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FINAL SITE INSPECTION WORK PLAN AND MUNITIONS AND EXPLOSIVES OF CONCERN QUALITY ASSURANCE PROJECT PLAN UNEXPLODED ORDNANCE 2 (UXO 2) MUNITIONS LOADING PIER COMPLEX NWS EARLE NJ

1/1/2014

CH2M HILL

MEC-QAPP Worksheet #1—Title and Approval Page

Final

Site Inspection Work Plan and Munitions and Explosives of Concern Quality Assurance Project Plan UXO 0002, Munitions Loading Pier Complex

Naval Weapons Station Earle
Sandy Hook Bay, Monmouth County, New Jersey

Contract Task Order WE06

January 2014

Prepared for

Department of the Navy
Naval Facilities Engineering Command
Mid-Atlantic

Under the

NAVFAC CLEAN 8012 Program
Contract N62470-11-D-8012

Prepared by

CH2MHILL

Virginia Beach, Virginia

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Approval Signatures

Roberto Pagtalunan
NAVFAC Mid-Atlantic – Remedial Project Manager

Approval to be provided in Approval Letter following submittal of Final
Jessica Mollin
USEPA Region 2 – Remedial Project Manager

Approval to be provided in Approval Letter following submittal of Final
Erica Bergman
NJDEP – Remedial Project Manager

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Executive Summary

This Site Inspection (SI) Work Plan and Munitions and Explosives of Concern (MEC) Uniform Federal Policy (UFP) – Quality Assurance Project Plan (QAPP), herein referred to as the MEC-QAPP, has been prepared to support SI field activities for Site Unexploded Ordnance 0002 (UXO 2), the Munitions Loading Pier Complex, at Naval Weapons Station (NWS) Earle, Sandy Hook Bay, Monmouth Country, New Jersey. It outlines the approach and procedures for conducting the SI to support the determination of whether there has been a release of MEC to the underwater environment at the site. The SI is not intended as a full-scale study of the nature and extent of contamination or explosives hazards; rather, it is being conducted to assess whether there is a potential presence of MEC at the site. The activities conducted through this investigation do not address munitions constituents (MC). If MEC is found to be present in the investigation areas, subsequent investigations, including MC sampling, may be necessary to assess the nature and extent of impacts to the environment.

The Department of the Navy (Navy) began using the Munitions Loading Pier Complex in the 1940s to load munitions and cargo onto ships. Based on the current use of the pier complex, this investigation will focus on the areas in the vicinity of Piers 1 and 2, which are no longer active; Piers 3A and 4 are currently active and will not be addressed during this investigation. The historical munitions loading and unloading activities at the pier complex and the explosion of the United States Ship (USS) Solar at Pier 1 while being unloaded in 1946 may have resulted in MEC being dropped or deposited into the bay.

This MEC-QAPP provides the approach for conducting a two-phased SI investigation around Piers 1 and 2. The Phase 1 investigation will consist of collection of digital geophysical mapping (DGM) survey data in the area adjacent to Piers 1 and 2 to locate geophysical anomalies around the piers, and the Phase 2 investigation will consist of conducting an anomaly inspection to determine whether the sources of select geophysical anomalies around Piers 1 and 2 are MEC. The need for Phase 2 is anticipated but not certain, and its details (if needed) would be based on the data collected during Phase 1. Therefore, the concept of the Phase 2 investigation activities are presented and, if it is confirmed that Phase 2 is warranted, an addendum to this MEC-QAPP will be provided to detail the selected anomaly inspection technology and the number and locations of geophysical anomalies requiring inspection. Data from this investigation will be used to assess the potential presence of MEC at the site and to identify areas of the site where MEC is not likely present (areas that may be free of geophysical anomalies). Data collected during the bathymetry and side-scan sonar surveys (under a separate QAPP), as well as data that are anticipated to be collected by the Naval Surface Warfare Center Panama City for these areas, may be used as a supplement to the planned data collection outlined in this MEC-QAPP.

This MEC-QAPP is intended to be the primary work-planning document for the DGM survey and anomaly inspection activities being performed at the site. Therefore, it will serve as an SI Work Plan and MEC-QAPP by providing a guideline for implementing the field activities and data quality assessment. This MEC-QAPP has been developed in accordance with three guidance documents:

- *Guidance for Quality Assurance Project Plans* (USEPA, 2002)
- *Uniform Federal Policy for Quality Assurance Project Plans* (USEPA, 2005)
- *Guidance on Systematic Planning Using the Data Quality Objectives Process* (USEPA, 2006)

To the extent practicable, this work plan was also developed in accordance with the *New Jersey Administrative Code 7.26E, Technical Requirements for Site Remediation* (NJAC, 2011).

The MEC-QAPP format typically consists of 37 worksheets designed specifically for chemical sampling. However, because of the absence of chemical sampling and the scope of work for this Munitions Response Program (MRP) investigation, some of the worksheets have either been modified or eliminated to meet the objectives of this investigation. All applicable tables are embedded within the worksheets. Figures are

provided at the end of worksheets, where applicable. Standard operating procedures (SOPs) are attached to provide more specific procedures for performing the work.

The Navy, Naval Facilities Engineering Command (NAVFAC) Mid-Atlantic, is conducting this SI in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) investigation process. This site has been identified under the Navy MRP. United States Environmental Protection Agency (USEPA) Region 2 and the New Jersey Department of Environmental Protection (NJDEP) have been identified in the Federal Facility Agreement for NWS Earle as the agencies that will review these CERCLA documents. This MEC-QAPP will help ensure that the data collected or compiled are scientifically sound, of known and documented quality, and suitable for intended uses.

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Appendixes

A Side-scan Sonar and Bathymetry Technical Memorandum
B Field Standard Operating Procedures
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SOP #4* – Anomaly Inspection SOP

* SOP will be provided by the subcontractor upon award

Tables

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2 Example DGM Field Data Sheet
3 DGM Data Processing Documentation Requirements
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5a DGM Survey Activities Summary
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Acronyms and Abbreviations

AM	Activity Manager
APP	Accident Prevention Plan
AQM	Activity Quality Manager
CA	corrective action
CD	compact disc
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulations
CLEAN	Comprehensive Long-term Environmental Action—Navy
cm	centimeter
CSM	conceptual site model
DDESB	Department of Defense Explosives Safety Board
DFOW	Definable Feature of Work
DGM	digital geophysical mapping
DVD	digital video disc
EM	electromagnetic
EOD	Explosive Ordnance Disposal
ESS	Explosives Safety Submission
FP	Follow-up Phase
FTL	Field Team Leader
FTP	file transfer protocol
GIS	geographic information system
GPS	global positioning system
H&S	health and safety
HE	high explosive
IP	Initial Phase
MC	munitions constituents
MEC	munitions and explosives of concern
MLW	mean low water
mm	millimeter
MR	Munitions Response
MRP	Munitions Response Program
MRSIMS	Munitions Response Site Information Management System
NAD	North American Datum
NAVFAC	Naval Facilities Engineering Command
Navy	Department of the Navy
NJDEP	New Jersey Department of Environmental Protection
NOSSA	Naval Ordnance Safety and Security Activity
NWS	Naval Weapons Station
PA	Preliminary Assessment
PAL	project action limit
PDF	portable document format
PM	Project Manager

POC	point of contact
PP	Preparatory Phase
PQO	project quality objective
QA	quality assurance
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QC	quality control
ROV	remotely operated vehicle
RPM	Remedial Project Manager
RRR	Recognize, Retreat, Report
RTC	Response to Comment
SI	Site Inspection
SOP	standard operating procedure
SSC	Site Safety Coordinator
STC	Senior Technical Consultant
SUXOS	Senior Unexploded Ordnance Supervisor
TBD	to be determined
TIFF	Tagged Image File Format
TP	Technical Paper
UFP	Uniform Federal Policy
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USS	United States Ship
UXO	unexploded ordnance
UXO 2	Site Unexploded Ordnance 0002
UXOQCS	Unexploded Ordnance Quality Control Specialist
UXOSO	Unexploded Ordnance Safety Officer

MEC-QAPP Worksheet #2—QAPP Identifying Information

Site Name/Number: Naval Weapons Station (NWS) Earle
Site Unexploded Ordnance 0002 (UXO 2), Munitions Loading Pier Complex

Operable Unit: Not applicable

Contractor Name: CH2M HILL

Contract Number: N62470-11-D-8012, Contract Task Order WE06

Contract Title: Comprehensive Long-term Environmental Action—Navy (CLEAN) 8012

1. **This Quality Assurance Project Plan (QAPP) was prepared in accordance with the requirements of:**

   - *Guidance for Quality Assurance Project Plans* (USEPA, 2002)
   - *Uniform Federal Policy for Quality Assurance Project Plans* (USEPA, 2005)
   - *Guidance on Systematic Planning Using the Data Quality Objectives Process* (USEPA, 2006)
   - *New Jersey Administrative Code 7.26E, Technical Requirements for Site Remediation* (NJAC, 2011)[1]

2. **Identify regulatory program:**

   Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)

3. **This is a project-specific QAPP for:**

   Site Inspection (SI) activities for the inactive pier areas of UXO 2 at NWS Earle.

   - Phase 1 Investigation - Digital geophysical mapping (DGM) survey
   - Phase 2 Investigation - Anomaly Inspection of select geophysical anomalies, if warranted

4. **List dates of scoping sessions that were held:**

Scoping Sessions for UXO 2	Date
NWS Earle Initial Scoping Session with United States Environmental Protection Agency (USEPA) and New Jersey Department of Environmental Protection (NJDEP)	6/12/2013
NWS Earle Second Scoping Session with USEPA and NJDEP	7/30/2013

5. **List dates and titles of any QAPP documents written for previous site work that are relevant to the current investigation.**

   - *Final Streamlined Quality Assurance Project Plan, UXO 0002, Munitions Loading Pier Complex, Side-scan Sonar and Bathymetric Survey* (CH2M HILL, 2013)

6. **List organizational partners (stakeholders) and connection with lead organization:**

   - Lead Organization— Naval Facilities Engineering Command (NAVFAC) Mid-Atlantic
   - Lead Regulatory Agency—USEPA Region 2
   - State Regulatory Agency—NJDEP
   - Pier Owner—NWS Earle

[1] New Jersey Administrative Code followed to the extent practicable for Munitions Response Program (MRP) SI Work Plans/QAPP.

MEC-QAPP Worksheet #2—QAPP Identifying Information (continued)

7. If any required QAPP elements or required information are not applicable to the project or are provided elsewhere, then note the omitted QAPP elements and provide an explanation for their exclusion as follows:

The worksheets that are not applicable to the munitions and explosives of concern (MEC) format of the Uniform Federal Policy (UFP)-QAPP are as follows: **Worksheets #15, #19, #20, #23-28,** #**30**, and #**36**. These worksheets have been excluded because information included on these worksheets pertain to environmental samples that are collected from the site and sent to an analytical laboratory, which is not part of the scope of work. Worksheets that were not applicable to this MEC-QAPP are listed as "excluded" in the following table and not included in the document. Where appropriate, an explanation for exclusion of a worksheet has been included. Additionally, if it is anticipated that a worksheet will require updating to complete Phase 2 activities (if Phase 2 is deemed necessary), an explanation has also been included in the comment column.

UFP-QAPP Worksheet #	Required Information	Included or Excluded	Comment
A. Project Management			
Documentation			
1	Title and Approval Page	Included	
2	Table of Contents QAPP Identifying Information	Included	
3	Distribution List	Included	Will be updated in QAPP Addendum, as appropriate, to identify Phase 2 project personnel
4	Project Personnel Sign-Off Sheet	Included	Will be updated in QAPP Addendum, as appropriate, to identify Phase 2 project personnel
Project Organization			
5	Project Organizational Chart	Included	Will be updated in QAPP Addendum, as appropriate, to identify Phase 2 project personnel
6	Communication Pathways	Included	Will be updated in QAPP Addendum, as appropriate, to identify Phase 2 project personnel
7	Personnel Responsibilities Table	Included	Will be updated in QAPP Addendum, as appropriate, to identify Phase 2 project personnel
8	Special Personnel Training Requirements Table	Included	Will be updated in QAPP Addendum, as appropriate, to identify Phase 2 technology-specific training requirements
Project Planning/Problem Definition			
9	Project Scoping Session Participants Sheet	Included	Additional scoping sessions will be included in the QAPP Addendum as needed
10	Conceptual Site Model (CSM)	Included	
11	Project Quality Objectives (PQOs)/Systematic Planning Process Statements	Included	Will be updated in QAPP Addendum
12-1a	Measurement Performance Criteria Table – Phase 1	Included	

MEC-QAPP Worksheet #2—QAPP Identifying Information (continued)

UFP-QAPP Worksheet #	Required Information	Included or Excluded	Comment
12-1b	Measurement Performance Criteria Table – Phase 2	Included	Will be updated in QAPP Addendum
12-2a	Definable Features of Work (DFOWs) – Phase 1	Included	
12-2b	DFOWs – Phase 2	Included	Will be updated in QAPP Addendum
13	Sources of Secondary Use Data and Information Secondary Use of Data Criteria and Limitations Table	Included	
14a	Summary of Project Tasks	Included	
14b	Summary of Project Tasks	Included	Will be updated in QAPP Addendum
15	Reference Limits and Evaluation Table	Excluded	Laboratory-related; no samples will be collected for this investigation
16	Project Schedule/Timeline Table	Included	Will be updated as needed in QAPP Addendum
Sampling Tasks			
17a	Sampling Design and Rationale – Phase 1	Included	
17b	Sampling Design and Rationale – Phase 2	Included	Will be updated in QAPP Addendum
18a	Sampling Locations and Methods/Standard Operating Procedures (SOPs) Requirements Table – Phase 1	Included	
18b	Sampling Locations and Methods/ SOPs Requirements Table – Phase 2	Included	Will be updated in QAPP Addendum
19	Analytical Methods/SOP Requirements Table	Excluded	Laboratory-related; no samples will be collected for this investigation
20	Field Quality Control (QC) Sample Summary Table	Excluded	Laboratory-related; no samples will be collected for this investigation
21	Project Sampling SOP References Table Sampling SOPs	Included	Will be updated in QAPP Addendum to identify information relevant to Phase 2
22a	Field Equipment Calibration, Maintenance, Testing, and Inspection Table	Included	
22b	Field Equipment Calibration, Maintenance, Testing, and Inspection Table	Included	Will be updated in QAPP Addendum
Analytical Tasks			
23	Analytical SOPs Analytical SOP References Table	Excluded	Laboratory-related; no samples will be collected for this investigation
24	Analytical Instrument Calibration Table	Excluded	Laboratory-related; no samples will be collected for this investigation
25	Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table	Excluded	Laboratory-related; no samples will be collected for this investigation
Sample Collection			
26	Sample Handling System, Documentation Collection, Tracking, Archiving and Disposal Sample Handling Flow Diagram	Excluded	Laboratory-related; no samples will be collected for this investigation

MEC-QAPP Worksheet #2—QAPP Identifying Information (continued)

UFP-QAPP Worksheet #	Required Information	Included or Excluded	Comment
27	Sample Custody Requirements, Procedures/SOPs Sample Container Identification Example Chain-of-Custody Form and Seal	Excluded	Laboratory-related; no samples will be collected for this investigation
QC Samples			
28	QC Samples Table Screening/Confirmatory Analysis Decision Tree	Excluded	Laboratory-related; no samples will be collected for this investigation
Data Management Tasks			
29	Project Documents and Records Table	Included	
30	Analytical Services Table Analytical and Data Management SOPs	Excluded	Laboratory-related; no samples will be collected for this investigation
C. Assessment Oversight			
31	Planned Project Assessments Table Audit Checklists	Included	
32	Assessment Findings and Corrective Action (CA) Responses Table	Included	
33	Quality Assurance (QA) Management Reports Table	Included	
D. Data Review			
34a	Verification (Step I) Process Table	Included	
34b	Verification (Step I) Process Table	Included	Will be updated in QAPP Addendum
35a	Validation (Steps IIa and IIb) Process Table	Included	
35b	Validation (Steps IIa and IIb) Process Table	Included	Will be updated in QAPP Addendum
36	Validation (Steps IIa and IIb) Summary Table	Excluded	Redundant information
37	Usability Assessment	Included	

MEC-QAPP Worksheet #3—Distribution List

Name of QAPP Recipients	Title/Role	Organization	Telephone Number	E-mail Address or Mailing Address
Roberto Pagtalunan	Remedial Project Manager (RPM)	NAVFAC Mid-Atlantic	(757) 341-2010	roberto.pagtalunan@navy.mil
Scott Fleming	NWS Earle Environmental	NWS Earle	(732) 866-2624	scott.fleming1@navy.mil
Jessica Mollin	RPM	USEPA Region 2	(212) 637-3921	Mollin.Jessica@epamail.epa.gov
Erica Bergman	RPM	NJDEP	(609) 292-7406	Erica.Bergman@dep.state.nj.us
John Tomik	Activity Manager (AM)	CH2M HILL	(757) 671-6214	john.tomik@ch2m.com
Adam Forshey	Project Manager (PM)	CH2M HILL	(757) 671-6267	adam.forshey@ch2m.com
Timothy Garretson	Senior Technical Consultant (STC)/ Activity Quality Manager (AQM)	CH2M HILL	(904) 374-5633	timothy.garretson@ch2m.com
David Wright	Project Geophysicist	CH2M HILL	(919) 520-8673	david.wright@ch2m.com
Tim Wenk	Project Engineer	CH2M HILL	(757) 671-6265	tim.wenk@ch2m.com
Karen Lemley	Subcontractor PM	NAEVA Geophysics	(434) 987-3187	klemley@naevageophysics.com
To be determined (TBD)	Senior Unexploded Ordnance Supervisor (SUXOS)	CH2M HILL	TBD	TBD
TBD	Unexploded Ordnance Quality Control Specialist (UXOQCS)/ Unexploded Ordnance Safety Officer (UXOSO)	CH2M HILL	TBD	TBD
TBD	Subcontractor PM	Anomaly Inspection subcontractor	TBD	TBD

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MEC-QAPP Worksheet #4—Project Personnel Sign-Off Sheet

Name	Organization/Title/Role	Telephone Number (optional)	Signature/e-mail Receipt	QAPP Section Reviewed	Date QAPP Read
Roberto Pagtalunan	Department of the Navy (Navy) RPM	(757) 341-2010			
Scott Fleming	NWS Earle Environmental Coordinator	(732) 866-2624			
Jessica Mollin	USEPA Region 2 RPM	(212) 637-3921			
Erica Bergman	NJDEP RPM	(609) 292-7406			
John Tomik	CH2M HILL/ AM	(757) 671-6259			
Adam Forshey	CH2M HILL/PM	(757) 671-6267			
Tim Wenk	CH2M HILL/ Project Engineer	(757) 671-6265			
Timothy Garretson	CH2M HILL/AQM/STC	(904) 374-5633			
David Wright	CH2M HILL/Project Geophysicist/STC	(919) 520-8673			
George DeMetropolis	CH2M HILL/MRP Health and Safety (H&S) & Quality Manager	(619) 272-7239			
Howard Gordon	CH2M HILL/H&S Manager	(720) 286-0240			
Karen Lemley	NAEVA Geophysics/DGM subcontractor/PM	(434) 987-3187			
TBD	Anomaly Inspection subcontractor	TBD			

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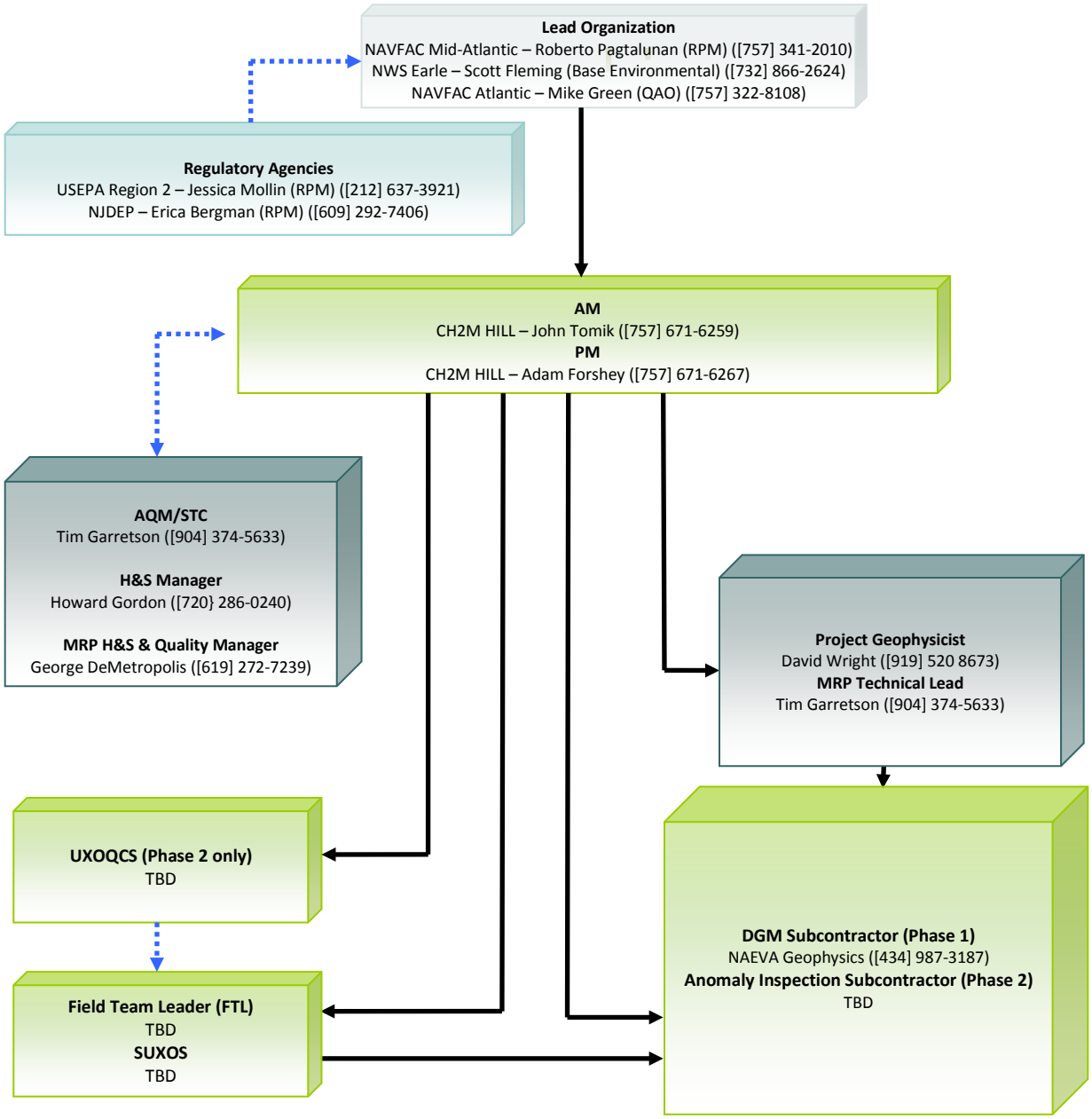
MEC-QAPP Worksheet #5—Project Organizational Chart



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MEC-QAPP Worksheet #6—Communication Pathways

Communication Drivers	Responsible Affiliation	Name	Phone Number	Procedure
Communication to and from the Navy (such as submission of UFP-QAPP for review and receipt of regulatory comments)	Navy RPM	Roberto Pagtalunan	(757) 341-2010	Primary point of contact (POC) for Navy (via e-mail, telephone, hard copy, or in person, as warranted); can delegate communication to other internal or external POCs.
Communication to and from NWS Earle (such as communication with facility personnel)	NWS Earle Environmental	Scott Fleming	(732) 866-2624	Primary POC for NWS Earle; can delegate communication to NWS Earle POCs.
Communication to and from USEPA (such as receipt of UFP-QAPP for review and submission of USEPA comments)	USEPA RPM	Jessica Mollin	(212) 637-3921	Primary POC for USEPA; can delegate communication to other internal or external POCs.
Communication to and from NJDEP (such as receipt of UFP-QAPP for review and submission of NJDEP comments)	NJDEP RPM	Erica Bergman	(609) 292-7406	Primary POC for NJDEP; can delegate communication to other internal or external POCs.
Communication to and from Navy contractor (such as submission of UFP-QAPP for review and receipt of regulatory comments, updates on project progress, and communication of stakeholder expectations)	CH2M HILL AM	John Tomik	(757) 671-6259	Primary POC for Navy contractor (via e-mail, telephone, hard copy, or in person, as warranted); can delegate communication to other contractor personnel, as appropriate.
Project administration and logistics	CH2M HILL PM	Adam Forshey	(757) 671-6267	Direct communication (via e-mail, telephone, hardcopy, or in person, as warranted) to and from Navy contractor project personnel to ensure appropriate project implementation.
Technical Communications for DGM data collection, interpretation, and reporting	CH2M HILL Project Geophysicist	David Wright	(919) 520-8673	Primary POC for issues relating to DGM field activities and data. Any deviation from the proposed DGM data collection procedures and QC requirements outline in this MEC-QAPP must be evaluated with the Project Geophysicist to ensure acceptable levels of data quality are maintained. Project Geophysicist must relay any change to the MEC-QAPP to the PM.
Technical Communications for MEC-related field activities	CH2M HILL MRP Technical Lead	Tim Garretson	(904) 374-5633	Primary POC for issues relating to MEC during implementation of any field work. Any MEC-related issues should be immediately communicated to the PM.

MEC-QAPP Worksheet #6—Communication Pathways (continued)

Communication Drivers	Responsible Affiliation	Name	Phone Number	Procedure
Implementation of data collection and MEC-QAPP changes in the field	CH2M HILL Field Team Leader (FTL) and/or UXOQCS	TBD	TBD	Documentation of deviations from the MEC-QAPP made in field log books and rationale for deviations, made within 24 hours of deviation; assistance in material procurement and delivery; survey oversight and implementation; deviations made only with approval from contractor PM.
Field CAs	CH2M HILL FTL and/or UXOQCS	TBD	TBD	See **Worksheet #32** of the MEC-QAPP guidance for Assessment Findings and CA Responses. If CAs are identified, **Worksheet #32-1** will be completed and saved with the project file.

MEC-QAPP Worksheet #7—Personnel Responsibilities Table

Name	Title	Organizational Affiliation	Responsibilities
Roberto Pagtalunan	NWS Earle RPM	NAVFAC Midlant	Coordinate environmental activities and investigations for NWS Earle. Ensure MRP activities are properly implemented in accordance with this MEC-QAPP.
Scott Fleming	NWS Earle Base Environmental	NWS Earle	Provide Base coordination and access and POC with other Base entities.
Mike Green	Quality Assurance Officer (QAO) Lead	NAVFAC Atlantic	Navy QA; provides quality review of MRP-related projects and activities for NACFAC, including review of this MEC-QAPP. Ensures the Navy is completing work in accordance with the MEC-QAPP.
John Tomik	CH2M HILL AM	CH2M HILL	Responsible for coordination of CH2M HILL's activities at NWS Earle; assists in data evaluation and interpretation; reviews reports.
Adam Forshey	CH2M HILL PM	CH2M HILL	Project administration; coordinates staffing; monitors project performance; ensures work is done in accordance with the MEC-QAPP.
Tim Garretson	CH2M HILL Munitions Response (MR) Technical Lead	CH2M HILL	As the technical lead, supports decision making with respect to MEC investigations and procedures.
	CH2M HILL AQM/STC		Ensures overall quality of the project is achieved and appropriate. Provides overall quality review of project deliverables.
David Wright	CH2M HILL Project Geophysicist	CH2M HILL	Ensures that all investigation practices are being conducted as appropriate; aids in data interpretation; provides QC review of subcontractor deliverables.
George DeMetropolis	CH2M HILL MRP H&S & Quality Manager	CH2M HILL	Oversees development of the Accident Prevention Plan (APP) and MEC-QAPP to define site-specific needs of the project and that appropriate H&S and QC requirements specifically related to MEC are defined and properly executed.
Howard Gordon	CH2M HILL H&S Manager	CH2M HILL	Oversees development of the APP to define site-specific needs of the project and the appropriate H&S requirements are defined and properly executed.
TBD	SUXOS	CH2M HILL	Provides technical oversight and support for MEC-QAPP revisions and field work implementation during munitions-related field activities (Phase 2). Implements approved MEC-QAPP during munitions-related activities. Plans, coordinates, and supervises all explosives operations. Coordinates all aspects of QC and H&S with the UXOQCS/UXOSO.
TBD	UXOQCS/UXOSO	TBD	Implements the MEC-related QC provisions of the project (Phase 2). Implements the Site-specific Health Plan, including MEC-related and general safety components.
TBD	FTL	CH2M HILL	Oversees data management to ensure collection of accurate and complete data; coordinates field activities.
Karen Lemley	DGM Subcontractor	NAEVA Geophysics	Implements approved MEC-QAPP DGM activities.
TBD	Anomaly Inspection Subcontractor	TBD	Implements approved MEC-QAPP for anomaly inspection activities.

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MEC-QAPP Worksheet #8—Special Personnel Training Requirements Table

Project Function	Specialized Training By Title or Description of Course	Training Provider	Training Date	Personnel / Groups Receiving Training	Personnel Titles / Organizational Affiliation	Location of Training Records / Certificates
Fieldwork	Use of DGM survey equipment	---[a]	Prior to survey activities	---[a]	CH2M HILL geophysicists, DGM subcontractor	Resume, as demonstrated experience and qualifications with equipment and software
Fieldwork	Boat Safety Course or United States Coast Guard Operator's (Captains) license	United States Coast Guard or other approved National Association of State Boating Law Administrators	Prior to mobilization	Boat Captain	DGM and Anomaly Inspection subcontractors	Project file, subcontractor records
Fieldwork	MEC Awareness Training[b]	CH2M HILL unexploded ordnance (UXO) Qualified Personnel	Prior to field activities	FTL (TBD), field team members (TBD), Site Safety Coordinator (SSC) (TBD), subcontractor	Field team members and SSC from CH2M HILL DGM and Anomaly Inspection subcontractors	Project file
Fieldwork	Use of anomaly inspection technology/methodology (TBD)	---a	Prior to field activities	---a	Anomaly Inspection subcontractor	Resume, as demonstrated experience and qualifications with equipment and software
Fieldwork	UXO Technician Training to meet minimum requirements of Department of Defense Explosives Safety Board (DDESB) Technical Paper (TP) 18 for the relevant UXO Technician level	• United States military Explosive Ordnance Disposal (EOD) school • Canada, Great Britain, Germany, or Australia military EOD school • Formal UXO training course of instruction or EOD assistant courses	Training will be verified as current prior to starting field activities by SSC; training will not be provided by CH2M HILL	UXO Technician II or higher	UXO Technician	Subcontractor records and CH2M HILL field safety files. Records to include resume (as demonstrated experience), qualifications, and copies of certifications

Notes:

[a] Training for equipment use will not be provided onsite by CH2M HILL, the survey subcontractor, or an outside vendor. The personnel using the equipment and software must have demonstrated experience and qualifications before working at the site and the kickoff of this investigation.

[b] MEC awareness training will include Recognize, Retreat, Report (RRR), also known as 3-R training. The RRR training is intended to make the trainees aware of the potential presence of MEC, ways to recognize potential MEC, and what to do if potential MEC is observed. This training DOES NOT enable the trainee to identify the type of MEC or handle any potential MEC item.

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MEC-QAPP Worksheet #9-1—Project Scoping Session Participants Sheet

Project Name: UXO 2 SI **Projected Date(s) of Sampling**: Winter 2013 **PM:** Adam Forshey/CH2M HILL	**Site Name**: UXO 2 **Site Location**: NWS Earle, Sandy Hook Bay, Monmouth County, New Jersey

Date of Session: 6/12/2013

Scoping Session Purpose: Introduction of SI activities (DGM survey and potential anomaly inspection) and Work Plan/MEC-QAPP

Name	Title	Affiliation	Phone #	E-mail Address	Project Role
Roberto Pagtalunan	RPM	NAVFAC Mid-Atlantic	(757) 341-2010	roberto.pagtalunan@navy.mil	NAVFAC Mid-Atlantic RPM
Scott Fleming	NWS Earle Environmental	NWS Earle	(732) 866-2624	scott.fleming1@navy.mil	NWS Earle project support
Jessica Mollin	RPM	USEPA	(212) 637-3921	mollin.jessica@epamail.epa.gov	USEPA RPM
Erica Bergman	RPM	NJDEP	(609) 292-7406	Erica.Bergman@dep.state.nj.us	NJDEP RPM
Jim Pastorick	NJDEP Technical Consultant	UXO Pro, Inc.	(703) 548-5300	jim@uxopro.com	NJDEP MEC Technical support
Greg Zalaskus	NJDEP Military MRP Manager	NJDEP Emergency Management Program	(609) 984-2065	greg.zalaskus@dep.state.nj.us	NJDEP Military MRP review
John Tomik	AM	CH2M HILL	(757) 671-6259	john.tomik@ch2m.com	CH2M HILL AM
Adam Forshey	PM	CH2M HILL	(757) 671-6267	adam.forshey@ch2m.com	CH2M HILL PM
David Wright	Project Geophysicist	CH2M HILL	(617) 523-2002	David.wright@ch2m.com	Technical support
Tim Wenk	Project Engineer	CH2M HILL	(757) 671-6265	tim.wenk@ch2m.com	Technical support

Comments/Decisions:

Representatives from the Navy, NJDEP, USEPA, and CH2M HILL met via conference call to discuss the approach for the SI activities at NWS Earle UXO 2. The group reviewed the site history and the conclusions and recommendations from the Preliminary Assessment (PA) Report, as well as the recent side-scan sonar and bathymetric data collected for the site. The PA identified the need for additional SI investigation activities based on the possibility of MEC being released during historical use of the piers (for example, items dropped in the water during loading/unloading activities and explosion of the United States Ship [USS] Solar in 1946) and based on 34 munitions items being identified in the dredged sediments from the Pier 3A construction.

Side-scan sonar and bathymetric data for the areas around Piers 1 and 2 have been collected as part of a preliminary data gathering to support the upcoming underwater DGM survey and anomaly investigation. The intent of the side-scan sonar and bathymetric survey was to identify the current underwater site conditions and identify underwater obstructions that could impact future investigations, particularly during the DGM survey.

MEC-QAPP Worksheet #9-1—Project Scoping Session Participants Sheet (continued)

Additionally, this information may be used as a line of evidence to support future investigations and decisions at the site. The side-scan sonar survey identified 236 and 65 items on or protruding from the sediment surface in the immediate vicinity of Piers 1 and 2, respectively. The bathymetric data collected from the site were used to confirm the water depths in the investigation area are similar to those that appear on the current navigational charts. The group agreed that a technical memorandum summarizing the side-scan and bathymetric survey will be included as an attachment to this underwater DGM and Anomaly Inspection SI Work Plan/MEC-QAPP for review.

Finally, the group discussed the next steps for the SI. The next step of the inspection is to perform a DGM survey of the areas adjacent to Piers 1 and 2 to locate geophysical anomalies. The underwater DGM survey will identify locations where metallic items are located and can be compared with side-scan/ bathymetry for lines of evidence as to the nature of the items, but will not distinguish between MEC and scrap metal. Therefore, to complete the SI process and determine the potential presence or suggested absence of MEC, an anomaly inspection will be necessary. It was proposed that the SI Work Plan/MEC-QAPP be developed to detail a two-phased investigation approach; Phase 1 is the DGM survey data collection process and Phase 2 is anomaly inspection. The SI Work Plan/MEC-QAPP document will include the decision logic and as much detail as possible regarding the anomaly inspection, to outline the entire SI process to the maximum extent possible. However, it was noted that the details regarding the specific technology to be used for the anomaly inspection, as well as the number and locations of anomalies that will require inspection in order to assess the potential presence of MEC and the potential explosive hazard, will not be known until additional site data are obtained. Therefore, these specifics will need to be included in a follow-up addendum to the QAPP. The group agreed with the approach of combining both the DGM investigation and anomaly inspection into one QAPP and providing an addendum once the anomaly inspection technology is selected.

The anticipated schedule was reviewed. The group agreed that an additional scoping session would likely be necessary prior to submitting the MEC-QAPP to further discuss the MEC-QAPP details and specifics of including both the Phase 1 DGM and Phase 2 anomaly inspection in the document.

MEC-QAPP Worksheet #9-2—Project Scoping Session Participants Sheet

Project Name: UXO 2 SI **Projected Date(s) of Sampling**: Winter 2013 **PM:** Adam Forshey/CH2M HILL	**Site Name**: UXO 2 **Site Location**: NWS Earle, Sandy Hook Bay, Monmouth County, New Jersey
Date of Session: July 30, 2013 **Scoping Session Purpose: MEC-QAPP/SI Work Plan Detail development and discussion**	

Name	Title	Affiliation	Phone #	E-mail Address	Project Role
Roberto Pagtalunan	RPM	NAVFAC Mid-Atlantic	(757) 341-2010	roberto.pagtalunan@navy.mil	NAVFAC Mid-Atlantic RPM
Jessica Mollin	RPM	USEPA	(212) 637-3921	mollin.jessica@epamail.epa.gov	USEPA RPM
Erica Bergman	RPM	NJDEP	(609) 292-7406	Erica.Bergman@dep.state.nj.us	NJDEP RPM
Jim Pastorick	NJDEP Technical Consultant	UXO Pro, Inc.	(703) 548-5300	jim@uxopro.com	NJDEP MEC Technical support
Sergio Lopez	USEPA Environmental Engineer	USEPA	(732) 321-6778	lopez.sergio@epa.gov	USEPA QAPP Reviewer
Adam Forshey	PM	CH2M HILL	(757) 671-6267	adam.forshey@ch2m.com	CH2M HILL PM
Tim Garretson	AQM/STC	CH2M HILL	(904) 374-5633	timothy.garretson@ch2m.com	AQM/STC/MR Technical Lead
David Wright	Project Geophysicist	CH2M HILL	(617) 523-2002	David.wright@ch2m.com	Technical support
Tim Wenk	Project Engineer	CH2M HILL	(757) 671-6265	tim.wenk@ch2m.com	Technical support

Comments/Decisions:

Representatives from the Navy, NJDEP, USEPA, and CH2M HILL met via conference call to further discuss the details for development of the SI MEC-QAPP and conducting the SI activities at NWS Earle UXO 2. The objectives were to review the format of the SI Work Plan/MEC-QAPP, discuss how Phase 1 and Phase 2 activities will be incorporated, and to obtain agreement on the content of **Worksheets #10, #11, #12, and #14**. Phase 1 and Phase 2 are included in this MEC-QAPP format not only to capture the entire SI process, but to provide flexibility for the content of the anomaly inspection to be included in a subsequent addendum.

The group reviewed the format of the MEC-QAPP. In this document, Phase 1 and Phase 2 will be presented. A summary will be included in Worksheet 2 to identify worksheets that are included and excluded, and worksheets that are anticipated to require an update in the addendum. In instances where Phase 1- and Phase 2-specific details can be separated (such as **Worksheets #12 and #14**), the Phase 1 and Phase 2 information will be presented on a Worksheet "a" and Worksheet "b," respectively. Worksheets specific to Phase 2 will be completed in the addendum.

Worksheet #10 is the CSM. This worksheet will detail the current understanding of the site and sets up the background information necessary for defining the problem and developing the subsequent worksheets. The group discussed the locations of the Alexander Hamilton shipwreck, the explosion of the USS Solar, and potentially inaccessible areas that may not be included in the DGM survey. This MEC-QAPP includes two figures, **Figures 5a and 5b**, to identify the potential locations that may be inaccessible. These areas are not likely to be critical for determining presence of MEC. If an area is inaccessible, it will be noted and document in field logs.

MEC-QAPP Worksheet #9-2—Project Scoping Session Participants Sheet (continued)

Worksheet #11 provides the PQOs and the planning process statements. The group discussed the proposed environmental questions, PQOs), project action limits (PALs), and other items to be included in this worksheet. No revisions to the proposed environmental question, PQOs, PALs, or other criteria were required based on the review. QC requirements for DGM survey were discussed (including 100 percent coverage of the area and platform to maintain an altitude of no more than 1.5 meters [5 feet] above the sediment surface). Additional detail for these QC requirements will be included in the MEC-QAPP for review.

Jim Pastorick/NJDEP asked how the group will determine the number of contacts to be investigated during Phase 2 activities. Will visual sampling plan (VSP) or a statistical approach be used or some other method? Tim Wenk/CH2M HILL discussed that any approach may be applied; it depends on what the team feels is necessary for making a risk management decision for these areas. Adam Forshey/CH2M HILL clarified that a statistical approach may be applied, but it will depend on the DGM results. For instance, depending on the results, there may be a significant number of anomalies, hence applying a statically approach may not be feasible and a more general approach may be warranted or sufficient. The group agreed that this will be evaluated and determined after the DGM data have been collected and prior to developing an addendum.

Finally, the group discussed the details of conducting the DGM survey that will be included in **Worksheet #14a** and then the proposed schedule for the remaining SI activities. Sergio Lopez/USEPA asked if **Worksheet #17** will be included in the MEC-QAPP. Adam Forshey/CH2M HILL confirmed that it would. It provides the information for sampling design and rationale. For Phase 1 (**Worksheet #17a**), 100 percent of the site will be inspected, if possible; therefore, the proposed, idealized transects, and inspection strategy are presented here. **Worksheet #17b** will provide the specifics of the anomaly inspection and the sampling design and rationale for which anomalies will be inspected. These details will be important for Phase 2 and will be included in **Worksheet #17b** when the addendum is developed.

MEC-QAPP Worksheet #10—Conceptual Site Model

A three-dimensional CSM depicting the current understanding of UXO 2 is provided as **Figure 1**. The information used to develop the three-dimensional CSM is detailed as follows.

Facility Description

NWS Earle is located in Monmouth County, New Jersey, approximately 47 miles south of New York City (**Figure 2**). The station consists of two areas: the 10,160-acre inland Main Base (Mainside area) and the 706-acre Waterfront area, which includes the NWS Earle Munitions Loading Pier Complex (**Figure 3**).

The Mainside area is approximately 10 miles inland from the Atlantic Ocean, in Colts Neck, Howell, and Wall townships and Tinton Falls Borough. The surrounding area contains agricultural land, vacant land, and low-density housing. The Mainside area consists of a large, undeveloped portion of land associated with ordnance operations, production, and storage; this portion of the Base is encumbered by explosive safety quantity distance arcs that restrict use and development. Other land use in the Mainside area consists of residences, offices, workshops, warehouses, recreational space, open space, and undeveloped land.

The Waterfront area, which is approximately 10 miles north of the Mainside area (**Figure 2**), is in Middletown Township; the pier complex is within the Monmouth County Bayshore Region. The Bayshore is situated on Raritan Bay and the Atlantic Ocean and is close to New York City and several New Jersey attractions. The Monmouth County Bayshore Region is characterized by traditional downtowns and dense residential neighborhoods.

Normandy Road, a government-owned military highway, is used for transporting munitions and other military materials between the Mainside and Waterfront areas. The road has seven crossings to facilitate east-west passage by the civilian population. Munitions and other supplies pass from the Mainside area along the railroad tracks and Normandy Road to the Waterfront area to reach the ships at the NWS Earle Munitions Loading Pier.

Site Background

UXO 2

Ammunition and military supply ships are homeported and resupplied at the NWS Earle Munitions Loading Pier Complex. Sandy Hook Bay is on the north shore of the New Jersey coast, west of the Sandy Hook peninsula, and borders the communities of Leonardo and Atlantic Highlands to the east and Belford to the west. The Sandy Hook Channel entrance leads to Terminal Channel and the NWS Earle Munitions Loading Pier Complex. Terminal Channel, entered from Sandy Hook Channel, approximately 1 mile west-southwest of the northern tip of Sandy Hook, leads to a turning basin and three deepwater piers (Piers 2, 3A, and 4) and one shallow water pier (Pier 1) at the NWS Earle Munitions Loading Pier complex (**Figure 3**). The current loading pier complex stretches 2.9 miles into Sandy Hook Bay.

The areas around the Munitions Loading Pier and the Terminal Channel are restricted, as defined in the Code of Federal Regulations (CFR), Title 33, Paragraph 334.102. No unauthorized vessels are permitted to enter the restricted area at any time, and vessels are only authorized to cross the Terminal Channel when there are no Navy vessels transiting the channel.

UXO 2 consists of the areas surrounding the inactive (Piers 1 and 2) and active (Piers 3A and 4) piers of the Munitions Loading Complex (**Figure 3**). The PA recommended that an SI be performed only for the inactive portions of UXO 2 (Pier 1 and 2 areas) to further evaluate the potential presence or suggested absence of MEC at the site. Piers 3A and 4 are not recommended for investigation until munitions activities have ceased. Active pier sites used for munitions-related activities are typically not investigated until they are no longer in use or until the use of the piers is suspected of causing contamination at other areas. Piers 3A and 4 are not anticipated to result in contamination of the inactive pier areas because current and future

MEC-QAPP Worksheet #10—Conceptual Site Model (continued)

operations at Piers 3A and 4 are subject to strict munitions handling procedures, munitions documentation standards, and safety precautions/recovery of items inadvertently dropped or otherwise mishandled. As discussed in the Final PA report, *Final Preliminary Assessment Report UXO 0002 – Munitions Loading Pier Complex* (CH2M HILL, 2012), Piers 3A are 4 are also believed to be the least likely to contain munitions, as most munitions from the Pier 3 area were likely removed during the Pier 3A construction and Pier 4, which was constructed in 1990, has not been in service as long as the other piers and has been subject to current munitions loading operating and safety procedures for the entirety of its use. Additionally, the Tier 1 sediment transport evaluation also suggests mobilization of intact munitions around the piers is unlikely. Therefore, because active pier sites used for munitions-related activities are not typically investigated and to prevent impacts to facility mission, the active piers (Piers 3A and 4) are not included in the investigation described herein.

Additional details on Area UXO 2 are provided within the UXO 2 PA Report (CH2M HILL, 2012).

Pier 1

The initial pier complex consisted of Trestle 1 and Pier 1 (commonly referred to as the Navy Barge Pier). The pier and trestle were constructed of wooden piles and a concrete surface. Pier 1, constructed in 1943, originally measured 722 meters (2,370 feet) in length by 19.5 meters (64 feet) in width and was connected to Trestle 1; Trestle 1 extended the pier approximately 1.4 miles (1,445 meters or 4,742 feet) in length and 10.4 meters (34 feet) in width into Sandy Hook Bay. Following completion of the initial pier complex, the need for a larger deep-water pier to support the Army and Navy was identified. In response, Pier 1 was expanded further into Sandy Hook Bay by approximately 76.2 meters (250 feet). Currently, Pier 1 runs parallel to Trestle 1A and is approximately 769 meters (2,229 linear feet) in length and approximately 18.3 meters (60 feet) in width. Access to the pier is blocked by a physical barrier, and the pier is no longer used for munitions loading.

Pier 2

Currently, Trestle 1A leads to Pier 2 and Berths 2N1 and 2N2 on the west and east sides of the pier, respectively. Initially, Old Trestle 2 (845 meters [2,772 feet] long by 10.4 meters [34 feet] wide) was the transport to Pier 2. Constructed in 1944, Pier 2 measures 212 meters (695 feet) in length by 27.4 meters [90 feet] in width and is extended by an approximately 79.2 meter (260 feet) long walkway (**Figure 3**). Berth lengths on Pier 2 are 183 meters (600 feet). A 152-meter-long (500-foot-long) elevated loading platform is located along each side of the pier. Pier 2 was previously used as the Navy deep water pier for cargo and munitions loading and was capable of accommodating two cruisers, destroyers, or merchant ships (CH2M HILL, 2012). Pier 2 is no longer used for cargo or munitions loading. Currently, Pier 2 is still accessible by Base personnel but is not in use.

UXO 2 Physical Characteristics

Historically, the depth of the channel and turning basin (adjacent to Piers 2, 3, and 4) was -10.7 meters (-35 feet) mean low water (MLW) and -5.5 meters (-18 feet) MLW adjacent to Pier 1; currently the water depth is slightly shallower than the maintained depth (-4.9 meters [-16 feet] to -10 meters [-33 feet] MLW at Pier 2 and -3.4 meters [-11 feet] to -4.5 meters [-15 feet] MLW at Pier 1) based on bathymetry data collected in 2013 (**Appendix A**). A survey conducted in September 2009 indicated the areas within the turning basin to be as deep as -13.7 meters [-45 feet] MLW. The characteristics of the sediment in the vicinity of Piers 1 and 2 is not well documented; however, sediment cores were collected in support of the Pier 3 rehabilitation and the results are expected to be consistent with the sediment in the vicinity of Piers 1 and 2 (Battelle, 2005). The cores collected around Pier 3 indicate the shallow sediments consist of the following: organic black muck with shell hash (approximately 0 to 3 feet), black silty clay (approximately 3 to 5 feet), and

MEC-QAPP Worksheet #10—Conceptual Site Model (continued)

orange/gray/brown silty clay and sand (approximately 5 to 7 feet). NWS Earle maintains a restricted area surrounding UXO 2, as defined by 33 CFR 334.102. The restricted zone was originally established by the United States Coast Guard and was later expanded by the United States Army Corps of Engineers (USACE) (Navy, 2004). This zone is a large rectangular area that encompasses the piers and trestles from the shoreline to a point approximately 2,250 meters (7,382 feet) from the seaward end of the piers (**Figure 3**). Buoys identify the restricted area, and the zone is marked on nautical charts (Navy, 2004). The following restrictions are enforced at the Pier Complex, as detailed in 33 CFR 334.102:

- No persons, unauthorized vessels, or other unauthorized craft may enter the restricted area at any time.
- Vessels are authorized to cross the Terminal Channel provided that there are no Naval vessels transiting the Channel.

Currently, Piers 3A and 4 are active munitions loading piers. Piers 1 and 2 are no longer active for any loading or unloading operations, although munitions were historically handled at these piers. Access to the NWS Earle Munitions Loading Pier Complex is controlled by NWS Earle Security from the Waterfront area. While a physical barrier does not exist to prevent access to the pier area by boat, the NWS Earle restricted zone is enforced by the Navy and limits accessibility to the site.

UXO 2 Potential Contaminant Sources

The source of the potential MEC was previously defined as the munitions items that may have been dropped into Sandy Hook Bay or mishandled during loading activities associated with UXO 2. MEC may also have been released as a result of the USS Solar explosion at Pier 1 in 1946. The exact location, quantity, and depth of items potentially released are currently unknown. It is anticipated that munitions that may have been dropped from the various piers and were not recovered by EOD or during dredging activities are either on the surface of the seafloor or are partially or completely buried in the sediment.

NWS Earle has been in use as a munitions facility since December 1943. Any type of conventional ordnance that was in the United States inventory during and after World War II may have been shipped to and from NWS Earle. Items identified during the 2005 and 2006 dredging operations in the Pier 3 area included:

- 20-millimeter (mm) Anti-Aircraft (high-explosive [HE]) ammo rounds
- 40-mm Anti-Aircraft (HE) ammo rounds
- Practice bombs
- Grenades
- Fully loaded 20-mm drum magazine
- MK 30 5-inch illumination projectile
- MK 36 5-inch projectile
- 5-inch/54 powder can (partially emptied)

It should be noted that additional MEC release areas unrelated to NWS Earle may exist outside of the UXO 2 boundary area, including the former Fort Hancock, located on Sandy Hook (**Figure 2**), that was utilized by the Army as a proving ground, firing range, ammunition storage area, anti-aircraft defense site, and Nike missile site where an MR action has already been required.

UXO 2 Potential Receptors

Reasonably anticipated human receptors include construction workers, Navy EOD divers, and trespassers (such as recreational divers). Ecological receptors near the NWS Earle Munitions Loading Pier include aquatic vegetation (wetlands), benthic organisms, estuarine and marine fish, and wildlife.

MEC-QAPP Worksheet #10—Conceptual Site Model (continued)

Source-receptor interaction at UXO 2 could occur through the following activities if MEC or munitions constituents (MC) are present:

- Construction workers encountering MEC during pier maintenance, piling repairs, demolition, or during future construction activities in or around the piers (such as digging or dredging)
- Site workers encountering MEC during investigations, sampling activities, ecological studies, or emergency responses
- Fishermen contacting MEC while fishing, trolling, or conducting similar activities or by munitions items becoming entangled in fishing nets or gear
- Recreational divers encountering MEC during swimming and diving
- Ecological receptors exposed to MC released from deteriorated MEC items
- Ecological receptors exposed to MC and other dangers during the detonation of MEC

Access of human receptors to the locations of the potential MEC is limited both by the depth of the water near the pier areas and turning basin, where the water depth can reach up to -13.7 meters (-45 feet) MLW, and the enforcement of the restricted zone surrounding the NWS Earle Munitions Loading Pier (Navy, 2004). Ecological receptors such as fish and other aquatic species have unrestricted access to potential MEC through direct contact. Wildlife may be exposed to MC, if present, through ingestion of chemicals that have accumulated in prey, ingestion of surface water, and incidental ingestion of sediment while foraging or grooming.

MEC-QAPP Worksheet #11—Project Quality Objectives/Systematic Planning Process Statements

Problem Definition

Based on the findings of the PA report, there is potential for MEC to have been dropped or released from munitions loading/unloading operation and the explosion of the USS Solar at UXO 2. Therefore, the purpose of the SI activities discussed in this MEC-QAPP is to conduct a DGM and anomaly inspection, if necessary, in the vicinity of Piers 1 and 2 (**Figure 2**) is to determine if MEC is present in these areas. The investigation boundary around the piers is based on an offset of approximately 76 meters (250 feet) around the berthing areas of the inactive piers. This proposed investigation area, based on the location of the munitions loading activities and the width of the largest ship that may have possibly been loaded at the pier (approximately 76 meters [250 feet] wide), is believed to be the area at the site that has the highest potential to contain MEC, if present. Data generated through this investigation will be used to support the determination of the presence or suggested absence of MEC at the site.

Table 1 provides a summary of this SI investigation, a description of the environmental questions to be answered, the investigation approach, and the PQOs to determine the potential for MEC to be present at UXO 2.

TABLE 1
Environmental Questions and Project Quality Objectives

Environmental Question	General Investigation Approach to Answer the Environmental Question	PQO in the form of if/then statements
Are MEC items present within the vicinity of Piers 1 and 2?	Phase 1 - A DGM survey of the areas surrounding Piers 1 and 2 (**Figure 2**) will be performed to locate geophysical anomalies which may be indicative of MEC. These data will be used to determine the magnitude and distribution of anomalies in the vicinity of the inactive piers and to select areas and anomalies for additional inspection to determine if MEC is present at the site. Data from the previous side-scan sonar and bathymetric investigation may also be used as a supplement to the DGM data, to determine what areas will require additional inspection (sonar imaging may be used to assess the type of debris present, such as a tire or ladder, and so forth, if imaging is adequate).	If no geophysical anomalies are identified that may represent MEC within the investigation area, then no further investigation will be performed and the Navy, USEPA, and NJDEP will determine the appropriate path forward. If geophysical data collected indicate the presence of geophysical anomalies that may represent MEC within the investigation area and the Navy, USEPA, and NJDEP determine that additional investigation is warranted, then the Navy, USEPA, and NJDEP will determine the number of anomalies or areas to be investigated further in order to obtain adequate representation of debris present for determining presence or suggested absence of MEC, and the most appropriate technology for the additional anomaly inspection activities will be selected. This information will be documented in an addendum to this MEC-QAPP.
	Phase 2 - If additional investigation is deemed necessary based on the results of the Phase 1, then an inspection of select geophysical anomalies will be performed to determine if MEC is present within the vicinity of Piers 1 and 2.	If anomaly inspection is performed on an agreed upon selection of geophysical anomalies and no MEC is identified, then the potential for MEC to be present is assumed to be low and additional action at Piers 1 and/or 2 is not necessary. The Navy, USEPA, and NJDEP will determine the path forward for these areas and what future restrictions, if any, are warranted. If MEC is identified, then the Navy, USEPA, and NJDEP will determine the need for additional investigation and action for Piers 1 and/or 2.

MEC-QAPP Worksheet #11—Project Quality Objectives/Systematic Planning Process Statements (continued)

Who will use the data?

- Representatives from the Navy, USEPA, and NJDEP will use the data to determine if a release has occurred at the site as a result of historical munitions loading activities and MEC is present at the inactive portions of UXO 2 (Piers 1 and 2) and to identify the need for additional investigations. Engineers, geophysicists, and other scientists will use the data to aid in making site management decisions.

What are the Project Action Limits?

- The purpose of this investigation is to gather supporting data to aid the decision-making process and to determine the need for future investigations and MR actions at UXO 2. Although quantitative risk-based decisions cannot be generated from the data obtained during this SI, a qualitative assessment of explosive hazard may be performed to determine if additional investigations or actions are necessary for the site. The following PALs have been identified for this investigation:
  - Phase 1 (DGM Survey) PAL – A geophysical anomaly will be identified for any DGM response above the investigation-established background level for the DGM equipment. This level will be established by the project geophysicist based on the background geophysical response observed in the field.
  - Phase 2 (Anomaly Inspection) PAL – If any MEC items are discovered during the anomaly inspection, a release has occurred and the Navy, USEPA, and NJDEP will determine if additional investigation or action is necessary at the site.

For what will the data be used?

- Phase 1 (DGM Survey) data will be used to determine the location and approximate number of geophysical anomalies that may represent MEC in the areas adjacent to Piers 1 and 2. The data collected from the DGM survey will be discussed by the Navy, NJDEP, and USEPA to determine if additional investigation is necessary. Additional data from the previous side-scan sonar and bathymetric survey may be used to supplement the DGM data when evaluating the need for additional investigation and anomalies requiring inspection.
- If additional investigation is necessary, the Phase 2 (Anomaly Inspection) data will be used to determine the presence or suggested absence of MEC in the areas adjacent to Piers 1 and 2.

What types of data are needed?

Phase 1 DGM Survey

- Underwater DGM will be performed to identify geophysical anomalies on or below the seafloor. Water depth and the height of the sensor above seafloor will also be recorded with the DGM data.
- Data positioning will be recorded through a positioning system linked to a global positioning system (GPS) unit on the boat used to support the survey.
- Data positioning will be performed in accordance with the topside GPS accuracies and sensor positional accuracies specified in this MEC-QAPP and the DGM SOPs included in **Appendix B**.
- QC testing will be performed on the survey equipment to ensure functionality. The equipment used to support this investigation will be tested to ensure functionality on a daily basis in accordance with the SOPs and the QC requirements established in **Worksheet #12a**.

MEC-QAPP Worksheet #11—Project Quality Objectives/Systematic Planning Process Statements (continued)

- All field activities will be recorded on paper or digital log books. If digital log books are used, all information recorded using the digital log book will be converted into a portable document format (PDF) file that will contain a digital signature (including date and time stamp) of the personnel logging the field activities.

Phase 2 Anomaly Inspection (if necessary)

- Visual confirmation of a select number of geophysical anomalies to characterize the anomaly source (to determine if MEC is present). This data will be used to support the determination as to whether or not a release has occurred at the site as a result of munitions loading activities at Piers 1 and 2.
- Data positioning will be performed in accordance with the anomaly inspection SOP(s) to be included in the MEC-QAPP Addendum.
- QC will be performed in accordance with the SOP and the QC requirements to be established in **Worksheet #12b** when the MEC-QAPP Addendum is prepared.
- All field activities will be recorded on paper or digital log books. If digital log books are used, all information recorded using the digital log book will be converted into a PDF file that will contain a digital signature (including date and time stamp) of the personnel logging the field activities.

How "good" do the data need to be in order to support the environmental decision?

Phase 1 DGM Survey

- Performance functionality QC testing will be conducted for all geophysical equipment to ensure adequate detection capabilities. Equipment must pass all QC tests as described in **Worksheet #12a** and detailed in **Appendix B**. This testing will ensure that the equipment is functioning properly and providing usable data.
- The detection performance for currently available DGM systems is very sensitive to the separation distance between the target of interest and the DGM sensor. Signal levels are nominally proportional to $1/r^5$, where "r" is the separation distance. In addition, the signal levels are proportional to the size of the objects; therefore, larger items can be detected at greater distances from the DGM sensor than smaller items. Items located deeper in the sediment may not provide sufficient signal to be detected above the instrument noise levels. Industry predicted responses curves for various munitions items as a function of separation distance based on Naval Research Laboratory studies are presented in SOP #2 of **Appendix B**.
- The DGM sensor will be towed at a maximum height of 1.5 meters (5 feet) above the sea floor for 98 percent of the data collected along each transect (no more than 2 percent of the DGM data for each transect may be from heights of 1.5 meters [5 feet] or more). Exceptions include raising the system higher to avoid obstructions, localized depressions or trenches in the sea floor that are too small to adjust the sensor height accordingly, or if the sea state conditions significantly change during the DGM operation.
- Data obtained from the survey and field log books will be available for QC. The QC review of the field log books will allow the reviewer to verify that equipment functionality tests are being conducted at least once a day and that other details pertaining to the investigation have been recorded.
- Data should be collected from 100 percent of the site, to the maximum extent practicable (complete coverage will be attempted but currents and obstacles may prevent effective accomplishment of this.).

MEC-QAPP Worksheet #11—Project Quality Objectives/Systematic Planning Process Statements (continued)

Underwater obstructions and hazards may make data collection in certain areas impossible or impractical and present safety issues to those conducting the investigation; these locations should be noted by the field team. The project geophysicist will review data during collection to minimize data gaps as a result of routine survey operations.

Phase 2 Anomaly Inspection (if necessary)

- If significant anomalies are located during Phase 1, the Navy, NJDEP, and USEPA will determine whether additional investigation is necessary. The Navy, USEPA, and NJDEP will determine the number and locations of anomalies requiring inspection to identify if MEC is present at the site. The number and location of anomalies requiring inspection will be documented in an Addendum to this MEC-QAPP. In addition, any technology-specific quality requirements for conducting the anomaly inspection will be added to **Worksheet #12b** as part of the MEC-QAPP Addendum.
- Anomaly inspection will rely on visual confirmation of the anomaly by a UXO technician. All items will be visually inspected by UXO-qualified personnel for the classification of the item(s). Positive identification of a MEC item will also require independent verification by a second qualified UXO technician as a QC check of the initial identification.
- Data recorded throughout anomaly inspection (including item description, location, photos, and so forth) will be thoroughly documented in a log and made available for QC review. The data recorded must be sufficient to determine if recovered items are MEC or inert items and allow reviewers to identify the classification of MEC or materials potentially presenting and explosive hazard.
- If underwater obstructions and hazards make inspection of anomalies in certain areas impractical or present safety issues to those conducting the investigation, then the location(s) and reason(s) why an inspection is impractical will be documented by the field team.

How much data should be collected?

Phase 1 DGM Survey

- An attempt will be made to collect DGM data from 100 percent of the immediate area of Piers 1 and 2 (**Figure 3**) where accessible. The investigation boundary around Piers 1 and 2 is an offset of approximately 76.2 meters (250 feet) around both piers, as detailed in the PA Report (CH2M HILL, 2012). The total site area is approximately 50 acres (approximately 27 acres around Pier 1 and 18 acres around Pier 2). Areas that are inaccessible will be documented in field notes and the field log book.

Phase 2 Anomaly Inspection (if necessary)

- The number and location of anomalies to be inspected will be identified by the Navy, USEPA, and NJDEP and will be documented in an addendum to this MEC-QAPP. An attempt will be made to reacquire and inspect the selected subset of anomalies. Anomalies that are inaccessible or cannot be reacquired during the anomaly inspection will be documented by the field team.
- The number of anomalies/locations investigated must be sufficient for all parties to agree the site has sufficiently been investigated to support the determination of a release.

Where, when, and how should the data be collected and generated?

- DGM data will be collected from within the survey areas (surrounding Piers 1 and 2) described in **Worksheet #10** and shown on **Figure 3**.

MEC-QAPP Worksheet #11—Project Quality Objectives/Systematic Planning Process Statements (continued)

- The anticipated schedule of activities is presented in **Worksheet #16**.
- DGM survey data will be collected and generated in accordance with the procedures outlined in this MEC-QAPP and the SOPs in **Appendix B**. Specific details of the DGM equipment and procedures for performing in accordance with this MEC-QAPP are provided by the DGM subcontractor as an SOP in **Appendix B**.
- Anomaly inspection data will be collected and generated in accordance with the procedures outlined the MEC-QAPP Addendum for Phase 2 activities, if warranted.

Who will collect and generate the data? How will the data be reported?

Phase 1 DGM Survey

- The field team, which will consist of a CH2M HILL FTL and NAEVA Geophysics personnel, will collect the DGM data. The data collected will be included in the SI Report.
- Raw data files will be provided to CH2M HILL from the subcontractor on a daily basis.
- Initial PDF maps of raw DGM results will be provided to CH2M HILL from the DGM subcontractor within 24 hours of data collection to allow for a determination of whether data collected spacing should be adjusted.
- All geophysical data will be accompanied by a field data sheet documenting the field activities associated with the data and the processing performed. An example field data sheet is provided in **Table 2**.

TABLE 2
Example DGM Field Data Sheet

Site identification
Grid identification (or other identifier of surveyed area)
FTL Name
Field Team Members' Names
Date of data collection
Instrument Used
Positioning Method Used
Instrument Serial Numbers
File names in data recorders
Data collection sampling rate
Line numbers, survey direction, fiducial locations, start and end points
Weather conditions
Grid conditions (if applicable)
Survey area sketch (if applicable)
Associated Base station data file names (magnetometer)
Associated QC data file names
Field notes (other)

MEC-QAPP Worksheet #11—Project Quality Objectives/Systematic Planning Process Statements (continued)

- Within 3 working days of data collection, CH2M HILL or its DGM subcontractor will provide pre-processed results. Pre-processed data will be corrected for sensor offsets, latency, and drift. Also provided will be a digital planimetric map, in Geosoft format and coincident with the location of the geophysical survey, so that each day's geophysical data set can be registered within the original mission plan survey map and coordinates can be extracted for decision-making purposes.
- Within 5 working days of data collection, final processed geophysical data, maps, and supporting geophysical interpretations will be provided by CH2M HILL or its DGM subcontractor in accordance with the procedures outlined in this MEC-QAPP and applicable SOPs. Geophysical field data will be provided in delineated fields as x, y, z, d, v1, v2, and so on, where x and y are North American Datum (NAD) 83, New Jersey State Plane (meters) in Easting and Northing directions, z (altimeter reading), d (depth sensor reading), and v1, v2, and so on as the geophysical response readings. The last data field will be a time stamp. Each data field will be separated by a comma or tab. Each file containing data will be logically and sequentially named so that the file name can be easily correlated with the area surveyed. Information to be provided is summarized in **Table 3**.

TABLE 3
DGM Data Processing Documentation Requirements

Information Type	Raw/Pre-processed Data Delivery	Final Data Delivery	Will be in File Headers
Site identification	X	X	X
Geophysical instrument type used	X	X	X*
Positioning method used	X	X	X*
Instrument serial numbers (geophysical and positioning)	X	X	
Coordinate system and unit of measure	X	X	X*
Grid identification (or other identifier of surveyed area)	X	X	X
Date of data collection	X	X	X
Raw data file names associated with delivery	X	X	X*
Processed data file names associated with delivery	X	X	X*
Name of Project Geophysicist	X	X	
Name of Site Geophysicist	X	X	
Name of data processor	X	X	X*
Data processing software used	X	X	
Despiking method and details	X	X	
Sensor drift removal and details	X	X	
Latency/lag correction and details	X	X	
Heading correction and details (magnetometer data)	X	X	
Sensor bias, background leveling and/or standardization adjustment method and details		X	

MEC-QAPP Worksheet #11—Project Quality Objectives/Systematic Planning Process Statements (continued)

TABLE 3
DGM Data Processing Documentation Requirements

Information Type	Raw/Pre-processed Data Delivery	Final Data Delivery	Will be in File Headers
Diurnal correction (magnetometer data)	X	X	
PDF document showing graphical results of each field QC test	X	X	
Geophysical noise identification and removal (spatial, temporal, motional, terrain induced) and details		X	
Other filtering/processing performed and details		X	
Gridding method		X	
Anomaly selection and decision criteria details		X	
Geosoft ".xyz" file for unit of survey being delivered (grid or area agreed upon with MR Geophysicist)		X	
Geosoft ".grd" file for unit of survey being delivered		X	
Geosoft ".map" file for unit of survey being delivered		X	
PDF of Geosoft map for unit of survey being delivered		X	
Geosoft ".map" mosaic of all processed data to date		X	
PDF mosaic of Geosoft map of all processed data to date		X	
Other processing comments		X	
Date data processing is completed	X	X	
Data delivery date	X	X	
Scanned copy of field notes and field PDA notes (if applicable)	X		

*If CH2M HILL's Munitions Response Site Information Management System (MRSIMS), MRP Enterprise, or other database accepted by CH2M HILL's MR Geophysicist is used then the fields marked with an asterisk are not required in the file headers.

- All data will be provided via a file transfer protocol (FTP) site
- Field notes documented by the field team during the survey will be scanned and included in the SI Report as an appendix (if necessary).

<u>Phase 2 Anomaly Inspection (if necessary)</u>

- The field team, which will consist of CH2M HILL subcontractor members (TBD), a CH2M HILL FTL, CH2M HILL SUXOS and UXOSO/UXOQCS will inspect anomalies (and locations) identified by the Navy, NJDEP, and USEPA.
- Raw data forms, field photographs, and field notes will be provided to CH2M HILL from the subcontractor on a daily basis.

MEC-QAPP Worksheet #11—Project Quality Objectives/Systematic Planning Process Statements (continued)

- Within 10 working days of data collection, maps and anomaly inspection interpretations will be provided in accordance with the procedures outlined in this MEC-QAPP, the MEC-QAPP Addendum, and the anomaly inspection subcontractor SOP. General information for anomalies inspected will be documented in a table. Each anomaly or group of anomalies will be assigned an identification number and will include a description. If an item is suspected to be MEC-related, general information required to be recorded is summarized in **Table 4**.

TABLE 4
Anomaly Inspection MEC Field Data Documentation Requirements

Information Type
Site identification
Inspection technology used
Positioning method used
Instrument serial numbers (inspection and positioning)
Coordinate system and unit of measure
Date of data collection
Name of Project Geophysicist
Name of FTL
Anomaly Group
Anomaly Class
Anomaly Category
Type/Filler
Description/Fuzing
Quantity
Water Depth
Depth in sediment
Weight
Fragmentation
UXO leader comment for anomaly
Location
Action Taken

- Anomaly Inspection activities will be recorded in daily field log to the extent possible. Copies of field logs will be provided daily via a FTP site or e-mail for files less than 5 megabytes. Recorded video footage (if any) will be provided within 20 days of data collection and will be submitted on compact discs (CDs) or digital video discs (DVDs).
- All production data, including initial data imaging, obstruction position/location, and QC data, will be processed, interpreted, and delivered to the CH2M HILL Project Geophysicist within 5 days of data collection. The deliverable will include geo-referenced Tagged Image File Format (TIFF) images and shape files appropriate for import into geographic information system (GIS) software. Images will be broken into blocks of no greater than 100 megabytes each.

MEC-QAPP Worksheet #11—Project Quality Objectives/Systematic Planning Process Statements (continued)

- Field notes documented by the field team during the survey will be scanned and included in the SI Report as an appendix (if necessary).

How will the data be archived?

- All files will be made available for QC verification throughout the project to verify that the field procedures are properly implemented. All raw data files, hard copy documents, and field notes will be maintained by CH2M HILL for the duration of the project. Hard copy documents will be maintained at the CH2M HILL office in Virginia Beach, Virginia. Electronic data will be stored on the local CH2M HILL server. All hardcopy and electronic documents will be maintained at the CH2M HILL office in Virginia Beach, Virginia, through the duration of the project (at a minimum). Upon project completion, relevant data and documents will be archived at the Federal Record Center. Additionally, final hardcopy and electronic reports will be stored on the Administrative Record.
- The data will be archived in accordance with Navy guidance. At the end of the project, archived data will be returned to the Navy.

List the Project Quality Objectives in the form of if/then qualitative and quantitative statements.

The data to be collected during the investigations described within this MEC-QAPP do not allow for a quantitative risk-based analyses and decisions. Therefore, specific quantitative PQOs are not currently developed. However, general qualitative PQOs are provided in **Table 1**.

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MEC-QAPP Worksheet #12-1a—Phase 1 Measurement Performance Quality Table - Munitions Response

DFOW Data Type	Measurement Data Quality Indicator[a]	QC Sample and/or Activity to Assess Measurement Performance	Measurement Performance Criteria	Frequency
DGM Survey Data Collection Equipment Warm-up	Functionality	DGM system is warmed up prior to use to ensure response stability.	System does not show drift in response in static measurements.	At the beginning of each work day.
DGM Survey Data Collection Topside GPS Positioning	Accuracy	Topside GPS positions are of sufficient accuracy to translate DGM sensor positions. Topside GPS evaluated at GPS check point established near vessel launch site.	Measured positions are within 10 centimeters (cm) (4 inches) of known position.	At the beginning of each work day.
DGM Survey Data Collection Sensor Positioning (horizontal)	Accuracy	DGM data are at a sufficient enough accuracy to allow for appropriate relocation of geophysical anomalies for further inspection. This will be evaluated by comparing anomaly positions from repeat lines to ensure position repeatability to within this metric.	Derived target locations (electromagnetic [EM] peak amplitude response or magnetic dipole fit positions) will be ±2 meter (6.5 feet) of ground truth.	At the beginning of each work day.
DGM Survey Data Collection Sensor Positioning (vertical)	Accuracy and Sensitivity	DGM sensors are within specified distance from seafloor throughout investigation.	Sensor must be towed at a maximum height of 1.5 meters (5 feet) above the sea floor for 98 percent of the data collected along each transect (no more than 2 percent of the DGM data for each transect may be from heights of 1.5 meters [5 feet] or more).	Throughout entirety of DGM data collection operations.
DGM Survey Data Collection Static Background / Standard Response Test	Sensitivity	Test jig with industry standard object attached to the array platform and measurements collected.	Performed to determine if unusual levels of instrument or ambient noise exist. If EM method is used, value must be within ± 20 percent of running average response, after background correction. If mag, qualitative assessment of response will be performed.	At the beginning and end of each work day or if results appear to be questionable.
DGM Survey Data Collection Depth Test	Sensitivity	Two depth measurements will be recorded at a known depth location to verify depth/altitude equipment is functioning properly.	Depth detection results are required to be within 15 cm (6 inches) of the known depth.	At the beginning of each work day.
DGM Survey Data Collection Repeat Data	Repeatability	Data collected in survey mode over metallic object underwater. The object will be either a known object that was seeded or an object that already existed near the survey area.	Item position is within 2 meters (6.5 feet) of known position (if known location) or multiple passes over object result in anomalies representing object from all passes within a 2-meter-radius (6.5-foot-radius) circle.	At the beginning and end of each work day.

[a] Measurement Data Quality Indicators are defined as follows:

- Functionality – target system is mechanically operational
- Accuracy – target system is providing sufficiently accurate data as defined by the Measurement Performance Criteria
- Sensitivity – target system is responsive to given site conditions as defined by the Measurement Performance Criteria
- Repeatability – target system is capable of providing repeatable data as defined by the Measurement Performance Criteria

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MEC-QAPP Worksheet #12-1b—Phase 2 Measurement Performance Quality Table - Munitions Response

Following completion of Phase 1 activities, if applicable, the details of the anomaly inspection will be developed by the Navy, USEPA, and NJDEP. This worksheet will be populated when the MEC-QAPP Addendum is prepared.

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MEC-QAPP Worksheet #12-2a—Phase 1 Definable Features of Work Auditing Procedure

DFOW	Task with Auditable Function	Audit Procedure	QC Phase	Frequency of Audit	Pass/Fail Criteria	Action if Failure Occurs
Pre-mobilization Activities	GIS Setup	Verify GIS system is functional and ready for site data	Preparatory Phase (PP)	Once	GIS system has been set up and is ready for site data	Do not proceed with field activities until criterion is passed
	Document Management and Control	Verify appropriate measures are in place to manage and control project documents	PP	Once	Appropriate measures are in place to manage and control project documents	Do not proceed with field activities until criterion is passed
	Data Management	Verify appropriate measures are in place to manage and control project data	PP	Once	Appropriate measures are in place to manage and control project data	Do not proceed with field activities until criterion is passed
	Subcontractor Procurement	Ensure procurement of subcontractors and verify qualifications, training, licenses	PP/ Initial Phase (IP)	Once	Subcontractors' qualifications, training, and licenses are up to date and acceptable	Ensure subcontractor provides qualifications, training, and licenses or change subcontractor
	Work Plan	Verify the Project Work Plan has been developed and approved	PP/IP	Once	Work Plan has been prepared and approved, all parties agree to the technical and operational approach	Do not proceed with field activities until criterion is passed
Mobilization/ Site Preparation	Onsite Document Review	Verify Project Plans are approved and review with project team and get appropriate signatures	PP/IP	Once	Document is approved and has been reviewed and acknowledged by appropriate project team members	Personnel who are not familiar with the Project Plans may not proceed with field activities until criterion are passed
	Establish Communication and Logistics	Verify functionality of communications equipment and logistical support is coordinated	PP/IP	Once	Communications and other logistical support are coordinated	Do not proceed with field activities until criterion is passed
	Local Agencies and Emergency Services Notification	Verify local agencies and emergency services have been notified of site activities	PP/IP	Once	Emergency services and local agencies are aware of site activities	Do not proceed with field activities until criterion is passed
	Verify site-specific training	Verify all site-specific training has been performed and acknowledged	PP/IP	Once	Site-specific training is performed and acknowledged	Do not proceed with field activities until criterion is passed
	Site Boundary and Transect Establishment	Verify area/boundary and transects	PP/IP	Once	Area/boundary is correct and transects are appropriate	Stop activities until area/boundary/transect approach is verified
DGM Survey	Equipment Testing	Verify equipment testing has been performed and equipment is functional	IP/ Follow-up Phase (FP)	Once/Daily/As Required	Equipment passed functionality test as required by this MEC-QAPP	Repair or replace instrument
	Work Methods	Verify work methods are established and communicated	IP/FP	Daily	Work methods are established and communicated and being performed in accordance with this MEC-QAPP and SOPs	Stop activities until the MEC-QAPP and SOPs can be followed and any activities not performed within compliance are re-evaluated and re-performed, if necessary
	Geophysical Survey (towed-array)	Verify DGM survey of the area is performed as detailed in this MEC-QAPP	IP/FP	Daily	DGM activities are being performed in accordance with this MEC-QAPP and SOPs	Stop work until DGM activities are corrected and in compliance with the MEC-QAPP and SOPs
	Data Transfer/Upload to FTP	Verify data are transferred for review	IP/FP	Per Data Collection Set	Data has been transferred as required by this MEC-QAPP and SOPs	Request transfer of data
DGM Data Evaluation and Documentation	Geophysical Data Processing and Interpretation	Verify data processing is adequately performed and interpretation/anomaly selection is appropriate	IP/FP	Per Data Package	Data are appropriately processed, interpreted, and documented and anomaly selection has been made as detailed in this MEC-QAPP	Request data be resubmitted or recollected, as necessary, for adequate review.
Demobilization	Demobilize from the site	Verify equipment and personnel have been demobilized from the site and the site is returned to pre-mobilization condition	FP	Once	All personnel and equipment have been demobilized and the site is in pre-construction condition	Restore site to preconstruction condition, package and ship all equipment offsite, demobilize crew

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MEC-QAPP Worksheet #12-2b—Phase 2 Definable Features of Work Auditing Procedure

Following completion of Phase 1 activities, if applicable, the details of the anomaly inspection will be developed by the Navy, USEPA, and NJDEP. This worksheet will be populated when the MEC-QAPP Addendum is prepared.

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MEC-QAPP Worksheet #13—Secondary Data Criteria and Limitations Table

Secondary Data	Data Source	Data Generator (s)	How Data Will Be Used	Limitations on Data Use
SI	Data collected by side-scan and bathymetry surveys	CH2M HILL	Identify navigational hazards to prevent tangling of DGM equipment. Data may be used as supplemental information to identify geophysical anomalies at UXO 2 for anomaly inspection and for interpretation of potential presence of MEC at the site.	Cannot be used for evaluating subsurface (buried) items.
Underwater Munitions Detections Survey (anticipated to be completed in August 2013)	Results of acoustic imaging and geophysical anomaly detection survey collected by lightweight class unmanned underwater vehicle systems and a man portable class unmanned underwater vehicle.	Naval Surface Warfare Center Panama City Division, Panama City, Florida	Data may be used as supplemental information obtained during this investigation, to compare results and repeatability of systems (if appropriate), and to identify geophysical anomalies and/or MEC at UXO 2.	Performance criteria and QC testing of equipment is unknown; therefore, data obtained during this investigation may be used to supplement the data collected under this MEC-QAPP if the quality is determined to be appropriate for supplemental use.

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MEC-QAPP Worksheet #14a—Summary of Phase 1 Tasks

This section of the MEC-QAPP details the specific DFOWs to be performed to meet the objectives of the investigation. The principal tasks associated with the DFOWs are detailed as follows. Each of these work elements for the investigation, the SOPs that define the methods for performing the activities, and any other supporting documentation for performing the SI are presented in **Table 5a**.

TABLE 5a
DGM Survey Activities Summary

DFOW	SOP	Supporting Document(s)
PHASE 1 DGM Survey		
Pre-Mobilization Activities	-	MEC-QAPP
DGM Mobilization/Site Preparation	-	MEC-QAPP
DGM Survey	**SOP #2 and SOP #3 (Appendix B)**	MEC-QAPP
DGM Data Evaluation and Documentation		MEC-QAPP
DGM Demobilization	-	MEC-QAPP

Pre-Mobilization Activities

Before mobilization to the site occurs, planning activities will be performed to ensure procedures are in place to perform the fieldwork. This MEC-QAPP has been developed to provide details of how the DGM survey will be performed and the quality standards to which it will be compared. Before mobilization to the site occurs, this plan will be reviewed and approved by the Navy, the regulators, and CH2M HILL and its subcontractor(s). Additionally, internal coordination will take place so that GIS information and equipment are available and updated for project activities, document and data management procedures are in place, and all necessary subcontractors have been procured. Subcontractor qualifications, certifications, and licenses will be reviewed before selection. Additionally, field team personnel will provide information to the Navy that will be necessary for obtaining access to the facility and investigation area. This information will be coordinated with the NWS Earle Environmental POC.

DGM Mobilization and Site Preparation

Field personnel, equipment, and materials will be mobilized to the site to complete the DGM survey. Onsite personnel will review this MEC-QAPP and all applicable SOPs and appendixes. Nautical charts and bathymetry/ side-scan data (**Appendix A**) will also be reviewed to locate potential navigational hazards that may be encountered during the survey. Appropriate site-specific training, including H&S review of site activities, emergency responses, and communications, will be conducted before the start of work. Additionally, a morning safety meeting will be conducted each day to review the tasks to be performed that day and any potential hazards.

All equipment will be inspected upon arrival at the site, tested for functionality, and repaired or replaced as necessary for quality performance. Equipment inspections will also be performed daily throughout the project to ensure proper functionality and prevent any damage. Good housekeeping procedures will be followed to reduce the risk of equipment damage.

The CH2M HILL FTL will ensure that onsite communications (such as mobile phones and two-way radios) have been established between team members. Support zones and break areas will be identified before

MEC-QAPP Worksheet #14a—Summary of Phase 1 Tasks (continued)

work begins. A third-order survey monument, or better, will be located (if an existing monument is available) or established prior to conducting the DGM survey.

DGM Survey

After site-setup activities have been completed, the DGM survey will be performed. The expected duration of the survey work is 15 days.

The survey will provide high percentage bottom coverage of the identified areas of concern (complete coverage will be attempted but currents and obstacles may prevent effective accomplishment of this. Additional detail regarding acceptable coverage for data delivery is defined in SOP #2 of **Appendix B**.). The surveying equipment will be capable of detecting and avoiding any obstructions that may be located within the investigation area.

- The DGM survey will include the geophysical mapping of the designated areas of UXO 2 (**Figures 4 and 5**) to the maximum extent accessible and that can be completed safely. Areas beneath the pier or where access is infeasible or unsafe will not be surveyed.
- The instrument footprint along each transect will be sufficient for identifying potential MEC and material potentially presenting an explosive hazard (minimal swath width is estimated to be 2 meters [6.5 feet], although sensor array configuration will provide a greater width, if possible).
- The investigation areas are approximate, and the boundaries are not to be considered the exact extent of the investigation areas. Field modification of the investigation areas may be required to accommodate site conditions and data collection and to improve productivity and efficiency.
- Efforts will be made to maintain straight, evenly spaced transects to the extent that the bay conditions permit.
- It is assumed that if an obstruction, such as sunken vessels, is present in the area, it will be avoided.
- Detection of geophysical anomalies will be accurate to within 2 meters (6.5 feet) of the source of the anomaly. In order for geophysical data to be accepted, the geophysical equipment will be maintained at a depth that is between the seafloor surface and no greater than 1.5 meters (5 feet) above the seafloor while acquiring data, unless localized, site-specific conditions (sea floor topography, water currents, presence of hazards) dictate otherwise. Maintaining a minimal altitude above the seafloor will improve the likelihood of detection of various sized anomalies.
- The DGM equipment will be capable of operating in water depths of at least 12 meters (approximately 40 feet).
- The DGM activities will be performed under an approved Explosives Safety Submission (ESS) Determination Request which authorizes non-intrusive site activities without an ESS. Anchoring within the prohibited/danger areas is not permitted unless otherwise approved by Naval Ordnance Safety and Security Activity (NOSSA) prior to site activities. The DGM system will be capable of detecting and avoiding potential underwater obstructions that may damage the vessel or entangle or snag the DGM equipment.
- Coordinates for all deliverables will be in NAD 83, New Jersey State Plane (meters).

Note that QC procedures and specifics regarding equipment operations and conducting the DGM survey are included in **Appendix B**.

