EnTech
Houston, TX • (281) 362-2714

November 20, 2017

INFORMATION ONLY

Ms. Olivia Yu
Oil Conservation Division – District 1
State of New Mexico – Energy Minerals and Natural Resources
1625 N. French Drive
Hobbs, New Mexico 88240

RE: C&J Energy Services
State AB SWD #1
Hobbs, Lea County, New Mexico
Case Number: 1RP-4836

Dear Ms. Yu:

Please accept this letter as a formal Work Plan for the above referenced project site, as required by the OCD in their directive attached to the Release Notification and Corrective Action Form, dated October 4, 2017.

INTRODUCTION

This work plan is being developed by EnTech Consulting Corporation (EnTech) to delineate potential soil impact at the C&J Energy Services (CJES) State AB SWD #1 salt water disposal facility (hereinafter referred to as the "Site"), located approximately 6 miles west of Hobbs, Lea County, New Mexico (**Figure 1 - Site Location Map**). The CJES Site is located in Section 3, Township 19S, Range 37E. The actual location of the release is 660 feet from the north line of the Section and 1980 feet from the east line of the Section at latitude 32.694868 and longitude -103.241236.

The Site consists of a storage yard, equipped with numerous tanks and a truck unloading area. On September 22, 2017, an offload valve attached to a hose was left partially open during a night offload. The hose was stored vertically so that the release was not seen until it filled the hose and spilled. The fluids were discovered the next morning on September 23, 2017, when the valve was properly closed. The released fluids were immediately removed through the use of a vacuum truck from the yard. The immediate release area was scraped, with affected soils stockpiled at the site. The site reportedly experienced thunderstorms on the 23rd-25th of September. The storm water outfall for the site is located on the east side of the facility. The heavy rains produced storm water which migrated off the well pad via the storm water outfall. The spill area and storm water outfall will be treated as an area of concern for the purpose of the work plan.

On October 31st, representatives of CJES and EnTech met with the New Mexico Oil Conservation Division (OCD) and State Lands. Based on these discussions, additional areas of concern will also be addressed in this work plan. Offsite areas south of the tank battery will be investigated to delineate possible impacts from breaks in the southern portion of the earthen berm that surrounds the Site. A stockpile along the southern property boundary, that contains stained soils related to a 2016 tank fire, will be sampled along with a potentially impacted area south of the containment berm of the tank battery. The liner in the tank battery will inspected to verify impacts from fires and repairs resulting from the fire incidents did not affect its integrity (**Figure 2 and Figure 5**).

In New Mexico, the OCD oversees and regulates oil, gas and geothermal activities, including enforcement and compliance with environmental regulations. Guidance for cleanup of crude oil releases is provided in the OCD Guidelines for Remediation of Leaks, Spills and Releases (August 13, 1993) document. Primary contaminants, or chemicals of concern (COCs), associated with releases from this facility, and requested in the directive attached to the OCD Release Notification and Corrective Action (dated October 4, 2017) include benzene, toluene, ethylbenzene, and total xylenes (BTEX), total petroleum hydrocarbons (TPH), and chlorides. Guidelines for these COCs in soil were evaluated based on a Site ranking system established during a previous tank closure at the Site, which is documented in a report dated October 7, 2015. The ranking system estimates the likelihood of exposures to the COCs and is based on the following three (3) parameters to protect groundwater and surface water resources:

- Depth to groundwater (Site ranking score = 20);
- Wellhead protection area (Site ranking score = 0); and,
- Distance to surface water body (Site ranking score = 0).

