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CROWS LANDING
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FINAL REPORT

MUNITIONS AND EXPLOSIVES OF CONCERN SITE B
NASA Crows Landing Flight Facility
Crows Landing, California

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

August 17, 2005

Submitted to:

Naval Facilities Engineering Command (NAVFAC)
Southwest Division

Submitted by:

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Date: 22 August, 2005

From: Charles So, P.E. CS

Subject: Final Report for Initial Geophysical Survey for MEC Clearance at Site B ("Live Ammunition" Area), NASA Crows Landing Flight Facility, California

Transmitted herein is the final report for the initial geophysical survey conducted for a part of Site B at NASA Crows Landing Flight Facility. The area discussed in this report covers only the flat area west of Little Salado Creek and the adjacent sidewall. The report describes survey procedures followed in the field and results, including graphical presentation of anomalies detected and a summary of the target list.

The geophysical survey was conducted in accordance with the requirements and procedures described in the MEC Verification and Clearance Work Plan[1] and the Unexploded Ordnance and Geophysical Quality Assurance/Quality Control Plan[2] submitted in June 2005. Prior to the geophysical survey, a Geophysical Prove-out (GPO) using a test plot was performed to determine the appropriate instrument for subsequent survey use. EM61-MKII was selected based on the test results. The GPO test was performed on June 27 and 28, 2005. On June 22, 2005, seed items for QA/QC, including the blind seeds, were placed at the site by the QA Geophysicist, in accordance with the QA/QC plan requirements.

The initial geophysical survey at Site B was initiated and completed in July 2005. Geophysical survey data were reviewed by the QA Geophysicist. Some preliminary QA/QC issues were noted with the survey results. These issues will be resolved following the recommendations made by the QA Geophysicist. A planned action includes resurvey of a northern part of the site due to data interference caused by the existing temporary fence. The final anomaly target list will be developed after the resurvey and resolution of the other survey data issue.

Enclosure – MEC Site B Initial Geophysical Survey Results, Final Report, dated August 17, 2005

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[1] Shaw Environmental, Inc., 2005, *Munitions and Explosives of Concern Verification and Clearance, NASA Crows Landing Flight Facility, Crows Landing, California, Final Project Plans*, June 9.

[2] Shaw Environmental, Inc., 2005, *Final Unexploded Ordnance and Geophysical Quality Assurance/Quality Control Plan, Munitions and Explosives of Concern Verification and Clearance, NASA Crows Landing Flight Facility, Crows Landing, California*, June 15.

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Table of Contents

List of Figures i
List of Appendices i
Acronyms and Abbreviations ii
1.0 Introduction 1-1
1.1 Site Description 1-1
1.2 Objectives 1-2
2.0 Technology and Approach 2-1
2.1 Time-Domain Electromagnetics (Geonics EM61-MKII) 2-1
2.2 Navigational Technology (Trimble Pro-XRS) 2-2
3.0 Geophysical Survey Procedures 3-1
3.1 Calibration Test Area 3-1
3.2 EM61-MKII Electromagnetic Survey 3-1
3.3 GPS Survey 3-1
4.0 Geophysical Data Processing 4-1
4.1 EM61-MKII Data Processing 4-1
5.0 Results 5-1
5.1 EM61-MKII Electromagnetic Results 5-1
6.0 Discussion 6-1
7.0 References 7-1

List of Figures

Figure 1 Crows Landing Area Map with Survey Sites Posted
Figure 2 Site B Map of Sum of EM61MK2 Channels with Targets Posted
Figure 3 Site B Map of Sum of EM61MK2 Channels with Targets Posted and Sub-Target Amplitude Grayed
Figure 4 Site B Map of Targets Located in Real-Time in the Sidewall of the Little Salado Creek with the EM61MK2 HH

List of Appendices

Appendix A Target List for MEC Site B

Acronyms and Abbreviations

Crows Landing	NASA Crows Landing Flight Facility
EM	Electromagnetic
EM61-MKII	Geonics EM61-MKII Metal Detector
EM61-MKIIHH	Geonics EM61-MKII Metal Detector Hand Held
EOD	Explosive Ordnance Disposal
GPO	Geophysical Proveout
GPS	Global Positioning System
IRP	Installation Restoration Program
mm	millimeter
MEC	Munitions of Explosive Concern
RI	Remedial Investigation
SUXOS	Senior Unexploded Ordnance Supervisor
TDEM	Time-Domain Electromagnetics

1.0 Introduction

This report presents the results of a geophysical investigation conducted by Shaw Environmental, Inc. at Munitions and Explosives of Concern (MEC) Site B, NASA Crows Landing Flight Facility (Crows Landing) in Stanislaus County, California. The fieldwork was conducted on June 29 through July 14, 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 compact disc accompanies this hard copy containing the following files:

- The Site B geophysical report
- All of the raw and processed geophysical data in the appropriate American Standard Code for Information Interchange file format
- Geophysical maps in a portable document format

1.1 Site Description

Site B is referred to as the "live ammunition" area. The "live ammunition" area is located immediately north of Ike Crow Road (Figure 1, "Crows Landing Area Map with Survey Sites Posted"). During the Remedial Investigation (RI) conducted at the Facility, this area was included as part of Installation Restoration Program (IRP) Site 18 and was identified as Site 18 South. The site was referred to as the "live ammunition" area because of a previous finding of two 20 millimeter (mm) projectiles. According to the information presented in the Draft Final RI Report, a 20-mm shell was discovered in a pile of dredged spoil material in late 1991 by a farmer following a dredging operation at Little Salado Creek (PRC Environmental Management, Inc., 1997). The Explosive Ordnance Disposal (EOD) personnel from Naval Shipyard Mare Island were called upon in response to the discovery of the 20-mm shell. Although the 20-mm shell was described as "intact" in the RI Report, there was no specific description as to the explosive nature of the item provided by the EOD.

While the area was being investigated, an additional, highly corroded 20-mm shell was discovered using metal detectors within a limited area of the creek bed. According to the Draft Final RI Report, there were speculations from the Navy personnel that the projectiles might have come from an airplane crash in the 1960s or early 1970s. However, based on reviews of the available records there is no documentation of any airplane crash in that period.

