N60211_000637
CROWS LANDING
SSIC NO. 5090.3.A

INSTALLATION RESTORATION PROGRAM SITE 11B
NASA Crows Landing Flight Facility
Crows Landing, California

Geophysical Survey Results
Contract Number N62474-98-D-2076
Contract Task Order 0110

Revision 1

May 23, 2005

Submitted to:

Naval Facilities Engineering Command (NAVFAC)
Southwest Division

Submitted by:

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GEOPHYSICAL SURVEY RESULTS
INSTALLATION RESTORATION PROGRAM SITE 11B

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CD CONTAINING THE SITE 11B GEOPHYSICAL REPORT, ALL OF THE RAW AND PROCESSED GEOPHYSICAL DATA IN THE APPROPRIATE ASCII FILE FORMAT, AND GEOPHYSICAL MAPS IN PDF FORMAT

THIS CD IS NOT AVAILABLE.

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Acronyms and Abbreviations

Crows Landing	NASA Crows Landing Flight Facility
DGM	Digital Geophysical Mapping
EM	Electromagnetic
EM61-MKII	Geonics EM61-MKII Metal Detector
EM31	Geonics EM31-MKII Frequency Domain
FDEM	Frequency-Domain Electromagnetics
GPR	Ground Penetrating Radar
GPS	Global Positioning System
Hz	Hertz
IRP	Installation Restoration Program
mS/m	milliSiemens/meter
MHz	MegaHertz
mV	milliVolts
MEC	Munitions of Explosive Concern
NAD	North American Datum
ppt	parts per thousand
Shaw	Shaw Environmental, Inc.
TDEM	Time-Domain Electromagnetics

1.0 Introduction

This report presents the results of a geophysical investigation conducted by Shaw Environmental, Inc. (Shaw) at Installation Restoration Program (IRP) Site 11B, Crows Landing in Stanislaus County, California. The fieldwork was conducted on May 16 through 18, 2005, under Contract Number N62474-98-D2076, and Contract Task Order 0110. This report includes:

- Color maps of the geophysical data overlain by locations of site features;
- A summary of the geophysical survey results;
- Discussion of the survey results.

In addition, a CD accompanies this hard copy containing the following files:

- The Site 11B geophysical report;
- All of the raw and processed geophysical data in the appropriate ASCII file format;
- Geophysical maps in PDF format.

1.1 Objectives

The main objective of the investigation was to determine the nature and extent of buried debris in IRP Site 11B. Electromagnetic geophysical methods were utilized to delineate the lateral extent of a suspected subsurface trench and to define other point source anomalies within the survey area. The geophysical surveys performed on IRP Site 11B will specifically help detect any potential metallic and/or non-metallic anomalies, including buried waste and general metallic debris. The methods utilized for this survey were both time domain (TDEM) and frequency domain (FDEM) electromagnetics, as well as ground penetrating radar (GPR). A global positioning system was utilized for navigational accuracy in conjunction with these geophysical instruments. Total area coverage for this survey was 3.4 acres.

2.0 Technology and Approach

This section presents the theoretical background and rationale for using FDEM induction, TDEM metal detection GRP, and GPS.

2.1 Time Domain Electromagnetics (Geonics EM61-MKII)

The Geonics EM61-MKII is a unique type of electromagnetic (EM) metal detector. Most standard types of metal detectors are FDEM tools or magnetometers of some simple type. The EM61-MKII utilizes time domain theory to explore for both ferrous and non-ferrous buried metal objects. By using time domain theory the EM61-MKII is capable of discriminating between conductive earth materials and metallic targets such as buried metallic waste, underground storage tanks (UST's), and ordnance.

The EM61-MKII is the latest model of metal detection instrument from Geonics, Ltd. It generates several electromagnetic (EM) pulses per second in a general square wave configuration. The system takes readings during the off time between square wave pulses. During each EM pulse, eddy currents, with associated secondary magnetic fields, are induced in earth materials and in any buried metallic objects that are present (Faraday's Law). The system measures the decay of secondary magnetic fields associated with the eddy currents using two horizontally mounted coils. The system measures these fields in milliVolts (mV).

By using time domain theory, the EM61-MKII is capable of discriminating between conductive earth materials and metallic targets. In general, the secondary magnetic field associated with the induced current dissipates much faster in earth materials than in buried metal objects. Between each pulse, the EM61-MKII allows for the response from the earth materials to dissipate and subsequently measures the prolonged buried metal response at 4 different time gates. By sensing only the buried metal response, the EM61-MKII can distinguish between conductive soils or rock and metal targets.

The EM61-MKII system consists of a backpack, data logger, and a wheeled two-coil transmitter/receiver cart that is pulled by the operator. The data logger, which is attached to the backpack, runs the entire system. The purpose of the EM61-MKII survey is to evaluate the presence of buried metal objects and debris. The EM61-MKII can detect a single 55-gallon drum at a depth of 3 meters (10 feet). The high sensitivity and ability to detect all metals make the EM61-MKII a valuable tool for highly accurate detection of subsurface metallic objects.

EM61-MKII survey data are typically presented as plan-view contour maps. The maps are color-enhanced to aid in interpretation of subtle anomalies. The data can also be presented as profile data along any given profile.

2.2 Frequency Domain Electromagnetic Induction (Geonics EM31)

FDEM Induction was used at Site 11B to assess the location of buried conductive non-metallic waste and metallic materials. The Geonics, Ltd. EM31 terrain conductivity meter was used for the project. It is commonly used to explore for buried metallic and non-metallic debris to a maximum depth of approximately 18 feet. An EM31 is typically used to: delineate contrasts in electrical conductivity which may represent landfill boundaries; map groundwater contaminant plumes; delineate buried waste materials; locate USTs; locate buried pipes, cables, drums; or waste pits/trenches.

The FDEM instrumentation consists of a pole with a transmitter coil at one end and a receiver coil at the other. An alternating current is applied to the transmitter coil, causing the coil to radiate a primary EM field, which generates eddy currents in conductive subsurface materials. These eddy currents have an associated secondary magnetic field with a strength and phase shift (relative to the primary field) that are dependent on the (bulk) conductivity of the materials within the volume sensed. The combined effect of the primary and secondary fields is measured by the receiver coil. Two components of the signal are measured. Components that are both in-phase and 90 degrees out-of-phase (quadrature) are measured. The quadrature component, also referred to as terrain conductivity, is representative of the conductivity of subsurface materials and is measured in milliSiemens/meter (mS/m). The in-phase component, which is measured in parts per thousand (ppt), is also referred to as current density, and is generally representative of significant accumulations of buried metallic debris.

The EM31 consists of a data logger and 13 foot boom that is carried at the hip of operator. The data logger is connected by a cable that is attached directly to the EM31 and controls and records data from the instrument. The purpose of the EM31 survey is to detect and evaluate potential buried ferrous-metallic and non-metallic debris.

EM31 survey data are typically presented as plan-view contour maps of both terrain conductivity and the in-phase component. The maps are color-enhanced to aid in interpretation of subtle anomalies. The data can also be presented as profile data along any given profile.

2.3 Ground Penetrating Radar (GPR)

GPR data are sometimes useful in estimating depths to the target and are useful in accurately mapping lateral boundaries of buried materials, pits/trenches, structures such as buried structures such as USTs, pipes and utilities. The GPR unit consists of an antenna, and a control unit that is a computer with a built in color display.

