Beach Cities Health District 514 N. Prospect Ave. Redondo Beach, CA 90277

Attention: Leslie Dickey, tel. (310) 374-3426, ext. 274/ email. Leslie.Dickey@bchd.org.

Subject: Summary Report for Oil Well Search and Leak-Testing Activities at Vacant Lot, APN: 7502-017-902, Southwest Corner of Beryl St. and Flagler Ln, Redondo Beach, CA (90277).

**1.0 INTRODUCTION:** Terra-Petra has prepared this report to summarize oil well search and well leaktesting services performed at the vacant former oil production site located at the Subject Property referenced above (See **Exhibit 1 Site Location Map**).

The subject site consists of a vacant property on one (1) parcel (APN: 7502-017-902) (See Exhibit 2, Plat Map and Exhibit 3, Site Map).

One (1) abandoned oil/gas well (identified as Well No. 2, Operator: Decalta International Corp, API: 0403718117, Lease Name: Simmons) located at the southwest portion of the site was reported abandoned by others by permit issued by the California Geologic Energy Management Division (CalGEM), formerly the Division of Oil, Gas and Geothermal Resources (DOGGR), in December 1989.

Based on geophysical survey results presented in the GeoVision Geophysical Services (GeoVision) published, <u>Geophysical Investigation at Southwest Corner of Beryl St. and Flagler Lane, Redondo Beach,</u> <u>CA</u>, dated 10/1/20, the location of a significant magnetic anomaly thought to likely be due to the subject oil/gas well was found at a point approximately 30 ft. east of the fenceline on the west boundary and approximately 30 ft. north of the toe of the slope on the south end of the Subject Property (See **Exhibit 4**, **Geophysical Investigation Report**).

The purpose of the oil well search and leak-testing activities was to comply with CalGEM requirements for site redevelopment. The procedures, findings and conclusions resulting from this subsurface investigation are presented in the following sections of this report.

**2.0 SCOPE OF WORK:** On 2/1/21, Terra-Petra directed an excavation contractor using a rubber tire Deere 310SL backhoe to excavate an approximate 27' x 27' x 17 ft. (deep) pit at the location of the metallic anomaly at the southwest portion of the subject site to expose the subject well. (Note: The planned excavation dimensions of 15 ft. x 15 ft. x 15 ft. (deep) were enlarged laterally as a result of sidewall caving and actions to create a safe entry excavation pit for subsequent leak-testing of the well casing.)

Terra-Petra personnel used a portable, battery-operated RKI-Eagle 4-gas detector to monitor volatile organic compounds (VOC) emissions from soil during the excavation and stockpiling activities.

Once the top of the well casing was found, Terra-Petra personnel initiated a Facetime application remote inspection by a CalGEM representative (Selena) to conduct a top of well casing leak-test using a Heath Consultants Flame-ionization Detector (FID) with a lower detection limit of 1 part per million by volume (ppmv) to monitor combustible gas emissions from the well casing as methane and volatile  $C_1$  through  $C_6$ 

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February 2, 2021



petroleum hydrocarbons, and a bubble leak-test by filling the top plate space within the well casing with water and inspection the top plate of the well casing for bubbles indicating gas leakage from within the well casing.

Following the online leak-testing activities, Terra-Petra personnel used the RKI-Eagle gas detection instrument to monitor  $H_2S$  emissions from the top of the subject well casing.

Following the leak-testing activities, Conaway Geomatics personnel surveyed the location and top-ofcasing elevation of the subject well (See **Exhibit 5, Well Survey Report**).

Following the remote inspection and observation by the CalGEM representative and the leak-testing activiteis, Terra-Petra directed the backfilling of the well excavation pit by using the backhoe to push stockpiled soil back into the pit, and wheel rolling to compact the top approximate 4 ft. of soil to restore surface grade elevation contours. Excess soil was spread evenly in the work area to match surrounding elevation contours preventing future ponding of stormwater in the work area.

**3.0 FINDINGS:** Soil excavated and stockpiled during the well search process is described as brown sand, moderately moist, with no discoloration and no odors, and small quantities of debris including short sections of <sup>3</sup>/<sub>4</sub>-inch diameter pipe/conduit, pieces of broken concrete and asphalt and several concrete fencepost anchors with short sections of fencepost pipe attached (See **Exhibit 6, Photographic Log**).

VOC emission monitoring results during soil excavation and stockpiling activities all showed nondetectable (ND) concentrations of VOC.

The top of the well casing was exposed at the location determined during the on-site geophysical investigation by GeoVision at a depth of approximately 15 ft. below surface grade elevation (bsg), and the excavation pit depth was terminated at a depth of approximately 17 ft. bsg. Groundwater conditions were not found to a depth of approximately 17 ft. bsg.