A photograph included in a July 2002 Archives Search Report shows "hard landing" of a PB4Y-1 Liberator plane at the Crows Landing Facility around October 1943. The location where the plane landed appears to be the embankment of a dry creek, probably Little Salado Creek. In accordance with the specification data, PB4Y-1 planes then did not carry 20-mm projectiles; they carried only .50-caliber machine guns and bombs of various sizes. Therefore, it is not expected that the 20-mm projectiles found in the creek area were a result of the "hard landing" of the PB4Y-1 plane.

There were indications from former Facility personnel that an A-4 jet crash had occurred at the location where the 20-mm projectiles were found and that A-4 jets carried 20-mm projectiles. However, there are also no specific details describing this plane crash or other information from the available records documenting this incident.

Although there is no record describing the exact nature of the 20-mm projectiles found, based on historical munitions used at the Facility, the 20-mm projectiles were likely for training practice purposes. No environmental investigation was conducted at the site subsequent to the events.

This site received an No Further Action status when the Record of Decision for IRP Site 18 was signed in 1999. However, the potential presence of additional ammunition, particularly 20-mm projectiles in the area, may pose a risk to the public health and the environment. As such, fence was installed around the perimeter of the area in the summer of 2003 to minimize potential exposure to additional munitions.

1.2 Objectives

The main objective of the investigation was to conduct a geophysical investigation at MEC Site B to assess the nature and extent of geophysical anomalies that may represent buried MEC or related MEC items. For the purpose of MEC verification and clearance, Site B encompasses all areas inside the temporary fencing, including Little Salado Creek, the flat area west adjacent to the creek, and the dredged soil berm east of the creek. Initial geophysical survey of the soil berm was conducted separately and results were reported in a separate report. This report covers the survey performed of the flat area and the sidewall embankments of the creek.

A Geophysical Proveout (GPO) was conducted at Crows Landing (in accordance with MR DID 005-05A) to assess the most appropriate instrument to use for the geophysical survey for the flat area within Site B. The GPO was conducted in late June 2005 by Shaw prior to the onset of fieldwork. The instrument selected was the Geonics EM61-MKII Metal Detector (EM61-MKII) combined with Global Positioning System (GPS) for navigation. The geophysical surveys performed on MEC Site B were conducted to detect any potential metallic anomalies that may represent MEC or MEC-related items. Total area coverage for Site B was 1.5 acres (including the creek sidewalls). Due to the physical nature of the creek walls within Site B, a Geonics

EM61-MKII Metal Detector Hand Held (EM61-MKIIHH) was used in real-time to detect any anomalies that may be present within the creek walls.

2.0 Technology and Approach

This section presents the theoretical background and rationale for using Time-Domain Electromagnetics (TDEM) metal detection 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 TDEM 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 (USTs), and ordnance.

The EM61-MKII is the latest model of metal detection instrument from Geonics, Ltd. It generates several electromagnetic 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. 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 four 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.

The EM61-MKII HH essentially works the same way that the regular EM61-MKII. The only difference is that it is designed to be hand held and has smaller coils. Due to the site conditions at the Little Salado Creek side walls we had to use the hand held version.

2.2 Navigational Technology (Trimble Pro-XRS)

Differential GPS technologies provide location data at approximately 1.5-foot, real time horizontal accuracy. For this project, Shaw utilized the single frequency, Trimble Pathfinder Pro-XRS with the EM61-MKII system. For the EM61-MKII survey, 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.

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 MEC Site B 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 the EM61-MKII. A calibration test was performed prior to fieldwork each day and at the end of the day. A trailer hitch ball was used as an anomaly source for the calibration test. The calibration line was conducted in two directions and the resulting anomaly was within 10 percent of the measured magnitude for each test.

As described in the the following additional calibration tests were performed:

- Static Background Test
- Static Spike Test
- Personnel Test
- Cable Shake Test
- Data Repeatability Test

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 MEC Site B were collected North-South with a line spacing of approximately 2.5 feet. This guarantees that the entire surface of the field area was covered with the sensor. 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.

The EM61-MKII HH was utilized in real time for the sidewalls at Little Salado Creek. The operator scanned all accessible areas of the sidewalls. Each time the instrument indicated an anomaly (in real time the instrument makes a sound over a detected anomaly) a pin flag was inserted into the ground by the Senior Unexploded Ordnance Supervisor (SUXOS). After all pin flags were inserted they were located with GPS for later excavation activities.

3.3 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.

No post processing was required for the real time EM61-MKIIHH survey the target list will consist of all of the anomalies located in real time and located with GPS.

5.0 Results

The following section presents the results of the EM61-MKII surveys over MEC Site B. Figure 1 is the location map of the area. Figure 2, "Site B Map of Sum of EM61MK2 Channels with Targets Posted," depicts the EM61-MKII data. Figure 3, "Site B Map of Sum of EM61MK2 Channels with Targets Posted and Sub-Target Amplitude Grayed," depicts EM61 MKII data with background removed to visually observe the anomalies easier. Figure 4, "Site B Map of Targets Located in Real-Time in the Sidewall of the Little Salado Creek with the EM61MK2 HH," consists of the anomaly locations that were detected with the EM61-MKIIHH on the sidewall of Little Salado Creek.

5.1 EM61-MKII Electromagnetic Results

As evidenced in Figures 2 and 3 the surface interferences are shown on the maps. The main interferences are the chain link fence on the west and northern side of the site. In addition a subsurface metal pipeline trending northwest is evident in the northern section of the fenced in area. Several small interferences were noted after the survey and were located with GPS. Most of these objects were not observable prior to the survey due to weeds and small brush which obscured them. In addition many of the items were half buried. All of these features are indicated on the map. All data and objects are mapped in North American Datum 83 California State Plane Coordinates (US Feet).

Several point source anomalies were detected in the area. Each anomaly is marked with a cross and has a unique anomaly number. Each of these anomalies represents a metallic object or objects. In all, 216 anomalies were detected. Each of the anomalies has the potential to be a MEC item or an MEC related item (e.g., scrap, etc.). The surface or half buried metal objects called out in the legend are not included in the target list. The target list represents all buried objects.