When conducting a GPR survey, an antenna containing both a transmitter and a receiver is pulled along the ground surface. The transmitter radiates short pulses of high frequency (200 to 900 MHz) EM energy into the ground. The EM wave propagates into the subsurface at a velocity determined by the electromagnetic properties (primarily dielectric constant) of the medium through which the wave travels. When the wave encounters the interface of two materials having different electrical properties, such as between soil, metal, concrete, or rock, etc a portion of the energy is reflected back to the surface where the receiver measures its amplitude and time of arrival. The magnitude of the reflection indicates the degree of contrast in the electrical properties of the interface producing the reflection. The greater the contrast, the greater the amplitude will be. The time of the reflection arrival indicates the relative depth of the source of the reflection. The reflection is often seen as a characteristic triplet that is the result of the receiving antenna response and of multiples generated along the propagation path. The received signal is transmitted to a control unit, displayed on a color monitor, and saved on the control unit's digital hard drive. GPR data are displayed as cross-sections. The vertical scale is two way travel time in nanoseconds. This can be converted to depth given knowledge of the electrical properties. The horizontal scale is distance along the ground surface.

The electrical conductivity of the local soil is an important factor with GPR surveys. The higher the soil conductivity, the lower the depth of penetration the EM wave will have. Materials or conditions such as surface clays, caliche, and shallow groundwater will severely limit the GPR depth of penetration.

Applications of GPR include delineation of pits and trenches containing metallic and nonmetallic debris, location of buried pipes, drums, and USTs, and mapping of landfill boundaries and near surface geology.

2.4 Navigational Technology (Trimble Pro-XRS)

Differential GPS technologies provide location data at approximately one and one-half foot, real time horizontal accuracy. For this project, Shaw utilized the single frequency, Trimble Pathfinder Pro-XRS with both the EM61-MKII and EM31 systems. For the EM61-MKII and EM31 surveys, GPS data was obtained in conjunction with the geophysical data. This assures that every data point has an associated northing and easting coordinate. Therefore, positional

accuracy is tied into each geophysical map. For the GPR survey, the endpoints of each of the GPR profiles were marked with paint and these points were later collected with GPS in order to ensure locational accuracy and correlation with other geophysical methods.

The availability of sufficient satellite coverage dictates the appropriate use of GPS. Two factors dictate sufficiency of satellite coverage: the view of the sky from the survey site, and the number and height of GPS satellites above the survey site. Tree coverage and proximity to buildings and topographic features such as cliffs and steep hills affect access to a clear view of the sky. The orbits of the GPS satellites can be readily viewed through use of GPS planning software such as Trimble's Quick Plan software. By reviewing the satellite availability on a daily basis, optimal survey periods can be defined, and periods of poor satellite visibility coordinated with rest times, preventative maintenance, data downloading, and travel.

3.0 Geophysical Survey Procedures

3.1 Calibration Test Area

Prior to conducting the geophysical surveys in IRP Site 11B, a small area outside of the site boundary was tested and established as having "little or no noise". This area was employed for use as a calibration test area for instrument calibration and quality control checks for both the EM61-MKII and EM31 geophysical instruments. A calibration test was performed prior to and subsequent to each survey.

3.2 EM61-MKII Electromagnetic Survey

EM61-MKII data were collected with the GPS antenna centered above the coils 5.6 feet above the ground surface. Data within IRP Site 11B were collected North-South with a line spacing of approximately 2.5 feet. For this survey, each traverse was marked by lines spray painted by a second geophysicist traveling at a minimum of ten (10) feet behind instrument. The GPS data streamed from the remote control unit directly into the Allegro data logger. The four-channel electromagnetic and GPS data were stored in the EM61-MKII's Allegro data logger and were downloaded following the field activities.

3.3 EM31 Electromagnetic Survey

Shaw utilized the EM31 instrument in a subsequent survey for IRP Site 11B. For this survey, data were collected North-South along lines with spacing of approximately 5 ft. Wider line spacing was used for this instrument because the cone of registration is wider than that offered by the EM61 instrument. Each traverse was marked by lines overlaying those lines delineating the path of the preceding EM61 survey. These lines were spray painted by a second geophysicist traveling at a minimum of ten (10) feet behind instrument. The EM31 sensor was carried a constant distance above ground surface with the GPS sensor offset 5 inches laterally and 9 inches in the direction of travel relative to the EM31 sensor.

3.4 GPR Survey

After completion of the EM61-MKII and EM31 surveys, the data were preliminarily processed. This data were then evaluated in order to strategically locate GPR traverses. Eleven (11) GPR traverses ranging from approximately 60 to 95 feet long were collected across a suspected trench in Site 11B. These profiles were collected perpendicular to the apparent length of the inferred trench in order to attempt to best locate the edges of the trench. Both the 200 MegaHertz (MHz) and 400MHz antennas were tested and used during the GPR survey to best illustrate sub-surface reflections. Due to unfavorable soil conditions for GPR data collection, however, both the 200 and 400MHz antennas proved to inadequately interpret underlying features.

3.5 GPS Survey

Upon completion of the geophysical survey a GPS survey was conducted. GPS data were obtained to delineate all of the surface features on site. This data is typically used in conjunction with the geophysical data to enhance interpretation of the data. Virtually every surface feature and surface structure was outlined with the GPS system.

4.0 Geophysical Data Processing

4.1 EM61-MKII Data Processing

Geonics DAT-61 for Windows software was used to download the EM61-MKII data to a laptop in the field. The EM data sets were verified and subsequently backed up prior to system demobilization. A file was created from DAT-61 that integrated the geophysical and GPS data to create a location for every EM data point. The EM data sets were then merged and processed. Geosoft's Oasis Montaj was used for leveling, gridding, target picking, analysis, and map creation.

Data was leveled by shifting the data by the amount of the minimum value and a color contour map was created using the California State Plane Coordinates. Site feature locations such as surface metal and fence boundary were then plotted over the top of the map in order to distinguish between buried and surface metals. Final maps were exported from Oasis Montaj to ESRI's ArcMap for ease of compatibility with other agencies.

4.2 EM31-MKII Data Processing

Geonics DAT-31 for Windows software was used to download the EM31 data to a laptop in the field. The EM data sets were verified and subsequently backed up prior to system demobilization. A file was created from DAT-31 that integrated the geophysical and GPS data to create a location for every EM data point. The EM data sets were then merged and processed. Geosoft's Oasis Montaj was used for leveling, gridding, target picking, analysis, and map creation.

Data was gridded and a color contour map was created using the California State Plane Coordinates. Site feature locations such as surface metal and fence boundary were then plotted over the top of the map in order to distinguish between buried and surface metals. Final maps were exported from Oasis Montaj to ESRI's ArcMap for ease of compatibility with other agencies.

4.3 GPR Data Processing

As the GPR data is collected and displayed in real-time on a computer console in the field, no steps were necessary for post processing this data. Upon return from the field, the GPR console was connected to a desktop computer and all data profiles were downloaded and backed up to removable media.

5.0 Results

The following sections present the results of the EM61-MKII and EM31 surveys over IRP Site 11B. Figures 1 and 2 depict the EM61-MKII data while Figures 3 and 4 depict the EM31 conductivity and in-phase data respectively.

5.1 EM61-MKII Electromagnetic Results

As evident in Figure 1, there are a combination of large anomalies that are likely due to a large mass of debris, as well as point source anomalies. These anomalies are indicated by color changes relative to the colorbar that is representative of EM61-MKII signal response in mV, and are marked on the map by either an enclosed area for large, conglomerate anomalies, or crosses for point source anomalies.

