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Shaw® Shaw Environmental, Inc.

FINAL DATA REPORT

Geophysical Investigation
Munitions Destruction Areas SEADs 46 & 57
Seneca Army Depot Activity
Romulus, New York

Project No. 845734
April 2005

Contract No. DACA45-98-D-0003
Task Order No. 150

Prepared for:
U.S. Army Corps of Engineers
Omaha District Rapid Response
Building 525 Castle Hall
Offutt Air Force Base, NE 68113

Prepared by:
Shaw Environmental, Inc.
2790 Mosside Boulevard
Monroeville, Pa 15146
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LIST OF ACRONYMS AND ABBREVIATIONS

ATV ..... all-terrain vehicle
bgs ..... below ground surface
BRAC ..... Base Closure and Realignment
Demo ..... demolition
DGM ..... digital geophysical mapping
DQO ..... Data Quality Objective
EE/CA ..... Engineering Evaluation/Cost Analysis
EM ..... electromagnetic
EM-61MK2 ..... Geonics Model EM-61MK2 Time-Domain EM High Sensitivity Metal Detector
EOD ..... explosive ordnance disposal
ft ..... feet
GPO ..... geophysical prove-out
Hz ..... hertz
in ..... inch
MEC ..... munitions and explosives of concern
mm ..... millimeter
mph ..... miles per hour
mV ..... milliVolt
NAD83 ..... North American Datum, 1983
NMEA ..... National Marine Electronics Association (format)
NY ..... New York
OE ..... ordnance and explosives
PC ..... personal computer
Ppm ..... parts per million
QA ..... quality assurance
QC ..... quality control
RTS ..... Leica TSP1100 robotic total station
SEAD ..... Seneca Army Depot (study) area
SEDA ..... Seneca Army Depot Activity
Shaw ..... Shaw Environmental, Inc.
SOW ..... Scope of Work
SRA ..... saturated response area
TDEM ..... time domain electromagnetic
USACE ..... U.S. Army Corps of Engineers
USB ..... universal serial bus
UXO ..... unexploded ordnance

1.0 INTRODUCTION

Shaw Environmental, Inc. (Shaw) has been tasked to perform a geophysical investigation at the Seneca Army Depot Activity (SEDA) in Romulus, New York (NY). The geophysical investigation is intended to provide detailed mapping of geophysical anomalies with the potential to represent munitions and explosives of concern (MEC) on the Munitions Destruction Areas Seneca Army Depot area (SEAD) 46 and SEAD 57 for removal actions at a later date.

The work was performed under the U.S. Army Corps of Engineers (USACE) Rapid Response Contract No. DACA45-98-D-0003, Task Order No. 150.

1.1 SITE BACKGROUND

Construction of the Seneca Ordnance Depot began in June 1941, and two years later, in 1943, the Depot began its mission of receipt, storage, maintenance, and supply of military items, including munitions and equipment. As the amount of ammunition on base increased following World War II, the mission of the base shifted from the supply of ordnance to the storage and disposal of it. The Depot's mission changed in early 1995 when the Department of Defense recommended closure of SEDA under its Base Realignment and Closure (BRAC) process. Congress approved this recommendation on September 28, 1995 and SEDA was officially closed in July 2000. An Environmental Evaluation /Cost Analysis (EE/CA) was performed to characterize all former MEC areas (Parsons, 2001).

SEAD 46 (also known as the 3.5-inch Rocket Range) covers approximately 76 acres (expanded from the original 45 acres) located on the northeast side of the Depot. The site consists of perimeter wooded areas, several central open field areas, and a large berm near the north end of the area. Aerial photos taken in 1954 show the site as a long open area in which 3.5" rockets were apparently fired. It is believed that the berm at the north end of the area was a target into which the rockets were fired. Subsequent to Army use of SEAD 46, a number of small trees have grown up in the open areas. Shaw was tasked to perform digital geophysical mapping (DGM) using a towed array of Geonics EM-61MK2 Time-Domain electromagnetic (EM) High Sensitivity Metal Detector (EM-61MK2) sensors over the accessible open portions of the site (approximately 30 acres). Geophysical anomaly maps and target lists were developed to assist in the evaluation and scoping of a subsequent MEC removal action. Shaw was also tasked to clear 10-foot wide lanes, at approximately 50-feet intervals through the wooded portions of the site and perform mag and flag anomaly counts on these transects to assist in the evaluation and scoping of a subsequent MEC removal action.

SEAD 57, the former Explosive Ordnance Disposal (EOD) Demolition (demo) Range, covers approximately 79 acres at the northwestern end of the Depot immediately adjacent and south of the former Open Burning/Open Detonation Grounds. This area consists of a circular berm approximately 100 feet in diameter surrounding the former demolition pit surrounded by generally open fields and perimeter wooded areas. Several former support structures are present in the northern part of the site. The area was used during the 1970's and until 1984 for the disposal of munitions and homemade explosive devices that were collected from federal, state and police agencies within an assigned geographical area in the Northeastern United States. Training of EOD specialists assigned to the unit also took place at this location through about 1984. Shaw was tasked to perform DGM using a towed array of Geonics EM-61MK2 sensors over the accessible open portions of the site located between 400 to 1000-feet (ft) from the edge of the demo berm (approximately 21 acres). The area less than 400-feet from the demo berm was deemed to contain too much metal frag from former EOD operations to be suitable for DGM. Geophysical anomaly maps and target lists were developed to assist in the evaluation and scoping of a subsequent MEC removal action. Shaw was also tasked to clear 10-foot wide lanes, approximately every 50-feet through the wooded portions of the site and perform mag and flag anomaly counts on these transects to assist in the evaluation and scoping of a subsequent MEC removal action.

1.2 SITE CONDITIONS

SEDA is directly underlain by generally fine-grained glacial tills and shale. Local areas of artificial fill and Quaternary alluvium are also present. These types of materials do not pose major interference problems for collecting of quality geophysical data.

At SEAD 46 and SEAD 57, the topography does not pose significant complications. The earthen "target berm" at the north end of SEAD 46 and the former EOD berm at SEAD 57, and a few ditches are the only topographic features of note. The open field areas of SEAD 46 were "rough plowed" in the late 1990s to enhance future wildlife habitat. This left large areas of very deeply rutted terrain which, although clear, are difficult to walk on and survey over. Lastly, the area soils are not very permeable. Surface water tends to pond in low-lying areas which keeps the ground soft and soggy for several days after rainfall. Significant precipitation occurred during the field efforts. Completion of the DGM in several areas at both sites was delayed waiting for conditions to dry sufficiently such that the towed array would not get stuck.

The majority of SEAD 46 and SEAD 57 is flat, open areas covered with scrub growth and grass. These areas have historically been mowed with a "bush-hog" or similar equipment. At SEAD 46, numerous trees have grown within the DGM areas. While trees less than 3-inches in diameter were removed, over a hundred intra-area trees were mapped around. The towed array and tow-vehicle were approximately 25-feet in front-to-back length and turned slowly. All accessible cleared areas which could be practically mapped with the towed array were mapped.

1.3 HISTORICAL MEC ENCOUNTERED

OE recovery depths in the EE/CA ranged from the ground surface to 1-foot for SEAD 46 and from the ground surface to 6-inches (in) for SEAD 57. Based on the EE/CA results, the expected unexploded ordnance (UXO) density is low.

At SEAD 46, 75 100 x100-foot grids were surveyed using an EM-61 during the ordnance and explosives (OE) EE/CA. Of the 1,291 anomalies identified, 1,155 anomalies were intrusively investigated. MEC related items were recovered from 478 of the anomalies investigated and of these 10 were classified as UXO. Other than one 3.5-in rocket M28A2 HEAT found on the ground surface, no rockets or rocket motors were found during in EE/CA. The majority of the MEC encountered were related to 40 millimeter (mm) rifle grenades and slap flares. Primary anticipated targets for this area are 20 mm projectiles, 40 mm practice rifle grenades and MK2 grenades. Both iron/steel and aluminum composition primary targets are present and weigh less than 1.5 pounds. Per the Explosives Safety Submission, the most probable munition is the 3.5-inch rocket M28A2 HEAT.

At SEAD 57, 61 100x100-foot grids were surveyed using an EM-61 during the OE EE/CA. Of the 2,951 anomalies identified 2,117 were intrusively investigated. OE-related items were recovered from 1,152 of the anomalies investigated and of these a grenade and two 20 mm rounds were classified as UXO. Frag from a 105 mm round was by far the largest MEC item encountered in either area. Primary anticipated targets for this area are 20mm and 37mm projectiles and MK2 and CS grenades. Both iron/steel and aluminum composition primary targets are present and weigh less than 2 pounds. Abundant frag is present in and around the former demolition pit area, with the density of frag falling off with distance. Per the Explosives Safety Submission, the most probable munition is the 37mm projectile.

1.4 REPORTING

This data report contains sections describing instrumentation, field procedures and data processing methods, and geophysical survey results and interpretation. Survey data, supporting data, and targets lists for each site are provided on a CD-ROM attached in Appendix A. Quad geophysical results and target maps for SEAD 46 are attached in Appendix B. Quad geophysical results and target maps for SEAD 57 are attached in Appendix C. The final GPO Report is attached as Appendix D.

The statements, opinions, and conclusions contained in this report are based solely upon the services performed by Shaw as described in this report and the Work Plan. In performing these services and preparing the report, Shaw relied upon work and information provided by others, including the U.S. Army whose information is not guaranteed by Shaw. The findings of the report are limited to those specifically expressed in the report.

2.0 INSTRUMENTATION, SURVEY DESIGN, DATA PROCESSING, AND QA/QC

This section details the geophysical equipment, methodology, data processing and quality assurance (QA) and quality control (QC) used in conducting the geophysical surveys at SEDA areas SEAD 46 and SEAD 57. As specified in the Scope of Work (SOW), a towed-array of EM-61MK2 sensors was selected as the most appropriate technology to perform DGM.

2.1 GEOPHYSICAL INSTRUMENTATION

A towed array of EM-61MK2 sensors was specified in the SOW. Based on scoping discussions with USACE and the results of the Geophysical Prove-out (GPO), three EM-61MK2 sensors were deployed upon a non-metallic platform riding on USACE provided skids. The EM-61MK2 coils were oriented narrow-end forward and spaced across the 6-foot sled width such that 2-foot cross-track spacing was implemented. The coil height was 12-inches above ground surface (approximately 4.5-inches lower than in the standard wheeled configuration). The sled was towed by a John Deere Gator all-terrain vehicle (ATV) at a distance of about 17 feet behind the ATV. A non-metallic survey prism was mounted on the array centered above the middle sensor. Navigation control was provided using a Leica TSP1100 series robotic total station (RTS).

2.1.1 Geonics EM-61MK2

The Geonics EM-61MK2 is a 4-channel high-sensitivity time domain electromagnetic (TDEM) sensor designed to detect shallow ferrous and non-ferrous metallic objects with good spatial resolution and minimal interference from adjacent metallic features. TDEM sensors work by utilizing an EM transmitter which generates a pulsed primary magnetic field in the earth inducing eddy currents in nearby metallic objects. The eddy current decay produces a secondary magnetic field measured by the receiver coil of the EM-61MK2. Measurements are taken a relatively long time after the primary pulse at specified time gates which allows the current induced in the ground to have dissipated, leaving only the current in the metal to still produce a significant secondary field.

The EM-61MK2 consists of two air-cored, 1-meter by 0.5-meter rectangular coils. Secondary voltages induced in both coils are measured in millivolts (mV). The coils are stacked 40 centimeters apart, with the source/receiver coil located below a second receiver coil. The EM-61MK2 records a voltage output from both coils as well as a differential that is the calculated voltage difference between the two coils. The responses at four specified time gates are recorded and displayed by an integrated data logger. Data synchronization cables linking the three systems define a master (System 1-left) and two slave units (System 2 –center; System 3-right).

The EM-61MK2 data were collected at the maximum effective rate, which was about 9-10 hertz (Hz) for a 3-unit array.

2.1.2 Leica TSP1100 RTS

The Leica TSP1100 is a motorized robotic total station (RTS) that uses automatic target recognition to track the location of the prism and has a highly accurate distance/azimuth measurement system to produce +/-5 mm +2 parts per million (ppm) accuracy.

The RTS system hardware consists of three integrated components; 1) the Leica TPS1100 series dual laser RTS; and 2) the RTS rover remote link control panel; and 3) a survey prism which is tracked by the RTS base station. Once the RTS base station is located in space using known control points (via resection or backsighting), the RTS can be operated in fast record mode to automatically track and log the position of the prism at 3-4 samples per second. The remote link, which is in constant radio contact with the base station, is cabled to the data logger so that the serial position data stream in pseudo-National Marine Electronics Association (nmea) format is captured in real-time.

The RTS is also operated as a standard surveying instrument reading and recording positional data via a PCMIA data storage card on the base station. The PCMIA data storage card can also used to transfer navigation data between the RTS and field computers. The RTS was used to capture the position of site features (debris piles, unidentified fences, trees, wells, etc.) in the survey areas. Additionally, the RTS was used in waypoint mode for target relocation.

2.1.3 Instrument Integration and Recording

Serial cabling from each sensor and the RTS was routed, using serial to universal serial bus (USB) adapters, to a USB hub and fed into a weatherproof tablet personal computer (PC). Geometrics MagLog® software was used for data collection. MagLog was utilized because of its robustness for handling multi-sensor arrays and because MagLog uses the PC clock time stamps for all the input data streams, minimizing clock slew and latency effects. Three EM-61MK2 4 time gate data streams and one RTS pseudo-nmea data stream (for a prism location centered above the middle coil) were recorded.

2.2 GEOPHYSICAL SURVEY DESIGN

Logical survey areas were delineated in the field based on line-of-sight considerations for the RTS. The EM-61MK2 survey was performed in the 3-sensor towed array configuration. All four time gates of data were collected and a RTS navigation data stream for the prism position were simultaneously logged using MagLog on the tablet PC. Measurements were collected continuously at the maximum sampling rate along each data line. Intra-array coil spacing was 2-feet apart. Towed array data tracks were adjacent to overlapping in order to obtain maximum coverage of the mapable area.

The survey data tracks were determined by the equipment operator/driver. The array was towed down a convenient line along the edge of a logical survey area while an assistant following the array marked the path of the inner edge of the array (the side of the array closest to the unmapped side of the area) with stripes of spray paint. Upon reaching the far edge of the survey area, the operator turns around and follows the paint path back keeping the "outer" skid of the array (the side of the array closest to the just mapped area) on the marked path of the previous line. In this way the survey progresses across the survey area without data gaps except those caused by physical obstructions. If at least one survey control point was not located within a logical survey area, the towed array was detoured to acquire a convenient survey control point for sensor and navigation QC purposes.

Following collection of the geophysical data, the RTS was used to map the boundary of each survey area, the locations of large physical features within the survey areas (paths, fences, electric lines, large trees etc) and the locations of metallic features or utilities within the survey areas (wells, surface metal, etc.) which would be expected to be detected in the EM data. The positional data were used to accurately plot survey features on the facility base map and check on positional accuracy.

2.3 DATA PROCESSING

Four RTS time gate sensor data, a pseudo-nmea position data stream (in North American Survey Datum, 1983 (NAD83) NY State Plane, Central Zone coordinates), and system time were logged in MagLog. After data collection was complete, the QC and survey data were moved to field PCs for processing using USB data sticks. The data were imported into Geosoft UXDetect®, and converted to Latitude-Longitude Coordinates. The data were then imported into Geometrics MagMap® for sensor offset calculation (i.e. converting the pseudo-nmea prism location to positions associated with each sensor's data). MagMap exported three xyz data streams, one for each sensor in latitude/longitude coordinates which were imported back into UXDetect, where they were converted back to NY State Plane Central Zone Coordinates.

Latency effects were almost non-existent such that latency correction was not required. A long operator drift correction was applied to level the data. Replicate data and line crossings which induce artifacts were culled from the data. The data were then divided geographically into 250-foot square quads for quad-based analysis and gridding. Each quad consists of four 125-foot square grids. Quads are denoted by the southwest grid; i.e. Quad C16 contains grids C16, C17, D16, and D17.

A Data Processing Log (Form 6-5) was used to document all data processing steps for each quad. Form 6-5s for all grids are included on the CD ROM in Appendix A.

2.4 DATA QA/QC

The Geonics EM-61MK2 and Leica TSP1100 RTS were operated in accordance with the manufacturer's operating manuals. Sensor data and positional data were collected consistent with the Work Plan. Three semi-permanent calibration sites were established for morning and evening equipment

verification and QC testing. Each site contained a null test area, a 3-point navigation test area, and a repeat line test area.

2.4.1 Equipment Function Verification

Each morning, all equipment was allowed to warm up for 5 minutes and then checked for proper functioning in accordance with the manufacturer's specifications and the Work Plan. The following tests were performed each morning and evening;

- **Static Background and Spike Test**: The Static Background Test and Spike Test monitors the instrument background readings, monitor for electronic drift, identifies potential interference, and determines the impulse response and repeatability of measurements over a standard test item. The standard test item is a standard 2-inch diameter steel trailer hitch ball. For the towed array system, the tow vehicle was turned on during the test. With the instrument held in static position, measurements were recorded for a period of at least 3 minutes. A standard test item was then placed, using a non-metallic bracket, over the center of the top coil and an additional minute of data was recorded. Static background readings for the EM-61MK2 remained within 2.5 mV of background. Readings for the response of the standard test item varied less than 20% after subtraction of the sensor baseline response.

- **Personnel/Cable Shake Test**: The Personnel Test was performed to check the influence of personnel carried metallic items (e.g. keys, boots, belt buckles, etc.) on the sensors and to ensure that cables and connectors are secure and not contributing to system noise. The tow vehicle was turned on during the test and the engine was periodically "revved." With the instrument held in static position, the operator(s) walk around the sensors, shaking cables and checking connections while measurements are being recorded for a period of at least 1 minute. The EM-61MK2 responses should remain within 2 mV of background and be free from spikes or variations. If spikes were encountered, the system was inspected, fixed, and the test rerun.

- **3-Point Navigation Function Test**: The 3-Point Navigation Function Test was designed to document the function and accuracy of the navigation control system. The towed array was towed along the fixed north-south and east-west towed array traverse paths in both directions such that each EM-61MK2 sensor passed over a known item of known location on each pass. The standard responses were compared for each sensor, navigation precision was checked, and instrument latency was calculated.

- **Repeat Data**: The repeatability of geophysical mapping data was monitored by the collection of replicate data. Replicate data were collected for each data set. 50-foot long fixed position replicate lines were established over standard test items. Start and endpoints of the line were marked with pin-flags and a 50-foot tape line to guide the tow vehicle. Three standard test items were placed at the center of the line located such that each sensor will pass directly over one. The amplitudes of the standard test items should be within 20% and the location accuracy should be within 1 foot.

The Shaw Site Geophysicist or QC Geophysicist reviewed and approved the Daily QC data and completed the Daily Sensor QC Verification and Navigation QC Verification Logs.

- **Review of Sensor QC Data:** Sensor QC test results (equipment warm-up, sensor position, static background and spike tests, cable shake test, personnel test) were reviewed to ensure proper sensor function. Geonics and Geosoft software were used to make initial review of the data. This step validates that the data collected fall within prescribed recording ranges, background noise and signal-to-noise-ratios fall within acceptable ranges, and that standard responses to known items are consistent with known values. Minimum, maximum, mean, and standard deviations of the pre- and post-survey sensor QC tests were calculated, compared to the data quality objective (DQO) standards and reported. For background noise, the mean of the Sum Channel must be < 3.25 mV with a

standard deviation < 2 mV. The data were clipped such that any measurements that are well above the background noise will not be included in these statistics. The clipping value(s) were recorded.

- **Review of Navigation QC Data:** Geonics, Leica and Geosoft software were used to make initial review of the navigation QC and to ensure that the navigation system functioned properly. The 3-point Navigation Function Test data was reviewed. Navigation offset distances and latency factors were calculated based on the test results and compared to the DQO objectives. Positioning errors were not to exceed 1.0 feet.

- **Analysis of Replicate Data:** The pre-and post-survey replicate data lines were reviewed for each data set. Data sampling statistics were calculated in Geosoft. The amplitudes of the responses over standard test items should be within 20%, the location accuracy should be within 1 foot, and the latency calculation were checked with the 3-Point Navigation Function Test results.

- **Coverage Assessment:** To verify that complete coverage was achieved during survey activities, all navigation traverses were reviewed and documented during the data processing and analysis steps. The survey area and incidental data gappage (unsurveyed area due to line variance, equipment malfunction, or operator error and not due to terrain or obstructions) was calculated. Total incidental data gappage for SEAD 46 and SEAD 57 surveys was equal to the 0.01 acre metric.

- **Analysis of Data Sampling:** Data sampling statistics were calculated in Geosoft. These statistics included: tow velocity, along-track and across-track data spacing, area surveyed, and area of data gaps. The tow vehicle maintained a mean speed < 3 miles per hour (mph). Along-track sampling error was < 0.5 feet. Across-track sampling error was < 3.0 feet excluding data gaps due to trees or other obstacles that preclude the survey platform from providing complete coverage. This metric was intended to control data gaps associated with inconsistent track plots that are not associated with trees or other obstructions. For the purposes of this project, minor occurrences were accepted if they did not exceed 0.5 feet.

2.4.2 Known Location Survey Data Checks

During site set-up, a NY state licensed surveyor established 2 first order control survey monuments at each site and established survey control points on 250-foot centers over the open areas, The survey control points consisted of 1-foot long, 5/8-in diameter rebar hubs with survey caps and witness stakes. As part of each day's survey area, care was taken to survey over at least one survey control point as a navigation and sensor check. The anomaly location in the processed data and offset from the known location, if any, was also documented on the Daily Navigation QC Verification Log (Form 6-2). All survey control points were located in the processed data to within 1-foot.

As part of the USACE QA program, the USACE planted 20 blind seed items over SEADs 46 and 57. These were COE SEED#01 through COE SEED#20. Based on their review of the survey data, the USACE geophysicist determined that all USACE blind seed items were located to SOW specifications.

2.4.3 Data Usability

The Shaw Site Geophysicist or QC Geophysicist reviewed and approved each Daily Sensor QC Verification Log (Form 6-1) and Daily Navigation QC Verification Log (Form 6-2) daily to document the proper equipment function. Evaluation of the equipment verification and QC data indicated the geophysical sensors and navigation system were operating properly during the surveys and that the project DQO metrics were achieved. Very few individual DQO exceedances of any type were encountered.

The USACE Project Geophysicist has verbally approved all data for use.

2.5 TARGET SELECTION

The data channel sum was calculated based on the algebraic sum of the 4 (leveled) time gate millivolt responses. In UXDetect, the sum channel data for each quad were gridded using a minimum curvature algorithm on a 0.25-foot grid in preparation for target selection. Target selection was initially performed using the UXDetect Blakely algorithm auto picker to a minimum threshold of 10mV.

Each target list was reviewed by the Project or QC Geophysicist. Boundary conditions and saturated response areas (SRA) were defined. QC flag(s) were then associated with each pick in the target lists during QC review as follows:

QC Flag	Flag Description
0	Pick removed in QC Review
1	Original Pick
2	Pick added in initial review
3	Pick added in QC Review
4	Pick removed – a data or gridding artifact
5	Pick removed – anomaly is due to a cultural feature
6	Pick removed – duplicate target
7	Pick removed – located outside of Quad or Clearance Area
8	Pick removed – within a saturated response area (SRA)
9	Pick is located on a quad boundary

The target selection process was documented on Form 6-5. Dig sheets were prepared for each quad, with targets sorted in order of target peak amplitude. Form 6-5s for each quad are included on the CD ROM in Appendix A.

2.6 TARGET SELECTION QC

Each target list and it's supporting data and flags were independently reviewed by a second Shaw geophysicist prior to final approval by Project Geophysicist. Dig Lists and supporting data were then submitted to the USACE Project Geophysicist for QA review. QC sign-off on each target list is documented on Form 6-5 for each quad. Form 6-5s for each quad are included on the CD ROM in Appendix A.

The USACE Project Geophysicist has verbally approved all target lists for use and selected or approved targets for anomaly verification which will be discussed by site in the following sections.

3.0 SEAD 46 GEOPHYSICAL SURVEY RESULTS

3.1 SITE CONDITIONS

The SEAD 46 site boundaries and environs are presented on Figure 3-1. SEAD 46 consists of approximately 32 acres of open areas, 45 acres of wooded areas, and about ½-acre associated with the target berm. Of this area, approximately 28.25 acres were geophysically mapped with the towed array. No buildings or utilities are present. The only large cultural features present were the access road, with an associate gate and culvert, and the target berm. A few monitoring wells and signs were present, as well as metal piping lying on the ground surface north of the target berm. The irregularly shaped wooded areas and numerous individual trees dictated the towed array survey coverage.

No surface MEC was encountered.

3.2 SURVEY RESULTS

The final EM-61MK2 towed array sum channel survey results for SEAD 46 are presented on Plate 1. Summary and quad target lists (which are too lengthy to present here) and supporting data are included on the CD Rom in Appendix A. Individual quad maps showing the geophysical mapping results, anomalies, and target picks are presented in Appendix B. All maps are plotted to the same color key such that areas of near background conditions are keyed to blue hues and progressively stronger metallic responses are shown in yellow, oranges, reds, and pinks. The general DGM results are as follows:

- Approximately 27.26 acres of SEAD 46 (including 0.98 acres of SRA) were mapped. Incidental DGM gappage of about 0.067 acres was within specification.
- One SRA was mapped in C16-D18, in the northwestern portion of the area. This area was observed to have a mostly packed gravel surface and is similar in appearance and EM-61MK2 response to a known spent ammunition processing area at SEAD 57.
- Anomaly density increases toward the target berm from the south (in the direction from the presumed historical firing point). A number of large anomalies are present just north of the berm which are mostly related to non-MEC pipes, wells, and other surface metal.
- In general, there are large numbers of metallic anomalies throughout the area. Anomaly counts fall-off significantly behind wooded areas. However, a large percentage of these anomalies are lower-amplitude, simple (discrete) anomalies which are likely indicative of frag or similar small pieces of metal.

3.3 ANOMALY VERIFICATION

A total of 98 anomalies from the SEAD 46 quad targets lists were selected or approved by USACE for anomaly verification. 61 anomalies were relocated and dug in June 2004, followed by another 37 in January 2005. Verification target locations are shown on Figure 3-2. For the first 61, one or two generally lower amplitude anomalies (13-137 mV) were selected for relocation and intrusive verification per quad, depending on the DGM coverage of the quad. Subsequently, 37 of the highest amplitude targets were selected for verification at the request of the installation. DGM anomaly verification results for these targets are presented in Table 3-1.

Sum channel anomaly peak amplitudes of these verification targets ranged from 13.2mV to 597861mV. All anomalies were reacquired using the RTS to waypoint to the verification target coordinates. A plastic pin-flag was placed at that location, then a single EM-61MK2 (cart) was used to locate the actual peak of the anomaly. The EM-61MK2 operator located the peak, calculated a sum channel peak response, moved the pin-flag and measured the direction and offset of the peak. Little or no response above background conditions was measured for 6 of the lowest amplitude (13.2-23.2 mV) targets. This is due to the following primary factors:

- The 10mV target selection threshold for the sum of channels is very close to or within the noise levels in many areas.

- The sum channel response is dominated by the 1st time gate contribution. 10 mV (sum) only represents 2-3mV of time gate 3 response (equivalent to the (old) EM-61 bottom coil response).
- The EM-61MK2 coils deployed in the cart configuration are approximately 4.5-inches higher than the 12-inch coil height deployed on the towed array. The resulting towed array data are more sensitive to smaller anomalies than standard deployments.
- And towed array data generally has a higher signal-to-noise ratio than single unit deployments.

However, there is no practical alternative to using a standard, wheeled cart EM-61MK2 deployment for relocation. The vast majority of targets were relocated to within 0 to ½ foot of the target coordinates. In only two cases did anomaly relocation exceed a 1 foot offset and the maximum offset was 1.5 feet. For the reasons listed above, relocation peak amplitudes were on average about 1/3 lower than the towed array data peak amplitudes, but were internally consistent with the scale factor.

Shaw UXO technicians went to each pin flag location to intrusively verify each location. Initially, they used a Schonstedt GA-72 type magnetic gradiometer for location and excavation, but because of the prevalence of aluminum scrap present, a Fisher all-metal handheld detector was also used. The metal source of the anomaly was removed, the dig result was classified, and the depth and relative location to the pin were documented. In only one case did the primary item excavated exceed 1 foot from the relocated dig location.

No UXO or hazardous MEC were found in the verification excavations. All recovered metal was classified as ordnance related scrap, frag, or non-OE scrap. No apparent metallic contact was found at three locations corresponding to low amplitude targets with little or no relocation peaks. The most common items recovered were .50 caliber cartridge cases and 25 pop flares found in 46G02 and 46G06. Aluminum scrap and frag were recovered in approximately the same quantity as ferrous scrap and frag. The maximum excavation depth was 12-inches, but most recovered items were buried less than 6-inches.

A post-dig QC was performed over each excavation location using the EM-61MK2 to verify that the anomaly peak had been removed. In all cases, the post-dig QC verified that the anomaly had been removed. One 23 mV target (46I04-261) was neither reacquired nor and contact found. Because of its slightly higher amplitude, it is inferred that it represented a piece of surface metal moved during operations or mowing.

3.4 MAG AND FLAG TRANSECTS IN WOODS

Approximately 45 acres of dense woods are present at SEAD 46 which are unsuitable for DGM. In these areas 10-foot wide transects every 50 feet were cleared by "hydro-axe" or similar equipment for mag & flag characterization. Vegetation clearance activities are described in Section 2.0 of the Work Plan. Mag and flag transect locations are depicted in Figure 3-3. 70 transects totaling about 19,500 linear feet were cleared. Transects were limited in length on the western boundary of the site and in grid H18 due to wetlands which limited the use of clearance machinery. Shaw UXO technicians using Schonstedt GA72 type magnetometers, located and flagged ferrous anomalies along these transects. Subsequent anomaly verification work has indicated the presence of significant amount of aluminum scrap and frag which suggests that anomaly counts generated via magnetometers may be biased low. Mag and flag transect measurement and flag counts are tabulated in Table 3-2. Mag and flag anomaly counts on the transects in the woods are significantly lower than the DGM anomaly densities in the open areas, presumably due to the lack of ejectile/projectile frag penetration through the physical obstruction of the trees and canopy. Note, however, that significant amounts of aluminum scrap and frag were detected in the DGM areas which would not be detected with a Schonstedt gradiometer.

3.5 BERM SCREENING

The SEAD 46 target berm was screened for metallic debris using an EM-61-MK2 in man portable mode. Because of the steepness of the slopes, these data are considered screening level quality. A total of 10 base-to-top transects were collected. Profile data for each time-gate for each transect are presented on Figure 3-4. Transects 1 and 6 were performed on the west and east flanks of the berm. One strong and a few smaller metallic anomalies were detected. Transects 2 though 5 were collected

along the front (south) face of the berm. Numerous metallic anomalies were detected. A monitoring well is present near the base of transects 2 and 3, accounting for some of the end of line response. Transects 7 through 10 were collected from the back (north) face of the berm. Few, small metallic responses were detected. Based on the screening data, it appears that metallic anomalies from potential past firing activities are concentrated in the south face of the berm.

3.6 STATISTICS

The various DGM and non-DGM clearance areas for SEAD 46 have been calculated and divided by quad. Area calculations are presented in Table 3-3. Clearance areas for SEAD 46 totaling 76.9 acres were as follows:

Acres	Clearance Area
27.3	DGM Area
Non-DGM Areas	
1	Saturated Response Area
3.4	Open, but non-towed-array accessible area
44.7	Woods
0.5	Berm

An analysis of DGM anomalies by quad for varying potential cut lines (excluding saturated response areas) is presented in Table 3-4. Most of the targets detected are smaller anomalies and the distribution of the anomalies is strongly sensitive to the cut line threshold selected.

Cut Line	Total DGM Targets
<=10mV	12,606
<=20mV	5,463
<=30mV	3,124
<=40mV	2,137
<=50mV	1,563

Other than the defined SRA, it does not appear that any significant portion of the DGM area has anomaly densities (for likely cut-lines) greater than 600 targets/acre.

4.0 SEAD 57 GEOPHYSICAL SURVEY RESULTS

4.1 SITE CONDITIONS

The SEAD 57 site boundaries and environs are presented on Figure 4-1. SEAD 57 consists of approximately 14-acres of open area expected to contain high densities of MEC-related frag and scrap located within 400-feet of the former EOD demo berm. The remainder of the site, defined as the area between 400-feet and 1000-feet from the former EOD demo berm, consists of about 25 acres of open areas and 40 acres of wooded areas. Of this area, approximately 20.5 acres were geophysically mapped with the towed array. An access road with inactive overhead utilities crosses the northern part of the site from east to west. Three former EOD structures and a pole barn (Building T2105) are present north of the road. A former spent ammunition processing area is located on the south side of the access road on the west side of the site (grids B12-E14). A few monitoring wells, poles, culverts, guy-lines, and signs were present. Although not initially believed to be present, apparent underground utilities were detected during the DGM. Only a handful of trees were present in the open areas. The irregularly shaped wooded areas dictated the boundaries of the towed array DGM coverage to the west, south, and east.

No surface MEC was encountered.

4.2 SURVEY RESULTS

The final EM-61MK2 towed array sum channel survey results for SEAD 57 are presented on Plate 2. Summary and quad target lists (which are too lengthy to present here) and supporting data which are included on the CD Rom in Appendix A. Individual quad maps showing the geophysical mapping results, anomalies, and target picks are presented in Appendix C. All maps are plotted to the same color key such that areas of near background conditions are keyed to blue hues and progressively stronger metallic responses are shown in yellow, oranges, reds, and pinks. The general DGM results are as follows:

- Approximately 22.5 acres (including 2 acres of SRA) of SEAD 57 were mapped. Incidental DGM gappage of about 0.038 acres was within specification.
- One large SRA was mapped in grids B12 to E14. This area was observed to have a mostly packed gravel surface and is a known spent ammunition processing area. Additional geophysical screening with a single EM-61MK2 was performed. The results indicate that the SRA extends a few feet west of the 1000-foot boundary but does not extend further west to the treeline. Five other smaller SRAs were also defined.
- An apparent buried utility was mapped on the north side of the road which runs up to the former EOD structures. A north-south running linear anomaly on about 738800E may represent buried demo control wires leading from the EOD structures to the demo pit.
- Anomaly density is very high within the 400-foot radius of the former demo berm. A "spray" ejectile pattern is evident with anomaly densities decreasing with increasing distance from the demo pit. Very high anomaly densities are also observed on the west side of the 400-foot boundary. Relatively fewer anomalies were noted on the east and south sides of the 400-foot boundary.
- In general, there are large numbers of metallic anomalies throughout the area. Anomaly densities are higher than in SEAD 46 and a larger range of anomaly sizes were observed. Except for the SRAs, anomaly density falls-off with distance from the former demo pit.

4.3 ANOMALY VERIFICATION

A total of 75 anomalies from the SEAD 57 quad targets lists were selected or approved by USACE for anomaly verification. 60 anomalies were relocated and dug in June 2004, followed by another 15 in January 2005. Verification target locations are shown on Figure 4-2. For the first 60, one or two generally lower amplitude anomalies (10.1-229.4mV) were selected for relocation and intrusive verification per quad, depending on the DGM coverage of the quad. Subsequently, 15 of the highest amplitude targets were selected for verification at the request of the installation. DGM anomaly verification results for these targets are presented in Table 4-1.

Sum channel anomaly peak amplitudes of these verification targets ranged from 10.1mV to 229.4mV. All anomalies were reacquired using the RTS to waypoint to the verification target coordinates. A plastic pin-flag was placed at that location, then a single EM-61MK2 (cart) was used to locate the non-interpolated peak of the anomaly. The EM-61MK2 operator located the peak, calculated a sum channel peak response, moved the pin-flag and measured the direction and offset of the peak. Little or no response above background conditions was measured for 6 of the lowest amplitude (10.1-16.8 mV) targets. This is due to the following primary factors:

- The 10mV target selection threshold for the sum of channels is very close to or within the noise levels in many areas.
- The sum channel response is dominated by the 1st time gate contribution. For 10 mV (sum) only represents 2-3mV of the time gate 3 response (equivalent to the (old) EM-61 bottom coil response).
- The EM-61MK2 coils deployed in the cart configuration are approximately 4.5-inches higher than the 12-inch coil height deployed on the towed array. The resulting towed array data are more sensitive to smaller anomalies than standard deployments.
- And towed array data generally has a higher signal-to-noise ratio than single unit deployments.

However, there is no practical alternative to using a standard, wheeled cart EM-61MK2 deployment for relocation. The vast majority of targets were relocated to within 0 to ½ foot of the target coordinates. In only one case did anomaly relocation exceed a 1 foot offset (1.5 feet off set). For the reasons listed above, relocation peak amplitudes were on average about 1/3 lower than the towed array data peak amplitudes, but were internally consistent with the scale factor.

Shaw UXO technicians went to each pin flag location to intrusively verify each location. Initially, they used a Schonstedt GA-72 type magnetic gradiometer for location and excavation, but because of the prevalence of aluminum scrap present, a Fisher all-metal handheld detector was also used. The metal source of the anomaly was removed, the dig result was classified, and the depth and relative location to the pin were logged. The primary item excavated was no more than 1 foot from the relocated dig location in all cases.

No UXO or hazardous MEC were found in the initial round of lower amplitude verification excavations. Four (4) UXO were found in the 15 high amplitude target excavations (a 75mm, a 75mm AP shot, a 105mm and an unknown fuzed bomb). All other recovered metal was classified as ordnance related scrap, frag, or non-OE scrap or USACE seed items. Two USACE blind seed items, simulated 20mm projectiles COE SEED#6 and COE SEED#7, were included by USACE in the target verification lists. Both were recovered within location precision specifications. No metallic contact was found at 4 locations corresponding to low amplitude targets with little or no relocation peaks. The most common items recovered were aluminum frag. Aluminum scrap and frag were recovered more frequently than were ferrous scrap and frag. The deepest item recovered was at 12-inches below ground surface (which was also the only item deeper than 6-inches).

A post-dig QC was performed over each excavation location using the EM-61MK2 to verify that the anomaly peak had been removed. In all cases, the post-dig QC verified that the anomaly had been removed. All verification anomalies QC'd acceptably.

4.4 MAG AND FLAG TRANSECTS IN WOODS

Approximately 40 acres of heavy woods are present at SEAD 57 which are unsuitable for DGM. In these areas 10-foot wide transects every 50 feet were cleared by "hydro-axe" or similar equipment for mag & flag characterization. Vegetation clearance activities are described in Section 2.0 of the Work Plan. Mag and flag transect locations are depicted in Figure 4-2. 45 transects totaling about 17,000 linear feet were cleared. Transects were not cut in the southeast corner of the area which overlaps areas in the former Demo Range woods which had been previously mag and flagged. Shaw UXO technicians using Schonstedt GA72 type magnetometers, located and flagged ferrous anomalies along these transects. Subsequent anomaly verification work has indicated the presence of significant amount of aluminum scrap and frag which suggests that anomaly counts generated via magnetometers may be biased low. Mag

and flag transect measurement and flag counts are tabulated in Table 4-2. Mag and flag anomaly counts on the transects in the woods are significantly lower than the DGM anomaly densities in the open areas, presumably due to the lack of ejectile/projectile frag penetration through the physical obstruction of the trees and canopy. Note, however, that significant amounts of aluminum scrap and frag were detected in the DGM areas which would not be detected with a Schonstedt gradiometer.

4.5 STATISTICS

The various DGM and non-DGM clearance areas for SEAD 57 have been calculated and divided by quad. Area calculations are presented in Table 4-3. Clearance areas for SEAD 57 totaling 79 acres were as follows:

Acres	Clearance Area
20.5	DGM Area
	Non-DGM Areas
2	Saturated Response Area (includes a small portion of grids B12-C12 extending beyond the 1000-foot boundary)
2.1	Open, but non-towed-array accessible area
40	Woods
14.4	Within 400-ft of the EOD Berm

An analysis of DGM anomalies by quad for varying potential cut lines (excluding saturated response areas) is presented in Table 4-4. Most of the targets detected are smaller anomalies and the distribution of the anomalies is not as sensitive to the cut line threshold selected as in SEAD 46.

Cut Line	Total DGM Targets
<=10mV	13,857
<=20mV	8,935
<=30mV	6,875
<=40mV	5,786
<=50mV	5,044

Several SRAs were defined by DGM. In addition, the DGM area on the western margin of the 400-foot boundary in SEAD 57 (i.e. quads E08, E10, G10, and G12) might be considered for alternative clearance methods due to anomaly densities greater than 600/acre based on likely cut lines for the removal action.

5.0 REFERENCES

Parsons Engineering Science, Inc., 2001, Ordnance and Explosives Engineering Evaluation/Cost Analysis Report, Seneca Army Depot Activity. Prepared for USACE. Draft Final Document, September 2001.

TABLES

Table 3-1
SEAD 46: DGM Anomaly Verification

Form 2-2

Site: SEDA
Area: SEAD 46

Project GP: K. Boler
QC GP: J. Ma

COR: T. Westenburg
SEDA: T. Battaglia
COE GP: R. Grabowski

EM61MK2 Data
RTS Navigation
NAD 83 NY State Plane, CZ

Shaw E & I, Inc.

Anomaly ID(1)	DGM SURVEY Location (ft) Easting(X)	Northing(Y)	Amp(2) (mV)	REACQUISTION Location (ft) Offset	Dir.	Amp(2) (mV)	Comments	Date	DIG RESULTS Location (ft) Offset	Dir.	Type Code	Depth (in)	Date	Item Description	Clear. Code	POST-DIG QC Amp(2) (mV)	QC Code	GP QC Initials
46A16-109	748950.00	1007475.00	37.6	0		21		6/28/04	0		OS	2	6/28/04	.50 cal	A	<10	G	KB
46A16-177	748994.75	1007414.25	13.2	0		5	little or no peak	6/28/04	0.5	E	S	1	6/28/04	Fe scrap	A	<10	G	KB
46A18-070	748918.25	1007508.00	39.8	0.5	N	29		6/28/04	0.5	W	S	4	6/28/04	const. debris	A	<10	G	KB
46C08-007	749243.25	1006406.00	16.3	1	S	6	little or no peak	6/25/04	0.5	S	OS	8	6/28/04	.50 cal cart case	A	<10	F	KB
46C10-010	749236.50	1006549.50	23.7	1	SW	19		6/25/04	0		S	2	6/28/04	nail	A	<10	G	KB
46C16-007	749011.38	1007400.68	103.5	1.5	E	75		6/28/04	0.5	E	S	5	6/28/04	filler cap	A	<10	G	KB
46C18-059	749156.00	1007557.50	22.1	0		13	on edge of road	6/28/04	0		S	4	6/28/04	nails	A	<10	G	KB
46E08-172	749304.75	1006435.00	14.2	0.5	NE	13		6/25/04	0		S	2	6/28/04	nail	A	<10	G	KB
46E08-180	749256.25	1006472.75	13.7	0.5	E	5	little or no peak	6/25/04					6/28/04	no contact	D1	<10	F	KB
46E10-029	749405.25	1006550.25	46.1	0		20		6/25/04	0		OS	6	6/28/04	.50 cal	A	<10	G	KB
46E10-085	749426.25	1006529.25	22.7	0		13		6/25/04	0		OS	4	6/28/04	fill plug	A	<10	G	KB
46E12-025	749469.25	1006786.75	60.9	0		31		6/25/04	0		OS	3	6/28/04	.50 cal	A	<10	G	KB
46E12-081	749425.50	1006772.00	30.2	0.5	S	28		6/25/04	0		OS	6	6/28/04	.50 cal	A	<10	G	KB
46E14-002	749487.75	1007067.75	597861	0		3968		1/24/05	0	W	S	6	1/25/05	Trash can lid	A	<10	G	BC
46E14-004	749473.25	1007049.00	3372.6	0		188		1/24/05	0		S	3	1/25/05	Steel scrap	A	<10	G	BC
46E14-007	749481.25	1007067.50	1458.3	0		123		1/24/05	1.5	E	S	4	1/25/05	Steel Scrap	A	<10	G	BC
46E14-009	749496.25	1007061.25	1390.2	0		100		1/24/05	1	W	S	4	1/25/05	Steel Scrap	A	<10	G	BC
46E14-011	749480.00	1007082.25	894.6	0		104		1/24/05	0		S	3	1/25/05	Long bolt	A	<10	G	BC
46E14-012	749473.50	1007055.75	841.7	0		66		1/24/05	0.7	S	S	3	1/25/05	Long bolt	A	<10	G	BC
46E14-015	749483.63	1007072.32	383.2	0		42		1/24/05	0		OS	3	1/25/05	trip flare, clamp	A	<10	G	BC
46E14-080	749385.75	1007035.25	40.9	0		26		6/25/04	0		OS	3	6/28/04	.50 cal	A	<10	G	KB
46E16-070	749406.25	1007493.25	21.4	0		14		6/28/04	0		S	5	6/28/04	3/8-in bolt	A	<10	G	KB
46E18-024	749463.00	1007643.50	28.8	0		21		6/28/04	0		S	6	6/28/04	Fe scrap	A	<10	G	KB
46E20-008	749465.75	1007756.25	34.3	1	N	22		6/28/04	0		S	4	6/28/04	Fe scrap	A	<10	G	KB
46G04-013	749708.75	1005984.75	64.1	1	E	130		6/25/04	0		S	3	6/28/04	spike	A	<10	F	KB
46G06-002	749,596.50	1,006,186.75	1,362	0		254		1/20/05	0		OS	3	1/24/05	(2) Pop flare	A	<10	G	BC
46G06-004	749,739.00	1,006,190.50	1,003	0		195		1/20/05	0		S	2	1/21/05	Scrap steel	A	<10	G	BC
46G06-005	749,607.75	1,006,154.25	772	0		147		1/20/05	0		OS	2	1/24/05	Pop flare	A	<10	G	BC
46G06-006	749,577.50	1,006,187.25	724	1	E	139		1/20/05	0.6	W	OS	6	1/24/05	Pop flare	A	<10	G	BC
46G06-007	749,667.25	1,006,162.25	724	0		161		1/20/05	0		OS	3	1/21/05	Pop flare	A	<10	G	BC
46G06-008	749,589.50	1,006,187.25	628	0		140		1/20/05	0.7	E	OS	4	1/24/05	Pop flare	A	<10	G	BC

12 March 05

Table 3-1
SEAD 46: DGM Anomaly Verification

Anomaly ID(1)	DGM SURVEY Location (ft) Easting(X)	Northing(Y)	Amp(2) (mV)	REACQUISTION Location (ft) Offset	Dir.	Amp(2) (mV)	Comments	Date	DIG RESULTS Location (ft) Offset	Dir.	Type Code	Depth (in)	Date	Item Description	Clear. Code	POST-DIG QC Amp(2) (mV)	QC Code	GP QC Initials
46G06-009	749,596.50	1,006,151.00	622	0		165		1/20/05	0		OS	2	1/24/05	Pop flare	A	<10	G	BC
46G06-010	749,663.25	1,006,141.00	589	0		260		1/20/05	0.2	W	OS	3	1/21/05	Pop flare	A	<10	G	BC
46G06-011	749,603.00	1,006,173.25	569	0		139		1/20/05	0		OS	2	1/24/05	Pop flare	A	<10	G	BC
46G06-012	749,609.75	1,006,178.75	562	0		105		1/20/05	0.5	S	OS	3	1/24/05	Pop flare	A	<10	G	BC
46G06-013	749,601.75	1,006,151.00	553	0		116		1/20/05	0		OS	2	1/21/05	Pop flare	A	<10	G	BC
46G06-014	749,644.25	1,006,154.50	478	0		135		1/20/05	1	W	OS	6	1/21/05	Pop flare	A	<10	G	BC
46G06-015	749,620.00	1,006,101.75	470	0		180		1/20/05	0.9	E	S	0	1/21/05	12in nail	A	<10	G	BC
46G06-016	749,676.75	1,006,167.75	469	0		83		1/20/05	0.5	E	OS	6	1/21/05	Pop flare	A	<10	G	BC
46G06-017	749,648.75	1,006,128.75	466	0		160		1/20/05	0.5	W	OS	3	1/21/05	Pop flare	A	<10	G	BC
46G06-018	749,671.50	1,006,147.00	455	0		98		1/20/05	0.6	W	OS	4	1/21/05	Pop flare	A	<10	G	BC
46G06-019	749,603.75	1,006,168.00	450	0		61		1/20/05	0.3	E	OS	6	1/24/05	Pop flare	A	<10	G	BC
46G06-020	749,579.50	1,006,209.25	443	0		91		1/20/05	0.4	E	OS	4	1/24/05	Pop flare	A	<10	G	BC
46G06-021	749,640.00	1,006,132.25	436	0		82		1/20/05	0		OS	2	1/21/05	Pop flare	A	<10	G	BC
46G06-022	749,605.75	1,006,197.25	429	0		122		1/20/05	0		OS	3	1/24/05	Pop flare	A	<10	G	BC
46G06-023	749,637.25	1,006,086.75	417	0		98		1/20/05	1.1	E	OS	7	1/21/05	Pop flare	A	<10	G	BC
46G06-024	749,568.00	1,006,185.75	415	0		115		1/20/05	1	W	OS	8	1/25/05	Pop flare	A	<10	G	BC
46G06-025	749,594.75	1,006,224.00	414	0		86		1/20/05	0		OS	6	1/24/05	Pop flare	A	<10	G	BC
46G06-026	749,569.25	1,006,164.75	401	0		75		1/20/05	0		OS	4	1/21/05	Pop flare	A	<10	G	BC
46G06-027	749,580.75	1,006,180.75	391	1	S	148		1/20/05	0		OS	4	1/25/05	Pop flare	A	<10	G	BC
46G06-008	749,680.00	1,006,169.00	374	0		122		1/20/05	1	W	OS	4	1/21/05	Pop flare	A	<10	G	BC
46G06-029	749,570.25	1,006,200.75	373	0		158		1/20/05	0		OS	3	1/24/05	Pop flare	A	<10	G	BC
46G06-030	749,578.75	1,006,194.50	367	0		75		1/20/05	0.2	E	OS	5	1/24/05	Pop flare	A	<10	G	BC
46G06-086	749713.75	1006109.50	75.3	0		72		6/25/04	0		OS	5	6/28/04	Al scrap	A	<10	G	KB
46G06-167	749675.75	1006091.00	26.8	0.5	NW	31		6/25/04	0		OS	3	6/28/04	Al scrap	A	<10	G	KB
46G08-061	749518.25	1006484.50	56	0		27		6/25/04	0		OS	12	6/28/04	Al scrap	A	<10	G	KB
46G08-123	749518.00	1006442.75	22.8	0		15		6/25/04	1	S	OS	2	6/28/04	fuze liter	A	<10	G	KB
46G10-037	749516.00	1006566.50	137.5	0		86		6/25/04	0		OS	6	6/28/04	two .50 cal	A	<10	G	KB
46G10-068	749505.75	1006585.75	48.1	1	NE	20		6/25/04	0		S	5	6/28/04	coke can	A	<10	G	KB
46G12-042	749637.50	1006928.75	49.2	1	NE	26		6/25/04	0		OS	4	6/28/04	.50 cal	A	<10	G	KB
46G12-081	749578.00	1006987.75	38.9	0		29		6/25/04	1	SW	OS	3	6/28/04	.50 cal	A	<10	G	KB
46G14-241	749743.50	1007112.25	40.3	0		20		6/25/04	0		OS	2	6/28/04	.50 cal	A	<10	G	KB
46G14-379	749581.00	1007026.75	30.7	0.5	E	14		6/25/04	1	NE	OS	1	6/28/04	.50 cal	A	<10	G	KB
46G16-003	749,727.50	1,007,294.00	2,020	0		150		1/25/05	0		S	0	1/25/05	Lightning rod	A	<10	G	BC
46G14-004	749,726.50	1,007,297.00	1,948	0		180		1/25/05	0		S	0	1/25/05	Same as 003	A	<10	G	BC
46G16-033	749679.00	1007323.25	47.8	0		33		6/25/04	0		S	2	6/28/04	lots of nails	B	12	F	KB
46G16-015	749719.00	1007481.50	88.3	1	N	43		6/25/04	0		OS	2	6/28/04	.50 cal	A	<10	F	KB

Table 3-1
SEAD 46: DGM Anomaly Verification

Anomaly ID(1)	DGM SURVEY Location (ft) Easting(X)	Northing(Y)	Amp(2) (mV)	REACQUISTION Location (ft) Offset	Dir.	Amp(2) (mV)	Comments	Date	DIG RESULTS Location (ft) Offset	Dir.	Type Code	Depth (in)	Date	Item Description	Clear. Code	POST-DIG QC Amp(2) (mV)	QC Code	GP QC Initials
46G18-021	749543.50	1007548.00	23.9	0		17		6/28/04	0		OS	3	6/28/04	.50 cal	A	<10	G	KB
46G20-002	749526.50	1007759.25	52	0		28		6/28/04	0		S	6	6/28/04	Fe scrap	A	<10	G	KB
46I04-261	749957.00	1005941.75	23.1	0.5	SE	5	little or no peak	6/25/04	0				6/28/04	no contact	D1	<10	U(3)	KB
46I04-314	749914.00	1005936.25	21.2	0		31		6/25/04	0		F	2	6/28/04	Al frag	A	<10	G	KB
46I06-055	749985.50	1006142.25	58.4	1	W	41		6/25/04	0		F	3	6/28/04	Al frag	A	<10	G	KB
46I06-117	749899.25	1006181.00	38.9	0.5	SW	32		6/25/04	0		OS	4	6/28/04	Al scrap	A	<10	G	KB
46I08-122	749931.50	1006383.75	21	0		51		6/25/04	0		F	2	6/25/04	Al frag	A	<10	F	KB
46I08-145	749910.75	1006390.25	17.6	0.5	W	18	by road	6/25/04	1	N	OS	2	6/25/04	m2 fuze igniter	A	<10	G	KB
46I10-082	749913.75	1006598.75	31.4	0.5	NE	35		6/25/04	1	S	OS	4	6/25/04	.50 cal tracer	A	<10	G	KB
46I10-106	749757.50	1006697.50	26.3	1.5	E	20		6/25/04	0		S	2	6/28/04	ox shoe nail	A	<10	G	KB
46I12-047	749755.25	1006969.75	42.4	1	SE	35		6/25/04	0		OS	3	6/28/04	.50 cal	A	<10	G	KB
46I12-077	749966.50	1006969.75	30.6	0		17		6/28/04	0		S	3	6/28/04	Fe scrap	A	<10	G	KB
46I14-018	749920.25	1007185.25	61.9	0.5	N	28		6/28/04	0.5	N	S	6	6/28/04	nail, drift pin	A	<10	G	KB
46I14-055	749778.25	1007053.75	27.5	0		22		6/25/04	1	N	OS	2	6/28/04	.50 cal	A	<10	G	KB
46I16-009	749766.75	1007427.00	54.9	0.5	SE	33	adjacent to gap area	6/28/04	0		S	5	6/28/04	padlock	A	<10	G	KB
46I16-102	749859.25	1007495.75	12.6	0		6	little or no peak	6/28/04					6/28/04	no contact	D1	<10	F	KB
46I18-026	749885.50	1007509.00	21.7	0		15		6/28/04	1	N	S	3	6/28/04	nail	A	<10	G	KB
46K02-044	750222.00	1005700.00	88.5	0		39		6/25/04	0		OS	12	6/25/04	Al scrap	A	<10	G	KB
46K02-153	750233.25	1005693.75	17.5	0		14		6/25/04	0		OS	8	6/25/04	Al scrap	A	<10	G	KB
46K04-153	750100.50	1005944.75	62	0		47		6/25/04	0		OS	4	6/28/04	Al scrap	A	<10	G	KB
46K04-297	750197.50	1005828.50	35.2	0		24		6/25/04	1	NE	OS	2	6/25/04	Fe scrap	A	<10	G	KB
46K06-116	750025.25	1006219.75	45.6	0		27		6/25/04	0.5	W	F	4	6/25/04	Al frag	A	<10	G	KB
46K06-460	750157.25	1006147.00	18.2	0.5	SW	8		6/25/04	2	N	F	0	6/25/04	Al scrap	A	<10	F	KB
46K08-024	750080.25	1006399.00	47.6	0		22		6/25/04	0		OS	3	6/25/04	Al scrap	A	<10	G	KB
46K08-063	750105.00	1006321.00	28.5	0.5	N	31		6/25/04	0		OS	1	6/25/04	Al scrap	A	<10	G	KB
46K10-012	750060.25	1006538.25	51	0.5	W	38		6/25/04	0		OS	5	6/25/04	.50 cal tracer	A	<10	G	KB
46K10-086	750079.75	1006555.00	16.2	0		6	little or no peak	6/25/04	0		F	2	6/25/04	Al scrap	A	<10	G	KB
46M02-033	750250.25	1005744.75	42.4	0		20		6/25/04	0		OS	12	6/25/04	Al scrap	A	<10	G	KB
46M04-051	750316.5	1005903.25	146.9	0.5	SE	133		6/25/04	0		OS	6	6/25/04	Al scrap	A	<10	G	KB
46M04-211	750300.00	1005929.50	22.9	1.5	E	13		6/25/04	0		OS	3	6/25/04	Al scrap	A	<10	G	KB
46M06-060	750262.50	1006065.25	16.1	0.5	NE	13		6/25/04	0		OS	3	6/25/04	Al scrap	A	<10	G	KB

Type Code: U (UXO), F(frag), OS (ordnance related scrap), S (non-OE scrap), H (hot rock/dirt)
Clearance Code: A (response peak has been removed), B (large item has been removed from hole), C (source deeper than 4 feet), D (other - specify)
D1- no contact detected with either Schonstedt or Fisher instruments. E.g. anomaly was within noise or due to surface metal no longer present.
QC Code: Agreement between DGM results and Dig results: G (Good), F (Fair), U (Unacceptable).
(1) Anomaly ID = Site + Quad ID + anomaly number in review dig list.
(2) Sensor coils were 4.5-in lower in the towed array than in the standard wheel configuration. Wheeled single units used for reacquisition/clearance show lower values/peaks.
Reported amplitude is the sum of time gates 1-4. Reacquisition and clearance numbers were field "leveled" by operator.
(3) Likely surface metal moved by mowing. Only a very low amplitude blip found in a 3-ft radius during reaquisition. No contact (Schonstedt ot Fisher) found in dig.

Table 3-2
SEAD 46 Mag and Flag Transects in Woods

	Transect ID	Transect Length (ft)	Num. of Flags
East Side	1E	731	16
	2E	207	17
	3E	164	14
	4E	91	1
	5E	91	1
	6E	146	6
	7E	146	5
	8E	156	3
	9E	146	5
	10E	156	6
	11E	146	8
	12E	146	3
	13E	269	0
	14E	275	2
	15E	267	0
	16E	368	0
	17E	368	0
	18E	399	1
	19E	436	2
	20E	535	0
	21E	555	22
	22E	545	0
	23E	547	0
	24E	555	0
	25E	499	1
	26E	497	0
	27E	465	0
	28E	464	2
	29E	464	0
	30E	565	0
	31E	565	1
	32E	565	0
	33E	565	7
	34E	500	0
	35E	517	1
	36E	517	0
	sub-total	13628	124

	Transect ID	Transect Length (ft)	Num. of Flags
North Side (West to East)	1N	119	0
	2N	119	0
	3N	130	1
	4N	94	0
	5N	94	1
	6N	94	0
	7N	215	2
	8N	220	0
	9N	190	5
	10N	180	4
	11N	125	5
	12N	125	5
	13N	125	5
	14N	131	0
	15N	131	0
West Side	1W	380	12
	2W	316	2
	3W	316	0
	4W	316	0
	5W	364	0
	6W	342	0
	7W	342	0
	8W	342	0
	9W	342	0
Interior Areas	1I	40	0
	2I	53	0
	3I	53	0
	4I	98	0
	5I	95	0
	6I	86	0
	7I	94	0
	8I	65	0
	9I	84	2
	10I	122	0
	sub-total	5942	44

SEAD 46 Transect totals

Length	19,570	ft
Area	195,700	sq ft
	4.5	acres
Flag count	168	
Flag density	37.4	flags/acre

Notes:
Transects were 10-foot wide.
Transects were not extended through wetland areas.
Schonstedt magnetic gradiometers are only sensitive to ferrous objects.
Schonstedt flag counts likely understate clearance effort where aluminum/brass MEC is present.