Figure 4 indicates the locations of all anomalies that were detected in real time using the EM61-MKIIHH on Little Salado Creek side wall. All surface items were removed during the operation by the SUXOS. In all, 203 anomalies were detected.

Two target lists for all of the detected anomalies were constructed and are included in Appendix A. The first target list is for the flat area using the EM61-MKII within the fenced area. The second target list is for the side wall of Little Salado Creek. The target lists include each anomaly number, the associated California Coordinates for the anomaly location, and anomaly magnitudes. The target list can be used for excavation purposes.

6.0 Discussion

In general, 419 point source anomalies were detected in the EM61-MKII and EM61-MKIIHH 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 MEC excavation safety procedures during exploratory excavation activities at the site. Although the anomalies may be typical of MEC, they may also be caused by other metal debris.

7.0 References

PRC Environmental Management, Inc., 1997, *Final Remedial Investigation Report, Installation Restoration Program Sites 10,11, 12, 13, 14, 16, 17, and 18*, July 31.

Figures

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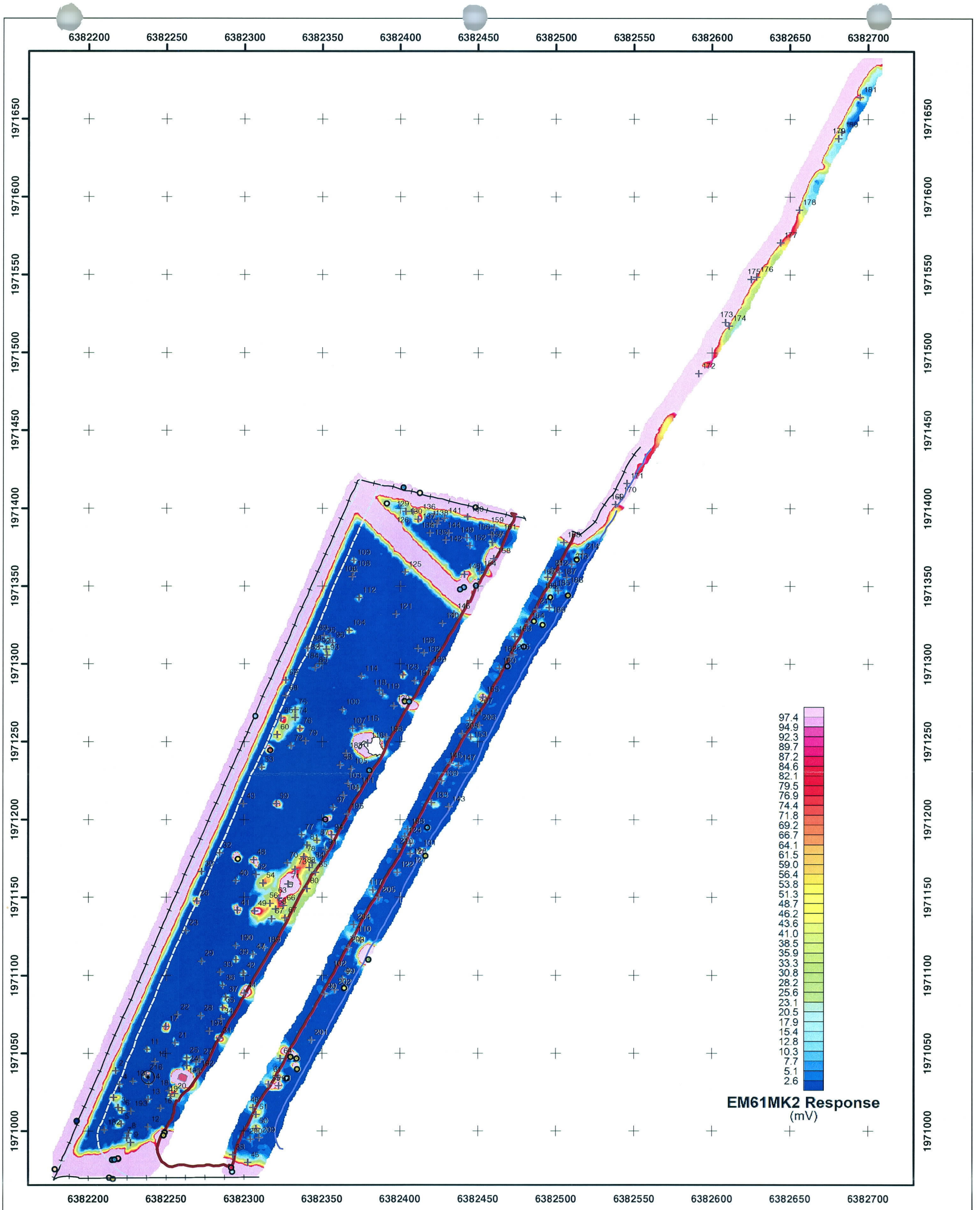
Figure 1 - Crows Landing Area Map with Survey Sites Posted

NAD83, California Zone 3, US Feet



Legend

- dirt pile
- edge of ravine
- fence
- road

Items Defined By Areas

- metal debris
- metal grate

Items Defined By Point Sources

- barbed wire
- bottle cap
- buckets
- can
- chain link piece
- known qc point
- large scrap metal
- metal clamp
- metal debris
- metal piece
- metal post
- metal post with concrete bottom
- metal posts
- metal tube
- metal wire
- piece of chain link
- pipe
- Area B Targets

