27-28
HEAL ID: 1911C03-008B
Lab Label: EB-3
Test Date: 10-Dec-19
Start Time: 9:42

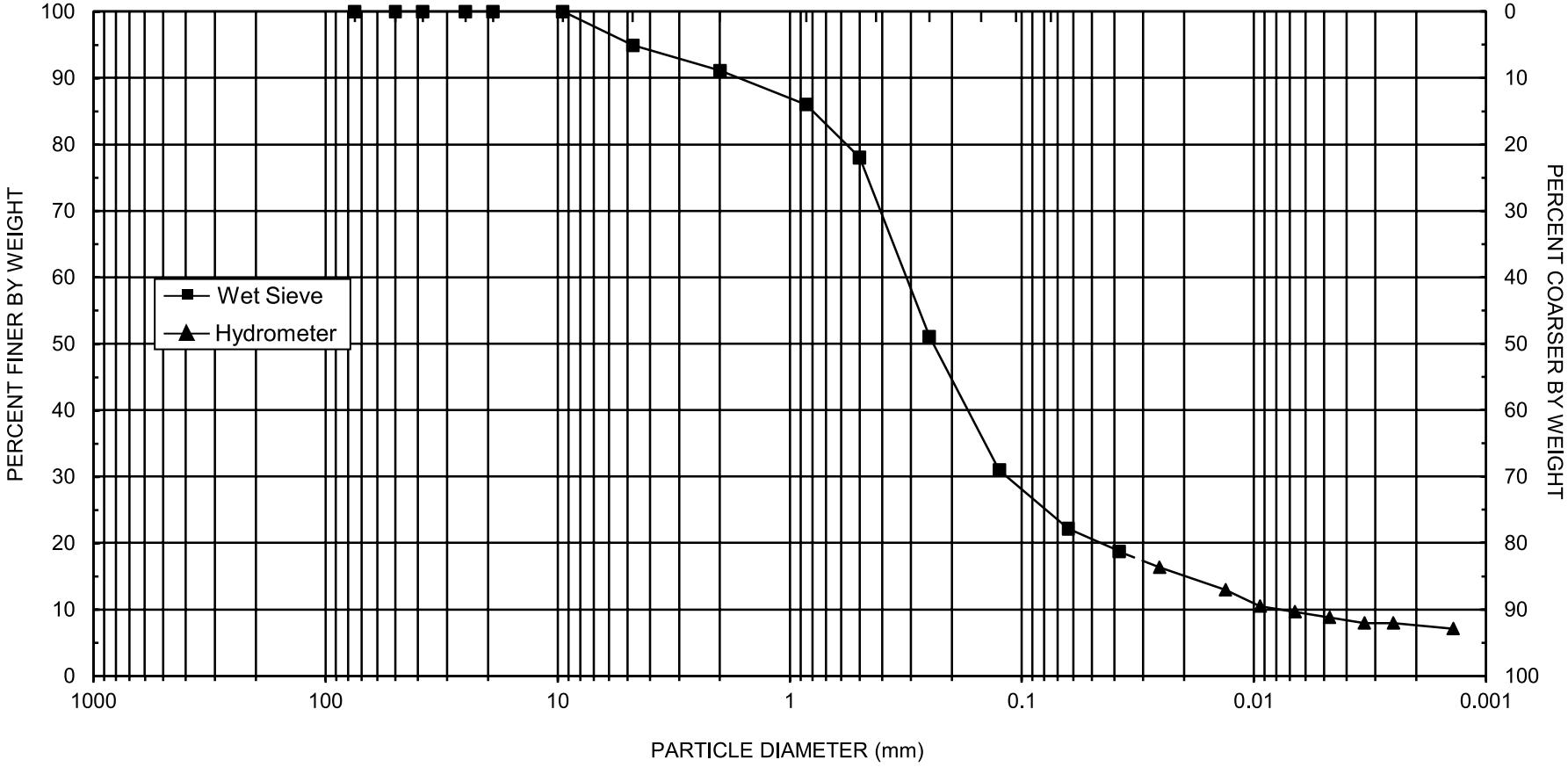
Type of Water Used: DISTILLED
Reaction with H_2O_2*:* NA
Dispersant:* $(NaPO_3)_6$
Assumed particle density: 2.65
Initial Wt. (g)*:* 26.91
Total Sample Wt. (g)*:* 29.70
Wt. Passing #10 (g)*:* 27.06

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	H_m (cm)	D (mm)	P (%)	% Finer
10-Dec-19	4	19.7	11.50	6.67	4.8	14	0.0255	18	16.4
	15	19.7	10.50	6.67	3.8	14	0.0132	14	13.0
	30	19.8	9.75	6.64	3.1	14	0.0094	12	10.5
	60	19.8	9.50	6.64	2.9	14	0.0067	11	9.7
	120	19.8	9.25	6.64	2.6	14	0.0047	10	8.9
	240	19.8	9.00	6.64	2.4	14	0.0033	9	8.0
	427	19.8	9.00	6.64	2.4	14	0.0025	9	8.0
11-Dec-19	1401	19.8	8.75	6.64	2.1	14	0.0014	8	7.2

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: J. Hines
Data entered by: A. Albay-Yenney
Checked by: J. Hines



SAMPLE NUMBER	LAB LABEL
EB-LIF-20 27-28	**EB-3**

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Wet Sieve Data (#10 Split)

Job Name: Hall Environmental Analysis Laboratory
Job Number: DB19.1446.00
Sample Number: EB-LIF-28 20-21
HEAL ID: 1911C03-009B
Lab Label: EB-4
Test Date: 12-Dec-19

Initial Dry Weight of Sample (g): 218.12
Weight Passing #10 (g): 157.69
Weight Retained #10 (g): 60.43
Weight of Hydrometer Sample (g): 64.97
Calculated Weight of Sieve Sample (g): 89.87

Shape: Rounded
Hardness: Hard and durable

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	218.12	100.00
	2"	50	0.00	0.00	218.12	100.00
	1.5"	38.1	0.00	0.00	218.12	100.00
	1"	25	0.00	0.00	218.12	100.00
	3/4"	19.0	9.81	9.81	208.31	95.50
	3/8"	9.5	26.53	36.34	181.78	83.34
	4	4.75	14.00	50.34	167.78	76.92
	10	2.00	10.09	60.43	157.69	72.30
-10			(Based on calculated sieve wt.)			
	20	0.85	4.98	29.88	59.99	66.75
	35	0.500	5.37	35.25	54.62	60.78
	60	0.250	17.25	52.50	37.37	41.58
	120	0.125	12.98	65.48	24.39	27.14
	230	0.063	4.41	69.89	19.98	22.23
	400	0.038	2.10	71.99	17.88	19.90
	dry pan		0.20	72.19	17.68	
	wet pan			17.68	0.00	

Laboratory analysis by: A. Albay-Yenney
Data entered by: A. Albay-Yenney
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Hydrometer Data

Job Name: Hall Environmental Analysis Laboratory
Job Number: DB19.1446.00
Sample Number: EB-LIF-28 20-21
HEAL ID: 1911C03-009B
Lab Label: EB-4
Test Date: 10-Dec-19
Start Time: 9:48

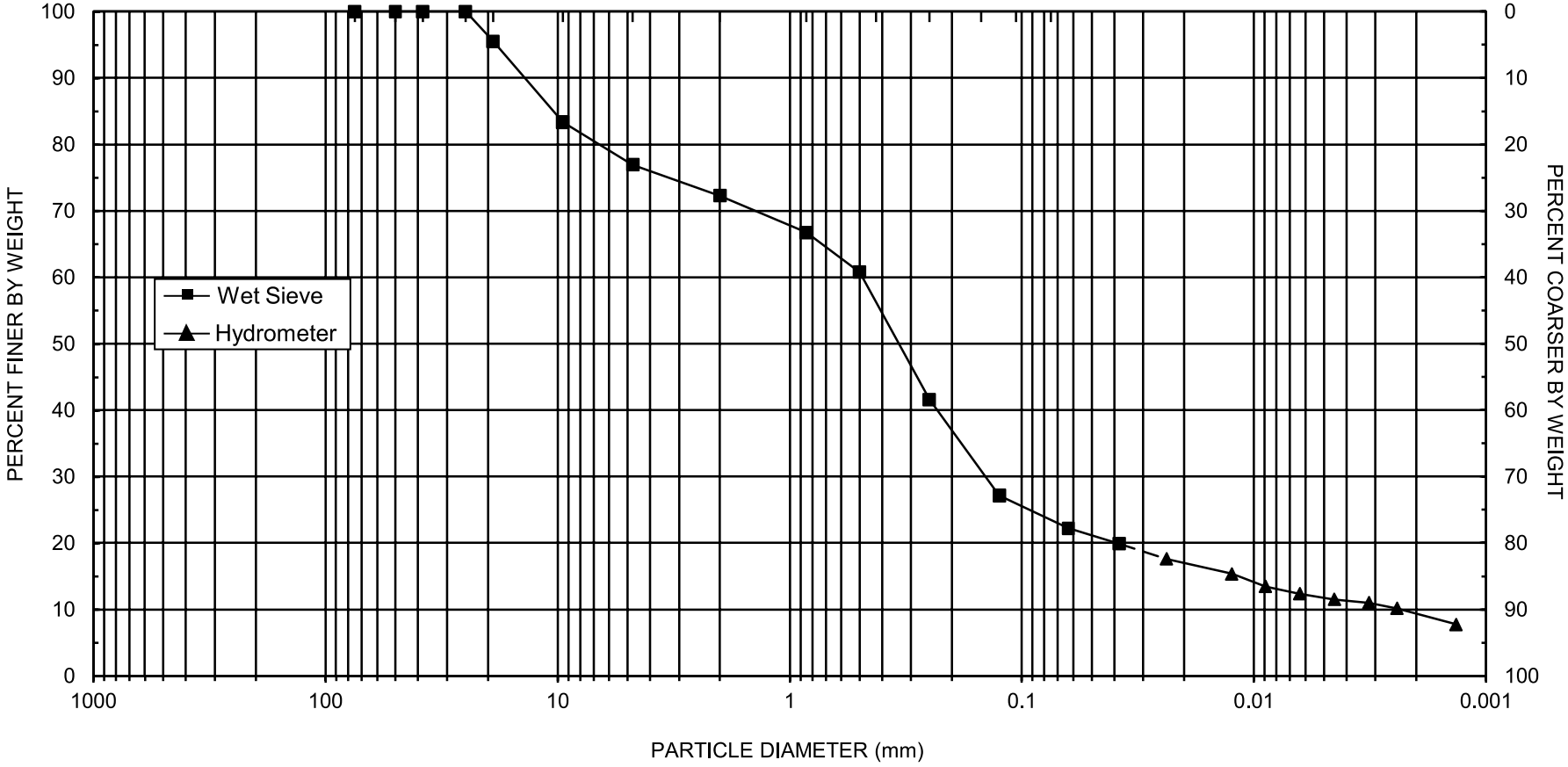
Type of Water Used: DISTILLED
Reaction with H_2O_2*:* NA
Dispersant:* $(NaPO_3)_6$
Assumed particle density: 2.65
Initial Wt. (g)*:* 64.97
Total Sample Wt. (g)*:* 218.12
Wt. Passing #10 (g)*:* 157.69

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	H_m (cm)	D (mm)	P (%)	% Finer
10-Dec-19	4	19.7	22.50	6.67	15.8	12	0.0238	24	17.6
	15	19.7	20.50	6.67	13.8	13	0.0124	21	15.4
	30	19.8	18.75	6.64	12.1	13	0.0089	19	13.5
	60	19.8	17.75	6.64	11.1	13	0.0063	17	12.4
	120	19.8	17.00	6.64	10.4	13	0.0045	16	11.5
	240	19.9	16.50	6.60	9.9	13	0.0032	15	11.0
	422	20.0	15.75	6.57	9.2	13	0.0024	14	10.2
11-Dec-19	1396	18.6	14.00	7.02	7.0	14	0.0013	11	7.8

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: J. Niedbala
Data entered by: A. Albay-Yenney
Checked by: J. Hines



SAMPLE NUMBER	LAB LABEL
EB-LIF-28 20-21	**EB-4**

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Wet Sieve Data (#10 Split)

Job Name: Hall Environmental Analysis Laboratory
Job Number: DB19.1446.00
Sample Number: EB-LIF-28 21-23
HEAL ID: 1911C03-010B
Lab Label: EB-5
Test Date: 12-Dec-19

Initial Dry Weight of Sample (g): 391.02
Weight Passing #10 (g): 252.36
Weight Retained #10 (g): 138.66
Weight of Hydrometer Sample (g): 70.05
Calculated Weight of Sieve Sample (g): 108.54

Shape: Rounded
Hardness: Hard and durable

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	391.02	100.00
	2"	50	0.00	0.00	391.02	100.00
	1.5"	38.1	0.00	0.00	391.02	100.00
	1"	25	0.00	0.00	391.02	100.00
	3/4"	19.0	0.00	0.00	391.02	100.00
	3/8"	9.5	45.46	45.46	345.56	88.37
	4	4.75	46.79	92.25	298.77	76.41
	10	2.00	46.41	138.66	252.36	64.54
-10			(Based on calculated sieve wt.)			
	20	0.85	11.47	49.96	58.58	53.97
	35	0.500	9.73	59.69	48.85	45.01
	60	0.250	15.63	75.32	33.22	30.61
	120	0.125	9.44	84.76	23.78	21.91
	230	0.063	4.35	89.11	19.43	17.90
	400	0.038	2.11	91.22	17.32	15.96
	dry pan		0.14	91.36	17.18	
	wet pan			17.18	0.00	

Laboratory analysis by: A. Albay-Yenney
Data entered by: A. Albay-Yenney
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Hydrometer Data

Job Name: Hall Environmental Analysis Laboratory
Job Number: DB19.1446.00
Sample Number: EB-LIF-28 21-23
HEAL ID: 1911C03-010B
Lab Label: EB-5
Test Date: 11-Dec-19
Start Time: 9:54

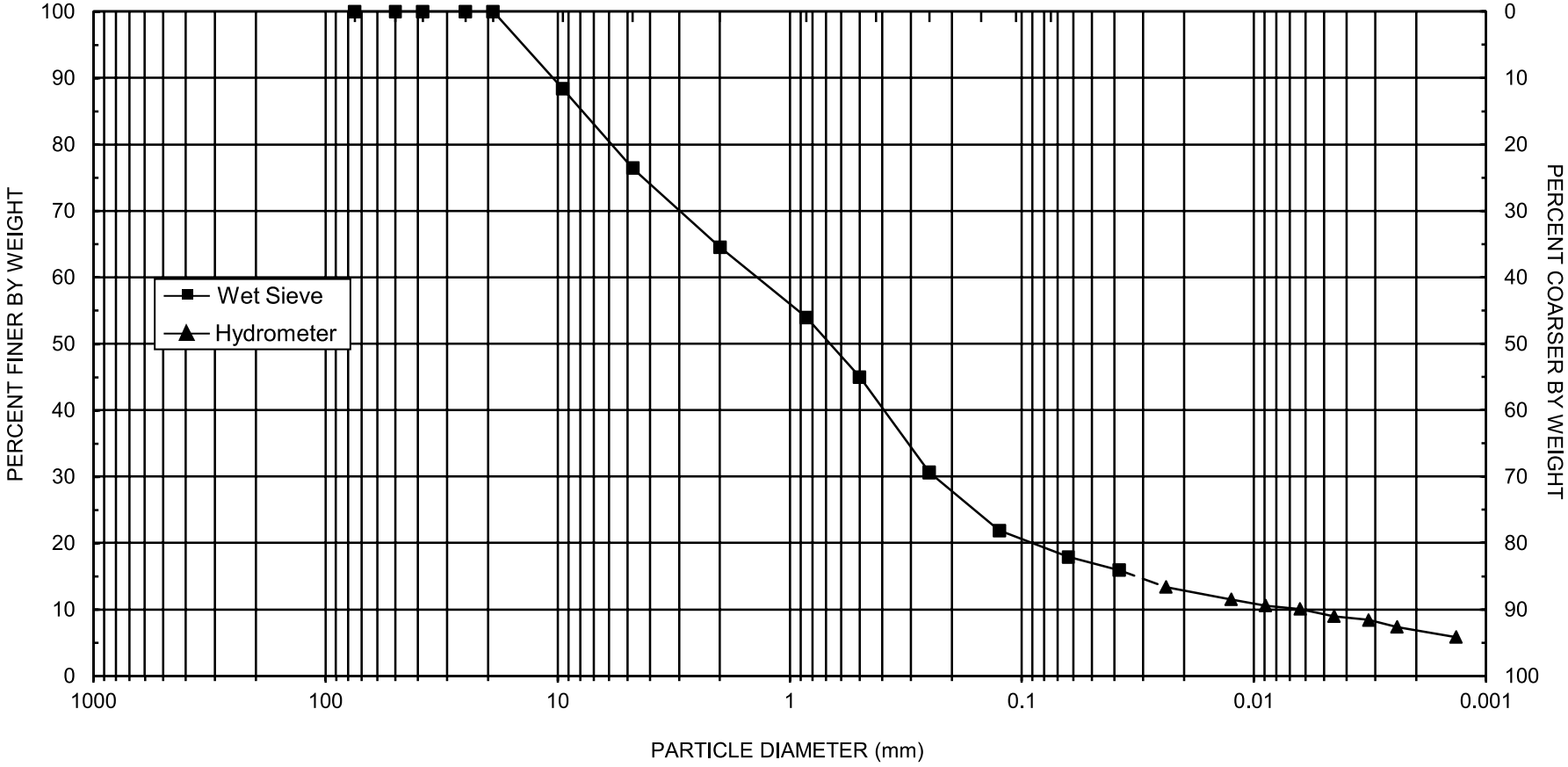
Type of Water Used: DISTILLED
Reaction with H_2O_2*:* NA
Dispersant:* $(NaPO_3)_6$
Assumed particle density: 2.65
Initial Wt. (g)*:* 70.05
Total Sample Wt. (g)*:* 391.02
Wt. Passing #10 (g)*:* 252.36