The subject steel well casing measured approximately 12.5-inches diameter and was found to have a metal top plate continuously welded within the well casing, approximately 0.25-in. to 0.5-in. below the top of the top of the steel well casing. The metal top plate was labeled "Simmons" 2.

Results of the FID monitoring at the top of the well casing showed non-detectable concentrations of combustible gas as methane and  $C_1$  to  $C_6$  petroleum hydrocarbons. Results of the bubble leak-testing activity showed no bubbles and therefore no indication of gas leakage from the top of the well casing.

Results of the monitoring for  $H_2S$  emissions at the top of the well casing showed non-detectable concentrations of  $H_2S$ .

**4.0 CONCLUSIONS**: Based on the procedures and findings presented above, Terra-Petra has performed the well investigation services in compliance with CalGEM guidelines, has identified the metallic anomaly determined by GeoVision at the southwest portion of the Subject Site as the "Simmons" 2 well, has reported combustible gas concentrations as methane and C<sub>1</sub> to C<sub>6</sub> petroleum hydrocarbons as below 50 ppmv which is the CalGEM action level indicating a leaking well casing, and non-detectable concentrations of H<sub>2</sub>S at the subject well casing top.

**5.0 LIMITATIONS**: The guidelines presented in this report are based upon the services described herein and are based upon the scope of work for this survey. Our professional services have been performed using that degree of care and skill ordinarily exercised under similar circumstances by reputable geologists and environmental scientists practicing in this or similar localities. No other warranty, expressed or implied, is made as to the professional advice in this report. Any change in the existing

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conditions at the subject site should be brought immediately to the attention of Terra-Petra. If the information related to us or further observations by South Bay Health District reveal unanticipated or changed conditions, Terra-Petra reserves the right to make alterations or additions to the original recommendations.

The recommendations have been prepared specifically for the subject site and are to be used only by South Bay Health District and authorized clients, consultants, and subcontractors on this subject site. No information contained herein may be reproduced, imitated, or used in any way other than for the above referenced project.

The opportunity to be of service is appreciated. Please contact Justin Conaway at (949) 339-6949 if there are questions or comments.

Sincerely, Terra-Petra

David L. Lucero Sr. Project Scientist Nik Reppuhn, PE

Log: 21-049.rept

#### ATTACHMENTS:

- Exhibit 1 Site Location Map
- Exhibit 2 Plat Map
- Exhibit 3 Site Map
- Exhibit 4 Geophysical Investigation Report
- Exhibit 5 Well Survey Report
- Exhibit 6 Photographic Log

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## **EXHIBIT 1**

## **Site Location Map**

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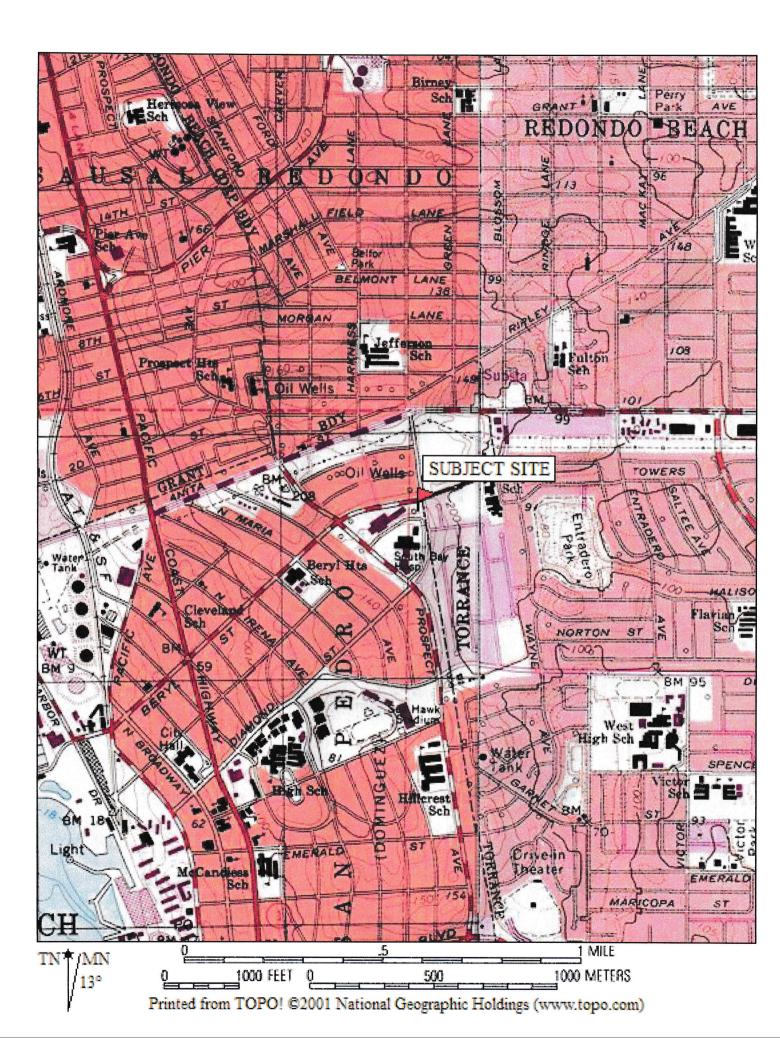
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## Exhibit 2