Table 3-3
SEAD 46 Quad Clearance Areas (in square feet)

QUAD	DGM AREA	NON-DGM AREAS				TOTAL AREA to CLEAR	OUTSIDE of AREA	TOTAL AREA
		NON-SURVEYABLE	SRA	WOODS	BERM			
46A08	0	0	0	31,250	0	31,250	31,250	62,500
46A10	0	0	0	31,250	0	31,250	31,250	62,500
46A12	0	0	0	31,250	0	31,250	31,250	62,500
46A14	0	0	0	31,250	0	31,250	31,250	62,500
46A16	21,550	0	0	9,700	0	31,250	31,250	62,500
46A18	10,500	2,000	0	18,750	0	31,250	31,250	62,500
46C08	1,100	0	0	61,400	0	62,500	0	62,500
46C10	5,500	0	0	57,000	0	62,500	0	62,500
46C12	0	0	0	62,500	0	62,500	0	62,500
46C14	0	0	0	62,500	0	62,500	0	62,500
46C16	3,300	6,200	28,000	25,000	0	62,500	0	62,500
46C18	5,500	0	14,500	42,500	0	62,500	0	62,500
46C20	0	2,500	0	0	0	2,500	60,000	62,500
46E04	0	0	0	31,250	0	31,250	31,250	62,500
46E06	0	0	0	62,500	0	62,500	0	62,500
46E08	48,500	1,200	0	12,800	0	62,500	0	62,500
46E10	61,800	700	0	0	0	62,500	0	62,500
46E12	37,500	2,500	0	22,500	0	62,500	0	62,500
46E14	8,400	100	0	39,000	15,000	62,500	0	62,500
46E16	24,000	28,500	0	10,000	0	62,500	0	62,500
46E18	26,000	3,000	0	33,500	0	62,500	0	62,500
46E20	1,600	3,400	0	0	0	5,000	57,000	62,000
46G04	15,000	0	0	16,000	0	31,000	31,250	62,250
46G06	47,500	200	0	14,800	0	62,500	0	62,500
46G08	47,000	12,000	0	3,500	0	62,500	0	62,500
46G10	47,000	15,500	0	0	0	62,500	0	62,500
46G12	56,000	6,500	0	0	0	62,500	0	62,500
46G14	54,600	100	0	0	7,800	62,500	0	62,500
46G16	57,000	3,500	0	2,000	0	62,500	0	62,500
46G18	16,800	1,700	0	44,000	0	62,500	0	62,500
46G20	1,100	2,200	0	5,500	0	8,800	53,700	62,500
46I04	53,500	9,000	0	0	0	62,500	0	62,500
46I06	62,100	400	0	0	0	62,500	0	62,500
46I08	40,000	21,700	0	800	0	62,500	0	62,500
46I10	38,000	7,500	0	17,000	0	62,500	0	62,500
46I12	32,000	2,000	0	28,500	0	62,500	0	62,500
46I14	35,600	200	0	26,700	0	62,500	0	62,500
46I16	36,900	1,700	0	23,900	0	62,500	0	62,500
46I18	15,000	1,000	0	46,500	0	62,500	0	62,500
46I20	0	0	0	11,200	0	11,200	51,300	62,500
46K02	36,000	400	0	26,100	0	62,500	0	62,500
46K04	60,800	1,700	0	0	0	62,500	0	62,500
46K06	58,600	0	0	3,900	0	62,500	0	62,500
46K08	41,200	0	0	21,300	0	62,500	0	62,500
46K10	28,800	0	0	33,700	0	62,500	0	62,500
46K12	0	0	0	62,500	0	62,500	0	62,500
46K14	0	0	0	62,500	0	62,500	0	62,500
46K16	0	0	0	62,500	0	62,500	0	62,500
46K18	0	0	0	62,500	0	62,500	0	62,500
46K20	0	0	0	13,800	0	13,800	48,700	62,500

Table 3-3
SEAD 46 Quad Clearance Areas (in square feet)

QUAD	DGM AREA	NON-DGM AREAS				TOTAL AREA to CLEAR	OUTSIDE of AREA	TOTAL AREA
		NON-SURVEYABLE	SRA	WOODS	BERM			
46M02	7,800	7,800	0	46,900	0	62,500	0	62,500
46M04	37,500	0	0	25,000	0	62,500	0	62,500
46M06	7,200	0	0	55,300	0	62,500	0	62,500
46M08	0	0	0	62,500	0	62,500	0	62,500
46M10	0	0	0	62,500	0	62,500	0	62,500
46M12	0	0	0	62,500	0	62,500	0	62,500
46M14	0	0	0	62,500	0	62,500	0	62,500
46M16	0	0	0	62,500	0	62,500	0	62,500
46M18	0	0	0	62,500	0	62,500	0	62,500
46M20	0	0	0	14,000	0	14,000	48,500	62,500
46O02	0	2,000	0	21,000	0	23,000	39,500	62,500
46O04	0	0	0	23,100	0	23,100	39,400	62,500
46O06	0	0	0	21,900	0	21,900	40,600	62,500
46O08	0	0	0	20,600	0	20,600	41,900	62,500
46O10	0	0	0	19,400	0	19,400	43,100	62,500
46O12	0	0	0	18,800	0	18,800	43,700	62,500
46O14	0	0	0	18,100	0	18,100	44,400	62,500
46O16	0	0	0	16,300	0	16,300	46,200	62,500
46O18	0	0	0	7,250	0	7,250	55,000	62,250
Sq ft	1,188,250	147,200	42,500	1,947,750	22,800	3,348,500	963,000	4,311,500
Acres	27.28	3.38	0.98	44.71	0.52	76.87	22.11	98.98

Notes:
Non-surveyable areas were inacessible to the towed array, due to trees, terrain, buildings, etc.
SRA= Saturated response area.
Each quad is 250x250-ft = 62,500 square feet = 1.43 acres.

Table 3-4
DGM Anomaly Amplitude Analysis
SEAD 46

QUAD	DGM Anomaly Counts at Various Cut Lines (mV)							DGM Coverage		Anomaly/Acre
	>=10	>=20	>=30	>=40	>=50	>=100	>=1000	Sq ft	Acres	(40mV cutline)
46A16	181	100	95	91	77	52	6	21,550	0.49	184
46A18	110	78	67	57	50	35	5	10,500	0.24	236
46C08	14	5	3	3	2	1	0	1,100	0.03	119
46C10	30	10	4	3	3	0	0	5,500	0.13	24
46C16	51	25	19	14	11	6	0	3,300	0.08	185
46C18	76	60	46	37	32	15	0	5,500	0.13	293
46E08	233	110	69	47	40	25	1	48,500	1.11	42
46E10	240	108	59	35	24	14	0	61,800	1.42	25
46E12	315	189	81	51	36	4	0	37,500	0.86	59
46E14	207	143	94	63	46	27	1	8,400	0.19	327
46E16	156	59	33	23	20	9	4	24,000	0.55	42
46E18	119	38	19	9	7	1	0	26,000	0.60	15
46E20	11	7	7	5	3	1	1	1,600	0.04	136
46G04	80	28	19	18	12	5	0	15,000	0.34	52
46G06	678	268	150	115	99	73	2	47,500	1.09	105
46G08	401	140	87	68	59	28	2	47,000	1.08	63
46G10	465	180	118	84	61	36	6	47,000	1.08	78
46G12	703	265	136	70	35	12	3	56,000	1.29	54
46G14	950	603	397	245	159	37	0	54,600	1.25	195
46G16	371	108	52	36	25	8	3	57,000	1.31	28
46G18	108	22	10	4	0	0	0	16,800	0.39	10
46G20	7	5	3	2	1	0	0	1,100	0.03	79
46I04	1,100	353	154	94	66	25	0	53,500	1.23	77
46I06	828	323	166	104	66	22	1	62,100	1.43	73
46I08	307	117	62	39	29	14	0	40,000	0.92	42
46I10	363	143	84	60	41	20	4	38,000	0.87	69
46I12	278	137	76	45	32	11	0	32,000	0.73	61
46I14	172	82	41	30	25	9	0	35,600	0.82	37
46I16	118	58	29	14	8	2	0	36,900	0.85	17
46I18	59	27	16	9	6	3	0	15,000	0.34	26
46K02	234	192	91	67	58	37	8	36,000	0.83	81
46K04	1,161	553	339	240	179	72	8	60,800	1.40	172
46K06	1,006	405	219	140	100	38	1	58,600	1.35	104
46K08	314	106	55	34	18	5	0	41,200	0.95	36
46K10	195	52	25	17	10	3	0	28,800	0.66	26
46M02	118	59	37	33	28	15	2	7,800	0.18	184
46M04	723	264	142	107	85	54	9	37,500	0.86	124
46M06	124	41	20	14	10	6	0	7,200	0.17	85
TOTAL	12,606	5,463	3,124	2,127	1,563	725	67	1,188,250	27.28	78

Notes:
Saturated response areas are excluded from the totals and calculations.

Table 4-1
SEAD 57: DGM Anomaly Verification

Form 2-2

Site: SEDA	Project GP: K. Boler	COR: T. Westenburg
Area: SEAD 57	QC GP: J. Ma	SEDA: T. Battaglia
		COE GP: R. Grabowski

EM61MK2 Data
RTS Navigation
NAD83 NY State Plane, CZ

Shaw™ Shaw E & I, Inc.

	DGM SURVEY			REACQUISTION					DIG RESULTS							POST-DIG QC		
Anomaly	Location (ft)		Amp(2)	Location (ft)		Amp(2)			Location (ft)		Type	Depth	Date	Item	Clear.	Amp(2)	QC	GP QC
ID(1)	Easting(X)	Northing(Y)	(mV)	Offset	Dir.	(mV)	Comments	Date	Offset	Dir.	Code	(in)		Description	Code	(mV)	Code	Initials
57C14-327	738228.50	1009936.75	10.1	0		5	little or no peak	6/22/04					6/23/04	no contact	D1	<10	F	KB
57E04-002	738496.50	1008652.50	162.5	0		70		6/22/04	0		OS	1	6/22/04	Al scrap	A	<10	G	KB
57E06-008	738486.00	1008793.75	124.2	0		45		6/22/04	0.5	W	OS	2	6/22/04	Al scrap	A	<10	F	KB
57E08-251	738466.75	1009044.50	11.1	1	S	31	between track interp.	6/22/04	1	N	F	2	6/23/04	Al frag	A	<10	F	KB
57E10-159	738464.75	1009314.75	118.7	0		74		6/22/04	0		OS	2	6/23/04	Al scrap	A	<10	G	KB
57E10-247	738457.25	1009425.25	45.5	1	W	32		6/22/04	0.5	W	F	3	6/23/04	Al frag	A	<10	G	KB
57E10-281	738482.75	1009278.75	23.7	0		33		6/22/04	0		F	4	6/23/04	Al frag	A	<10	G	KB
57E12-143	738457.50	1009722.00	41.3	0.5	W	39		6/22/04	0.5	E	F	2	6/23/04	Al frag	A	<10	G	KB
57E12-188	738441.50	1009526.75	25.1	0.5	W	23		6/22/04	0		F	2	6/23/04	Al frag	A	<10	G	KB
57E14-424	738475.25	1009756.25	24.4	0.5	N	26	anom. to W	6/22/04	0		F	1	6/23/04	Al frag	A	<10	G	KB
57E14-470	738451.25	1009766.25	22.4	0		20		6/22/04	0		OS	4	6/23/04	.50 cal links	A	<10	G	KB
57E16-022	738481.25	1010039.75	34.4	0		19		6/22/04	0		F	1	6/23/04	Al frag	A	<10	G	KB
57G04-001	738708.00	1008647.75	1705	0		776		1/19/05	0		S	6	1/20/05	Shovel	A	<10	G	BC
57G04-154	738684.50	1008733.00	56.8	0.5	SE	28		6/22/04	0		F	4	6/22/04	Al frag	A	<10	G	KB
57G04-266	738677.25	1008705.50	20.9	0	NE	24		6/22/04	0		F	4	6/22/04	Al frag	A	<10	G	KB
57G06-243	738546.50	1008825.50	32.5	0.5	N	15		6/22/04	0		F	6	6/22/04	Al frag	A	<10	G	KB
57G06-037	738567.00	1008894.00	180.2	0.5	NE	85		6/22/04	0		OS	3	6/23/04	Al scrap	A	<10	G	KB
57G08-001	738530.00	1009072.25	1367	0		126		1/19/05	0		S	2	1/20/05	rebar	A	<10	G	BC
57G08-003	738536.00	1009059.00	1296	0		192		1/19/05	0		S	1	1/20/05	rebar	A	<10	G	BC
57G08-156	738525.50	1009050.64	33.3	0		36	anom. to SE	6/22/04	0.5	E	OS	1	6/23/04	unidentified ORS	A	<10	G	KB
57G10-002	738504.75	1009276.50	1173	0		93		1/19/05	0		U	3	1/20/05	unkn. bomb, fuzed	A	<10	G	BC
57G10-424	738548.50	1009451.25	22.7	0.5	NE	23		6/22/04	0.5	SW	F	4	6/23/04	Al frag	A	<10	G	KB
57G12-561	738583.50	1009692.00	110.5	0.5	E	64		6/22/04	1	NE	S	12	6/23/04	COE SEED #6	A	<10	G	KB
57G12-711	738585.75	1009695.75	70.6	0.5		38	adj. to 57G12-561	6/22/04			S		6/23/04	same as above	A	<10	G	KB
57G14-497	738696.00	1009990.50	39.6	0		16		6/22/04	0		F	1	6/23/04	Al frag	A	<10	G	KB
57G14-669	738554.75	1009993.25	23.3	0		15		6/22/04	0.5	NE	S	2	6/23/04	construction debris	A	<10	G	KB
57G16-171	738645.75	1010085.25	30.3	0		15		6/22/04	0		F	1	6/23/04	Al frag	A	<10	G	KB
57G16-287	738702.50	1010120.75	16.5	0.5	NW	10		6/22/04	0		F	2	6/23/04	Fe frag	A	<10	G	KB
57I04-001	738756.75	1008663.75	2671	0		276		1/20/05			U	7	1/20/05	105mm proj.	A	<10	G	BC
57I04-002	738784.25	1008747.50	2647	0		176		1/19/05	0.2	W	U	4	1/20/05	75mm proj.	A	<10	G	BC
57I04-003	738774.75	1008648.50	1743	0		140		1/19/05			S	0	1/20/05	Grounding rod	A	<10	G	BC
57I04-004	738799.25	1008701.00	1579	0		227		1/19/05	0.2	W	S	3	1/20/05	Shackle	A	<10	G	BC
57I04-005	738822.00	1008677.00	1361	0		106		1/19/05			U	10	1/20/05	75mm AP shot	A	<10	G	BC
57I04-214	738773.50	1008660.75	41.5	0.5	N	218		6/22/04	0		OS	2	6/22/04	Unident. ORS	A	<10	G	KB
57I04-338	738913.25	1008680.00	14.4	0		11		6/23/04	0.5	E	F	3	6/22/04	Al frag	A	<10	G	KB

Table 4-1
SEAD 57: DGM Anomaly Verification

	DGM SURVEY			REACQUISTION					DIG RESULTS							POST-DIG QC		
Anomaly	Location (ft)		Amp(2)	Location (ft)		Amp(2)			Location (ft)		Type	Depth	Date	Item	Clear	Amp(2)	QC	GP QC
ID(1)	Easting(X)	Northing(Y)	(mV)	Offset	Dir.	(mV)	Comments	Date	Offset	Dir.	Code	(in)		Description	Code	(mV)	Code	Initials
57I06-001	738793.50	1008770.25	2045	0		218		1/19/05	0.5	N	S	2	1/19/05	Construction debris	A	<10	G	BC
57I06-038	738767.50	1008771.25	16.2	0.5	S	17		6/22/04	0.5	W	F	2	6/22/04	Al frag	A	<10	G	KB
57I12-120	738956.50	1009689.25	186.1	0		105		6/23/04	0		F	3	6/23/04	Al frag	A	<10	G	KB
57I12-512	738954.75	1009715.50	23.1	0.5	N	16		6/23/04	1	E	F	2	6/23/04	Al frag	A	<10	G	KB
57I14-015	738817.25	1009924.75	1933	0		179		1/19/05	0.5	S	S	2	1/20/05	Tent peg	A	<10	G	BC
57I14-022	738814.75	1009980.75	1559	0		80		1/19/05	0.2	S	S	2	1/20/05	Bolt	A	<10	G	BC
57I14-163	738861.25	1009779.75	167.3	0.5	W	74		6/22/04	0		F	3	6/23/04	Fe frag	A	<10	G	KB
57I14-291	738862.25	1009783.25	81.7	0		55		6/22/04	1	SW	S	5	6/23/04	COE SEED #7	A	<10	G	KB
57I14-466	738920.25	1009973.25	37.1	0.5	S	21		6/22/04	0		F	2	6/23/04	Fe frag	A	<10	G	KB
57I14-761	738941.50	1009936.25	19	0.5	N	15		6/22/04	0		F	3	6/23/04	Al frag	A	<10	G	KB
57I16-005	738767.38	1010097.33	5378	0		930		1/19/05			S	2	1/20/05	grd rods	A	<10	G	BC
57I16-006	738777.50	1010112.00	2883	0		166		1/19/05	0.5	W	S	4	1/20/05	Bolt	A	<10	G	BC
57I16-008	738978.46	1010071.23	2035	1	N	750		1/19/05			S	2	1/20/05	grd rods	A	<10	G	BC
57I16-009	738773.50	1010110.75	1812	0		580		1/19/05	0.7	E	S	4	1/20/05	Bolt	A	<10	G	BC
57I16-205	738997.75	1010024.75	27.4	0.5	W	19		6/22/04	0		F	2	6/23/04	Fe frag	A	<10	G	KB
57I16-082	738839.00	1010072.25	67.7	0.5	S	26		6/22/04	1	NW	F	3	6/23/04	Fe frag	A	<10	G	KB
57K04-036	739091.00	1008711.00	36.2	0		33		6/23/04	0		F	3	6/23/04	Al frag	A	<10	G	KB
57K04-046	739005.75	1008649.25	28.4	0.5	W	22		6/23/04	0		F	2	6/23/04	Al frag	A	<10	G	KB
57K06-003	739097.50	1008753.00	51.8	1	W	36		6/23/04	0.5	N	S	2	6/23/04	construction debris	A	<10	G	KB
57K12-358	739050.75	1009696.50	40.8	0		29		6/23/04	0		F	2	6/23/04	Al frag	A	<10	G	KB
57K12-447	739177.25	1009720.75	23.6	0.5	N	16		6/23/04	0		F	6	6/23/04	Fe frag	A	<10	G	KB
57K14-258	739102.75	1009767.50	59.8	0		43		6/23/04	0		F	3	6/23/04	Al frag	A	<10	G	KB
57K14-305	739064.00	1009867.00	47.3	0.5	NW	31		6/22/04	1	S	S	4	6/23/04	construction debris	A	<10	G	KB
57K16-176	739091.00	1010008.25	33.8	0		19		6/22/04	1	NE	S	4	6/23/04	construction debris	A	<10	G	KB
57K16-270	739202.25	1010088.50	21.6	0		29		6/22/04	0		F	2	6/23/04	Al frag	A	<10	G	KB
57M06-146	739412.25	1008957.00	15.4	0		7	little or no peak	6/23/04					6/23/04	no contact	D1	<10	F	KB
57M08-011	739422.75	1009240.25	229.4	0		110		6/23/04	0		F	1	6/23/04	Al frag	A	<10	G	KB
57M08-048	739469.25	1009033.25	51.2	0		40		6/23/04	0		F	2	6/23/04	Al frag	A	<10	G	KB
57M10-045	739415.25	1009462.25	53.4	0.5	N	34		6/23/04	0.5	N	F	3	6/23/04	Fe frag	A	<10	G	KB
57M10-063	739485.25	1009344.50	41.6	1.5	NE	27		6/23/04	0		F	2	6/23/04	Al frag	A	<10	G	KB
57M12-422	739451.25	1009695.75	41.2	0		27		6/23/04	0		F	3	6/23/04	Fe frag	A	<10	G	KB
57M12-653	739331.25	1009714.50	16.8	0		6	little or no peak	6/23/04					6/23/04	no contact	D1	<10	F	KB
57M14-198	739355.75	1009990.00	51.4	0		31		6/23/04	0		F	4	6/23/04	Fe frag	A	<10	G	KB
57M14-392	739433.00	1009801.00	21.9	0.5	W	16		6/23/04	0		F	2	6/23/04	Al frag	A	<10	G	KB
57M16-153	739287.25	1010141.00	32.5	1	N	23		6/22/04	0		F	3	6/23/04	Fe frag	A	<10	G	KB
57M16-358	739358.25	1010107.75	10.4	0		6	little or no peak	6/22/04	0		OS	2	6/23/04	small arms ammo	A	<10	G	KB
57O10-100	739530.25	1009441.25	15.2	0		6	little or no peak	6/23/04					6/23/04	no contact	D1	<10	F	KB
57O10-061	739509.25	1009448.50	19.9	0		16		6/23/04	0		F	3	6/23/04	Al frag	A	<10	G	KB
57O12-062	739553.00	1009615.00	20.7	0.5	NE	18		6/23/04	0.5	E	F	2	6/23/04	Al frag	A	<10	G	KB
57O12-097	739517.00	1009703.50	13.9	0		7	little or no peak	6/23/04					6/23/04	no contact	D1	<10	F	KB

Table 4-1
SEAD 57: DGM Anomaly Verification

	DGM SURVEY			REACQUISTION					DIG RESULTS							POST-DIG QC		
Anomaly	Location (ft)		Amp(2)	Location (ft)		Amp(2)			Location (ft)		Type	Depth	Date	Item	Clear.	Amp(2)	QC	GP QC
ID(1)	Easting(X)	Northing(Y)	(mV)	Offset	Dir.	(mV)	Comments	Date	Offset	Dir.	Code	(in)		Description	Code	(mV)	Code	Initials
Type Code: U (UXO), F(frag), OS (ordnance related scrap), S (non-OE scrap), H (hot rock/dirt)																		
Clearance Code: A (response peak has been removed), B (large item has been removed from hole), C (source deeper than 4 feet), D (other - specify)																		
	D1- no contact detected with either Schonstedt or Fisher instruments. E.g. anomaly was within noise or due to surface metal no longer present.																	
QC Code: Agreement between DGM results and Dig results: G (Good), F (Fair), U (Unacceptable).																		
(1) Anomaly ID = Site + Quad ID + anomaly number in review dig list.																		
(2) Sensor coils were 4.5-in lower in the towed array than in the standard wheel configuration. Wheeled single units used for reacquisition/clearance show lower values/peaks.																		
Reported amplitude is the sum of time gates 1-4. Reacquisition and clearance numbers were field "leveled" by operator.																		
(3) Likely surface metal moved by mowing. Only a very low amplitude blip was found in a 3-ft radius during reaquisition. No contact (Schonstedt ot Fisher) was found in dig.																		

Table 4-2
SEAD 57 Mag and Flag Transect in Woods

	Transect ID	Transect Length (ft)	Num. of Flags
East Side	1E	339	0
	2E	339	0
	3E	339	0
	4E	339	0
	5E	272	1
	6E	251	1
	7E	383	1
	8E	405	0
	9E	375	1
	10E	376	2
	11E	375	0
	12E	299	0
	13E	329	0
Wast Side	0W	396	19
	1W	500	13
	2W	500	2
	3W	500	6
	4W	500	5
	5W	500	4
	6W	500	5
	7W	500	3
	8W	500	3
	9W	500	0
	10W	500	1
	11W	500	2
	sub-total	10317	69

	Transect ID	Transect Length (ft)	Num. of Flags
South Side	1S	455	8
	2S	438	11
	3S	432	8
	4S	448	2
	5S	473	2
	6S	460	4
	7S	407	4
	8S	400	3
	9S	278	0
	10S	375	4
	11S	367	3
	12S	315	2
	13S	324	1
	14S	301	0
	15S	325	0
	16S	296	0
	17S	195	0
North Side	1N	43	0
	2N	95	0
	3N	115	1
	4N	123	0
	sub-total	6665	53

SEAD 57 Transect totals

Length	16,982	ft
Area	169,820	sq ft
	3.9	acres
Flag count	122	
Flag density	31.3	flags/acre

Notes:
Transects were 10-foot wide.
Transects were not performed in the SE area which overlaps the EE/CA Demo range.
Schonstedt magnetic gradiometers are only sensitive to ferrous objects.
Schonstedt flag counts likely understate clearance effort where aluminum/brass MEC is present.

Table 4-3
SEAD 57 Quad Clearance Areas (in square feet)

QUAD	DGM AREA	NON-DGM AREAS				TOTAL AREA to CLEAR	EXCLUDED >1000 ft	TOTAL AREA
		NON-SURVEYABLE	SRA	WOODS	<400 ft			
57A06	0	0	0	7,800	0	7,800	54,700	62,500
57A08	0	0	0	23,500	0	23,500	39,000	62,500
57A10	0	0	0	23,500	0	23,500	39,000	62,500
57A12	0	0	0	2,500	0	2,500	60,000	62,500
57C02	0	0	0	2,500	0	2,500	60,000	62,500
57C04	0	0	0	39,100	0	39,100	23,400	62,500
57C06	0	0	0	62,500	0	62,500	0	62,500
57C08	0	0	0	62,500	0	62,500	0	62,500
57C10	0	0	0	62,500	0	62,500	0	62,500
57C12	0	0	47,500	12,500	0	60,000	2,500	62,500
57C14	18,000	0	1,200	0	0	19,200	43,300	62,500
57E02	0	0	0	23,500	0	23,500	39,000	62,500
57E04	2,500	0	0	60,000	0	62,500	0	62,500
57E06	7,900	100	0	54,500	0	62,500	0	62,500
57E08	11,500	0	0	51,000	0	62,500	0	62,500
57E10	14,000	0	0	48,500	0	62,500	0	62,500
57E12	19,500	0	15,600	27,400	0	62,500	0	62,500
57E14	55,500	4,000	1,900	0	0	61,400	1,100	62,500
57E16	7,500	0	0	6,500	0	14,000	48,500	62,500
57G00	0	0	0	15,600	0	15,600	46,900	62,500
57G02	0	0	0	62,500	0	62,500	0	62,500
57G04	34,400	0	0	28,100	0	62,500	0	62,500
57G06	39,100	0	0	0	23,400	62,500	0	62,500
57G08	8,800	0	0	0	53,700	62,500	0	62,500
57G10	15,600	0	0	0	46,900	62,500	0	62,500
57G12	57,100	300	0	0	5,100	62,500	0	62,500
57G14	50,500	10,000	2,000	0	0	62,500	0	62,500
57G16	29,000	1,200	0	14,800	0	45,000	17,500	62,500
57I00	0	0	0	23,500	0	23,500	39,000	62,500
57I02	0	0	0	62,500	0	62,500	0	62,500
57I04	31,000	1,900	0	29,000	600	62,500	0	62,500
57I06	5,500	0	0	0	57,000	62,500	0	62,500
57I08	0	0	0	0	62,500	62,500	0	62,500
57I10	0	0	0	0	62,500	62,500	0	62,500
57I12	30,800	500	0	0	31,200	62,500	0	62,500
57I14	58,000	4,500	0	0	0	62,500	0	62,500
57I16	49,000	8,300	0	200	0	57,500	5,000	62,500
57K00	0	0	0	23,400	0	23,400	39,100	62,500
57K02	0	0	0	62,500	0	62,500	0	62,500
57K04	12,200	800	0	49,000	0	62,000	500	62,500
57K06	500	200	0	6,800	55,000	62,500	0	62,500
57K08	0	0	0	0	62,500	62,500	0	62,500
57K10	0	0	0	0	62,500	62,500	0	62,500
57K12	29,500	1,200	6,000	0	25,800	62,500	0	62,500
57K14	49,000	13,500	0	0	0	62,500	0	62,500
57K16	41,000	14,000	0	0	0	55,000	7,500	62,500
57M00	0	0	0	7,800	0	7,800	54,700	62,500
57M02	0	0	0	60,000	0	60,000	2,500	62,500
57M04	0	0	0	62,500	0	62,500	0	62,500
57M06	8,800	200	0	42,500	11,000	62,500	0	62,500
57M08	23,000	900	0	0	38,600	62,500	0	62,500

Table 4-3
SEAD 57 Quad Clearance Areas (in square feet)

QUAD	DGM AREA	NON-DGM AREAS				TOTAL AREA to CLEAR	EXCLUDED >1000 ft	TOTAL AREA
		NON-SURVEYABLE	SRA	WOODS	<400 ft			
57M10	33,400	100	0	0	29,000	62,500	0	62,500
57M12	46,500	200	15,000	0	800	62,500	0	62,500
57M14	50,000	8,000	0	4,500	0	62,500	0	62,500
57M16	27,500	5,000	0	5,000	0	37,500	25,000	62,500
57O02	0	0	0	30,500	0	30,500	32,000	62,500
57O04	0	0	0	62,500	0	62,500	0	62,500
57O06	0	0	0	62,500	0	62,500	0	62,500
57O08	0	0	0	62,500	0	62,500	0	62,500
57O10	14,000	300	0	48,200	0	62,500	0	62,500
57O12	12,500	0	0	50,000	0	62,500	0	62,500
57O14	0	15,000	0	40,000	0	55,000	7,500	62,500
57O16	0	0	0	6,500	0	6,500	56,000	62,500
57Q04	0	0	0	23,500	0	23,500	39,000	62,500
57Q06	0	0	0	50,800	0	50,800	11,700	62,500
57Q08	0	0	0	62,500	0	62,500	0	62,500
57Q10	0	0	0	60,000	0	60,000	2,500	62,500
57Q12	0	0	0	41,200	0	41,200	21,300	62,500
57Q14	0	2,000	0	6,000	0	8,000	54,500	62,500
57S08	0	0	0	4,000	0	4,000	58,500	62,500
57S10	0	0	0	1,500	0	1,500	61,000	62,500
Sq Ft	893,100	92,200	89,200	1,742,700	628,100	3,445,300	992,200	4,437,500
Acres	20.50	2.12	2.05	40.01	14.42	79.09	22.78	101.87

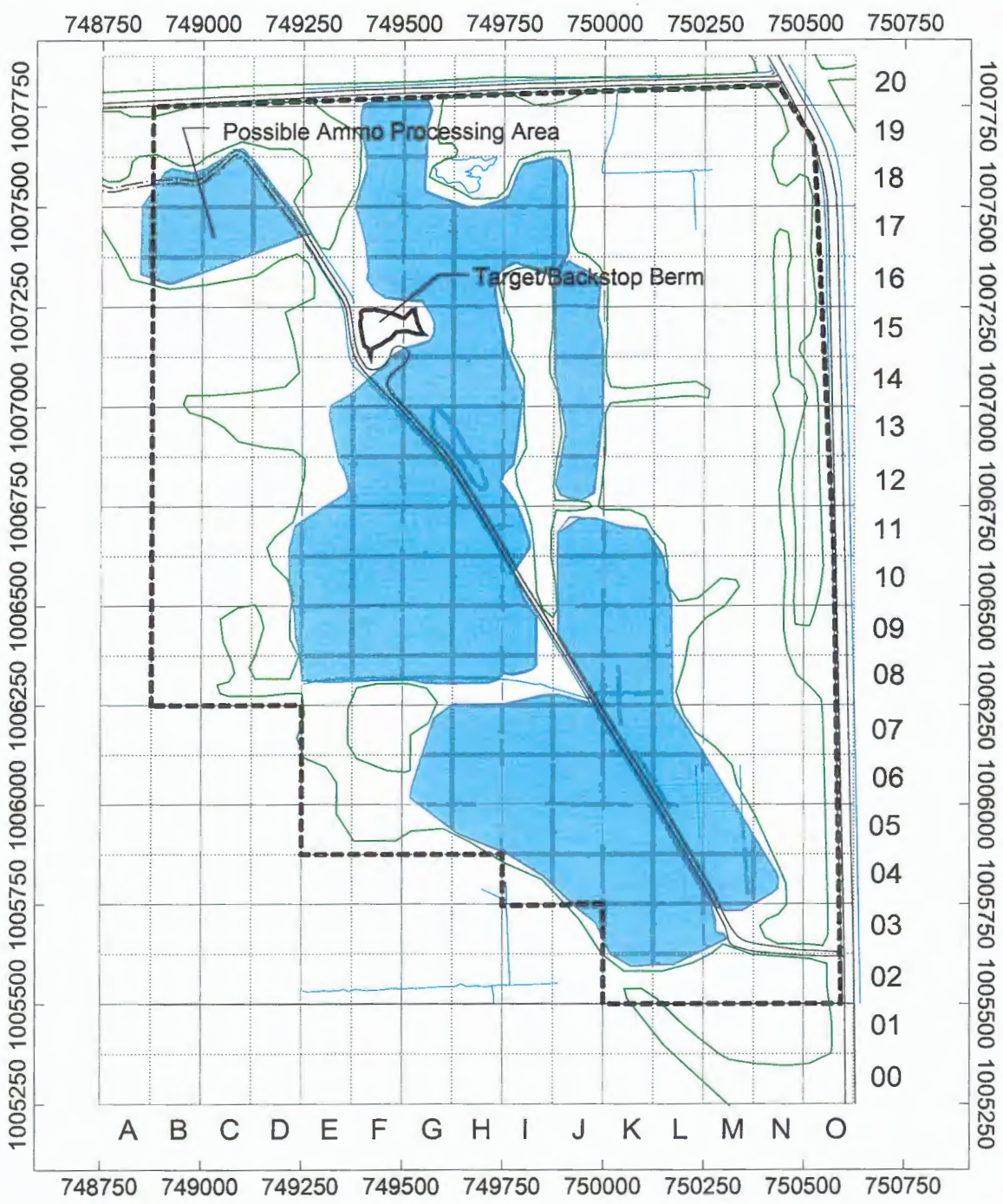
Notes:
Non-surveyable areas were inacessible to the towed array, due to trees, terrain, buildings, etc.
SRA= Saturated response area.
Each quad is 250x250-ft = 62,500 square feet = 1.43 acres.
Small part of the 1000-ft boundary in 57C12 was extended to include the western end of a SRA.
<400 is within 400-ft of the EOD demo berm. >1000 is outside of the 1000-ft radius from the EOD demo berm.

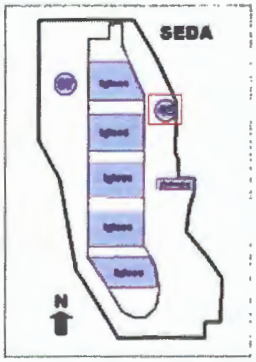
Table 4-4
DGM Anomaly Amplitude Analysis
SEAD 57

QUAD	DGM Anomaly Counts at Various Cut Lines (mV) >=10	>=20	>=30	>=40	>=50	>=100	>=1000	DGM Coverage Sq ft	Acres	Anomaly/Acre (40mV cutline)
57C12	0	0	0	0	0	0	0	0	0	N/A
57C14	286	190	139	110	93	55	6	18,000	0.41	266
57E04	7	4	4	2	1	1	0	2,500	0.06	35
57E06	61	39	24	16	15	10	0	7,900	0.18	88
57E08	245	215	201	190	183	152	0	11,500	0.26	720
57E10	337	291	265	250	240	189	0	14,000	0.32	778
57E12	307	216	163	140	131	90	0	19,500	0.45	313
57E14	913	525	343	267	208	116	13	55,500	1.27	210
57E16	62	30	23	18	13	10	0	7,500	0.17	105
57G04	334	257	220	186	154	91	1	34,400	0.79	236
57G06	435	325	254	195	169	98	0	39,100	0.90	217
57G08	177	161	150	139	135	111	3	8,800	0.20	688
57G10	464	407	381	358	303	277	2	15,600	0.36	1000
57G12	1215	991	887	809	756	584	9	57,100	1.31	617
57G14	1007	705	552	470	420	273	51	50,500	1.16	405
57G16	389	236	170	127	109	76	15	29,000	0.67	191
57I04	404	289	247	210	191	119	6	31,000	0.71	295
57I06	42	31	24	21	19	12	1	5,500	0.13	166
57I12	643	524	445	394	363	270	8	30,800	0.71	557
57I14	1033	681	491	405	351	230	21	58,000	1.33	304
57I16	603	276	178	135	97	49	12	49,000	1.12	120
57K04	91	57	39	26	21	12	0	12,200	0.28	93
57K06	3	2	1	1	1	0	0	500	0.01	87
57K12	423	278	221	184	149	89	2	29,500	0.68	272
57K14	785	503	377	302	252	147	15	49,000	1.12	268
57K16	491	281	189	154	126	86	17	41,000	0.94	164
57M06	255	98	34	19	14	9	0	8,800	0.20	94
57M08	390	152	85	55	44	26	0	23,000	0.53	104
57M10	511	165	90	65	46	27	5	33,400	0.77	85
57M12	656	292	206	170	146	92	17	46,500	1.07	159
57M14	614	376	248	192	151	80	19	50,000	1.15	167
57M16	344	219	158	124	101	56	5	27,500	0.63	196
57O10	193	61	34	23	16	9	0	14,000	0.32	72
57O12	137	58	32	29	26	18	3	12,500	0.29	101
TOTAL	13,857	8,935	6,875	5,786	5,044	3,464	231	893,100	20.50	282

Notes:
Saturated response areas are excluded from the totals and calculations.
All DGM coverage of 57C12 is SRA. No individual targets were selected.

FIGURES





Scale 1:5000

250 0 250

US survey foot

NAD83 / NY CS83 Central Zone

Legend

Road

Drainage

Site Boundary

Approx. treeline

Figure 3-1

Site Map
SEAD 46

12 August 04

Shaw

Shaw E & I, Inc.

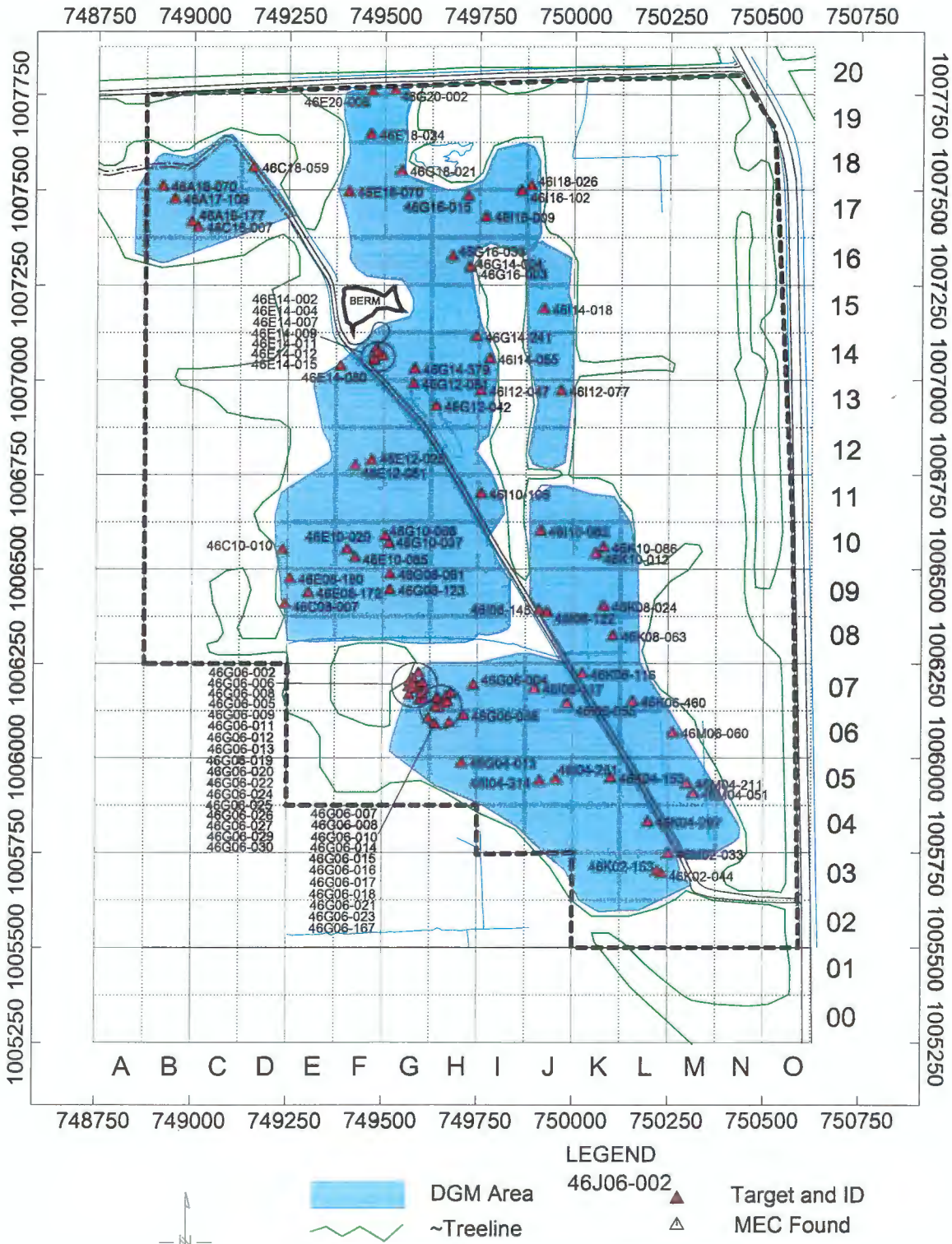
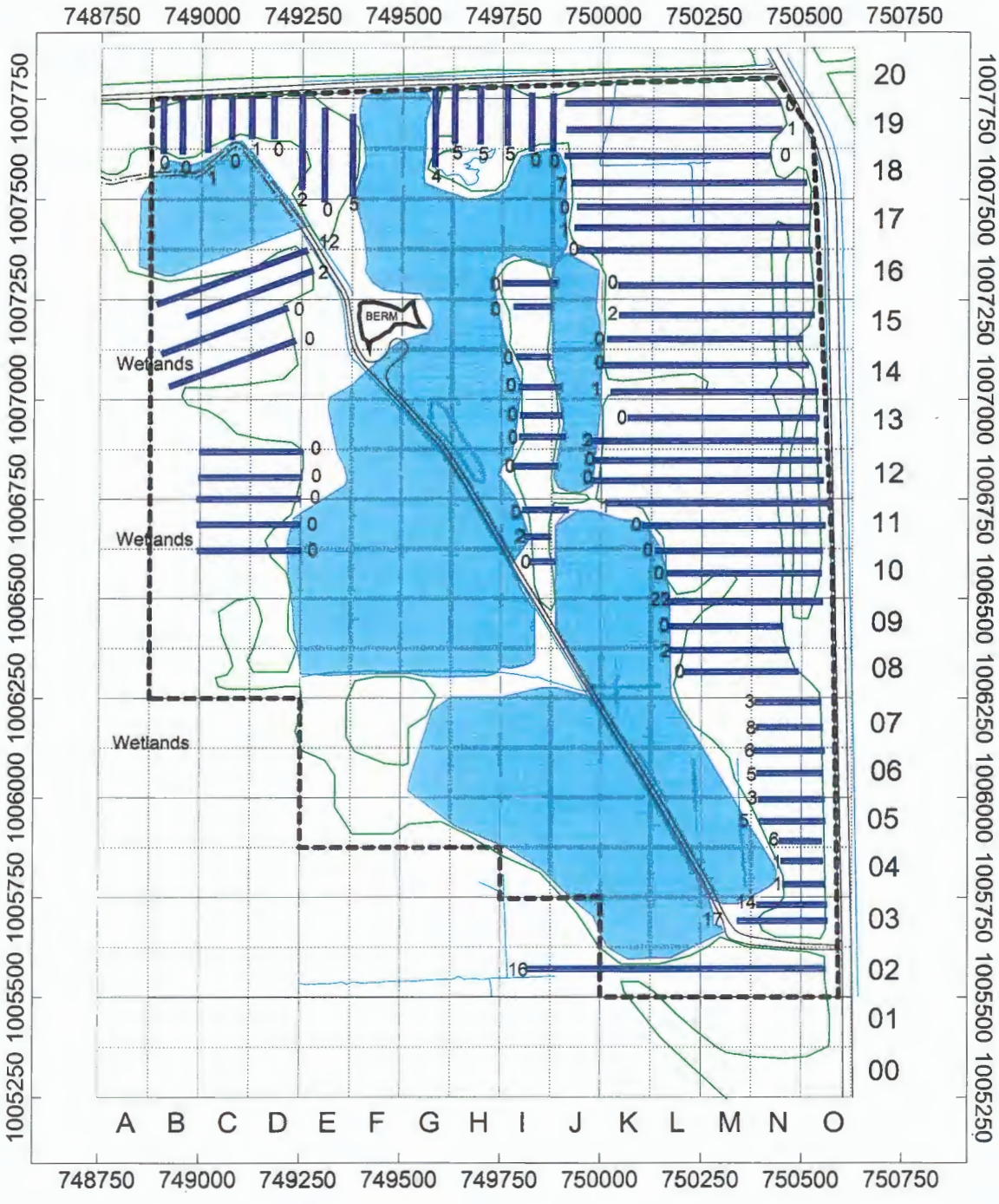


Figure 3-2

DGM Anomaly Verification Targets
SEAD 46

28 March 05



LEGEND

DGM Area

~Treeline

4 Schonstedt Mag & Flag Anomaly Counts On 10-ft Transects Through Woods

N

Scale 1:5000

250 0 250

US survey foot

NAD83 / NY CS83 Central Zone

Shaw

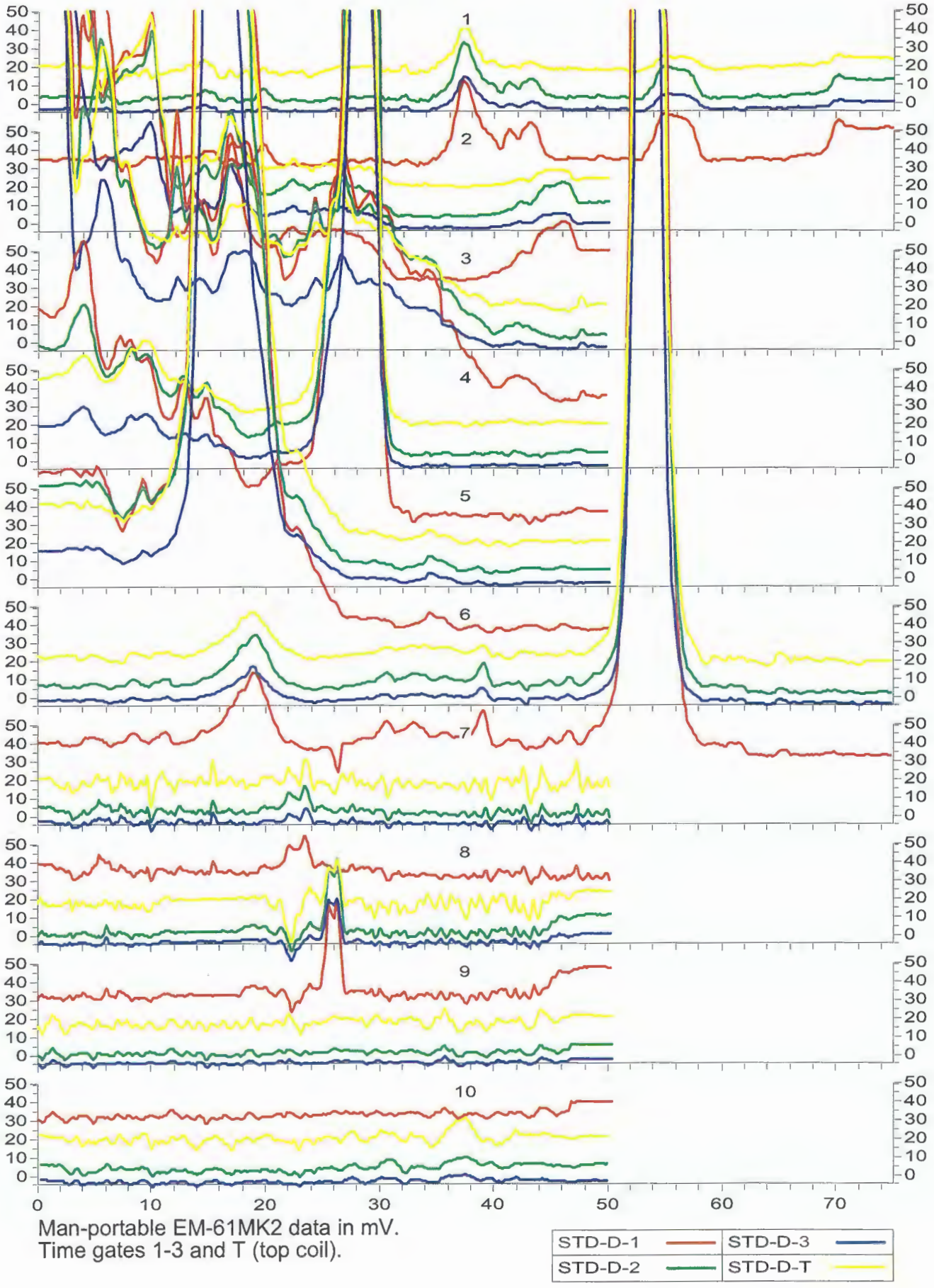
Shaw E & I, Inc.

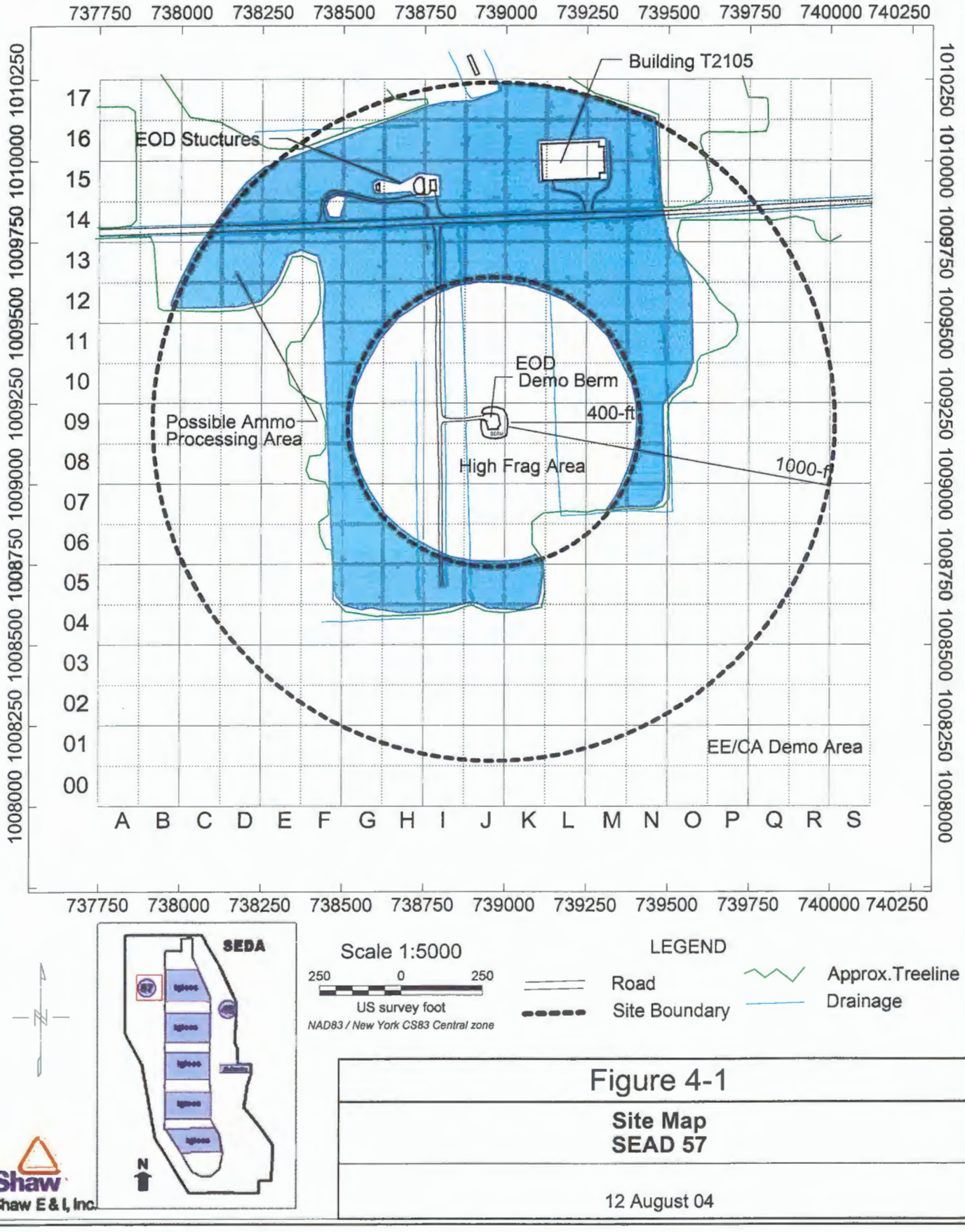
Figure 3-3

Mag & Flag Transects in Woods SEAD 46

12 August 04

Figure 3-4: SEAD 46 Berm Screening Transects:



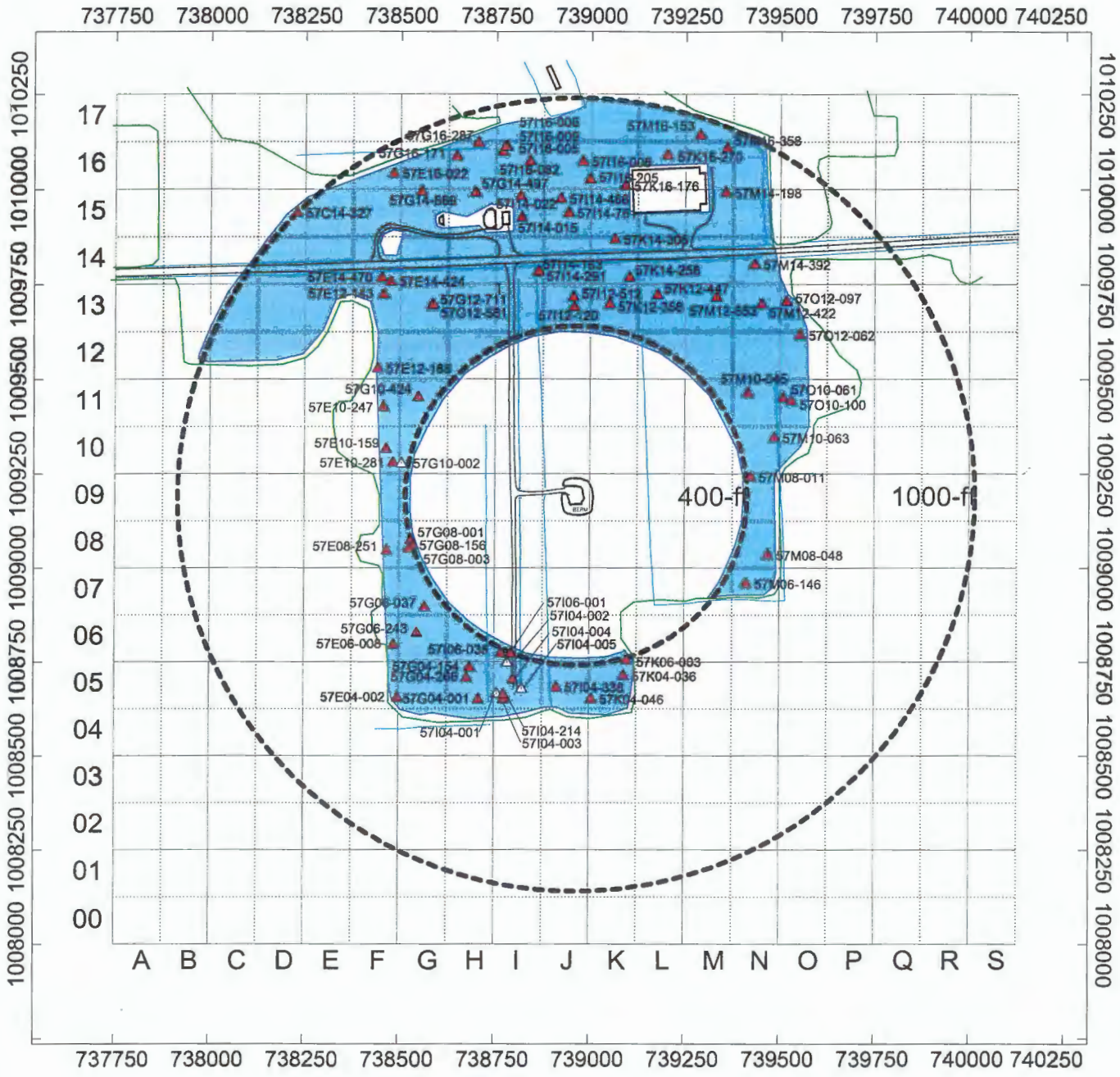


Shaw
Shaw E & I, Inc.

Figure 4-1

Site Map
SEAD 57

12 August 04



Legend

DGM Area

57I06-146 Target and ID

MEC Found

Scale 1:5000

250 0 250

US survey foot

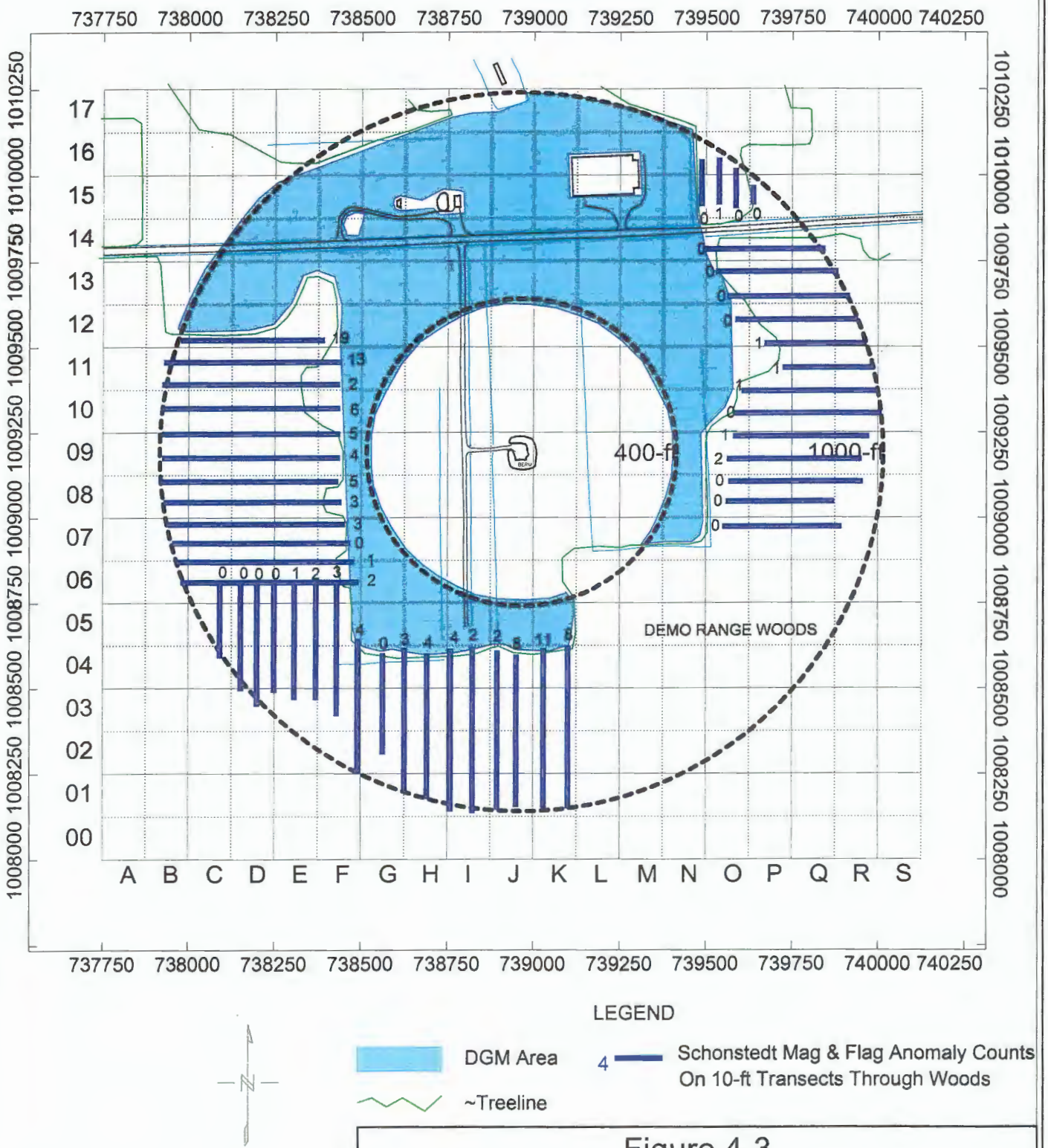
NAD83 / New York CS83 Central zone

Shaw E & I, Inc.

Figure 4-2

DGM Anomaly Verification Targets SEAD 57

28 March 05



LEGEND

DGM Area

~Treeline

4 Schonstedt Mag & Flag Anomaly Counts On 10-ft Transects Through Woods

N

Scale 1:5000

250 0 250

US survey foot

NAD83 / New York CS83 Central zone

Shaw

Shaw E & I, Inc.