OCD SITE RANKING

Based on the proximity of the Site to area water wells, surface water bodies, and depth to groundwater, an OCD ranking score of 20 points was established in October 2015, with the soil remediation goals defined in the table below:

	Total Ranking Site Score		
Parameter	19 or greater	10-19	0-9
Benzene	10 ppm	10 ppm	10 ppm
BTEX	50 ppm	50 ppm	50 ppm
TPH (C_6-C_{36})	100 ppm	1000 ppm	5000 ppm

Per the NMOCD Pit Rule (NMAC 19.15.17), closure criteria for chloride affected soils have been established as follows:

Closure Criteria for Soils				
Depth to Groundwater with less than 10,000 mg/L TDS	Constituent	Method	Limit*	Background
<50-feet	Chloride	EPA 300.0	600 mg/Kg	To Be Determined

*numerical limit or background concentration, whichever is greater

Based on typical OCD remediation standards, the analytical goals for confirmation samples collected from the affected area at the Site are: TPH target concentration of 100 mg/Kg, benzene target concentration of 10 mg/Kg, total BTEX target concentration of 50 mg/Kg, and chloride target concentration of 600 mg/Kg or background, whichever is greater. A field soil vapor headspace measurement of 100 ppm may be substituted for a laboratory analysis of the benzene and BTEX concentration limits as per OCD Guidelines.

The scope of this work plan is to document the environmental sample collection objectives and the proposed technical site investigation strategies that will be utilized during the characterization of impacts associated with the release of oil and gas fluids at the Site and subsequent remediation.

SCOPE OF WORK

During the assessment process, EnTech personnel will collect soil samples in and around the area of concern. A backhoe will scrape each sample location and a sidewall grab sample will be taken from the sample location at the shallow surface (0 to 6-inches below ground surface (bgs)) and just above the hard pan (18 to 24-inches bgs) using a hand trowel. Based on the geology observed during a previous tank closure occurring on the Site and documented in an October 7, 2015 report, the area underlying the Site consists of a dense, well cemented caliche rock (hardpan), which will limit the initial investigation to a depth of approximately 1.5-feet below ground surface (bgs). A third sample will be chipped from the hard pan at the base of the scraped sample location using a chisel and hammer. The soils removed by the backhoe to provide access for sampling will be placed back in the sample locations once the samples have been obtained.

An Organic Vapor Meter (OVM) will be utilized for field screening to assist in verifying the vertical and lateral extent of residual soil impact. Soil screening will be completed by placing soil samples in zip-lock bags, allowing the sample to equilibrate for 10-minutes, and then collecting a headspace reading using the OVM. Readings below 100 ppm can be used for field screening residual soil to determine if they are below cleanup level for BTEX and TPH. A maximum of 24 discreet soil samples will be collected from and just outside the areas of concern, as well as seven (7) additional discreet soil samples from the four (4) cardinal compass directions in unimpacted areas (**Figure 3**). An additional 25 soil samples will be taken in the same mobilization from areas beyond the above-mentioned sample locations, and held under a separate chain-of-custody in the event that further delineation sampling is required (**Figure 4**).

An area of the southern tank battery containment berm will have grab samples taken from two locations in the berm, at the location where former tanks were removed from the battery. These tanks were involved in September 2015 and September 2016 fire incidents. The liner over the berm will be lifted and the samples will be collected six (6) inches into the berm. A stained soil stockpile west of the tank battery will also have a grab sample taken, as this stockpile contains scraped soils related to the 2016 incident. All samples will be collected utilizing a hand trowel and will be analyzed for BTEX, TPH and chloride by the methods listed below.

Soil samples will be analyzed for BTEX by EPA Method 8260 or 8021, TPH by EPA Method 8015 extended range (GRO+DRO+MRO; C6 thru C36), and for chloride by EPA Method 300.0. Sample results will be requested on an expedited turnaround time of twenty-four (24) hours. All shallow surface samples will be analyzed for BTEX, with the corresponding samples taken from just above the hard pan and chipped from the hard pan held and analyzed for BTEX only if the shallow surface samples are above target concentrations. All samples will be analyzed for TPH and chloride.

All soil samples will be collected in laboratory prepared glassware and placed in a cooler on ice, following chain-of-custody protocols. The samples will be transported to a selected analytical laboratory along with a completed chain-of-custody form and submitted for analysis of the parameters specified above.

One (1) split soil sample will be collected from the set of discrete soil samples during the assessment phase of the project to document quality assurance/quality control (QA/QC). One (1) split duplicate soil sample will also be submitted from the collected confirmation soil samples during the remediation phase and submitted for COC analysis. This soil sample will be collected from the laterally farthest sample location.