## Plat Map

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## Exhibit 3

## Site Map

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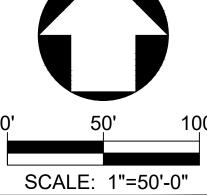
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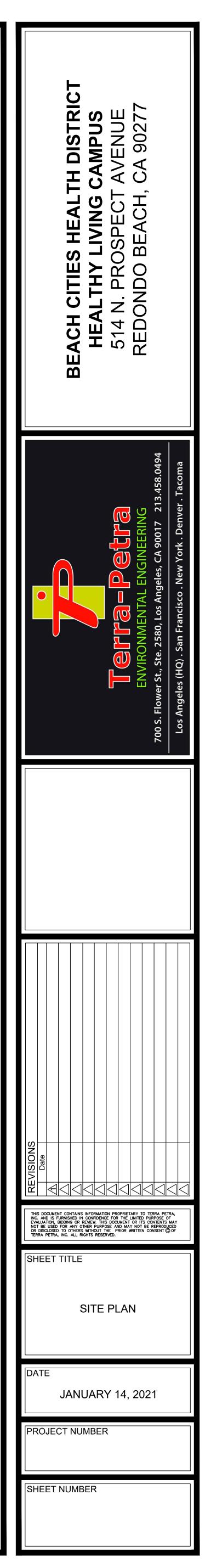
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## Exhibit 4

## **Geophysical Investigation Report**

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October 1, 2020

Project Number 20304

Justin Conaway Terra-Petra 700 S. Flower Street, Suite 2580 Los Angeles, CA 90017 Justin@terra-petra.com

# Subject:Geophysical Investigation at Southwest Corner of<br/>Beryl Street and Flager Lane, Redondo Beach, California

Mr. Conaway:

A geophysical survey was conducted on September 30<sup>th</sup>, 2020 at the above-mentioned property. The purpose of the geophysical survey was to screen for one steel-cased abandoned oil well in the southwestern portion of the site. The site consisted of an open dirt lot bound by fencing on the north and west sides, a steep hill to the property line on the southern side, and surface metallic objects to the east. The geophysical method applied to this investigation consisted of the magnetic technique.

#### **METHODOLOGY**

The primary geophysical instrument used during this investigation consisted of a Geometrics G858 optically pumped cesium-vapor magnetometer (G858). This magnetometer measures the intensity of the earth's magnetic field in nanoteslas (nT) and, optionally, the vertical gradient of the earth's magnetic field in nanoteslas per meter (nT/m). Buried ferrous metallic objects give rise to anomalies in the earth's magnetic field. These anomalies are generally dipolar with a positive response south and a negative response north of the object. The dimensions and amplitude of a magnetic anomaly are a function of the size, mass, depth, and magnetic properties of the source. Magnetometers can typically locate an object the size of a 550-gallon tank to depths of about 10 feet providing background noise levels are not too high and the tank is not extensively corroded. Objects with more mass, like oil wells, can be located to greater depths.

The magnetometer was used in conjunction with a GPS system for spatial control. GPS data were collected in the geodetic coordinate system and then converted to California State Plane 1983, NAD83 (Conus), Zone V (0405) in US Survey Feet, during data processing. Positions were taken using a Spectra Precision GPS system with Centerpoint RTX corrections.

Prior to data acquisition, the G858 was programmed with the appropriate sampling interval and GPS input settings. The magnetometer was then tied to the Spectra Precision GPS system for spatial control. Spatial information was sent to the console at 1 second intervals using a GGA NMEA stream. Magnetic data and spatial data were downloaded to a laptop computer at the end of the survey using the program MAGMAP 2000 by Geometrics, Inc. Electromagnetic utility locating equipment was used to locate buried lines and metallic pipes in the vicinity of the investigation. All such located lines were marked and their positions recorded with the GPS system, as well as the locations of surface metallic objects that could impact the magnetic data.

Details on the geophysical method can be found in the attached technical note titled "Magnetic Method"

## **DATA PROCESSING**

Color-enhanced contour maps of the magnetic data were generated using the GEOSOFT® Oasis montaj <sup>TM</sup> geophysical mapping system. The maps were color-enhanced to aid in the interpretation of subtle anomalies. Prior to map generation, a number of preprocessing steps were completed and included:

- Backup of all original field data files to computer.
- Correcting of all data acquisition errors (typically removing null data and erroneous GPS points).
- Reformatting field data files to free format XYZ files containing at a minimum GPS time and field measurements.
- Merging GPS position data and geophysical data using commercial and in-house software.
- Merging of multiple data files into a single file and sorting, if necessary.
- Converting of data files to State Plane northings and eastings.