Figure 4-3

Mag & Flag Transects in Woods SEAD 57

12 August 04

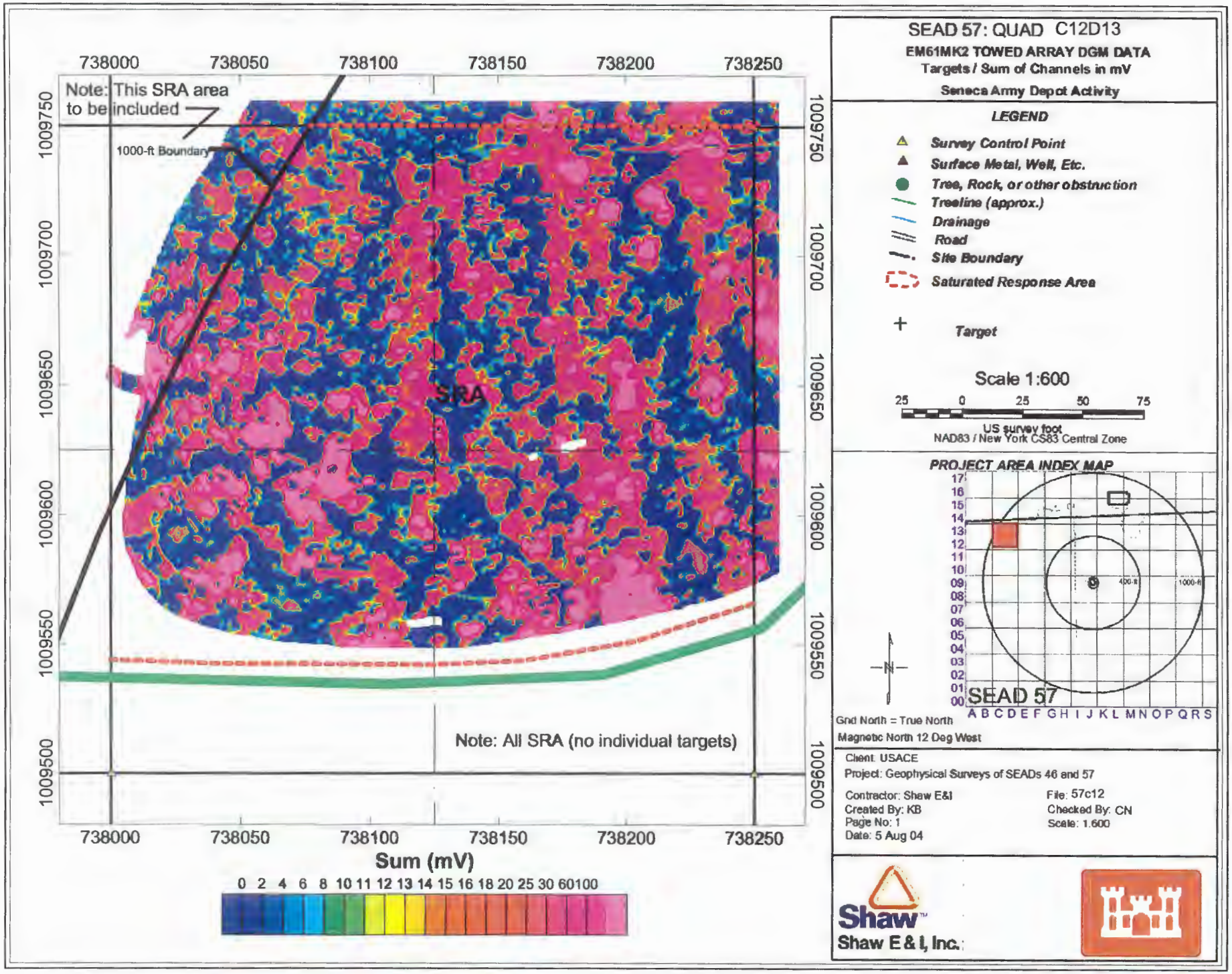
PLATES

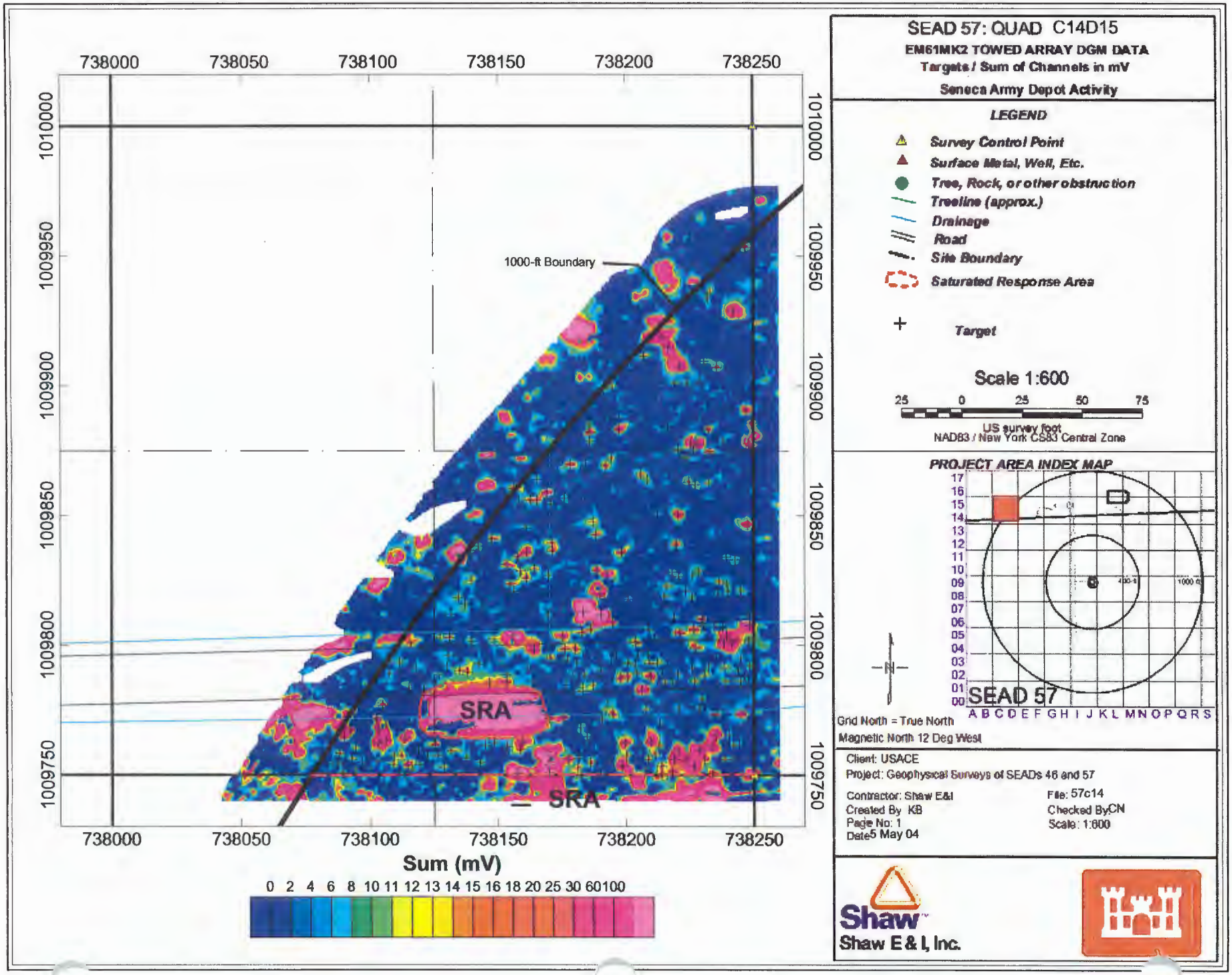
APPENDIX A

DATA CD-ROMs

APPENDIX B

SEAD 46 Quad Maps
Geophysical Survey Results


SEAD 57: QUAD C12D13
EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity
738000
738050
738100
738150
738200
738250
1009750
1009700
1009650
1009600
1009550
1009500
Note: This SRA area to be included
1000-ft Boundary
SRA
Note: All SRA (no individual targets)
Sum (mV)
0 2 4 6 8 10 11 12 13 14 15 16 18 20 25 30 60100
LEGEND
Survey Control Point
Surface Metal, Well, Etc.
Tree, Rock, or other obstruction
Treeline (approx.)
Drainage
Road
Site Boundary
Saturated Response Area
Target
Scale 1:600
25 0 25 50 75
US survey foot
NAD83 / New York CS83 Central Zone
PROJECT AREA INDEX MAP
SEAD 57
Grid North = True North
Magnetic North 12 Deg West
Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57
Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 5 Aug 04
File: 57c12
Checked By: CN
Scale: 1:600
Shaw
Shaw E & I, Inc.


SEAD 57: QUAD C14D15
EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity
LEGEND
Survey Control Point
Surface Metal, Well, Etc.
Tree, Rock, or other obstruction
Treeline (approx.)
Drainage
Road
Site Boundary
Saturated Response Area
Target
Scale 1:600
25 0 25 50 75
US survey foot
NAD83 / New York CS83 Central Zone
PROJECT AREA INDEX MAP
SEAD 57
Grid North = True North
Magnetic North 12 Deg West
738000 738050 738100 738150 738200 738250
1010000 1009950 1009900 1009850 1009800 1009750
1000-ft Boundary
SRA
SRA
Sum (mV)
0 2 4 6 8 10 11 12 13 14 15 16 18 20 25 30 60 100
Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57
Contractor: Shaw E&I
Created By KB
Page No: 1
Date 5 May 04
File: 57c14
Checked By CN
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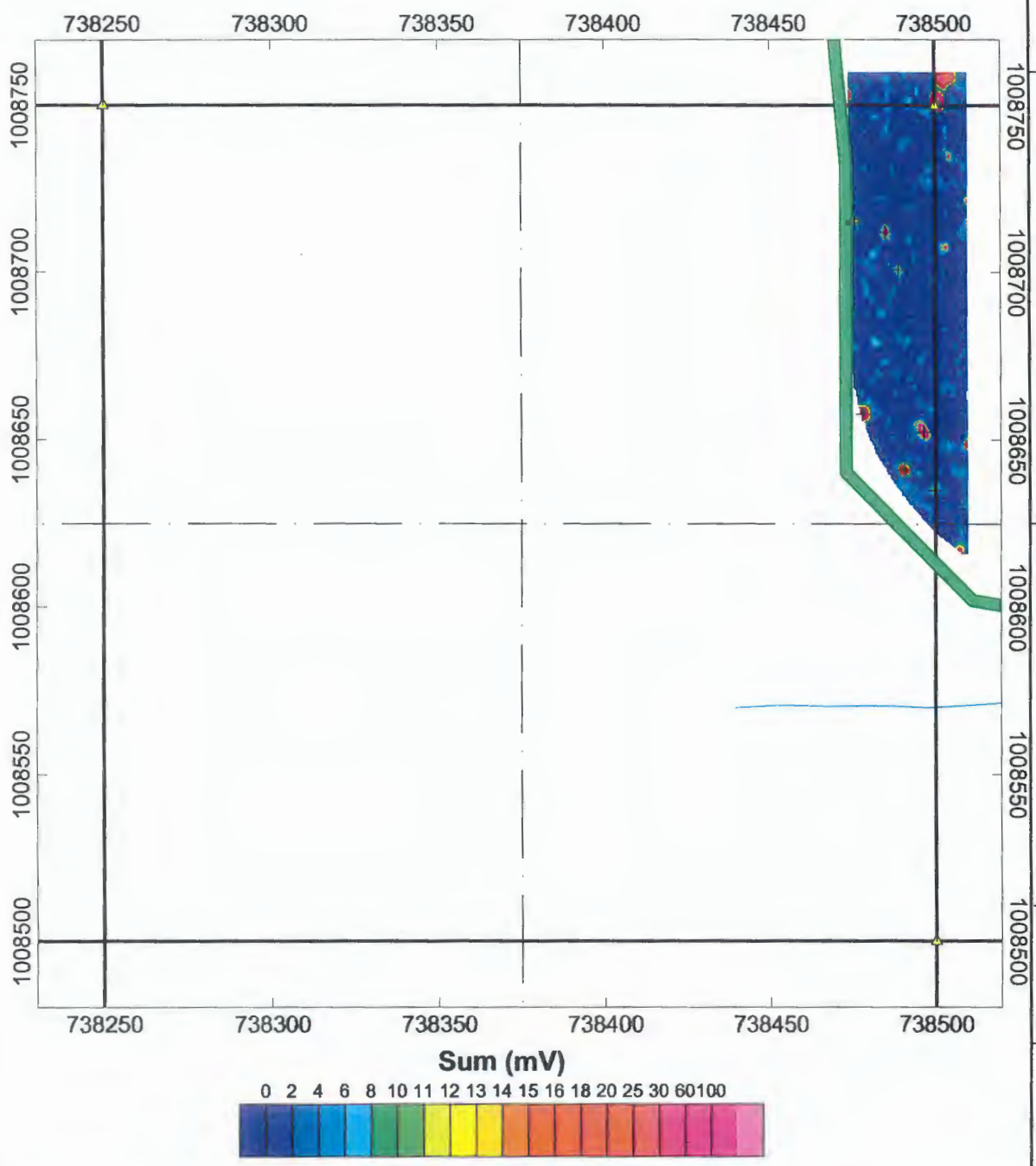
Shaw
Shaw E & I, Inc.



SEAD 57: QUAD E04F05

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

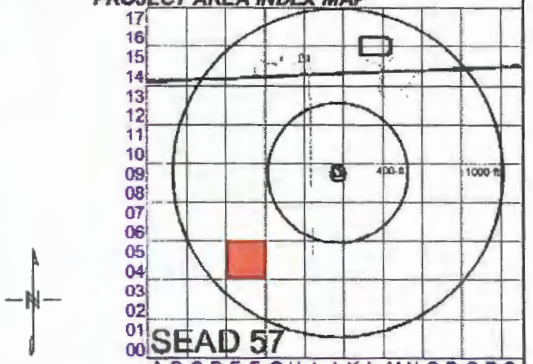
- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP



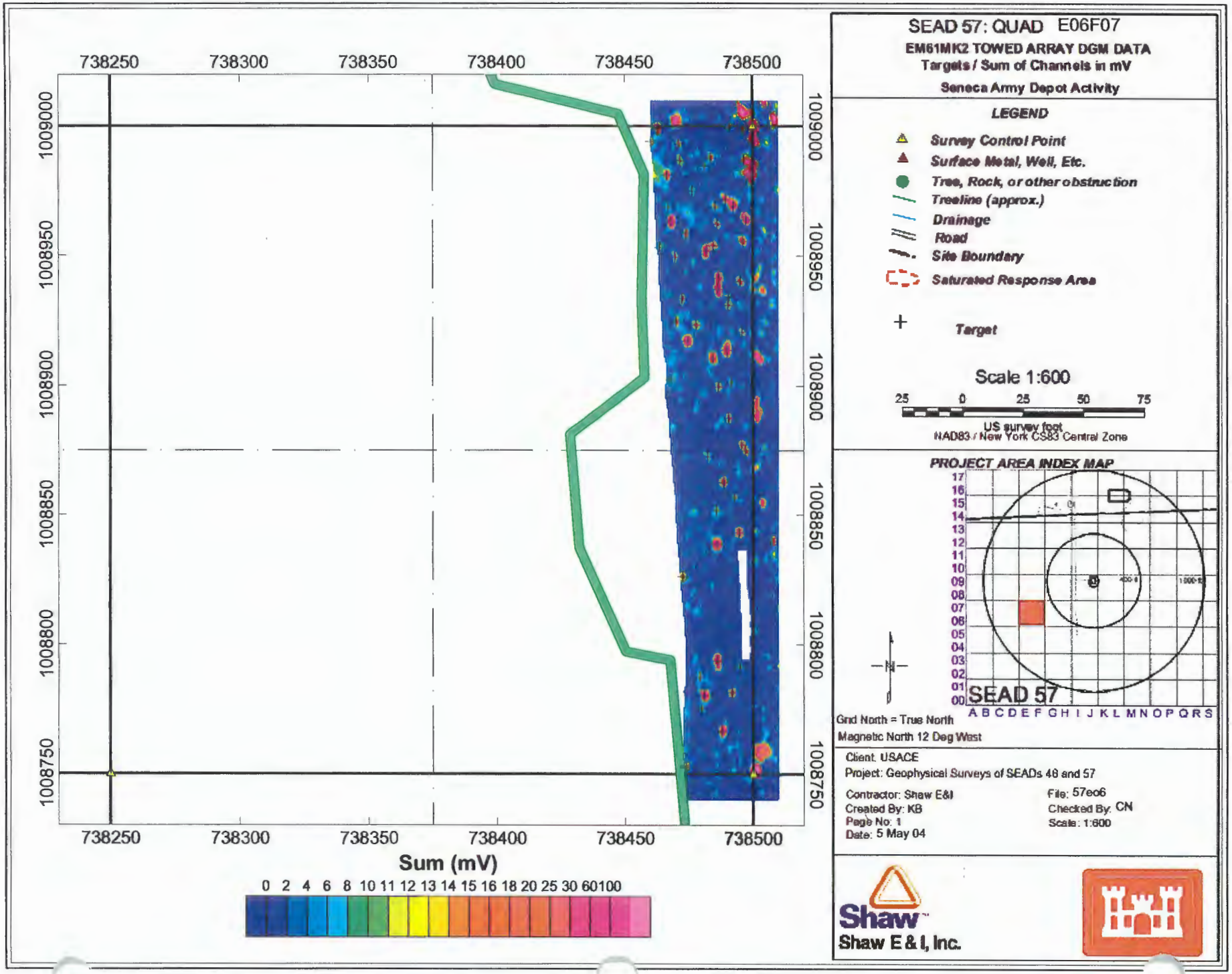
Grid North = True North
Magnetic North 12 Deg West

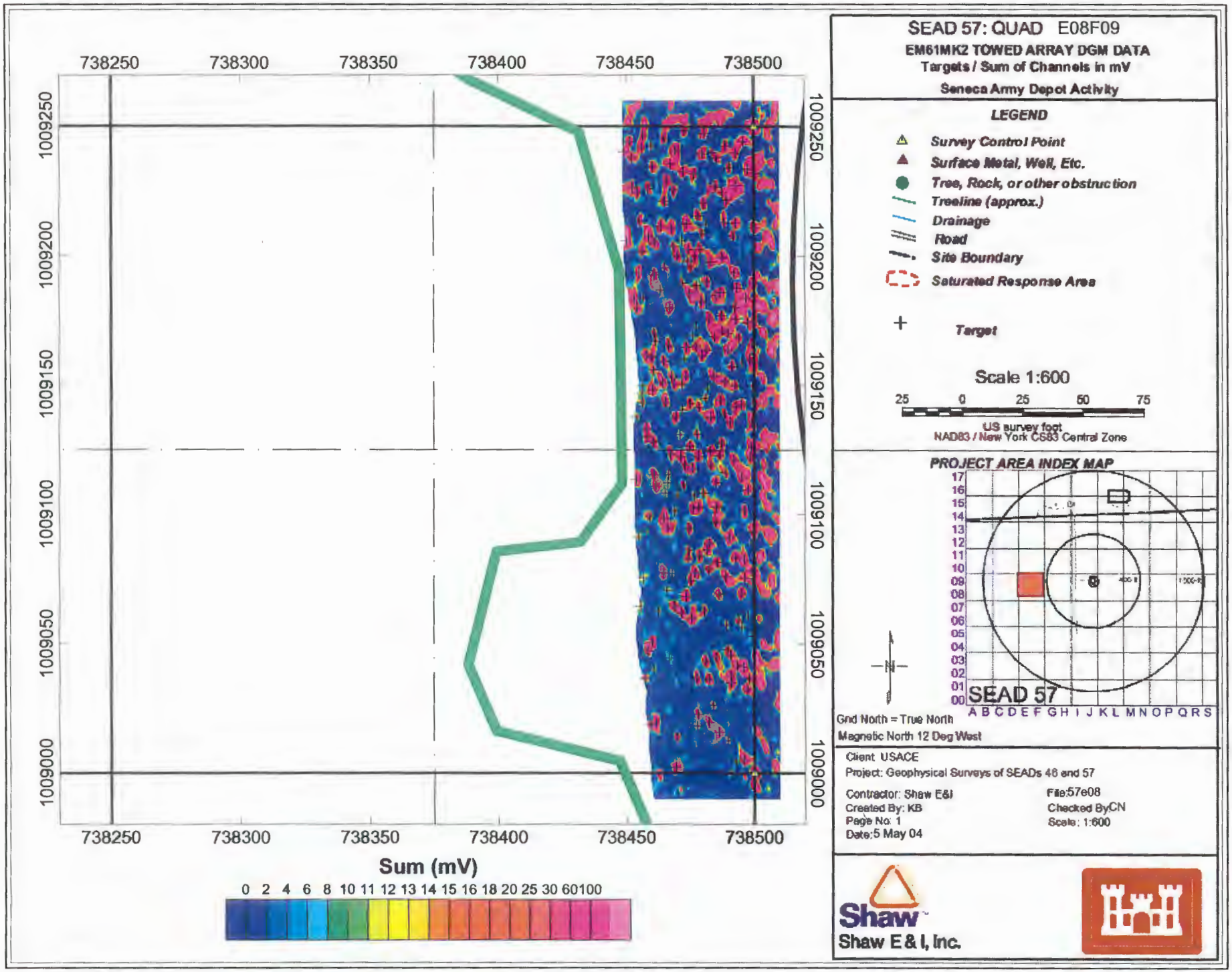
Client USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 5 May 04

File: 57e04
Checked By: CN
Scale: 1:600

Shaw™
Shaw E & I, Inc.


738250
738300
738350
738400
738450
738500
1009000
1008950
1008900
1008850
1008800
1008750
Sum (mV)
0 2 4 6 8 10 11 12 13 14 15 16 18 20 25 30 60100
SEAD 57: QUAD E06F07
EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity
LEGEND
Survey Control Point
Surface Metal, Well, Etc.
Tree, Rock, or other obstruction
Treeline (approx.)
Drainage
Road
Site Boundary
Saturated Response Area
Target
Scale 1:600
25 0 25 50 75
US survey foot
NAD83 / New York CS83 Central Zone
PROJECT AREA INDEX MAP
SEAD 57
Grid North = True North
Magnetic North 12 Deg West
Client: USACE
Project: Geophysical Surveys of SEADs 48 and 57
Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 5 May 04
File: 57eo6
Checked By: CN
Scale: 1:600
Shaw
Shaw E & I, Inc.



SEAD 57: QUAD E08F09

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP

Grid North = True North
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 5 May 04

File: 57e08
Checked By: CN
Scale: 1:600

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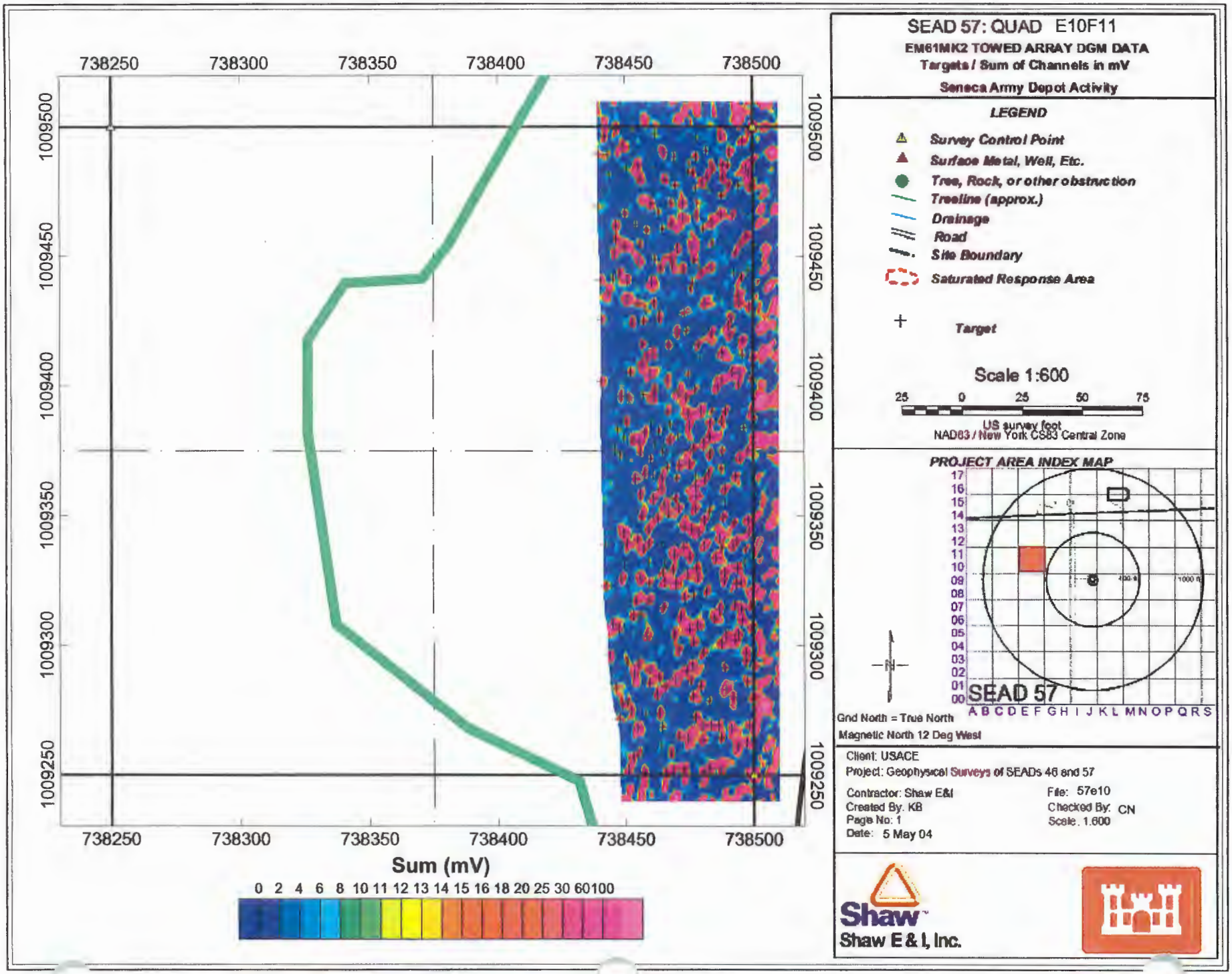
Shaw E & I, Inc.



SEAD 57: QUAD E10F11

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP

Grid North = True North
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 5 May 04

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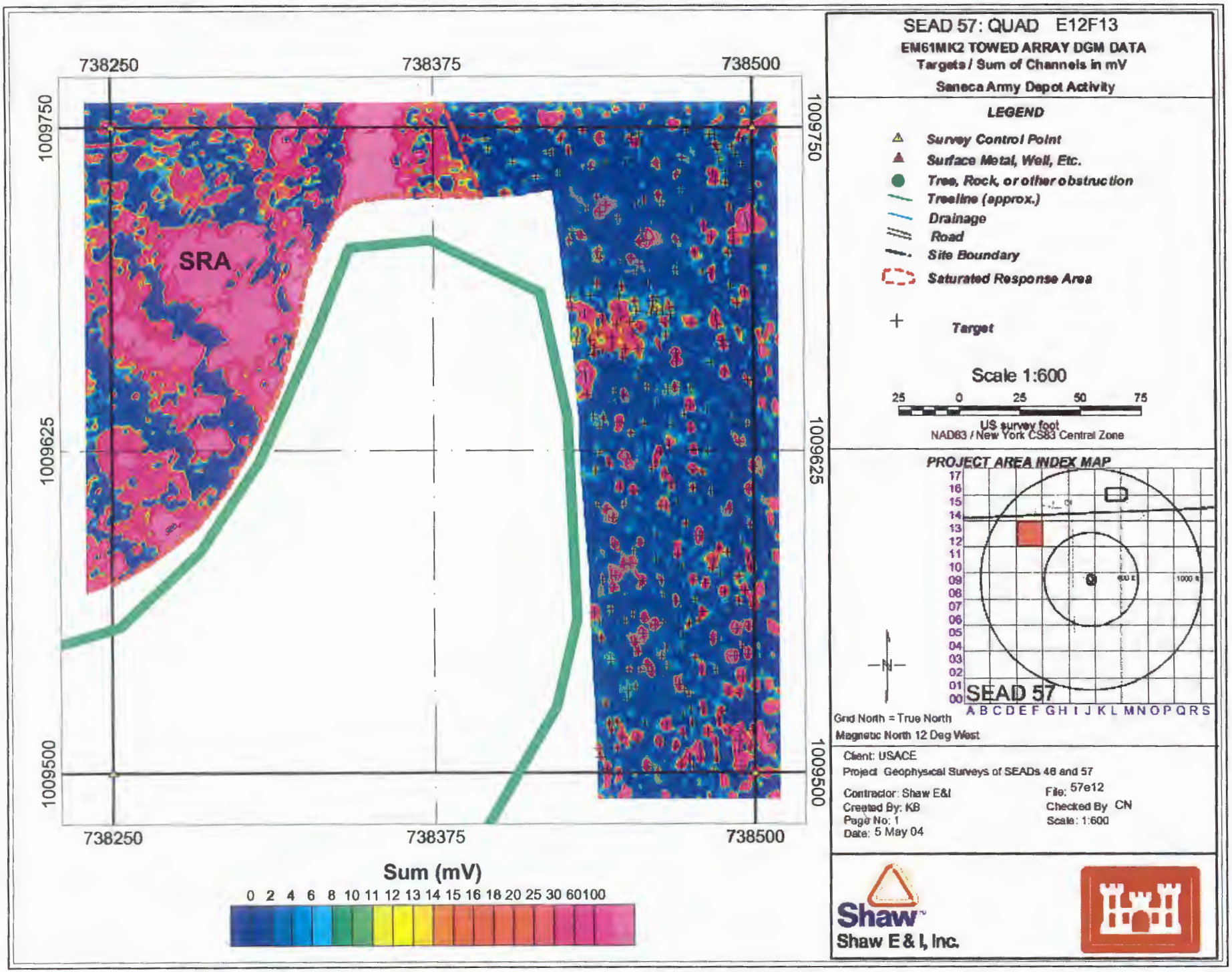
Checked By: CN
Scale: 1:600

Shaw™
Shaw E & I, Inc.



SEAD 57: QUAD E12F13

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP

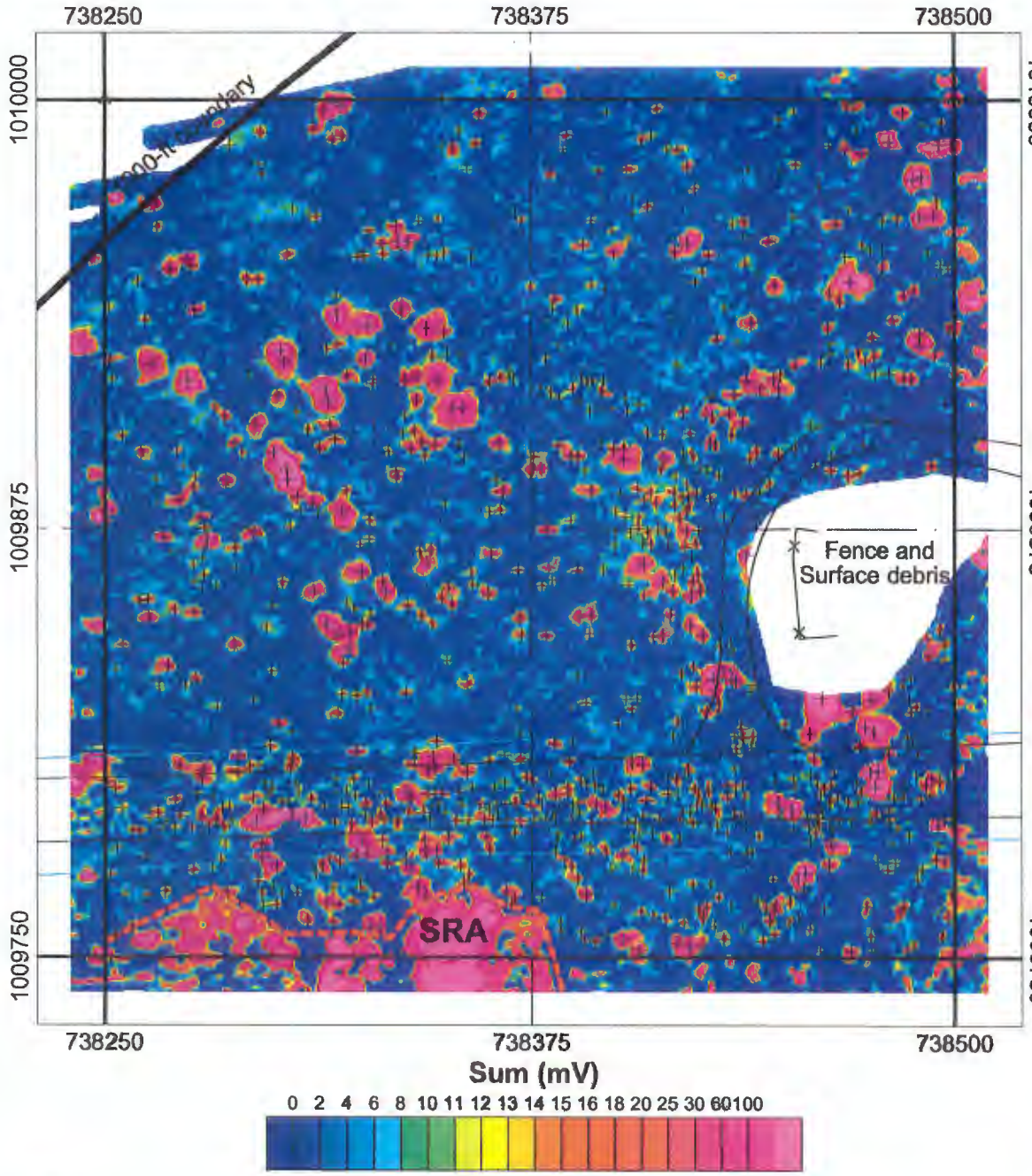
Grid North = True North
Magnetic North 12 Deg West

Client: USACE
Project Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 5 May 04

File: 57e12
Checked By CN
Scale: 1:600

Shaw
Shaw E & I, Inc.



SEAD 57: QUAD E14F15

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

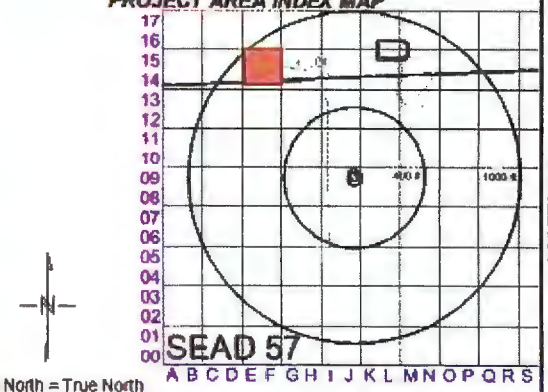
- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP



Grid North = True North
Magnetic North 12 Deg West

Client: USACE
Project Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 5 May 04

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Checked By CN
Scale: 1:600

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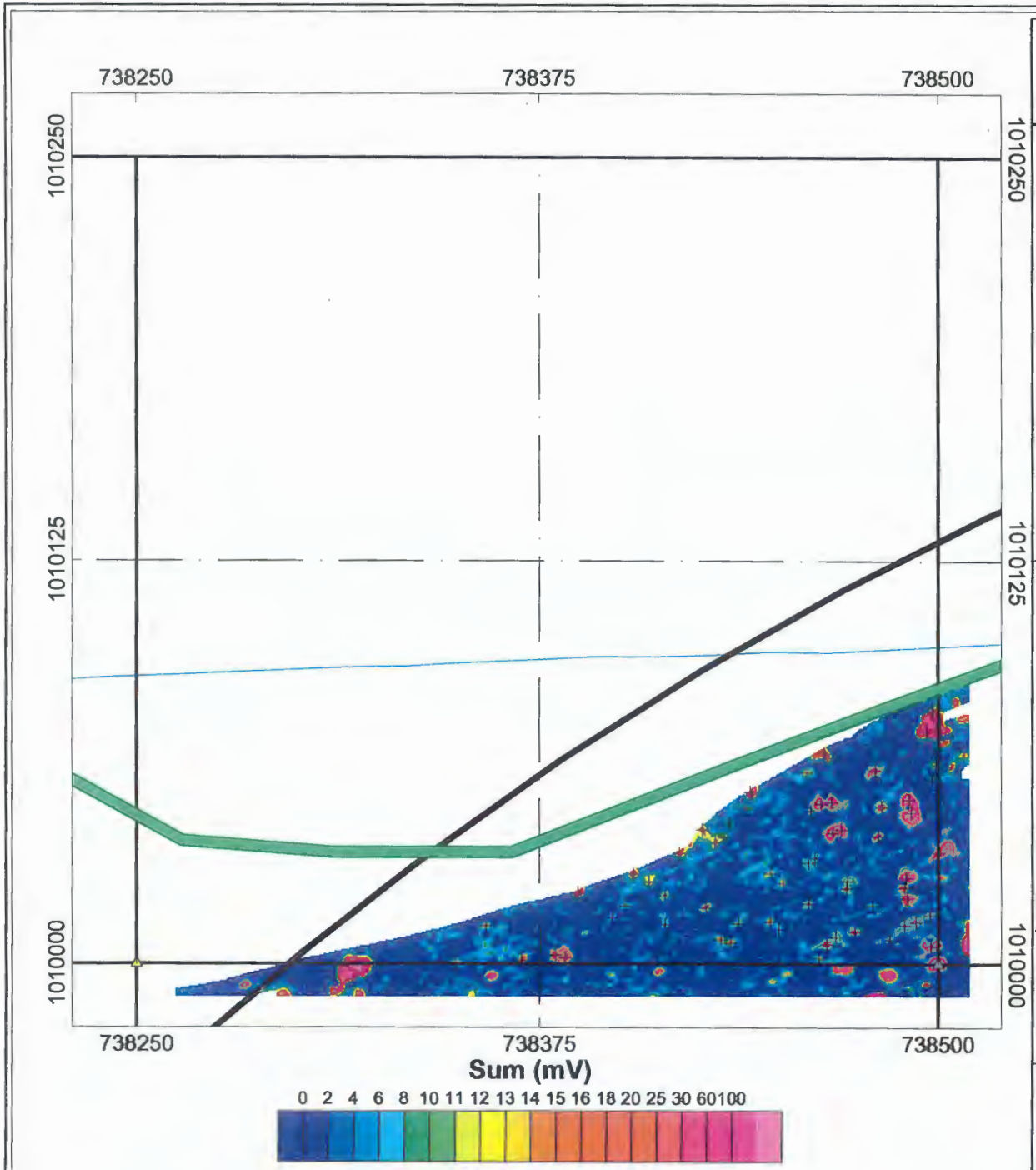
Shaw E & I, Inc.



SEAD 57: QUAD E16F17

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

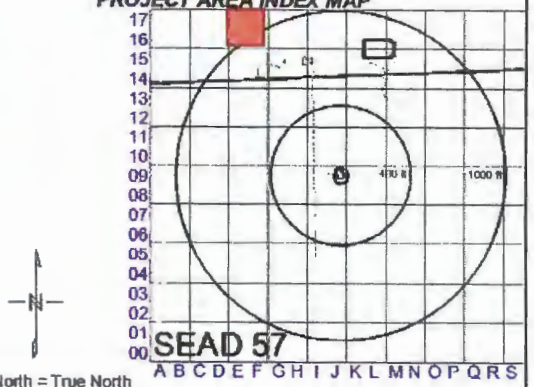
- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- \+ *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP



Grid North = True North
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 6 May 04

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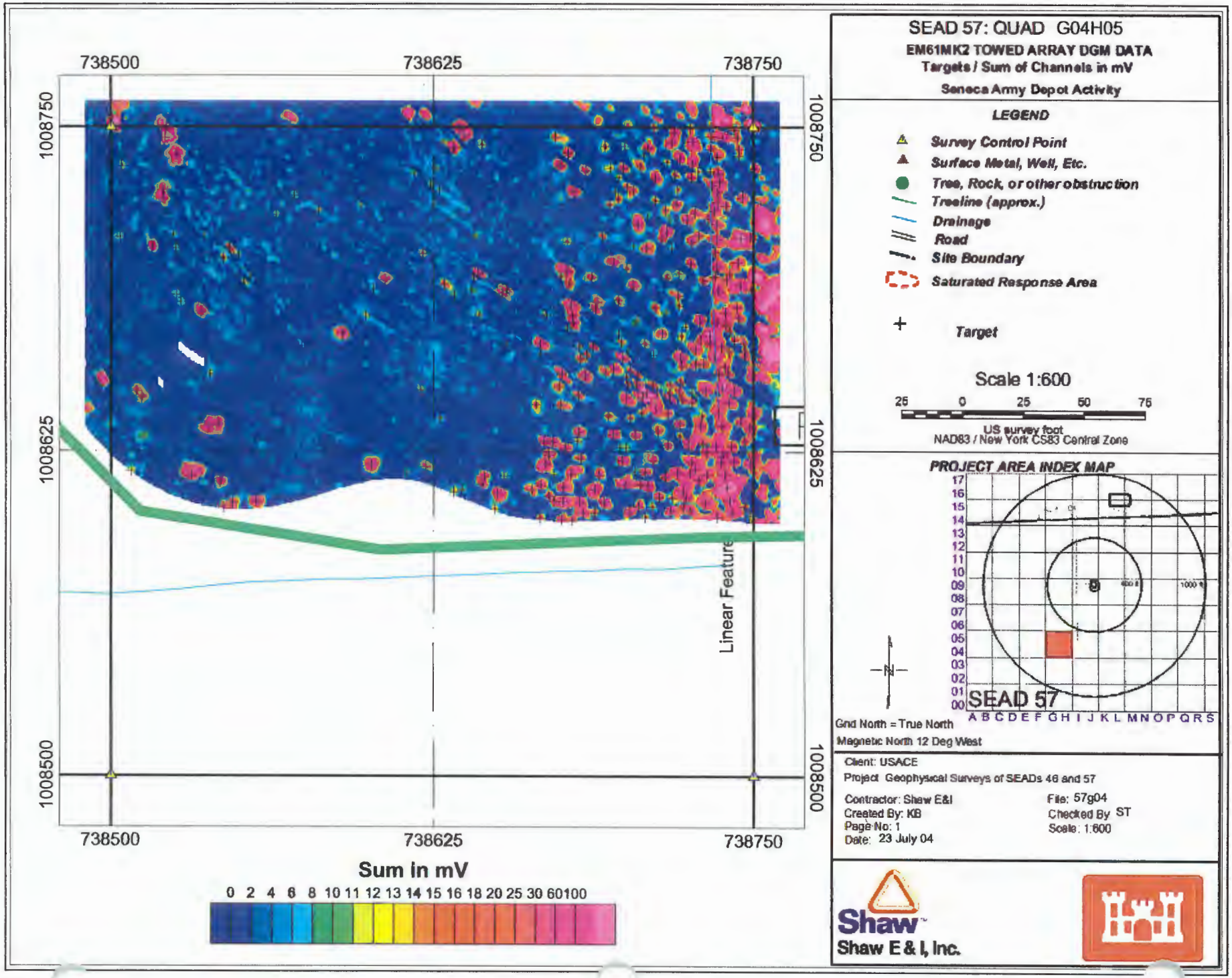
Checked By: CN
Scale: 1:600

Shaw™
Shaw E & I, Inc.



SEAD 57: QUAD G04H05

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- \+ *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP

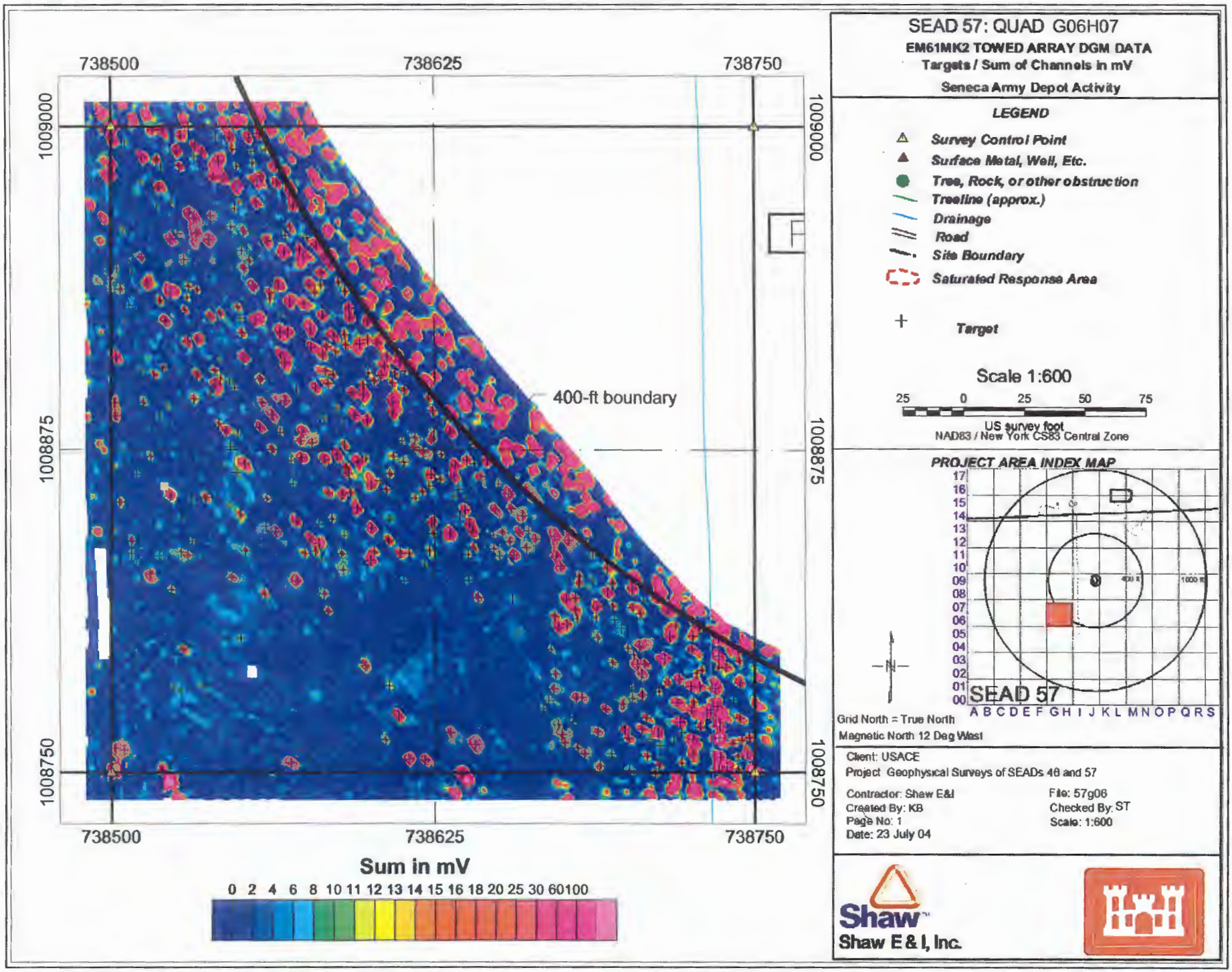
Grid North = True North
Magnetic North 12 Deg West

Client: USACE
Project Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 23 July 04

File: 57g04
Checked By ST
Scale: 1:600

Shaw™
Shaw E & I, Inc.



SEAD 57: QUAD G06H07

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP

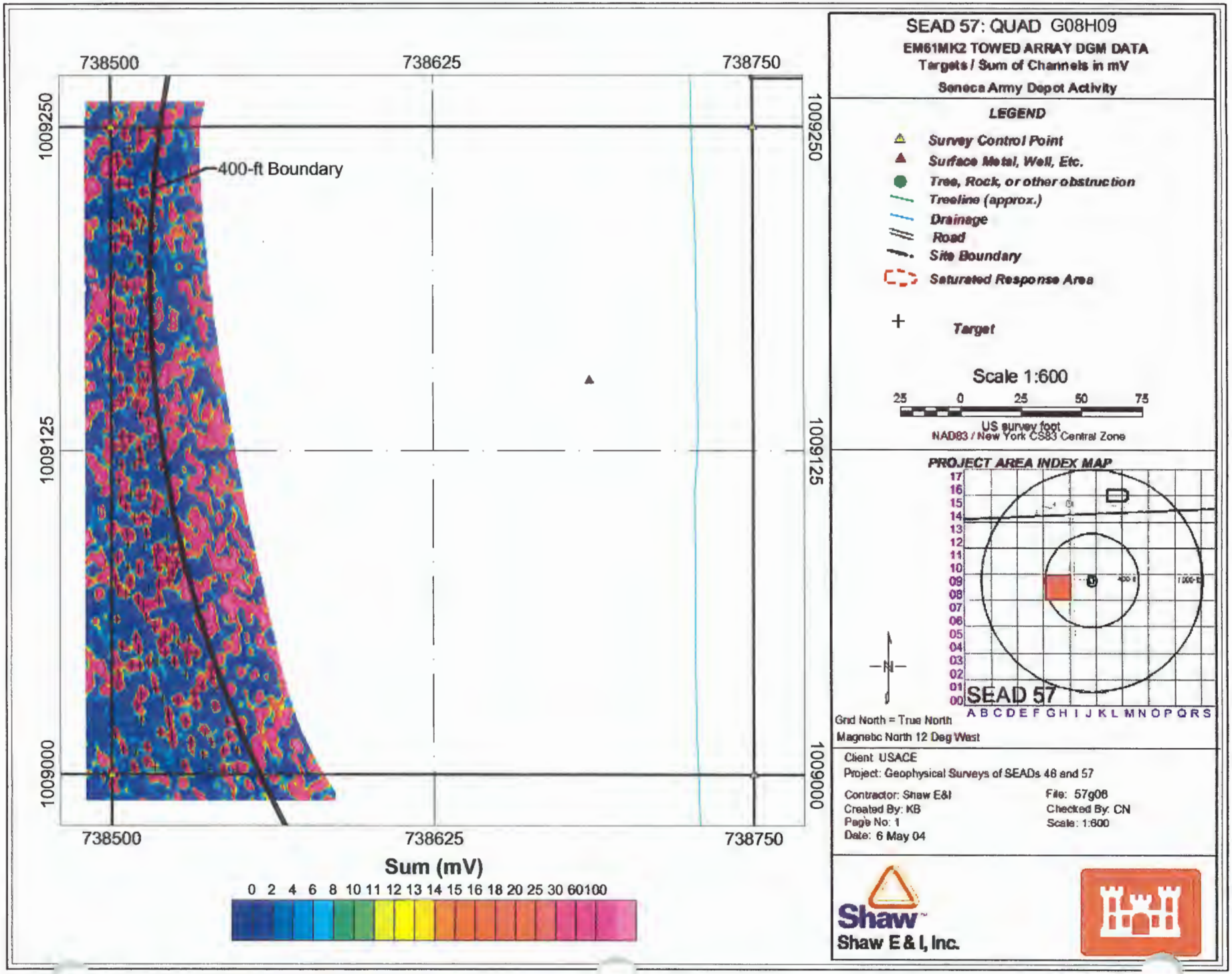
Grid North = True North
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 48 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 23 July 04

File: 57g06
Checked By: ST
Scale: 1:600

Shaw™
Shaw E & I, Inc.



SEAD 57: QUAD G08H09

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV

Seneca Army Depot Activity

LEGEND

- Survey Control Point
- Surface Metal, Well, Etc.
- Tree, Rock, or other obstruction
- Treeline (approx.)
- Drainage
- Road
- Site Boundary
- Saturated Response Area
- Target

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP

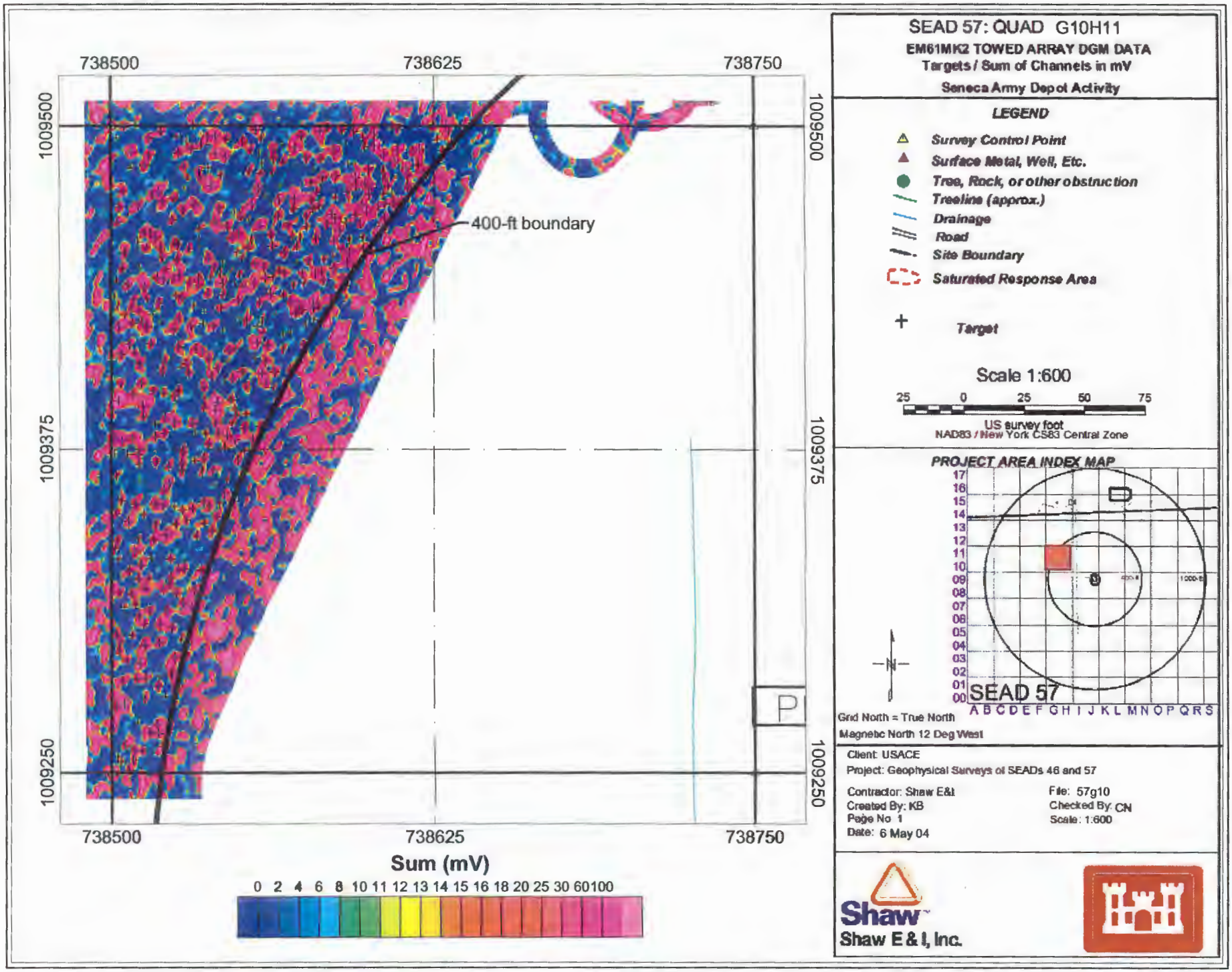
Grid North = True North
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 6 May 04

File: 57g08
Checked By: CN
Scale: 1:600

Shaw
Shaw E & I, Inc.



SEAD 57: QUAD G10H11

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP

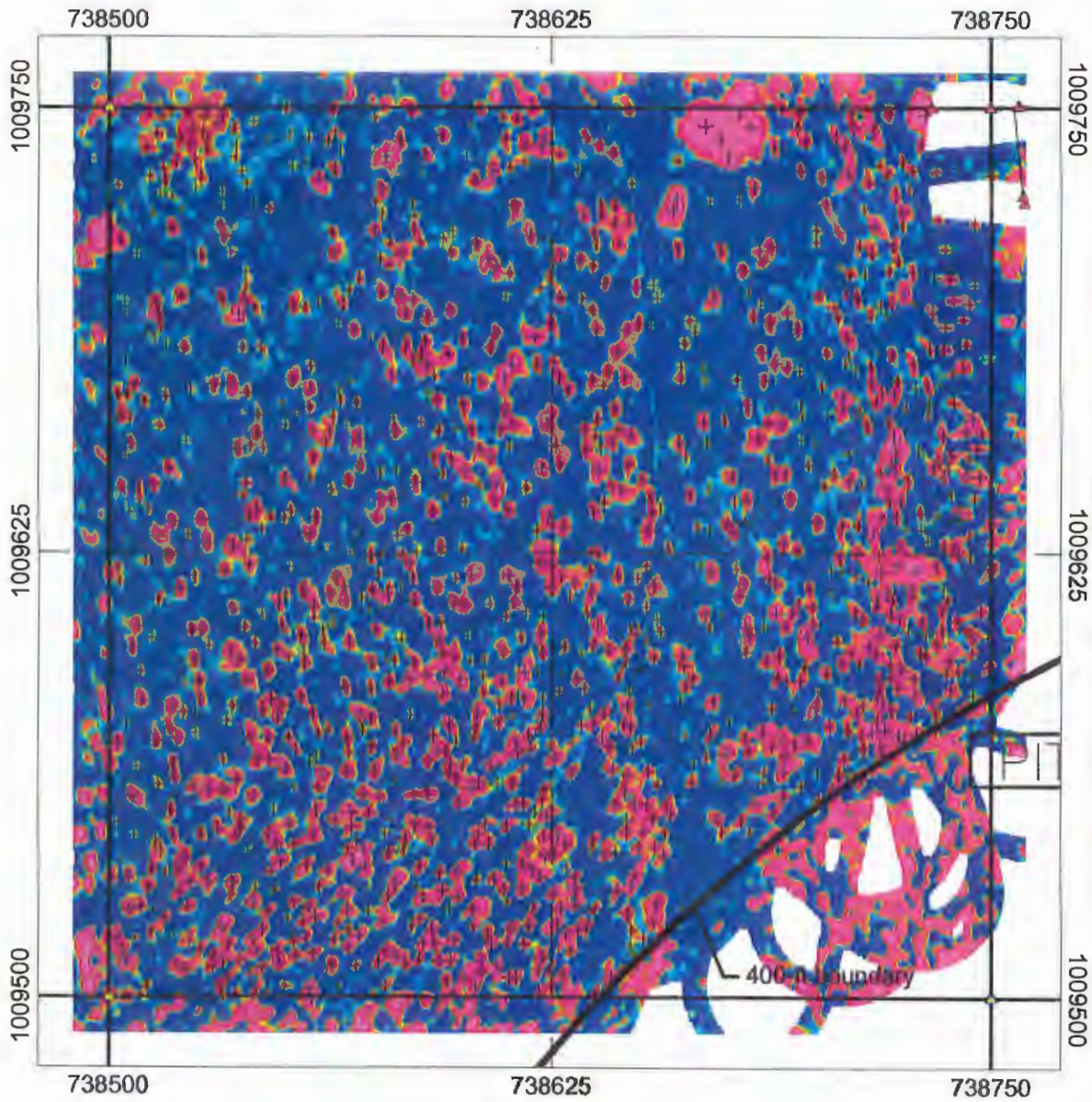
Grid North = True North
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No 1
Date: 6 May 04

File: 57g10
Checked By: CN
Scale: 1:600

Shaw
Shaw E & I, Inc.



Sum (mV)

0 2 4 6 8 10 11 12 13 14 15 16 18 20 25 30 60100

SEAD 57: QUAD G12H13

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP

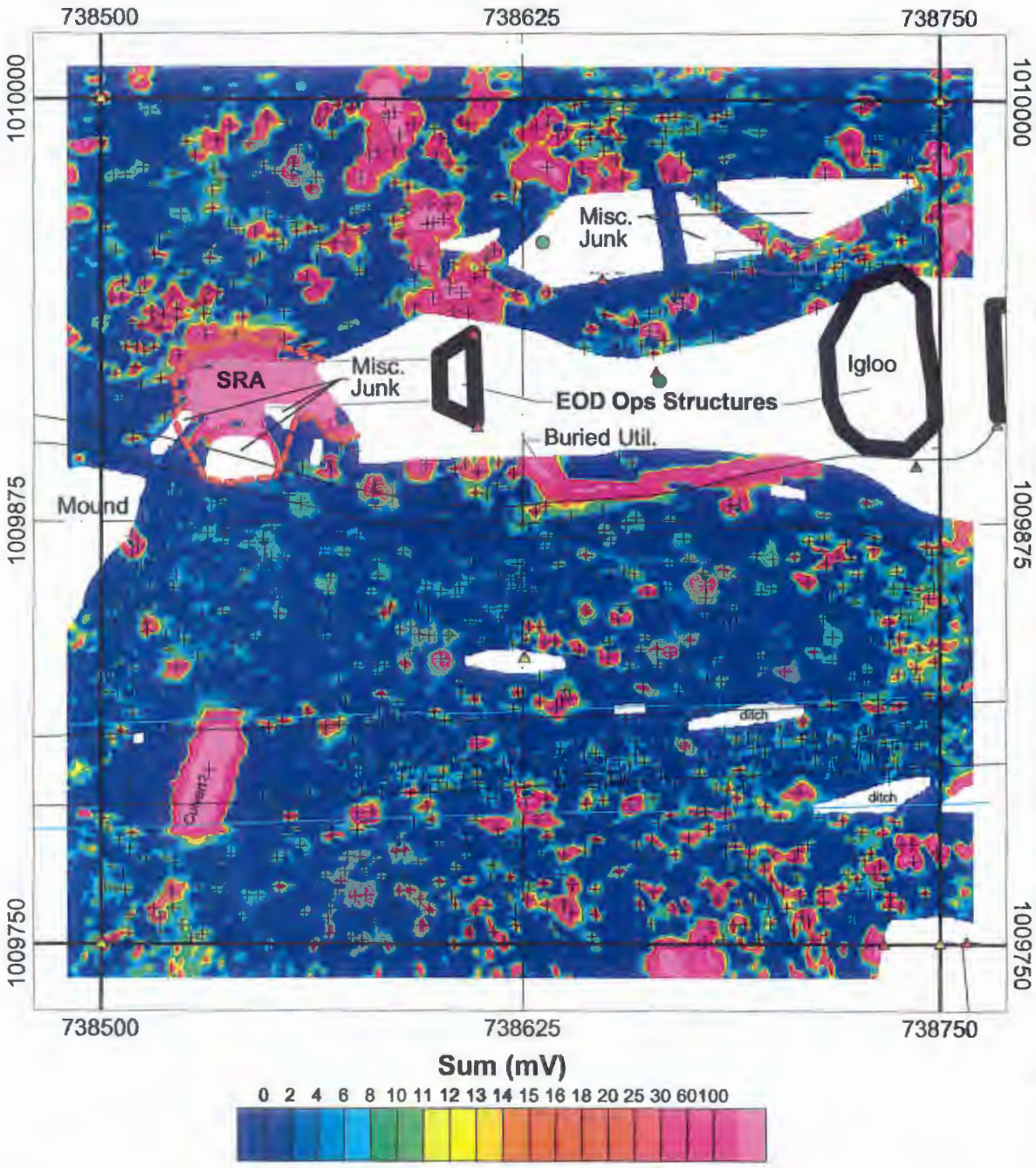
Grid North = True North
Magnetic North 12 Deg West

Client: USACE
Project Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 6 May 04

File: 57g12
Checked By: CN
Scale: 1:600

Shaw
Shaw E & I, Inc.



