SITE INVESTIGATION REPORT
ASSATEAGUE ISLAND
WORCESTER COUNTY, MARYLAND
AND ACCOMACK COUNTY, VIRGINIA

PREPARED FOR:

U.S. ARMY CORPS OF ENGINEERS

HUNTSVILLE DIVISION

PREPARED BY:

PARSONS ENGINEERING SCIENCE, INC.

FAIRFAX, VIRGINIA

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92D-0022-0030-95003

March 10, 1994

Mr. William Davis
U.S. Army Engineer Division, Huntsville
ATTN: CEHND-PM-OT
106 Wynn Drive
Huntsville, Alabama 35805

RE: Submittal of Final Site Investigation Report, Assateague Island EE/CA, Contract DACA-87-92-D-0022, Delivery Order 0030

Dear Bill:

Parsons Engineering Science, Inc. (Parsons ES) is pleased to submit, for your review, four copies of the Final Site Investigation Report for Assateague Island, Worcester County, Maryland, and Accomack County, Virginia. Please send one of these copies to CENCR.

Under separate cover, ten copies of the Final Site Investigation Report are being sent to the U.S. Army Engineer District, Baltimore. One of these copies is to be sent to the U.S. National Park Service.

All of the comments from the U.S. Army Engineer Division, Huntsville, on the draft site investigation report that required action have been addressed in the report. The actions taken are listed on the enclosed comment sheets.

All of the comments from the U.S. Army Engineer District, Baltimore, have been incorporated in the text. One paragraph was eliminated and four others were added to provide the information requested. A number of sentences were re-worded and others were added to present the same basic information of the draft report in a more clear and accurate manner.

If you have any questions, please do not hesitate to call me at (703) 934-2382.

Sincerely,

PARSONS ENGINEERING SCIENCE, INC.

Robert W. Luce, Ph.D., P.G.
Project Manager

RWL:kf
726000/RL42216Z.LTR

cc: H. G. Earhart with attachment
C. Raddell with attachment
File 726000.05

PARSONS

EXECUTIVE SUMMARY

ES1 A site investigation was completed at Assateague Island, Worcester County, Maryland, and Accomack County, Virginia, to determine the nature and extent of ordnance and explosive waste (OEW) at the site. From 1945 to 1946 or 1947, two areas in the Maryland portion of the long, sandy barrier island, each approximately 350 acres, were used as practice rocket ranges, and, to a lesser extent, as practice bombing ranges by the U.S. Navy and/or Army Air Corps. Previous investigations from 1988 to 1992 had confirmed the presence of (inert) OEW at both areas as well as at an offshore area adjacent to the more northerly one. In 1991, a preliminary assessment of both onshore areas led to their eligibility under the Defense Environmental Restoration Program - Formerly Used Defense Sites (DERP FUDS). In 1994, the U.S. Army Corps of Engineers, Huntsville Division, issued Delivery Order 0030 of Contract DACA87-92-D-0022 to undertake a field investigation.

ES2 Field work for the site investigation was conducted from October 11 through December 6, 1994. Based on the Archives Search Report and supplementary information from a former range spotter, it was concluded that the highest probability sectors for encountering OEW associated with the targets and burial trenches in both areas would be in the beach and dune zones. Grid systems 4,500 feet long and from 400 to 800 feet wide were set up in both areas. The corners of individual grid cells of the system (100 feet by 200 feet) were staked and surveyed (Maryland State Plane Coordinates, North American Datum, 1983). Magnetometer sweeps were performed on lanes essentially parallel to the shoreline at 50 foot intervals, This provided a minimum of 10 percent magnetometer coverage per grid cell. The magnetometers were Foerester Ferex (MK 26) Ordnance Locators.

ES3 Eighteen grid cells in the northern area and nine grid cells in the southern area were selected for intrusive investigation due to the number and/or size of the magnetic anomalies found. Intrusive investigation typically consisted of sweeping all of the selected cell, excavating 6-inch lifts to a depth of 2 feet, and identifying the item(s) causing the anomaly.

ES4 In the northern area, 20 OEW items were found on the surface and 109 OEW items were found in an area in an area west of the present day artificial sand dunes. The number and distribution of the items indicate a former target area with dimensions of approximately 800 feet x 1,100 feet. The OEW items were almost exclusively parts of 2.25-inch practice rockets. At the shoreline in the northern area, partial excavation of a large anomaly yielded 36 OEW items; the density of these items, again almost exclusively parts of 2.25-inch practice rockets, indicates that a burial trench had been found. All OEW items in the target area and in the trench were examined and found to be inert. An addendum to the Work Plan was prepared and approved so that an adjacent offshore area 1,000 feet long by 200 feet wide could be swept with an MK 26 magnetometer. The number and distribution of the anomalies led to the conclusion that they are related to OEW from the onshore burial trench or from burial trenches that are now underwater; no underwater intrusive work was required, authorized, or executed.

ES5 In the southern area, no OEW items were found on the surface or in the subsurface, although some had been found on the surface in the past. Several additional reconnaissance lanes approximately 10,000 feet long were swept and intrusively investigated west of the beach, north of the planned survey area. No target area nor burial trench was located in the southern area. A plausible explanation provided by the former range spotter is that the southern range had been thoroughly cleaned and the material transported to the northern area for burial.

ES6 All of the OEW items recovered in this investigation were certified as inert and properly classified as munitions scrap. The items were generally in rusted and deteriorated condition. Except for two items given to the National Park Service for its museum, the munitions scrap was transferred (with receipt) to a local scrap dealer.

ES7 The inert condition of all OEW items found in this investigation and the fact that no confirmed live OEW has been reported during previous investigations, leads to a recommendation that no further action be required for the site. The lack of live ordnance eliminates the need for a non-time critical removal action; therefore, an Engineering Evaluation/Cost Analysis (EE/CA) was not appropriate.

IDENTIFICATION OF RESPONSIBLE PERSONNEL

The following individuals are the main contributors to the production of this Site Investigation Report.

NAME	TITLE
Robert W. Luce, Ph.D., P.G.	Project Manager, Parsons Engineering Science
James M. Kapinos, P.E.	Project Engineer, Parsons Engineering Science
Arthur W. DeJohn, P.G.	Project Geologist, Parsons Engineering Science
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Kristen A. Foote	Word Processor, Parsons Engineering Science

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LIST OF ACRONYMS

ASR	Archives Search Report
CEHND	Corps of Engineers, Huntsville Division
CENAB	Corps of Engineers, Baltimore District
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DC	Dune Crossing
DoD	Department of Defense
DERP	Defense Environmental Restoration Program
EE/CA	Engineering Evaluation/Cost Analysis
EOD	Explosive Ordnance Disposal
FDE	Findings and Determination of Eligibility
FUDS	Formerly Used Defense Sites
GPS	Global Positioning System
HEI	Hanson Engineers, Inc.
HSG	High Sensitivty Gradiometer
HVAR	High Velocity Aircraft Rocket
INPR	Inventory Project Report
LSG	Low Senstivity Gradiometer
mm	Millimeter
MK26	Forester Ferex Electromagnetic Detector
NAD	North American Datum
NEPA	National Environmental Policy Act
NPS	National Park Service
OEW	Ordnance and Explosive Waste
Parsons ES	Parsons Engineering Science
QC	Quality Control
REC	Record of Environmental Consideration
SCAR	Subcaliber Aircraft Rocket
USGS	U.S. Geological Survey
UXB	UXB International, Inc.
UXO	Unexploded Ordnance

SECTION 1

INTRODUCTION

1.1 OVERVIEW

1.1.1 Assateague Island is a low, sandy, 36-mile barrier island that covers 17,552 acres and extends south-southwesterly from Worcester County, Maryland, to Accomack County, Virginia. The island was divided into five areas (Areas B, C, D, and E) for purposes of an Ordnance and Explosive Waste (OEW) evaluation. Two areas of the island in Maryland, designated as Areas A and C, were used by the Navy and/or Army Air Corps pilots based at Naval Air Stations at Chincoteague, Virginia, and Manteo, North Carolina, as rocket/bombing ranges from 1944 until 1946 or 1947 (Figure 1-1). Areas A and C comprise approximately 350 acres each. OEW was confirmed in Areas A and C prior to this investigation. The remainder of Assateague Island, exclusive of Areas A and C, is designated Area E. No ordnance was previously confirmed in Area E. There are two additional offshore areas of concern, designated Areas B and D, which have not undergone a preliminary assessment. These offshore areas, each an estimated 300 acres, extend into the ocean at both former ranges. Burial trenches were probably dug at or above the high water line for both ranges in 1946 (U.S. Army Corps of Engineers, 1994). Erosion has caused the barrier island to migrate westward so that the present positions of the burial trench(es) are in doubt. The island topography changes frequently because of erosion and deposition that are caused by storms occurring between June and November.

1.1.2 Under the Defense Environmental Restoration Program (DERP), 10 U.S.C. Sec. 2701-2727, and under Sec. 104 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Secretary of Defense is authorized to conduct response actions at sites that are contaminated while under the jurisdiction of the Department of Defense (DoD) or its predecessor agencies. The Secretary of the Army, acting through the Corps of Engineers, acts as the DoD executive agent for the cleanup of sites that were contaminated while under the jurisdiction of DoD, but which subsequently have been transferred out of DoD control. This initiative is known as the Formerly Used Defense Site (FUDS) program. Eligibility in the FUDS program is a two-step process. Assateague Island became eligible as a FUDS on February 20, 1992, when the Inventory Project Report (INPR) for the site was approved. The INPR, which is similar to a preliminary assessment, determined that OEW was at the site. Prior

to the INPR, the Findings and Determination of Eligibility Study (FDES) had determined that the Assateague Island was formerly used by the Navy.

1.1.3 In June 1994, the U.S. Army Corps of Engineers, Rock Island District, prepared the Archives Search Report (ASR) of the site for the U.S. Army Corps of Engineers, Huntsville Division (CEHND). The ASR concluded that Areas A, C, and E were confirmed FUDS and that Areas B and D were potential FUDS. The presence of ordnance was confirmed for Areas A and C. Additional conclusions were that Areas B and D had the potential for ordnance and that Area E was uncontaminated. The ASR recommended that an Engineering Evaluation/Cost Analysis (EE/CA) be performed in Areas A and C. Preliminary Assessments were recommended for Areas B and D, but only after the EE/CA had accurately established the boundaries for Areas A and C. No further action was recommended for Area E.

1.1.4 An OEW site investigation to determine the nature and extent of OEW surface and subsurface contamination at the site has been completed. As recommended in the ASR, this work was undertaken "to confirm the precise location of range boundaries and burial trenches, as well as to quantify the OEW contamination in the range Areas." Work included a detailed archival search, magnetometer surveys in Areas A and C, intrusive operations in Areas A and C, an underwater magnetometer survey of Area B, and reconnaissance magnetometer sweeps of part of Area E north of Area C. Work was not undertaken in Areas D and E (except for reconnaissance magnetometer sweeps in Area E). Field work was conducted from October 11 through December 6, 1994, by UXB International, under contract to Parsons Engineering Science, Inc. (Parsons ES). Hanson Engineers, another subcontractor, provided mapping services. Any OEW items found on the surface or in the subsurface were examined and certified as to their present condition (inert or live). This report presents results of the OEW survey, conclusions drawn from the OEW survey, and a recommendation for site disposition.

1.1.5 The project was originally approved as an EE/CA investigation. However, all OEW found in this investigation was inert and is properly classified as munitions scrap. No live ordnance was located; therefore, non-time critical removal actions were not required, eliminating the requirement to perform an EE/CA.

1.2 SITE INVESTIGATION REPORT FORMAT

1.2.1 Delivery Order 0030 under contract number DACA87-92-D-0022 was implemented as a result of the ASR recommendations. The objective of this delivery order is to "determine the nature and extent of OEW surface/subsurface contamination at the site."

1.2.2 The objectives of this Site Investigation Report are to provide:

- the results of the field investigation;
- conclusions as a result of the field investigation; and
- a recommendation on site disposition.

1.2.3 This report consists of six sections and several supporting appendices. Section 1 contains a project overview and background information. Field work results (magnetometer survey and intrusive operations) are included in Sections 2 and 3. Section 4 presents the conclusions. Section 5 provides a recommendation for the site. Section 6 provides references for this document.

1.3 BACKGROUND

1.3.1 Site Description

1.3.1.1 General

1.3.1.1.1 Assateague Island consists of approximately 17,552 acres: 8,018 acres in Worcester County, Maryland, and 9,534 acres in Accomack County, Virginia. The U.S. Fish and Wildlife Service owns 9,021 acres in Virginia and 418 acres in Maryland that comprise the Chincoteague National Wildlife Refuge. The U.S. National Park Service (NPS) owns 6,900 acres in Maryland and 205 acres in Virginia that comprise the Assateague Island National Seashore. The State of Maryland owns 696 acres that comprise Assateague Island State Park. The Commonwealth of Virginia owns 308 acres of salt-marshlands. The U.S. Coast Guard owns less than 1 acre in Virginia for operating a lighthouse. Approximately 4 acres in Maryland are held by private interests.

1.3.1.1.2 As a consequence of finding ordnance in July 1988 along the shore in Area A (see Section 1.3.9.1), a site visit and research into the Navy's use of the island were

undertaken and completed in July 1991. This led to an FDES conclusion, dated December 19, 1991, that Assateague Island had been formerly used by DoD and was eligible under the DERP-FUDS program. The INPR, dated February 20, 1992, identified an OEW hazard for the site, thereby making the site a FUDS. In March 1992, a contractor completed a three-week magnetometer sweep of a portion of Area A but did not locate OEW. However, the ASR recommended an EE/CA be performed in Areas A and C and preliminary assessments be performed in Areas B and D after the boundaries for Areas A and C were accurately located.

1.3.1.2 Areas A and B

1.3.1.2.1 Area A consists of approximately 350 acres. The boundaries were estimated in the ASR and are shown in Figure 1-1. Area A was used as a rocket range for Navy pilots at the end of World War II. It was reported that a buried trench for the disposal of OEW from the range was dug, most likely along the shoreline at the time the range was cleared (U.S. Army Corps of Engineers, 1994). The type of ordnance that has historically been found in this Area is practice rockets. This Area is currently being used as part of the National Seashore and State Park and will likely continue in this capacity.

1.3.1.2.2 Area B consists of approximately 300 acres and is the ocean Area adjacent to Area A. Aircraft flew from west to east, from the bay to the ocean, as they fired at the target. Area B was in the flight path beyond the target area located in Area A. The possibility exists that munitions fired at the target in Area A may have overshot the target and landed in Area B. Westward migration of the shoreline may have caused a buried trench dug on land to be now in Area B. No definite boundaries have been established for this Area. The type of ordnance that has historically been found in this Area is practice rockets.

1.3.1.3 Areas C and D

1.3.1.3.1 Area C consists of approximately 350 acres. The boundaries were estimated in the ASR and are shown in Figure 1-1. This Area was used as a rocket range for Navy pilots at the end of World War II. This Area may also contain a burial trench used for disposal of OEW from the range. The types of ordnance that historically have been found in this area are practice rockets, practice bombs, and 20 millimeter (mm) cartridges. This Area is currently a part of the National Seashore and will likely continue to be used in this capacity.

1.3.1.3.2 Area D consists of approximately 300 acres and is the ocean Area adjacent to Area C. Area D was in the flight path beyond the target area located in Area C. The possibility exists that munitions fired at the target area may have overshot the target and landed in Area D. A burial trench dug on land originally might now be in Area D because of westward shoreline migration. No definite boundaries have been established for this area. No geophysical survey was conducted in Area D because no OEW was found in the site investigation of Area C.

1.3.1.4 Area E

Area E consists of an estimated 16,852 acres. It is the remainder of Assateague Island, excluding the area consisting of the two rocket ranges. Area E is currently being used as part of the National Seashore, as a Wildlife Refuge, and as a State Park and will likely continue to be used in these capacities. There is no confirmation of ordnance items in this Area. The INPR and the ASR stated that a project investigation was not needed for Area E.

1.3.2 Physical and Biological Site Characterization

Assateague Island is a long, narrow, sandy barrier island of low elevation that is separated from mainland Maryland and Virginia by Sinepuxent Bay and Chincoteague Bay. Relatively unpopulated and secluded, Assateague Island preserves many important ecological and geographic features of its coastal environment. See Appendix A for further information concerning Assateague Island's topography, geology and soils, groundwater, wildlife, vegetation, wetlands, and marine/estuarine systems.

1.3.3 Cultural Resources

A comprehensive historical and archaeological survey of Assateague Island has not been undertaken. However, potentially significant nineteenth-century archaeological sites, including the Green Run Village Cemetery and Scott's Ocean House Hotel, are known to be present in Areas A and C. During field operations of this project, two shipwrecks were discovered in Area A, and a building foundation was found in Area C. See Appendix B for more information concerning cultural resources.

1.3.4 Record of Environmental Consideration

A Record of Environmental Consideration (REC) was issued on November 2, 1994, by the U.S. Army Corps of Engineers, Baltimore District for the Assateague Island project. The REC is used when the proposed action is exempt from the National Environmental Policy Act (NEPA) requirements (as are Defense Environmental Restoration funded clean-ups). The REC addressed how key environmental issues such as endangered species, wetlands, cultural resources, and noise would be treated. It concluded that adherence to the plans for the project would cause no change to the existing environmental conditions and that the environmental quality would be enhanced by removal of OEW.

1.3.5 Public Use

1.3.5.1 Assateague Island is currently used as a National Seashore, a National Wildlife Refuge, and a Maryland State Park (Assateague State Park). Area A is part of the Assateague Island National Seashore and Assateague State Park. As such, it is readily accessible to the public for various recreational activities. Public use of the area includes, but is not limited to, camping, picnicking, sunbathing, and fishing. Public swimming and fishing take place in the adjacent Area B.

1.3.5.2 Area C is part of the Assateague Island National Seashore. Area C is limited to off-road vehicles only and is also accessible to the public for recreational activities such as fishing, sunbathing, and seasonal hunting.

1.3.6 Barrier Island Dynamics

1.3.6.1 The planning for this site investigation accounted for the natural processes that change the geographic position and the topography of barrier islands. Although major changes do take place spasmodically as a result of storms, there also has been a general landward migration of Assateague Island. This migration is in response to a rising sea level brought about by the melting of polar ice caps and glaciers formed during the last Ice Age (Leatherman, 1988). The major process for sediment movement is inlet formation by which seas break through a narrow part of a barrier island and deposit sediment from the shore into the bay, thereby building up and extending marsh and lagoonal deposits. Another process is washover, by which high seas break through low points in the barrier dune line and make fan-shaped deposits of material on the bay side of the island. Both processes cause a "roll-over" whereby older, deeper

sediments at the shoreline are transported landward and deposited on top of younger sand, marsh, and lagoonal sediments. A third natural process on barrier islands, which somewhat competes with the other two processes, is the dune formation by wind processes (Leatherman, 1988).

1.3.6.2 It has been documented that Assateague Island has migrated landward in historic times. However, the rate of retreat has not been steady and cannot be accurately predicted. Areas A and C have moved landward approximately 125 feet and 75 feet, respectively, in the 50 years since the rocket ranges were in use. This landward movement was determined by comparing shoreline positions on historical U.S. Geological Survey topographical maps. The accuracy of these topographic maps (1:24,000 scale) is 40 feet; this much error is associated with each shoreline position.

1.3.6.3 The consequences of barrier island dynamics for this site investigation are the following:

- material, such as OEW, originally buried on land near the shoreline may now be under water and in the surf zone because of westward migration of the island;

- locating instruments, such as magnetometers, must be able to find material at depths of more than a few feet because a single storm can deposit, or erode, sediments several times that thickness, both on the island and in the nearshore ocean area; and

- field investigations must be tied into fixed coordinate systems.

1.3.7 DERP FUDS Eligibility

1.3.7.1 The Findings and Determination of Eligibility (FDE) dated December 19, 1991, established 17,552 acres known as Assateague Island as being eligible under the DERP FUDS. The FDE covered the entire acreage of Assateague Island itself (U.S. Army Corps of Engineers, 1994). The INPR, which was approved on February 20, 1992, identified potential OEW hazards at the site.

1.3.7.2 Offshore Areas B and D are potentially eligible for DERP FUDS because munitions intentionally fired at targets in Areas A and C may have unintentionally strayed into Areas B and D, respectively. Areas B and D are not included in the December 19, 1991 FDE. They, therefore, require Preliminary Assessments to become eligible for DERP FUDS (U.S. Army Corps of Engineers, 1994).

1.3.8 Archives Search Report

1.3.8.1 The ASR is a two-volume document that was prepared by the U.S. Army Corps of Engineers, Rock Island District, in June 1994. The two volumes are 1) Findings and 2) Conclusions and Recommendations. The report presents documents from the historical records search and from site inspection reports and provides background information on the island and on ordnance that might have been used on the island.

1.3.8.2 OEW contamination was confirmed in Areas A and C based on direct witness accounts of ordnance items by the ASR team and verifiable documented evidence. Areas B and D are potential ordnance Areas because the possibility exists that munitions fired at targets in Areas A and C landed in Areas B and D. No OEW contamination was found in Area E.

1.3.8.3 The ASR recommended that an EE/CA be performed on Areas A and C "to confirm the precise location of range boundaries and burial trenches, as well as to quantify the OEW contamination in the range Areas." The ASR also recommended that Area E should be considered uncontaminated and that no additional field data collection be required for this Area. The ASR further identified Areas B and D as potential ordnance Areas, and recommended a Preliminary Assessment for these Areas be performed after the boundaries of Areas A and C had been established (U.S. Army Corps of Engineers, 1994).

1.3.9 Previous UXO Investigations

1.3.9.1 1988 EOD Team Deployment

In 1988, the 144th Explosive Ordnance Disposal (EOD) team from Ft. Meade, Maryland, was deployed at the request of the NPS when ordnance washed ashore at North Ocean Beach (Area A). On July 15, the EOD team arrived at the site and secured all ordnance items that had washed ashore. On July 16, the U.S. Navy EOD Mobile Unit II took over operations and, from July 17-20, conducted an underwater survey. It appeared that the ordnance was coming from

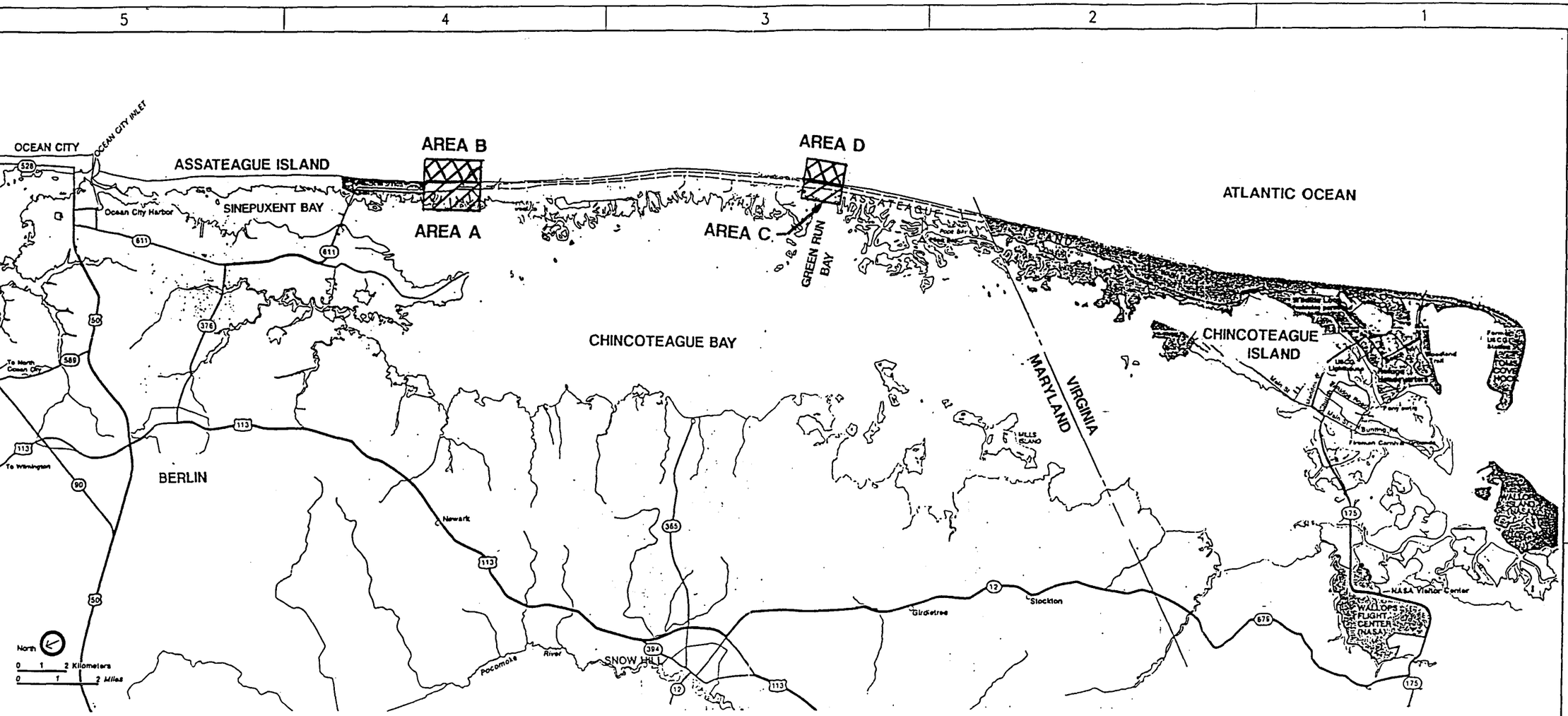
a "hole" approximately 15 meters offshore in Area B. The results led the Navy EOD team leader to believe that the "hole" scoured during a storm uncovered a trench dug to bury expended ordnance cleared from the range. It was further believed that the trench was underwater because of the natural westward migration of the island. The ordnance recovered by both teams totaled eleven spent 2.25-inch rocket motors, eleven 2.25-inch rocket heads, two 5-inch rocket heads, and two spent 3.25-inch rocket motors. All items found were inert. Unfortunately, the location of the suspected trench was not tied to a fixed location onshore. Therefore, its exact location cannot be determined from field documents. (For the Case Incident Record prepared by the NPS and the Summary of Significant Events prepared by the Navy EOD team, see Appendix C. The Summary of Significant Events states that explosive exploration on two suspect items, mistakenly termed live in the ASR, found both items inert.)

1.3.9.2 1991 Contracted Research and Site Visit

Human Factors Applications, Inc., a subcontractor to E.A. Engineering, Science and Technology, conducted a site visit July 24-25, 1991, in conjunction with the INPR. The objective was to find the location of the rocket range in Area C and its burial trench in Area C, or perhaps offshore in Area D. Neither was found, although parts of a 5-inch rocket motor were found in Area C. The team was shown an expended MK43 practice bomb and a 20 mm cannon casing that had been found on the island by an NPS Ranger. Research at Wallops Flight Center showed that Assateague Island had been used as a rocket, bombing, and shooting range for Naval Air Station, Chincoteague,Virginia, and Naval Air Station, Manteo, North Carolina. The team recommended a large-scale ordnance survey of Assateague Island be conducted, paying closest attention to the North Ocean Beach Area (Area A).

1.3.9.3 1992 Interim Survey of North Ocean Beach Area

ISSI Unexploded Ordnance, Inc., under Corps of Engineers Contract No. DACA87-92-P.0545, conducted a surface and subsurface survey of the North Ocean Beach Area (Area A) from February 27 through March 19, 1992. A total of 436 lanes and 570,300 square feet of the beach was surveyed in the vicinity of the 1988 EOD Team Deployment. The area was swept with Schonstedt Instrument Company GA-72CV magnetic locators. The area measured 300 feet by 1,800 feet at the north end of Area A. No ordnance or ordnance-related items were discovered; only fencing, metal pipes, and a shipwreck. The trench probably was not detected because of the low sensitivity magnetometers used and the target area was not detected because of the location of the survey.



Revisions			
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US Army Corps of Engineers Huntsville Division

DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
FORMERLY USED DEFENSE SITES
ORDNANCE AND EXPLOSIVE WASTE

ASSATEAGUE ISLAND
MARYLAND AND VIRGINIA
SITE LOCATION MAP

Scale: As Shown
Date: DEC, 1994
Drawing Code:
Sheet reference number:
Contract Number: DACA87-92-D-002
Delivery Order: 0030
Sheet of

FIGURE 1-1

SECTION 2

MAGNETOMETER SURVEY

2.1 INTRODUCTION

The first part of the site investigation was a field survey using magnetometers to locate former target areas and burial trenches in Areas A and C. Subsequently, Area B was investigated to locate a possible offshore burial trench. Except for a few reconnaissance sweeps in Area E just north of Area C, no surveys with magnetometers were performed in Areas D or E. All the magnetometer surveys were conducted from October 13 through December 1, 1994. The locations of all anomalies and surface OEW were recorded. Grid cells in Areas A and C were selected for later intrusive investigation.

2.2 OPERATING PROCEDURES

2.2.1 Areas A and C

2.2.1.1 Probability Sectors

Areas A and C were divided into sectors of relatively high or low potential for the presence of OEW. Mr. Adrien Smith, a spotter at the time the rocket ranges were used, clearly recalled that the 500-foot-diameter targets were east of the dense vegetation, which is west of the island's main road (oral communication, 1994). Thus, the high probability sectors in Areas A and C are located between the mean high tide line and the road (the old road in Area A) approximately 800 feet from the ocean. The low probability sectors extend westward from the road to the bay (Figures 2-1 and 2-2).

2.2.1.2 Grid System

2.2.1.2.1 In order not to miss a burial trench of unknown but probably relatively small dimensions, it was necessary to set up a systematic grid system. The grid system was aligned with the shoreline running generally north-south. Two alphanumeric coordinate grids were used at the site, one for Area A and one for Area C (Figures 2-1 and 2-2, respectively). The grids are made up of tiers and grid cells. A grid cell is the smallest element of the grid system,

typically 100 feet by 200 feet (the 100-foot side is oriented parallel to the shoreline). A tier is a row of grid cells that parallels the shoreline. A typical tier consists of 45 grid cells (i.e., grid cells A0 through A44). Thus, a typical tier is 200 feet wide and 4,500 feet long. Some tiers and grids were smaller to accommodate site features such as roads and thick vegetation.

2.2.1.2.2 The four corners of each grid cell were located in the field using a total station planimetric surveying instrument that can electronically record distances and angles. A wooden stake was placed at each corner and labeled. To prevent contacting ordnance, the ground area was swept with a magnetometer prior to placing stakes. The entire alphanumeric coordinate grid system was then tied into known planimetric surveying control points provided by the NPS. Interior grid cell stakes (every 50 feet east to west) were placed using a 200-foot tape measure. This provided markers every 50 feet east to west for the entire length of each tier, creating "lanes" to be swept with a magnetometer.

2.2.1.2.3 The above total station/tape measure procedure ensured that the grid system and sweep lanes were placed where intended and that the accuracy of all grid corners was well within 25 meters (as required in the Statement of Work.) Stakes were required every 50 feet for the sweep lanes to ensure accurate sweeps along each tier, south to north. A quality control (QC) review of the work performed with the total station has been completed and is included in Appendix G.

2.2.1.3 Sweep Procedures

2.2.1.3.1 Initially, a tier was swept with a magnetometer, south to north, using lanes spaced 50 feet apart (Figures 2-1 and 2-2). Each lane was 5 feet wide, a standard lane width used by UXO specialists. Typically, the lanes were labeled based on the distance from the eastern edge of Tier A, which was set approximately at the high tide line (i.e., the lane 100 feet from the eastern edge of Tier A is referred to as the 100-foot lane). Anomalies encountered along a lane were recorded and plotted on a Five Cell Anomaly Data Sheet (Figure 2-4 of the Work Plan). Recorded data included area, tier, grid cell, lane where anomaly was encountered, and distance along the lane in the grid cell. The distance along the lane was visually estimated to the nearest 15 feet.

2.2.1.3.2 If no significant anomalies were encountered during the 50-foot spacing sweeps, or if more coverage of a cell was deemed necessary, a second sweep was made in lanes positioned midway between the 50-foot lanes (this provided lane sweeps every 25 feet east to west). These supplementary lanes were swept the length of the entire tier as in Tier A of Area A) or in specific cells in a tier (as in Tier B of Area A). The UXO technicians swept these lanes by walking midway between the 50-foot staked lanes (the 25-foot lanes were not staked). If no significant anomalies were encountered when sweeping the 25-foot lanes, or if more area needed to be swept, additional tiers were swept, starting with sweep lanes spaced 50 feet apart.

2.2.1.3.3 After sweeps of Area A and Area C were completed, recommendations as to which grid cells to intrusively investigate were presented to the U.S. Army Corps of Engineers, Huntsville Division with a copy to the U.S. Army Corps of Engineers, Baltimore District (CENAB). The recommendation for intrusive investigation in each Area was accompanied by completed Five Cell Data Anomaly Sheets for each Area and was made by the project manager for Parsons ES in collaboration with the Senior UXO Supervisor and the Parsons ES Field Supervisor. The recommendation for each Area was based on the number of anomalies found in a grid cell, the size of anomalies found in a grid cell, and the number of surface OEW found in a grid cell. The CEHND project manager after coordinating with the CENAB project manager selected the grid cells to be intrusively investigated. The pattern of anomalies in both Areas clearly identified areas requiring intrusive investigation, eliminating the need for a more rigorous ranking system or a formal anomaly review board.

2.2.1.4 Instruments Used

2.2.1.4.1 The geophysical instruments used in the search for ordnance on Assateague Island were dual tube fluxgate magnetometers also commonly known as gradiometers. The high water table and the presence of saltwater made ground penetrating radar and electromagnetic devices inappropriate for this site. Both high sensitivity gradiometers (HSG) and low sensitivity gradiometers (LSG) were used during the geophysical surveys. Both detect changes in the earth's magnetic field caused by ferromagnetic metals or ferromagnetic minerals such as magnetite. Typically, HSGs are capable of detecting ferromagnetic materials at a greater depth than LSGs.

2.2.1.4.2 The HSG used by Parsons ES was the Foerester Ferex Electromagnetic Detector (MK 26) Ordnance Locator. The MK 26 is the most recent military-approved locator and is currently used by U.S. military EOD forces to detect subsurface ordnance items. The

locator is a hand-held unit that incorporates two fluxgate magnetometers, aligned and mounted a fixed distance apart. Both audio and metered signals are provided to the operator. The detection capability of the MK 26 is dependent both on the mass of the item and its depth. It is capable of locating a 500-pound bomb at a depth of 19 feet. The MK 26 was used for sweeping all tiers during the magnetometer surveys because it was likely that ordnance disposed in burial trenches might be at depths of more than 10 feet because of the changing topography. Ten feet is beyond the detection limit of the LSG.

2.2.1.4.3 The LSG used at the site was the Schonstedt GA-52B. The Schonstedt is also a passive dual fluxgate instrument used for detecting subsurface ferrous metal items. The locator is a hand-held unit that is equipped with two fluxgate magnetometers, aligned and mounted a fixed distance apart. An audio signal is provided to the operator when a ferromagnetic object is encountered. The Schonstedt GA-52B is an inexpensive and highly portable magnetometer. It was used to quickly screen surface and near-surface areas for ferrous content and used to sweep an area before the wooden grid stakes were placed by the survey crew.

2.2.1.4.4 A comparison was made with both instruments. Several of the anomalies located using the MK 26 were later swept using the Schonstedt GA-52B. In almost all tests, the Schonstedt did not locate the anomaly previously located by the MK 26. Especially noteworthy is the fact that the burial trench located in Area A by the MK 26 was not located by the Schonstedt GA-52B magnetometer.

2.2.2 Area B

2.2.2.1 Work Plan Addendum

The project Work Plan did not include field investigations for Area B. However, as the project progressed, it appeared that with little extra effort, the personnel and equipment on site could efficiently locate OEW offshore in the vicinity of the burial trench found in Area A. Consequently, a memorandum from Parsons ES outlining work procedures was sent to and approved by CEHND (Appendix D). The Work Plan Addendum was followed in the offshore investigation of Area B.

2.2.2.2 Grid System

2.2.2.2.1 The grid system in Area B, the offshore area adjacent to Area A, consisted of one tier only, Tier Z (Figure 2-1). Tier Z was located immediately east of Area A, Tier A. It was 200 feet wide and 1,000 feet long consisting of 10 grid cells. Each grid cell was 100 feet by 200 feet, with the shorter side parallel to the shoreline. The cells started with Grid Cell Z22 and ended with Grid Cell Z31. This range was selected because it was believed that it included the area of the 1988 EOD Team offshore OEW discovery, and it was adjacent to the concentration of subsurface OEW in Area A, Tier A, believed to be a burial trench. The lanes were 25 feet apart laterally.

2.2.2.2.2 A buoy/marker system was used daily to setup the grid system. A buoy was anchored at a grid cell corner, 250 feet from a 50-foot lane survey stake in Area A, Tier A. A rope ran east from the survey stake to the buoy. Floats were placed as lane markers every 25 feet along the rope starting at the 50-foot lane of Tier Z and proceeded east to the 175-foot lane. The buoy itself was the 200-foot lane marker. Three of these buoy/marker lines were used to guide the sweeps over the range of cells investigated in Tier Z.

2.2.2.3 Sweep Procedures

The tier was swept parallel to the shoreline using lanes spaced 25 feet apart (Figure 2-1). Sweeps began at the 0-foot lane and progressed eastward. The lanes in the shallow water (up to 3 or 4 feet deep) were swept by UXO specialists walking in the water. Lanes in deeper water were swept from a boat maneuvered parallel to the shoreline. Anomalies encountered along a lane were recorded and plotted on an Individual Cell Anomaly Data Sheet (Figure 2-5 of the Work Plan). Recorded data included area, tier, and grid cell, as well as the lane where an anomaly was encountered, and the distance along the lane in the grid cell. The distance along the lane was visually estimated to the nearest 15 feet.

2.2.2.4 Instruments Used

The MK 26 was used for the magnetometer survey of Area B. A 100-foot cable extension allowed the instrument meter to be protected from the sea. Refer to Section 2.2.1.4 for information concerning this instrument.

2.3 MAGNETOMETER SURVEY RESULTS

2.3.1 Area A

2.3.1.1 The magnetometer survey in Area A (Figure 2-1) began with the beach area (Tier A). The distance between the high tide line and the foot of the dunes was less than 200 feet. Therefore, this tier was approximately 150 feet wide and 4,500 feet long. Additionally, the dune line and the shoreline varied such so that the high tide line was near the 50-foot lane for Grid Cells A0 through A21 and near the 100-foot lane for Grid Cells A25 through A44. Thus, the 0-foot lane could not be swept the entire length of the tier. A 175-foot lane was added to the northern portion of the tier where the beach widened.

2.3.1.2 The eastern edge of Tier B was located 150 feet west of the 150-foot lane of Tier A. It was offset due to the presence of the barrier dunes constructed by the NPS a few years ago. According to the NPS, the sand used to construct the dunes was taken from the beach and was cleared of UXO as the work progressed. Therefore, it is unlikely that OEW is in the dunes. Also, the dunes are 15 to 20 feet high, so it is unlikely that the MK 26 instrument would detect any OEW that may be present under the dunes. Tier B is 200 feet wide by 4,500 feet long.

2.3.1.3 Tiers C, D, and E were set up adjacent to Tier B as a result of a visual walkover of this area. Several spent 2.25-inch rocket motors were discovered as a result of this walkover, leading to the decision to sweep Tiers C, D, and E. These tiers started at Grid Cell 18 and terminated at Grid Cells 23 through 27 depending on the presence of dense vegetation. Tiers C and D were 200 feet wide; Tier E was only 100 feet wide because of the asphalt entrance road.

2.3.1.4 In general, these tiers were swept using 50-foot lanes, providing enough information to make recommendations regarding intrusive operations. Numerous anomalies and surface munitions scrap (mostly 2.25-inch rocket motors, all expended) were located. Many of the anomalies and most of the surface OEW were found in Tiers B, C, D, and E in Grid Cells 22 through 26. Two large continuous anomalies (100 feet by 200 feet and 10 feet by 70 feet) were found at the high tide line in Tier A, and a large number of small anomalies were discovered in the picnic areas (Tier B, 25-foot through 150-foot lane of Grid Cells B0 through

B13).

2.3.1.5 The total surface area of the grid system established in Area A was 1,945,000 ft^2 or 44.7 acres. The amount of area swept in this grid system (based on 5-foot-wide sweep lanes) is 248,500 ft^2 or 5.7 acres. This corresponds to a sweep coverage of 12.8 percent. Figure 2-1 depicts the lanes swept in Area A. A summary of the sweeps completed and surface OEW found in Area A is provided in Tables 2.1 and 2.2, respectively. The Five Cell Anomaly Data Sheets used in the field to plot and record the anomalies are presented in Appendix F.

2.3.1.6 Based on the results of the surface survey, the following grid cells in Area A were selected for intrusive investigation using the procedure described in paragraph 2.2.1.3.3.:

- Tier A, Grid Cells A27, A28, and A29 (100-foot by 200-foot anomaly);
- Tier A, Grid Cell A36 (10-foot by 70-foot anomaly);
- Tier B, Grid Cells B3 through B8 (picnic area);
- Tier B, Grid Cells B18, B19, B24, and B26;
- Tier C, Grid Cell C24;
- Tier D, Grid Cell D23; and
- Tier E, Grid Cells E23 and E24.

2.3.2 Area B

2.3.2.1 Tier Z was swept using 25-foot lanes (Figure 2-1). The 0-foot, 25-foot, and 50-foot lanes were swept by UXO specialists walking in the water, while the 75-foot through 200-foot lanes were swept from the boat. Several anomalies were found in Grid Cell Z22 through Z29 from the 75-foot lane through the 175-foot lane. However, the majority of the anomalies is located in Grid Cells Z26 through Z29 in lanes 75 feet through 150 feet (approximately 175 feet to 250 feet from the high tide line). These cells are adjacent to the subsurface OEW concentration in Area A, Tier A which is believed to be a burial trench. Some of the anomalies in Grid Cells Z27 and Z28 produced continuous "ring offs" on the MK 26. At the conclusion of the magnetometer survey in Tier Z, operations in Area B were terminated. Subsurface investigation in Area B is beyond the scope of work of this project; therefore, no grid cells were selected for intrusive investigation.

2.3.2.2 The total surface area of the grid system established in Area B was 200,000-ft^2 or 4.6 acres. The area swept in this grid system (based on 5-foot-wide sweep lanes) is 45,000 ft^2 or 1.0 acres. This corresponds to a sweep coverage of 22.5 percent. Figure 2-1 depicts the

lanes swept in Area B. A summary of the sweeps completed in Area B is provided in Table 2.3. The Individual Cell Anomaly Data Sheets used in the field to record the anomalies, as well as Five Cell Anomaly Data Sheets showing a summary plot of each grid cell, are presented in Appendix F.

2.3.3 Area C

2.3.3.1 The magnetometer survey in Area C (Figures 2-2 and 2-3) began with the beach area (Tier A). The 0-foot lane was established near the high tide line, followed by lanes placed westward at 50-foot increments. Tier A was 200 feet wide by 4500 feet long. Tier B was placed in the dunes, immediately adjacent (west) to Tier A, measured 200 feet by 4,500 feet with 50-foot lanes established using wooden stakes. Tier Z was established between the low and high tide lines immediately adjacent and east of Tier A, and measured 50 feet wide by 4,500 feet long. No stakes were used to mark this tier because they would have washed away.

2.3.3.2 Tier A was first swept using 50-foot sweep lanes. A large anomaly was located in Grid Cell A25 (50 feet by 150 feet), another in Grid Cell A31 (10 feet by 20 feet), and several small anomalies were randomly scattered throughout the rest of the tier. To ensure that a possible trench was not missed, Tier A was then swept using 25-foot lanes by walking equidistant between the stakes marking the 50-foot lanes. This yielded additional anomalies and one larger anomaly in Grid Cell A29 (10 feet by 10 feet).

2.3.3.3 The sweep of Tier Z commenced after completing Tier A. This tier is the beach area between the low and high tide lines and is 50 feet wide. Thus, two lanes spaced 25 feet apart were swept in this tier. These sweep lanes were set during low tide by placing a pin flag in the sand just prior to sweeping, using the 0-foot stakes of Tier A as a reference. These sweeps resulted in the discovery of two anomalies within the entire tier.

2.3.3.4 Tier B was swept using 50-foot sweep lanes. Several anomalies were identified in Grid Cells B4 through B9, B15 through B19, and B24 through B26. One large anomaly was identified in Grid Cell B44; it appeared to be an old building foundation. These selected grid cells were then swept using 25-foot lanes to better delineate the number of anomalies and determine if they might be part of the former target area.

2.3.3.5 The total surface area of the grid system established in Area C was 1,800,000-ft^2 or 41.3 Acres. The amount of area swept in this grid system (based on 5-foot-wide sweep lanes)

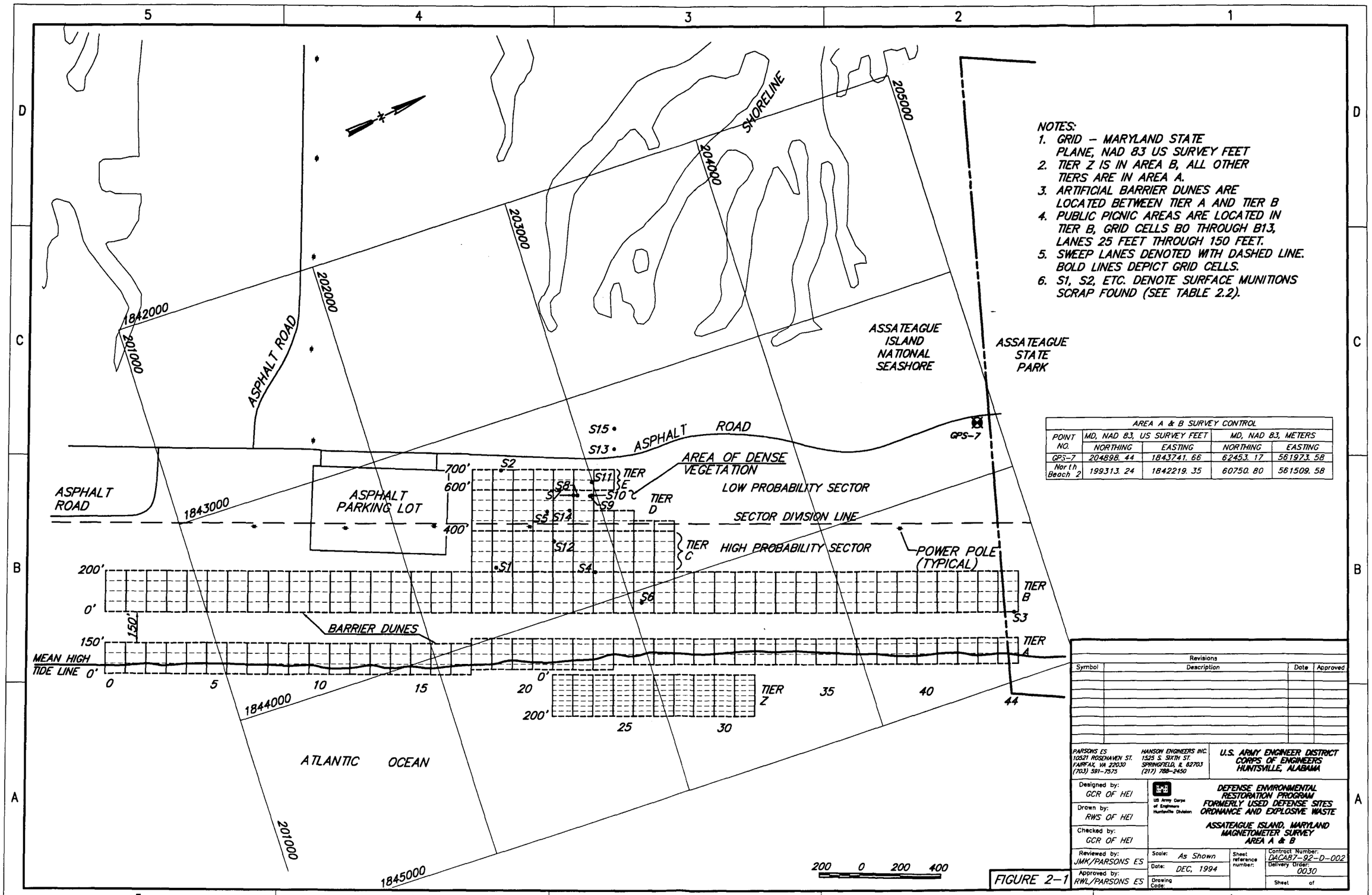
is 364,500 ft^2 or 8.4 acres. This corresponds to a sweep coverage of 20.3 percent. Figure 2-2 depicts the lanes swept in Area C. A summary of the sweeps completed in Area C is provided in Table 2.4. The Five Cell Anomaly Data Sheets used in the field to plot/record the anomalies are presented in Appendix F. No surface OEW was found in Area C. Based on the results of the surface survey, the following grid cells in Area C were selected for intrusive investigation:

- Tier A, Grid Cells A24 and A25 (50-foot by 150-foot anomaly),
- Tier A, Grid Cell A29 (10-foot by 10-foot anomaly),
- Tier A, Grid Cell A31 (10-foot by 20-foot anomaly), and
- Tier B, Grid Cells B4, B7, B18, B25 and B44.

2.3.3.6 Intrusive operations were undertaken in these grid cells and no OEW was found (see Section 3). Reconnaissance magnetometer sweeps and intrusive investigations were then performed, south to north, beginning at dune crossing (DC) 13, west of Tier B, ending at DC 11, near Jim's Gut (following a suggestion of a local resident). The approximate distance between DC 11 and 13 is 10,000 feet. One set of sweeps was completed between DC 13 and DC 12, using lanes 50 feet, 75 feet, 100 feet, and 125 feet east of the sand road. Another set of sweeps was completed between DC 12 and DC 11 using lanes 50 feet, 100 feet and 125 feet east of the sand road. As anomalies were discovered, they were intrusively investigated. No UXO or OEW was found during these additional sweeps. These additional reconnaissance sweeps north of the usual grid system are shown on Figure 2-3.

2.3.4 Areas D and E

In accordance with the Statement of Work and the Work Plan, a magnetometer survey was not performed in Areas D and E (except for the reconnaissance sweeps in Area E just north of Area C).



NOTES:
1. GRID – MARYLAND STATE PLANE, NAD 83 US SURVEY FEET
2. TIER Z IS IN AREA B, ALL OTHER TIERS ARE IN AREA A.
3. ARTIFICIAL BARRIER DUNES ARE LOCATED BETWEEN TIER A AND TIER B
4. PUBLIC PICNIC AREAS ARE LOCATED IN TIER B, GRID CELLS B0 THROUGH B13, LANES 25 FEET THROUGH 150 FEET.
5. SWEEP LANES DENOTED WITH DASHED LINE. BOLD LINES DEPICT GRID CELLS.
6. S1, S2, ETC. DENOTE SURFACE MUNITIONS SCRAP FOUND (SEE TABLE 2.2).

AREA A & B SURVEY CONTROL

POINT NO.	MD, NAD 83, US SURVEY FEET		MD, NAD 83, METERS	
	NORTHING	EASTING	NORTHING	EASTING
GPS-7	204898.44	1843741.66	62453.17	561973.58
North Beach 2	199313.24	1842219.35	60750.80	561509.58

Revisions

Symbol	Description	Date	Approved

PARSONS ES
10521 ROSEHAVEN ST.
FAIRFAX, VA 22030
(703) 591-7575

HANSON ENGINEERS INC.
1525 S. SIXTH ST.
SPRINGFIELD, IL 62703
(217) 788-2450

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
HUNTSVILLE, ALABAMA

Designed by: GCR OF HEI
Drawn by: RWS OF HEI
Checked by: GCR OF HEI
Reviewed by: JMK/PARSONS ES
Approved by: RWL/PARSONS ES

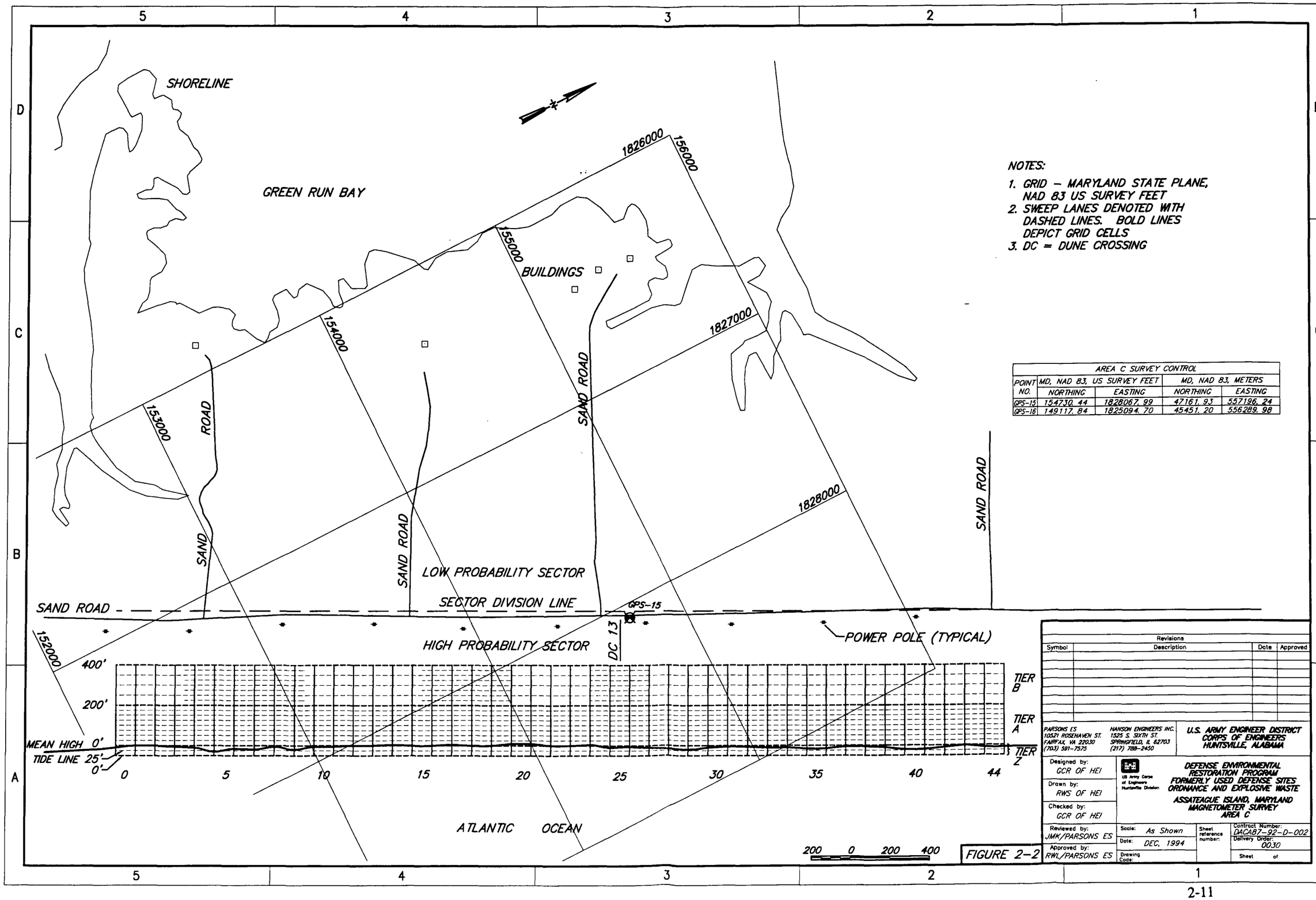
US Army Corps of Engineers Huntsville Division

DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
FORMERLY USED DEFENSE SITES
ORDNANCE AND EXPLOSIVE WASTE

ASSATEAGUE ISLAND, MARYLAND
MAGNETOMETER SURVEY
AREA A & B

Scale: As Shown
Date: DEC, 1994
Sheet reference number:
Drawing Code:
Contract Number: DACA87-92-D-002
Delivery Order: 0030
Sheet of

FIGURE 2-1



NOTES:

1. GRID – MARYLAND STATE PLANE, NAD 83 US SURVEY FEET
2. SWEEP LANES DENOTED WITH DASHED LINES. BOLD LINES DEPICT GRID CELLS
3. DC = DUNE CROSSING

AREA C SURVEY CONTROL				
POINT NO.	MD, NAD 83, US SURVEY FEET		MD, NAD 83, METERS	
	NORTHING	EASTING	NORTHING	EASTING
GPS-15	154730.44	1828067.99	47161.93	557196.24
GPS-16	149117.84	1825094.70	45451.20	556289.98

FIGURE 2-2

Revisions			
Symbol	Description	Date	Approved

PARSONS ES
10521 ROSEHAVEN ST.
FAIRFAX, VA 22030
(703) 591-7575

HANSON ENGINEERS INC.
1525 S. SIXTH ST.
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U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
HUNTSVILLE, ALABAMA

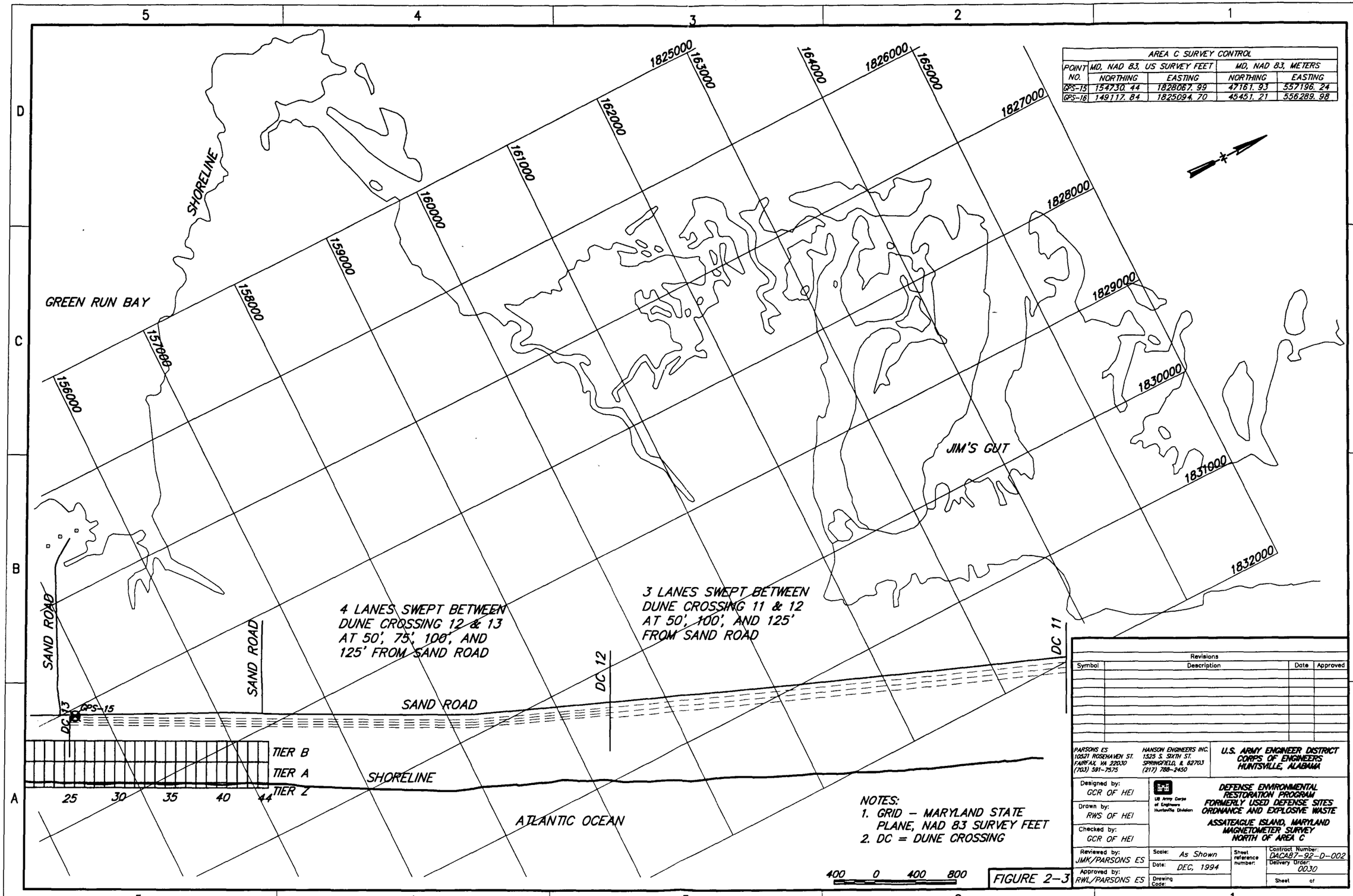
Designed by: GCR OF HEI
Drawn by: RWS OF HEI
Checked by: GCR OF HEI
Reviewed by: JMK/PARSONS ES
Approved by: RWL/PARSONS ES

US Army Corps of Engineers Huntsville Division

DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
FORMERLY USED DEFENSE SITES
ORDNANCE AND EXPLOSIVE WASTE
ASSATEAGUE ISLAND, MARYLAND
MAGNETOMETER SURVEY
AREA C

Scale: As Shown
Date: DEC, 1994
Drawing Code:
Sheet reference number:
Contract Number: DACA87-92-D-002
Delivery Order: 0030
Sheet of

AREA C SURVEY CONTROL				
POINT NO.	MD. NAD 83, US SURVEY FEET		MD. NAD 83, METERS	
	NORTHING	EASTING	NORTHING	EASTING
GPS-15	154730.44	1828067.99	47161.93	557196.24
GPS-16	149117.84	1825094.70	45451.21	556289.98



NOTES:
1. GRID – MARYLAND STATE PLANE, NAD 83 SURVEY FEET
2. DC = DUNE CROSSING

FIGURE 2-3

Revisions			
Symbol	Description	Date	Approved

PARSONS ES
10521 ROSEHAVEN ST.
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HUNTSVILLE, ALABAMA

Designed by: GCR OF HEI
Drawn by: RWS OF HEI
Checked by: GCR OF HEI
Reviewed by: JMK/PARSONS ES
Approved by: RWL/PARSONS ES

US Army Corps of Engineers Huntsville Division

DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
FORMERLY USED DEFENSE SITES
ORDNANCE AND EXPLOSIVE WASTE
ASSATEAGUE ISLAND, MARYLAND
MAGNETOMETER SURVEY
NORTH OF AREA C

Scale: As Shown
Date: DEC, 1994
Drawing Code:
Sheet reference number:
Contract Number: DACA87-92-D-002
Delivery Order: 0030
Sheet of

TABLE 2.1

SWEEPS COMPLETED IN AREA A

TIER	LANE(S)	GRID CELLS SWEPT	AREA SWEPT (ft^2)[a]
A	0 ft	A0 thru A17	9,000
A	25 ft	A18 thru A24	3,500
A	50 ft	A0 thru A44	22,500
A	100 ft, 150 ft	A0 thru A44	45,000
A	175 ft	A18 thru A44	13,500
B	0 ft, 50 ft, 100 ft, 150 ft, 200 ft	B0 thru B44	112,500
C	250 ft, 300 ft, 350 ft, 400 ft	C18 thru C27	20,000
D	450 ft	D18 thru D27	5,000
D	500 ft	D18 thru D25	4,000
D	550 ft	D18 thru D23	3,000
D	600 ft	D18 thru D24	3,500
E	650 ft, 700 ft	E18 thru E24	7,000

Total Grid Cell Area = 1,945,000 ft^2 = 44.7 AC
Total Area Swept = 248,500 ft^2 = 5.7 AC

Notes:
(a) Area of sweep is the lane length multiplied by the lane width (5-foot-wide lane).

TABLE 2.2

SURFACE MUNITIONS SCRAP FOUND IN AREA A

Item Number	Munitions Scrap Item Found[1]	Tier	Grid Cell	Lane[2]	Distance Along Lane
1	2.25-in rocket head	C	C19	220 ft	20 ft
2	2.25-in rocket motor	E	E19	695 ft	40 ft
3	2.25-in rocket motor	B	B44[3]	0 ft	80 ft
4	2.25-in rocket motor	B	B24	200 ft	10 ft
5	2.25-in rocket motor	D	D21	495 ft	70 ft
6	2 EA. 2.25-in rocket motors	B	B26	50 ft	40 ft
7	2 EA. 2.25-in rocket motors	D	D23	575 ft	0 ft
8	2.25-in rocket motor	D	D23	575 ft	20 ft
9	2.25-in rocket motor	D	D23	575 ft	80 ft
10	2.25-in rocket motor	D	D23	575 ft	90 ft
11	3 EA. 2.25-in rocket motors	E	E23	640 ft	90 ft
12	2.25-in rocket motor	C	C22	350 ft	5 ft
13	2 EA. 2.25-in rocket motors	* See Note 4 *			
14	2.25-in rocket motor	D	D22	* See Note 5 *	80 ft
15	2.25-in rocket motor	* See Note 6 *			

Notes:

1) All items were determined to be expended.
2) All lanes were measured with respect to the 0-foot lane of Tier B.
3) Rocket motor found on top of fill sand of artificial barrier dune.
4) Rocket motors found 50 to 100 feet west of grid cell E24.
5) Lane not recorded.
6) Rocket motor found 150 to 200 feet west of grid cell E24.

TABLE 2.3

SWEEPS COMPLETED IN AREA B

Tier	Lane(s)	Grid Cells Swept	Area Swept (ft^2) [a]
Z	0 ft, 25 ft, 50 ft[b]	Z22 through Z31	15,000
Z	75 ft, 100 ft, 125 ft, 150 ft,175 ft, 200 ft[c]	Z22 through Z31	30,000

Total Grid Cell Area = 200,000 ft^2 = 4.6 Ac
Total Area Swept = 45,000 ft^2 = 1.0 Ac

Notes:
(a) Area of sweep is the lane length mutliplied by the lane width (5-foot-wide lane).
(b) Lanes swept by UXO specialists walking in the water.
(c) Lanes swept by UXO specialists in a boat.

TABLE 2.4

SWEEPS COMPLETED IN AREA C

Tier	Lane(s)	Grid Cell Swept	Area Swept (ft^2) [a]
A	0 ft, 25ft, 50 ft, 75 ft, 100 ft 125 ft, 150 ft, 175 ft, 200 ft	A0 through A44	202,500
B	250 ft, 300 ft, 350 ft, 400 ft	B0 through B44	90,000
B	225 ft, 275 ft, 325 ft, 375 ft	B3 through B9, B15 through B19, B24 through B26[b]	27,000
Z	0 ft, 25 ft	0 through 44	45,000

Total Grid Cell Area = 1,800,000 ft^2 = 41.3 Ac
Total Area Swept = 364,500 ft^2 = 8.4 Ac

Notes:
(a) Area of sweep is the lane length multiplied by the lane width (5-foot-wide lane).
(b) The northern half of grid cell B3, the southern half of grid cell B9, and the northern half of grid cell B15 were swept for these lanes.

SECTION 3

INTRUSIVE OPERATIONS

3.1 INTRODUCTION

The second part of the site investigation was an intrusive investigation of selected grid cells in Areas A and C determined from the magnetometer survey. The intrusive operations began with a 100 percent magnetometer sweep over a selected grid cell in order to locate and flag all anomalies. All flagged locations were then excavated and the recovered items were identified. It is important to note that the goal of the site investigation was not to clear all OEW from Areas A and C; rather the goal was to identify and locate any former target areas and buried trenches and to characterize the OEW associated with them as to its type and condition, i.e., live or inert.

3.2 OPERATING PROCEDURES

3.2.1 Detailed Magnetometer Sweep of Individual Grid Cell

Individual grid cells (typically 100 feet by 200 feet) were swept from south to north within a given tier. Each cell was divided into 5-foot wide lanes oriented east-west and delineated with flags. As many as four UXO specialists operating MK 26 magnetometers swept and flagged a cell, each walking in separate lanes. One UXO specialist recorded the anomalies on an Individual Cell Anomaly Data Sheet (Appendix F).

3.2.2 Intrusive Investigations

3.2.2.1 The Site Specific Health and Safety Plan, which was written by UXB International, Inc. and formed Chapter 10 of the approved Work Plan, governed all UXO investigation procedures; UXO operations; handling and disposal of hazardous items; as well as non-UXO safety procedures and equipment. The Site Specific Health and Safety Plan was followed at all times.

3.2.2.2 A 1,250-foot work exclusion zone was set up for a given grid cell and security guards were placed at four entry points along the zone boundary before excavation began. Radio

contact was maintained at all times between the guards and the UXO Field Supervisor during the excavation. Excavation activities began once the exclusion zone was established. All but UXO specialists were excluded from the zone.

3.2.3 Excavation

3.2.3.1 Typically, the excavation crew consisted of three or four UXO specialists working with small hand tools to remove sand in 6-inch lifts to a depth of 2 feet. The number of anomalies intrusively investigated in a grid cell ranged from one large anomaly to approximately 90 anomalies. In some cases, cells that were characterized by a very high density of anomalies were mapped as one large anomaly.

3.2.3.2 Under the direction of a CEHND safety representative, large or unusual anomalies in Area C were excavated by shovels to depths up to 6 feet. These locations included the large anomaly in Grid Cells A24 and A25, an anomaly that was produced by a building foundation, and the anomaly in Grid Cell B44 produced by a metal standpipe. In Area A, the CEHND project manager approved using a backhoe to assist in excavating the large anomaly on the beach that was subsequently identified as a trench.

3.2.4 Demolition

Demolition procedures for UXO were outlined in the Work Plan. However, demolition was not performed because UXO was not found.

3.2.5 Quality Control Procedures for Intrusive Operations

Quality Control for intrusive operations was performed by a Senior UXO Supervisor who was not part of the intrusive team. Approximately 10 percent of each of the cells where intrusive work was conducted (excluding the picnic area and the burial trench) was reswept using an MK 26 magnetometer, and anomalies found were intrusively investigated. The direction of the QC sweep was north/south, perpendicular to the initial 100 percent sweep. Anomalies and recovered items were recorded. This formal QC check was in addition to verifying with a magnetometer that each excavation was cleared after removing the metallic object.

3.3 RESULTS

3.3.1 Area A

Eighteen grid cells in five tiers (A through E) were swept and the anomalies excavated (Figure 3-1). The items found ranged from rusty pieces of snow/sand fence to rusted 2.25-inch rockets (Table 3.1). In Grid Cells A27-A29 which is the area of the suspected trench at the shoreline, 35 2.25-inch Subcaliber Aircraft Rockets (SCAR) were found as well as one 5-inch High Velocity Aircraft Rocket (HVAR). The items were found in close proximity to one another at depths in excess of 6 feet. The remaining grid cells located to the west of the suspected trench area were excavated to a maximum depth of 2 feet; 106 rusty 2.25-inch SCAR and three rusty 5-inch HVAR were found as well as other non-OEW items (Appendix F). **All items found in Area A were certified as inert.** The items listed in Table 3.1 are therefore classified as either munitions scrap or other scrap.

3.3.2 Area C

Nine grid cells in Tiers A and B were swept and intrusively investigated (Figure 3-2). The excavation depth was 2 feet except in the case of three large anomalies associated with buried parts of buildings. For these, excavation went to 4 or 5 feet. **No OEW items were found.** The items found are listed in Table 3.2 and are classified as other scrap. The Individual Cell Intrusive Data Sheets for Area C are presented in Appendix F.

3.3.3 Quality Control Results for Intrusive Operations

Quality Control operations were conducted on Areas A and C. The QC procedures for intrusive operations described in paragraph 3.2.5.1 were conducted in all grid cells intrusively investigated in Areas A and C (except the picnic area and the burial trench). In the QC sweeps, no new anomalies were discovered and no OEW was discovered. Therefore, the intrusive operations are considered to have been conducted correctly and adequately.

GRID CELLS INTRUSIVELY INVESTIGATED IN AREA A		
TIER	GRID CELLS	COMMENT
A	A27, A28, A29, A36	ONLY INVESTIGATED LARGE ANOMALIES IN EACH CELL
B	B3, B4, B5, B6, B7, B8	50 FT, 100 FT, AND 150 FT LANES ONLY
B	B18, B19, B24, B26	ALL OF CELL INVESTIGATED
C	C24	ALL OF CELL INVESTIGATED
D	D23	ALL OF CELL INVESTIGATED
E	E23, E24	ALL OF CELL INVESTIGATED

NOTES:
1. GRID – MARYLAND STATE PLANE, NAD 83 US SURVEY FEET
2. TIER Z IS IN AREA B, ALL OTHER TIERS ARE IN AREA A.
3. ARTIFICIAL BARRIER DUNES ARE LOCATED BETWEEN TIER A AND TIER B
4. PUBLIC PICNIC AREAS ARE LOCATED IN TIER B, GRID CELLS B0 THROUGH B13, LANES 25 FEET THROUGH 150 FEET.
5. SWEEP LANES DENOTED WITH DASHED LINE. BOLD LINES DEPICT GRID CELLS.
6. SINGLE CROSS HATCHED CELLS WERE INTRUSIVELY INVESTIGATED AND NO MUNITIONS SCRAP WAS FOUND. DOUBLE CROSS HATCHED CELLS WERE INTRUSIVELY INVESTIGATED AND MUNITIONS SCRAP WAS FOUND.
7. NO INTRUSIVE INVESTIGATIONS PERFORMED IN AREA B.

AREA A & B SURVEY CONTROL				
POINT NO.	MD, NAD 83, US SURVEY FEET		MD, NAD 83, METERS	
	NORTHING	EASTING	NORTHING	EASTING
GPS-7	204898.44	1843741.66	62453.17	561973.58
North Beach 2	199313.24	1842219.35	60750.80	561509.58

Revisions			
Symbol	Description	Date	Approved

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(703) 591-7575

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U.S. ARMY ENGINEER DISTRICT
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HUNTSVILLE, ALABAMA

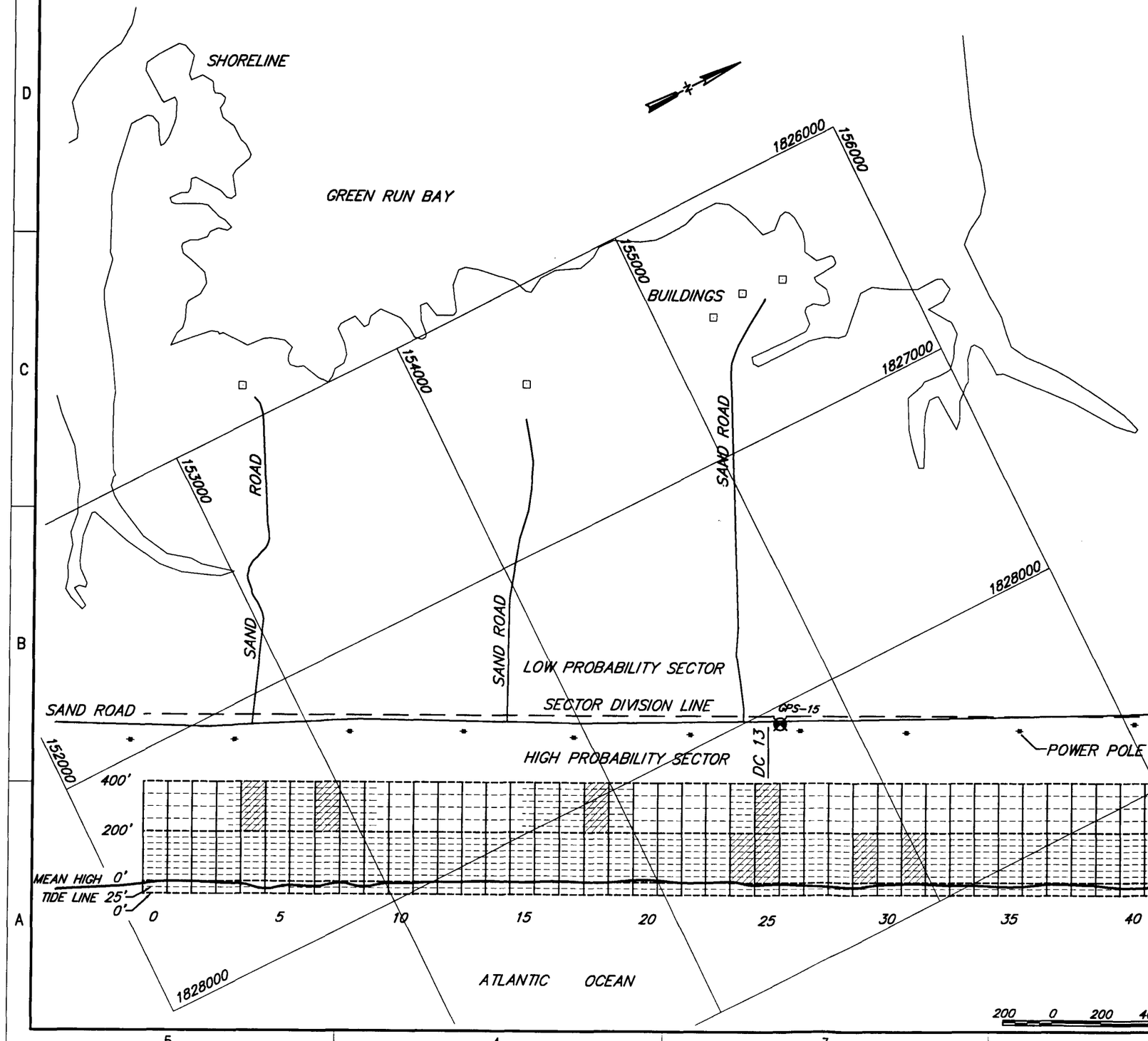
Designed by: GCR OF HEI
Drawn by: RWS OF HEI
Checked by: GCR OF HEI
Reviewed by: JMK/PARSONS ES
Approved by: RWL/PARSONS ES

US Army Corps of Engineers Huntsville Division

DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
FORMERLY USED DEFENSE SITES
ORDNANCE AND EXPLOSIVE WASTE
ASSATEAGUE ISLAND, MARYLAND
INTRUSIVE INVESTIGATION
AREA A

Scale: As Shown
Date: DEC, 1994
Drawing Code:
Sheet reference number:
Contract Number: DACA87-92-D-002
Delivery Order: 0030
Sheet of

FIGURE 3-1



GRID CELLS INTRUSIVELY INVESTIGATED IN AREA C		
TIER	GRID CELLS	COMMENT
A	A24, A25	ONLY INVESTIGATED LARGE ANOMALIES IN EACH CELL
A	A29, A31	ALL OF CELL INVESTIGATED
B	B4, B7, B18, B25	ALL OF CELL INVESTIGATED
B	B44	ONLY INVESTIGATED STANDPIPE

AREA C SURVEY CONTROL				
POINT NO.	MD, NAD 83, US SURVEY FEET		MD, NAD 83, METERS	
	NORTHING	EASTING	NORTHING	EASTING
GPS-15	154730.44	1828067.99	47161.93	557196.24
GPS-16	149117.84	1825094.70	45451.20	556289.98

NOTES:
1. GRID – MARYLAND STATE PLANE, NAD 83 US SURVEY FEET
2. SWEEP LANES DENOTED WITH DASHED LINES. BOLD LINES DEPICT GRID CELLS
3. DC = DUNE CROSSING
4. SINGLE CROSS HATCHED CELLS WERE INTRUSIVELY INVESTIGATED AND NO MUNITIONS SCRAP WAS FOUND.

FIGURE 3-2

Revisions			
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DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
FORMERLY USED DEFENSE SITES
ORDNANCE AND EXPLOSIVE WASTE
ASSATEAGUE ISLAND, MARYLAND
INTRUSIVE INVESTIGATION
AREA C

Designed by: GCR OF HEI	Scale: As Shown	Sheet reference number:	Contract Number: DACA87-92-D-002
Drawn by: RWS OF HEI	Date: DEC, 1994		Delivery Order: 0030
Checked by: GCR OF HEI	Drawing Code:		Sheet of
Reviewed by: JMK/PARSONS ES			
Approved by: RWL/PARSONS ES			

TABLE 3.1
AREA A INTRUSIVE INVESTIGATION RESULTS

Tier	Grid Cell	Intrusive Points	Items Found[1]			Comments: tools used; depth of excavation, condition of items, disposition.
			UXO	Munitions Scrap[2]	Other Scrap	
A	A27	4	0	(10 EA) 2.25 in	0	Hand tools, shovels, backhoe; max. 6 ft-deep; inert; not removed.
A	A28	6	0	(25 EA) 2.25 in	0	Hand tools, shovels, backhoe; max. 6 ft-deep; inert; not removed.
A	A29	1	0	(1 EA) 5 in	0	Hand tools; shovels, backhoe; max. 6 ft-deep; inert; transferred to National Park Service.
A	A36	1	0	0	Shipwreck	Hand tools; max. 3 ft deep, weathered, not removed.
B	B3	12	0	0	Wire, Tent Peg	Hand tools; max. 2 ft deep, rusted, trash.
B	B4	10	0	0	Wire, Tent Peg, Wrench	Hand tools; max. 2 ft deep, rusted, trash.
B	B5	21	0	0	Wire, Tent Post, Nails	Hand tools; max. 2 ft deep, rusted, trash.
B	B6	24	0	0	Wire, Tent Post, Nails	Hand tools; max. 2 ft deep, rusted, trash.
B	B7	7	0	0	Wire, Tent Post, Nails	Hand tools; max. 2 ft deep, rusted, trash.
B	B8	17	0	0	Wire, Tent post, Nails	Hand tools; max. 2 ft deep, rusted, trash.
B	B18	39	0	0	Wire	Hand tools; max. 2 ft deep, rusted, trash.

TABLE 3.1 CONTINUED
AREA A INTRUSIVE INVESTIGATION RESULTS

Tier	Grid Cell	Intrusive Points	Items Found[1]			Comments: tools used; depth of excavation condition of items, disposition.
			UXO	Munitions Scrap[2]	Other Scrap	
B	B19	24	0	0	Wire	Hand tools, max. 2 ft deep, rusted, trash.
B	B24	76	0	(6 EA) 2.25 in & 1 frag.	Wire	Hand tools, max. 2 ft deep, inert, munitions scrap accepted by local scrap dealer, other scrap disposed as trash.
B	B26	64	0	(23 EA) 2.25 in	Wire	Hand tools, max. 2 ft deep, inert, munitions scrap accepted by local scrap dealer, other scrap disposed as trash.
C	C24	94	0	(9 EA) 2.25 in (3 EA) 5 in & 13 frag	Wire	Hand tools, max. 2 ft deep, inert, munitions scrap accepted by local scrap dealer, other scrap disposed as trash.
D	D23	58	0	(29 EA) 2.25 in & 16 frag	Wire	Hand tools, max. 2 ft deep, inert, munitions scrap accepted by local scrap dealer, other scrap disposed as trash.
E	E23	52	0	(17 EA) 2.25 in & 36 frag	Wire	Hand tools, max. 2 ft deep, inert, munitions scrap accepted by local scrap dealer, other scrap disposed as trash.
E	E24	61	0	(22 EA) 2.25 in & 29 frag	Wire	Hand tools, max. 2 ft deep, inert, munitions scrap accepted by local scrap dealer, other scrap disposed as trash.

NOTES:
(1) The maximum allowable cable excavation depth at many intrusive points was 2 feet; therefore, some anomalies did not result in an item found. Additionally, many intrusive points yielded more than one item found.
(2) 2.25in = scrap from 2.25-inch SCAR
5in = scrap from 5-inch HVAR
frag = fragments of 2.25-inch SCAR

TABLE 3.2
AREA C INTRUSIVE INVESTIGATION RESULTS

Tier	Grid Cell	Intrusive Points	Items Found			Comments: tools used; depth of excavation condition of items, disposition.
			UXO	Munitions Scrap	Other Scrap	
A	A24	1	0	0	Building Foundation	Hand tools, shovel; max. depth 4 ft; good condition; not removed.
A	A25	1	0	0	Building Foundation	Hand tools, shovel; max. depth 4 ft; good condition; not removed.
A	A29	3	0	0	Wire	Hand tools, shovel; max. depth 2 ft; rusted; trash.
A	A31	4	0	0	Nails, Tool	Hand tools, shovel; max. depth 2 ft; rusted; trash.
B	B4	42	0	0	Wire, Nails, Tools	Hand tools; max. depth 2 ft; rusted; trash.
B	B7	14	0	0	Wire, Rebar	Hand tools; max. depth 2 ft, rusted, trash.
B	B18	52	0	0	Wire	Hand tools; max. depth 2 ft, rusted, trash.
B	B25	27	0	0	Wire, Building Foundation	Hand tools, shovels; max. depth 2 ft; good condition; not removed.
B	B44	1	0	0	Standpipe	Hand tools, shovels; max. depth 5 ft; good condition; not removed.