MEC-QAPP Worksheet #14a—Summary of Phase 1 Tasks (continued)

DGM Data Evaluation and Documentation

On a daily basis, the DGM subcontractor will provide each day's data for QC inspection. Such data are considered to be in raw form. These data will be corrected for sensor offsets, latency, and drift. Also provided will be a digital planimetric map, in Geosoft format and coincident with the location of the geophysical survey, so that each day's geophysical data set can be registered within the original mission plan survey map.

All geophysical field data will be provided to CH2M HILL in delineated fields as x, y, z, d, v1, v2, and so on, where x and y are accurately georeferenced with NAD 83, New Jersey State Plane (meters) easting and northing coordinates, z (altimeter reading), d (depth sensor reading), and v1, v2, and so on as the geophysical response readings. The last data field will be a time stamp. Each data field will be separated by a comma or tab. Each file containing data will be logically and sequentially named so that the file name can be easily correlated with the area surveyed.

Within 5 working days of data collection, the processed geophysical field data, all final maps, and supporting geophysical interpretations will be developed. All geophysical data will include a report documenting the field activities associated with the data and the processing performed. Information to be provided is summarized in **Tables 3** and **4** of **Worksheet #11**.

Once QC inspection of all geophysical data has been performed, the data will be evaluated to determine the potential presence of MEC at the site. The data will be reviewed by MEC-experienced data processing geophysicists. The geophysicists will use the following criteria for selecting significant anomalies:

- Maximum amplitude of the response with respect to local background conditions
- Lateral extent (plan size) of the area of response
- Shape of the response
- Location of the response with respect to the edge of the transects, unsurveyable areas, and underwater features

Instrument-specific software will be used for initial data processing and the output will be imported into Geosoft Oasis Montaj for additional processing, graphical display, anomaly selections, and QA/QC. Types of processing will be system-specific, but the general processing steps that may be performed to ensure quality data include the following:

- Positional offset correction
- Sensor bias, background leveling, and/or standardization adjustment
- Sensor drift removal
- Latency or lag correction
- Geophysical noise identification and removal
- Contour level selection with background shading
- Digital filtering and enhancement (such as low pass, high pass, band pass, convolution, correlation, and non-linear)

All field data, quality procedures, methods, and interpretations of the DGM Survey will be summarized and documented in a technical memorandum.

DGM Demobilization

Prior to demobilization from the site, an evaluation of the data will be performed to ensure that all DGM project objectives are achieved, the data are of acceptable quality, and accepted by the Navy. Once approval

MEC-QAPP Worksheet #14a—Summary of Phase 1 Tasks (continued)

of the data is achieved from the Navy, the crew and equipment will be demobilized from the site. All staging or storage areas will be removed, and the site will be returned to pre-mobilization condition.

MEC-QAPP Worksheet #14b—Summary of Phase 2 Tasks

This section of the MEC-QAPP details the specific DFOWs for the anomaly inspection to be performed to meet the objectives of the anomaly investigation if the Navy, NJDEP, and USEPA agree additional investigation is warranted. This worksheet will be modified, as necessary, when the MEC-QAPP Addendum is prepared. The anticipated principal tasks associated with the DFOWs are detailed as follows. Each of these work elements for the investigation, the SOPs that define the methods for performing the activities, and any other supporting documentation for performing the SI are presented in **Table 5b**.

TABLE 5b
Anomaly Inspection Activities Summary

DFOW	SOP	Supporting Document(s)
PHASE 2 Anomaly Inspection		
Pre-Mobilization Activities	-	MEC-QAPP and MEC-QAPP Addendum
Anomaly Inspection Mobilization/Site Preparation	-	MEC-QAPP and MEC-QAPP Addendum
Anomaly Inspection	**SOP #4* (Appendix B)**	MEC-QAPP and MEC-QAPP Addendum
Anomaly Inspection Demobilization	-	MEC-QAPP and MEC-QAPP Addendum
SI Reporting		

* This SOP will be provided by the subcontractor upon award

Pre-Mobilization Activities

If additional investigation is warranted based on the DGM data collected, an ESS will be developed and submitted for NOSSA approval prior to anomaly inspection field activities. Additionally, an addendum to this MEC-QAPP will be developed to incorporate the specific details relating to the implementation and methodology of the anomaly inspection approach. The addendum will document the quality standards for the specific technology to be implemented, the agreed upon anomalies or anomaly areas requiring inspection (to be selected by the Navy, USEPA, and NJDEP, based upon the DGM results), and the SOPs for performing the anomaly inspection.

Before mobilization to the site occurs, planning activities will be performed to ensure procedures are in place to perform the fieldwork. Before fieldwork is performed, the work planning documentation will be reviewed and approved by the Navy, the regulators, and CH2M HILL and its subcontractor(s). Additionally, internal coordination will take place so that GIS information and equipment are available and updated for project activities based upon the most recent data (including DGM data), document and data management procedures are in place for conducting the anomaly inspection, and all necessary subcontractors have been procured. Subcontractor qualifications, certifications, and licenses will be reviewed before selection. Additionally, field team personnel will provide information to the Navy that will be necessary for obtaining access to the facility and investigation area. This information will be coordinated with the NWS Earle Environmental POC (Scott Fleming).

Anomaly Inspection Mobilization and Site Preparation

Once the ESS and MEC-QAPP addendum have been approved, the field personnel, equipment, and materials will be mobilized to the site to complete the anomaly inspection. Onsite personnel will review this MEC-QAPP, the MEC-QAPP Addendum, the ESS, and all applicable SOPs and appendixes. Nautical charts, bathymetry/side-scan data (**Appendix A**), and DGM data will be reviewed to locate potential navigational or potential H&S hazards that may be encountered during the inspection. Appropriate site-specific training, including H&S review of site activities, emergency responses, and communications, will be conducted before

MEC-QAPP Worksheet #14b—Summary of Phase 2 Tasks (continued)

the start of work. Additionally, a morning safety meeting will be conducted each day to review the tasks to be performed that day and any potential hazards.

All equipment will be inspected upon arrival at the site, tested for functionality, and repaired or replaced as necessary for quality performance. Equipment inspections will also be performed daily throughout the project to ensure proper functionality and prevent any damage. Good housekeeping procedures will be followed to reduce the risk of equipment damage.

The CH2M HILL FTL will ensure that onsite communications (such as mobile phones and two-way radios) have been established between team members. Support zones and break areas will be identified before work begins.

Anomaly Inspection

The Navy, NJDEP, and USEPA will determine a representative quantity and locations of geophysical anomalies requiring inspection. The type of technology to be used will be determined based upon site conditions, H&S considerations, and DGM survey results. Specific procedures for the technology to be implemented will be included in an addendum to this MEC-QAPP. Examples of the types of technologies that may be utilized to conduct the anomaly inspection may include (but are not limited to) the following:

- Remotely operated vehicle (ROV) – An ROV equipped with high resolution video cameras, navigation system, and high-intensity halogen lighting may be utilized to provide enhanced visual observation of select anomalies.
- Diver – An experienced UXO dive team may be utilized to perform visual inspection of anomalies (high resolution video cameras, navigation system, and high-intensity halogen lighting may be used) to provide enhanced visual inspection of select anomalies.
- Dredging or Magnetic Dredge Recovery - Anomaly sources may be recovered through the use of a barge-mounted clamshell-type dredge or electromagnet with raking system (for ferrous anomaly recovery only, to reduce investigation-derived waste generated). Select sources of anomalies or anomaly areas will be recovered and will be visually inspected by UXO-qualified personnel.

The QC procedures and specifics regarding equipment operations and conducting the anomaly inspection will be provided in an addendum to this MEC-QAPP.

Anomaly Inspection Demobilization

Once approval of the data is achieved from the Navy, the crew and equipment will be demobilized from the site. All staging or storage areas will be removed, and the site will be returned to pre-mobilization condition.

SI Reporting

At the conclusion of all field activities (including Phase 1 and Phase 2), an SI Report will be prepared to document the activities performed at the site and summarize the results and conclusions of the DGM survey activities and anomaly inspections. The report will include DGM maps and anomalies inspected, interpretations of the data obtained, and a narrative description of the field activities, including data collection methodology, processing, interpretation, and results. The narrative will also detail the accuracy of the equipment, describe the instrumentation that was used, provide the limitations of the equipment and data, and detail the QC checks performed to ensure equipment functionality. Following the review by the Navy, the report will be distributed to the USEPA and NJDEP.

MEC-QAPP Worksheet #16—Project Schedule/Timeline Table

Activities	Organization	Dates (MM/DD/YY)		Deliverable	Deliverable Due Date
		Anticipated Date(s) of Initiation	Anticipated Date of Completion		
Draft SI Work Plan/ MEC-QAPP	Navy/CH2M HILL		9/26/2013	Draft Project Plans	9/26/2013
Regulatory Review	USEPA and NJDEP	09/26/2013	11/26/2013	Regulatory Comments	11/26/2013
Resolve Regulatory Comments/Draft Final SI Work Plan/MEC-QAPP	CH2M HILL	11/26/2013	01/09/2014	Regulatory Response to Comments (RTCs)	01/10/2014
Issue Final SI Work Plan/MEC-QAPP	CH2M HILL	01/10/2014	01/24/2014	Final Project Plans	01/24/2014
Phase 1 SI Field Work (DGM Survey)	CH2M HILL and DGM Subcontractor	03/24/2014	04/14/2014	Field Documentation, Raw Geophysical Survey Data, QC Reports and H&S documents	04/14/2014
Data Evaluation/Technical Memorandum Summary	CH2M HILL and DGM Subcontractor	04/15/2014	07/15/2014	Preprocessed Data and Final Data	7/15/2014
Draft SI Work Plan/ MEC-QAPP Addendum	CH2M HILL	07/15/2014	10/15/2014	Draft Project Plan Addendum	10/15/2014
Regulatory Review	USEPA and NJDEP	10/15/14	12/15/2014	Regulatory Comments	12/15/2014
Resolve Regulatory Comments on Draft Final SI Work Plan/ MEC-QAPP Addendum	CH2M HILL	12/15/2014	12/30/14	Regulatory RTCs	12/30/2014
Issue Final SI Work Plan/ MEC-QAPP Addendum	CH2M HILL	12/30/2014	1/15/2015	Final Project Plan Addendum	01/15/2015
Phase 2 SI Field Work (Anomaly Inspection)	CH2M HILL and Anomaly Inspection Subcontractor	03/24/2015	04/17/2015	Field Documentation, QC Reports and H&S documents	04/17/2015
Draft SI Report	CH2M HILL	04/20/2015	08/15/2015	Draft SI Report	08/15/2015
Regulatory Review	USEPA and NJDEP	08/15/2015	10/15/2015	Regulatory Comments	10/15/2015
RTCs	CH2M HILL	10/15/2015	11/15/2015	Regulatory RTCs	11/15/2015
Final SI Report	CH2M HILL	11/15/2015	12/15/2015	Final SI Report	1/15/2015

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MEC-QAPP Worksheet #17a—Phase 1 Sampling Design and Rationale

The primary objective of this investigation is to determine the presence or suggested absence of MEC at the inactive piers at UXO 2. To do this, a DGM survey will be completed as Phase 1 of the investigation follow by an inspection of select geophysical anomalies (Phase 2), if deemed necessary. The general investigation approach and rationale is provided in **Table 1** (**Worksheet #11**). A detailed description of the DFOWs and tasks to be performed during this investigation are presented and detailed in **Worksheet #14a**. The schedule of activities for the project is indicated in **Worksheet #16**. Additional detail on the sample design and rationale for the proposed SI activities are provided as follows.

Phase 1 DGM Survey

Objective: Locate geophysical anomalies within the sediment or lying on the sediment surface within the investigation area of Piers 1 and 2 (**Figure 2**). To the extent practicable, 100 percent coverage of the investigation area will be evaluated for geophysical anomalies (complete coverage will be attempted but currents and obstacles may limit the coverage to be below 100 percent).

Sample Design and Rationale: The Investigation area of Piers 1 and 2 was selected based on the locations of the berths (length of the piers) along the piers and the maximum width of the largest ship to berth at the piers (approximately 76.2 meters [250 feet]) where munitions loading operations have occurred historically. The use of DGM technology is the most practicable and reliable technology to identify metallic items within and lying on the sediment within the investigation area. The use of DGM to identify metallic items has been demonstrated in the industry to be an effective technology to detect a majority of MEC items, which are made of metal. However, there are limitations to the maximum depth at which various sized items can be detected (see SOP #2 of **Appendix B**). To the extent practicable, DGM data will be collected along transects, starting at the edges of the pier and running parallel to the structure. The proposed transects are depicted on **Figures 4 and 5**; the transects may be field-modified based on site conditions, subcontractor/system selected, and safety concerns. All recorded DGM data will be reviewed by the project geophysicist.

MEC-QAPP Worksheet #17b—Phase 2 Sampling Design and Rationale

Following completion of Phase 1 activities, if applicable, the details of the anomaly inspection will be developed by the Navy, USEPA, and NJDEP. This worksheet will be populated when the MEC-QAPP Addendum is prepared.

MEC QAPP Worksheet #18a—Phase 1 Sampling Locations and Methods and Standard Operating Procedure Requirements Table

Data collection activities performed at the site will include a DGM survey of the inactive piers (Piers 1 and 2) at UXO 2. The DGM survey will focus on the immediate areas along the piers (28 acres at Pier 1 and 17 acres at Pier 2). Based upon available site data from the PA report, these areas are most likely to contain potential MEC based on historical pier use as a munitions loading and unloading area. Target areas are identified on **Figure 2**.

Target Area	Exclusion Areas	Matrix	Depth (Units)	Survey Methodology	Number of Samples	Sampling SOP Reference
Pier 1	Alexander Hamilton and sunken vessel found near the end of Pier 1	Underwater seafloor surface and near surface (sediment)	Not Applicable	Towed-Array	100 percent coverage to the extent practicable (**Figure 2**)	SOP #2
Pier 2	Walkway areas					

MEC QAPP Worksheet #18b—Phase 2 Sampling Locations and Methods and Standard Operating Procedure Requirements Table

Following completion of Phase 1 activities, if applicable, the details of the anomaly inspection will be developed by the Navy, USEPA, and NJDEP. This worksheet will be populated when the MEC-QAPP Addendum is prepared.

MEC-QAPP Worksheet #21—Project Sampling SOP References Table

Reference Number	Title, Revision Date, and/or Number	Originating Organization of Sampling SOP	Equipment Type	Modified for Project Work? (Y/N)	Comments
SOP 1	Preparing Field Log Books	CH2M HILL	Not Applicable	N	None
SOP 2	Underwater DGM SOP	CH2M HILL	DGM Equipment	N	None
SOP 3	Underwater DGM Surveying	NAEVA Geophysics	DGM Underwater Array	Y	None
SOP 4*	Anomaly Inspection SOP	Anomaly Inspection Subcontractor	TBD	TBD	None

* SOP will be provided by the subcontractor upon award

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MEC-QAPP Worksheet #22a—Phase 1 Field Equipment Calibration, Maintenance, Testing, and Inspection Table

See also **Worksheet #12-1a**.

Field Equipment	Activity	Frequency	Acceptance Criteria	CA	Responsible Person	SOP Reference	Comments
DGM Survey Data Collection Equipment Warm-up	Functionality	At the beginning of each work day.	System does not show drift in response in static measurements.	Inspect/repair/replace equipment until functioning properly	Equipment operator	SOP-2 and SOP-3	QC Geophysicist to evaluate test compliance during daily data review
DGM Survey Data Collection Topside GPS Positioning	Accuracy	At the beginning of each work day.	Measured positions are within 10 cm (4 inches) of known position.	Inspect/repair/replace equipment until functioning properly	Equipment operator	SOP-2 and SOP-3	QC Geophysicist to evaluate test compliance during daily data review
DGM Survey Data Collection Sensor Positioning	Accuracy	At the beginning of each work day.	Derived target locations (EM peak amplitude response or magnetic dipole fit positions) will be ±2 meters (6.5 feet) of ground truth.	Inspect/repair/replace equipment until functioning properly	Equipment operator	SOP-2 and SOP-3	QC Geophysicist to evaluate test compliance during daily data review
DGM Survey Data Collection Static Background/Standard Response Test	Sensitivity	At the beginning and end of each work day or if results appear to be questionable.	Performed to determine if unusual levels of instrument or ambient noise exist. If EM method is used, value must be within ± 20 percent of running average response, after background correction. If mag, qualitative assessment of response will be performed.	Inspect/repair/replace equipment until functioning properly	Equipment operator	SOP-2 and SOP-3	QC Geophysicist to evaluate test compliance during daily data review
DGM Survey Data Collection Sensor Depth Test	Sensitivity	At the beginning of each work day.	Equipment must demonstrate that depth results are within 15 cm (6 inches) of the known depth.	Inspect/repair/replace equipment until functioning properly	Equipment operator	SOP-2 and SOP-3	QC Geophysicist to evaluate test compliance during daily data review
DGM Survey Data Collection Repeat Data	Repeatability	At the beginning and end of each work day.	Item position is within 2 meters (6.5 feet) of known position (if known location) or multiple passes over object result in anomalies representing object from all passes within a 2–meter-radius (6.5-foot-radius) circle.	Inspect/repair/replace equipment until functioning properly	Equipment operator	SOP-2 and SOP-3	QC Geophysicist to evaluate test compliance during daily data review

MEC-QAPP Worksheet #22b—Phase 2 Field Equipment Calibration, Maintenance, Testing, and Inspection Table

Following completion of Phase 1 activities, if applicable, the details of the anomaly inspection will be developed by the Navy, USEPA, and NJDEP. This worksheet will be populated when the MEC-QAPP Addendum is prepared.

MEC-QAPP Worksheet #29—Project Documents and Records Table

Document	Where Maintained
• Field Notebooks • Field Work Plans • CA Forms • Electronic Data Deliverables • Meteorological Data from Field • Equipment and Instrument Check Logs • Field Team Notes and Field Logs • Equipment Maintenance, Testing, and Inspection Logs • Reported Result for QC Checks • Raw Data (stored on CD/DVD) • Field Photograph Log • Daily Project Reports • Daily H&S Documents • QC Documentation and Reports • Meeting Agendas, Minutes, and Presentations • Summary Reports	• Field data deliverables such as log books entries, electronic data deliverables, field work plans, and daily reports will be kept on CH2M HILL's network server. • Survey information hardcopy deliverables and data processing and interpretation documents will be saved on CH2M HILL's network server. • Survey data and anomaly inspection results will be reported in the SI.

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MEC-QAPP Worksheet #31—Planned Project Assessments Table

Assessment Type	Frequency	Internal or External	Organization Performing Assessment	Person(s) Responsible for Performing Assessment	Person(s) Responsible for Responding to Assessment Findings	Person(s) Responsible for Identifying and Implementing CA	Person(s) Responsible for Monitoring Effectiveness of CA
PHASE 1 DGM SURVEY							
Field Performance Audit	Once during field event	Internal	CH2M HILL	Geophysicist (for DGM) and UXOQCS (anomaly inspection)	Project Geophysicist	Geophysicist (for DGM) and	CH2M HILL PM
Data storage and transfer system check	Before initial data collection and once weekly	Internal	CH2M HILL	CH2M HILL Geophysicist	Geophysical Subcontractor	Geophysical Subcontractor	CH2M HILL PM
PHASE 2 ANOMALY INSPECTION*							
Field Performance Audit	Once during field event	Internal	CH2M HILL	UXOQCS	UXOQCS	UXOQCS	CH2M HILL PM

*If additional investigation is warranted, the anomaly inspection technology will be selected by the Navy, NJDEP, and USEPA. Anomaly inspection planned project assessments specific to the selected technology will be discussed in greater detail in the MEC-QAPP Addendum.

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MEC-QAPP Worksheet #32—Assessment Findings and Corrective Action Responses

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings	Timeframe of Notification	Nature of CA Response Documentation	Individual(s) Receiving CA Response	Timeframe for Response
Field Performance Audit	Checklist and Written Audit Report	CH2M HILL PM	Within 1 week of audit	Memorandum	CH2M HILL SUXOS, Project Geophysicist	Within 1 week of receipt of CA Form

MEC-QAPP Worksheet #32-1—Corrective Action Form

Person initiating CA _____ Date _____

Description of problem and when identified (submit a drawing or sketch if necessary): _____

_____

_____

_____

_____

_____

Cause of problem, if known or suspected: _____

Resolution/Sequence of CA: (including date implemented, action planned, and personnel/data affected) _

_____

_____

_____

_____

_____

CA implemented by: _____ Date: _____

CA initially approved by: _____ Date: _____

Follow-up date: _____

Final CA approved by: _____ Date: _____

Information copies to:

_____

_____

_____

_____

MEC-QAPP Worksheet #32-2—Field Performance Audit Checklist

Project Responsibilities

Project No.: _____ Date: _____

Project Location: _____ Signature: _____

Team Members:

Yes _ No _ 1) Is the approved work plan being followed?

Comments _____

_____

Yes _ No _ 2) Was a briefing held for project participants?

Comments _____

_____

Yes _ No _ 3) Were additional instructions given to project participants?

Comments _____

_____

DGM/Anomaly Inspection Operations

Yes _ No _ 1) Are routine inspections and QC checks of the equipment being performed as outlined in this MEC-QAPP?

Comments _____

_____

Yes _ No _ 2) Are the proposed locations (DGM transects or metallic anomaly locations) clearly communicated with the Investigation Team?

Comments _____

_____

Yes _ No _ 3) Is data collection being performed as required by the MEC-QAPP?

Comments _____

_____

Yes _ No _ 4) Are data stored properly and uploaded for transfer in a timely manner?

Comments _____

_____

MEC-QAPP Worksheet #32-2—Field Performance Audit Checklist (continued)

Yes _ No _ 5) Were photographs taken and documented?

Comments _____

_____

Document/Data Control

Yes _ No _ 1) Are all work plan documents available onsite for review?

Comments _____

_____

Yes _ No _ 2) Are daily reports and other documentation completed as required by the MEC-QAPP?

Comments _____

_____

Yes _ No _ 3) Are equipment QC data and collected field data properly transferred? Reviewed?

Comments _____

_____

MEC-QAPP Worksheet #33—QA Management Reports Table

Type of Report	Frequency	Projected Delivery Date	Person Responsible for Report Preparation	Report Recipient(s)
Daily QC Report	Daily	Following Day	UXOQCS/FTL	CH2M HILL PM
QC Meeting Minutes	Post Meeting	Within 7 days	UXOQCS/FTL	CH2M HILL PM
Preparatory Inspection Forms	Once for each applicable DFOW (before start of task)	With daily reports the following day after meeting	UXOQCS/FTL	CH2M HILL PM
Initial Inspection Forms	Once for each applicable DFOW (before start of task)	With daily reports the following day after meeting	UXOQCS/FTL	CH2M HILL PM
Follow-up Inspection Forms	Once for each applicable DFOW (document in daily reports)	Document in Daily Reporting	UXOQCS/FTL	CH2M HILL PM

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MEC-QAPP Worksheet #34a—Phase 1 Verification (Step I) Process Table

Verification Input	Description	Internal / External	Responsible for Verification
Evidence of required approval of plan (MEC-QAPP)	Evidence of approval and completeness of MEC-QAPP. Includes establishment of PQOs, QC criteria, SOPs, PALs, figures, and so forth.	Internal	PM/FTL, CH2M HILL
Site-specific Training Records	Ensure project personnel have proper training and certification to perform site activities and achieve project data quality objectives.	Internal	PM/FTL, CH2M HILL
Geophysical Survey Data Methods	Geophysical survey data methods will be reviewed to ensure data collection is performed as defined in the MEC-QAPP.	Internal	Geophysicist , CH2M HILL
Data Collection and Transfer	Ensure data collection is complete and recorded accurately and that data transfer protocol is adequate.	Internal	Geophysicist , CH2M HILL
Performance requirements (including QC criteria)	Ensure performance requirements are fully established (see **Worksheet #12a**).	Internal	PM/FTL, CH2M HILL
Field Log Notebooks	Field notes will be reviewed to ensure completeness of field data collection, data collection times, site operations, site conditions, and so forth. The log book will also be used to document, explain, and justify all deviations from the approved MEC-QAPP and other work planning documents.	Internal	PM/FTL, CH2M HILL

MEC-QAPP Worksheet #34b—Phase 2 Verification (Step I) Process Table

Following completion of Phase 1 activities, if applicable, the details of the anomaly inspection will be developed by the Navy, USEPA, and NJDEP. This worksheet will be populated when the MEC-QAPP Addendum is prepared.

MEC-QAPP Worksheet #35a—Phase 1 Validation (Steps IIa and IIb) Process Table

Step IIa / IIb	Validation Input	Description	Responsible for Validation (name, organization)
IIb	Onsite Screening	Ensure that all field data meet work plan requirements for completeness and accuracy based on the field calibration records.	Project Geophysicist, CH2M HILL
IIa	Geophysical Survey Data Methods	Verify that all data collected were in accordance with the SOPs and requirements of the MEC-QAPP. Ensure that any deviations from the MEC-QAPP are documented.	Project Geophysicist, CH2M HILL
IIa	Data Collection and Transfer	Ensure that all data are usable and have been corrected in accordance with data processing procedures defined in the SOPs.	Project Geophysicist, CH2M HILL
IIa	Performance Requirements (including QC criteria)	Establish that QC tests were performed and compliant with method-required limits as specified in **Worksheet #12a**.	Project Geophysicist, CH2M HILL
IIa	Field Log Notebooks	Review field log books, field documents, and data deliverables for compliance to methods and signatures.	Project Geophysicist, CH2M HILL
IIb	Performance Requirements (including QC criteria)	Ensure that the data report has been provided and that all data are complete. Evaluate whether all data collection procedures were followed with respect to the equipment and QC process.	Project Geophysicist, CH2M HILL

MEC-QAPP Worksheet #35b—Phase 2 Validation (Steps IIa and IIb) Process Table

Following completion of Phase 1 activities, if applicable, the details of the anomaly inspection will be developed by the Navy, USEPA, and NJDEP. This worksheet will be populated when the MEC-QAPP Addendum is prepared.

MEC-QAPP Worksheet #37—Usability Assessment

Summarize the usability assessment process and all procedures, including interim steps and any statistics, equations, and computer algorithms, that will be used:

- If all QC criteria are met, then the data are usable.
- If QC criteria are not met, then data are suspect and cannot be used until confirmed. Recollection of data may be required.

Describe the evaluative procedures used to assess overall measurement error associated with the project.

- To assess whether a sufficient quantity of acceptable geophysical data are available for decision making, the data will be reviewed by MEC-experienced data processing geophysicists as described in **Worksheets #11, #12-1a, and #14a**. QC criteria outlined in this MEC-QAPP and the SOPs will be evaluated to ensure the data are collected within the parameters specified.
- To assess whether a sufficient quantity of acceptable data for the anomaly inspection is available to make further decisions for the site, the data will be reviewed by the Navy, NJDEP, and USEPA to ensure the inspection met the objectives identified in the MEC-QAPP Addendum.
- If significant inconsistencies in data are detected, they will be evaluated to assess impact on decision making.
- If significant deviations are noted between QC of equipment, background information, and field data, the cause will be further evaluated to assess impact on decision making.

Describe the documentation that will be generated during the usability assessment and how usability assessment results will be presented so that they identify trends, relationships (correlations), and anomalies:

- Data tables will be produced for geophysical data and will reflect which anomalies were selected as significant and which were eliminated from consideration during data interpretation. These data tables will be presented in the Technical Memorandum summary and SI Report.
- A description of anomalies investigated during the Anomaly Inspection will be summarized and presented in the SI Report as described in **Worksheets #11, #12-1b and #14b**. Appropriate details of the items (weight, orientation, location, and so forth) will be included to the extent practical. Additional details may be required by the MEC-QAPP Addendum.
- The SI will identify any data usability limitations and recommend additional investigations if necessary. DGM equipment detection limitations for estimated maximum depth of various sized items will be summarized in an uncertainties section of the SI Report.
- A data quality evaluation section will be included as part of the final report to summarize the results of the data collection and interpretation.
- The SI will identify any data usability limitations and recommend CA if necessary.

Identify the personnel responsible for performing the usability assessment.

- The PM, Project Geophysicist, SUXOS, and other team members will be responsible for collecting and compiling the data. The data will then be presented to the Navy, USEPA, and NJDEP representatives, who will evaluate the data usability according to project objectives.

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References

Battelle. 2005. *Final Data Survey Report, Sediment Testing and Analysis for Upland Disposal of Non-HARS Suitable Material from the Pier Complex Replacement Project*. February.

CH2M HILL. 2012. *Final Preliminary Assessment Report UXO 0002 – Munitions Loading Pier Complex. NWS Earle, Sandy Hook Bay, Monmouth County, New Jersey.* November.

CH2M HILL. 2013. *Final Streamlined Quality Assurance Project Plan, UXO 0002, Munitions Loading Pier Complex, Side-scan Sonar and Bathymetric Survey.* March.

Department of the Navy (Navy). 2004. *Environmental Assessment, Pier Complex Replacement at U.S. Naval Weapons Station Earle, Sandy Hook Bay, Monmouth County, New Jersey.* April.

New Jersey Administrative Code (NJAC). 2011. *New Jersey Administrative Code 7.26E, Technical Requirements for Site Remediation*.

United States Environmental Protection Agency (USEPA). 2002. *Guidance for Quality Assurance Project Plans.* USEPA QA/G-5, QAMS.

USEPA. 2005. *Uniform Federal Policy for Quality Assurance Project Plans.* EPA-505-B-04-900A. Version 1. Final. March.

USEPA. 2006. *Guidance on Systematic Planning Using the Data Quality Objectives Process.* EPA/240/B-06/001. Final. February.

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Figures

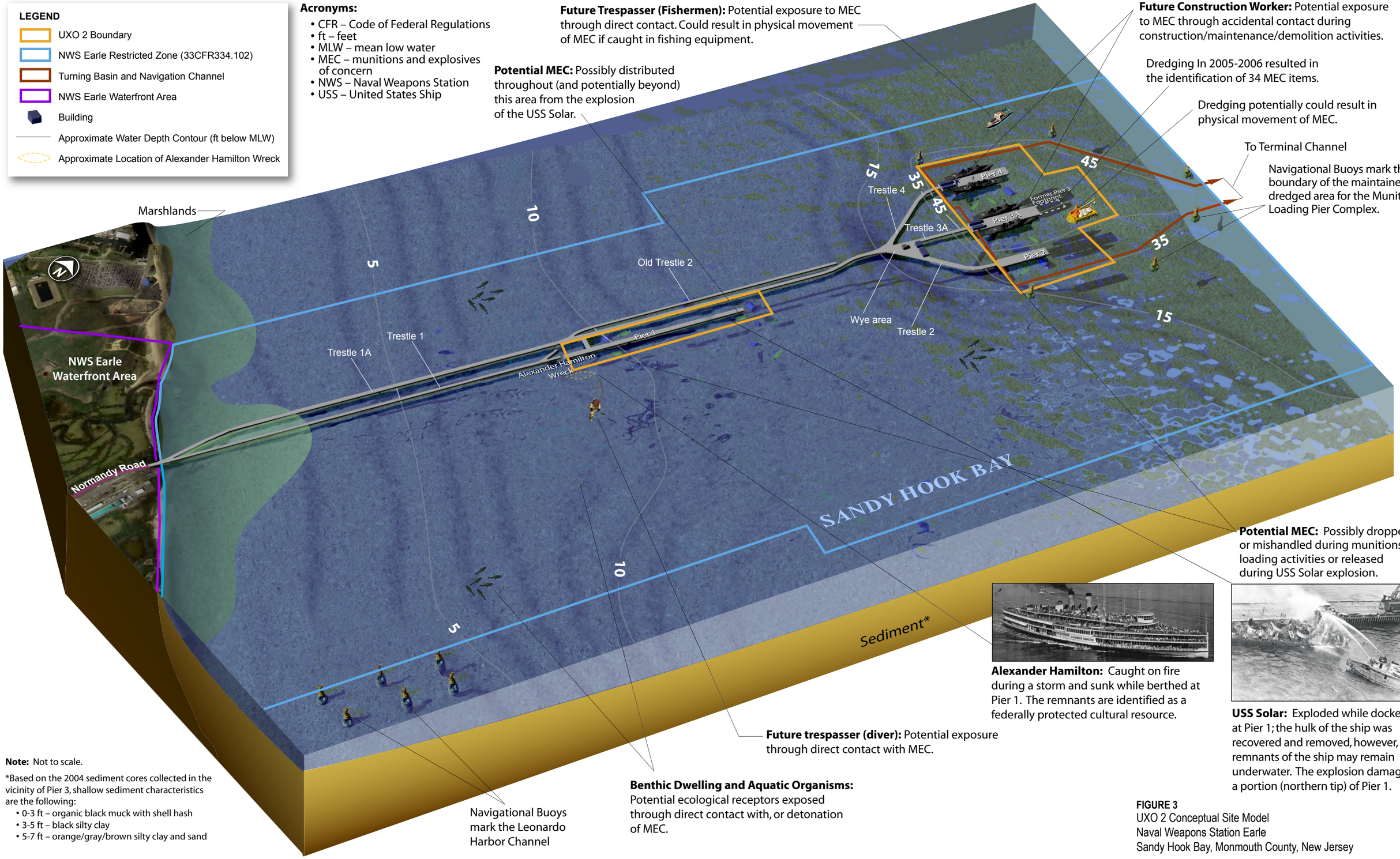


FIGURE 3
UXO 2 Conceptual Site Model
Naval Weapons Station Earle
Sandy Hook Bay, Monmouth County, New Jersey

CH2MHILL

Legend

- NWS Earle - Mainside Area
- NWS Earle - Waterfront Area
- Normandy Road
- Monmouth County, NJ

N W E S

0 2 4 Miles

Figure 2
NWS Earle Location Map
NWS Earle Munitions Loading Pier Complex
Monmouth County, New Jersey

CH2MHILL

Legend

- NWS Earle Boundary - Waterfront Area
- NWS Earle Restricted Zone (33CFR334.102)
- UXO 2 Active Pier Area
- UXO 2 Inactive Pier Area

N
W E
S

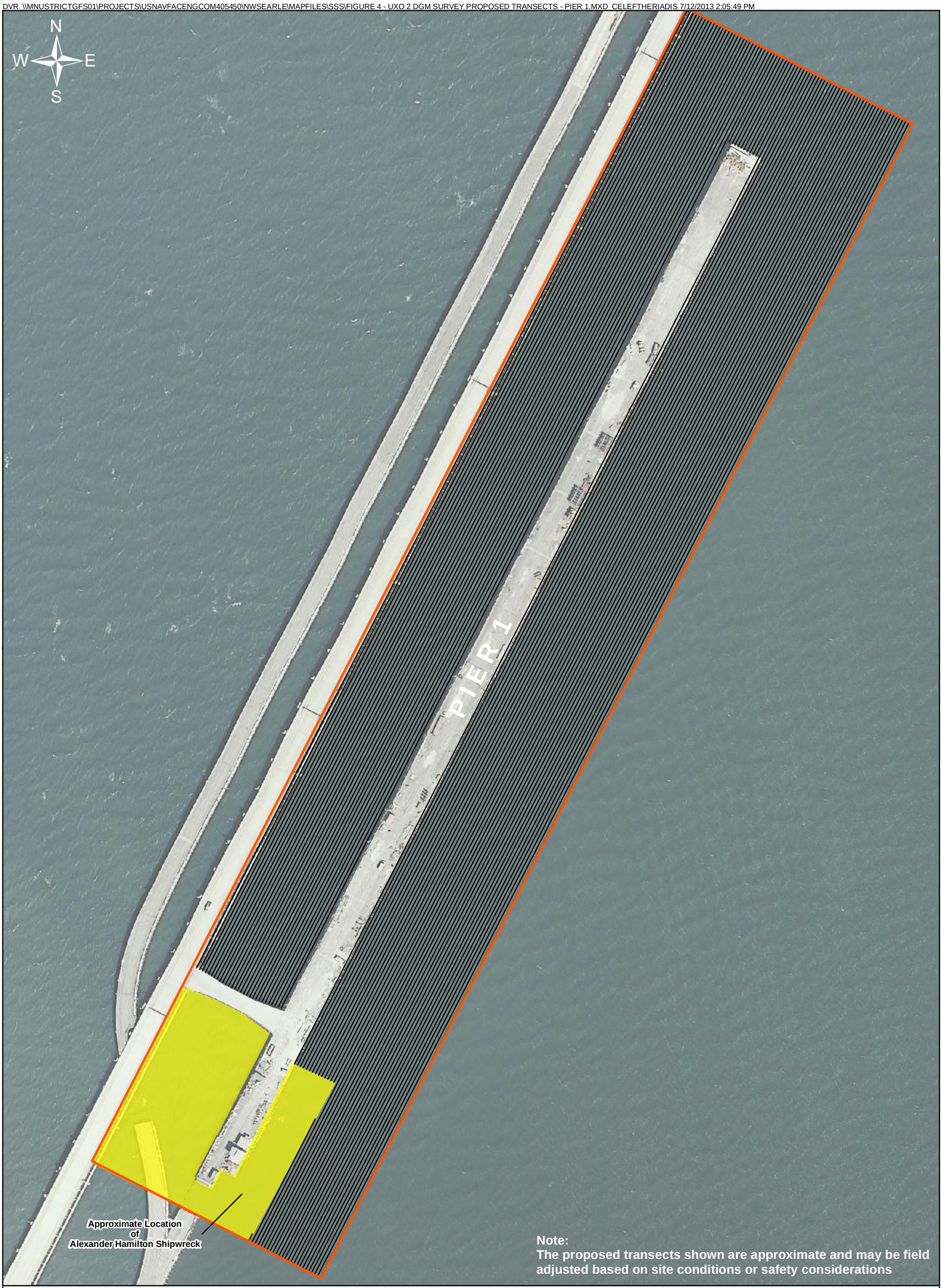
0 1,000 2,000 Feet

Imagery: 2007

Figure 3
UXO 2 Summary
NWS Earle Munitions Loading Pier Complex
Monmouth County, New Jersey

CH2MHILL

DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\NWSEARLE\MAPFILES\SSS\FIGURE 4 - UXO 2 DGM SURVEY PROPOSED TRANSECTS - PIER 1.MXD CELEFTHERIADIS 7/12/2013 2:05:49 PM



Legend

- Proposed Transect (2 Meter Spacing)
- Potentially Inaccessible Area
- Area Recommended for SI

N
W E
S

0 175 350
Feet

Figure 4
UXO 2 DGM Survey Proposed Transects - Pier 1
NWS Earle Munitions Loading Pier Complex
Monmouth County, New Jersey

CH2MHILL

DVR \\MNUSTRICTGFS01\PROJECTS\USNAVFACENGCOM405450\NWSEARLE\MAPFILES\SSS\FIGURE 5 - UXO 2 DGM SURVEY PROPOSED TRANSECTS - PIER 2.MXD CELEFTHERIADIS 7/12/2013 2:08:22 PM

Legend

- Proposed Transect (2 Meter Spacing)
- Potentially Inaccessible Area
- Area Recommended for SI

N
W E
S

0 125 250
Feet

Figure 5
UXO 2 DGM Survey Proposed Transects - Pier 2
NWS Earle Munitions Loading Pier Complex
Monmouth County, New Jersey

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Appendix A
Side-scan Sonar and Bathymetry Technical Memorandum

Side-Scan Sonar and Bathymetric Survey Results for UXO 2 Munitions Loading Pier Complex, Piers 1 and 2, at Naval Weapons Station Earle, Sandy Hook Bay, Monmouth County, NJ

PREPARED FOR: Roberto Pagtalunan/NAVFAC Mid-Atlantic
PREPARED BY: Adam Forshey /CH2M HILL

COPIES: Scott Fleming/NAVFAC Mid-Atlantic
Mike Green/NAVFAC Atlantic
Erica Bergman/NJDEP
Jessica Mollin/USEPA
John Tomik/CH2M HILL
David Wright/CH2M HILL
Timothy Garretson/CH2M HILL

DATE: June 14, 2013

Introduction

This Technical Memorandum documents the activities and findings for the side-scan sonar and bathymetric survey investigation conducted in support of a Site Inspection (SI) at the UXO 2 Munitions Loading Pier Complex, Piers 1 and 2, at Naval Weapons Station (NWS) Earle, Monmouth County, New Jersey.

Under NAVFAC CLEAN Contract N62470-11-D-8012, Contract Task Order (CTO) WE06, CH2M HILL is tasked with conducting an SI to evaluate the potential presence of munitions and explosives of concern (MEC) at this site. The scope of the SI includes the collection of bottom feature data for the inactive pier areas, including side-scan sonar imagery and bathymetric data.

The objective of this investigation was to determine the depth of water and seafloor contours and to identify potential areas of concern where debris or other materials may be protruding from the seafloor that could ensnare or otherwise foul equipment used during future underwater investigations at the site. Additionally, data from this survey may be used as a line of evidence to support an evaluation of the potential for MEC to be present in the vicinity of Piers 1 and 2. The side-scan sonar and bathymetric survey data collection, data processing and interpretation were performed by Arc Surveying and Mapping of Jacksonville, Florida, under subcontract to CH2M HILL.

Site Description/Background

NWS Earle is located in Monmouth County, NJ, approximately 47 miles south of New York City. The station consists of two areas, the 10,248-acre Main Base (Main Side area), located inland, and the 706-acre Waterfront Area (**Figure 1**). The two portions of the Base are connected by a Navy controlled right-of way which includes a private road (Normandy Road) and a rail line. The Navy commissioned the facility in 1943 with the primary mission of supplying ammunition to the Atlantic Fleet. Presently, NWS Earle's mission is to receive, store, segregate, and issue ordnance for all Carrier and Expeditionary Strike Groups of the United States Atlantic Fleet.

The Munitions Loading Pier complex at NWS Earle stretches 2.2 miles into the Sandy Hook Bay and comprises 2.9 miles of pier and trestle (**Figure 2**). The pier complex is comprised of a 2-mile-long trestle that connects to three finger piers (Piers 2, 3 and 4). One mile from the shore, the trestle branches off to the Old Trestle 2 and Pier 1. The Sandy Hook Bay is currently utilized for recreational, military, and commercial activities.

Area UXO 2

Area UXO 2 is comprised of the inactive portions of the munitions loading pier complex at NWS Earle (**Figure 2**). According to the Preliminary Assessment (PA), the potential exists for MEC to be present in areas of UXO 2 as a result of historical loading operations as well as the explosion of the United States Ship (USS) Solar in 1946. The areas around the Munitions Loading Pier and the Terminal Channel are restricted, as defined in the Code of Federal Regulations (CFR), Title 33, Paragraph 334.102. No unauthorized vessels are permitted to enter the restricted area at any time, and vessels are only authorized to cross the Terminal Channel when there are no Naval vessels transiting the Channel. The PA recommended that an SI be performed only for the inactive portions of UXO 2 (Pier 1 and 2 areas) to further evaluate the potential presence or absence of MEC at the site. Because active Munitions Response Sites (MRSs) and ranges are not evaluated by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the PA recommended that Piers 3A and 4, which are currently active, not be included as part of the investigation at this time. Additional details on Area UXO 2 are provided within the UXO 2 PA Report (CH2M HILL, 2012).

Investigation Activities

A side-scan sonar and bathymetric survey investigation was conducted to determine the depth of water and seafloor contours and to identify potential areas of concern where debris or other materials may be protruding from the seafloor that could ensnare or otherwise foul equipment used during future underwater investigations at the site. Details regarding the equipment, approach, methods, operation procedures, results and quality control methods are presented in the subcontractor report included as **Attachment 1**.

Results

Side-scan sonar imagery and bathymetric data collected during the site investigation has been used to accurately determine water depths and seafloor contours and identify potential obstructions that may interfere with future investigations around Piers 1 and 2. The side-scan and bathymetric survey activities included 200 percent bottom coverage of the identified areas of concern (approximately 50 acres). Selected “targets” were identified as any obstructions protruding from the seafloor that may potentially impact implementation of future investigations. A total of 236 targets were identified around Pier 1 and a total of 65 targets were identified around Pier 2. The western side of Pier 2 has minimal obstructions, likely because of maintenance dredging activities near the active Pier 3A. The majority of the targets are identified around Pier 1 and along the eastern and northern side of Pier 2. The most significant targets identified include the Alexander Hamilton wreckage (a culturally protected resource) adjacent to the southern portion of Pier 1, an unknown sunken vessel identified off the northern portion of Pier 1, and “gangplank” structures off the north end of Pier 2.

A target list, which identifies and provides a description (including approximate length, width, and height in meters) of each obstruction, is included as an attachment to the subcontractor report (**Attachment 1**).

Conclusions

The inactive piers (Piers 1 and 2) at UXO 2 were investigated during the side-scan sonar and bathymetric survey investigation. The results of the survey identified depth of water and seafloor contours adjacent to the piers and also identified 301 targets that may represent obstructions during future investigation activities. The majority of the targets (236) are located around Pier 1 and are likely associated with the decaying pier structure. Most of the remaining targets around Pier 2 (65) are located along the eastern side of the pier. It is likely that the western side of the pier has fewer targets because of maintenance dredging activities associated with ongoing operations at Pier 3A. Data from this investigation confirms that debris is located on the sediment surface adjacent to the inactive pier areas, but is not adequate to determine if the debris is MEC related. Additional investigation is necessary to assist in the determination of the potential presence or absence of MEC at the site. The data from this investigation will be used to support future investigations at the site.

References

CH2M HILL. 2012. *Final Preliminary Assessment Report UXO 0002 – Munitions Loading Pier Complex. NWS Earle, Sandy Hook Bay, Monmouth County, New Jersey.* November.

Figures

Legend

- NWS Earle - Mainside Area
- NWS Earle - Waterfront Area
- Normandy Road
- Monmouth County, NJ

N W E S

0 2 4 Miles

Figure 1
NWS Earle Location Map
NWS Earle Munitions Loading Pier Complex
Monmouth County, New Jersey

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Legend

- NWS Earle Boundary - Waterfront Area
- NWS Earle Restricted Zone (33CFR334.102)
- UXO 2 Area Recommended for SI
- UXO 2 Area to be Evaluated Once No Longer Active

N
W E
S

0 1,000 2,000 Feet

Imagery: 2007

Figure 2
UXO 2 Summary
NWS Earle Munitions Loading Pier Complex
Monmouth County, New Jersey

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Attachment 1
Arc Survey Report

Arc Surveying and Mapping, Inc.
Post Survey Report

Area UXO-002 Piers 1 and 2
Naval Weapons Station Earle
Sandy Hook Bay, Monmouth County, New Jersey

Contract Task Order WE06

Revision History

Date	Version	Description	Author
04/20/2013	1.0	First Draft	Robert Foster
04/23/2013	1.0	First Draft	Robert Foster/ Frank Sawyer
04/26/2013	2.0	Second Draft	Robert Foster/ Frank Sawyer
5/22/2013	3.0	Third Draft	John F. Sawyer
5/23/2013	4.0	Fourth Draft	Frank J. Sawyer
5/30/2013	5.0	Fifth Draft	John F. Sawyer

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1.0 Acronyms List

ASCII – The American Standard Code for Information Interchange
CAT 5E – Category 5E
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act
CPU – Central Processing Unit
CTO – Contract Task Order
DGPS – Differential Global Positioning System
GPS – Global Positioning System
IARTK – Inertially-Aided Real-Time Kinematic
LOA – Length Over All
m – Meter
MBES – Multi-beam Echo Sounder
MEC – Munitions and Explosives of Concern
MRSs – Munitions Response sites
MRU – Motion Reference Unit
NAD – North American Datum
NGS – National Geodetic Survey
NJ – New Jersey
NOAA – National Oceanic and Atmospheric Administration
NWS – Naval Weapons Station
PA – Preliminary Assessment
POS MV – Position and Orientation for Marine Vessels
PPS – Pulse Per Second
QC – Quality Control
RTCM – Radio Technical Commission for Marine Services
SI – Site Inspection
SIM – SONAR Interface Module
SONAR – Sound Navigation and Ranging
SSS – Side-Scan SONAR
SV – Survey Vessel
SVP – Sound Velocity Profiler
SWMB – Shallow Water Multi-beam
USCG – United States Coast Guard
USS – United States Ship
UTM – Universal Transverse Mercador
UXO – Unexploded Ordnance

2.0 Introduction

This report describes bathymetric and side-scan sonar survey activities performed by Arc Surveying and Mapping, Inc. as a subcontractor for CH2M HILL in support of a Site Inspection (SI) of Area UXO-002 at Naval Weapons Station (NWS) Earle in Monmouth County, New Jersey.

2.1 Site Location, Descripiton, Background and Project Objectives

NWS Earle is located in Monmouth County, NJ, approximately 47 miles south of New York City. The station consists of two areas, the 10,248-acre Main Base (Main Side area), located inland, and the 706-acre Waterfront Area (Figure 1). The two portions of the Base are connected by a Navy controlled right-of way which includes a private road (Normandy Road) and a rail line. The Navy commissioned the facility in 1943 with the primary mission of supplying ammunition to the Atlantic Fleet. Presently, NWS Earle's mission is to receive, store, segregate, and issue ordnance for all Carrier and Expeditionary Strike Groups of the United States Atlantic Fleet.

The Munitions Loading Pier complex at NWS Earle stretches 2.2 miles into the Sandy Hook Bay and comprises 2.9 miles of pier and trestle (Figure 2). The pier complex is comprised of a 2-mile-long trestle that connects to three finger piers (Piers 2, 3A and 4). One mile from the shore, the trestle branches off to the Old Trestle 2 and Pier 1. The Sandy Hook Bay is currently utilized for recreational, military, and commercial activities.

2.1.1 Area UXO-002

Area UXO-002 is comprised of the active and inactive portions of the munitions loading pier complex at NWS Earle where munitions loading activities have historically occurred (Figure 2). According to the Preliminary Assessment (PA), the potential exists for Munitions and Explosives of Concern (MEC) to be present in areas of UXO-002 as a result of historical loading operations as well as the explosion of the United States Ship (USS) Solar in 1946. The PA recommended the inactive portions of UXO-002 (Pier 1 and 2 areas) continue on to an SI to further evaluate the potential presence or absence of MEC at the site. Because active Munitions Response Sites (MRSs) and ranges are not typically evaluated by Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the PA recommended that Piers 3A and 4, which are currently utilized for munitions handling, not be included as part of the investigation at this time; the investigation of these areas is recommended once munitions handling operations are no longer performed. The side-scan sonar (SSS) and bathymetric data collected will ultimately be used to support the SI. The areas proposed for SSS and bathymetric activities (the area around inactive Piers 1 and 2) encompass approximately 50 acres total (Figure 2).

2.2 Scope of Work

The Department of the Navy has issued Contract Task Order (CTO) WE06 to CH2M HILL to conduct an SI to evaluate the potential presence of munitions and explosives of concern (MEC) at the munitions loading piers at NWS Earle. Subsequently, CH2M HILL subcontracted Arc Surveying and Mapping, Inc. to perform the SSS and bathymetric survey in support of the SI. SI investigation activities include, but are not limited to, underwater bathymetry and SSS surveys of the site. The objectives of these surveys are to access current site conditions and locate potential obstructions or navigational hazards that may be encountered during future investigation activities. Additionally, data from this survey may be used as a line of evidence to support evaluation of the potential for MEC to be present in the vicinity of Piers 1 and 2. A summary of the results is presented in Attachment 1.

3.0 Equipment

The equipment used for the SI at UXO-002 at NWS Earle include a Reson SeaBat 7125 dual-frequency, multi-beam echo sounder (MBES), EdgeTech 4125 side-scan sonar, Applanix Position and Orientation for Marine Vessels (POS MV) Wavemaster, Trimble DSM™ 232 Differential Global Positioning System (DGPS) and an Odom Digibar Pro Velocimeter. A description of the equipment used is provided below. Additional detail is also available in Appendix A of the Streamlined Quality Assurance Project Plan for UXO-002 (CH2M HILL, 2013). All equipment was mounted and operated from the survey vessel (SV) Grey Witch during the SI.

The side-scan data was collected using the EdgeTech dual frequency (600 kHz and 1600 kHz) chirp side-scan sonar. The model used was the 4125. The side-scan sonar is capable of producing sonic images of the bottom with the resolution to display small objects if they are exposed and not completely buried. The limitations of the side-scan sonar are that it cannot penetrate the bottom and detect a buried object.

3.1 Reason SeaBat 7125 dual-frequency MBES

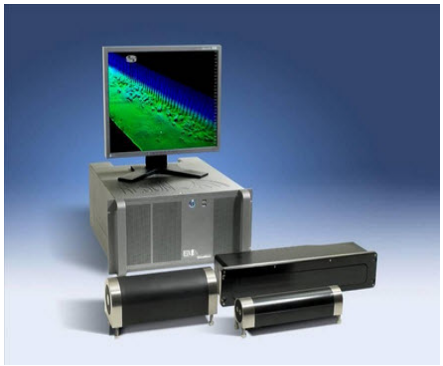


Figure 3: Reson SeaBat 7125

The Reson SeaBat 7125 dual-frequency MBES (Figure 3) was mounted on the port gunwale of the SV Grey Witch. The Reson SeaBat 7125 dual-frequency MBES is a classic example of mono-static sonar, in which the transmitter and receiver are mounted together, but operate independently. The transmitter pushes a pulse of acoustic pressure, which makes contact with the seabed, and the receiver "listens" for the returning sound wave or "Echo". Based on the travel time, the system calculates the bathymetry of the seabed. The system operates at a user controlled frequency of either 200 kHz or 400 kHz, allowing the user to collect high resolution hydrographic survey data to depths between 0.5 and 450 meters. The Reson SeaBat 7125 meets all International Hydrographic Organization (IHO) standards for hydrographic surveys throughout this depth range. The system uses real-time roll stabilization which maximizes a usable swath width of 165 degrees. The user interface

provides adjustable gates, allowing the user to manually reject false data during data collection. The system also allows for up to 15 degrees of, "on the fly", virtual beam steering, enabling the user to locate pilings, bulkheads, and other objects rising vertically in the water column.

3.2 EdgeTech 4125 Side-Scan SONAR

From the location of the Trimble DSM 232 (0.00), offsets were measured to the EdgeTech 4125 SSS tow-point, found at the bow of the SV Grey Witch. Throughout the course of the survey, cable in/out adjustments were manually performed (with respect to changes in depth) to the SSS, allowing for data collection from proper depths. Coupled with the positioning offsets to the tow-point and the known amount of cable out, the survey acquisition software automatically performs calculations and positions the EdgeTech 4125 SSS data with sub-meter accuracy.

Figure 4: EdgeTech 4125 SSS

3.3 Applanix POS MV Wavemaster

The Applanix POS MV Wavemaster (Figure 5) uses Inertially-Aided Real-Time Kinematic (IARTK) technology, providing the latest state-of-the-art combination of inertial and global positioning system (GPS) technology. Inertial corrections (heave, pitch and roll) and an accurately calculated attitude and heading are required for precise positioning of hydrographic survey data. The Applanix POS MV Wavemaster provides a full six degrees-of-freedom position and orientation solution for the Reson SeaBat 7125 MBES regardless of vessel dynamics. The Applanix POS MV uses 2 DGPS receivers to calculate its heading.

Figure 5: Applanix POS MV Wavemaster

3.4 Trimble DSM232 DGPS

Figure 6: Trimble DSM232

The SV Grey Witch is equipped with a Trimble DSM232 integrated 12-channel GPS receiver (Figure 6). There are three modes of operation: Auto-Range, which locks onto the beacon nearest the vessel, Auto-Power, which locks onto the differential correction base station with the greatest signal strength, and Manual, which allows the user to select the desired differential correction base station. Additionally, the DSM232 can accept differential corrections, such as Radio Technical Commission for Marine Services (RTCM) messages, from an external source such as a user established DGPS reference station. For this survey, the unit was set to receive sub-meter DGPS corrections from the United States Coast Guard (USCG) differential correction base station located in Sandy Hook, NJ (approximately 3 miles from NWS Earle). The DGPS antenna is mounted directly over the MBES transducer, enabling an offset of 0.00 m and providing the greatest possible accuracy of recorded MBES data. For position of the SI survey, the DSM232 was configured in the auto-power mode to only use correctors from the strongest USCG beacon (Sandy Hook, NJ). In cases where the age of DGPS correctors exceeded 20 seconds, the unit was set to go offline. Additionally, the unit was set to exclude satellites with an altitude below 8°.

3.5 Odom Digibar Pro Velocimeter

The Odom Digibar Pro Velocimeter (Figure 7) is a battery operated, hand terminal instrument that was used to accurately measure the speed of sound (velocity accuracy +/- 0.3 meters/second) for the entire water column at NWS Earle. The speed of sound profile is required to accurately calibrate the Reson SeaBat 7125 MBES and EdgeTech 4125 SSS. These measurements allow the MBES and SSS to compensate for all influences found in the water column that would indefinitely affect their underwater acoustic propagation.

Figure 7: Odom Digibar Pro Velocimeter

4.0 Methodology

The tasks and techniques implemented during the survey activities are outlined below (see sections 4.1 and 4.4).

4.1 Multi-beam Echosounder Bathymetric Survey Activities

As previously mentioned, the Reson SeaBat 7125 is a dual-frequency MBES utilized for collection of bathymetric data. During MBES calibration and data acquisition, MBES data was collected at the 200 kHz frequency setting. This setting was implemented to provide a true bottom detection of the seabed around Piers 1 and 2 at Area UXO-002.

Shallow water multi-beam (SWMB) data were monitored in real-time using the 2-D and 3-D data display windows in Hypack/Hysweep along with the Reson controller window. The Reson SeaBat 7125 control interface allowed the operator the ability to control ping rate and pulse length as well as gain and power settings. The Reson SeaBat 7125 control interface is virtually hands free and was set up prior to data collection. Adjustments to the gates were made to ensure that false returns or outliers were eliminated during data collection. Power settings were adjusted along dock faces and around structures to eliminate reflections or false returns. Data was also viewed in the Hysweep interface screen which allowed the operator to see 3-D representations of the bottom in real-time, as well as cross section views along with preset error displays (such as heave, drift, and sounding overlays to previous sweeps) and numerous other QA tools built into the software. During data collection any soundings not meeting IHO standards were automatically removed. For this survey, transect line spacing was set at 7.5-meters (m) to ensure 100% coverage and 100% overlap, resulting in 200% bottom coverage.

There were two survey locations at NWS Earle Area UXO-002, denoted as “Pier 1” and “Pier 2” (Figure 2). The approximate average depth surrounding Pier 1 was around 3.5 m. The approximate average depth at Pier 2 was 10 m. There were 20 survey lines that encompassed Pier 1, and 25 survey lines that encompassed Pier 2. All survey lines had a spacing of 7.5m. The MBES was operated at a swath width of 140 degrees throughout the survey. At this swath width, the system provides approximately 4 times the water depth in seabed coverage, for example – in a water depth of 3m, a 12m wide area of seafloor data was acquired. At Pier 1, each survey line was run and MBES survey data were collected, providing 100% coverage of the area and 100% overlap, resulting in 200% coverage. At Pier 2, because the depth of this location was greater, only every other survey line was run, collecting MBES survey data and still providing 100% coverage of the area and 100% overlap, resulting in 200% bottom coverage of MBES data. In cases where the depth contours fell below the average, survey “infill” lines were run to ensure 100% coverage of the area and 100% overlap, resulting in 200% coverage or greater bottom coverage of MBES data.

4.2 Side-scan Sonar Survey Activities

Sonographics, Inc., Arc’s subcontractor, completed an underwater SSS survey. The purpose of the survey was to locate subsurface obstructions protruding from the seafloor around Piers 1 and 2 at UXO-002, that may potentially impact implementation of future investigations at the Munitions Loading Pier Complex UXO-002, NWS Earle.

Additionally, information from this survey may be used as a line of evidence to evaluate the potential for MEC to be present in the vicinity of the munitions loading piers.

On April 4, 2013 a survey vessel provided by Arc Surveying and Mapping was mobilized with the Edgetech 4125 SSS. The Navigation computer with Hypack Navigation Software was installed to interface the DGPS and output towfish coordinates to the side-scan computer topside. The navigation computer was loaded with preplanned survey lines equally spaced at 7.5 meter intervals through the length of the survey area and provided visual guidance to the helmsman for navigation of each line. The EdgeTech 4125 SSS was setup to detect the seafloor at a range of 30-50 meters on both port and starboard sides of the towfish. A 30-50 meter seafloor detection range on survey lines equally spaced at 7.5 meter intervals provided greater than 200% coverage, leaving no data gaps in between. The DGPS system received differential corrections from the nearest Coast Guard Beacon and provided WGS 84 differential positions to the Navigation computer.

The side-scan towfish was deployed from the side of the vessel with minimal amount of cable out. The distance from the DGPS antenna to the center of the transducers was also measured. The layback and offset were calculated by the navigation software, enabling towfish coordinates to be sent to the sonar computer in real-time.

4.3 Acquisition Software

Several instruments are used in the collection of hydrographic survey data and all required robust software to integrate their data. The acquisition software used for the compilation and collection of this hydrographic survey data for this investigation was Hypack/Hysweep version 2012.

4.3.1 Hypack 2012

Hypack was used for vessel navigation and line tracking during the data collection. Hypack’s survey program was used to log data and was used in conjunction with Hypack's Hysweep Survey program to log vessel positioning. In addition, the Hysweep interface enabled the boat operator to view the nadir depths in the Hypack survey data information window. This allowed the boat operator to avoid shallow water and obstacles, ensuring the safety of vessel, equipment and crew. The vessels DGPS system was configured in the software for positioning only. This data was saved in Hypack with a .RAW extension.

4.3.2 Hysweep 2012

Hysweep was used for MBES data collection as well as navigation. Different displays were available for the survey technician to ensure adequate bottom coverage and real-time QC verification of data collection during the survey. The Applanix POS MV Wavemaster and the Reson SeaBat 7125 were configured in Hysweep for data collection. All data was collected on the survey computer. The raw MBES files were collected and saved with an .HSX file extension and made available for post processing.

4.4 Data Processing and Interpretation

After the survey data collection was complete, processing and interpretation of the data was performed to evaluate bottom depths, potential obstructions, and surface features in the vicinity of Piers 1 and 2 at UXO-002.

4.4.1 Multi-beam Echosounder Processing and Interpretation

All raw MBES data was sent to the Reason topside which is a combination of a central processing unit (CPU) and sonar interface module (SIM). Data transmission was performed by way of a category (CAT) 5E Ethernet cable, allowing for instantaneous collection and compilation of raw MBES data onto the CPU. The raw data was collected and saved in Hypack/Hysweep with an .HSX file extension, available on the CPU for post processing. The topside CPU also performed the beam-forming, bottom detection, and controlled the sonar head with respect to gain, ping rate and transmit angle. It also contained the interfaces for all time-critical external sensors such as 1 pulse per second (PPS) attitude and position data. Real-time sound velocities were also interfaced to the Reson SeaBat 7125 using the Reson Sound Velocity Profiler (SVP). The SVP was mounted with the transducer and performed initial beam-forming and beam steering.

Hypack/Hysweep .HSX files were loaded into the Hysweep MB MAX Multi-beam data processing software at the completion of the survey. The data in the .HSX file was displayed such that heave, pitch, roll and heading as well as positioning, velocities, and tide values for each individual line were displayed prior to integration into the sounding information from the Reson SeaBat 7125 MBES. After examination of this data, it was then combined with the raw MBES data and the sweeps were reviewed. Typically 100 sweeps were displayed at a time and any outliers were removed with the editing tools available in MB Max. Any anomalies found during this step of the processing, such as targets identified on the seafloor, were saved to a Hypack target file with a .TGT file extension. Upon completion of sweep editing, all data was saved to Hysweep's .HS2 format then exported in the appropriate matrix. All processed MBES data were exported as a 1x1 meter grid. All soundings within each 1x1 meter grid were averaged and exported as one point per cell. As well as the 1x1 meter grid, an "ALL" file was also saved containing every data point with an .XYZ file extension in ASCII format. See Figures 10 and 11 which depict the color coded depths and coverage of the MBES.

4.4.2 Side-scan Sonar Processing and Interpretation

The side-scan data was recorded in the native EdgeTech (.jsf) format on the hard drive in the Sonar Computer by the EdgeTech Discover program. The .jsf files were read by the Chesapeake SonarWizMap program and, after adjustments and navigation smoothing, image files were created for the construction of a sonar mosaic. The water column was removed, and the target images were cut and pasted electronically to form georeferenced tiff images smaller than 100 megabytes each. Two sonar mosaics were exported as a Geo-Tif files (Attachments 2). Each individual sonar line was examined for possible targets. Targets were identified and digitized for display in a .dxf file and documentation in the .xls target file. Targets were marked, measured and added to target reports (Attachments 3 and 4).

5.0 Results/Summary of Work Performed

Survey activities in support of a SI at NWS Earle, Area UXO-002, were completed in one day following onsite arrival, mobilization and site setup. Excellent weather conditions and adequate mobility preparation enabled the process to run smoothly.

5.1 Mobilization, Site Setup and Demobilization

The SV Grey Witch was towed from Jacksonville, Florida to Leonardo State Marina located in Leonardo, NJ. This location was chosen due to the close proximity to that of NWS Earle, Area UXO-002. The allotted survey hours of operation at the facility corresponded with the operational hours at the marina.

Figure 8: SV Grey Witch

After being towed to Leonardo State Marina, the vessel was parked and subsequently, the survey crew checked in at the Blue Bay Inn, located in Atlantic Highlands, NJ. The survey crew then rendezvoused with the client representative from CH2M HILL. Once together, the group gained clearance to NWS Earle then participated in a safety meeting with the CH2M HILL client representative. Upon completion of the safety meeting, mobilization of the SV Grey Witch was required.

The SV Grey Witch was partially demobilized for transit to the survey location for each of its surveys and required mobilization prior to launching at Leonardo State Marina. The first step to onsite mobilization of the SV Grey Witch included standard re-rigging of the SV. Once all equipment was reinstalled, a preliminary communications test is conducted. A “job” was created in the survey acquisition software Hypack and all devices/instruments to be used were given their proper placement with respect to the vessel dimensions outlined in Hypack. Background charts were loaded into the Hypack “job” and line files encompassing Pier 1 and 2 were created. With all systems communicating properly, standard survey activities were conducted as detailed in Sections 4.1 and 4.2.

Following completion of the survey activities in support of a SI at NWS Earle, Area UXO-002, the SV Grey Witch required a partial demobilization in preparation for transit from Leonardo State Marina, Leonardo, NJ to Jacksonville, Florida. The SV Grey Witch was pulled from the water, secured to its trailer and all sensitive equipment was safely stowed. Once this portion of the demobilization was complete, the SV Grey Witch and its crew made the return trip to Jacksonville, Florida.

6.0 Quality Control

Quality Control is required to ensure that data was collected properly. Each instrument/sensor required proper calibration and/or alignment before hydrographic survey

activities could take place. In addition to the QC procedures described below, monitoring raw survey data in real-time was another measure taken to ensure the quality of data collected. The following sections describe the quality control procedures implemented during this survey.

6.1 Instruments and Positioning System Quality Control

6.1.1 Multibeam Echosounder Quality Control

Before survey activities could take place, the MBES required calibration. Using the Odom Digibar Pro Velocimeter, the speed of sound profile of the water column at the survey site was recorded. This information allowed the MBES to compensate for all influences that existed in the water column at the time and location of the survey. A Patch Test was then performed as the next step in calibrating the MBES.

The mounting arrangement of the MBES aboard the SV Grey Witch is not permanent and a Patch Test was required with each new installation of the MBES. The Patch Test was performed for proper orientation alignment (about the X, Y and Z axis) with respect to the seabed (Figure 9). To properly orient the MBES with the seabed, MBES data was collected over a flat bottom seabed and a section of seabed revealing a steep slope. Roll computational corrections (about the Y axis) were made in an area of flat bottom. Pitch and yaw computational corrections (about the X and Z axis respectively), were made in an area of seabed with a steep slope. Due to 1 PPS GPS time synchronization (between the DGPS and MBES); a latency computational correction was unnecessary. The flat and steep slope sections of seabed (used for the Patch Test) were located using a nautical chart depicting known contours of the area. Patch Test offsets were determined, and were saved and applied in Hysweep Hardware and used throughout the survey.

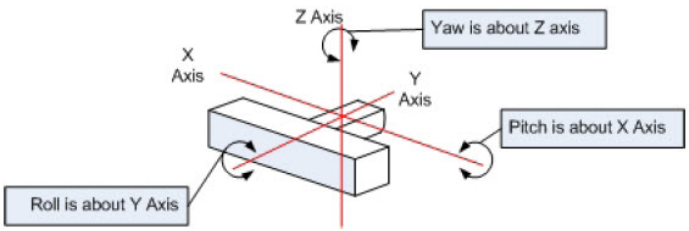


Figure 9: Patch Test Orientation

6.1.2 Side-scan Sonar System Quality Control

Maintenance and calibration checks were performed immediately prior to mobilization. Wet tests were performed on the morning of the survey day. The wet tests included surveying the points of the northeast and northwest corners of both Piers 1 and 2 and comparing them to existing NOAA navigational chart data. The coordinates of the points recorded to the side-scan data were compared with the coordinates of those points on the NOAA navigational chart. This comparison confirmed that the navigation data in the side-scan files were within a sub-meter accuracy. In addition, several unique seafloor targets were selected for further confidence checks of the sonar. Each of these targets were verified by two or more independent overlapping survey lines. When targets are detected on overlapping lines surveyed in opposite directions, those target signatures plot at approximately the same coordinate points; confirming the geodetic accuracy of the survey. Some of these targets were also recorded at the outer edge of the side-scan swath (48-50 meters from the towfish) confirming range of the side-scan sonar.

The sonar output was continuously monitored for interference with data quality. Some minor sea state, surface clutter and thermal effects were observed during the course of the survey. The towfish position was displayed on the screen for both the helmsman and the sonar operator. The distance off line, which was prominently displayed, was the full time task of the helmsman to keep it within 20 feet of the track-line. The track-lines were reviewed before leaving the survey site to determine if any gaps needed to be covered. The survey lines equally spaced at 7.5 meter intervals with the 30-50 meter swath of the side-scan sonar provided at 100% coverage of the area and 100% overlap, resulting in 200% coverage. The longer range setting of the low frequency channels provided a backup coverage insurance as that frequency was providing 50% more coverage (300+ %) than the high frequency.

6.1.3 DGPS Quality Control

Prior to the commencement of survey a NGS (National Geodetic Survey) control monument 853 1680 D Tidal was located at Coast Guard Station Sandy Hook. The DGPS antenna was then place on the point and the position was compared to the published coordinates to ensure the DGPS position within the sub-meter tolerance for the project. The resulting QC test confirmed the visual accuracy of the positioning system as shown below:

853 1680 D TIDAL E583957.23, N4480136.73 (Published)

CHECK 853 1680 D, E583957.19, N4480136.55 (DGPS Position)

Diff = 0.18 meters

6.2 System Validation

All equipment aboard the SV Grey Witch was tested prior to mobilization as well as on site to ensure each piece of equipment was operating to manufacturers specifications prior to the commencement of survey work. The multibeam swath depth sounder and the velocimeter were tested for accuracy by standard manual bar check methods (lowering a bar below the transducer attached to a chain and marked at 5 foot intervals) verifying sonar speed of sound readings. DGPS equipment was checked by measurement between the vessel DGPS antenna and previously located topographic survey points (see 6.1.2) in addition to comparing survey lines run in opposite directions in cross section format. This procedure ensured that no timing errors (latency) were present in the data.

7.0 Summary and Conclusions

Upon completion of the survey, all data was reviewed and analyzed to ensure the requirements of the survey were met. The multi-beam and side-scan surveys will provide data for potential obstructions within the project limits and provide high density seafloor elevation information as corresponding to the SI. The data also provides imaging of targets and can be used as a line of evidence for determining the potential presence of MEC. The multibeam sounding swaths overlaid with such accuracy that seafloor features matched both horizontally and vertically.

A total of 236 and 65 targets were mapped in Piers 1 and 2, respectively. Some of the targets near the edges of the piers are potentially dangerous navigational hazards; particularly the shipwreck (PS_Alexander_Hamilton) near Pier 1, and the gangplank (00_035_debris) sticking up near the north end of Pier 2. The vast majority of the targets mapped appear not to be hazards to navigation, though they could potentially foul equipment during future investigations. See Attachment 3 for the summary of targets around Pier 1 and Attachment 4 for the summary of targets around Pier 2. Each of the side-scan targets are grouped into general description categories. Each category is given a two digit number. Within the respective categories each individual target is given a unique three digit number. The numbering system starts with the two digit category number followed by the unique three digit individual target number. The two digit category number and the three digit individual target number are separated by a hyphen. Each target number is then followed by a text that includes a word or short phrase describing the targets in that category.

Targets are any obstructions protruding from the seafloor that may potentially impact implementation of future investigations. All targets are documented in two .xls target files including the approximate length, width, and height off the bottom of each target. Most of the targets appear to be debris originating from the decaying piers. Based on their unique apparent orientation and height off the bottom (greater than 1 meter), the targets listed below may have greater potential to be hazards to DGM. The most significant of these are the targets labeled “PS Alexander Hamilton” (pictured in Figure 12 and located just east of Pier 1 near the south end of the survey area) which is the shipwreck PS Alexander Hamilton, and “00_035_debris” (shown in Figure 13) which appears to be a gangplank that previously connected one or more of the platforms to the north end of Pier 2. Figure 14 is a side-scan sonar image of an unidentified sunken vessel, target 05_000_boat, approximately 11.5 meters in length located just northeast of the north end of Pier 1.

<u>Pier 1</u>

00_010_debris

00_043_debris

00_095_debris

00_103_debris

00_113_debris

00_115_debris

00_160_debris

02_004_misc_feature

PS_Alexander_Hamilton

<u>Pier 2</u>

00_035_debris (gangplank)

Figure 1: NWS Earle Map

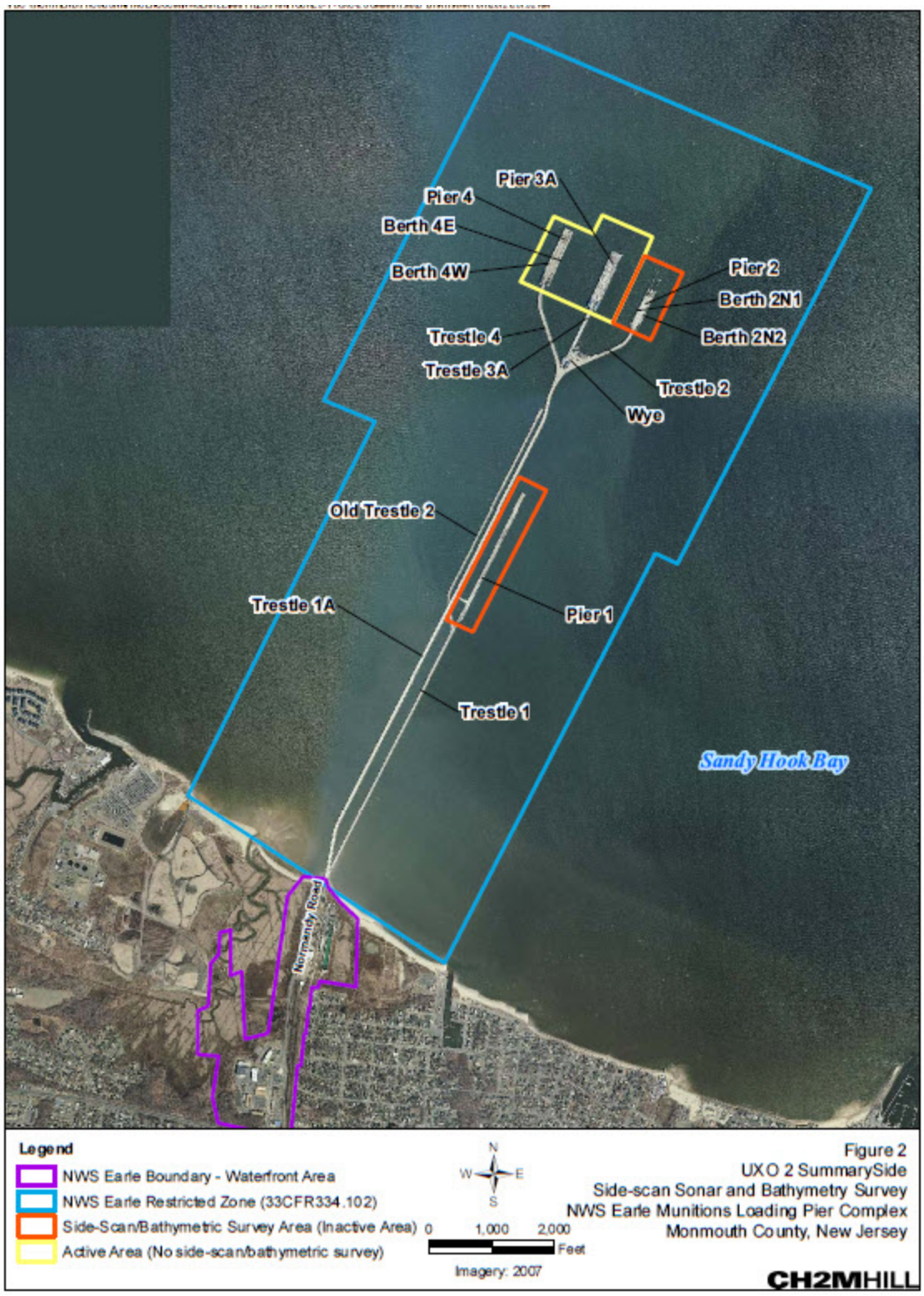


Figure 2: UXO-002 Summary Side

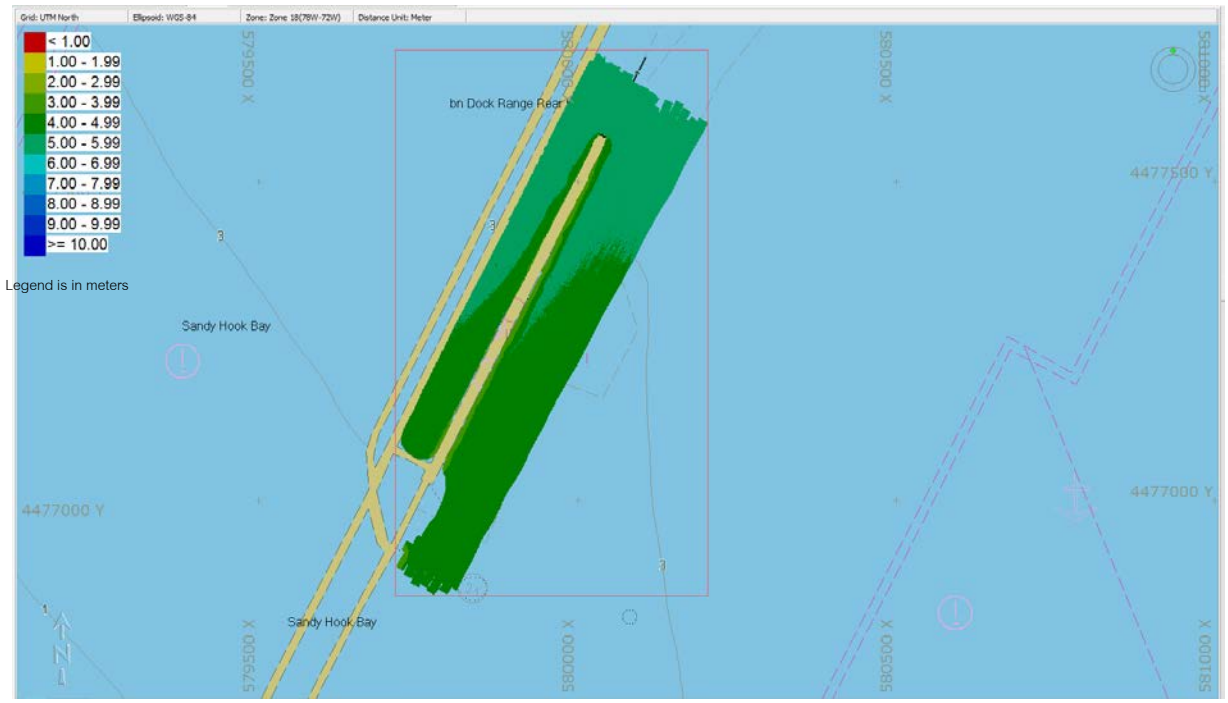


Figure 10: Pier 1 MBES Coverage

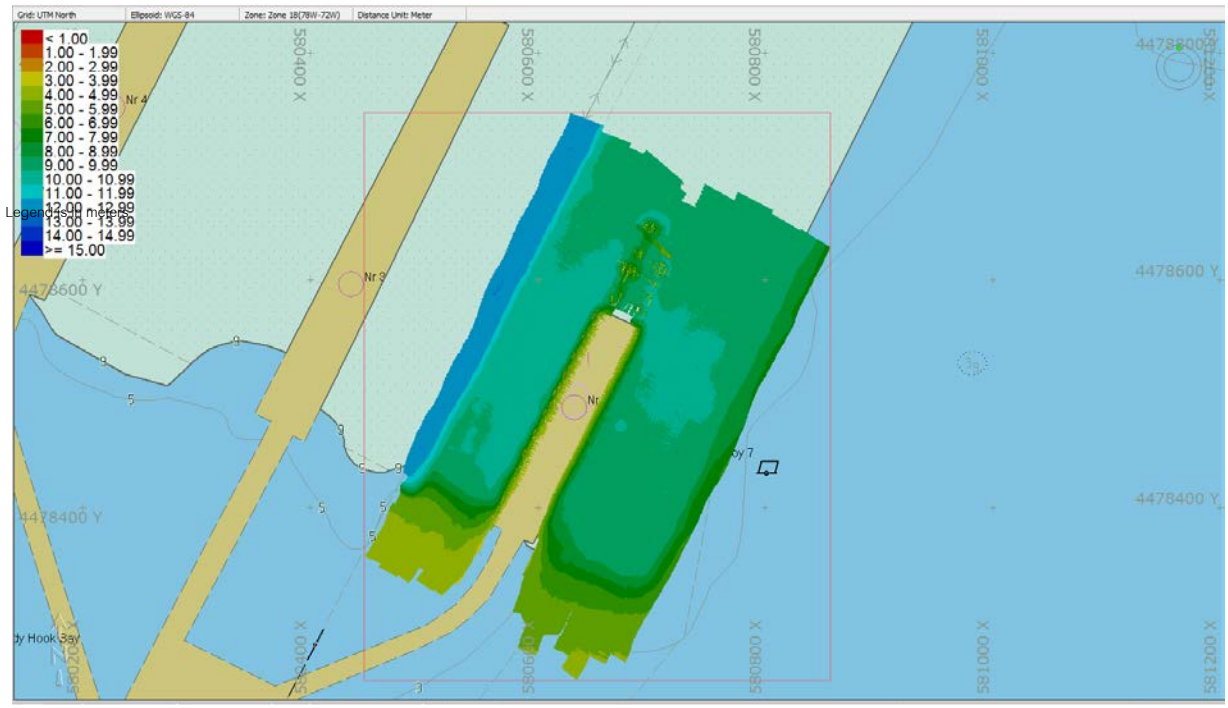


Figure 11: Pier 2 MBES Coverage

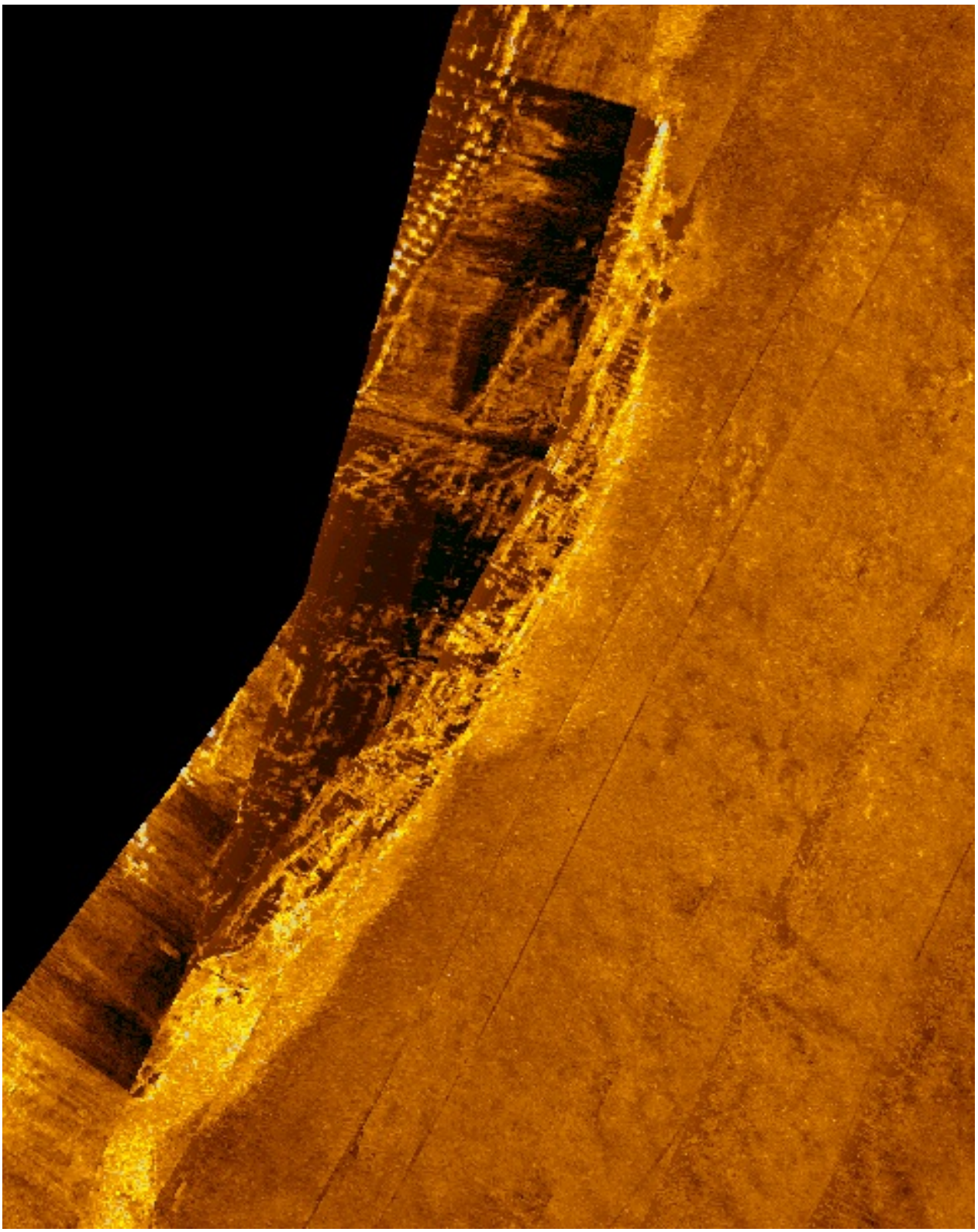


Figure 12: Side-scan mosaic area displaying the PS Alexander Hamilton wreck.