SEAD 57: QUAD G14H15

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

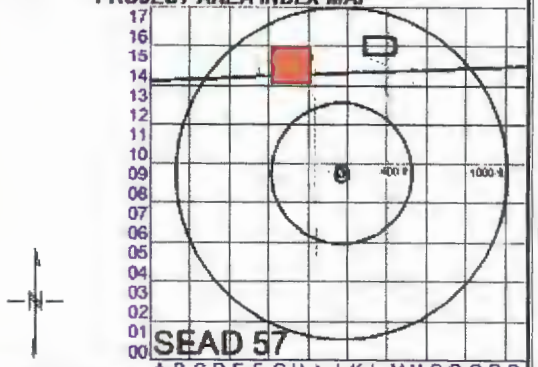
- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP



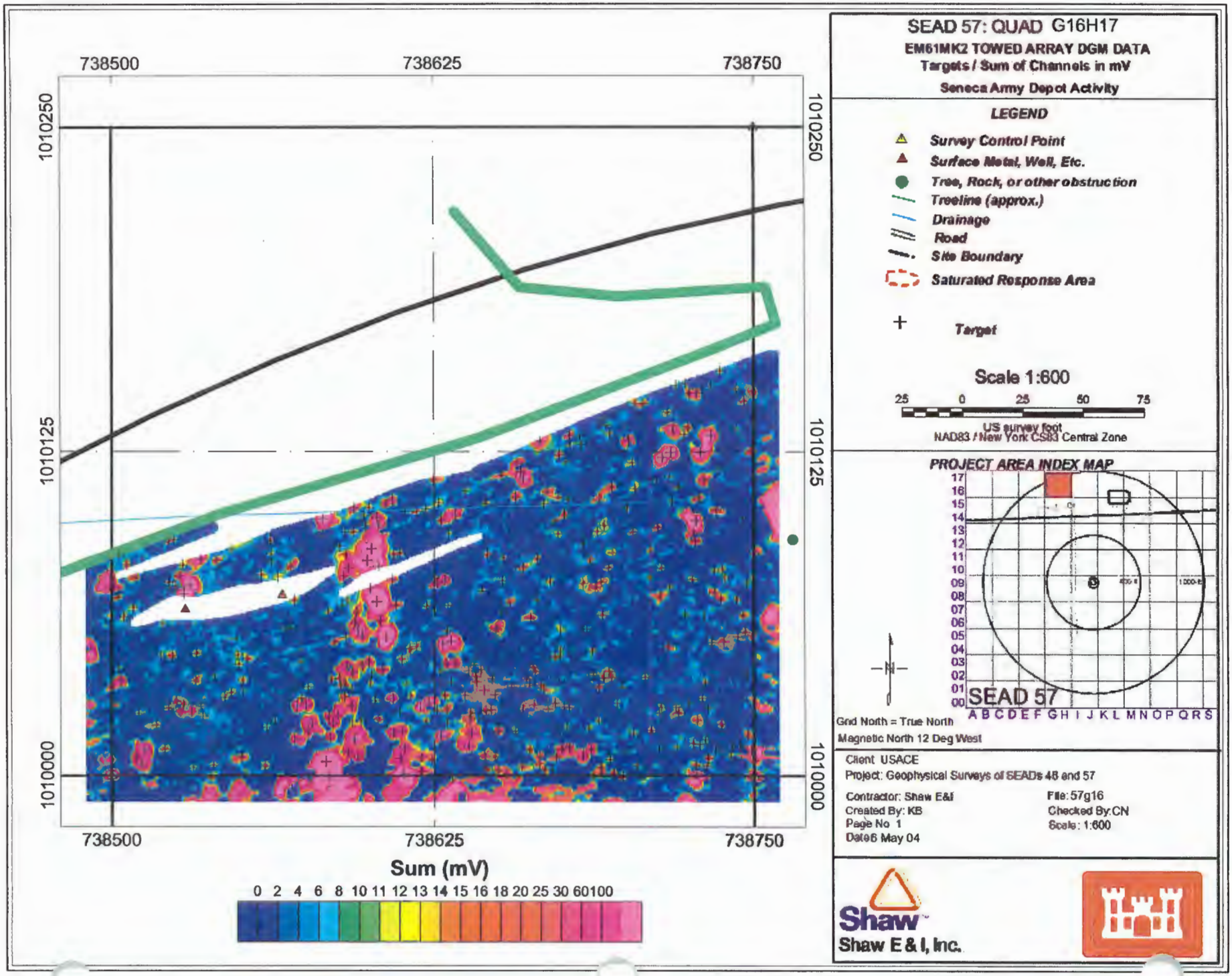
Grid North = True North
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date:11 May 04

File: 57g14
Checked By ST
Scale: 1:600

Shaw™
Shaw E & I, Inc.



SEAD 57: QUAD G16H17

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CSRS Central Zone

PROJECT AREA INDEX MAP

Grid North = True North
Magnetic North 12 Deg West

Client USACE
Project: Geophysical Surveys of SEADs 48 and 57

Contractor: Shaw E&I
Created By: KB
Page No 1
Date6 May 04

File: 57g16
Checked By:CN
Scale: 1:600

Shaw
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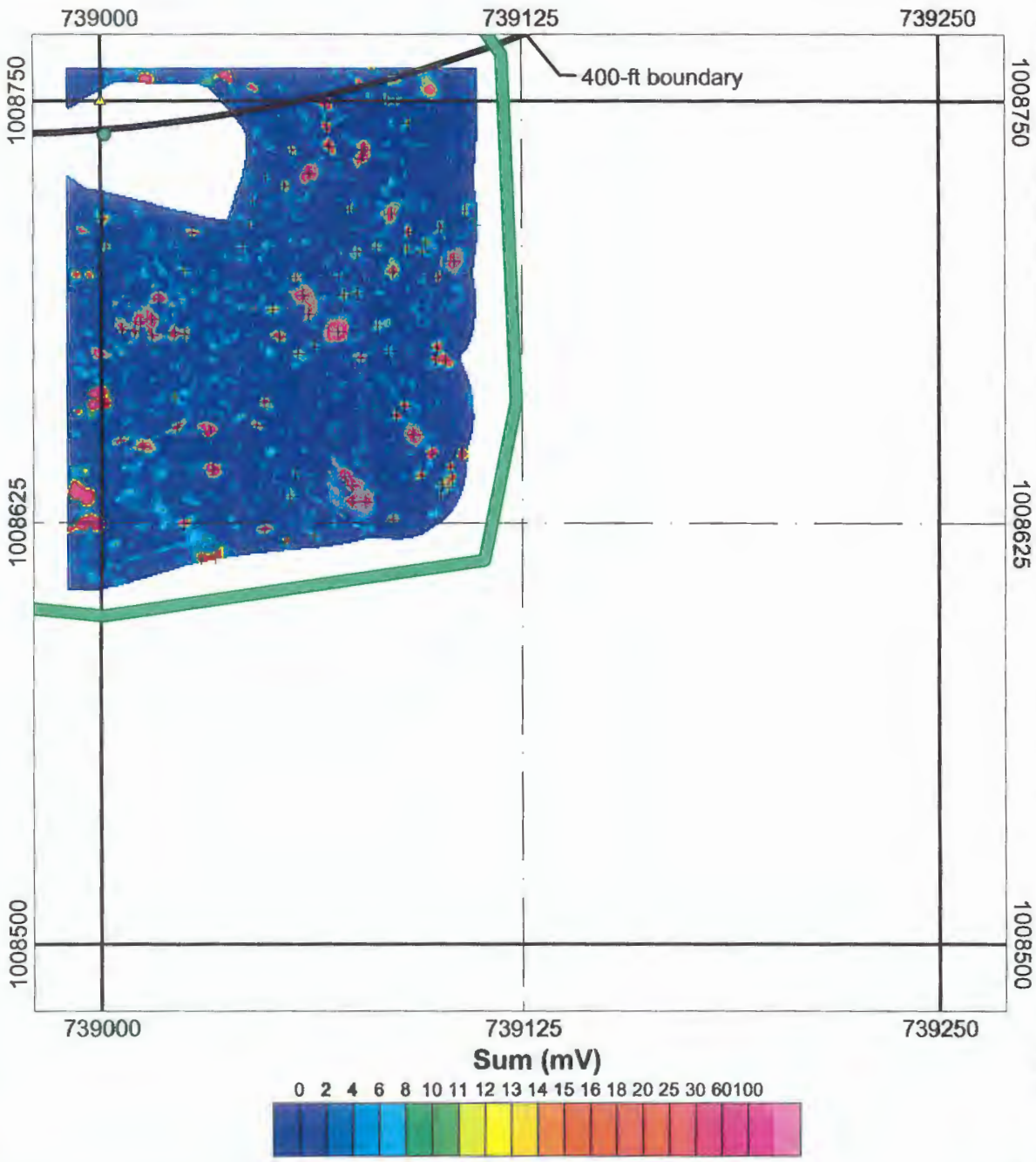

SEAD 57: QUAD K04L05

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- \+ *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP

Grid North = True North
Magnetic North 12 Deg West

Client USACE
Project: Geophysical Surveys of SEADs 48 and 57

Contractor: Shaw E&I
Created By: KB
Page No 1
Date:10 May 04

File: 57k04
Checked By:ST
Scale: 1:600

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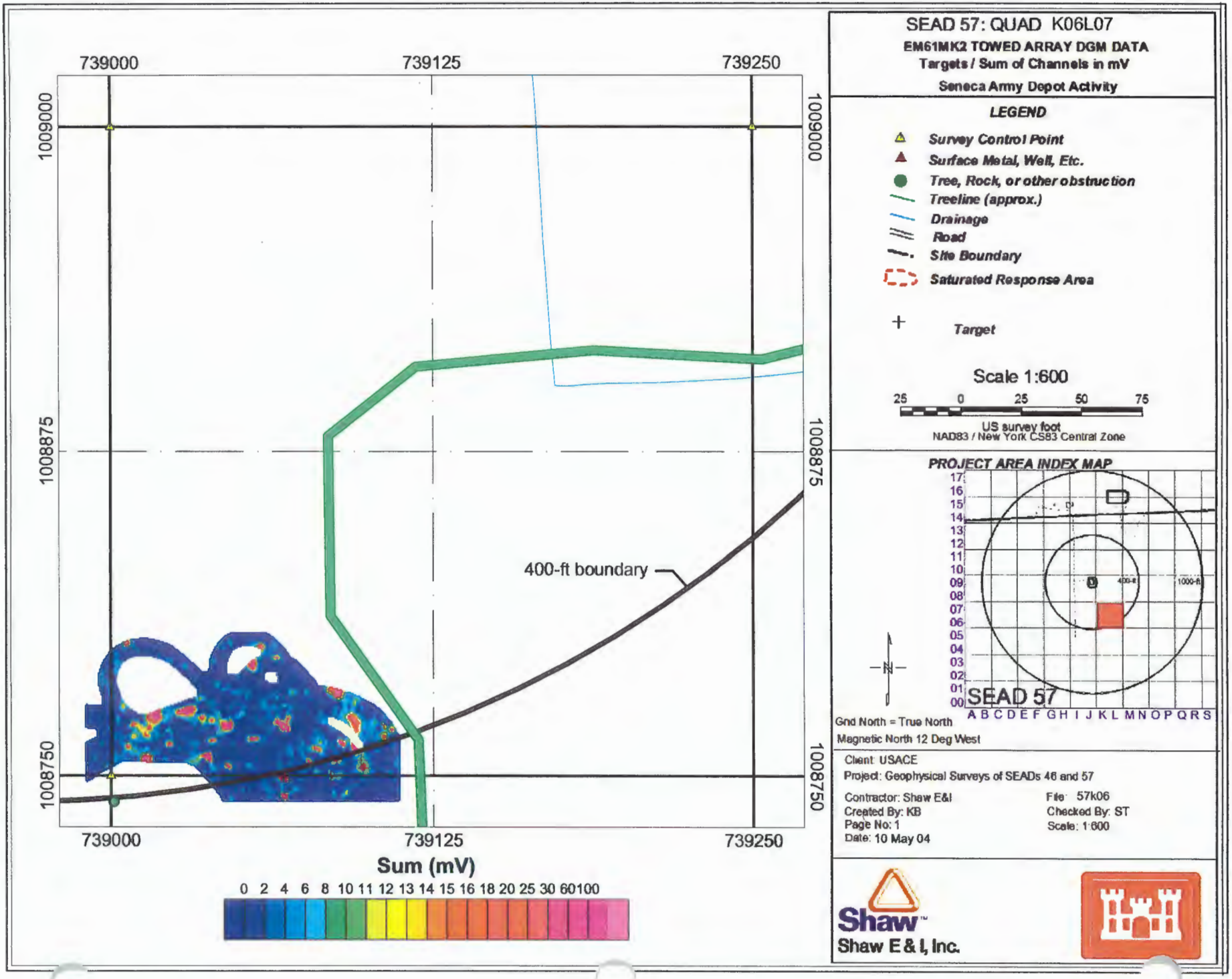
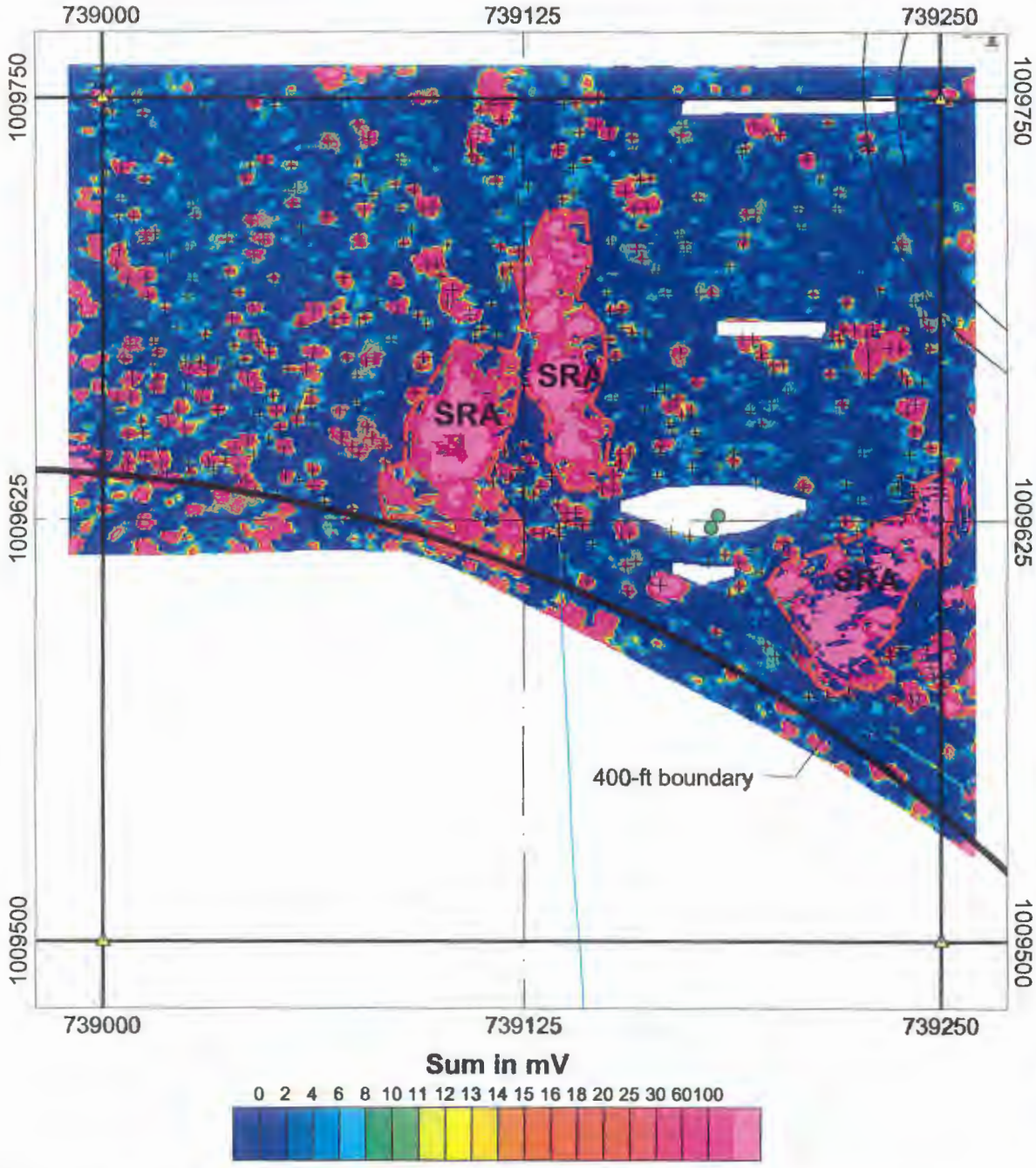

739000
739125
739250
1009000
1008875
1008750
400-ft boundary
Sum (mV)
0 2 4 6 8 10 11 12 13 14 15 16 18 20 25 30 60100
SEAD 57: QUAD K06L07
EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity
LEGEND
Survey Control Point
Surface Metal, Well, Etc.
Tree, Rock, or other obstruction
Treeline (approx.)
Drainage
Road
Site Boundary
Saturated Response Area
Target
Scale 1:600
25 0 25 50 75
US survey foot
NAD83 / New York CS83 Central Zone
PROJECT AREA INDEX MAP
SEAD 57
Grid North = True North
Magnetic North 12 Deg West
Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57
Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 10 May 04
File: 57k06
Checked By: ST
Scale: 1:600
Shaw
Shaw E & I, Inc.



SEAD 57: QUAD K12L13

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP

Grid North = True North
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 26 July 04

File: 57k12
Checked By: ST
Scale: 1:600

Shaw
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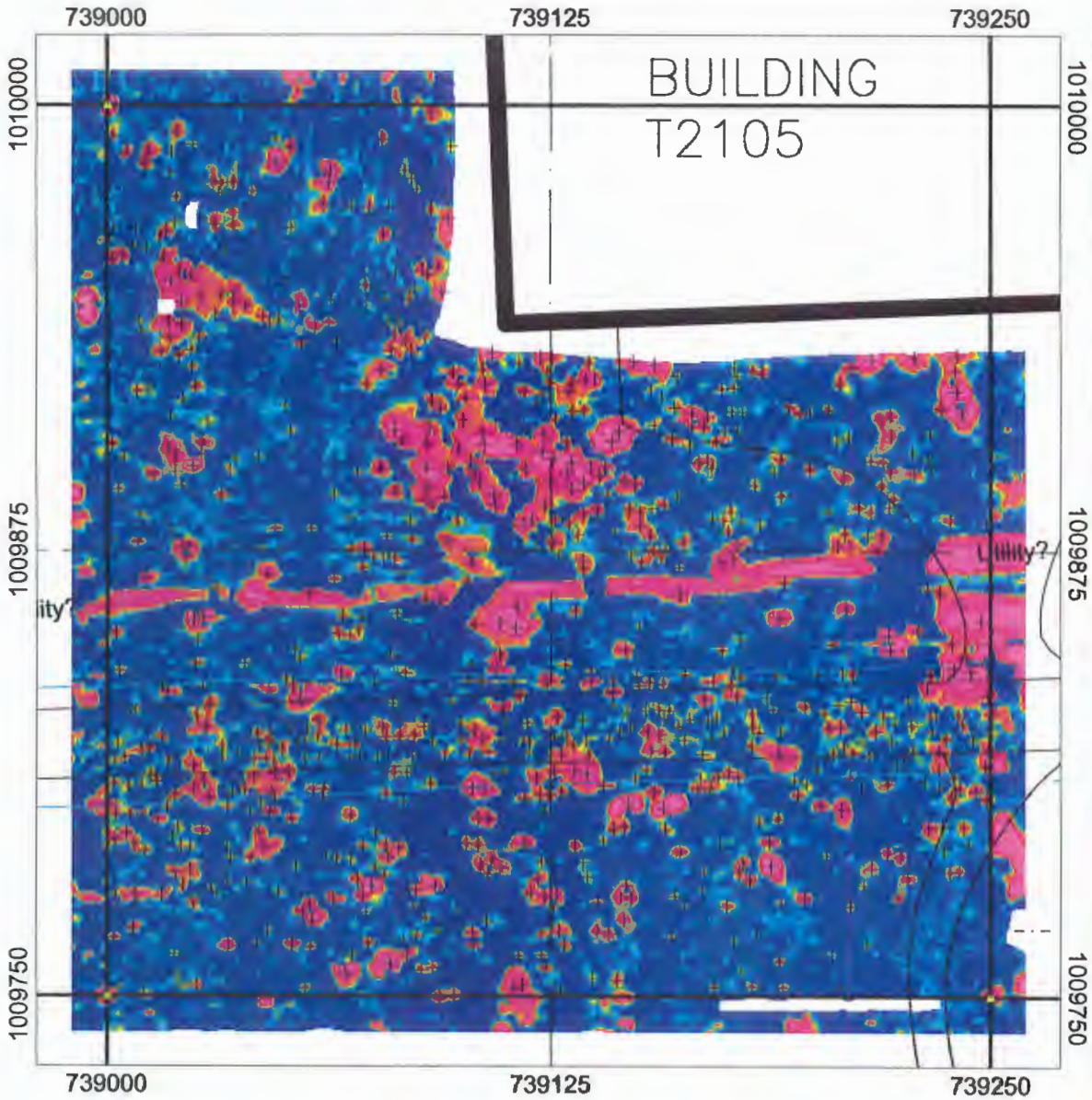


SEAD 57: QUAD K14L15

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV

Seneca Army Depot Activity

LEGEND

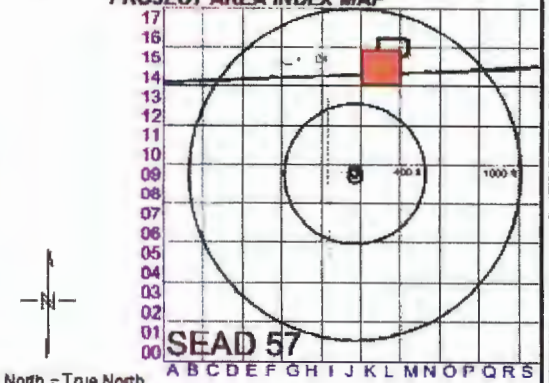
- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP



Grid North = True North
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 11 May 04

File: 57k14
Checked By: ST
Scale: 1:600

Shaw
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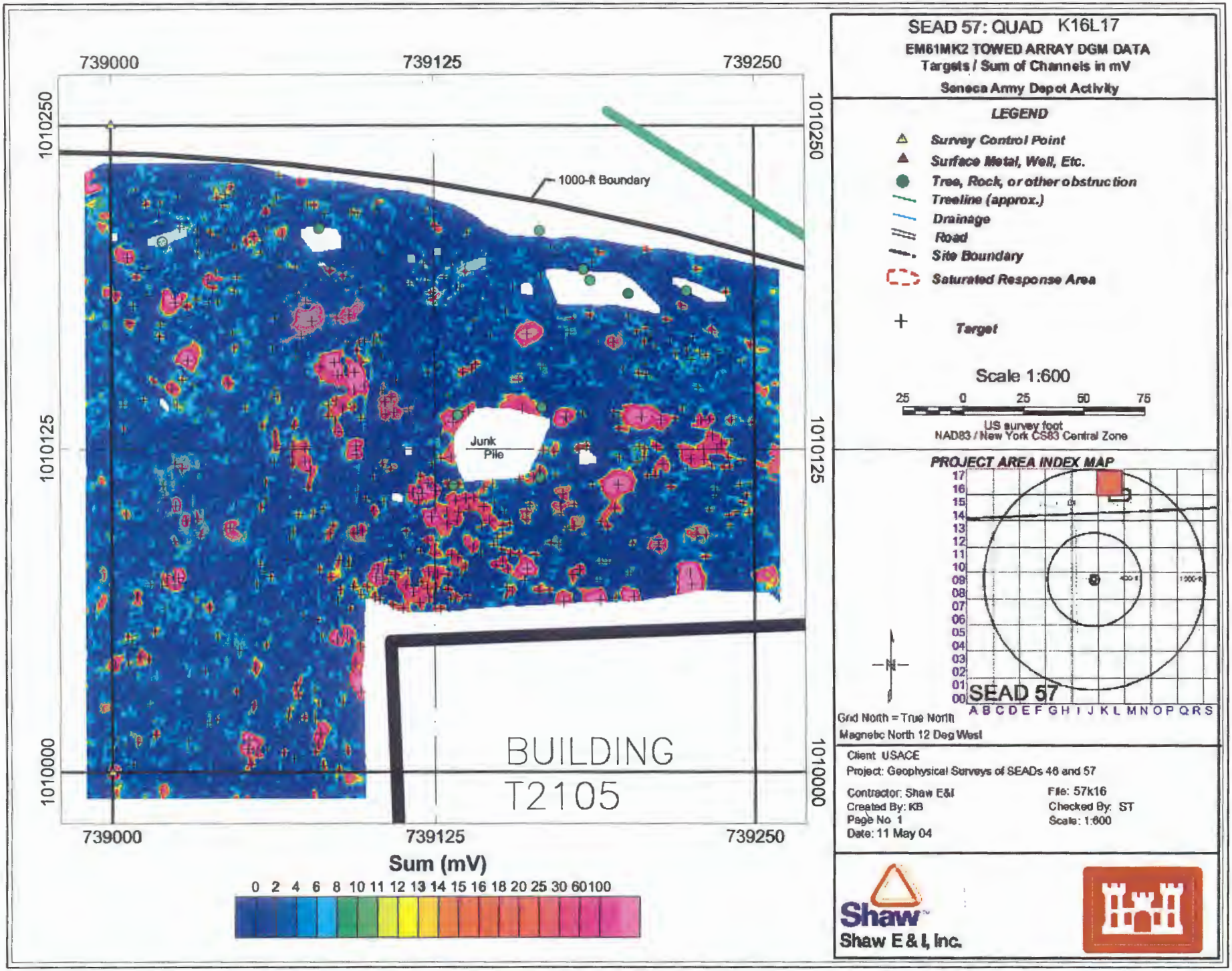

SEAD 57: QUAD K16L17

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- \+ *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP

Grid North = True North
Magnetic North 12 Deg West

Client USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No 1
Date: 11 May 04

File: 57k16
Checked By: ST
Scale: 1:600

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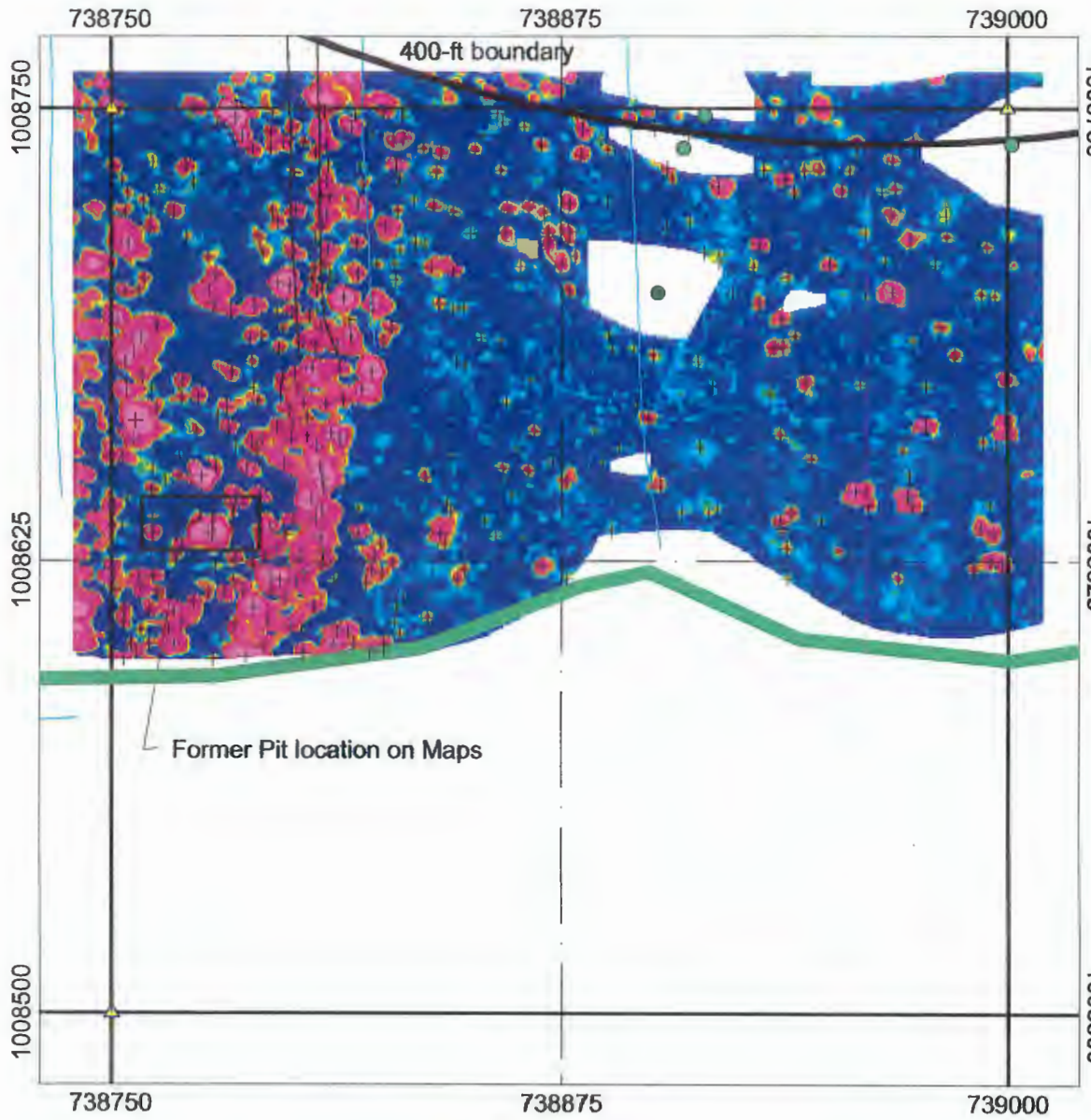


Sum in mV

0 2 4 6 8 10 11 12 13 14 15 16 18 20 25 30 60100

SEAD 57: QUAD I04J05

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

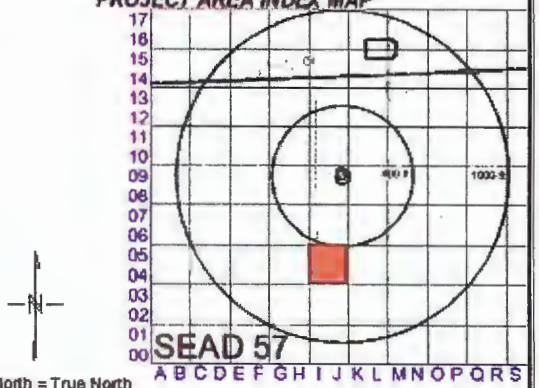
- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP



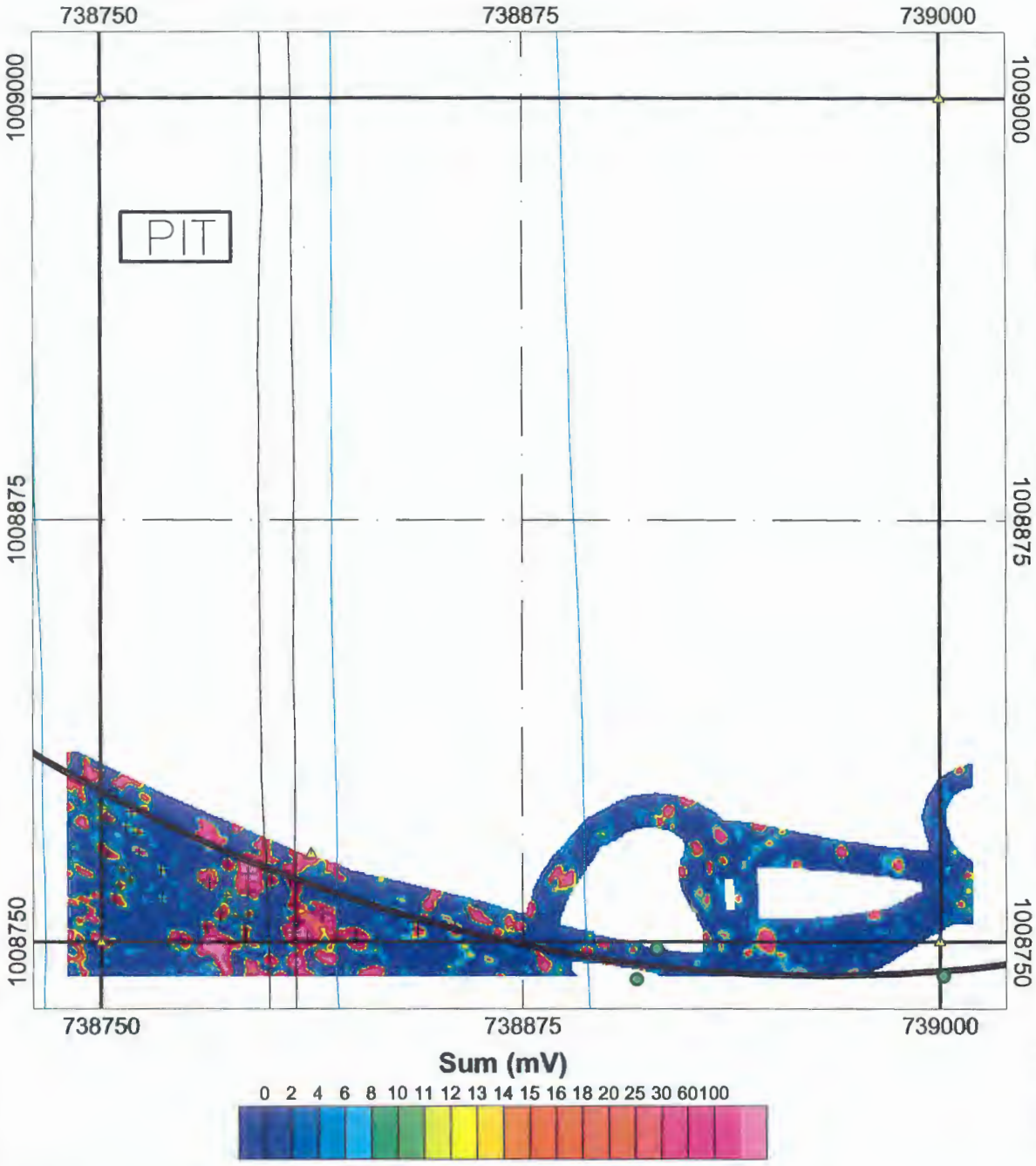
Grid North = True North
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 26 July 04

File: 57i04
Checked By ST
Scale: 1:600

Shaw
Shaw E & I, Inc.



SEAD 57: QUAD I06J07

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

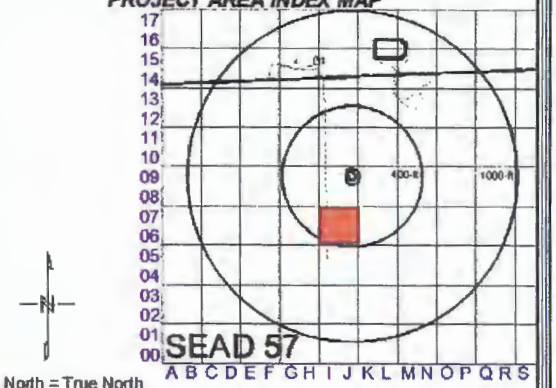
- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP



Grid North = True North
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date:11 May 04

File: 57i06
Checked By: ST
Scale: 1:600

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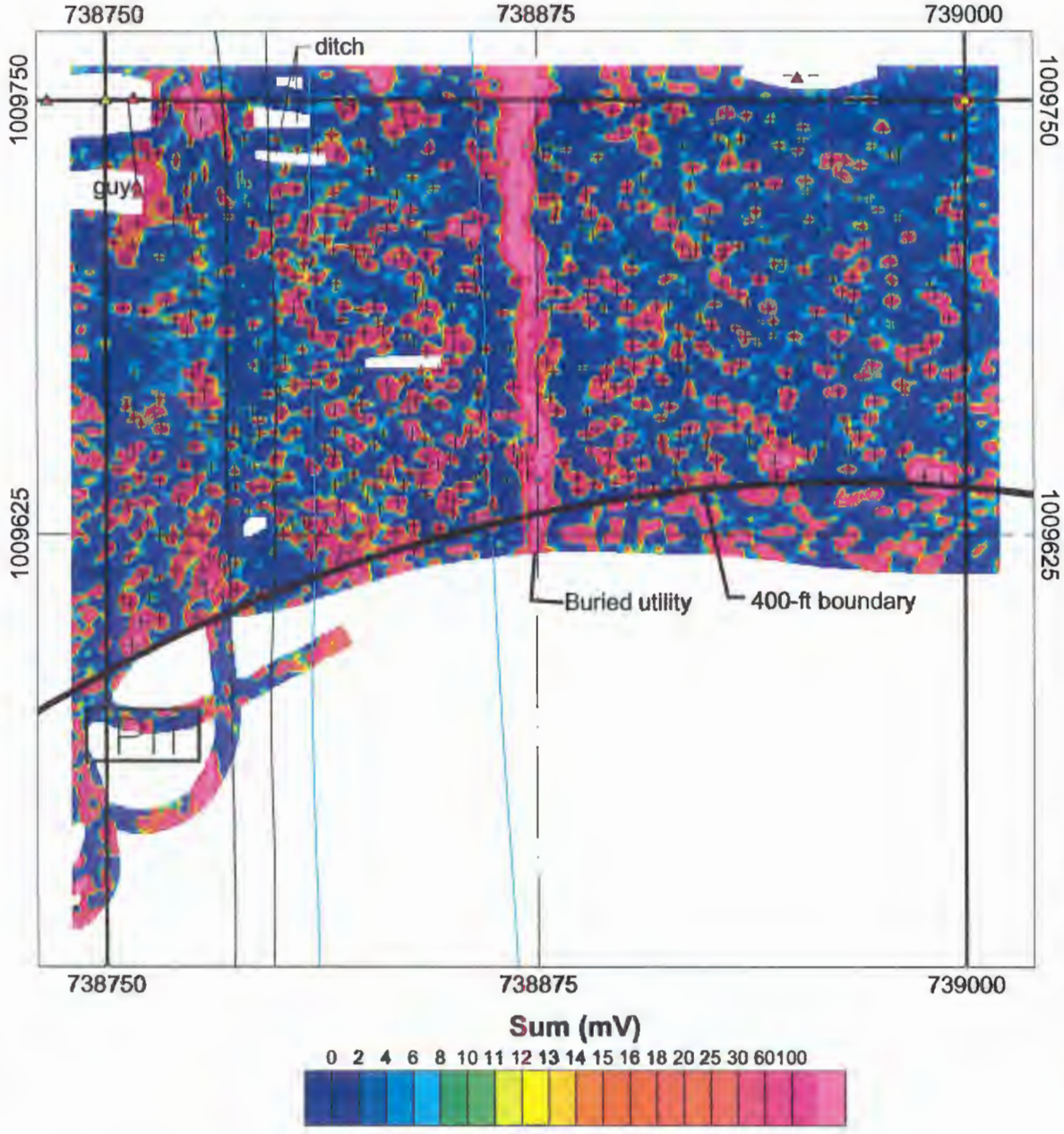

SEAD 57: QUAD I12J13

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP

Grid North = True North
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No. 1
Date: 11 May 04

File: 57I12
Checked By: ST
Scale: 1:600

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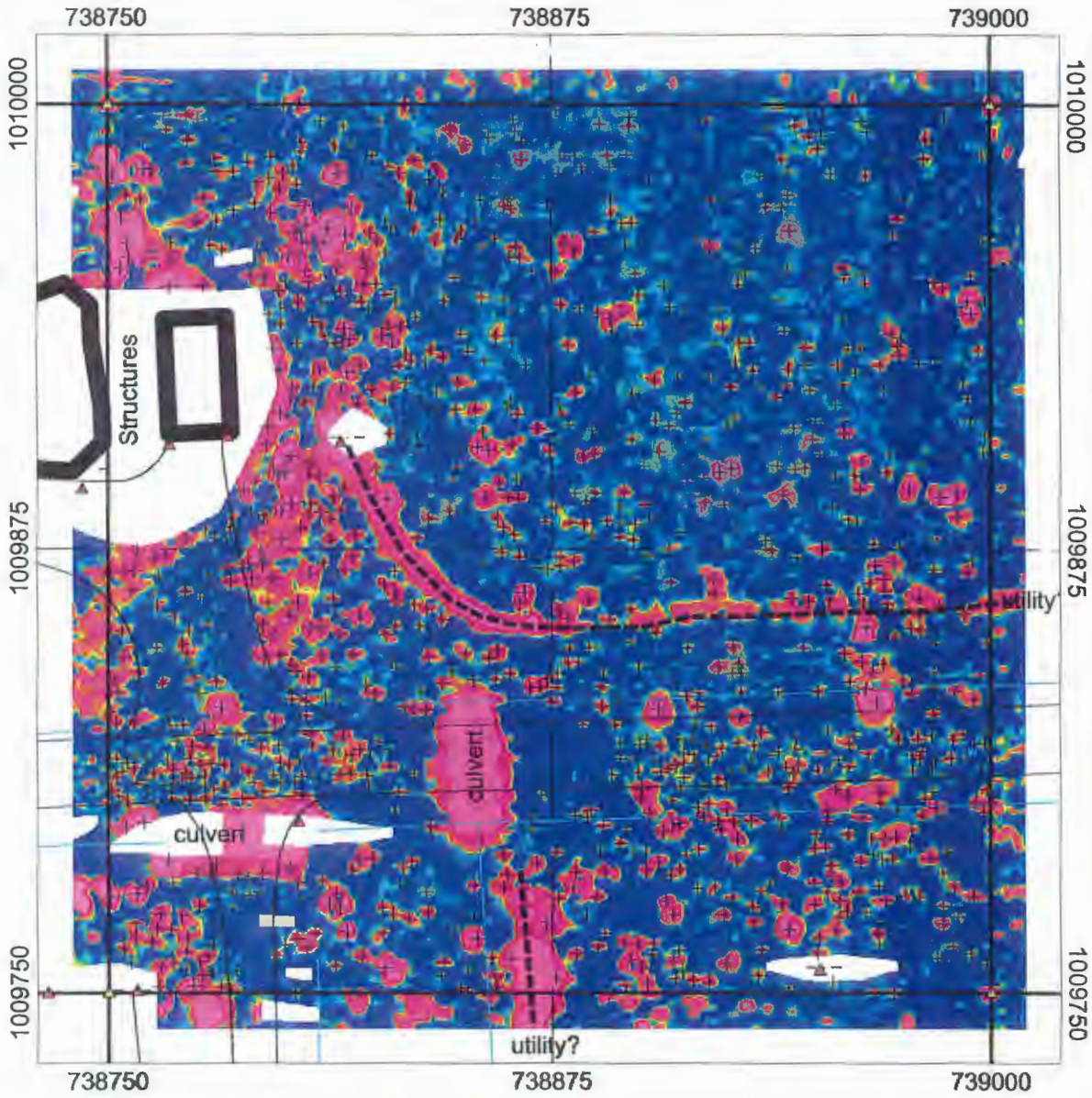


SEAD 57: QUAD I14J15

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV

Seneca Army Depot Activity

LEGEND

- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP

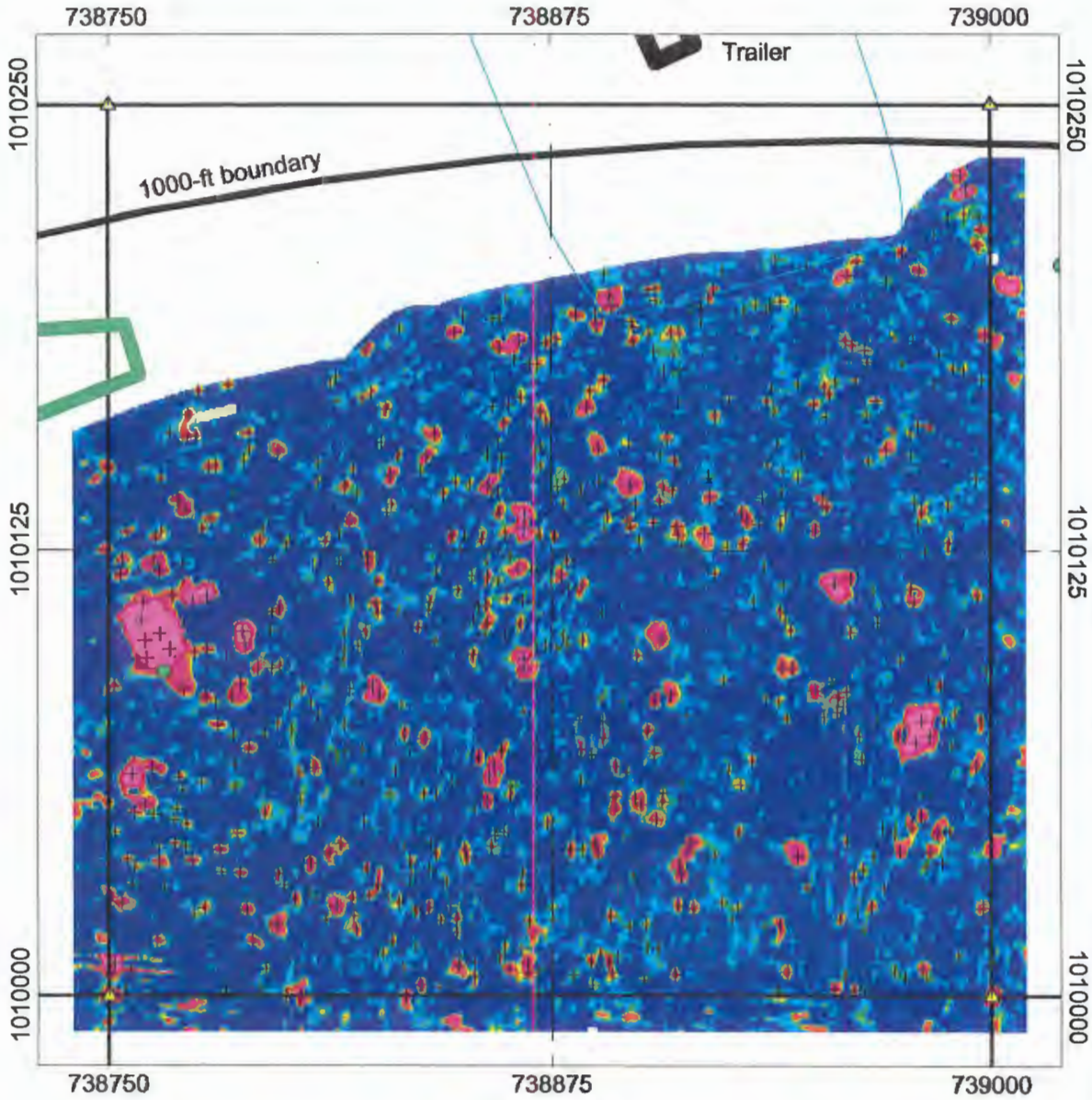
Grid North = True North
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 11 May 04

File: 57i14
Checked By: ST
Scale: 1:600

Shaw
Shaw E & I, Inc.



SEAD 57: QUAD I16J17

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

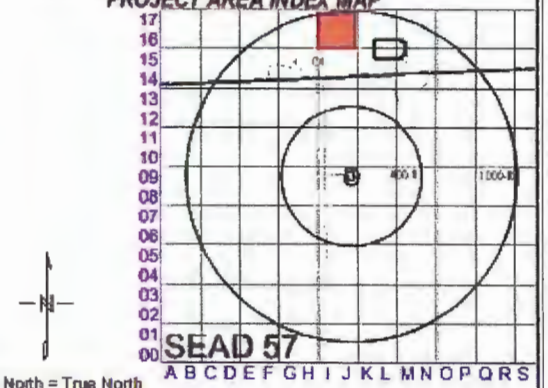
- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- \+ *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP



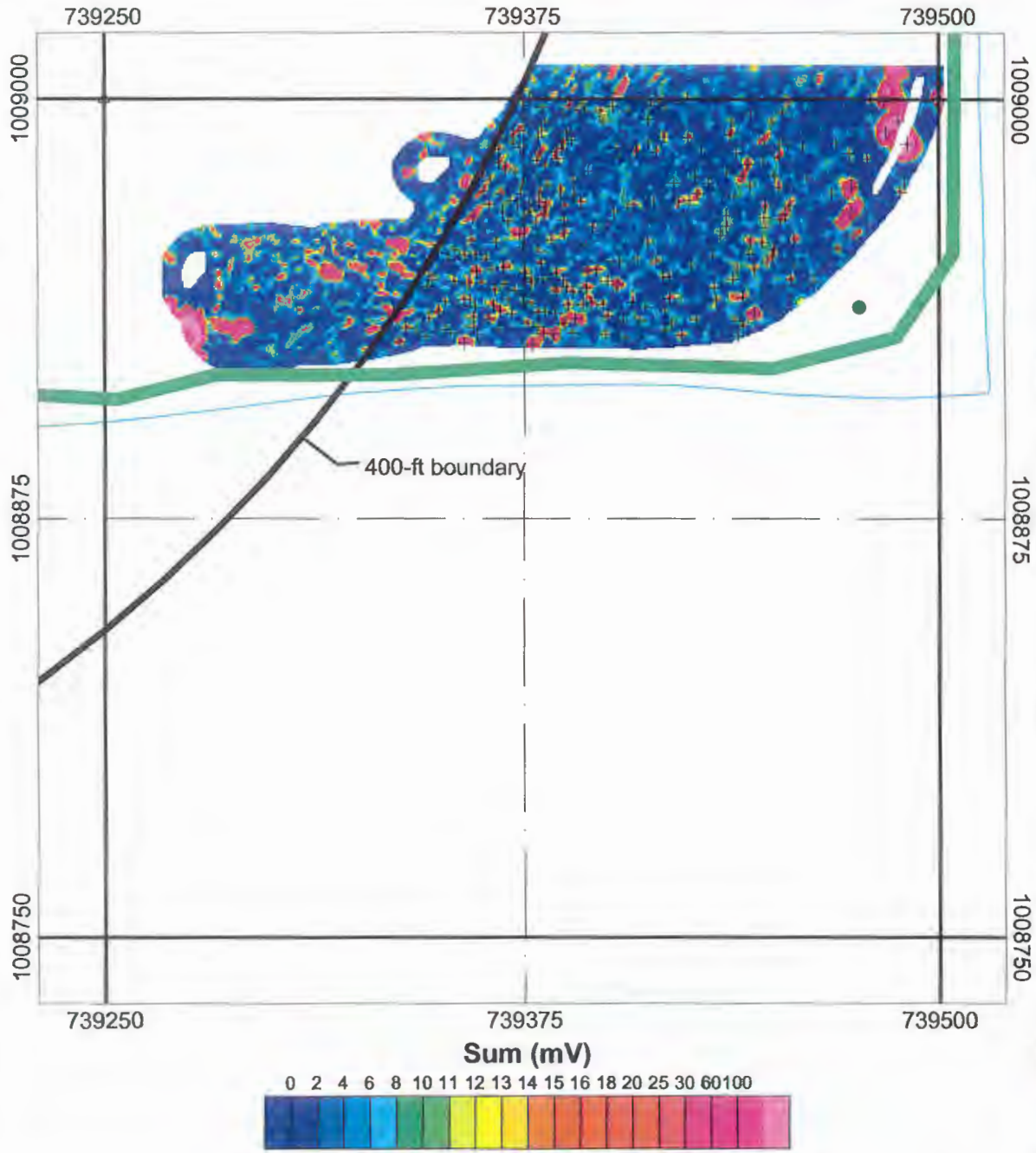
Grid North = True North
Magnetic North 12 Deg West

Client USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No 1
Date: 26 July 04

File: 57i16
Checked By: LT
Scale: 1:600

Shaw
Shaw E & I, Inc.



SEAD 57: QUAD M06N07

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- \+ *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP

Grid North = True North
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date:10 May 04

File: 57m06
Checked By: JF
Scale: 1:600

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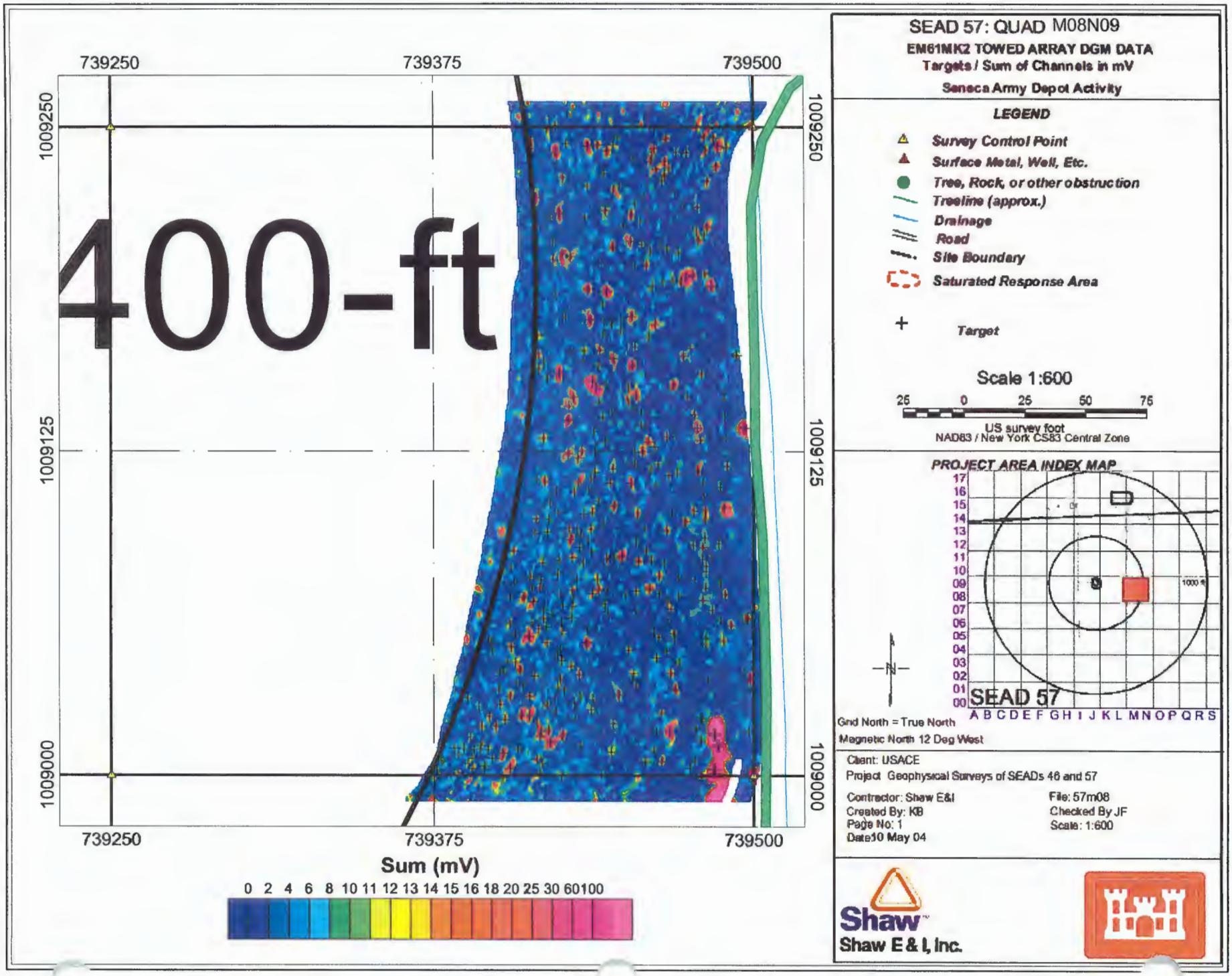
Shaw E & I, Inc.



SEAD 57: QUAD M08N09

EM61MK2 TOWED ARRAY DGM DATA

Targets / Sum of Channels in mV

Seneca Army Depot Activity

LEGEND

- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- \+ *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP

Grid North = True North
Magnetic North 12 Deg West

Client: USACE
Project Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date10 May 04

File: 57m08
Checked By JF
Scale: 1:600

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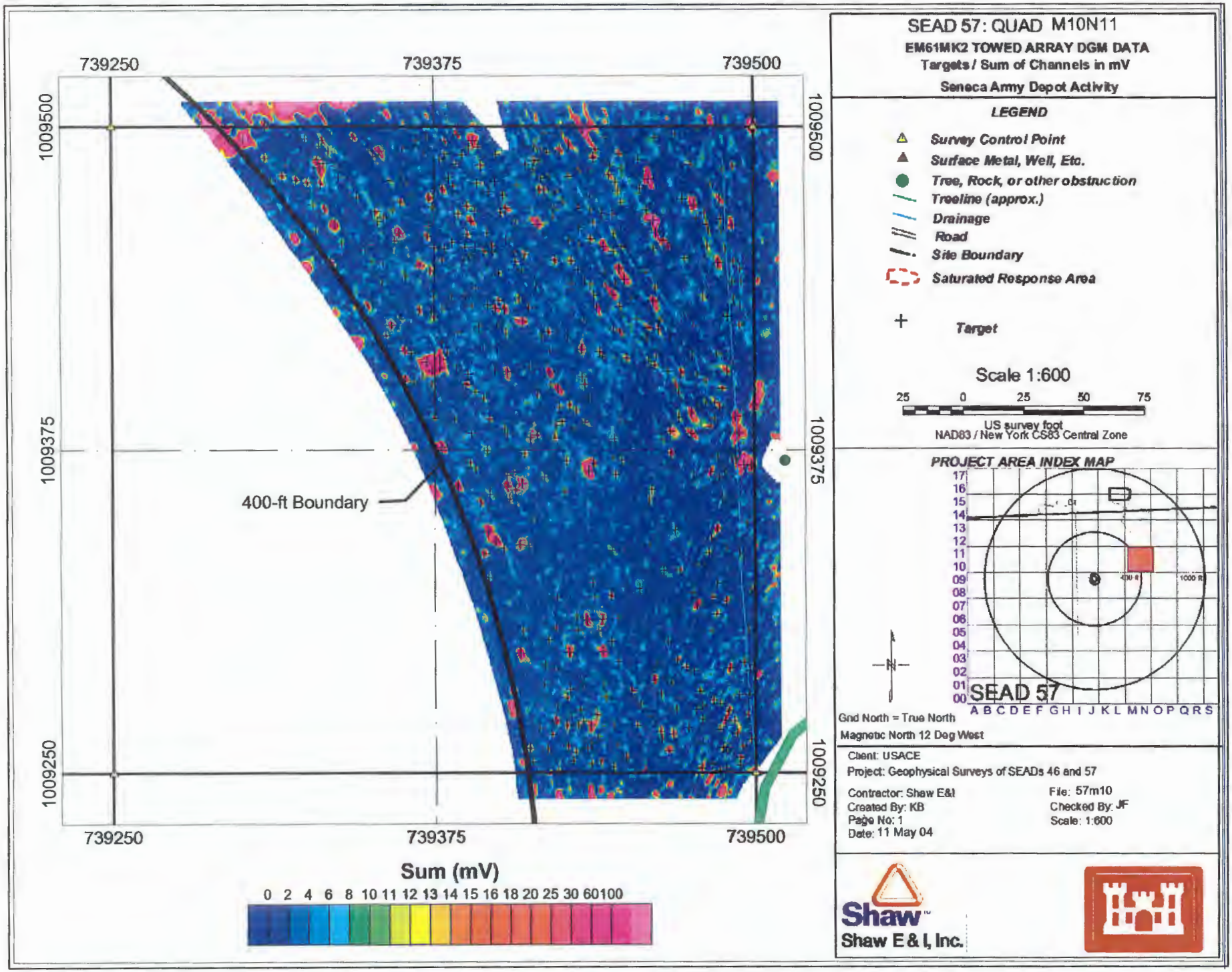


SEAD 57: QUAD M10N11

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP

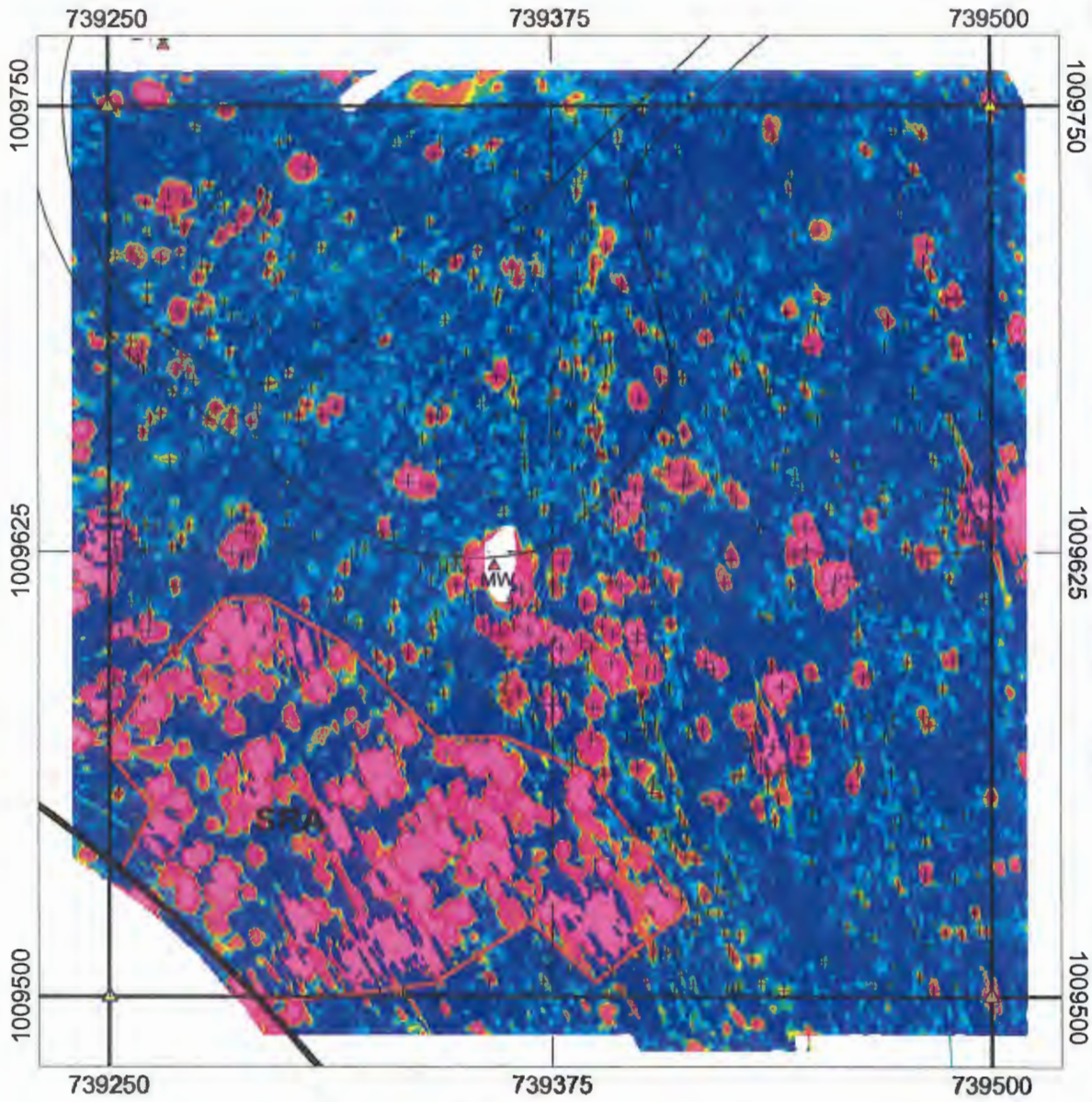
Grid North = True North
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 11 May 04

File: 57m10
Checked By: JF
Scale: 1:600

Shaw E & I, Inc.