SECTION 4

CONCLUSIONS

4.1 INTRODUCTION

Surface and subsurface OEW scrap was found in Area A; no OEW was found in Area C; several anomalies were identified in Area B (no intrusive operations were undertaken in this area); and Areas D and E were not investigated except for a reconnaissance survey north of Area C (no anomalies were found in the investigated part of Area E). All OEW-related items found were inert and therefore classified as munitions scrap.

4.2 AREA A

4.2.1 Burial Trench

The concentration of OEW at the shoreline in Area A Grid Cells A27 through A29 indicates a burial trench. The large anomaly located in these grid cells was continuous and is approximately 100 feet by 200 feet. The entire anomaly was not intrusively investigated. However, 11 points of intrusive excavation resulted in the discovery of 36 OEW items. The majority of these excavations produced more than one OEW item (one excavation produced 10 OEW items). All of these OEW items were inert. Figure 4-1 shows the location of the trench.

4.2.2 Target Area

4.2.2.1 According to Mr. Adrien Smith, the former range spotter, targets in both areas were wooden and 500 feet across with a 50-foot-diameter bullseye. Therefore, OEW should have been scattered in an area greater than 500 feet, with the densest concentration near the center. The number and location of surface and subsurface OEW found in Area A reveal the presence of a former target area. The exact boundaries of the target area cannot be delineated because all the grid cells in this area were not intrusively investigated. However, subsurface OEW items were found in Grid Cells B24, B26, C24, D23, E23, and E24 (Grid Cells D23, E23 and E24 contained the most OEW). Surface OEW was found in Grid Cells B24, B26, B44, C19, C22, D21, D22, D23, E19, E23, and across the road from E24. No OEW was found in Grid Cells B3 through B8 (picnic area), B18, or B19.

4.2.2.2 Based on the location of the OEW found and the locations of the anomalies found in the 50-foot lanes of the grid cells that were not intrusively investigated, the former target area is likely to be located in Tiers B, C, D, and E in Grid Cells 23 through 27. Figure 4-1 depicts the approximate location of the former target area.

4.3 AREA B

4.3.1 The magnetometer survey in Area B was performed to identify a possible offshore burial trench. The survey included Tier Z, Grid Cells Z22 through Z31. These grid cells were selected because:

- they were adjacent to the burial trench found in Area A (Grid Cells A27, A28, and A29);
- they were adjacent to the former target area found in Area A; and
- there was reason to believe these grid cells included the area of the 1988 OEW survey. That survey found OEW, but the locations were not tied to fixed control points.

The work in Area B included a magnetometer survey only; an intrusive investigation was not performed.

4.3.2 Most of the anomalies found were located in grid cells Z26 through Z29 in lanes 75 feet through 150 feet (approximately 175 feet to 250 feet from the high tide lane). Some of the anomalies in grid cells Z27 and Z28 produced continuous "ring offs" on the magnetometer. A small number of anomalies were scattered throughout Grid Cells Z22 through Z25. Because an intrusive investigation of these anomalies was not undertaken, three possible conclusions exist:

- The anomalies found are related to OEW that has washed out of the burial trench in Area A;
- The anomalies found are related to OEW and are part of one or more burial trenches that are now underwater; and
- The anomalies found are non-OEW related.

4.3.3 Since a large number of anomalies (some continuous) were located adjacent to the trench in Area A and this tier was located in the likely area of the 1988 EOD Team Deployment, there is a high probability that at least some of the anomalies are OEW. Thus, OEW is likely to be present in Area B, having washed out of the trench in Area A, or a second trench has been located.

4.3.4 If OEW washed out of the burial trench in Area A, it would concentrate in nearby offshore Grid Cells Z26 through Z29 but some of this OEW would likely be moved southward due to longshore currents. This latter movement is suggested by the scattered anomalies in Grid Cells Z22 through Z25.

4.3.5 If a second burial trench exists, its likely location is in Grid Cells Z26 through Z29, where a large number of anomalies was found. Surf action and natural currents may be periodically uncovering the trench and washing OEW southward (suggested by the scattered anomalies found to the south).

4.4 AREA C

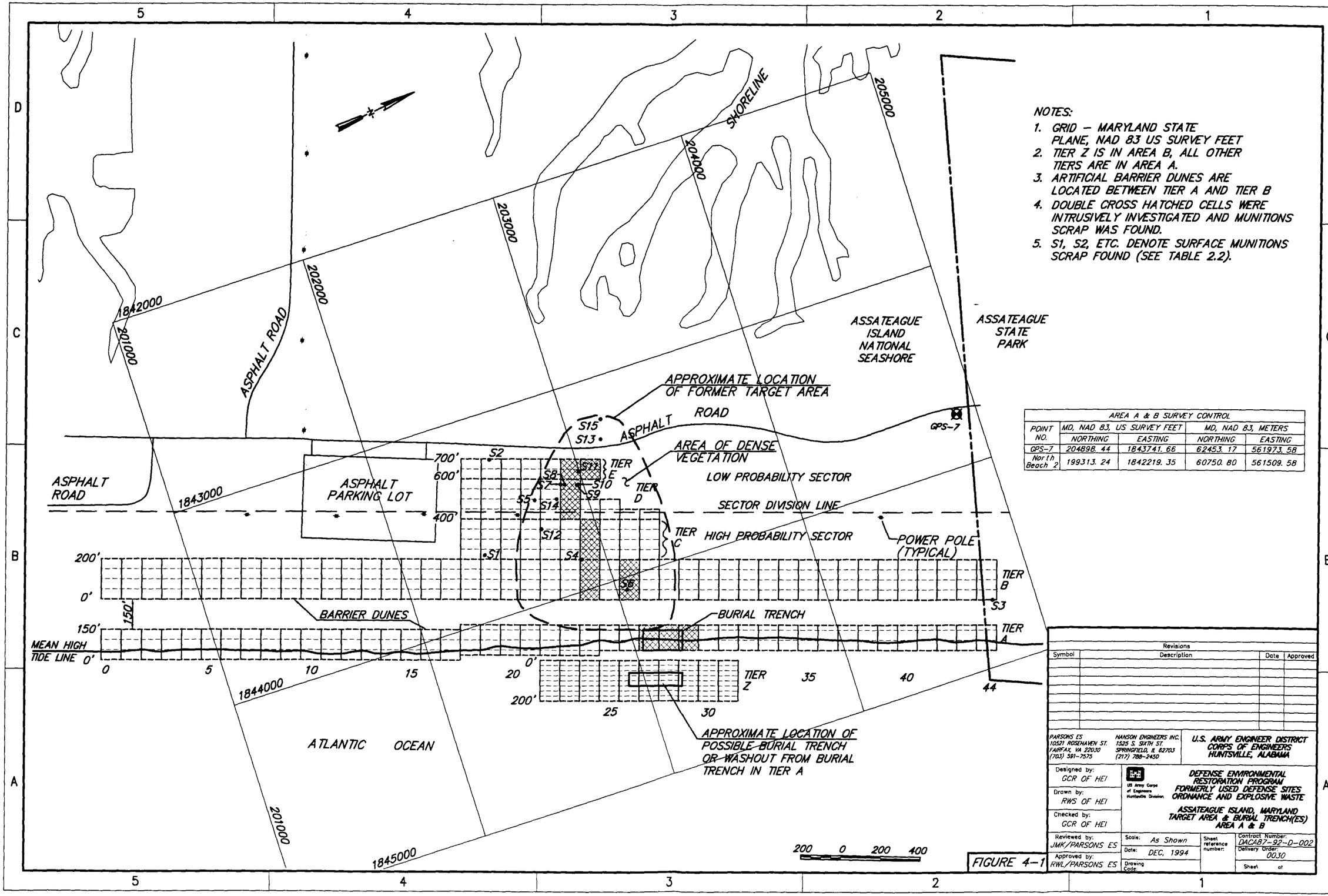
4.4.1 The magnetometer sweeps along a 4,500-foot stretch of the island from the sea to dense vegetation did not reveal any anomalies due to OEW or munitions scrap. No OEW was seen on the ground surface, although the 1993 site inspection did find part of an inert 5-inch HVAR motor on the ground surface just inland from the western shore (U.S. Army Corps of Engineers, 1994). There were reports that fishermen in the area had used ballistic tips of the rockets for fishing weights. However, even after additional surface and subsurface surveys were performed from DC 13 to DC 11, near Jim's Gut (following a suggestion of a local resident), no OEW or munitions scrap was found.

4.4.2 Because OEW was not found in Area C, Mr. Adrien Smith was again consulted (oral and written communication, 1994). He redrew on a map his recollection of the flight path; it bisected the main area of the field study in Area C. Previously, he recalled that the targets were arranged on the flat part of the beach, although some small dunes were flattened. Mr. Smith offered a plausible explanation for the lack of OEW evidence. The U.S. Navy commanding officer at the time, Lt. (j.g.) McLaughlin, was a rather thorough individual. He might have had the target area cleaned and then ordered the material transported in trucks 10 miles north for burial in Area A. Transporting the material in this way would have been easier than moving the heavy excavation equipment on a sand road from north of Area A to Area C

for the burial. Without additional information we cannot choose with certainty between that explanation and the possibility that the former rocket range is outside Area C as portrayed in the ASR. The entire length and more than two-thirds of the width of the high probability sector were swept (all of the beach area up to the area of 50 percent vegetation), and no evidence for a trench or target area was found.

4.5 AREAS D AND E

Because Areas D and E (except for a reconnaissance survey north of Area C) were not investigated, no absolute conclusions concerning these areas can be made except that no anomalies were found in the reconnaissance survey north of Area C; however, no further action is recommended for Areas D and E. The ASR specifically outlined Area C, based on all information available, and Mr. Adrien Smith, the rocket range spotter, confirmed the validity of the location of Areas A and C during the supplementary background research for this present site investigation. The site investigation found no OEW in Area C. Therefore, there was no onshore evidence of a target area or buried trench that could be used as a guide to a search for a buried trench offshore in Area D. Without new information, further investigation in Areas D and E would likely be haphazard, expensive, and fruitless.



NOTES:

1. GRID – MARYLAND STATE PLANE, NAD 83 US SURVEY FEET
2. TIER Z IS IN AREA B, ALL OTHER TIERS ARE IN AREA A.
3. ARTIFICIAL BARRIER DUNES ARE LOCATED BETWEEN TIER A AND TIER B
4. DOUBLE CROSS HATCHED CELLS WERE INTRUSIVELY INVESTIGATED AND MUNITIONS SCRAP WAS FOUND.
5. S1, S2, ETC. DENOTE SURFACE MUNITIONS SCRAP FOUND (SEE TABLE 2.2).

AREA A & B SURVEY CONTROL

POINT NO.	MD, NAD 83, US SURVEY FEET		MD, NAD 83, METERS	
	NORTHING	EASTING	NORTHING	EASTING
GPS-7	204898.44	1843741.66	62453.17	561973.58
North Beach 2	199313.24	1842219.35	60750.80	561509.58

FIGURE 4-1

Revisions			
Symbol	Description	Date	Approved

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Drawn by: RWS OF HEI
Checked by: GCR OF HEI
Reviewed by: JMK/PARSONS ES
Approved by: RWL/PARSONS ES

US Army Corps of Engineers Huntsville Division

DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
FORMERLY USED DEFENSE SITES
ORDNANCE AND EXPLOSIVE WASTE

ASSATEAGUE ISLAND, MARYLAND
TARGET AREA & BURIAL TRENCH(ES)
AREA A & B

Scale: As Shown
Date: DEC, 1994
Drawing Code:
Sheet reference number:
Contract Number: DACA87-92-D-002
Delivery Order: 0030
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SECTION 5

RECOMMENDATION

5.1 This investigation focused on the locations of the greatest probability for OEW. All OEW items found during this site investigation were inert munitions scrap, generally in rusted and deteriorated condition. Additionally, no live OEW was found during previous investigations. A more exhaustive magnetometer and intrusive investigation would be prohibitively expensive without significantly increasing the probability of locating all OEW. Furthermore, the former rocket range areas are on National Seashore land and NPS personnel are, and will be, alert to any changes in island conditions.

5.2 In view of these facts, no further action is recommended at the Assateague Island site. If new information is discovered, CEHND could consider a new, more exhaustive, investigation at that time.

SECTION 6

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APPENDIX A

SITE CHARACTERIZATION

(Abstracted from the Work Plan, Section 6)

SITE CHARACTERIZATION

A1 TOPOGRAPHY

The topography of Assateague Island consists mainly of flat to gently rolling sand dunes. Island elevations range from sea level to approximately 15 feet.

A2 GEOLOGY/SOILS

A2.1 Regional Geology

The subsurface sediments of the Delmarva Peninsula rest on a seaward sloping basement of Paleozoic crystalline rocks. The basement is folded and faulted into a series of northwest-southeast trending ridges and depressions (U.S. Army, 1975). The axis of one major depression, the Salisbury Embayment, crosses the Delmarva Peninsula near the Virginia-Maryland border. Cretaceous sands, silts and clays account for more than half of the thickness of subsurface sediments. Lower Cretaceous formations representing non-marine deposition in river channels, flood plains and swamps are overlain by Upper Cretaceous lagoonal, estuarine and deep-water marine formations. These sediments are overlain by thin marine Paleocene and Eocene clays, silts, and sands of deep water origin. Oligocene deposits are absent in the area but the shallow marine Miocene shelly sand, silt, and clays of the Chesapeake Group are present and are overlain by largely shallow marine sand, silt, and clay of Pleistocene, and possibly Pliocene age.

A2.2 Site Geology

The 17,552 acre site is a barrier island off the Atlantic Coast of the Delmarva Peninsula. The sand barrier rests on soft lagoonal mud that contains oyster, clam, and snail shells. The lagoonal mud overlies organic coastal salt marsh mud, and peat, which, in turn, overlies organic debris-rich sandy mud (U.S. Army, 1975).

A2.3 Site Soils

The sand barrier is composed of beach and washover sands and gravels topped by wind blown sand dunes. Except for steep slopes on dunes this "soil" is nearly level and is composed of light-gray to white marine sand and shell material. the sand is constantly shifted by waves and wind, is excessively drained, exhibits no soil development, and supports little vegetation. The lagoon behind Assateague Island is open water with areas of marsh and mud flats. tidal marsh "soils" are sandy to clayey, poorly drained, acidic, saline and can contain peat or highly organic black muck (U.S. Army, 1975).

A3 GROUNDWATER

Groundwater in the region surrounding Assateague Island is supplied primarily by the Manokin, Pokomoke, and Quaternary aquifers. The Manokin aquifer is recharged by the overlying Pokomoke aquifer, which is recharged by the downward movement of water from the Quaternary sediments. Recharging of the Manokin and Pokomoke aquifers occurs along a drainage divide between the Atlantic Ocean and Chesapeake Bay. The Quaternay aquifer is recharged by precipitation over a broad area. Regional movement of groundwater in the Manokin and Pokomoke aquifers is away from the drainage divide and towards the ocean, bays, rivers and areas of pumping. Groundwater movement in the Quaternary aquifer is from areas of high water table to streams, bays and the ocean (U.S. Army, 1975).

A4 WILDLIFE

A4.1 Wildlife Resources

Unique to this barrier island are two populations of wild ponies. The Maryland population is made up of about 175 animals distributed into 11 major herds that are owned by the National Park Service. A fence separates the two populations at the Maryland/Virginia boundary. However, some animals cross the boundary, especially during the breeding season.

A4.2 Threatened and Endangered Species

A4.2.1 There are two endangered animal species inhabiting the island, the Peregrine Falcon *(Falco peregrinus tundrius)* and the Delmarva Fox Squirrel *(Sciurus niger ginereus)*. The Piping Plover *(Charadrius melodus)*, a threatened species, nests on Assateague Island but is not present year-around. The Southern Bald Eagle, a threatened species, may occasionally be observed in Chincoteague Wildlife Refuge on the southern end of Assateague Island. Four bird species of special concern but not federally listed are the Osprey *(Pandion haliaetus carolinensis)*, the Red-cockaded Woodpecker *(Picoides borealis)*, the Eastern Merlin *(Falco columbarius)*, and the Ipswich Sparrow *(Basserculus princeps)* (U.S. Army, 1994; Assateague Island National Seashore, 1982).

A4.2.2 One reptile, the Atlantic Loggerhead Turtle *(Caretta)*, also inhabits the island (Assateague Island National Seashore, 1982). No critical habitat has been designated on Assateague Island by the Fish and Wildlife Service. The loggerhead is known to have used Assateague Island for nesting. A project, now terminated, to reestablish a nesting population of the species by the Fish and Wildlife Service was initiated in Chincoteague National Wildlife Refuge in 1969. Recent data suggest that the Assateague coast is relatively unimportant to loggerheads as nesting habitat and has little potential for increased use.

A5 VEGETATION

A5.1 Plant communities on Assateague vary from sparse beach grass communities seaward of the barrier dunes, through dense shrub thickets on the secondary dunes, to wetland forest in the refuge area, or to broad salt-marsh areas along the bayside perimeter. In addition to the salt tolerant species generally associated with barrier islands, several fresh and brackish water plant species have become established in the managed waterfowl impoundments on the Virginia end of the island. Some of the plants included in this group are sago pondweed, wild millet, and widgeon grass, which provide a winter food supply for waterfowl. No threatened or endangered plant species from the lists of Nationally Endangered Plant Species (Department of the Interior) is known to exist on Assateague Island (Assateague National Seashore, 1982).

A5.2 A botanical survey of the Maryland portion of Assateague Island (Hill, 1986) identified 47 species of vascular plants that are considered rare or threatened by the State of Maryland Natural Heritage program. An addition 114 plant species are rare or threatened on Assateague Island. Hill identified several critical area where associations of rare vegetation are found. Near North Beach, the most critical areas are Great Egging Island and a small area just west of the main parking lots. A pine woodland in this area is also considered to be very critical area. To the south, the entire area of Scotts Point to the woodland at the Peoples and Lunch cabin has some of the rarest species on the island. One of the two groves of the highly state rare Beach Plum (Prunus maritima) is located just north of the Green Run cemetery.

A6 WETLANDS

Abundant tidal wetlands exist on the western (bay) side of Assateague Island. In Sinepuxent and Chincoteague Bays, the salinity of the water approaches that of the ocean, creating 3,360 acres of salt marsh in the Assateague Island National Seashore (Furbish, 1994). The salt marshes are dominated by the grasses *Spartina* in the low intertidal zone and *Juncus* in the upper intertidal zone. Salt marshes have a complex zonation and structure of plants, animals, and microbes adapted to salinity fluctuations, alternative drying and submergence and extreme daily temperature variation (Mitsch and Gosselink, 1986). A network of tidal creeks cross the marsh. The Assateague Island National Seashore also has 1,280 acres of fresh water wetlands (Furbish, 1994).

A7 MARINE/ESTUARINE SYSTEMS

A7.1 The Sinepuxent Bay to the north and the Chincoteague Bay to the south comprise the estuarine waters between the barrier island and the Delmarva peninsula. Tide range and tidal currents in the inshore waters of Assateague Island are controlled by the position of ocean inlets. The two ocean inlets on Assateague Island are the Ocean City inlet on the north, which leads to Sinepuxent Bay, and the Chincoteague inlet 30 miles to the south, which lead to Chincoteague Bay. Mean tide range at the Ocean City and Chincoteague inlets is 3.4 to 3.8 ft., but near the midpoint between the two inlets in northern Chincoteague Bay, the tide range is only 0.4 ft. High water at the midpoint occurs approximately 7 hours after high water at the inlets. Tidal currents in the bays range from 0.15 to 0.5 knots. Through the tides, approximately 7 percent of the water in the bays is renewed each day (U.S. Army, 1975).

A7.2 The bays are shallow and protected from the ocean influences. Estuarine shellfish species, especially blue crab and oysters, are available in populations suitable for sport shellfishing from the National Seashore. Commercially leased oyster beds are located in the bay areas. The bay areas also provide habitat for waterfowl migrating along the Atlantic coast. Many ducks and geese winter in the bay area including mallards, canvas backs, black ducks, scaups, scoters and Canadian geese. The shortnose sturgeon, an endangered species, has been identified in estuarine and marine waters near Assateague Island (U.S. Army, 1994).

A8 REFERENCES

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APPENDIX B

CULTURAL RESOURCES

(Abstracted from the Work Plan, Section 6)

CULTURAL RESOURCES

B1 BACKGROUND

A comprehensive historical and archaeological survey of Assateague Island has not been undertaken. The Park Service has planned a survey since 1979, but the planned survey has not been carried out. The General Management Plan for the National Seashore (1982) states that, "a comprehensive archaeological survey and evaluation will be undertaken," and that until this is done "any ground disturbance will be preceded by an archaeological site survey" (Assateague Island National Seashore, 1982). A surface survey of the North Beach Life Saving Station, Seaboard Fish Oil and Guano Company, Scott's Ocean House Hotel and the Green Run Inlet Cemetery was conducted in 1984, but the study did not extend beyond these four sites, and no subsurface testing was done (Knecht and Lazenby, 1985). In the absence of a complete survey, only tentative conclusions can be made about the presence or absence of potentially significant culture resources in the project areas.

B2 PREHISTORIC RESOURCES

In prehistoric times, the marshes along the bay side of Assateague were probably exploited for shellfish, fish, and waterfowl by Native Americans. However, no prehistoric archaeological sites have been found on the island. A survey of land south of the project area belonging to the Department of Agriculture located no prehistoric sites (Goodwin & Associates, 1989). In 1982, David Orr of the National Park Service expressed the opinion in MacKintosh (1982) that, since Assateague Island is a highly mobile barrier island, prehistoric archaeological sites are unlikely to survive on the island. However, MacKintosh (1982) criticized this position, and prehistoric materials have been recovered from a nearby site on the mainland; Heite (1993) found shell middens near the Assateague Island National Seashore Barrier Island Visitor Center. Heite interpreted these as being related to historic period lime burning, although there is some question about this conclusion and the site may actually represent a prehistoric shell midden (Heite, 1993; Alan Cooper, personal communication). Prehistoric artifacts recovered from this site include scattered stone flakes and pottery. In the light of this information it must be concluded that, although early prehistoric sites are unlikely on the island, late prehistoric sites may be present.

B3 HISTORIC RESOURCES

B3.1 European settlement on Assateague began in the seventeenth century, when the island was used for grazing cattle. The population of the island probably remained very low through the seventeenth and eighteenth centuries, and any sites from the colonial period may have been disturbed by the mobility of the island's sands. No sites or structures from the seventeenth or eighteenth centuries are known to survive on the island.

B3.2 During the nineteenth century, Assateague was home to several small towns based on fishing, tourism, and the maintenance of the coast guard and life saving stations. At least two salt works functioned for a time, Birch's (1870 to 1890) and Jones, both in the northern part of the island. Two historic maps that show structures on the island exist, the 1877 Lake, Griffing and Stevenson *Atlas of Wicomico, Somerset and Worcester Counties, Maryland* and the 1900 USGS Green Run quadrangle. The structures shown on these maps are all listed in Bearss' 1968 *General Background Study and Base Map, Assateague Island National Seashore.* Potentially significant archaeological sites associated with these nineteenth-century communities may be present in the project area.

B3.3 To our knowledge, no inventory has been made of underwater sites adjacent to the island, where numerous shipwrecks are known to be present. In 1992, Brook Blades of the National Park Service conducted exploratory investigations of a wreck in the northern impact area (ISSI, 1992).

B4 LIFE SAVING STATIONS

B4.1 In 1875, two life saving stations were established on Assateague to assist ships in trouble off the Maryland coast. These stations, Green Run Inlet and Assateague Beach, were part of a network of coast guard stations set up by act of Congress along the east coast to save lives and protect commerce (Wroten, 1972). A third life-saving station was established at Pope's Island in 1878 and a fourth at North Beach in 1883. The station structures were multi-purpose, housing the crew, called surf men, as well as their boats and rescue gear, and supporting small towers on their roofs for scanning the sea. Some of the stations were operated until the 1950s, and they saw action several hundred times.

B4.2 The North Beach Life Saving Station, which is shown on the 1900 USGS Green Run quadrangle, is located just south of the northern impact area. In 1984, foundation rubble from the station was still visible (Assateague Island National Seashore, 1984). An archaeological survey located surface remains of the North Beach Life Saving Station. The surveyors concluded on the basis of surface indications that the site was badly disturbed, but that important subsurface deposits might exist (Knecht and Lazeny, 1985). The 1900, USGS Green Run quadrangle shows six other structures in the vicinity, two in the impact area and four outside it to the south, all of them probably cottages constructed to house the surf men and their families. The Green Run Inlet Life Saving Station was located approximately one half mile north of the southern impact area.

B5 GREEN RUN INLET VILLAGE

B5.1 The Green Run Inlet Village grew up around a hotel called Scott's Ocean House, built on the bay side of the island in the 1870s. The hotel was very popular in the 1880s and remained in operation until 1913. The hotel, a two-story wooden structure, was later razed and the lumber shipped to the mainland (Bearss, 1968).

B5.2 The 1877 Lake, Griffing and Stevenson *Atlas of Wicomico, Somerset and Worcester Counties, Maryland* shows ten families in residence in the village. Some of the families were employed by the hotel, but others worked at the Green Run Inlet Life Saving Stations or as watermen. One former resident told Edwin Bearss (1968) that the village held up to 30 families in the 1890s. However, the village was already dying when the hotel closed in 1913, and by the time the life saving station closed in 1937 the other houses in the village had all disappeared.

B5.3 The village of Green Run Inlet was located in and to the north of the southern impact area. The 1877 Lakes *et al.* atlas shows three houses in the impact area. This map places the Ocean House several hundred yards north of the impact area; however, Bearss (1968) places it on the northern edge of the impact area. An archaeological survey mapped the surface remains of the Ocean House, placing them in the same location as the Bearss (1968) map (Knecht and Lazenby, 1985). The 1900 USGS Green Run quadrangle also shows three structures in the impact area, although they are differently placed. Since the village is reported to have grown beyond its 1877 size, other houses may have been present in the impact area. According to the Assateague National Seashore Land Protection Plan (1984), virtually no visible

remains of the community are visible. However, the Knecht and Lazenby survey (1985) found some surface remains, as well as surface indications of middens and privies, and concluded that the site "still retains substantial archaeological integrity, and constitutes a particularly valuable historic resource" (Knecht and Lazenby, 1985). Potentially significant archaeological remains of the other structures could be present as well.

B6 GREEN RUN INLET CEMETERY

B6.1 Only one grave marker now survives from the Green Run Inlet Cemetery, in use from about 1870 to 1915. In 1946, at least 25 markers were present, in 1965, six, and in 1984, when Knecht and Lazenby visited the site, a single marker dated 1874 could still be seen. Most of the markers were carved of teak, although the one Knecht and Lazenby recorded was of stone.

B6.2 The cemetery is not shown on any historic map, but Bearss (1968), and Knecht and Lazenby (1985) place it along the bay side in the approximate center of the southern impact area. Knecht and Lazenby (1985) report that a wooden fence installed in 1971 to surround the cemetery was still in good condition when they visited it. Knecht and Lazenby did some limited ground clearing and subsurface probing in order to locate additional grave markers and grave sites. They failed to locate additional markers, but they did successfully locate 17 unmarked graves. There is no indication that they tested for graves located outside of the fenced area, and experience has shown that the fences around historic cemeteries often do not match the locations of all the graves. On Assateague, when the ground is mobile and most of the markers disappeared long ago, the fence may be a poor guide.

B7 SALT WORKS

Salt making was an important activity on the Virginia and Maryland eastern shores from the seventeenth century to early in the twentieth. Two salt works are known to have operated on Assateague in the late nineteenth century. One, Birch's salt works, operated from approximately 1870 to 1890 a few hundred yards south of the northern impact area. The other, the Jones Salt Works, was located a few hundred yards north of the northern impact area.

B8 CONCLUSIONS

Potentially significant nineteenth-century archaeological sites, including the Green Run Village cemetery and Scott's Ocean House Hotel, are known to be present in the project areas. The lack of a systematic archaeological survey allows for the possibility that shipwrecks and prehistoric archaeological sites could also be present. For these reasons, care should be taken in planning the location of the magnetometer survey. Remains of the structures at North Beach and Green Run Inlet are likely to show as anomalies, as are coffins in the Green Run Cemetery. These sites should be carefully avoided. It should be noted that shipwrecks off the island or within former inlets are also likely to show as anomalies, and archaeologists should be notified if any such remains are encountered in the present investigation or in any future investigations designed to locate ordnance and explosive wastes (OEW).

B9 REFERENCES

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APPENDIX C

1988 EOD TEAM DEPLOYMENT

Case Incident Report

Prepared by

National Park Service

Rev. (1/76)

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

CASE INCIDENT RECORD

1. ORGANIZATION CODE	2. ORGANIZATION (PARK) NAME	3. LOCATION CODE	4. CASE/INCIDENT NO.
1 4190	Assateague Island National Seashore	0105	880407

5. LOCATION OF INCIDENT	6. WHEN DID IT OCCUR?	MO.	DAY	YR.	24 HOUR TIME	HRS.	MIN.	7. DAY OF WEEK
Sinepuxent District beach, approx. ½ mile N. of protected beach		07	14	88		14	30	5

8. OFFENSE/INCIDENT CODE	9. NATURE OF INCIDENT	10. HOW REPORTED
66:05:00	Discovery of explosive ordinance devices	radio

11. REPORTED BY	12. ADDRESS	13. PHONE
Mike Kiser, ASIS Lifeguard	ASIS	HOME / BUSINESS

14. RECEIVED BY	15. WHEN RECEIVED: DATE	16. TIME BROADCAST	17. WHEN INVESTIGATED
Robbie Sampsell	7/14/88	1430	DATE 7/14/88 TIME 143

18. INVESTIGATED BY	19. OFFICER/RANGER NO.	20. WHEN CLEARED	DISPOSITION
Sampsell, FitzGerald	504 0105	DATE N/A TIME	21.

	22. INVOLVED PERSONS	23. ADDRESS	24. PHONE	25. SEX	26. RACE	27. AGE	28. DATE OF BIRTH
1	See attached						
2							
3							
4							

29. DETAILS OF INCIDENT

7/14/88, 1430 hrs: I received a call from Ranger Sampsell with a report of three 90-100 mm shells with fuses washed ashore just N. of the guarded beach (Sinepuxent District). As Sampsell advised he would proceed to the area and secure it, I contacted Lt. Paul Jackson (Maryland State Police) for assistance. Jackson advised he would contact the State Fire Marshalls Office as they usually handle bombs and explosives. Sampsell arrived on scene and advised he did have three shells which were identified by ASIS Lifeguard Mike Kiser as possibly containing fuses. Kiser had recently discharged from U.S. Army (artillery).

1500 hrs: Lt. Jackson returned my call to advise that the State Fire Marshalls Office (Ruxton Bramble) would be responding from Ocean City. At approx. 1530 hrs the State Fire Marshalls office was on scene and advised we would need an Explosive Ordinance Disposal Unit (EOD) to respond.

1535 hrs: I contacted the 144th EOD at Fort George Meade, Ft. Meade Maryland and spoke to a Lt. Chambliss advising him of the situation. Lt. Chambliss advised he would get a team together and be enroute, ETA approx. 1930 hours.

1600 hrs: I contacted MARO and spoke to Chris Andress (MARO Chief Ranger) and advised him of the situation. Andress asked to contacted at VAFO the following day for update.

30. QUANTITY	31. PROPERTY STOLEN OR DAMAGED	32. ESTIMATED VALUE	RECOVERED 33. DATE	RECOVERED 34. VALUE
35 PROPERTY CODE OF HIGHEST VALUE		36 TOTAL	37 TOTAL	00

INVESTIGATED BY (Signature and Date) —

APPROVED BY (Signature and Date) B. FitzGerald 7/

FORM NO. 10-344
(Rev. 3-73)

U.S. DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

SUPPLEMENTARY CASE/INCIDENT RECORD

ORGANIZATION (PARK) NAME	CASE/INCIDENT NUMBER
Assateague Island National Seashore	880407
LOCATION OF INCIDENT	**DATE OF INCIDENT** MO DA YR
Sinepuxent District approx. ½ mile N. of guarded beach.	07 14 88

NATURE OF INCIDENT

Discovery of explosive ordinance devices

COMPLAINANT'S NAME	COMPLAINANT'S ADDRESS

RESULTS OF INVESTIGATION

7/14/88, 2000 hrs: I received a call from ASIS Dispatch advising that the Ft. Meade EOD Team had arrived, secured the devices, and departed enroute Ft. Meade. Lt. Chambliss advised they would dispose of the devices on their firing range. Chambliss identified the items as 5" shells with at least one rocket motor. He further speculated the source of the shells may be a hole just offshore approx. 15 yards. At this time I made plans to contact U.S. Navy EOD Units to request assistance in checking out this possibility.

7/15/88, 0830 hrs: I contacted U.S. Navy EOD Unit at Ft. Story (Virginia Beach) and speak to a Lt. Long. Long advises we have a reasonable request but we will have to make the request through the Department of the Interior to DOD, Chief of Naval Operations Lt. Long did give me the name of a Lt. Commander Albrecht (EOD Group II) and a phone number (804-422-7191) that WASO can call for faster response.

0900 hrs: I contact Walt Dabney, Chief Ranger, WASO Ranger Activities Division, and advise him of the situation. Dabney advises he will contact Lt. Cmmdr. Albrecht for assistance. I then call VAFO to update Andress.

1200 hrs: I contact Lt. Cmmdr. Albrecht who advises that Dabney has contacted him and we will have to go through CNO for priority clearance. I then contact Dabney and we discuss the possibility of NPS Dive teams exploring the hole offshore.

1230 hrs: I contact ASIS guard Mike Kiser to ask him to swin the area with mask and snorkel to determine the possibility of other shells in the hole. Kiser asvises that another shell has just washed ashore in the same area. I contact Ranger Trimble to alert him and ask him to secure the area, closing it to swimming, fishing, surfing. I then call Ft. Meade EOD to request assistance again. I also call Dabney back and leave a message about the additional oridnance washing ashore.

1430: Receive word from 144th EOD they will respond, ETA approx. 1700 hrs.

1545 hrs: Dabney returns my call to advise he had been to see Assistant Sec. of the Interior Alan Fitzsimmons about our request for Navy assistance. Fitzsimmons contacted a Captain Bill Coehen at (202) 692-3227 to make the request for CNO assistance.

1615 hrs: I meet with protection and guard personnel to update them on plan of action until Navy responds. We will close the area to water activity, check it every hour during daylight hours to check for further ordinance, guards and protection staff share responsibility for keeping visitors out of the area. I advised Trimble to contact me at home for further developments.

SUBMITTED BY (SIGNATURE AND DATE)	APPROVED BY (SIGNATURE AND DATE)
	7/2

FORM NO. 10-344
(Rev. 3-73)

U.S. DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

SUPPLEMENTARY CASE/INCIDENT RECORD

ORGANIZATION (PARK) NAME	CASE/INCIDENT NUMBER
Assateague Island National Seashore	880407
LOCATION OF INCIDENT	**DATE OF INCIDENT** MO DA YR
Sinepuxent District beach, approx. ½ mile N. of guarded beach	07 14 88

NATURE OF INCIDENT
Discovery of explosive ordinance devices

COMPLAINANT'S NAME	COMPLAINANT'S ADDRESS

RESULTS OF INVESTIGATION

1730 hours: I received a call from a Sergent First Class Michael Dillaplain (team leader 144th EOD) who advises he has secured the ordinance found this date. Dillaplain request permission to go through DOD channels to contact Navy EOD Units to respond and check out the area just offshore. I advise Dillaplain that any assistance he could provide in getting the Navy to respond would be appreciated.

7/16/88, 0800 hrs: I received word that Lt. Cmmdr. Albrecht had called the previous evening at approx. 1800 to advise a Navy EOD team would be enroute on 7/16. Further received a message to contact a Lt. Thetford at (804) 422- 7955.

0830 hrs: I made contact with Lt. Thetford who advised that the U.S. Navy Mobile Unit II (EOD DET) would be enroute with six persons, ETA at ASIS approx. 1500 hrs. Thetford initially requested permission to leave ordinance found at ASIS until arrangement for its disposal could be secured. I denied this request due to lack of secure storage area. Thetford also requested I secure quarters for the EOD team. After contacting numerous hotels I finally contacted the Ocean City Chamber of Commerce who assisted in locating temporary quarters for the night.

0930 hrs: Sgt. Dillaplain arrived back on site with orders to secure the area and turn it over to Navy EOD upon their arrival.

1220 hrs: Received word from Sgt. Dillaplain that he had located another shell which had washed ashore.

1530 hrs: U.S. Navy EOD Mobile Unit II arrives with Lt. Jeff Danshaw in charge. We go out to the site to survey the situation. At approx. 1630 hrs. Sgt. Dillaplain turns the area over to Lt. Danshaw and the EOD Unit from Ft. Meade departs the area. Danshaw advises he will begin underwater survey of the area in the morning.

From 7/17 through 7/20 Lt. Danshaw's team conducted an underwater survey of the suspect area (see attached diagram compiled by Danshaw). At a debriefing on 7/21/88 attended by ASIS Supt. Rector, Asst. Supt. Fagan, District Ranger Hartley, Ranger Sampsell, Senior Chief Tom Herman, Lt. Danshaw, and myself; Danshaw explained the following re: his survey:

He believes the ordinance to be washing out of a trench dug in the vicinity of an old Air Corps target range used around WW II (this matches reports from several Park employees who lived near here during this time period). As the target area was cleared they probably dug a trench about 20-30' deep and buried the expelled shells, etc. The trench was originally located on Assateague, but due to island migration it has now

SUBMITTED BY (SIGNATURE AND DATE)	APPROVED BY (SIGNATURE AND DATE)
	7/21/8

FORM NO. 10-344
(Rev. 3-73)

U.S. DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

SUPPLEMENTARY CASE/INCIDENT RECORD

ORGANIZATION (PARK) NAME	CASE/INCIDENT NUMBER
Assateague Island National Seashore	880407
LOCATION OF INCIDENT	**DATE OF INCIDENT** MO DA YR
Sinepuxent District beach approx. ½ mile N. of the guarded beach	07 14 88

NATURE OF INCIDENT

Discovery of explosive ordinance devices

COMPLAINANT'S NAME	COMPLAINANT'S ADDRESS

RESULTS OF INVESTIGATION

become exposed to the actions of surf and currents.

Danshaw believes the ordinance is a type of Air Force (U.S. Army Air Corps) shell (see the attached diagrams) and rocket used for target practice. While Danshaw feels the chances of an explosive incident are relatively small, he asked us to keep the area closed to public access until he can have a Technical Center x-ray the shells for explosives.

During the survey three main areas of ordinance concentration were identified using underwater ordinance detectors. The number of hits with the detectors would make it virtually impossible for Danshaw's small team to do a complete excavation of the area. Determination for disposal/disposition of these sites will be made after the recovered shells are x-rayed.

Total items recovered during the incident"

1. Seven rocket motors, one of which appeared not have been fored/impacted.
2. Six five inch shells, two of which appeared not to have been fired/impacted.
3. Numerous lead/alloy ballistic tips used to weight and improve aerodynamics on practice rockets.

Key personnel involved:

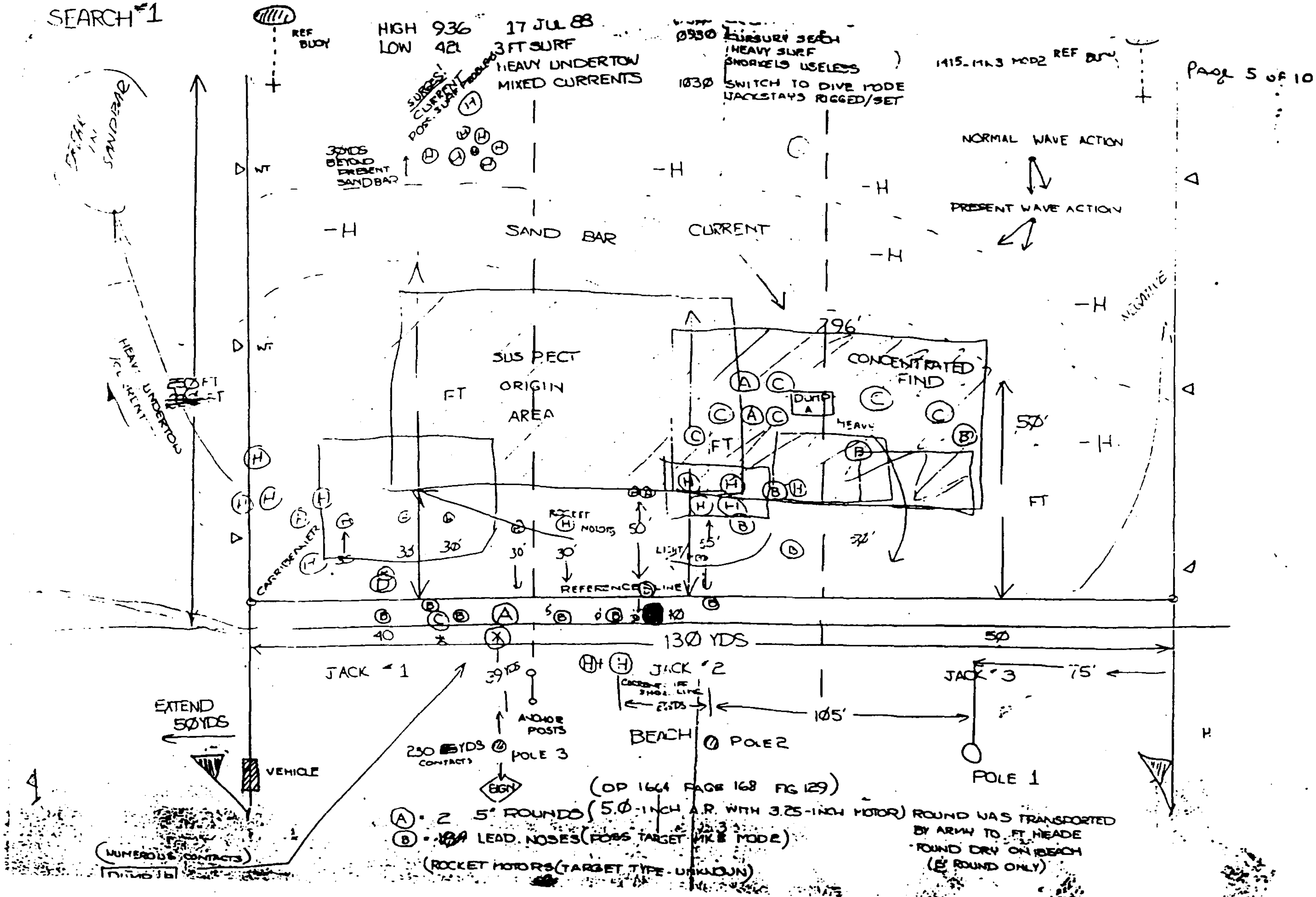
SFC Michael Dillaplain, U.S. Army, 144 th EOD. (301) 677-5182

Lt. Jeff Danshaw, U.S. Navy, EOD Group II. (804) 422-7073 or 7992

Chief Petty Officer Slade, U.S. Coast Guard Station Ocean City. Chief Slade provided quarters to the Navy team several nights during the survey.

When Lt. Danshaw departed with his team on 7/21/88 he advised we contact COM NAV BASE Duty Officer at (804) 444-7097 if we locate any further items. They will pass info on to NAV BASE EOD Group II.

SUBMITTED BY (SIGNATURE AND DATE)	APPROVED BY (SIGNATURE AND DATE)
	7/25/88


SEARCH #1
REF BUOY
HIGH 936
LOW 421
17 JUL 88
3 FT SURF
HEAVY UNDERTOW
MIXED CURRENTS
0930 SURF SEARCH
HEAVY SURF
SNORKELS USELESS
1030 SWITCH TO DIVE MODE
JACKSTAYS RIGGED/SET
1415 MK3 MOD2 REF BUOY
NORMAL WAVE ACTION
PRESENT WAVE ACTION
30 YDS BEYOND PRESENT SANDBAR
SAND BAR
CURRENT
SUSPECT FT ORIGIN AREA
CONCENTRATED FIND
296'
50'
FT
HEAVY UNDERTOW CURRENT
250 FT
ROCKET MOTORS
REFERENCE LINE
130 YDS
40
50
JACK #1
JACK #2
JACK #3
75'
105'
ANCHOR POSTS
230 YDS CONTACTS
POLE 3
BEACH
POLE 2
POLE 1
EXTEND 50 YDS
VEHICLE
SIGN
(OP 1664 PAGE 168 FIG 129)
(A) - 2 5" ROUNDS (5.0-INCH A.R. WITH 3.25-INCH MOTOR) ROUND WAS TRANSPORTED BY ARMY TO FT MEADE
FOUND DRY ON BEACH
(B ROUND ONLY)
(B) - LEAD NOSES (POSS TARGET MK 8 MOD 2)
(ROCKET MOTORS (TARGET TYPE UNKNOWN))
(NUMEROUS CONTACTS)

NAVY ROCKETS

2.25-INCH ASSEMBLIES

Motor	Head	Velocity	Approximate Trajectory of
2.25" Mk 10 or 11	2.25" Mk 1 or 3 (1.6 lb.)	1150 ft./sec.	3.5" Rocket (3.25" Motor)
2.25" Mk 12 or 13	2.25" Mk 1 or 3 (1.6 lb.)	810 ft./sec.	5.0" Rocket (3.25" Motor)
2.25" Mk 10 or 11	2.25" Mk 2 (8.6 lb.)	810 ft./sec.	5.0" Rocket (3.25" Motor)

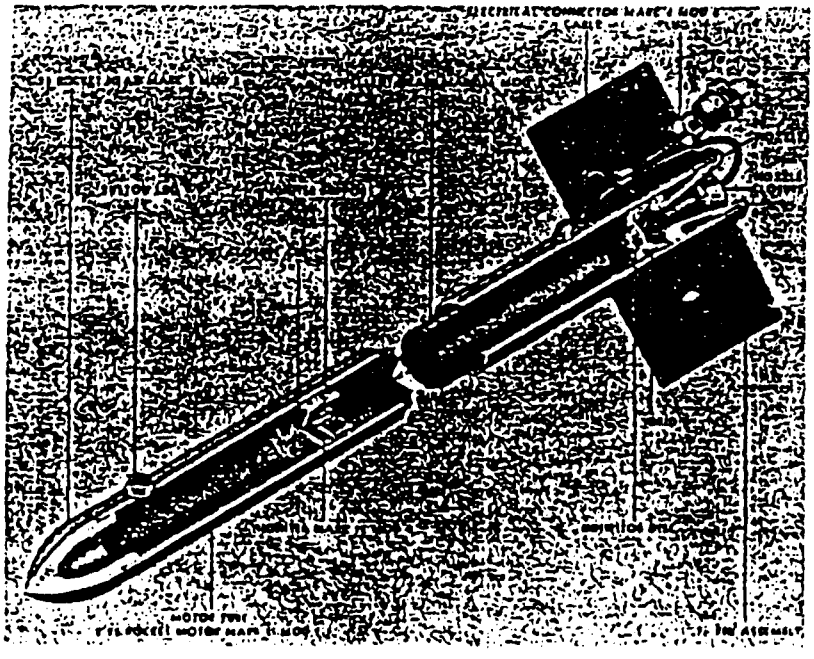


Figure 124. 2.25-inch A.R., Practice

2.25-inch A.R. Practice

General: The 2.25-inch sub-caliber rocket for aircraft was developed for training purposes. Initially, two types were designed to approximate the trajectory of the 3.5-inch and 5.0-inch rockets; however, only the Motor Mk 11 and the Head Mk 3 Mod 2 will be used in future training.

The Mk 1, a California Institute of Technology production, was issued until adopted and issued by Bureau of Ordnance as the Mk 3 Mod 2. The Mk 2, a California Institute of Technology production, was designed as a slow sub-caliber rocket. The complete assembly for the latter is no longer available.

The 2.25-inch Motors Mk 10 and Mk 11 are similar to each other, as are the 2.25-inch Motors Mk 12 and Mk 13. The Motors Mk 10 and Mk 11 differ from the Mk 12 and Mk 13 in that the diameter of the nozzle on the latter is smaller and the weight of the propellant of the Mk 10 and Mk 11 is 1.75 pounds, as compared to the weight of 1.12 pounds in the Mk 12 and Mk 13.

The external dimensions of these rockets are the same. For recognition purposes, the 2.25-inch motors Mk 10 and Mk 11 are painted white with black fins, while the Motors Mk 12 and Mk 13 are grey with black fins.

Motor Mk 11 and Head Mk 3 Mod 2: Over-all length of the rocket is 29 inches. Two button-type lugs are provided on the motor tube, spaced approximately 19 inches apart. Four fins are welded to the after end of the motor tube. The propellant is a cylindrical grain of ballistite weighing approximately 1-¾ pounds.

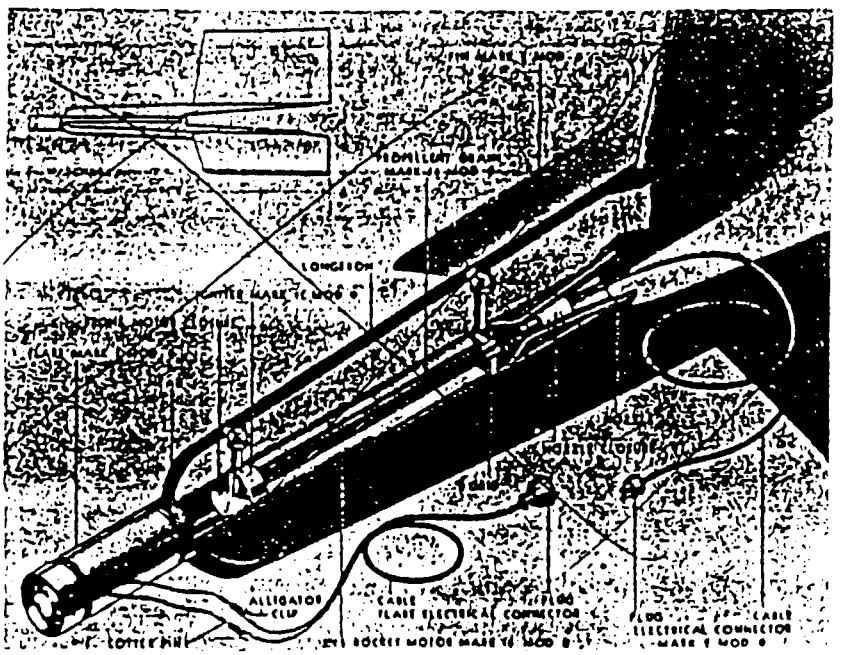


Figure 125. 3.25-inch Target Rocket

3.25-inch Targets

General: As a target for antiaircraft gunners, the rocket is projected with speeds approximating those of an aircraft. It consists of a rocket propulsive unit to which are attached large stabilizing fins, for maximum visibility. Rocket targets are referred to by their assembly number as indicated in the accompanying table. They all consist of a simple rocket motor with three large fins prepared from wooden frames and light-weight fiber board. The fins are 120 degrees apart, each attached by two lugs.

The 3.25-inch Rocket Targets Mk 1 and Mk 2 consist of a motor 36 inches long, to which fins 18 inches by 34 inches are attached. An electrical connection is made by a standard 110-volt plug. The 3.25-inch Target Rocket Mk 1 is standardized at 425 m.p.h. and the Mk 2 at 300 m.p.h. On some models, a screamer is put over the nose end.

The Mks 3 and 4 differ from Mks 1 and 2 in that the motor is heavier and the fins are held on by threaded studs instead of lugs. The ballistics are similar; Mk 3 is like Mk 1 and Mk 4 is like Mk 2.

0-inch Mk 1 Mod 0! The head is filled with T and weighs 46.5 pounds when fitted with a fuze Mk 143. The same adapter rings are used as on the 3.5-inch Head Mk 5. The head is issued with a nose plug. The nose fuze must always be assembled in the head before firing. Fire with the fuze on "safe" if delay is desired. The head is shipped with the base fuze sealed in place. This base fuze must not be removed.

5.0-inch Mk 1 Mod 1: This head differs from the 5.0-inch Head Mk 1 Mod 0 only in that the nose is especially cavitated to take the Fuze Mk 172 Mod 0, which is larger than the Mk 149 or other nose fuzes and therefore is not interchangeable with them.

Motor

The 3.25-inch Motor Mk 7 is used with the 3.5- and 5.0-inch heads described above. At the forward end of the motor are a black-powder igniter and an electric squib. Two electric leads extend through the motor and out the after end to a cable and plug connection. At the after end of the motor, there are a nozzle and a bag of silica gel which acts as a dehydrating agent in keeping moisture from the ballistite grain. The grain used in the cruciform type with inhibitors, 33 inches long, 2.75 inches in diameter, and weighing 8.5 pounds.

The tail consists of four sheet-metal fins set 90° apart and welded to a central cylinder. The tail is slipped over the after end of the motor and is secured by a tail locking ring, which screws on.

Remarks: The 3.5-inch (H.E. and F.S.) have a maximum velocity of 1,200 ft./sec. exclusive of plane speed, as compared to 800 ft./sec. for the 5.0-inch H.E.

The 3.5-inch Heads Mk 11, incendiary, and Mk 12, gas, were never loaded.

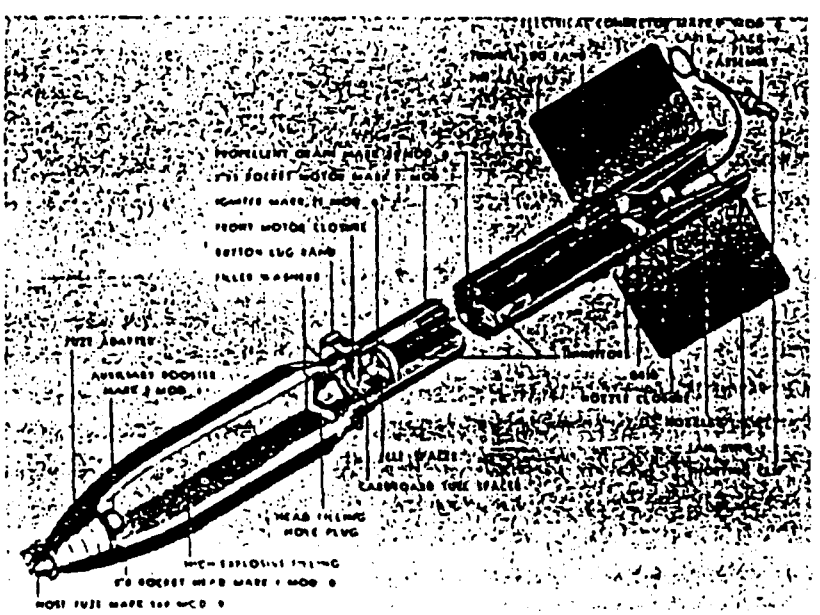


Figure 129. 5.0–inch A.R. with 3.25–inch Motor

PHOTOGRAPH LOG

ASIS -322

CASE # ________ PHOTO # 1

DATE: 7/17/88 TIME: ________

LOCATION: Dinepuxet Dish Beach 1/4 N. of Guarded beach

FACING N/A TAKEN BY R.S.

SHOWING: 2 5" shells recovered by NAVY EOD Team

CAMERA BRAND: ________

FILM TYPE: ________

CASE # ________ PHOTO # 2

DATE: ________ TIME: ________

LOCATION: AS ABOVE

FACING N/A TAKEN BY R.S.

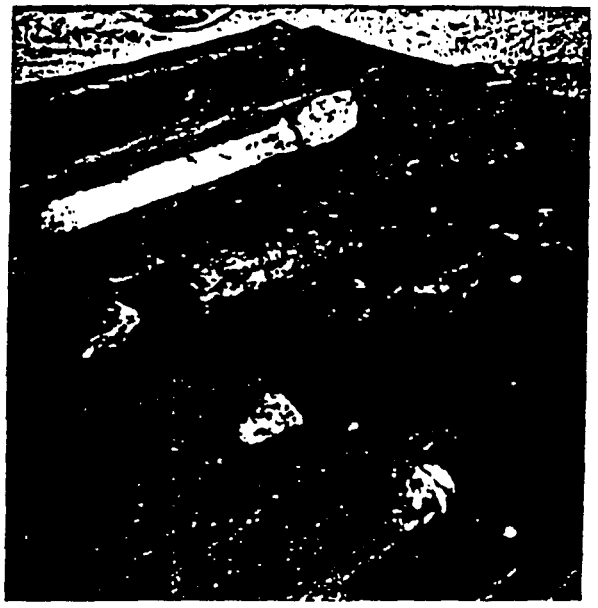
SHOWING: 3 5" shells and 6 rocket motors recovered by NAVY EOD Team.

CAMERA BRAND: ________

FILM TYPE: ________

PHOTOGRAPH LOG

ASIS -322



PAGE 9 OF 10

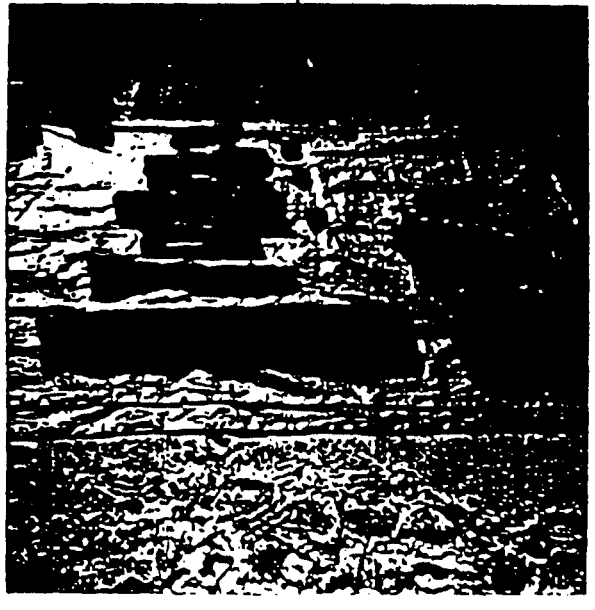
CASE # _____ PHOTO # 3
DATE: 7/19/88 TIME: _____

LOCATION: Sixpence Dist beach ½ mile N. of Ormond Beach

FACING N/A TAKEN BY RS

SHOWING: 3 ballistic tips and 6 rocket motors recovered by NAVY EOD Team

CAMERA BRAND: _____
FILM TYPE: _____



CASE # _____ PHOTO # 4
DATE: 7/19/88 TIME: _____

LOCATION: As above

FACING N/A TAKEN BY RS

SHOWING: 6 Rocket motors, 3 ballistic tips and 3 5" shells recovered by NAVY EOD Team

CAMERA BRAND: _____
FILM TYPE: _____

Summary of Significant Events

Prepared by

Navy EOD Team

CHRONOLOGICAL SUMMARY OF SIGNIFICANT EVENTS

15 JULY - FRIDAY

2330 - OIC received tasking from EODMU TWO Operations Officer

16 JULY - SATURDAY

0600 - Detachment TWO arrives at EODMU TWO for operations loadout. Det 02 is augmented Ensign Hendrickson and Petty Officer Clemmey from Det 36.
1115 - TAD Orders received and loadout complete; depart for Assateague National Seashore Park.
1530 - Arrive at Assateague National Seashore Park; establish liaison with Park's Head Ranger, Mr. Brion Fitzgerald.
1600 - Proceed to subject site for initial assessment.
1615 - Arrived on site; Received turnover of information from SFC Dilliplain, 144th Ordnance EOD Detachment, Fort Meade, MD.
1645 - Conveyed recommendation to Head Ranger to further extend security perimeter to isolate area from any public traffic. Established a communications plan between Navy EOD Team and Ranger Station. Established emergency procedures for medical and/or diving accident. Generated plan-of-attack.

17 JULY - SUNDAY

0700 - On site; began rigging jackstays for systematic search of subject origin area. Began a detailed chart of the search area. Established emergency communications and made notifications to the Maryland State Police Medivac (NAS Pax River backup) and recompression chamber at John Hopkins Medical Center, Baltimore, MD.
0900 - 1415 - Conducted visual bottom search utilizing a jackstay "Z" search starting at Northern limit working South. Dive station was established on the beach with two emergency swimmers in addition to a standby diver. No additional ordnance items were discovered. Wave action was turbulent; mixed currents prevailed. Severe erosion of existing beachline progressing. A churning action was creating a hole in the surf area displacing large amounts of sand.
1530 - With low tide approaching at 1625, MK 9 and MK 10 ordnance locators are rigged. Detachment briefed on search procedure.
1605 - Large metallic concentration discovered 40 yards south of initial suspect area. (2 to 3 feet of water; surf light to moderate intensity). Began excavation of suspect area. Numerous ordnance items recovered from 1 to 2.5 feet below sand level. Refer to drawn schematic diagrams for exact ordnance location and type found. Excavation hampered by strong semi-circular current, increase surf activity, and a flooding tide.

2105 - Major erosion of shoreline taking place as high tide approached. Churning action continuing to dredge a hole that is slowly moving to the north. A total of 5 to 8 yards eroded from the original shoreline since arrival.

2130 - Positive identification of ordnance items made. All components comprise two end items; a 2.25-inch A.R. (Aircraft Rocket - Practice) and a 5.0-inch A.R. with a 3.25-inch motor. (Technical data in reference (b), pages 161 and 168, figures 124 and 129 respectively).

18 JULY - MONDAY

0800 - 1330 - On site; discovered turbulent surf and continued erosion of original shoreline. Winds from southeast 15 to 20 knots. Diving out of the question. Surf is 3 to 5 feet. Monitored beach for any washed up items. Three MK 3 Mod 2 Rocket Noses and one 2.25-inch rocket motor recovered. Low tide search plan devised and support equipment rigged.

1330 - Began systematic perimeter search with ordnance locators to verify ordnance source as tide ebbs. Refer to diagrams for search results.

1600 - Negative metallic contacts to south of concentrated area.

1645 - 2055 - Discovered multiple hits to northwest of concentrated area. Excavation substanuated buried ordnance. Refer to diagram for location and ordnance type. As low tide approached a significant topographical discovery was made; the churning hole has moved north about 30 yards and a sandbar being formed to immediate south depositing 1 to 3 feet of sand on concentrated find area. Continued radial search of concentrated area to north-northwest and discovered multiple hits along the path of the heavy current. The heavy current was a result of a riptide created by a break in the sandbar surrounding the ordnance concentration area. Refer to schematic for plots.

19 JULY - TUESDAY

0800 - On site; surf moderate, winds southwest 5 to 10 knots. Rig MK I and diving station to investigate area outside of sandbar. (About 240 yards off shore)

0930 - 2000 - Began jackstay search of perimeter continuing the radial search to pin-point source of ordnance. Negative visual or instrument discoveries south or east of suspected source. Eight ordnance locator discoveries made to northeast of concentrated find. Excavation of about 2.5 feet revealed no items. Water depth was 18 feet; underwater surges made excavation long and difficult. No other hits in 50 feet circle line search found. Current and surf attributed to aborting diving efforts in area where sandbar breaks. (Strong Riptide). Refer to schematic for detailed plot.

20 JULY - WEDNESDAY

0800 - 1400 - All reference flags and posts moved inland 30 to 40 yards. Hole eroding shore line at astronomical rate. (From 5 to 28 yards; refer to schematic). Taking advantage of natural erosion, areas checked where 5 to 6 feet of sand once was. Two rocket motors discovered about 3 feet deep. (11.5 feet below the original shore level and 1 to 2 feet below the water table). Difficult to excavate; sand continually caving in on dig. Ten feet directly north of find was an intact 2.25-inch A.R. in excellent condition about 1 foot below the sand.

1430 - 2045 - With low tide coming at 1703, areas were scanned with MK 9 and MK 10 ordnance locators from northwest to northeast to complete the radial search. Hits and several rocket motors discovered 1 to 2 feet below the sand following the sweep of the current. Extended restricted area 50 yards to north. Negative contacts found north of the restricted area. A detailed schematic was completed with discoveries, distances, and permanent reference posts to accurately complete the beach survey.

21 JULY - THURSDAY

0800 - On site site; no other items discovered after low tide. High concentration area continuing to be buried in moving sandbar. Beach continuing to erode as "hole" moves north. (Hole moved a total of 41 yards since arrival on site). Riptide toward break in sandbar now retarding hole movement.

0930 - Debriefed National Park Superintendent, Mr. Roger K. Rector and the staff of ranger personnel.

1045 - Departed Assateague National Park for rendezvous with Monark at Cape Charles.

1445 - Ordnance loaded on Monark at Cape Charles. Det 02 and Det 36 elements depart for Fort Story and Norfolk EOD Det respectively.

1615 - Arrived at EODMU TWO, Fort Story and reported to Operations Officer.

25 JULY - MONDAY

* 0930 - Arrangements made to transport ordnance to Yorktown range.

1200 - Departed for Norfolk EOD Det for ordnance pickup and transported to Yorktown EOD Range bunker via explosive route.

1700 - Ordnance transferred to Yorktown bunker. Two suspect items separated (Intact 2.25-inch A.R., Practice and one 5.0-inch A.R. encrusted with extensive sea growth) for explosive exploration.

26 JULY - TUESDAY

1030 - Explosive exploration completed. Refer to photographs. Both suspect items classified inert. Found sand and seawater in 2.25 rocket and mud/sand sledge in 5.0-inch rocket warhead.

1430 - Head Ranger at Assateague National Park notified of test results with recommendations to maintain beach secured to public traffic and to frequently monitor site.

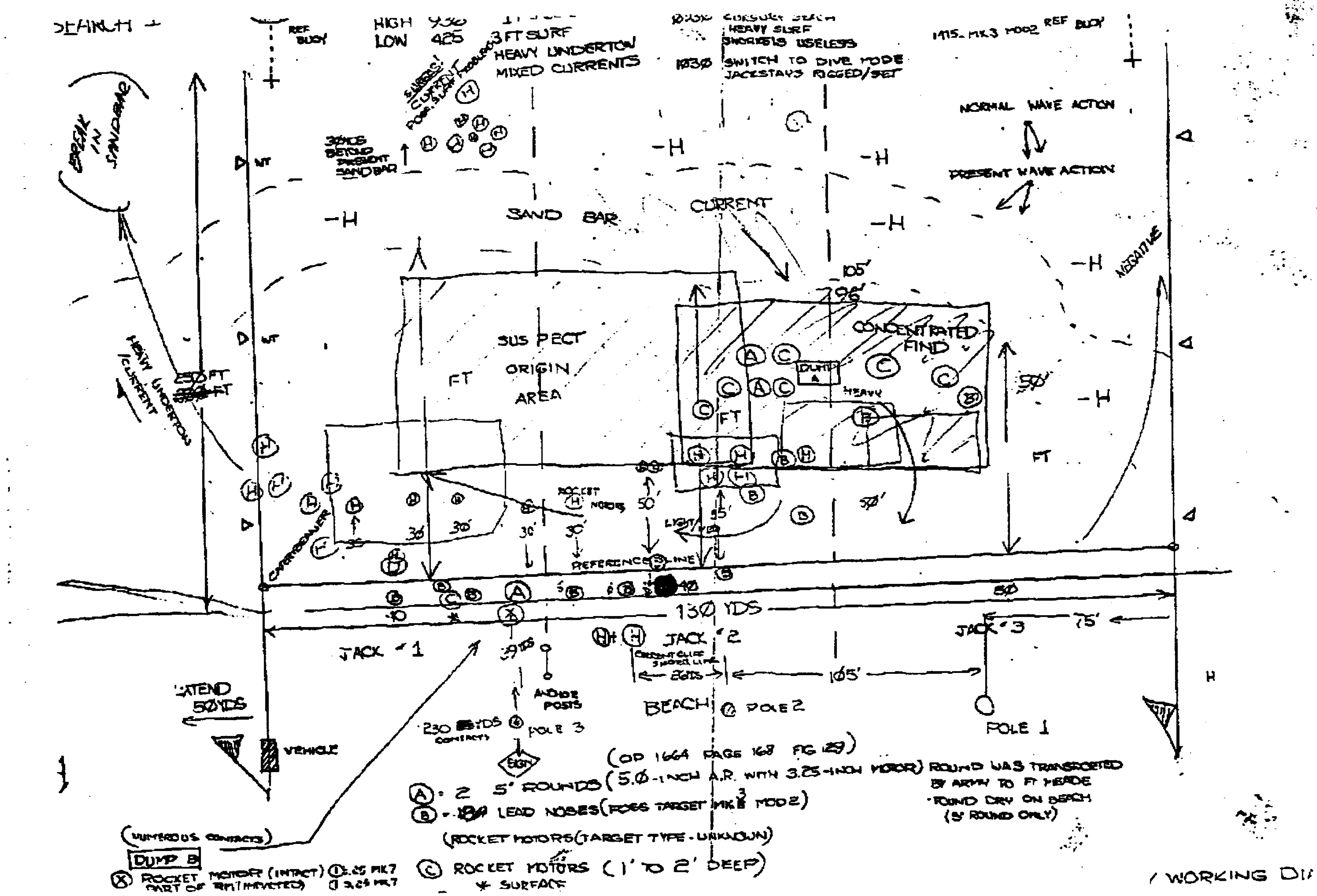
1 AUGUST - MONDAY

1530 - Followup phone call to Assateague National Park to Head Ranger, Mr. Brion Fitzgerald, made. No additional items found at site since Det 02 departure.

* TOTAL ORDNANCE FOUND:

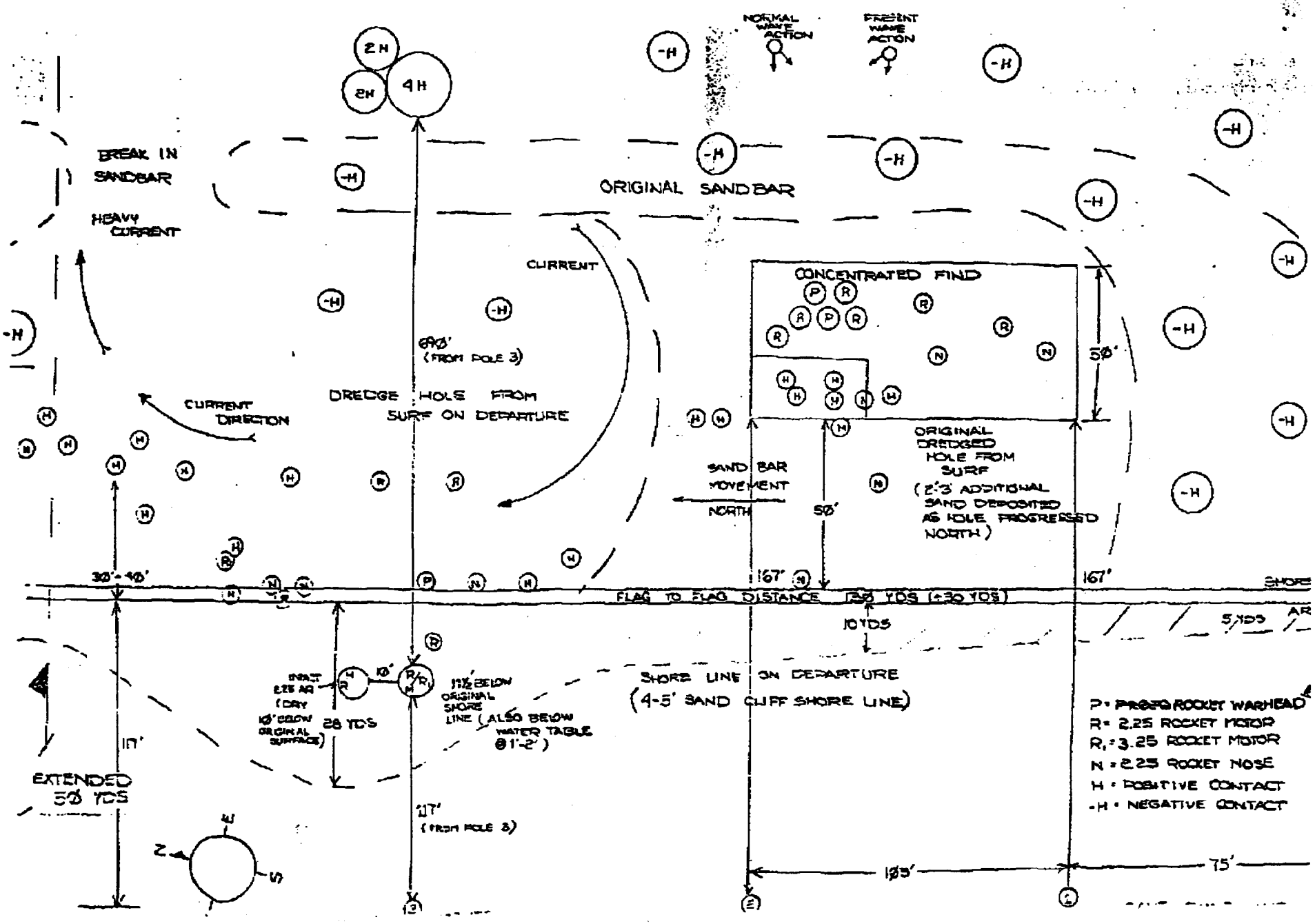
10	2.25-inch A.R., Practice - impacted/damaged
11	MK 3 Mod 2 Rocket Heads for 2.25-inch rockets
1	2.25-inch A.R., Practice - intact; good condition
2	5.0-inch Rocket Warheads - one intact; one with impact damage
2	3.25-inch Rocket Motors

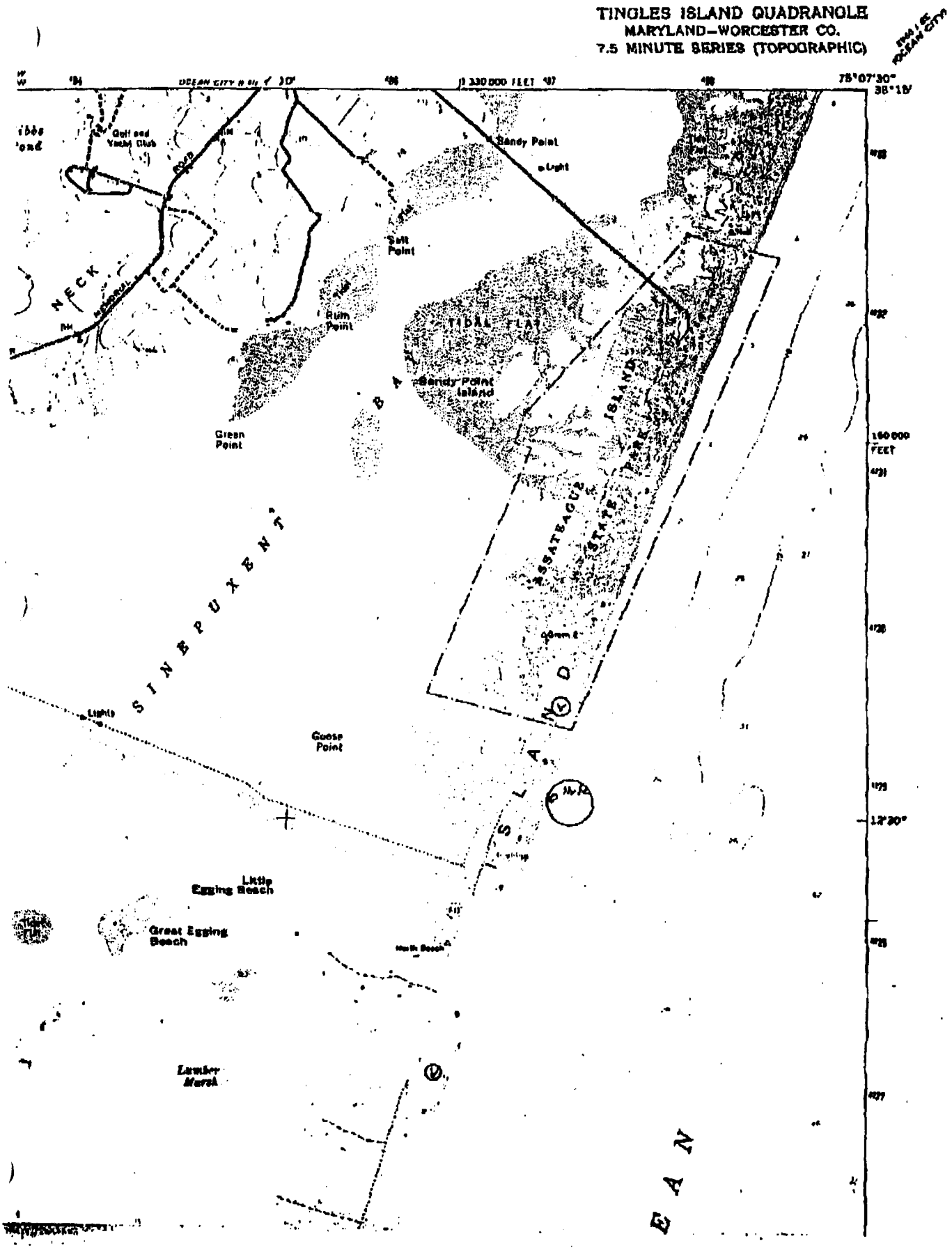
All items disposed of explosively 26 July 1988 at Yorktown EOD Range.



REF BUOY
HIGH 930
LOW 425
3 FT SURF
HEAVY UNDERTOW
MIXED CURRENTS
HEAVY SURF
SNORKELS USELESS
1030 SWITCH TO DIVE MODE
JACKSTAYS RIGGED/SET
1415 MK3 MOD2 REF BUOY
NORMAL WAVE ACTION
PRESENT WAVE ACTION
BREAK IN SANDBAR
30 YDS BEYOND PRESENT SANDBAR
SAND BAR
CURRENT
NEGATIVE
HEAVY UNDERTOW / CURRENT
SUSPECT ORIGIN AREA
FT
CONCENTRATED FIND
DUMP A
HEAVY
ROCKET NOSES
REFERENCE LINE
130 YDS
JACK 1
JACK 2
JACK 3
75'
105'
50'
BEACH
POLE 1
POLE 2
POLE 3
ANODE POSTS
230 YDS
CONTACTS
SIGN
EXTEND 50 YDS
VEHICLE
(OP 1664 PAGE 168 FIG 29)
(A) = 2 5' ROUNDS (5.0-INCH A.R. WITH 3.25-INCH MOTOR)
(B) = 180 LEAD NOSES (FOSS TARGET MK 3 MOD 2)
(ROCKET MOTORS (TARGET TYPE - UNKNOWN)
(C) ROCKET MOTORS (1' TO 2' DEEP)
* SURFACE
ROUND WAS TRANSPORTED BY ARMY TO FT MEADE
FOUND DRY ON BEACH
(5' ROUND ONLY)
(NUMEROUS CONTACTS)
DUMP B
(X) ROCKET MOTOR (INTACT)
PART OF

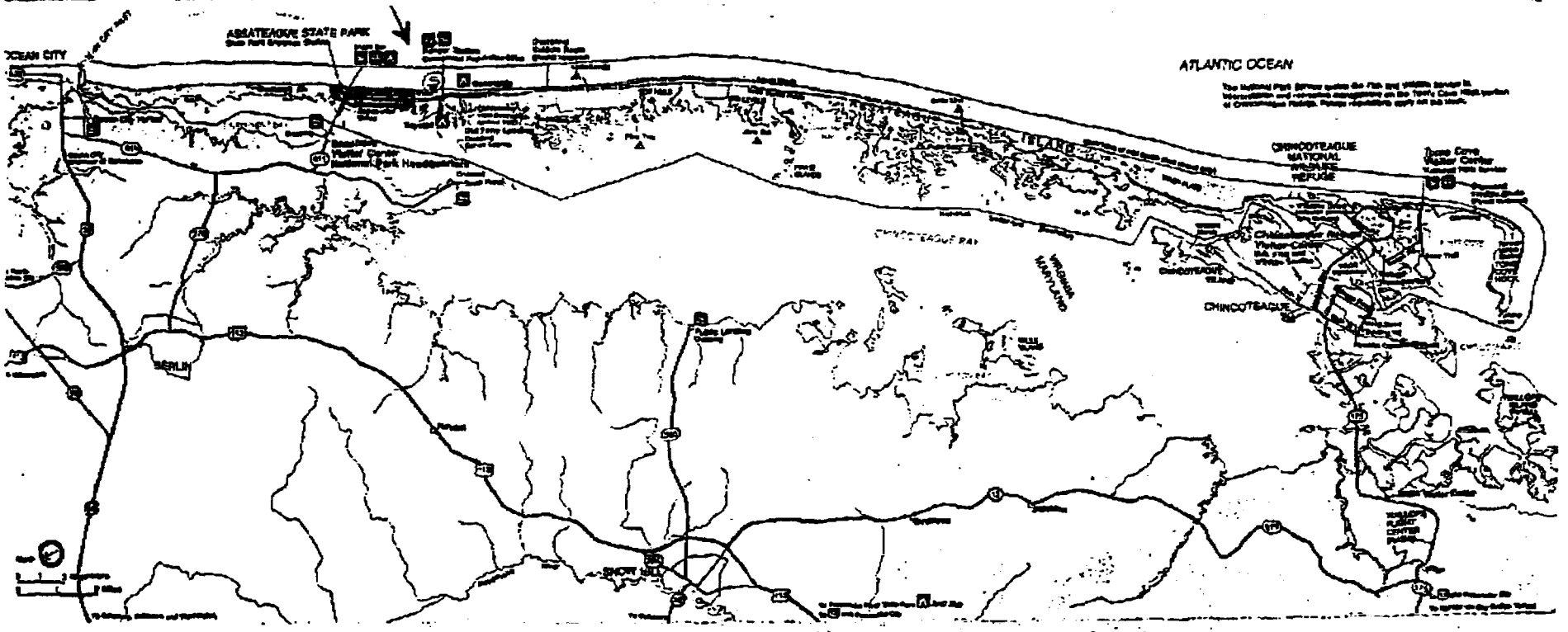
/ WORKING DI


NORMAL WAVE ACTION
PRESENT WAVE ACTION
2H
2H
4H
-H
BREAK IN SANDBAR
HEAVY CURRENT
ORIGINAL SAND BAR
CURRENT
CONCENTRATED FIND
690'
(FROM POLE 3)
DREDGE HOLE FROM SURF ON DEPARTURE
CURRENT DIRECTION
50'
ORIGINAL DREDGED HOLE FROM SURF
(2'-3' ADDITIONAL SAND DEPOSITED AS HOLE PROGRESSED NORTH)
SAND BAR MOVEMENT NORTH
50'
30'-40'
167'
167'
SHORE
FLAG TO FLAG DISTANCE 150 YDS (±30 YDS)
10 YDS
5 YDS
AR
SHORE LINE ON DEPARTURE
(4-5' SAND CLIFF SHORE LINE)
INSTALL 2.25 AR (DRY 10' BELOW ORIGINAL SURFACE)
10'
28 YDS
11½' BELOW ORIGINAL SHORE LINE (ALSO BELOW WATER TABLE @ 1'-2')
117'
EXTENDED 50 YDS
117'
(FROM POLE 3)
P = PROPO ROCKET WARHEAD
R = 2.25 ROCKET MOTOR
R1 = 3.25 ROCKET MOTOR
N = 2.25 ROCKET NOSE
H = POSITIVE CONTACT
-H = NEGATIVE CONTACT
105'
75'
W
N
S
E
1
2


TINGLES ISLAND QUADRANGLE
MARYLAND—WORCESTER CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
75°07'30"
38°15'
Golf and Yacht Club
Sandy Point
Light
Salt Point
NECK
Rum Point
TIDAL FLAT
Sandy Point Island
Green Point
ASSATEAGUE STATE PARK
ISLAND
SINEPUXENT
BAY
Lights
Goose Point
Little Egging Beach
Great Egging Beach
Lumber Marsh
OCEAN
150 000 FEET

Map and Guide

ENCLOSURE 2



01 03 211900Z JUL 88 PP UUUU 2031900

EODMU TWO

COMNAVSURFLANT NORFOLK VA

INFO CINCLANTFLT NORFOLK VA

COMEODGRU TWO

UNCLAS //N08027//

SUBJ: EOD SERVICE REQUEST ICO ASSATEAGUE ISLAND NATIONAL PARK

A. PHONCON EODMU TWO, LT THETFORD/COMEODGRU TWO, LCDR ALBRECHT OF 15 JUL 88

B. COMNAVSURFLANT 160210Z JUL 88

C. PHONCON EODMU TWO, LT THETFORD/ASSATEAGUE ISLAND PARK RANGER FITZGERALD OF 20 JUL 88

D. PHONCON EODMU TWO, LT THETFORD/ASSATEAGUE ISLAND NATIONAL PARK RANGER FITZGERALD OF 16 JUL 88

1. AS DISCUSSED REF A, ORIG HAS TAKEN REF B FOR ACTION.

2. RECOMMEND SUSPENDING SUBJECT OPERATION AND CLOSING AFFECTED SECTION OF BEACH TO THE PUBLIC. AS DISCUSSED REF C, DEPT OF INTERIOR PARK PERSONNEL CONCUR. FURTHER EOD SUPPORT CAN BE REQUESTED AS ORDNANCE ITEMS ARE UNEARTHED BY WAVE ACTION.