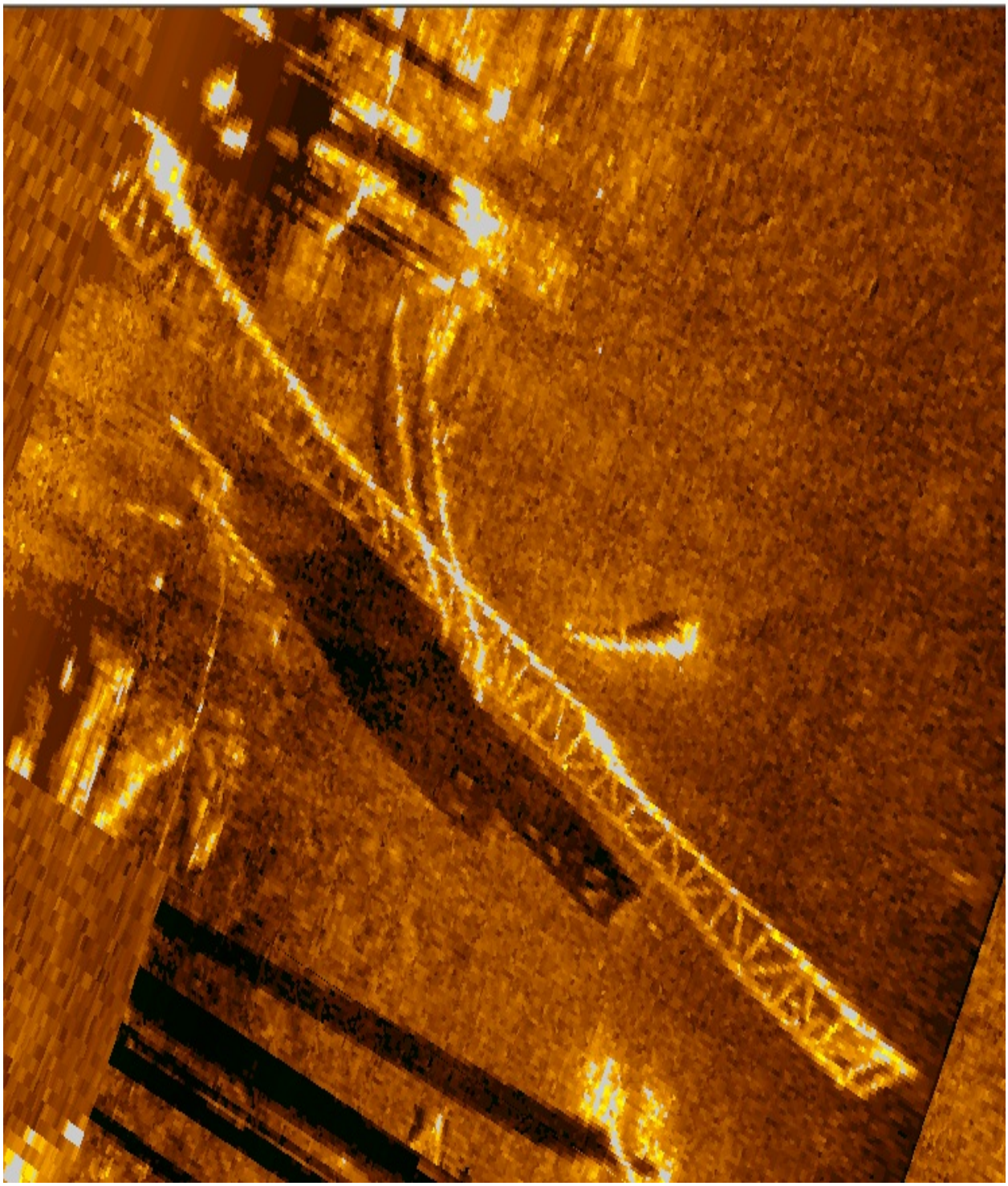


Figure 13: Side-scan mosaic area displaying what is a likely a gangplank sticking up 7 meters off the seafloor in approximately 10 meters of water.

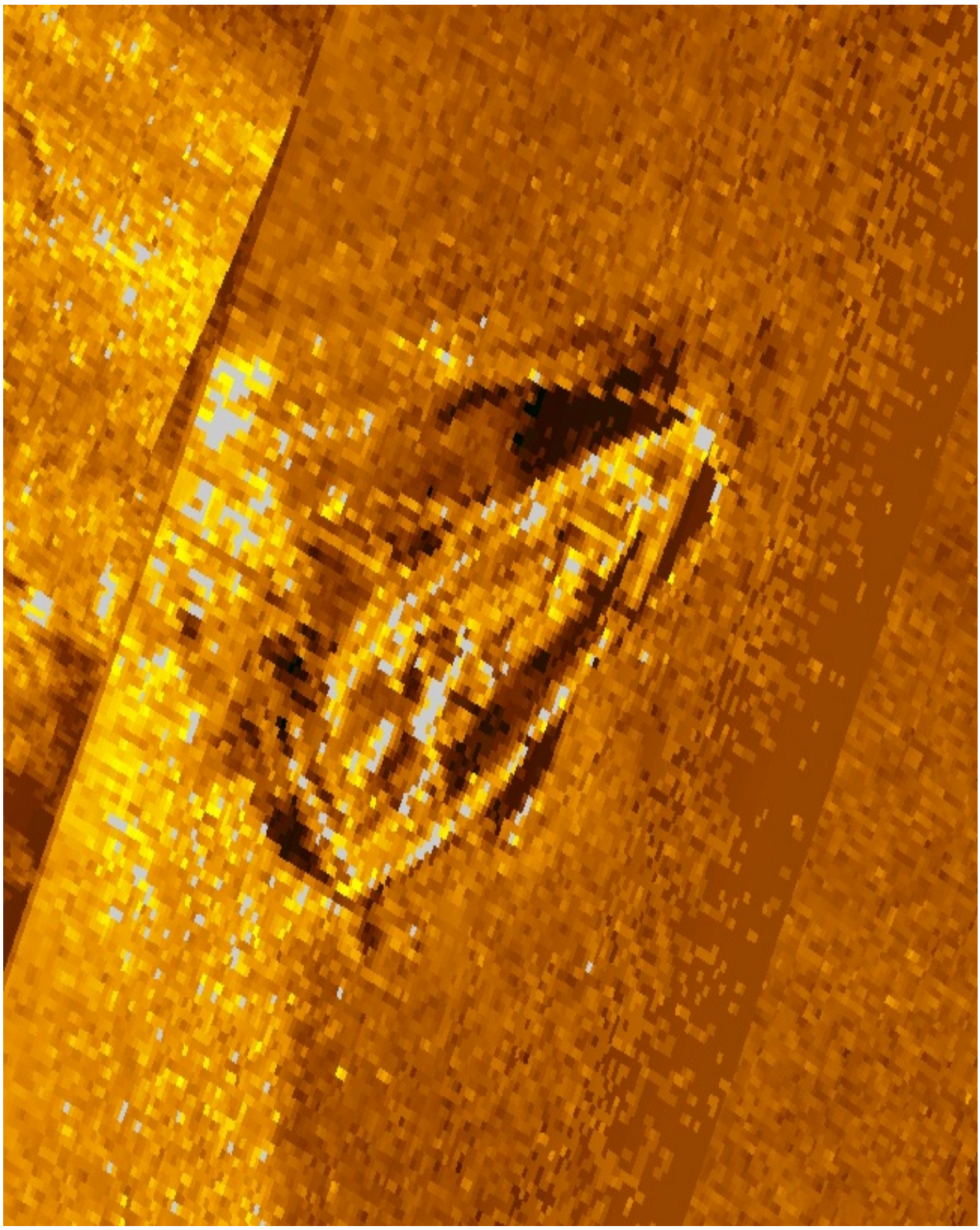


Figure 14: Side-scan mosaic area displaying an unidentified sunken vessel.

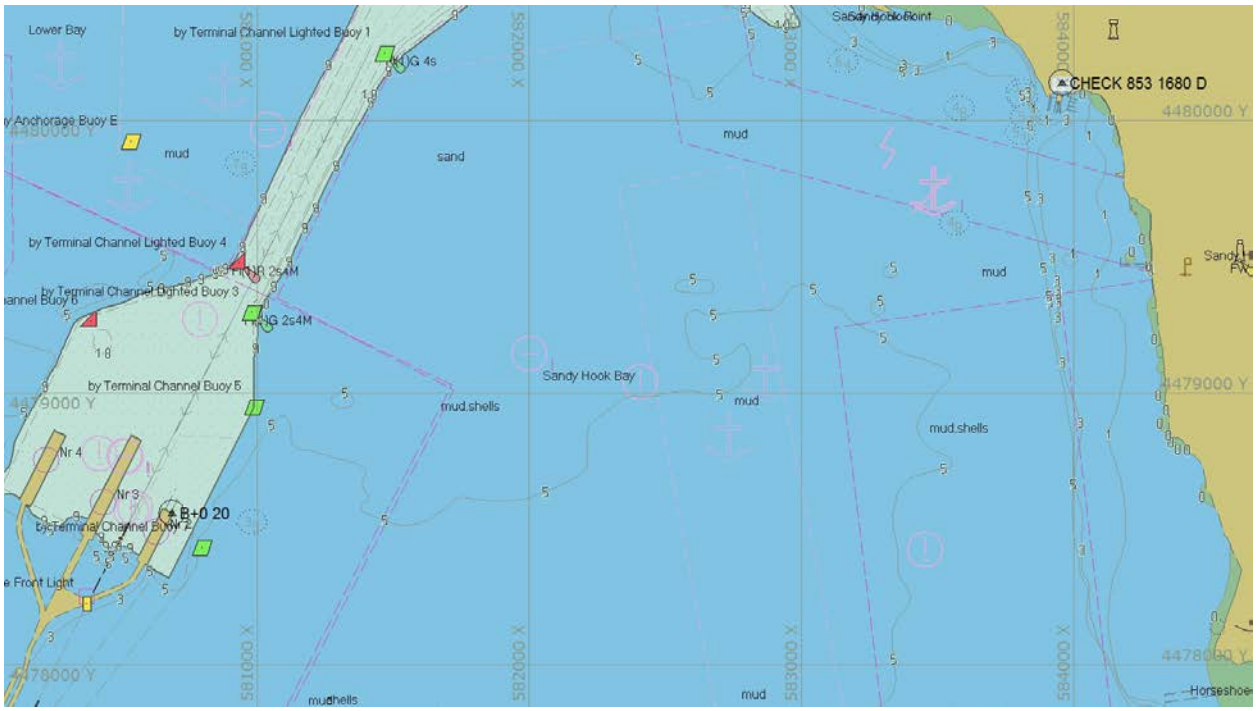
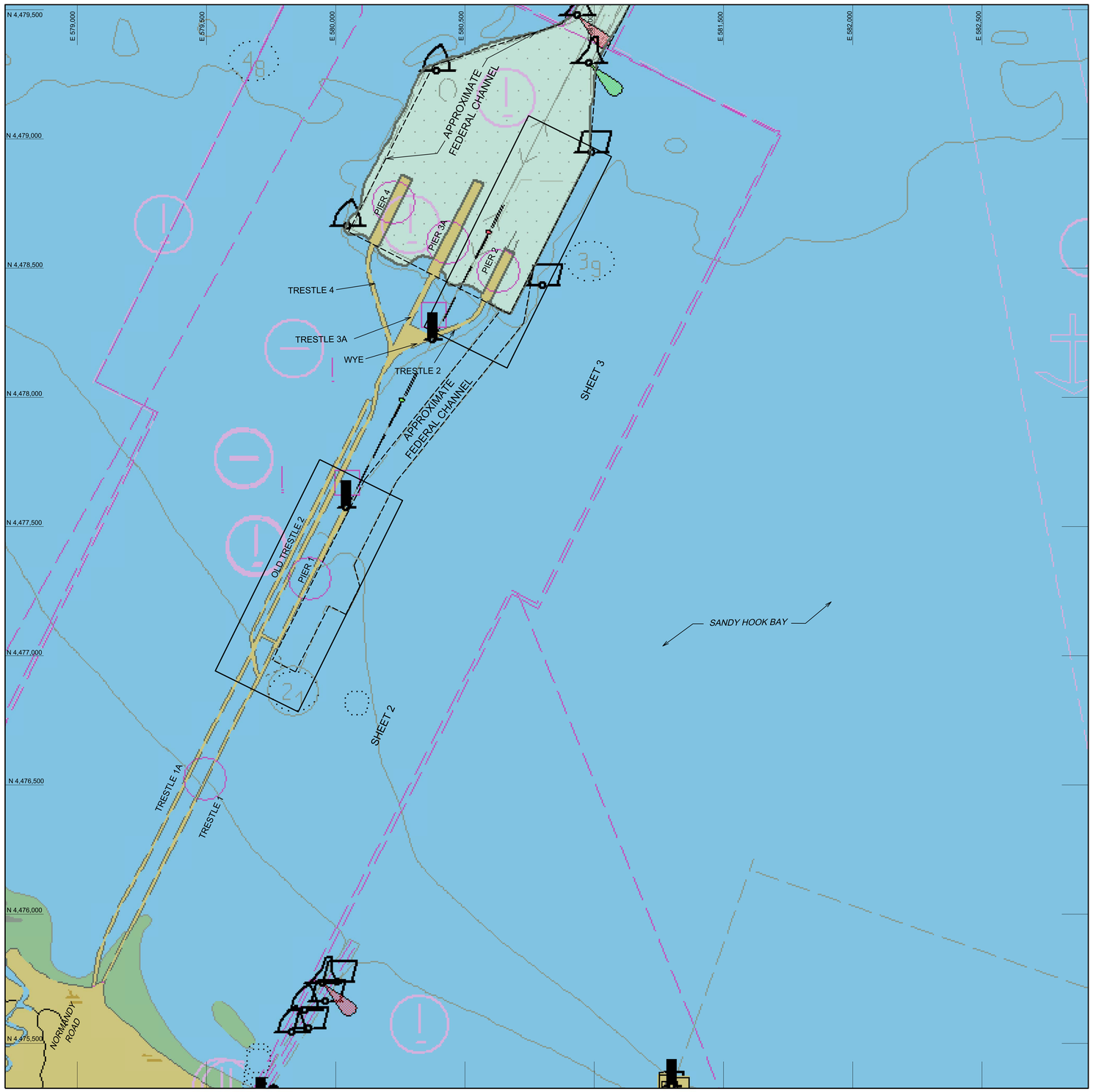


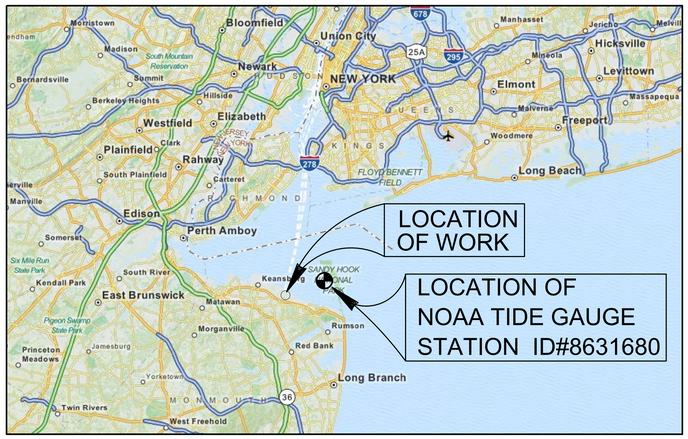
Figure 15: Project Control Point Location and Information

```
AB6711 ***********************************************************************
AB6711   FBN  -  This is a Federal Base Network Control Station.
AB6711   TIDAL BM  -  This is a Tidal Bench Mark.
AB6711   DESIGNATION  -  853 1680 D TIDAL
AB6711   PID  -  AB6711
AB6711   STATE/COUNTY  -  NJ/MONMOUTH
AB6711   COUNTRY  -  US
AB6711   USGS QUAD  -  SANDY HOOK (1981)
AB6711
AB6711    *CURRENT SURVEY CONTROL
AB6711   ______________________________________________________________________
AB6711   * NAD 83(2011) POSITION  -  40 28 03.60102(N       074 00 34.73527(W)  ADJUSTED
AB6711   * NAD 83(2011) ELLIP HT  -  30.375 (meters)         (06/27/12) ADJUSTED
AB6711   * NAD 83(2011) EPOCH  -  2010.00
AB6711   * NAVD 88 ORTHO HEIGHT  -  2.061 (meters)          6.76  (feet) ADJUSTED
AB6711   ______________________________________________________________________
AB6711   NAD 83(2011) X  -  1,338,574.717 (meters)      COMP
AB6711   NAD 83(2011) Y  -  4,671,133.506 (meters)      COMP
AB6711   NAD 83(2011) Z  -  4,117,609.364 (meters)      COMP
AB6711   LAPLACE CORR  -  3.32  (seconds)               DEFLEC12A
AB6711   GEOID HEIGHT  -  32.44  (meters)               GEOID12A
AB6711   DYNAMIC HEIGHT  -  2.060 (meters)              6.76  (feet) COMP
AB6711   MODELED GRAVITY  -  980,205.3 (mgal)           NAVD 88
```

Attachment 1
Examples of Data Deliverables

HYDROGRAPHIC CONDITIONS SURVEY FOR NAVAL WEAPONS STATION EARL MUNITIONS LOADING PIER COMPLEX, PIERS 1 & 2, MONMOUTH COUNTY, NEW JERSEY





SURVEY NOTES:

1. REFER TO SURVEY NO. 12-08-03
2. ELEVATIONS ARE IN METERS AND REFER TO MEAN LOW WATER (MLW).
3. ALL ELEVATIONS ARE BELOW THE CHART DATUM UNLESS PRECEDED BY A (+) SIGN.
4. TIDAL REDUCTIONS WERE BASED UPON A NOAA TIDE GAUGE STATION ID#8631680, LOCATED AT THE U.S COAST GUARD STATION, SANDY HOOK.
5. COORDINATES ARE BASED ON NORTH AMERICAN DATUM (NAD) 1983, UNIVERSAL TRANSVERSE MERCATOR (UTM) PROJECTION ZONE 18 N IN METERS.
6. THIS SURVEY WAS PERFORMED UTILIZING A RESON SEABAT 7125 MULTIBEAM SWATH SOUNDER WITH A 200 KHZ. (HIGH FREQUENCY) TRANSDUCER FOR DEPTH MEASUREMENTS.
7.

VESSEL	DATE OF SURVEY	AREA SURVEYED
GREY WITCH	APRIL 4, 2013	PIER 1
GREY WITCH	APRIL 4, 2013	PIER 2

8. AIDS TO NAVIGATION WERE NOT LOCATED DURING THIS SURVEY.
9. CONTOURS WERE GENERATED EVERY 0.25m.
10. BACKGROUND PLANIMETRICS AND CHANNELS WERE DRAWN FROM BACKGROUND AERIAL PHOTOGRAPHY AND NAVIGATION CHARTS. THE BACKGROUND DATA IS FOR GRAPHIC PURPOSES ONLY, IT IS NOT FOR NAVIGATION OR CONSTRUCTION.
11. THE INFORMATION DEPICTED ON THIS MAP REPRESENTS THE RESULTS OF SURVEYS MADE ON THE DATES INDICATED ABOVE AND CAN ONLY BE CONSIDERED AS INDICATING THE GENERAL CONDITIONS AT THAT TIME.
12. FINAL DRAFT EDITS; MAY 14, 2013

SIDE-SCAN SONAR NOTES:

1. THE UNDERWATER SIDE-SCAN SONAR SURVEY WAS PERFORMED ON APRIL 4, 2013 UTILIZING THE VESSEL "GREY WITCH" WHICH WAS PROVIDED BY ARC SURVEYING & MAPPING, INC.
2. THE NAVIGATION COMPUTER WITH HYPACK NAVIGATION SOFTWARE WAS INSTALLED TO INTERFACE AND OUTPUT TOWFISH COORDINATES TO THE SIDE-SCAN COMPUTER TOPSIDE.
3. THE SIDE-SCAN SYSTEM WAS THE EDGETECH 4125 DUAL FREQUENCY (600 and 1600 kHz) WHICH IS CAPABLE OF PRODUCING SONIC IMAGES OF THE BOTTOM WITH THE RESOLUTION TO DISPLAY SMALL OBJECTS IF THEY ARE EXPOSED AND NOT COMPLETELY BURIED. THE LIMITATIONS OF THE SIDE-SCAN SONAR IS THAT IT CANNOT PENETRATE THE BOTTOM AND DETECT A BURIED OBJECT.
4. REFER TO THE SURVEY REPORT FOR THIS SURVEY FOR MORE DETAILED INFORMATION ON THE METHODOLOGY, EQUIPMENT AND RESULTS.
5. SIDE-SCAN TARGETS WERE NUMBERED IN THE SEQUENCE THAT THEY WERE IDENTIFIED DURING DATA PROCESSING. SEE SHEET NO.4 FOR TABULATION.
6. SIDE-SCAN SONAR IMAGE MOSAIC PROVIDED BY SONOGRAPHICS, INC., WILTON MANORS, FL.

GRAPHIC SCALE

100 0 300 600

(METERS) (1:6000)

ARC SURVEYING & MAPPING, INC.
5202 San Juan Ave.
Jacksonville, Florida 32210
Tel. (904)384-8377 • Fax (904)384-6388
www.arcsurveyors.com
Licensed Business # 6487

No.	Symbol	Date	Description	Approved
		05/14/13	COVER SHEET TITLE & NOTES FOR TABULATION ON SHEET 4	

Legend / Abbreviations

Drawn by: D. TRIBBITS — Drawing Date: 05/14/13
Chd by: J. SAWYER — Survey Date: SEE NOTES
Party Chief: F. SAWYER — Field Ed by: XX-XXXXXXX
Survey Performed for:

File name:
Reference files:

SANDY HOOK BAY, MONMOUTH COUNTY, NEW JERSEY

HYDROGRAPHIC CONDITION SURVEY
NAVAL WEAPONS STATION EARLE
PIER 1 AND PIER 2, AREA UXO-002

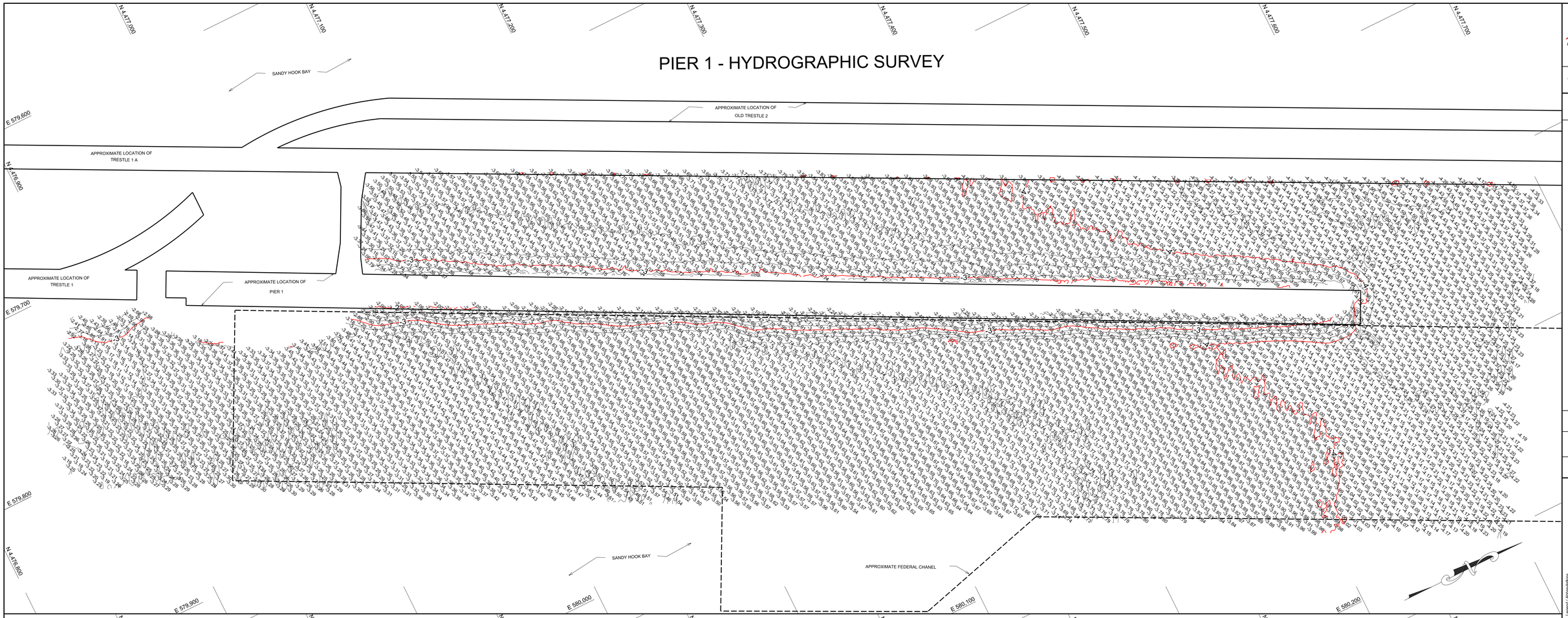
COVER SHEET

PROJECT NO.
12-08-03

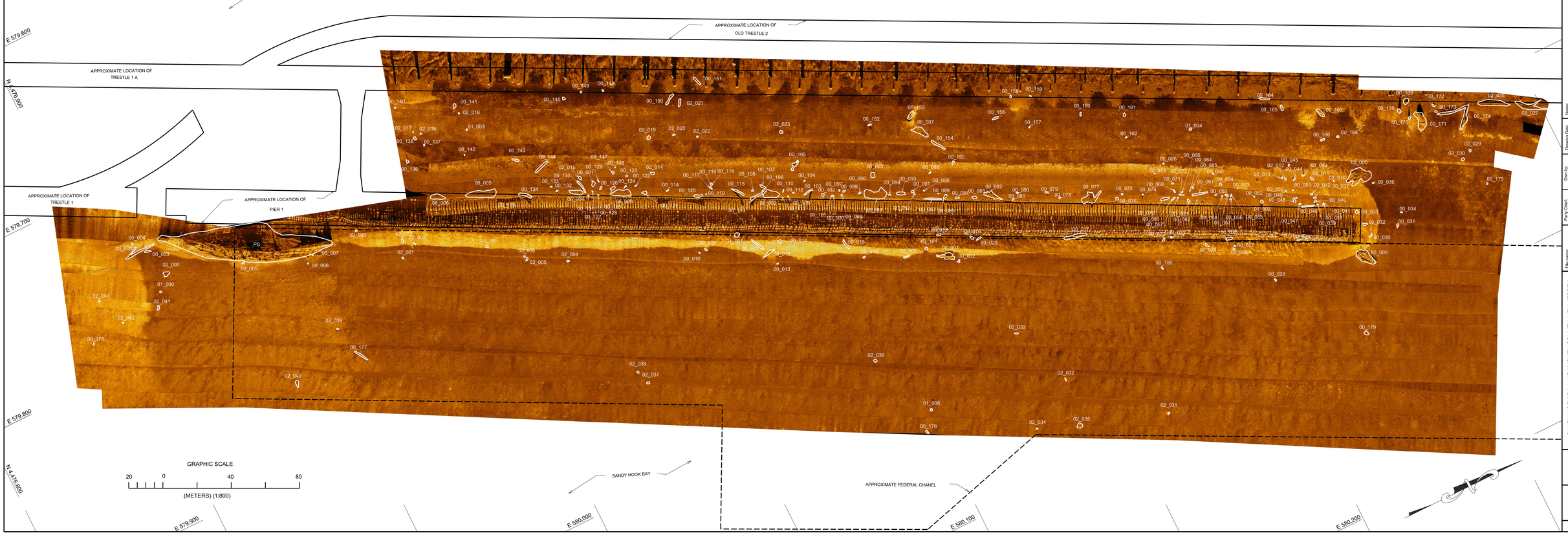
FILE NO.
C-13-31

SHEET 1 OF 4

PIER 1 - HYDROGRAPHIC SURVEY



PIER 1 - SIDE-SCAN IMAGE AND FEATURES



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No.	Symbol	Date	Description	Approved
		05/14/13	COVER SHEET TITLE & NOTES FOR TABULATION ON SHEET 4	

Legend / Abbreviations
02_016 SIDE-SCAN FEATURE AND ID NUMBER

Notes:
1. REFER TO SHEET NO. 1 FOR ALL NOTES.
2. SEE SHEET NO. 4 FOR SIDE-SCAN FEATURE TABULATION.
3. FINAL DRAFT, 05/14/13

Party Chief: F. SAWYER	Dwn by: D. TRABITS	Chk'd by: J. SAWYER	Drawing Date: 05/14/13
Field Bk-Pg: 13-07/18-20			Survey Date: SEE NOTES

Survey Performed for:
CH2MHill
5701 Cleveland Street, Suite 200
Virginia Beach, VA 23462

File name:
Reference files:

SANDY HOOK BAY, MONMOUTH COUNTY, NEW JERSEY

HYDROGRAPHIC CONDITION SURVEY
NAVAL WEAPONS STATION EARLE
PIER 1 AND PIER 2, AREA UXO-002

PLAN SHEET

PROJECT NO.
12-08-03

FILE NO.
C-13-31

SHEET 2 OF 4

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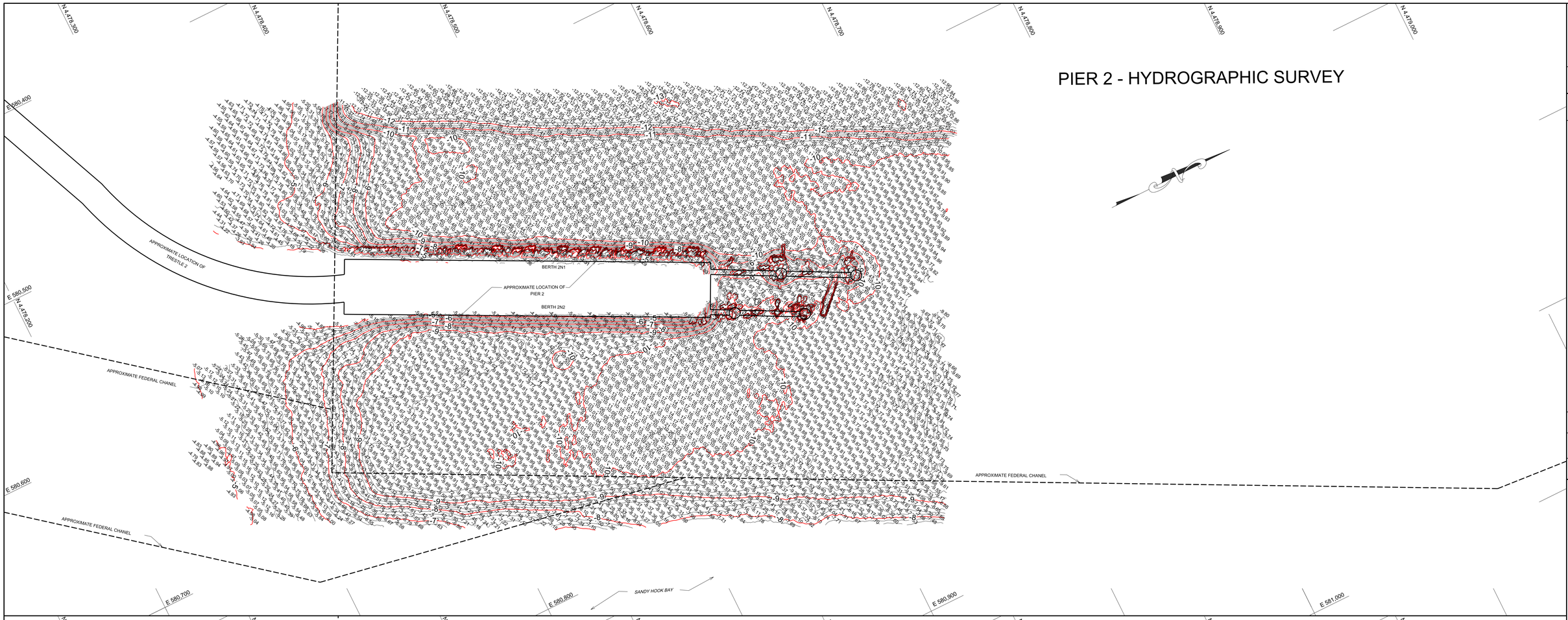
PIER 2 - HYDROGRAPHIC SURVEY



PIER 2 - SIDE-SCAN IMAGE AND FEATURES

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Licensed Business # 6487

No.	Symbol	Date	Description	Approved
		05/14/13	COVER SHEET TITLE & NOTES FOR TABULATION ON SHEET 4	

Legend / Abbreviations
02_016 SIDE-SCAN FEATURE AND ID NUMBER

Notes:
1. REFER TO SHEET NO. 1 FOR ALL NOTES.
2. SEE SHEET NO. 4 FOR SIDE-SCAN FEATURE TABULATION.
3. FINAL DRAFT, 05/14/13

Field Chief: F. SAWYER	Dwn by: D. TRIBBITS	Drawing Date: 05/14/13	
Field Ob-By: 13-01/18-20	Ckd by: J. SAWYER	Survey Date: SEE NOTES	
	Survey Performed for: CH2MHill 5701 Cleveland Street, Suite 200 Virginia Beach, VA 23462		

File name:
Reference files:

SANDY HOOK BAY, MONMOUTH COUNTY, NEW JERSEY

HYDROGRAPHIC CONDITION SURVEY
NAVAL WEAPONS STATION EARLE
PIER 1 AND PIER 2, AREA UXO-002

PLAN VIEW

PROJECT NO.
12-08-03

FILE NO.
C-13-31

SHEET 3 OF 4

120803_sht3_pier2.dgn Default 5/14/2013 1:38:56 PM

PIER - 1
SIDE-SCAN SONAR TARGET TABULATION

ID#	EASTING (X)	NORTHING (Y)	LATITUDE	LONGITUDE	DESCRIPTION
00 000	579742.933	4476922.818	40.439132	-74.059757	DEBRIS
00 001	579954.567	4477350.774	40.442966	-74.057208	DEBRIS
00 002	579959.768	4477355.232	40.443006	-74.057146	DEBRIS
00 003	579745.036	4476931.501	40.439210	-74.059731	DEBRIS
00 004	579737.156	4476924.674	40.439149	-74.059825	DEBRIS
00 005	579775.603	4476978.761	40.439632	-74.059365	DEBRIS
00 006	579792.670	4477012.449	40.439934	-74.059160	DEBRIS
00 007	579789.594	4477017.194	40.439977	-74.059195	DEBRIS
00 008	579787.820	4477046.188	40.440239	-74.059213	DEBRIS
00 009	579830.185	4477110.635	40.440815	-74.058705	DEBRIS
00 010	579888.669	4477220.563	40.441800	-74.058002	DEBRIS
00 011	579900.234	4477253.281	40.442093	-74.057861	DEBRIS
00 012	579906.468	4477256.427	40.442121	-74.057787	DEBRIS
00 013	579914.804	4477258.781	40.442141	-74.057689	DEBRIS
00 014	579903.334	4477265.323	40.442201	-74.057823	DEBRIS
00 015	579923.075	4477299.653	40.442509	-74.057586	DEBRIS
00 016	579933.443	4477306.325	40.442568	-74.057463	DEBRIS
00 017	579977.279	4477421.239	40.443599	-74.056932	DEBRIS
00 018	579941.174	4477350.894	40.442969	-74.057366	DEBRIS
00 019	579951.468	4477367.544	40.443118	-74.057243	DEBRIS
00 020	579953.327	4477371.423	40.443152	-74.057220	DEBRIS
00 022	580002.035	4477467.308	40.444011	-74.056634	DEBRIS
00 023	580002.778	4477472.434	40.444058	-74.056625	DEBRIS
00 024	580015.915	4477488.745	40.444203	-74.056468	DEBRIS
00 025	580018.406	4477502.607	40.444328	-74.056437	DEBRIS
00 026	580025.250	4477501.785	40.444320	-74.056356	DEBRIS
00 027	580022.808	4477503.166	40.444332	-74.056385	DEBRIS
00 028	580051.803	4477515.809	40.444444	-74.056041	DEBRIS
00 029	580036.959	4477538.190	40.444647	-74.056213	DEBRIS
00 030	580053.349	4477577.279	40.444997	-74.056015	DEBRIS
00 031	580055.103	4477594.453	40.445152	-74.055992	DEBRIS
00 032	580045.886	4477576.793	40.444993	-74.056103	DEBRIS
00 033	580037.630	4477576.220	40.444989	-74.056201	DEBRIS
00 034	580048.939	4477599.317	40.445196	-74.056064	DEBRIS
00 036	580026.175	4477592.282	40.445135	-74.056334	DEBRIS
00 037	580024.048	4477560.724	40.444851	-74.056363	DEBRIS
00 038	580025.294	4477559.858	40.444843	-74.056348	DEBRIS
00 039	580023.399	4477557.361	40.444821	-74.056371	DEBRIS
00 040	580021.054	4477557.158	40.444819	-74.056398	DEBRIS
00 041	580018.958	4477557.835	40.444825	-74.056423	DEBRIS
00 042	580016.409	4477556.914	40.444817	-74.056453	DEBRIS
00 043	580004.315	4477557.440	40.444823	-74.056596	DEBRIS
00 044	580004.477	4477551.275	40.444768	-74.056595	DEBRIS
00 045	579995.397	4477552.222	40.444777	-74.056702	DEBRIS
00 046	580021.326	4477550.874	40.444762	-74.056396	DEBRIS
00 047	580018.448	4477548.255	40.444739	-74.056430	DEBRIS
00 048	580014.778	4477546.449	40.444723	-74.056474	DEBRIS
00 049	580014.422	4477548.196	40.444739	-74.056478	DEBRIS
00 050	580007.981	4477544.353	40.444705	-74.056554	DEBRIS
00 051	580009.424	4477548.217	40.444740	-74.056537	DEBRIS
00 052	580003.076	4477526.029	40.444540	-74.056614	DEBRIS
00 053	579994.097	4477519.957	40.444486	-74.056721	DEBRIS
00 054	579987.924	4477512.015	40.444416	-74.056795	DEBRIS
00 055	579996.008	4477514.430	40.444437	-74.056699	DEBRIS
00 056	579998.235	4477512.901	40.444423	-74.056673	DEBRIS
00 057	579995.090	4477511.885	40.444414	-74.056710	DEBRIS
00 058	579994.343	4477509.411	40.444391	-74.056719	DEBRIS
00 059	579991.992	4477506.367	40.444364	-74.056748	DEBRIS
00 060	579980.418	4477509.745	40.444396	-74.056884	DEBRIS
00 061	579986.025	4477492.388	40.444239	-74.056820	DEBRIS
00 062	579991.404	4477494.611	40.444258	-74.056756	DEBRIS
00 063	579988.875	4477490.210	40.444219	-74.056786	DEBRIS
00 064	579983.159	4477493.901	40.444253	-74.056853	DEBRIS
00 065	579981.800	4477496.059	40.444272	-74.056869	DEBRIS
00 066	579981.628	4477489.561	40.444214	-74.056872	DEBRIS
00 067	579982.540	4477485.520	40.444177	-74.056862	DEBRIS
00 068	579979.103	4477485.809	40.444180	-74.056902	DEBRIS
00 069	579984.472	4477482.592	40.444151	-74.056839	DEBRIS
00 070	579981.913	4477478.922	40.444118	-74.056870	DEBRIS
00 071	579974.504	4477486.206	40.444184	-74.056956	DEBRIS
00 072	579983.434	4477489.020	40.444209	-74.056851	DEBRIS
00 073	579964.855	4477479.698	40.444127	-74.057071	DEBRIS
00 074	579974.065	4477468.650	40.444026	-74.056964	DEBRIS
00 075	579967.326	4477457.674	40.443928	-74.057044	DEBRIS
00 076	579968.755	4477453.331	40.443889	-74.057028	DEBRIS
00 077	579962.035	4477440.439	40.443773	-74.057109	DEBRIS
00 078	579953.087	4477423.744	40.443624	-74.057217	DEBRIS
00 079	579946.630	4477418.249	40.443575	-74.057293	DEBRIS
00 080	579939.517	4477402.860	40.443437	-74.057379	DEBRIS
00 081	579941.698	4477399.119	40.443403	-74.057354	DEBRIS
00 082	579934.628	4477389.694	40.443319	-74.057439	DEBRIS
00 083	579930.628	4477378.997	40.443223	-74.057487	DEBRIS
00 084	579926.247	4477369.292	40.443136	-74.057540	DEBRIS
00 085	579921.958	4477364.757	40.443095	-74.057591	DEBRIS
00 087	579921.194	4477358.374	40.443038	-74.057601	DEBRIS
00 088	579906.362	4477361.905	40.443071	-74.057775	DEBRIS
00 089	579919.286	4477361.018	40.443062	-74.057623	DEBRIS
00 090	579913.694	4477348.714	40.442952	-74.057690	DEBRIS
00 091	579911.465	4477348.361	40.442949	-74.057717	DEBRIS
00 092	579913.473	4477348.623	40.442951	-74.057693	DEBRIS
00 093	579910.019	4477341.310	40.442885	-74.057735	DEBRIS
00 094	579907.479	4477335.179	40.442830	-74.057765	DEBRIS
00 095	579891.618	4477331.460	40.442798	-74.057953	DEBRIS
00 096	579898.799	4477320.052	40.442695	-74.057870	DEBRIS
00 097	579893.474	4477312.540	40.442628	-74.057933	DEBRIS
00 098	579894.847	4477309.870	40.442604	-74.057918	DEBRIS
00 099	579892.322	4477310.196	40.442607	-74.057947	DEBRIS
00 100	579893.161	4477305.403	40.442564	-74.057938	DEBRIS
00 101	579892.917	4477304.499	40.442555	-74.057941	DEBRIS
00 102	579890.035	4477300.048	40.442516	-74.057976	DEBRIS
00 103	579884.808	4477295.026	40.442471	-74.058038	DEBRIS
00 104	579878.093	4477294.263	40.442465	-74.058117	DEBRIS
00 105	579866.672	4477293.768	40.442461	-74.058252	DEBRIS
00 106	579872.539	4477269.795	40.442245	-74.058186	DEBRIS

PIER - 1
SIDE-SCAN SONAR TARGET TABULATION

ID#	EASTING (X)	NORTHING (Y)	LATITUDE	LONGITUDE	DESCRIPTION
00 107	579869.843	4477270.640	40.442253	-74.058217	DEBRIS
00 108	579869.638	4477264.037	40.442193	-74.058221	DEBRIS
00 109	579881.676	4477281.577	40.442350	-74.058076	DEBRIS
00 110	579877.606	4477280.663	40.442342	-74.058125	DEBRIS
00 111	579881.055	4477278.630	40.442324	-74.058084	DEBRIS
00 112	579881.319	4477285.193	40.442383	-74.058080	DEBRIS
00 113	579873.278	4477265.374	40.442205	-74.058177	DEBRIS
00 114	579847.365	4477219.648	40.441795	-74.058489	DEBRIS
00 115	579866.494	4477257.046	40.442130	-74.058259	DEBRIS
00 116	579856.096	4477244.913	40.442022	-74.058383	DEBRIS
00 117	579856.708	4477243.028	40.442005	-74.058376	DEBRIS
00 118	579858.229	4477243.274	40.442007	-74.058358	DEBRIS
00 119	579859.288	4477239.164	40.441970	-74.058346	DEBRIS
00 120	579858.128	4477233.588	40.441920	-74.058360	DEBRIS
00 121	579843.343	4477207.217	40.441684	-74.058538	DEBRIS
00 122	579836.779	4477204.103	40.441656	-74.058615	DEBRIS
00 123	579829.390	4477201.983	40.441638	-74.058703	DEBRIS
00 124	579834.748	4477198.234	40.441604	-74.058640	DEBRIS
00 125	579832.247	4477191.138	40.441540	-74.058671	DEBRIS
00 126	579828.805	4477185.732	40.441492	-74.058712	DEBRIS
00 127	579828.591	4477180.249	40.441442	-74.058715	DEBRIS
00 128	579832.012	4477182.259	40.441460	-74.058674	DEBRIS
00 129	579824.513	4477185.960	40.441494	-74.058762	DEBRIS
00 130	579822.392	4477176.167	40.441406	-74.058789	DEBRIS
00 131	579829.593	4477176.705	40.441410	-74.058704	DEBRIS
00 132	579818.965	4477161.496	40.441274	-74.058831	DEBRIS
00 133	579815.668	4477159.970	40.441261	-74.058870	DEBRIS
00 134	579813.351	4477144.401	40.441121	-74.058899	DEBRIS
00 136	579766.572	4477090.472	40.440640	-74.059457	DEBRIS
00 137	579760.681	4477103.956	40.440762	-74.059525	DEBRIS
00 138	579754.846	4477100.595	40.440732	-74.059594	DEBRIS
00 139	579994.937	4477625.348	40.445436	-74.056698	DEBRIS
00 140	579733.363	4477098.569	40.440716	-74.059848	DEBRIS
00 141	579750.623	4477127.898	40.440978	-74.059641	DEBRIS
00 142	579776.423	4477122.223	40.440925	-74.059337	DEBRIS
00 143	579791.757	4477147.825	40.441154	-74.059153	DEBRIS
00 144	579801.896	4477161.109	40.441272	-74.059032	DEBRIS
00 145	579772.517	4477189.325	40.441529	-74.059375	DEBRIS
00 146	579821.991	4477198.358	40.441606	-74.058791	DEBRIS
00 147	579823.753	4477196.102	40.441586	-74.058770	DEBRIS
00 148	579778.139	4477211.966	40.441733	-74.059306	DEBRIS
00 149	579773.457	4477199.742	40.441623	-74.059363	DEBRIS
00 150	579801.132	4477242.421	40.442005	-74.059031	DEBRIS
00 151	579799.336	4477264.347	40.442203	-74.059049	DEBRIS
00 152	579865.343	4477342.518	40.442901	-74.058261	DEBRIS
00 153	579869.190	4477369.388	40.443142	-74.058213	DEBRIS
00 154	579893.060	4477373.585	40.443178	-74.057931	DEBRIS
00 155	579907.142	4477376.977	40.443207	-74.057764	DEBRIS
00 156	579894.358	4477410.783	40.443513	-74.057911	DEBRIS
00 157	579908.262	4477426.218	40.443650	-74.057745	DEBRIS
00 158	579886.910	4477423.970	40.443632	-74.057997	DEBRIS
00 159	579891.849	4477434.885	40.443730	-74.057937	DEBRIS
00 160	579914.285	4477456.612	40.443924	-74.057670	DEBRIS
00 161	579926.844	4477479.705	40.444130	-74.057519	DEBRIS
00 162	579938.457	4477474.296	40.444081	-74.057383	DEBRIS
00 164	579953.189	4477555.765	40.444813	-74.057199	DEBRIS
00 165	579961.919	4477563.769	40.444884	-74.057095	DEBRIS
00 166	579990.170	4477577.090	40.445002	-74.056760	DEBRIS
00 167	579974.825	4477582.411	40.445051	-74.056940	DEBRIS
00 168	579993.212	4477585.920	40.445081	-74.056723	DEBRIS
00 169	579992.245	4477630.885	40.445486	-74.056729	DEBRIS
00 170	580001.832	4477627.320	40.445453	-74.056616	DEBRIS
00 171	580002.311	4477634.420	40.445517	-74.056610	DEBRIS
00 172	580001.939	4477643.760	40.445601	-74.056613	DEBRIS
00 173	580005.237	4477643.509	40.445598	-74.056574	DEBRIS
00 174	580017.092	4477657.606	40.445724	-74.056433	DEBRIS
00 175	580056.389	4477651.888	40.445669	-74.055970	DEBRIS
00 176	580041.967	4477293.775	40.442444	-74.056185	DEBRIS
00 177	579855.424	4477016.873	40.439968	-74.058419	DEBRIS
00 178	579779.416	4476878.388	40.438728	-74.059333	DEBRIS
00 179	580103.647	4477549.140	40.444739	-74.055426	DEBRIS
00 180	580017.186	4477459.029	40.443935	-74.056456	DEBRIS
00 181	579944.453	4477340.724	40.442877	-74.057329	DEBRIS
01 000	579769.014	4476927.686	40.439173	-74.059449	TIRE
01 001	579888.712	4477244.914	40.442019	-74.057998	TIRE
01 002	580007.224	4477528.705	40.444564	-74.056565	TIRE
01 003	579763.330	4477130.212	40.440998	-74.059491	TIRE
01 004	579950.694	4477510.345	40.444404	-74.057234	TIRE
01 006	580030.668	4477301.422	40.442514	-74.056317	TIRE
02 000	579760.144	4476935.616	40.439245	-74.059553	MISC FEATURE
02 001	579814.576	4477063.553	40.440393	-74.058895	MISC FEATURE
02 002	579804.754	4477067.480	40.440429	-74.059010	MISC FEATURE
02 003	579809.886	4477073.694	40.440484	-74.058949	MISH FEATURE
02 004	579858.301	4477149.321	40.441161	-74.058369	MISC FEATURE
02 005	579847.649	4477127.707	40.440967	-74.058497	MISC FEATURE
02 006	579845.105	4477127.721	40.440968	-74.058527	MISC FEATURE
02 007	579888.202	4477224.278	40.441833	-74.058007	MISC FEATURE
02 008	579944.408	4477327.630	40.442759	-74.057331	MISC FEATURE
02 010	580015.210	4477572.155	40.444955	-74.056465	MISC FEATURE
02 011	580008.678	4477561.146	40.444856	-74.056544	MISC FEATURE
02 012	580001.955	4477546.990	40.444729	-74.056625	MISC FEATURE
02 013	580000.017	4477545.416	40.444715	-74.056648	MISC FEATURE
02 014	579834.131	4477216.650	40.441770	-74.058645	MISC FEATURE
02 015	579818.676	4477177.077	40.441415	-74.058832	MISC FEATURE
02 016	579753.550	4477104.964	40.440771	-74.059609	MISC FEATURE
02 017	579750.853	4477101.617	40.440741	-74.059641	MISC FEATURE
02 018	579754.412	4477129.620	40.440993	-74.059596	MISC FEATURE
02 019	579814.815	4477224.337	40.441841	-74.058872	MISC FEATURE
02 020	579820.069	4477237.635	40.441960	-74.058808	MISC FEATURE
02 021	579803.618	4477249.122	40.442065	-74.059001	MISC FEATURE
02 022	579827.002	4477249.354	40.442065	-74.058725	MISC FEATURE
02 023	579846.341	4477294.884	40.442473	-74.058491	MISC FEATURE
02 025	580017.176	4477679.935	40.445925	-74.056429	MISC FEATURE
02 026	579961.425	4477488.377	40.444205	-74.057110	MISC_FEATURE

PIER - 1
SIDE-SCAN SONAR TARGET TABULATION

ID#	EASTING (X)	NORTHING (Y)	LATITUDE	LONGITUDE	DESCRIPTION
02 027	580026.332	4477692.555	40.446038	-74.056319	MISC FEATURE
02 029	580034.377	4477651.207	40.445665	-74.056230	MISC FEATURE
02 030	580036.897	4477645.029	40.445609	-74.056201	MISC FEATURE
02 031	580093.084	4477425.260	40.443624	-74.055566	MISC FEATURE
02 032	580049.513	4477379.695	40.443218	-74.056085	MISC FEATURE
02 033	580012.966	4477366.089	40.443099	-74.056518	MISC FEATURE
02 034	580068.121	4477352.120	40.442968	-74.055869	MISC FEATURE
02 035	580077.848	4477376.092	40.443183	-74.055752	MISC FEATURE
02 036	579991.139	4477284.646	40.442367	-74.056785	MISC FEATURE
02 037	579943.353	4477159.730	40.441246	-74.057365	MISC FEATURE
02 038	579935.390	4477156.937	40.441222	-74.057459	MISC FEATURE
02 039	579834.877	4477010.863	40.439916	-74.058662	MISC FEATURE
02 040	579853.399	4476975.100	40.439592	-74.058448	MISC FEATURE
02 041	579777.028	4476921.104	40.439113	-74.059355	MISC FEATURE
02 042	579775.624	4476900.027	40.438923	-74.059375	MISC FEATURE
02 043	579758.624	4476892.770	40.438859	-74.059576	MISC FEATURE
05 000	580062.725	4477568.846	40.444920	-74.055906	BOAT
05 000	580018.639	4477584.627	40.445067	-74.056423	DEBRIS PILE
06 000	579837.482	4477195.992	40.441583	-74.058608	SMALL DEBRIS AREA
06 001	579824.382	4477182.762	40.441465	-74.058764	SMALL DEBRIS AREA
06 002	579875.203	4477272.077	40.442265	-74.058154	SMALL DEBRIS AREA
06 003	579904.072	4477327.941	40.442765	-74.057807	SMALL DEBRIS AREA
06 004	579825.388	4477172.397	40.441372	-74.058754	SMALL DEBRIS AREA
06 005	579801.746	4477122.777	40.440927	-74.059039	SMALL DEBRIS AREA
06 006	579790.340	4477097.826	40.440704	-74.059176	SMALL DEBRIS AREA
06 007	579881.122	4477367.600	40.443125	-74.058072	SMALL DEBRIS AREA
PS	579774.798	4476991.264	40.439745	-74.059373	ALEXANDER HAMILTON

PIER - 2
SIDE-SCAN SONAR TARGET TABULATION

ID#	EASTING (X)	NORTHING (Y)	LATITUDE	LONGITUDE	DESCRIPTION
00 000	580582.307	4478335.447	40.451776	-74.049682	DEBRIS
00 001	580618.459	4478329.856	40.451722	-74.049257	DEBRIS
00 002	580597.383	4478365.465	40.452044	-74.049501	DEBRIS
00 003	580602.689	4478388.863	40.452255	-74.049435	DEBRIS
00 004	580615.327	4478401.481	40.452367	-74.049285	DEBRIS
00 005	580615.252	4478409.750	40.452442	-74.049284	DEBRIS
00 006	580621.241	4478432.222	40.452643	-74.049211	DEBRIS
00 007	580626.391	4478430.734	40.452630	-74.049150	DEBRIS
00 008	580630.609	4478446.323	40.452770	-74.049099	DEBRIS
00 009	580635.398	4478450.197	40.452804	-74.049042	DEBRIS
00 010	580638.113	4478459.111	40.452884	-74.049009	DEBRIS
00 011	580638.888	4478463.355	40.452922	-74.048999	DEBRIS
00 012	580648.567	4478473.909	40.453016	-74.048883	DEBRIS
00 013	580652.038	4478481.898	40.453088	-74.048841	DEBRIS
00 014	580657.681	4478481.384	40.453083	-74.048775	DEBRIS
00 015	580672.330	4478478.886	40.453059	-74.048603	DEBRIS
00 016	580655.779	4478493.631	40.453193	-74.048796	DEBRIS
00 017	580658.892	4478488.718	40.453149	-74.048760	DEBRIS
00 018	580671.551	4478493.934	40.453194	-74.048610	DEBRIS
00 019	580659.646	4478506.436	40.453308	-74.048749	DEBRIS
00 020	580669.387	4478515.899	40.453393	-74.048633	DEBRIS
00 021	580668.533	4478520.345	40.453433	-74.048642	DEBRIS
00 022	580674.299	4478525.642	40.453480	-74.048573	DEBRIS
00 023	580674.974	4478532.088	40.453538	-74.048565	DEBRIS
00 024	580676.343	4478534.729	40.453561	-74.048548	DEBRIS
00 025	580691.409	4478532.023	40.453536	-74.048371	DEBRIS
00 026	580690.101	4478538.888	40.453598	-74.048385	DEBRIS
00 027	580661.650	4478593.278	40.454090	-74.048714	DEBRIS
00 028	580690.910	4478553.442	40.453729	-74.048374	DEBRIS
00 029	580694.947	4478564.036	40.453824	-74.048325	DEBRIS
00 030	580679.433	4478577.351	40.453945	-74.048506	DEBRIS
00 031	580658.618	4478584.333	40.454010	-74.048751	DEBRIS
00 032	580671.491	4478588.667	40.454048	-74.048599	DEBRIS
00 033	580691.906	4478599.223	40.454141	-74.048356	DEBRIS
00 034	580695.853	4478610.291	40.454240	-74.048309	DEBRIS
00 035	580697.932	4478633.284	40.454447	-74.048281	DEBRIS
00 036	580708.575	4478631.886	40.454434	-74.048156	DEBRIS
00 037	580687.782	4478635.506	40.454468	-74.048400	DEBRIS
00 038	580527.040	4478418.874	40.452532	-74.050323	DEBRIS
00 041	580501.126	4478392.641	40.452299	-74.050632	DEBRIS
00 042	580500.331	4478402.196	40.452385	-74.050640	DEBRIS
00 043	580501.146	4478408.302	40.452440	-74.050630	DEBRIS
00 044	580794.548	4478446.944	40.452759	-74.047165	DEBRIS
00 045	580759.467	4478402.278	40.452360	-74.047585	DEBRIS
00 046	580707.741	4478386.723	40.452225	-74.048197	DEBRIS
01 000	580452.771	4478413.938	40.452495	-74.051200	TIRE
01 001	580527.212	4478400.394	40.452366	-74.050324	TIRE
02 000	580593.313	4478319.817	40.451634	-74.049555	MISC FEATURE
02 001	580624.227	4478341.688	40.451828	-74.049187	MISC FEATURE
02 002	580611.501	4478360.837	40.452001	-74.049335	MISC FEATURE
02 003	580645.004	4478374.996	40.452126	-74.048938	MISC FEATURE
02 004	580615.848	4478384.729	40.452216	-74.049281	MISC FEATURE
02 005	580622.570	4478394.110	40.452300	-74.049200	MISC FEATURE
02 006	580646.185	4478412.337	40.452462	-74.048919	MISC FEATURE
02 007	580668.320	4478474.420	40.453019	-74.048650	MISC FEATURE
02 008	580699.996	4478496.383	40.453214	-74.048274	MISC FEATURE
02 009	580708.596	4478507.281	40.453311	-74.048171	MISC FEATURE
02 010	580451.153	4478429.267	40.452633	-74.051217	MISC FEATURE
02 011	580493.805	4478427.725	40.452615	-74.050714	MISC FEATURE
02 012	580509.027	4478385.846	40.452237	-74.050540	MISC FEATURE
02 013	580548.572	4478484.441	40.453121	-74.050061	MISC FEATURE
02 014	580830.272	4478638.002	40.454477	-74.046720	MISC FEATURE
02 015	580766.379	4478542.790	40.453625	-74.047485	MISC FEATURE
02 016	580799.407	4478475.110	40.453012	-74.047105	MISC FEATURE
02 019	580603.744	4478320.968	40.451643	-74.049431	MISC FEATURE

ARC SURVEYING & MAPPING, INC.
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No.	Symbol	Date	Description	Approved
		05/14/13	COVER SHEET TITLE & NOTES FOR TABULATION ON SHEET 4	

Legend / Abbreviations

Notes:
1. REFER TO SHEET NO. 1 FOR ALL NOTES
2. SEE SHEET NO. 4 FOR SIDE-SCAN FEATURE TABULATION.
3. FINAL DRAFT, 05/14/13

Party Chief: F. SAWYER | Dwn by: D. TRABITS | Drawing Date 05/14/13
Field Bk/Pg 13-01/18-20 | Ckd by: J. SAWYER | Survey Date: SEE NOTES

Survey Performed for:
CH2MHill
5701 Cleveland Street, Suite 200
Virginia Beach, VA 23462

File name:
Reference files:

SANDY HOOK BAY, MONMOUTH COUNTY, NEW JERSEY

HYDROGRAPHIC CONDITION SURVEY
NAVAL WEAPONS STATION EARLE
PIER 1 AND PIER 2, AREA UXO-002

SIDE-SCAN SONAR FEATURE TABULATIONS

PROJECT NO.
12-08-03

FILE NO.
C-13-31

SHEET 4 OF 4

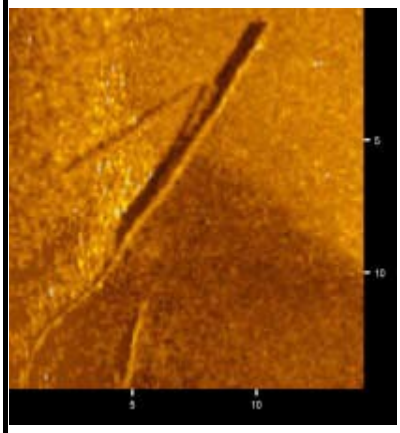
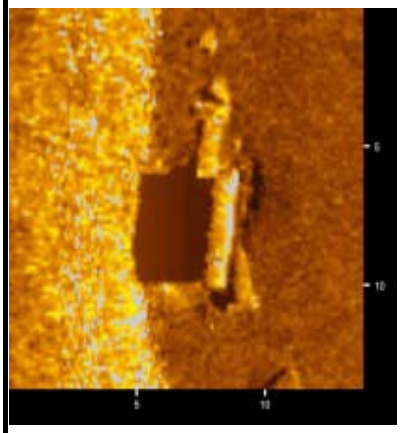
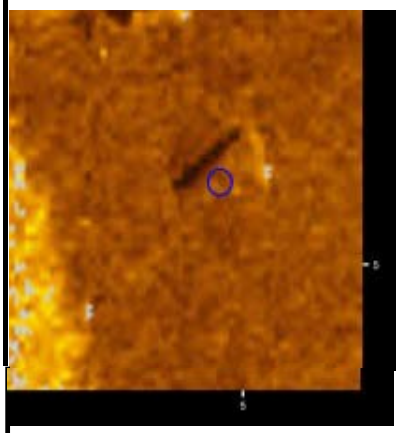
Attachment 2
Raw Data Files for Side-scan and Bathymetry

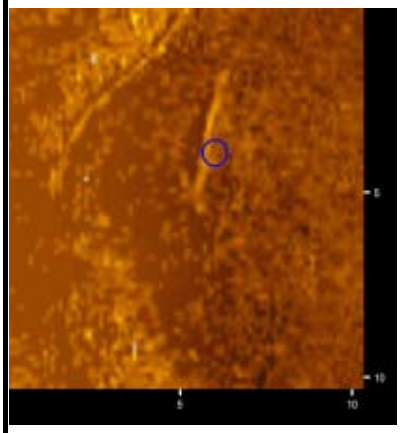
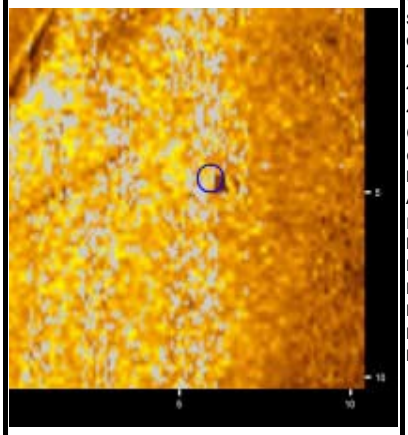
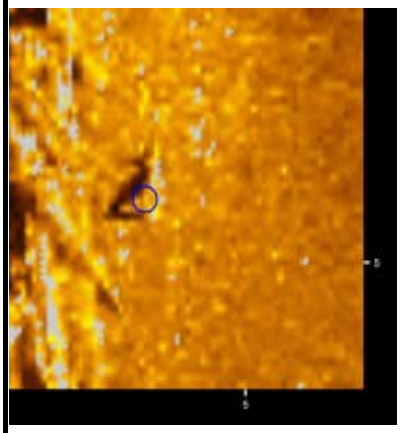
This attachment contains Raw Data files and is available upon request.

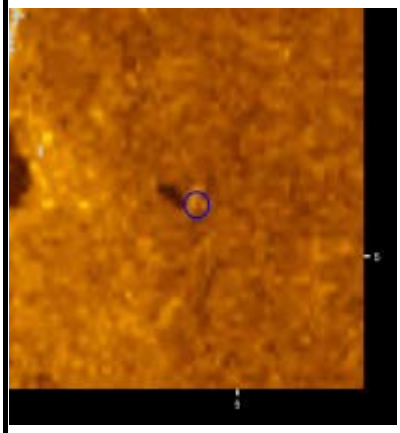
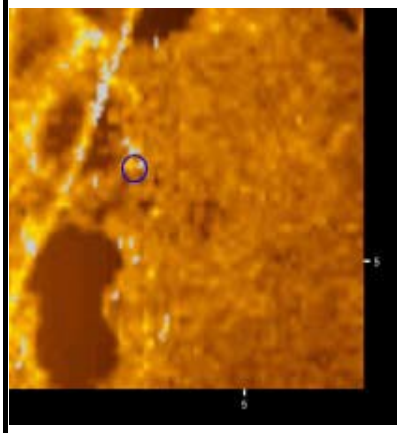
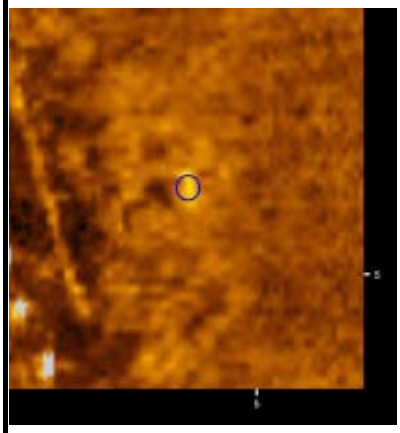
Attachment 3
NWS Earle Pier 1 Side-scan Target Images

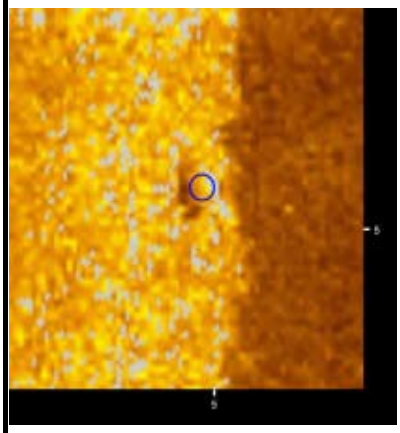
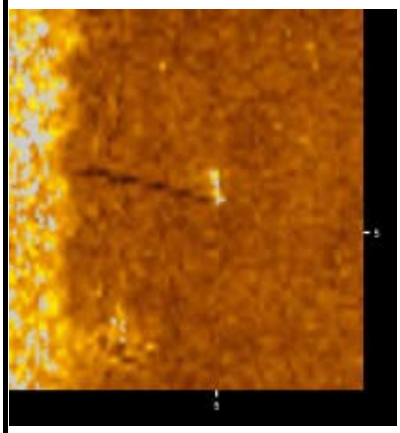
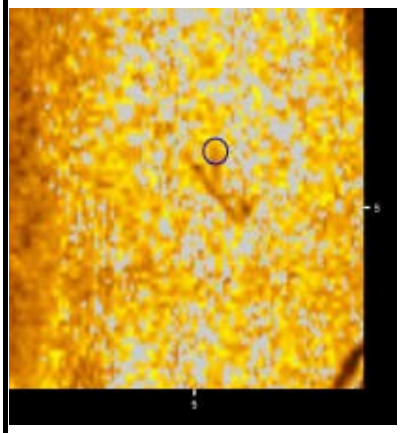
Report NWS Earle Side-Scan - Pier 1

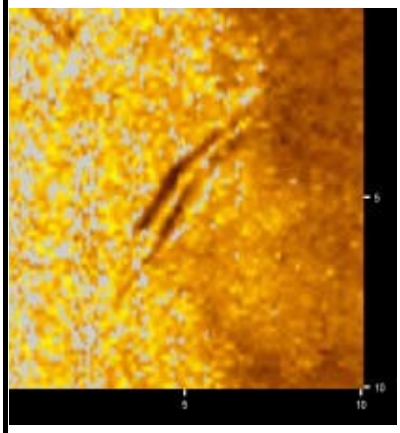
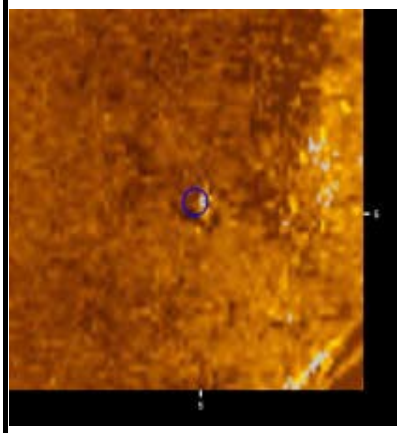
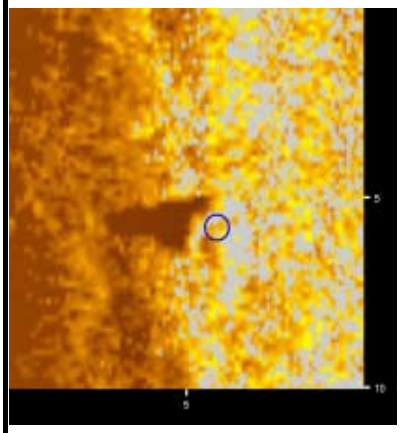
Generated on 4/19/2013 6:55:36 PM

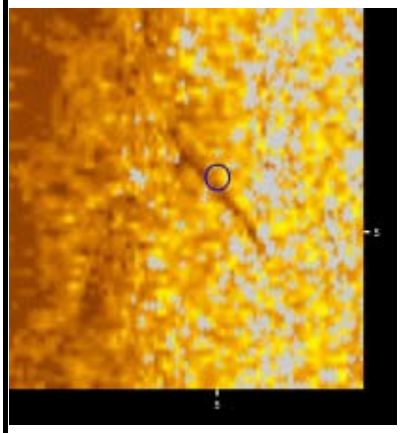
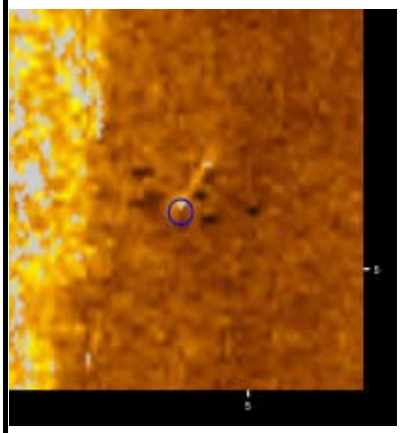
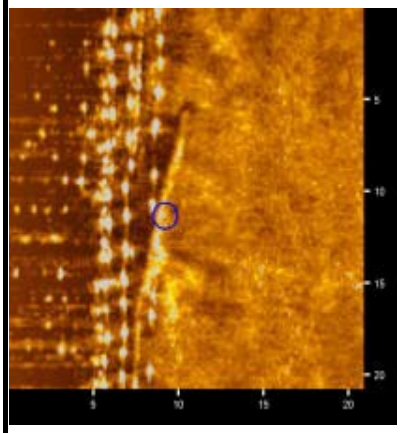
Target Image	Target Info	User Entered Info
	00_000_debris Sonar Time at Target: 4/4/2013 4:06:48 PM Click Position 40.4391316433 -74.0597572275 (WGS84) 40.4390237016-74.0601725903 (NAD27LL) 40.4391316433-74.0597572275 (LocalLL) (X) 579742.93 (Y) 4476922.82 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\100.jsf Ping Number: 133299 Range to target: 11.22 Fish Height: 2.91 Heading: 0.000 Degrees Event Number: 1095 Line Name: 100	Dimensions and attributes Target Width: 0.87 Target Height: 0.21 Target Length: 17.11 Target Shadow: 0.90
	00_001_debris Sonar Time at Target: 4/4/2013 4:24:19 PM Click Position 40.4429663014 -74.0572083354 (WGS84) 40.4428584320-74.0576237434 (NAD27LL) 40.4429663014-74.0572083354 (LocalLL) (X) 579954.57 (Y) 4477350.77 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\17N.jsf Ping Number: 148530 Range to target: 11.22 Fish Height: 4.10 Heading: 0.000 Degrees Event Number: 1099 Line Name: 17N	Dimensions and attributes Target Width: 2.16 Target Height: 0.84 Target Length: 7.85 Target Shadow: 3.09
	00_002_debris Sonar Time at Target: 4/4/2013 4:24:22 PM Click Position 40.4430059606 -74.0571464567 (WGS84) 40.4428980918-74.0575618660 (NAD27LL) 40.4430059606 -74.0571464567 (LocalLL) (X) 579959.77 (Y) 4477355.23 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\17N.jsf Ping Number: 148571 Range to target: 8.63 Fish Height: 4.10 Heading: 0.000 Degrees Event Number: 1099 Line Name: 17N	Dimensions and attributes Target Width: 1.41 Target Height: 0.24 Target Length: 1.86 Target Shadow: 0.60

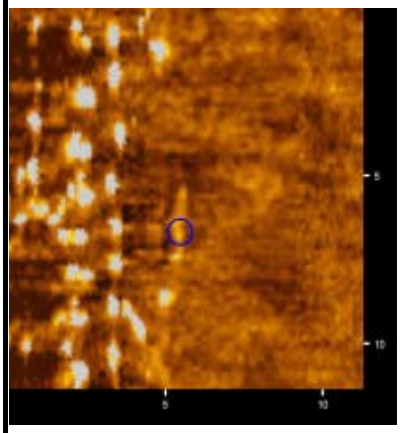
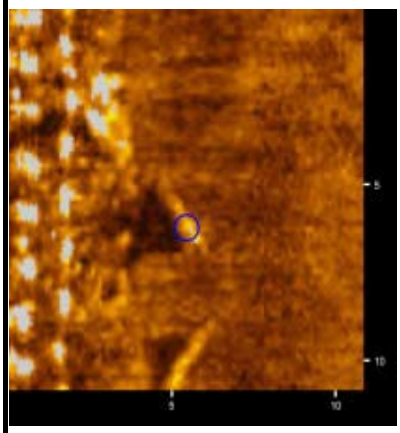
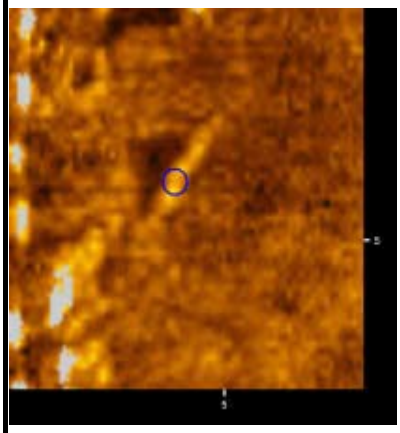
	00_003_debris Sonar Time at Target: 4/4/2013 4:06:52 PM Click Position 40.4392096546 -74.0597313519 (WGS84) 40.4391017145 -74.0601467149 (NAD27LL) 40.4392096546 -74.0597313519 (LocalLL) (X) 579745.04 (Y) 4476931.50 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\100.jsf Ping Number: 133356 Range to target: 13.92 Fish Height: 3.34 Heading: 0.000 Degrees Event Number: 1095 Line Name: 100	Dimensions and attributes Target Width: 0.61 Target Height: 0.14 Target Length: 3.64 Target Shadow: 0.61
	00_004_debris Sonar Time at Target: 4/4/2013 4:19:44 PM Click Position 40.4391548183 -74.0598204525 (WGS84) 40.4390468773 -74.0602358136 (NAD27LL) 40.4391548183 -74.0598204525 (LocalLL) (X) 579737.54 (Y) 4476925.33 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\18S.jsf Ping Number: 144534 Range to target: 12.89 Fish Height: 3.29 Heading: 0.000 Degrees Event Number: 0 Line Name: 18S	Dimensions and attributes Target Width: 0.89 Target Height: 0.10 Target Length: 1.07 Target Shadow: 0.40
	00_005_debris Sonar Time at Target: 4/4/2013 4:07:18 PM Click Position 40.4396324385 -74.0593650536 (WGS84) 40.4395245060 -74.0597804239 (NAD27LL) 40.4396324385 -74.0593650536 (LocalLL) (X) 579775.60 (Y) 4476978.76 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\100.jsf Ping Number: 133731 Range to target: 8.20 Fish Height: 3.24 Heading: 0.000 Degrees Event Number: 1095 Line Name: 100	Dimensions and attributes Target Width: 1.02 Target Height: 0.21 Target Length: 1.42 Target Shadow: 0.60

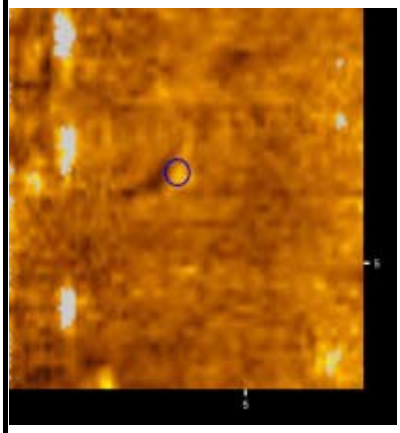
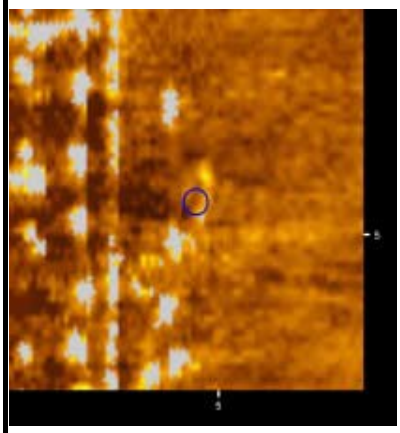
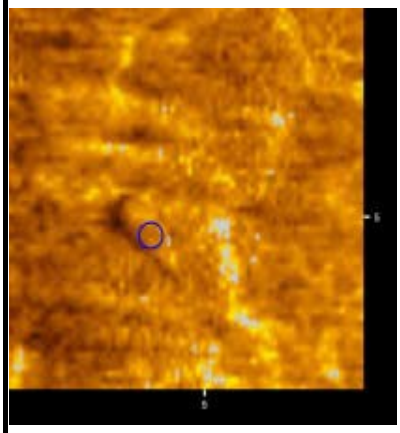
	00_006_debris Sonar Time at Target: 4/4/2013 4:07:35 PM Click Position 40.4399342569-74.0591596034 (WGS84) 40.4398263300 -74.0595749774 (NAD27LL) 40.4399342569-74.0591596034 (LocalLL) (X) 579792.67 (Y) 4477012.45 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\100.jsf Ping Number: 133979 Range to target: 8.85 Fish Height: 3.34 Heading: 0.000 Degrees Event Number: 1095 Line Name: 100	Dimensions and attributes Target Width: 0.75 Target Height: 0.25 Target Length: 0.72 Target Shadow: 0.76
	00_007_debris Sonar Time at Target: 4/4/2013 4:07:36 PM Click Position 40.4399772921 -74.0591952750 (WGS84) 40.4398693663-74.0596106479 (NAD27LL) 40.4399772921-74.0591952750 (LocalLL) (X) 579789.59 (Y) 4477017.19 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\100.jsf Ping Number: 133997 Range to target: 13.81 Fish Height: 3.34 Heading: 0.000 Degrees Event Number: 1095 Line Name: 100	Dimensions and attributes Target Width: 0.84 Target Height: 0.20 Target Length: 0.83 Target Shadow: 0.91
	00_008_debris Sonar Time at Target: 4/4/2013 4:21:39 PM Click Position 40.4402386395-74.0592125463 (WGS84) 40.4401307195-74.0596279173 (NAD27LL) 40.4402386395 -74.0592125463 (LocalLL) (X) 579787.82 (Y) 4477046.19 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\17N.jsf Ping Number: 146213 Range to target: 24.28 Fish Height: 4.06 Heading: 0.000 Degrees Event Number: 1099 Line Name: 17N	Dimensions and attributes Target Width: 0.87 Target Height: 0.08 Target Length: 0.86 Target Shadow: 0.50

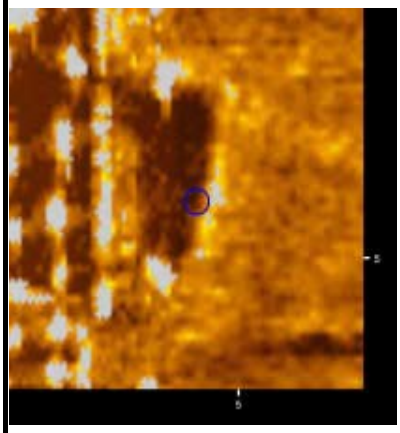
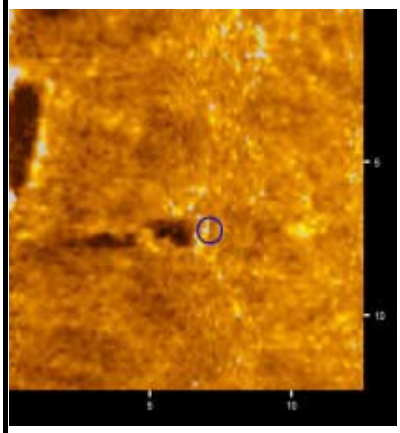
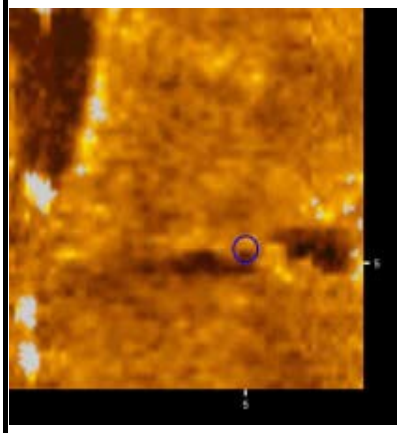
	00_009_debris Sonar Time at Target: 4/4/2013 4:22:14 PM Click Position 40.4408151066-74.0587049857 (WGS84) 40.4407071969-74.0591203667 (NAD27LL) 40.4408151066-74.0587049857 (LocalLL) (X) 579830.18 (Y) 4477110.63 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\17N.jsf Ping Number: 146719 Range to target: 7.55 Fish Height: 3.78 Heading: 0.000 Degrees Event Number: 1099 Line Name: 17N	Dimensions and attributes Target Width: 1.08 Target Height: 0.19 Target Length: 1.44 Target Shadow: 0.45
	00_010_debris Sonar Time at Target: 4/4/2013 4:23:12 PM Click Position 40.4417997129-74.0580016564 (WGS84) 40.4416918216-74.0584170502 (NAD27LL) 40.4417997129-74.0580016564 (LocalLL) (X) 579888.67 (Y) 4477220.56 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\17N.jsf Ping Number: 147552 Range to target: 7.98 Fish Height: 3.99 Heading: 0.000 Degrees Event Number: 1099 Line Name: 17N	Dimensions and attributes Target Width: 0.45 Target Height: 1.06 Target Length: 0.97 Target Shadow: 3.21
	00_011_debris Sonar Time at Target: 4/4/2013 4:23:28 PM Click Position 40.4420933183-74.0578611918 (WGS84) 40.4419854327-74.0582765877 (NAD27LL) 40.4420933183-74.0578611918 (LocalLL) (X) 579900.23 (Y) 4477253.28 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\17N.jsf Ping Number: 147786 Range to target: 11.87 Fish Height: 4.10 Heading: 0.000 Degrees Event Number: 1099 Line Name: 17N	Dimensions and attributes Target Width: 1.11 Target Height: 0.21 Target Length: 2.34 Target Shadow: 0.68

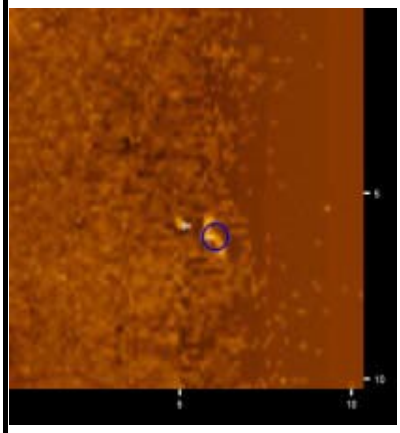
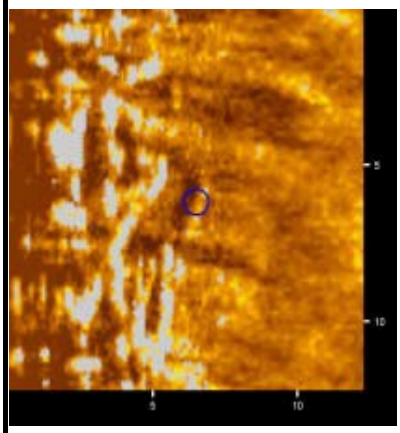
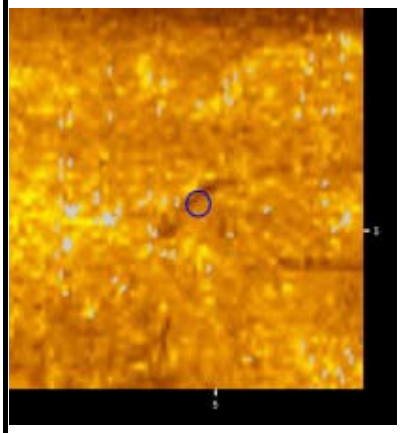
	00_012_debris Sonar Time at Target: 4/4/2013 4:23:30 PM Click Position 40.4421210633-74.0577872886 (WGS84) 40.4420131780 -74.0582026862 (NAD27LL) 40.4421210633-74.0577872886 (LocalLL) (X) 579906.47 (Y) 4477256.43 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\17N.jsf Ping Number: 147822 Range to target: 7.55 Fish Height: 3.99 Heading: 0.000 Degrees Event Number: 1099 Line Name: 17N	Dimensions and attributes Target Width: 1.33 Target Height: 0.26 Target Length: 4.62 Target Shadow: 0.60
	00_013_debris Sonar Time at Target: 4/4/2013 4:16:49 PM Click Position 40.4421414649 -74.0576887227 (WGS84) 40.4420335797-74.0581041227 (NAD27LL) 40.4421414649-74.0576887227 (LocalLL) (X) 579914.80 (Y) 4477258.78 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\18S.jsf Ping Number: 142012 Range to target: 12.95 Fish Height: 4.05 Heading: 0.000 Degrees Event Number: 0 Line Name: 18S	Dimensions and attributes Target Width: 0.94 Target Height: 0.09 Target Length: 1.08 Target Shadow: 0.31
	00_014_debris Sonar Time at Target: 4/4/2013 4:23:33 PM Click Position 40.4422014910-74.0578231197 (WGS84) 40.4420936076-74.0582385159 (NAD27LL) 40.4422014910 -74.0578231197 (LocalLL) (X) 579903.33 (Y) 4477265.32 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\17N.jsf Ping Number: 147865 Range to target: 14.24 Fish Height: 4.10 Heading: 0.000 Degrees Event Number: 1099 Line Name: 17N	Dimensions and attributes Target Width: 1.85 Target Height: 0.59 Target Length: 1.80 Target Shadow: 2.47