Figure 1 shows four large subsurface features. The largest is a 200 feet long and 40 feet wide north south trending anomaly in the southeastern section of the area. This anomaly is interpreted to be a buried trench containing debris. It is typical of an anomaly generated by a buried trench. Another significantly large anomaly occurs in the data at approximately 6386290E, 1968890N (40 feet southwest of the north-south trending buried trench). The surface area above the anomaly is slightly mounded and also likely represents an accumulation of shallow buried debris.

A linear anomaly trends north-south on the northern side of the large suspected trench, and appears to extend into the trench. This linear anomaly is typical of a small utility type structure, however, it may represent some other linear structure.

On the far eastern section of the site, directly east of the trench and small linear anomaly, are two more linear anomalies along the fenceline that trend north-south. These anomalies are interpreted to be abandoned utilities (former power and water lines) associated with the former water production well 6/8-20H1. The utilities appear to turn to the southwest and terminate approximately 35 feet north of the former well location (Figure 1).

Figure 1 also indicates numerous point source anomalies that are distributed throughout the site. These anomalies are typical of buried metallic items. The items may represent anything metallic from buried household debris to possibly munitions and explosives of concern (MEC) items. MEC items have been located on ground surface within the site boundary.

Figure 2 identifies each of the point source anomalies with an associated number. These numbers are listed in the target list generated for Appendix A (558 anomalies). The target list contains the anomaly number and its associated easting and northing coordinate in State Plane

Coordinates. The anomaly value (magnitude) is also listed in the target list. The target list can be used to accurately reacquire (relocate) each anomaly.

5.2 EM31 Electromagnetic Results

Figures 3 and 4 represent the results of the EM31 survey at Site 11B. Figure 3 represents the variation in terrain conductivity across the site. In general, the only objects that were resolved are the buried trench (detected with lower resolution) and the former utilities along the east side of Site 11B. No other point source anomalies were detected. This is likely due to the larger sampling space of the EM31 and lack of other significant non-metallic buried materials. The data indicate that the "background conductivities" range from approximately 30 to 55 mS/m. This is a typical range for natural soils. In short, the EM31 terrain conductivity component detected the largest buried items and accumulation of materials but did not have the required resolution for the point source anomalies.

Figure 4 represents the in-phase component of EM31 data. The in-phase data generally exhibit the same resolution and detected the same targets as the terrain conductivity data

5.3 GPR Results

Soil conditions at Site 11B proved to be unfavorable for GPR data collection. Both 200MHz and 400MHz antennas were tested at the site to determine the best data collection parameters for the local soil conditions. Although some subsurface disturbance was evident within the GPR profiles, it did not prove useful for discrimination of subsurface trenches or pits.

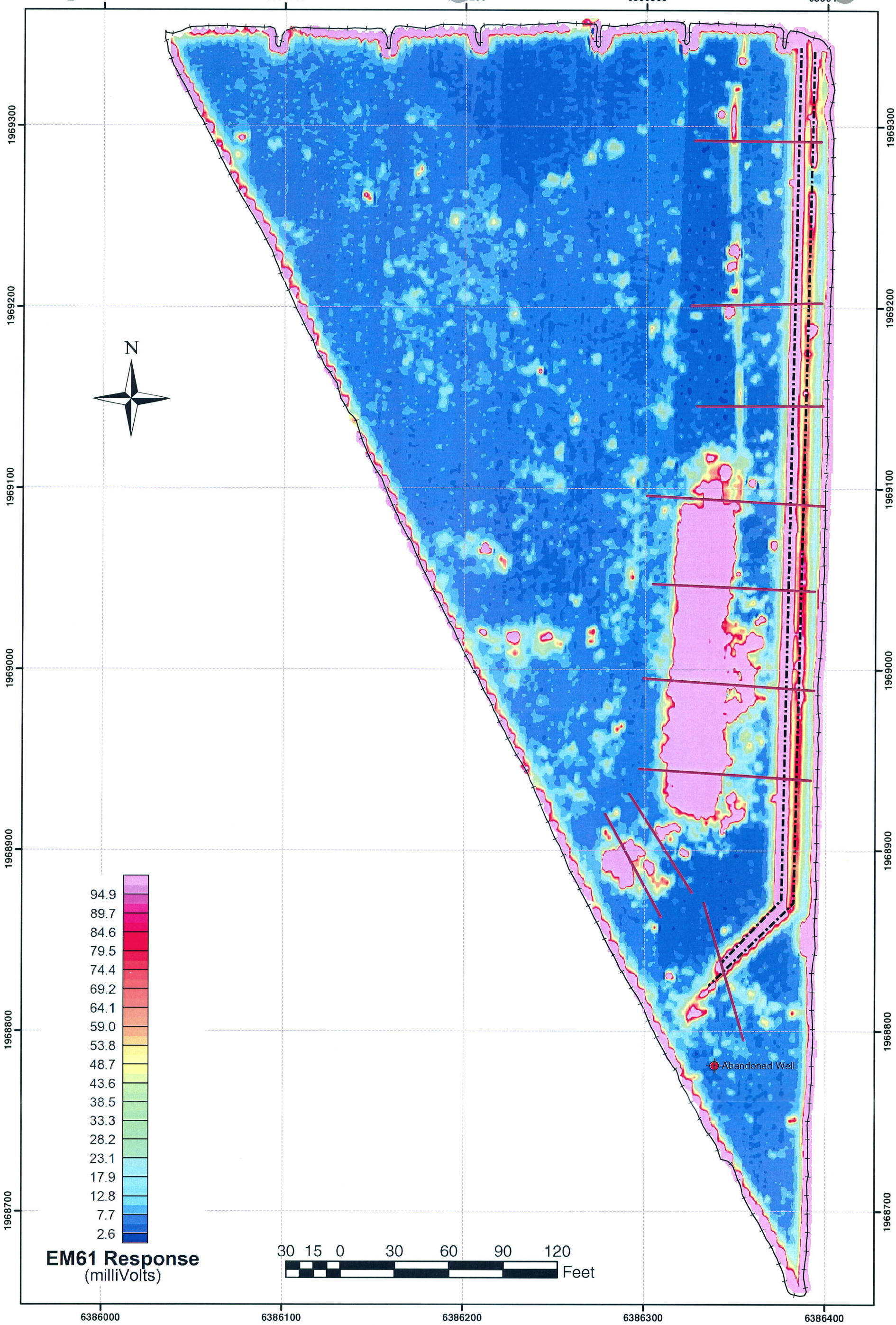
GPR data were collected along traverses that crossed known anomalies in the EM61-MKII data that were representative of debris in trenches. Although some disturbances were evident in the GPR data a clear feature such as a trench was not evident and depth of penetration was limited. Locations of all GPR profiles conducted are shown in the figures.

6.0 Discussion

At IRP Site 11B four subsurface features were interpreted. The most obvious one is the approximate 200 feet by 40 feet trench in the southeast section of the area. A similar, smaller anomaly was identified approximately 40 feet to the southwest of the large anomaly. In addition, two north-south trending utilities that are likely abandoned water and power lines associated with the former water production well 6/8-20H1 were detected along the fence-line on the eastern side of the site, A small north-south trending linear utility-type object was also detected north of the interpreted trench. This anomaly appears to extend into the trench. These objects require straightforward exploratory excavation activities to confirm and/or determine the nature and extent of the buried material.

In general, 558 point source anomalies were detected in the EM61 MKII data. These anomalies, their locations, and anomaly magnitudes are included in Appendix A which can be used to waypoint and excavate each anomaly. These point source anomalies indicate the same character as anomalies generated by MEC items. It is suggested to use EOD excavation safety procedures during exploratory excavation activities at the site.