3. EOD TEAM HAS BEEN ON-SITE SINCE PM 16 JUL. SOURCE OF ORDNANCE HAS BEEN LOCALIZED TO AN AREA APPROX 100 X 125 FT. AREA IS LOCATED

LT THETFORD DTG=360=

LT D. D. THETFORD BY DIR

IN SURF ZONE AND IS BELIEVED TO HAVE BEEN A FORMER ORDNANCE BURIAL PIT. WAVE ACTION AND RIP CURRENTS PERMIT EOD ACTIVITY ONLY AT LOW TIDE (3 - 4 HOURS/DAY).

4. AS DISCUSSED REF D, ENTIRE AREA IS KNOWN TO BE IMPACT AREA OF WORLD WAR II FIRING RANGE. RECOVERED ITEMS APPEAR TO BE ORDNANCE CLEARED FROM THE BEACH AND BURIED IN A TRENCH 30 - 40 YEARS AGO. THE SURF HAS RECENTLY ERODED THE BEACHLINE SO THAT THE BURIAL AREA IS NOW UNDER WATER AND ORDNANCE IS BEING EXPOSED BY WAVE ACTION AND MOVED HIGHER ONTO THE BEACH. ITEMS FOUND TO DATE INCLUDED:

10 - LEAD BALLISTIC POINTS (NON-EXPLOSIVE)

11 - ROCKET MOTORS (EXPLOSIVES EXPENDED)

2 - 5 INCH ROUNDS (REQUIRE X-RAY TO VERIFY NON-EXPLOSIVE)

1 - 2.25 INCH PRACTICE ROCKET (ROCKET GRAIN EXPENDED)

5. ORIG WILL NOTIFY ALCON IF X-RAYS OF 5 INCH ROUNDS REVEAL EXPLOSIVE HAZARD.

6. ASSESSMENT: BASED ON AVAILABLE INFO, ORDNANCE IS LIKELY TO CONTINUE TO WASH UP ONTO THE BEACH AS THE EROSION PROCESS CONTINUES. SURF TURBULENCE MAKES DIVING OPERATIONS DIFFICULT AND DANGEROUS. IN PAST THREE DAYS, THE SURF HAS DEPOSITED ADDITIONAL 2-3 FT OF SAND ONTO BURIAL AREA MAKING ORDNANCE SEARCH AND RECOVERY EXTREMELY

LT THETFORD DTB=960=

LT D. D. THETFORD BY DIR

DIFFICULT. ORDNANCE LOCATORS IDENTIFY NUMEROUS METALLIC CONTACTS, NOW BURIED UNDER 3 - 5 FT OF SAND. A LARGE SCALE OPERATION IS BEYOND THE CAPABILITY OF THE SINGLE DETACHMENT CURRENTLY ASSIGNED. SUCH AN OPERATION WILL REQUIRE ADDITIONAL PERSONNEL AND EQUIPMENT, AND WILL MOST LIKELY IN THE LONG TERM BE INEVITABLE.

7. RECOMMENDATION: SUSPEND OPERATIONS AND HAVE PARK SERVICE PERSONNEL MONITOR SITE. IF ORDNANCE EXPOSURE REMAINS INFREQUENT CONTINUE WITH "AS-OCCURRING" RECOVERY OPERATION. IN THE PAST, U. S. ARMY EOD PERSONNEL FROM FT MEADE, MD HAVE RESPONDED TO ASSATEAGUE FOR ORDNANCE ITEMS FOUND ABOVE THE SURF LINE. FOR ITEMS BELOW THE HIGH WATER LINE REQUESTS FOR EOD ASSISTANCE SHOULD BE DIRECTED TO COMNAVBASE, NORFOLK, VA. SHOULD SUBSTANTIAL OR FREQUENT ORDNANCE EXPOSURE OCCUR, REASSESS SITUATION WITH LIKELIHOOD THAT A PLANNED, LARGE-SCALE CLEARANCE EFFORT WILL BE REQUIRED.

LT THETFORD DTG*&LO*

LT D. D. THETFORD BY DIR

APPENDIX D

WORK PLAN ADDENDUM

for

AREA B

PARSONS ENGINEERING SCIENCE, INC.

MEMORANDUM

November 23, 1994

To: William Davis, CEHND-PM-OT

From: Robert Luce, Parsons Engineering Science, Inc.

Subject: Assateague Island Water Borne OEW Survey Operations

The purpose of this survey is to identify the seaward boundaries of OEW contamination off Assateague Island National Seashore in Area B. The following steps will be taken to accomplish this.

A) Locate and set up external boundary markers from the 50 ft. lane of area A, tier A, to the 100 ft. lane of area B, tier Z, from west to east running from marker 2600 to 3000 south to north.

B) Position buoys with anchor and line at the 100 ft. lane 2600 ft. marker, 100 ft. lane, 2800 ft. marker and 100 ft. lane 3000 ft. marker.

C) Working from the shore eastward, starting from the 0 ft. lane of area B, tier Z (same as 0 ft. lane of area A, tier A), 2600 ft. marker, perform a 5 ft wide MK 26 sweep at 25 ft. intervals to the 2800 ft. marker.

D) The marker lines will run from the 50 ft. lane, area A, tier A to the 100 ft. lane of area B, tier Z, (from the beach seaward) a total of 150 ft. (Approximately 100 ft. seaward of the low tide line).

E) The MK 26 Magnetometer in the 1-10 scale will be used to sweep 5 ft. wide lanes at 25 ft. intervals in the underwater/down hole mode starting at the 0 ft. lane, area B, tier Z, proceeding east (seaward) into tier Z, marking each anomaly with a buoy. An approximate location of the anomaly will be recorded by the surveyor.

F) At the end of the two cell search, the number of anomalies found will be evaluated to determine if this area is a possible ordnance pit or trench area. This determination will be made by the Corps of Engineers (Bill Davis), Parsons Engineering Science (Bob Luce), and UXB International (Tom Yancy). If the ordnance pit or trench area is found, the surveyor will locate its boundaries using the total station and the established baseline on the beach.

G) If the ordnance pit or trench area is not found, steps C through F will be repeated for area B, tier Z, cells 2800 to 3000.

H) If the ordnance pit or trench is not located in area B, tier Z between cells 2600 to 3000, steps C through F will be repeated for the following areas using 5 ft. wide sweep lanes at 50 ft. intervals:

1) Area B, tier Z, 0 ft. lane through 100 ft. lane, cells 3000 to 3200

2) Area B, tier Z, 0 ft. lane through 100 ft. lane, cells 2400 to 2600

3) Area B, tier Z, 0 ft. lane through 100 ft. lane, cells 2200 to 2400

Note: When the ordnance pit or trench area is located, delineated, and surveyed, the survey operations in the above areas can be terminated (i.e., items 2 and 3 do not need to be undertaken if the pit or trench is located when executing item 1).

I) The initial phase of this survey will be conducted for the shore to a depth of 4 ft. at low tide. The MK 26 in the 1-10 scale will be utilized in the down hole/underwater mode with the operator dressed in a diver's wet suit, life jacket, and safety harness with life line. The seaward limits of the sweep will be identified by 10 ft. PVC pipe sections placed at the end of the seaward lane.

J) The MK 26 operator will conduct 5 ft. wide sweeps at 25 ft. or 50 ft. lane intervals (as outlined above) in a south/north direction, placing buoys at each anomaly located. The control unit will be operated from the beach by two surveyors at an identified survey point.

K) At the conclusion of shore operations, water borne operations will commence utilizing a local craft of opportunity.

1) The water borne operation phase will consist of 4 personnel in the boat and two surveyors on shore.

a) In the boat will be:

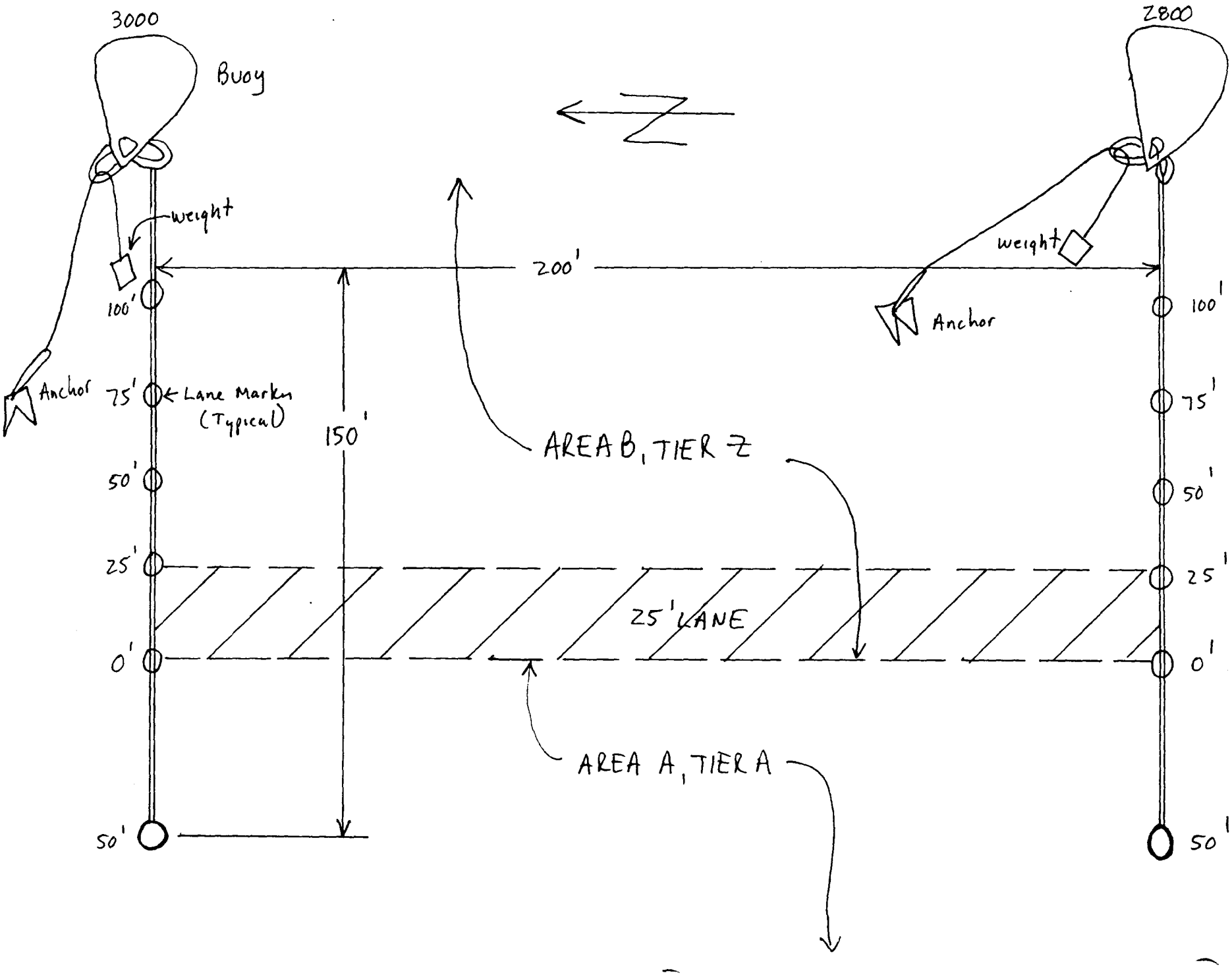
1) one boat operator
2) two MK 26 operators
3) one buoy tender

b) Shore based personnel:

1) 2 surveyors

2) The craft will start sweep operations in a north/south direction conducting 5 ft. wide sweeps at 25 ft. or 50 ft. lane intervals (as outlined above) working eastward, starting at the point shore-based operations ceased. All anomalies will be marked with a buoy. Anomalies will be located as outlined in steps E and F.

3) The sweep operation from the boat will consist of towing the MK 26 in the underwater mode 1-10 scale at 0.1 knots.


3000
Buoy
weight
Anchor
100'
75'
Lane Marks
(Typical)
50'
25'
0'
50'
150'
200'
AREA B, TIER 2
25' LANE
AREA A, TIER A
2800
weight
Anchor
100'
75'
50'
25'
0'
50'

APPENDIX E

LIST OF MUNITIONS SCRAP FOUND

(SURFACE AND SUBSURFACE)

UXB International, Inc.

Ordnance Clearance Survey
Daily Sweep Log

10/31/94

SUBAREA/~~GRID~~: A TIER B-C-D-E Surface Items

PAGE 1 of ___

TYPE OF SWEEP: Surface X Subsurface ___ Quality Assurance ___

UXO ITEM NUMBER	DATE / TIME LOCATED	INDENTIFICATION OR FEATURES	NOTES
#1	10/31/94 19' West of 19+00 (200)	2.25 RKT HEAD INERT	
#2	10/31/94 SHACK 65' EAST of ENTRANCE	2.25 RKT MTR FIRED	
#3	10/31/94 Tier B 4400 80' (0)	2.25 RKT MTR FIRED	
#4	10/31/94 TIER B 2400 10' (200)	2.25 RKT MTR FIRED	
#5	2150 area A, TIER B 400' West of 20' Lane	2.25 RKT MTR FIRED	
#6	2600 40 (50) AREA A TIER B	2 - 2.25 RKT MTR FIRED	
#7	175 west of 400' Lane line C 2300' area A TIER D	2 2.25 RKT MTR FIRED	
#8	175' west of 400' Lane Tier C 2320' area A TIER D	1-2.25 RKT MTR FIRED	
#9	175' west of 400' Lane Tier C 2380' area A Tier D	1- 2.25 RKT MTR FIRED	
#10	175' west of 400' Lane Tier C 2390' area A Tier D	1- 2.25 RKT MTR FIRED	
#11	240' west of 400' Lane Tier C 2390' area A Tier E	3- 2.25 RKT MTRS FIRED	
#12	area A, tier C 2205' 350 L Ave	1- 2.25" RKT MTR FIRED	
#13	ACROSS STREET From TIER E 50' from edge of	2 2.25 RKT MTR FIRED STREET	25+00
14	AREA A TIER D 22+00 90'	1 2.25 RKT MTR FIRED	
15	Across Street From Tier F 150' from R.A!	1 2.25 RKT MTR FIRED	25+00

Signature Team Leader ___

UXB Form 1.0019

UXB International, Inc.

Certificate of Inspection

Subsurface Items Summary

Contract Number: _____ Contract Name: _____

I _____ certify that the property listed hereon has been inspected by me and to the best of my knowledge and belief, contains no items of a dangerous nature.

_____ _____

Signature of UXB Senior Site Supervisor Date

Item No.	Description	Quantity	Weight
1	5" ROCKET WARHEAD	1	
2-54	2.25" ROCKET MOTOR	53	
55-56	2.25" ROCKET HEAD TP	2	
57-80	2.25" ROCKET MOTOR	23	
81	2.25" ROCKET (COMPLETE)	1	
82-84	3.5" ROCKETE MOTOR	3	
85-94	2.25" ROCKET MOTOR	10	
95-96	2.25" ROCKET HEAD TP	2	
97	OLD STYLE PRASTIC BOMB (PARTIAL)	1	
98-125	2.25" ROCKET MOTOR	28	

UXB FORM 1.0021

UXB International, Inc.

Certificate of Inspection

Subsurface Items

Contract Number: _____ Contract Name: Assateague Island

I Louis K Schucker certify that the property listed hereon has been inspected by me and to the best of my knowledge and belief, contains no items of a dangerous nature.

Louis K Schucker
Signature of UXB Senior Site Supervisor

11-23-94
Date

Item Description	Quantity	Weight
1- 5" Rocket Warhead Inert	01	
2- 2.25" Rocket Motor	01	
3- 225" Rocket Motor	01	
4- 2.25- Rocket motor	01	
5- 2.25- Rocket motor	01	
6- 2.25- Rocket motor	01	
7- 2.25- Rocket motor	01	
8- 2.25 Rocket motor	01	
9- 2.25 Rocket motor	01	
10- 2.25- Rocket motor	01	
11- 2.25- Rocket motor	01	
12- 2.25 Rocket motor	01	
13- 2.25 Rocket motor	01	
14- 2.25 Rocket motor	01	
15- 2.25 Rocket motor	01	
16- 2.25- Rocket motor	01	
17- 2.25- Rocket moto	01	
18- 2.25- Rocket motor	01	
19- 2.25- Rocket moto	01	
20 2.25 Rocket moto	01	
	01	

UXB FORM 1.0021

1/7

UXB International, Inc.

Certificate of Inspection

Contract Number: _____ Contract Name: Assateague Island

I Louis K Schucker certify that the property listed hereon has been inspected by me and to the best of my knowledge and belief, contains no items of a dangerous nature.

Louis K Schucker
Signature of UXB Senior Site Supervisor

11-23-94
Date

Item Description	Quantity	Weight
21 - 2.25 Rocket motor	01	
22 - 2.25 Rocket motor	01	
23 - 2.25 Rocket motor	01	
24 - 2.25 Rocket motor	01	
25 - 2.25 Rocket motor	01	
26 - 2.25 Rocket motor	01	
27 - 2.25 Rocket motor	01	
28 - 2.25 Rocket motor	01	
29 - 2.25 Rocket motor	01	
30 - 2.25 Rocket motor	01	
31 - 2.25 Rocket motor	01	
32 - 2.25 Rocket motor	01	
33 - 2.25 Rocket motor	01	
34 - 2.25 Rocket motor	01	
35 - 2.25 Rocket motor	01	
36 - 2.25 Rocket motor	01	
37 - 2.25 Rocket motor	01	
38 - 2.25 Rocket motor	01	
39 - 2.25 Rocket motor	01	
40 - 2.25 Rocket motor	01	

UXB FORM 1.0021

2/7

UXB International, Inc.

Certificate of Inspection

Contract Number: _____ Contract Name: Assateague Island

I Louis K Schucker certify that the property listed hereon has been inspected by me and to the best of my knowledge and belief, contains no items of a dangerous nature.

Louis K Schucker — Signature of UXB Senior Site Supervisor

11-23-94 — Date

Item Description	Quantity	Weight
41 2.25 RKT MOTOR	1	
42 2.25 Rocket MOTOR	1	
43 2.25 Rocket MOTOR	1	
44 2.25 Rocket MOTOR	1	
45 2.25 Rocket MOTOR	1	
46 2.25 Rocket MOTOR	1	
47 2.25 Rocket MOTOR	1	
48 2.25 Rocket MOTOR	1	
49 2.25 Rocket MOTOR	1	
50 2.25 Rocket MOTOR	1	
51 2.25 Rocket MOTOR	1	
52 2.25 Rocket MOTOR	1	
53 2.25 Rocket MOTOR	1	
54 2.25 Rocket MOTOR	1	
55 2.25 Rocket HEAD T.P	1	
56 2.25 Rocket HEAD T.P.	1	
57 2.25 Rocket MOTOR	1	
58 2.25 Rocket MOTOR	1	
59 2.25 Rocket MOTOR	1	
60 2.25 Rocket MOTOR	1	

UXB FORM 1.0021

UXB International, Inc.

Certificate of Inspection

Contract Number: _____ Contract Name: Assateague Island

I Louis K Schucker certify that the property listed hereon has been inspected by me and to the best of my knowledge and belief, contains no items of a dangerous nature.

Louis K Schucker
Signature of UXB Senior Site Supervisor

11/28/94
Date

Item Description	Quantity	Weight
61 2.25 Rocket Motor	1	
62 2.25 Rocket Motor	1	
63 2.25 Rocket Motor	1	
64 2.25 Rocket Motor	1	
65 2.25 Rocket Motor	1	
66 2.25 Rocket Motor	1	
67 2.25 Rocket Motor	1	
68 2.25 Rocket Motor	1	
69 2.25 Rocket Motor	1	
70 2.25 Rocket Motor	1	
71 2.25 Rocket Motor	1	
72 2.25 Rocket Motor	1	
73 2.25 Rocket Motor	1	
74 2.25 Rocket Motor	1	
75 2.25 Rocket Motor	1	
76 2.25 Rocket Motor	1	
77 2.25 Rocket Motor	1	
78 2.25 Rocket Motor	1	
79 2.25 Rocket Motor	1	
80 2.25 Rocket Motor	1	
	1	

UXB FORM 1.0021

4/7

UXB International, Inc.

Certificate of Inspection

Contract Number: _____ Contract Name: Assateague Island

I Louis K Schucker certify that the property listed hereon has been inspected by me and to the best of my knowledge and belief, contains no items of a dangerous nature.

Louis K Schucker — Signature of UXB Senior Site Supervisor

11/28/94 — Date

Item Description	Quantity	Weight
81 - 2.25" Rocket Motor	1	
82 3.5" Rocket Motor	1	
83 3.5" Rocket Motor	1	
84 3.5" Rocket motor	1	
85 2.25" Rocket Motor	1	
86 2.25" Rocket Motor	1	
87 2.25" Rocket Motor	1	
88 2.25" Rocket Motor	1	
89 2.25" Rocket Motor	1	
90 2.25" Rocket Motor	1	
91 2.25" Rocket Motor	1	
92 2.25" Rocket Motor	1	
93 2.25" Rocket Motor	1	
94 2.25" Rocket Motor	1	
95 2.25" Rocket Head TP	1	
96 2.25" Rocket Head TP	1	
97 ~~2.25"~~ 5" Old style Practice Bomb PARTIAL	1	
98 2.25" Rocket Motor	1	
99 2.25" Rocket Motor	1	
100 2.25" Rocket Motor	1	

UXB FORM 1.0021

UXB International, Inc.

Certificate of Inspection

Contract Number: _____ Contract Name: Assateague Island

I Louis K Schucker certify that the property listed hereon has been inspected by me and to the best of my knowledge and belief, contains no items of a dangerous nature.

Louis K Schucker
Signature of UXB Senior Site Supervisor

11/28/94
Date

Item Description	Quantity	Weight
101 - 2.25" Rocket Motor	1	
102 - 2.25" Rocket Motor	1	
103 - 2.25" Rocket Motor	1	
104 - 2.25" Rocket Motor	1	
105 - 2.25" Rocket Motor	1	
106 - 2.25" Rocket Motor	1	
107 - 2.25" Rocket Motor	1	
108 - 2.25" Rocket Motor	1	
109 - 2.25" Rocket Motor	1	
110 - 2.25" Rocket Motor	1	
111 - 2.25" Rocket Motor	1	
112 - 2.25" Rocket Motor	1	
113 - 2.25" Rocket Motor	1	
114 - 2.25" Rocket Motor	1	
115 - 2.25" Rocket Motor	1	
116 - 2.25" Rocket Motor	1	
117 - 2.25" Rocket Motor	1	
118 - 2.25" Rocket Motor	1	
119 - 2.25" Rocket Motor	1	
120 - 2.25" Rocket Motor	1	

UXB FORM 1.0021

UXB International, Inc.

Certificate of Inspection

Contract Number: _____ Contract Name: Assateague Island

I Louis K Schucker certify that the property listed hereon has been inspected by me and to the best of my knowledge and belief, contains no items of a dangerous nature.

Louis K. Schucker
Signature of UXB Senior Site Supervisor

11/28/94
Date

Item Description	Quantity	Weight
121 - 2.25" Rocket motor	1	
122 - 2.25" Rocket motor	1	
123 - 2.25" Rocket motor	1	
124 - 2.25" Rocket motor	1	
125 - 2.25" Rocket motor	1	

UXB FORM 1.0021

APPENDIX F

MAGNETOMETER SURVEY

AND INTRUSIVE DATA SHEETS

Magnetometer Survey

5 Cell

Anomaly Data Sheets

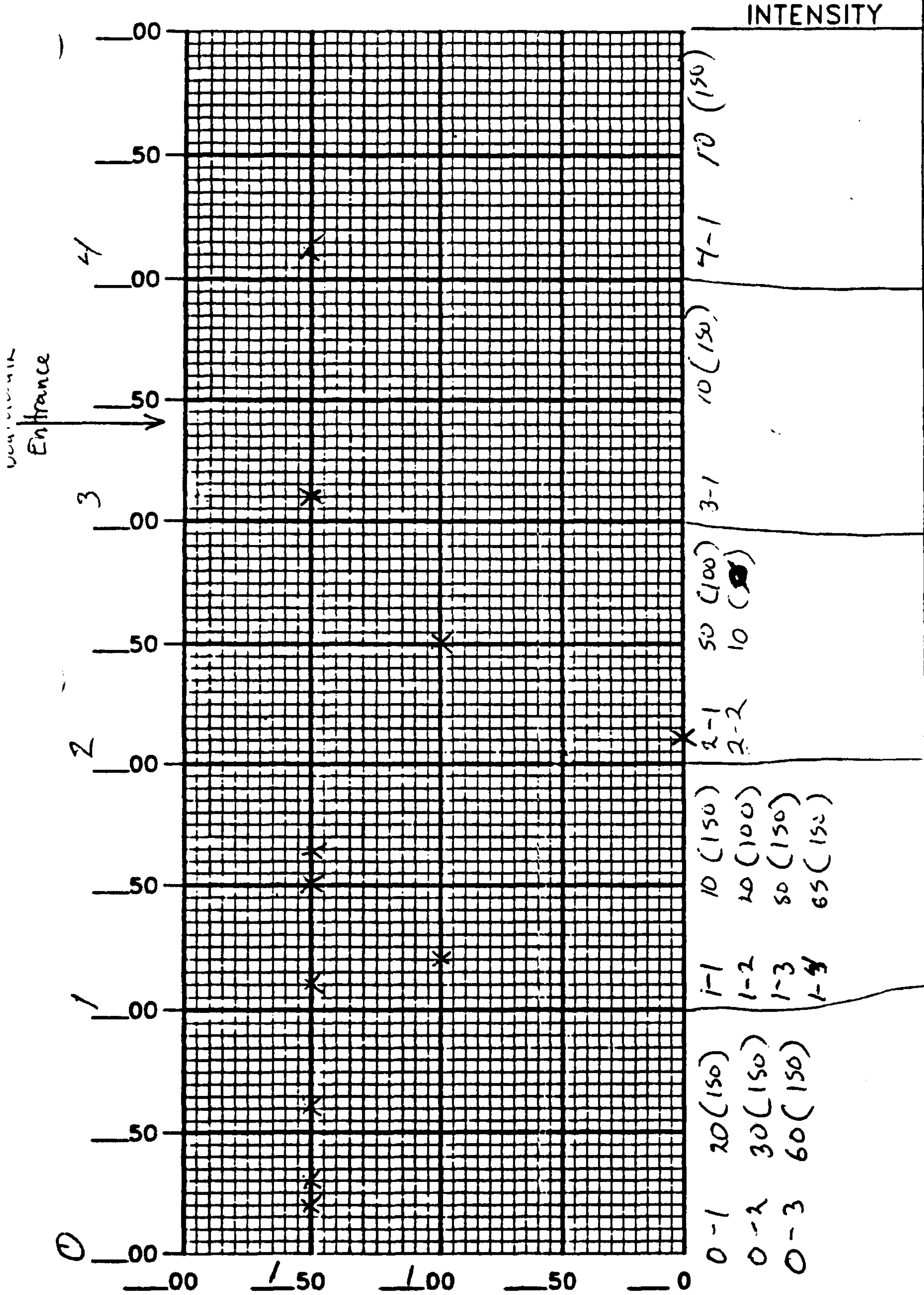
Area A

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET

ANOMALY INTENSITY | NOTES



AREA A / A TIER

SENIOR UXO SUPERVISOR [signature]

DATE 10/25/94

SHEET # 1 of 9

ES FIELD MANAGER [signature]

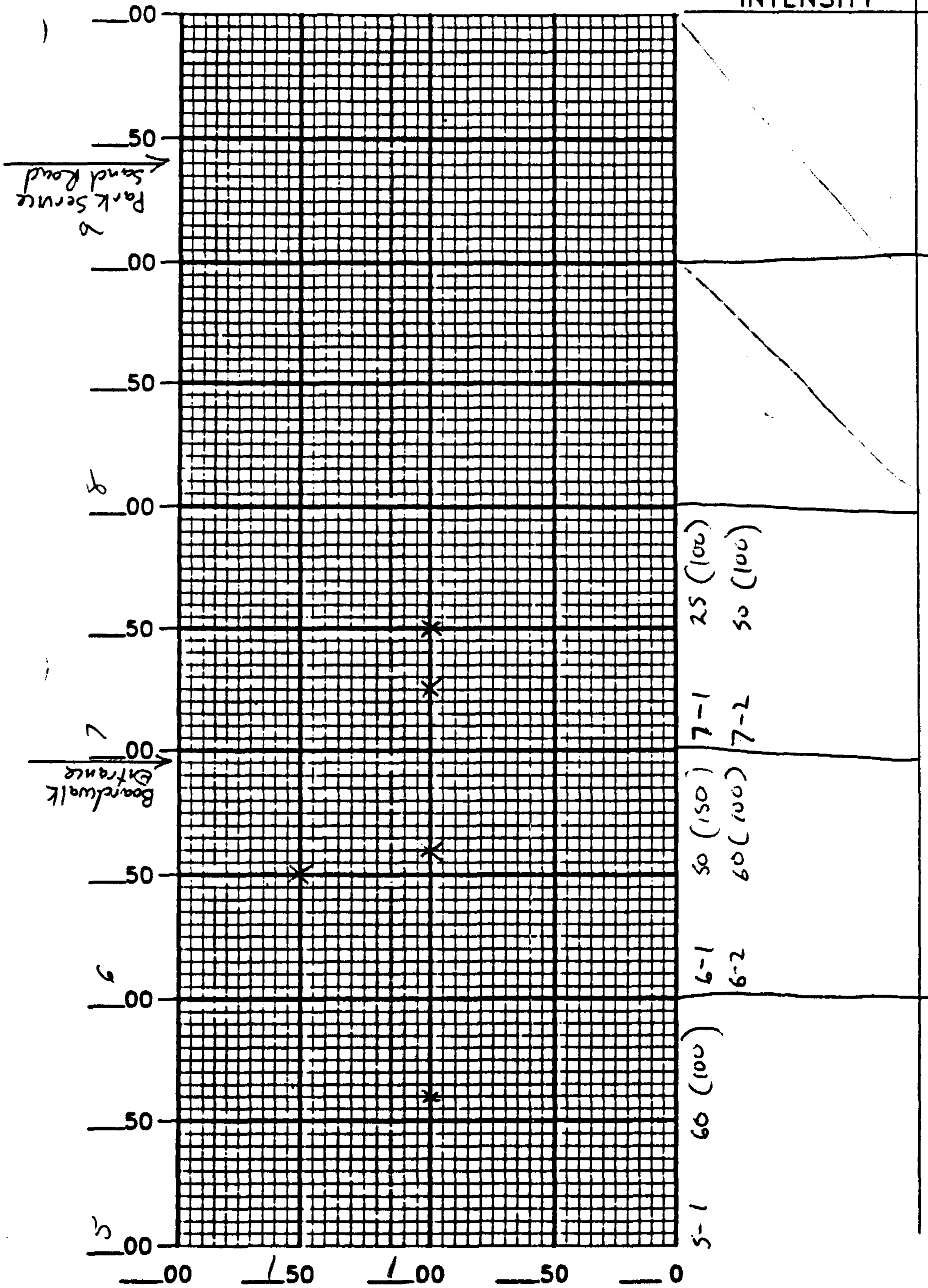
ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET

ANOMALY INTENSITY | NOTES



AREA A Tier A

SENIOR UXO SUPERVISOR [signature]

DATE 10/25/94

SHEET # 2 of 9

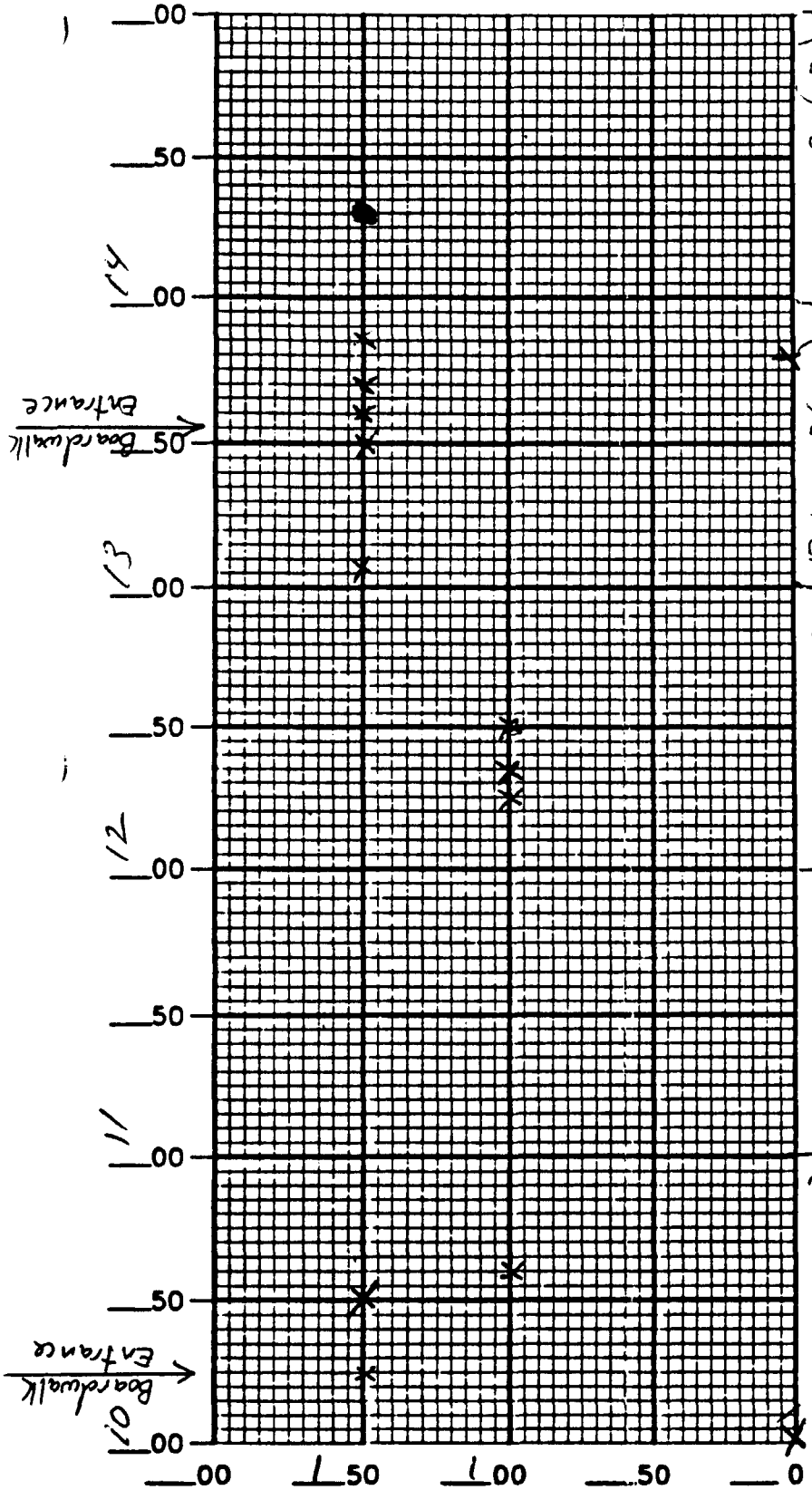
ES FIELD MANAGER JMK

ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



AREA A Tier A SENIOR UXO SUPERVISOR [illegible] DATE 10/25/94

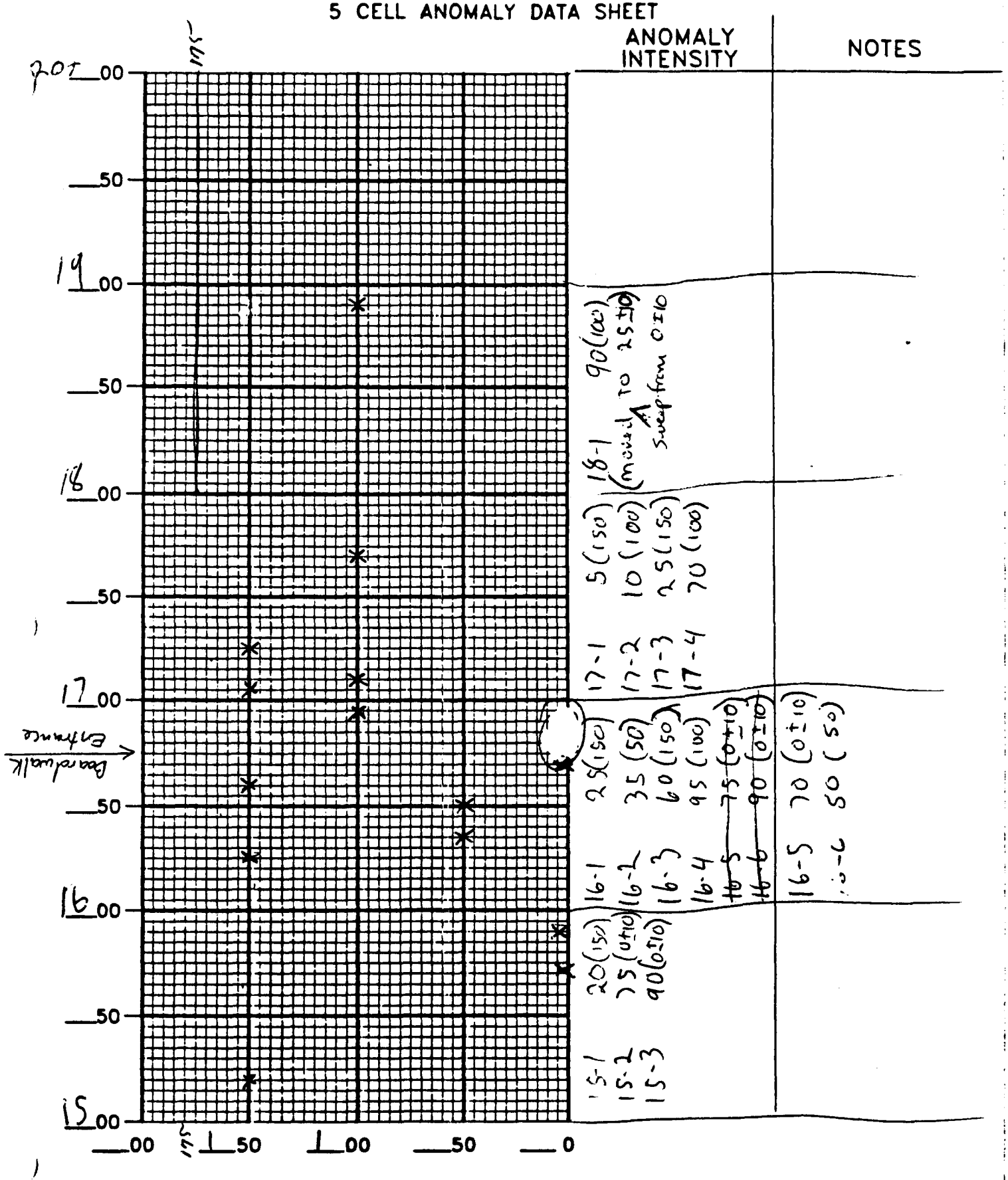
SHEET # 3 of 9 ES FIELD MANAGER [illegible]

ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



AREA A Tier A SENIOR UXO SUPERVISOR [signature] DATE 10/26/94

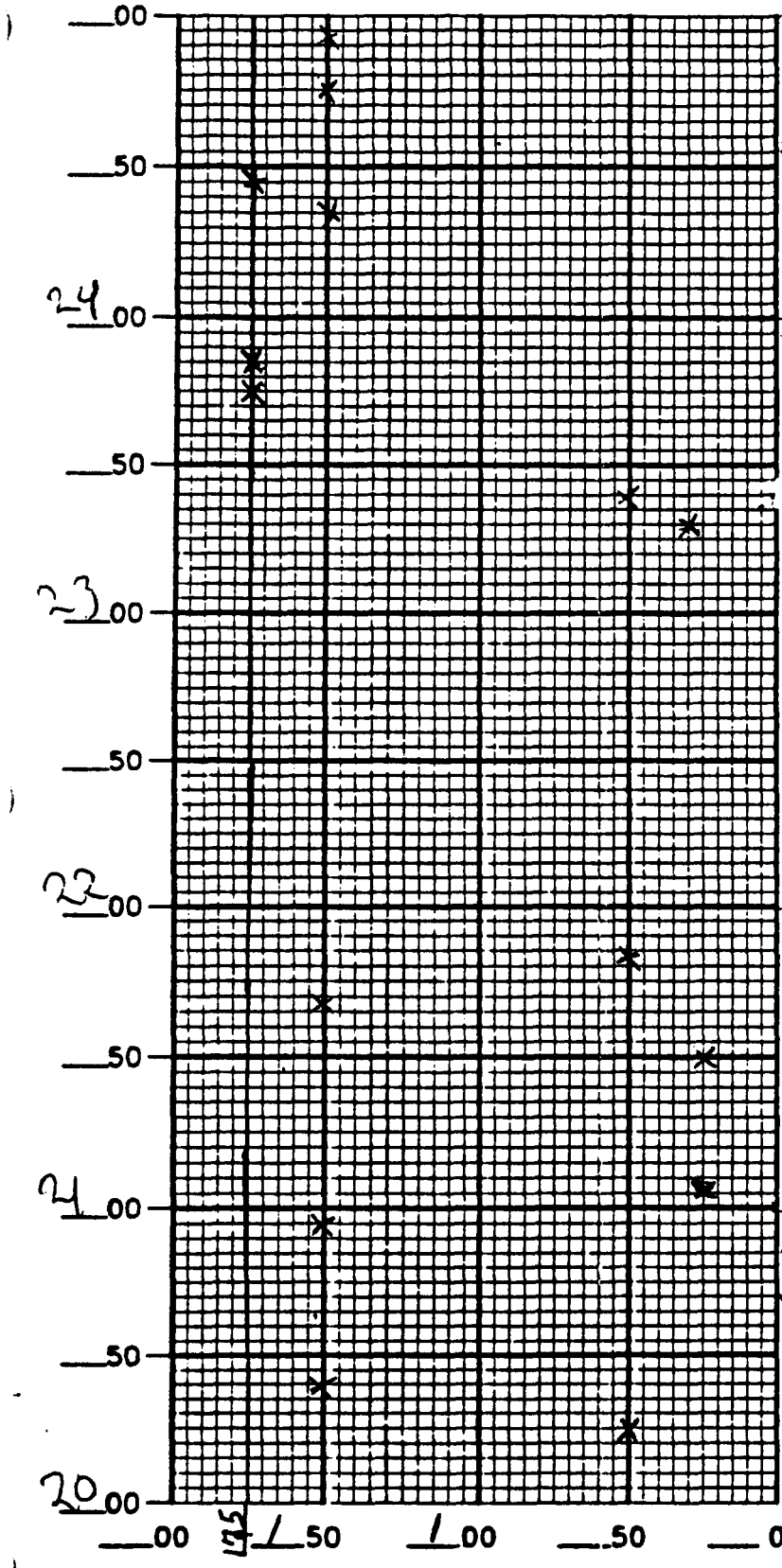
SHEET # 4 of 9 ES FIELD MANAGER JMK

ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES
40 (175) 45-(150) 75(150) 95-(150)	
24-1 24-2 24-3 24-4	
30(250) 40(50) 75(175-) 85-(175)	~~[illegible]~~
23-1 23-2 23-3 23-4	
5(250) 50(250) 65-(150) 80 (50)	
21-1 21-2 21-3 21-4	
20-1- 25-(50) 20-2- 40 (150) 20-3- 95(150)	

AREA A Tier A SENIOR UXO SUPERVISOR [illegible] DATE 10/26/94

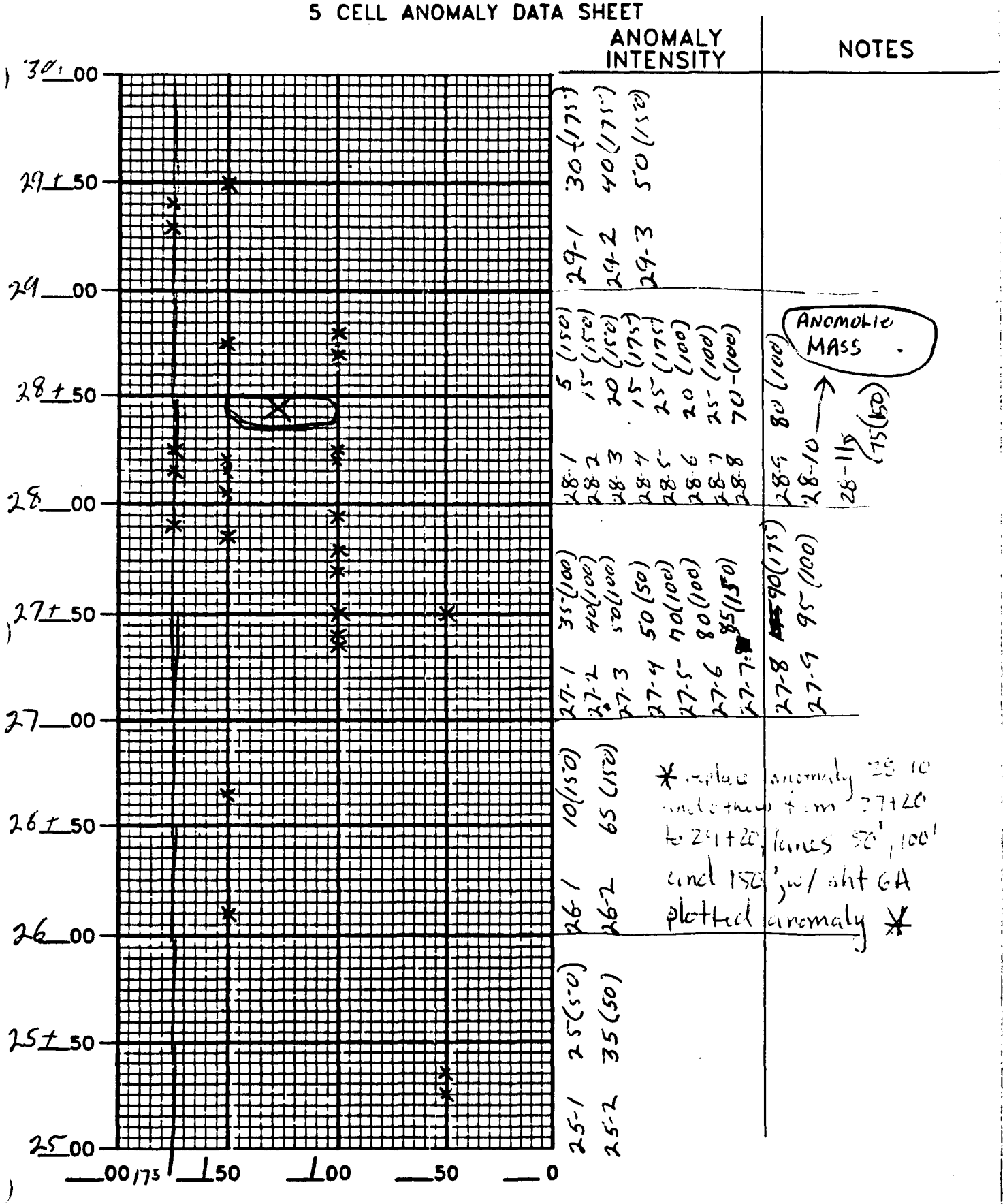
SHEET # 5 of 9 ES FIELD MANAGER JMK

ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



AREA A tier A SENIOR UXO SUPERVISOR [signature] DATE 10/26/94

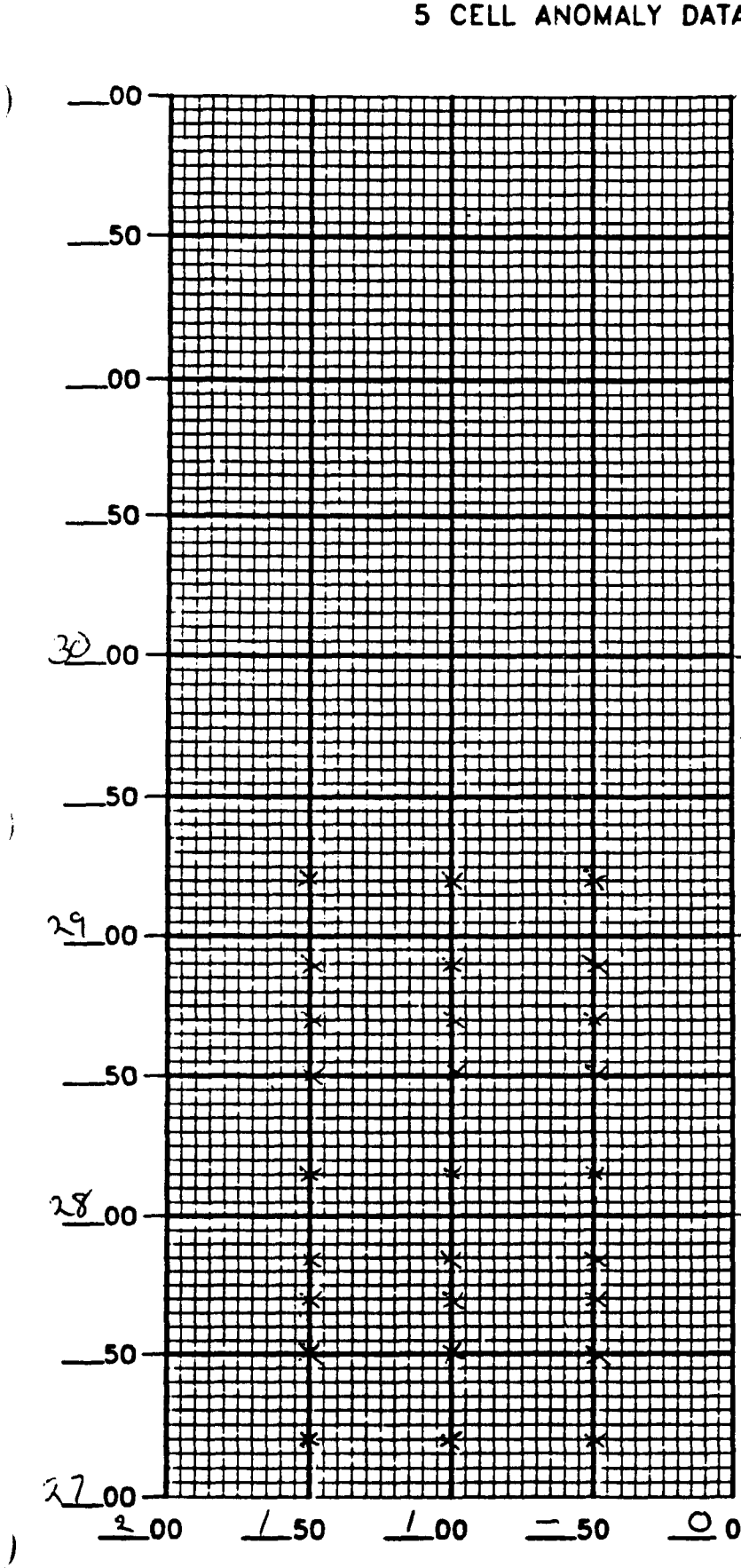
SHEET # 6 of 9 ES FIELD MANAGER JMK

ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



ANOMALY INTENSITY													NOTES
29-1	2	20	100	3	20	150	4	20	50				
28-1	2	15	100	3	15	150	4	50	100	5	50	150	6	70	100	7	90	150	8	90	100	9	15	50	10	50	50	11	70	50	12	90	50
27-1	2	20	100	3	20	150	4	50	100	5	50	150	6	70	100	7	80	150	8	80	100	9	20	50	10	50	50	11	70	50	12	80	50

AREA A tier A SENIOR UXO SUPERVISOR SK Schuster DATE 10/28/94

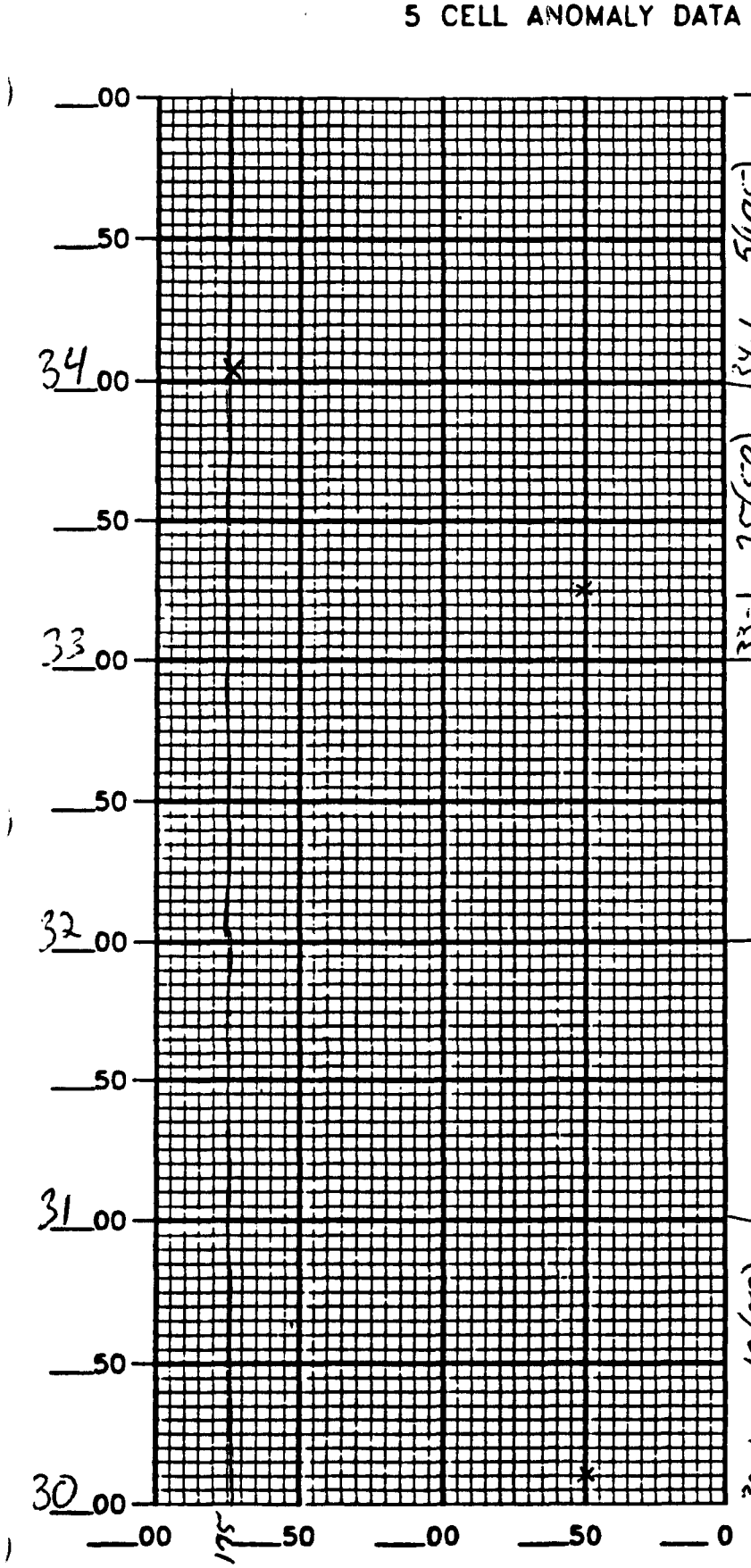
SHEET # 6A/9 ES FIELD MANAGER JMK

ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



AREA A Tier A SENIOR UXO SUPERVISOR [signature] DATE 10/26/94

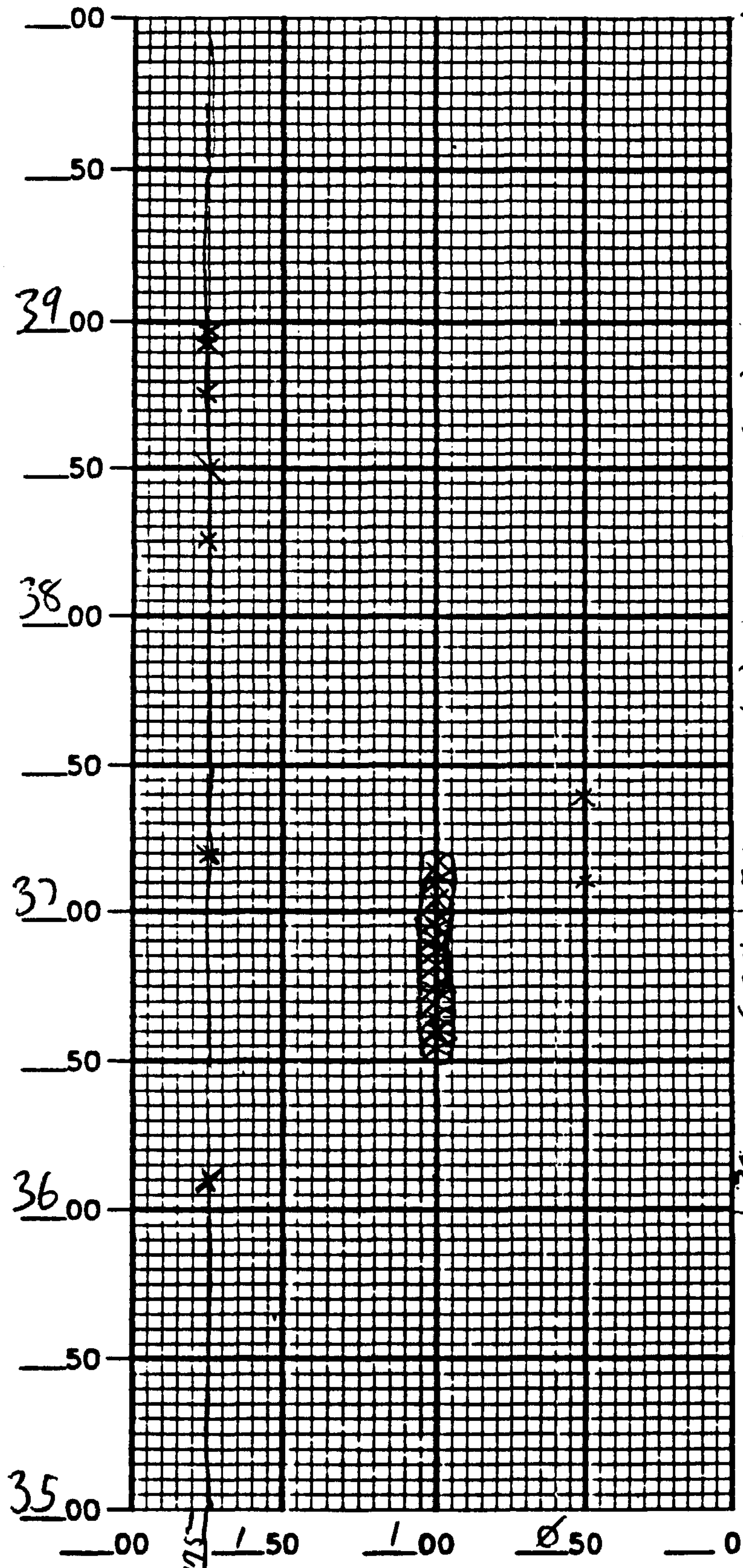
SHEET # 7 of 9 ES FIELD MANAGER AMK

ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES
38-1 25(175)	
38-2 50(175)	
38-3 75(175)	
38-4 93(175)	
38-5 98(175)	
37-1 10(50)	
37-2 20(175)	
37-3 40(50)	
36-1 10(175)	
36-2 Runs along [redacted] the 100' lane 70' long 10' wide Fm 3650 to 3720	

AREA: A Tier A

SENIOR UXO SUPERVISOR: [signature]

DATE: 10/26/94

SHEET #: 8 of 9

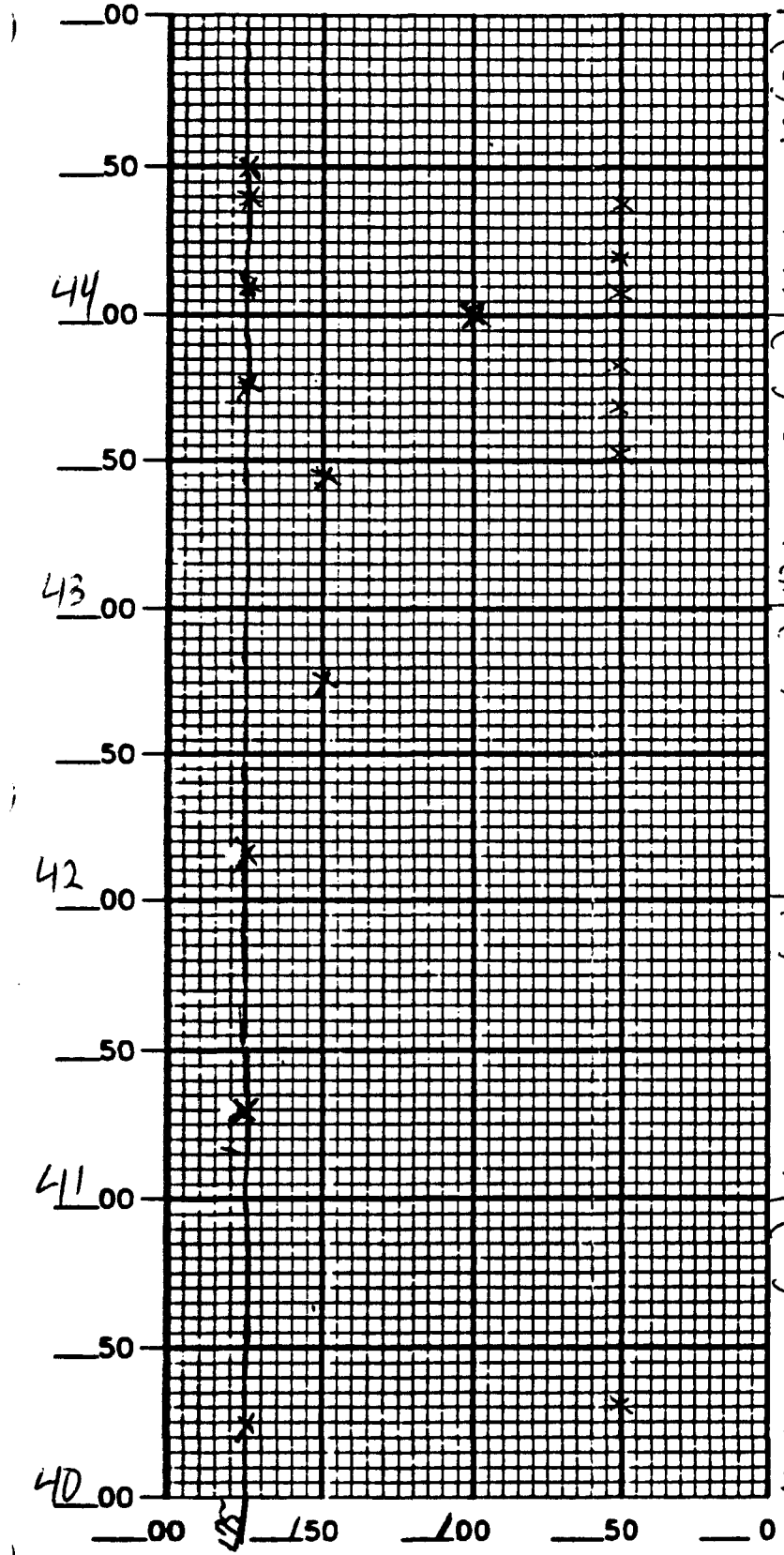
ES FIELD MANAGER: JMK

ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



AREA A Tier A SENIOR UXO SUPERVISOR [signature] DATE 10/27/94

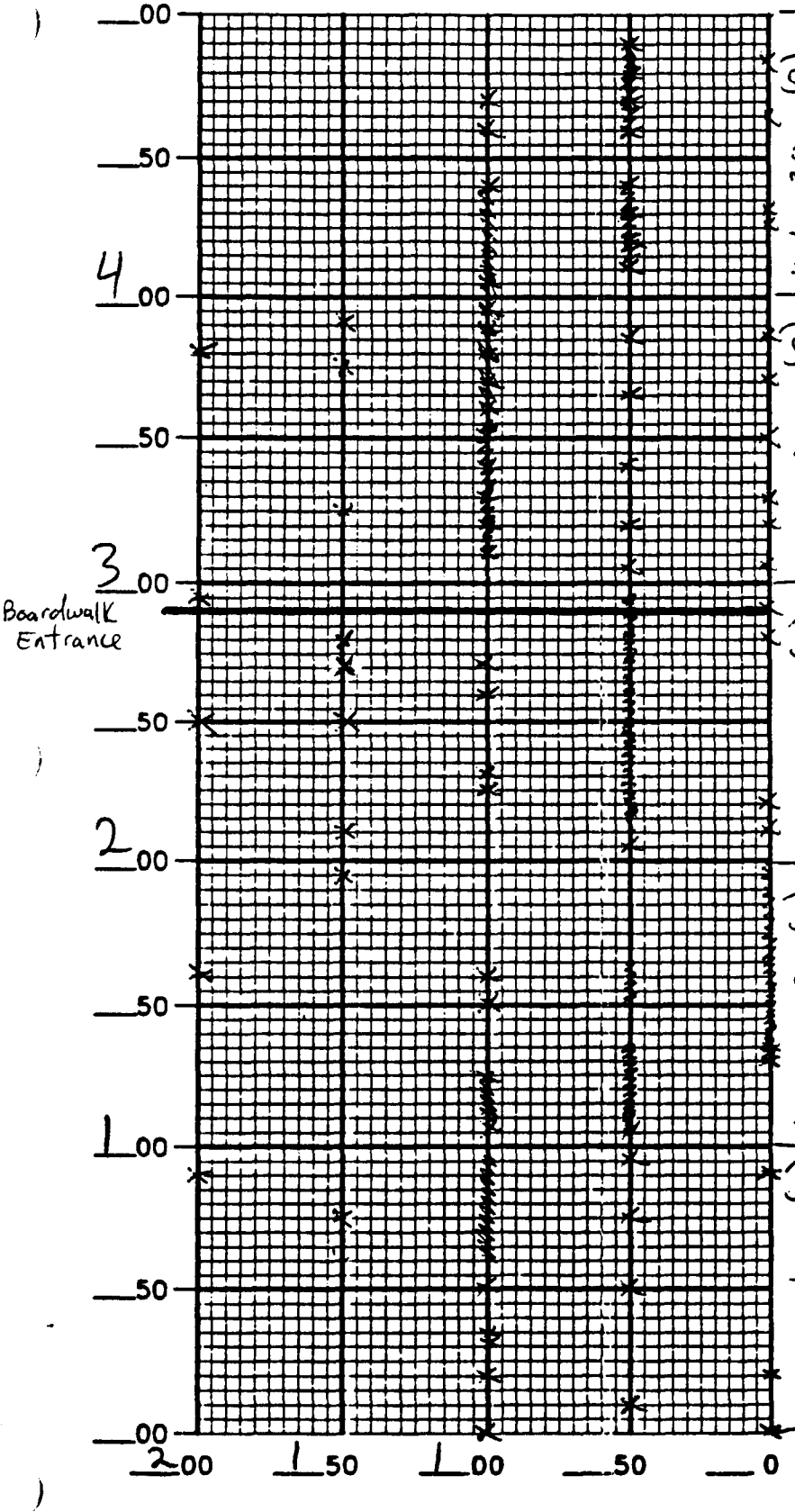
SHEET # 9 of 9 ES FIELD MANAGER [signature]

ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



ANOMALY INTENSITY						NOTES						
(0)	(0)	(0)	(50)	(50)		(100)	(100)					
30	35	65	90	10-40	60-80	5-40	60	70				
4-1	4-2	4-3	4-4	4-5	4-6	4-7	4-8	4-9				
(0)	(0)	(0)	(0)	(0)	(50)	(50)	(50)	(50)	(50)	(100)	(150)	(150)	(200)	(150)
5	20	30	50	70	80	5	40	65	85	5-95	25	75	80	90
3-1	3-2	3-3	3-4	3-5	3-6	3-7	3-8	3-9	3-10	3-11	3-12	3-13	3-14	3-15	3-16
(0)	(0)	(0)	(0)	(50)	(50)	(100)	(100)	(100)	(100)	(150)	(200)	(150)	(206)
10	20	80	90	5	15-95	25	30	60	70	10	50	80	70	95
2-1	2-2	2-3	2-4	2-5	2-6	2-7	2-8	2-9	2-10	2-11	2-12	2-13	2-14	2-15
(0)	(50)	(50)	(100)	(100)	(100)	(200)								
30-95	5-35	50-60	5-25	50	60	95 (150)								
1-1	1-2	1-3	1-4	1-5	1-6	1-7	1-8							
(0)	(0)	(50)	(50)	(50)	(50)	(100)	(100)	(100)	(100)	(100)	(100)	(150)	(200)
on line	20	90	10	50	75	95	on line	20	30	35	50	60-95	75	90
0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-11	0-12	0-13	0-14	0-15

* Picnic areas located from STA 0+00 to 13+50, 25 ft lane to 150 ft lane

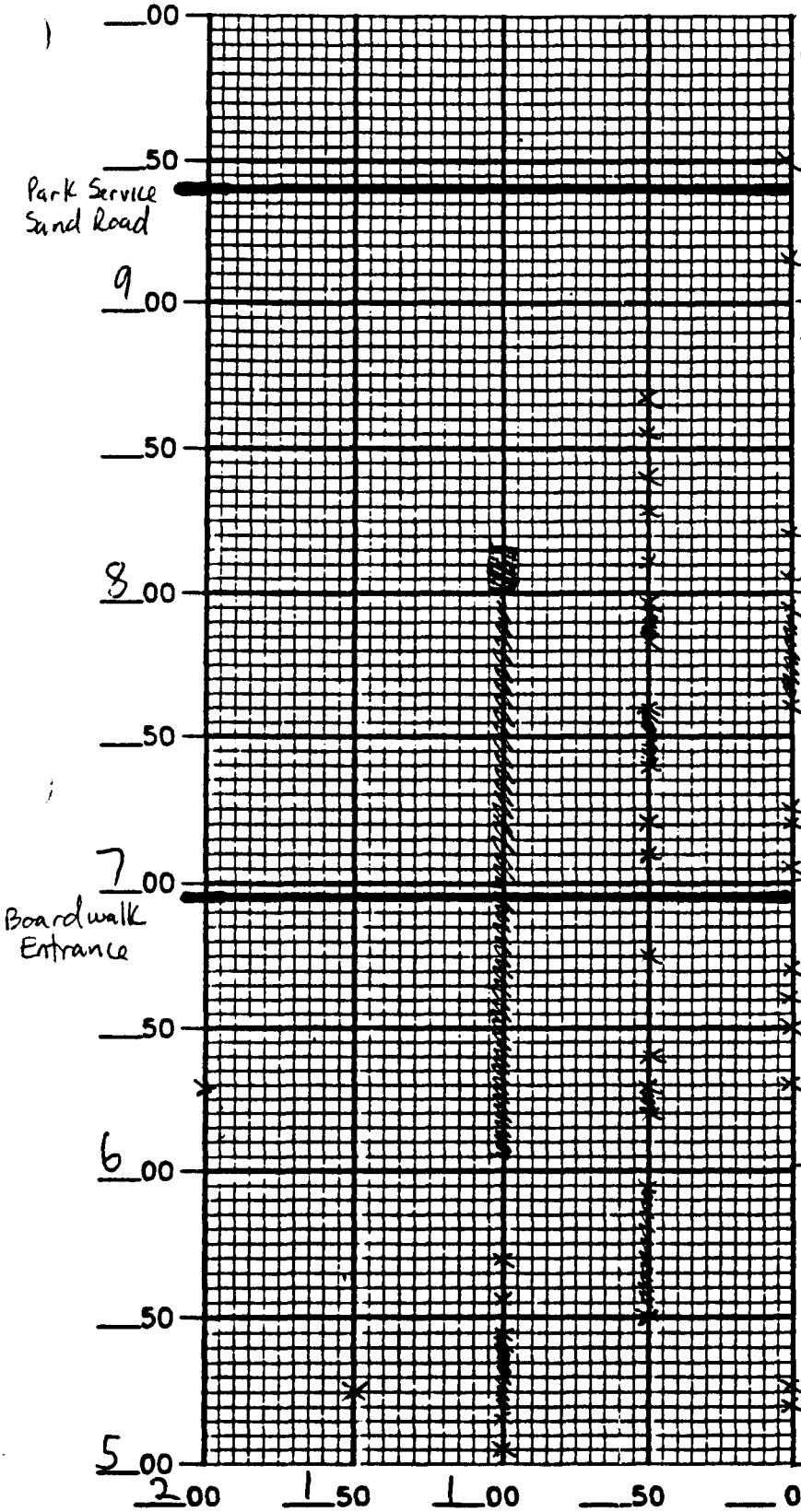
AREA A Tier B SENIOR UXO SUPERVISOR [signature] DATE 11/1/94

SHEET # 1 of 9 ES FIELD MANAGER James M Kaynor ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES
(0) (0) 15 50 9-1 9-2	
(0) (0) (50) (50) (50) (50) (100) 5 20 10 30 40 55 65 5-15 8-1 8-2 8-3 8-4 8-5 8-6 8-7 8-8	
(0) (0) (0) (0) (50) (50) (50) (50) 5 20 25 55-95 10 20 40-60 80-95 (50) 7-1 7-2 7-3 7-4 7-5 7-6 7-7 7-8	5-95 (100) 7-9
(0) (0) (0) (0) (50) (50) (100) (300) 30 50 60 70 20-30 75 5-95 30 6-1 6-2 6-3 6-4 6-5 6-6 6-7 6-8	
(0) (0) (50) (100) (100) (100) 20 25 50-95 5 15-95 55 5-1 5-2 5-3 5-4 5-5 5-6	(100) 70 (150) 25 5-7 5-8

*Picnic areas located from STA 0+00 to 13+50, 25ft lane to 150 ft lane

AREA A Tier B SENIOR UXO SUPERVISOR [signature] DATE 11/1/94

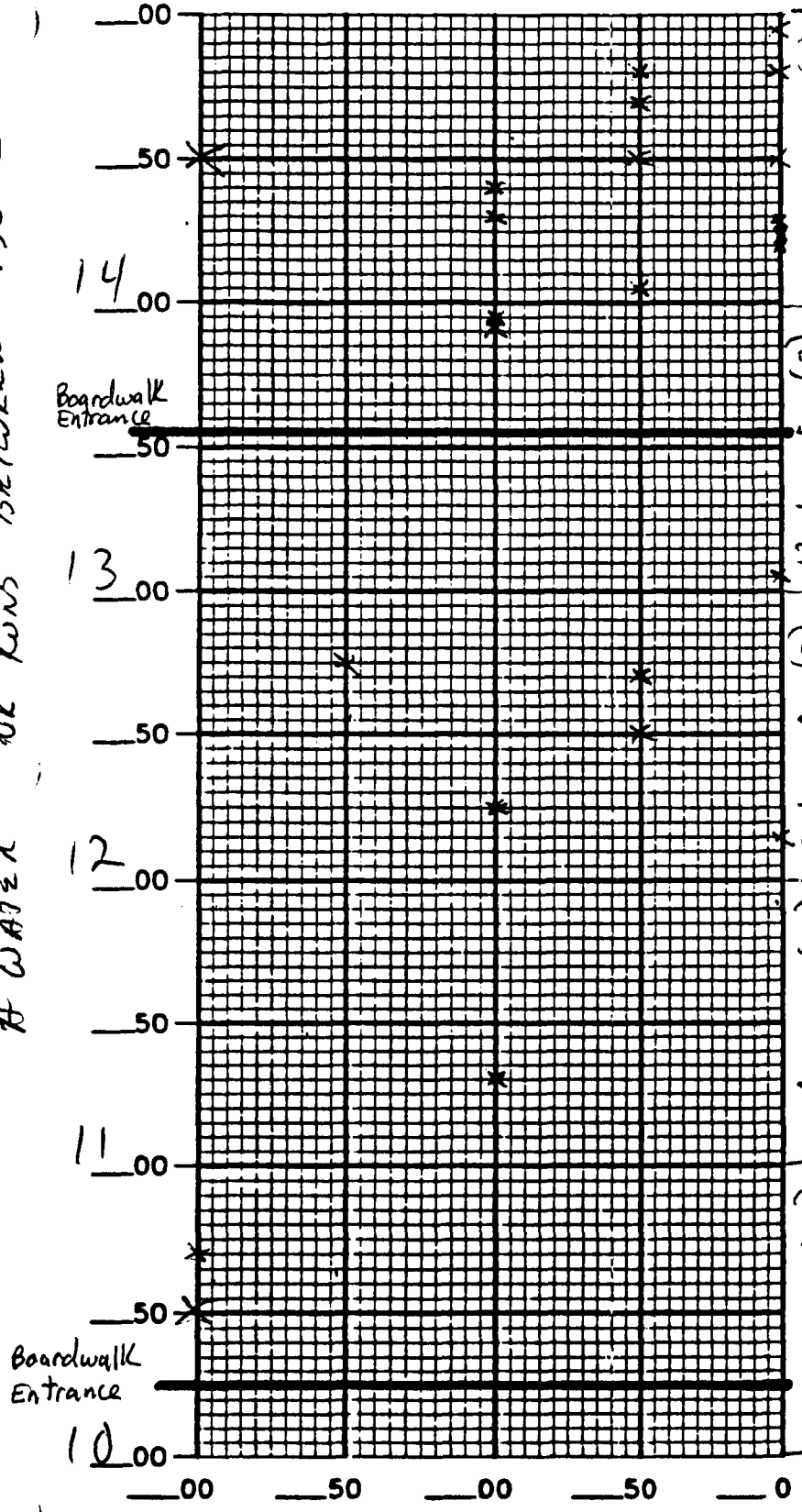
SHEET # 2 of 9 ES FIELD MANAGER JMK

ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



ANOMALY INTENSITY			NOTES	
14-1	20-30	(0)	14-8	(50)
14-2	50	(0)	14-9	(100)
14-3	80	(0)	14-10	(100)
14-4	95	(50)	14-11	(200)
14-5	5	(50)		
14-6	50	(50)		
14-7	70			
13-1	5	(0)		
13-2	90	(100)		
12-1	15	(0)		
12-2	50	(50)		
12-3	70	(50)		
12-4	25	(100)		
12-5	75	(150)		
11-1	30	(100)		
10-1	50	(200)		
10-2	70	(new)		

* Picnic areas located from STA 0100 to 13+50, 25 ft lane to 150 ft lane.