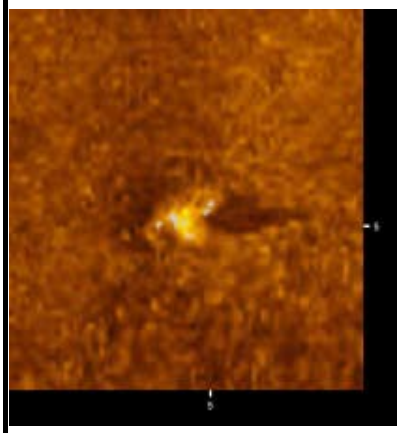
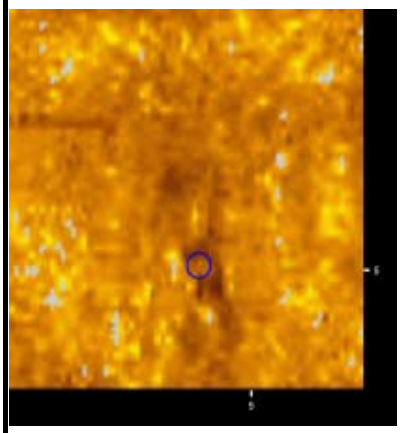
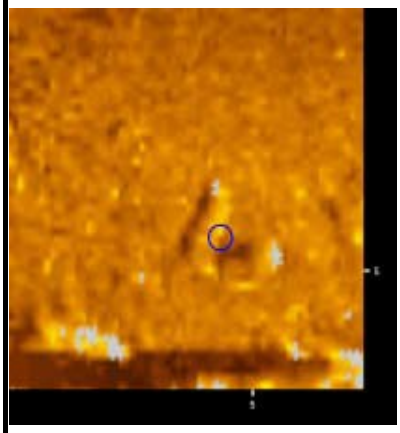
	00_015_debris Sonar Time at Target: 4/4/2013 4:23:51 PM Click Position 40.4425088375-74.0575860636 (WGS84) 40.4424009597 -74.0580014643 (NAD27LL) 40.4425088375-74.0575860636 (LocalLL) (X) 579923.07 (Y) 4477299.65 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\17N.jsf Ping Number: 148120 Range to target: 14.67 Fish Height: 4.10 Heading: 0.000 Degrees Event Number: 1099 Line Name: 17N	Dimensions and attributes Target Width: 0.58 Target Height: 0.12 Target Length: 3.45 Target Shadow: 0.45
	00_016_debris Sonar Time at Target: 4/4/2013 4:23:56 PM Click Position 40.4425679411 -74.0574629862 (WGS84) 40.4424600642-74.0578783898 (NAD27LL) 40.4425679411-74.0574629862 (LocalLL) (X) 579933.44 (Y) 4477306.32 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\17N.jsf Ping Number: 148197 Range to target: 9.50 Fish Height: 3.99 Heading: 0.000 Degrees Event Number: 1099 Line Name: 17N	Dimensions and attributes Target Width: 0.81 Target Height: 0.34 Target Length: 1.59 Target Shadow: 0.97
	00_017_debris Sonar Time at Target: 4/4/2013 4:24:51 PM Click Position 40.4435988584-74.0569316840 (WGS84) 40.4434910015-74.0573470956 (NAD27LL) 40.4435988584 -74.0569316840 (LocalLL) (X) 579977.28 (Y) 4477421.24 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\17N.jsf Ping Number: 148997 Range to target: 32.15 Fish Height: 4.49 Heading: 0.000 Degrees Event Number: 1099 Line Name: 17N	Dimensions and attributes Target Width: 1.49 Target Height: 0.21 Target Length: 10.62 Target Shadow: 1.67

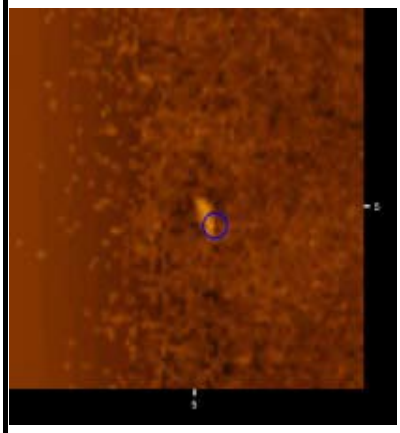
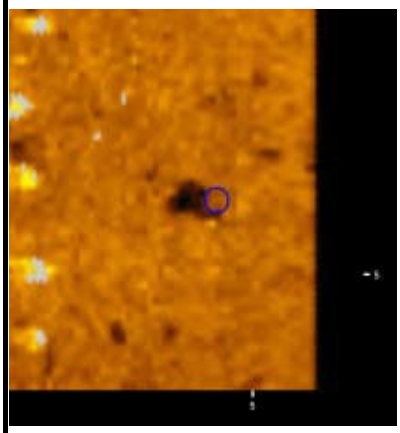
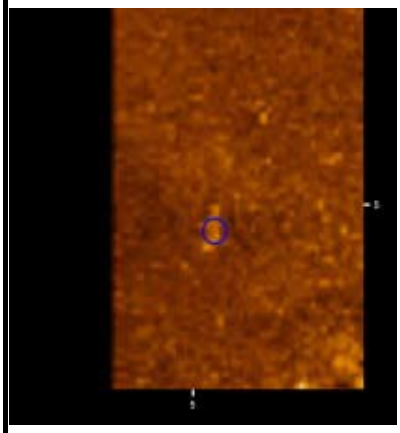
	00_018_debris Sonar Time at Target: 4/4/2013 4:24:16 PM Click Position 40.4429686701 -74.0573662223 (WGS84) 40.4428608014 -74.0577816262 (NAD27LL) 40.4429686701 -74.0573662223 (LocalLL) (X) 579941.17 (Y) 4477350.89 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\17N.jsf Ping Number: 148478 Range to target: 30.10 Fish Height: 4.49 Heading: 0.000 Degrees Event Number: 1099 Line Name: 17N	Dimensions and attributes Target Width: 0.91 Target Height: 0.08 Target Length: 2.53 Target Shadow: 0.53
	00_019_debris Sonar Time at Target: 4/4/2013 4:24:24 PM Click Position 40.4431176671 -74.0572427606 (WGS84) 40.4430098011 -74.0576581668 (NAD27LL) 40.4431176671 -74.0572427606 (LocalLL) (X) 579951.47 (Y) 4477367.54 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\17N.jsf Ping Number: 148600 Range to target: 28.48 Fish Height: 4.49 Heading: 0.000 Degrees Event Number: 1099 Line Name: 17N	Dimensions and attributes Target Width: 0.95 Target Height: 0.23 Target Length: 2.23 Target Shadow: 1.58
	00_020_debris Sonar Time at Target: 4/4/2013 4:24:26 PM Click Position 40.4431524270 -74.0572203604 (WGS84) 40.4430445617 -74.0576357670 (NAD27LL) 40.4431524270 -74.0572203604 (LocalLL) (X) 579953.33 (Y) 4477371.42 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\17N.jsf Ping Number: 148627 Range to target: 28.70 Fish Height: 4.60 Heading: 0.000 Degrees Event Number: 1099 Line Name: 17N	Dimensions and attributes Target Width: 0.88 Target Height: 0.14 Target Length: 2.65 Target Shadow: 0.90

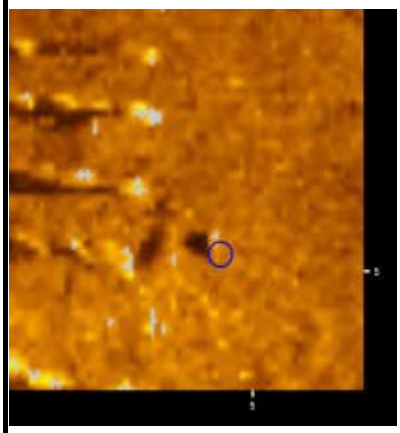
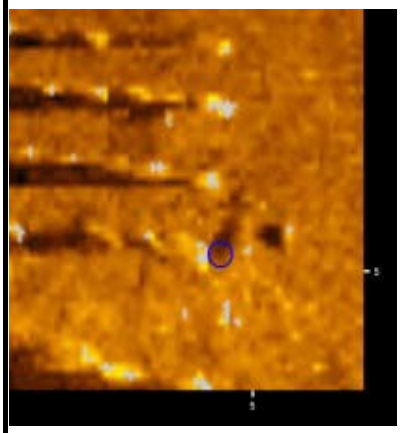
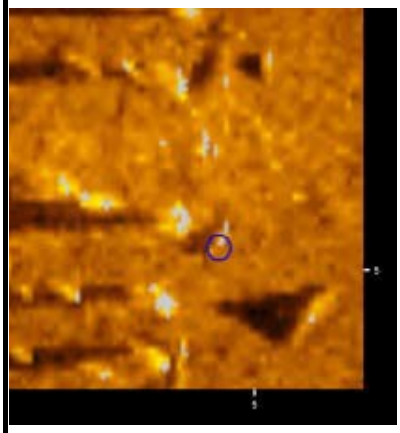
	00_022_debris Sonar Time at Target: 4/4/2013 4:25:15 PM Click Position 40.4440114607 -74.0566340067 (WGS84) 40.4439036115 -74.0570494237 (NAD27LL) 40.4440114607 -74.0566340067 (LocalLL) (X) 580002.04 (Y) 4477467.31 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\17N.jsf Ping Number: 149344 Range to target: 31.50 Fish Height: 4.60 Heading: 0.000 Degrees Event Number: 1099 Line Name: 17N	Dimensions and attributes Target Width: 0.91 Target Height: 0.10 Target Length: 1.82 Target Shadow: 0.68
	00_023_debris Sonar Time at Target: 4/4/2013 4:25:18 PM Click Position 40.4440575611 -74.0566246048 (WGS84) 40.4439497128 -74.0570400218 (NAD27LL) 40.4440575611 -74.0566246048 (LocalLL) (X) 580002.78 (Y) 4477472.43 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\17N.jsf Ping Number: 149376 Range to target: 33.23 Fish Height: 4.71 Heading: 0.000 Degrees Event Number: 1099 Line Name: 17N	Dimensions and attributes Target Width: 1.13 Target Height: 0.26 Target Length: 1.66 Target Shadow: 1.96
	00_024_debris Sonar Time at Target: 4/4/2013 4:25:27 PM Click Position 40.4442032286 -74.0564676632 (WGS84) 40.4440953828 -74.0568830835 (NAD27LL) 40.4442032286 -74.0564676632 (LocalLL) (X) 580015.91 (Y) 4477488.74 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\17N.jsf Ping Number: 149510 Range to target: 29.35 Fish Height: 4.71 Heading: 0.000 Degrees Event Number: 1099 Line Name: 17N	Dimensions and attributes Target Width: 1.14 Target Height: 0.06 Target Length: 2.20 Target Shadow: 0.38

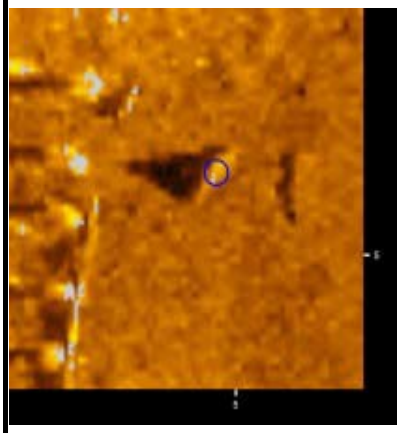
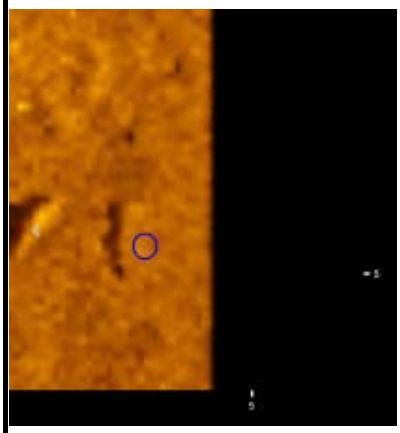
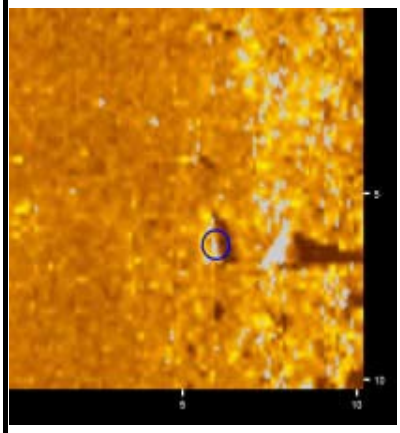
	00_025_debris Sonar Time at Target: 4/4/2013 4:25:33 PM Click Position 40.4443278594 -74.0564365392 (WGS84) 40.4442200162 -74.0568519595 (NAD27LL) 40.4443278594 -74.0564365392 (LocalLL) (X) 580018.41 (Y) 4477502.61 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\17N.jsf Ping Number: 149596 Range to target: 33.88 Fish Height: 4.71 Heading: 0.000 Degrees Event Number: 1099 Line Name: 17N	Dimensions and attributes Target Width: 0.77 Target Height: 0.17 Target Length: 3.34 Target Shadow: 1.36
	00_026_debris Sonar Time at Target: 4/4/2013 4:25:34 PM Click Position 40.4443197923 -74.0563559597 (WGS84) 40.4442119486 -74.0567713821 (NAD27LL) 40.4443197923 -74.0563559597 (LocalLL) (X) 580025.25 (Y) 4477501.78 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\17N.jsf Ping Number: 149613 Range to target: 27.51 Fish Height: 4.71 Heading: 0.000 Degrees Event Number: 1099 Line Name: 17N	Dimensions and attributes Target Width: 1.21 Target Height: 0.26 Target Length: 1.36 Target Shadow: 1.66
	00_027_debris Sonar Time at Target: 4/4/2013 4:25:34 PM Click Position 40.4443324646 -74.0563845753 (WGS84) 40.4442246213 -74.0567999970 (NAD27LL) 40.4443324646 -74.0563845753 (LocalLL) (X) 580022.81 (Y) 4477503.17 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\17N.jsf Ping Number: 149613 Range to target: 30.32 Fish Height: 4.71 Heading: 0.000 Degrees Event Number: 1099 Line Name: 17N	Dimensions and attributes Target Width: 0.88 Target Height: 0.15 Target Length: 0.77 Target Shadow: 0.98

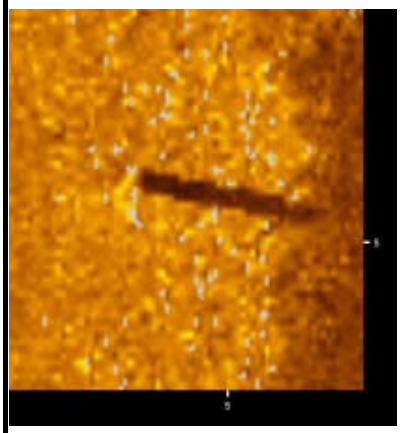
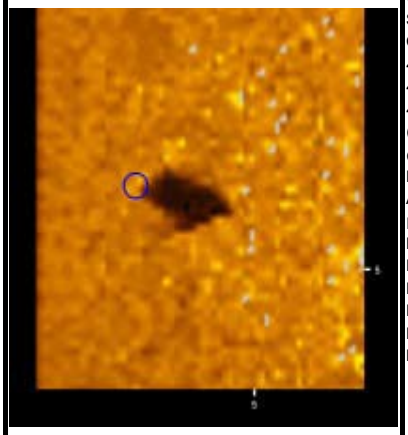
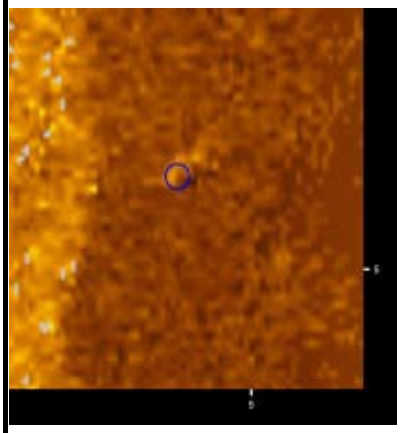
	00_028_debris Sonar Time at Target: 4/4/2013 4:14:39 PM Click Position 40.4444435665-74.0560411233 (WGS84) 40.4443357242 -74.0564565532 (NAD27LL) 40.4444435665-74.0560411233 (LocalLL) (X) 580051.80 (Y) 4477515.81 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\18S.jsf Ping Number: 140117 Range to target: 14.24 Fish Height: 4.48 Heading: 0.000 Degrees Event Number: 0 Line Name: 18S	Dimensions and attributes Target Width: 0.83 Target Height: 0.28 Target Length: 1.63 Target Shadow: 1.00
	00_029_debris Sonar Time at Target: 4/4/2013 4:25:50 PM Click Position 40.4446465941 -74.0562133175 (WGS84) 40.4445387569-74.0566287418 (NAD27LL) 40.4446465941-74.0562133175 (LocalLL) (X) 580036.96 (Y) 4477538.19 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\17N.jsf Ping Number: 149852 Range to target: 36.04 Fish Height: 4.76 Heading: 0.000 Degrees Event Number: 1099 Line Name: 17N	Dimensions and attributes Target Width: 0.81 Target Height: 0.10 Target Length: 2.14 Target Shadow: 0.75
	00_030_debris Sonar Time at Target: 4/4/2013 4:42:37 PM Click Position 40.4449971294-74.0560151475 (WGS84) 40.4448892990-74.0564305750 (NAD27LL) 40.4449971294 -74.0560151475 (LocalLL) (X) 580053.35 (Y) 4477577.28 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\14S.jsf Ping Number: 164437 Range to target: 12.84 Fish Height: 4.86 Heading: 0.000 Degrees Event Number: 0 Line Name: 14S	Dimensions and attributes Target Width: 0.42 Target Height: 0.18 Target Length: 1.52 Target Shadow: 0.52

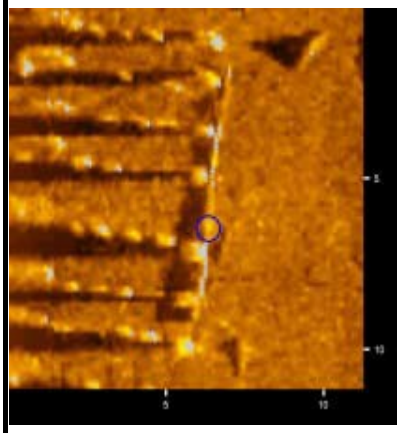
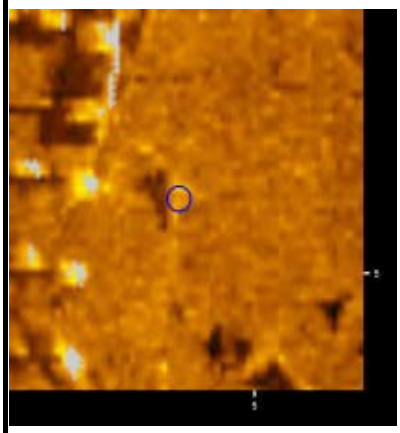
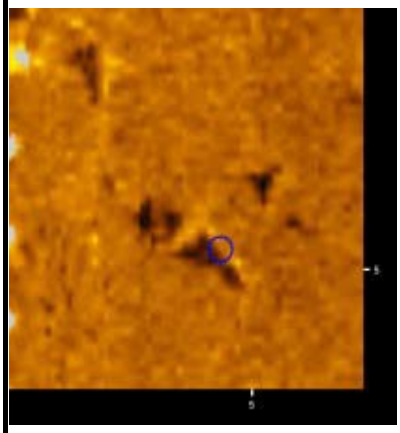
	00_031_debris Sonar Time at Target: 4/4/2013 4:42:30 PM Click Position 40.4451516658-74.0559923005 (WGS84) 40.4450438386 -74.0564077277 (NAD27LL) 40.4451516658-74.0559923005 (LocalLL) (X) 580055.10 (Y) 4477594.45 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\14S.jsf Ping Number: 164328 Range to target: 19.85 Fish Height: 4.96 Heading: 0.000 Degrees Event Number: 0 Line Name: 14S	Dimensions and attributes Target Width: 1.49 Target Height: 0.54 Target Length: 1.11 Target Shadow: 2.50
	00_032_debris Sonar Time at Target: 4/4/2013 4:42:39 PM Click Position 40.4449934716 -74.0561031934 (WGS84) 40.4448856414-74.0565186186 (NAD27LL) 40.4449934716-74.0561031934 (LocalLL) (X) 580045.89 (Y) 4477576.79 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\14S.jsf Ping Number: 164465 Range to target: 19.10 Fish Height: 4.53 Heading: 0.000 Degrees Event Number: 0 Line Name: 14S	Dimensions and attributes Target Width: 0.00 Target Height: 0.13 Target Length: 0.80 Target Shadow: 0.59
	00_033_debris Sonar Time at Target: 4/4/2013 5:19:08 PM Click Position 40.4449891024-74.0562006146 (WGS84) 40.4448812725-74.0566160374 (NAD27LL) 40.4449891024 -74.0562006146 (LocalLL) (X) 580037.63 (Y) 4477576.22 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf Ping Number: 196186 Range to target: 11.87 Fish Height: 5.07 Heading: 0.000 Degrees Event Number: 0 Line Name: 9S	Dimensions and attributes Target Width: 1.81 Target Height: 0.11 Target Length: 1.48 Target Shadow: 0.29

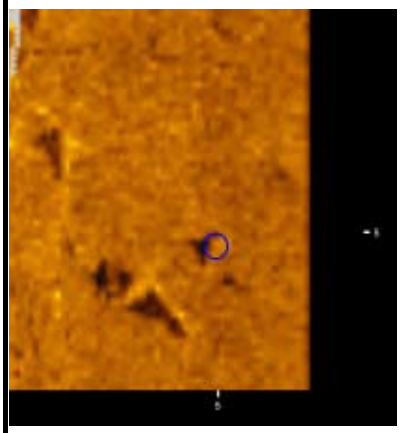
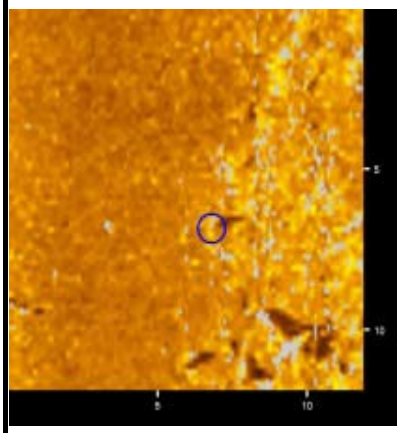
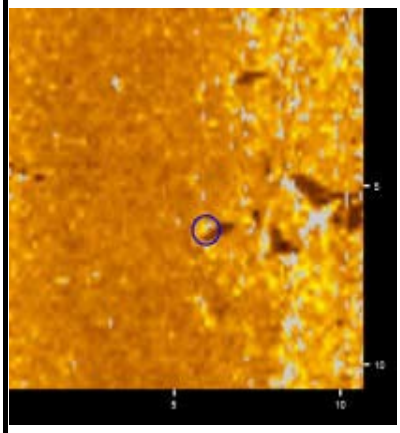
	00_034_debris Sonar Time at Target: 4/4/2013 5:18:56 PM Click Position 40.4451960655-74.0560643654 (WGS84) 40.4450882395-74.0564797906 (NAD27LL) 40.4451960655-74.0560643654 (LocalLL) (X) 580048.94 (Y) 4477599.32 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf Ping Number: 196011 Range to target: 11.33 Fish Height: 5.29 Heading: 0.000 Degrees Event Number: 0 Line Name: 9S	Dimensions and attributes Target Width: 0.99 Target Height: 0.27 Target Length: 1.24 Target Shadow: 0.66
	00_035_debris Sonar Time at Target: 4/4/2013 5:19:12 PM Click Position 40.4449491665-74.0563222093 (WGS84) 40.4448413362-74.0567376292 (NAD27LL) 40.4449491665-74.0563222093 (LocalLL) (X) 580027.37 (Y) 4477571.68 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf Ping Number: 196246 Range to target: 4.96 Fish Height: 4.75 Heading: 0.000 Degrees Event Number: 0 Line Name: 9S	Dimensions and attributes Target Width: 0.75 Target Height: 0.54 Target Length: 0.74 Target Shadow: 0.88
	00_036_debris Sonar Time at Target: 4/4/2013 5:19:04 PM Click Position 40.4451348885-74.0563336422 (WGS84) 40.4450270623-74.0567490608 (NAD27LL) 40.4451348885-74.0563336422 (LocalLL) (X) 580026.18 (Y) 4477592.28 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf Ping Number: 196125 Range to target: 5.72 Fish Height: 5.25 Heading: 0.000 Degrees Event Number: 0 Line Name: 9S	Dimensions and attributes Target Width: 1.25 Target Height: 0.24 Target Length: 1.32 Target Shadow: 0.37

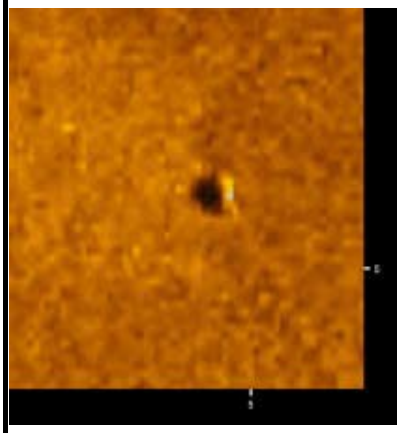
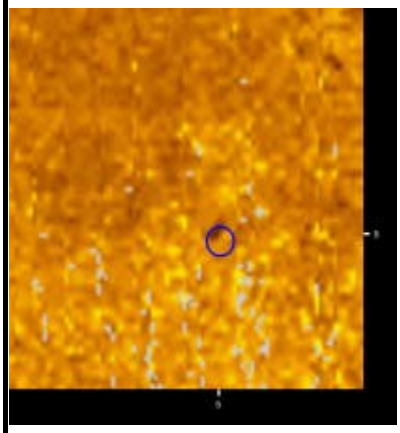
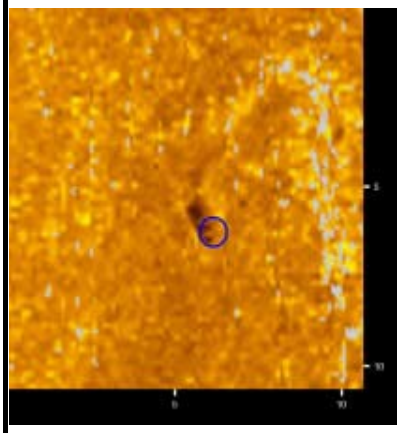
	00_037_debris Sonar Time at Target: 4/4/2013 5:19:18 PM Click Position 40.4448508242-74.0563627028 (WGS84) 40.4447429920 -74.0567781222 (NAD27LL) 40.4448508242-74.0563627028 (LocalLL) (X) 580024.05 (Y) 4477560.72 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf Ping Number: 196322 Range to target: 7.34 Fish Height: 4.75 Heading: 0.000 Degrees Event Number: 0 Line Name: 9S	Dimensions and attributes Target Width: 0.59 Target Height: 0.33 Target Length: 0.66 Target Shadow: 0.66
	00_038_debris Sonar Time at Target: 4/4/2013 5:19:18 PM Click Position 40.4448429047 -74.0563481137 (WGS84) 40.4447350722-74.0567635335 (NAD27LL) 40.4448429047-74.0563481137 (LocalLL) (X) 580025.29 (Y) 4477559.86 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf Ping Number: 196323 Range to target: 8.85 Fish Height: 4.75 Heading: 0.000 Degrees Event Number: 0 Line Name: 9S	Dimensions and attributes Target Width: 0.89 Target Height: 0.20 Target Length: 1.12 Target Shadow: 0.44
	00_039_debris Sonar Time at Target: 4/4/2013 5:19:19 PM Click Position 40.4448205933-74.0563707825 (WGS84) 40.4447127604-74.0567862019 (NAD27LL) 40.4448205933 -74.0563707825 (LocalLL) (X) 580023.40 (Y) 4477557.36 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf Ping Number: 196344 Range to target: 8.42 Fish Height: 4.75 Heading: 0.000 Degrees Event Number: 0 Line Name: 9S	Dimensions and attributes Target Width: 0.33 Target Height: 0.43 Target Length: 3.58 Target Shadow: 0.96

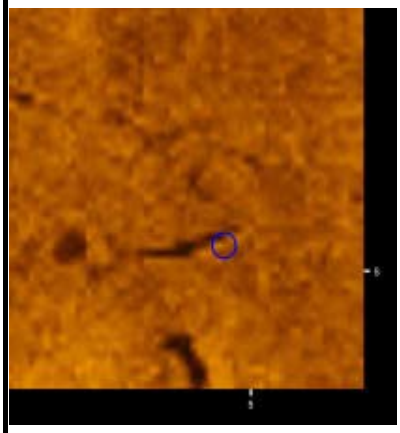
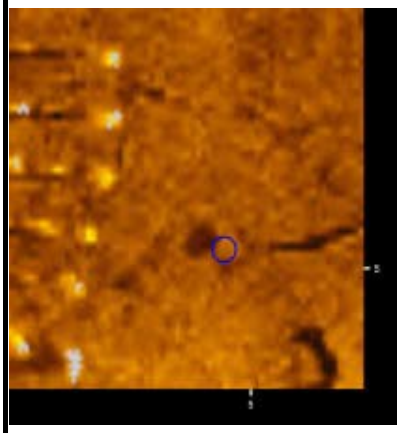
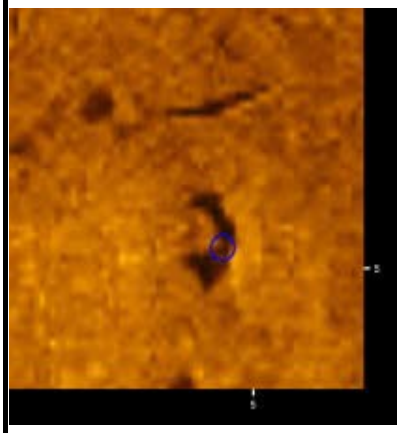
	00_040_debris Sonar Time at Target: 4/4/2013 5:19:20 PM Click Position 40.4448189875-74.0563984550 (WGS84) 40.4447111548 -74.0568138736 (NAD27LL) 40.4448189875-74.0563984550 (LocalLL) (X) 580021.05 (Y) 4477557.16 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf Ping Number: 196353 Range to target: 6.47 Fish Height: 4.64 Heading: 0.000 Degrees Event Number: 0 Line Name: 9S	Dimensions and attributes Target Width: 0.73 Target Height: 0.84 Target Length: 1.45 Target Shadow: 1.76
	00_041_debris Sonar Time at Target: 4/4/2013 5:19:20 PM Click Position 40.4448252934 -74.0564230823 (WGS84) 40.4447174609-74.0568385003 (NAD27LL) 40.4448252934-74.0564230823 (LocalLL) (X) 580018.96 (Y) 4477557.84 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf Ping Number: 196356 Range to target: 4.32 Fish Height: 4.53 Heading: 0.000 Degrees Event Number: 0 Line Name: 9S	Dimensions and attributes Target Width: 0.73 Target Height: 0.34 Target Length: 1.32 Target Shadow: 0.51
	00_042_debris Sonar Time at Target: 4/4/2013 5:27:46 PM Click Position 40.4448172366-74.0564532489 (WGS84) 40.4447094040-74.0568686662 (NAD27LL) 40.4448172366 -74.0564532489 (LocalLL) (X) 580016.41 (Y) 4477556.91 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\8N.jsf Ping Number: 203686 Range to target: 12.41 Fish Height: 5.23 Heading: 0.000 Degrees Event Number: 0 Line Name: 8N	Dimensions and attributes Target Width: 0.77 Target Height: 0.31 Target Length: 1.36 Target Shadow: 0.85

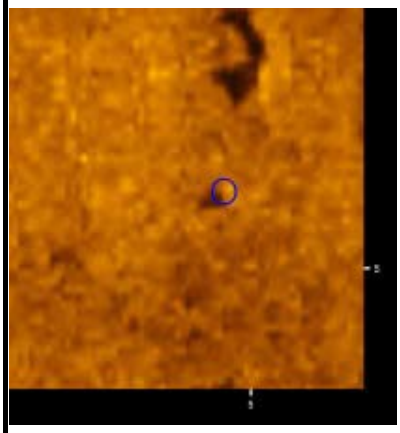
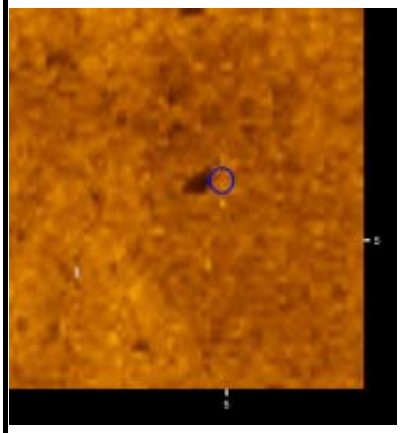
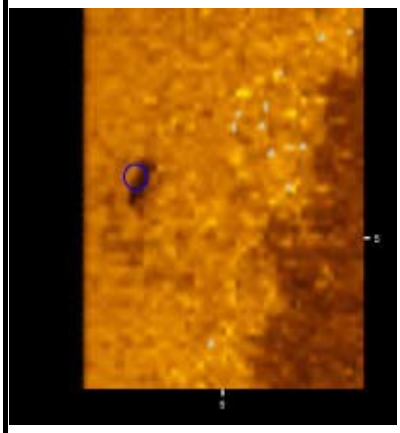
	00_043_debris Sonar Time at Target: 4/4/2013 5:19:24 PM Click Position 40.4448231447 -74.0565957708 (WGS84) 40.4447153128 -74.0570111843 (NAD27LL) 40.4448231447 -74.0565957708 (LocalLL) (X) 580004.32 (Y) 4477557.44 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf Ping Number: 196408 Range to target: 8.20 Fish Height: 4.75 Heading: 0.000 Degrees Event Number: 0 Line Name: 9S	Dimensions and attributes Target Width: 0.81 Target Height: 1.54 Target Length: 1.11 Target Shadow: 4.55
	00_044_debris Sonar Time at Target: 4/4/2013 5:19:26 PM Click Position 40.4447675960 -74.0565946413 (WGS84) 40.4446597630 -74.0570100551 (NAD27LL) 40.4447675960 -74.0565946413 (LocalLL) (X) 580004.48 (Y) 4477551.28 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf Ping Number: 196444 Range to target: 4.96 Fish Height: 4.64 Heading: 0.000 Degrees Event Number: 0 Line Name: 9S	Dimensions and attributes Target Width: 1.41 Target Height: 1.02 Target Length: 1.21 Target Shadow: 1.92
	00_045_debris Sonar Time at Target: 4/4/2013 5:19:28 PM Click Position 40.4447769977 -74.0567015828 (WGS84) 40.4446691653 -74.0571169939 (NAD27LL) 40.4447769977 -74.0567015828 (LocalLL) (X) 579995.40 (Y) 4477552.22 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf Ping Number: 196470 Range to target: 13.27 Fish Height: 4.53 Heading: 0.000 Degrees Event Number: 0 Line Name: 9S	Dimensions and attributes Target Width: 0.68 Target Height: 0.12 Target Length: 1.47 Target Shadow: 0.37

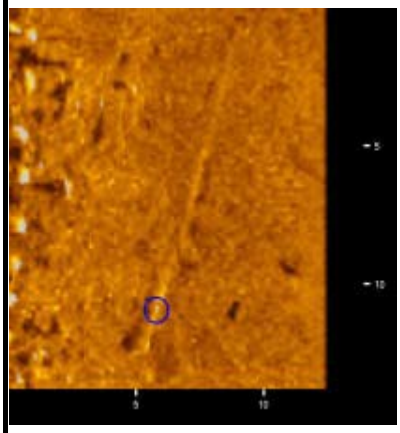
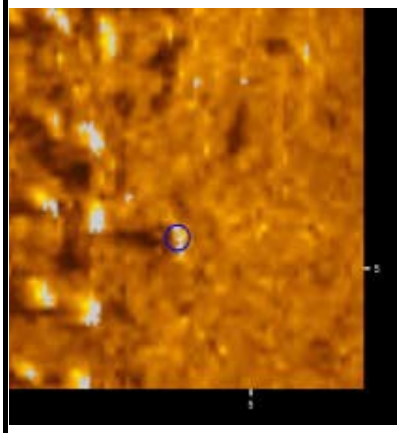
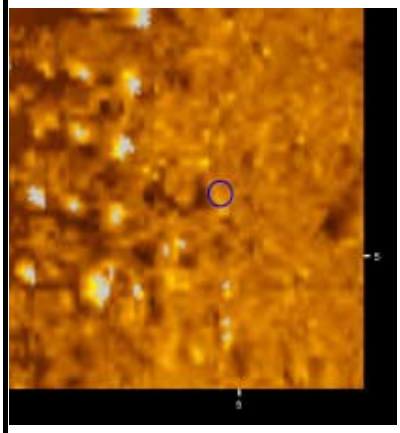
	00_046_debris Sonar Time at Target: 4/4/2013 5:19:22 PM Click Position 40.4447623611-74.0563960367 (WGS84) 40.4446545271-74.0568114557 (NAD27LL) 40.4447623611-74.0563960367 (LocalLL) (X) 580021.33 (Y) 4477550.87 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf Ping Number: 196389 Range to target: 9.82 Fish Height: 4.75 Heading: 0.000 Degrees Event Number: 0 Line Name: 9S	Dimensions and attributes Target Width: 1.05 Target Height: 0.38 Target Length: 7.66 Target Shadow: 0.96
	00_047_debris Sonar Time at Target: 4/4/2013 5:19:24 PM Click Position 40.4447390442-74.0564302958 (WGS84) 40.4446312099-74.0568457141 (NAD27LL) 40.4447390442-74.0564302958 (LocalLL) (X) 580018.45 (Y) 4477548.26 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf Ping Number: 196414 Range to target: 8.63 Fish Height: 4.75 Heading: 0.000 Degrees Event Number: 0 Line Name: 9S	Dimensions and attributes Target Width: 0.96 Target Height: 0.33 Target Length: 1.17 Target Shadow: 0.73
	00_048_debris Sonar Time at Target: 4/4/2013 5:19:26 PM Click Position 40.4447231278-74.0564737913 (WGS84) 40.4446152933-74.0568892085 (NAD27LL) 40.4447231278-74.0564737913 (LocalLL) (X) 580014.78 (Y) 4477546.45 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf Ping Number: 196437 Range to target: 6.37 Fish Height: 4.64 Heading: 0.000 Degrees Event Number: 0 Line Name: 9S	Dimensions and attributes Target Width: 1.16 Target Height: 0.54 Target Length: 1.93 Target Shadow: 1.03

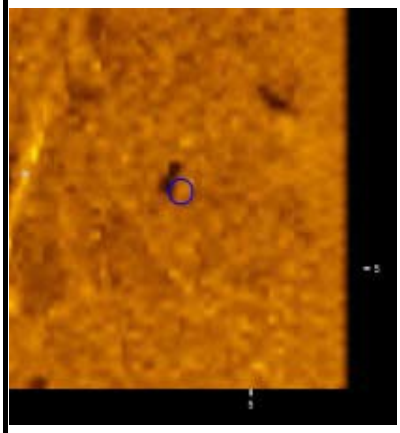
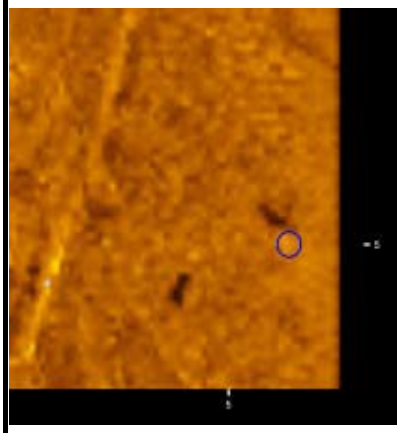
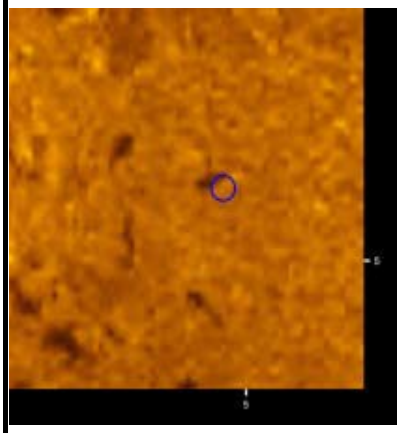
	00_049_debris Sonar Time at Target: 4/4/2013 5:19:25 PM Click Position 40.4447388987 -74.0564777690 (WGS84) 40.4446310645 -74.0568931861 (NAD27LL) 40.4447388987 -74.0564777690 (LocalLL) (X) 580014.42 (Y) 4477548.20 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf Ping Number: 196428 Range to target: 5.18 Fish Height: 4.64 Heading: 0.000 Degrees Event Number: 0 Line Name: 9S	Dimensions and attributes Target Width: 0.63 Target Height: 0.36 Target Length: 0.84 Target Shadow: 0.59
	00_050_debris Sonar Time at Target: 4/4/2013 5:27:40 PM Click Position 40.4447049025 -74.0565541966 (WGS84) 40.4445970679 -74.0569696118 (NAD27LL) 40.4447049025 -74.0565541966 (LocalLL) (X) 580007.98 (Y) 4477544.35 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\8N.jsf Ping Number: 203597 Range to target: 11.65 Fish Height: 5.13 Heading: 0.000 Degrees Event Number: 0 Line Name: 8N	Dimensions and attributes Target Width: 0.68 Target Height: 0.41 Target Length: 0.85 Target Shadow: 1.10
	00_051_debris Sonar Time at Target: 4/4/2013 5:27:41 PM Click Position 40.4447395663 -74.0565367006 (WGS84) 40.4446317324 -74.0569521162 (NAD27LL) 40.4447395663 -74.0565367006 (LocalLL) (X) 580009.42 (Y) 4477548.22 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\8N.jsf Ping Number: 203621 Range to target: 10.90 Fish Height: 5.23 Heading: 0.000 Degrees Event Number: 0 Line Name: 8N	Dimensions and attributes Target Width: 0.54 Target Height: 0.28 Target Length: 0.76 Target Shadow: 0.68

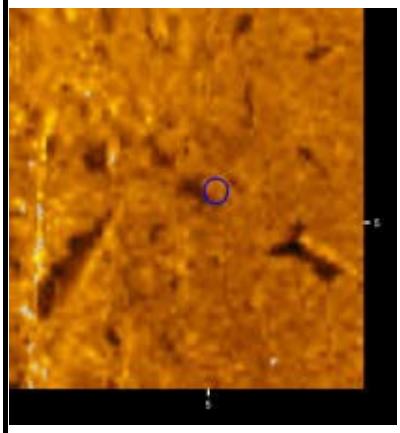
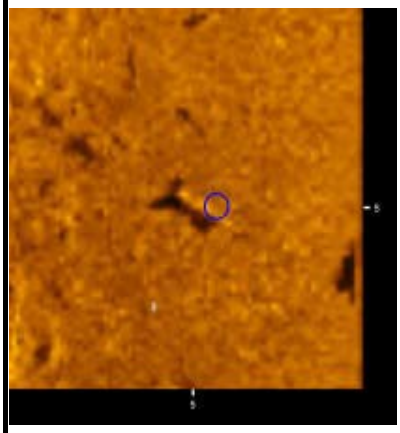
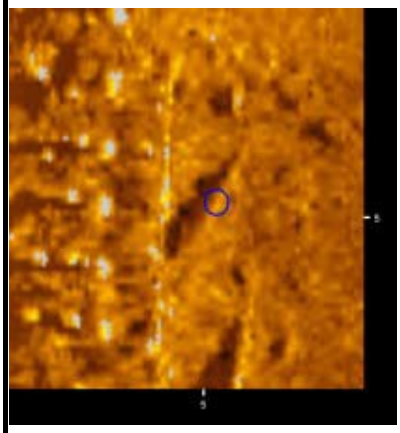
	00_052_debris Sonar Time at Target: 4/4/2013 5:19:37 PM Click Position 40.4445403144 -74.0566143343 (WGS84) 40.4444324766 -74.0570297489 (NAD27LL) 40.4445403144 -74.0566143343 (LocalLL) (X) 580003.08 (Y) 4477526.03 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf Ping Number: 196596 Range to target: 6.80 Fish Height: 4.64 Heading: 0.000 Degrees Event Number: 0 Line Name: 9S	Dimensions and attributes Target Width: 0.66 Target Height: 0.38 Target Length: 0.89 Target Shadow: 0.74
	00_053_debris Sonar Time at Target: 4/4/2013 5:27:28 PM Click Position 40.4444864785 -74.0567209746 (WGS84) 40.4443786399 -74.0571363868 (NAD27LL) 40.4444864785 -74.0567209746 (LocalLL) (X) 579994.10 (Y) 4477519.96 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\8N.jsf Ping Number: 203429 Range to target: 11.87 Fish Height: 4.96 Heading: 0.000 Degrees Event Number: 0 Line Name: 8N	Dimensions and attributes Target Width: 0.43 Target Height: 0.22 Target Length: 0.35 Target Shadow: 0.59
	00_054_debris Sonar Time at Target: 4/4/2013 5:27:24 PM Click Position 40.4444155320 -74.0567947492 (WGS84) 40.4443076921 -74.0572101599 (NAD27LL) 40.4444155320 -74.0567947492 (LocalLL) (X) 579987.92 (Y) 4477512.01 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\8N.jsf Ping Number: 203370 Range to target: 10.25 Fish Height: 4.87 Heading: 0.000 Degrees Event Number: 0 Line Name: 8N	Dimensions and attributes Target Width: 0.57 Target Height: 0.21 Target Length: 1.49 Target Shadow: 0.51

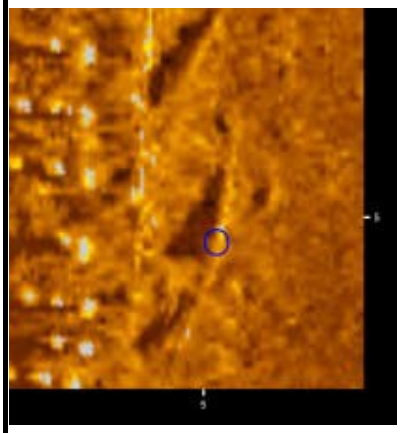
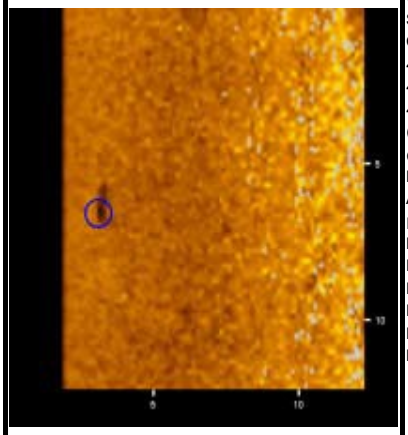
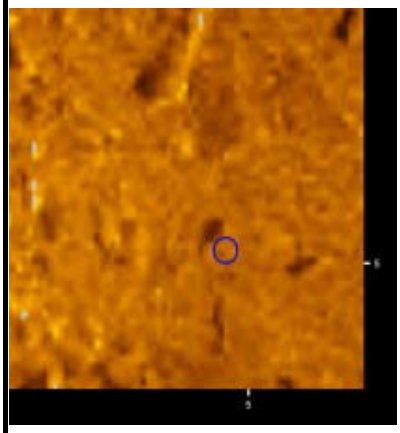
	00_055_debris Sonar Time at Target: 4/4/2013 5:19:43 PM Click Position 40.4444365130-74.0566991315 (WGS84) 40.4443286733 -74.0571145445 (NAD27LL) 40.4444365130-74.0566991315 (LocalLL) (X) 579996.01 (Y) 4477514.43 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf Ping Number: 196688 Range to target: 6.80 Fish Height: 4.32 Heading: 0.000 Degrees Event Number: 0 Line Name: 9S	Dimensions and attributes Target Width: 0.31 Target Height: 0.30 Target Length: 2.38 Target Shadow: 0.59
	00_056_debris Sonar Time at Target: 4/4/2013 5:19:43 PM Click Position 40.4444225208 -74.0566730692 (WGS84) 40.4443146807-74.0570884830 (NAD27LL) 40.4444225208-74.0566730692 (LocalLL) (X) 579998.23 (Y) 4477512.90 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf Ping Number: 196689 Range to target: 9.50 Fish Height: 4.32 Heading: 0.000 Degrees Event Number: 0 Line Name: 9S	Dimensions and attributes Target Width: 1.09 Target Height: 0.34 Target Length: 0.77 Target Shadow: 0.89
	00_057_debris Sonar Time at Target: 4/4/2013 5:19:44 PM Click Position 40.4444136722-74.0567102832 (WGS84) 40.4443058320-74.0571256960 (NAD27LL) 40.4444136722 -74.0567102832 (LocalLL) (X) 579995.09 (Y) 4477511.88 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf Ping Number: 196706 Range to target: 7.34 Fish Height: 4.64 Heading: 0.000 Degrees Event Number: 0 Line Name: 9S	Dimensions and attributes Target Width: 0.74 Target Height: 0.49 Target Length: 1.94 Target Shadow: 1.03

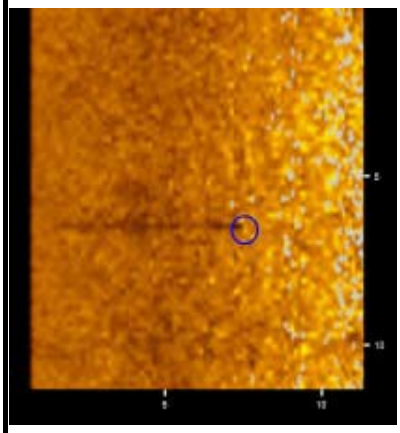
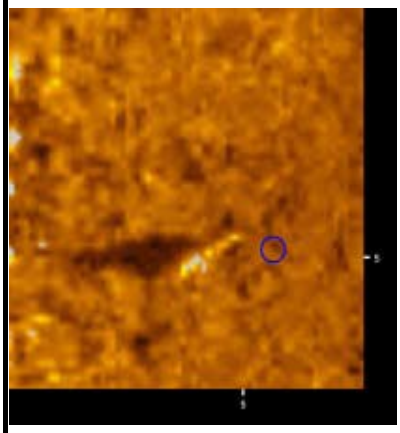
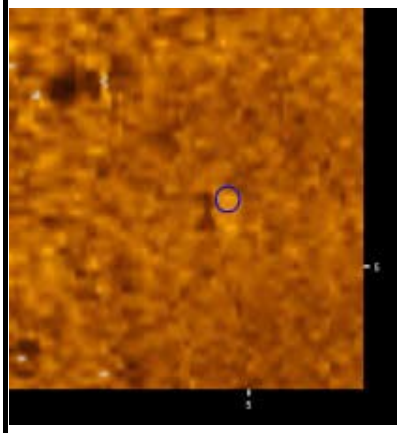
	00_058_debris Sonar Time at Target: 4/4/2013 5:19:45 PM Click Position 40.4443914577 -74.0567194005 (WGS84) 40.4442836170 -74.0571348132 (NAD27LL) 40.4443914577 -74.0567194005 (LocalLL) (X) 579994.34 (Y) 4477509.41 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf Ping Number: 196723 Range to target: 7.98 Fish Height: 4.64 Heading: 0.000 Degrees Event Number: 0 Line Name: 9S	Dimensions and attributes Target Width: 0.47 Target Height: 0.25 Target Length: 0.54 Target Shadow: 0.52
	00_059_debris Sonar Time at Target: 4/4/2013 5:19:47 PM Click Position 40.4443642633 -74.0567475032 (WGS84) 40.4442564222 -74.0571629154 (NAD27LL) 40.4443642633 -74.0567475032 (LocalLL) (X) 579991.99 (Y) 4477506.37 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf Ping Number: 196749 Range to target: 7.55 Fish Height: 4.53 Heading: 0.000 Degrees Event Number: 0 Line Name: 9S	Dimensions and attributes Target Width: 1.12 Target Height: 0.41 Target Length: 0.89 Target Shadow: 0.89
	00_060_debris Sonar Time at Target: 4/4/2013 5:19:49 PM Click Position 40.4443958053 -74.0568835399 (WGS84) 40.4442879654 -74.0572989484 (NAD27LL) 40.4443958053 -74.0568835399 (LocalLL) (X) 579980.42 (Y) 4477509.74 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf Ping Number: 196770 Range to target: 4.10 Fish Height: 4.64 Heading: 0.000 Degrees Event Number: 0 Line Name: 9S	Dimensions and attributes Target Width: 0.60 Target Height: 0.40 Target Length: 1.13 Target Shadow: 0.59

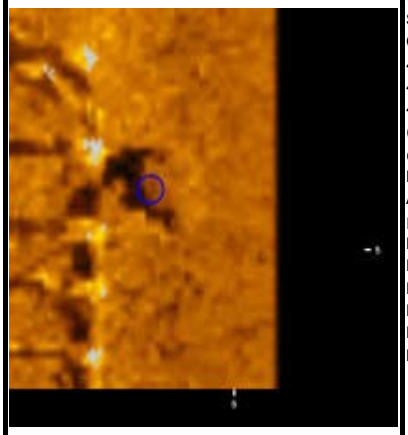
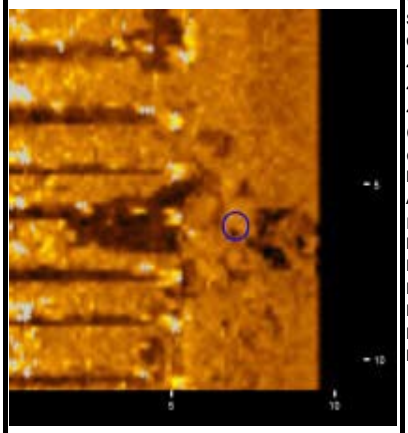
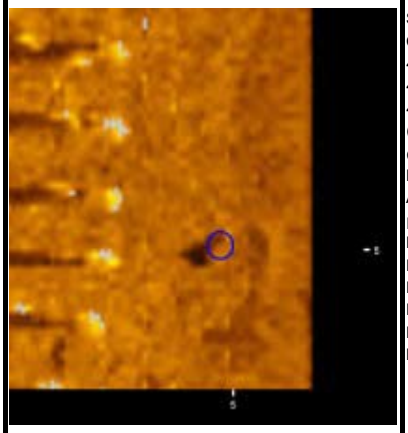
	00_061_debris Sonar Time at Target: 4/4/2013 5:19:54 PM Click Position 40.4442389189-74.0568196176 (WGS84) 40.4441310754-74.0572350286 (NAD27LL) 40.4442389189-74.0568196176 (LocalLL) (X) 579986.02 (Y) 4477492.39 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf Ping Number: 196852 Range to target: 9.60 Fish Height: 4.64 Heading: 0.000 Degrees Event Number: 0 Line Name: 9S	Dimensions and attributes Target Width: 1.03 Target Height: 0.33 Target Length: 12.38 Target Shadow: 0.81
	00_062_debris Sonar Time at Target: 4/4/2013 5:19:52 PM Click Position 40.4442584301-74.0567559143 (WGS84) 40.4441505868-74.0571713268 (NAD27LL) 40.4442584301-74.0567559143 (LocalLL) (X) 579991.40 (Y) 4477494.61 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf Ping Number: 196820 Range to target: 13.10 Fish Height: 4.75 Heading: 0.000 Degrees Event Number: 0 Line Name: 9S	Dimensions and attributes Target Width: 1.18 Target Height: 0.46 Target Length: 0.89 Target Shadow: 1.48
	00_063_debris Sonar Time at Target: 4/4/2013 5:19:55 PM Click Position 40.4442190281-74.0567862837 (WGS84) 40.4441111840-74.0572016957 (NAD27LL) 40.4442190281-74.0567862837 (LocalLL) (X) 579988.88 (Y) 4477490.21 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf Ping Number: 196855 Range to target: 13.16 Fish Height: 4.64 Heading: 0.000 Degrees Event Number: 0 Line Name: 9S	Dimensions and attributes Target Width: 0.96 Target Height: 0.17 Target Length: 1.41 Target Shadow: 0.52

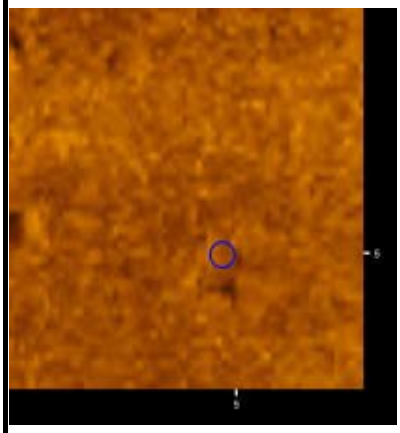
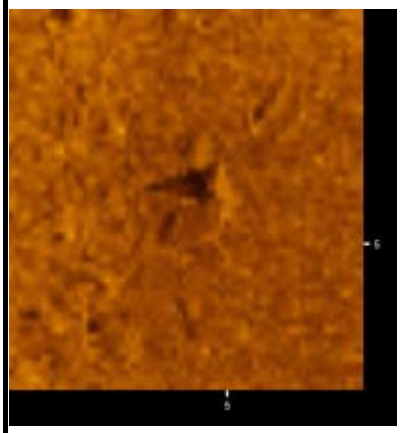
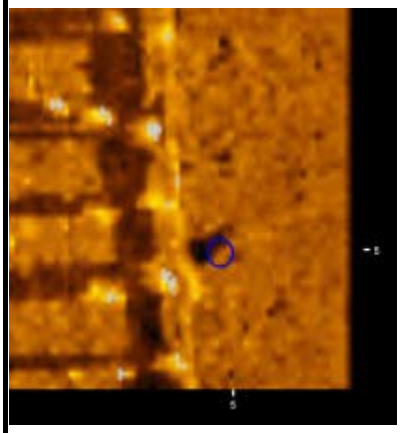
	00_064_debris Sonar Time at Target: 4/4/2013 5:19:54 PM Click Position 40.4442528267 -74.0568532084 (WGS84) 40.4441449836 -74.0572686184 (NAD27LL) 40.4442528267 -74.0568532084 (LocalLL) (X) 579983.16 (Y) 4477493.90 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf Ping Number: 196853 Range to target: 6.37 Fish Height: 4.64 Heading: 0.000 Degrees Event Number: 0 Line Name: 9S	Dimensions and attributes Target Width: 0.56 Target Height: 0.25 Target Length: 0.75 Target Shadow: 0.44
	00_065_debris Sonar Time at Target: 4/4/2013 5:19:54 PM Click Position 40.4442723906 -74.0568689702 (WGS84) 40.4441645480 -74.0572843797 (NAD27LL) 40.4442723906 -74.0568689702 (LocalLL) (X) 579981.80 (Y) 4477496.06 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf Ping Number: 196845 Range to target: 4.10 Fish Height: 4.75 Heading: 0.000 Degrees Event Number: 0 Line Name: 9S	Dimensions and attributes Target Width: 0.82 Target Height: 0.41 Target Length: 0.59 Target Shadow: 0.59
	00_066_debris Sonar Time at Target: 4/4/2013 5:19:57 PM Click Position 40.4442138781 -74.0568718072 (WGS84) 40.4441060343 -74.0572872169 (NAD27LL) 40.4442138781 -74.0568718072 (LocalLL) (X) 579981.63 (Y) 4477489.56 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf Ping Number: 196884 Range to target: 7.23 Fish Height: 4.75 Heading: 0.000 Degrees Event Number: 0 Line Name: 9S	Dimensions and attributes Target Width: 0.37 Target Height: 0.23 Target Length: 0.80 Target Shadow: 0.44

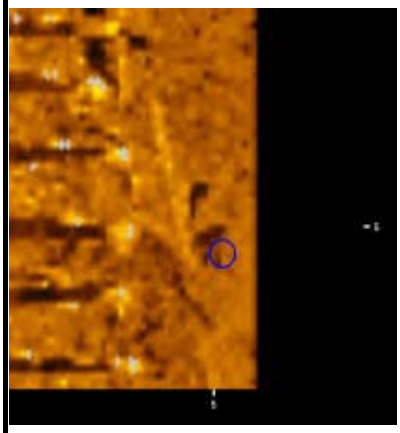
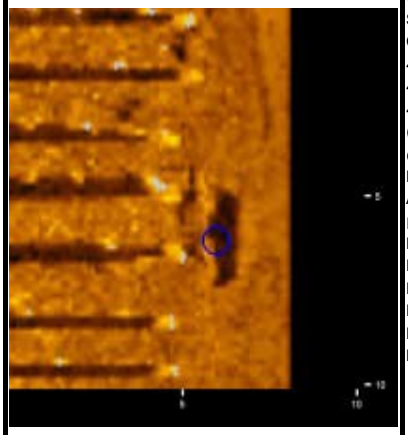
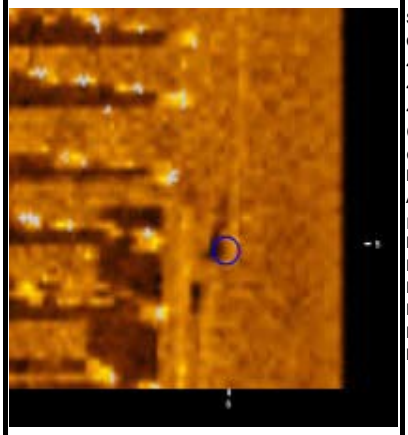
	00_067_debris Sonar Time at Target: 4/4/2013 5:19:58 PM Click Position 40.4441773857 -74.0568615691 (WGS84) 40.4440695410 -74.0572769793 (NAD27LL) 40.4441773857 -74.0568615691 (LocalLL) (X) 579982.54 (Y) 4477485.52 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf Ping Number: 196905 Range to target: 10.03 Fish Height: 4.64 Heading: 0.000 Degrees Event Number: 0 Line Name: 9S	Dimensions and attributes Target Width: 1.19 Target Height: 0.32 Target Length: 0.82 Target Shadow: 0.81
	00_068_debris Sonar Time at Target: 4/4/2013 5:19:59 PM Click Position 40.4441803218 -74.0569020576 (WGS84) 40.4440724773 -74.0573174668 (NAD27LL) 40.4441803218 -74.0569020576 (LocalLL) (X) 579979.10 (Y) 4477485.81 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf Ping Number: 196915 Range to target: 6.91 Fish Height: 4.64 Heading: 0.000 Degrees Event Number: 0 Line Name: 9S	Dimensions and attributes Target Width: 0.43 Target Height: 0.34 Target Length: 1.75 Target Shadow: 0.66
	00_069_debris Sonar Time at Target: 4/4/2013 5:19:59 PM Click Position 40.4441508242 -74.0568391512 (WGS84) 40.4440429789 -74.0572545621 (NAD27LL) 40.4441508242 -74.0568391512 (LocalLL) (X) 579984.47 (Y) 4477482.59 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf Ping Number: 196916 Range to target: 13.16 Fish Height: 4.64 Heading: 0.000 Degrees Event Number: 0 Line Name: 9S	Dimensions and attributes Target Width: 0.73 Target Height: 0.30 Target Length: 3.19 Target Shadow: 0.96

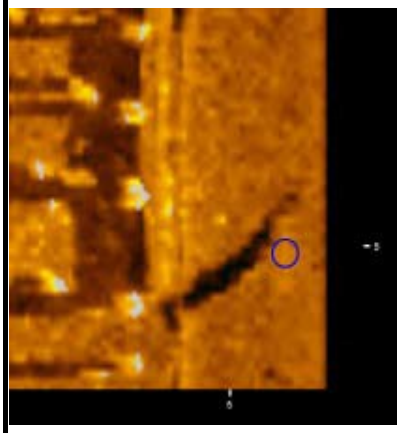
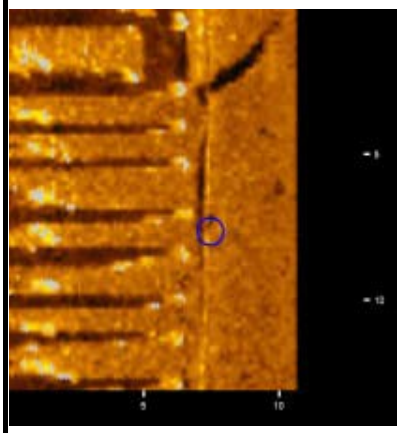
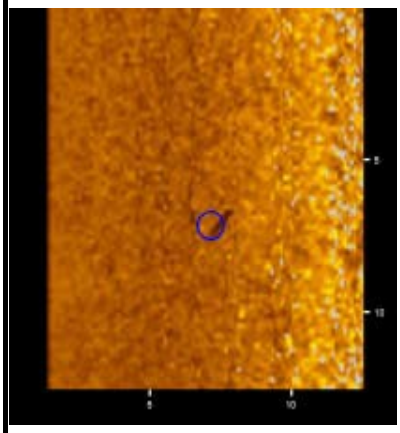
	00_070_debris Sonar Time at Target: 4/4/2013 5:20:01 PM Click Position 40.4441180148-74.0568697909 (WGS84) 40.4440101689-74.0572852012 (NAD27LL) 40.4441180148-74.0568697909 (LocalLL) (X) 579981.91 (Y) 4477478.92 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf Ping Number: 196947 Range to target: 12.73 Fish Height: 4.64 Heading: 0.000 Degrees Event Number: 0 Line Name: 9S	Dimensions and attributes Target Width: 0.82 Target Height: 0.39 Target Length: 4.88 Target Shadow: 1.26
	00_071_debris Sonar Time at Target: 4/4/2013 4:55:34 PM Click Position 40.4441843429-74.0569562231 (WGS84) 40.4440764988-74.0573716308 (NAD27LL) 40.4441843429-74.0569562231 (LocalLL) (X) 579974.50 (Y) 4477486.21 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf Ping Number: 175698 Range to target: 4.10 Fish Height: 4.10 Heading: 0.000 Degrees Event Number: 0 Line Name: 11S	Dimensions and attributes Target Width: 0.57 Target Height: 0.27 Target Length: 1.62 Target Shadow: 0.41
	00_072_debris Sonar Time at Target: 4/4/2013 5:19:56 PM Click Position 40.4442088274-74.0568505808 (WGS84) 40.4441009833-74.0572659911 (NAD27LL) 40.4442088274-74.0568505808 (LocalLL) (X) 579983.43 (Y) 4477489.02 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf Ping Number: 196881 Range to target: 9.06 Fish Height: 4.75 Heading: 0.000 Degrees Event Number: 0 Line Name: 9S	Dimensions and attributes Target Width: 0.43 Target Height: 0.23 Target Length: 0.90 Target Shadow: 0.52

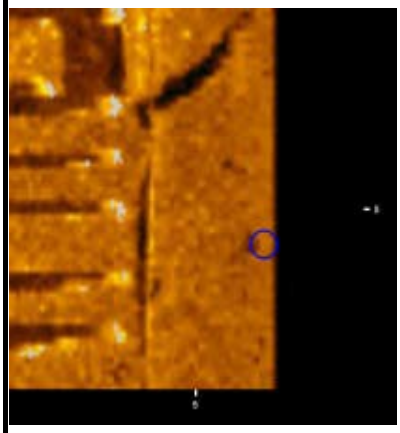
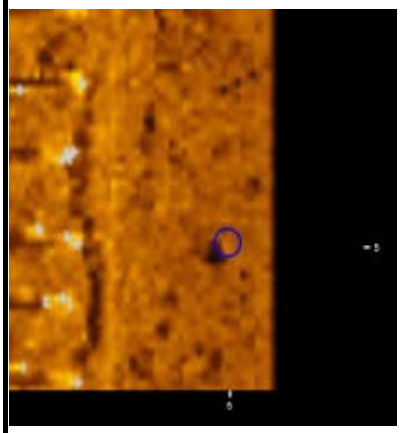
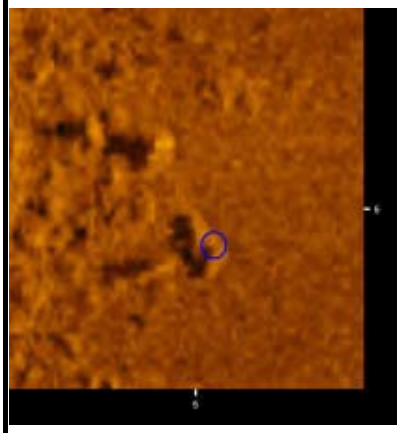
	00_073_debris Sonar Time at Target: 4/4/2013 4:55:39 PM Click Position 40.4441266512 -74.0570708127 (WGS84) 40.4440188062 -74.0574862179 (NAD27LL) 40.4441266512 -74.0570708127 (LocalLL) (X) 579964.85 (Y) 4477479.70 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf Ping Number: 175761 Range to target: 9.71 Fish Height: 4.10 Heading: 0.000 Degrees Event Number: 0 Line Name: 11S	Dimensions and attributes Target Width: 0.59 Target Height: 1.44 Target Length: 0.63 Target Shadow: 5.73
	00_074_debris Sonar Time at Target: 4/4/2013 5:20:07 PM Click Position 40.4440262380 -74.0569636126 (WGS84) 40.4439183905 -74.0573790211 (NAD27LL) 40.4440262380 -74.0569636126 (LocalLL) (X) 579974.06 (Y) 4477468.65 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf Ping Number: 197036 Range to target: 10.68 Fish Height: 4.53 Heading: 0.000 Degrees Event Number: 0 Line Name: 9S	Dimensions and attributes Target Width: 0.73 Target Height: 0.75 Target Length: 1.89 Target Shadow: 2.30
	00_075_debris Sonar Time at Target: 4/4/2013 5:20:13 PM Click Position 40.4439280186 -74.0570444495 (WGS84) 40.4438201693 -74.0574598564 (NAD27LL) 40.4439280186 -74.0570444495 (LocalLL) (X) 579967.33 (Y) 4477457.67 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf Ping Number: 197125 Range to target: 9.50 Fish Height: 4.64 Heading: 0.000 Degrees Event Number: 0 Line Name: 9S	Dimensions and attributes Target Width: 0.98 Target Height: 0.13 Target Length: 0.60 Target Shadow: 0.30

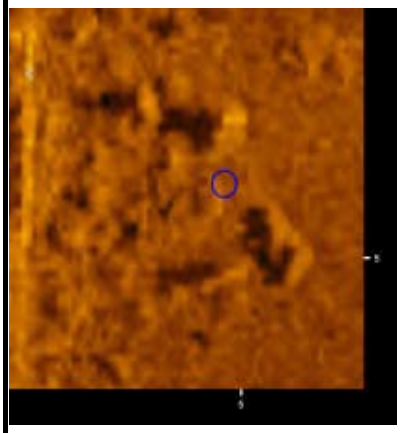
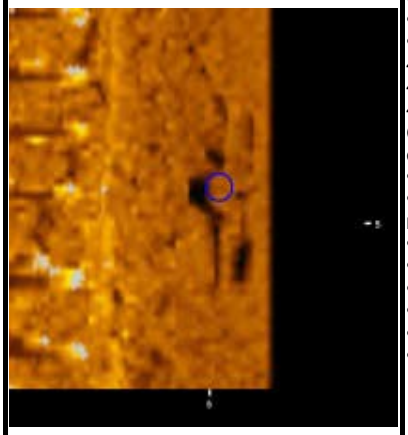
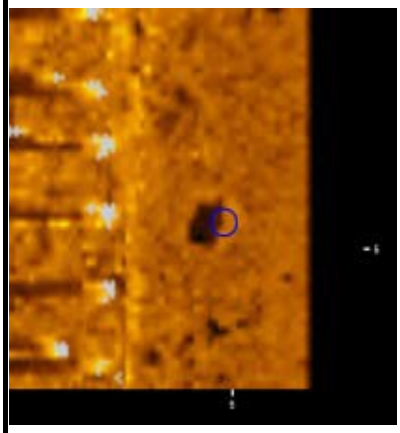
	00_076_debris Sonar Time at Target: 4/4/2013 4:55:48 PM Click Position 40.4438887628-74.0570281508 (WGS84) 40.4437809126 -74.0574435584 (NAD27LL) 40.4438887628-74.0570281508 (LocalLL) (X) 579968.75 (Y) 4477453.33 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf Ping Number: 175896 Range to target: 5.72 Fish Height: 3.88 Heading: 0.000 Degrees Event Number: 0 Line Name: 11S	Dimensions and attributes Target Width: 1.53 Target Height: 0.51 Target Length: 1.93 Target Shadow: 1.04
	00_077_debris Sonar Time at Target: 4/4/2013 4:55:54 PM Click Position 40.4437732737 -74.0571089995 (WGS84) 40.4436654213-74.0575244056 (NAD27LL) 40.4437732737-74.0571089995 (LocalLL) (X) 579962.04 (Y) 4477440.44 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf Ping Number: 175987 Range to target: 5.50 Fish Height: 3.99 Heading: 0.000 Degrees Event Number: 0 Line Name: 11S	Dimensions and attributes Target Width: 4.56 Target Height: 1.38 Target Length: 3.13 Target Shadow: 3.59
	00_078_debris Sonar Time at Target: 4/4/2013 4:56:02 PM Click Position 40.4436237483-74.0572166041 (WGS84) 40.4435158931-74.0576320082 (NAD27LL) 40.4436237483 -74.0572166041 (LocalLL) (X) 579953.09 (Y) 4477423.74 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf Ping Number: 176106 Range to target: 4.96 Fish Height: 3.88 Heading: 0.000 Degrees Event Number: 0 Line Name: 11S	Dimensions and attributes Target Width: 0.64 Target Height: 0.44 Target Length: 0.93 Target Shadow: 0.80

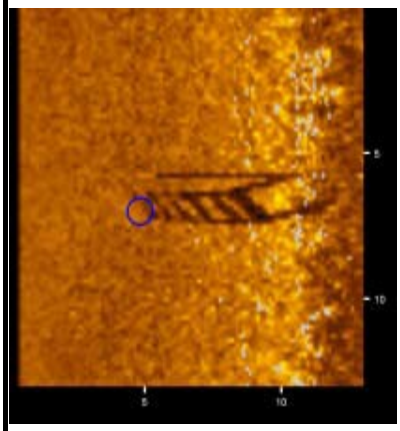
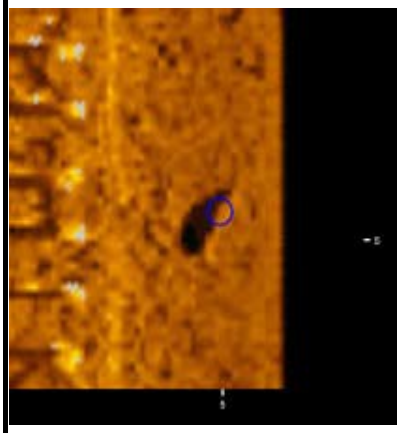
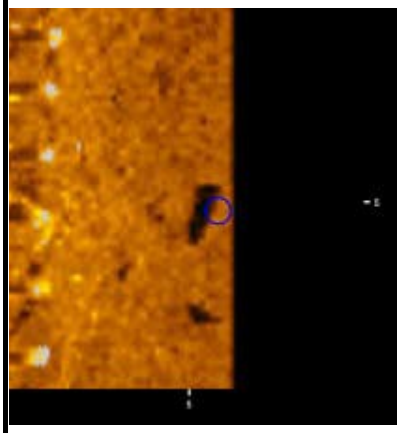
	00_079_debris Sonar Time at Target: 4/4/2013 5:20:34 PM Click Position 40.4435748775-74.0572934264 (WGS84) 40.4434670216 -74.0577088288 (NAD27LL) 40.4435748775-74.0572934264 (LocalLL) (X) 579946.63 (Y) 4477418.25 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf Ping Number: 197422 Range to target: 7.01 Fish Height: 4.32 Heading: 0.000 Degrees Event Number: 0 Line Name: 9S	Dimensions and attributes Target Width: 0.91 Target Height: 0.15 Target Length: 1.36 Target Shadow: 0.30
	00_080_debris Sonar Time at Target: 4/4/2013 5:20:41 PM Click Position 40.4434369323 -74.0573792252 (WGS84) 40.4433290738-74.0577946262 (NAD27LL) 40.4434369323-74.0573792252 (LocalLL) (X) 579939.52 (Y) 4477402.86 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf Ping Number: 197533 Range to target: 7.45 Fish Height: 4.32 Heading: 0.000 Degrees Event Number: 0 Line Name: 9S	Dimensions and attributes Target Width: 0.81 Target Height: 0.70 Target Length: 1.14 Target Shadow: 1.66
	00_081_debris Sonar Time at Target: 4/4/2013 4:56:14 PM Click Position 40.4434030269-74.0573539817 (WGS84) 40.4432951676-74.0577693835 (NAD27LL) 40.4434030269 -74.0573539817 (LocalLL) (X) 579941.70 (Y) 4477399.12 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf Ping Number: 176277 Range to target: 5.83 Fish Height: 3.99 Heading: 0.000 Degrees Event Number: 0 Line Name: 11S	Dimensions and attributes Target Width: 1.01 Target Height: 0.37 Target Length: 0.90 Target Shadow: 0.72

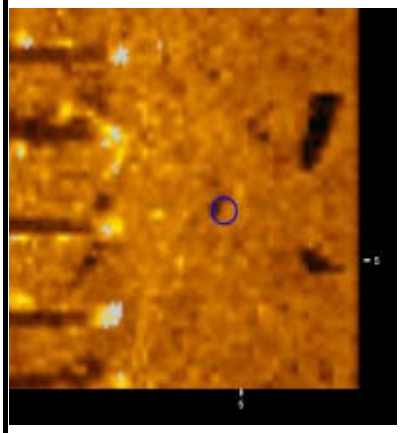
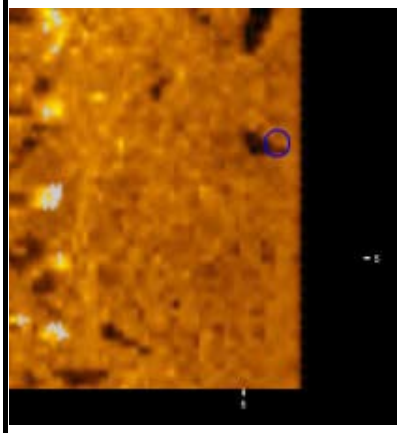
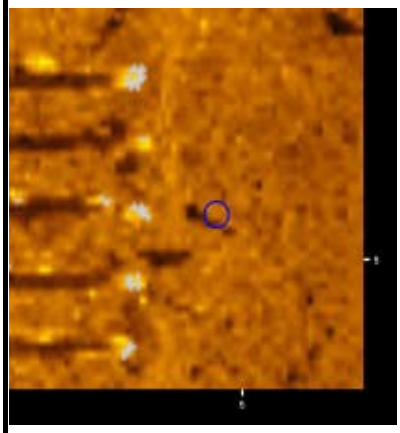
	00_082_debris Sonar Time at Target: 4/4/2013 4:56:19 PM Click Position 40.4433188060-74.0574385175 (WGS84) 40.4432109451 -74.0578539176 (NAD27LL) 40.4433188060-74.0574385175 (LocalLL) (X) 579934.63 (Y) 4477389.69 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf Ping Number: 176350 Range to target: 3.78 Fish Height: 4.10 Heading: 0.000 Degrees Event Number: 0 Line Name: 11S	Dimensions and attributes Target Width: 2.04 Target Height: 0.42 Target Length: 4.86 Target Shadow: 0.64
	00_083_debris Sonar Time at Target: 4/4/2013 4:56:24 PM Click Position 40.4432228372 -74.0574870310 (WGS84) 40.4431149745-74.0579024304 (NAD27LL) 40.4432228372-74.0574870310 (LocalLL) (X) 579930.63 (Y) 4477379.00 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf Ping Number: 176421 Range to target: 5.07 Fish Height: 3.88 Heading: 0.000 Degrees Event Number: 0 Line Name: 11S	Dimensions and attributes Target Width: 0.96 Target Height: 0.43 Target Length: 2.49 Target Shadow: 0.80
	00_084_debris Sonar Time at Target: 4/4/2013 4:56:29 PM Click Position 40.4431358317-74.0575399031 (WGS84) 40.4430279674-74.0579553016 (NAD27LL) 40.4431358317 -74.0575399031 (LocalLL) (X) 579926.25 (Y) 4477369.29 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf Ping Number: 176487 Range to target: 5.61 Fish Height: 3.67 Heading: 0.000 Degrees Event Number: 0 Line Name: 11S	Dimensions and attributes Target Width: 0.73 Target Height: 0.25 Target Length: 0.90 Target Shadow: 0.48

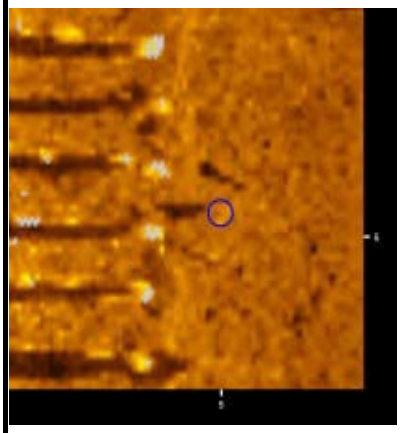
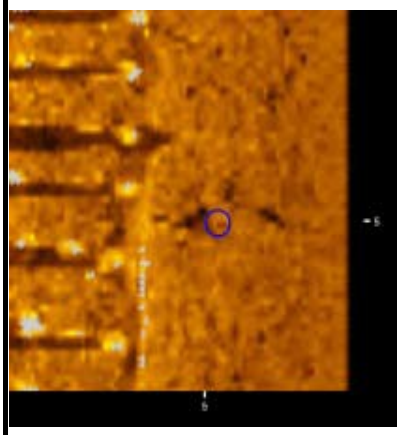
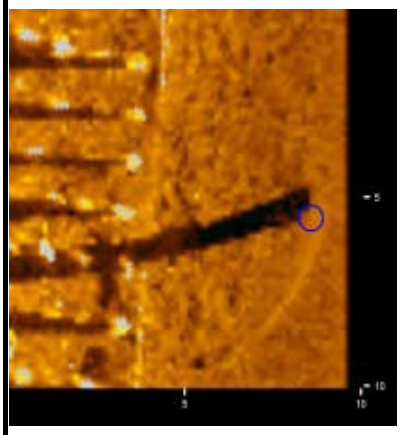
	00_085_debris Sonar Time at Target: 4/4/2013 4:56:31 PM Click Position 40.4430953930-74.0575910433 (WGS84) 40.4429875279 -74.0580064407 (NAD27LL) 40.4430953930-74.0575910433 (LocalLL) (X) 579921.96 (Y) 4477364.76 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf Ping Number: 176524 Range to target: 3.88 Fish Height: 3.99 Heading: 0.000 Degrees Event Number: 0 Line Name: 11S	Dimensions and attributes Target Width: 0.87 Target Height: 0.51 Target Length: 3.12 Target Shadow: 0.81
	00_087_debris Sonar Time at Target: 4/4/2013 4:56:34 PM Click Position 40.4430379735 -74.0576008532 (WGS84) 40.4429301072-74.0580162506 (NAD27LL) 40.4430379735-74.0576008532 (LocalLL) (X) 579921.19 (Y) 4477358.37 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf Ping Number: 176561 Range to target: 6.15 Fish Height: 3.78 Heading: 0.000 Degrees Event Number: 0 Line Name: 11S	Dimensions and attributes Target Width: 0.73 Target Height: 0.27 Target Length: 23.51 Target Shadow: 0.57
	00_088_debris Sonar Time at Target: 4/4/2013 4:56:35 PM Click Position 40.4430712082-74.0577752789 (WGS84) 40.4429633434-74.0581906717 (NAD27LL) 40.4430712082 -74.0577752789 (LocalLL) (X) 579906.36 (Y) 4477361.91 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf Ping Number: 176584 Range to target: 8.63 Fish Height: 3.78 Heading: 0.000 Degrees Event Number: 0 Line Name: 11S	Dimensions and attributes Target Width: 0.34 Target Height: 0.16 Target Length: 0.62 Target Shadow: 0.40