Figures



Legend

- GPR Profile Locations
- Interpreted Utilities
- Fence

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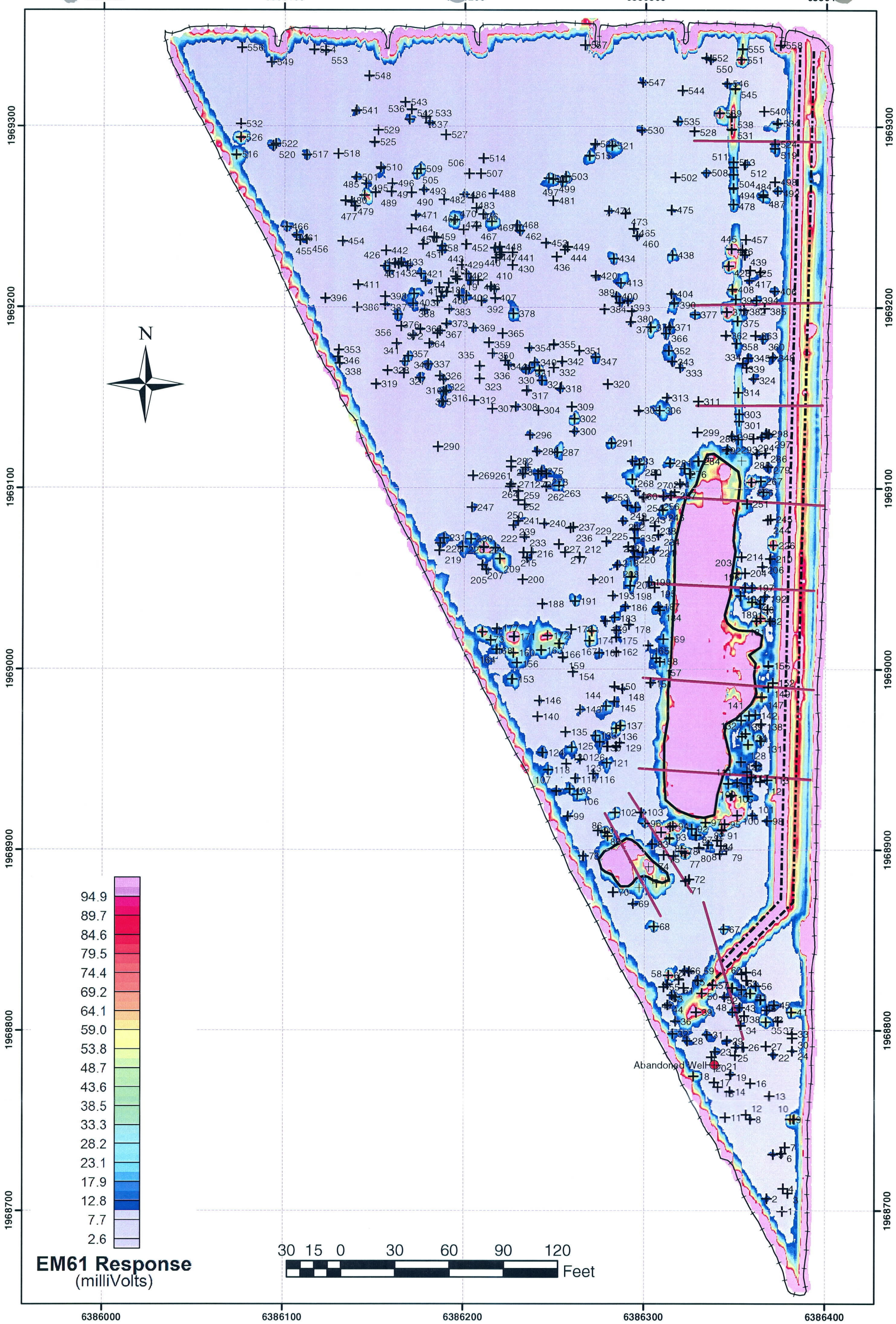
Figure 1 - EM61 Channel 3 Response (milliVolts)

NAD83, California Zone 3, US Survey Feet



Legend

- GPR Profile Locations
- Interpreted Utilities
- Fence
- Point Source Anomalies
- Saturated Zones

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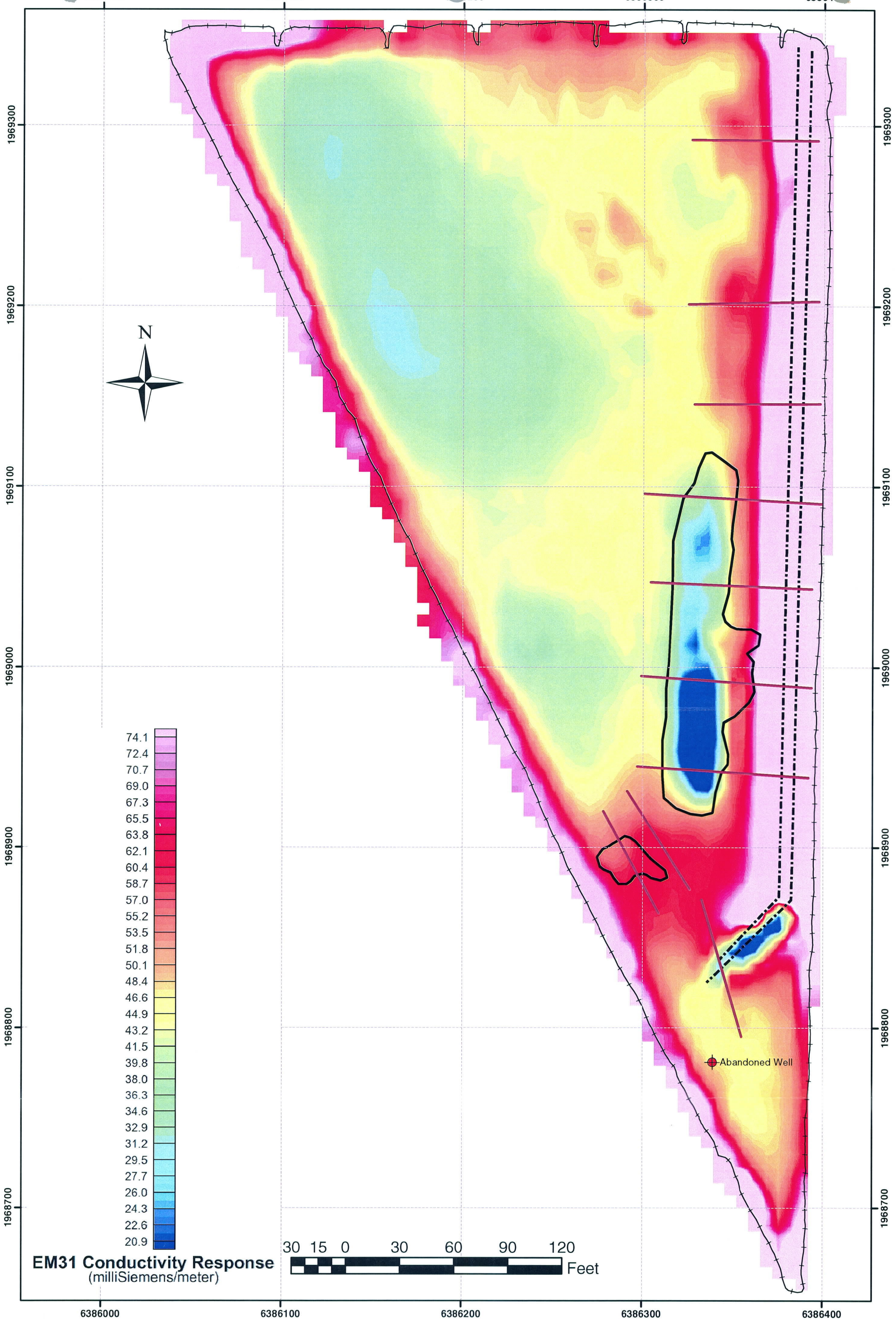
Figure 2 - EM61 Channel 3 Response (milliVolts) with Point Source Anomalies Posted