AREA A Tier B SENIOR UXO SUPERVISOR [signature] DATE 11/1/94

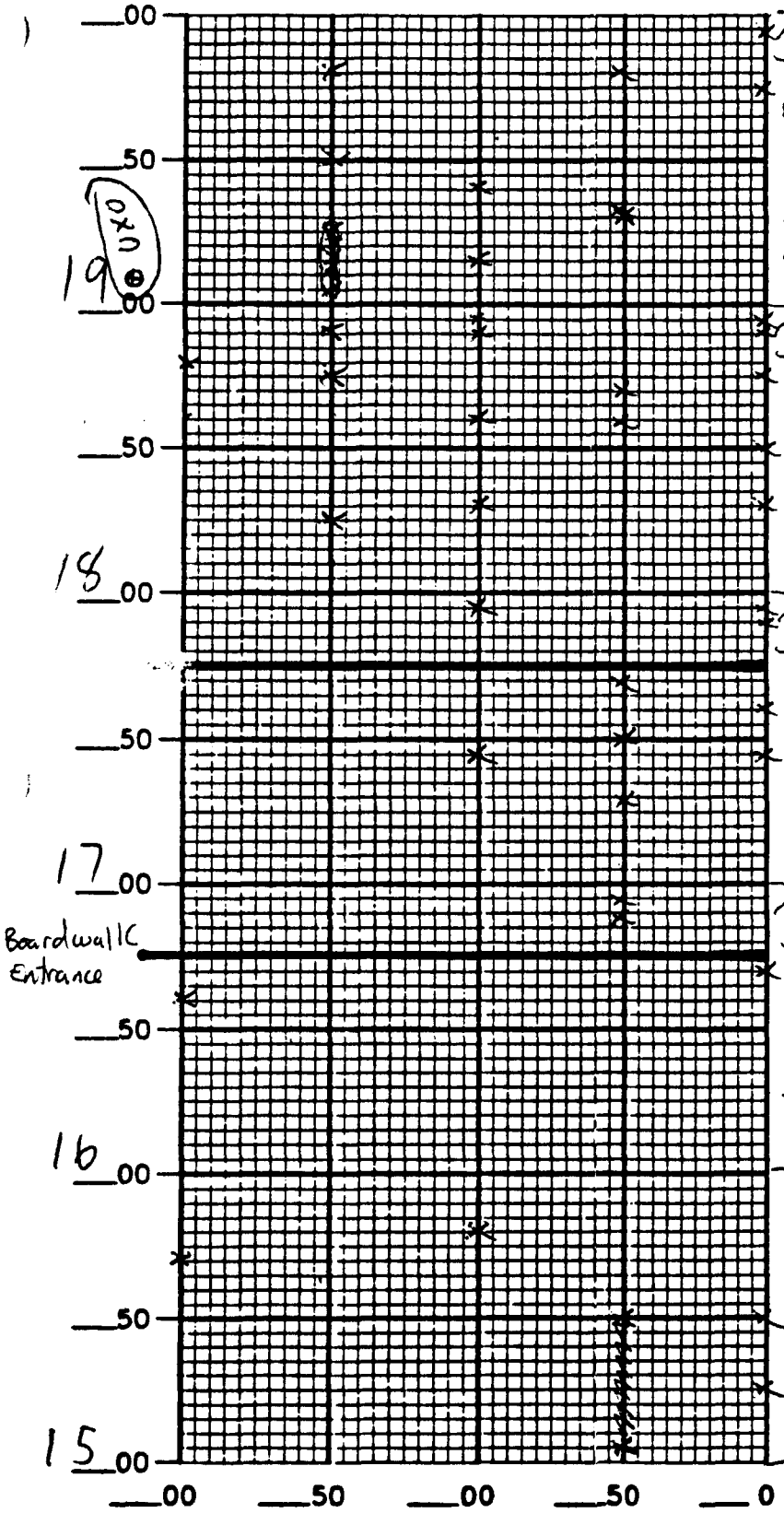
SHEET # 3 of 9 ES FIELD MANAGER JMK

ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



ANOMALY INTENSITY						NOTES
19-1	75	(0)				
19-2	95	(0)				
19-3	30	(50)				
19-4	80	(50)				
19-5	15	(100)				
19-6	40	(100)				
19-7	5-25	(150)				
19-8	50	(150)				
19-9	80	(150)				
18-1	30	(0)				
18-2	50	(0)				
18-3	75	(0)				
18-4	90	(0)				
18-5	95	(50)				
18-6	60	(50)				
18-7	70	(100)				
18-8	30					
18-9	60	(100)				
18-10	90	(100)				
18-11	95	(100)				
18-12	25	(150)				
18-13	75	(150)				
18-14	80	(200)				
18-15	90	(150)				
17-1	45	(0)				
17-2	60	(0)				
17-3	90	(0)				
17-4	95	(50)				
17-5	25	(50)				
17-6	50	(50)				
17-7	70	(100)				
17-8	45					
17-9	95	(100)				
16-1	70	(0)				
16-2	90	(50)				
16-3	95	(50)				
16-4	60	(200)				
15-1	25	(0)				
15-2	50	(0)				
15-3	5-50	(50)				
15-4	80	(100)				
15-5	20	(200)				

AREA A Tier 13 SENIOR UXO SUPERVISOR [illegible] DATE 11/1/94

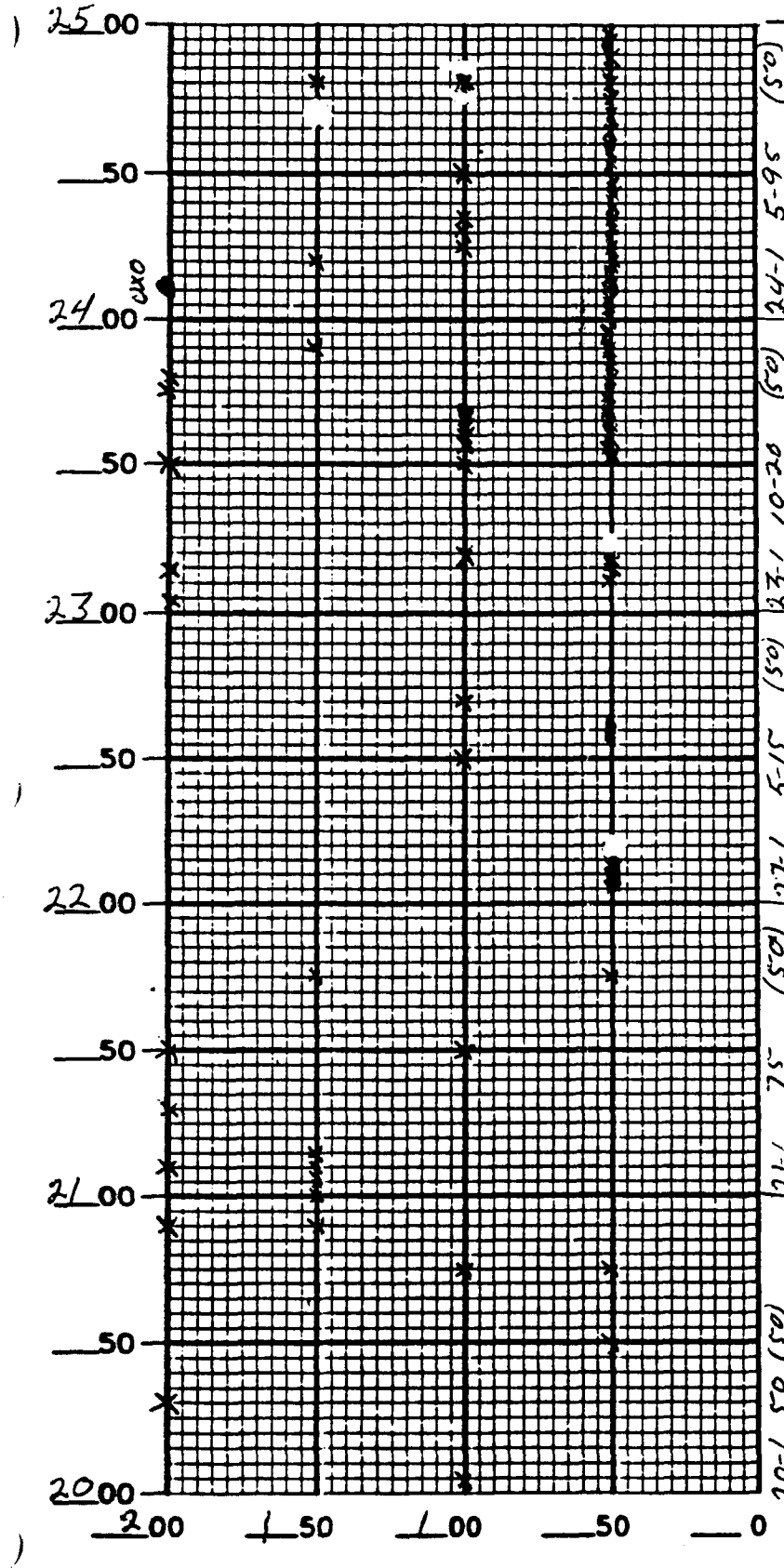
SHEET # 4 of 9 ES FIELD MANAGER AMK

ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



ANOMALY INTENSITY							NOTES
	(50)	(150)	(100)	(100)	(100)	(150)	
24-1	5-95	20	25	30	35	50	80
24-2							80
24-3							
24-4							
24-5							
24-6							
24-7							
24-8							
	(50)	(50)	(200)	(200)	(100)	(200)	(100)
23-1	10-20						60-70
23-2	50	50-95					80
23-3		5					
23-4		15					
23-5		20					
23-6		50					
23-7		50					
23-8		90					
23-9		75					
23-10							60-70
23-11							80
	(50)	(50)	(100)	(100)			
22-1	5-15	50-65	50	70			
22-2							
22-3							
22-4							
	(50)	(100)	(150)	(200)	(200)	(150)	(200)
21-1	75	50	0-15	10	30	75	50
21-2							
21-3							
21-4							
21-5							
21-6							
21-7							
	(50)	(50)	(100)	(100)	(200)	(150)	(200)
20-1	50						
20-2	75						
20-3	80						
20-4	5						
20-5	75						
20-6	30						
20-7	90						
20-8	90						

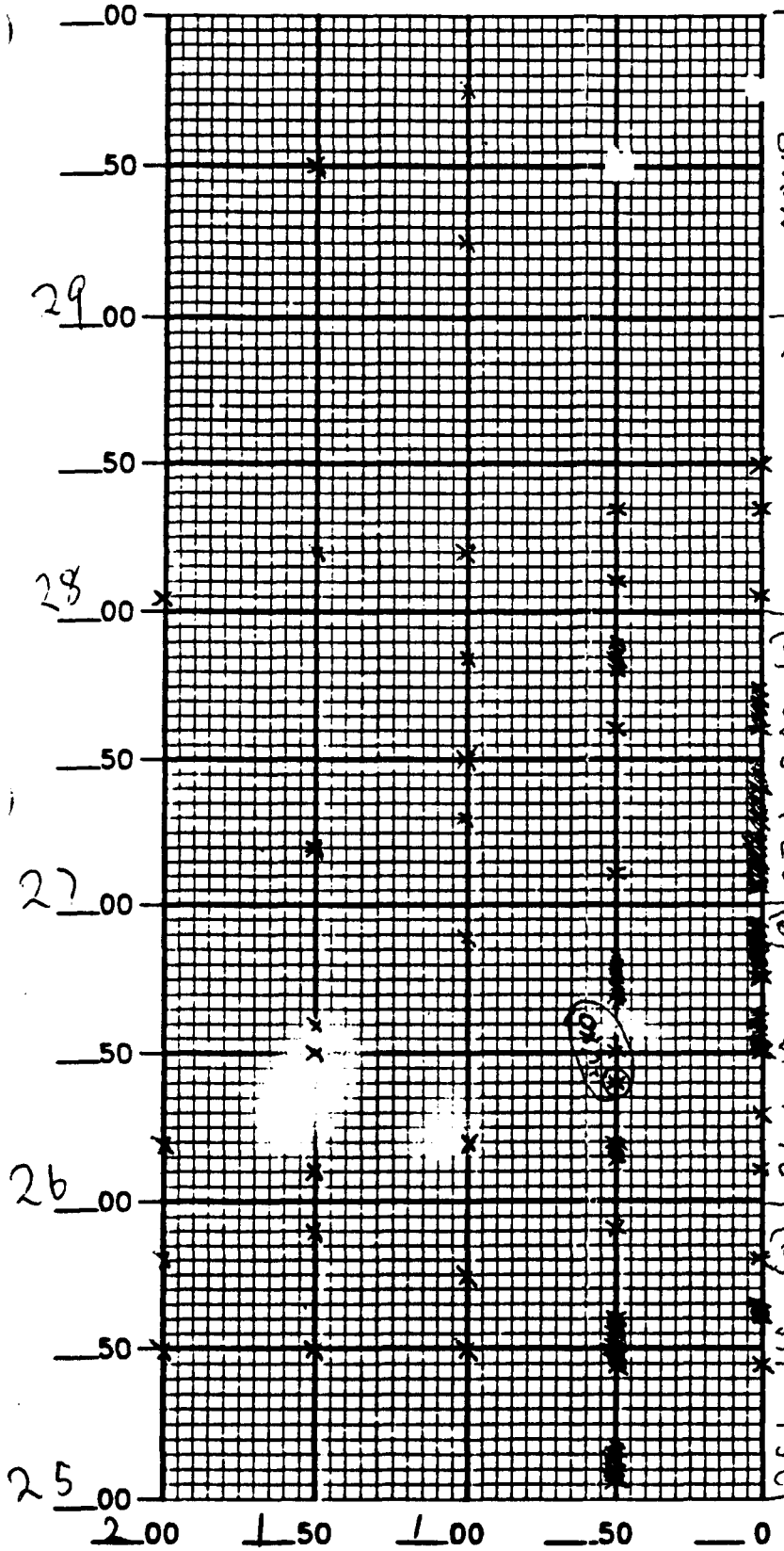
AREA A Tier B SENIOR UXO SUPERVISOR [illegible] DATE 11-1-94

SHEET # 5 of 9 ES FIELD MANAGER JMK ENGINEERING-SCIENCE, INC.

Figu[illegible]

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



ANOMALY INTENSITY		NOTES
29-1 NONR (100)		
29-2 25 (150)		
29-3 75 (100)		
28-1 5 (0)		
28-2 35 (0)		
28-3 50 (0)		
28-4 10 (50)		
28-5 35 (50)		
28-6 5 (200)		
28-7 20 (150)		
28-8 20 (100)		
27-1 5-50 (0)		
27-2 60-75 (0)		
27-3 10 (50)		
27-4 60 (50)		
27-5 80-90 (50)		
27-6 20 (150)		
27-7 30 (100)		
27-8 50 (100)		
27-9 85 (100)		
26-1 10 (0)		
26-2 30 (0)		
26-3 50-65 (0)		
26-4 15-20 (50)		
26-5 50 (50)		
26-6 70-85 (50)		
26-7 95 (0)		
26-8 10 (150)		
26-9 20 (200)		
26-10 20 (100)		
26-11 50 (150)		
26-12 60 (150)		
26-13 90 (100)		
25-1 45 (0)		
25-2 60-65 (0)		
25-3 80 (0)		
25-4 5-20 (50)		
25-5 45-60 (50)		
25-6 90 (50)		
25-7 50 (150)		
25-8 50 (100)		
25-9 50 (200)		
25-10 75 (100)		
25-11 90 (150)		
25-12 80 (200)		

AREA A Tier B SENIOR UXO SUPERVISOR [illegible] DATE 11/1/94

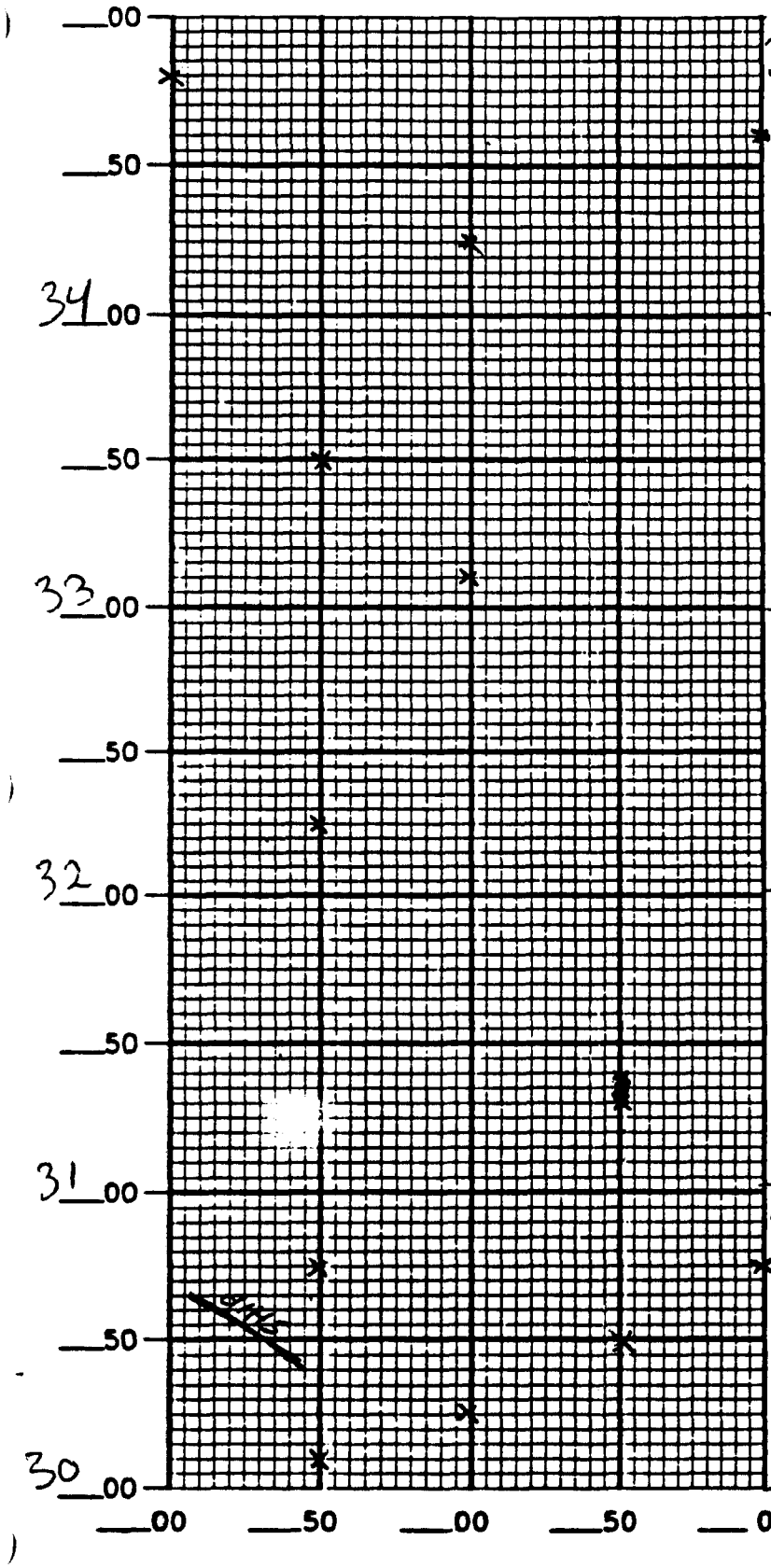
SHEET # 6 of 9 ES FIELD MANAGER JMK

ENGINEERING-SCIENCE, INC.

Figu _4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES
34-1 (0) 34-2 60 34-3 100 200 80	
33-1 100 33-2 10 150 50	
32-1 25 150	
31-1 30-40 (50)	
30-1 50 (50) 30-2 25 (0) 30-3 10 (150) 30-4 25 (100) 30-5 75 (150)	

AREA A Tier B SENIOR UXO SUPERVISOR [illegible] DATE 11/1/94

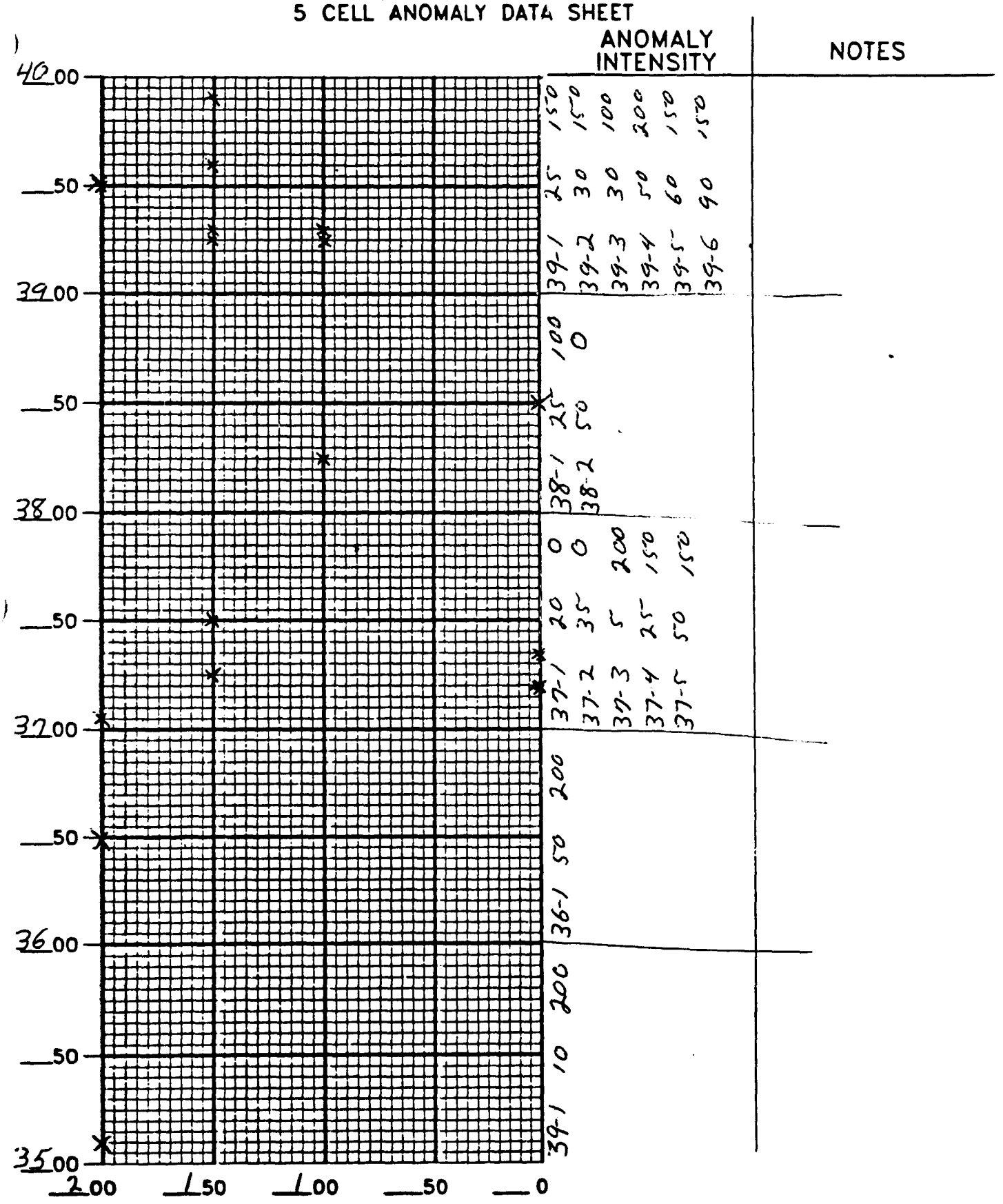
SHEET # 7 of 9 ES FIELD MANAGER [illegible]

ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



AREA A Tier B

SENIOR UXO SUPERVISOR SK Schuda

DATE 11/1/94

SHEET # 8/9

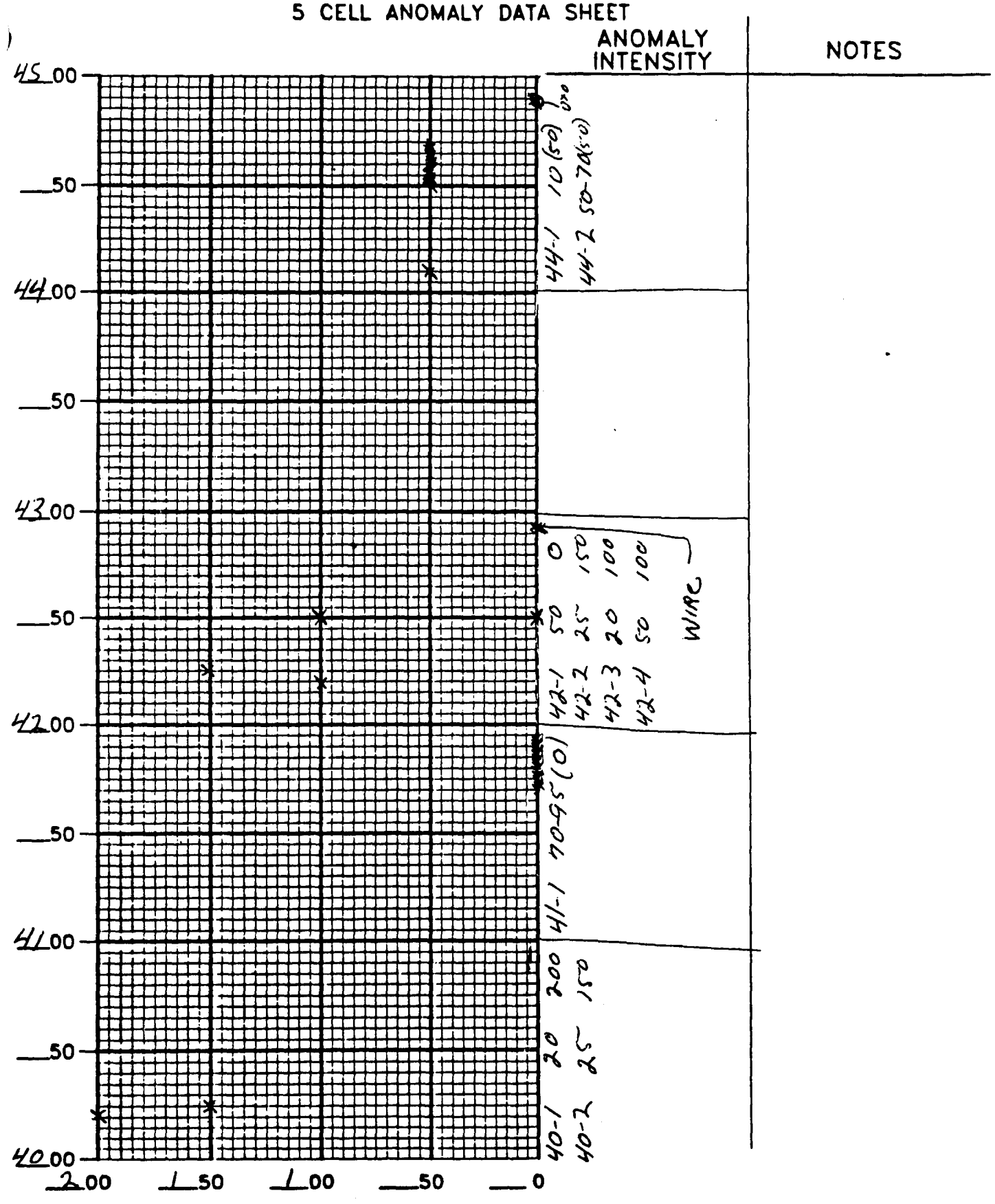
ES FIELD MANAGER JMC

ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



AREA A Tier B SENIOR UXO SUPERVISOR [illegible] Schuck DATE 11-1-94

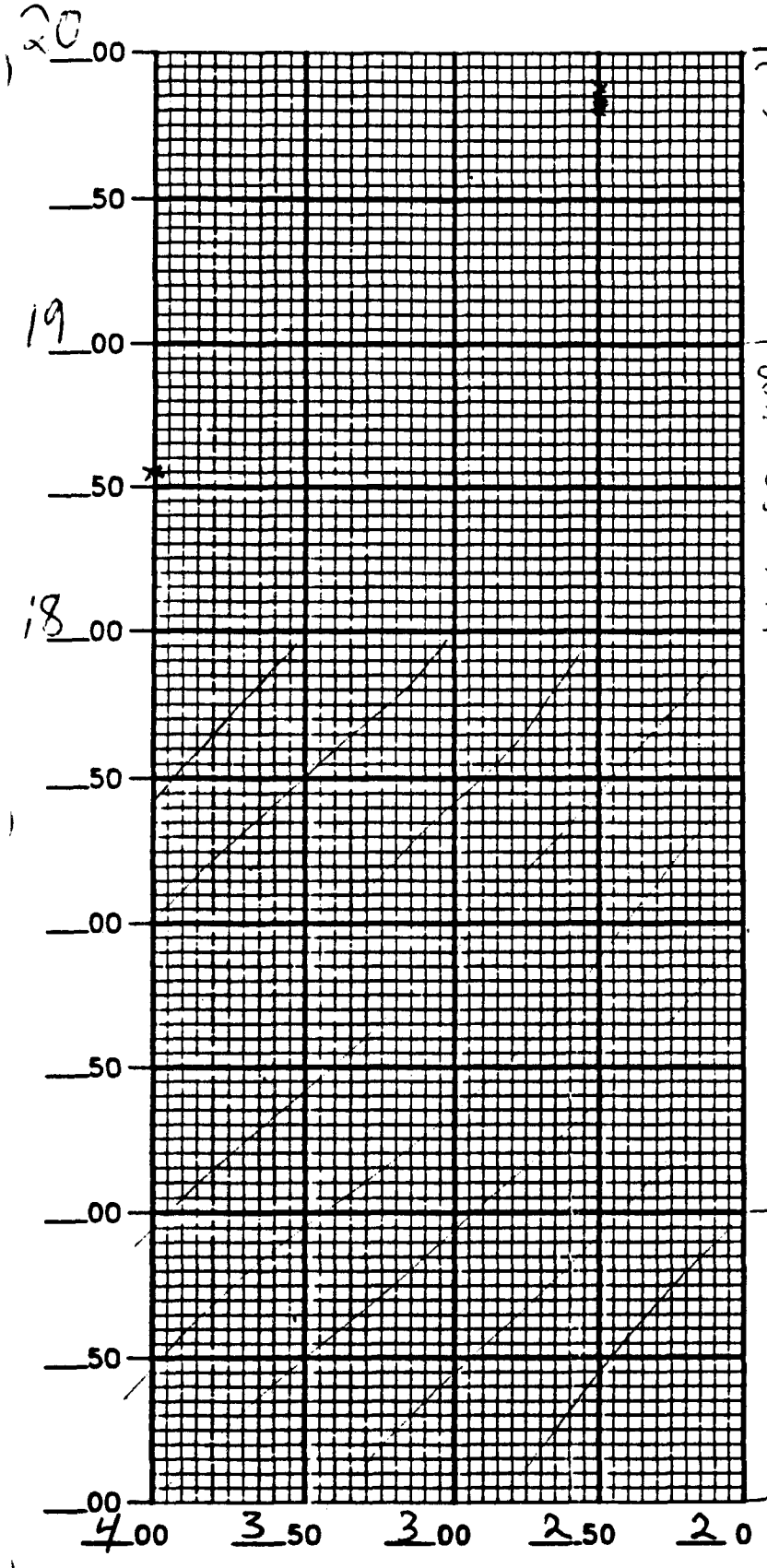
SHEET # 999 ES FIELD MANAGER JMK

ENGINEERING-SCIENCE, INC.

Figure 4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



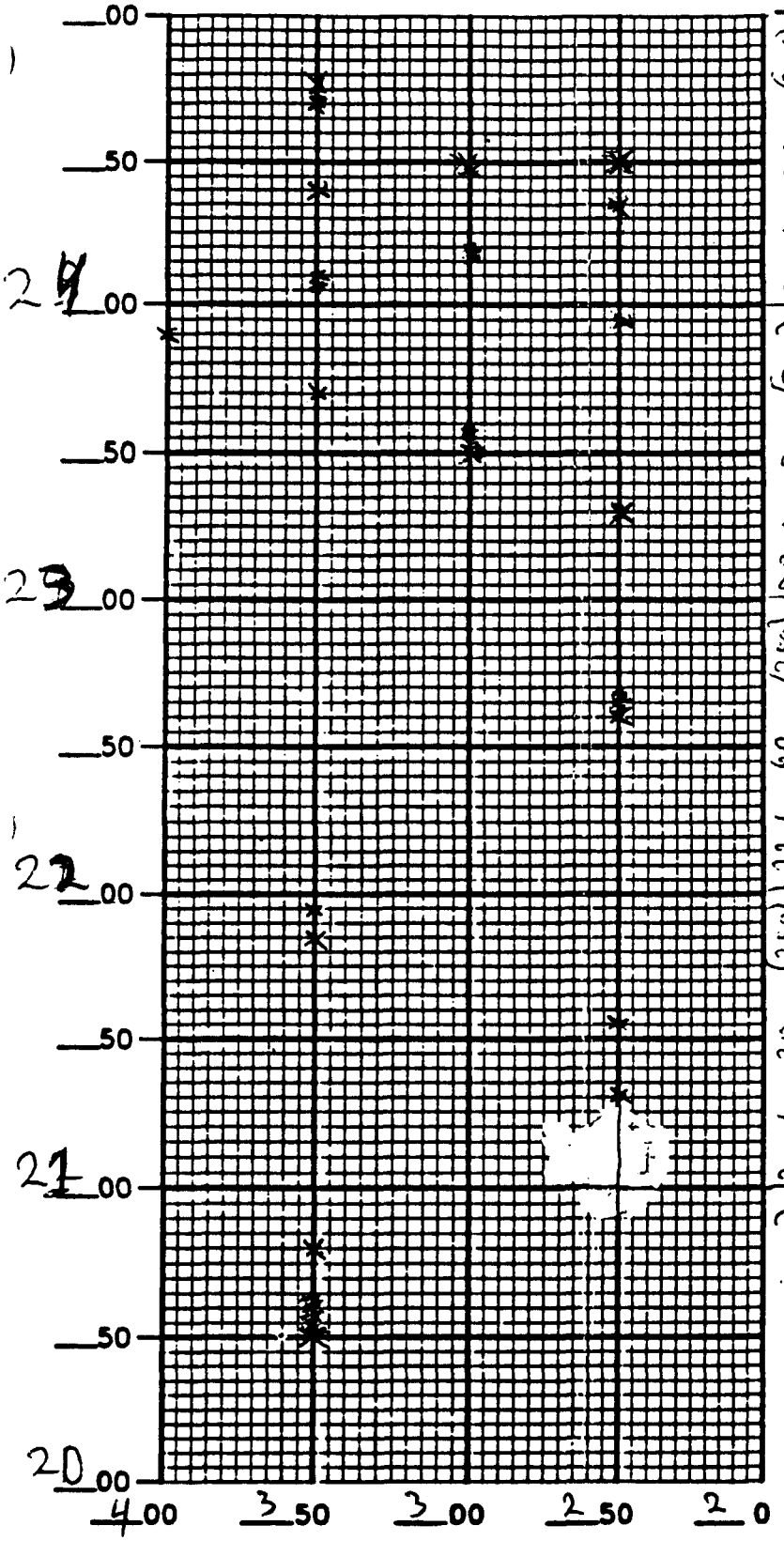
ANOMALY INTENSITY	NOTES
MQ-1 BO-90 (250)	
18-1 SS 4100	

AREA A Tier C SENIOR UXO SUPERVISOR [signature] DATE 11-2-94

SHEET # 1 of 3 ES FIELD MANAGER [signature] ENGINEERING-SCIENCE, INC.

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



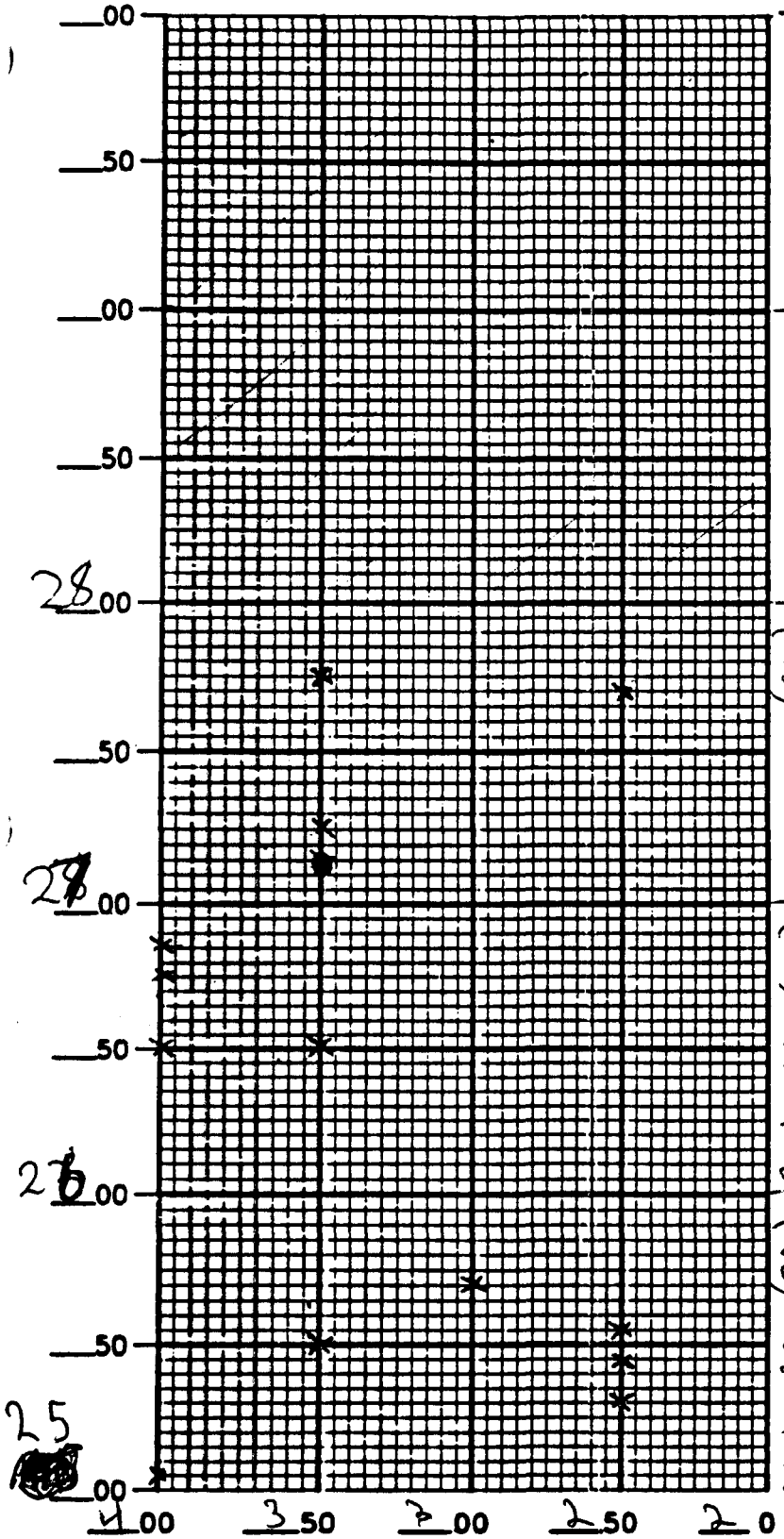
ANOMALY INTENSITY	NOTES
24-1 15-20 (300) (250)	
24-2 30 (300)	
24-3 50 (250)	
24-4 50 70-80 (350) (350)	
24-5 40	
24-6 5-10	
24-7	
23-1 (300) 50	
23-2 (250) 30	
23-3 (280) 45	
23-4 (400) 90	
23-5 (350) 70	
22-1 (250) 60	
21-1 (250) 30	
21-2 (250) 60	
21-3 (350) 95	
21-4 (350) 85	
20-1 (350) 80	
20-2 (350) 50-65	

AREA A Tier C SENIOR UXO SUPERVISOR [signature] DATE 11-2-94

SHEET # 2 of 3 ES FIELD MANAGER [signature] ENGINEERING-SCIENCE, INC.

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES
25-1 30 (250) 25-2 10 (300) 25-3 45 (250) 25-4 55 (250) 25-5 50 (950) 25-6 5 (400)	
26-1 85 (400) 26-2 75 (400) 26-3 50 (350) 26-4 50 (400)	
27-1 70 (250) 27-2 15 (350) 27-3 25 (350) 27-4 15 (350)	

AREA A Tier C SENIOR UXO SUPERVISOR ~~SK Schuster~~ DATE 4-2-94

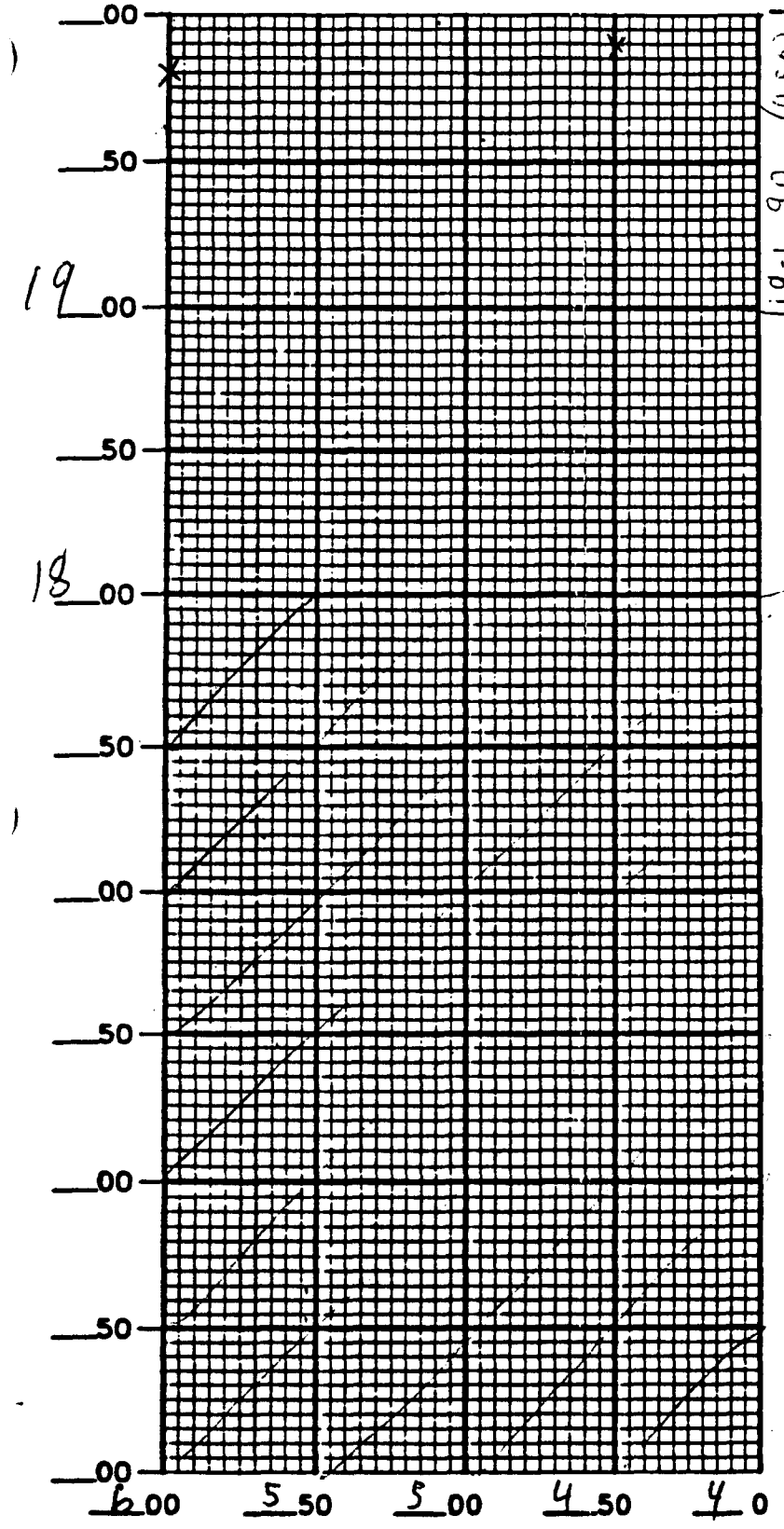
SHEET # 3/3 ES FIELD MANAGER Antho A

ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES
19-1 90 (450) (600)	
19-2 80	

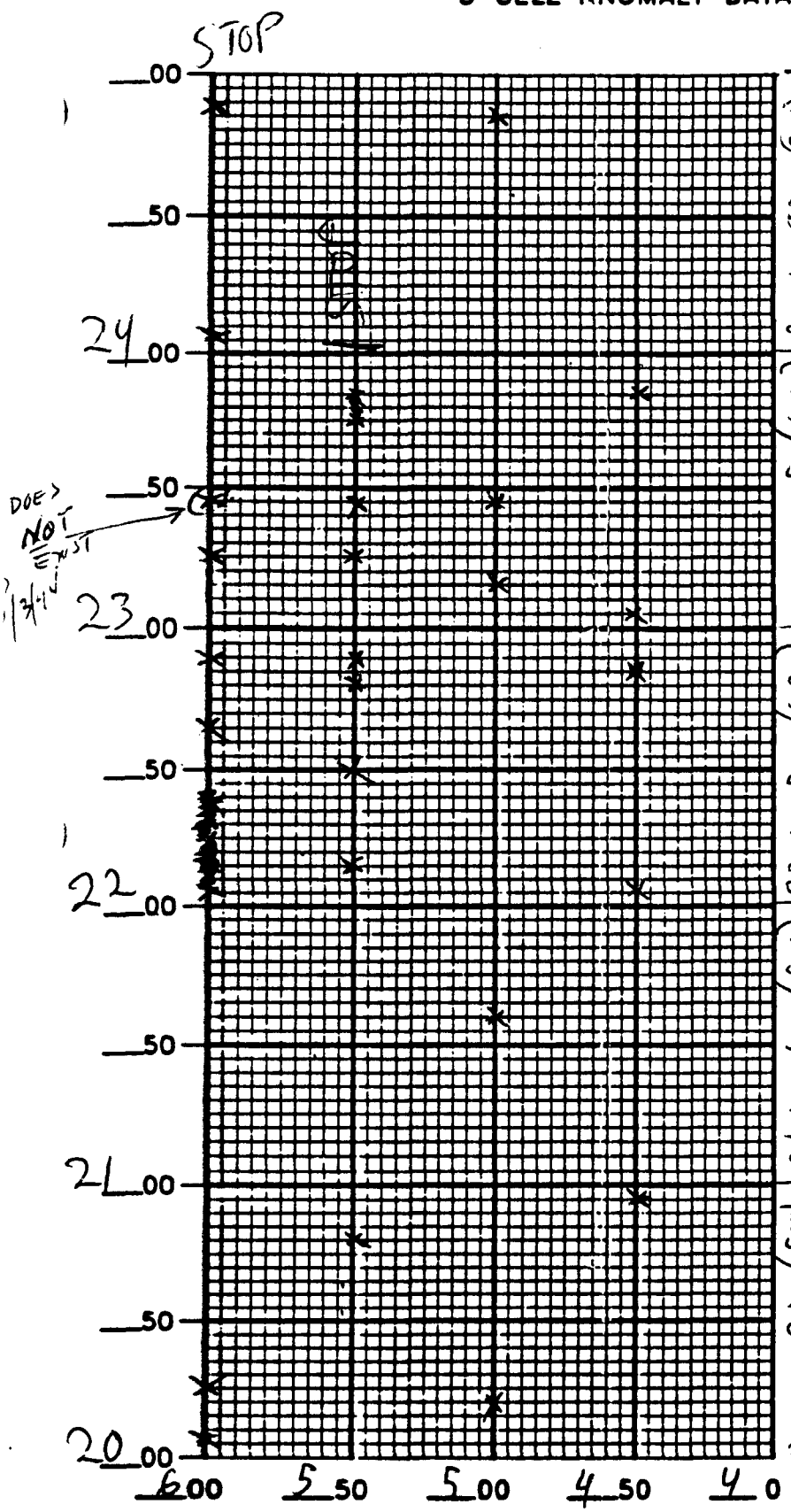
AREA A Tier D SENIOR UXO SUPERVISOR [signature] DATE 11-2-94

SHEET # 1 of 3 ES FIELD MANAGER [signature] ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



ANOMALY INTENSITY						NOTES
24-1	85	(500)	(600)	(600)		
24-2	5					
24-3	90					
23-1	5	(450)	(500)	(450)	(600)	(550)
23-2	15	(500)	(500)	(450)	(600)	(550)
23-3	45					
23-4	85					
23-5	25					
23-6	25					
23-7	45					
23-8	75-85					
22-1	5	(450)	(450)	(550)	(600)	(550)
22-2	85					
22-3	15					
22-4	5-45					
22-5	50					
22-6	65	(600)				
22-7	80	(550)				
22-8	90	(600)				
22-9	90	(550)				
21-1	60	(500)				
20-1	20	(500)	(450)	(600)	(600)	(550)
20-2	95					
20-3	5					
20-4	25					
20-5	80					

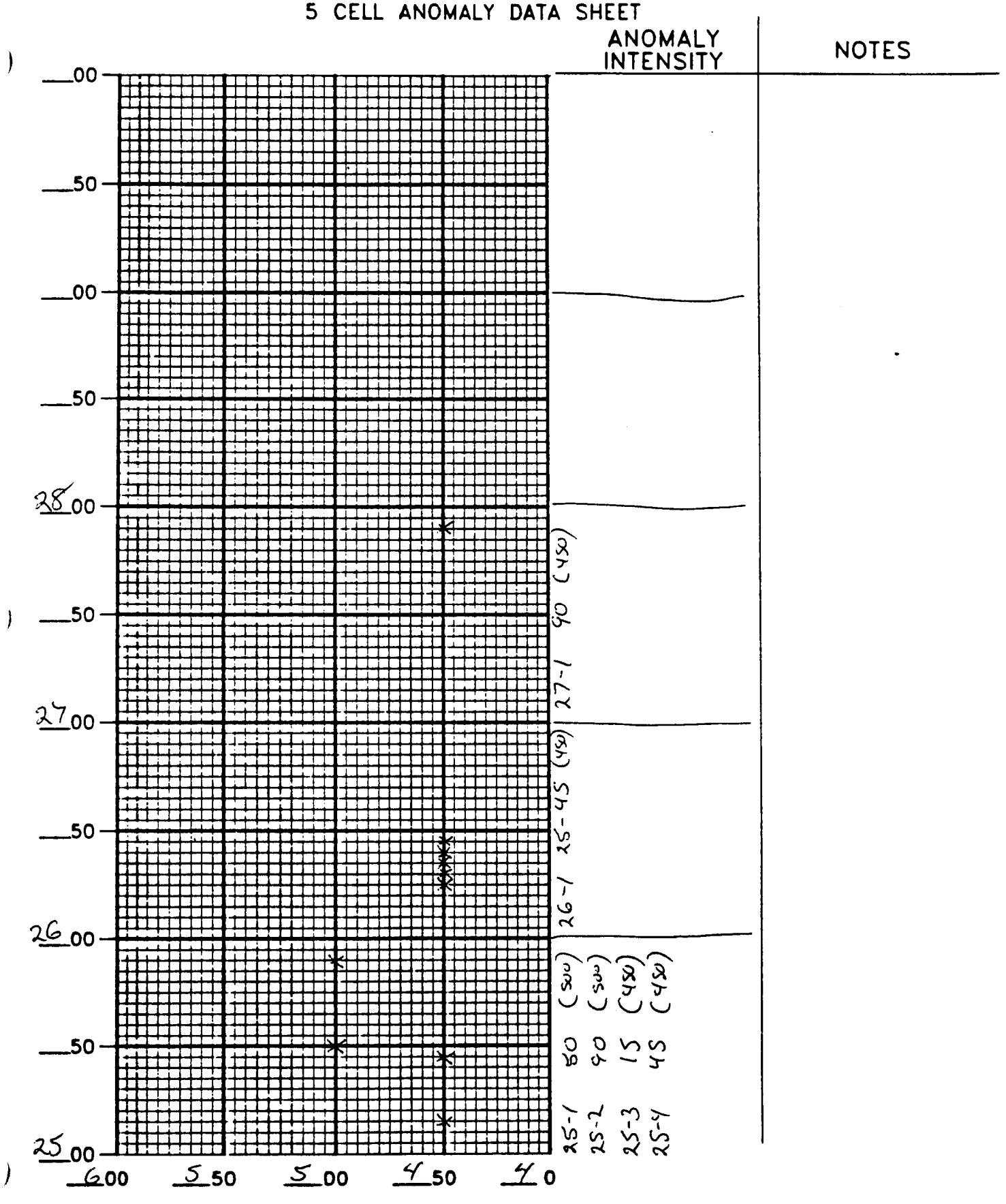
AREA A Tier D SENIOR UXO SUPERVISOR [signature] DATE 11-2-94

SHEET # 2 of 3 ES FIELD MANAGER [signature] ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



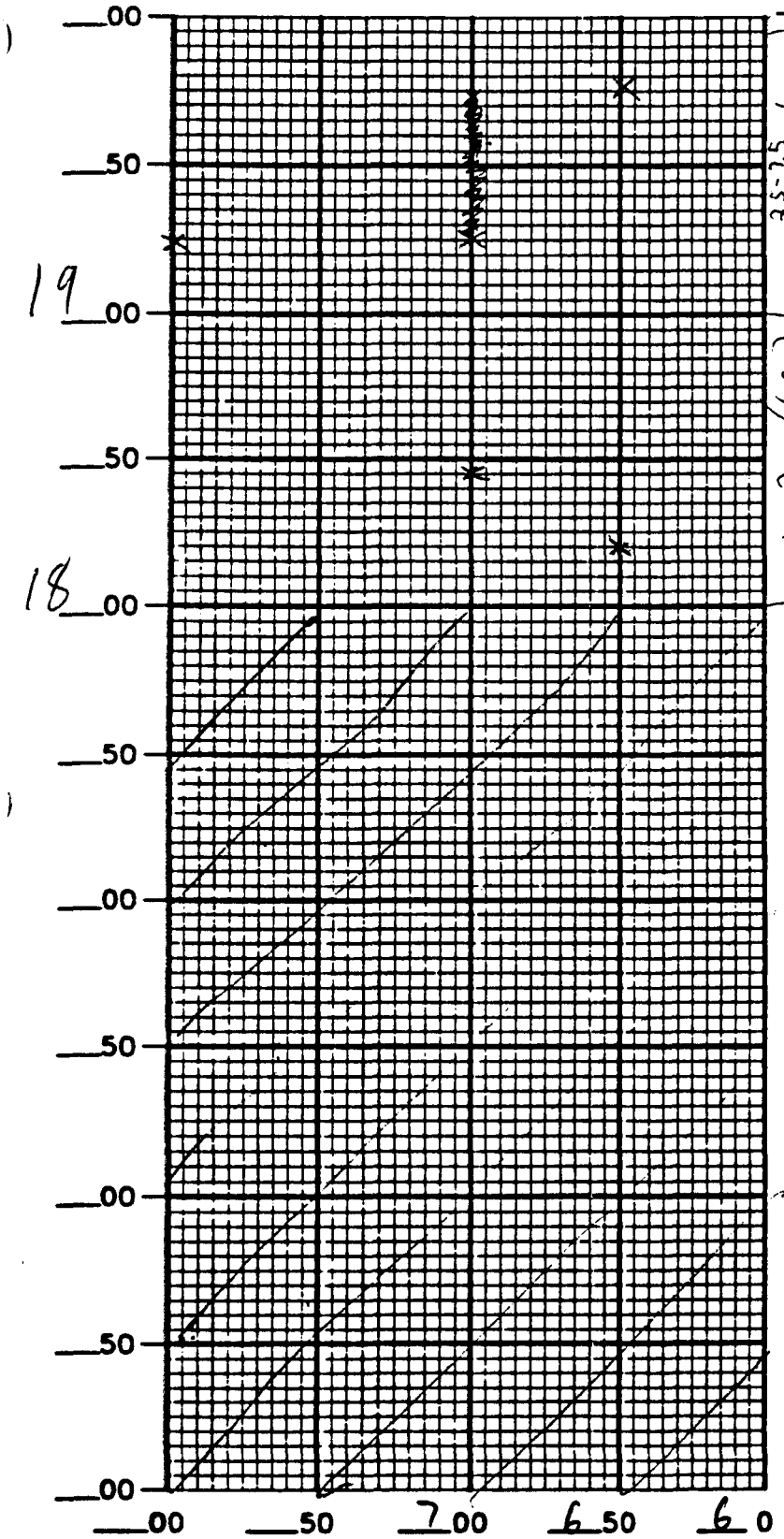
AREA A TIER D SENIOR UXO SUPERVISOR _____ DATE _____

SHEET # 3 of 3 ES FIELD MANAGER _____ ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES
19-1 35-25 (700) 19-2 25 (650)	
18-1 20 (650) 18-2 45 (700)	

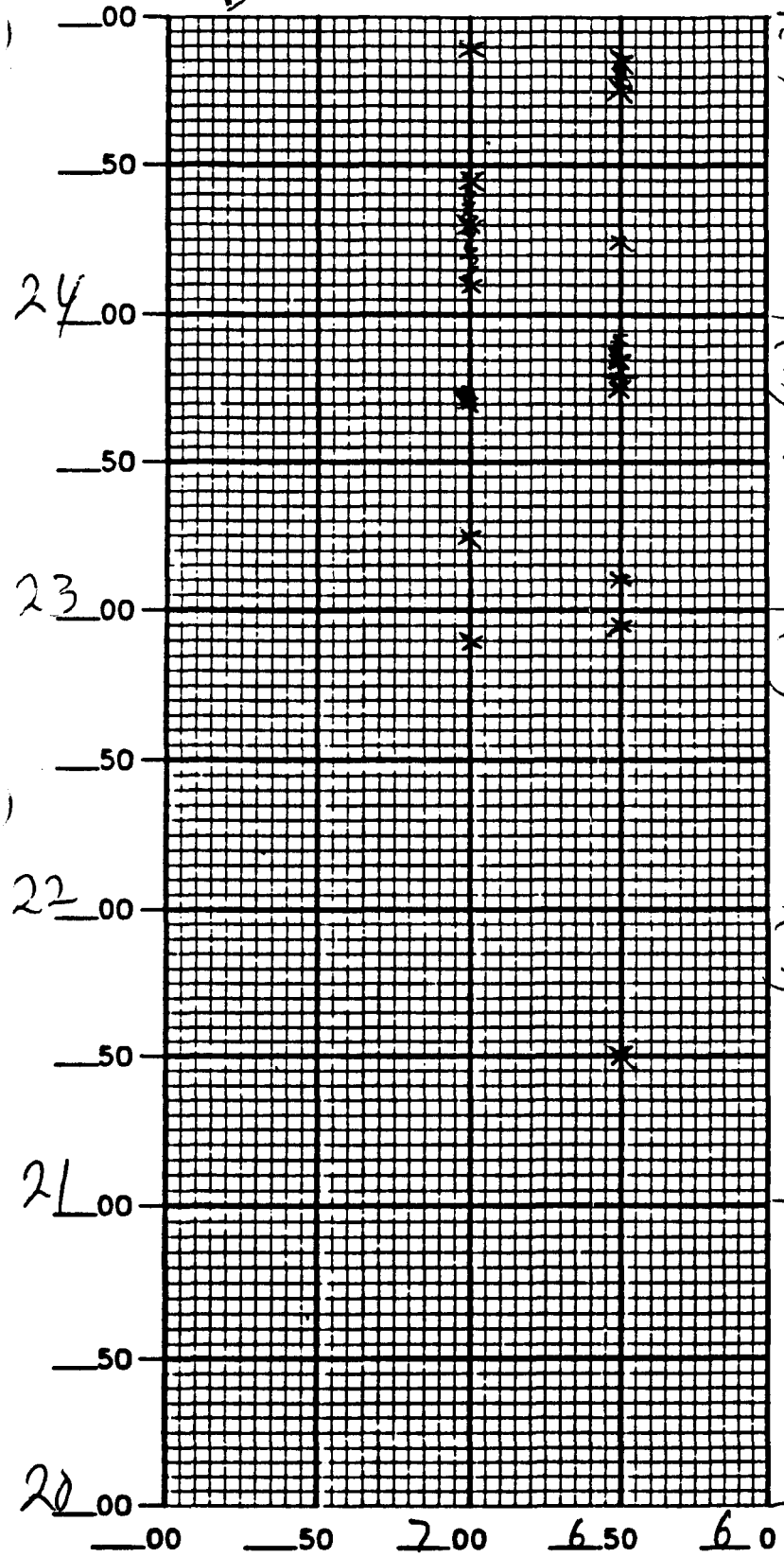
AREA A Tier E SENIOR UXO SUPERVISOR [signature] DATE 11-2-94

SHEET # 1 of 2 ES FIELD MANAGER [signature] ENGINEERING-SCIENCE, INC.

Figure

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES
24-1 5-45 (700)	
24-2 90 (700)	
24-3 25 (650)	
24-4 75-85 (650)	
23-1 10 (650)	
23-2 25 (700)	
23-3 25-95 (650)	
23-4 70-75 (700)	
22-1 95 (650)	
22-2 90 (700)	
21-1 50 (650)	

AREA A Tier E SENIOR UXO SUPERVISOR [signature] DATE 11-2-94

SHEET # 2 of 2 ES FIELD MANAGER [signature] ENGINEERING-SCIENCE, INC.

Magnetometer Survey

Individual Cell Anomaly Data Sheets

And

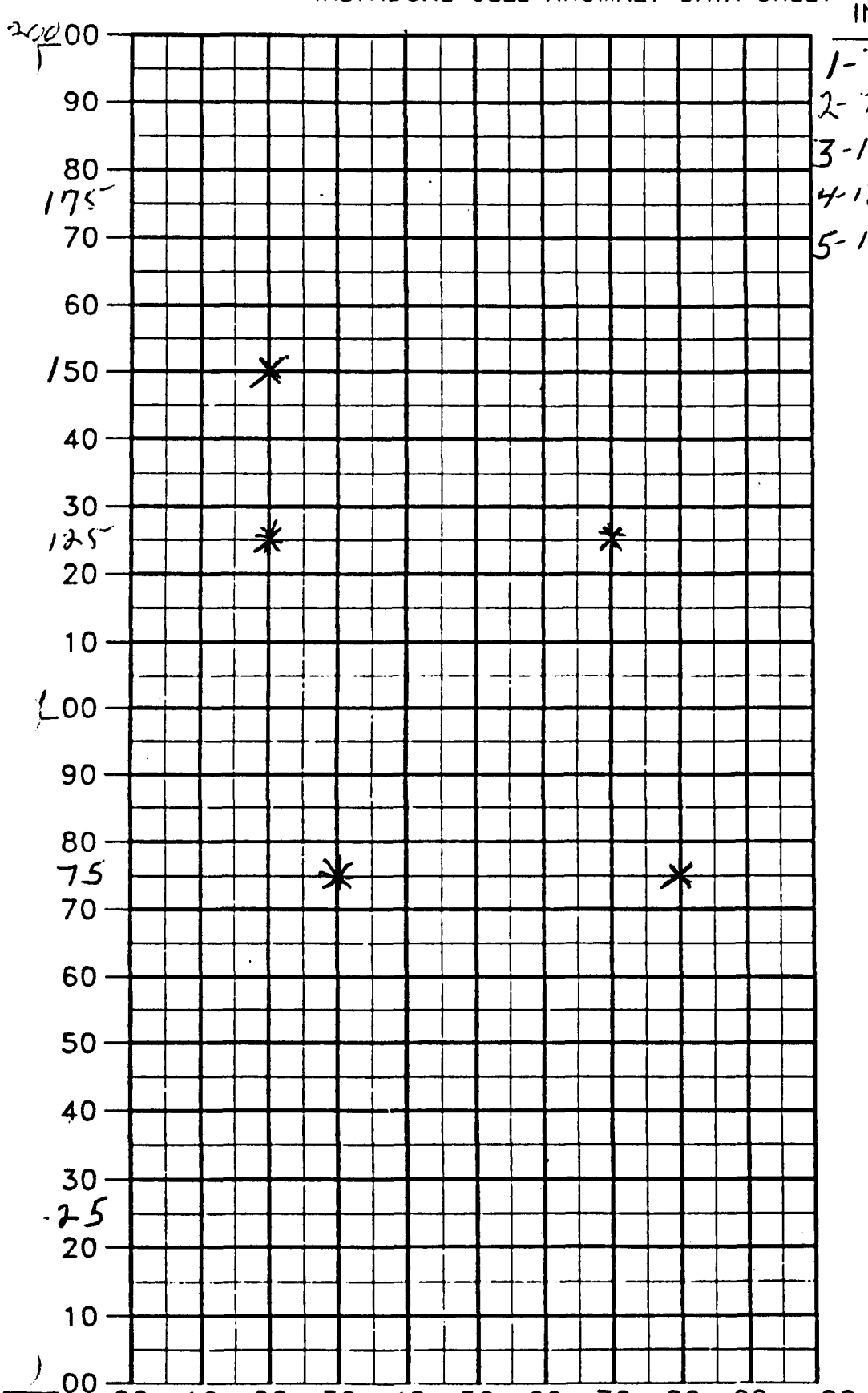
5 Cell Anomaly Data Sheets

Area B

Figure 2-5

ASSATEAGUE ISLAND

INDIVIDUAL CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES
1-75-2230	
2-75-2280	
3-125-2220	
4-125-2270	
5-150-2220	

1/10

2200

AREA B Tier 2 SENIOR UXO SUPERVISOR S R Schrecker DATE 11/29/94 11/30/94

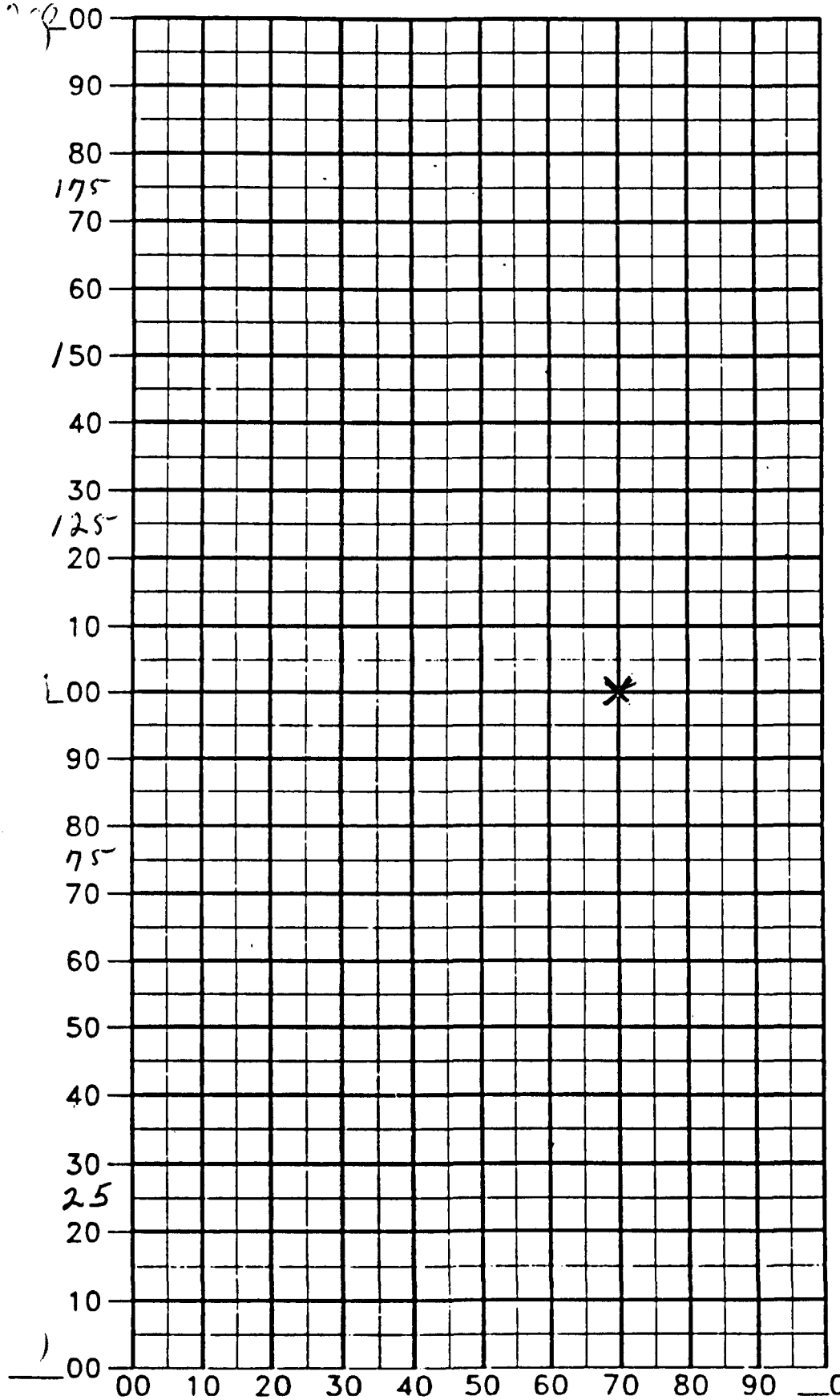
SHEET # ES FIELD MANAGER

ENGINEERING-SCIENCE, INC.

Figure 2-5

ASSATEAGUE ISLAND

INDIVIDUAL CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES
1-100-2370	

2/10

2300

AREA B tier 2 SENIOR UXO SUPERVISOR [signature] DATE 11/29/94 11/30/94

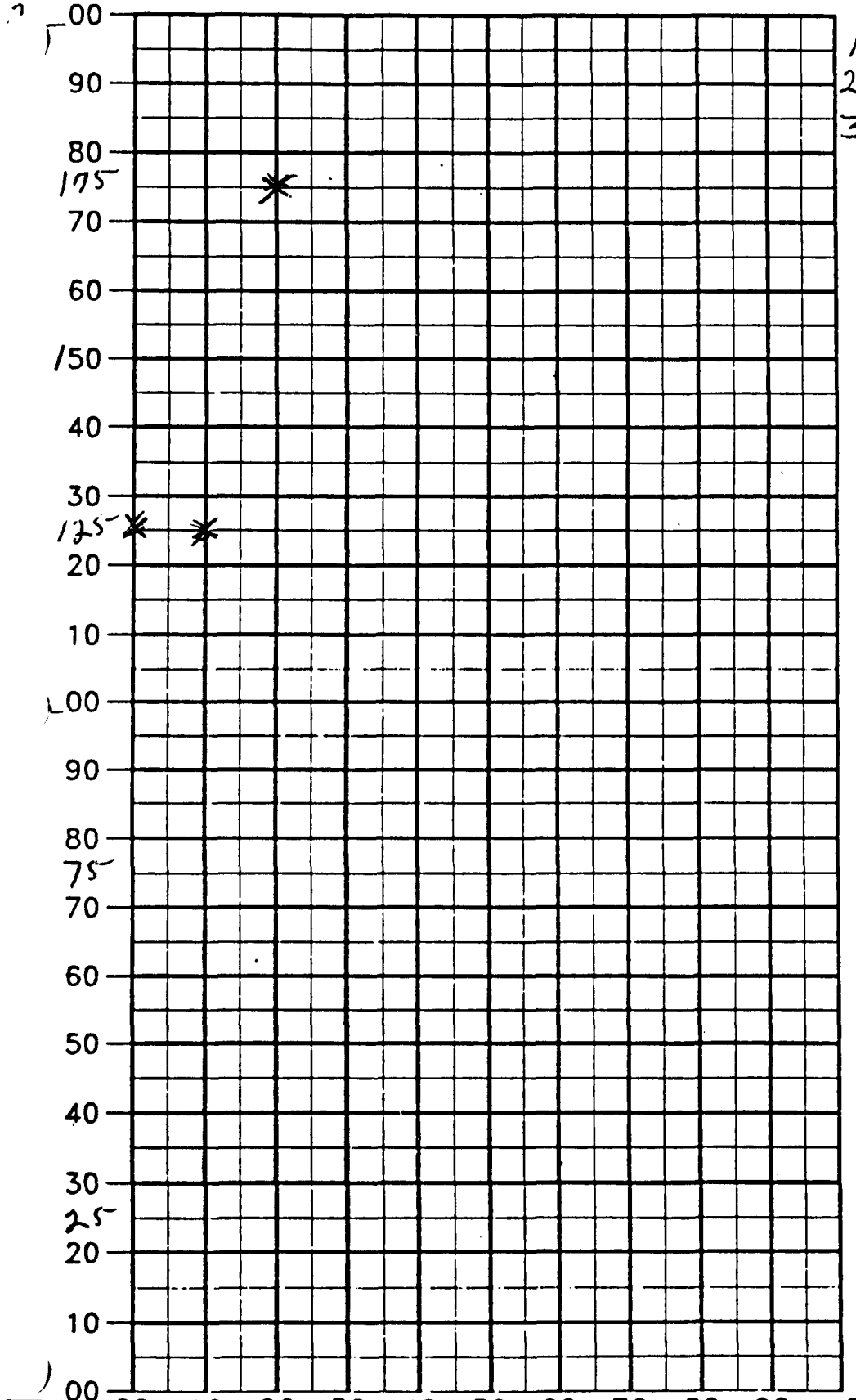
SHEET # ES FIELD MANAGER

ENGINEERING-SCIENCE, INC.

Figure 2-5

ASSATEAGUE ISLAND

INDIVIDUAL CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES
1-125-2400	
2-125-2410	
3-175-2420	

3/10

2400

AREA B Tier 2 SENIOR UXO SUPERVISOR S R Schucker DATE 11/29/94 11/30/94

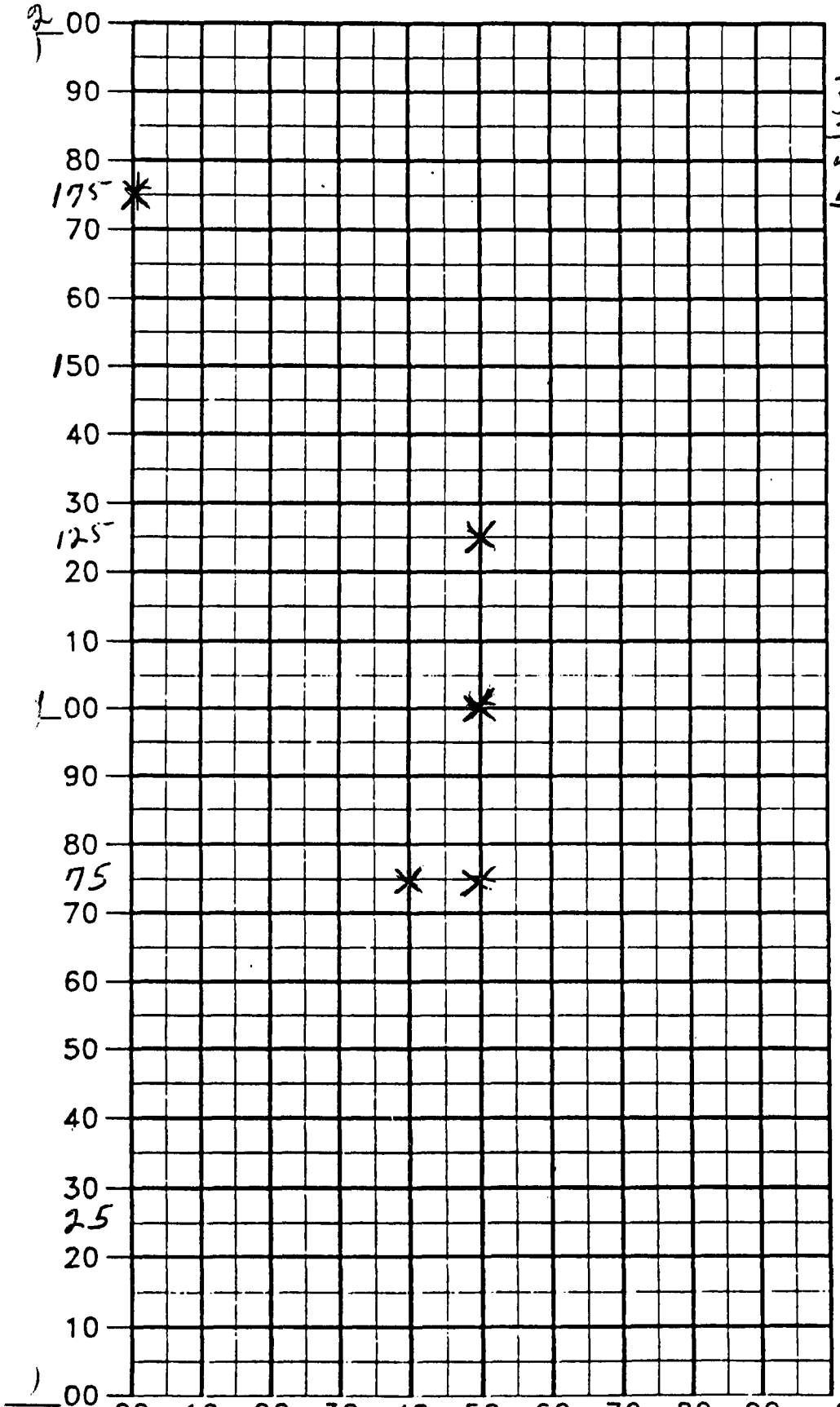
SHEET # ES FIELD MANAGER

ENGINEERING-SCIENCE, INC.

Figure 2-5

ASSATEAGUE ISLAND

INDIVIDUAL CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES
1-75-2540	
2-75-2550	
3-100-2550	
4-125-2550	
5-175-2500	

4/10

2500

AREA B tier 2 SENIOR UXO SUPERVISOR B K Schucker DATE 11/29/94 11/30/94

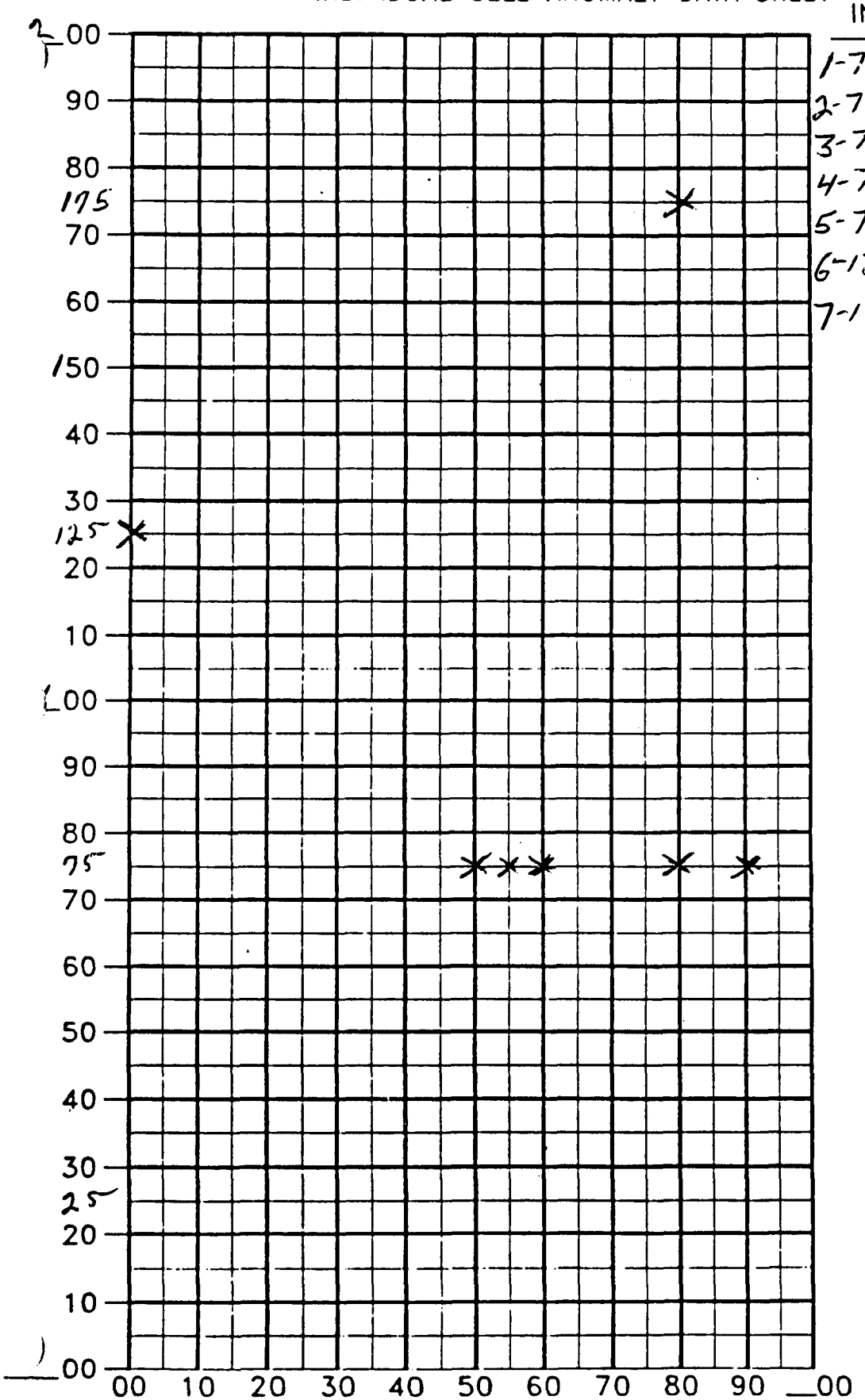
SHEET # ES FIELD MANAGER

ENGINEERING-SCIENCE, INC.

Figure 2-5

ASSATEAGUE ISLAND

INDIVIDUAL CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES
1-75 – 2650	
2-75 – 2655	
3-75 – 2660	
4-75 – 2680	
5-75 – 2690	
6-125 – 2600	
7-175 – 2680	

5/10

2600

AREA B tier 2 SENIOR UXO SUPERVISOR S K Schucker DATE 11/29/94 11/30/94

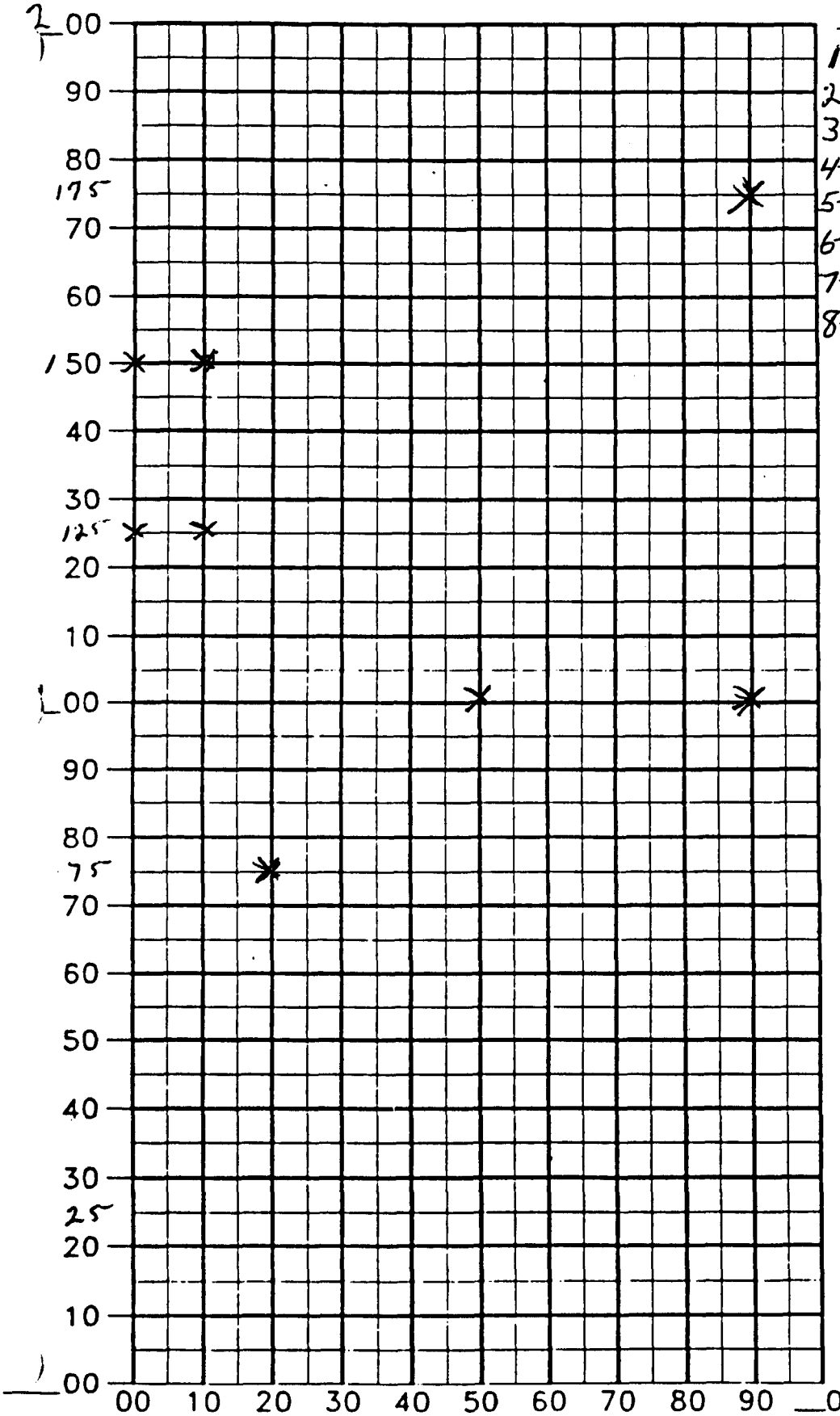
SHEET # ES FIELD MANAGER

ENGINEERING-SCIENCE, INC.

Figure 2-5

ASSATEAGUE ISLAND

INDIVIDUAL CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES
1-75-2720	
2-100-2750	
3-100-2790	
4-125-2700	
5-125-2710	
6-150-2700	
7-150-2710	
8-175-2790	

6/10

2700

AREA B tier 2 SENIOR UXO SUPERVISOR S K Schucker DATE 11/29/94 11/30/94

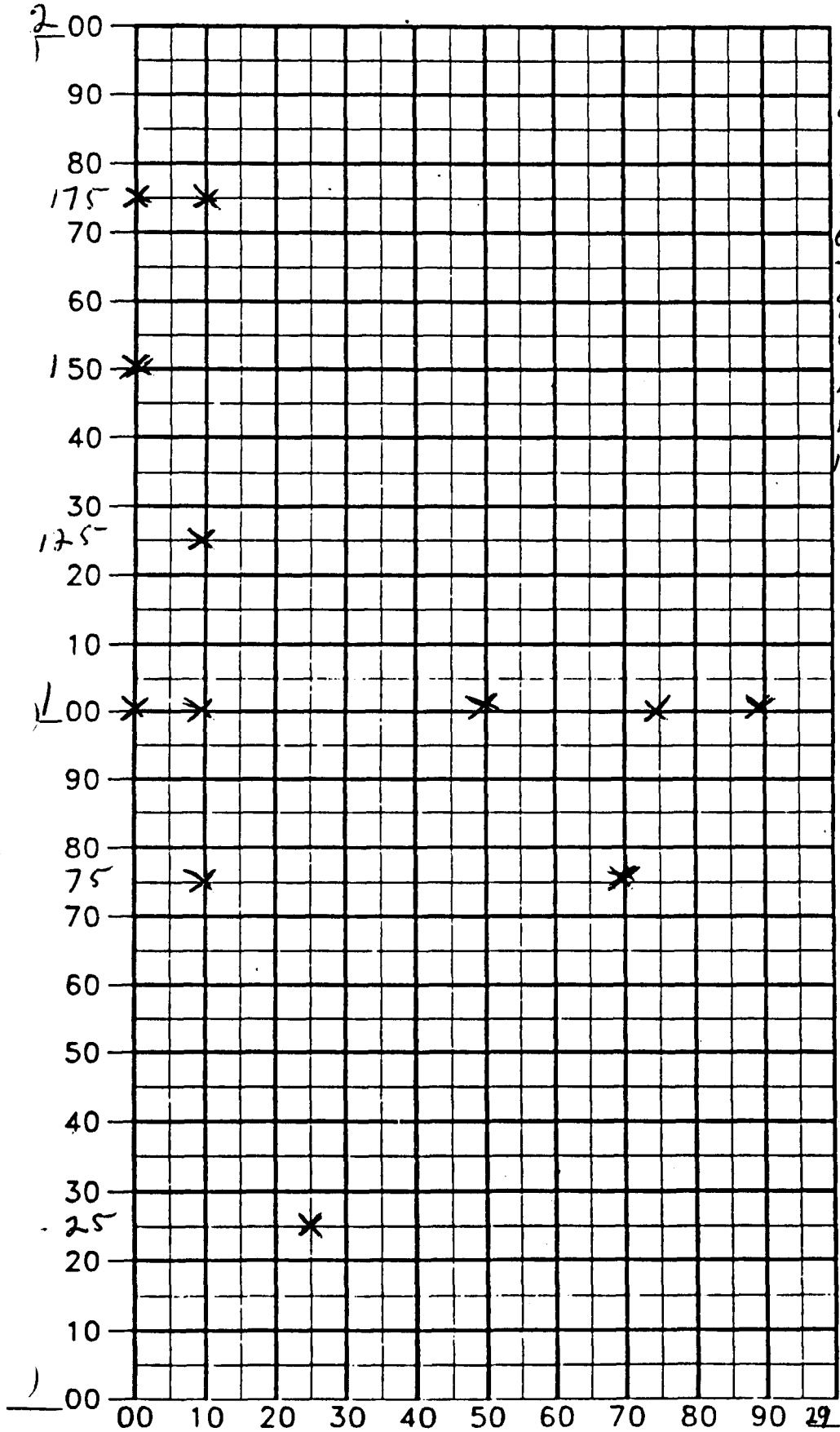
SHEET # ES FIELD MANAGER

ENGINEERING-SCIENCE, INC.