Sum in mV

0 2 4 6 8 10 11 12 13 14 15 16 18 20 25 30 60100

SEAD 57: QUAD M12N13

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP

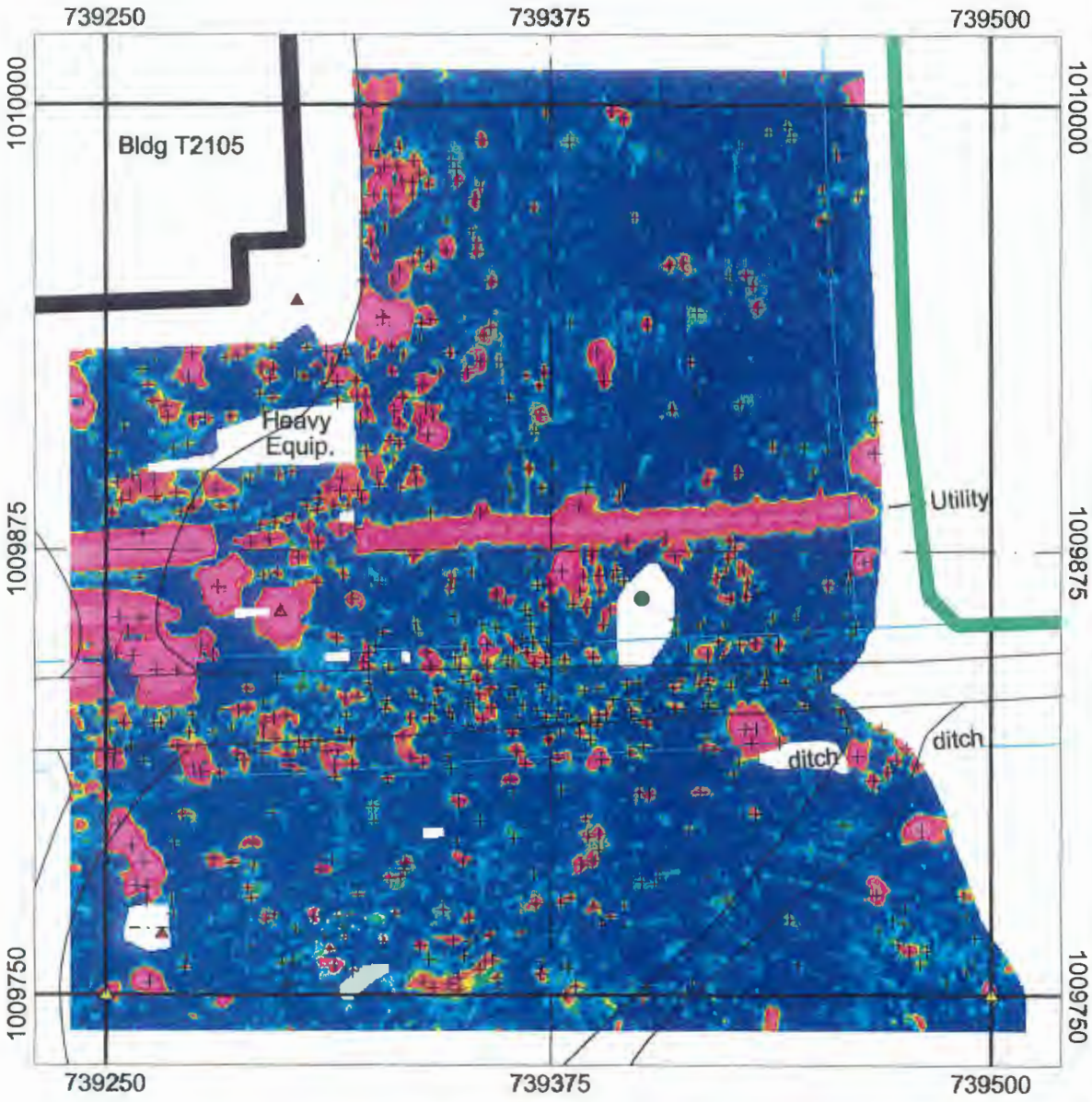
Grid North = True North
Magnetic North 12 Deg West

Client USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 26 July 04

File: 57m12
Checked By: LT
Scale: 1:600

Shaw™
Shaw E & I, Inc.



Sum in mV

0 2 4 6 8 10 11 12 13 14 15 16 18 20 25 30 60 100

SEAD 57: QUAD M14N15

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

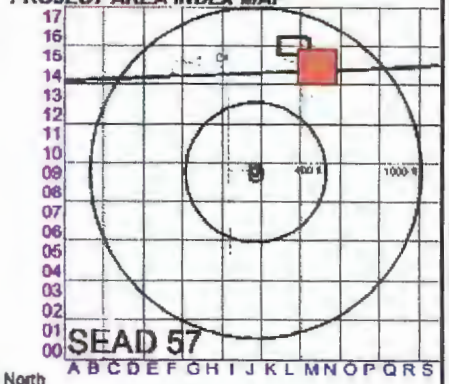
- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP



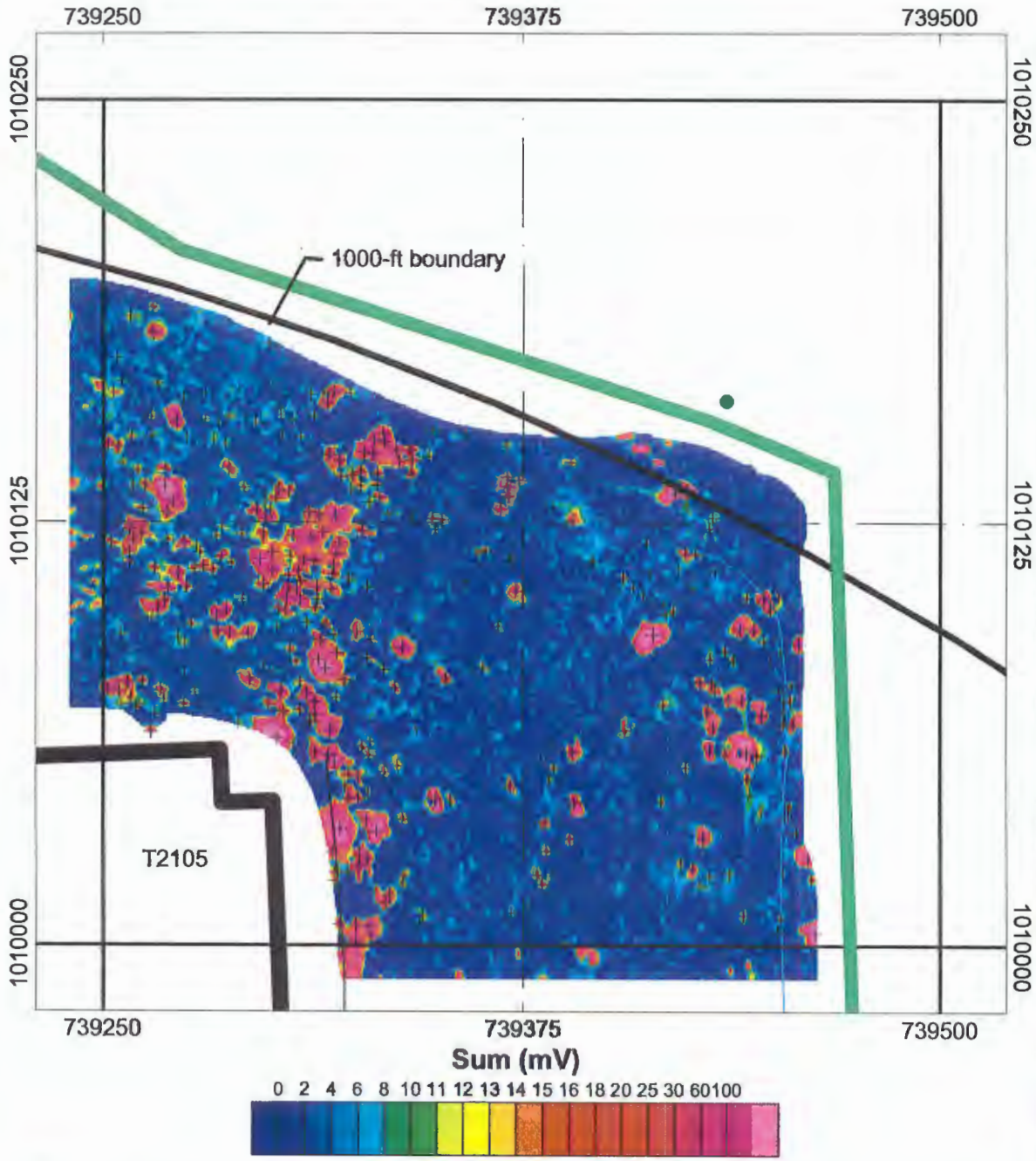
Grid North = True North
Magnetic North 12 Deg West

Client: USACE
Project Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 26 July 04

File: 57m14
Checked By LT
Scale: 1:600

Shaw
Shaw E & I, Inc.



SEAD 57: QUAD M16N17

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

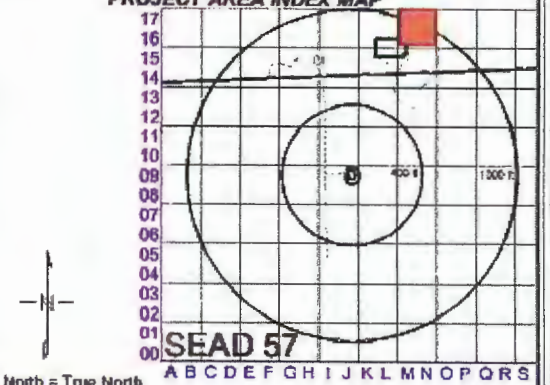
- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP



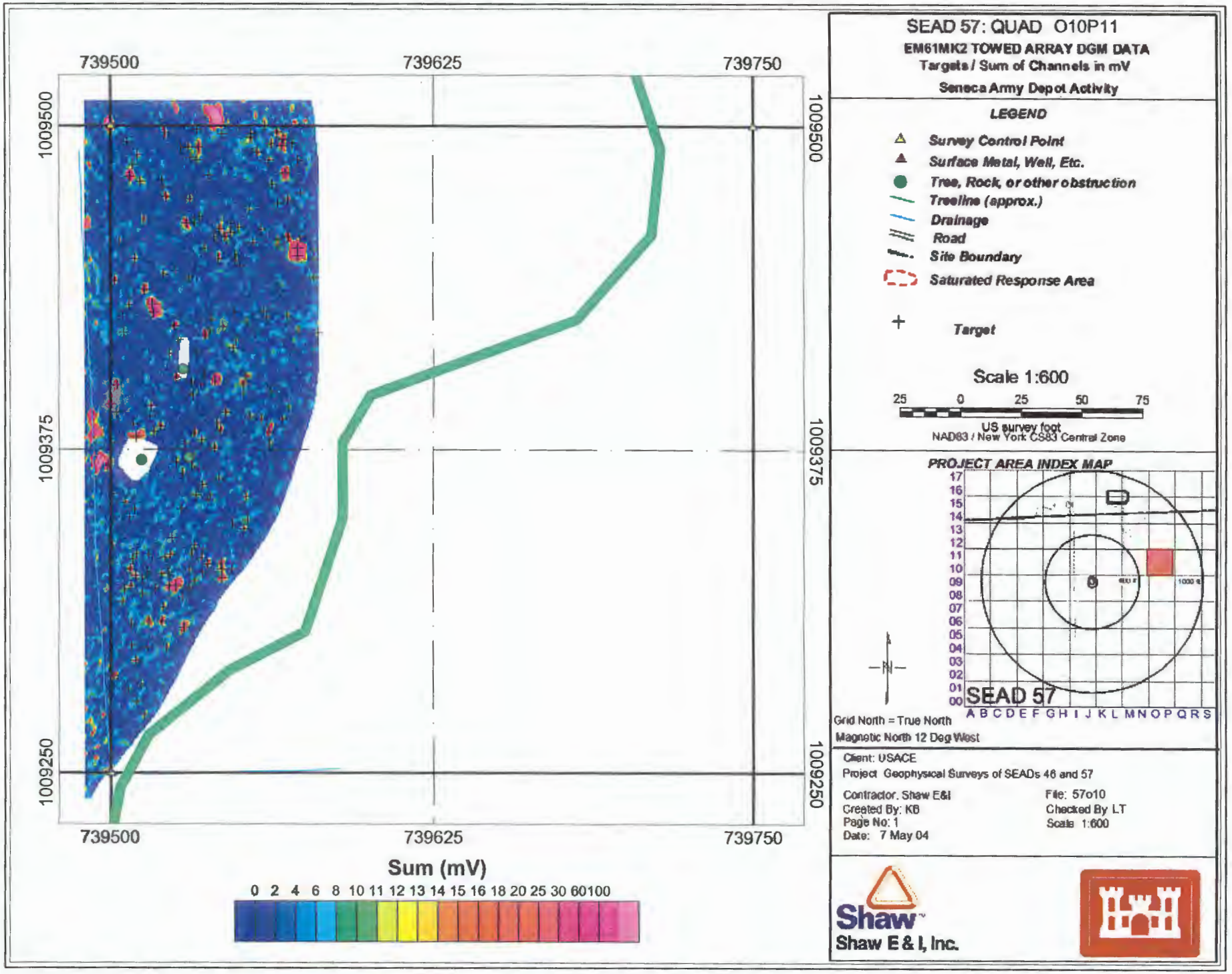
Grid North = True North
Magnetic North 12 Deg West

Client USACE
Project: Geophysical Surveys of SEADs 48 and 57

Contractor: Shaw E&I
Created By: KB
Page No. 1
Date:11 May 04

File: 57m16
Checked By:ST
Scale: 1:600

Shaw™
Shaw E & I, Inc.



SEAD 57: QUAD O10P11

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP

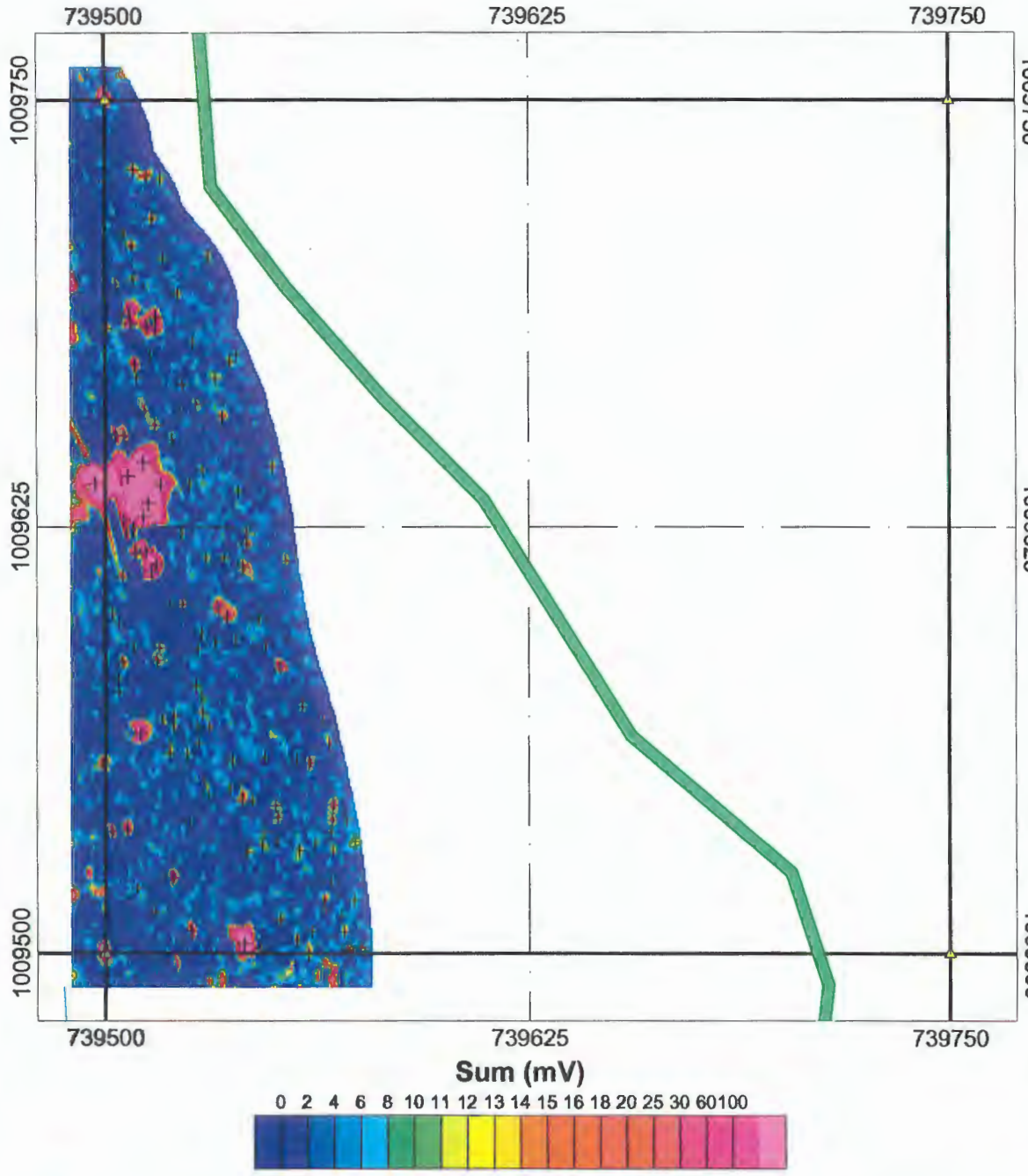
Grid North = True North
Magnetic North 12 Deg West

Client: USACE
Project Geophysical Surveys of SEADs 46 and 57

Contractor. Shaw E&I
Created By: KB
Page No: 1
Date: 7 May 04

File: 57o10
Checked By LT
Scale 1:600

Shaw
Shaw E & I, Inc.



SEAD 57: QUAD O12P13

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

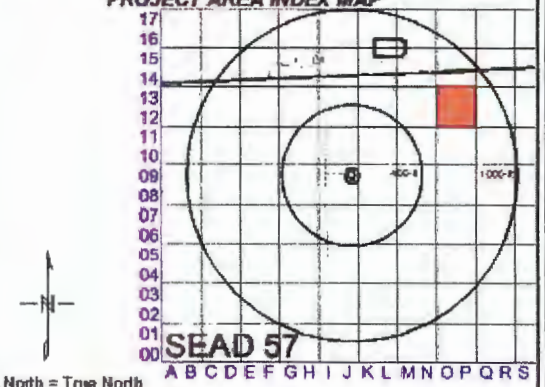
- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- + *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP



Grid North = True North
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 7 May 04

File: 57o12
Checked By: LT
Scale: 1:600

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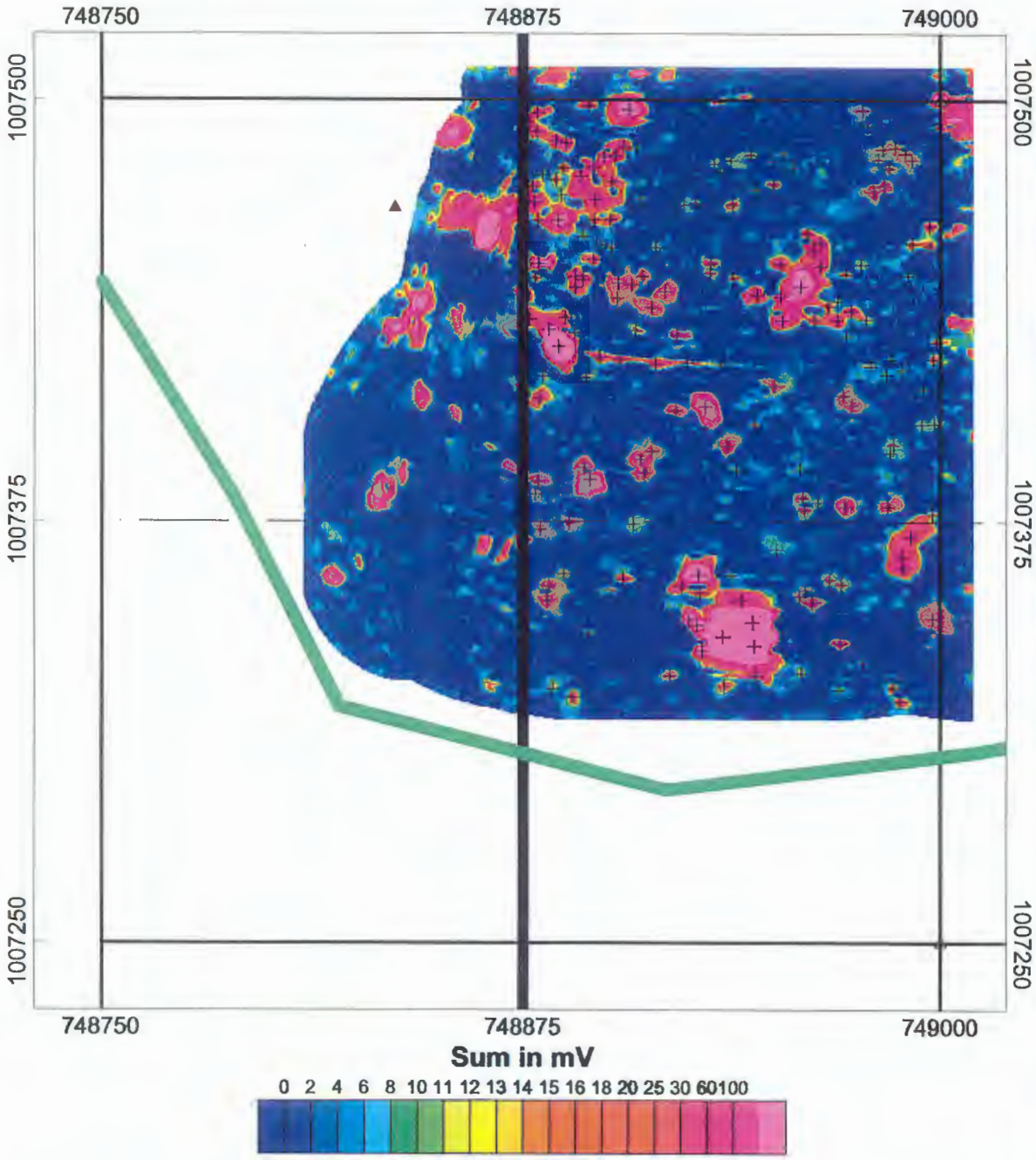
APPENDIX C

SEAD 57 Quad Maps
Geophysical Survey Results



SEAD 46: QUAD A16B17

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

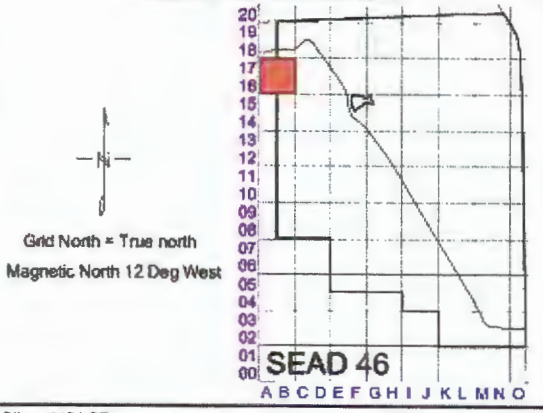
- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP



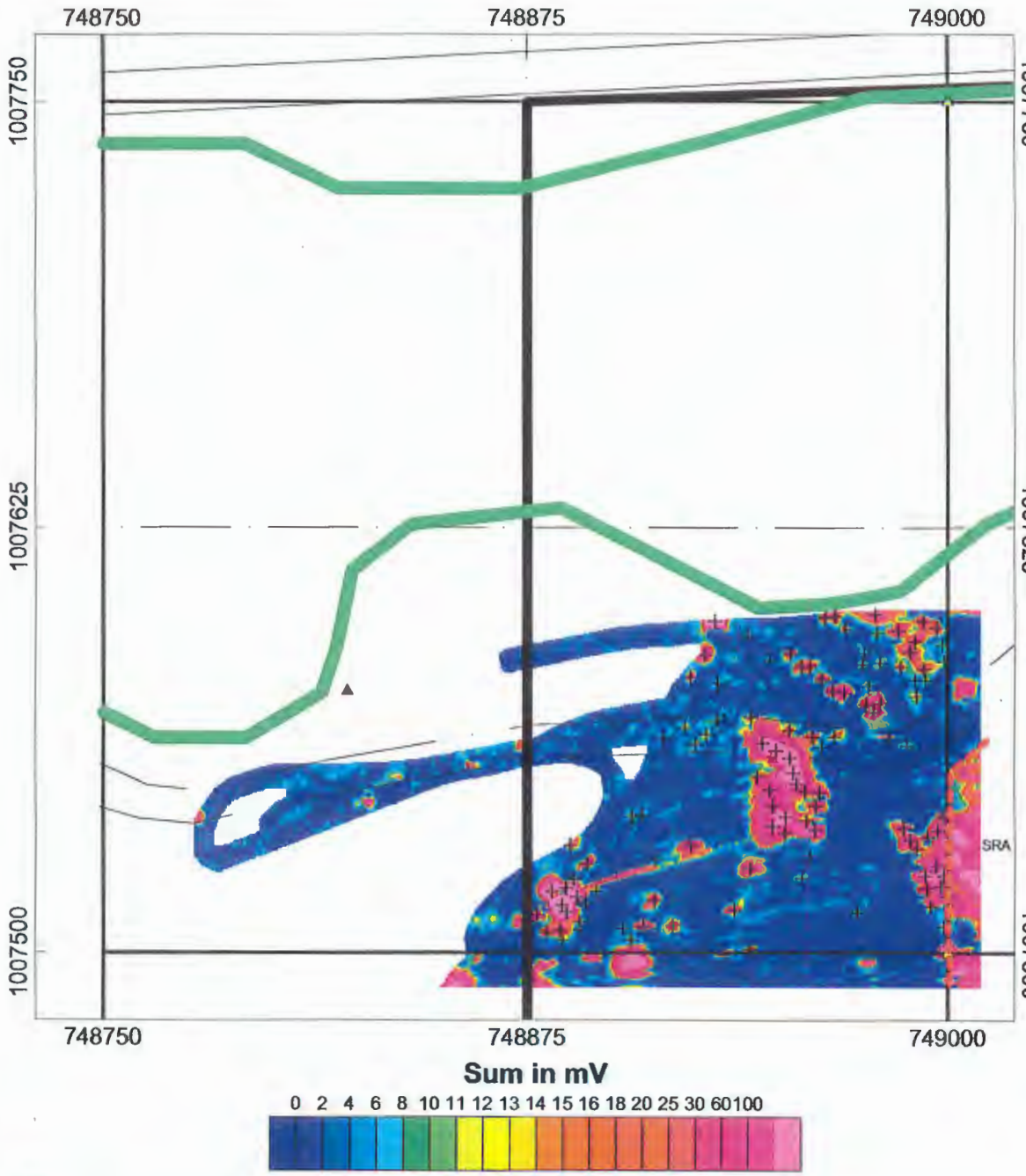
Grid North = True north
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 12 May 04

File: 46a16
Checked By: ST
Scale: 1:600

Shaw™
Shaw E & I, Inc.



SEAD 46: QUAD A18B19

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP

Grid North = True north
Magnetic North 12 Deg West

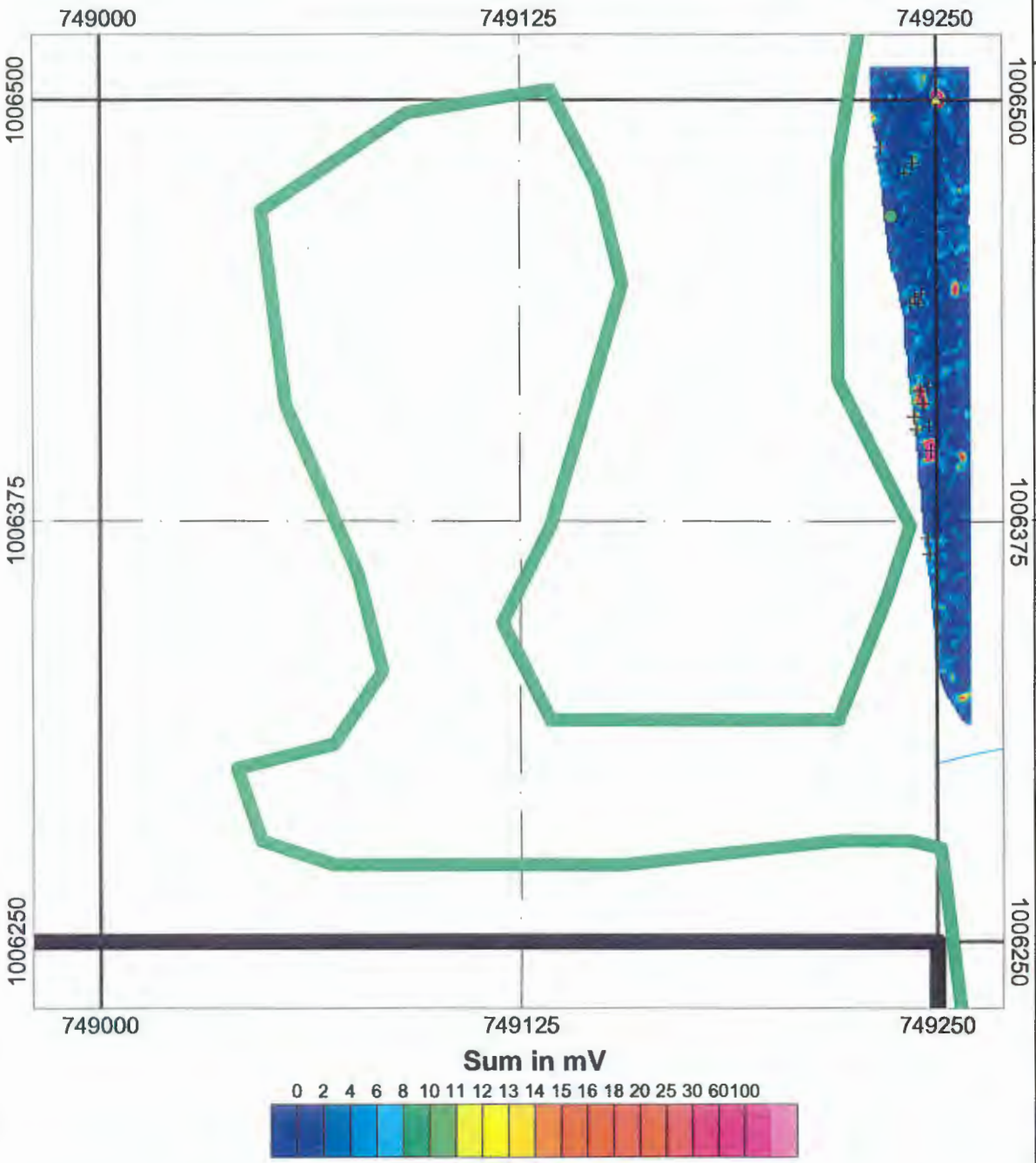
SEAD 46

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 12 May 04

File: 46a18
Checked By: JF
Scale: 1:600

Shaw
Shaw E & I, Inc.



SEAD 46: QUAD C08D09

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

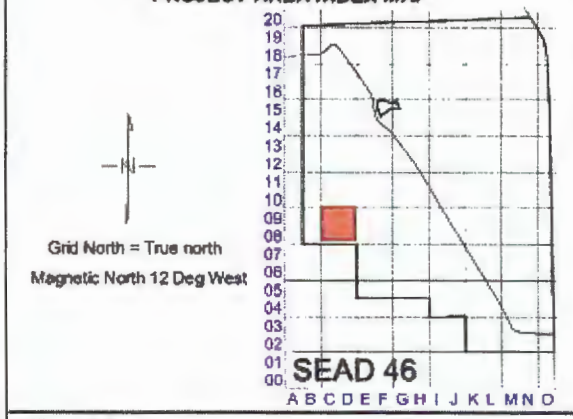
- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP



Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 12 May 04

File: 46c08
Checked By: JF
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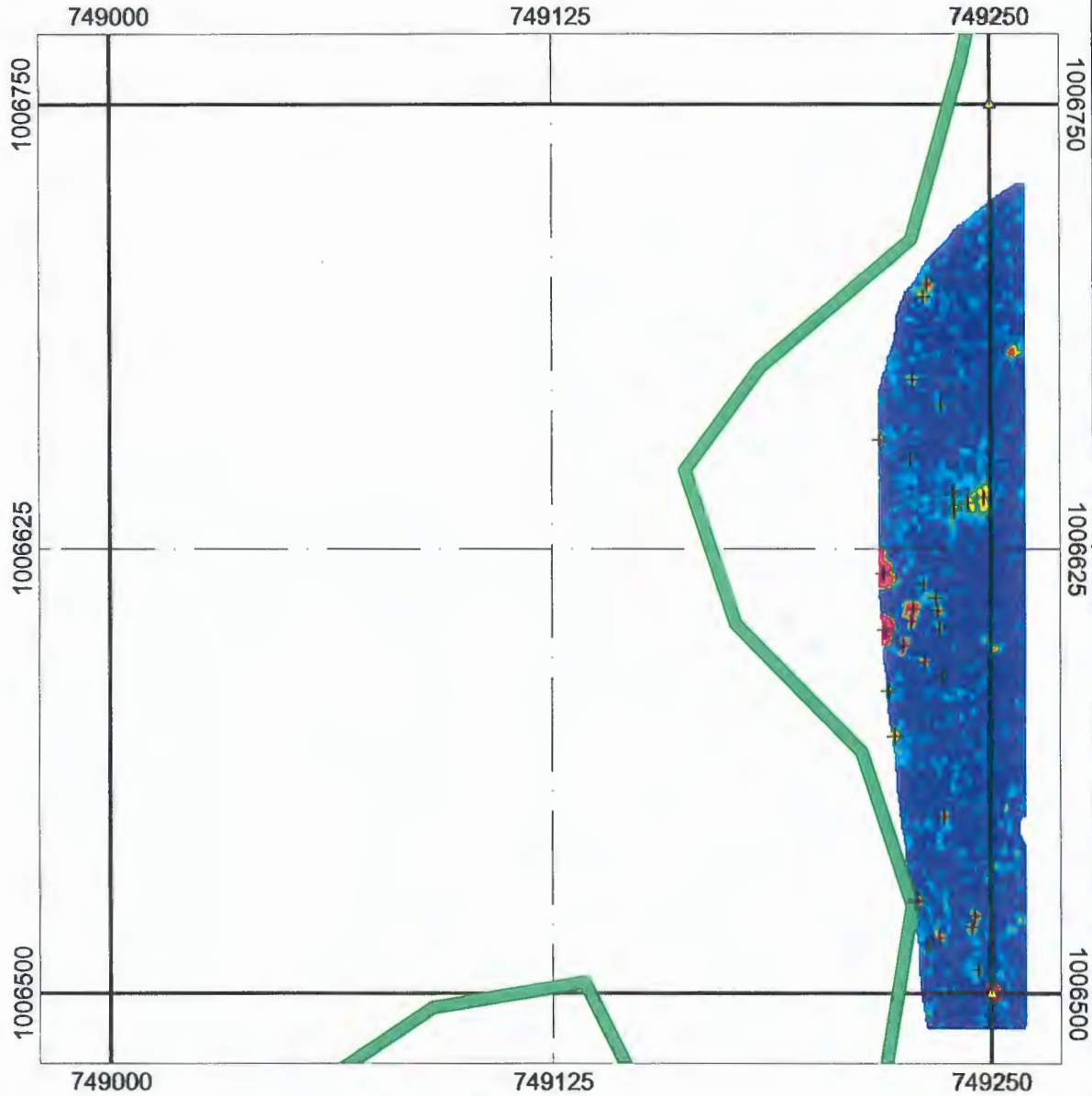
Shaw
Shaw E & I, Inc.



Sum in mV

0 2 4 6 8 10 11 12 13 14 15 16 18 20 25 30 60 100

SEAD 46: QUAD C10D11

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP

Grid North = True north
Magnetic North 12 Deg West

SEAD 46

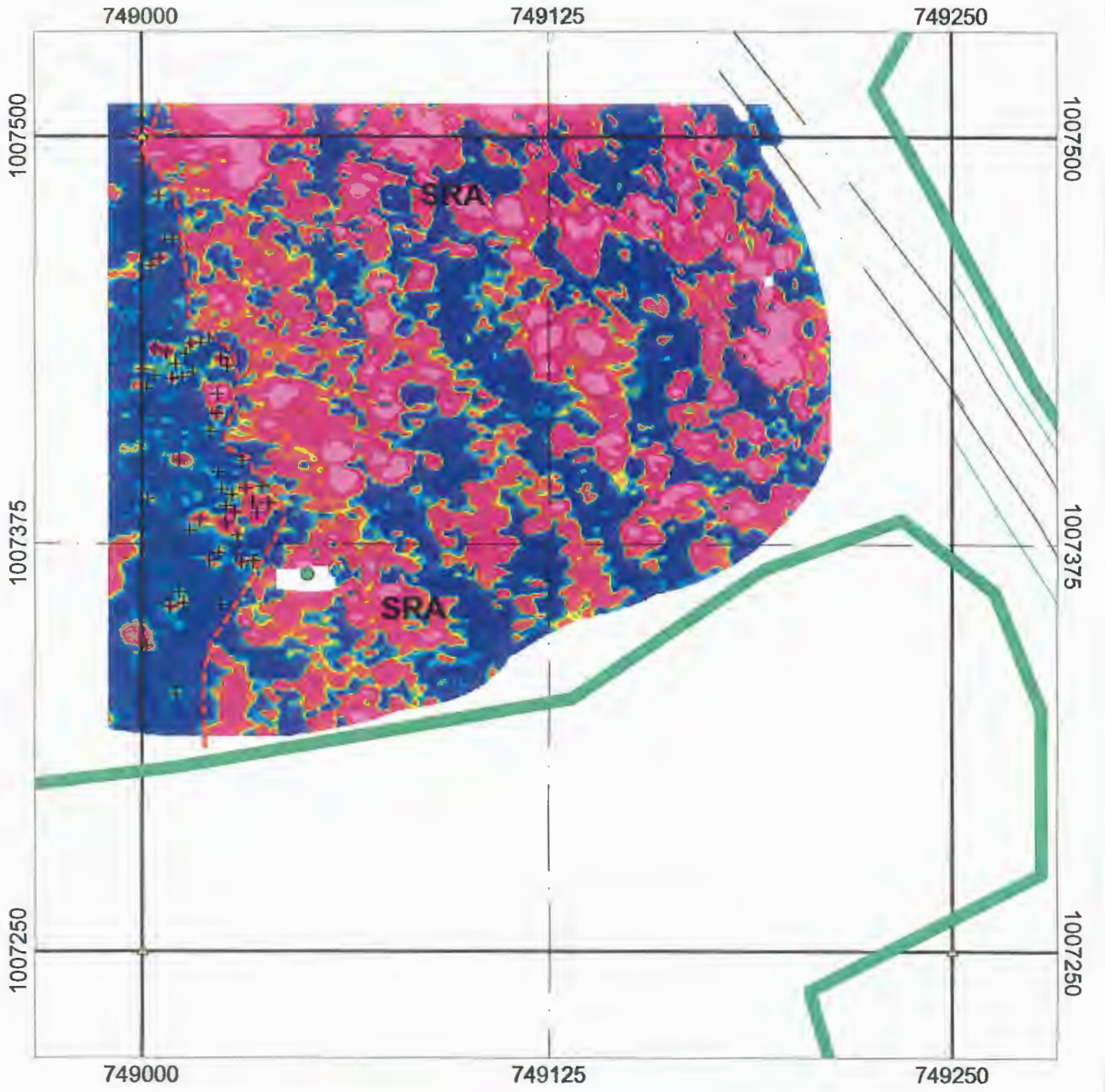
A B C D E F G H I J K L M N O

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 12 May 04

File: 46c10
Checked By: ST
Scale: 1:600

Shaw
Shaw E & I, Inc.



Sum in mV

0 2 4 6 8 10 11 12 13 14 15 16 18 20 25 30 60100

SEAD 46: QUAD C16D17

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

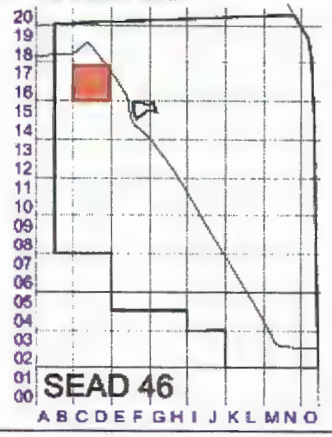
- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP



Grid North = True north
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 12 May 04

File: 46c16
Checked By:JF
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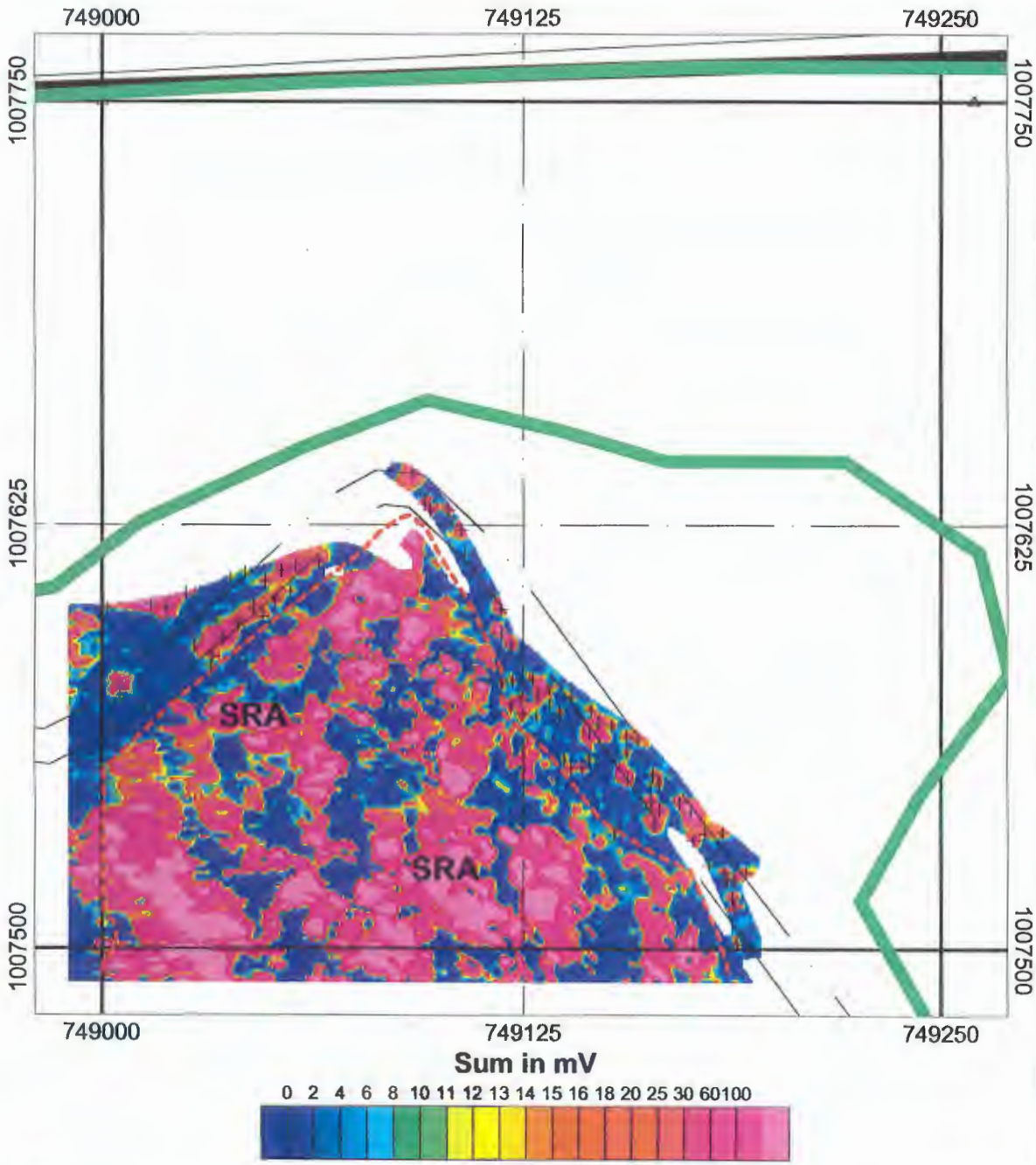
Shaw
Shaw E & I, Inc.



Sum in mV

0 2 4 6 8 10 11 12 13 14 15 16 18 20 25 30 60100

SEAD 46: QUAD C18D19

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

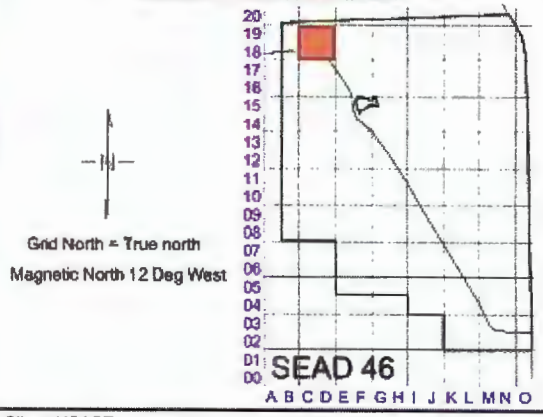
- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP



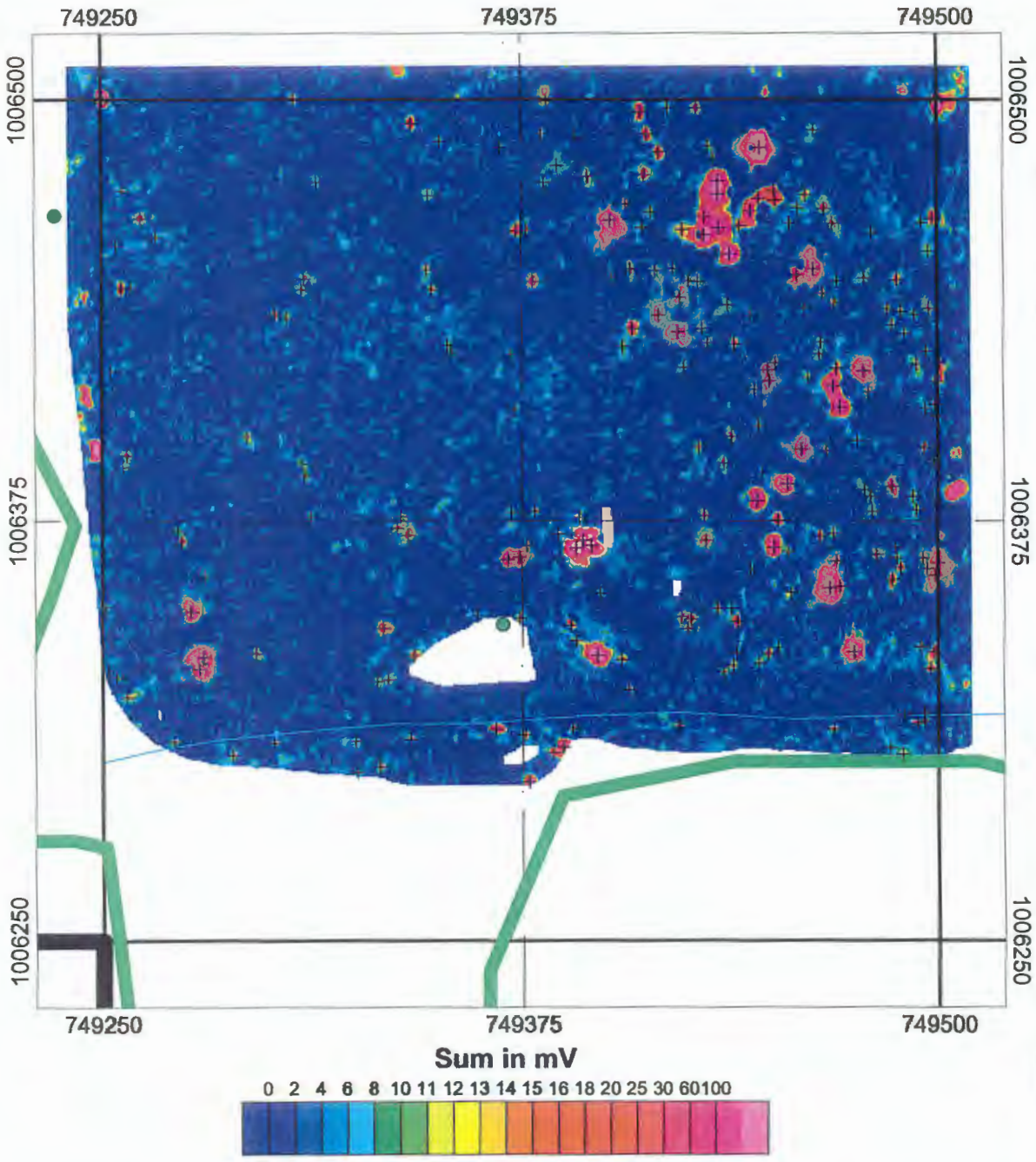
Grid North = True north
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 12 May 04

File: 46c18
Checked By: JF
Scale: 1:600

Shaw
Shaw E & I, Inc.



SEAD 46: QUAD E08F09

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

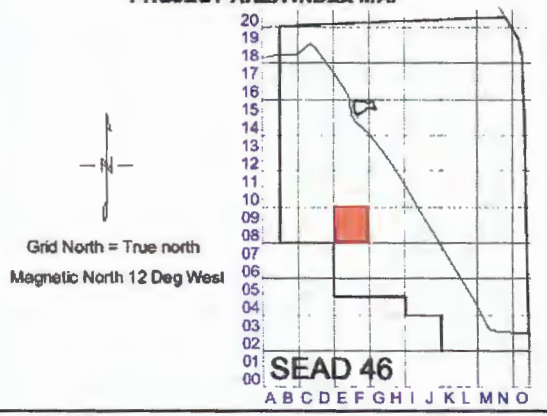
- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP



Grid North = True north
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 1 May 04

File: 46E08
Checked By: ST
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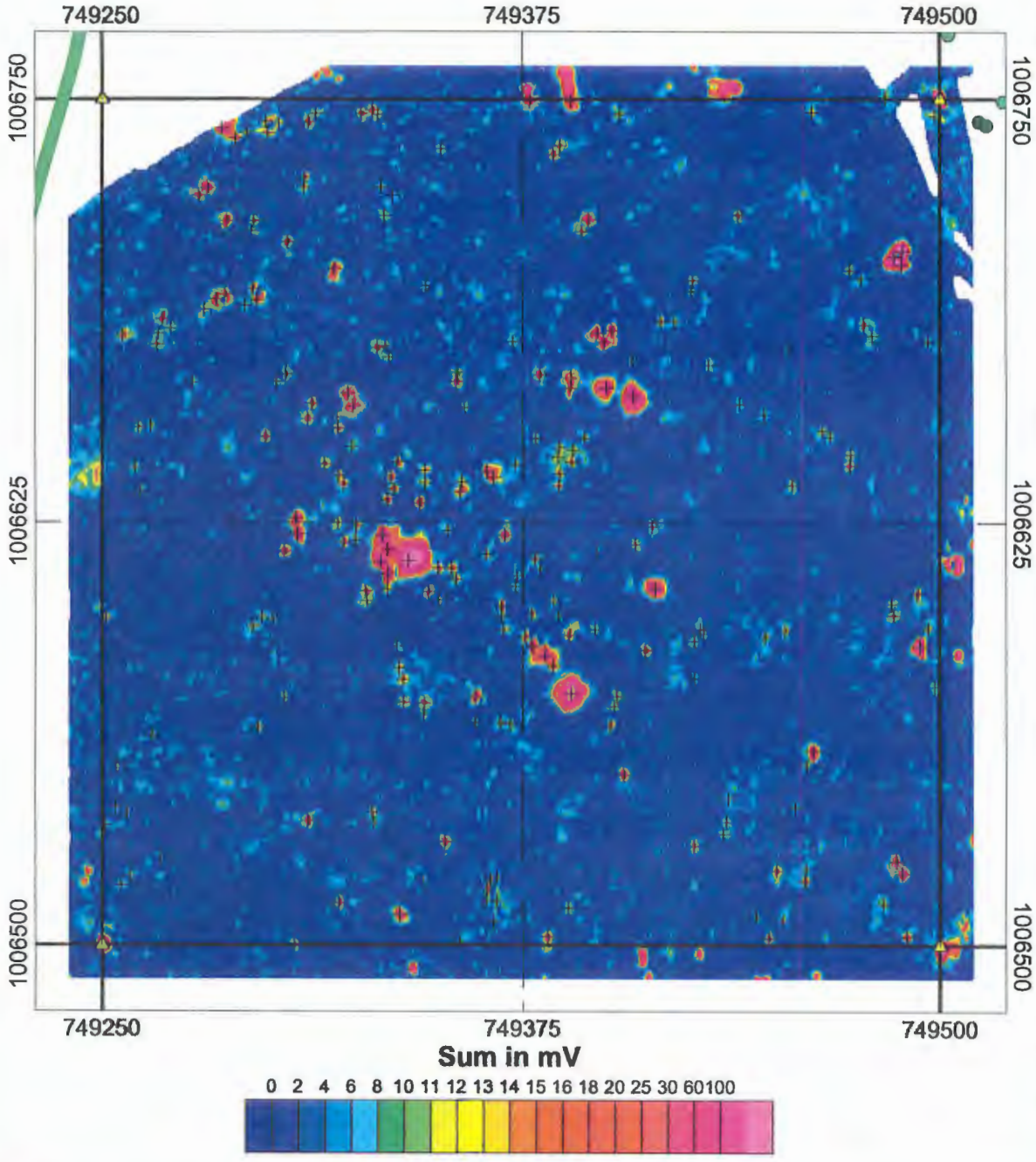
Shaw
Shaw E & I, Inc.



SEAD 46: QUAD E10F11

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

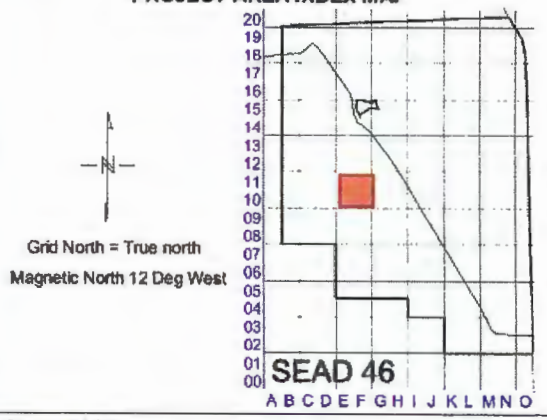
- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP



Grid North = True north
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date13 May 04

File46e10
Checked By:T
Scale: 1:600

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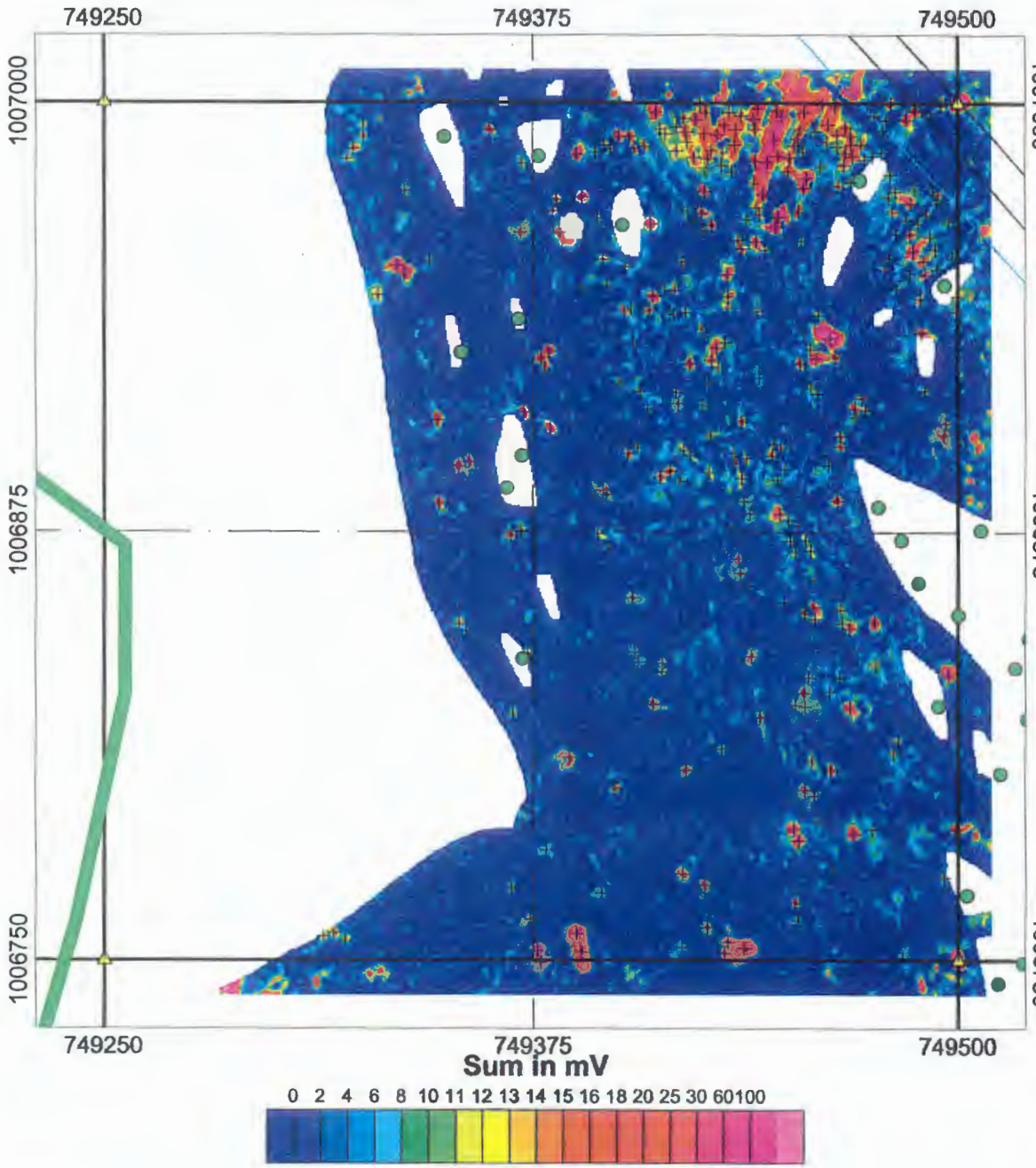


SEAD 46: QUAD E12F13

EM61MK2 TOWED ARRAY DGM DATA

Targets / Sum of Channels in mV

Seneca Army Depot Activity

LEGEND

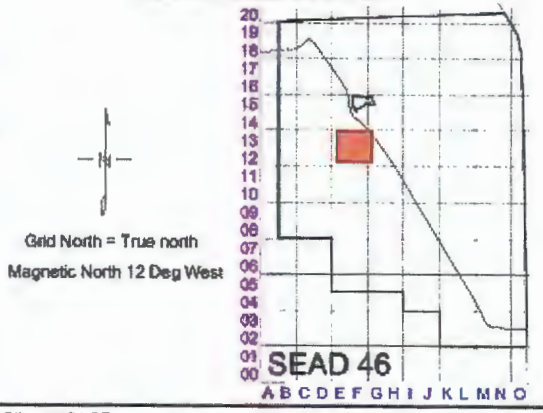
- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP



Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
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Page No: 1
Date: 15 July 04

File: 46e12
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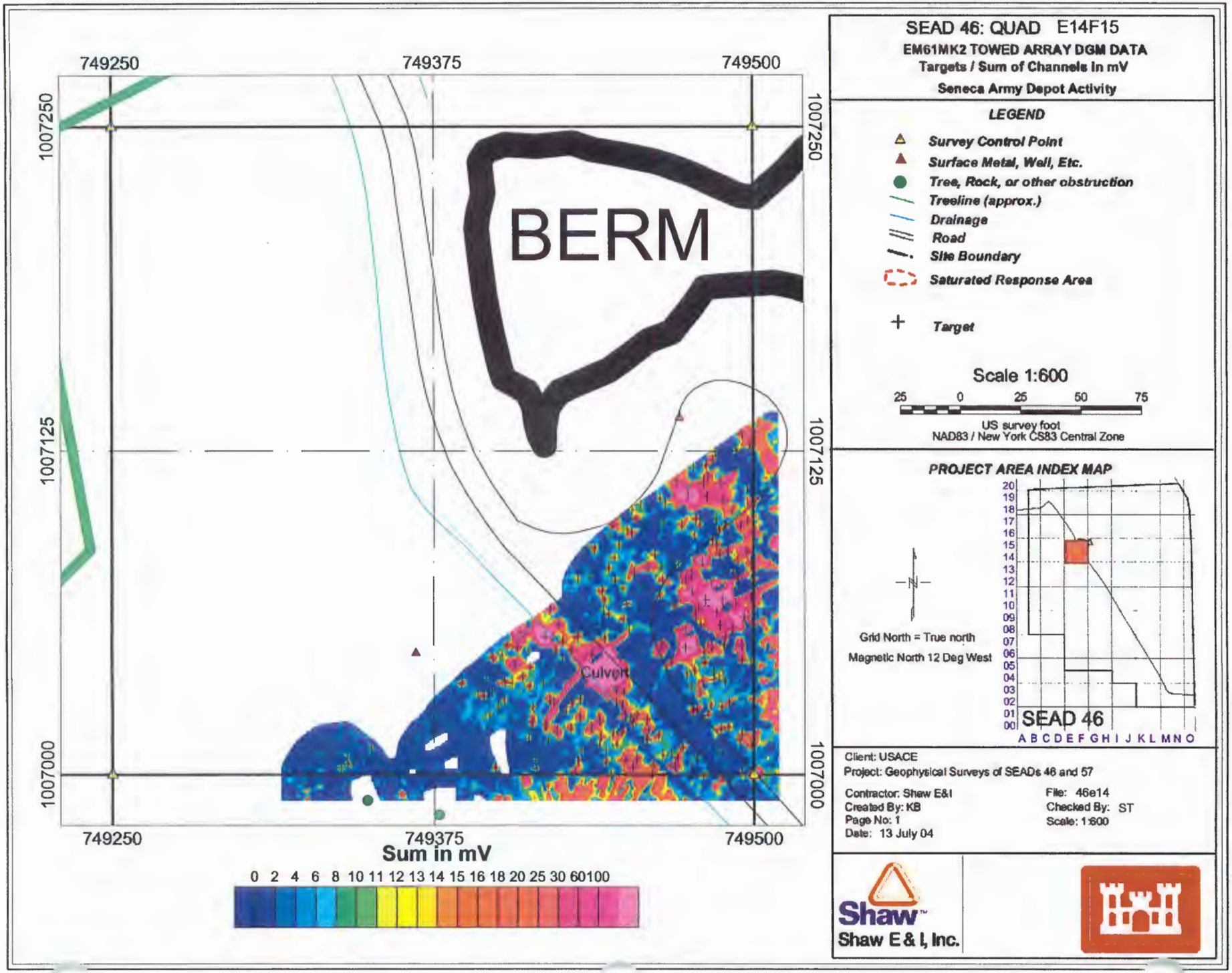
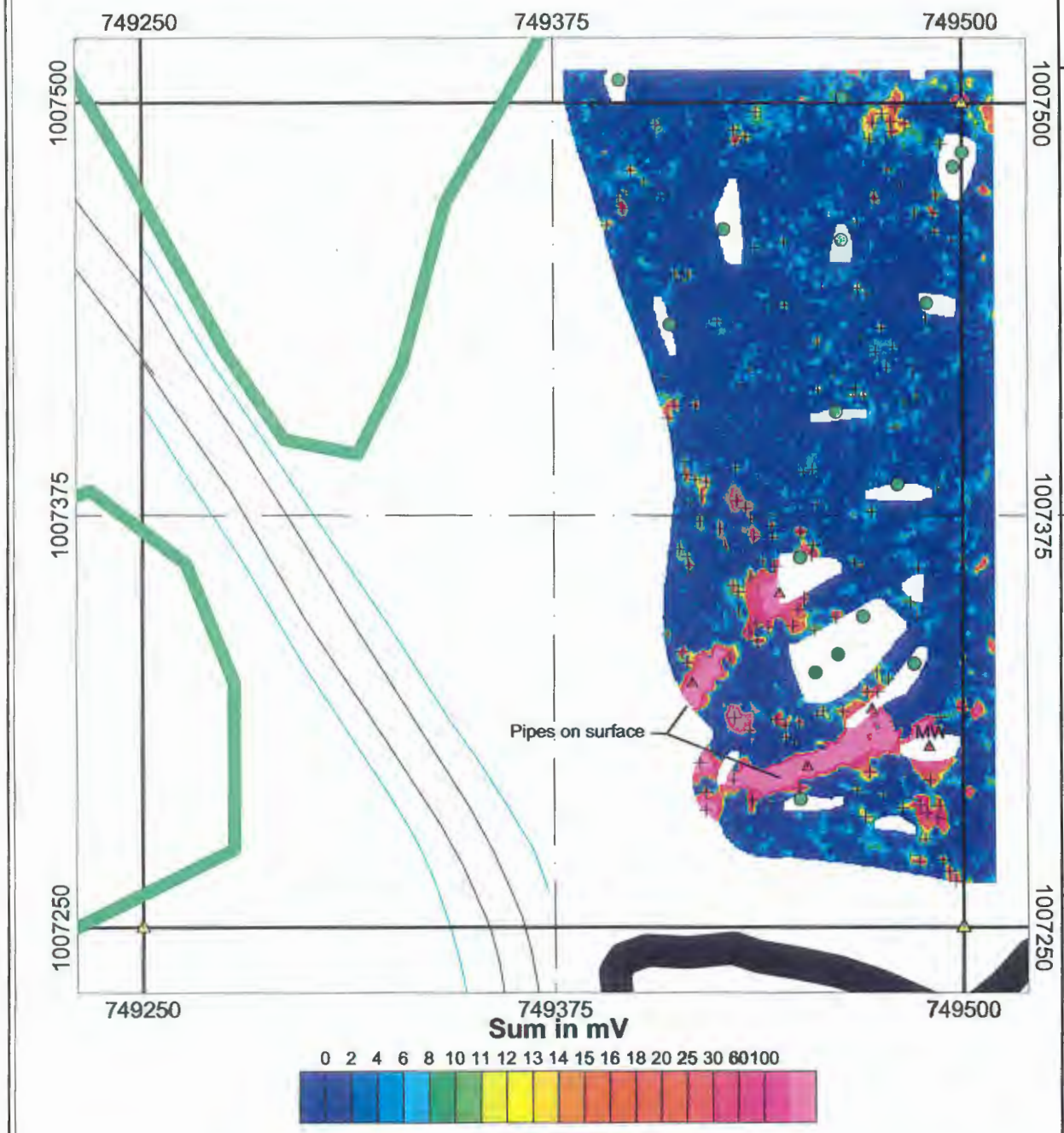
Scale: 1:600

Shaw™
Shaw E & I, Inc.


