April 3, 2020 Reference No. 11137172

Mr. Michael Belveg
Assistant Engineer (Environmental)
New York State Department of Environmental Conservation
615 Erie Boulevard West
Division of Environmental Remediation
Syracuse, NY 13204

Dear Mr. Belveg:

Re: Supplemental Investigation Summary - Southern Terminals
Cold Springs Terminal Site, Hillside Road, Lysander, New York
NYSDEC Spill No. 89-04923

1. Introduction

On behalf of the Respondents to the Southern Terminals Consent Order executed by the New York State Department of Environmental Conservation (NYSDEC) on August 25, 2016, GHD has prepared this Supplemental Investigation (SI) Summary for the Cold Springs Terminal Site, located along Hillside Road in Lysander, New York (Site). Refer to Figure 1 for a Site Location Map. The purpose of the SI was to collect and evaluate data to refine the remedial strategy for the Site (see GHD letter and enclosures dated October 4, 2019 to Mr. Michael Belveg, which is incorporated in its entirety in Attachment A). The Work Plan also included replacement of several wells damaged/destroyed during previous aboveground storage tank (AST) removal activities conducted by the Site Owners and/or their contractors and agents on the Southern Terminals (ST) portion of the Site.

Activities performed as part of the SI included:

- Repair/replacement and installation of monitoring wells
- Additional data collection activities required to refine the remedial approach and finalize remedial system design, including groundwater analytical data, hydraulic conductivity, and LNAPL transmissivity
- Light non-aqueous phase liquid (LNAPL) recovery activities

Pursuant to GHD's March 11, 2020 telephone discussion, we will address next steps and prepare a final Remedial Action Work Plan for the activities required under the Southern Terminals Consent Order.

2. Supplemental Investigation

The following sections summarize work performed as part of the October 2019 Supplemental Investigation Work Plan (SIWP). Implementation of the SIWP began on November 4, 2019 and is ongoing. The following sections summarize field activities associated with implementation of the SIWP. All activities were conducted in accordance with NYSDEC DER-10/Technical Guidance for Site Investigation and Remediation (DER-10).

GHD
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T 716 297 6150 F 716 297 2265 W www.ghd.com

2.1 Stage I

2.1.1 Monitoring Well Repair and Replacement

GHD retained New York State (NYS) Licensed drilling contractor Nothnagle Drilling, Inc. (Nothnagle) to complete soil boring, monitoring and recovery well installation, and well development activities between November 4 and 25, 2019.

2.1.1.1 Monitoring Well Repair

GHD personnel repaired three monitoring well locations (A11, A12, and A13) prior to the Site survey. Each location was repaired by addition of a flexible rubber coupling and a section of polyvinyl chloride (PVC) pipe to bring the monitoring well up to, or above, grade. J-plugs were reused or replaced as necessary. Monitoring well A3 was previously identified as requiring repair, however, upon further inspection, the monitoring well was not repaired due to its location in a paved area and potential for additional damage. The well is located in an uncovered manhole (a lockable J-plug is present) in an area of heavy traffic during Site activities. Monitoring well A14 was damaged beyond immediate repair, with the well casing lifted and slightly bent at ground surface. This well will still be used for LNAPL thickness measurements but not for groundwater elevation measurements or potential future groundwater sampling. Given the close proximity of A13 and newly installed RW-3, A14 is not necessary for groundwater elevation measurements. Monitoring well SMW3, which is bent at the surface, will also be used to determine the presence or absence of LNAPL not for groundwater elevation measurements.

2.1.1.2 Monitoring and Recovery Well Installation

A total of nine nested monitoring well locations (MW-1 through MW-7, MW-9, and MW-10) and five recovery wells (RW-1 through RW-5) were installed and developed between November 4 and 25, 2019. MW-8 could not be installed due to Site conditions at the time of the SI. There was approximately 1 foot of standing water at the location of MW-8 and the area immediately surrounding it, preventing safe access by the drill rig and field personnel. Monitoring and recovery well locations are presented on Figure 2. Soil boring and well construction logs are included as Attachment B.

Utility Mark-out

To prevent damage to existing utilities in the vicinity of the Site, a NYS One-Call was completed prior to initiation of field activities. Consistent with standard operating procedure, boring locations which were accessible for the applicable equipment, were cleared by Ground Penetrating Radar Systems, LLC (GPRS) utilizing electromagnetic and/or ground penetrating radar (GPR) methods. The MW-10 nested well, originally intended to replace HD-4A, was moved inside the containment structure due to the presence of a gas line running the length of the gravel road immediately outside the fenced portion of the Site.

Soil Boring/Monitoring Well Installation

Prior to drilling, boring locations were hand cleared to a depth of 5 feet below ground surface (bgs) utilizing a hand auger. Soil borings were then advanced utilizing hollow stem augers (HSA). Each boring was continuously sampled in 4-foot increments via driven Macro Core® sampler equipped with disposable acetate sleeves for logging and screening purposes. Soil samples were screened for the presence of

volatile organic vapors using a photoionization detector (PID) calibrated to 100 parts per million (ppm) by volume of isobutylene. Nested monitoring well locations were drilled using a 6.25-inch internal diameter (ID) auger; recovery well locations were drilled with a 4.25-inch ID auger, then over-drilled utilizing 8.25-inch ID augers. The Macro Core® and augers were decontaminated between boring locations, utilizing a pressure washer and/or Alconox® and potable water rinse on a temporary decontamination pad.

Borings for monitoring wells were advanced to top of glacial till, between approximately 23 feet bgs at MW-5 to approximately 35.5 feet bgs at MW-10 based on lithology or refusal. No soil samples were collected for analysis during soil boring or monitoring well installation activities.

Monitoring wells were installed as nested pairs of shallow and deep wells in the same borehole with screened intervals straddling the water table and deep gravel layer, respectively. Shallow wells were constructed of 10 feet of 2-inch diameter, 0.010-inch continuous-slot, Schedule 40 PVC screen and riser to approximately 2 to 3 feet above ground surface. Deep wells were constructed with screened intervals within the gravel layer identified at each location. All deep monitoring wells were advanced to the top of the glacial till with the exception of MW-6D, where refusal was encountered at approximately 26.5 feet bgs. The annular space in screened intervals was backfilled with #00N sand followed by bentonite chip seals between shallow and deep wells and above shallow wells to within approximately 1 to 1.5 feet of ground surface. Nested wells were completed at the surface with a 6-inch protective steel casing set in concrete and locking hinged cover.

Subsurface conditions observed at MW-10 resulted in the installation of monitoring wells screened across three different intervals. During drilling activities, little to no indication of impacts were observed in shallow soils straddling the water table. Elevated PIDs were detected beginning at approximately 24 feet bgs. An additional intermediate well (MW-10I) was installed between the shallow and deep intervals to capture potential impacts otherwise not identified in shallow soils and groundwater. MW-10I and MW-10D were installed as a nested pair; MW-10S was installed in a separate boring and completed at the surface with a 4-inch protective steel casing set in concrete and locking hinged cover.

Recovery wells were constructed of 10 feet of 6-inch diameter, 0.010-inch continuous-slot, Schedule 40 PVC screen and riser to approximately 2 to 3 feet above ground surface. Recovery wells were screened straddling the water table, from approximately 5 to 15 feet bgs. Annular space in screened intervals was backfilled with #00N sand followed by a bentonite seal to within approximately 1.5 feet of ground surface. Recovery wells were completed at the surface with an 8-inch protective steel casing set in concrete and locking Royer cover.

Monitoring and recovery well locations are presented on Figure 2. Soil boring and well construction logs are included as Attachment B.

Monitoring and Recovery Well Development

A total of nine newly-installed monitoring well clusters, five newly-installed recovery wells, and six existing monitoring wells determined to be potential monitoring network wells were developed between November 21 and 25, 2019. Wells were purged of approximately five well volumes or to dryness five times utilizing a submersible pump set at a rate of approximately 2 to 3 gallons per minute (GPM). Development water was transferred to 275-gallon totes located on Site and stored for later off-Site disposal.

Soil Gas Probe Installation

Several inches of standing water was encountered within containment areas on both the southwestern and southeastern portions of the ST at the time of the SI. As a result, soil gas probe installation was not completed during the initial field mobilization. GHD will continue to evaluate Site conditions and will complete soil gas probe installation when conditions permit.

2.1.2 Monitoring Well Survey

Following monitoring well repair and replacement, GHD retained Bryant Associates, PC, a NYS Licensed Surveyor, to complete a survey of all monitoring wells located on both the Northern Terminal (NT) and ST properties. A total of 122 wells which were located and identified as usable during 2019 monitoring well assessment activities were surveyed for northing and easting on the New York State Plane Coordinate System – Central System, North American Datum of 1983 (NAD83), and measuring point elevation (northern point of monitoring well riser) on the North American Vertical Datum of 1988 (NAVD88). A map of monitoring and recovery well locations is included as Figure 2.

2.2 Stage II

2.2.1 Groundwater and LNAPL Gauging

Approximately 1 week following completion of monitoring and recovery well development, GHD personnel completed a comprehensive groundwater elevation and LNAPL gauging event across both the NT and ST portions of the Site. A total of 96 of 122 planned wells were located and gauged between December 2 and December 5, 2019. Weather conditions at the time of the event impeded location of, or safe access to, the remaining wells.

The gauging event consisted of recording depth to the LNAPL surface (as applicable), depth to water, and total depth of the well using an oil-water interface probe. Down-well equipment was decontaminated between each well location using an Alconox®-water solution and tap water rinse. Decontamination water was transferred to on-Site totes for characterization and off-Site disposal.

Groundwater elevations ranged from 363.19 feet above mean sea level (AMSL) at AMW5 on the ST to 394.57 feet AMSL at MW-207 on the NT. Monitoring wells MW-206 and MW-209, located on the northern portion of the NT, exhibited artesian conditions at the time of the gauging event. Observed apparent LNAPL thicknesses ranged from between 0.01 foot at A25, MW-2S, S13, S2, and B6 to 3.59 feet at A14.

Additional groundwater and LNAPL gauging events have been performed on selected wells in February and March 2020. Apparent LNAPL thicknesses for all gauging events completed as part of the SI are summarized in Table 1 and on Figure 3.

2.2.2 Groundwater Sample Collection

Groundwater sample collection occurred on December 3 and 4, 2019. Groundwater analytical data are summarized in Tables 2 and 3. NT wells SMW12 and PZ102S were redeveloped prior to sampling, as the wells are not routinely monitored and the condition of the wells was unknown. The wells were pumped of five well volumes, allowed to recover overnight, and were sampled the following day. With the exception of BMW5, groundwater monitoring and recovery wells were purged and sampled utilizing a peristaltic pump and in accordance with standard low flow methodology to minimize water table drawdown and potential

for free product in samples. Due to the deep water table at the well location, BMW-5 was purged and sampled with poly tubing fitted with a stainless steel foot valve (inertial pumping).

Wells were purged until parameters of temperature, pH, conductivity, redox potential, and dissolved oxygen stabilized to within 10 percent of the previous reading for three consecutive readings as measured on a YSI. At well locations where LNAPL was present at the time of sampling, a 1-inch PVC pipe covered with zip-tied-in-place plastic was inserted into the well below the measured depth of LNAPL. The peristaltic tubing was then lowered through the 1-inch PVC to prevent collection of LNAPL-contaminated groundwater samples.

As requested by NYSDEC in comments to the SIWP on October 9, 2019, GHD provided NYSDEC with the list of wells to be sampled via email on November 26, 2019. The proposed monitoring list was approved by NYSDEC on November 27, 2019. Recovery well RW-1 was included in the original list of wells to be sampled; however, due to sediment issues, could not be sampled after multiple attempts. As such, nearby monitoring well A10 was substituted. Groundwater samples from the ST were analyzed for CP-51 list VOCs by United States Environmental Protection Agency (USEPA) Method 8260C, CP-51 list SVOCs by USEPA Method 8270D, iron by USEPA Method 6010, total organic carbon by Standard Method 5310C, nitrate and sulfate by USEPA Method 300, sulfide by Standard Method 4500, dissolved methane and carbon dioxide by method RSK-175, and petroleum degrader microbe count by Standard Method 9215B. In addition, groundwater samples were collected from MW-2S, MW-2D, MW-3S, MW-6S, MW-10I, RW-5, A10, and S4 on the ST portion of the Site to evaluate current conditions and natural source zone depletion (NSZD) parameters.

Groundwater samples were collected from NT monitoring wells BMW-5, BMW-12, BMW-13, BMW-14R, and piezometer PZ-102S for analysis of Commissioner Policy (CP)-51 list volatile organic compounds (VOCs) by USEPA Method 8260C, CP-51 list semi-volatile organic compounds (SVOCs) by USEPA Method 8270D, and lead via USEPA Method 6010D.

Groundwater samples for VOCs, SVOCs, lead, total organic carbon, sulfate, sulfide, nitrate, dissolved methane, and dissolved carbon dioxide were submitted to TestAmerica of Canton, Ohio, a New York State Department of Health (NYSDOH) Environmental Laboratory Accreditation Program (ELAP)-certified laboratory, for analysis under chain of custody procedures. Analysis of petroleum degrader microbe count was performed by GHD. Analytical laboratory reports will be provided in the Revised Remedial Action Work Plan (RAWP) or at the request of NYSDEC.

Purge and development water was transferred to on-Site totes for temporary storage prior to off-Site disposal.

LNAPL Sample Collection

On December 12, 2019, GHD notified NYSDEC via email that LNAPL samples, not originally outlined in the SIWP, would be collected. Samples were collected from monitoring wells MWA, A10, A14, and MW-5S for analysis of CP-51 list VOCs by USEPA Method 8260C, fractionated volatile petroleum hydrocarbons (VPH) by Massachusetts Department of Environmental Protection (MADEP) Method VPH-18-2.1, and fractionated extractable petroleum hydrocarbons (EPH) by MADEP Method EPH-04-1. An LNAPL analytical summary is included as Table 4. Analytical laboratory reports will be provided in the Revised RAWP or at the request of NYSDEC.

2.2.3 Hydraulic Conductivity Testing

Single-well hydraulic conductivity estimates were obtained for NT wells BMW-12, BMW-13, and BMW-14R and at newly-installed deep nested monitoring wells (gravel zone) MW-1D, MW-4D, and MW-9D on the ST. Hydraulic conductivity estimates were collected via rising and falling head slug tests in which a known volume of water was displaced in the well by inserting a PVC slug. The water level change was measured using a down-hole pressure transducer and oil-water interface probe. Following equilibration, the slug was removed and the water level rise in the well was monitored. Multiple slug tests were conducted to support analysis of data. Testing data were imported into Aqtesolv®, which incorporates the monitoring well construction data and the recovery time into an unconfined solution to estimate hydraulic conductivity. Complete testing data will be provided in the Revised RAWP. Backup data can be provided at the request of NYSDEC.

On the NT, hydraulic conductivity ranged from $5.39x10^{-4}$ centimeters per second (cm/s) at BMW-12 to $2.30x10^{-3}$ cm/s at BMW-14R. Hydraulic conductivity values for the deep wells on the ST ranged from $1.86x10^{-4}$ cm/s at MW-1D to $1.63x10^{-3}$ cm/s at MW-4D. A summary of hydraulic conductivity values is presented in Table 5.

2.2.4 LNAPL Baildown Tests

To support the assessment of LNAPL mobility and recoverability at the Site, LNAPL baildown tests were conducted to determine LNAPL transmissivities in wells in the LNAPL zone. Monitoring wells A13 and S3 and recovery wells RW-1 and RW-5 were chosen based on overall location and the presence of greater than 6 inches of LNAPL at the time of testing, pursuant to best practices in ASTM E2856-13: *Standard Guide for Evaluation of LNAPL Transmissivity* (May 2013) . Baildown tests were performed at wells A13, S3, and RW-5 between December 11 and 13, 2019; the test at RW-1 was completed on January 31, 2020.

Analysis of the LNAPL baildown results was performed following American Society for Testing and Materials (ASTM) guidance E2856-13, and LNAPL transmissivity was estimated using the American Petroleum Institute's (API's) *LNAPL Transmissivity Workbook: Calculation of LNAPL Transmissivity from Baildown Test Data* (API Workbook, September 2012). As summarized in Table 6, LNAPL transmissivity (T_n) values for the wells were less than the Interstate Technology and Regulatory Council (ITRC) *de minimis* criterion of 0.8 square foot per day (ft^2/day). Transmissivity values between 0.1 to 0.8 ft^2/day are typically indicative of less mobile, lower recoverability LNAPL present at residual saturations. These LNAPL transmissivity results provide a line of evidence that the bulk of the LNAPL in the area of the tested wells is present as unrecoverable residual. This is consistent with the fine grained nature of the soils in this area. Complete testing data will be provided in the Revised RAWP. Backup data can be provided at the request of NYSDEC.

2.2.5 Grain Size Sample Collection and Analysis

On January 28, 2020, GHD informed NYSDEC via email that sediment samples would be collected from up to ten monitoring wells for grain size analysis. Sedimentation appeared to be an issue in newly-installed monitoring and recovery wells following development, and the samples were collected to assist in determining potential sediment load in system design. Sediment in new wells was agitated within the water column of each well and pumped into 5-gallon buckets and was allowed to settle out. The

buckets were allowed to settle for 72 hours before the water was decanted and sediment was collected for analysis. Sediment samples to be analyzed for grain size distribution were shipped to Integrated Geosciences Laboratories, Inc. of Houston, Texas under chain of custody procedure. Grain size data is summarized in Table 7. Analysis and analytical reports will be provided in the Revised RAWP or can be provided at the request of NYSDEC.

Additional monitoring well development in conjunction with LNAPL recovery events have reduced sedimentation rates to a point where it appears that it is no longer an issue. GHD will continue to monitor potential sedimentation during future recovery and skimming events, however, at this time no further activities specifically focused on addressing sedimentation infiltration are planned.

2.3 Phase III

LNAPL Recovery

As part of the SI and at the request of NYSDEC, GHD is conducting LNAPL recovery activities at the Site. GHD is utilizing Sessler Environmental Services, LLC (Sessler) to perform vacuum-enhanced fluid recovery (VEFR) events at newly-installed recovery wells. Weekly events have occurred on February 3, 17, and 24, and March 3, 11, 23, and 30, 2020. A weekly event was not performed February 10, 2020, as weather conditions prohibited truck access to the Site. Recovery wells included in weekly events include RW-1 through RW-3 and RW-5. At this time, RW-4 contains insufficient LNAPL for VEFR. A summary of VEFR events and recovered LNAPL volumes is included as Table 8. A total of approximately 250 gallons of LNAPL and 2,030 gallons of groundwater have been extracted to date. Groundwater and LNAPL recovered during VEFR events are transferred off Site for disposal as discussed in Section 2.4.

The decline in LNAPL recovery over time is consistent with the low LNAPL transmissivity in the formation and suggests that LNAPL recharge to the well is controlled by the low LNAPL transmissivity of the predominantly finer grained materials. As discussed further below, this supports the use of less energy intensive methods (e.g. skimming) which, if operated continuously, are more compatible with these low LNAPL transmissivities (recovery of LNAPL at rates consistent with the later parts of the recovery cycle observed during the VEFR events).

2.4 Investigation Derived Waste

Soil generated during soil boring installation was transferred to a 30-cubic yard (CY) roll-off container for characterization and off-Site disposal. Soil will be transported to Covanta Environmental Solutions LLC (CES) of Oriskany, New York for incineration and landfill or to Niagara Falls, New York for energy-from-waste then landfill pending profile approval. Sediment generated during monitoring well development is located in 55-gallon drums on Site and will be transported to CES pending approved profile.

Groundwater and LNAPL generated during monitoring well development and sampling was transferred to on-Site 275-gallon totes for off-Site disposal. Groundwater and LNAPL were removed from totes via vacuum-truck during a regularly-scheduled LNAPL recovery event. Petroleum/water mixture is transported to CES of Oriskany, New York. The petroleum fraction is stripped and processed for recycling, and groundwater is treated then discharged to the local publicly-owned treatment works (POTW). Groundwater manifests to date are located in Attachment C.

2.5 Monitoring Well Abandonment

On February 17, 2020, GHD personnel identified approximately 4.8 feet of LNAPL in newly-installed MW-5D. Prior to that time, no indications of LNAPL, such as elevated PID readings or sheens on purge water had been identified in the deeper-screened zone at the MW-5 cluster, indicating that the presence of LNAPL in the deep well is not indicative of current Site conditions. GHD personnel purged all LNAPL from MW-5D. MW-5D contained approximately 0.6 foot of LNAPL on February 24; 5.1 feet on March 2; and 0.05 on March 11, 2020. LNAPL was purged from the well each time it was observed. A total of approximately 3 gallons has been removed from the deep well. The shallow well within the nested pair, MW-5S, regularly contains 4 to 5 feet of LNAPL.

Due to well construction (i.e., shallow and deep well completed in the same borehole) and Site conditions encountered at the time of well installation (i.e., running sands), it is possible that some bridging of the bentonite seal between the two nested well screened intervals has occurred. As such, GHD abandoned the MW-5S/D pair on March 19, 2020. Nothnagle was on Site to perform well abandonment. The protective casing was removed, and the well was over-drilled to the bottom of the shallow well screen (approximately 15.5 feet bgs). The shallow well PVC screen and riser were removed from the boring. The well was then over-drilled to the bottom of the deep well screen, approximately 21 feet bgs. The PVC screen and riser were removed. The boring was then backfilled with cement grout, applied in 5-foot lifts via tremie. A monitoring well abandonment log is included in Attachment B. Monitoring wells MW-5S and MW-5D will be replaced at a later date as wells in separate borings.

3. Conclusions and Recommendations

Based on field observations and data collected during implementation of the SIWP, the spatial distribution of LNAPL is illustrated on Figure 3. LNAPL is observed: 1) beneath Hillside Drive; 2) beneath the southern boundary of the Northern Terminal; and 3) beneath the ST property. The greatest thicknesses of LNAPL are observed in the former ST tank farm areas, but impacts in these areas are primarily contained within lower conductivity (relative to the wells in Hillside Drive) soils. Overall, the boundaries of the plume exhibit less than 1 foot of LNAPL thickness with the exception of an area beneath the NT at BMW-5 and a narrow core running east-west between monitoring wells AMW5 and S9 through the center of the plume, south of Hillside Road. The western extent of the LNAPL plume (as illustrated on Figure 3) is currently undefined by the available monitoring well array. The direction of groundwater flow (generally to the south) is consistent with historic data, with a steeper hydraulic gradient generally observed beneath the NT as compared to the ST.

Exceedances of Class GA Groundwater Standards, as presented in Technical and Operational Guidance Series (TOGS 1.1.1) for VOCs, were detected in wells located on the NT and ST. The detection of elevated VOC concentrations in the deep gravel layer highlight a concern regarding the potential spreading of dissolved petroleum hydrocarbons if groundwater is reinjected in this zone in conjunction with the previously proposed remedial approach (i.e., vacuum-enhanced groundwater extraction).

The population of petroleum degrading microbes in samples collected from ST wells is sufficient to support biodegradation of petroleum hydrocarbons. Concentrations of dissolved carbon dioxide and methane are indicative that the microbes are active and NSZD is occurring. This is likely to be due to a combination of aerobic degradation and methanogenesis in areas of negative redox conditions.

Recommendations

Based on data collected to date, GHD recommends the following activities at the Site going forward.

- *Continued VEFR Events at the Site* – As discussed with NSYDEC on March 11, 2020, GHD will discontinue weekly VEFR events. Going forward, events will occur on a biweekly basis, and are currently scheduled for April 13 and 27 and May 11 and 26, 2020. At this time, and consistent with low LNAPL transmissivities observed in monitoring and recovery wells on Site, vacuum events extract on average approximately 10 gallons of LNAPL and 65 gallons of water per recovery well per event (refer to Table 8). More recent extraction events have resulted in lower LNAPL recoveries, on the order of approximately 2 to 3 gallons per well. .
- *Installation of Delineation Wells* – Installation of delineation wells to confirm the western extent of the LNAPL plume. Three well clusters will be installed as shown on Figure 4 (two contingent well cluster locations are depicted on Figure 4 pending the data obtained from the initial three well pairs). Reinstallation of MW-5S and MW-5D will occur at this time, and GHD will evaluate if Site conditions have improved sufficiently for installation of the MW-8 cluster. Each cluster will contain a shallow well to monitor LNAPL conditions as well as a deep well, screened in the gravel zone.
- *Installation and Operation of Automated LNAPL Skimmers* – Low LNAPL recoveries during VEFR events indicate that the wells would be suitable for more passive methods of LNAPL removal, such as skimmers. Automated LNAPL skimmers should be installed at approximately ten wells in various locations on Site that consistently exhibit a LNAPL thickness greater than 1 foot. The automated devices will: 1) facilitate more effective LNAPL recovery (to the extent practicable); 2) allow less frequent monitoring, once extraction rates are determined; 3) limit the amount of excess groundwater generated for disposal; and 4) if appropriate, can be incorporated into an alternative remedial strategy. Installation and operation of LNAPL skimmers would result in cessation of VEFR events.

An updated project schedule is included as Attachment D.

4. References

AECOM, 2014. Pilot Test Summary Report, Cold Springs Terminals, Lysander, New York, NYSDEC Spill # 89-04923

American Petroleum Institute (API), 2016. API LNAPL Transmissivity Workbook: A Tool for Baildown Test Analysis

ASTM International, 2013. Standard Guide for Estimation of LNAPL Transmissivity, E2856-13

GHD, 2019. Monitoring Well Assessment and LNAPL Gauging Event Letter Report, Southern Terminals, Cold Springs Terminal Site, Hillside Road, Lysander, New York

GHD, 2019. Supplement Investigation Work Plan, Cold Springs Terminal Site, Hillside Road, Lysander, New York, NYSDEC Spill No. 89-04923

Groundwater & Environmental Services, Inc. (GES), 2015. Remedial Action Work Plan, Cold Springs Terminal, Lysander, New York, NYSDEC Spills Incident #89-04923

Please do not hesitate to contact us with questions or if additional information is needed.

Sincerely,

GHD

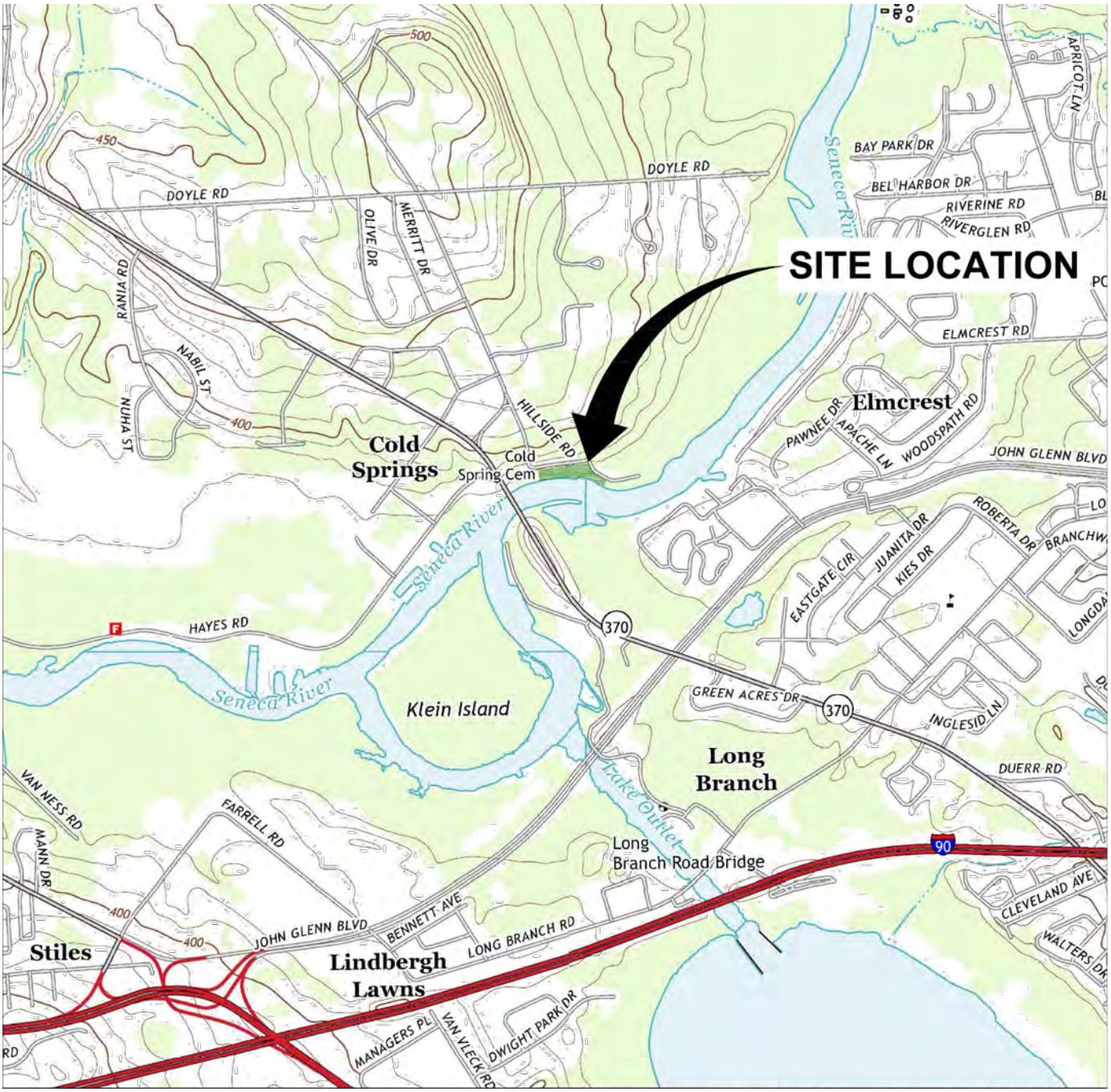
Alyssa Cruikshank

AC/adh-eew/3
*Encl.

cc: Ben Conlon, Esq., NYSDEC
S. David Devaprasad, Esq., Devaprasad PLLC
Patrick Dworaczyk, Kinder Morgan
Dennis Hoyt, GHD
Wendy Marsh, Esq., Hancock Estabrook, LLP
Harry Warner, NYSDEC

*List of Enclosures:

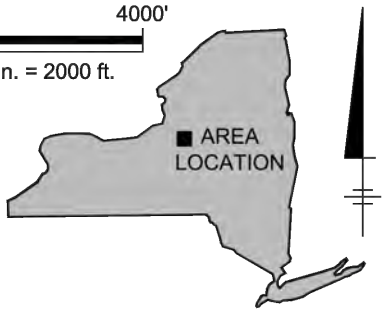
Figure 1 - Site Location Map
Figure 2 - Site Map
Figure 3 - Apparent LNAPL Thickness - December 2-5, 2019
Figure 4 - Proposed Monitoring Well Locations
Table 1 - LNAPL Thicknesses
Table 2 - Groundwater Analytical Summary
Table 3 - Petroleum Degrader Count Summary
Table 4 - LNAPL Analytical Summary
Table 5 - Hydraulic Conductivity Summary
Table 6 - LNAPL Transmissivity Summary
Table 7 - Grain Size Analysis Summary
Table 8 - LNAPL Recovery
Attachment A - Supplemental Investigation Work Plan
Attachment B - Boring and Well Construction Logs
Attachment C - Groundwater Disposal Manifests
Attachment D - Project Schedule



REFERENCE: BASE MAP USGS 7.5. MIN. TOPO. QUAD., BALDWINSVILLE, BREWERTON, CAMILLUS & SYRACUSE WEST, NY, 2013.

0 2000' 4000'

Approximate Scale: 1 in. = 2000 ft.



NEW YORK

2019Q1-Title Block

SOUTHERN TERMINALS GROUP
COLD SPRINGS TERMINAL SITE
HILLSIDE ROAD, LYSANDER, NEW YORK

SITE LOCATION MAP

Project No. 111-37172
Report No. 001
Date JUL 19

FIGURE 1

Filename: P:\Drawings\10000000s\11137172 - Cold Springs\Report 1\CADD\Drawings\Figures\Report Figures\11137172 - Figures.dwg
Plot Date: 2 August 2019 - 1:36 PM

LEGEND

- BMW2 — MONITORING WELL
- MW-5S/D — WELL ABANDONED
- MW-1S/D — NESTED MONITORING WELL LOCATION
- RW-4 — RECOVERY WELL LOCATION
- MW-8S/D — WELL NOT INSTALLED

NOTE:

TWO A6 SHOWN ON FIGURE

N

0 100'

GHD

SOUTHERN TERMINALS GROUP
COLD SPRINGS TERMINAL SITE
HILLSIDE ROAD, LYSANDER, NEW YORK

SITE MAP

Project No. **111-37172**
Report No. **003**
Date **MAR 20**

FIGURE 2

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LEGEND

- BMW2 — MONITORING WELL
- NESTED MONITORING WELL LOCATION
- RECOVERY WELL LOCATION
- 1.09 — APPARENT LNAPL THICKNESS
- MW-5S/D — MONITORING WELL NOT FOUND / HEAVILY DAMAGED

NOTE:

TWO A6 SHOWN ON FIGURE

APPARENT LNAPL THICKNESS IN FEET

0-1	3-4
1-2	4-5
2-3	5+

N

0 100'

GHD

SOUTHERN TERMINALS GROUP
COLD SPRINGS TERMINAL SITE
HILLSIDE ROAD, LYSANDER, NEW YORK

GREATEST APPARENT LNAPL THICKNESSES DECEMBER 2019-MARCH 2020

Project No. 111-37172
Report No. 003
Date MAR 20

FIGURE 3

Filename: C:\US\Buffalo\Legacy\Drawings-NIA\Drawings\10000000s\11137172 - Cold Springs\Report 3\CADD\Drawings\Figures\Report Figures\11137172 - Figure3(3-25-20).dwg
Plot Date: 27 March 2020 - 5:22 PM

LEGEND

- BMW2 — MONITORING WELL
- MW-5S/D — WELL ABANDONED
- MW-1S/D — NESTED MONITORING WELL LOCATION
- RW-4 — RECOVERY WELL LOCATION
- PROPOSED MONITORING WELL CLUSTER
- OPTIONAL PROPOSED MONITORING WELL CLUSTER

NOTE:

TWO A6 SHOWN ON FIGURE

N

0 100'

GHD

SOUTHERN TERMINALS GROUP
COLD SPRINGS TERMINAL SITE
HILLSIDE ROAD, LYSANDER, NEW YORK

PROPOSED MONITORING WELL LOCATIONS

Project No. **111-37172**
Report No. **003**
Date **MAR 20**

FIGURE 4

Filename: C:\US\Buffalo\Legacy\Drawings-NIA\Drawings\10000000s\11137172 - Cold Springs\Report 3\CADD\Drawings\Figures\Report Figures\11137172 - Figure4.dwg
Plot Date: 25 March 2020 - 7:58 PM

Table 1

LNAPL Thicknesses
Southern Terminal
Lysander, New York

Monitoring Well ID	Date	Measuring Point Elevation (feet AMSL)	Depth to Product (feet BMP)	Depth to Water (feet BMP)	Well Total Depth (feet BMP)	Apparent LNAPL Thickness (feet)	Groundwater Elevation (feet AMSL)	Corrected Groundwater Elevation[1] (feet AMSL)
Southern Terminals								
A1	12/2/2019[2]	377.43	-	-	-	-	-	-
	3/11/2020		-	6.76	-	-	370.67	-
	3/16/2020		-	8.15	-	-	369.28	-
	3/23/2020		-	9.35	-	-	368.08	-
A2	12/2/2019[2]	379.22	-	-	-	-	-	-
	3/11/2020		-	9.78	-	-	369.44	-
	3/16/2020		-	10.68	-	-	368.54	-
	3/23/2020		-	11.04	-	-	368.18	-
	3/30/2020		-	7.68	11.95	-	371.54	-
A3	12/2/2019[2]	379.45	-	-	-	-	-	-
	3/11/2020		13.99	14.45	-	0.46	365.00	365.36
	3/16/2020		14.10	14.61	-	0.51	364.84	365.24
	3/23/2020		14.50	15.10	-	0.60	364.35	364.82
	3/30/2020		14.48	15.08	-	0.60	364.37	364.84
A4	12/2/2019[2]	378.91	-	-	-	-	-	-
	3/11/2020		DRY		10.58	-	-	-
	3/16/2020		DRY		10.60	-	-	-
	3/23/2020		DRY		10.58	-	-	-
	3/30/2020		DRY		10.59	-	-	-
A5	12/2/2019	378.37	-	14.58	19.17	-	363.79	-
	3/11/2020		-	12.76	-	-	365.61	-
	3/16/2020		-	13.06	-	-	365.31	-
	3/23/2020		-	13.58	-	-	364.79	-
	3/30/2020		-	12.99	19.12	-	365.38	-
A6-West[3]	12/2/2019	378.16	-	12.05	12.17	-	366.11	-
	3/11/2020		-	11.95	-	-	366.21	-
	3/16/2020		-	11.97	-	-	366.19	-
	3/23/2020		-	11.99	12.12	-	366.17	-
A6-East[3]	12/2/2019	-	-	-	-	-	-	-
A7	12/2/2019	377.99	-	11.63	11.80	-	366.36	-
	3/11/2020		-	11.58	-	-	366.41	-
	3/16/2020		-	11.58	-	-	366.41	-
	3/23/2020		-	11.60	-	-	366.39	-
	3/30/2020		-	11.59	11.75	-	366.40	-
A9	12/2/2019	376.67	-	12.81	17.30	-	363.86	-
	3/11/2020		-	11.15	-	-	365.52	-
	3/16/2020		-	11.32	-	-	365.35	-
	3/23/2020		-	11.85	-	-	364.82	-
	3/30/2020		-	11.27	17.30	-	365.40	-
A10	12/2/2019	373.17	9.32	10.48	14.38	1.16	362.69	363.61
	2/17/2020		8.35	10.44	-	2.09	362.73	364.38
	2/24/2010		8.31	10.35	-	2.04	362.82	364.43
	3/2/2020		7.94	10.10	-	2.16	363.07	364.78
	3/11/2020		7.78	9.99	-	2.21	363.18	364.93
	3/16/2020		8.00	10.14	-	2.14	363.03	364.72
	3/23/2020		8.57	10.55	-	1.98	362.62	364.18
	3/30/2020		8.36	10.30	14.37	1.94	362.87	364.40

Table 1

LNAPL Thicknesses
Southern Terminal
Lysander, New York

Monitoring Well ID	Date	Measuring Point Elevation (feet AMSL)	Depth to Product (feet BMP)	Depth to Water (feet BMP)	Well Total Depth (feet BMP)	Apparent LNAPL Thickness (feet)	Groundwater Elevation (feet AMSL)	Corrected Groundwater Elevation[1] (feet AMSL)
Southern Terminals								
A11	12/2/2019	374.01	-	10.36	16.47	-	363.65	-
	2/17/2020		-	9.47	-	-	364.54	-
	2/24/2020		-	9.45	-	-	364.56	-
	3/2/2020		9.11	9.13	-	0.02	364.88	364.90
	3/11/2020		-	8.94	-	-	365.07	-
	3/16/2020		-	9.12	-	-	364.89	-
	3/23/2020		-	9.65	-	-	364.36	-
	3/30/2020		-	9.48	16.44		364.53	-
A12	12/2/2019[2]	373.63	-	-	-	-	-	-
	2/17/2020		8.68	11.00	-	2.32	362.63	364.46
	2/24/2020		8.73	10.96	-	2.23	362.67	364.43
	3/2/2020		8.30	10.45	-	2.15	363.18	364.88
	3/11/2020		8.08	9.93	-	1.85	363.70	365.16
	3/16/2020		8.30	9.36	-	1.06	364.27	365.11
	3/23/1930		8.95	10.73	-	1.78	362.90	364.31
	3/30/2020		8.80	10.59	15.99	1.79	363.04	364.45
A13	12/2/2019	375.07	10.99	13.88	21.55	2.89	361.19	363.47
	2/17/2020		10.37	11.45	-	1.08	363.62	364.47
	2/24/2020		10.38	11.50	-	1.12	363.57	364.45
	3/2/2020		10.07	11.20	-	1.13	363.87	364.76
	3/11/2020		9.84	10.97	-	1.13	364.10	364.99
	3/16/2020		10.00	11.14	-	1.14	363.93	364.83
	3/23/2020		10.55	11.67	-	1.12	363.40	364.28
	3/30/2020		10.40	11.51	21.35	1.11	363.56	364.44
A14[4]	12/2/2019	374.00	9.79	13.38	21.69	3.59	360.62	363.46
	2/17/2020		9.21	11.52	-	2.31	362.48	364.30
	2/24/2020		9.13	11.43	-	2.30	362.57	364.39
	3/2/2020		8.85	11.20	-	2.35	362.80	364.66
	3/11/2020		8.67	10.88	-	2.21	363.12	364.87
	3/16/2020		8.93	10.73	-	1.80	363.27	364.69
	3/23/2020		9.64	11.20	-	1.56	362.80	364.03
	3/30/2020		9.35	11.20	-	1.85	362.80	364.26
A18	12/2/2019	373.80	10.21	10.51	19.21	0.30	363.29	363.53
	2/17/2020		9.45	9.73	-	0.28	364.07	364.29
	2/24/2020		9.40	9.68	-	0.28	364.12	364.34
	3/2/2020		9.10	9.35	-	0.25	364.45	364.65
	3/11/2020		8.92	9.15	-	0.23	364.65	364.83
	3/16/2020		9.12	9.40	-	0.28	364.40	364.62
	3/23/2020		9.71	9.97	-	0.26	363.83	364.04
	3/30/2020		9.48	9.75	-	0.27	364.05	364.26
A21	12/2/2019	372.99	-	9.58	15.33	-	363.41	-
	2/17/2020		-	8.90	-	-	364.09	-
	2/24/2020		-	8.90	-	-	364.09	-
	3/11/2020		-	8.38	-	-	364.61	-
	3/16/2020		-	8.78	-	-	364.21	-
	3/23/2020		-	9.29	-	-	363.70	-
	3/30/2020		-	7.90	15.18	-	365.09	-