These data adjustments were made using a combination of commercial and in-house software. All adjustments made to data files and resulting file names were documented and are retained in project files.

The output of the data preprocessing was a data file containing the magnetic total field response. Data processing steps included the following:

- Reformatting of data files to GEOSOFT® format.
- Generating final map scale.
- Gridding data using down- and cross-line splines or minimum curvature.
- Masking grid in areas where data not acquired (i.e. around site perimeter or building).
- Applying Hanning filter to smooth the data, as necessary.
- Generating color zone file describing color for different data ranges.
- Contouring the data.
- Generating map surrounds (title block, legend, scale, color bar, north arrow, etc.).
- Annotating anomalies.
- Merging various plot files and plotting final map.

The names of the files generated and the processing parameters used were documented and are retained in project files. All files generated during the processing sequence were archived on a backup drive.

### RESULTS

A color-enhanced contour map of the total magnetic field response is presented as Figure 1. The coordinates shown on the contour map reference the California State Plane, NAD83 (Conus), Zone V (0405), US survey feet coordinate system. The color bar indicates the amplitude of the measured quantity with magenta and dark blue indicating high and low amplitudes, respectively. Light orange, yellow, and light green indicate average "background" values of the measured quantity. A typical magnetic oil well response is shown in the attached Technical Note.

One possible oil well location was imaged in the magnetic data and is labelled with an "oil well" symbol on Figure 1. This location was marked in the field and is provided in Table 1.

Table 1: Oil Well Coordinates

Description	Northing (US Survey Feet)	Easting (US Survey Feet)	Anomaly (nT)	
Simmons 2	1,769,644.9	6,446,701.5	51,600	

Notes:

- Coordinates in CA State Plane, Zone V (0405), NAD83 (Conus), US Survey Feet.
- 2. Coordinates collected using a Spectra Precision GPS system with Centerpoint RTX corrections.

This anomaly, however not fully imaged due to the spatial constraints, has a radius of over 50 feet with high amplitude response (Over 6,000 nT above background values of approximately 45,000 nT). This is a typical response of a steel-cased abandoned oil well.

If you have any questions concerning this investigation, please call us at 951-549-1234, or email at efeldman@geovision.com.

Sincerely, **GEO***Vision* Geophysical Services

Prepared by

Emily Feldman Project Geophysicist

Approved by

CA

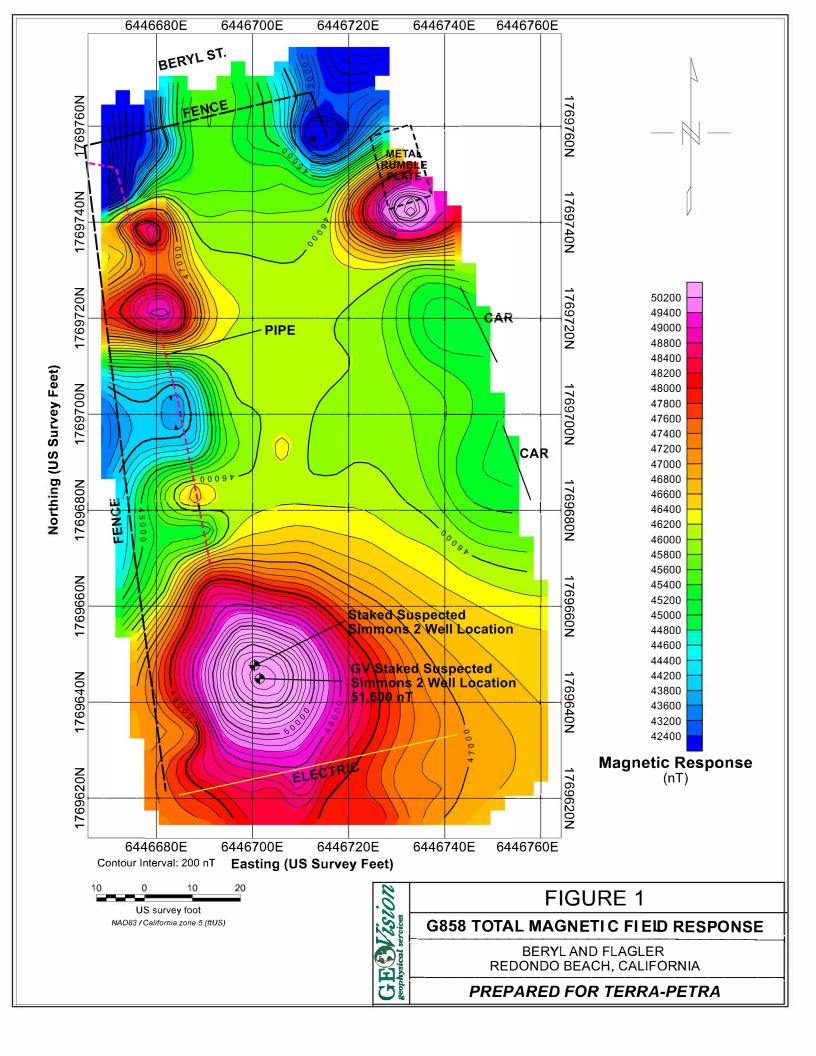
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Victor Gonzalez, PGp Senior Geophysicist