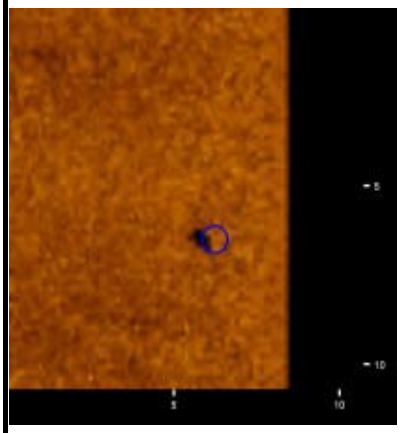
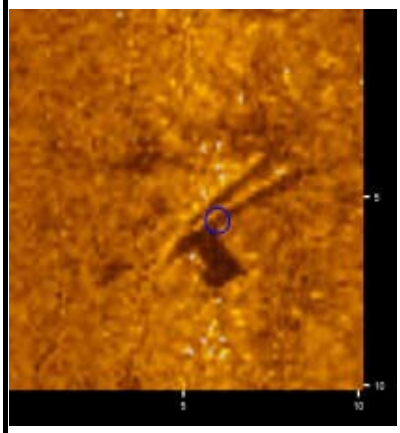
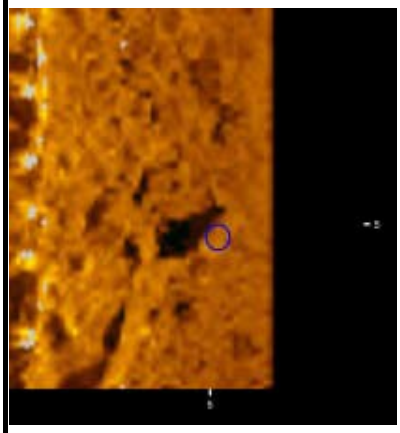
	00_089_debris Sonar Time at Target: 4/4/2013 4:56:33 PM Click Position 40.4430619758 -74.0576230108 (WGS84) 40.4429541102 -74.0580384075 (NAD27LL) 40.4430619758 -74.0576230108 (LocalLL) (X) 579919.29 (Y) 4477361.02 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf Ping Number: 176552 Range to target: 3.24 Fish Height: 3.78 Heading: 0.000 Degrees Event Number: 0 Line Name: 11S	Dimensions and attributes Target Width: 0.48 Target Height: 0.39 Target Length: 0.57 Target Shadow: 0.57
	00_090_debris Sonar Time at Target: 4/4/2013 4:56:39 PM Click Position 40.4429516744 -74.0576904868 (WGS84) 40.4428438067 -74.0581058823 (NAD27LL) 40.4429516744 -74.0576904868 (LocalLL) (X) 579913.69 (Y) 4477348.71 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf Ping Number: 176635 Range to target: 3.99 Fish Height: 3.78 Heading: 0.000 Degrees Event Number: 0 Line Name: 11S	Dimensions and attributes Target Width: 0.48 Target Height: 0.35 Target Length: 0.57 Target Shadow: 0.57
	00_091_debris Sonar Time at Target: 4/4/2013 5:21:09 PM Click Position 40.4429487091 -74.0577168100 (WGS84) 40.4428408414 -74.0581322050 (NAD27LL) 40.4429487091 -74.0577168100 (LocalLL) (X) 579911.47 (Y) 4477348.36 (Projected Coordinates) Map Projection: UTM84-18N Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf Ping Number: 197933 Range to target: 9.39 Fish Height: 4.32 Heading: 0.000 Degrees • Event Number: 0 • Line Name: 9S	Dimensions and attributes Target Width: 0.83 Target Height: 0.27 Target Length: 1.39 Target Shadow: 0.69

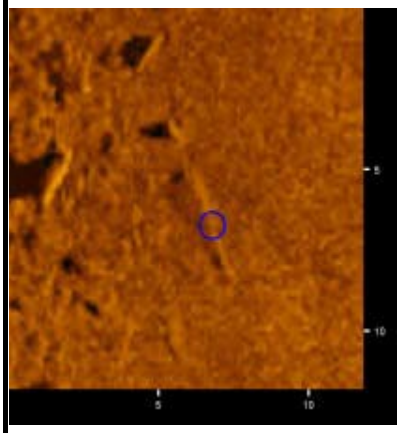
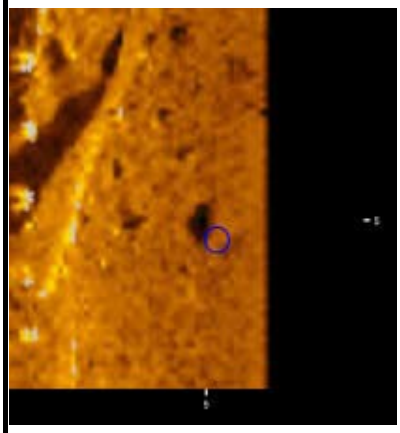
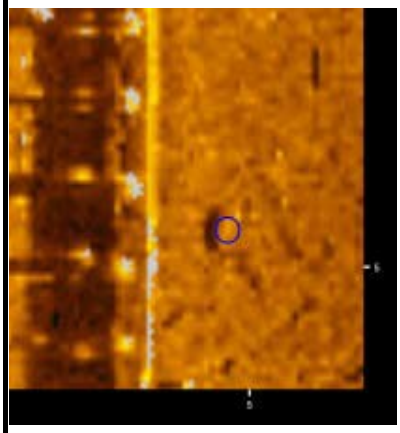
	00_092_debris • Sonar Time at Target: 4/4/2013 5:21:08 PM • Click Position 40.4429508783 -74.0576931082 (WGS84) 40.4428430105 -74.0581085037 (NAD27LL) 40.4429508783 -74.0576931082 (LocalLL) (X) 579913.47 (Y) 4477348.62 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf • Ping Number: 197925 • Range to target: 11.01 • Fish Height: 4.32 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 9S	Dimensions and attributes • Target Width: 0.77 • Target Height: 0.08 • Target Length: 0.93 • Target Shadow: 0.23
	00_093_debris • Sonar Time at Target: 4/4/2013 4:56:42 PM • Click Position 40.4428853366 -74.0577347543 (WGS84) 40.4427774676 -74.0581501491 (NAD27LL) 40.4428853366 -74.0577347543 (LocalLL) (X) 579910.02 (Y) 4477341.31 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 176686 • Range to target: 4.21 • Fish Height: 3.78 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 1.20 • Target Height: 0.43 • Target Length: 4.49 • Target Shadow: 0.72
	00_094_debris • Sonar Time at Target: 4/4/2013 4:56:45 PM • Click Position 40.4428303482 -74.0577654649 (WGS84) 40.4427224781 -74.0581808592 (NAD27LL) 40.4428303482 -74.0577654649 (LocalLL) (X) 579907.48 (Y) 4477335.18 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 176727 • Range to target: 4.86 • Fish Height: 3.88 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 0.66 • Target Height: 0.48 • Target Length: 1.24 • Target Shadow: 0.88

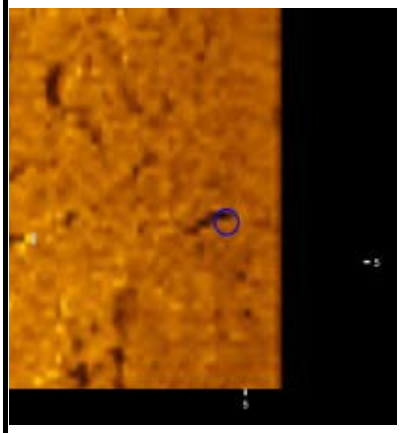
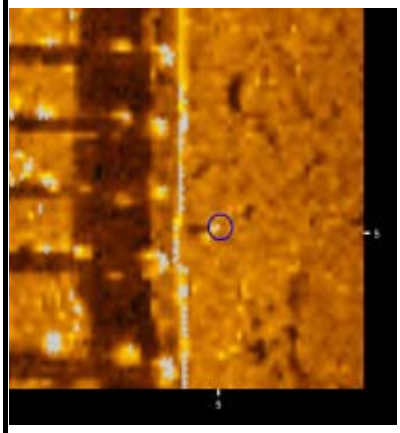
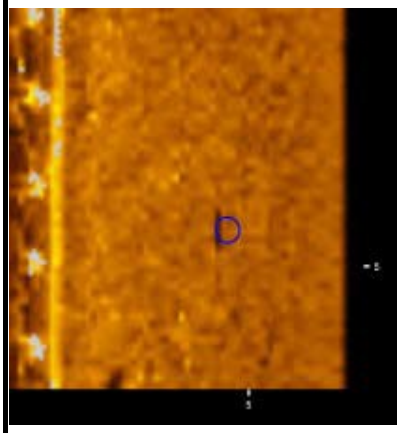
	00_095_debris • Sonar Time at Target: 4/4/2013 4:56:50 PM • Click Position 40.4427983711 -74.0579529333 (WGS84) 40.4426905011 -74.0583683230 (NAD27LL) 40.4427983711 -74.0579529333 (LocalLL) (X) 579891.62 (Y) 4477331.46 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 176795 • Range to target: 7.34 • Fish Height: 3.78 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 1.81 • Target Height: 1.63 • Target Length: 1.73 • Target Shadow: 6.30
	00_096_debris • Sonar Time at Target: 4/4/2013 4:56:53 PM • Click Position 40.4426949248 -74.0578697042 (WGS84) 40.4425870523 -74.0582850966 (NAD27LL) 40.4426949248 -74.0578697042 (LocalLL) (X) 579898.80 (Y) 4477320.05 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 176837 • Range to target: 4.42 • Fish Height: 3.78 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 0.42 • Target Height: 0.52 • Target Length: 1.58 • Target Shadow: 0.94
	00_097_debris • Sonar Time at Target: 4/4/2013 4:56:57 PM • Click Position 40.4426277679 -74.0579334315 (WGS84) 40.4425198941 -74.0583488226 (NAD27LL) 40.4426277679 -74.0579334315 (LocalLL) (X) 579893.47 (Y) 4477312.54 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 176896 • Range to target: 3.34 • Fish Height: 3.88 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 0.64 • Target Height: 0.46 • Target Length: 1.63 • Target Shadow: 0.69

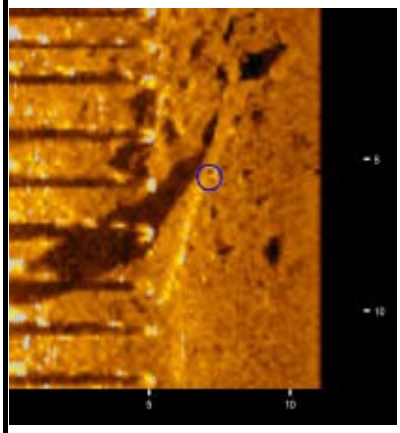
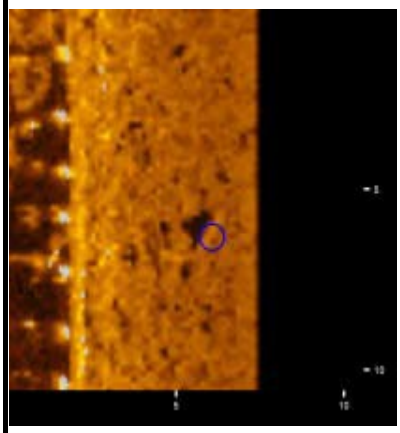
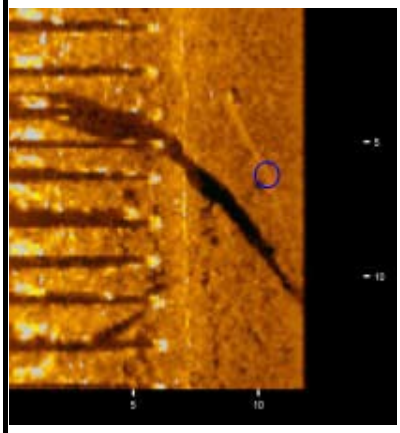
	00_098_debris • Sonar Time at Target: 4/4/2013 4:56:58 PM • Click Position 40.4426035874-74.0579175827 (WGS84) 40.4424957131 -74.0583329743 (NAD27LL) 40.4426035874-74.0579175827 (LocalLL) (X) 579894.85 (Y) 4477309.87 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 176907 • Range to target: 5.83 • Fish Height: 3.88 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 0.38 • Target Height: 0.24 • Target Length: 0.83 • Target Shadow: 0.46
	00_099_debris • Sonar Time at Target: 4/4/2013 4:56:58 PM • Click Position 40.4426067636 -74.0579473081 (WGS84) 40.4424988894-74.0583626989 (NAD27LL) 40.4426067636-74.0579473081 (LocalLL) (X) 579892.32 (Y) 4477310.20 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 176913 • Range to target: 3.45 • Fish Height: 3.88 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 0.33 • Target Height: 0.50 • Target Length: 1.09 • Target Shadow: 0.77
	00_100_debris • Sonar Time at Target: 4/4/2013 4:57:00 PM • Click Position 40.4425635069-74.0579380268 (WGS84) 40.4424556318-74.0583534181 (NAD27LL) 40.4425635069 -74.0579380268 (LocalLL) (X) 579893.16 (Y) 4477305.40 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 176938 • Range to target: 6.47 • Fish Height: 3.78 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 0.28 • Target Height: 0.35 • Target Length: 0.99 • Target Shadow: 0.77

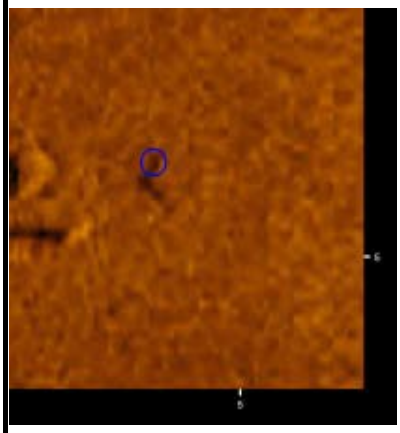
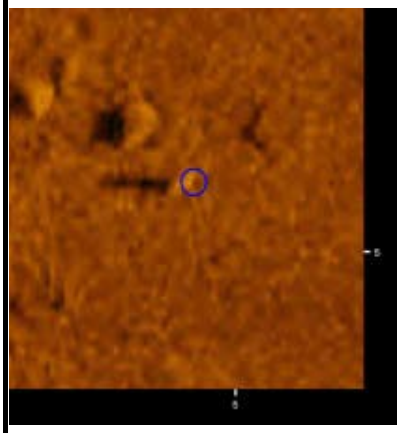
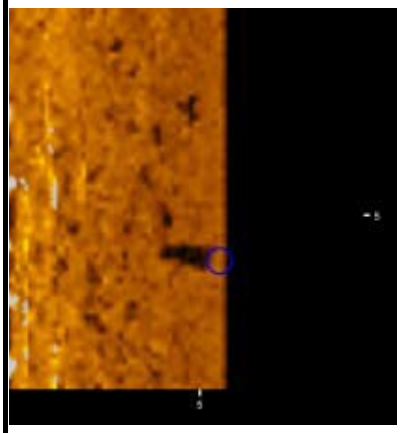
	00_101_debris • Sonar Time at Target: 4/4/2013 4:57:00 PM • Click Position 40.4425553871 -74.0579410080 (WGS84) 40.4424475118 -74.0583563993 (NAD27LL) 40.4425553871 -74.0579410080 (LocalLL) (X) 579892.92 (Y) 4477304.50 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 176944 • Range to target: 6.69 • Fish Height: 3.78 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 0.84 • Target Height: 0.57 • Target Length: 0.70 • Target Shadow: 1.37
	00_102_debris • Sonar Time at Target: 4/4/2013 4:57:03 PM • Click Position 40.4425155682 -74.0579755535 (WGS84) 40.4424076922 -74.0583909441 (NAD27LL) 40.4425155682 -74.0579755535 (LocalLL) (X) 579890.03 (Y) 4477300.05 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 176979 • Range to target: 6.26 • Fish Height: 3.78 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 1.00 • Target Height: 0.29 • Target Length: 0.84 • Target Shadow: 0.61
	00_103_debris • Sonar Time at Target: 4/4/2013 4:57:06 PM • Click Position 40.4424708402 -74.0580378059 (WGS84) 40.4423629635 -74.0584531951 (NAD27LL) 40.4424708402 -74.0580378059 (LocalLL) (X) 579884.81 (Y) 4477295.03 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 177025 • Range to target: 3.99 • Fish Height: 3.78 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 0.95 • Target Height: 2.03 • Target Length: 5.31 • Target Shadow: 6.38

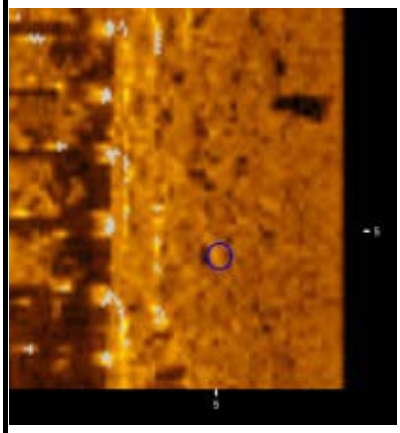
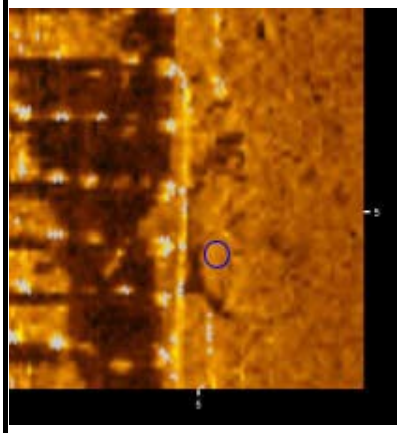
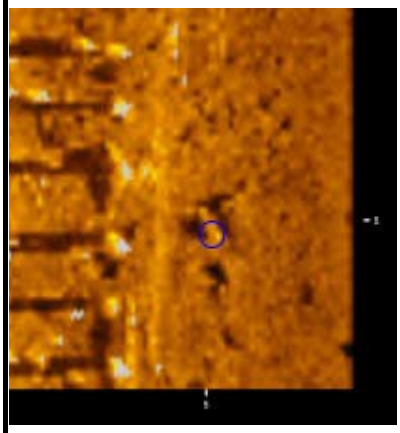
	00_104_debris • Sonar Time at Target: 4/4/2013 5:21:37 PM • Click Position 40.4424646058-74.0581170750 (WGS84) 40.4423567293 -74.0585324622 (NAD27LL) 40.4424646058-74.0581170750 (LocalLL) (X) 579878.09 (Y) 4477294.26 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf • Ping Number: 198343 • Range to target: 5.18 • Fish Height: 4.21 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 9S	Dimensions and attributes • Target Width: 0.48 • Target Height: 0.40 • Target Length: 0.92 • Target Shadow: 0.71
	00_105_debris • Sonar Time at Target: 4/4/2013 4:57:10 PM • Click Position 40.4424612481 -74.0582517923 (WGS84) 40.4423533721-74.0586671761 (NAD27LL) 40.4424612481-74.0582517923 (LocalLL) (X) 579866.67 (Y) 4477293.77 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 177088 • Range to target: 11.55 • Fish Height: 3.78 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 1.00 • Target Height: 0.38 • Target Length: 4.58 • Target Shadow: 1.34
	00_106_debris • Sonar Time at Target: 4/4/2013 4:57:19 PM • Click Position 40.4422447411-74.0581856391 (WGS84) 40.4421368601-74.0586010258 (NAD27LL) 40.4422447411 -74.0581856391 (LocalLL) (X) 579872.54 (Y) 4477269.80 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 177216 • Range to target: 4.32 • Fish Height: 3.67 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 0.70 • Target Height: 0.73 • Target Length: 1.57 • Target Shadow: 1.40

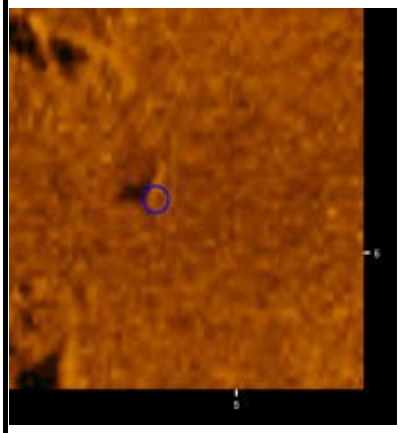
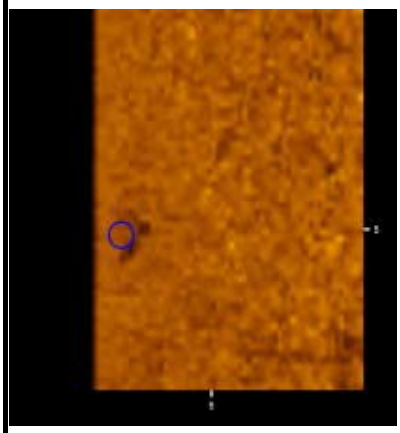
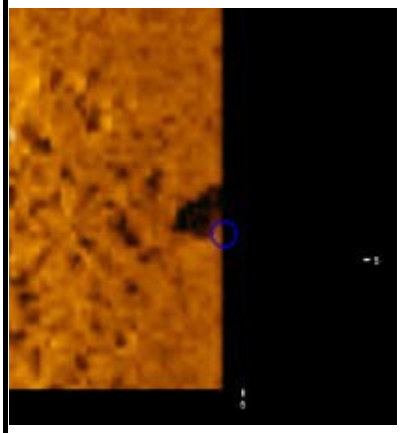
	00_107_debris • Sonar Time at Target: 4/4/2013 5:21:48 PM • Click Position 40.4422526097 -74.0582173171 (WGS84) 40.4421447290 -74.0586327029 (NAD27LL) 40.4422526097 -74.0582173171 (LocalLL) (X) 579869.84 (Y) 4477270.64 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf • Ping Number: 198500 • Range to target: 8.85 • Fish Height: 4.10 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 9S	Dimensions and attributes • Target Width: 1.13 • Target Height: 0.31 • Target Length: 3.15 • Target Shadow: 0.79
	00_108_debris • Sonar Time at Target: 4/4/2013 4:57:22 PM • Click Position 40.4421931474 -74.0582205642 (WGS84) 40.4420852654 -74.0586359502 (NAD27LL) 40.4421931474 -74.0582205642 (LocalLL) (X) 579869.64 (Y) 4477264.04 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 177260 • Range to target: 4.21 • Fish Height: 3.67 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 0.70 • Target Height: 0.39 • Target Length: 0.96 • Target Shadow: 0.67
	00_109_debris • Sonar Time at Target: 4/4/2013 4:57:12 PM • Click Position 40.4423499933 -74.0580764239 (WGS84) 40.4422421142 -74.0584918128 (NAD27LL) 40.4423499933 -74.0580764239 (LocalLL) (X) 579881.68 (Y) 4477281.58 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 177116 • Range to target: 7.34 • Fish Height: 3.67 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 0.50 • Target Height: 0.16 • Target Length: 1.06 • Target Shadow: 0.37

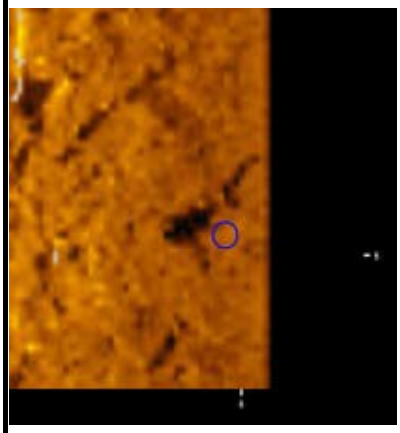
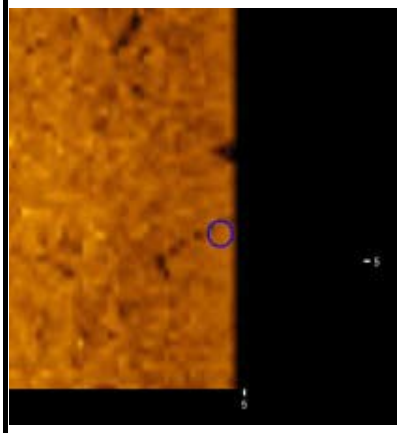
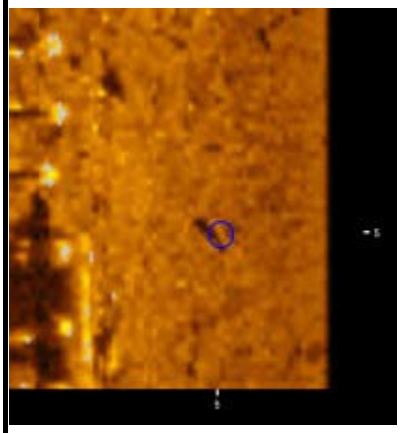
	00_110_debris • Sonar Time at Target: 4/4/2013 4:57:13 PM • Click Position 40.4423421441-74.0581245233 (WGS84) 40.4422342650 -74.0585399110 (NAD27LL) 40.4423421441-74.0581245233 (LocalLL) (X) 579877.61 (Y) 4477280.66 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 177134 • Range to target: 4.10 • Fish Height: 3.67 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 0.42 • Target Height: 0.44 • Target Length: 1.06 • Target Shadow: 0.74
	00_111_debris • Sonar Time at Target: 4/4/2013 4:57:14 PM • Click Position 40.4423235045 -74.0580841204 (WGS84) 40.4422156248-74.0584995092 (NAD27LL) 40.4423235045-74.0580841204 (LocalLL) (X) 579881.05 (Y) 4477278.63 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 177136 • Range to target: 8.09 • Fish Height: 3.78 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 0.31 • Target Height: 0.26 • Target Length: 0.53 • Target Shadow: 0.67
	00_112_debris • Sonar Time at Target: 4/4/2013 4:57:11 PM • Click Position 40.4423826008-74.0580801860 (WGS84) 40.4422747223-74.0584955746 (NAD27LL) 40.4423826008 -74.0580801860 (LocalLL) (X) 579881.32 (Y) 4477285.19 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 177095 • Range to target: 5.40 • Fish Height: 3.78 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 0.15 • Target Height: 0.12 • Target Length: 0.89 • Target Shadow: 0.22

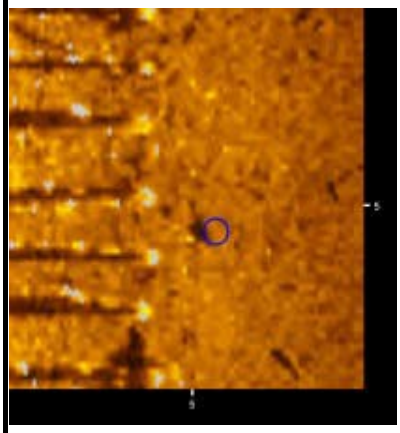
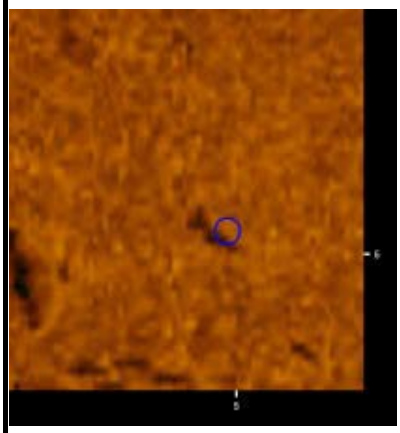
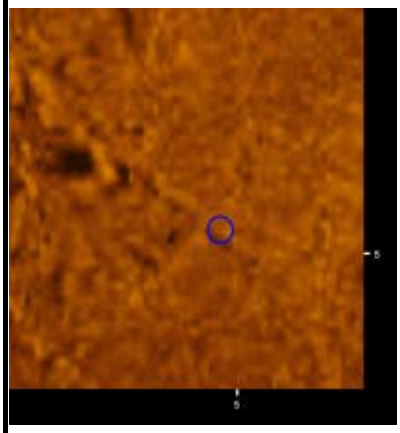
	00_113_debris • Sonar Time at Target: 4/4/2013 4:57:21 PM • Click Position 40.4422048428 -74.0581774724 (WGS84) 40.4420969610 -74.0585928595 (NAD27LL) 40.4422048428 -74.0581774724 (LocalLL) (X) 579873.28 (Y) 4477265.37 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 177241 • Range to target: 6.91 • Fish Height: 3.67 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 1.32 • Target Height: 1.06 • Target Length: 7.90 • Target Shadow: 3.18
	00_114_debris • Sonar Time at Target: 4/4/2013 4:57:45 PM • Click Position 40.4417954370 -74.0584887376 (WGS84) 40.4416875475 -74.0589041189 (NAD27LL) 40.4417954370 -74.0584887376 (LocalLL) (X) 579847.36 (Y) 4477219.65 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 177589 • Range to target: 4.32 • Fish Height: 3.67 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 0.62 • Target Height: 0.44 • Target Length: 1.64 • Target Shadow: 0.77
	00_115_debris • Sonar Time at Target: 4/4/2013 4:57:26 PM • Click Position 40.4421304743 -74.0582585090 (WGS84) 40.4420225911 -74.0586738944 (NAD27LL) 40.4421304743 -74.0582585090 (LocalLL) (X) 579866.49 (Y) 4477257.05 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 177312 • Range to target: 4.42 • Fish Height: 3.67 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 0.66 • Target Height: 2.06 • Target Length: 7.88 • Target Shadow: 7.35

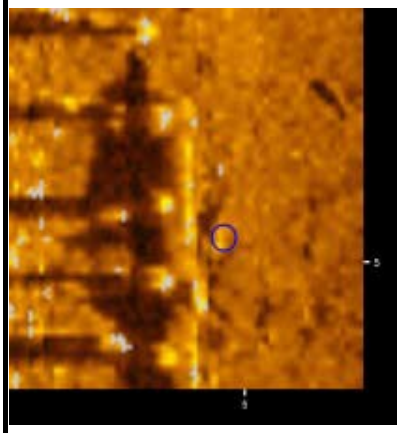
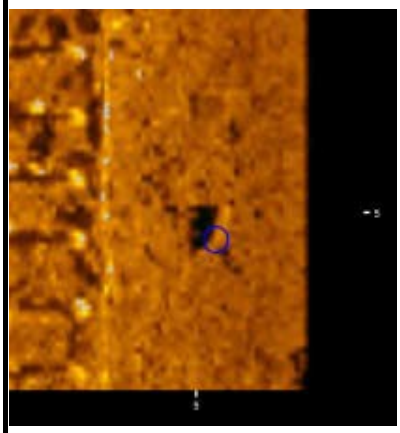
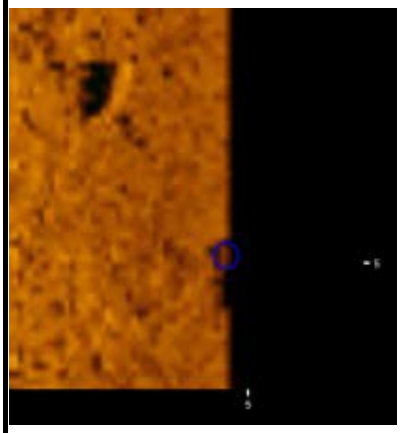
	00_116_debris • Sonar Time at Target: 4/4/2013 5:22:01 PM • Click Position 40.4420221821-74.0583826288 (WGS84) 40.4419142972 -74.0587980116 (NAD27LL) 40.4420221821-74.0583826288 (LocalLL) (X) 579856.10 (Y) 4477244.91 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf • Ping Number: 198687 • Range to target: 8.42 • Fish Height: 4.10 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 9S	Dimensions and attributes • Target Width: 0.55 • Target Height: 0.13 • Target Length: 1.00 • Target Shadow: 0.31
	00_117_debris • Sonar Time at Target: 4/4/2013 5:22:02 PM • Click Position 40.4420051389 -74.0583756482 (WGS84) 40.4418972535-74.0587910313 (NAD27LL) 40.4420051389-74.0583756482 (LocalLL) (X) 579856.71 (Y) 4477243.03 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf • Ping Number: 198696 • Range to target: 9.82 • Fish Height: 4.10 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 9S	Dimensions and attributes • Target Width: 0.52 • Target Height: 0.57 • Target Length: 1.05 • Target Shadow: 1.72
	00_118_debris • Sonar Time at Target: 4/4/2013 4:57:33 PM • Click Position 40.4420072165-74.0583576808 (WGS84) 40.4418993311-74.0587730643 (NAD27LL) 40.4420072165 -74.0583576808 (LocalLL) (X) 579858.23 (Y) 4477243.27 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 177419 • Range to target: 3.13 • Fish Height: 3.56 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 0.55 • Target Height: 0.79 • Target Length: 0.62 • Target Shadow: 1.35

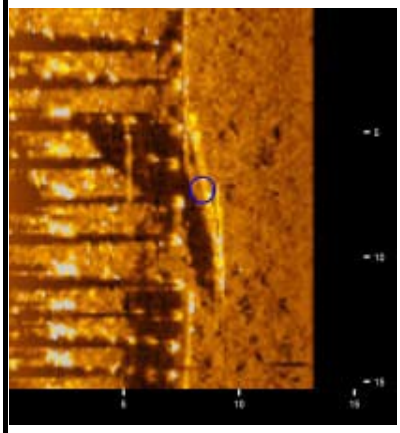
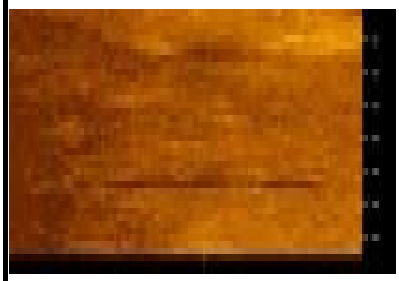
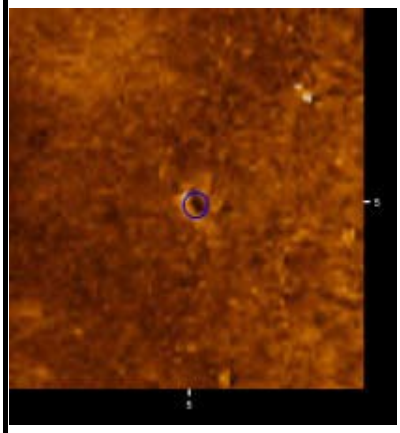
	00_119_debris • Sonar Time at Target: 4/4/2013 4:57:35 PM • Click Position 40.4419700879-74.0583457169 (WGS84) 40.4418622016 -74.0587611009 (NAD27LL) 40.4419700879-74.0583457169 (LocalLL) (X) 579859.29 (Y) 4477239.16 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 177440 • Range to target: 5.93 • Fish Height: 3.56 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 0.84 • Target Height: 0.15 • Target Length: 0.45 • Target Shadow: 0.30
	00_120_debris • Sonar Time at Target: 4/4/2013 4:57:37 PM • Click Position 40.4419199724 -74.0583600937 (WGS84) 40.4418120852-74.0587754776 (NAD27LL) 40.4419199724-74.0583600937 (LocalLL) (X) 579858.13 (Y) 4477233.59 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 177476 • Range to target: 7.45 • Fish Height: 3.56 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 1.07 • Target Height: 0.22 • Target Length: 1.60 • Target Shadow: 0.53
	00_121_debris • Sonar Time at Target: 4/4/2013 4:57:51 PM • Click Position 40.4416838469-74.0585377186 (WGS84) 40.4415759553-74.0589530992 (NAD27LL) 40.4416838469 -74.0585377186 (LocalLL) (X) 579843.34 (Y) 4477207.22 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 177673 • Range to target: 6.47 • Fish Height: 3.56 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 1.91 • Target Height: 0.33 • Target Length: 2.68 • Target Shadow: 0.77

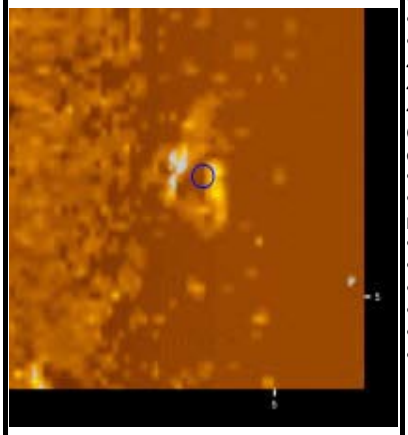
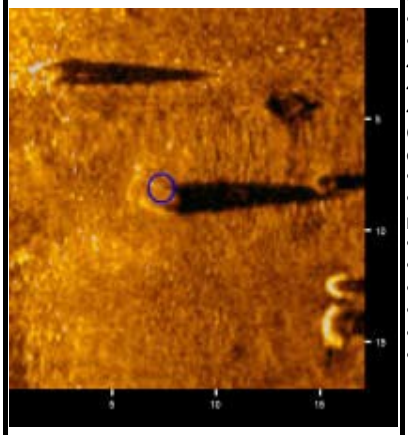
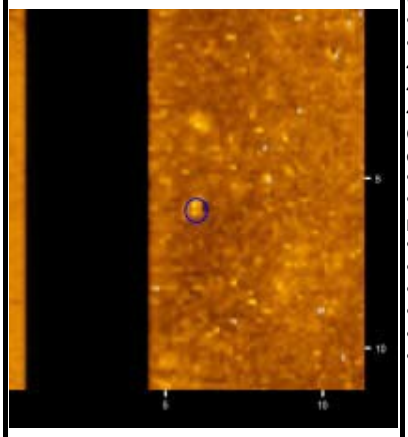
	00_122_debris • Sonar Time at Target: 4/4/2013 5:22:21 PM • Click Position 40.4416564250 -74.0586154948 (WGS84) 40.4415485331 -74.0590308736 (NAD27LL) 40.4416564250 -74.0586154948 (LocalLL) (X) 579836.78 (Y) 4477204.10 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf • Ping Number: 198973 • Range to target: 10.68 • Fish Height: 3.99 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 9S	Dimensions and attributes • Target Width: 0.53 • Target Height: 0.28 • Target Length: 1.17 • Target Shadow: 0.86
	00_123_debris • Sonar Time at Target: 4/4/2013 4:57:56 PM • Click Position 40.4416380375 -74.0587028741 (WGS84) 40.4415301456 -74.0591182507 (NAD27LL) 40.4416380375 -74.0587028741 (LocalLL) (X) 579829.39 (Y) 4477201.98 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 177745 • Range to target: 3.56 • Fish Height: 3.56 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 0.79 • Target Height: 0.39 • Target Length: 1.41 • Target Shadow: 0.61
	00_124_debris • Sonar Time at Target: 4/4/2013 4:57:56 PM • Click Position 40.4416037537 -74.0586401859 (WGS84) 40.4414958608 -74.0590555643 (NAD27LL) 40.4416037537 -74.0586401859 (LocalLL) (X) 579834.75 (Y) 4477198.23 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 177751 • Range to target: 2.91 • Fish Height: 3.56 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 0.84 • Target Height: 0.67 • Target Length: 1.03 • Target Shadow: 1.07

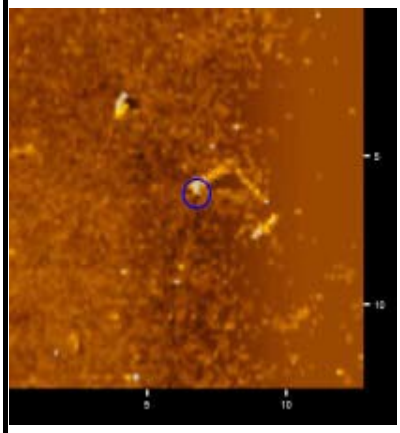
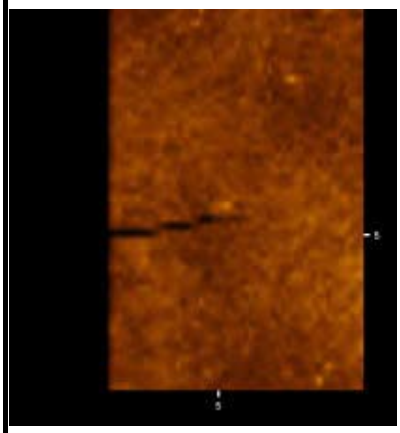
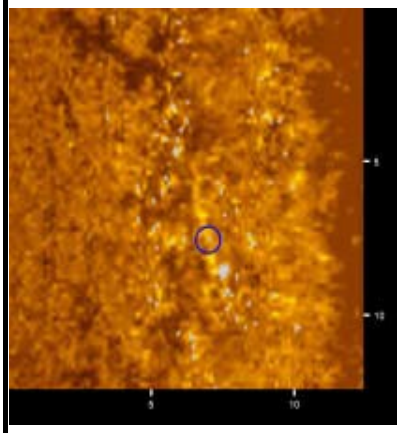
	00_125_debris • Sonar Time at Target: 4/4/2013 4:57:59 PM • Click Position 40.4415400739-74.0586705553 (WGS84) 40.4414321797 -74.0590859333 (NAD27LL) 40.4415400739-74.0586705553 (LocalLL) (X) 579832.25 (Y) 4477191.14 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 177800 • Range to target: 3.88 • Fish Height: 3.67 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 1.61 • Target Height: 0.61 • Target Length: 2.22 • Target Shadow: 1.07
	00_126_debris • Sonar Time at Target: 4/4/2013 4:58:02 PM • Click Position 40.4414917061 -74.0587118232 (WGS84) 40.4413838111-74.0591272004 (NAD27LL) 40.4414917061-74.0587118232 (LocalLL) (X) 579828.80 (Y) 4477185.73 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 177842 • Range to target: 3.24 • Fish Height: 3.67 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 0.76 • Target Height: 0.36 • Target Length: 1.83 • Target Shadow: 0.53
	00_127_debris • Sonar Time at Target: 4/4/2013 4:58:05 PM • Click Position 40.4414423359-74.0587150263 (WGS84) 40.4413344397-74.0591304036 (NAD27LL) 40.4414423359 -74.0587150263 (LocalLL) (X) 579828.59 (Y) 4477180.25 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 177875 • Range to target: 5.50 • Fish Height: 3.56 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 0.41 • Target Height: 0.27 • Target Length: 0.78 • Target Shadow: 0.53

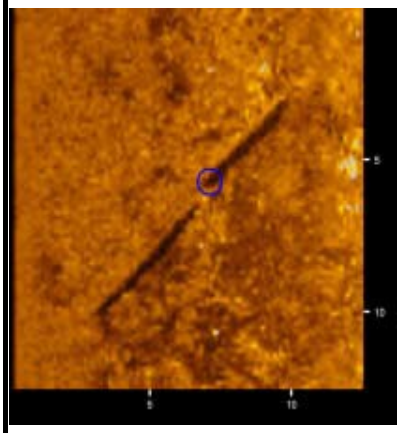
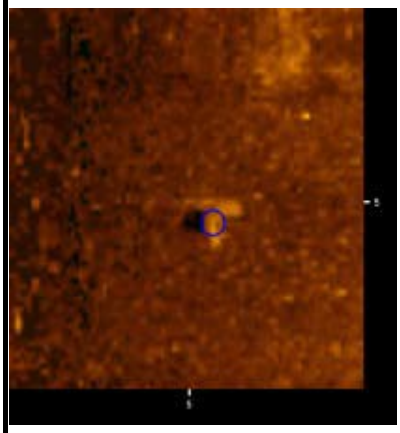
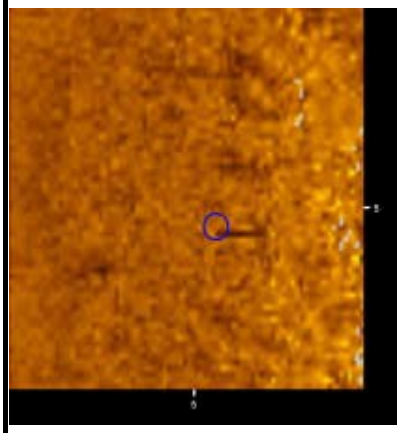
	00_128_debris • Sonar Time at Target: 4/4/2013 4:58:03 PM • Click Position 40.4414601146 -74.0586744455 (WGS84) 40.4413522187 -74.0590898238 (NAD27LL) 40.4414601146 -74.0586744455 (LocalLL) (X) 579832.01 (Y) 4477182.26 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 177853 • Range to target: 7.66 • Fish Height: 3.56 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 0.96 • Target Height: 0.29 • Target Length: 0.99 • Target Shadow: 0.76
	00_129_debris • Sonar Time at Target: 4/4/2013 5:22:30 PM • Click Position 40.4414941748 -74.0587623879 (WGS84) 40.4413862800 -74.0591777638 (NAD27LL) 40.4414941748 -74.0587623879 (LocalLL) (X) 579824.51 (Y) 4477185.96 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf • Ping Number: 199111 • Range to target: 9.28 • Fish Height: 4.32 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 9S	Dimensions and attributes • Target Width: 0.53 • Target Height: 0.22 • Target Length: 1.34 • Target Shadow: 0.55
	00_130_debris • Sonar Time at Target: 4/4/2013 5:22:34 PM • Click Position 40.4414061649 -74.0587886324 (WGS84) 40.4412982683 -74.0592040080 (NAD27LL) 40.4414061649 -74.0587886324 (LocalLL) (X) 579822.39 (Y) 4477176.17 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf • Ping Number: 199172 • Range to target: 12.41 • Fish Height: 4.21 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 9S	Dimensions and attributes • Target Width: 0.42 • Target Height: 0.12 • Target Length: 4.72 • Target Shadow: 0.39

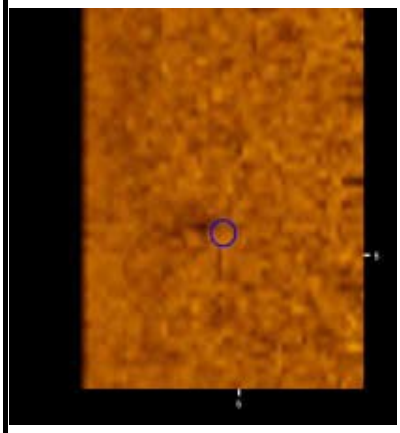
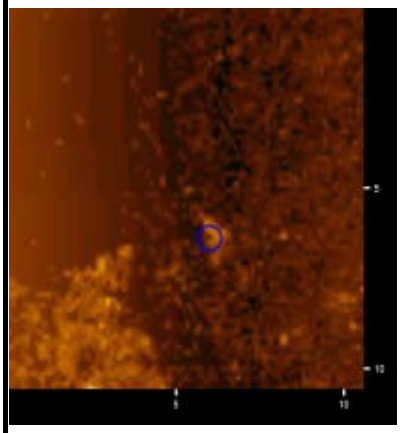
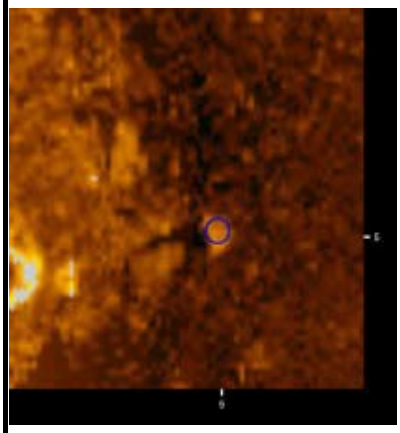
	00_131_debris • Sonar Time at Target: 4/4/2013 4:58:06 PM • Click Position 40.4414103180 -74.0587036614 (WGS84) 40.4413024212 -74.0591190392 (NAD27LL) 40.4414103180 -74.0587036614 (LocalLL) (X) 579829.59 (Y) 4477176.71 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 177893 • Range to target: 7.98 • Fish Height: 3.56 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 0.62 • Target Height: 0.20 • Target Length: 0.99 • Target Shadow: 0.53
	00_132_debris • Sonar Time at Target: 4/4/2013 4:58:14 PM • Click Position 40.4412743357 -74.0588308755 (WGS84) 40.4411664364 -74.0592462508 (NAD27LL) 40.4412743357 -74.0588308755 (LocalLL) (X) 579818.96 (Y) 4477161.50 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 178015 • Range to target: 5.29 • Fish Height: 3.56 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 0.55 • Target Height: 0.44 • Target Length: 1.45 • Target Shadow: 0.91
	00_133_debris • Sonar Time at Target: 4/4/2013 4:58:16 PM • Click Position 40.4412609091 -74.0588699378 (WGS84) 40.4411530097 -74.0592853121 (NAD27LL) 40.4412609091 -74.0588699378 (LocalLL) (X) 579815.67 (Y) 4477159.97 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 178034 • Range to target: 3.02 • Fish Height: 3.56 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 0.62 • Target Height: 0.36 • Target Length: 1.51 • Target Shadow: 0.53

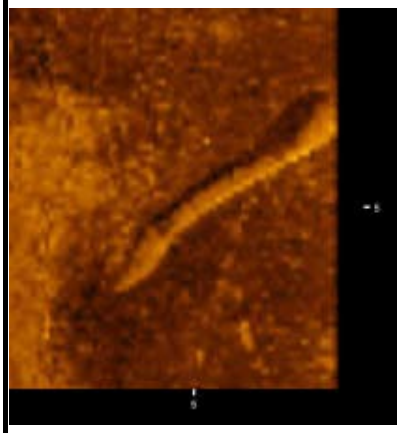
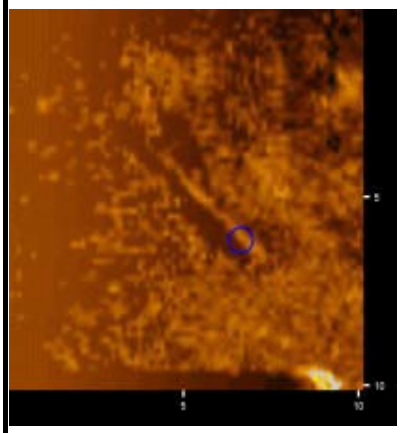
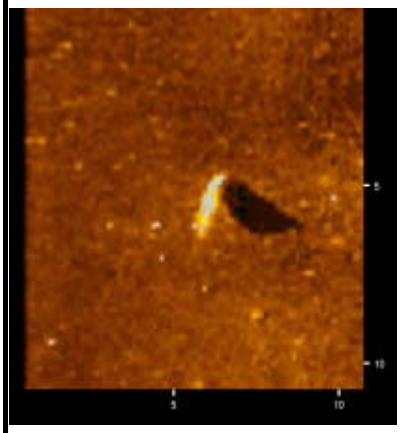
	00_134_debris • Sonar Time at Target: 4/4/2013 4:58:22 PM • Click Position 40.4411208828 -74.0588992074 (WGS84) 40.4410129805 -74.0593145817 (NAD27LL) 40.4411208828 -74.0588992074 (LocalLL) (X) 579813.35 (Y) 4477144.40 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 178135 • Range to target: 7.77 • Fish Height: 3.56 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 1.40 • Target Height: 0.90 • Target Length: 7.24 • Target Shadow: 2.89
	00_136_debris • Sonar Time at Target: 4/4/2013 5:33:49 PM • Click Position 40.4406395884 -74.0594574922 (WGS84) 40.4405316780 -74.0598728546 (NAD27LL) 40.4406395884 -74.0594574922 (LocalLL) (X) 579766.57 (Y) 4477090.47 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\7S.jsf • Ping Number: 208953 • Range to target: 14.89 • Fish Height: 4.21 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 7S	Dimensions and attributes • Target Width: 0.30 • Target Height: 1.11 • Target Length: 0.38 • Target Shadow: 5.58
	00_137_debris • Sonar Time at Target: 4/4/2013 5:23:17 PM • Click Position 40.4407616111 -74.0595252523 (WGS84) 40.4406537036 -74.0599406124 (NAD27LL) 40.4407616111 -74.0595252523 (LocalLL) (X) 579760.68 (Y) 4477103.96 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf • Ping Number: 199793 • Range to target: 10.47 • Fish Height: 4.10 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 9S	Dimensions and attributes • Target Width: 0.62 • Target Height: 0.23 • Target Length: 1.32 • Target Shadow: 0.67

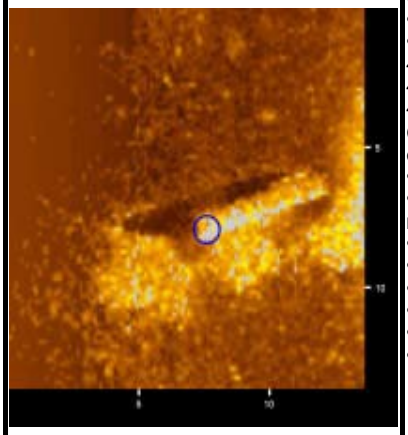
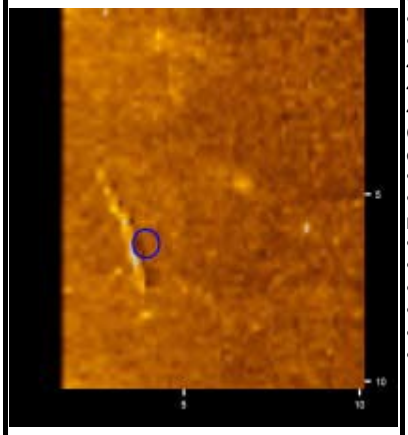
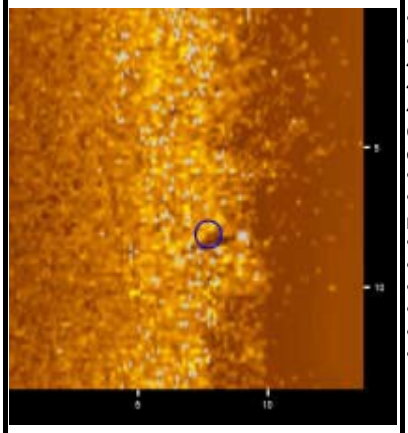
	00_138_debris • Sonar Time at Target: 4/4/2013 5:12:41 PM • Click Position 40.4407318984 -74.0595944753 (WGS84) 40.4406239905 -74.0600098338 (NAD27LL) 40.4407318984 -74.0595944753 (LocalLL) (X) 579754.85 (Y) 4477100.60 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\6N.jsf • Ping Number: 190571 • Range to target: 17.37 • Fish Height: 4.10 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 6N	Dimensions and attributes • Target Width: 1.41 • Target Height: 0.11 • Target Length: 1.50 • Target Shadow: 0.47
	00_139_debris • Sonar Time at Target: 4/4/2013 5:29:45 PM • Click Position 40.4454357508 -74.0566977898 (WGS84) 40.4453279326 -74.0571131973 (NAD27LL) 40.4454357508 -74.0566977898 (LocalLL) (X) 579994.94 (Y) 4477625.35 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\7S.jsf • Ping Number: 205415 • Range to target: 33.23 • Fish Height: 5.61 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 7S	Dimensions and attributes • Target Width: 1.64 • Target Height: 0.91 • Target Length: 2.59 • Target Shadow: 6.52
	00_140_debris • Sonar Time at Target: 4/4/2013 4:59:29 PM • Click Position 40.4407157069 -74.0598480050 (WGS84) 40.4406077997 -74.0602633569 (NAD27LL) 40.4407157069 -74.0598480050 (LocalLL) (X) 579733.36 (Y) 4477098.57 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.002.jsf • Ping Number: 179098 • Range to target: 3.45 • Fish Height: 3.78 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S.002	Dimensions and attributes • Target Width: 0.62 • Target Height: 0.28 • Target Length: 0.76 • Target Shadow: 0.41

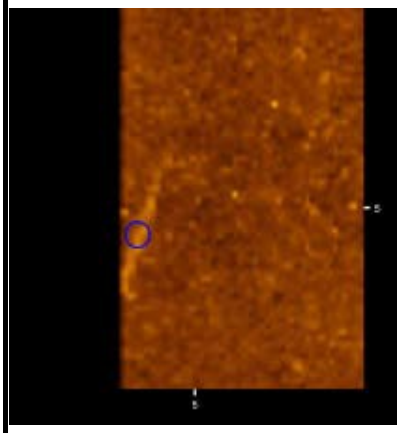
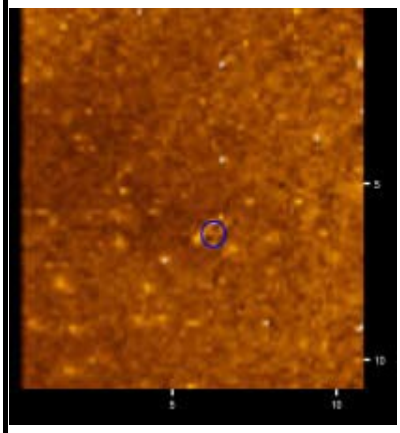
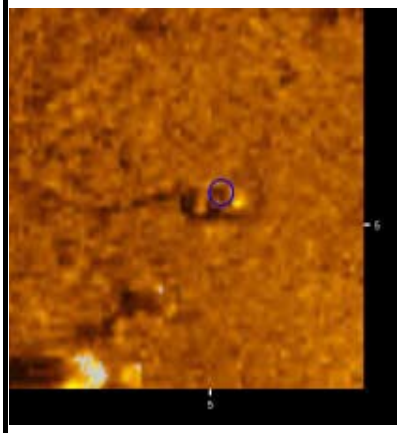
	00_141_debris • Sonar Time at Target: 4/4/2013 5:33:36 PM • Click Position 40.4409782479-74.0596408283 (WGS84) 40.4408703455-74.0600561842 (NAD27LL) 40.4409782479-74.0596408283 (LocalLL) (X) 579750.62 (Y) 4477127.90 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\7S.jsf • Ping Number: 208764 • Range to target: 12.84 • Fish Height: 4.42 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 7S	Dimensions and attributes • Target Width: 2.44 • Target Height: 0.47 • Target Length: 2.04 • Target Shadow: 1.60
	00_142_debris • Sonar Time at Target: 4/4/2013 5:23:05 PM • Click Position 40.4409246481-74.0593373633 (WGS84) 40.4408167434-74.0597527274 (NAD27LL) 40.4409246481-74.0593373633 (LocalLL) (X) 579776.42 (Y) 4477122.22 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf • Ping Number: 199615 • Range to target: 5.61 • Fish Height: 3.88 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 9S	Dimensions and attributes • Target Width: 0.54 • Target Height: 1.08 • Target Length: 0.54 • Target Shadow: 2.63
	00_143_debris • Sonar Time at Target: 4/4/2013 4:58:25 PM • Click Position 40.4411538023-74.0591533685 (WGS84) 40.4410459018-74.0595687361 (NAD27LL) 40.4411538023-74.0591533685 (LocalLL) (X) 579791.76 (Y) 4477147.83 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 178174 • Range to target: 13.27 • Fish Height: 3.45 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 0.76 • Target Height: 0.15 • Target Length: 4.40 • Target Shadow: 0.61

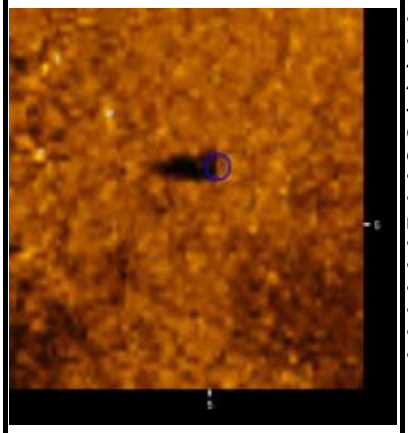
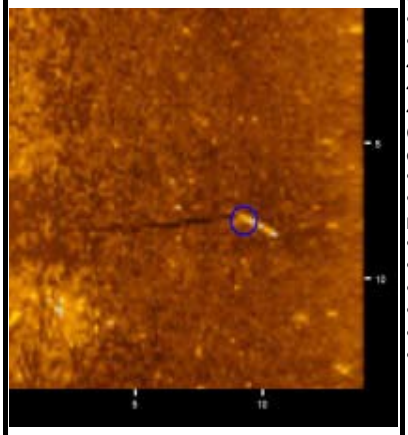
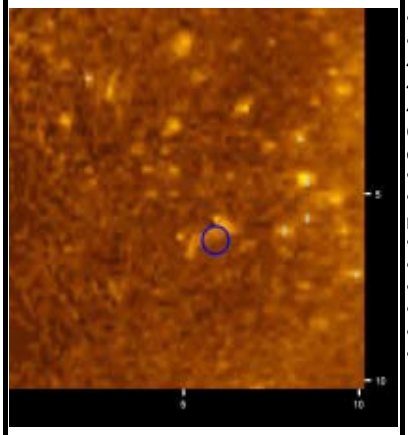
	00_144_debris • Sonar Time at Target: 4/4/2013 4:58:18 PM • Click Position 40.4412724836 -74.0590321662 (WGS84) 40.4411645852 -74.0594475363 (NAD27LL) 40.4412724836 -74.0590321662 (LocalLL) (X) 579801.90 (Y) 4477161.11 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 178068 • Range to target: 9.82 • Fish Height: 3.56 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 0.82 • Target Height: 0.26 • Target Length: 9.93 • Target Shadow: 0.83
	00_145_debris • Sonar Time at Target: 4/4/2013 5:13:24 PM • Click Position 40.4415294699 -74.0593749911 (WGS84) 40.4414215784 -74.0597903509 (NAD27LL) 40.4415294699 -74.0593749911 (LocalLL) (X) 579772.52 (Y) 4477189.32 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\6N.jsf • Ping Number: 191190 • Range to target: 8.52 • Fish Height: 4.32 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 6N	Dimensions and attributes • Target Width: 1.44 • Target Height: 0.36 • Target Length: 1.20 • Target Shadow: 0.88
	00_146_debris • Sonar Time at Target: 4/4/2013 4:57:59 PM • Click Position 40.4416060974 -74.0587905629 (WGS84) 40.4414982051 -74.0592059374 (NAD27LL) 40.4416060974 -74.0587905629 (LocalLL) (X) 579821.99 (Y) 4477198.36 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 177788 • Range to target: 8.52 • Fish Height: 3.56 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 0.56 • Target Height: 0.42 • Target Length: 0.46 • Target Shadow: 1.22

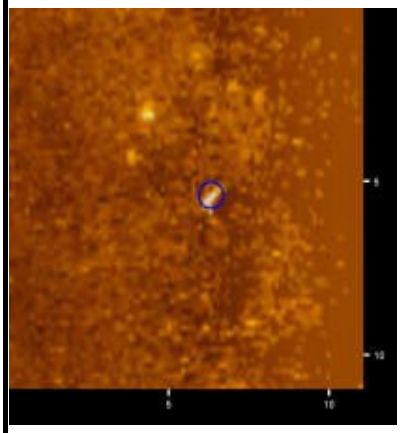
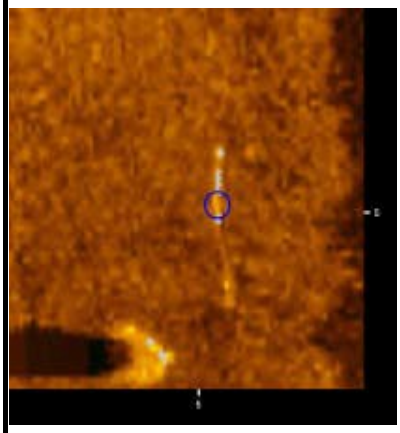
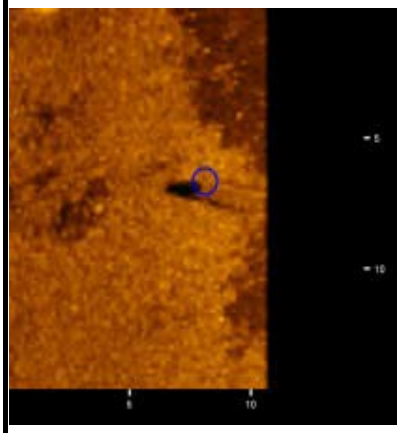
	00_147_debris • Sonar Time at Target: 4/4/2013 4:57:59 PM • Click Position 40.4415855992-74.0587700731 (WGS84) 40.4414777064 -74.0591854483 (NAD27LL) 40.4415855992-74.0587700731 (LocalLL) (X) 579823.75 (Y) 4477196.10 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 177796 • Range to target: 5.93 • Fish Height: 3.56 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 0.65 • Target Height: 0.25 • Target Length: 0.84 • Target Shadow: 0.53
	00_148_debris • Sonar Time at Target: 4/4/2013 5:13:35 PM • Click Position 40.4417328852 -74.0593058690 (WGS84) 40.4416249978-74.0597212295 (NAD27LL) 40.4417328852-74.0593058690 (LocalLL) (X) 579778.14 (Y) 4477211.97 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\6N.jsf • Ping Number: 191350 • Range to target: 12.62 • Fish Height: 4.10 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 6N	Dimensions and attributes • Target Width: 0.88 • Target Height: 0.35 • Target Length: 1.78 • Target Shadow: 1.24
	00_149_debris • Sonar Time at Target: 4/4/2013 5:13:28 PM • Click Position 40.4416232205-74.0593626072 (WGS84) 40.4415153309-74.0597779668 (NAD27LL) 40.4416232205 -74.0593626072 (LocalLL) (X) 579773.46 (Y) 4477199.74 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\6N.jsf • Ping Number: 191259 • Range to target: 11.98 • Fish Height: 4.32 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 6N	Dimensions and attributes • Target Width: 1.03 • Target Height: 0.42 • Target Length: 1.04 • Target Shadow: 1.38

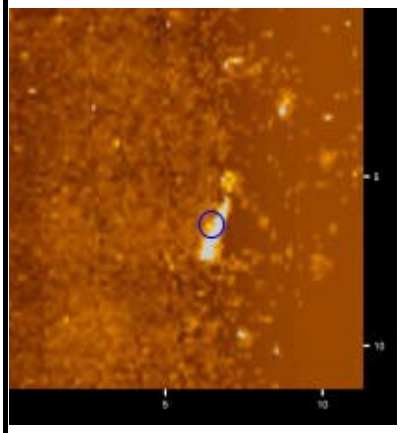
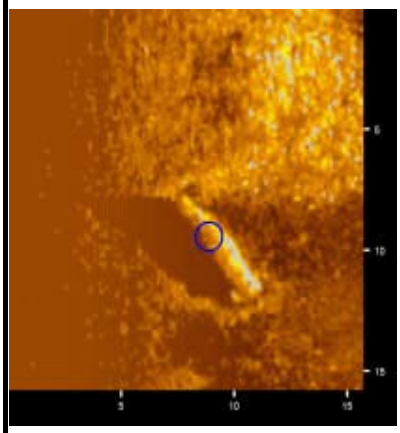
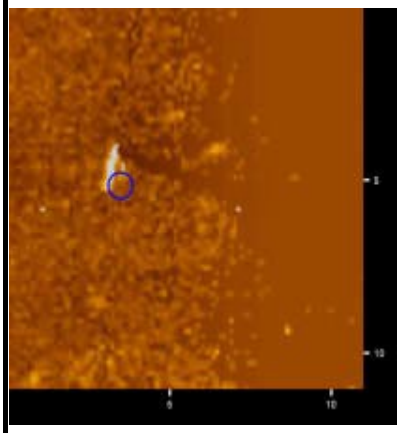
	00_150_debris • Sonar Time at Target: 4/4/2013 5:13:52 PM • Click Position 40.4420050082-74.0590309604 (WGS84) 40.4418971255 -74.0594463266 (NAD27LL) 40.4420050082-74.0590309604 (LocalLL) (X) 579801.13 (Y) 4477242.42 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\6N.jsf • Ping Number: 191603 • Range to target: 4.10 • Fish Height: 4.21 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 6N	Dimensions and attributes • Target Width: 0.90 • Target Height: 0.67 • Target Length: 7.06 • Target Shadow: 1.11
	00_151_debris • Sonar Time at Target: 4/4/2013 5:14:01 PM • Click Position 40.4422026918 -74.0590493829 (WGS84) 40.4420948135-74.0594647475 (NAD27LL) 40.4422026918-74.0590493829 (LocalLL) (X) 579799.34 (Y) 4477264.35 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\6N.jsf • Ping Number: 191732 • Range to target: 14.89 • Fish Height: 4.10 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 6N	Dimensions and attributes • Target Width: 0.54 • Target Height: 0.26 • Target Length: 5.32 • Target Shadow: 1.04
	00_152_debris • Sonar Time at Target: 4/4/2013 5:14:47 PM • Click Position 40.4429005079-74.0582613323 (WGS84) 40.4427926414-74.0586767135 (NAD27LL) 40.4429005079 -74.0582613323 (LocalLL) (X) 579865.34 (Y) 4477342.52 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\6N.jsf • Ping Number: 192403 • Range to target: 8.74 • Fish Height: 4.53 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 6N	Dimensions and attributes • Target Width: 0.97 • Target Height: 0.52 • Target Length: 2.09 • Target Shadow: 1.27

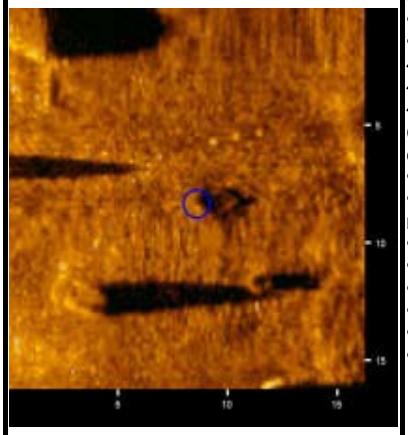
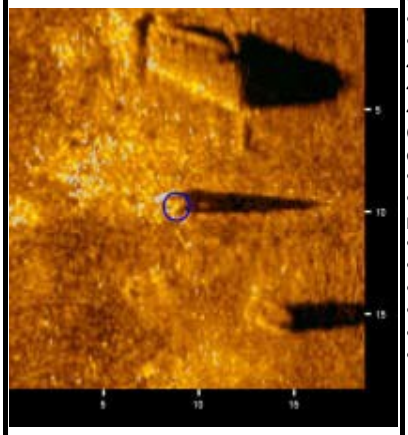
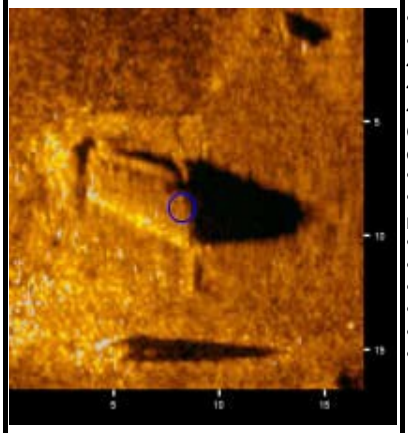
	00_153_debris • Sonar Time at Target: 4/4/2013 5:38:29 PM • Click Position 40.4431421843-74.0582125943 (WGS84) 40.4430343228 -74.0586279754 (NAD27LL) 40.4431421843-74.0582125943 (LocalLL) (X) 579869.19 (Y) 4477369.39 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\6N.001.jsf • Ping Number: 212998 • Range to target: 9.93 • Fish Height: 4.64 • Heading: 0.000 Degrees • Event Number: 1125 • Line Name: 6N.001	Dimensions and attributes • Target Width: 1.32 • Target Height: 1.01 • Target Length: 5.40 • Target Shadow: 3.06
	00_154_debris • Sonar Time at Target: 4/4/2013 5:31:41 PM • Click Position 40.4431776949 -74.0579306421 (WGS84) 40.4430698330-74.0583460302 (NAD27LL) 40.4431776949-74.0579306421 (LocalLL) (X) 579893.06 (Y) 4477373.59 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\7S.jsf • Ping Number: 207092 • Range to target: 4.32 • Fish Height: 4.64 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 7S	Dimensions and attributes • Target Width: 0.75 • Target Height: 0.39 • Target Length: 3.57 • Target Shadow: 0.58
	00_155_debris • Sonar Time at Target: 4/4/2013 4:56:30 PM • Click Position 40.4432068946-74.0577641801 (WGS84) 40.4430990327-74.0581795724 (NAD27LL) 40.4432068946 -74.0577641801 (LocalLL) (X) 579907.14 (Y) 4477376.98 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 176499 • Range to target: 14.89 • Fish Height: 3.78 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 0.65 • Target Height: 0.22 • Target Length: 2.13 • Target Shadow: 0.97

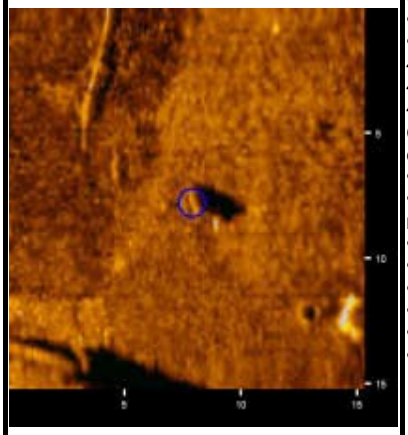
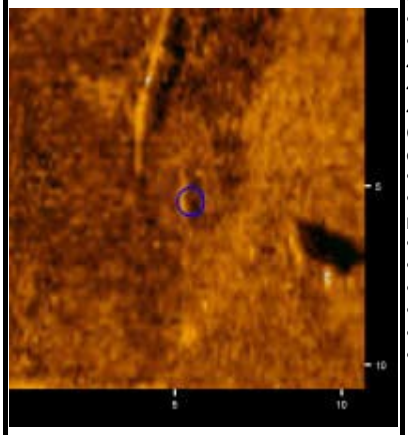
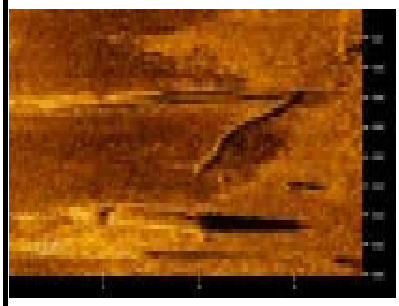
	00_156_debris • Sonar Time at Target: 4/4/2013 5:15:21 PM • Click Position 40.4435126461 -74.0579106552 (WGS84) 40.4434047913 -74.0583260420 (NAD27LL) 40.4435126461 -74.0579106552 (LocalLL) (X) 579894.36 (Y) 4477410.78 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\6N.jsf • Ping Number: 192896 • Range to target: 3.34 • Fish Height: 4.64 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 6N	Dimensions and attributes • Target Width: 0.84 • Target Height: 0.28 • Target Length: 4.21 • Target Shadow: 0.37
	00_157_debris • Sonar Time at Target: 4/4/2013 5:15:31 PM • Click Position 40.4436503418 -74.0577447824 (WGS84) 40.4435424893 -74.0581601727 (NAD27LL) 40.4436503418 -74.0577447824 (LocalLL) (X) 579908.26 (Y) 4477426.22 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\6N.jsf • Ping Number: 193030 • Range to target: 8.74 • Fish Height: 4.93 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 6N	Dimensions and attributes • Target Width: 0.92 • Target Height: 0.31 • Target Length: 1.49 • Target Shadow: 0.68
	00_158_debris • Sonar Time at Target: 4/4/2013 5:15:25 PM • Click Position 40.4436321517 -74.0579968171 (WGS84) 40.4435242998 -74.0584122011 (NAD27LL) 40.4436321517 -74.0579968171 (LocalLL) (X) 579886.91 (Y) 4477423.97 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\6N.jsf • Ping Number: 192952 • Range to target: 9.28 • Fish Height: 4.75 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 6N	Dimensions and attributes • Target Width: 1.95 • Target Height: 0.20 • Target Length: 0.82 • Target Shadow: 0.45

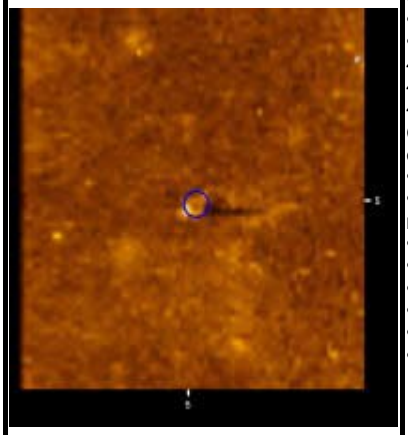
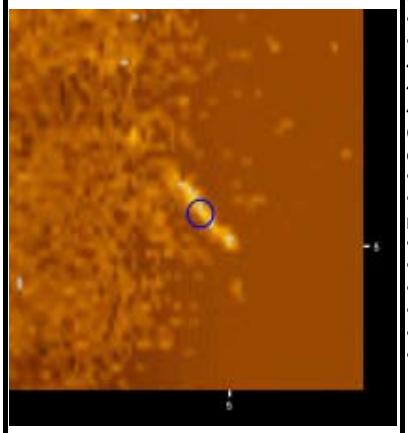
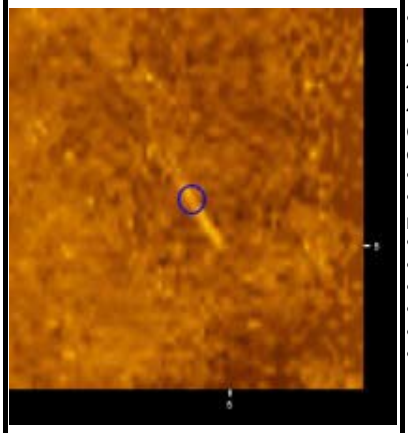
	00_159_debris • Sonar Time at Target: 4/4/2013 5:15:31 PM • Click Position 40.4437299964 -74.0579372062 (WGS84) 40.4436221465 -74.0583525912 (NAD27LL) 40.4437299964 -74.0579372062 (LocalLL) (X) 579891.85 (Y) 4477434.89 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\6N.jsf • Ping Number: 193032 • Range to target: 9.82 • Fish Height: 4.92 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 6N	Dimensions and attributes • Target Width: 1.13 • Target Height: 0.74 • Target Length: 0.98 • Target Shadow: 1.96
	00_160_debris • Sonar Time at Target: 4/4/2013 5:39:10 PM • Click Position 40.4439235546 -74.0576699437 (WGS84) 40.4438157078 -74.0580853345 (NAD27LL) 40.4439235546 -74.0576699437 (LocalLL) (X) 579914.29 (Y) 4477456.61 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\6N.001.jsf • Ping Number: 213596 • Range to target: 6.69 • Fish Height: 4.96 • Heading: 0.000 Degrees • Event Number: 1125 • Line Name: 6N.001	Dimensions and attributes • Target Width: 0.41 • Target Height: 2.46 • Target Length: 1.91 • Target Shadow: 8.17
	00_161_debris • Sonar Time at Target: 4/4/2013 5:39:21 PM • Click Position 40.4441303633 -74.0575189657 (WGS84) 40.4440225203 -74.0579343593 (NAD27LL) 40.4441303633 -74.0575189657 (LocalLL) (X) 579926.84 (Y) 4477479.70 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\6N.001.jsf • Ping Number: 213757 • Range to target: 7.01 • Fish Height: 4.96 • Heading: 0.000 Degrees • Event Number: 1125 • Line Name: 6N.001	Dimensions and attributes • Target Width: 0.73 • Target Height: 0.23 • Target Length: 1.50 • Target Shadow: 0.41

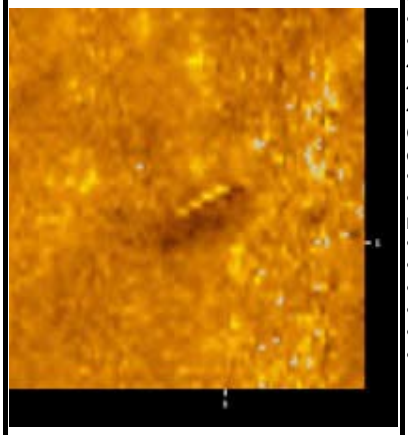
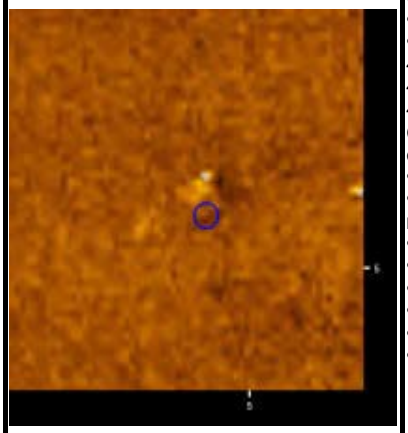
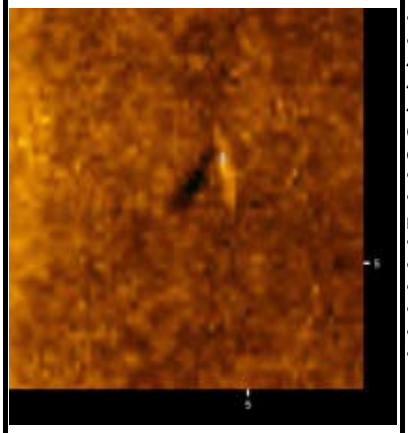
	00_162_debris • Sonar Time at Target: 4/4/2013 5:15:56 PM • Click Position 40.4440805223-74.0573827336 (WGS84) 40.4439726776 -74.0577981310 (NAD27LL) 40.4440805223-74.0573827336 (LocalLL) (X) 579938.46 (Y) 4477474.30 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\6N.jsf • Ping Number: 193404 • Range to target: 13.49 • Fish Height: 5.07 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 6N	Dimensions and attributes • Target Width: 0.49 • Target Height: 0.40 • Target Length: 1.03 • Target Shadow: 1.23
	00_164_debris • Sonar Time at Target: 4/4/2013 5:16:32 PM • Click Position 40.4448129729 -74.0571987840 (WGS84) 40.4447051433-74.0576141821 (NAD27LL) 40.4448129729-74.0571987840 (LocalLL) (X) 579953.19 (Y) 4477555.77 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\6N.jsf • Ping Number: 193922 • Range to target: 10.14 • Fish Height: 5.07 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 6N	Dimensions and attributes • Target Width: 0.38 • Target Height: 0.17 • Target Length: 4.08 • Target Shadow: 0.38
	00_165_debris • Sonar Time at Target: 4/4/2013 5:16:37 PM • Click Position 40.4448842350-74.0570948412 (WGS84) 40.4447764065-74.0575102416 (NAD27LL) 40.4448842350 -74.0570948412 (LocalLL) (X) 579961.92 (Y) 4477563.77 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\6N.jsf • Ping Number: 193993 • Range to target: 5.50 • Fish Height: 5.18 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 6N	Dimensions and attributes • Target Width: 1.12 • Target Height: 0.88 • Target Length: 2.65 • Target Shadow: 1.54

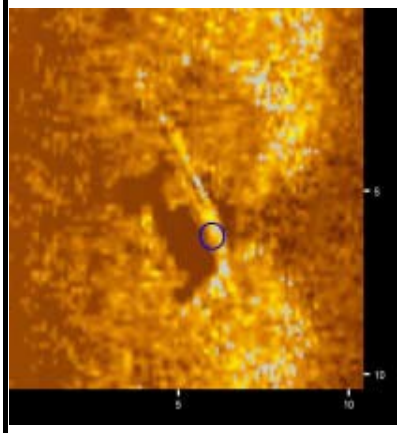
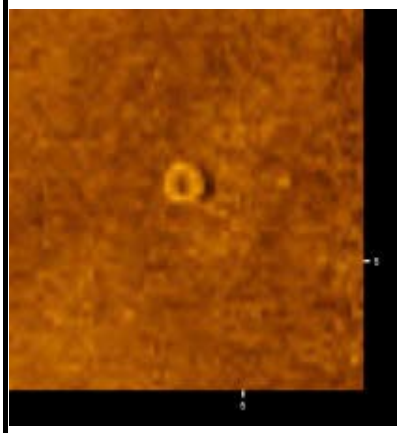
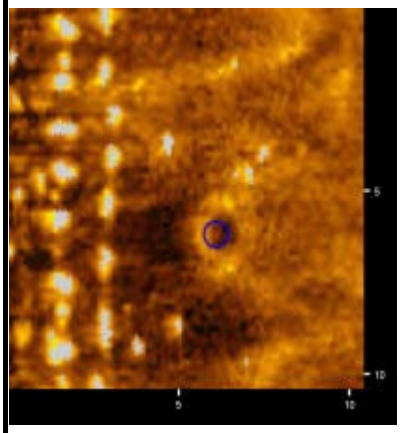
	00_166_debris • Sonar Time at Target: 4/4/2013 5:16:48 PM • Click Position 40.4450015114-74.0567600734 (WGS84) 40.4448936841 -74.0571754818 (NAD27LL) 40.4450015114-74.0567600734 (LocalLL) (X) 579990.17 (Y) 4477577.09 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\6N.jsf • Ping Number: 194152 • Range to target: 14.35 • Fish Height: 5.35 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 6N	Dimensions and attributes • Target Width: 0.78 • Target Height: 0.64 • Target Length: 2.21 • Target Shadow: 2.07
	00_167_debris • Sonar Time at Target: 4/4/2013 5:40:09 PM • Click Position 40.4450509108 -74.0569403318 (WGS84) 40.4449430852-74.0573557352 (NAD27LL) 40.4450509108-74.0569403318 (LocalLL) (X) 579974.82 (Y) 4477582.41 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\6N.001.jsf • Ping Number: 214451 • Range to target: 15.65 • Fish Height: 5.61 • Heading: 0.000 Degrees • Event Number: 1125 • Line Name: 6N.001	Dimensions and attributes • Target Width: 1.44 • Target Height: 1.30 • Target Length: 5.32 • Target Shadow: 5.01
	00_168_debris • Sonar Time at Target: 4/4/2013 5:16:52 PM • Click Position 40.4450807538-74.0567231004 (WGS84) 40.4449729280-74.0571385093 (NAD27LL) 40.4450807538 -74.0567231004 (LocalLL) (X) 579993.21 (Y) 4477585.92 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\6N.jsf • Ping Number: 194215 • Range to target: 12.95 • Fish Height: 5.31 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 6N	Dimensions and attributes • Target Width: 0.73 • Target Height: 1.14 • Target Length: 1.58 • Target Shadow: 3.84