NAD83, California Zone 3, US Survey Feet



Legend

- GPR Profile Locations
- Saturated Zones
- Interpreted Utilities
- Fence

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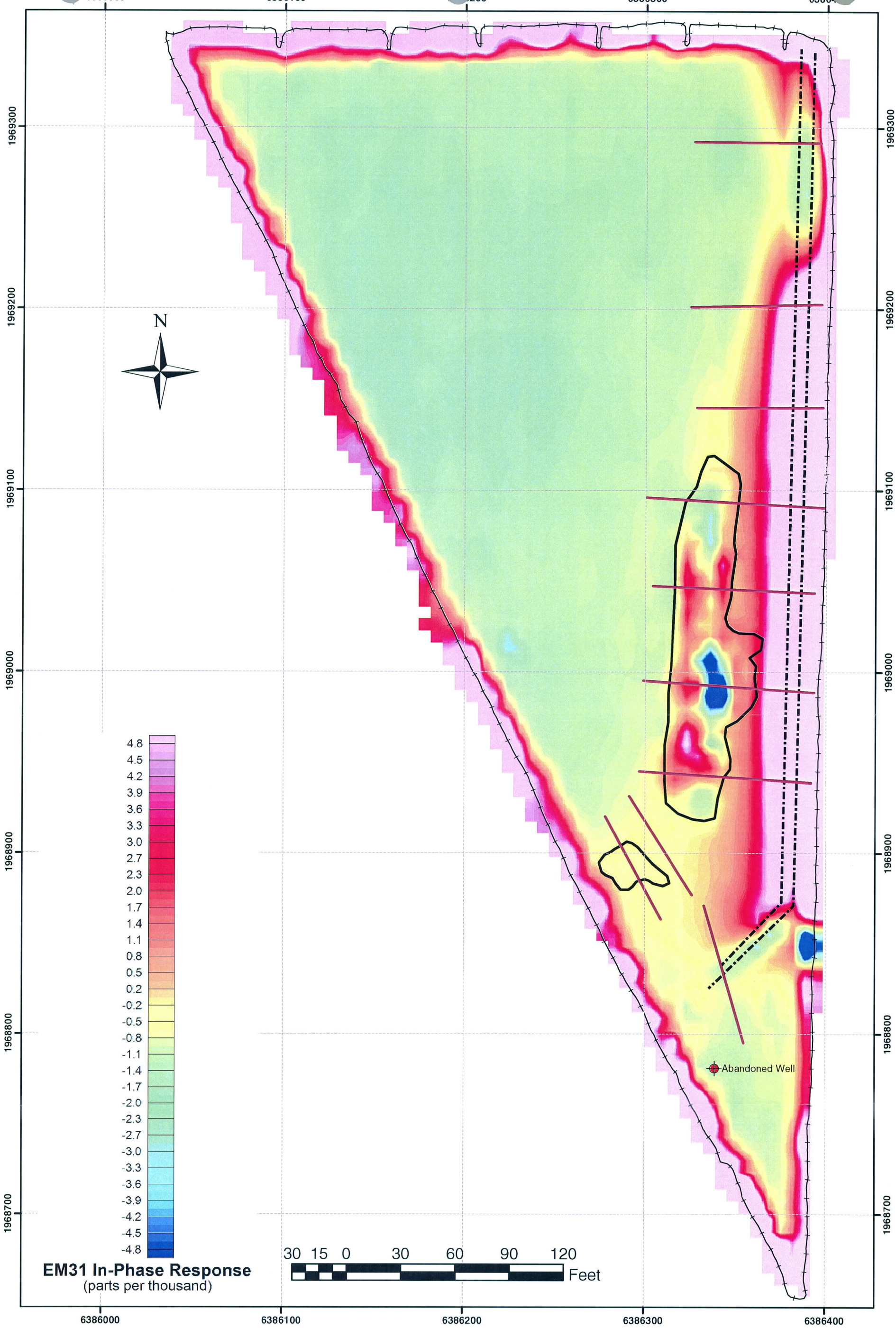
Figure 3 - EM31 Ground Conductivity Response (milliSiemens/meter)

NAD83, California Zone 3, US Survey Feet



Legend

- GPR Profile Locations
- Saturated Zones
- Interpreted Utilities
- Fence

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Figure 4 - EM31 In-Phase Response
(parts per thousand)

NAD83, California Zone 3, US Survey Feet

Appendix A
Target List

CROWS LANDING FLIGHT FACILITY - AREA 11B

Target Locations and Corresponding EM61 Channel 3 Response Values

X (easting)	Y (northing)	Value (mV)	Target ID
6386376.50	1968699.50	10.00	1
6386368.00	1968706.50	15.30	2
6386379.50	1968709.50	12.30	3
6386377.00	1968712.00	11.40	4
6386371.50	1968731.00	14.70	5
6386376.00	1968731.50	11.50	6
6386378.00	1968735.00	10.00	7
6386359.00	1968750.50	14.60	8
6386381.00	1968750.50	83.70	9
6386383.00	1968750.50	93.40	10
6386345.00	1968751.50	10.40	11
6386356.50	1968753.00	12.70	12
6386369.50	1968763.50	12.10	13
6386347.50	1968766.00	14.60	14
6386341.00	1968768.50	10.60	15
6386359.00	1968770.50	10.20	16
6386339.00	1968771.00	11.60	17
6386327.50	1968774.50	62.50	18
6386348.00	1968775.50	18.90	19
6386337.50	1968785.00	11.70	20
6386350.50	1968786.00	10.00	21
6386371.50	1968786.50	17.90	22
6386339.50	1968788.00	18.10	23
6386382.00	1968788.50	13.00	24
6386351.00	1968790.50	14.30	25
6386355.00	1968790.50	12.20	26
6386367.50	1968791.00	11.00	27
6386324.00	1968794.00	15.40	28
6386346.00	1968794.00	16.40	29
6386382.00	1968795.50	11.20	30
6386335.00	1968797.50	20.50	31
6386316.00	1968798.00	22.20	32
6386382.00	1968798.00	10.60	33
6386353.50	1968802.50	13.40	34
6386367.50	1968804.50	58.10	35
6386317.50	1968805.00	13.60	36
6386374.00	1968805.00	12.00	37
6386355.50	1968808.00	10.40	38
6386329.00	1968810.00	156.80	39
6386349.00	1968810.00	27.50	40
6386381.50	1968810.00	90.80	41
6386368.00	1968811.00	19.00	42
6386353.00	1968812.50	14.50	43
6386313.00	1968814.00	16.80	44
6386372.00	1968814.00	22.40	45
6386364.50	1968817.00	27.90	46
6386317.50	1968818.50	22.30	47
6386344.50	1968818.50	15.50	48