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	H_m (cm)	D (mm)	P (%)	% Finer
11-Dec-19	4	18.8	21.50	6.96	14.5	12	0.0239	21	13.4
	15	18.8	19.50	6.96	12.5	13	0.0125	18	11.6
	30	18.8	18.50	6.96	11.5	13	0.0089	16	10.6
	60	19.3	17.75	6.80	11.0	13	0.0063	16	10.1
	120	19.6	16.50	6.70	9.8	13	0.0045	14	9.0
	240	20.0	15.75	6.57	9.2	13	0.0032	13	8.5
	430	20.2	14.50	6.50	8.0	13	0.0024	11	7.4
12-Dec-19	1407	19.1	13.25	6.86	6.4	14	0.0013	9	5.9

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: J. Niedbala
Data entered by: A. Albay-Yenney
Checked by: J. Hines



SAMPLE NUMBER	LAB LABEL
EB-LIF-28 21-23	**EB-5**

Laboratory Tests and Methods

Tests and Methods

Particle Size Analysis:	ASTM D7928, ASTM D6913

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1911C03**
17-Dec-19

Client: Marathon
Project: LIF Investigation

Sample ID: **LCS-49056**	SampType: **LCS**	TestCode: **EPA Method 8015M/D: Diesel Range Organics**
Client ID: **LCSS**	Batch ID: **49056**	RunNo: **64856**
Prep Date: **11/27/2019**	Analysis Date: **12/2/2019**	SeqNo: **2223563** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	51	10	50.00	0	103	63.9	124			
Surr: DNOP	5.1		5.000		102	70	130			

Sample ID: **MB-49056**	SampType: **MBLK**	TestCode: **EPA Method 8015M/D: Diesel Range Organics**
Client ID: **PBS**	Batch ID: **49056**	RunNo: **64856**
Prep Date: **11/27/2019**	Analysis Date: **12/2/2019**	SeqNo: **2223565** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	ND	10								
Motor Oil Range Organics (MRO)	ND	50								
Surr: DNOP	8.0		10.00		79.9	70	130			

Sample ID: **LCS-49070**	SampType: **LCS**	TestCode: **EPA Method 8015M/D: Diesel Range Organics**
Client ID: **LCSS**	Batch ID: **49070**	RunNo: **64876**
Prep Date: **12/2/2019**	Analysis Date: **12/3/2019**	SeqNo: **2224173** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	43	10	50.00	0	85.8	63.9	124			
Surr: DNOP	4.0		5.000		79.0	70	130			

Sample ID: **MB-49070**	SampType: **MBLK**	TestCode: **EPA Method 8015M/D: Diesel Range Organics**
Client ID: **PBS**	Batch ID: **49070**	RunNo: **64876**
Prep Date: **12/2/2019**	Analysis Date: **12/3/2019**	SeqNo: **2224174** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	ND	10								
Motor Oil Range Organics (MRO)	ND	50								
Surr: DNOP	10		10.00		105	70	130			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
D	Sample Diluted Due to Matrix
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix
B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1911C03**

17-Dec-19

Client: Marathon

Project: LIF Investigation

Sample ID: **rb**	SampType: **MBLK**	TestCode: **EPA Method 8015D: Gasoline Range**							
Client ID: **PBS**	Batch ID: **S64862**	RunNo: **64862**							
Prep Date:	Analysis Date: **12/2/2019**	SeqNo: **2223727**	Units: **mg/Kg**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	ND	5.0								
Surr: BFB	820		1000		81.9	77.4	118			

Sample ID: **2.5UG GRO LCS**	SampType: **LCS**	TestCode: **EPA Method 8015D: Gasoline Range**							
Client ID: **LCSS**	Batch ID: **S64862**	RunNo: **64862**							
Prep Date:	Analysis Date: **12/2/2019**	SeqNo: **2223728**	Units: **mg/Kg**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	22	5.0	25.00	0	87.0	80	120			
Surr: BFB	920		1000		92.4	77.4	118			

Sample ID: **1911c03-001ams**	SampType: **MS**	TestCode: **EPA Method 8015D: Gasoline Range**							
Client ID: **MKTF-LIF-53 7.8**	Batch ID: **S64862**	RunNo: **64862**							
Prep Date:	Analysis Date: **12/3/2019**	SeqNo: **2223730**	Units: **mg/Kg-dry**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	1700	29	145.4	1571	91.6	69.1	142			
Surr: BFB	13000		5818		216	77.4	118			S

Sample ID: **1911c03-001amsd**	SampType: **MSD**	TestCode: **EPA Method 8015D: Gasoline Range**							
Client ID: **MKTF-LIF-53 7.8**	Batch ID: **S64862**	RunNo: **64862**							
Prep Date:	Analysis Date: **12/3/2019**	SeqNo: **2223731**	Units: **mg/Kg-dry**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	1800	29	145.4	1571	129	69.1	142	3.14	20	
Surr: BFB	13000		5817		219	77.4	118	0	0	S

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of range due to dilution or matrix		

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

Sample Log-In Check List

Client Name: MARATHON GALLUP Work Order Number: 1911C03 RcptNo: 1

Received By: Isaiah Ortiz 11/26/2019 12:20:00 PM I_OL

Completed By: Isaiah Ortiz 11/26/2019 12:59:02 PM I_OL

Reviewed By: 11/26/19

Chain of Custody

1. Is Chain of Custody complete? Yes ☑ No ☐ Not Present ☐
2. How was the sample delivered? Client

Log In

3. Was an attempt made to cool the samples? Yes ☑ No ☐ NA ☐
4. Were all samples received at a temperature of >0° C to 6.0°C Yes ☑ No ☐ NA ☐
5. Sample(s) in proper container(s)? Yes ☑ No ☐
6. Sufficient sample volume for indicated test(s)? Yes ☑ No ☐
7. Are samples (except VOA and ONG) properly preserved? Yes ☑ No ☐
8. Was preservative added to bottles? Yes ☐ No ☑ NA ☐
9. VOA vials have zero headspace? Yes ☐ No ☐ No VOA Vials ☑
10. Were any sample containers received broken? Yes ☐ No ☑
11. Does paperwork match bottle labels? (Note discrepancies on chain of custody) Yes ☑ No ☐
12. Are matrices correctly identified on Chain of Custody? Yes ☑ No ☐
13. Is it clear what analyses were requested? Yes ☑ No ☐
14. Were all holding times able to be met? (If no, notify customer for authorization.) Yes ☑ No ☐

# of preserved bottles checked for pH: (<2 or >12 unless noted)

Adjusted?

Checked by: JR 11/26/19

Special Handling (if applicable)

15. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☑

Person Notified: Date:

By Whom: Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding:

Client Instructions:

16. Additional remarks:

17. **Cooler Information**

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	5.1	Good	Not Present			

Chain-of-Custody Record

Client: Marathon Petroleum Company
Gallup Refining Division

Mailing Address:

Phone #: 505-726-9745

email or Fax#: ~~phil~~ BMoore1@marathonpetroleum.com

QA/QC Package:
☒ Standard ☐ Level 4 (Full Validation)

Accreditation
☐ NELAP ☐ Other

☐ EDD (Type)

Turn-Around Time:
☒ Standard ☐ Rush

Project Name: LIF Investigation

Project #: 697-066-001

Project Manager: phildebrandt@trihydro.com
Paul Hildebrandt

Sampler: Paul Hildebrandt

On Ice: ☒ Yes ☐ No

Sample Temperature: 5.6 -0.5 (cf) 5.1 °C

HALL ENVIRONMENTAL ANALYSIS LABORATORY
www.hallenvironmental.com
4901 Hawkins NE - Albuquerque, NM 87109
Tel. 505-345-3975 Fax 505-345-4107

Analysis Request

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1911C03	BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH 8015B (GRO / DRO / MRO)	TPH (Method 418.1)	EDB (Method 504.1)	PAH's (8310 or 8270 SIMS)	RCRA 8 Metals	Anions (F,Cl,NO_3,NO_2,PO_4,SO_4)	8081 Pesticides / 8082 PCB's	8260B (VOA)	8270 (Semi-VOA)	Grain Size + Analysis	Moisture			Air Bubbles (Y or N)
11/25/19	1045	Soil	MKTF-LIF-53 7-8	Glass/3	MeOH	-001			X													
11/25/19	1045	Soil	MKTF-LIF-53 7-8	Ziploc/1	—	1												X	X			
11/25/19	1045	Soil	MKTF-LIF-53 8-9	Glass/3	MeOH	-002			X													
11/25/19	1045	Soil	MKTF-LIF-53 8-9	Ziploc/1	—	1												X	X			
11/24/19	1430	Soil	MKTF-LIF-44 6-7	Glass/3	MeOH	-003			X													
11/24/19	1430	Soil	MKTF-LIF-44 6-7	Ziploc/1	—	1												X	X			
11/24/19	1415	Soil	MKTF-LIF-44 8-10	Glass/3	MeOH	-004			X													
11/24/19	1415	Soil	MKTF-LIF-44 8-10	Ziploc/1	—	1												X	X			
11/24/19	1420	Soil	MKTF-LIF-44 18-19	Glass/3	MeOH	-005			X													
11/24/19	1420	Soil	MKTF-LIF-44 18-19	Ziploc/1	—	1												X	X			
11/25/19	0820	Soil	EB-LIF-34 20-21	Glass/3	MeOH	-006			X													
11/25/19	0820	Soil	EB-LIF-34 20-21	Ziploc/1	—	1												X	X			

Date	Time	Relinquished by:	Received by:	Date	Time
11/26/19	1220		client	11/26/19	1220

Remarks:

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

Chain-of-Custody Record

Client: Marathon Petroleum Company
Gallup Refining Division

Mailing Address:

Phone #: 505-726-9745

email or Fax#: BMoore1@MarathonPetroleum.com

QA/QC Package:
☑ Standard ☐ Level 4 (Full Validation)

Accreditation
☐ NELAP ☐ Other

☐ EDD (Type)

Turn-Around Time:
☑ Standard ☐ Rush

Project Name: LIF Investigation

Project #: 697-066-001

Project Manager: Paul Hildebrandt
phildebrandt@Trihydro.com

Sampler: P Hildebrandt

On Ice: ■ Yes ☐ No

Sample Temperature: 5.6-0.5[ice] 5.1°C

HALL ENVIRONMENTAL ANALYSIS LABORATORY
www.hallenvironmental.com
4901 Hawkins NE - Albuquerque, NM 87109
Tel. 505-345-3975 Fax 505-345-4107

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No.	BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH 8015B (GRO / DRO / MRO)	TPH (Method 418.1)	EDB (Method 504.1)	PAH's (8310 or 8270 SIMS)	RCRA 8 Metals	Anions (F,Cl,NO_3,NO_2,PO_4,SO_4)	8081 Pesticides / 8082 PCB's	8260B (VOA)	8270 (Semi-VOA)	Grain size	Moisture			Air Bubbles (Y or N)
11/25/19	0903	Soil	EB-LIF-19 16-18	Glass/3	MeOH	-007			X													
11/25/19	0903	Soil	EB-LIF-19 16-18	Ziploc/1	—	1												X	X			
11/25/19	1320	Soil	EB-LIF-20 27-28	Glass/3	MeOH	-008			X													
11/25/19	1320	Soil	EB-LIF-20 27-28	Ziploc/1	—	1												X	X			
11/25/19	0940	Soil	EB-LIF-28 20-21	Glass/3	MeOH	-009			X													
11/25/19	0940	Soil	EB-LIF-28 20-21	Ziploc/1	—	1												X	X			
11/25/19	0930	Soil	EB-LIF-28 21-23	Glass/3	MeOH	10 -010			X													
11/25/19	0930	Soil	EB-LIF-28 21-23	Ziploc/1	—	1												X	X			

Analysis Request

Date:	Time:	Relinquished by:	Received by:	Date	Time
11/25/19	1645 1220		In Ice client	11/26/19	1220
Date:	Time:	Relinquished by:	Received by:	Date	Time

Remarks:

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: clients.hallenvironmental.com

February 17, 2021

Paul Hildebrandt

Marathon
92 Giant Crossing Rd
Gallup, NM 87301
TEL: (505) 722-3833
FAX

RE: MPC MKTF LIF Investigation OrderNo.: 2102373

Dear Paul Hildebrandt:

Hall Environmental Analysis Laboratory received 6 sample(s) on 2/6/2021 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites. In order to properly interpret your results, it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifiers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0901

Sincerely,

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Analytical Report
Lab Order **2102373**
Date Reported: **2/17/2021**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Marathon **Client Sample ID:** MKTF-LIF-74 2-3
Project: MPC MKTF LIF Investigation **Collection Date:** 2/4/2021 9:45:00 AM
Lab ID: 2102373-001 **Matrix:** SOIL **Received Date:** 2/6/2021 10:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
PERCENT MOISTURE						Analyst: **JMR**	
Percent Moisture	20	1.0		wt%	1	2/8/2021	R75175
EPA METHOD 8015D MOD: GASOLINE RANGE						Analyst: **JMR**	
Gasoline Range Organics (GRO)	1500	290		mg/Kg-dr	50	2/12/2021 5:10:33 AM	57986
Surr: BFB	99.6	70-130		%Rec	50	2/12/2021 5:10:33 AM	57986
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **TOM**	
Diesel Range Organics (DRO)	490	12		mg/Kg-dr	1	2/11/2021 9:26:54 AM	58001
Motor Oil Range Organics (MRO)	ND	62		mg/Kg-dr	1	2/11/2021 9:26:54 AM	58001
Surr: DNOP	102	70-130		%Rec	1	2/11/2021 9:26:54 AM	58001

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of range due to dilution or matrix		

Analytical Report
Lab Order **2102373**
Date Reported: **2/17/2021**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Marathon
Client Sample ID: MKTF-LIF-74 4-5
Project: MPC MKTF LIF Investigation
Collection Date: 2/4/2021 9:47:00 AM
Lab ID: 2102373-002 **Matrix:** SOIL **Received Date:** 2/6/2021 10:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
PERCENT MOISTURE						Analyst: **JMR**	
Percent Moisture	19	1.0		wt%	1	2/8/2021	R75175
EPA METHOD 8015D MOD: GASOLINE RANGE						Analyst: **JMR**	
Gasoline Range Organics (GRO)	2300	290		mg/Kg-dr	50	2/12/2021 5:39:04 AM	57986
Surr: BFB	101	70-130		%Rec	50	2/12/2021 5:39:04 AM	57986
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **mb**	
Diesel Range Organics (DRO)	180	12		mg/Kg-dr	1	2/10/2021 8:45:58 PM	58001
Motor Oil Range Organics (MRO)	ND	59		mg/Kg-dr	1	2/10/2021 8:45:58 PM	58001
Surr: DNOP	118	70-130		%Rec	1	2/10/2021 8:45:58 PM	58001