Table 1

LNAPL Thicknesses
Southern Terminal
Lysander, New York

Monitoring Well ID	Date	Measuring Point Elevation (feet AMSL)	Depth to Product (feet BMP)	Depth to Water (feet BMP)	Well Total Depth (feet BMP)	Apparent LNAPL Thickness (feet)	Groundwater Elevation (feet AMSL)	Corrected Groundwater Elevation[1] (feet AMSL)
Southern Terminals								
A23	12/3/2019	375.81	-	10.77	15.27	-	365.04	-
	2/17/2020		-	9.65	-	-	366.16	-
	2/24/2020		-	9.91	-	-	365.90	-
	3/2/2020		-	9.62	-	-	366.19	-
	3/11/2020		-	9.33	-	-	366.48	-
	3/16/2020		-	9.84	-	-	365.97	-
	3/23/2020		-	10.58	-	-	365.23	-
	3/30/2020		-	10.07	15.23	-	365.74	-
A24	12/2/2019	373.43	-	8.84	13.27	-	364.59	-
	2/17/2020		7.51	7.52	-	0.01	365.91	365.92
	2/24/2020		-	7.54	-	-	365.89	-
	3/2/2020		-	7.05	-	-	366.38	-
	3/11/2020		-	7.10	-	-	366.33	-
	3/16/2020		-	7.45	-	-	365.98	
	3/23/2020		-	8.01	-	-	365.42	-
	3/30/2020		-	7.52	13.28	-	365.91	-
A25	12/2/2019	373.66	9.58	9.59	15.08	0.01	364.07	364.08
	2/17/2020		7.95	8.09	-	0.14	365.57	365.68
	2/24/2020		8.02	8.16	-	0.14	365.50	365.61
	3/2/2020		7.30	7.37	-	0.07	366.29	366.35
	3/11/2020		7.40	7.48	-	0.08	366.18	366.24
	3/16/2020		7.75	7.90	-	0.15	365.76	365.88
	3/23/2020		8.44	8.55	-	0.11	365.11	365.20
	3/30/2020		-	7.94	15.05	-	365.72	-
A26	12/2/2019	378.28	-	6.64	6.68	-	371.64	-
	3/11/2020		-	6.63	-	-	371.65	-
	3/16/2020		-	6.63	-	-	371.65	-
	3/23/2020		-	6.64	-	-	371.64	-
	3/30/2020		-	6.64	6.67	-	371.64	-
AMW1	12/2/2019	377.30	-	13.44	15.40	-	363.86	-
	3/11/2020		-	11.71	-	-	365.59	-
	3/16/2020		-	11.87	-	-	365.43	-
	3/23/2020		-	12.40	-	-	364.90	-
	3/30/2020		-	11.32	-	-	365.98	-
AMW3	12/5/2019	373.44	9.80	11.25	15.27	1.45	362.19	363.34
AMW4	12/2/2019[2]	378.43	-	-	-	-	-	-
	3/11/2020		-	10.48	-	-	367.95	-
	3/16/2020		-	10.77	-	-	367.66	-
	3/23/2020		-	11.20	-	-	367.23	-
	3/30/2020		-	10.65	13.85	-	367.78	-
AMW5	12/2/2019	375.65	11.84	14.77	18.19	2.93	360.88	363.19
	2/17/2020		11.27	14.18	-	2.91	361.47	363.77
	2/24/2020		11.30	14.29	-	2.99	361.36	363.72
	3/2/2020		10.95	13.68	-	2.73	361.97	364.13
	3/11/2020		10.83	13.65	-	2.82	362.00	364.23
	3/16/2020		11.15	13.93	-	2.78	361.72	363.92
	3/23/2020		11.68	14.53	-	2.85	361.12	363.37
	3/30/2020		11.19	14.20	-	3.01	361.45	363.83

Table 1

LNAPL Thicknesses
Southern Terminal
Lysander, New York

Monitoring Well ID	Date	Measuring Point Elevation (feet AMSL)	Depth to Product (feet BMP)	Depth to Water (feet BMP)	Well Total Depth (feet BMP)	Apparent LNAPL Thickness (feet)	Groundwater Elevation (feet AMSL)	Corrected Groundwater Elevation[1] (feet AMSL)
Southern Terminals								
AMW7	12/3/2019	375.31	-	11.62	16.64	-	363.69	-
	2/17/2020		-	10.65	-	-	364.66	-
	2/24/2020		-	10.60	-	-	364.71	-
	3/2/2020		-	10.23	-	-	365.08	-
	3/11/2020		-	10.10	-	-	365.21	-
	3/16/2020		-	10.42	-	-	364.89	-
	3/23/2020		-	11.23	-	-	364.08	-
	3/30/2020		-	10.84	16.60	-	364.47	-
AMW8	12/2/2019	378.52	-	14.70	17.06	-	363.82	-
	3/11/2020		-	11.22	-	-	367.30	-
	3/16/2020		-	11.99	-	-	366.53	-
	3/23/2020		-	13.27	-	-	365.25	-
	3/30/2020		-	11.87	17.06	-	366.65	-
DEC 1-6"	12/2/2019	373.97	-	8.91	13.68	-	365.06	-
	2/17/2020		-	5.30	-	-	368.67	-
	2/24/2020		-	5.43	-	-	368.54	-
	3/2/2020		-	FROZEN AT 4.90'		-	-	-
	3/11/2020		-	5.08	-	-	368.89	-
	3/16/2020		-	5.46	-	-	368.51	-
	3/23/2020		-	5.80	-	-	368.17	-
	3/30/2020		-	4.73	13.65	-	369.24	-
DEC 2-6"	12/2/2019	372.01	-	7.27	12.04	-	364.74	-
	2/17/2020		-	FROZEN AT 3.22'		-	-	-
	2/24/2020		-	FROZEN AT 3.10'		-	-	-
	3/2/2020		-	FROZEN AT 3.10'		-	-	-
	3/11/2020		-	3.24	-	-	368.77	-
	3/16/2020		-	3.81	-	-	368.20	-
	3/23/2020		-	3.85	-	-	368.16	-
	3/30/2020		-	3.02	12.00	-	368.99	-
MWA	12/2/2019	376.57	12.62	13.22	14.44	0.60	363.35	363.82
	3/11/2020		11.11	11.19	-	0.08	365.38	365.44
	3/16/2020		11.27	11.36	-	0.09	365.21	365.28
	3/23/2020		11.71	11.98	-	0.27	364.59	364.80
	3/30/2020		-	10.96	14.40	-	365.61	-
MWB	12/2/2019	374.74	-	9.88	13.13	-	364.86	-
	3/11/2020		-	8.03	-	-	366.71	-
	3/16/2020		9.42	9.55	-	0.13	365.19	365.29
	3/23/2020		-	9.98	-	-	364.76	-
	3/30/2020		-	8.24	13.05	-	366.50	-
MW-1S	12/2/2019	373.50	-	10.11	16.93	-	363.39	-
	2/17/2020		8.92	11.42	16.95	2.50	362.08	364.06
	2/24/2020		8.94	11.60	16.95	2.66	361.90	364.00
	3/2/2020		8.69	10.93	-	2.24	362.57	364.34
	3/11/2020		8.58	10.42	16.92	1.84	363.08	364.53
	3/16/2020		8.80	10.89	16.92	2.09	362.61	364.26
	3/23/2020		9.25	11.95	-	2.70	361.55	363.68
	3/30/2020		9.13	11.77	16.92	2.64	361.73	363.82

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LNAPL Thicknesses
Southern Terminal
Lysander, New York

Monitoring Well ID	Date	Measuring Point Elevation (feet AMSL)	Depth to Product (feet BMP)	Depth to Water (feet BMP)	Well Total Depth (feet BMP)	Apparent LNAPL Thickness (feet)	Groundwater Elevation (feet AMSL)	Corrected Groundwater Elevation[(1)] (feet AMSL)
Southern Terminals								
MW-1D	12/2/2019	373.44	-	10.11	29.67	-	363.33	-
	2/17/2020		-	9.42	-	-	364.02	-
	2/24/2020		-	9.42	-	-	364.02	-
	3/2/2020		-	9.10	-	-	364.34	-
	3/11/2020		-	8.92	29.68	-	364.52	-
	3/16/2020		-	9.14	29.61	-	364.30	-
	3/23/2020		-	9.75	-	-	363.69	-
	3/30/2020		-	9.58	29.84	-	363.86	-
MW-2S	12/2/2019	374.22	10.65	10.66	16.57	0.01	363.56	363.57
	2/17/2020		9.32	12.36	18.13	3.04	361.86	364.26
	2/24/2020		9.32	12.48	18.05	3.16	361.74	364.24
	3/2/2020		9.15	11.55	-	2.40	362.67	364.57
	3/11/2020		8.94	11.25	18.15	2.31	362.97	364.79
	3/16/2020		9.05	12.00	18.13	2.95	362.22	364.55
	3/23/2020		9.36	13.60	-	4.24	360.62	363.97
	3/30/2020		9.34	12.85	18.12	3.51	361.37	364.14
MW-2D	12/2/2019	374.38	-	10.91	29.39	-	363.47	-
	2/17/2020		-	10.17	-	-	364.21	-
	2/24/2020		-	10.18	-	-	364.20	-
	3/2/2020		-	9.83	-	-	364.55	-
	3/11/2020		-	9.61	29.40	-	364.77	-
	3/16/2020		-	9.83	29.38	-	364.55	-
	3/23/2020		-	10.42	-	-	363.96	-
	3/30/2020		-	10.25	29.38	-	364.13	-
MW-3S	12/2/2019	373.76	-	10.04	18.32	-	363.72	-
	2/17/2020		-	9.15	18.33	-	364.61	-
	2/24/2020		-	9.12	18.30	-	364.64	-
	3/2/2020		-	8.79	-	-	364.97	-
	3/11/2020		-	8.69	18.35	-	365.07	-
	3/16/2020		-	8.95	18.32	-	364.81	-
	3/23/2020		-	9.53	-	-	364.23	-
	3/30/2020		-	9.20	18.32	-	364.56	-
MW-3D	12/2/2019	373.73	-	10.30	31.82	-	363.43	-
	2/17/2020		-	9.58	-	-	364.15	-
	2/24/2020		-	9.56	-	-	364.17	-
	3/2/2020		-	9.24	-	-	364.49	-
	3/11/2020		-	9.04	31.87	-	364.69	-
	3/16/2020		-	9.25	31.85	-	364.48	-
	3/23/2020		-	9.86	-	-	363.87	-
	3/30/2020		-	9.67	31.88	-	364.06	-

Table 1

LNAPL Thicknesses
Southern Terminal
Lysander, New York

Monitoring Well ID	Date	Measuring Point Elevation (feet AMSL)	Depth to Product (feet BMP)	Depth to Water (feet BMP)	Well Total Depth (feet BMP)	Apparent LNAPL Thickness (feet)	Groundwater Elevation (feet AMSL)	Corrected Groundwater Elevation[1] (feet AMSL)
Southern Terminals								
MW-4S	12/2/2019	378.32	-	14.45	19.48	-	363.87	-
	2/17/2020		-	13.28	19.72	-	365.04	-
	2/24/2020		-	13.17	19.71	-	365.15	-
	3/2/2020		-	12.85	-	-	365.47	-
	3/11/2020		-	12.66	19.73	-	365.66	-
	3/16/2020		-	12.93	19.72	-	365.39	-
	3/23/2020		-	13.45	-	-	364.87	-
	3/30/2020		-	13.04	19.71	-	365.28	-
MW-4D	12/2/2019	378.32	-	14.58	27.59	-	363.74	-
	2/17/2020		-	13.63	-	-	364.69	-
	2/24/2020		-	13.60	-	-	364.72	-
	3/2/2020		-	13.29	-	-	365.03	-
	3/11/2020		-	13.03	27.45	-	365.29	-
	3/16/2020		-	13.21	27.45	-	365.11	-
	3/23/2020		-	13.78	-	-	364.54	-
	3/30/2020		-	13.63	27.45	-	364.69	-
MW-5S	12/2/2019	373.16	8.72	11.21	18.24	2.49	361.95	363.92
	2/17/2020		7.55	11.73	18.20	4.18	361.43	364.73
	2/24/2020		7.31	12.25	18.27	4.94	360.91	364.81
	3/2/2020		6.94	12.05	-	5.11	361.11	365.15
	3/11/2020		7.12	10.66	18.27	3.54	362.50	365.30
	3/16/2020		7.59	9.98	18.20	2.39	363.18	365.07
MW-5D	12/2/2019	373.18	-	9.41	24.18	-	363.77	-
	2/17/2020		7.49	12.30	-	4.81	360.88	364.68
	2/24/2020		8.40	9.04	-	0.64	364.14	364.65
	3/2/2020		7.08	12.15	-	5.07	361.03	365.04
	3/11/2020		8.02	8.07	24.05	0.05	365.11	365.15
	3/16/2020		-	8.22	24.00	-	364.96	-
MW-6S	12/2/2019	372.00	-	8.22	17.34	-	363.78	-
	2/17/2020		-	7.48	17.33	-	364.52	-
	2/24/2020		-	7.46	17.33	-	364.54	-
	3/2/2020		-	7.14	-	-	364.86	-
	3/11/2020		-	6.98	17.33	-	365.02	-
	3/16/2020		-	7.17	17.32	-	364.83	-
	3/23/2020		-	7.73	-	-	364.27	-
	3/30/2020		-	7.55	17.35	-	364.45	-
MW-6D	12/2/2019	372.07	-	8.38	30.02	-	363.69	-
	2/17/2020		-	7.67	-	-	364.40	-
	2/24/2020		-	7.66	-	-	364.41	-
	3/2/2020		-	7.34	-	-	364.73	-
	3/11/2020		-	7.17	30.01	-	364.90	-
	3/16/2020		-	7.36	30.02	-	364.71	-
	3/23/2020		-	7.95	-	-	364.12	-
	3/30/2020		-	7.75	30.02	-	364.32	-

Table 1

LNAPL Thicknesses
Southern Terminal
Lysander, New York

Monitoring Well ID	Date	Measuring Point Elevation (feet AMSL)	Depth to Product (feet BMP)	Depth to Water (feet BMP)	Well Total Depth (feet BMP)	Apparent LNAPL Thickness (feet)	Groundwater Elevation (feet AMSL)	Corrected Groundwater Elevation[(1)] (feet AMSL)
Southern Terminals								
MW-7S	12/2/2019	371.93	-	8.29	18.22	-	363.64	-
	2/17/2020		-	7.54	-	-	364.39	-
	2/24/2020		-	7.50	18.99	-	364.43	-
	3/2/2020		-	7.20	-	-	364.73	-
	3/11/2020		-	7.01	19.02	-	364.92	-
	3/16/2020		-	7.26	19.00	-	364.67	-
	3/23/2020		-	7.84	-	-	364.09	-
	3/30/2020		-	7.66	19.00	-	364.27	-
MW-7D	12/2/2019	371.97	-	8.48	31.94	-	363.49	-
	2/17/2020		-	7.78	-	-	364.19	-
	2/24/2020		-	7.76	-	-	364.21	-
	3/2/2020		-	7.45	-	-	364.52	-
	3/11/2020		-	7.26	31.95	-	364.71	-
	3/16/2020		-	7.45	31.95	-	364.52	-
	3/23/2020		-	8.07	-	-	363.90	-
	3/30/2020		-	7.89	31.94	-	364.08	-
MW-9S	12/2/2019	371.90	-	8.18	17.53	-	363.72	-
	2/17/2020		-	7.50	17.53	-	364.40	-
	2/24/2020		-	7.44	17.50	-	364.46	-
	3/2/2020		-	7.13	-	-	364.77	-
	3/11/2020		-	7.02	17.50	-	364.88	-
	3/16/2020		-	7.23	17.52	-	364.67	-
	3/23/2020		-	7.77	-	-	364.13	-
	3/30/2020		-	7.55	17.50	-	364.35	-
MW-9D	12/2/2019	371.88	-	8.28	36.07	-	363.60	-
	2/17/2020		-	7.66	-	-	364.22	-
	2/24/2020		-	7.64	-	-	364.24	-
	3/2/2020		-	7.33	-	-	364.55	-
	3/11/2020		-	7.18	36.07	-	364.70	-
	3/16/2020		-	7.38	36.05	-	364.50	-
	3/23/2020		-	7.98	-	-	363.90	-
	3/30/2020		-	7.79	36.08	-	364.09	-
MW-10S	12/2/2019	371.67	-	7.67	16.84	-	364.00	-
	2/17/2020		-	7.07	16.77	-	364.60	-
	2/24/2020		-	7.05	16.77	-	364.62	-
	3/2/2020		-	6.77	-	-	364.90	-
	3/11/2020		-	6.67	16.85	-	365.00	-
	3/16/2020		-	6.87	16.85	-	364.80	-
	3/23/2020		-	7.37	-	-	364.30	-
	3/30/2020		-	7.13	16.83	-	364.54	-
MW-10I	12/2/2019	370.91	-	7.31	30.32	-	363.60	-
	2/17/2020		-	6.73	-	-	364.18	-
	2/24/2020		-	6.72	-	-	364.19	-
	3/2/2020		-	6.41	-	-	364.50	-
	3/11/2020		-	6.26	30.25	-	364.65	-
	3/16/2020		-	6.57	30.28	-	364.34	-
	3/23/2020		-	7.06	-	-	363.85	-
	3/30/2020		-	6.86	30.25	-	364.05	-

Table 1

LNAPL Thicknesses
Southern Terminal
Lysander, New York

Monitoring Well ID	Date	Measuring Point Elevation (feet AMSL)	Depth to Product (feet BMP)	Depth to Water (feet BMP)	Well Total Depth (feet BMP)	Apparent LNAPL Thickness (feet)	Groundwater Elevation (feet AMSL)	Corrected Groundwater Elevation[1] (feet AMSL)
Southern Terminals								
MW-10D	12/2/2019	370.97	-	7.33	37.16	-	363.64	-
	2/17/2020		-	6.66	-	-	364.31	-
	2/24/2020		-	6.76	-	-	364.21	-
	3/2/2020		-	6.45	-	-	364.52	-
	3/11/2020		-	6.30	37.12	-	364.67	-
	3/16/2020		-	6.52	37.13	-	364.45	-
	3/23/2020		-	7.03	-	-	363.94	-
	3/30/2020		-	6.90	37.14	-	364.07	-
PZ103S	12/2/2019[2]	377.79	-	-	-	-	-	-
PZ103D	12/2/2019[2]	377.76	-	-	-	-	-	-
PZ104S	12/2/2019[2]	-	-	-	-	-	-	-
PZ105S	12/5/2019	373.57	-	9.41	20.02	-	364.16	-
PZ105D	12/5/2019	373.53	-	10.31	26.78	-	363.22	-
RW-1	12/2/2019	373.37	9.43	11.93	16.81	2.50	361.44	363.42
	2/17/2020		8.87	11.02	17.17	2.15	362.35	364.05
	2/24/2020		9.00	10.43	16.98	1.43	362.94	364.07
	3/2/2020		8.71	10.40	-	1.69	362.97	364.31
	3/11/2020		8.55	9.57	17.23	1.02	363.80	364.61
	3/16/2020		8.83	9.68	17.27	0.85	363.69	364.36
	3/23/2020		9.37	10.38	-	1.01	362.99	363.79
	3/30/2020		9.16	10.11	17.23	0.95	363.26	364.01
RW-2	12/2/2019	372.78	-	9.18	15.05	-	363.60	-
	2/17/2020		7.96	10.21	17.10	2.25	362.57	364.35
	2/24/2020		8.20	9.22	17.18	1.02	363.56	364.37
	3/2/2020		7.98	8.68	-	0.70	364.10	364.65
	3/11/2020		7.77	8.18	17.29	0.41	364.60	364.92
	3/16/2020		7.95	8.40	17.32	0.45	364.38	364.74
	3/23/2020		8.46	9.30	-	0.84	363.48	364.14
	3/30/2020		8.34	8.91	17.31	0.57	363.87	364.32
RW-3	12/2/2019	373.32	9.51	10.58	17.17	1.07	362.74	363.59
	2/17/2020		8.52	10.64	17.11	2.12	362.68	364.35
	2/24/2020		8.62	10.11	17.15	1.49	363.21	364.39
	3/2/2020		8.38	9.50	-	1.12	363.82	364.70
	3/11/2020		8.21	9.11	17.18	0.90	364.21	364.92
	3/16/2020		8.42	9.23	17.24	0.81	364.09	364.73
	3/23/2020		8.91	10.02	-	1.11	363.30	364.18
	3/30/2020		8.74	9.88	17.25	1.14	363.44	364.34
RW-4	12/2/2019	372.54	-	8.63	16.68	-	363.91	-
	2/17/2020		7.61	7.66	16.50	0.05	364.88	364.92
	2/24/2020		7.56	7.61	-	0.05	364.93	364.97
	3/2/2020		7.24	7.30	-	0.06	365.24	365.29
	3/11/2020		7.06	7.10	16.42	0.04	365.44	365.47
	3/16/2020		7.30	7.36	16.40	0.06	365.18	365.23
	3/23/2020		7.78	7.83	-	0.05	364.71	364.75
	3/30/2020		7.48	7.55	16.40	0.07	364.99	365.05

Table 1

LNAPL Thicknesses
Southern Terminal
Lysander, New York

Monitoring Well ID	Date	Measuring Point Elevation (feet AMSL)	Depth to Product (feet BMP)	Depth to Water (feet BMP)	Well Total Depth (feet BMP)	Apparent LNAPL Thickness (feet)	Groundwater Elevation (feet AMSL)	Corrected Groundwater Elevation[1] (feet AMSL)
Southern Terminals								
RW-5	12/2/2019	372.49	7.29	10.71	17.30	3.42	361.78	364.48
	2/17/2020		7.55	9.57	17.14	2.02	362.92	364.52
	2/24/2020		7.60	8.98	-	1.38	363.51	364.60
	3/2/2020		7.30	8.77	-	1.47	363.72	364.88
	3/11/2020		7.14	8.44	17.28	1.30	364.05	365.08
	3/16/2020		7.48	8.19	17.42	0.71	364.30	364.86
	3/23/2020		8.00	8.85	-	0.85	363.64	364.31
	3/30/2020		7.68	8.68	17.45	1.00	363.81	364.60
S2	12/2/2019	376.83	12.96	12.97	20.28	0.01	363.86	363.87
	3/11/2020		11.27	11.82	-	0.55	365.01	365.44
	3/16/2020		11.45	11.98	-	0.53	364.85	365.27
	3/23/2020		11.98	12.52	-	0.54	364.31	364.74
	3/30/2020		-	11.64	20.22	-	365.19	-
S3	12/2/2019	375.19	11.28	11.81	17.90	0.53	363.38	363.80
	3/11/2020		-	9.58	-	-	365.61	-
	3/16/2020		9.79	10.66	-	0.87	364.53	365.22
	3/23/2020		10.35	11.12	-	0.77	364.07	364.68
	3/30/2020		10.19	10.90	-	0.71	364.29	364.85
S4	12/2/2019	374.22	-	10.13	17.48	-	364.09	-
	3/11/2020		CANNOT DETERMINE DUE TO BIOFOULING FILM				-	-
	3/16/2020		-	8.23	-	-	365.99	-
	3/23/2020		-	8.61	-	-	365.61	
	3/30/2020		-	5.74	17.42	-	368.48	-
S5	12/5/2019	375.535	-	11.72	16.67	-	363.82	-
S8	12/2/2019[2]	372.87	-	-	-	-	-	-
	3/11/2020		-	6.78	-	-	366.09	-
	3/16/2020		-	7.38	-	-	365.49	-
	3/23/2020		-	7.42	-	-	365.45	-
	3/30/2020		-	6.56	16.60	-	366.31	-
S9	12/2/2019[2]	372.18	-	-	-	-	-	-
	3/11/2020		5.90	8.33	-	2.43	363.85	365.77
	3/16/2020		6.28	8.60	-	2.32	363.58	365.41
	3/23/2020		6.85	9.12	-	2.27	363.06	364.85
	3/30/2020		6.00	8.45	-	2.45	363.73	365.67
S13	12/3/2019	372.72	9.34	9.35	15.89	0.01	363.37	363.38
S18	12/2/2019[2]	373.98	-	-	-	-	-	-
S22	12/2/2019[2]	-	-	-	-	-	-	-
S23	12/2/2019[5]	370.34	-	OBSTRUCTED AT 1.47'		-	-	-
SMW12	12/2/2019[2]	373.77	-	-	-	-	-	-
	3/23/2020		-	5.16	-	-	368.61	-
	3/30/2020		-	3.80	13.50	-	369.97	-
SMW3[4]	12/2/2019[2]	370.79	-	-	-	-	-	-
	3/11/2020		-	6.15	-	-	364.64	-
	3/16/2020		-	6.41	-	-	364.38	-
	3/23/2020		-	6.72	-	-	364.07	-
	3/30/2020		-	5.90	10.85	-	364.89	-

Table 1

LNAPL Thicknesses
Southern Terminal
Lysander, New York

Monitoring Well ID	Date	Measuring Point Elevation (feet AMSL)	Depth to Product (feet BMP)	Depth to Water (feet BMP)	Well Total Depth (feet BMP)	Apparent LNAPL Thickness (feet)	Groundwater Elevation (feet AMSL)	Corrected Groundwater Elevation[1] (feet AMSL)
Northern Terminal								
B3	12/2/2019[2]	378.10	-	-	-	-	0.00	-
B4	12/2/2019	382.47	-	17.61	23.51	-	364.86	-
B5	12/5/2019	385.41	-	21.57	26.70	-	363.84	-
B6	12/2/2019	381.50	17.36	17.37	23.79	0.01	364.13	364.14
B7	12/2/2019	385.36	-	21.54	22.90	-	363.82	-
B8	12/5/2019	377.50	-	13.82	19.79	-	363.68	-
B9	12/2/2019	385.40	-	21.57	21.63	-	363.83	-
B10	12/2/2019[2]	377.98	-	-	-	-	-	-
B11	12/2/2019	382.33	-	18.48	21.36	-	363.85	-
B12	12/2/2019[2]	377.21	-	-	-	-	-	-
B13	12/2/2019	381.91	16.04	16.09	21.44	0.05	365.82	365.86
B14	12/3/2019	376.02	12.25	12.52	23.23	0.27	363.50	363.71
B15	12/2/2019	382.09	-	17.17	18.66	-	364.92	-
B16	12/2/2019[2]	373.72	-	-	-	-	-	-
B18	12/2/2019[2]	373.03	-	-	-	-	-	-
BH3	12/2/2019	395.45	-	20.36	29.91	-	375.09	-
BMW2	12/2/2019	398.72	-	8.47	37.69	-	390.25	-
BMW4	12/2/2019	374.13	-	8.94	14.47	-	365.19	-
BMW5	12/2/2019	389.58	24.99	26.08	31.52	1.09	363.50	364.36
BMW6	12/2/2019	395.04	-	30.31	32.34	-	364.73	-
BMW7	12/2/2019	397.75	-	11.5	17.19	-	386.25	-
BMW8	12/2/2019	400.10	-	9.41	22.62	-	390.69	-
BMW9	12/2/2019	380.28	-	3.63	17.71	-	376.65	-
BMW12	12/2/2019	385.32	-	20.94	25.61	-	364.38	-
BMW13	12/2/2019	382.69	-	18.84	25.41	-	363.85	-
BMW14R	12/2/2019	379.96	-	15.93	19.83	-	364.03	-
CT4	12/2/2019[5]	379.55	-	DRY OR OBSTRUCTED AT 5.34'		-	-	-
CT19	12/2/2019[2]	381.96	-	-	-	-	-	-
CT20	12/2/2019[2]	381.53	-	-	-	-	-	-
GWE-PTW	12/2/2019[2]	374.06	-	-	-	-	-	-
HD1	12/2/2019	373.20	-	2.44	3.77	-	370.76	-
HD3A	12/2/2019	369.00	-	1.57	11.58	-	367.43	-
HD6	12/2/2019	368.62	-	4.03	6.13	-	364.59	-
HD7	12/2/2019	369.12	4.09	4.11	6.41	0.02	365.01	365.03
HD8	12/2/2019	371.97	-	4.38	6.39	-	367.59	-
MW-201	12/2/2019	395.38	-	26.43	26.70	-	368.95	-
MW-202	12/2/2019	395.42	-	15.28	18.30	-	380.14	-
MW-203	12/2/2019	394.38	-	DRY	20.41	-	-	-
MW-204	12/2/2019	395.02	-	4.98	21.77	-	390.04	-
MW-205	12/2/2019	398.05	-	5.26	22.65	-	392.79	-
MW-206	12/2/2019	397.87	-	1.86	22.81	-	396.01	-
MW-207	12/2/2019	398.65	-	4.08	22.62	-	394.57	-
MW-208	12/2/2019	397.23	-	4.63	22.07	-	392.60	-
MW-209	12/2/2019	399.74	-	3.09	24.80	-	396.65	-

Table 1

LNAPL Thicknesses
Southern Terminal
Lysander, New York

Monitoring Well ID	Date	Measuring Point Elevation (feet AMSL)	Depth to Product (feet BMP)	Depth to Water (feet BMP)	Well Total Depth (feet BMP)	Apparent LNAPL Thickness (feet)	Groundwater Elevation (feet AMSL)	Corrected Groundwater Elevation[1] (feet AMSL)
Northern Terminal								
MW-210	12/2/2019	386.72	-	9.64	20.06	-	377.08	-
MW-211	12/2/2019	387.40	-	7.48	17.27	-	379.92	-
PZ101S	12/2/2019[2]	379.47	-	-	-	-	-	-
PZ101D	12/2/2019[2]	379.52	-	-	-	-	-	-
PZ102D	12/3/2019	378.08	-	14.34	23.92	-	363.74	-
PZ102S	12/3/2019	378.24	-	14.51	17.85	-	363.73	-
PZ106S	12/2/2019[2]	374.15	-	-	-	-	-	-
SMW11	12/2/2019[2]	380.80	-	-	-	-	-	-
UNK WELL	12/2/2019	369.80	-	4.92	14.14	-	364.88	-

Notes

[1] Corrected groundwater elevation = Elevation + (LNAPL density [0.79] x NAPL thickness)
[2] Monitoring well could not be located due to snow accumulation
[3] Two A6 monitoring wells identified on historical maps
[4] Well used for monitoring LNAPL thicknesses only
[5] Monitoring well located but not gauged

Acronyms and Abbreviations

feet AMSL = Feet above mean sea level
feet BMP = Feet Below Measuring Point
- = No data available
DRY = Well dry at time of gauging
LNAPL = Light Non-aqueous Phase Liquids

Table 2

Groundwater Analytical Summary
Cold Springs Terminal
Lysander, New York

			Southern Terminal								Northern Terminal				Northern Terminal
Sample Location:			**MW-2S**	**MW-2D**	**MW-3S**	**MW-6S**	**MW-10I**	**RW-5**	**A10**	**S4**	**BMW-5**	**BMW-12**	**BMW-13**	**BMW-14R**	**PZ102S**
Sample Date:	**Units**	**TOGS 1.1.1 [1]**	**12/4/2019**	**12/4/2019**	**12/4/2019**	**12/4/2019**	**12/3/2019**	**12/4/2019**	**12/4/2019**	**12/3/2019**	**12/13/2019**	**12/3/2019**	**12/3/2019**	**12/3/2019**	**12/4/2019**
Field Parameters															
Conductivity	mS/cm	NA	0.776	1.037	0.783	0.765	1.607	0.736	0.743	0.312	-	0.828	1.114	1.026	0.77
Dissolved oxygen	mg/L	NA	7.49	6.5	1.15	3.05	NM	1.43	8.79	5.63	-	5.6	3.12	13.08	1.24
Oxidation reduction potential	millivolts	NA	-19.8	-60.3	50.9	57.4	-31.6	94.9	-37.9	14	-	-44.3	-44	-68.3	-46.2
pH	s.u.	NA	7.02	7.15	6.91	6.55	8.43	7.19	6.82	7.13	-	7.53	8.09	7.48	6.82
Temperature	Deg C	NA	9.66	11.21	9.88	9.32	9.36	10.26	10.1	11.33	-	9.72	6.0	6.6	10.31
Turbidity	NTU	NA	15.9	8.33	15.7	5.16	10.2	5.26	5.63	7.77	-	42.6	9.38	8.08	12.9
Volatile Organic Compounds															
1,2,4-Trimethylbenzene	µg/L	5	**920**	**2.4**	**94**	**250**	**370 / 390**	**970**	**1200**	**140**	**1500**	**540**	**1500**	**1500**	**760**
1,3,5-Trimethylbenzene	µg/L	5	**270**	**0.27 J**	**6.5**	**90**	**110 / 110**	**290**	**350**	**2.8 J**	**430**	**300**	**470**	**420**	**230**
sec-Butylbenzene	µg/L	5	<130	**0.78 J**	**5.5**	<40	<100 / <100	<200	<130	**0.58 J**	<100	<40	<400	**11 J**	<130
Benzene	µg/L	1	**5800**	**57**	**57**	**360**	**6500 / 6600**	**5200**	**17 J**	**140**	<100	**6.7 J**	**7500**	<50	**1800**
p-Isopropyltoluene (Cymene)	µg/L	5	<130	<2.0	**2.7**	<40	<100 / <100	<200	<130	<4.0	<100	<40	<400	**9.9 J**	<130
Ethylbenzene	µg/L	5	**1400**	**0.84 J**	**37**	**360**	**1700 / 1700**	**1500**	**1100**	**200**	**1000**	**180**	**1400**	**82**	**810**
Isopropyl benzene	µg/L	5	**57 J**	**6.1**	**29**	**29 J**	**44 J / 46 J**	**58 J**	**58 J**	**7.1**	**59 J**	**9.5 J**	**56 J**	**71**	**35 J**
Methyl tert butyl ether (MTBE)	µg/L	10	<130	<2.0	<2.0	<40	<100 / <100	<200	<130	<4.0	<100	<40	<400	<50	<130
Naphthalene	µg/L	10	**540**	**0.84 J**	**2.2**	**89**	**130 / 140**	**490**	**550**	**47**	**410**	**190**	**530**	**360**	**270**
N-Butylbenzene	µg/L	5	<130	**1.1 J**	**7.5**	<40	<100 / <100	<200	<130	**1.3 J**	<100	<40	<400	**34 J**	<130
N-Propylbenzene	µg/L	5	**120 J**	**7.2**	**29**	**51**	**43 J / 50 J**	**130 J**	**160**	**16**	**180**	**27 J**	**140 J**	**180**	**81 J**
Toluene	µg/L	5	**6900**	**2.6**	**4.0**	**1100**	**850 / 890**	**10,000**	**480**	**14**	**640**	**84**	**21,000**	<50	**3900**
Xylenes (total)	µg/L	5	**6700**	**5.7**	**13**	**1800**	**3500 / 3600**	**7800**	**5500**	**74**	**5000**	**1400**	**11,000**	**430**	**5300**
Semi-Volatile Organic Compounds															
Acenaphthene	µg/L	20	**1.2**	<0.19	**0.59**	**2.2**	<0.77 / <0.74	<1.9	<3.7	<0.19	<3.6	<1.2	<4.0	<1.9	<1.9
Anthracene	µg/L	50	<0.19	<0.19	<0.19	<0.19	<0.77 / <0.74	<1.9	<3.7	<0.19	<3.6	<1.2	<4.0	<1.9	<1.9
Benzo(a)anthracene	µg/L	0.002	<0.19	<0.19	<0.19	<0.19	<0.77 / <0.74	<1.9	<3.7	<0.19	<3.6	<1.2	<4.0	<1.9	<1.9
Benzo(a)pyrene	µg/L	ND	<0.19	<0.19	<0.19	<0.19	<0.77 / <0.74	<1.9	<3.7	<0.19	<3.6	<1.2	<4.0	<1.9	<1.9
Benzo(b)fluoranthene	µg/L	0.002	<0.19	<0.19	<0.19	<0.19	<0.77 / <0.74	<1.9	<3.7	<0.19	<3.6	<1.2	<4.0	<1.9	<1.9
Benzo(g,h,i)perylene	µg/L	NA	<0.19	<0.19	<0.19	<0.19	<0.77 / <0.74	<1.9	<3.7	<0.19	<3.6	<1.2	<4.0	<1.9	<1.9
Benzo(k)fluoranthene	µg/L	0.002	<0.19	<0.19	<0.19	<0.19	<0.77 / <0.74	<1.9	<3.7	<0.19	<3.6	<1.2	<4.0	<1.9	<1.9
Chrysene	µg/L	0.002	<0.19	<0.19	<0.19	<0.19	<0.77 / <0.74	<1.9	<3.7	<0.19	<3.6	<1.2	<4.0	<1.9	<1.9
Dibenz(a,h)anthracene	µg/L	NA	<0.19	<0.19	<0.19	<0.19	<0.77 / <0.74	<1.9	<3.7	<0.19	<3.6	<1.2	<4.0	<1.9	<1.9
Fluoranthene	µg/L	50	<0.19	<0.19	<0.19	<0.19	<0.77 / <0.74	<1.9	<3.7	<0.19	<3.6	<1.2	<4.0	<1.9	<1.9
Fluorene	µg/L	50	**1.8**	<0.19	**0.79**	**2.6**	<0.77 / <0.74	<1.9	<3.7	<0.19	<3.6	<1.2	<4.0	<1.9	<1.9
Indeno(1,2,3-cd)pyrene	µg/L	0.002	<0.19	<0.19	<0.19	<0.19	<0.77 / <0.74	<1.9	<3.7	<0.19	<3.6	<1.2	<4.0	<1.9	<1.9
Naphthalene	µg/L	10	**390**	**1.9**	**1.7**	**34**	**97 / 100**	**310**	**440**	**19**	**580**	**150**	**380**	**290**	**190**
Phenanthrene	µg/L	50	1.2	<0.19	<0.19	**0.95**	<0.77 / <0.74	<1.9	<3.7	<0.19	4.9	<1.2	<4.0	<1.9	<1.9
Pyrene	µg/L	50	<0.19	<0.19	<0.19	<0.19	<0.77 / <0.74	<1.9	<3.7	<0.19	<3.6	<1.2	<4.0	<1.9	<1.9
Gasses															
Carbon dioxide	µg/L	NA	**73,000**	**73,000**	**130,000**	**230,000**	**140,000 / 140,000**	**65,000**	**130,000**	**72,000**	-	-	-	-	-
Methane	µg/L	NA	**6600**	**3800**	**7500**	**5400**	**5500 / 5400**	**1600**	**4400**	**3300**	-	-	-	-	-
Metals															
Fe^{2+}	mg/L	NA	**1.05**	**2.29**	**1.00**	**1.26**	**2.12**	**0.02**	**1.59**	**0.93**	-	-	-	**2.52**	-
Lead	µg/L	25	-	-	-	-	-	-	-	-	**280**	**22**	**27**	**3.1 J**	**4.5 J**
Wet Chemistry															
Nitrate (as N)	mg/L	10	<0.10	<0.50	<0.10	<0.10	<0.10 / <0.10	<0.10	<0.10	<0.10	-	-	-	-	-
Sulfate	mg/L	250	**5.2**	**2.8 J**	**4.1**	**6.3**	**6.2 / 6.2**	**16**	**2.9 J**	**13**	-	-	-	-	-
Sulfide	mg/L	0.05	<1.0	<1.0	<1.0	<1.0	<1.5 / <1.0	**1.0**	<1.0	<1.9	-	-	-	-	-
Total organic carbon (TOC)	mg/L	NA	**13**	**4.4**	**10**	**11**	**18 / 17**	**16**	**11**	**4.6**	-	-	-	-	-