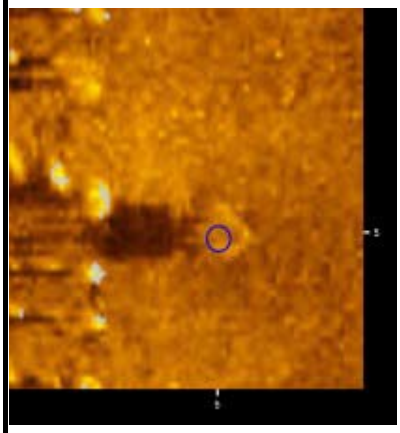
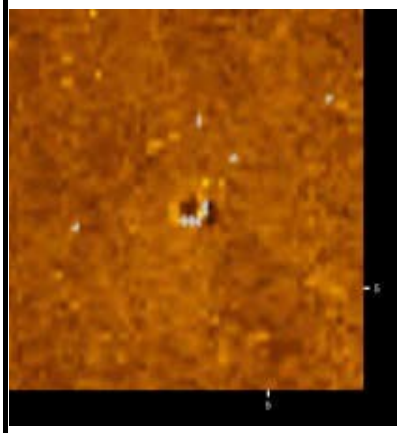
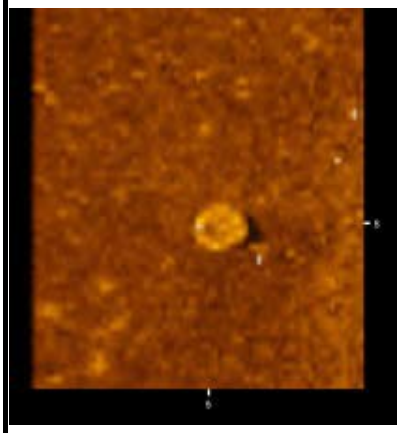
	00_169_debris • Sonar Time at Target: 4/4/2013 5:29:44 PM • Click Position 40.4454858885-74.0567288325 (WGS84) 40.4453780714-74.0571442390 (NAD27LL) 40.4454858885-74.0567288325 (LocalLL) (X) 579992.25 (Y) 4477630.89 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\7S.jsf • Ping Number: 205393 • Range to target: 38.19 • Fish Height: 5.29 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 7S	Dimensions and attributes • Target Width: 1.96 • Target Height: 0.16 • Target Length: 1.42 • Target Shadow: 1.22
	00_170_debris • Sonar Time at Target: 4/4/2013 5:29:43 PM • Click Position 40.4454528478-74.0566162470 (WGS84) 40.4453450296-74.0570316565 (NAD27LL) 40.4454528478-74.0566162470 (LocalLL) (X) 580001.83 (Y) 4477627.32 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\7S.jsf • Ping Number: 205385 • Range to target: 28.05 • Fish Height: 5.29 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 7S	Dimensions and attributes • Target Width: 2.04 • Target Height: 1.02 • Target Length: 1.79 • Target Shadow: 6.84
	00_171_debris • Sonar Time at Target: 4/4/2013 5:29:41 PM • Click Position 40.4455167646-74.0566097128 (WGS84) 40.4454089478-74.0570251222 (NAD27LL) 40.4455167646-74.0566097128 (LocalLL) (X) 580002.31 (Y) 4477634.42 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\7S.jsf • Ping Number: 205346 • Range to target: 30.96 • Fish Height: 5.07 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 7S	Dimensions and attributes • Target Width: 5.66 • Target Height: 0.77 • Target Length: 3.06 • Target Shadow: 5.66

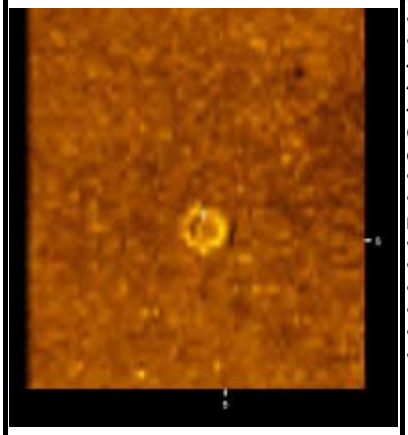
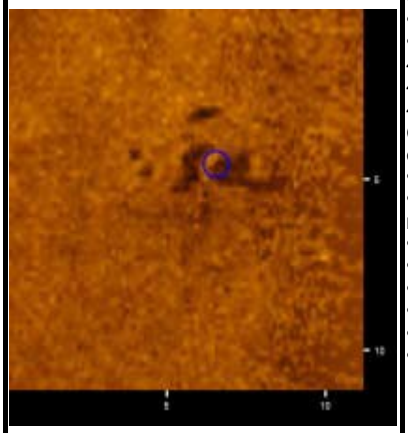
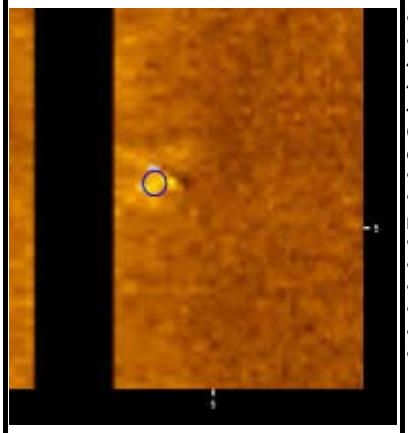
	00_172_debris • Sonar Time at Target: 4/4/2013 5:29:37 PM • Click Position 40.4456009301 -74.0566129153 (WGS84) 40.4454931151 -74.0570283242 (NAD27LL) 40.4456009301 -74.0566129153 (LocalLL) (X) 580001.94 (Y) 4477643.76 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\7S.jsf • Ping Number: 205298 • Range to target: 35.71 • Fish Height: 5.29 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 7S	Dimensions and attributes • Target Width: 0.63 • Target Height: 0.28 • Target Length: 1.78 • Target Shadow: 1.98
	00_173_debris • Sonar Time at Target: 4/4/2013 5:29:37 PM • Click Position 40.4455983516 -74.0565740641 (WGS84) 40.4454905364 -74.0569894739 (NAD27LL) 40.4455983516 -74.0565740641 (LocalLL) (X) 580005.24 (Y) 4477643.51 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\7S.jsf • Ping Number: 205290 • Range to target: 32.69 • Fish Height: 5.29 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 7S	Dimensions and attributes • Target Width: 0.58 • Target Height: 0.07 • Target Length: 1.65 • Target Shadow: 0.41
	00_174_debris • Sonar Time at Target: 4/4/2013 5:29:29 PM • Click Position 40.4457241926 -74.0564325145 (WGS84) 40.4456163796 -74.0568479272 (NAD27LL) 40.4457241926 -74.0564325145 (LocalLL) (X) 580017.09 (Y) 4477657.61 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\7S.jsf • Ping Number: 205183 • Range to target: 29.02 • Fish Height: 5.07 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 7S	Dimensions and attributes • Target Width: 1.00 • Target Height: 0.66 • Target Length: 6.23 • Target Shadow: 4.42

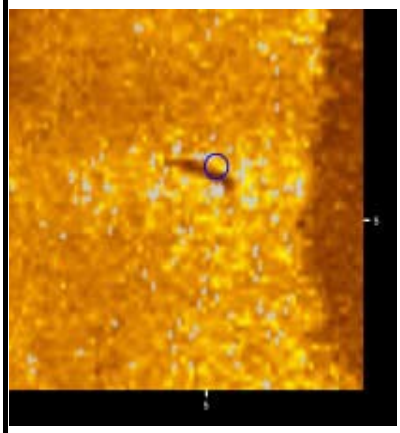
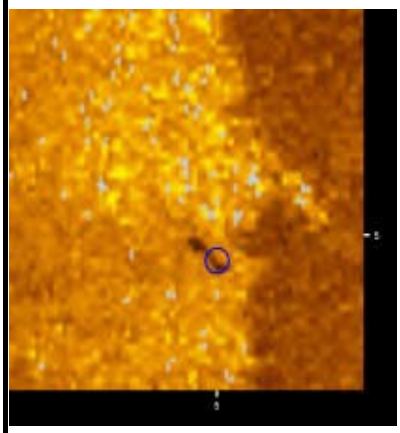
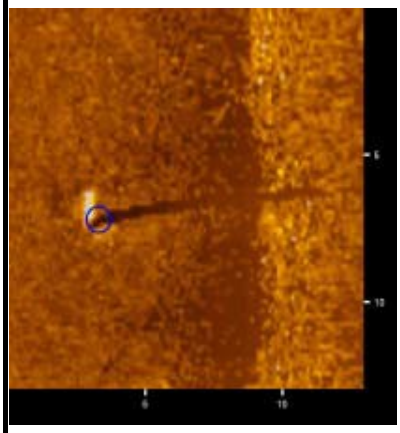
	00_175_debris • Sonar Time at Target: 4/4/2013 5:18:33 PM • Click Position 40.4456689071 -74.0559699000 (WGS84) 40.4455610909 -74.0563853250 (NAD27LL) 40.4456689071 -74.0559699000 (LocalLL) (X) 580056.39 (Y) 4477651.89 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf • Ping Number: 195681 • Range to target: 7.77 • Fish Height: 5.29 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 9S	Dimensions and attributes • Target Width: 0.84 • Target Height: 0.86 • Target Length: 0.84 • Target Shadow: 1.84
	00_176_debris • Sonar Time at Target: 4/4/2013 3:15:53 PM • Click Position 40.4424444518 -74.0561850660 (WGS84) 40.4423365669 -74.0566005032 (NAD27LL) 40.4424444518 -74.0561850660 (LocalLL) (X) 580041.97 (Y) 4477293.77 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\27N.jsf • Ping Number: 89035 • Range to target: 15.97 • Fish Height: 3.34 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 27N	Dimensions and attributes • Target Width: 0.69 • Target Height: 0.11 • Target Length: 2.15 • Target Shadow: 0.56
	00_177_debris • Sonar Time at Target: 4/4/2013 3:23:56 PM • Click Position 40.4399680896 -74.0584192070 (WGS84) 40.4398601605 -74.0588345999 (NAD27LL) 40.4399680896 -74.0584192070 (LocalLL) (X) 579855.42 (Y) 4477016.87 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\27N.001.jsf • Ping Number: 96030 • Range to target: 11.87 • Fish Height: 2.91 • Heading: 0.000 Degrees • Event Number: 1081 • Line Name: 27N.001	Dimensions and attributes • Target Width: 0.54 • Target Height: 0.13 • Target Length: 2.94 • Target Shadow: 0.57

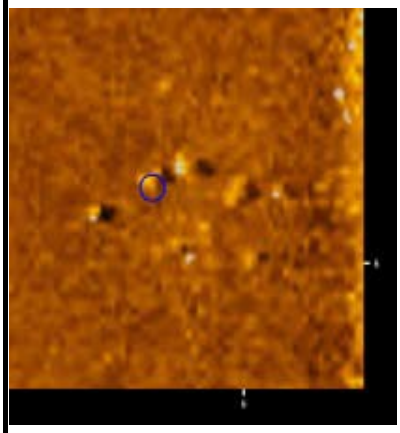
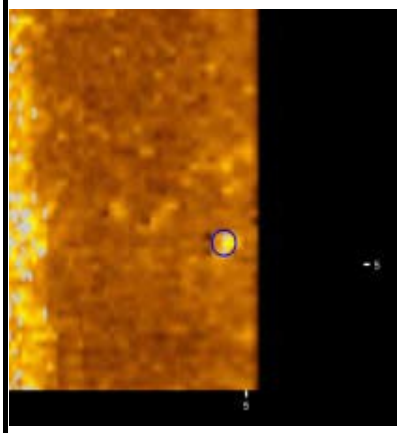
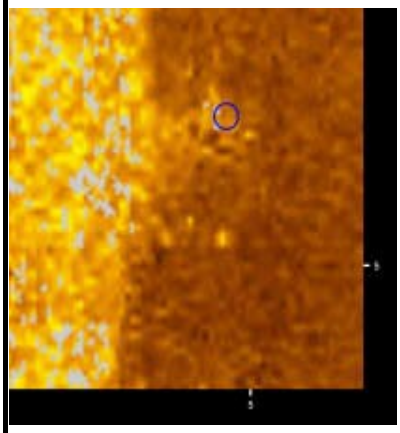
	00_178_debris • Sonar Time at Target: 4/4/2013 3:25:03 PM • Click Position 40.4387279200 -74.0593326963 (WGS84) 40.4386199678 -74.0597480723 (NAD27LL) 40.4387279200 -74.0593326963 (LocalLL) (X) 579779.42 (Y) 4476878.39 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\27N.001.jsf • Ping Number: 97008 • Range to target: 12.62 • Fish Height: 3.02 • Heading: 0.000 Degrees • Event Number: 1081 • Line Name: 27N.001	Dimensions and attributes • Target Width: 0.36 • Target Height: 0.11 • Target Length: 1.47 • Target Shadow: 0.48
	00_179_debris • Sonar Time at Target: 4/4/2013 4:12:16 PM • Click Position 40.4447388145 -74.0554256622 (WGS84) 40.4446309760 -74.0558411063 (NAD27LL) 40.4447388145 -74.0554256622 (LocalLL) (X) 580103.65 (Y) 4477549.14 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\100.jsf • Ping Number: 138057 • Range to target: 10.68 • Fish Height: 4.64 • Heading: 0.000 Degrees • Event Number: 1095 • Line Name: 100	Dimensions and attributes • Target Width: 1.13 • Target Height: 0.12 • Target Length: 1.12 • Target Shadow: 0.30
	00_180_debris • Sonar Time at Target: 4/4/2013 4:25:15 PM • Click Position 40.4439354242 -74.0564564227 (WGS84) 40.4438275726 -74.0568718447 (NAD27LL) 40.4439354242 -74.0564564227 (LocalLL) (X) 580017.19 (Y) 4477459.03 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\17N.jsf • Ping Number: 149342 • Range to target: 14.24 • Fish Height: 4.71 • Heading: 0.000 Degrees • Event Number: 1099 • Line Name: 17N	Dimensions and attributes • Target Width: 1.08 • Target Height: 0.18 • Target Length: 1.05 • Target Shadow: 0.60

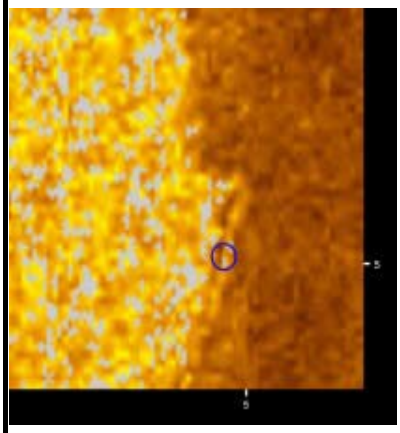
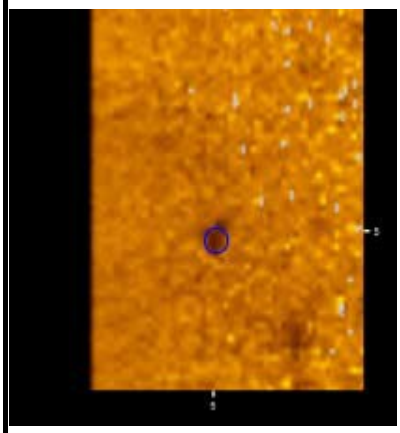
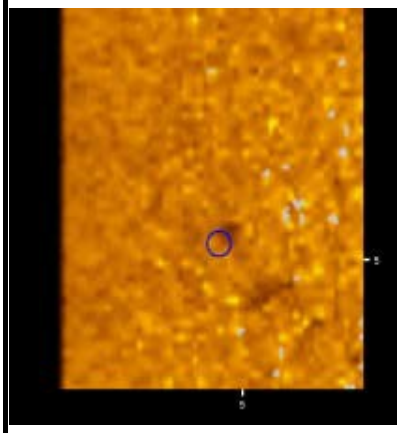
	00_181_debris • Sonar Time at Target: 4/4/2013 4:24:13 PM • Click Position 40.4428767438 -74.0573288399 (WGS84) 40.4427688730 -74.0577442453 (NAD27LL) 40.4428767438 -74.0573288399 (LocalLL) (X) 579944.45 (Y) 4477340.72 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\17N.jsf • Ping Number: 148442 • Range to target: 15.86 • Fish Height: 4.21 • Heading: 0.000 Degrees • Event Number: 1099 • Line Name: 17N	Dimensions and attributes • Target Width: 0.98 • Target Height: 0.51 • Target Length: 4.75 • Target Shadow: 2.26
	01_000_tire • Sonar Time at Target: 4/4/2013 4:06:56 PM • Click Position 40.4391729955 -74.0594491421 (WGS84) 40.4390650534 -74.0598645127 (NAD27LL) 40.4391729955 -74.0594491421 (LocalLL) (X) 579769.01 (Y) 4476927.69 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\100.jsf • Ping Number: 133413 • Range to target: 8.74 • Fish Height: 3.24 • Heading: 0.000 Degrees • Event Number: 1095 • Line Name: 100	Dimensions and attributes • Target Width: 0.99 • Target Height: 0.10 • Target Length: 1.15 • Target Shadow: 0.31
	01_001_tire • Sonar Time at Target: 4/4/2013 4:23:21 PM • Click Position 40.4420190587 -74.0579980818 (WGS84) 40.4419111721 -74.0584134746 (NAD27LL) 40.4420190587 -74.0579980818 (LocalLL) (X) 579888.71 (Y) 4477244.91 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\17N.jsf • Ping Number: 147688 • Range to target: 25.79 • Fish Height: 4.49 • Heading: 0.000 Degrees • Event Number: 1099 • Line Name: 17N	Dimensions and attributes • Target Width: 2.40 • Target Height: 0.31 • Target Length: 2.34 • Target Shadow: 1.95

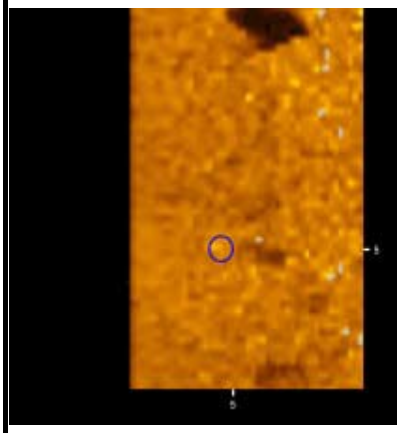
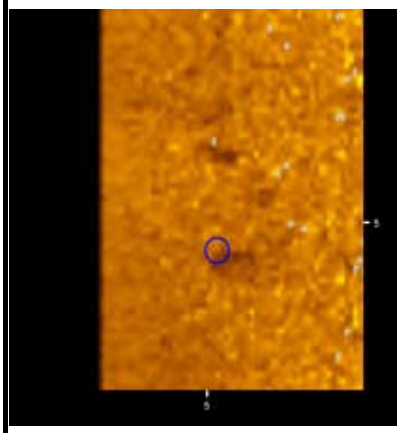
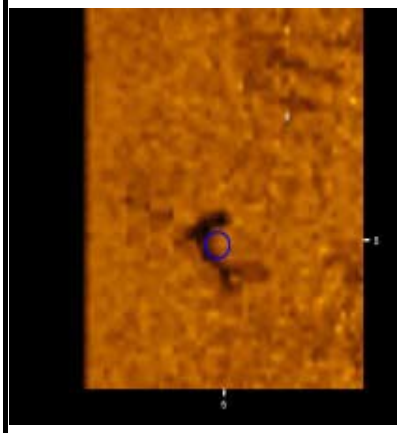
	01_002_tire • Sonar Time at Target: 4/4/2013 5:19:35 PM • Click Position 40.4445640222 -74.0565650986 (WGS84) 40.4444561846 -74.0569805143 (NAD27LL) 40.4445640222 -74.0565650986 (LocalLL) (X) 580007.22 (Y) 4477528.71 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf • Ping Number: 196566 • Range to target: 8.96 • Fish Height: 4.53 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 9S	Dimensions and attributes • Target Width: 1.33 • Target Height: 0.77 • Target Length: 1.18 • Target Shadow: 2.06
	01_003_tire • Sonar Time at Target: 4/4/2013 5:12:57 PM • Click Position 40.4409978682 -74.0594907327 (WGS84) 40.4408899657 -74.0599060924 (NAD27LL) 40.4409978682 -74.0594907327 (LocalLL) (X) 579763.33 (Y) 4477130.21 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\6N.jsf • Ping Number: 190799 • Range to target: 10.57 • Fish Height: 4.10 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 6N	Dimensions and attributes • Target Width: 0.28 • Target Height: 0.12 • Target Length: 0.96 • Target Shadow: 0.34
	01_004_tire • Sonar Time at Target: 4/4/2013 5:16:13 PM • Click Position 40.4444040745 -74.0572339170 (WGS84) 40.4442962362 -74.0576493164 (NAD27LL) 40.4444040745 -74.0572339170 (LocalLL) (X) 579950.69 (Y) 4477510.35 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\6N.jsf • Ping Number: 193648 • Range to target: 7.55 • Fish Height: 4.96 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 6N	Dimensions and attributes • Target Width: 1.46 • Target Height: 0.24 • Target Length: 1.23 • Target Shadow: 0.46

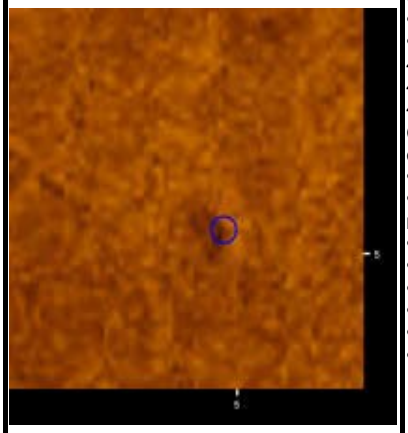
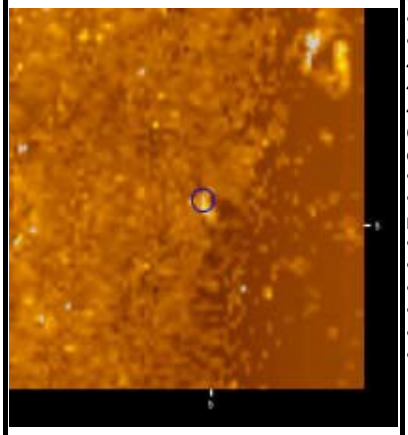
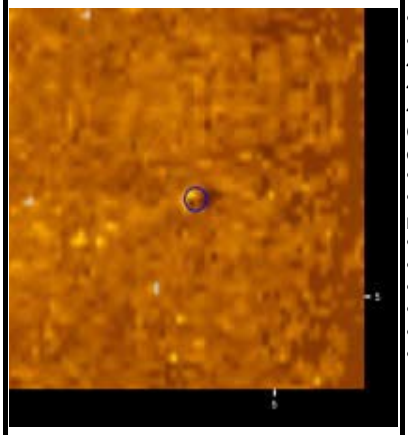
	01_006_tire • Sonar Time at Target: 4/4/2013 3:07:43 PM • Click Position 40.4425144266 -74.0563173131 (WGS84) 40.4424065438 -74.0567327465 (NAD27LL) 40.4425144266 -74.0563173131 (LocalLL) (X) 580030.67 (Y) 4477301.42 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\28S.jsf • Ping Number: 81931 • Range to target: 7.34 • Fish Height: 3.45 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 28S	Dimensions and attributes • Target Width: 1.41 • Target Height: 0.14 • Target Length: 1.16 • Target Shadow: 0.33
	02_000_misc_feature • Sonar Time at Target: 4/4/2013 4:05:27 PM • Click Position 40.4392452774 -74.0595527177 (WGS84) 40.4391373373 -74.0599680852 (NAD27LL) 40.4392452774 -74.0595527177 (LocalLL) (X) 579760.14 (Y) 4476935.62 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\20S.jsf • Ping Number: 132131 • Range to target: 11.87 • Fish Height: 3.45 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 20S	Dimensions and attributes • Target Width: 2.81 • Target Height: 0.50 • Target Length: 4.52 • Target Shadow: 2.09
	02_001_misc_feature • Sonar Time at Target: 4/4/2013 4:21:52 PM • Click Position 40.4403924993 -74.0588949200 (WGS84) 40.4402845813 -74.0593102984 (NAD27LL) 40.4403924993 -74.0588949200 (LocalLL) (X) 579814.58 (Y) 4477063.55 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\17N.jsf • Ping Number: 146392 • Range to target: 1.94 • Fish Height: 3.88 • Heading: 0.000 Degrees • Event Number: 1099 • Line Name: 17N	Dimensions and attributes • Target Width: 0.95 • Target Height: 0.46 • Target Length: 1.09 • Target Shadow: 0.58

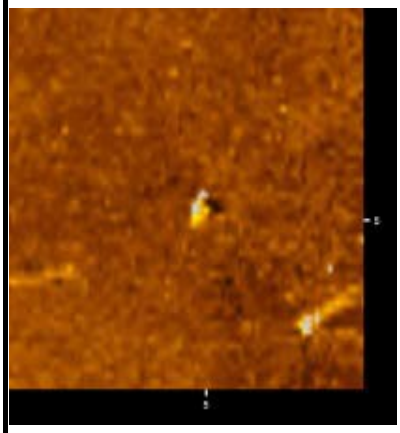
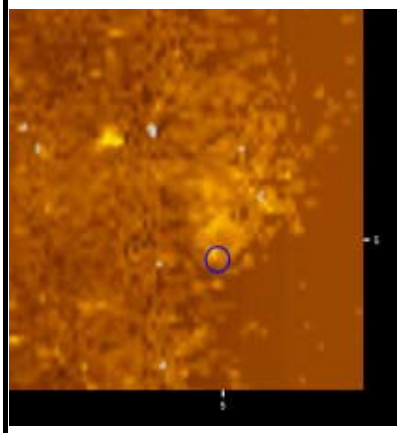
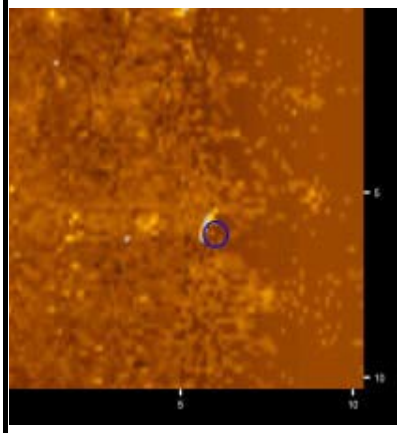
	02_002_misc_feature • Sonar Time at Target: 4/4/2013 4:21:51 PM • Click Position 40.4404288108-74.0590102301 (WGS84) 40.4403208941 -74.0594256052 (NAD27LL) 40.4404288108-74.0590102301 (LocalLL) (X) 579804.75 (Y) 4477067.48 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\17N.jsf • Ping Number: 146390 • Range to target: 8.63 • Fish Height: 3.88 • Heading: 0.000 Degrees • Event Number: 1099 • Line Name: 17N	Dimensions and attributes • Target Width: 0.68 • Target Height: 0.40 • Target Length: 1.96 • Target Shadow: 1.09
	02_003_mish_feature • Sonar Time at Target: 4/4/2013 4:21:55 PM • Click Position 40.4404842943 -74.0589489483 (WGS84) 40.4403763785-74.0593643247 (NAD27LL) 40.4404842943-74.0589489483 (LocalLL) (X) 579809.89 (Y) 4477073.69 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\17N.jsf • Ping Number: 146441 • Range to target: 6.58 • Fish Height: 3.56 • Heading: 0.000 Degrees • Event Number: 1099 • Line Name: 17N	Dimensions and attributes • Target Width: 0.53 • Target Height: 0.23 • Target Length: 1.09 • Target Shadow: 0.51
	02_004_misc_feature • Sonar Time at Target: 4/4/2013 4:17:44 PM • Click Position 40.4411608854-74.0583686443 (WGS84) 40.4410529819-74.0587840321 (NAD27LL) 40.4411608854 -74.0583686443 (LocalLL) (X) 579858.30 (Y) 4477149.32 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\18S.jsf • Ping Number: 142807 • Range to target: 11.44 • Fish Height: 3.94 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 18S	Dimensions and attributes • Target Width: 0.61 • Target Height: 1.66 • Target Length: 1.06 • Target Shadow: 8.83

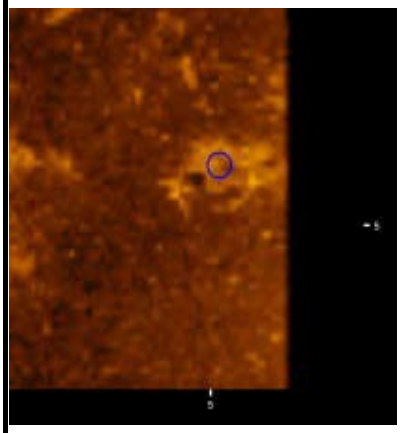
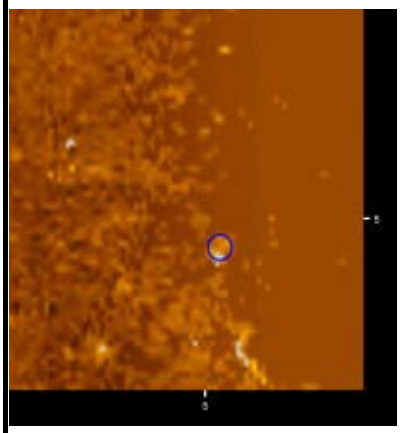
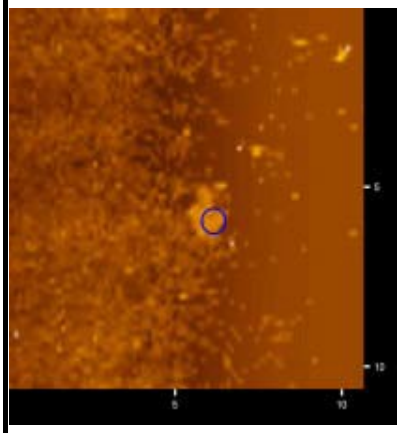
	02_005_misc_feature • Sonar Time at Target: 4/4/2013 4:17:55 PM • Click Position 40.4409672104 -74.0584969423 (WGS84) 40.4408593031 -74.0589123279 (NAD27LL) 40.4409672104 -74.0584969423 (LocalLL) (X) 579847.65 (Y) 4477127.71 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\18S.jsf • Ping Number: 142966 • Range to target: 10.47 • Fish Height: 3.72 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 18S	Dimensions and attributes • Target Width: 0.75 • Target Height: 0.15 • Target Length: 1.35 • Target Shadow: 0.46
	02_006_misc_feature • Sonar Time at Target: 4/4/2013 4:22:24 PM • Click Position 40.4409675827 -74.0585269333 (WGS84) 40.4408596756 -74.0589423181 (NAD27LL) 40.4409675827 -74.0585269333 (LocalLL) (X) 579845.11 (Y) 4477127.72 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\17N.jsf • Ping Number: 146868 • Range to target: 2.70 • Fish Height: 3.99 • Heading: 0.000 Degrees • Event Number: 1099 • Line Name: 17N	Dimensions and attributes • Target Width: 0.76 • Target Height: 0.23 • Target Length: 0.68 • Target Shadow: 0.30
	02_007_misc_feature • Sonar Time at Target: 4/4/2013 4:23:13 PM • Click Position 40.4418332156 -74.0580066940 (WGS84) 40.4417253251 -74.0584220875 (NAD27LL) 40.4418332156 -74.0580066940 (LocalLL) (X) 579888.20 (Y) 4477224.28 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\17N.jsf • Ping Number: 147573 • Range to target: 10.14 • Fish Height: 3.99 • Heading: 0.000 Degrees • Event Number: 1099 • Line Name: 17N	Dimensions and attributes • Target Width: 0.98 • Target Height: 0.13 • Target Length: 0.68 • Target Shadow: 0.37

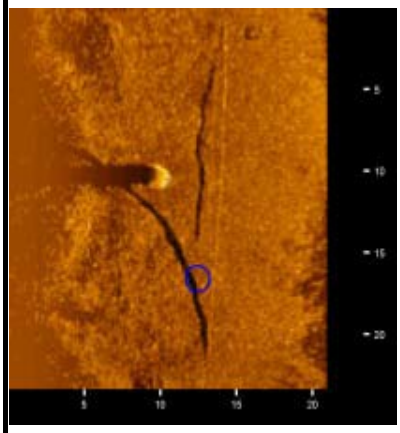
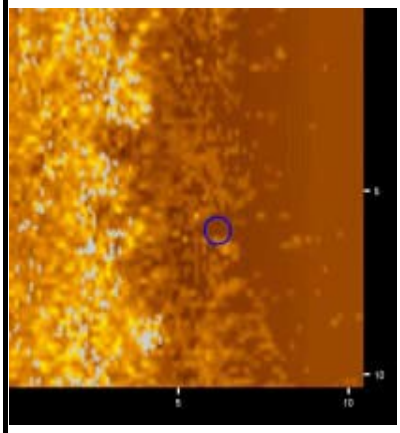
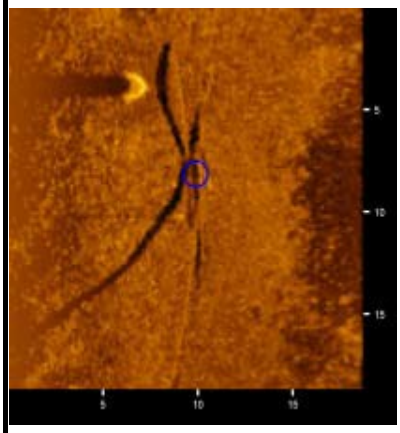
	02_008_misc_feature • Sonar Time at Target: 4/4/2013 4:24:08 PM • Click Position 40.4427588057 -74.0573310239 (WGS84) 40.4426509323 -74.0577464298 (NAD27LL) 40.4427588057 -74.0573310239 (LocalLL) (X) 579944.41 (Y) 4477327.63 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\17N.jsf • Ping Number: 148363 • Range to target: 10.14 • Fish Height: 4.21 • Heading: 0.000 Degrees • Event Number: 1099 • Line Name: 17N	Dimensions and attributes • Target Width: 0.38 • Target Height: 0.19 • Target Length: 1.67 • Target Shadow: 0.53
	02_010_misc_feature • Sonar Time at Target: 4/4/2013 5:19:15 PM • Click Position 40.4449546408 -74.0564654671 (WGS84) 40.4448468112 -74.0568808833 (NAD27LL) 40.4449546408 -74.0564654671 (LocalLL) (X) 580015.21 (Y) 4477572.15 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf • Ping Number: 196283 • Range to target: 5.93 • Fish Height: 4.64 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 9S	Dimensions and attributes • Target Width: 0.57 • Target Height: 0.33 • Target Length: 1.09 • Target Shadow: 0.59
	02_011_misc_feature • Sonar Time at Target: 4/4/2013 5:19:21 PM • Click Position 40.4448561013 -74.0565438690 (WGS84) 40.4447482699 -74.0569592837 (NAD27LL) 40.4448561013 -74.0565438690 (LocalLL) (X) 580008.68 (Y) 4477561.15 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf • Ping Number: 196371 • Range to target: 6.26 • Fish Height: 4.64 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 9S	Dimensions and attributes • Target Width: 0.79 • Target Height: 0.33 • Target Length: 1.61 • Target Shadow: 0.59

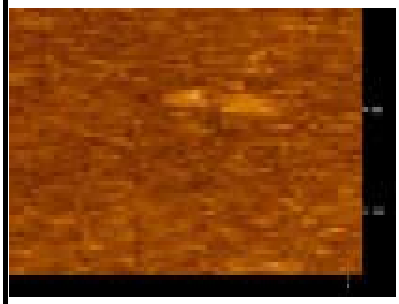
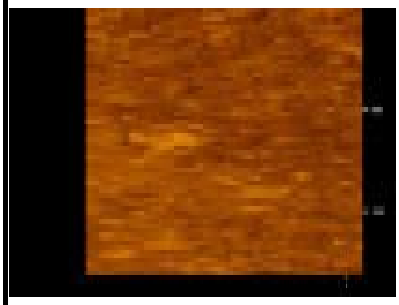
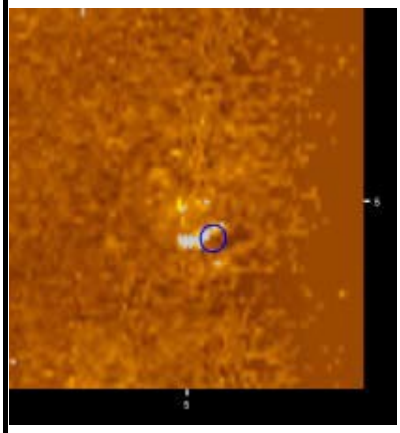
	02_012_misc_feature • Sonar Time at Target: 4/4/2013 5:19:28 PM • Click Position 40.4447292333-74.0566249182 (WGS84) 40.4446213996 -74.0570403315 (NAD27LL) 40.4447292333-74.0566249182 (LocalLL) (X) 580001.95 (Y) 4477546.99 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf • Ping Number: 196478 • Range to target: 4.96 • Fish Height: 4.75 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 9S	Dimensions and attributes • Target Width: 0.89 • Target Height: 0.73 • Target Length: 0.66 • Target Shadow: 1.25
	02_013_misc_feature • Sonar Time at Target: 4/4/2013 5:19:30 PM • Click Position 40.4447152443 -74.0566479648 (WGS84) 40.4446074104-74.0570633776 (NAD27LL) 40.4447152443-74.0566479648 (LocalLL) (X) 580000.02 (Y) 4477545.42 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf • Ping Number: 196494 • Range to target: 5.83 • Fish Height: 4.64 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 9S	Dimensions and attributes • Target Width: 0.59 • Target Height: 0.53 • Target Length: 1.04 • Target Shadow: 0.96
	02_014_misc_feature • Sonar Time at Target: 4/4/2013 4:57:49 PM • Click Position 40.4417697006-74.0586451467 (WGS84) 40.4416618113-74.0590605240 (NAD27LL) 40.4417697006 -74.0586451467 (LocalLL) (X) 579834.13 (Y) 4477216.65 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 177646 • Range to target: 6.04 • Fish Height: 3.56 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 0.87 • Target Height: 0.22 • Target Length: 1.41 • Target Shadow: 0.46

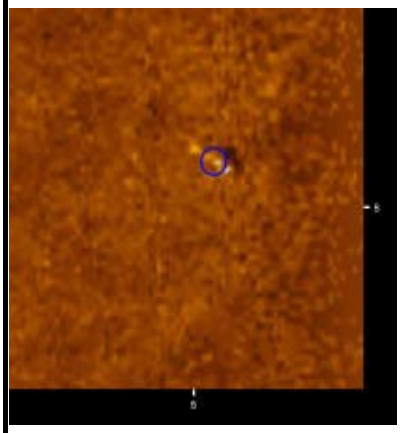
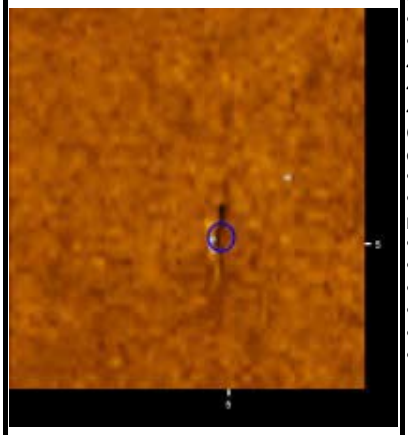
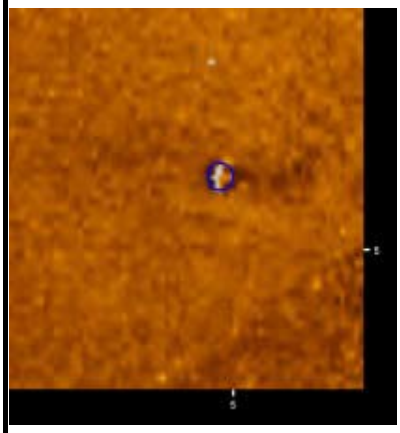
	02_015_misc_feature • Sonar Time at Target: 4/4/2013 5:22:35 PM • Click Position 40.4414147119-74.0588323304 (WGS84) 40.4413068157 -74.0592477049 (NAD27LL) 40.4414147119-74.0588323304 (LocalLL) (X) 579818.68 (Y) 4477177.08 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf • Ping Number: 199179 • Range to target: 8.74 • Fish Height: 4.21 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 9S	Dimensions and attributes • Target Width: 0.78 • Target Height: 0.13 • Target Length: 1.13 • Target Shadow: 0.31
	02_016_misc_feature • Sonar Time at Target: 4/4/2013 5:12:43 PM • Click Position 40.4407713778 -74.0596092023 (WGS84) 40.4406634709-74.0600245602 (NAD27LL) 40.4407713778-74.0596092023 (LocalLL) (X) 579753.55 (Y) 4477104.96 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\6N.jsf • Ping Number: 190596 • Range to target: 14.13 • Fish Height: 4.10 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 6N	Dimensions and attributes • Target Width: 0.54 • Target Height: 0.20 • Target Length: 1.03 • Target Shadow: 0.74
	02_017_misc_feature • Sonar Time at Target: 4/4/2013 5:12:40 PM • Click Position 40.4407414848-74.0596414232 (WGS84) 40.4406335774-74.0600567804 (NAD27LL) 40.4407414848 -74.0596414232 (LocalLL) (X) 579750.85 (Y) 4477101.62 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\6N.jsf • Ping Number: 190563 • Range to target: 13.38 • Fish Height: 4.10 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 6N	Dimensions and attributes • Target Width: 0.41 • Target Height: 0.17 • Target Length: 0.61 • Target Shadow: 0.61

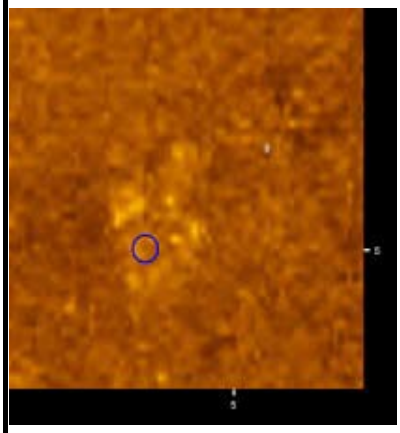
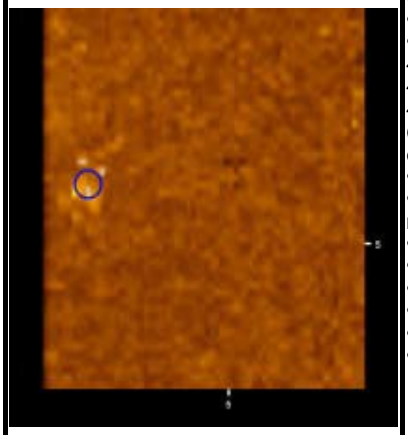
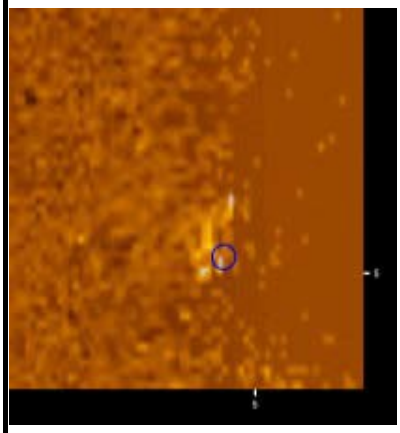
	02_018_misc_feature • Sonar Time at Target: 4/4/2013 5:33:35 PM • Click Position 40.4409933909-74.0595959419 (WGS84) 40.4408854887 -74.0600112989 (NAD27LL) 40.4409933909-74.0595959419 (LocalLL) (X) 579754.41 (Y) 4477129.62 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\7S.jsf • Ping Number: 208746 • Range to target: 10.03 • Fish Height: 4.21 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 7S	Dimensions and attributes • Target Width: 0.76 • Target Height: 0.25 • Target Length: 1.21 • Target Shadow: 0.68
	02_019_misc_feature • Sonar Time at Target: 4/4/2013 5:13:47 PM • Click Position 40.4418407962 -74.0588719078 (WGS84) 40.4417329093-74.0592872789 (NAD27LL) 40.4418407962-74.0588719078 (LocalLL) (X) 579814.82 (Y) 4477224.34 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\6N.jsf • Ping Number: 191530 • Range to target: 15.86 • Fish Height: 4.21 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 6N	Dimensions and attributes • Target Width: 1.82 • Target Height: 0.22 • Target Length: 2.15 • Target Shadow: 0.88
	02_020_misc_feature • Sonar Time at Target: 4/4/2013 5:13:54 PM • Click Position 40.4419600858-74.0588082909 (WGS84) 40.4418522012-74.0592236630 (NAD27LL) 40.4419600858 -74.0588082909 (LocalLL) (X) 579820.07 (Y) 4477237.64 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\6N.jsf • Ping Number: 191627 • Range to target: 15.11 • Fish Height: 4.32 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 6N	Dimensions and attributes • Target Width: 0.54 • Target Height: 0.52 • Target Length: 1.32 • Target Shadow: 2.15

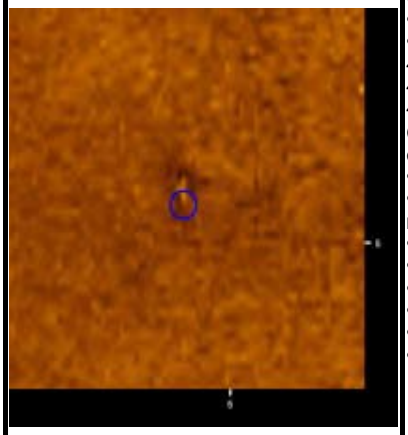
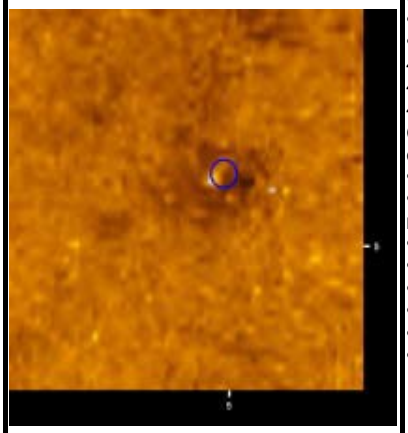
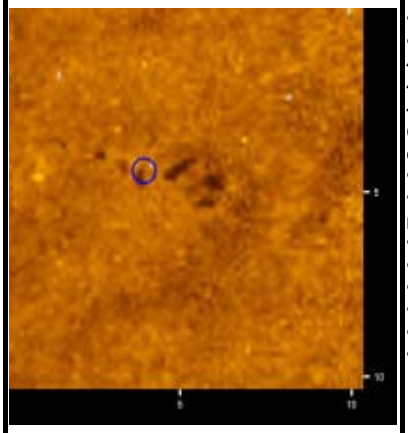
	02_021_misc_feature • Sonar Time at Target: 4/4/2013 5:13:55 PM • Click Position 40.4420651383-74.0590008029 (WGS84) 40.4419572568-74.0594161695 (NAD27LL) 40.4420651383-74.0590008029 (LocalLL) (X) 579803.62 (Y) 4477249.12 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\6N.jsf • Ping Number: 191651 • Range to target: 4.64 • Fish Height: 4.32 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 6N	Dimensions and attributes • Target Width: 2.33 • Target Height: 0.45 • Target Length: 1.43 • Target Shadow: 0.74
	02_022_misc_feature • Sonar Time at Target: 4/4/2013 5:14:00 PM • Click Position 40.4420649764-74.0587250797 (WGS84) 40.4419570937-74.0591404534 (NAD27LL) 40.4420649764-74.0587250797 (LocalLL) (X) 579827.00 (Y) 4477249.35 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\6N.jsf • Ping Number: 191718 • Range to target: 16.51 • Fish Height: 4.32 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 6N	Dimensions and attributes • Target Width: 0.60 • Target Height: 0.44 • Target Length: 0.73 • Target Shadow: 1.94
	02_023_misc_feature • Sonar Time at Target: 4/4/2013 5:14:23 PM • Click Position 40.4424732482-74.0584913498 (WGS84) 40.4423653734-74.0589067273 (NAD27LL) 40.4424732482-74.0584913498 (LocalLL) (X) 579846.34 (Y) 4477294.88 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\6N.jsf • Ping Number: 192055 • Range to target: 14.57 • Fish Height: 4.42 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 6N	Dimensions and attributes • Target Width: 0.96 • Target Height: 0.22 • Target Length: 1.78 • Target Shadow: 0.81

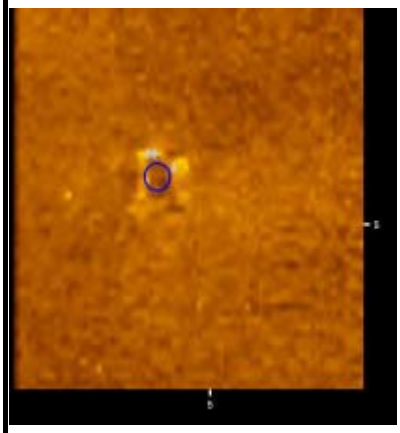
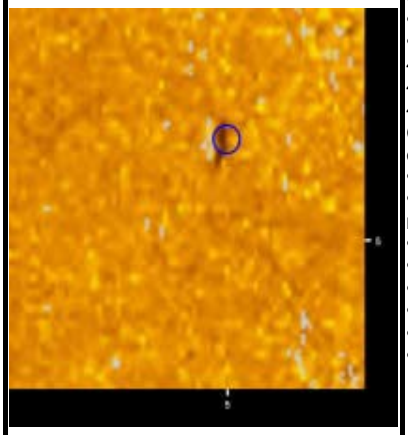
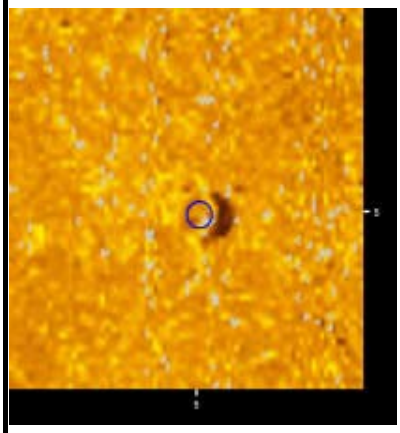
	02_025_misc_feature • Sonar Time at Target: 4/4/2013 5:17:34 PM • Click Position 40.4459253269-74.0564287028 (WGS84) 40.4458175181 -74.0568441146 (NAD27LL) 40.4459253269-74.0564287028 (LocalLL) (X) 580017.18 (Y) 4477679.94 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\6N.jsf • Ping Number: 194819 • Range to target: 11.44 • Fish Height: 5.29 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 6N	Dimensions and attributes • Target Width: 6.37 • Target Height: 0.21 • Target Length: 20.34 • Target Shadow: 0.53
	02_026_misc_feature • Sonar Time at Target: 4/4/2013 4:55:36 PM • Click Position 40.4442051578 -74.0571101596 (WGS84) 40.4440973148-74.0575255633 (NAD27LL) 40.4442051578-74.0571101596 (LocalLL) (X) 579961.42 (Y) 4477488.38 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 175723 • Range to target: 16.72 • Fish Height: 4.10 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 0.80 • Target Height: 0.32 • Target Length: 1.63 • Target Shadow: 1.45
	02_027_misc_feature • Sonar Time at Target: 4/4/2013 5:17:41 PM • Click Position 40.4460381256-74.0563191683 (WGS84) 40.4459303188-74.0567345823 (NAD27LL) 40.4460381256 -74.0563191683 (LocalLL) (X) 580026.33 (Y) 4477692.56 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\6N.jsf • Ping Number: 194918 • Range to target: 11.76 • Fish Height: 5.29 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 6N	Dimensions and attributes • Target Width: 1.44 • Target Height: 0.29 • Target Length: 11.07 • Target Shadow: 0.76

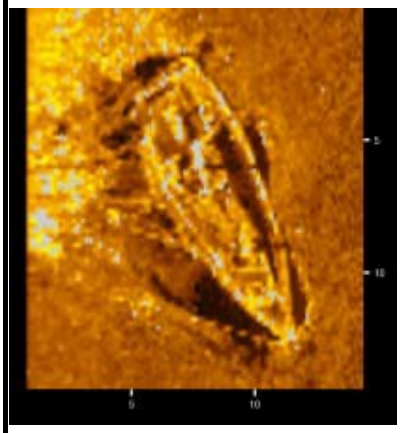
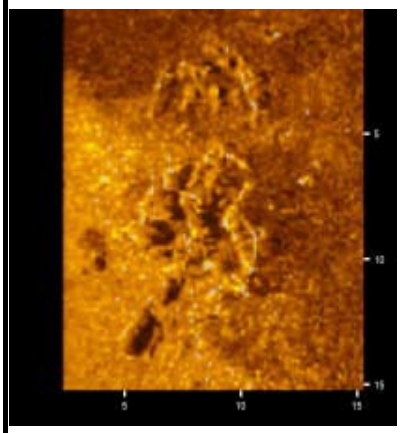
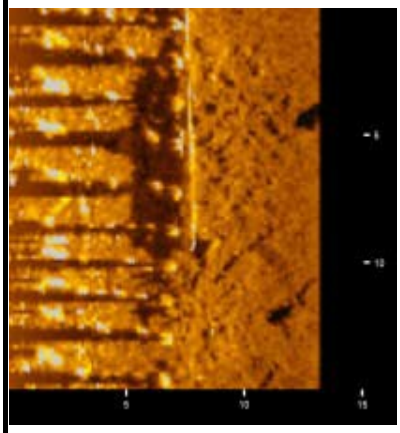
	02_029_misc_feature • Sonar Time at Target: 4/4/2013 5:29:28 PM • Click Position 40.4456648904 -74.0562295114 (WGS84) 40.4455570752 -74.0566449297 (NAD27LL) 40.4456648904 -74.0562295114 (LocalLL) (X) 580034.38 (Y) 4477651.21 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\7S.jsf • Ping Number: 205167 • Range to target: 10.79 • Fish Height: 5.18 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 7S	Dimensions and attributes • Target Width: 0.22 • Target Height: 0.05 • Target Length: 0.05 • Target Shadow: 0.11
	02_030_misc_feature • Sonar Time at Target: 4/4/2013 5:29:30 PM • Click Position 40.4456089974 -74.0562005837 (WGS84) 40.4455011809 -74.0566160031 (NAD27LL) 40.4456089974 -74.0562005837 (LocalLL) (X) 580036.90 (Y) 4477645.03 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\7S.jsf • Ping Number: 205192 • Range to target: 5.61 • Fish Height: 5.18 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 7S	Dimensions and attributes • Target Width: 0.08 • Target Height: 0.05 • Target Length: 0.11 • Target Shadow: 0.08
	02_031_misc_feature • Sonar Time at Target: 4/4/2013 3:30:31 PM • Click Position 40.4436239332 -74.0555658146 (WGS84) 40.4435160713 -74.0559812613 (NAD27LL) 40.4436239332 -74.0555658146 (LocalLL) (X) 580093.08 (Y) 4477425.26 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\25N.jsf • Ping Number: 101757 • Range to target: 13.70 • Fish Height: 3.72 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 25N	Dimensions and attributes • Target Width: 0.82 • Target Height: 0.32 • Target Length: 1.83 • Target Shadow: 1.35

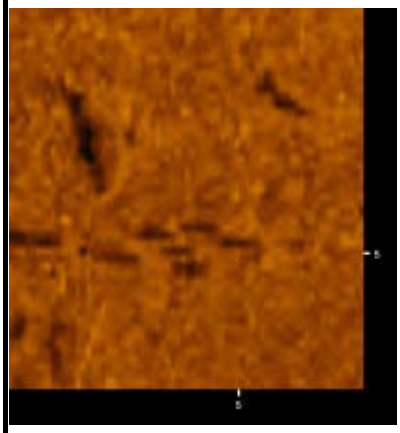
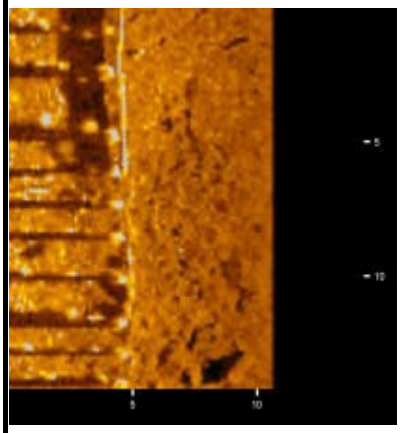
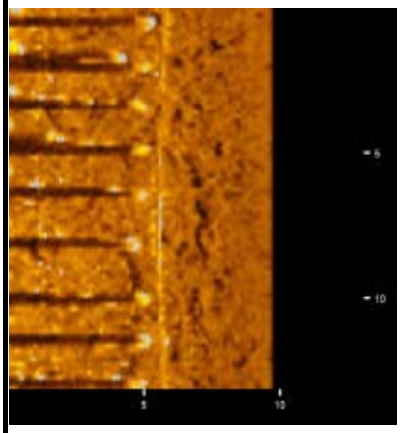
	02_032_misc_feature • Sonar Time at Target: 4/4/2013 3:43:46 PM • Click Position 40.4432176869-74.0560852684 (WGS84) 40.4431098184 -74.0565007039 (NAD27LL) 40.4432176869-74.0560852684 (LocalLL) (X) 580049.51 (Y) 4477379.70 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\23N.jsf • Ping Number: 113274 • Range to target: 12.30 • Fish Height: 3.67 • Heading: 0.000 Degrees • Event Number: 1087 • Line Name: 23N	Dimensions and attributes • Target Width: 0.46 • Target Height: 0.17 • Target Length: 1.64 • Target Shadow: 0.63
	02_033_misc_feature • Sonar Time at Target: 4/4/2013 3:48:23 PM • Click Position 40.4430986372 -74.0565178760 (WGS84) 40.4429907679-74.0569333010 (NAD27LL) 40.4430986372-74.0565178760 (LocalLL) (X) 580012.97 (Y) 4477366.09 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\22S.jsf • Ping Number: 117283 • Range to target: 7.77 • Fish Height: 3.67 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 22S	Dimensions and attributes • Target Width: 0.49 • Target Height: 0.13 • Target Length: 1.87 • Target Shadow: 0.33
	02_034_misc_feature • Sonar Time at Target: 4/4/2013 3:16:20 PM • Click Position 40.4429675003-74.0558693584 (WGS84) 40.4428596254-74.0562848008 (NAD27LL) 40.4429675003 -74.0558693584 (LocalLL) (X) 580068.12 (Y) 4477352.12 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\27N.jsf • Ping Number: 89433 • Range to target: 9.28 • Fish Height: 3.45 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 27N	Dimensions and attributes • Target Width: 0.40 • Target Height: 0.26 • Target Length: 0.89 • Target Shadow: 0.80

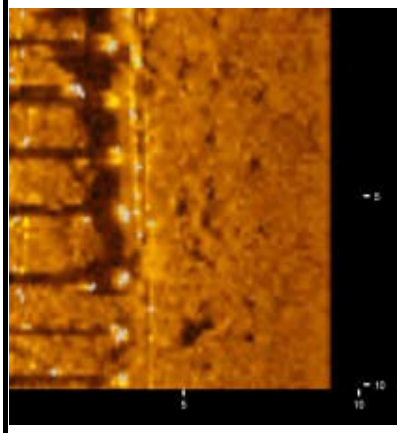
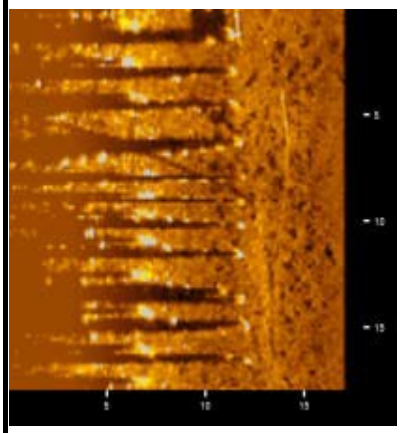
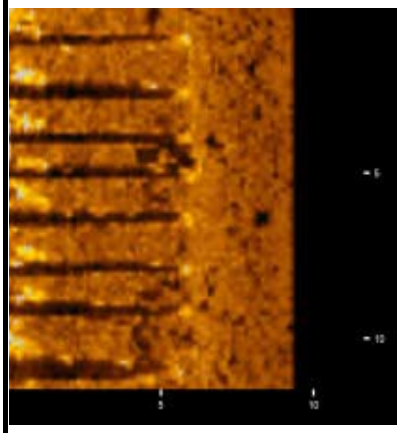
	02_035_misc_feature • Sonar Time at Target: 4/4/2013 3:16:32 PM • Click Position 40.4431825036-74.0557516498 (WGS84) 40.4430746329 -74.0561670941 (NAD27LL) 40.4431825036-74.0557516498 (LocalLL) (X) 580077.85 (Y) 4477376.09 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\27N.jsf • Ping Number: 89594 • Range to target: 7.01 • Fish Height: 3.56 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 27N	Dimensions and attributes • Target Width: 1.91 • Target Height: 0.33 • Target Length: 2.33 • Target Shadow: 0.79
	02_036_misc_feature • Sonar Time at Target: 4/4/2013 3:35:29 PM • Click Position 40.4423671114 -74.0567854787 (WGS84) 40.4422592273-74.0572009009 (NAD27LL) 40.4423671114-74.0567854787 (LocalLL) (X) 579991.14 (Y) 4477284.65 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\24S.jsf • Ping Number: 106082 • Range to target: 3.88 • Fish Height: 3.56 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 24S	Dimensions and attributes • Target Width: 0.18 • Target Height: 0.26 • Target Length: 1.31 • Target Shadow: 0.41
	02_037_misc_feature • Sonar Time at Target: 4/4/2013 3:08:58 PM • Click Position 40.4412464775-74.0573645931 (WGS84) 40.4411385717-74.0577800064 (NAD27LL) 40.4412464775 -74.0573645931 (LocalLL) (X) 579943.35 (Y) 4477159.73 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\28S.jsf • Ping Number: 83028 • Range to target: 15.21 • Fish Height: 3.13 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 28S	Dimensions and attributes • Target Width: 1.16 • Target Height: 0.17 • Target Length: 1.59 • Target Shadow: 0.87

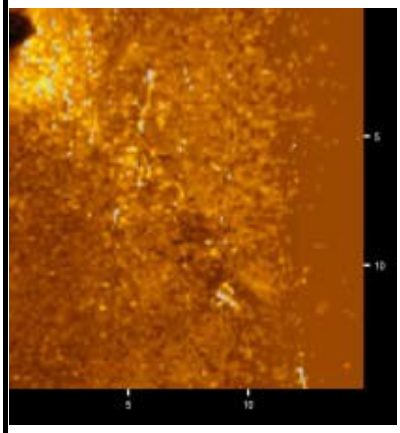
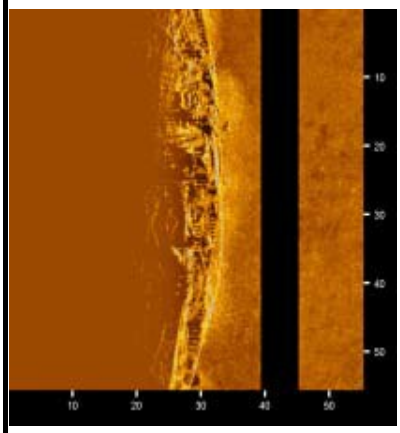
	02_038_misc_feature • Sonar Time at Target: 4/4/2013 3:22:48 PM • Click Position 40.4412220863 -74.0574588219 (WGS84) 40.4411141803 -74.0578742329 (NAD27LL) 40.4412220863 -74.0574588219 (LocalLL) (X) 579935.39 (Y) 4477156.94 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\27N.001.jsf • Ping Number: 95044 • Range to target: 8.63 • Fish Height: 3.34 • Heading: 0.000 Degrees • Event Number: 1081 • Line Name: 27N.001	Dimensions and attributes • Target Width: 0.41 • Target Height: 0.25 • Target Length: 0.65 • Target Shadow: 0.74
	02_039_misc_feature • Sonar Time at Target: 4/4/2013 3:37:44 PM • Click Position 40.4399159236 -74.0586622030 (WGS84) 40.4398079943 -74.0590775900 (NAD27LL) 40.4399159236 -74.0586622030 (LocalLL) (X) 579834.88 (Y) 4477010.86 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\24S.jsf • Ping Number: 108035 • Range to target: 11.11 • Fish Height: 3.13 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 24S	Dimensions and attributes • Target Width: 0.69 • Target Height: 0.26 • Target Length: 0.57 • Target Shadow: 1.05
	02_040_misc_feature • Sonar Time at Target: 4/4/2013 3:10:36 PM • Click Position 40.4395919961 -74.0584483379 (WGS84) 40.4394840590 -74.0588637321 (NAD27LL) 40.4395919961 -74.0584483379 (LocalLL) (X) 579853.40 (Y) 4476975.10 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\28S.jsf • Ping Number: 84444 • Range to target: 7.77 • Fish Height: 2.91 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 28S	Dimensions and attributes • Target Width: 1.09 • Target Height: 0.15 • Target Length: 2.84 • Target Shadow: 0.44

	02_041_misc_feature • Sonar Time at Target: 4/4/2013 3:53:21 PM • Click Position 40.4391129335 -74.0593554845 (WGS84) 40.4390049897 -74.0597708578 (NAD27LL) 40.4391129335 -74.0593554845 (LocalLL) (X) 579777.03 (Y) 4476921.10 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\21N.jsf • Ping Number: 121602 • Range to target: 6.47 • Fish Height: 3.34 • Heading: 0.000 Degrees • Event Number: 1091 • Line Name: 21N	Dimensions and attributes • Target Width: 1.20 • Target Height: 0.17 • Target Length: 1.44 • Target Shadow: 0.40
	02_042_misc_feature • Sonar Time at Target: 4/4/2013 3:38:38 PM • Click Position 40.4389232069 -74.0593746858 (WGS84) 40.4388152591 -74.0597900596 (NAD27LL) 40.4389232069 -74.0593746858 (LocalLL) (X) 579775.62 (Y) 4476900.03 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\24S.jsf • Ping Number: 108819 • Range to target: 9.71 • Fish Height: 3.13 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 24S	Dimensions and attributes • Target Width: 0.50 • Target Height: 0.10 • Target Length: 1.16 • Target Shadow: 0.33
	02_043_misc_feature • Sonar Time at Target: 4/4/2013 3:52:12 PM • Click Position 40.4388594687 -74.0595760180 (WGS84) 40.4387515204 -74.0599913869 (NAD27LL) 40.4388594687 -74.0595760180 (LocalLL) (X) 579758.62 (Y) 4476892.77 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\22S.jsf • Ping Number: 120606 • Range to target: 8.74 • Fish Height: 3.13 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 22S	Dimensions and attributes • Target Width: 1.28 • Target Height: 0.20 • Target Length: 1.75 • Target Shadow: 0.62

	05_000_boat • Sonar Time at Target: 4/4/2013 4:51:41 PM • Click Position 40.4449202641 -74.0559056586 (WGS84) 40.4448124316 -74.0563210894 (NAD27LL) 40.4449202641 -74.0559056586 (LocalLL) (X) 580062.73 (Y) 4477568.85 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\13N.jsf • Ping Number: 172318 • Range to target: 8.85 • Fish Height: 4.96 • Heading: 0.000 Degrees • Event Number: 1107 • Line Name: 13N	Dimensions and attributes • Target Width: 6.22 • Target Height: 0.66 • Target Length: 11.42 • Target Shadow: 1.57
	05_000_debris_pile • Sonar Time at Target: 4/4/2013 5:19:09 PM • Click Position 40.4450666621 -74.0564234609 (WGS84) 40.4449588348 -74.0568388775 (NAD27LL) 40.4450666621 -74.0564234609 (LocalLL) (X) 580018.64 (Y) 4477584.63 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf • Ping Number: 196196 • Range to target: 8.85 • Fish Height: 4.96 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 9S	Dimensions and attributes • Target Width: 10.04 • Target Height: 0.51 • Target Length: 8.94 • Target Shadow: 1.17
	06_000_small_debris_area • Sonar Time at Target: 4/4/2013 4:57:56 PM • Click Position 40.4415832978 -74.0586082300 (WGS84) 40.4414754043 -74.0590236094 (NAD27LL) 40.4415832978 -74.0586082300 (LocalLL) (X) 579837.48 (Y) 4477195.99 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 177756 • Range to target: 6.37 • Fish Height: 3.67 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 4.43 • Target Height: 0.38 • Target Length: 11.60 • Target Shadow: 0.84

	06_001_small_debris_area • Sonar Time at Target: 4/4/2013 5:22:31 PM • Click Position 40.4414653796 -74.0587643377 (WGS84) 40.4413574842 -74.0591797136 (NAD27LL) 40.4414653796 -74.0587643377 (LocalLL) (X) 579824.38 (Y) 4477182.76 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\9S.jsf • Ping Number: 199129 • Range to target: 10.79 • Fish Height: 4.21 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 9S	Dimensions and attributes • Target Width: 1.57 • Target Height: 0.39 • Target Length: 4.08 • Target Shadow: 1.18
	06_002_small_debris_area • Sonar Time at Target: 4/4/2013 4:57:18 PM • Click Position 40.4422650413 -74.0581539364 (WGS84) 40.4421571606 -74.0585693238 (NAD27LL) 40.4422650413 -74.0581539364 (LocalLL) (X) 579875.20 (Y) 4477272.08 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 177194 • Range to target: 5.72 • Fish Height: 3.67 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 0.00 • Target Height: 0.26 • Target Length: 5.69 • Target Shadow: 0.52
	06_003_small_debris_area • Sonar Time at Target: 4/4/2013 4:56:49 PM • Click Position 40.4427654836 -74.0578065528 (WGS84) 40.4426576123 -74.0582219464 (NAD27LL) 40.4427654836 -74.0578065528 (LocalLL) (X) 579904.07 (Y) 4477327.94 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 176777 • Range to target: 5.29 • Fish Height: 3.78 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 4.59 • Target Height: 0.22 • Target Length: 11.53 • Target Shadow: 0.40

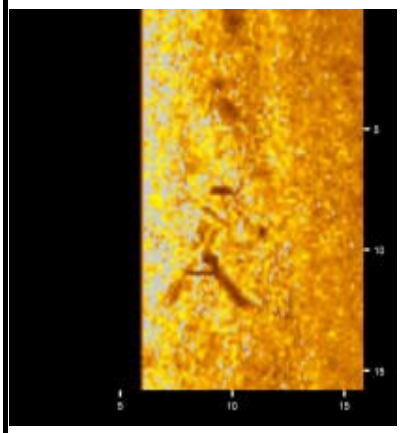
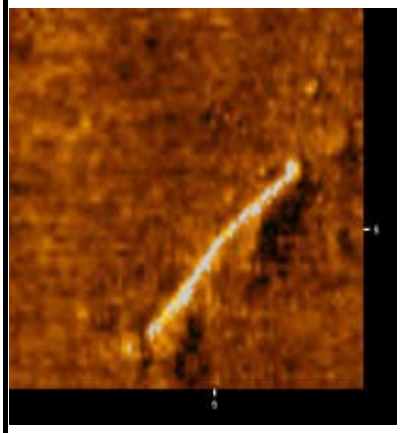
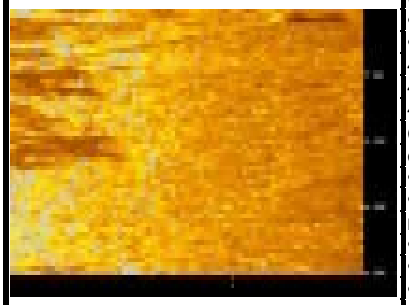
	06_004_small_debris_area • Sonar Time at Target: 4/4/2013 4:58:08 PM • Click Position 40.4413719120-74.0587537832 (WGS84) 40.4412640145 -74.0591691599 (NAD27LL) 40.4413719120-74.0587537832 (LocalLL) (X) 579825.39 (Y) 4477172.40 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 177931 • Range to target: 6.15 • Fish Height: 3.56 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 3.82 • Target Height: 0.18 • Target Length: 8.38 • Target Shadow: 0.38
	06_005_small_debris_area • Sonar Time at Target: 4/4/2013 4:58:34 PM • Click Position 40.4409272070 -74.0590387509 (WGS84) 40.4408193011-74.0594541227 (NAD27LL) 40.4409272070-74.0590387509 (LocalLL) (X) 579801.75 (Y) 4477122.78 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 178298 • Range to target: 5.50 • Fish Height: 3.34 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 5.77 • Target Height: 0.23 • Target Length: 13.20 • Target Shadow: 0.47
	06_006_small_debris_area • Sonar Time at Target: 4/4/2013 4:58:46 PM • Click Position 40.4407035533-74.0591763499 (WGS84) 40.4405956432-74.0595917193 (NAD27LL) 40.4407035533 -74.0591763499 (LocalLL) (X) 579790.34 (Y) 4477097.83 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\11S.jsf • Ping Number: 178470 • Range to target: 3.56 • Fish Height: 3.24 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11S	Dimensions and attributes • Target Width: 3.80 • Target Height: 0.32 • Target Length: 10.85 • Target Shadow: 0.52

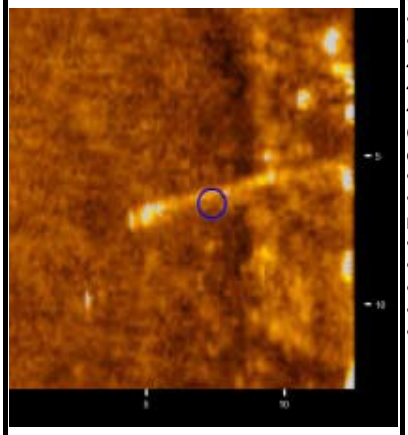
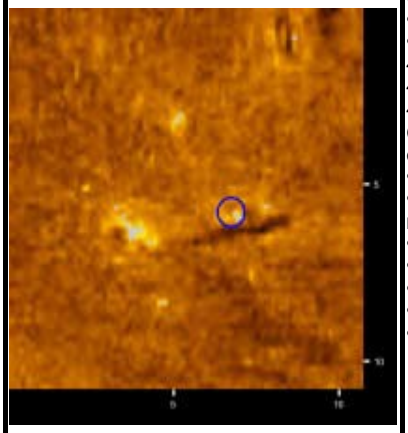
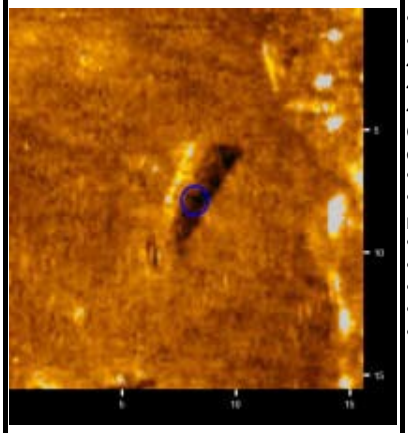
	06_007_small_debris_area • Sonar Time at Target: 4/4/2013 5:15:01 PM • Click Position 40.4431249258 -74.0580721479 (WGS84) 40.4430170633 -74.0584875327 (NAD27LL) 40.4431249258 -74.0580721479 (LocalLL) (X) 579881.12 (Y) 4477367.60 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\6N.jsf • Ping Number: 192599 • Range to target: 11.22 • Fish Height: 4.64 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 6N	Dimensions and attributes • Target Width: 6.25 • Target Height: 0.27 • Target Length: 8.68 • Target Shadow: 0.75
	PS_Alexander_Hamilton • Sonar Time at Target: 4/4/2013 4:07:23 PM • Click Position 40.4397451401 -74.0593729655 (WGS84) 40.4396372101 -74.0597883350 (NAD27LL) 40.4397451401 -74.0593729655 (LocalLL) (X) 579774.80 (Y) 4476991.26 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\P1 draft2\XTF\100.jsf • Ping Number: 133801 • Range to target: 14.57 • Fish Height: 3.34 • Heading: 0.000 Degrees • Event Number: 1095 • Line Name: 100	Dimensions and attributes • Target Width: 15.55 • Target Height: 2.13 • Target Length: 55.01 • Target Shadow: 26.04

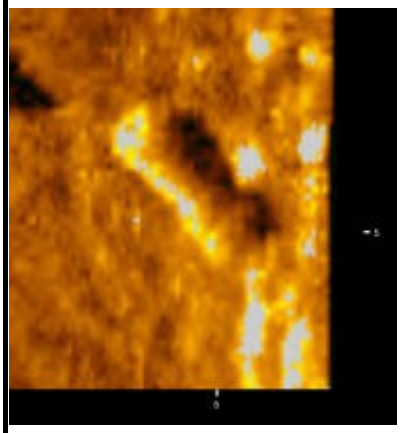
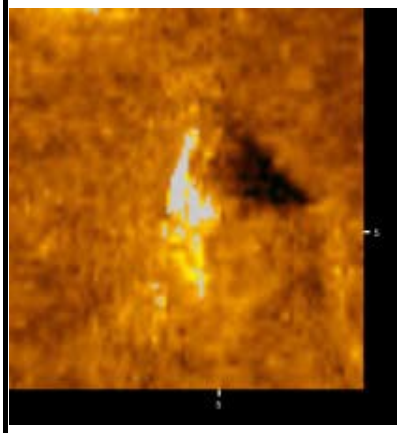
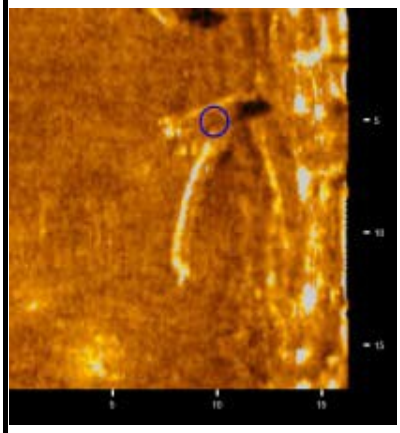
Attachment 4
NWS Earle Pier 2 Side-scan Target Images

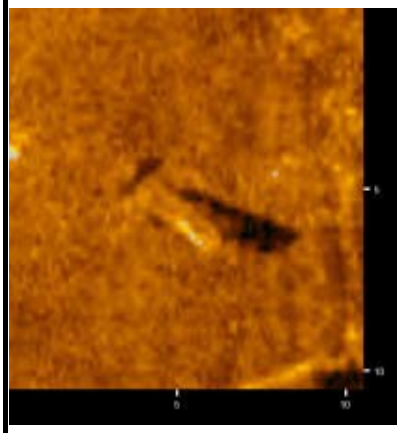
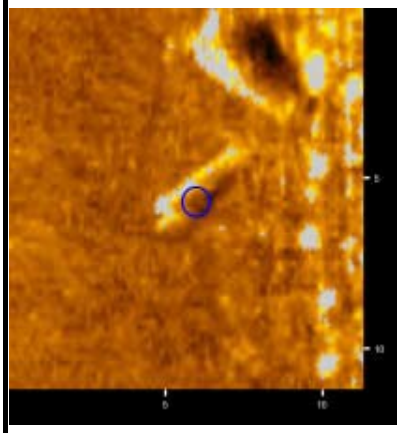
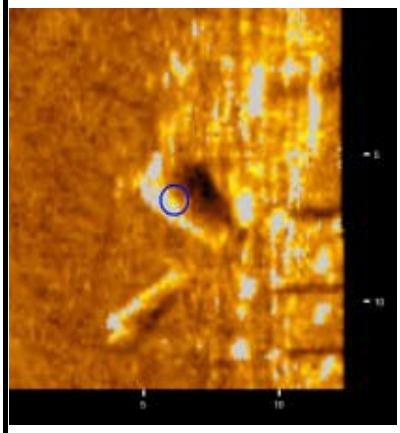
Report NWS Earle Side-scan - Pier 2

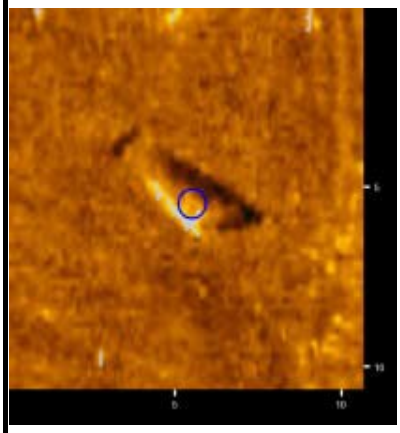
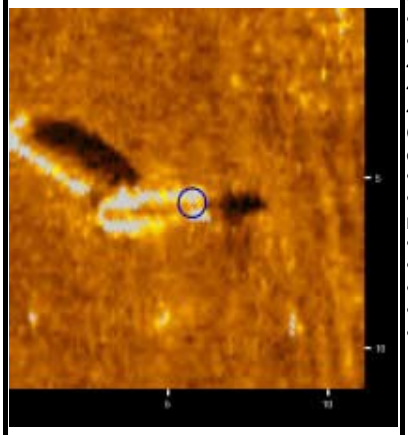
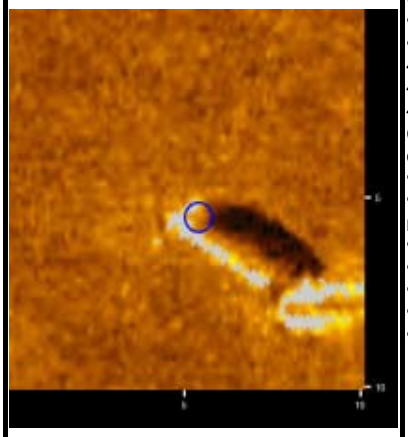
Generated on 4/24/2013 4:01:14 PM

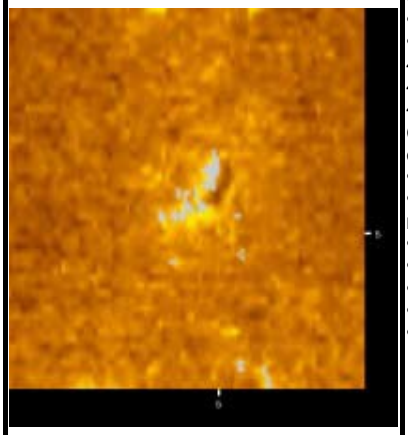
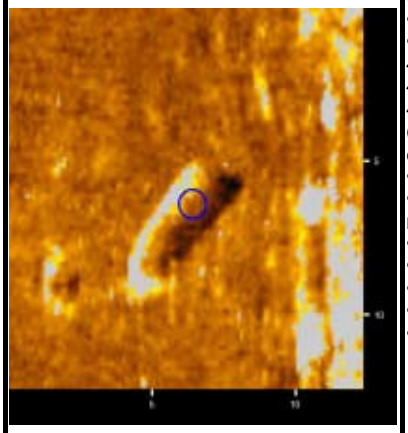
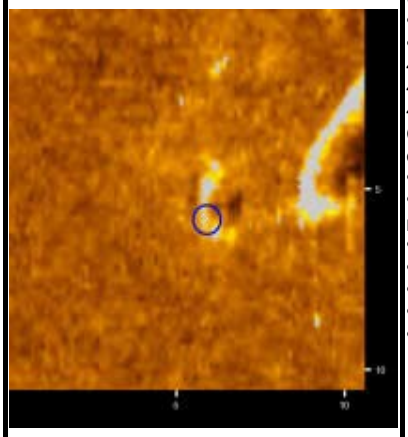
Target Image	Target Info	User Entered Info
	00_000_debris • Sonar Time at Target: 4/4/2013 1:48:26 PM • Click Position 40.4517755050 -74.0496823145 (WGS84) 40.4516677947 -74.0500978658 (NAD27LL) 40.4517755050 -74.0496823145 (LocalLL) (X) 580582.31 (Y) 4478335.45 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\16S.jsf • Ping Number: 34543 • Range to target: 12.62 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 16S	Dimensions and attributes • Target Width: 2.77 • Target Height: 0.33 • Target Length: 6.06 • Target Shadow: 1.26
	00_001_debris • Sonar Time at Target: 4/4/2013 1:33:14 PM • Click Position 40.4517216368 -74.0492567342 (WGS84) 40.4516139236 -74.0496722966 (NAD27LL) 40.4517216368 -74.0492567342 (LocalLL) (X) 580618.46 (Y) 4478329.86 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\22N.jsf • Ping Number: 21323 • Range to target: 27.51 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 22N	Dimensions and attributes • Target Width: 0.60 • Target Height: 0.00 • Target Length: 5.50 • Target Shadow: 0.00
	00_002_debris • Sonar Time at Target: 4/4/2013 1:48:13 PM • Click Position 40.4520444422 -74.0495007305 (WGS84) 40.4519367369 -74.0499162849 (NAD27LL) 40.4520444422 -74.0495007305 (LocalLL) (X) 580597.38 (Y) 4478365.47 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\16S.jsf • Ping Number: 34347 • Range to target: 13.70 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 16S	Dimensions and attributes • Target Width: 0.00 • Target Height: 0.00 • Target Length: 0.00 • Target Shadow: 0.00

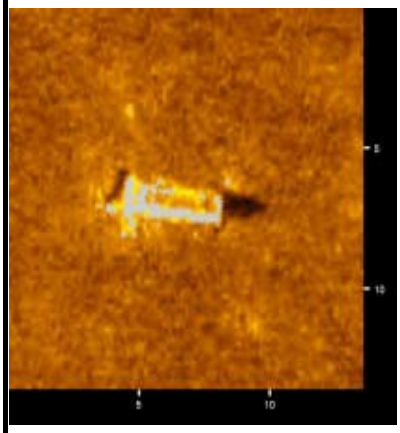
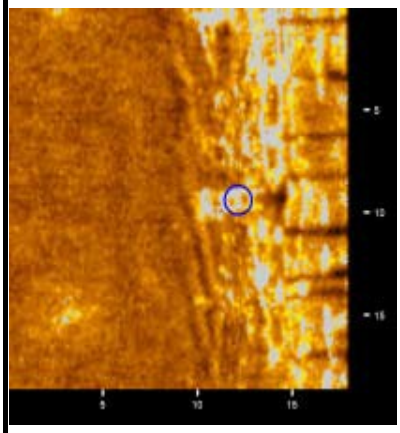
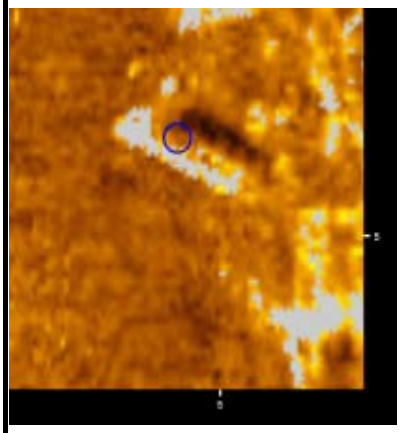
	00_003_debris • Sonar Time at Target: 4/4/2013 1:40:29 PM • Click Position 40.4522546918-74.0494351999 (WGS84) 40.4521469909-74.0498507548 (NAD27LL) 40.4522546918-74.0494351999 (LocalLL) (X) 580602.69 (Y) 4478388.86 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\20S.jsf • Ping Number: 27634 • Range to target: 49.31 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 20S	Dimensions and attributes • Target Width: 0.85 • Target Height: 0.00 • Target Length: 7.57 • Target Shadow: 0.00
	00_004_debris • Sonar Time at Target: 4/4/2013 1:40:23 PM • Click Position 40.4523671257-74.0492845758 (WGS84) 40.4522594265-74.0497001338 (NAD27LL) 40.4523671257-74.0492845758 (LocalLL) (X) 580615.33 (Y) 4478401.48 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\20S.jsf • Ping Number: 27534 • Range to target: 42.83 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 20S	Dimensions and attributes • Target Width: 0.00 • Target Height: 0.00 • Target Length: 0.00 • Target Shadow: 0.00
	00_005_debris • Sonar Time at Target: 4/4/2013 1:40:20 PM • Click Position 40.4524416200-74.0492844107 (WGS84) 40.4523339225-74.0496999683 (NAD27LL) 40.4524416200-74.0492844107 (LocalLL) (X) 580615.25 (Y) 4478409.75 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\20S.jsf • Ping Number: 27492 • Range to target: 46.28 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 20S	Dimensions and attributes • Target Width: 1.60 • Target Height: 0.24 • Target Length: 4.33 • Target Shadow: 1.19