SEAD 46: QUAD E14F15
EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity
LEGEND
Survey Control Point
Surface Metal, Well, Etc.
Tree, Rock, or other obstruction
Treeline (approx.)
Drainage
Road
Site Boundary
Saturated Response Area
Target
Scale 1:600
25 0 25 50 75
US survey foot
NAD83 / New York CS83 Central Zone
PROJECT AREA INDEX MAP
Grid North = True north
Magnetic North 12 Deg West
SEAD 46
A B C D E F G H I J K L M N O
749250
749375
749500
1007250
1007125
1007000
BERM
Culvert
Sum in mV
0 2 4 6 8 10 11 12 13 14 15 16 18 20 25 30 60 100
Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57
Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 13 July 04
File: 46e14
Checked By: ST
Scale: 1:600
Shaw
Shaw E & I, Inc.



SEAD 46: QUAD E16F17

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

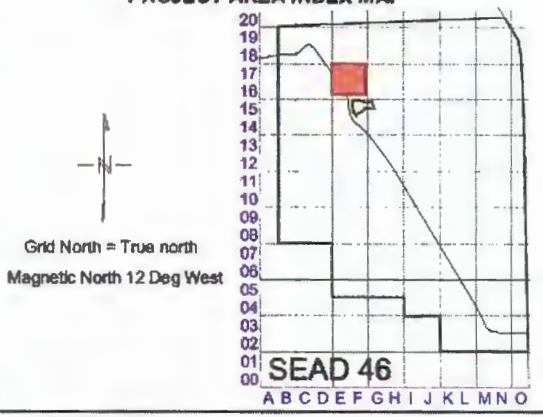
- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP



Grid North = True north
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 13 July 04

File: 46e16
Checked By: ST
Scale: 1:600

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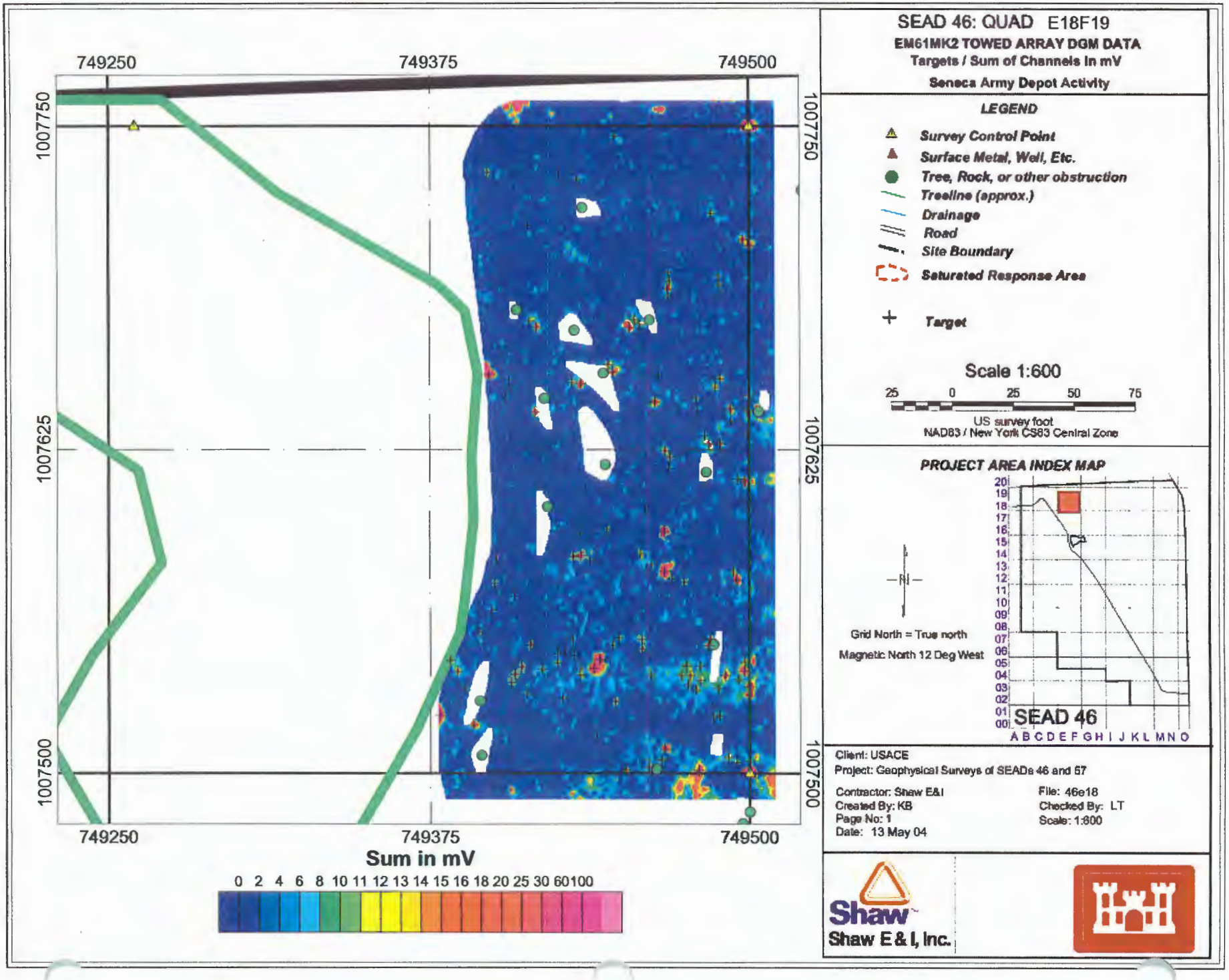
Shaw E & I, Inc.



SEAD 46: QUAD E18F19

EM61MK2 TOWED ARRAY DGM DATA

Targets / Sum of Channels in mV

Seneca Army Depot Activity

LEGEND

- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP

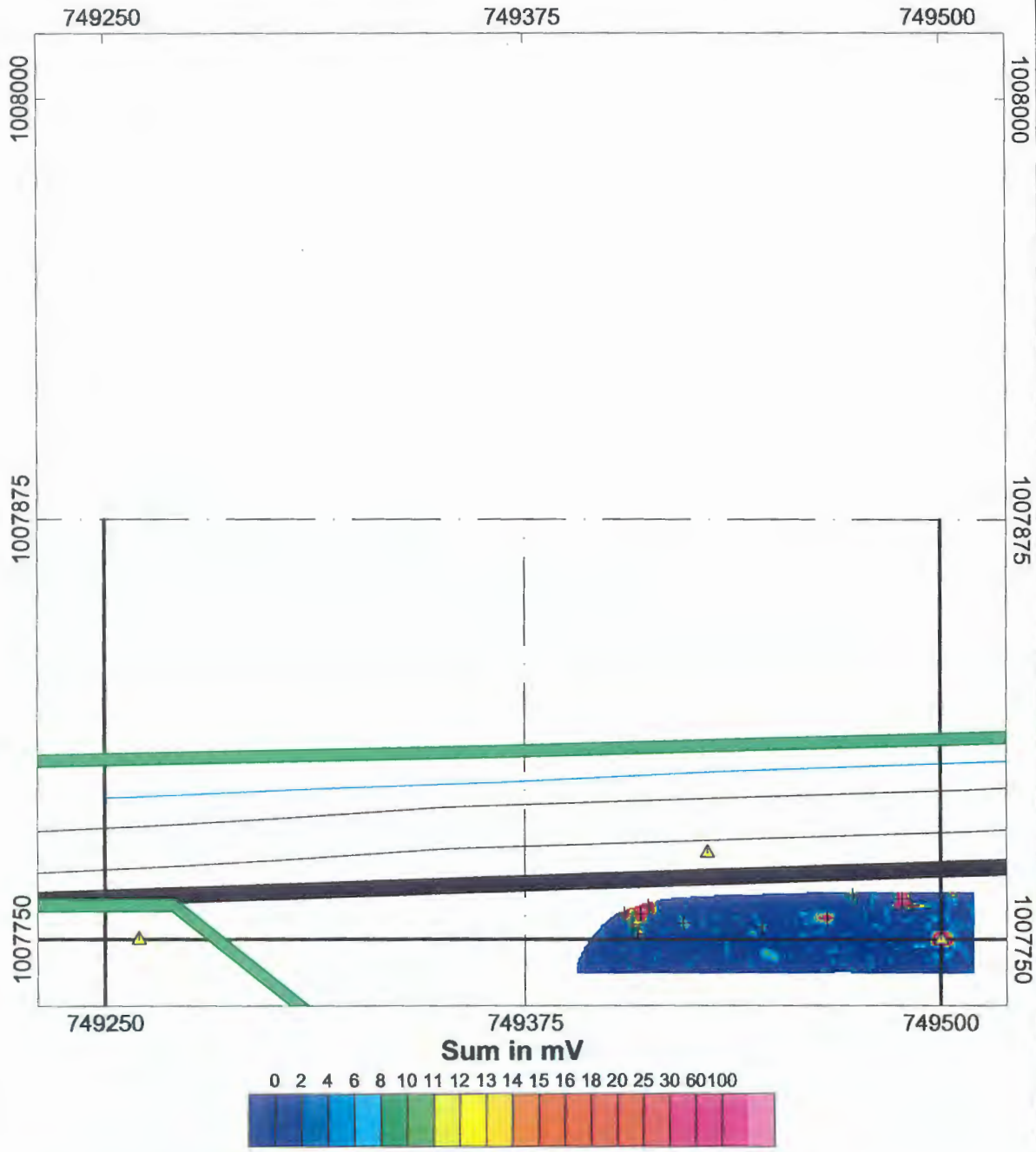
Grid North = True north
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 13 May 04

File: 46e18
Checked By: LT
Scale: 1:600

Shaw
Shaw E & I, Inc.



SEAD 46: QUAD E20F21

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

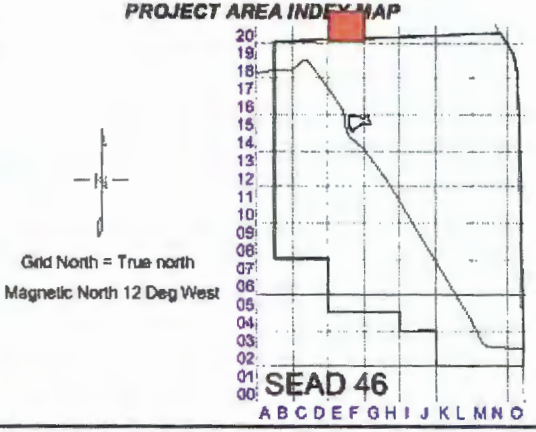
- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP



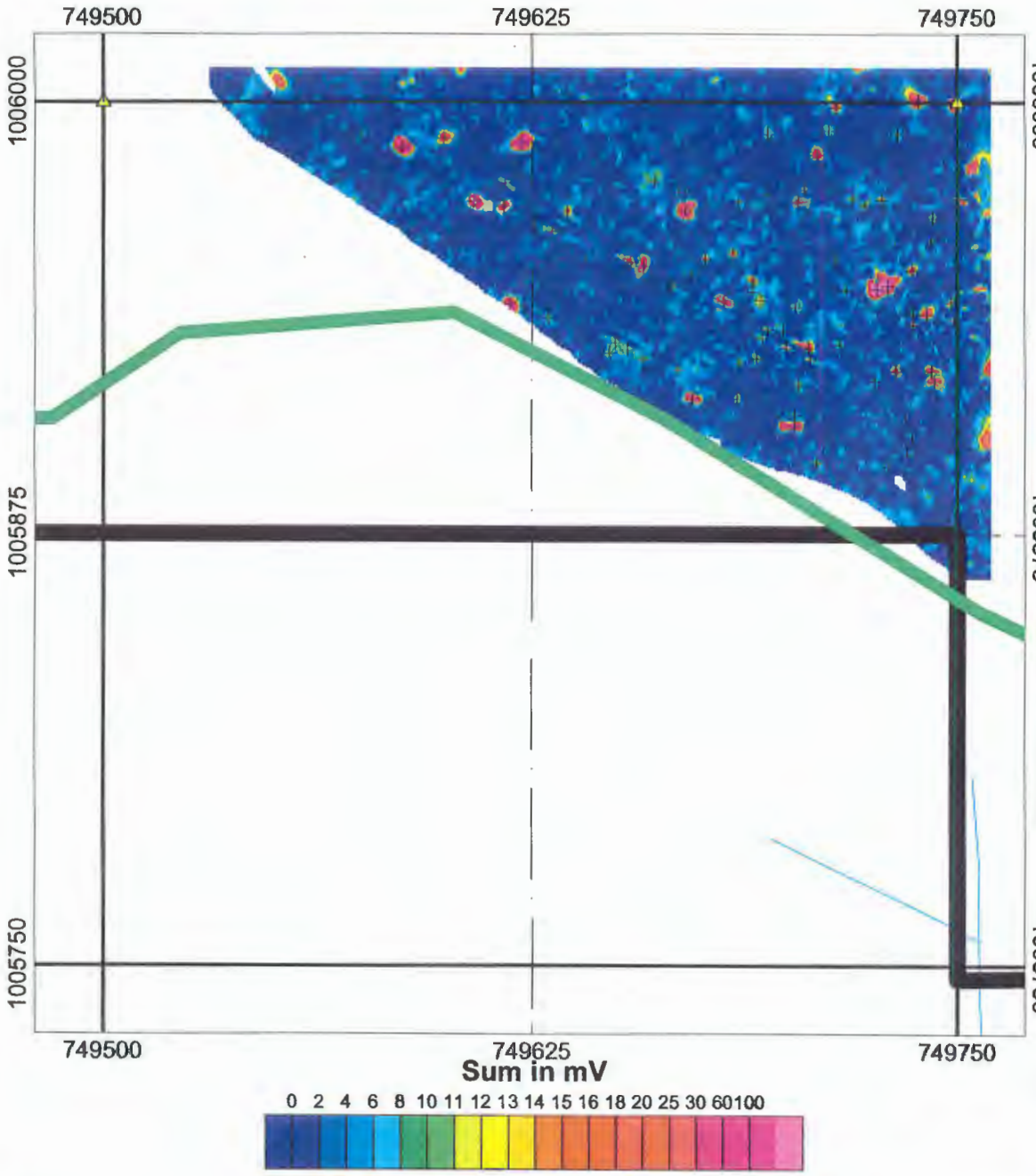
Grid North = True north
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 13 May 04

File: 46e20
Checked By: JF
Scale: 1:600

Shaw E & I, Inc.



SEAD 46: QUAD G04H05

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

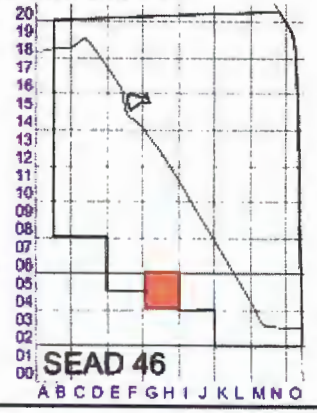
- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP



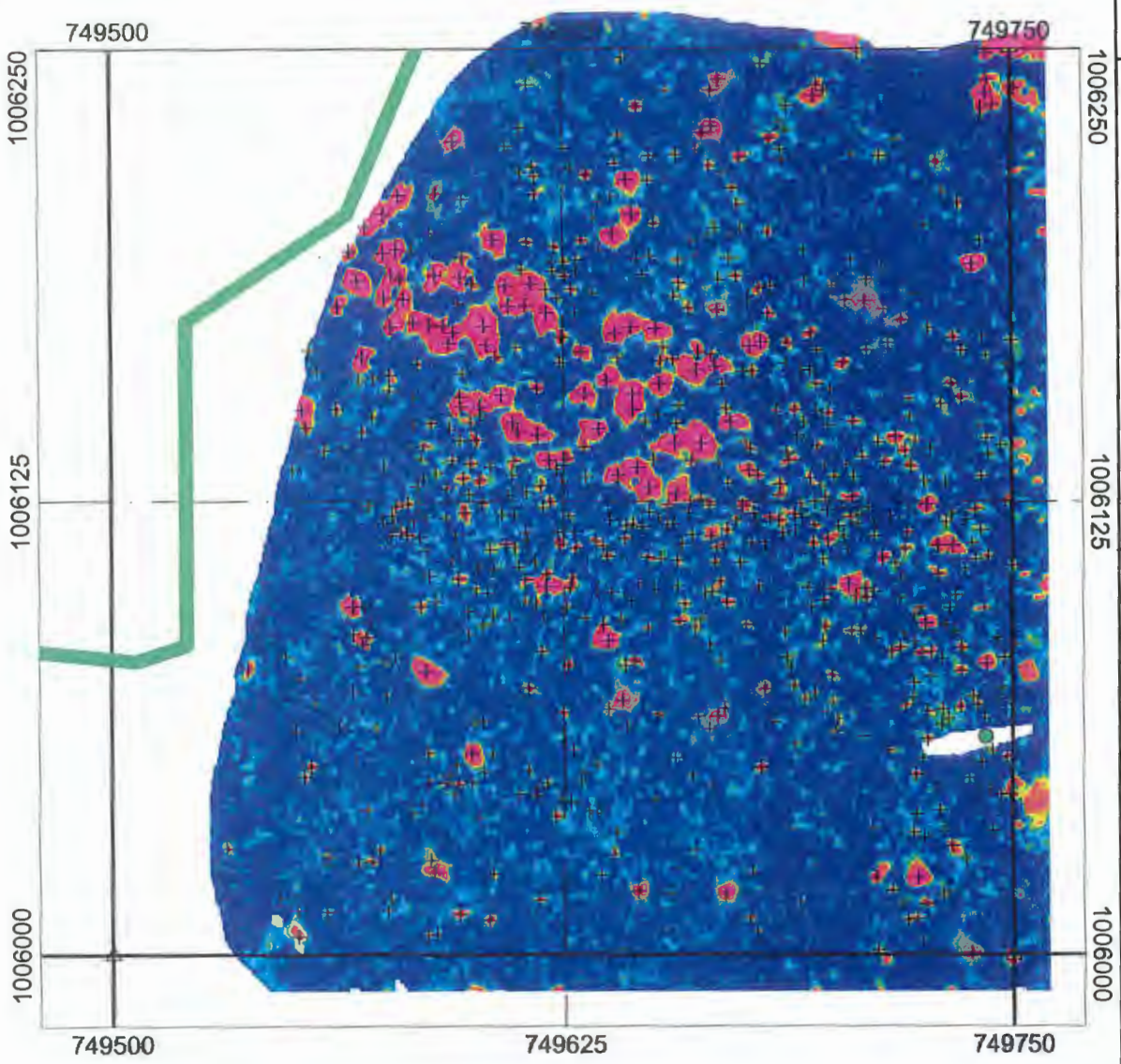
Grid North = True north
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 14July 04

File: 46g04
Checked By: ST
Scale: 1:600

Shaw™
Shaw E & I, Inc.



SEAD 46: QUAD G06H07

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

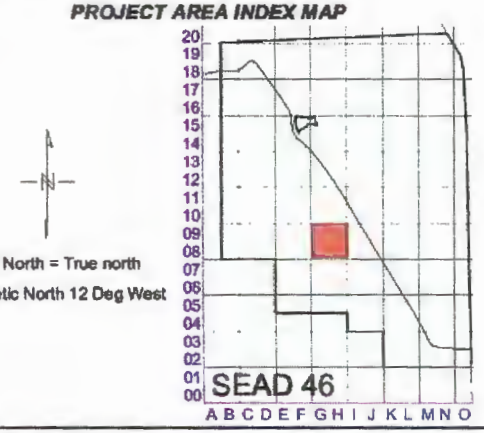
- ***Survey Control Point***
- ***Surface Metal, Well, Etc.***
- ***Tree, Rock, or other obstruction***
- ***Treeline (approx.)***
- ***Drainage***
- ***Road***
- ***Site Boundary***
- ***Saturated Response Area***
- ***Target***

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP



Grid North = True north
Magnetic North 12 Deg West

Sum in mV

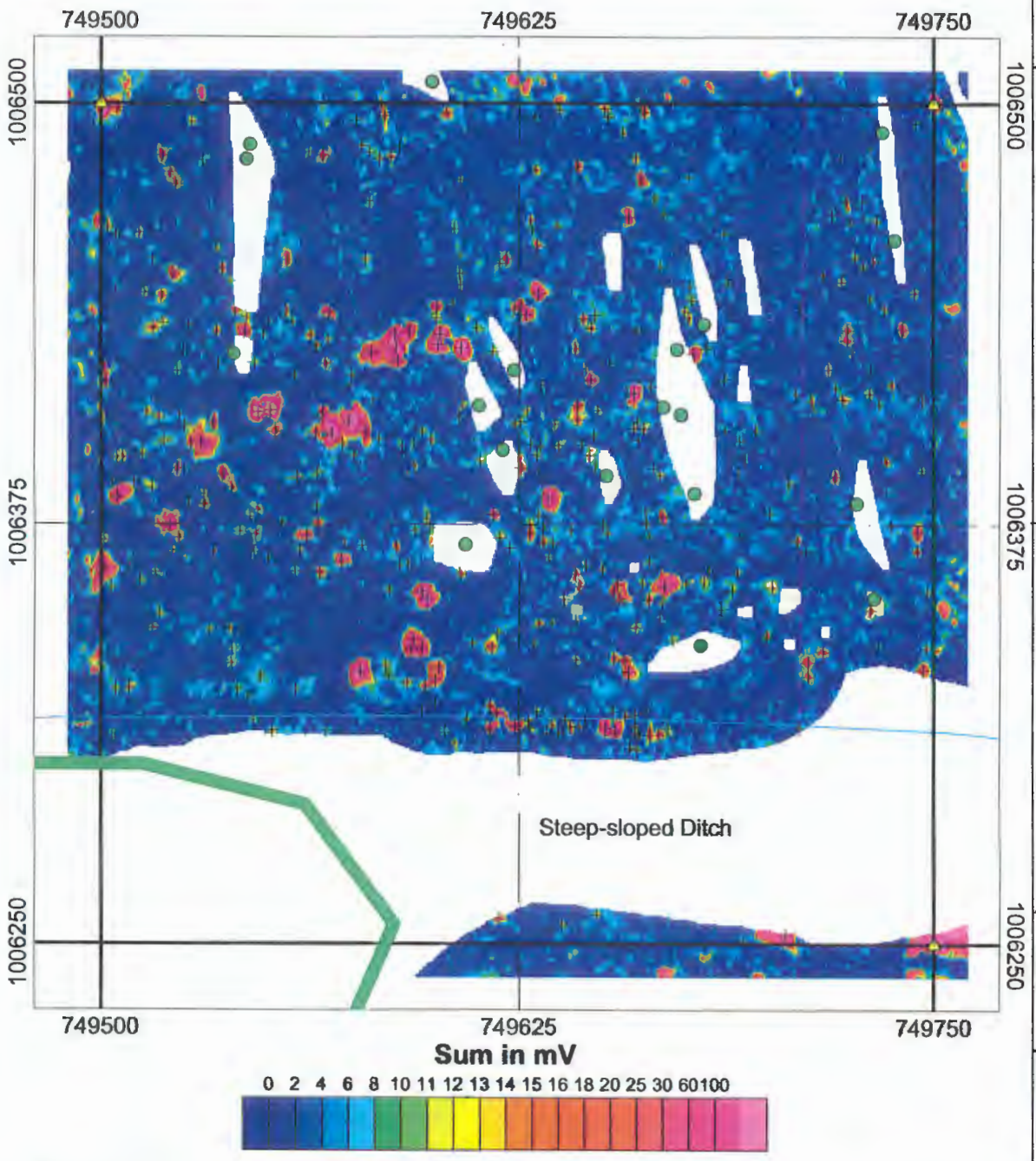
0 2 4 6 8 10 11 12 13 14 15 16 18 20 25 30 60 100

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 14 May 04

File: 46g06
Checked By: JF
Scale: 1:600

Shaw™
Shaw E & I, Inc.



SEAD 46: QUAD G08H09

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

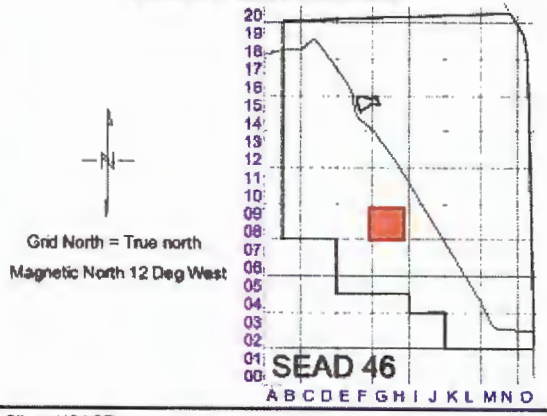
- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP

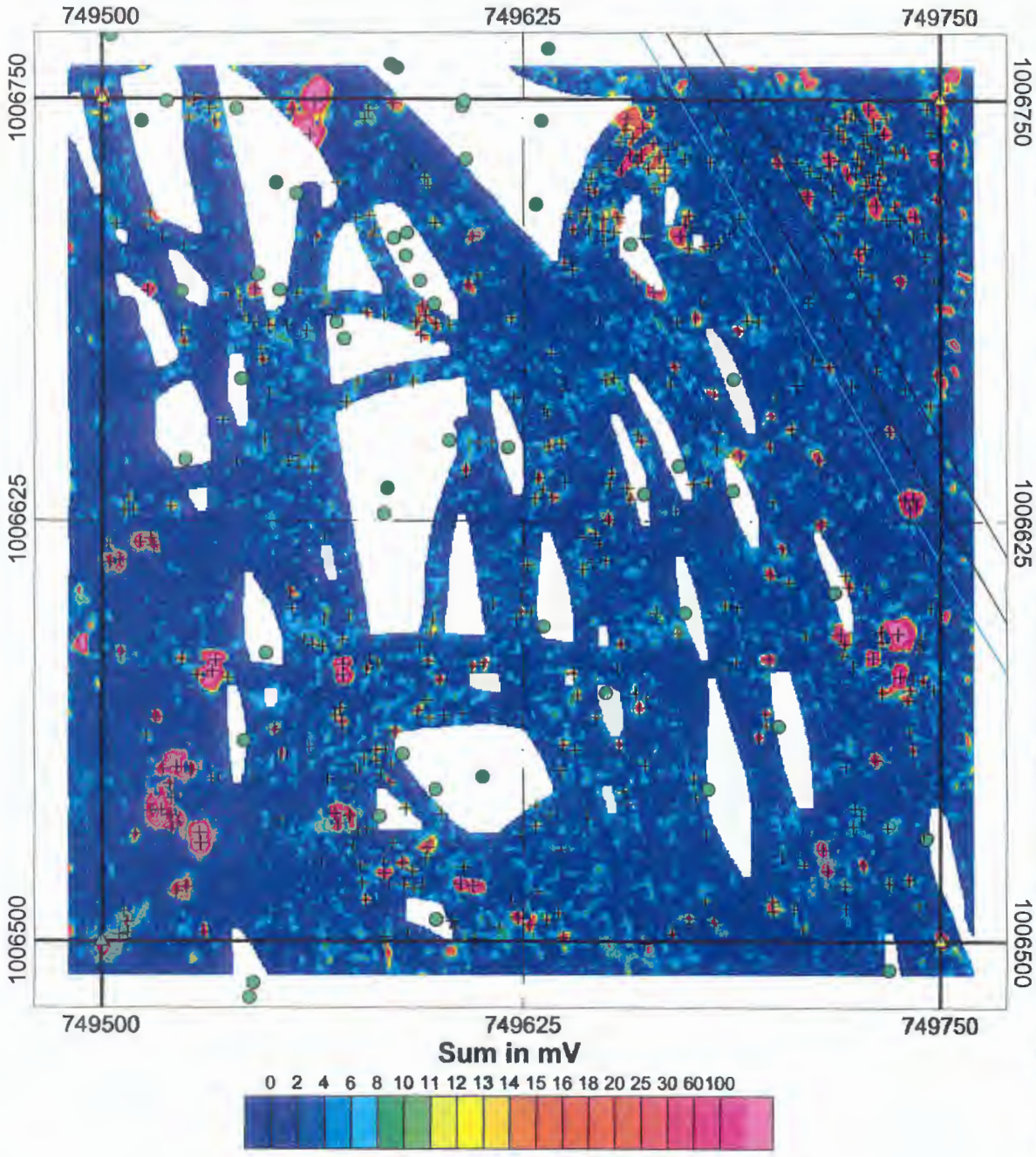


Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 14 July 04

File: 46g08
Checked By: ST
Scale: 1:600

Shaw
Shaw E & I, Inc.



SEAD 46: QUAD G10H11

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

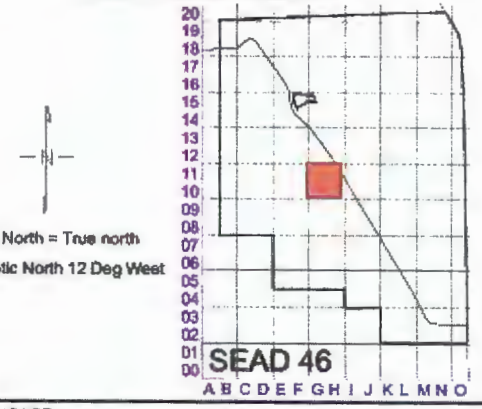
- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP



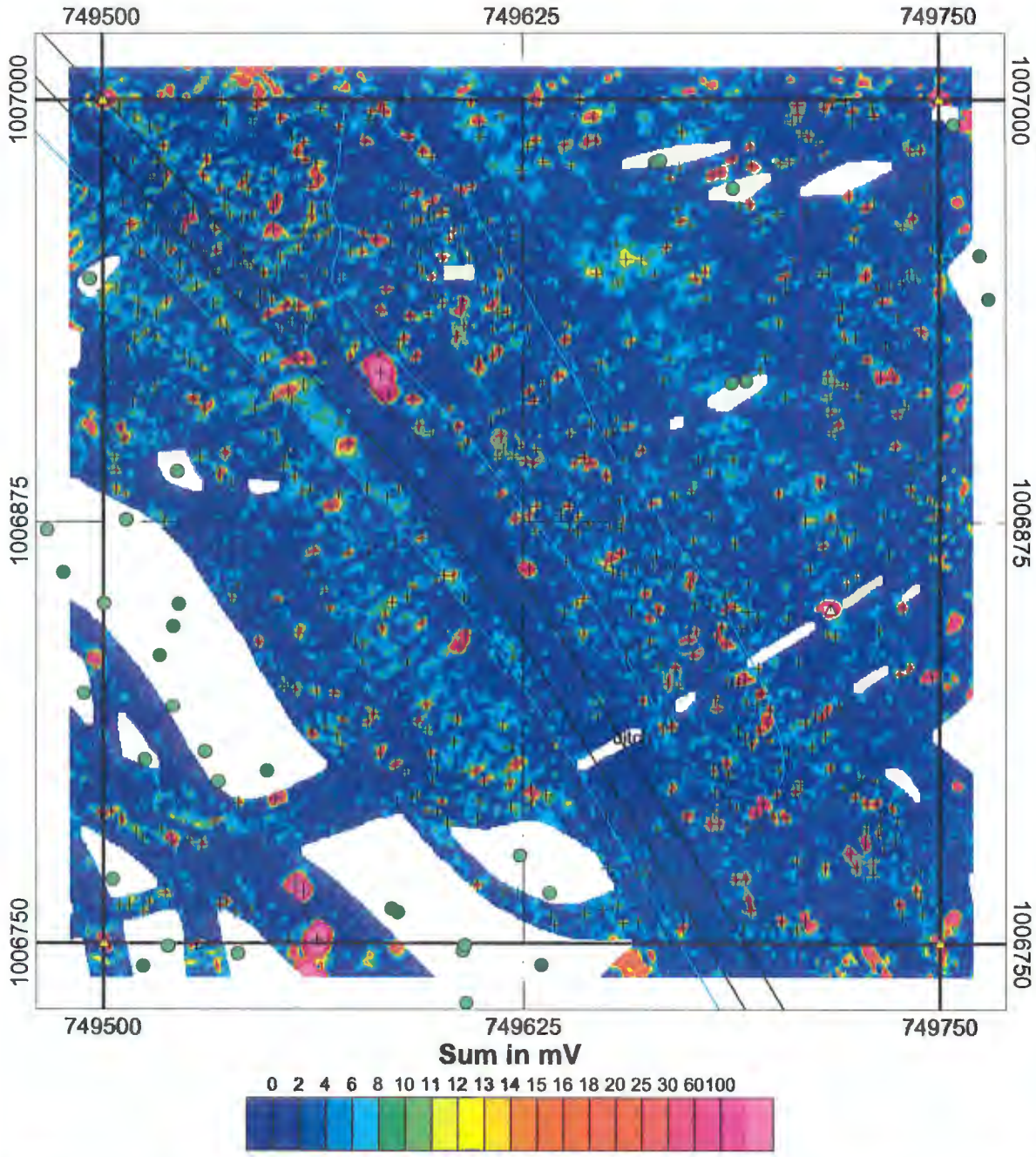
Grid North = True north
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 17 Aug 04

File: 46g10
Checked By: JF
Scale: 1:600

Shaw™
Shaw E & I, Inc.



SEAD 46: QUAD G12H13

EM61MK2 TOWED ARRAY DGM DATA

Targets / Sum of Channels in mV

Seneca Army Depot Activity

LEGEND

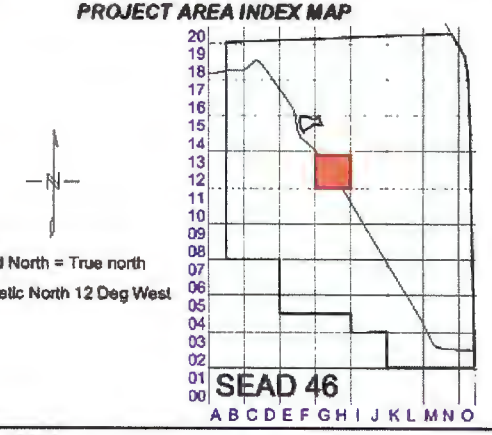
- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP



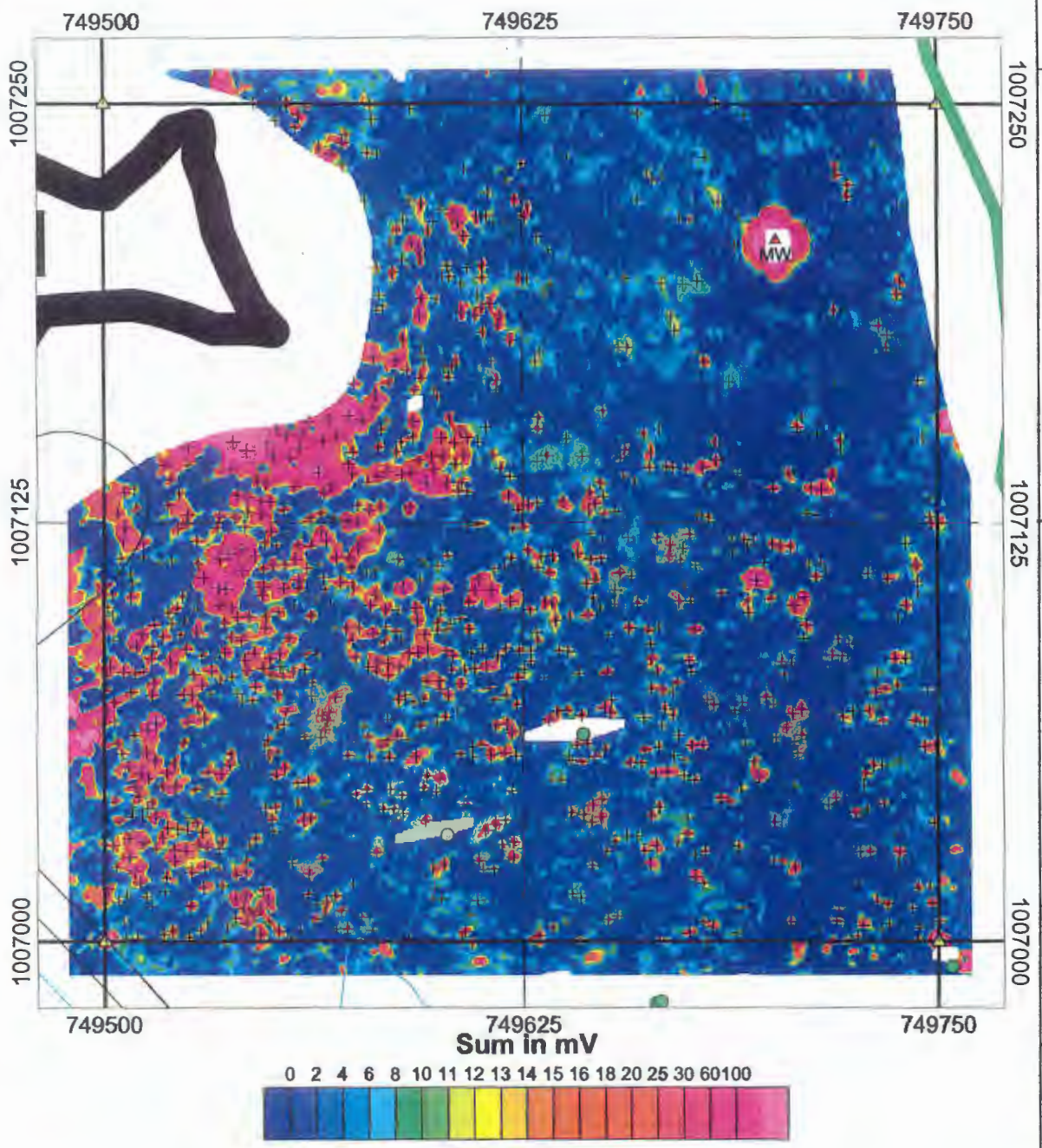
Grid North = True north
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 26 May 04

File: 46g12
Checked By: ST
Scale: 1:600

Shaw™
Shaw E & I, Inc.



SEAD 46: QUAD G14H15

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

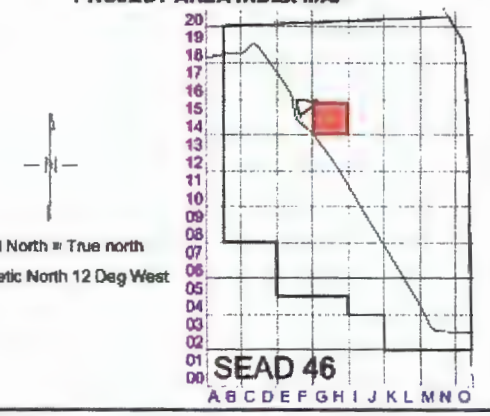
- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP



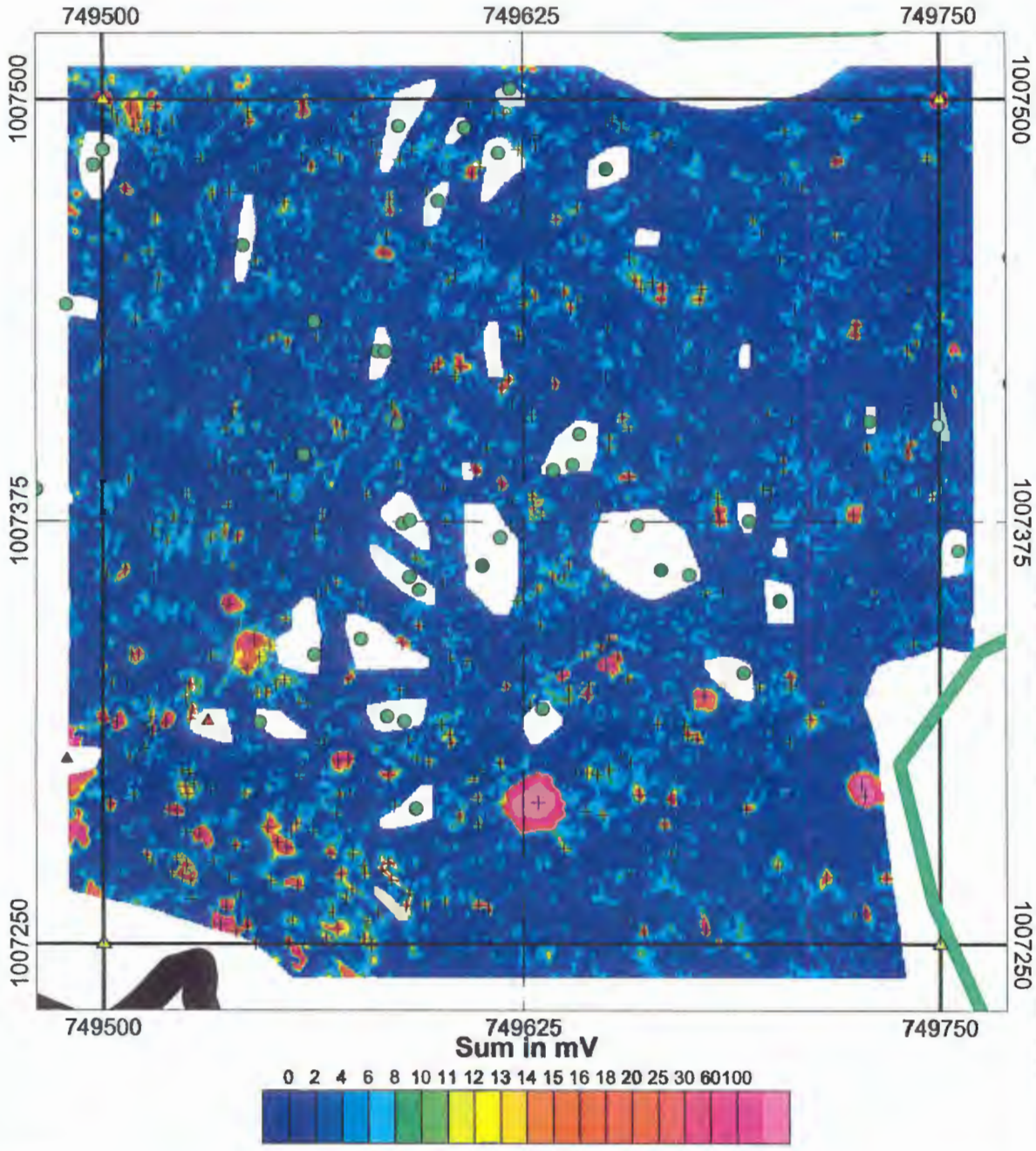
Grid North = True north
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 45 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 14 July 04

File: 46g14
Checked By: ST
Scale: 1:600

Shaw
Shaw E & I, Inc.



SEAD 46: QUAD G16H17

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

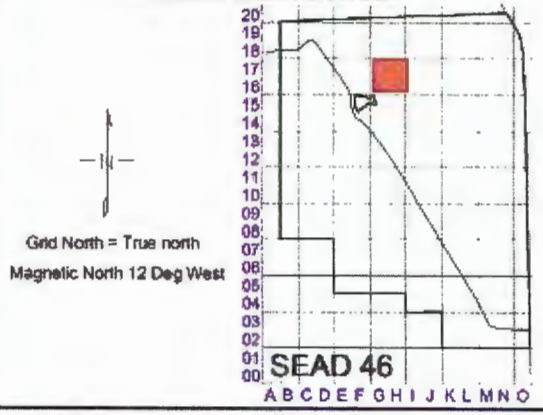
- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP



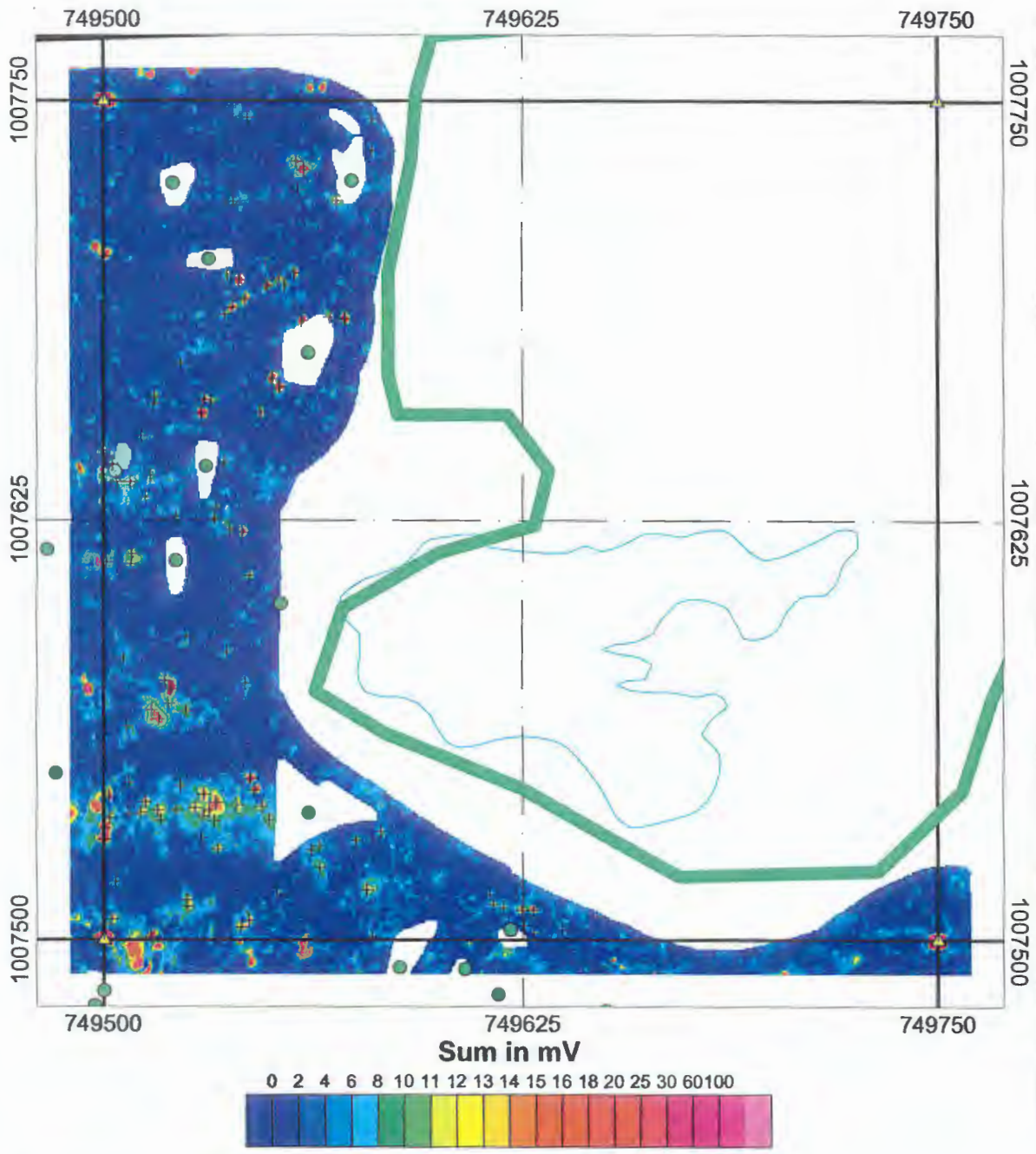
Grid North = True north
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 14 July 04

File: 46g16
Checked By: ST
Scale: 1:600

Shaw™
Shaw E & I, Inc.



SEAD 46: QUAD G18H19

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

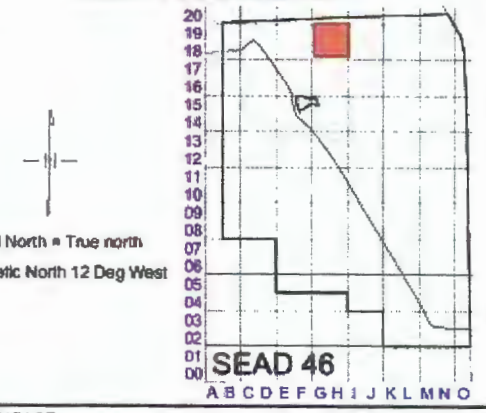
- ***Survey Control Point***
- ***Surface Metal, Well, Etc.***
- ***Tree, Rock, or other obstruction***
- ***Treeline (approx.)***
- ***Drainage***
- ***Road***
- ***Site Boundary***
- ***Saturated Response Area***
- ***Target***

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP



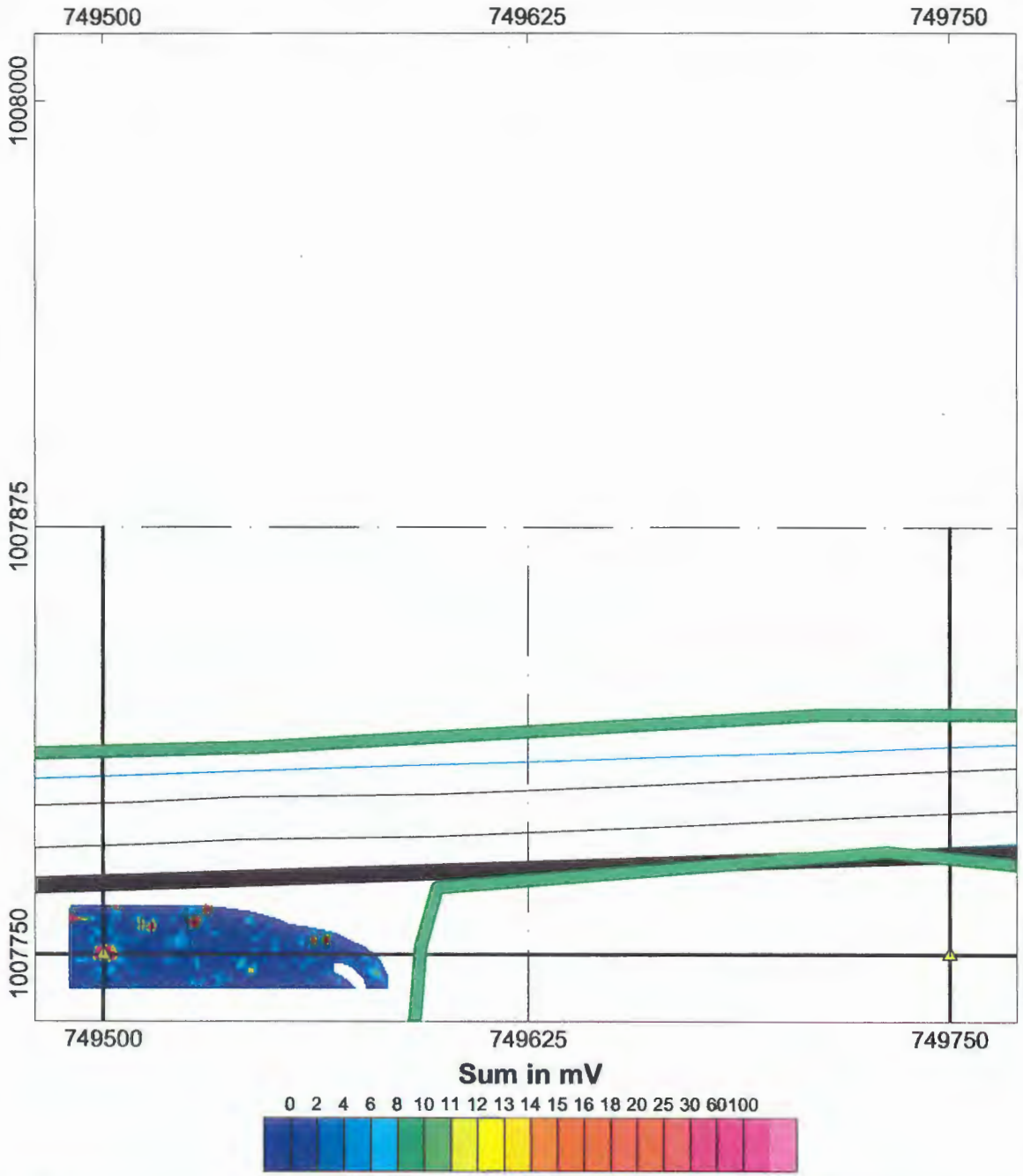
Grid North = True north
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 17 Jul 04

File: 46g18
Checked By: JF
Scale: 1:600

Shaw™
Shaw E & I, Inc.



SEAD 46: QUAD G20H21

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

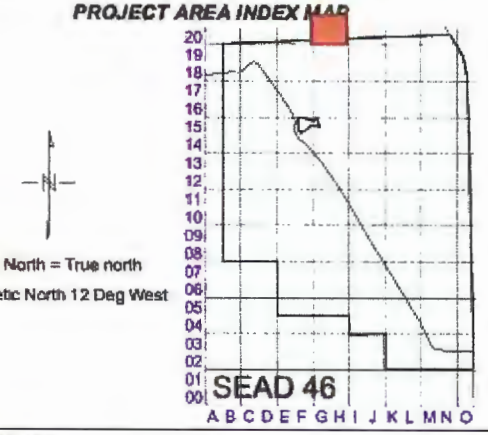
- ***Survey Control Point***
- ***Surface Metal, Well, Etc.***
- ***Tree, Rock, or other obstruction***
- ***Treeline (approx.)***
- ***Drainage***
- ***Road***
- ***Site Boundary***
- ***Saturated Response Area***
- ***Target***

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP



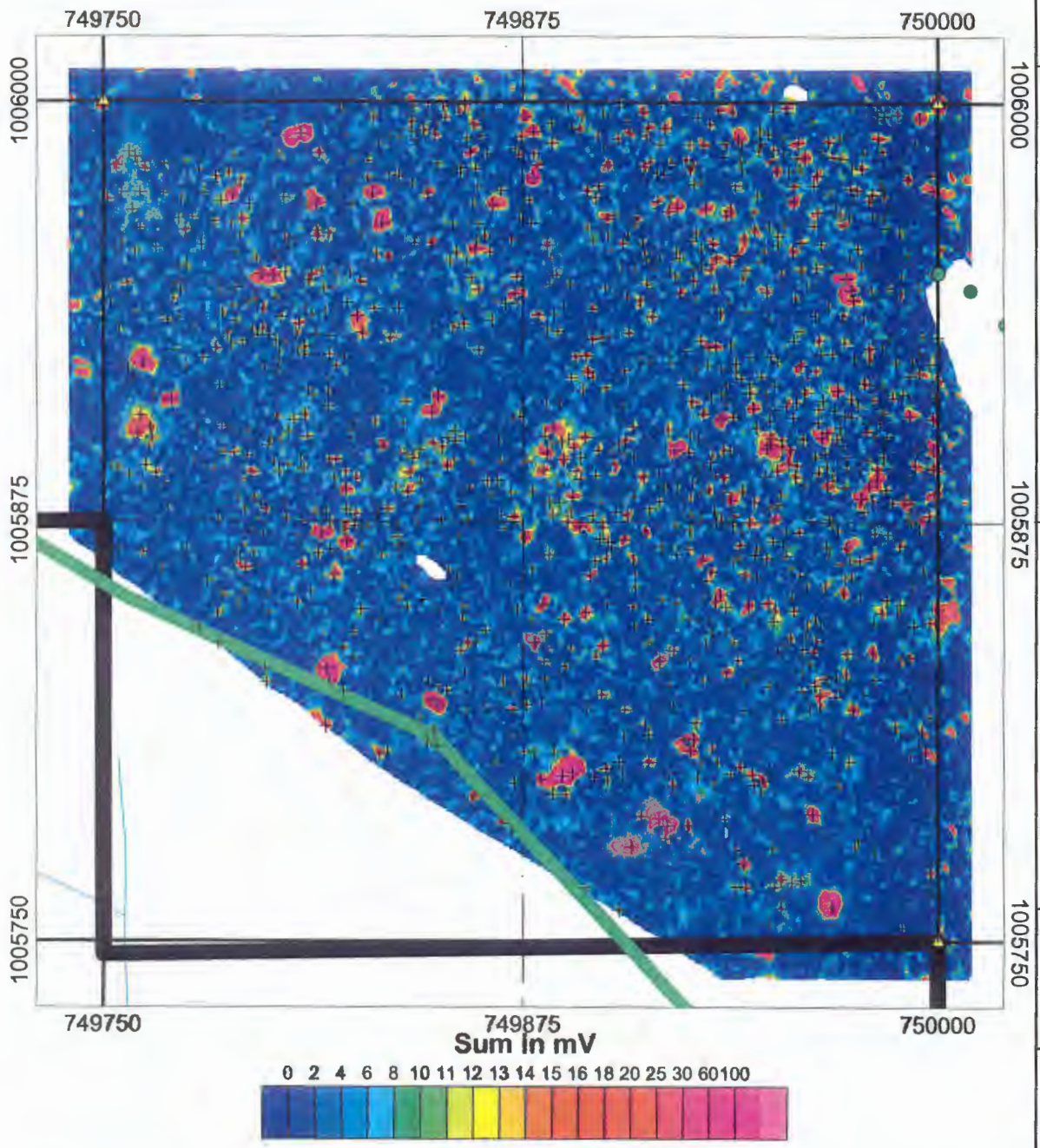
Grid North = True north
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 14 May 04

File: 46g20
Checked By: JF
Scale: 1:600

Shaw
Shaw E & I, Inc.