Notes

[1] Groundwater Standards and Guidance Values (SGVs) from New York State Department of Environmental Conservation (NYSDEC) Division of Water Technical and Operational Guidance Series (1.1.1), effective June 1998 (with addenda)
Bold values indicate a detection
Shading indicates value exceeds SGV
Two values in same cell indicate duplicate analysis

Data Qualifiers
J = The analyte was positively identified; however, the associated numerical value is an estimated concentration

Acronyms and Abbreviations
mS/cm = millisiemens per centimeter
s.u. = standard unit
Deg C = degrees Celsius
NTU = Nephelometric Turbidity unit
µg/L = micrograms per liter
mg/L = milligrams per liter
NA = not applicable
- = No data were collected

Table 3

Petroleum Degrader Count Summary
Cold Springs Terminal
Lysander, New York

Sample Location:	Units	A10	MW-2S	MW-2D	MW-3S	MW-6S	MW-10I	RW-5	S4
Sample Date:		12/4/2019	12/4/2019	12/4/2019	12/4/2019	12/4/2019	12/3/2019	12/4/2019	12/3/2019
Petroleum Degrader Microbe Count									
Petroleum Hydrocarbon Specific Microbial Population	CFU/mL	1.03E+04	2.17E+03	2.41E+03	2.18E+03	2.11E+04	1.30E+03	1.16E+04	7.22E+03

Notes:

Method 9215B Adapted from Standard Methods for the Examination of Water and Wastewater 17th ed.
Grown on gasoline and diesel vapor
Values are averages of duplicates

Acronyms and Abbreviations
CFU = Colony Forming Units
mL = milliliters

Table 4

LNAPL Analytical Summary
Cold Springs Terminal
Lysander, New York

Sample Location:	Units	A10	A14	MW-5S	MWA
Sample Date:		12/13/2019	12/13/2019	12/13/2019	12/13/2019
Hydrocarbon Fractionation					
C5-C8 Aliphatic	mg/kg	45,400	59,900	78,600	-
C5-C8 Aliphatic, adjusted (1)	mg/kg	44,800	47,700	52,900	-
C9-C10 Aromatic	mg/kg	122,000	87,400	131,000	-
C9-C12 Aliphatic	mg/kg	229,000	168,000	266,000	-
C9-C12 Aliphatic, adjusted (1)	mg/kg	87,000	57,000	103,000	-
C5-C8 Aliphatic	µg/L	-	-	-	909,000
C5-C8 Aliphatic, adjusted (1)	µg/L	-	-	-	790,000
C9-C10 Aromatic	µg/L	-	-	-	12,400,000
C9-C12 Aliphatic	µg/L	-	-	-	22,500,000
C9-C12 Aliphatic, adjusted (1)	µg/L	-	-	-	9,180,000
C9-C18 Aliphatic	mg/kg	346,000	542,000	409,000	332,000
C11-C22 Aromatic	mg/kg	52,800	102,000	58,500	45,000
C11-C22 Aromatic, adjusted (1)	mg/kg	48,000	95,300	52,700	38,900
C19-C36 Aliphatic	mg/kg	18,400	43,800	5720	11,300

Notes
(1) Adjusted results do not include target compounds measured during sample analysis but that are excluded from the carbon fraction based on molecular structure

Acronyms and Abbreviations
mg/kg = milligrams per kilogram
µg/L = micrograms per liter
- = No data were collected
LNAPL - Light non-aqeous phase liquids

Table 5

Hydraulic Conductivity Summary
Cold Springs Terminal
Lysander, New York

Well I.D.	Aquifer Condition	Stratigraphic Interval	Analytical Method [1]	Rising Head Test Hydraulic Conductivity [2] (cm/sec)	Rising Head Test Geometric Mean (cm/sec)	Falling Head Test Hydraulic Conductivity [2] (cm/sec)	Falling Head Test Geometric Mean (cm/sec)
Northern Terminal							
BMW-12	Unconfined	Shallow Overburden	Bouwer-Rice	5.10E-04	5.39E-04	-	-
				5.70E-04		-	
BMW-13	Unconfined	Shallow Overburden	Bouwer-Rice	1.40E-03	1.74E-03	-	-
				3.20E-03		-	
				1.60E-03		-	
				1.60E-03		-	
				1.40E-03		-	
				1.70E-03		-	
BMW-14R	Unconfined	Shallow Overburden	Bouwer-Rice	2.30E-03	2.30E-03	-	-
				2.30E-03		-	
Southern Terminal							
MW-1D	Unconfined	Deep Overburden (Gravel Layer)	Bouwer-Rice	2.00E-04	2.00E-04	1.60E-04	1.86E-04
				2.00E-04		1.90E-04	
				2.00E-04		2.10E-04	
MW-4D	Unconfined	Deep Overburden (Gravel Layer)	Bouwer-Rice	1.60E-03	1.35E-03	1.90E-03	1.63E-03
				1.20E-03		2.10E-03	
				1.10E-03		1.50E-03	
				1.50E-03		1.50E-03	
				1.40E-03		1.30E-03	
MW-9D	Unconfined	Deep Overburden (Gravel Layer)	Bouwer-Rice	9.30E-04	1.31E-03	1.40E-03	1.45E-03
				1.40E-03		8.00E-04	
				1.40E-03		1.70E-03	
				1.40E-03		1.60E-03	
				1.30E-03		1.60E-03	
				1.50E-03		1.90E-03	

Notes

[1] Bouwer, H., and R.C. Rice, 1976. A Slug Test Method for Determining Hydraulic Conductivity of Unconfined Aquifers with Completely or Partially Penetrating Wells, Water Resources Research, vol. 12, no. 3, pp.423-428

[2] Falling head slug tests are considered invalid when the water level is within the screened interval. As a result, falling head test results are not shown for wells with water levels within the screened intervals

Table 6

LNAPL Transmissivity Summary
Cold Springs Terminal
Lysander, New York

Well ID	Date	Initial LNAPL Thickness	Final LNAPL Thickness	LNAPL Transmissivity			Average	Standard Deviation	Coefficient of Variation
				Bouwer- Rice*	Cooper- Jacob	Cooper- Bredehoeft-Papadopulos			
		ft		ft^2/d			ft^2/d		
A13	12/11/2019	2.66	0.19	0.40	0.42	0.42	0.41	0.01	0.02
RW-1	01/31/2020	3.28	0.44	0.39	0.45	0.65	0.49	0.14	0.28
RW-5	12/11/2019	2.99	0.41	0.05	0.02	0.09	0.06	0.03	0.63
S3	12/12/2019	0.53	0.26	0.01	0.83	5.01	1.95	2.68	1.38

Notes

* Bouwer-Rice model provides best fit of data

Acronyms and Abbreviations
ft = feet
ft^2/d = square feet per day

Table 7

Grain Size Analysis Summary
Cold Springs Terminal
Lysander, New York

Well ID[1]	Mean Grain Size Description	Median Grain Size	Particle Size Distribution [2]						
				Sand Size					
		mm	Gravel	Coarse	Medium	Fine	Silt	Clay	Silt and Clay
RW-1	Silt	0.055	0.00	0.00	0.00	25.89	70.76	3.35	74.11
RW-2	Silt	0.048	0.00	0.00	0.00	18.45	76.68	4.87	81.55
RW-4	Silt	0.040	0.00	0.00	0.00	7.15	87.13	5.72	92.85
RW-5	Silt	0.054	0.00	0.00	0.00	26.33	68.87	4.81	73.67
MW-2S	Silt	0.060	0.00	0.00	0.00	35.26	59.85	4.89	64.74
MW-4S	Silt	0.044	0.00	0.00	0.00	19.08	72.17	8.75	80.92
MW-5S	Silt	0.043	0.00	0.00	0.00	17.07	75.78	7.15	82.93
MW-7S	Silt	0.049	0.00	0.00	0.00	23.93	70.65	5.42	76.07

Notes

Samples analyzed via ASTM Method D433/D4464M Laser Analysis
[1] Samples collected from sediment accumulated within monitoring well
[2] Retained weight, percent

Acronyms and Abbreviations
mm = millimeters

Table 8

LNAPL Recovery
Cold Springs Terminal
Lysander, New York

	Units	Date	Recovery Well					Totals
			RW-1	RW-2	RW-3	RW-4	RW-5	
Initial LNAPL Thickness	Feet	02/03/2020	1.17	1.85	2.85	0.05	3.20	*NA*
LNAPL Recovered[1,2]	Gallons		23	-	30	-	23	*76*
Water Removed[1,2]	Gallons		45	-	27	-	44	*116*
Total Removed[1,2]	Gallons		68	-	57	-	67	*192*
Total Duration of Extraction	Minutes		120	-	120	-	120	*360*
Initial LNAPL Thickness	Feet	02/17/2020	2.15	2.25	2.12	0.05	2.02	*NA*
LNAPL Recovered[1,3]	Gallons		5	15	15	-	10	*45*
Water Removed[1,3]	Gallons		45	60	96	-	30	*231*
Gallons Removed[1,3]	Gallons		50	75	111	-	40	*276*
Total Duration of Extraction	Minutes		90	90	90	-	90	*360*
Initial LNAPL Thickness	Feet	02/24/2020	1.43	1.02	1.49	0.05	1.38	*NA*
LNAPL Recovered[1,3]	Gallons		2	9	10	-	2	*23*
Water Removed[1,3]	Gallons		35	35	45	-	15	*130*
Gallons Removed[1,3]	Gallons		37	44	55	-	17	*153*
Total Duration of Extraction	Minutes		90	90	90	-	90	*360*
Initial LNAPL Thickness	Feet	03/02/2020	1.33	0.70	1.12	0.06	1.47	*NA*
LNAPL Recovered[1,4]	Gallons		2	15	10	-	10	*37*
Water Removed[1,4]	Gallons		66	85	68	-	90	*309*
Total Removed[1,4]	Gallons		68	100	78	-	100	*346*
Total Duration of Extraction	Minutes		25	25	25	-	30	*105*
Initial LNAPL Thickness	Feet	03/11/2020	1.02	0.41	0.90	0.04	1.30	*NA*
LNAPL Recovered[1,4]	Gallons		12	3	10	-	8	*33*
Water Removed[1,4]	Gallons		56	97	100	-	82	*335*
Total Removed[1,4]	Gallons		68	100	110	-	90	*368*
Total Duration of Extraction	Minutes		30	25	30	-	30	*115*
Initial LNAPL Thickness	Feet	03/16/2020	0.85	0.45	0.81	0.06	0.71	*NA*
LNAPL Recovered[1,4]	Gallons		2	2	3	-	3	*10*
Water Removed[1,4]	Gallons		54	83	49	-	92	*278*
Total Removed[1,4]	Gallons		56	85	52	-	95	*288*
Total Duration of Extraction	Minutes		30	25	30	-	30	*115*
Initial LNAPL Thickness	Feet	03/23/2020	1.01	0.84	1.11	0.05	0.85	*NA*
LNAPL Recovered[1,4]	Gallons		6	2	2	-	3	*13*
Water Removed[1,4]	Gallons		50	67	65	-	92	*274*
Total Removed[1,4]	Gallons		56	69	67	-	95	*287*
Total Duration of Extraction	Minutes		30	25	30	-	30	*115*

Notes:

[1] Approximate volumes based on measurements of water and LNAPL thickness in vac truck following completion of recovery at each well

[2] LNAPL was recovered by vac truck extraction for a continuous 2-hour period at each well

[3] LNAPL was recovered by vac truck extraction for a continuous 1.5-hour period at each well

[4] LNAPL was recovered by vac truck extraction for multiple cycles of 5 minutes of extraction followed by 15 minutes of recovery

Acronyms and Abbreviations

- = LNAPL recovery not performed at recovery well during specific recovery event
N/A = not applicable

Attachment A
Supplemental Investigation Work Plan

October 4, 2019 Reference No. 11137172

Mr. Michael Belveg
Assistant Engineer (Environmental)
Division of Environmental Remediation
New York State Department of Environmental Conservation
615 Erie Boulevard West
Syracuse, New York 13204

Dear Mr. Belveg:

Re: Supplemental Investigation Work Plan - Southern Terminals
Cold Springs Terminal Site, Hillside Road, Lysander, New York
NYSDEC Spill No. 89-04923

1. Introduction

On behalf of the Respondents to the Southern Terminals Consent Order executed by the New York State Department of Environmental Conservation (NYSDEC) on August 25, 2016, GHD has prepared this Supplemental Investigation Work Plan for the Cold Springs Terminal Site, located along Hillside Road in Lysander, New York (Site). The purpose of this Work Plan is to collect and evaluate data to refine the remedial strategy for the Site. The Work Plan also addresses the need to replace several wells damaged/destroyed, presumably by the Site Owners and/or their contractors and agents, during aboveground storage tank (AST) removal activities on the Southern Terminal (ST) portion of the Site.

Activities within this Work Plan include:

- Repair/replacement and installation monitoring infrastructure
- Additional data collection activities required to refine the remedial approach and finalize remedial system design
- Light non-aqueous phase liquid (LNAPL) recovery activities
- Submission of a Revised Remedial Action Work Plan (RAWP)

2. Background

The Cold Springs Terminal Site is comprised of three former Petroleum Bulk Storage (PBS) facilities on Hillside Road in the Town of Lysander, Onondaga County, New York. A Site Location Map is provided as Figure 1. A Site Map is included as Figure 2. The terminal occupies approximately 6 total acres, with the Northern Terminal (NT) consisting of 2.75 acres north of Hillside Road, and the Southwestern and Southeastern Terminals, collectively the ST, consisting of approximately 1.75 and 1.6 acres, respectively.

Throughout their operational histories, the facilities handled gasoline, Jet-A fuel, kerosene, diesel, and fuel oil. NYSDEC-mandated environmental activities were initiated following a 1989 spill of an unknown volume of gasoline; however, other spills have been documented. Multiple investigations have occurred during the Site's regulatory history. Historical remedial actions at the Site have included manual and automated LNAPL recovery as well as soil vapor extraction (SVE). These activities were performed adjacent to Hillside Road beneath the southernmost portion of the NT, and in northern portions of the ST properties. Reportedly, over an 18-year period between 1990 and 2008 (prior to the involvement of these Respondents in the response activities at the Site), an estimated 12,800 gallons of LNAPL was removed from Site as liquid and soil vapor (GES, 2015).

In compliance with the NYSDEC-approved Supplemental Site Investigation Work Plan (2012), AECOM performed various Site investigations on the ST properties to determine viability of vacuum-enhanced groundwater extraction (VEGE) and multi-phase extraction (MPE) remedial alternatives for residual LNAPL at the Site (2014). Based on the results of the pilot test, GES (2015) prepared a RAWP for VEGE at approximately 40 groundwater extraction points located on the ST and southern portion of the NT properties.

In June 2019 and pursuant to authorization from NYSDEC, GHD performed a limited Monitoring Well Assessment and LNAPL Gauging Event (GHD, 2019). The purpose of GHD's evaluation was to assess the Site and current monitoring well network conditions. While the majority of NT wells were located, only 49 of the 84 anticipated monitoring wells on the ST property were located. Of those, four monitoring wells could not be gauged as a result of damage and an additional nine wells were observed to be in poor condition. Overall, LNAPL was measured in thicknesses varying from approximately 0.01 feet at S5 to 3.48 feet at A10. The apparent extent of LNAPL is generally consistent with historical observations; however, monitoring wells in several areas of historically observed LNAPL could not be located and/or gauged. As such, GHD has identified a number of monitoring wells for replacement or repair. Summaries of monitoring well conditions and LNAPL measurements collected during the event are included as Tables 1 and 2 and are presented on Figures 3 and 4, respectively.

A follow-up conference call between NYSDEC, GHD, and ST was held on September 11, 2019. At that time, NYSDEC requested that LNAPL recovery begin during 2019. As such, GHD has proposed the installation of recovery wells and vacuum-enhanced fluid recovery (VEFR) events (Section 4.0).

3. Objectives

The objectives of this Supplemental Investigation Work Plan are to collect additional data sufficient to refine the engineering design for the NYSDEC-approved RAWP.

4. Scope of Work

The following sections summarize the Scope of Work for this Supplemental Investigation Work Plan. The investigation is broken into three phases based on field investigation/monitoring infrastructure installation, data collection, and additional remedial activities.

Section 4.1 includes information regarding repair/replacement and installation of monitoring infrastructure required at the Site. Section 4.2 summarizes preliminary additional data collection activities required to refine the remedial approach for the Site and finalize remedial system design. Section 4.3 summaries LNAPL recovery activities and submission of the Revised RAWP.

All activities will be conducted in accordance with NYSDEC *DER-10/Technical Guidance for Site Investigation and Remediation* (DER-10). NYSDEC will be provided with at least one week verbal and written notice of all field activities.

4.1 Phase I

4.1.1 Monitoring Well Repair and Replacement

GHD will repair three ST monitoring wells (A3, A12, A14) identified as damaged during 2019 monitoring well assessment activities. A total of ten nested monitoring well pair locations will be installed in central portions of the Southwestern and Southeastern terminals intended to replace remedial system performance wells (as identified in the NYSDEC-approved RAWP) and/or monitoring wells that historically contained greater than 1 foot of LNAPL that could not be located or were determined to be heavily damaged during the 2019 monitoring well assessment. These wells will also be used to fill in data gaps regarding LNAPL distribution. Five large-diameter wells will be installed for use in conjunction with LNAPL recovery activities.

Prior to initializing any subsurface intrusive activities, GHD or its drilling vendor will complete a New York State One-Call utility mark out to prevent accidental damage to underground utilities. GHD will retain a New York State Licensed drilling contractor to advance soil borings for monitoring and recovery well installation via hollow-stem auger (HSA). Borings will be continuously sampled via MacroCore and disposable acetate sleeves for geologic logging and screening purposes. Each sample will be screened for the presence of volatile organic compounds (VOCs) utilizing a photoionization detector (PID) equipped with a 10.6 eV lamp calibrated to 100 parts per million (ppm) by volume of isobutylene. Borings for monitoring well installation will be advanced to the top of the till layer that underlays the Site at a depth of approximately 20 feet; borings intended for installation of LNAPL recovery wells will be advanced to 12 to 15 feet bgs based on observations of LNAPL and the groundwater table at each location.

Upon completion of soil boring, each boring will be converted to a groundwater monitoring well or LNAPL recovery well. Newly installed monitoring well pairs will be constructed of 2-inch schedule 40 polyvinyl chloride (PVC). Deep wells in the pair will be screened across the gravel layer identified in historical reports as located immediately above the glacial till, e.g., 17 to 20 feet below ground surface (bgs). Shallow monitoring wells will be screened across the groundwater table observed at each boring location,

e.g., 5 to 15 feet bgs. Screens will be 0.010-inch slotted (10-slot) well screen. Annular space will be backfilled with #00N sand, bentonite, and grout to the surface. Each well will be fitted with a locking J-plug and finished at the surface with flush-mount well boxes. Nested well pairs will allow the ST Group to evaluate flow patterns and groundwater conditions in different lithological zones as opposed to wells that are screened across multiple zones. Information from wells screened in the gravel zone will also be of assistance in determining if reinjection of extracted and treated groundwater is a viable option during operation of the VEGE system.

Recovery wells will be constructed of a minimum of 6-inch schedule 80 PVC with 10 feet of 10-slot screen spanning the water table and LNAPL zone. Annular space will be backfilled with #00N sand to the top of the well screen, followed by a minimum of one foot of bentonite, and grouted to the surface. Each recovery well will be finished at the surface with a flush-mount well box or manhole, dependent on well size.

Newly installed monitoring and recovery wells will be developed prior to use for sample collection no earlier than 24 hours following installation. A submersible pump will be used to purge each well until temperature, conductivity, pH, and turbidity of the purge water have stabilized as measured on a Yellow Spring Instrument (YSI) water quality meter or similar equipment. Existing wells which may be utilized as part of the monitoring network in the future will also be re-developed.

Investigation-derived waste (IDW) generated during monitoring/recovery well installation will be containerized for characterization and off-Site disposal. Consumable IDW will be disposed of as municipal waste.

A summary of proposed monitoring and recovery wells to be installed is included as Figure 5. Recovery wells on the Southeastern Terminal are contingent on field observations and determinations; however, 2-inch PVC monitoring wells will be installed, at a minimum.

4.1.2 Soil Gas Probe Installation

To facilitate an assessment of deep soil gas concentrations and to support quantification of natural mass losses via vapor losses (both hydrocarbons and biogenic gases) in the subsurface both shallow and deep soil gas probes will be installed on the Southern Terminal property.

A direct-push rig will be utilized to advance up to four soil borings to approximately 2 feet above the LNAPL layer for deep soil gas probe installation. Deep soil gas probes will be constructed utilizing a 6-inch stainless steel soil gas insert with poly tubing to surface. Up to a 1-foot sand pack will be placed around and above the screen, followed by at least 1 foot of bentonite and grout to surface. Up to four additional shallow soil probes will be installed to approximately 1 foot bgs utilizing a 6-inch stainless steel soil gas insert and poly tubing to surface. A 6-inch sand pack will be placed to the top of the screen, followed by bentonite to surface. Each soil gas probe will be finished at the surface with a flush-mount well box. Proposed soil gas probe locations are shown on Figure 6. Soil gas probes on the Southeastern Terminal are contingent on field observations and determinations.

4.1.3 Monitoring Well Survey

Following monitoring well repair and replacement, GHD will retain a New York State Licensed Surveyor to complete a survey of all monitoring wells located on both the NT and ST properties. GHD has reviewed several historical reports for survey data for existing monitoring wells, however conflicting information exists across multiple reports, and the recent demolition activities have changed topographic data such that a full survey is warranted. Survey data will be used to calculate groundwater elevation data for use in Site potentiometric surface contours.

4.2 Phase II

4.2.1 Groundwater and LNAPL Gauging

Approximately two weeks following completion of monitoring well replacement/repair to allow wells to reach equilibrium, a comprehensive groundwater elevation and LNAPL gauging event will be completed. All wells on both the NT and ST will be included in this event. The gauging event will consist of recording the depth to the LNAPL surface (as applicable), depth to the water surface, and total depth of the well using an interface probe. Down-well equipment will be decontaminated between each well location utilizing an Alconox-water solution and tap water rinse.

4.2.2 Groundwater Sample Collection

In order to design a remedial system that will perform most efficiently, more data is required to determine the current flux of constituents of concern (COCs) entering the ST. Groundwater samples will be collected from NT monitoring wells BMW-5, BMW-12, BMW-13, BMW-14R, and piezometer PZ-102S for VOCs by United States Environmental Protection Agency (USEPA) Method 8260, semi-volatile organic compounds (SVOCs) by USEPA Method 8270, and lead via USEPA Method 6010.

In addition, groundwater samples from four to eight groundwater monitoring wells will be collected to evaluate natural source zone depletion (NSZD) on the ST portion of the Site. The monitoring wells will be chosen in source, up- and down-gradient, and cross-gradient areas based on results of the gauging event. If monitoring/recovery wells to be sampled contain LNAPL at the time of the groundwater sample collection, the wells will be bailed of product and allowed to recover. Low-flow sample methodology will be utilized to minimize water table drawdown and potential for free product in samples. Wells will be purged until field parameters of temperature, pH, conductivity, redox potential, and dissolved oxygen stabilize to within 10 percent of the previous reading for three consecutive readings as measured on a YSI (or similar). Measurements will be recorded on a monitoring well sampling log. Samples collected for NSZD evaluation will be analyzed for VOCs by USEPA Method 8260, SVOCs by USEPA Method 8270, total organic carbon, Fe^{2+}, Fe^{3+}, sulfate, sulfide, nitrate, dissolved methane, dissolved carbon dioxide, and petroleum degrader microbe count.

All groundwater samples will be submitted to a New York State Department of Health (NYSDOH) Environmental Laboratory Accreditation Program (ELAP)-certified laboratory for analysis under

Chain-of-Custody procedures. IDW will be containerized for later off-Site disposal. Consumable IDW will be disposed of as municipal waste.

4.2.3 Hydraulic Conductivity Testing

Single-well hydraulic conductivity estimates will be obtained for NT wells BMW-12, BMW-13, and BMW-14R and at two to three newly installed deep nested monitoring wells (gravel zone) on the ST via slug tests. A known volume of water will be displaced in the well by inserting a PVC slug and the water level decline will be measured using a down-hole pressure transducer. Following equilibration, the slug will be removed and the water level rise in the well will be monitored. Multiple slug tests may be conducted in multiple wells to support analysis of data. Slug test displacement and recovery data will be analyzed using AQTESOLV (or similar) software to yield estimates of hydraulic conductivity in each well.

4.2.4 LNAPL Baildown Tests

To support the assessment of LNAPL mobility and recoverability at the site, LNAPL baildown tests will be conducted to determine LNAPL transmissivities in wells in the LNAPL zone. Wells to be tested will be determined following the comprehensive gauging event and will be focused in the area of future VEGE implementation. LNAPL baildown tests will be conducted in compliance with the American Petroleum Institute (API) LNAPL Transmissivity Workbook (2016). Data obtained during baildown tests will be utilized to calculate LNAPL transmissivities for use in system design.

4.2.5 Soil Gas Sample Collection

Soil gas samples will be collected from shallow and deep soil gas probes installed during Phase I of the Supplemental Investigation for NSZD evaluation. Soil gas probes will be purged of three volumes prior to sample collection. Samples will be collected over a one-hour period using individually certified-clean 6-liter Summa® canisters equipped with pre-calibrated flow controllers. The initial vacuum of each Summa® canister will be recorded immediately after opening; the final vacuum immediately prior to closure. Samples will be transported to a NYSDOH ELAP-certified laboratory for analysis of oxygen, carbon dioxide, methane, ethane, VOCs via USEPA Method TO-15, and total petroleum hydrocarbons (PHCs).

4.3 Phase III

4.3.1 LNAPL Recovery

As part of this Supplemental Investigation, ST Group will conduct LNAPL recovery activities at the Site. Based on results obtained during the comprehensive LNAPL and groundwater gauging event discussed in Section 4.2.1, the ST will utilize a subcontractor to perform a minimum of one VEFR event at each of the five newly installed recovery wells (to the extent they demonstrate a significant LNAPL thickness) utilizing a vac-truck. The necessity for additional VEFR events will be determined by weekly gauging at recovery wells within the source area.

LNAPL and water recovered will be transported off-Site for treatment and disposal or recycling.

4.3.2 Revised Remedial Action Work Plan

Upon completion of Phases I and II, a Revised RAWP for NYSDEC approval will be prepared. The Revised RAWP will be submitted to NYSDEC on or before January 17, 2020, based on contractor availability to complete tasks as proposed in this Supplemental Investigation Work Plan.

5. Implementation Schedule

A revised project schedule is included as Attachment A.

6. References

AECOM, 2014. *Pilot Test Summary Report, Cold Springs Terminals, Lysander, New York, NYSDEC Spill #: 89-04923.*

American Petroleum Institute (API), 2016. *API LNAPL Transmissivity Workbook: A Tool for Baildown Test Analysis*.

GHD, 2019. *Monitoring Well Assessment and LNAPL Gauging Event Letter Report, Southern Terminals, Cold Springs Terminal Site, Hillside Road, Lysander, New York.*

Groundwater & Environmental Services, Inc. (GES), 2015. *Remedial Action Work Plan, Cold Springs Terminal, Lysander, New York, NYSDEC Spills Incident #89-04923*.

Please do not hesitate to contact us with questions or if additional information is needed.

Sincerely,

GHD

Alyssa Cruikshank

DJH/eew/2

Encl.

Figure 1 – Site Location Map
Figure 2 – Site Map
Figure 3 – 2019 Well Assessment Summary
Figure 4 – Apparent LNAPL Thickness – June 6-7, 2019
Figure 5 – Proposed Monitoring and Recovery Well Locations
Figure 6 – Proposed Soil Gas Probe Locations
Table 1 – Monitoring Well Assessment Status

Table 2 – Apparent LNAPL Thicknesses
Attachment A – Project Schedule

cc: Patrick Dworaczyk, Kinder Morgan
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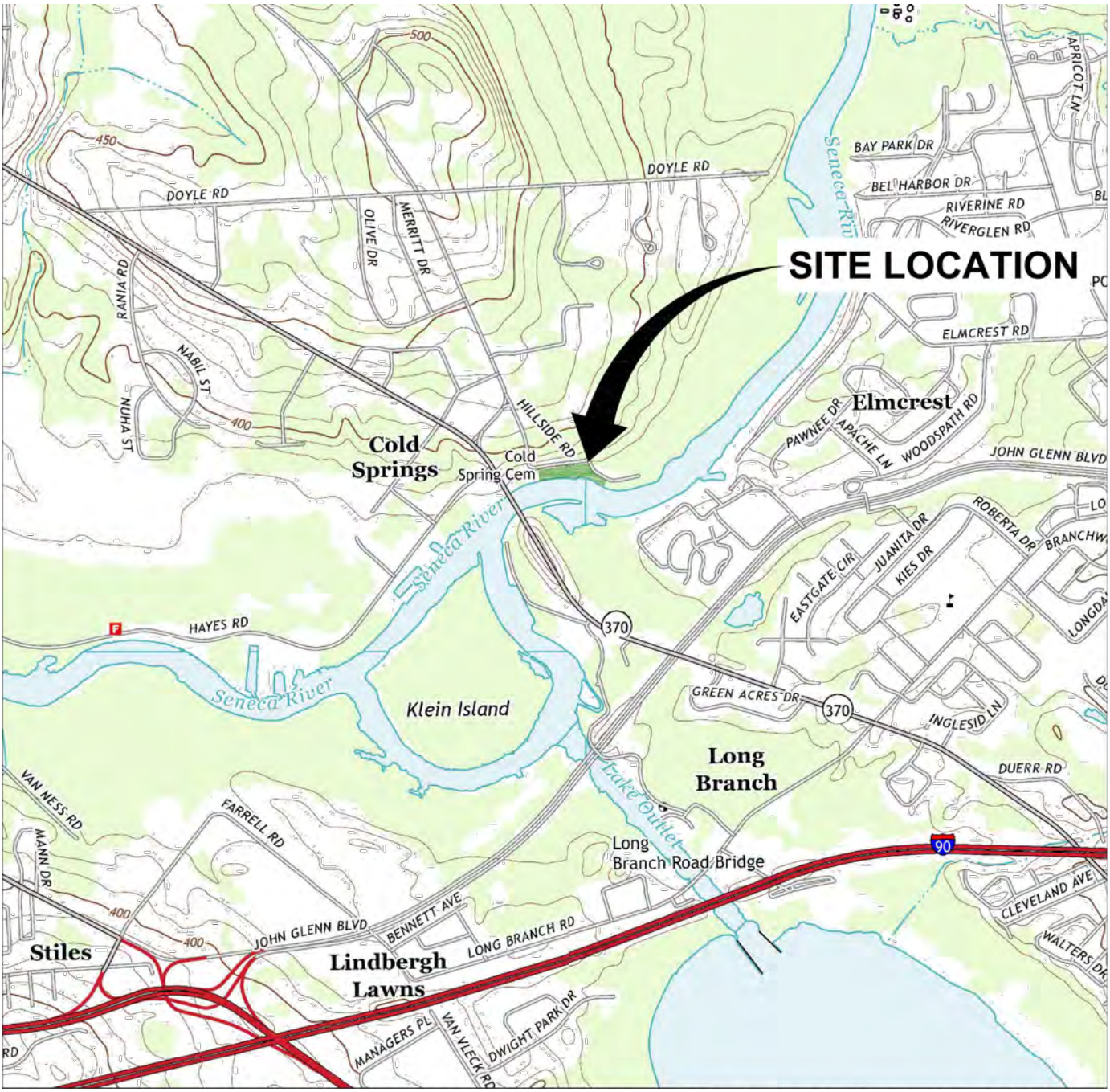
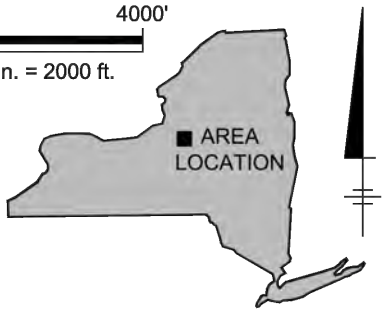
Ben Conlon, Esq., NYSDEC
Wendy Marsh, Esq., Hancock Estabrook, LLP
S. David Devaprasad, Esq., Devaprasad pllc
Dennis Hoyt, GHD



REFERENCE: BASE MAP USGS 7.5. MIN. TOPO. QUAD., BALDWINSVILLE, BREWERTON, CAMILLUS & SYRACUSE WEST, NY, 2013.

0 2000' 4000'

Approximate Scale: 1 in. = 2000 ft.



NEW YORK

2019Q1-Title Block

SOUTHERN TERMINALS GROUP
COLD SPRINGS TERMINAL SITE
HILLSIDE ROAD, LYSANDER, NEW YORK

SITE LOCATION MAP

Project No. 111-37172
Report No. 002
Date SEP 19

FIGURE 1

Filename: N:\US\Buffalo\Legacy\Drawings-NIA\Drawings\10000000s\11137172 - Cold Springs\Report 2\CADD\Drawings\Figures\Report Figures\11137172 - Figures.dwg
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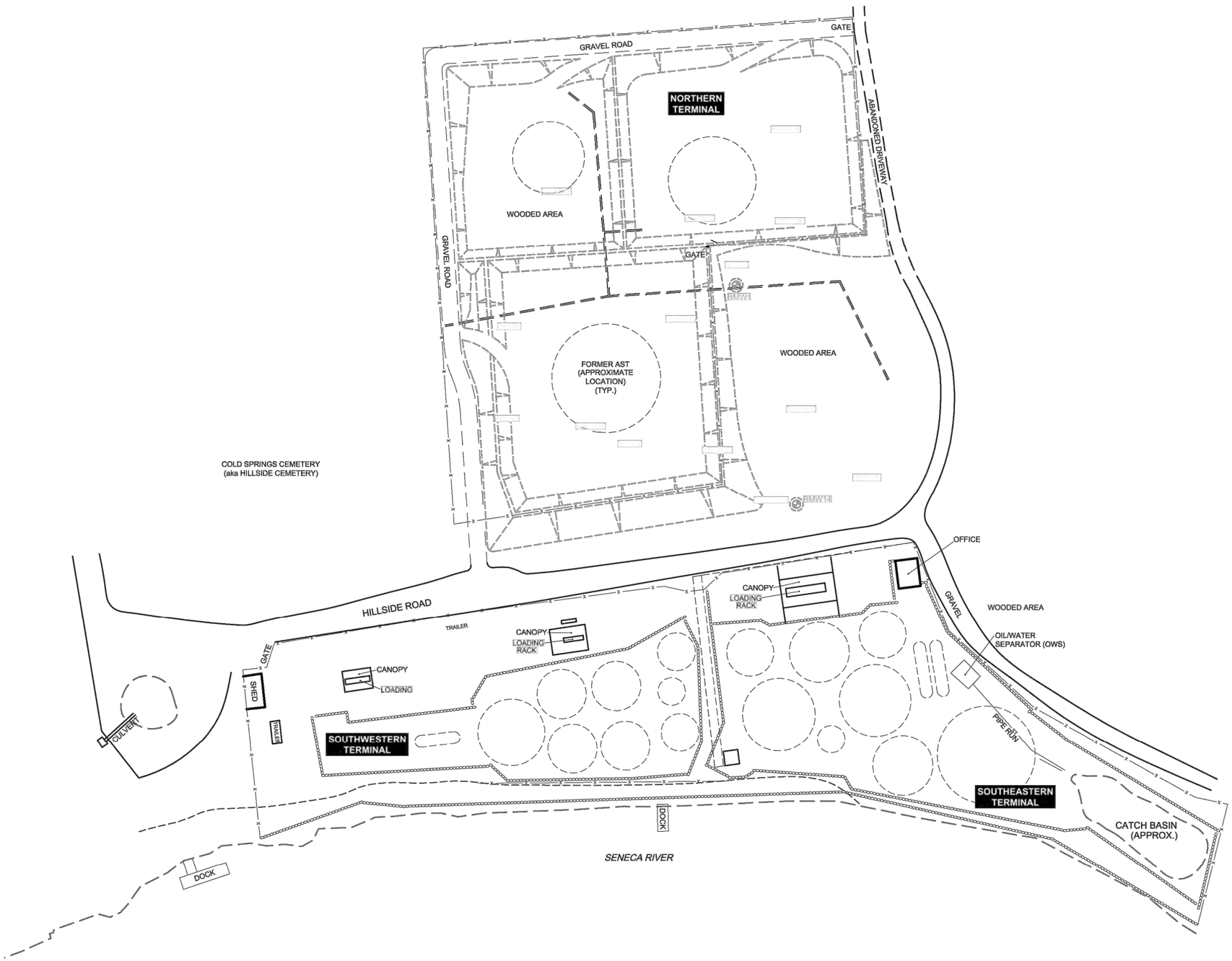

N

0 100'

SOUTHERN TERMINALS GROUP
COLD SPRINGS TERMINAL SITE
HILLSIDE ROAD, LYSANDER, NEW YORK

SITE MAP

Project No. 111-37172
Report No. 002
Date SEP 19

FIGURE 2

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LEGEND

BMW2 MONITORING WELL

WELL ASSESSMENT SUMMARY

- WELL FOUND, GOOD CONDITION, GAUGED
- WELL FOUND, GOOD CONDITION, NOT GAUGED
- WELL FOUND, POOR CONDITION, GAUGED
- WELL FOUND, DAMAGED, NOT GAUGED
- WELL NOT FOUND

NOTE:

1. THERE ARE TWO A6 SHOWN ON FIGURE

N

0 100'

GHD

SOUTHERN TERMINALS GROUP
COLD SPRINGS TERMINAL SITE
HILLSIDE ROAD, LYSANDER, NEW YORK

WELL ASSESSMENT SUMMARY

Project No. 111-37172
Report No. 002
Date SEP 19

FIGURE 3

Filename: N:\US\Buffalo\Legacy\Drawings-NIA\Drawings\10000000s\11137172 - Cold Springs\Report 2\CADD\Drawings\Figures\Report Figures\11137172 - Figures.dwg
Plot Date: 30 September 2019 - 2:20 PM

LEGEND

BMW2	MONITORING WELL
BMW1	MONITORING WELL NOT FOUND
3.33	LNAPL THICKNESS

LNAPL THICKNESS IN FEET

- 0-1
- 1-2
- 2-3
- 3-4

NOTE:

1. THERE ARE TWO A6 SHOWN ON FIGURE

N

0 100'

GHD

SOUTHERN TERMINALS GROUP
COLD SPRINGS TERMINAL SITE
HILLSIDE ROAD, LYSANDER, NEW YORK

APPARENT LNAPL THICKNESS
JUNE 6-7, 2019

Project No. 111-37172
Report No. 002
Date SEP 19

FIGURE 4

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LEGEND

BMW2	MONITORING WELL
BMW1	MONITORING WELL NOT FOUND / HEAVILY DAMAGED
A12	MONITORING WELL TO BE REPAIRED
	PROPOSED NESTED MONITORING WELL LOCATION
	PROPOSED RECOVERY WELL LOCATION

N

0 100'