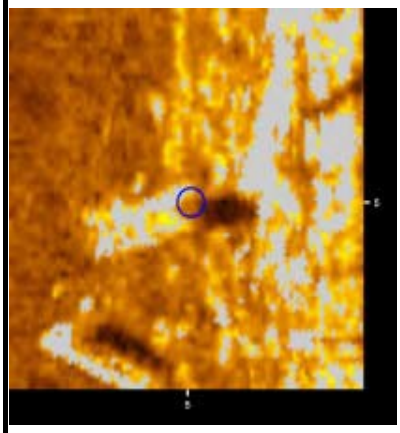
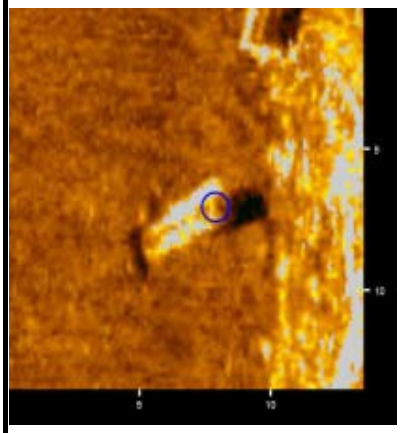
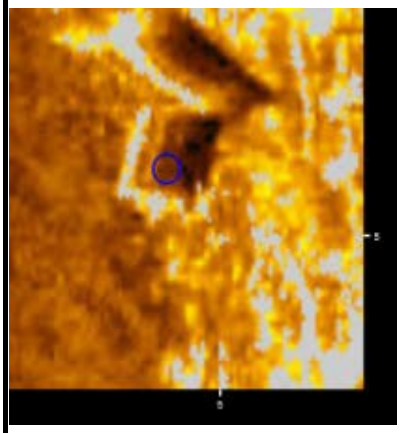
	00_006_debris • Sonar Time at Target: 4/4/2013 1:40:11 PM • Click Position 40.4526434581 -74.0492109329 (WGS84) 40.4525357646 -74.0496264912 (NAD27LL) 40.4526434581 -74.0492109329 (LocalLL) (X) 580621.24 (Y) 4478432.22 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\20S.jsf • Ping Number: 27364 • Range to target: 50.38 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 20S	Dimensions and attributes • Target Width: 1.34 • Target Height: 0.22 • Target Length: 4.07 • Target Shadow: 1.20
	00_007_debris • Sonar Time at Target: 4/4/2013 1:40:10 PM • Click Position 40.4526295564 -74.0491503940 (WGS84) 40.4525218623 -74.0495659539 (NAD27LL) 40.4526295564 -74.0491503940 (LocalLL) (X) 580626.39 (Y) 4478430.73 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\20S.jsf • Ping Number: 27359 • Range to target: 45.10 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 20S	Dimensions and attributes • Target Width: 2.40 • Target Height: 0.40 • Target Length: 2.29 • Target Shadow: 2.06
	00_008_debris • Sonar Time at Target: 4/4/2013 1:40:04 PM • Click Position 40.4527695701 -74.0490986780 (WGS84) 40.4526618789 -74.0495142384 (NAD27LL) 40.4527695701 -74.0490986780 (LocalLL) (X) 580630.61 (Y) 4478446.32 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\20S.jsf • Ping Number: 27269 • Range to target: 48.12 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 20S	Dimensions and attributes • Target Width: 8.27 • Target Height: 0.38 • Target Length: 3.90 • Target Shadow: 2.07

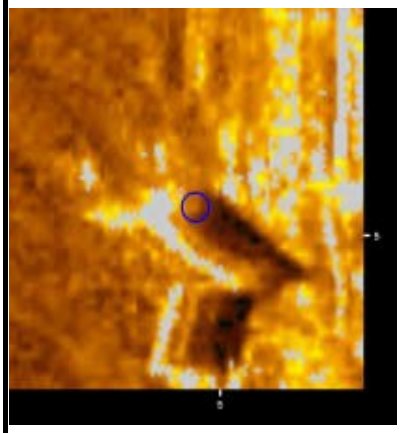
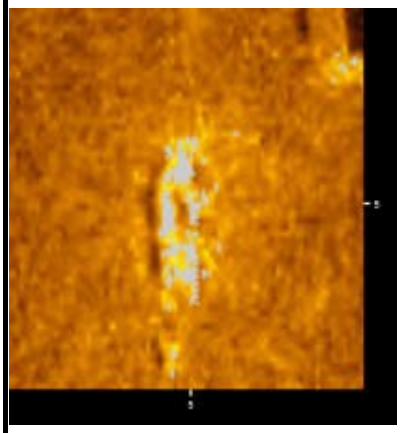
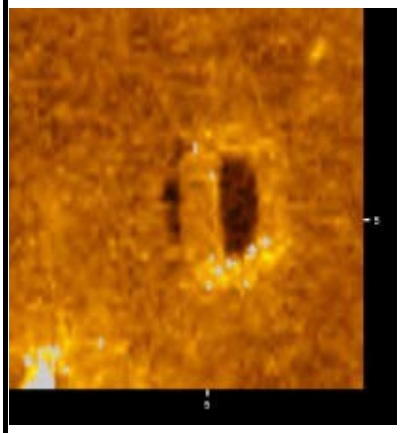
	00_009_debris • Sonar Time at Target: 4/4/2013 1:40:02 PM • Click Position 40.4528040026-74.0490417092 (WGS84) 40.4526963118 -74.0494572709 (NAD27LL) 40.4528040026-74.0490417092 (LocalLL) (X) 580635.40 (Y) 4478450.20 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\20S.jsf • Ping Number: 27237 • Range to target: 45.53 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 20S	Dimensions and attributes • Target Width: 1.00 • Target Height: 0.47 • Target Length: 3.79 • Target Shadow: 2.41
	00_010_debris • Sonar Time at Target: 4/4/2013 1:39:58 PM • Click Position 40.4528840360 -74.0490085688 (WGS84) 40.4527763469-74.0494241308 (NAD27LL) 40.4528840360-74.0490085688 (LocalLL) (X) 580638.11 (Y) 4478459.11 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\20S.jsf • Ping Number: 27184 • Range to target: 47.04 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 20S	Dimensions and attributes • Target Width: 1.48 • Target Height: 0.19 • Target Length: 3.48 • Target Shadow: 1.03
	00_011_debris • Sonar Time at Target: 4/4/2013 1:39:57 PM • Click Position 40.4529221957-74.0489988905 (WGS84) 40.4528145073-74.0494144525 (NAD27LL) 40.4529221957 -74.0489988905 (LocalLL) (X) 580638.89 (Y) 4478463.36 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\20S.jsf • Ping Number: 27160 • Range to target: 48.23 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 20S	Dimensions and attributes • Target Width: 1.58 • Target Height: 0.30 • Target Length: 4.07 • Target Shadow: 1.63

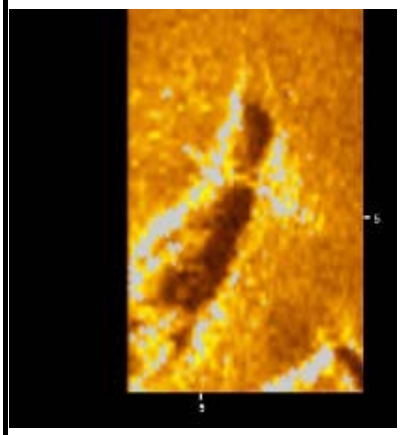
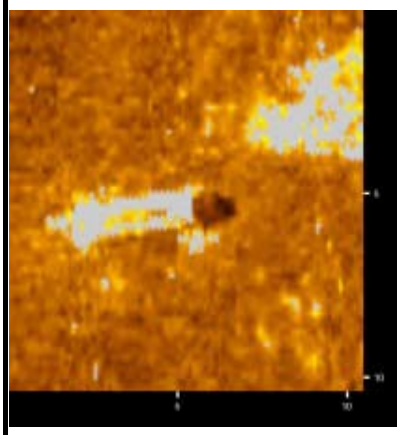
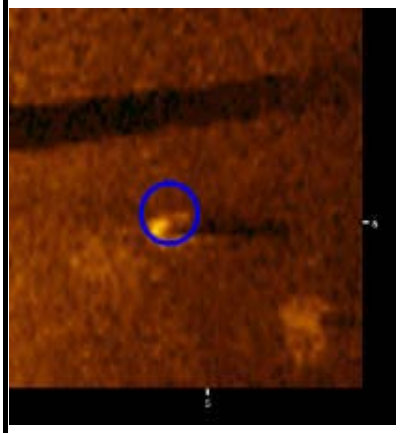
	00_012_debris • Sonar Time at Target: 4/4/2013 1:39:51 PM • Click Position 40.4530163191 -74.0488834171 (WGS84) 40.4529086323 -74.0492989815 (NAD27LL) 40.4530163191 -74.0488834171 (LocalLL) (X) 580648.57 (Y) 4478473.91 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\20S.jsf • Ping Number: 27080 • Range to target: 44.23 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 20S	Dimensions and attributes • Target Width: 1.27 • Target Height: 0.28 • Target Length: 3.24 • Target Shadow: 1.37
	00_013_debris • Sonar Time at Target: 4/4/2013 1:39:48 PM • Click Position 40.4530879464 -74.0488414722 (WGS84) 40.4529802609 -74.0492570373 (NAD27LL) 40.4530879464 -74.0488414722 (LocalLL) (X) 580652.04 (Y) 4478481.90 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\20S.jsf • Ping Number: 27029 • Range to target: 44.67 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 20S	Dimensions and attributes • Target Width: 1.39 • Target Height: 0.37 • Target Length: 3.78 • Target Shadow: 1.88
	00_014_debris • Sonar Time at Target: 4/4/2013 1:39:47 PM • Click Position 40.4530827713 -74.0487749973 (WGS84) 40.4529750855 -74.0491905642 (NAD27LL) 40.4530827713 -74.0487749973 (LocalLL) (X) 580657.68 (Y) 4478481.38 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\20S.jsf • Ping Number: 27017 • Range to target: 39.38 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 20S	Dimensions and attributes • Target Width: 1.33 • Target Height: 0.47 • Target Length: 3.51 • Target Shadow: 2.14

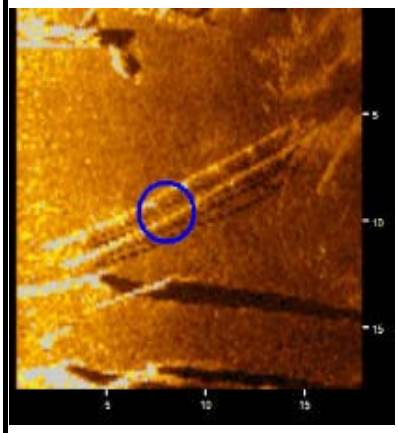
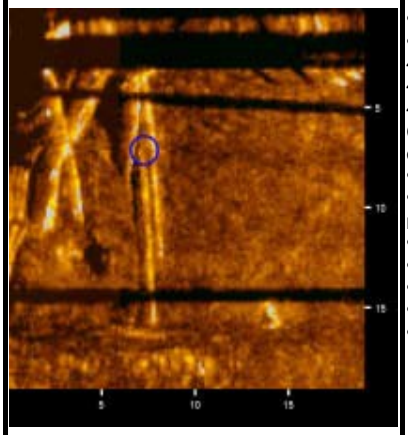
	00_015_debris • Sonar Time at Target: 4/4/2013 1:39:45 PM • Click Position 40.4530588509 -74.0486025774 (WGS84) 40.4529511638 -74.0490181487 (NAD27LL) 40.4530588509 -74.0486025774 (LocalLL) (X) 580672.33 (Y) 4478478.89 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\20S.jsf • Ping Number: 26992 • Range to target: 25.14 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 20S	Dimensions and attributes • Target Width: 0.81 • Target Height: 0.18 • Target Length: 1.16 • Target Shadow: 0.51
	00_016_debris • Sonar Time at Target: 4/4/2013 1:39:43 PM • Click Position 40.4531932698 -74.0487958699 (WGS84) 40.4530855864 -74.0492114355 (NAD27LL) 40.4531932698 -74.0487958699 (LocalLL) (X) 580655.78 (Y) 4478493.63 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\20S.jsf • Ping Number: 26957 • Range to target: 46.50 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 20S	Dimensions and attributes • Target Width: 0.00 • Target Height: 0.22 • Target Length: 1.99 • Target Shadow: 1.10
	00_017_debris • Sonar Time at Target: 4/4/2013 1:39:44 PM • Click Position 40.4531487126 -74.0487597800 (WGS84) 40.4530410282 -74.0491753468 (NAD27LL) 40.4531487126 -74.0487597800 (LocalLL) (X) 580658.89 (Y) 4478488.72 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\20S.jsf • Ping Number: 26975 • Range to target: 41.54 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 20S	Dimensions and attributes • Target Width: 1.32 • Target Height: 0.16 • Target Length: 2.21 • Target Shadow: 0.68

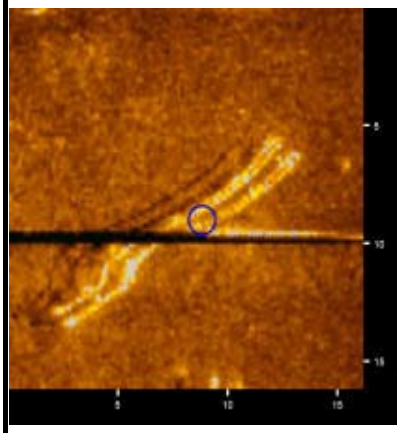
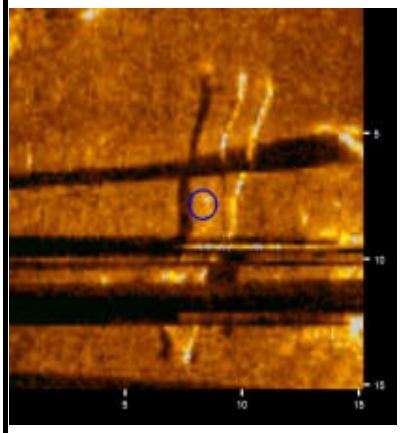
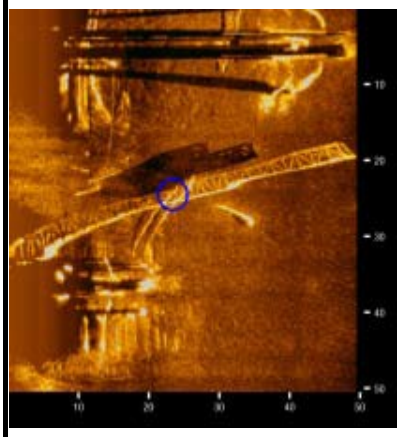
	00_018_debris • Sonar Time at Target: 4/4/2013 1:39:40 PM • Click Position 40.4531944731 -74.0486098529 (WGS84) 40.4530867890 -74.0490254233 (NAD27LL) 40.4531944731 -74.0486098529 (LocalLL) (X) 580671.55 (Y) 4478493.93 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\20S.jsf • Ping Number: 26914 • Range to target: 32.47 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 20S	Dimensions and attributes • Target Width: 1.69 • Target Height: 0.65 • Target Length: 4.04 • Target Shadow: 2.46
	00_019_debris • Sonar Time at Target: 4/4/2013 1:39:37 PM • Click Position 40.4533082412 -74.0487486462 (WGS84) 40.4532005601 -74.0491642124 (NAD27LL) 40.4533082412 -74.0487486462 (LocalLL) (X) 580659.65 (Y) 4478506.44 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\20S.jsf • Ping Number: 26878 • Range to target: 48.66 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 20S	Dimensions and attributes • Target Width: 0.00 • Target Height: 0.00 • Target Length: 0.00 • Target Shadow: 0.00
	00_020_debris • Sonar Time at Target: 4/4/2013 1:39:32 PM • Click Position 40.4533925369 -74.0486325745 (WGS84) 40.4532848572 -74.0490481431 (NAD27LL) 40.4533925369 -74.0486325745 (LocalLL) (X) 580669.39 (Y) 4478515.90 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\20S.jsf • Ping Number: 26801 • Range to target: 44.02 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 20S	Dimensions and attributes • Target Width: 1.03 • Target Height: 0.30 • Target Length: 3.17 • Target Shadow: 1.44

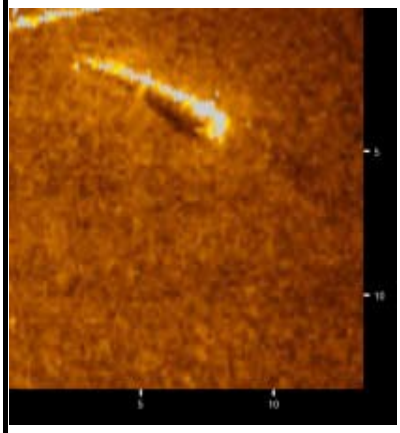
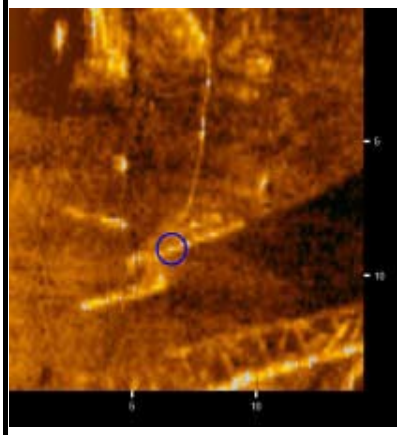
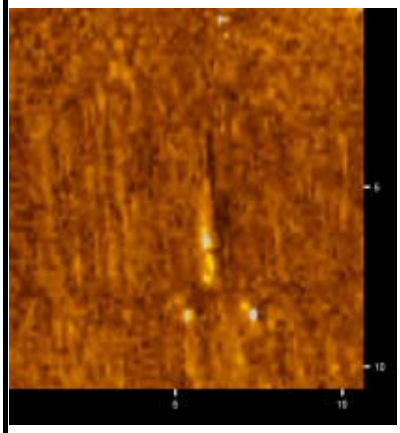
	00_021_debris • Sonar Time at Target: 4/4/2013 1:39:30 PM • Click Position 40.4534326755-74.0486420757 (WGS84) 40.4533249967-74.0490576439 (NAD27LL) 40.4534326755-74.0486420757 (LocalLL) (X) 580668.53 (Y) 4478520.35 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\20S.jsf • Ping Number: 26779 • Range to target: 46.72 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 20S	Dimensions and attributes • Target Width: 1.36 • Target Height: 0.36 • Target Length: 2.99 • Target Shadow: 1.86
	00_022_debris • Sonar Time at Target: 4/4/2013 1:39:27 PM • Click Position 40.4534798309-74.0485734214 (WGS84) 40.4533721528-74.0489889911 (NAD27LL) 40.4534798309-74.0485734214 (LocalLL) (X) 580674.30 (Y) 4478525.64 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\20S.jsf • Ping Number: 26735 • Range to target: 43.80 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 20S	Dimensions and attributes • Target Width: 1.66 • Target Height: 0.38 • Target Length: 3.75 • Target Shadow: 1.86
	00_023_debris • Sonar Time at Target: 4/4/2013 1:39:25 PM • Click Position 40.4535378222-74.0485646385 (WGS84) 40.4534301453-74.0489802080 (NAD27LL) 40.4535378222-74.0485646385 (LocalLL) (X) 580674.97 (Y) 4478532.09 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\20S.jsf • Ping Number: 26698 • Range to target: 45.96 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 20S	Dimensions and attributes • Target Width: 1.66 • Target Height: 0.12 • Target Length: 1.89 • Target Shadow: 0.59

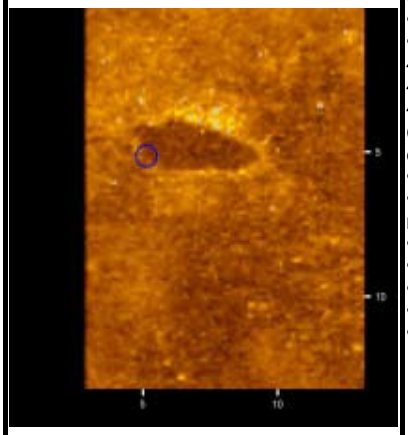
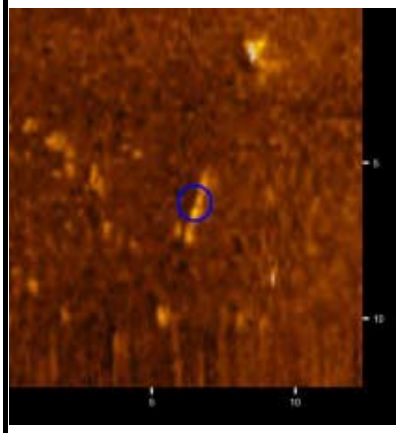
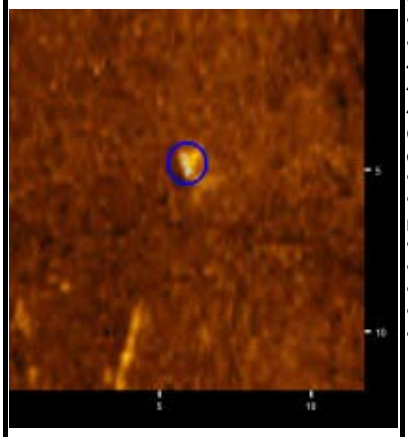
	00_024_debris • Sonar Time at Target: 4/4/2013 1:39:24 PM • Click Position 40.4535614795-74.0485481563 (WGS84) 40.4534538030-74.0489637261 (NAD27LL) 40.4535614795-74.0485481563 (LocalLL) (X) 580676.34 (Y) 4478534.73 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\20S.jsf • Ping Number: 26680 • Range to target: 45.85 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 20S	Dimensions and attributes • Target Width: 1.10 • Target Height: 0.13 • Target Length: 2.64 • Target Shadow: 0.68
	00_025_debris • Sonar Time at Target: 4/4/2013 1:39:22 PM • Click Position 40.4535356494-74.0483708425 (WGS84) 40.4534279717-74.0487864170 (NAD27LL) 40.4535356494-74.0483708425 (LocalLL) (X) 580691.41 (Y) 4478532.02 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\20S.jsf • Ping Number: 26656 • Range to target: 31.07 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 20S	Dimensions and attributes • Target Width: 1.44 • Target Height: 0.18 • Target Length: 3.80 • Target Shadow: 0.59
	00_026_debris • Sonar Time at Target: 4/4/2013 1:39:20 PM • Click Position 40.4535976139-74.0483853985 (WGS84) 40.4534899376-74.0488009723 (NAD27LL) 40.4535976139-74.0483853985 (LocalLL) (X) 580690.10 (Y) 4478538.89 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\20S.jsf • Ping Number: 26622 • Range to target: 35.17 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 20S	Dimensions and attributes • Target Width: 1.10 • Target Height: 0.24 • Target Length: 2.46 • Target Shadow: 0.93

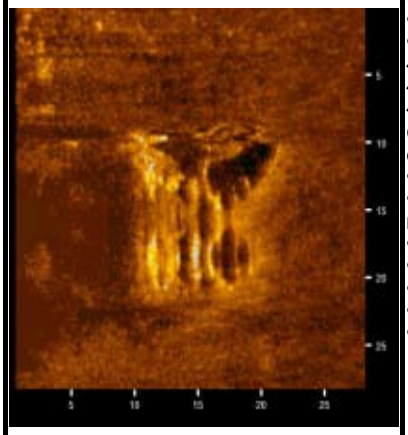
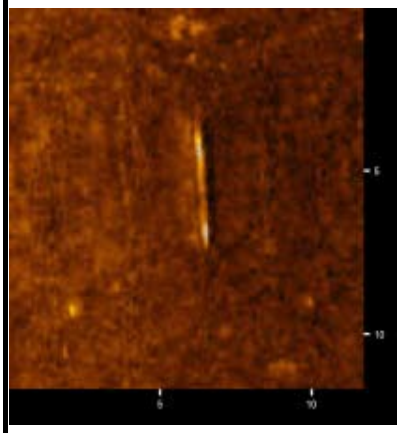
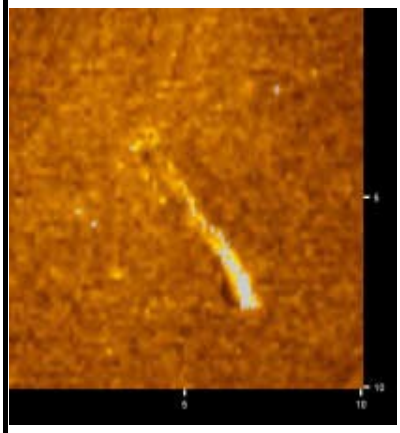
	00_027_debris • Sonar Time at Target: 4/4/2013 2:17:56 PM • Click Position 40.4540903096-74.0487139816 (WGS84) 40.4539826452-74.0491295441 (NAD27LL) 40.4540903096-74.0487139816 (LocalLL) (X) 580661.65 (Y) 4478593.28 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\11N.001.jsf • Ping Number: 54837 • Range to target: 4.81 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11N.001	Dimensions and attributes • Target Width: 2.03 • Target Height: 0.78 • Target Length: 5.40 • Target Shadow: 0.92
	00_028_debris • Sonar Time at Target: 4/4/2013 1:39:14 PM • Click Position 40.4537286368-74.0483740094 (WGS84) 40.4536209632-74.0487895827 (NAD27LL) 40.4537286368-74.0483740094 (LocalLL) (X) 580690.91 (Y) 4478553.44 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\20S.jsf • Ping Number: 26541 • Range to target: 40.57 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 20S	Dimensions and attributes • Target Width: 4.10 • Target Height: 0.15 • Target Length: 1.44 • Target Shadow: 0.68
	00_029_debris • Sonar Time at Target: 4/4/2013 2:18:12 PM • Click Position 40.4538236707-74.0483250533 (WGS84) 40.4537159990-74.0487406272 (NAD27LL) 40.4538236707-74.0483250533 (LocalLL) (X) 580694.95 (Y) 4478564.04 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\11N.001.jsf • Ping Number: 55077 • Range to target: 16.43 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11N.001	Dimensions and attributes • Target Width: 0.76 • Target Height: 1.21 • Target Length: 0.72 • Target Shadow: 2.41

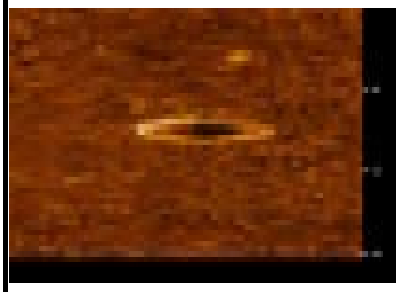
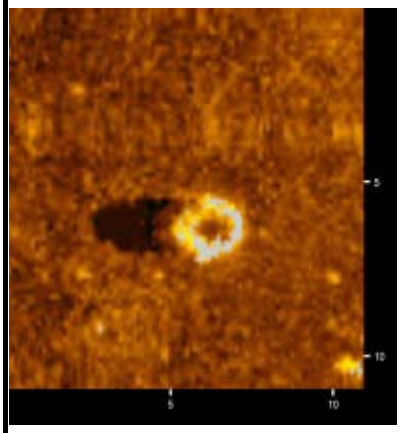
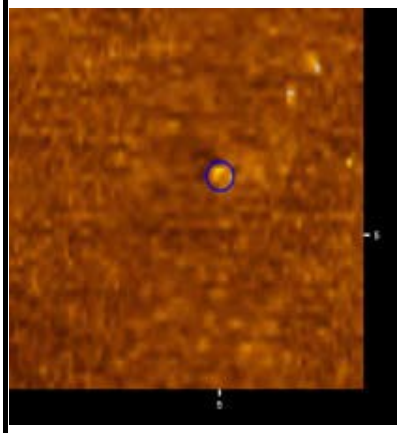
	00_030_debris • Sonar Time at Target: 4/4/2013 2:18:05 PM • Click Position 40.4539451193-74.0485063019 (WGS84) 40.4538374509-74.0489218706 (NAD27LL) 40.4539451193-74.0485063019 (LocalLL) (X) 580679.43 (Y) 4478577.35 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\11N.001.jsf • Ping Number: 54976 • Range to target: 10.54 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11N.001	Dimensions and attributes • Target Width: 1.74 • Target Height: 1.33 • Target Length: 13.78 • Target Shadow: 2.17
	00_031_debris • Sonar Time at Target: 4/4/2013 2:17:56 PM • Click Position 40.4540100264-74.0487508709 (WGS84) 40.4539023605-74.0491664329 (NAD27LL) 40.4540100264-74.0487508709 (LocalLL) (X) 580658.62 (Y) 4478584.33 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\11N.001.jsf • Ping Number: 54843 • Range to target: 14.21 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 11N.001	Dimensions and attributes • Target Width: 0.84 • Target Height: 0.30 • Target Length: 4.42 • Target Shadow: 0.50
	00_032_debris • Sonar Time at Target: 4/4/2013 1:53:20 PM • Click Position 40.4540478160-74.0485985200 (WGS84) 40.4539401502-74.0490140857 (NAD27LL) 40.4540478160-74.0485985200 (LocalLL) (X) 580671.49 (Y) 4478588.67 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\15N_dub.jsf • Ping Number: 38795 • Range to target: 35.50 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 15N_dub	Dimensions and attributes • Target Width: 2.11 • Target Height: 0.23 • Target Length: 12.73 • Target Shadow: 0.76

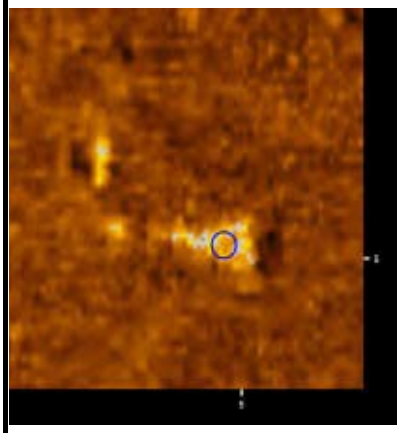
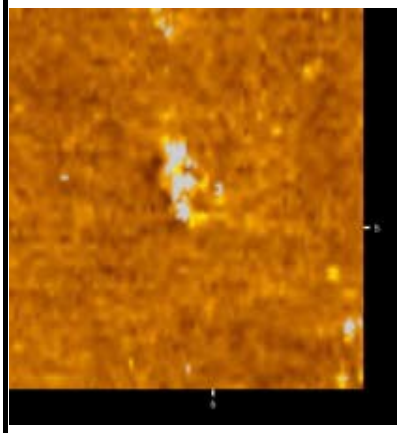
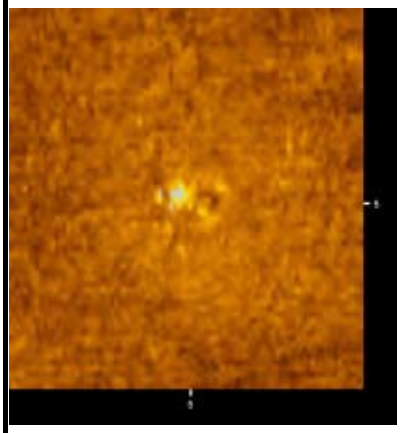
	00_033_debris • Sonar Time at Target: 4/4/2013 1:53:27 PM • Click Position 40.4541409212-74.0483564445 (WGS84) 40.4540332564-74.0487720158 (NAD27LL) 40.4541409212-74.0483564445 (LocalLL) (X) 580691.91 (Y) 4478599.22 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\15N dub.jsf • Ping Number: 38900 • Range to target: 21.15 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 15N_dub	Dimensions and attributes • Target Width: 1.90 • Target Height: 0.65 • Target Length: 13.34 • Target Shadow: 1.42
	00_034_debris • Sonar Time at Target: 4/4/2013 1:53:32 PM • Click Position 40.4542402444-74.0483084997 (WGS84) 40.4541325816-74.0487240717 (NAD27LL) 40.4542402444-74.0483084997 (LocalLL) (X) 580695.85 (Y) 4478610.29 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\15N dub.jsf • Ping Number: 38970 • Range to target: 22.23 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 15N_dub	Dimensions and attributes • Target Width: 1.61 • Target Height: 0.56 • Target Length: 12.01 • Target Shadow: 1.27
	00_035_debris • Sonar Time at Target: 4/4/2013 1:53:41 PM • Click Position 40.4544471578-74.0482810587 (WGS84) 40.4543394993-74.0486966301 (NAD27LL) 40.4544471578-74.0482810587 (LocalLL) (X) 580697.93 (Y) 4478633.28 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\15N dub.jsf • Ping Number: 39098 • Range to target: 30.10 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 15N_dub	Dimensions and attributes • Target Width: 4.00 • Target Height: 6.53 • Target Length: 51.18 • Target Shadow: 40.79

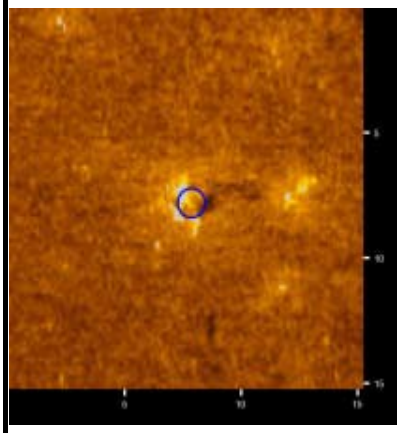
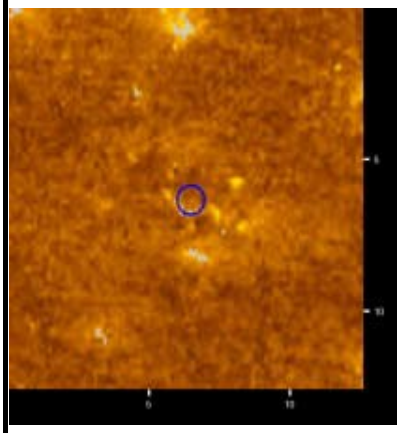
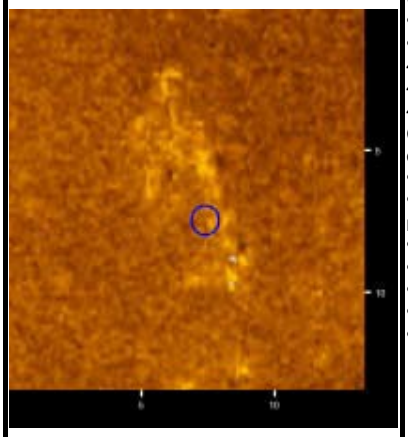
	00_036_debris • Sonar Time at Target: 4/4/2013 1:53:42 PM • Click Position 40.4544335294 -74.0481557300 (WGS84) 40.4543258701 -74.0485713047 (NAD27LL) 40.4544335294 -74.0481557300 (LocalLL) (X) 580708.58 (Y) 4478631.89 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\15N dub.jsf • Ping Number: 39116 • Range to target: 19.85 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 15N_dub	Dimensions and attributes • Target Width: 1.65 • Target Height: 0.75 • Target Length: 6.09 • Target Shadow: 1.57
	00_037_debris • Sonar Time at Target: 4/4/2013 1:53:40 PM • Click Position 40.4544681587 -74.0484004601 (WGS84) 40.4543605011 -74.0488160284 (NAD27LL) 40.4544681587 -74.0484004601 (LocalLL) (X) 580687.78 (Y) 4478635.51 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\15N dub.jsf • Ping Number: 39085 • Range to target: 40.24 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 15N_dub	Dimensions and attributes • Target Width: 2.95 • Target Height: 0.17 • Target Length: 8.00 • Target Shadow: 0.63
	00_038_debris • Sonar Time at Target: 4/4/2013 1:59:01 PM • Click Position 40.4525323610 -74.0503234216 (WGS84) 40.4524246696 -74.0507389523 (NAD27LL) 40.4525323610 -74.0503234216 (LocalLL) (X) 580527.04 (Y) 4478418.87 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\7N.jsf • Ping Number: 42828 • Range to target: 26.86 • Heading: 0.000 Degrees • Event Number: 1045 • Line Name: 7N	Dimensions and attributes • Target Width: 0.62 • Target Height: 0.08 • Target Length: 3.92 • Target Shadow: 0.23

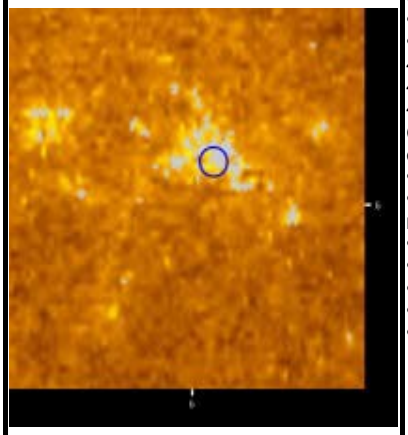
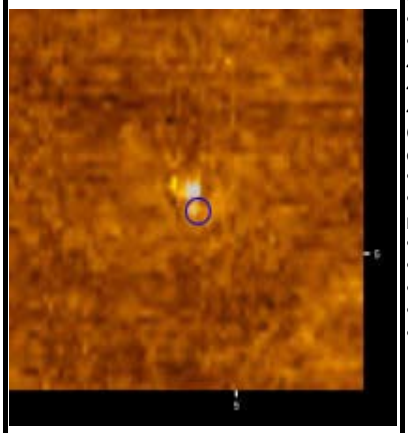
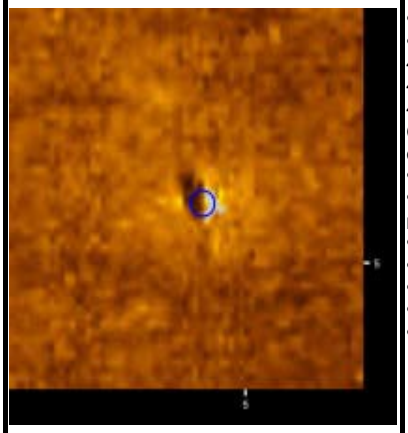
	00_041_debris • Sonar Time at Target: 4/4/2013 2:48:23 PM • Click Position 40.4522985635-74.0506323143 (WGS84) 40.4521908684 -74.0510478385 (NAD27LL) 40.4522985635-74.0506323143 (LocalLL) (X) 580501.13 (Y) 4478392.64 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\1N.jsf • Ping Number: 68738 • Range to target: 8.20 • Heading: 0.000 Degrees • Event Number: 1071 • Line Name: 1N	Dimensions and attributes • Target Width: 1.69 • Target Height: 1.53 • Target Length: 4.62 • Target Shadow: 4.21
	00_042_debris • Sonar Time at Target: 4/4/2013 2:04:51 PM • Click Position 40.4523847136 -74.0506404744 (WGS84) 40.4522770204-74.0510559978 (NAD27LL) 40.4523847136-74.0506404744 (LocalLL) (X) 580500.33 (Y) 4478402.20 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\4S.jsf • Ping Number: 45153 • Range to target: 26.65 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 4S	Dimensions and attributes • Target Width: 0.42 • Target Height: 0.15 • Target Length: 2.73 • Target Shadow: 0.63
	00_043_debris • Sonar Time at Target: 4/4/2013 2:04:49 PM • Click Position 40.4524396349-74.0506300884 (WGS84) 40.4523319428-74.0510456118 (NAD27LL) 40.4524396349 -74.0506300884 (LocalLL) (X) 580501.15 (Y) 4478408.30 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\4S.jsf • Ping Number: 45129 • Range to target: 28.70 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 4S	Dimensions and attributes • Target Width: 0.96 • Target Height: 0.11 • Target Length: 1.02 • Target Shadow: 0.48

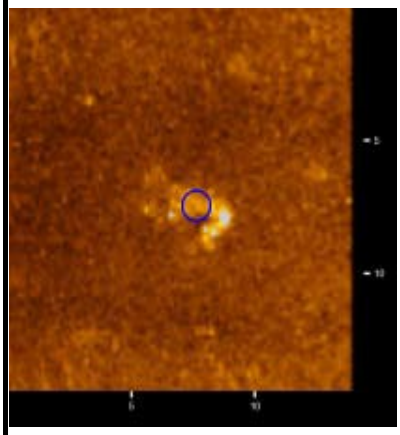
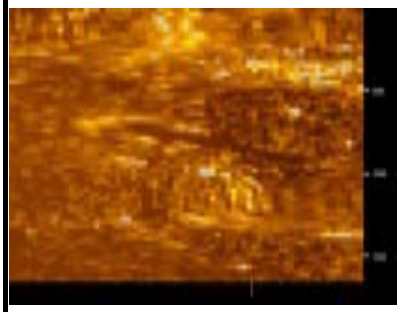
	00_044_debris • Sonar Time at Target: 4/4/2013 1:20:09 PM • Click Position 40.4527592481 -74.0471654651 (WGS84) 40.4526515487 -74.0475810747 (NAD27LL) 40.4527592481 -74.0471654651 (LocalLL) (X) 580794.55 (Y) 4478446.94 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\28S.001.jsf • Ping Number: 11647 • Range to target: 38.73 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 28S.001	Dimensions and attributes • Target Width: 10.33 • Target Height: 1.00 • Target Length: 11.75 • Target Shadow: 5.42
	00_045_debris • Sonar Time at Target: 4/4/2013 1:20:29 PM • Click Position 40.4523603088 -74.0475848104 (WGS84) 40.4522526025 -74.0480004116 (NAD27LL) 40.4523603088 -74.0475848104 (LocalLL) (X) 580759.47 (Y) 4478402.28 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\28S.001.jsf • Ping Number: 11936 • Range to target: 26.22 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 28S.001	Dimensions and attributes • Target Width: 0.66 • Target Height: 0.13 • Target Length: 3.95 • Target Shadow: 0.44
	00_046_debris • Sonar Time at Target: 4/4/2013 1:31:05 PM • Click Position 40.4522252201 -74.0481967262 (WGS84) 40.4521175134 -74.0486123127 (NAD27LL) 40.4522252201 -74.0481967262 (LocalLL) (X) 580707.74 (Y) 4478386.72 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\24S.jsf • Ping Number: 19452 • Range to target: 16.40 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 24S	Dimensions and attributes • Target Width: 0.58 • Target Height: 0.26 • Target Length: 5.49 • Target Shadow: 0.54

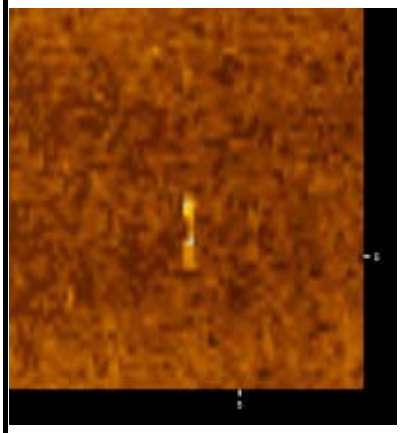
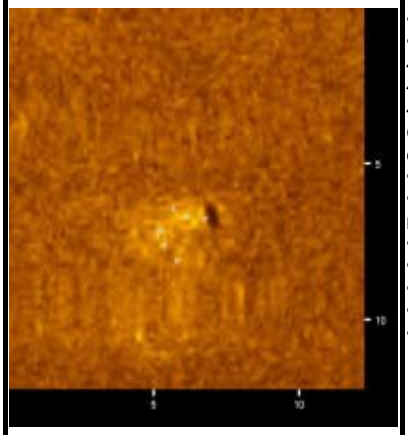
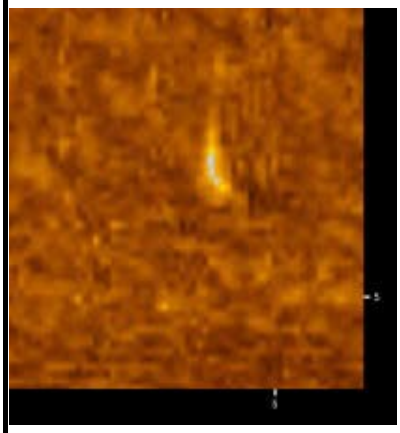
	01_000_tire • Sonar Time at Target: 4/4/2013 2:54:15 PM • Click Position 40.4524950861-74.0511998088 (WGS84) 40.4523873975-74.0516153174 (NAD27LL) 40.4524950861-74.0511998088 (LocalLL) (X) 580452.77 (Y) 4478413.94 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\1S.jsf • Ping Number: 71673 • Range to target: 30.32 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 1S	Dimensions and attributes • Target Width: 1.27 • Target Height: 0.11 • Target Length: 1.35 • Target Shadow: 0.62
	01_001_tire • Sonar Time at Target: 4/4/2013 1:58:52 PM • Click Position 40.4523658716-74.0503237298 (WGS84) 40.4522581767-74.0507392614 (NAD27LL) 40.4523658716-74.0503237298 (LocalLL) (X) 580527.21 (Y) 4478400.39 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\7N.jsf • Ping Number: 42701 • Range to target: 21.47 • Heading: 0.000 Degrees • Event Number: 1045 • Line Name: 7N	Dimensions and attributes • Target Width: 2.73 • Target Height: 0.55 • Target Length: 2.20 • Target Shadow: 1.90
	02_000_misc_feature • Sonar Time at Target: 4/4/2013 1:40:56 PM • Click Position 40.4516336464-74.0495545156 (WGS84) 40.4515259325-74.0499700710 (NAD27LL) 40.4516336464-74.0495545156 (LocalLL) (X) 580593.31 (Y) 4478319.82 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\20S.jsf • Ping Number: 28021 • Range to target: 23.74 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 20S	Dimensions and attributes • Target Width: 0.68 • Target Height: 0.12 • Target Length: 0.51 • Target Shadow: 0.76

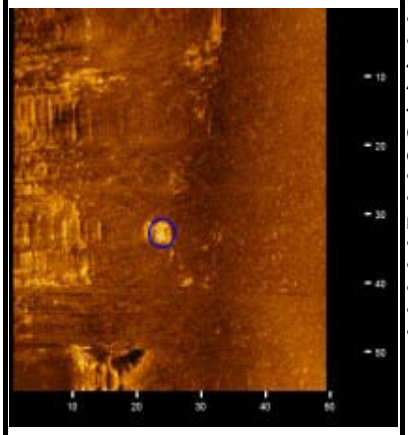
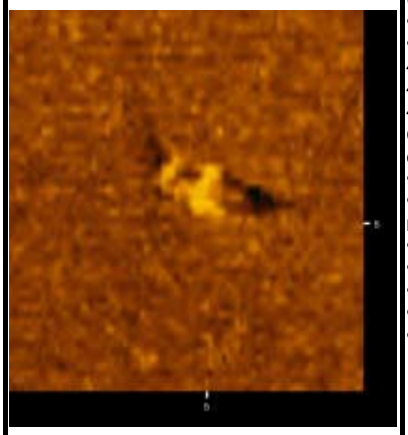
	02_001_misc_feature • Sonar Time at Target: 4/4/2013 1:33:20 PM • Click Position 40.4518276513-74.0491872210 (WGS84) 40.4517199401 -74.0496027846 (NAD27LL) 40.4518276513-74.0491872210 (LocalLL) (X) 580624.23 (Y) 4478341.69 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\22N.jsf • Ping Number: 21408 • Range to target: 26.97 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 22N	Dimensions and attributes • Target Width: 0.00 • Target Height: 0.00 • Target Length: 1.24 • Target Shadow: 0.00
	02_002_misc_feature • Sonar Time at Target: 4/4/2013 1:40:39 PM • Click Position 40.4520013810 -74.0493348495 (WGS84) 40.4518936742-74.0497504083 (NAD27LL) 40.4520013810-74.0493348495 (LocalLL) (X) 580611.50 (Y) 4478360.84 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\20S.jsf • Ping Number: 27776 • Range to target: 29.13 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 20S	Dimensions and attributes • Target Width: 1.23 • Target Height: 0.00 • Target Length: 2.04 • Target Shadow: 0.00
	02_003_misc_feature • Sonar Time at Target: 4/4/2013 1:31:22 PM • Click Position 40.4521256752-74.0489379910 (WGS84) 40.4520179694-74.0493535592 (NAD27LL) 40.4521256752 -74.0489379910 (LocalLL) (X) 580645.00 (Y) 4478375.00 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\24S.jsf • Ping Number: 19699 • Range to target: 34.31 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 24S	Dimensions and attributes • Target Width: 1.19 • Target Height: 0.16 • Target Length: 1.72 • Target Shadow: 0.69

	02_004_misc_feature • Sonar Time at Target: 4/4/2013 1:40:29 PM • Click Position 40.4522161776-74.0492805563 (WGS84) 40.4521084752-74.0496961152 (NAD27LL) 40.4522161776-74.0492805563 (LocalLL) (X) 580615.85 (Y) 4478384.73 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\20S.jsf • Ping Number: 27624 • Range to target: 35.60 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 20S	Dimensions and attributes • Target Width: 1.65 • Target Height: 0.55 • Target Length: 1.71 • Target Shadow: 2.38
	02_005_misc_feature • Sonar Time at Target: 4/4/2013 1:40:24 PM • Click Position 40.4523000247-74.0492001029 (WGS84) 40.4521923237-74.0496156634 (NAD27LL) 40.4523000247-74.0492001029 (LocalLL) (X) 580622.57 (Y) 4478394.11 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\20S.jsf • Ping Number: 27556 • Range to target: 33.23 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 20S	Dimensions and attributes • Target Width: 2.06 • Target Height: 0.00 • Target Length: 3.58 • Target Shadow: 0.00
	02_006_misc_feature • Sonar Time at Target: 4/4/2013 1:40:14 PM • Click Position 40.4524619166-74.0489193246 (WGS84) 40.4523542180-74.0493348913 (NAD27LL) 40.4524619166-74.0489193246 (LocalLL) (X) 580646.18 (Y) 4478412.34 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\20S.jsf • Ping Number: 27405 • Range to target: 19.31 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 20S	Dimensions and attributes • Target Width: 2.18 • Target Height: 0.37 • Target Length: 5.05 • Target Shadow: 0.86

	02_007_misc_feature • Sonar Time at Target: 4/4/2013 1:39:47 PM • Click Position 40.4530190072-74.0486504299 (WGS84) 40.4529113194-74.0490660002 (NAD27LL) 40.4530190072-74.0486504299 (LocalLL) (X) 580668.32 (Y) 4478474.42 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\20S.jsf • Ping Number: 27026 • Range to target: 26.76 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 20S	Dimensions and attributes • Target Width: 1.99 • Target Height: 0.17 • Target Length: 2.19 • Target Shadow: 0.51
	02_008_misc_feature • Sonar Time at Target: 4/4/2013 1:30:21 PM • Click Position 40.4532137699-74.0482741207 (WGS84) 40.4531060848-74.0486896995 (NAD27LL) 40.4532137699-74.0482741207 (LocalLL) (X) 580700.00 (Y) 4478496.38 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\24S.jsf • Ping Number: 18824 • Range to target: 37.22 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 24S	Dimensions and attributes • Target Width: 0.70 • Target Height: 0.09 • Target Length: 0.95 • Target Shadow: 0.38
	02_009_misc_feature • Sonar Time at Target: 4/4/2013 1:30:16 PM • Click Position 40.4533111087-74.0481713276 (WGS84) 40.4532034253-74.0485869084 (NAD27LL) 40.4533111087-74.0481713276 (LocalLL) (X) 580708.60 (Y) 4478507.28 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\24S.jsf • Ping Number: 18739 • Range to target: 34.09 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 24S	Dimensions and attributes • Target Width: 0.68 • Target Height: 0.11 • Target Length: 0.91 • Target Shadow: 0.45

	02_010_misc_feature • Sonar Time at Target: 4/4/2013 2:54:12 PM • Click Position 40.4526333238-74.0512169429 (WGS84) 40.4525256383-74.0516324503 (NAD27LL) 40.4526333238-74.0512169429 (LocalLL) (X) 580451.15 (Y) 4478429.27 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\1S.jsf • Ping Number: 71619 • Range to target: 38.08 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 1S	Dimensions and attributes • Target Width: 0.81 • Target Height: 0.58 • Target Length: 1.59 • Target Shadow: 3.51
	02_011_misc_feature • Sonar Time at Target: 4/4/2013 2:48:39 PM • Click Position 40.4526153076-74.0507141900 (WGS84) 40.4525076196-74.0511297102 (NAD27LL) 40.4526153076-74.0507141900 (LocalLL) (X) 580493.81 (Y) 4478427.73 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\1N.jsf • Ping Number: 68976 • Range to target: 12.30 • Heading: 0.000 Degrees • Event Number: 1071 • Line Name: 1N	Dimensions and attributes • Target Width: 2.38 • Target Height: 0.40 • Target Length: 3.47 • Target Shadow: 0.62
	02_012_misc_feature • Sonar Time at Target: 4/4/2013 1:58:40 PM • Click Position 40.4522365943-74.0505400045 (WGS84) 40.4521288975-74.0509555313 (NAD27LL) 40.4522365943-74.0505400045 (LocalLL) (X) 580509.03 (Y) 4478385.85 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\7N.jsf • Ping Number: 42528 • Range to target: 31.72 • Heading: 0.000 Degrees • Event Number: 1045 • Line Name: 7N	Dimensions and attributes • Target Width: 2.13 • Target Height: 0.15 • Target Length: 1.97 • Target Shadow: 1.02

	02_013_misc_feature • Sonar Time at Target: 4/4/2013 1:59:29 PM • Click Position 40.4531208843-74.0500611986 (WGS84) 40.4530132046-74.0504767325 (NAD27LL) 40.4531208843-74.0500611986 (LocalLL) (X) 580548.57 (Y) 4478484.44 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\7N.jsf • Ping Number: 43235 • Range to target: 30.75 • Heading: 0.000 Degrees • Event Number: 1045 • Line Name: 7N	Dimensions and attributes • Target Width: 0.47 • Target Height: 0.22 • Target Length: 1.70 • Target Shadow: 0.62
	02_014_misc_feature • Sonar Time at Target: 4/4/2013 1:28:58 PM • Click Position 40.4544767983-74.0467198907 (WGS84) 40.4543691341-74.0471355015 (NAD27LL) 40.4544767983-74.0467198907 (LocalLL) (X) 580830.27 (Y) 4478638.00 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\24S.jsf • Ping Number: 17610 • Range to target: 20.61 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 24S	Dimensions and attributes • Target Width: 1.06 • Target Height: 0.32 • Target Length: 1.22 • Target Shadow: 0.91
	02_015_misc_feature • Sonar Time at Target: 4/4/2013 1:19:24 PM • Click Position 40.4536253511-74.0474854329 (WGS84) 40.4535176717-74.0479010293 (NAD27LL) 40.4536253511-74.0474854329 (LocalLL) (X) 580766.38 (Y) 4478542.79 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\28S.001.jsf • Ping Number: 11159 • Range to target: 26.33 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 28S.001	Dimensions and attributes • Target Width: 0.76 • Target Height: 0.20 • Target Length: 1.35 • Target Shadow: 0.65

	02_016_misc_feature • Sonar Time at Target: 4/4/2013 1:19:48 PM • Click Position 40.4530124930-74.0471045840 (WGS84) 40.4529047988 -74.0475201936 (NAD27LL) 40.4530124930-74.0471045840 (LocalLL) (X) 580799.41 (Y) 4478475.11 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\28S.001.jsf • Ping Number: 11512 • Range to target: 31.50 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 28S.001	Dimensions and attributes • Target Width: 0.00 • Target Height: 0.00 • Target Length: 0.00 • Target Shadow: 0.00
	02_019_misc_feature • Sonar Time at Target: 4/4/2013 1:40:54 PM • Click Position 40.4516429964 -74.0494313686 (WGS84) 40.4515352822-74.0498469270 (NAD27LL) 40.4516429964-74.0494313686 (LocalLL) (X) 580603.74 (Y) 4478320.97 (Projected Coordinates) • Map Projection: UTM84-18N • Acoustic Source File: C:\SonarWiz-Projects\NWS Earl Pier 2\XTF\Pier 2\20S.jsf • Ping Number: 27993 • Range to target: 15.00 • Heading: 0.000 Degrees • Event Number: 0 • Line Name: 20S	Dimensions and attributes • Target Width: 1.31 • Target Height: 0.38 • Target Length: 2.48 • Target Shadow: 1.54

Attachment 5
CD (or DVD) with all Data and Deliverables, Including .pdf Describing Contents

Attachment 5 contains a full electronic copy of this report and is included on the attached CD

Appendix B
Field Standard Operating Procedures

STANDARD OPERATING PROCEDURE

Preparing Field Log Books

I. Purpose

This SOP provides general guidelines for entering field data into log books during site investigation and remediation activities.

II. Scope

This is a general description of data requirements and format for field log books. Log books are needed to properly document all field activities in support of data evaluation and possible legal activities.

III. Equipment and Materials

- Log book
- Indelible pen

IV. Procedures and Guidelines

Properly completed field log books are a requirement for much of the work we perform under the Navy CLEAN contract. Log books are legal documents and, as such, must be prepared following specific procedures and must contain required information to ensure their integrity and legitimacy. This SOP describes the basic requirements for field log book entries.

A. PROCEDURES FOR COMPLETING FIELD LOG BOOKS

1. Field notes commonly are kept in bound, hard-cover logbooks used by surveyors and produced, for example, by Peninsular Publishing Company and Sesco, Inc. Pages should be water-resistant and notes should be taken only with water-proof, non-erasable permanent ink, such as that provided in Sanford Sharpie® permanent markers.

2. On the inside cover of the log book the following information should be included:

   - Company name and address
   - Log-holders name if log book was assigned specifically to that person
   - Activity or location
   - Project name
   - Project manager's name
   - Phone numbers of the company, supervisors, emergency response, etc.

3. All lines of all pages should be used to prevent later additions of text, which could later be questioned. Any line not used should be marked through with a line and initialed and dated. Any pages not used should be marked through with a line, the author's initials, the date, and the note "Intentionally Left Blank."

4. If errors are made in the log book, cross a single line through the error and enter the correct information. All corrections shall be initialed and dated by the personnel performing the correction. If possible, all corrections should be made by the individual who made the error.

5. Daily entries will be made chronologically.

6. Information will be recorded directly in the field log book during the work activity. Information will not be written on a separate sheet and then later transcribed into the log book.

7. Each page of the log book will have the date of the work and the note takers initials.

8. The final page of each day's notes will include the note-takers signature as well as the date.

9. Only information relevant to the subject project will be added to the log book.

10. The field notes will be copied and the copies sent to the Project Manager or designee in a timely manner (at least by the end of each week of work being performed).

B. INFORMATION TO BE INCLUDED IN FIELD LOG BOOKS

1. Entries into the log book should be as detailed and descriptive as possible so that a particular situation can be recalled without reliance on the collector's memory. Entries must be legible and complete.

2. General project information will be recorded at the beginning of each field project. This will include the project title, the project number, and project staff.

3. Scope: Describe the general scope of work to be performed each day.

4. Weather: Record the weather conditions and any significant changes in the weather during the day.

5. Tail Gate Safety Meetings: Record time and location of meeting, who was present, topics discussed, issues/problems/concerns identified, and corrective actions or adjustments made to address concerns/ problems, and other pertinent information.

6. Standard Health and Safety Procedures: Record level of personal protection being used (e.g., level D PPE), record air monitoring data on a regular basis and note where data were recording (e.g., reading in borehole, reading in breathing zone, etc). Also record other required health and safety procedures as specified in the project specific health and safety plan.

7. Instrument Calibration; Record calibration information for each piece of health and safety and field equipment.

8. Personnel: Record names of all personnel present during field activities and list their roles and their affiliation. Record when personnel and visitors enter and leave a project site and their level of personal protection.

9. Communications: Record communications with project manager, subcontractors, regulators, facility personnel, and others that impact performance of the project.

10. Time: Keep a running time log explaining field activities as they occur chronologically throughout the day.

11. Deviations from the Work Plan: Record any deviations from the work plan and document why these were required and any communications authorizing these deviations.

12. Heath and Safety Incidents: Record any health and safety incidents and immediately report any incidents to the Project Manager.

13. Subcontractor Information: Record name of company, record names and roles of subcontractor personnel, list type of equipment being used and general scope of work. List times of starting and stopping work and quantities of consumable equipment used if it is to be billed to the project.

14. Problems and Corrective Actions: Clearly describe any problems encountered during the field work and the corrective actions taken to address these problems.

15. Technical and Project Information: Describe the details of the work being performed. The technical information recorded will vary significantly between projects. The project work plan will describe the specific activities to be performed and may also list requirements for note taking. Discuss note-taking expectations with the Project Manager prior to beginning the field work.

16. Any conditions that might adversely affect the work or any data obtained (e.g., nearby construction that might have introduced excessive amounts of dust into the air).

17. Sampling Information; Specific information that will be relevant to most sampling jobs includes the following:

    - Description of the general sampling area – site name, buildings and streets in the area, etc.
    - Station/Location identifier
    - Description of the sample location – estimate location in comparison to two fixed points – draw a diagram in the field log book indicating sample location relative to these fixed points – include distances in feet.
    - Sample matrix and type
    - Sample date and time
    - Sample identifier
    - Draw a box around the sample ID so that it stands out in the field notes
    - Information on how the sample was collected – distinguish between “grab,” “composite,” and “discrete” samples

- Number and type of sample containers collected
- Record of any field measurements taken (i.e. pH, turbidity, dissolved oxygen, and temperature, and conductivity)
- Parameters to be analyzed for, if appropriate
- Descriptions of soil samples and drilling cuttings can be entered in depth sequence, along with PID readings and other observations. Include any unusual appearances of the samples.

C. SUGGESTED FORMAT FOR RECORDING FIELD DATA

1. Use the left side border to record times and the remainder of the page to record information (see attached example).
2. Use tables to record sampling information and field data from multiple samples.
3. Sketch sampling locations and other pertinent information.
4. Sketch well construction diagrams.

V. Attachments

Example field notes.

0715 ARRIVE ON SITE AT XYZ SITE.
CH2M HILL STAFF:
John Smith: FIELD TEAM LEADER
Bob Builder: SITE SAFETY COORD.
WEATHER: OVERCAST + COOL, 45°F
CHANCE OF LATE SHOWERS
SCOPE: • COLLECT GROUNDWATER SAMPLES for LTM work at SITE 14
• SUPERVISE SURVEY CREW AT SITE 17
0725 BB ~~Con~~ ~~JS~~ (JS) Calibrates PID: 101 ppm/100 ppm ok
PID Model #, SERIAL #
0730 BB Calibrates HORIBA METER
Model #, SERIAL #
→ List calibration Results
0738 Survey CREW ARRIVES on SITE
→ List NAMES
0745 BB Holds H+S TALK on Slips, Trips, Falls, Ticks + AIR MONITORING
JS + SURVEY CREW ATTEND
No H+S ISSUES IDENTIFIED as CONCERNS. All work is in "Level D."
0755 JS Conducts site-WIDE AIR Monitoring
All readings = 0.0 ppm in

JS 5-12-03

SITE 14 LTM
BREATHING ZONE (BZ)
0805 Mobilize to well MW-22 to SAMPLE, surveyors SETTING UP AT SITE 17
0815 PM (PAUL PAPER PUSHER) CALLS AND INFORMS JS to collect GW SAMPLE AT well MW-44 today for 24 hour TAT ANALYSIS OF VOC'S
0820 Purging MW-22
→ RECORD WATER QUALITY DATA
JS 5-12-03
0843 Collect SAMPLE AT MW-22 for total TAL Metals and VOC'S. No Dissolved Metals Needed PER PM.
0905 JS + BB Mobilize to SITE 17 to show surveyors wells to Survey.
0942 Mobilize to well MW-22 to Collect SAMPLE
0950 CAN not ACCESS WELL MW-22 due to BASE OPERATIONS; CONTACT PAUL PAPERPUSHER AND HE STATED he will check on GAINING ACCESS with BASE contact.
0955 Mobilize to well MW-19

JS 5-12-03

STANDARD OPERATING PROCEDURE

Underwater Digital Geophysical Mapping

I. Purpose and Scope

The purpose of this Standard Operating Procedure (SOP) is to identify the instrumentation, approach, data verification and quality control (QC) procedures for conducting underwater digital geophysical mapping (DGM) in support of munitions response (MR) activities at UXO 2, the Munitions Loading Pier Complex, located at Naval Weapons Station Earle, Sandy Hook Bay, Monmouth County, New Jersey. DGM operations use instruments that record instrument response digitally, allowing for the subsequent download and interpretation of the data.

For the underwater investigations, DGM will be conducted using either an underwater electromagnetic (EM) system or an array of underwater magnetometers.

II. Equipment and Materials

- Geonics marine EM61-MK2 time domain electromagnetic (TDEM) metal detector
- Geometrics G-882 marine magnetometer array (or equivalent system)
- Global positioning systems (GPS)
- Survey Vessel with instrument rigging capability

III. Procedures and Guidelines

- The DGM system will not be permitted to intentionally encounter the sea floor because of the possible presence of environmentally sensitive habitat and underwater Munitions and Explosives of Concern (MEC) within the survey area.
- DGM survey personnel will have reviewed data from side-scan sonar (SSS) surveys conducted prior to the start of DGM as well as other available information that may be useful in the safe operation of the DGM instrument.
- The survey vessel will be operated by personnel familiar with the safe operation of the vessel in open water. Proper operational licenses and training will be required and verified prior to the start of field work.
- DGM activities will be performed under an approved Explosives Safety Submission (ESS) or ESS Determination Request (ESS-DR). Field personnel will comply with the applicable ESS/ESS-DR.

DGM Personnel Qualifications

- **Program Geophysicist (CH2M HILL) -** This individual will have a degree in geophysics, geology, geological engineering, or a closely related field, and will have a minimum of 5 years of experience directly related to the geophysical mapping, detection and discrimination of buried military munitions. This individual has overall responsibility for design, implementation, and management of geophysical investigations required for the work effort related to military munitions, but may not necessarily be on site full time. This individual will be the program geophysicist-of-record.
- **Project/QC Geophysicist (CH2M HILL)** - This individual will have a degree in geophysics, geology, geological engineering, or a closely related field. The Project Geophysicist will have training and experience appropriate to the geophysical investigations managed. This individual is responsible for

design, implementation, management and quality control (QC) of the geophysical investigation but may not be on site full time.

- **Site Geophysicist (SUBCONTRACTOR)** - This individual will have a degree in geophysics, geology, geological engineering, or a closely related field and have demonstrated experience in the operation of the DGM instrument and positioning equipment. The Site Geophysicist will be responsible for the safe operation of the DGM instrument and data collection in accordance with the project safety requirements, project scope of work and measurement quality objectives (MQOs). The Site Geophysicist will be responsible for QC of field data and transmittal of survey data, results and relevant field information to CH2M HILL in accordance with the project scope of work.
- **Field Geophysicists (SUBCONTRACTOR) -** These individuals will have a degree in geophysics, geology, geological engineering, or a closely related field, and will have training and experience in the safe operation of the DGM instrument and positioning systems.

IV. DGM Measurement Quality Objectives

The primary objective of the DGM is to identify metallic objects on or beneath the sea floor that may be indicative of MEC. The DGM MQOs are summarized in the following subsections.

General Geophysical Systems Functioning

- **Topside Positional Accuracy:** The MQO for topside GPS positional accuracy is that the coordinates being obtained from the topside positioning system allow for accurate translation of the DGM sensor positions. The measurement performance criterion (MPC) for this is that the topside GPS positional accuracy will be ±10 cm (4 in). This will be evaluated by utilizing real-time kinematic GPS (RTK GPS) to record the position at a pre-established GPS check point near the survey vessel launch site and comparing this position against the surveyed coordinates prior to embarking for daily survey work.
- **DGM Target Positional Accuracy**: The MQO for DGM target positional accuracy is that the translated coordinates of the DGM data are at a sufficient enough accuracy to allow for appropriate relocation of MEC items for further inspection. The measurement performance criterion (MPC) for this is that the derived target locations (EM peak amplitude response or magnetic dipole fit positions) will be ±2 m (6.6 ft) of the ground truth. This will be evaluated by comparing anomaly positions from repeat lines to ensure position repeatability to within this metric.
- **DGM Target Repeatability:** The MQO for DGM target repeatability is that the derived target locations (EM peak amplitude response or magnetic dipole fit positions) are repeatable from the beginning to the end of an operation. The MPC for this is that the target locations will be repeatable to ±2m. This will be evaluated by comparing the positions of data collected over an area where anomalies have been detected (assuming sea state conditions don't change significantly during the survey operation).

DGM Survey

- **Down line Data Density:** The MQO for down line (along the survey transect) data density is to have sufficient data collected along each transect to detect MEC items. The MPC for this is that at least 98% of possible sensor readings are captured along each transect at 0.3 m (1 ft) or less. In addition, any transect (or portion thereof) containing a data gap (relative to other collected data points) of 1 m (3.3 ft) or greater does not meet the MQO. This will be evaluated by verifying that all of the DGM data collected and used for anomaly selection meets this objective.

- **Height Above Sea Floor:** The MQO for height above the sea floor is the height that the DGM sensor is towed above the sea floor during data collection. If the height increases too much, the detection capability of the sensor is reduced. Side scan sonar data will be acquired prior to the start of the DGM and will be provided to the DGM SUBCONTRACTOR for review. CH2M HILL estimates that the maximum operational depth for the DGM system is approximately 12 m (40 ft). The MPC is that the sensor will be towed at a maximum height of 1.5 m (5ft) above the sea floor for 98% of the data collected along each transect (i.e. no more than 2% of the DGM data for each transect may be from heights of 1.5 m (5 ft) or more. Exceptions include raising the system higher to avoid obstructions, localized depressions or trenches in the sea floor that are too small to adjust the sensor height accordingly, or if the sea state conditions significantly change during the DGM operation. The DGM system will have an on-board altimeter to record the height and an onboard depth transducer to record the sensor depth. The system will have the capability to both monitor and output the sensor height and depth below the sea surface as data channels that can be evaluated during QC.

V. Geophysical Instrumentation

For the underwater investigation, DGM will be conducted using either a marine EM61-MK2 system or an underwater magnetometer such as the Geometrics G-882. The system may consist of a single sensor or an array of ganged sensors. General descriptions of the instruments are provided below for these specific instruments, although equivalent systems or proprietary configurations may be ultimately utilized by the DGM SUBCONTRACTOR.

Marine EM61-MK2

The marine EM61-MK2 system consists of a coil that transmits a pulsed (i.e. time-varying) primary magnetic field into the earth that induces eddy currents in electrically conductive materials. The decay of these eddy currents produces a secondary magnetic field measured by the same coil. If the secondary field is measured at a relatively long time after termination of the primary pulse, the current induced in the relatively non-conductive ground will fully dissipate, while the current in the conductive media (metallic objects) will continue to produce a secondary magnetic field. The measured response is reported in units of millivolts (mV). Electromagnetic data are generally acquired over a predetermined grid or survey transects depending on the specific project objective. The data provide a spatial distribution of the instrument response over the surveyed area.

The strength or amplitude of a target's response is dependent on the object's size, orientation and distance relative to the sensor. The sensor-target separation distance is the dominant factor because the response amplitude is nominally proportional to $1/r^5$, (where 'r' represents the separation distance). **Figure 1** presents the response of a range of ordnance, oriented in a 'worst case' scenario, as a function of distance (adapted from Nelson et al, 2008 and Nelson et al, 2009). Although some marine systems utilize 'high power' transmitters resulting in a ten-fold increase in output current and received signal levels, the noise levels on these systems are also ten times higher, resulting in similar signal to noise performance. For this reason the expected signal to noise ratio of these technologies as presented are applicable to any instruments using this technology.

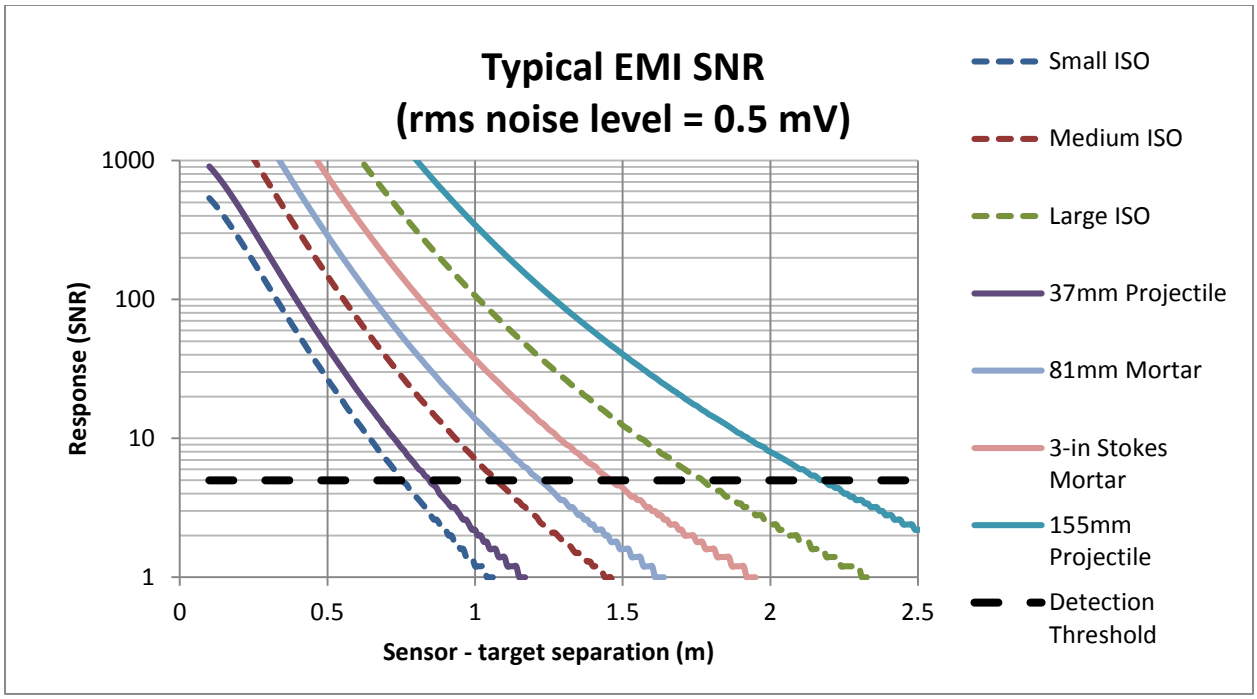


Figure 1. *Typical Signal to Noise Ratio (SNR) performance achieved by EMI sensors.*

Geometrics G-882

The G-882 is an optically pumped cesium vapor instrument that measures the intensity of the earth's magnetic field in nanoTeslas (nT). This instrument can be used to detect localized distortions of the Earth's magnetic field caused by ferrous metallic objects. Response amplitudes are predictable for given ordnance type (size), orientation and sensor-target separation distance. Response amplitudes are maximized when the long axis of the object is parallel to the Earth's magnetic field vector, and minimized when the object is oriented normal to the Earth's field. The sensor-target separation distance is the dominant factor because the response amplitude is nominally proportional to $1/r^3$, (where 'r' represents the separation distance). Response amplitudes for a representative range of ordnance, oriented in the least favorable position, are presented as a function of depth on **Figure 2** (data adapted from Bell et al, 2012). The detection threshold presented is given assuming a noise level of 1 nT and a signal to noise ratio (SNR) detection threshold of 5.

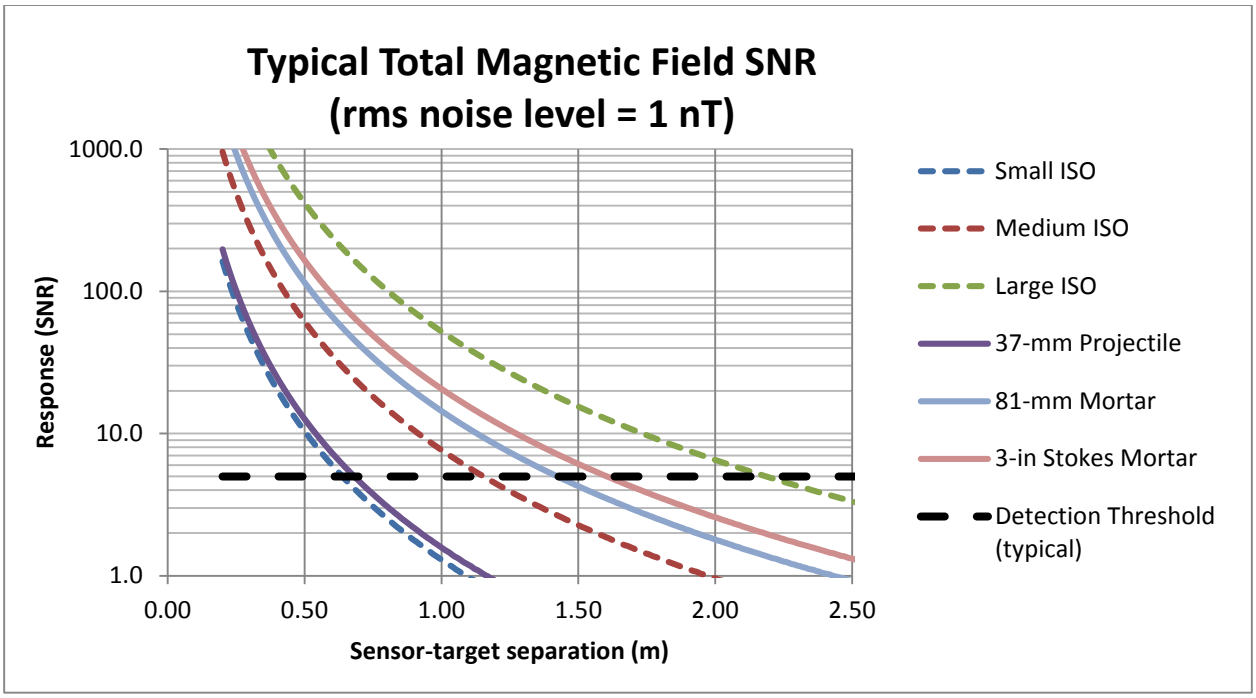


Figure 2. *Total Magnetic Field signal amplitudes for a range of ordnance, assuming a least favorable orientation relative to the Earth's magnetic field. The detection threshold is provided assuming noise levels of 1 nT and SNR of 5. Noise levels will vary from site to site depending upon geology and deployment platform considerations.*

Positioning Equipment

Topside GPS positioning will be accomplished using RTK GPS. RTK GPS instruments are ideal for field-mapping applications with adequate satellite visibility conditions as they provide the highest GPS accuracy possible. Typical RTK GPS accuracies are in the range of 2 to 5 centimeters under optimal field conditions. This accuracy will be reduced in the marine environment due to movement of the boat, waves and underwater currents impacting the DGM sensors and bounce as the sensor attempts to maintain the required height above sea floor.

Data Acquisition, Processing and Reporting

Data Processing

Instrument-specific software will be used for initial data processing, and the output will be imported into Geosoft Oasis Montaj™ for additional processing, graphical display, anomaly selections and QC. All processing steps will be documented. The general processing steps that may be performed on the DGM data include, but are not limited to, the following:

- Positional offset correction
- Sensor bias, background leveling, diurnal corrections and/or standardization adjustment
- Sensor drift removal
- Latency or lag correction
- Geophysical noise identification and removal (spatial, temporal, motional, terrain induced)
- Contour level selection with background shading
- Digital filtering and enhancement (low pass, high pass, band pass, convolution, correlation, non-linear, etc.)

Interpretation/Anomaly Selection

Munitions and explosives of concern (MEC)-experienced data processing geophysicists will use the following criteria for selecting and locating DGM anomalies:

- Identification of an anomaly selection threshold based on background geophysical response
- Lateral extent (plan size) of the area of response
- Three-dimensional shape of the response
- Decay curve or dipole characteristics
- Location of the response with respect to underwater obstructions, potential debris, and sea floor topography
- Potential distortions in the response due to underwater obstructions, potential debris, and sea floor topography

Target Files

The target analysis process culminates in the creation of Microsoft Excel target lists, an example of which is shown as **Figure 3**. The target files are to include:

- Unique anomaly identification numbers
- Transect identification
- Predicted location in Universal Transverse Mercator (UTM) North American Datum 1983 (NAD83) Grid Plane Coordinates in Easting (meters) and Northing (meters), Zone 20N
- Anomaly type identifier
- Response amplitude and units

FIGURE 3
Example MRP Enterprise Target File for Transect Data

ID	GRIDCELLID	X1	Y1	X2	Y2	X3	Y3	X4	Y4	TYPE	AMPLITUDE	UNITS
1	AA-00001	273474.60	3838895.60	0	0	0	0	0	0	1	20.20	mv
2	AA-00002	273473.80	3838893.20	0	0	0	0	0	0	1	8.04	mv
3	AA-00003	273471.00	3838886.00	0	0	0	0	0	0	1	8.85	mv
4	AA-00004	273469.00	3838881.60	0	0	0	0	0	0	1	11.85	mv
5	AA-00005	273462.60	3838867.60	0	0	0	0	0	0	1	27.94	mv

Results Maps

With each target sheet, the DGM contractor will also provide a results map, which will contain the following:

- Client
- Project
- Contractor
- Map Approver
- Date Map was Created
- Scale Bar
- Survey Area and Transect Identification
- Contoured Data
- Color Bar with Data Units Listed

- Index Map
- Target Locations with Identification Numbers
- North Arrow
- Legend
- Title Block

Records Management

All files will be made available for quality assurance (QA) verification during the project to verify that the field and data processing procedures are properly implemented. All raw data files, final processed data files, hard copies, and field notes will be maintained for the duration of the project.

Final Reports, Maps, and Geophysical Mapping Data

All data provided by the DGM SUBCONTRACTOR will be provided via a CH2M HILL-maintained File Transfer Protocol (FTP) or Share Point site. Final reports, maps and DGM data will also be provided on DVD or CD with the final report(s). **Figure 4** shows the folder structure to be used on the FTP or Share Point site.

On a daily basis the contractor will provide each day's raw data files. Raw data is defined as data directly recorded by the data acquisition system, without any modification (or filtering) that changes the originally recorded values from the geophysical or positional sensors.

- Raw data will be provided as American Standard Code for Information Interchange (ASCII) text format so the data files are viewable in text editing software. Proprietary binary format data will be directly converted to text format before delivery.
- Recommended file extensions are ".txt" and ".xyz"; however, other file extensions are acceptable.
- Each delivered raw file will have an informative and unique name. A comprehensive file naming explanation file will be provided on the FTP site.

No later than 3 work days after collection, the SUBCONTRACTOR will provide pre-processed data. The following applies to all pre-processed data deliverables:

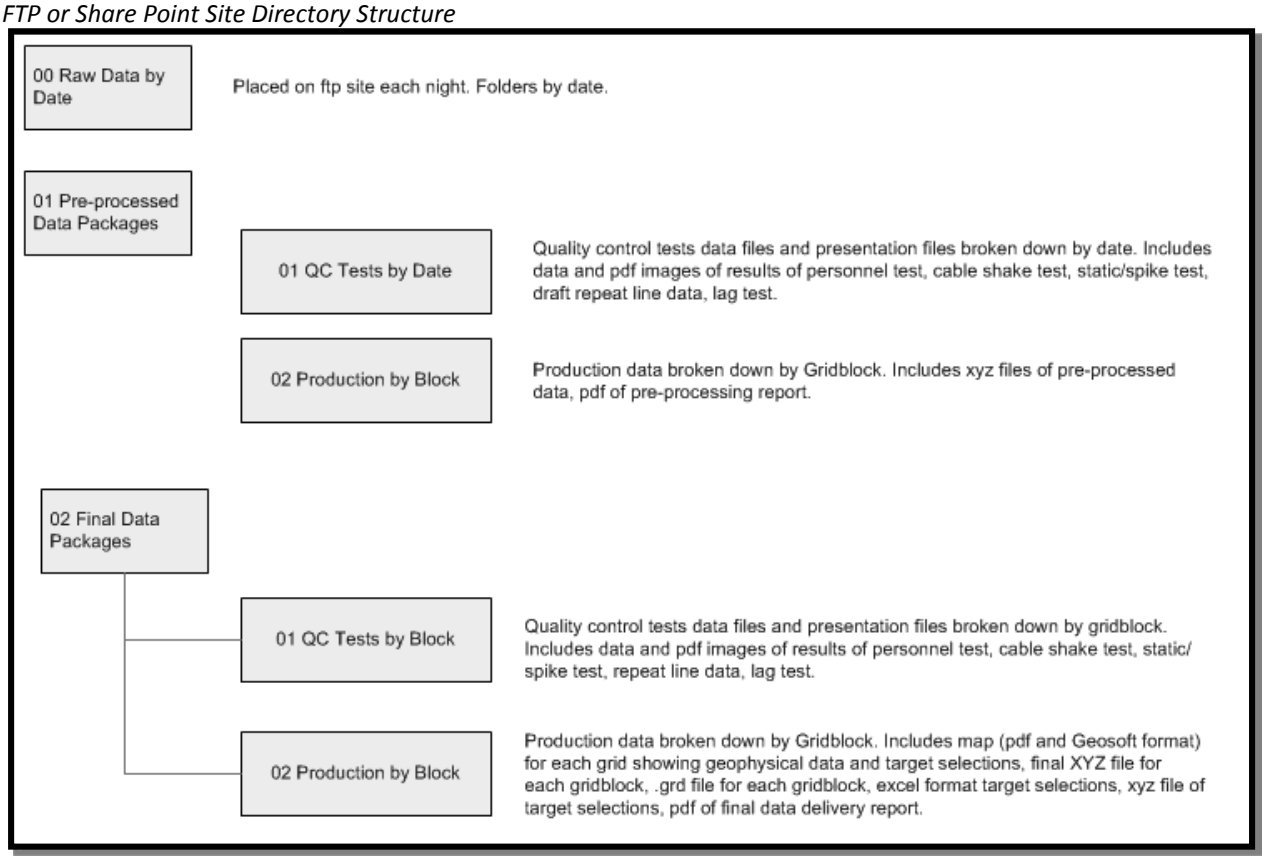
- All pre-processed geophysical data, including all QC tests will be delivered in Geosoft Database (GDB) format or xyz format, readable by Geosoft's Oasis Montaj software package.
- QC test databases and Adobe Acrobat Portable Document Format (PDF) files containing images of QC test results will be provided <u>by date</u>.
- Databases will be delivered in GDB or xyz format, and will include the following minimum channel information:
  - Easting (X) and Northing (Y) coordinates in UTM projection (NAD 83), meters
  - Time (with precision to at least 0.1 s)
  - Raw geophysical data channels
  - Pre-Processed geophysical data channels

No later than 5 work days after collection, the DGM contractor will provide final (processed) data. The following applies to all final (processed) data deliverables.