SEAD 46: QUAD I04J05

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

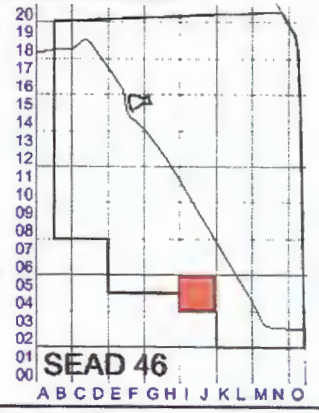
- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP



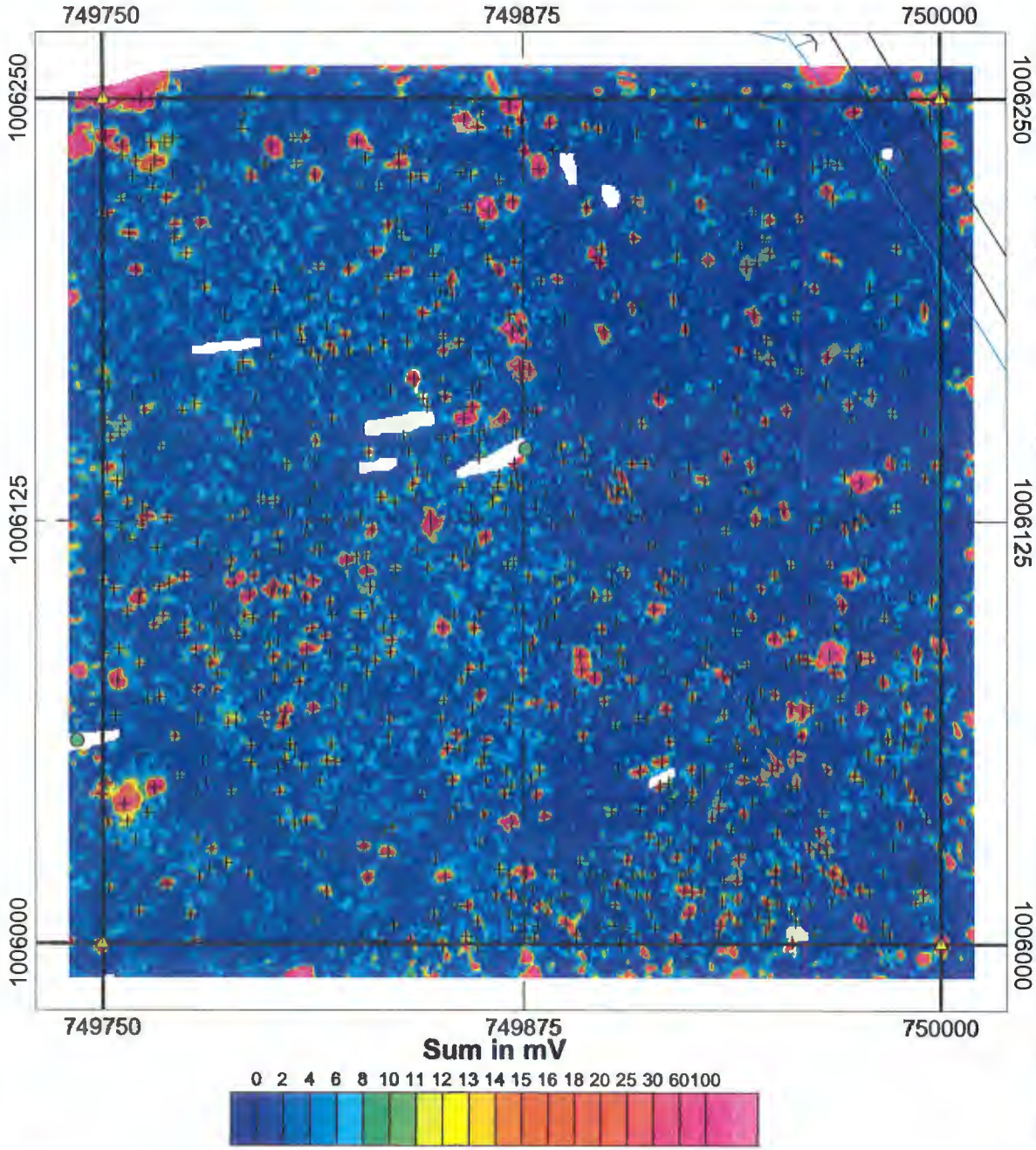
Grid North = True north
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 26 July 04

File: 46i04
Checked By: LT
Scale: 1:600

Shaw™
Shaw E & I, Inc.



SEAD 46: QUAD I06J07

EM61MK2 TOWED ARRAY DGM DATA

Targets / Sum of Channels in mV

Seneca Army Depot Activity

LEGEND

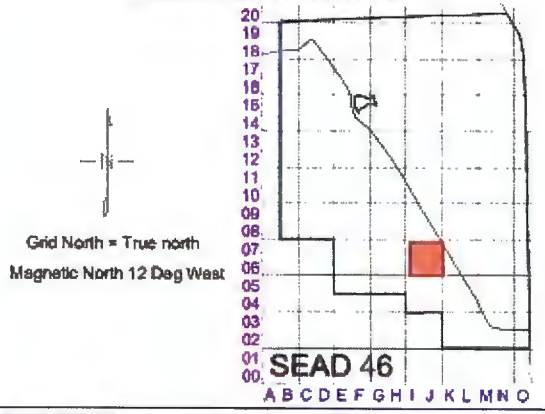
- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP



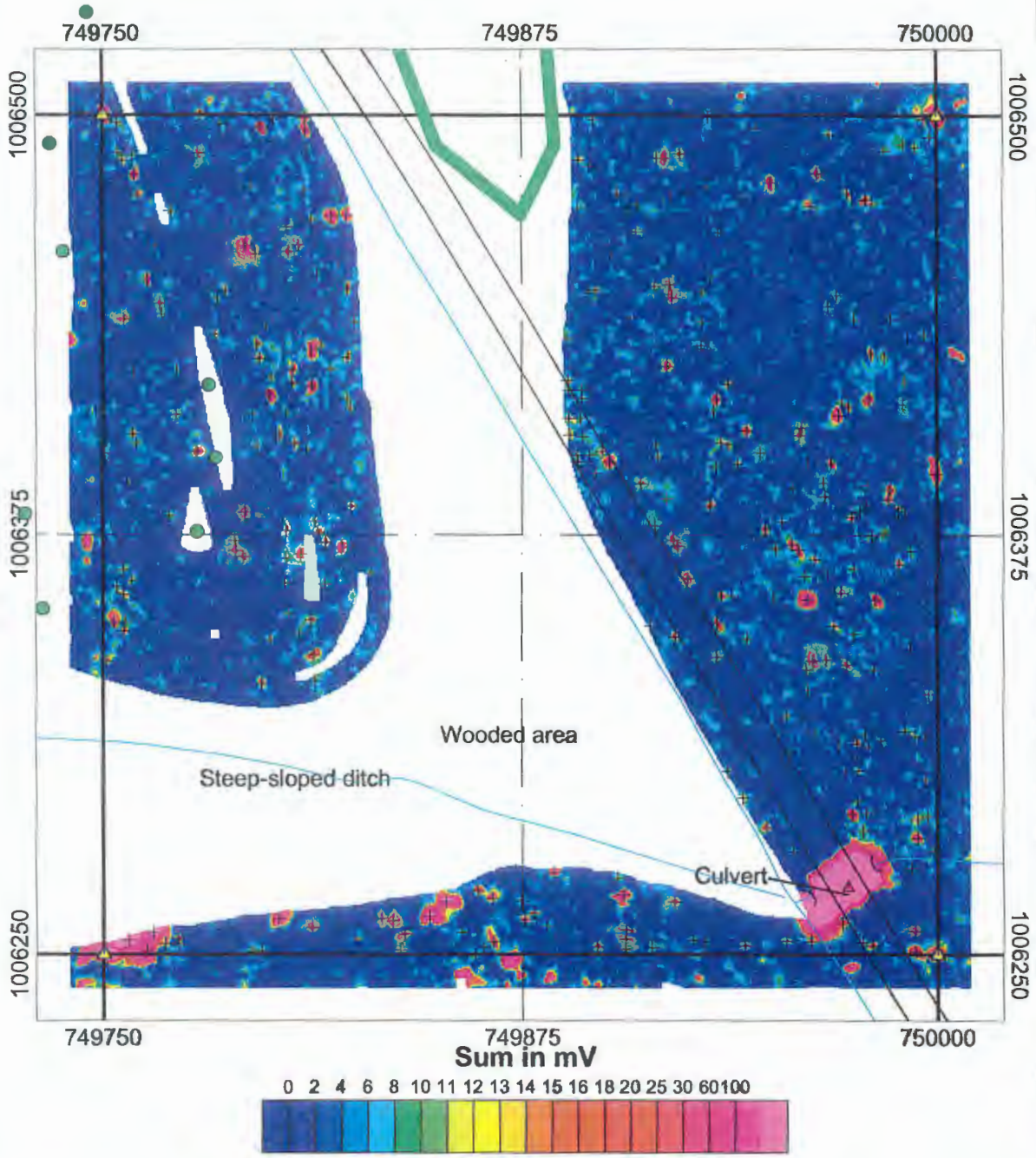
Grid North = True north
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 17 May 04

File: 46i06
Checked By: JF
Scale: 1:600

Shaw™
Shaw E & I, Inc.



SEAD 46: QUAD I08J09

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

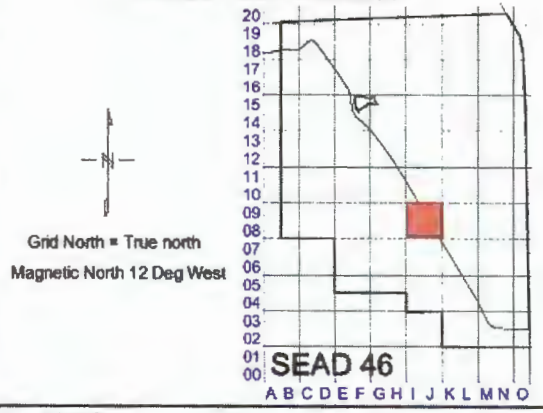
- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP



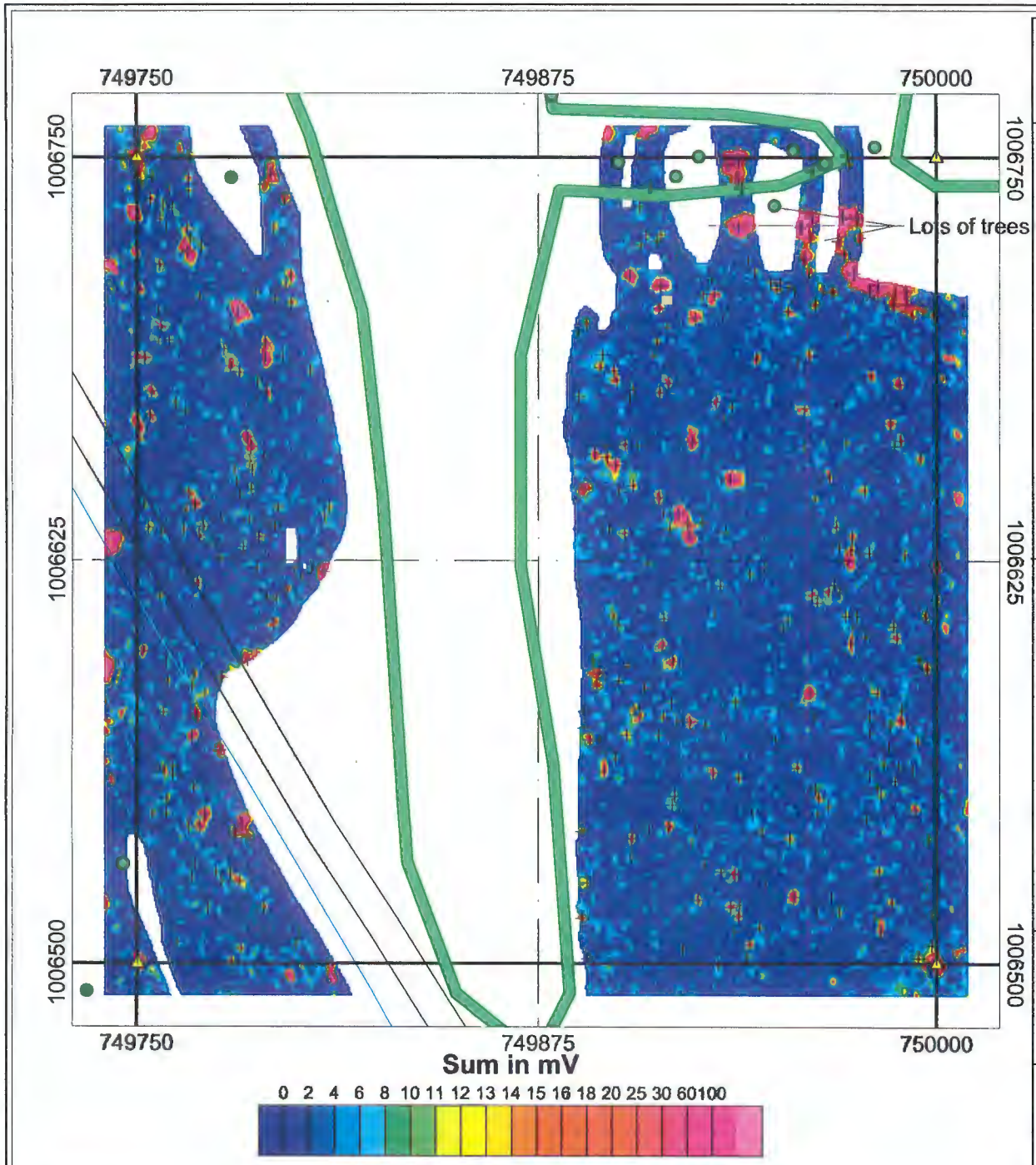
Grid North = True north
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 26 July 04

File: 46i08
Checked By: LT
Scale: 1:600

Shaw
Shaw E & I, Inc.



SEAD 46: QUAD I10J11

EM61MK2 TOWED ARRAY DGM DATA

Targets / Sum of Channels in mV

Seneca Army Depot Activity

LEGEND

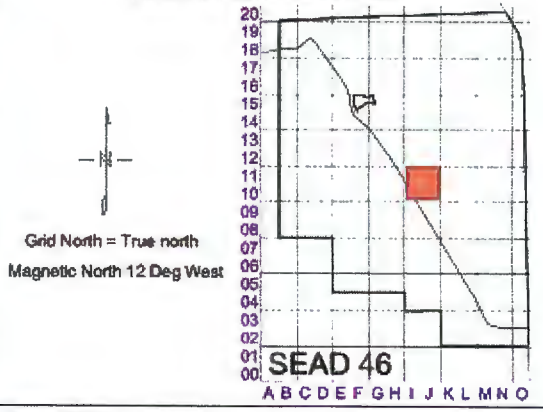
- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP



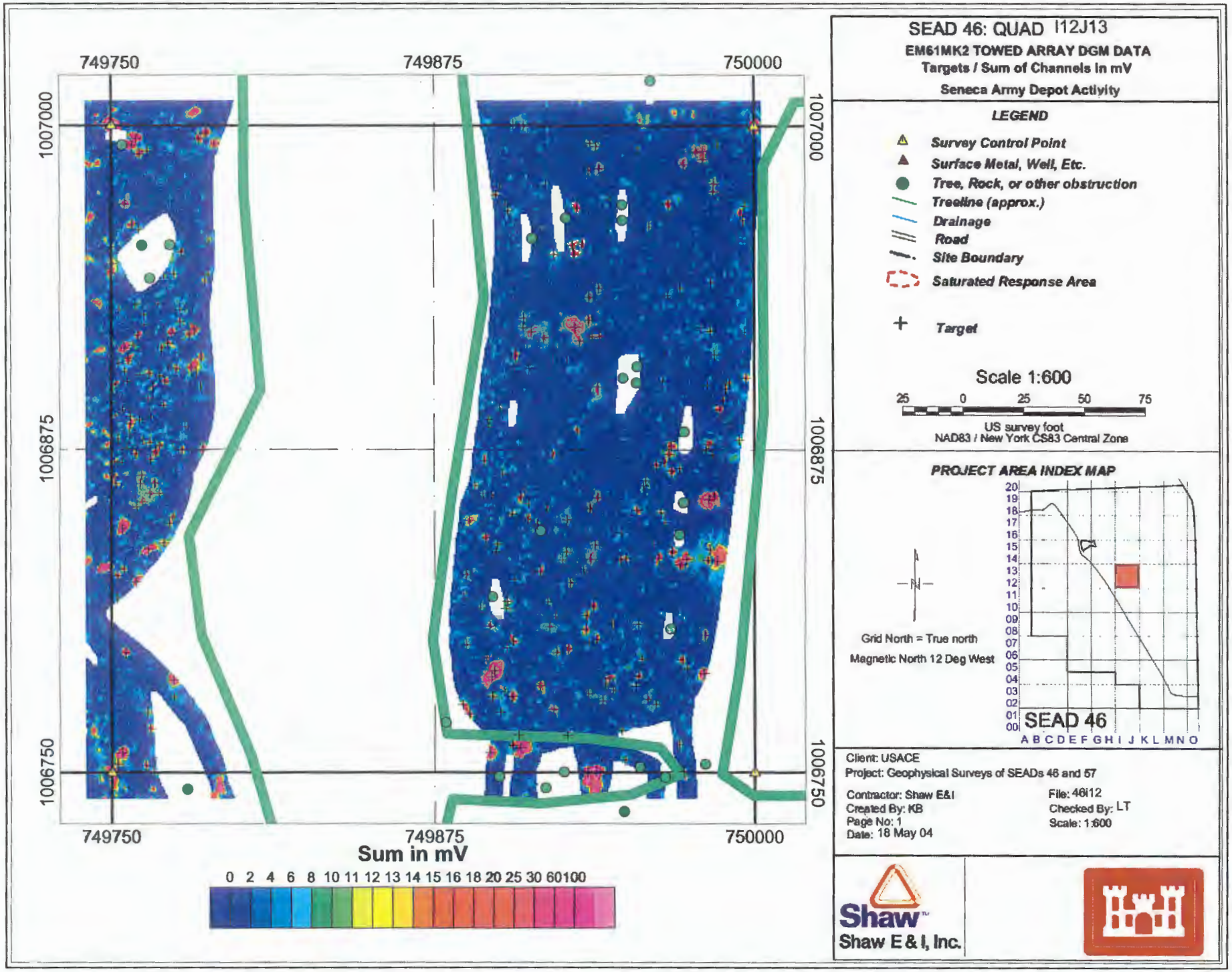
Grid North = True north
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 17 May 04

File: 46i10
Checked By: LT
Scale: 1:600

Shaw™
Shaw E & I, Inc.



SEAD 46: QUAD I12J13

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP

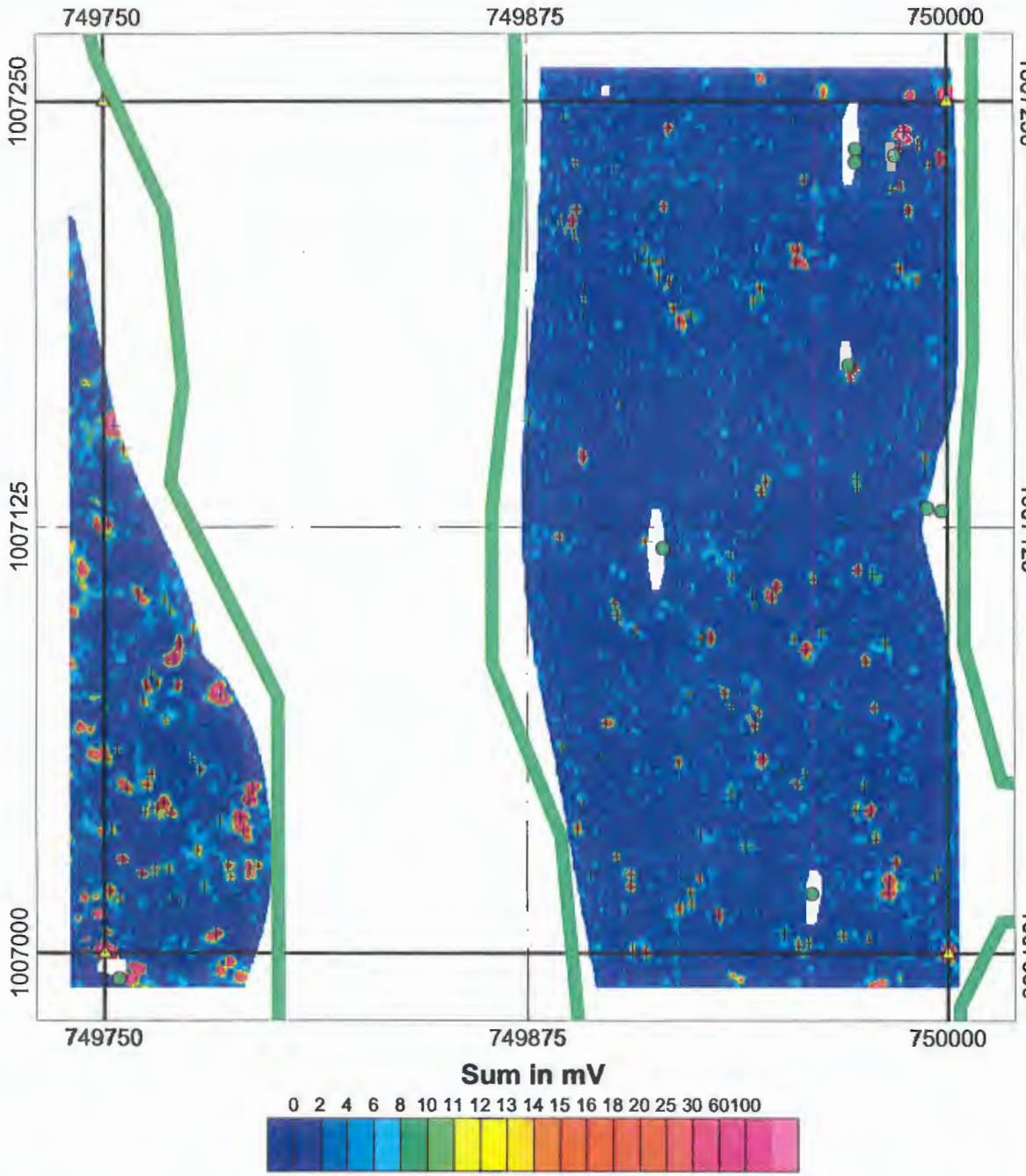
Grid North = True north
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 18 May 04

File: 46i12
Checked By: LT
Scale: 1:600

Shaw™
Shaw E & I, Inc.



SEAD 46: QUAD I14J15

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

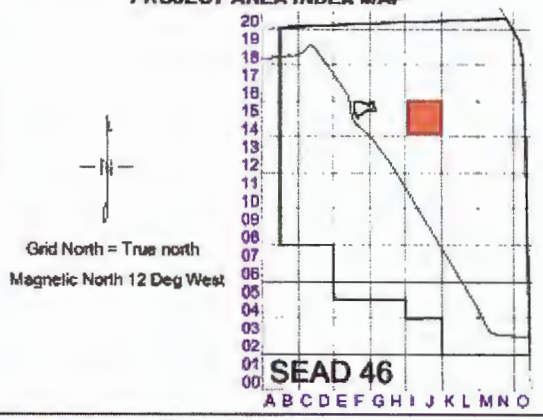
- ***Survey Control Point***
- ***Surface Metal, Well, Etc.***
- ***Tree, Rock, or other obstruction***
- ***Treeline (approx.)***
- ***Drainage***
- ***Road***
- ***Site Boundary***
- ***Saturated Response Area***
- ***Target***

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP



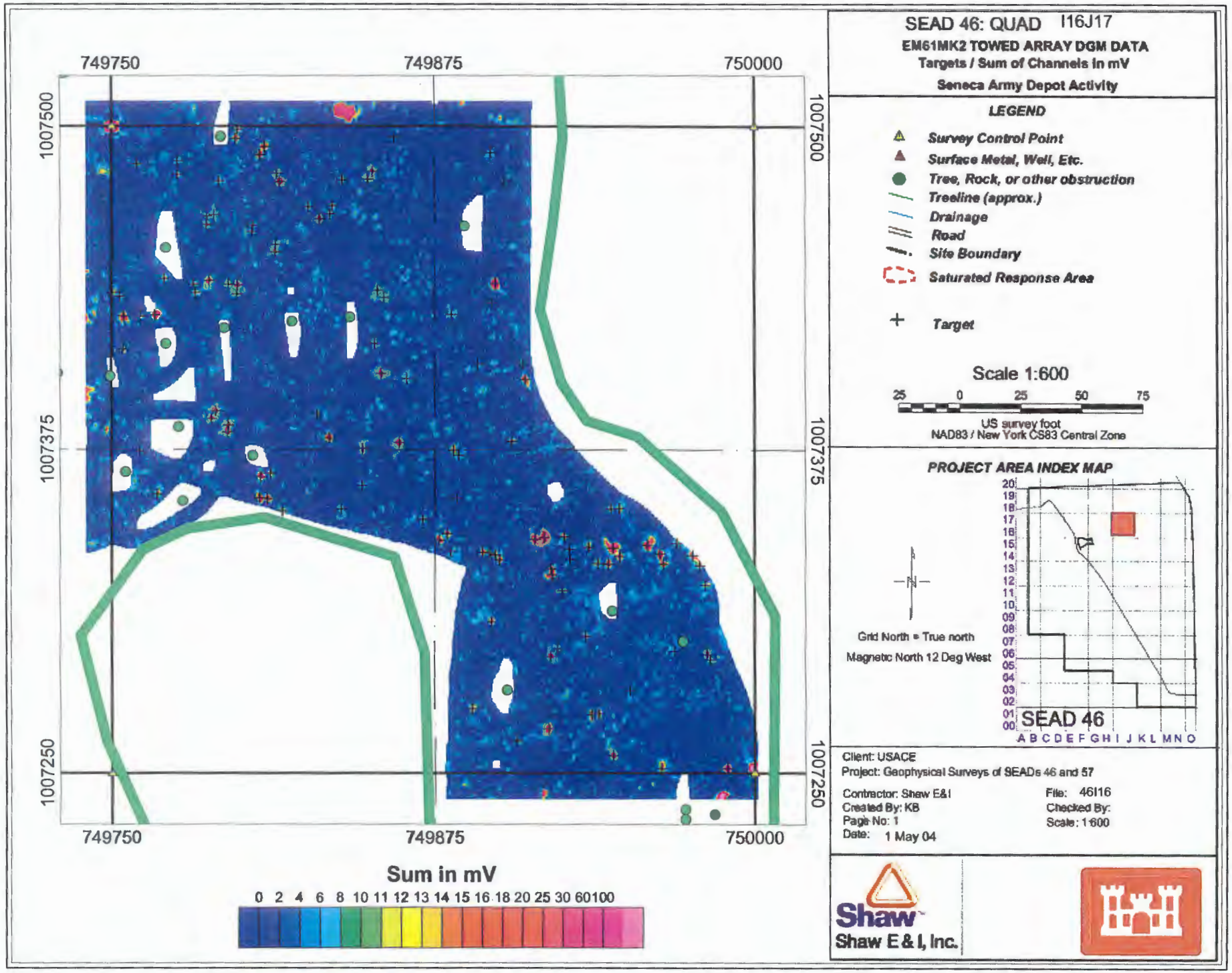
Grid North = True north
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 18 May 04

File: 46i14
Checked By: LT
Scale: 1:600

Shaw™
Shaw E & I, Inc.



SEAD 46: QUAD I16J17

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP

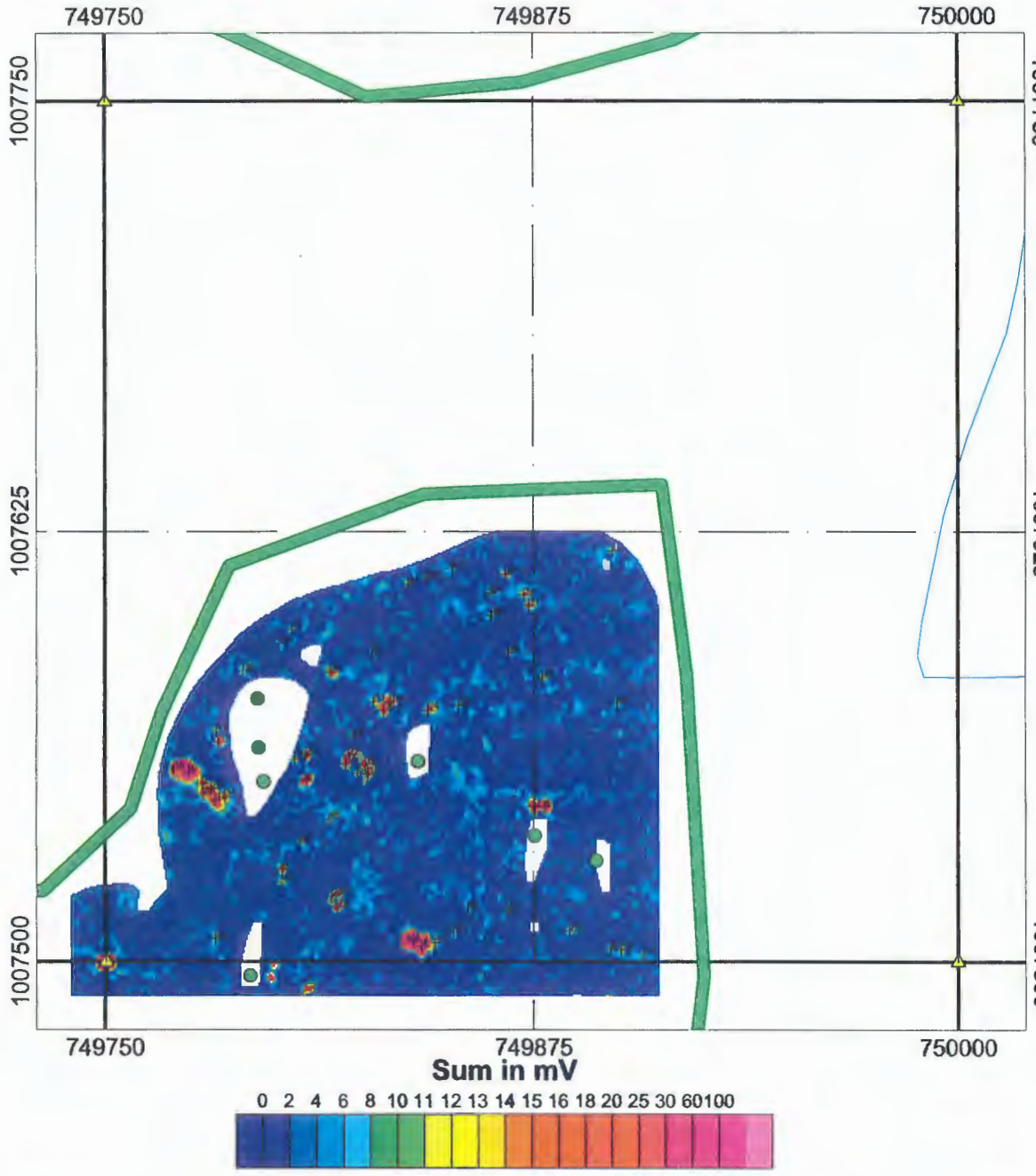
Grid North = True north
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 1 May 04

File: 46I16
Checked By:
Scale: 1:600

Shaw
Shaw E & I, Inc.



SEAD 46: QUAD I18J19

EM61MK2 TOWED ARRAY DGM DATA

Targets / Sum of Channels in mV

Seneca Army Depot Activity

LEGEND

- Survey Control Point
- Surface Metal, Well, Etc.
- Tree, Rock, or other obstruction
- Treeline (approx.)
- Drainage
- Road
- Site Boundary
- Saturated Response Area
- 123 Target and ID

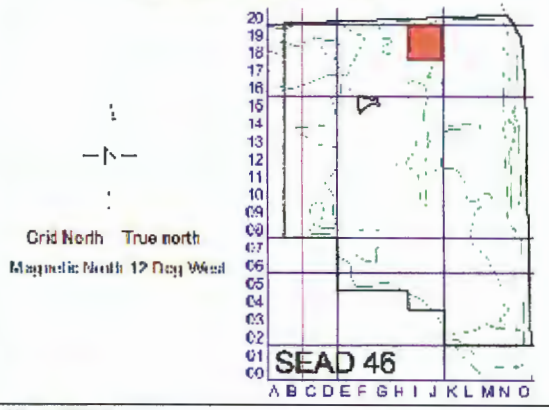
Note: Full target ID includes SEAD and Quad indeces
Example: 46E08123

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CRS Central Zone

PROJECT AREA INDEX MAP

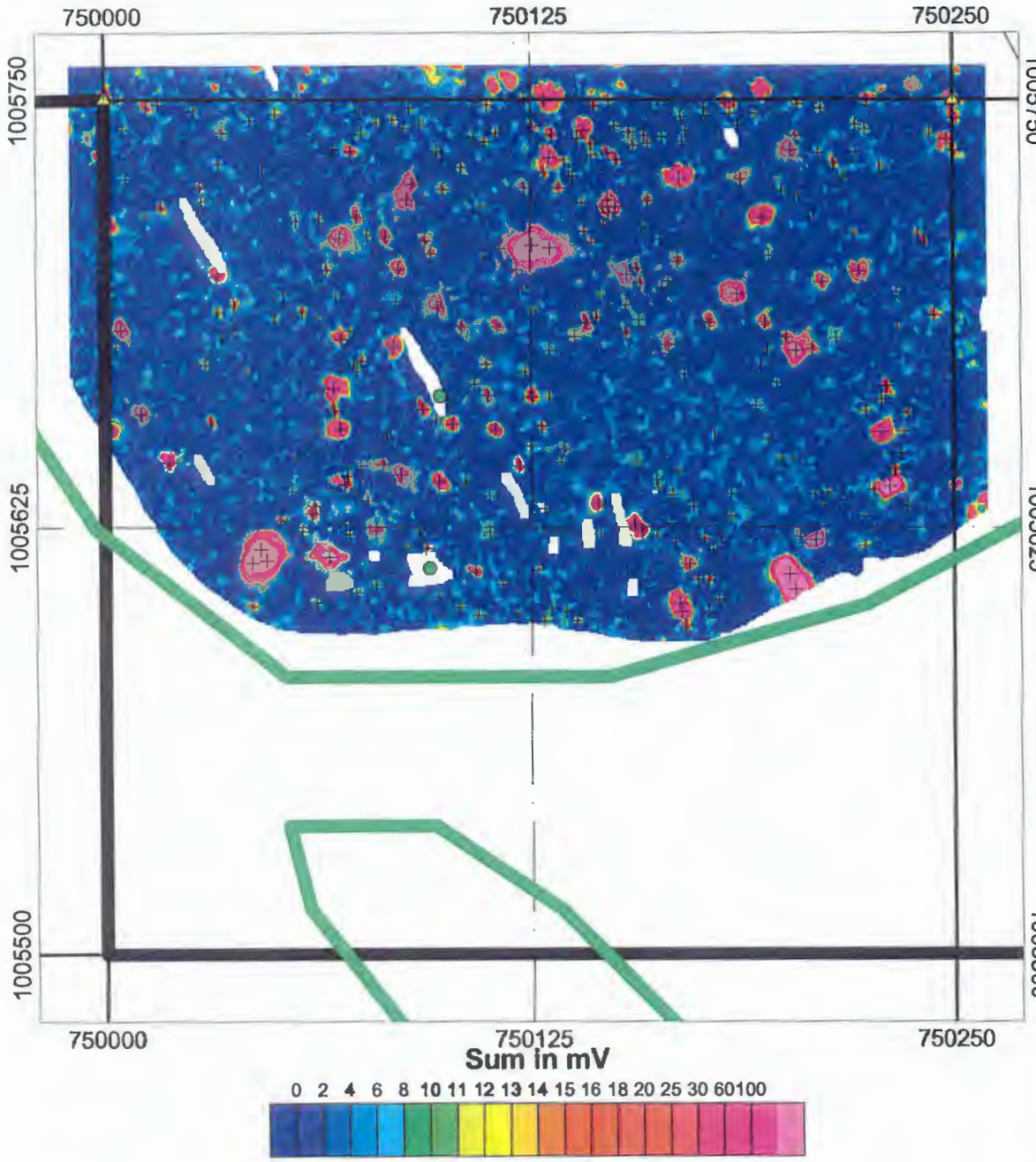


Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 18 May 04

File: 46i18
Checked By: LT
Scale: 1:600

Shaw™
Shaw E & I, Inc.



SEAD 46: QUAD K02L03

EM61MK2 TOWED ARRAY DGM DATA

Targets / Sum of Channels in mV

Seneca Army Depot Activity

LEGEND

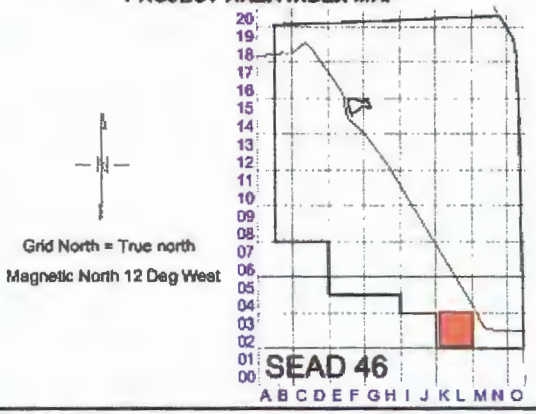
- ***Survey Control Point***
- ***Surface Metal, Well, Etc.***
- ***Tree, Rock, or other obstruction***
- ***Treeline (approx.)***
- ***Drainage***
- ***Road***
- ***Site Boundary***
- ***Saturated Response Area***
- ***Target***

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP



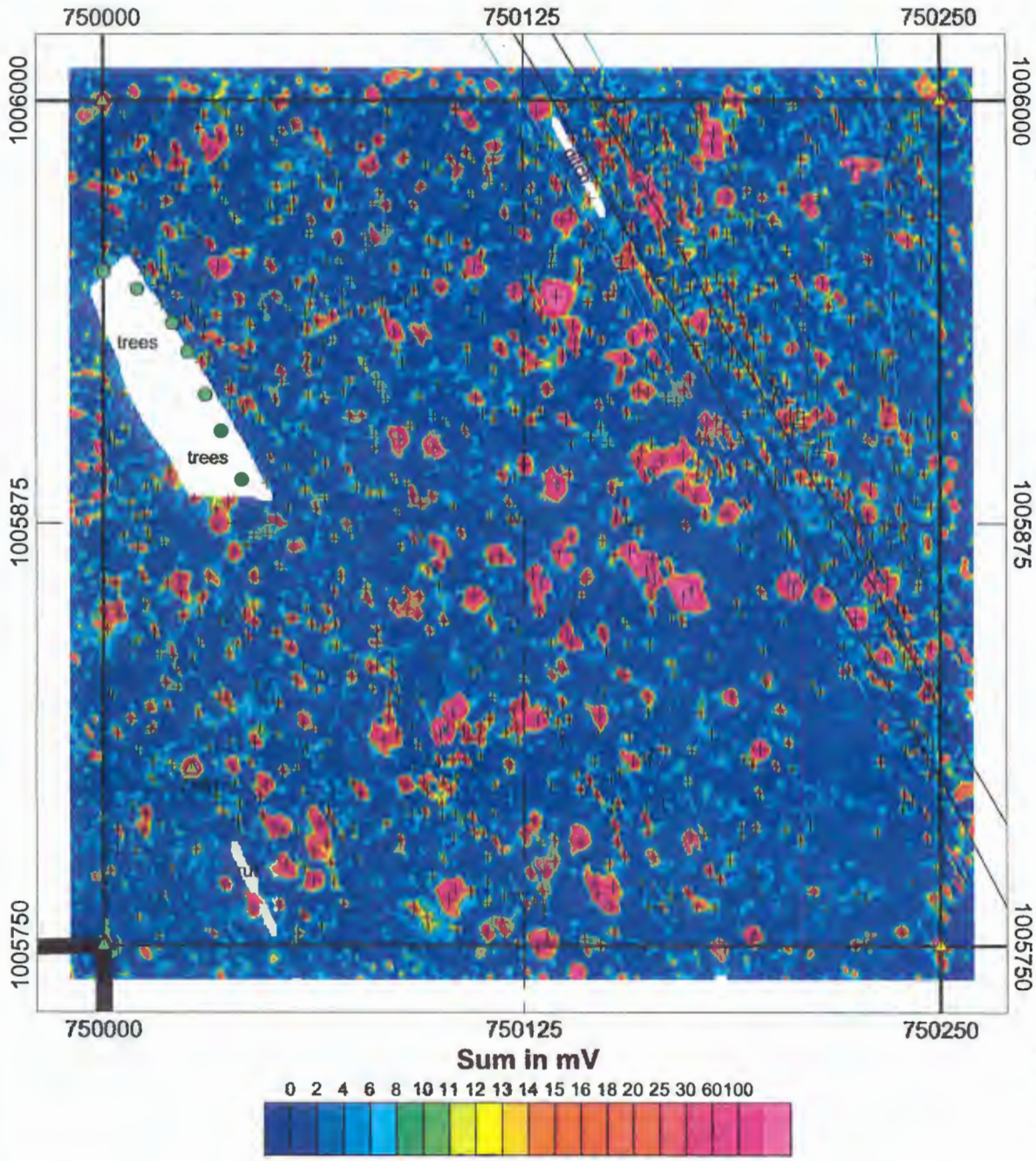
Grid North = True north
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 20 May 04

File: 46k02
Checked By: LT
Scale: 1:600

Shaw
Shaw E & I, Inc.



SEAD 46: QUAD K04L05

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

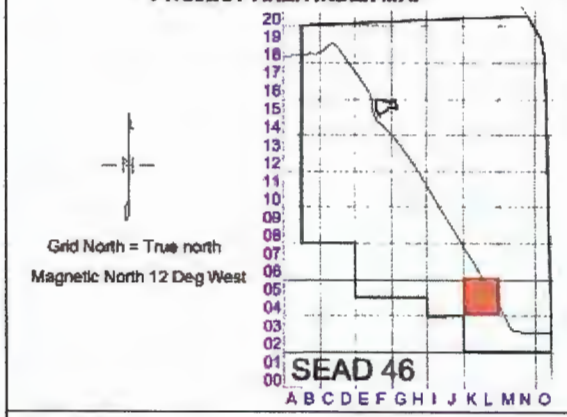
- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP



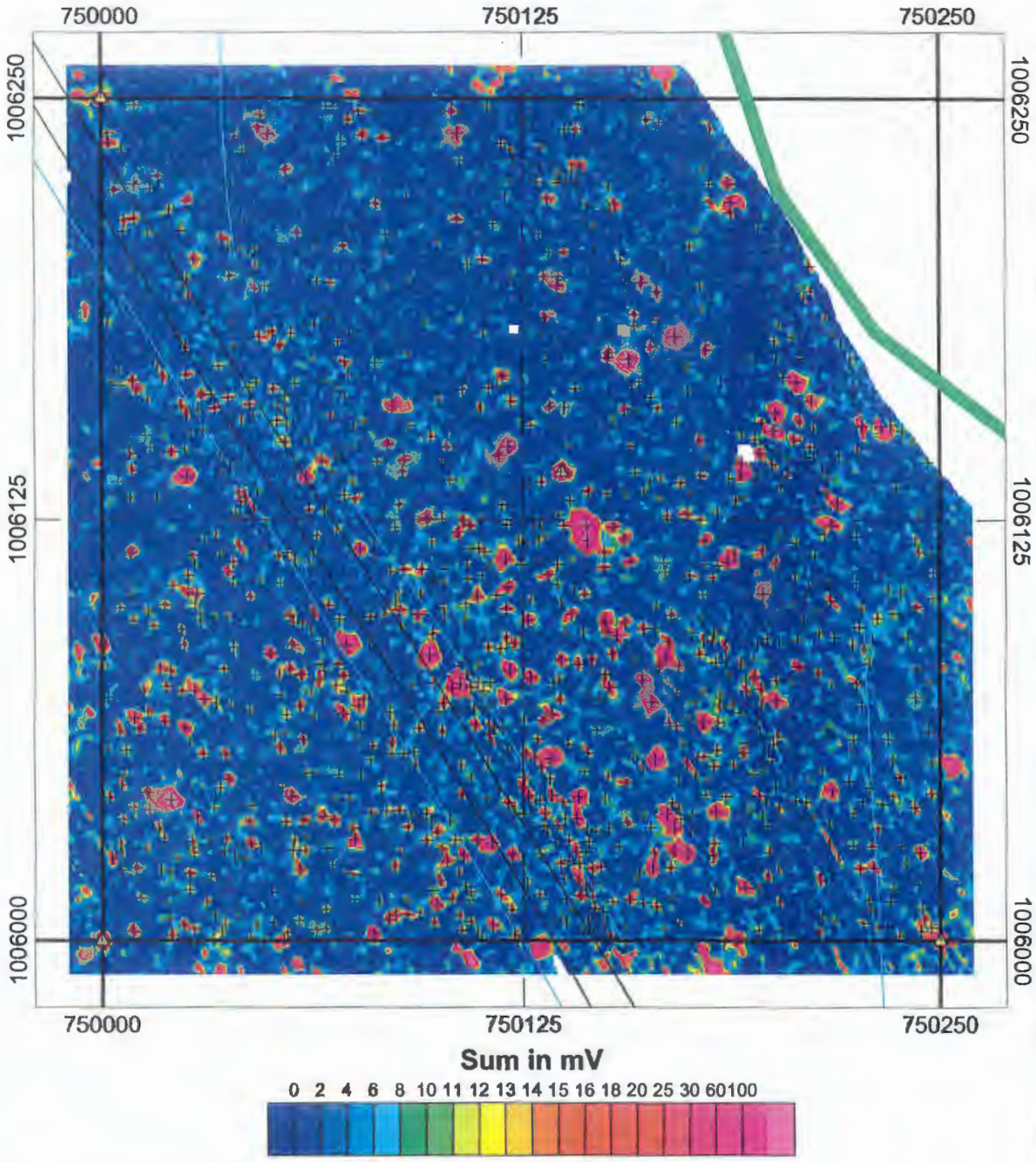
Grid North = True north
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 19 May 04

File: 46k04
Checked By: ST
Scale: 1:600

Shaw
Shaw E & I, Inc.



SEAD 46: QUAD K06L07

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

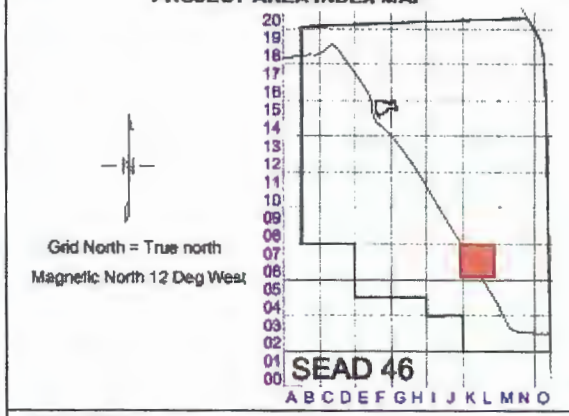
- ***Survey Control Point***
- ***Surface Metal, Well, Etc.***
- ***Tree, Rock, or other obstruction***
- ***Treeline (approx.)***
- ***Drainage***
- ***Road***
- ***Site Boundary***
- ***Saturated Response Area***
- ***Target***

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP

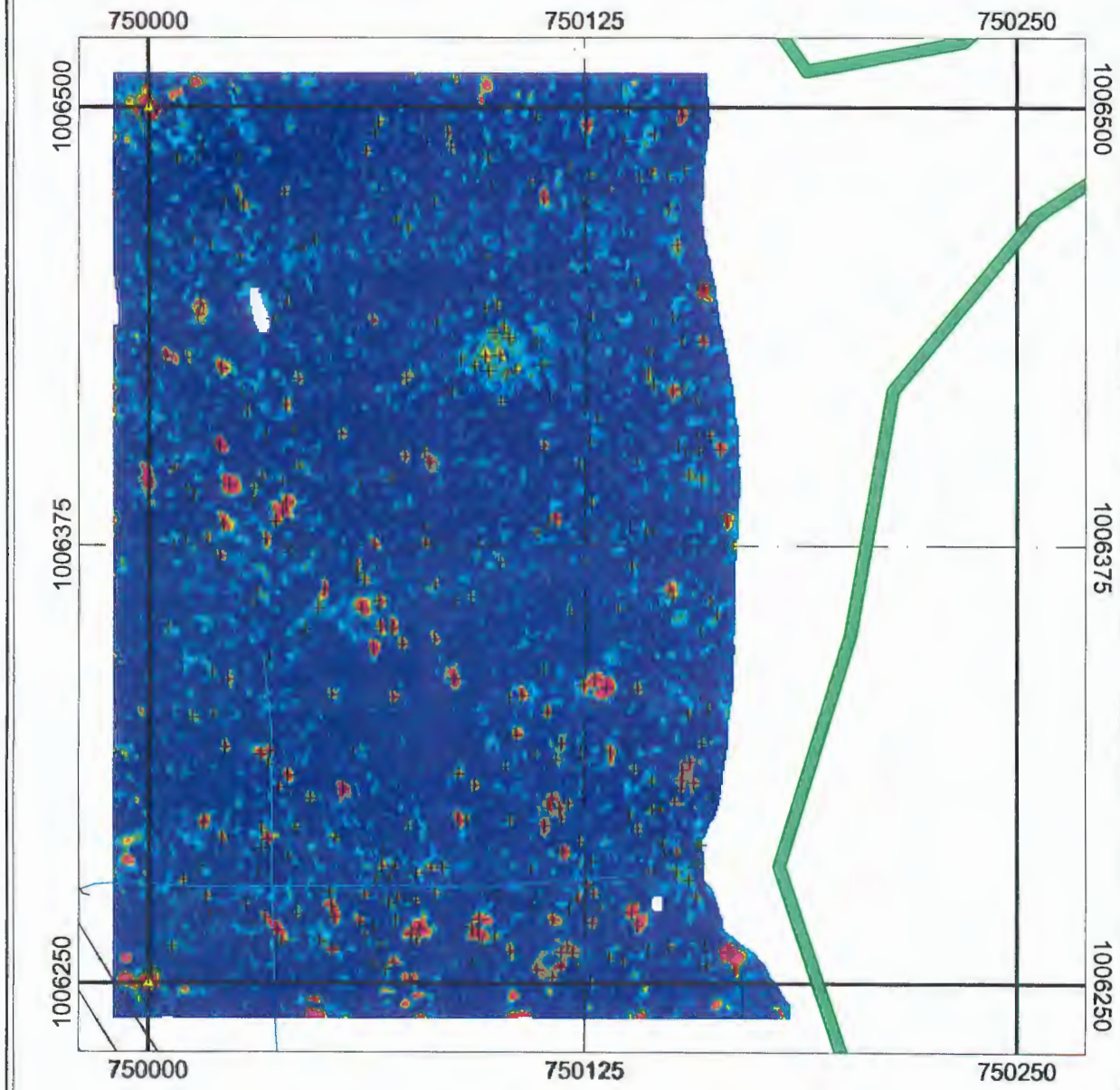


Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 19 May 04

File: 46k06
Checked By: ST
Scale: 1:600

Shaw E & I, Inc.



Sum in mV

0 2 4 6 8 10 11 12 13 14 15 16 18 20 25 30 60 100

SEAD 46: QUAD K08L09

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

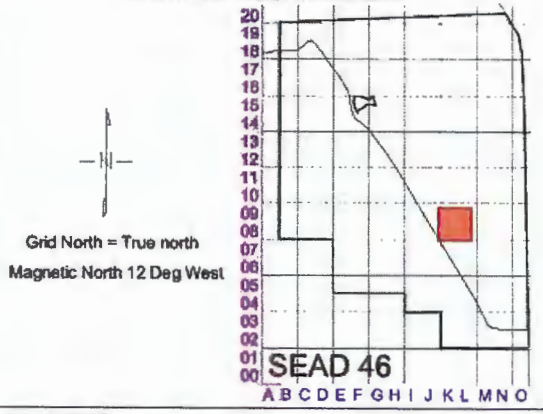
- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP



Grid North = True north
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 19 May 04

File: 46k08
Checked By: ST
Scale: 1:600

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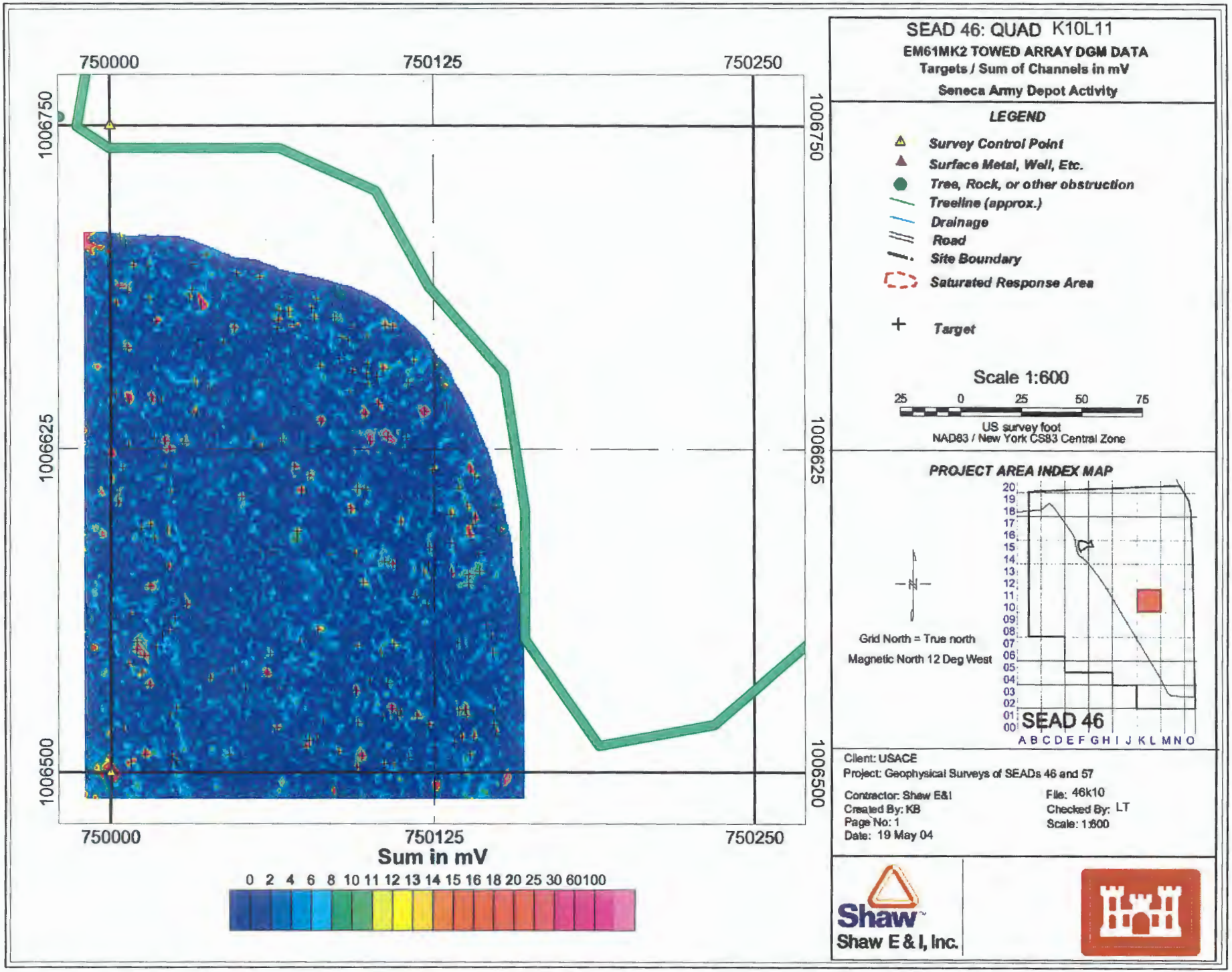


SEAD 46: QUAD K10L11

EM61MK2 TOWED ARRAY DGM DATA

Targets / Sum of Channels in mV

Seneca Army Depot Activity

LEGEND

- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP

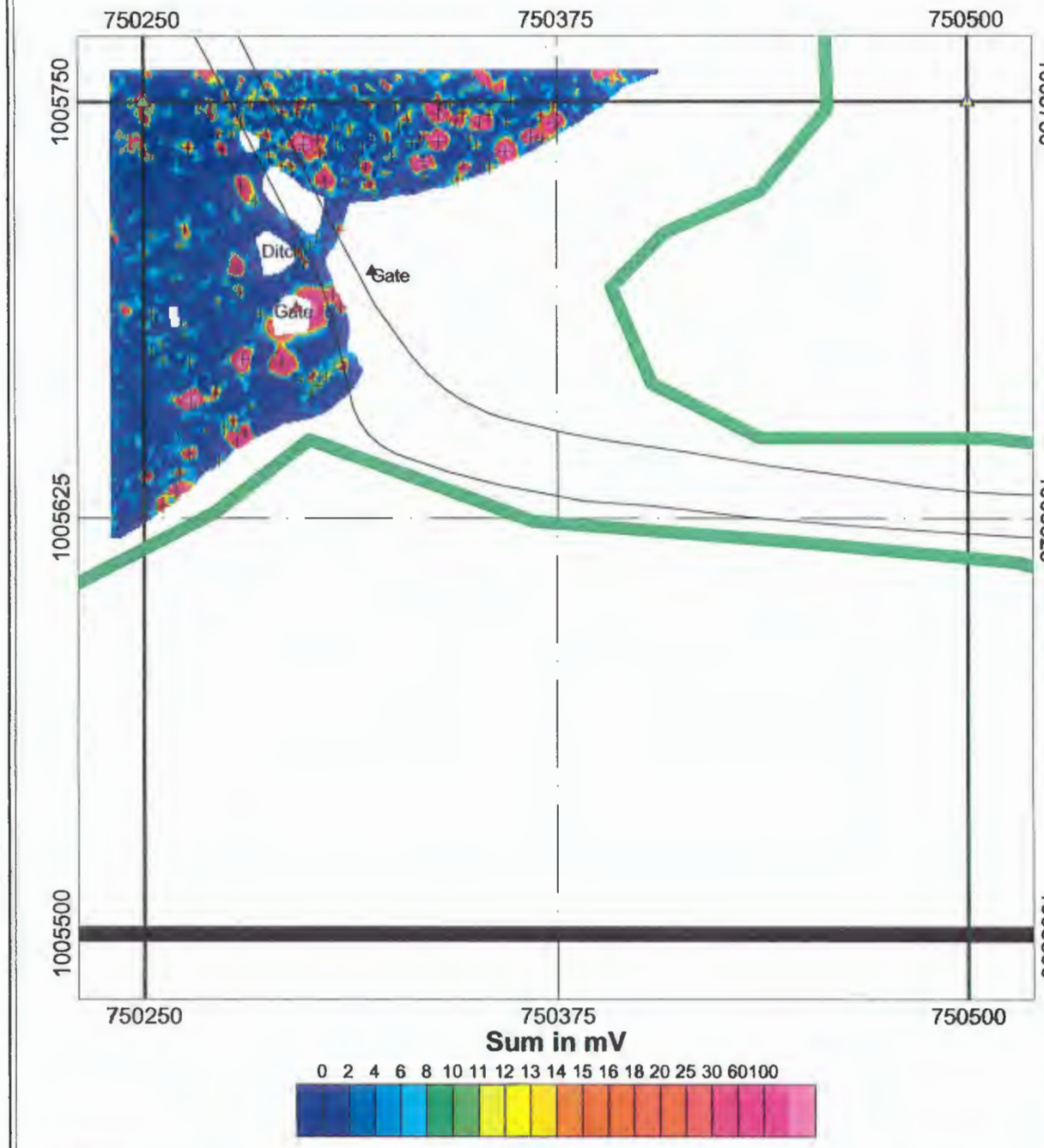
Grid North = True north
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 19 May 04

File: 46k10
Checked By: LT
Scale: 1:600

Shaw
Shaw E & I, Inc.