N

0 25 50 100 150 200 Feet

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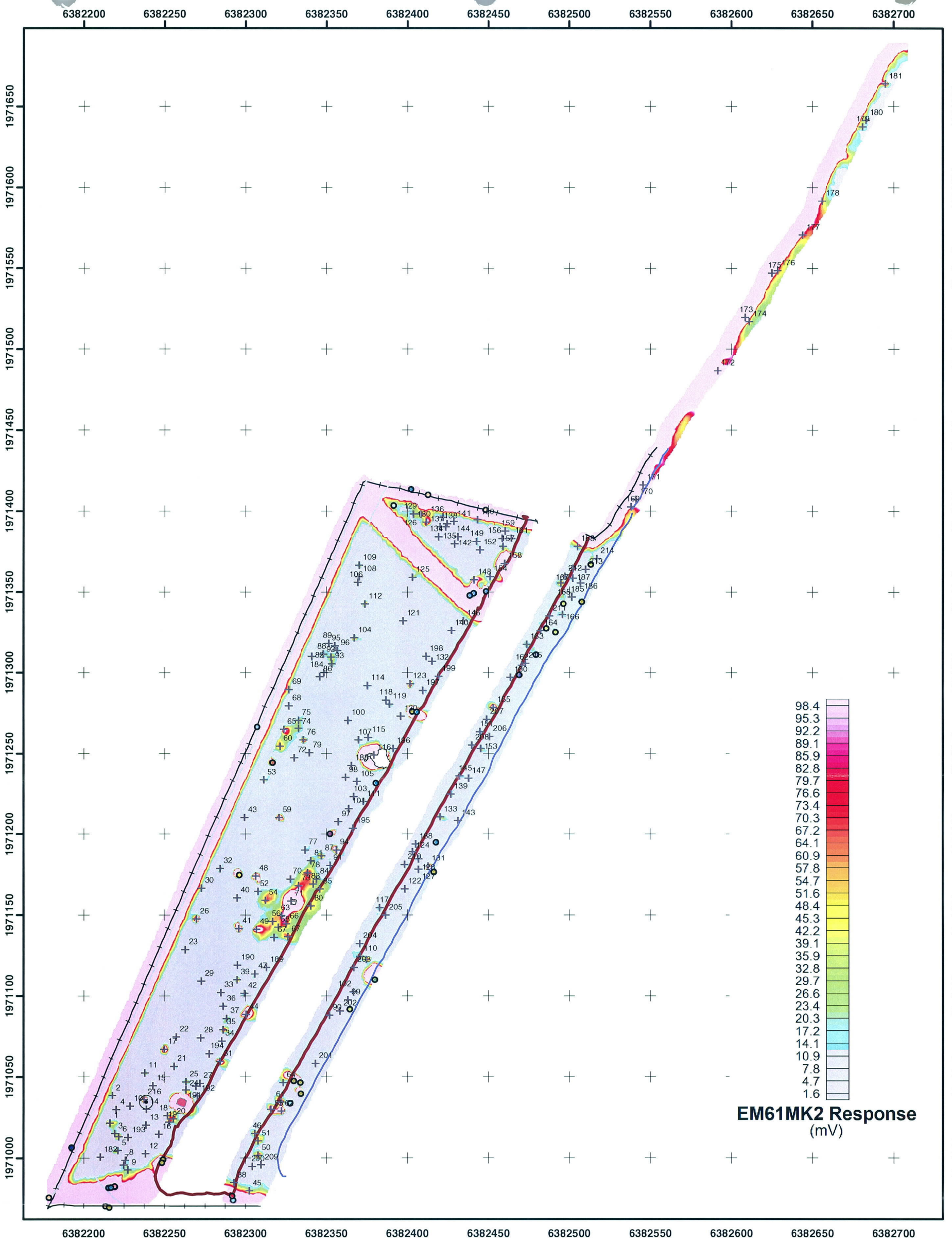
Figure 2 - Site B Map of Sum of EM61MK2 Channels with Targets Posted

NAD 83, State Plane California 3, US Feet



Legend

- dirt pile
- edge of ravine
- fence
- road

Items Defined by Areas

- metal debris
- metal grate

Items Defined By Point Sources

- barbed wire
- bottle cap
- buckets
- can
- chain link piece
- known qc point
- large scrap metal
- metal clamp
- metal debris
- metal piece
- metal post
- metal post with concrete bottom
- metal posts
- metal tube
- metal wire
- piece of chain link
- pipe
- Area B Targets

N

0 25 50 100 150 200 Feet

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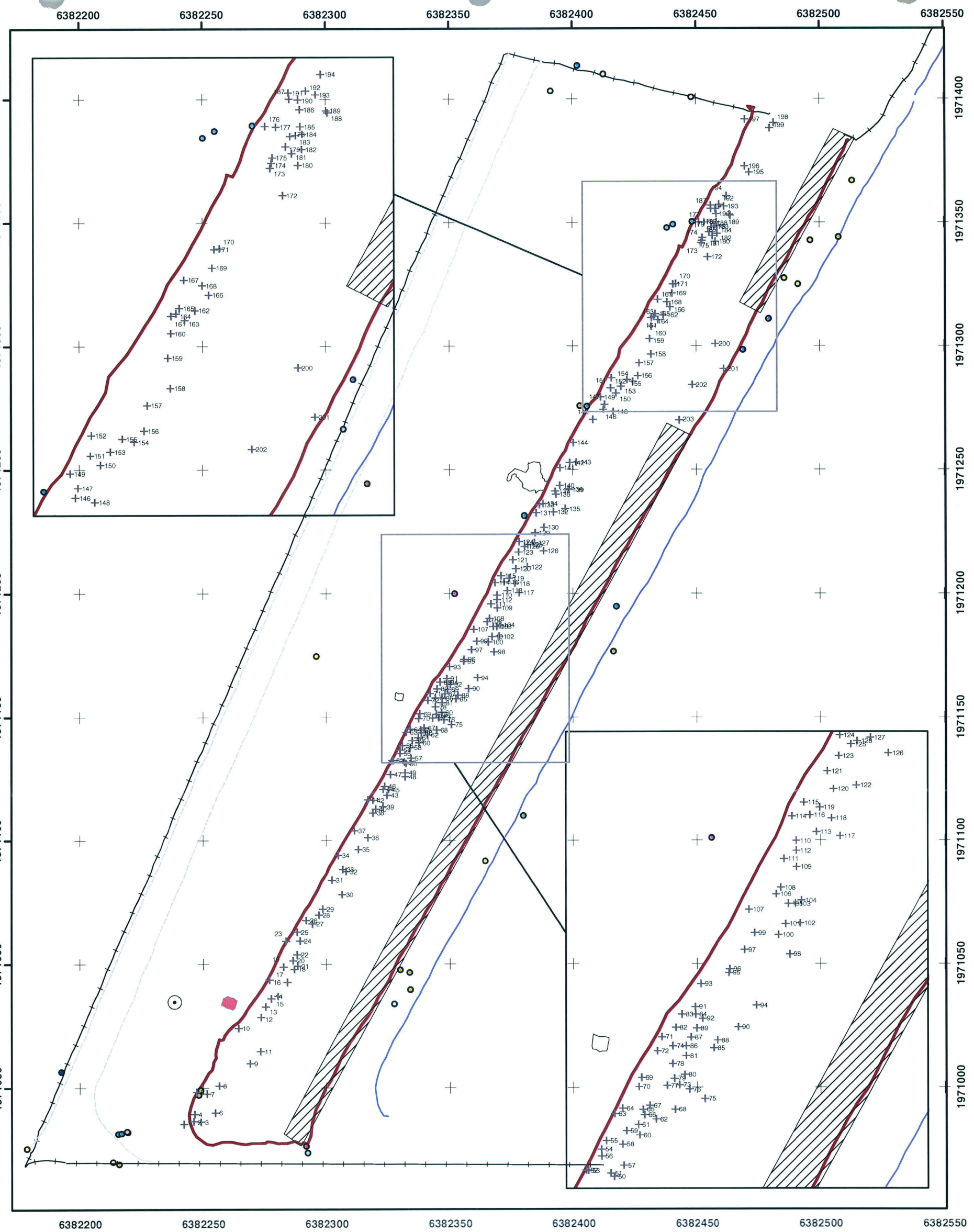
Figure 3 - Site B Map of Sum of EM61MK2 Channels with Targets Posted and sub-target amplitude grayed