- All processed geophysical data, including all QC tests will be delivered in GDB or xyz format.
- QC test databases and PDF files containing images of QC test results will be provided by data block.

- Processed production data will be provided broken down by data block.
- A Final Data Delivery Report will be provided with each data block documenting field notes, pre-processing and processing information. Information provided by the report is summarized in **Table 1.**
- Databases will include the following minimum channel information:
  - Easting (X) and Northing (Y) coordinates in UTM projection (NAD 83), meters
  - Time (with precision to at least 0.1 second)
  - Raw geophysical data channels
  - Pre-Processed geophysical data channels
  - Processed geophysical data channels
- Deliverables will include:
  - Geosoft ".map" file for each data block.
  - PDF of Geosoft map for each data block.
  - Geosoft grid ".grd" file for data block showing gridded data from channel used for targeting.
  - Microsoft Excel Target files
  - Geosoft ".xyz" data file and target file
  - Geosoft ".map" mosaic of all processed data to date.
  - PDF mosaic of the Geosoft map of all processed data to date.
- All filenames must include the data block or transect name (as appropriate).

FIGURE 4
FTP or Share Point Site Directory Structure



- A Pre-Processed Data Delivery Report will be provided with each data block documenting field notes and pre-processing information. Information provided by the report is summarized in **Table 1**.

TABLE 1
Processing Documentation Requirements

Information Type	Pre-Processed Data Delivery Report	Final Data Delivery Report	Must be in File Headers
Site ID	X	X	X
Geophysical instrument type used	X	X	
Positioning method used	X	X	
Instrument serial numbers (geophysical and positioning)	X	X	
Coordinate system and unit of measure	X	X	
Grid ID (or other identifier of surveyed area)	X	X	X
Date of data collection	X	X	X
Raw data file names associated with delivery	X	X	
Processed data file names associated with delivery	X	X	
Name of Project Geophysicist	X	X	
Name of Site Geophysicist	X	X	
Name of data processor	X	X	
Data processing software used	X	X	
Despiking method and details	X	X	
Sensor drift removal and details	X	X	
Latency/lag correction and details	X	X	
Sensor bias, background leveling and/or standardization adjustment method and details		X	
Diurnal correction (magnetometer data)	X	X	
Geophysical noise identification and removal (spatial, temporal, motional, terrain induced) and details		X	
Other filtering/processing performed and details		X	
Gridding method		X	
Anomaly selection and decision criteria details		X	
Other processing comments		X	
Date data processing is completed	X	X	
Data delivery date	X	X	
Scanned copy of field notes and field mobile data collection device notes (if applicable)	X		

VI. Quality Control

A description of each basic QC test, its acceptance criteria, and its frequency is provided below and summarized below.

DGM Instruments Quality Control

The DGM system will be field tested to confirm proper operating conditions. Several basic QC tests will be performed by the SUBCONTRACTOR in addition to instrument-specific tests. These tests are also summarized in **Table 2**.

1. **Equipment Warm-up**. The system will be turned on and warmed up for a minimum of 10 minutes prior to use. This test is to demonstrate that the instruments boot properly and that the internal diagnostics routines demonstrate that the necessary sensors (e.g. noise, pitch, roll, etc.) are operating correctly. Equipment warm-up will be performed the first time an instrument is turned on for the day or has been turned off for a sufficient amount of time for the specific instrument to cool down.

2. **Record Topside GPS Positions.** The topside GPS positioning accuracy will be demonstrated by using the topside RTK GPS rover to record the position at a pre-established GPS check point near the survey vessel launch site and comparing this position against the surveyed coordinates prior to embarking for daily survey work. This test will be performed at the beginning of each work day.

3. **Repeat Data.** This test is performed by evaluating repeat data collected over a set of anomalies. The target positions derived from the data will be repeatable to ±2m from the beginning through the end of each day's operation.

TABLE 2
BASIC DGM INSTRUMENTS QUALITY CONTROL

Test	Test Description	Acceptance Criteria	Power On	Beginning of Day	Beginning and End of Day
1	Equipment Warm-up	Minimum of 10 minutes. instruments boot properly and internal diagnostics routines demonstrate that the necessary sensors are operating correctly	X		
2	Record Topside GPS Positions	± 10cm between RTK GPS rover positions and known, surveyed locations		X	
3	Repeat Data	Derived target positions repeatable to within ±2m.			X

Quality Control of DGM Data and Deliverables

QC of geophysical data and data deliverables will be performed at each step of the processing path. This path is presented as **Figure 5**. The QC tests, identified in the Quality Control section of this SOP, that are performed on the system on a daily basis that are checked immediately in the field by the SUBCONTRACTOR and reviewed by the CH2M HILL Project/QC Geophysicist to confirm that the DGM system is functioning properly. Data will not move to the next stage until they have passed the required QC checks.

The following items are among the QC checks performed on the field forms:

- Appropriate fields have been completed
- Field entries are appropriate for work performed
- Back-up hard copies or field book entries are legible
- Data required for geophysical data processors have been entered
- General editorial review (spelling, dates, etc.)

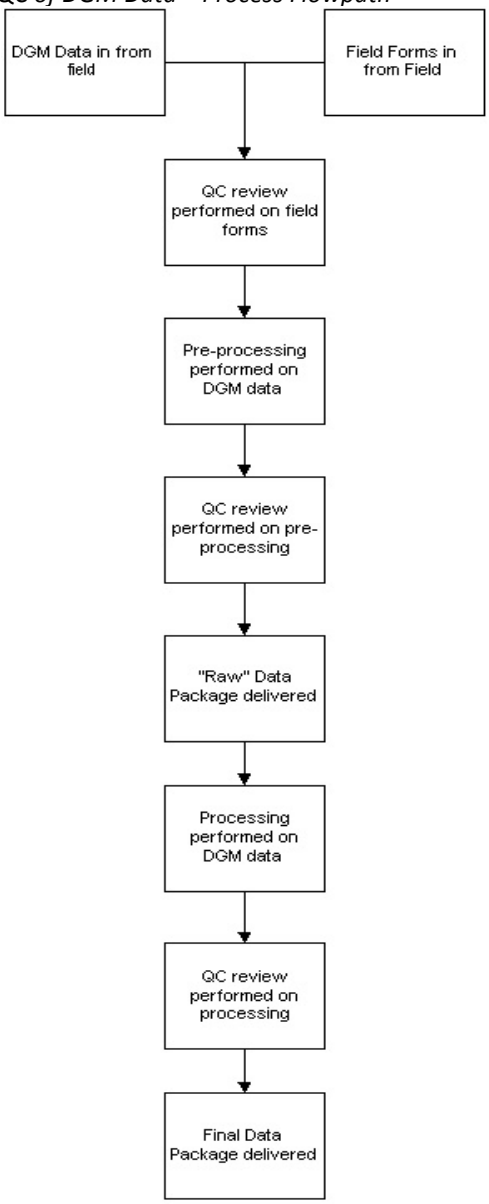
The following items are among the QC checks performed (as applicable to the particular data set) on the "Pre-Processed Data":

- Data are provided in UTM Zone 20N and in units of meters
- Coordinates are correct (i.e. plot in correct locations when loaded into GIS)
- System passes QC tests
- Down line data density is acceptable
- Appropriate file headers have been attached
- Files contain transects stipulated in daily field notes

The following items are among the QC checks performed (or as applicable to the particular data set) on the "Processed Data":

- Latency/Lag correction is appropriate
- Despiking is appropriate
- Leveling is appropriate
- Filtering performed is appropriate
- Line breaking is appropriate
- Anomaly selections are clearly annotated
- Excel target lists of anomalies, anomaly IDs and anomaly type identifier match the results maps

FIGURE 5
QC of DGM Data – Process Flowpath



Corrective Measures

The following are the basic corrective measures to be followed in association with DGM:

- Replacement of sensors if they fail to meet instrument check requirements.
- Re-collection of data if MQOs are not met
- Re-processing DGM data in lieu of re-collection if it is determined that processing error may have resulted in data not meeting MQOs.

VII. References

Nelson, H.H., T. Bell, J. Kingdon, N. Khadr, and D.A. Steinhurst, 2008. *EM61-MK2 Response of Standard Munitions Items*. NRL/MR/6110—08-9155. October.

Nelson, H.H., T. Bell, J. Kingdon, N. Khadr, and D.A. Steinhurst, 2009. *EM61-MK2 Response of Three Munitions Surrogates*. NRL/MR/6110—09-9183. March.

Bell, T.H., N. Khadr, G.R. Harbaugh, and D.A. Steinhurst, 2012. *Magnetometer Response of Commonly Found Munitions Items and Munitions Surrogates*. NRL/MR/6110—12-9385. January.

STANDARD OPERATING PROCEDURES FOR UNDERWATER DIGITAL GEOPHYSICAL MAPPING

Underwater DGM Survey at Area UXO-0002
Naval Weapons Station Earle
Sandy Hook Bay, Monmouth County, New Jersey

Contract Task Order: WE06

9675 Summit Place
Chaska, MN 55318
Tel: 952-556-1118 • Fax: 952-556-1119
Email: info@3dgeophysics.com

October 30, 2013

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FIGURES

Investigation Area
Proposed DGM Grid Lines

APPENDIX A EM61-Flex3 Operating Notes

APPENDIX B Example Field Log

1. PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide specific procedures for data collection, processing and equipment for the underwater geophysical investigations at Area UXO-0002, Naval Weapons Station Earle (NWS Earle), Sandy Hook Bay, Monmouth County, New Jersey (the "site").

2. EQUIPMENT AND THEORY

This SOP is applicable for the Geonics, Ltd. EM61-Flex3 time domain metal detector, operated using the 3Dgeophysics (3Dg) Underwater UXO Towed Array (UUTA), Trimble 5700 Real Time Kinematic (RTK) Global Positioning System (GPS), and a Trimble AgGPS FmX integrated navigation system.

The EM61-Flex3 (see manufacturer operating notes in **Appendix A**) is a high-resolution time-domain electromagnetic instrument designed to detect, with high spatial resolution, shallow ferrous and non-ferrous metallic objects. The EM61-Flex3 system is based on the standard Geonics EM61-MK2 metal detector. The EM61-Flex3 consists of two air-cored receiver coils, a grand air-cored transmitter coil, a digital data recorder, batteries and processing electronics. The 1.0 x 0.5 meter receiver coil pairs are arranged side by side and are encompassed by the transmitter coil. The EM61-Flex3 uses a transmitter repetition rate of 140 Hertz (Hz) and a 24-volt transmitter pulser; both specifications are doubled in comparison to the standard EM61-MK2. The EM61-Flex3 transmitter generates a pulsed primary magnetic field, which then induces eddy currents in nearby metallic objects. Each of the two spatially separated receiver coils measures these eddy currents. The EM61-Flex3 offers the ability measure the eddy currents at two operator selected time gates (firmware). The "early" time gate provides enhanced detection of smaller metallic objects. The "late" time gate is analogous to the 3rd time gate from the standard EM61-MK2. Secondary voltages induced in both coils are measured in millivolts (mV). Data is collected using the MLFXmarine acquisition program (Geomar Software, Inc.) and temporarily stored in a Panasonic ToughBook PC.

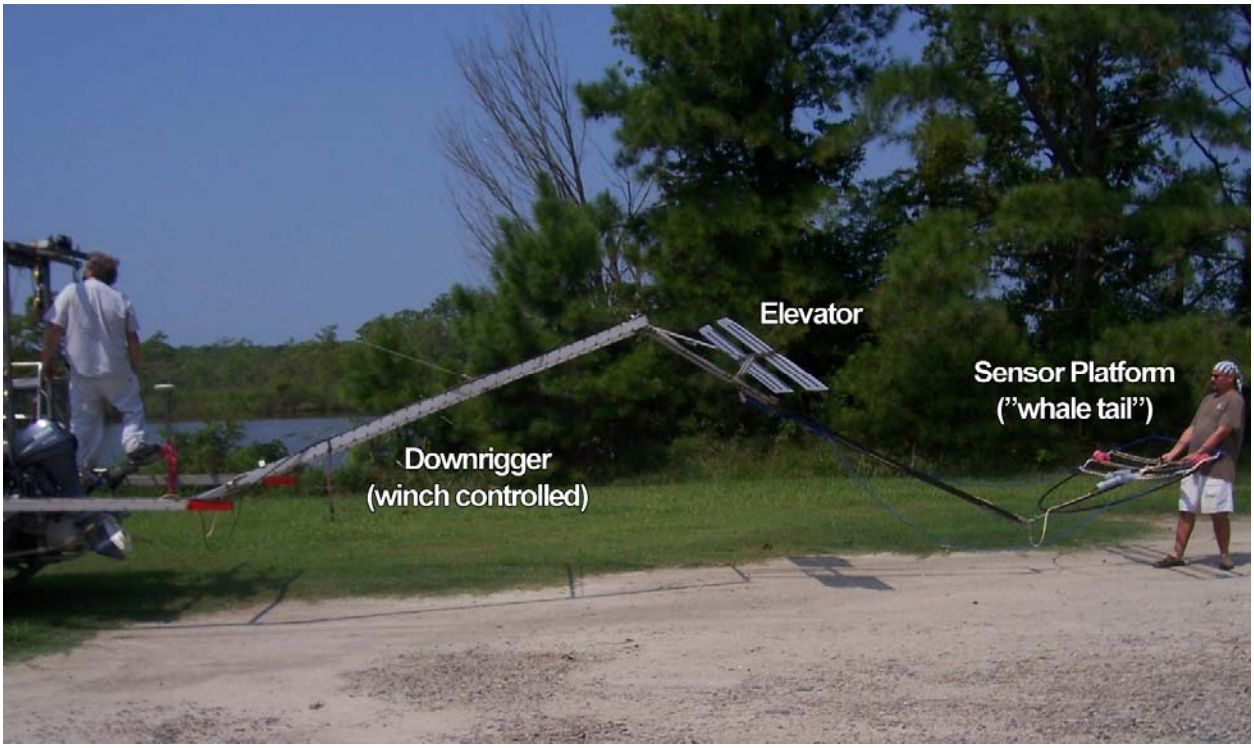
The Electromagnetic (EM) system will be deployed using a UUTA ("Utah") developed by 3Dgeophysics (Chaska, MN). The UUTA includes an EM coil support platform (whale tail) and a rigid down-rigging system. The downrigger is equipped with a control surface (hydrofoil or "elevator") and an electric winch system that allows the system operator to control the height of the coil above the water bottom during data acquisition. Several sensors are integrated with the UUTA to provide position control of the Flex3 coil platform. A pressure transducer on the platform measures the accurate depth of the receiver coils. An inclinometer measures the exact angle of the downrigger and is used to determine horizontal offset of the coil platform from the boat. A bow-mounted side scan sonar and bottom finder are used to map the water bottom depth and image potential bottom obstructions during the survey.

The UUTA uses two RTK receivers to accurately measure the exact position and heading of the boat. The rigid downrigger is designed to keep the sensor platform inline with the keel of the

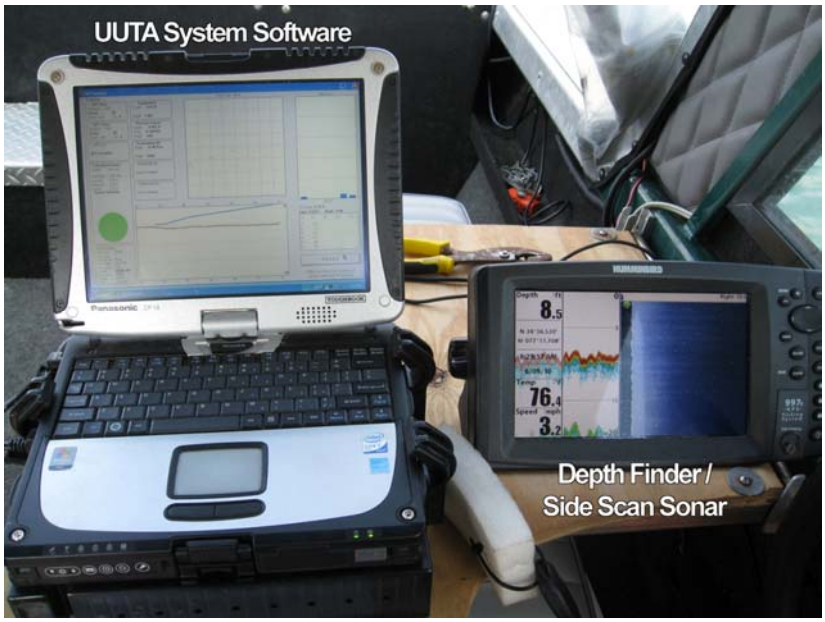
boat and the two RTK GPS receivers so that accurate geolocation of the platform can be achieved. The Trimble 5700 GPS is a 24-channel dual frequency RTK receiver that uses both L1 and L2 satellites. This system operates with a base and rover units; the base sends corrections to the rovers via radio link, thus maintaining a 3cm horizontal accuracy and a 5cm vertical accuracy. For configuration with the EM61-Flex3, the rovers are set to output a GGA National Marine Electronics Association (NMEA) string at 1 Hz. The MLFXMarine program captures the GPS, pressure transducer, inclinometer, and sonar bottom depth data and performs the position calculation of the sensor platform. The sonar transducer is mounted on the bow of the boat providing the system operator advance warning of water bottom changes and allowing time to use the elevator and winch systems to adjust and maintain the sensor height above bottom. When boat speed and elevator angle remain constant the depth of the sensor platform does not change.

Shown below are several photographs of the UUTA deployed on a 22-ft ThunderJet jet boat. Several of the important subsystems have been labeled in the photographs. When fully loaded the boat drafts less than 2 feet in the water. The survey boat is equipped with a 6-liter V8 engine with a high-output alternator and electronic power bus, sufficient to drive the survey operation continuously without the need to charge batteries.

UUTA in travel mode deployed on 22-ft ThunderJet boat



UUTA downrigger system and sensor platform



UUTA control systems and data displays

3. INSTRUMENT STANDARDIZATION

All instruments and sensors will be assembled as specified in their specific User Manuals. Additionally, each instrument will be field tested daily to ensure that the instrument is operating properly (explained in Section 6).

4. EM DATA ACQUISITION

Data will be collected within two areas of the site totaling approximately 50 acres. The DGM survey will focus on the inactive portions of the munitions loading pier complex within Area UXO 2 at NWS Earle, specifically the areas surrounding Piers 1 and 2 (see attached Figure). All accessible areas will be surveyed with nominally 100% coverage (allowing for gaps due to obstacle avoidance and limitations due deployment considerations).

The boat will be operated at an average velocity of 2 to 4 miles per hour (MPH). Data will be recorded automatically along each survey line using up to 18 readings/second for each receiver coil. In addition to the EM data, the output of two RTK GPS receivers, one pressure transducer, one boom angle sensor (inclinometer) and one bottom finder transducer are logged to the hard drive by the acquisition software. Data will not be collected in heavily vegetated areas that prevent boat propulsion, or in areas with significant bottom obstructions that prevent safe operation of the equipment. Data will be collected in a minimum water depth of 3 ft to prevent the boat or sensor platform from touching the bottom. All EM data will be collected within 5 ft of the ocean bottom except when avoiding bottom obstructions. Grid lines will be spaced 1.25 meters apart within the survey areas. Grid lines will be collected using a generally systematic progression in which lines approximately separated by a distance equal to the turning radius of the boat will be collected sequentially. The actual grid line collection sequence will be affected by wind direction and strength, sea-state and tidal conditions.

The proposed grid lines will be straight line segments parallel to the long axis of the defined study area (see attached figure). As a result of the turning radius limitations of the UUTA system data cannot be collected within two boat lengths of the closed end of the pier.

4.1 NAVIGATION

Navigation is facilitated by the Trimble AgGPS FmX integrated navigation system and the RTK GPS. A base station is setup on a terrestrial control point and differential GPS corrections are sent via radio link to the rover receivers.

The FmX display allows the creation of virtual survey lines based on an operator-defined lines (“AB lines”). The AB lines are set by placing two points in the field or by importing a Geographic Information System (GIS) .shp file. Once a line has been established, the FmX processor can calculate a virtual grid using an operator supplied line spacing. The FmX display also provides a light bar display to assist the boat operator in guiding the boat along the virtual survey lines. The FmX provides a swath coverage display that shows the boat operator the current survey line and previous lines on which data have already been collected.

4.2 START-UP PROCEDURES

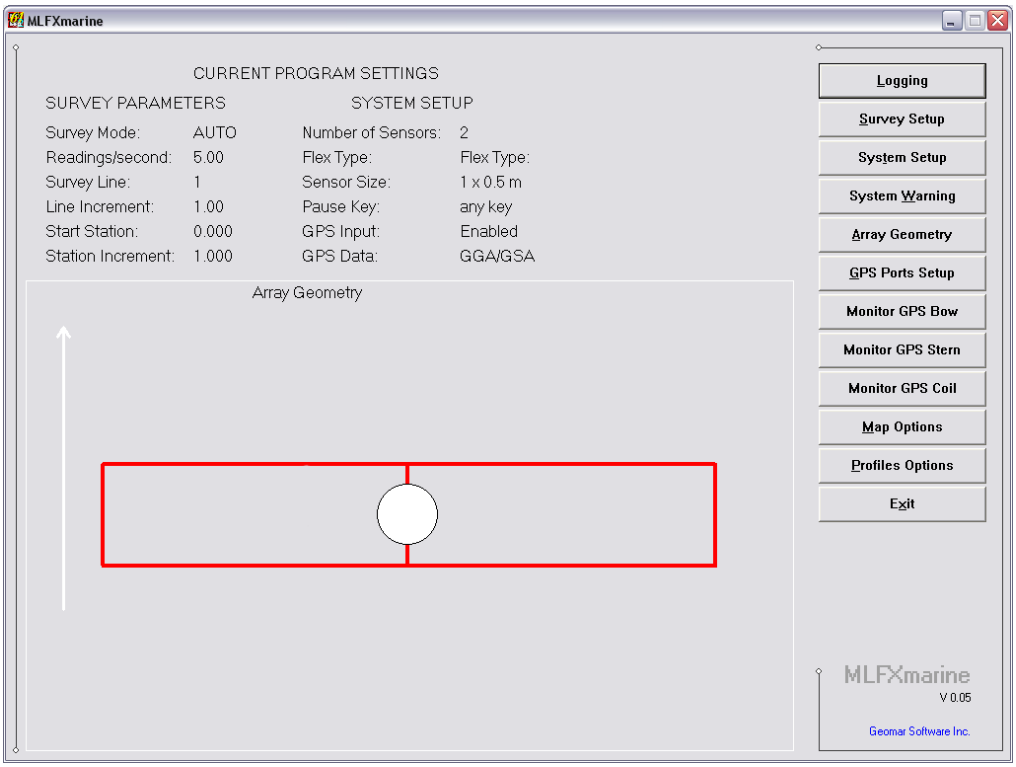
The following steps describe the daily startup procedures prior to data collection:

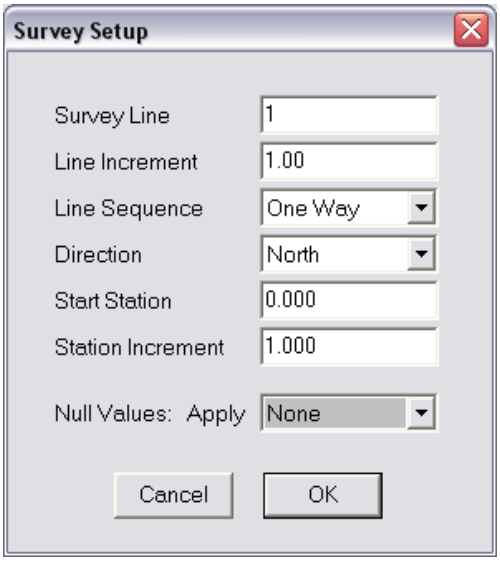
1. Setup GPS base station
2. Prepare boat (on trailer)
   - Remove rigging safety chains and straps
   - Install drain plugs
   - Engage battery systems
   - Visually inspect all mechanical systems for defects; repair/replace if necessary
   - Inventory boat safety equipment (Personal Flotation Devices [PFDs], fire extinguisher, first aid kit)
   - Turn on all electrical systems
3. Perform land-based system Quality Assurance/Quality Control (QA/QC) tests (Section 6)
4. Launch boat
5. Prepare boat (in water)
   - Engage primary motor
   - Start and test trolling motor
   - Test all boat electrical systems
   - Test UUTA winch and elevator operation
   - Deploy sonar transducer
6. Perform water-based system Quality Assurance/Quality Control (QA/QC) tests (Section 6)

4.3 DATA COLLECTION STEPS

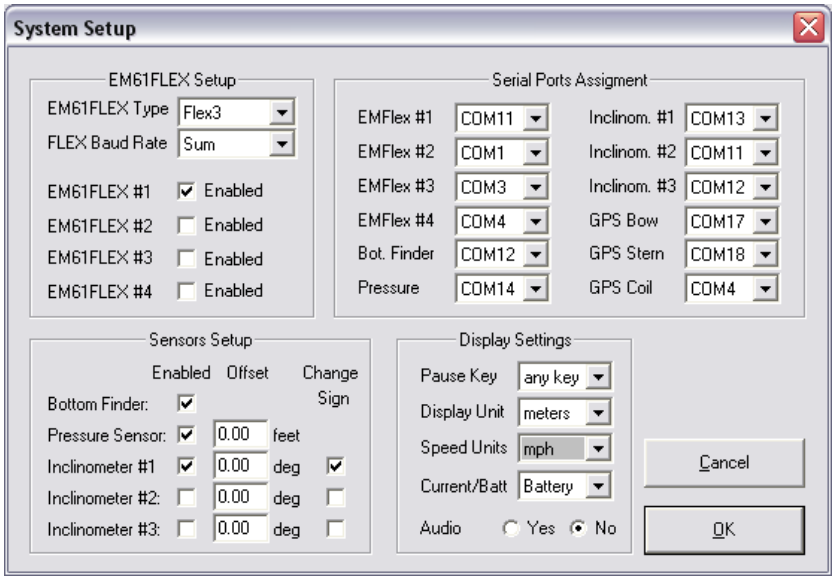
Below are the steps to begin surveying with the EM61-Flex3 and UUTA system:

- Turn on instrument and cooling fans by engaging the toggle switches.
- Allow the system to warm up for at least 15 minutes
- Prepare data acquisition field log
- Turn on the Toughbook PC and open MLFXMarine program. The screen below will be displayed.
- Click on “Survey Setup” and specify the below options. The important option is ‘Survey Line’. Survey Line will initially be set to 1 and then will be changed to the current grid line as data collection progresses. Instrument nulling will be preformed periodically throughout the survey.


MLFXmarine
CURRENT PROGRAM SETTINGS
SURVEY PARAMETERS
SYSTEM SETUP
Survey Mode: AUTO
Readings/second: 5.00
Survey Line: 1
Line Increment: 1.00
Start Station: 0.000
Station Increment: 1.000
Number of Sensors: 2
Flex Type: Flex Type:
Sensor Size: 1 x 0.5 m
Pause Key: any key
GPS Input: Enabled
GPS Data: GGA/GSA
Array Geometry
Logging
Survey Setup
System Setup
System Warning
Array Geometry
GPS Ports Setup
Monitor GPS Bow
Monitor GPS Stern
Monitor GPS Coil
Map Options
Profiles Options
Exit
MLFXmarine
V 0.05
Geomar Software Inc.

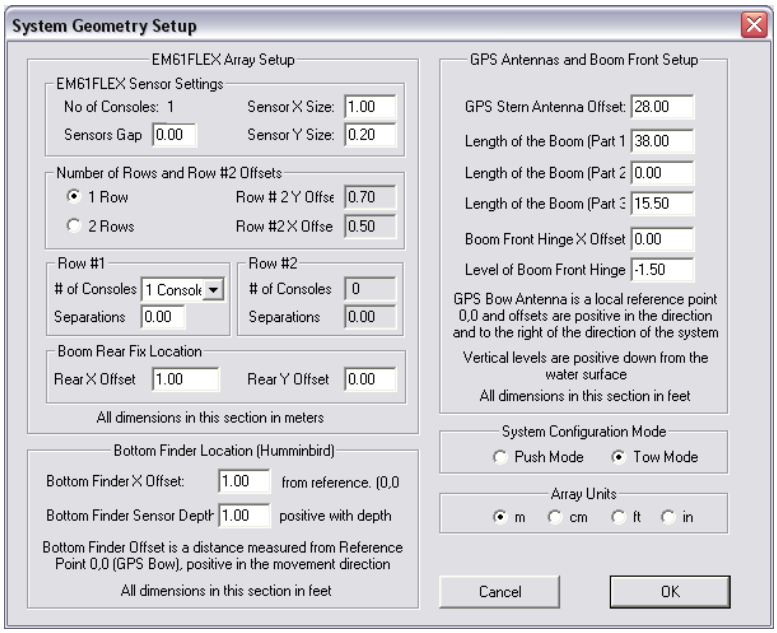

Survey Setup
Survey Line 1
Line Increment 1.00
Line Sequence One Way
Direction North
Start Station 0.000
Station Increment 1.000
Null Values: Apply None
Cancel
OK

- Click on “System Setup” and specify the below options. These settings will remain the same throughout the project.

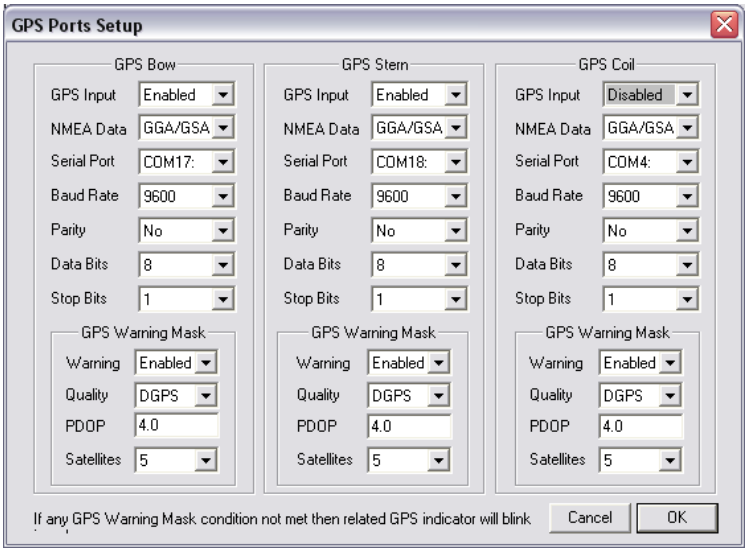


- Click on “System Warning” and specify the below options. These settings will remain the same throughout the project.

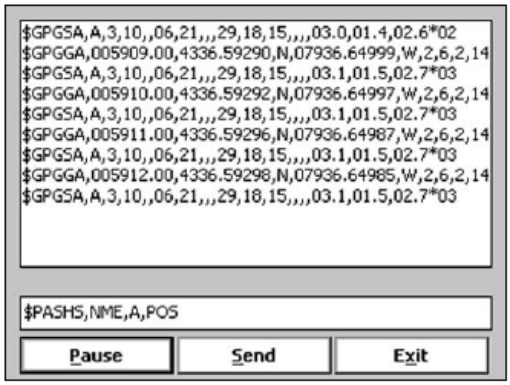
- Click on "Array Geometry" and specify the below options. These settings will remain the same throughout the project. It is critical that all values in this dialogue box are correctly entered. The position calculation of the array platform determined by the values entered here.

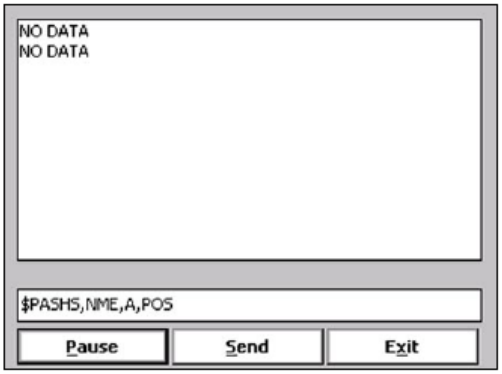


- Click on "GPS Ports Setup" and specify the below options. When using GPS the below settings will be used. GPS Bow and GPS Stern are "enabled"; GPS Coil is disabled.

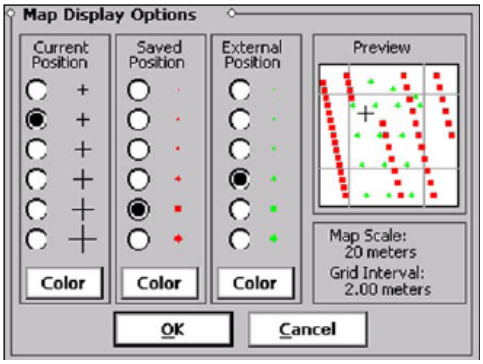


- Click on “Monitor GPS Bow” and “Monitor GPS Stern” in succession; the below window will open. If the NMEA strings are being output correctly, the screen will appear like the one on the left. If there is a problem with the baud rate, “No Data” will appear once a second. If there is nothing coming through “No Data” will flash once every 6 seconds.

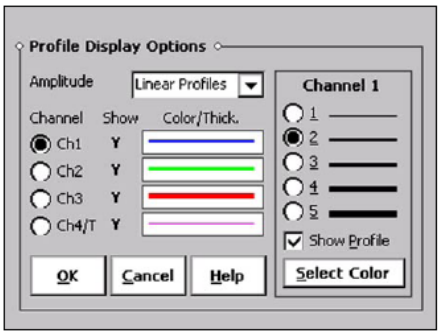


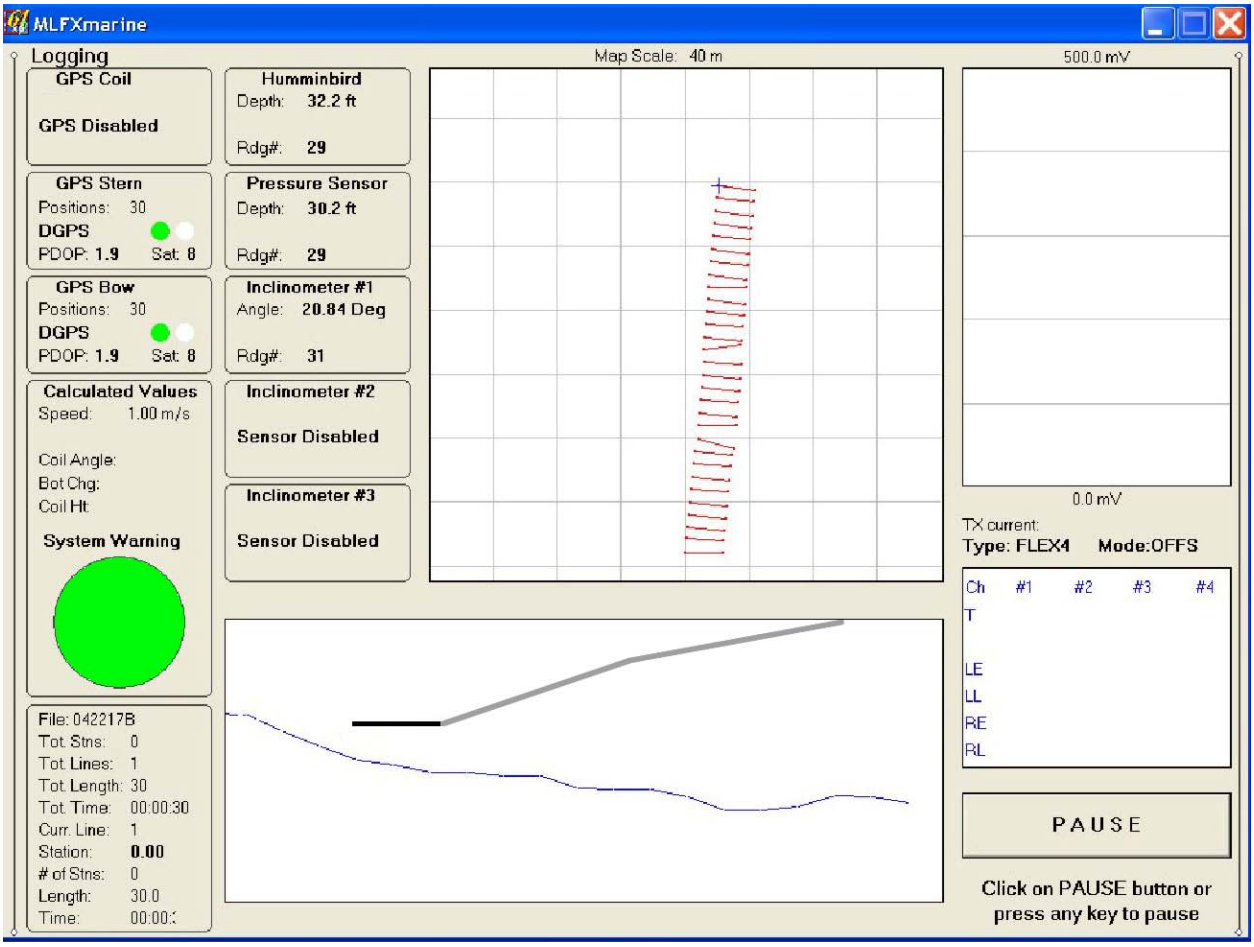


- Click on “Map Options” and specify the below options. These are more operator preferences for aesthetics then for performance of the software.



- Click on “Profile Options” and specify the below options. These are more operator preferences for aesthetics then for performance of the software.





- Once all the parameters are set click on the "Logging". The screen above will be displayed. Click on *File* and name your file and save it. Line up on the current survey line according to the AgGPS FmX display and select *Go*. The software will start logging the EM readings and a large *Pause* button will appear on the screen. At the end of the line, tap the *Pause* button or hit enter on the keypad.

  On the above screen, the EM data, positional sensor data, the data coverage and platform location map, and a scrolling bottom depth profile are monitored. Operator defined system warnings, including sensor platform angle, change in bottom depth, and coil height above bottom depth, are also monitored.

- At the end of the file, the *Exit* button is selected. The file automatically saves at the end of every line.

- During data collection the system operator will maintain a detailed field log. The log will be used to document all data collection activities. A sample field log is provided in **Appendix B**.

5. DATA STORAGE AND PRELIMINARY PROCESSING

The EM61-Flex3 array data are temporarily stored on a Toughbook PC during data collection. At the end of each field day, the data are transferred to a PC workstation for further on-site processing using Geosoft Oasis Montaj software.

Initial data processing (pre-processing) will be performed by the field team and includes reviewing data for integrity and repeatability. The following data pre-processing steps will be performed on the collected underwater DGM and QC/QA data:

1. Convert binary field files
2. Apply appropriate data channel template
3. Perform Georeferencing (UTM meters, NAD83 datum)
4. Output Geosoft XYZ format

6. QUALITY CONTROL - INSTRUMENTATION

The Industry Standard Object (ISO) that will be used for Static Test:

- Shape: Straight Nipple
- Schedule: 40
- Pipe Size: 1in (1.315in OD)
- Length: 4in
- Finish: Black Welded Steel

The following quality control (QC) procedures are performed and documented during the data collection process and reviewed by a qualified geophysicist on a daily basis. Depending on the logistics of the project site these tests may be performed on land prior to boat launch or in water after boat launch.

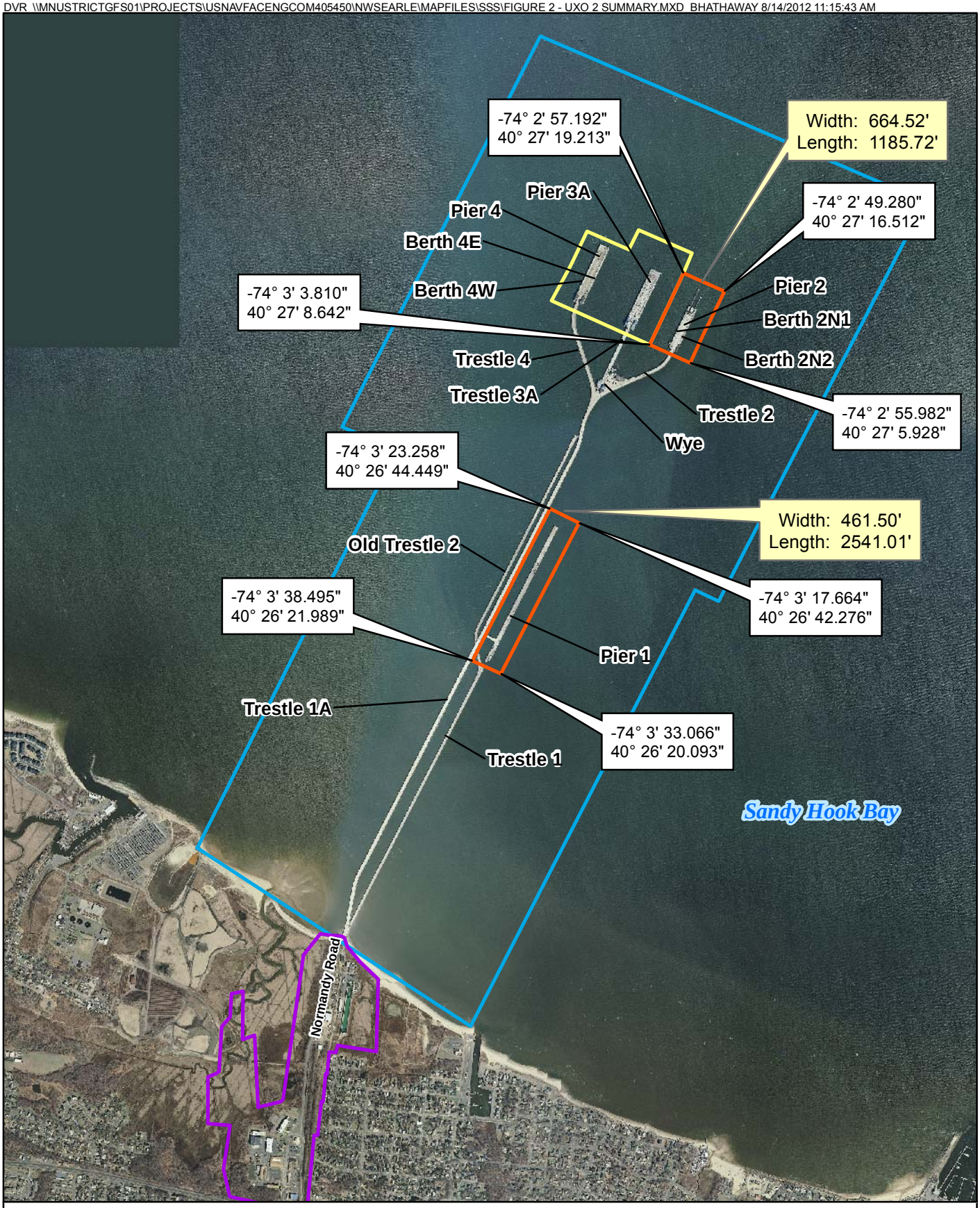
1. Equipment Warm-up: Minimum 15 minutes
2. Personnel Test: Will not be preformed. The sensor platform is a rigid structure that is remains at a constant distance from the tow vessel. Boat personnel do not operate within the influence of the sensor platform.
3. Cable Shake Test: Will not be preformed. All the cables are securely fastened and cannot be shaken without shaking the entire system.
4. Record Sensor Positions: Accuracy of the GPS will be demonstrated by operating the two GPS antennas over a known control point. The accuracy of the data positioning will be assessed by calculating the difference between a known location over which the GPS antennas are held and the displayed positions. The sensor position test will be conducted at the beginning of the survey operation for each workday. Maximum position error for successful completion of the test is 10 cm.

5. Static Background / Standard Response ("spike") Test: A test jig will be manufactured using an ISO. The test jig will attach to the array platform and provide a standard for daily tests. The standard response test will be performed on land prior to and after data collection each day. The test will be performed by partially extending the downrigger structure to move the coil set beyond the magnetic influence of the boat. The coil structure will be positioned parallel to the ground surface using a non-conductive support structure in an area free of metallic contacts. The test will consist of collecting data for a 3-minute period. During this time, the instrument will be held in a fixed position for 1 minute without the test jig (background test), for 1 minute with the test jig in place, and finally for another minute without the test jig. The purpose of the static test is to determine whether unusual levels of instrument or ambient noise exist. To proceed with data collection the measured magnetic response for the test jig is required to be within 20% of the first project day's measured response.
6. Pressure Sensor Test: Prior to data collection the accuracy of the pressure sensor (i.e. EM sensor platform depth) will be tested. Two data points will be recorded during the test to verify the functionality of the pressure sensor. The test will be performed on land with the boat held in a fixed position. The pressure sensor's depth results are required to be within 6 inches of the known depth.

7. Repeat data: Because of the difficulty and expense of setting an IVS with terrestrial specifications in a marine environment, coupled with the difficulty of conducting an IVS test in air with a trailered boat, the repeat data test will provide daily evidence of system response and positioning repeatability. Daily a single line of data will be collected over an object. The object will be a known object (10 lb dumbbell weight) that will be seeded near the survey area. There are two objectives for this test. First, to demonstrate positioning repeatability that meets the DQO of 2-meter accuracy. Second, to demonstrate repeatability of the response that meets the DQO of general repeatability.

Positive completion of the daily tests provides assurance that the MLFXMarine system software will accurately calculate the position of the sensor platform during data collection.

FIGURES



Legend

- NWS Earle Boundary - Waterfront Area
- NWS Earle Restricted Zone (33CFR334.102)
- Side-Scan/Bathymetric Survey Area (Inactive Area)
- Active Area (No side-scan/bathymetric survey)

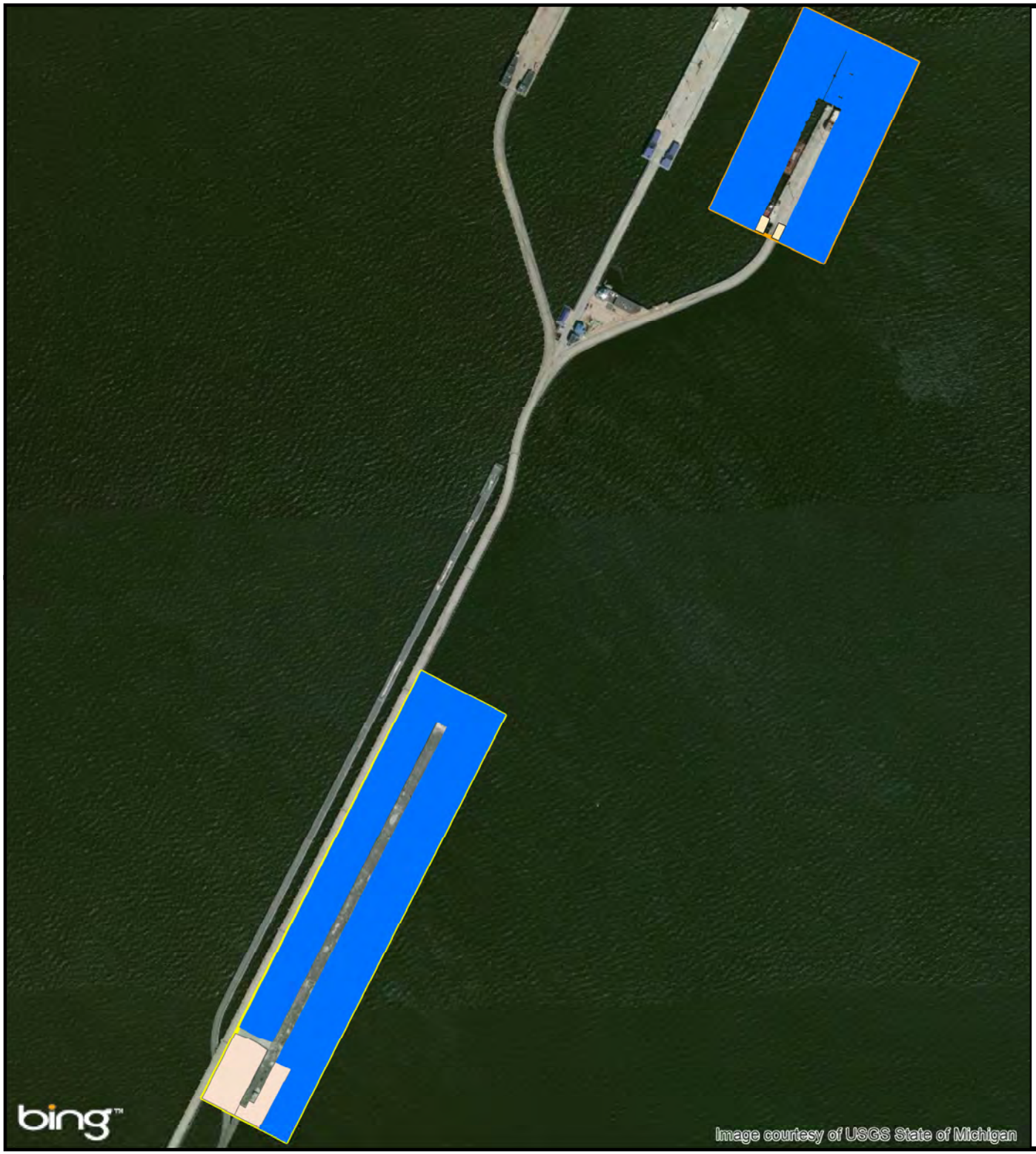
N
W E
S

0 1,000 2,000 Feet

Imagery: 2007

Figure 2
UXO 2 Summary
Underwater DGM Survey
NWS Earle Munitions Loading Pier Complex
Monmouth County, New Jersey

CH2MHILL



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THE LEADER IN SUBSURFACE DETECTION
Subsurface Geophysical Surveys

Legend

- Pier_1_Proposed_Transects_2_meter_spacing
- Pier_1_Potentially_Inaccessible_Areas
- Pier_1_Area_Recommended_for_SI
- Pier_2_Proposed_Transects_2_meter_spacing
- Pier_2_Potentially_Inaccessible_Areas
- Pier_2_Area_Recommended_for_SI

N
W E
S

300 150 0 300 600 900 1,200
Feet

DGM Proposed Line Paths
Munitions Loading Pier
NWS Earle
Monmouth County, New Jersey

APPENDIX A

EM61-Flex3 Operating Notes

GEONICS LIMITED
1745 Meyerside Dr. Unit 8 Mississauga, Ontario Canada L5T 1C6

Tel: (905) 670-9580
Fax: (905) 670-9204
E-mail: geonics@geonics.com
URL: http://www.geonics.com

EM61-FLEX 3
HIGH SENSITIVITY WIDE SWATH METAL DETECTOR

OPERATING NOTES

GEONICS LIMITED

LEADERS IN ELECTROMAGNETICS

8-1745 Meyerside Drive, Mississauga, Ontario L5T 1C6

Tel: (905) 670-9580 Fax: (905) 670-9204

E-mail:geonics@geonics.com Web site:http://www.geonics.com

August 2009

EM61-FLEX 3
HIGH SENSITIVITY WIDE SWATH METAL DETECTOR

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   - Signal Cable and Sensor Diagram (Fig 3)
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   - EM61-FLEX 3 Calibration Set-up (Fig 5)
5. Computer Interface Format

INTRODUCTION

Geonics EM61-FLEX 3 is a high sensitivity, wide swath, large sensing depth electromagnetic detector for detection of ferrous and non ferrous metallic objects such as unexploded ordinance (UXO) and improvised explosive devices (IED). The unique sensor configuration allows for detection of small and deep targets in the presence of large ambient electromagnetic noise.

A. EM61-FLEX 3 SYSTEM

1. SYSTEM DESCRIPTION

The EM61-FLEX 3 consists of four main parts: (1) sensor assembly (sensor head), (2) main console, (3) data acquisition field computer with associated software, and (4) power supply. Figure 1 depicts the system main components.

The sensor assembly consists of transmitter coil, two pairs of receiver coils and interconnecting box. The transmitter coil is a multi-turn loop connected to the pulse generator inside the main console. Two pairs of receiver coils (left and right pair) are situated inside the transmitter loop for left and right detection footprint.

Under control of field computer two coils in each of the pair (L1, L2 and R1, R2) can be connected either to measure difference in signal between two coils, or sum, which will depend on the application.

The main console contains electronics for transmitter pulse generation, signal processing, timing control and communication with data acquisition computer.

The difference mode of operation (two coils in the left and right pair connected in opposition) is used to detect targets located on or near surface in presence of high ambient electromagnetic noise. The sum mode of operation (two coils in left and right pair connected to add signal) is used for detection of larger targets at depth in relatively electromagnetically quiet environment.

For each mode of operation, difference or sum, each pair of sensor in conjunction with main console will produce two time gates: early and late.

Ratio between signal from early and late gate can be used as a rough indicator of target size. In general, the ratio between early and late gate response is larger for smaller targets than for bigger targets.

In addition, the late gate response will be less affected by the noise and effects of ambient temperature change – important fact when looking for a deep target in the sum mode of operation.

Nominal instrument operation power supply is 24 V. The instrument will operate with lower power supply voltage, down to 12 V.

2. EM61-FLEX 3 CALIBRATION DEVICE (QC COIL)

2.1 Introduction

Calibration device, QC Coil, can be used to check the gain calibration of the EM61-FLEX 3. The device can be used as an "absolute" calibration, so that the different EM61 units, if calibrated with the QC coil, would under the same conditions give the same results over a particular target.

2.2 Description

The EM61-FLEX 3 calibration device is used to check the operation of the complete EM61-FLEX 3 system, including transmitter and all four receiver coils, as well as the signal processing console.

The device should be positioned when checking calibration as per Figure 5.

2.3 Calibration Procedure

The calibration check procedure is as follows:

The instrument under test should be placed outdoors as for normal operation far from any larger metallic object. After the instrument nulling, QC coil should be set as per Figure 1, all four gates responses recorded and compared with value in Table I. We suggest that ± 10% deviation from the standard value is considered acceptable.

2.4 Measure response for both modes: difference and sum.

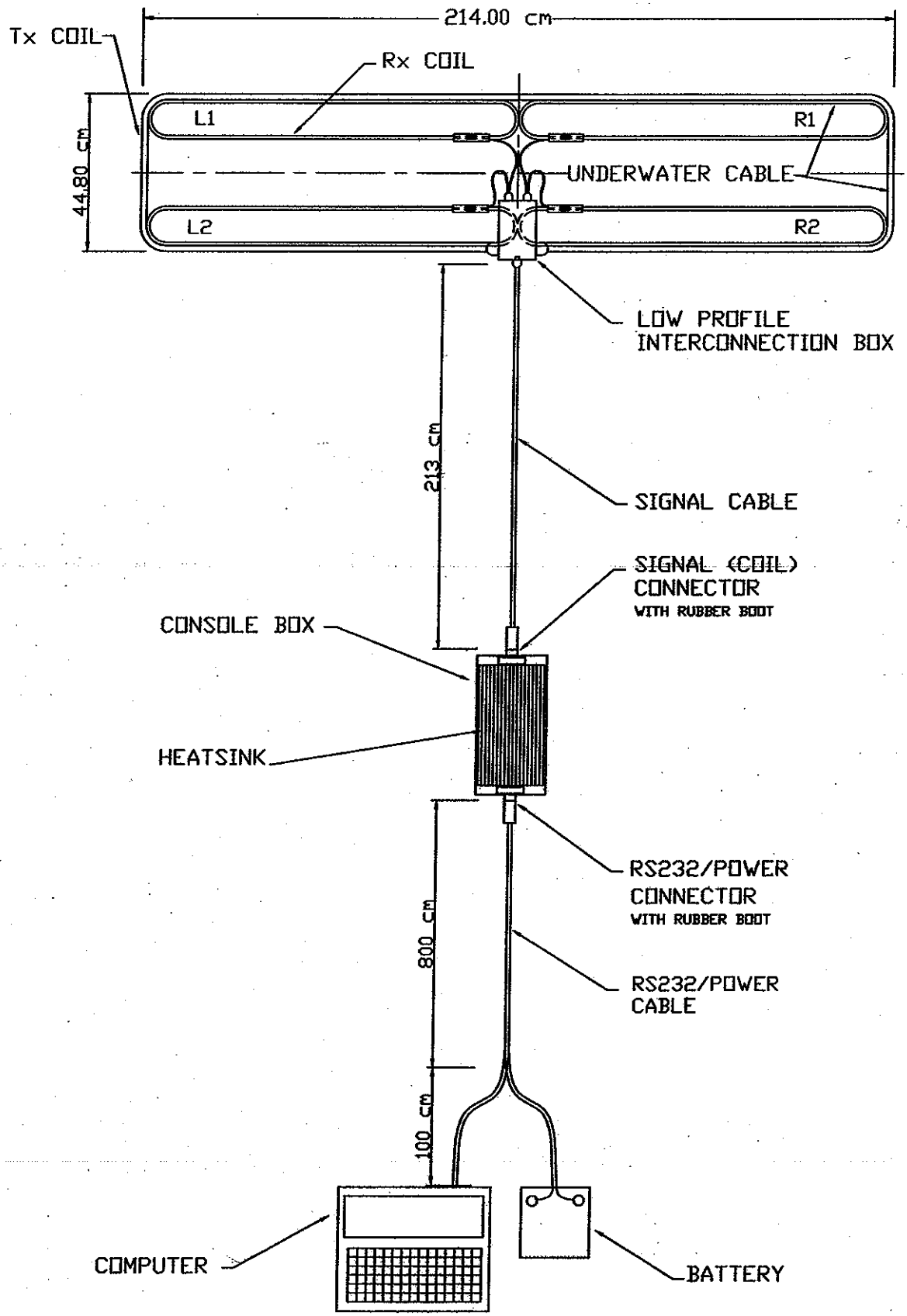
Table I of the Standard Value

Difference Mode	Sum Mode
$L_E < \pm 100$ mV	$L_E = 3750$ mV
$L_L < \pm 70$ mV	$L_L = 2450$ mV
$R_E < \pm 100$ mV	$R_E = 3750$ mV
$R_L < \pm 70$ mV	$R_L = 2450$ mV

3. EM61-FLEX 3 Technical Specifications

Measured Quantity	:	Four channels of secondary response in mV
EM Source	:	Air-cored coil, 2.14 x 0.45 m size
Current Waveform	:	Unipolar rectangular current with 50% duty cycle
EM Sensors	:	Left coil pair: Two air-cored coil, 1.05 x 0.1m each
	:	Right coil pair: Two air-cored coil, 1.05 x 0.1 m each
Maximum Output	:	25 000 mV
Dynamic Range	:	18 bits
Time Gates	:	Two gates for left and right coil pair each, centered at 196 and 446 μs after T/O time.
System Controller	:	Field computer
Acquisition Speed	:	Up to 16 records per second (4 time gates per record)
Calibration Check	:	QC Coil
Power Supply	:	24 V / 4.5 A (13 A peak)
Operating Temperature	:	-30°C to +51°C
Storage Temperature	:	-40°C to +71°C
Operating Weight	:	kg
	:	(W) x (L) x (H) cm
Shipping Weight & Dimensions	:	kg
	:	(W) x (L) x (H) cm (Box 1 of 1)

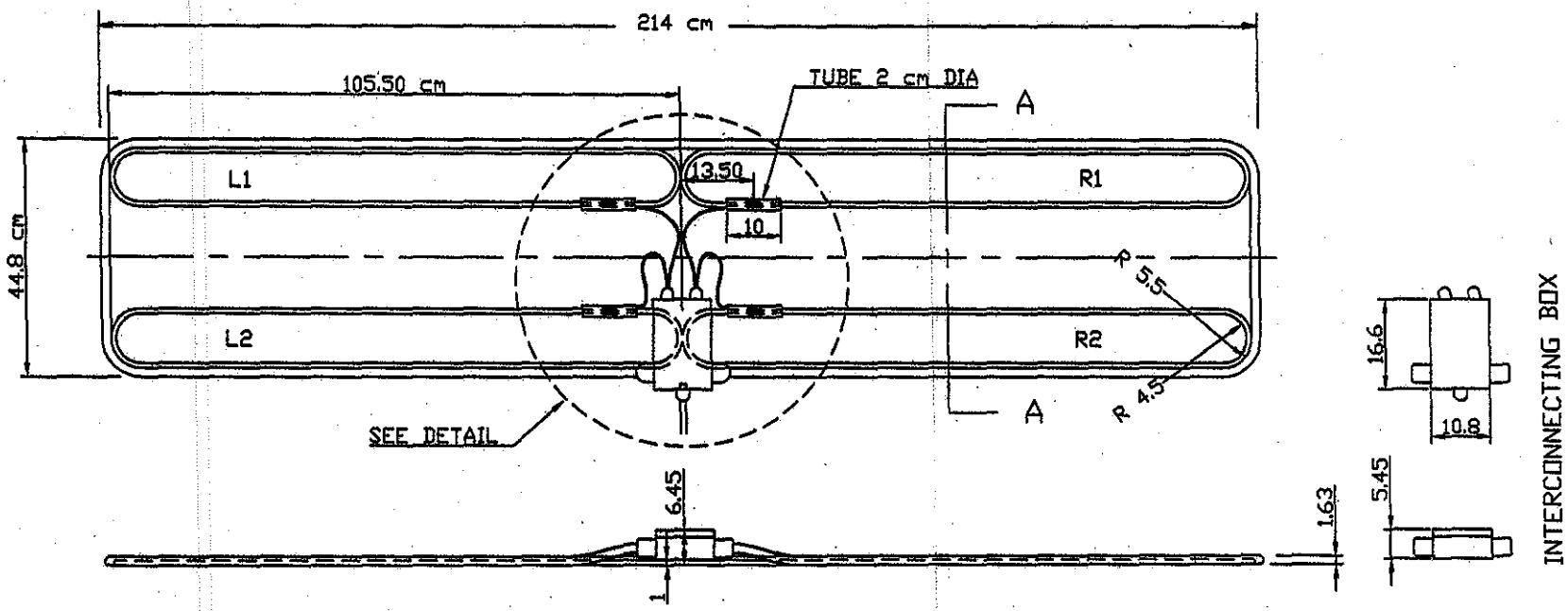
EM61 - FLEX 3
SYSTEM BLOCK DIAGRAM

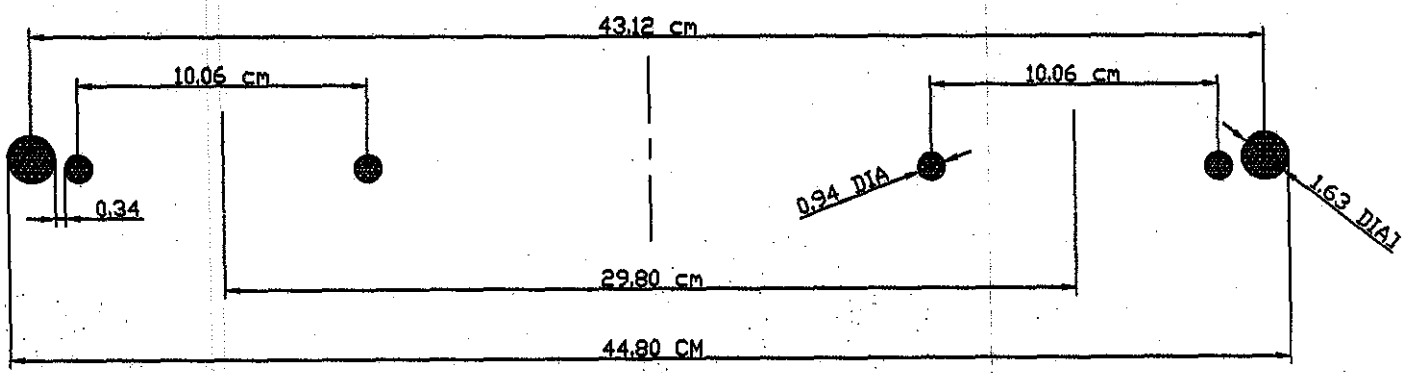


JULY 29, 2009

FIG 1

EM61 FLEX 3
SENSORS





SECTION A-A
SCALE 5:1

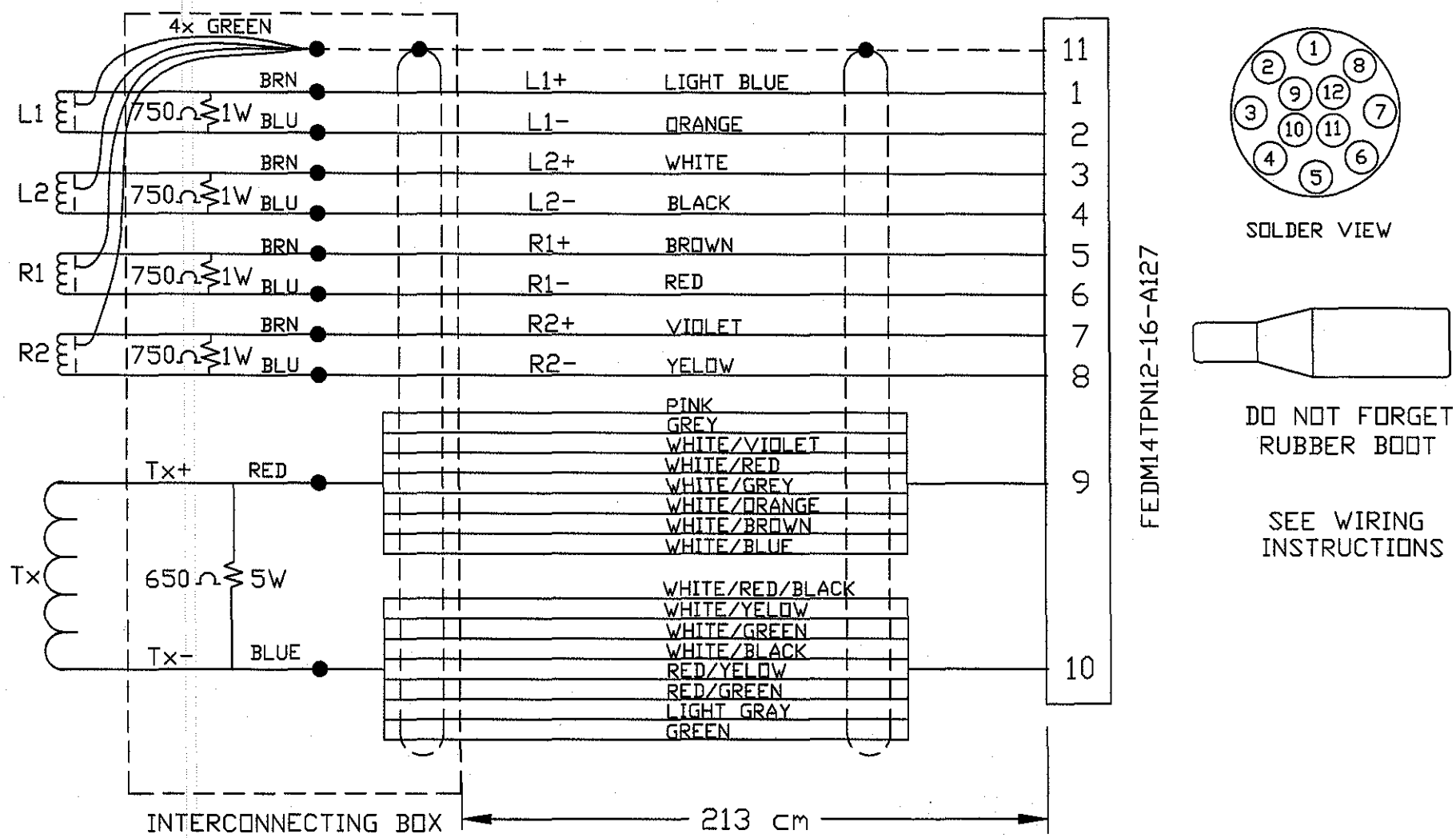
CENTIMETERS

JULY 10, 2009

FIG 2

EM61 - FLEX 3

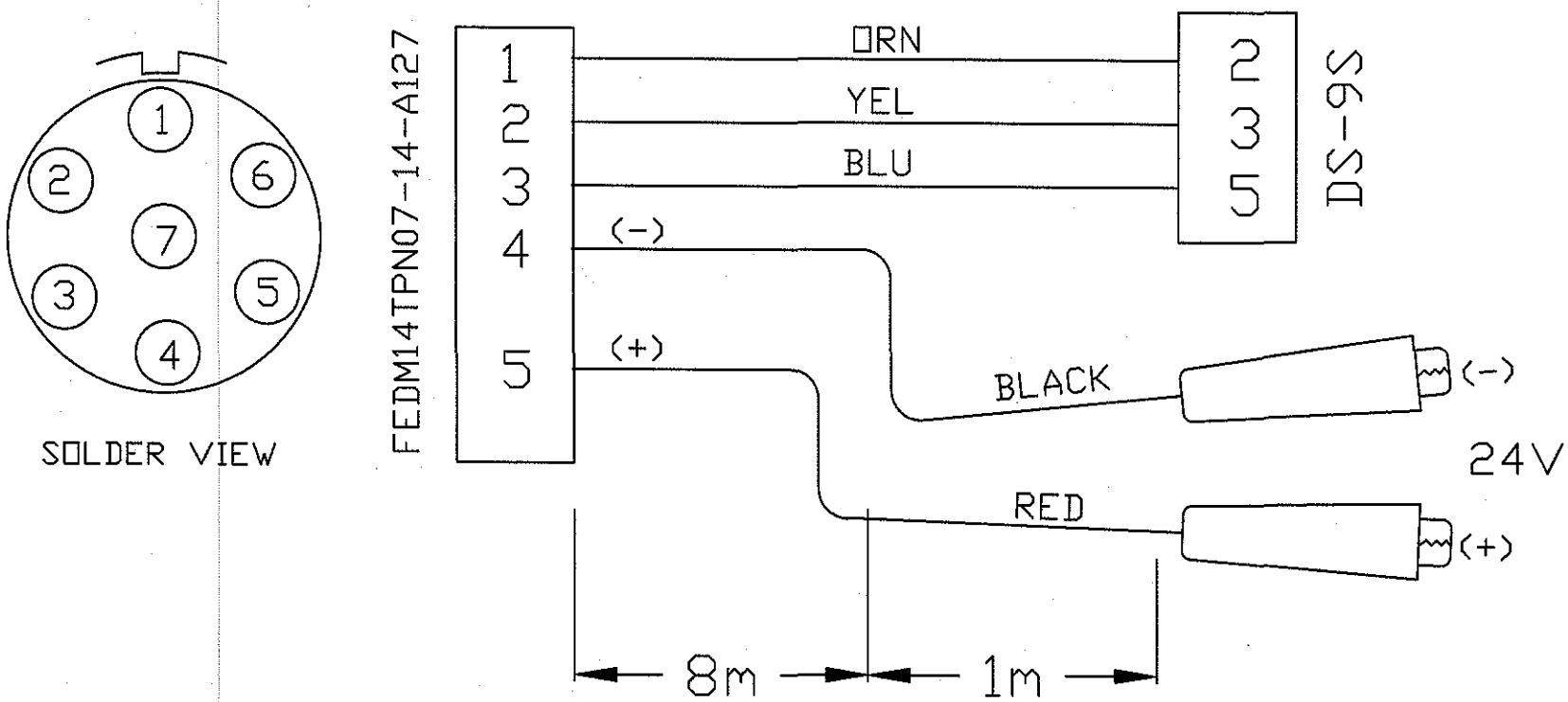
SIGNAL CABLE AND SENSORS



JULY 31, 2009

FIG 3

EM61 FLEX 3
RS232/POWER CABLE



AUG. 6, 2009

FIG 4

EM61 FLEX 3 QC COIL CALIBRATION SETUP

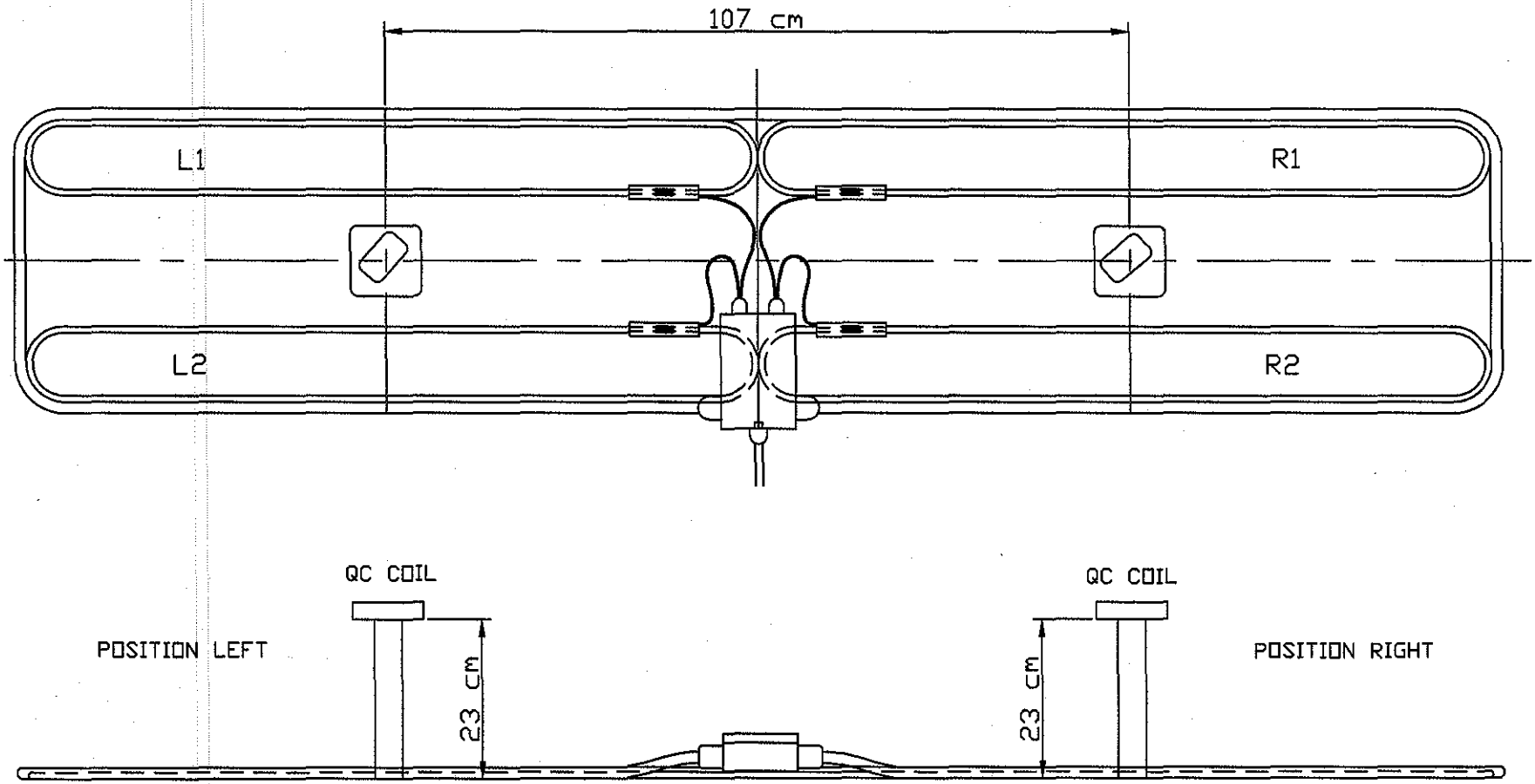


FIG 5

5. COMPUTER INTERFACE FORMAT

EM61FLEX3 INFORMATION

COMPUTER INTERFACE PORT INFORMATION
31 July 2009

PORT AND CABLE PIN ASSIGNMENT

EM61FLEX3 computer COM PORT INTERFACE CABLE functions are summarised as follows:

DS-9 connector	function
5	GROUND
2	RS-232 RXD
3	RS-232 TXD

RS-232 CONFIGURATION

The port is configured as a DCE (Date Communication Equipment). No handshaking is used.

The port is initialised as follows:

Baud rate:	9600
parity:	none
data bits:	8
stop bit:	1

CONTROLLING COMPUTER COMMANDS
(all ASCII code, 30 ms between characters)

COMMAND	COMMAND INTERPRETATION
S	SUM MODE
D	DIFFERENTIAL MODE

EM61FLEX3 RESPONSE MESSAGES

OK	computer command received correctly
ER	receiving error

EM61FLEX3 DATA FORMAT

Each data record consists of 16 bytes detailed below:

Byte 1 (ASCII)	start byte D: Differential modes S: Summing Mode

Byte 2 (HEX number for ranges. Ranges are the gains of the DC amplifiers.)

HEX	R1	R1A	R2	R2A	R3	R3A	R4	R4A	CH1	CH2	CH3	CH4
0	0	0	0	0	0	0	0	0	1	1	1	1
1	0	0	0	0	0	0	0	1	1	1	1	10
3	0	0	0	0	0	0	1	1	1	1	1	100
4	0	0	0	0	0	1	0	0	1	1	10	1
5	0	0	0	0	0	1	0	1	1	1	10	10
7	0	0	0	0	0	1	1	1	1	1	10	100
C	0	0	0	0	1	1	0	0	1	1	100	1
D	0	0	0	0	1	1	0	1	1	1	100	10
F	0	0	0	0	1	1	1	1	1	1	100	100
10	0	0	0	1	0	0	0	0	1	10	1	1
11	0	0	0	1	0	0	0	1	1	10	1	10
13	0	0	0	1	0	0	1	1	1	10	1	100
14	0	0	0	1	0	1	0	0	1	10	10	1
15	0	0	0	1	0	1	0	1	1	10	10	10
17	0	0	0	1	0	1	1	1	1	10	10	100
1C	0	0	0	1	1	1	0	0	1	10	100	1
1D	0	0	0	1	1	1	0	1	1	10	100	10
1F	0	0	0	1	1	1	1	1	1	10	100	100
30	0	0	1	1	0	0	0	0	1	100	1	1
31	0	0	1	1	0	0	0	1	1	100	1	10
33	0	0	1	1	0	0	1	1	1	100	1	100
34	0	0	1	1	0	1	0	0	1	100	10	1
HEX	R1	R1A	R2	R2A	R3	R3A	R4	R4A	CH1	CH2	CH3	CH4
35	0	0	1	1	0	1	0	1	1	100	10	10
37	0	0	1	1	0	1	1	1	1	100	10	100
3C	0	0	1	1	1	1	0	0	1	100	100	1
3D	0	0	1	1	1	1	0	1	1	100	100	10
3F	0	0	1	1	1	1	1	1	1	100	100	100
40	0	1	0	0	0	0	0	0	10	1	1	1
41	0	1	0	0	0	0	0	1	10	1	1	10
43	0	1	0	0	0	0	1	1	10	1	1	100
44	0	1	0	0	0	1	0	0	10	1	10	1
45	0	1	0	0	0	1	0	1	10	1	10	10
47	0	1	0	0	0	1	1	1	10	1	10	100
4C	0	1	0	0	1	1	0	0	10	1	100	1
4D	0	1	0	0	1	1	0	1	10	1	100	10
4F	0	1	0	0	1	1	1	1	10	1	100	100
50	0	1	0	1	0	0	0	0	10	10	1	1
51	0	1	0	1	0	0	0	1	10	10	1	10
53	0	1	0	1	0	0	1	1	10	10	1	100
54	0	1	0	1	0	1	0	0	10	10	10	1
55	0	1	0	1	0	1	0	1	10	10	10	10
57	0	1	0	1	0	1	1	1	10	10	10	100
5C	0	1	0	1	1	1	0	0	10	10	100	1
5D	0	1	0	1	1	1	0	1	10	10	100	10
5F	0	1	0	1	1	1	1	1	10	10	100	100

70	0	1	1	1	0	0	0	0	10	100	1	1
71	0	1	1	1	0	0	0	1	10	100	1	10
73	0	1	1	1	0	0	1	1	10	100	1	100
74	0	1	1	1	0	1	0	0	10	100	10	1
75	0	1	1	1	0	1	0	1	10	100	10	10
77	0	1	1	1	0	1	1	1	10	100	10	100
7C	0	1	1	1	1	1	0	0	10	100	100	1
7D	0	1	1	1	1	1	0	1	10	100	100	10
7F	0	1	1	1	1	1	1	1	10	100	100	100
C0	1	1	0	0	0	0	0	0	100	1	1	1
C1	1	1	0	0	0	0	0	1	100	1	1	10
C3	1	1	0	0	0	0	1	1	100	1	1	100
C4	1	1	0	0	0	1	0	0	100	1	10	1
C5	1	1	0	0	0	1	0	1	100	1	10	10
C7	1	1	0	0	0	1	1	1	100	1	10	100
CC	1	1	0	0	1	1	0	0	100	1	100	1
CD	1	1	0	0	1	1	0	1	100	1	100	10
CF	1	1	0	0	1	1	1	1	100	1	100	100
D0	1	1	0	1	0	0	0	0	100	10	1	1
D1	1	1	0	1	0	0	0	1	100	10	1	10
D3	1	1	0	1	0	0	1	1	100	10	1	100
D4	1	1	0	1	0	1	0	0	100	10	10	1
D5	1	1	0	1	0	1	0	1	100	10	10	10
D7	1	1	0	1	0	1	1	1	100	10	10	100
DC	1	1	0	1	1	1	0	0	100	10	100	1
DD	1	1	0	1	1	1	0	1	100	10	100	10
HEX	R1	R1A	R2	R2A	R3	R3A	R4	R4A	CH1	CH2	CH3	CH4
DF	1	1	0	1	1	1	1	1	100	10	100	100
F0	1	1	1	1	0	0	0	0	100	100	1	1
F1	1	1	1	1	0	0	0	1	100	100	1	10
F3	1	1	1	1	0	0	1	1	100	100	1	100
F4	1	1	1	1	0	1	0	0	100	100	10	1
F5	1	1	1	1	0	1	0	1	100	100	10	10
F7	1	1	1	1	0	1	1	1	100	100	10	100
FC	1	1	1	1	1	1	0	0	100	100	100	1
FD	1	1	1	1	1	1	0	1	100	100	100	10
FF	1	1	1	1	1	1	1	1	100	100	100	100

Byte 3 Higher byte of the 2's complement Hex number of channel 1.

Byte 4 Lower byte of channel 1.

Byte 5 Higher byte of the 2's complement Hex number of channel 2.

Byte 6 Lower byte of channel 2.

Byte 7 Higher byte of the 2's complement Hex number of channel 3.

Byte 8 Lower byte of channel 3.

Byte 9 Higher byte of the 2's complement Hex number of channel 4.

Byte 10 Lower byte of channel 4.

Byte 11 Higher byte of the 2's complement number of TX current.

Byte 12 Lower byte of the 2's complement number of TX current.

Byte 13 Hex number of battery voltage

Byte 14 7F Stop byte

Byte 15 7F Stop byte

EM61FLEX3 CONVERTING FACTORS

Each EM61FLEX3 unit has four channels. RANGE1, RANGE2, RANGE3 and RANGE4 affect channel 1, channel 2, channel 3 and channel 4 respectively.

RANGEs are determined by the microprocessor in the EM61FLEX3 unit, based on the instantaneous amplitudes of the signals in each channel. RANGEs have also three settings: 1,10 and 100.

GEONICS's convention is that the response is converted to output voltage in mV at the output of each sampling channel by the following:

$$\text{RESPONSE} = \frac{\text{DATA} \times 4.8333}{\text{RANGE}} \quad (\text{mV})$$

RESPONSE is the data on computer

DATA is the data from instrument

RANGE is controlled by the EM61FLEX3 which could be 100,10,1

CH1 (channel 1) = LE (left early channel)

CH2 (channel 2) = LL (left late channel)

CH3 (channel 3) = RE (right early channel)

CH4 (channel 4) = RL (right late channel)

APPENDIX B

Example Field Log

Marine Geophysical Survey – Data Acquisition Log

Date:		**Vessel:**		**Instrument:**		**Page:**	_____ of _____
Project:		**Captain:**		**# Sensors:**			
Client:		**Observer:**		**Sensor Size:**		**Grid Pattern:**	
Location:		**Crew:**		**Separation:**		**Line Spacing:**	

Grid	Nav Line	EM Line	File	Dir	Wind Dir	Note
					S-------B	
					S-------B	
					S-------B	
					S-------B	
					S-------B	
					S-------B	
					S-------B	
					S-------B	
					S-------B	
					S-------B	
					S-------B	
					S-------B	
					S-------B	
					S-------B	

Wave Ht: _____ **Wind Speed:** _____ **Weather:** _____

Onsite: _____ **Begin Data:** _____ **Misc Notes:**

Offsite: _____ **End Data:** _____ _____