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of range due to dilution or matrix		

Analytical Report
Lab Order **2102373**
Date Reported: **2/17/2021**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Marathon **Client Sample ID:** MKTF-LIF-74 5-6
Project: MPC MKTF LIF Investigation **Collection Date:** 2/4/2021 9:49:00 AM
Lab ID: 2102373-003 **Matrix:** SOIL **Received Date:** 2/6/2021 10:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
PERCENT MOISTURE						Analyst: **JMR**	
Percent Moisture	23	1.0		wt%	1	2/8/2021	R75175
EPA METHOD 8015D MOD: GASOLINE RANGE						Analyst: **JMR**	
Gasoline Range Organics (GRO)	630	65		mg/Kg-dr	10	2/12/2021 6:07:35 AM	57986
Surr: BFB	101	70-130		%Rec	10	2/12/2021 6:07:35 AM	57986
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **mb**	
Diesel Range Organics (DRO)	22	12		mg/Kg-dr	1	2/10/2021 8:55:44 PM	58001
Motor Oil Range Organics (MRO)	ND	62		mg/Kg-dr	1	2/10/2021 8:55:44 PM	58001
Surr: DNOP	113	70-130		%Rec	1	2/10/2021 8:55:44 PM	58001

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of range due to dilution or matrix		

Analytical Report
Lab Order **2102373**
Date Reported: **2/17/2021**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Marathon
Client Sample ID: MKTF-LIF-85 7-9
Project: MPC MKTF LIF Investigation
Collection Date: 2/5/2021 10:31:00 AM
Lab ID: 2102373-004 **Matrix:** SOIL **Received Date:** 2/6/2021 10:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
PERCENT MOISTURE						Analyst: **JMR**	
Percent Moisture	25	1.0		wt%	1	2/8/2021	R75175
EPA METHOD 8015D MOD: GASOLINE RANGE						Analyst: **JMR**	
Gasoline Range Organics (GRO)	130	67		mg/Kg-dr	10	2/12/2021 6:36:12 AM	57986
Surr: BFB	103	70-130		%Rec	10	2/12/2021 6:36:12 AM	57986
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **TOM**	
Diesel Range Organics (DRO)	ND	13		mg/Kg-dr	1	2/11/2021 9:56:42 AM	58001
Motor Oil Range Organics (MRO)	ND	64		mg/Kg-dr	1	2/11/2021 9:56:42 AM	58001
Surr: DNOP	102	70-130		%Rec	1	2/11/2021 9:56:42 AM	58001

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of range due to dilution or matrix		

Analytical Report
Lab Order **2102373**
Date Reported: **2/17/2021**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Marathon
Client Sample ID: PA-LIF-07 11-13
Project: MPC MKTF LIF Investigation
Collection Date: 2/5/2021 1:31:00 PM
Lab ID: 2102373-005 **Matrix:** SOIL **Received Date:** 2/6/2021 10:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
PERCENT MOISTURE						Analyst: **JMR**	
Percent Moisture	13	1.0		wt%	1	2/8/2021	R75175
EPA METHOD 8015D MOD: GASOLINE RANGE						Analyst: **JMR**	
Gasoline Range Organics (GRO)	300	110		mg/Kg-dr	20	2/12/2021 7:04:44 AM	57986
Surr: BFB	101	70-130		%Rec	20	2/12/2021 7:04:44 AM	57986
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **mb**	
Diesel Range Organics (DRO)	130	10		mg/Kg-dr	1	2/10/2021 9:15:11 PM	58001
Motor Oil Range Organics (MRO)	ND	50		mg/Kg-dr	1	2/10/2021 9:15:11 PM	58001
Surr: DNOP	103	70-130		%Rec	1	2/10/2021 9:15:11 PM	58001

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of range due to dilution or matrix		

Analytical Report
Lab Order **2102373**
Date Reported: **2/17/2021**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Marathon
Client Sample ID: PA-LIF-07 13-14
Project: MPC MKTF LIF Investigation
Collection Date: 2/5/2021 1:32:00 PM
Lab ID: 2102373-006 **Matrix:** SOIL **Received Date:** 2/6/2021 10:30:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
PERCENT MOISTURE						Analyst: **JMR**	
Percent Moisture	13	1.0		wt%	1	2/8/2021	R75175
EPA METHOD 8015D MOD: GASOLINE RANGE						Analyst: **JMR**	
Gasoline Range Organics (GRO)	82	5.6		mg/Kg-dr	1	2/12/2021 7:33:18 AM	57986
Surr: BFB	102	70-130		%Rec	1	2/12/2021 7:33:18 AM	57986
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **TOM**	
Diesel Range Organics (DRO)	11	11		mg/Kg-dr	1	2/11/2021 10:20:26 AM	58001
Motor Oil Range Organics (MRO)	ND	53		mg/Kg-dr	1	2/11/2021 10:20:26 AM	58001
Surr: DNOP	91.8	70-130		%Rec	1	2/11/2021 10:20:26 AM	58001

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of range due to dilution or matrix		

Laboratory Report for
Hall Environmental Analysis Laboratory

Project Number: 2102373

February 16, 2021

Daniel B. Stephens & Associates, Inc.

4400 Alameda Blvd. NE, Suite C • Albuquerque, New Mexico 87113

February 16, 2021

Andy Freeman
Hall Environmental Analysis Laboratory
4901 Hawkins NE, Suite D
Albuquerque, NM 87109
(505) 345-3975

Re: DBS&A Laboratory Report for the HEAL Project Number: 2102373 Sample Testing

Dear Mr. Freeman:

Enclosed is the report for the HEAL Project Number: 2102373 sample testing. Please review this report and provide any comments as samples will be held for a maximum of 30 days. After 30 days samples will be returned or disposed of in an appropriate manner.

All testing results were evaluated subjectively for consistency and reasonableness, and the results appear to be reasonably representative of the material tested. However, DBS&A does not assume any responsibility for interpretations or analyses based on the data enclosed, nor can we guarantee that these data are fully representative of the undisturbed materials at the field site. We recommend that careful evaluation of these laboratory results be made for your particular application.

The testing utilized to generate the enclosed report employs methods that are standard for the industry. The results do not constitute a professional opinion by DBS&A, nor can the results affect any professional or expert opinions rendered with respect thereto by DBS&A. You have acknowledged that all the testing undertaken by us, and the report provided, constitutes mere test results using standardized methods, and cannot be used to disqualify DBS&A from rendering any professional or expert opinion, having waived any claim of conflict of interest by DBS&A.

We are pleased to provide this service to HEAL and look forward to future laboratory testing on other projects. If you have any questions about the enclosed data, please do not hesitate to call.

Sincerely,

DANIEL B. STEPHENS & ASSOCIATES, INC.
SOIL TESTING & RESEARCH LABORATORY

Joleen Hines
Laboratory Manager

Enclosure

Summaries

Daniel B. Stephens & Associates, Inc.

Summary of Tests Performed

Laboratory Sample Number	Initial Soil Properties[1]			Saturated Hydraulic Conductivity[2]			Moisture Characteristics[3]								Particle Size[4]			Specific Gravity[5]		Air Perm-eability	Atterberg Limits	Proctor Compaction
	G	VM	VD	CH	FH	FW	HC	PP	FP	DPP	RH	EP	WHC	K_{unsat}	DS	WS	H	F	C			
2102373-001B/ MKTF-LIF-74 2-3																X	X					
2102373-002B/ MKTF-LIF-74 4-5																X	X					
2102373-004B/ MKTF-LIF-85 7-9																X	X					
2102373-005B/ PA-LIF-07 11-13																X	X					

[1] G = Gravimetric Moisture Content, VM = Volume Measurement Method, VD = Volume Displacement Method

[2] CH = Constant Head Rigid Wall, FH = Falling Head Rigid Wall, FW = Falling Head Rising Tail Flexible Wall

[3] HC = Hanging Column, PP = Pressure Plate, FP = Filter Paper, DPP = Dew Point Potentiometer, RH = Relative Humidity Box, EP = Effective Porosity, WHC = Water Holding Capacity, Kunsat = Calculated Unsaturated Hydraulic Conductivity

[4] DS = Dry Sieve, WS = Wet Sieve, H = Hydrometer

[5] F = Fine (<4.75mm), C = Coarse (>4.75mm)

Notes

Sample Receipt:
Four samples, each as loose material in an 8-oz jar, were hand-delivered on February 8, 2021. The samples were delivered in a cooler with ice packs and were received in good order.

Sample Preparation and Testing Notes:
Each of the samples was subjected to particle size analysis testing.

Particle diameter calculations in the hydrometer portion of the particle size analysis testing are based on the use of an assumed specific gravity value of 2.65.

Daniel B. Stephens & Associates, Inc.

Summary of Particle Size Characteristics

Sample Number	d_{10} (mm)	d_{50} (mm)	d_{60} (mm)	C_u	C_c	Method	ASTM Classification	USDA Classification	
2102373-001B/ MKTF-LIF-74 2-3	0.0018	0.11	0.17	94	3.3	WS/H	Classification by ASTM 2487 requires Atterberg test	Sandy Loam	
2102373-002B/ MKTF-LIF-74 4-5	0.0010	0.041	0.057	57	1.2	WS/H	Classification by ASTM 2487 requires Atterberg test	Loam	(Est)
2102373-004B/ MKTF-LIF-85 7-9	0.00065	0.030	0.047	72	1.3	WS/H	Classification by ASTM 2487 requires Atterberg test	Loam	(Est)
2102373-005B/ PA-LIF-07 11-13	0.0039	0.29	0.40	103	7.8	WS/H	Classification by ASTM 2487 requires Atterberg test	Sandy Loam †	

Est = Reported values for d_{10}, C_u, C_c, and soil classification are estimates, since extrapolation was required to obtain the d_{10} diameter

$$C_u = \frac{d_{60}}{d_{10}}$$

$$C_c = \frac{(d_{30})^2}{(d_{10})(d_{60})}$$

DS = Dry sieve

H = Hydrometer

WS = Wet sieve

† Greater than 10% of sample is coarse material

d_{50} = Median particle diameter

Daniel B. Stephens & Associates, Inc.

Percent Gravel, Sand, Silt and Clay*

Sample Number	% Gravel (>4.75mm)	% Sand (<4.75mm, >0.075mm)	% Silt (<0.075mm, >0.002mm)	% Clay (<0.002mm)
2102373-001B/ MKTF-LIF-74 2-3	0.9	54.9	33.2	11.0
2102373-002B/ MKTF-LIF-74 4-5	0.0	30.3	51.9	17.8
2102373-004B/ MKTF-LIF-85 7-9	0.0	23.5	55.9	20.6
2102373-005B/ PA-LIF-07 11-13	13.5	59.0	19.4	8.1

*USCS classification does not classify clay fraction based on particle size. USDA definition of clay (<0.002mm) used in this table.

Particle Size Analysis

Daniel B. Stephens & Associates, Inc.

Summary of Particle Size Characteristics

Sample Number	d_{10} (mm)	d_{50} (mm)	d_{60} (mm)	C_u	C_c	Method	ASTM Classification	USDA Classification	
2102373-001B/ MKTF-LIF-74 2-3	0.0018	0.11	0.17	94	3.3	WS/H	Classification by ASTM 2487 requires Atterberg test	Sandy Loam	
2102373-002B/ MKTF-LIF-74 4-5	0.0010	0.041	0.057	57	1.2	WS/H	Classification by ASTM 2487 requires Atterberg test	Loam	(Est)
2102373-004B/ MKTF-LIF-85 7-9	0.00065	0.030	0.047	72	1.3	WS/H	Classification by ASTM 2487 requires Atterberg test	Loam	(Est)
2102373-005B/ PA-LIF-07 11-13	0.0039	0.29	0.40	103	7.8	WS/H	Classification by ASTM 2487 requires Atterberg test	Sandy Loam †	

Est = Reported values for d_{10}, C_u, C_c, and soil classification are estimates, since extrapolation was required to obtain the d_{10} diameter

$$C_u = \frac{d_{60}}{d_{10}}$$

$$C_c = \frac{(d_{30})^2}{(d_{10})(d_{60})}$$

DS = Dry sieve

H = Hydrometer

WS = Wet sieve

† Greater than 10% of sample is coarse material

d_{50} = Median particle diameter

Percent Gravel, Sand, Silt and Clay*

Sample Number	% Gravel (>4.75mm)	% Sand (<4.75mm, >0.075mm)	% Silt (<0.075mm, >0.002mm)	% Clay (<0.002mm)
2102373-001B/ MKTF-LIF-74 2-3	0.9	54.9	33.2	11.0
2102373-002B/ MKTF-LIF-74 4-5	0.0	30.3	51.9	17.8
2102373-004B/ MKTF-LIF-85 7-9	0.0	23.5	55.9	20.6
2102373-005B/ PA-LIF-07 11-13	13.5	59.0	19.4	8.1

*USCS classification does not classify clay fraction based on particle size. USDA definition of clay (<0.002mm) used in this table.

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Sieve Data (#10 Split)

Job Name: Hall Environmental Analysis Laboratory
Job Number: DB21.1064.00
Sample Number: 2102373-001B/ MKTF-LIF-74 2-3
Matrix: Soil
Date/Time Sampled: 2/4/21 945
Test Date: 9-Feb-21

Initial Dry Weight of Sample (g): 216.40
Weight Passing #10 (g): 209.21
Weight Retained #10 (g): 7.19
Weight of -10 Sub-Sample (g): 49.88
Calculated Weight of Sieve Sample (g): 51.59
Shape: Angular
Hardness: Soft

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	216.40	100.00
	2"	50	0.00	0.00	216.40	100.00
	1.5"	38.1	0.00	0.00	216.40	100.00
	1"	25	0.00	0.00	216.40	100.00
	3/4"	19.0	0.00	0.00	216.40	100.00
	3/8"	9.5	0.00	0.00	216.40	100.00
	4	4.75	1.99	1.99	214.41	99.08
	10	2.00	5.20	7.19	209.21	96.68
-10			(Based on calculated sieve wt.)			
	20	0.85	1.37	3.08	48.51	94.02
	40	0.425	3.30	6.38	45.21	87.63
	60	0.250	7.29	13.67	37.92	73.50
	100	0.150	9.03	22.70	28.89	55.99
	140	0.106	3.50	26.20	25.39	49.21
	200	0.075	2.58	28.78	22.81	44.21
	dry pan		0.54	29.32	22.27	
	wet pan			22.27	0.00	

d_{10} (mm): 0.0018
d_{16} (mm): 0.0053
d_{30} (mm): 0.032
d_{50} (mm): 0.11
d_{60} (mm): 0.17
d_{84} (mm): 0.37

Median Particle Diameter --d_{50} (mm): 0.11
Uniformity Coefficient, Cu --[d_{60}/d_{10}] (mm): 94
Coefficient of Curvature, Cc --[$(d_{30})^2/(d_{10}*d_{60})$] (mm): 3.3
Mean Particle Diameter --[$(d_{16}+d_{50}+d_{84})/3$] (mm): 0.16

ASTM Soil Classification: Classification by ASTM 2487 requires Atterberg test
USDA Soil Classification: Sandy Loam

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Hydrometer Data

Job Name: Hall Environmental Analysis Laboratory
Job Number: DB21.1064.00
Sample Number: 2102373-001B/ MKTF-LIF-74 2-3
Matrix: Soil
Date/Time Sampled: 2/4/21 945
Test Date: 10-Feb-21
Start Time: 7:30