NAD 83, State Plane California 3, US Feet



Legend

- dirt pile
- edge of ravine
- fence
- road
- Sidewall too steep for data collection

Items Defined By Areas

- metal debris
- metal grate

Items Defined By Point Sources

- barbed wire
- bottle cap
- buckets
- can
- chain link piece
- known qc point
- large scrap metal
- metal clamp
- metal debris
- metal piece
- metal post
- metal post with concrete bottom
- metal posts
- metal tube
- metal wire
- piece of chain link
- pipe
- Creek Sidewall Targets

N

0 15 30 60 90 120 Feet

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Figure 4 - Site B Map of Targets located in real-time in the sidewall of the Little Salado Creek with the EM61MK2 HH

NAD 83, State Plane California 3, US Feet

Appendix A
Target List for MEC Site B

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Site B Target List

Target #	Easting (US feet)	Northing (US feet)	Summed Response (mV)
1	6382216.0	1971021.5	55.4
2	6382217.5	1971038.5	19.1
3	6382219.0	1971015.0	36.7
4	6382220.0	1971029.8	17.8
5	6382221.0	1971004.5	29.9
6	6382221.5	1971013.0	73.7
7	6382224.5	1970995.5	15.9
8	6382225.5	1970998.5	18.4
9	6382227.0	1970992.5	17.7
10	6382228.5	1971032.0	20.8
11	6382237.5	1971052.5	77.7
12	6382238.0	1971002.5	14.5
13	6382238.3	1971020.3	21.8
14	6382238.5	1971030.0	17.3
15	6382242.5	1971044.5	16.2
16	6382246.0	1971014.5	15.2
17	6382249.5	1971067.0	149.6
18	6382251.5	1971026.0	25.8
19	6382252.5	1971022.0	48.9
20	6382255.0	1971024.0	29.0
21	6382255.5	1971056.5	35.7
22	6382257.0	1971074.5	19.8
23	6382262.5	1971128.5	21.4
24	6382263.0	1971042.0	15.3
25	6382263.0	1971047.0	56.1
26	6382269.5	1971147.5	136.4
27	6382271.5	1971046.0	19.8
28	6382272.0	1971074.0	19.7
29	6382272.5	1971109.0	20.2
30	6382272.5	1971166.5	14.3
31	6382284.0	1971059.5	241.3
32	6382284.0	1971178.5	52.5
33	6382284.5	1971102.0	17.7
34	6382285.0	1971072.0	14.6
35	6382286.0	1971079.0	114.4
36	6382286.0	1971093.5	51.7
37	6382288.0	1971086.0	37.3
38	6382292.5	1970984.5	21.2
39	6382294.5	1971110.0	65.7
40	6382294.5	1971160.5	32.2
41	6382295.5	1971141.5	386.0
42	6382299.0	1971101.5	40.0
43	6382299.0	1971210.0	14.2
44	6382300.0	1971088.5	193.3
45	6382302.0	1970979.5	19.8
46	6382305.5	1971015.0	83.8
47	6382305.5	1971113.5	36.1
48	6382306.0	1971174.0	274.5
49	6382306.5	1971141.0	130.5
50	6382307.5	1971001.5	65.0

Crows Landing Flight Facility
Site B Target List

Target #	Easting (US feet)	Northing (US feet)	Summed Response (mV)
51	6382307.5	1971010.5	46.1
52	6382307.5	1971164.5	16.8
53	6382311.0	1971233.5	78.1
54	6382312.0	1971159.0	63.2
55	6382315.5	1971030.0	431.7
56	6382316.5	1971146.0	21.2
57	6382317.5	1971136.0	15.4
58	6382320.0	1971142.3	21.2
59	6382320.5	1971210.0	369.6
60	6382321.0	1971254.5	33.1
61	6382321.5	1971034.5	596.9
62	6382322.0	1971029	627.6
63	6382322.0	1971149.5	31.7
64	6382323.0	1971046.5	23.2
65	6382323.5	1971265	162.1
66	6382325.0	1971144.5	40.2
67	6382326.0	1971136.5	66
68	6382326.5	1971279.5	18.6
69	6382326.5	1971289.5	17.3
70	6382327.5	1971172	14.8
71	6382328.0	1971158.5	43751
72	6382329.8	1971247.3	17.2
73	6382332.5	1971168	28.4
74	6382332.5	1971265.5	20.5
75	6382332.5	1971270.5	26.7
76	6382335.5	1971258.5	115.5
77	6382336.5	1971190	35.7
78	6382338.0	1971176	26.4
79	6382339.0	1971250.5	14.6
80	6382340.0	1971155.5	14.2
81	6382340.0	1971183.5	27
82	6382340.5	1971310	55.3
83	6382341.5	1971169	26.8
84	6382343.5	1971172	29.9
85	6382345.5	1971166	36.2
86	6382345.5	1971297.5	15.8
87	6382346.5	1971186.5	77.8
88	6382347.8	1971311.3	20.7
89	6382351.0	1971318	22.1
90	6382351.5	1971088	28.8
91	6382352.0	1971180.5	19.3
92	6382352.5	1971309.5	30.2
93	6382353.0	1971305.5	37.4
94	6382356.0	1971190	135.7
95	6382355.0	1971316.5	16.3
96	6382356.5	1971313.5	21.6
97	6382357.0	1971207.5	27.3
98	6382361.5	1971235	17.7
99	6382363.0	1971097.5	24.6
100	6382363.0	1971270.5	52.5