6386315.50	1968819.50	24.80	49
6386332.00	1968820.50	123.60	50
6386359.00	1968820.50	49.60	51
6386354.00	1968822.50	20.00	52
6386322.00	1968823.50	11.40	53
6386349.00	1968823.50	56.70	54
6386311.00	1968824.00	13.10	55
6386362.00	1968824.50	23.00	56
6386338.00	1968825.00	113.20	57
6386313.00	1968825.50	13.50	58
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6386319.50	1968828.00	11.30	61
6386313.50	1968830.50	273.70	62
6386354.00	1968831.00	10.30	63
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6386325.00	1968832.50	15.00	65
6386322.50	1968833.00	15.00	66
6386344.00	1968856.00	59.80	67
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6386283.00	1968876.50	12.10	70
6386323.00	1968882.50	10.80	71
6386325.00	1968883.50	11.60	72
6386266.50	1968896.50	11.00	73
6386316.50	1968896.50	13.80	74
6386311.00	1968897.00	11.10	75
6386342.00	1968897.50	21.00	76
6386323.00	1968898.00	195.80	77
6386321.00	1968899.00	167.20	78
6386345.50	1968900.00	14.20	79
6386330.50	1968901.00	14.90	80
6386342.50	1968902.00	10.80	81
6386335.50	1968902.50	29.40	82
6386304.50	1968903.00	17.60	83
6386340.50	1968905.00	13.50	84
6386314.00	1968906.00	73.80	85
6386280.00	1968907.50	74.10	86
6386329.00	1968908.00	30.90	87
6386278.50	1968909.50	88.80	88
6386309.50	1968909.50	495.00	89
6386274.50	1968910.50	10.40	90
6386343.00	1968910.50	198.10	91
6386326.50	1968911.50	29.10	92
6386314.50	1968912.50	188.80	93
6386316.00	1968913.00	184.40	94
6386344.50	1968914.00	210.40	95
6386300.50	1968914.50	33.40	96
6386334.00	1968915.00	92.00	97
6386368.00	1968916.00	18.80	98
6386258.00	1968918.50	15.60	99
6386351.50	1968919.00	259.10	100

6386360.00	1968919.00	18.20	101
6386284.00	1968920.50	58.10	102
6386298.50	1968920.50	14.80	103
6386357.50	1968929.50	29.00	104
6386348.50	1968930.00	203.10	105
6386263.00	1968930.50	33.10	106
6386251.50	1968932.50	12.10	107
6386259.00	1968933.50	25.60	108
6386346.50	1968936.50	40.50	109
6386357.00	1968936.50	17.80	110
6386351.50	1968937.00	17.40	111
6386364.00	1968937.50	13.80	112
6386368.00	1968938.50	32.80	113
6386262.00	1968939.50	16.30	114
6386359.50	1968940.00	22.10	115
6386272.00	1968942.00	12.60	116
6386357.00	1968943.00	19.10	117
6386247.00	1968944.00	25.10	118
6386362.00	1968946.50	23.60	119
6386257.00	1968947.50	10.40	120
6386279.50	1968948.00	36.10	121
6386353.50	1968948.50	20.30	122
6386264.50	1968950.00	11.00	123
6386244.00	1968953.50	20.10	124
6386260.00	1968956.50	41.40	125
6386280.00	1968957.00	10.50	126
6386284.50	1968957.00	10.90	127
6386357.50	1968958.00	58.70	128
6386286.50	1968959.00	10.60	129
6386275.50	1968959.50	19.60	130
6386364.50	1968960.00	59.30	131
6386354.00	1968962.50	38.00	132
6386273.00	1968963.00	26.80	133
6386356.00	1968964.00	40.80	134
6386256.50	1968965.00	11.70	135
6386284.50	1968967.00	79.70	136
6386287.00	1968968.50	83.60	137
6386364.50	1968969.50	12.10	138
6386353.50	1968971.50	48.20	139
6386241.00	1968973.50	10.10	140
6386358.00	1968974.00	30.10	141
6386361.50	1968974.50	28.50	142
6386264.50	1968977.50	17.00	143
6386279.00	1968979.50	36.80	144
6386283.50	1968982.00	12.30	145
6386242.00	1968982.50	11.50	146
6386365.00	1968984.50	77.70	147
6386288.00	1968989.00	13.10	148
6386368.50	1968990.00	45.10	149
6386283.50	1968990.50	11.30	150
6386303.50	1968992.50	13.10	151
6386371.00	1968992.50	35.70	152

6386227.00	1968994.50	36.80	153
6386260.50	1968998.50	10.80	154
6386368.50	1969002.00	36.20	155
6386229.50	1969003.50	30.20	156
6386308.50	1969004.00	35.80	157
6386306.50	1969006.00	30.40	158
6386255.00	1969006.50	11.10	159
6386227.50	1969009.00	73.80	160
6386275.00	1969009.00	26.00	161
6386284.50	1969009.50	11.40	162
6386243.00	1969010.50	40.20	163
6386218.50	1969011.00	41.70	164
6386302.00	1969013.00	11.90	165
6386253.00	1969014.00	61.20	166
6386269.50	1969015.50	80.20	167
6386215.00	1969016.00	43.10	168
6386310.50	1969016.50	30.00	169
6386284.50	1969017.50	13.20	170
6386228.00	1969018.00	266.10	171
6386246.50	1969018.50	132.70	172
6386210.50	1969020.50	179.90	173
6386271.00	1969021.00	96.00	174
6386284.50	1969021.50	14.80	175
6386259.50	1969022.00	10.80	176
6386218.50	1969022.50	12.00	177
6386291.50	1969024.50	10.10	178
6386278.50	1969026.50	15.20	179
6386362.00	1969026.50	183.10	180
6386369.50	1969026.50	15.80	181
6386364.00	1969028.00	193.90	182
6386283.50	1969028.50	20.60	183
6386308.50	1969032.50	19.10	184
6386368.00	1969033.00	11.70	185
6386289.50	1969034.50	13.60	186
6386307.50	1969034.50	21.00	187
6386243.50	1969036.00	11.50	188
6386364.00	1969036.00	25.10	189
6386359.50	1969037.00	63.10	190
6386261.50	1969037.50	45.80	191
6386366.50	1969040.00	20.20	192
6386282.50	1969040.50	13.40	193
6386353.00	1969040.50	31.70	194
6386305.50	1969045.00	10.10	195
6386355.50	1969045.00	39.20	196
6386359.50	1969045.00	24.10	197
6386292.00	1969046.00	27.40	198
6386302.50	1969048.00	13.70	199
6386232.50	1969049.50	10.00	200
6386271.50	1969049.50	15.60	201
6386292.50	1969051.00	92.90	202
6386351.00	1969053.00	151.70	203
6386355.50	1969053.00	11.60	204