Attachments:

Figure 1 - Color Contour Map of the Total Magnetic Field Response

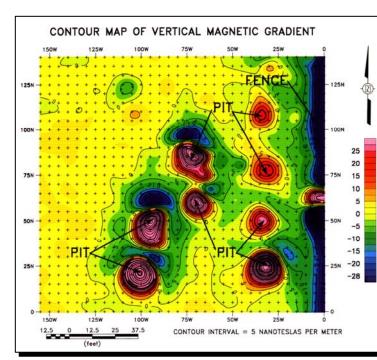
Technical Note - Magnetic Method



## **MAGNETIC METHOD**

The magnetic method involves the measurement of the earth's magnetic field intensity. Typically the total magnetic field and/or vertical magnetic gradient is measured. Measurements of the horizontal or vertical component or horizontal gradient of the magnetic field may also be made.

Anomalies in the earth's magnetic field are caused by induced or remanent magnetism. Induced magnetic anomalies are the result of secondary magnetization induced in a ferrous body by the earth's magnetic field. The shape, dimensions, and amplitude of an induced magnetic anomaly is a function of the orientation, geometry, size, depth, and magnetic susceptibility of the body as well as the intensity and inclination of the earth's magnetic field in the survey area. Buried ferrous metallic objects, such as pipes, drums, tanks, and debris generally give rise to dipolar anomalies with a positive response south and a negative response north of the object. The magnetic method is an effective way to search for small metallic objects because magnetic anomalies have spatial dimensions much larger than those of the objects. An oil well typically gives rise to a monopolar anomaly with a very high amplitude, positive peak several feet south of the well and a low amplitude, broad negative response to the north. The magnetic anomaly over a buried oil well often has a diameter of over 50 feet and amplitude of several thousand nanoteslas, depending on depth and casing characteristics. Magnetometers can typically locate an abandoned oil well to depths of over 20 feet providing that background noise levels are not too high and the well casing is not significantly corroded. Magnetometers are not able to detect nonferrous metals such as aluminum and brass.



#### Magnetic Survey to Locate Pits Containing Buried Metallic Containers

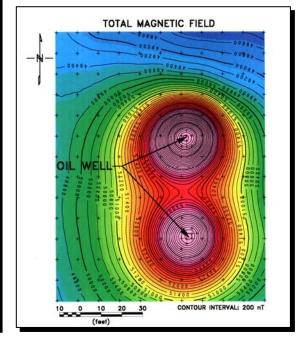




Geometrics G-858 Magnetometer

The magnetic method is typically used to:

- Locate abandoned steel well casings
- Locate buried tanks and pipes
- Locate pits and trenches containing buried metallic debris
- Detect buried unexploded ordnance (UXO)
- Map old waste sites and landfill boundaries
- Clear drilling locations
- Map basement faults and geology
- Investigate archaeological sites