Crows Landing Flight Facility
Site B Target List

Target #	Easting (US feet)	Northing (US feet)	Summed Response (mV)
101	6382363.5	1971215.5	20.7
102	6382366.5	1971102.5	23.1
103	6382366.5	1971223	22.6
104	6382367.0	1971321.5	89.1
105	6382368.5	1971232.5	18.5
106	6382369.0	1971356	15.1
107	6382369.5	1971258.5	37.2
108	6382370.0	1971359.5	21.7
109	6382370.0	1971366.5	46.3
110	6382370.5	1971124.5	29
111	6382372.5	1971220	52.6
112	6382373.5	1971342.5	112.5
113	6382374.5	1971122.5	83.1
114	6382375.0	1971292	39.1
115	6382375.5	1971260	17.3
116	6382379.0	1971249	20240.5
117	6382382.5	1971154.5	30
118	6382386.5	1971283	31.7
119	6382388.5	1971280.5	42.8
120	6382395.5	1971273	22.9
121	6382397.0	1971332	18.2
122	6382398.0	1971166	18.1
123	6382401.5	1971293	118.4
124	6382403.0	1971189	16.3
125	6382403.0	1971359	26.8
126	6382403.5	1971398	14.3
127	6382406.5	1971178	14.5
128	6382406.5	1971184.5	23.2
129	6382408.0	1971398	35.5
130	6382411.5	1971393	109.8
131	6382412.5	1971180	532.8
132	6382415.0	1971307	15
133	6382420.0	1971210.5	23.7
134	6382419.0	1971384	14.5
135	6382420.0	1971390	23.4
136	6382421.8	1971396	17.6
137	6382423.3	1971390	49.1
138	6382424.3	1971392	51.6
139	6382426.5	1971224.5	22.9
140	6382427.0	1971326	21.7
141	6382428.5	1971393.5	24
142	6382429.0	1971379.5	19.5
143	6382431.0	1971208	24.3
144	6382431.0	1971384	17.8
145	6382432.0	1971236	27.1
146	6382434.3	1971332	8.6
147	6382437.5	1971234.5	15.4
148	6382441.0	1971357.5	121.4
149	6382442.5	1971381	19.6
150	6382443.0	1971394.5	14.1

Crows Landing Flight Facility
Site B Target List

Target #	Easting (US feet)	Northing (US feet)	Summed Response (mV)
151	6382444.5	1971263.5	22
152	6382444.5	1971376	24.3
153	6382445.0	1971253	32.5
154	6382451.0	1971359.5	509.5
155	6382453.0	1971278.5	462.8
156	6382458.5	1971383	57.3
157	6382459.0	1971378	387.8
158	6382460.0	1971367.5	31274.2
159	6382460.3	1971387.5	107.8
160	6382463.5	1971297	17.7
161	6382464.0	1971383	331.2
162	6382470.5	1971304.5	14.1
163	6382473.5	1971317.5	46.6
164	6382482.0	1971326	16.2
165	6382494.5	1971355.5	81.5
166	6382495.5	1971336	28.8
167	6382502.0	1971358.5	21.4
168	6382505.0	1971378	32.4
169	6382538.0	1971402.5	163.7
170	6382541.0	1971407	246.5
171	6382545.5	1971416	52.6
172	6382591.5	1971486.5	616.6
173	6382608.5	1971519.5	471.3
174	6382611.0	1971517	20.5
175	6382625.0	1971547	98.3
176	6382628.5	1971548.5	31.6
177	6382644.0	1971570.5	41.3
178	6382656.0	1971591.5	34
179	6382681.0	1971637.5	15.7
180	6382683.0	1971641.5	16
181	6382695.0	1971664	161.8
182	6382210.0	1971000.5	11.1
183	6382365.2	1971242.5	10.2
184	6382348.1	1971300	12.3
185	6382501.4	1971346.9	11.2
186	6382506.8	1971355.6	9.9
187	6382502.2	1971364.6	2.4
188	6382404.9	1971193.6	9.2
189	6382312.7	1971117.6	11.2
190	6382294.6	1971119	11.1
191	6382269.1	1971044.2	14.5
192	6382270.1	1971038.2	8.2
193	6382227.2	1971012.6	11.2
194	6382277.4	1971064.2	12.5
195	6382366.1	1971203.4	8.7
196	6382390.9	1971253.1	12.2
197	6382409.3	1971289	14
198	6382411.3	1971309.9	11.7
199	6382419.0	1971297.7	14
200	6382303.8	1970994.6	14

Crows Landing Flight Facility
Site B Target List

Target #	Easting (US feet)	Northing (US feet)	Summed Response (mV)
201	6382342.9	1971058.3	12.1
202	6382358.1	1971090.6	14
203	6382366.6	1971117.6	10.7
204	6382370.3	1971132.3	14
205	6382386.1	1971149.9	10.8
206	6382450.6	1971260.6	12.7
207	6382448.8	1971271.1	14
208	6382439.6	1971255.1	14
209	6382309.4	1970995.6	15.6
210	6382397.8	1971181	10
211	6382487.4	1971335.2	12.2
212	6382497.2	1971359.8	10.5
213	6382510.0	1971364	10.4
214	6382516.9	1971370.5	13.9
215	6382472.6	1971305.7	9.8
216	6382237.0	1971036	560.9