In the event that laboratory analyses and/or field screening does not indicate residual soil concentrations below the OCD remediation standards in excavated and/or overexcavated areas, soil samples will be taken from soil borings placed into and just below the hard pan to determine if contaminants have migrated through the hard pan. If residual soil concentrations are still not below the OCD remediation standards, an additional work plan will be submitted for approval to install at least one (1) monitor well in the area of likely maximum contamination to establish that shallow groundwater has not been impacted by the release.

BACKGROUND

Background samples will be collected at locations shown on **Figure 6**. Samples will be collected 6-inches bgs. Per NMOCD regulations (NMAC 19.15.17), closure criteria for soil can be based on background concentrations or numerical limits, whichever is greater.

LINER

Visual inspection of the liner will be made to verify that the 2015 and 2016 fires and subsequent repairs did not affect the integrity of the liner. The liner will be inspected at six (6) locations inside the tank battery (**Figure 5**). Four inspection locations will be north, west and south of tanks that were removed as a result of the fires. Two additional visual inspections will be made to the north and east of the existing tanks in the battery. Using a hand trowel, the inspections areas will be scraped and pea gravel removed to expose the liner. Liner integrity will be documented and photographs will be taken of the surface before material atop the liner is removed and of the liner one it has been exposed. Repairs will be made to the liner as necessary, based on the visual inspections.

REPORTING

A letter report will be prepared to document the assessment/remediation activities and the analytical results. The letter report will include site maps providing the location of borings; lithologic description of encountered boring soils; field screening and laboratory analytical results, including chain of custody documentation; and photographic documentation of the location and fieldwork.

We appreciate your assistance on this project and look forward to a successful completion of the outlined procedure. Upon your review and approval, C&J Energy Services will begin the process. If you have any questions regarding any aspect of this proposed work plan, please do not hesitate to contact us at any time.

Sincerely,

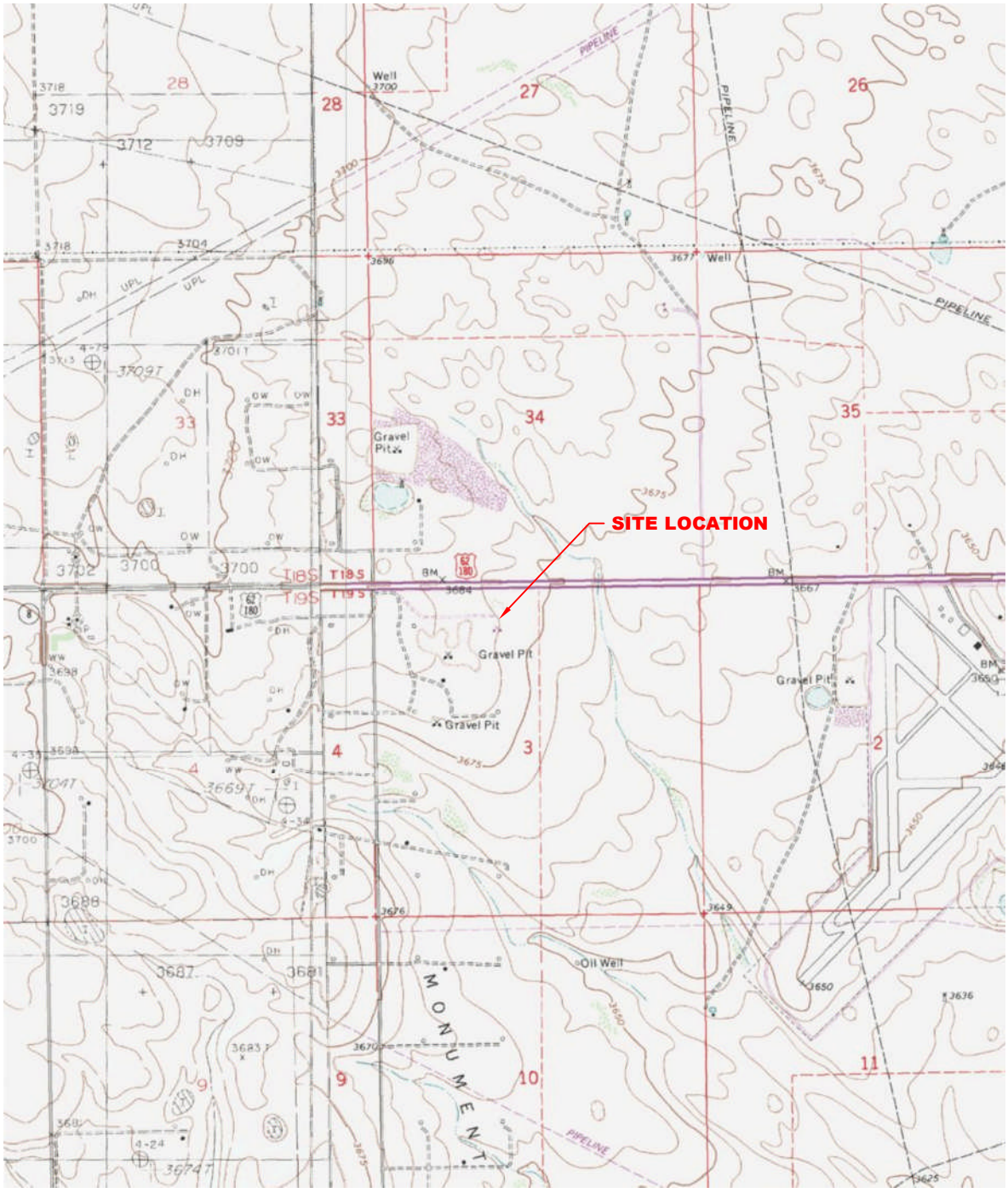
EnTech Consulting Corp.