GHD

SOUTHERN TERMINALS GROUP
COLD SPRINGS TERMINAL SITE
HILLSIDE ROAD, LYSANDER, NEW YORK

PROPOSED MONITORING WELL AND RECOVERY WELL LOCATIONS

Project No. 111-37172
Report No. 002
Date SEP 19

FIGURE 5

Filename: N:\US\Buffalo\Legacy\Drawings-NIA\Drawings\10000000s\11137172 - Cold Springs\Report 2\CADD\Drawings\Figures\Report Figures\11137172 - Figures.dwg
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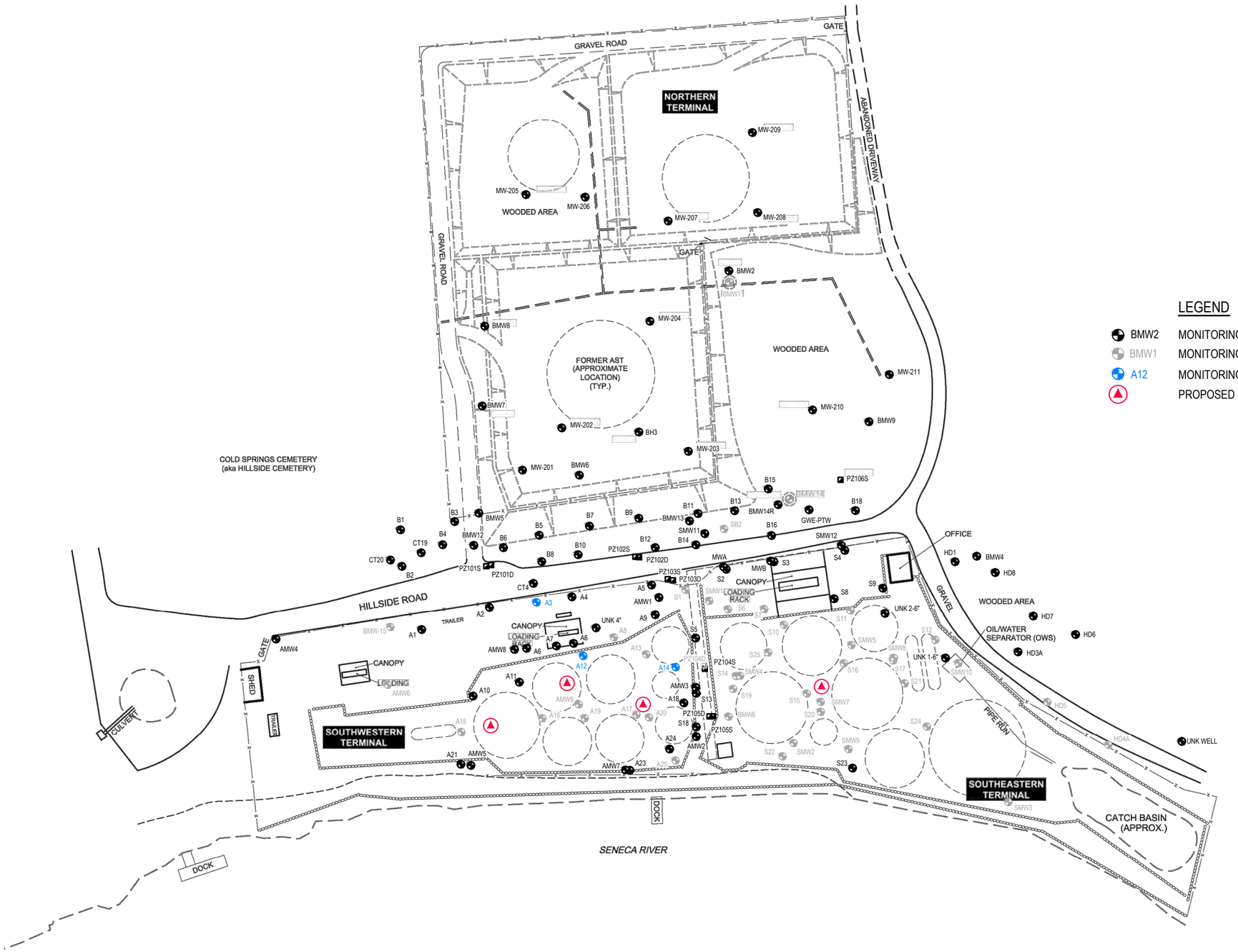

LEGEND

BMW2	MONITORING WELL
BMW1	MONITORING WELL NOT FOUND / HEAVILY DAMAGED
A12	MONITORING WELL TO BE REPAIRED
	PROPOSED SOIL GAS PROBE LOCATIONS

N

0 100'

GHD

SOUTHERN TERMINALS GROUP
COLD SPRINGS TERMINAL SITE
HILLSIDE ROAD, LYSANDER, NEW YORK

PROPOSED SOIL GAS PROBE LOCATIONS

Project No. 111-37172
Report No. 002
Date SEP 19

FIGURE 6

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Table 1

Monitoring Well Assessment Status
Southern Terminal
Lysander, New York
June 5 - 7, 2019

Southern Terminals				Northern Terminals			
	Well Located		Poor Condition/		Well Located		Poor Condition/
Monitoring Well ID	Y	N	Damaged	Monitoring Well ID	Y	N	Damaged
A1	X			B1	X		
A2	X			B2	X		
A3	X		Y	B3	X		
A4	X			B4	X		
A5	X		Y	B5	X		
A6	X			B6	X		
A6	X			B7	X		
A7	X			B8	X		
A8[1]		X		B9	X		
A9	X			B10	X		
A10	X			B11	X		
A11	X		Y	B12	X		
A12	X		Y	B13	X		
A13	X		Y	B14	X		
A14	X		Y	B15	X		
A15[1]		X		B16	X		
A16[1]		X		B18	X		
A17[1]		X		BH3	X		
A18	X			BMW1	X		
A19[1]		X		BMW2	X		
A20[1]		X		BMW4	X		
A21	X			BMW5	X		
A23	X			BMW6	X		
A24	X		Y	BMW7	X		
A25	X		Y	BMW8	X		
AMW1	X		Y	BMW9	X		
AMW2	X		Y	BMW12	X		
AMW3	X			BMW13	X		
AMW4	X			BMW14	X		
AMW5	X			CT19	X		
AMW6[1]		X		CT20	X		
AMW7	X			GWE-PTW	X		
AMW8	X		Y	HD1	X		
AMW9[1]		X		HD3A	X		
BMW6[1]		X		HD6	X		
BMW-15[1]		X		HD7	X		
CT4	X		Y	HD8	X		
HD4A[1]		X		MW-201	X		
HD5[1]		X		MW-202	X		
MWA	X			MW-203	X		
MWB	X			MW-204	X		
PZ102D	X			MW-205	X		
PZ102S	X			MW-206	X		
PZ103D	X			MW-207	X		
PZ103S	X			MW-208	X		
PZ104D[1]		X		MW-209	X		
PZ104S	X		Y	MW-210	X		

Table 1

Monitoring Well Assessment Status
Southern Terminal
Lysander, New York
June 5 - 7, 2019

Monitoring Well ID	Southern Terminals Well Located Y	Southern Terminals Well Located N	Poor Condition/ Damaged	Monitoring Well ID	Northern Terminals Well Located Y	Northern Terminals Well Located N	Poor Condition/ Damaged
PZ105D	X		Y	MW-211	X		
PZ105S	X			PZ101D	X		
S1	X		Y	PZ101S	X		
S2	X			PZ106S	x		
S3	X		Y	SB2[(1)]		X	
S4	X			SMW11	X		
S5	X			Unknown	X		
S6[(1)]		X					
S7[(1)]		X					
S8	X						
S9	X						
S10[(1)]		X					
S11[(1)]		X					
S12[(1)]		X					
S13	X						
S14[(1)]		X					
S15[(1)]		X					
S16[(1)]		X					
S17[(1)]		X					
S18	X						
S19[(1)]		X					
S20[(1)]		X					
S21[(1)]		X					
S22	X		Y				
S23	X		Y				
S24[(1)]		X					
S25[(1)]		X					
SMW1[(1)]		X					
SMW2[(1)]		X					
SMW3	X		Y				
SMW4[(1)]		X					
SMW5[(1)]		X					
SMW7[(1)]		X					
SMW8[(1)]		X					
SMW9[(1)]		X					
SMW10[(1)]		X					
SMW12	X						
UNKNOWN 1	X						
UNKNOWN 2	X						
UNKNOWN 3	X						

Notes:

[(1)] - Monitoring well not located

Table 2

Monitoring Well Assessment Status
Southern Terminal
Lysander, New York
June 5 - 7, 2019

Monitoring Well ID	Depth to LNAPL (feet bmp)	Depth to Water (feet bmp)	LNAPL Thickness (feet)	Well Total Depth (feet bmp)
A1	-	9.21	-	11.02
A2	-	9.47	-	12.10
A3	12.69	13.55	0.86	13.81
A4	-	DRY	-	10.60
A5	-	11.98	-	17.99
A6	-	-	-	-
A6	-	11.96	-	12.09
A7	-	11.55	-	11.74
A8[1]	-	-	-	-
A9	-	11.42	-	17.24
A10	7.96	11.44	3.48	14.11
A11	-	6.75	-	14.83
A12	6.01	7.18	1.17	13.95
A13	7.52	10.03	2.51	18.85
A14	9.13	11.52	2.39	21.62
A15[1]	-	-	-	-
A16[1]	-	-	-	-
A17[1]	-	-	-	-
A18	9.49	9.83	0.34	19.18
A19[1]	-	-	-	-
A20[1]	-	-	-	-
A21	-	8.80	-	10.33
A23	-	9.28	-	14.84
A24	-	8.15	-	13.04
A25	8.88	8.95	0.07	14.98
AMW1	-	12.11	-	15.38
AMW2[2]	-	-	-	-
AMW3	8.35	11.04	2.69	15.04
AMW4	-	DRY	-	10.19
AMW5	11.44	14.77	3.33	18.15
AMW6[1]	-	-	-	-
AMW7	-	10.38	-	16.49
AMW8	-	12.22	-	16.17
AMW9[1]	-	-	-	-
BMW6[1]	-	-	-	-
BMW-15[1]	-	-	-	-
CT4	-	14.29	-	14.39
HD4A[1]	-	-	-	-
HD5[1]	-	-	-	-
MWA	11.13	11.19	0.06	14.41
MWB	9.55	9.96	0.41	13.05
PZ102D	-	12.88	-	23.88
PZ102S	-	12.93	-	17.81
PZ103D	-	12.65	-	23.87
PZ103S	-	12.43	-	18.75
PZ104D[1]	-	-	-	-

Table 2

Monitoring Well Assessment Status
Southern Terminal
Lysander, New York
June 5 - 7, 2019

Monitoring Well ID	Depth to LNAPL (feet bmp)	Depth to Water (feet bmp)	LNAPL Thickness (feet)	Well Total Depth (feet bmp)
PZ104S	-	8.07	-	18.83
PZ105D	-	9.35	-	26.73
PZ105S	-	8.27	-	19.71
S1[2]	-	-	-	-
S2	11.14	11.71	0.57	18.22
S3	-	7.26	-	15.00
S4	-	6.68	-	10.60
S5	5.55	5.56	0.01	14.40
S6[1]	-	-	-	-
S7[1]	-	-	-	-
S8	-	6.20	-	16.63
S9	7.57	9.13	1.56	20.03
S10[1]	-	-	-	-
S11[1]	-	-	-	-
S12[1]	-	-	-	-
S13	8.19	8.66	0.47	15.19
S14[1]	-	-	-	-
S15[1]	-	-	-	-
S16[1]	-	-	-	-
S17[1]	-	-	-	-
S18	-	8.02	-	15.45
S19[1]	-	-	-	-
S20[1]	-	-	-	-
S21[1]	-	-	-	-
S22[2]	-	-	-	-
S23[2]	-	-	-	-
S24[1]	-	-	-	-
S25[1]	-	-	-	-
SMW1[1]	-	-	-	-
SMW2[1]	-	-	-	-
SMW3	-	6.84	-	17.00
SMW4[1]	-	-	-	-
SMW5[1]	-	-	-	-
SMW7[1]	-	-	-	-
SMW8[1]	-	-	-	-
SMW9[1]	-	-	-	-
SMW10[1]	-	-	-	-
SMW12	-	4.84	-	13.55
UNKNOWN 1	-	5.02	-	13.65
UNKNOWN 2	-	3.1	-	12.09
UNKNOWN 3	-	6.56	-	6.63

Notes:

(1) - Monitoring well not located

(2) - Monitoring located but not gauged due to damage

LNAPL - Light non-aqueous phase liquid

Table 2

Monitoring Well Assessment Status
Southern Terminal
Lysander, New York
June 5 - 7, 2019

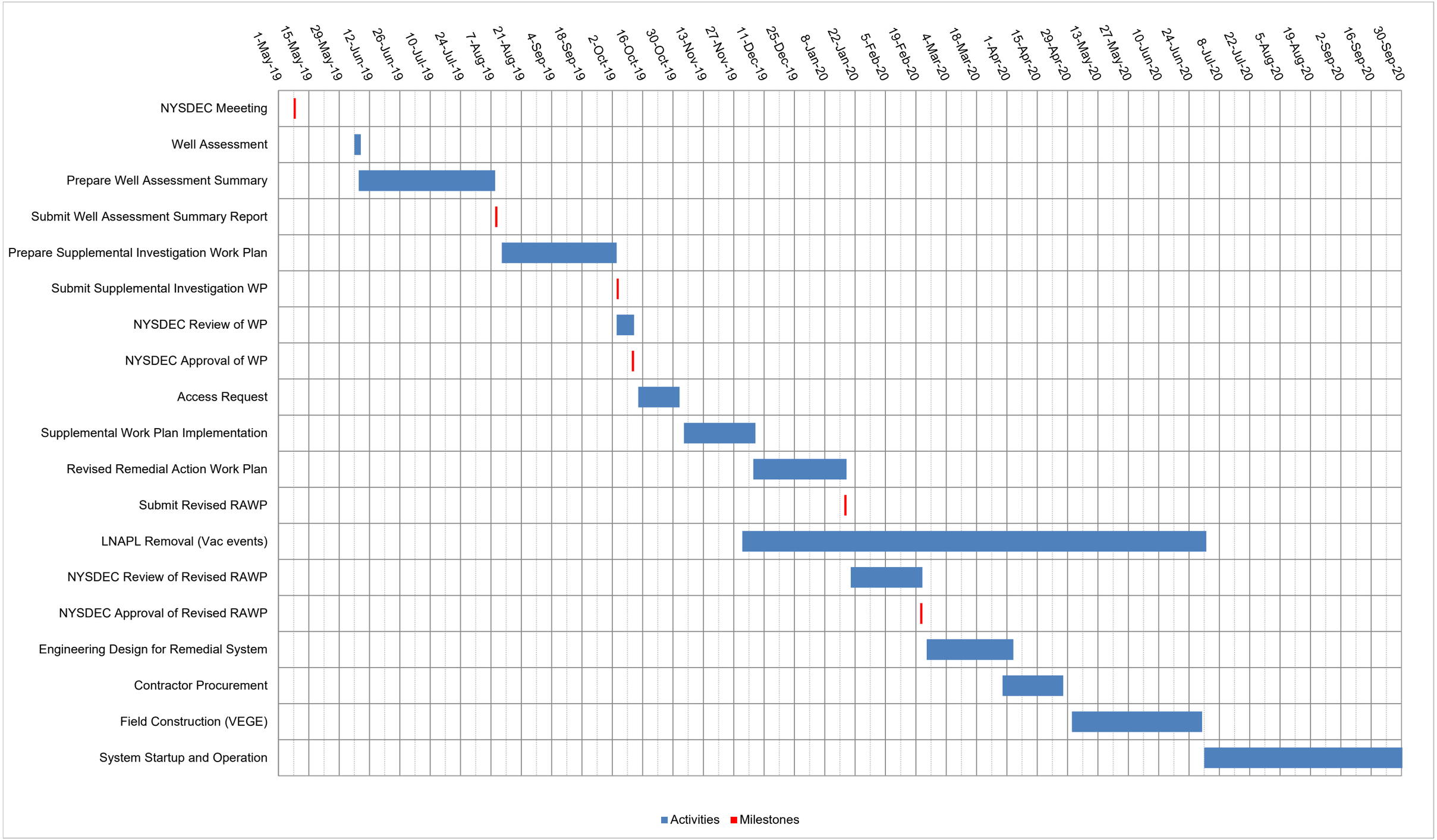
Monitoring Well ID	Depth to LNAPL (feet bmp)	Depth to Water (feet bmp)	LNAPL Thickness (feet)	Well Total Depth (feet bmp)

ft bmp - Feet below measuring point
"-" - No data available
DRY - Monitoring well dry at time of gauging event

Attachment A
Project Schedule

Southern Terminals
Cold Springs Terminal Site, Hillside Road
Lysander, New York

Project Schedule



Attachment B
Boring and Well Construction Logs

Project name:	Cold Springs - Southern Terminals	**Drilling contractor:**	**Nothnagle Drilling**	**Hole designation:**	MW-1 S/D
Project number:	11137172-15	**Driller:**	**Bryan Swartz**	**Date/Time started:**	11-11-2019 1430
Client:	Southern Terminals Group	**Surface elevation:**		**Date/Time completed:**	11-12-2019 1300
Location:	Hillside Road, Lysander, NY	**Weather (A.M.):**	**20F, Snow (11-12-2019)**	**Drilling method:**	Hollow Stem Auger (6.25")
		(P.M.):	**30F, Snow (11-11-2019)**	**GHD supervisor:**	I. McNamara

Stratigraphic Intervals (Depths in ft BGS)			**Sample Description**	**Sample Details**											
			Order of descriptors: **Soil type symbol(s) - primary component(s), (nature of deposit), secondary components, relative density/consistency, grain size/plasticity, gradation/structure, colour, moisture content,**			**Penetration Record Split Spoon Blows (Record N-Values & Recoveries)**									
From	**At**	**To**	**Note: Plasticity determination requires the addition of moisture if the sample is too dry to roll (indicate if moisture was added or not).**	**Sample Number**	**Sampling Method**	**6"**	**6"**	**6"**	**6"**	**N**	**R**	**Sample Interval**	**PID/FID (ppm)**	**Chemical Analysis**	**Grain Size/ Other Analysis**
0		5	Hand Auger	0 - 5	Hand Auger						60	0 - 1	3.4		
0		1	SM - Silty sand	5 - 9	Macrocore						36	1 - 2	10.2		
1		3.5	CL - Clay, Stiff, Brown, Wet, Gray and Orange Mottling, Increase silt and fine grained sand with depth	9 - 13	Macrocore						36	2 - 3	7.1		
3.5		5.5	SM - Silty sand, Brown, Moist	13 - 17	Macrocore						36	3 - 4	2.3		
5.5		26	SW - Very Fine and Fine Grained Sand, Compact, Dilatant, Gray-Brown with Isolated Dark Brown Staining, Odor, Sheen, Moist to Wet with Depth	17 - 20	Macrocore						36	4 - 5	3.5		
	6		Water Table	20 - 24	Macrocore						48	5 - 6	122.6		
	11		No Staining, Decreased Odors	24 - 27	Macrocore						36	6 - 7	416.7		
	20		No Sheen, Decreased Odors									7 - 8	64.5		
26		27	GW - Fine and Course Gravel, Compact, Black, Red, Brown, Wet									9 - 10	84.9		
27		27.2	GC - Clay and Silt with Fine and Course Gravel and Course Grained Sand, Hard, Red-Brown, Moist (Glacial Till)									10 - 11	54.8		
												11 - 12	66.5		
			Deep Well - Screen 25.8 - 27.3, Sand 25.0 - 27.3, Bentonite Chips (Holeplug) 15.5 - 25.0, Sand 15.0 - 15.5									13 - 14	104.7		
			Shallow Well - Screen 4.5 - 14.5, Sand 3.0 - 14.5, Bentonite Chips (Holeplug) 1.5 - 3.0, Concrete Surface Seal 0 - 1.5									14 - 15	100.0		
												15 - 16	41.1		

Notes and Comments

Depth of borehole caving _____ Depth of first groundwater encounter _____ Topsoil thickness _____
Water level in open borehole on completion _____ After _____ Hours _____
Notes: _____

Project name:	Cold Springs - Southern Terminals	**Drilling contractor:**	**Nothnagle Drilling**	**Hole designation:**	MW-1 S/D
Project number:	11137172-15	**Driller:**	**Bryan Swartz**	**Date/Time started:**	11-11-2019 1430
Client:	Southern Terminals Group	**Surface elevation:**		**Date/Time completed:**	11-12-2019 1300
Location:	Hillside Road, Lysander, NY	**Weather (A.M.):**	**20F, Snow (11-12-2019)**	**Drilling method:**	Hollow Stem Auger (6.25")
		(P.M.):	**30F, Snow (11-11-2019)**	**GHD supervisor:**	I. McNamara

Stratigraphic Intervals (Depths in ft BGS)			Sample Description	Sample Details											
			Order of descriptors: **Soil type symbol(s) - primary component(s), (nature of deposit), secondary components, relative density/consistency, grain size/plasticity, gradation/structure, colour, moisture content,**			Penetration Record Split Spoon Blows (Record N-Values & Recoveries)									
From	**At**	**To**	**Note: Plasticity determination requires the addition of moisture if the sample is too dry to roll (indicate if moisture was added or not).**	**Sample Number**	**Sampling Method**	**6"**	**6"**	**6"**	**6"**	**N**	**R**	**Sample Interval**	**PID/FID (ppm)**	**Chemical Analysis**	**Grain Size/ Other Analysis**
												17 - 18	72.2		
												18 - 19	54.4		
												19 - 20	104.7		
												20 - 21	58.5		
												21 - 22	44.3		
												22 - 23	86.5		
												23 - 24	2.9		
												24 - 25	16.2		
												25 - 26	0.7		
												26 - 27	0.5		

Notes and Comments

Depth of borehole caving _____ Depth of first groundwater encounter _____ Topsoil thickness _____

Water level in open borehole on completion _____ After _____ Hours _____

Notes: _____

Project name:	Cold Springs - Southern Terminals	**Drilling contractor:**	**Nothnagle Drilling**	**Hole designation:**	MW-2 S/D
Project number:	11137172-15	**Driller:**	**Bryan Swartz**	**Date/Time started:**	11-11-2019 0845
Client:	Southern Terminals Group	**Surface elevation:**		**Date/Time completed:**	11-11-2019 1300
Location:	Hillside Road, Lysander, NY	**Weather (A.M.):**	**32F, Overcast**	**Drilling method:**	Hollow Stem Auger (6.25")
		(P.M.):	**32F, Overcast**	**GHD supervisor:**	I. McNamara

Stratigraphic Intervals (Depths in ft BGS)			**Sample Description**	**Sample Details**											
			Order of descriptors: **Soil type symbol(s) - primary component(s), (nature of deposit), secondary components, relative density/consistency, grain size/plasticity, gradation/structure, colour, moisture content,**			**Penetration Record Split Spoon Blows (Record N-Values & Recoveries)**									
From	**At**	**To**	**Note: Plasticity determination requires the addition of moisture if the sample is too dry to roll (indicate if moisture was added or not).**	**Sample Number**	**Sampling Method**	**6"**	**6"**	**6"**	**6"**	**N**	**R**	**Sample Interval**	**PID/FID (ppm)**	**Chemical Analysis**	**Grain Size/ Other Analysis**
0		5	Hand Auger	0 - 5	Hand Auger						60	0 - 1	0.2		
0		0.5	SW - Fine and Medium Grained Sand, Loose, Brown, Moist	5 - 9	Macrocore						36	1 - 2	170.8		
0.5		4	CL - Clay, Firm, Brown with Gray Mottling, Moist, Odors, Increase Silt with Depth	9 - 13	Macrocore						30	2 - 3	459.2		
4		5.5	SM - Silty Sand, Very Fine and Fine Grained Sand, Compact, Brown, Moist, Odors	13 - 17	Macrocore						36	3 - 4	743.4		
5.5		25	SW - Very Fine and Fine Grained Sand, Compact, Gray Brown, Wet, Odors, Trace Silt	17 - 21	Macrocore						48	4 - 5	717.8		
	6		Water Table	20 - 24	Macrocore						48	5 - 6	779.9		
	7		Brown, Dilatant	24 - 28	Macrocore						24	6 - 7	726.2		
	15		Dilatant, Loose when Shaken									7 - 8	729		
17		21	Weight of Rods/Hammer to Advance Sampler 4'									9 - 10	124.3		
25		26	GW - Fine and Coarse Gravel with Fine, Medium, and Coarse Grained Sand, Compact, Subrounded Gravel, Black/Brown/Red, Wet, Slight Odor									10 - 11	105.9		
26			Glacial Till - Hard, Reddish-Brown with Rusty Orange Mottling, Moist									11 - 11.5	173.9		
			Deep Well - Screen 24.9 - 26.4, Sand 24.0 - 26.4, Bentonite Chips (Holeplug) 15.5 - 24.0, Sand 15.0 - 15.5									13 - 14	62.1		
			Shallow Well - Screen 3.8 - 13.8, Sand 3.0 - 13.8, Bentonite Chips (Holeplug) 1.5 - 3.0, Concrete Surface Seal 0 - 1.5									14 - 15	122.7		
												15 - 16	87.9		

Notes and Comments

Depth of borehole caving _____ Depth of first groundwater encounter _____ Topsoil thickness _____
Water level in open borehole on completion _____ After _____ Hours _____
Notes: _____

Project name:	Cold Springs - Southern Terminals	**Drilling contractor:**	**Nothnagle Drilling**	**Hole designation:**	MW-2 S/D
Project number:	11137172-15	**Driller:**	**Bryan Swartz**	**Date/Time started:**	11-11-2019 0845
Client:	Southern Terminals Group	**Surface elevation:**		**Date/Time completed:**	11-11-2019 1300
Location:	Hillside Road, Lysander, NY	**Weather (A.M.):**	**32F, Overcast**	**Drilling method:**	Hollow Stem Auger (6.25")
		(P.M.):	**32F, Overcast**	**GHD supervisor:**	I. McNamara

Stratigraphic Intervals (Depths in ft BGS)			**Sample Description**	**Sample Details**											
			Order of descriptors: **Soil type symbol(s) - primary component(s), (nature of deposit), secondary components, relative density/consistency, grain size/plasticity, gradation/structure, colour, moisture content,**			**Penetration Record Split Spoon Blows (Record N-Values & Recoveries)**									
From	**At**	**To**	**Note: Plasticity determination requires the addition of moisture if the sample is too dry to roll (indicate if moisture was added or not).**	**Sample Number**	**Sampling Method**	**6"**	**6"**	**6"**	**6"**	**N**	**R**	**Sample Interval**	**PID/FID (ppm)**	**Chemical Analysis**	**Grain Size/ Other Analysis**
												17 - 18	84.3		
												18 - 19	131.2		
												19 - 20	237.4		
												20 - 21	255.5		
												21 - 22	230.7		
												22 - 23	152.5		
												23 - 24	27.2		
												24 - 25	11.4		
												25 - 26	6.4		

Notes and Comments

Depth of borehole caving _____ Depth of first groundwater encounter _____ Topsoil thickness _____

Water level in open borehole on completion _____ After _____ Hours _____

Notes: _____

Project name:	Cold Springs - Southern Terminals	**Drilling contractor:**	**Nothnagle Drilling**	**Hole designation:**	MW-3 S/D
Project number:	11137172-15	**Driller:**	**Bryan Swartz**	**Date/Time started:**	11-7-2019 0800
Client:	Southern Terminals Group	**Surface elevation:**		**Date/Time completed:**	11-7-2019 1500
Location:	Hillside Road, Lysander, NY	**Weather (A.M.):**	**42F, Overcast**	**Drilling method:**	Hollow Stem Auger (6.25")
		(P.M.):	**38F, Showers**	**GHD supervisor:**	I. McNamara

Stratigraphic Intervals (Depths in ft BGS)			**Sample Description**	**Sample Details**											
			Order of descriptors: **Soil type symbol(s) - primary component(s), (nature of deposit), secondary components, relative density/consistency, grain size/plasticity, gradation/structure, colour, moisture content,**			**Penetration Record Split Spoon Blows (Record N-Values & Recoveries)**									
From	**At**	**To**	**Note: Plasticity determination requires the addition of moisture if the sample is too dry to roll (indicate if moisture was added or not).**	**Sample Number**	**Sampling Method**	**6"**	**6"**	**6"**	**6"**	**N**	**R**	**Sample Interval**	**PID/FID (ppm)**	**Chemical Analysis**	**Grain Size/ Other Analysis**
0		5	Hand Auger	0 - 5	Hand Auger						60	0 - 1	0.8		
0		0.67	CL - Silty Clay, Firm, Brown, Moist, Odors	5 - 9	Macrocore						48	1 - 2	1.5		
0.67		2.5	SM - Silty Sand, Fine Grained Sand, Compact, Brown, Moist, Odors, Trace Clay	9 - 13	Macrocore						24	2 - 3	57.5		
2.5		4.8	CL - Clay, Stiff, Brown, Moist, Slight Odor, Trace Silt, Fine Grained Sand, and Fine Gravel	13 - 17	Macrocore						36	3 - 4	134.3		
4.8		5.1	SW - Fine Grained Sand with Silt, Compact, Brown, Moist, Slight Odor, Trace Clay	17 -20	Macrocore						36	4 - 5	50.7		
5.1		8	CL - Clay, Firm, Gray Brown, Moist, Slight Odors, Trace Silt	20 - 24	Macrocore						48	5 - 6	117.2		
	7.5		Water Table	24 - 28	Macrocore						12	6 - 7	49.4		
8		9.4	CL - Silty Clay, Firm, Gray Brown, Wet, Odors	28 - 31	Macrocore						12	7 - 8	73.6		
9.4		13.5	SW - Very Fine and Fine Grained Sand, Some Silt, Compact, Brown, Wet, Dilatant, Slight Odor									8 - 9	165.4		
13.5		27	SW - Very Fine and Fine Grained Sand, Compact, Brown, Wet, Dilatant, Slight Odor, Trace Silt									9 - 10	16.8		
			24 - 27' - Weight of rods/hammer advanced sampler									10 - 11	11.9		
27		29	GW - Fine Gravel and Fine, Medium, and Coarse Grained Sand, Compact, Black/Brown/Red, Wet, Slight Odor, Trace Coarse Gravel									13 - 14	9.0		
			Deep Well - Screen 26.2 - 29.2, Sand 25.5 - 29.2, Bentonite Chips (Holeplug) 16.5 - 25.5, Sand 16.0 - 16.5									14 - 15	5.1		
			Shallow Well - Screen 5.7 - 15.7, Sand 4.0 - 15.7, Bentonite Chips (Holeplug) 1.5 - 4.0, Concrete Surface Seal 0 - 1.5									15 - 16	3.8		

Notes and Comments

Depth of borehole caving _____ Depth of first groundwater encounter _____ Topsoil thickness _____
Water level in open borehole on completion _____ After _____ Hours _____
Notes: _____

Project name:	Cold Springs - Southern Terminals	**Drilling contractor:**	**Nothnagle Drilling**	**Hole designation:**	MW-3 S/D
Project number:	11137172-15	**Driller:**	**Bryan Swartz**	**Date/Time started:**	11-7-2019 0800
Client:	Southern Terminals Group	**Surface elevation:**		**Date/Time completed:**	11-7-2019 1500
Location:	Hillside Road, Lysander, NY	**Weather (A.M.):**	**42F, Overcast**	**Drilling method:**	Hollow Stem Auger (6.25")
		(P.M.):	**38F, Showers**	**GHD supervisor:**	I. McNamara

Stratigraphic Intervals (Depths in ft BGS)			**Sample Description**	**Sample Details**											
			Order of descriptors: **Soil type symbol(s) - primary component(s), (nature of deposit), secondary components, relative density/consistency, grain size/plasticity, gradation/structure, colour, moisture content,**			**Penetration Record Split Spoon Blows (Record N-Values & Recoveries)**									
From	**At**	**To**	**Note: Plasticity determination requires the addition of moisture if the sample is too dry to roll (indicate if moisture was added or not).**	**Sample Number**	**Sampling Method**	**6"**	**6"**	**6"**	**6"**	**N**	**R**	**Sample Interval**	**PID/FID (ppm)**	**Chemical Analysis**	**Grain Size/ Other Analysis**
												17 - 18	5.2		
												18 - 19	4.8		
												19 - 20	16.0		
												20 - 21	6.2		
												21 - 22	30.2		
												22 - 23	14.8		
												23 - 24	28.3		
												24 - 25	20.2		
												28 - 29	16.0		

Notes and Comments

Depth of borehole caving _____ Depth of first groundwater encounter _____ Topsoil thickness _____

Water level in open borehole on completion _____ After _____ Hours _____

Notes: _____

Project name:	Cold Springs - Southern Terminals	**Drilling contractor:**	**Nothnagle Drilling**	**Hole designation:**	MW-4 S/D
Project number:	11137172-15	**Driller:**	**Bryan Swartz**	**Date/Time started:**	11/5/2019
Client:	Southern Terminals Group	**Surface elevation:**		**Date/Time completed:**	11/5/2019
Location:	Hillside Road, Lysander, NY	**Weather (A.M.):**		**Drilling method:**	Hollow Stem Auger (6.25")
		(P.M.):		**GHD supervisor:**	I. McNamara

Stratigraphic Intervals (Depths in ft BGS)			**Sample Description**	**Sample Details**											
			Order of descriptors: **Soil type symbol(s) - primary component(s), (nature of deposit), secondary components, relative density/consistency, grain size/plasticity, gradation/structure, colour, moisture content,**			**Penetration Record Split Spoon Blows (Record N-Values & Recoveries)**									
From	**At**	**To**	**Note: Plasticity determination requires the addition of moisture if the sample is too dry to roll (indicate if moisture was added or not).**	**Sample Number**	**Sampling Method**	**6"**	**6"**	**6"**	**6"**	**N**	**R**	**Sample Interval**	**PID/FID (ppm)**	**Chemical Analysis**	**Grain Size/ Other Analysis**
0		5	Hand Auger	0 - 5	Hand Auger							2	2.3		
1		1.5	GW - Gravel, Asphalt, Asphalt Bedding, Slight Odor	5 - 9	Macrocore							2.5	2.7		
	1.5		ML - Sandy Silt, Fine and Medium Grained Sand, Predominently Fine Grained Sand, Low Plasticity (65, 35), Dark Brownish Gray, Petroleum Odor, Trace Coarse Grained Sand and Fine Gravel	9 - 13	Macrocore							3	20.7		
	4		As Above (75, 25), No Plasticity	13 - 17	Macrocore							3.5	5.4		
5		20	SM - Silty Sand, Fine Grained Sand, Compact, Gray Brown with Gray-Black Staining, Strong Odors and Slight Sheen, Moist to Wet with Depth	17 -20	Macrocore							4	11.5		
	9		Water Table, Dilatant Soils	20 - 24	Macrocore							4.5	7.6		
			Odors and Staining Decrease with Depth	24 - 27	Macrocore							5	49.0		
20		22.5	SP - Fine Grained Sand, Compact, Brown, Wet, Slight Odor, No Staining									5.5	40.1		
22.5		23.5	SM - Silty Sand, Fine and Medium Grained Sand, Compact, Brown, Wet, No Odor, Trace Fine Gravel with Depth									6 - 7	401.2		
23.5		25.5	GW - Fine and Coarse Gravel with Fine, Medium, and Coarse Grained Sand, Compact, Black/Brown/Rusty Orange, Coarsens Downward, Wet, Slight Odor									7 - 8	563.7		
25.5		26.5	Glacial Till - Hard, Rusty Orange/Brown, Fine Subrounded Gravel, Moist, No Odor, Transitions to Red 26 to 26.5', Very Hard, Moist									8 - 9	1048		
												9 - 10	580.1		
			Deep Well - Screen 23.2 - 25.2, Sand 22.7 - 25.2, Bentonite Chips (Holeplug) 17.2 - 22.7, Sand 17.0 - 17.2									10 - 11	34.1		
			Shallow Well - Screen 7.2 - 17.2, Sand 5.0 - 17.2, Bentonite Chips (Holeplug) 1.0 - 5.0, Concrete Surface Seal 0 - 1.0									13 - 14	146.2		

Notes and Comments

Depth of borehole caving _____ Depth of first groundwater encounter _____ Topsoil thickness _____

Water level in open borehole on completion _____ After _____ Hours _____

Notes: _____

Project name:	Cold Springs - Southern Terminals	**Drilling contractor:**	**Nothnagle Drilling**	**Hole designation:**	MW-4 S/D
Project number:	11137172-15	**Driller:**	**Bryan Swartz**	**Date/Time started:**	11/5/2019
Client:	Southern Terminals Group	**Surface elevation:**		**Date/Time completed:**	11/5/2019
Location:	Hillside Road, Lysander, NY	**Weather (A.M.):**		**Drilling method:**	Hollow Stem Auger (6.25")
		(P.M.):		**GHD supervisor:**	I. McNamara

Stratigraphic Intervals (Depths in ft BGS)			**Sample Description**	**Sample Details**											
			Order of descriptors: **Soil type symbol(s) - primary component(s), (nature of deposit), secondary components, relative density/consistency, grain size/plasticity, gradation/structure, colour, moisture content,**			**Penetration Record Split Spoon Blows (Record N-Values & Recoveries)**									
From	**At**	**To**	**Note: Plasticity determination requires the addition of moisture if the sample is too dry to roll (indicate if moisture was added or not).**	**Sample Number**	**Sampling Method**	**6"**	**6"**	**6"**	**6"**	**N**	**R**	**Sample Interval**	**PID/FID (ppm)**	**Chemical Analysis**	**Grain Size/ Other Analysis**
												14 - 15	17.6		
												17 - 18	107.2		
												18 - 19	21.4		
												19 - 20	10.9		
												20 - 21	21.5		
												21 - 22	7.6		
												22 - 23	8.4		
												23 - 24	7.2		
												24 - 25	5.3		
												25 - 26	15.3		
												26.5	10.1		

Notes and Comments

Depth of borehole caving _____ Depth of first groundwater encounter _____ Topsoil thickness _____

Water level in open borehole on completion _____ After _____ Hours _____

Notes: _____

Project name:	Cold Springs - Southern Terminals	**Drilling contractor:**	**Nothnagle Drilling**	**Hole designation:**	MW-5 S/D
Project number:	11137172-15	**Driller:**	**Bryan Swartz**	**Date/Time started:**	11-18-2019 0930
Client:	Southern Terminals Group	**Surface elevation:**		**Date/Time completed:**	11-18-2019 1430
Location:	Hillside Road, Lysander, NY	**Weather (A.M.):**	**32F, Mostly Cloudy**	**Drilling method:**	Hollow Stem Auger (6.25")
		(P.M.):	**32F, Mostly Cloudy**	**GHD supervisor:**	I. McNamara

Stratigraphic Intervals (Depths in ft BGS)			**Sample Description**	**Sample Details**											
			Order of descriptors: Soil type symbol(s) - primary component(s), (nature of deposit), secondary components, relative density/consistency, grain size/plasticity, gradation/structure, colour, moisture content, supplementary descriptors.			**Penetration Record Split Spoon Blows (Record N-Values & Recoveries)**									
From	**At**	**To**	**Note: Plasticity determination requires the addition of moisture if the sample is too dry to roll (indicate if moisture was added or not).**	**Sample Number**	**Sampling Method**	**6"**	**6"**	**6"**	**6"**	**N**	**R**	**Sample Interval**	**PID/FID (ppm)**	**Chemical Analysis**	**Grain Size/ Other Analysis**
0		5	Hand Auger	0 - 5	Hand Auger						60	0 - 1	1.4		
0		4.5	CL - Clay, Firm, Brown with Gray and Rusty Orange Mottling, Moist, Odors with Depth	5 - 9	Macrocore						36	1 - 2	409.7		
4.5		5.3	SM - Silty Sand, Firm, Gray Staining and Strong Odors, Moist, Trace Clay	9 - 13	Macrocore						36	2 - 3	985.0		
5.3		19.25	SW - Very Fine and Fine Grained Sand, Compact, Gray, Moist, Odors, Some Silt Decreases with Depth	13 - 17	Macrocore						36	3 - 4	534.2		
	7		Brown, Water Table and Sheen	17 - 20	Macrocore						36	4 - 5	387.2		
	9		Decrease Odors	22.5 - 23.5	Macrocore						12	5 - 6	576.4		
	11		Saturated, Loose if Shaken									6 - 7	633.4		
	14.5		Gray-Brown Zone from 14.5 - 16, Slight Odor									7 - 8	686.2		
	16		Brown from 16 - 19.25									9 - 10	162.6		
19.25		23	GW - Fine and Coarse Gravel with Fine, Medium, and Coarse Grained Sand, Compact, Black, Brown, Red, Wet, Subrounded Gravel, No Odor									10 - 11	61.3		
23		23.5	GC - Clay and Silt with Fine and Coarse Gravel and Medium and Coarse Grained Sand, Hard, Red-Brown with Rusty Orange Weathering top 2 inches, Moist (Glacial Till)									11 - 12	64.1		
			Running Sands and/or Natural Formation Collapse only allowed well to extend to 20.2 feet bgs after 3 attempts to set well at originally intended 23.5 foot depth									13 - 14	35.5		
			Deep Well - Screen 18.2 - 21.2, Sand 16.7 - 21.2, Bentonite Chips (Holeplug) 15.5 - 16.7, Sand 15.0 - 15.5									14 - 15	26.6		
			Shallow Well - Screen 5.5 - 15.5, Sand 3 - 15.5, Bentonite Chips (Holeplug) 1.5 - 3.0, Concrete Surface Seal 0 - 1.5									15 - 16	50.7		