Crows Landing Flight Facility

Site B Sidewall Target List

Target #	Easting (US feet)	Northing (US feet)	Ch1 Response (mV)	Ch3 Response (mV)
1	6382242.0	1970985.3	243.12	68.54
2	6382245.9	1970986.4	5273.33	738.77
3	6382248.9	1970986.1	3759.81	811.04
4	6382246.3	1970989.2	133	14.33
5	6382247.1	1970998.3	14142.61	14519.42
6	6382254.7	1970989.9	4787.81	1743.17
7	6382251.3	1970997.5	235.21	23.45
8	6382256.3	1971000.8	92.24	33.83
9	6382268.9	1971009.7	666.55	275.31
10	6382264.1	1971024.0	110.59	21.91
11	6382273.1	1971014.6	2207.79	319.65
12	6382273.3	1971028.4	616.94	209.81
13	6382275.2	1971032.7	261.2	35.46
14	6382277.4	1971035.9	2018.3	-0.55
15	6382280.2	1971036.9	428.76	2.2
16	6382276.7	1971043.4	599.29	42.41
17	6382283.9	1971042.5	2169.19	65.17
18	6382286.8	1971047.9	626.62	20.95
19	6382282.4	1971048.8	1546.52	102.99
20	6382286.3	1971051.4	1533.05	259.57
21	6382288.1	1971049.2	8272.63	201.44
22	6382287.9	1971053.7	999	65.55
23	6382283.4	1971059.3	12561.64	3691.59
24	6382289.1	1971059.3	327.99	63.51
25	6382287.9	1971062.9	40.72	4.66
26	6382291.5	1971067.7	-1145.57	-98.44
27	6382294.1	1971066.2	-888.05	-161.24
28	6382296.7	1971069.9	-1961.68	-231.04
29	6382298.3	1971072.2	1732.17	0.66
30	6382306.2	1971078.0	303.93	26.06
31	6382302.1	1971084.0	29.88	9.47
32	6382307.8	1971087.4	352.91	66.36
33	6382306.5	1971088.3	173.98	40.06
34	6382304.6	1971094.0	215.4	13.48
35	6382312.8	1971096.4	274.99	1.62
36	6382316.6	1971101.0	2523.96	3.45
37	6382311.2	1971103.8	1534.74	42.47
38	6382318.8	1971111.1	382.44	48.28
39	6382322.7	1971113.5	-647.84	-49.25
40	6382319.8	1971112.6	14152.14	11186.25
41	6382316.6	1971116.3	7842.18	2005.7
42	6382318.7	1971116.2	250.69	72.02
43	6382324.4	1971118.2	80.02	13.9
44	6382322.8	1971120.7	100.04	12.51
45	6382325.0	1971120.5	1005.47	142.65
46	6382323.4	1971122.0	405.74	34.17
47	6382325.8	1971126.7	-1096.91	-62.61
48	6382331.9	1971125.8	1871.61	202.1
49	6382331.8	1971127.4	-1388.53	-245.32
50	6382332.2	1971131.1	737	142.25
51	6382331.5	1971131.8	592.62	68.61

Crows Landing Flight Facility
Site B Sidewall Target List

Target #	Easting (US feet)	Northing (US feet)	Ch1 Response (mV)	Ch3 Response (mV)
52	6382326.5	1971132.4	13315.88	4270.12
53	6382327.0	1971132.4	95.09	10.84
54	6382329.6	1971136.7	301.81	58.18
55	6382330.6	1971138.5	2554.22	919.48
56	6382329.6	1971135.3	5151	143.51
57	6382334.2	1971133.4	3751.81	899.21
58	6382333.9	1971137.7	763.17	129.81
59	6382334.7	1971140.5	204.27	43.9
60	6382337.4	1971139.6	3754.9	847.02
61	6382337.1	1971141.7	252.98	24.85
62	6382340.8	1971142.809	277.93	42.58
63	6382332.3	1971143.898	2252.3	406.58
64	6382333.9	1971145.054	180.73	44.51
65	6382338.1	1971144.787	2834.31	714.13
66	6382338.4	1971143.724	1409.43	340.4
67	6382339.5	1971145.618	-3203.3	-805.6
68	6382344.6	1971144.804	750.05	139.71
69	6382337.8	1971151.264	3538.93	59.75
70	6382337.3	1971149.408	4929.62	1065.84
71	6382341.9	1971159.491	3784.25	863.56
72	6382341.0	1971156.657	156.9	34
73	6382345.5	1971149.75	2122.36	431.39
74	6382344.1	1971157.688	443.68	127.3
75	6382350.6	1971146.987	3229.98	651.79
76	6382347.5	1971148.88	583.38	81.12
77	6382343.0	1971149.617	-2783.19	-638.27
78	6382344.2	1971154.042	3534.46	762.56
79	6382344.5	1971151.056	1453.25	341.36
80	6382346.6	1971151.874	1616.69	288.95
81	6382346.8	1971155.648	1835.17	418.84
82	6382344.8	1971161.389	14617.03	11893.99
83	6382346.0	1971164.09	2670.6	360.93
84	6382348.7	1971164.107	1404.47	131.39
85	6382352.5	1971157.246	8031.96	1999.42
86	6382346.8	1971157.669	1111.57	276.15
87	6382347.9	1971159.412	14567.93	6342.38
88	6382353.3	1971158.809	8893.42	2032.95
89	6382349.0	1971161.236	892.77	218.82
90	6382357.5	1971161.486	4473.17	955.62
91	6382348.7	1971165.611	7875.94	733.78
92	6382350.2	1971163.244	329.61	53.95
93	6382349.8	1971170.243	403.48	60.43
94	6382361.2	1971165.866	1622.15	362.6
95	6382355.6	1971172.524	13124.3	3815.32
96	6382355.7	1971173.291	8312.19	130.35
97	6382358.8	1971177.169	1151.95	4.26
98	6382367.9	1971176.301	1718.53	46.17
99	6382360.8	1971180.63	1265.07	24.01
100	6382365.6	1971180.249	4154.8	882.07
101	6382367.1	1971182.474	1167.87	375.73
102	6382370.1	1971182.576	13559.38	4515.3