Figure 2-5

ASSATEAGUE ISLAND

INDIVIDUAL CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES
1-25-2825	
2-75-2810	
3-75-2870	
4-100-2800	
5-100-2810	
6-100-2850	
7-100-2875	
8-100-2890	
9-125-2810	
10-150-2800	
11-175-2800	
12-175 2810	

7/10

2800

AREA B tw 2 SENIOR UXO SUPERVISOR S K Schucker DATE 11/29/94 11/30/94

SHEET # ES FIELD MANAGER

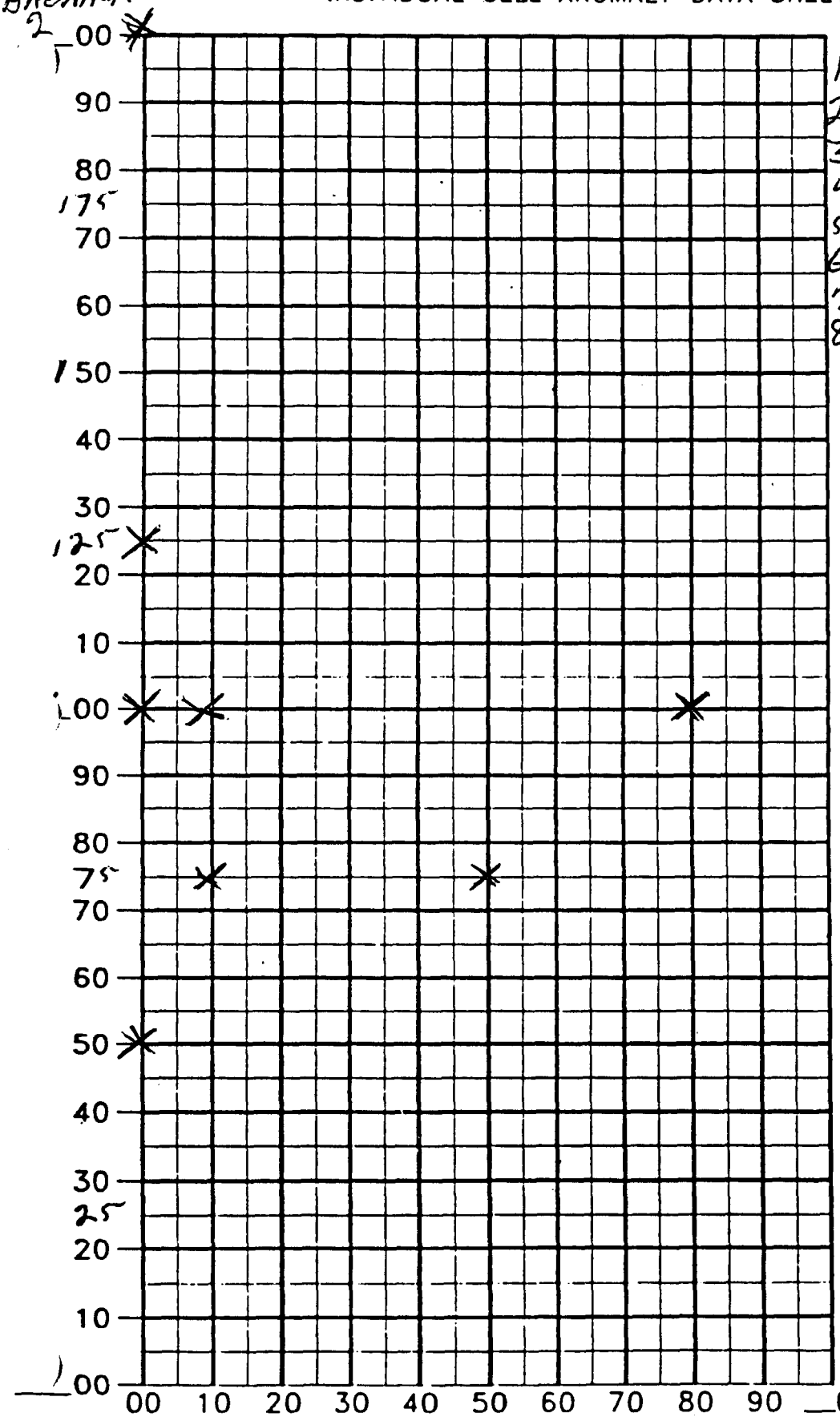
ENGINEERING-SCIENCE, INC.

Figure 2-5

ASSATEAGUE ISLAND

INDIVIDUAL CELL ANOMALY DATA SHEET

BREAKER 2



ANOMALY INTENSITY	NOTES
1-50-2900	
2-75-2910	
3-75-2950	
4-100-2900	
5-100-2910	
6-100-2980	
7-125-2900	
8-200-2900	

8/10

2900

AREA Btin 2 SENIOR UXO SUPERVISOR BK Schucker DATE 11/29/94 11/30/94

SHEET # ES FIELD MANAGER

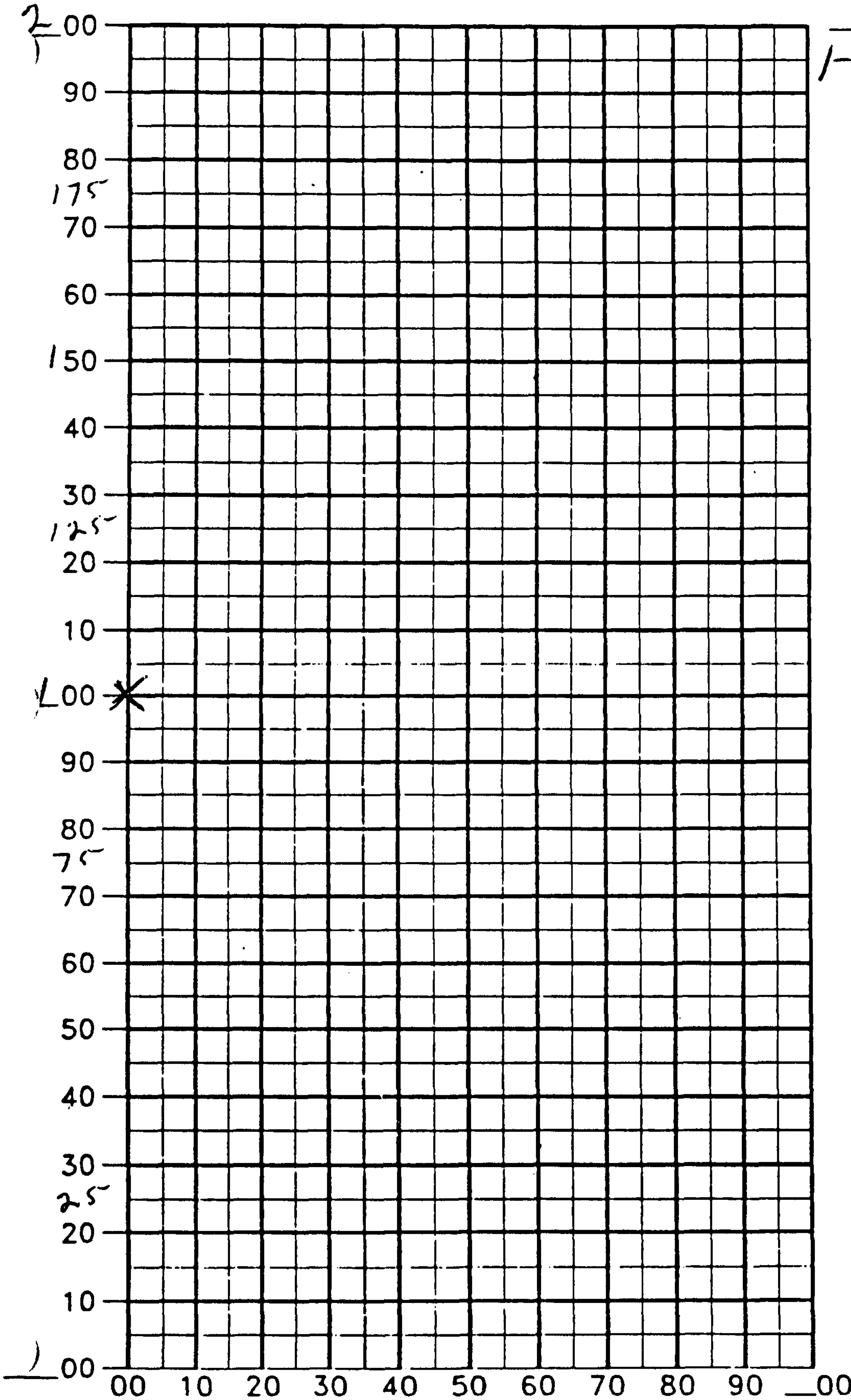
ENGINEERING-SCIENCE, INC.

Figure 2-5

ASSATEAGUE ISLAND

INDIVIDUAL CELL ANOMALY DATA SHEET

ANOMALY INTENSITY	NOTES
1-100-3000	



9/10

AREA 3000 B ... SENIOR UXO SUPERVISOR [signature] DATE 11/29/94 11/30/94

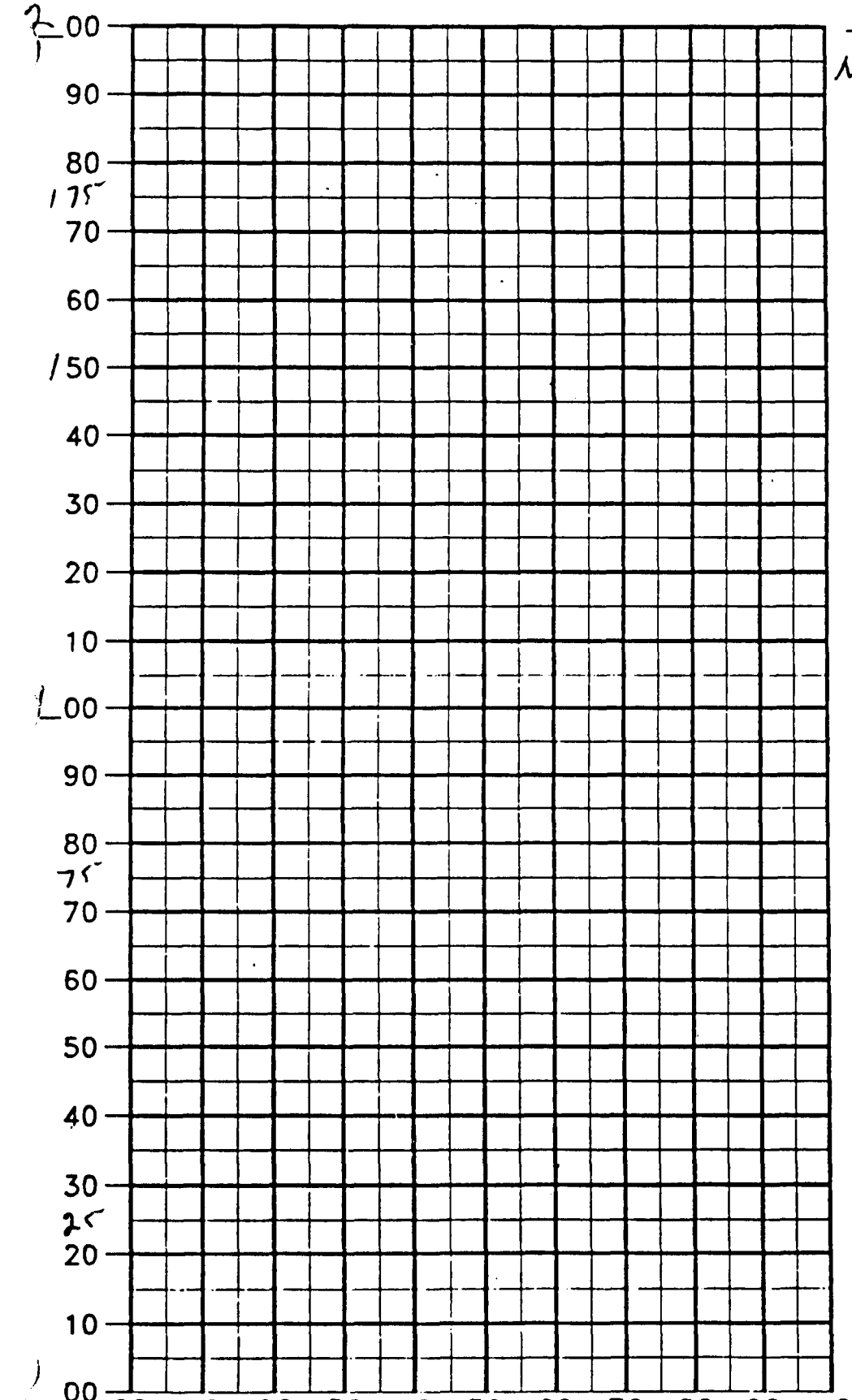
SHEET # ES FIELD MANAGER

ENGINEERING-SCIENCE, INC.

Figure 2-5

ASSATEAGUE ISLAND

INDIVIDUAL CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES
No anomalies	

10/10

AREA 3100 B tier 2

SENIOR UXO SUPERVISOR SK Schucker

DATE 11/30/94 11/29/94

SHEET #

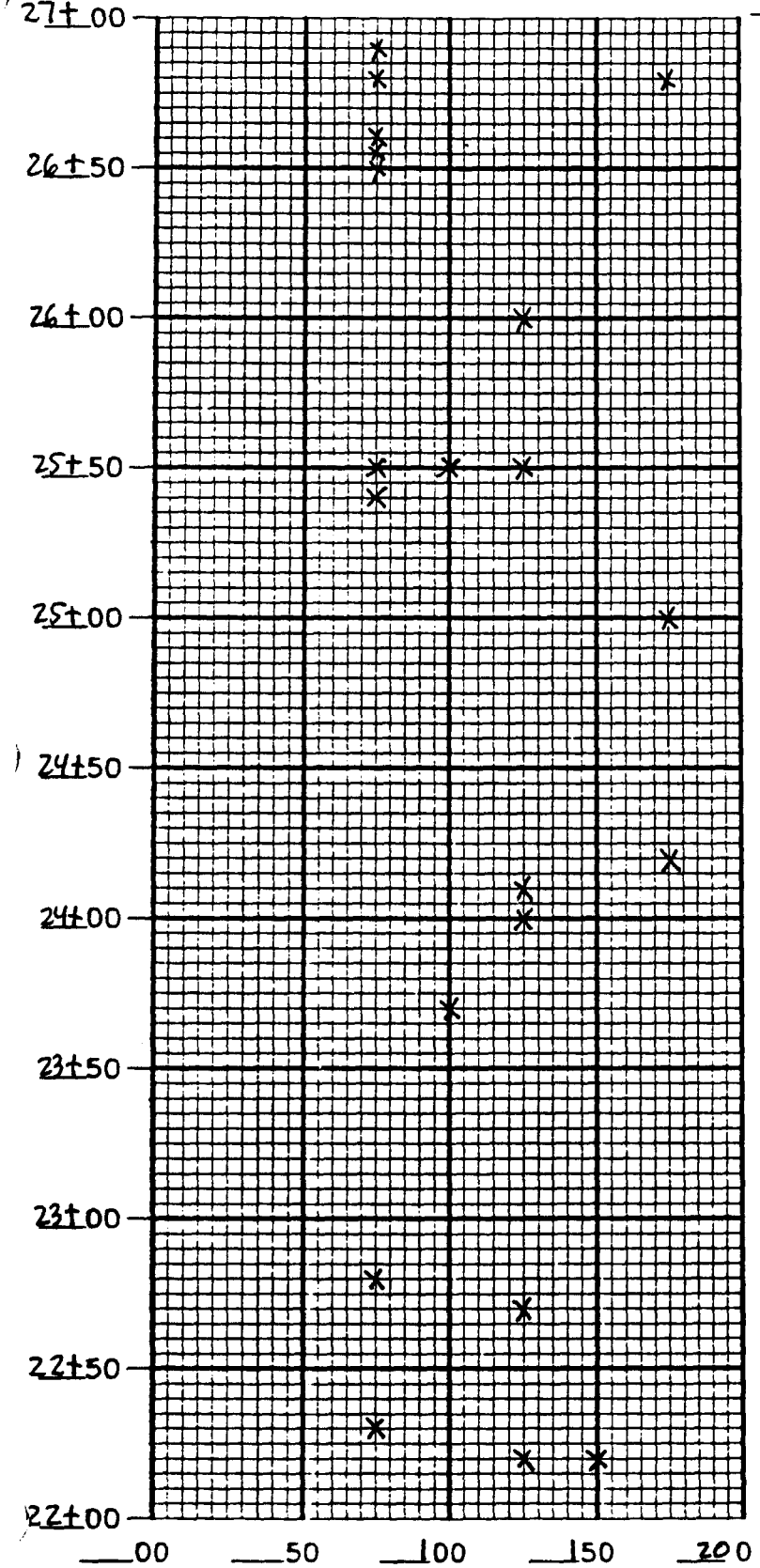
ES FIELD MANAGER

ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES

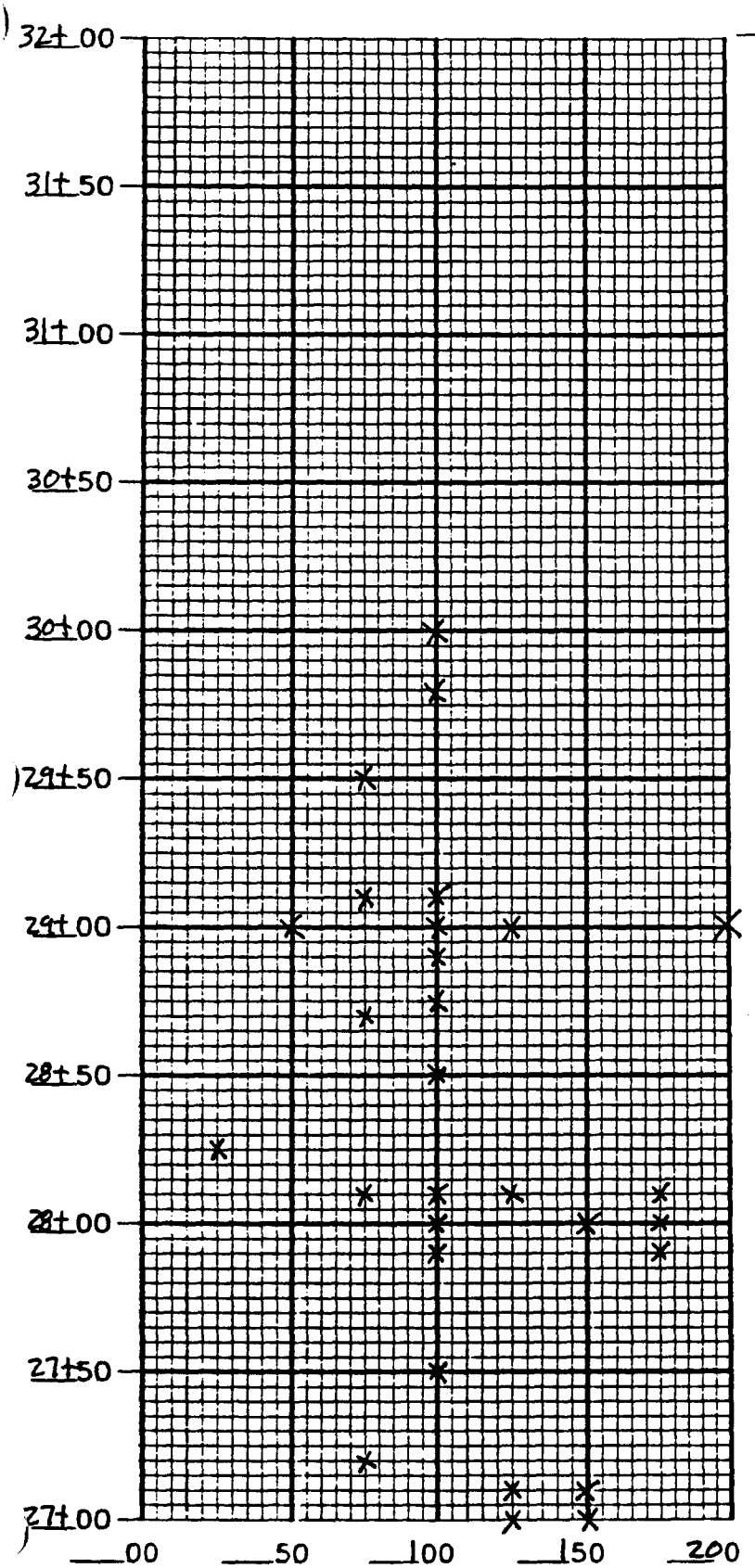
AREA B, Tier 2 SENIOR UXO SUPERVISOR _____ DATE _____

SHEET # 1 of 2 ES FIELD MANAGER _____ ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES

AREA B, Tier 2 SENIOR UXO SUPERVISOR _____ DATE _____

SHEET # 2 of 2 ES FIELD MANAGER _____ ENGINEERING-SCIENCE, INC.

Magnetometer Survey

5 Cell

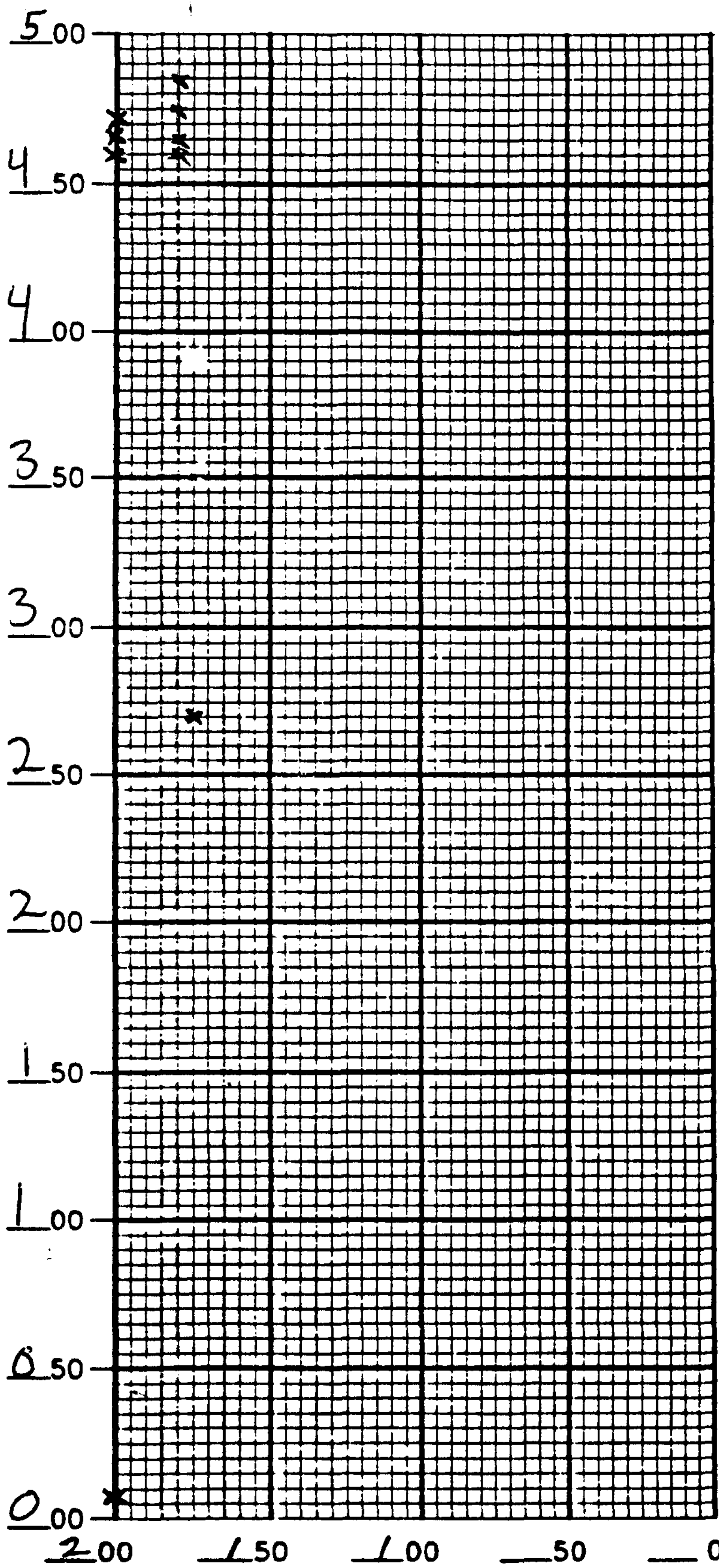
Anomaly Data Sheets

Area C

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES
4-1 ... 59'3"	
4-2 ... 63'	
4-3 ... 70'	
4-4 ... 70'	
4-5 ... 75'	
4-6 ... 85'	
4-7 ... 95'	
4	
3	
2-1 ... 70	
2	
1	
0-1 ... 9'4"	
0	

AREA C/A (Tier)

SENIOR UXO SUPERVISOR [signature]

DATE 10/18/94

SHEET # 1 of 9

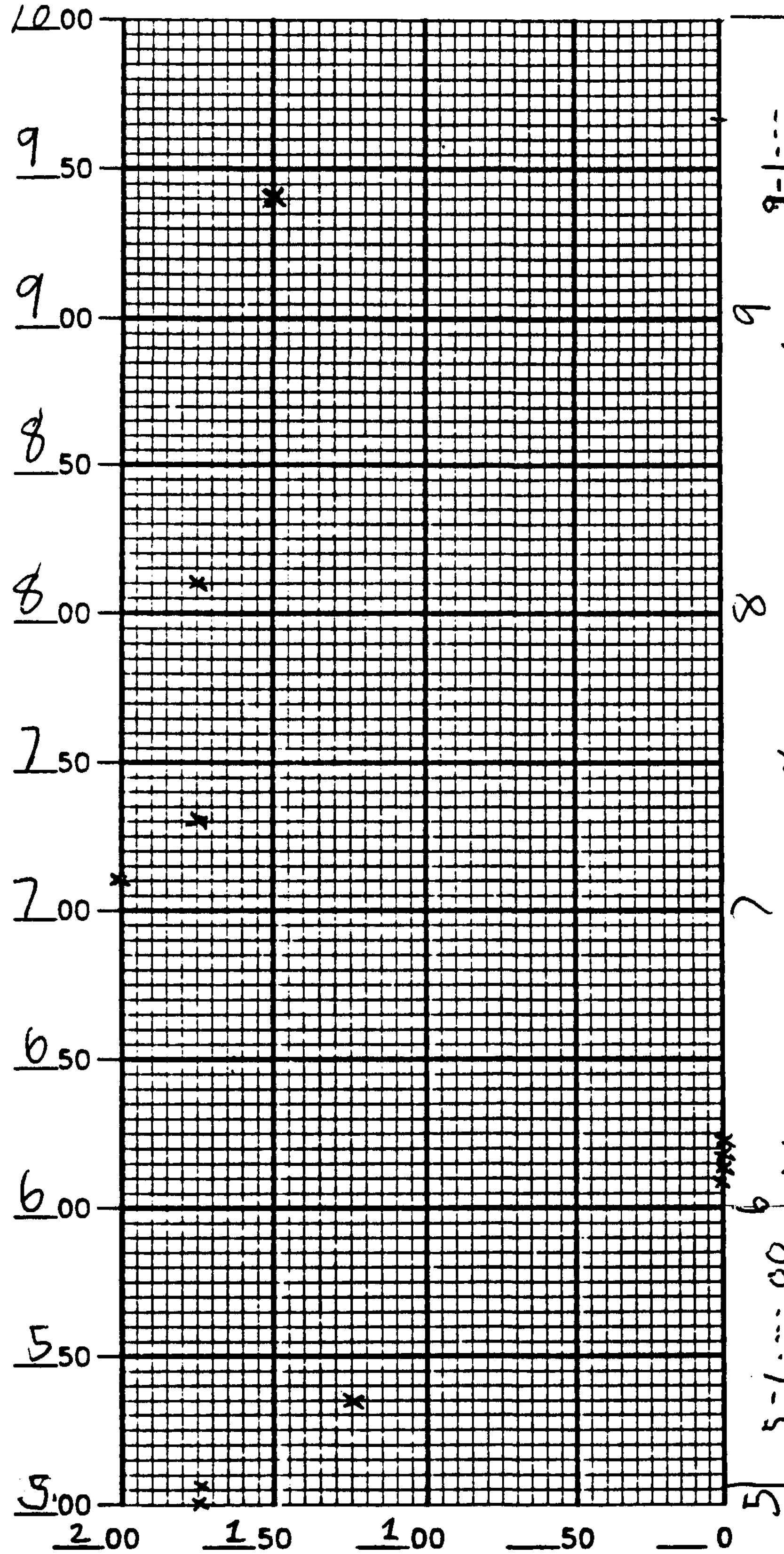
ES FIELD MANAGER JM Kapinos

ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES
9-1---	
9-2---40'	
8-1---10'	
7-1--9'	
7-2--35'	
6-1	
6-2	
6-3	
6-4	
5-1---00	
5-2---05	
5-3---35	

AREA C/A

SENIOR UXO SUPERVISOR [signature]

DATE 10/18/94

SHEET # 2 of 9

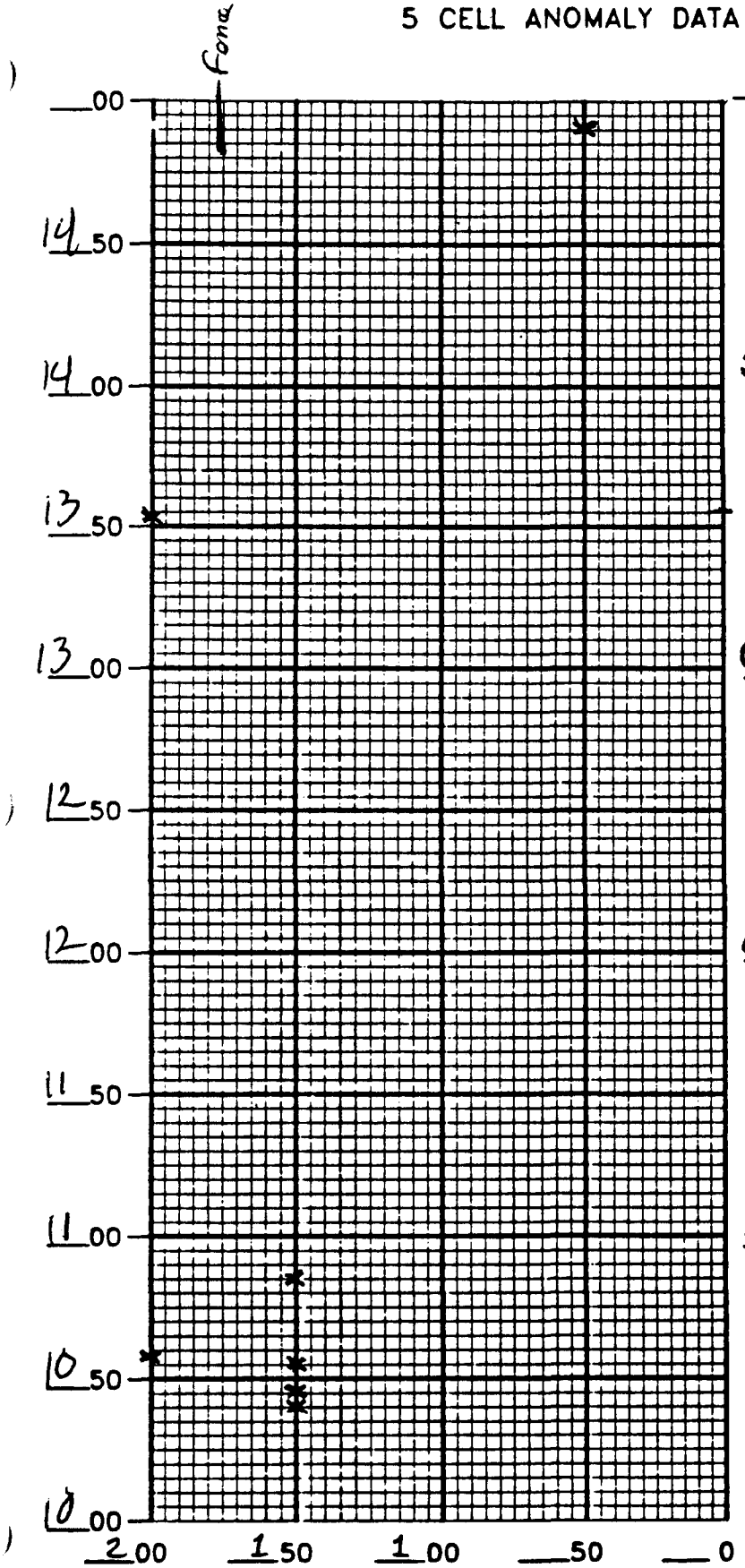
ES FIELD MANAGER JMK

ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES
14-1 --- 93'	
13-1 ---	
13-2 --- 50'	
10-1 --- 58'	
10-2 --- 40'	
10-3 --- 45'	
10-4 --- 55'	
10-5 --- 90'	

AREA C/A

SENIOR UXO SUPERVISOR BK Schuck

DATE 10/18/94

SHEET # 3 of 9

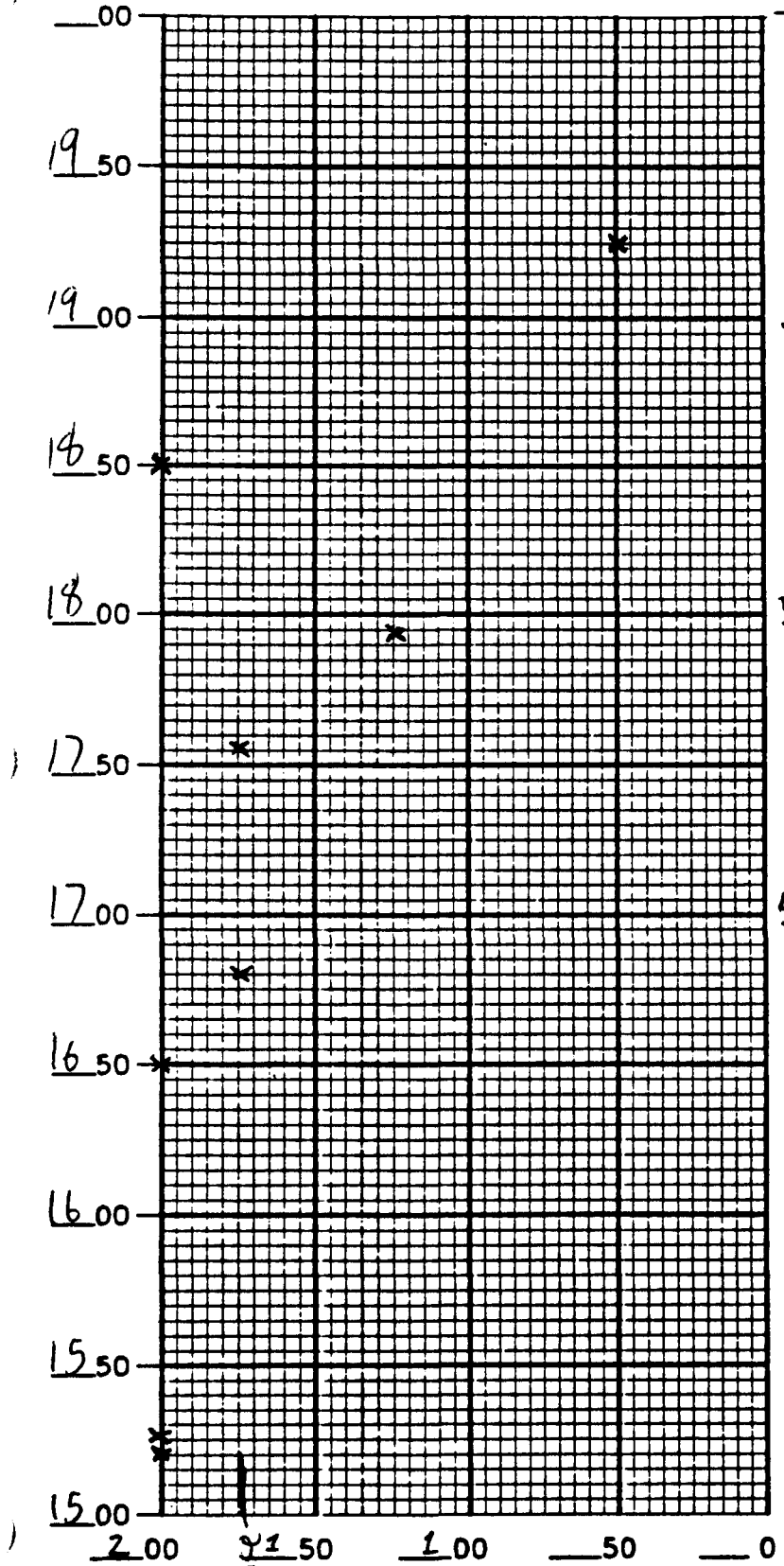
ES FIELD MANAGER JMK

ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



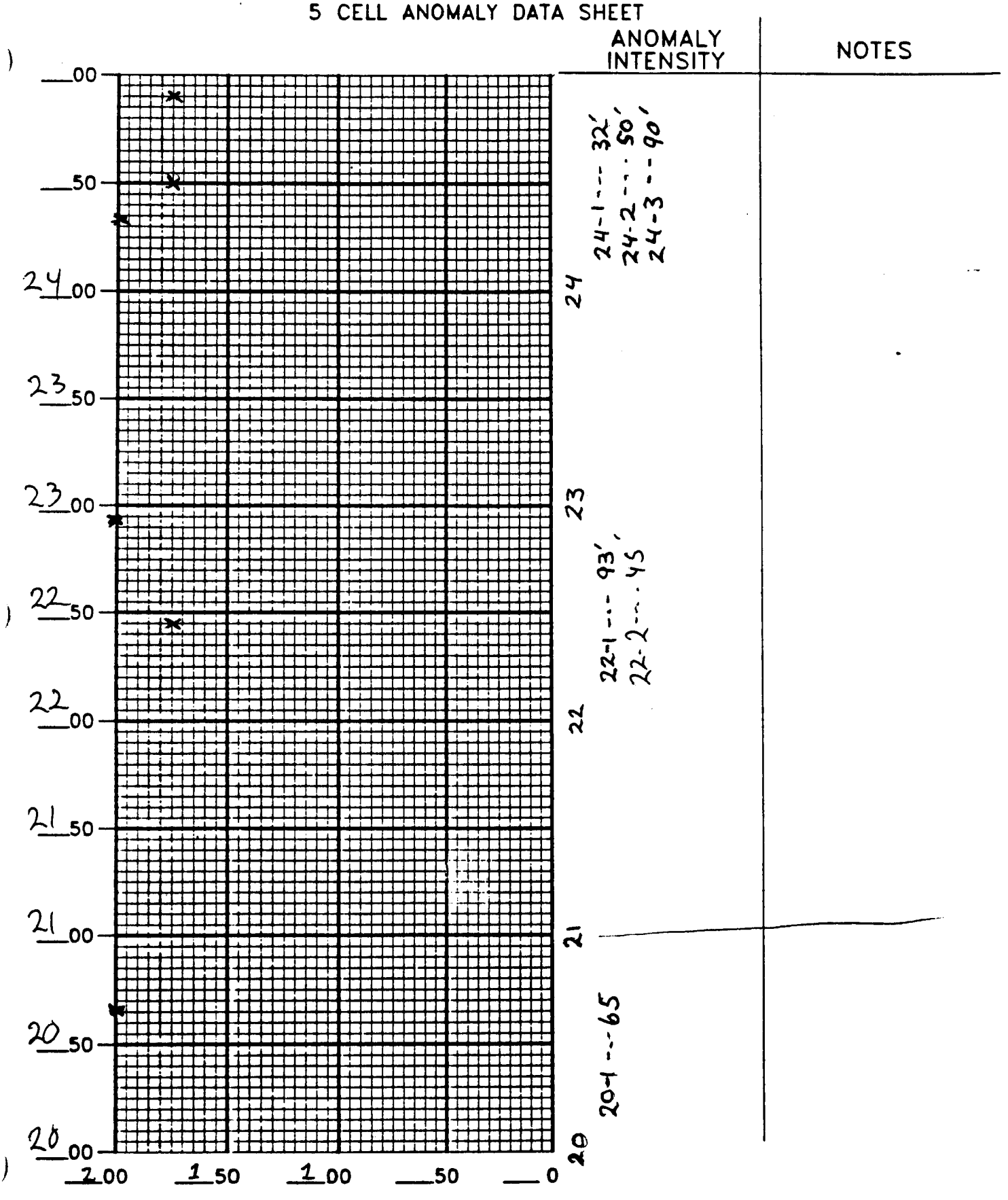
AREA C/A SENIOR UXO SUPERVISOR SK Schuck DATE 10/18/94

SHEET # 4 of 9 ES FIELD MANAGER JMK ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



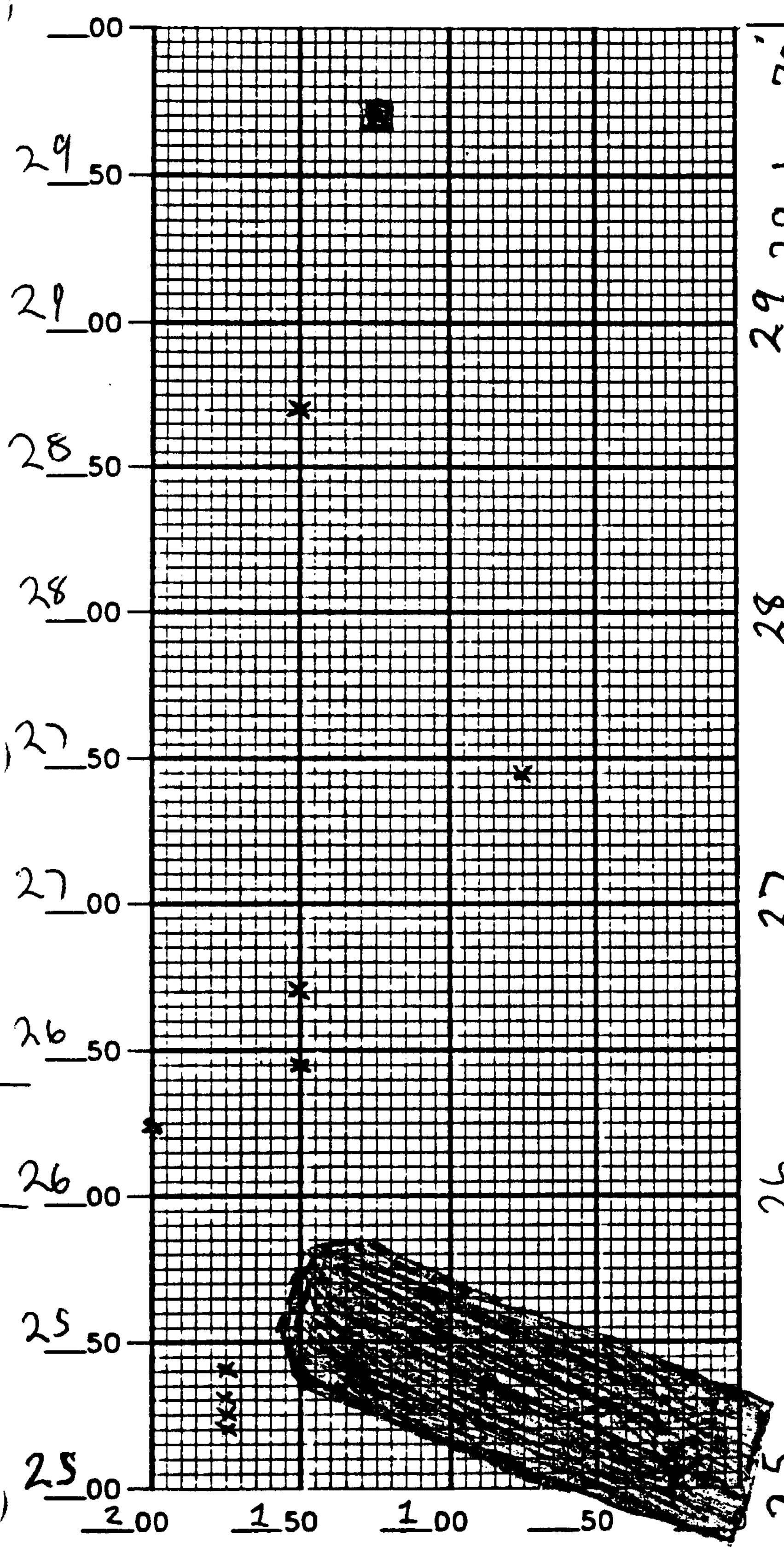
AREA C/A SENIOR UXO SUPERVISOR [signature] DATE 10/15/91

SHEET # 5 of 9 ES FIELD MANAGER JMK ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES
29-1 ... 70'	
29	
28-1 ... 70'	
28	
27-1 ... 45'	
27	
26-1 ... 25'	
26-2 ... 45'	
26-3 ... 70'	
26	
25-1 ... 50'	
150' x 50'	
25-2 ... 40	
3 ... 30	
4 ... 35	
5 ... 25	
25	

AREA C/A

SENIOR UXO SUPERVISOR S.K. Schucker

DATE 10/18/94

SHEET # 6 of 9

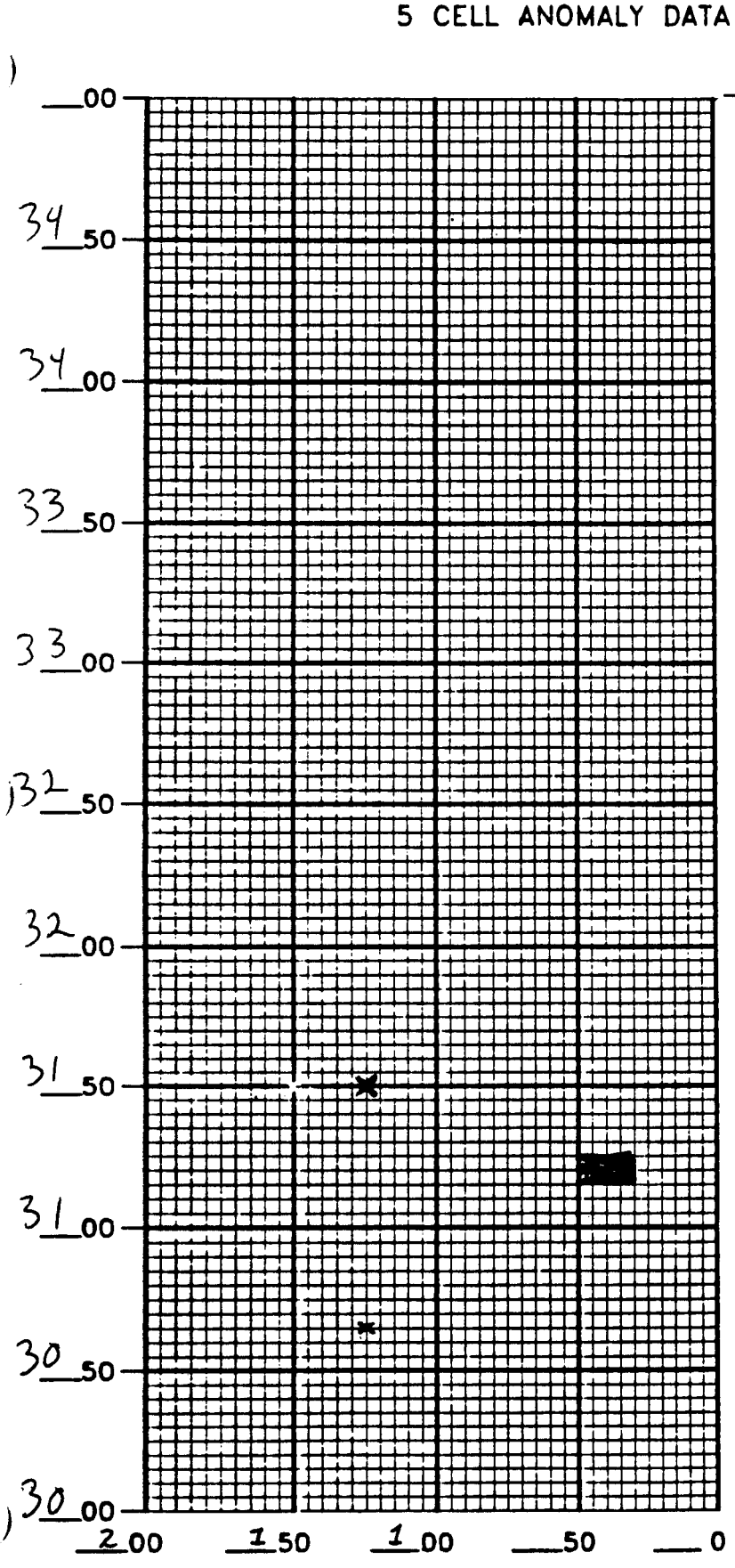
ES FIELD MANAGER JMK

ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES
34	
33	
32	
31	31-1 --- 25' 31-2 --- 50'
30	30-1 --- 65'

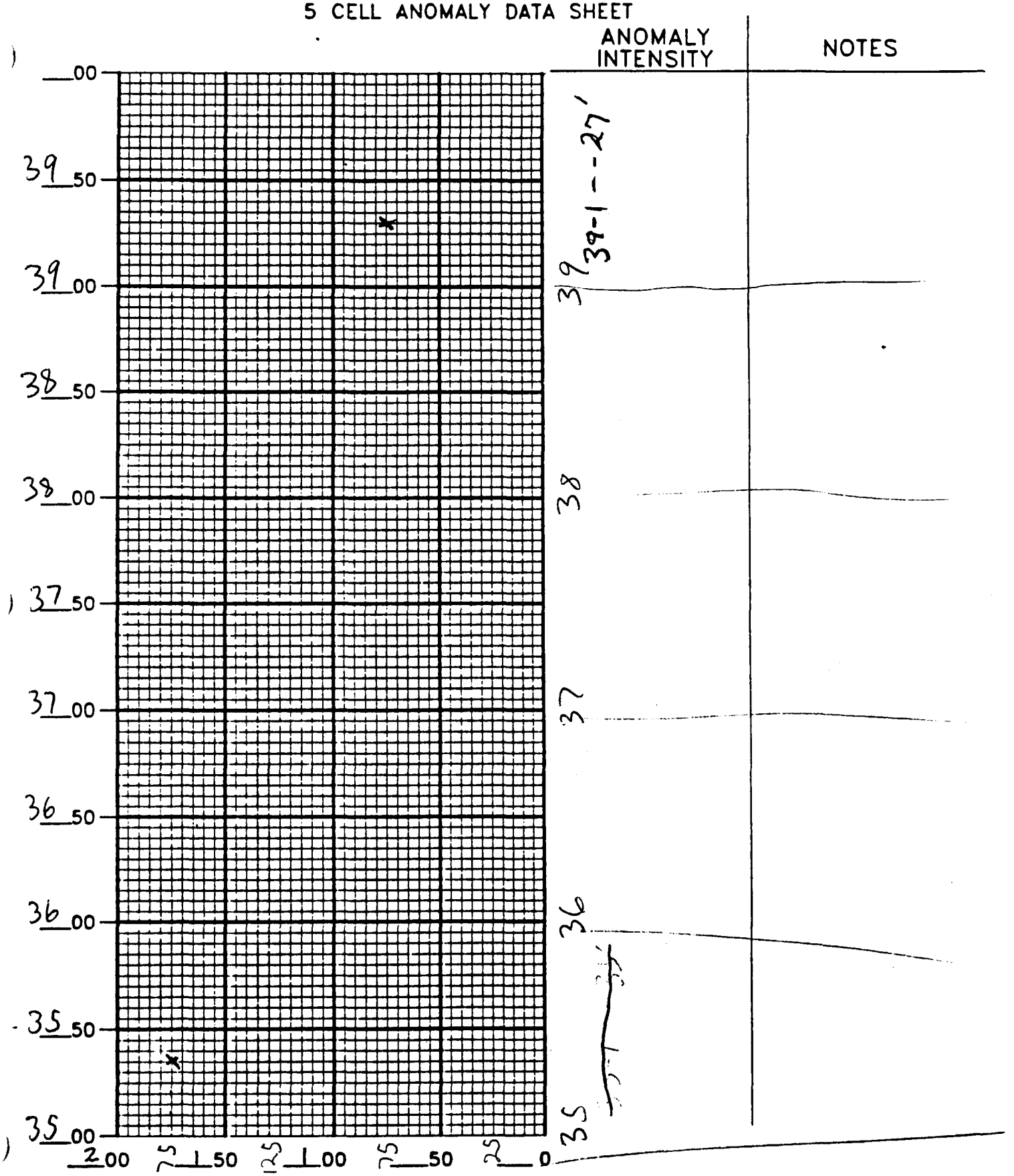
AREA C/A SENIOR UXO SUPERVISOR SK Schuchs DATE 10/18/94

SHEET # 7 of 9 ES FIELD MANAGER JMK ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



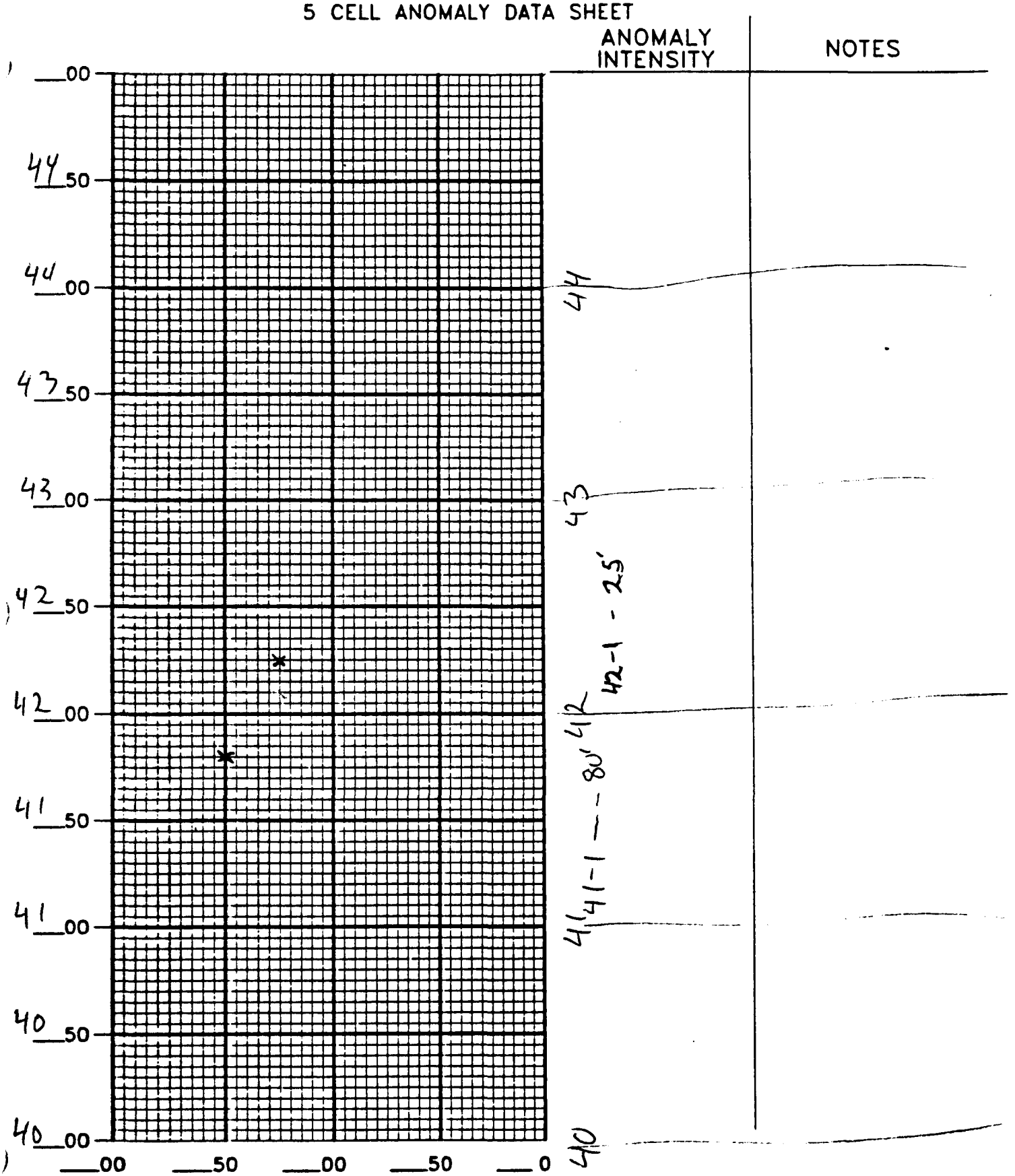
AREA C/A SENIOR UXO SUPERVISOR S.K. Schuster DATE 10/18/94

SHEET # 8 of 9 ES FIELD MANAGER Jmk ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



AREA C/A

SENIOR UXO SUPERVISOR E.K. Schuck

DATE 10/18/94

SHEET # 9 of 9

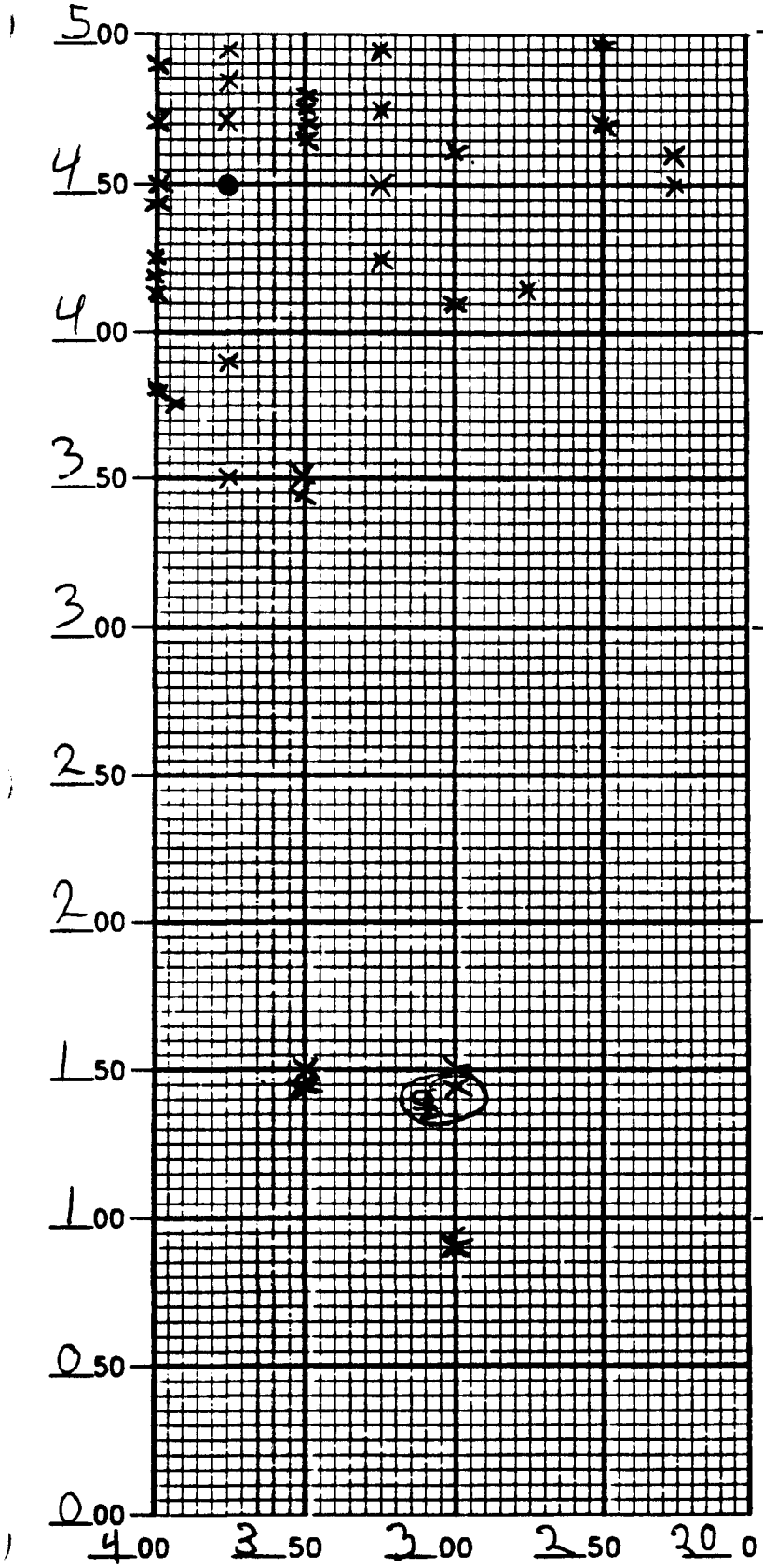
ES FIELD MANAGER JMK

ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES
B4-1 ... 90' B4-2 ... 70' B4-3 ... 50' B4-4 ... 45' B4-5 ... 25' B4-6 — 20'	B4-7 ... 15' B4-8 ... 65' B4-9 ... 70' B4-10 ... 75' B4-11 — 80' B4-12 ... 10' B1-13 ... 60' B4-14 ... 70' RU-15 ... 95
B3-1 ... 80' B3-2 ... 70' B3-3 ... 50' B3-4 ... 45'	B3-5 -- 50' B3-6 -- 90'
B1-1 ... 50' B1-2 50' B1-3 45	
Bϕ-1 ... 90'	

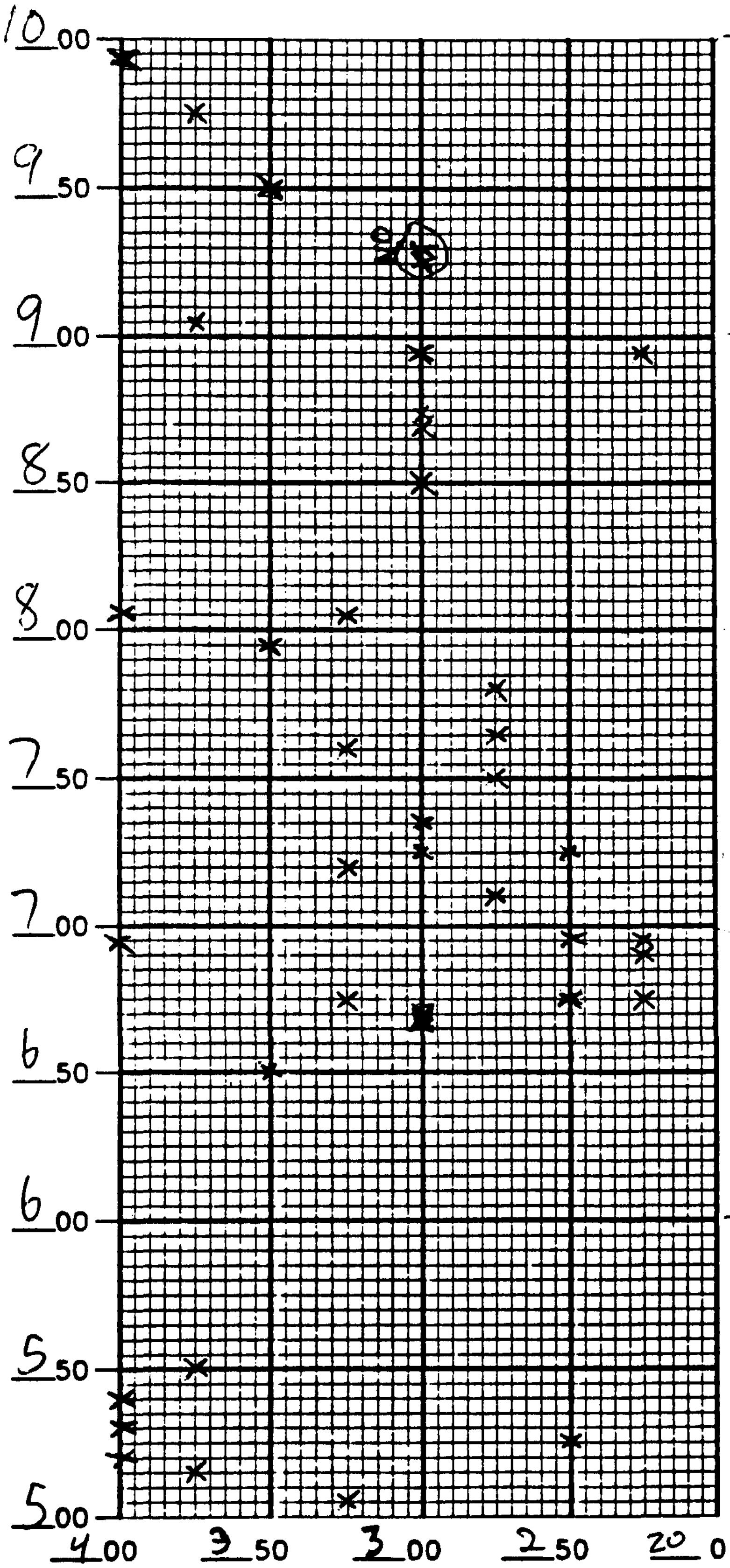
AREA C/B/ (Tier) SENIOR UXO SUPERVISOR [signature] DATE 10/19/94 10/24/94 BM/MK

SHEET # 1 of 9 ES FIELD MANAGER [signature] ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES
B9-1 ... 50' B9-2 ... 95'	
B8-4 ... 5' B8-1 ... 50' 8-2 ... 74' 8-3 ... 75' 8-5 ... 90'	
B7-4 ... 95' B7-1 ... 25' B7-2 ... 25' B7-3 ... 35'	
B6-1 ... 70' B6-2 ... 75' B6-3 ... 95' B6-4 ... 95' B6-5 ... 50'	
B5-1 ... 40' B5-2 ... 30' B5-3 ... 20' B5-4 ... 25'	

AREA C / B (Tier)

SENIOR UXO SUPERVISOR [signature] DATE 10/20/94 (10/24/94 [initials] 4MK)

SHEET # 2 of 9

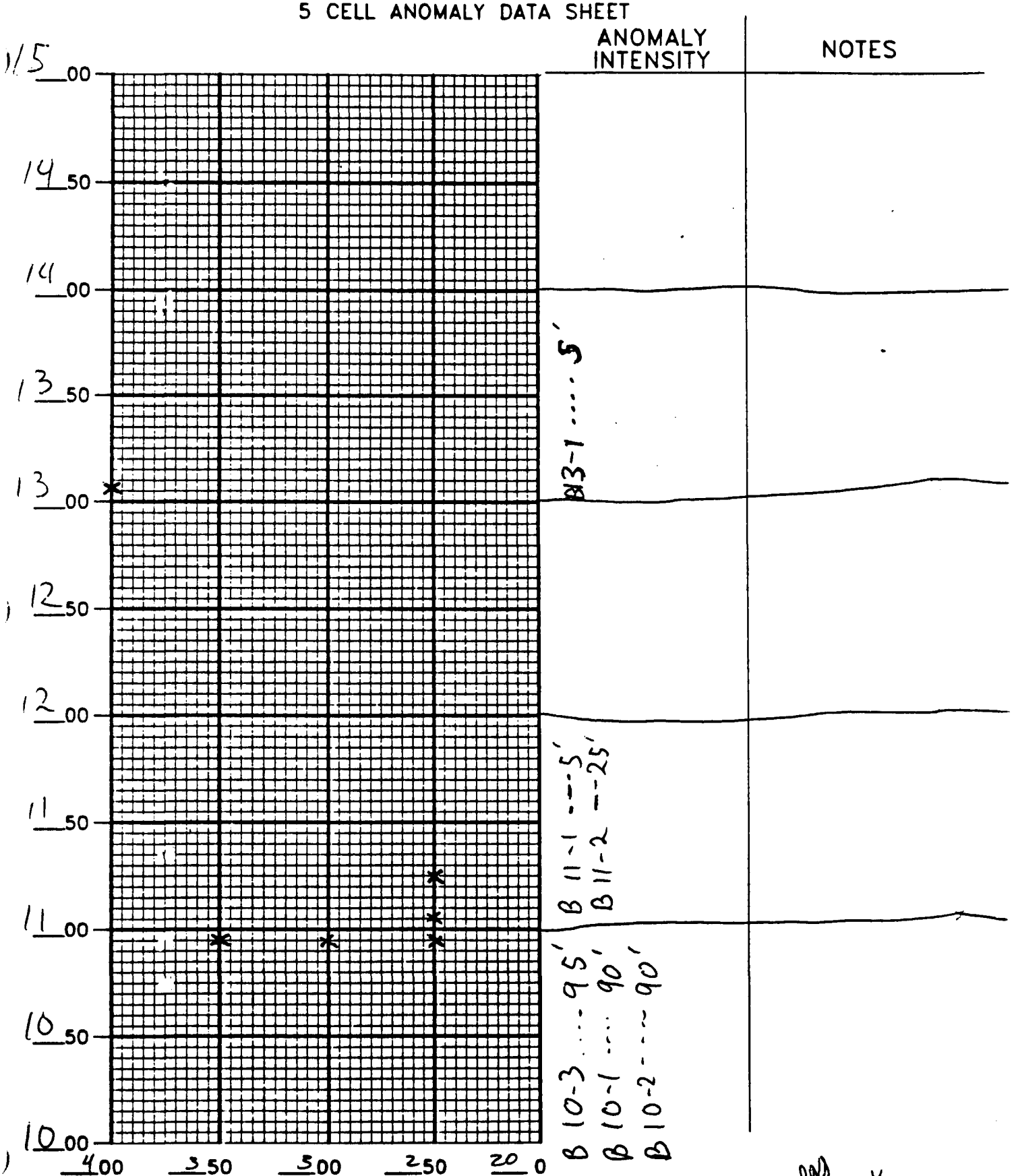
ES FIELD MANAGER 4MK

ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



AREA C Tier B SENIOR UXO SUPERVISOR [signature] DATE 10/20/94

10/24/94 [signature] JMK

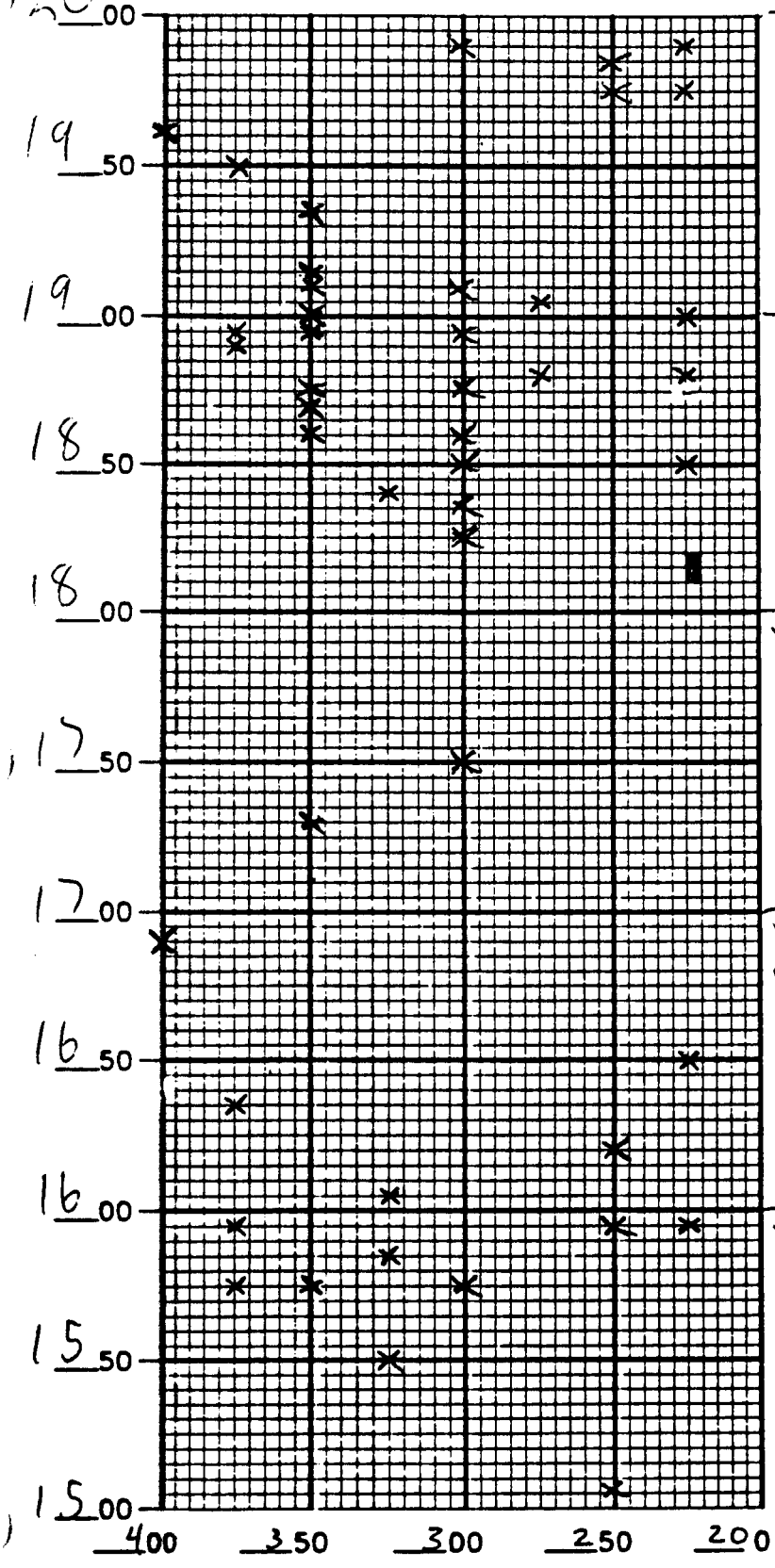
SHEET # 3 of 9 ES FIELD MANAGER JMK

ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



ANOMALY INTENSITY		NOTES	
B19-3	10'	B19-1	10'
B19-4	10'	B19-2	25'
B19-7	40'	B19-5	85'
B19-8	60'	B19-6	90'
B18-3	60'	B18-1	25'
B18-5	70'	B18-2	30'
B18-7	75'	B18-4	50'
B18-10	95'	B18-6	60'
B18-11	98	B18-6	75'
		B18-9	90'
B17-1	30'		
B17-2	50'		
B16-2	90'		
B16-1	20'		
B15-4	75'		
B15-1	5'		
B15-2	75'		
B15-3	95'		

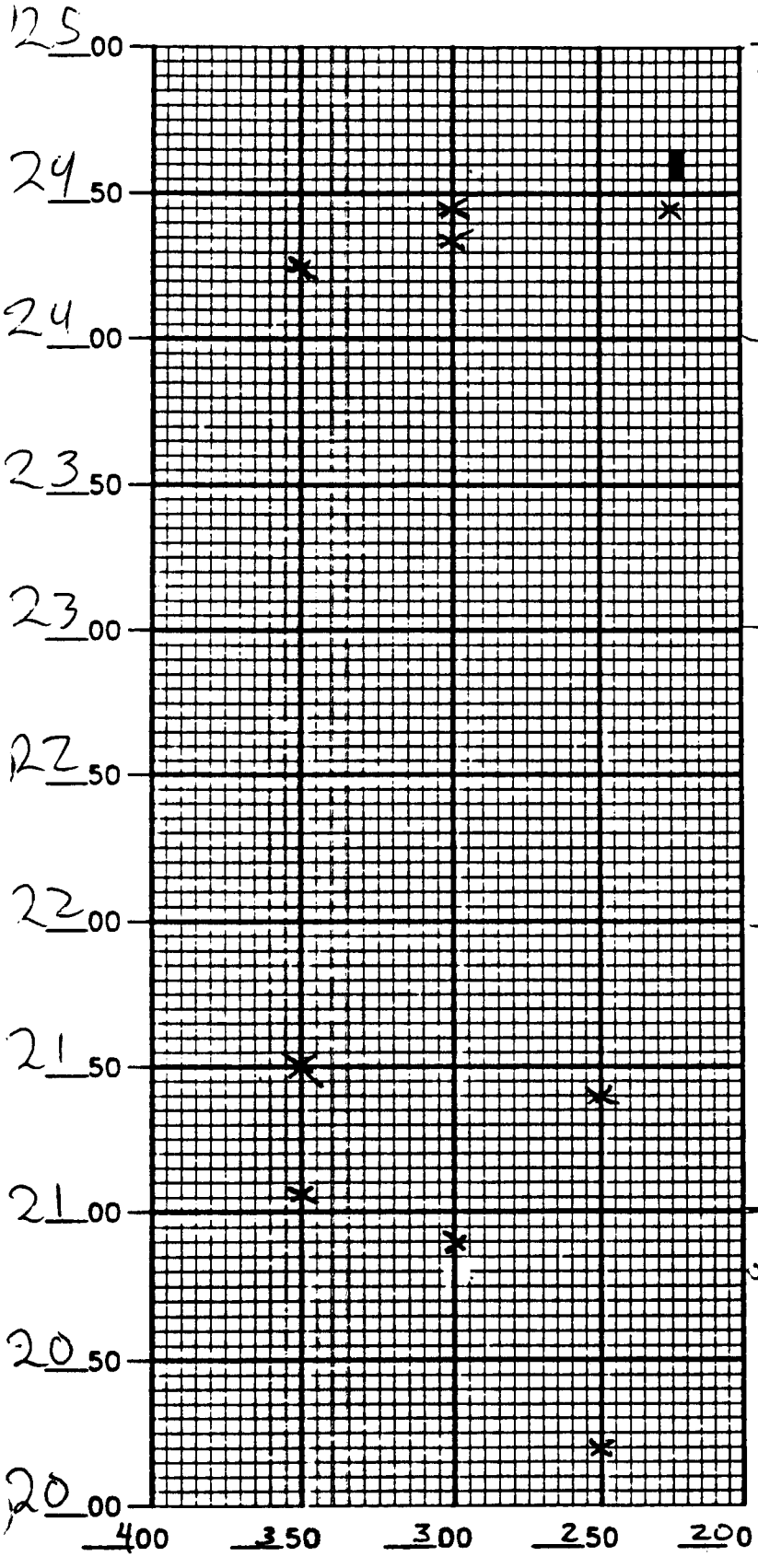
AREA C Tier B SENIOR UXO SUPERVISOR [signature] DATE 10-20-94 10/24/94 BB 4mK

SHEET # 4 of 9 ES FIELD MANAGER 4mK ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES
B24-1 ... 25' B24-2 ... 35' B24-3 ... 45'	
B21-1 ... 5' B21-2 ... 50' B21-3 ... 40'	
B20-1 ... ~~20'~~ 40' B20-2 ... ~~80'~~ 20'	

AREA C Tier B SENIOR UXO SUPERVISOR [signature] DATE 10/20/94 10/24/94 4MK

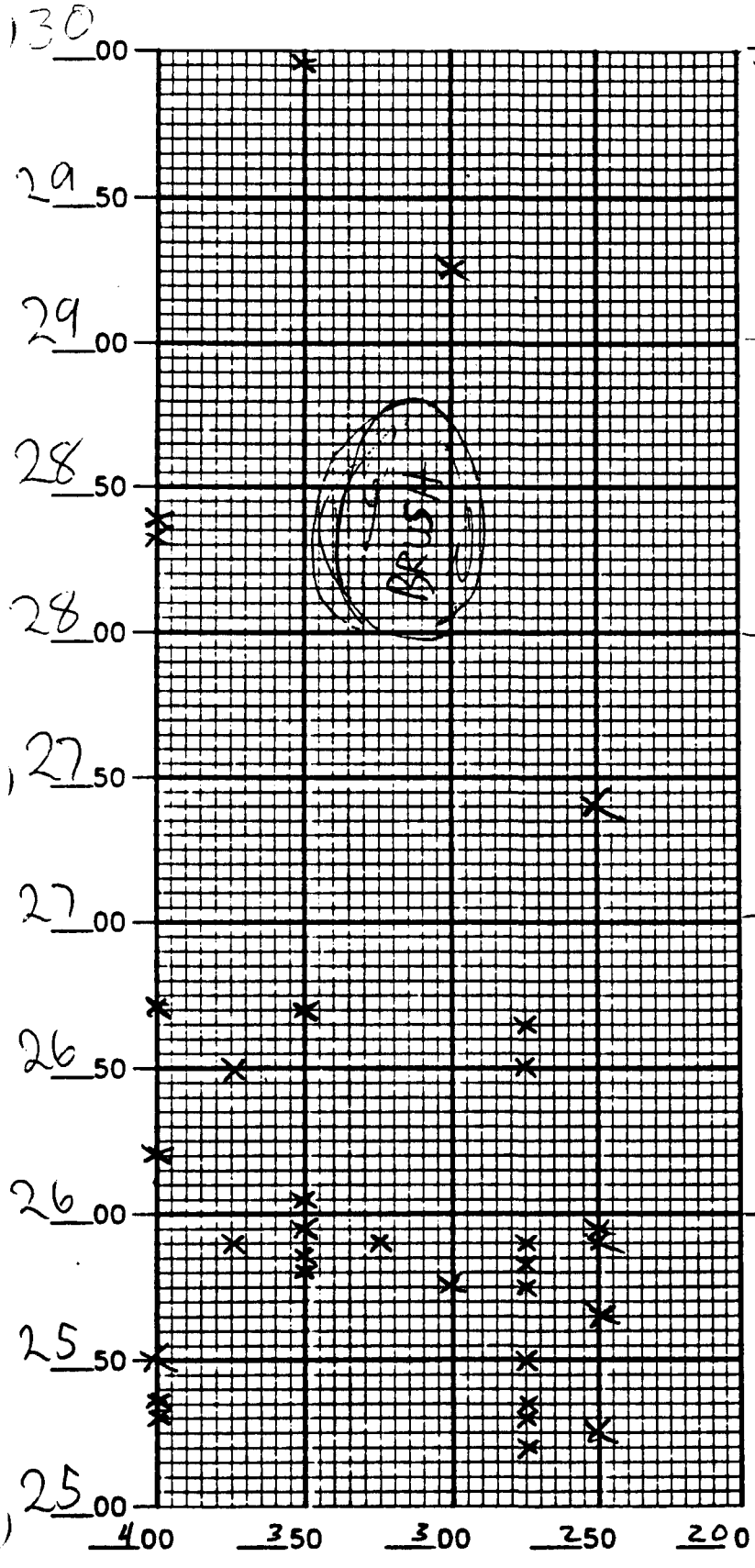
SHEET # 5 of 9 ES FIELD MANAGER 4MK

ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES
B29-1 ... 95' B29-2 ... 35'	
B28-1 ... 40 B28-2 ... 35	
B27-1 ... 40	
B26-1 ... 5' B26-2 20' B26-3 70' B26-4 70'	
B25-1 ... 20' B25-4 ... 35' B25-5 ... 50' B25-7 ... 80' B25-8 ... 85'	
B25-11 ... 95' B25-2 ... 25' B25-3 ... 75' B25-6 ... 70' B25-9 ... 90' B25-10 ... 95'	