Chan Patel
Senior Project Manager
chan.patel@entechservice.com
(713) 201-5704

Linda Vilkaitis
Project Engineer
linda.vilkaitis@entechservice.com
(281) 352-8216

Cc: Ms. Amber Groves, State Land Office
Mr. Les Teague, CJES Director of Environmental

Attachments:
Figure 1 – Site Location Map
Figure 2 – Site Layout
Figure 3 – Site Layout with Sample Locations
Figure 4 – Additional Sample Locations for Delineation
Figure 6 – Background Sample Locations



0 1/2

Miles

EnTech

Houston, TX · (281) 362-2714

Figure 1
Site Location Map
CJES - State AB SWD #1
Hobbs, New Mexico

Job No.: CJES15051	DATE: 11/17

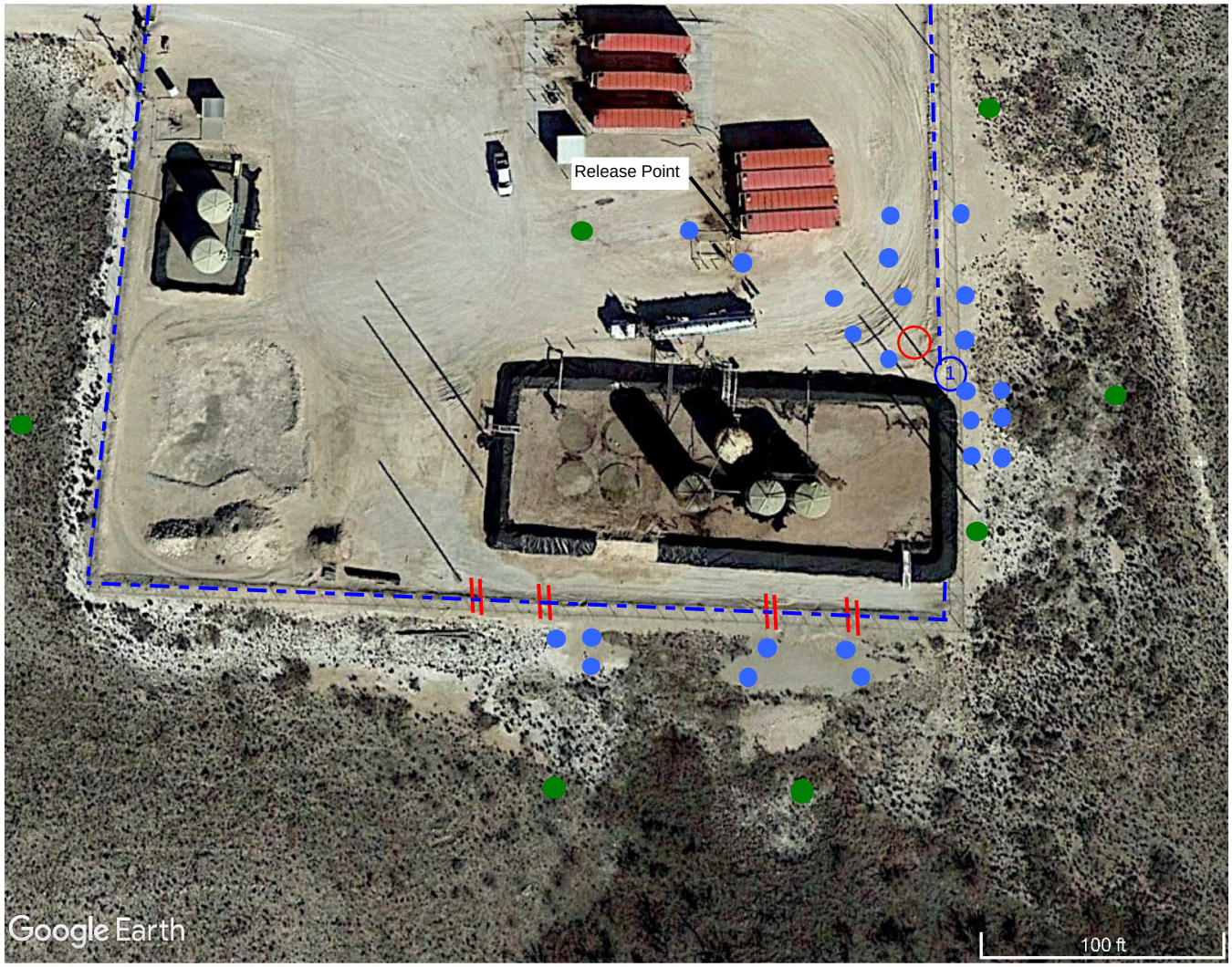
Legend:

- **-Earthen Berm**
- **-Break in Earthen Berm**
- (1) **-Storm Water Outfall**

EnTech
Houston, TX · (281) 362-2714

Figure 2
Site Layout
CJES -State AB SWD #1
Hobbs, New Mexico

Job No.: CJES15051	DATE: 11/17



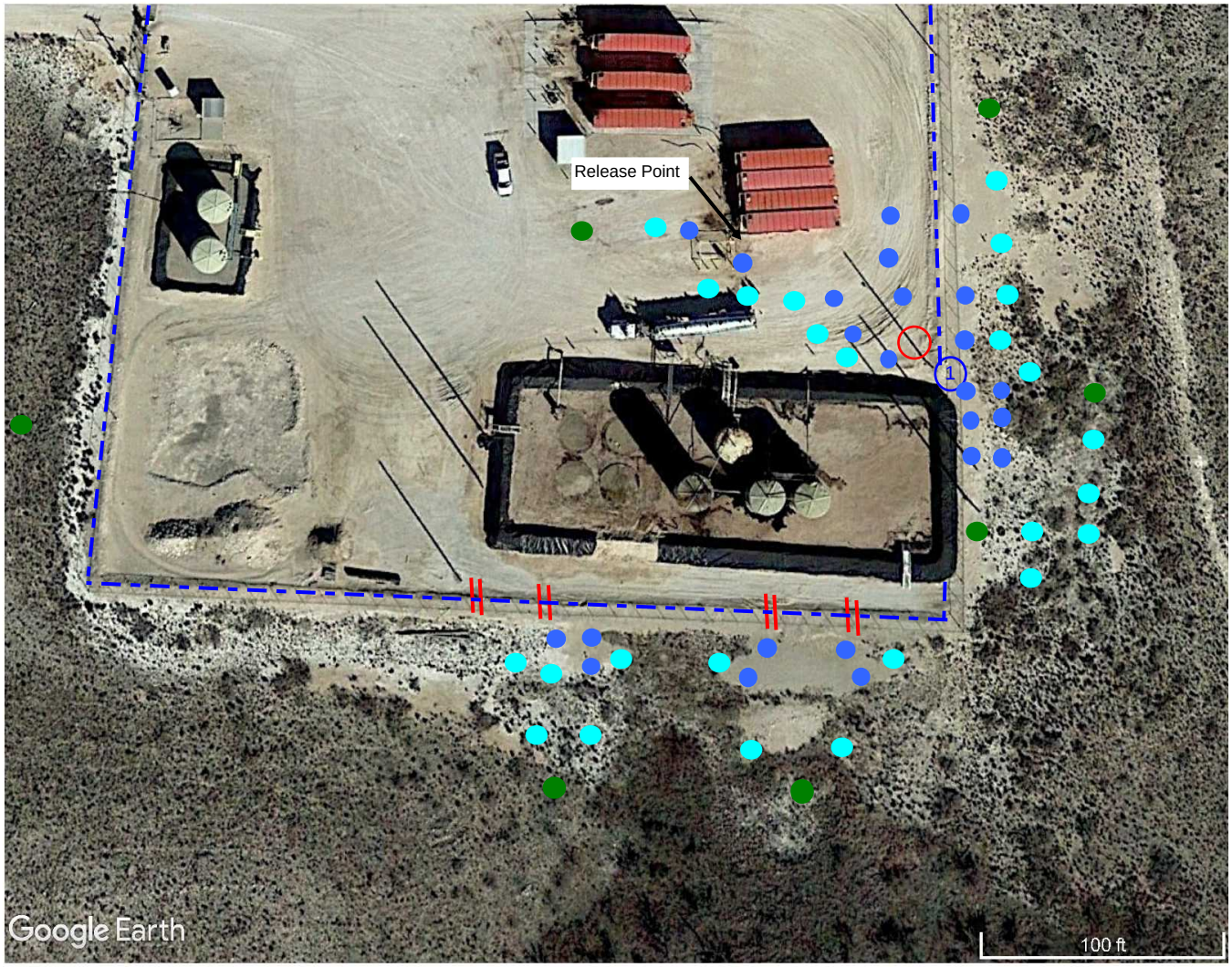
Legend:

- -Earthen Berm
- -Break in Earthen Berm
- 1 -Storm Water Outfall
- -Scraped Soil Stockpile (from Spill) **and Soil Grab Sample Location**
- -Soil Sample Locations for Delineation
- -Soil Sample Locations - Cardinal Directions/Background

EnTech
Houston, TX · (281) 362-2714

Figure 3
Site Layout with Sample Locations
CJES -State AB SWD #1
Hobbs, New Mexico

Job No.: CJES15051	DATE: 11/17



Legend:

- -Earthen Berm
- -Break in Earthen Berm
- 1 -Storm Water Outfall
- -Scraped Soil Stockpile (from Spill) **and Soil Grab Sample Location**
- -Soil Sample Locations for Delineation
- -Soil Sample Locations - Cardinal Directions
- **-Soil Sample Locations for Possible Additional Delineation**

EnTech
Houston, TX · (281) 362-2714

Figure 4
Additional Sample Locations for Delineation
CJES -State AB SWD #1
Hobbs, New Mexico

Job No.: CJES15051	DATE: 11/17

Legend:

- -Earthen Berm
- -Break in Earthen Berm
- 1 -Storm Water Outfall
- -Soil Grab Sample Location - Earthen Berm
- -Soil Grab Sample Location - Soil Stockpiles
- -Liner Inspection Points