Magnetic Survey to Locate Abandoned Oil Wells

1124 Olympic Drive, Corona, California 92881, ph. 951-549-1234, fx. 951-549-1236, www.geovision.com

## Exhibit 5

## **Well Survey Report**

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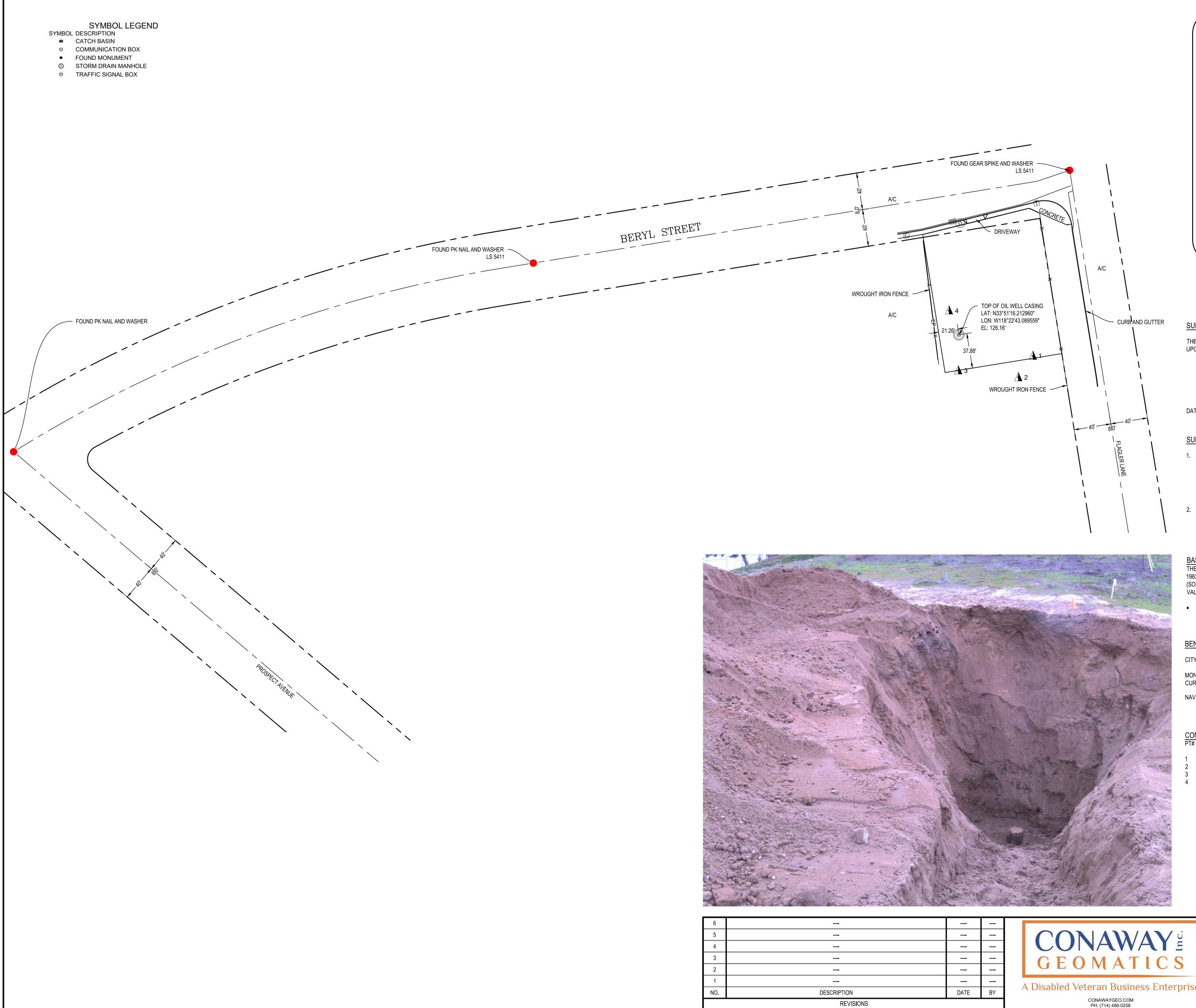
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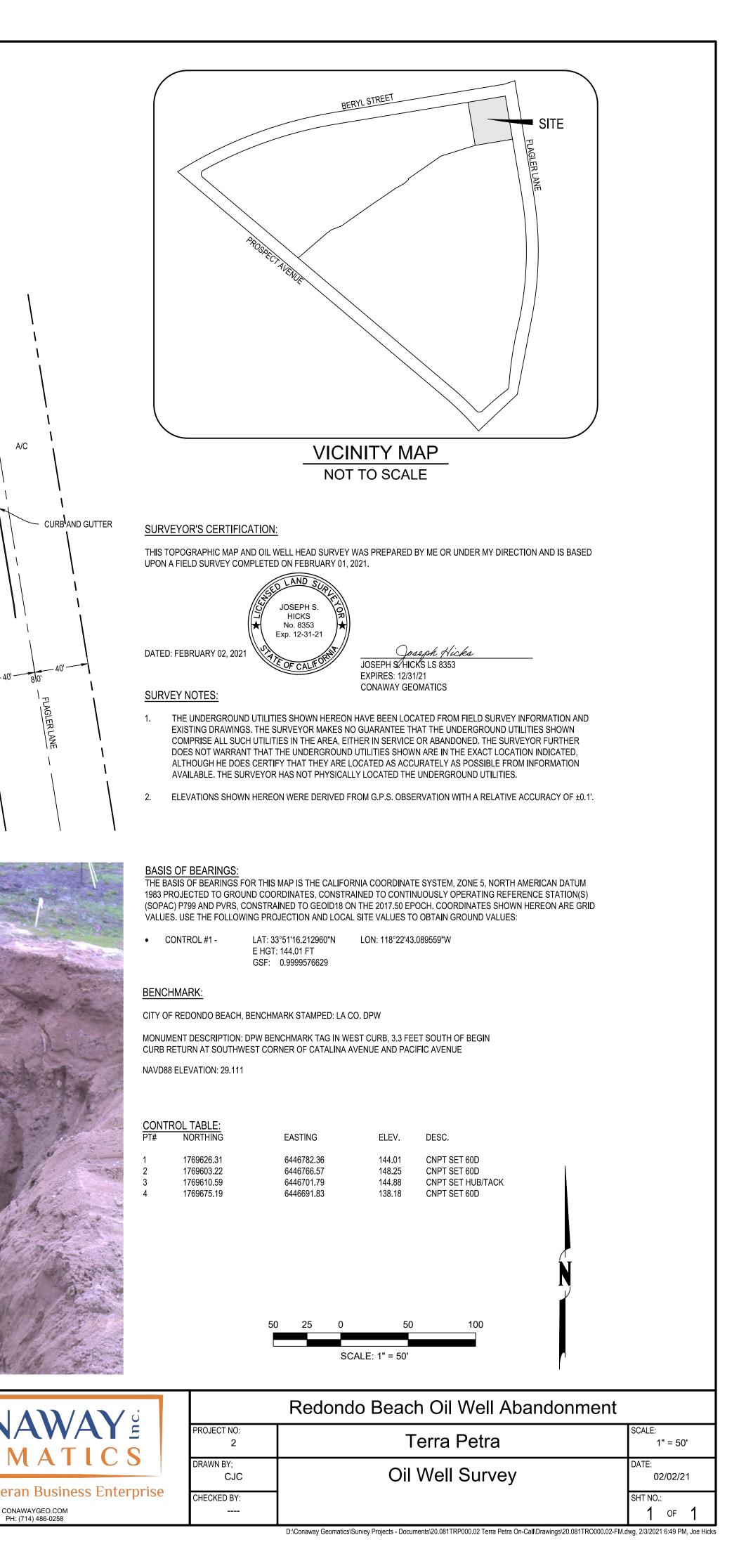
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Terra-Petra ENVIRONMENTAL ENGINEERING