AREA C Tier B SENIOR UXO SUPERVISOR [signature] DATE 10/24/94 AMK

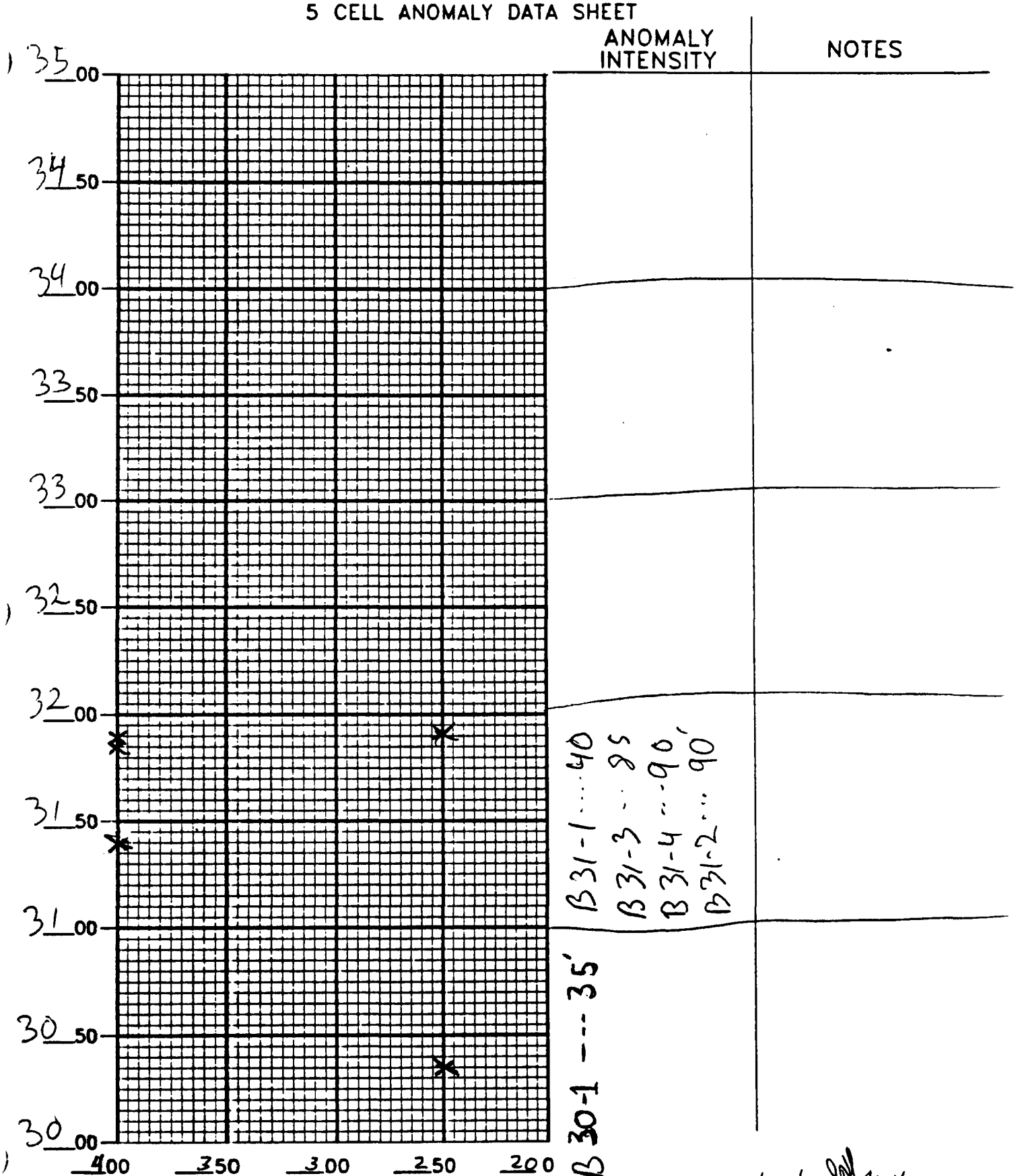
SHEET # 6 of 9 ES FIELD MANAGER AMK

ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES

AREA C Tier B SENIOR UXO SUPERVISOR [signature] DATE 10/20/94

10/24/94 [signature] JMK

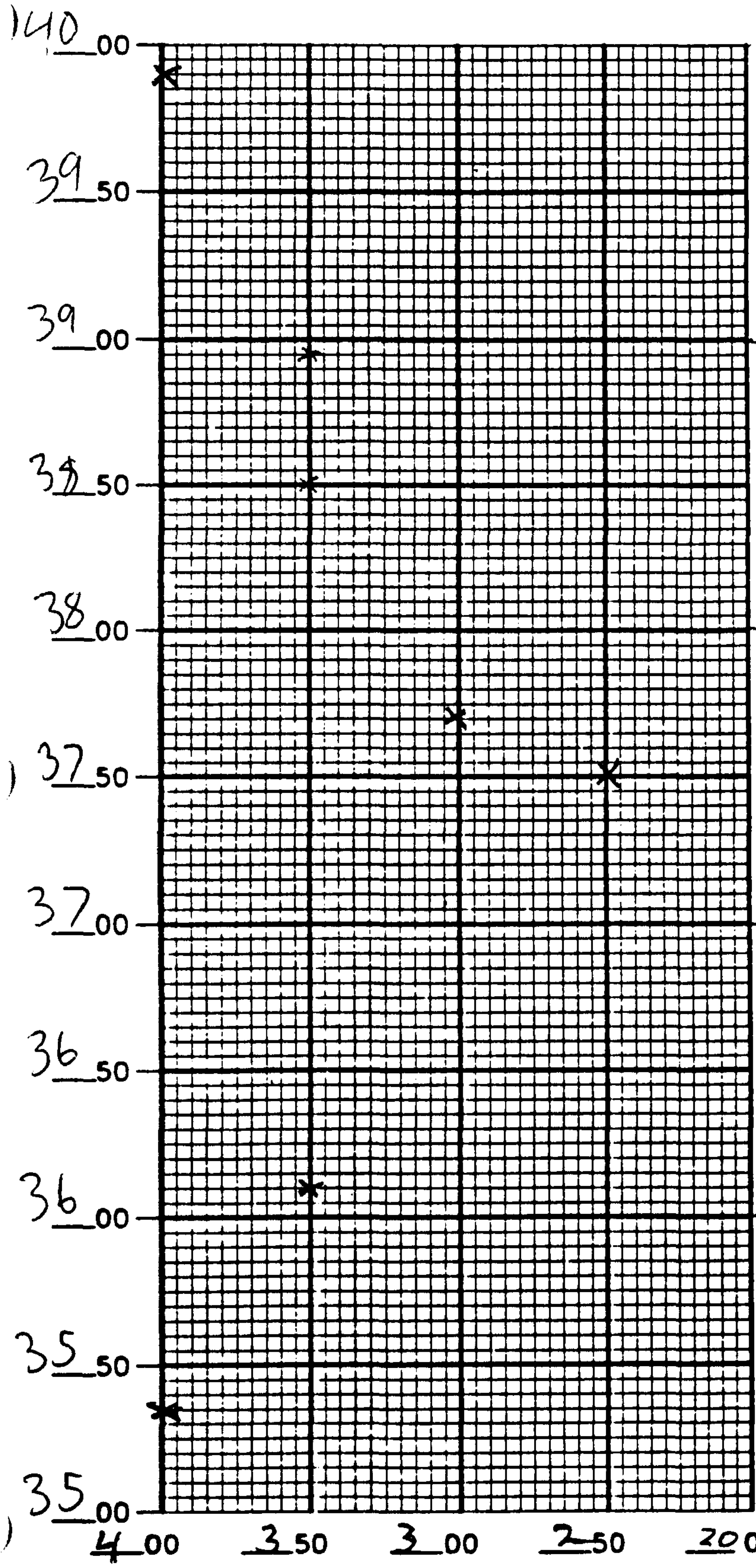
SHEET # 7 of 9 ES FIELD MANAGER JMK

ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES
39-1 — ~~40~~ 90	
38-1 — 50	
38-2 — 95	
37-1 — 70	
37-2 — 50	
B36-1 — 10	
B35-1 ... 35	

AREA C Tier B

SENIOR UXO SUPERVISOR S.K. Schuck

DATE 10/20/94 (10/24/94 JMK)

SHEET # 8 of 9

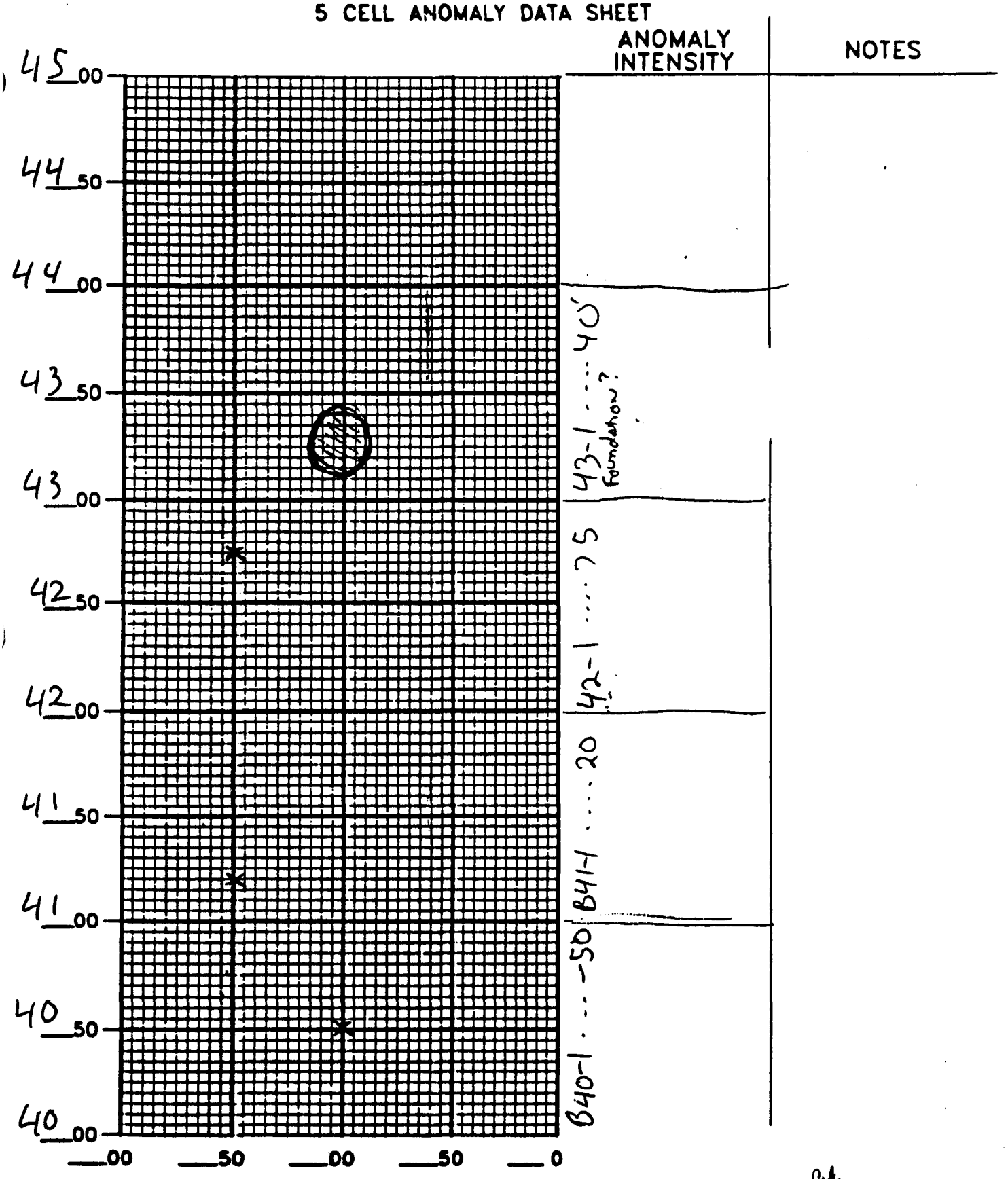
ES FIELD MANAGER JMK

ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



AREA C Tier B SENIOR UXO SUPERVISOR [signature] DATE 10/24/94

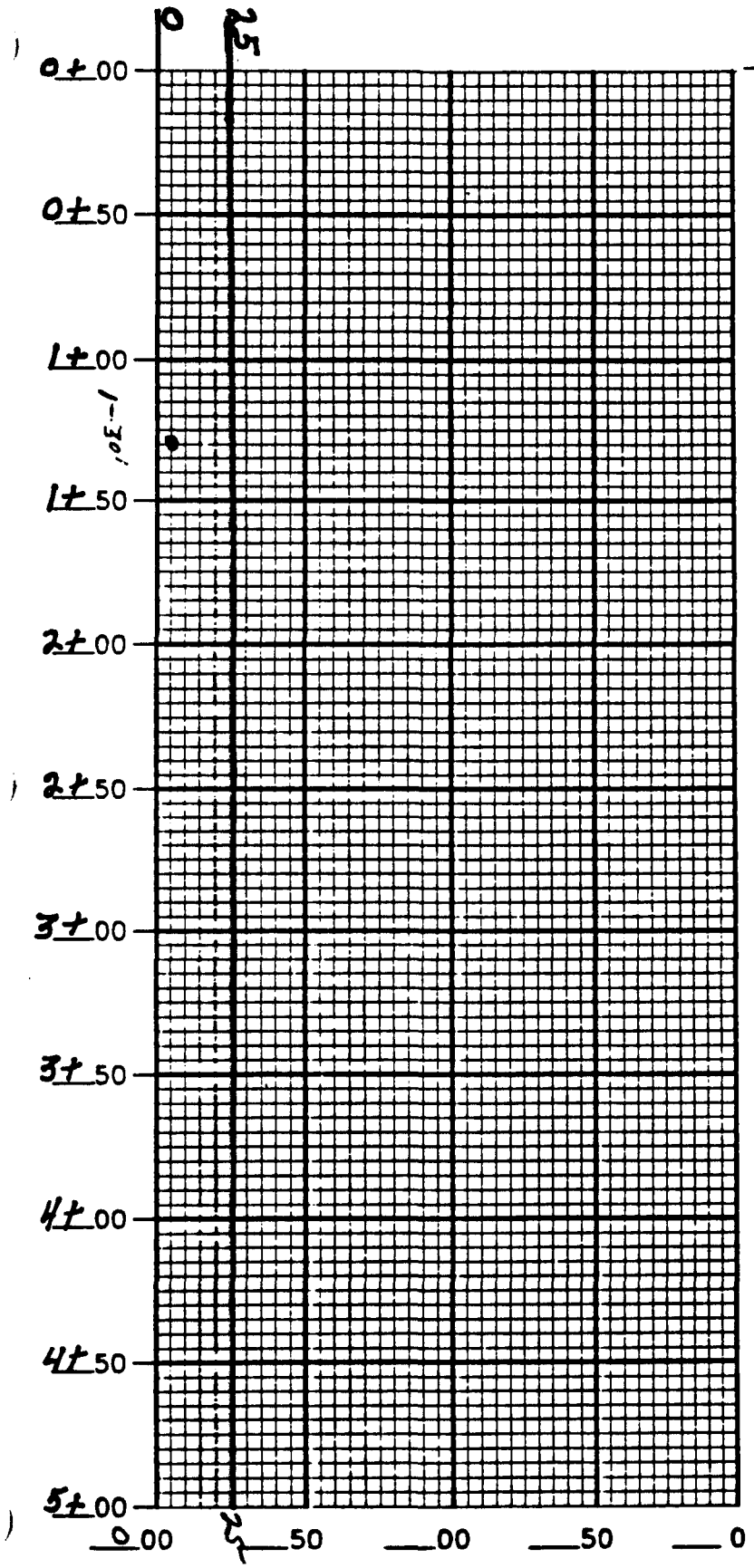
SHEET # 9 of 9 ES FIELD MANAGER [signature]

ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES

AREA C - Z GRID

SENIOR UXO SUPERVISOR [signature]

DATE 10/19/94

SHEET # 1 OF 9

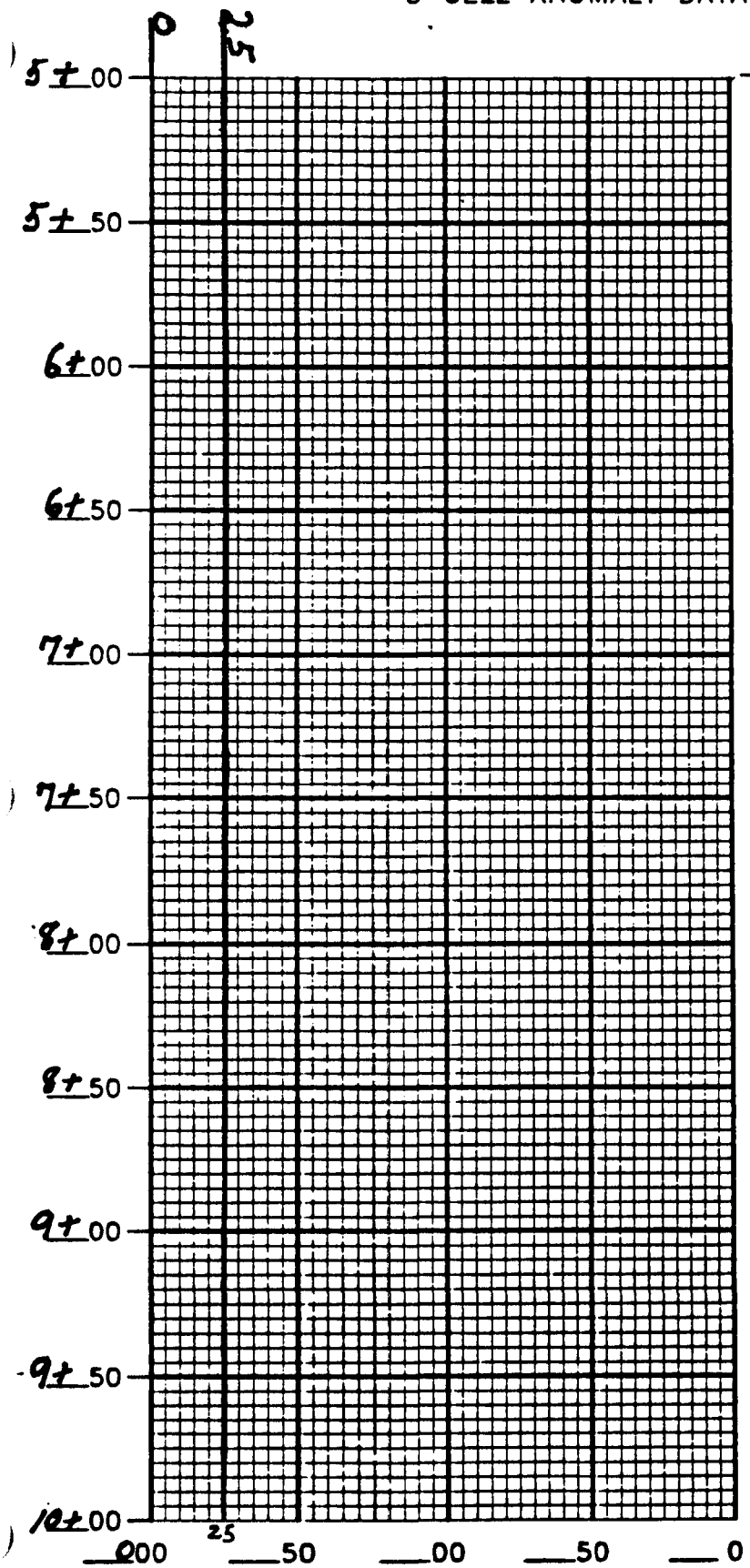
ES FIELD MANAGER [signature]

ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES

AREA C - Z" GRID

SENIOR UXO SUPERVISOR [signature]

DATE 10/19/94

SHEET # 2 - 9

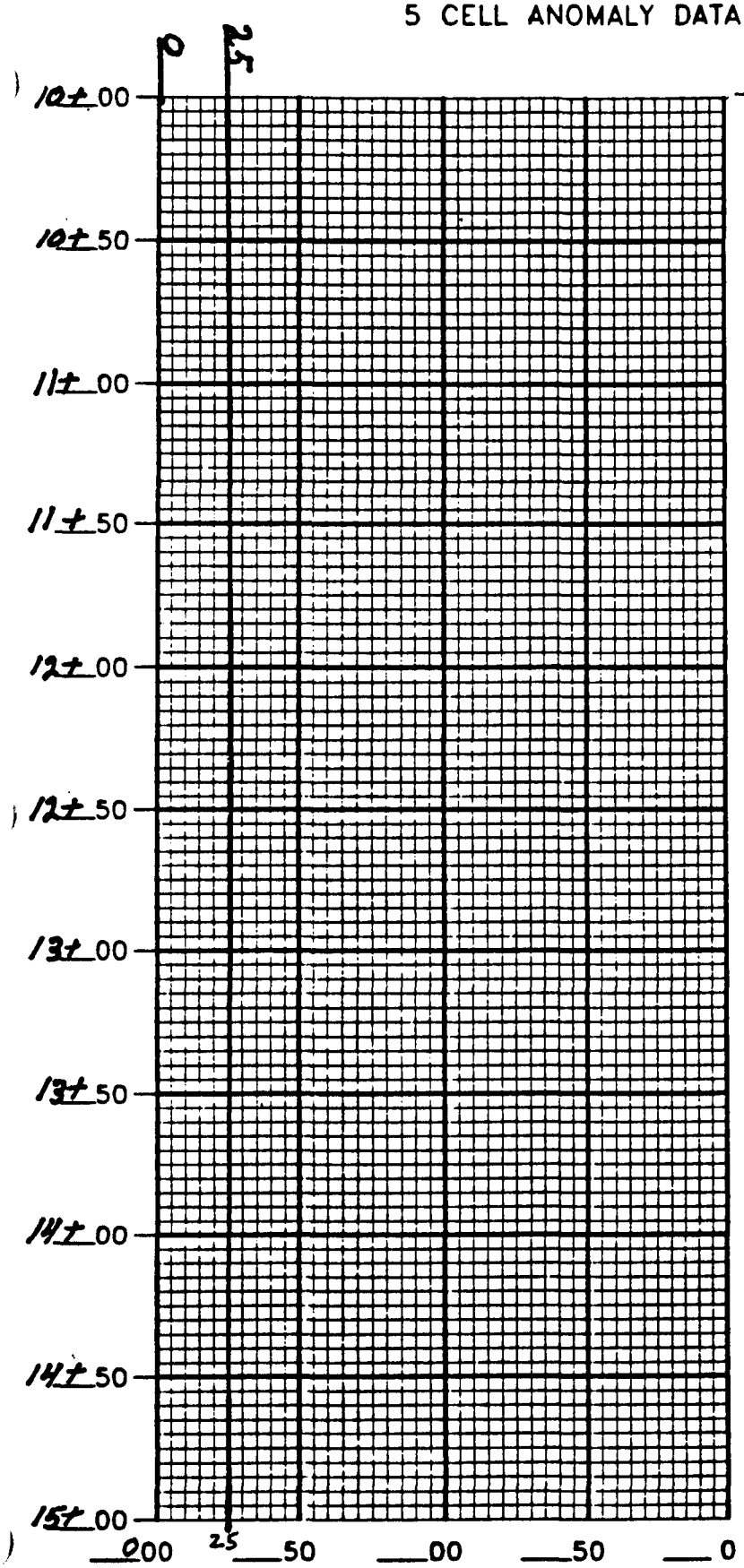
ES FIELD MANAGER JMK

ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES

AREA C 2 GRID

SENIOR UXO SUPERVISOR [signature]

DATE 10/19/94

SHEET # 3-9

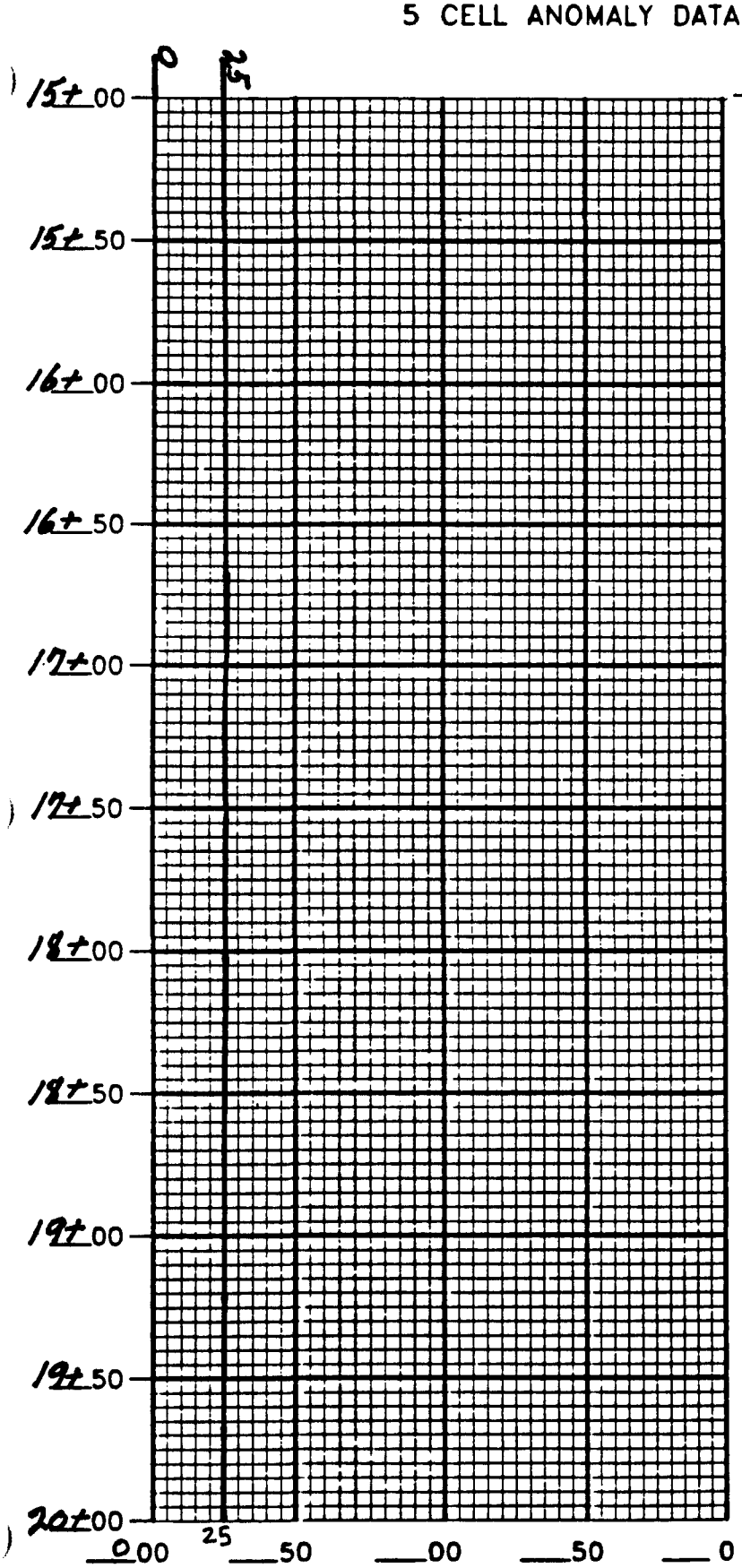
ES FIELD MANAGER [signature]

ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES

AREA C 2 GRID SENIOR UXO SUPERVISOR [signature] DATE 10/19/94

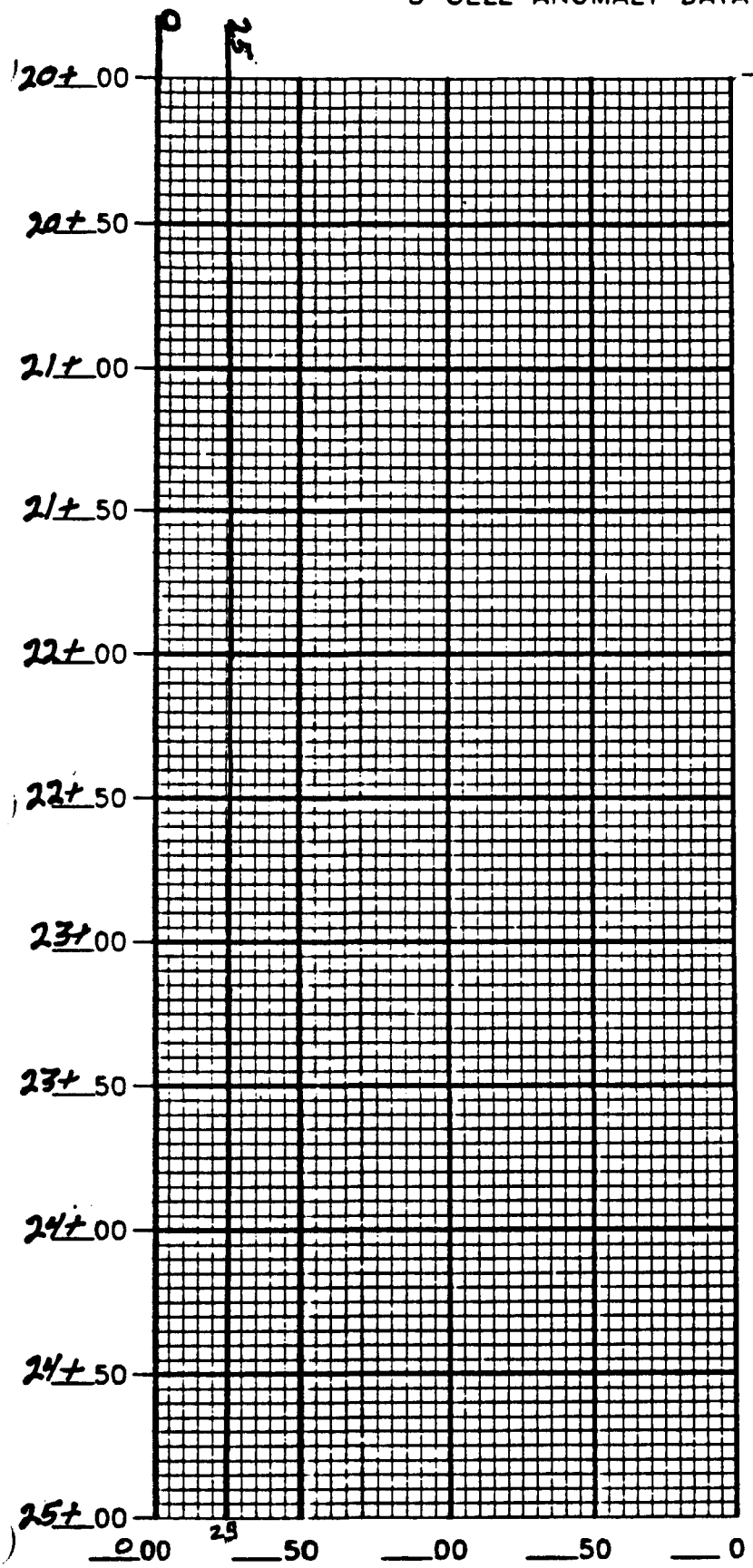
SHEET # 4 of 9 ES FIELD MANAGER JMK

ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES

AREA C 2 GRID

SENIOR UXO SUPERVISOR [illegible]

DATE 12/19/94

SHEET # 5 of 9

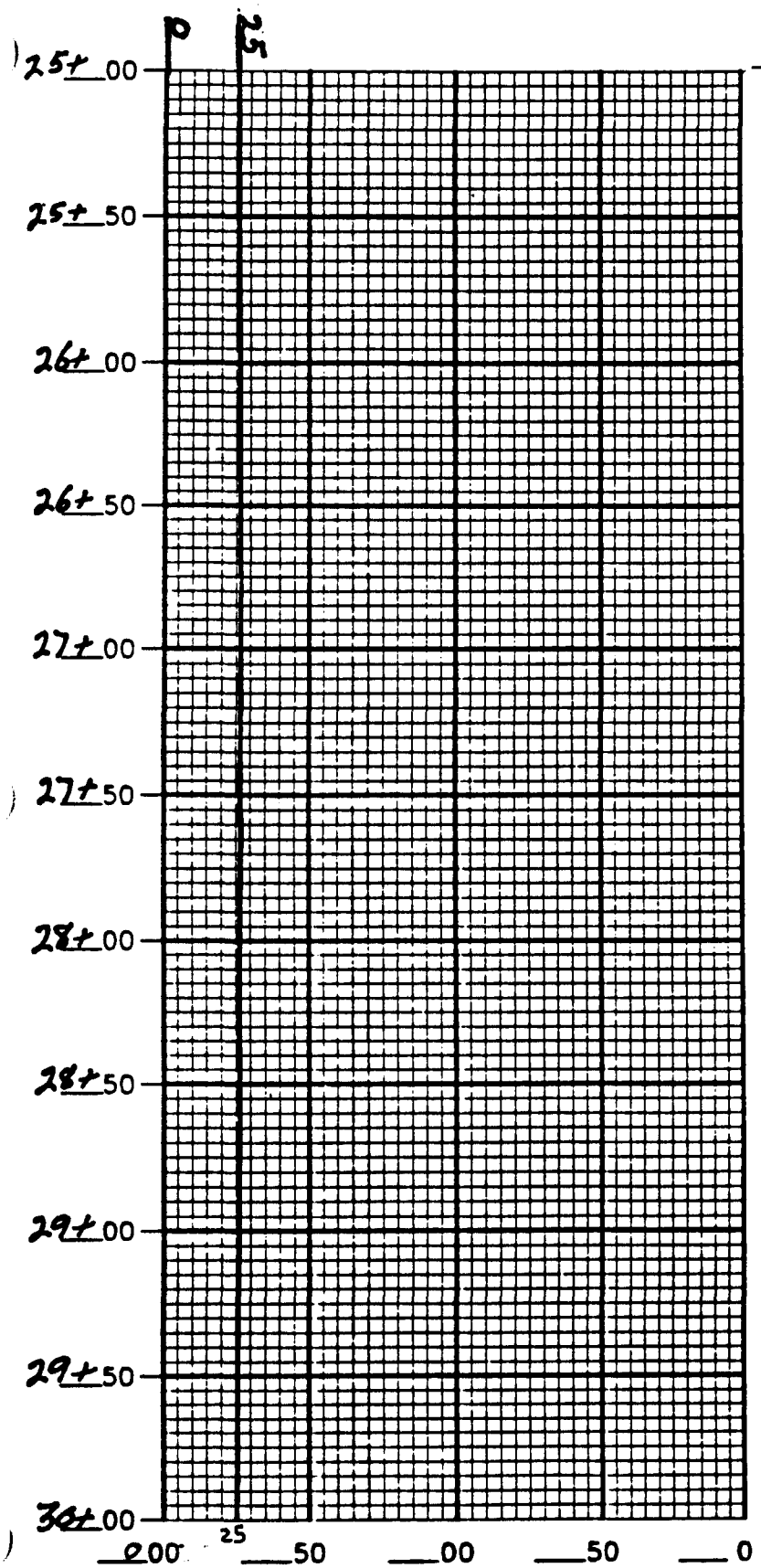
ES FIELD MANAGER [illegible]

ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES

AREA C 2 GRID

SENIOR UXO SUPERVISOR [signature]

DATE 10/19/91

SHEET # 6 of 9

ES FIELD MANAGER JMK

ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET

0 25

30+00
30+50
31+00
31+50
32+00
32+50
33+00
33+50
34+00
34+50
35+00

25

0 00 — 50 — 00 — 50 — 0

ANOMALY INTENSITY	NOTES

AREA C Z GRID

SENIOR UXO SUPERVISOR [signature]

DATE 10/20/94

SHEET # 7/9

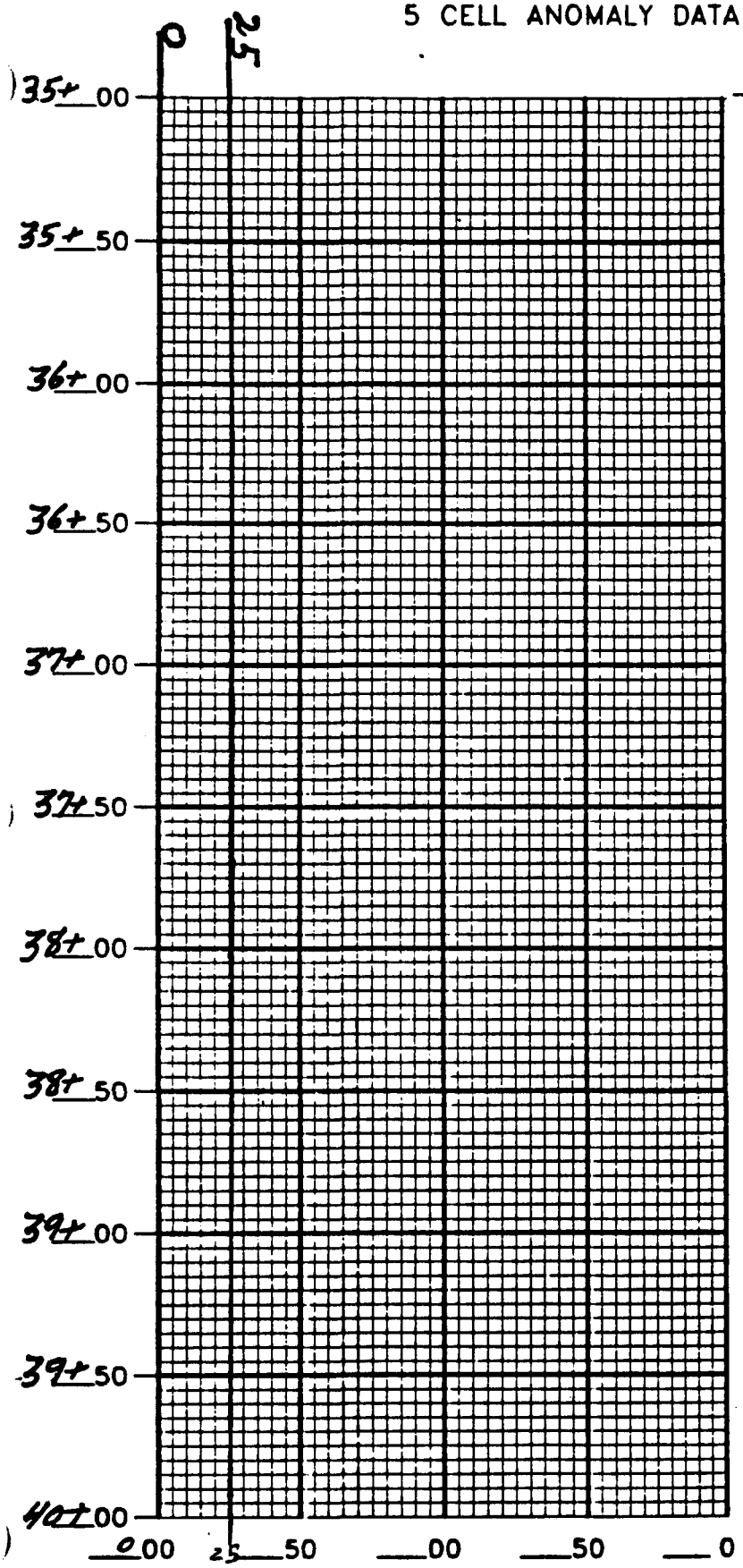
ES FIELD MANAGER JMK

ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES

AREA C 2 GRID

SENIOR UXO SUPERVISOR [signature]

DATE 10/20/94

SHEET # 8 / 9

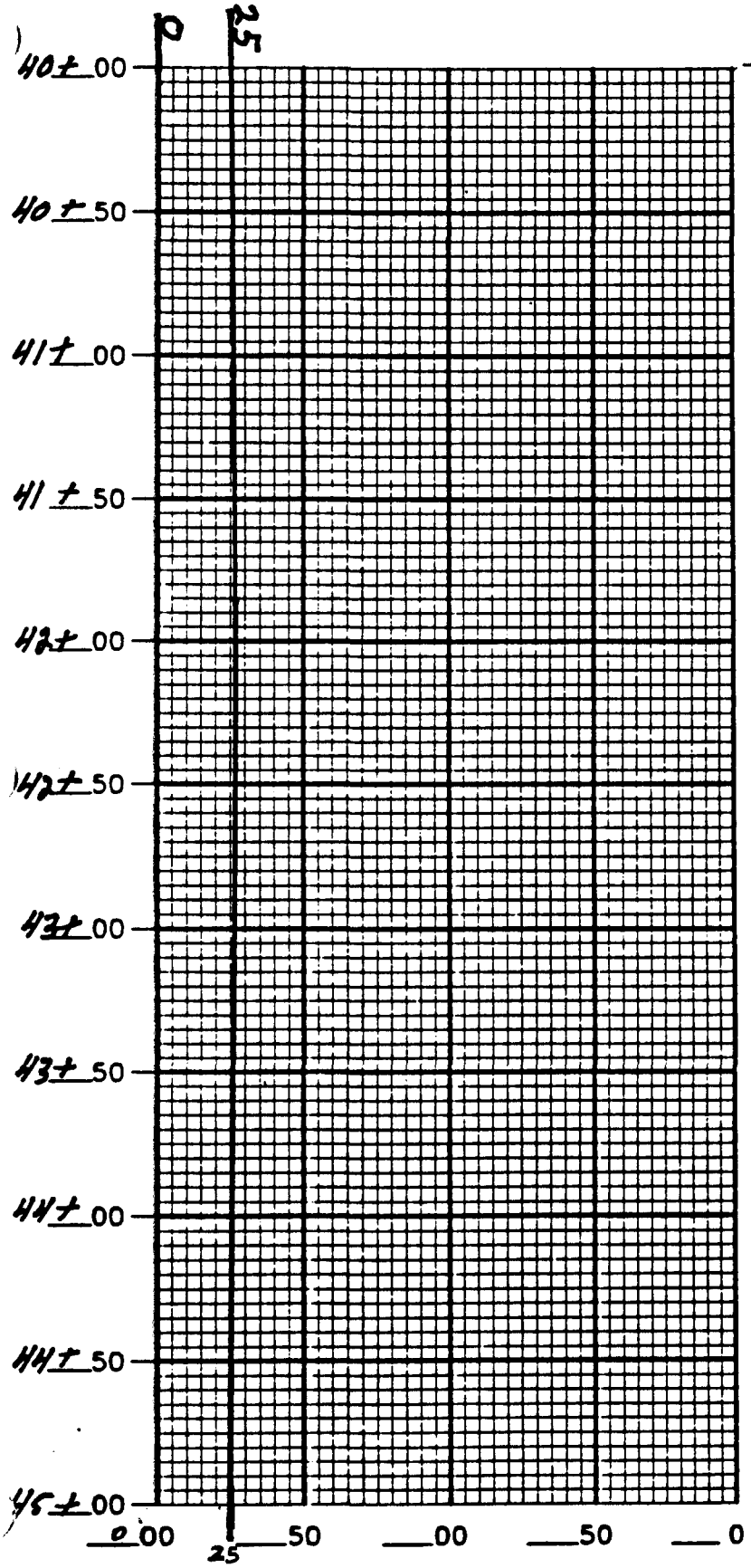
ES FIELD MANAGER [signature]

ENGINEERING-SCIENCE, INC.

Figure 2-4

ASSATEAGUE ISLAND

5 CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES

AREA C 7 GRID SENIOR UXO SUPERVISOR [signature] DATE 10/20/94

SHEET # 9 of 9 ES FIELD MANAGER JMK ENGINEERING-SCIENCE, INC.

Individual Cell Intrusive

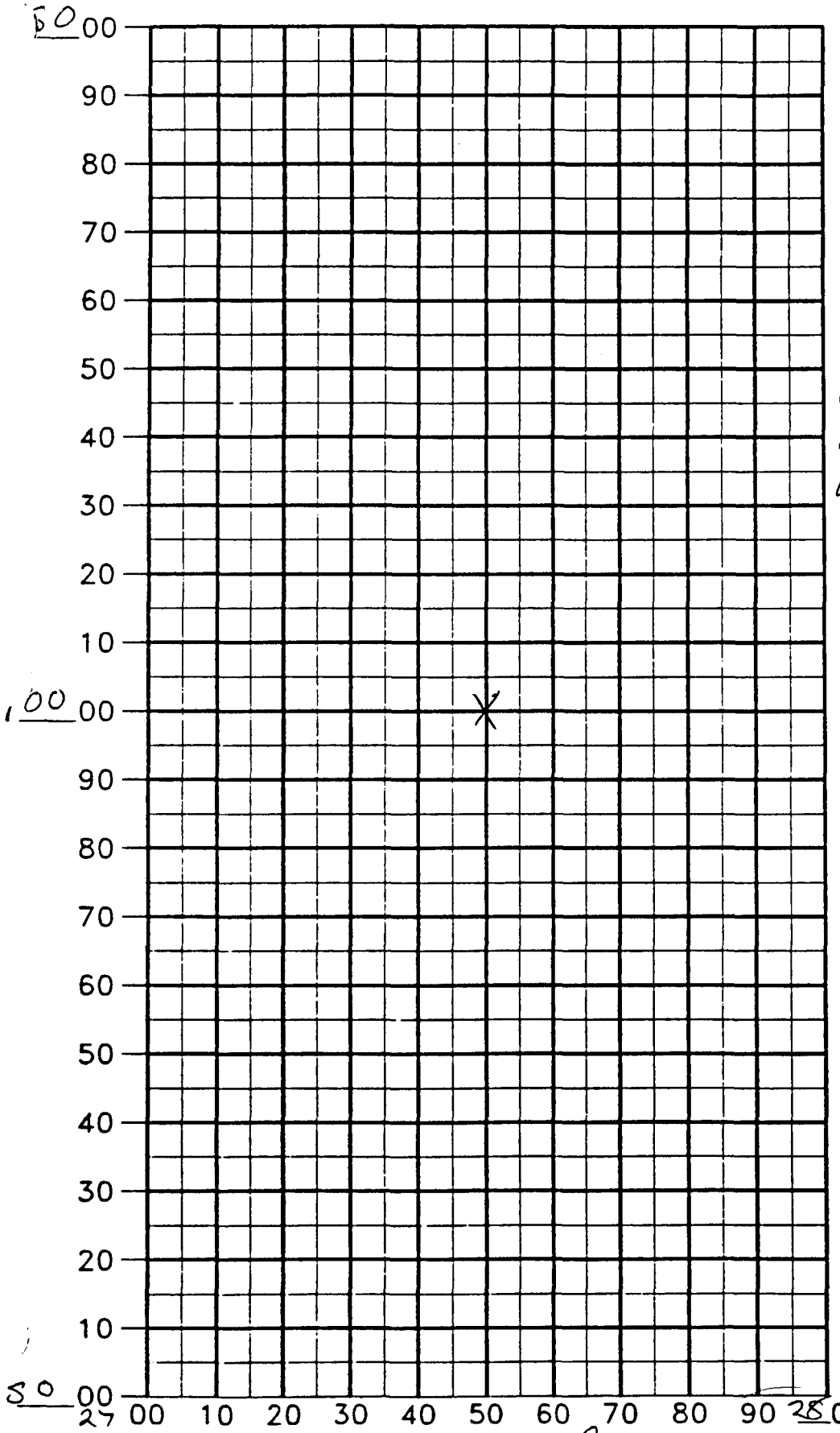
Data Sheets

Area A

Figure 2-6

ASSATEAGUE ISLAND

INDIVIDUAL CELL INTRUSIVE DATA SHEET



ANOMALY INTENSITY	NOTES
	27-1 2,2S SCRAP DEPTH 5.5'
ONLY ONE WAS MADE LARGE ANOMALY	INVESTIGATION IN THIS

AREA A TIER A cell 2700

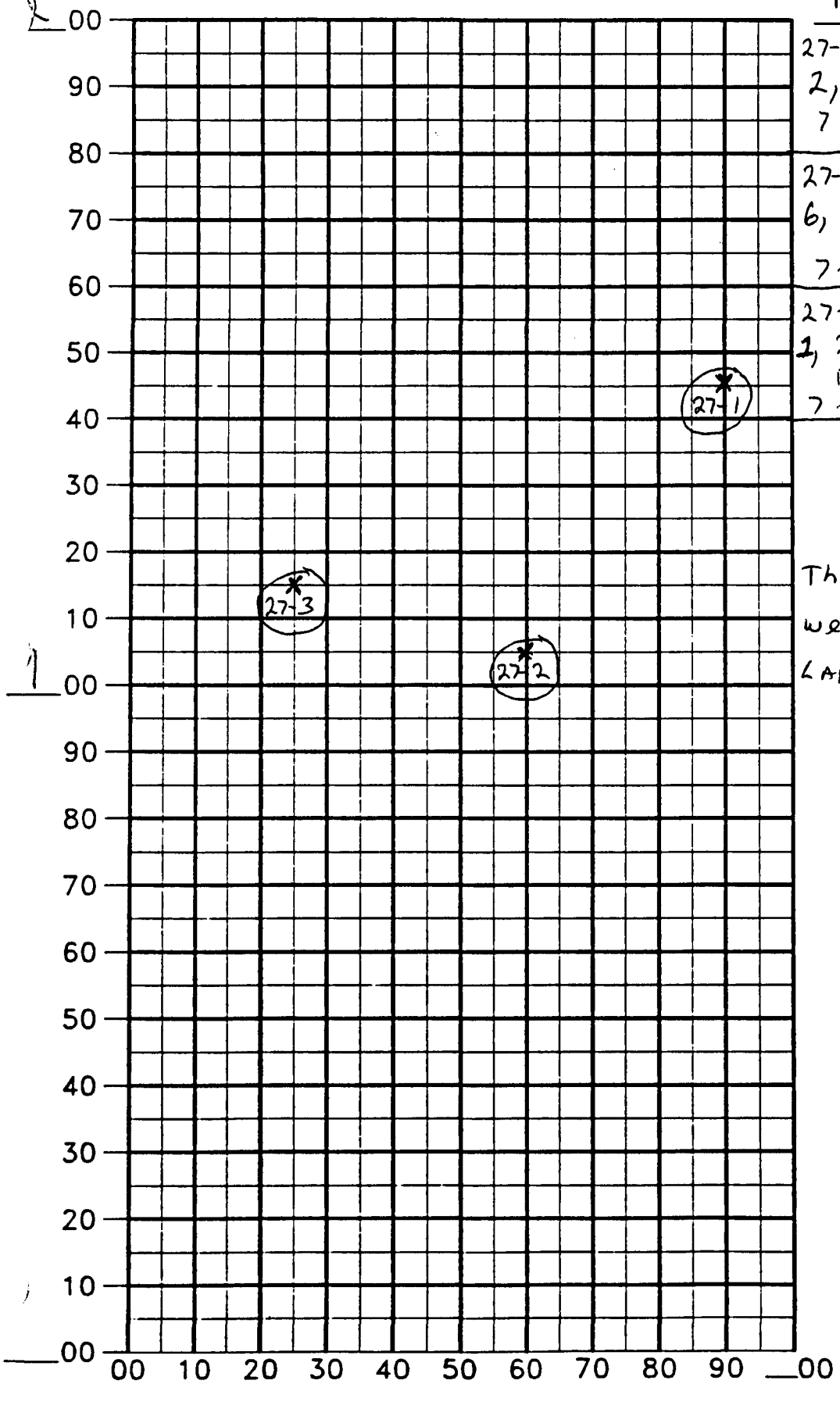
SENIOR UXO SUPERVISOR J M L

DATE 11-14-94

Figure 2-6

ASSATEAGUE ISLAND

INDIVIDUAL CELL INTRUSIVE DATA SHEET



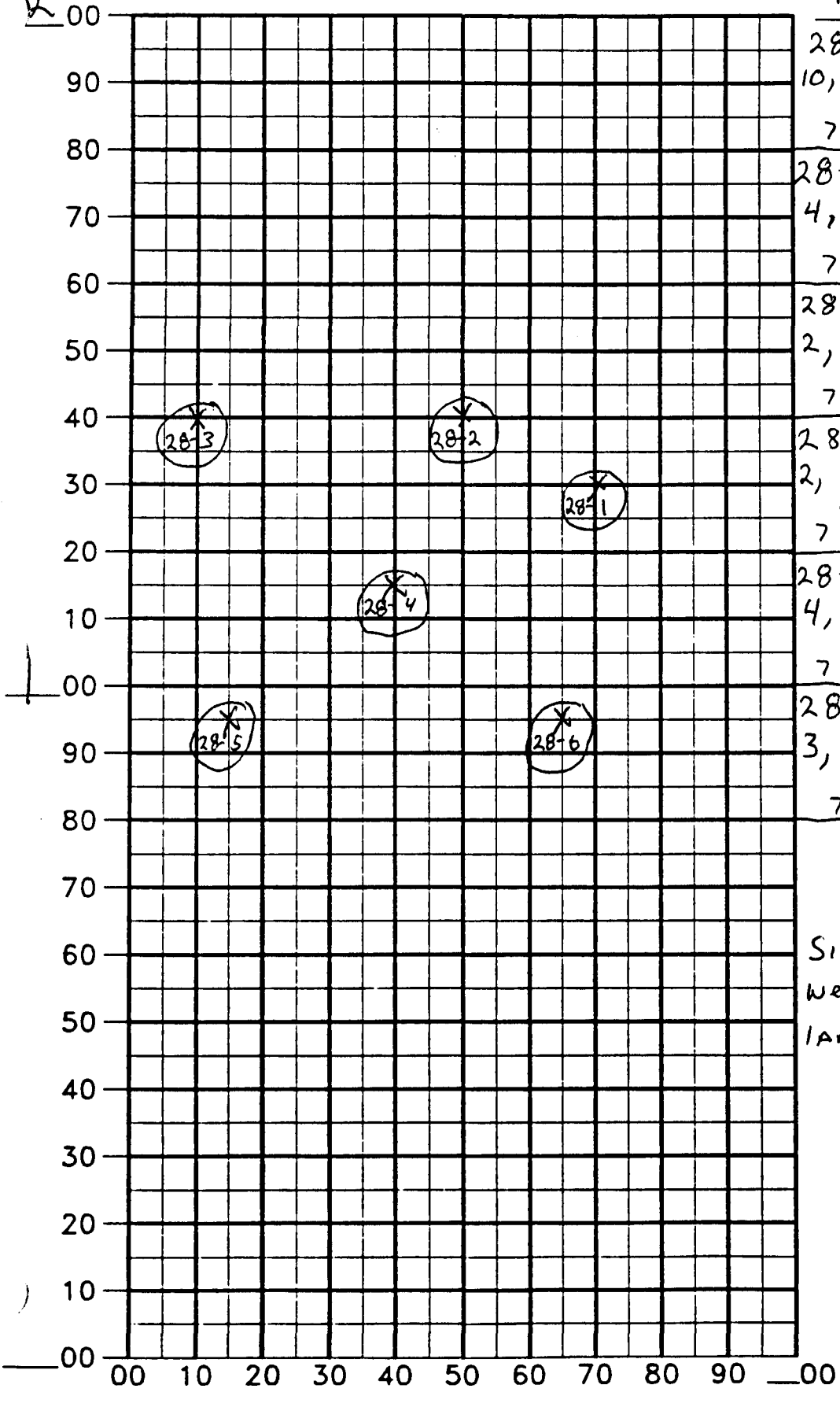
ANOMALY INTENSITY	NOTES
27-1 2, 2.25 SCAR ROCKETS 7 feet deep	
27-2 6, 2.25 SCAR Rockets 7 feet deep	
27-3 1, 2.25 SCAR Rockets 7 feet deep	
	Three INVESTIGATIONS were made IN THIS LARGE ANOMALY

AREA A Tier A Cell 2700 SENIOR UXO SUPERVISOR S K Schucker DATE 11/15/94

Figure 2-6

ASSATEAGUE ISLAND

INDIVIDUAL CELL INTRUSIVE DATA SHEET



ANOMALY INTENSITY	NOTES
28-1 10, 2.25 SCAR Rockets 7 feet deep	
28-2 4, 2.25 SCAR Rockets 7 feet deep	
28-3 2, 2.25 SCAR Rockets 7 feet deep	
28-4 2, 2.25 SCAR Rockets 7 feet deep	
28-5 4, 2.25 SCAR Rockets 7 feet deep	
28-6 3, 2.25 SCAR Rockets 7 feet deep	
	Six Investigations were made in this large anomaly

AREA A Tier A
Cell 2800

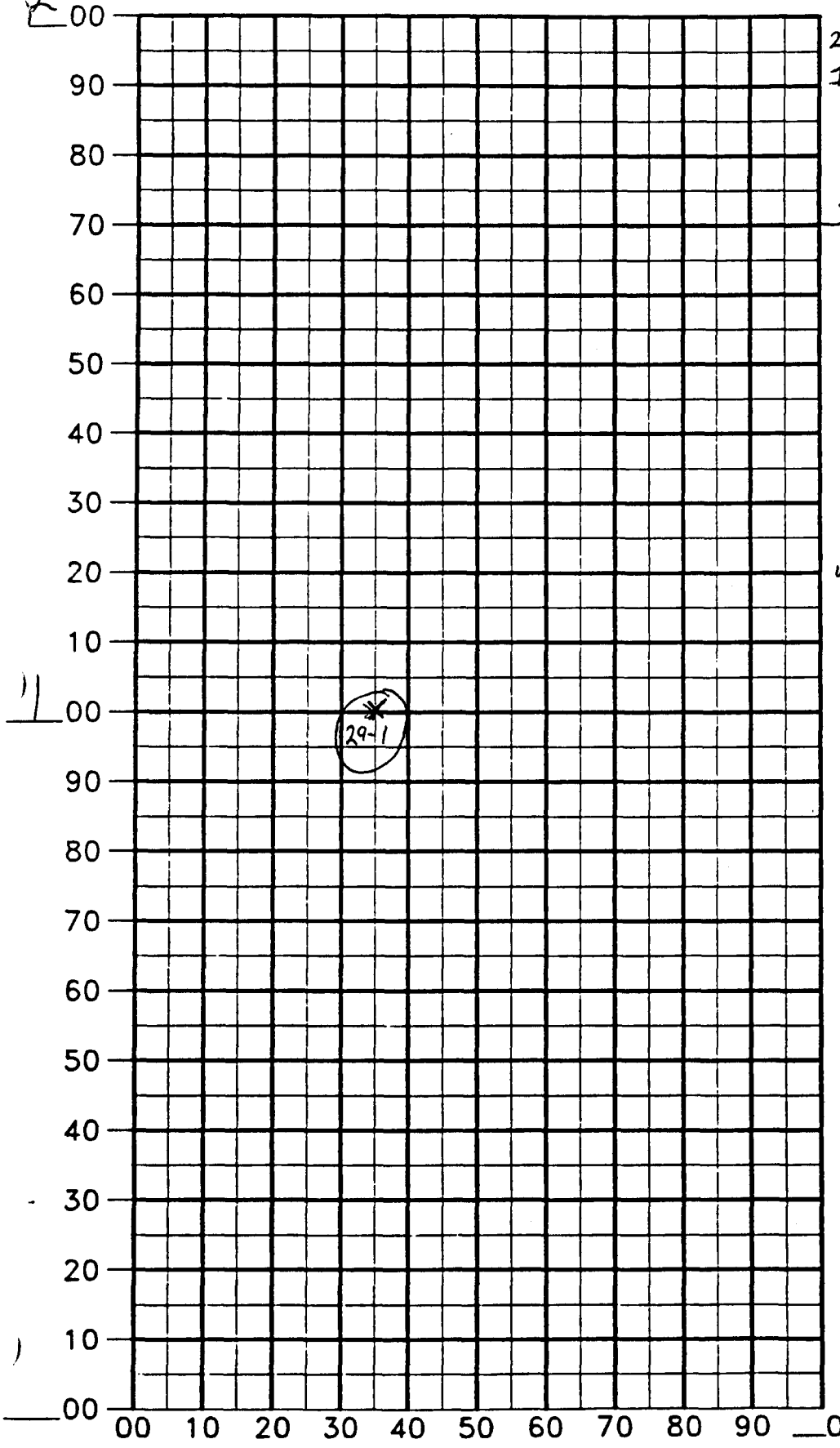
SENIOR UXO SUPERVISOR S K Schuck

DATE 11/15/94

Figure 2-6

ASSATEAGUE ISLAND

INDIVIDUAL CELL INTRUSIVE DATA SHEET



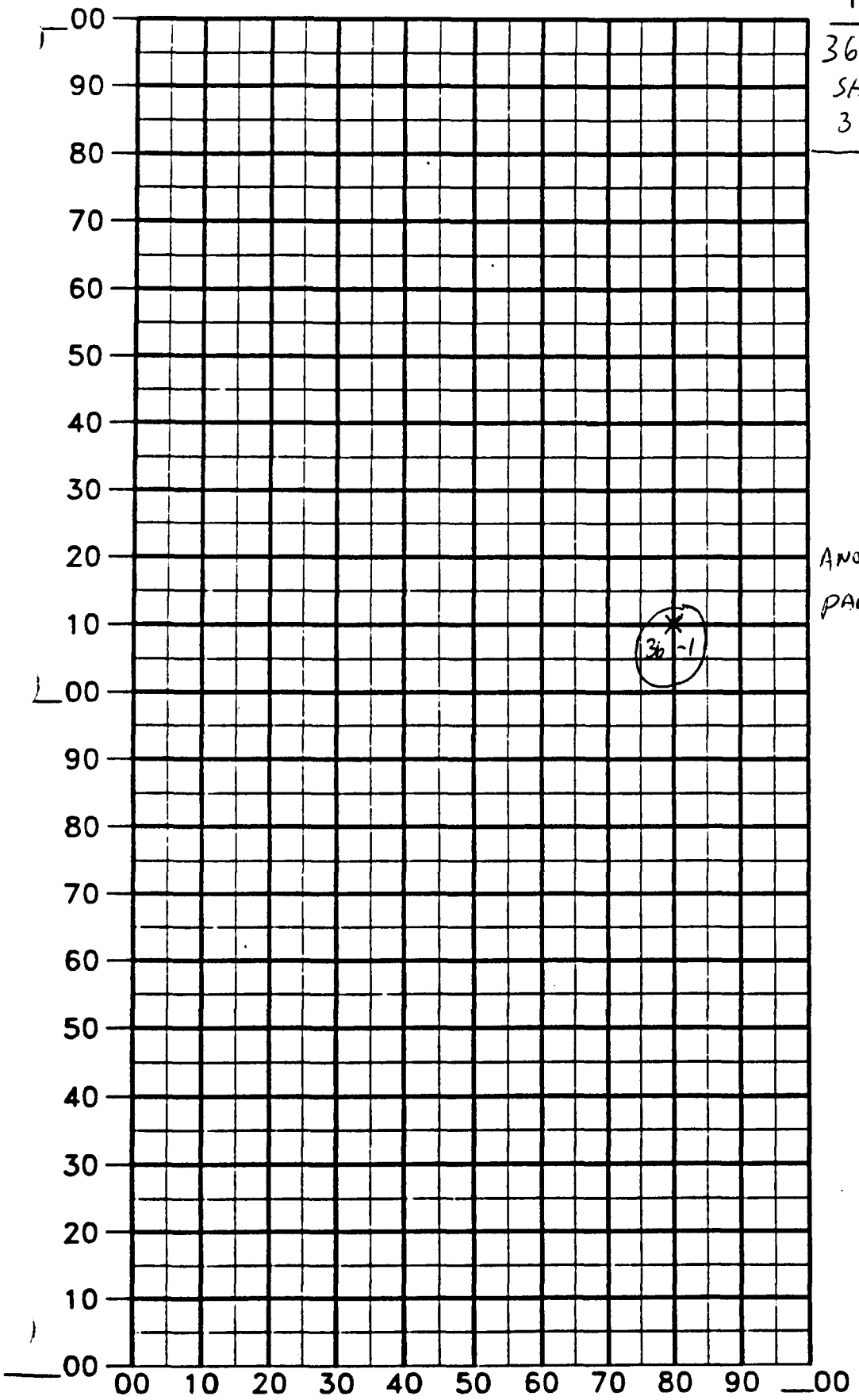
ANOMALY INTENSITY	NOTES
29-1 1, 5" HVAR Rocket WARHEAD "INERT" 3' deep	
	ANOMALY INVESTIGATED WAS JUST OUTSIDE of A Larger ANOMALY

AREA A Tier A Cell 2900 SENIOR UXO SUPERVISOR LK Schucker DATE 11/15/94

Figure 2-6

ASSATEAGUE ISLAND

INDIVIDUAL CELL INTRUSIVE DATA SHEET



ANOMALY INTENSITY	NOTES
36-1 SHIP WRECK 3 feet deep	

ANOMALY INVESTIGATED IS PART of LARGE ANOMALY

AREA A Tier A Cell 3600 SHEET #

SENIOR UXO SUPERVISOR SK Schuebe

ES FIELD MANAGER

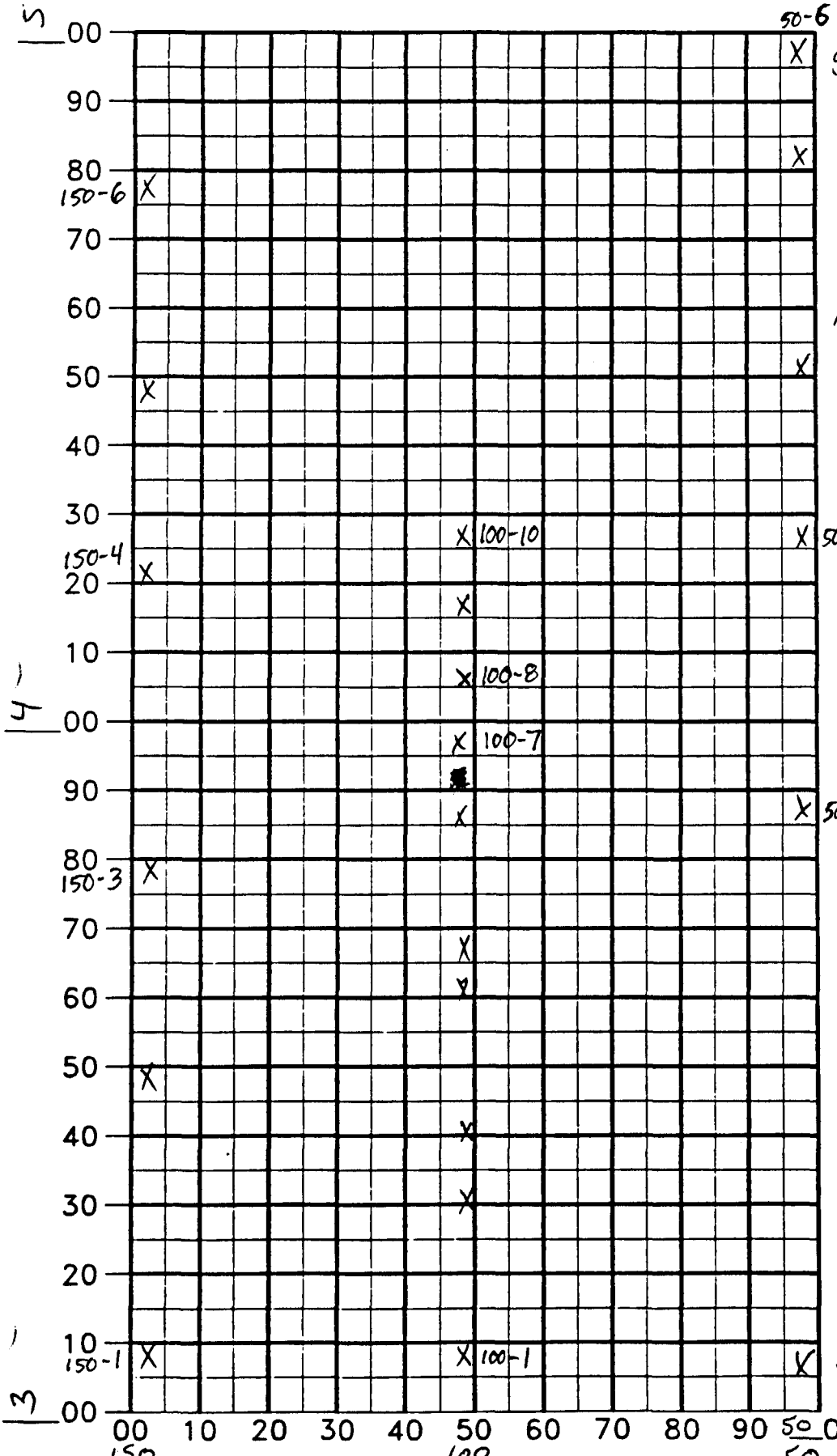
DATE 11/15/94

ENGINEERING-SCIENCE, INC.

Figure 2-6

ASSATEAGUE ISLAND

INDIVIDUAL CELL INTRUSIVE DATA SHEET



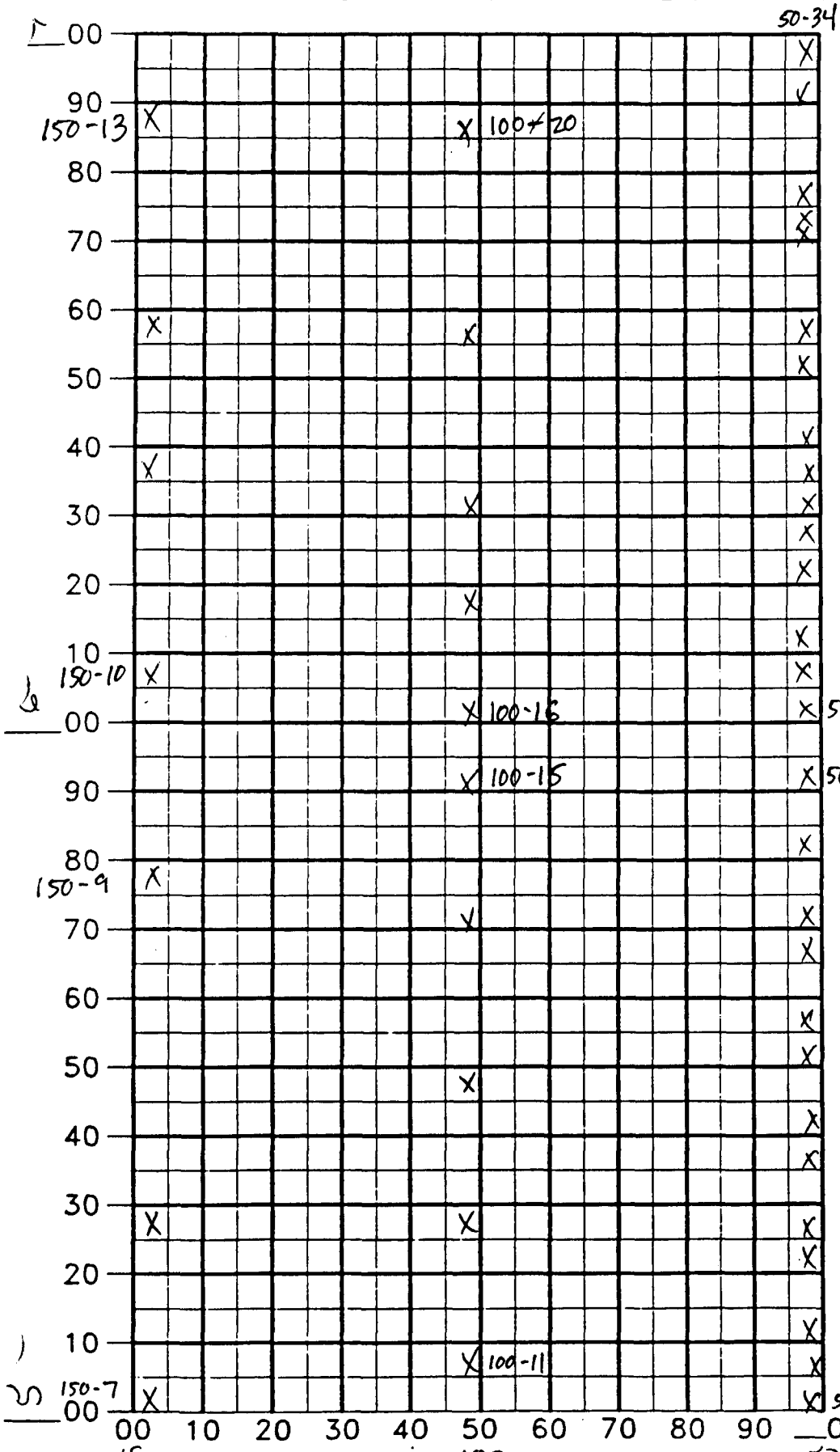
	ANOMALY INTENSITY	NOTES
		Depth
50-1	wire	0 to 6" depth
	2 wire	For all
	3 tent peg	anomalies
	4 tent peg	
	5 tent peg	
	6 wire	
100	1 wire	
	2 wire	
	3 wire	
	4 wire	
	5 wire	
	6 Tentpeg	
	7 tentpeg	
50-3	8 Spanner wrench	
	9 tent peg	
	10 wire	
150-1	tent peg	
	2 wire	
	3 wire	
50-2	4 wire	
	5 tent peg	
	6 metal fence post	

AREA A TIER B SENIOR UXO SUPERVISOR S K Schucker DATE 11/15/94

Figure 2-6

ASSATEAGUE ISLAND

INDIVIDUAL CELL INTRUSIVE DATA SHEET



	ANOMALY INTENSITY	NOTES
		Depth
50-7	wire	0 to 6" depth
	8 wire	for all anomalies
	9 wire	
	10 tent peg	
	11 tent peg	
	12 tent peg	
	13 nails	
	14 nails	
	15 staples	
	16 tent peg	
	17 tent peg	
	18 tent peg	
	19 tent peg	
	20 wire	
	21 wire	
	22 wire	
	23 wire	
	24 wire	
	25 nail	
	26 wire	
	27 wire	
	28 tent peg	
	29 wire	
	30 tent peg	
	31 tent peg	
50-20	32 tent peg	
	33 nail	
50-19	34 wire	
100-11	wire	
	12 wire	
	13 nail	
	14 screw	
	15 tent peg	
	16 tent peg	
	17 wire	
	18 wire	
	19 tent peg	
	20 tin can	
150-7	tent peg	
	8 can	
	9 wire	
	10 wire	
	11 tent peg	
	12 wire	
50-7	13 tent peg	

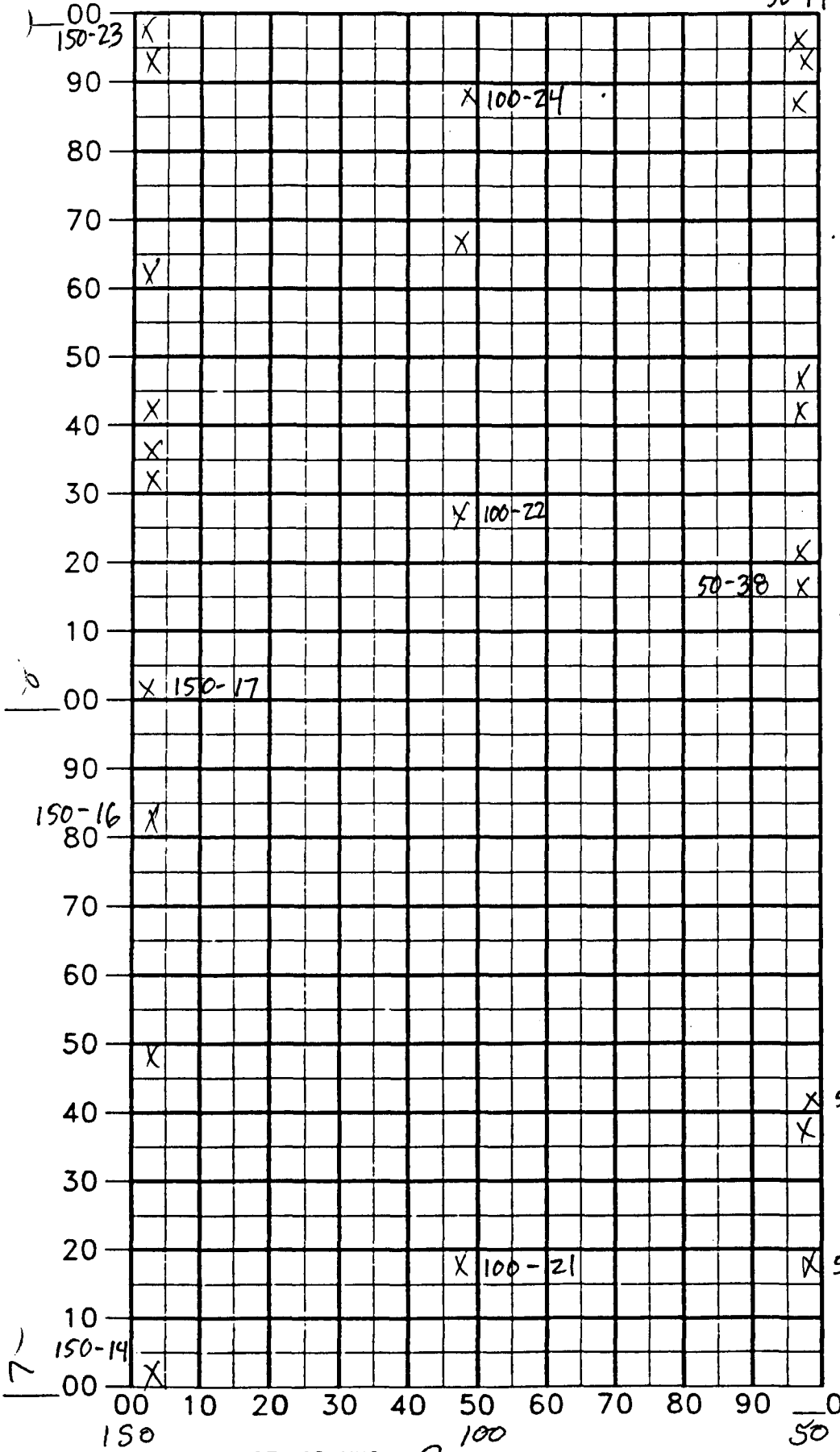
AREA A Tin B SENIOR UXO SUPERVISOR S K Schreiber DATE 11/15/94

500-600

Figure 2-6

ASSATEAGUE ISLAND

INDIVIDUAL CELL INTRUSIVE DATA SHEET



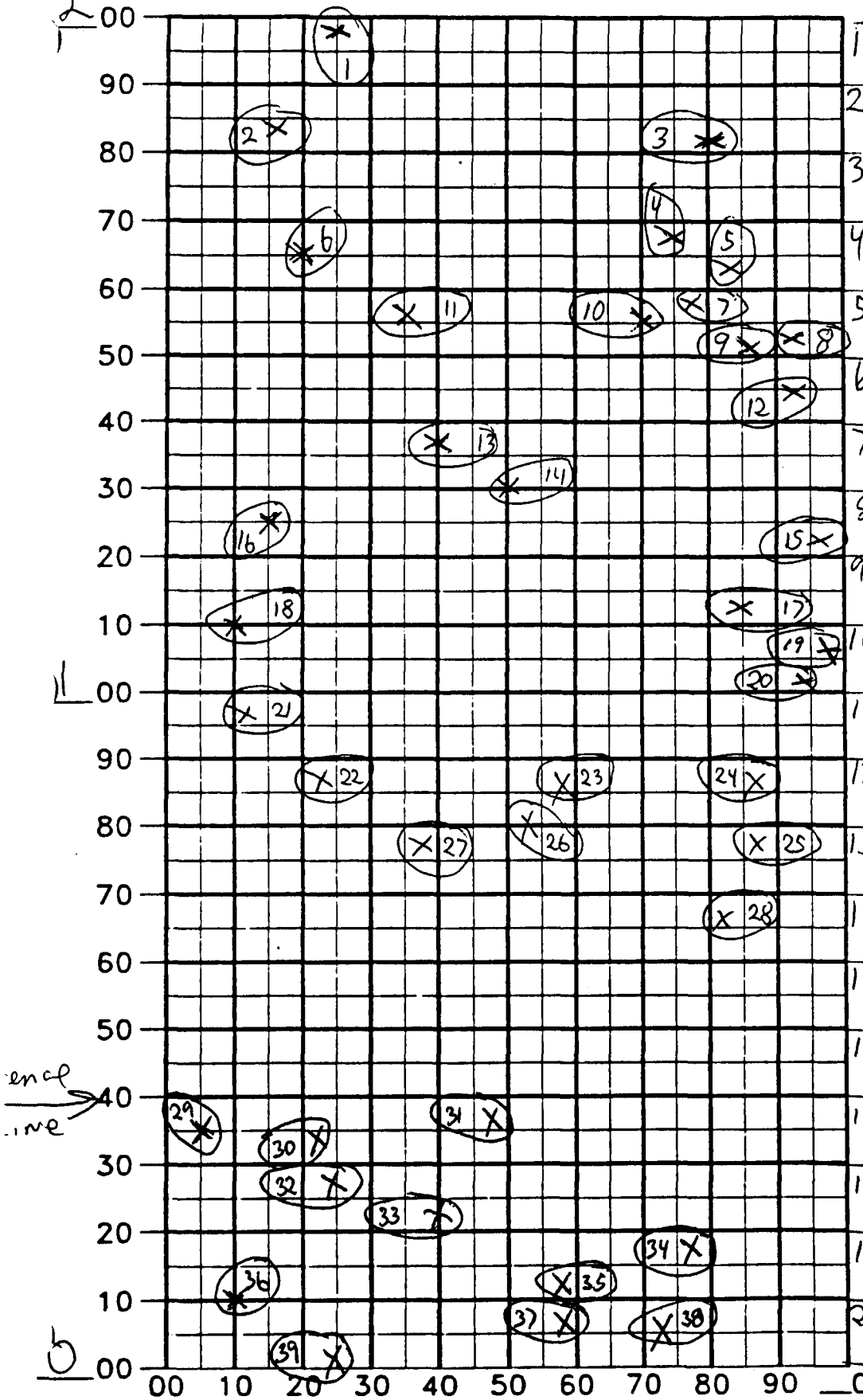
ANOMALY INTENSITY	NOTES
50-35	WIRE 0-6
36	WIRE 6
37	TENT PEG 2
38	TENT PEG 6
39	TENT PEG 3
40	WIRE 4
41	WIRE 6
42	WIRE 2
43	WIRE 3
44	WIRE 2
100-21	TENT PEG 2
22	WIRE 6
23	TENT PEG 2
24	WIRE 4
~~25~~	
150-14	TENT PEG 6
15	WIRE 2
16	TENT PEG 6
17	TENT PEG 8
18	SPANNER WRENCH 12
19	PEG 2
20	WIRE 6
21	WIRE 4
22	WIRE 6
23	WIRE 2

AREA Area B 700-800 SENIOR UXO SUPERVISOR SK Schucker DATE 11/15/94

Figure 2-6

ASSATEAGUE ISLAND

INDIVIDUAL CELL INTRUSIVE DATA SHEET



	ANOMALY INTENSITY	NOTES
1	WIRE 6"	21 WIRE 6"
2	WIRE 6"	22 WIRE 6"
3	WIRE 6"	23 WIRE 6"
4	WIRE 6"	24 WIRE 6"
5	WIRE 6"	25 WIRE 6"
6	WIRE 6"	26 WIRE 6"
7	WIRE 6"	27 WIRE 6"
8	WIRE 6"	28 WIRE 6"
9	WIRE 6"	29 WIRE 6"
10	WIRE 6"	30 WIRE 6"
11	WIRE 6"	31 WIRE 6"
12	WIRE 6"	32 WIRE 6"
13	WIRE 6"	33 WIRE 6"
14	WIRE 6"	34 WIRE 6"
15	WIRE 6"	35 WIRE 6"
16	WIRE 6"	36 WIRE 6"
17	WIRE 6"	37 WIRE 6"
18	WIRE 6"	38 WIRE 6"
19	WIRE 6"	39 WIRE 6"
20	WIRE 6"	40