0 100

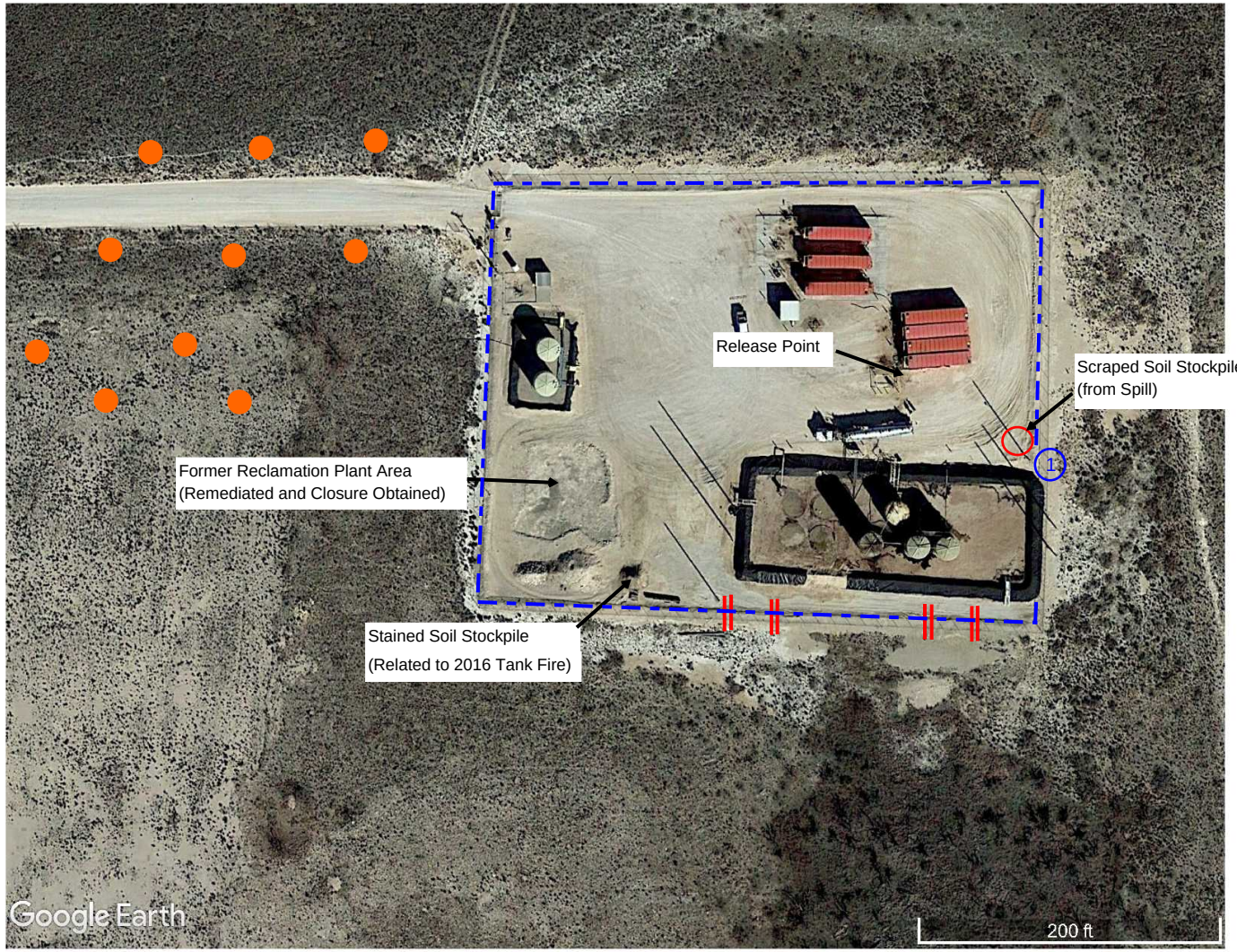
Feet

EnTech

Houston, TX · (281) 362-2714

Figure 5
Soil Grab Sample Locations and Liner Inspection Points
CJES -State AB SWD #1
Hobbs, New Mexico

Job No.: CJES15051	DATE: 11/17



Legend:

- **-Earthen Berm**
- **-Break in Earthen Berm**
- (1) **-Storm Water Outfall**
- **-Background Sample Location**

EnTech
Houston, TX · (281) 362-2714

Figure 6
Background Sample Locations
CJES -State AB SWD #1
Hobbs, New Mexico

Job No.: CJES15051	DATE: 11/17