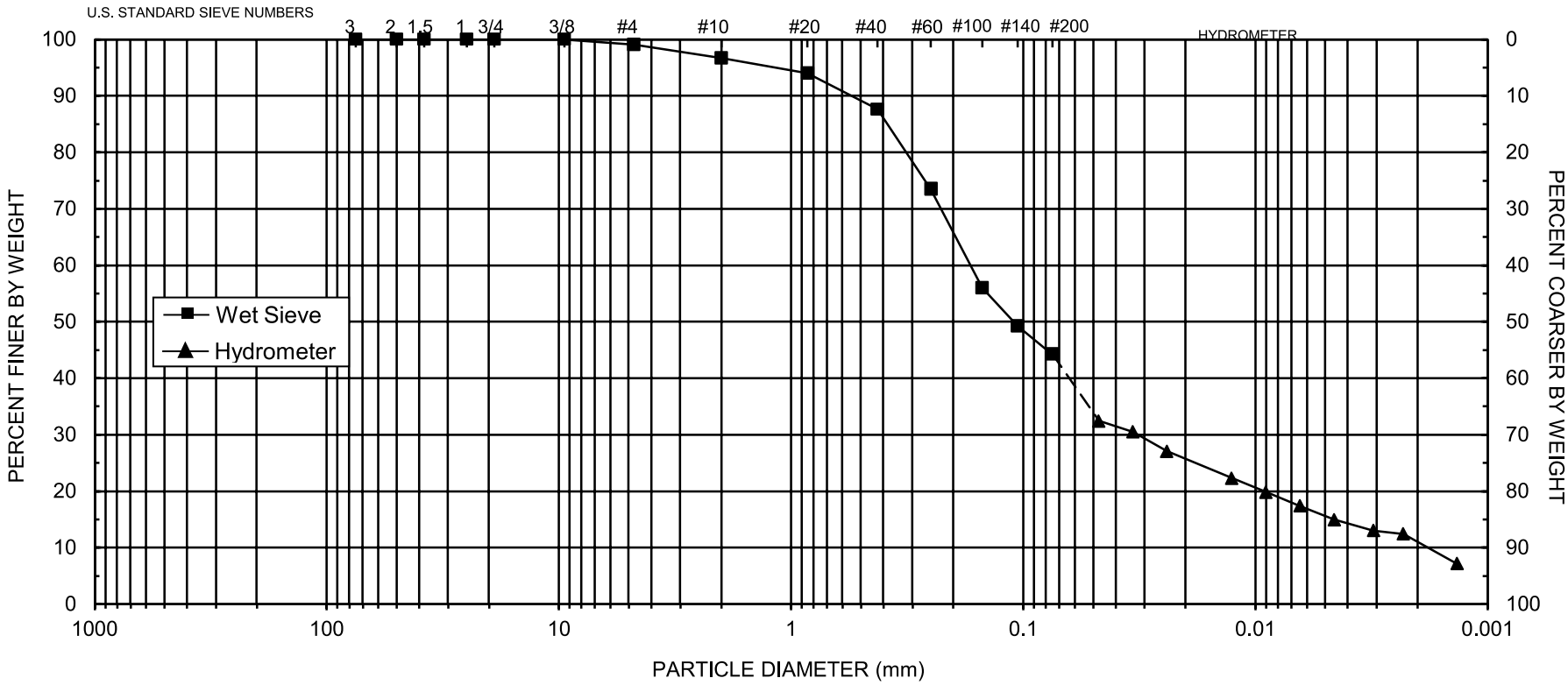
Type of Water Used: DISTILLED
Reaction with H_2O_2*:* NA
Dispersant:* $(NaPO_3)_6$
Assumed particle density: 2.65
Initial Wt. (g)*:* 49.88
Total Sample Wt. (g)*:* 216.40
Wt. Passing #10 (g)*:* 209.21

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	H_m (cm)	D (mm)	P (%)	% Finer
10-Feb-21	1	20.1	23.25	6.54	16.7	12	0.0473	34	32.4
	2	20.1	22.25	6.54	15.7	12	0.0337	31	30.5
	4	20.1	20.50	6.54	14.0	12	0.0241	28	27.1
	15	20.2	18.00	6.52	11.5	13	0.0126	23	22.2
	30	20.2	16.75	6.52	10.2	13	0.0090	21	19.8
	60	20.2	15.50	6.52	9.0	13	0.0064	18	17.4
	120	20.1	14.25	6.54	7.7	14	0.0046	15	14.9
	265	20.1	13.25	6.55	6.7	14	0.0031	13	13.0
	480	19.9	13.00	6.60	6.4	14	0.0023	13	12.4
11-Feb-21	1440	20.1	10.25	6.55	3.7	14	0.0014	7	7.2

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines



d_{10} = **0.0018**	d_{30} = **0.032**	d_{50} = **0.11**	d_{60} = **0.17**	C_u = **94**	C_c = **3.3**

SAMPLE NUMBER	DATE/TIME SAMPLED	ASTM CLASSIFICATION	USDA CLASSIFICATION
2102373-001B/ MKTF-LIF-74 2-3	**2/4/21 945**	**Classification by ASTM 2487 requires Atterberg test**	**Sandy Loam**

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Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Sieve Data (#10 Split)

Job Name: Hall Environmental Analysis Laboratory
Job Number: DB21.1064.00
Sample Number: 2102373-002B/ MKTF-LIF-74 4-5
Matrix: Soil
Date/Time Sampled: 2/4/21 947
Test Date: 9-Feb-21

Initial Dry Weight of Sample (g): 158.07
Weight Passing #10 (g): 158.07
Weight Retained #10 (g): 0.00
Weight of -10 Sub-Sample (g): 48.87
Calculated Weight of Sieve Sample (g): 48.87
Shape: Angular
Hardness: Soft

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	158.07	100.00
	2"	50	0.00	0.00	158.07	100.00
	1.5"	38.1	0.00	0.00	158.07	100.00
	1"	25	0.00	0.00	158.07	100.00
	3/4"	19.0	0.00	0.00	158.07	100.00
	3/8"	9.5	0.00	0.00	158.07	100.00
	4	4.75	0.00	0.00	158.07	100.00
	10	2.00	0.00	0.00	158.07	100.00
-10			(Based on calculated sieve wt.)			
	20	0.85	0.28	0.28	48.59	99.43
	40	0.425	0.68	0.96	47.91	98.04
	60	0.250	1.72	2.68	46.19	94.52
	100	0.150	3.32	6.00	42.87	87.72
	140	0.106	3.91	9.91	38.96	79.72
	200	0.075	4.90	14.81	34.06	69.70
	dry pan		1.50	16.31	32.56	
	wet pan			32.56	0.00	

d_{10} (mm): 0.0010
d_{16} (mm): 0.0017
d_{30} (mm): 0.0081
d_{50} (mm): 0.041
d_{60} (mm): 0.057
d_{84} (mm): 0.13

Median Particle Diameter --d_{50} (mm): 0.041
Uniformity Coefficient, Cu --[d_{60}/d_{10}] (mm): 57
Coefficient of Curvature, Cc --[$(d_{30})^2/(d_{10}*d_{60})$] (mm): 1.2
Mean Particle Diameter --[$(d_{16}+d_{50}+d_{84})/3$] (mm): 0.058

Note: Reported values for d_{10}, C_u, C_c, and soil classification are estimates, since extrapolation was required to obtain the d_{10} diameter

ASTM Soil Classification: Classification by ASTM 2487 requires Atterberg test
USDA Soil Classification: Loam

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Hydrometer Data

Job Name: Hall Environmental Analysis Laboratory
Job Number: DB21.1064.00
Sample Number: 2102373-002B/ MKTF-LIF-74 4-5
Matrix: Soil
Date/Time Sampled: 2/4/21 947
Test Date: 10-Feb-21
Start Time: 7:36

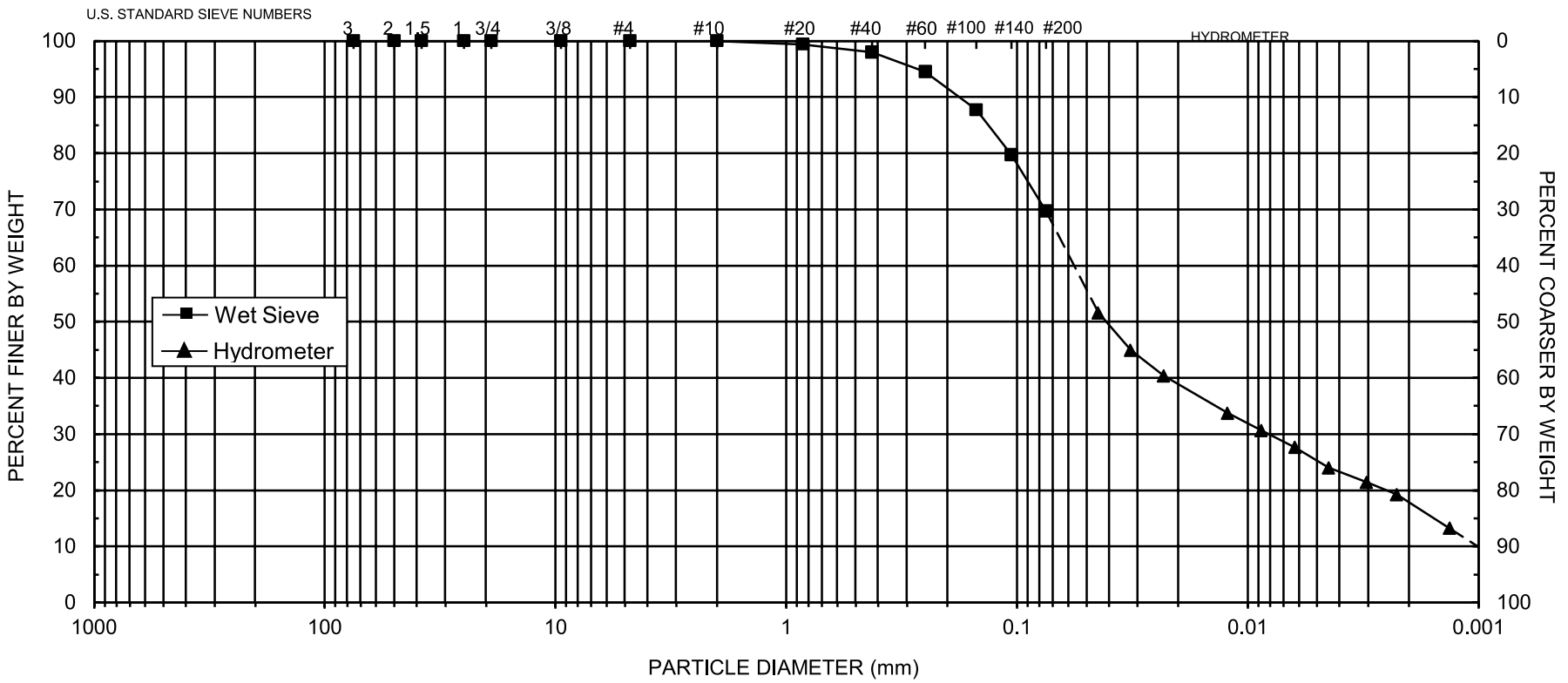
Type of Water Used: DISTILLED
Reaction with H_2O_2*:* NA
Dispersant:* $(NaPO_3)_6$
Assumed particle density: 2.65
Initial Wt. (g)*:* 48.87
Total Sample Wt. (g)*:* 158.07
Wt. Passing #10 (g)*:* 158.07

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	H_m (cm)	D (mm)	P (%)	% Finer
10-Feb-21	1	20.1	31.75	6.54	25.2	11	0.0444	52	51.6
	2	20.1	28.50	6.54	22.0	11	0.0322	45	44.9
	4	20.1	26.25	6.54	19.7	12	0.0232	40	40.3
	15	20.2	23.00	6.52	16.5	12	0.0122	34	33.7
	30	20.2	21.50	6.52	15.0	12	0.0087	31	30.6
	60	20.2	20.00	6.52	13.5	13	0.0062	28	27.6
	120	20.1	18.25	6.54	11.7	13	0.0045	24	24.0
	261	20.1	17.00	6.55	10.4	13	0.0031	21	21.4
	480	19.9	16.00	6.60	9.4	13	0.0023	19	19.2
11-Feb-21	1435	20.1	13.00	6.55	6.4	14	0.0013	13	13.2

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines



d_{10} = **0.0010**	d_{30} = **0.0081**	d_{50} = **0.041**	d_{60} = **0.057**	C_u = **57**	C_c = **1.2**

SAMPLE NUMBER	DATE/TIME SAMPLED	ASTM CLASSIFICATION	USDA CLASSIFICATION
2102373-002B/ MKTF-LIF-74 4-5	**2/4/21 947**	**Classification by ASTM 2487 requires Atterberg test**	**Loam**

Note: Reported values for d_{10}, C_u, C_c, and ASTM classification are estimates, since extrapolation was required to obtain the d_{10} diameter

Daniel B. Stephens & Associates, Inc.

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Sieve Data (#10 Split)

Job Name: Hall Environmental Analysis Laboratory
Job Number: DB21.1064.00
Sample Number: 2102373-004B/ MKTF-LIF-85 7-9
Matrix: Soil
Date/Time Sampled: 2/5/21 1031
Test Date: 9-Feb-21

Initial Dry Weight of Sample (g): 268.61
Weight Passing #10 (g): 268.61
Weight Retained #10 (g): 0.00
Weight of -10 Sub-Sample (g): 49.12
Calculated Weight of Sieve Sample (g): 49.12
Shape: Angular
Hardness: Soft

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	268.61	100.00
	2"	50	0.00	0.00	268.61	100.00
	1.5"	38.1	0.00	0.00	268.61	100.00
	1"	25	0.00	0.00	268.61	100.00
	3/4"	19.0	0.00	0.00	268.61	100.00
	3/8"	9.5	0.00	0.00	268.61	100.00
	4	4.75	0.00	0.00	268.61	100.00
	10	2.00	0.00	0.00	268.61	100.00
-10			(Based on calculated sieve wt.)			
	20	0.85	0.10	0.10	49.02	99.80
	40	0.425	0.45	0.55	48.57	98.88
	60	0.250	1.19	1.74	47.38	96.46
	100	0.150	2.79	4.53	44.59	90.78
	140	0.106	2.98	7.51	41.61	84.71
	200	0.075	4.02	11.53	37.59	76.53
	dry pan		1.65	13.18	35.94	
	wet pan			35.94	0.00	

d_{10} (mm): 0.00065
d_{16} (mm): 0.0012
d_{30} (mm): 0.0062
d_{50} (mm): 0.030
d_{60} (mm): 0.047
d_{84} (mm): 0.10

Median Particle Diameter --d_{50} (mm): 0.030
Uniformity Coefficient, Cu --$[d_{60}/d_{10}]$ (mm): 72
Coefficient of Curvature, Cc --$[(d_{30})^2/(d_{10}*d_{60})]$ (mm): 1.3
Mean Particle Diameter --$[(d_{16}+d_{50}+d_{84})/3]$ (mm): 0.044

Note: Reported values for d_{10}, C_u, C_c, and soil classification are estimates, since extrapolation was required to obtain the d_{10} diameter

ASTM Soil Classification: Classification by ASTM 2487 requires Atterberg test
USDA Soil Classification: Loam

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Hydrometer Data

Job Name: Hall Environmental Analysis Laboratory
Job Number: DB21.1064.00
Sample Number: 2102373-004B/ MKTF-LIF-85 7-9
Matrix: Soil
Date/Time Sampled: 2/5/21 1031
Test Date: 10-Feb-21
Start Time: 7:42