6386212.50	1969055.00	12.20	205
6386365.00	1969056.50	14.80	206
6386210.50	1969057.50	12.10	207
6386285.00	1969057.50	14.10	208
6386220.00	1969061.00	78.50	209
6386369.50	1969061.00	12.60	210
6386235.00	1969061.50	15.20	211
6386264.00	1969062.00	11.20	212
6386294.50	1969062.00	14.40	213
6386353.50	1969062.00	11.70	214
6386233.00	1969064.50	10.60	215
6386237.50	1969064.50	12.20	216
6386256.00	1969064.50	10.10	217
6386299.00	1969064.50	18.20	218
6386186.50	1969065.50	11.50	219
6386294.00	1969065.50	13.30	220
6386305.00	1969065.50	12.50	221
6386217.50	1969067.00	16.40	222
6386199.50	1969067.50	29.80	223
6386211.00	1969067.50	428.90	224
6386291.00	1969067.50	10.20	225
6386371.00	1969068.50	236.60	226
6386252.50	1969069.00	10.20	227
6386187.00	1969069.50	13.90	228
6386279.00	1969070.50	12.20	229
6386204.00	1969072.00	34.60	230
6386189.00	1969072.50	18.40	231
6386294.50	1969072.50	18.20	232
6386233.50	1969073.00	12.30	233
6386307.50	1969074.00	12.20	234
6386294.50	1969077.50	15.40	235
6386259.00	1969078.00	10.30	236
6386260.50	1969078.50	10.30	237
6386305.50	1969079.00	10.50	238
6386227.50	1969079.50	14.70	239
6386244.50	1969080.50	12.50	240
6386230.00	1969082.00	11.40	241
6386288.00	1969082.00	16.90	242
6386299.50	1969082.50	12.20	243
6386368.00	1969082.50	11.00	244
6386369.50	1969083.00	11.60	245
6386310.00	1969088.00	61.90	246
6386204.50	1969089.50	14.50	247
6386295.00	1969089.50	18.90	248
6386290.50	1969090.50	17.20	249
6386233.50	1969091.00	11.80	250
6386356.50	1969091.50	33.60	251
6386230.00	1969093.50	11.70	252
6386279.00	1969095.00	13.40	253
6386299.50	1969095.00	11.00	254
6386310.50	1969095.50	13.90	255
6386314.50	1969096.00	11.20	256

6386316.50	1969098.00	10.90	257
6386365.50	1969098.00	25.00	258
6386230.00	1969098.50	11.10	259
6386295.00	1969098.50	13.70	260
6386225.50	1969101.00	10.20	261
6386245.50	1969101.00	12.70	262
6386252.50	1969101.50	29.60	263
6386226.00	1969102.50	10.90	264
6386319.50	1969102.50	14.10	265
6386359.00	1969103.50	316.90	266
6386364.00	1969104.00	38.60	267
6386293.00	1969105.00	54.50	268
6386205.00	1969107.00	10.70	269
6386306.00	1969107.50	10.50	270
6386232.50	1969108.00	13.30	271
6386241.00	1969108.00	14.90	272
6386245.50	1969108.00	16.10	273
6386325.00	1969108.00	38.80	274
6386243.00	1969109.50	15.00	275
6386322.00	1969111.00	31.10	276
6386234.00	1969111.50	11.30	277
6386226.00	1969112.00	10.80	278
6386368.00	1969112.00	16.20	279
6386297.00	1969113.50	35.70	280
6386314.00	1969114.00	35.40	281
6386226.00	1969115.00	12.10	282
6386293.00	1969115.00	20.60	283
6386329.50	1969115.00	39.20	284
6386362.00	1969119.00	18.80	285
6386366.50	1969119.50	15.90	286
6386251.50	1969120.00	36.60	287
6386240.50	1969120.50	13.30	288
6386345.50	1969121.50	27.50	289
6386185.50	1969123.00	12.00	290
6386281.50	1969125.00	32.20	291
6386351.50	1969127.00	23.70	292
6386360.00	1969127.50	11.10	293
6386364.50	1969128.50	26.30	294
6386348.00	1969129.00	18.50	295
6386236.50	1969129.50	14.50	296
6386368.50	1969130.00	21.80	297
6386367.00	1969130.50	20.10	298
6386329.00	1969131.00	10.80	299
6386261.00	1969131.50	18.10	300
6386352.00	1969137.00	36.10	301
6386261.00	1969138.50	59.10	302
6386352.00	1969141.00	36.60	303
6386241.00	1969143.00	10.30	304
6386296.50	1969143.00	12.40	305
6386308.00	1969143.00	30.60	306
6386215.50	1969144.00	10.60	307
6386228.50	1969145.00	12.20	308

6386259.50	1969145.00	10.60	309
6386188.00	1969148.00	15.90	310
6386329.50	1969148.00	10.00	311
6386205.50	1969148.50	10.80	312
6386312.00	1969150.00	11.50	313
6386351.50	1969153.00	55.60	314
6386188.50	1969153.50	19.30	315
6386190.00	1969154.00	19.60	316
6386234.50	1969154.00	12.50	317
6386253.00	1969155.00	20.10	318
6386151.00	1969157.50	11.10	319
6386279.50	1969157.50	10.40	320
6386243.00	1969159.50	23.10	321
6386188.50	1969160.00	13.80	322
6386208.50	1969160.50	10.60	323
6386360.00	1969160.50	23.10	324
6386175.50	1969161.00	20.70	325
6386186.50	1969162.00	11.90	326
6386166.50	1969163.50	10.40	327
6386157.50	1969165.00	10.40	328
6386241.50	1969165.00	131.00	329
6386234.00	1969165.50	17.90	330
6386236.00	1969166.50	19.10	331
6386249.50	1969166.50	10.50	332
6386319.50	1969166.50	17.80	333
6386356.00	1969166.50	12.10	334
6386208.50	1969167.50	10.80	335
6386224.50	1969168.00	12.50	336
6386180.00	1969168.50	14.20	337
6386131.00	1969169.00	11.90	338
6386354.00	1969169.00	15.40	339
6386239.00	1969169.50	17.30	340
6386167.00	1969170.00	31.30	341
6386254.00	1969170.00	13.00	342
6386315.00	1969170.00	18.80	343
6386222.50	1969170.50	10.80	344
6386357.00	1969172.00	15.10	345
6386130.00	1969172.50	11.10	346
6386272.50	1969172.50	22.40	347
6386370.50	1969172.50	22.30	348
6386169.00	1969173.00	25.60	349
6386215.50	1969174.50	11.80	350
6386263.50	1969176.00	11.30	351
6386313.00	1969176.00	30.30	352
6386130.50	1969176.50	12.00	353
6386236.00	1969177.50	17.60	354
6386249.50	1969179.50	12.20	355
6386162.50	1969180.00	11.70	356
6386180.50	1969180.00	12.00	357
6386350.50	1969180.00	30.70	358
6386213.50	1969180.50	10.50	359
6386365.00	1969182.50	27.00	360

6386171.50	1969184.50	13.70	361
6386344.50	1969184.50	13.40	362
6386361.00	1969184.50	11.90	363
6386185.00	1969185.50	10.60	364
6386221.00	1969185.50	10.20	365
6386311.50	1969185.50	28.20	366
6386186.50	1969187.00	12.60	367
6386175.50	1969188.00	11.10	368
6386205.00	1969188.50	16.70	369
6386303.00	1969189.00	58.90	370
6386313.50	1969189.00	23.30	371
6386165.00	1969189.50	11.00	372
6386190.00	1969191.00	17.20	373
6386292.00	1969192.00	11.10	374
6386351.00	1969192.50	41.10	375
6386163.00	1969196.00	20.40	376
6386327.50	1969196.00	32.30	377
6386227.00	1969196.50	49.40	378
6386345.00	1969197.50	282.10	379
6386292.50	1969198.00	12.00	380
6386178.00	1969198.50	11.60	381
6386354.50	1969198.50	12.90	382
6386191.50	1969199.00	13.00	383
6386277.50	1969199.00	10.50	384
6386366.00	1969199.50	12.30	385
6386140.50	1969200.00	10.10	386
6386156.00	1969201.50	12.40	387
6386171.50	1969202.00	16.50	388
6386286.00	1969202.50	17.80	389
6386316.00	1969202.50	38.80	390
6386185.00	1969203.50	11.60	391
6386209.50	1969203.50	12.90	392
6386290.50	1969203.50	17.50	393
6386361.50	1969204.00	34.20	394
6386350.00	1969204.50	35.50	395
6386123.00	1969205.00	13.00	396
6386217.00	1969205.00	10.50	397
6386156.00	1969206.00	10.40	398
6386187.00	1969206.00	12.50	399
6386284.00	1969206.00	15.10	400
6386197.00	1969206.50	17.50	401
6386201.00	1969206.50	23.50	402
6386172.00	1969207.50	40.70	403
6386314.50	1969207.50	14.70	404
6386190.00	1969208.50	10.40	405
6386371.50	1969209.00	22.40	406
6386216.50	1969210.00	10.70	407
6386348.00	1969210.00	96.70	408
6386186.00	1969211.00	10.90	409
6386214.50	1969211.50	11.70	410
6386141.00	1969212.50	12.20	411
6386191.00	1969213.50	11.40	412