Notes and Comments

Depth of borehole caving _____ Depth of first groundwater encounter _____ Topsoil thickness _____
Water level in open borehole on completion _____ After _____ Hours _____
Notes: _____

Project name:	Cold Springs - Southern Terminals	**Drilling contractor:**	**Nothnagle Drilling**	**Hole designation:**	MW-5 S/D
Project number:	11137172-15	**Driller:**	**Bryan Swartz**	**Date/Time started:**	11-18-2019 0930
Client:	Southern Terminals Group	**Surface elevation:**		**Date/Time completed:**	11-18-2019 1430
Location:	Hillside Road, Lysander, NY	**Weather (A.M.):**	**32F, Mostly Cloudy**	**Drilling method:**	Hollow Stem Auger (6.25")
		(P.M.):	**32F, Mostly Cloudy**	**GHD supervisor:**	I. McNamara

Stratigraphic Intervals (Depths in ft BGS)			Sample Description	Sample Details											
			Order of descriptors: **Soil type symbol(s) - primary component(s), (nature of deposit), secondary components, relative density/consistency, grain size/plasticity, gradation/structure, colour, moisture content, supplementary descriptors.**			Penetration Record Split Spoon Blows (Record N-Values & Recoveries)									
From	**At**	**To**	**Note: Plasticity determination requires the addition of moisture if the sample is too dry to roll (indicate if moisture was added or not).**	**Sample Number**	**Sampling Method**	**6"**	**6"**	**6"**	**6"**	**N**	**R**	**Sample Interval**	**PID/FID (ppm)**	**Chemical Analysis**	**Grain Size/ Other Analysis**
												17 - 18	28.1		
												18 - 19	38.8		
												19 - 20	32.7		
												22 - 23	12.7		

Notes and Comments

Depth of borehole caving _____ Depth of first groundwater encounter _____ Topsoil thickness _____

Water level in open borehole on completion _____ After _____ Hours _____

Notes: _____

Project name:	Cold Springs - Southern Terminals	**Drilling contractor:**	**Nothnagle Drilling**	**Hole designation:**	MW-6 S/D
Project number:	11137172-15	**Driller:**	**Bryan Swartz**	**Date/Time started:**	11-18-2019 1530
Client:	Southern Terminals Group	**Surface elevation:**		**Date/Time completed:**	11-19-2019 1200
Location:	Hillside Road, Lysander, NY	**Weather (A.M.):**	**40F, Overcast (11-19-2019)**	**Drilling method:**	Hollow Stem Auger (6.25")
		(P.M.):	**35F, Overcast (11-18-2019)**	**GHD supervisor:**	I. McNamara

Stratigraphic Intervals (Depths in ft BGS)			**Sample Description**	**Sample Details**												
			Order of descriptors: **Soil type symbol(s) - primary component(s), (nature of deposit), secondary components, relative density/consistency, grain size/plasticity, gradation/structure, colour, moisture content, supplementary descriptors.**			**Penetration Record Split Spoon Blows (Record N-Values & Recoveries)**									
From	**At**	**To**	**Note: Plasticity determination requires the addition of moisture if the sample is too dry to roll (indicate if moisture was added or not).**	**Sample Number**	**Sampling Method**	**6"**	**6"**	**6"**	**6"**	**N**	**R**	**Sample Interval**	**PID/FID (ppm)**	**Chemical Analysis**	**Grain Size/ Other Analysis**
0		5	Hand Auger	0 - 5	Hand Auger						60	0 - 1	6.4		
0		4.2	CL - Clay and Silt with Fine Gravel, Firm, Gray-Black, Moist, Odors	5 - 9	Macrocore						0	1 - 2	294.5		
4.2		4.8	CL - Clay and Silt, Firm, Brown with Gray Mottling, Moist, Odors, Trace Fine Gravel	9 - 13	Macrocore						0	2 - 3	470.3		
4.8		17	SM - Silty Sand, Very Fine and Fine Grained Sand, Compact, Brown, Moist, Odors, Trace Clay Decreases with Depth	13 - 17	Macrocore						0	3 - 4	482.2		
	11		Cuttings Brown Silt and Very Fine Sand, Soft, Wet, Odors, Dilatant	17 - 20	Macrocore						24	4 - 5	528.4		
17		24.5	SW - Very Fine and Fine Grained Sand, Little Medium Grained Sand, Compact until Shaken then Loose, Dilatant, Brown, Wet, Odors and Sheen	20 - 24	Macrocore						36	17 - 18	34.3		
	22		Coarsens Downward	24 - 28	Macrocore						24	18 - 19	21.1		
24.5		26.5	GW - Fine and Coarse Gravel with Fine, Medium, and Coarse Grained Sand, Compact, Subrounded, Black, Brown, Red, Wet									20 - 21	22.5		
	26.5		Sampler and Auger Refusal - Very Hard									21 - 22	39.1		
												22 - 23	192.4		
			Deep Well - Screen 25.3 - 27.3, Sand 24.0 - 27.3, Bentonite Chips (Holeplug) 15.5 - 24.0, Sand 15.0 - 15.5									24 - 25	112.9		
			Shallow Well - Screen 4.7 - 14.7, Sand 3.0 - 14.7, Bentonite Chips (Holeplug) 1.5 - 3.0, Concrete Surface Seal 0 - 1.5									25 - 26	53.9		

Notes and Comments

Depth of borehole caving _____ Depth of first groundwater encounter _____ Topsoil thickness _____
Water level in open borehole on completion _____ After _____ Hours _____
Notes: _____

Project name:	Cold Springs - Southern Terminals	**Drilling contractor:**	**Nothnagle Drilling**	**Hole designation:**	MW-7 S/D
Project number:	11137172-15	**Driller:**	**Bryan Swartz**	**Date/Time started:**	11-13-2019 1200
Client:	Southern Terminals Group	**Surface elevation:**		**Date/Time completed:**	11-13-2019 1700
Location:	Hillside Road, Lysander, NY	**Weather (A.M.):**	**20F, Sunny**	**Drilling method:**	Hollow Stem Auger (6.25")
		(P.M.):	**20F, Sunny**	**GHD supervisor:**	I. McNamara

Stratigraphic Intervals (Depths in ft BGS)			**Sample Description**	**Sample Details**											
			Order of descriptors: **Soil type symbol(s) - primary component(s), (nature of deposit), secondary components, relative density/consistency, grain size/plasticity, gradation/structure, colour, moisture content,**			**Penetration Record Split Spoon Blows (Record N-Values & Recoveries)**									
From	**At**	**To**	**Note: Plasticity determination requires the addition of moisture if the sample is too dry to roll (indicate if moisture was added or not).**	**Sample Number**	**Sampling Method**	**6"**	**6"**	**6"**	**6"**	**N**	**R**	**Sample Interval**	**PID/FID (ppm)**	**Chemical Analysis**	**Grain Size/ Other Analysis**
0		5	Hand Auger	0 - 5	Hand Auger						60	0 - 1	12.6		
0		1	SM - Silty Sand, Loose, Dark Brown, Moist, Some Organics (Roots and Plant Debris)	5 - 9	Macrocore						36	1 - 2	120		
1		3	SW - Very Fine and Fine Grained Sand, Some Silt, Firm, Brown, Moist, Slight Odor	9 - 13	Macrocore						30	2 - 3	203.7		
3		4.5	CL - Clay, Stiff, Brown with Gray Mottling, Moist, Slight Odor	13 - 17	Macrocore						30	3 - 4	379.3		
4.5		5.2	SW - Very Fine and Fine Grained Sand, Firm, Gray-Brown, Moist, Strong Odor, Trace Silt	17 - 20	Macrocore						36	4 - 5	590.7		
5.2		9	CL - Clay, Stiff to Hard, Brown with Gray Mottling, Moist, Odors	20 - 24	Macrocore						12	5 - 6	235.2		
	7.5		Water Table	24 - 28	Macrocore						48	6 - 7	97.7		
9		27.25	SW - Very Fine and Fine Grained Sand, Compact, Dilatant and Loose when Shaken, Brown, Wet, Odors	28 - 29	Macrocore						12	7 - 8	60.2		
			20 - 24' - Macrocore sunk under weight of rods/hammer									9 - 10	39.7		
27.25		30	GW - Fine and Coarse Gravel and Fine, Medium, and Coarse Grained Sand, Compact, Black/Red/Brown, Subrounded Gravel, Wet, Slight Odor									10 - 11	60.2		
												11 - 12	108.6		
			Deep Well - Screen 26.2 - 29.2, Sand 25.7 - 29.2, Bentonite Chips (Holeplug) 16.5 - 25.7, Sand 16.0 - 16.5									13 - 14	65.8		
			Shallow Well - Screen 5.6 - 15.6, Sand 4.0 - 15.6, Bentonite Chips (Holeplug) 1.5 - 4.0, Concrete Surface Seal 0 - 1.5									14 - 15	108.0		
												15 - 16	53.5		

Notes and Comments

Depth of borehole caving _____ Depth of first groundwater encounter _____ Topsoil thickness _____
Water level in open borehole on completion _____ After _____ Hours _____
Notes: _____

Project name:	Cold Springs - Southern Terminals	**Drilling contractor:**	**Nothnagle Drilling**	**Hole designation:**	MW-7 S/D
Project number:	11137172-15	**Driller:**	**Bryan Swartz**	**Date/Time started:**	11-13-2019 1200
Client:	Southern Terminals Group	**Surface elevation:**		**Date/Time completed:**	11-13-2019 1700
Location:	Hillside Road, Lysander, NY	**Weather (A.M.):**	**20F, Sunny**	**Drilling method:**	Hollow Stem Auger (6.25")
		(P.M.):	**20F, Sunny**	**GHD supervisor:**	I. McNamara

Stratigraphic Intervals (Depths in ft BGS)			Sample Description	Sample Details											
			Order of descriptors: **Soil type symbol(s) - primary component(s), (nature of deposit), secondary components, relative density/consistency, grain size/plasticity, gradation/structure, colour, moisture content,**			Penetration Record Split Spoon Blows (Record N-Values & Recoveries)									
From	**At**	**To**	**Note: Plasticity determination requires the addition of moisture if the sample is too dry to roll (indicate if moisture was added or not).**	**Sample Number**	**Sampling Method**	**6"**	**6"**	**6"**	**6"**	**N**	**R**	**Sample Interval**	**PID/FID (ppm)**	**Chemical Analysis**	**Grain Size/ Other Analysis**
												17 - 18	30.3		
												18 - 19	145.7		
												19 - 20	112.9		
												20 - 21	61.3		
												24 - 25	17.4		
												25 - 26	40.3		
												26 - 27	44.3		
												27 - 28	5.4		
												28 - 29	5.9		

Notes and Comments

Depth of borehole caving _____ Depth of first groundwater encounter _____ Topsoil thickness _____

Water level in open borehole on completion _____ After _____ Hours _____

Notes: _____

Project name:	Cold Springs - Southern Terminals	**Drilling contractor:**	**Nothnagle Drilling**	**Hole designation:**	MW-9 S/I/D
Project number:	11137172-15	**Driller:**	**Bryan Swartz**	**Date/Time started:**	11-20-2019 1515
Client:		**Surface elevation:**		**Date/Time completed:**	11-21-2019 1200
Location:	Hillside Road, Lysander, NY	**Weather (A.M.):**	**38F, Mostly Cloudy (11-21-2019)**	**Drilling method:**	Hollow Stem Auger (6.25")
		(P.M.):	**42F, Overcast (11-20-2019)**	**GHD supervisor:**	I. McNamara

Stratigraphic Intervals (Depths in ft BGS)			**Sample Description**	**Sample Details**												
			Order of descriptors: Soil type symbol(s) - primary component(s), (nature of deposit), secondary components, relative density/consistency, grain size/plasticity, gradation/structure, colour, moisture content, supplementary descriptors.			**Penetration Record Split Spoon Blows (Record N-Values & Recoveries)**									
From	**At**	**To**	**Note: Plasticity determination requires the addition of moisture if the sample is too dry to roll (indicate if moisture was added or not).**	**Sample Number**	**Sampling Method**	**6"**	**6"**	**6"**	**6"**	**N**	**R**	**Sample Interval**	**PID/FID (ppm)**	**Chemical Analysis**	**Grain Size/ Other Analysis**
0		5	Hand Auger	0 - 5	Hand Auger						60	0 - 1	0.0		
0		3.5	SW - Fine, Medium, and Coarse Grained Sand, Loose, Black, Dry	5 - 9	Macrocore						48	1 - 2	2.6		
3.5		7.5	CL - Clay, Firm to Hard, Brown with Gray Mottling, Moist, Odors	9 - 13	Macrocore						24	2 - 3	17.9		
	7.5		Water Table	13 - 17	Macrocore						36	3 - 4	269.0		
7.5		9	SM - Silty Sand, Very Fine and Fine Grained Sand, Compact, Dilatant, Gray-Brown to Brown with Depth, Wet, Odors, Sheen, Dark Brown Staining in Isolated Zones from 8 - 9' bgs	17 - 20	Macrocore						36	4 - 5	452.3		
9		31	SW - Very Fine and Fine Grained Sand, Compact, Dilatant and Loose when Shaken, Brown, Odors	20 - 24	Macrocore						48	5 - 6	580.1		
31		32.5	SW - Fine, Medium, and Coarse Grained Sand, Some Very Fine Grained Sand, Compact, Brown, Wet	24 - 28	Macrocore						48	6 - 7	424.4		
32.5		34	GW - Fine and Coarse Gravel with Fine, Medium, and Coarse Grained Sand, Compact, Black/Brown/Red, Wet, Slight Odor	29 - 33	Macrocore						48	7 - 8	648.7		
			Auger Refusal at 34' bgs, very hard gravelly drilling from 33 to 34'									8 - 9	187.8		
												9 - 10	54.8		
			Deep Well - Screen 31.6 - 33.6, Sand 29.5 - 33.6, Bentonite 16.5 - 29.5, Sand 16.0 - 16.5									10 - 11	39.9		
			Shallow Well - Screen 5.0 - 15.0, Sand 4.0 - 15.0, Bentonite 1.5 - 4.0, Concrete Surface Seal 0 - 1.5									13 - 14	40.9		
												14 - 15	46.7		
												15 - 16	65.3		

Notes and Comments

Depth of borehole caving _____ Depth of first groundwater encounter _____ Topsoil thickness _____
Water level in open borehole on completion _____ After _____ Hours _____
Notes: _____

Project name:	Cold Springs - Southern Terminals	**Drilling contractor:**	**Nothnagle Drilling**	**Hole designation:**	MW-9 S/I/D
Project number:	11137172-15	**Driller:**	**Bryan Swartz**	**Date/Time started:**	11-20-2019 1515
Client:		**Surface elevation:**		**Date/Time completed:**	11-21-2019 1200
Location:	Hillside Road, Lysander, NY	**Weather (A.M.):**	**38F, Mostly Cloudy (11-21-2019)**	**Drilling method:**	Hollow Stem Auger (6.25")
		(P.M.):	**42F, Overcast (11-20-2019)**	**GHD supervisor:**	I. McNamara

Stratigraphic Intervals (Depths in ft BGS)			Sample Description	Sample Details											
			Order of descriptors: **Soil type symbol(s) - primary component(s), (nature of deposit), secondary components, relative density/consistency, grain size/plasticity, gradation/structure, colour, moisture content, supplementary descriptors.**			Penetration Record Split Spoon Blows (Record N-Values & Recoveries)									
From	**At**	**To**	**Note: Plasticity determination requires the addition of moisture if the sample is too dry to roll (indicate if moisture was added or not).**	**Sample Number**	**Sampling Method**	**6"**	**6"**	**6"**	**6"**	**N**	**R**	**Sample Interval**	**PID/FID (ppm)**	**Chemical Analysis**	**Grain Size/ Other Analysis**
												17 - 18	37.8		
												18 - 19	49		
												19 - 20	59.6		
												20 - 21	19.9		
												21 - 22	24.2		
												22 - 23	61.3		
												23 - 24	101.0		
												24 - 25	54.5		
												25 - 26	118.5		
												26 - 27	172.3		
												27 - 28	214.9		
												29 - 30	105.9		
												30 - 31	132.2		
												31 - 32	80.6		

Notes and Comments

Depth of borehole caving _____ Depth of first groundwater encounter _____ Topsoil thickness _____

Water level in open borehole on completion _____ After _____ Hours _____

Notes: _____

Project name:	Cold Springs - Southern Terminals	**Drilling contractor:**	**Nothnagle Drilling**	**Hole designation:**	MW-10 S/I/D
Project number:	11137172-15	**Driller:**	**Bryan Swartz**	**Date/Time started:**	11-19-2019 1300
Client:	Southern Terminals Group	**Surface elevation:**		**Date/Time completed:**	11-20-2019 1445
Location:	Hillside Road, Lysander, NY	**Weather (A.M.):**	**40F, Mostly Cloudy (11-20-2019)**	**Drilling method:**	Hollow Stem Auger (6.25")
		(P.M.):	**48F, Mostly Cloudy (11-19-2019)**	**GHD supervisor:**	I. McNamara

Stratigraphic Intervals (Depths in ft BGS)			**Sample Description**	**Sample Details**											
			Order of descriptors: Soil type symbol(s) - primary component(s), (nature of deposit), secondary components, relative density/consistency, grain size/plasticity, gradation/structure, colour, moisture content, supplementary descriptors.			**Penetration Record Split Spoon Blows (Record N-Values & Recoveries)**									
From	**At**	**To**	**Note: Plasticity determination requires the addition of moisture if the sample is too dry to roll (indicate if moisture was added or not).**	**Sample Number**	**Sampling Method**	**6"**	**6"**	**6"**	**6"**	**N**	**R**	**Sample Interval**	**PID/FID (ppm)**	**Chemical Analysis**	**Grain Size/ Other Analysis**
0		5	Hand Auger	0 - 5	Hand Auger						60	0 - 1	0.0		
0		3.5	SM - Silty Sand with Fine and Coarse Gravel, Compact, Dark Brown to Brown with Depth, Moist to Wet with Depth, No Odor	5 - 9	Macrocore						6	1 - 2	0.0		
3.5		5	SM - Silty Sand, Fine and Medium Grained Sand, Compact, Brown, Moist, Slight Odor	9 - 13	Macrocore						24	2 - 3	0.0		
5		9	ML - Silty Clay, Firm, Gray-Brown, Moist, Odors, Trace Fine Grained Sand	13 - 17	Macrocore						24	3 - 4	0.2		
9		28	SW - Very Fine and Fine Grained Sand, Compact, Dilatant and Loose when Shaken, Gray-Brown, Wet, Little Odor	17 - 20	Macrocore						36	4 - 5	7.4		
28			SW - Fine, Medium, and Coarse Grained Sand, Compact, Black/Brown/Red, Wet, Trace Sand Concretions	20 - 24	Macrocore						48	5 - 6	17.3		
			Attempted to auger to 32' bgs for next sample; however, had 10' of running sands in the augers. Had to abandon boring and start over the next day 5 feet to the west.	24 - 28	Macrocore						48	9 - 10	1.6		
			Based on running sands, new boring location was straight drill until gravel layer and glacial till were encountered and then install the wells, no sampling.	28 - 32	Macrocore						48	10 - 11	0.6		
												13 - 14	0.7		
			Augers grinding and jumping on gravel at 34' bgs									14 - 15	0.2		
			Auger refusal at 35.5' bgs									17 - 18	0.1		
												18 - 19	0.0		
												19 - 20	0.1		
												20 - 21	0.0		

Notes and Comments

Depth of borehole caving _____ Depth of first groundwater encounter _____ Topsoil thickness _____
Water level in open borehole on completion _____ After _____ Hours _____
Notes: _____

Project name:	Cold Springs - Southern Terminals	**Drilling contractor:**	**Nothnagle Drilling**	**Hole designation:**	MW-10 S/I/D
Project number:	11137172-15	**Driller:**	**Bryan Swartz**	**Date/Time started:**	11-19-2019 1300
Client:	Southern Terminals Group	**Surface elevation:**		**Date/Time completed:**	11-20-2019 1445
Location:	Hillside Road, Lysander, NY	**Weather (A.M.):**	**40F, Mostly Cloudy (11-20-2019)**	**Drilling method:**	Hollow Stem Auger (6.25")
		(P.M.):	**48F, Mostly Cloudy (11-19-2019)**	**GHD supervisor:**	I. McNamara

Stratigraphic Intervals (Depths in ft BGS)			Sample Description	Sample Details											
			Order of descriptors: **Soil type symbol(s) - primary component(s), (nature of deposit), secondary components, relative density/consistency, grain size/plasticity, gradation/structure, colour, moisture content, supplementary descriptors.**			Penetration Record Split Spoon Blows (Record N-Values & Recoveries)									
From	**At**	**To**	**Note: Plasticity determination requires the addition of moisture if the sample is too dry to roll (indicate if moisture was added or not).**	**Sample Number**	**Sampling Method**	**6"**	**6"**	**6"**	**6"**	**N**	**R**	**Sample Interval**	**PID/FID (ppm)**	**Chemical Analysis**	**Grain Size/ Other Analysis**
			Deep Well - Screen 33.7 - 35.7, Sand 33.0 - 35.7, Bentonite 29.0 - 33.0, Sand 28.5 - 29.0									21 - 22	0.3		
			Intermediate Well - Screen 24.0 - 29.0, Sand 21.5 - 29.0, Bentonite 16.5 - 21.5, Bentonite/Cutting Mix 1.5 - 16.5, Concrete Surface Seal 0 - 1.5									22 - 23	1.6		
			Shallow Well - Installed in initial boring approximately 5' east of deep/intermediate well cluster									23 - 24	6.9		
			Shallow Well - Screen 4.5 - 14.5, Sand 3.0 - 14.5, Bentonite 1.5 - 3.0, Concrete Surface Seal 0 - 1.5									24 - 25	123.3		
												25 - 26	138.3		
												26 - 27	103.6		
												27 - 28	30.0		
												28 - 29	63.4		
												29 - 30	44.4		
												30 - 31	47.8		
												31 - 32	39.5		

Notes and Comments

Depth of borehole caving _____ Depth of first groundwater encounter _____ Topsoil thickness _____

Water level in open borehole on completion _____ After _____ Hours _____

Notes: _____

Project name:	Cold Springs - Southern Terminals	**Drilling contractor:**	**Nothnagle Drilling**	**Hole designation:**	RW-1
Project number:	11137172-15	**Driller:**	**Bryan Swartz**	**Date/Time started:**	11-4-2019 1200
Client:	Southern Terminals Group	**Surface elevation:**		**Date/Time completed:**	11-4-2019 1700
Location:	Hillside Road, Lysander, NY	**Weather (A.M.):**		**Drilling method:**	Hollow Stem Auger (8.25")
		(P.M.):	**45F, Overcast**	**GHD supervisor:**	I. McNamara

Stratigraphic Intervals (Depths in ft BGS)			**Sample Description**	**Sample Details**											
			Order of descriptors: **Soil type symbol(s) - primary component(s), (nature of deposit), secondary components, relative density/consistency, grain size/plasticity, gradation/structure, colour, moisture content,**			**Penetration Record Split Spoon Blows (Record N-Values & Recoveries)**									
From	**At**	**To**	**Note: Plasticity determination requires the addition of moisture if the sample is too dry to roll (indicate if moisture was added or not).**	**Sample Number**	**Sampling Method**	**6"**	**6"**	**6"**	**6"**	**N**	**R**	**Sample Interval**	**PID/FID (ppm)**	**Chemical Analysis**	**Grain Size/ Other Analysis**
0		5	Hand Auger									0 - 1	2.0		
0		0.25	SW - Fine and Medium Grained Sand with Silt and Clay, Firm, Dark Brown, Trace Organics (Roots)									1.5	1.0		
0.25		4	CL - Clay, Stiff, Dark Brown with Gray and Brown Mottling, Moist, Odors, Hard with Depth									2	3.5		
4		9.5	SM - Silty Sand, Fine Grained Sand, Compact, Gray, Moist, Odors, Trace Clay									3	150.3		
	6		No Clay									3.5	33.2		
	7		Strong Odors and Black Staining from 7 - 9									4	28.5		
	8		Water Table									4.5	923.8		
9.5		15	SM - Silty Sand, Fine Grained Sand, Compact, Dilatant, Brown, Wet, Slight Odors Decrease with Depth									5	468.4		
												5 - 6	347.5		
												6 - 7	639.8		
			Screen 5.7 - 15.7, Sand 3.0 - 15.7, Bentonite Chips (Holeplug) 1.5 - 3.0, Concrete Surface Seal 0 - 1.5									7 - 8	804.3		
												8 - 9	1082		
												9 - 10	120.6		
												10 - 11	169.1		

Notes and Comments

Depth of borehole caving _____ Depth of first groundwater encounter _____ Topsoil thickness _____
Water level in open borehole on completion _____ After _____ Hours _____
Notes: _____

Project name:	Cold Springs - Southern Terminals	**Drilling contractor:**	**Nothnagle Drilling**	**Hole designation:**	RW-1
Project number:	11137172-15	**Driller:**	**Bryan Swartz**	**Date/Time started:**	11-4-2019 1200
Client:	Southern Terminals Group	**Surface elevation:**		**Date/Time completed:**	11-4-2019 1700
Location:	Hillside Road, Lysander, NY	**Weather (A.M.):**		**Drilling method:**	Hollow Stem Auger (8.25")
		(P.M.):	**45F, Overcast**	**GHD supervisor:**	I. McNamara

Stratigraphic Intervals (Depths in ft BGS)			**Sample Description**	**Sample Details**											
			Order of descriptors: **Soil type symbol(s) - primary component(s), (nature of deposit), secondary components, relative density/consistency, grain size/plasticity, gradation/structure, colour, moisture content,**			**Penetration Record Split Spoon Blows (Record N-Values & Recoveries)**									
From	**At**	**To**	**Note: Plasticity determination requires the addition of moisture if the sample is too dry to roll (indicate if moisture was added or not).**	**Sample Number**	**Sampling Method**	**6"**	**6"**	**6"**	**6"**	**N**	**R**	**Sample Interval**	**PID/FID (ppm)**	**Chemical Analysis**	**Grain Size/ Other Analysis**
												11 - 12	64.2		
												12 - 13	91.9		
												13 - 14	47.5		
												14 - 15	38.3		

Notes and Comments

Depth of borehole caving _____ Depth of first groundwater encounter _____ Topsoil thickness _____

Water level in open borehole on completion _____ After _____ Hours _____

Notes: _____

Project name:	Cold Springs - Southern Terminals	**Drilling contractor:**	**Nothnagle Drilling**	**Hole designation:**	RW-2
Project number:	11137172-15	**Driller:**	**Bryan Swartz**	**Date/Time started:**	11-6-2019 0730
Client:	Southern Terminals Group	**Surface elevation:**		**Date/Time completed:**	11-6-2019 1200
Location:	Hillside Road, Lysander, NY	**Weather (A.M.):**		**Drilling method:**	Hollow Stem Auger (8.25")
		(P.M.):		**GHD supervisor:**	I. McNamara

Stratigraphic Intervals (Depths in ft BGS)			**Sample Description**	**Sample Details**											
			Order of descriptors: **Soil type symbol(s) - primary component(s), (nature of deposit), secondary components, relative density/consistency, grain size/plasticity, gradation/structure, colour, moisture content,**			**Penetration Record Split Spoon Blows (Record N-Values & Recoveries)**									
From	**At**	**To**	**Note: Plasticity determination requires the addition of moisture if the sample is too dry to roll (indicate if moisture was added or not).**	**Sample Number**	**Sampling Method**	**6"**	**6"**	**6"**	**6"**	**N**	**R**	**Sample Interval**	**PID/FID (ppm)**	**Chemical Analysis**	**Grain Size/ Other Analysis**
0		5	Hand Auger	0 - 5	Hand Auger						60	0 - 2	10.5		
0		2.5	CL - Clay, Firm, Brown, Wet, Some Organics (Roots and Plant Remains) 0 - 0.5 feet, Odors	5 - 9	Macrocore						30	2 - 3	N/A		
2.5		11.5	SM - Silty Sand, Fine Grained Sand, Firm, Brown, Wet, Odors and Slight Sheen, Trace Clay	9 - 13	Macrocore						36	3 - 4	N/A		
	4.5		No Clay, Dilatant	13 - 17	Macrocore						48	4 - 5	N/A		
	10		No Odors, Increase in Fine Grained Sand									5 - 6	1236		
11.5		17	SW - Fine Grained Sand with Silt, Compact, Dilatant, Brown, Wet, Very Slight Odors									6 - 7	1566		
												7 - 7.5	254.7		
			Overdrilled with 8.25" augers and set well at 15 feet									9 - 10	208.9		
			Screen 5.3 - 15.3, Sand 3.0 - 15.3, Bentonite Chips (Holeplug) 1.5 - 3.0, Concrete Surface Seal 0 - 1.5									10 - 11	102.8		
												11 - 12	173.3		
												13 - 14	283.2		
												14 - 15	102.1		
												15 - 16	59.6		
												16 - 17	223.2		

Notes and Comments

Depth of borehole caving _____ Depth of first groundwater encounter _____ Topsoil thickness _____
Water level in open borehole on completion _____ After _____ Hours _____
Notes: _____

Project name:	Cold Springs - Southern Terminals	**Drilling contractor:**	**Nothnagle Drilling**	**Hole designation:**	RW-3
Project number:	11137172-15	**Driller:**	**Bryan Swartz**	**Date/Time started:**	11-6-2019 1230
Client:	Southern Terminals Group	**Surface elevation:**		**Date/Time completed:**	11-6-2019 1700
Location:	Hillside Road, Lysander, NY	**Weather (A.M.):**		**Drilling method:**	Hollow Stem Auger (8.25")
		(P.M.):		**GHD supervisor:**	I. McNamara

Stratigraphic Intervals (Depths in ft BGS)			**Sample Description**	**Sample Details**											
			Order of descriptors: **Soil type symbol(s) - primary component(s), (nature of deposit), secondary components, relative density/consistency, grain size/plasticity, gradation/structure, colour, moisture content,**			**Penetration Record Split Spoon Blows (Record N-Values & Recoveries)**									
From	**At**	**To**	**Note: Plasticity determination requires the addition of moisture if the sample is too dry to roll (indicate if moisture was added or not).**	**Sample Number**	**Sampling Method**	**6"**	**6"**	**6"**	**6"**	**N**	**R**	**Sample Interval**	**PID/FID (ppm)**	**Chemical Analysis**	**Grain Size/ Other Analysis**
0		5	Hand Auger	0 - 5	Hand Auger						60	0 - 1	126.4		
0		0.8	CL - Clay, Firm, Brown, Moist, Odors, Trace Silt and Organics (Roots and Plant Remains)	5 - 9	Macrocore						36	1 - 2	1407		
0.8		4.5	SM - Silty Sand, Fine Grained Sand, Compact, Brown, Dilatant, Odors	9 - 13	Macrocore						36	2 - 3	1498		
4.5		10	SW - Fine and Medium Grained Sand, Some Silt, Compact, Brown, Strong Odors, Dilatant, Moist	13 - 15	Macrocore						12	3 - 4	1258		
	7		Water Table									4 - 5	1675		
10		14	SW - Fine and Medium Grained Sand and Silt, Compact, Brown, Wet, Dilatant and Loose when Shaken, Decreased Odors									5 - 6	1090		
												6 - 7	1442		
			Overdrilled with 8.25" augers and set well at 15 feet									7 - 8	1582		
			Screen 4.9 - 14.9, Sand 3.0 - 14.9, Bentonite Chips (Holeplug) 1.5 - 3.0, Concrete Surface Seal 0 - 1.5									9 - 10	1052		
												10 - 11	173.9		
												11 - 12	251.4		
												13 - 14	164.9		

Notes and Comments

Depth of borehole caving _____ Depth of first groundwater encounter _____ Topsoil thickness _____
Water level in open borehole on completion _____ After _____ Hours _____
Notes: _____

Project name:	Cold Springs - Southern Terminals	**Drilling contractor:**	**Nothnagle Drilling**	**Hole designation:**	RW-4
Project number:	11137172-15	**Driller:**	**Bryan Swartz**	**Date/Time started:**	11-14-2019 0900
Client:	Southern Terminals Group	**Surface elevation:**		**Date/Time completed:**	
Location:	Hillside Road, Lysander, NY	**Weather (A.M.):**	**25F, Overcast**	**Drilling method:**	Hollow Stem Auger (8.25")
		(P.M.):		**GHD supervisor:**	I. McNamara

Stratigraphic Intervals (Depths in ft BGS)			**Sample Description**	**Sample Details**											
			Order of descriptors: **Soil type symbol(s) - primary component(s), (nature of deposit), secondary components, relative density/consistency, grain size/plasticity, gradation/structure, colour, moisture content,**			**Penetration Record Split Spoon Blows (Record N-Values & Recoveries)**									
From	**At**	**To**	**Note: Plasticity determination requires the addition of moisture if the sample is too dry to roll (indicate if moisture was added or not).**	**Sample Number**	**Sampling Method**	**6"**	**6"**	**6"**	**6"**	**N**	**R**	**Sample Interval**	**PID/FID (ppm)**	**Chemical Analysis**	**Grain Size/ Other Analysis**
			Could not hand auger first 5' of boring due to presence of compacted crushed stone and rip-rap	2.5 - 5	Macrocore						NR	2.5	437.7		
0		2.5	Crushed Stone / Rip-Rap, Gray, Compact, Dry	5 - 9	Macrocore						48	5 - 6	806.5		
2.5		7.5	CL - Clay, Stiff, Brown with Gray Mottling, Moist, Odors, Dark Gray Staining	9 - 13	Macrocore						36	6 - 7	836.1		
5		6	SM - Silty Sand, Very Fine and Fine Grained Sand layer	13 - 16	Macrocore						32	7 - 8	384.4		
	7.5		Water Table									8 - 9	627.7		
7.5		9.2	SM - Silty Sand, Some Very Fine Grained Sand, Compact, Dilatant, Brown with Gray Staining, Wet, Odors, Sheen									9 -10	355.1		
9.2		16	SW - Very Fine and Fine Grained Sand, Compact until Shaken then Loose, Dilatant, Brown, Wet									10 - 11	107.6		
	9.5		Staining									11 - 12	140.5		
	12		Staining and Sheen									13 - 14	92.7		
												14 - 15	47.4		
			Overdrilled with 8.25" augers, while drilling from 5 - 10' bgs, inner 4.25" augers sunk 5', fished out but all tooling was locked together so entire string needed to be pulled. Boring stayed open to 15' bgs long enough to get well materials in. Boring collapse backfilled bottom 5' of screened interval.									15 - 16	82.5		
			Screen 4.6 - 14.6, Natural Formation Collapse 10.0 - 14.6, Sand 3.0 - 10.0, Bentonite Chips (Holeplug) 1.5 - 3.0, Concrete Surface Seal 0 - 1.5												

Notes and Comments

Depth of borehole caving _____ Depth of first groundwater encounter _____ Topsoil thickness _____
Water level in open borehole on completion _____ After _____ Hours _____
Notes: _____

Project name:	Cold Springs - Southern Terminals	**Drilling contractor:**	**Nothnagle Drilling**	**Hole designation:**	RW-5
Project number:	11137172-15	**Driller:**	**Bryan Swartz**	**Date/Time started:**	11-12-2019 1415
Client:	Southern Terminals Group	**Surface elevation:**		**Date/Time completed:**	
Location:	Hillside Road, Lysander, NY	**Weather (A.M.):**		**Drilling method:**	Hollow Stem Auger (8.25")
		(P.M.):	**25F, Overcast**	**GHD supervisor:**	I. McNamara

Stratigraphic Intervals (Depths in ft BGS)			**Sample Description**	**Sample Details**											
			Order of descriptors: **Soil type symbol(s) - primary component(s), (nature of deposit), secondary components, relative density/consistency, grain size/plasticity, gradation/structure, colour, moisture content,**			**Penetration Record Split Spoon Blows (Record N-Values & Recoveries)**									
From	**At**	**To**	**Note: Plasticity determination requires the addition of moisture if the sample is too dry to roll (indicate if moisture was added or not).**	**Sample Number**	**Sampling Method**	**6"**	**6"**	**6"**	**6"**	**N**	**R**	**Sample Interval**	**PID/FID (ppm)**	**Chemical Analysis**	**Grain Size/ Other Analysis**
0		5	Hand Auger	0 - 5	Hand Auger						60	0 - 1	0.0		
0		2.5	CL - Clay, Stiff, Brown, Moist, No Odor, Organics (Roots) from 0 - 1.5 feet	5 - 9	Macrocore						24	1 - 2	0.3		
2.5		4.5	SM - Silty Sand, Very Fine and Fine Grained Sand, Compact, Gray-Brown, Odor, Moist, Trace Clay	9 - 13	Macrocore						36	2 - 3	721.4		
	4.5		Water Table	13 - 14	Macrocore						12	3 - 4	759.3		
4.5		14	SW - Very Fine and Fine Grained Sand, Compact, Dilatant, Brown, Odor, Wet, Some to Trace Silt with Depth									4 - 5	709.5		
	10		Decreased Odors									5 - 6	540.8		
	12.5		Saturated, Loose when Shaken									6 - 7	571.6		
												9 - 10	103.4		
			Screen 4.3 - 14.3, Sand 3.0 - 14.3, Bentonite Chips (Holeplug) 1.5 - 3.0, Concrete Surface Seal 0 - 1.5									10 - 11	96.5		
												11 - 12	92.0		
			Inner 4.25" augers sunk to 15 feet while overdrilling with 8.25" augers, set well at 15 feet as a result									13 - 14	163.4		

Notes and Comments

Depth of borehole caving _____ Depth of first groundwater encounter _____ Topsoil thickness _____

Water level in open borehole on completion _____ After _____ Hours _____

Notes: _____

Well Instrumentation Log
(Form SP-15)

Project Name:	COLD SPRINGS TERMINALS	Well Designation:	MW-1S
Project Number:	11137172	Date Completed:	11/12/2019
Client:	SOUTHERN TERMINALS GROUP	Drilling Method:	HOLLOW STEM AUGER (6.25")
Location:	LYSANDER, NY	GHD Supervisor:	IAN McNAMARA

Cap Type: HINGED COVER/J- PLUG

Protective Casing Type: STEEL CASING

Measure bottom of well (after completion) 17.07 ft/m (below top of riser pipe)

Stick up = 2.53 ft/m

Bottom of Surface Seal ~1.5 ft/m

Surface Seal Type: CONCRETE

Borehole Diameter 10.25 in/cm

Riser Pipe

Annulus Backfill Type: N/A

Top of Seal* at ~1.5 ft/m

Seal Type: BENTONITE CHIPS (3/8" HOLE PLUG)