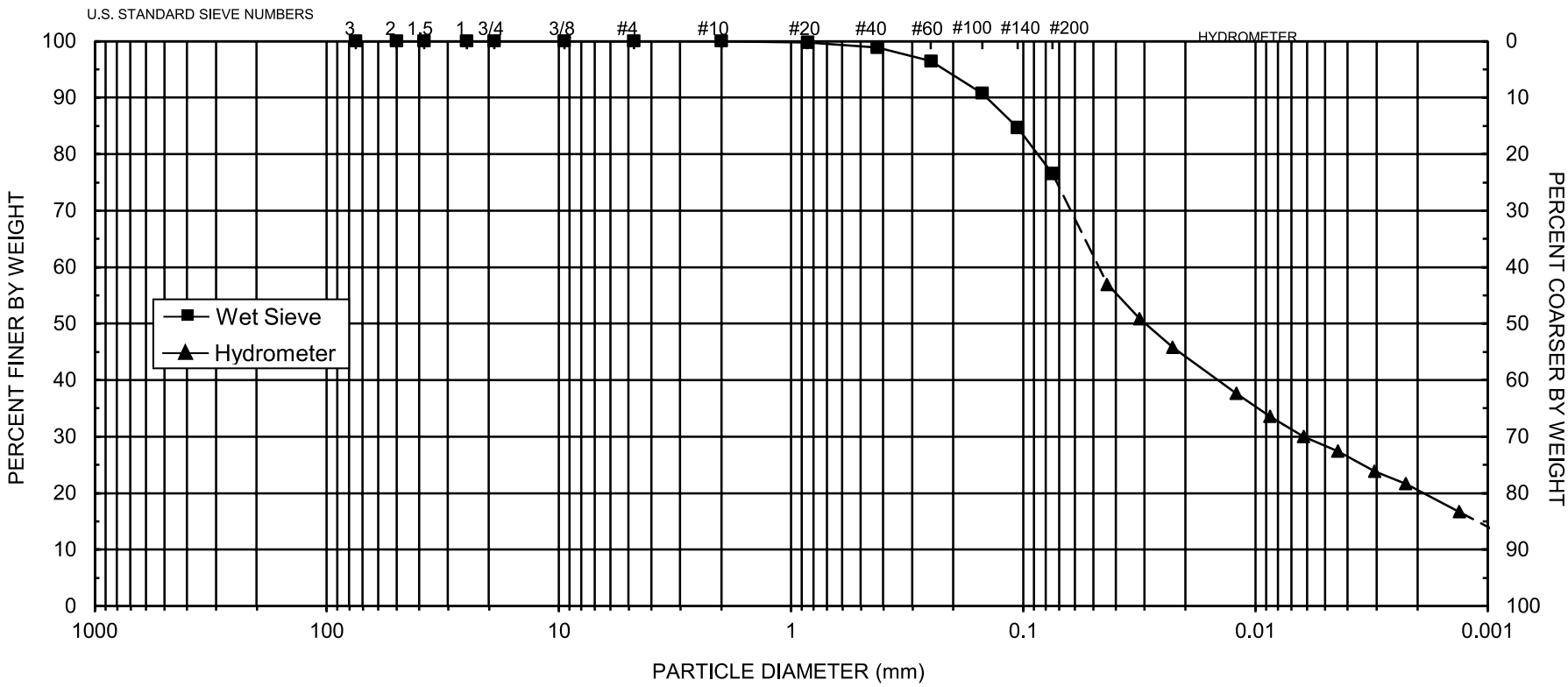
Type of Water Used: DISTILLED
Reaction with H_2O_2*:* NA
Dispersant:* $(NaPO_3)_6$
Assumed particle density: 2.65
Initial Wt. (g)*:* 49.12
Total Sample Wt. (g)*:* 268.61
Wt. Passing #10 (g)*:* 268.61

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	H_m (cm)	D (mm)	P (%)	% Finer
10-Feb-21	1	20.2	34.50	6.52	28.0	10	0.0435	57	57.0
	2	20.2	31.50	6.52	25.0	11	0.0315	51	50.9
	4	20.2	29.00	6.52	22.5	11	0.0227	46	45.8
	15	20.2	25.00	6.52	18.5	12	0.0121	38	37.6
	30	20.2	23.00	6.52	16.5	12	0.0086	34	33.5
	60	20.2	21.25	6.52	14.7	12	0.0062	30	30.0
	120	20.1	20.00	6.54	13.5	13	0.0044	27	27.4
	255	20.1	18.25	6.55	11.7	13	0.0031	24	23.8
	480	19.9	17.25	6.60	10.6	13	0.0022	22	21.7
11-Feb-21	1430	20.1	14.75	6.55	8.2	13	0.0013	17	16.7

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines



d_{10} = **0.00065**	d_{30} = **0.0062**	d_{50} = **0.030**	d_{60} = **0.047**	C_u = **72**	C_c = **1.3**

SAMPLE NUMBER	DATE/TIME SAMPLED	ASTM CLASSIFICATION	USDA CLASSIFICATION
2102373-004B/ MKTF-LIF-85 7-9	**2/5/21 1031**	**Classification by ASTM 2487 requires Atterberg test**	**Loam**

Note: Reported values for d_{10}, C_u, C_c, and ASTM classification are estimates, since extrapolation was required to obtain the d_{10} diameter

Daniel B. Stephens & Associates, Inc.

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Sieve Data (#10 Split)

Job Name: Hall Environmental Analysis Laboratory
Job Number: DB21.1064.00
Sample Number: 2102373-005B/ PA-LIF-07 11-13
Matrix: Soil
Date/Time Sampled: 2/5/21 131
Test Date: 9-Feb-21

Initial Dry Weight of Sample (g): 333.99
Weight Passing #10 (g): 256.64
Weight Retained #10 (g): 77.35
Weight of -10 Sub-Sample (g): 50.74
Calculated Weight of Sieve Sample (g): 66.03
Shape: Angular
Hardness: Soft

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	333.99	100.00
	2"	50	0.00	0.00	333.99	100.00
	1.5"	38.1	0.00	0.00	333.99	100.00
	1"	25	0.00	0.00	333.99	100.00
	3/4"	19.0	0.00	0.00	333.99	100.00
	3/8"	9.5	17.38	17.38	316.61	94.80
	4	4.75	27.77	45.15	288.84	86.48
	10	2.00	32.20	77.35	256.64	76.84
-10			(Based on calculated sieve wt.)			
	20	0.85	3.56	18.85	47.18	71.45
	40	0.425	6.41	25.26	40.77	61.74
	60	0.250	10.96	36.22	29.81	45.14
	100	0.150	7.63	43.85	22.18	33.59
	140	0.106	2.52	46.37	19.66	29.77
	200	0.075	1.53	47.90	18.13	27.46
	dry pan		0.35	48.25	17.78	
	wet pan			17.78	0.00	

d_{10} (mm): 0.0039
d_{16} (mm): 0.017
d_{30} (mm): 0.11
d_{50} (mm): 0.29
d_{60} (mm): 0.40
d_{84} (mm): 3.8

Median Particle Diameter --d_{50} (mm): 0.29
Uniformity Coefficient, Cu --[d_{60}/d_{10}] (mm): 103
Coefficient of Curvature, Cc --[$(d_{30})^2/(d_{10}*d_{60})$] (mm): 7.8
Mean Particle Diameter --[$(d_{16}+d_{50}+d_{84})/3$] (mm): 1.4

ASTM Soil Classification: Classification by ASTM 2487 requires Atterberg test
USDA Soil Classification: Sandy Loam †

† Greater than 10% of sample is coarse material

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Hydrometer Data

Job Name: Hall Environmental Analysis Laboratory
Job Number: DB21.1064.00
Sample Number: 2102373-005B/ PA-LIF-07 11-13
Matrix: Soil
Date/Time Sampled: 2/5/21 131
Test Date: 10-Feb-21
Start Time: 7:48

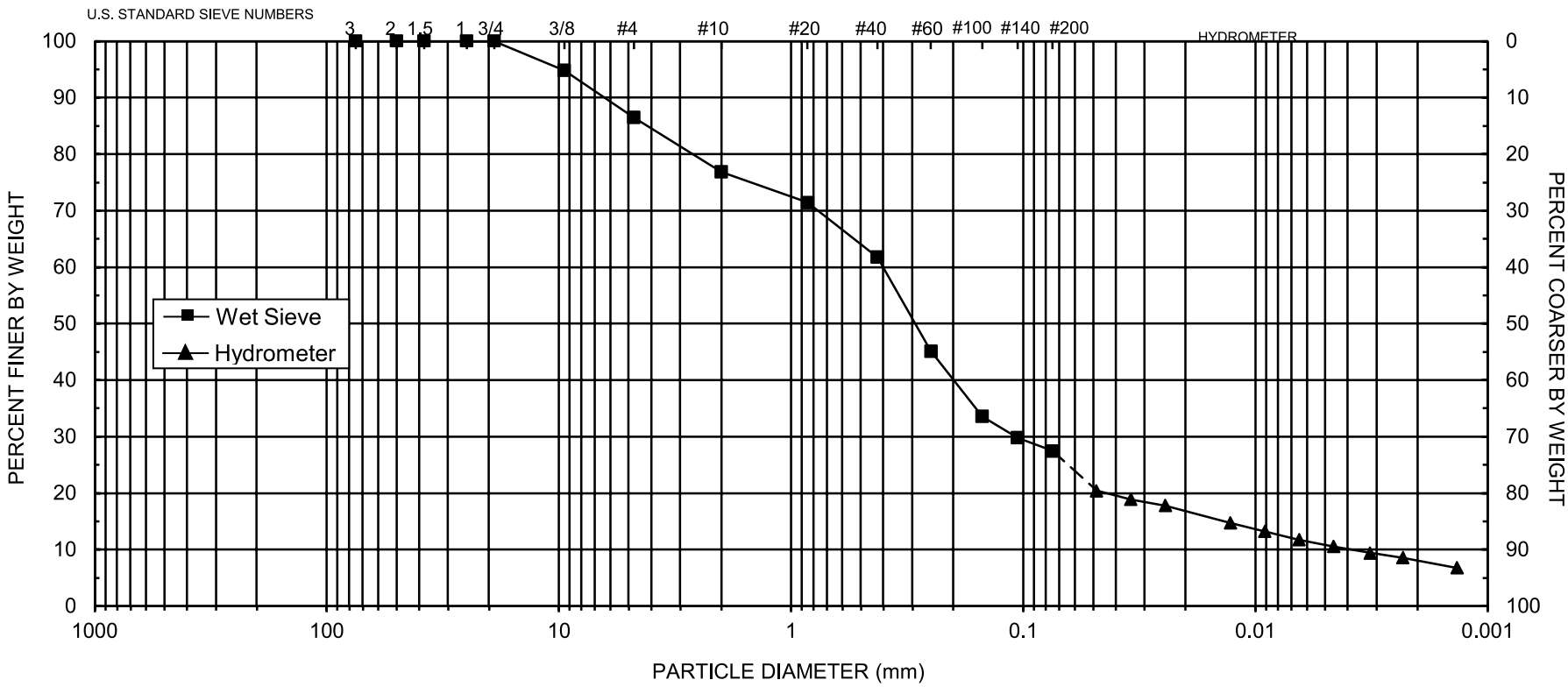
Type of Water Used: DISTILLED
Reaction with H_2O_2*:* NA
Dispersant:* $(NaPO_3)_6$
Assumed particle density: 2.65
Initial Wt. (g)*:* 50.74
Total Sample Wt. (g)*:* 333.99
Wt. Passing #10 (g)*:* 256.64

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	H_m (cm)	D (mm)	P (%)	% Finer
10-Feb-21	1	20.2	20.00	6.52	13.5	13	0.0483	27	20.4
	2	20.2	19.00	6.52	12.5	13	0.0344	25	18.9
	4	20.2	18.25	6.52	11.7	13	0.0244	23	17.8
	15	20.2	16.25	6.52	9.7	13	0.0128	19	14.7
	30	20.2	15.25	6.52	8.7	13	0.0091	17	13.2
	60	20.2	14.25	6.52	7.7	14	0.0065	15	11.7
	120	20.1	13.50	6.54	7.0	14	0.0046	14	10.5
	250	20.1	12.75	6.55	6.2	14	0.0032	12	9.4
	480	19.9	12.25	6.60	5.6	14	0.0023	11	8.6
11-Feb-21	1426	20.1	11.00	6.55	4.4	14	0.0014	9	6.7

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines



d_{10} = **0.0039**	d_{30} = **0.11**	d_{50} = **0.29**	d_{60} = **0.40**	C_u = **103**	C_c = **7.8**

SAMPLE NUMBER	DATE/TIME SAMPLED	ASTM CLASSIFICATION	USDA CLASSIFICATION
2102373-005B/ PA-LIF-07 11-13	**2/5/21 131**	**Classification by ASTM 2487 requires Atterberg test**	**Sandy Loam †**

† Greater than 10% of sample is coarse material

Daniel B. Stephens & Associates, Inc.

Laboratory Tests and Methods

Tests and Methods

Particle Size Analysis:	ASTM D7928, ASTM D6913
USCS (ASTM) Classification:	ASTM D6913, ASTM D4318, ASTM D2487
USDA Classification:	ASTM D7928, ASTM D6913, USDA Soil Textural Triangle

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **2102373**

17-Feb-21

Client: Marathon

Project: MPC MKTF LIF Investigation

Sample ID: **MB-58022**	SampType: **MBLK**	TestCode: **EPA Method 8015M/D: Diesel Range Organics**
Client ID: **PBS**	Batch ID: **58022**	RunNo: **75192**
Prep Date: **2/10/2021**	Analysis Date: **2/10/2021**	SeqNo: **2654980** Units: **%Rec**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: DNOP	9.6		10.00		95.9	70	130			

Sample ID: **LCS-58022**	SampType: **LCS**	TestCode: **EPA Method 8015M/D: Diesel Range Organics**
Client ID: **LCSS**	Batch ID: **58022**	RunNo: **75192**
Prep Date: **2/10/2021**	Analysis Date: **2/10/2021**	SeqNo: **2654982** Units: **%Rec**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: DNOP	4.7		5.000		94.6	70	130			

Sample ID: **MB-58001**	SampType: **MBLK**	TestCode: **EPA Method 8015M/D: Diesel Range Organics**
Client ID: **PBS**	Batch ID: **58001**	RunNo: **75192**
Prep Date: **2/9/2021**	Analysis Date: **2/10/2021**	SeqNo: **2655610** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	ND	10								
Motor Oil Range Organics (MRO)	ND	50								
Surr: DNOP	9.1		10.00		90.7	70	130			

Sample ID: **LCS-58001**	SampType: **LCS**	TestCode: **EPA Method 8015M/D: Diesel Range Organics**
Client ID: **LCSS**	Batch ID: **58001**	RunNo: **75192**
Prep Date: **2/9/2021**	Analysis Date: **2/10/2021**	SeqNo: **2655612** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	52	10	50.00	0	104	68.9	141			
Surr: DNOP	4.5		5.000		89.0	70	130			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
D	Sample Diluted Due to Matrix
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix
B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **2102373**

17-Feb-21

Client: Marathon

Project: MPC MKTF LIF Investigation

Sample ID: **lcs-57986**	SampType: **LCS**	TestCode: **EPA Method 8015D Mod: Gasoline Range**
Client ID: **LCSS**	Batch ID: **57986**	RunNo: **75251**
Prep Date: **2/8/2021**	Analysis Date: **2/11/2021**	SeqNo: **2657708** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	23	5.0	25.00	0	91.5	70	130			
Surr: BFB	490		500.0		98.2	70	130			

Sample ID: **mb-57986**	SampType: **MBLK**	TestCode: **EPA Method 8015D Mod: Gasoline Range**
Client ID: **PBS**	Batch ID: **57986**	RunNo: **75251**
Prep Date: **2/8/2021**	Analysis Date: **2/11/2021**	SeqNo: **2657709** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	ND	5.0								
Surr: BFB	480		500.0		96.0	70	130			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
D	Sample Diluted Due to Matrix
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix
B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Limit

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: clients.hallenvironmental.com

Sample Log-In Check List

Client Name: **Marathon** Work Order Number: **2102373** RcptNo: **1**

Received By: **Sean Livingston** **2/6/2021 10:30:00 AM** Sean Livingston

Completed By: **Cheyenne Cason** **2/8/2021 10:02:42 AM**

Reviewed By: DAD 2/8/21

Chain of Custody

1. Is Chain of Custody complete?	Yes ☑	No ☐	Not Present ☐
2. How was the sample delivered?	Client		

Log In

3. Was an attempt made to cool the samples?	Yes ☑	No ☐	NA ☐
4. Were all samples received at a temperature of >0° C to 6.0°C	Yes ☑	No ☐	NA ☐
5. Sample(s) in proper container(s)?	Yes ☑	No ☐	
6. Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
7. Are samples (except VOA and ONG) properly preserved?	Yes ☑	No ☐	
8. Was preservative added to bottles?	Yes ☐	No ☑	NA ☐
9. Received at least 1 vial with headspace <1/4" for AQ VOA?	Yes ☐	No ☐	NA ☑
10. Were any sample containers received broken?	Yes ☐	No ☑	TO
11. Does paperwork match bottle labels? (Note discrepancies on chain of custody)	Yes ☑	No ☐	# of preserved bottles checked for pH: 2/8/21 (<2 or >12 unless noted)
12. Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	Adjusted?
13. Is it clear what analyses were requested?	Yes ☑	No ☐	
14. Were all holding times able to be met? (If no, notify customer for authorization.)	Yes ☑	No ☐	Checked by:

Special Handling (if applicable)

15. Was client notified of all discrepancies with this order?	Yes ☐	No ☐	NA ☑

Person Notified: Date:

By Whom: Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding:

Client Instructions:

16. Additional remarks:

17. **Cooler Information**

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	5.3	Good				

Chain-of-Custody Record

Client: Marathon Petroleum Co.