AREA A, TIER B — SENIOR UXO SUPERVISOR _____ DATE 11/23/94

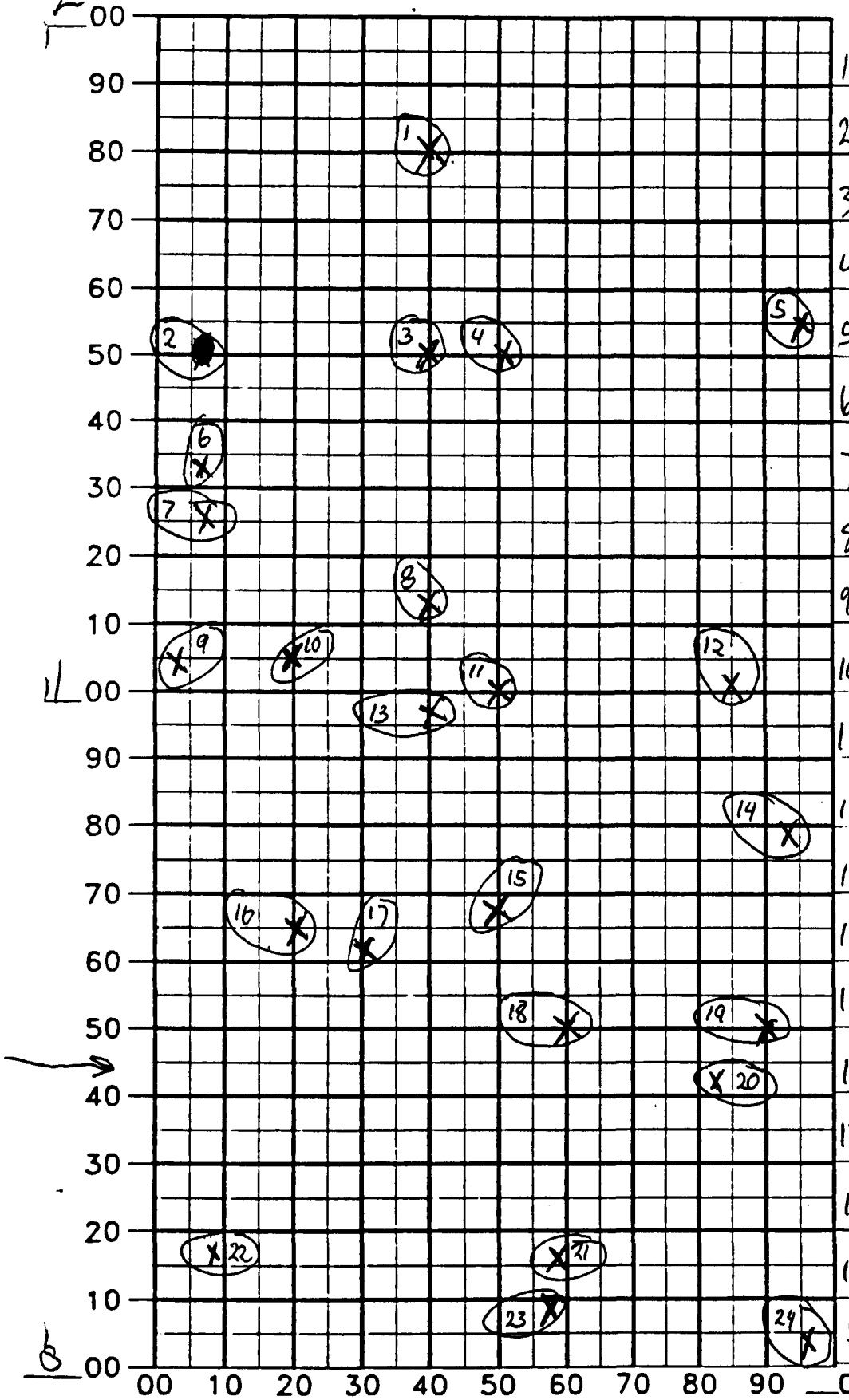
Cell 1800 — ES FIELD

ENGINEERING-SCIENCE INC

Figure 2-6

ASSATEAGUE ISLAND

INDIVIDUAL CELL INTRUSIVE DATA SHEET



ANOMALY INTENSITY	NOTES
1-WIRE 6"	21-WIRE 6'
ANOMALY 2-Deeper THAN 2'	22-WIRE 6'
3-WIRE 6"	23-WIRE 6"
4-WIRE 6"	24-WIRE 6'
5-WIRE 6"	
6-WIRE 6"	
7-WIRE 6'	
8-NAIL 6"	
9-WIRE 6"	
10-WIRE 6"	
11-WIRE 6'	
12-WIRE 6"	
13-WIRE 6'	
14-WIRE 6"	
15-WIRE 6"	
16-WIRE 6"	
17-WIRE 6'	
18-WIRE 6"	
19-WIRE 6"	
20-WIRE 6"	

AREA A Tier B — Cell 1900

SENIOR UXO SUPERVISOR _____

ES FIELD

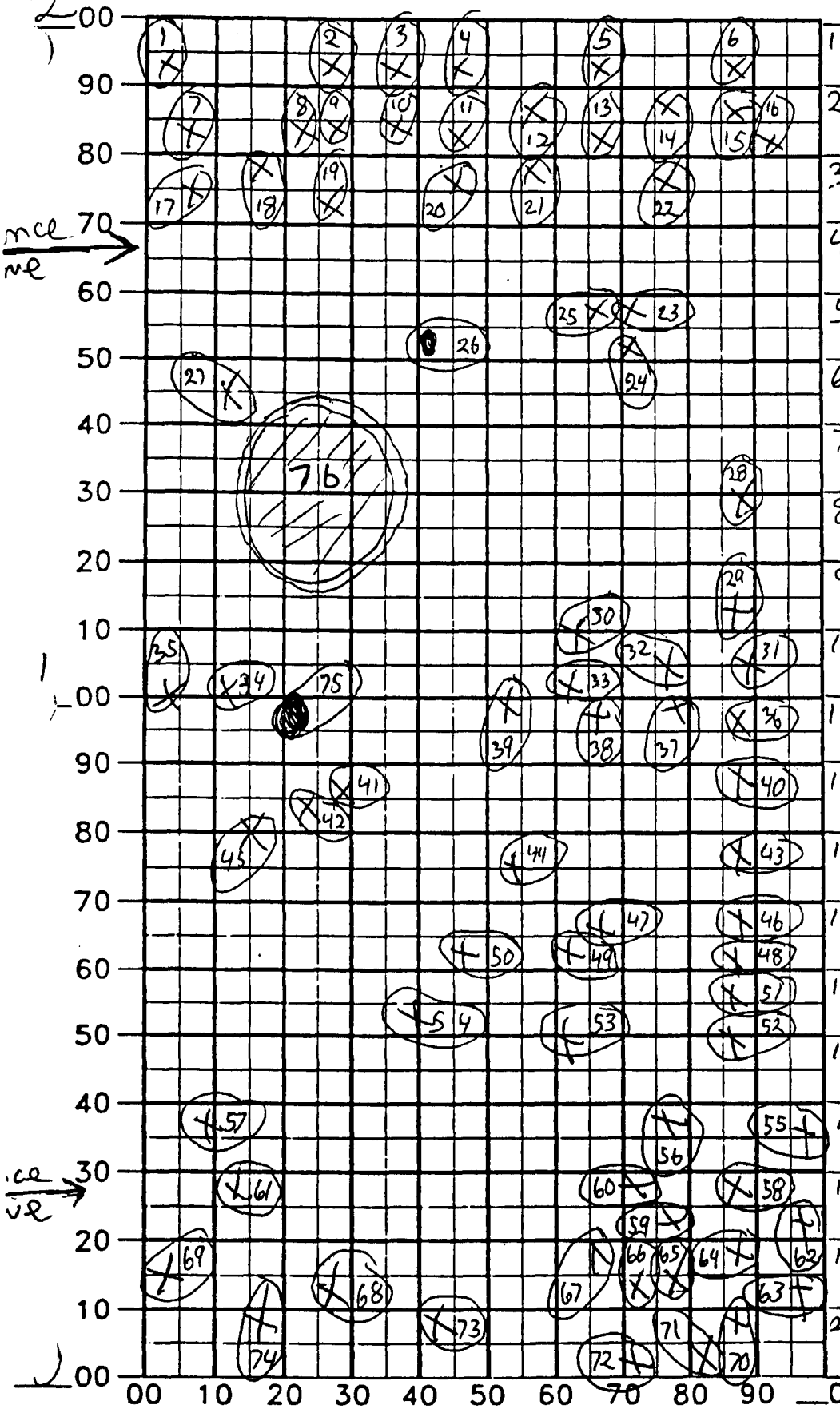
DATE 11/28/94

ENGINEERING-SCIENCE INC

Figure 2-6

ASSATEAGUE ISLAND

INDIVIDUAL CELL INTRUSIVE DATA SHEET



ANOMALY INTENSITY	NOTES
1 WIRE	21 WIRE
2 WIRE	22 WIRE
3 WIRE	23 WIRE
4 WIRE	24 WIRE
5 Fence Post	25 WIRE
6 WIRE	26 Anomaly Deeper than 1'
7 WIRE	27 WIRE
8 WIRE	28 WIRE
9 WIRE	29 WIRE
10 WIRE	30 WIRE
11 WIRE	31 WIRE
12 WIRE	32 Fence Post
13 WIRE	33 WIRE
14 WIRE	34 WIRE
15 WIRE	35 WIRE
16 Fence Post	36 WIRE
17 WIRE	37 WIRE
18 WIRE	38 WIRE
19 WIRE	39 WIRE
20 WIRE	40 WIRE

AREA A Tier B Cell 2400

SENIOR UXO SUPERVISOR [signature]

DATE 11/22/94

ES FIELD

ENGINEERING-SCIENCE INC

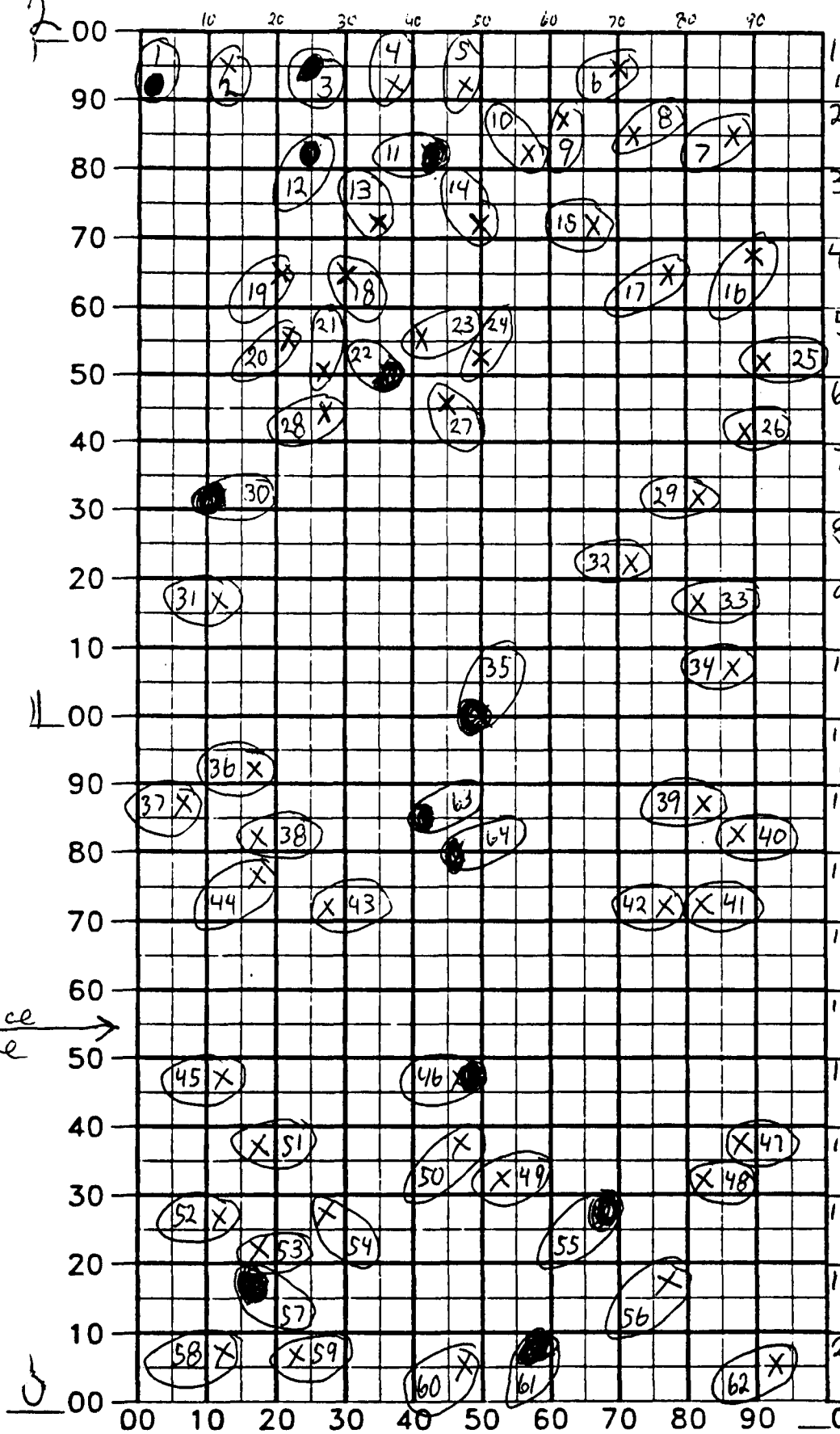
Area A, Tier B, Cell 2400 continued

41 WIRE	59 WIRE
42 WIRE	60 - 1, Expended 2.25 Rocket 6" deep
43 WIRE	61 WIRE
44 WIRE	62 fence Post
45 WIRE	63 fence Post
46 WIRE	64 - 1, Expended 2.25 Rocket, 3" deep
47 WIRE	65 fence post
48 WIRE	66 WIRE
49 WIRE	67 - 1, Expended 2.25 Rocket 2" deep
50 WIRE	68 1, Expended 2.25 Rocket 6" deep
51 WIRE	69 Rocket fins 5" deep
52 WIRE	70 WIRE
53 WIRE	71 WIRE
54 1, Expended 2.25 Rocket 6" deep	72 WIRE
55 fence Post	73 WIRE
56 WIRE	74 - 1, Expended 2.25 Rocket 3" deep
57 WIRE	75 ANOMALY Deeper THAN 2'
58 fence Post	76 LARGE Pile of Fence POSTS, 10" deep

Figure 2-6

ASSATEAGUE ISLAND

INDIVIDUAL CELL INTRUSIVE DATA SHEET



ANOMALY INTENSITY	NOTES
1 - Anomaly Deeper than 2'	21 - WIRE
2 - WIRE	22 - 1, Expended 2.25 Rocket 6" Deep
3 - Anomaly Deeper than 2'	23 - WIRE
4 - WIRE	24 - WIRE
5 - WIRE	25 - 1, Expended 2.25 Rocket 12" deep
6 - WIRE	26 - 1, Expended 2.25 Rocket 12" deep
7 - 1, Expended 2.25 Rocket 12" deep	27 - 1, Expended 2.25 Rocket 12" deep
8 - WIRE	28 - WIRE
9 - WIRE	29 - WIRE
10 - WIRE	30 - Anomaly Deeper than 2'
11 - Anomaly Deeper than 2'	31 - CAN
12 - Anomaly Deeper than 2'	32 - WIRE
13 - WIRE	33 - WIRE
14 - WIRE	34 - WIRE
15 - WIRE	35 - Anomaly Deeper than 2'
16 - 1, Expended 2.25 Rocket 10" deep	36 - 1, Expended 2.25 Rocket 12" Deep
17 - WIRE	37 - 1, Expended 2.25 Rocket 12" deep
18 - WIRE	38 - 3, Expended 2.25 Rockets 12" deep
19 - 1, Expended 2.25 Rocket 10" Deep	39 - WIRE
20 - WIRE	40 - WIRE

AREA A, Tier B — Cell 2600

SENIOR UXO SUPERVISOR _____

ES FIELD

DATE 11/23/94

ENGINEERING-SCIENCE INC

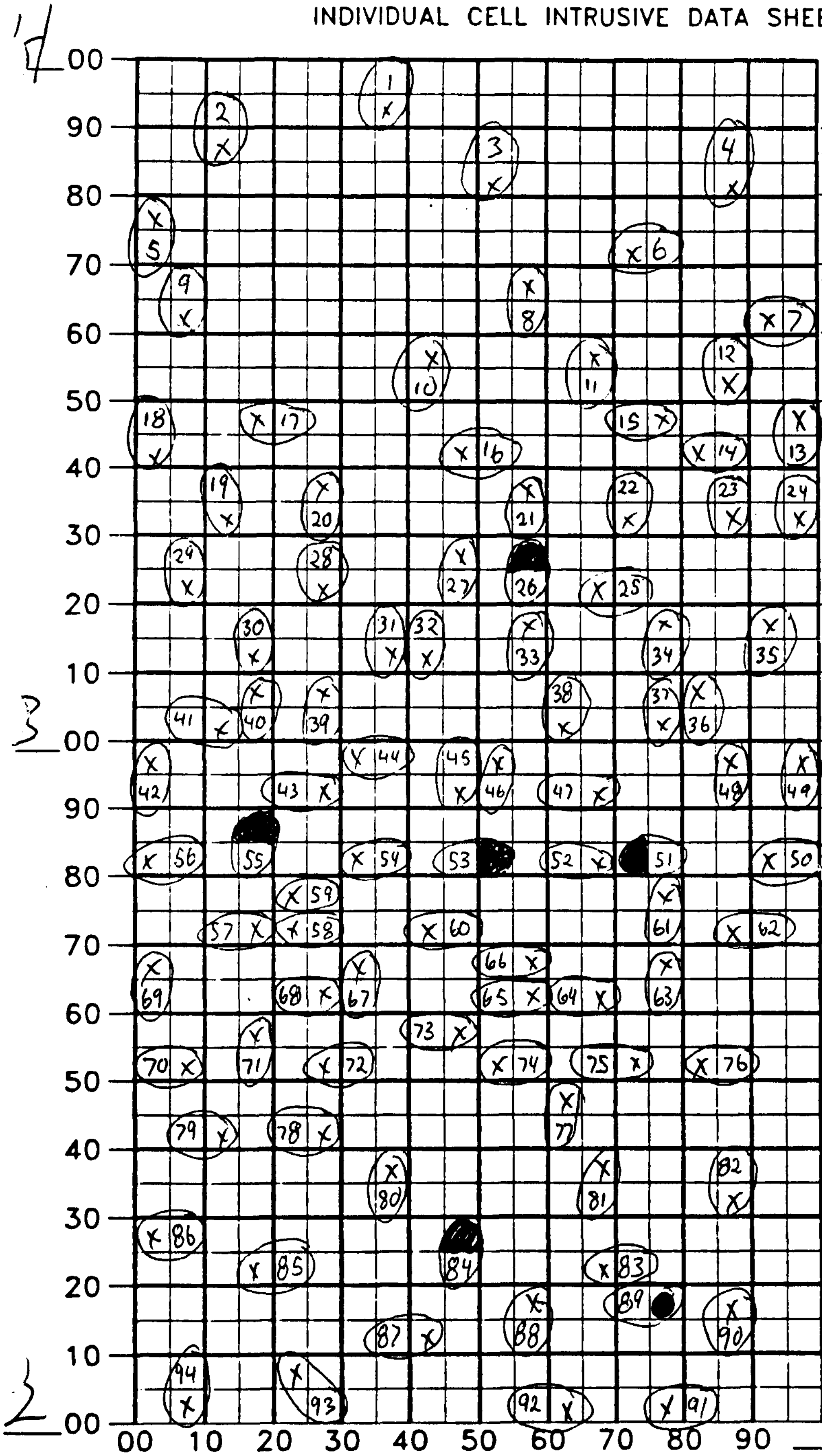
Area A, Tier B, Cell 2600 continued

41 - WIRE	
42 - WIRE	
43 - 1, Expended 2.25 Rocket 18" Deep	
44 - 1, Expended 2.25 Rocket 18" Deep	
45 - WIRE	
46 - Anomaly deeper than 2'	
47 - WIRE	
48 - WIRE	
49 - WIRE	
50 - WIRE	
51 - WIRE	
52 - 1 Expended 2.25 Rocket 18" deep	
53 - 1, Expended 2.25 Rocket 18" deep	
54 - 1, Expended 2.25 Rocket 18" deep	
55 - 1, Expended 2.25 Rocket / Anomaly Deeper than 2'	
56 - 2, Expended 2.25 Rockets 18" deep	
57 - Anomaly, Deeper than 2'	
58 - 1, Expended 2.25 Rocket 18" deep	
59 - WIRE	
60 - 1, Expended 2.25 Rocket 18" deep	
61 - Anomaly Deeper than 2'	
62 - 1, Expended 2.25 Rocket 18" deep	
63 - Anomaly Deeper than 2'	
64 - Anomaly Deeper than 2'	

Figure 2-6

ASSATEAGUE ISLAND

INDIVIDUAL CELL INTRUSIVE DATA SHEET



ANOMALY INTENSITY	NOTES
1 - Rocket Pieces 3" deep	21 - WIRE 6"
2 - WIRE surface	22 - WIRE 6"
3 - Rocket Pieces 4" deep	23 - WIRE 6"
4 - WIRE 1" deep	24 - WIRE 6"
5 - WIRE 6" deep	25 - WIRE 6"
6 - 1, Expended 2.25 Rocket 2" DEEP	26 - Large anomaly deeper than 2'
7 - WIRE 7" deep	27 - 1, Expended Rocket motor for 5" HVAR 10" deep
8 - WIRE 10" deep	28 - WIRE 6"
9 - Rocket Pieces 3" deep	29 - Rocket Pieces 6" deep
10 - 1, Expended 2.25 Rocket 3" deep	30 - WIRE 6"
11 - WIRE 5" deep	31 - WIRE 6"
12 - WIRE 3" deep	32 - WIRE 6"
13 - WIRE 6" deep	33 - Rocket Pieces 2" deep
14 - RUST 2" deep	34 - Rocket Pieces 3" deep
15 - CAN 6" deep	35 - WIRE 6"
16 - WIRE 6" deep	36 - WIRE 6"
17 - Rocket Pieces 2" deep	37 - WIRE 6"
18 - WIRE 6"	38 - WIRE 6"
19 - WIRE 6"	39 - WIRE 6"
20 - WIRE 6"	40 - WIRE 6"

AREA A Tier C SENIOR UXO SUPERVISOR [signature] DATE 11/22/94

Cell 2400 ES FIELD

ENGINEERING-SCIENCE, INC.

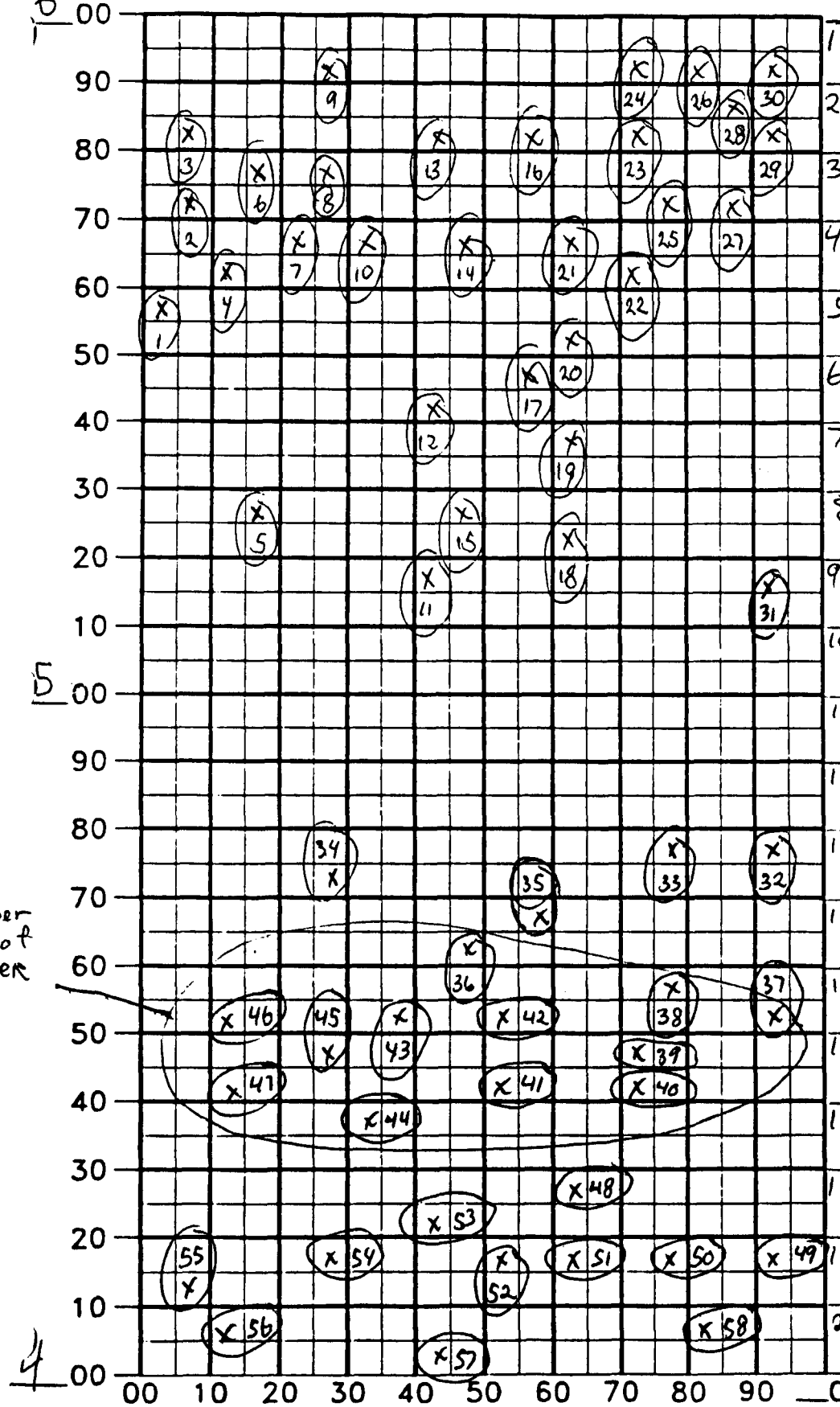
Area A, Tier C, Cell 2400 continued

41- Rocket Pieces 2.2S 10" deep
42- WIRE 6"
43- WIRE 6"
44- WIRE 6"
45- 1, Expended 2.2S Rocket 6" deep
46- 1, Expended 2.2S Rocket 8" deep
47- WIRE 6"
48- WIRE 6"
49- RUST, Surface
50- WIRE 6"
51- Large Anomaly Deeper THAN 2'
52- WIRE 6"
53- Large Anomaly Deeper THAN 2'
54- WIRE 6"
55- Large Anomaly Deeper THAN 2'
56- WIRE 6"
57- WIRE 6"
58- WIRE 6"
59- WIRE 6"
60- 1, Expended 2.2S Rocket 6" deep
61- WIRE 6"
62- 1, Expended 2.2S Rocket 6" deep
63- WIRE 6"
64- WIRE 6"
65- 1 Expended Rocket motor 5" INVAR 10" deep
66- 1 Expended Rocket motor 5" INVAR 12" deep
67- WIRE 6"
68- RUST Surface
69- Rocket Pieces 2.2S 6" deep
70- Rocket Pieces 2.2S 10" deep
71- WIRE 6"
72- WIRE 6"
73- 1, Expended 2.2S Rocket 3" deep
74- 1, Expended 2.2S Rocket 3" deep
75- WIRE 6"
76- WIRE 6"
77- WIRE 6"
78- 1 Expended 2.2S Rocket 6" deep
79- WIRE 6"
80- CAN 6" deep
81- WIRE 6"
82- Rocket Pieces 2" deep
83- WIRE 6"
84- Large Anomaly Deeper THAN 2'
85- WIRE 6"
86- Rocket Pieces 6" deep
87- WIRE 6"
88- WIRE 6"
89- IRON POT 12"
90- WIRE 6"
91- WIRE 6"
92- Rocket Pieces 6" deep
93- WIRE 6"
94- WIRE 6"

Figure 2-6

ASSATEAGUE ISLAND

INDIVIDUAL CELL INTRUSIVE DATA SHEET



ANOMALY INTENSITY	NOTES
1- Rocket Pieces 2.25 2" deep	21-1, Expended 2.25 Rocket 6" Deep
2 Rocket Pieces 2.25 3" deep	22 Rocket Pieces 2.25 2" deep
3-1, Expended 2.25 Rocket 3" Deep	23-1, Expended 2.25 Rocket 8" deep
4-1, Expended 2.25 Rocket 2" deep	24 Rocket Pieces 2.25 2" deep
5-1, Expended 2.25 Rocket 3" Deep	25-1, Expended 2.25 Rocket 3" Deep
6 Rocket Pieces 2.25 6" deep	26-1, Expended 2.25 Rocket 3" Deep
7-1, Expended 2.25 Rocket 6" Deep	27-1, Expended 2.25 Rocket 6" deep
8-1, Expended 2.25 Rocket 1" Deep	28 Rocket Pieces 2.25 2" deep
9- Can 6" Deep	29-1, Expended 2.25 Rocket 6" Deep
10-1, Expended 2.25 Rocket 2" Deep	30 Rocket Pieces 2.25 2" deep
11 Rocket Pieces 2.25 6" deep	31-1, Expended 2.25 Rocket 12" Deep
12-1, Expended 2.25 Rocket 3" deep	32-1 Expended 2.25 Rocket 12" Deep
13-1, Expended 2.25 Rocket 2" Deep	33 Rocket Pieces 2.25 3" deep
14-1, Expended 2.25 Rocket 4" Deep	34 Rocket Pieces 2.25 2" deep
15 Rocket Pieces 2.25 2" deep	35-1, Expended 2.25 Rocket 5" Deep
16 Rocket Pieces 2.25 2" deep	36 WIRE 8" Deep
17-1, Expended 2.25 Rocket 6" Deep	37 Asphalt 10" Deep
18-1, Expended 2.25 Rocket 3" Deep	38-1 Expended 2.25 Rocket 3" Deep
19 Rocket Pieces 2.25 6" deep	39 Bottle Cap 12" Deep
20-1, Expended 2.25 Rocket 3" Deep	40 Can 8" Deep

AREA A Tier D cell 2300 ES FIELD

SENIOR UXO SUPERVISOR S.R. Schrader

DATE 11/21/94

ENGINEERING-SCIENCE INC

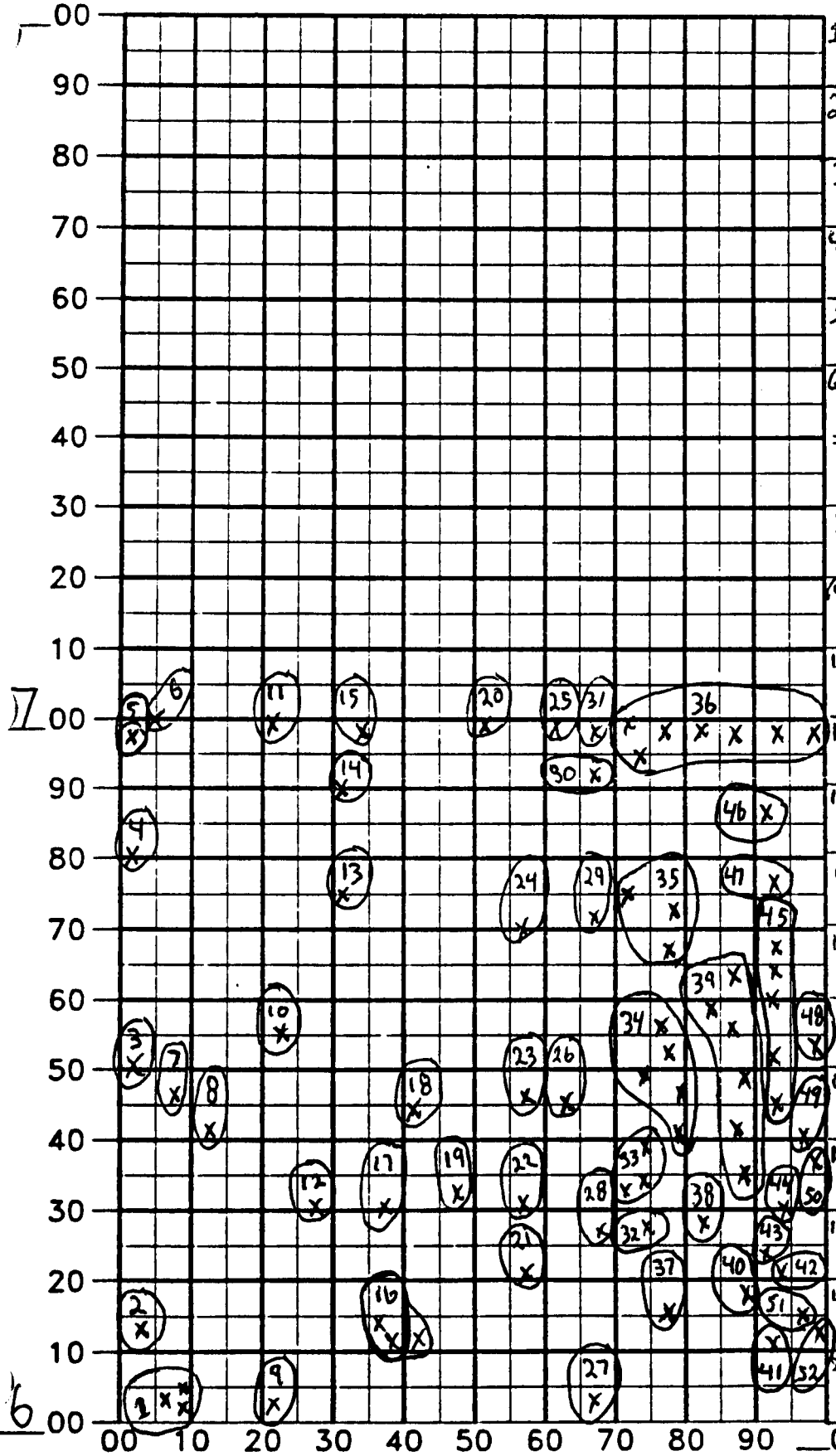
Area A, Tier D, Cell 2300 Continued

41 - 1, Expended 2.2S Rocket 2" deep
42 - WIRE, 6" Deep
43 - WIRE, 8" Deep
44 - 1, Expended 2.2S Rocket 4" deep
45 - WIRE, 4" Deep
46 - WIRE, 8" Deep
47 - WIRE, 6" Deep
48 - 1, Expended 2.2S Rocket 6" deep
49 - 1, Expended 2.2S Rocket 3" deep
50 Rocket Pieces 2.2S 12" deep
51 - 1, Expended 2.2S Rocket 6" deep
52 - WIRE 6" deep
53 - 1, Expended 2.2S Rocket 4" deep
54 - WIRE 6" deep
55 - Rocket Pieces 2.2S 6" deep
56 - 1, Expended 2.2S Rocket 2" deep
57 - WIRE 12" deep
58 - Rocket Pieces 2.2S 3" deep

Figure 2-6

ASSATEAGUE ISLAND

INDIVIDUAL CELL INTRUSIVE DATA SHEET



ANOMALY INTENSITY	NOTES
1-RUST 12"	21- RUST 6" DEEP
2-RUST 12" deep	22- FRAGMENT 2.25 ROCKET 6" DEEP
3- 1, Expended 2.25 Rocket 9" Deep	23- Fragment 2.25 ROCKET 5" DEEP
4- 1, Expended 2.25 Rocket 6" DEEP	24- Fragment 2.25 ROCKET 8" DEEP
5- RUST 6" DEEP	25- Asphalt Surface
6- Asphalt Surface	26- Fragment 2.25 Rocket 3" DEEP
7- 1 EXPENDED 2.25 Rocket 9" DEEP	27- RUST 18' DEEP
8- 2, Expended 2.25 Rocket 6" DEEP	28- 1, Expended 2.25 ROCKET 2" Deep
9- 1, EXPENDED 2.25 Rocket 12" DEEP	29- RUST 10" Deep
10- FRAG 2.25 ROCKET 6" DEEP	30- RUST Surface
11- Asphalt surface	31- Asphalt Surface
12- CAN 3"	32- 1 Expended 2.25 Rocket 3" Deep
13- RUST 6" DEEP	33- Fragments 2.25 Rocket 12" DEEP
14- CAN 6" DEEP	34- Fragments 2.25 Rocket 12" DEEP
15- Asphalt SURFACE	35- FRAGMENTS 2.25 ROCKET 8" DEEP
16- 4 Expended 2.25 Rockets 3" Deep	36- Asphalt SURFACE
17- Fragment 2.25 Rocket 8" DEEP	37- Fragment 2.25 Rocket 6" DEEP
18- Fragment 2.25 Rocket 12" DEEP	38- Fragment 2.25 Rocket 3" DEEP
19- 1, Expended 2.25 Rocket 4" DEEP	39- FRAGMENTS 2.25 ROCKET 6" DEEP
20- Asphalt SURFACE	40 RUST 12" DEEP

MORE ON REVERSE SIDE

AREA A Tier E Cell 2300 SHEET #

SENIOR UXO SUPERVISOR B B Schucker

ES FIELD MANAGER

DATE 11/16/94

ENGINEERING-SCIENCE, INC.

Area A, Tier E, Cell 2300 continued

41 - RUST 12" DEEP

42 - FRAGMENT, 2.25 ROCKET 6" deep

43 - 1 Expended 2.25 ROCKET, 12" deep

44 - FRAGMENT, 2.25 ROCKET, 3" deep

45 - 5 LARGE FRAGMENTS, 2.25 ROCKET, 6" deep

46 - 1 Expended, 2.25 ROCKET, 6" deep

47 - RUST, SURFACE

48 - FRAGMENT, 2.25 ROCKET, 3" deep

49 - 1 Expended, 2.25 ROCKET, 3" deep

50 - FRAGMENT, 2.25 ROCKET, 4" deep

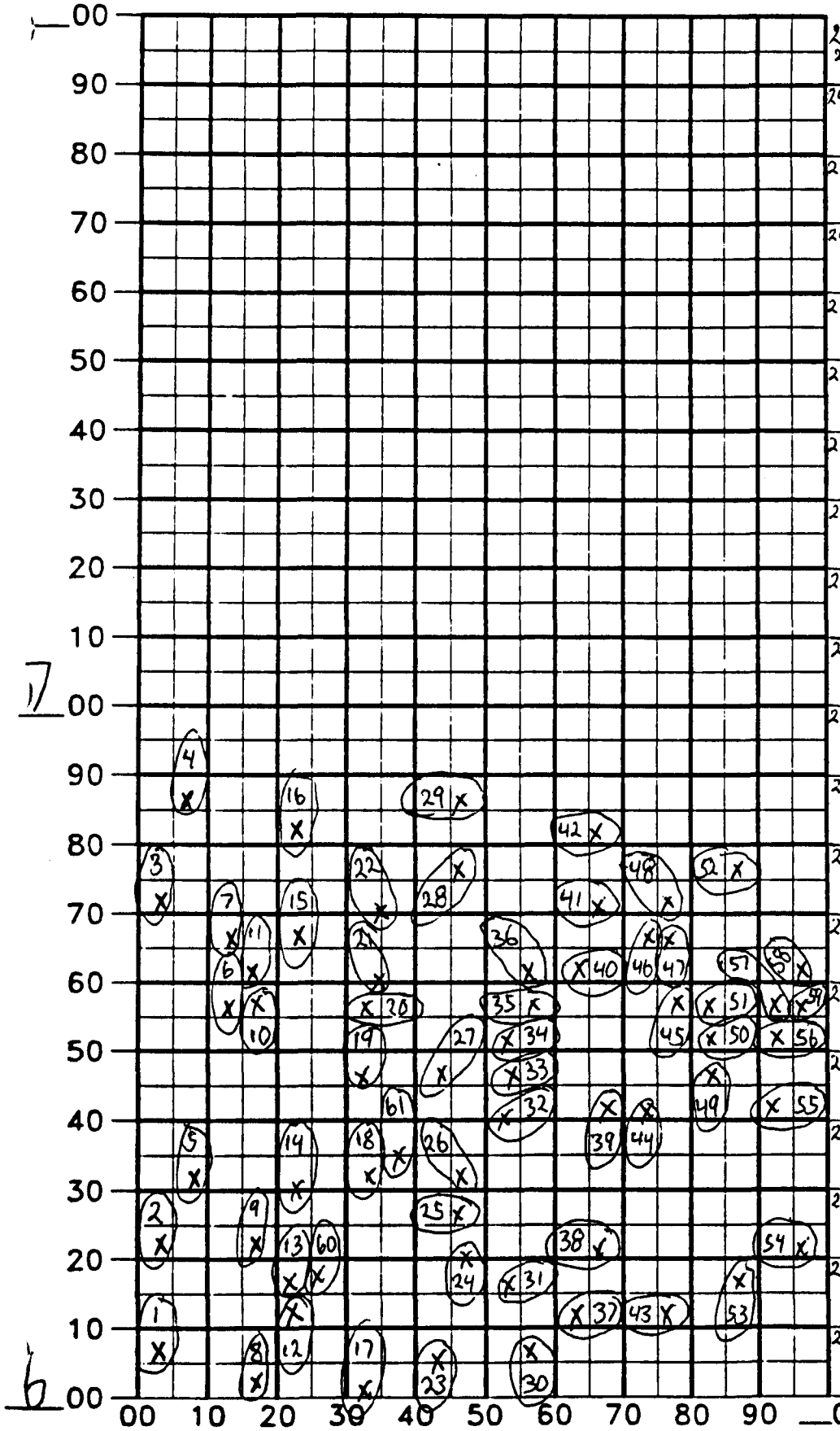
51 - 1 Expended, 2.25 ROCKET, 12" deep

52 - FRAGMENT, 2.25 ROCKET, 6" deep

Figure 2-6

ASSATEAGUE ISLAND

INDIVIDUAL CELL INTRUSIVE DATA SHEET



ANOMALY INTENSITY	NOTES
24-1- Expended 2.25 Rocket (1) 3" DEEP	24-21 - Fragments 2.25 Rocket SURFACE
24-2- RUST 12" DEEP	24-22 - 1, Expended 2.25 Rocket 3" DEEP
24-3- Fragments 2.25 Rocket 6" DEEP	24-23 - 1, Expended 2.25 Rocket 6" DEEP
24-4- 1, Expended 2.25 Rocket 6" DEEP	24-24 - Fragments 2.25 Rocket 6" Deep
24-5- Fragments 2.25 Rocket 3" Deep	24-25 - Fragments 2.25 Rocket 3" Deep
24-6- Fragments 2.25 Rocket SURFACE	24-26 - SHEET METAL 6" deep
24-7- CAN 2" Deep	24-27 - 1, Expended 1.25 Rocket 3" DEEP
24-8- 1, Expended 2.25 Rocket 8" DEEP	24-28 - 1, Expended 2.25 Rocket 2" DEEP
24-9- Fragments 2.25 Rocket 6" DEEP	24-29 - Fragments 2.25 Rocket 6" Deep
24-10- Fragments 2.25 Rocket 10" DEEP	24-30 - Fragments 2.25 Rocket 10" DEEP
24-11- RUST 10" Deep	24-31 - 1, Expended 2.25 Rocket 6" DEEP
24-12 - Fragments 2.25 Rocket 3" Deep	24-32 - Large Fragmen 2.25 Rocket 18" DEEP
24-13 - Fragments 2.25 Rocket 10" Deep	24-33 - 1, Expended 2.25 Rocket 3" Deep
24-14 - Fragments 2.25 Rocket 12" Deep	24-34 - Fragments 2.25 Rocket 5" Deep
24-15 - 1, Expended 2.25 Rocket 10" DEEP	24-35 - 1, Expended 2.25 Rocket 2" Deep
24-16 - RUST 18" Deep	24-36 - Fragments 2.25 Rocket 10" Deep
24-17 - 1, Expended 2.25 Rocket 6" DEEP	24-37 - RUST 10" Deep
24-18 - Fragments 2.25 Rocket 12" Deep	24-38 - RUST 12" Deep
24-19 - Fragments 2.25 Rocket 3" Deep	24-39 - 1, Expended 2.25 Rocket 5" DEEP
24-20 - Fragments 2.25 Rocket SURFACE	24-40 - Fragments 2.25 Rocket 6" Deep

MORE ON REVERSE SIDE

AREA A Tier E Cell 2400

SENIOR UXO SUPERVISOR _____

ES FIELD MANAGER

DATE 11/17/94

SHEET #

ENGINEERING-SCIENCE, INC.

Area A, Tier E, Cell 2400 continued

24-41 – 1, Expended 2.25 Rocket 6" deep
24-42 – 1, Expended 2.25 Rocket 8" deep
24-43 – Fragments 2.25 Rocket 10" deep
24-44 – Fragments 2.25 Rocket 6" deep
24-45 – Fragments 2.25 Rocket 3" deep
24-46 – 1, Expended 2.25 Rocket 10" deep
24-47 – Rust 3" deep
24-48 – Fragments 2.25 Rocket 3" deep
24-49 – 1, Expended 2.25 Rocket 4" deep
24-50 – Fragments 2.25 Rocket 10" deep
24-51 – 1, Expended 2.25 Rocket 6" deep
24-52 – Fragments 2.25 Rocket 10" deep
24-53 – Rust 3" deep
24-54 – 1, Expended 2.25 Rocket 6" deep
24-55 – 1, Expended 2.25 Rocket 10" deep
24-56 – 1, Expended 2.25 Rocket 3" deep
24-57 – CAN 10" deep
24-58 – 1, Expended 2.25 Rocket 6" deep
24-59 – Fragments 2.25 Rocket 3" deep
24-60 – Fragments 2.25 Rocket 10" deep
24-61 – Fragments 2.25 Rocket 3" deep

Individual Cell Intrusive

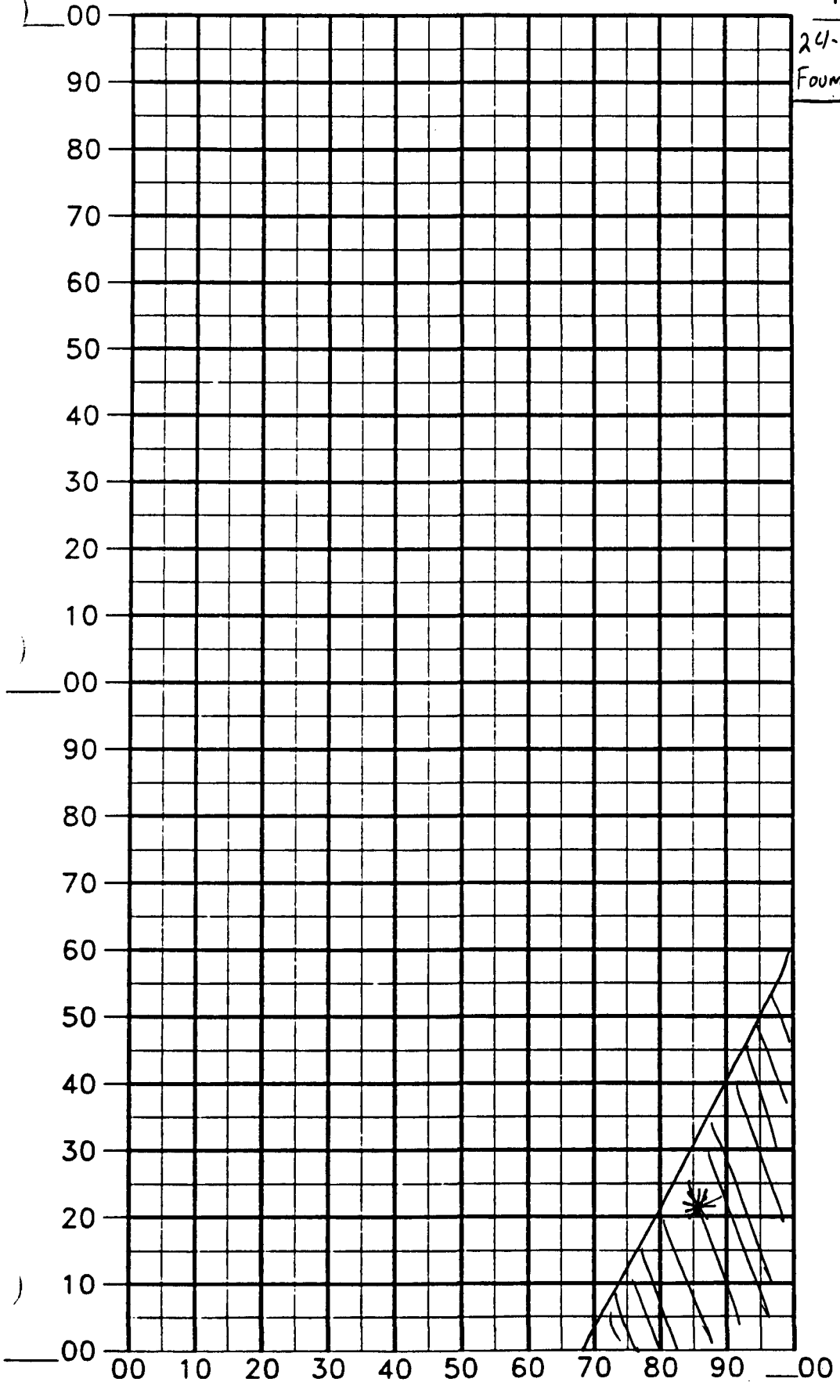
Data Sheets

Area C

Figure 2-6

ASSATEAGUE ISLAND

INDIVIDUAL CELL INTRUSIVE DATA SHEET



AREA C Tier A
cell 2400

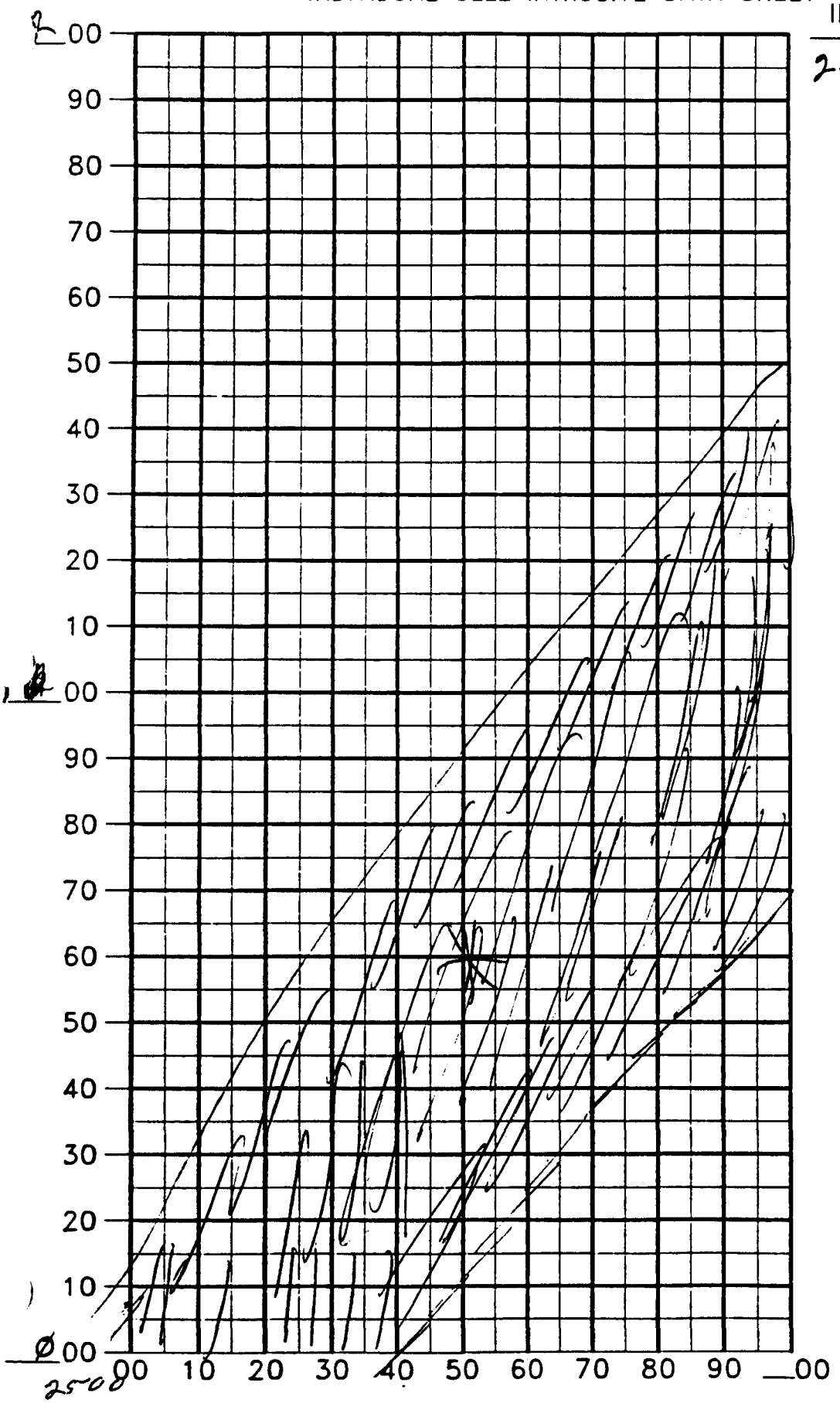
SENIOR UXO SUPERVISOR [signature]

DATE 11/10/94

Figure 2-6

ASSATEAGUE ISLAND

INDIVIDUAL CELL INTRUSIVE DATA SHEET



ANOMALY INTENSITY	NOTES
25-1	Foundation 40"

AREA C Tier A 2500

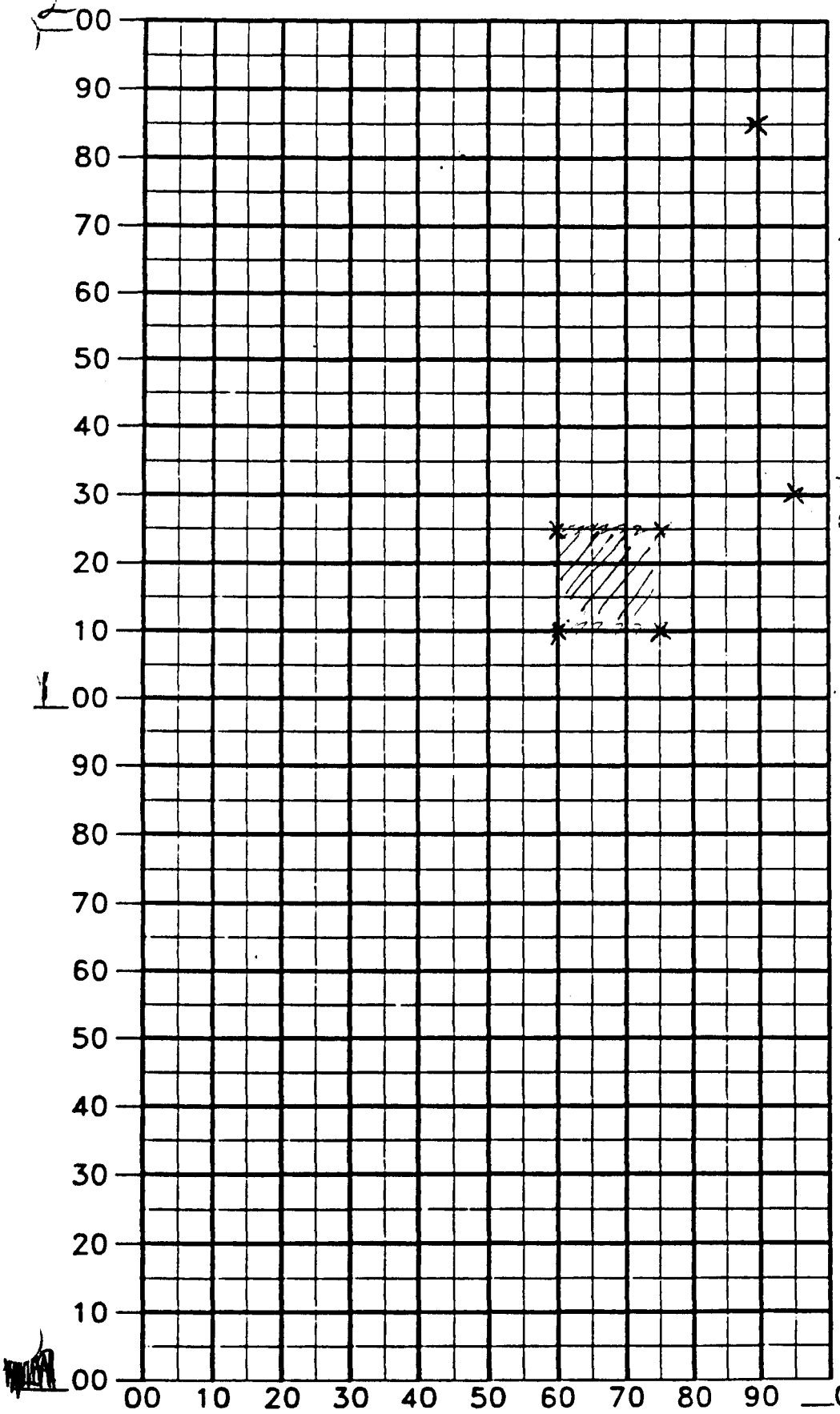
SENIOR UXO SUPERVISOR [signature]

DATE 11/10/94

Figure 2-6

ASSATEAGUE ISLAND

INDIVIDUAL CELL INTRUSIVE DATA SHEET



ANOMALY INTENSITY	NOTES	
KNife 18"		29-1
3"x12"x 1/4" Piece of metal	4'	29-2
5" metal pole in concrete	5'	29-3

AREA C Tier A SENIOR UXO SUPERVISOR [signature] DATE 11/8/94

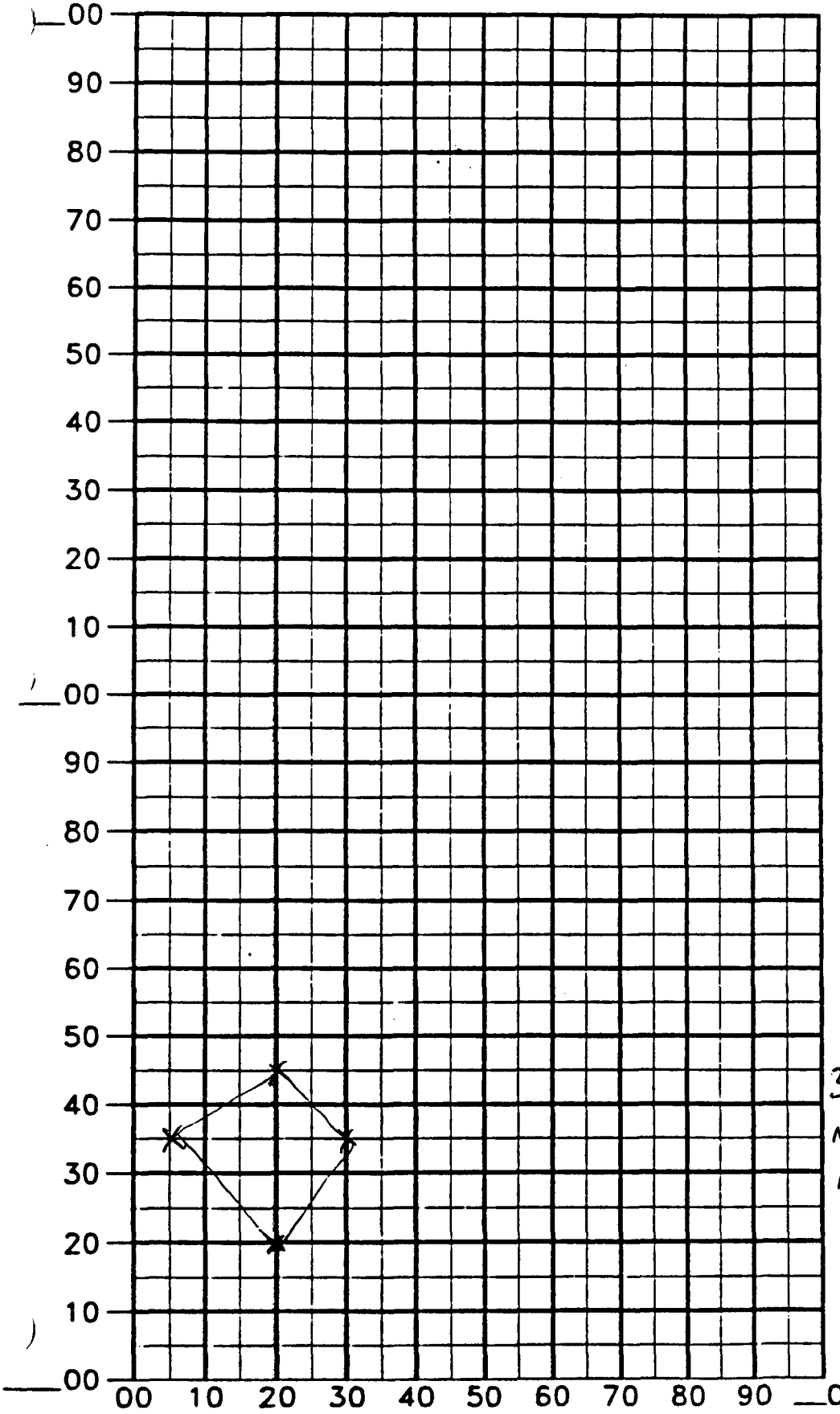
Cell 2900 ES FIELD

ENGINEERING SCIENCE INC

Figure 2-6

ASSATEAGUE ISLAND

INDIVIDUAL CELL INTRUSIVE DATA SHEET



ANOMALY INTENSITY	NOTES
31-1	neg find 5½' deep Recommend further Investig w/ backhoe

AREA C tier A
Cell 3100

SENIOR UXO SUPERVISOR _____

ES FIELD

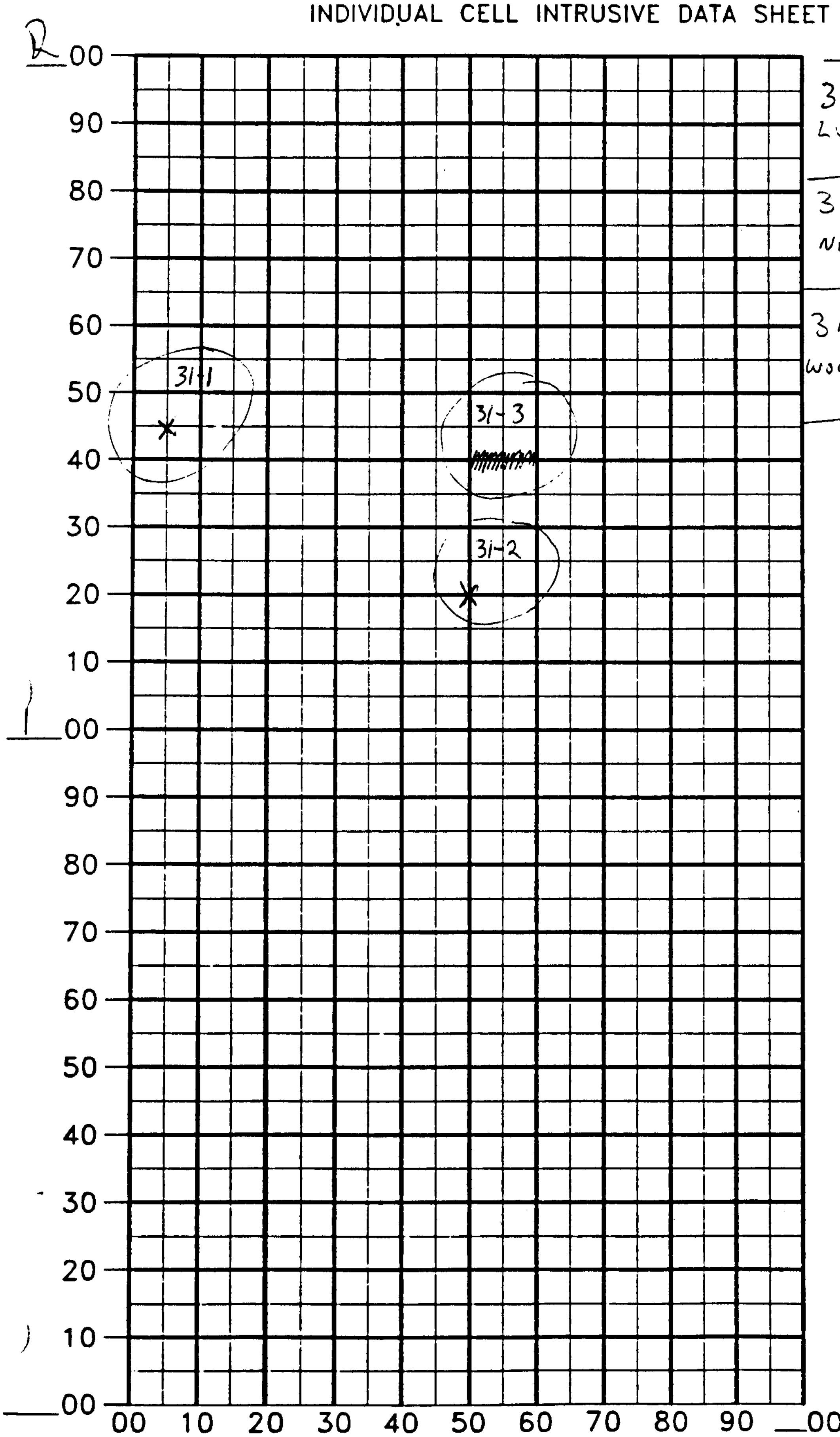
DATE 11/8/94

ENGINEERING SCIENCE, INC.

Figure 2-6

ASSATEAGUE ISLAND

INDIVIDUAL CELL INTRUSIVE DATA SHEET



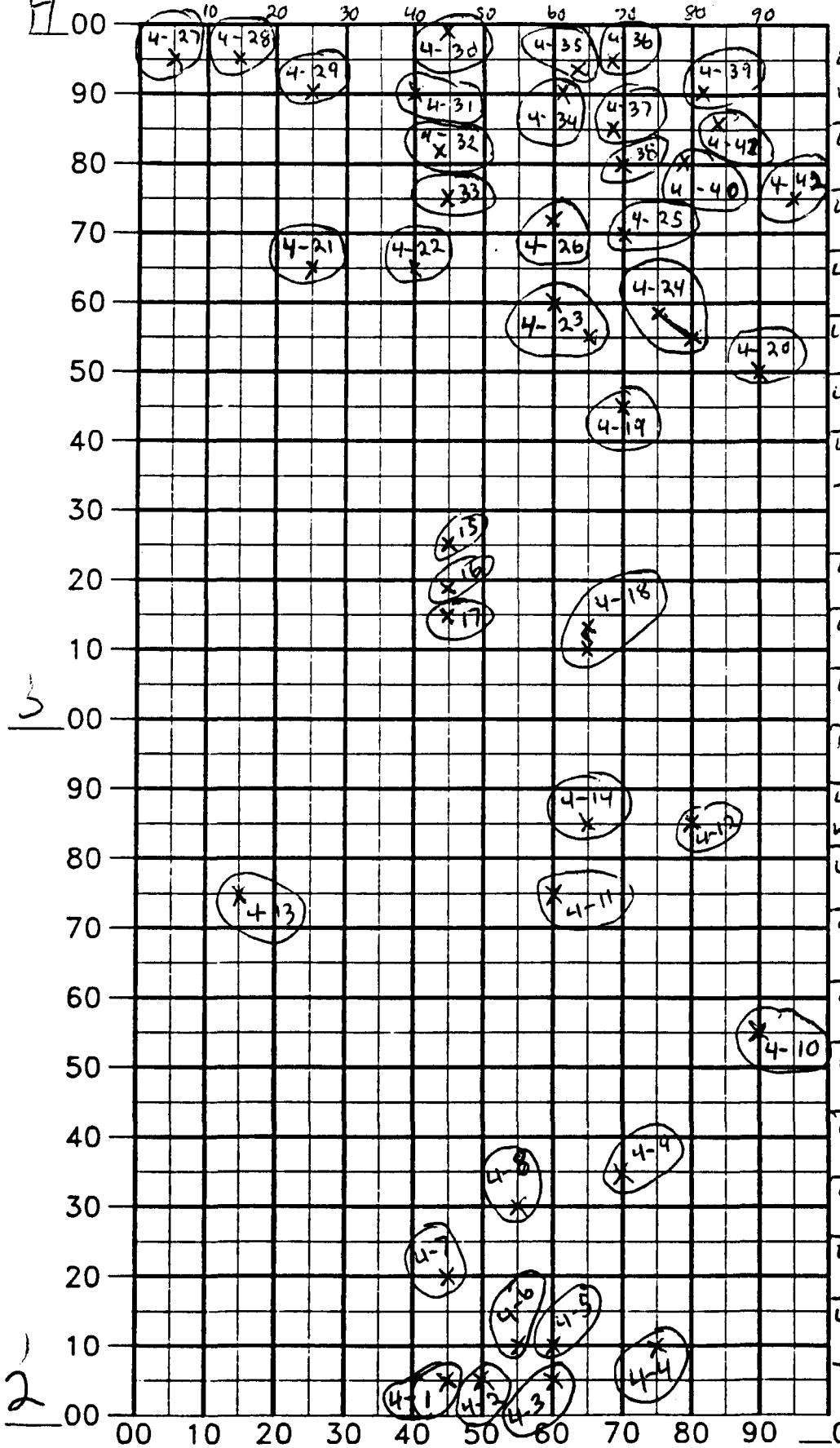
ANOMALY INTENSITY	NOTES
31-1 Lugwrench	10"
31-2 NAil	6"
31-3 wood & metal	4.5'

AREA C Tier A Cell 3100 SENIOR UXO SUPERVISOR [signature] DATE 11/9/94

Figure 2-6

ASSATEAGUE ISLAND

INDIVIDUAL CELL INTRUSIVE DATA SHEET



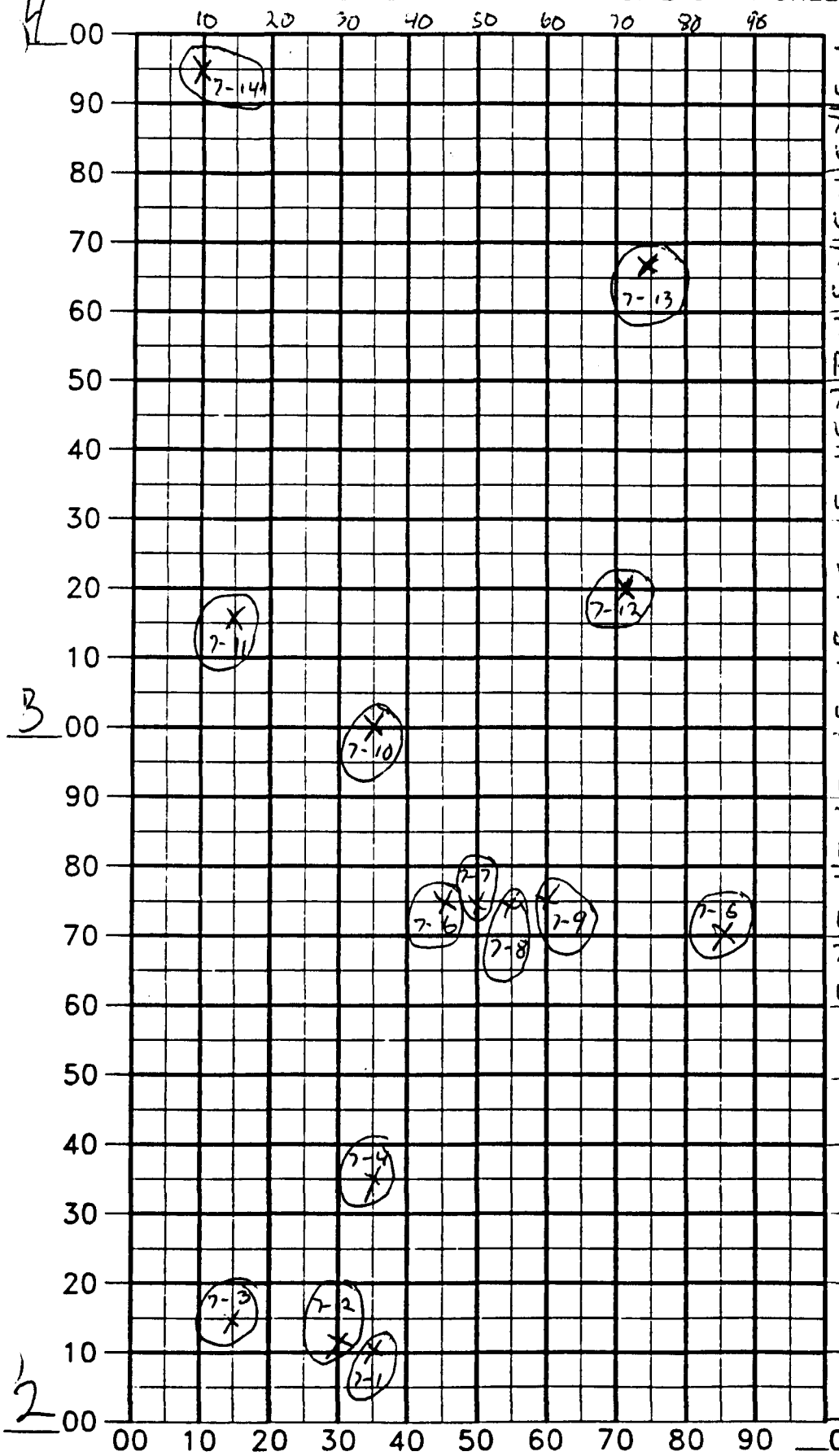
	ANOMALY INTENSITY	NOTES	
4-1 WIRE	12"	~~4-22 WIRE~~	3"
4-2 WIRE	6"	~~4-23 WIRE~~	?
4-3 WIRE	15"	~~4-24 WIRE~~	24"
4-4 WIRE	12"	~~4-25 WIRE~~	6"
4-5 WIRE	15"	~~4-26 WIRE~~	12"
4-6 WIRE	15"	~~4-27 WIRE~~	6"
4-7 WIRE	20"	~~4-28 WIRE~~	3"
4-8 WIRE	6"	~~4-29 WIRE~~	surf.
4-9 WIRE	17"	~~4-30 WIRE~~	6"
4-10 WIRE	4"	~~4-31 WIRE~~	2"
4-11 WIRE	24"	~~4-32 WIRE~~	?
4-12 WIRE	6"	~~4-33 WIRE~~	?
4-13 WIRE	6"	4-34 WIRE	12"
4-14 WIRE	24"	4-35 WIRE	6"
4-15 WIRE	3"	4-36 WIRE	12"
4-16 WIRE	4"	4-37 WIRE	15"
4-17 WIRE	18"	4-38 WIRE	6"
4-18 WIRE	12"	4-39 WIRE	3"
4-19 WIRE	3"	4-40 WIRE	6"
4-20 WIRE	15"	4-41 WIRE	8"
4-21 WIRE	18"	4-42 WIRE	6"

AREA C Tier B Cell 400 SENIOR UXO SUPERVISOR _____ DATE 11/9/94

Figure 2-6

ASSATEAGUE ISLAND

INDIVIDUAL CELL INTRUSIVE DATA SHEET



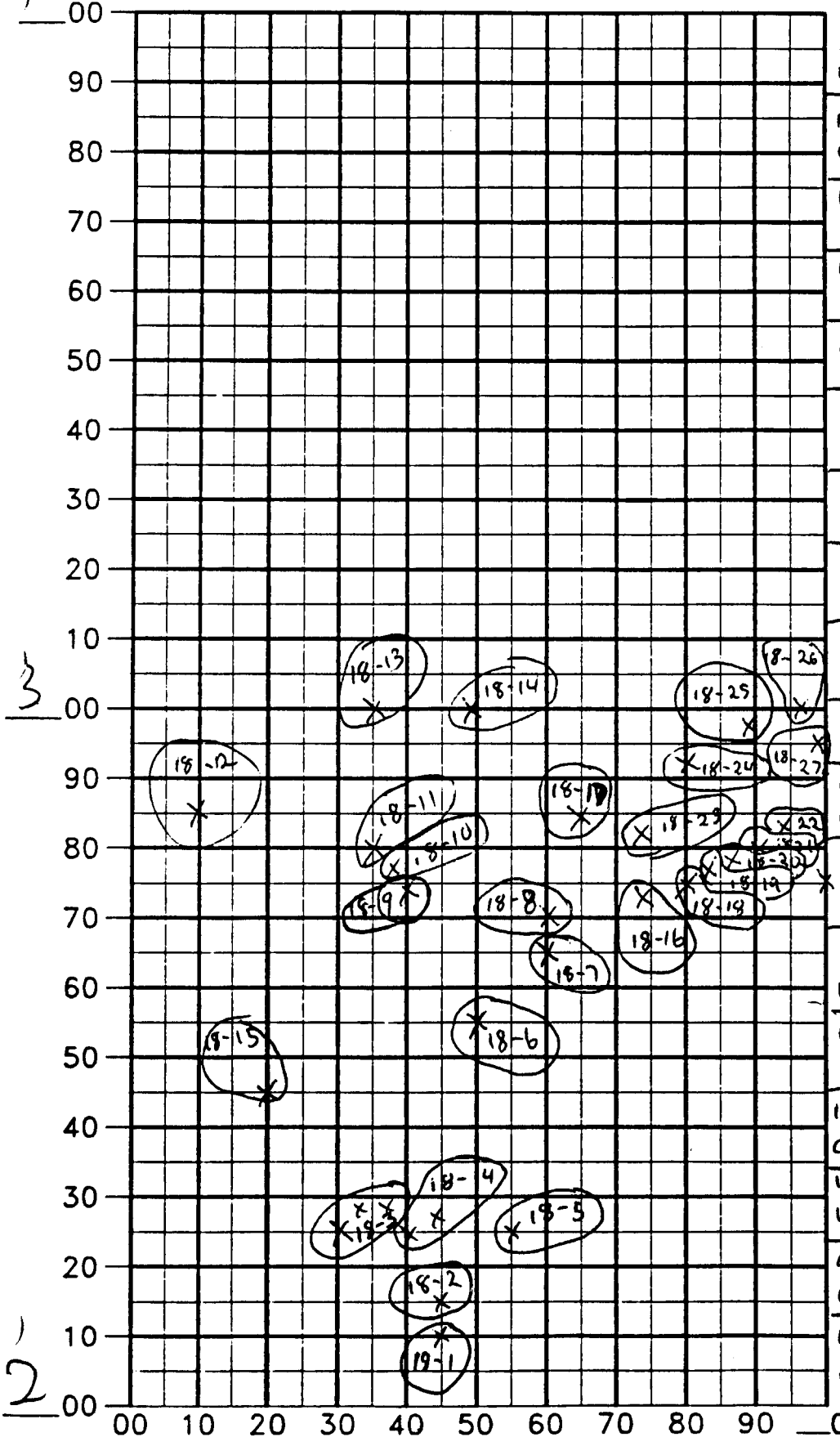
	ANOMALY INTENSITY	NOTES
7-1 WIRE	8"	
7-2 WIRE	6"	
7-3 WIRE	6"	
7-4 WIRE	3"	
7-5 Rebar	6"	
7-6 WIRE	8"	
7-7 WIRE	10"	
7-8 WIRE	12"	
7-9 WIRE	10"	
7-10 WIRE	3"	
7-11 WIRE	6"	
7-12 WIRE	10"	
7-13 WIRE	12"	
7-14 WIRE	2"	

AREA C Tier B cell 700 SENIOR UXO SUPERVISOR S Klehuet DATE 11/16/94

Figure 2-6

ASSATEAGUE ISLAND

INDIVIDUAL CELL INTRUSIVE DATA SHEET



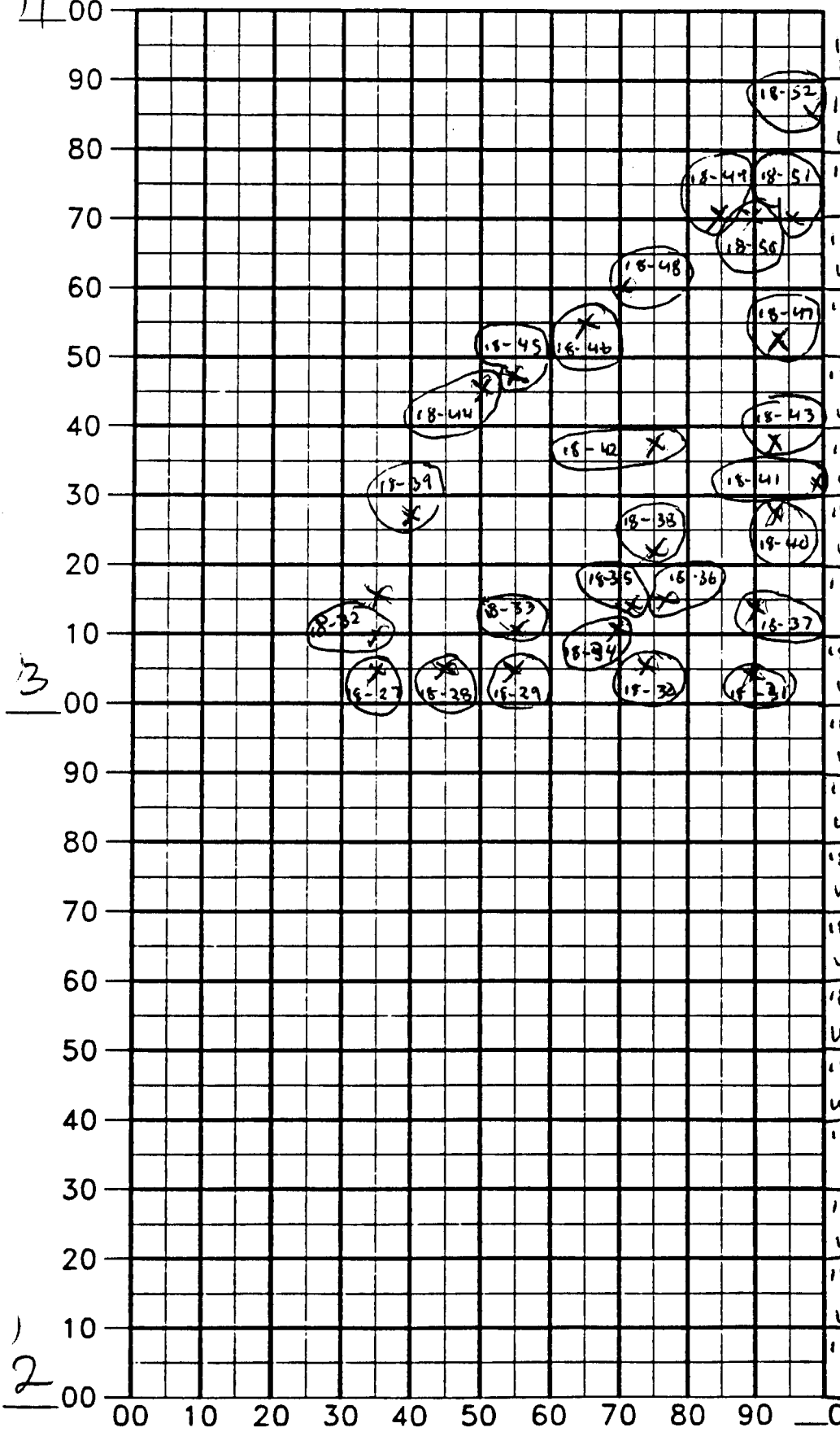
	ANOMALY INTENSITY	NOTES	
18-1 wire	6"	18-19 wire	5"
18-2 wire	6"	18-20 wire	10"
18-3 wire	12"	18-21 wire	3"
18-4 wire	8"	18-22 wire	8"
18-5 wire	3"	18-23 wire	6"
18-6 wire	20"	18-24 wire	12"
18-7 wire	6"	18-25 wire	10"
18-8 wire	24"	18-26 wire	6"
18-9 wire	5"	18-27 wire	6"
18-10 wire	8"		
18-11 wire	Surface		
18-12 wire	8"		
18-13 wire	15"		
18-14 wire	8"		
18-15 CAN	30"		
18-16 wire	4"		
18-17 wire	6"		
18-18 wire	8"		

AREA C Tier B SENIOR UXO SUPERVISOR _____ DATE 11/9/94

Figure 2-6

ASSATEAGUE ISLAND

INDIVIDUAL CELL INTRUSIVE DATA SHEET



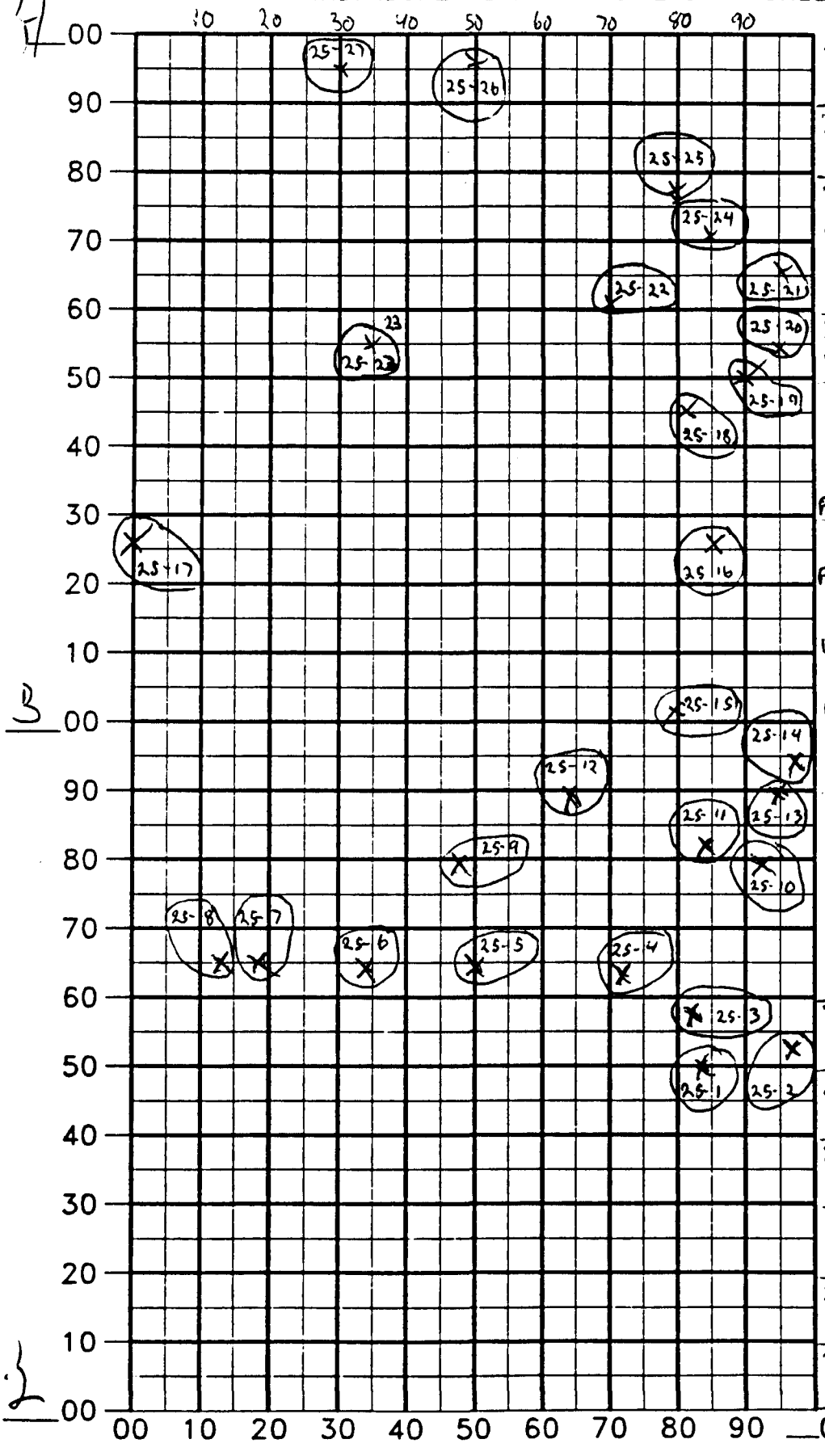
	ANOMALY INTENSITY	NOTES
18-27 WIRE	6"	18-47 WIRE 6"
18-28 WIRE	12"	18-48 WIRE 12"
18-29 WIRE	18"	18-49 WIRE 18"
18-30 WIRE	20"	18-50 WIRE 3"
18-31 WIRE	12"	18-51 WIRE 12"
18-32 WIRE	4"	18-52 WIRE 4"
18-33 WIRE	3"	
18-34 WIRE	6"	
18-35 WIRE	8"	
18-36 WIRE	10"	
18-37 WIRE	24"	
18-38 WIRE	12"	
18-39 WIRE	30"	
18-40 WIRE	3"	
18-41 WIRE	12"	
18-42 WIRE	12"	
18-43 WIRE	8"	
18-44 WIRE	10"	
18-45 WIRE	7"	
18-46 WIRE	6"	

AREA C Tier B Cell 1800 SENIOR UXO SUPERVISOR [signature] DATE 4/10/94

Figure 2-6

ASSATEAGUE ISLAND

INDIVIDUAL CELL INTRUSIVE DATA SHEET



	ANOMALY INTENSITY	NOTES
25-1 SPRAY CAN	12"	N/A
25-2 WIRE	8"	N/A
25-3 WIRE	10"	
25-4 WIRE	8"	
25-5 WIRE	6"	
25-6 WIRE	18"	
25-7 Found at Tier	18"	
25-8 FOUNDATION	18"	
25-9 WIRE	10"	
25-10 WIRE	12"	
25-11 WIRE	8"	
25-12 WIRE	6"	
25-13 WIRE	4"	
25-14 WIRE	6"	
25-15 WIRE	4"	
25-16 WIRE	12"	
25-17 Bolts	6"	
25-18 WIRE	12"	
25-19 WIRE	3"	
25-20 WIRE	8"	
25-21 WIRE	10"	
25-22 WIRE	8"	
25-23 4"x4" steel	12"	
25-24 WIRE	12"	
25-25 WIRE	6"	
25-26 WIRE	3"	
25-27 WIRE	8"	

AREA C Tier B Cell 2500 SENIOR UXO SUPERVISOR [signature] DATE 11/10/94

NOTE: An Individual Cell Intrusive Data Sheet does not exist for Area C, Grid Cell B44. Only the standpipe anomaly in this grid cell was investigated. The standpipe appeared to be part of an old house.