SEAD 46: QUAD M02N03

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

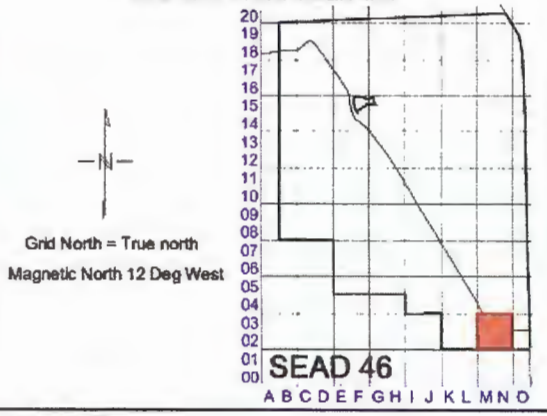
- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP



Grid North = True north
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 19 May 04

File: 46m02
Checked By: JF
Scale: 1:600

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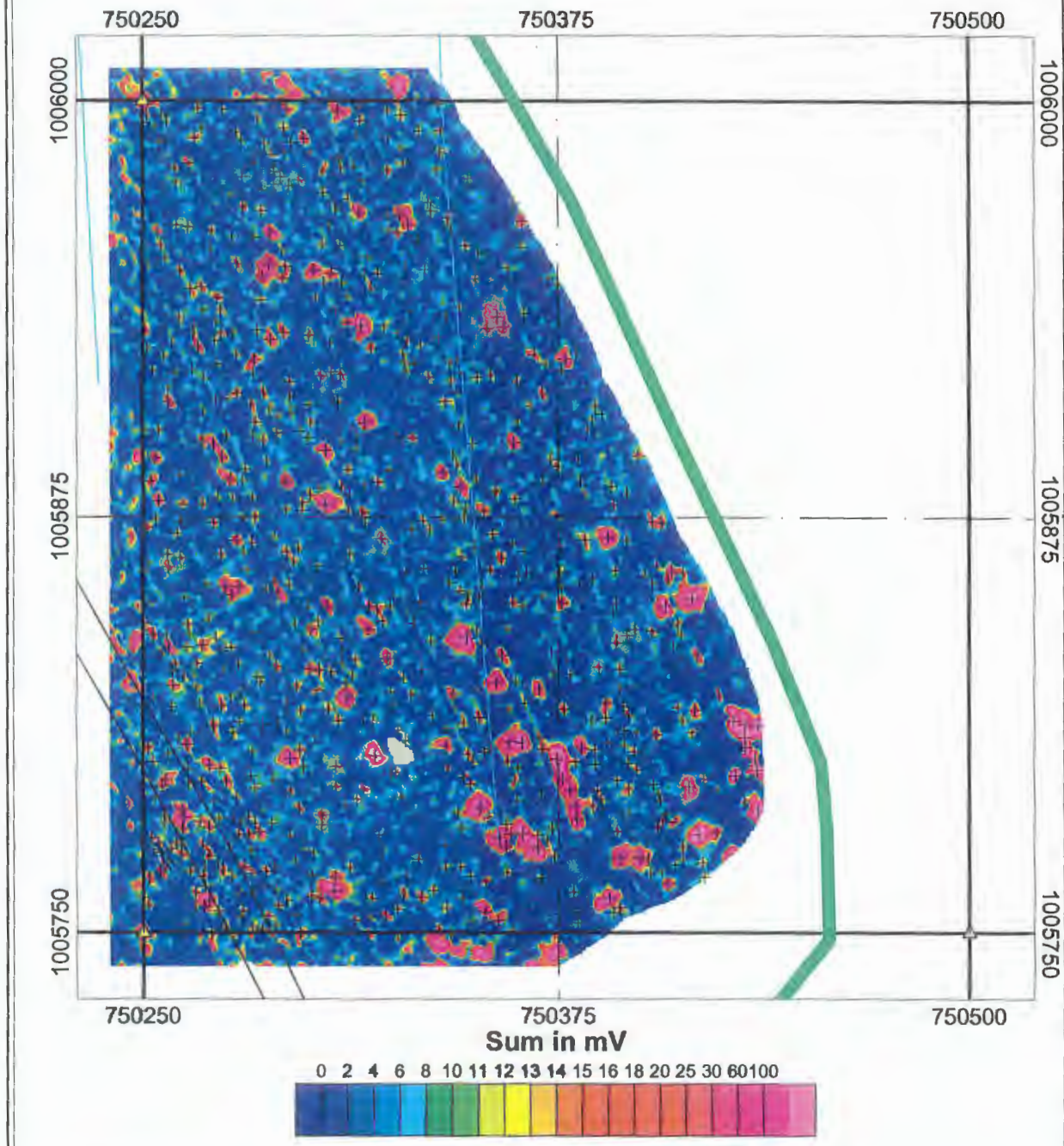


SEAD 46: QUAD M04N05

EM61MK2 TOWED ARRAY DGM DATA

Targets / Sum of Channels in mV

Seneca Army Depot Activity

LEGEND

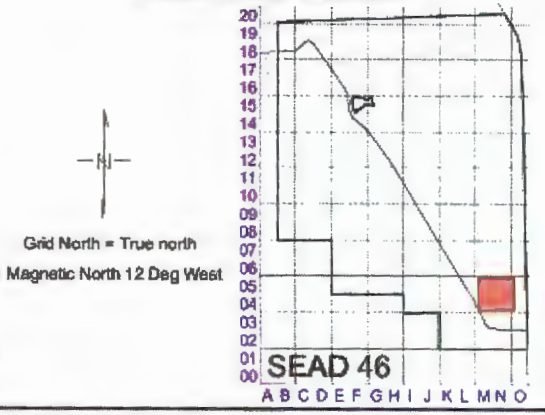
- *Survey Control Point*
- *Surface Metal, Well, Etc.*
- *Tree, Rock, or other obstruction*
- *Treeline (approx.)*
- *Drainage*
- *Road*
- *Site Boundary*
- *Saturated Response Area*
- *Target*

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP



Grid North = True north
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 19 May 04

File: 46m04
Checked By: ST
Scale: 1:600

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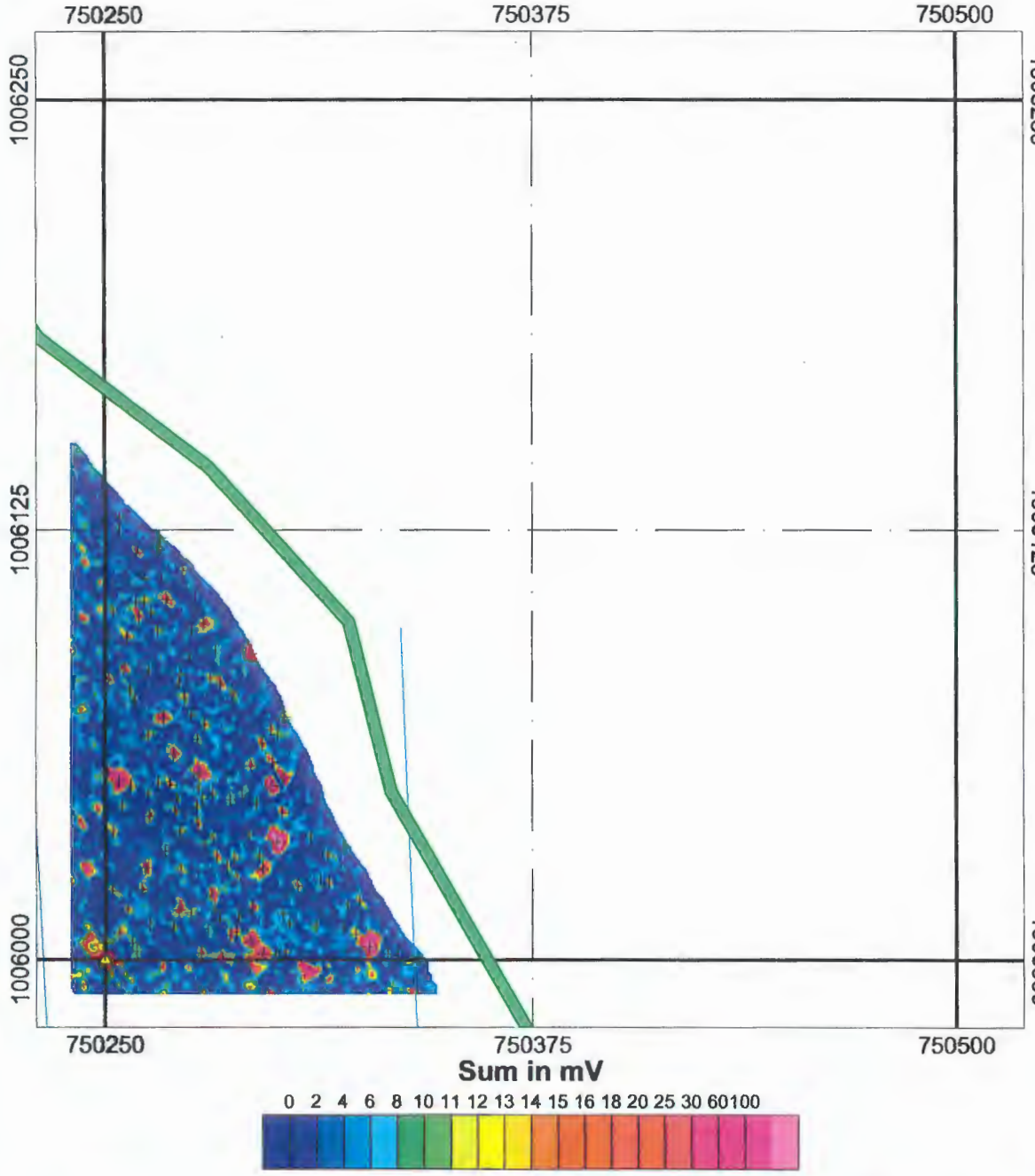


SEAD 46: QUAD M06N07

EM61MK2 TOWED ARRAY DGM DATA
Targets / Sum of Channels in mV
Seneca Army Depot Activity

LEGEND

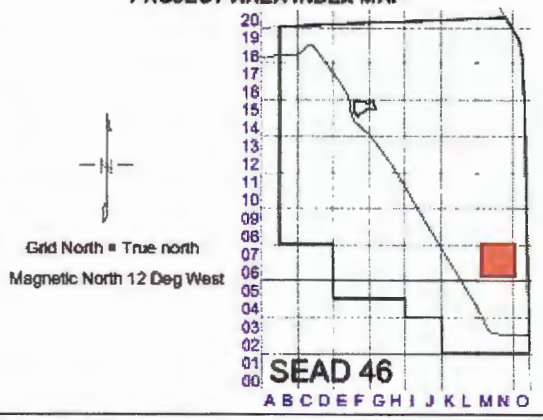
- ***Survey Control Point***
- ***Surface Metal, Well, Etc.***
- ***Tree, Rock, or other obstruction***
- ***Treeline (approx.)***
- ***Drainage***
- ***Road***
- ***Site Boundary***
- ***Saturated Response Area***
- ***Target***

Scale 1:600

25 0 25 50 75

US survey foot
NAD83 / New York CS83 Central Zone

PROJECT AREA INDEX MAP



Grid North = True north
Magnetic North 12 Deg West

Client: USACE
Project: Geophysical Surveys of SEADs 46 and 57

Contractor: Shaw E&I
Created By: KB
Page No: 1
Date: 19 May 04

File: 46m06
Checked By: LT
Scale: 1:600

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APPENDIX D

Geophysical Prove-out Report

FINAL
LETTER REPORT
GEOPHICAL PROVE-OUT
APRIL 2005

GEOPHYSICAL INVESTIGATION MUNITIONS DESTRUCTION AREAS SEAD'S 46 & 57
SENECA ARMY DEPOT ACTIVITY, ROMULUS, NEW YORK

RAPID RESPONSE PROGRAM
CONTRACT DACA45-98-D-0003
CONTRACT TASK ORDER NO. 150

Geophysical Prove-out Letter Report

This Letter Report pertains to the Geophysical Prove-out (GPO) supporting Ordnance and Explosives (OE) and Unexploded Ordnance (UXO) removal at the Seneca Army Depot Activity (SEDA) areas SEAD 46 and SEAD 57. In a field data review meeting with USACE Rick Grabowski and Andy Schwartz on 10 November 2003, Shaw Environmental, Inc. (Shaw) was informed that the GPO data and results were acceptable to USACE, that all seed items in the GPO plots had been detected, and that the target locations were good.

The East GPO test plot, which is 150x50 feet in size, contains known items at known locations and depths. The East GPO test plot was surveyed to establish data and interpretive baselines. The South GPO test plot is 100x200 feet in size and is located adjacent to SEAD 57. The West GPO test plot is 100x300 feet in size and is located adjacent to the Open Burning Ground area. Both unknown item sites consist of flat open fields with some deep-plowed rutting. One tree is present in or adjacent to each site.

1.1 Objectives

Geophysical mapping, using a towed array of three EM-61MK2 instruments as mandated by the scope off work, was performed for the purpose of detecting and locating all potential OE of 20mm and larger size under conditions similar to those at SEAD 46 and SEAD 57. Secondary objectives were to verify conformance of the geophysical sensors with DID OE-005-05 and to document acceptable data deliverable formats and documentation and to test data transfer to USACE.

1.2 Geophysical Survey Equipment

A towed array of EM-61MK2 sensors was specified in the SOW. Based on scoping discussions with USACE, the deployment form factor consisted of 3 EM-61MK2 sensors mounted on a non-metallic platform towed behind a Gator all-terrain vehicle (ATV).

1.2.1 Geonics EM-61MK2 TDEM Sensor

The Geonics EM-61MK2 time domain EM (TDEM) sensor was the primary EM device. TDEM sensors are designed to detect shallow ferrous and non-ferrous metallic objects with good spatial resolution and minimal interference from adjacent metallic features.

An EM transmitter generates a pulsed primary magnetic field in the earth, which induces eddy currents in nearby metallic objects. The eddy current decay produces a secondary magnetic field measured by the receiver coil of the EM-61MK2. Measurements are taken at varying time intervals (gates) after the primary pulse, allowing the current induced in the ground to have dissipated, leaving only the current in the metal to still produce a significant secondary field. The responses are recorded and displayed in a data logger.

The EM-61MK2 consists of two air-cored, 1-meter by 0.5-meter rectangular coils. Secondary voltages induced in both coils are measured in millivolts (mV). The coils are stacked 40 cm apart, with the source/receiver coil located below a second receiver coil. The EM-61MK2 was set to record voltage output from four time gates from the bottom coil. The bottom coil data is generally most useful for detecting ordnance-sized buried metallic objects.

EM-61MK2 data were automatically collected from each instrument every 0.08 seconds

1.2.2 Towed Array Form Factor

The EM-61MK2 was deployed in a three-sensor system on a non-metallic platform using USACE supplied skids, with the coils assembled into an array for high-productivity coverage. The coils were mounted narrow end forward, separated by about 5.5 inches such that the coil center-to-center spacing was 25.5 inches and the total width of the array was about 72 inches. Mounted on the platform, the bottom coils were level at a height of 12-inches above the ground surface. The leftmost (facing in the direction of travel) EM-61MK2 was designated instrument #1, the center unit as instrument #2 and the rightmost unit as instrument #3. All instruments, cables, and connections were prominently labeled #1, #2, or #3 so as to facilitate the set-up of each sensor and to ensure the exact connections for each survey. This also helped to reliably isolate any equipment problems if necessary.

Geonics supplied synchronization cables were utilized to designate a "master" and two "slave" EM-61MK2s for regulating the data stream.

The sled was towed by a "John Deere Gator" all-terrain tow vehicle which was also used to carry the EM-61MK2 electronics, batteries, and control box/data logger. Based on on-site noise tests of the ATV, a sled-ATV separation of 17 feet was utilized using a structural fiberglass and wood tow-bar supported by a wooden skid.

A survey prism (see below) was mounted on a Geonics GPS support tripod and centered above the center coil at a height of about 65 inches above the ground.

1.2.3 Robotic Total Station Navigation

Spatial positioning of the EM-61MK2 towed array data was achieved via a Leica TSP1100 series Robotic Total Station (RTS) system. The Leica TSP1100 is a motorized robotic total station that uses automatic target recognition to track the location of the prism and has a highly accurate distance/azimuth measurement system to produce +/-5 millimeters +2 parts per million accuracy. The RTS gives more precise locations than GPS and can be used wherever good sightlines are available - to distances of about 1,400 feet. Survey control of at least two known points is required to set up the system.

The RTS system hardware consists of three integrated components; 1) the Leica TPS1100 dual laser robotic total station; 2) the RTS rover remote link control panel; and 3) a survey prism which is tracked by the RTS base station.

RTS coordinates are logged at a rate of about 3 samples per second (Hz) which capture the location of the prism mounted above the center of towed array. The navigation sampling rate is regulated by the RTS and is not user changeable.

The RTS was also used to augment geophysical data and improve geophysical mapping through capture of visual observations made during site walk-over. During this process, RTS was used for position-stamping debris piles, trees, holes, unidentified fences, soil changes, vegetation, burn areas, craters, etc.

The RTS was set-up at each site using two or more staked grid corner locations. All data were collected in North America Survey datum, 1983 (NAD83) in New York State Plane Central Zone coordinates.

1.2.4 Data Collection Software

Both navigation and sensor data was recorded on a tablet PC using Geometrics MagLog software. RTS data (via a cable to the RTS remote link) and the three EM-61MK2 output data cables were connected to the tablet using a USB to 4 serial port adapter. MagLog recorded the 4 channels of sensor data for each EM-61MK2 and the RTS navigation data in pseudo-NEMA format. All data were controlled and time stamped using the PC tablets clock such that no time-slews or drift occurred.

1.2.5 Survey Procedures

Temporary QC test areas were set-up adjacent to each test plot. These consisted, as described in the Work Plan, as a static test area free of metallic response, a 3-point navigation test area, and a 50-foot replicate line. The RTS was then set up using the known co-ordinates of the staked grid corner locations. Check shots were made to the other grid corners to double-check the coordinate accuracy.

1.2.5.1 Pre-Survey QC

Pre-survey QC procedures were performed as follows:

- Static Test Line
- Cable shake / Personnel Test Line
- Standard Test Item Response Test Line
- 3-Point Navigation Test Line
- Pre-Survey 50-ft Repeat Line

Pre-survey QC lines were designated Lines 1, 2, 3, …

Initially, due to the presence and curvature of the skids, it was difficult to get a consistent ground level response for a trailer hitch ball placed on the ground. For the standard test item response, a template bracket holding a trailer hitch ball was fabricated to rest on marked positions on each upper coil such that a consistent response could be obtained and that the correct sequencing (coil#1, coil#2, and coil#3) of the sensor data streams could be verified.

Because the skids were both wide and curved in 3-d, it proved difficult to constrain them to a fixed track for the 3-point navigation tests. Based on USACE comments, semi-permanent guide tracks made of 4x4s will be used to better constrain the sled path prior to implementation of the production surveys.

1.2.5.2 GPO Plot Survey Procedures

Because of the long tow-bar, the towed array has a fairly large (>30 feet) turning radius. The surveys were therefore performed in a few continuous lines designed to maximize strait line tracks along the long-axes of the test plots and minimize required turns at the ends. For both test areas, "ruttage" was essentially parallel to the grid and was not a significant factor (although the West GPO plot was significantly more rutted than the South Plot). Sled survey paths were marked using spray paint behind the "outer" edge of the towed array. On the succeeding line, the gator driver followed the paint marks with the "inner" wheel of the vehicle such that the paths overlapped slightly and no data gaps were present. Survey data lines were designated Lines 100, 101, 102, ...

One tree is present within the South GPO test plot. It was surveyed around, leaving a tree gap not accessible using the towed array. One tree is present 3-feet off the SE corner of the West GPO test plot which did not impact the survey. No weather, equipment breakdowns, or dynamic events affected the surveys. Three deep (1.5-foot) excavation holes were present in the West GPO test plot. Plywood sheets were laid down over the holes for the survey.

1.2.5.3 Post Survey QC

Post-survey QC procedures were performed as follows:

- Static Test Line
- Cable shake / Personnel Test Line
- Standard Test Item Response Test Line
- 3-Point Navigation Test Line
- Post-Survey 50-ft Repeat Line

Post-survey QC lines were designated Lines 200, 201, 202, ...

1.3 Data Processing

Geometrics MagMap software was used to merge the sensor and navigation data and to calculate the sensor offsets for the outboard coils. MagMap only calculates sensor offsets in geographic (lat/long) coordinates at this time (a new version which operates on other coordinate systems is promised by the end of the year). Raw data (navigation data in NY State Plane coordinates) were transferred from the PC tablet to a laptop running MagMap using a 256 mb USB memory stick. Field data files were as follows (using Julian day 307 as an example):

- 307.survey.gps.Leica_rts

- 307.survey.em61mkii.em_1
- 307.survey.em61mkii.em_2
- 307.survey.em61mkii.em_3

The navigation data were then exported into Geosoft using an export template. The coordinates were converted in Geosoft to latitude/longitude and then re-exported back into MagMap for sensor offset calculation. Sensor offsets of the two outboard coils were calculated using a sensor offset of +/- 25.5 inches (0.65 m). A MagMap bug was found which required switching the instrument #2 and instrument #3 position in the MagMap sensor offset calculation field. The sensor and navigation data were merged and output as three XYZ streams (one for each sensor). The data were re-imported into Geosoft using an import template, merged into one file (example 307.gdb), and converted back to New York State Plane coordinates.

The data channels were leveled using the Geosoft UXDrift GX using a length of 100 and ignoring 10% of the highest and 60% of the lowest values.

The normalized sum data channel (sum) was then calculated using the summation of the leveled data channels 1 through 4.

Based on a review of the QC data, sensor latency was minimal, likely because all data were time-stamped using the same fast tablet clock. Lag correction was not deemed necessary. No advanced filtering or data processing was performed.

After the data was masked to the grid boundaries plus a small buffer (omitting the turnaround areas) the sum channel data were gridded using minimum curvature. Significant gridding parameters were as follows: cell size 0.25 feet; starting coarse grid = 4; starting search radius = 2; and cells to extend bend data = 8.

For clarity, the full data set Geosoft data gdb files were split into two gdbs one (ex South_QC.gdb) containing the pre- and post-survey QC data and one (ex South_Survey.gdb) containing the survey data.

1.3.1 Target Selection

Targets were selected using the UXDetect Blakely method target picker on the sum channel grid. Field data were initially reviewed with USACE using a very conservative threshold of 8-9 mV (sum). Targets along/just outside of the test plot edges were retained. The picks were then reviewed by the Project Geophysicist and duplicate target were merged and a few picks were moved. In a field data review meeting with USACE Rick Grabowski and Andy Schwartz on 10

November 2003, Shaw was informed that all seed items in the GPO plots were detected and that the locations were good. It was noted that several seed items had been removed from the test plots, but the removed items have not been specified. For the sample submission data sets, a slightly higher threshold of 10 mV was used. UXDetect target lists are given in the target line of the survey.gdb.

1.3.2 Analysis of Target Selection

Per the 10 November 2003 USACE data review meeting, all seed items present in the GPO plots were detected to acceptable depth and location standards.

Summary detection data for the GPO seed items is presented in Table 1.

Attached summary data and target figures are included as follows:

- Figure 1: East GPO - Sum of Leveled Data Channels;
- Figure 2: East GPO – Target Map;
- Figure 3: South GPO - Sum of Leveled Data Channels;
- Figure 4: South GPO – Target Map;
- Figure 5: West GPO - Sum of Leveled Data Channels;
- Figure 6: West GPO – Target Map.

1.3.3 QC Review and Documentation Sheets

QC Review and documentations sheets were completed for each data set. Per the Work Plan, these are:

- Form 6-1: Sensor QC;
- Form 6-2: Navigation QC; and
- Form 6-5: Data Processing Log and QC.

1.4 Sample Data Submittals (Electronic Files)

For each GPO area, electronic data, QC, and geophysical analysis files are organized as follows:

Geosoft directory

- .gdb files (target list in survey.gdb)
- .map files
- pdfs of maps

QC directory

- Forms 6-1, 6-2, and 6-5

Raw directory

- Raw navigation and sensor data

Digital geophysical data are provided on CD-Rom included in Appendix A of the Final Data Report.

Table 1
GPO Seed Item Analysis

Seed_ID	Description	Burial Depth (inches)	Northing (NY SP ft)	Easting (NY SP ft)	Picked	Response Sum (mV)	Target ID	Northing (NY SP ft)	Easting (NY SP ft)	Offset	Comments
EAST GPO											
1	3.5" Warhead	15	1,013,127.2	743,546.7	yes	90	14	1,013,128.0	743,547.8	< 2 ft	
2	Fuze	12	1,013,137.6	743,541.8	yes	166.7	28	1,013,139.0	743,542.8	< 2 ft	
3	75mm	31	1,013,147.8	743,540.6	yes	74.5	30	1,013,148.8	743,540.3	< 2 ft	
4	3.5" Motor	11	1,013,171.1	743,533.3	yes	705	47	1,013,171.3	743,533.8	< 1 ft	
5	155mm	35	1,013,194.7	743,528.8	yes	205.4	60	1,013,194.3	743,527.5	< 2 ft	
6	3.5" Warhead	21	1,013,226.0	743,519.3	yes	93.1	75	1,013,225.3	743,519.0	< 1 ft	
7	3.5" Warhead	45	1,013,241.9	743,515.3	yes	14.2	85	1,013,240.0	743,515.0	< 2 ft	
8	Slap Flare	20	1,013,253.8	743,509.6	yes	88.4	101	1,013,254.0	743,511.8	< 3 ft	
9	Fuze	7	1,013,260.7	743,515.5	yes	174.3	110	1,013,260.0	743,515.5	< 1 ft	
10	3.5" Warhead	32	1,013,245.5	743,517.5	yes	60.1	93	1,013,245.8	743,519.3	< 2 ft	
11	75mm	18	1,013,203.1	743,530.6	yes	404.2	65	1,013,203.0	743,530.8	< 1 ft	
13	3.5" Motor	9	1,013,168.7	743,539.7	yes	597.6	43	1,013,168.8	743,539.5	< 1 ft	
14	Grenade	13	1,013,153.5	743,541.2	yes	192.2	31	1,013,154.3	743,543.3	< 3 ft	
15	Slap Flare	12	1,013,133.1	743,554.0	yes	88	23	1,013,134.8	743,554.3	< 2 ft	
16	Grenade	20	1,013,216.7	743,532.4	yes	29.1	70	1,013,216.8	743,532.0	< 1 ft	
17	75mm	32	1,013,261.4	743,519.9	yes	78.3	111	1,013,261.5	743,519.5	< 1 ft	
18	3.5" Motor	10	1,013,255.4	743,523.3	yes	86.8	102	1,013,254.8	743,521.8	< 2 ft	low between 265 and 87 mV peaks
19	Grenade	10	1,013,242.5	743,528.2	yes	423.1	87	1,013,241.5	743,530.0	< 3 ft	
20	3.5" Warhead	30	1,013,157.4	743,554.4	yes	405.9	36	1,013,157.8	743,555.8	< 2 ft	
21	3.5" Motor	23	1,013,131.0	743,565.0	yes	164.1	19	1,013,132.3	743,564.8	< 2 ft	
23	Fuze	23	1,013,168.5	743,553.9	yes	17.4	44	1,013,169.0	743,555.5	< 2 ft	
24	Slap Flare	15	1,013,179.0	743,550.0	yes	163.6	48	1,013,179.3	743,551.8	< 2 ft	
25	75mm	16	1,013,185.6	743,549.8	yes	577.3	53	1,013,185.8	743,549.8	< 1 ft	
27	155mm	21	1,013,218.1	743,543.3	yes	1043.9	73	1,013,218.3	743,542.8	< 1 ft	
28	3.5" Motor	18	1,013,233.4	743,539.6	yes	170.4	81	1,013,232.8	743,538.8	< 2 ft	typo in COE easting
29	75 mm	18	1,013,248.0	743,534.5	yes	39.6	95	1,013,247.8	743,534.5	< 1 ft	
COE 1	BLU-66/B	18	1,013,193.9	743,570.6	no	60.9					peak between COE-1 and COE-17
COE 2	Fuze PD M5	12	1,013,256.1	743,537.1	yes	41.6	105	1,013,255.0	743,536.3	< 2 ft	between 3 picks 40-50mV
COE 3	Fuze Mech	11	1,013,268.9	743,550.7	yes	37.1	118	1,013,268.8	743,552.5	< 2 ft	artifact low by peak
COE 4	M-69 Grenade	6	1,013,188.0	743,560.7	yes	107.1	55	1,013,186.0	743,561.3	< 3 ft	
COE 5	M-69 Grenade	6	1,013,234.9	743,550.4	yes	27.1	83	1,013,233.5	743,550.8	< 2 ft	
COE 7	40 mm HEDP	7	1,013,202.2	743,562.1	yes	39.6	64	1,013,200.8	743,561.3	< 2 ft	
COE 8	40 mm w/case	10	1,013,157.6	743,581.1	yes	33.2	34	1,013,156.5	743,582.8	< 2 ft	
COE 9	40 mm Al. dummy	16	1,013,158.4	743,568.8	yes	13.9	38	1,013,158.4	743,568.8	0 ft	
COE 12	3.5 Motor	25	1,013,139.9	743,578.1	yes	95.2	27	1,013,138.3	743,578.0	< 2 ft	

Table 1
GPO Seed Item Analysis

Seed_ID	Description	Burial Depth (inches)	Northing (NY SP ft)	Easting (NY SP ft)	Picked	Response Sum (mV)	Target ID	Northing (NY SP ft)	Easting (NY SP ft)	Offset	Comments
COE 13	M203	18	1,013,136.5	743,589.3	yes	17.9	25	1,013,135.0	743,589.0	< 2 ft	
COE 14	M203	17	1,013,167.7	743,576.2	no	15					below pick threshold of 10 mV
COE 15	3. 5 Motor	39	1,013,189.1	743,577.6	no	7					not detected
COE 17	3.5" Warhead	39	1,013,198.5	743,573.2	yes	60.9	62	1,013,196.3	743,572.8	< 3 ft	
						SOUTH GPO					
S-1	.5X3.5 PIPE	3	1,009,870.2	738,193.2	yes	42.8	6	1,009,871.0	738,193.3	< 1 ft	
S-2	.5X3.5 PIPE	9	1,009,882.6	738,186.0	yes	33.2	26	1,009,883.8	738,185.0	< 2 ft	
S-3	.5X3.5 PIPE	10	1,009,905.2	738,184.0	yes	29.7	72	1,009,904.0	738,184.3	< 2 ft	connected/adj to a 35.6mV anom
S-4	.5X3.5 PIPE	6	1,009,937.7	738,206.7	yes	51.5	153	1,009,936.8	738,207.0	< 1 ft	
S-5	.5X3.5 PIPE	6	1,009,940.7	738,226.6	yes	29	163	1,009,941.5	738,225.3	< 2 ft	
S-6	.5X3.5 PIPE	7	1,009,957.0	738,216.6	yes	75.6	186	1,009,957.5	738,214.5	< 3 ft	
S-7	.5X3.5 PIPE	12	1,009,948.4	738,258.6	yes	16.2	173	1,009,950.0	738,256.8	< 3 ft	neg artifact between 16.2 & 13.6mV anoms
S-8	.5X3.5 PIPE	12	1,009,947.9	738,293.6	yes	19.6	170	1,009,948.3	738,293.5	< 1 ft	
S-9	.5X3.5 PIPE	12	1,009,916.1	738,301.8	yes	24.9	99	1,009,916.8	738,302.0	< 1 ft	
S-10	.5X3.5 PIPE	11	1,009,889.5	738,285.3	yes	98.6	37	1,009,889.0	738,284.5	< 1 ft	
S-11	.5X3.5 PIPE	12	1,009,892.4	738,246.6	yes	67.1	44	1,009,891.5	738,246.3	< 2 ft	
S-12	.5X3.5 PIPE	12	1,009,884.9	738,197.3	yes	53.3	28	1,009,884.5	738,196.3	< 2 ft	
S-13	1.25X5 PIPE	15	1,009,912.0	738,169.8	yes	87.2	89	1,009,911.0	738,170.3	< 2 ft	
S-14	1.25X5 PIPE	15	1,009,928.0	738,165.9	yes	24.3	136	1,009,928.3	738,165.0	< 1 ft	connect/adj to a 44.7mV anomaly.
S-15	1.25X5 PIPE	15	1,009,925.0	738,218.1	no	28.8					edge area of compound anom, no peak
S-16	2X17 PIPE	24	1,009,934.2	738,345.9	yes	133.9	145	1,009,933.3	738,343.8	< 3 ft	
S-17	2X5 PIPE	15	1,009,939.1	738,338.2	yes	89.1	159	1,009,939.3	738,336.5	< 2 ft	
S-18	2X5 PIPE	15	1,009,924.5	738,326.5	yes	180.5	123	1,009,924.3	738,325.3	< 2 ft	
S-19	75MM	21	1,009,917.7	738,274.7	no	714.9					same as S-20
S-20	1.25X5 PIPE	7	1,009,918.9	738,273.8	yes	714.9	107	1,009,919.0	738,273.0	< 1 ft	same as S-19
S-21	75MM	21	1,009,931.0	738,242.3	yes	117.6	140	1,009,929.5	738,240.8	< 3 ft	
S-22	75MM	21	1,009,923.4	738,263.2	yes	116.9	121	1,009,924.0	738,261.5	< 2 ft	
S-23	1.25X5 PIPE	11	1,009,908.5	738,220.9	yes	345.6	79	1,009,908.3	738,220.0	< 1 ft	
S-24	75MM	22	1,009,910.5	738,219.0	no	149.5					compound anom. wi S-23
S-25	1.25X6 PIPE	15	1,009,915.6	738,216.5	yes	281.3	97	1,009,915.0	738,215.8	< 1 ft	
S-26	2X7.5 PIPE	19	1,009,920.8	738,214.9	yes	200.9	109	1,009,919.8	738,213.3	< 2 ft	
S-27	2X7.5 PIPE	16	1,009,919.8	738,210.7	yes	125	106	1,009,919.0	738,208.0	< 3 ft	between two peaks
S-28	2X7.5 PIPE	15	1,009,927.4	738,212.0	yes	89.6	131	1,009,926.0	738,211.8	< 2 ft	
S-29	75MM	30	1,009,935.4	738,184.9	yes	37.4	148	1,009,935.0	738,183.3	< 2 ft	
S-30	75MM	24	1,009,941.1	738,175.7	yes	72.7	160	1,009,939.5	738,174.8	< 2 ft	
S-32	2X18 PIPE	20	1,009,921.1	738,180.4	no	3640					detected, part of compound anomaly
S-33	1.25X7.5 PIPE	12	1,009,922.0	738,182.6	yes	4720	112	1,009,920.3	738,183.3	< 2 ft	detected, part of compound anomaly
S-34	2X18 PIPE	4	1,009,921.5	738,184.8	no	4720					detected, part of compound anomaly
S-35	2X18 PIPE	5	1,009,923.8	738,184.4	no	3640					detected, part of compound anomaly
S-36	2X18 PIPE	4	1,009,925.4	738,182.6	yes	3640	133	1,009,927.8	738,184.5	< 4 ft	detected, part of compound anomaly
S-37	2X18 PIPE	15	1,009,923.5	738,181.2	yes	3640	119	1,009,923.5	738,181.5	< 1 ft	detected, part of compound anomaly
S-38	BLANK	24	1,009,913.7	738,198.5	no						No item
S-39	BLANK	24	1,009,911.5	738,197.9	no						No item

Table 1
GPO Seed Item Analysis

Seed_ID	Description	Burial Depth (inches)	Northing (NY SP ft)	Easting (NY SP ft)	Picked	Response Sum (mV)	Target ID	Northing (NY SP ft)	Easting (NY SP ft)	Offset	Comments
S-40	2X18 PIPE	17	1,009,925.5	738,301.7	yes	336	125	1,009,925.3	738,300.5	< 2 ft	
S-41	2X18 PIPE	17	1,009,937.3	738,318.9	yes	360	154	1,009,936.8	738,316.8	< 3 ft	
S-42	2X18 PIPE	8	1,009,934.5	738,326.4	yes	419	151	1,009,935.8	738,325.8	< 2 ft	
S-43	2X18 PIPE	20	1,009,919.8	738,347.7	yes	242.8	110	1,009,919.8	738,346.8	< 1 ft	
S-44	2X22 PIPE	24	1,009,909.9	738,354.1	yes	235.2	85	1,009,910.0	738,354.3	< 1 ft	
S-45	2X22 PIPE	20	1,009,913.8	738,314.7	yes	233.3	94	1,009,913.3	738,314.3	< 1 ft	
S-46	2x24-in pipe	25	1,009,946.0	738,216.8	yes	270.5	166	1,009,943.8	738,214.0	< 4 ft	
S-47	2x18-in pipe	12	1,009,950.9	738,194.4	yes	1523.3	171	1,009,949.3	738,193.3	< 3 ft	
S-48	1.25x6-in pipe	11	1,009,953.1	738,189.1	yes	229.9	175	1,009,951.0	738,188.3	< 3 ft	
S-49	1.25x5-in pipe	11	1,009,956.9	738,184.6	yes	119.6	188	1,009,958.5	738,186.3	< 3 ft	
S-50	1.25x5-in pipe	11	1,009,959.6	738,189.6	yes	148.6	189	1,009,959.0	738,189.3	< 1 ft	
WEST GPO											
W-1	2x24-in pipe	22.0	1,011,702.9	736,178.4	yes	355.2	16	1,011,703.0	736,177.5	< 1 ft	
W-2	2x18-in pipe	22.0	1,011,710.4	736,191.6	yes	1825.8	21	1,011,709.8	736,191.0	< 1 ft	
W-3	2x24-in pipe	22.0	1,011,698.9	736,210.1	yes	179.5	8	1,011,698.0	736,211.0	< 2 ft	
W-4	75mm	32.1	1,011,714.2	736,227.8	yes	108.2	29	1,011,713.5	736,228.3	< 1 ft	
W-5	3-in Stokes	33.0	1,011,703.7	736,233.8	yes	2116	18	1,011,703.5	736,235.3	< 2 ft	
W-6	75mm	32.1	1,011,713.6	736,248.5	no	2					not detected
W-7	75mm	32.1	1,011,748.0	736,247.8	yes	28.1	45	1,011,747.3	736,248.8	< 2 ft	
W-8A	2x24-in pipe	22.0	1,011,755.9	736,207.5	no	140.8					
W-8B	2x24-in pipe	22.0	1,011,759.9	736,204.7	yes	293.1	47	1,011,758.5	736,204.8	< 2 ft	
W-9A	75mm	32.1	1,011,777.5	736,238.7	yes	369	54	1,011,777.5	736,239.8	< 2 ft	
W-9B	75mm	32.1	1,011,777.5	736,241.9	no	369	15				same as W-9a
W-10	grenade MK2	24.4	1,011,813.8	736,196.7	yes	43.7	73	1,011,813.3	736,196.3	< 1 ft	
W-11	3-in Stokes	33.0	1,011,847.5	736,173.3	yes	49.3	98	1,011,846.5	736,172.8	< 2 ft	
W-12	grenade MK2	24.4	1,011,855.6	736,188.9	yes	17.8	99	1,011,856.0	736,189.5	< 1 ft	
W-13	grenade MK2	24.4	1,011,836.7	736,263.4	yes	32.5	82	1,011,835.8	736,264.8	< 2 ft	between 2 picks
W-14	0.5x3.5-in pipe	5.5	1,011,841.7	736,228.6	yes	23.4	94	1,011,843.0	736,227.5	< 2 ft	between 3 picks 10-30mV
W-15	0.5x3.5-in pipe	5.5	1,011,843.2	736,224.7	yes	13.9	97	1,011,844.8	736,223.5	< 3 ft	between 2 picks
W-16	60mm	25.7	1,011,890.7	736,202.7	yes	21.3	117	1,011,890.5	736,203.0	< 1 ft	
W-17	3-in Stokes	33.0	1,011,870.9	736,252.9	yes	2440.6	106	1,011,870.5	736,252.0	< 1 ft	
W-18	0.5x3.5-in pipe	5.5	1,011,904.8	736,169.6	yes	28.8	121	1,011,904.3	736,170.0	< 1 ft	
W-19	0.5x3.5-in pipe	5.5	1,011,905.3	736,168.1	no	28.8					same as W-18
W-20	75mm	32.1	1,011,911.9	736,212.4	yes	26.8	124	1,011,911.0	736,213.3	< 2 ft	
W-21	3-in Stokes	33.0	1,011,935.4	736,248.1	yes	23.8	137	1,011,934.8	736,247.8	< 1 ft	
W-22	75mm	32.1	1,011,973.9	736,248.2	yes	33	167	1,011,973.3	736,247.3	< 2 ft	
W-23	75mm	32.1	1,011,976.6	736,198.2	yes	20.6	170	1,011,976.8	736,198.3	< 1 ft	
W-24	(7) 75mm	na	1,011,955.2	736,173.6	yes	139.1	154	1,011,954.3	736,174.5	< 2 ft	detected, part of compound anomaly
W-25	0.5x3.5-in pipe	5.5	1,011,936.0	736,237.9	yes	9.2	138	1,011,936.0	736,234.3	< 4 ft	
W-26	0.5x3.5-in pipe	5.5	1,011,943.0	736,237.9	yes	19.9	143	1,011,943.3	736,240.3	< 3 ft	
W-27	0.5x3.5-in pipe	5.5	1,011,954.0	736,237.9	no	8.7					
W-28	0.5x3.5-in pipe	5.5	1,011,961.0	736,237.9	no	3					below pickthreshold of 10 mV
W-29	0.5x3.5-in pipe	5.5	1,011,974.0	736,237.9	yes	12.2	169	1,011,973.4	736,237.2	< 1 ft	
W-30	0.5x3.5-in pipe	5.5	1,011,980.0	736,237.9	yes	105.1	171	1,011,980.8	736,235.5	< 3 ft	

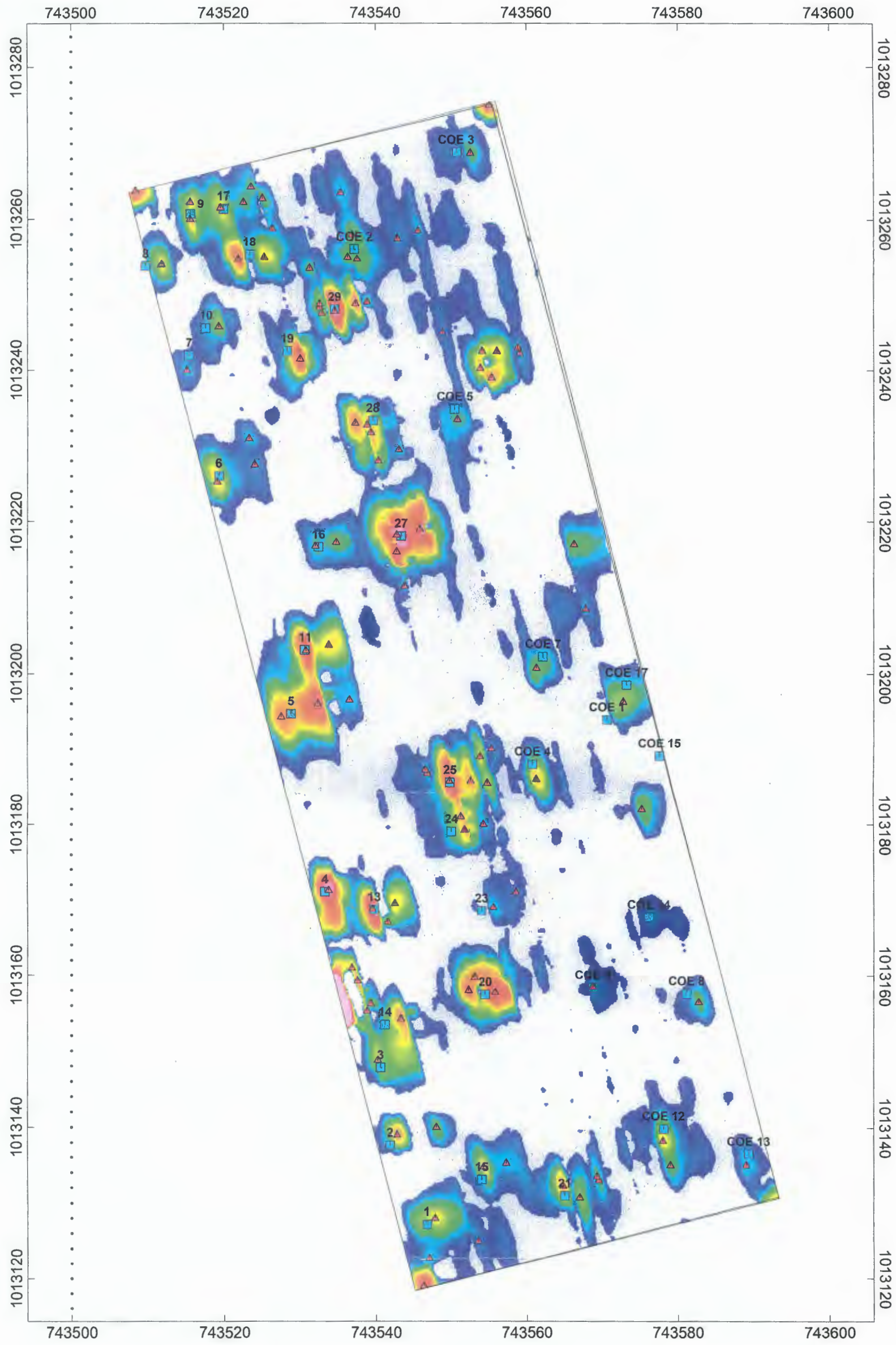
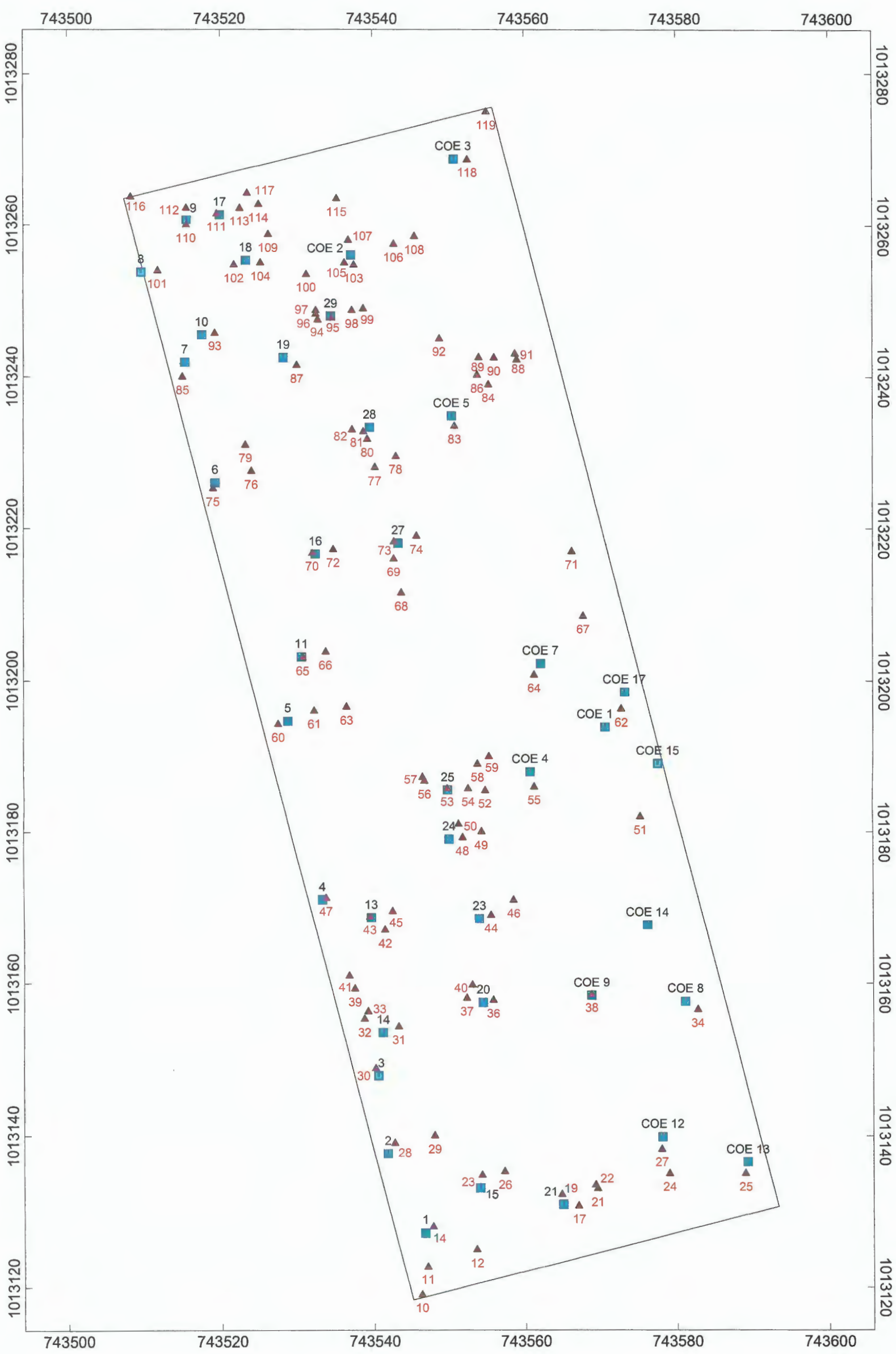


FIGURE 1

SEDA: EAST GPO TEST AREA
EM-61MK2 TOWED ARRAY DATA
SUM OF LEVELED DATA CHANNELS

SHAW ENVIRONMENTAL INC.



Seed Item

Pick Location

Scale 1:175

10 0 10

US survey foot

NAD83 / New York CS83 Central zone

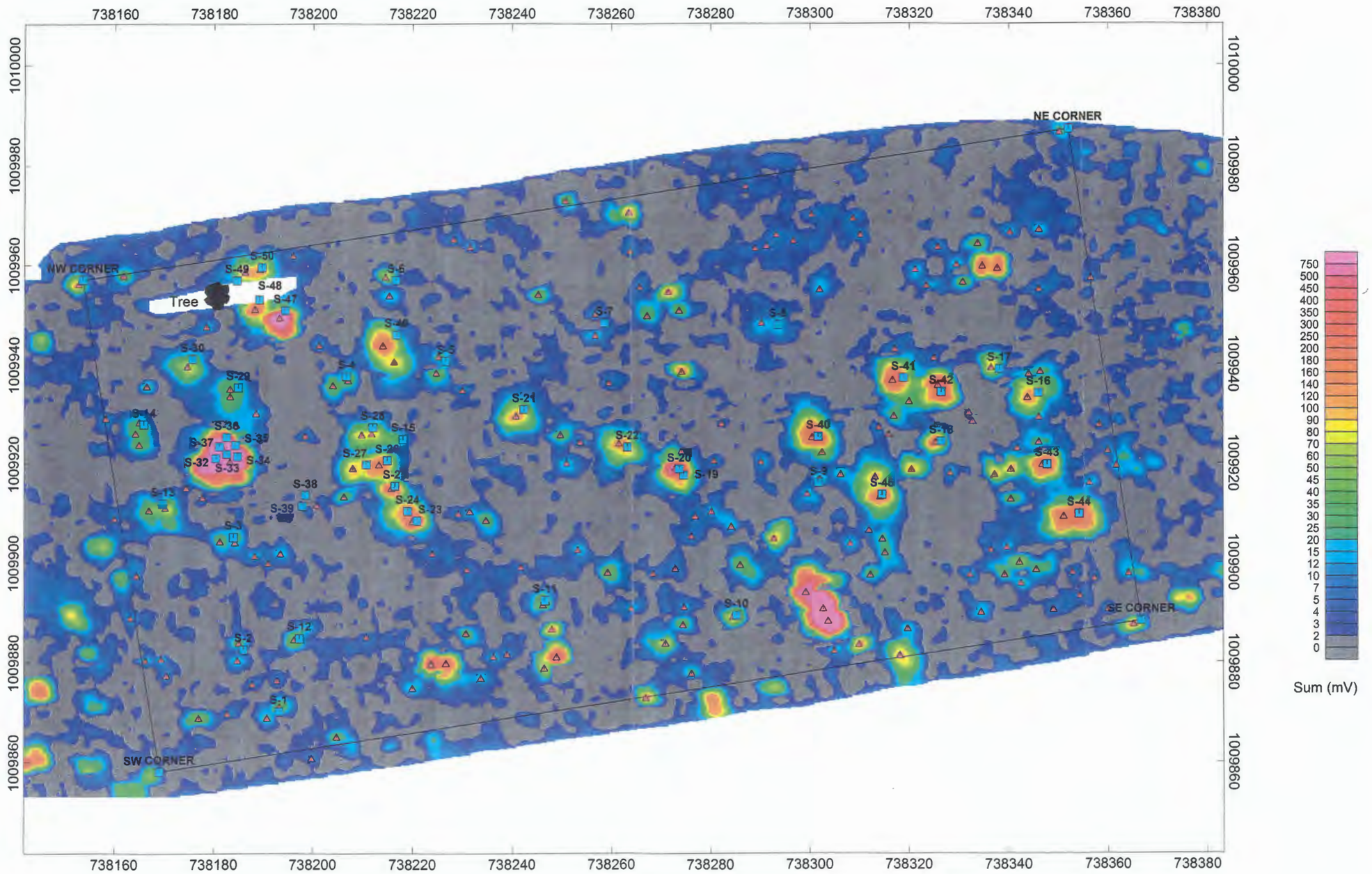
FIGURE 2

SEDA: EAST GPO TEST AREA

EM-61MK2 TOWED ARRAY DATA

TARGET MAP

SHAW ENVIRONMENTAL INC.



Pick Location

Seed Item

Scale 1:250

10 0 10 20 30 40 50

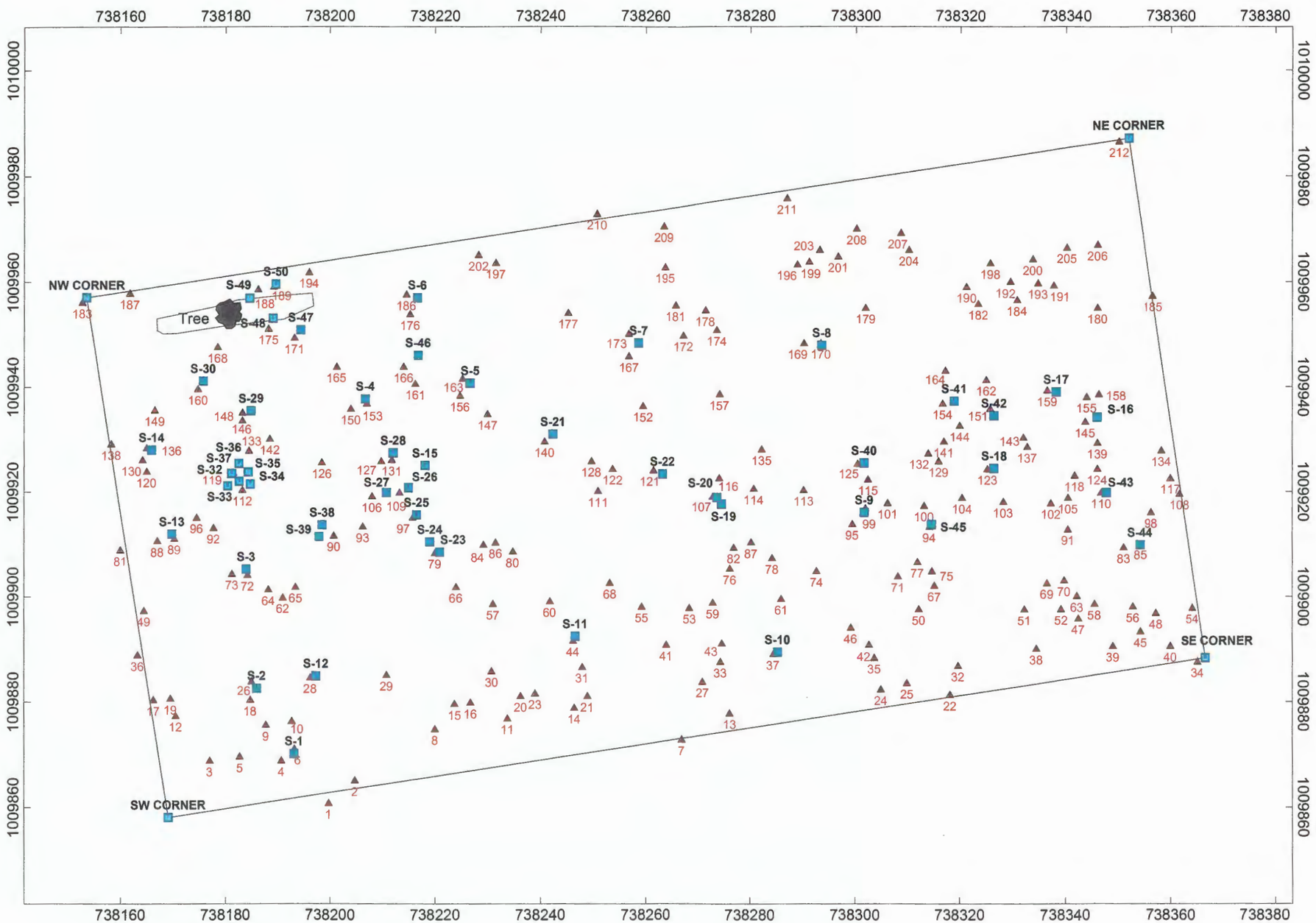
US survey foot

NAD83 / New York CS83 Central zone

FIGURE 3

SEDA: SOUTH GPO TEST PLOT
EM-61MK2 TOWED ARRAY DATA
SUM OF LEVELED DATA CHANNELS

SHAW ENVIRONMENTAL, INC.



Pick Location ▲

Seed Item ■

Scale 1:250

10 0 10 20 30 40 50

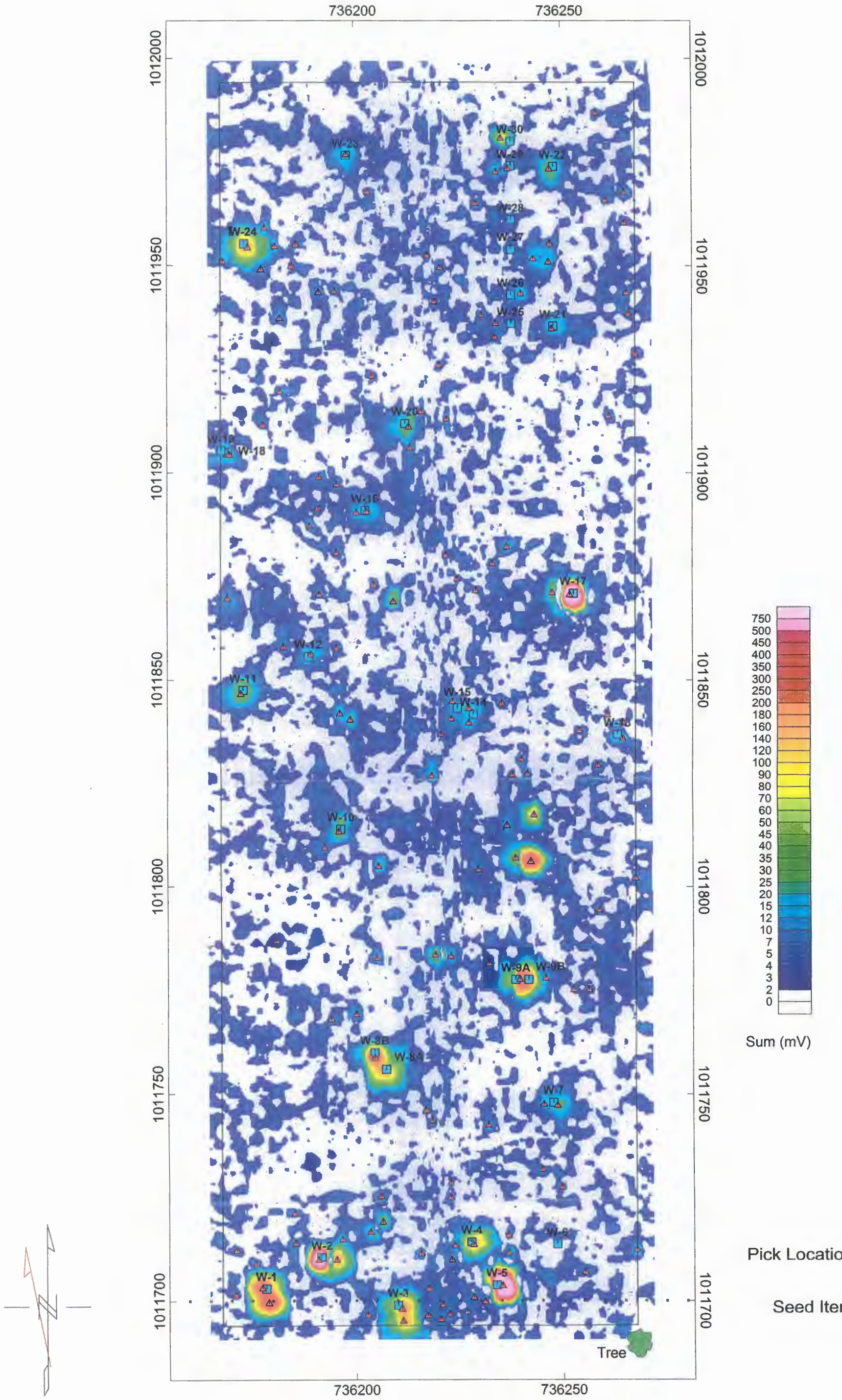
US survey foot

NAD83 / New York CS83 Central zone

FIGURE 4

SEDA: SOUTH GPO TEST PLOT
EM-61MK2 TOWED ARRAY DATA
TARGET MAP

SHAW ENVIRONMENTAL, INC.



Scale 1:300

10 0 10 20 30

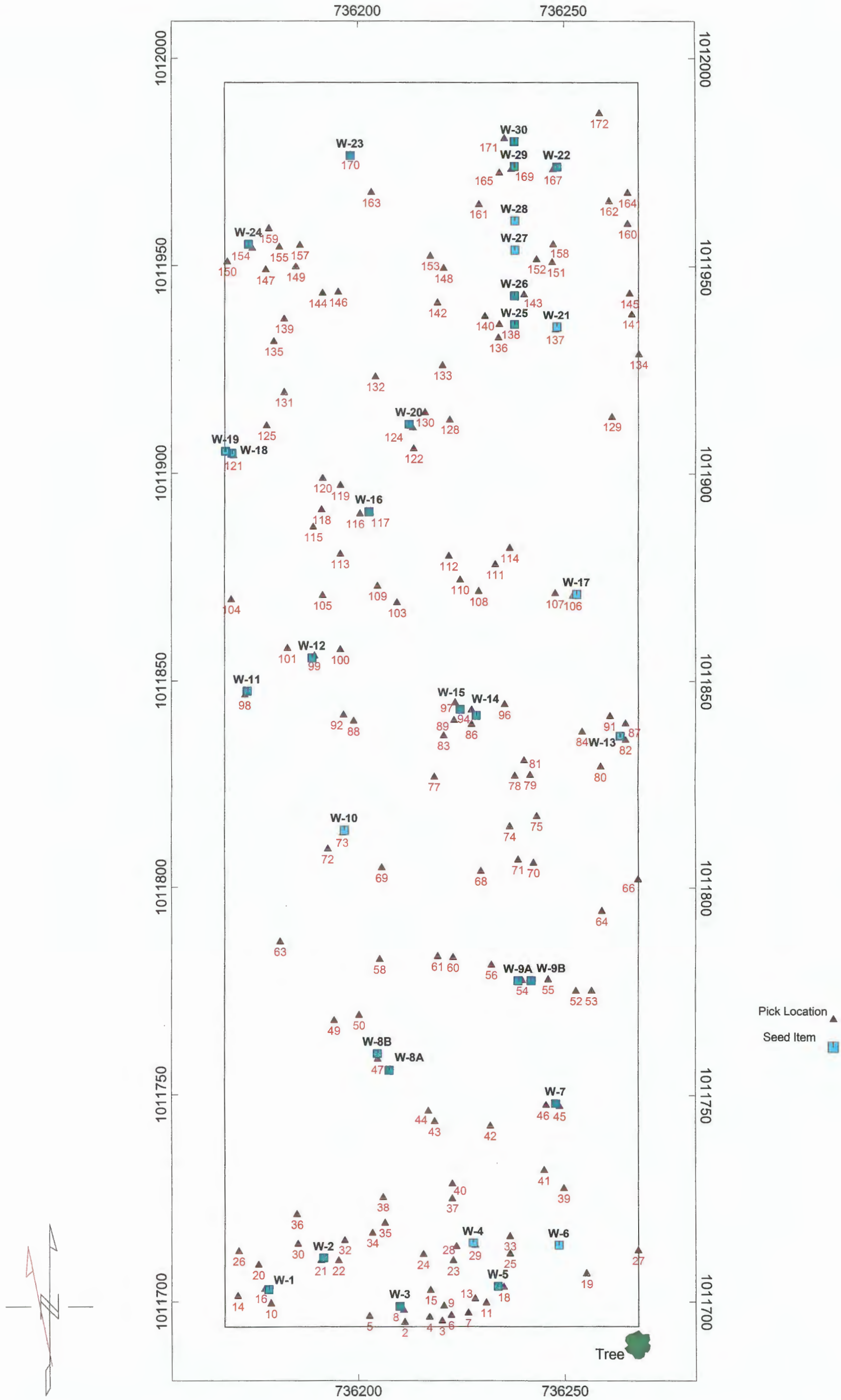
US survey foot

NAD83 / New York CS83 Central zone

FIGURE 5

SEDA: WEST GPO TEST PLOT
EM-61MK2 TOWED ARRAY DATA
SUM OF LEVELED DATA CHANNELS

SHAW ENVIRONMENTAL, INC.



Scale 1:300

10 0 10 20 30

US survey foot

NAD83 / New York CS83 Central zone

FIGURE 6

SEDA: WEST GPO TEST PLOT
EM-61MK2 TOWED ARRAY DATA
TARGET MAP

SHAW ENVIRONMENTAL, INC.