Mailing Address: 92 Giant Crossing Rd
Gallup, NM 87301

Phone #: 505-722-3833

email or Fax#: phildebrandt@Trihydro.com

QA/QC Package:
☐ Standard ☐ Level 4 (Full Validation)

Accreditation: ☐ Az Compliance
☐ NELAC ☐ Other

☒ EDD (Type)

Turn-Around Time:
☒ Standard ☐ Rush

Project Name: MPC MKTF LIF Investigation

Project #: 697-085-001

Project Manager: Paul Hildebrandt

Sampler: Paul Hildebrandt

On Ice: ☑ Yes ☐ No

# of Coolers: 1

Cooler Temp(including CF): 5.3 +0 = 5.3 (°C)

HALL ENVIRONMENTAL ANALYSIS LABORATORY
www.hallenvironmental.com
4901 Hawkins NE - Albuquerque, NM 87109
Tel. 505-345-3975 Fax 505-345-4107

Date	Time	Matrix	Sample Name	Container Type and #	Preservative Type	HEAL No. 2102373	BTEX / MTBE / TMB's (8021)	TPH:8015D(GRO / DRO / MRO)	8081 Pesticides/8082 PCB's	EDB (Method 504.1)	PAHs by 8310 or 8270SIMS	RCRA 8 Metals	Cl, F, Br, NO_3, NO_2, PO_4, SO_4	8260 (VOA)	8270 (Semi-VOA)	Total Coliform (Present/Absent)	Gain Size Analysis
2/4/21	0845	Soil	MKTF-LIF-74 2-3	2	MeOH	001		X									X
2/4/21	0947		MKTF-LIF-74 4-5	2		002		X									X
2/4/21	0949		MKTF-LIF-74 5-6	1		003		X									
2/5/21	1031		MKTF-LIF-85 7-9	2		004		X									X
2/5/21	1331		PA-LIF-07 11-13	2		005		X									X
2/5/21	1332		PA-LIF-07 13-14	1		006		X									

Date:	Time:	Relinquished by:	Received by:	Via:	Date	Time
2/5/21	1455		SGL	COO	2/6/21	10:30
Date:	Time:	Relinquished by:	Received by:	Via:	Date	Time

Remarks:

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: clients.hallenvironmental.com

June 15, 2021

Lesli Alexander

Trihydro
2400 Midpoint Drive Suite 570
Fort Collins, CO 80525
TEL: (307) 745-7474
FAX

RE: Gallup Refinery LIF OrderNo.: 2105803

Dear Lesli Alexander:

Hall Environmental Analysis Laboratory received 9 sample(s) on 5/19/2021 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites. In order to properly interpret your results, it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifiers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0901

Sincerely,

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Analytical Report
Lab Order **2105803**
Date Reported: **6/15/2021**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Trihydro **Client Sample ID:** EB-LIF-99 19-20'
Project: Gallup Refinery LIF **Collection Date:** 5/14/2021 2:20:00 PM
Lab ID: 2105803-001 **Matrix:** MEOH (SOIL) **Received Date:** 5/19/2021 7:28:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **mb**
Diesel Range Organics (DRO)	ND	9.8		mg/Kg	1	5/21/2021 11:54:03 AM
Motor Oil Range Organics (MRO)	ND	49		mg/Kg	1	5/21/2021 11:54:03 AM
Surr: DNOP	92.8	70-130		%Rec	1	5/21/2021 11:54:03 AM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **CCM**
Gasoline Range Organics (GRO)	7.6	3.4		mg/Kg	1	5/19/2021 11:58:00 AM
Surr: BFB	90.8	70-130		%Rec	1	5/19/2021 11:58:00 AM

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
D	Sample Diluted Due to Matrix
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix
B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Limit

Analytical Report
Lab Order **2105803**
Date Reported: **6/15/2021**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Trihydro **Client Sample ID:** EB-LIF-99 21-22'
Project: Gallup Refinery LIF **Collection Date:** 5/14/2021 2:29:00 PM
Lab ID: 2105803-003 **Matrix:** MEOH (SOIL) **Received Date:** 5/19/2021 7:28:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **SB**
Diesel Range Organics (DRO)	3200	47		mg/Kg	5	5/22/2021 8:11:12 PM
Motor Oil Range Organics (MRO)	ND	240	D	mg/Kg	5	5/22/2021 8:11:12 PM
Surr: DNOP	96.2	70-130		%Rec	5	5/22/2021 8:11:12 PM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **CCM**
Gasoline Range Organics (GRO)	2100	59		mg/Kg	20	5/19/2021 12:58:00 PM
Surr: BFB	254	70-130	S	%Rec	20	5/19/2021 12:58:00 PM

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
D	Sample Diluted Due to Matrix
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix
B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Limit

Analytical Report
Lab Order **2105803**
Date Reported: **6/15/2021**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Trihydro **Client Sample ID:** EB-LIF-109 11.5-12'
Project: Gallup Refinery LIF **Collection Date:** 5/14/2021 3:08:00 PM
Lab ID: 2105803-004 **Matrix:** MEOH (SOIL) **Received Date:** 5/19/2021 7:28:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **mb**
Diesel Range Organics (DRO)	630	9.9		mg/Kg	1	5/21/2021 12:13:32 PM
Motor Oil Range Organics (MRO)	ND	49		mg/Kg	1	5/21/2021 12:13:32 PM
Surr: DNOP	107	70-130		%Rec	1	5/21/2021 12:13:32 PM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **CCM**
Gasoline Range Organics (GRO)	24	3.0		mg/Kg	1	5/19/2021 1:38:00 PM
Surr: BFB	191	70-130	S	%Rec	1	5/19/2021 1:38:00 PM

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix
E	Value above quantitation range
H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit
P	Sample pH Not In Range
PQL	Practical Quanitative Limit
RL	Reporting Limit
S	% Recovery outside of range due to dilution or matrix

Analytical Report
Lab Order **2105803**
Date Reported: **6/15/2021**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Trihydro **Client Sample ID:** EB-LIF-109 15-15.5'
Project: Gallup Refinery LIF **Collection Date:** 5/14/2021 3:24:00 PM
Lab ID: 2105803-006 **Matrix:** MEOH (SOIL) **Received Date:** 5/19/2021 7:28:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **mb**
Diesel Range Organics (DRO)	730	10		mg/Kg	1	5/21/2021 12:26:26 PM
Motor Oil Range Organics (MRO)	ND	50		mg/Kg	1	5/21/2021 12:26:26 PM
Surr: DNOP	119	70-130		%Rec	1	5/21/2021 12:26:26 PM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **CCM**
Gasoline Range Organics (GRO)	17	15		mg/Kg	5	5/19/2021 1:57:00 PM
Surr: BFB	140	70-130	S	%Rec	5	5/19/2021 1:57:00 PM

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of range due to dilution or matrix		

Analytical Report
Lab Order **2105803**
Date Reported: **6/15/2021**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Trihydro **Client Sample ID:** EB-LIF-108 10-11'
Project: Gallup Refinery LIF **Collection Date:** 5/14/2021 3:45:00 PM
Lab ID: 2105803-007 **Matrix:** MEOH (SOIL) **Received Date:** 5/19/2021 7:28:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015M/D: DIESEL RANGE ORGANICS						Analyst: **mb**
Diesel Range Organics (DRO)	2500	96		mg/Kg	10	5/21/2021 12:36:10 PM
Motor Oil Range Organics (MRO)	ND	480	D	mg/Kg	10	5/21/2021 12:36:10 PM
Surr: DNOP	0	70-130	S	%Rec	10	5/21/2021 12:36:10 PM
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **CCM**
Gasoline Range Organics (GRO)	110	14		mg/Kg	5	5/19/2021 2:17:00 PM
Surr: BFB	102	70-130		%Rec	5	5/19/2021 2:17:00 PM

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
PQL	Practical Quanitative Limit	RL	Reporting Limit
S	% Recovery outside of range due to dilution or matrix		

Analytical Report
Lab Order **2105803**
Date Reported: **6/15/2021**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Trihydro **Client Sample ID:** MeOH Blank
Project: Gallup Refinery LIF **Collection Date:**
Lab ID: 2105803-009 **Matrix:** MEOH BLAN **Received Date:** 5/19/2021 7:28:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **CCM**
Gasoline Range Organics (GRO)	ND	5.0		mg/Kg	1	5/19/2021 2:57:00 PM
Surr: BFB	83.0	70-130		%Rec	1	5/19/2021 2:57:00 PM

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
D	Sample Diluted Due to Matrix
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix
B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Limit

Laboratory Report for
Hall Environmental Analysis Laboratory

Project Number: 2105803

June 15, 2021

Daniel B. Stephens & Associates, Inc.

4400 Alameda Blvd. NE, Suite C • Albuquerque, New Mexico 87113

June 15, 2021

Andy Freeman
Hall Environmental Analysis Laboratory
4901 Hawkins NE, Suite D
Albuquerque, NM 87109
(505) 345-3975

Re: DBS&A Laboratory Report for the HEAL Project Number: 2105803 Sample Testing

Dear Mr. Freeman:

Enclosed is the report for the HEAL Project Number: 2105803 sample testing. Please review this report and provide any comments as samples will be held for a maximum of 30 days. After 30 days samples will be returned or disposed of in an appropriate manner.

All testing results were evaluated subjectively for consistency and reasonableness, and the results appear to be reasonably representative of the material tested. However, DBS&A does not assume any responsibility for interpretations or analyses based on the data enclosed, nor can we guarantee that these data are fully representative of the undisturbed materials at the field site. We recommend that careful evaluation of these laboratory results be made for your particular application.

The testing utilized to generate the enclosed report employs methods that are standard for the industry. The results do not constitute a professional opinion by DBS&A, nor can the results affect any professional or expert opinions rendered with respect thereto by DBS&A. You have acknowledged that all the testing undertaken by us, and the report provided, constitutes mere test results using standardized methods, and cannot be used to disqualify DBS&A from rendering any professional or expert opinion, having waived any claim of conflict of interest by DBS&A.

We are pleased to provide this service to HEAL and look forward to future laboratory testing on other projects. If you have any questions about the enclosed data, please do not hesitate to call.

Sincerely,

DANIEL B. STEPHENS & ASSOCIATES, INC.
SOIL TESTING & RESEARCH LABORATORY

Joleen Hines
Laboratory Manager

Enclosure

Daniel B. Stephens & Associates, Inc.
Soil Testing & Research Laboratory
4400 Alameda Blvd. NE, Suite C
Albuquerque, NM 87113
505-889-7752
FAX 505-889-0258

Summaries

Summary of Tests Performed

Laboratory Sample Number	Initial Soil Properties[1]			Saturated Hydraulic Conductivity[2]			Moisture Characteristics[3]								Particle Size[4]			Specific Gravity[5]		Air Perm-eability	Atterberg Limits	Proctor Compaction
	G	VM	VD	CH	FH	FW	HC	PP	FP	DPP	RH	EP	WHC	K_{unsat}	DS	WS	H	F	C			
2105803-002A/ EB-LIF-99 18-19'																X	X					
2105803-005A/ EB-LIF-109 10.5-11.5'																X	X					
2105803-008A/ EB-LIF-108 12-13'																X	X					

[1] G = Gravimetric Moisture Content, VM = Volume Measurement Method, VD = Volume Displacement Method

[2] CH = Constant Head Rigid Wall, FH = Falling Head Rigid Wall, FW = Falling Head Rising Tail Flexible Wall

[3] HC = Hanging Column, PP = Pressure Plate, FP = Filter Paper, DPP = Dew Point Potentiometer, RH = Relative Humidity Box, EP = Effective Porosity, WHC = Water Holding Capacity, Kunsat = Calculated Unsaturated Hydraulic Conductivity

[4] DS = Dry Sieve, WS = Wet Sieve, H = Hydrometer

[5] F = Fine (<4.75mm), C = Coarse (>4.75mm)

Notes

Sample Receipt:
Three samples, each as loose material in a resealable quart bag, were hand-delivered on May 19, 2021. The samples were delivered in a cooler with ice packs and were received in good order.

Sample Preparation and Testing Notes:
Each of the samples was subjected to particle size analysis testing.

Particle diameter calculations in the hydrometer portion of the particle size analysis testing are based on the use of an assumed specific gravity value of 2.65.

Summary of Particle Size Characteristics

Sample Number	d_{10} (mm)	d_{50} (mm)	d_{60} (mm)	C_u	C_c	Method	ASTM Classification	USDA Classification	
2105803-002A/ EB-LIF-99 18-19'	0.0004	0.04	0.06	170	1.2	WS/H	Classification by ASTM 2487 requires Atterberg test	Loam	(Est)
2105803-005A/ EB-LIF-109 10.5-11.5'	0.0003	0.009	0.019	73	0.6	WS/H	Classification by ASTM 2487 requires Atterberg test	Clay Loam	(Est)
2105803-008A/ EB-LIF-108 12-13'	0.00042	0.019	0.039	93	0.8	WS/H	Classification by ASTM 2487 requires Atterberg test	Loam	(Est)

Est = Reported values for d_{10}, C_u, C_c, and soil classification are estimates, since extrapolation was required to obtain the d_{10} diameter

$$C_u = \frac{d_{60}}{d_{10}}$$

$$C_c = \frac{(d_{30})^2}{(d_{10})(d_{60})}$$

DS = Dry sieve

H = Hydrometer

WS = Wet sieve

† Greater than 10% of sample is coarse material

d_{50} = Median particle diameter

Percent Gravel, Sand, Silt and Clay*

Sample Number	% Gravel (>4.75mm)	% Sand (<4.75mm, >0.075mm)	% Silt (<0.075mm, >0.002mm)	% Clay (<0.002mm)
2105803-002A/ EB-LIF-99 18-19'	1.3	33.3	42.0	23.4
2105803-005A/ EB-LIF-109 10.5-11.5'	0.0	14.2	54.2	31.6
2105803-008A/ EB-LIF-108 12-13'	1.6	18.7	56.0	23.8

*USCS classification does not classify clay fraction based on particle size. USDA definition of clay (<0.002mm) used in this table.

Particle Size Analysis

Summary of Particle Size Characteristics

Sample Number	d_{10} (mm)	d_{50} (mm)	d_{60} (mm)	C_u	C_c	Method	ASTM Classification	USDA Classification	
2105803-002A/ EB-LIF-99 18-19'	0.0004	0.04	0.06	170	1.2	WS/H	Classification by ASTM 2487 requires Atterberg test	Loam	(Est)
2105803-005A/ EB-LIF-109 10.5-11.5'	0.0003	0.009	0.019	73	0.6	WS/H	Classification by ASTM 2487 requires Atterberg test	Clay Loam	(Est)
2105803-008A/ EB-LIF-108 12-13'	0.00042	0.019	0.039	93	0.8	WS/H	Classification by ASTM 2487 requires Atterberg test	Loam	(Est)

Est = Reported values for d_{10}, C_u, C_c, and soil classification are estimates, since extrapolation was required to obtain the d_{10} diameter

$$C_u = \frac{d_{60}}{d_{10}}$$

$$C_c = \frac{(d_{30})^2}{(d_{10})(d_{60})}$$

DS = Dry sieve

H = Hydrometer

WS = Wet sieve

† Greater than 10% of sample is coarse material

d_{50} = Median particle diameter

Percent Gravel, Sand, Silt and Clay*

Sample Number	% Gravel (>4.75mm)	% Sand (<4.75mm, >0.075mm)	% Silt (<0.075mm, >0.002mm)	% Clay (<0.002mm)
2105803-002A/ EB-LIF-99 18-19'	1.3	33.3	42.0	23.4
2105803-005A/ EB-LIF-109 10.5-11.5'	0.0	14.2	54.2	31.6
2105803-008A/ EB-LIF-108 12-13'	1.6	18.7	56.0	23.8

*USCS classification does not classify clay fraction based on particle size. USDA definition of clay (<0.002mm) used in this table.