APPENDIX G

SURVEY

QC REPORTS

HANSON ENGINEERS

MEMORANDUM

TO	Engineering Science	DATE	10/19/94
	c/o Bob Luce		
FROM	Gary Rogers		
SUBJECT	Assateague Island		
	Quality Control		

GARY C. ROGERS 2957 PROFESSIONAL LAND SURVEYOR STATE OF ILLINOIS SPRINGFIELD, ILLINOIS

State of Maryland
Limited License #8

As per Section 7.3.7 of the work plan identifying Survey Layout Quality Control responsibilities, I performed a site visit on October 13 and 14, 1994.

Before entering work zones, I was given a safety briefing and signed a form stating that I had read and understood the Health and Safety Plan. This was administered by UXB International.

UXB's surveyors were in the process of laying out the geophysical search limits for Area C. The northerly and southerly location of the search area had been coordinated with Engineering Science and was established as shown on Figure 2-2 of the work plan. Two search lanes were established using a Topcon total station. The easterly search lane was set at the approximate high water line of the ocean. The westerly search lane was parallel to and 200 feet westerly of the easterly lane. Both lanes were 4500 feet long and had wooden stakes set at 100 foot intervals along the northerly-southerly lines.

Interior lanes at 50, 100, and 150 feet were to be set at a minimum of 200 foot intervals between the easterly-westerly lanes using a marked rope or tape to identify the correct position. This was not complete at the time of my departure.

Also, UXB had not tied the search area into the state plane coordinate system. Horizontal control points to complete this had been located, but a decision had been made by UXB to tie in both sites at the same time using G.P.S. at a later date. This decision will help the surveyors to stay ahead of the magnetometer crews.

Several anomalies were detected and flagged by the magnetometer crews on the easterly and westerly lanes of Area C during this site visit. The locations of these were recorded using the total station. The accuracy of their positions relative to the grid should be well within the 15 foot requirement stated in the work plan.

Based upon my review of UXB's surveying procedures, to the best of my knowledge, information and belief, the staked locations of the search lanes and the anomalies found during my site visit in Area C were located to the accuracies required in the work plan.

APPENDIX H

INTRUSIVE OPERATIONS

QC REPORTS

AREAS A AND C

QC Reports

Area A

1Dec 94

MEMORANDUM

FROM: CHARLES J. GALBREATH, UXB INTERNATIONAL INC.

TO: PARSONS ENGINEERING SCIENCE (BOB LUCE)

VIA: KEITH SCHUCKER, UXB INTERNATIONAL INC.

SUBJ: QA SWEEPS, ASSATEAQUE ISLAND

1. ON 30 NOV 94 AND 1DEC94, I CONDUCTED QA SWEEPS ON AREA A, TIER B, CELLS 1800 & 1900. THESE SWEEPS WERE RUN ON A NORTH/SOUTH AXIS, PERPENDICULAR TO, AND 90° OFF, THE STANDARD SWEEP LANES, WHICH WERE SWEPT ON AN EAST/WEST AXIS. QA LANES WERE 25, 75, 125 AND 175 FEET FROM GRID CORNER POSTS.

2. SWEEPS WERE CONDUCTED USING THE MK26 FORESTER-FEREX ORDNANCE LOCATOR SET ON THE 1-10 SCALE.

3. TOTAL QA SWEEP AREA ENCOMPASSED SLIGHTLY OVER 10% OF THE TOTAL GRID AREAS.

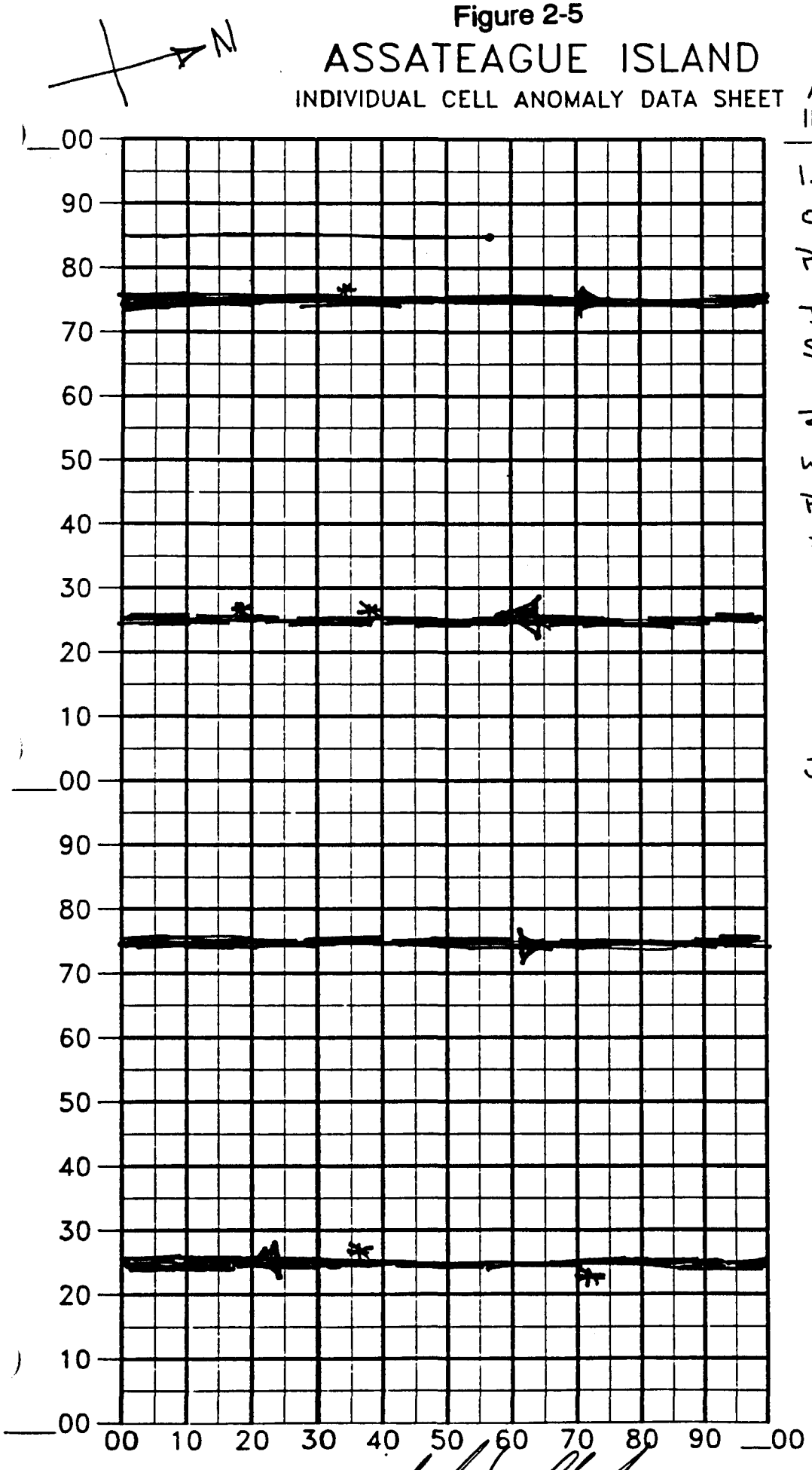
4. NO PREVIOUSLY UNIDENTIFIED ANOMOLIES WERE LOCATED NOR WERE ANY ORDNANCE ITEMS FOUND.

CHARLES J. GALBREATH

Figure 2-5

ASSATEAGUE ISLAND

INDIVIDUAL CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES
	1. SWEEP WAS CONDUCTED ON A NORTH/SOUTH AXIS PERPENDICULAR TO THE STANDARD SWEEP LANES.
	2. FIVE (5) ANOMOLIES WERE FOUND. ALL WERE PREVIOUSLY IDENTIFIED PIECES OF JUNK (WIRE, ETC.), NOT ORDNANCE ITEMS.
	3. SWEEP DIRECTION

AREA A, TIER B
CELL 1800

SENIOR UXO SUPERVISOR _____

DATE 1 DEC 94

UXB International, Inc.

Ordnance Clearance Survey
Daily Sweep Log

SUBAREA/GRID: AREA A, TIER B, CELL 1800

TYPE OF SWEEP: Surface _____ Subsurface _____ Quality Assurance ✓

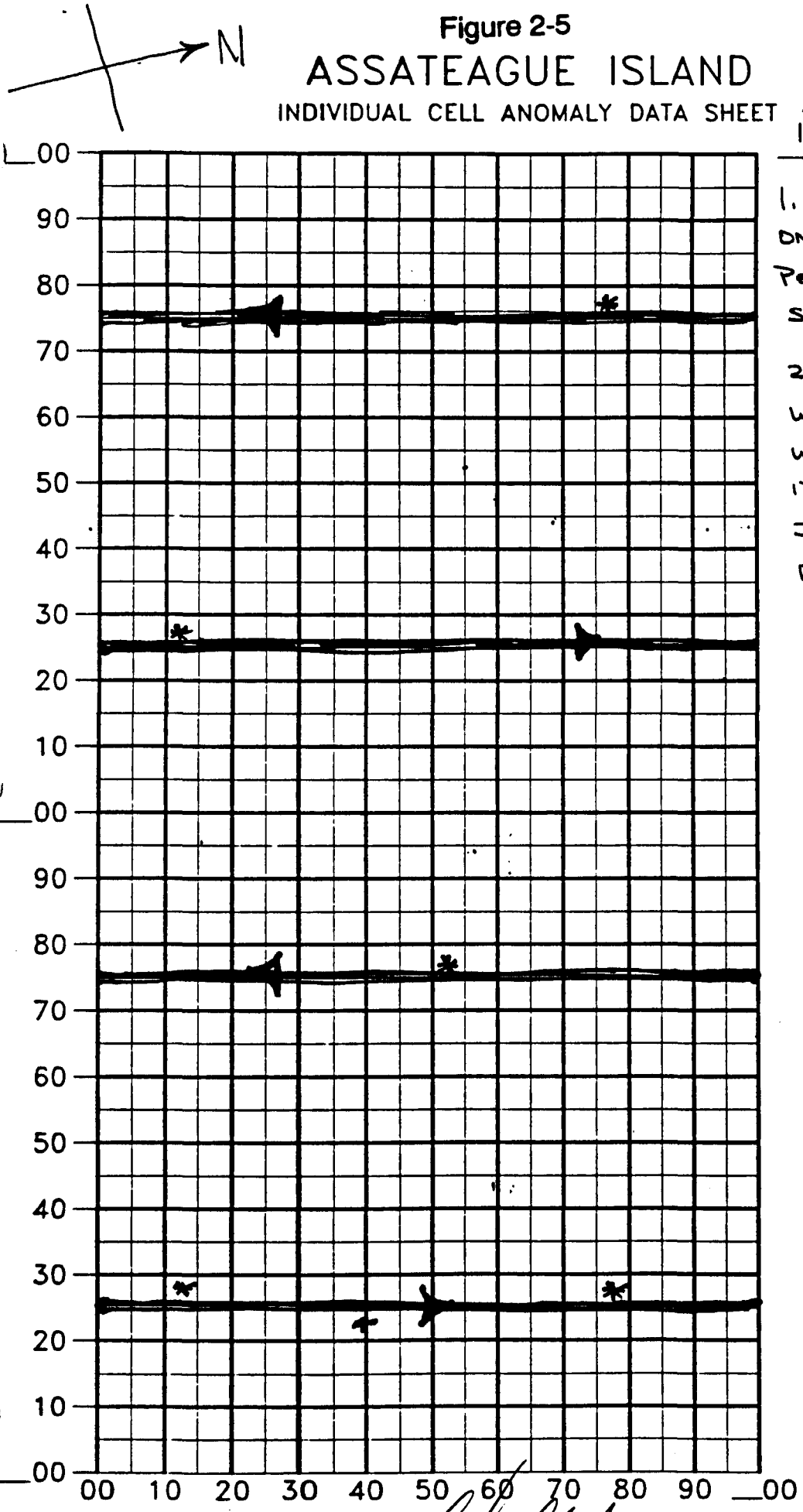
UXO ITEM NUMBER	DATE / TIME LOCATED	INDENTIFICATION OR FEATURES	NOTES
NO PREVIOUSLY	UNIDENTIFIED	ANOMOLIES FOUND	

Signature Team Leader _____

Figure 2-5

ASSATEAGUE ISLAND

INDIVIDUAL CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES
	1. SWEEP WAS CONDUCTED ON A NORTH/SOUTH AXIS PERPENDICULAR TO THE STANDARD SWEEP LANES.
	2. SIX (6) ANOMOLIES WERE FOUND. ALL WERE PREVIOUSLY IDENTIFIED PIECES OF JUNK (WIRE, SCRAP, ETC), NOT ORDNANCE ITEMS.
	3. SWEEP DIRECTION

AREA A, TIER B
CELL 1900

SENIOR UXO SUPERVISOR [signature]

DATE 1 DEC 94

UXB International, Inc.

Ordnance Clearance Survey
Daily Sweep Log

SUBAREA/GRID: AREA A, TIER B, CELL 1900

TYPE OF SWEEP: Surface _____ Subsurface _____ Quality Assurance ✓

UXO ITEM NUMBER	DATE / TIME LOCATED	INDENTIFICATION OR FEATURES	NOTES
NO PREVIOUSLY	UNIDENTIFIED	ANOMALIES FOUND	

Signature Team Leader _____

23 NOV 94

MEMORANDUM

FROM: CHARLES J. GALBREATH, UXB INTERNATIONAL INC.
TO : PARSONS ENGINEERING SCIENCE (BOB LUCE)

VIA: KEITH SCHUCKER, UXB INTERNATIONAL INC

SUBJ: QA SWEEP, ASSATEAQUE ISLAND

1. ON 23 NOV 94, I CONDUCTED QA ON A TIER B CELLS 24 & 26. THESE SWEEPS WERE RUN ON A NORTH/SOUTH AXIS, PERPENDICULAR TO, AND 90° OFF, THE STANDARD SWEEP LANES, WHICH WERE SWEPT ON AN EAST/WEST AXIS. QA LANES WERE 25, 75, 125 AND 175 FEET FROM GRID CORNER POSTS

2. SWEEPS WERE CONDUCTED USING THE MK26 FORESTER FEREX ORDNANCE LOCATOR UTILIZING THE 1-10 SCALE.

3. TOTAL QA SWEEP AREA ENCOMPASSED SLIGHTLY OVER 10% OF THE TOTAL GRID AREAS.

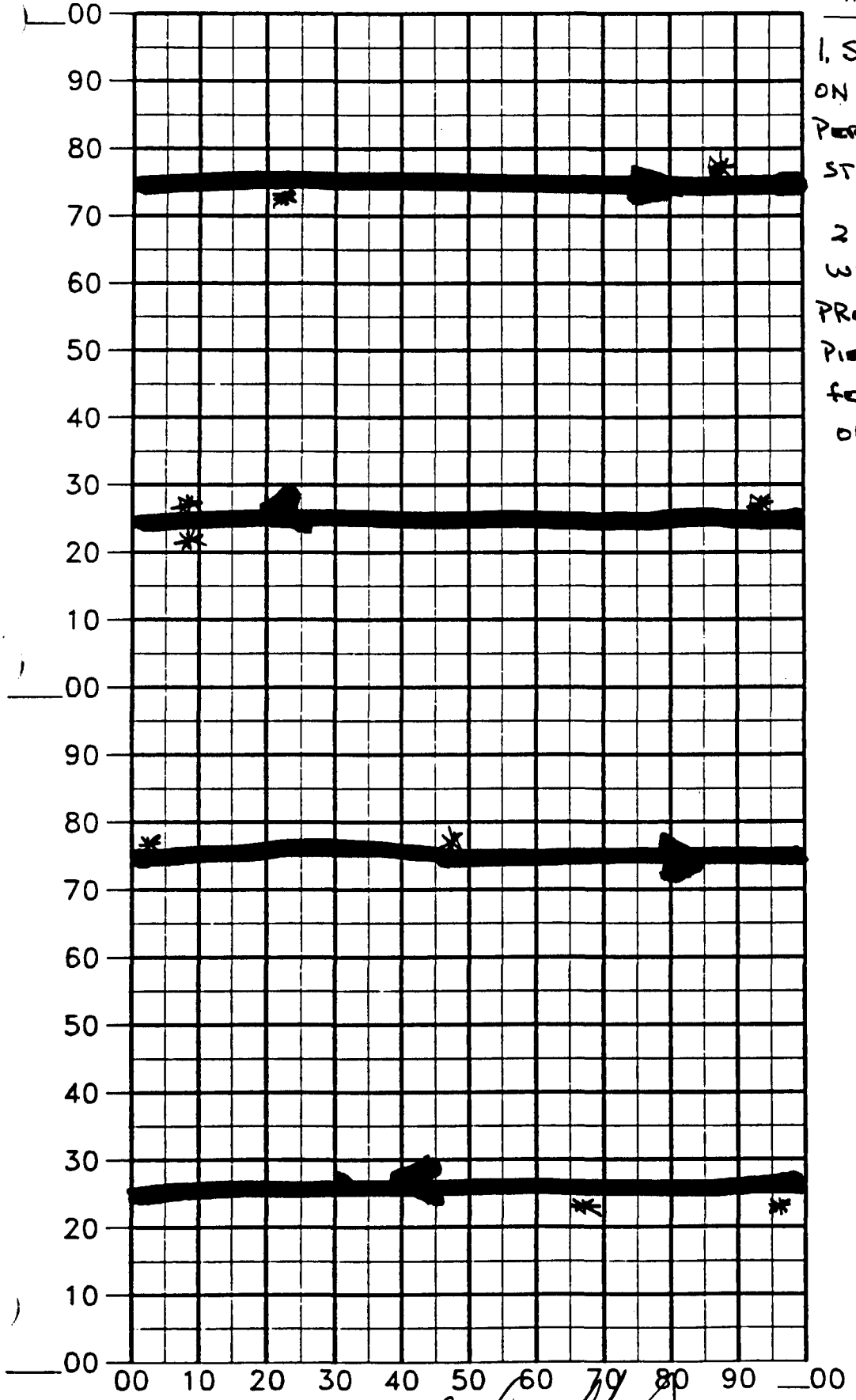
4. NO PREVIOUSLY UNIDENTIFIED ANOMOLIES WERE FOUND.

CHARLES J. GALBREATH

Figure 2-6

ASSATEAGUE ISLAND

INDIVIDUAL CELL INTRUSIVE DATA SHEET



ANOMALY INTENSITY	NOTES
	1. SWEEP WAS CONDUCTED ON A NORTH/SOUTH AXIS PERPENDICULAR TO THE STANDARD SWEEP LANES
	2. NINE(9) ANOMOLIES WERE FOUND. ALL WERE PREVIOUSLY IDENTIFIED PIECES OF JUNK (WIRE, FENCE POSTS, ETC.), NOT ORDNANCE ITEMS.
	3. SWEEP DIRECTION

AREA A TIER B CELL 24

SENIOR UXO SUPERVISOR _____

DATE 23 Nov 94

UXB International, Inc.

Ordnance Clearance Survey
Daily Sweep Log

SUBAREA/GRID: A TIER B CELL 24

TYPE OF SWEEP: Surface _____ Subsurface _____ Quality Assurance Y

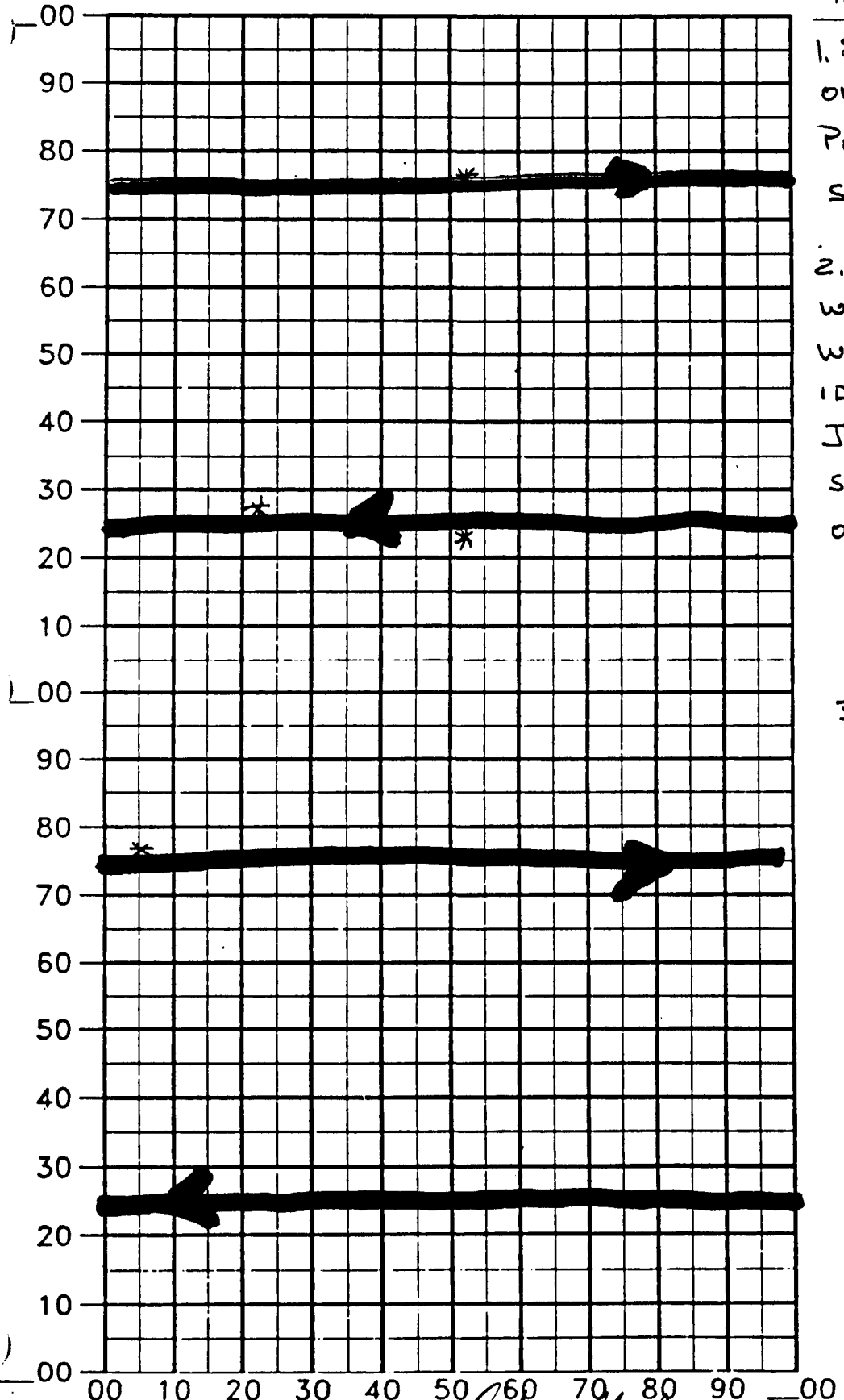
UXO ITEM NUMBER	DATE / TIME LOCATED	INDENTIFICATION OR FEATURES	NOTES
NO PREVIOUSLY	UNIDENTIFIED	ANOMOLIES FOUND	

Signature Team Leader _____

Figure 2-5

ASSATEAGUE ISLAND

INDIVIDUAL CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES
	1. SWEEP WAS CONDUCTED ON A NORTH/SOUTH AXIS PERPENDICULAR TO THE STANDARD SWEEP LANES
	2. FOUR(4) ANOMOLIES WERE FOUND. ALL WERE PREVIOUSLY IDENTIFIED PIECES OF JUNK (WIRE, & SHEET SCRAP ETC.) NOT ORDNANCE ITEMS.
	3. SWEEP DIRECTION

AREA A TIER B CELL 26

SENIOR UXO SUPERVISOR

DATE 23 NOV 94

SHEET #

ES FIELD MANAGER

ENGINEERING-SCIENCE, INC.

UXB International, Inc.

Ordnance Clearance Survey
Daily Sweep Log

SUBAREA/GRID: A TIER B CELL 26

TYPE OF SWEEP: Surface _____ Subsurface _____ Quality Assurance X

UXO ITEM NUMBER	DATE / TIME LOCATED	INDENTIFICATION OR FEATURES	NOTES
NO PREVIOUSLY	UNIDENTIFIED	ANOMOLIES FOUND	

Signature Team Leader _____

22 NOV 94

MEMORANDUM

FROM: CHARLES J. GALBREATH, UXB INTERNATIONAL INC.

TO: PARSONS ENGINEERING SCIENCE (BOB LUCE)

VIA: KEITH SCHUCKER, UXB INTERNATIONAL INC.

SUBJ: QA SWEEP, ASSATEAQUE ISLAND

1. ON 22 NOV 94, I CONDUCTED QA SWEEPS ON A TIER D CELL 23 AND A TIER C CELL 24. THESE SWEEPS WERE RUN ON A NORTH/SOUTH AXIS, PERPENDICULAR TO, AND 90° OFF, THE STANDARD SWEEP LANES, WHICH WERE SWEPT ON AN EAST/WEST AXIS. QA LANES WERE 25, 75, 125, AND 175 FEET FROM GRID CORNER POSTS.

2. SWEEPS WERE CONDUCTED USING THE MK 26 FORSTER - FEREX ORDNANCE LOCATOR UTILIZING THE 1-10 SCALE.

3. TOTAL QA SWEEP AREA WAS SLIGHTLY OVER 10% OF THE TOTAL GRID AREAS.

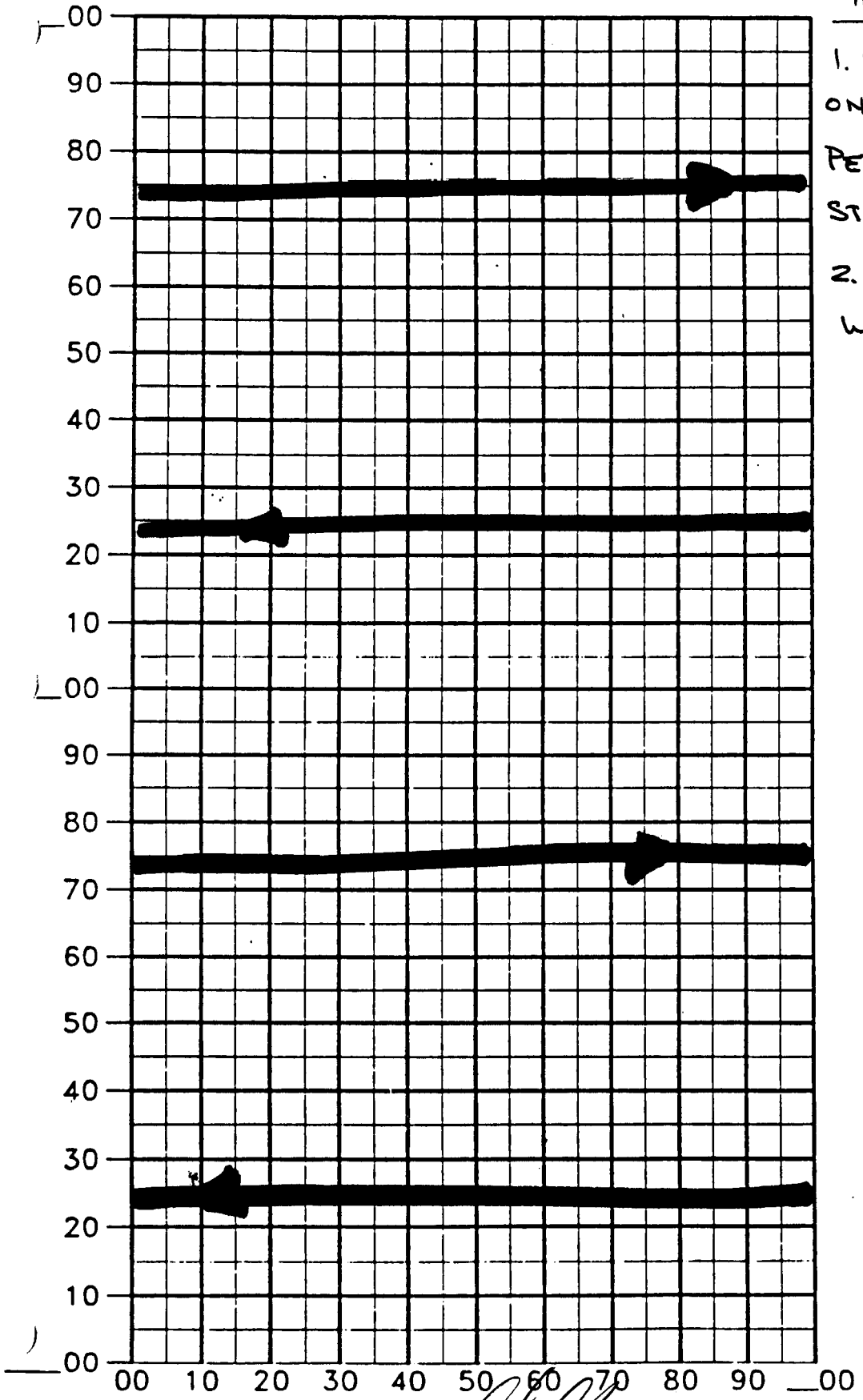
4. NO PREVIOUSLY UNIDENTIFIED ANOMOLIES WERE FOUND.

CHARLES J. GALBREATH

Figure 2-5

N ASSATEAGUE ISLAND

INDIVIDUAL CELL ANOMALY DATA SHEET



ANOMALY INTENSITY	NOTES
	1. SWEEP WAS CONDUCTED ON A NORTH/SOUTH AXIS PERPENDICULAR TO THE STANDARD SWEEP LANES.
	2. NO ANOMOLIES WERE FOUND

A TIER C

AREA CELL 24 SENIOR UXO SUPERVISOR _____ DATE 22 NOV 94

SHEET # ES FIELD MANAGER

ENGINEERING-SCIENCE, INC.

UXB International, Inc.

Ordnance Clearance Survey
Daily Sweep Log

SUBAREA/GRID: A TIER C CELL 24

PAGE 1 of 1

TYPE OF SWEEP: Surface _____ Subsurface _____ Quality Assurance X

UXO ITEM NUMBER	DATE / TIME LOCATED	INDENTIFICATION OR FEATURES	NOTES
NO ANOMOLIES	FOUND		

Signature Team Leader _____ UXB QA

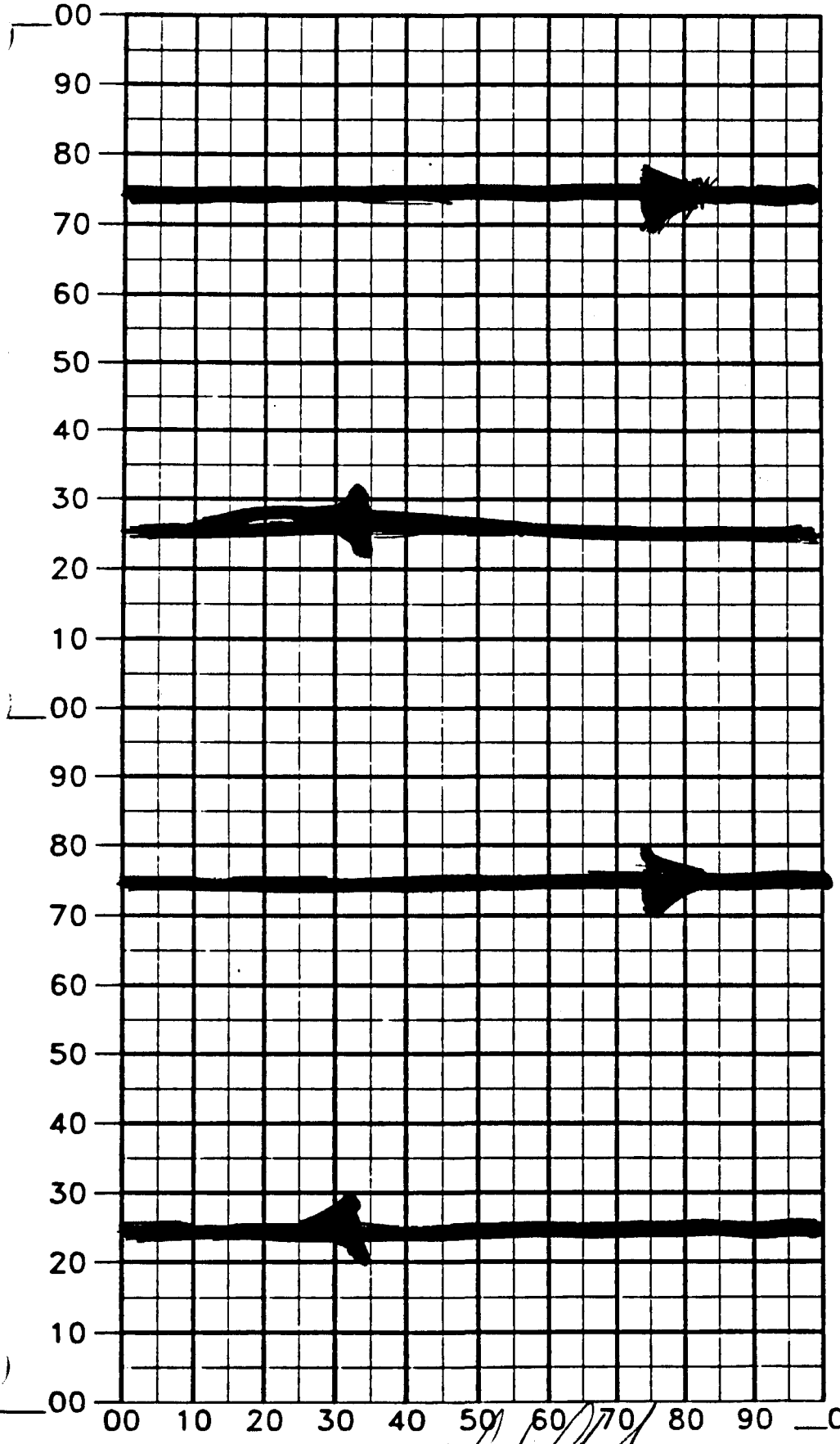
UXB Form 1.0019

Figure 2-6

ASSATEAGUE ISLAND

N

INDIVIDUAL CELL INTRUSIVE DATA SHEET



ANOMALY INTENSITY	NOTES
	1. SWEEP WAS CONDUCTED ON A NORTH/SOUTH AXIS PERPENDICULAR TO THE STANDARD SWEEP LANES.
	2. * ONE ANOMOLY WAS FOUND. IT HAD BEEN PREVIOUSLY IDENTIFIED AS JUNK, NOT AN ORDNANCE ITEM.

A TIER D

AREA CELL 23 SENIOR UXO SUPERVISOR [signature] DATE 22 Nov 94

ES FIELD

ENGINEERING-SCIENCE INC

UXB International, Inc.

Ordnance Clearance Survey
Daily Sweep Log

SUBAREA/GRID: A TIER D CELL 23

PAGE 1 of 1

TYPE OF SWEEP: Surface _____ Subsurface _____ Quality Assurance ✓

UXO ITEM NUMBER	DATE / TIME LOCATED	INDENTIFICATION OR FEATURES	NOTES
NO PREVIOUSLY UNIDENTIFIED ANOMOLIES FOUND			

Signature Team Leader _____ UXB QA

UXB Form 1.0019

17 Nov 94

MEMORANDUM

FROM: CHARLES J. GALBREATH, UXB INTERNATIONAL, INC.
TO: PARSONS ENGINEERING SCIENCE (Bob Luce)

SUBJ: QA SWEEP

1. ON 17 Nov 94, I CONDUCTED QA SWEEPS ON A TIER E, CELLS 23 & 24. THESE SWEEPS WERE RUN ON A NORTH/SOUTH AXIS, PERPENDICULAR TO, AND 90° OFF THE STANDARD SWEEP LANES, WHICH WERE SWEPT ON AN EAST/WEST AXIS. QA LANES WERE 25 AND 75 FT FROM GRID CORNER POSTS.

2. NO, PREVIOUSLY UNIDENTIFIED ANOMOLIES WERE FOUND.

3. SWEEP WAS CONDUCTED USING THE MK 26 ORDNANCE LOCATOR.

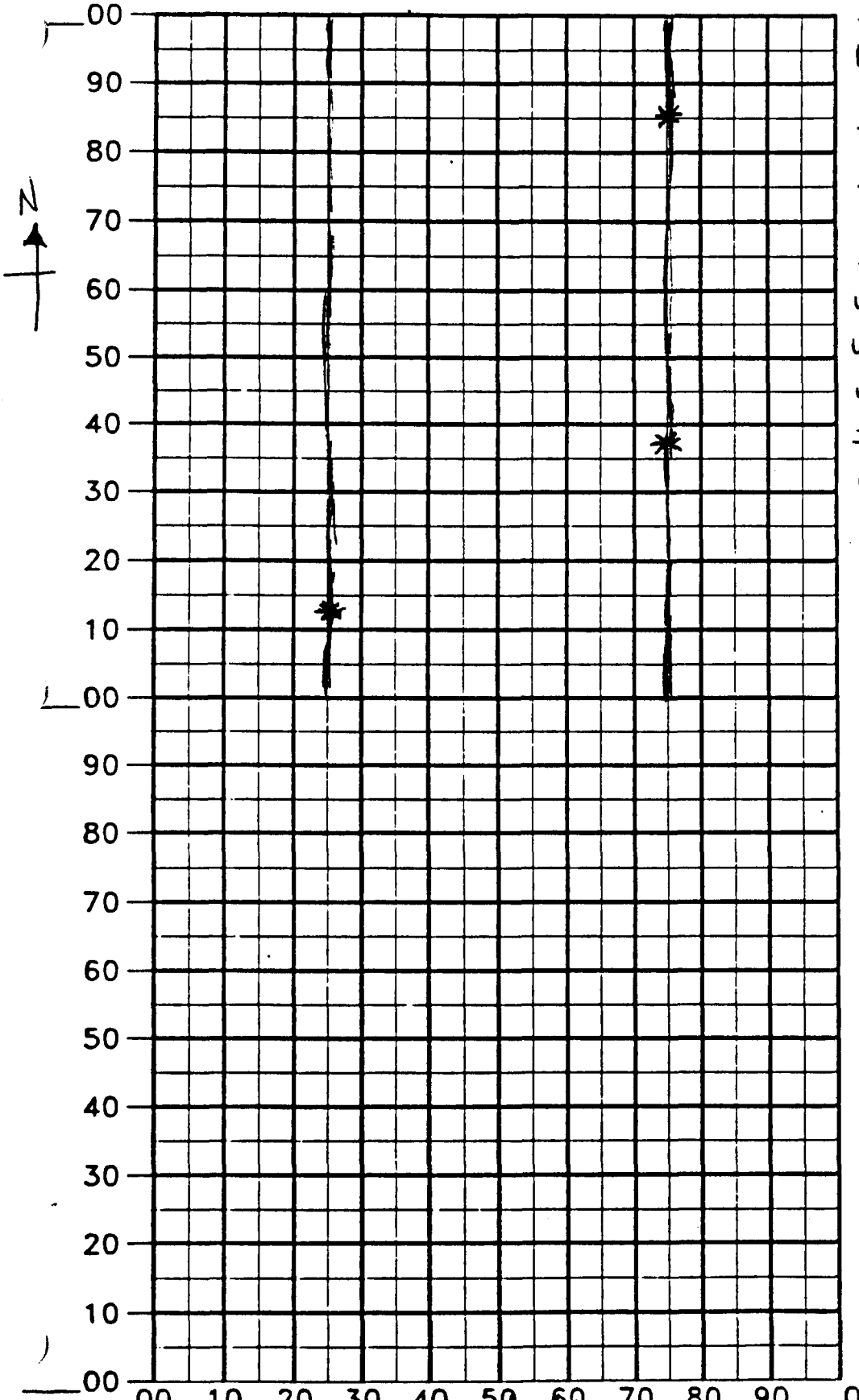
4. TOTAL SWEEP AREA WAS SLIGHTLY OVER 10% OF THE TOTAL GRID AREAS

CHARLES J. GALBREATH

Figure 2-6

ASSATEAGUE ISLAND

INDIVIDUAL CELL INTRUSIVE DATA SHEET



ANOMALY INTENSITY	NOTES
	1. SWEEP WAS CONDUCTED ON A NORTH/SOUTH AXIS PERPENDICULAR TO THE STANDARD SWEEP LANES.
	2. THREE ANOMOLIES WERE FOUND. ALL WERE PREVIOUSLY IDENTIFIED PIECES OF JUNK/SCRAP, NOT ORDNANCE ITEMS

A CELL E

AREA GRID 23

SENIOR UXO SUPERVISOR _____

ES FIELD

DATE 17 Nov 94

ENGINEERING-SCIENCE INC

UXB International, Inc.

Ordnance Clearance Survey
Daily Sweep Log

SUBAREA/GRID: A CELL E (GRID 23)

PAGE 1 of 1

TYPE OF SWEEP: Surface _____ Subsurface _____ Quality Assurance 1

UXO ITEM NUMBER	DATE / TIME LOCATED	INDENTIFICATION OR FEATURES	NOTES
No previously	UNIDENTIFIED	ANOMALIES found.	

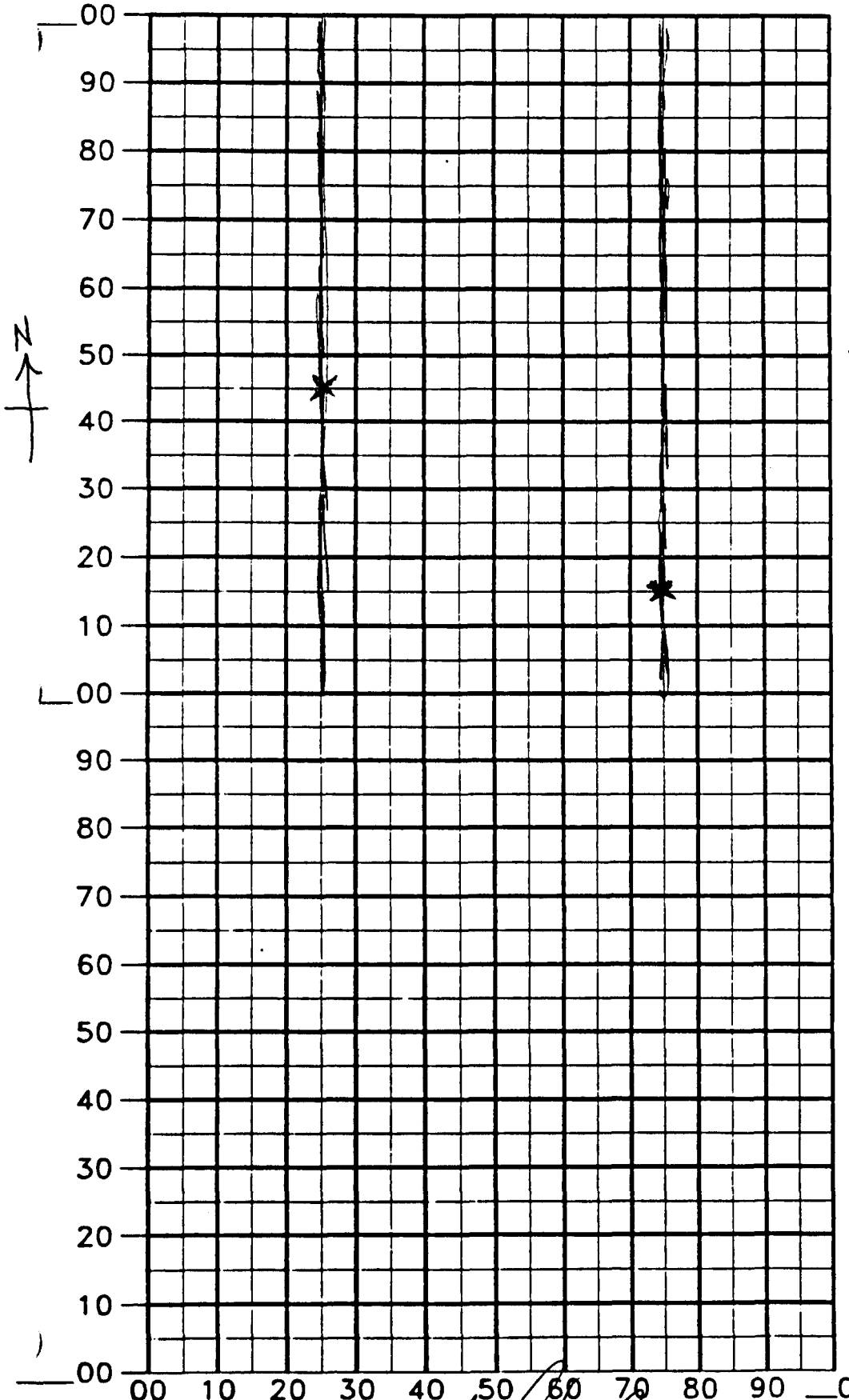
Signature Team Leader _____

UXB Form 1.0019

Figure 2-6

ASSATEAGUE ISLAND

INDIVIDUAL CELL INTRUSIVE DATA SHEET



ANOMALY INTENSITY	NOTES
	1. SWEEP WAS CONDUCTED ON A NORTH SOUTH AXIS PERPENDICULAR TO THE STANDARD SWEEP LANES.
	2. TWO ANOMOLIES WERE FOUND. BOTH WERE PREVIOUSLY IDENTIFIED PIECES OF JUNK, NOT ORDNANCE ITEMS.

A CELL E

AREA GRID 24

SENIOR UXO SUPERVISOR [signature]

ES FIELD

DATE 17 Nov 94

ENGINEERING-SCIENCE INC

UXB International, Inc.

Ordnance Clearance Survey
Daily Sweep Log

SUBAREA/GRID: A CELL E (GRID 24

TYPE OF SWEEP: Surface _____ Subsurface _____ Quality Assurance ✓

UXO ITEM NUMBER	DATE / TIME LOCATED	INDENTIFICATION OR FEATURES	NOTES
No previously	UNIDENTIFIED	ANOMALIES FOUND.	

Signature Team Leader _____

QC Report

Area C

To: Parsons Engineering Science (Bob Luce)

FM: UXB International (Tom Sigon)

subj: Quality control sweep of Assateague Islands area C tier A and B.

1. All Quality Assurance checks were accomplished proceeding along lanes 25 feet apart measuring from each cells corner marker working from South to North direction 90° perpendicular to the original sweep lanes using the MK26 ordnance locater on the HO scale.

2. On 11 November 1994 I completed a quality assurance check of Assateague Island area C tiers A and B with the following results:

A. tier A cell 24 - in lanes 25 and 75 hit a foundation at 40".

B. tier A cell 25 - in lanes 25, 75, 125 and 175 hit a foundation at 40".

C. Tier A cell 29 - no anomolies

D. Tier A cell 31 - No anomolies

E. Area C tier B Cell 4- No anomolies

F. Area C tier B Cell 7- Lane 50' 1 piece of wire 3" long 6" deep was found.

G. Area C tier B Cell 18- no anomolies.

H- Area C tier B Cell 24- No anomolies

I- Area C tier B Cell 25- Lane 250 one anomoly located wire 2" long 18" deep.

3. This sweep consisted of approximately 10% to 12% of the identified grids/cells.

4. All anomolies discovered were in an area that had been investigated before

UXB International, Inc.

Ordnance Clearance Surv
Daily Sweep Lo

SUBAREA/GRID: AREA C

PAGE 1 of 1

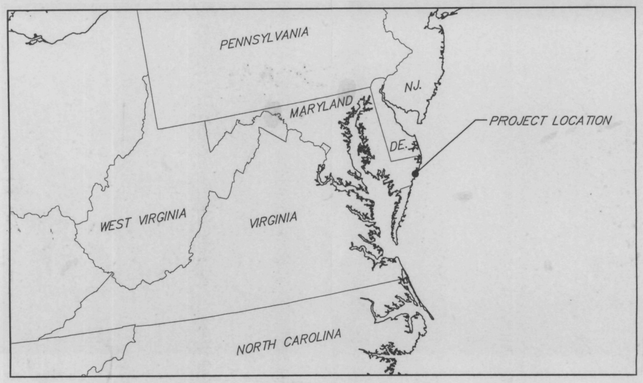
TYPE OF SWEEP: Surface _____ Subsurface _____ Quality Assurance X

UXO ITEM NUMBER	DATE / TIME LOCATED	INDENTIFICATION OR FEATURES	NOTES
AREA C TIER A	CELL 24	HIT FOUNDATION LANE 25 AND 75	
	CELL 25	HIT FOUNDATION LANES 25, 75, 125, 175	
	CELL 29	NO HITS	
	CELL 31	NO HITS	
AREA C TIER B	CELL 4	NO HITS	
	CELL 7	ONE HIT WIRE 3" LONG 6" DEE	
	CELL 18	NO HITS	
	CELL 24	NO HITS	
	CELL 25	ONE HIT WIRE 2" LONG 18" DEE	

Signature Team Leader

UXB Form 1.0019

OCEAN CITY
OCEAN CITY INLET
ASSATEAGUE STATE PARK
State Park Entrance Station
AREA B
North Ocean Beach
Oceanside
South Ocean Beach
Life of Dunes Nature Trail
Life of Forest Nature Trail
Old Ferry Landing
Bayside
AREA A
FOX HILLS
PIG LEVELS
Beach Route
Inner Dunes Route
AREA D
AREA C
ATLANTIC OCEAN
ASSATEAGUE ISLAND
10mi/16km of wild beach (foot access only)
WASH FLATS
CHINCOTEAGUE NATIONAL WILDLIFE REFUGE
Wildlife Loop (vehicles permitted 3pm to dusk)
Wildcat Marsh
Chincoteague Refuge Visitor Center U.S. Fish and Wildlife Service
CHINCOTEAGUE ISLAND
USCG Lighthouse
Refuge Headquarters
Woodland Trail
Former USCG Station
TOMS COVE HOOK
Fishing Point
Pony swim
Bunting Rd
Fireman Carnival Grounds
CHINCOTEAGUE
CHINCOTEAGUE INLET
WALLOPS ISLAND (NASA)
NASA Visitor Center
WALLOPS FLIGHT CENTER (NASA)
Ocean City Harbor
SINEPUXENT BAY
Ocean City Chamber of Commerce
South Point
NEWPORT BAY
PIRATE ISLANDS
Assateague Island National Seashore Boundary
CHINCOTEAGUE BAY
MILLS ISLAND
JOHNSON BAY
VIRGINIA
MARYLAND
To North Ocean City
To Wilmington
BERLIN
Newark
Pocomoke River
SNOW HILL
Girdletree
Stockton
To Salisbury, Baltimore and Washington
To Salisbury
To Pocomoke River State Park .5mi/.8km
To 13 and Pocomoke City
To 13 and Pocomoke City
To Norfolk via Bay Bridge Tunnel
North
0 1 2 Kilometers
0 1 2 Miles



Revisions			
Symbol	Description	Date	Approved

PARSONS ES
10521 ROSEHAVEN ST.
FAIRFAX, VA 22030
(703) 591-7575

HANSON ENGINEERS INC.
1525 S. SIXTH ST.
SPRINGFIELD, IL 62703
(217) 788-2450

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
HUNTSVILLE, ALABAMA

Designed by: GCR OF HEI
Drawn by: RWS OF HEI
Checked by: GCR OF HEI
Reviewed by: JMK/PARSONS ES
Approved by: RWL/PARSONS ES

US Army Corps of Engineers Huntsville District

DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
FORMERLY USED DEFENSE SITES
ORDINANCE AND EXPLOSIVE WASTE

ASSATEAGUE ISLAND
MARYLAND AND VIRGINIA
SITE LOCATION MAP

Scale:
Date: DEC, 1994
Drawing Code:
Sheet reference number:
Contract Number: DACA87-92-D-002
Delivery Order: 0030
Sheet 1 of 4

SWEEPS COMPLETED IN AREA A			
TIER	LANE(S)	GRID CELLS SWEPT	AREA SWEPT (FT^2)
A	0 ft	A0 thru A17	9, 000
A	25 ft	A18 thru A24	3, 500
A	50 ft	A0 thru A44	22, 500
A	100 ft, 150 ft	A0 thru A44	45, 000
A	175 ft	A18 thru A44	13, 500
B	0 ft, 50 ft, 100 ft, 150 ft, 200 ft	B0 thru B44	112, 500
C	250 ft, 300 ft, 350 ft, 400 ft	C18 thru C27	20, 000
D	450 ft	D18 thru D27	5, 000
D	500 ft	D18 thru D25	4, 000
D	550 ft	D18 thru D23	3, 000
D	600 ft	D18 thru D24	3, 500
E	650 ft, 700 ft	E18 thru E24	7, 000

Total Grid Cell Area = 1,945,000 ft^2 = 44.7 AC
Total Area Swept = 248,000 ft^2 = 5.7 AC

SWEEPS COMPLETED IN AREA B			
TIER	LANE(S)	GRID CELLS SWEPT	AREA SWEPT (FT^2)
Z	0 ft, 25 ft, 50 ft (1)	Z22 thru Z31	15, 000
Z	75 ft, 100 ft, 125 ft, 150 ft, 175 ft, 200 ft (2)	Z22 thru Z31	30, 000

NOTE: (1) Lanes swept by walking in the water.
(2) Lanes swept from a boat.

Total Grid Cell Area = 200,000 ft^2 = 4.6 AC
Total Area Swept = 45,000 ft^2 = 1.0 AC

SURFACE MUNITIONS SCRAP FOUND IN AREA A					
Item Number	Munitions Scrap Item Found (1)	Tier	Grid Cell	Lane (2)	Distance Along Lane
S1	2. 25-inch rocket head	C	C19	220 ft	20 ft
S2	2. 25-inch rocket motor	E	E19	695 ft	40 ft
S3	2. 25-inch rocket motor	B	B44(3)	0 ft	80 ft
S4	2. 25-inch rocket motor	B	B24	200 ft	10 ft
S5	2. 25-inch rocket motor	D	D21	495 ft	70 ft
S6	2 EA 2. 25-inch rocket motors	B	B26	50 ft	40 ft
S7	2 EA 2. 25-inch rocket motors	D	D23	575 ft	0 ft
S8	2. 25-inch rocket motor	D	D23	575 ft	20 ft
S9	2. 25-inch rocket motor	D	D23	575 ft	80 ft
S10	2. 25-inch rocket motor	D	D23	575 ft	90 ft
S11	3 EA 2. 25-inch rocket motors	E	E23	640 ft	90 ft
S12	2. 25-inch rocket motor	C	C22	350 ft	5 ft
S13	2 EA 2. 25-inch rocket motors	* See Note 4 *			
S14	2. 25-inch rocket motor	D	D22	* See Note 5*	80 ft
S15	2. 25-inch rocket motor	* See Note 6 *			

NOTES:
(1) All items were determmined to be expended.
(2) All lanes were measured with respect to the 0 ft. lane of Tier B.
(3) Rocket motor found on top of fill sand of artificial barrier dune.
(4) Rocket motors found 50 to 100 feet west of grid cell E24.
(5) Lane not recorded.
(6) Rocket motor found 150 to 200 feet west of grid cell E24.

AREA A INTRUSIVE INVESTIGATION RESULTS					
Tier	Grid Cell Investigated	No. of Intrusive Points	Items Found: Munitions Scrap (1)	Items Found: Other Scrap	Comment
A	A27	4	10 EA. 2. 25 in.	0	Only Investigated large anomaly
A	A28	6	25 EA. 2. 25 in.	0	Only Investigated large anomaly
A	A29	1	1 EA. 5 in.	0	Only Investigated large anomaly
A	A36	1	0	Shipwreck	Only Investigated large anomaly
B	B3	12	0	Wire, Tent Peg	Only 50 ft, 100 ft and 150 ft lanes investigated
B	B4	10	0	Wire, Tent Peg Wrench	Only 50 ft, 100 ft and 150 ft lanes investigated
B	B5	21	0	Wire, Tent Post, Nails	Only 50 ft, 100 ft and 150 ft lanes investigated
B	B6	24	0	Wire, Tent Post, Nails	Only 50 ft, 100 ft and 150 ft lanes investigated
B	B7	7	0	Wire, Tent Post, Nails	Only 50 ft, 100 ft and 150 ft lanes investigated
B	B8	17	0	Wire, Tent Post, Nails	Only 50 ft, 100 ft and 150 ft lanes investigated
B	B18	39	0	Wire	All of cell investigated
B	B19	24	0	Wire	All of cell investigated
B	B24	76	6 EA. 2. 25 in. & 1 Frag	Wire	All of cell investigated
B	B26	64	23 EA. 2. 25 in.	Wire	All of cell investigated
C	C24	94	9 EA. 2. 25 in, 3 EA 5in & 13 Frag	Wire	All of cell investigated
D	D23	58	29 EA. 2. 25 in. & 16 Frag	Wire	All of cell investigated
E	E23	52	17 EA. 2. 25 in. & 36 Frag	Wire	All of cell investigated
E	E24	61	22 EA. 2. 25 in. & 29 Frag	Wire	All of cell investigated

NOTES:
(1) 2.25 in = Scrap from 2.25 inch Subcaliber Aircraft Rocket (SCAR)
5 in = Scrap from 5 inch High Velocity Aircraft Rocket (HVAR)
Frag = Fragments of 2.25 in SCAR

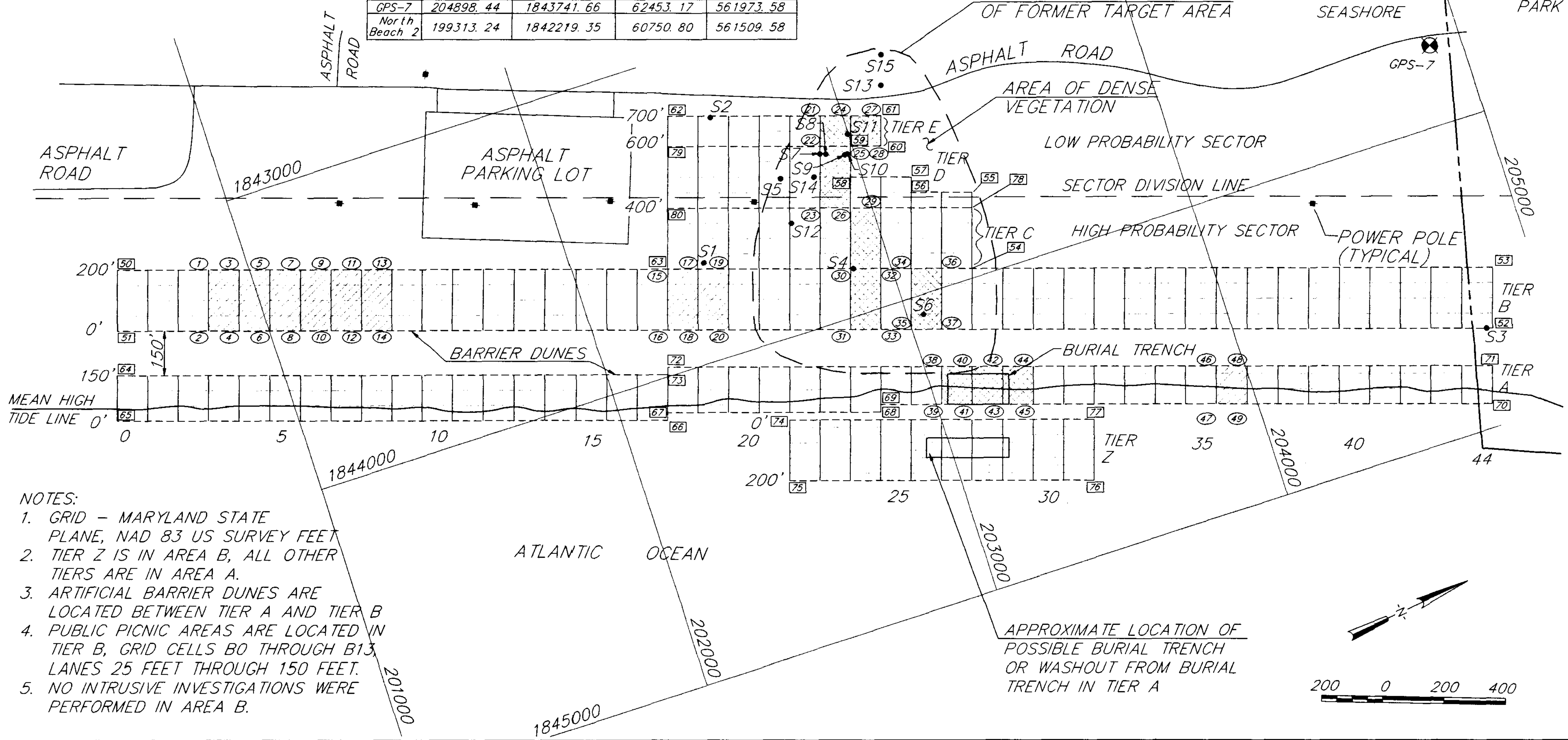
LEGEND

- INTRUSIVE GRID CELL CORNER (47)
- TIER CORNER (70)
- 600' SWEEP LANE LABEL
- GRID CELL INTRUSIVELY INVESTIGATED NO MUNITIONS SCRAP FOUND
- GRID CELL INTRUSIVELY INVESTIGATED MUNITIONS SCRAP FOUND
- LANE SWEPT IN MAGNETOMETER SURVEY
- GPS-7 SURVEY CONTROL POINT
- GRID CELL
- • S12 SURFACE MUNITIONS SCRAP FOUND
- PROPERTY BOUNDARY

INTRUSIVE GRID CELL CORNER LOCATION				
POINT NO.	MD, NAD 83, US SURVEY FEET: NORTHING	MD, NAD 83, US SURVEY FEET: EASTING	MD, NAD 83, METERS: NORTHING	MD, NAD 83, METERS: EASTING
1	200873. 20	1843196. 07	61226. 28	561807. 29
2	200811. 31	1843386. 25	61207. 42	561865. 26
3	200968. 29	1843226. 99	61255. 26	561816. 72
4	200906. 41	1843417. 19	61236. 41	561874. 69
5	201063. 40	1843257. 93	61284. 25	561826. 14
6	201001. 47	1843448. 11	61265. 39	561884. 11
7	201158. 51	1843288. 87	61313. 23	561835. 57
8	201096. 61	1843479. 05	61294. 38	561893. 54
9	201253. 59	1843319. 80	61342. 22	561845. 00
10	201191. 71	1843509. 98	61323. 36	561902. 97
11	201348. 70	1843350. 74	61371. 20	561854. 43
12	201286. 82	1843540. 92	61352. 35	561912. 40
13	201443. 79	1843381. 67	61400. 19	561863. 86
14	201381. 92	1843571. 86	61381. 33	561921. 83
15	202299. 63	1843660. 04	61661. 06	561948. 71
16	202237. 80	1843850. 25	61642. 20	562006. 68
17	202394. 76	1843690. 99	61690. 04	561958. 14
18	202332. 88	1843881. 18	61671. 19	562016. 11
19	202489. 84	1843721. 92	61719. 03	561967. 57
20	202428. 03	1843912. 13	61700. 17	562025. 54
21	202929. 80	1843339. 25	61853. 12	561850. 92
22	202898. 86	1843434. 34	61843. 70	561879. 91
23	202837. 03	1843624. 55	61824. 84	561937. 88
24	203024. 88	1843370. 18	61882. 11	561860. 35
25	203013. 20	1843477. 37	61878. 55	561893. 03
26	202932. 08	1843655. 47	61853. 82	561947. 31
27	203119. 99	1843401. 12	61911. 09	561869. 78
28	203089. 05	1843496. 21	61901. 67	561898. 77
29	203027. 21	1843686. 41	61882. 81	561956. 74
30	202870. 23	1843845. 65	61834. 97	562005. 28
31	202808. 42	1844035. 86	61816. 11	562063. 25
32	202965. 31	1843876. 59	61863. 95	562014. 71
33	202903. 47	1844066. 78	61845. 10	562072. 68
34	203060. 45	1843907. 53	61892. 94	562024. 14
35	202998. 52	1844097. 69	61874. 08	562082. 11
36	203155. 51	1843938. 46	61921. 92	562033. 56
37	203093. 65	1844128. 64	61903. 07	562091. 53
38	203054. 96	1844247. 52	61891. 28	562127. 77
39	203016. 32	1844366. 38	61879. 50	562164. 00
40	203150. 08	1844278. 44	61920. 27	562137. 19
41	203111. 41	1844397. 31	61908. 48	562173. 42
42	203245. 17	1844309. 37	61949. 25	562146. 62
43	203206. 55	1844428. 27	61937. 47	562182. 85
44	203340. 23	1844340. 31	61978. 24	562156. 05
45	203301. 59	1844459. 19	61966. 45	562192. 28
46	203910. 81	1844525. 91	62152. 15	562212. 62
47	203872. 16	1844644. 78	62140. 36	562248. 85
48	204005. 94	1844556. 83	62181. 13	562222. 05
49	203967. 29	1844675. 73	62169. 35	562258. 28

TIER CORNER LOCATION				
POINT NO.	MD, NAD 83, US SURVEY FEET: NORTHING	MD, NAD 83, US SURVEY FEET: EASTING	MD, NAD 83, METERS: NORTHING	MD, NAD 83, METERS: EASTING
50	200587. 93	1843103. 28	61139. 32	561779. 00
51	200526. 06	1843293. 47	61120. 47	561836. 97
52	204805. 38	1844685. 42	62424. 80	562261. 24
53	204867. 21	1844495. 28	62443. 66	562203. 27
54	203250. 58	1843969. 38	61950. 91	562042. 99
55	203327. 94	1843731. 64	61974. 48	561970. 53
56	203137. 75	1843669. 78	61916. 51	561951. 67
57	203153. 21	1843622. 23	61921. 22	561937. 18
58	202963. 02	1843560. 36	61863. 25	561918. 32
59	202993. 96	1843465. 28	61872. 68	561889. 34
60	203089. 05	1843496. 21	61901. 67	561898. 77
61	203119. 99	1843401. 12	61911. 09	561869. 78
62	202454. 31	1843184. 57	61708. 20	561803. 78
63	202299. 63	1843660. 04	61661. 06	561948. 71
64	200479. 65	1843436. 13	61106. 32	561880. 45
65	200433. 27	1843578. 76	61092. 18	561923. 93
66	202144. 99	1844135. 54	61613. 92	562093. 64
67	202152. 72	1844111. 76	61616. 27	562086. 39
68	202818. 39	1844328. 29	61819. 17	562152. 39
69	202826. 06	1844304. 51	61821. 53	562145. 14
70	204728. 01	1844923. 17	62401. 24	562333. 71
71	204766. 67	1844804. 30	62413. 02	562297. 47
72	202199. 08	1843969. 12	61630. 42	562042. 91
73	202191. 39	1843992. 91	61628. 06	562050. 16
74	202525. 37	1844259. 27	61729. 86	562131. 35
75	202463. 51	1844449. 46	61711. 00	562189. 32
76	203414. 46	1844758. 78	62000. 85	562283. 60
77	203476. 33	1844568. 59	62019. 71	562225. 63
78	203312. 49	1843779. 22	61969. 77	561985. 03
79	202423. 39	1843279. 68	61698. 77	561832. 77
80	202361. 52	1843469. 87	61679. 91	561890. 74

AREA A & B SURVEY CONTROL				
POINT NO.	MD, NAD 83, US SURVEY FEET: NORTHING	MD, NAD 83, US SURVEY FEET: EASTING	MD, NAD 83, METERS: NORTHING	MD, NAD 83, METERS: EASTING
GPS-7	204898. 44	1843741. 66	62453. 17	561973. 58
North Beach 2	199313. 24	1842219. 35	60750. 80	561509. 58



NOTES:
1. GRID – MARYLAND STATE PLANE, NAD 83 US SURVEY FEET.
2. TIER Z IS IN AREA B, ALL OTHER TIERS ARE IN AREA A.
3. ARTIFICIAL BARRIER DUNES ARE LOCATED BETWEEN TIER A AND TIER B
4. PUBLIC PICNIC AREAS ARE LOCATED IN TIER B, GRID CELLS B0 THROUGH B13, LANES 25 FEET THROUGH 150 FEET.
5. NO INTRUSIVE INVESTIGATIONS WERE PERFORMED IN AREA B.

Revisions			
Symbol	Description	Date	Approved

PARSONS ES
10521 ROSEHAVEN ST.
FAIRFAX, VA 22030
(703) 591-7575

HANSON ENGINEERS INC.
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SPRINGFIELD, IL 62703
(217) 788-2450

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
HUNTSVILLE, ALABAMA

US Army Corps of Engineers Huntsville Division

DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
FORMERLY USED DEFENSE SITES
ORDNANCE AND EXPLOSIVE WASTE

ASSATEAGUE ISLAND, MARYLAND
OEW SURVEY RESULTS
AREA A & B

Designed by: GCR OF HEI
Drawn by: RWS OF HEI
Checked by: GCR OF HEI
Reviewed by: JMK/PARSONS ES
Approved by: RWL/PARSONS ES

Scale: 1" = 200'
Date: DEC, 1994
Drawing Code:
Sheet reference number:
Contract Number: DACA87-92-D-002
Delivery Order: 0030
Sheet 2 of 4

AREA C SURVEY CONTROL				
POINT NO.	MD, NAD 83, US SURVEY FEET		MD, NAD 83, METERS	
	NORTHING	EASTING	NORTHING	EASTING
GPS-15	154730.44	1828067.99	47161.93	557196.24
GPS-16	149117.84	1825094.70	45451.20	556289.98

AREA C INTRUSIVE INVESTIGATION RESULTS					
Tier	Grid Cell Investigated	No. of Intrusive Points	Items Found		Comment
			Munitions Scrap	Other Scrap	
A	A24	1	0	Building Foundation	Only Investigated large anomaly
A	A25	1	0	Building Foundation	Only Investigated large anomaly
A	A29	3	0	Wire	All of cell investigated
A	A31	4	0	Wire	All of cell investigated
B	B4	42	0	Wire, Nails, Tools	All of cell investigated
B	B7	14	0	Wire, Rebar	All of cell investigated
B	B18	52	0	Wire	All of cell investigated
B	B25	27	0	Wire, Building Foundation	All of cell investigated
B	B44	1	0	Standpipe	Only Investigated standpipe

INTRUSIVE GRID CELL CORNER LOCATION				
POINT NO.	MD, NAD 83, US SURVEY FEET		MD, NAD 83, METERS	
	NORTHING	EASTING	NORTHING	EASTING
1	152657.55	1827291.57	46530.11	556959.58
2	152567.56	1827470.18	46502.69	557014.03
3	152746.91	1827336.61	46557.35	556973.31
4	152656.86	1827515.19	46529.91	557027.75
5	152925.52	1827426.63	46611.79	557000.75
6	152835.49	1827605.23	46584.35	557055.19
7	153014.74	1827471.60	46638.99	557014.46
8	152924.67	1827650.18	46611.54	557068.89
9	153907.75	1827921.72	46911.18	557151.66
10	153817.75	1828100.32	46883.75	557206.09
11	153997.07	1827966.74	46938.40	557165.38
12	153907.04	1828145.33	46910.96	557219.81
13	154353.51	1828370.37	47047.05	557288.40
14	154263.52	1828549.00	47019.62	557342.85
15	154532.88	1828236.81	47101.72	557247.70
16	154442.85	1828415.40	47074.28	557302.13
17	154352.85	1828594.03	47046.84	557356.57
18	154622.08	1828281.77	47128.90	557261.40
19	154532.14	1828460.41	47101.49	557315.85
20	154442.12	1828639.03	47074.05	557370.29
21	154800.08	1828595.46	47183.14	557357.00
22	154710.03	1828774.06	47155.71	557411.45
23	154889.32	1828640.44	47210.36	557370.72
24	154799.38	1828819.10	47182.95	557425.18
25	154978.59	1828685.44	47237.57	557384.44
26	154888.61	1828864.07	47210.14	557438.89
27	155067.84	1828730.42	47264.77	557398.15
28	154977.97	1828909.12	47237.38	557452.62
29	156229.52	1829091.99	47618.85	557508.35
30	156139.37	1829270.52	47591.38	557562.77
31	156318.78	1829136.98	47646.06	557522.07
32	156228.75	1829315.57	47618.62	557576.50

SWEEPS COMPLETED IN AREA C			
TIER	LANE(S)	GRID CELLS SWEPT	AREA SWEPT (FT^2)
A	0 ft, 25 ft, 50 ft, 75 ft, 100 ft, 125 ft, 150 ft, 175 ft, 200 ft	A0 thru A44	202,500
B	250 ft, 300 ft, 350 ft, 400 ft	B0 thru B44	90,000
B	225 ft, 275 ft, 325 ft, 375 ft	B3 thru B9 B15 thru B19 B24 thru B26	27,000
Z	0 ft, 25 ft	Z0 thru Z44	45,000

NOTE: Half of grid cells B3, B9, and B15 swept.

Total Grid Cell Area = 1,800,000 ft^2 = 41.3 AC
Total Area Swept = 364,500 ft^2 = 8.4 AC

TIER CORNER LOCATION				
POINT NO.	MD, NAD 83, US SURVEY FEET		MD, NAD 83, METERS	
	NORTHING	EASTING	NORTHING	EASTING
50	152300.38	1827111.54	46421.25	556904.71
51	152097.83	1827513.41	46359.51	557027.20
52	156116.31	1829538.89	47584.35	557644.57
53	156318.78	1829136.98	47646.06	557522.07
54	152210.37	1827290.14	46393.81	556959.14
55	152120.34	1827468.75	46366.37	557013.58
56	156228.75	1829315.57	47618.62	557576.49
57	156138.82	1829494.24	47591.21	557630.93

LEGEND

- (32) INTRUSIVE GRID CELL CORNER
- 56 TIER CORNER
- 600' SWEEP LANE LABEL
- GRID CELL INTRUSIVELY INVESTIGATED NO MUNITIONS SCRAP FOUND
- LANE SWEPT IN MAGNETOMETER SURVEY
- GPS-7 SURVEY CONTROL POINT
- GRID CELL

SHORELINE
GREEN RUN BAY
1826000
155000
BUILDINGS
154000
153000
ROAD
SAND
SAND ROAD
1827000
SAND ROAD
1828000
156000
SAND ROAD
LOW PROBABILITY SECTOR
SECTOR DIVISION LINE
GPS-15
SAND ROAD
DC 13
POWER POLE (TYPICAL)
152000
HIGH PROBABILITY SECTOR
400'
200'
MEAN HIGH 0'
TIDE LINE 25'
0'
TIER B
TIER A
TIER Z
0 5 10 15 20 25 30 35 40 44
ATLANTIC OCEAN
200 0 200 400

NOTES:
1. GRID – MARYLAND STATE PLANE, NAD 83 US SURVEY FEET
2. OEW AND MUNITIONS SCRAP WAS NOT FOUND IN AREA C.

Revisions			
Symbol	Description	Date	Approved

PARSONS ES
10521 ROSEHAVEN ST.
FAIRFAX, VA 22030
(703) 591-7575

HANSON ENGINEERS INC
1525 S. SIXTH ST.
SPRINGFIELD, IL 62703
(217) 788-2450

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
HUNTSVILLE, ALABAMA

Designed by: GCR OF HEI
Drawn by: RWS OF HEI
Checked by: GCR OF HEI
Reviewed by: JMK/PARSONS ES
Approved by: RWL/PARSONS ES

US Army Corps of Engineers Huntsville Division

DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
FORMERLY USED DEFENSE SITES
ORDNANCE AND EXPLOSIVE WASTE
ASSATEAGUE ISLAND, MARYLAND
OEW SURVEY RESULTS
AREA C

Scale: 1" = 200'
Date: DEC, 1994
Sheet reference number:
Drawing Code:
Contract Number: DACA87-92-D-002
Delivery Order: 0030
Sheet 3 of 4

DESIGNED	GCR	12/05/94
DRAWN	RWS	12/07/94
REVIEWED	GCR	12/07/94

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AREA C SURVEY CONTROL				
POINT NO.	MD. NAD 83, US SURVEY FEET		MD. NAD 83, METERS	
	NORTHING	EASTING	NORTHING	EASTING
GPS-15	154730.44	1828067.99	47161.93	557196.24
GPS-16	149117.84	1825094.70	45451.21	556289.98

LEGEND

LANE SWEPT IN MAGNETOMETER SURVEY

GPS-7 SURVEY CONTROL POINT

GRID CELL

GREEN RUN BAY

SHORELINE

JIM'S GUT

SAND ROAD

SAND ROAD

SAND ROAD

4 LANES SWEPT BETWEEN DUNE CROSSING 12 & 13 AT 50', 75', 100', AND 125' FROM SAND ROAD

3 LANES SWEPT BETWEEN DUNE CROSSING 11 & 12 AT 50', 100', AND 125' FROM SAND ROAD

DC 13

DC 12

DC 11

GPS-15

TIER B

TIER A

TIER Z

SHORELINE

ATLANTIC OCEAN

25 30 35 40 44

400 0 400 800

NOTES:
1. GRID – MARYLAND STATE PLANE, NAD 83 SURVEY FEET
2. DC = DUNE CROSSING

DESIGNED	GCR	*	12/05/94
DRAWN	RWS	*	12/07/94
REVIEWED	GCR	*	12/07/94

\DRAWINGS\94SS054\SHT-4.DWG 12/15/94 08:22 GCR

Revisions

Symbol	Description	Date	Approved

PARSONS ES
10521 ROSEHAVEN ST.
FAIRFAX, VA 22030
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HANSON ENGINEERS INC.
1525 S. SIXTH ST.
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CORPS OF ENGINEERS
HUNTSVILLE, ALABAMA

Designed by: GCR OF HEI

Drawn by: RWS OF HEI

Checked by: GCR OF HEI

Reviewed by: JMK/PARSONS ES

Approved by: RWL/PARSONS ES

U.S. Army Corps of Engineers Huntsville Division

DEFENSE ENVIRONMENTAL RESTORATION PROGRAM FORMERLY USED DEFENSE SITES ORDNANCE AND EXPLOSIVE WASTE

ASSATEAGUE ISLAND, MARYLAND OEW SURVEY RESULTS NORTH OF AREA C

Scale: 1" = 400'

Date: DEC, 1994

Drawing Code:

Sheet reference number:

Contract Number: DACA87-92-D-002

Delivery Order: 0030

Sheet 4 of 4