Bottom of Seal* at ~3.0 ft/m

Top of Screen* at ~4.5 ft/m

Pack Type: - sand, size #00N
- gravel
- natural

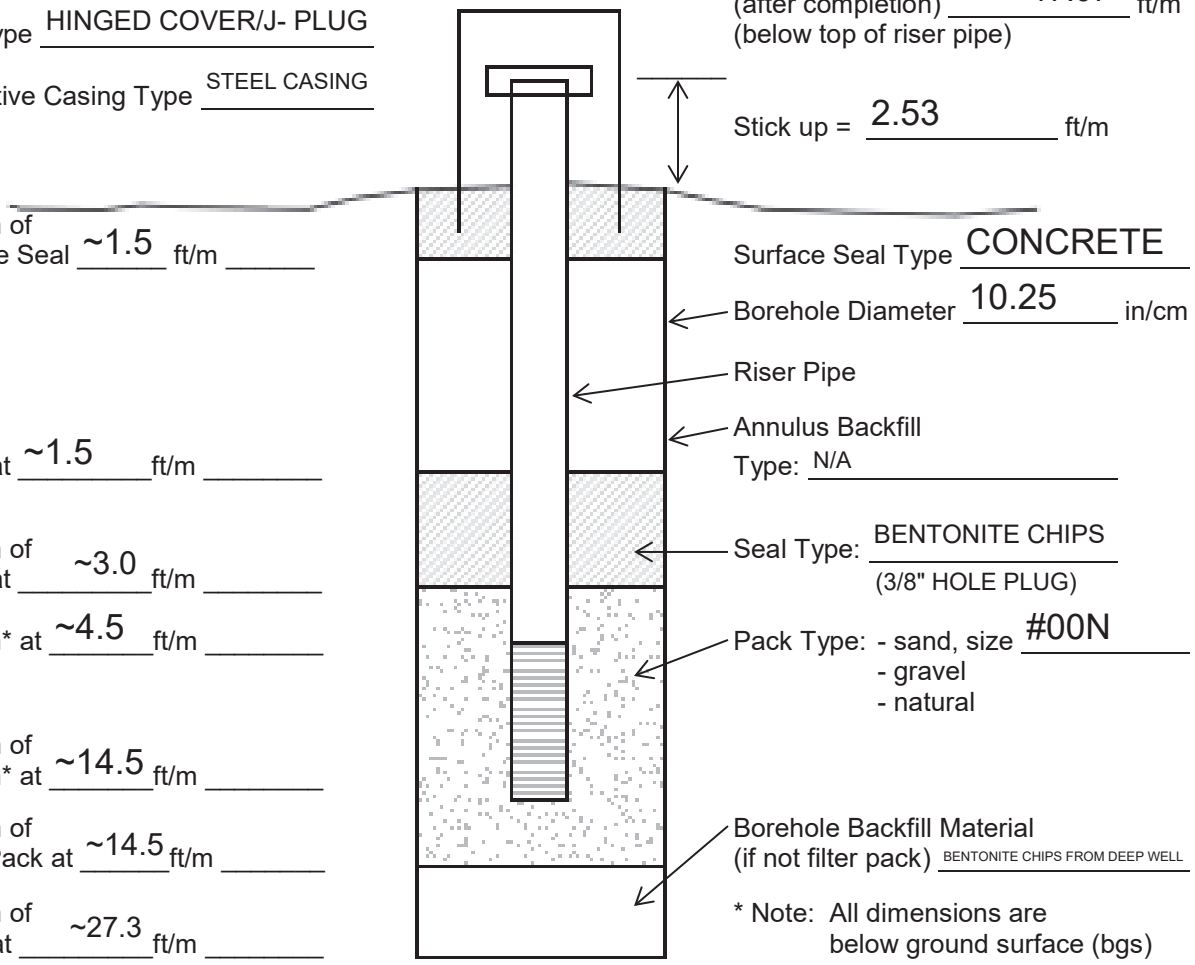
Bottom of Screen* at ~14.5 ft/m

Bottom of Filter Pack at ~14.5 ft/m

Borehole Backfill Material (if not filter pack) BENTONITE CHIPS FROM DEEP WELL

Bottom of Hole* at ~27.3 ft/m

* Note: All dimensions are below ground surface (bgs)



Screen Type: ☒ continuous slot ☐ wire wrapped ☐ louvre ☐ other:

Screen Material: ☐ stainless steel ☒ pvc ☐ other:

Screen Length: 10 ft/m Screen Diameter: 2 in/cm Screen Slot Size: 0.010 in

Riser Pipe Material: PVC SCH. 40 Riser Pipe Diameter: 2 in/cm

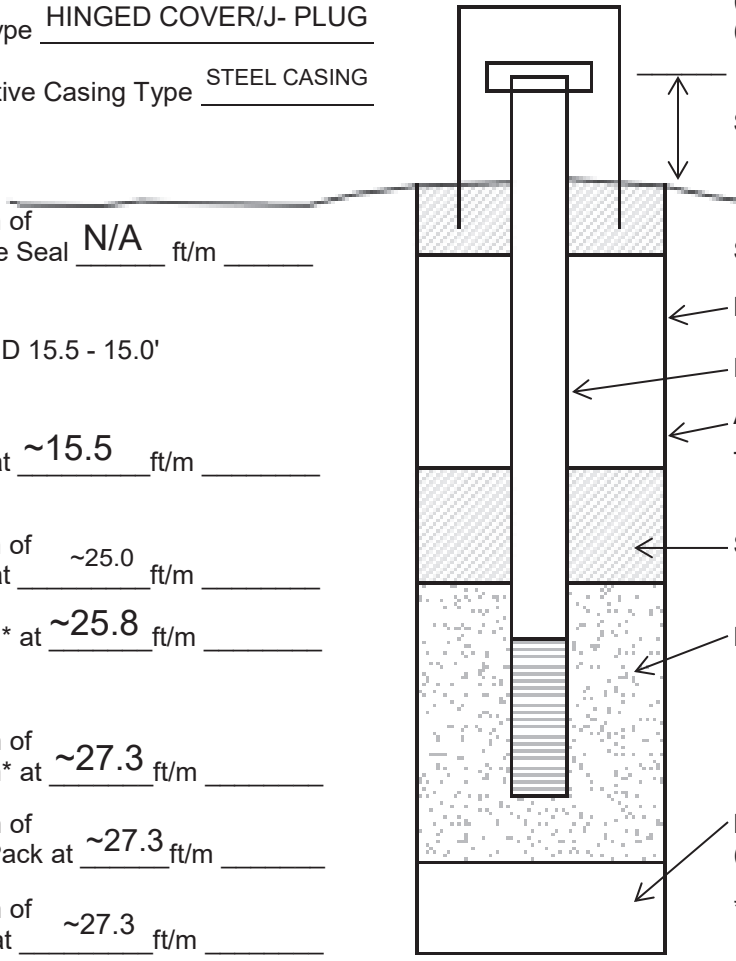
Surface Casing (Y/N) Y Material STEEL Depth 2 ft/m

Diameter 6 in/cm Sealant CONCRETE

Development: Method: WHALE PUMP Duration: 5x WELL VOLUME

Description of Purged Water:

Project Name:	COLD SPRINGS TERMINALS	Well Designation:	MW-1D
Project Number:	11137172	Date Completed:	11/12/2019
Client:	SOUTHERN TERMINALS GROUP	Drilling Method:	HOLLOW STEM AUGER (6.25")
Location:	LYSANDER, NY	GHD Supervisor:	IAN McNAMARA



Cap Type: HINGED COVER/J- PLUG

Protective Casing Type: STEEL CASING

Measure bottom of well (after completion) 29.77 ft/m (below top of riser pipe)

Stick up = 2.47 ft/m

Bottom of Surface Seal N/A ft/m

Surface Seal Type: N/A

Borehole Diameter 10.25 in/cm

SAND 15.5 - 15.0'

Riser Pipe

Annulus Backfill

Top of Seal* at ~15.5 ft/m

Type: N/A- SHALLOW WELL

Bottom of Seal* at ~25.0 ft/m

Seal Type: BENTONITE CHIPS (3/8' HOLE PLUG)

Top of Screen* at ~25.8 ft/m

Pack Type: - sand, size #00N
- gravel
- natural

Bottom of Screen* at ~27.3 ft/m

Bottom of Filter Pack at ~27.3 ft/m

Borehole Backfill Material (if not filter pack) N/A

Bottom of Hole* at ~27.3 ft/m

* Note: All dimensions are below ground surface (bgs)

Screen Type: ☒ continuous slot ☐ wire wrapped ☐ louvre ☐ other:

Screen Material: ☐ stainless steel ☒ pvc ☐ other:

Screen Length: 1.5 ft/m Screen Diameter: 2 in/cm Screen Slot Size: 0.010 in

Riser Pipe Material: PVC SCH. 40 Riser Pipe Diameter: 2 in/cm

Surface Casing (Y/N) Y Material STEEL Depth 2 ft/m

Diameter 6 in/cm Sealant CONCRETE

Development: Method: WHALE PUMP Duration: 5x WELL VOLUME

Description of Purged Water:

Well Instrumentation Log
(Form SP-15)

Project Name:	COLD SPRINGS TERMINALS	Well Designation:	MW-2S
Project Number:	11137172	Date Completed:	11/11/2019
Client:	SOUTHERN TERMINALS GROUP	Drilling Method:	HOLLOW STEM AUGER (6.25")
Location:	LYSANDER, NY	GHD Supervisor:	IAN McNAMARA

Cap Type: HINGED COVER/J- PLUG

Protective Casing Type: STEEL CASING

Measure bottom of well (after completion) 16.72 ft/m (below top of riser pipe)

Stick up = 2.91 ft/m

Bottom of Surface Seal ~1.5 ft/m

Surface Seal Type: CONCRETE

Borehole Diameter 10.25 in/cm

Riser Pipe

Annulus Backfill Type: N/A

Top of Seal* at ~1.5 ft/m

Seal Type: BENTONITE CHIPS (3/8" HOLE PLUG)

Bottom of Seal* at ~3.0 ft/m

Top of Screen* at ~3.8 ft/m

Pack Type: - sand, size #00N
- gravel
- natural

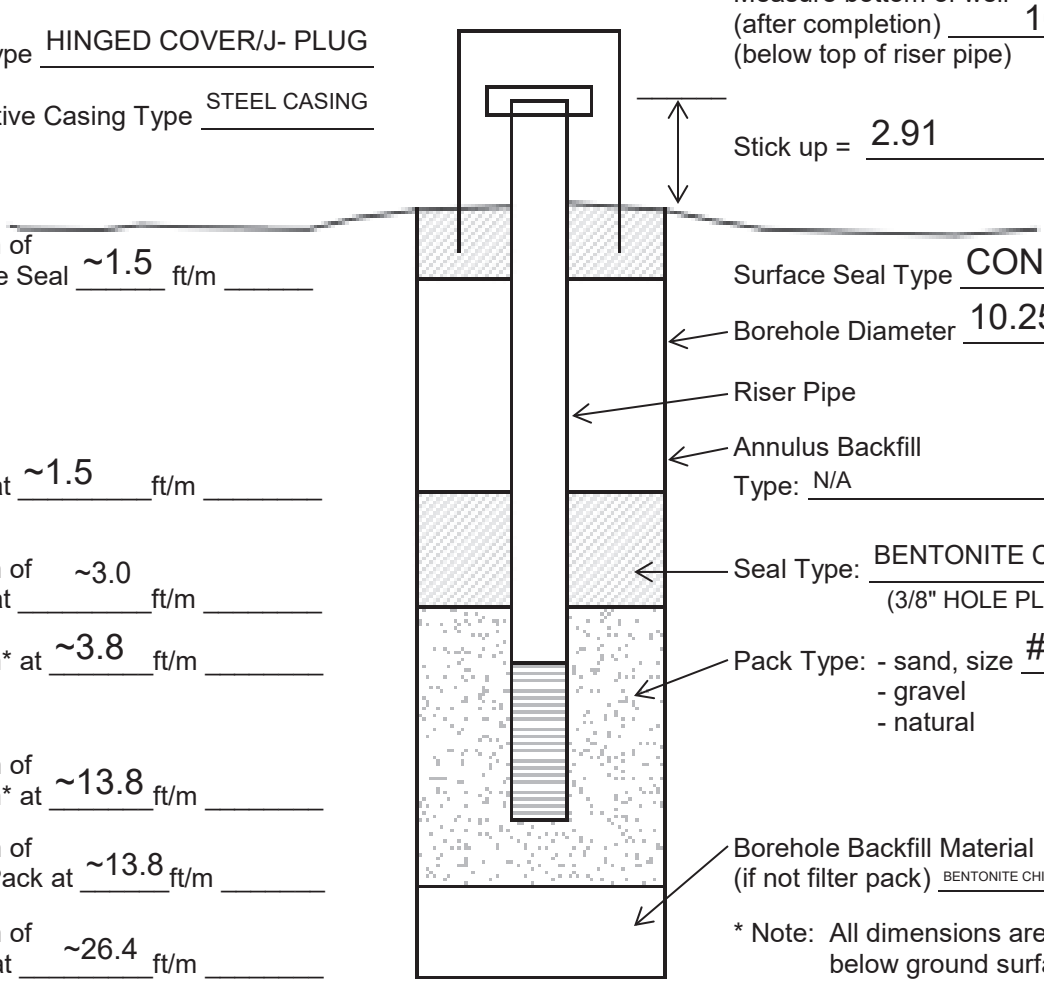
Bottom of Screen* at ~13.8 ft/m

Bottom of Filter Pack at ~13.8 ft/m

Borehole Backfill Material (if not filter pack) BENTONITE CHIPS FROM DEEP WELL

Bottom of Hole* at ~26.4 ft/m

* Note: All dimensions are below ground surface (bgs)



Screen Type: ☒ continuous slot ☐ wire wrapped ☐ louvre ☐ other:

Screen Material: ☐ stainless steel ☒ pvc ☐ other:

Screen Length: 10 ft/m Screen Diameter: 2 in/cm Screen Slot Size: 0.010 in

Riser Pipe Material: PVC SCH. 40 Riser Pipe Diameter: 2 in/cm

Surface Casing (Y/N) Y Material STEEL Depth 2 ft/m

Diameter 6 in/cm Sealant CONCRETE

Development: Method: WHALE PUMP Duration: 5x WELL VOLUME

Description of Purged Water:

Well Instrumentation Log
(Form SP-15)

Project Name:	COLD SPRINGS TERMINALS	Well Designation:	MW-2D
Project Number:	11137172	Date Completed:	11/11/2019
Client:	SOUTHERN TERMINALS GROUP	Drilling Method:	HOLLOW STEM AUGER (6.25")
Location:	LYSANDER, NY	GHD Supervisor:	IAN McNAMARA

Cap Type: HINGED COVER/J- PLUG

Protective Casing Type: STEEL CASING WITH HINGED COVER

Measure bottom of well (after completion) 29.46 ft/m (below top of riser pipe)

Stick up = 3.07 ft/m

Bottom of Surface Seal: N/A ft/m

Surface Seal Type: N/A

Borehole Diameter: 10.25 in/cm

SAND 15.5 - 15.0 ft

Top of Seal* at ~15.5 ft/m

Riser Pipe

Annulus Backfill Type: N/A- SHALLOW WELL

Bottom of Seal* at ~24.0 ft/m

Top of Screen* at ~24.9 ft/m

Seal Type: BENTONITE CHIPS (3/8" HOLEPLUG)

Pack Type: - sand, size #00N
- gravel
- natural

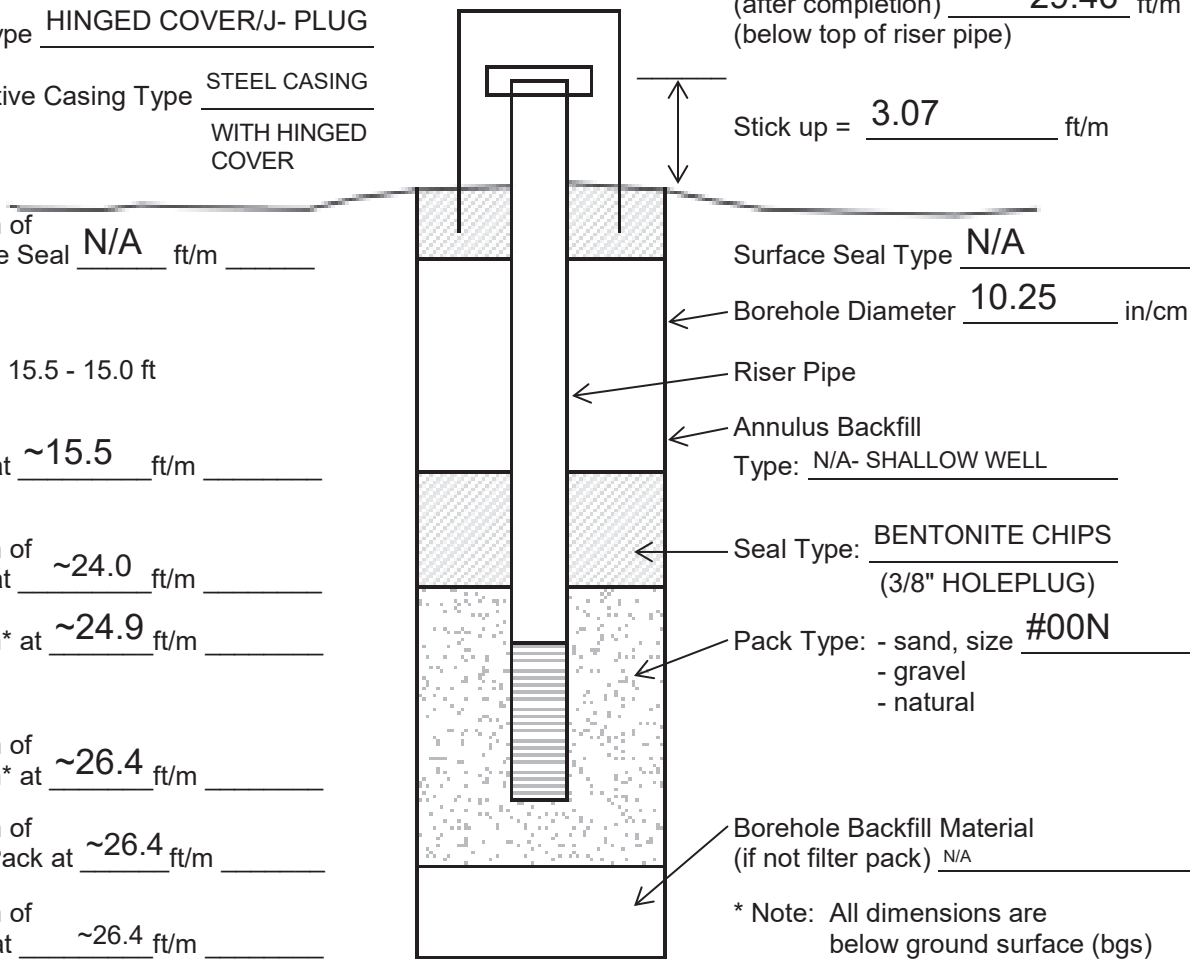
Bottom of Screen* at ~26.4 ft/m

Bottom of Filter Pack at ~26.4 ft/m

Borehole Backfill Material (if not filter pack): N/A

Bottom of Hole* at ~26.4 ft/m

* Note: All dimensions are below ground surface (bgs)



Screen Type: ☒ continuous slot ☐ wire wrapped ☐ louvre ☐ other:

Screen Material: ☐ stainless steel ☒ pvc ☐ other:

Screen Length: 1.5 ft/m Screen Diameter: 2 in/cm Screen Slot Size: 0.010 in

Riser Pipe Material: PVC SCH. 40 Riser Pipe Diameter: 2 in/cm

Surface Casing (Y/N) Y Material STEEL Depth 2 ft/m

Diameter 6 in/cm Sealant CONCRETE

Development: Method: WHALE PUMP Duration: 5x WELL VOLUME

Description of Purged Water:

Well Instrumentation Log
(Form SP-15)

Project Name:	COLD SPRINGS TERMINALS	Well Designation:	MW-3S
Project Number:	11137172	Date Completed:	11/07/2019
Client:	SOUTHERN TERMINALS GROUP	Drilling Method:	HOLLOW STEM AUGER (6.25")
Location:	LYSANDER, NY	GHD Supervisor:	IAN McNAMARA

Cap Type: HINGED COVER/J- PLUG

Protective Casing Type: STEEL CASING

Measure bottom of well (after completion) 18.39 ft/m (below top of riser pipe)

Stick up = 2.70 ft/m

Bottom of Surface Seal ~1.5 ft/m

Surface Seal Type: CONCRETE

Borehole Diameter 10.25 in/cm

Riser Pipe

Annulus Backfill

Type: N/A

Top of Seal* at ~1.5 ft/m

Seal Type: BENTONITE CHIPS (3/8" HOLE PLUG)

Bottom of Seal* at ~4.0 ft/m

Top of Screen* at ~5.7 ft/m

Pack Type: - sand, size #00N
- gravel
- natural

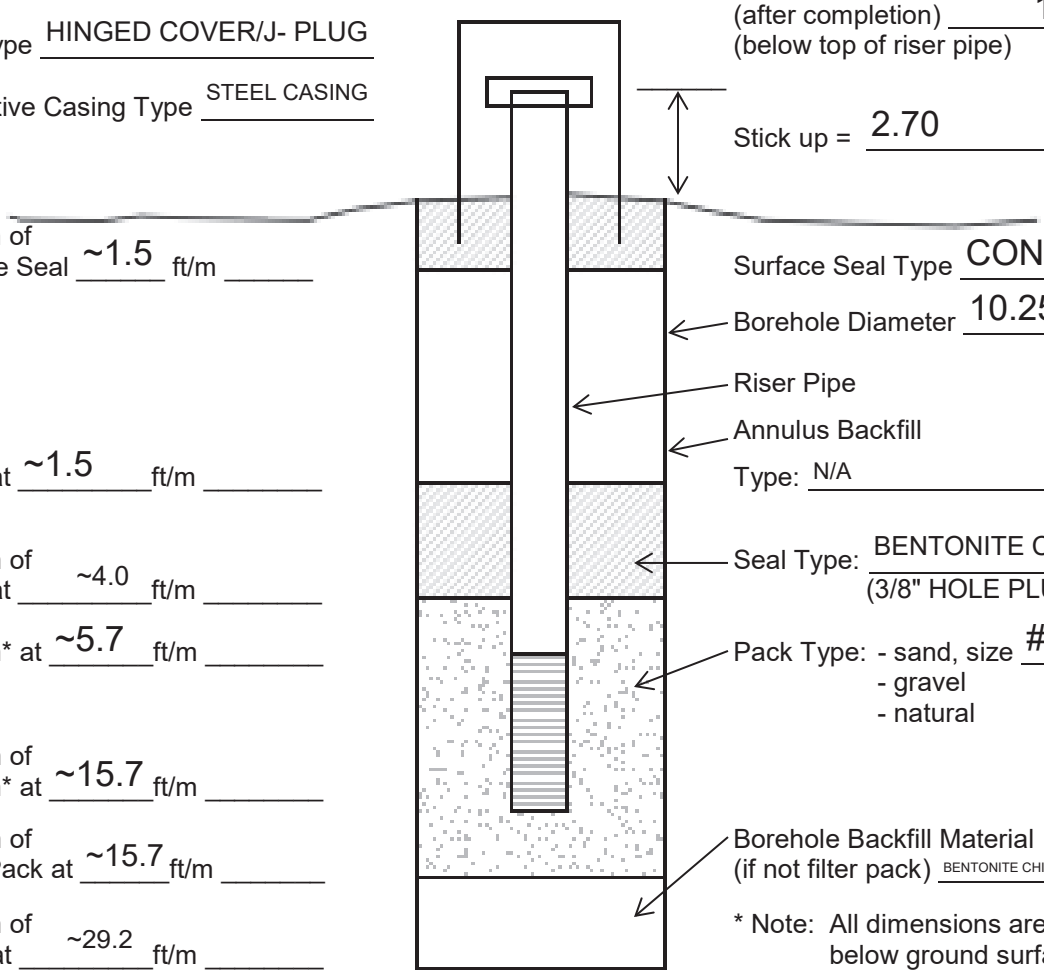
Bottom of Screen* at ~15.7 ft/m

Bottom of Filter Pack at ~15.7 ft/m

Borehole Backfill Material (if not filter pack) BENTONITE CHIPS FROM DEEP WELL

Bottom of Hole* at ~29.2 ft/m

* Note: All dimensions are below ground surface (bgs)



Screen Type: ☒ continuous slot ☐ wire wrapped ☐ louvre ☐ other:

Screen Material: ☐ stainless steel ☒ pvc ☐ other:

Screen Length: 10 ft/m Screen Diameter: 2 in/cm Screen Slot Size: 0.010 in

Riser Pipe Material: PVC SCH. 40 Riser Pipe Diameter: 2 in/cm

Surface Casing (Y/N) Y Material STEEL Depth 2 ft/m

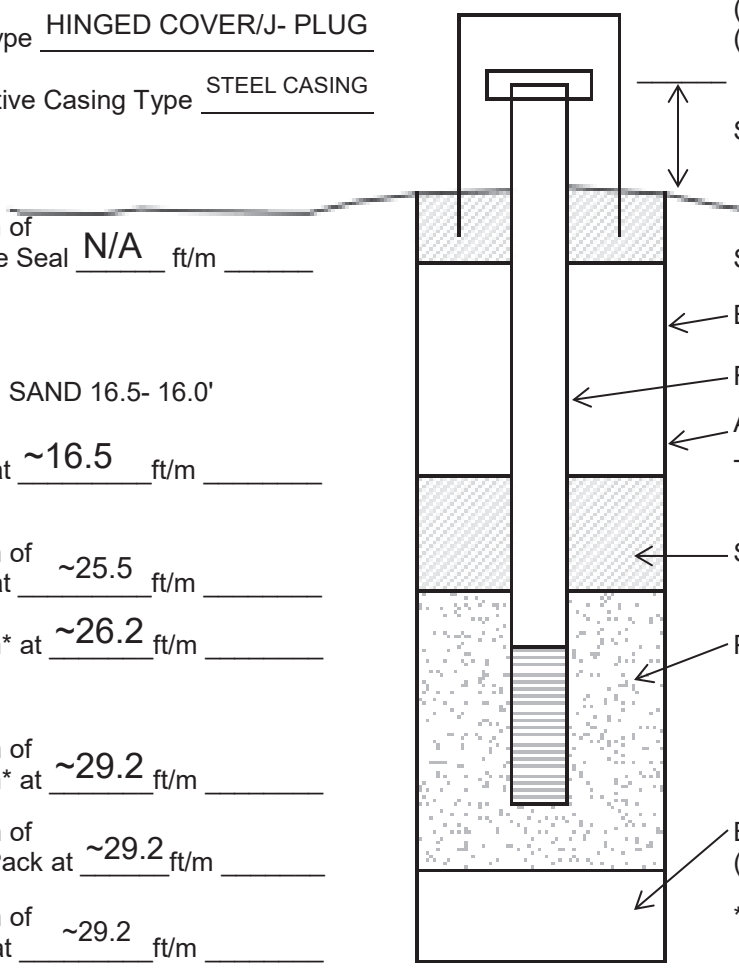
Diameter 6 in/cm Sealant CONCRETE

Development: Method: WHALE PUMP Duration: 5x WELL VOLUME

Description of Purged Water:

Well Instrumentation Log
(Form SP-15)

Project Name:	COLD SPRINGS TERMINALS	Well Designation:	MW-3D
Project Number:	11137172	Date Completed:	11/07/2019
Client:	SOUTHERN TERMINALS GROUP	Drilling Method:	HOLLOW STEM AUGER (6.25")
Location:	LYSANDER, NY	GHD Supervisor:	IAN McNAMARA



Measure bottom of well (after completion) 31.91 ft/m (below top of riser pipe)

Cap Type HINGED COVER/J- PLUG

Protective Casing Type STEEL CASING

Stick up = 2.67 ft/m

Bottom of Surface Seal N/A ft/m

Surface Seal Type N/A

Borehole Diameter 10.25 in/cm

Riser Pipe

Annulus Backfill

Type: N/A- SHALLOW WELL

SAND 16.5- 16.0'

Top of Seal* at ~16.5 ft/m

Seal Type: BENTONITE CHIPS (3/8" HOLE PLUG)

Bottom of Seal* at ~25.5 ft/m

Top of Screen* at ~26.2 ft/m

Pack Type: - sand, size #00N
- gravel
- natural

Bottom of Screen* at ~29.2 ft/m

Bottom of Filter Pack at ~29.2 ft/m

Borehole Backfill Material (if not filter pack) N/A

Bottom of Hole* at ~29.2 ft/m

* Note: All dimensions are below ground surface (bgs)

Screen Type: ☒ continuous slot ☐ wire wrapped ☐ louvre ☐ other: _____

Screen Material: ☐ stainless steel ☒ pvc ☐ other: _____

Screen Length: 3 ft/m Screen Diameter: 2 in/cm Screen Slot Size: 0.010 in

Riser Pipe Material: PVC SCH. 40 Riser Pipe Diameter: 2 in/cm

Surface Casing (Y/N) Y Material STEEL Depth 2 ft/m

Diameter 6 in/cm Sealant CONCRETE

Development: Method: WHALE PUMP Duration: 5x WELL VOLUME

Description of Purged Water: _____

Well Instrumentation Log
(Form SP-15)

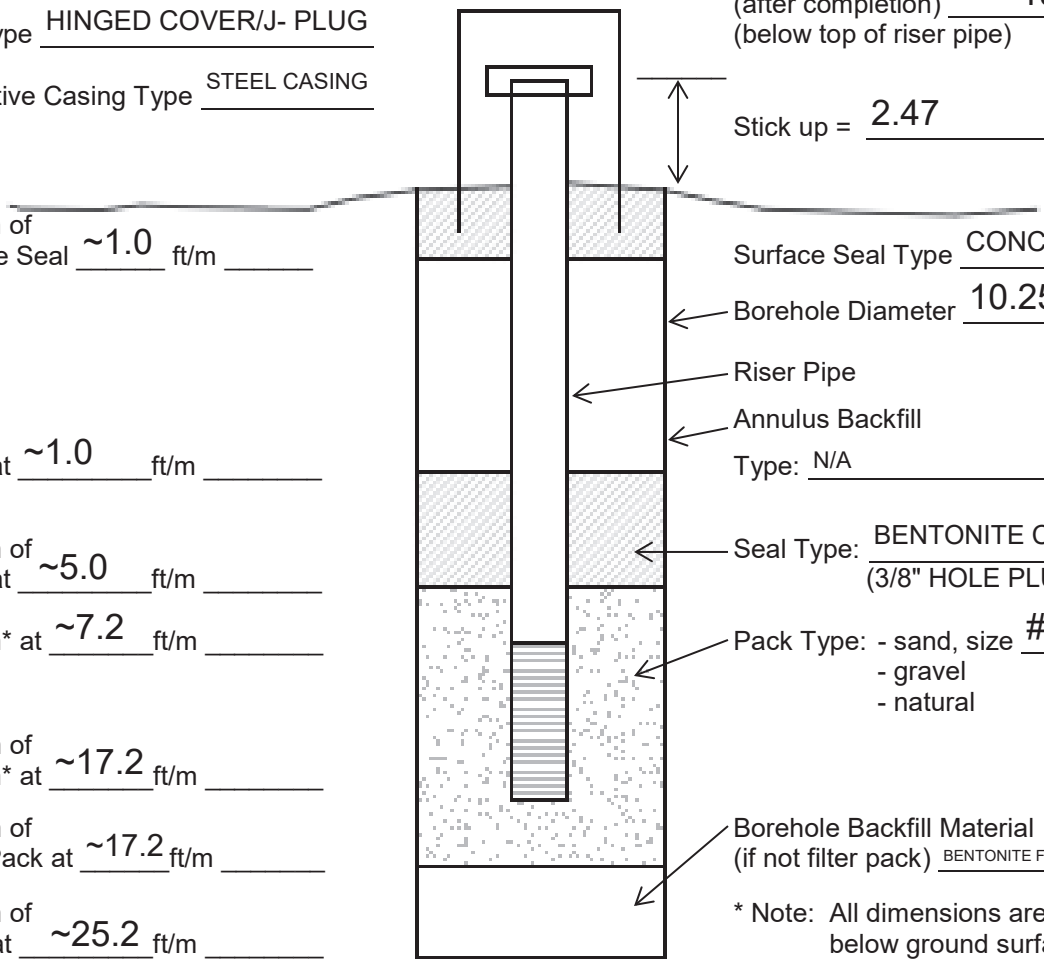
Project Name:	COLD SPRINGS TERMINALS	Well Designation:	MW-4S
Project Number:	11137172	Date Completed:	11/05/2019
Client:	SOUTHERN TERMINALS GROUP	Drilling Method:	HOLLOW STEM AUGER (6.25")
Location:	LYSANDER, NY	GHD Supervisor:	IAN McNAMARA

Cap Type: HINGED COVER/J- PLUG

Protective Casing Type: STEEL CASING

Measure bottom of well (after completion) 19.59 ft/m (below top of riser pipe)

Stick up = 2.47 ft/m



Bottom of Surface Seal ~1.0 ft/m

Surface Seal Type: CONCRETE PAD

Borehole Diameter 10.25 in/cm

Riser Pipe

Annulus Backfill

Type: N/A

Top of Seal* at ~1.0 ft/m

Seal Type: BENTONITE CHIPS (3/8" HOLE PLUG)

Bottom of Seal* at ~5.0 ft/m

Top of Screen* at ~7.2 ft/m

Pack Type: - sand, size #00N
- gravel
- natural

Bottom of Screen* at ~17.2 ft/m

Bottom of Filter Pack at ~17.2 ft/m

Borehole Backfill Material (if not filter pack) BENTONITE FROM DEEP WELL

Bottom of Hole* at ~25.2 ft/m

* Note: All dimensions are below ground surface (bgs)

Screen Type: ☒ continuous slot ☐ wire wrapped ☐ louvre ☐ other: _____

Screen Material: ☐ stainless steel ☒ pvc ☐ other: _____

Screen Length: 10 ft/m Screen Diameter: 2 in/cm Screen Slot Size: 0.010 in

Riser Pipe Material: PVC SCH. 40 Riser Pipe Diameter: 2 in/cm

Surface Casing (Y/N) Y Material STEEL Depth 2 ft/m

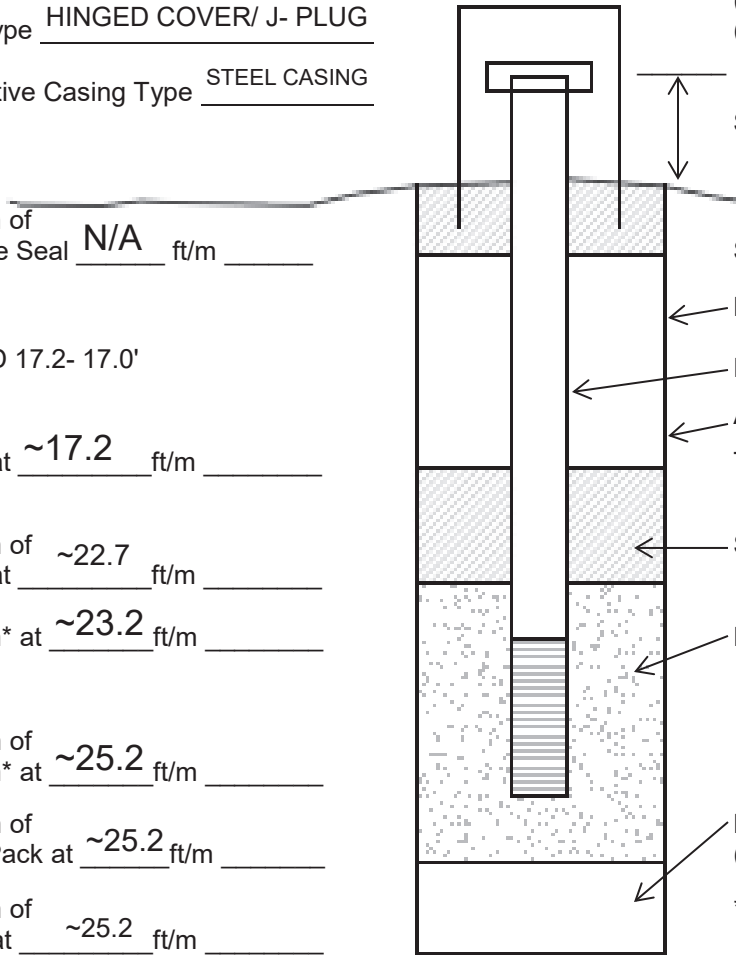
Diameter 6 in/cm Sealant CONCRETE

Development: Method: WHALE PUMP Duration: 5x WELL VOLUME

Description of Purged Water: _____

Well Instrumentation Log
(Form SP-15)

Project Name:	COLD SPRINGS TERMINALS	Well Designation:	MW-4D
Project Number:	11137172	Date Completed:	11/05/2019
Client:	SOUTHERN TERMINALS GROUP	Drilling Method:	HOLLOW STEM AUGER (6.25")
Location:	LYSANDER, NY	GHD Supervisor:	IAN McNAMARA



Cap Type: HINGED COVER/ J- PLUG

Protective Casing Type: STEEL CASING

Measure bottom of well (after completion) 27.67 ft/m (below top of riser pipe)

Stick up = 2.47 ft/m

Bottom of Surface Seal N/A ft/m

Surface Seal Type: N/A

Borehole Diameter 10.25 in/cm

SAND 17.2- 17.0'

Riser Pipe

Annulus Backfill

Type: N/A- SHALLOW WELL

Top of Seal* at ~17.2 ft/m

Seal Type: BENTONITE CHIPS (3/8" HOLE PLUG)

Bottom of Seal* at ~22.7 ft/m

Top of Screen* at ~23.2 ft/m

Pack Type: - sand, size #00N
- gravel
- natural

Bottom of Screen* at ~25.2 ft/m

Bottom of Filter Pack at ~25.2 ft/m

Borehole Backfill Material (if not filter pack) N/A

Bottom of Hole* at ~25.2 ft/m

* Note: All dimensions are below ground surface (bgs)

Screen Type: ☒ continuous slot ☐ wire wrapped ☐ louvre ☐ other:

Screen Material: ☐ stainless steel ☒ pvc ☐ other:

Screen Length: 2 ft/m Screen Diameter: 2 in/cm Screen Slot Size: 0.010 in

Riser Pipe Material: PVC SCH. 40 Riser Pipe Diameter: 2 in/cm

Surface Casing (Y/N) Y Material STEEL Depth 2 ft/m

Diameter 6 in/cm Sealant CONCRETE

Development: Method: WHALE PUMP Duration: 5x WELL VOLUME

Description of Purged Water:

Well Instrumentation Log
(Form SP-15)

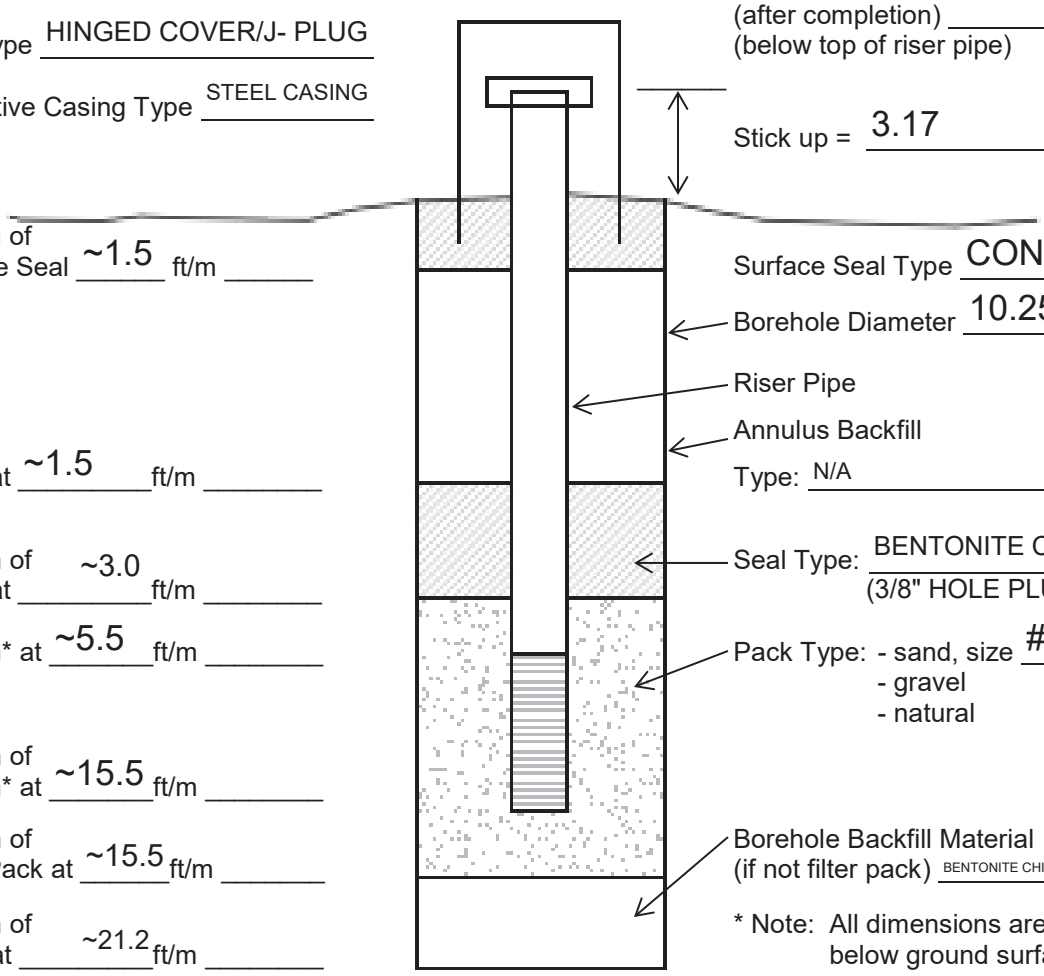
Project Name:	COLD SPRINGS TERMINALS	Well Designation:	MW-5S
Project Number:	11137172	Date Completed:	11/18/2019
Client:	SOUTHERN TERMINALS GROUP	Drilling Method:	HOLLOW STEM AUGER (6.25")
Location:	LYSANDER, NY	GHD Supervisor:	IAN McNAMARA