6386286.50	1969213.50	39.90	413
6386178.50	1969214.50	14.10	414
6386203.50	1969215.00	14.70	415
6386207.50	1969215.00	10.80	416
6386357.50	1969215.00	17.10	417
6386196.00	1969215.50	10.40	418
6386195.00	1969217.00	10.90	419
6386272.50	1969217.50	12.00	420
6386176.00	1969218.50	23.30	421
6386201.00	1969218.50	13.60	422
6386363.50	1969219.50	11.10	423
6386158.50	1969220.00	14.40	424
6386358.00	1969220.50	11.20	425
6386156.00	1969223.00	27.50	426
6386168.50	1969223.00	14.80	427
6386346.00	1969223.00	226.00	428
6386198.50	1969223.50	10.40	429
6386226.50	1969223.50	10.10	430
6386163.50	1969224.00	12.50	431
6386161.50	1969224.50	12.40	432
6386165.00	1969225.00	11.80	433
6386282.50	1969227.00	38.20	434
6386217.50	1969227.50	10.80	435
6386251.00	1969228.00	10.20	436
6386219.50	1969229.00	10.90	437
6386315.00	1969229.00	40.80	438
6386355.00	1969229.00	13.60	439
6386220.50	1969230.50	10.30	440
6386226.50	1969230.50	11.20	441
6386156.50	1969231.50	10.30	442
6386187.50	1969231.50	16.40	443
6386255.50	1969232.00	10.30	444
6386353.50	1969232.00	13.60	445
6386347.50	1969232.50	518.00	446
6386217.00	1969233.00	12.80	447
6386219.50	1969233.50	11.60	448
6386257.00	1969233.50	10.10	449
6386187.50	1969234.00	15.90	450
6386177.00	1969235.00	10.80	451
6386201.00	1969235.00	10.60	452
6386245.00	1969235.50	11.20	453
6386132.50	1969236.50	11.00	454
6386109.00	1969237.00	11.80	455
6386112.50	1969237.50	10.40	456
6386355.50	1969237.50	11.20	457
6386184.50	1969238.50	10.30	458
6386183.00	1969239.00	10.30	459
6386295.50	1969239.50	14.10	460
6386107.00	1969240.00	18.60	461
6386230.50	1969242.50	24.60	462
6386199.50	1969243.00	10.30	463
6386170.50	1969243.50	10.10	464

6386293.50	1969243.50	12.80	465
6386101.50	1969244.50	33.70	466
6386206.50	1969245.00	11.20	467
6386229.00	1969245.50	24.10	468
6386215.00	1969247.50	50.80	469
6386194.50	1969248.50	55.90	470
6386173.00	1969251.00	14.90	471
6386210.50	1969251.50	14.80	472
6386289.00	1969252.00	10.20	473
6386280.00	1969253.50	18.10	474
6386314.50	1969254.00	11.60	475
6386206.50	1969255.00	10.80	476
6386139.50	1969256.00	12.20	477
6386348.50	1969257.00	37.10	478
6386137.50	1969258.50	11.60	479
6386134.00	1969259.00	11.90	480
6386249.00	1969259.00	10.50	481
6386188.50	1969259.50	12.40	482
6386204.50	1969260.50	10.10	483
6386365.00	1969261.00	34.80	484
6386144.50	1969262.00	105.90	485
6386200.00	1969262.50	16.20	486
6386365.00	1969262.50	36.80	487
6386216.00	1969263.00	10.70	488
6386150.50	1969263.50	10.80	489
6386170.50	1969263.50	11.50	490
6386159.50	1969264.00	10.30	491
6386373.00	1969264.50	35.80	492
6386177.50	1969265.00	15.50	493
6386348.50	1969266.00	38.20	494
6386145.50	1969268.50	13.10	495
6386160.00	1969268.50	11.20	496
6386254.00	1969269.50	37.50	497
6386371.50	1969269.50	10.70	498
6386249.00	1969271.00	33.70	499
6386246.50	1969271.50	36.90	500
6386140.00	1969272.00	22.90	501
6386316.50	1969272.00	10.30	502
6386256.00	1969272.50	47.50	503
6386348.50	1969273.50	31.30	504
6386173.50	1969274.00	63.60	505
6386202.50	1969274.00	10.60	506
6386209.00	1969274.00	10.40	507
6386333.50	1969274.50	23.30	508
6386175.50	1969276.50	71.60	509
6386153.50	1969277.50	18.90	510
6386348.50	1969277.50	26.40	511
6386355.00	1969279.00	30.70	512
6386348.50	1969280.50	27.30	513
6386210.50	1969282.50	10.40	514
6386269.00	1969284.00	46.00	515
6386073.50	1969284.50	55.40	516

6386112.50	1969284.50	24.00	517
6386130.00	1969285.00	10.20	518
6386371.50	1969288.00	29.00	519
6386094.00	1969289.50	22.30	520
6386281.50	1969289.50	33.50	521
6386095.50	1969290.50	24.50	522
6386272.00	1969290.50	12.60	523
6386371.50	1969290.50	25.60	524
6386150.00	1969291.50	11.10	525
6386076.00	1969294.00	179.90	526
6386189.50	1969295.50	10.00	527
6386327.00	1969297.50	12.50	528
6386152.00	1969298.00	10.00	529
6386298.00	1969298.00	16.30	530
6386347.50	1969298.50	115.60	531
6386076.00	1969301.50	10.20	532
6386180.50	1969302.00	15.00	533
6386373.00	1969302.00	59.10	534
6386318.00	1969303.00	30.80	535
6386169.50	1969304.00	29.00	536
6386178.50	1969305.50	11.90	537
6386347.50	1969305.50	139.60	538
6386341.00	1969307.50	293.30	539
6386365.50	1969308.50	10.10	540
6386140.00	1969309.00	13.60	541
6386170.50	1969309.50	10.50	542
6386167.00	1969313.50	10.30	543
6386320.50	1969320.00	12.80	544
6386349.50	1969321.00	81.80	545
6386345.00	1969324.00	22.40	546
6386298.50	1969324.50	13.50	547
6386147.00	1969328.00	10.30	548
6386093.00	1969335.50	11.60	549
6386336.00	1969337.00	16.50	550
6386353.00	1969337.00	174.40	551
6386333.50	1969338.00	16.60	552
6386123.00	1969342.00	13.10	553
6386116.50	1969342.50	10.60	554
6386353.50	1969343.00	67.00	555
6386076.50	1969343.50	10.40	556
6386266.50	1969345.00	13.90	557
6386374.50	1969345.00	3418.50	558