justin@terra-petra.com | terra-petra.com

DATE: 21/21 PROJECT NAME: OIL WELL LEAR TEST S/WCIENER OF BERYL ST & TIME IN: 0 700 lur PROJECT LOCATION: FLAGERLAN. Dav1,7502-017-902, REPORDO TIME OUT: 1300 br ADDRESS: BEACH TRAVEL TIME: 1,0 4v WEATHER CONDITIONS: humidity temperature wind O clear barometer 0 71-85 O dry O <32F o still O fog O rising O moderate 0 86-100 \$ 33-55 O breezy falling O cloudy 0 > 100**W**high 0 56-70 O strong O steady O rain PERSONS ON SITE: ACTIVITY: INSPECTION ITEM(S): · ALUGRO - TPP. O sumps O fdn. prep. O scoping O probes O meeting O dewatering Perse - Parters O gas detectors 🖋 field O drainage O alarms O subslab venting O exploration O telemeter O installation O subslab prep. O fans O cushion SOLONA - ON GEM **X** monitoring DOILWEI O membrane O design O smoke test 0 O plan check inspection O protection 0 O vent riser 0 0 O signage 0 O vent riser top-out O partial 0 O final O elevator pit 0 NOTES: MET REMABLE ERVIP. REWARL CREW 2 MEN W/ AND WHER TRUCK AT JAM. - MET PULSER THE DEEMS 310SL AT OTIGHT, PERFORMED SOIL CONTWAL GEOMETRICS (2MON) TO EXPOSE "SIMMONS"-2 OIL WELL FOR LEAR FLCAVATION TESTIONS W/ FID & BUBBLE TEST & RHA- FAGLE( Inspector's Signature

#### LOS ANGELES

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9:21-007

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sheet <sup>2</sup> of <sup>3</sup>

# DAILY FIELD REPORT (CONTINUED)DATE 2/1/21INSPECTION OF SOIL VAPOR MITIGATION SYSTEMTIME IN 0700hrJOB #/NAME OUT WOEL WAY TESTTIME OUT BOOL

NOTES: · FOUDD SMALL BTY. OF METAL PAPING (CONDUNT), CONCRETE & A/C FRAGMENTS AND GONCRETE FEACEDOGT BOTTOMS. IN SOIL. · SOIL APPEARED CLEAN AND FREE OF SIGNIFICONT TPH/LOC IMPACTS (BROWN, SAND, MOIST, MO ODOG), USED RHI-EAGLE TO MONNTOR VOC EMISSIONS FROM EXCANATED SOIL - ALL ND.