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Sieve Data (#10 Split)

Job Name: Hall Environmental Analysis Laboratory
Job Number: DB21.1064.00
Sample Number: 2105803-002A/ EB-LIF-99 18-19'
Matrix: Soil
Date/Time Sampled: 5/14/21 1420
Test Date: 26-May-21

Initial Dry Weight of Sample (g): 311.56
Weight Passing #10 (g): 307.22
Weight Retained #10 (g): 4.34
Weight of -10 Sub-Sample (g): 42.97
Calculated Weight of Sieve Sample (g): 43.58

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	311.56	100.00
	2"	50	0.00	0.00	311.56	100.00
	1.5"	38.1	0.00	0.00	311.56	100.00
	1"	25	0.00	0.00	311.56	100.00
	3/4"	19.0	0.00	0.00	311.56	100.00
	3/8"	9.5	4.04	4.04	307.52	98.70
	4	4.75	0.00	4.04	307.52	98.70
	10	2.00	0.30	4.34	307.22	98.61
-10			(Based on calculated sieve wt.)			
	20	0.85	0.21	0.82	42.76	98.13
	40	0.425	0.87	1.69	41.89	96.13
	60	0.250	2.40	4.09	39.49	90.62
	100	0.150	3.99	8.08	35.50	81.46
	140	0.106	3.26	11.34	32.24	73.98
	200	0.075	3.76	15.10	28.48	65.36
	dry pan		0.89	15.99	27.59	
	wet pan			27.59	0.00	

d_{10} (mm): 0.00037
d_{16} (mm): 0.00079
d_{30} (mm): 0.0052
d_{50} (mm): 0.044
d_{60} (mm): 0.063
d_{84} (mm): 0.17

Median Particle Diameter --d_{50} (mm): 0.044
Uniformity Coefficient, Cu --$[d_{60}/d_{10}]$ (mm): 170
Coefficient of Curvature, Cc --$[(d_{30})^2/(d_{10}*d_{60})]$ (mm): 1.2
Mean Particle Diameter --$[(d_{16}+d_{50}+d_{84})/3]$ (mm): 0.072

Note: Reported values for d_{10}, C_u, C_c, and soil classification are estimates, since extrapolation was required to obtain the d_{10} diameter

ASTM Soil Classification: Classification by ASTM 2487 requires Atterberg test
USDA Soil Classification: Loam

Laboratory analysis by: B. Constand
Data entered by: J. Hines
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Hydrometer Data

Job Name: Hall Environmental Analysis Laboratory
Job Number: DB21.1064.00
Sample Number: 2105803-002A/ EB-LIF-99 18-19'
Matrix: Soil
Date/Time Sampled: 5/14/21 1420

Test Date: 24-May-21
Start Time: 8:30

Type of Water Used: DISTILLED
Reaction with H_2O_2*:* NA
Dispersant:* $(NaPO_3)_6$
Assumed particle density: 2.65

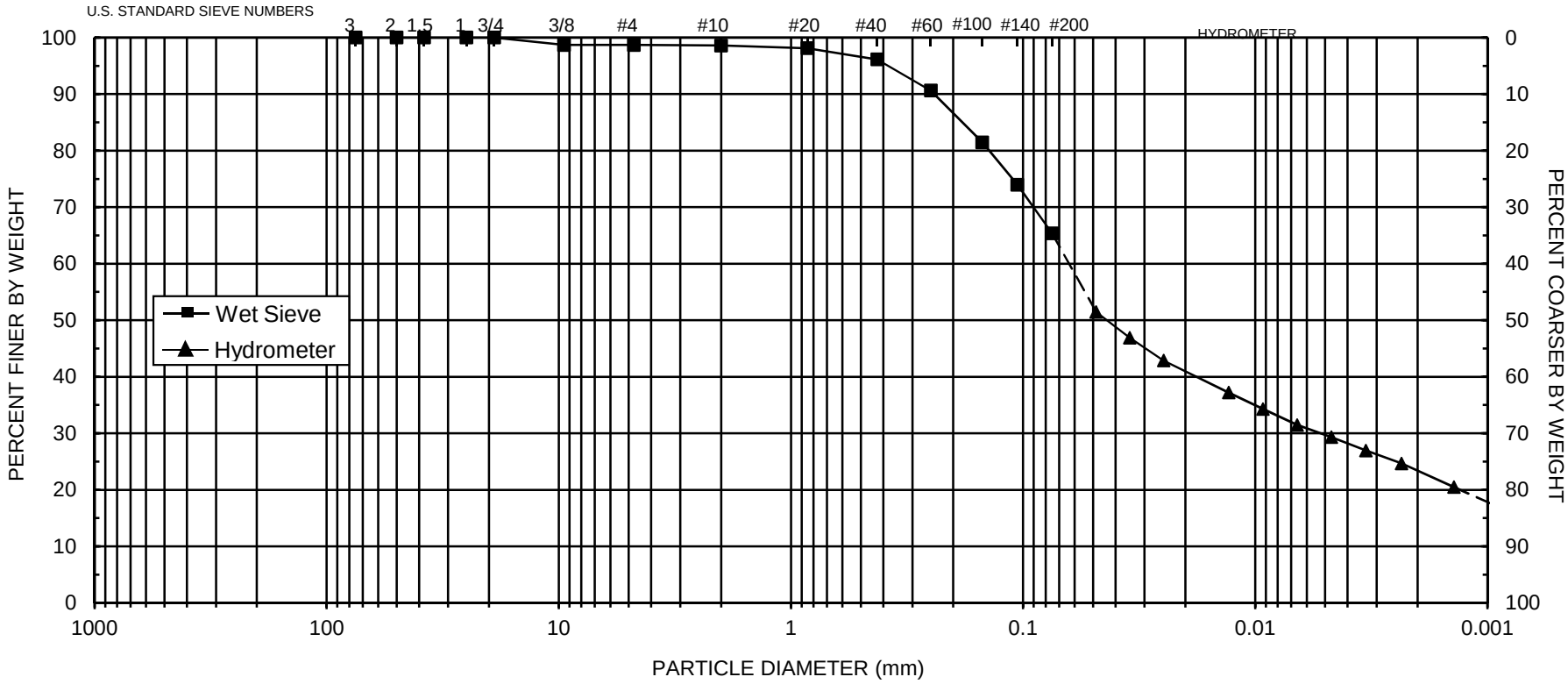
Initial Wt. (g)*:* 42.97
Total Sample Wt. (g)*:* 311.56
Wt. Passing #10 (g)*:* 307.22

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	H_m (cm)	D (mm)	P (%)	% Finer
24-May-21	1	22.30	27.00	4.57	22.4	13	0.0484	52	51.47
	2	22.30	25.00	4.57	20.4	13	0.0347	48	46.88
	4	22.30	23.25	4.57	18.7	13	0.0248	43	42.87
	15	22.40	20.75	4.53	16.2	14	0.0130	38	37.22
	30	22.35	19.50	4.55	15.0	14	0.0093	35	34.31
	60	22.40	18.25	4.53	13.7	14	0.0066	32	31.48
	120	22.55	17.25	4.48	12.8	14	0.0047	30	29.31
	240	22.50	16.25	4.49	11.8	14	0.0033	27	26.97
	492	22.50	15.25	4.49	10.8	15	0.0023	25	24.68
25-May-21	1428	22.30	13.50	4.57	8.9	15	0.0014	21	20.50

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: B. Constand
Data entered by: J. Hines
Checked by: J. Hines



d_{10} = **0.00037**	d_{30} = **0.0052**	d_{50} = **0.044**	d_{60} = **0.063**	C_u = **170**	C_c = **1.2**

SAMPLE NUMBER	DATE/TIME SAMPLED	ASTM CLASSIFICATION	USDA CLASSIFICATION
2105803-002A/ EB-LIF-99 18-19'	**5/14/21 1420**	**Classification by ASTM 2487 requires Atterberg test**	**Loam**

Note: Reported values for d_{10}, C_u, C_c, and ASTM classification are estimates, since extrapolation was required to obtain the d_{10} diameter

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Sieve Data (#10 Split)

Job Name: Hall Environmental Analysis Laboratory
Job Number: DB21.1064.00
Sample Number: 2105803-005A/ EB-LIF-109 10.5-11.5'
Matrix: Soil
Date/Time Sampled: 5/14/21 1508
Test Date: 27-May-21

Initial Dry Weight of Sample (g): 296.41
Weight Passing #10 (g): 296.41
Weight Retained #10 (g): 0.00
Weight of -10 Sub-Sample (g): 42.19
Calculated Weight of Sieve Sample (g): 42.19

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	296.41	100.00
	2"	50	0.00	0.00	296.41	100.00
	1.5"	38.1	0.00	0.00	296.41	100.00
	1"	25	0.00	0.00	296.41	100.00
	3/4"	19.0	0.00	0.00	296.41	100.00
	3/8"	9.5	0.00	0.00	296.41	100.00
	4	4.75	0.00	0.00	296.41	100.00
	10	2.00	0.00	0.00	296.41	100.00
-10			(Based on calculated sieve wt.)			
	20	0.85	0.26	0.26	41.93	99.38
	40	0.425	0.36	0.62	41.57	98.53
	60	0.250	0.83	1.45	40.74	96.56
	100	0.150	1.47	2.92	39.27	93.08
	140	0.106	1.42	4.34	37.85	89.71
	200	0.075	1.63	5.97	36.22	85.85
	dry pan		0.63	6.60	35.59	
	wet pan			35.59	0.00	

d_{10} (mm): 0.00026
d_{16} (mm): 0.00045
d_{30} (mm): 0.0017
d_{50} (mm): 0.0094
d_{60} (mm): 0.019
d_{84} (mm): 0.070

Median Particle Diameter --d_{50} (mm): 0.0094
Uniformity Coefficient, Cu --$[d_{60}/d_{10}]$ (mm): 73
Coefficient of Curvature, Cc --$[(d_{30})^2/(d_{10}*d_{60})]$ (mm): 0.59
Mean Particle Diameter --$[(d_{16}+d_{50}+d_{84})/3]$ (mm): 0.027

Note: Reported values for d_{10}, C_u, C_c, and soil classification are estimates, since extrapolation was required to obtain the d_{10} diameter

ASTM Soil Classification: Classification by ASTM 2487 requires Atterberg test
USDA Soil Classification: Clay Loam

Laboratory analysis by: B. Constand
Data entered by: J. Hines
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Hydrometer Data

Job Name: Hall Environmental Analysis Laboratory
Job Number: DB21.1064.00
Sample Number: 2105803-005A/ EB-LIF-109 10.5-11.5'
Matrix: Soil
Date/Time Sampled: 5/14/21 1508

Test Date: 24-May-21
Start Time: 8:36

Type of Water Used: DISTILLED
Reaction with H_2O_2*:* NA
Dispersant:* $(NaPO_3)_6$
Assumed particle density: 2.65

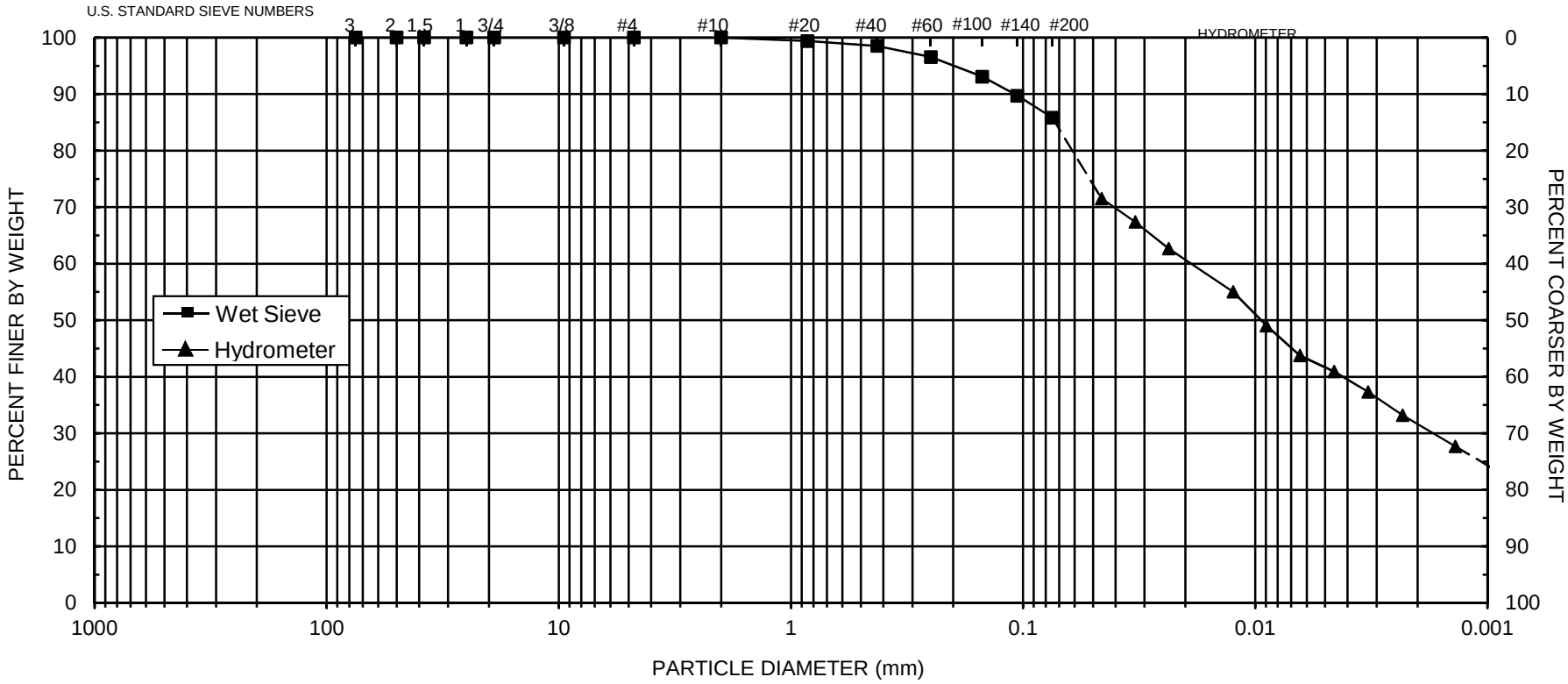
Initial Wt. (g)*:* 42.19
Total Sample Wt. (g)*:* 296.41
Wt. Passing #10 (g)*:* 296.41

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	H_m (cm)	D (mm)	P (%)	% Finer
24-May-21	1	22.30	34.75	4.57	30.2	11	0.0459	72	71.53
	2	22.30	33.00	4.57	28.4	12	0.0329	67	67.39
	4	22.35	31.00	4.55	26.5	12	0.0236	63	62.69
	15	22.40	27.75	4.53	23.2	13	0.0125	55	55.03
	30	22.35	25.25	4.55	20.7	13	0.0090	49	49.06
	60	22.40	23.00	4.53	18.5	13	0.0064	44	43.77
	120	22.55	21.75	4.48	17.3	14	0.0046	41	40.94
	240	22.50	20.25	4.49	15.8	14	0.0033	37	37.34
	487	22.50	18.50	4.49	14.0	14	0.0023	33	33.19
25-May-21	1425	22.30	16.25	4.57	11.7	14	0.0014	28	27.69

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: B. Constand
Data entered by: J. Hines
Checked by: J. Hines



d_{10} = **0.00026**	d_{30} = **0.0017**	d_{50} = **0.0094**	d_{60} = **0.019**	C_u = **73**	C_c = **0.59**

SAMPLE NUMBER	DATE/TIME SAMPLED	ASTM CLASSIFICATION	USDA CLASSIFICATION
2105803-005A/ EB-LIF-109 10.5-11.5'	**5/14/21 1508**	**Classification by ASTM 2487 requires Atterberg test**	**Clay Loam**

Note: Reported values for d_{10}, C_u, C_c, and ASTM classification are estimates, since extrapolation was required to obtain the d_{10} diameter

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Sieve Data (#10 Split)

Job Name: Hall Environmental Analysis Laboratory
Job Number: DB21.1064.00
Sample Number: 2105803-008A/ EB-LIF-108 12-13'
Matrix: Soil
Date/Time Sampled: 5/14/21 1545
Test Date: 26-May-21

Initial Dry Weight of Sample (g): 279.57
Weight Passing #10 (g): 271.94
Weight Retained #10 (g): 7.63
Weight of -10 Sub-Sample (g): 43.28
Calculated Weight of Sieve Sample (g): 44.49

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	279.57	100.00
	2"	50	0.00	0.00	279.57	100.00
	1.5"	38.1	0.00	0.00	279.57	100.00
	1"	25	0.00	0.00	279.57	100.00
	3/4"	19.0	0.00	0.00	279.57	100.00
	3/8"	9.5	1.80	1.80	277.77	99.36
	4	4.75	2.57	4.37	275.20	98.44
	10	2.00	3.26	7.63	271.94	97.27
-10			(Based on calculated sieve wt.)			
	20	0.85	0.53	1.74	42.75	96.08
	40	0.425	0.52	2.26	42.23	94.91
	60	0.250	1.13	3.39	41.10	92.37
	100	0.150	1.66	5.05	39.44	88.64
	140	0.106	1.50	6.55	37.94	85.27
	200	0.075	2.44	8.99	35.50	79.79
	dry pan		1.19	10.18	34.31	
	wet pan			34.31	0.00	

d_{10} (mm): 0.00042
d_{16} (mm): 0.00083
d_{30} (mm): 0.0037
d_{50} (mm): 0.019
d_{60} (mm): 0.039
d_{84} (mm): 0.098

Median Particle Diameter --d_{50} (mm): 0.019
Uniformity Coefficient, Cu --$[d_{60}/d_{10}]$ (mm): 93
Coefficient of Curvature, Cc --$[(d_{30})^2/(d_{10}*d_{60})]$ (mm): 0.84
Mean Particle Diameter --$[(d_{16}+d_{50}+d_{84})/3]$ (mm): 0.039

Note: Reported values for d_{10}, C_u, C_c, and soil classification are estimates, since extrapolation was required to obtain the d_{10} diameter

ASTM Soil Classification: Classification by ASTM 2487 requires Atterberg test
USDA Soil Classification: Loam

Laboratory analysis by: B. Constand
Data entered by: J. Hines
Checked by: J. Hines

Daniel B. Stephens & Associates, Inc.