Cap Type: HINGED COVER/J- PLUG

Protective Casing Type: STEEL CASING

Measure bottom of well (after completion) 18.66 ft/m (below top of riser pipe)

Stick up = 3.17 ft/m



Bottom of Surface Seal ~1.5 ft/m

Surface Seal Type: CONCRETE

Borehole Diameter: 10.25 in/cm

Riser Pipe

Annulus Backfill

Type: N/A

Top of Seal* at ~1.5 ft/m

Seal Type: BENTONITE CHIPS (3/8" HOLE PLUG)

Bottom of Seal* at ~3.0 ft/m

Top of Screen* at ~5.5 ft/m

Pack Type: - sand, size #00N
- gravel
- natural

Bottom of Screen* at ~15.5 ft/m

Bottom of Filter Pack at ~15.5 ft/m

Borehole Backfill Material (if not filter pack): BENTONITE CHIPS FROM DEEP WELL

Bottom of Hole* at ~21.2 ft/m

* Note: All dimensions are below ground surface (bgs)

Screen Type: ☒ continuous slot ☐ wire wrapped ☐ louvre ☐ other: _____

Screen Material: ☐ stainless steel ☒ pvc ☐ other: _____

Screen Length: 10 ft/m Screen Diameter: 2 in/cm Screen Slot Size: 0.010 in

Riser Pipe Material: PVC SCH. 40 Riser Pipe Diameter: 2 in/cm

Surface Casing (Y/N) Y Material STEEL Depth 2 ft/m

Diameter 6 in/cm Sealant CONCRETE

Development: Method: WHALE PUMP Duration: 5x WELL VOLUME

Description of Purged Water: _____

Well Instrumentation Log
(Form SP-15)

Project Name:	COLD SPRINGS TERMINALS	Well Designation:	MW-5D
Project Number:	11137172	Date Completed:	11/18/2019
Client:	SOUTHERN TERMINALS GROUP	Drilling Method:	HOLLOW STEM AUGER (6.25")
Location:	LYSANDER, NY	GHD Supervisor:	IAN McNAMARA

Cap Type: HINGED COVER/ J- PLUG

Protective Casing Type: STEEL CASING

Measure bottom of well (after completion) 24.43 ft/m (below top of riser pipe)

Stick up = 3.19 ft/m

Bottom of Surface Seal: N/A ft/m

Surface Seal Type: N/A

Borehole Diameter: 10.25 in/cm

Riser Pipe

Annulus Backfill

Type: N/A- SHALLOW WELL

SAND 15.5 - 15.0'

Top of Seal* at ~15.5 ft/m

Seal Type: BENTONITE CHIPS (3/8" HOLE PLUG)

Bottom of Seal* at ~16.7 ft/m

Top of Screen* at ~18.2 ft/m

Pack Type: - sand, size #00N
- gravel
- natural

Bottom of Screen* at ~21.2 ft/m

Bottom of Filter Pack at ~21.2 ft/m

Borehole Backfill Material (if not filter pack) N/A

Bottom of Hole* at ~21.2 ft/m

* Note: All dimensions are below ground surface (bgs)

Screen Type: ☒ continuous slot ☐ wire wrapped ☐ louvre ☐ other:

Screen Material: ☐ stainless steel ☒ pvc ☐ other:

Screen Length: 3 ft/m Screen Diameter: 2 in/cm Screen Slot Size: 0.010 in

Riser Pipe Material: PVC SCH. 40 Riser Pipe Diameter: 2 in/cm

Surface Casing (Y/N) Y Material STEEL Depth 2 ft/m

Diameter 6 in/cm Sealant CONCRETE

Development: Method: WHALE PUMP Duration: 5x WELL VOLUME

Description of Purged Water:

Well Instrumentation Log
(Form SP-15)

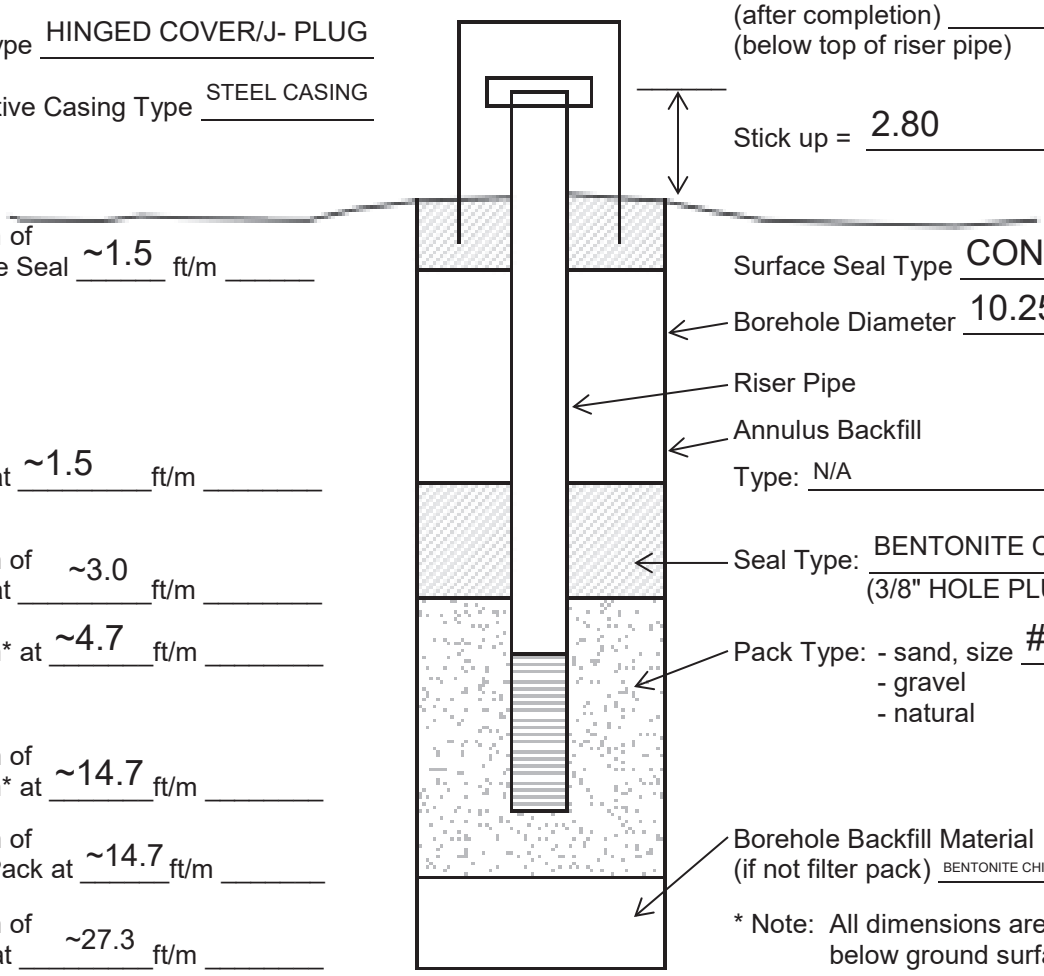
Project Name:	COLD SPRINGS TERMINALS	Well Designation:	MW-6S
Project Number:	11137172	Date Completed:	11/19/2019
Client:	SOUTHERN TERMINALS GROUP	Drilling Method:	HOLLOW STEM AUGER (6.25")
Location:	LYSANDER, NY	GHD Supervisor:	IAN McNAMARA

Cap Type: HINGED COVER/J- PLUG

Protective Casing Type: STEEL CASING

Measure bottom of well (after completion) 17.47 ft/m (below top of riser pipe)

Stick up = 2.80 ft/m



Bottom of Surface Seal ~1.5 ft/m

Surface Seal Type: CONCRETE

Borehole Diameter: 10.25 in/cm

Riser Pipe

Annulus Backfill

Type: N/A

Top of Seal* at ~1.5 ft/m

Seal Type: BENTONITE CHIPS (3/8" HOLE PLUG)

Bottom of Seal* at ~3.0 ft/m

Top of Screen* at ~4.7 ft/m

Pack Type: - sand, size #00N
- gravel
- natural

Bottom of Screen* at ~14.7 ft/m

Bottom of Filter Pack at ~14.7 ft/m

Borehole Backfill Material (if not filter pack): BENTONITE CHIPS FROM DEEP WELL

Bottom of Hole* at ~27.3 ft/m

* Note: All dimensions are below ground surface (bgs)

Screen Type: ☒ continuous slot ☐ wire wrapped ☐ louvre ☐ other: _____

Screen Material: ☐ stainless steel ☒ pvc ☐ other: _____

Screen Length: 10 ft/m Screen Diameter: 2 in/cm Screen Slot Size: 0.010 in

Riser Pipe Material: PVC SCH. 40 Riser Pipe Diameter: 2 in/cm

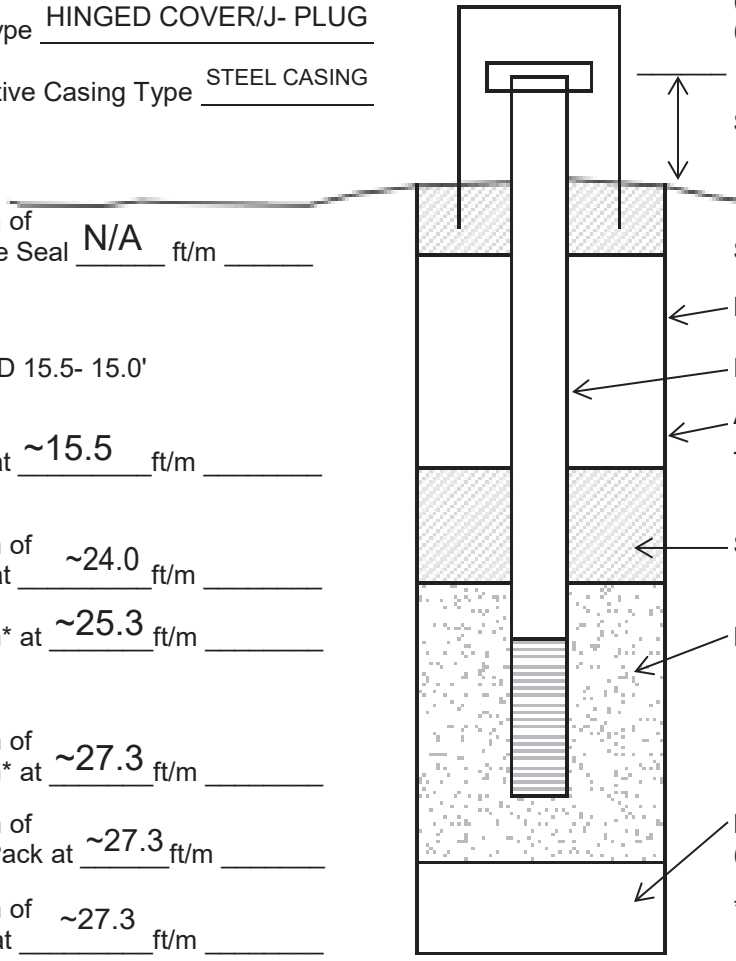
Surface Casing (Y/N) Y Material STEEL Depth 2 ft/m

Diameter 6 in/cm Sealant CONCRETE

Development: Method: WHALE PUMP Duration: 5x WELL VOLUME

Description of Purged Water: _____

Project Name:	COLD SPRINGS TERMINALS	Well Designation:	MW-6D
Project Number:	11137172	Date Completed:	11/19/2019
Client:	SOUTHERN TERMINALS GROUP	Drilling Method:	HOLLOW STEM AUGER (6.25")
Location:	LYSANDER, NY	GHD Supervisor:	IAN McNAMARA



Cap Type: HINGED COVER/J- PLUG

Protective Casing Type: STEEL CASING

Measure bottom of well (after completion) 30.14 ft/m (below top of riser pipe)

Stick up = 2.87 ft/m

Bottom of Surface Seal N/A ft/m

Surface Seal Type: N/A

Borehole Diameter 10.25 in/cm

SAND 15.5- 15.0'

Riser Pipe

Annulus Backfill

Top of Seal* at ~15.5 ft/m

Type: N/A- SHALLOW WELL

Bottom of Seal* at ~24.0 ft/m

Seal Type: BENTONITE CHIPS (3/8" HOLE PLUG)

Top of Screen* at ~25.3 ft/m

Pack Type: - sand, size #00N
- gravel
- natural

Bottom of Screen* at ~27.3 ft/m

Bottom of Filter Pack at ~27.3 ft/m

Borehole Backfill Material (if not filter pack) N/A

Bottom of Hole* at ~27.3 ft/m

* Note: All dimensions are below ground surface (bgs)

Screen Type: ☒ continuous slot ☐ wire wrapped ☐ louvre ☐ other:

Screen Material: ☐ stainless steel ☒ pvc ☐ other:

Screen Length: 2 ft/m Screen Diameter: 2 in/cm Screen Slot Size: 0.010 in

Riser Pipe Material: PVC SCH. 40 Riser Pipe Diameter: 2 in/cm

Surface Casing (Y/N) Y Material STEEL Depth 2 ft/m

Diameter 6 in/cm Sealant CONCRETE

Development: Method: WHALE PUMP Duration: 5x WELL VOLUME

Description of Purged Water:

Well Instrumentation Log
(Form SP-15)

Project Name:	COLD SPRINGS TERMINALS	Well Designation:	MW-7S
Project Number:	11137172	Date Completed:	11/13/2019
Client:	SOUTHERN TERMINALS GROUP	Drilling Method:	HOLLOW STEM AUGER (6.25")
Location:	LYSANDER, NY	GHD Supervisor:	IAN McNAMARA

Cap Type: HINGED COVER/J- PLUG

Protective Casing Type: STEEL CASING

Measure bottom of well (after completion) 18.36 ft/m (below top of riser pipe)

Stick up = 2.81 ft/m

Bottom of Surface Seal ~1.5 ft/m

Surface Seal Type: CONCRETE

Borehole Diameter 10.25 in/cm

Riser Pipe

Annulus Backfill

Type: N/A

Top of Seal* at ~1.5 ft/m

Seal Type: BENTONITE CHIPS (3/8" HOLE PLUG)

Bottom of Seal* at ~4.0 ft/m

Top of Screen* at ~5.6 ft/m

Pack Type: - sand, size #00N
- gravel
- natural

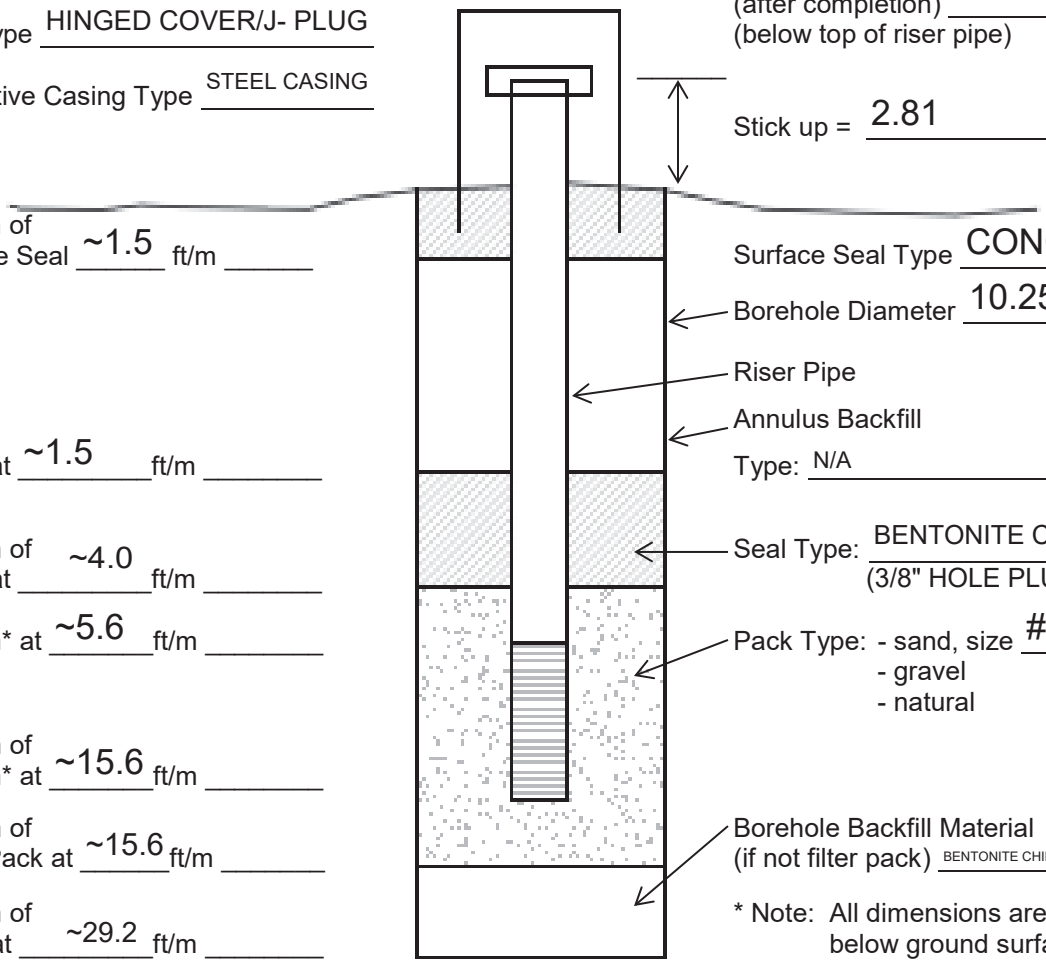
Bottom of Screen* at ~15.6 ft/m

Bottom of Filter Pack at ~15.6 ft/m

Borehole Backfill Material (if not filter pack) BENTONITE CHIPS FROM DEEP WELL

Bottom of Hole* at ~29.2 ft/m

* Note: All dimensions are below ground surface (bgs)



Screen Type: ☒ continuous slot ☐ wire wrapped ☐ louvre ☐ other:

Screen Material: ☐ stainless steel ☒ pvc ☐ other:

Screen Length: 10 ft/m Screen Diameter: 2 in/cm Screen Slot Size: 0.010 in

Riser Pipe Material: PVC SCH. 40 Riser Pipe Diameter: 2 in/cm

Surface Casing (Y/N) Y Material STEEL Depth 2 ft/m

Diameter 6 in/cm Sealant CONCRETE

Development: Method: WHALE PUMP Duration: 5x WELL VOLUME

Description of Purged Water:

Well Instrumentation Log
(Form SP-15)

Project Name:	COLD SPRINGS TERMINALS	Well Designation:	MW-7D
Project Number:	11137172	Date Completed:	11/13/2019
Client:	SOUTHERN TERMINALS GROUP	Drilling Method:	HOLLOW STEM AUGER (6.25")
Location:	LYSANDER, NY	GHD Supervisor:	IAN McNAMARA

Cap Type: HINGED COVER/J- PLUG

Protective Casing Type: STEEL CASING

Measure bottom of well (after completion) 32.02 ft/m (below top of riser pipe)

Stick up = 2.85 ft/m

Bottom of Surface Seal N/A ft/m

Surface Seal Type: N/A

Borehole Diameter 10.25 in/cm

Riser Pipe

Annulus Backfill

Type: N/A- SHALLOW WELL

SAND 16.5- 16.0'

Top of Seal* at ~16.5 ft/m

Seal Type: BENTONITE CHIPS (3/8" HOLE PLUG)

Bottom of Seal* at ~25.7 ft/m

Top of Screen* at ~26.2 ft/m

Pack Type: - sand, size #00N
- gravel
- natural

Bottom of Screen* at ~29.2 ft/m

Bottom of Filter Pack at ~29.2 ft/m

Borehole Backfill Material (if not filter pack) N/A

Bottom of Hole* at ~29.2 ft/m

* Note: All dimensions are below ground surface (bgs)

Screen Type: ☒ continuous slot ☐ wire wrapped ☐ louvre ☐ other: _____

Screen Material: ☐ stainless steel ☒ pvc ☐ other: _____

Screen Length: 3 ft/m Screen Diameter: 2 in/cm Screen Slot Size: 0.010 in

Riser Pipe Material: PVC SCH. 40 Riser Pipe Diameter: 2 in/cm

Surface Casing (Y/N) Y Material STEEL Depth 2 ft/m

Diameter 6 in/cm Sealant CONCRETE

Development: Method: WHALE PUMP Duration: 5x WELL VOLUME

Description of Purged Water: _____

Well Instrumentation Log
(Form SP-15)

Project Name:	COLD SPRINGS TERMINALS	Well Designation:	MW-9S
Project Number:	11137172	Date Completed:	11/21/2019
Client:	SOUTHERN TERMINALS GROUP	Drilling Method:	HOLLOW STEM AUGER (6.25")
Location:	LYSANDER, NY	GHD Supervisor:	IAN McNAMARA

Cap Type: HINGED COVER/J- PLUG

Protective Casing Type: STEEL CASING

Measure bottom of well (after completion) 17.53 ft/m (below top of riser pipe)

Stick up = 2.56 ft/m

Bottom of Surface Seal ~1.5 ft/m

Surface Seal Type: CONCRETE

Borehole Diameter 10.25 in/cm

Riser Pipe

Annulus Backfill

Type: N/A

Top of Seal* at ~1.5 ft/m

Seal Type: BENTONITE CHIPS (3/8" HOLE PLUG)

Bottom of Seal* at ~4.0 ft/m

Top of Screen* at ~5.0 ft/m

Pack Type: - sand, size #00N
- gravel
- natural

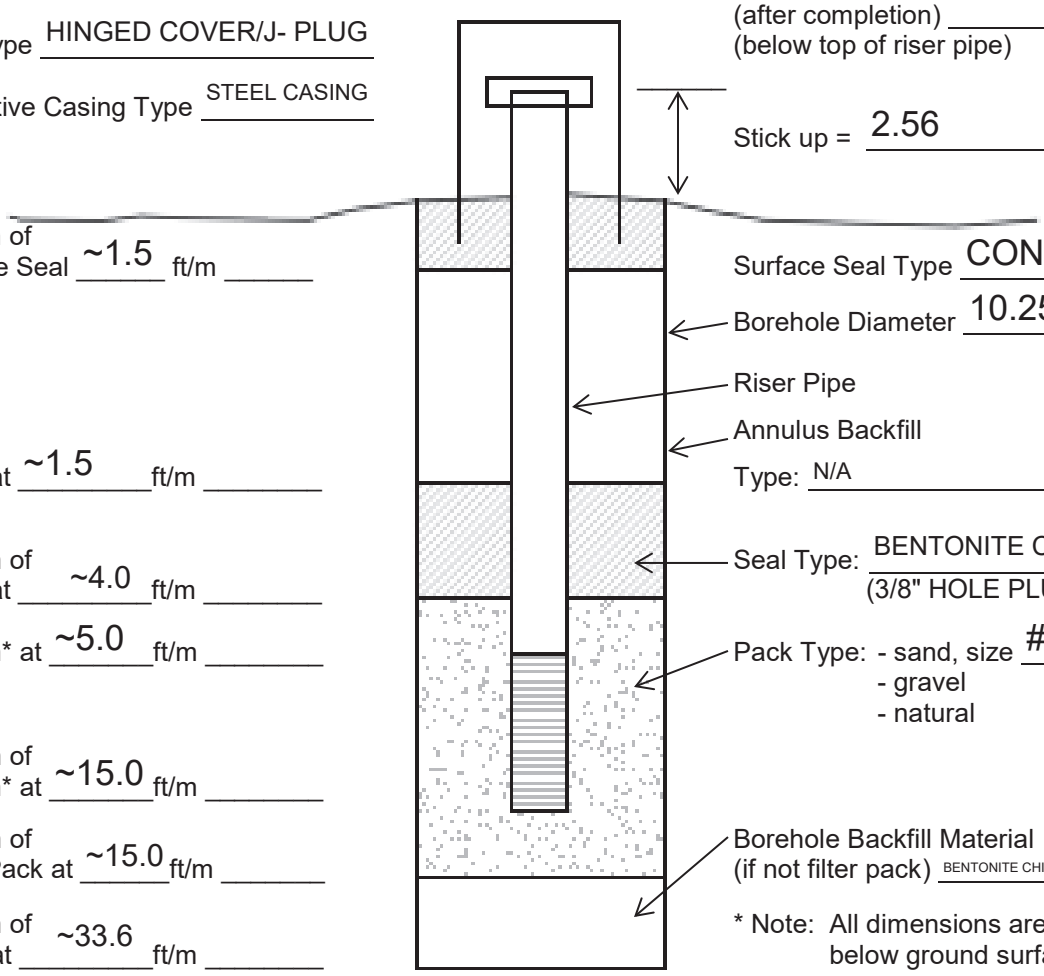
Bottom of Screen* at ~15.0 ft/m

Bottom of Filter Pack at ~15.0 ft/m

Borehole Backfill Material (if not filter pack) BENTONITE CHIPS FROM DEEP WELL

Bottom of Hole* at ~33.6 ft/m

* Note: All dimensions are below ground surface (bgs)



Screen Type: ☒ continuous slot ☐ wire wrapped ☐ louvre ☐ other:

Screen Material: ☐ stainless steel ☒ pvc ☐ other:

Screen Length: 10 ft/m Screen Diameter: 2 in/cm Screen Slot Size: 0.010 in

Riser Pipe Material: PVC SCH. 40 Riser Pipe Diameter: 2 in/cm

Surface Casing (Y/N) Y Material STEEL Depth 2 ft/m

Diameter 6 in/cm Sealant CONCRETE

Development: Method: WHALE PUMP Duration: 5x WELL VOLUME

Description of Purged Water:

Well Instrumentation Log
(Form SP-15)

Project Name:	COLD SPRINGS TERMINALS	Well Designation:	MW-9D
Project Number:	11137172	Date Completed:	11/21/2019
Client:	SOUTHERN TERMINALS GROUP	Drilling Method:	HOLLOW STEM AUGER (6.25")
Location:	LYSANDER, NY	GHD Supervisor:	IAN McNAMARA

Cap Type: HINGED COVER/J- PLUG

Protective Casing Type: STEEL CASING

Measure bottom of well (after completion) 36.17 ft/m (below top of riser pipe)

Stick up = 2.54 ft/m

Bottom of Surface Seal: N/A ft/m

Surface Seal Type: N/A

Borehole Diameter: 10.25 in/cm

SAND 16.5 -16.0'

Top of Seal* at ~16.5 ft/m

Riser Pipe

Annulus Backfill

Type: N/A- SHALLOW WELL

Bottom of Seal* at ~29.5 ft/m

Top of Screen* at ~31.6 ft/m

Seal Type: BENTONITE CHIPS (3/8" HOLE PLUG)

Pack Type: - sand, size #00N
- gravel
- natural

Bottom of Screen* at ~33.6 ft/m

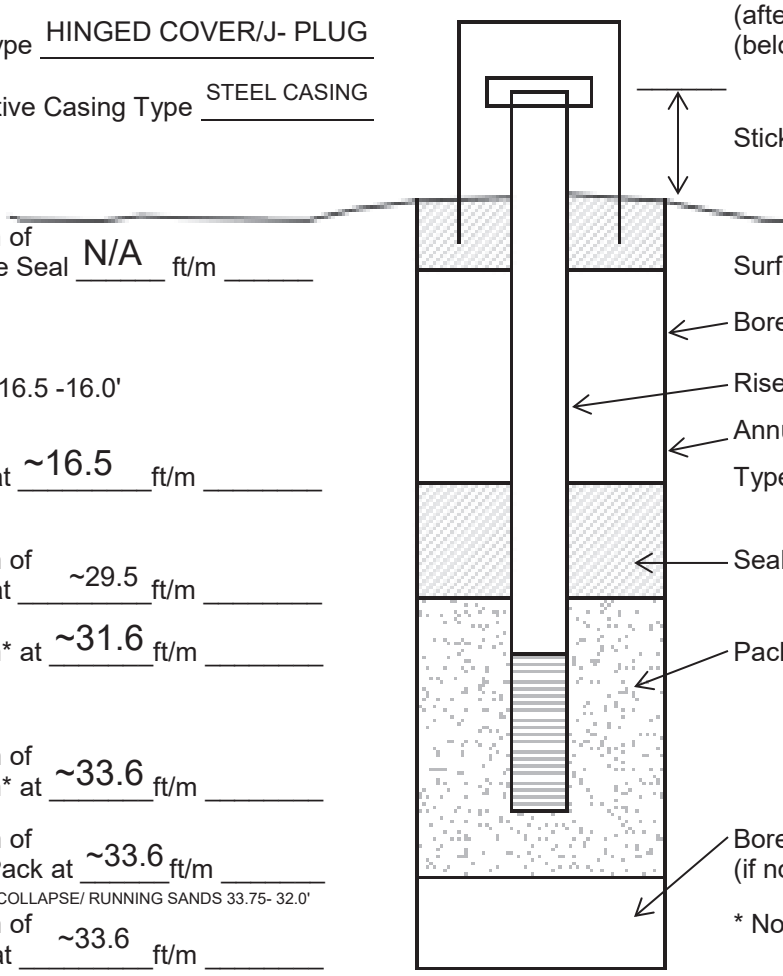
Bottom of Filter Pack at ~33.6 ft/m

NATURAL COLLAPSE/ RUNNING SANDS 33.75- 32.0'

Bottom of Hole* at ~33.6 ft/m

Borehole Backfill Material (if not filter pack) N/A

* Note: All dimensions are below ground surface (bgs)



Screen Type: ☒ continuous slot ☐ wire wrapped ☐ louvre ☐ other:

Screen Material: ☐ stainless steel ☒ pvc ☐ other:

Screen Length: 2 ft/m Screen Diameter: 2 in/cm Screen Slot Size: 0.010 in

Riser Pipe Material: PVC SCH. 40 Riser Pipe Diameter: 2 in/cm

Surface Casing (Y/N) Y Material STEEL Depth 2 ft/m

Diameter 6 in/cm Sealant CONCRETE

Development: Method: WHALE PUMP Duration: 5x WELL VOLUME

Description of Purged Water:

Well Instrumentation Log
(Form SP-15)

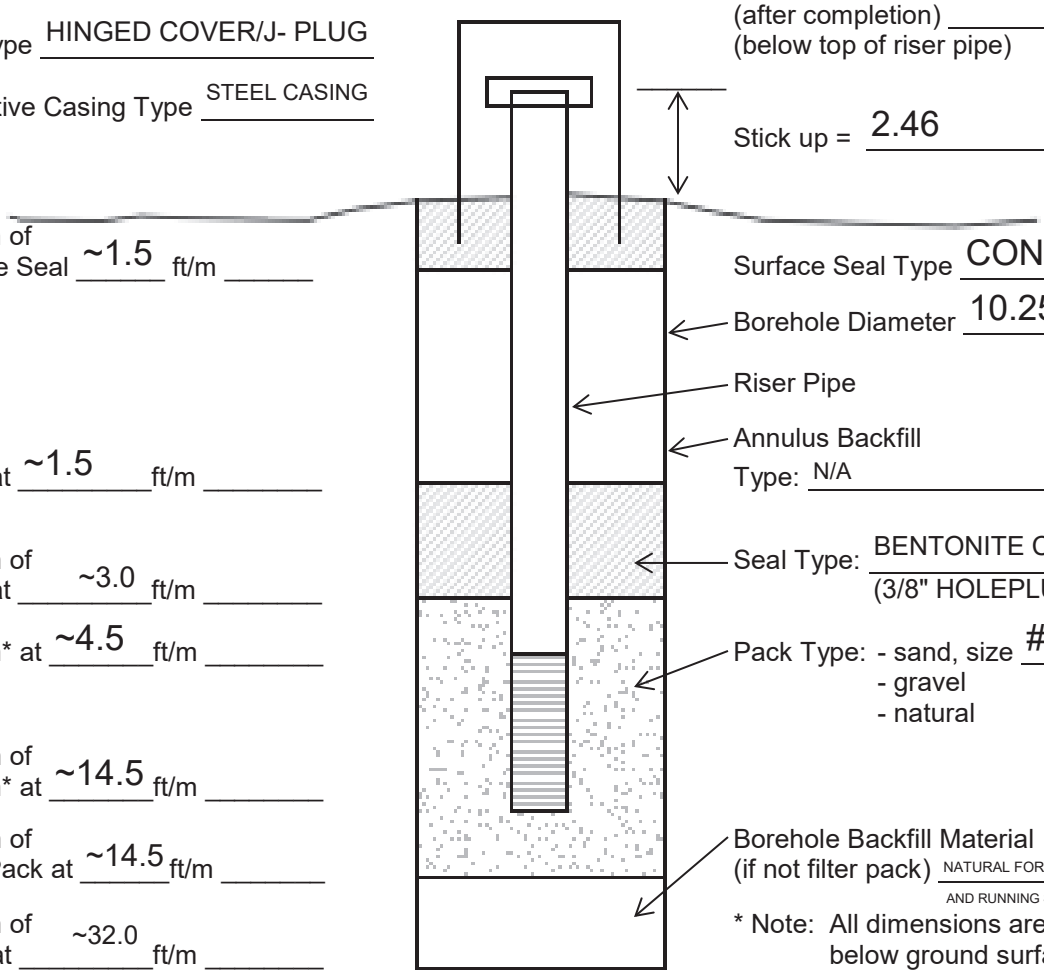
Project Name:	COLD SPRINGS TERMINALS	Well Designation:	MW-10S
Project Number:	11137172	Date Completed:	11/20/2019
Client:	SOUTHERN TERMINALS GROUP	Drilling Method:	HOLLOW STEM AUGER (6.25")
Location:	LYSANDER, NY	GHD Supervisor:	IAN McNAMARA

Cap Type: HINGED COVER/J- PLUG

Protective Casing Type: STEEL CASING

Measure bottom of well (after completion) 16.94 ft/m (below top of riser pipe)

Stick up = 2.46 ft/m



Bottom of Surface Seal ~1.5 ft/m

Surface Seal Type: CONCRETE

Borehole Diameter: 10.25 in/cm

Riser Pipe

Annulus Backfill Type: N/A

Top of Seal* at ~1.5 ft/m

Seal Type: BENTONITE CHIPS (3/8" HOLEPLUG)

Bottom of Seal* at ~3.0 ft/m

Top of Screen* at ~4.5 ft/m

Pack Type: - sand, size #00N
- gravel
- natural

Bottom of Screen* at ~14.5 ft/m

Bottom of Filter Pack at ~14.5 ft/m

Borehole Backfill Material (if not filter pack): NATURAL FORMATION COLLAPSE AND RUNNING SANDS

Bottom of Hole* at ~32.0 ft/m

* Note: All dimensions are below ground surface (bgs)

Screen Type: ☒ continuous slot ☐ wire wrapped ☐ louvre ☐ other: _____

Screen Material: ☐ stainless steel ☒ pvc ☐ other: _____

Screen Length: 10 ft/m Screen Diameter: 2 in/cm Screen Slot Size: 0.010 in

Riser Pipe Material: PVC SCH. 40 Riser Pipe Diameter: 2 in/cm

Surface Casing (Y/N) Y Material STEEL Depth 2 ft/m

Diameter 4 in/cm Sealant CONCRETE

Development: Method: WHALE PUMP Duration: 5x WELL VOLUME

Description of Purged Water: _____

Well Instrumentation Log
(Form SP-15)

Project Name:	COLD SPRINGS TERMINALS	Well Designation:	MW-10I
Project Number:	11137172	Date Completed:	11/20/2019
Client:	SOUTHERN TERMINALS GROUP	Drilling Method:	HOLLOW STEM AUGER (6.25")
Location:	LYSANDER, NY	GHD Supervisor:	IAN McNAMARA

Cap Type: HINGED COVER/J- PLUG

Protective Casing Type: STEEL CASING

Measure bottom of well (after completion) 30.39 ft/m (below top of riser pipe)

Stick up = 1.44 ft/m

Bottom of Surface Seal ~1.5 ft/m

Surface Seal Type: CONCRETE

Borehole Diameter 10.25 in/cm

Riser Pipe

Annulus Backfill

Type: BENTONITE CHIPS AND SOIL CUTTING MIX

Top of Seal* at ~16.5 ft/m

Seal Type: BENTONITE CHIPS (3/8" HOLE PLUG)

Bottom of Seal* at ~21.5 ft/m

Top of Screen* at ~24.0 ft/m

Pack Type: - sand, size #00N
- gravel
- natural

Bottom of Screen* at ~29.0 ft/m

Bottom of Filter Pack at ~29.0 ft/m

Borehole Backfill Material (if not filter pack) BENTONITE CHIPS FROM DEEP WELL

Bottom of Hole* at ~35.7 ft/m

* Note: All dimensions are below ground surface (bgs)

Screen Type: ☒ continuous slot ☐ wire wrapped ☐ louvre ☐ other: _____

Screen Material: ☐ stainless steel ☒ pvc ☐ other: _____

Screen Length: 5 ft/m Screen Diameter: 2 in/cm Screen Slot Size: 0.010 in

Riser Pipe Material: PVC SCH. 40 Riser Pipe Diameter: 2 in/cm

Surface Casing (Y/N) Y Material STEEL Depth 2 ft/m

Diameter 6 in/cm Sealant CONCRETE

Development: Method: WHALE PUMP Duration: 5x WELL VOLUME

Description of Purged Water: _____

Well Instrumentation Log
(Form SP-15)

Project Name:	COLD SPRINGS TERMINALS	Well Designation:	MW-10D
Project Number:	11137172	Date Completed:	11/20/2019
Client:	SOUTHERN TERMINALS GROUP	Drilling Method:	HOLLOW STEM AUGER (6.25")
Location:	LYSANDER, NY	GHD Supervisor:	IAN McNAMARA

Cap Type: HINGED COVER/J- PLUG

Protective Casing Type: STEEL CASING

Measure bottom of well (after completion) 37.20 ft/m (below top of riser pipe)

Stick up = 1.50 ft/m

Bottom of Surface Seal: N/A ft/m

Surface Seal Type: N/A

Borehole Diameter: 10.25 in/cm

SAND 29.0- 28.5'

Top of Seal* at ~29.0 ft/m

Riser Pipe

Annulus Backfill

Type: N/A- INTERMEDIATE WELL

Bottom of Seal* at ~33.0 ft/m

Top of Screen* at ~33.7 ft/m

Seal Type: BENTONITE CHIPS (3/8" HOLE PLUG)

Pack Type: - sand, size #00N
- gravel
- natural

Bottom of Screen* at ~35.7 ft/m

Bottom of Filter Pack at ~35.7 ft/m

Bottom of Hole* at ~35.7 ft/m

Borehole Backfill Material (if not filter pack) N/A

* Note: All dimensions are below ground surface (bgs)