"EXCAVATION FINGENSIONS AT SUPFACE GRADEEL."=27'X 27'X 19'(deep). - top of WELL CASING LOCATED AT = 15' BSG AT ALMOST EXACT LOCATION OF STAKE,

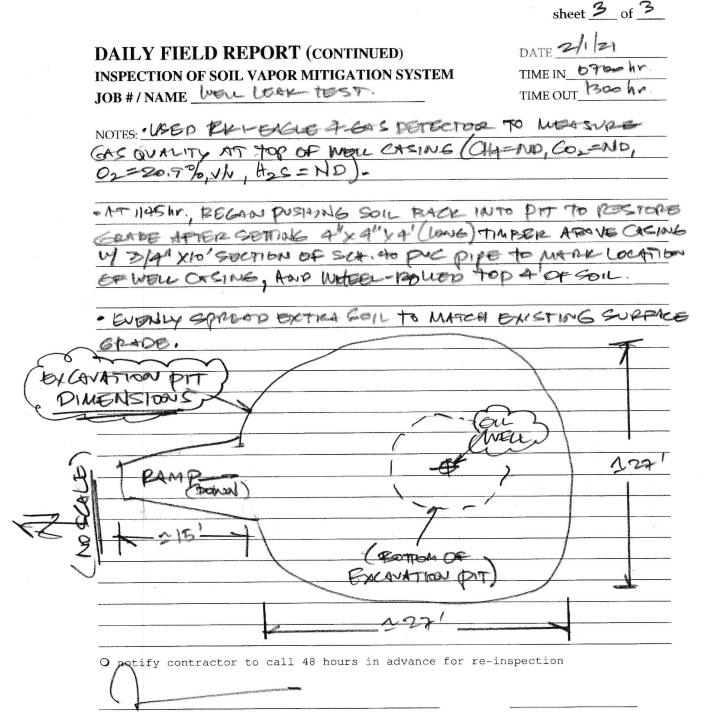
-CONTACTED CALLEM to NOTIFY WE'D BEREADY FOR INSPECTION AT NEOME - THEY TOLD ME THE INSPECTION WOULD BE BONE REMOTERY VIA FACETIME APP. BY SELENIA (TEL. 714-329-1471), I ASKED CALGOM (DATE PETERSON) IF WESHOULD CUT TOP PLATE OFF WOLL TO LEAK TEST -TOP PLATE MELPED CONTINUOUSLY AROND LAISIDE OF 12.5" (D STEEL CASIDIE, W/ SIMMON'S". 2 ON FACE - THEY STID THE WELL WOULD BE LEAK. TESTED AS IS (CANCELLED WEDER THRU HOLE BE LEAK. TESTED AS IS (CANCELLED

OUNDER FACETIME OFFERVATION BY CALGEN REP. (AT 1050 HA), PERFORMED LOAK-TEST W/ FID (OHA = 0-2 PRMV) AND BUBBLE -TOST (FILLED TOP PLATE AREA W/ HOTHO BUBBLES OFFERVED. 66NVE SPECIF, INFO TO ORGEM REP. AND COMPLETED COLL.

O notify contractor to call 48 hours in advance for re-inspection

inspector's signature

verified by



inspector's signature

verified by

## Exhibit 6

## **Photographic Log**

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PHOTOGRAPHIC LOG:



1. Looking west at beginning of oil well excavation process.



2. Looking north at beginning of oil well excavation process.



3. Looking east at survey crewman setting up equipment at southeast portion of site.



4. Looking down at soil monitoring procedure for excavated/stockpiled soil.



5. Looking at hand-held magnetic locator instrument used to locate well casing and direct excavation.



6. Looking northeast at soil excavation process.



7. Looking east, down into well excavation pit at oil well at depth of approximately 15 ft. bsg.



8. Close-up photo of exposed top of well casing in excavation pit.



9. Close-up photo of cleaned top of well casing in excavation pit.



10. Looking north at survey crew setting up equipment for well casing survey measurements.



11. Looking east, down into excavation pit at exposed top of well casing.



12. Close-up look at top of well casing in excavation pit after FID leak test and bubble test.



13. Close-up look at top of well casing in excavation pit after FID leak test and bubble test.



14. Looking north at backfilling of excavation pit after leak testing.



15. Looking east, down into excavation pit during backfilling – marked well casing location with 4 in. x 4 in. x 4 ft. long timber and 10 ft. PVC pipe section.



16. Looking north at excavation pit backfilling process.



17. Looking northwest at excavation pit backfill process.



18. Looking west at final excavation pit backfill process, restoring surface grade elevation.



19. Looking west at final excavation pit backfill process, restoring surface grade elevation.



20. Looking northwest at surface staked location of well casing after backfilling activities.



21. Looking east at surface staked location of well casing after backfilling activities.



22. Looking south at restored surface grade elevation after soil excavation, leak-testing and backfilling activities.



23. Looking southwest at restored surface grade elevation after soil excavation, leak-testing and backfilling activities.



24. Looking southwest at restored surface grade elevation after soil excavation, leak-testing and backfilling activities.