Crows Landing Flight Facility
Site B Sidewall Target List

Target #	Easting (US feet)	Northing (US feet)	Ch1 Response (mV)	Ch3 Response (mV)
103	6382369.1	1971186.551	8968.54	2784.26
104	6382370.3	1971187.2	1842.96	750.86
105	6382367.6	1971186.572	7104.99	154.92
106	6382365.2	1971188.493	14444.41	12083.1
107	6382359.6	1971185.391	535.57	101.59
108	6382366.1	1971189.795	513.29	149.83
109	6382369.3	1971194.041	200.64	42.3
110	6382369.2	1971199.304	1103.55	351.15
111	6382366.7	1971195.68	2138.86	37.78
112	6382369.3	1971197.34	481.6	73.02
113	6382373.4	1971201.09	9118.21	129.71
114	6382368.4	1971204.314	2745.91	19.69
115	6382370.8	1971207.091	161.11	38.49
116	6382372.0	1971204.565	240.58	65.18
117	6382378.1	1971200.246	785.04	182.58
118	6382376.4	1971203.943	200.29	43.59
119	6382374.0	1971206.079	341.54	28.05
120	6382376.9	1971209.9	862.83	125.59
121	6382375.6	1971213.476	1367.81	321.49
122	6382381.4	1971210.659	180.32	48.33
123	6382377.9	1971216.646	57.77	19.12
124	6382378.1	1971220.866	426.08	98.26
125	6382380.4	1971219.007	598.6	61.18
126	6382388.0	1971217.204	597.49	125.45
127	6382384.3	1971220.353	12524.28	259.39
128	6382381.6	1971219.686	1051.35	105.11
129	6382384.6	1971224.393	15869.82	4323.83
130	6382388.2	1971226.599	8859.45	2315.99
131	6382385.0	1971232.476	3667.27	35.33
132	6382392.0	1971232.813	150.26	34.79
133	6382386.3	1971235.782	3089.47	47
134	6382387.8	1971236.23	204.05	43.1
135	6382396.9	1971234.152	580.81	103.21
136	6382393.0	1971239.933	1581	242.55
137	6382392.7	1971241.197	3989.02	569.16
138	6382398.1	1971242.094	13557.37	159.21
139	6382398.5	1971241.764	4207.53	571.47
140	6382394.6	1971243.561	7706.64	1194.03
141	6382394.7	1971250.687	721.04	172.16
142	6382398.7	1971252.645	387.3	28.61
143	6382401.4	1971252.9	285.22	15.63
144	6382400.2	1971260.813	2228	273.36
145	6382408.1	1971270.15	596.13	75.48
146	6382412.3	1971274.28	2651.78	395.34
147	6382412.8	1971276.284	8746.49	68.39
148	6382416.3	1971273.395	16284.33	5615.75
149	6382411.2	1971279.257	2261.1	513.45
150	6382417.5	1971280.941	-16738.29	-10749.22
151	6382415.4	1971282.87	15942.52	16152
152	6382415.6	1971287.007	7094.22	3303.26
153	6382419.5	1971283.647	1223.45	14.82

Crows Landing Flight Facility
Site B Sidewall Target List

Target #	Easting (US feet)	Northing (US feet)	Ch1 Response (mV)	Ch3 Response (mV)
154	6382424.3	1971285.63	1069.39	16.15
155	6382421.9	1971286.313	3325.32	108.3
156	6382426.3	1971287.907	1095.75	242.81
157	6382426.9	1971293.148	57.79	18.97
158	6382431.8	1971296.635	246.86	38.71
159	6382431.2	1971302.846	60.48	17.39
160	6382431.8	1971307.789	-1627.78	-363.49
161	6382431.9	1971311.312	1408.33	232.64
162	6382436.7	1971312.437	872.02	181.14
163	6382434.7	1971310.477	10544.45	240.24
164	6382432.9	1971311.85	1844.47	435.39
165	6382433.6	1971312.881	1541.22	163.49
166	6382439.6	1971315.623	411.06	39.77
167	6382434.6	1971318.685	1387.28	5.2
168	6382438.2	1971317.569	1714.52	313.93
169	6382440.3	1971321.17	531.6	4.81
170	6382441.8	1971325.09	157.1	8.93
171	6382440.7	1971324.933	2135.56	479.29
172	6382454.7	1971335.923	481.54	80.29
173	6382452.2	1971341.572	71.43	4.2
174	6382452.4	1971342.547	1826.67	630.74
175	6382452.6	1971343.622	222.06	40.67
176	6382451.2	1971350.07	7638.85	1871.86
177	6382453.4	1971349.929	4775.16	811.57
178	6382456.3	1971347.976	504.92	74.9
179	6382455.3	1971345.865	1834.96	448.56
180	6382457.8	1971342.115	2092.69	262.14
181	6382456.6	1971344.464	250.49	59.77
182	6382458.6	1971345.323	404.87	88.41
183	6382457.4	1971348.177	855.44	228.18
184	6382458.7	1971348.435	3296.1	828.2
185	6382458.3	1971349.996	4839.21	1327.09
186	6382458.2	1971353.422	3792.57	973.49
187	6382456.1	1971355.568	14231.69	2928.29
188	6382463.9	1971352.805	3345.73	564.98
189	6382463.6	1971353.203	2613.12	827.01
190	6382457.9	1971355.422	8048.84	1634.87
191	6382455.9	1971356.86	13860.99	3504.1
192	6382459.5	1971357.264	-3515.08	-761.43
193	6382461.4	1971356.45	4924.59	822.63
194	6382462.5	1971360.6	433.71	-4.99
195	6382471.7	1971370.37	411.04	0.8
196	6382469.8	1971372.699	755.06	-3.04
197	6382469.9	1971391.579	124.78	22.25
198	6382481.6	1971390.236	248.12	-2.89
199	6382479.9	1971388.098	1078.67	119.09
200	6382457.8	1971300.809	1772.58	57.05
201	6382461.2	1971290.655	527.48	27.21
202	6382448.4	1971284.175	560.35	-0.72
203	6382443.1	1971269.788	3500	15