Screen Type: ☒ continuous slot ☐ wire wrapped ☐ louvre ☐ other: _____

Screen Material: ☐ stainless steel ☒ pvc ☐ other: _____

Screen Length: 2 ft/m Screen Diameter: 2 in/cm Screen Slot Size: 0.010 in

Riser Pipe Material: PVC SCH. 40 Riser Pipe Diameter: 2 in/cm

Surface Casing (Y/N) Y Material STEEL Depth 2 ft/m

Diameter 6 in/cm Sealant CONCRETE

Development: Method: WHALE PUMP Duration: 5x WELL VOLUME

Description of Purged Water: _____

Project Name:	COLD SPRINGS TERMINALS	Well Designation:	RW-1
Project Number:	11137172	Date Completed:	11/04/2019
Client:	SOUTHERN TERMINALS GROUP	Drilling Method:	HOLLOW STEM AUGER (8.25")
Location:	LYSANDER, NY	GHD Supervisor:	IAN McNAMARA

Cap Type: LOCKING ROYER/ J- PLUG

Protective Casing Type: STEEL STICK-UP

Measure bottom of well (after completion) 17.35 ft/m (below top of riser pipe)

Stick up = 1.68 ft/m

Bottom of Surface Seal ~1.5 ft/m

Surface Seal Type: CONCRETE

Borehole Diameter 12.25 in/cm

Riser Pipe

Annulus Backfill Type: N/A

Top of Seal* at ~1.5 ft/m

Seal Type: BENTONITE CHIPS (3/8" HOLE PLUG)

Bottom of Seal* at ~3.0 ft/m

Top of Screen* at ~5.7 ft/m

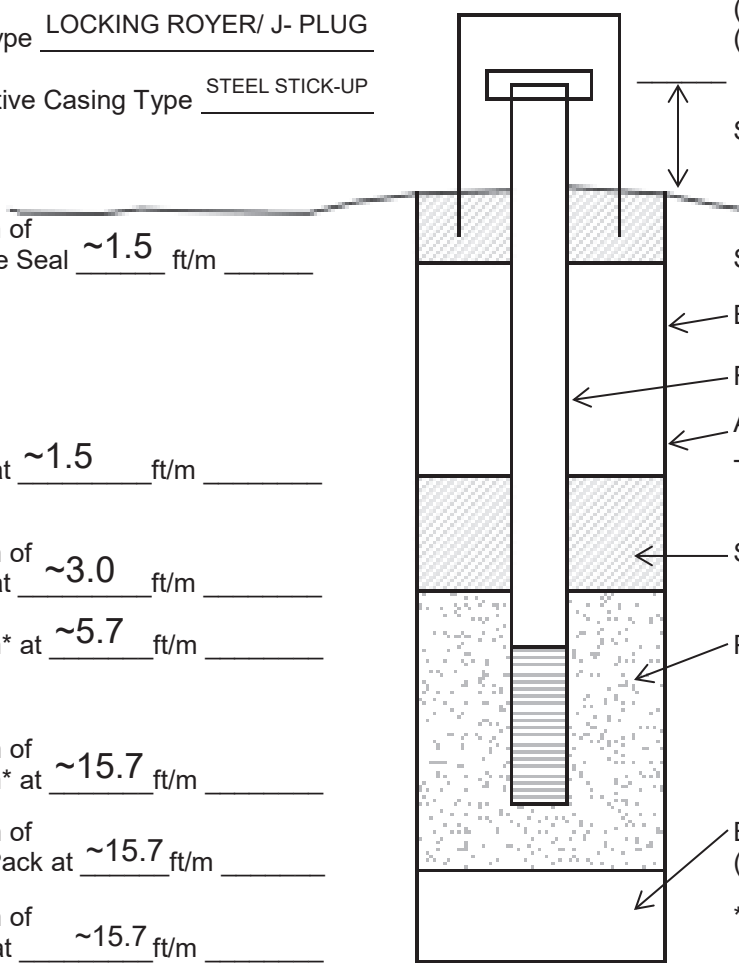
Pack Type: - sand, size #00N
- gravel
- natural

Bottom of Screen* at ~15.7 ft/m

Bottom of Filter Pack at ~15.7 ft/m

Borehole Backfill Material (if not filter pack) N/A

Bottom of Hole* at ~15.7 ft/m



* Note: All dimensions are below ground surface (bgs)

Screen Type: ☒ continuous slot ☐ wire wrapped ☐ louvre ☐ other:

Screen Material: ☐ stainless steel ☒ pvc ☐ other:

Screen Length: 10 ft/m Screen Diameter: 6 in/cm Screen Slot Size: 0.010 in

Riser Pipe Material: PVC SCH. 40 Riser Pipe Diameter: 6 in/cm

Surface Casing (Y/N) Y Material STEEL Depth 2 ft/m

Diameter 8 in/cm Sealant CONCRETE

Development: Method: WHALE PUMP Duration: 5x WELL VOLUME

Description of Purged Water:

Project Name:	COLD SPRINGS TERMINALS	Well Designation:	RW-2
Project Number:	11137172	Date Completed:	11/06/2019
Client:	SOUTHERN TERMINALS GROUP	Drilling Method:	HOLLOW STEM AUGER (8.25")
Location:	LYSANDER, NY	GHD Supervisor:	IAN McNAMARA

Cap Type: LOCKING ROYER/ J- PLUG

Protective Casing Type: STEEL STICK-UP

Measure bottom of well (after completion) 17.16 ft/m (below top of riser pipe)

Stick up = 1.88 ft/m

Bottom of Surface Seal ~1.5 ft/m

Surface Seal Type: CONCRETE

Borehole Diameter 12.25 in/cm

Riser Pipe

Annulus Backfill Type: N/A

Top of Seal* at ~1.5 ft/m

Seal Type: BENTONITE CHIPS (3/8" HOLE PLUG)

Bottom of Seal* at ~3.0 ft/m

Top of Screen* at ~5.3 ft/m

Pack Type: - sand, size #00N
- gravel
- natural

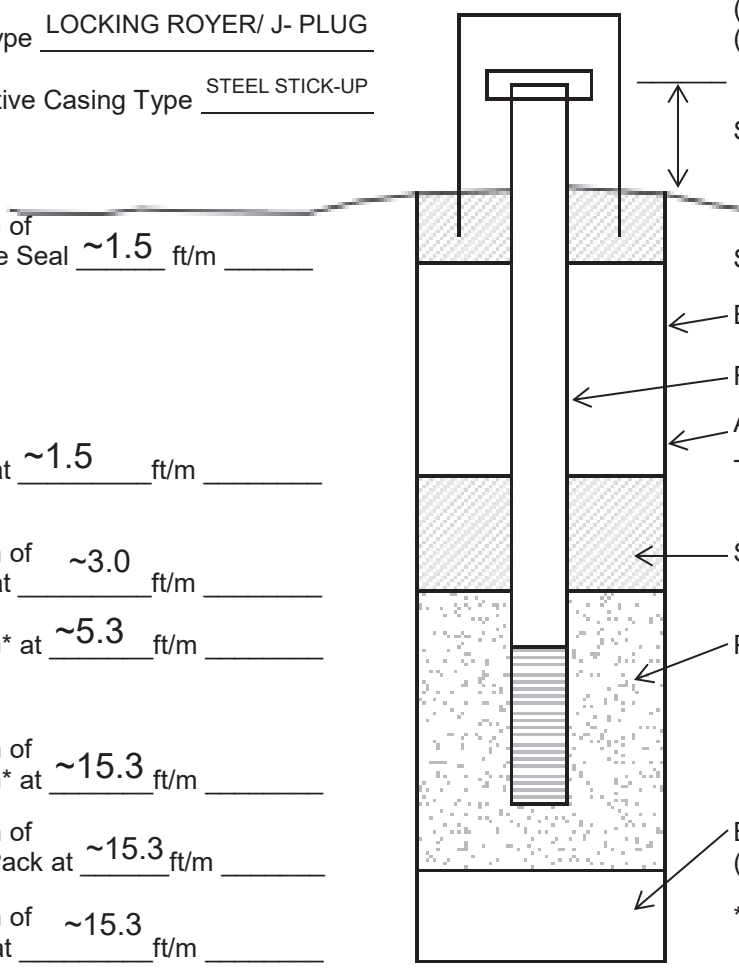
Bottom of Screen* at ~15.3 ft/m

Bottom of Filter Pack at ~15.3 ft/m

Borehole Backfill Material (if not filter pack) N/A

Bottom of Hole* at ~15.3 ft/m

* Note: All dimensions are below ground surface (bgs)



Screen Type: ☒ continuous slot ☐ wire wrapped ☐ louvre ☐ other:

Screen Material: ☐ stainless steel ☒ pvc ☐ other:

Screen Length: 10 ft/m Screen Diameter: 6 in/cm Screen Slot Size: 0.010 in

Riser Pipe Material: PVC SCH. 40 Riser Pipe Diameter: 6 in/cm

Surface Casing (Y/N) Y Material STEEL Depth 2 ft/m

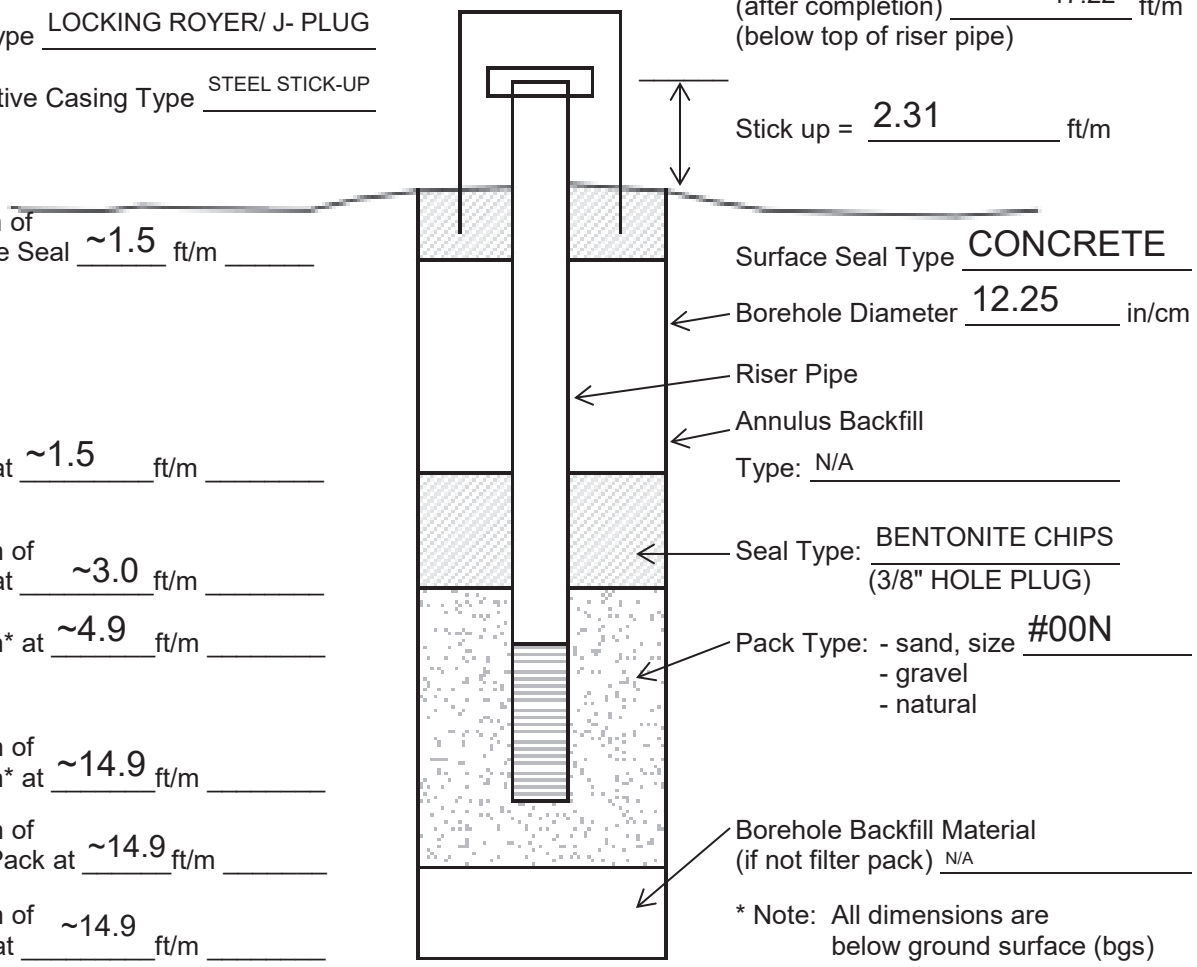
Diameter 8 in/cm Sealant CONCRETE

Development: Method: WHALE PUMP Duration: 5x WELL VOLUME

Description of Purged Water:

Well Instrumentation Log
(Form SP-15)

Project Name:	COLD SPRINGS TERMINALS	Well Designation:	RW-3
Project Number:	11137172	Date Completed:	11/06/2019
Client:	SOUTHERN TERMINALS GROUP	Drilling Method:	HOLLOW STEM AUGER (8.25")
Location:	LYSANDER, NY	GHD Supervisor:	IAN McNAMARA



Screen Type: ☒ continuous slot ☐ wire wrapped ☐ louvre ☐ other: _____

Screen Material: ☐ stainless steel ☒ pvc ☐ other: _____

Screen Length: 10 ft/m Screen Diameter: 6 in/cm Screen Slot Size: 0.010 in

Riser Pipe Material: PVC SCH. 40 Riser Pipe Diameter: 6 in/cm

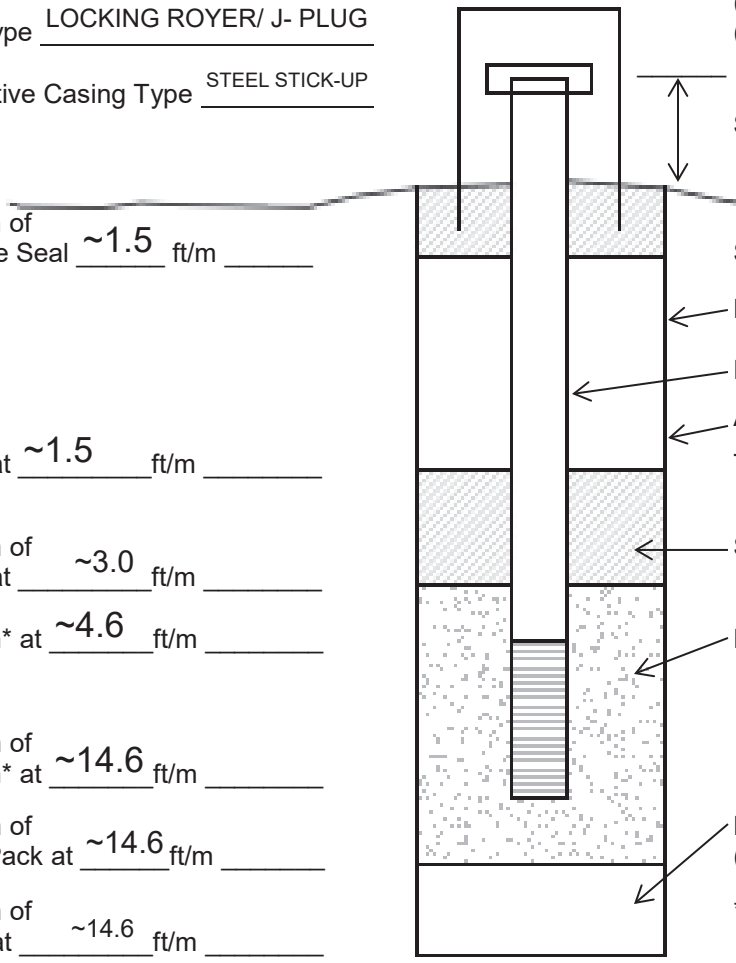
Surface Casing (Y/N) Y Material STEEL Depth 2 ft/m

Diameter 8 in/cm Sealant CONCRETE

Development: Method: WHALE PUMP Duration: 5x WELL VOLUME

Description of Purged Water: _____

Project Name:	COLD SPRINGS TERMINALS	Well Designation:	RW-4
Project Number:	11137172	Date Completed:	11/14/2019
Client:	SOUTHERN TERMINALS GROUP	Drilling Method:	HOLLOW STEM AUGER (8.25")
Location:	LYSANDER, NY	GHD Supervisor:	IAN McNAMARA



Cap Type: LOCKING ROYER/ J- PLUG

Protective Casing Type: STEEL STICK-UP

Measure bottom of well (after completion) 16.97 ft/m (below top of riser pipe)

Stick up = 2.35 ft/m

Bottom of Surface Seal ~1.5 ft/m

Surface Seal Type: CONCRETE

Borehole Diameter 12.25 in/cm

Riser Pipe

Annulus Backfill Type: N/A

Top of Seal* at ~1.5 ft/m

Bottom of Seal* at ~3.0 ft/m

Seal Type: BENTONITE CHIPS (3/8" HOLE PLUG)

Top of Screen* at ~4.6 ft/m

Pack Type: - sand, size #00N
- gravel
- natural COLLAPSE 15 - 10'

Bottom of Screen* at ~14.6 ft/m

Bottom of Filter Pack at ~14.6 ft/m

Borehole Backfill Material (if not filter pack) N/A

Bottom of Hole* at ~14.6 ft/m

* Note: All dimensions are below ground surface (bgs)

Screen Type: ☒ continuous slot ☐ wire wrapped ☐ louvre ☐ other:

Screen Material: ☐ stainless steel ☒ pvc ☐ other:

Screen Length: 10 ft/m Screen Diameter: 6 in/cm Screen Slot Size: 0.010 in

Riser Pipe Material: PVC SCH. 40 Riser Pipe Diameter: 6 in/cm

Surface Casing (Y/N) Y Material STEEL Depth 2 ft/m

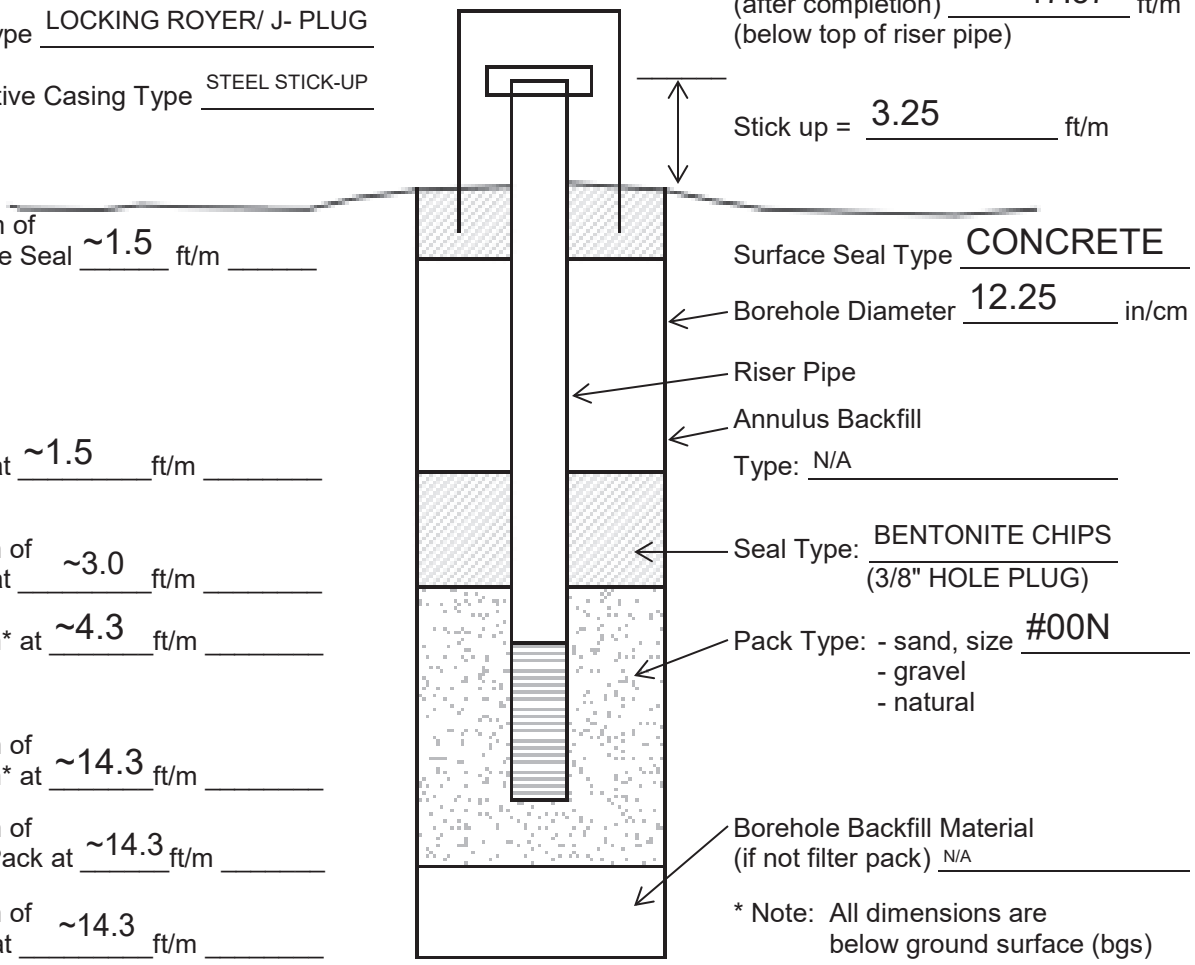
Diameter 8 in/cm Sealant CONCRETE

Development: Method: WHALE PUMP Duration: 5x WELL VOLUME

Description of Purged Water:

Well Instrumentation Log
(Form SP-15)

Project Name:	COLD SPRINGS TERMINALS	Well Designation:	RW-5
Project Number:	11137172	Date Completed:	11/12/2019
Client:	SOUTHERN TERMINALS GROUP	Drilling Method:	HOLLOW STEM AUGER (8.25")
Location:	LYSANDER, NY	GHD Supervisor:	IAN McNAMARA



Screen Type: ☒ continuous slot ☐ wire wrapped ☐ louvre ☐ other: _____

Screen Material: ☐ stainless steel ☒ pvc ☐ other: _____

Screen Length: 10 ft/m Screen Diameter: 6 in/cm Screen Slot Size: 0.010 in

Riser Pipe Material: PVC SCH. 40 Riser Pipe Diameter: 6 in/cm

Surface Casing (Y/N) Y Material STEEL Depth 2 ft/m

Diameter 8 in/cm Sealant CONCRETE

Development: Method: WHALE PUMP Duration: 5x WELL VOLUME

Description of Purged Water: _____

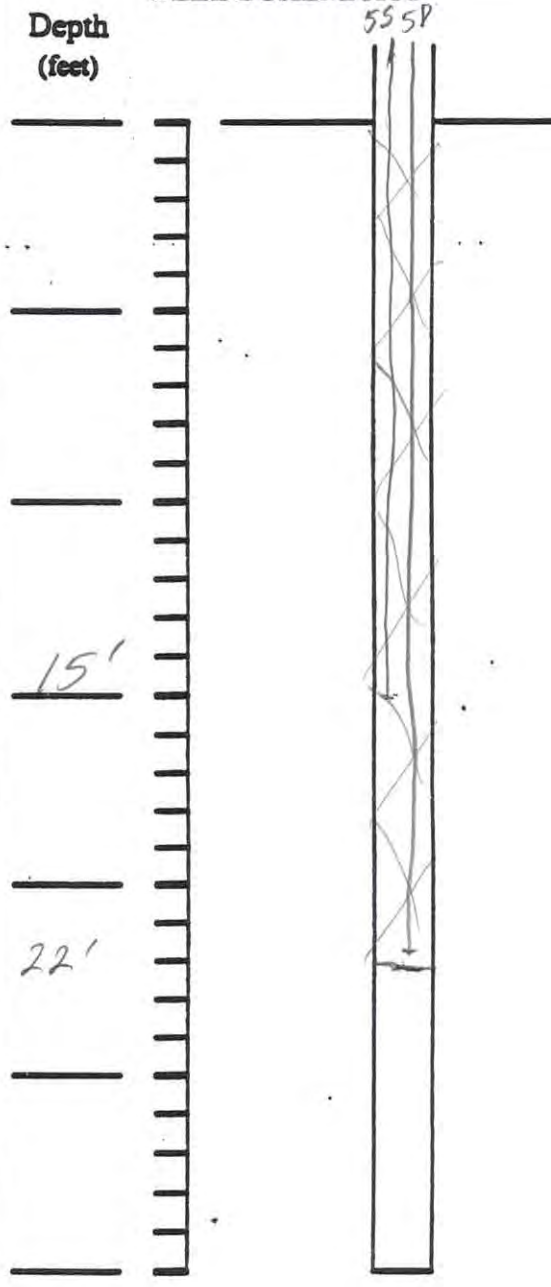
WELL DECOMMISSIONING RECORD
NYSDEC NPL Sites

Site Name: COLD SPRINGS TERMINAL	Well I.D.: 5S, 5D
Site Location: LYSANDER, NY	Driller: B. SWARTZ
Drilling Co.: NOTHNAGLE DRILLING, INC.	Inspector:
	Date: 3-19-20

DECOMMISSIONING DATA
(Fill in all that apply)

OVERDRILLING	
Interval Drilled	0'-22'
Drilling Method(s)	
Borehole Dia. (in.)	10"
Temporary Casing Installed? (y/n)	N
Depth temporary casing installed	
Casing type/dia. (in.)	
Method of installing	
CASING PULLING	
Method employed	WINCH
Casing retrieved (feet)	15'+21.5'
Casing type/dia. (in)	2" PVC
CASING PERFORATING	
Equipment used	
Number of perforations/foot	
Size of perforations	
Interval perforated	
GROUTING	
Interval grouted (FBLS)	0-22'
# of batches prepared	2
For each batch record:	
Quantity of water used (gal.)	31.2
Quantity of cement used (lbs.)	376
Cement type	I
Quantity of bentonite used (lbs.)	15.6
Quantity of calcium chloride used (lbs.)	0
Volume of grout prepared (gal.)	45
Volume of grout used (gal.)	45

WELL SCHEMATIC*



COMMENTS: OVERDRILLED 2" PVC NESTED WELL 5S+5D WITH 6¼" H.S.A. PULLED TWO -2" PVC WELLS + TREMIE GROUT ABANDONED

* Sketch in all relevant decommissioning data, including: interval overdrilled, interval grouted, casing left in hole, well stickup, etc.

Stephen A. DiLaura

Department Representative

Attachment C
Groundwater Disposal Manifests

NON-HAZARDOUS WASTE MANIFEST

Please print or type (Form designed for use on elite (12 pitch) typewriter)

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. NYQ

Manifest Document No. SUN 2282

2. Page 1 of 1

3. Generator's Name and Mailing Address: Solutia Technical Center
7431 Hillside Road
Lyndon, NY 13017

SOH 1103.262

4. Generator's Phone: (716) 205-1881 Attn: Alyssa Cruikshank

5. Transporter Company Name: Sun Environmental Corp.

6. US EPA ID Number: NYR000176958

A. State Transporter's ID 28-709

B. Transporter 1 Phone (315) 446-6994

7. Transporter 2 Company Name

8. US EPA ID Number

C. State Transporter's ID

D. Transporter 2 Phone

9. Designated Facility Name and Site Address: Modern Oil
120 Dry Road
Oriskany NY 13424

10. US EPA ID Number: NYD000826776

E. State Facility's ID

F. Facility's Phone (315) 736-6080

11. WASTE DESCRIPTION	12. Containers No.	Type	13. Total Quantity	14. Unit Wt./Vol.
a. NON-RCRA, NON-DOT REGULATED LIQUIDS (Fuel Impacted Water) Gasoline	1	TT	est 800	G
b.				
c.				
d.				

G. Additional Descriptions for Materials Listed Above

a. Approval # 1100043429/103262 DIRECT BILL TO GHD
JOB # SESS.0014

H. Handling Codes for Wastes Listed Above

a. R

15. Special Handling Instructions and Additional Information

Emergency Response (800) 807-7455
Sun Environmental Corp.

16. GENERATOR'S CERTIFICATION: I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

AS AGENT FOR GENERATOR

Printed/Typed Name: IAN MCNAMARA Signature: [signature] Date: Month 2 Day 3 Year 20

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: Jeremie Wallstrack Signature: [signature] Date: Month 2 Day 3 Year 20

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name: Signature: Date: Month Day Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of the waste materials covered by this manifest, except as noted in item 19.

Printed/Typed Name: Dave Valenti Signature: [signature] Valenti IOTSC Date: Month 02 Day 04 Year 2020

NON-HAZARDOUS WASTE

GENERATOR

TRANSPORTER

FACILITY

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SO 107531

NON-HAZARDOUS WASTE MANIFEST

Please print or type. (Form designed for use on elite (12 pitch) typewriter)

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. VSQG

Manifest Document No. SUN-2330 | 2. Page 1 of 1

GENERATOR

3. Generator's Name and Mailing Address: Southern Terminal Group
7431 Hillside Road
Lyndon, NY 13027

4. Generator's Phone: (716) 205-1881 Attn: Alyssa Cruikshank

5. Transporter 1 Company Name: Sun Environmental Corp. | 6. US EPA ID Number: NYR000176958 | A. State Transporter's ID: NA-70 | B. Transporter 1 Phone: (315) 218-6995

7. Transporter 2 Company Name | 8. US EPA ID Number | C. State Transporter's ID | D. Transporter 2 Phone

9. Designated Facility Name and Site Address: Industrial Oil
120 Dry Road
Oriskany NY 13424 | 10. US EPA ID Number: NYR000005298 | E. State Facility's ID | F. Facility's Phone: (315) 736-6080

11. WASTE DESCRIPTION	12. Containers No.	12. Containers Type	13. Total Quantity	14. Unit Wt./Vol.
a. NON-RCRA, NON-DOT REGULATED LIQUIDS (Fuel Impacted Water)		Gal	300	T
b.				
c.				
d.				

G. Additonal Descriptions for Materials Listed Above
a. Approval # 1100043429/103262
JOB # SESS.0014
DIRECT BILL TO GHD

H. Handling Codes for Wastes Listed Above
a. R

15. Special Handling Instructions and Additional information
Emergency Response (800) 807-7455
Sun Environmental Corp.

16. **GENERATOR'S CERTIFICATION:** I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name: IAN MCNAMARA-GHD AS AGENT OF SOUTHERN TERMINAL GROUP | Signature | Date: Month 2 Day 17 Year 20

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: Cooper Lamb / Sun Environmental | Signature | Date: Month 2 Day 17 Year 20

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name | Signature | Date: Month Day Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of the waste materials covered by this manifest, except as noted in item 19.

Printed/Typed Name: [illegible] | Signature | Date: Month 02 Day 18 Year 20

NON-HAZARDOUS WASTE

NON-HAZARDOUS WASTE MANIFEST

#7090

Please print or type. (Form designed for use on elite (12 pitch) typewriter)

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. [illegible]

Manifest Document No. SUN 3291

2. Page 1 of 1

3. Generator's Name and Mailing Address: Southern Terminal Groups
7431 Hillside Road
Lysander, NY 13027

4. Generator's Phone: (716) 205-1691 Attn: Alyssa Cruttenden

5. Transporter 1 Company Name: Sun Environmental Corp.

6. US EPA ID Number: NYR000176958

A. State Transporter's ID: TA-702

B. Transporter 1 Phone: (315) 218-8955

7. Transporter 2 Company Name

8. US EPA ID Number

C. State Transporter's ID

D. Transporter 2 Phone

9. Designated Facility Name and Site Address: Industrial Oil
120 Dry Road
Oriskany NY 13424

10. US EPA ID Number: NYR000005298

E. State Facility's ID

F. Facility's Phone: (315) 736-6080

11. WASTE DESCRIPTION	12. Containers No.	12. Containers Type	13. Total Quantity	14. Unit Wt./Vol.
a. NON-RCRA, NON-DOT REGULATED LIQUIDS (Fuel Impacted Water)			est. 300 gallons	T
b.				
c.				
d.				

GENERATOR

G. Additional Descriptions for Materials Listed Above

a. Approval # 1100043429/103262 DIRECT BILL TO GHD
JOB # SESS.0014

H. Handling Codes for Wastes Listed Above

a. R

15. Special Handling Instructions and Additional Information

Emergency Response (800) 807-7455
Sun Environmental Corp.

16. **GENERATOR'S CERTIFICATION:** I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name: IAN McNAMARA, GHD - AS AGENT FOR SOUTHERN TERMINALS CORP

Signature

Date: Month 2 Day 27 Year 20

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: Connor Lamb

Signature

Date: Month 2 Day 24 Year 20

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name

Signature

Date: Month Day Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of the waste materials covered by this manifest, except as noted in item 19

Printed/Typed Name: Mark Polisse

Signature

Date: Month 2 Day 25 Year 20

NON-HAZARDOUS WASTE

Rev. 3/05

NON-HAZARDOUS WASTE MANIFEST

Please print or type. (Form designed for use on elite (12 pitch) typewriter)

NON-HAZARDOUS WASTE MANIFEST	1. Generator's US EPA ID No. VSQG	Manifest Document No. SON-3339	2. Page 1 of 1

GENERATOR

3. Generator's Name and Mailing Address: Southern Terminal Group
7431 Hillside Road
Lyrendon, NY 13027
Attn: Alyssa Cruikshank

4. Generator's Phone: (716) 206-1861

5. Transporter 1 Company Name	6. US EPA ID Number	A. State Transporter's ID	7A-709
Sun Environmental Corp.	NYR000170959	B. Transporter 1 Phone	(315) 218-0295
7. Transporter 2 Company Name	8. US EPA ID Number	C. State Transporter's ID	
		D. Transporter 2 Phone	

9. Designated Facility Name and Site Address	10. US EPA ID Number	E. State Facility's ID	
Industrial Oil 120 Dey Road Oriskany NY 13424	NYR000005298	F. Facility's Phone	(315) 736-6080

11. WASTE DESCRIPTION	12. Containers No.	Type	13. Total Quantity	14. Unit Wt./Vol.
a. NON-RCRA, NON-DOT REGULATED LIQUIDS (Fuel Impacted Water)			est 350	gal
b.				
c.				
d.				

G. Additional Descriptions for Materials Listed Above

a. Approval # 1100043429/103262 DIRECT BILL TO GHD
JOB # SESS.0014

H. Handling Codes for Wastes Listed Above

a. R

15. Special Handling Instructions and Additional Information

Emergency Response (800) 807-7455
Sun Environmental Corp.

16. **GENERATOR'S CERTIFICATION:** I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name	Signature	Date: Month	Day	Year
IAN MCNAMARA - GHD, AS AGENT FOR SOUTHERN TERMINALS GROUP		3	2	20

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date: Month	Day	Year
Cooper Lamb		3	2	20

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date: Month	Day	Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of the waste materials covered by this manifest, except as noted in item 19.

Printed/Typed Name	Signature	Date: Month	Day	Year
MARK RUSSO		3	3	20

NON-HAZARDOUS WASTE

Rev. 3/95

NON-HAZARDOUS WASTE MANIFEST

Please print or type (Form designed for use on elite (12 pitch) typewriter)

NON-HAZARDOUS WASTE

GENERATOR

NON-HAZARDOUS WASTE MANIFEST	1. Generator's US EPA ID No. VSOG	Manifest Document No. SUN 3294	2. Page 1 of 1
3. Generator's Name and Mailing Address Southern Terminal Groups 7431 Hillside Road Lysander, NY 13027			
4. Generator's Phone ((716) 205-1881 Attn: Alyssa Cruikshank			
5. Transporter 1 Company Name Sun Environmental Corp.	6. US EPA ID Number NYR000178958	A. State Transorter's ID 7A 709	
		B. Transporter 1 Phone (315) 218-4995	
7. Transporter 2 Company Name	8. US EPA ID Number	C. State Transporter's ID	
		D. Transporter 2 Phone	
9. Designated Facility Name and Site Address Industrial Oil 120 Dry Road Oriskany NY 13424	10. US EPA ID Number NYR000005298	E. State Facility's ID	
		F. Facility's Phone (315) 736-6050	

11. WASTE DESCRIPTION	12. Containers No.	Type	13. Total Quantity	14. Unit Wt./Vol.
a. NON RCRA, NON-DOT REGULATED LIQUIDS (Fuel Impacted Water)			est	T
b.				
c.				
d.				

G. Additonal Descriptions for Materials Listed Above	H. Handling Codes for Wastes Listed Above
a. Approval # 1100043429/103262 DIRECT BILL TO GHD JOB # 5ESS.0014	a. R

15. Special Handling Instructions and Additional Information

Emergency Response (800) 897-7455
Sun Environmental Corp.

16. **GENERATOR'S CERTIFICATION:** I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name	Signature	Date Month	Day	Year

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date Month	Day	Year

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date Month	Day	Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator; Certification of receipt of the waste materials covered by this maifest, except as noted in item 19.

Printed/Typed Name	Signature	Date Month	Day	Year

Rev. 3/95

NON-HAZARDOUS WASTE MANIFEST

Please print or type (Form designed for use on elite (12 pitch) typewriter)

NON-HAZARDOUS WASTE

GENERATOR

NON-HAZARDOUS WASTE MANIFEST	1. Generator's US EPA ID No. VSQG	Manifest Document No. SUN 3293	2. Page 1 of 1
3. Generator's Name and Mailing Address Southern Terminal Group 301 Hillside Road Lysander, NY 13027			
4. Generator's Phone ( ) (315) 205-1881 Attn: Alyssa Cruikshank			
5. Transporter 1 Company Name Sun Environmental Corp.	6. US EPA ID Number NYR000176958	A. State Transporter's ID TA-209	
		B. Transporter 1 Phone (315) 218-4995	
7. Transporter 2 Company Name	8. US EPA ID Number	C. State Transporter's ID	
		D. Transporter 2 Phone	
9. Designated Facility Name and Site Address Industrial Oil 120 Dry Road Oriskany NY 13424	10. US EPA ID Number NYR000085298	E. State Facility's ID	
		F. Facility's Phone (315) 736-6050	

11. WASTE DESCRIPTION	12. Containers No.	12. Containers Type	13. Total Quantity	14. Unit Wt./Vol.
a. NON RCRA, NON DOT REGULATED LIQUIDS (Pad Impacted Water)			2M	T
b.				
c.				
d.				

G. Additonal Descriptions for Materials Listed Above	H. Handling Codes for Wastes Listed Above
a. Approval # 1100043429/103262 DIRECT BILL TO GHD JOB # SESS.0014	a. R

15. Special Handling Instructions and Additional Information

Emergency Response (800) 307-7455
Sun Environmental Corp.

16. **GENERATOR'S CERTIFICATION:** I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name	Signature	Date Month	Day	Year

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date Month	Day	Year

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date Month	Day	Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of the waste materials covered by this maifest, except as noted in item 19.

Printed/Typed Name	Signature	Date Month	Day	Year

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Rev. 3/95

NON-HAZARDOUS WASTE MANIFEST

Please print or type (Form designed for use on elite (12 pitch) typewriter)

NON-HAZARDOUS WASTE

GENERATOR

NON-HAZARDOUS WASTE MANIFEST	1. Generator's US EPA ID No. VSQG	Manifest Document No.	2. Page 1 of 1
3. Generator's Name and Mailing Address Southern Tier Envelope 7431 Henry Clay Blvd Liverpool NY 13088			
4. Generator's Phone (716)			
5. Transporter 1 Company Name Environmental Corp	6. US EPA ID Number NYR000176758	A. State Transorter's ID TA-709	
		B. Transporter 1 Phone 315-212-6005	
7. Transporter 2 Company Name	8. US EPA ID Number	C. State Transporter's ID	
		D. Transporter 2 Phone	
9. Designated Facility Name and Site Address Industrial Ct - CES 120 Dry Rd Cortland NY 13045	10. US EPA ID Number NYR000005298	E. State Facility's ID	
		F. Facility's Phone 315-756-6080	

11. WASTE DESCRIPTION	12. Containers No.	Type	13. Total Quantity	14. Unit Wt./Vol.
a. Non-RCRA Non-DOT Regulated Liquids (Fuel Impacted Water)	1	TT	Est 370	G
b. Sec 3855				
c.				
d.				

G. Additonal Descriptions for Materials Listed Above

A) Approval # 1100043129/103262
Job # SESS-0014 Direct Bill to GHD

H. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

Emergency Response 800-807-7455
Sun Environmental Corp

16. **GENERATOR'S CERTIFICATION:** I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name	Signature	Date Month	Day	Year

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date Month	Day	Year
		3	30	20

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date Month	Day	Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of the waste materials covered by this maifest, except as noted in item 19.

Printed/Typed Name	Signature	Date Month	Day	Year

Rev. 3/95

Attachment D
Project Schedule

Southern Terminals
Cold Springs Terminal Site, Hillside Road
Lysander, New York

Project Schedule