Particle Size Analysis
Hydrometer Data

Job Name: Hall Environmental Analysis Laboratory
Job Number: DB21.1064.00
Sample Number: 2105803-008A/ EB-LIF-108 12-13'
Matrix: Soil
Date/Time Sampled: 5/14/21 1545

Test Date: 24-May-21
Start Time: 8:42

Type of Water Used: DISTILLED
Reaction with H_2O_2*:* NA
Dispersant:* $(NaPO_3)_6$
Assumed particle density: 2.65

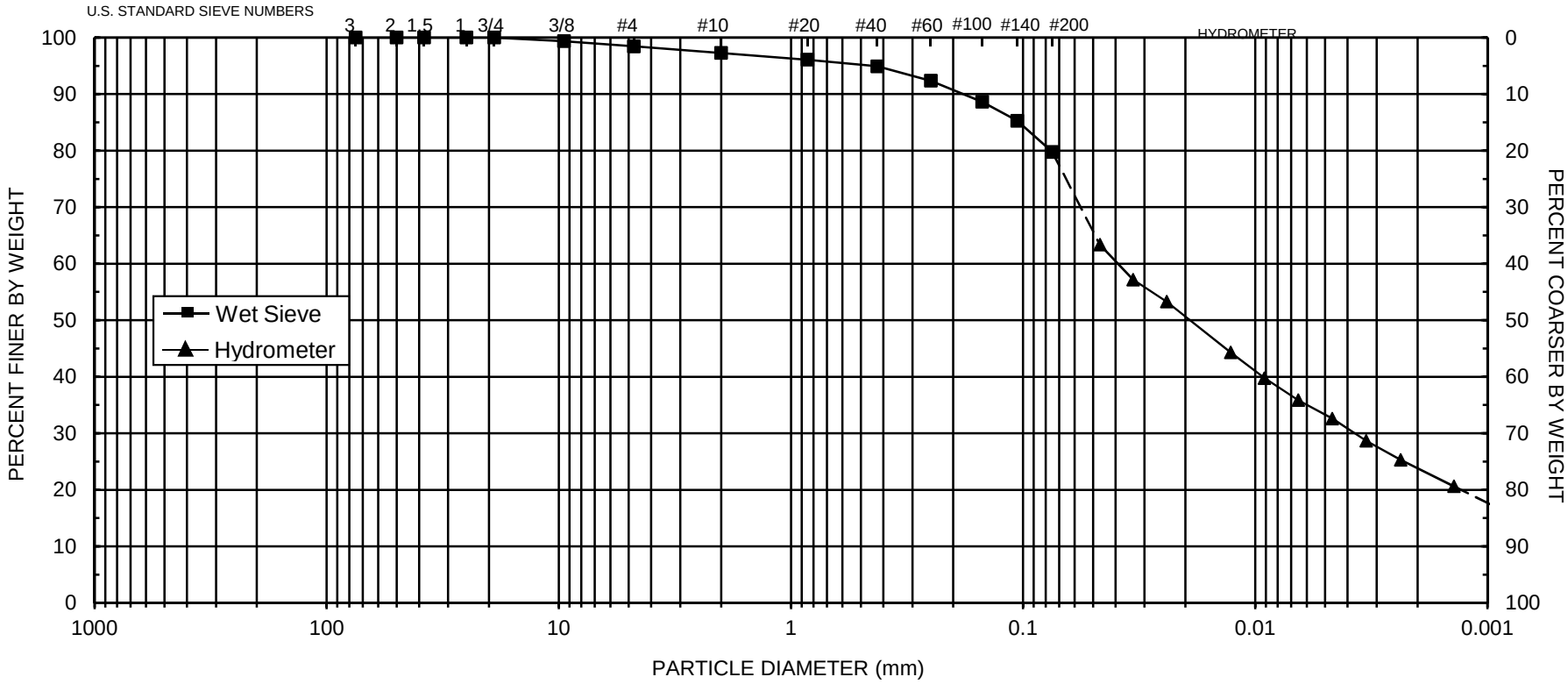
Initial Wt. (g)*:* 43.28
Total Sample Wt. (g)*:* 279.57
Wt. Passing #10 (g)*:* 271.94

Date	Time (min)	Temp (°C)	R (g/L)	R_L (g/L)	R_{corr} (g/L)	H_m (cm)	D (mm)	P (%)	% Finer
24-May-21	1	22.35	32.75	4.55	28.2	12	0.0467	65	63.37
	2	22.35	30.00	4.55	25.5	12	0.0336	59	57.19
	4	22.40	28.25	4.53	23.7	12	0.0241	55	53.30
	15	22.40	24.25	4.53	19.7	13	0.0128	46	44.31
	30	22.35	22.25	4.55	17.7	13	0.0091	41	39.78
	60	22.40	20.50	4.53	16.0	14	0.0065	37	35.89
	120	22.50	19.00	4.49	14.5	14	0.0047	34	32.60
	240	22.50	17.25	4.49	12.8	14	0.0033	29	28.67
	483	22.50	15.75	4.49	11.3	15	0.0024	26	25.29
25-May-21	1421	22.30	13.75	4.57	9.2	15	0.0014	21	20.63

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: B. Constand
Data entered by: J. Hines
Checked by: J. Hines



d_{10} = **0.00042**	d_{30} = **0.0037**	d_{50} = **0.019**	d_{60} = **0.039**	C_u = **93**	C_c = **0.84**

SAMPLE NUMBER	DATE/TIME SAMPLED	ASTM CLASSIFICATION	USDA CLASSIFICATION
2105803-008A/ EB-LIF-108 12-13'	**5/14/21 1545**	**Classification by ASTM 2487 requires Atterberg test**	**Loam**

Note: Reported values for d_{10}, C_u, C_c, and ASTM classification are estimates, since extrapolation was required to obtain the d_{10} diameter

Laboratory Tests and Methods

Tests and Methods

Particle Size Analysis:	ASTM D7928, ASTM D6913
USCS (ASTM) Classification:	ASTM D6913, ASTM D4318, ASTM D2487
USDA Classification:	ASTM D7928, ASTM D6913, USDA Soil Textural Triangle

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **2105803**
15-Jun-21

Client: Trihydro
Project: Gallup Refinery LIF

Sample ID: **MB-60148** SampType: **MBLK** TestCode: **EPA Method 8015M/D: Diesel Range Organics**
Client ID: **PBS** Batch ID: **60148** RunNo: **77563**
Prep Date: **5/19/2021** Analysis Date: **5/21/2021** SeqNo: **2752797** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	ND	10								
Motor Oil Range Organics (MRO)	ND	50								
Surr: DNOP	12		10.00		121	70	130			

Sample ID: **LCS-60148** SampType: **LCS** TestCode: **EPA Method 8015M/D: Diesel Range Organics**
Client ID: **LCSS** Batch ID: **60148** RunNo: **77563**
Prep Date: **5/19/2021** Analysis Date: **5/21/2021** SeqNo: **2752798** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	55	10	50.00	0	111	68.9	141			
Surr: DNOP	5.8		5.000		116	70	130			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
D	Sample Diluted Due to Matrix
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix
B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Limit

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **2105803**
15-Jun-21

Client: Trihydro
Project: Gallup Refinery LIF

Sample ID: **2.5ug GRO lcs** SampType: **LCS** TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **LCSS** Batch ID: **R77497** RunNo: **77497**
Prep Date: Analysis Date: **5/19/2021** SeqNo: **2750872** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	23	5.0	25.00	0	93.6	78.6	131			
Surr: BFB	1000		1000		104	70	130			

Sample ID: **MB** SampType: **MBLK** TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **PBS** Batch ID: **R77497** RunNo: **77497**
Prep Date: Analysis Date: **5/19/2021** SeqNo: **2750874** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	ND	5.0								
Surr: BFB	900		1000		90.4	70	130			

Sample ID: **2105803-001ams** SampType: **MS** TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **EB-LIF-99 19-20'** Batch ID: **R77497** RunNo: **77497**
Prep Date: Analysis Date: **5/19/2021** SeqNo: **2750877** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	23	3.4	17.14	7.567	92.2	61.3	114			
Surr: BFB	730		685.4		107	70	130			

Sample ID: **2105803-001amsd** SampType: **MSD** TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **EB-LIF-99 19-20'** Batch ID: **R77497** RunNo: **77497**
Prep Date: Analysis Date: **5/19/2021** SeqNo: **2751135** Units: **mg/Kg**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	23	3.4	17.14	7.567	89.1	61.3	114	2.29	20	
Surr: BFB	740		685.4		108	70	130	0	0	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
D	Sample Diluted Due to Matrix
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix
B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
P	Sample pH Not In Range
RL	Reporting Limit

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: clients.hallenvironmental.com

Sample Log-In Check List

Client Name: **Trihydro** Work Order Number: **2105803** RcptNo: 1

Received By: **Juan Rojas** **5/19/2021 7:28:00 AM**

Completed By: **Cheyenne Cason** **5/19/2021 8:25:39 AM**

Reviewed By: JR 5/19/21

Chain of Custody

1. Is Chain of Custody complete?	Yes ☑	No ☐	Not Present ☐
2. How was the sample delivered?	Courier		

Log In

3. Was an attempt made to cool the samples?	Yes ☑	No ☐	NA ☐
4. Were all samples received at a temperature of >0° C to 6.0°C	Yes ☑	No ☐	NA ☐
5. Sample(s) in proper container(s)?	Yes ☑	No ☐	
6. Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
7. Are samples (except VOA and ONG) properly preserved?	Yes ☑	No ☐	
8. Was preservative added to bottles?	Yes ☐	No ☑	NA ☐
9. Received at least 1 vial with headspace <1/4" for AQ VOA?	Yes ☐	No ☐	NA ☑
10. Were any sample containers received broken?	Yes ☐	No ☑	
11. Does paperwork match bottle labels? (Note discrepancies on chain of custody)	Yes ☑	No ☐	# of preserved bottles checked for pH: (<2 or >12 unless noted)
12. Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	Adjusted?
13. Is it clear what analyses were requested?	Yes ☑	No ☐	
14. Were all holding times able to be met? (If no, notify customer for authorization.)	Yes ☑	No ☐	Checked by: SPA 5.19.21

Special Handling (if applicable)

15. Was client notified of all discrepancies with this order?	Yes ☐	No ☐	NA ☑

Person Notified: _____ Date: _____

By Whom: _____ Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding: _____

Client Instructions: _____

16. Additional remarks:

17. Cooler Information

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	1.9	Good				

Chain-of-Custody Record

Client: Trihydro Corp

Mailing Address: 92 Giant Crossing Rd
Jamestown Gallup NM 87347

Phone #: 505-640-1823

email or Fax#: lalexander@trihydro.com

QA/QC Package:
☑ Standard ☐ Level 4 (Full Validation)

Accreditation: ☐ Az Compliance
☐ NELAC ☐ Other

☒ EDD (Type)

Turn-Around Time:
☒ Standard ☐ Rush

Project Name: Gallup Refinery LIF

Project #: 697-085-002

Project Manager: Lesli Alexander

Sampler: Will Glenn

On Ice: ☒ Yes ☐ No

# of Coolers: 1

Cooler Temp(including CF): 2.1-0.2=1.9 (°C)

2105803
HEAL No. 2103

HALL ENVIRONMENTAL ANALYSIS LABORATORY
www.hallenvironmental.com
4901 Hawkins NE - Albuquerque, NM 87109
Tel. 505-345-3975 Fax 505-345-4107

Analysis Request

Date	Time	Matrix	Sample Name	Container Type and #	Preservative Type	HEAL No.	BTEX / MTBE / TMB's (8021)	TPH:8015D(GRO / DRO / MRO)	8081 Pesticides/8082 PCB's	EDB (Method 504.1)	PAHs by 8310 or 8270SIMS	RCRA 8 Metals	Cl, F, Br, NO_3, NO_2, PO_4, SO_4	8260 (VOA)	8270 (Semi-VOA)	Total Coliform (Present/Absent)	Grain Size - Sieve Analysis
5/14/21	1420	Soil	EB-LIF-99 19-20'	6oz + MeOH(2)	MeOH/ice	001		X									X NVG
	1420		EB-LIF-99, 18-19'	Ziplock	ICE	002											X
	1429		EB-LIF-99 21-22'	6oz + MeOH(2)	MeOH/ICE	003		X									
	1508		EB-LIF-109 11.5-12	6oz + MeOH(2)	MeOH/ice	004		X									
	1508		EB-LIF-109 10.5-11.5	Ziplock	ICE	005											X
	1524		EB-LIF-109 15-15.5'	6oz + MeOH(2)	MeOH/ICE	006		X									
	1545		EB-LIF-108 10-11'	6oz + MeOH(2)	MeOH/ice	~~002~~ 007		X									
	1545		EB-LIF-108 12-13'	Ziplock	ICE	008											X
5/14/21	—	—	MeOH Blank	MeOH	ICE	009		X									

Date	Time	Relinquished by:	Received by:	Via:	Date	Time
5-14-21						
5-18-21	10:45			courier	5/19/21	7:28

Remarks:

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

District I
1625 N. French Dr., Hobbs, NM 88240
Phone:(575) 393-6161 Fax:(575) 393-0720
District II
811 S. First St., Artesia, NM 88210
Phone:(575) 748-1283 Fax:(575) 748-9720
District III
1000 Rio Brazos Rd., Aztec, NM 87410
Phone:(505) 334-6178 Fax:(505) 334-6170
District IV
1220 S. St Francis Dr., Santa Fe, NM 87505
Phone:(505) 476-3470 Fax:(505) 476-3462

State of New Mexico
Energy, Minerals and Natural Resources
Oil Conservation Division
1220 S. St Francis Dr.
Santa Fe, NM 87505

CONDITIONS

Action 106746

CONDITIONS

Operator: Western Refining Southwest LLC 539 South Main Street Findlay, OH 45840	OGRID: 267595
	Action Number: 106746
	Action Type: [UF-DP] Discharge Permit (DISCHARGE PERMIT)

CONDITIONS

Created By	Condition	Condition Date
scwells	Accepted for Record Retention Purposes-Only	11/23/2022